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THE WATER RESOURCES OF CAROLINE, DORCHESTER, AND TALBOT COUNTIES

THE GROUND-WATER RESOURCES

By William C. Rasmussen and Turbit H. Slaughter

THE SURFACE-WATER RESOURCES

By Arthur E. Hulme

SALINITY STUDIES IN ESTUARIES OF THE EASTERN SHORE

By J. J. Murphy

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The Ground-Water Resources

BY

WILLIAM C. RASMUSSEN AND TURBIT H. SLAUGHTER

ABSTRACT

Caroline, Dorchester, and Talbot Counties, the middle three counties of the Eastern Shore, have abundant ground water. Not less than 100 million gallons a day are available, about 9 times the current use. The potential yield of the Pleistocene and Pliocene(?) series at depths of 30 to 100 feet is estimated to be 60 million gallons a day. Many million more gallons of mineralized water for restricted use are available from sands not yet penetrated at depths of 1,600 to 3,000 feet.

Water is produced from 10 aquifers which range in depth from the surface to more than 1,400 feet. Three of those aquifers are used extensively down to depths of 600 feet. Two potential aquifers lie at depths from 900 to 3,300 feet.

Caroline, Dorchester, and Talbot Counties lie in the Atlantic Coastal Plain province which is underlain by a huge wedgeshaped mass of sediments resting upon a sloping surface of hard crystalline rock of Precambrian and Paleozoic age, referred to as "the basement."

The Coastal Plain sediments range in age from Early Cretaceous to Recent. Beneath Caroline, Dorchester, and Talbot Counties, the Coastal Plain deposits range from 2,000 to 4,000 feet in thickness. They are composed of sands, greensands, gravels, silts, clays, shales, and shell beds. In general, the sands and gravels are porous and permeable and yield water freely; the finer-grained beds contain water but yield it slowly or not at all. The basement complex slopes generally to the southeast as do the overlying sediments, most of which thicken down the dip so that the slope of the upper formations is not as great as that of the lower formations.

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.

The lower Cretaceous rocks may contain good aquifers and good water but are so far below the surface that they have not been explored. The formations of the Upper Cretaceous series and of the Tertiary and Quaternary systems contain the principal aquifers. The significant aquifers in the area are in the Piney Point, Aquia, Choptank, and Calvert formations and in the Pleistocene and Pliocene(?) series. The most important of these on the basis of present development and probable potential yield are the Piney Point formation and the Pleistocene and Pliocene(?) series.

Overlying the crystalline rocks is a series of sands, clays, and shales correlated with the Patuxent formation, part of the Lower Cretaceous series. The top of the Patuxent formation probably occurs about 1,600 feet below land surface on the northwestern margin and about 3,300 feet below land surface on the southeastern margin of the area. The formation increases in thickness from 600 feet to 800 feet in a southeasterly direction. The top of the formation dips to the southeast at an average rate of 50 feet to the mile. Regional geologic evidence warrants the assumption that the sands in the formation may yield large quantities of water, most of it, however, probably too highly mineralized for most purposes.

Overlying the Lower Cretaceous series is a thick group of shales and sands correlated with the Upper Cretaceous series. This series, divided into six formations, has an estimated thickness ranging from 1,000 feet along the southwest margin of Talbot County to 2,500 feet along the southeast margin of Dorchester County. The dip of the top of the series is about 8 feet per mile.

The lower three formations, the Arundel, Patapsco and Raritan, are composed of silty sands intercalated with silty clays. The cleaner sands are potential sources for large quantities of warm water at depths ranging from 1,000 to 3,500 feet. Water from a depth of 1,351 to 1,420 feet in a sand of Raritan(?) age, flowing from a test well at Wades Point, Talbot County, was irony but otherwise good. Water from the Raritan(?) from a flowing well at Church Creek was also reported "good."

The Raritan formation is unconformably overlain by the Magothy formation, the most persistent aquifer of the Cretaceous system in Maryland. The formation consists of "sugary" sands and irregular lenses of lignitic clay. Thickness of the Magothy formation in this area ranges from 43 feet to 135 feet. The formation yields fairly large quantities of water of remarkably good quality to seven wells in Dorchester and Talbot Counties from depths of 800 to 1,100 feet below sea level.

The Matawan(?) formation unconformably overlies the Magothy formation. It consists of micaceous glauconitic clays and glauconitic sands encountered at depths from about 700 to 900 feet below sea level. The Matawan(?) formation functions as an aquifer in Caroline and Talbot Counties and as an aquiclude in Dorchester County. Lying conformably above the Matawan(?)

formation is the Monmouth formation, which functions almost entirely as an aquiclude. The Monmouth is a glauconitic silty clay and clayey sand. The formation ranges from 34 feet to 230 feet thick. The top of the formation dips an average of 8 feet per mile in a southeasterly direction.

The Tertiary system includes the most important aquifers and thickest aquicludes.

The Paleocene series consist of alternate hard and soft beds of clay and sparsely glauconitic sand, with thin beds of shells and chalk(?). In general, it functions as an aquiclude, but it does yield water to a few wells. The Paleocene ranges in thickness from about 70 feet to more than 300 feet.

The major artesian water-bearing beds in use in Caroline, Dorchester, and Talbot Counties are in the Eocene series. The Eocene series is represented in ascending order by the Aquia greensand, the Nanjemoy formation, and the Piney Point formation.

The Aquia greensand is an important aquifer in the western half of Talbot County and northwestern Dorchester County. The aquifer is composed of green quartz sand, moderately glauconitic, with a few lenses of clay and occasional hard beds. The top of the formation dips from 255 feet below sea level at Claiborne, Talbot County, to 605 feet below sea level about 4 miles west of Cambridge, Dorchester County, where the formation presumably wedges out. The rate of dip is about 25 feet per mile. A maximum thickness of 231 feet is recorded at Wades Point, Talbot County. The average specific capacity for 99 wells producing water from the Aquia greensand is 2.0 gpm per foot of drawdown, indicating that high rates of yield will cause large drawdowns. The quality of water from the Aquia greensand is good for almost all purposes.

The Nanjemoy formation is primarily a leaky aquiclude, composed of blackish-green, highly glauconitic sand, silt, and clay. The formation is very irregular in thickness, apparently owing to erosion of its upper surface. The average recorded thickness is 166 feet. The formation slopes toward the southeast. So far the Nanjemoy formation yields water only to open holes in conjunction with formations above or below.

The Piney Point formation is the major aquifer in the area. It probably underlies all of Caroline, Dorchester, and Talbot Counties, although in places it is quite thin. It ranges from a few feet to more than 200 feet in thickness and averages 74 feet in logged wells. The Piney Point formation is a quartz sand, somewhat glauconitic, ranging in color from brown to olive-green to green. The top of the formation dips to the southeast at an average rate of 29 feet per mile. An estimated 1.9 billion gallons of water a year is produced from the Piney Point formation. Wells yielding more than 600 gpm have been developed at Cambridge. The water is of good quality.

The Miocene series contains relatively thin aquifers. The series is represented by its middle and upper parts, called the Chesapeake group, and is composed of the Calvert, Choptank, St. Marys formations of middle Miocene age and the Yorktown formation of late Miocene age. The Chesapeake group in the southern tip of Dorchester County is represented by a sand of late Miocene age, tentatively correlated with the Yorktown formation of Virginia and the Cohansey sand of New Jersey.

The Calvert formation is generally an aquiclude; however, in places it functions as an aquifer yielding small quantities of water to numerous wells, and moderate to large quantities of water at Cordova, Easton, Federalsburg, Hurlock, and Vienna. The Calvert formation is predominantly a silt, slightly glauconitic in the upper part and diatomaceous in the lower part, and contains several lenticular beds of sand. The top of the Calvert formation dips an average of 10 feet per mile toward the southeast. It ranges in thickness from 20 feet in western Talbot County to more than 300 feet in southeastern Dorchester County. The aquifers are of moderate to low productiveness. The average specific capacity is 2.7 gpm per foot of drawdown. The water from the Calvert formation is usable for most purposes.

Conformably overlying the Calvert formation is the Choptank formation. It functions as an aquifer, its principal development being in Caroline County. The formation consists of lenticular beds of sand and silt with shell marl. The top of the formation ranges from 55 feet above sea level in northern Caroline County to more than 200 feet below sea level along the Nanticoke River in the southeast margin of the area. The rate of dip is about 4 feet per mile. The Choptank formation ranges in thickness up to about 150 feet and averages about 80 feet. The average specific capacity is 2.4 gpm per foot of drawdown. The Choptank formation is capable of producing small to moderate yields beneath most of its area and moderately large yields at a few locations. In general, the quality of water is good; but in northern Caroline County it is very irony (12–13 ppm).

The St. Marys formation overlies the Choptank formation principally as a clayey silt and silty clay aquiclude with stringers and small lenses of sand. It blankets the southeastern half of the area. The top ranges from 58 feet above sea level at Goldsboro, Caroline County, to 83 feet below sea level at Elliott Island, Dorchester County. The thickness of the formation ranges up to about 120 feet and averages about 35 feet. Water is produced from local stringer sands, generally in rather small amounts per well.

The Yorktown and Cohansey formations(?) are sand containing a few shells. They are a small wedge of sediment at the low and marshy southern end of Dorchester County, resting upon the St. Marys formation. No wells were found in this area, presumably because the water is unpalatable. The dip on the formation is southeasterly at the rate of 8 to 10 feet per mile. The formation ranges in thickness from 20 to 62 feet.

A red and orange gravelly sand is tentatively correlated with the Brandywine and Bryn Mawr formations of Pliocene(?) age. The average thickness of the sand is estimated at 10 feet. It yields water to large-capacity wells at Ridgely, Preston, Hurlock and Cordova. The red gravelly sand functions with the overlying formations of Pleistocene age as a single aquifer. The quality of water from the Pleistocene and Pliocene(?) series, in general, is the best of all the ground waters.

The Pleistocene series comprises all of the shallow yellow, buff, and tan deposits of sand, silt, and clay between soil zone and the Pliocene(?) red gravelly sands. The average thickness of the combined Pleistocene and Pliocene(?) series is 37 feet. The Pleistocene deposits yield water to more wells in Caroline, Dorchester, and Talbot Counties than any other series of sands. The specific capacities of wells in the Pleistocene and Pliocene(?) series are higher than those for any other formation, ranging up to 30 gpm per foot. The quality of ground water from the Pleistocene series is remarkably good.

Ground water satisfactory in quality for ordinary uses can be obtained at most places in Caroline, Dorchester, and Talbot Counties.

INTRODUCTION

Location and Purpose of Investigation

Caroline, Dorchester, and Talbot Counties are the middle three counties of the Eastern Shore of Maryland (fig. 1).

Ground water is the major source of water in this area. The water supply of the cities and towns, of the rural homes and on the farms, and of the canneries and industries is supplied by wells. Supplemental irrigation from wells is growing. There is practically no use of surface water, because many of the rivers are tidal, and saline and brackish marshes and swamps are prevalent in the lowland areas.

A cooperative investigation of the ground-water resources of the Eastern Shore was begun in July, 1949, by the U. S. Geological Survey and the Maryland Department of Geology, Mines and Water Resources. The investigation was made under the general supervision of A. N. 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.

Extent of Area and Scope of Investigation

Caroline, Dorchester, and Talbot Counties form a rough parallelogram bounded on the north by Queen Annes County, on the east by the State of Delaware, on the southeast by the Nanticoke River, and on the west by Chesapeake Bay.

The area of the three counties is 1,732.38 square miles, of which 1,174.82 is land and 557.56 is water (Gazetteer of Maryland, 1941, p. 239). Caroline County has an area of 326.35 square miles, of which 322.06 is land and 4.29 is

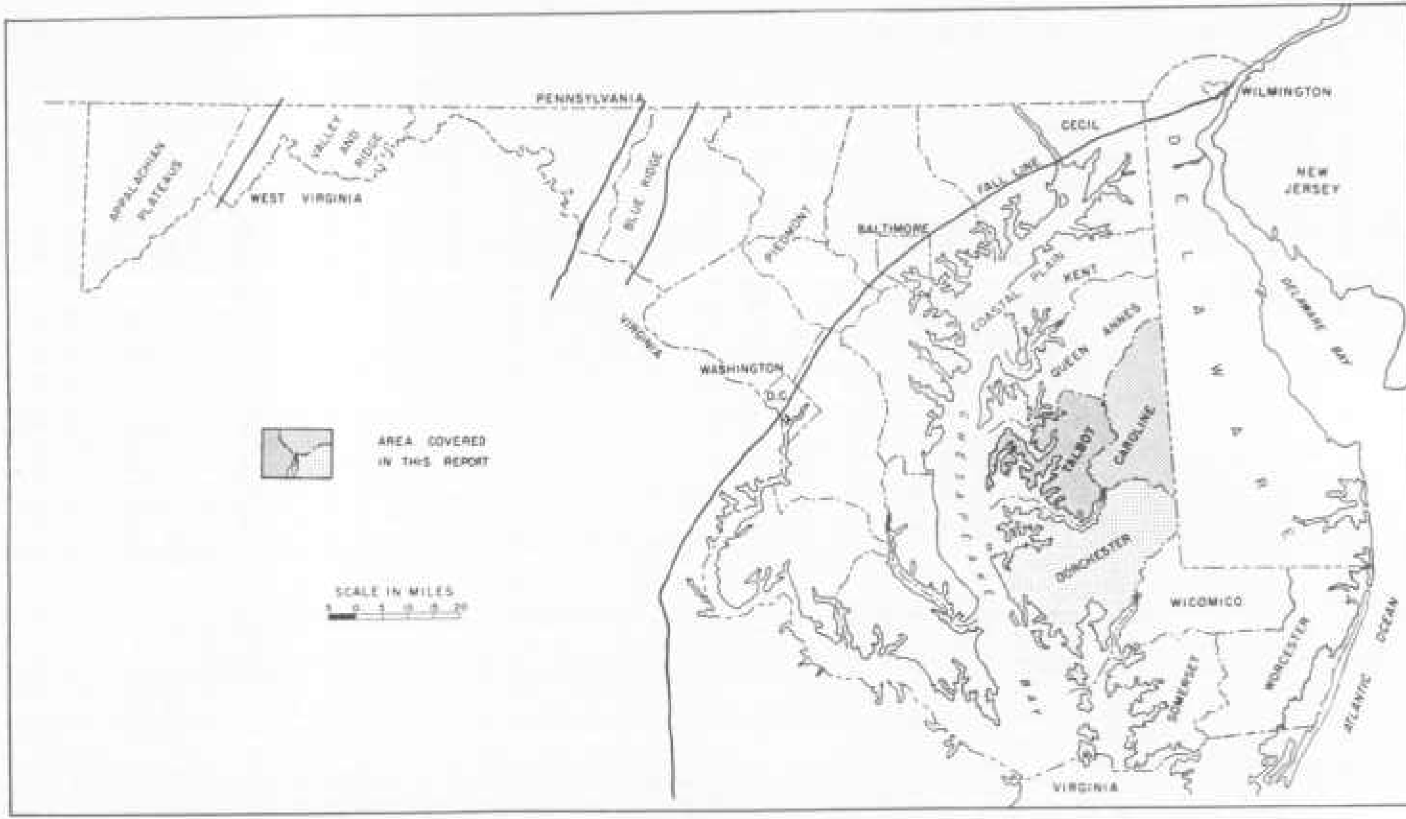

FIGURE 1. Map of Maryland showing Physiographic Provinces and Area covered by this Report.

water. Dorchester County has an area of 943.52 square miles, of which 580.94 is land and 362.58 is water. Talbot County has an area of 462.51 square miles, of which 271.82 is land and 190.69 is water.

Field work was begun with a well canvass in Dorchester and Talbot Counties during the summer of 1950, and in Caroline County in the summer of 1951. Earlier reconnaissances at Cambridge, in 1946, and Easton, in 1948, had been made by the Baltimore cooperative ground-water office.

Many well logs were available as a result of the Maryland Well Law of 1945. Sediment samples from many of the wells had been collected by the drillers. Earlier well logs were collected from well drillers, water superintendents, and others. Sediment samples were collected by the staff at the drilling sites of several deep wells. A total of 238 well logs are published in this report (39 from Caroline County, 64 from Dorchester County, and 135 from Talbot County), but additional logs were used in the geologic interpretations and in the construction of the geologic maps.

Additional hydrologic and lithologic data were obtained from samples from 9 test holes representing 2,205.5 feet of hole. Four of the holes, 4 to 6 inches in diameter, totaling 1,253 feet of hole, were logged electrically with a Widco logger.

Subsurface samples collected by well drillers and the staff total 5,960, representing 60,157 feet of hole. The samples were utilized in the construction of 32 sand logs representing 15,097 feet of hole, and 34 peg logs representing 14,316 feet of hole. In addition, 328 graphic strip logs representing 123,759 feet of hole were made to help in the mapping of the areal extent and thickness of aquifers and aquicludes.

Paleontological studies of macrofossils and microfossils, chiefly Foraminifera, were made on 3,017 feet of samples from 7 wells and 1 roadcut. In the early part of the investigation identification was by Glenn G. Collins, micropaleontologist, of the Maryland Department of Geology, Mines and Water Resources, and later the collections were studied by the U. S. Geological Survey.

Nine shallow water-table observation wells were driven, and the water levels measured monthly by tape for periods of 2 to 5 years. At the Eastern Shore State Hospital at Cambridge, Dorchester County, an abandoned well (Dor-Ce 22) 406 feet deep has been used since March 1952 as an observation well, equipped with an automatic water-stage recorder. An automatic water-stage recorder on a 380-foot well (Dor-Bd 2) on Hambrook Bar, near Cambridge, recorded water levels from July 20, 1951 to December 31, 1952. This well was then measured once a week by hand tape. A well (Care-Dc 56) at West Denton has been equipped with an automatic water-stage recorder since September 1952. On April 15, 1953, an automatic water-stage recorder was installed on an unused 1,015-foot well of the Easton Utilities Commission. During the spring and summer of 1953, water-level measurements were made of two aquifers in the western part of Talbot County, in three wells. These were the "200-" and "350-foot" aquifers of Eocene age in general use in that area, to obtain a background record prior to anticipated large pumpage.

From August 1949 through June 1954, 1,086 water-level measurements were made and 23 hydrographs were prepared to show fluctuations of water level in the area. In the course of routine well canvass, 323 water-level measurements were made; and 904 water-level measurements reported by well drillers and well owners were recorded. The 4 automatic water-stage recorders have provided 349 weeks of continuous water-level records.

Aquifer tests were made at Easton, Cordova, Federalsburg, Hurlock, West Denton, and Cambridge.

Water samples were collected from 32 wells,; 13 complete analyses were made on 10, and 23 partial analyses on 22 in the laboratory of the U. S. Geological Survey. The Maryland Department of Health, well drillers and other sources supplied 132 additional analyses. All told, 168 analyses are tabulated in Tables 30, 31, and 32: 39 in Caroline County; 73 in Dorchester County, and 56 in Talbot County. Field analyses of 75 water samples were made: 36 in Caroline County, 22 in Dorchester County, and 17 in Talbot County. The field analyses are listed in the "Remarks" section of Tables 33, 34, and 35.

The original draft of the report was completed in June 1954. Subsequently it was substantially revised and four additional aquifer tests were made in 1956 by Turbit H. Slaughter.

Acknowledgments

Well inventory and water-level measurements were made by Durward H. Boggess, Reginald P. Bailey, O. Jack Coskery, I. Wendell Marine, Richard R. Gosnell, Letha M. Taylor, Robert Harroff, and G. James Jensen. Aquifer tests were run by Joseph W. Brookhart, Gordon E. Andreasen, Russell H. Brown, and Rex R. Meyer. Micropaleontology was done by Glenn G. Collins and Ruth Todd. Megapaleontology was done by Julia Gardner and Druid Wilson. A peg model was constructed by Jean A. Smith. Field analyses of water and collection of water samples for laboratory analysis were made by Louis P. Vlangas. Guidance in the preparation of the report was given by Henry C. Barksdale, staff engineer of the U. S. Geological Survey.

The writers acknowledge with gratitude the cooperation of well drillers, water operators, water company managers, consulting engineers, industrialists, and many private citizens, who supplied information on wells and aid in conducting well field tests.

Well-Numbering System

Wells listed in the well tables (Tables 33, 34, and 35) of Caroline, Dorchester, and Talbot Counties are located on county base maps (Pls. 13, 14, and 15).

The maps are covered by a grid system of latitude and longitude lines forming 5-minute quadrangles.

The 5-minute quadrangles are identified by two letters, an uppercase and a lowercase. Uppercase letters begin at the top of both sides of the map with the letter "A" and extend to the bottom of the map. Lowercase letters begin at the left edge along the top and bottom of the map with the letter "a" and extend across the map. Wells located in each quadrangle are numbered consecutively in the order in which they were visited.

To distinguish wells of different counties, a county abbreviation is placed before the quadrangle designation, separated by a hyphen. For example, a well designation Dor-Ce 2, represents the second well located in the Ce quandrangle of Dorchester County.

Geography

Physical Features

Caroline, Dorchester, and Talbot Counties form a low-lying, gently rolling, terraced plain, which ranges in altitude from sea level, in the many tidal rivers, to 78 feet above sea level in the northern end of Caroline County. Dorchester and Talbot Counties are more than three-quarters surrounded by tidewater, and are deeply indented by tidal rivers. Much of the lower two-thirds of Dorchester County is marshland, with altitudes of 2 feet or less above sea level. The land gradually rises from the marshland to a maximum of 53 feet in northern Dorchester County. The land surface in Caroline County is predominantly a plain, 40 to 65 feet above sea level, dissected by a few narrow tidal waterways. The western half of Talbot County is an area of necks and drowned valleys, where the land is 20 feet or less above sea level. The eastern half of Talbot County is a plain which ranges, in general, from 40 to 70 feet above sea level, and reaches 78 feet at the highest point near Easton. Elevations of localities are given in Table 1.

The drainage of the area is controlled by two large tidal rivers, the Choptank and the Nanticoke, and by many small rivers and creeks directly tributary to Chesapeake Bay. The Nanticoke River has a prominent tributary, Marshyhope Creek, which is tidal to Federalsburg. The Choptank River is tidal to Greensboro. It has a prominent tributary, Tuckahoe Creek, which is tidal to Hillsboro. Along the bayside of Talbot County, the Wye River, Miles River, and Tred Avon River are tidal estuaries. In Dorchester County, the Little Choptank River and the Honga River are embayed estuaries. The Blackwater River, Transquaking River, and Chicamacomico River are meandering swampy bayous. The specific type names—creek, river, bay, sound, gut, etc.—are dictated more by local custom than exact definition.

The islands and island necks of the low country are the homesites of the watermen. The peninsula necks are finger-like in outline. The higher land of the plain, in the range from 20 to 78 feet above sea level, is about half wooded and half cultivated. These are the homelands of the lumbermen and farmers.

There are a few ponds and lakes in the higher land. The ponds were formed by the damming of a creek, where sufficient head existed to operate a mill.

TABLE 1

Elevations in Caroline, Dorchester, and Talbot Counties

Elevations are those of benchmarks in or near the locality listed or of contours. The position in the county is a compass reference with respect to the center: N, north; NE, northeast; E, east; SE, southeast; S, south; SW, southwest; W, west; NW, northwest; C, central.

Caroline County			Dorchester County			Talbot County		
Locality	Position	Altitude (ft.)	Locality	Position	Altitude (ft.)	Locality	Position	Altitude (ft.)
Templeville	N	74	Williamsburg	NE	38	Fairbank	W	5
Henderson	N	56	Finchville	NE	42	Tilghman	W	8
Goldsboro	N	60	Eldorado	NE	10	Sherwood	W	11
Baltimore Corner	NW	54	Rhodesdale	NE	41	Wittman	W	10
Bridgeton	NW	52	Hurlock	NE	45	Neavitt	W	5
Greensboro	NC	30	East New Market	NC	35	Bozman	W	8
Whiteleysburg	NE	63	Secretary	NC	20	Claiborne	NW	5
Ridgely	WC	70	Reids Grove	E	25	McDaniel	NW	10
Hillsboro	W	47	Vienna	E	13	St. Michaels	NW	12
W. Denton	C	20	Salem	EC	16	Royal Oak	WC	6
Denton	C	40	Hicksburg	EC	21	Bellevue	SW	4
Burrsville	E	58	Drawbridge	SE	3	Oxford	SW	7
Hobbs	EC	53	Elliott Island	SE	3	Tunis Mills	WC	12
Hickman	SE	56	Bloodsworth Island	S	1	Unionville	WC	14
Smithville	SE	36				Longwoods	NC	51
Williston	SC	24	Bishops Head	S	3	Skipton	N	60
Concord	SC	59	Wingate	S	2	Wye Mills	N	40
Harmony	SC	49	Toddville	S	2	Cordova	NE	50
American Corners	SC	50	Hoopersville	SW	4	Matthews	E	53
Bethlehem	SW	47	Lakesville	SW	2	Woodland	NC	60
Dover Bridge	SW	2	Andrews	SC	3	Easton	C	40
Choptank	SW	5	Robbins	SC	3	Stumptown	SC	55
Preston	S	43	Seward	C	6	Hambleton	SC	53
Federalsburg	S	29	Bucktown	C	5	Bruceville	SE	35
			Taylors Island	W	3	Trappe	S	56
			Madison	W	3	Barber	S	47
			Church Creek	WC	6	Highlys Beach	S	14
			Hudson	NW	4			
			Cornersville	NW	4			
			Lloyds	NW	5			
			Christs Rock	NC	12			
			Cambridge	NC	20			
			Jacktown	NC	27			

Many of these mill ponds have been drained, since the mills are no longer operated. Among the ponds still existent are: Caroline County—Mud Millpond on the upper Choptank River, near Henderson, a pond on Broadway Branch near Goldsboro, and a pond on Hunting Creek near Linchester; Dorchester County—Big Mill pond on the Chicamacomico River near Salem, Higgins Millpond on Transquaking River near Airey, Irving pond and a pond at Galestown on Gales Creek; Talbot County—remnant ponds on Miles Creek, near Trappe, Williams Creek and Papermill Pond near Easton. The lakes are found chiefly in Caroline County. Garland Lake, Williston Lake, and a lake at Smithville are in "Maryland basins." There is topographic evidence of the former existence of many similar lakes, which have been drained by enlargement of the outlet (e.g., Watts Creek, near Denton).

Among the marshes in the central and southern parts of Dorchester County are many bodies of open water at sea level, called ponds and lakes, which are connected by tidal channels to the bay. Because the water in them is brackish and connected to tidal flow, they are not lakes and ponds in the usual sense of the word, but bays or bayous.

A prominent break in the slope of the land occurs in the altitude range from 25 to 40 feet above sea level. This break in slope is discernible in the field and is particularly apparent on the topographic map, as a gentle terrace scarp, which extends from south to north along the centerline of Talbot County, passing through Easton. West of this scarp is the lowland neck area, below 25 feet in elevation; east of the scarp is a dissected plain ranging from 40 to 78 feet in elevation. The 25- and 40-foot terraces are described in the section on geomorphology. The same terrace scarp faces the Choptank estuary in eastern Talbot County and in Caroline County.

A physical feature which has influenced life in many ways in this area, but which is so subdued that many persons who live here are unaware of it, is the profusion of broad, poorly drained basins. They have been termed "Maryland basins" (Rasmussen and Slaughter, 1955) and are described in the section on geomorphology. They are low, sandy rims with a central depression of oval shape. The long diameters of the basins range from a few hundred feet to several miles in length. The relief is seldom more than 25 feet, and commonly 10 to 15 feet. The basins retard runoff and frequently the water table is only a few inches from the land surface in the central area. Swampy conditions persist in many basins, although some have been drained by natural outlets and others with ditches and canals. The basins contribute stored moisture which stimulates luxuriant, verdant growth. The stands of pine, oak, gum, cypress, and cedar are governed by topographic position and basin development.

The soils of Caroline, Dorchester, and Talbot Counties are loams, loamy sands, sandy loams, silt loams, and clay loams. They are, in the main, remarkably permeable, although the deflocculated soils of the saltmarsh area in Dorchester County would require drainage and removal of salt to render them useful.

Because of the abundant rainfall, the gentle terrace slopes, and the profusion of "basins", a high water table exists in many places, particularly in the wet seasons. This has resulted in a substantial drainage program in Caroline and Dorchester Counties. Talbot County is more dissected, so artificial drainage has not been so urgent there.

Although there are many miles of bay shoreline in these three counties, wide, sandy beaches are rare. The best are developed on the tidal reaches of the Choptank River, in the vicinity of Cambridge. Dunes are also a rarity, although a few low, sandy hills are associated with the sandy rims of the "basins."

Climate

The climate of Caroline, Dorchester, and Talbot Counties is mild and equable. Precipitation is fairly evenly distributed throughout the year, with an annual average of about 43 inches. Summers are warm, but tempered in the tidewater area by the bay breezes; winters are cool, and rarely cold. The air is humid, but not oppressive.

Precipitation

The average monthly precipitation for the years of record at Cambridge and Easton is given in Table 2. The precipitation is fairly evenly distributed. The average for the summer quarter is 29 percent and for the autumn quarter 21 percent; the winter and spring quarters have each about 25 percent. August has the highest average precipitation, but this is counterbalanced by high evapotranspiration losses, so that moisture recharge generally is deficient. November has the lowest monthly precipitation; but, because evapotranspiration losses have decreased, moisture recharge is usually adequate.

Table 2 also records precipitation for a single year, 1952, at Cambridge, Denton, and Easton in order to contrast the variations from place to place and month to month. The year was one of abnormally high precipitation. Cambridge received almost 6 inches more than Easton that year, although on the long-term average it receives only about 1.5 inches more.

Snowfall is slight, and ice is uncommon except for 2 or 3 days each winter. Small tornadoes and waterspouts, doing little damage, occur at rare intervals. High winds are brought by local thundersqualls. Remnants of tropical hurricanes are attended by heavy rains, but not often by winds of hurricane velocity.

The monthly and annual precipitation records at Cambridge show the variable nature of precipitation, month-to-month and year-to-year. The year 1930 had the lowest annual total, 23.63 inches, but the summer of 1943 recorded the severest dry spell, with only 1.15 inches of rain in July and August. The record annual rainfall was 66.54 inches in 1948. September 1935 was the record month, with 16.26 inches.

Of almost as much significance as the monthly total rainfall is the rainfall distribution. A dry spell may be loosely defined as a period of 14 days or more in which the rainfall is 1 inch or less. Dry spells occur at the rate of one or two a year, during the 180- to 200-day growing season. They cause short and poor quality crops. Supplemental irrigation from streams, dug-out ponds, and from wells may be the ultimate answer to this hazard.

TABLE 2

Precipitation at Cambridge, Denton and Easton

(inches of water)

1952	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Cambridge	4.84	2.89	4.90	6.24	4.17	1.95	3.07	9.46	3.38	1.47	7.08	4.37	53.82
Denton	5.03	2.16	5.33	5.97	4.65	3.55	4.45	8.33	3.17	.79	5.55	3.56	52.54
Easton	4.25	2.68	3.72	6.06	3.58	1.94	2.58	8.06	4.05	1.18	5.33	4.41	47.84
Average													
Cambridge (58 years)	3.64	3.31	3.83	3.61	3.63	3.78	4.55	4.87	3.41	3.18	2.85	3.16	43.82
Easton (62 years)	3.38	3.15	3.70	3.39	3.49	3.82	4.55	4.46	3.37	3.19	2.77	3.07	42.34

TABLE 3

Average Temperatures at Cambridge, Denton and Easton

(degrees Fahrenheit)

1952	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Cambridge	41.0	40.2	44.1	56.8	63.5	75.8	80.4	75.9	68.7	54.9	48.6	39.7	57.5
Denton	40.7	—	42.5	55.8	62.4	74.4	78.2	75.2	67.8	54.4	47.7	38.7	—
Easton	40.4	39.3	44.3	56.4	62.6	76.0	79.9	76.0	68.8	55.3	48.5	38.7	57.2
Average													
Cambridge (58 years)	36.1	36.2	45.1	54.5	65.1	73.3	77.6	75.9	70.2	59.0	48.0	38.3	56.6
Easton (62 years)	35.0	35.3	44.4	53.4	63.8	71.9	76.3	74.6	68.9	57.7	47.0	37.1	55.4

Temperature

The average monthly and annual temperatures for the years of record are summarized in Table 3. The average annual temperature is 56°F. The lowest monthly average is 35°F in January. The highest monthly average is 77.6°F in July. The tempering effect of Chesapeake Bay and of the Atlantic Ocean reduces the extremes that are experienced at this latitude in the continental interior.

Population

Caroline, Dorchester, and Talbot Counties are predominantly rural. In 1950 the population was 65,477 (U. S. Census), or an average of 56 persons per square mile of land area. The population is concentrated in the county seats and in small communities, leaving the country areas sparsely settled. The population has been remarkably stable from 1900 to 1950 (Table 4). Table 5 lists the population in 1950 of the principal communities. The rural population is about 33 persons per square mile of land area.

TABLE 4

Population of Caroline, Dorchester, and Talbot Counties, 1900 to 1950

(U. S. Census)

Year	Caroline County	Dorchester County	Talbot County	Area total
1900	16,248	27,962	20,342	64,552
1910	19,216	28,669	19,620	67,505
1920	18,652	27,895	18,306	64,853
1930	17,387	26,813	18,583	62,783
1940	17,549	28,006	18,784	64,339
1950	18,234	27,815	19,428	65,477

TABLE 5

Population of the Principal Communities in Caroline, Dorchester, and Talbot Counties, 1950

Caroline County		Dorchester County		Talbot County	
Denton	1,806	Cambridge	10,351	Easton	4,836
Federalsburg	1,878	Church Creek	187	Oxford	757
Greensboro	1,181	Eldorado	79	St. Michaels	1,470
Goldsboro	198	East New Market	264	Trappe	325
Henderson	106	Hurlock	944		
Hillsboro	179	Secretary	344		
Marydel	110	Vienna	414		
Preston	353				
Ridgely	834				
Total	6,645		12,583		7,388

Agriculture, Industry, and Transportation

Farming is the principal occupation in Caroline, Dorchester, and Talbot Counties. The chief sources of farm income are poultry, vegetables, field crops, and dairy cattle. In Caroline County the revenue from the raising of poultry accounts for 63 percent of the products sold (Hamilton, 1951, p. 12). Dorchester County, formerly primarily concerned with vegetable produce, has turned more to poultry and field crops. Poultry and dairying are chief sources of income in Talbot County. The chief field crops are corn, wheat, soybeans, barley, hay, and Irish and sweet potatoes. The chief vegetables produced are tomatoes, sweet corn, and lima beans. Table 6 summarizes farm acreage and income (Hamilton, 1951).

Employment is offered itinerant workers in picking of tomatoes, snap beans, lima beans, and peas. At the same time, seasonal canneries and packers operate for portions of July, August, and September.

TABLE 6

Farm Acreage and Income in Caroline, Dorchester, and Talbot Counties, 1950

	Caroline County	Dorchester County	Talbot County
Land acreage (tillable and forest)	204,800	371,200	178,560
Farm acreage (tillable and forest)	165,079	179,323	139,698
Farm acreage as percentage of land area	80.6	48.3	78.2
Value of farm products sold per farm	$6,480	$4,723	$6,967
Income above expenses per farm	$2,558	$1,305	$3,408

TABLE 7

Commercial Forests in Caroline, Dorchester, and Talbot Counties, 1950

County	Area (acres)	Type
Caroline	84,800	Virginia pine, loblolly pine, with mixed hardwoods, chiefly oak and poplar
Dorchester	160,300	Loblolly pine
Talbot	47,200	Hardwoods of white oak, red oak, and tulip poplar, with pine
Total	292,300	

Lumbering is a sustained industry. The entire area has probably been cut over 6 or 7 times since settlement in the 17th century. The acreage and types of commercial forest in 1950 are given in Table 7 (U. S. Dept. Agriculture, Forest Service, 1954).

Food packing and canning plants, fertilizer and feed companies, shipbuilding and repair, lumber mills, a wire cloth company, a plastics company, and poultry dressing plants offer diversity in employment.

The seafood industry includes many oyster and crab processing plants. Several hundred tons of fish, mostly striped bass, croakers, flounders, shad, trout, herring, bluefish, and perch, are caught each year. Frogs, turtles, and terrapin are also prized.

The main power plant for the Maryland Eastern Shore is located at Vienna, Dorchester County, where steam turbines are used to generate power.

The Del-Mar-Va Division of the Pennsylvania Railroad provides freight service to many of the cities and towns of the area, with branch lines which connect to the main line between Wilmington, Delaware, and Cape Charles, Virginia.

Hard-surface roads form a network across the tricounty area. The main road carrying traffic north and south through Talbot and Dorchester Counties is U. S. Route 50. Centrally located in Caroline County, Route 404 carries the greatest amount of traffic from northwest to southeast, connecting at Wye Mills, Queen Annes County, with U. S. Route 50 and at Bridgeville, Delaware, with U. S. Route 13.

Bus service connects all major cities and towns of the area. Cambridge and Easton are the termini of many interstate truck fleets. The Choptank River is the main artery for water freight traffic. The Easton airport serves the surrounding area as a passenger terminus for major flight lines.

Previous Investigations

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

Darton (1896) made the first report by counties on the ground-water conditions on the Eastern Shore (p. 124–133, 148–150, 153–154). Fuller (1905, p. 114–123) summarized Darton's work. A well at Tilghman, Talbot County, is listed by Fuller and Sanford (1906, p. 90–91).

The physiographic origin and relationship of terrace formations, which are so extensive on the surface of Somerset, Wicomico, and Worcester Counties, were emphasized by Shattuck (1906).

The first detailed work on the geology of the area was the Choptank folio (Miller 1912). A geologic map of Talbot County by Miller and Little followed in 1916. Miller also wrote the geologic section of the Talbot County report published in 1926.

A report by Clark, Mathews, and Berry (1918) includes brief descriptions of the geology, surface waters and ground waters of Caroline, Dorchester, and Talbot Counties, and tables of well logs, water analyses, and general water supply.

Stephenson, Cooke, and Mansfield (1932) reviewed the geology of the Chesapeake Bay region, making important contributions to the areal stratigraphy. Cooke expanded 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 Caroline, Dorchester, and Talbot Counties.

Richards (1936) described marine fossils of the Pamlico formation (25-foot terrace) which extends over much of Talbot County and most of Dorchester County. His study of invertebrate fossils from deep wells along the Atlantic Coastal Plain (1947) included specimens from wells at Denton, Caroline County, St. Michaels, Talbot County, and Cambridge, Dorchester County. In an earlier paper (1945, p. 902, 903) he subdivided the formations in these three wells on the basis of fossils and lithology. He published also logs, cross sections, and structure maps (1945, 1948, 1950, 1953; Straley and Richards 1948) defining a synclinal trough in the sedimentary beds and a channel in the bedrock, extending through Salisbury, Wicomico County and lower Dorchester County, which he named the "Salisbury embayment."

A report on the logs and paleontology of three oil tests, drilled during the period 1943 to 1946 in Wicomico and Worcester Counties, was compiled by Anderson and others (1948).

Shifflett's study of Eocene stratigraphy and Foraminifera of the Aquia formation (1948) included two wells (Dor-Ce 3 and Dor-Bc 6) in Dorchester County. Her report brought out that the major aquifer in the vicinity of Cambridge, the "400-foot" sand, is of Jackson age, and suggested that the Aquia and Nanjemoy formations are absent at Cambridge. Microfossil study and lithologic correlation in this investigation, however, indicates the presence of the Nanjemoy formation.

Spangler and Peterson (1950) published structure maps and isopach maps which include Caroline, Dorchester, and Talbot Counties. Inconsistencies in their report were cited by Dorf (1952) and by Johnson and Richards (1952).

Data on fluctuations of water level in observation wells in Dorchester County date back to 1947 (R. R. Meyer, 1951, p. 189–193) and 1948 (Gerald Meyer, 1951, p. 174–176). First records on the fluctuation of water levels in Caroline and Talbot Counties were made in 1949 (Brookhart, 1952, p. 181–186).

Rasmussen and Slaughter (1951) concluded that the "400-foot" aquifer supplying Cambridge was of great extent to the southwest and south, possibly limited by a boundary to the northwest, and of unknown extent to the east and northeast, and estimated its "safe" yield to be between 2 billion and 6 billion gallons a year. Rasmussen elaborated the image-well method used in this estimate in 1952.

A study of the 25-foot (Pamlico) terrace in Maryland by Breitenbach and Carter included 14 points roughly south to north in Talbot County (1952, p. 3.)

REGIONAL GEOLOGY

Caroline, Dorchester, and Talbot Counties are a portion of the Atlantic Coastal Plain which was formed by the deposition of large volumes of sediment carried by streams from the Appalachian Mountains and the Piedmont province to the Fall Line beyond which the active erosion of the rivers decreased and aggradation occurred in extensive and compound alluvial fans, in deltas, in estuaries and bays, and in the open sea.

Stratigraphy

The wedge-shaped mass of sediments that underlie the Coastal Plain is illustrated in Plate 1. The sediments lie upon a sloping surface of hard crystalline rock of Precambrian and Paleozoic age, sometimes referred to as "the basement." The deposits range in thickness from a few feet at the Fall Line in Anne Arundel County to more than 8,500 feet beneath the Atlantic shore in Worcester County. Beneath Caroline, Dorchester, and Talbot Counties the sedimentary rocks are estimated to range from 2,000 to 4,000 feet in thickness.

The Coastal Plain sediments are composed of sands, greensands, gravels, silts, clays, shales, and shell beds. In general the sands and gravels are porous and permeable; they contain water in storage and transmit it readily. The silts and clays also contain water, but yield it slowly or not at all. The sediments range in age from Triassic to Quaternary.

The Triassic rocks are hard conglomerate, shale, and sandstone lying on the basement at depths below 5,000 feet in Wicomico and Worcester Counties. They are not known to occur beneath Caroline, Dorchester, and Talbot Counties.

The Cretaceous rocks are divided into two series; the Lower Cretaceous and the Upper Cretaceous. The Lower Cretaceous is composed of lenticular, crossbedded angular feldspathic quartz sands and varicolored clays. The Upper Cretaceous has similar sands and clays, but has in addition gray lignitic sands, drab clays, greensands, and dark green micaceous sandy clays. The Cretaceous system ranges in thickness from about 1,000 feet at the outcrop to more than 5,630 feet near Ocean City. The Cretaceous units lie at depths ranging from 600 to 4,000 feet in Caroline, Dorchester, and Talbot Counties.

The Tertiary system overlies the Cretaceous system. It is composed of several series of marine strata, chiefly medium- to fine-grained beds of quartz sand, greensand, shell, gray diatomaceous silts, and green, brown, and gray clays, overlain by an uneven mantle of nonmarine red gravelly sand. The marine series are assigned to the Paleocene, Eocene, and Miocene epochs. The nonmarine red gravelly sand is correlated on the basis of lithology with the Bryn Mawr gravel of Pliocene(?) age. The Tertiary rocks range in thickness from a few hundred feet at the outcrop, in the vicinity of Annapolis, in Anne Arundel County, to about 1,950 feet at Ocean City, in Worcester County.

The sand beds, and a few of the shell beds, of the marine series form the important artesian aquifers of Caroline, Dorchester, and Talbot Counties. These beds have good opportunity for recharge through intake belts buried beneath relatively thin Pliocene(?) and Quaternary deposits. The beds are also exposed in many slopes and banks along the rivers of the Western Shore, and in the lower portion of many of the creeks of the Eastern Shore.

The red gravelly sand of Pliocene(?) age was deposited in channels extending to more than 100 feet below sea level and ranges in thickness from a few inches to more than 50 feet.

The Quaternary deposits overlie the Tertiary rocks unconformably as a mantle which ranges in thickness from a few inches to more than 100 feet. The Quaternary sediments are composed of white gravelly sand, buff medium-grained sand, gray fine sand, sandy silt, and peaty clay. The lower Quaternary deposits occur as channel fills in the buried Tertiary erosion surface. The upper Quaternary deposits are stratified drift, occurring as barlike or eskerlike ridges which form the rim of broad, oval, saucer-shaped depressions. The depressions contain a few inches to a few feet of organic loam, representing peat-bog deposition. Dunes have formed on the rims.

TABLE 8

Rates of Southeasterly Dip, Coastal Plain Series of Maryland

(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 Atlantic Ocean, 23 miles
Pleistocene	—	0	0	3
Pliocene(?)	—	0	.3	8
Miocene	—	0	1.5	10
Eocene	—	7	22	42
Paleocene	—	3	20	39
Upper Cretaceous	—	8	17	59
Lower Cretaceous	43	55	55	73
Basement rocks	58	58	64	146

Structure

The regional structure of the Coastal Plain sediments is a homocline dipping in a southeasterly direction (Pl. 1). Table 8 shows the rates of dip along the cross section increase with depth.

The strike of the sediments is in general northeasterly, approximately parallel to the Fall Line. Figure 2 shows a cross section through the Coastal Plain sediments approximately along the strike, 50 to 100 miles east of the Fall Line.

The sediments occupy several troughs in the basement complex, separated by broad ridges. Caroline, Dorchester, and Talbot Counties lie in one of these troughs which has been named the "Salisbury embayment" (Richards, 1948,

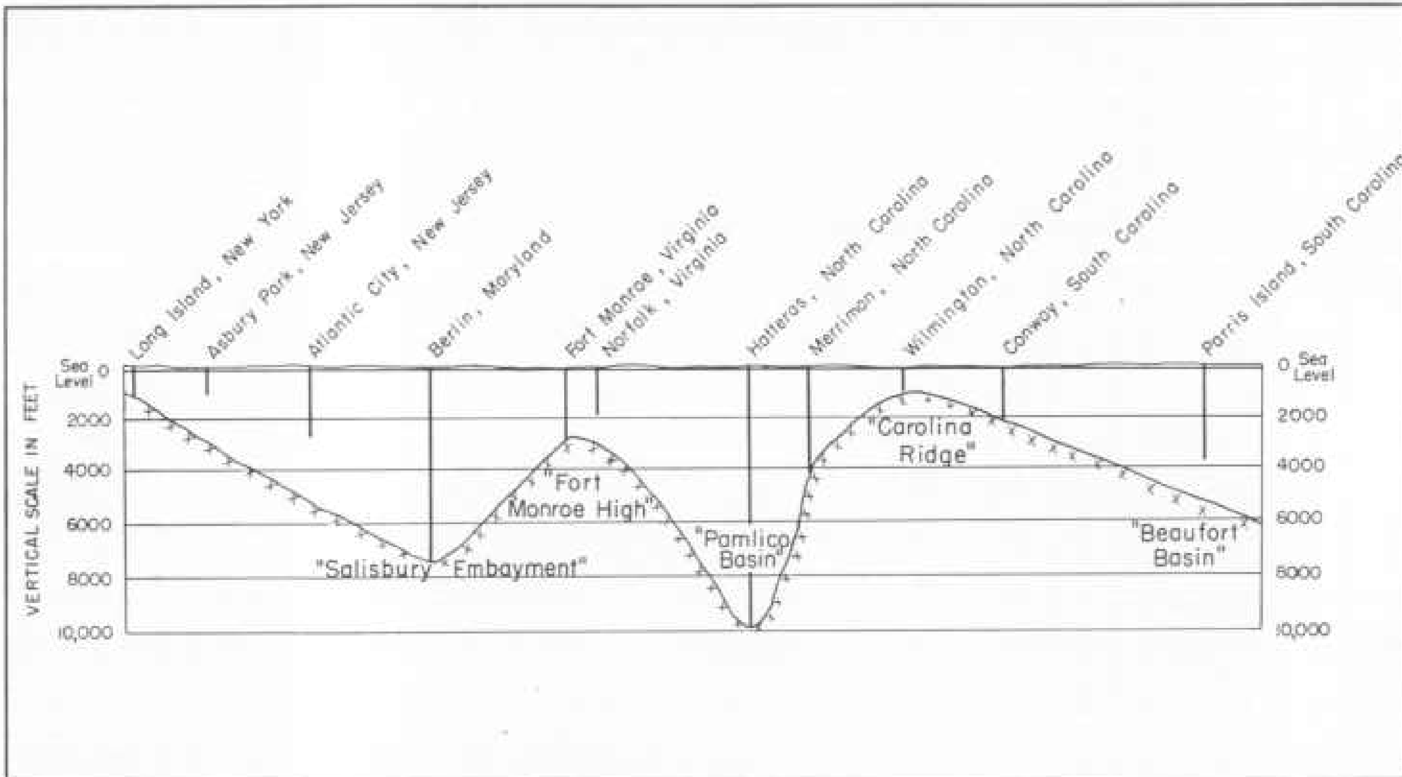

FIGURE 2. Section of the Coastal Plain Sediments from New York to South Carolina, showing the Salisbury Embayment (adopted from Richards, 1950)

p. 54) because the axis passes through Worcester and Wicomico Counties in the vicinity of Salisbury.

Geomorphology

The Coastal Plain of the lower Maryland Eastern Shore, though appearing monotonously level to the untrained eye, has a variety of surface features. There are terraces, stream channels, drowned valleys, basin-like depressions, swamps and marshes, remnant dunes, barlike features, and disturbed soils.

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 are inclined gently upward in a series of low steps, or terraces. The break between 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 are not in agreement over whether there are 2 terraces or 7 (Cooke, 1941).

The terraces are evidence of recent higher stands of sea level, and their number and sequence must eventually be properly keyed (Cooke, 1930, a and b; 1932, 1935) to the great advances and retreats of the continental ice mass, which has waxed and waned at least four times within fairly recent geological time (Coleman, 1941), creating inverse low and high levels of the sea.

Shattuck (1901, 1906) recognized and defined four terraces (besides the recent) along the shores of Maryland and adjacent states. He named the Talbot terrace (sea strand at 42 feet) from Talbot County. Cooke, working along the entire Atlantic Coastal Plain from New Jersey to Florida, enlarged Shattucks' terraces to seven. Other geologists have added local intermediate terraces, evidence for which has not been found to be regional in extent.

The terrace boundaries are parallel with the present-day sea level, demonstrating stability of the Atlantic Coastal Plain since early Pleistocene time. Some have doubted the horizontality of the terraces (Johnson, 1928; Dryden, 1935), but their supporting evidence has been challenged (Cooke, 1936).

Table 9 lists the terraces which are believed to be present in Caroline, Dorchester, and Talbot Counties. Evidence exists for all of these terraces in the three counties. The evidence is especially good for the Talbot terrace in Talbot County, the Pamlico terrace in Talbot and Dorchester Counties, and the Penholoway terrace in Talbot and Caroline Counties.

Good topographic map evidence of terraces is a grouping of contours representing the terrace scarp or sea cliff formed when the sea stood at the foot of the slope. Because the modern topographic maps of this area have a 20-foot contour interval, it is difficult to define accurate terrace boundaries on them. The quadrangles of a half century ago have a 10-foot interval, and show the terrace boundaries more accurately.

Further evidence of terraces is found in a lineation of gravel pits, dunes, and bar-like features, with adjacent swales containing black, organic soils. Field work in Talbot County substantiated the 40-foot Talbot terrace on this basis. Breitenbach and Carter (1952) confirmed the Pamlico 25-foot terrace in Talbot County by map study.

The terrace surfaces have been assumed by many geologists to be associated with terrace deposits, which have been given formation names equivalent to the terrace under which they lie. The Pamlico formation in particular, in this area, is a deltaic deposit, which fills, in part, earlier Pleistocene valleys.

TABLE 9

Terraces Below the 100-Foot Contour in Caroline, Dorchester, and Talbot Counties

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

Maryland "Basins"

The dominant land forms in Caroline, Dorchester, and Talbot Counties, aside from the terraces, are oval-shaped basins of low relief. There are basins within basins, and the rims of some of them overlap or cross over those of others, but most of them are self-contained. Their relief and pattern is so subdued that many of the local residents are unaware of their existence. Others, while familiar with the "whale wallows", as they are colloquially known, do not realize the influence they have had on the destiny of the inhabitants and on the vegetation in the area.

Most of the first trails were blazed on the rims of these basins, because the low central areas were frequently too marshy to cross. Primitive roads followed the trails, so that almost all the early county roads proceed in broad curves, passing from basin margin to basin margin. The early pattern of cultivated fields followed the basin rims, and only encroached upon the centers of basins which had natural drainage, or which could be drained by simple ditching. 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 at the center is usually darker, thicker, and more organic than the sandy loams on the rim.

The crest line of the rim generally slopes in the same direction as the surrounding plain. The long axes of the basins range in diameter from about 0.15 mile to 7 miles, and the short axes from 0.10 mile to 5 miles. The orientation of the axes is diverse. The basins range in area from about 7 acres to over 17,000 acres.

The rims are narrow, 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. The rims apparently were not developed uniformly around the perimeters of the basins, but there appears to be no predominant direction for greater development.

The relationship of Maryland "basins" to "Carolina bays" and similar topographic features in New Jersey and Alaska and the many hypotheses of their origin are discussed in Bulletin 16 (Rasmussen and Slaughter, 1955).

The basins 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. They are thus a significant factor in the ground-water recharge and discharge in the three counties.

To evaluate one of these basins in the subsurface, a basin which has a pronounced topographic expression was selected in Dorchester County, about 1 mile north of East New Market. It is readily discernible by the dip into the basin on State Highway 11. Topographically it is brought out by contours on the East New Market quadrangle, 7½-minute series. The axis of the basin is 2,800 feet in long diameter, bearing about N. 35° W. The maximum relief from the highest point on the rim (52 feet sea level datum) to the lowest in the center (32 feet) is 20 feet, but the altitude of the rim decreases from 52 feet on the south side to 45 feet on the north side.

Four test holes were drilled in this basin, approximately along the long diameter. They were Dor-Bf 26, 24, 29, and 28. Bf 26 and 28 are on the rim and Bf 24 and 29 in the basin. They showed the basin to be a feature restricted to the Quaternary surficial deposits and not affecting the underlying Tertiary deposits. The rims and part of the center of the basins are composed of a material distinct in color and of somewhat more variable texture than the earlier materials of Pleistocene age, which has been named the Parsonsburg sand (Rasmussen and Slaughter, 1955). The basins are, therefore, chiefly depositional features formed by the accumulation of rims upon the pre-existing plain. Because the rims are composed of stratified sand and gravel, with occasional erratic cobbles and boulders, they are considered to be a stratified drift formed around icebergs which were stranded on the Eastern Shore land mass during some short-term higher stand of the sea in late Pleistocene time. The basins are thus kettleholes, in the broader sense, developed on a marine plain.

Stream Channels and Drowned Valleys

The lower portion of the streams in Caroline, Dorchester, and Talbot Counties (Pls. 13, 14, and 15) are meandering whereas the upper stem and branches are relatively straight. The topographic maps indicate that the meandering portions occur chiefly below the 20-foot contour. At tide level they become meandering estuaries. According to Campbell (1927) the meanders in the sea level course of a river were formed when the river was above sea level because a stream flowing at tide level does not corrode its banks or impinge on the outer curve, but tends to follow a median channel and has no power to cut off its meanders.

The meanders of the Nanticoke, Choptank, Blackwater, Chicamacomico, and Transquaking Rivers, and of Tuckahoe, Marshyhope, and Kings 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, developing the typical meander bends, cutoff meanders, and ox-bow lakes of streams in old age. Sea level was probably about 25 feet below the sea level today, as 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 each stream 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 20-foot elevation, developing the choked, swampy flood plains so prevalent in the lower reaches today.

The valleys above the tidal meanders are mature, in contrast to the intervening terrace plains, which are youthful. Their maturity is probably due more to the ease of erosion of the unconsolidated sands, silts, and clays than to an extensive period of time or an intensive weathering.

The difference in configuration between the drowned valleys of western Talbot County and northwestern Dorchester County which have a dendritic pattern and form a neck area and the meandering sluggish drowned valleys of the lower half of Dorchester County which form a marsh area is probably due to difference in erosiveness of the parent materials of the Pamlico terrace plain. In the neck area, the Pamlico formation is a sand-silt material, whereas in the marsh area it is a silt-clay material.

A striking geomorphic feature of the drowned valleys is the barbed junction of a few of the tributaries. In normal stream drainage, tributaries join the trunk at a V-junction, with the V pointing downstream. Barbed tributaries join the trunk at right angles or with the V pointing upstream. Tuckahoe Creek joins the Choptank River in a pronounced barb. Kings Creek, Bolingbroke Creek, and the Tred Avon River are barbed into the Choptank River.

Another peculiarity of the larger drowned valleys is the chevron bends in their course. The chevron bend of the Choptank River around Bow Knee Point, at its junction with Hunting Creek, is similar to that of a barbed tributary. It makes a second chevron bend around Chancellor Point, 2 miles east of Cambridge. A third chevron bend is made around Cook Point as it joins Chesapeake Bay. The Little Choptank River likewise makes a chevron bend as it joins the bay. The chevron bends of the Miles River at Newcomb, and, again, at Eastern Bay are pronounced. Fishing Bay has a chevron bend at which opposite sides of the river match like pieces of a jig-saw puzzle.

These barbed tributaries and chevron bends indication reversals in drainage within fairly recent geological time.

The large drainageways show two-directional control, whereas the headwater creeks are random in direction and consequent upon the initial slope. The larger, deeper streams have cut through the Pleistocene mantle, and their drainage is controlled by the strike and dip of the beds of Tertiary age.

In general, the large streams flow parallel to the strike, which is southwest and south-southwest. Strike control is shown by the flow of the Choptank River from Williston to Dover Bridge and from Hunting Creek to Cambridge. It is shown by the Nanticoke River from Seaford, Delaware, to Vienna. The upper course of Tuckahoe Creek, though flowing essentially over the Pleistocene mantle, appears to have been influenced by buried Tertiary deposits, perhaps by a cuesta of the Choptank formation. The estuarine rivers of the neck areas also manifest control by strike of the Tertiary system: the Little Choptank River, the Tred Avon River, the Miles River above Newcomb, Broad Creek, and Harris Creek.

A few segments of the major streams, however, flow in the dip direction of the Tertiary strata: the Marshyhope Creek in the segment near Eldorado; the Choptank River in the segment along Frazier Neck to Hunting Creek; and the lower portion of Tuckahoe Creek, above its junction with the Choptank River. There are also segments counter to the direction of dip; the Choptank River below Cambridge; Miles River below Newcomb; and Edge Creek near Royal Oak. They probably indicate reversals in drainage of the Chesapeake Bay system.

Dunes

There are few dunes of significance in Caroline, Dorchester, and Talbot Counties. The rim material of some of the Maryland "basins" occasionally resembles dune deposits. Some of the rim material may have been reworked and redeposited as low-level dunes by the wind, but there has been little migration of material from the basin rims. A few recent dunes are found along the margin of Chesapeake Bay, but they are small, seldom more than 5 feet high, and scattered. Wind activity has not played a prominent part in the geomorphic history of this area.

GENERAL PRINCIPLES OF GROUND-WATER OCCURRENCE

Origin and Recharge of Ground Water

The major part of ground water originally falls as rain or snow. The precipitation 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, left by the ancient seas, lakes, or rivers in which the sediment accumulated. Such water is called "connate" water.

Part of the ground water may have come from hot springs and magmatic liquids of the interior of the earth. These waters, called "juvenile" or "magmatic" ground waters, are common in volcanic areas, but are believed to be negligible in this area.

Along the coast, water may enter the ground-water reservoirs from the sea. It can be detected by its high salt content. In general, fresh water beneath the land holds back the salty water since 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 reservoir.

Encroachment of salt water has occurred in Somerset County, where an artesian aquifer of the Yorktown and Cohansey formations(?) has been intruded by brackish waters of Chesapeake Bay. This sand underlies Elliott Island and Bloodsworth Island in lower Dorchester County, under water-table conditions at shallow depth. At Elliott Island drillers by-pass it, presumably because of poor quality water. Most of the shallow water-table sands of the lower two-thirds of Dorchester County and some of the shallow sands of the western half of Talbot County have been contaminated by bay waters, and the ground waters are not usable for most purposes.

The portion of ground water derived by replenishment from the atmosphere is governed by the natural laws of the hydrologic cycle, which 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 evapotranspitation, combining evaporation of water and transpiration by plants

S comprises the changes in storage (usually small increments of the equation) of the surface reservoirs, the soil reservoirs, or the ground-water reservoirs. The changes may be positive or negative.

Storage of Ground Water

The portion of the rainfall or snow melt that filters into the ground, after satisfying, at least locally, the deficiency of moisture in the soil zone, percolates by gravity through the small openings between sediment grains, or through fissures in the rocks, to the top of a zone of saturation, which top is known as the water table. The water table may be defined as that level in the ground below which the crevices are saturated with water that is free to flow into wells. The water table is the water level in free, open wells.

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 retention of some water above the saturated zone. The capillary water is not yielded to wells.

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

A measure of the ability of the ground to store water is called the "specific yield," which is the ratio of the volume of water a saturated sample will yield by gravity to the volume of the sample. 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 the volume of the sample. One inch of water filtering into such 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 is 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 the water table. In confined, artesian water-bearing beds, the coefficient of storage is usually a few hundredths to a few thousandths of a percent, due 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 the slight expansion of the water under the decrease in pressure around the well.

Available ground water is stored in water-yielding beds or strata called aquifers. In Caroline, Dorchester, and Talbot 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, and the artesian aquifers overlain, by confining beds which contain water but yield it slowly. The confining beds are called aquicludes because they include water, but retain it; in this area they are usually composed of silt or clay.

Aquifers serve three purposes: as ground-water reservoirs, retaining water in storage; as ground-water conduits, acting as a multitude of pipes, many of filament size, for the slow movement of ground water; and as ground-water 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.

Water-bearing beds are separated into two groups, the unconfined aquifers and the confined aquifers. 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 are distinctly different for water-table conditions than for artesian conditions.

Water-Table Aquifers

Unconfined aquifers are those in which infiltration water has free access to recharge the water surface. Wells pumping from the zone of saturation beneath the water table depress the water table toward them and drive 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 area the water table is usually 2 to 20 feet below land surface, with an average, areally and year around, of about 4 feet. The bottom of the unconfined reservoir is seldom more than 100 feet below land surface. The saturated thickness is usually only 50 to 100 feet, so that there is not a great deal of available "drawdown," or available "reservoir" which can be dewatered for large producing wells. However, because the coefficient of storage for water-table aquifers is usually large, in the range of 1 to 30 percent, water-table wells penetrating permeable aquifers are often capable of large yields, without great drawdown, or without having a radius of influence greater than a few thousand feet. Wells located close to ponds or streams usually have the highest yield, deriving recharge from the surface-water.

Artesian Aquifers

Confined aquifers are water-bearing beds enclosed above and below by impermeable to 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. As the artesian head falls, many such wells cease to flow and must be pumped, but they are still artesian.

The height to which water rises in wells drilled to an artesian aquifer indicates the pressure head of the water in the aquifer. The imaginary surface to which the water would rise in a well drilled to the aquifer at any point is called the piezometric (pressure-head-indicating) or potentiometric (potential-indicating) surface.

Most artesian aquifers have low coefficients of storage, in the range from 0.001 to 0.00001. The area of falling water levels in artesian aquifers often extends several miles from the producing well or well fields.

Most of the artesian aquifers in the tricounty 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. The artesian aquifers are encountered below water-table sands and their confining beds at depths of 50 to 100 feet below land surface and have a regional dip to the southeast of 10 to 20 feet to the mile.

Since the artesian aquifers in the tricounty area lie deeper than the water-table aquifer, and in places have an initial potentiometric surface as high or higher than the overlying water table, there is usually greater available draw-down. 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 leaky confining beds in areas where the artesian sands are not directly in contact with the water-table aquifer but the potentiometric surface is below the water table. The confining beds would permit the passage of water at only a slow rate, but the contribution over a large area may be substantial.

Aquicludes

The confining materials between aquifers in Caroline, Dorchester, and Talbot Counties are chiefly silt, with minor amounts of clay and very fine sand. Although these beds are porous, the pores are so small that the capillary forces hold the water to the grains and allow it to move only very slowly in response to high hydraulic gradients, that is, under great differences of pressure. Though these porous materials have a low permeability, where they are extensive they transmit appreciable quantities of water under vertical differences in head as they contain a large quantity of water in storage.

Movement and Discharge of Ground Water

Water moves in the two modes of turbulent and streamline flow. Fast-moving water, common in rivers, lakes, and seas, and in large openings in the ground, such as caves or fissures, is turbulent, such that small particles of the water, or suspended grains in the water, are transported in complex whorls and eddies. Slow-moving water, such as water moving slowly through small pipes or through granular openings in the ground, is streamline, or laminar, in that the path of a small particle is threadlike and unbroken, and continuous in the same general direction.

Most ground water moves in laminar flow. Exceptions are the flow of water in cavernous limestones, in 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 an infinitesimal velocity 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 written (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, 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 field coefficient of permeability is defined by Wenzel (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 a coefficient of transmissibility, T, which is the product of the average field coefficient of permeability and the saturated thickness, m, in feet (Theis, 1935, p. 520)

$$T = P \cdot \mathrm{m}$$

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 as ground-water runoff (flow into surface bodies of water), ground-water evapotranspiration, subterranean leakage or underflow, and yield to wells.

Ground-water runoff is the lateral percolation of ground water to areas of surface seepage, that is, to springs, to channels, or to open bodies of water. Ground-water runoff is high in the tricounty area.

Ground-water evapotranspiration is the discharge of ground water due to the heat of the sun. The water moves almost vertically from the water table and is discharged as water vapor, either directly from the soil or via plant tissues. Where the water table stands within a few feet of the surface, the capillary fringe commonly extends up to the land surface. As the 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. Under these water-table conditions, plant roots commonly extend to the water table or to the capillary fringe and drink water through the rootlets to the stems, to discharge it as water vapor from the stomata of the leaves. This is transpiration. Evapotranspiration is high in the tricounty area.

Subterranean movement from one aquifer to another accounts for some ground-water discharge. If the movement is from a higher to a lower aquifer, the deeper rocks must have a means of discharging water to the surface or into a body of surface water somewhere.

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 potentiometric surface surrounding the well is lowered, creating a cone of depression, so that there is a hydraulic gradient from the limit of the cone of depression to the mouth of the well. The lowered water level is usually maintained as long as the well is operating, but when the well is shut down the water level rises, though 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 3. The figure also shows the Theis (1935) formula used to determine the rate of fall of water levels in response to pumping, for given distances, times, and coefficients of transmissibility and storage.

Pumping of water from wells decreases the ground-water runoff and, with a near-surface water table, it may decrease ground-water 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 water diverted to the uses of man. The amount of ground water so discharged is the measure of the ultimate practicable yield of wells in an area.

Several wells developed and pumped in the same formation mutually affect water levels in each other by amounts depending upon the character of the aquifer, their rates of pumping, and their distance apart. If the water levels in the formation become sustained after the wells or well fields have been com-

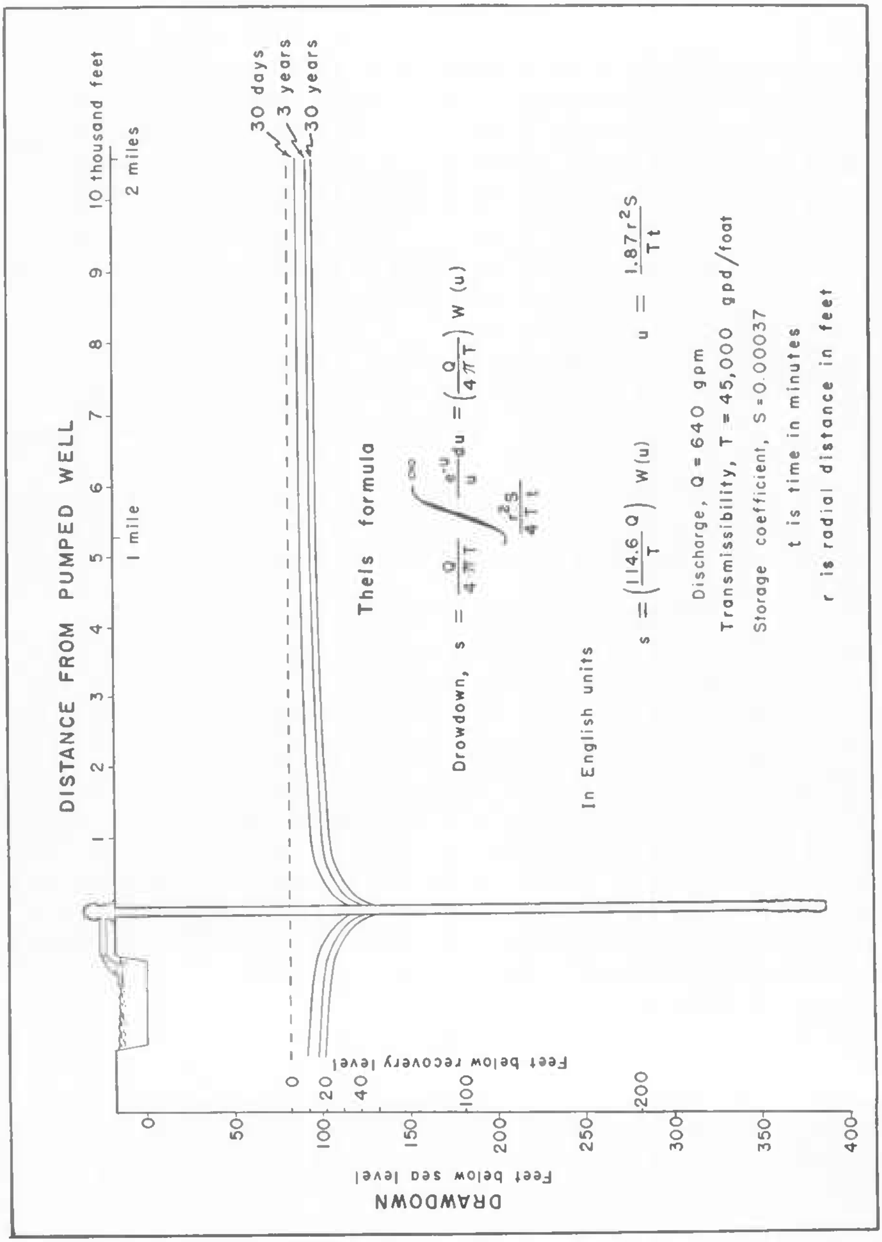

FIGURE 3. Cross Section of Cone of Depression, Piney Point Formation, based on Coefficients of T and S at Cambridge.

pletely developed, the discharge is considered within the "safe" yield of the formation. If, however, the water levels continue to fall and do not stabilize, the "safe" yield of the formation may have been exceeded at least locally.

"Safe" yield, as used here, means the maximum rate of continuous pumping from a well or group of wells, or from an aquifer, that can be maintained indefinitely with the water level in the wells approaching but not declining below some danger level. This danger level may be the top of an artesian aquifer, the top of a screen, the position of the pump bowls, the economic pumping lift, or the position of a fresh water-salt water interface. Controlled well-field tests and geological study enable the determination of the proper well spacing and rates of pumping to develop the maximum practicable yield of good water.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

The geologic formations of Caroline, Dorchester, and Talbot Counties, their range in thickness and in depth, and their character and water-bearing properties are summarized in Table 10.

The stratigraphic correlations in this report that differ from or extend those of previous workers in adjacent areas are based chiefly upon the lithology of well logs, governed by paleontology on a few key wells. The paleontology is presented in Table 11. The major paleontologic control is derived from deep wells at Wades Point in Talbot County, West Denton in Caroline County, and Cambridge in Dorchester County.

Precambrian and Paleozoic Crystalline Complex

The thick accumulation of sediments which underlie Caroline, Dorchester, and Talbot Counties rests upon hard, crystalline rocks at estimated depths ranging from 2,200 feet below land surface beneath Tilghman Island, on the northwest to 4,000 feet below land surface beneath the Nanticoke River on the southeast. These very hard, crystalline rocks contain little or no water. They represent the "basement" below which water wells can not be drilled. Plate 2 shows the depth of the basement rock surface.

Cretaceous System

Plate 3 is a map of the top of the Cretaceous system, a southeasterly sloping homocline, ranging from about 500 feet below sea level at Wye Mills, Talbot County, to 1,100 feet below sea level along the state line, east of Eldorado, Dorchester County. The rate of dip to the southeast is 22 feet per mile. The map is based on data for only 14 wells in the tricounty area and 8 wells in the surrounding counties, so that it is only an approximate representation of the top of the Cretaceous system, or the base of the Tertiary system. The trough with an axis passing beneath Federalsburg and Royal Oak may be the trough

TABLE 10

Geologic Formations and their Water-bearing Properties in Caroline, Dorchester, and Talbot Counties

System	Series (Group)	Formation (Range in depth to top of formation, in feet, northwest to southeast)	Thickness (feet) Range (Average)	General character, probable origin, and boundaries	Water-bearing properties
Quaternary	Recent	0	0–10 (3)	Loam soil, alluvial sand and silt, dune sand, and peat.	Provides water to a few shallow wells of small yield.
	Pleistocene (Columbia group)	Parsonsburg sand Talbot and Pamlico formations, undifferentiated Walston silt Beaverdam sand (0–10)	0–100+ (30+)	Unconsolidated, stratified, lenticular deposits of buff sand and silt, with small amounts of gravel and clay. The deposits occur as stratified drift, with a few erratic boulders; stabilized dunes; marsh mud; fluviatile thinly stratified, crossbedded channel fill; massive, well-sorted beach sands; and possibly marine sands. Disconformable lower boundary.	Yields moderate to large quantities of water to a few wells, small quantities to many wells. Water-table conditions prevail. The water is suitable for almost all purposes.
Tertiary	Pliocene(?)	Brandywine formation Bryn Mawr gravel (0–40)	0–45+ (10?)	Slightly cemented red, orange, and brown gravelly sand. Locally contains hard ledges, a few inches to 2 feet thick, usually at the base. Occurs chiefly as channel fill. Disconformable lower boundary.	Yields moderate quantities of water to wells in conjunction with overlying Pleistocene deposits, under water-table conditions. Capable of large yields in buried channel deposits. The quality of water is excellent for most purposes.

	Upper and middle Miocene (Chesapeake group)	Yorktown and Cohansey(?) formations, undifferentiated (0–50+)	0–50 (20)	Gray sands with gray or blue clayey silt. Occurs only in the southern end of the area beneath Elliott Island and Bishops Head. Marine littoral. Slightly disconformable.	Not known to yield water in this area. The sands lie under a marsh cover, and the water is probably of undesirable quality.
		St. Marys formation (0–83)	0–110+ (60±)	Predominantly clayey silt and silty clay with some very fine sand, shells and Foraminifera. Conformable lower boundary.	An aquiclude. A few wells derive water locally from stringer sands in Caroline County and eastern Dorchester County.
		Choptank formation (0–200)	0–130 (80+)	Gray and brown sand and clay, containing shell marl and Foraminifera. Marine. Conformable lower boundary.	Yields small to moderate quantities of water to wells in Caroline County and eastern Dorchester County. The water is moderately hard and may be irony.
		Calvert formation (0–230)	20–300 (200±)	Gray diatomaceous silts and clays, containing lenses and thin sheets of gray sand, shell beds and Foraminifera. Marine.	Largely an aquiclude, but contains two or three aquifers which locally yield large quantities of water at Easton, Federalsburg, Hurlock, and Vienna. The quality ranges from usable for some purposes to usable only for limited purposes.
	Oligocene	None	—	An interval of erosion or nondeposition. Regional unconformity.	An uneven boundary between Miocene and Eocene strata.

TABLE 10—*Continued*

System	Series (Group)	Formation (Range in depth to top of formation, in feet, northwest to southeast)	Thickness (feet) Range (Average)	General character, probable origin, and boundaries	Water-bearing properties
Tertiary—*Continued*	Eocene (Jackson group equivalents)	Piney Point formation (70–620)	2–191 (74)	An olive-green to black quartz sand, slightly to moderately glauconitic, predominantly medium to coarse grain, with some lenses of fine sand, silt, and clay, containing Foraminifera. Very uneven lower boundary. Marine. Formation wedges out in Queen Annes County, but this probably does not serve as an impermeable boundary. Recharge from the intake belt of the Aquia greensand probably occurs across Eocene formation boundaries.	The most important artesian aquifer in the area, providing large quantities of ground water in Dorchester County, lower Talbot County and central Caroline County, and small quantities in northwestern Talbot County. The quality of water is suitable for most purposes. The water level has been lowered over 100 feet below sea level at Cambridge in a huge cone of depression which has extended out into Dorchester County and into Talbot County.
	Eocene (Pamunkey group)	Nanjemoy formation (75–510)	0–294 (166)	Blackish-green highly glauconitic sand, silt and clay. Conformable lower boundary. Marine.	A leaky aquiclude in the northwest: probably a tighter confining formation in the southeast.

	(Wilcox group equivalents)	Aquia greensand (250–600)	0–231+ (100±)	A green glauconitic quartz sand, with a few lenses of clay, containing shell fragments, Foraminifera, and hardbeds. Marine. Limited to western Talbot County and northwestern Dorchester County with an impermeable boundary passing northeastward through Trappe. A recharge boundary strikes northeastward through Annapolis, Anne Arundel County, about 15 miles from Claiborne.	An important aquifer, capable of providing moderate quantities of water to many wells. Average water level is a few feet above sea level. Average specific capacity of the wells is 2.0 gpm per foot of drawdown.
	Paleocene	Brightseat(?) formation (300–1,000)	70–300+ (150)	Alternate hard and soft beds of gray clay and sparsely glauconitic sand containing Foraminifera and shells. Marine. Regional unconformity.	Generally an aquiclude, but yields water to five wells at moderate to small rates of yield. The water is soft, nonirony, but high in sodium bicarbonate.
Cretaceous	Upper Cretaceous	Monmouth formation (450–1,100)	34–230 (98)	Dark-green glauconitic sand and lead-gray clay containing shells and Foraminifera. Marine. Lower boundary conformable.	An aquiclude. A small quantity of water is obtained from the formation in a well at Easton.
		Matawan formation (650–1,200)	98–176 (128)	Black micaceous glauconitic clay and brown glauconitic sand. Marine. Not conformable to the Magothy formation.	An aquifer in Talbot and Caroline Counties which has produced in six wells in conjunction with other sands. An aquiclude in Dorchester County as logged in five wells.

TABLE 10—*Continued*

System	Series (Group)	Formation (Range in depth to top of formation, in feet, northwest to southeast)	Thickness (feet) Range (Average)	General character, probable origin, and boundaries	Water-bearing properties
Cretaceous—*Continued*	Upper Cretaceous—*Continued*	Magothy formation (650–1,400)	43–139 (88)	White, yellow, and gray sand interlaminated with gray and brown shale, containing lignite and carbonaceous matter, but no animal fossils. Nonmarine. Unconformable lower boundary.	Yields large quantities of water to seven wells and is potentially productive throughout the area. The water flows initially in wells developed at low altitude. The quality is suitable for almost all purposes. The temperature ranges from 68.5° to 78°F.
		Raritan, Patapsco, and Arundel formations, undifferentiated (900–1,600)	600–1,700 (1,100)	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. The formation is predominantly deltaic and estuarine. The lower boundary is unconformable.	A potential aquifer. One well (Tal-Cb 89) penetrated a water-bearing, medium-grained sand, 69 feet thick, at depths of 1,351–1,420 ft. below land surface (alt. 13 ft.). A flow of 8.5 gpm in 1953 was obtained at an elevation 19 ft. above sea level. The water is low in dissolved solids, soft, but high in iron (10–13 ppm). Temperature 69°F. One other well, at Church Creek, is believed to derive its flow from the Raritan formation.

	Lower Cretaceous	Patuxent formation (1,600–3,300)	600–800 (700)	Not penetrated by the drill in this area, but presumed to be extensively present because of its occurrence in deep oil tests in Wicomico and Worcester Counties, and in the outcrop in Cecil County and on the Western Shore. Probably composed of thick sands and thin shales.	A potential aquifer. The water is warm to hot, and probably is too highly mineralized for most uses.
Paleozoic and pre-Cambrian		Crystalline complex (2,200–4,000)	Extends to indefinite depth	Not penetrated in Carline, Dorchester, and Talbot Counties, but presumed to form a basement rock beneath this area.	An aquifuge; hard crystalline rocks that neither contain nor transmit ground water.

TABLE 11

Paleontology of Samples from Wells and Outcrops in Caroline, Dorchester, and Talbot Counties

	Depth (feet)	Formation and series	Paleontology
Well Car-Dc 122 Permit 11234 Location—West Denton Paleontologist—Druid Wilson	40–45	St. Marys, Miocene	*Pecten* (*Lyropecten*) sp. fragment *Anadara* cf *idonea* (Conrad) fragment *Corbula inaequalis* Say *Astarte* sp. *Teinostoma* cf *greensboroense* Martin Barnacle fragment Coral fragment
	45–50	St. Marys, Miocene	*Pecten* (*Lyropecten*) sp. fragment *Corbula inaequalis* Say *Siphonalia* cf *marylandica* Martin fragment *Vrosalpinex* cf *cinereus* (Say) fragment *Crucibulum pileolum* (Lea) *Turritella plebeia* Say Barnacle fragment Coral fragment
	50–55	St. Marys, Miocene	*Pecten* (*Lyropecten*) sp. fragment *Corbula inaequalis* Say *Turritella* cf *variabilis* Conrad Barnacle fragment
	55–60	St. Marys, Miocene	*Corbula inaequalis* Say Gastropods indeterminate fragments Barnacle
	60–65	St. Marys, Miocene	*Turritella plebeia* Say Barnacle fragments
	65–68	St. Marys, Miocene	*Pecten* (*Lyropecten*) sp. fragments *Uzita* cf *marylandica* Martin Barnacle
	82–87	Choptank, Miocene	*Yoldia* cf *laevis* (Say) fragment Pelecypod indeterminate fragments *Turritella* sp.
	87–92	Choptank, Miocene	*Callocardia* cf *subnasuta* (Conrad) fragment *Turritella variabilis* var. *cumberlandian* Conrad *Dentalium caduloide* Dall
	92–97	Choptank, Miocene	*Pecten* (*Lyropecten*) sp. fragments *Astarte* sp. fragment *Corbula inaequalis* Say Pelecypod indeterminate fragment Barnacle fragment
		"Because of the meagerness of the evidence the age assignments . . . cannot be regarded as very certain."—Druid Wilson	

TABLE 11—*Continued*

	Depth (feet)	Formation and series	Paleontology
Car-De 122—*Continued*	Above 192	St. Marys and Choptank, Miocene	Ruth Todd, micropaleontologist says: "the following boundaries are recog-: nizable on the basis of the Foraminifera
	192–197	Calvert, Miocene	
	197–331	Calvert, Miocene	The uppermost samples, down to the 321–331′ sample, are Miocene; those from the 192–197′ sample downward probably being Calvert and the higher ones questionably St. Marys and Choptank. Below 331 feet an abrupt change of lithology to coarse quartz grains coincides with the lowest good Miocene.
	331–370	Eocene	The first Eocene forms encountered are in the 370–374′ sample. The samples in the interval between the lowest good Miocene (331 feet) and the highest Eocene (370 feet) contain only rare Miocene specimens probably by contamination from above.
	370–488	Piney Point, Eocene (Jackson group equivalents)	Samples between 370 and 488 feet contain Eocene, probably Jackson, forams, in some samples largely obscured by Miocene specimens from above. No diagnostic forms were found in the interval from 488 to 516 feet. In the 516–520′ sample Wilcox Eocene species appear and they continue downward to the 604–609′ sample.
	488–516	Nanjemoy(?), Eocene	
	516–520	Aquia, Eocene	
	604–609	Aquia, Eocene	
	609–615 to 852.2	Paleocene	In the 609–615′ sample the first Paleocene is encountered and it continues downward to the 850′8″–852′2″ sample and possibly lower, though with a change in facies below 852′2″.
	922.2–932.8	Upper Cretaceous	The first definite Upper Cretaceous forams were observed in the 922′2″–932′8″ sample and they continue to the bottom of the well. The interval between 852′2″ and 922′2″ might possibly be Upper Cretaceous also, but, discounting the probable contamination by Paleocene specimens from above, the fauna in this interval still has more of a Paleocene than an Upper Cretaceous flavor."
Denton	360–391	Eocene	*Ostrea sculptrata* (Richards, 1945, p. 901)

TABLE 11—*Continued*

	Depth (feet)	Formation and series	Paleontology
Herring Hill 1 mile north of Federalsburg, Caroline County	4 above sea level 28 above sea level	Pamlico, Pleistocene	See Richards, 1936, p. 1620, for fossil description
Williston, Caroline County	0 East bank of Choptank River	Pamlico, Pleistocene	Do.
Dor-Ah 3 Williamsburg	420–502	Miocene	Ruth Todd, micropaleontologist, says, "I can see no indication of anything other than Miocene."
Dor-Bc 6 Permit 1505 Cornersville	300, 360, 400, 420 510–520	Piney Point, Eocene (Jackson group equivalents) Paleocene	"Jackson Eocene Foraminifera" (Shifflett, 1948, p. 26) *Marginulina subaculeata* (Cushman) var. *tuberculata* (Plummer) (Shifflett, 1948, p. 26)
Dor-Ce 3 Permit 174 Cambridge	450 590–760	Piney Point, Eocene (Jackson group equivalents) Nanjemoy, Eocene Paleocene	Shifflett (1948, p. 26) says, "The first Jackson Foraminifera occur at 450 feet depth." (See her fig. 13) Shifflett *loc. cit.*: The presence of Claiborne beds in this well cannot be established definitely on the basis of the fauna recorded from the samples. Three Claiborne species occur. They are *Uvigerina russelli* Howe, *Laxastama claibarnensis* Cushman and *Cibicides westi* Howe. The first two occur in a few scattered samples, and *Cibicides westi* occurs in the portion of the section which seems to be definitely Paleocene in age. The first appearance of definite Paleocene Foraminifera is at a depth of 590 feet. Here *Marginulina subaculeata* (Cushman), var. *tuberculata* (Plummer) and other forms occur for the first time in the section. At this depth there is also a slight change in the lithology from a

TABLE 11—*Continued*

	Depth (feet)	Formation and series	Paleontology
Dor-Ce 3—*Continued*			medium coarse quartz sand with large dark green grains of glauconite to a sand with finer grains of olive green glauconite. The Paleocene-Eocene contact is accordingly placed at 590 feet.
	760–940	Upper Cretaceous	The Paleocene has a thickness of 170 feet in this well and continues down to a depth of 760 feet at which point twenty-one species of Cretaceous Foraminifera and seven other species which could not be specifically identified make their first appearance in the section. The lithologic change is hardly noticeable, although the amount of glauconite is somewhat reduced and the color of the sample from 760 feet to 770 feet is light gray rather than greenish gray. The Cretaceous-Paleocene contact is definitely at a depth of 760 feet according to the foraminiferal fauna." Glenn Collins says: "there seems to be a few feet of Claiborne below the Upper Eocene, but I have been unable to find the break."
Dor-Fe 4 Permit 5021 Elliott Island Paleontologist—Julia Gardner	91–102	St. Marys, Miocene	*Nucula sinaria* Dall *Yoldia laevis* (Say) *Parvilucina crenulata* (Conrad) *Montacuta mariana* Dall *Dosinia* sp. juvenile *Chione* sp. juvenile *Tellina declivis* Conrad *Nactra clathrodon* Lea *Dentalium caduloide* Dall *Dentalium*? sp. *Teinostoma nanum* (Isaac Lea) *Turritella plebeia* Say *Polynices* (*Lunatia*) sp. *Turbonilla* (*Pyrgiscus*) sp. *Strombiformis* (*Polygyreulina*) "*laevigata* (H. C. Lea)" *Uzita peralta* (Conrad) Larval shell *Chymatosyrinx limatula* (Conrad) juvenile *Mangilia parva* (Conrad) *Mangilia* sp. cf *M. parva* (Conrad)

TABLE 11—*Continued*

	Depth (feet)	Formation and series	Paleontology
Dor-Fe 4—*Continued*			Turrid *Volvula oxytata* Bush Crab "The apparent abundance of *Turritella plebeia* and *Uzita peralta* are probably the best evidence of St. Marys age."
Tal-Ce 5 Permit 2261 Easton	283	Piney Point, Eocene (Jackson group equivalents)	Glenn Collins says: "the top of the Jackson (is) at 283 feet," on the basis of microfossils.
Outcrop, road-cut on U. S. 50 and Peachblossom Creek, 2 mi. south of Easton Paleontologist—Julia Gardner	About 20 feet above sea level	Choptank, Miocene	The following species were identified:
		Calvert and Choptank	*Astrhelia palmata* (Goldfuss)
		Choptank; Zones 16–19	*Anadara staminea* (Say)
		Calvert and Choptank; Zones 4–19	*Chlamys* (*Lyropecten*) *madisonia* (Say)
		Calvert and Choptank; Zones 4–19	*Chlamys* (*Lyropecten*) *madisonia* (Say)
		Choptank; Zones 17^r–18^c–19^c	*Astarte obruta* Conrad
		Choptank; Zones 16^c–17^c–18^c	*Crassatellites turgidulus* (Conrad)
		Calvert and Choptank and St. Marys	*Cardium* (*Cerastoderma*) *laqueatum* Conrad
		Calvert and Choptank and St. Marys	*Dosinia* (*Dosinidia*) *acetabulum* Conrad
		Calvert and Choptank(?) and St. Marys	*Macrocallista marylandica* (Conrad)
		Choptank and St. Marys	*Venus* (*Mercenaria*) *cuneata* Conrad *Venus* (*Mercenaria*) sp. indet.
		Calvert; Zones 10–14; Choptank, Zones 17–19; ?St. Marys	*Corbula* (*Bicorbula*) *idonea* Conrad
		Calvert and Choptank	*Turritella* sp. cf. *T. cumberlandia* Conrad, immature; similar forms in collection determined as *T. cumberlandia* Conrad
		Calvert and Choptank and St. Marys	*Polinices* (*Lunatia*) *heros* Say
		Calvert and Choptank and St. Marys	*Ecphora* sp.
		Calvert and Choptank and St. Marys	*Balanus concavus* Bronn

TABLE 11—*Continued*

	Depth (feet)	Formation and series	Paleontology
Outcrop, Oxford Neck	6 to 15 feet above sea level	Pamlico and Talbot, Pleistocene (or possibly Parsonsburg sand)	See Cope, 1871, p. 178; Miller, 1912, p. 5; Miller, 1926, p. 75: *Elephas americanus* *Elephas columbi* *Elephas primigeneus* *Terrapene eurypygia* *Cistudo eurypygia* *Cervus canadensis* *Cariacus virginianus* *Chelydra serpentina*(?)
Outcrop, Choptank River 4.5 mi. southeast of Easton, near Dover Bridge	0 to 27 feet sea level	Pleistocene Choptank, Miocene	See Miller, 1912, p. 4; Miller, 1926, p. 64 Abundant species are: *Macrocallista marylandica* *Venus plena* *V. campechiensis* *Crassatellites marylandicus* *Pecten madisonius* *Astarte obruta* *Dosinia acetabulum* *Arca staminea* Fewer specimens of *Ecphora quadricostata* *Cardium laqueatum* *Turritella plebeia* *T. variabilis* *Polynices duplicatus* *P. heros* *Corbula idonea* Near the water line *Ostrea carolinensis* *Balanus concavus*
Outcrop, Boston cliffs on Choptank River 1.5 mi. south of Dover Bridge (this may be same locality as preceding)	0–10 10–22	Pleistocene Choptank, Micoene	See Clark, Shattuck and Dall, 1904, p. xcii Reddish and yellowish fossiliferous sand containing the following species: *Pleurotoma albida*, *Ptychosalpinx multirugata*, *Ecphora quadricostata var. umbilicata*, *Ecphora tampaensis*, *Scala marylandica*, *Seila adamsii*, *Caecum patuxentium*, *Turritella plebeia*, *Crucibulum multilineatum*, *Cadulus thallus*, *Saxicava artica*, *Corbula idonea*, *Corbula inaequalis* *Asaphis centenaria*, *Metis biplicata*, *Melina maxillata*, etc. (Zone 19, in part)

TABLE 11—*Continued*

	Depth (feet)	Formation and series	Paleontology
Outcrop on Tuckahoe Creek 1 mile south of Stony Point	11.5–15.5	Pleistocene	See Miller, 1926, p. 59:
	0–11.5	Calvert, Miocene	"Numerous specimens of Venus Melina, Pecten, Astarte, Balanus, Corbula, Crassatellites, Polynices, Turritella, etc."
Tal-Cb 89 Permit 12546	16–224	Pleistocene, Miocene, and Eocene	No Foraminifera
	224 250	Eocene	One specimen of *Globigerina*? sp.
Wades point	250–274	Eocene	No Foraminifera
	274–305	Eocene	One specimen of *Nodosaria* cf *affinis* Reuss
Micropaleontologist—Ruth Todd	305–320	Eocene	No Foraminifera
	320–345	Eocene	One specimen of *Globorotalia* sp.
	345–433	Eocene	No Foraminifera
	433–438	Probably Nanjemoy, Eocene	Poorly preserved forams, good fauna
	438–500	Eocene	Barren, or nearly so.
	500–515	Aquia, Eocene	*Spiroplectammina wilcoxensis* Cushman and Ponton—Paleocene to Claiborne *Buliminella robertsi* (Howe and Ellis)—Claiborne to Jackson *Globorotalia wilcoxensis* Cushman and Ponton—Paleocene to Claiborne
	525–536	Eocene	Similar to 433–438
	536–546	Paleocene	
	575–581	Paleocene	Good rich Paleocene fauna, including the following diagnostic species: *Robulus pseudo-mamilligerus* (Plummer) *Pseudoglandulina pygmaea* (Reuss) *Bulimina cacumenata* Cushman and Parker *Siphogenerinoides eleganta* (Plummer) *Siphonina prima* Plummer *Alabamina wilcoxensis* Toulmin *Globigerina pseudo-bulloides* Plummer
	607–617	Upper Cretaceous	*Robulus navarroensis* (Plummer) *Gümbelina costulata* Cushman *G. striata* (Ehrenberg) *G. plummerse* Loetterle *Gümbelitria cretacea* Cushman *Pseudouvigerina plummerae* Cushman *Pullenia americana* Cushman *Globotruncana cretacea* Cushman

TABLE 11—*Continued*

	Dept (feet)	Formation and Series	Paleontology
Tal-Cb 3 Permit 132 McDaniel	130 240 330	Piney Point, Eocene Nanjemoy, Eocene Aquia, Eocene	Glenn Collins says: . . . the top of the Eocene first appears at 130 ft., which appears to be the Nanjemoy formation and the Aquia may be at 330 ft. . . . The forams in this well from 130 ft. to 330 ft. look like Nanjemoy and a *Marginulina* sp. appears at 240 ft. which I found . . . in the Curtiss Stewart well at Piney Point . . . .

of the Salisbury embayment at the close of Cretaceous time. The strike of the Cretaceous surface veers around this axis from a northeast-southwest trend to a north-south trend south of it.

Plate 4 is an isopach map of the Cretaceous system showing an increase in thickness from 1,700 feet along the northwest margin, between Claiborne and Wye Mills, to about 3,300 feet beneath Bloodsworth Island at the south end of the area. The rate of thickening is about 32 feet per mile to the southeast.

The sediments of the Cretaceous system are chiefly sands, tough clays, shales, and shell marls containing glauconite, lignite, and feldspar.

The water-bearing capacity of the Cretaceous system is large, since sands predominate. The sands lie deep, however, and it may be many years before a large quantity of water is derived from them in this area. An aquifer with water low in dissolved solids encountered at depths between 1,338 and 1,407 feet below sea level, in the well at Wades Point (Tal-Cb 89), correlated with the Raritan formation, suggests that much of this deeper water may be usable for some purposes, although little is known of the quality of most of it. The deeper sands may contain water higher in dissolved solids.

The Cretaceous system is separated into the Lower Cretaceous Series and the Upper Cretaceous Series. In Maryland the Lower Cretaceous is now restricted to the Patuxent formation. Formerly, the Arundel and Patapsco formations were considered Lower Cretaceous and were included with the Patuxent formation as the Potomac group.

Lower Cretaceous Series

Patuxent formation

The Patuxent formation is the sandy basal formation of the Coastal Plain series, presumably lying on top of the basement rocks beneath the entire area of Caroline, Dorchester, and Talbot Counties. No wells have been drilled sufficiently deep to penetrate it. Regional considerations indicate that the Patuxent formation is present as a sheet, 600 to 800 feet thick, with the top probably occurring about 1,600 feet below land surface on the northwestern margin and about 3,300 feet below land surface on the southeastern margin of the area. The dip of the top of the formation is about 50 feet to the mile to the southeast. The formation probably thickens in the same direction at the rate of about 6 feet per mile.

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 (1948, 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.

The Patuxent formation probably includes many thick, coarse to fine, poorly sorted sands, containing large quantities of mineralized water. The pressure heads are probably high, almost to land surface. The temperatures of the water will range from warm to hot.

The hydrologic conditions could be reasonably approximated by assuming a half-infinite aquifer, with a recharge line 40 to 70 miles from the area, laid along the outcrop belt, and represented by input image wells of equal capacity approximately 110 miles away. The Theis (1935) formula could then be used for nonequilibrium conditions to determine long-range pumping rates and water levels by using as a first approximation values for T and S derived from the outcrop in the Baltimore area and the Newark area, Delaware.

Upper Cretaceous Series

Above the Patuxent formation lies the thick group of shales and sands of the Upper Cretaceous series. The series is estimated to range in thickness from 1,000 feet beneath the northwest margin of the area to about 2,500 feet beneath the southeast margin. No well penetrates the entire thickness of the Upper Cretaceous series in this area, but Tal-Cb 89 at Wades Point penetrates 913 feet of Cretaceous rocks, which is believed to represent nearly the complete section of the Upper Cretaceous series along the northwest margin. Structurally, the top of the Upper Cretaceous series is represented in Plate 3.

The Upper Cretaceous series is divided into six formations, from lower to upper, as follows: Arundel clay; Patapsco formation; Raritan formation; Magothy formation; Matawan formation; and Monmouth formation. There is considerable doubt that the Arundel clay persists from the Western Shore of Maryland to this area as a basal clay of the Upper Cretaceous series. The wells in this area are generally not deep enough to intersect this clay. Although Tal-Cb 89 presumably could reach it, the log of that well does not show a basal clay.

The Upper Cretaceous series is separable into two units: a nonmarine sequence and a marine sequence. The nonmarine sequence is the thick lower unit composed of clays and quartz sands with fossil wood, comprising the Arundel, Patapsco, Raritan, and Magothy formations. The marine sequence is a thinner unit composed of micaceous and glauconitic shales and sands with marine fossils, comprising the Matawan and Monmouth formations.

All these formations are separated from each other, and from the underlying Patuxent and the overlying strata of Tertiary age, by erosional unconformities. The magnitude of erosion is sufficiently large at some of these boundaries to eliminate the Monmouth, the Matawan, and/or the Magothy formations.

The water-bearing characeristics of the Upper Cretaceous series are not known with any degree of certitude, because of the sparse well control and the lack of sufficient depth in most of the fourteen wells which reach the Cretaceous system. It appears that the Monmouth formation is an aquiclude, but aquifers containing usable water have been found in the others.

Arundel, Patapsco, and Raritan formations, undifferentiated

The Arundel, Patapsco and Raritan formations have been logged in 5 wells in Dorchester and Talbot Counties: Dor-Bd 4 and -Ce 3; Tal-Cb 89, -Ce 5, and -Ee 8. The greatest thickness, 540 feet, was recorded in Tal-Cb 89; but greater thicknesses might have been encountered in the other wells if they had been drilled deeper, since the bottom of the unit is not believed to have been reached in them.

In Tal-Cb 89, the sediments of this unit, extending from 980 to 1,520 feet below land surface, are logged as gray and white silty sands, intercalated with tough, pink, red, gray, and chocolate-brown, silty clays. The individual beds range in thickness from 1 to 69 feet and average 16 feet. In the outcrop area these beds, probably of continental origin, are highly variable within short distances, and are not correlatable on distinctive lithology or sequence, except as a unit.

In Tal-Cb 89 (altitude 13 feet) at Wades Point an important water-bearing medium-grained sand, 69 feet thick, was encountered between depths of 1,351 feet and 1,420 feet below land surface. The water from the formation had a flowing head, yielding an estimated 8.5 gpm through a 1.5-inch discharge pipe, at an elevation of 19 feet above sea level. The quality of the water, as determined from two analyses, is good. The water is low in dissolved solids (124 to 134 ppm), soft (68 to 70 ppm hardness), low in sodium (4.5 ppm), low in bicarbonate (36 ppm), and low in chloride (2.0 ppm). However, iron (10 to 12.5 ppm) and manganese (0.28 ppm) are very high, and aeration and filtration would be required before the water could be used for most purposes. The water is slightly low in pH (6.3) and warm (69°F).

No well log is available on Dor-Cd 17, but regional considerations indicate that this well, drilled to a depth of 934 feet, yields water from the Raritan formation. The flow was 10 gpm at an elevation about 11 ft. above sea level on June 10, 1940.

The logs of the other four wells do not record enough of the Arundel, Patapsco and Raritan formations to indicate that usable water sands are present. At Easton, Tal-Ce 5 logs 11 feet of a coarse cemented sand in the Raritan(?) at the bottom, but the well was screened and developed in the overlying sand of the Magothy formation. At Trappe, Tal-Ee 8 was logged with variegated clays in the Arundel, Patapsco and Raritan section, 1,169–1,245 feet below land surface. At Cambridge, Dor-Ce 3 was logged with only 5.5 feet of tough, gray clay tentatively considered Raritan. Near Cambridge, Dor-Bd 4 recorded 43.5 feet of red and brown sandy clay, which has been assigned to the Arundel, Patapsco and Raritan formations. There should be over 1,000 feet of these three formations beneath the Cambridge area, with the probability of one or more thick water-bearing sands at depths between 1,000 and 2,000 feet below sea level.

The Arundel, Patapsco and Raritan formations are potential sources of large quantities of warm water at depths ranging from about 1,000 to 3,500 feet below sea level in Caroline, Dorchester and Talbot Counties. They have a broad intake belt from 4 to 12 miles wide, which crosses Maryland from Washington, D. C., to the Elk River in Cecil County. In Wicomico and Worcester Counties to the southeast, the three deep oil tests show these formations at great depth as thick deposits of sand and clay. The sands, though probably discontinuous, are interconnected and coextensive throughout a broad area. However, it is uncertain how far down the dip the water is usable, and also whether good water extends up the dip beneath Chesapeake Bay to the intake area.

Magothy formation

The Magothy formation is the most persistent water-bearing unit of the Cretaceous system in Maryland. It consists of white, yellow, and gray "sugary" sands with irregular lenses of dark clay containing lignite. In Maryland the formation is nonfossiliferous and, presumably, nonmarine. It is underlain unconformably by the Raritan formation, and overlain unconformably by the Matawan or Monmouth formation or marine clays and shales of Paleocene age. Plate 5 is a structure map of the uppermost water-bearing sand of the Magothy formation.

The Magothy formation yields fairly large quantities of water to 7 wells in Dorchester and Talbot Counties (Dor-Bd 4, -Bd 5, -Ce 1, -Ce 3, -Ce 15, -Dd 2; Tal-Ce 5). The Magothy yielded a flow of 12 gpm in 1953 at 15 feet above sea level in the Wades Point well, Tal-Cb 89. It yielded water to Tal-Bf 66, at Cordova, but the well was abandoned, probably because of the high drawdown of 185 feet while pumping 210 gpm.

Pumping tests on the wells are as follows: Dor-Ce 3 of the water company at Cambridge, 436 gpm for 24 hours with a drawdown of 107.5 feet for a specific capacity of 4.4 gpm/ft.; Dor-Ce 15, of the ice company at Cambridge, 200 gpm for 24 hours with a drawdown of 48 feet, for a specific capacity of 4.2 gpm/ft.; Dor-Bd 4 at Horn Point near Cambridge, 30 gpm for 10 hours with a 56 foot drawdown, for a specific capacity of 0.5 gpm/ft.; and Tal-Ce 5, at Easton, about 420 gpm with a 59 foot drawdown, for a specific capacity of 7.1 gpm/ft. These specific capacities are not high, but the wells have several hundred feet of available drawdown to the top of the producing formation, so fairly high yields can be sustained for long periods in properly developed wells.

The static water levels of wells drilled to the Magothy formation have almost all been reported high in the 10 years 1945–1954. Well Dor-Bd 5 flowed until 1945 at an altitude 20 feet above sea level. Well Dor-Bd 4 had a static level 6 feet above land surface, or 21 feet above sea level, in August 1946. Well Dor-Ce 1 at Cambridge flowed at 20 gpm at the land surface (elev. 18 feet), and had a static level 11 feet above land surface in May 1945. Well Dor-Dd 2 at Church Creek had a static water level 12 feet above land surface, or about 15 feet above sea level, when drilled in September 1951. Well Tal-Bf 66, however, at Cordova registered a static level of 90 feet below land surface shortly after it was completed. Well Tal-Ce 5 at Easton measured 9.8 feet below land surface, or about 25 feet above sea level October 8, 1948. The operating level measured 67.3 feet below land surface on January 18, 1949.

The temperatures measured for the waters from the Magothy formation are warm: Tal-Ce 5 at Easton was 78°F in March 1949 from a depth of 1,147 feet; Tal-Cb 89 at Wades Point was 68.5°F on August 3, 1953, from a depth of 980 feet; Dor-Ce 1 at Cambridge was 72°F in April 1946 from a depth of 965 feet; and Dor-Ce 3 at Cambridge was 72°F in October 1948, from a depth of 977 feet.

The quality of ground water from the Magothy formation is in general good: very low in chloride; soft; pH neutral to slightly alkaline; low sulfate; and low to moderate in dissolved solids. In Dorchester County the water is moderate in sodium bicarbonate. In Talbot County the Wades Point well showed a very high iron content (7.7 to 11.0 ppm) in the Magothy formation, but the well at Easton (Tal-Ce 5) was 0.38 ppm, just above the limit recommended by the Public Health Service for iron and manganese together. The water company well at Cambridge, Dor-Ce 3, showed a fluoride content of 1.0 to 1.1 ppm.

The characteristics of the Magothy formation revealed in the well logs in Dorchester and Talbot Counties reflect a formation composed predominantly of white sand with lenses of silty and clayey gray sand, and gray sandy clay, containing wood (probably lignitic). The formation ranges in thickness from 43 feet (Tal-Ce 5) to 139 feet (Tal-Ec 8) and has an average thickness in 6 wells of 88 feet.

A coefficient of transmissibility of 12,000 gpd/ft was determined for the Magothy formation in a recovery test at Easton on well Tal-Ce 5, in January 1949, by R. R. Meyer. The recovery method did not permit determination of the coefficient of storage.

Matawan(?) formation

The Matawan(?) formation functions as an aquifer in Caroline and Talbot Counties, and as an aquiclude in Dorchester County, as indicated by logs of 12 wells penetrating the formation. The Matawan(?) formation consists of black micaceous glauconitic clays and brown glauconitic sands. It contains shells and Foraminifera closely related to those of the Taylor marl of the Gulf Coastal area. It is unconformably underlain in this area by the Magothy formation and conformably overlain by the Monmouth formation.

The Matawan(?) formation has yielded water to 6 wells in Caroline and Talbot Counties: Tal-Bf 66 and 71 at Cordova; Tal-Ce 1 and 3 at Easton; Tal-Ee 8 at Trappe; and Care-Dc 122 at West Denton. At Cordova, Tal-Bf 66 logged 64 feet of fine sand, presumably in the Matawan(?) formation, from 780 to 844 feet below sea level. The well was produced from this section and from the underlying Magothy formation, but was abandoned soon after development, presumably because of excessive drawdown at a pumping rate of 210 gpm. Another well at Cordova, Tal-Bf 71, has been in service since 1940. It is pumped continuously during the canning season and intermittently at other times at a rate of about 185 gpm with a reported deep operating head. The water comes from a screened section of the Paleocene(?) and from an open hole in the Matawan(?) formation at depths from 809 to 862 feet below land surface (elevation 55 feet). At Easton the Matawan(?) produces in conjunction with other aquifers: in Tal-Ce 1, altitude 20 feet, production was from the Monmouth(?) formation at 782–788 feet and from the Matawan(?) formation at 1,000–1,015 feet depths (this well is now an observation well); Tal-Ce 3, altitude 12 feet, produces from the Aquia greensand at about 640-foot depth through an opening in the casing, and from the Matawan(?) formation through a screen set 995–1025 feet below land surface. At Trappe, production in Tal-Ee 8 (altitude 55 feet) is from screened sections of the Eocene series at 407–427 feet and from the Matawan(?) formation at 913–925 feet below land surface. At West Denton production is from the Piney Point formation of the Eocene series through an opening between the 8- and 4-inch casing at 332 feet, and from the Matawan(?) formation screened at 943.5 feet to 965 feet below land surface. The combined yield is only 35 gpm. None of these wells produce from the Matawan(?) formation alone.

A 24-hour pumping test was run on the city well, Tal-Ce 3, at Easton. The gross coefficient of transmissibility determined from drawdown in the pumped well, and including screen loss, was 19,500 gpd/ft. Average rate of pumpage from the two producing sands in this well was 616 gpm. Subsequent observations of mutual interference between Tal-Ce 50, screened in the Aquia greensand, and Tal-Ce 3, indicate that much of the pumpage of Tal-Ce 3 is from the Aquia greensand. The only conclusion that can be drawn is that the coefficient of transmissibility of the Matawan(?) formation is considerably less than 19,500 gpd/ft.

Just as the multiple aquifer production prevents a clear conception of the yield of water from the Matawan(?) formation, so it confuses the analysis of the quality of water from these wells. Several analyses have been made on Tal-Ce 1 and Tal-Ce 3 (Table 32). Tal-Ce 1 was not only screened in the Matawan(?) and Monmouth(?) formations, but had an open casing in the "100-foot" aquifer (Calvert formation) until 1950, when the casing was sealed. The 5 analyses made between 1943 and 1948 show considerable variation in dissolved solids (220 to 526 ppm), pH (7.6 to 8.6) and hardness (14 to 75 ppm), which is understandable in view of the three sources. Similarly, Tal-Ce 3, which draws from the Aquia and Matawan(?) formations, shows a variation in 6 analyses in dissolved solids (198 to 516 ppm), pH (7.8 to 8.6), and hardness (6 to 94 ppm). All the analyses are low in chloride (2.2 to 2.7 ppm) and iron (0.06 to 0.4 ppm). The mixture is predominantly a sodium bicarbonate water.

The temperatures of 75° and 76°F recorded in Tal-Ce 3 would probably represent the deep (1,025-foot) water in the Matawan(?) rather than the less deep (630-foot) water in the Aquia.

The thickness of the sand sections of the Matwan(?) formation in the producing wells ranges from 20 to 64 feet and averages 32 feet.

The Matawan(?) aquifer yields moderate quantities of usable water under conditions of high drawdown, indicating relatively low permeability, and the sand is encountered at depths of about 700 to 900 feet below sea level.

In Dorchester County the Matawan(?) formation is logged in 5 wells, Dor-Bd 4, -Dd 2, -Ce 1, -Ce 3, and -Ce 15) as predominantly a clay (98 to 140 feet in thickness) with thin lenses (not over 15 feet) of fine sand. Only Dor-Cd 17, for which no log is available, may be producing from the Matawan(?) at a reported depth of 900 feet.

The estimated thickness of the Matawan(?) formation logged in wells in the three counties ranges from 98 to 176 feet and averages 128 feet. The top ranges from 687 feet below sea level at Wades Point (Tal-Cb 89) to 940 feet below at Easton (Tal-Ce 1). The trough in central Talbot County on top of the Magothy formation (Pl. 5) and on top of the Cretaceous system (Pl. 3) seems to be reflected on the top of the Matawan(?) formation.

Monmouth formation

The Monmouth formation is a glauconitic green-black silty clay and clayey sand which functions almost entirely as an aquiclude in Caroline, Dorchester, and Talbot Counties. It overlies the Matawan(?) formation conformably and underlies the Paleocene series of the Tertiary system unconformably.

The Monmouth formation is not easy to correlate on the basis of lithology alone. It can be identified on the basis of Foraminifera of Navarro age (a type paleontologic unit in the Gulf Coast) and on distinctive megafossils which are recovered only in fragmentary form in drilled wells. The available paleontologic correlation was restricted to three wells, and the formation was logged in only 12 wells.

The top of the formation is shown on Plate 3 as the top of the Cretaceous system, which ranges from 594 feet below sea level at Wades Point (Tal-Cb 89) to 828 at West Denton (Care-Dc 122). The thickness of the formation ranges from 34 feet (Dor-Bd 4) to 229.5 feet (Tal-Ce 1) and averages 98 feet.

Only one well is believed to be developed in the Monmouth formation in the tricounty area, Tal-Ce 1 at the city of Easton, screened between 782 and 788 feet below land surface. The well was pumped for many years, deriving its principal water from the Calvert formation at about 100 feet and the Matawan(?) formation at about 1,000 feet, and it is not believed that much water was obtained from the Monmouth formation. The chemical analyses of Tal-Ce 1 reflect the mixture of sources. The well was given up as a source of supply in 1950. Although two other deep wells were drilled at Easton (Tal-Ce 3 and -Ce 5), the Monmouth formation was not deemed worthy of further development.

The performance of the Monmouth formation as an aquiclude cannot be evaluated with available information. It is highly glauconitic, and many of the drillers confuse fine to medium glauconitic sands with clay because glauconite is a soft mineral easily pulverized by the drilling tool.

Tertiary System

The most important group of aquifers and the thickest aquicludes of Caroline, Dorchester, and Talbot Counties are in the rocks of the Tertiary system. The Tertiary system in these three counties, from the bottom up, consists of glauconitic sands and clays, buff and tan sands and sandstones, gray diatomaceous silts, blue clays, yellow shell marls, gray sands, and, at the top and not definitely known to be Tertiary, red gravelly sands.

The largest yields of water are obtained under artesian conditions from the olive-brown sands of the "400-foot" aquifer, which supplies Cambridge, Denton, Trappe, and, in small part, Easton, in the Piney Point formation. Another large water-yielding artesian bed is the Aquia greensand, which provides water for Easton, St. Michaels, Oxford, Tilghman, and the northwest corner of Dorchester County. Gray sands in the Calvert formation provide a good source of artesian water for Hurlock, Federalsburg, Easton, and adjacent territory. Sandy marl of the Choptank formation yields water at West Denton and in lower Caroline County. The red gravelly sand of Pliocene(?) age yields water under water-table conditions in the eastern half of the tricounty area.

The aquicludes of the Tertiary system are thick and protect the aquifers from contamination by the brackish waters of Chesapeake Bay and its tidal tributaries. The Calvert formation has a thick section of diatomaceous silt and "blue clay" which protects the aquifer in the Piney Point formation. The green silt and clay of the Nanjemoy formation protect the Aquia greensand. The green and gray clays of the Paleocene series and the Monmouth formation protect sands of the Magothy, Matawan and Raritan formations.

Paleocene Series

The Paleocene series has been identified in 16 well logs in Caroline, Dorchester, and Talbot Counties. It consists of alternate hard and soft beds of gray clay and sparsely glauconitic sand with thin beds of shells and chalk(?) containing Foraminifera of Midway type. It functions as an aquiclude, but it does yield water to a few wells.

Contours of the top of the Paleocene series show two synclinal troughs with axes pitching southeastward at rates of 10 to 18 feet per mile (Pl. 6). The isopach map, Plate 7, indicates that the thickness of the Paleocene ranges from about 70 feet to over 300 feet and averages about 150 feet. Some uncertainty exists in establishing the lithologic breaks which separate the Paleocene series in the subsurface from the overlying Eocene series and the underlying Upper Cretaceous series. Micropaleontological studies of four wells, Tal-Cb 89, Care-Dc 122, Dor-Ce 3, and Dor-Bc 6, were used as a basic guide. The lithologic criteria used to differentiate the Paleocene series are: the overlying Aquia greensand, an olive-green moderately glauconitic quartz sand containing scattered grains of brown pseudomorphic glauconite; the Paleocene series, a gray slightly glauconitic clay and sand with no brown glauconite pseudomorphs; the underlying Monmouth formation, a green, or greenish black, highly glauconitic clay and sand.

In parts of Dorchester and Talbot Counties the Paleocene is represented by a sandy-clay facies of the olive-green sand of the Aquia, suggesting that the lower part of the Aquia greensand straddles the Paleocene-Eocene boundary.

The transitional phase from the Aquia greensand to the Paleocene series was suggested also by the occurrence of the Paleocene form *Marginulina subaculeata* (Cushman), var. *tuberculata* (Plummer) in the sample from 510 to 520 feet, the producing sand at the bottom of the hole in well Dor-Bc 6 at Cornersville (Shifflett, 1948, p. 26). Water is produced at about this same depth in many other wells in northwestern Dorchester County from an aquifer traced semicontinuously to the outcrop of the Aquia greensand. Comparison of the lithologic sediment log of Dor-Bc 6 with the other sediment logs shows the olive-green sand facies is absent and its place is taken by the greenish-gray sand and clay facies in the Cornersville area and farther east, at Cambridge, in Dor-Ce 3, only the greenish-gray clay facies is present.

The five wells considered producing from sands of the Paleocene series are Dor-Bc 3, 5, 6, and 10 and Tal-Ed 4. These wells are on the necks of land near the mouth of the Choptank River. The only measured yield is from Tal-Ed 4, which was tested at 30 gpm for 6 hours with a drawdown of 31.5 feet, or a specific capacity of about 1 gpm/ft. The static water level in this well was 8.5 feet below land surface or 1.5 feet below sea level, on August 10, 1950. Dor-Bc 5 was reported flowing October 16, 1951. Therefore, the pressure head in the formation remains high. A single chemical analysis on Dor-Bc 5, indicates a formation water which is soft, nonirony, but high in sodium bicarbonate.

The sands of the Paleocene series may be considered to derive recharge from the Aquia greensand and to compose a single aquifer with it. The sands appear to be confined to a small area near the mouth of the Choptank River. Elsewhere, the Paleocene series functions as an aquiclude.

Eocene Series

The Eocene sediments include the major water-bearing beds in use in Caroline, Dorchester, and Talbot Counties. The Eocene series consists of three formations: the Aquia greensand, an important aquifer in the western half of the area; the Nanjemoy formation, a greensand and clay aquiclude; and the Piney Point formation, the major aquifer of the area.

Aquia greensand

The Aquia greensand is a green quartz sand, moderately glauconitic, with a few lenses of yellow and green clay, shell fragments, and occasional hard beds. The sands predominate and are commonly coarse to medium in grain size. The formation contains diagnostic Foraminifera of Wilcox age. The predominant color is olive-green, although drillers mention white, brown, greenish-black, and black.

Most samples contain a few scattered grains which have the reniform or botryoidal shape of glauconite but are brown instead of green-black in color. The crushed grain gives a yellow-brown streak, characteristic of limonite. Hard colorless portions of these grains are quartz. The grains are weathered glauconite grains, which serve to distinguish the Aquia greensand from the underlying greenish sands and clays of Paleocene age, and from the overlying Nanjemoy formation.

The Aquia greensand is an important aquifer in western Talbot County and northwestern Dorchester County. Table 12 summarizes the static water level and pump tests of 114 wells. The wells ranged in yield from 4 gpm to 362 gpm, and had specific capacities ranging from 0.1 to 20 gpm per foot of drawdown. The average specific capacity (omitting those tests in which zero draw-

TABLE 12

Water Level, Yield, Capacity, and Completion of Wells in the Aquia Greensand

Well number	Static water level			Well Test				Completion (open hole or screen)	
	Feet above or below datum		Date of measurement	Drawdown (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
	Land surface	Sea level							
Tal-Bb 1	−6	+9	Oct. 17, 1951	6	4	17.5	2.9	OH	37
2	−14	+1	Aug. 30, 1953	11	4	13	1.2	OH	31
Bc 1	−8.2	+0.8	Oct. 14, 1950	20	6	36	1.8	OH	21
2	−11	−2	Jan. 29, 1953	15	4	15	1.0	—	—
3	−13	0	Oct. 6, 1950	17	6	28	1.6	Sc	21
4	−12	0	Nov. 18, 1946	8	12	20	2.5	Sc	8
Cb 1	−7	+1	Mar. 11, 1949	32	6	35	1.1	OH	6
2	−8.5	−0.5	Mar. 23, 1948	8.5	11.5	12	1.4	Sc	20
3	−6	+4	Sep. 5, 1951	8	4	22	2.8	OH	57
5	−13	+2	Aug. 28, 1948	20	6	40	2.0	OH	48
6	−12	+2	Sep. 10, 1948	16	8	25	1.6	Sc	
11	−8	+4	Feb. 7, 1948	12	4	20	1.7	OH	35
13	−7	+1	Sep. 5, 1951	8	6	18	2.3	Sc	30
14	−6	+2	Mar. 20, 1948	14	4	23	1.6	OH	38
20	−4	+3	Apr. 3, 1946	17	6	18	1.1	OH	32
26	−4	+4	Feb. 26, 1952	5	4	18	3.6	OH	20
29	−8.5	+2.5	Jan. 21, 1952	11.5	6	20	1.7	OH	230
30	−8	−1	May 31, 1946	26	6	50	1.9	OH	33
31	−7	+1	Jan. 17, 1948	8	6	15	1.9	OH	20
37	−3	+1	Jan. 30, 1948	19	4	22	1.2	OH	20
39	−6	+2	Mar. 1, 1948	9	6	10	1.1	OH	12
42	−5	+5	Aug. 9, 1945	6	3	16	2.7	—	—
47	−7	+5	Feb. 2, 1948	7	4	17	2.4	OH	20
48	−5	−2	Feb. 14, 1948	10	4	22	2.2	OH	60
49	−15	−3	Oct. 30, 1949	15	4	20	1.3	OH	30
50	−6	+2	Mar. 6, 1946	6	5	15	2.5	OH	74
51	−9	+3	Nov. 28, 1951	16	10	15	0.9	OH	52
Tal-Cb 52	−5	+7	Feb. 18, 1952	11	4	12	1.1	OH	36
56	−8	+1	Sep. 14, 1951	8	4	10	1.3	OH	20
57	−6	+4	Mar. 6, 1947	12	4	10	0.8	OH	20
58	−6	+4	Mar. 7, 1947	16	4	20	1.3	OH	20
60	−5.5	−.5	Sep. 18, 1951	4.5	4	12	2.7	OH	20
63	−6	+4	May 19, 1951	10	4	18	1.8	Sc	20
65	−8	+2	May 11, 1946	19	5	20	1.1	OH	50
66	−8	+2	May 7, 1946	19	6	22	1.2	OH	45
67	−11	+1	Sep. 6, 1947	14	4	15	1.1	OH	46
69	−5	+3	May 17, 1946	17	5	21	1.2	OH	33
72	−6	0	Sep. 22, 1951	11	4	9	0.8	OH	20

TABLE 12—*Continued*

Well number	Static water level			Well Test				Completion (open hole or screen)	
	Feet above or below datum		Date of measurement	Drawdown (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
	Land surface	Sea level							
74	−4	+6	Apr. 27, 1946	14	5	21	1.5	OH	40
75	−10	0	Oct. 2, 1952	6	6	15	2.5	—	—
78	−7	+3	Mar. 25, 1948	13	4	25	1.9	OH	35
79	−6	+4	Feb. 3, 1947	16	4	22	1.4	OH	21
81	−8	+3	Feb. 21, 1948	7	3	22	3.1	OH	45
82	−8	+3	Apr. 19, 1947	14	15	4	2.9	OH	42
84	−6	+4	Dec. 10, 1948	6	10	25	4.2	OH	31
85	−8	−5	Feb. 18, 1947	22	6	25	1.1	Sc	10
88	−1.74[m]	+.26	Jun. 2, 1953					Sc	20
	−2.27[m]	−.27	Sep. 11, 1953	12.5	8	30	2.4	OH	39
90	−8	0	Sep. 24, 1947	12	4	15	1.3	OH	40
Cc 2	−7	+1	Sep. 17, 1948	23	18	25	1.1	OH	87
12	−12	−4	Mar. 29, 1946	6	12	30	5.0	Sc	12
14	−6.1	−2.1	Dec. 12, 1951	34	6	30	0.9	Sc	15
15	−6.5	−2.5	Sep. 20, 1952	18.5	4	15	0.8	Sc	20
17	−11.5	−3.5	May 28, 1948	23.5	10	35	1.5	Sc	20
18	−4	+1	Oct. 17, 1947	56	10	50	0.9	Sc	10
19	−9.5	−3.5	Jan. 12, 1946	40.5	6	45	1.1	Sc	5
Tal-Cc 20	−5	+5	Jun. 15, 1946	3	36	30	10	—	—
26	−9	−4	Nov. 3, 1947	21	6	30	1.4	Sc	10
Cd 18	−14.5	−2.5	Mar. 9, 1950	10	6	15	1.5	Sc	20
32	−12	−4	Nov. 27, 1948	8	10	30	3.8	Sc	30
Ce 50	−29	−9	Jan. 24, 1952	167	24	362	2.2	Sc	53
Db 38	−9	−4	May 6, 1950	46	10	100	2.2	Sc	20
41	−2	+3	Mar. 25, 1946	103	24	100	1.0	Sc	25
Dc 2	−8	−2	Jan. 10, 1949	21	10	46	2.2	Sc	19
16	−6.5	+1.5	May 16, 1946	37	6	30	0.8	Sc	10
Dd 1	−6.5	−.5	Nov. 22, 1947	43.5	6	40	0.9	Sc	15
5	−22.5	−17.5	Nov. 21, 1946	22.5	6	20	0.9	Sc	20
7	−7	+3	Apr. 25, 1947	23	6	25	1.1	Sc	10
9	−7	−1	Aug. 11, 1948	23	8	30	1.3	Sc	9
10	−11.5	−1.5	Jun. 19, 1951	19.5	6	12	0.6	Sc	20
13	−10	−1	Mar. 7, 1952	10	6	10	1.0	Sc	16
14	−13.7	−5.7	May 25, 1951	23.3	8	15	0.6	Sc	15
15	−9.7	−.7	Mar. 1951	20	6	10	0.5	Sc	15
21	−20	−8	Apr. 14, 1951	16	8	15	0.9	Sc	10
22	−10.2	+1.8	Jan. 10, 1950	10.7	6	15	1.4	Sc	21
23	−12.5	−2.5	Aug. 17, 1951	27.5	8	25	0.9	Sc	15
24	−18	0	Mar. 17, 1952	32	6	20	0.6	Sc	10

TABLE 12—*Continued*

Well number	Static water level: Feet above or below datum: Land surface	Static water level: Feet above or below datum: Sea level	Static water level: Date of measurement	Well Test: Drawdown (feet)	Well Test: Period (hours)	Well Test: Rate (gpm)	Well Test: Specific capacity (gpm per ft.)	Completion (open hole or screen): Type	Completion (open hole or screen): Feet
26	−22.8	−14.8	Oct. 1, 1951	42	8	12	2.9	Sc	15
28	−9	+7	Aug. 18, 1949	20	6	20	1.0	—	—
29	−6	+8	Apr. 4, 1947	34	6	25	0.7	Sc	10
30	−24	−6	Apr. 2, 1947	10	12	40	4.0	Sc	12
33	−27	−8	May 12, 1951	29	10	15	0.5	Sc	15
35	−16.4	−10.4	Aug. 20, 1949	20.6	8	33	1.6	Sc	22
36	−16	−10	May 9, 1951	14	10	18	1.3	Sc	10
De 9	−30	−2	Apr. 2, 1947	3	6	18	6.0	Sc	10
11	−27	−7	Nov. 24, 1951	83	6	25	0.3	Sc	15
Dor-Bb 2	−2	+2	Oct. 25, 1949	61	7	9	0.1	—	—
3	−2	+3	Nov. 27, 1949	61	8	10	0.2	—	—
4	−2	+2	Jul. 26, 1948	8	6	15	1.8	—	—
6	−2	+1	Jul. 31, 1948	4	7	15	3.8	OH	21
10	−6	−1	Oct. 6, 1950	0	6	15	?	—	—
Bc 1	−3	+1	Aug. 19, 1949	81	8	10	0.1	OH	—
2	−2	+1	Nov. 6, 1951	0	8	16	?	Sc	6
4	−2	+3	Nov. 10, 1949	6	6	10	1.7	Sc	6
14	0	+3	May 19, 1947	0	6	25	?	Sc	6
15	−3	+3	Nov. 28, 1947	0	4	20	?	Sc	5
16	−2	+3	Jun. 18, 1947						
	4.12[m]	+.88	Oct. 24, 1951	0	7	22	?	Sc	6
17	−4	0	Apr. 27, 1950	0	6	16	?	Sc	6
19	−5	+1	May 15, 1949	10	4	23	2.3	Sc	20
21	−2	+1	May 29, 1949	0	6	10	?	—	—
Bd 9	−1.5	+3.5	Oct. 18, 1947	0	6	10	?	Sc	8
Cb 1	0	+5	Dec. 10, 1949	60	8	10	0.2	OH	—
2	−4	−1	Aug. 5, 1949	0	10	10	?	OH	—
3	−2	+4	Sep. 18, 1948	6	6	15	2.5	OH	32
Cc 6	—	—	—	0	6	18	?	Sc	6
16	−2	+4	Sep. 20, 1947	0	6	15	?	Sc	6
18	−4	+1	Sep. 11, 1947	0	4	20	?	Sc	6
19	−2.16[m]	+1.84	Oct. 24, 1951	3	10	20	6.8	Sc	16
24	0	+3	Nov. 16, 1950	1.5	6	30	20	Sc	20
27	−35	−32	Jun. 8, 1951	2	10	10	5	OH	—
28	−3	0	Oct. 18, 1951	0	12	8	?	OH	—
29	−42	−38	Nov. 8, 1948	4	10	25	6.3	OH	62
31	−1	+3	Sep. 9, 1950	0	6	10	?	OH	—
Cd 18	−7	+3	Dec. 20, 1949	77	12	12	0.2	OH	—
22	−7	+8	Sep. 15, 1951	0	30	15	?	OH	—

[m] Measured water level; others are reported levels.

down was reported) of 99 wells is 2.0 gpm per foot. This is a relatively low specific capacity and indicates that high rates of yield cannot be attained without large drawdown. Since the top of the producing sand is several hundred feet below land surface, and since the head remains high in the aquifer, there are several hundred feet of available drawdown. The artesian head in the Aquia was close to, or a few feet above, sea level throughout the area in the period 1945–1954.

The Aquia greensand ranges in thickness from 231 feet at Wades Point (Tal-Cb 89), northwestern Talbot County, to zero at Cambridge (Dor-Ce 3). The greensand wedges out to the southeast along a line which trends northeast (Pl. 8). The top of the formation dips from 255 feet below sea level at Wades Point to 605 feet below sea level at the edge of the wedge-out, about 4 miles west of Cambrige. The rate of dip is about 25 feet per mile.

Hydrologically the Aquia greensand is a sharply outlined aquifer with the relatively impervious Nanjemoy formation above and the Paleocene clay below in the down-dip direction that lies between two subparallel boundaries, one a recharge boundary at the outcrop extending northeasterly through Annapolis on the Western Shore and the other an impermeable boundary extending northeasterly through Trappe, Talbot County. These boundaries are about 30 miles apart. For hydrologic analysis in this area, the Aquia aquifer may be considered infinite along the strike, that is, northeast and southwest.

The coefficients of transmissibility and storage are unknown. Although the specific capacities of the wells listed in Table 12 are low, most were developed only for domestic purposes. They usually represent only partial penetration of the aquifer and inexpensive methods of development and screening. As a first approximation a $T = 5{,}000$ gpd/ft. and an $S = 0.0004$ might be assumed.

Analyses of water from the Aquia greensand indicate a water at most places usable for many purposes. The waters are, in general, moderately high in sodium bicarbonate, low in iron, and slightly alkaline. Dissolved solids range from 214 ppm (Tal-Cb 91) to 502 ppm (Dor-Cd 23). Hardness ranges from 2 ppm (Dor-Cd 18) to 178 ppm (Tal-Bb 3). Chloride is low, except in western Talbot County, in the Bb, Cb, and Db quadrangles, where it ranges from 14 ppm (Tal-Cb 91) to 90 ppm (Tal-Db 19). This higher chloride may be the first indication of the intrusion of brackish water from Chesapeake Bay. The intake belt of the Aquia greensand crosses the bay in the vicinity of the bay bridge (Greiner, 1948, Pl. 6).

Nanjemoy formation

The Nanjemoy formation is a blackish-green glauconitic sand, silt, and clay. Glauconite usually comprises more than 50 percent of the constituents, and may be as much as 90 percent. The formation is little used as an aquifer; it functions as a leaky aquiclude.

The Nanjemoy formation is logged in 174 wells in Dorchester and Talbot Counties and in 2 wells in Caroline County. The formation was absent in two wells in northern Caroline County, so it may wedge out in the eastern part of the area. Only four wells in Caroline County were drilled deep enough to reach the Nanjemoy formation and it was not reached in any wells in eastern Dorchester County.

The formation gradually changes from a sandy facies along the western part of the area to a silt and clay facies in the east. It ranges in thickness in the 176 wells from 34 to 294 feet in an irregular manner. The base of the formation is fairly regular. The top is much less regular and seems to have suffered valley erosion before deposition of the overlying Piney Point formation. The Nanjemoy formation attains its greatest thickness in the Talbot County Dd quadrangle (Oxford and Baileys Neck area), ranging there from 150 to 290 feet thick, and in that quadrangle the Piney Point formation is relatively thin. The average thickness recorded for the Nanjemoy formation in 167 wells which penetrate the aquiclude is 166 feet.

The top of the Nanjemoy formation slopes with the regional Tertiary homocline toward the southeast. It is encountered at −75 feet sea level datum in Tal-Bb 2 at Claiborne and at −506 feet in Dor-Ed 8 at Andrews.

The Nanjemoy formation is not known to yield water independently to wells. In Tal-Cc 27, -Dc 3, and -Dc 43, it yields water to holes open in the overlying formations. Two abandoned wells, Dor-Bc 29 and 30, are reported to have produced from the Nanjemoy formation. Dor-Cc 21 is producing from the Nanjemoy and/or the Paleocene series. In the many other wells drilled through the Nanjemoy formation, the drillers did not attempt to develop wells in it. This may be due to the plastic character of wet glauconite grains, which are easily crushed together, and then behave like a ball of clay.

The outcrop belt of the Nanjemoy formation is limited to the Western Shore. The sandy nature of the Nanjemoy formation in the northwestern portion of the area may make it sufficiently permeable to transmit water down dip from the intake belt of the Aquia greensand to the overlying Piney Point formation which is not known to have an intake belt of its own.

Piney Point formation

The Piney Point formation is an extensive quartz sand, slightly to moderately glauconitic, ranging from brown, olive-green, to green in color. It is believed to underlie all of Caroline, Dorchester, and Talbot Counties, although in several places on the eastern side of the area it has not yet been proved by the drill. The top of the formation dips southeasterly at an average rate of 29 feet per mile. It occurs about 100 feet below sea level beneath the northwest corner of the area and about 600 feet beneath the southeast margin.

The Piney Point formation is the major aquifer in the tricounty area, providing an estimated 1.9 billion gallons a year from an estimated 2,300 wells

(456 wells are scheduled). The formation ranges from 2 to 191 feet in thickness and averages 74 feet. It has a fairly regular top, but an uneven base.

It is underlain in the western half of the area by the Nanjemoy formation, which appears sufficiently permeable in the northwestern part of the area to pass recharge up from the Aquia greensand. In the northeastern part of the area, in northern Caroline County, the Piney Point appears to be directly underlain by the Aquia greensand, and therefore capable of indirect recharge from the outcrop of the Eocene series.

The Piney Point formation is overlain by the Calvert formation of Miocene age. In portions of the area, the Calvert is represented by a basal sand, fine- to medium-grained, which probably functions with the Piney Point as an aquifer. This sand is overlain by a thick ash-colored diatomaceous silt, with beds of clay. Where the sand is absent, the silt overlies the Piney Point directly. The silt functions as an aquiclude, though probably a leaky one.

The Piney Point formation ranges widely in capacity as well as in thickness (Table 13). The average specific capacity of 92 wells in Talbot County is 1.65 gpm per foot of drawdown; the average specific capacity of 69 wells in Dorchester County is 10.1 gpm per foot; and 2 wells in Caroline County have an average of 1.25 gpm per foot. The range in specific capacity is 0.2 to 88.3 gpm per foot, and the average for the 3 counties is 5.2 gpm per foot. Although the partial penetration of the aquifer and the short period of development of many of the wells may be the reason for some of the lower specific capacities, they are, in a general way, an indication of the permeability and the transmissibility of the aquifer.

An aquifer test at Cambridge gave a coefficient of transmissibility of 45,000 gpd per foot and a coefficient of storage of 0.00037 for the Piney Point formation.

The pumping of several hundred wells in Dorchester and Talbot Counties, particularly the municipal and industrial pumping at Cambridge (about 1 billion gallons a year), has created a huge cone of depression in the potentiometric surface. In 1888, when the first well was drilled to the aquifer, flowing wells were obtained at altitudes 20 feet above sea level. In November 1953, water in wells in Cambridge had declined to levels more than 100 feet below sea level, and in some pumped wells to more than 160 feet. Plate 9 shows this cone of depression with a radius of influence of more than 20 miles. The cone has higher water levels for equal radial distances to the northwest than to the northeast and southwest, indicating probable recharge from the northwest, presumably from intake in the outcrop of the Eocene series. The cone is somewhat elongated to the north due to secondary centers of pumpage at Trappe and Denton. Although this cone of depression is deep, about 250 feet of drawdown is still available in the Cambridge area before the sand begins to unwater.

The Piney Point formation is limited by a recharge boundary about 33 miles

TABLE 13

Water Level, Yield, Capacity, and Completion of Wells in the Piney Point Formation

Well number	Static water level			Well test				Completion (open hole or screen)	
	Feet above or below datum		Date of measurement	Draw-down (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
	Land surface	Sea level							
Tal-Bd 21	−8	+6	Oct. 5, 1951	22	6	12	0.5	Sc	15
Cb 7	−8	0	Sep. 7, 1951	12	4	16	1.3	OH	63
8	−8	−1	Sep. 27, 1951	13	4	10	0.8	OH	51
9	−8	−1	Nov. 19, 1951	11	5	15	1.4	OH	71
12	−8	−3	Dec. 16, 1947	7	3	10	1.4	OH	57
15	−7	+3	Sep. 26, 1952	12	4	15	1.3	OH	69
19	−6	+1	Apr. 12, 1946	24	3	12	0.5	OH	70
21	−9	+1	Sep. 25, 1951	12	4	11	0.9	OH	54
24	−4	+6	Dec. 12, 1947	7	3	10	1.4	OH	63
32	−5	+3	Dec. 22, 1947	10	3	12	1.2	OH	63
45	−5	−2	May 10, 1951	13	5	13	1.0	OH	57
87	−7	+1	Sep. 24, 1952	12	5	14	1.2	OH	69
Cc 7	−8	−3	Mar. 31, 1949	12	8	25	2.1	OH	130
30	−2	+10	Feb. 4, 1946	10	10	20	2.0	OH	56
31	−7	+5	May 10, 1940	13	6	40	3.1	OH	57
Cd 12	−11.5	+0.5	Sep. 17, 1947	13.5	8	20	1.5	OH	118
14	−9.5	+2.5	Oct. 27, 1947	15.5	10	50	3.2	OH	114
24	−8.6	−0.6	Oct. 21, 1950	18.3	10	20	1.1	OH	115
25	−9.8	−1.8	Apr. 9, 1946	10.75	6	30	2.8	OH	100
26	−12	−3	Jun. 30, 1950	18	4	20	1.1	OH	103
30	−11	−3	Aug. 30, 1950	59	8	30	0.5	OH	114
34	−9	+5	Oct. 25, 1951	21	6	15	0.7	Sc	15
41	−4.5	+7.5	Nov. 15, 1947	10.5	8	18	1.7	OH	76
43	−7	+6	Dec. 31, 1945	7	8	20	2.9	OH	76
45	−7	+5	Oct. 17, 1952	11	4	25	2.3	OH	37
Da 1	−4	−1	Feb. 16, 1950	8	4	15	1.9	OH	84
2	−6	−1	Mar. 1, 1950	8	3.5	14	1.8	OH	84
3	−9	+1	Mar. 30, 1950	14	4	10	0.7	OH	95
Da 4	−10	−2	May 15, 1951	11	4	28	2.5	OH	95
7	−6	+2	Nov. 26, 1945	14	6	20	1.4	OH	90
8	−3	+6	Dec. 6, 1946	12	3	21	1.8	OH	100
9	−6	+2	Apr. 22, 1946	14	3	15	1.1	OH	104
10	−12.19[m]	−4.19	Jun. 2, 1953	9	3	15	1.7	OH	90
12	0	+4	Jul. 1949	10	4	10	1.0	—	—
13	−12	−7	Mar. 4, 1948	8	3	10	1.3	OH	95
14	−9	−4	Aug. 27, 1947	11	4	15	1.4	OH	95
16	−5	0	Apr. 18, 1946	20	4	16	0.8	OH	110
17	−8	−2	Sep. 11, 1947	12	2	19	1.6	OH	100
18	−9	−1	Aug. 24, 1951	12	4	14	1.2	OH	105

TABLE 13—*Continued*

Well number		Static water level			Well test				Completion (open hole or screen)	
		Feet above or below datum		Date of measurement	Draw-down (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
		Land surface	Sea level							
Tal-	19	−8	0	Dec. 5, 1949	12	3.5	10	0.8	OH	95
	21	−10	−2	Aug. 22, 1951	12	4	13	1.1	OH	105
	22	−8	0	Sep. 20, 1952	13	4	10	0.8	OH	105
	23	−9	−1	Sep. 1, 1951	13	4	13	1.0	OH	105
	24	−9	−1	Jan. 3, 1947	11	4	12	1.1	OH	105
	25	−8	0	Aug. 30, 1951	11	4	14	1.3	OH	105
	26	−10.5	−0.5	Nov. 25, 1948	4.5	4	5	1.1	OH	100
	27	−8	−3	Mar. 5, 1950	15	4	12	0.8	OH	105
	28	−14	−8	Feb. 2, 1947	8	3	12	1.5	OH	120
	29	−8	−3	May 6, 1951	14	3	12	0.9	OH	105
	30	−12	−6	Dec. 23, 1949	13	4	10	0.8	OH	105
	31	−10	0	Feb. 12, 1950	13	4	12	0.9	OH	105
	32	−11.06[m]	−1.06	Apr. 23, 1953	18	3.5	16	0.9	OH	96
	34	−11	−3	May 23, 1951	13	4	12	0.9	OH	105
	35	−12	−2	Nov. 20, 1948	9	4	12	1.3	OH	100
	36	−10	0	Dec. 10, 1949	12	3	11	0.9	OH	105
	37	−13	−3	Jan. 10, 1947	9	3	14	1.6	OH	120
	38	−14	−4	Jan. 18, 1947	8	3	13	1.6	OH	100
	39	−12	−2	Mar. 20, 1948	10	3	24	2.4	OH	105
Db	24	−8	+2	Sep. 29, 1951	12	4	12	1.0	OH	79
	25	−7	0	Feb. 6, 1951	9	6	12	1.3	OH	73
	26	−8	−3	Aug. 25, 1950	10	4	20	2.0	OH	53
	27	−10	−4	Aug. 30, 1950	12	6	10	0.9	OH	64
	28	−10	−4	Sep. 5, 1950	12	4	18	1.5	OH	50
	30	−8.99[m]	+3.01	Mar. 17, 1953	10	5	22	2.2	OH	76
		−10.27[m]	+1.73	Sep. 11, 1953	10	5	22	2.2	OH	76
	31	−6	+1	Aug. 1951	9	4	13	1.4	OH	84
	32	−6	0	Apr. 1946	20	3	15	0.8	OH	100
	35	−3	0	Dec. 1946	15	4	18	1.2	OH	100
	36	−4	+2	Dec. 1945	14	4	17	1.2	OH	90
	37	−6	−1	Mar. 22, 1946	9	4	12	1.3	OH	100
	43	−7	−2	Mar. 17, 1951	11	4	18	1.6	OH	102
	49	−7	+5.5	Aug. 10, 1951	10	4	12	1.2	OH	84
	50	−8	+4	Aug. 12, 1951	12	4	12	1.0	OH	84
	51	−7	+3	Jun. 2, 1951	9	6	32	3.5	OH	101
	52	−8	+4	Mar. 15, 1951	11	4	30	2.7	OH	56
	57	−8	−2	Apr. 10, 1951	13	4	12	0.9	OH	105
	58	−14	−9	Nov. 20, 1946	8	5	10	1.3	OH	110
Dc	5	−4	+4	Nov. 6, 1945	1.75	8	20	11.4	OH	145
	10	−13	−5	Jan. 24, 1950	3	6	20	6.6	OH	104
	31	−4.5	+3.5	Aug. 25, 1947	5.5	4	35	6.4	OH	82

TABLE 13—*Continued*

Well number	Static water level			Well test				Completion (open hole or screen)	
	Feet above or below datum		Date of measurement	Draw-down (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
	Land surface	Sea level							
Tal-Dd 4	−11.5	+3.5	Jan. 2, 1948	18.5	6	10	0.5	Sc	8
16	−41	−31	Sep. 5, 1951	29	6	15	0.5	OH	97
De 6	−65	−25	Jan. 15, 1952	2	8	18	9.0	—	—
10	−33	−23	Mar. 5, 1951	18	10	40	2.2	OH	271
12	−65	−25	Jun. 16, 1950	35	6	25	0.7	OH	18
Df 1	−36	+4	May 31, 1949	22	8	18	0.8	OH	20
Ed 1	−59.5	−49.5	Oct. 2, 1948	15.5	8	25	1.6	Sc	20
Ed 3	−46	−41	Dec. 20, 1947	20	6	10	0.5	—	—
5	−46.6	−36.6	Nov. 8, 1950	23	8	15	0.7	OH	21
7	−42.53[m]	−27.53	May 15, 1952	13	6	10	0.8	Sc	20
Ee 17	−64	−50	Aug. 20, 1949	16	10	13	0.8	Sc	25
19	—	—	—	12	6	7.5	0.6	—	—
Dor-Bd 6	−60	−52	Nov. 24, 1948	17	10	18	1.1	OH	185
8	−69	−54	May 22, 1948	6	14	15	2.5	OH	39
Cc 3	−30	−27	Nov. 1, 1947	5	10	15	3.0	OH	45
4	−17	−13	Aug. 23, 1951	6	5	14	2.3	OH	61
5	−37	−35	May 5, 1951	5	5	25	5.0	OH	48
13	−43	−40	Aug. 3, 1949	5	14	18	3.6	OH	53
Cc 26	−36	−33	Jun. 1, 1949	7	10	20	2.9	OH	54
Cd 6	−64.6	−52.6	Aug. 6, 1951	0	8	8	?	—	—
11	−60	−48	Nov. 17, 1949	0	8	12	?	OH	—
12	−68	−56	Jun. 13, 1950	2	8	10	5.0	OH	20
27	−33	−29	Aug. 10, 1950	0	8	10	?	OH	
32	−38	−32	May 11, 1948	0	8	15	?	OH	37
35	−42	−37	Mar. 22, 1948	13	4	18	1.4	OH	39
36	−55	−51	May 7, 1951	0	8	18	?	OH	30
39	−39	−36	Jan. 15, 1947	0	8	15	?	OH	20
Ce 2	−102[m]	−87	Jun. 28, 1951	79	35	625	7.9	—	—
12	−83.5	−65.5	Jul. 3, 1947	28	24	350	12.5	Sc	51
13	−88.5	−70.5	Oct. 23, 1947	56.5	24	350	6.2	Sc	51.5
28	−75	−50	Apr. 10, 1950	25	8	20	0.8	OH	41
29	−76	−51	Apr. 11, 1950	64	15	12	0.2	—	—
30	−76	−61	Nov. 8, 1949	8	15	20	2.5	OH	47
34	−75	−51	Jun. 1, 1950	10	5	20	2.0	OH	55.5
35	−70	−45	May 8, 1950	60	15	12	0.2	—	—
39	−69	−55	Jul. 10, 1947	20	8	20	1.0	OH	35
40	−76	−51	Oct. 25, 1949	8	15	20	2.5	OH	47
41	−60	−35	Sep. 6, 1948	13	5	15	1.2	OH	30
42	−60	−40	Jan. 18, 1950	12	6	25	2.1	OH	—
43	−76	−53	Jul. 7, 1950	0	24	10	?	—	—

TABLE 13—*Continued*

Well number		Static water level			Well test				Completion (open hole or screen)	
		Feet above or below datum		Date of measurement	Draw-down (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
		Land surface	Sea level							
Dor-	61	−98	−83	Mar. 27, 1952	7	24	580	82.9	Sc	50
	62	−109	−94	Jun. 25, 1952	85	24	513	6.0	OH	57.5
Db	1	−14	−10	Jan. 21, 1949	10	5	21	2.1	OH	35
	14	−11	−7	Oct. 1, 1951	12	5	8	0.7	OH	60
	15	−13	−8	Aug. 15, 1953	0	20	15	?	OH	—
Dd	1	−30	−26	Jan. 8, 1950	6	7	30	5.0	OH	24
	3	−30	−27	Sep. 25, 1949	9	8	30	3.3	OH	28
	4	−45	−39	Apr. 15, 1949	5	8	22	4.4	OH	47
De	1	−46	−40	Dec. 8, 1949	14	5	22	1.6	OH	51
Ec	1	−11.5	−6.5	Jun. 29, 1948	3.5	3	309	88.3	OH	47
	2	−19	−13	May 30, 1949	7	5	25	3.6	OH	35
	3	−16	−13	Jun. 6, 1950	9	5	28	3.1	OH	59
	4	−20	−17	Nov. 23, 1949	18	4	25	1.4	OH	35
	5	−20	−17	Nov. 15, 1950	3	3	30	10.0	OH	32
	17	−20	−15	Jan. 10, 1947	4	2	28	7.0	OH	47
Ed	4	−17.06[m]	−14.06	Sep. 13, 1951	6	5	30	5.0	OH	43
	5	−16	−13	May 3, 1947	1	2	30	30.0	OH	62
	7	−16	−14	Feb. 21, 1948	9	12	18	2.0	OH	62
	9	−18	−15	Oct. 24, 1949	17	8	21	1.2	OH	46
	10	−15	−13	Mar. 1, 1951	7	7.5	20	2.9	OH	87.5
	11	−19	−16	Jan. 27, 1947	3	3	28	9.3	OH	42
	12	−16	−13	Jul. 10, 1948	4	6	25	6.3	OH	50
	13	−16	−13	May 1, 1947	1	3	30	30.0	OH	55
	14	−19	−16	Aug. 31, 1950	2	4	25	12.5	OH	55
Fc	1	−6	+1	Apr. 14, 1947	1	3	25	25.0	OH	34
	11	−13.18[m]	−9.18	Nov. 8, 1951	0	6	14	?	OH	—
	25	−16	−12	Jun. 15, 1950	0	8	14	?	OH	40
Fd	7	−3	−1	Dec. 10, 1947	0	3	15	?	OH	30
	8	−15	−12	Mar. 12, 1948	0	6	15	?	OH	65
	9	−8.79[m]	−3.79	Nov. 14, 1951	3	14	25	8.3	OH	35
	12	−8.5	−4.5	Feb. 1, 1947	1.5	7	28	18.7	OH	54
	15	−2	+2	Mar. 19, 1949	5	7	20	4.0	OH	79
Fe	1	−3	0	Jun. 16, 1947	1.5	5	20	13.3	OH	100
Fe	2	−3	0	May 28, 1947	1.5	3	30	20.0	OH	42
	3	−6	−3	Aug. 12, 1948	6	5	22.5	3.8	OH	20
	4	−8	−6	Jan. 30, 1950	8	3	22	2.8	OH	47
	12	−4	−2	Oct. 31, 1949	14	5	18	1.2	OH	54
	13	−3	−1	Nov. 10, 1949	15	3	25	1.7	OH	45
	14	−5.37[m]	−3.37	Nov. 14, 1951	0	6	20	?	OH	—
	15	−5	−1	Apr. 10, 1948	0	4	15	?	OH	67

TABLE 13—*Continued*

Well number	Static water level			Well Test				Completion (open hole or screen)	
	Feet above or below datum		Date of measurement	Draw-down (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
	Land surface	Sea level							
Dor- 16	−15	−11	Mar. 20, 1948	0	6	20	?	OH	74
17	−2	+1	Jan. 10, 1949	5	2	28	5.6	OH	45
18	−1.5	+1.5	Dec. 9, 1947	2.5	3	25	10.0	OH	40
19	−2	+1	Jun. 12, 1950	10	4	25	2.5	OH	48
20	−7	−4	Dec. 1, 1950	5	3	25	5.0	OH	30
21	−3	0	Jun. 9, 1947	0.5	6	20	40.0	OH	62
22	−2	+1	Nov. 18, 1949	16	2	25	1.6	OH	50
23	−3	−1	May 9, 1947	2.5	4	30	12.0	OH	36
24	−3	0	Jun. 3, 1947	0.5	5	25	50.0	OH	69
28	−4	−1	Oct. 2, 1951	0	8	17	?	OH	29
30	−3	+1	Jun. 29, 1951	2	20	25	12.5	OH	23
31	−2	+1	Apr. 25, 1951	0	8	14	?	OH	30
32	−3	0	May 22, 1947	2	3	25	12.5	OH	40
34	−4	−1	May 31, 1949	3	3	25	8.3	OH	42
Ff 3	−5	+5	Mar. 8, 1950	11	4	23	2.1	OH	29
4	−5	+5	Feb. 28, 1950	2	10	30	15.0	OH	36
Ge 1	−2.5	−0.5	May 16, 1947	1	2	30	30.0	OH	40
6	−3.5	−0.5	Sep. 8, 1948	6.5	3	28	4.3	OH	33.5
8	−4	−2	Apr. 23, 1948	0	6	15	?	OH	39
Care-Cc 2	−39.28[m]	+20.72	Aug. 15, 1952	210	24	150	.7	OH	53
Dc 67	−10	+4	Sep. 15, 1951	90	72	160	1.8	OH	204

[m] Measured water level; others are reported levels.

northwest of Cambridge. In other directions, the formation may be considered sensibly infinite.

The quality of water in the Piney Point formation is good and fairly consistent over a large area. It is a sodium bicarbonate type, low in iron, low in chloride, moderately soft, and somewhat alkaline. Average dissolved solids total 440 ppm.

Oligocene Series

No Oligocene deposits are known in Caroline, Dorchester, and Talbot Counties. The Oligocene epoch was probably a time of emergence of the Coastal Plain, followed by gentle erosion. The Eocene surface was slightly beveled, and the Piney Point formation was etched in low relief. Erosion may have contin-

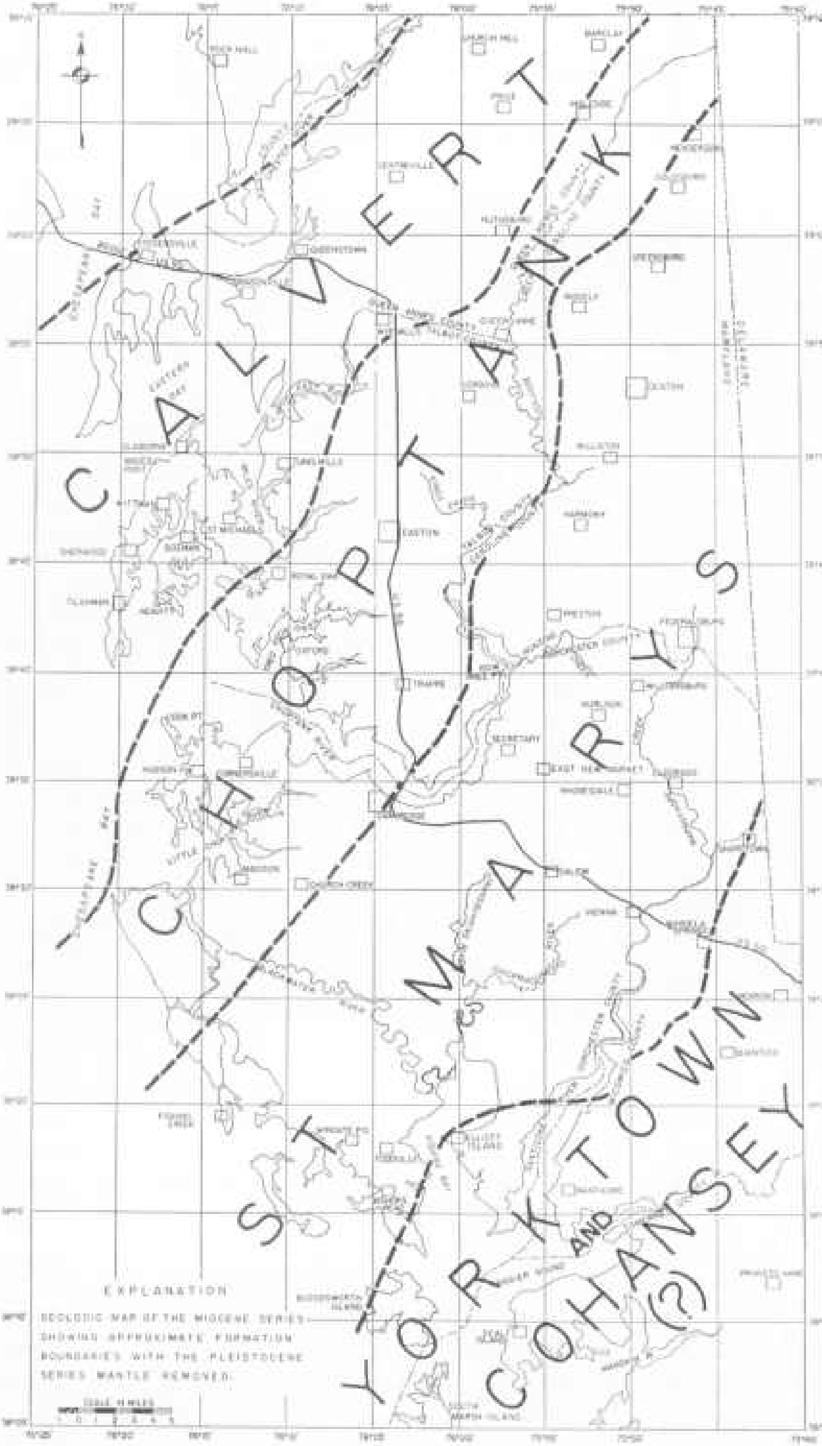

FIGURE 4. Geologic Map of the Miocene Series in Caroline, Dorchester, and Talbot Counties.

ued into the early Miocene epoch. In middle Miocene time the Calvert sea flooded the area.

The hydrologic effect of the overlap by Miocene silts was to deny the Piney Point formation an intake belt of its own. Recharge must move across the bedding planes from the Aquia and Nanjemoy formations or from the basal sand of the Miocene series in Talbot and Caroline Counties.

Miocene Series

The Miocene series in Caroline, Dorchester, and Talbot Counties consists of relatively thin aquifers of sand and marl separated by thick aquicludes of silt and sandy clay. The aquifers yield artesian water where they are buried beneath the confining aquicludes and water-table water where they are buried by the mantle of permeable Pleistocene and Pliocene(?) deposits. The aquicludes are leaky and transmit water slowly in the direction of high hydraulic gradient.

The middle and upper Miocene is the principal unit beneath the surface of Caroline, Dorchester, and Talbot Counties. Late or upper Miocene underlies the southern tip of Dorchester County.

Figure 4 is a geologic map of the Miocene series in Caroline, Dorchester, and Talbot Counties, as it would appear if the overlying mantle of Pleistocene and Pliocene(?) materials were removed, compiled from well records and a few outcrops, by means of lithologic correlation and paleontology at a few key sites.

The Miocene series crosses the area in broad belts, which strike northeastward. These belts contain the intake areas for the Miocene aquifers, bounded by the beveled edges of the Miocene aquicludes. Each stratum dips southeastward from its intake, or edge, beneath the overlying strata. The rates of dip are 5 to 10 feet per mile.

In general, the Calvert formation functions as an aquiclude, enclosing a few aquifers of local extent. The Choptank formation is a fairly extensive and continuous aquifer. The St. Marys formation is almost exclusively an aquiclude, although a few wells produce small quantities from "pockety" sands. The Yorktown and Cohansey formations(?) are not used because they contain brackish water from overlying salt-marsh deposits.

Plate 12, a geologic cross section of the Miocene series in Dorchester and Caroline Counties at a slight angle to the strike of the formations, shows the stratigraphic relations of the Chesapeake group to the underlying Piney Point formation of Eocene age, the overlying Pleistocene and Pliocene(?) series, and the Recent topography.

Calvert formation

The Calvert formation is predominantly a gray silt, slightly glauconitic in the upper part and diatomaceous in the lower part. It contains several thin beds of sand, medium to very fine in grain size, with occasional shell fragments.

The continuity and extent of these sands were not established and they are regarded as lenticular (Pl. 12). The drillers describe the Calvert as blue, brown, green, or gray clay. The few sands which they encounter are frequently described as crusty, hard, and cementlike.

Knowledge of the Calvert formation in Caroline, Dorchester, and Calvert Counties is based on relatively good control. More than 900 wells, with good areal dispersion, which go to or through the formation, have been scheduled. Logs are available on almost half of these.

The structure of the top of the Calvert formation is shown in Plate 10. The top of the formation ranges from sea level in western Talbot County to a projected 280 feet below sea level beneath Bloodsworth Island and 230 feet below sea level in southeastern Dorchester County near Sharptown. The contours are uneven, or scalloped, in localities where many wells give close control, indicating that the overlying Choptank formation was deposited on an erosion surface. However, for most purposes, the boundary between the Calvert formation and the Choptank formation may be considered a parallel unconformity or *disconformity*.

The contact of the Calvert formation with the underlying Eocene series is a surface which not only has been gently eroded but has undergone slight settlement, or tilting, and possibly also faulting, and is a low angle unconformity, or *nonconformity*.

The Calvert formation ranges in dip from 7 to 20 feet per mile and averages about 10 feet per mile. It veers in direction of dip from northeast to south, but has a resultant to the southeast.

The thickness of the Calvert formation ranges from 20 feet in western Talbot County to more than 300 feet in southeastern Dorchester County. It has an estimated average thickness of about 200 feet. An isopach map of the Calvert formation was not constructed because of uncertainties of correlation and lack of control. The neck area of western Talbot County is an area of much uncertainty, where Pleistocene channels filled with blue sandy mud of the Pamlico formation may be confused lithologically with the Calvert.

The Calvert formation yields water to about 129 scheduled wells in the three counties: 45 in Caroline; 27 in Dorchester; and 57 in Talbot, or about 7 percent of the scheduled wells. It is estimated that about 1,300 wells in the area produce water from sands of the Calvert.

The specific capacity of 27 wells in sands of the Calvert is given in Table 14. The average specific capacity is 2.7 gpm per foot of drawdown, and the range is from 0.3 to 9.2 gpm per foot. The average head of water above sea level, in 29 wells, is 13 feet with a range from +50 to −40 feet. Hence the coefficients of transmissibility of sands in the Calvert formation are moderately low, but except for a few local cones of depression, the pressure head in the sands was still high during the period 1945–1954.

TABLE 14

Water Level, Yield, Capacity, and Completion of Wells in the Calvert Formation

Well number	Static water level			Well test				Completion (open hole or screen)	
	Feet above or below datum		Date of measurement	Draw-down (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
	Land surface	Sea level							
Tal-Ae 1	−19	+26	Jul. 5, 1952	21	4	40	1.9	OH	42
17	−27	+40	Feb. 2, 1947	16	6	24	1.5	OH	63
Be 7	−40	0	May 21, 1948	20	6	5	0.3	OH	175[a]
8	−30	+37	Oct. 10, 1950	12	2	10	0.8	OH	125[a]
Bf 25	−29	+31	Dec. 3, 1949	10	2	30	3.0	OH	60
63	−15	+45	Sep. 15, 1947	3	12	8	2.7	—	—
Cc 27	−8	0	Apr. 28, 1949	17	16	20	1.2	OH	243[b]
Ce 9	−73.04[m]	−35	Oct. 8, 1948	48	6.5	200	4.2	OH	44
10	−78	−40	Dec. 1946	48	6.5	200	4.2	OH	46
14	−65	−5	Mar. 1947	25	12	48	1.9	Sc	12
22	−38.8[m]	+16.2	Jan. 17, 1947	15.5	6	20	1.3	OH	89
25	−48	+12	Mar. 1949	12	6	7	0.6	—	—
41	−73	−19	Nov. 2, 1949	7	8	10	1.4	OH	55
42	−16	+19	May 1949	24	6	8	0.3	OH	60
43	−2	+50	Feb. 25, 1947	13	12	50	3.8	OH	70
Ee 20	−43	+17	Mar. 24, 1951	12	8	16	1.3	OH	86
Dor-Cf 5	−14	+7	Sep. 21, 1949	12	14	18	1.5	OH	120
6	−15	+5	Mar. 20, 1949	4	7	30	7.5	Sc	12
Df 10	−2.5	+4.5	Oct. 13, 1950	2.5	12	23	9.2	—	—
Dg 4	+0.5	+3.5	Oct. 23, 1951	?	—	33	?	OH	33
Caro-Cc 3	−10.5	+49.5	May 9, 1946	30	8	50	1.7	OH	53
Cd 13	−16[m]	−1	May 18, 1953	27	3	50	1.9	OH	189
Db 1	−31	+19	Nov. 4, 1952	19	7	30	1.6	OH	74
2	−31	+21	May 14, 1949	20	2	30	1.5	OH	37
3	−32	+13	Feb. 24, 1951	8	2	30	3.8	OH	65
Fd 5	−19.5	+20.5	Aug. 12, 1950	9	6	50	5.5	OH	78.5
	−39.5	+0.5	Jun. 10, 1952						
6	−18	+22	Dec. 21, 1947	50	8	200	4.0	Sc	10
7	−17	+23	Dec. 21, 1947	50	8	200	4.0	Sc	10

[a] Yields water from both Calvert and Piney Point formations.

[b] Yields water from Calvert, Piney Point, and Nanjemoy formations.

[m] Measured water level; others are reported levels

The Nanticoke aquifer in the top of the Calvert formation throughout the northern half of the lower tricounty area (Rasmussen and Slaughter, 1955) is considered present in Dorchester County as the uppermost sand of the Calvert formation at Vienna, but its persistence to the west and north has yet to be demonstrated.

The sands of the Calvert formation yield moderate to large quantities of ground water at rates of 100 to 200 gpm at a few locations: a chicken processing plant at Cordova (Tal-Bf 67, 68); the city of Easton (Tal-Ce 2, 9, 10, and 57); the city of Federalsburg (Care-Fd 3, 5, 6, 7 and 8); a canning company at Hurlock (Dor-Bg 7); and the town of Vienna (Dor-Dh 7 and 8).

R. R. Meyer calculated the coefficient of transmissibility of the "100-foot" aquifer at Easton, correlated as a sand of the Calvert formation, at 4,200 gpd per foot, and the coefficient of storage at 0.00007, in a short aquifer test in October 1948. An aquifer test of longer duration of the "100-foot" aquifer, conducted January 16–18, 1956, yielded computed coefficients of transmissibility and storage of 3,500 gpd per foot and .0001 respectively. These values indicate that the Calvert at Easton can be relied upon only for moderate use.

At Cordova, the coefficients of transmissibility and storage of a "300-foot" basal sand of the Calvert formation were computed to be of the order of 1,300 gpd per foot and .0001 respectively, from a test conducted March 10–12, 1956. Initial large drawdowns and low coefficient values indicate a limited capacity of this sand for development in the Cordova area.

The recharge opportunity for sands in the Calvert formation can be described only in general terms. The beveled edges of the Calvert formation, crossing the northwestern corner of the area, beneath the necks of Talbot County and Kent Island and passing on beneath Queen Annes County to the Delaware state line, are covered by a Pleistocene and Pliocene(?) mantle of sand and silt except for a few isolated outcrops. This mantle is probably generally more permeable than the Calvert formation itself. The band of Calvert passes beneath Chesapeake Bay and emerges on the Western Shore along the Calvert Cliffs.

The water table in the overlying Pleistocene and Pliocene(?) series attains a height of 70 feet above sea level in north-central Queen Annes County, and perhaps a greater height in central Calvert and St. Marys Counties. These levels could provide the hydraulic drive necessary to maintain the average altitude of water level in wells in the sands of the Calvert at 13 feet above sea level in Caroline, Dorchester, and Talbot Counties.

If the sands in the Calvert formation are so lenticular that they are confined to isolated pockets, recharge from the Calvert intake zone is a remote possibility. However, the silts of the Calvert, which comprise the remainder of the formation, have a high porosity, and may store water in sufficient quantity and release it at a slow but sufficient rate to replenish the sand lentils and sustain a moderate amount of pumping. The more probable condition is that some of the sands form an interconnected sheet and are able to derive recharge from the outcrop zone to sustain a larger draft of pumping. The overlying Choptank formation is, in general, more permeable than the Calvert formation and may also transmit recharge to it.

The quality of water from the sands in the Calvert formation is good for most purposes, with the exception of the wells in the Nanticoke aquifer at Vienna. Excluding the Vienna analyses, the average water from the Calvert has about 360 ppm of dissolved solids, chiefly as sodium bicarbonate. The water is moderately hard, alkaline, low in chloride, and somewhat irony. The water from the Nanticoke aquifer at Vienna is very high in dissolved solids (2,100 ppm), slightly salty, high in sodium bicarbonate, soft, very alkaline, and irony.

A basal sand of the Calvert formation directly underlain by the Piney Point formation has been logged in some portions of the area. Water is produced from a basal sand at Cordova, Talbot County, and is known to have been produced from a basal sand at Cambridge (Dor-Ce 16, 17).

Choptank formation

The Choptank formation is generally an aquifer in Caroline, Dorchester, and Talbot Counties. It yields water to 9 percent of the scheduled wells: 111 wells in Caroline County, 32 wells in Dorchester County, and 17 wells in Talbot County. It is estimated that the Choptank formation supplies water to more than 1,500 wells in the 3 counties, of which more than 1,000 are in Caroline County. It is the principal aquifer at Henderson, Goldsboro, West Denton, and Hynson.

Lenticular zones of gray sandy silt and shells in the Choptank formation are logged by the drillers as blue, green, or brown clay. These zones function as aquicludes, probably leaky or capable of releasing some water from storage under differential head. Occasionally a well is logged almost entirely as silt (Care-Dc 122), even in an area where the formation yields water to other wells.

Lithologically, the Choptank formation may be summarized as gray and brown sand and silt, containing shell marl and Foraminifera.

The intake belt of the Choptank formation is a broad band, 3 to 14 miles wide, which crosses the area from southwest to northeast through Cornersville, Easton, Cordova, and Henderson. Only in the northwestern corner of Talbot County is the Choptank formation absent. The intake belt is covered, in most places, by a mantle of the Pleistocene and Pliocene series, which is, in general, more permeable than the Choptank formation and transmits water to it through an unconfined saturated zone. A few outcrops may be found, particularly in Talbot County. Fossils from an outcrop on Peachblossom Creek, 2 miles south of Easton, are listed in Table 11.

The structure of the top of the Choptank formation is shown in Plate 11. It ranges from 55 feet above sea level at Henderson, northern Caroline County, to more than 200 feet below sea level along the Nanticoke River in the southeast margin of the area. The dip is about 4 feet per mile, to the southeast. Control is too spotty to define structural anomalies. Only a relatively few logs are available in Caroline County, where the formation is penetrated by the greatest number of wells.

In thickness the Choptank formation ranges from a featheredge to 130 feet, as determined from well logs, and up to 150 feet as determined from comparison of the structure maps. Where it is confined between the Calvert and St. Marys formations, it averages about 110 feet thick (Pl. 12).

The capabilities of the Choptank formation as an aquifer are still only vaguely known. Table 15 summarizes the water level, yield, capacity, and completion of wells in the Choptank formation. The average water level in the Choptank formation, during the period 1946–1954, was 18 feet above sea level in Caroline County, 23 feet in Talbot County, and 11 feet in Dorchester County. The average specific capacity is 2.5 gpm per foot of drawdown in Caroline County, 3.0 in Talbot County, and 2.0 in Dorchester County. The range in specific capacity is from 0.1 to 8.3 gpm per foot.

The transmissibility of the Choptank formation was computed to be about 6,000 gpd per foot and the coefficient of storage to be about 0.003 in a short aquifer test at West Denton (p. 102).

The Choptank formation has relatively low transmissibility and specific capacity. The storage coefficient is high enough to indicate leaky confining beds. The head remains relatively high. The Choptank formation should be capable of small to moderate yields beneath most of its area and of moderately large yields at a few locations. Wells of capacity over 200 gpm may be rare and may require special construction.

The water of the Choptank formation is very irony (12–13 ppm) in northern Caroline County near its intake belt and about 1 ppm in southern Caroline County where it is confined. The water is of the calcium bicarbonate type, low in chloride, moderately hard (120 ppm), and moderate in dissolved solids.

St. Marys formation

The St. Marys formation is a clayey silt and silty clay with some very fine sand, shells and Foraminifera, that usually functions as an aquiclude in the southeastern half of the tricounty area (fig. 4). It is an impermeable cover to the Choptank formation in the southeastern three-fourths of Dorchester County, the southeastern tip of Talbot County between the Choptank River and Bolingbroke and Miles Creeks, and in all of Caroline County, except a 3-mile border to Tuckahoe Creek.

The St. Marys formation is overlain by the Pleistocene and Pliocene(?) series throughout the area except in the southern tip of Dorchester County at

Elliott Island, Bishops Head, and Bloodsworth Island, where it is overlain by the Yorktown and Cohansey formations(?). Outcrops are not known.

Structurally, the St. Marys formation is part of the regional homocline, with strata dipping southeastward. Because the top of the St. Marys formation is an eroded surface beneath the Pleistocene and Pliocene(?) deposits, there is no datum which can be contoured to reveal the structure. The top of the formation, based on 124 wells, ranges from 58 feet above sea level at Goldsboro to 83 feet below sea level at Elliott Island. Although the buried top of the St. Marys formation is probably a channeled plain, there seems to be a descent to the plain and grade to the channels from north to south. The average level of this buried plain is about sea level at Denton, 10 feet below sea level at Secretary, and 30 feet below sea level at Bishops Head. The channels drop from 25 feet below sea level at Denton to 83 feet below at Elliott Island.

The thickness of the St. Marys formation ranges from zero, in the northwestern half of the area, where it is absent, to about 120 feet. As recorded in 124 well logs, the thickness ranges from 7 feet in a well near Ridgely to 107 feet in a well near Bishops Head. The variations in thickness and the stratigraphic relations are indicated in Plate 12. The estimated average thickness of the formation is 60 feet.

The St. Marys formation supplies water to 11 scheduled wells in Caroline County and 22 in Dorchester County. Ten of the wells in Caroline County (Care-Dc 16, 19, 123, -Dd 6, 24, 33, 40, 41, -De 11, and -Ec 2) and one in Dorchester Co. (Dor-Eg 1) are believed to produce from the St. Marys formation alone. The other 21 wells produce from holes which are open in the Choptank formation also.

The water levels in wells in the St. Marys formation ranged from −3 to +35 feet, and averaged 13 feet above sea level during the period 1945–1954. The two wells (Care-Dc 16, 19) with a water level below sea level are in West Denton, where the aquifer of the St. Marys has probably lost head by leaking water to the underlying aquifer of the Choptank formation, in which there is an extensive cone of depression due to local industrial pumping (p. 91).

The average specific capacity of four wells (Care-Dc 123, -Dd 6, 40, and -Ec 2) is 2.1 gpm per foot of drawdown. Maximum test yield was 40 gpm. The wells produced from open holes.

The water in the St. Marys formation is of the calcium bicarbonate type, hard, low in chloride, moderate in dissolved solids, and almost neutral. The two water analyses are low in iron, but other wells, reported or determined by field test kit, indicate some irony waters.

Yorktown and Cohansey formations(?)

The Yorktown and Cohansey formations(?), undifferentiated, are a tan and gray fine- to coarse-grained sand, containing a few shells. The unit has

TABLE 15

Water Level, Yield, Capacity, and Completion of Wells in the Choptank Formation

Well number	Static water level: Feet above or below datum, Land surface	Static water level: Feet above or below datum, Sea level	Date of measurement	Well test: Drawdown (feet)	Well test: Period (hours)	Well test: Rate (gpm)	Well test: Specific capacity (gpm per ft.)	Completion (open hole or screen): Type	Completion (open hole or screen): Feet
Tal-Be 14	−12	+48	Nov. 14, 1953	18	2	40	2.2	OH	8[a]
Bf 48	−27.08[m]	+25.92	Mar. 20, 1954	9	2	20	2.2	OH	27
Ce 15	−9.99[m]	+42.01	Aug. 7, 1950	20.5	10	35	1.7	—	—
35	−74.4[m]	−35.4	Aug. 15, 1950	20	8	40	2.0	OH	25[a]
36	−6	+46	Aug. 7, 1950	8	12	30	3.8	OH	31
39	−6	+44	Jul. 5, 1946	6	12	20	3.3	—	—
Cf 21	−17	+13	Mar. 5, 1953	18	2	50	2.8	OH	57
Cg 1	−14	+26	Aug. 26, 1952	16	1	20	1.3	OH	48
2	−15	+25	May 22, 1953	15	2	30	2.0	OH	39
Dc 6	−9	−1	May 11, 1951	24	6	20	8.3	OH	58[a]
Dor-Ah 2	−16	+22	Nov. 29, 1947	48	6	15	0.3	OH	52.5[b]
Bb 9	−8	−3	Jun. 10, 1950	7	8	10	1.4	OH	40
Bf 4	−1	+14	Mar. 10, 1950	39	6	5	0.1	OH	50[b]
5	−10	+10	Jun. 15, 1951	2	14	20	10.0	OH	87[b]
9	−1	+1	Mar. 10, 1950	39	6	5	0.1	OH	—[b]
11	−1	+1	Mar. 21, 1950	39	6	8	0.2	OH	—[b]
12	−1	+1	Mar. 25, 1950	39	6	5	0.1	OH	—[b]
14	−1	+1	Apr. 17, 1950	39	5	5	0.1	OH	—[b]
15	−1	+1	Mar. 10, 1950	39	6	5	0.1	OH	—[b]
16	−1	+1	Mar. 15, 1950	39	5	5	0.1	OH	—[b]
17	−1	+1	Feb. 13, 1950	39	6	5	0.1	OH	50[b]
18	−1	+1	Feb. 23, 1950	39	6	5	0.1	OH	50[b]
Ce 58	−7	+18	June 15, 1950	0	6	16	?	OH	—
Cf 8	−3	+9	May 12, 1953	3	3	25	8.3	Sc	20
Cg 6	−2	+15	Oct. 30, 1950	0	18	15	?	OH	—[c]
Dg 14	+2	+8	Apr. 4, 1946	0	—	5	?	OH	—[a]
Ec 13	−3	+1	Dec. 19, 1949	27	10	8	0.3	OH	36[b]
18	−10	−7	Jun. 22, 1951	4	3	20	5.0	Sc	6[c]
Fc 2	−6	−1	Apr. 23, 1947	2	7	15	7.5	OH	65[c]
3	−5	0	Sep. 22, 1950	3	5	12	4.0	OH	50[c]
4	−2	+2	Dec. 24, 1949	16	10	18	1.1	OH	84[c]
	−6.32[m]	−2.32	Nov. 21, 1951	—	—	—	—	—	—
5	−2	+3	Jan. 2, 1950	16	12	20	1.3	OH	69[c]
6	−3	−1	May 17, 1950	4	6	18	4.5	OH	63[c]
7	−6	0	Apr. 25, 1947	3	6	7	2.3	OH	60[c]
14	−3	+1	Dec. 17, 1947	11	12	9.5	0.9	OH	55[c]
15	−7	−3	Sep. 29, 1950	5	12	5	1.0	OH	65[c]
16	−10	−7	Sep. 10, 1949	23	10	8	0.3	OH	57[c]
17	−12	−7	Sep. 10, 1949	20	10	11	0.6	OH	71[c]

TABLE 15—*Continued*

Well number	Static water level: Feet above or below datum: Land surface	Static water level: Feet above or below datum: Sea level	Static water level: Date of measurement	Well test: Drawdown (feet)	Well test: Period (hours)	Well test: Rate (gpm)	Well test: Specific capacity (gpm per ft.)	Completion (open hole or screen): Type	Completion (open hole or screen): Feet
Fc 18	−3	+2	Dec. 13, 1947	10	10	9	0.9	OH	55[c]
19	−8	−4	Mar. 17, 1948	6	10	9	1.5	OH	60[c]
20	−8	−3	Apr. 7, 1947	2	8	5	2.5	OH	70[c]
21	−9	−4	Nov. 27, 1950	5	8	9	1.8	OH	69.5[c]
Fe 11	−3	0	Mar. 25, 1950	2	5	4	2.0	OH	33
Caro-Bd 2	−12	+48	Mar. 20, 1951	8	2	40	5.0	Sc	8
8	−15.57	+44.43	Dec. 22, 1952	18	—	70	3.9	OH	28.5
Cc 51	−11	+49	Sep. 30, 1953	15	2	30	2.0	Sc	10
Cd 3	−10	+10	Nov. 7, 1952	40	2	50	1.3	OH	56
Db 4	−27	+23	Aug. 18, 1952	13	2	20	1.5	OH	19
8	−18[m]	+32	Jul. 1, 1953	12	2	30	2.5	OH	14
Dc 2	−7	+2.6	Jun. 3, 1949	14	2	40	2.9	OH	46
24	−40.5[m]	−12.5	Jul. 23, 1952	19.4	0.2	12.5	0.6	—	—
	−47.4[m]	−19.4	Sep. 30, 1953	—	—	—	—	—	—
57	0	+13	1948	84	—	100	1.2	OH	28
60	−22	+6	Oct. 20, 1950	8	2	10	1.3	OH	80
68	—	—	—	73	—	140	1.9	OH	22
74	−21	+19	May 14, 1952	10	2	30	3.0	OH	32
81	−17	+7	Jun. 2, 1951	13	2	20	1.5	OH	20
98	−12	+13	1942	5.5	—	6	1.1	—	—
	−21	+4	Sep. 13, 1952	—	—	—	—	—	—
100	0	+12	Aug. 22, 1952	20	2	30	1.5	OH	42
111	−17	+3	Feb. 1, 1953	13	2	100	7.7	OH	36
Dd 5	−26	+16	Mar. 26, 1950	14	2	30	2.1	OH	98
Ec 1	−23	+9	Apr. 5, 1952	15	—	60	4.0	OH	78[a]
Ee 1	−11	+29	Sep. 22, 1951	9	10	50	5.6	—	—
Fb 1	−26	+9	Sep. 16, 1947	16	10	20	1.3	OH	188[a]
2	−27	+13	Sep. 16, 1947	15	10	25	1.7	OH	48
3	−18	+19	May 5, 1951	12	1	10	0.8	OH	70
4	−4.8	+33.2	May 26, 1949	12	2	40	3.3	Sc	8
Fc 1	−33	+17	Dec. 17, 1945	25	6	80	3.2	OH	78[a]
Fc 2	−33.3	+16.7	Oct. 26, 1949	85	12	200	2.4	OH	57[a]

[a] Yields water from both Choptank and Calvert formations.
[b] Yields water from both St. Marys and Choptank formations.
[c] Yields water from St. Marys, Choptank, and Calvert formations.
[m] Measured water level; others are reported levels.

been logged in only four wells (Dor-Fe 4, 27, 36, and -Ge 1) at the southern end of Dorchester County. No wells are known which derive water from it in this area. The sands contain water, but the top of the unit is only 23 to 42 feet below the surface of the salt marsh and the overlying materials are permeable deposits of the Recent and Pleistocene series, so that the water is probably unpalatable.

The thickness of the Yorktown and Cohansey(?) in the four wells is 20, 27, 40, and 62 feet. The unit thickens to the southeast. The maximum thickness in Dorchester County along the Nanticoke River probably does not exceed 100 feet. The dip of the Yorktown and Cohansey formations(?) is southeasterly at the rate of 8 to 10 feet per mile. The relations of this unit to the Yorktown and Cohansey formations(?) has been discussed by Rasmussen and Slaughter (1955).

Pliocene(?) Series

Brandywine formation and Bryn Mawr gravel

Above the gray sands and silts ("blue clay") of the Miocene series, and beneath the tan and buff sands and silts of the Pleistocene series, occurs a red and/or orange gravelly quartz sand which, by position, coloration, texture, and induration, is correlated as a unit with the Brandywine formation and the Bryn Mawr gravel and considered to represent the Pliocene series in this area.

The sand is nonfossiliferous. In texture it is a fine to coarse sand, slightly gravelly, with thin pockets of silt. The average grain size is medium to coarse. The gravel, composed of small pebbles, make up less than 5 percent of the deposit.

In color, the sand appears to have two members: the lower member is red to brown, and the upper member ranges from brown to orange to yellow. The gravelly sands are consolidated, in contrast to the unconsolidated Pleistocene sediments. Hematite, the red oxide of iron, and limonite, the yellow hydrated oxide of iron, form the chief binders and provide the coloration, although they frequently comprise less than 1 percent of the material.

The extent of the red and orange gravelly sand is imperfectly known because many drillers do not mention color when they describe the well cutting, and without color the Pliocene(?) cuttings cannot be differentiated from the Pleistocene. In some logs a gravelly section has been interpreted as Pliocene(?) or Pleistocene and Pliocene(?) without recourse to color.

The Pliocene(?) has been recognized extensively in Caroline County and in the northeast corner of Dorchester County, but only here and there in Talbot County and in the low country of Dorchester County. The uppermost Pleistocene formation, the Parsonburg sand, occasionally has a brown color with resembles the red and orange of the Pliocene series.

The areal distribution of the Pliocene(?) series is partly borne out by the distribution of wells in the three counties which produce from the series: for the Pliocene(?) alone, 7 in Caroline County, 1 in Dorchester County and none in Talbot County; for the Pleistocene and Pliocene(?) together, 65 in Caroline County, 53 in Dorchester County, and 40 in Talbot County. The wells scheduled in the Pliocene(?) or Pleistocene and Pliocene(?) are 9.3 percent of all the wells scheduled. It is estimated that more than 1,600 wells produce a part or all of their water from the Pliocene(?) series, chiefly in Caroline County and northeastern Dorchester County.

The yield of wells in the red and orange gravelly sand is remarkably good where an appreciable saturated thickness is present. Unfortunately, the average thickness of the sand is only about 10 feet, with a range from 0 to 45 feet (Dor-Ah 3, -Bf 28). The Pliocene(?) yields water to wells at Ridgely (Care-Cc 1), Preston (-Fc 23 and 24), Hurlock (Dor-Bg 4, 5, 6, 8, 9, 10, 32) and Cordova (Tal-Bf 72). Care-Cc 1 has a specific capacity of 14.3 gpm per foot of drawdown and Dor-Bg 8 has a specific capacity of 11.8 gpm per foot.

A test of the Pleistocene and Pliocene(?) "100-foot" aquifer at Hurlock yielded a coefficient of transmissibility of the order of 155,000 gpd per foot and showed the coefficient of storage to be artesian. Records of water levels and test data on the "100-foot" aquifer indicate further large-scale yield potentialities in the Hurlock area.

Only since 1954 has the Pleistocene and Pliocene(?) series been developed as a large-scale producer at Cordova, northeastern Talbot County.

A test of the Pleistocene and Pliocene(?) "50-foot" aquifer at Cordova showed the coefficient of transmissibility to be of the order of 100,000 gpd per foot and the coefficient of storage to be artesian. The test data indicated further potential large-scale development of the Pleistocene and Pliocene(?) series sands in the Cordova area.

The red and orange gravelly sand produces water under water-table conditions, usually in conjunction with underlying gray Miocene sands and marls. Table 16 lists specific capacities of nine wells in the Pleistocene and Pliocene(?) series, and indicates that the water levels are within 4 to 16 feet from the land surface, and that the head is well above sea level.

The quality of water from the Pleistocene and Pliocene(?) series is better than that of other ground waters in all respects except the pH. The water is moderate in iron (0.46 ppm, average of 19 analyses), low in bicarbonate (8.5 ppm), low in chloride (13.4 ppm), soft (hardness only 35 ppm), and low in dissolved solids (132 ppm). The pH (5.7) indicates slightly acid water.

The red and orange gravelly sands in Caroline and Dorchester Counties are channel-fill deposits in a set of channels probably tributary to the valley system of the lower tricounties (Rasmussen and Slaughter, 1955). Too little test drilling has been done to define these ancient channels in the middle three counties, but they represent the most important potential storage of shallow ground water in this area. Upon their discovery and delineation may depend the future of irrigation and industrial ground-water development. The bottom of the red gravelly sand, as determined in well logs, ranges from 42 feet above sea level to 34 feet below. The irregularity in depth substantiates the conclusion of a channeled surface.

The recognition of the channels related to the red and orange gravelly sand is complicated by the overlying Pleistocene series also being deposits superimposed on the red gravelly sand. Some of the Pleistocene channels are deeper than the pre-Pliocene(?) channels and cut down into the Miocene surface. There are thus two superposed drainage networks choked with detritus incised in the

TABLE 16

Water Level, Yield, Capacity and Completion of Wells in the Pleistocene and Pliocene(?) Series

Well number	Static water level			Well test				Completion (open hole or screen)	
	Feet above or below datum: Land surface	Feet above or below datum: Sea level	Date of measurement	Drawdown (feet)	Period (hours)	Rate (gpm)	Specific capacity (gpm per ft.)	Type	Feet
Dor-Bg 8	−4	+63	Jul. 27, 1948	11	8	130	11.8	Sc	10
32	−8	+42	Jun. 1953	12	8	150	12.5	Sc	17
Caro-Cc 1	−6	+56	Jul. 15, 1952	21	26	300	14.3	Sc	4
4	—	—	—	22	—	150	6.8	—	—
6	−8	+52	Aug. 12, 1947	22	—	150	6.8	—	—
11	−0.5	+71.5	Oct. 28, 1947	?	40	900	?	Sc	22
Fc 4	−15	+35	May 12, 1951	10	2	8	0.8	Sc	7
Fd 1	−15.57[m]	+19.5	Apr. 6, 1950	11.8	10	350	29.7	Sc	23
Tal-Bf 72	−11	+31	Sept. 1954	14	4	175	12.5	Sc	21

[m] Measured; other water levels reported.

Miocene surface. The red and orange gravelly sand conforms to the regional Tertiary structure, dipping southeasterly at the rate of 4 to 5 feet to the mile. It was deposited as a broad alluvial fan rather than as part of the marine Tertiary sequence. The regional structure has little influence upon the movement or storage of ground water in the sand because the water is unconfined and recharge is usually directly through the overlying mantle of Pleistocene materials.

Quaternary System

The Quaternary system is composed almost entirely of unconsolidated deposits which form a relatively thin sedimentary mantle over the Tertiary rocks throughout most of the area.

The Pleistocene series was deposited during the epoch of widespread glaciation by outwash carried down to the sea by huge rivers of melt water and shifted by shore currents to the site of deposition. The Pleistocene sediments of this area are ascribed chiefly to fluviatile, estuarine, and lagoonal deposition, and only in a small part to marine shoreline deposition. The uppermost few feet of the detritus, particularly the gravelly sand with rare boulders, is believed to have come from icebergs.

The deposits of the Recent series, which were laid down after the continental glacier had withdrawn from North America, are insignificant and are frequently indistinguishable from the Pleistocene series.

Pleistocene Series

The Pleistocene series comprises the superficial yellow, buff, and tan deposits of sand, silt, and clay from the soil zone down to the top of the red and orange gravelly sand of the Pliocene(?) series, or, where the latter is absent, down to the top of the gray sand and blue clay of the Miocene series. The Pleistocene deposits are predominantly medium- to fine-grained with prominent admixtures of coarse sand and scattered pebbles in some strata and silt in others. There are a few pockets of sandy gravel, usually composed of small pebbles and grit. Lenses of silt with clay as a minor admixture occur in a few beds.

The Pleistocene deposits yield water to more wells in Caroline, Dorchester, and Talbot Counties than any other series of sands. Most of the wells are domestic dug and drivepoint wells of small capacity, but there are many wells of moderate capacity. A few wells, as at Ridgely, Federalsburg and Hurlock, are of large capacity. A total of 506 scheduled wells produce from the Pleistocene formations alone: 270 wells in Caroline County, 55 in Dorchester County, and 181 in Talbot County. An additional 158 wells produce from the combined Pleistocene and Pliocene(?) series. Percentagewise, 37.7 percent of the wells inventoried are in the Pleistocene and Pliocene(?) series. The scheduled wells are estimated at about 10 percent of the total number of wells, and the Pleistocene series bears a higher proportion of the others because only enough small domestic wells were scheduled to reveal their characteristics. It is estimated that of approximately 18,000 wells in the tricounty area, more than 9,000 are developed in the Pleistocene series.

The wells in the Pleistocene are concentrated in the eastern half of Talbot County, the northeastern quarter of Dorchester County, and throughout Caroline County. Elsewhere the sands of Pleistocene age are near sea level, and in some places are occupied by brackish waters or underlie stagnant swamp waters.

The average thickness of the combined Pleistocene and Pliocene(?) series is 37 feet, with a range from 4 to 152 feet, as determined from 570 logged wells. The averages by counties are: Caroline, 38 feet; Dorchester, 30 feet; Talbot, 41 feet.

Data on yield and capacity of the Pleistocene series are meager. Table 16 lists reported well tests. The specific capacities of the Pleistocene series in conjunction with the Pliocene(?) series are higher than those of any formation. The yield of Care-Cc 11, a well of the town of Ridgely, reported at 900 gpm, is the highest of any well in the area.

The Pleistocene deposits yield water under water-table conditions in most of the area. In the neck areas of western Talbot County and northwestern Dorchester County Pleistocene channels have been choked with the deltaic silts of the Pamlico formation, and some artesian wells may tap confined Pleistocene sands.

The structure of the Pleistocene series is not definitely known because of the channel-fill type of deposition. There appears to be a general slope, or dip, of the Pleistocene deposits to the east and south. The underground channel-filling structure of the Pleistocene deposits may have the ultimate control of the movement and discharge of water to wells if and when pumping rates reach the point where ground-water overflow has been eliminated.

The quality of ground water in wells in the Pleistocene series is remarkably good. The average analyzed water is moderate in iron (less than 1 ppm), low in bicarbonate (less than 20 ppm), low in chloride (less than 10 ppm), soft (hardness less than 35 ppm), and low in dissolved solids (average of 15 analyses, 136 ppm). The pH is 6.2, indicating a slightly acid water. However, the waters in the Pleistocene in the low country, almost one-third of the tricounty area, owing to marsh and brackish-water conditions, are so poor as to be unusable for most purposes.

Beaverdam sand

The Beaverdam sand, the basal Pleistocene formation in this area, is an unconsolidated white to buff medium-grained sand with small quantities of coarse to fine sand, occasional pebbles, and a lesser admixture of white silt. It is nonfossiliferous. It ranges in thickness from zero to 60 feet.

The Beaverdam sand has been positively identified only in a few well logs in the area, but is believed to be present beneath much of the area. It is probably thickest and most persistent beneath those lands which have an altitutde above 25 feet (above the Pamlico terrace). The eastern half of Talbot County, almost all of Caroline County, and the northeastern quarter of Dorchester County contain the principal deposits of Beaverdam sand. Elsewhere the Beaverdam sand has not been distinguished from the Pamlico formation.

The Beaverdam sand is the major aquifer of the Pleistocene series. It yields small but adequate quantities of water to many driven and dug wells, and large quantities of water, usually in conjunction with the Pliocene(?) deposits, to a few wells. The large city wells at Federalsburg, apparently screened entirely in the Beaverdam sand (see logs of Care-Fd 1 and 2), have a specific capacity of about 30 gpm per foot of drawdown. An aquifer test at Federalsburg, though inconclusive because of nearby recharge boundaries, indicated a field coefficient of transmissibility of more than 100,000 gpd per foot and an ultimate coefficient of storage of about 0.15 (p. 104).

Water-table conditions prevail generally in the Beaverdam sand. However, it is overlain, in places, by the Walston silt which can function as an aquiclude where it is sufficiently impermeable. No extensive confined conditions have been recognized, but there is not sufficient logged record available from several parts of Caroline County to say that such conditions do not exist. Artesian conditions are also possible in the lowland area, beneath the Pamlico terrace plain, where lenses of the Beaverdam sand may be confined by silts and clays of the Pamlico formation. No such areas have yet been defined.

Walston silt

The Walston silt is a lenticular formation of fine sand, silt, clay and peat, in Caroline, Dorchester, and Talbot Counties. It occurs at altitudes of about 40 feet above sea level and probably does not exceed 30 feet in thickness. It has not been classified in many well logs, because samples are usually necessary to recognize it on lithology and it is difficult to determine on most drillers' logs.

The Walston silt has fine sand lentils which may yield small quantities of ground water to shallow dug or driven wells, but it generally functions as a leaky aquiclude.

Talbot and Pamlico formations

The Talbot and Pamlico formations were deposited as three deltaic masses in the primeval Chesapeake estuary: the Kent Island delta in Queen Annes County, the Talbot County neck delta, and the Dorchester County delta. The elevation of the Kent Island deltaic area ranges from sea level to 29 feet above sea level and averages about 15 feet; the elevation of the Talbot neck deltaic area ranges from sea level to 20 feet above sea level and averages about 9 feet; the Dorchester lowland deltaic area ranges from sea level to 12 feet above sea level and averages about 4 feet. The Kent Island deltaic area was formed probably in the Talbot, or 42-foot sea, the Talbot neck area probably in the Pamlico, or 25-foot sea, and the Dorchester lowland probably in the Silver Bluff, or 6-foot sea. There seems to be a silty sand deposit in the Kent Island area, sandy silt in the Talbot neck area, and a sandy, silty clay deposit in the Dorchester County lowland area. This sequence may represent increasingly fine materials at greater distances from the source areas or increasingly fine materials with progressing geologic time.

Richards (1936, p. 1620) identified mollusks and other fossils from the Pamlico formation at Herring Hill 1 mile north of Federalsburg and from the east bank of the Choptank River near Williston in Caroline County, evidence that the Pamlico formation is a marine phase of the Pleistocene series.

The Talbot and Pamlico formations are a lenticular group of sands, silts and clays with limited amounts of gravel. They provide water to shallow dug and driven wells in the Talbot County neck area, but contain undesirable water in Dorchester County. They function, in part, as a leaky aquiclude.

Parsonsburg sand

The Parsonsburg sand is composed predominantly of poorly sorted, brown, medium-grained sand. The materials range from the size of small boulders (rare), through cobbles, gravel, very coarse to very fine sand, silt, and clay. Its color is buff, tan, orange, or brown. It is distinguishable from the Walston silt by its sand 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 are seldom in contact. It is easily distinguishable from the gray sands and blue clays of the Miocene series. The type locality of the formation is at Parsonsburg in Wicomico County (Rasmussen and Slaughter, 1955).

The Parsonsburg sand is a veneer deposit, strewn upon the older deposits at all ranges of altitude, from below sea level to the highest divide (79 feet above sea level in this area). It ranges in thickness from a knife edge to 33 feet. It composes the rims and, in small part, the centers of the Maryland "basins". The Parsonsburg sand has been classified on only a few of the well logs as accurate recognition requires sediment samples.

Recent Series

The Recent sediments in Caroline, Dorchester, and Talbot Counties consist of thin deposits of very limited water-bearing capacity. The sediments comprise loam soil, alluvial sand and silt, dune sand, marsh muck, swamp and bog peat, and man-made fill.

The soils of Dorchester County are sandy loams, silty loams, and clay loams. The soils of Caroline County are sands and sandy loam, with some silt loam. The soils of Talbot County are sands and sandy loams, silt loams, and clay loams. The highland soils may be irony. In the bay marsh, they are brackish and gummy.

In general, they have a good structure and a high infiltration rate, but in places they are water-logged.

There are few recent dunes, and they are confined to the bay and estuary shores. The dunes are low and generally stabilized with vegetation.

Man-made fill is increasing in importance as a geological deposit, although in this area it is still insignificant. Because man's 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

A quantitative analysis of the ground water hydrology of the three counties in terms of recharge and discharge was not made. An inventory of the size and types of wells was made. Measurements of water-level fluctuations determined those areas and aquifers in which water levels were relatively sustained and those in which water-level decline is persistent. The utilization of water—rural, municipal, and industrial—was appraised. Aquifer tests made at Cordova, Federalsburg, Hurlock, West Denton, Easton and Cambridge include the Pleistocene-Pliocene(?) series, the Choptank, Calvert, Piney Point, Matawan, and Magothy formations.

TABLE 17

Types of Wells Scheduled in Caroline, Dorchester, and Talbot Counties

County	Dug	Driven	Jetted	Drilled	Unknown	Total
Caroline	19	321	172	32	10	554
Dorchester	7	85	369	42	3	506
Talbot	154	61	446	42	5	708
Total	180	467	987	116	18	1,768

Well Inventory

The records of 1,768 wells are compiled in Tables 33, 34 and 35: 554 in Caroline County, 506 in Dorchester County, and 708 in Talbot County. Their locations are shown on Plates 13, 14, and 15. They are estimated to include about 10 percent of the wells in Caroline County, about 8 percent in Dorchester County, and about 13 percent in Talbot County. They include practically all of the municipal wells and almost all of the industrial wells. Only enough of the driven and dug wells were scheduled to indicate the potential of the shallow water-table aquifer and to show where those types are preponderant in number.

Table 17 lists the wells by type for each county. The greater number of dug wells in Talbot County indicates that such wells are satisfactory and enduring there, which may be due to the earlier settlement of that county and to the retention of farms for many years. The great number of driven wells in Caroline

County is prompted by the fact that the driven well is the most economical means of getting a shallow water supply and indicates that the shallow ground water (within 100 feet in depth) is satisfactory and adequate there for most domestic purposes and that the sediments are sufficiently nonresistant to permit well driving and sufficiently permeable to yield water to well points. The lack of many driven and dug wells in Dorchester County is due to the marshy conditions and unpalatable shallow ground water in much of the county. The high ratio of jetted to drilled wells (9 to 1) suggests that jetting is more economical in this area for the greatest number of users who need a deep well but not a large quantity of water. It demonstrates also that the sediments can be drilled with a jet and that a rock bit is seldom required.

Table 18, listing the wells by age and type, indicates that more than 70 percent of the wells in use in 1954 have been constructed since 1940. Dug wells were most common in the first decade of the 20th century. Driven wells did not become popular until the decade 1921–1930. Drilled wells have remained a small, relatively steady proportion, since they are needed only for large-capacity wells. Jetted wells have been the dominant type since 1931.

TABLE 18

Age of Scheduled Wells by Period and Type in Caroline, Dorchester, and Talbot Counties

Period	Jetted	Driven	Drilled	Dug	Bored	Unknown	Total	Percent of known
Unknown	47	173	22	23	0	12	277	—
Before 1900	1	1	9	8	0	0	19	1.5
1901–1910	19	16	25	133	0	2	195	13
1911–1920	23	4	3	2	0	0	32	2
1921–1930	12	45	12	6	0	0	75	5
1931–1940	56	32	6	5	0	4	103	7
1941–1950	614	127	22	4	1	1	769	52
1951–1953	212	69	6	1	0	0	288	19.5
Total	984	467	105	182	1	19	1,758	100.0

The wells are classified according to geologic formation in Table 19. The proportion of wells in the Pleistocene and Pliocene(?) is greater than the percentages indicate, because most of the driven wells are in these shallow units and the driven wells were scheduled only in sufficient number to indicate their areal distribution. The other units, which are reached by jetted and drilled wells, are in their approximate statistical relation to each other. The Piney Point, the Aquia, the Choptank, and the Calvert formations contain the most important artesian aquifers.

The average depth of wells is given in Table 20. The average depth of wells in Dorchester County is more than four times that in Caroline County, and in

Talbot County the average depth is nearly three times that in Caroline County. Drilled wells are deepest; jetted wells are fairly deep; driven wells are shallow; and dug wells are shallowest.

TABLE 19

Classification of Scheduled Wells by Geologic Series and Formation

Fractions indicate wells which produce from more than one formation

Series Formation	Caroline	Dorchester	Talbot	Total	Percent
Pleistocene series	270.0	55.5	181.0	506.5	28.6
Pleistocene and Pliocene(?) series	65.0	54.0	41.0	160.0	9.0
Pliocene(?) series	7.0	1.0	0.0	8.0	0.5
Miocene series	167.0	80.0	77.7	324.7	18.4
St. Marys formation	(11.0)	(20.8)	(0.0)	(31.8)	(1.8)
Choptank formation	(111.0)	(31.9)	(16.5)	(159.4)	(9.0)
Calvert formation	(45.0)	(27.3)	(61.2)	(133.5)	(7.6)
Eocene series	19.5	296.5	395.6	711.6	40.3
Piney Point formation	(18.5)	(210.5)	(226.8)	(455.8)	(25.8)
Nanjemoy formation	0	(3.0)	(1.3)	(4.3)	(.2)
Aquia greensand	(1.0)	(83.0)	(167.5)	(251.5)	(14.3)
Paleocene series	1.0	8.0	1.0	10.0	0.5
Upper Cretaceous series	0.5	7.0	5.7	13.2	.8
Monmouth formation	(0.5)		(0.9)	(1.4)	(.1)
Matawan formation			(2.3)	(2.3)	(.1)
Magothy formation		(6.0)	(2.0)	(8.0)	(.5)
Raritan formation		(1.0)	(0.5)	(1.5)	(.1)
Unknown	24.0	4.0	6.0	34.0	1.9
Total	554.0	506.0	708.0	1,768.0	100.0

TABLE 20

Average Depth of Wells, by Type, in Caroline, Dorchester, and Talbot Counties

(Averages in feet. Grand averages weighted by proportionate number of wells)

County	Jetted	Dug	Driven	Drilled	Grand average
Caroline	143	19	27	214	82.1
Dorchester	408	15	30	414	349.7
Talbot	332	23	29	454	241.4
Grand average	320.4	21.9	27.9	370.3	224

The average diameter of 175 dug wells is 46 inches. The most common diameter is 48 inches and the range is from 20 to 72 inches. Among the 467 scheduled driven wells, the 1¼- and 1½-inch diameter pipes were most common and about equal in number. There were a few 1¾-inch, 2-inch, and 2½-

inch diameter driven wells. In jetted wells, the 1½-, 2-, and 2½-inch diameter pipes are most popular. For larger capacity jetted wells 3-, 4-, 6-, and 8-inch casing is employed and, rarely, 10- and 12-inch. The 1¼-, 3½-, and 5-inch sizes are rarely used. In drilled wells, the 1½- and 6-inch casing diameters are most common and about equally popular. Very large capacity wells are 24-inch, 14- to 8-inch, 12- to 6-inch, and 10- to 6-inch double-cased wells. Moderate to small capacity drilled wells are 4-inch, 3½-inch, 3-inch, 2½-inch, 2-inch, and 1½-inches in diameter.

Water-level Fluctuations

The level to which the water from a formation will rise in a well is known as the "static" water level, implying that the water reaches and remains at a fixed level. Actually the level is not static but fluctuates up and down.

In artesian wells, the water rises and falls in response to changes in atmospheric pressure, and to other loading of the earth's crust such as that imposed by tides, railroad trains, etc. The flow of artesian wells increases and diminishes in response to the air pressure changes during a storm. Artesian wells in tidal areas increase in flow or in water level as the tide comes in and decline as the tide goes out. Earthquake shocks cause sharp water-level changes, occasionally of great amplitude.

In water-table wells, the response of the water level to rain usually occurs soon after it has fallen. Between periods of precipitation, the water level declines at a decelerating rate.

The water-level fluctuations which reveal the hydraulic characteristics of a ground-water reservoir the most are those resulting from periods of pumping and nonpumping. All the nearby wells in the same formation, and even wells at distances of several miles, are influenced by the wells pumping in a ground-water reservoir. The rate of decline and the rate of recovery of the water levels in observation wells in response to known amounts and periods of pumping give the basic data for determining how much more water can be taken, or how much longer pumping can persist at present rates, or how far the pumps will have to raise the water from future lowered levels. Thus water-level fluctuations are the essential clue to the perennial yield of ground-water reservoirs.

Figure 5 shows the natural water-level fluctuations in four wells driven into the water-table aquifer in the Pleistocene and Pliocene(?) series. Each hydrograph shows an annual cycle in which the chief influence is evapotranspiration. Rainfall is fairly evenly distributed, so that it has a stabilizing effect. However, months of abnormal rainfall are reflected by sustained or rising water levels, and months of little or no rain cause an extended recession curve.

The temperature curve describes the wax and wane of solar heat, which is the main control on evaporation. Temperature reaches a peak in late July, but the water table does not reach its lowest level until late October. This lag

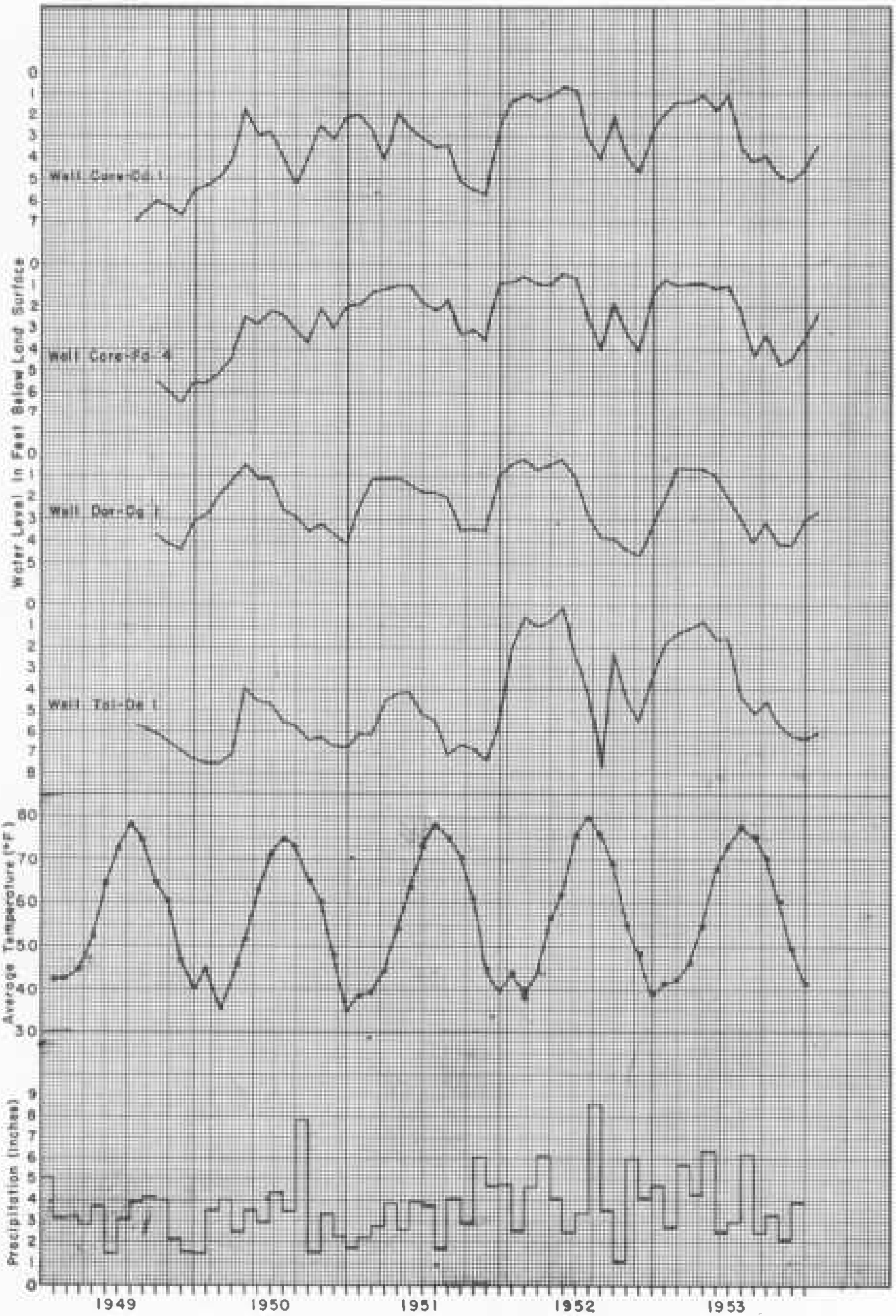

FIGURE 5. Natural Fluctuation of Water Level in 4 Shallow Wells in Caroline, Dorchester, and Talbot Counties.

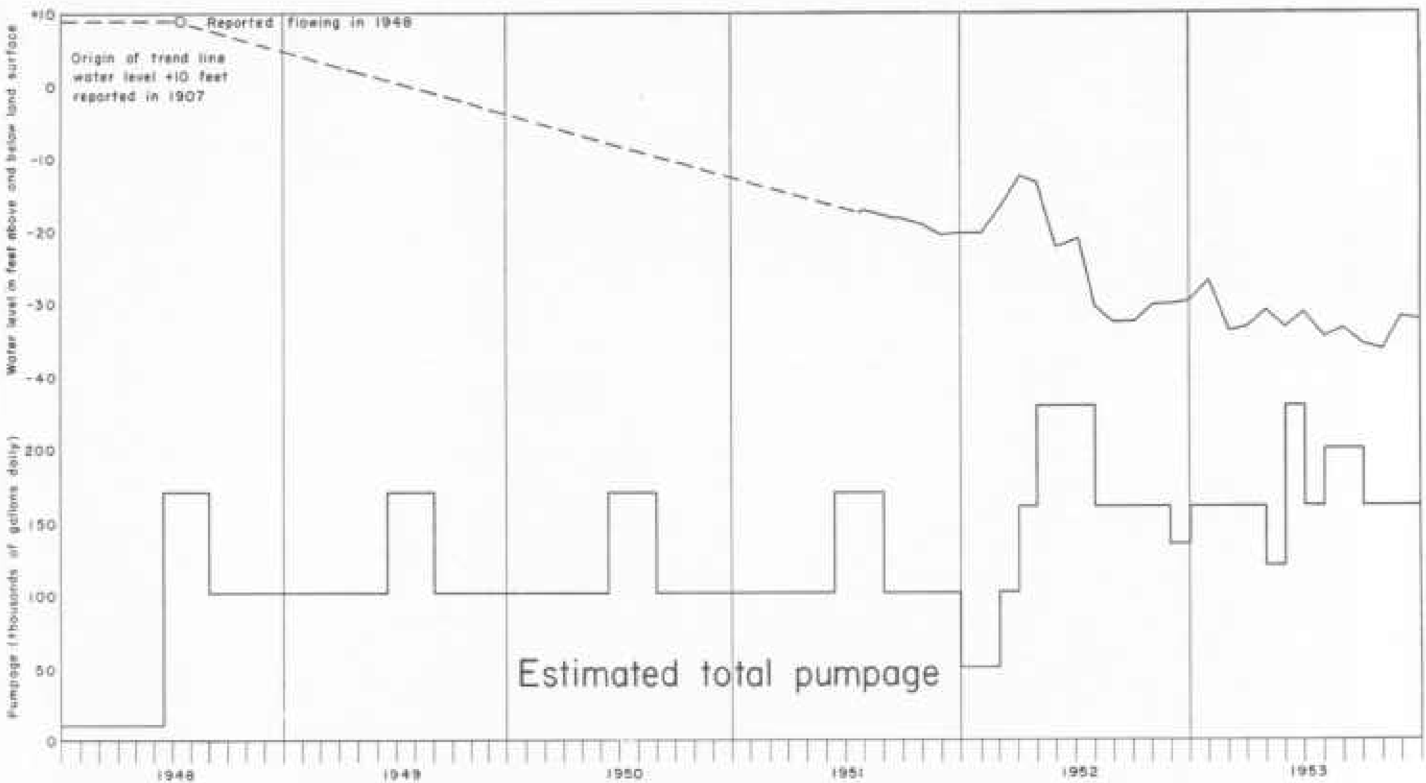

FIGURE 6. Decline of Water Level at West Denton in Response to Industrial Pumping, 1948 to 1953.

is due to the growth of vegetation beyond the peak of summer heat, with its increased water demand, which scarcely abates before the first killing frost.

The graphs of water levels in figure 5 indicate that rates of recharge and discharge have remained fairly constant over the period of record with no indication of a downward trend in water level in the water-table aquifers of the tricounty area.

Figure 6 shows the decline of water level in the Choptank formation at West Denton, locally called the "100-foot" aquifer, in response to industrial pumpage during the period 1948 to 1953. Most of the domestic wells in the West Denton area are developed in this aquifer and many were pumped by suction lift. The industrial pumpage, begun in 1948 and increased in 1951, created a cone of depression toward the industrial wells which lowered the water level beyond suction lift in the nearest domestic wells and increased the height of lift on all wells within the area of influence.

The potentiometric map of water levels in the Piney Point formation (Pl. 9) illustrates the widespread influence of pumping at a fairly high rate for a relatively long period of time at Cambridge. The cone of depression is more than 100 feet below sea level at the center and has a radius of influence of more than 25 miles. The cone can be deepened an additional 250 feet, in the process yielding billions of gallons of more water annually, before the danger level is reached. Figure 7 is a graph of the lowering of water levels in five observation wells in this aquifer during the period 1951 to 1953.

Figure 8 illustrates the decline of water level in a well at Baltimore Corner in northern Caroline County caused by deepening a drainage ditch. The land surface is about 54 feet above sea level. This well is representative of the water table beneath the interior terraced plains.

Water Utilization

The estimated use of ground water in Caroline, Dorchester, and Talbot Counties is 11.3 million gallons a day, or about 4 billion gallons a year. Surface water is not used for general water supply, but an undetermined amount is used for cooling and possibly for industrial washing processes. The electric plant at Vienna is said to have used an average of 105 million gallons of water a day from the Nanticoke River for cooling purposes in 1953. This is almost 10 times the daily groundwater demand for all purposes.

Table 21 summarizes the average daily water demand in the three counties. Industrial pumpage and municipal pumpage are nearly equal in amount. Industrial and commercial consumption is more than 2.5 times as great as domestic and farm consumption.

Tables 22 and 23 record the monthly municipal pumpage by geologic formations at Cambridge and Easton. The pumpage at Cambridge has gradually increased since 1932, augmented particularly during World War II. The pump-

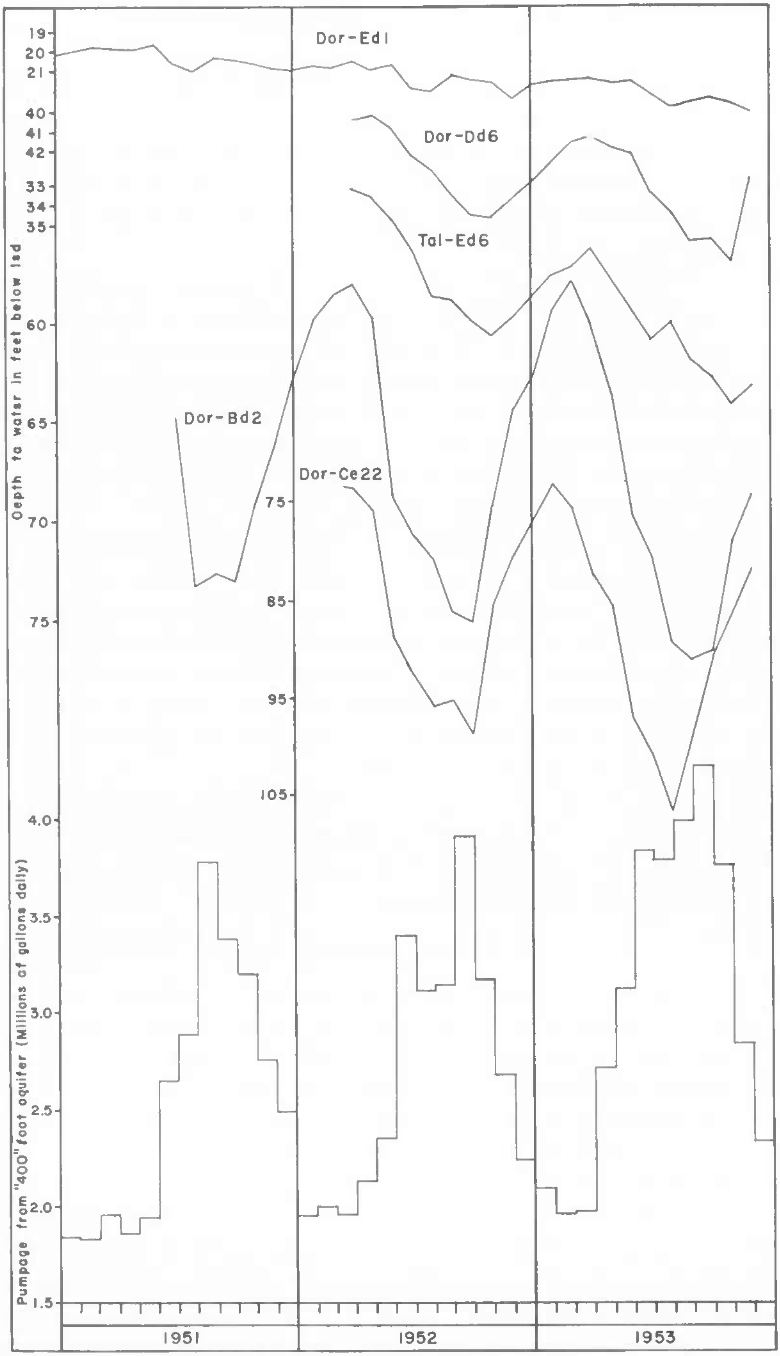

FIGURE 7. Lowering of Water Levels in the Piney Point Formation in Response to Pumping, 1951 to 1953.

age is seasonal, responding to the packing and canning industry. The pumpage at Easton reaches a peak in July and August. Table 24 shows the estimated or computed average daily pumpage of towns and cities in the three counties.

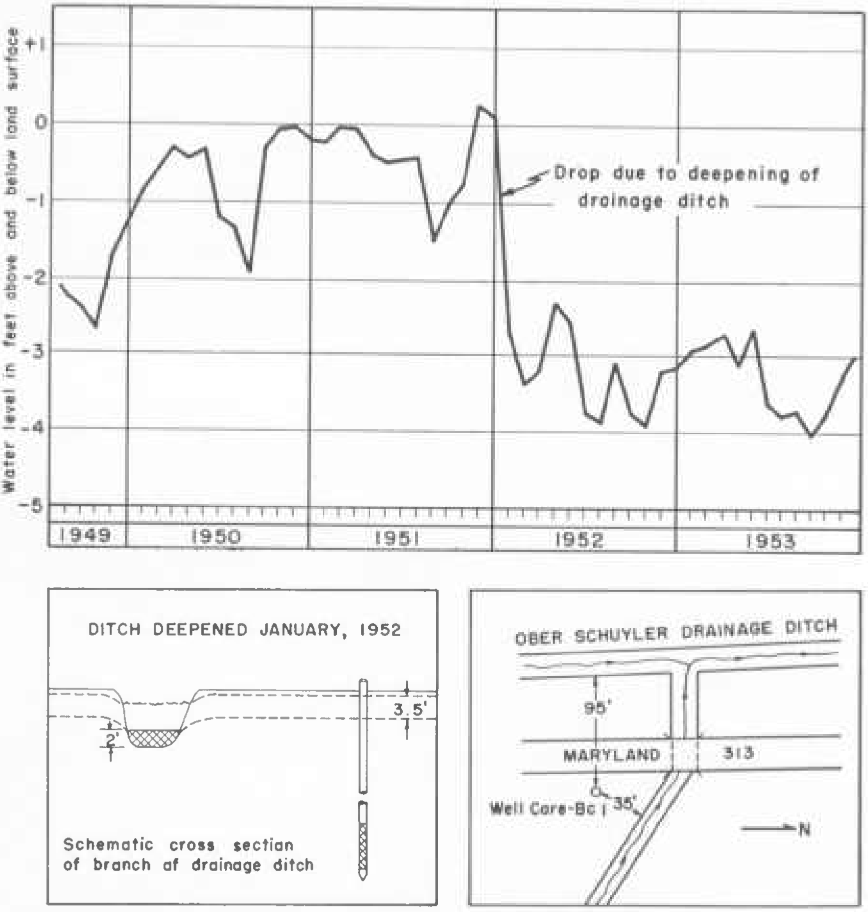

FIGURE 8. Decline of Water Level in a Well Due to Deepening of a Drainage Ditch Caroline County.

Drainage of Soils

The natural drainage in Caroline and Dorchester Counties and, to a lesser extent, in Talbot County is not adequate in the winter and spring to carry off excess precipitation. The water soaks in and is retained on the watershed, resulting in a high water table and a saturated soil zone. In some areas the soil cannot be cultivated until well into the growing season, and many acres are too swampy to be cultivated at all.

These conditions are brought about by several factors: the low-lying terraced plains are so flat that runoff is retarded; the rills and gullies are quickly choked with alluvium; the transported material is chiefly in the sand-size grades, too large to flush readily except under intense storm conditions; the permeable soil absorbs much of the rainfall; the lush vegetation intercepts much rainfall and retards overland flow; and Maryland basins with their broad, low-lying rims constitute an effective series of check dams.

Drainage is an important factor of land utilization in Caroline and Dorchester Counties. Talbot County is much better drained. Though surrounded by tidewater on more than nine-tenths of its perimeter, the land rises at a sufficient rate from the water's edge to permit normal runoff in most of the area.

TABLE 21

Utilization of Ground Water in Caroline, Dorchester, and Talbot Counties

(gallons per day, 1950 to 1953)

Production

Ownership or franchise	Caroline	Dorchester	Talbot	Total
Municipal	805,000	2,869,000	790,000	4,464,000
Industrial	3,043,000	936,000	827,000	4,806,000
Rural	777,000	553,000	737,000	2,067,000
Total	4,625,000	4,358,000	2,354,000	11,337,000

Consumption

Purpose	Caroline	Dorchester	Talbot	Total
Domestic-urban	240,000	494,000	301,000	1,035,000
Domestic-farm rural	294,000	309,000	351,000	954,000
Farm stock	483,000	243,000	386,000	1,112,000
Industrial-commercial	3,608,000	3,312,000	1,316,000	8,236,000
Total	4,625,000	4,358,000	2,354,000	11,337,000

Aquifer Tests

The optimum rate of yield of water from a water-bearing formation depends principally upon the hydraulic coefficients of the formation, the coefficients of transmissibility and storage. These coefficients can be determined by means of controlled aquifer tests in which a single well or a group of wells is pumped at a constant rate and the declines in water levels in these and in nearby observation wells are measured. When pumping has ceased, the water levels recover and the rate of recovery may be used to give a check calculation of

TABLE 22

Monthly Pumpage of the Dorchester Water Company, Cambridge, 1932 to 1953
(in millions of gallons of water)

The Piney Point formation, the "400-foot" aquifer, was the sole source until 1948. The Magothy(?) formation, the "950-foot" aquifer, has been used as an auxiliary source since 1948.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1932	27.0	25.8	29.5	30.1	26.4	36.6	39.9	41.2	46.1	39.7	34.5	33.9	410.7
1933	29.3	34.1	41.5	41.6	46.2	50.2	50.8	57.4	56.1	42.6	34.7	33.0	517.5
1934	26.3	44.5	49.7	34.5	30.7	47.7	52.8	59.5	63.8	64.4	43.7	42.9	560.5
1935	32.9	39.5	39.3	37.6	43.1	54.5	55.7	72.0	67.3	61.0	47.7	43.6	594.2
1936	39.5	45.2	46.3	41.9	47.1	61.1	44.7	75.2	78.8	61.0	52.1	45.9	638.8
1937	42.7	46.3	59.1	41.1	47.6	55.4	49.9	76.1	52.4	46.5	51.6	37.2	605.9
1938	27.9	27.8	35.6	46.5	53.2	59.8	64.0	74.1	48.8	43.3	49.4	55.6	586.0
1939	36.9	35.4	45.0	41.3	50.8	50.1	47.4	73.4	71.1	51.1	42.1	38.0	582.6
1940	39.9	40.5	40.9	45.7	43.2	57.1	58.3	78.9	56.6	59.6	46.2	45.5	612.4
1941	46.1	35.6	35.6	50.2	55.7	47.1	54.6	66.0	78.4	68.0	57.4	53.7	648.4
1942	48.7	48.8	42.9	51.4	45.2	59.6	59.7	77.7	77.3	59.1	60.2	60.2	690.8
1943	78.3	52.2	40.2	41.5	51.1	71.5	79.0	97.0	82.6	64.6	66.4	72.7	797.1
1944	75.0	74.7	77.6	68.2	68.8	74.4	68.0	95.9	89.3	78.0	75.9	79.4	925.2
1945	75.0	66.3	71.1	71.3	66.1	73.4	78.7	91.7	90.2	86.9	87.2	101.1	959.0
1946	87.2	71.7	66.6	70.0	67.1	75.2	73.1	115.7	102.2	92.6	88.8	83.4	993.6
1947	76.4	69.6	75.5	71.7	72.1	76.9	78.2	111.7	113.3	72.7	56.8	61.5	936.4
1948													
Piney Point	67.3	69.0	69.8	60.0	73.2	87.1	83.4	96.6	90.8	73.4	69.2	71.8	911.6
Magothy(?)	0	0	0	0	0	0.3	0	3.0	2.9	1.9	2.5	0.3	10.9
1949													
Piney Point	59.7	52.5	57.4	62.0	68.5	91.3	91.0	107.2	84.8	79.9	57.8	52.1	864.2
Magothy(?)	0	0	0	0	0	3.4	2.8	1.6	0	0.1	0	0	7.9
1950													
Piney Point	52.9	50.2	50.0	53.7	68.9	84.9	78.9	110.2	92.3	74.6	58.0	50.4	825.0
Magothy(?)	0	0	0	0	0	8.5	14.5	12.5	13.4	14.6	14.2	12.9	90.6
1951													
Piney Point	56.9	51.2	60.8	55.8	60.2	79.6	89.5	117.7	101.5	98.7	82.8	77.3	932.0
Magothy(?)	15.3	13.9	15.0	13.6	13.5	13.1	5.0	13.4	11.7	0	0	0	114.5
1952													
Piney Point	60.3	58.0	60.9	63.9	73.1	102.1	96.4	97.4	107.3	97.8	80.3	65.3	962.8
Magothy(?)	0	0	0	0	0	7.0	2.1	8.3	14.2	18.2	2.7	0	52.5
1953													
Piney Point	64.9	54.8	60.6	69.7	69.9	85.1	97.6	102.3	99.1	88.3	62.4	57.2	972.2
Magothy(?)	0	0	0	0	0.5	0.9	3.4	7.7	5.7	4.9	13.0	13.7	49.8

the formation coefficients. Procedures for analyzing aquifer-test data have been summarized by Brown (1953).

The U. S. Geological Survey and the Maryland Department of Geology, Mines and Water Resources installed three test wells in December 1955, to be used for aquifer tests and for continuing observations of water levels. The wells are Tal-Bf 73, 295 feet deep, and Tal-Bf 74, 51 feet deep, both at Cordova, Talbot County, and Dor-Bg 33, 96 feet deep, at Hurlock, Dorchester County.

TABLE 23

Monthly Pumpage at Easton, 1950 to 1953

(in thousands of gallons of water)

Month	1950					1951				
	Tal-Ce 2 Depth 110 ft. Calvert formation	Tal-Ce 50 Depth 630 ft. Aquia greensand	Tal-Ce 3 Depth 1025 ft. Aquia and Matawan(?) formations	Tal-Ce 5 Depth 1148 ft. Magothy formation	Monthly total	Tal-Ce 2 Depth 110 ft. Calvert formation	Tal-Ce 50 Depth 630 ft. Aquia greensand	Tal-Ce 3 Depth 1025 ft. Aquia and Matawan(?) formations	Tal-Ce 5 Depth 1148 ft. Magothy formation	Monthly total
Jan.	1,379.9	0	17,524.6	0	18,904.5	2,082.8	3,029.8	8,032.0	1,833.8	14,978.4
Feb.	11.7	0	12,993.0	160.1	13,164.8	4,210.6	0	9,179.3	0	13,389.9
Mar.	3,646.5	0	10,772.3	0	14,418.8	4,503.3	0	11,144.9	0	15,648.2
Apr.	4,824.0	0	9,083.8	0	13,907.8	1,423.0	1,371.9	11,802.8	790.3	15,388.0
May	4,401.9	0	10,287.4	0	14,689.3	19.7	466.7	12,173.7	2,742.6	15,402.7
June	3,064.6	0	11,807.3	1,357.9	16,229.8	1,143.1	0	12,467.3	2,546.1	16,156.5
July	210.2	0	2,137.2	12,695.7	15,043.1	1,688.1	0	15,652.5	1,601.6	18,942.2
Aug.	673.7	0	2,006.9	14,665.5	17,346.1	1,994.8	0	17,044.9	1,368.4	20,408.1
Sept.	1,731.8	0	5,371.2	7,019.7	14,122.7	2,350.6	0	13,328.6	1,314.3	16,993.5
Oct.	3,909.8	4,638.9	9,143.1	1,511.3	19,203.1	4,086.9	0	9,129.8	1,868.0	15,084.7
Nov.	3,482.8	2,573.2	9,241.5	1,113.2	16,410.7	4,432.8	0	7,857.7	1,606.7	13,897.2
Dec.	3,842.3	920.6	7,858.3	1,655.0	14,276.2	4,680.0	0	8,624.3	1,375.8	14,680.1
Annual total	31,179.2	8,132.7	108,226.6	40,178.4	187,716.9	32,615.7	4,868.4	136,437.8	17,047.6	190,969.5
	1952					1953				
Jan.	4,833.7	0	9,212.8	686.2	14,732.7	3,847.1	1,185.9	8,659.6	3,318.5	17,011.1
Feb.	4,553.5	0	9,291.9	0	13,845.4	3,498.5	2,106.5	6,093.3	3,168.2	14,866.5
Mar.	4,680.9	0	8,900.4	800.7	14,382.0	3,662.7	1,167.1	9,456.5	1,873.3	16,159.6
Apr.	4,747.3	0	8,192.7	1,886.5	14,826.5	2,565.6	2,407.3	10,258.8	1,909.1	17,140.8
May	4,054.5	0	9,653.6	2,317.2	16,025.3	1,340.7	2,702.8	12,480.5	1,294.1	17,818.1
June	2,736.0	0	13,721.1	1,968.5	18,425.6	2,064.9	2,412.5	10,908.5	3,495.2	18,881.1
July	2,295.7	0	12,299.3	6,379.4	20,974.4	2,162.5	4,499.2	8,021.8	7,917.0	22,600.5
Aug.	674.0	2,868.5	8,076.4	8,155.3	19,774.2	2,449.8	3,269.8	5,569.4	8,487.6	19,776.6
Sept.	2,273.9	283.6	8,545.4	6,001.6	17,104.5	2,654.8	1,769.7	7,212.8	6,871.7	18,509.0
Oct.	3,961.7	4,750.9	7,274.0	4,432.7	20,419.3	2,418.3	1,651.6	10,131.6	3,079.1	17,280.6
Nov.	4,089.6	4,458.4	9,249.0	1,954.2	19,751.2	2,908.2	3,046.5	5,967.1	3,900.7	15,822.5
Dec.	4,025.0	155.1	9,194.8	3,087.3	16,462.2	2,602.3	8,393.0	2,278.4	2,455.6	15,729.3
Annual total	42,925.8	12,516.5	113,611.4	37,669.6	206,723.3	32,175.4	34,611.9	97,038.3	47,770.1	211,595.7

Magothy Formation at Easton

A recovery test on the aquifer in the Magothy formation at Easton, using well Tal-Ce 5 on West Street, was made in January 1949 by R. R. Meyer. He stated the following in a memorandum:

A recovery test was made on well 5, the new 1,188-foot well, in January 1949. The well was pumped at 415 gpm for 1 hour and 57 minutes. The static level before pumping was 9.28 feet below the pump base and the pumping level was 68.31 feet at the end of the pumping period. The recovery was measured for 9 hours and 47 minutes and the water level was 9.74 feet, or 0.46 foot below the original static level, and the recovery was continuing.

Previous to this test the well had not been pumped for several weeks. . .

The *T* computed from this test was 19,000 for the first 5 minutes of the recovery and 12,000 for the period from 5 to 350 minutes. The first 5 minutes was probably affected by the water reentering the well from the pump column. The great lag in the recovery *may* indicate that the aquifer is lenticular and the drawdown would continue to decline excessively with continued pumping.

TABLE 24

Average Daily Municipal Pumpage in Caroline, Dorchester, and Talbot Counties

(gallons per day, 1950 to 1953)

	Population in 1950	Pumpage
Caroline County		
Denton	1,806	91,000
Federalsburg	1,878	500,000
Greensboro	1,181	116,800
Preston	353	34,000
Ridgely	834	63,000
Dorchester County		
Cambridge	10,351	2,739,300
East New Market	264	15,000
Hurlock	944	56,000
Secretary	344	23,000
Vienna	414	36,000
Talbot County		
Claiborne	150	6,000
Easton	4,836	546,000
Oxford	757	100,000
St. Michaels	1,470	100,000
Trappe	325	38,000

Matawan(?) Formation at Easton

A field test on the Matawan(?) formation at Easton was run by J. W. Brookhart and G. E. Andreasen. The pumped well, Tal-Ce 3, is screened in sand of the Matawan(?) from 995 to 1,025 feet, but it has an overlap in the casing at about the 600-foot level, opposite the Aquia greensand. The well was allowed to recover for 5 days before the test. Tal-Ce 1, located 244 feet from the pumped well, was measured with a float-type automatic water stage recorder. Tal-Ce 1 is screened at 1,000 to 1,015 feet depth. This well had formerly been open in the "100-foot" aquifer in the Calvert formation, but the opening was sealed a short time prior to the test. The well is also screened at 782–788 feet in the Monmouth formation, but the driller's log shows a sandy clay at this level and the water superintendent believed that little, if any, water was derived from this level.

At the start of the test, the static water level in Tal-Ce 1 was 23.00 feet below land surface and in Tal-Ce 3 22.59 feet below land surface.

Pumping began at noon, August 19, 1950, and continued at an average rate of 616 gpm (range from 600 to 675 gpm) to noon, August 20. Recovery measurements were made on both wells through August 27.

The maximum drawdown in the pumped well, Tal-Ce 3, was 73.5 feet, giving a 24-hour specific capacity of 8.4 gpm per foot of drawdown. Tal-Ce 1 drew down 18.5 feet in the 24 hours. At the end of the 7-day recovery Tal-Ce 1 was 0.80 foot and Tal-Ce 3 only 0.06 foot below the original level.

Brookhart computed a coefficient of transmissibility of 25,000 gpd per foot and a coefficient of storage of 0.0003 for the aquifer. Owing to the multiple openings in Tal-Ce 1 and 3, these coefficients are only approximations.

Piney Point Formation at Cambridge

A well field test was run on the "400-foot" aquifer in the Piney Point formation at Cambridge on July 23, 1951, by R. H. Brown and T. H. Slaughter. Washington St. no. 1 well (Dor-Ce 4) was used for observation and equipped with an automatic water-stage recorder. The pumped well, Dor-Ce 2 (Dorchester Ave. no. 1), located 1,171 feet from the observation well, was operated for 8 hours and 45 minutes at the rate of 637 ± 10 gpm. Recovery water levels were measured for 1 hour and 40 minutes. The basic data are given in Table 25.

Because it was impractical to shut down all the city wells for the test, four other wells (Dor-Ce 9, 10, 12 and 13) were pumped continuously before and during the test. Other wells (Dor-Ce 4, 5, 6, 7 and 8) had not been operated for periods of 64 hours to 1 month prior to the test. The pumped well (Dor-Ce 2) was shut off 64 hours before the test started. The water level in Dor-Ce 4 had recovered to a level of 99.58 feet below land surface when the test started, and indications were that this was the highest recovery level for that part of the well field. Details of the test are given by Rasmussen and Slaughter (1951).

Several values of the coefficients of transmissibility and storage are possible from the recorded data, but the early phase of the test was preferred because the drawdown water levels were least likely to have been affected by extraneous influences (further recovery, barometric fluctuations, tidal influence from the Choptank River). The following values were obtained using the Theis nonequilibrium formula:

	Drawdown	*Recovery*	*Average*
T in gpd per ft.	47,500	42,500	45,000
S	.00036	.00038	.00037

Figure 3 is a diagram of the cone of depression based on these coefficients.

TABLE 25

Water Levels in the Aquifer Test of the Piney Point Formation at Cambridge

[drawdown and recovery of water level in Dor-Ce 4 due to the pumping of Dor-Ce 2, 1,171 feet distant]

Drawdown

July 23, 1951 Time	Minutes since pumping started	Water[1] level
8:15 a.m.	0	99.58
:19	4	.59
:22	7	.60
:24	9	.61
:26	11	.62
:28	13	.64
:30	15	.67
:32	17	.69
:34	19	.72
:37	22	.77
:40	25	.82
:45	30	.91
:50	35	100.00
:55	40	.10
9:00	45	.19
:05	50	.29
:10	55	.38
:15	60	.48
:20	65	.56
:25	70	.65
:30	75	.74
:35	80	.83
:40	85	.91
:45	90	.99
10:00	105	101.23
:15	120	.45
:30	135	.65
:46	151	.86
11:00	165	102.03
:17	182	.22
:35	200	.42
:55	220	.62
12:15 p.m.	240	.80
:45	270	103.06
1:25	310	.38
:45	330	.48
2:00	345	.59
:15	360	.72
:30	375	.82
:45	390	.91

Drawdown

July 23, 1951 Time	Minutes since pumping started	Water level
3:00	405	104.00
:15	420	.09
:30	435	.16
:45	450	—
4:30	495	.46
:45	505	.53
5:00	520	.58

Recovery

Time	Minutes since pumping stopped	Water level	Recovery[2] increment
5:00 p.m.	0		
:04	4	104.59	0.01
:06	6	.60	.00
:12	12	.59	.03
:15	15	.57	.06
:17	17	.55	.09
:19	19	.53	.12
:21	21	.51	.15
:23	23	.48	.19
:25	25	.46	.21
:27	27	.43	.25
:30	30	.39	.30
:33	33	.35	.35
:36	36	.30	.41
:39	39	.26	.46
:42	42	.22	.51
:45	45	.17	.57
:50	50	.10	.65
:55	55	.04	.73
6:00	60	103.96	.82
:10	70	.82	1.01
:20	80	.70	1.16
:30	90	.57	1.32
:40	100	.56	1.48

[1] Feet below top of casing, which is about 0.75 foot above land surface.

[2] Difference in feet between the observed water level and the extrapolated drawdown.

Calvert formation at Cordova

An aquifer at Cordova, northeastern Talbot County, has been correlated, on the basis of lithology, as the basal sand member of the Calvert formation. The unit has been recognized in the logs of wells Tal-Bf 66, -Bf 67, -Bf 68, -Bf 71, and -Bf 77 and test holes -Bf 73, -Bf 75, and -Bf 76. The top of the sand is at a depth ranging from 267 to 289 feet below the land surface. The thickness ranges from 13 to 25 feet. The only wells producing from the sand are Tal-Bf 67 and -Bf 68.

The basal sand of the Calvert is overlain by a silty, or clayey, diatomaceous bed about 100 feet thick, and underlain by sand and clay of the Piney Point(?) formation. The Piney Point(?) formation was logged to a partially penetrated depth of 350 feet in test holes Tal-Bf 75 and 76 and to a totally penetrated depth of 403 feet in well -Bf 66. In the Cordova area the basal sand member of the Calvert formation and the underlying 30 to 40 feet of sediments of the Piney Point(?) formation can be considered to function together as a hydrologic unit.

Well Tal-Bf 68, the pumped well, is owned by the Esskay Packing Company. It is 8 inches in diameter and is screened from 210 to 290 feet. On March 9, 1956, at 4:00 a. m. this well was shut off and allowed to remain idle until 2:00 p. m. on March 10, when the test began. The well was pumped for 1,700 minutes at an average rate of 107 gpm. Discharge was measured by means of an orifice and a piezometer tube. The discharge from the well was conducted 350 feet to a plant waste- and sewage-disposal system by means of a 2½-inch fire hose. At 6:20 p. m. on March 11, pumping ceased and recovery measurements were made for 800 minutes thereafter.

Well Tal-Bf 73, drilled to a depth of 295 feet and screened from 283 to 288 feet, was used as an observation well. It is 303.5 feet east of the pumped well. On February 21, this well was equipped with an automatic water-stage recorder which recorded water levels in the aquifer before and during the test. During the pretest shut-off period of well -Bf 68 the water level in well -Bf 73 rose from −43.75 to −27.74 feet. A leveling off of the rising water level was not achieved before the test began, necessitating an extrapolation plot of the pretest recovery water level. During the period of pumping the water level in -Bf 73 declined from −27.74 to −57.63 feet, for an observed drawdown of 29.89 feet. Adding the additional drawdown required by extrapolation of the prepumping hydrograph gave a total drawdown of 33.63 feet.

The resultant drawdown and recovery data compare very well and fitted the Theis nonequilibrium type curve. No recharge or discharge boundaries were indicated during the period of pumping and recovery.

The computed coefficients of transmissibility and storage are about 1,300 gpd per foot and 0.0001, respectively. The field coefficient of permeability, obtained by dividing the thickness of the producing sand into the coefficient of transmissibility, would be about 90 gpd per square foot, very low for coastal-plain sands. The low productivity of this aquifer is illustrated also by the reported specific capacity of Tal-Bf 68, .4 gpm per foot of drawdown. When producing 100 gpm the pumping level was −256 feet, which only allows a relatively small amount of additional available drawdown before the top of the producing sand is reached (screen is set at 270–290 feet).

In the Cordova area the basal sand of the Calvert formation has a limited capacity for ground-water development. It is calculated, using the test coefficients, that pumping at a rate of 100 gpm continuously for 180 days, would cause a lowering of the water levels of about 25 feet at a distance of 5,000 feet from the pumped well.

Calvert formation at Easton

On January 16, 1956, an aquifer test was made on the "100-foot" aquifer in the Calvert formation at the North Washington Street well field of the Easton Utilities Commission. The "100-foot" aquifer is 30± feet thick at Easton, and its top is at a depth of approximately 104 feet (see log of Tal-Ce 1).

The pumped well, Tal-Ce 2, the only well in the field tapping this aquifer, is 110.4 feet deep. The position of the screen in this well is not known. From November 1, 1955, until the test was begun on January 16, 1956, -Ce 2 was shut down. During that time the water level in it rose from 48 to 33.5 feet below the surface. Beginning at 3:00 p. m. on January 16, well Tal-Ce 2 was pumped for 1,141 minutes at an average rate of 193 gpm, at which time a plant power failure occurred. After a lapse of 17 minutes, pumping was resumed and was continued at an average rate of 188 gpm until 3:00 p. m. on January 17. The recovery of the water level was measured for 1,108 minutes thereafter. The pumping rate was measured with a Venturi meter, the water discharging directly into the city's supply system.

Observation wells Tal-Ce 6, -Ce 7, and -Ce 8 are 116 feet, 135 feet and 154 feet, respectively, from the pumped well. Measurements of the water levels during the test were made by means of a chalked steel tape.

An automatic water-stage recorder was installed at the Easton municipal pier at the head of the Tred Avon River, but a tidal correction for the observed levels was found not to be necessary.

The drawdown curves of data from wells Tal-Ce 6, -Ce 7, and -Ce 8 compared very favorably with each other and fitted the Theis nonequilibrium type curve. No boundary effects were evident during the period of drawdown before the power failure occurred (1,141 minutes). The average coefficients of transmissibility (T) and storage (S) from the data from all three wells were computed to be about 3,500 gpd per foot and .0001, respectively, for the 1,141 minute period.

Recovery curves of the wells also compared favorably with each other and fitted the type curve satisfactorily. Average coefficients of transmissibility and storage for all three wells were computed from the recovery data to be about the same as those computed from the drawdown data. Thus, the average coefficients for the Calvert formation are very close to the values ascertained by R. R. Meyer in October 1948.

In the aquifer test on the "100-foot" aquifer in the Calvert formation at Easton run by R. R. Meyer in October 1948, the pumped well Tal-Ce 1 was open in the Calvert aquifer and screened at 1,000 to 1,015 feet in the Matawan formation and at 782 to 788 feet in the Monmouth formation. Short comparative tests indicated that 240 gpm of the yield of 285 gpm was derived from the Calvert formation. Wells Tal-Ce 3, 6, 7, and 8 were used as observation wells. The drawdown in Ce 6 at a distance of 116 feet was 26 feet. The coefficient of transmissibility was calculated to be about 4,200 gpd per foot and the coefficient of storage was calculated to be about 0.00007.

Choptank Formation at West Denton

An aquifer test was run on the Choptank formation at West Denton on July 21, 1952, by D. H. Boggess, using an industrial well, Care-Dc 57, as the pumped well. The results are described in an open-file memorandum (Rasmussen and Reed, 1952) from which the following is quoted:

> On July 14, 1952, an automatic water-stage recorder was installed on the observation well Dc 56, to obtain a continuous record of the water level. This record showed that the water level fluctuated within a range of 0.5 foot in response to tides in the Choptank River. On the evening of July 18, 1952, the pump in well Dc 57 was shut down. Shortly thereafter, the water level in the observation well began to rise rapidly and continued to rise through the morning of July 21. The total rise of the water level was 5.47 feet. At 7:30 a.m., July 21, the pump on well Dc 57 was started and shortly thereafter the water level in the observation well started to decline. Well Dc 57 was pumped continuously for 18 hours and the water level in the observation well declined 2.41 feet. After the pump was shut down the water level in the observation well again started to rise. During this time wells Dc 54 and Dc 68 were pumped continuously.
>
> The rate of pumping in well Dc 57 could not be measured during the test, but by assuming that the reported rate of 120 gallons per minute is correct, the drawdown in well Dc 56 can be analyzed by the Theis nonequilibrium formula and the formula solved for the coefficients of transmissibility and storage.
>
> The coefficient of transmissibility was computed to be about 6,000 gallons per day per foot and the coefficient of storage to be about 0.003. The coefficient of transmissibility indicates that the aquifer has a rather low permeability. The coefficient of storage is rather large for an artesian aquifer and suggests the possibility of leakage into the aquifer. Two possible sources of leakage are present—the overlying water-table aquifer and the underlying 250-foot zone. However, present data are inadequate to determine whether leakage exists and, if it does, to what extent this leakage would affect the drawdowns in the 100-foot zone.

Pleistocene and Pliocene(?) Series at Cordova

On March 24, 1956, an aquifer test was made on the "50-foot" aquifer of the Pleistocene and Pliocene(?) series. The test was made at the Esskay Packing Company's plant at Cordova, using well Tal-Bf 72. This well is 52 feet deep and 10 inches in diameter and is screened between depths of 31 and 52 feet. In the vicinity of observation well Tal-Bf 74, 100 feet north of well -Bf 72, the "50-foot" aquifer ranges in thickness from 38 to 45 feet. Drillers' logs of wells in the area show the aquifer to be 20 feet thick 4,000 feet southwest of the test site and 70 feet thick 4,500 feet southeast of the test site. The log of a well 4,000 feet northeast of the Esskay plant does not show the coarse sand and gravel of the aquifer. An estimate of the areal extent of the aquifer is difficult because of the absence of well logs east and west of the test site.

Observation well Tal-Bf 74 is 4 inches in diameter and contains a 3-inch-diameter screen opposite the aquifer at a depth of 43 to 48 feet. On December 30, 1955, an automatic water-stage recorder was installed on this well to record water levels prior to and during the test.

The test was begun at 1:15 p. m., March 24, 1956. Well Tal-Bf 72 was pumped at an average rate of 202 gpm for 2,502 minutes. The pumping rate was determined by means of an orifice and piezometer tube. The discharge water was carried 400 feet away by means of a 2½-inch fire hose to a plant waste- and sewage-disposal system. Pumping stopped at 6:57 a. m. on March 26, and measurement of recovery of water levels was made for 79 minutes.

The resulting drawdown-data plot was complex. It was similar to the data plots from a test made on the "100-foot" aquifer of the Pleistocene and Pliocene(?) series at Hurlock on March 6, 1956. The plot for the latter part of the test, 400 to 2,502 minutes after pumping started, indicated a coefficient of transmissibility of about 100,000 gpd per foot. Although the results of one test cannot be considered conclusive, the results are in the same order of magnitude of those obtained by Bennett and Meyer (1948) at Salisbury. The coefficient of storage indicated artesian conditions, but this may be due to vertical changes in the permeability, and a corresponding leaky-aquifer condition. That is, although the entire thickness of material below 5 feet is saturated, water from the upper, less permeable material leaks down into the more permeable lower material in which the wells are screened. Thus, the whole thickness of saturated material does not act as a single homogeneous aquifer. Possibly water-table conditions would prevail after a much longer period of pumping, but the present test was too short to determine this.

The local subsurface geologic data suggest the presence of a channel aquifer in the Pleistocene and Pliocene(?) series which, on the basis of the aquifer-test data and the logs and yields of wells drilled into it, is capable of additional development in the Cordova area. Additional test holes and aquifer testing should, however, precede large-scale development to substantiate and enlarge available geologic and hydrologic information.

Pleistocene and Pliocene(?) Series at Federalsburg

An aquifer test was made at Federalsburg on April 6, 1950, by R. H. Brown and J. W. Brookhart, using wells Care-Fd 1 and 2, developed at depths of 45 and 46 feet in the Pleistocene and Pliocene(?) series. The test was not thoroughly satisfactory because boundary conditions were registered early and the pump broke suction before a sufficient record was obtained. Care-Fd 1 was pumped at the rate of 350 gpm for 12 hours. Care-Fd 2, located 161 feet from Fd 1, was measured with a tape. Brookhart says (informal communication):

> Well No. 2 continued to draw down throughout the test but not at a fixed geometric ratio. Since the discharge remained constant and the rate of drawdown was gradually increasing the test showed a boundary effect on the spreading cone of depression of the water table. This boundary effect represents a nearby discharge area and/or a semi-permeable barrier. With a changing geometric drawdown ratio the coefficient of transmissibility was also continuously changing. The coefficient of transmissibility was about 300,000 gpd/ft. in the early part of the test and decreased to about 170,000 gpd/ft. near the end. Since the transmissibility was still decreasing at the end of the test, a lower figure than 170,000 should be used to determine drawdown at various points from the pumped well.

A test of longer duration is necessary to calculate accurately the coefficients of transmissibility and storage of the aquifer. More complete tests in this aquifer in the Salisbury area indicate $T = 100{,}000$ gpd per foot and $S = 0.15$ (Rasmussen and Slaughter, 1955).

Pleistocene and Pliocene(?) Series at Hurlock

On March 6, 1956, an aquifer test was run on the "100-foot" aquifer of the Pleistocene and Pliocene(?) series at Hurlock. Well Dor-Bg 32, owned by the American Stores Company, was used as the pumped well. It is 83 feet deep and 8 inches in diameter and is screened opposite a bed of sand and gravel at a depth of 66 to 83 feet. The well was originally drilled to a depth of 104 feet.

Well cuttings from observation well Dor-Bg 33 showed that the aquifer is 86 feet thick and is composed principally of coarse sand and granule-size gravel from a depth of 6 to 92 feet below the surface except for a clay layer less than 1 foot thick at 19 feet. Below the sand and gravel is clay to the bottom of the well at a depth of 99 feet. A sieve analysis of the sample cuttings shows that they are preponderantly coarse sand, except for those from 75 to 80 feet deep, and from 86 to 91 feet deep, which were medium-grained sand. Silt and clay particles ranged from 4.3 to 13.2 percent by weight throughout all the samples.

In order to obtain pretest water levels, an automatic water-stage recorder was installed on February 21, 1956 on observation well Dor-Bg 33, which is 239 feet east of the pumped well, Dor-Bg 32. Well Dor-Bg 33 is 4 inches in diameter and contains a 3-inch-diameter screen from 85 to 90 feet below the surface.

On March 5, at 3:30 p. m., well Dor-Bg 32 was shut off and well Dor-Bg 4 was put into continuous operation to take care of plant needs during the test and to stabilize the water levels prior to the test. Other large-capacity wells in the area producing from the "100-foot" aquifer of the Pleistocene and Pliocene(?) series are 2,000 to 2,300 feet from well Dor-Bg 33. Although the discharge from these wells could not be controlled during the aquifer test, the recorded water levels during the pretest stabilization period did not show any effect of their pumping.

The test was begun at 9:00 a. m. on March 6, and Dor-Bg 32 was pumped for 2,760 minutes thereafter at an average rate of 302 gpm. The pumping rate was determined by means of an orifice and peizometer tube, and the water was discharged to a plant sewer and drainage system. The pumped well was shut off at 6:30 a. m. on March 8, and recovery measurements were made for 120 minutes.

The water-level recorder chart of well -Bg 33 showed that after 530 minutes of drawdown the level rose abruptly 0.03 foot and then rapidly declined. This water-level change was attributed to the loading effect of the weight of a freight train passing within 250 feet of the well. A similar aquifer-loading effect was noted also in pretest water-level records from this well. This effect indicates a confined (artesian) aquifer.

After 740 minutes of drawdown a heavy rain began which lasted for an hour and had an irregular effect on the water level. Rain occurred again from 1,830 to 1,850 minutes and from 2,030 to 2,090 minutes. As a result, only the initial 740 minutes of pumping was considered reliable, and even for this period the drawdown curve was complex. The period of pumping from 350 to 740 minutes indicated a coefficient of transmissibility of about 150,000 gpd per foot. The results of this test, as at Cordova, cannot be considered conclusive; however, they are of a reasonable order of magnitude.

The test indicated an artesian coefficient of storage. This aquifer, like that at Cordova, may also have vertical changes in permeability which cause a leaky-aquifer condition and account for the artesian coefficient of storage. Additional tests of much longer duration should be conducted for conclusive data.

The results of the aquifer test indicate that the aquifer in the Pleistocene and Pliocene(?) series in the Hurlock area is capable of additional utilization. The records of water levels in the area show no major decline since 1918, when the Maryland Geological Survey (v. 10, 1918) reported the water level at 1½ feet below the land surface. At the beginning of this test the water level was 5.42 feet below the land surface in well Dor-Bg 33.

QUALITY OF GROUND WATER

General Principles

The vaporized moisture of the atmosphere is relatively pure, but as it condenses into water droplets it absorbs gases. The amount of gas dissolved in rainwater is very small, only a few parts per million by weight. It is composed mainly of three gases (Bunsen, 1855), carbon dioxide (2 to 3 percent), oxygen

(34 percent), and nitrogen (63 to 64 percent). Carbon dioxide acidifies the water slightly, increasing its ability to dissolve minerals in the earth. The dissolved oxygen combines with both mineral and organic matter. The nitrogen is relatively inert.

As rainwater falls to earth, minute quantities of other soluble gases and particles of dust in the air are collected such as ammonia, nitric acid, sulfuric acid, and chlorine, the amount and kind varying according to local conditions.

As precipitation percolates into the ground and comes in contact with humus, it absorbs substantial quantities of carbonic and organic acids, so that shallow ground waters are apt to be slightly acid. As the water continues downward it dissolves minerals with which it comes in contact. The mineral composition of the rocks largely determines the chemical character of water at depth. Ground water filtering through limestone absorbs calcium carbonate and becomes hard; water in igneous or metamorphic rocks is usually only slightly mineralized, the type dependent on the soluble minerals present.

The permeable Coastal Plain sediments that underlie the tricounty area are of continental, marine, and mixed continental and marine origin. The variety of sands, gravels, silts, clays, shales, and shell or marl beds in these sediments influences the type and quality of the ground water in different aquifers and from place to place within an 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, because there has not been adequate circulation of meteoric waters to remove the marine or brackish waters in which the aquifers were deposited or with which they may have been filled at some time since their deposition.

Chemical analyses of water are generally reported in terms of parts per weight of the constituents dissolved in the water in one million parts by weight of water (ppm).

The dissolved minerals in water comprise two groups of ions. Iron, calcium, magnesium, sodium, and potassium are the most important members of the group of positively charged metallic ions or cations. Bicarbonate, sulfate, chloride, fluoride, and nitrate are the most common in the group of negatively charged acidic ions or anions. Silica, generally considered not to be ionized, is frequently determined also. To facilitate comparisons of different waters in geochemical studies, the parts per million may be converted to a form that shows the reaction capacity of the ions or radicals in the water. Bennett and Meyer (1952, p. 149) pointed out that this method permits an early detection of salt-water contamination.

Silica

Silica, or silicon dioxide, more commonly occurring as quartz, is the most abundant mineral in the crust of the earth. It is the major constituent of sand

and sandstone and occurs in many other rocks. Water dissolves quartz only slightly. The quantity of silica in ground water generally ranges from a few ppm to a few tens of 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 is brought above the surface and 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 hydrous iron oxide.

The U. S. Public Health Service standards for drinking water on interstate carriers allow up to 0.3 ppm of iron (or of iron and manganese together) in an acceptable public water supply. Greater quantities of iron, while not harmful to health, produce 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 species of bacteria which 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 also released from solution by oxidation and is objectionable mainly because of the stains (black) that 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 are responsible for most of the hardness or soap-consuming capacity of water. These ions, together with acid ions in equilibrium with them, constitute 60 to 90 percent of the dissolved minerals of hard water (Collins, Lamar, and Lohr, 1934, p. 7). Calcium and magnesium generally occur in ground water as carbonates or bicarbonates and less frequently as sulfates and chlorides. Ground waters contaminated by intrusions of sea water or drawn from aquifers from which the connate marine waters have not been flushed out are generally high in these constituents.

Sodium and potassium

The effects of sodium and potassium are similar. Sodium is the more important because it is the more common. They are the soft-water cations. Foster (1950) noted that analyses of waters of the Atlantic and Gulf Coastal Plains showed the same carbonate and bicarbonate content at depth as near the surface, but the waters had changed from predominantly calcium carbonate water at shallower depths to predominantly sodium carbonate water at greater depths, suggesting replacement of calcium by sodium through the action of base exchange. Sodium and potassium occur in many common minerals, such as mica and feldspar, with which the ground waters react.

Minor cations—aluminum, zinc, lithium, and copper

These cations are sometimes found in ground water, but usually in very small amounts. They are trace elements, the effects of which, in animal physiology, are little understood. Their role in the physiology of plants is partially 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), and rarely as the carbonate radical (CO_3). Bicarbonate is the chief acidic ion in most of the ground waters of the tricounty area except in those affected by salt-water contamination. The bicarbonate and carbonate are often reported as alkalinity 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 found in most ground water in the tricounty 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 or magnesium sulfate.

Chloride

Only minor amounts of chloride salts are present in ground water except in areas of salty water. If chloride is present in excess of about 250 to 500 ppm. the water will have a salty taste.

An acceptable water, according to the U. S. Public Health Service standards (1946), may contain up to 250 ppm of chloride. Ground water with large quantities of chloride, calcium, and magnesium, may be corrosive.

Fluoride

Fluoride in water supplies in amounts up to 1 ppm lessens or prevents the incidence of dental caries in the teeth of growing children (Dean, 1938). Continued use by growing children of water containing fluoride much in excess of 1 ppm, however, will cause a defect known as mottled enamel (Dean, 1936). Many cities now fluoridate the drinking-water supplies to lessen or prevent the incidence of dental caries in children's teeth.

Available water analyses of the tricounty area show that some fluoride exists in practically all the aquifers. Table 26 lists the minimum, maximum and average fluoride content of the aquifers tested.

TABLE 26

Fluoride Content of Water in Aquifers of Caroline, Dorchester, and Talbot Counties

Aquifer	Number of analyses	Fluoride content in parts per million		
		Minimum	Maximum	Average
Pleistocene and Pliocene(?)	2	0.0	0.0	0.0
Calvert formation	3	.4	1.0	.6
Piney Point formation	10	.9	1.6	1.1
Aquia greensand	4	.3	10.0	2.0
Aquia greensand and Matawan(?) formation	3	.4	.9	.6
Magothy formation	5	.0	1.0	.5
Raritan formation	1			.1

The extremely high fluoride content of 10.0 ppm reported from well Tal-Ce 50 at Easton, producing from the Aquia greensand, is omitted from the average.

Nitrate

Small quantities of nitrates 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 nitrates. The presence of unusually large quantities of nitrates may indicate organic pollution of the ground water, especially in shallow wells. Sometimes high nitrates are due to the use of nitrate fertilizer on the fields rather than to pollution. A large concentration of nitrate (45 ppm or more) in drinking water may cause methemoglobinemia in infants ("blue babies") (Waring, 1949).

Dissolved Solids

The dissolved solids reported in analyses is the total quantity of dissolved mineral matter in the water. The dissolved-solids content 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 of more than 500 ppm of dissolved solids for public water supply; however, a dissolved-solids content up to 1,000 ppm is permitted if necessary.

Turbidity and Suspended Solids

Turbidity is seldom present in ground-water supplies, if the wells are properly developed. Unpleasant turbidity may sometimes be reduced by cleaning wells. Suspended material can be removed by filtration.

Hardness

The hardness of water may be roughly defined as its soap-consuming capacity. The harder a water is, the more soap will be required to make a satisfactory lather and the greater will be the formation of soap curds. Hard waters form

TABLE 27

Classification of Hard and Soft Waters

Hardness range (parts per million)	Description of water
Less than 61	Soft water
61–120	Moderately soft to moderately hard water
121–180	Hard water
More than 180	Very hard water

insoluble deposits (boiler scale, etc.) when heated or evaporated. Hardness of natural waters is caused primarily by the salts of calcium and magnesium in solution in the water. Other constituents such as iron, aluminum, strontium, barium, zinc and free acid also cause hardness, but they are seldom found in natural waters in sufficient quantities to have much effect. "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, 1934, 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 equivalent to the term "temporary hardness" formerly used to designate that part of the hardness that could be removed by boiling because calcium and magnesium bicarbonates are broken down by heat and precipitated as the carbonates. That portion of the hardness that could not be so removed, roughly equivalent to the noncarbonate hardness, was called "permanent hardness". The hardness scale used by the U. S. Geological Survey (Collins, Lamar, and Lohr, 1934, p. 17, 18) is given in Table 27.

pH

There is a definite relation between the acidity or alkalinity of a water and its pH value. The pH is the logarithm of the reciprocal of the gram ionic equivalents of hydrogen per liter of solution. A solution having a pH value of 7 to said to be neutral. Decreasing values of pH below 7 denote increasing acidity, and increasing values above 7 increasing alkalinity. In general, the shallow ground waters have pH values of 5.5 to 6.5, due to carbonic and organic acids from the soil. Waters from marl and shell beds have pH values of 8 to 9.

Temperature

Ground water is used in large amounts for cooling purposes. The water from the shallowest wells (10–30 feet) varies in temperature with the seasonal atmospheric temperature, but over a smaller range. It averages about the same as, or slightly higher than, the mean annual air temperature. The temperature of water produced more or less continuously from a well at greater depths does not vary seasonally more than a degree or two. 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 was an increase of about 1° F for each 60-foot increase of depth in the Baltimore area. Recorded temperatures of wells of different depths in the tricounty area are given in Tables 30, 31 and 32 and in the remarks column in Tables 33, 34 and 35

Comparison of Water Quality in Water-bearing Formations

A comparison of the quality of the waters in the tricounty area, utilizing the available chemical analyses for iron, bicarbonate, chloride, dissolved solids, hardness, and pH, is presented in Figures 9 and 10. The averages for the aquifers are localized geographically. The data show approximate values and comparative trends within an aquifer and from one aquifer to another.

Pleistocene and Pliocene(?) Series

Average values indicate that the waters from the Pleistocene and Pliocene(?) aquifers are moderate in iron (0.59 ppm), very low in bicarbonate (13.8 ppm), low in chloride (11.8 ppm), and low in dissolved solids (134 ppm). They are soft and slightly acidic.

Miocene Series

St. Marys formation

Two water samples from a well producing from the St. Marys formation are low in iron (0.3 ppm), low in chloride (4.0 ppm), moderate in dissolved solids (195 ppm), and hard (145 ppm). The pH is reported as 7.3.

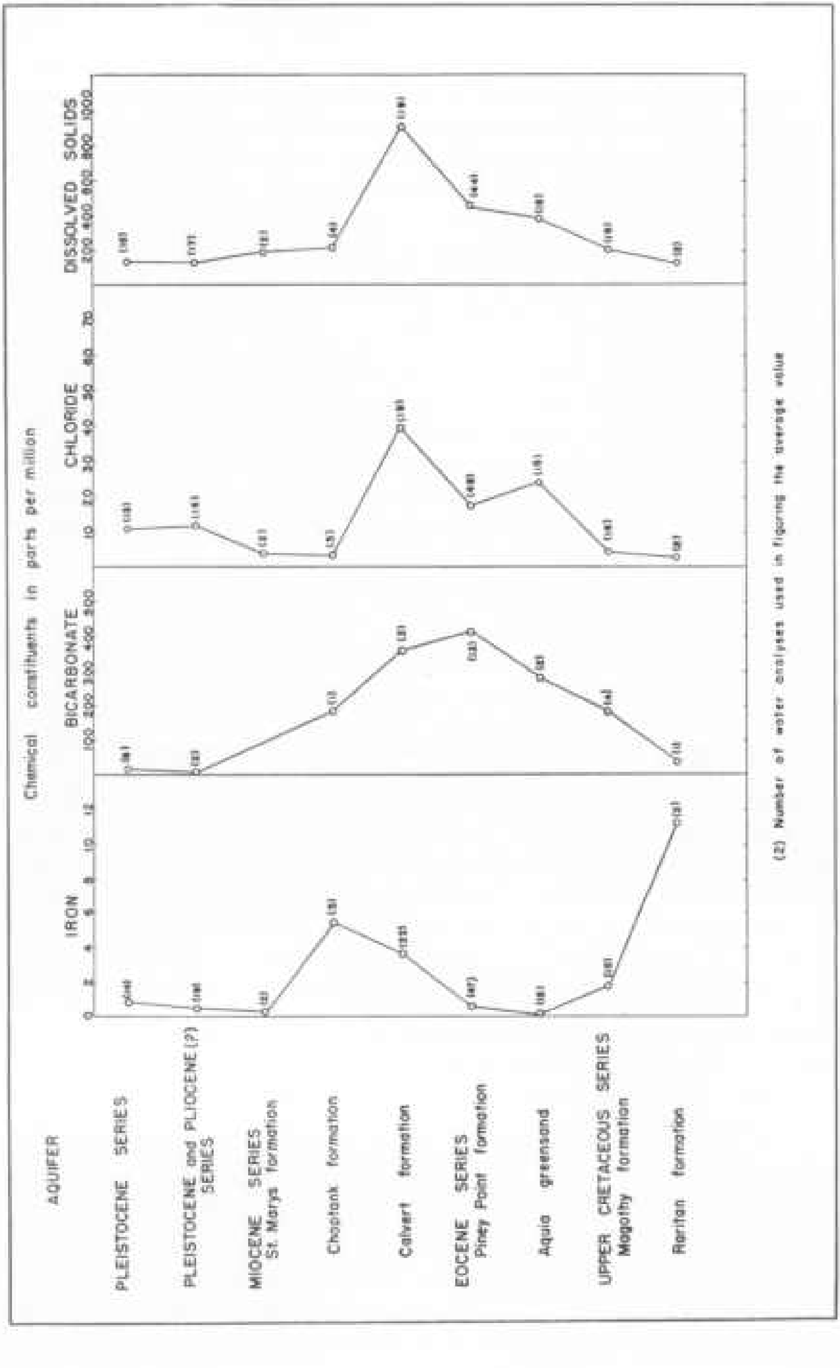

FIGURE 9. Average Quantity of Iron, Bicarbonate, Chloride, and Dissolved Solids in the Ground Waters in Caroline, Dorchester, and Talbot Counties.

Choptank formation

Analyses of water samples from five wells in Caroline County indicate a high iron content (12–13 ppm) in the northern part of the county and a lower iron content (about 1 ppm) in the southern part of the county. The average iron content is 5.5 ppm. Bicarbonate, reported in only one analysis, is moderate (180 ppm). The average chloride content is low (3.0 ppm), with a mini-

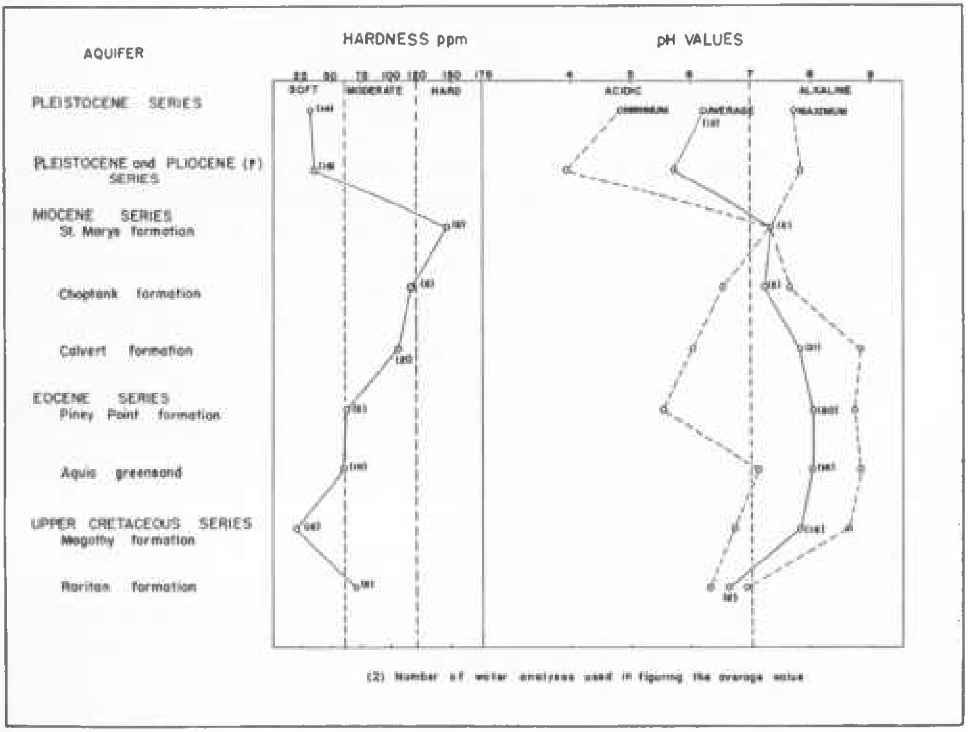

FIGURE 10. Average Hardness, and the Range in and Average pH in the Ground Waters of Caroline, Dorchester, and Talbot Counties.

mum of 1.9 ppm and a maximum of 4.1 ppm. The water is moderately high in dissolved solids (212 ppm) and moderately hard (120 ppm). The pH ranged from 6.5 to 7.8.

Calvert formation

Water from the Nanticoke aquifer at Vienna in eastern Dorchester County has a different chemical character from the water in the Calvert elsewhere in this area. The average iron content for the Calvert formation is moderately high (3.7 ppm). The water of the Nanticoke aquifer at Vienna contains 804 ppm of bicarbonate. The average bicarbonate content elsewhere is also high

(219 ppm). The average chloride content of the water of the Nanticoke at Vienna is moderately high (98 ppm), but elsewhere the average chloride content of the water from the Calvert is low (4.9 ppm). Except for the high dissolved-solids content at Vienna, averaging 2,100 ppm, the average content of dissolved solids is moderate (360 ppm). The water of the Nanticoke aquifer at Vienna has an average hardness of 43 ppm. The average for the water from the Calvert formation elsewhere in the area is 135 ppm. The water at Vienna has a pH of 8.5. Elsewhere the average pH value is 7.4.

Eocene Series

Piney Point formation

The Piney Point formation is represented by the greatest number of analyses and with the best areal distribution. The general quality of water is good and is comparatively uniform. The iron content of the aquifer is consistently moderate (average 0.52 ppm). Bicarbonate is moderately high (average 409 ppm) and is the highest of all the major aquifers in the three counties. The average content of chloride is 17.5 ppm. An exceptionally high value of 2,077 ppm of chloride from a well on Hoopers Island, Dorchester County, was excluded from the average. A comparison of the water from the Piney Point formation in Talbot County, where the aquifer is near the surface, with the water from the aquifer in Dorchester County, where it is deeper, indicates a general rise in dissolved solids with increasing depth. The water from a well about 1 mile southeast of Tunis Mills, Talbot County, contained 330 ppm of dissolved solids, whereas that from a well 35 miles south of Tunis Mills at Toddville, Dorchester County, contained 864 ppm. The average dissolved-solids content of the water from the Piney Point formation is moderately high (440 ppm). The aquifer yields water that is just out of the soft class (average hardness 61 ppm). The average of the pH values is 8.0.

Aquia greensand

The average iron content of water from the Aquia greensand is low (0.18 ppm). The bicarbonate content is moderate, averaging 278 ppm. Analyses of water from five wells in western Talbot County, one at Claiborne (Tal-Bb 3), one at Wittman (Tal-Cb 91), two at St. Michaels (Tal-Cc 26 and 29), and one at Neavitt (Tal-Db 19), indicate a brackish-water zone in the aquifer. The chloride content of these wells ranges from 14 ppm to 90 ppm and averages 42 ppm. At Oxford, six miles to the east, the average chloride content is only 3.9 ppm. The water from the Aquia greensand is moderately high in dissolved solids (average 386 ppm). It is soft, having an average hardness of 59 ppm. The average of the pH values is 8.0.

Upper Cretaceous Series

Matawan(?) formation

Nowhere in the tricounty area does the Matawan(?) formation produce water singly, but it is always developed in conjunction with one or more higher aquifers. Water from a well (Tal-Ce 3) at Easton, Talbot County, producing water from both the Aquia greensand and the Matawan(?) formation, was sampled five times during the period 1947–52. The averages of these analyses and of analyses of water from the Aquia greensand at Easton are:

	Aquia greensand and Matawan(?) formation	*Aquia greensand alone*
Iron	0.13 ppm	0.0 ppm
Chloride	2.4 ppm	3.6 ppm
Dissolved solids	227.0 ppm	540.0 ppm
Hardness	32.0 ppm	10.0 ppm
pH	8.1	8.7

The comparison suggests that the water from the Matawan(?) at Easton has a higher iron content, a lower chloride content, a lower dissolved-solids content, a higher hardness, and a lower pH than that from the Aquia greensand.

Magothy formation

With some exceptions, the Magothy formation yields water of very good quality. The average iron content is moderate, (0.52 ppm), excluding the water from test well Tal-Cb 89, two samples from which averaged 9.4 ppm. The formation yields water ranging from moderately low (68 ppm) in bicarbonate in northwestern Talbot County to moderate (296 ppm) at Cambridge in Dorchester County. The average for the formation is 182 ppm. The chloride content is uniformly low, averaging 4.3 ppm. The dissolved-solids content averages 200 ppm. The samples of water from the Magothy in test hole Tal-Cb 89 had an average hardness of 60 ppm, but the average for all other wells tapping this formation is low (14 ppm), indicating a very soft water. The water from the Magothy formation is predominantly alkaline.

Raritan formation

The only available analyses of water from the Raritan formation are from test well Tal-Cb 89. They indicate a high average iron content of 11 ppm, a low bicarbonate content of 36 ppm, a low average chloride content of 2.9 ppm, and moderately low dissolved solids, averaging 129 ppm. The water is slightly hard, averaging 69 ppm, and has a pH of about 6.6.

Summary

Figure 9 summarizes the average and range of chemical constituents by aquifers.

Iron

Excluding the iron content of the Raritan formation represented by only one well, the average iron content is highest in the water from the Choptank formation. The water from the Calvert formation shows the second highest iron content, that from the Magothy formation, the third. The waters from the Pleistocene and Pliocene(?) series, the St. Marys formation, the Piney Point formation, and the Aquia greensand have an average iron content of less than 1 ppm.

Bicarbonate

The Pleistocene and Pliocene(?) series have the lowest bicarbonate content. The average content increases with depth to a maximum in the Calvert and Piney Point formations. From the Piney Point formation downward to the Raritan formation, the content progressively diminishes.

Chloride and dissolved solids

The lines for average chloride and dissolved solids content in figure 9 are similar because the highly mineralized ground waters of this area are connected in some manner with marine conditions. However, the ratio between chloride and dissolved solids varies.

Hardness

The Pleistocene and Pliocene(?) series and the Magothy formation yield soft water. The remaining formations, except the Raritan, yield a moderately hard to hard water. This is probably caused by the solution of calcium carbonate from the limy shells in the relatively abundant shell and marl beds in these formations.

pH

Figure 10 shows the minimum, average, and maximum pH of water from the different aquifers. The trend is from lower pH ranges in the shallow aquifers to higher ranges in the deeper aquifers.

Special Problems of Water Quality

Salt-Water Contamination

The relationship of ground water to salt water was first studied by Ghyben (1889, p. 21) and by Herzberg (1901). Their conclusions were based on theoretical hydrostatic equilibrium between salt water and fresh water. Hubbert (1940, p. 785–944) and Krul and Liefrinck (1946, p. 15–17) demonstrated 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 as far below sea level as the static head of the fresh water is above sea level. Hence, in an artesian aquifer cropping out beneath a salt-water body, if the water table at the outcrop on land were 20 feet above sea level and the salt water had a density of 1.025 the depth to the contact between fresh water and salt water would be 800 feet below sea level. If the specific gravity of the salt water were less than 1.025, the contact of the fresh and salt water would be deeper.

Some of the principal aquifers of the Eastern Shore have outcrop areas that cross the Chesapeake Bay and are probably exposed to the intrusion of salt or brackish water there. Heavy pumping, especially near the bay, should be undertaken with caution. Periodic sampling and analysis for chloride content would detect indications that salt-water intrusion from the bay may have begun.

Aquia greensand

Available water analyses reveal probable intrusion of salt water into the Aquia greensand in the western part of Talbot County, including Claiborne, St. Michaels, Neavitt, and Wittman. The area is divided into three major necks (finger peninsulas) and many minor necks by a dendritic system of tidal creeks. It is bounded on the north by Eastern Bay, on the northeast by the Miles River, on the south by the Choptank River, and on the west by the Chesapeake Bay, all of which contain salt or brackish water. The chloride content of the ground water from this area is listed in Table 28. A chloride content of 100 ppm is perceptible to the taste of especially sensitive individuals; most people cannot taste it until the content rises to 250 to 500 ppm.

No analysis from the southern part of Tilghman Island was available, but reports indicated a variable quality of water. The analyses from Easton, Oxford, and Sherwood represent the normal chloride content of the water from the aquifer. That normal water was obtained at Sherwood, which lies between the area of highest chlorides and the bay, may indicate that pumpage there has not been heavy or that the salt water is advancing from a different direction.

The Aquia greensand crops out northwest of Talbot County on the Western Shore and underlies the Chesapeake Bay. A set of test holes (Greiner, 1948) spaced across the Chesapeake Bay bridge alinement, show that the Aquia is overlain there by a layer of Recent semi-liquid to very soft black silt and clay and by Pleistocene sediments of sand and gravel. The aquifer was incised in Pleistocene time by the Susquehanna River, leaving steep banks later covered by a thin cover of Pleistocene sediments and by the soft bottom deposits. Thus, it would be possible for salt water from the bay to enter the aquifer and move down dip. Periodic chloride checks should be made on wells in western Talbot County tapping the Aquia, both in and surrounding the affected area, in order to detect any enlargment of the salt-water area or any increase of chloride concentration within the area. Isochlor maps should be prepared to indicate the direction of movement of the chlorides. As all the high chloride wells are very near tidal waters or shallow-lying brackish-water sands, salt water may have merely infiltrated down along the outside of the well casings. Periodic areal chemical canvasses would prove or disprove this possibility.

TABLE 28

Chloride Content of Ground Water from Wells Tapping the Aquia Greensand in Western Talbot County

Area	Well	Number of analyses	Chloride content in parts per million
Bozman	Tal-Cb 46	1	26
Claiborne	Tal-Bb 3	2	31.5
Easton	Tal-Ce 50	1	3.6
Neavitt	Tal-Db 19	1	90
Oxford	Tal-Dc 2	1	3.9
St. Michaels	Tal-Cc 26	1	42.4
	Tal-Cc 29	1	36.3
Sherwood	Tal-Cb 83	1	6
Wittman	Tal-Cb 91	1	13.9
	Tal-Cb 65	1	30

Calvert formation

Analyses of water from the municipal wells at Vienna, Dorchester County, producing from one Nanticoke aquifer in the Calvert formation, show an average chloride content of 98 ppm. The water from this aquifer may normally contain high chloride as analyses of water from the Nanticoke aquifer farther inland at Mardela Springs, Wicomico County, average 135 ppm of chloride, indicating the condition at Vienna is not confined to a small local area.

Methods of Water Treatment

Water suitable for general use should be moderately soft, low in dissolved solids, and noncorrosive. Various methods are employed to purify ground water 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 and collected in settling basins.

In this way ferrous iron in the water is oxidized to the ferric form and precipitated, odors are moved, the corrosiveness of the water caused by carbon dioxide and other gases is reduced, and the pH is raised.

Sedimentation.—Heavy suspended matter may be removed from water by the simple gravitational process of settling in large basins. A coagulant such as aluminum sulfate (alum) may be added to form a floc that settles out of the water and carries the fine sediment with it.

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 or crushed and graded anthracite coal. Filtration can be slow through large filter basins, or rapid, filtering as much as 2 or 3 gpm of water per square foot of filter. Rapid-sand filters are of two general types—gravity or 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 alum, is generally used to remove suspended material prior to rapid sand filtration.

Water softening.—Water can be softened in a number of ways, but the principal methods involve chemical precipitation or base exchange. 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. In the base-exchange method particles of natural or synthetic "zeolite" materials absorb calcium and magnesium and replace them with sodium. The materials are restored or recharged by flushing with a solution of common salt (sodium chloride). The zeolite filters require less expert and constant attention than the lime-soda ash treatment.

Iron removal.—Cowser (1951, p. 504-505) lists seven methods for elimination, reduction, or stabilization of the iron content of water. Their effectivenes varies with the type of water, and the selection of a suitable method of iron removal might depend upon what other treatment the water requires. The methods are:

1. Coke-tray aeration, retention, and filtration reduces iron content 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 and filtration.
4. Base exchange using zeolite material.
5. Catalysis materials.
6. Lime softening, remarkably effective.

7. Sequestration, adding 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 zeolite-type materials are available. They are effective on many types of water, are 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 tanks ranging from 12 to 20 inches in diameter, the maximum diameter producing up to 8½ gallons a minute. The system is well adapted to domestic and farm use. The cost to build such a unit was estimated under $50.00. The system must be cleaned regularly by backwashing. However, it is only necessary to remove the limestone or gravel at intervals of six months to a year. The limestone is replaced as it is used up.

Waste Disposal

It is inevitable that some surface water is contaminated by bacteria harmful to man and that 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 well cased considerably below the average water-table will be less likely to be contaminated than one not so protected. It is desirable 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 an outer casing which fits tightly 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 finegrained materials. In coarse sand and gravel or in fractured rocks, greater distances may be essential, and in highly fractured or cavernous rocks pollution may travel for miles.

Subrahmanyan and Bhaskaran (1950), studying the risk of pollution of ground water from borehole latrines in India, found that the extent of travel or distance of contamination was dependent upon the velocity of flow of the ground water. The factors controlling the velocity are principally the hydraulic gradient of the water table and the permeability of the soil and subsurface materials. They found that, under the conditions studied, a safe distance from a source of contamination is the distance represented by 8 days' travel of the ground water. This is probably because the bacteria do not live very long beneath the ground.

A well, particularly a water-table well, should be located, if possible, on an elevation higher than that of the area of contamination. If the well is pumped heavily, however, a wide and deep cone of depression forms, allowing contamination from a lower elevation to move in the direction of the producing well. To determine the safe distance between a well and a source of contamination, especially for the flat country which characterizes the lower Eastern Shore, one must evaluate the type of contamination, the depth and type of well, the direction of water-table gradient, the possible extent of water-table cone of depression, and the permeability of the subsurface material.

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 because of screen trouble. Screens deteriorate because of corrosive action of water, necessitating a new screen or a new well. If the screen has not corroded, but is only encrusted or plugged by mineral matter, silts, clays, or iron deposits, it can be renovated by mixing buffered acid with the water in the well. The acid is allowed to stand for awhile 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.

The glassy phosphates, sodium polyphosphate or sodium hexametaphosphate, are popular and effective chemicals for cleaning wells (Andrews, 1947). They are easily obtained, safe to handle, and relatively inexpensive. The phosphate defloculates small particles of clay, silt, calcium carbonate, metal oxides, and salts on the screen and in the surrounding producing area (Caplan, 1953). If, however, a screen is clogged by fine sand, chemical treatment is not applicable. The procedure for cleaning wells with sodium polyphosphate 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 the use of 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 and allowed to remain for 24 to 48 hours; the well is surged periodically during that time. The procedure is repeated until no further improvement is observed. The characteristics and general excellent results obtained by the use of sodium polyphosphate are noteworthy. Results of well cleaning using the chemical are described by Andrews (1947) and Kleber (1950, p. 10–13).

FUTURE OF GROUND-WATER DEVELOPMENT

The future of ground-water development in Caroline, Dorchester, and Talbot Counties is good. The simplest estimate that may be used to arrive at a gross approximation of the ultimate yield is to assume an average sustained rate of yield for each square mile of aquifer, based on knowledge of current yields, specific capacities, water levels, saturated thickness, available drawdown, coefficients of transmissibility and storage, formation boundaries, opportunities for recharge, and possibilities of salt-water intrusion. Table 29 summarizes the estimate. It is estimated that 100 million gallons a day is available on a sustained-yield basis, or about nine times the current use of 11.3 million gallons a day.

TABLE 29

Estimates of Sustained Yields of Aquifers in Caroline, Dorchester and Talbot Counties

Aquifer	Areal extent (square miles)	Sustained yield per square mile (gallons a day)	Total sustained yield (million gallons a day)
Pleistocene and Pliocene(?) series	600	100,000	60.0
St. Marys formation	400	1,000	.4
Choptank formation	600	6,000	3.6
Calvert formation	800	6,000	4.8
Piney Point formation	900	20,000	18.0
Aquia greensand	500	12,000	6.0
Magothy and Raritan formations	1,200	6,000	7.2
Total			100.0

The table is based in part on a hydrologic study of the Beaverdam Creek in Wicomico County, from which it was concluded 300,000 gpd per square mile could be recovered from the aquifer of the Pleistocene and Pliocene(?) (Rasmussen and Slaughter, 1955). The average saturated thickness of the Pleistocene and Pliocene(?) series in Caroline, Dorchester, and Talbot Counties is less than half that of Wicomico County, so it is postulated that the sustained yield recoverable by wells is only 100,000 gpd per square mile. On this basis, 60 mgd is available from the Pleistocene and Pliocene(?) series in these counties.

The estimate of 40 mgd from the artesian aquifers may be conservative, but the huge cone of depression caused by pumping 2.7 mdg (based on 1953 pumpage totals) from the Piney Point formation at Cambridge indicates the need for caution. The estimate of 18 mgd from the Piney Point formation is based on calculations of the "safe" yield at Cambridge (Rasmussen and Slaughter, 1951). The sustained yields estimated for the other formations are made on a comparative basis with the Pleistocene and Pliocene(?) series and the Piney Point formation.

The estimates probably err on the conservative side. The ultimate safe yield may be more than twice the estimates.

Caroline County

The larger supplies of ground water in Caroline County will probably be developed from the shallow sands of the Pleistocene and Pliocene(?) series at depths ranging from 50 to 100 feet. The largest-capacity wells will be developed in buried channels of Pleistocene and Pliocene(?) material, as yet imperfectly defined. Wells which have 40 or more feet of saturated sand, situated along the valleys of the perennial streams or along a ponded body of fresh water will prove the most reliable sources.

Large-capacity wells can be developed in the shallow Pleistocene and Pliocene(?) materials along the fresh-water estuaries. The Choptank River and Tuckahoe Creek, above their junction, and Marshyhope Creek contain relatively fresh water. Industrial wells along these three drainageways would be assured of adequate recharge.

Artesian water in moderate to large capacity wells is available from several productive beds. The Choptank formation is present throughout the county at depths ranging from about 50 to 200 feet and will sustain wells at rates up to about 200 gpm. The Calvert formation contains productive sands in the Federalsburg area at depths of about 300 feet. The Piney Point formation yields large quantities at Denton from depths of 400 feet. It has not been prospected in the southern half of the county, where it will probably be found at depths ranging from 400 to 600 feet.

The deepest well at West Denton produces a moderate quantity of water from the Matawan(?) formation at depths of 980 feet. The Magothy and Raritan formations are still untested. A test hole to a depth of 1,600 feet is warranted in any effort to obtain large quantities of water there.

Dorchester County

The future ground-water development in Dorchester County is related to location. In the northeastern quarter of the county, the shallow Pleistocene and Pliocene(?) series remains relatively undeveloped and is probably capable of large yield. In the remainder of the county, the land is so low that the shallow ground waters, in general, have an undesirable quality. Future development there depends upon further exploration of the deep aquifers.

The Pleistocene and Pliocene(?) series in northeastern Dorchester County ranges from 30 to 80 feet in thickness (Pl. 12). Most of it is medium to coarse grained and saturated with water. This is an agricultural area, in which supplemental irrigation from wells may eventually become important. Large-diameter, shallow bored wells may be applicable here.

The best sites for wells of high capacity in the shallow formations are alongside the perennial fresh-water streams. Nanticoke River and Marshyhope Creek are fresh above their junction. High-capacity wells along these streams would be assured of permanent recharge. The duPont Company at Seaford, Delaware, has wells 80 to 90 feet deep in the Pleistocene and Pliocene(?) series along the Nanticoke estuary which are reported capable of yields of 500 to 900 gpm. These wells are reported to require periodic cleaning to remove deposits of flocculent iron and clay.

Artesian water also is available in the northeastern quarter of Dorchester County. An aquifer in the Calvert formation, at a depth of 250 to 300 feet, still has a potential for moderately large ground-water supplies from wells that produce 200 gpm or less. The Piney Point formation, the aquifer which supplies Cambridge, has not been tested in this area, but there is reason to believe that it will be found and be productive at depths from 450 to 600 feet.

Throughout the remainder of Dorchester County, production from the Piney Point formation, while limited by the lowered operating heads illustrated in Plate 9, is still capable of large yield despite gradually declining water levels. It is estimated that pumpage at Cambridge can be expanded from the present 1 billion to 6 billion gallons a year, before the "safe" yield is reached (Rasmussen and Slaughter, 1951).

In northwestern Dorchester County, the Aquia greensand is potentially capable of development. The water level in this formation is close to sea level, and several hundred feet of drawdown is available.

Deep sands in the Upper Cretaceous series remain to be developed. The range in depth may be from 700 to 1,600 feet below land surface. The yield of the "950-foot" aquifer in the Magothy formation at Cambridge promises wells capable of 400 to 500 gpm with suitable quality of water. Such conditions may not be maintained throughout the county, but the prospects remain good until proved otherwise.

Talbot County

Talbot County presents an enigma in the future of its ground-water development. There are hopeful indications of considerable potential supply and there are disappointing deep wells and areas of development from multiple aquifers because no single aquifer was capable of high rates of yield.

In northwestern Talbot County, in the neck area, present development is from the Piney Point formation at depths ranging from 70 to 250 feet below land surface and from the Aquia greensand at depths ranging from 250 to 450 feet below land surface. Although both of these aquifers have many wells producing from them, they are for the most part domestic wells of small capacity. The specific capacities are relatively low, about 2 gpm per foot. A few wells record yields as high as 350 gpm. Both these formations should be capable of yielding several times the present withdrawal.

The deep test hole Tal-Cb 89 (altitude 13 feet), at Wades Point, revealed two deep aquifers, the Magothy between 915 and 980 feet, and the Raritan between 1,351 and 1,420 feet below the land surface. Both sands yielded water of good quality except for very high iron. The deeper aquifer yielded a flow of 8.5 gpm from a 1.5-inch pipe at an elevation 19 feet above sea level, and the less deep aquifer yielded a flow of 12 gpm from a similar discharge pipe at 15 feet above sea level.

In central Talbot County, at Easton, six aquifers are already in use: the Calvert formation at about 100 feet; the Piney Point formation at about 300 feet (westward from town); the Aquia greensand at about 620 feet; the Monmouth formation at about 780 feet; the Matawan(?) formation at about 1,000 feet; and the Magothy formation at about 1,140 feet. Only the Aquia greensand appears promising for expanded development. However, test drilling could proceed deeper, to depths of 1,800 feet, in search of aquifers in the Raritan and Patapsco formations.

In northern Talbot County at Cordova, the Pleistocene and Pliocene(?) series has been shown to be 50 feet thick, although few logs are available to reveal wide areal characteristics. As shown at Cordova, when buried channels exist in this area, the potential yield may be large. Deep wells have been drilled at Cordova to a 300-foot basal sand of the Calvert formation (Tal-Bf 67,68) and to the Matawan(?) and Magothy formations (Tal-Bf 66 and 71), but they have not been promising. Deeper prospecting is warranted to depths of 1,700 feet in search of water in the Raritan and Patapsco formations.

In southern Talbot County the Piney Point formation is the principal aquifer. It is capable of much greater development, although operating heads will be deep. The Aquia greensand has wedged out in this area. A deep well at Trappe (Tal-Ee 8), drilled into the Raritan at 1,245 feet, did not reveal promising sands. However, deeper prospecting into the Raritan and Patapsco formations to depths of 1,800 feet is warranted.

TABLE 30

Chemical Analyses of Water from Wells in Caroline County

(In parts per million, except pH, conductance, temperature and color)

Field Data							Cations							Anions												
Well	Date of collection	Depth of well	Elevation of well	Aquifer	Temperature (°F.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Analyst
Ae 4	Aug. 17, 1953	21	65	*Pleistocene*		34	6.6	2.8	0.0	7.6	8.8				0	34	4.8		0.6	124	44		8.0		5.5	B
Bd 3	Apr. 25, 1946	80	60	Choptank				13									4.1		.08	210	142		148		6.8	B
Bd 4	Apr. 25, 1946	80	60	do				12									3.9		.5	154	98		96		6.5	B
Bd 18	Nov. 24, 1953	397	60	Piney Point	57			.38		5.9	1.3			481	0		.4		.8		20	0		690	8.2	A
Bd 34	Nov. 24, 1953	25	60	*Pleistocene*	57			.09		8.6	10			2	0		19		38		63	61		256	4.8	A
Bd 51	Sep. 2, 1953	25	60	do													12.1		.0		9.6		28		6.3	B
Bd 52	Mar. 7, 1949	15	55	do				.3									35.1		20	382	2.0		40		7.3	B
Be 2	Mar. 14, 1951	17	45	do				2.5									6.6		.08	104	26		8.5		5.3	B
Cb 7	Nov. 24, 1953	45	40	do	56			1.4		25	1.9			63	0		4.1		.8		70	19		163	6.9	A
Cc 11	Oct. 30, 1947	76	70	*Pleistocene and Pliocene*(?)		7.1	.0	.0	.03	.9	4.4				0	3.3	18.1		2.0	168	50		12		6.0	B
	Feb. 24, 1953	76	70	do		6.5	.0	.1	.0	6.7	.1				0	.8	32.7	0.0	4.8	134	24		7.0		5.5	B
	Nov. 24, 1953	76	70	do	57.5			.08		6.9	4.6			10	0		29		17		36	28		212	5.8	A
Cc 12, 14–16	Apr. 24, 1945	65	70	do				.0									22.4		5.0	132	22		5.5		5.3	B
	Sep. 24, 1947	65	70	do				.9									17.5		1.8	130	30		15		5.9	B
Cd 10	Jan. 23, 1951	300	35	Piney Point				.0									1.5		.04	468	40		320		8.2	B
Cd 11	Jan. 23, 1951	300	35	do				.0									1.8		.04	358	56		276		8.2	B
Cd 36, 37	May 7, 1945	275	5	Choptank and Piney Point				.0									1.7		.04	334	38		252		8.3	B
	Dec. 10, 1947	275	5	do				.0									1.6		.02	320	41		249		8.0	B
Cd 36	Nov. 17, 1953	275	5	do				.10		9.7	3.6			290	0		1.9		.5		38	0		431	8.1	A
Dc 28	Nov. 23, 1953	28	27	*Pleistocene*	60			.40		8.9	1.4			13	0		4.1		5.0		28	17		95	6.1	A
Dc 38	Nov. 24, 1953	90	11	Choptank	58			1.2		23	17			180	0		1.9		.5		127	0		338	7.3	A
Dc 41	Jul. 30, 1951	111	11	do				.1									3.6		.04	152	124		136		7.8	B

Dd 1	Oct. 29, 1947	400	42	Piney Point				0.0									2.4		0.003	562	26		455		8.1	B
Dd 2	Oct. 29, 1947	402	35	do				.0									2.0		.002	532	8		443		8.3	B
[a]	Nov. 24, 1953	402	35	do	63.5	23	0.0	.04	0.0	4.4	3.6	190	8	512	18	7.4	3.5	1.6	.7	517	26	0	548	809	8.5	A
Dd 41	Mar. 21, 1946	115	50	St. Marys				.2									2.1		.02	204	139		161		7.3	B
	Oct. 27, 1952	115	50	do				.4									6.0		.08	186	150		161		7.3	B
Eb 7	Nov. 12, 1953	18	20	*Pleistocene and Pliocene(?)*				.1									6.0		.16	368	132		346		7.8	B
Ed 7	Nov. 24, 1953	30	45	*Pleistocene*	58			.42		17	7.6			12	0		16		50		74	63		315	6.2	A
Ee 1[b]	Jul. 27, 1951	170	40	Choptank		28		1									3.0				110		128		7.6	U
Fc 23	Feb. 24, 1953	62	43	*Pliocene(?)*		6.7	1.6	.1	.0	5.3	.1				0	4.9	9.7	0.0	4.8	84	24		8.0		5.5	B
Fc 24	May 14, 1945	62	45	do		11	.0	.24	.0	2.1	2.7				0	2.6	5.7		1.5	90	10		6.0		5.5	B
	Oct. 29, 1947	62	45	do				.3									8.4		4.0	132	20		11		6.0	B
Fd 1	Sep. 25, 1947	45	30	*Pleistocene*				.7									5.7		.00	64	17		12		6.1	B
Fd 2	Sep. 25, 1947	46	30	do				.0									2.0		.08	246	14		172		7.5	B
Fd 1, 2	Nov. 23, 1953	45	30	do	60			.07		5.5	.4			17	0		2.9		4.2		15	2		71.7	6.5	A
Fd 3	Jul. 25, 1945	300	30	Calvert		57	.48	.73	.0	33	14				0	6.3	2.3		.04	240	130		174		7.3	B
	Nov. 23, 1953	300	30	do	59			.43		31	13			206	0		1.6		.5		131	0		310	7.2	A
Fd 5	Sep. 6, 1950	308	25	do		54	1.1	.7	.0	33	13				34	4.4	1.5		.04	230	131		164		8.2	B

Analyst: A, U. S. Geological Survey. B, Maryland State Health Department. U, Unknown.

[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.

[a] Cu 0.0, Zn 0.0, Li 2.4, PO_4 0.9, CO_2 2.7, color 25.

[b] CO_2, 4.1.

TABLE 31

Chemical Analyses of Water from Wells in Dorchester County

(In parts per million, except pH, conductance, temperature and color)

Field Data							Cations						Anions												
Well	Date of collection	Depth of well	Elevation of well	Aquifer	Temperature (°F.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Analyst
Bc 5[a]	Feb. 18, 1954	560	3	*Paleocene*	56			0.00				Na+K 100		224	16	8.4	3.0		0.4		6	0	256	411	8.5	A
Bd 4	Mar. 12, 1947	940	15	Magothy(?)				1.2									2.7		.08	184	16		123		8.1	B
Bd 5	Jul. 17, 1947	978	20	do				.3									4.0		.08	280	14		10		8.3	B
Bf 1	Sep. 25, 1947	471	27	Piney Point				.0									5.7		.18	422	28		345		8.1	B
	Sep. 22, 1948	485	27	do				.0									5.3		.04	444	36		340		7.7	B
	Feb. 8, 1949	485	27	do		11	0.5	.0	0.0	7.4	4.7				24	13	4.8		.12	442	20		345		8.3	B
	Jan. 22, 1951	485	27	do				.1									4.4		.04	424	26		344		8.3	B
	Apr. 10, 1951	485	27	do		11	.4	8.6	.0	7.5	4.6				32	8.9	4.8		.04	468	18		346		8.1	B
	Jan. 7, 1953	485	27	do		11	.0	.2	.0	13	.5				0	5.6	6		.01	418	20				7.9	B
	Feb. 25, 1953	485	27	do				.1									4.8		.04	410	230		366		7.7	B
Bf 6	Apr. 10, 1951	225	40	Calvert		39	5.9	7.9	.0	26	14				0	2.0	2.9		.06	224	112		145		7.8	B
Bf 17	Apr. 6, 1950	160	2	St. Marys and Choptank				.0									150		.04	604	118		130		9.0	B
Bf 23	Feb. 4, 1944	15	5	*Pleistocene*				.3									2.8		2.0	26	10		5		5.6	B
Bf 25	Oct. 8, 1953	39	35	*Pliocene*(?)				.02				Na+K 3.9		7	0	1.0	2.0		3.6		4	0		36	5.8	A
Bf 27	Oct. 9, 1953	21	45	*Pleistocene*				.09				Na+K 17		7	0	11	15		95		6	71		236	5.9	A
Bg 8 & 9	Aug. 4, 1948	65	45	*Pleistocene* and *Pliocene*(?)		14		.0	.0	8.2	2.6				0	16	9.7		6.0	106	34		11		5.5	B
	Sep. 22, 1944	65	45	do				.0									9.7		6.0	118	23		5		5.5	B
	Nov. 10, 1948	65	45	do				.3									11		4.0	112	60		11		6.0	B
Bg 10	Jul. 13, 1943	80	40	do				.1									10.3		4.0	108	23		6		5.3	B
	Jun. 7, 1944	80	40	do		12		.0	.0	16	.8				0	3.1	11		10	148	34		7		3.9	B
	Sep. 5, 1944	80	40	do		16		.0							0		11		8.0	140	30		10		5.5	B
	Sep. 25, 1947	80	40	do				.0									8.5		2.0	106	49		10		6.1	B

Bg 16	May 24, 1945	45	45	do				0.04									3.7		3.0	48	8		13		6.1	B
Cc 14	1951	551	4	Aquia														1.8								B
Cd 18	Apr. 11, 1950	623	10	do				.1									2.5		.04	432	2		387		8.7	B
Cd 23	Mar. 17, 1950	620	4	do				.4												502	18		401		8.1	B
Cd 28[b]	Feb. 18, 1954	370	6	Piney Point	53			.00				Na+K 167		412	20	4.6	17		.2		36	0	452	720	8.5	A
Ce 1	Oct. 25, 1945	965	18	Magothy(?)		11		.7	0.0	1.6	0.98				30	9.1	1.0		.02	252	10		196		8.3	B
	Apr. 17, 1946	965	18	do	72									234		3	4		.1		9			38.8	8.0	A
Ce 2	Jun. 26, 1945	412	15	Piney Point		18	0.0	.0	.0	5.9	3.6				40	15	6.7		.02	522	26		347		7.9	B
	Aug. 4, 1945	412	15	do		23	.48	.2	.0	7.5	3.3				0	13	7.2		.02	474	36		305		8.4	B
	Aug. 6, 1946	512	15	do				.0									5.9		.02	474	8		388		8.3	B
	Mar. 12, 1947	412	15	do				.0									5.4		.04	496	36		394		8.5	B
	Oct. 8, 1948	412	15	do	64	20		.11		5.1	3.5	172	6.4	455	8	19	7.5	1.2	.4	473	27			766	8.0	A
	Jan. 24, 1951	412	15	do		18	.0	.1	.0	4.7	3.1				38	15	6	1.0	.04	424	18		342		8.4	B
[c]	Jan. 17, 1952	412	15	do		21	.0	.09	.0	4.6	3.3	160	7.4	432		16	10	1.1	.7	441	25		432	685	8.4	A
Ce 3	Aug. 6, 1946	977	15	Magothy(?)		32	3.2	.49	.0	1.9	.98				23	9.3	2.9		.04	282	10		201		8.3	B
	Aug. 7, 1946	977	15	do		26	.64	.24	.0	1.4	.57				21	7.8	2.5		.04	256	7		200		8.6	B
	Aug. 14, 1946	977	15	do		17	.58	.49	.0	.64	.72				10	9.7	2.4		.02	314	8		203		8.3	B
	Oct. 8, 1948	977	15	do	72	18		.22		3.2	2.4	139	5.3	358	9	14	6.8	1.0	.2	385	18			615	8.2	A
	Jan. 24, 1951	977	15	do		8.1	.0	.1	.0	.3	.0				22	10	2.5	1.0	.04	250	4		200		8.4	B
Ce 4	Jan. 24, 1951	372	18	Piney Point		15	.0	.1	.0	4.7	3.2				36	11	6	1.1	.04	476	20		381		8.6	B
Ce 5	Mar. 12, 1947	405	18	do				.0									6		.04	496	38		407		8.5	B
Ce 4 & 5	Apr. 25, 1945	372–405	18	do				.0									10.9		.06	508	57		408		8.4	B
Ce 6	Apr. 17, 1946	463	20	do										452	18	5	8		.2		33			77.1	8.1	A
	Apr. 17, 1946	463	20	do										494		10	7		.3		30			77.0	8.1	A
	Aug. 1, 1946	463	20	do				.04									6		.02	444	8		388		8.5	B
	Mar. 12, 1947	463	20	do				.0									4.8		.06	502	40		408		8.7	B
	Jan. 24, 1951	463	20	do		19	.0	.0	.0	5.2	4.1				42	8.6	7.9	1.0	.04	500	30		420		8.5	B
Ce 9	Mar. 12, 1947	460	25	do				.2									9.1		.08	524	94		444		8.1	B
Ce 10	Jan. 24, 1951	375	3	do		22	.0	.2	.0	9.4	4.4				35	7.4	7.3	.9	.04	474	32		382		8.2	B
Ce 12 & 13	Jan. 24, 1951	430	18	do		17	.0	.0	.0	7.2	3.9				44	14	6	1.0	.04	446	28		380		8.1	B
Ce 27	Jan. 24, 1951	158	15	St. Marys, Choptank, and Calvert				.5									2.5		.04	320	88		236		7.8	B
Ce 61	1952	442	15	Piney Point		76		.03								17	27.0			520	36				8.3	C
Ce 62	1952	450	15	do		82		.4								17	7.6			416	32				8.2	C
Ce 63	May 5, 1953	360	20	Calvert				.5									15.7		.06	726	226		583		7.1	B
Ce 64	Nov. 3, 1953	399	15	Piney Point				.5									29.1		.02	676	242		531		7.5	B
Cf 5	Jan. 24, 1951	210	21	Calvert				26									15.1		.04	168	46		23		6.0	B
Cf 6[d]	Feb. 15, 1950	190	10	do		47	.0	.0	.0	17	11					10	3.6		.04	466	70		401		7.9	B

TABLE 31—*Continued*

Field Data							Cations							Anions												
Well	Date of collection	Depth of well	Elevation of well	Aquifer	Temperature (°F.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Analyst
Cf 8	Feb. 19, 1954	189	12	St. Marys and Choptank	55			0.05				Na+K 111		300	14	13	7.0		0.8		52	0	328	530	8.4	A
Cg 7	Apr. 28, 1944	31	40	*Pleistocene*				.4									18.8		5.0	208	51		14		5.8	B
Db 15	Nov. 9, 1953	353	5	Piney Point				.5									69.1		.06	616	70		376		7.7	B
Dh 7	Jun. 13, 1944	305	10	Calvert				.0									31.5		.06	810	5		532		8.1	B
	Mar. 12, 1947	305	10	do				.0									111.5		.08	1,280	46		668		8.3	B
Dh 7[e]	Dec. 9, 1952	305	10	do		55	0.1	3.0	0.0	9.0	6.2	438	14	804	8	163	170	1.0	.5	1,270	48	0		2,030	8.5	A
Dh 8	Apr. 17, 1945	315	10	do			36	29	.0	16	1.3				0	88	71.5		.04	4,344	43		6		8.8	B
8	Apr. 24, 1945	315	10	do				0.9									100		.1	3,000	96		711		8.7	B
	Mar. 12, 1947	315	10	do				.5									101.2		.06	1,246	48		679		8.5	B
	Aug. 11, 1949	315	10	do				.0									98.8		.1	1,232	16		663		8.6	B
Dh 9	Oct. 5, 1953	65	9	*Pleistocene and Pliocene(?)*				6.4									1.2		.08	130	48		61		6.0	B
Ec 3[f]	Feb. 17, 1954	398	3	Piney Point								Na+K 186		390	22	8.2	59		.5		44	0	434	837	8.5	A
Fc 8	Mar. 22, 1950	406	6	do													2,080									B
Fe 14[g]	Feb. 26, 1954	504	2	do		25	.0	.06	.0	7.8	5.2	300	16	528	14	22	195	1.4	.9	864	41		556	1,450	8.5	A

Analyst: A, U. S. Geological Survey. B, Maryland State Health Department. C, Strasburger and Siegel.

[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.

[a] CO_2 1.3. [b] CO_2 2.3. [c] Cu 0.0, Li 1.0, PO_4 0.4, color 5, turbidity 2.2. [d] CO_2 2.1. [e] Cu 0.13, Li 6.0, PO_4 0.0, color 38. [f] CO_2 2.2. [g] Cu 0.0, Zn 0.28, Li 5.5, PO_4 0.0, Co_2 2.8, color 8.

TABLE 32

Chemical Analyses of Water from Wells in Talbot County

(In parts per million, except pH, conductance, temperature, and color)

Field Data							Cations							Anions												
Well	Date of collection	Depth of well	Elevation of well	Aquifer	Temperature (°F.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Analyst
Bb 3	Jul. 1, 1947	364	15	Aquia				0.5									30.9		0.08	332	178		216		7.7	B
Bb 3	Sep. 21, 1948	364	15	do				.9									32.1		.04	332	174		215		7.5	B
Bf 38[a]	Feb. 26, 1954	147	55	Calvert	53			2.4				Na+K 7.6		208	0	1.6	3.0		.2		160	0		325	8.1	A
Cb 89[b]	Aug. 3, 1953	980	13	Magothy	69	7.7	0.0	7.7	0.15	15	5.8	3.4	4.2	56	0	26	2.0	0.2	.2	94	61	15		145	6.7	A
Cb 89[c]	Aug. 1953	980	13	do		8.1		11	.16							22	4.4			99	58	5			6.9	C
Cb 89[d]	Aug. 3, 1953	1420	13	Raritan	69	8.2	.0	10	.28	15	8.0	4.5	5.1	36	0	57	2.0	.1	.2	124	70	41		177	6.3	A
Cb 89[e]	Aug. 1953	1420	13	do		8.3		13	.24							51	3.9			134	68	20			6.9	C
Cb 91	Jul. 16, 1946	420	5	Aquia				.04									13.9		.00	214	106		142		7.5	B
Cc 26	Apr. 27, 1948	380	5	do				.3									42.4		.06	278	102		145		7.5	B
Cc 29	Sep. 22, 1947	455	10	do				.04									36.3		.04	338	60		190		7.9	B
Cc 29	Sep. 21, 1948	455	10	do				.2									36.9		.04	338	68		188		7.6	B
Cc 29[f]	Feb. 10, 1954	455	10	do	63	12	.0	.15	.00	13	6.7	86	14	224	4	9.6	54	.3	.8	338	60	0	232	536	8.4	A
Cd 26	Apr. 14, 1947	312	9	Piney Point				.3									12.7		.4	330	102		23		5.7	B
Ce 1	Oct. 11, 1943	1012	20	Calvert, Monmouth(?) and Matawan(?)				.0									2.9		.0	277	75		207		7.9	B
Ce 1	Mar. 11, 1947	1012	20	do				.1									2.8		.06	526	32		448		8.6	B
Ce 1	May 12, 1947	1012	20	do				.1												220	36		179		8.4	B
Ce 1	Sep. 22, 1947	1012	20	do				.1									2.7		.04	246	14		184		7.9	B
Ce 1	Sep. 21, 1948	1012	20	do				.1									4.4		.04	278	56		192		7.6	B
Ce 2[g]	Sep. 22, 1947	110	15	Calvert				.5									2.6		.04	348	12		240		8.1	B
Ce 2	Oct. 7, 1948	110	15	do	59	56		.03		36	15	27	5.9	242	0	6.9	2.8	.5	.3	260	152			394	7.5	A
Ce 2	Nov. 20, 1952	110	15	do				.4									3.6	.4	.02	262	154		200		7.6	B

TABLE 32—*Continued*

Field Data							Cation							Anions											
Well	Date of collection	Depth of well	Elevation of well	Aquifer	Temperature (°F.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Analyst
Ce 3	Jun. 23, 1943	1025	12	Aquia(?), and Upper Cretaceous				0.4									2.7		0.03	516	6		425		8.6	B
Ce 3	Mar. 11, 1947	1025	12	do				.0									2.2		.04	262	94		209		8.1	B
Ce 3	May 12, 1947	1025	12	do				.1									2.3		.02	224	38		177		8.1	B
Ce 3[h]	Oct 6, 1948	1025	12	do	76	13		.13		4.1	2.2	72	6.9	211	0	12	2.2	0.6	.9	221	19			362	7.8	A
Ce 3[i]	Mar. 18, 1949	1025	12	do	75	14		.06		4.8	1.2	81	1.8	210	0	15	2.5	.9	1.8	241	17	0		377	8.2	A
Ce 3	Nov. 20, 1952	1025	12	do				.1									2.4	.4	.04	198	16		162		8.1	B
Ce 5	May 12, 1947	1148	38	Magothy				.5									2.6		.06	122	29		73		7.7	B
Ce 5	Jan. 7, 1948	1148	38	do				.7									1.9		.02	136	15		72		7.7	B
Ce 5	Sep. 22, 1948	1148	38	do		27	2.0	.8	0.0	1.7	2.2				0	.8	1.8		.02	130	20		73		7.1	B
Ce 5[j]	Mar. 11, 1949	1148	38	do	78	9.5		.38		2.4	2.0	30	2.2	80	0	15	25	.2	1.6	111	14	0		168	7.5	A
Ce 5	Nov. 20, 1952	1148	38	do				.7									2.4	.0	.02	106	12		73		7.1	B
Ce 24	Jan. 12, 1944	30	70	*Pleistocene*				.5									288		.02	1,260	365		118		7.7	B
Ce 50	Aug. 4, 1952	630	20	Aquia		16	9.2	.1	.0	6.4	2.7				5	14	3.6	10	.8	590	2		452		8.0	B
Ce 50	Nov. 20, 1952	630	20	do				.0									3.6	4.0	.04	540	10		477		8.7	B
Db 19	Mar. 16, 1948	400	6	do				24									89.7		.01	430	138		311		7.1	B
Da 36[k]	Feb. 10, 1954	210	10	Piney Point	57			.82						260	12	.4	2.0		3.0		106	0	284	430	8.4	A
Dc 2	Oct. 27, 1947	577	6	Aquia				.0									3.9		.04	382	4		311		8.8	B
Dc 2	Apr. 13, 1948	577	6	do				.0									3.8		.04	362	9		311		8.0	B
Dc 2	Nov. 30, 1948	577	6	do				.0									3.9		.08	378	10		314		8.2	B
Dc 2[l]	Feb. 5, 1954	577	6	do	68			.17				Na+K 147		332	22	8.6	6.0		.8		8	0	376	589	8.5	A
Dc 48	Mar. 14, 1945	300	8	Piney Point				1.2									215.1		10	928	240		11		5.5	B
Dd 48	Aug. 4, 1948	150	5	Calvert				1.2									4		.04	462	278		250		7.4	B
Dd 50	Nov. 8, 1948	300	5	Piney Point				6.0									12.1		.10	288	214		188		7.7	B
Ee 1	Nov. 15, 1943	400	56	do				.0									.5		.2	238	62		172		8.3	B
Ee 1	Jun. 29, 1944	400	56	do				.0									1	.7	.12	230	68		170		8.1	B
Ee 1	Jul. 14, 1944	400	56	do				.0									.8		.18	238	64		171		7.9	B

Ee 1	Sep. 22, 1947	400	56	do				.2									1.3		.04	264	67		175		7.9	B
Ee 1	Sep. 21, 1948	400	56	do				.0									1.8		.04	278	69		175		8.5	B
Ee 1[m]	Feb. 9, 1954	400	56	do	65			.48				Na+K 58		204	6	12	.2		1.2		64	0	216	354	8.4	A
Ee 2	Jul. 15, 1952	125	45	Calvert				2.8												248	134		139		6.9	B
Ee 7	Aug. 19, 1946	423	55	Piney Point		46	2.1	.97							20	8.2	2.6		.02	256	94		175		8.3	B
Ee 9	Jun. 21, 1944	430	30	do				.1									13.9		5.0	108	55		28		5.9	B
Ee 9	Jun. 29, 1944	430	30	do				1.6									13.3		3.0	130	73		49		6.5	B
Ee 12	Jul. 15, 1952	126	45	Calvert				1.4												244	156		163		7.2	B
Ee 14	Apr. 21, 1947	407	11	Piney Point				1.2									5.1		.4	344	262		288		7.1	B

Analyst: A, U. S. Geological Survey. B, Maryland State Health Department. C, Penniman and Browne, Inc.

Solids of the "B" analyses are total solids. If the turbidity is less than 10, tbese are approximately all dissolved solids. The "A" analyses are dissolved solids.

[a] CO_2 2.1. [b] Cu 0.0, Zn 0.2, Li 0.4, PO_4 0.0, color 5. [c] CO_2 24, color 8, turbidity 25. [d] Cu 0.0, Zn 1.0, Li 0.4, PO_4 0.0, color 5. [e] CO_2 27, turbidity 25. [f] Cu 0.0, Zn 0.0, Li 2.5, PO_4 0.2, CO_2 1.5, color 6. [g] Color 2. [h] Color 3. [i] Color 5. [j] Color 15. [k] CO_2 1.8. [l] CO_2 1.9. [m] CO_2 1.4.

TABLE 33

Record of wells in Caroline County

Static water level: Measured depths designated by "m."
Pumping equipment: *Method of lift:* A, air lift; B, bucket; C, cylinder-lift (includes pitcher pumps); J, jet; Ic, impeller centrifugal; T, impeller turbine; N, none; R, reciprocating suction.
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; 0, observation; P, public supply or school; T, test hole.
Rate: S, up to 500 gpd; M, 500 to 5,000 gpd; L, over 5,000 gpd.

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ac 1	Clifton Walls	—	—	60	Driven	30	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, F, S	Water reported slightly "irony."
Ad 1	Town of Templeville	M. Pentz	1951	74	Jetted	78	—	Choptank(?)	—	—	N	T	Well abandoned; casing pulled.
Ad 2	Do	Middletown Well Drillers	1952	74	do	275	—	Calvert(?)	—	—	N	T	See log. Reported no water encountered. Abandoned.
Ad 3	N. B. Wooleyhan	—	1950	74	Driven	7.0m	1¼	Pleistocene	3.45m	Jul. 10, 1953	C, H	D, S	
Ad 4	John J. Roberts	—	1950	60	do	22	2	do	—	—	C, H	D, S	Water reported good.
Ad 5	M. Tiefenthaler	—	—	60	do	19	1¼	do	—	—	R, E	D, F, S	Water reported not always clear.
Ad 6	Oliver Hunt	—	—	70	do	21	1¼	do	—	—	C, H	D, S	Water reported good.
Ad 7	J. M. Kotowski	Jones	—	75	do	24	1¼	do	—	—	—, E	D, S	Do
Ad 8	Steve Miricz	—	—	60	do	16	1¼	do	—	—	C, H	D, S	Do
Ad 9	Peter Petraschuk	—	—	70	do	20	1¼	do	10	Oct. 1953	—, E	D, S	Supply reported poor.
Ad 10	Clifford Slaughter	—	—	70	do	30	1¼	do	—	—	C, H	D, S	Water reported good.
Ad 11	Edward Wright	—	—	70	do	—	—	do	—	—	—, E	D, F, S	Water reported slightly hard and "irony".
Ad 12	Francis Pearce	—	—	70	do	18	1¼	do	—	—	J, E	D, F, S	Water reported good.
Ad 13	Steve Rodimack	—	—	70	do	35	1¼	do	—	—	C, H	D, F, S	Field test Jan. 1954: chloride 30 ppm, hardness ±25 ppm, iron .1 ppm, pH 6.5.
Ad 14	J. Henry Tim	—	—	70	do	30	1¼	do	—	—	C, H	D, S	Water reported good.
Ad 15	Chas. A. Miller	—	1944	65	do	30	1¼	do	5	1944	R, E	D, F, S	Water reported slightly "irony".
Ad 16	Wm. M. Taylor	—	—	75	do	30	1¼	do	—	—	C, H	D, S	Water reported good.

Ae 1	Chas. J. Kovacs	—	1952	60	Driven	22	1½	Pleistocene	—	—	R, E	D, F, S	Water reported good.
Ae 2	Town of Marydel	C. Pentz	1937	60	Jetted	90	4	Choptank(?)	—	—	N	P, S	Three wells spaced 25 feet apart to same depth tied in to supply fire hydrant.
Ae 3	T. O. Ford	—	1940	60	do	90	3	do	—	—	N	N	Water reported containing much sediment and having odor. Abandoned.
Ae 4	J. B. Patton	—	1953	65	Driven	21	1½	Pleistocene	—	—	R, E	D, S	See chemical analysis.
Bc 1	W. Colliers	U.S.G.S.	1949	54	do	20.5[m]	1¼	do	2.10[m]	Aug. 17, 1949	N	O	Monthly record.
Bc 2	St. Gertrudes Academy	M. Pentz	1949	65	Jetted	60	4	Pliocene(?)	11.7	Dec. 15, 1949	T, E	P, F, M	Field test, Jan. 1954: chloride 22 ppm, hardness ±42 ppm, pH 5.8. See log.
Bc 3	Do	—	—	65	do	45(?)	4	do	—	—	R, E	N	Supply inadequate.
Bc 4	Alvin Edwards	Harris	—	60	Driven	27	1½	Pleistocene	—	—	C, E	D, F, S	Water reported good.
Bc 5	W. H. Redden	—	—	40	do	32	1½	do	—	—	R, E	D, F, S	
Bc 6	F. E. Borg	—	—	50	do	34	1½	do	—	—	R, E	D, S	Water reported slightly "irony" and hard. Softener used. Field test, Jan. 1954: chloride 12 ppm, hardness 8–17 ppm, iron 9 ppm, pH 6.5.
Bc 7	W. B. Meredith	—	—	50	do	17	1½	do	—	—	R, E	D, S	Water reported slightly "irony".
Bc 8	Saulsbury Bros.	—	—	55	do	30	1½	do	—	—	C, H	D, S	
Bc 9	Linwood Kinnamon	—	1951	65	do	14	1½	do	—	—	—, E	D, S	
Bc 10	Annie Fountain	—	—	60	do	—	1½	do	—	—	C, H	D, S	
Bc 11	Chas. W. Thomas	Thomas	1949	60	do	28	1½	do	—	—	C, H	D, S	
Bc 12	Linwood Garrell	—	—	60	do	—	1½	do	—	—	R, E	D, F, S	Water reported good.
Bc 13	Ernest C. Bowman	—	—	55	do	20	1½	do	—	—	R, E	D, S	Reported water level lowers during dry spells. Water reported hard.
Bc 14	Jos. A. Amrien (?)	—	1951	45	do	20	1½	do	16	1951	R, E	D, S	Water reported good. Reports water in another well at same depth near barn very "irony".
Bd 1	Board of Education	M. Pentz	1951	50	Jetted	368	3	Eocene	32	Mar. 27, 1951	J, E	P, S	See log. Water reported good. Drawdown reported 30 feet after 2 hours pumping 10 gal. a min. Open hole 160–368 feet.
Bd 2	Do	do	1951	60	do	78	3	Choptank	12	Mar. 20, 1951	J, E	P, S	See log. Water reported very "irony". Drawdown reported 8 feet after 2 hours pumping 40 gpm. Screened 70–78 feet.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Bd 3	Cooklyn Dairies, Inc.	—	1932	60	Jetted	80	6	Choptank	—	—	T, E	I, L	See chem. analysis. Reported to pump 168,000 gal. a week from April to August.
Bd 4	Do	M. Pentz	1938	60	do	80	6	do	—	—	T, E	I, L	See Chemical analysis. Reported pumpage 45,000 gpd.
Bd 5	Do	do	1938	60	do	120	6	Calvert(?)	—	—	J, E	I, L	Reported pumpage 21,600 gpd.
Bd 6	Do	do	1949	60	do	580	8–4	Aquia(?)	305	Nov. 15, 1950	T, E	I, L	See log. Reported pumpage 129,600 gal. per week. Open hole 178–580 feet.
Bd 7	Cooklyn Dairies, Inc.	Breeding	1940	60	Driven	20	2	Pleistocene	—	—	R, E	I, L	See chemical analysis. Five wells on common line reported to pump 14,400 gpd.
Bd 8	Town of Goldsboro	Ennis Bros.	1949	60	Jetted	57.5^{m}	4	Choptank	15.57^{m}	Dec. 22, 1952	N	F, P, S	Well jetted to 83.5 feet, open from 55 to 83.5 feet. Drawdown reported 18 feet pumping 70 gpm.
Bd 9	T. Noble Jarrell	C. or M. Pentz	—	58	do	90	3	do	—	—	R, S	I, L	Bd 9, 10, 11, 12, and 13 pumped on common line. Estimated pumpage 1,050,000 gal. a week from June to Oct. Water reported "irony".
Bd 10	Do	do	—	58	do	90	4	do	—	—	R, S	I, L	See Bd. 9
Bd 11	Do	do	—	58	do	90	3	do	—	—	R, S	I, L	Do
Bd 12	Do	do	—	58	do	90	3	do	—	—	R, S	I, L	Do
Bd 13	Do	do	—	58	do	90	3	do	—	—	R, S	I, L	Do
Bd 14	Do	do	—	58	do	90	3	do	—	—	R, S	I, M	Bd 14 and 15 pumped on common line. Estimated pumpage 450,000 gal. a week from June to Oct. Water reported "irony".
Bd 15	Do	do	—	58	do	90	3	do	—	—	R, S	I, M	See Bd 14.
Bd 16	Do	Ennis Bros.	1947	58	do	78	4	do	—	—	R, E	I, L	Water reported "irony".

Bd 17	John Milby	Ennis Bros.	1949	60	Jetted	139	4	Calvert(?)	31	Nov. 23, 1949	J, E	D, S	Water reported hard, not "irony".
Bd 18	Clifton Elliott	do	1952	60	do	397	4	Piney Point (?)	60	Oct. 28, 1952	R, E	D, S	See log and chemical analysis. Field test Nov. 24, 1953: hardness 17–34 ppm, iron 0.2 ppm, pH 8.5. Temperature 57° F.
Bd 19	Herman Kemp, Sr.	—	—	50	Driven	18	1½	Pleistocene	—	—	R, E	D, F, S	Water reported good.
Bd 20	Oscar Bishop	Dorn(?)	1941	45	Drilled	200	4	Calvert(?)	23	1941	J, E	D, F	Do
Bd 21	Ina J. Howell	—	—	30	Driven	23	1½	Pleistocene	—	—	J, E	D, S	Water reported "irony".
Bd 22	Dillon Flemings	Harris	1952	48	do	25	1½	do	18	1952	—, —	D, F, S	Well was 22 feet, went dry in fall of 1952; redrove to 25 feet, went dry again Sept. 1953.
Bd 23	W. C. Quillen	C. Pentz	1926	50	Drilled	145	—	Calvert(?)	—	—	R, E	D, S	Water reported very hard; leaves scale in hotwater pipe.
Bd 24	Robert Bright	Breeding	—	50	Driven	20	1½	Pleistocene	—	—	R, E	D, S	
Bd 25	Marion McMullen	do	1953	50	do	30	1½	do	—	—	—, —	N	Water has "irony" odor, cloudy blue color and bad taste.
Bd 26	J. C. Jackson	—	1951	50	do	29	1½	do	—	—	R, E	D, F, S	
Bd 27	Eugene Koreck	—	—	50	do	16	1½	do	—	—	R, E	D, F, S	Water reported good.
Bd 28	Wilson Smith	—	—	55	do	23	1½	do	—	—	R, E	D, F, S	Do
Bd 29	James R. Smith	—	—	65	do	20	1½	do	—	—	J, E	D, S	Do
Bd 30	Walter Ross	—	—	60	do	17	1½	do	—	—	C, H	D, F, S	Do
Bd 31	Earl Jarrell	—	—	70	do	30	1½	do	—	—	C, H	D, S	
Bd 32	Marion Stansbury	—	—	75	do	—	1½	—	—	—	C, H	D, S	Do
Bd 33	Harry O. Hubbard	—	—	60	do	25	1½	do	—	—	C, H	D, C, S	Water reported very "irony".
Bd 34	H. D. Shively	—	—	60	do	25	1½	do	—	—	R, E	D, F, S	See chemical analysis. Water reported slightly "irony". Field test, Nov. 24, 1953: hardness 68–85 ppm, iron 0.2 ppm, pH 5.5. Temperature 57°.
Bd 35	Noble Shively	—	—	60	do	14.1m	1½	do	7.97m	Nov. 1, 1953	C, H	D, S	Water reported slightly "irony".
Bd 36	C. J. Mack	—	—	55	do	21	1½	do	—	—	J, E	D, S	Water reported good.
Bd 37	Gus Miller	—	—	50	do	20	1½	do	—	—	C, H	D, F, S	Water reported "irony".
Bd 38	J. W. Hignutt	—	—	60	do	40	1½	do	—	—	J, E	D, F, S	Water reported good.
Bd 39	Fred Allen	—	—	70	do	30	1½	do	17	Aug. 1953	R, E	D, S	Water reported very "irony". Water conditioner used.
Bd 40	Nandor Borzey	—	—	70	do	27	1½	do	—	—	R, E	D, F, S	
Bd 41	Ralph K. Mosley	—	—	65	do	25	1½	do	—	—	J, E	D, S	Water reported "irony".
Bd 42	Adam Eckstadt	—	—	70	do	25	1½	do	6	Sep. 1953	J, E	D, S	

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Bd 43	Orban Voyscik	—	—	60	Dug	13m	48	Pleistocene	11.07m	Oct. 15, 1953	C, H	D, F, S	Water reported good.
Bd 44	W. Gniecko	—	—	50	Driven	14	1½	do	—	—	C, H	D, S	Water reported slightly "irony".
Bd 45	Town of Henderson	Ennis	1953	55	Jetted	45.5	6	Choptank	32	May 25, 1953	N	P, S	See log. Pumped 80 gal. a min. at 21 feet; 120 gal. a min. at 32 feet, screened 35.5–45.5 feet.
Bd 46	Harvey T. Thompson	—	—	55	Drilled	173	4	Calvert(?)	—	—	N	N	Water reported very "irony".
Bd 47	Do	—	—	55	Dug	18	48	Pleistocene	—	—	C, H	D, S	Water reported slightly "irony".
Bd 48	Bill Phillips	M. Pentz	1949	55	Jetted	300–400?	3	—	18	1949	J, E	D, M	Water reported very "irony" during first year of use, now reported less "irony".
Bd 49	Logan Canning Co.	?	1937	60	do	90	4	Choptank(?)	—	—	R, S	I, M	Water reported good. Seasonal use.
Bd 50	Do	?	1937	60	do	90	4	do	—	—	N	N	Well reported to have been too close to and affected by pumpage of Bd 48. Reported filled in.
Bd 51	W. H. Weer	—	—	60	Driven	25	1½	Pleistocene	—	—	R, E	D, S	See chemical analysis. Water reported very "irony".
Bd 52	Wm. Hutchins	—	—	55	Dug	15	—	do	—	—	J, E	D, F, S	See chemical analysis. Water reported "irony".
Be 1	Herman S. Dorman	—	—	60	Driven	22	1½	do	8	Jul., 1953	R, E	D, F, S	Water reported good.
Be 2	George Lowman	—	—	45	do	17	1½	do	—	—	—, E	D, S	See chemical analysis. Water reported very "irony".
Be 3	George E. Luff	—	—	50	do	15	1½	do	—	—	C, H	D, S	
Be 4	Raymond Vreed	—	—	50	?	49	3	do	—	—	R, E	D, F, S	
Be 5	Robert G. Miller	—	—	45	Driven	25	1½	do	10	1950	R, E	D, S	Was 35 feet deep, put new point to 25 feet, got better water(?).

Cb 1	P. Yoash	?	1910–15	12	Jetted	165(?)	3	Calvert(?)	—	—	R, E	D, S	Flowing June 9, 1953, estimated 5 feet above land surface, estimated flow 15 gpm. Reported flow ceases during summer when cannery (Cc 1–8) is operating. Water reported having sulfurous taste and odor. Field test Jan. 1954: chloride 8 ppm, hardness ±42 ppm, pH 8.5. See Md. Geol. Survey, vol. 10, p. 288, well 24.
Cb 2	N. F. Thomas	Thomas	—	60	Driven	—	1½	—	—	—	R, E	D, S	Water reported good.
Cb 3	R. Magrogan	—	—	50	do	—	1¼	—	—	—	J, E	D, S	Water reported slightly "irony".
Cb 4	J. J. Hammer	Prichard	1908	58	Dug	13.9^{m}	50	Pleistocene	5.56^{m}	Jun. 9, 1953	C, E, W	D, F, S	Static water level reported low in 1930.
Cb 5	A. Cooper	Bailey	1946	45	Jetted	125	3	Choptank(?)	—	—	R, E	D, F, S	Static water level reported 2 feet above land surface 1946. Water reported good. Driller reported fullers earth 75–90 feet and developed well in a fine white sand.
Cb 6	Pearl Downes	—	—	40	Dug	28	40	Pleistocene	—	—	C, H	D, S	Water reported good, low at times.
Cb 7	Do	Downes	1928	40	Driven	45	1¼	do	—	—	C, H	F, S	See chemical analysis. Water reported slightly "irony". Field test, Nov. 24, 1953: hardness 51–68 ppm, iron 0.5 ppm, pH 8.5. Temperature 56°F. Reported shell bed encountered when driving.
Cb 8	R. B. Wessel	—	1940	40	Jetted	111	—	—	—	—	R, E	D, F, S	Water reported good.
Cb 9	W. A. Cooper	—	—	45	Dug	13.5^{m}	36	Pleistocene	5.63^{m}	Jun. 10, 1953	J, E	D, S	Water reported good. Well goes dry at times.
Cb 10	Do	Harris	1952	45	Driven	43	1½	do	15	1952	R, E	D, F, S	Water reported very "irony".
Cb 11	J. Redding	—	—	50	do	—	1¼	—	—	—	C, H	D, S	
Cc 1	Saulsbury Bros., Inc.	Ennis Bros.	1945	60	Jetted	70	8–4	Pliocene(?)	6	Jul. 15, 1952	J, E	I, L	See log. Drawdown reported 21 feet after 26 hours pumping 300 gpm. Cannery pumps 7,200,000 gal. a week for 18 week season. Screened 66–70 Ft.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cc 2	Saulsbury Bros., Inc.	Shannahan Artesian Well Co.	1946	60	Jetted	350	8	Piney Point	39.28m	Aug. 15, 1952	N	N	See log. Drawdown reported 210 feet after 24 hours pumping 150 gpm. Open hole 297–350 feet. Abandoned.
Cc 3	Do	do	1946	60	do	190	8	Calvert(?)	10.5	May 9, 1946	N	N	See log, Cc 2, 0–190 feet. Drawdown reported 30 feet after 8 hours pumping 50 gpm. Open hole 92–190 feet. Abandoned and sealed.
Cc 4	Do	Ennis Bros.	1949	60	do	70	8	Pleistocene and Pliocene(?)	—	—	T, E	I, L	Drawdown reported 22 feet pumping 150 gpm. Pumps 6,400,000 gal. a week for 18 week season. Screened from 50 to 70 feet.
Cc 5	Do	Pentz	Prior 1940	60	do	240	3	Calvert(?)	—	—	A, E	I, L	Pumps 1,080,000 gals. a week for 18 week season.
Cc 6	Do	Ennis Bros.	1947	60	do	70	8	Pleistocene and Pliocene(?)	8	Aug. 12, 1947	T, E	I, L	Drawdown reported 22 feet pumping 150 gpm. Screened 52–70 feet. Pumps 7,200,000 gals. a week for 18 week season.
Cc 7	Do	do	1945	60	do	691	10	Paleocene	—	—	N	T	See log. Well not completed.
Cc 8	F. Stevenson	—	—	60	—	—	—	—	—	—	J, E	D, F, S	Water reported slightly "irony".
Cc 9	Selby Skinner	—	—	56	Driven	30	1½	Pleistocene	—	—	J, E	D, F, S	Water reported having bad taste, low at times.
Cc 10	W. S. Carroll	—	1938	57	do	40	1½	do	—	—	R, E	D, F, S	Water reported good.
Cc 11	Town of Ridgely	Ennis Bros.	1947	70	Jetted	76	10	Pleistocene and Pliocene(?)	8.5	Oct. 28, 1947	T, E	P, L	See log and chemical analysis. Field test, Nov. 24, 1950: hardness 34 ppm, iron less than 0.1 ppm, pH 5.7. Temperature 57.5°F. Test pumped for 40 hours at 900 gpm. Average daily pumpage 210,000 gal. Screened 53–75 feet.

Cc 12	Town of Ridgley	Shannahan Artesian Well Co.	1939	70	Jetted	65	3	Pleistocene and Pliocene(?)	—	—	R,	N	See chemical analysis. Wells Cc 12, 14, 15 and 16 on common line. Used as standby wells for town supply.
Cc 13	Do	M. Pentz	—	70	do	85	3	do	—	—	N,	N	Water reported "irony". Drillers said to have encountered 4-inch "irony" hard layer at 80 feet.
Cc 14	Do	Shannahan Artesian Well Co.	1939	70	do	65	3	do	—	—	R	N	See Cc 12
Cc 15	Do	do	1939	70	do	65	3	do	—	—	R	N	Do
Cc 16	Do	do	1939	70	do	65	3	do	—	—	R	N	Do
Cc 17	O. E. Roberts	Harris	1951	50	Driven	18	1½	Pleistocene	—	—	R, E	D, S	Water reported good.
Cc 18	Lawrence Wright	Breeding	1953	53	do	30	1½	do	—	—	J, E	F, S	Do
Cc 19	Do	do	1953	56	do	20	1½	do	—	—	J, E	D, S	Do
Cc 20	George A. Butler	Harris	1951	52	do	25	1½	do	—	—	R, E	D, S	Water reported slightly "irony".
Cc 21	Do	do	—	52	do	23.6^m	1¼	do	8.9^m	Jun. 3, 1953	C, H	F, S	Do
Cc 22	Boonsboro Zion Methodist Church	—	—	51	do	35	1¼	do	—	—	C, H	D, S	Do
Cc 23	Maple Grove Farm	—	—	55	do	19.0^m	1½	do	6.05^m	Jun. 3, 1953	C, H	D, S	Field analysis, Jan. 1954: chloride 20 ppm, hardness ±27 ppm, iron 0.2 ppm, pH 5.7.
Cc 24	W. T. Wright	—	1940 (?)	53	do	—	1¼	—	—	—	R, E	D, S	Water reported good.
Cc 25	E. M. Clark	—	1947	57	do	—	1½	—	—	—	C, H	D, S	Frequently goes dry.
Cc 26	Breyers Ice Cream Co.	A. Nicholas Co.	1940	70	Jetted	100(?)	12	Choptank(?)	—	—	T, S	I, L	Cc 26 and Cc 27 operate continuously. Cc 26 used for boiler room.
Cc 27	Do	do	1940	70	do	85(?)	12	do	—	—	T, E	I, L	See Cc 26.
Cc 28	A. W. Saulsbury, Sr.	Breeding	1950	73	Driven	30	1½	Pliocene(?)	5	Oct. 1950	J, E	D, S	Water reported good.
Cc 29	G. H. Messick	Messick	1920	60	do	45	1½	Pleistocene	—	—	J, E	D, F, S	Do
Cc 30	Charles Dean	—	1945	55	do	35	1½	do	—	—	R, E	D, F, S	Do
Cc 31	Fred Buckle	—	1940	56	do	30	1½	do	—	—	C, H	D, S	Do
Cc 32	Do	—	1936	54	do	24	1¼	do	—	—	C, H	D, S	Pumps fine white sand.
Cc 33	Do	—	—	54	do	24	1¼	do	—	—	R, E	F, S	Water reported good.
Cc 34	Spencer Moore	Moore	—	58	do	30(?)	1½	do	—	—	R, E	D, F, S	Do
Cc 35	A Crouse	—	—	57	do	—	2	—	—	—	C, E	F, S	Do
Cc 36	Do	—	—	58	Dug	—	30	—	—	—	C, H	D, S	Do
Cc 37	E. Redding	Maloney	1938	52	Driven	33	1¼	Pleistocene	—	—	C, H	D, S	Water reported very "irony".

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cc 38	R. Blackburn	Thomas	1951	60	Driven	40	1½	Pleistocene	10	1951	J, E	D, S	Water reported good.
Cc 39	F. Lynch	Lynch	—	70	do	40	1½	do	—	—	R, E	D, S	Water reported slightly "irony".
Cc 40	Do	do	—	70	do	40	1½	do	—	—	R, E	F, S	Do
Cc 41	A. Savage	Thomas	1946	55	do	38	1½	do	6	1946	J, E	D, S	Water reported good.
Cc 42	Saulsbury Bros., Inc.	—	—	61	do	21.2^{m}	1¼	do	2.61^{m}	Jun. 11, 1953	C, H	N	Water reported slightly "irony".
Cc 43	Do	—	—	63	do	25	1¼	do	—	—	C, H	D, S	Do
Cc 44	Edward Sparks	Sparks	1951	60	do	28	1½	do	—	—	R, E	D, S	Water reported slightly "irony", and having "soapy" odor.
Cc 45	C. W. Hammer	Thomas	1941	55	do	25	1½	do	—	—	R, E	D, F, S	Water reported good.
Cc 46	J. Frampton	—	1950	55	do	30(?)	1½	do	8	Jan. 1950	R, E	D, F, S	Do
Cc 47	P. Ebling	—	—	54	do	40	1½	do	—	—	R, E	D, F, S	Do
Cc 48	A. Dingledine	Whitby	1951	52	do	20	1½	do	—	—	C, H	D, F, S	Do
Cc 49	John Scully, Jr.	—	1905	55	—	86	1½	Choptank(?)	6	1905	N	N	See Md. Geol. Survey, vol. 10, p. 288, well 25. Well covered.
Cc 50	Easton Ice & Coal Co.	C. Pentz	1913	55	Jetted	84	4	do	8	1913	R	N	See Md. Geol. Survey, vol. 10, p. 288, well 26.
Cc 51	Edward Sparks	M. Pentz	1953	60	do	78	3	do	11	Sep. 30, 1953	—, E	D, S	See log. Drawdown reported 15 feet after 2 hours pumping 30 gpm. Screened from 68–78 feet.
Cd 1	Lane Chicken Farm	Coop. Ground-water Program	1949	40	Driven	10.3^{m}	1¼	Pleistocene	6.12^{m}	Sep. 1, 1949	N	O	Monthly record.
Cd 2	O. N. Harrison	L. Rude & Son	1947	20	Jetted	303	2½–1½	Eocene	27	Aug. 1, 1947	J, E	D, S	See log. Water reported good Screened from 279 to 303 feet.
Cd 3	Thomas Smith	M. Pentz	1952	20	do	140	3	Choptank(?)	10	Nov. 7, 1952	C, H	D, S	Water reported good. Drawdown reported 40 feet after 2 hours pumping 50 gpm. Open hole 84–140 feet.

Cd 4	LaGarde & Lane Chicken Farm	Shannahan Artesian Well Co.	1952	40	Jetted	374	4–2	Eocene(?)	38	Jul. 19, 1952	J, E	D, F, M	See log. Water reported good. Drawdown reported 34 feet after 6 hours pumping 10 gpm. Screened 340–360 feet.
Cd 5	Do	C. Pentz	—	40	do	180	3	Choptank(?)	—	—	J, E	N	Water reported "irony". Supply reported inadequate, now used as standby.
Cd 6	Frank Zeigler, Sr.	M. Pentz	1949	60	Drilled	180	—	do	—	—	J, E	D, S	Water reported thickly sedimented.
Cd 7	John Towse	Harris	1944	45	Driven	21.1^m	1¼	Pleistocene and pliocene(?)	3.91^m	May 12, 1953	N	N	
Cd 8	Do	do	—	46	do	32.8^m	1¼	do	4.70^m	May 12, 1953	N	N	Water reported good.
Cd 9	Do	do	1944	44	do	14	1¼	Pleistocene	—	—	R, E	D, S	Do
Cd 10	Pet Milk Co.	C. Pentz	1919	35	Jetted	300	6	Eocene	14	1943(?)	T, E	I, S	See chemical analysis. Impellers set at 70 feet. Pumps fine black and white sand. Used only as standby.
Cd 11	Do	M. Pentz	1938	35	do	300	8	do	14	1943(?)	T, E	I, L	See chemical analysis. Reported hardness 18 ppm., temperature 58° F. Impellers set.
Cd 12	Cupid Ice Cream Co.	C. Pentz	1921 (?)	35	do	152.8^m	4	Calvert(?)	94.21^m	Jun. 11, 1953	N	N	Static water level reported 17 ft. below land surface, 1946 and 1947. Well reported unproductive while Cd 11 pumping. Pumped fine, white sand when pumped with airlift.
Cd 13	Mrs. F. H. Bailey	Do	1953	15	do	280	4	do	16^m	May 18, 1953	R, E	D, S	Water reported "soft". Drawdown reported 27 feet after 3 hours pumping 50 gpm. Open hole 91–280 feet.
Cd 14	Chas. Wood, Jr.	—	—	40	Driven	22	1½	Pleistocene and pliocene(?)	—	—	C, E	D, S	
Cd 15	Chas. Ellwanger	—	1950	55	do	39	1½	do	13	1950	J, E	D, F, S	Water reported good. Was 28 feet, went dry, deepened to 39 feet.
Cd 16	Carlton Carter	—	—	60	do	27.3^m	1½	do	13.67^m	Sep. 29, 1953	N	N	Water reported to have bad taste. Abandoned and capped.
Cd 17	Chas. and Grace Sparks	—	—	60	do	21.1^m	1¼	do	11.25^m	Sep. 29, 1953	R, E	D, F, S	
Cd 18	Martin A. Kilbler	—	—	60	do	20	1½	do	—	—	J, E	D, F, M	Water reported slightly "irony".
Cd 19	Wm. Embert	—	—	55	do	30	1½	do	—	—	—, E	D, F, M	

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cd 20	Herbert Ruf	—	—	50	Driven	—	—	—	—	—	–, E	D, F, M	
Cd 21	Wm. L. Gardner	—	—	50	do	20(?)	1¼	Pleistocene and Pliocene(?)	—	—	R E	D, S	Water reported good.
Cd 22	Eglantine Hatchery	C. Pentz	Prior 1939	40	Jetted	110	4	Choptank(?)	—	—	N	N	Well abandoned. Pumped sand.
Cd 23	Do	M. Pentz	1949	40	do	48	4	Pleistocene and Pliocene(?)	—	—	R, E	D, I, M	Water reported good, slightly hard.
Cd 24	Albert Rinner	—	—	50	Driven	19	1¼	Pleistocene	—	—	R, E	D, F, M	
Cd 25	Norman Edwards	—	—	50	do	24	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, F, S	Water reported good.
Cd 26	Clinton Edwards	M. Pentz	1951	50	Jetted	180	4	Choptank(?)	—	—	J, E	D, F	
Cd 27	Anabelle Bilbrough	L. Rude & Son	1945 (?)	40	Drilled	400(?)	4	Eocene(?)	—	—	–, E	D, F, M	Water reported very "irony". Has 30 foot drive point well at chicken house. Water reported "irony".
Cd 28	Walter Pimm	—	—	45	Driven	20(?)	1¼	Pleistocene	—	—	J, E	D, S	Water reported good.
Cd 29	Mrs. Roche	—	—	50	do	16.5[m]	1¼	do	8.41[m]	Oct. 1, 1953	N	N	
Cd 30	Ann Bradford	—	—	50	do	22	1¼	Pleistocene and Pliocene(?)	—	—	C, E	D	
Cd 31	Edward L. Ege	—	—	40	do	26	1¼	do	—	—	C, E	D, F, S	Water reported good.
Cd 32	Louis Kauer	—	—	45	do	35	1¼	do	—	—	R, E	D, F, S	Water reported good. Field analysis, Nov. 20, 1953: hardness 17 ppm; pH 6.2. Temperature 55° F.
Cd 33	Enoch Baker	—	—	40	do	22	1¼	do	—	—	D, H	D, S	Water reported slightly "irony".
Cd 34	B. L. Wothers	Breeding	—	50	do	19	1¼	Pleistocene	—	—	R, C, E, H	D, S	Water reported "irony". Two wells within few feet of each other to same depth.
Cd 35	Mrs. Abbott	do	—	50	do	30	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, F, S	Water reported "irony".

Cd 36	Town of Greensboro	C. Pentz	1914 (?)	5	Jetted	275	8	Choptank(?) and Piney Point	—	—	T, E	P, L	See chemical analysis. Field analysis, Nov. 24, 1953: hardness 39 ppm, iron less than 0.1 ppm; pH 8.5. Two aquifers, 150 feet and 275 feet. Open hole 150–275 feet.
Cd 37	Do	do	1914 (?)	5	do	275	8	do	—	—	T, E	P, L	See chemical analysis. Open hole 150–275 feet.
Cd 38	Greensboro Canning Co.	do	—	10	do	285(?)	5	do	—	—	R, S	I, L	Static water level reported 5 feet above land surface, 1918. Last reported flowing 1941. See Maryland Geol. Survey, vol. 10, p. 288, well 20.
Cd 39	Foster's Hotel	Shannahan Artesian Well Co.	1902	10 (?)	Drilled	160	6–4½	Calvert(?)	—	—	N	N	Static water level reported 12 feet above land surface, 1902. Water level reported to have dropped below pumping lift when Cd 10 was pumped. Well abandoned when Cd 36 and 37 put in. See Maryland Geol. Survey, vol. 10, p. 288, well 16.
Cd 40	Medford Hudson	C. Pentz	1905	20	do	105m	6	Choptank	35.49m	Oct. 13, 1953	N	N	Static water level reported 2 feet above land surface, 1905. Originally drilled to 290 feet. Flow reported to have stopped when Cd 10 was put in. See Maryland Geol. Survey, vol. 10, p. 288, well 15.
Cd 41	Do	do	1907	25 (?)	do	240	6–4	Eocene(?)	—	—	N	N	Static water level reported at land surface, 1907. Well abandoned and partially filled. See Maryland Geol. Survey, vol. 10, p. 288, well 19.
Cd 42	W. W. Weaver	—	—	40	Driven	60(?)	1½	Pleistocene and Pliocene(?)	—	—	C, W	D, F, S	Water reported slightly "irony".
Cd 43	Carl Schaller	—	—	55	do	—	—	do	—	—	—, E	D, F, S	
Cd 44	Norwood Pinder	—	—	45	do	18	1½	Pleistocene	—	—	J, E	D, F, S	Water reported good.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cd 45	Medford Hudson	—	1903	20	Drilled	150	6	Calvert(?)	—	—	N	N	See Maryland Geol. Survey, vol. 10, p. 288, well 17. Abandoned and covered.
Cd 46	Do	—	1904	20	do	150	6	do	—	—	N	N	See Maryland Geol. Survey, vol. 10, p. 288, well 18. Abandoned and covered.
Cd 47	Mrs. Roche	—	—	50	Driven	17	1½	Pleistocene	—	—	C, H	D, S	Water reported good.
Ce 1	George Steward	—	1947	60	do	28	1½	Pleistocene and Pliocene(?)	—	—	R, E	D, F, S	Do
Ce 2	Stephan Bacho	—	—	65	do	30	1½	do	—	—	J, E	D, C, M	Water reported "irony".
Ce 3	Ed Kilbler	—	—	65	do	22	1¼	do	—	—	—, E	D, F, S	Water reported slightly "irony".
Ce 4	Donald Spiering	—	—	45	do	35	1½	do	—	—	R, E	D, F, S	Water reported to leave deposit in pipes.
Ce 5	Norman Edwards	—	—	50	do	—	1½	do	—	—	C, H	D, S	Water reported good.
Ce 6	T. P. Edwards	—	—	45	do	29	1½	do	—	—	R, E	D, F, S	Water reported good. Field analysis, Jan. 1954: chloride 18 ppm, hardness 9-17 ppm, pH 6.0.
Ce 7	Do	—	—	45	do	22.5[m]	1½	do	9.01[m]	Sep. 30, 1953	N	N	
Db 1	John Eveland	M. Pentz	1952	50	Jetted	180	3	Calvert	31	Nov. 4, 1952	J, E	D, S	Drawdown reported 19 feet after 7 hours pumping 30 gpm. Open hole 106-180 feet.
Db 2	Virgil Carter	do	1949	52	do	170	3	do	31	May 14, 1949	J, E	D, S	Water reported good. Drawdown reported 20 feet after 2 hours pumping at 30 gpm. Open hole 133-170 feet.
Db 3	Hillsboro Methodist Church	do	1951	45	do	170	3	do	32	Feb. 24, 1951	J, E	P, S	Drawdown reported 8 feet after 2 hours pumping 30 gpm. Open hole 105-107 feet.

Db 4	T. H. Clopper	M. Pentz	1952	50	Jetted	106	4	Choptank(?)	27	Aug. 18, 1952	J, E	D, F, M	See log. Water reported good. Drawdown reported 13 feet after 2 hours pumping 20 gpm. Open hole 87–106 feet.
Db 5	Cooper Elben	—	1950	40	Driven	24	1¼	Pleistocene and Pliocene(?)	4	1950	R, E	D, F, M	Water reported good. Field analysis, Jan. 1954; chloride 16 ppm. hardness 9–17 ppm; iron 02' ppm; pH 5.3.
Db 6	John Eveland	M. Pentz (?)	1946	45	Jetted	190	3	Calvert(?)	28.58^{m}	Dec. 23, 1952	J, E	D, F, M	Water reported good, hard.
Db 7	Gerard Warwick	C. Pentz	Prior 1918	5	do	108	—	do	—	—	R, E	D, S	Static water level prior to 1918 reported 15 to 20 feet above sea level. Flowing June 9, 1953. Water reported having sulfurous taste.
Db 8	U. J. Carter	M. Pentz	1953	50	do	95	3	Choptank(?)	18^{m}	Jul. 1, 1953	J, E	D, S	See log. Water reported soft. Drawdown reported 12 feet after 2 hours pumping 30 gpm. Open hole 81–95 feet.
Dc 1	G. Clendaniel	McDaniel	1909	11	do	142^{m}	6	do	42.94^{m} 45.92^{m}	Jul. 7, 1952 Sep. 30, 1953	J, E	D, S	Driller reported drilled to 270 feet. Open hole 180–270 feet. Reported flowing until 1948. Water reported hard, containing "lime".
Dc 2	Emory Kimmey	M. Pentz	1949	9.6	do	136	3	do	7 14 18	Jun. 3, 1949 Jun. 18, 1951 Jul. 16, 1952	C, H	D, S	Drawdown reported 14 feet after 2 hours pumping 40 gpm. Open hole 90–136 feet.
Dc 3	J. Reed	C. Pentz (?)	—	12	do	100	3	do	—	—	R, E	D, S	Water reported hard, "lime". Water level reported occasionally low until June 25, 1952, when level dropped below ability of pump to lift.
Dc 4	E. Duffy	(?) Pentz	1931	13	do	87.7^{m}	3	do	24.85^{m} 28.06^{m}	Jul. 15, 1952 Sep. 30, 1953	C, H	D, S	Water reported good, slight odor. Reported drop pipe had to be lowered June 25, 1952, due to falling water level.
Dc 5	E. Carter	(?) Pentz	—	13	do	—	—	—	—	—	J, E	D, S	

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dc 6	C. J. Cohee	—	—	13	Jetted	60.5m	3	Choptank(?)	16.00m	Jul. 17, 1952	C, H	D, S	Water reported good.
									17.40m	Sep. 30, 1953			
Dc 7	H. Brown	McDaniel	—	11	do	102.4m	3	do	19.25m	Jul. 15, 1952	R, E	D, C, M	Do
									20.75m	Sep. 18, 1952			
									23.36m	Sep. 30, 1953			
Dc 8	C. J. Cohee	(?) Pentz	1902	12	do	103.6m	2	do	26.25m	Jul. 15, 1952	J, E	C, S	Reciprocating pump changed when water level dropped below pumping lift, July 15, 1952.
									23.78m	Sep. 18, 1952			
									27.38m	Sep. 30, 1953			
Dc 9	J. M. Love	—	—	13	Drilled	100	3	do	—	—	C, H	D, S	Water reported good.
Dc 10	O. Smith	Smith	1941	15	Jetted	91.9m	3½	do	26.66m	Sep. 30, 1953	C, H	D, S	Water reported good, "lime".
Dc 11	Cohee	—	—	14	—	—	—	—	—	—	C, H	D, S	
Dc 12	L. Reed	—	—	17	Driven	17	1¼	Pleistocene	—	—	C, H	D, S	Water reported slightly "irony."
Dc 13	Burt McKnatt	C. Pentz	—	15	Jetted	81.6m	3–2	Choptank(?)	21.42m	Sep. 18, 1952	J, E	D, F, S	Water reported good. Reported lowered water level from May 15, 1952.
Dc 14	Ida Neighbor	(?) Pentz	—	18	do	100(?)	1½	do	—	—	C, H	D, S	Water reported slightly "irony". Reported abandoned Sep. 30, 1953. Replaced by drive point.
Dc 15	T. E. Pollard	(?) Pentz	—	15	do	75.0m	3	do	21.66m	Jul. 17, 1952	R, E	D, S	Water reported good.
Dc 16	G. Butler	Dorn (?)	—	20	do	50	4	St. Marys(?)	23	Jul. 1952	R, E	D, S	Reported to have been deeper. Water reported good, slightly "limy". Installed deep well pump Sep. 15, 1953
									28.5	Sep. 15, 1953			
Dc 17	Mrs. Fearins	—	—	18	do	100	3	Choptank(?)	—	—	C, H	D, S	Water reported good. Water level reported low Sep. 30, 1953.
Dc 18	L. Jones	—	—	21	Driven	18	—	Pleistocene	—	—	C, H	D, S	Water reported good, slightly "limy".
Dc 19	G. W. Downes	—	—	20	Drilled	49.7m	2	St. Marys	23.02m	Jul. 17, 1952	C, H	D, S	Reported to produce very little water July 17, 1952; no water available, Sep. 30, 1953.

Dc 20	Mrs. C. C. Payne	Harris	1948	21	Driven	28	—	Pleistocene	—	—	C, H	D, S	
Dc 21	C. J. Cohee	—	—	20	Jetted	100	3 (?)	Choptank	—	—	C, H	D, S	Water reported good.
Dc 22	J. S. Jordan	Jordan	1949	28	Driven	14	1¼	Pleistocene	—	—	R, E	D, S	Water reported good though occasionally "rusty".
Dc 23	C. Schreiber	—	—	23	—	—	—	—	—	—	C, H	D, S	Water reported good, contains a "rusty" sediment.
Dc 24	Stewart E. Hallowell	M. Pentz	1949	28	Jetted	121^{m}	4	Choptank(?)	47.37^{m} 40.50^{m}	Sep. 30, 1953 Jul. 23, 1952	J, E	C, S	Water level reported below pumping lift twice in 1950 and June 27–30, 1952. Drawdown July 23, 1952, 19.38 feet after 10 minutes pumping 12.5 gpm.
Dc 25	David Taylor	—	—	24	Driven	20	1¼	Pleistocene	—	—	C, H	D, S	Water reported good.
Dc 26	Rural Electrification Adm.	M. Pentz	1949	30	Jetted	360	6	Piney Point			T, E	C, M	Reported rock at 160 feet, gray rock 20–30 feet thick.
Dc 27	J. W. Cohee	do	1938	26	do	150	3	Choptank	26.1	Jul. 1, 1952	J, E	D, S	Reported dropping water level necessitated extension of drop pipe from 31 to 48 feet, July 1, 1952.
Dc 28	Denton Cemetery	—	—	27	Driven	27.9^{m}	1¼	Pleistocene	16.8^{m}	Jul. 3, 1951	C, H	Ir, S	See chemical analysis. Field analysis, Nov. 23, 1953: hardness 17–34 ppm, iron 0.1 ppm: pH 6.5. Temperature 60° F.
Dc 29	Pauline Harris	—	1950	33	do	30	1¼	do	—	—	R, E	D, S	Two drive-point wells to same depth 3 feet apart pumped on common line.
Dc 30	F. Jones	—	—	22	do	—	—	do	—	—	C, H	D, S	
Dc 31	Ray Cohee	Cohee	1948	22	do	16	1¼	do	—	—	C, H	D, S	
Dc 32	Mrs. F. Nichols	—	—	19	do	—	1¼	do	—	—	C, H	D, S	Water reported poor in quality. Static water level reported very low July 18, 1952.
Dc 33	Do	—	—	19	do	12(?)	1¼	do	—	—	C, H	N	Well reported dry.
Dc 34	Do	—	—	17	do	—	1¼	do	—	—	C, H	N	
Dc 35	Church of The Nazarene	—	1950	17	do	13	1¼	do	—	—	C, H	D, S	Water reported good.
Dc 36	C. Cohee	Dorn	1948	16	Jetted	86.9^{m}	3	Choptank	27.26^{m}	Sep. 30, 1953	C, H	D, S	Do
Dc 37	American Oil Co.	—	1908	10	do	95^{m}	3	do	3.39^{m} 13.43^{m} 17.51^{m}	Jul. 3, 1951 Jul. 16, 1952 Sep. 30, 1953	R, E	C, M	Static water reported 14 feet above land surface, 1908. Reported flowing in 1949. Reported drilled to 180 feet; see Md. Geol. Survey, vol. 10, p. 288, well 8.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Alti-tude (ft.)	Type of well	Depth of well (ft.)	Diam-eter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equip-ment	Use of water	Remarks
Dc 38	Sinclair Oil Co.	M. Pentz	1951	11	Jetted	90	4	Choptank	—	—	R, E	C, S	See chemical analysis. Field analysis, Nov. 24, 1953: hardness 125 ppm; iron 0.5 ppm; pH 8.2. Temperature 58° F.
Dc 39	G. C. Cohee	—	—	10	do	83m	3	do	14.22m	Jul. 17, 1952	C, H	D, S	
Dc 40	R. P. Taylor	—	—	12	do	100	3	do	16.50m 20.85m	Jul. 17, 1952 Sep. 30, 1953	R, E	D, S	Water reported good, containing some "lime".
Dc 41	Clarence Hill	Dorn	1930	11	Drilled	111	2½	do	10.08m 13.62m	Sep. 18, 1952 Sep. 30, 1953	C, H	D, F, S	See chemical analysis.
Dc 42	E. Kimmey	(?) Pentz	1932	11	Jetted	77m	2½	do	13.59m 17.55m	Jul. 16, 1952 Sep. 30, 1952	C, H	D, S	Water reported good, but "muddy" taste.
Dc 43	Kimmey	—	—	11	—	—	—	—	—	—	C, H	D, S	
Dc 44	C. Collins	C. Pentz and Dorn	1933	12	Jetted	106m	3	Choptank	15.15m 16.60m	Jul. 17, 1952 Sep. 30, 1952	C, H	D, F, S	Water reported fair, marshy taste.
Dc 45	Wm. T. Layton	Layton	—	11	Driven	—	1½	Pleistocene	—	—	C, H	D, F, S	Water tastes "irony".
Dc 46	W. Dorn	C. Pentz	—	12	Jetted	100 (?)	3	Choptank	12	Jul. 15, 1952	C, H	D, S	Decline in water level necessitated increasing length of drop pipe from 16 feet to 28 feet, July 15, 1952.
Dc 47	Wilmer Mansfield	M. Pentz	1941	11	do	300	4	Piney Point	12.97m 12.20m	Jul. 22, 1952 Sep. 16, 1952	C, H	D, S	
Dc 48	A. Hignutz	—	—	11	Driven	—	—	Pleistocene	—	—	C, H	D, F, S	Water reported good.
Dc 49	Chas. A. Taylor	Taylor	1949	11	do	16	1½	do	—	—	R, E	D, S	Do
Dc 50	J. Bradley	—	—	11	Drilled	—	—	Calvert	—	—	C, H	D, S	Water reported good. Water level declines when Dc 54 is pumped.
Dc 51	H. Cockran	—	—	11	Driven	—	—	Pleistocene	—	—	R, E	D, S	
Dc 52	Frank Murphy	Maloney	1948	11	do	12	1¼	do	—	—	C, H	D, S	Water reported good.
Dc 53	Phillips Packing Co.	—	—	11	—	—	—	—	—	—	C, H	D, S	Do
Dc 54	Do	C. Pentz	1944	11	Jetted	289	6	Calvert(?)	—	—	T, E	I, L	Well reported to flow. When pumped causes fluctuations in wells Dd 43 and 44.

Dc 55	Phillips Packing Co.	—	—	10	Jetted	100(?)	3	Choptank	0.14m 4.07m 5.23m	Jul. 2, 1951 Jul. 16, 1952 Sep. 18, 1952	C, H	D, S	
Dc 56	Denton Cemetary	McDaniel	1904	13	Drilled	137m	6–3	do	17.57m	June 18, 1951	N	O	Daily record. Static water level reported 10 feet above land surface 1907. Well reported flowing 1948. Driller reports drilled to 150 feet. See Md. Geol. Survey, vol. 10, p. 288, well 7.
Dc 57	Maryland Broiler Industries, Inc.	M. Pentz	1948	13	do	131	6	do	0	1948	T, E	I, L	See log. Drawdown reported 84 feet pumping 100 gpm. Water reported "irony", hard, and having taste of sulfur. Open hole 103–131 feet.
Dc 58	Wingate Neal	C. Pentz	1931	32	do	140	4	do	28.25 45.21m	Aug. 20, 1950 Sep. 18, 1952	J, E	D, F, M	Static water level when drilled reported 5 feet below land surface. Water reported good.
Dc 59	E. Kimmey	—	—	13	Jetted	123.2m	3	do	18.40m 22.21m	Jul. 16, 1952 Sep. 30, 1953	C, H	D, S	Water reported good.
Dc 60	E. M. Crouse	M. Pentz	1950	28	do	180	4	do	22	Oct. 20, 1950	J, E	D, S	Drawdown reported 8 feet after 2 hours pumping 10 gpm. Water reported hard, "irony". Field analysis for iron showed less than 0.1 ppm. Open hole 100–180 feet.
Dc 61	W. H. Weir	—	1850(?)	34	Dug	19.7m	42	Pleistocene	7.05m	Jul. 5, 1951	C, H	D, F, S	Water reported good. Occasionally goes dry from pumping.
Dc 62	Wm. R. Addington	—	—	24	Driven	90	—	Choptank	—	—	J, E	D, S	Supply reported diminishing since 1949.
Dc 63	R. H. Hallowell	—	1931	12	Dug	40	2	Pleistocene	—	—	R, E	D, S	
Dc 64	E. Kimmey	Maloney	1952	10	Driven	14	1¼	do	3	June 27, 1952	C, H	D, S	Water reported good.
Dc 65	Do	do	1952	9	do	7m	1¼	do	1.04m	Jul. 17, 1952	N	N	
Dc 66	Sherman Tribbet	—	—	22	Jetted	113m	3	Choptank	27.82m	Sep. 18, 1952	C, H	D, S	
Dc 67	Caroline Poultry Farms, Inc.	M. Pentz	1951	14	do	470m	6	Piney Point	10	Sep. 15, 1951	T, E	I, L	See log. Drawdown reported 90 feet after 72 hours pumping 160 gpm. Open hole 340–470 feet. Drilled to 518 feet.
Dc 68	Do	do	1952	3	do	115	6	Choptank	—	—	T, E	I, L	See log. Reported to flow March 1952. Drawdown reported 73 feet pumping 140 gpm. Open hole 93–115 feet.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dc 69	Wayne Cawley	—	Prior 1935	50	Driven	20	1½	Pleistocene	—	—	R, E	D, F, M	Static water level reported occasionally low. Water reported good.
Dc 70	Do	C. Pentz	1912	40	Jetted	73.6m	3	Choptank	21.02m 32.73m	Jul. 22, 1952 Sep. 18, 1952	C, H	D, S	Water reported good.
Dc 71	R. H. Linser	M. Pentz	—	49	do	100	3(?)	do	—	—	R, E	D, S	Do
Dc 72	Melvin Brown	do	1950	45	do	200	4	do	—	—	J, E	D, S	Water reported good, slightly hard.
Dc 73	Do	do	1947(?)	45	do	186	4	do	17	1947	J, E	D, F, M	Do
Dc 74	Charles Blough	do	1952	40	do	150	3	do	21	May 14, 1952	J, E	D, S	See log. Drawdown reported 10 feet after 2 hours pumping 30 gpm. Water reported good bu hard. Open hole 118–150 feet.
Dc 75	Joseph Jordan	L. Rude and Son	1952	28	do	160	3	do	35	Jul. 23, 1952	J, E	D, S	See log. Water reported good. Open hole 105–159 feet.
Dc 76	Ed. Quillen	—	—	50	Dug	18	48	Pleistocene	8	Jul. 23, 1952	R, E	F, S	Reported dry in 1951.
Dc 77	A. P. Martin	Harris	1952	50	Driven	35	1½	do	15	Jul. 7, 1952	R, E	D, F, M	Water reported good.
Dc 78	W. R. Frampton	Dorn	1943	50	Jetted	85m	3	Choptank	26.33m 27.38m	Jul. 23, 1952 Sep. 18, 1952	C, H	D, S	Water reported "irony". Well reported originally drilled 105 feet.
Dc 79	Do	—	—	50	Driven	20	1¼	Pleistocene	—	—	C, H	F, S	Water reported good. Well never dry.
Dc 80	M. Butler	Harris	1948	52	do	25	1½	do	12	1948	R, E	D, F, M	Water reported having "bittersweet" taste. Two wells pumped together.
Dc 81	E. Linden Duffy	M. Pentz	1951	24	Jetted	110	3	Choptank	17	Jun. 2, 1951	J, E	I, M	Drawdown reported 13 feet after 2 hours pumping 20 gpm. Open hole 90–110 feet.
Dc 82	H. Keen	do	1941	28	do	105	3	do	12	1941	R, E	D, S	Water reported good. Static water level reported dropping since May 1952. Open hole 65–105 feet.

Dc 83	L. R. Orme	M. Pentz	1948	22	Jetted	96	4	Choptank	7	1948	R, E	D, S	Water reported good.
Dc 84	E. Downes, Jr.	do	1950	28	do	106	3	do	24	Jul. 2, 1952	J, E	D, S	Reported drop pipe extended from 21 feet to 42 feet July 1952, due to declining water level.
Dc 85	E. M. Crouse	do	1949	40	do	110^{m}	3	do	23.27^{m}	Sep. 17, 1952	J, E	D, S	Water reported "irony" and hard. Reported water level when drilled 23 feet below land surface. Drop pipe to 70 feet.
Dc 86	B. Brooks	do	1941	28	do	105	3	do	—	—	R, E	D, S	Water reported good.
Dc 87	M. A. Pentz	do	1940	4	do	100	3	do	—	—		D, S	Reported to flow 4.6 feet above land surface Sep. 19, 1952.
Dc 88	William Croop	—	—	40	Driven	22^{m}	1¼	Pleistocene	6.15^{m}	Sep. 16, 1952	C, H	D, S	Water reported good.
Dc 89	William T. Cannon	—	—	55	do	20	1¼	do	—	—	C, H	D, S	Water reported slightly hard.
Dc 90	W. T. Martin	—	1922	55	do	25	1¼	do	—	—	C, H	D, S	Water reported good. Well never dry.
Dc 91	Do	—	1900(?)	55	Dug	18	30	do	—	—	C, H	F, S	Well frequently dry in summer.
Dc 92	J. Schneider	Harris	1951	55	Driven	17	1¼	do	—	—	C, H	D, S	
Dc 93	Frank Kopen	M. Pentz	1948	55	Jetted	127	3	Choptank	21	1948	J, E	D, S	See log. Drop pipe to 50 feet.
Dc 94	Do	do	1945	55	do	100	3	do	21	1945	J, E	C, M	Reported green sand encountered 77 to 81 feet. Drop pipe to 60 feet.
Dc 95	Omer L. Nichols	—	—	57	Driven	20	1¼	Pleistocene	—	—	C, H	D, S	Water reported "cloudy" during spring months.
Dc 96	J. M. Coffin	—	1922	40	do	15	1¼	do	5	Sep. 16, 1952	C, H	D, S	
Dc 97	H. Lindeman	Dorn(?)	—	45	Jetted	276	—	Calvert	—	—	J, E	D, F, M	Water reported good.
Dc 98	Carol Bright	M. Pentz	1942	25	do	121	3	Choptank	12 21	1942 Sep. 13, 1952	R, E	D, S	Water reported good. Drawdown reported 5.5 feet after 1.5 min. pumping 6 gpm.
Dc 99	Burton Roe	C. Pentz	1926	13	do	105	3	do	2.40^{m}	Sep. 16, 1952	C, H	D, S	Reported flowing until 1948.
Dc 100	Lester Love	M. Pentz	1952	12	do	126	3	do	0	Aug. 22, 1952	R, E	D, S	See log. Drawdown reported 20 feet after 2 hours pumping 30 gpm. Open hole 84–126 feet.
Dc 101	Pure Oil Co.	—	—	55	Driven	35(?)	1¼	Pleistocene	—	—	R, E	D, S	Water reported good.
Dc 102	Rebecca Lane	—	—	58	do	30	1¼	do	—	—	R, E	F, M	Well reported never dry.
Dc 103	Do	—	—	58	do	30	1¼	do	—	—	R, E	D, S	
Dc 104	Paul Beauchamp	Maloney	1942	58	do	40	1¼	do	—	—	C, H	D, S	Well reported never dry.
Dc 105	W. F. DeFord	—	—	45	Dug	25	30	do	—	—	C, H	F, S	Reported affected by droughts.
Dc 106	Do	—	—	45	do	30	1¼	do	—	—	C, H	D, S	Water reported good.
Dc 107	C. J. Kern	—	1939	45	Driven	44	1¼	do	—	—	R, E	D, F, S	Do

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dc 108	Ralph Meredith	—	1936	48	Driven	25	1¼	Pleistocene	—	—	R, E	D, F, M	Water reported good.
Dc 109	Leslie Davis	—	1950	40	do	22	1¼	do	—	—	C, H	D, S	Do
Dc 110	James Waters	—	1951	45	do	25(?)	1¼	do	—	—	C, H	D, S	Do
Dc 111	Harold Towers	M. Pentz	1953	20	Jetted	120	3	Choptank	17	Feb. 1, 1953	C, H	D, S	Drawdown reported 13 feet after 2 hours pumping 100 gpm. Open hole 84–120 feet. Temperature 56.5° F.
Dc 112	Allen Warner	Warner	1948	59	Driven	50	1¼	Pleistocene	—	—	C, H	D, S	Water reported slightly "irony".
Dc 113	C. H. Wagner	Harris	1945	47	do	45	1¼	do	—	—	R, E	D, F, S	Water reported good.
Dc 114	W. W. Morris	do	1952	40	do	28	1¼	do	7	1952	R, E	D, S	Water reported slightly "irony".
Dc 115	Ernest Asche	Asche	1943	50	do	40(?)	1¼	do	—	—	R, E	D, F, S	Do
Dc 116	William Dempsey	M. Pentz	1947	35	Jetted	135	3	Choptank	—	—	R, E	D, F, M	Water reported very "irony". Filter softener used.
Dc 117	W. P. Day	C. Pentz	1920	32	do	200	3	Calvert	—	—	C, H	D, S	Water reported good.
Dc 118	Wilbert Butler	—	1949	38	Driven	33	1¼	Pleistocene	—	—	C, H	D, S	Do
Dc 119	Do	—	1943(?)	38	do	33	1¼	do	—	—	R, E	F, S	Do
Dc 120	Fred Butler	Harris	1952	40	do	44	1¼	do	18	Nov. 1952	R, E	D, S	Do
Dc 121	George P. Wood	Wood	1950	32	do	23	1¼	do	—	—	R, E	D, S	Do
Dc 122	Caroline Poultry Farms, Inc.	Shannahan Artesian Well Co.	1953	18	Drilled	980	8–4	Piney Point and Matawan(?)	7.27^{m}	Mar. 10, 1953	N	I, —	See log. 330–490-foot aquifer: static water level 18 feet below land surface. Drawdown reported 122 feet pumping 25 gpm. 942–970-foot aquifer: static water level 9 feet below land surface; drawdown reported 159 feet pumping 10 gpm. Screened from 944 feet to 965 feet. Overlap in casing at 332 feet. Open hole.
Dc 123	George Martinak	M. Pentz	1953	25	Jetted	84	3	St. Marys	10	Mar. 9, 1953	R, E	D, S	Water reported good. Drawdown reported 18 feet after 2 hours pumping 30 gpm. Open hole 42–84 feet.

Dc 124	George Martinak	Dulin	1930	25	Driven	22	1¼	Pleistocene	—	—	C, H	D, S	Water reported "irony".
Dc 125	Gus Koste	Maloney	1948	22	do	54	1¼	do	4	1948	R, E	D, S	Water reported good.
Dc 126	Catherine Friend	—	1933	44	do	20(?)	1¼	do	—	—	C, H	D, S	Well occasionally dry.
Dc 127	Phillips Packing Co.	—	1907	11	Drilled	289	6	Calvert(?)	—	—	E	I, L	City wells affected by heavy pumpage on this well. Flowing July 5, 1951.
Dc 128	Do	—	1907	11	do	289	6	do	—	—	E	I, L	Do
Dd 1	City of Denton	Shannahan Artesian Well Co.	1904	42	do	400	8	Piney Point	—	—	T, E	P, L	See log and chemical analysis.
Dd 2	Do	do	1938	35	do	402	8	do	—	—	T, E	P, L	See log and chemical analysis. Field analysis, Nov. 24, 1953: hardness 34 ppm, iron less than 0.1 ppm, pH 8.2. Temperature 63.5° F.
Dd 3	E. R. Shoemaker	M. Pentz	1940	30	Jetted	290	3	Choptank and Calvert	—	—	J, E	D, S	Water reported good, slightly sulfurous odor.
Dd 4	G. Bech	do	1947	45	do	275	4	do	8	Dec. 15, 1947	N	N	Abandoned. Open hole 65–275 feet.
Dd 5	Roy Adams	do	1950	42	do	205	4	Choptank	26	Mar. 26, 1950	J, E	D, F, I, M	See log. Drawdown reported 14 feet after 2 hours pumping 30 gpm. Open hole 107–205 feet.
Dd 6	Samuel Mellitts	do	1952	45	do	65	4	St. Marys	10	Nov. 11, 1952	C, H	C, S	See log. Drawdown 20 feet after 2 hours pumping 40 gpm. Open hole 45–65 feet.
Dd 7	C. E. Sharp	do	1945	44	do	100	3	Choptank	30	1945	J, E	D, F, M	Water reported hard.
Dd 8	M. A. Pentz	do	1940	45	do	400	4	Piney Point	30	1940	J, E	D, S	See log. Hardness reported 136 ppm(calcium and magnesium).
Dd 9	John N. Jordin	do	1937	40	do	97	2	St. Marys	7	1937	R, E	D, S	Water reported good.
Dd 10	Dallas Neal	Neal	1948	55	Driven	16	1¼	Pleistocene	—	—	R, E	D, F, M	Water reported "irony".
Dd 11	H. H. Nuttle	C. Pentz	—	55	Jetted	500(?)	6	Eocene	12	1948	J, E	D, F, M	
Dd 12	W. L. Jump	Harris	1947	55	Driven	28	1¼	Pleistocene	—	—	R, E	D, S	Water reported soft.
Dd 13	B. F. Somers	—	About 1850	50	Dug	24.9m	42	do	19.90m	Apr. 21, 1953	J, E	D, F, S	Dry during droughts.
Dd 14	Melvin Andrew	Maloney	1938	58	Driven	51	1¼	do	—	—	R, E	D, F, S	
Dd 15	William Brubaker	Harris	1952	57	do	32	1¼	do	12	March 1952	R, E	D, S	Reported clay at 18 feet.
Dd 16	Frank Zeigler, Sr.	M. Pentz	1941	55	Jetted	250	3(?)	Calvert(?)	—	—	R, E	F, M	
Dd 17	Dukes Henning	Harris	1951	50	Driven	28	1¼	Pleistocene	—	—	C, H	D, S	
Dd 18	P. M. Lutz	do	1945	45	do	25	1¼	do	—	—	R, E	D, F, M	

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level		Pumping equipment	Use of water	Remarks
									Feet below land surface	Date of measurement			
Dd 19	Carroll Henning	Harris	1951	57	Driven	28	1½	Pleistocene	—	—	C, H	D, S	Water reported "milky" during wet seasons. Former well near large trees abandoned because of brownish discoloration of water.
Dd 20	Do	Maloney	Prior 1935	56	do	30(?)	1¼	do	—	—	C, H	F, S	
Dd 21	County Farm	Harris	1949	52	do	44	1½	do	—	—	C, H	F, S	Water reported slightly "irony".
Dd 22	Do	do	1945	50	do	44	1½	do	—	—	R, E	D, S	Do
Dd 23	John E. Lister	do	1949	45	do	32	1½	do	3	1949	R, E	D, F, S	Do
Dd 24	Do	Dorn	1940	50	Jetted	100	4	St. Marys(?)	—	—	J, E	D, F, S	
Dd 25	C. H. Meluney	Meluney	1953	45	Driven	33.5[m]	1¼	Pleistocene	3.37[m]	Apr. 22, 1953	R, E	D, S	
Dd 26	Cannon Wright	Harris	1953	44	do	36	1½	do	—	—	R, E	D, S	Field analysis, Jan. 1954: chloride 26 ppm, hardness 71 ppm, iron less than 0.1 ppm, pH 6.5.
Dd 27	Anthony Musso	—	—	53	do	24(?)	1½	do	—	—	—	I, S	Water reported good.
Dd 28	Gordon Holbrook	C. Pentz	1941	53	Jetted	208	3	Choptank	—	—	J, E	D, S	Water reported slightly hard.
Dd 29	J. H. Dandy	Harris	1950	51	Driven	25	1¼	Pleistocene	—	—	C, H	D, S	Water reported good.
Dd 30	Joe Bacsak	Maloney	1945	57	do	22	1½	do	—	—	C, H	D, S	Do
Dd 31	Do	do	1941	57	do	22	1¼	do	—	—	J, E	F, S	Well has gone dry twice.
Dd 32	Do	do	1938	57	do	23[m]	1½	do	3.53[m]	Apr. 22, 1953	C, H	N	
Dd 33	J. Shaffer	C. Pentz	1920	45	Jetted	80	3	St. Marys(?)	2.22[m]	Apr. 23, 1953	C, H	D, S	Water reported very "irony".
Dd 34	J. D. Stover	Maloney(?)	1948	45	Driven	30	1¼	Pleistocene	—	—	C, H	D, S	Water reported good.
Dd 35	Gadow Bros.	Wilhelm	1950	38	do	40	1½	do	0	1950	R, E	I, M	Do
Dd 36	K. Towers	—	1949	46	do	22	1¼	do	—	—	C, H	D, S	Static water level reported occasionally low.
Dd 37	Thurman Fountain	M. Maloney	1950	55	do	22	1¼	do	—	—	R, E	D, S	Water reported "irony", hard.
Dd 38	J. Porter	do	1950	52	do	30	1¼	do	—	—	R, E	D, F, S	Water reported slightly "irony".
Dd 39	Charles Foy	—	—	53	do	25(?)	1¼	do	—	—	R, E	D, S	Water reported good.
Dd 40	William Behlke	M. Pentz	1953	40	Jetted	100	3	St. Marys	29[m]	Aug. 31, 1953	J, E	D, S	Drawdown reported 14 feet after 2 hours pumping 10 gpm. Open hole 84–100 feet.

Dd 41	Walter Ihlenfeld	M. Pentz	—	50	Jetted	115	3	St. Marys	17	Feb. 1954	R, E	F, M	See chemical analysis. Static water level reported 14 feet below land surface 1949.
Dd 42	City of Denton	—	1905	40	do	285	8–6	Calvert	11	1918	N	N	Abandoned 30–35 years ago. See Md. Geol. Survey, vol. 10, p. 288, well 3.
Dd 43	Do	—	—	5	do	270	6–$4\frac{1}{2}$	do	—	—	N	N	Static water level reported 3 feet above land surface 1918. See Md. Geol. Survey, vol. 10, p. 288, well 4. Abandoned. Filled with concrete 1938.
Dd 44	Do	—	—	5	do	270	6–$4\frac{1}{2}$	do	—	—	N	N	Do
Dd 45	Diamond Supply Co.	C. Pentz	1914	25	do	169^{m}	4	Choptank	27.33^{m}	Mar. 17, 1954	N	N	Well reported jetted to 280 feet. See Md. Geol. Survey, vol. 10, p. 288, well 5.
De 1	R. H. Stafford	—	—	60	Driven	19	$1\frac{1}{4}$	Pleistocene	3	Mar. 21, 1953	J, E	C, M	
De 2	Lawrence Collison	Green	1951	60	do	30	$1\frac{1}{4}$	do	—	—	R, E	D, S	Water reported slightly hard, not "irony".
De 3	Douglas Bennington	Harris	1952	45	do	24	$1\frac{1}{4}$	do	—	—	R, E	D, F, M	Water reported slightly "irony".
De 4	J. D. Stover	—	—	45	do	35	$1\frac{1}{4}$	do	—	—	C, H	F, S	Water reported good.
De 5	Walton Willis	Willis	1952	60	do	27	$1\frac{1}{4}$	do	—	—	R, E	D, S	Water reported slightly "irony". Field analysis, Jan. 1954: chloride 16 ppm, hardness 26 ppm, iron 0.1 ppm, pH 6.3.
De 6	Do	Harris	1950	60	do	30	$1\frac{1}{2}$	do	—	—	C, E	F, S	Water reported slightly "irony".
De 7	John Corkell	—	—	58	do	32(?)	$1\frac{1}{4}$	do	—	—	J, E	D, F, M	
De 8	C. Colbourn	—	—	60	do	19.1^{m}	$1\frac{1}{4}$	do	2.14^{m}	Apr. 23, 1953	C, H	D, S	
De 9	Leslie Scott	Maloney	1948	56	do	25	$1\frac{1}{4}$	do	—	—	C, H	D, S	Water reported good.
De 10	George Breeding	Harris	1953	60	do	42	$1\frac{1}{2}$	do	—	—	R, E	D, F, S	Do
De 11	Nuttle Canning Co., Inc.	C. Pentz	About 1933	55	Jetted	90	3	St. Marys	—	—	R, E	I, M	Well pumped on common line with three driven wells. See De 12. Water reported "irony".
De 12	Do	—	—	55	Driven	25	$1\frac{1}{4}$	Pleistocene	—	—	R, E	I, M	Three drive point wells close together to same depth on common line with De 11. Water reported good.
De 13	Do	—	—	55	do	25	$1\frac{1}{4}$	do	—	—	R, S	I, S	Three drive point wells close together to same depth on common line. Water reported good.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Eb 1	Carl Worm	Maloney	1923	30	Driven	23	1¼	Pleistocene	—	—	R, E	D, F, S	Water reported soft.
Eb 2	Do	—	1923	30	do	20m	1¼	do	9.85m	Sep. 8, 1953	C, H	F, S	Do
Eb 3	Matthew Curran	—	1928	10	Jetted	250	1¼	Calvert	—	—	Ic, E	D, S	Do
Eb 4	Lula Hopkins	—	1938	35	Driven	19.4m	1¼	Pleistocene and Pliocene(?)	7.13m	Sep. 8, 1953	C, H	D, S	Water reported soft. Field analysis, Jan. 1954: chloride 12 ppm, hardness 17 ppm, iron 0.1 ppm, pH 6.5.
Eb 5	Do	Maloney	1947	35	do	20	1¼	do	—	—	R, E	F, S	Water reported soft.
Eb 6	Henry L. Griep	Griep	1950	20	do	22	1¼	do	—	—	R, E	D, F, M	Do
Eb 7	Do	do	1952	20	do	18	1¼	do	—	—	R, E	N	See chemical analysis. Water reported hard.
Eb 8	Fred Quidas	McDaniel & Spence	1909	5	Jetted	100	4	Choptank	5.6m	Mar. 17, 1954	N	D, F, S	Probably one of three wells in Md. Geol. Survey, vol. 10, p. 288, well 1. See Eb 9 and 10.
Eb 9	Mrs. Jos. Worm	do	1909	5	do	100	4	do	1.7m	Mar. 17, 1954		D, F, M	See Eb 8.
Eb 10	Miss S. Cousins	do	1909	5	do	100+	—	do	—	—	R, E	D, F, M	Water reported very hard. Reported to bave had sulfurous odor and to bave had a slight flow before pump installed. See Eb 8.
Ec 1	Schluderberg-Kurdle Co.	Shannahan Artesian Well Co.	1952	32	do	230	8	Choptank and Calvert	23	Apr. 5, 1952	N	I	See log. Drawdown reported 15 feet pumping 60 gpm. Open hole 152–230 feet.
Ec 2	U. G. Todd	M. Pentz	1953	20	do	25.5m	4	St. Marys	18.57m	Aug. 24, 1953	C, H	P, S	Water reported good. Jetted to 44 feet. Open hole 37–44 feet. Static water level reported 13 feet below land surface, March 1953. Drawdown reported 10 feet after 2 hours pumping 40 gpm.

Ec 3	C. B. Nagel	M. Pentz	1945	25	Jetted	180	4	Choptank	—	—	Ic, E	D, F, S	Water reported slightly hard.
Ec 4	Do	Adams	1953	50	Driven	45	1¼	Pleistocene and Pliocene(?)	—	—	Ic, E	D, F, M	Water reported soft.
Ec 5	R. Patrick	—	—	40	do	23.8^{m}	1¼	do	10.38^{m}	Aug. 24, 1953	C, H	D, S	Water reported soft. Temperature 57° F.
Ec 6	Lee C. Holt	M. Pentz	1946	15	Jetted	240	3	Calvert	—	—	R, E	D, S	Water reported slightly hard.
Ec 7	A. Kelley	Maloney	1951	40	Driven	16	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, F, M	Field analysis, Jan. 1954: chloride 18 ppm, hardness 17 ppm, iron 1.5 ppm, pH 6.7.
Ec 8	A. F. Harty	Coleman	1943	40	do	20	1¼	do	—	—	J, E	D, S	Water reported soft, slightly "irony".
Ec 9	Do	Lord	1951	40	do	20	1¼	do	—	—	C, H	F, S	Water reported good. Temperature 65° F.
Ec 10	Norman Todd	Maloney	1943	45	do	18	1¼	do	—	—	C, H	D, S	Water reported soft. Water level reported low at times.
Ec 11	Alfred Schreiger	do	1950	50	do	27	1¼	do	—	—	R, E	D, S	Water reported hard.
Ec 12	Wilbert Thomas	do	1946	40	do	18	1¼	do	—	—	R, E	D, F, S	Water reported soft.
Ec 13	Ken Taylor	—	1951	30	do	30	1¼	do	—	—	Ic, E	D, F, S	Do
Ec 14	Phillips Packing Co.	Wheatley	1941	8	Jetted	165	4	Choptank	—	—	R, S	I, M	Water reported hard. Reported driller encountered hard layer at 163 feet.
Ed 1	Grace Everngam	Adams	1947	45	Driven	23	1¼	Pleistocene	—	—	Ic, E	D, F, S	
Ed 2	H. L. Sullivan	Maloney	1916	55	do	28	1¼	do	14	Aug. 24, 1953	C, H	D, S	Water reported soft. Temperature 62° F.
Ed 3	Do	do	1948	55	do	32	1¼	do	25	—	R, E	F, S	
Ed 4	H. J. Dew	do	1951	30	do	22	1¼	do	8	Aug. 26, 1953	R, E	D, M	
Ed 5	V. O. Wright	Wright	1948	40	do	29	1¼	do	23	Aug. 26, 1953	R, E	D, F, S	
Ed 6	C. Laramore	Maloney	1950	50	do	20	1¼	do	—	—	R, E	D, F, M	Water reported "irony" and hard.
Ed 7	W. J. Linthicum	do	1923	45	do	30.1^{m}	2	do	9.47^{m}	Aug. 26, 1953	C, H	F, S	See chemical analysis. Field analysis, Nov. 24, 1953: hardness 94 ppm; iron 0.2 ppm; pH 6.5. Water reported soft but "irony". Temperature 58° F.
Ed 8	Do	do	1952	45	do	30	1¼	do	—	—	R, E	D, S	Water reported soft.
Ed 9	Do	do	—	45	do	30	1¼	do	—	—	N	N	
Ed 10	Earl Jackson	—	1947	55	do	—	1¼	do	—	—	C, H	D, F, S	Water reported soft. Temperature 60° F.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ed 11	Frank Adams	Maloney	1951	45	Driven	36.3m	1¼	Pleistocene	8.44m	Aug. 26, 1953	R, E	D, F, M	
Ed 12	Ross Trice	do	1921 (?)	60	do	22	1¼	do	—	—	C, H	D, S	Water reported soft. Temperature 58° F.
Ed 13	Do	do	1921 (?)	60	do	20.8m	1¼	do	6.70m	Sep. 1, 1953	R, E	F, M	Water reported soft.
Ed 14	Do	do	—	60	do	30	1¼	do	—	—	C, H	F, S	Water reported soft. Temperature 60° F.
Ed 15	Dorsey Nichols	do	1948	55	do	—	1¼	do	—	—	C, H	D, S	Do
Ed 16	Do	do	1951	55	do	—	1¼	do	—	—	R, E	F, S	Water reported slightly "irony".
Ed 17	Lawrence Everngam	Adams	1953	55	do	18	1¼	do	9	Sep. 2, 1953	Ic, E	D, S	Water reported soft.
Ed 18	Ralph C. Russel	Warren	1952	45	do	19	1¼	do	—	—	R, E	D, S	Water reported very hard.
Ed 19	Do	do	1949	45	do	19	1¼	do	—	—	R, E	F, M	Do
Ed 20	Evelyn F. Williamson	Masek	1922	45	do	35	1½	do	—	—	C, H	D, S	Water reported soft.
Ed 21	Do	Fishell	1930	45	do	35	1½	do	—	—	R, E	F, M	Do
Ed 22	Mark Hignutk	—	—	60	do	42.8m	1¼	do	12.91m	Sep. 2, 1953	C, H	D, S	Temperature 58° F.
Ed 23	Do	—	—	60	do	40	1¼	do	—	—	Ic, E	F, M	Water reported soft.
Ed 24	William Adams	Maloney	1952	55	do	25	1¼	do	—	—	C, H	F, S	Do
Ee 1	L. B. Case	M. Pentz	1951	40	Jetted	170	3	Choptank	11	Sep. 22, 1951	C, E	D, S	See log and chemical analysis. Field analysis Jan. 1954: hardness 136 ppm, iron 2.5 ppm, pH 8.5. Drawdown reported 9 feet after 10 hours pumping 50 gpm.
Ee 2	John McDonald	Maloney	1943	50	Driven	40	1½	Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported soft. Field analysis Jan. 1954: chloride 16 ppm, hardness 26 ppm, iron 0.1 ppm, pH 6.3.
Ee 3	Do	do	1948	50	do	37.8m	1½	do	6.37m	Sep. 1, 1953	C, H	F, S	Temperature 58° F.

Ee 4	John McDonald	Maloney	1952	50	Driven	24	1½	Pleistocene	—	—	C, H	F, S	Temperature 58° F.
Ee 5	Frank Papaianni	Wilhem	1950	50	do	30	1¾	do	—	—	R, E	D, S	Water reported soft.
Ee 6	Do	do	1952	50	do	30	1¾	do	—	—	R, E	F, S	Do
Ee 7	Elmer Trice	—	1946	45	do	40	1½	Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported hard.
Ee 8	Do	—	1946	45	do	40	1¼	do	—	—	R, E	F, S	Do
Ee 9	O. C. Closson	Closson	1949	45	do	28	1¼	Pleistocene	—	—	R, E	D, S	Water reported soft.
Ee 10	Do	do	1943	45	do	28	1¼	do	—	—	C, H	F, S	Temperature 50° F.
Ee 11	Do	do	—	45	do	28	1¼	do	—	—	N	N	
Ee 12	Arthur Adams	Adams	1952	35	do	18	1¼	do	—	—	C, H	D, S	Water reported soft. Temperature 62° F.
Ee 13	Do	do	1951	35	do	17.8[m]	1¼	do	5.37[m]	Sep. 3, 1953	C, H	F, S	Do
Ee 14	Do	do	1941	35	do	18	1¼	do	—	—	C, H	F, S	
Fb 1	P. D. Voshell	Shannahan Artesian Well Co.	1947	35	Jetted	222	3	Choptank and Calvert	26	Sep. 16, 1947	J, E	D, F, M	See log. Drawdown reported 16 feet after 10 hours pumping 20 gpm. Open hole 84–222 feet.
Fb 2	C. W. Voshell	do	1947	40	do	170	3	Choptank	27	Sep. 16, 1952	J, E	D, F, M	Drawdown reported 15 feet afte 10 hours pumping 25 gpm. Open hole 122–170 feet.
Fb 3	M. K. Blades	M. Pentz	1951	37	do	180	3	do	18	May 5, 1951	J, E	D, S	Field analysis Jan. 1954: chloride 10 ppm, hardness 150 ppm, iron 0.5 ppm, pH 8.2. Drawdown reported 12 feet after 1 hour pumping 10 gpm. Open hole 110–180 feet.
Fb 4	J. P. Lecates	do	1949	38	do	48	3	do	4.8	May 26, 1949	J, E	I, L	Drawdown reported 12 feet after 2 hours pumping 40 gpm. Screened 40–48 feet. Cannery operates 10 hours daily July, August, September.
Fb 5	J. William Sanders	Sanders	1949	38	Driven	16	1¼	Pleistocene	—	—	R, E	D, F, M	Water reported hard.
Fb 6	Do	—	—	38	do	—	1¼	—	—	—	C, H	D, S	Water reported soft.
Fb 7	Voshell Bros.	Voshell	1930	20	do	(?)	2	—	—	—	R, E	D, F, S	Water reported slightly hard.
Fb 8	Do	do	1914	20	Dug	17.5[m]	72	Pleistocene	8.77[m]	Sep. 9, 1953	R, E	D, F, S	Do
Fb 9	A. T. Blades	Engle	1952	10	Driven	—	1¼	—	—	—	R, E	D, F, M	Do
Fb 10	H. A. Spies	Nolan	1943	36	Bored	65	2½	Pleistocene and Pliocene(?)	—	—	R, E	D, F, M	Water reported hard. Field analysis, Jan. 1954: hardness 170 ppm, iron 1.5 ppm, pH 8.0.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Fb 11	H. A. Spies	Spies	1928	36	Driven	23	1¼	Pleistocene	—	—	C, H	N	Water reported hard.
Fb 12	E. O. Wright	Engle	1951	25	Jetted	120	2½	Choptank	.5	Sep. 9, 1953	R, E	D, F, M	Water reported slightly hard and tasting of magnesia. Field test, Jan. 21, 1954: chloride 8 ppm, hardness 187 ppm, iron 0.5 ppm, pH 8.2
Fb 13	Enoch Friend	Cole	1928	30	Driven	23	1½	Pleistocene	—	—	C, H	D, S	Water reported slightly hard, "irony" taste.
Fb 14	Do	do	—	30	do	—	1¼	—	—	—	C, H	N	Water reported soft, slight "irony" taste.
Fb 15	Peter Dewilde	Dewilde	1941	20	do	17	1½	Pleistocene	9	Sep. 9, 1953	R, E	D, F, S	Water reported slightly hard.
Fb 16	Do	do	—	20	Dug	9.6^{m}	30	do	7.68^{m}	Sep. 9, 1953	N	N	Do
Fb 17	Roy Perry	Maloney	1946	37	Driven	25	1¼	do	—	—	C, H	D, S	Water reported soft.
Fb 18	Do	Cole	—	37	do	25	1¼	do	—	—	C, H	F, S	Do
Fb 19	F. E. Dulin	Dyer	1952	46	do	22	1¼	do	—	—	C, H	D, S	Water reported hard.
Fb 20	Do	Webb	1910	46	Dug	16.7^{m}	36	do	3.57^{m}	Sep. 10, 1953	C, H	F, S	Water reported slightly hard, marshy taste. Temperature 65° F.
Fb 21	G. Sands	Lane	1942	42	Driven	21	1½	do	—	—	R, E	F, S	Water reported soft. Well reported occasionally dry.
Fb 22	Do	Marqwbite	1935	42	do	40	1¼	Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported slightly hard.
Fb 23	Olan Mathews	Coleman	1942	29	do	—	1¼	—	—	—	R, E	D, S	Water reported soft.
Fb 24	Fanny E. Price	Shannahan Artesian Well Co.	1913	5	Jetted	150 (?)	3–1¼	Choptank	—	—	R, E	D, M	Water reported soft. Field analysis, Jan. 21, 1954: cbloride 8 ppm, hardness 90 ppm, iron 0.1 ppm, pH 8.2. Probably one of wells mentioned in Md. Geol. Survey, v. 10, p. 288 (see well 2).
Fb 25	Pearl Wright	—	1904	5	do	150	2	do	—	—	–, E	D, S	See Md. Geol. Survey, v. 10, p. 288, well 2. Covered. Reported not flowing, Mar. 17, 1954.

Fb 26	Pearl Wright	—	1904	5	Jetted	150	2	Choptank	—	—	N	N	See Md. Geol. Survey, v. 10, p. 288, well 2. Reported to flow less than 1 gpm at land surface, Mar. 17, 1954.
Fc 1	Leon C. Bulow	Shannahan Artesian Well Co.	1945	50	do	275	8	Choptank and Calvert	33	Dec. 17, 1945	T, E	I, L	See log. Drawdown reported 25 feet after 6 hours pumping 80 gpm. Open hole 197–275 feet.
Fc 2	Do	do	1949	50	do	260	8	do	33.3	Oct. 26, 1949	T, E	I, L	See log. Drawdown reported 85 (?) feet after 12 hours pumping 200 gpm. Open hole 203–260 feet.
Fc 3	Do	do	—	50	do	160	8	Choptank	24	Sep. 11, 1953	T, E	I, L	Wells Fc 1, 2, and 3 together produce 800 gpm, 12 hours daily, 5 days a week, from June to December.
Fc 4	Board of Education	M. Pentz	1951	50	do	42	3	Pliocene(?)	15	May 12, 1951	J, E	S	See log. Drawdown reported 10 feet after 2 hours pumping 8 gpm. Screened 35–42 feet.
Fc 5	F. S. Langrell	Patchett	1938	30	do	350	4	Calvert	—	—	R, E	D, S	Field analysis, Jan. 21, 1954: chloride 10 ppm, hardness 130 ppm, pH 8.2.
Fc 6	Do	Langrell	—	20	Driven	10	3½	Pleistocene	8.0m	Aug. 20, 1953	C, H	D, S	Water reported good.
Fc 7	A. Adolph Seaman	—	—	35	Dug	15.4m	42	do	4.65m	Aug. 20, 1953	R, E	D, F, M	Do
Fc 8	Bertha E. Taylor	Taylor	1923	55	Driven	20	2½	do	—	—	R, E	D, F, M	Water reported hard, "irony".
Fc 9	Sally Carroll	Darr	—	45	do	40.7m	1½	Pleistocene and Pliocene(?)	10.35m	Aug. 20, 1953	C, H	F, S	Water reported very good.
Fc 10	Do	do	1938	45	do	40	1½	do	8	Aug. 20, 1953	C, H	D, S	Water reported good.
Fc 11	Howard M. Harris	Harris	1949	45	do	16.4m	1½	Pleistocene	3.60m	Aug. 20, 1953	J, E	F, M	
Fc 12	Chas. F. Noble, Jr.	Parker	—	50	do	20.6m	1¼	do	12.80m	Aug. 20, 1953	C, H	D, S	Field analysis, Jan. 25, 1954: hardness 34 ppm, iron 1.0 ppm, pH 6.5.
Fc 13	George Nichols	Wilson	1951	50	do	21	1¼	do	—	—	R, E	D, F, M	Water reported good.
Fc 14	P. F. Frase	—	Prior 1946	50	do	—	1¼	do	—	—	R, E	D, F, M	Water reported hard.
Fc 15	W. S. Beall	Maloney	1948	50	do	22	1½	do	—	—	Ic, E	D, S	Water reported slightly hard.
Fc 16	Lee Meredith	Parker	1949	45	do	25	1½	do	—	—	R, E	F, S	Water reported soft.
Fc 17	Edward Schmick	Maloney	1950	45	do	45	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, F, M	Do
Fc 18	W. F. Gadow	Gadow	1953	45	do	30	1½	Pleistocene	12	Sep. 3, 1953	R, E	D, F, S	Water reported very hard.

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Fc 19	W. F. Gadow	Parker	1930	45	Driven	35	1¼	Pleistocene	12	Sep. 3, 1953	C, W	N	Do
Fc 20	Homer Schmidt	—	—	50	do	33	1¼	do	—	—	R, E	D, F, M	Water reported hard.
Fc 21	John D. Rieck	—	1923	40	do	32	1¼	Pleistocene and Pliocene(?)	20	Sep. 11, 1953	R, E	D, F, S	Water reported soft.
Fc 22	Do	—	1923	40	do	32	1¼	do	20	Sep. 11, 1953	R, E	D, F, S	Do
Fc 23	Town of Preston	—	1926	45	Drilled	62	8	Pliocene(?)	—	—	Ic, E	P, L	See chemical analysis. Field analysis, Jan. 1954: chloride 10 ppm, hardness 40 ppm, pH 6.5.
Fc 24	Do	—	1926	45	do	62	10	do	—	—	Ic, E	P, L	See chemical analysis.
Fd 1	Town of Federalsburg	Kelley Well Co.	1928	35	do	45	24	Pleistocene	16.28m	Jul. 7, 1948	R, E	P, L	See log and chemical analysis. Field analysis, Nov. 23, 1953: hardness 25 ppm, pH 6.2. Pumping water level July 7, 1948, 30.53 feet below land surface. Average daily pumpage (summer) Fd 1 and 2, 775,000 gpd. Temperature 60° F.
Fd 2	Do	do	1928	35	do	46	24	do	13.42m	Jul. 7, 1948	R, E	P, L	See log and chemical analysis. Field analysis, Nov. 23, 1953; hardness 25 ppm, pH 6.2. Temperature 60° F.
Fd 3	Do	Shannahan Artesian Well Co.	1945	45	do	300	6	Calvert	21	1945	T, E	P, L	See chemical analysis. Water reported hard, containing manganese and iron. Field analysis, Nov. 23, 1953: hardness 143 ppm, pH 8.2. Temperature 59° F.
Fd 4	Cooperative Ground-Water Program	Coop. Ground-Water Program	1949	40	Driven	9.1m	1¼	Pleistocene	5.45m	Sep. 1, 1949	N	O	Monthly record. Temperature 65° F.

Fd 5	Maryland Plastics Co.	Shannahan Artesian Well Co.	1950	40	Jetted	308	6	Calvert	19.5 39.5	Aug. 12, 1950 Jun. 10, 1952	T, E	I, L	See log and chemical analysis. Drawdown 9 feet after 6 hours pumping 50 gpm. Open hole 228.5–308 feet. Estimated use 666,000 gal. per week.
Fd 6	Caroline Poultry Farms, Inc.	M. Pentz	1947	40	do	304	6	do	18	Dec. 21, 1947	T, E	I, L	Drawdown reported 50 feet after 8 hours pumping 200 gpm. Fd 5 and 6 pumped alternately. Estimated pumpage 500 gpm. Screened from 294–304 feet.
Fd 7	Do	do	1947	40	do	306	6	do	17	Dec. 21, 1947	T, E	I, L	See log. Drawdown reported 50 feet after 8 hours pumping 200 gpm. Fd 5 and 6 pumped alternately. Estimated pumpage 500 gpm. Screened 294–304 feet.
Fd 8	J. N. Wright, Jr.	Ennis Bros.	1950	40	do	299	8	do	40	Aug. 15, 1950	T, E	I, L	See log. Screened 273–299 feet.
Fd 9	Do	M. Pentz	1947	40	do	160	6	Choptank	—	—	T, E	N	Well pumped fine sand.
Fd 10	Carl Reagan	—	1933	50	Driven	22	2	Pleistocene	—	—	R, E	D, F, S	Temperature 62° F.
Fd 11	Chris Nagel	Adams	1943	45	do	40	1¼	do	—	—	R, E	D, F, S	Water reported good.
Fd 12	Howard Wright	do	—	40	do	48	1¼	do	—	—	R, E	D, F, M	Water reported soft.
Fd 13	M. Brewington	Masek	1932	40	do	65	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported hard, "irony".
Fd 14	Do	do	1937	40	do	34.1[m]	1¼	Pleistocene	2.72[m]	Aug. 21, 1953	C, H	F, S	Water reported hard, "irony". Field analysis Nov. 20, 1953: hardness 24 ppm, iron 9 ppm, pH 6.5. Temperature 58° F.
Fd 15	W. V. Marine	Marine	1951	45	do	18	1¼	do	—	—	R, E	D, F, S	Water reported slightly hard. Temperature 56° F.
Fd 16	J. G. Hubble	Adams	1951	50	do	32.7[m]	1¼	do	7.88[m]	Aug. 25, 1953	R, E	D, F, M	Water reported soft.
Fd 17	Ben Maloney	Maloney	1948	50	do	24	1¼	do	11	Aug. 25, 1953	R, E	D, F, S	Water reported soft. Temperature 59° F.
Fd 18	J. H. Williams	Adams	1943	35	do	28	1¼	do	—	—	R, E	D, F, S	Water reported soft.
Fd 19	Mary Robinson	Warren	1946	45	do	18	1¼	do	—	—	R, E	D, F, S	Do
Fd 20	Do	do	1950	45	do	24	1¼	do	—	—	R, E	D, F, S	Do
Fd 21	Merritt Lord	Lord	1952	45	do	28	1¼	Pleistocene and Pliocene(?)	—	—	R, E	D, F, S	Water reported slightly hard.
Fd 22	Reese Trice	Maloney	1950	45	do	35	1¼	do	—	—	R, E	D, F, S	Water reported soft.
Fd 23	R. H. McMahan	Wilson	1950	50	do	30	1¼	do	—	—	R, E	D, F, S	Do

TABLE 33—*Continued*

Well number (Care-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Fd 24	Town of Federalsburg	—	—	10	—	180	2	Choptank	—	—	N	N	Reported flowing until covered by pavement. This well and Fd 25 probably wells 9 and 10 in Md. Geol. Survey, vol. 10, p. 288.
Fd 25	Do	—	—	10	—	248	2	Calvert	—	—	N	N	Do
Fd 26	Mrs. Ira Nichols	—	1913	10	Jetted	265	3	do	—	—	N	N	Formerly for municipal supply. Reported flowed 5 feet above land surface. Abandoned and capped. See Md. Geol. Survey, vol. 10, p. 288, well 11.
Fd 27	Martino and Nuttle	—	1908	10	do	234m	3	do	21.51m	Mar. 17, 1954	N	N	Reported flowing until deep town and industrial wells were jetted in Federalsburg. See Md. Geol. Survey, vol. 10, p. 288, well 12.
Fd 28	Mrs. Ira Nichols	—	1904	10	do	248	2	do	—	—	N	N	Formerly municipal supply. Reported to have flowed 8 feet above land surface. Abandoned and capped. See Md. Geol. Survey, vol. 10, p. 288, well 13.
Fd 29	B. B. L. Feeds	—	1903(?)	10	do	255	3	do	—	—	N	N	Reported to have flowed 6 feet above land surface. Filled in and abandoned. Formerly owned by H. B. Messenger Cannery. See Md. Geol. Survey, vol. 10, p. 288, well 14.
Fe 1	M. E. White	White	1937	35	Driven	24	1¼	Pleistocene	8.0	Dec. 5, 1937	R, E	D, F, S	Field analysis, Jan. 25, 1954: hardness 10 ppm, iron 0.8 ppm, pH 6.5.

Fe 2	M. E. White	White	1880	35	Dug	11.9^{m}	42	Pleistocene	[illegible]	Aug. 21, 1953	C, H	F, S	Water reported hard, "irony". Temperature 65° F.
Fe 3	E. Donovan	—	—	35	Driven	30	1¼	do	—	—	C, H	D, S	Water reported soft.
Fe 4	Do	—	1945	35	do	30	1¼	do	—	—	C, H	F, S	Do
Fe 5	C. Ratthel	Adams	1948	35	do	33	1¼	do	—	—	R, E	D, F, S	Do
Fe 6	Mrs. Ozia Wothers	—	1941	45	do	40	1¼	do	—	—	C, H	D, S	Do
Fe 7	Do	Mesek	1945	45	do	35	1¼	do	—	—	C, H	D, S	Do
Fe 8	Claude Liden	Adams	1942	45	do	55	1¼	Pleistocene and Pliocene(?)	[illegible]	Sep. 10, 1953	R, E	D, F, M	Do
Fe 9	Wood M. Handy	—	—	45	do	55	1¼	do	—	—	C, H	D, F, S	Water reported slightly "irony".
Fe 10	G. R. Truitt, Jr.	—	—	45	do	—	1¼	—	—	—	C, H	D, S	Water reported soft.
Ge 1	James Harper	—	1903	40	do	—	1¼	—	—	—	C, H	D, F, M	Do

TABLE 34

Record of wells in Dorchester County

Static water level: Measured depths designated by "m".
Pumping equipment: *Method of lift:* A, air lift; B, bucket; C, cylinder-lift (includes pitcher pumps); J, jet; Ic, impeller centrifugal; T, impeller turbine; N, non R, reciprocating.
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, observation; P, public supply or school; T, test hole.
Rate: S, up to 500 gpd; M, 500 to 5,000 gdp; L, over 5,000 gdp.

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ag 1	N. Trice	Parker —	1951	35	Driven	30	1¼	Pleistocene and Pliocene(?)	—	—	R, C	D, F, M	Water reported "irony".
Ag 2	F. E. Cohee	Adams	—	42	do	21.6m	1¼	do	4.35m	Nov. 30, 1952	C, H	D, F, S	Water reported good.
Ah 1	C. Bowdle	—	1939	40	do	52	1¼	do	—	—	R, E	D, F, M	
Ah 2	Harold L. Clark	Shannahan Artesian Well Co.	1947	38	Jetted	151	3	St. Marys and Choptank	16	Nov. 29, 1947	J, E	D, F, M	See log. Drawdown reported 48 feet after 6 hours pumping 15 gpm. Open hole 98.5–151 feet.
Ah 3	Coop. Ground-water Program	Baldwin	1953	35	do	557	4	Calvert			N	T	See log.
Bb 1	Irving Wingate	Jarrett	1949	4	do	525	1½	Aquia	—	—	J, E	D, S	Screened 511–523 feet.
Bb 2	Russell C. Cook	Baldwin	1949	4	do	515	1½	do	2	Oct. 25, 1949	C, H	D, S	Drawdown reported 61 feet after 7 hours pumping 9 gpm.
Bb 3	Martin W. Meredith	do	1949	5	do	515	1½	do	2	Nov. 27, 1949	E	D, S	Drawdown reported 61 feet after 8 hours pumping 10 gpm.
Bb 4	Gady Ruark	Jarrett	1948	4	do	489	1½	do	2	Jul. 26, 1948	E	D, S	Drawdown reported 8 feet after 6 hours pumping 15 gpm.
Bb 5	Wm. Avery	do	1947	5	do	496	1½	do	2	Sep. 18, 1947	R, E	D, S	Water reported good. Screened 490–496 feet.
Bb 6	Ellsworth Wingate	do	1948	3	do	504	1½	do	2	Jul. 31, 1948	R, E	D, S	Drawdown reported 4 feet after 7 hours pumping 15 gpm. Open hole 483–504 feet.

Bb 7	Edwin Howard	Todd	1947	4	Jetted	525	$1\frac{1}{2}$	Aquia	2	May 1, 1947	C, H	D, S	Water reported good. Open hole 504–525 feet.
Bb 8	Edward J. McGrath	Todd	1947	5	do	504	$1\frac{1}{2}$	do	6	Apr. 23, 1947	R, E	D, S	See log. Water reported good. Open hole 480–504 feet.
Bb 9	Arthur W. Baldwin	Baldwin	1950	5	do	120	$2\frac{1}{2}$	Choptank	8	Jun. 10, 1950	Ic, E	D, S	Drawdown reported 7 feet after 8 hours pumping 10 gpm. Open hole 80–120 feet.
Bb 10	Sewell Spedden	do	1950	5	do	495	$1\frac{1}{2}$	Aquia	6	Oct. 6, 1950	J, E	D, S	Drawdown reported 0 feet after 6 hours pumping 15 gpm.
Bc 1	H. S. Stevens	do	1949	4	do	585	$1\frac{1}{2}$	do	3	Aug. 19, 1949	R, E	D, S	Drawdown reported 81 feet after 8 hours pumping 10 gpm. Open hole.
Bc 2	William Lloyd	Jarrett	1951	3	do	554	$1\frac{1}{2}$	do	2	Nov. 6, 1951	—	D, S	Drawdown reported 0 feet after 8 hours pumping 16 gpm. Screened 534–540 feet.
Bc 3	George M. Barrack	Baldwin	1949	4	do	540	$1\frac{1}{2}$	Paleocene(?)	4	May 3, 1949	C, H	D, S	Drawdown reported .5 feet pumping 10 gpm. Open hole.
Bc 4	Robert Fox	Jarrett	1949	5	do	567	$1\frac{1}{2}$	Aquia	2	Nov. 10, 1949	R, E	D, S	See log. Drawdown reported 6 feet after 6 hours pumping 10 gpm. Screened 559–565 feet, 2-foot tailpipe.
Bc 5	Melvin Hurley	do	1950	3	do	560	$1\frac{1}{2}$	Paleocene(?)	—	—	R, E	D, S	See chemical analysis. Field analysis, Feb. 1954: chloride 8 ppm, hardness 17 ppm, iron less than 0.1 ppm, pH 8.5. Well reported to flow Oct. 16, 1951. Screened 552–558 feet with 2-foot tailpipe.
Bc 6	S. D. Linthicum	Bradshaw	1947	3	do	527	$1\frac{1}{2}$	Paleocene	—	—	J, E	D, S	See log. Water reported good. Open hole 514–527 feet.
Bc 7	Willard Moore	Jarrett	1951	5	do	545	$1\frac{1}{2}$	Aquia	4	Jun. 21, 1951	C, H	D, S	Screened from 537 to 543 feet, with 2-foot tailpipe.
Bc 8	Harold Spedden	do	1950	6	do	525	$1\frac{1}{2}$	do	2	Jun. 10, 1950	C, H	D, S	Water reported good. Screened.
Bc 9	Melvin Seward	do	1951	6	do	546	$1\frac{1}{2}$	do	3	May 20, 1951	J, E	D, S	Screened 538–544 feet, with 2-foot tailpipe.
Bc 10	Galen Mills	do	1950	5	do	529	$1\frac{1}{2}$	Paleocene(?)	—	—	E	D, S	Screened 521–527 feet, with 2-foot tailpipe.
Bc 11	G. Hollaway	do	1947	5	do	532	$1\frac{1}{2}$	Aquia	1.5	Nov. 13, 1947	R, E	D, S	Screened 525–530 feet, with 2-foot tailpipe.
Bc 12	R. T. Williams	Todd	1946	4	do	520	$1\frac{1}{2}$	do	6	Aug. 28, 1946	C, H	D, S	Screened 512–518 feet, with 2-foot tailpipe.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Bc 13	Gus Ruark	Todd	1947	4	Jetted	544	1½	Aquia	2	May 9, 1947	J, E	D, S	Water reported good. Open hole.
Bc 14	Edward Hanson	do	1947	3	do	567	1½	do	0	May 19, 1947	R, E	D, S	Drawdown reported 0 feet after 6 hours pumping 25 gpm. Screened 559–565 feet, with 2-foot tailpipe.
Bc 15	E. Pennyleton	Jarrett	1947	6	do	572	1½	do	3	Nov. 28, 1947	J, E	D, S	Drawdown reported 0 feet after 4 hours pumping 20 gpm. Screened 565–570 feet, with 2-foot tailpipe.
Bc 16	P. T. Roeder	Todd	1947	5	do	555	1½	do	2 4.12[m]	Jun. 18, 1947 Oct. 24, 1951	C, H	D, S	Drawdown reported 0 feet after 7 hours pumping 22 gpm. Screened 547–553 feet with 2-foot tailpipe.
Bc 17	Bonnie Mills	Jarrett	1950	4	do	583	1½	do	4	Apr. 27, 1950	C, H	D, S	Drawdown reported 0 feet after 6 hours pumping 16 gpm. Screened 575–581 feet with 2-foot tailpipe.
Bc 18	Wm. Richardson	do	1951	3	do	587	1½	do	2	Jan. 17, 1951	J, E	D, S	Screened 579–585 feet with 2-foot tailpipe.
Bc 19	Mrs. Emma Marshall	Bradshaw	1949	6	do	511	1½	do	5	May 15, 1949	R, E	D, S	Drawdown reported 10 feet after 4 hours pumping 23 gpm. Screened 490–510 feet.
Bc 20	C. C. Brice	Todd	1947	5	do	522	1½	do	2	Jun. 7, 1947	Ic, E	D, S	Screened 514–520 feet with 2-foot tailpipe.
Bc 21	Mrs. Margaret Lowe	Baldwin	1949	3	do	505	1½	do	2	May 29, 1949	C, H	D, S	Drawdown reported 0 feet after 6 hours pumping 10 gpm.
Bc 22	Raymond J. Baldwin	Jarrett	1948	4	do	495	1½	do	—	—	J, E	D, S	Screened 487–493 feet with 2-foot tailpipe.
Bc 23	Unknown	—	—	—	—	111.9[m]	1½	Miocene	3.22[m]	Oct. 25, 1951	N	N	
Bc 24	Ralph Wing	Bradshaw	1946	5	Jetted	515	1½	Aquia	—	—	R, E	D, F, M	Screened 493–513 feet.
Bc 25	E. E. Oppenheimer	Todd	1946	5	do	512	2½–1½	do	6	Apr. 27, 1946	—	D, S	Open hole.
Bc 26	Mrs. Nellie Ruark	—	1905	5	Drilled	503	1½	do	—	—	N	N	Static water level reported 1.5 feet above land surface, 1918. On old cannery site, now abandoned. See Md. Geol. Survey, v. 10, p. 309, well 21.

Bc 27	Mrs. Nellie Ruark	—	1908	5	Drilled	40	3½	Pleistocene	10	1918	N	N	Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 39.
Bc 28	Do	—	1907	5	do	124	2½	Calvert	18	1918	N	N	Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 40.
Bc 29	Do	—	1908	5	do	424	1½	Nanjemoy(?)	18	1918	N	N	Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 41.
Bc 30	E. Pennyleton	—	Prior 1900	2	do	460	2	do	0	1918			Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 24.
Bd 1	R. A. Spring	Shannahan Artesian Well Co.	1896	9	do	300	6–3	Piney Point	—	—	R, E	D, M	Water reported good.
Bd 2	Carleton Slagle	do	1904	1	do	231^{m}	6	do	78.24^{m} 55.75^{m} 60.57^{m}	Sep. 20, 1952 Mar. 20, 1953 May 10, 1954	N	O	Daily and monthly record. Original depth reported 380 feet Static water level reported 3 feet above land surface in 1918. See Md. Geol. Survey, v. 10, p. 309, well 14.
Bd 3	Cambridge Country Club	Bradshaw	1929	5	Jetted	400^{m}	6–2	do	70	Jul. 24, 1951	T, E	P, M	Water reported good. Open hole.
Bd 4	Dr. Eugene F. Traub	Shannahan Artesian Well Co.	1946	15	do	940	4½–2	Magothy(?)	—	—	Ic, E	D, M	See log and chemical analysis. Static water level reported 6 feet above land surface, Aug. 30, 1946. Drawdown reported 56 feet after 10 hours pumping 30 gpm. Drilled to 1041 feet, screened 915–940 feet.
Bd 5	Mrs. P. P. Payne	Bradshaw	1938	20	do	978	1½	do	—	—	R, E	D, M	See chemical analysis. Reported to have flowed until 1945.
Bd 6	F. V. duPont	do	1948	8	do	400	2½–1½	Piney Point	60	Nov. 24, 1948	T, E	D, M	Drawdown reported 17 feet after 10 hours pumping 18 gpm. Open hole 215–400 feet.
Bd 7	Do	do	1950	12	do	408	2½–1½	do	72	Oct. 20, 1950	T, E	D, F, M	Open hole 328–408 feet.
Bd 8	Veterans of Foreign Wars	Jarrett	1948	15	do	399	2½–1½	do	69	May 22, 1948	J, E	P, S	Drawdown reported 6 feet after 14 hours pumping 15 gpm. Open hole 360–399 feet.
Bd 9	Fred McBriety	do	1947	5	do	602	1½	Aquia	1.5	Oct. 18, 1947	C, H	D, S	Drawdown reported 0 feet after 6 hours pumping 10 gpm. Screened 592–600 feet, with 2-foot tailpipe.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level		Pumping equipment	Use of water	Remarks
									Feet below land surface	Date of measurement			
Bf 1	Town of Secretary	Shannahan Artesian Well Co.	1936	27	Jetted	471	8–6	Piney Point	18.5	Apr. 1936	T, E	P, L	See log and chemical analysis.
Bf 2	Howard Williams	Baldwin	1951	24	do	160	2½	St. Marys and Choptank	13	Mar. 16, 1951	J, E	D, F, M	
Bf 3	Mrs. Roland Wheatley	L. Rude & Sons	1947	10	do	150	2½	St. Marys and Choptank(?)	8	Oct. 25, 1947	—	D, F, S	Open hole 100–150 feet.
Bf 4	M. Nassick	Baldwin	1950	15	do	160	2½	do	1	Mar. 10, 1950	—	D, F, S	Drawdown reported 39 feet after 6 hours pumping 5 gpm. Open hole 110–160 feet.
Bf 5	H. R. Klug	Cusick	1951	20	do	185	1½	do	10	Jun. 15, 1951	R, E	D, S	Drawdown reported 2 feet after 10 hours pumping 20 gpm. Water reported good, not "irony". Open hole 98–185 feet.
Bf 6	Town of East New Market	—	1905	40	Drilled	225	6	Piney Point	—	—	T, E	P, L	See chemical analysis. Static water level reported 2 feet above land surface, 1918. See Md. Geol. Survey, v. 10, p. 309, well 19. Originally reported drilled to 290 feet.
Bf 7	Sam Abee	Baldwin	1950	3	Jetted	160	1½	St. Marys and Choptank	1	Sep. 14, 1950	R, E	D, S	Water reported not "irony". Open hole.
Bf 8	G. W. Creighton	do	1950	2	do	160	1½	do	—	—	E	D, S	Open hole 110–160 feet.
Bf 9	R. B. Goslin	do	1950	2	do	160	1½	do	1	Mar. 10, 1950	E	D, S	Drawdown reported 39 feet after 6 hours pumping 5 gpm. Open hole.
Bf 10	Dr. R. B. Miller	do	1950	2	do	160	1½	do	1	Jul. 20, 1950	R, E	D, S	Open hole.
Bf 11	Rev. Raymond Brooks	do	1950	2	do	160	1½	do	1	Mar. 21, 1950	E	D, S	Drawdown reported 39 feet after 6 hours pumping 8 gpm. Open hole.
Bf 12	G. W. Carton	do	1950	2	do	160	1½	do	1	Mar. 25, 1950	R, E	D, S	Drawdown reported 39 feet after 6 hours pumping 5 gpm. Open hole.
Bf 13	Webster McAllen	do	1951	2	do	160	1½	do	5	Jun. 22, 1951	E	D, S	Open hole

Bf 14	E. M. Zentz	Baldwin	1950	2	Jetted	160	1½	St. Marys and Choptank	1	Apr. 17, 1950	J, E	D, S	Drawdown reported 39 feet after 5 hours pumping 5 gpm. Open hole.
Bf 15	Margaret Loux	do	1950	2	do	160	1½	do	1	Mar. 10, 1950	E	D, S	Drawdown reported 39 feet after 6 hours pumping 5 gpm. Open hole 115–160 feet.
Bf 16	Rev. Charles Harris	do	1950	2	do	160	1½	do	1	Mar. 15, 1950	E	D, S	Drawdown reported 39 feet after 5 hours pumping 5 gpm. Open hole.
Bf 17	Dr. John Mace	do	1950	2	do	160	1½	do	1	Feb. 13, 1950	J, E	D, S	See chemical analysis. Drawdown reported 39 feet after 6 hours pumping 5 gpm. Open hole 110–160 feet.
Bf 18	John E. Patten	do	1950	2	do	160	1½	do	1	Feb. 23, 1950	E	D, S	Drawdown reported 39 feet after 6 hours pumping 5 gpm. Open hole 110–160 feet.
Bf 19	Joe Wanex, Jr.	do	1950	10	do	170	1½	St. Marys(?) and Choptank	—	—	E	D, F, M	Open hole.
Bf 20	Town of Secretary	Wheatley	1920	4	do	168	1½	do	—	—	N	P, M	Water reported flowing 1 gpm. Dec. 19, 1951. Flow affected by tide. Reported not "irony".
Bf 21	P. Harrington	do	1920 (?)	3	do	170	1½	St. Marys and Choptank	—	—	N	N	Well reported flowing 5 gpm Dec. 19, 1951. Reported not "irony".
Bf 22	J. H. Willoughby	—	1904	12	do	300	4	Calvert	8	1904	R, E	D, F, M	See Md. Geol. Survey v. 10, p. 309, well 33. Open hole 280–300 feet.
Bf 23	Walton C. Bounds	—	—	5	Driven	15	1¼	Pleistocene	4	1954	Ic, E	D, S	See chemical analysis.
Bf 24	Coop. Ground-Water Program	Baldwin	1953	35	Jetted	301^m	4	Calvert(?)	—	—	N	T	See log.
Bf 25	Do	do	1953	35	do	39	2	Pliocene(?)	—	—	R, G	T	See chemical analysis.
Bf 26	Do	do	1953	45	do	126^m	4	Choptank	—	—	N	T	See log.
Bf 27	Do	do	1953	45	do	21	2	Pleistocene	—	—	R, G	T	See chemical analysis.
Bf 28	Do	do	1953	52	do	210^m	4	Choptank	—	—	N	T	See log.
Bf 29	Do	do	1953	40	do	210^m	4	do	—	—	N	T	Do
Bg 1	H. Osborn	—	—	42	Driven	25	1¼	Pleistocene	—	—	C, H	D, S	Water reported slightly "irony", stagnant taste during summer.
Bg 2	R. Mathew	—	1948	42	do	22.5^m	1¼	do	11.0^m	Jan. 24, 1951	C, H	F, S	Water reported not "irony".
Bg 3	Coop. Ground-Water Program	Coop. Ground-Water Program	1951	40	do	18.1^m	1	do	9.31^m	Mar. 4, 1951	N	O	See log. Monthly record.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level		Pumping equipment	Use of water	Remarks
									Feet below land surface	Date of measurement			
Bg 4	American Stores	Shannahan Artesian Well Co.	1942	40	Drilled	97	6–4	Pleistocene and Pliocene(?)	—	—	T, E	C, M	Water reported bad for boilers. Screened.
Bg 5	Do	do	1942	40	do	100	6–4	do	—	—	T, E	C, M	Do
Bg 6	John N. Wright, Jr.	Bradshaw	1948	40	Jetted	68.5m	6	do	11.87m	May 24, 1950	T, E	I, L	Water reported "irony". Reported drilled to 73 feet and screened 53–73 feet.
Bg 7	Do	Ennis Bros.	1950	40	Drilled	292	6	Miocene	33.5m	May 24, 1950	T, E	I, L	See log. Water reported having slight odor. Screened 237–249 feet.
Bg 8	Hurlock Water Co.	Shannahan Artesian Well Co.	1948	45	Jetted	67	3	Pleistocene and Pliocene(?)	4	Jul. 27, 1948	Ic, E	P, L	See chemical analysis. Water reported slightly acidic. Drawdown reported 11 feet after 8 hours pumping 130 gpm. Screened 56.5–66.5 feet.
Bg 9	Do	do	1948	45	do	67	3	do	4	Jul. 27, 1948	Ic, E	P, L	Do
Bg 10	Do	do	—	40	do	80	8	do	8	May 24, 1950	T, E	P, L	See chemical analysis.
Bg 11	Continental Can Co.	—	1948	45	Driven	42	1½	do	—	—	Ic, E	I, S	Water reported "irony". Used for fire protection.
Bg 12	Hurlock Milling Co.	Camper	1950	45	do	43	1½	do	—	—	Ic, G	I, L	Two drive point wells same depth 4 feet apart pumped together. Water reported not "irony".
Bg 13	Harrisons Dairies	—	—	45	Jetted	—	—	—	—	—	T, E	I, L	
Bg 14	W. H. Thomas	—	1900	15	Driven	18	1½	Pleistocene	—	—	R, E	D, S	Water reported not "irony".
Bg 15	F. Waddell	—	—	40	do	30.9m	1¼	Pleistocene and Pliocene(?)	9.01m	Jan. 30, 1952	C, H	P, S	Do
Bg 16	H. & B. Pickle Co.	—	—	45	do	45	1½	do	—	—	N	N	See chemical analysis. Four drive point wells same depth on common line. Abandoned.
Bg 17	Do	Shannahan Artesian Well Co.	1950	45	Jetted	90	6	St. Marys and Choptank	—	—	T, E	I, M	

Bg 18	Coop. Ground-Water Program	Baldwin	1953	40	Jetted	361.5[m]	4	Calvert	—	—	N	T	See log.
Bg 19–31	Hurlock Water Co.	—	1907	45	Driven	45–55	1¼–1½	Pleistocene and Pliocene(?)	1.5	1907	N	N	Water reported slightly acid. Formerly for public supply, now abandoned. See 13 wells reported Md. Geol. Survey, v. 10, p. 309, well 22.
Bg 32	American Stores	Shannahan	1953	40	Jetted	82.7	8	do	8	Jun. 1953	T, E	C, L	See log. Drawdown reported 12 feet after 8 hours pumping 150 gpm. Screened 66–82 feet.
Bg 33	Coop. Ground-Water Program	do	1955	40	Drilled	90	4	do	5.42	Mar. 6, 1956	N	O	See log.
Bh 1	C. Wheatley	Adams	1946	40	do	57	1¼	do	—	—	C, H	D, S	Water reported very "irony".
Bh 2	T. W. Moore	Griffin	—	35	do	—	1¼	do	—	—	R, E	D, F, M	
Bh 3	Apex Lumber Co.	—	1950	57	do	42.9[m]	1¼	do	26.05[m]	Jan. 25, 1951	C, H	D, F, S	Water reported not "irony".
Bh 4	Coop. Ground-Water Program	Coop. Ground-Water Program	1951	42	do	16.4[m]	1	Pleistocene series	5.69[m]	Feb. 6, 1951	N	O	Monthly record.
Bi 1	C. Hurlock	Adams	1950	33	do	30	1¼	Pleistocene and Pliocene(?) series	—	—	R, E	D, S	
Bi 2	Elmer Marine	Payne	1942	35	do	50	1¼	do	—	—	R, E	D, F, M	Water reported very good.
Bi 3	D. Williamson	—	—	42	do	—	1¼	do	—	—	R, E	D, F, M	
Bi 4	R. Dennis	—	—	42	do	33	1¼	do	—	—	R, E	D, F, M	Water reported slightly "irony".
Bi 5	L. R. Allen	—	1936	43	do	32	1¼	do	12	1951	R, E	D, F, M	
Bi 6	A. E. Wheatley	—	1943	25	do	49.3[m]	1¼	do	9.75[m]	Jan. 25, 1951	C, H	F, S	Water reported alightly "irony". Temperature 56.5° F.
Bi 7	F. M. Russell	—	—	45	do	25	1¼	do	—	—	R, E	D, F, M	Water reported hard.
Bi 8	J. Framptome	—	—	42	do	—	1¼	do	—	—	R, E	D, S	Water reported slightly "irony".
Cb 1	Emma Warfield	Baldwin	1949	5	Jetted	505	1¼	Aquia	0	Dec. 10, 1949	C, H	D, M	Drawdown reported 60 feet after 8 hours pumping 10 gpm. Open hole.
Cb 2	Sam Linthicum	do	1949	3	do	490	1¼	do	4	Aug. 5, 1949	C, H	D, S	Drawdown reported 0 feet after 10 hours pumping 10 gpm. Open hole.
Cb 3	Clarence Wilcox	Jarrett	1948	6	do	515	1¼	do	2	Sep. 18, 1948	C, H	D, S	Drawdown reported 6 feet after 6 hours pumping 15 gpm. Open hole 483–515 feet.
Cb 4	Edgar Everton	Bradshaw	1946	8	do	500	1¼	do	—	—	C, H	D, S	Screened from 480 to 500 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cb 5	Garnett, Fleming, Cordrey, and Carpenter, Inc.	—	1909	2	Drilled	505	1½	Aquia	—	—	—	D, S	Static water level reported 1.5 feet above land surface. Open hole 320–505 feet. See Md. Geol. Survey, v. 10, p. 309, well 38.
Cc 1	Edgar Lewis	Baldwin	1951	2	Jetted	530	1½	do	1.5	May 1, 1951	C, H	N	
Cc 2	V. H. Vandiver	Bradshaw	1947	3	do	370	2½–1½	Piney Point	—	—	J, E	D, S	Water reported soft. Open hole 315–370 feet.
Cc 3	Walter J. Moxom	do	1947	3	do	360	2½–1½	do	30	Nov. 1, 1947	J, E	D, S	Drawdown reported 5 feet after 10 hours pumping 15 gpm. Open hole 315–360 feet.
Cc 4	C. W. Geib	Cusick	1951	4	do	333	2½–1½	do	17	Aug. 23, 1951	C, H	D, S	See log. Drawdown reported 6 feet after 5 hours pumping 14 gpm. Open hole 272–333 feet.
Cc 5	Besley & Rogers, Inc.	do	1949	2	do	373	2½–1½	do	37	May 5, 1951	J, E	D, S	See log. Drawdown reported 5 feet after 5 hours pumping 25 gpm. Open hole 325–373 feet.
Cc 6	Dr. Chappel	Jarrett	1949	5	do	522	1½	Aquia	—	—	C, H	D, S	See log. Well reported flowing Oct. 16, 1951. Drawdown reported 0 feet after 6 hours pumping 18 gpm. Screened 514–520 feet, with 2-foot tailpipe.
Cc 7	Donald J. Herbert	Bradshaw	1950	5	do	389	2½–1½	Piney Point	42	Sep. 1950	J, E	D, S	Open hole.
Cc 8	George G. Rose	do	1947	3	do	370	2½–1½	do	—	—	J, E	D, S	Open hole 315–370 feet.
Cc 9	Wm. A. McEwen	do	1951	5	do	399	2½–1½	do	38	May, 1951	J, E	D, S	Field analysis, Feb. 1954: chloride 32 ppm, hardness 42 ppm, iron. 0 ppm, pH, 8.5. Temperature 58° F. Open hole.
Cc 10	Charles A. Shenton	do	1947	6	do	370	2½–1½	do	—	—	J, E	D, S	See log. Open hole 310–370 feet.
Cc 11	Claude Brooks	do	1948	4	do	360	2½–1½	do	—	—	J, E	D, S	Open hole 314–360 feet.
Cc 12	Felix Cornell	do	1948	5	do	376	2½–1½	do	—	—	J, E	D, S	Open hole 308–376 feet.

Cc 13	John W. Seeley	Cusick	1949	3	Jetted	376	2½–1¼	Piney Point	43	Aug. 3, 1949	J, E	D, S	See log. Drawdown reported 5 feet after 14 hours pumping 18 gpm. Driller reported well pumped 14 14 hours to get salt water out. Open hole 323–376 feet.
Cc 14	Dr. W. B. Johnson	Jarrett	1948	4	do	551	1¼	Aquia	12	Sep. 3, 1948	J, E	D, S	Screened 545–551 feet.
Cc 15	L. E. Chappell	do	1947	4	do	536	1¼	do	2	Oct. 3, 1947	J, E	D, S	Screened 529–534 feet, with 2-foot tailpipe.
Cc 16	Louise Scbneck	Todd	1947	6	do	560	1¼	do	2	Sep. 20, 1947	C, H	D, S	See chemical analysis. Drawdown reported 0 feet after 6 hours pumping 15 gpm. Screened 552–558 feet, with 2-foot tailpipe.
Cc 17	Harvey S. Unangst	Bradshaw	1949	3	do	514	1¼	do	0	Jul. 13, 1949	E	D, S	Screened 504–514 feet.
Cc 18	Stokes Keys	Todd	1947	5	do	558	1¼	do	4	Sep. 11, 1947	C, H	D, S	Drawdown reported 0 feet after 4 hours pumping 20 gpm. Screened 550–556 feet, with 2-foot tailpipe.
Cc 19	F. H. Whipple	Bradshaw	1951	4	do	550	1¼	do	2.16[m]	Oct. 24, 1951	—	D, S	Drawdown reported 3 feet after 10 hours pumping 20 gpm. Water level reported affected by tides. Screened 544–560 feet.
Cc 20	R. D. Effinbach	do	1949	3	do	411	2½–1¼	Piney Point	42.23[m]	Oct. 24, 1951	A, E	F, S	Open hole 386–411 feet.
Cc 21	F. S. Bell	Todd	1946	4	do	558	1¼	Nanjemoy or Paleocene	1	Jul. 30, 1946	R, E	D, S	Screened 550–558 feet.
Cc 22	Do	do	1946	4	do	558	1¼	do	1.78[m]	Oct. 24, 1951	R, E	D, S	Do
Cc 23	G. Corbett	Bradshaw	1948	3	do	500	1¼	Aquia	—	—	R, D	D, S	Water reported soft Screened 488–500 feet.
Cc 24	A. W. Binns	do	1950	3	do	508	2½–1¼	do	0	Nov. 16, 1950	E	D, S	Drawdown reported 1.5 feet after 6 hours pumping 30 gpm. Screened 488–508 feet.
Cc 25	Carl Travers	do	1948	3	do	376	2½–1¼	Piney Point	—	—	J, E	D, S	Water reported not "irony". Open hole 308–376 feet.
Cc 26	Do	do	1949	3	do	361	2½–1¼	do	36	Jun. 1, 1949	J, E	D, S	Drawdown reported 7 feet after 10 hours pumping 20 gpm. Open hole 307–361 feet.
Cc 27	W. J. Langrall	Baldwin	1951	3	do	525	1¼	Aquia	35	Jun. 8, 1951	R, E	D, S	Drawdown reported 2 feet after 10 hours pumping 10 gpm. Open hole.
Cc 28	Harry Bryant	do	1951	3	do	520	1¼	do	3	Oct. 18, 1951	R, E	D, S	Well dynamited at and water obtained from 340–350 foot depth. Drawdown reported 0 feet after 12 hours pumping 8 gpm. Open hole.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cc 29	Travers Brown	Bradshaw	1948	4	Jetted	400	2½–1¼	Aquia	42	Nov. 8, 1948	J, E	D, F, M	Drawdown reported 4 feet after 10 bours pumping 25 gpm. Open hole 338–400 feet.
Cc 30	George Slacum	Baldwin	1951	3	do	380	1¼	do	4	Jun. 14, 1951	J, E	D, S	Water reported "irony". Open hole.
Cc 31	Sewell Simmons	do	1950	4	do	525	1¼	do	1	Sep. 9, 1950	C, H	D, S	Field analysis. Feb. 1954: chloride 8 ppm, bardness 25 ppm, iron. 0 ppm, pH 8.6. Temperature 52° F. Drawdown reported 0 feet after 6 hours pumping 10 gpm. Open hole.
Cc 32	James W. Jarrett	Bradshaw	1949	3	do	504	1¼	do	—	—	C, H	D, F, S	Water reported to flow at land surface June 30, 1949. Screened 494–504 feet.
Cc 33	Mrs. Amy Christopher	do	1946	4	do	500	1¼	do	—	—	C, H	D, F, S	Reported water obtained at 350 feet not good. Jetted to 500 feet, water reported not "irony". Open hole.
Cc 34	Howard Frazier	do	1946	3	do	515	1¼	do	—	—	R, E	D, F, M	Water reported to flow 8 inches above land surface July 19, 1946. Screened 510–515 feet.
Cc 35	Leonard Simmons	do	1946	3	do	515	1¼	do	—	—	R, E	D, S	Water reported not "irony". Screened 505–515 feet.
Cc 36	Sam Moore	do	1947	5	do	525	1¼	do	—	—	Ic, E	D, S	Screened 515–525 feet.
Cc 37	Leonard A. Simmons	do	1947	2	do	515	1¼	do	—	—	R, E	I, M	Screened 495–515 feet.
Cc 38	Clarence Keene	do	1951	3	do	380	2½–1¼	Piney Point	20	Jun. 20, 1951	J, E	D, S	Water reported good. Open hole 277–380 feet.
Cc 39	Leonard A. Simmons	—	—	3	Drilled	500	1¼	Aquia	—	—	R, G	I, M	Well reported to flow on very high tide.
Cc 40	Do	—	—	3	do	350	1¼	Piney Point	—	—	R, G	I, M	Water reported "irony".
Cc 41	E. R. Lewis	Baldwin	1950	2	Jetted	550	1¼	Aquia	—	—	C, H	N	Static water level measured 0.29 foot above land surface, Oct. 30, 1951.
Cc 42	Vernon Matthews	—	—	3	Drilled	500	1¼	Aquia(?)	—	—	N	N	Static water level reported 0.5 foot above land surface 1918. Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 29.

Cc 43	Charles Herman	—	—	3	Drilled	510	1½	Aquia(?)	—	—	E	D, S	Static water level reported 2 feet above land surface. See Md. Geol. Survey, v. 10, p. 309, well 28.
Cc 44	Do	—	—	3	do	510	1½	do	—	—	N	N	Static water level reported 2 feet above land surface 1918. Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 28.
Cc 45	Town of Madison	—	—	3	do	575	1½	do	—	—	N	N	Static water level reported 1 foot above land surface 1918. Open hole 300–575 feet. Sealed and abandoned. See Md. Geol. Survey, v. 10, p. 309, well 25.
Cc 46	John Brannock	—	—	3	do	500	1½	do	1.42[m]	Jun. 1, 1954	N	N	Static water level reported 1.5 feet above land surface, 1918. See Md. Geol Survey, v. 10, p. 309, well 26.
Cc 47	Clarence L. Seward	—	1909	3	do	500	1½	do	1.5	1909	—	D, S	Static water level reported 5 feet below land surface in 1952. See Md. Geol. Survey, v. 10, p. 309, well 47.
Cc 48	Frank Hill	—	1897	3	do	503	1½	do	—	—	E	D, S	Static water level reported 1 foot above land surface, 1897. See Md. Geol. Survey, v. 10, p. 309, well 48.
Cc 49	Elmer Paul	—	1894	3	do	365	1½	Piney Point	—	—	N	N	Abandoned. See Md. Geol. Survey, v. 10, p. 309, well 46.
Cc 50	Galbraith	—	1909	2	do	545	1½	Aquia(?)	—	—	N	N	See Md. Geol. Survey, v. 10, p. 309, well 18.
Cc 51	W. A. Stewart Macklin	Wheatley	1899	5	do	340	1½	Piney Point	—	—	N	N	Static water level reported 6 feet above land surface, 1899. Destroyed. See Md. Geol. Survey, v. 10, p. 309, well 45.
Cc 52	Unknown	—	—	3	do	510	1½	Aquia(?)	—	—	N	N	Static water level reported 2 feet above land surface when drilled. Stopped flowing 1909. See Md. Geol. Survey, v. 10, p. 309, well 31.
Cd 1	Harold E. Fee	Elzey	—	4	Jetted	390	—	Piney Point(?)	—	—	J, E	D, F, M	Water reported excellent
Cd 2	W. T. Andrews & Son	Bradshaw	1948	14	do	450	4 –2½	do	—	—	T, E	I, M	Uses 2,000 gpd during 4 month season. Open hole.
Cd 3	John Fitzhugh	Todd	1946	5	do	330	2½–1½	Miocene	43	Jul. 8, 1946	J, E	D, S	Open hole 105–330 feet.
Cd 4	Guy S. Shorter	Bradshaw	1950	9	do	450	2½–1½	Piney Point	60	Aug. 7, 1950	E	D, S	Open hole.
Cd 5	Otis C. McGrath	do	1947	10	do	380	2½	do	—	—	J, E	D, F, M	Open hole 320–380 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cd 6	Carl Carroll	Baldwin	1949	12	Jetted	360	2½–1½	Piney Point	64.6	Aug. 6, 1951	J, E	D, F, M	Drawdown reported 0 feet after 8 hours pumping 8 gpm.
Cd 7	Clarence Jones	Jarrett	1948	3	do	370	2½–1½	do	49	Jan., 1948	J, E	D, F, M	Water reported not "irony". Open hole 345–370 feet.
Cd 8	O. B. Cheesman	Bradshaw	1941	9	do	380	3 –1¼	do	—	—	R, E	D, S	Water reported good. Static water level reported low once during canning season.
Cd 9	C. G. Blades	do	—	8	do	—	1½	—	—	—	J, E	D, F, M	Water reported good.
Cd 10	Handy Hayman	Jarrett	1951	10	do	365	2½–1½	Piney Point	63	Apr. 27, 1951	J, E	D, F, M	Water reported good. Open hole 340–365 feet.
Cd 11	S. Baird	do	1949	12	do	335	2½–1½	do	60	Nov. 17, 1949	J, E	D, F, M	See log. Drawdown reported 0 feet after 8 hours pumping 12 gpm. Open hole.
Cd 12	Emmet Palmer	Baldwin	1950	12	do	360	1½	do	68	Jun. 13, 1950	R, E	D, S	Water reported good. Drawdown reported 2 feet after 8 hours pumping 10 gpm. Open hole 340–360 feet.
Cd 13	Alfred Stuart	Jarrett	1946	12	do	386	2½–1½	do	60	Feb. 26, 1946	J, E	D, F, M	Water reported good. Open hole.
Cd 14	H. L. Tubman	—	—	13	Dug	18	48	Pleistocene	9	Aug. 31 1951	C, H	D, S	Water reported slightly "irony".
Cd 15	S. Parker	—	—	14	do	20	40	do	16	Aug. 31, 1951	R, E	D, S	Well goes dry during dry season. Water reported "irony".
Cd 16	Coop Ground-Water Program	Coop. Ground-Water Program	1951	5	Driven	21.6[m]	1	do	1.53[m]	Feb. 7, 1951	N	O	See log. Monthly record.
Cd 17	E. B. Jones	Cusick	1935	5	Jetted	934	2½–1½	Raritan(?)	—	—	R, E	D, S	Water reported to flow 10 gpm 6 feet above land surface June 10, 1940.
Cd 18	Col. W. Blizzard	Baldwin	1949	10	do	620	1¼	Aquia	7	Dec. 20, 1949	R, E	D, F, M	See chemical analysis. Drawdown reported 77 feet after 12 hours pumping 12 gpm. Open hole.
Cd 19	Chas. A. Richardson	Bradshaw	1947	5	do	400	2½–1½	Piney Point	—	—	J, E	D, S	Water reported good, not "irony".. Open hole 324–400 feet.

Cd 20	J. S. Radcliff	Bradshaw	1947	12	Jetted	629	1¼	Aquia	8.5	Jun., 1951	C, H	D, F, M	Water reported good. Screened 610–629 feet.
Cd 21	Mrs. E. W. Carrington	do	1951	6	do	375	2½–1¼	Piney Point	52	May 28, 1951	J, E	D, S	Open hole 330–375 feet.
Cd 22	Charles Kahl	Baldwin	1951	15	do	640	1¼	Aquia	7	Sep. 15, 1951	R, E	D, F, M	Drawdown reported 0 feet after 30 hours pumping 15 gpm. Open hole.
Cd 23	Dr. G. West	do	1950	4	do	620	1¼	do	7	Apr. 4, 1950	R, E	D, S	See chemical analysis. Water reported good, soft.
Cd 24	Vivian H. Farrare	Bradshaw	1948	12	do	400	2½–1¼	Piney Point	—	—	J, E	D, F, M	Water reported soft. Pumps air during summer with 80-foot suction line. Open hole 340–400 feet.
Cd 25	Roy Chase	do	1948	12	do	400	2½–1¼	do	—	—	J, E	D, S	Open hole 340–400 feet.
Cd 26	Wm. C. Dickerson	Todd	1947	4	do	350	2½–1¼	do	35	Jul. 28, 1947	J, E	D, S	Water reported good, not "irony". Open hole.
Cd 27	Col. F. J. Atwood	Baldwin	1950	4	do	368	2½–1¼	do	33	Aug. 10, 1950	J, E	D, S	Drawdown reported 0 feet after 8 hours pumping 10 gpm. Open hole.
Cd 28	L. W. Fitzhugh	Jarrett	1950	6	do	370	2½–1¼	do	50	Oct. 10, 1950	J, E	D, S	See chemical analysis. Field analysis, Feb. 1954: chloride 28 ppm, hardness 42 ppm, iron <0.1 ppm, pH, 8.5. Temperature 58° F. Open hole 336–370 feet.
Cd 29	T. Brown	do	1950	6	do	370	2½–1¼	do	—	—	J, E	D, S	Open hole 335–370 feet.
Cd 30	Norman Travers	Todd	1947	6	do	330	2½–1¼	do	35	Apr. 7, 1947	J, E	D, S	Open hole 315–330 feet.
Cd 31	Board of Education	Jarrett	1950	6	do	375	2½–1¼	do	52	Nov. 12, 1950	J, E	P, M	Open hole 345–375 feet.
Cd 32	D. Smith	do	1948	6	do	367	2½–1¼	do	38	May 11, 1948	J, E	D, S	Drawdown reported 0 feet after 8 hours pumping 15 gpm. Open hole 330–367 feet.
Cd 33	Ollie Paul	do	1950	6	do	370	2½–1¼	do	—	—	J, E	D, S	Water reported good, not "irony". Open hole 335–370 feet.
Cd 34	Calvin Adkins	Todd	1946	7	do	330	2½–1¼	do	43	Jul. 13, 1946	J, E	D, F, M	Water reported good. Open hole.
Cd 35	Wm. Ruark	Cusick	1948	5	do	380	2½–1¼	do	42	Mar. 22, 1948	J, E	D, S	See log. Drawdown reported 13 feet after 4 hours pumping 18 gpm. Open hole 341–380 feet.
Cd 36	L. Fitzhugh	Jarrett	1951	4	do	360	2½–1¼	do	55	May 7, 1951	J, E	D, F, M	Drawdown reported 0 feet after 8 hours pumping 18 gpm. Open hole 330–360 feet.
Cd 37	Waldon Foxwell	Todd	1947	3	do	448	2½–1¼	do	33	Jul. 4, 1947	J, E	D, S	Water reported good. Open hole.
Cd 38	Elwood Parsons	Baldwin	1950	14	do	382	2½–1¼	Miocene and Eocene	65	Sep. 27, 1950	J, E	D, F, M	Drawdown reported 0 feet after 8 hours pumping 15 gpm. Open hole 288–382 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cd 39	Whitehaven Methodist Church	Jarrett	1947	3	Jetted	365	2½–1½	Piney Point(?)	39	Jan. 15, 1947	J, E	D, S	Drawdown reported 0 feet after 8 hours pumping 15 gpm. Open hole 345–365 feet.
Ce 1	Crystal Ice and Storrage Co.	Shannahan Artesian Well Co.	1945	18	do	966	6–4½–3	Magothy(?)	—	—	T, E	I, L	See log and chemical analysis. Static water level reported 11 feet above land surface May 1945. Reported to flow 20 gpm at land surface 1945. Screened.
Ce 2	Dorchester Water Co. Company	Virginia Well and Machinery Co.	1945	15	Drilled	412	12	Piney Point	102^{m}	Jun. 28, 1951	T, E	P, L	See log and chemical analysis. Pumping test data in text. Yield reported 650 gpm, Oct. 8, 1948. Drawdown reported 79 feet after 35 minutes pumping 625 gpm. Temperature 64° F.
Ce 3	Do	Shannahan Artesian Well Co.	1946	15	do	977	14–10–8	Magothy(?)	100	Apr. 5, 1946	T, E	P, L	See log and chemical analysis. Drawdown reported 107.5 feet after 24 hours pumping 436 gpm. Temperature 72° F. Screened 941–971 feet.
Ce 4	Do	do	1931	18	Jetted	372^{m}	10–8–6	Piney Point	99.58^{m}	Jul. 23, 1951	T, E	P, L	See log and chemical analysis. Pumping test data in text.
Ce 5	Do	do	1931	18	do	405	12	do	100	Jul., 1951	T, E	P, L	Do
Ce 6	Do	Layne-Atlantic Co.	1936	20	Drilled	463	12–10	do	—	—	T, E	P, L	See log and chemical analysis. Open hole 365–463 feet.
Ce 7	Do	Shannahan Artesian Well Co.	1915	6	Jetted	375	12	do	—	—	A, G	P, L	See Md. Geol. Survey, v. 10, p. 309, wells 3, 4, and 5.
Ce 8	Do	do	1913	6	do	375	10	do	—	—	A, G	P, L	See Md. Geol. Survey, v. 10, p. 309, wells 3, 4, and 5.
Ce 9	Do	do	1936	25	do	413	12–8–6	do	102^{m}	Jul. 3, 1951	T, E	P, L	See log and chemical analysis.

Ce 10	Dorchester Water Company	Shannahan Artesian Well Co.	1910	6	Jetted	375	12-10-8	Piney Point	—	—	T, E	P, L	See log and chemical analysis. Open hole 335–375 feet. See Md. Geol. Survey, v. 10, p. 309, wells 3, 4, and 5.
Ce 11	Do	—	—	3	do	375	10	do	—	—	N	N	See Md. Geol. Survey, v. 10, p. 309, wells 3, 4, and 5. Abandoned and plugged in 1948.
Ce 12	Do	do	1947	18	Drilled	432	14–10	do	83.5	Jul. 3, 1947	T, E	P, L	See chemical analysis. Drawdown reported 28 feet after 24 hours pumping 350 gp.m. Screened 380–431 feet.
Ce 13	Do	do	1947	18	do	430	14–10	do	88.5	Oct. 23, 1947	T, E	P, L	See log and chemical analysis. Drawdown reported 56.5 feet after 24 hours pumping 350 gpm. Screened 376–427.5 feet.
Ce 14	Crystal Ice and Cold Storage Co.	do	1890	6	do	375	6	do	20 110	1918 May, 14, 1951	T, E	I, L	Water level affected by pumpage of wells Ce 2 to 13. Cannot use well for 6 weeks each year beginning July 15. See Md. Geol. Survey, v. 10, p. 309, well 11.
Ce 15	Do	do	1947	6	do	973.5	10–8–6–4–3	Magothy(?)	68	Aug., 1947	T, E	I, L	See log. Drawdown reported 48 feet after 24 hours pumping 200 gpm. Water reported "irony". Screened 950.5–970.5 feet.
Ce 16	Phillips Packing Co., Inc.	do	1903	15	do	293	6	Calvert	30	May 23, 1951	J, E	I, L	Water reported hard, corrosive. See Md. Geol. Survey, v. 10, p. 309, well 13.
Ce 17	Do	do	1903	15	do	293	6	do	46.2^{m}	May 28, 1951	—	I, L	See Md. Geol. Survey, v. 10, p. 309, well 13.
Ce 18	Cambridge Gas Co.	do	1893	6	do	359^{m}	4–2	Piney Point	51.8^{m}	Jul. 13, 1951	N	N	Well abandoned. See Md. Geol. Survey, v. 10, p. 309, well 6.
Ce 19	Phillips Oil Co., Inc.	—	—	5	—	117^{m}	4	do	57.45^{m}	Aug. 2, 1951	N	N	Originally reported 360 feet. See Md. Geol. Survey, v. 10, p. 309, well 8.
Ce 20	D. Moore	Shannahan Artesian Well Co.	1909	25	do	378^{m}	4	do	71.35^{m}	Aug. 17, 1951	N	N	Formerly L. K. Warren well. See Md. Geol. Survey, v. 10, p. 309, well 7.
Ce 21	Eastern Shore State Hospital	do	1913	12	do	370	8	do	14 23.77^{m}	1914 Feb. 14, 1952	A, S	P, L	See Md. Geol. Survey, v. 10, p. 309, well 12.
Ce 22	Do	do	1921	12	do	406^{m}	8	do	73.70^{m}	Feb. 14, 1952	N	O	Daily record.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ce 23	N. Darrock	Vane	1884	14	Dug	18	48	Pleistocene	13	Aug. 31, 1951	C, H	D, S	Water reported slightly "irony". Periodically low during summer. Temperature 64.5° F.
Ce 24	E. Fairfax	—	—	14	do	14.5^{m}	60	do	10.1^{m}	Aug. 31, 1951	C, H	N	Water reported "irony". Temperature 63° F.
Ce 25	J. Warst	—	1870	18	do	17.8^{m}	48	do	12.29^{m}	Aug. 31, 1951	B, H	D, S	Water reported slightly "irony". Temperature 61° F.
Ce 26	O. Hubbard	—	—	16	do	9.4^{m}	28	do	5.33^{m}	Aug. 31, 1951	B, H	D, S	Water reported good. Temperature 65° F.
Ce 27	V. Todd	Shannahan Artesian Well Co. (?)	—	15	—	158.5^{m}	2½	Choptank(?)	16.65^{m}	Jun. 14, 1951	C, H	—, S	See chemical analysis. Water reported very "irony".
Ce 28	J. A. Saulsbury	Cusick	1950	25	Jetted	436	2½–1¼	Piney Point	75	Apr. 10, 1950	J, E	C, M	See log. Drawdown reported 25 feet after 8 hours pumping 20 gpm. Open hole 395–436 feet.
Ce 29	Handley Lewis	Baldwin	1950	25	do	410	2½–1¼	do	76	Apr. 11, 1950	J, E	C, M	Drawdown reported 64 feet after 15 hours pumping 12 gpm. Reported heavy pumpage of canning factories during summer affects water level.
Ce 30	Noble Bradshaw	Bradshaw	1949	15	do	450	2½–1¼	do	76	Nov. 8, 1949	J, E	D, S	Drawdown reported 8 feet after 15 hours pumping 20 gpm. Open hole 403–450 feet.
Ce 31	Carl Simmons	Baldwin	1950	20	do	410	2½–1¼	do	—	—	J, E	D, S	Open hole.
Ce 32	Donald Cameron	Jarrett	1950	14	do	440	2½–1¼	do	75	Feb. 10, 1950	J, E	D, S	Open hole 415–440 feet.
Ce 33	Roy Robbins	Todd	1947	15	do	397	2½–1¼	do	63	Mar. 18, 1947	J, E	D, S	Open hole 360–397 feet.
Ce 34	Herbert Jones	Cusick	1950	24	do	452	2½–1¼	do	75	Jun. 1, 1950	J, E	D, S	Drawdown reported 10 feet after 5 hours pumping 20 gpm. Open hole 396.5–452 feet.
Ce 35	Everett Simmons	Baldwin	1950	25	do	410	2½–1¼	do	70	May 8, 1950	J, E	C, M	Drawdown reported 60 feet after 15 hours pumping 12 gpm.

Ce 36	Charles Mowbray	Jarrett	1946	24	Jetted	400	4–2	Piney Point	63 78	Feb. 26, 1946 Jun. 1951	J, E	D, S	
Ce 37	Mace Willey	Todd	1947	19	do	435	2½–1½	do	64	Apr. 14, 1947	J, E	D, F, S	Open hole 415–435 feet.
Ce 38	J. A. Saulsbury	Cusick	1950	25	do	410	2½–1½	do	—	—	J, E	D, F, S	
Ce 39	Woodrow Pritchett	Todd	1947	14	do	435	2½–1½	do	69	Jul. 10, 1947	J, E	D, F, M	Drawdown reported 20 feet after 8 hours pumping 20 gpm. Open hole 400–435 feet.
Ce 40	B. Trice	Bradshaw	1949	25	do	450	2½–1½	do	76	Oct. 25, 1949	J, E	D, S	Drawdown reported 8 feet after 15 hours pumping 20 gpm. Open hole 403–450 feet.
Ce 41	Rufus Dean	Jarrett	1948	25	do	430	2½–1½	do	60	Sep. 6, 1948	J, E	D, F, S	Drawdown reported 13 feet after 5 hours pumping 15 gpm. Open hole 400–430 feet.
Ce 42	Elwood Pliescott	do	1950	20	do	405	2½–1½	do	60	Jan. 18, 1950	J, E	D, S	Drawdown reported 12 feet after 6 hours pumping 25 gpm. Open hole.
Ce 43	Robbins Brothers	Baldwin	1950	23	do	410	2½–1½	do	76	Jul. 7, 1950	J, E	C, S	Drawdown reported 0 feet after 24 hours pumping 10 gpm.
Ce 44	Pbillip Elzey	Jarrett	1951	24	do	446	2½–1½	do	67	Feb. 2, 1951	J, E	D, S	Water reported slightly "irony". Open hole 416–446 feet.
Ce 45	Town of Cambridge	Bradshaw	1947	15	do	437	2½–1½	do	—	—	J, E	D, F, S	Open hole 387–437 feet.
Ce 46	Wilbur M. Dashiell	do	1950	20	do	447	2½–1½	do	—	—	J, E	D, S	Water reported not "irony". Open hole 388–447 feet.
Ce 47	Clem Miller	do	1951	25	do	457	2½–1½	do	70	Jul. 23, 1951	J, E	D, S	Water reported not "irony". Open hole 388–437 feet.
Ce 48	Melvin W. Turner	do	1950	20	do	452	2½–1½	do	79	Aug. 30, 1950	J, E	D, S	Water reported not "irony". Open hole 398–452 feet.
Ce 49	Vernon H. Aaron	do	1950	20	do	467	2½–1½	do	80	Nov. 16, 1950	J, E	D, S	Open hole 398–467 feet.
Ce 50	James Sherman	do	1947	20	do	440	2½–1½	do	—	—	J, E	D, S	Water reported not "irony". Open hole 404–440 feet.
Ce 51	Order of Moose	do	1951	22	do	462	2½–1½	do	88.07[m]	Oct. 24, 1951	—	D, S	Open hole 400–462 feet.
Ce 52	John Luthy	Jarrett	1950	8	do	440	2½–1½	do	55	Mar., 1950	J, E	D, F, S	Water reported not "irony". Open hole 400–440 feet.
Ce 53	Thurman Shorter	Bradshaw	1946	10	do	400	2½–1½	do	—	—	J, E	D, F, S	Open hole 356–400 feet.
Ce 54	Raymond Condon	do	1951	23	do	471	2½–1½	do	85	Oct. 1, 1951	J, E	D, S	Water reported not "irony". Open hole 420–471 feet.
Ce 55	Guy Edgar	Jarrett	1950	23	do	440	2½–1½	do	80	Oct. 24, 1951	J, E	D, S	Open hole 400–440 feet.
Ce 56	Edward Willey	do	1950	23	do	440	2½–1½	do	—	—	J, E	D, F, S	Do
Ce 57	Arson Angell	Todd	1947	4	do	420	2½–1½	do	63	Feb. 14, 1947	J, E	D, S	Water reported soft. Open hole.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ce 58	Jesse Frazier	Baldwin	1950	25	Jetted	150	2½	Choptank(?)	7	Jun. 15, 1950	R, E	D, F, M	Field analysis, Feb. 1954: chloride 30 ppm, hardness 110 ppm, iron <0.1 ppm, pH 8.5. Temperature 53° F. Drawdown reported 0 feet after 6 hours pumping 16 gpm. Open hole.
Ce 59	Order of Moose	Jarrett	1951	12	do	420	2½–1½	Piney Point	78.73m 64.20m	Oct. 26, 1951 Apr. 17, 1952	E	P, S	Open hole 395–420 feet.
Ce 60	R. Baker	do	1948	12	do	282	2½	Calvert(?)	14	Apr. 5, 1948	R, E	D, S	
Ce 61	Phillips Packing Co.	Shannahan Artesian Well Co.	1952	15	do	450	10–8	Piney Point	98	Mar. 27, 1952	T, E	I, L	See log and chemical analysis. Drawdown reported 7 feet after 24 hours pumping 580 gpm. Screened 392–442 feet.
Ce 62	Do	do	1952	15	do	450	10	do	109	Jun. 25, 1952	T, E	I, L	See chemical analysis. Drawdown reported 85 feet after 24 hours pumping 513 gpm. Open hole 392.5 to 450 feet.
Ce 63	Air Pax Products Co.	Jarrett	1953	20	do	360	—	do	—	—	J, E	I, L	See chemical analysis.
Ce 64	Wilbur Booze	Baldwin	1953	15	do	399	2½–1½	do	88	Oct. 30, 1953	—	D	See chemical analysis. Water reported hard.
Ce 65	Henry E. Keeler	Jarrett	1954	8	do	175	2½–1½	Calvert	9	Feb. 10, 1954	N	D, S	See log. Marsh gas pocket at 85 feet, odor of H_2S. Well abandoned.
Ce 66	Brice Twilley	Todd & Jarrett	1947	18	do	422	2½–1½	Piney Point	70	Jun. 19, 1947	R, E	I, L	Screened 404–422 feet.
Cf 1	Howard Smith	Jarrett	1947	25	do	460	1½	do	75	Sep. 25, 1947	J, E	D, F, S	Field analysis, Feb. 1954: chloride 20 ppm, hardness 59 ppm, iron <0.1 ppm, pH 8.5. Open hole 430–460 feet.
Cf 2	J. Vincent	McKnett	1942	7	Driven	50m	1¼	Pleistocene or Miocene	2.02m	Jun. 21, 1950	C, H	N	Temperature 61° F.
Cf 3	George B. Nabb	—	—	5	do	16.1m	1¼	Pleistocene	3.21m	Jun. 18, 1950	C, H	F, S	
Cf 4	E. Dean	Campbell	1948	18	do	—	1½–1¼	do	—	—	R, E	I, S	Water reported very "irony".

Cf 5	H. E. Chaney	Cusick	1949	21	Jetted	210	1¼	Calvert	14	Sep. 21, 1949	R, E	D, S	See log and chemical analysis. Water reported "irony". Drawdown reported 12 feet after 14 hours pumping 18 gpm. Open hole 90–210 feet.
Cf 6	W. E. Valliant	Jarrett	1949	10	do	190	4-2½	do	15	Mar. 20, 1949	J, E	D, S	See log and chemical analysis. Water reported not "irony". Drawdown reported 4 feet after 7 hours pumping 30 gpm. Screened 178–190 feet.
Cf 7	Cambridge Farms, Inc.	do	1951	12	do	312	2½	do	14	May 16, 1951	R, E	F, S	Water reported soft, not "irony" Screened 400–412 feet.
Cf 8	Mrs. Alvin Riggin	Cusick	1953	12	do	194	1¼	Choptank	3	May 12, 1953	J, E	D, C, S	See log and chemical analysis. Field analysis, Feb. 1954: chloride 14 ppm, hardness 59 ppm, iron <0.1 ppm, pH 8.5. Temperature 55° F. Drawdown reported 3 feet after 3 hours pumping 25 gpm. Screened 174–194 feet.
Cg 1	Coop. Ground-Water Program	Coop. Ground Water Program	1949	18	Driven	11.0^{m}	1¼	Pleistocene	1.00^{m}	May 10, 1954	N	O	Monthly record.
Cg 2	James E. Turpin	Turpin	1910	20	do	20.0^{m}	1¼	do	5.30^{m}	Jun. 21, 1950	C, H	F, S	Water reported "irony". Temperature 61° F.
Cg 3	T. J. Fulton, Sr.	Camper	1948	15	do	35	1½	do	5	1948	R, S	I, S	Water reported "irony".
Cg 4	Leslie Bradley	Bradley	1948	15	do	15	1½	do	—	—	R, E	D, F, S	Water reported slightly "irony", soft.
Cg 5	John Gore,	—	1920	15	Jetted	138.0^{m}	2	St. Marys and Choptank	7.34^{m}	Jun. 21, 1950	C, H	N	Temperature 62° F.
Cg 6	Ralph Baumgartner	Baldwin	1950	17	do	332	1¼	St. Marys, Choptank, and Calvert	2	Oct. 30, 1950	R, E	D, S	Water reported not "irony". Drawdown reported 0 feet after 18 hours pumping 15 gpm. Open hole.
Cg 7	Ed Corkran	—	1944	40	Driven	31.2^{m}	1½	Pleistocene	5.51^{m}	Feb. 16, 1954	N	N	See chemical analysis. Water reported "irony".
Ch 1	W. W. McAllister	Horseman	1944	15	do	40.9^{m}	1¼	Pleistocene and Pliocene(?)	9.15^{m}	Jun. 15, 1950	R, E	D, S	Water reported "irony". Temperature 62° F.
Ch 2	Anna Hughes	—	—	25	do	33.1^{m}	1½	do	7.51^{m}	Jun. 15, 1950	C, H	D, S	Water reported "irony", rusty in color. Temperature 63° F.
Ch 3	W. G. Murphy	—	1905	25	do	52.5^{m}	1¼	do	3.24^{m}	Jun. 15, 1950	C, H	D, F, S	Sater reported "irony". Temperature 58° F.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ch 4	Minus H. Collins	Wheatley	1942	42	Jetted	233	4	Choptank	30	Jun. 15, 1950	R, E	D, F, S	Water reported hard, not "irony".
Ch 5	—	—	—	4	Driven	31.0^m	1¼	Pleistocene and Pliocene(?)	1.49^m	Jun. 15, 1950	C, H	D, S	Water reported "irony". Temperature 62° F.
Ch 6	Phillips Packing Co., Inc.	Bradshaw	1939	3	Jetted	165	2½	St. Marys and Choptank	—	—	N	N	Well flowing Dec. 28, 1951. 8 gpm, 1.5 feet above land surface. Temperature 60° F. Abandoned.
Ch 7	Apex Wood Products	—	—	15	Driven	65	1½	Pleistocene and Pliocene(?)	—	—	R, S	I, S	
Ch 8	William Fraye	—	—	20	do	15.3^m	1½	Pleistocene	11.68^m	Jun. 16, 1950	N	N	Water reported not "irony". Temperature 60° F.
Ch 9	William M. Lee	—	—	20	do	16.6^m	1¼	do	7.00^m	Jun. 16, 1950	C, H	F, S	Water reported slightly "irony". Temperature 62° F.
Ch 10	Mary Milligan	Adams	—	20	do	35.5^m	1½	do	9	Jun. 14, 1950	C, H	D, S	Water reported very "irony". Temperature 61° F.
Ch 11	D. F. Bainsfield	—	—	15	do	24.6^m	1½	do	8.6^m	Jun. 16, 1950	C, H	D, S	Water reported "irony". Temperature 55° F.
Ch 12	Howard W. Farmholt	—	1947	20	do	29.3^m	1¼	do	6.66^m	Jun. 16, 1950	J, E	D, F, M	Temperature 62° F.
Ch 13	Lillian Prince	—	—	25	do	17.6^m	1¼	do	3.89^m	Jun. 18, 1950	R, E	D, F, S	Water reported slightly "irony". Temperature 65° F.
Ch 14	Mrs. John Smith	—	—	20	do	31.9^m	1¼	do	16.15^m	Jun. 18, 1950	C, H	D, S	Water reported not "irony". Temperature 58° F.
Ci 1	H. Calloway	—	—	15	do	35	1¼	do	—	—	C, H	D, S	Water reported "irony".
Ci 2	J. Lankford	Evans	1950	15	do	41.4^m	1¼	do	8.93^m	Jan. 25, 1951	C, H	D, S	Temperature 55° F.
Db 1	Elizabeth Moore	Cusick	1949	4	Jetted	354	1½	Piney Point	14	Jan. 21, 1949	C, H	D, S	See log. Field analysis, Feb. 1954: chloride 74 ppm, hardness 93 ppm, iron 0.9 ppm, pH 8.1. Temperature 56° F. Drawdown reported 10 feet after 5 hours pumping 21 gpm. Open hole 319–54 feet.

Db 2	Smithfield Parsonage	Bradshaw	1947	5	Jetted	380	1½	Piney Point	10.52[m]	Oct. 31, 1951	C, H	P, S	Water reported good. Open hole 320–380 feet.
Db 3	Caton Willey	do	1948	4	do	500	1¼	Aquia	—	—	N	D, S	Well flowing Oct. 31, 1951, 2.5 gpm, 1 foot above land surface. Screened 480–500 feet.
Db 4	Board of Education	Jarrett	1949	5	do	536	1½	do	1.5	Dec. 5 1949	C, H	P, S	Screened 530–536 feet, with 2-foot tail-pipe.
Db 5	J. S. Neild	Bradshaw	1951	3	do	517	1¼	do	—	—	N	D	Well flowing Oct. 31, 1951, 1.25 gpm, 1 foot above land surface. Screened 497–507 feet.
Db 6	I. Byrne	Jarrett	1947	3	do	542	1¼	do	0	Oct. 11, 1947	E	D, F, S	Screened from 537 to 542 feet.
Db 7	Sydney Green	Todd	1947	4	do	490	1¼	do	—	—	—	D, S	Reported to flow 1.5 feet above land surface Mar. 27, 1947. Screen 483–488 feet, with 2-foot tailpipe.
Db 8	Earl S. Webster	Bradshaw	1950	5	do	515	1¼	do	3	Sep. 18, 1950	—	D, S	Screened 505–515 feet.
Db 9	F. Roche	Todd	1947	3	do	490	1¼	do	0	Jan. 29, 1947	R, E	D, F, S	Screened 485–490 feet.
Db 10	C. H. Heckenberger	do	1947	3	do	559	1¼	do	—	—	—	D, S	Static water level reported 0.5 foot above land surface Jan. 10, 1947.
Db 11	Reynolds Carpenter	Jarrett	1947	5	do	567	1¼	do	0	Dec. 19, 1947	J, E	D, F, S	Field analysis, Feb. 1954: chloride 8 ppm, hardness 26 ppm, iron <0.1 ppm, pH 8.5. Temperature 56° F. Drawdown reported 0 feet after 4 hours pumping 30 gpm. Open hole 535–567 feet.
Db 12	Jaeger	Bradshaw	1905	4	do	501	1¼	do	—	—	R, E	D, S	Static water level reported 8 feet above land surface in 1918. Stopped flowing 1941–1942, probably due to heavy pumpage at Cedar Point. Probably well 37, Md. Geol. Survey, v. 10, p. 309.
Db 13	A. S. Jones	—	1908	4	do	492	1¼	do	—	—	C, H	D, S	Static water level reported 3 feet above land surface in 1918. Stopped flowing 1949. See Md. Geol. Survey, v. 10, p. 309, well 36.
Db 14	Milton J. Shenton	Cusick	1951	4	do	290	1¼	Piney Point	11	Oct. 1, 1951	C, H	D, S	See log. Drawdown reported 12 feet after 5 hours pumping 8 gpm. Open hole 230–290 feet.
Db 15	Ira Berry	Baldwin	1953	5	do	353	1¼	do	13	Aug. 15, 1953	C, H	D, S	See chemical analysis. Drawdown reported 0 feet after 20 hours pumping 15 gpm. Open hole.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dd 1	Arthur Brooks	Jarrett	1950	4	Jetted	384	2½–1½	Piney Point	30	Jan. 8, 1950	J, E	D, S	See log. Drawdown reported 6 feet after 7 hours pumping 30 gpm. Open hole 360–384 feet.
Dd 2	Joe Linthicum	Cusick	1950	3	do	835	2½–1½	Magothy(?)	—	—	—	D, S	See log. Static water level reported 12 feet above land surface, Sept. 13, 1951. Screened.
Dd 3	Edward C. Elzey	Jarrett	1949	3	do	408	2½–1½	Piney Point	30	Sep. 25, 1949	E	D, F, S	Drawdown reported 9 feet after 8 hours pumping 30 gpm. Open hole 380–408 feet.
Dd 4	Applegarth Bros	Bradshaw	1949	6	do	420	2½–1½	do	45	Apr. 15, 1949	J, E	D, F, S	Drawdown reported 5 feet after 8 hours pumping 22 gpm. Open hole 373–420 feet.
Dd 5	E. Roberson	Jarrett	1949	6	do	380	2½–1½	do	30	Sep. 29, 1949	J, E	D, F, S	Open hole 355–380 feet.
Dd 6	J. F. Linthicum	Wheatley	1935	4	do	375	1½	do	40.87[m]	Apr. 17, 1952	A, E	F, O, S	Monthly record.
De 1	Wm. W. Handley	Cusick	1949	6	do	439	2½–1½	do	46	Dec. 8, 1949	J, E	D, F, S	See log. Field analysis, Feb. 1954: chloride 30 ppm, hardness 25 ppm, iron 0.0 ppm, pH 8.5. Temperature 57° F. Drawdown reported 14 feet after 5 hours pumping 22 gpm. Open hole 388–439 feet.
De 2	Perry Myers	Jarrett	1950	5	do	420	2½–1½	do	39	Apr. 13, 1950	J, E	D, F, S	Open hole 390–420 feet.
Df 1	William Murphy	—	1949	5	Driven	16	1¼	Pleistocene	10	1949	C, H	D, S	Water reported "irony".
Df 2	Lloyd Willey	—	1940	3	do	6.2[m]	1¼	do	2.84[m]	Jun. 19, 1950	C, H	F, S	Water reported "irony". Temperature 65° F.
Df 3	Carl Evanspacker	—	—	10	—	—	1¼	do	—	—	R, E	D, S	Water reported slightly "irony".
Df 4	Josiah Cephus ,	Cephus	—	10	Driven	11.4[m]	1¼	do	5.24[m]	Jun. 21, 1950	C, H	N	Water reported slightly "irony". Temperature 64° F.

Df 5	Fred Kircher	—	—	5	Driven	22.0^m	1¼	Pleistocene	3.91^m	Jun. 19, 1950	C, H	F, S	Water reported slightly "irony". Temperature 65° F.
Df 6	Josiah A. Pinder	—	—	6	do	18.3^m	1¼	do	3.2^m	Jun. 19, 1950	C, H	D, F, S	Do
Df 7	Millie Pinder	Stanley	1930	5	do	16.1^m	1¼	do	2.20^m	Jun. 21, 1950	C, H	F, S	Water reported "irony". Temperature 60° F.
Df 8	James W. Cephus	Camper	1940	5	do	10.4^m	1¼	do	2.2^m	Jun. 21, 1950	C, H	D, F, S	Water reported "irony". Temperature 65° F.
Df 9	Baker Robbins	Bradshaw	1950	4	Jetted	500	1¼	Piney Point	12	Dec. 18, 1950	—	C, S	Field analysis, Feb. 1954: chloride 62 ppm, hardness 42 ppm, iron <0.1 ppm, pH 8.5.
Df 10	Kermit Pindar	Cusick	1950	7	do	300	1¼	Calvert	2.5	Oct. 13, 1950	R, E	D, F, S	See log. Drawdown reported 2.5 feet after 12 hours pumping 23 gpm.
Dg 1	G. Hurley	Hurley	—	7	Driven	12.2^m	1¼	Pleistocene	2.76^m	Jun. 13, 1950	C, H	D, S	Water reported "irony". Temperature 58° F.
Dg 2	—	—	—	3	do	—	1¼	—	—	—	C, H	D, S	Water reported "irony".
Dg 3	Nelson Willey	Sellers		3	do	40	1¼	Pleistocene	—	—	C, H	D, S	Water reported "irony", odorous. Reported originally driven to 70 feet, water was not good and pipe pulled up to 40 feet.
Dg 4	T. B. Robbins	Bradshaw	1949	3	Jetted	290	6-4	Calvert	—	—	R, E	I, M	Static water level 0.5 foot above land surface with flow of 4 gpm, Oct. 23, 1951. Open hole 257–290 feet.
Dg 5	William H. Layton	Layton	—	5	Driven	16.9^m	1¼	Pleistocene	4.28^m	Jun. 13, 1950	C, H	D, F, S	Water reported good. Temperature 61° F.
Dg 6	Clay Webb	—	—	8	do	26.4^m	1¼	do	2.07^m	Jun. 13, 1950	C, H	D, S	Water reported "irony". Temperature 60° F.
Dg 7	State Game Farm	—	—	15	do	60.9^m	1¼	Choptank(?)	9.14^m	Jun. 13, 1950	C, H	D, F, S	Do
Dg 8	Andrew Willey	Willey	—	6	do	15.5^m	1¼	Pleistocene	3.0^m	Jun. 14, 1950	C, H	F, S	Water reported "irony". Temperature 65° F.
Dg 9	Sarah Camp	—	—	5	do	8.1^m	1¼	do	1.95^m	Jun. 14, 1950	C, H	D, S	Water reported "irony". Temperature 62° F.
Dg 10	Stuart Oliphant	—	—	5	do	31.1^m	1¼	do	.92^m	Jun. 14, 1950	C, H	D, S	Water reported "irony". Temperature 63° F.
Dg 11	Alton Spear	—	—	15	do	15.4^m	1¼	do	3.20^m	Jun. 14, 1950	C, H	D, S	Water reported good, not "irony". Temperature 61° F.
Dg 12	William Percy	—	1943	5	do	33.0^m	1¼	do	5.71^m	Jun. 15, 1950	C, H	D, F, S	Water reported "irony". Temperature 55° F.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dg 13	T. B. Robbins	Bradshaw	1943	3	Jetted	290	3	Calvert	—	—	R, S	I, M	Static water level reported 0.5 foot above land surface Oct. 23, 1951. Field analysis, Feb. 1954: chloride 118 ppm, hardness 69 ppm, iron 0.0 ppm, pH 8.3. Temperature 61° F.
Dg 14	Clay Webb, Jr.	Todd	1946	6	do	212	1½	Choptank and Calvert(?)	—	—	R, E	D, S	Static water level reported 2 feet above land surface with flow of 5 gpm, Apr. 4, 1946. Water reported containing soda. Open hole.
Dh 1	Susan Hitch	Shannahan Artesian Well Co.	1934	15	Drilled	—	2	—	—	—	R, E	D, S	Water reported good, not "irony".
Dh 2	C. Webb Co.	—	—	12	Driven	52	1½	Pleistocene	—	—	—	I, S	
Dh 3	Eastern Shore Public Service Co.	—	1950	12	do	35–50	2	do	15.17	Feb. 1951	R, E	I, L	Two groups, 4 wells each, spaced 25 feet apart. Groups alternately pumped, pumping continuous. Water analyzed daily, average: chloride 10 ppm, CO_2 65 ppm, iron 18 ppm, alkalinity 48 ppm, pH 6.2.
Dh 4	Phillips Packing Co.	Wheatley	1925	12	Jetted	160	3	Choptank(?)	—	—	—	I, M	Water reported "irony".
Dh 5	Walter Becker	—	—	12	do	300	—	Calvert	—	—	R, E	I, M	Water reported not "irony", containing soda.
Dh 6	James F. Noble	—	—	10	do	229	1½	do	3	Sep. 14, 1949	C, H	D, S	Reported to flow 3.5 gpm until municipal wells (Dh 7 and 8) were installed.
Dh 7	Town of Vienna	Shannahan Artesian Well Co.	1934	10	do	305	6	do	—	—	T, E	P, L	See chemical analysis. Reported to flow, 1934. Water reported high in soda and salts.
Dh 8	Do	Ennis Bros.	1945	10	do	315	8	do	24.5	Apr. 29, 1945	T, E	P, L	See log and chemical analysis. Water reported high in soda and salts. Open hole 205–315 feet.

Dh 9	John D. Harrison	Campher	1952	10	Driven	65	1¼	Pleistocene	—	—	C, H	P, S	See chemical analysis. Water reported "irony".
Eb 1	P. A. Ransome	Bradshaw	1946	10	Jetted	370	1½	Piney Point	5	Jul. 11, 1946	R, E	D, S	
Ec 1	Charles Phillips	Cusick	1948	5	do	387	1½	do	11.5	Jun. 29, 1948	R, E	D, S	See log. Drawdown reported 3.5 feet after 3 hours pumping 309 gpm. Open hole 340–387 feet.
Ec 2	Wm. J. Paul	do	1949	6	do	420	1½	do	19	May 30, 1949	—	D, S	Drawdown reported 7 feet after 5 hours pumping 25 gpm. Open hole 385–420 feet.
Ec 3	Geo. A. Keene, Jr.	do	1950	3	do	398	1½	do	16	Jun. 6, 1950	C, H	D, S	See chemical analysis. Field analysis, Feb. 1954: chloride 70 ppm, hardness 42 ppm, iron <0.1 ppm, fluoride 1.2 ppm, pH 8.5. Drawdown reported 9 feet after 5 hours pumping 28 gpm. Open hole 339–398 feet.
Ec 4	John C. Simmons	do	1949	3	do	393	2½–1½	do	20	Nov. 23, 1949	R, E	D, S	See log. Drawdown reported 18 feet after 4 hours pumping 25 gpm. Open hole 358–393 feet.
Ec 5	Phillip G. Gootee	do	1950	3	do	400	1½	do	20	Nov. 15, 1950	R, E	D, F, S	See log. Drawdown reported 3 feet after 3 hours pumping 30 gpm. Open hole 368–400 feet.
Ec 6	Board of Education	Jarrett	1951	5	do	378	2½–1½	do	22	Jun. 26, 1951	R, E	P, M	Open hole 345–378 feet.
Ec 7	Crisfield Dehydrating Co.	Bradshaw	1946	5	do	400	1½	do	8	Apr. 151946	R, E	I, M	Water reported not "irony". Open hole 339–400 feet.
Ec 8	S. H. Applegarth	do	1948	4	do	400	1½	do	—	—	Ic, E	D, M	Water reported "irony". Open hole 336–400 feet.
Ec 9	Gorman Rohinson	do	1946	4	do	400	1½	do	12	May 24, 1946	C, H	D, S	Water reported not "irony". Open hole 332–400 feet.
Ec 10	Wm. Cannon	do	1946	4	do	390	1½	do	12	May 3, 1946	R, E	D, S	Water reported not "irony". Open hole 332–390 feet
Ec 11	Riley Lewis	do	1947	4	do	400	1½	do	—	—	R, E	D, S	Open hole 336–400 feet.
Ec 12	Winnie Adams	do	1946	4	do	390	1½	do	12	May 14, 1946	R, E	D, S	Water reported not "irony". Open hole 332–390 feet.
Ec 13	Raymond Stewart	Cusick	1949	4	do	126	1½	St. Marys and Choptank	3	Dec. 19, 1949	R, E	D, M	Field analysis, Feb. 1954: chloride, 90 ppm, hardness 110 ppm, pH 8.5. Drawdown reported 27 feet after 10 hours pumping 8 gpm. Open hole 90–126 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ec 14	Clauye Wallace	Bradshaw	1948	4	Jetted	370	1½	Piney Point	—	—	R, E	D, S	Open hole 336–370 feet.
Ec 15	Wm. Ruark	do	1949	5	do	164	1½	St. Marys and Choptank	8	Sep. 19, 1949	—	D, S	Open hole 91–164 feet.
Ec 16	O. Ruark	do	1949	5	do	160	1½	do	10	Sep. 1, 1949	R, E	D, S	Water reported not "irony". Open hole 95–160 feet.
Ec 17	Phillip Gootee	Cusick	1947	5	do	420	1½	Piney Point	20	Jan. 10, 1947	Ic, E	D, C, M	Drawdown reported 4 feet after 2 hours pumping 28 gpm. Open hole 373–420 feet.
Ec 18	Geo. L. Brufis	do	1951	3	do	133	1¼	St. Marys, Choptank, and Calvert	10	Jun. 22, 1951	C H	I, S	Drawdown reported 4 feet after 3 hours pumping 20 gpm. Screened 127–133 feet.
Ec 19	Board of Education	Bradshaw	1951	4	do	263	4–2½	Piney Point	22	Dec. 4, 1951	—	P, M	
Ed 1	R. L. Simmons	do	1929	3	do	453.3[m]	1½	do	19.43[m] 24.38[m]	Oct. 20, 1949 Apr. 1, 1954	N	O	Monthly Record. Temperature 58° F.
Ed 2	Robbins Bros.	do	1948	2	do	500	4–2½	do	22	Jul. 31, 1951	J, E	I, L	Open hole 406–500 feet.
Ed 3	S. Dixon	Cusick	1946	3	do	439	1½	do	16	Aug. 1946	—	D, S	See log. Open hole 396–439 feet.
Ed 4	Nelson Hart	do	1951	3	do	442	2½–1½	do	17.06[m]	Sep. 13, 1951	C, H	D, S	Drawdown reported 6 feet after 5 hours pumping 30 gpm. Open hole 399–442 feet.
Ed 5	Roy S. Simmons	do	1947	3	do	442	1½	do	16	May 3, 1947	C, H	D, S	Drawdown reported 1 foot after 2 hours pumping 30 gpm. Open hole 380–442 feet.
Ed 6	Winnie Abbott	Jarrett	1950	2	do	440	2½–1½	do	25	Sep. 15, 1950	J, E	D, S	Open hole 410–440 feet.
Ed 7	Sewell A. Willey	Cusick	1948	2	do	476	1½	do	16	Feb. 21, 1948	C, H	D, F, S	Drawdown reported 9 feet after 12 hours pumping 18 gpm. Open hole 414–476 feet.
Ed 8	Robbins Bros.	Shannahan Artesian Well Co.	1948	2	do	788	6–4	Paleocene(?)	—	—	N	N	See log. Static water level 12 feet above land surface May 8, 1948. Drawdown reported 52 feet after 8 hours pumping 8 gpm. Supply inadequate. Plugged and abandoned.

Ed 9	Robert S. Simmons	Cusick	1949	3	Jetted	465	1½	Piney Point	18	Oct. 24, 1949	R, E	D, S	See log. Drawdown reported 17 feet after 8 hours pumping 21 gpm. Open hole 415–461 feet.
Ed 10	Herman Hughes	do	1951	2	do	521	1½	do	15	Mar. 1, 1951	C, H	D, S	See log. Drawdown reported 7 feet after 7.5 hours pumping 20 gpm Open hole 433.5–521 feet.
Ed 11	George Foxwell	do	1947	3	do	442	1½	do	19	Jan. 27, 1947	C, H	D, S	Drawdown reported 3 feet after 3 hours pumping 28 gpm. Open hole 400–442 feet.
Ed 12	Olivia Johnson	do	1948	3	do	450	1½	do	16	Jul. 10, 1948	C, H	D, S	Drawdown reported 4 feet after 6 hours pumping 25 gpm. Open hole 400–450 feet.
Ed 13	Mary Todd	do	1947	3	do	445	1½	do	16	May 1, 1947	C, H	D, S	Drawdown reported 1 foot after 3 hours pumping 30 gpm. Open hole 390–445 feet.
Ed 14	Phillip Newcomb	do	1950	3	do	430	1½	do	19	Aug. 31, 1950	R, E	D, F, S	Water reported slightly "irony", occasionally tastes salty. Drawdown reported 2 feet after 4 hours pumping 25 gpm. Open hole 375–430 feet.
Ed 15	Robbins Bros.	Robbins	1913	2	Drilled	777	3½–1½	Paleocene(?)	—	—	N	N	Static water level reported 12 feet above land surface in 1913. Well observed to have a slight flow 2 feet above land surface, July 31, 1951. Probably well 32, Md. Geol. Survey, v. 10, p. 309.
Ee 1	Henry Robbins	Bradshaw	1949	2	Jetted	444	2½–1½	Piney Point	—	—	R, E	D, S	Open hole 394–444 feet.
Eg 1	Mattie Davenport	Davenport	—	3	Driven	74.1m	1¼	St. Marys(?)	—	—	—	D, S	Water reported "irony". Temperature 68° F.
Fc 1	Eugene Rippons	Cusick	1947	7	Jetted	443	1½	Piney Point	6	Apr. 14, 1947	R, E	D, S	See log. Field analysis, Feb. 1954: chloride 48 ppm, hardness 43 ppm, iron <0.1 ppm, pH 8.3. Temperature 48° F. Drawdown reported 1 foot after 3 hours pumping 25 gpm. Open hole 409–443 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level		Pumping equipment	Use of water	Remarks
									Feet below land surface	Date of measurement			
Fc 2	Rippons Bros.	Cusick	1947	5	Jetted	185	1¼	St. Marys, Choptank, and Calvert	6	Apr. 23, 1947	R, E	I, M	Drawdown reported 2 feet after 7 hours pumping 15 gpm. Open hole 120–185 feet.
Fc 3	Hubert S. Rippons	do	1950	5	do	175	1¼	do	5	Sep. 22, 1950	R, E	D, S	Drawdown reported 3 feet after 5 hours pumping 12 gpm. Open hole 125–175 feet.
Fc 4	Wm. C. Dean	do	1949	4	do	210	1¼	do	2 6.32^{m}	Dec. 24, 1949 Nov. 21, 1951	C, H	D, S	Water reported slightly "irony". Drawdown reported 16 feet after 10 hours pumping 18 gpm. Open hole 126–210 feet.
Fc 5	Floyd Ashton	do	1950	5	do	195	1¼	do	2	Jan. 2, 1950	R, E	D, S	Field analysis, Feb. 1954: chloride 96 ppm, hardness 95 ppm, iron 0.1 ppm, pH 8.3. Temperature 57° F. Drawdown reported 16 feet after 12 hours pumping 20 gpm. Open hole 126–195 feet.
Fc 6	Lord and Culver	do	1950	2	do	168	1¼	do	3	May 17, 1950	E	D, S	Drawdown reported 4 feet after 6 hours pumping 18 gpm. Open hole 105–168 feet.
Fc 7	W. R. Fry	do	1947	6	do	150	1¼	do	6	Apr. 25, 1947	R, E	D, S	Drawdown reported 3 feet after 6 hours pumping 7 gpm. Open hole 90–150 feet.
Fc 8	Board of Education	Bradshaw	1946	6	do	406	1¼	Piney Point	—	—	R, E	D, M	See chemical analysis. Water reported having slight sulfurous taste, not "irony". Open hole 343–406 feet.
Fc 9	Charles H. Flowers	do	1946	4	do	400	1¼	do	—	—	E	D, S	Open hole 345–400 feet.
Fc 10	Calvert Cannon	do	1949	4	do	407	1¼	do	17	Sep. 16, 1949	—	D, S	Open hole 344–407 feet.
Fc 11	I. L. Farman	Baldwin	1950	4	do	364^{m}	1¼	do	13.18^{m}	Nov. 8, 1951	R, E	D, S	Water reported soft. Drawdown reported 0 feet after 6 hours pumping 14 gpm. Open hole.

Fc 12	Alman Lewis	Bradshaw	1947	3	Jetted	380	1¼	Piney Point	—	—	R, E	D, S	Open hole 337–380 feet.
Fc 13	James I. Crout	do	1946	4	do	400	1¼	do	12	Jun. 17, 1946	E	D, S	Open hole 332–400 feet.
Fc 14	Maud Phillips	Cusick	1947	4	do	150	1¼	St. Marys, Choptank, and Calvert	3	Dec. 17, 1947	C, H	D, S	Water reported "irony". Drawdown reported 11 feet after 12 hours pumping 9.5 gpm. Open hole 95–150 feet.
Fc 15	H. W. Lovette	do	1950	4	do	160	1¼	do	7	Sep. 29, 1950	J, E	D, S	Water reported not "irony". Drawdown reported 5 feet after 12 hours pumping 5 gpm. Open hole 95–160 feet.
Fc 16	Vincent L. Tolley	do	1949	3	do	152	1¼	do	10	Sep. 10, 1949	R, E	D, S	Drawdown reported 23 feet after 10 hours pumping 8 gpm. Open hole 95–152 feet.
Fc 17	Hubert Meekins	do	1949	5	do	166	1¼	do	12	Sep. 10, 1949	C, H	D, S	Drawdown reported 20 feet after 10 hours pumping 11 gpm. Open hole 95–166 feet.
Fc 18	W. H. Hogue	do	1947	5	do	150	1¼	do	3	Dec. 13, 1947	E	D, S	Drawdown reported 10 feet after 10 hours pumping 9 gpm. Open hole 95–150 feet.
Fc 19	Harold C. Travers	do	1948	4	do	150	1¼	do	8	Mar. 17, 1948	R, E	D, S	Water reported not "irony". Drawdown reported 6 feet after 10 hours pumping 9 gpm. Open hole 90–150 feet.
Fc 20	Albert W. Johnson	do	1947	5	do	160	1¼	do	8	Apr. 7, 1947	R, E	D, S	Water reported not "irony". Drawdown reported 2 feet after 8 hours pumping 5 gpm. Open hole 90–160 feet.
Fc 21	Wilson Jones	do	1950	5	do	160	1¼	do	9	Nov. 27, 1950	R, E	D, S	See log. Drawdown reported 5 feet after 8 hours pumping 9 gpm. Open hole 90.5–160 feet.
Fc 22	Oscar Aaron	Bradshaw	1946	5	do	400	1¼	Piney Point	12	Jun. 3, 1946	R, E	D, S	Water reported soft, not "irony". Open hole 332–400 feet.
Fc 23	Sylvanus Phillips	do	1947	5	do	385	1¼	do	—	—	R, E	D, S	Open hole 343–385 feet.
Fc 24	White and Nelson	do	1940	3	do	530	—	Paleocene(?)	—	—	R, E	I, L	Water reported containing sulfur and magnesium.
Fc 25	Lillian Schneider	Jarrett	1950	4	do	405	1¼	Piney Point	16	Jun. 15, 1950	R, E	D, S	Water reported not "irony". Drawdown reported 0 feet after 8 hours pumping 14 gpm. Open hole 365–405 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Fd 1	Coop. Ground-Water Water Program	Coop. Ground-Water Program	1951	3	Driven	16.7^m	1	Pleistocene	11.2^m	Feb. 13, 1951	N	O	Monthly record.
Fd 2	Miles Wingate	Bradshaw	1951	2	Jetted	473	1½	Piney Point	14	Aug. 30, 1951	—	D, S	Open hole 405–473 feet.
Fd 3	Irving Cannon	do	1946	2	do	478	1½	do	9	Apr. 4, 1946	R, E	I, M	Water reported not "irony". Open hole 415–478 feet.
Fd 4	Milton J. Truitt	do	1949	2	do	507	2½–1½	do	14	Aug. 18, 1949	C, H	D, S	Open hole 414–507 feet.
Fd 5	Robert Powley	Jarrett	1950	2	do	504	1½	do	4	Jul. 6, 1950	R, E	D, S	Water reported not "irony". Open hole 465–504 feet.
Fd 6	Oslee Lewis	do	1947	2	do	450	1½	do	6	Oct. 2, 1947	R, E	D, S	Open hole.
Fd 7	Winnie Jones	do	1947	2	do	485	1½	do	3	Dec. 10, 1947	C, H	D, S	Drawdown reported 0 feet after 3 hours pumping 15 gpm. Open hole 455–485 feet.
Fd 8	Roy Todd	do	1948	3	do	485	1½	do	15	Mar. 12, 1948	C, H	D, S	Water reported not "irony". Drawdown reported 0 feet after 6 hours pumping 15 gpm. Open hole 420–485 feet.
Fd 9	O. Todd	Cusick	1949	5	do	470	1½	do	8.79^m	Nov. 14, 1951	C, H	D, S	See log. Drawdown reported 3 feet after 14 hours pumping 25 gpm. Open hole 435–470 feet.
Fd 10	Warren Pritchett	Todd	1946	4	do	420	1½	do	12	Apr. 22, 1946	R, E	D, S	Water reported not "irony". Open hole.
Fd 11	James Lewis	do	1946	3	do	420	1½	do	4	May 25, 1946	C, H	D, S	Do
Fd 12	G. Phillips	Cusick	1947	4	do	480	1½	do	8.5^m	Feb. 1, 1947	C, H	D, F, S	Drawdown reported 1.5 feet after 7 hours pumping 28 gpm. Open hole 426–480 feet.
Fd 13	Alfred Reynolds	Todd	1945	4	do	430	1½	do	5	Nov. 20, 1951	C, H	D, S	Open hole.
Fd 14	C. G. & C. F. Geiger	do	1946	3	do	415	1½	do	12	Apr. 10, 1946	R, G	D, S	Do

Fd 15	E. Irving Lewis	Cusick	1949	4	Jetted	484	1¼	Piney Point	2	Mar. 19, 1949	E	D, S	See log. Field analysis, Feb. 1954: chloride 166 ppm, hardness 45 ppm iron <0.1 ppm, fluoride 1.0 ppm, pH 8.5. Temperature 51° F. Drawdown reported 5 feet after 7 hours pumping 20 gpm. Open hole 405–484 feet.
Fe 1	Jenning W. Todd	do	1947	3	do	550	1¼	do	3	Jun. 16, 1947	R, E	D, S	Drawdown reported 1.5 feet after 5 hours pumping 20 gpm. Open hole 450–550 feet.
Fe 2	Henry Jones	do	1947	3	do	515	1¼	do	3	May 28, 1947	C, H	D, S	Field analysis, Feb. 1954: chloride 172 ppm, hardness 45 ppm, iron <0.1 ppm, fluoride 1.6 ppm, pH 8.5. Temperature 50° F. Drawdown reported 1.5 feet after 3 hours pumping 30 gpm. Open hole 473–515 feet.
Fe 3	Raymond N. Ruark	do	1948	3	do	473	1¼	do	6	Aug. 12, 1948	C, H	D, S	Drawdown reported 6 feet after 5 hours pumping 22.5 gpm. Open hole 453–473 feet.
Fe 4	Elliott Bros.	do	1950	2	do	520	1¼	do	8	Jan. 30, 1950	R, E	I, M	See log. Field analysis, Feb. 1954: chloride 88 ppm, hardness 25 ppm, iron 0.0 ppm, pH 8.5. Temperature 60° F. Drawdown reported 8 feet after 3 hours pumping 22 gpm. Open hole 473–520 feet.
Fe 5	Woodrow Waller	—	—	15	Driven	9.5^{m}	1¼	Pleistocene	2.5^{m}	Jun. 18, 1950	C, H	D, S	Water reported not "irony". Temperature 65° F.
Fe 6	Bill Moore	Jarrett	1951	2	Jetted	435	1¼	Piney Point	3	Apr. 3, 1951	C, H	D, S	Open hole 435–465 feet.
Fe 7	John North	do	1950	3	do	463	1¼	do	5.61^{m}	Nov. 15, 1951	C, H	D, S	Water reported not "irony". Open hole
Fe 8	Malcolm Wheatley	Todd	1946	2	do	426	1¼	do	4.5^{m}	May 31, 1946	R, E	D, S	Do
Fe 9	Ray Powley	Jarrett	1950	2	do	470	1¼	do	—	—	—	D, S	Open hole 445–470 feet.
Fe 10	Willis Windsor	do	1951	3	do	475	1¼	do	3	Apr. 12, 1951	C, H	D, S	Open hole 445–475 feet.
Fe 11	Carroll Todd	Cusick	1947	3	do	180	1¼	Choptank	3	Mar. 25, 1947	R, G	D, F, S	Drawdown reported 2 feet after 5 hours pumping 4 gpm. Open hole 147–180 feet.
Fe 12	Alonzo Abbott	do	1949	2	do	486	1¼	Piney Point	4	Oct. 31, 1949	R, E	D, S	See log. Drawdown reported 14 feet after 5 hours pumping 18 gpm. Open hole 432–486 feet.

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Fe 13	Hilby M. Jones	Cusick	1949	2	Jetted	477	1½	Piney Point	3	Nov. 10, 1949	C, H	D, S	Drawdown reported 15 feet after 3 hours pumping 25 gpm. Open hole 432–477 feet
Fe 14	Garlen Jones	Jarrett	1948	2	do	504	1½	do	5.37m	Nov. 14, 1951	C, H	D, S	See chemical analysis. Temperature 58° F. Drawdown reported 0 feet after 6 hours pumping 20 gpm. Open hole.
Fe 15	Fred Robbinson	do	1948	4	do	504	1½	do	5	Apr. 10, 1948	C, H	D, S	Drawdown reported 0 feet after 4 hours pumping 15 gpm. Open hole 437–504 feet.
Fe 16	Berry Phillips	do	1948	4	do	504	1½	do	15	Mar. 20, 1948	R, E	D, S	Drawdown reported 0 feet after 6 hours pumping 20 gpm. Open hole 430–504 feet.
Fe 17	Mrs. Ada G. Todd	Cusick	1949	3	do	475	1½	do	2	Jan. 10, 1949	C, H	D, S	Drawdown reported 5 feet after 2 hours pumping 28 gpm. Open hole 430–475 feet.
Fe 18	Harvey Hurley	do	1947	3	do	470	1½	do	1.5	Dec. 9, 1947	C, H	D, S	Reported water at 35 feet good. Drawdown reported 2.5 feet after 3 hours pumping 25 gpm. Open hole 430–470 feet.
Fe 19	Orland H. Todd	do	1950	3	do	488	1½	do	2	Jun. 12, 1950	C, H	D, S	Drawdown reported 10 feet after 4 hours pumping 25 gpm. Open hole 440–488 feet.
Fe 20	W. M. Mills	do	1950	3	do	475	1½	do	7	Dec. 1, 1950	J, E	D, S	Drawdown reported 5 feet after 3 hours. pumping 25 gpm. Open hole 445–475 feet.
Fe 21	Granville T. Morrell	do	1947	3	do	487	1½	do	3	Jun. 9, 1947	J, E	D, S	Drawdown reported .5 foot after 6 hours pumping 20 gpm. Open hole 425–487 feet.
Fe 22	Carlton Windsor	do	1949	3	do	477	1½	do	2	Nov. 18, 1949	C, H	D, S	Drawdown reported 16 feet after 2 hours pumping 25 gpm. Open hole 427–477 feet.

Fe 23	Bertram B. Bayliss	Cusick	1947	2	Jetted	504	1¼	Piney Point	3	May 9, 1947	C, H	D, S	Drawdown reported 2.5 feet after 4 hours pumping 30 gpm. Open hole 468–504 feet.
Fe 24	Bernard P. Murphy	do	1947	3	do	510	1¼	do	3	Jun. 3, 1947	E	D, S	Drawdown reported .5 feet after 5 hours pumping 25 gpm. Open hole 441–510 feet.
Fe 25	W. C. Dean Co.	do	1931	2	do	500	1¼	do	—	—	R, E	I, M	Water reported fair, slightly brackish. Open hole.
Fe 26	Meredith & Meredith	do	1941	2	do	500	1¼	do	—	—	R, E	I, M	Water reported good. Open hole.
Fe 27	John Pritchett	Jarrett	1950	2	do	487	1¼	do	3.73m	Nov. 15, 1951	C, H	D, S	See log. Open hole 460–487 feet.
Fe 28	George Ruark	do	1951	3	do	484	1¼	do	4	Oct. 2, 1951	C, H	D, S	Drawdown reported 0 feet after 8 hours pumping 17 gpm. Open hole 455–484 feet.
Fe 29	Mowbray Wingate	do	1950	3	do	475	1¼	do	6	Sep. 18, 1950	Ic, E	D, M	Open hole 455–475 feet.
Fe 30	Arthur Bevan	Cusick	1951	4	do	478	1¼	do	3	Jun. 29, 1951	R, E	D, S	See log. Drawdown reported 2 feet after 20 hours pumping 25 gpm. Open hole 455–478 feet.
Fe 31	Clarence Pritchett	Jarrett	1951	3	do	495	1¼	do	2	Apr. 23, 1951	J, E	D, S	Drawdown reported 0 feet after 8 hours pumping 14 gpm. Open hole 465–495 feet.
Fe 32	Clyde O. Pritchett	Cusick	1947	3	do	510	1¼	do	3	May 22, 1947	C, H	D, S	Drawdown reported 2 feet after 3 hours pumping 25 gpm. Open hole 470–510 feet.
Fe 33	Robert C. Ruark	Todd	1946	2	do	472	1¼	do	4	Jun. 25, 1946	C, H	D, S	Water reported soft. Open hole.
Fe 34	Andrew Holladay	Cusick	1949	3	do	476	1¼	do	4	May 31, 1949	R, E	D, S	Drawdown reported 3 feet after 3 hours pumping 25 gpm. Open hole 434–476 feet.
Fe 35	Wilson Pritchett	Todd	1946	3	do	472	1¼	do	4.70m	Nov. 11, 1951	C, H	D, S	Open hole.
Fe 36	Miles Jones	do	1946	3	do	500	1¼	do	4	Jun. 14, 1946	C, H	D, S	See log. Open hole 472–500 feet.
Fe 37	Orion Pritchett	Jarrett	1950	3	do	475	1¼	do	—	—	E	D, S	Open hole 450–475 feet.
Fe 38	William Dean	do	1952	3	do	477	1¼	do	5	Nov. 27, 1952	J, E	D, S	Water reported very "irony". Field analysis: iron 3 ppm. Open hole 441–477 feet.
Fe 39	Hobart Mills	Bradshaw (?)	1930 (?)	2	do	500	1¼	do	—	—	E	D, S	Field analysis, May 8, 1953: iron <0.1 ppm.
Ff 1	Preston Gray	—	—	3	Dug	3.0m	—	Pleistocene	2.2m	Jun. 18, 1950	B, H	D, S	Water reported not good. Temperature 64° F.
Ff 2	Rossie Gray	Gray	1930	3	Driven	12	1¼	do	6.5	Jun. 18, 1950	C, H	D, S	Water reported slightly "irony".

TABLE 34—*Continued*

Well number (Dor-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ff 3	Elbert Elliott	Cusick	1950	10	Jetted	534	1¼	Piney Point	5	Mar. 8, 1950	R, E	D, F, S	See log. Water reported not "irony" soft. Drawdown reported 11 feet after 4 hours pumping 23 gpm. Open hole 505–534 feet.
Ff 4	Marion Elliott	do	1950	10	do	521	1¼	do	5	Feb. 28, 1950	R, E	D, F, S	Water reported not "irony", soft. Drawdown reported 2 feet after 10 hours pumping 30 gpm. Open hole 485–521 feet.,
Ge 1	Brady P. Todd	do	1947	2	do	520	1¼	do	2.5	May 16, 1947	R, E	I, L	See log. Drawdown reported 1 foot after 2 hours pumping 30 gpm. Open hole 480–520 feet.
Ge 2	Reuben Murphy	Bradshaw	1946	2	do	514	1¼	do	—	—	C, H	D, S	Open hole 420–514 feet.
Ge 3	George Murphy	Jarrett	1951	3	do	495	1¼	do	3	Mar. 8, 1951	C, H	D, S	Water reported not "irony". Open hole 462–495 feet.
Ge 4	Laurence Robinson	do	1951	2	do	515	1¼	do	—	—	C, H	D, S	Water reported good. Open hole 480–515 feet.
Ge 5	Carroll Todd	do	1951	2	do	510	1¼	do	3.47[m]	Nov. 15, 1951	C, H	D, S	Water reported good. Open hole 480–510 feet.
Ge 6	Russell Mills	Cusick	1948	3	do	501.5	1¼	do	3.5	Sep. 8, 1948	J, E	D, S	Field analysis, Feb. 1954: chloride 238 ppm, hardness 75 ppm, iron <0.1 ppm, fluoride 0.8 ppm, pH 8.2. Temperature 60° F. Drawdown reported 6.5 feet after 3 hours pumping 28 gpm. Open hole 468–501.5 feet.
Ge 7	John Elliott	Todd	1946	2	do	472	1¼	do	4	Jul. 1, 1946	C, H	D, S	Open hole.
Ge 8	Dr. R. H. Burkhart	Jarrett	1948	2	do	504	1¼	do	4	Apr. 23, 1948	R, E	D, M	Drawdown reported 0 feet after 6 hours pumping 15 gpm. Open hole 465–504 feet.
Ge 9	Do	Todd	1947	2	do	504	1¼	do	3	Aug. 6, 1947	J, E	D, F, S	Open hole 480–504 feet.

TABLE 35

Record of Wells in Talbot County

Static water level: Measured depths designated by "m".
Pumping equipment: *Method of lift:* A, air lift; B, bucket; C, cylinder-lift (includes pitcher pumps); J, jet; Ic, impeller centrifugal; T, impeller turbine; N, none; R, reciprocating.
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, observation; P, public supply or school; T, test hole.
Rate: S, up to 500 gpd; M, 500 to 5,000 gpd; L, over 5,000 gpd.

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ad 1	R. C. Moyston	—	Prior 1903	60	Dug	29.2m	48	Pleistocene	21.35m	Oct. 24, 1953	J, E	D, F, S	Water reported very good.
Ad 2	Edward Boyd	—	Prior 1903	57	do	20.7m	42	do	15.60m	Oct. 24, 1953	C, H	D, S	Water reported good.
Ad 3	Do	—	Prior 1903	47	do	18.4m	42	do	14.50m	Oct. 24, 1953	C, H	D, S	
Ad 4	R. C. Moyston	—	1903	63	do	28.9m	42	do	17.50m	Oct. 24, 1953	C, H	D, S	Water reported very good, soft.
Ae 1	W. T. Roe	M. Pentz	1952	45	Jetted	220	4	Calvert(?)	19	Jul. 5, 1952	J, E	P, M	Field analysis, Feb. 26, 1954: chloride 10 ppm, hardness 75 ppm, iron 3 ppm, pH 7.5. Drawdown reported 21 feet after 4 hours pumping 40 gpm. Open hole 178–220 feet.
Ae 2	Old Wye Church	do	1951	45	do	100	4	Miocene(?)	16	May 9, 1951	R, E	P, D, S	Drawdown reported 9 feet after 2 hours pumping 100 gpm. Open hole 40–100 feet.
Ae 3	Tom O. Meredith	—	Prior 1928	40	Driven	15	1¼	Pleistocene	10	1951	C, H	D, S	Water reported very good.
Ae 4	Do	—	Prior 1903	45	Dug	18	48	do	12	Jul., 1953	R, E	D, S	Do
Ae 5	Do	—	Prior 1903	45	do	25	54	do	14	Jul., 1953	R, E	F, S	Do
Ae 6	Dunbar Chambers	—	Prior 1903	50	do	30	48	do	18	1953	R, G	F, S	Do
Ae 7	Do	—	Prior 1903	50	do	34	48	do	18	1953	R, E	D, S	Do
Ae 8	Hotton Rhodes	—	1945	55	do	55	1¼	Pleistocene(?) and Miocene	25.5	1953	R, E	D, F, S	Water reported slightly hard and "irony".
Ae 9	John Dulin	—	Prior 1903	60	do	28	42	Pleistocene	20	1953	C, H	D, S	Water reported very good.
Ae 10	Do	—	Prior 1929	60	Driven	28	1¼	do	20.8	1952	R, E	F, S	Do
Ae 11	Edward Rhodes	—	1948	50	Driven	45	1¼	do	23	1948	R, E	D, S	Water reported hard.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ae 12	Pbillip Callahan	Little	1945	60	Driven	29.9^{m}	1½	Pleistocene	22.73^{m}	Dec. 29, 1953	C, H	D, S	Water reported very good...
Ae 13	Omher Dulin	—	Prior 1903	25	Dug	22.1^{m}	36	do	16.67^{m}	Dec. 29, 1953	B, H	D, F, S	Do
Ae 14	Vernon Chance	—	Prior 1903	50	do	16.4^{m}	42	do	10.99^{m}	Dec. 29, 1953	R, E	D, F, S	Do
Ae 15	Phillip Callahan	—	Prior 1903	60	do	25.2^{m}	48	do	18.14^{m}	Feb. 6, 1954	R, E	D, S	Water reported very good. Temperature 55° F.
Ae 16	Do	—	Prior 1903	60	do	21	48	do	17	1953	C, G	F, S	Do
Ae 17	W. Earl Spies	Shannahan Artesian Well Co.	1947	67	Jetted	150	6	Calvert(?)	27	Feb. 2, 1947	J, E	D, F, S	See log. Drawdown reported 16 feet after 6 hours pumping 24 gpm. Water reported very good. Open bole 87–150 feet.
Af 1	Tri County Coop.	C. Pentz	1912 (?)	10	do	140	5	do	—	—	N	D, S	Field analysis, Feb. 26, 1954: chloride 12 ppm, hardness 125 ppm, iron <0.1 ppm, pH 8.2. Water level estimated 4 feet above land surface, June 9, 1953.
Af 2	Do	C. Pentz(?)	1933 (?)	10	do	165(?)	6	do	—	—	T, E	I, L	Water reported to have sulfur taste.
Af 3	Mrs. Mary Dudley	—	Prior 1903	60	Dug	21.9^{m}	42	Pleistocene	18.57^{m}	Dec. 28, 1953	R, E	F, S	Water reported very good.
Af 4	Do	—	Prior 1903	60	do	32	42	do	24	1952	C, H	D, S	Do
Bb 1	Samuel Bullen	A. L. Wilson	1951	15	Jetted	357	1½	Aquia	6	Oct. 17, 1951	J, E	D, S	Water reported good. Drawdown reported 6 feet after 4 hours pumping pumping 17.5 gpm. Open hole 320–357 feet.
Bb 2	John W. Jump	J. W. Wilson	1947	15	do	373	1½	do	14	Aug. 30, 1953	J, E	D, S	Water reported excellent. Drawdown reported 11 feet after 4 hours pumping 13 gpm. Open hole 341–373 feet.
Bb 3	Village of Claiborne	Shannahan Artesian Well Co.	1934	15	do	364	2	do	5	Apr. 9, 1934	C, E	P, M	See log and chemical analysis. Open hole 314–364 feet.

Bc 1	Morgan B. Schiller	do	1950	9	do	416	4	do	8.2	Oct. 14, 1950	A, E	D, S	See log. Drawdown reported 20 feet after 6 hours pumping 36 gpm. Screened 389–410 feet.
Bc 2	Morgan B. Schiller	Shannahan Artesian Well Co.	1953	9	Jetted	420	4	Aquia	11	Jan. 29, 1953	J, E	D, S	Drawdown reported 15 feet after 4 hours pumping 15 gpm. Screened 389–419 feet.
Bc 3	Lester V. Noteman Estate	do	1950	13	do	440	4–2	do	13	Oct. 6, 1950	J, E	D, S	See log. Water reported very good. Drawdown reported 17 feet after 6 hours pumping 28 gpm. Screened 409–430 feet.
Bc 4	Gordon Fisher, Jr.	Burgess	1946	12	do	430	3–2	do	12	Nov. 18, 1946	R, E	D, F, S	See log. Water reported little hard. Drawdown reported 8 feet after 12 hours pumping 20 gpm. Screened 422–430 feet.
Bd 1	Wm. Schnaitman	—	Prior 1914	5	Driven	18	1½	Pleistocene	10	Oct. 24, 1953	R, E	D, F, S	Water reported excellent.
Bd 2	Frank S. Dudley	—	Prior 1903	40	Dug	37.1^m	60	do	31.20^m	Oct. 24, 1953	C, H	F, S	Water reported very good
Bd 3	Do	—	Prior 1903	40	do	40.5^m	54	do	29.80^m	Oct. 24, 1953	J, E	D, S	Do
Bd 4	John Ashley	—	Prior 1903	30	do	17.7^m	48	do	11.40^m	Oct. 31, 1953	R, E	D, F, S	Do
Bd 5	John McGovern	—	Prior 1903	50	do	40.0^m	48	do	17.50^m	Oct. 31, 1953	J, E	D, S	Do
Bd 6	Do	—	Prior 1903	50	do	38	48	do	20	Oct. 31, 1953	C, G	F, S	Do
Bd 7	H. T. Slaughter	—	Prior 1903	56	do	22.7^m	42	do	17.00^m	Nov. 27, 1953	C, H	D, S	Water reported unpleasant.
Bd 8	Thomas Wyman	—	About 1933	35	do	30.5^m	42	do	—	—	C, H	D, S	Water reported good. Well dry Nov. 27, 1953.
Bd 9	Alton Callahan	—	Prior 1903	40	do	12.5^m	54	do	8.50^m	Nov. 27, 1953	R, E	D, F, S	Water reported very good.
Bd 10	Elbert Stafford	—	1903 (?)	30	do	11.5^m	42	do	7.50^m	Nov. 28, 1953	R, E	D, S	Do
Bd 11	Do	—	1903 (?)	30	do	22.5^m	42	do	15.50^m	Nov. 28, 1953	R, E	F, S	Do
Bd 12	Lee Lawrie	—	1903 (?)	20	do	17.5^m	48	do	15.20^m	Nov. 28, 1953	C, H	D, S	Do
Bd 13	Morgan B. Schiller	—	1903 (?)	18	do	18.5^m	48	do	12.00^m	Nov. 28, 1953	C, H	D, S	Do
Bd 14	R. C. Moyston	—	1903 (?)	17	do	10.8^m	54	do	7.25^m	Nov. 28, 1953	J, E	D, F, S	See log of Bd 23. Water reported poor.
Bd 15	Wm. E. Sharpp, Jr.	—	1903 (?)	17	do	10.6^m	42	do	7.20^m	Nov. 28, 1953	C, H	D, S	Do
Bd 16	Wm. E. Sharpp, Jr.	—	1903 (?)	28	do	28	48	do	13	Nov. 28, 1953	R, E	D, F, S	Water reported very good.
Bd 17	George D. Olds	—	1948	13	do	14.0^m	42	do	10.00^m	Nov. 28, 1953	C, W	F, S	Do
Bd 18	Do	Burgess	1949	13	Jetted	200	4–2½	Piney Point(?)	8	Sep. 1, 1949	C, W	D, F, S	See log. Water reported very good. Open hole 195–200 feet.
Bd 19	Dr. Shepard Krech	—	1952	15	do	80	2	Calvert	14	Dec. 5, 1953	R, E	D, F, S	Water reported very good.
Bd 20	Dr. Mead	—	—	15	Dug	34	48	Pleistocene	24	Dec. 5, 1953	R, E	D, S	Do
Bd 21	Morgan B. Schiller	Shannahan Artesian Well Co.	1951	14	Jetted	209	3–2	Piney Point(?)	8	Oct. 5, 1951	R, E	D, F, S	Water reported very good. Drawdown reported 22 feet after 6 hours pumping 12 gpm. Screened 192–207 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Bd 22	Thomas Wyman	Burgess	1953	25	Jetted	150	3–2	Calvert	24	Jun. 1, 1953	J, E	D, I, M	Water reported very good. Screened 140–150 feet.
Bd 23	R. C. Moyston	do	1952	17	do	315	3–2	Piney Point(?)	11.5	Sep. 22, 1952	J, E	D, F, S	See log. Open hole 240–315 feet. Tested 34 gpm for 6 hours.
Be 1	Coop. Ground-Water Program	Coop. Ground-Water Program	1949	20	do	15.3[m]	1¼	Pleistocene	13.30[m]	Sep. 1, 1949	N	O	Monthly record. Temperature 63° F.
Be 2	Hiram Dudley, Jr.	—	1903 (?)	60	Dug	38	48[m]	do	19.50[m]	Oct. 31, 1953	J, E	D, S	Water reported very good.
Be 3	C. W. Kellog	—	About 1933	40	Driven	50	1½	do	17	Oct. 31, 1953	C, H	D, S	Do
Be 4	Do	—	1903 (?)	50	Dug	60	48	do	40	Oct. 31, 1953	C, G	F, S	Do
Be 5	Do	—	About 1913	50	do	35	48	do	29	Oct. 31, 1953	C, G	F, S	Do
Be 6	Do	Shannahan Artesian Well Co.	1937	11	Jetted	466	4.5	Aquia	9 4	Oct., 1937 Oct., 1953	J, E	D, S	See log. Screened 456–466 feet.
Be 7	Alfred Quimby	Bailey	1948	40	do	375(?)	2½	Calvert and Piney Point (?)	40	May 21, 1948	J, E	D, F, M	Water reported very good. Drawdown reported 20 feet after 6 hours pumping 5 gpm. Open hole 150–375 feet. Lower 100 feet reported "no water".
Be 8	Ray Kapisak	M. Pentz	1950	55	Jetted	285	4	do	30	Oct. 10, 1950	J, E	D, C, M	Water reported very good. Drawdown reported 12 feet after 2 hours pumping 10 gpm. Open hole 160–285 feet.
Be 9	A. P. Quimby	do	1938	40	do	316	3	do	40	1938	J, E	D, F, S	Field analysis, Feb. 26, 1954: chloride 10 ppm, hardness 195 ppm, iron <0.1 ppm, pH 8.3. Temperature 54° F.
Be 10	Hersey C. Allen	—	1903 (?)	20	Dug	20	48	Pleistocene	14.5	Nov. 14, 1953	R, E	D, S	Water reported very good.
Be 11	Miss Chambers	—	1903 (?)	50	do	32.7[m]	48	do	26.15[m]	Nov. 14, 1953	N	S	For fire protection. Water reported good.
Be 12	Do	—	1903 (?)	50	do	34.0[m]	48	do	27.00[m]	Nov. 14, 1953	R, E	D, F, S	Water reported very good.
Be 13	Wm. H. Dulin	—	1903 (?)	52	do	34	48	do	27	Nov. 14, 1953	R, E	D, F, S	Do

Be 14	James Brooks	M. Pentz	1952	50	Jetted	105	4	Choptank and Calvert(?)	12	Nov. 14, 1953	J, E	D, F, M	Water reported good. Drawdown reported 18 feet after 2 hours pumping 40 gpm. Open hole 97–105 feet.
Be 15	Preston Dean	—	1928	25	Drilled	80	1½	Choptank(?)	40	Nov. 21, 1953	C, H	D, F, S	Water reported very good.
Be 16	Miss Chambers	—	1903 (?)	60	Dug	30.5m	48	Pleistocene	16.95m	Nov. 21, 1953	C, H	F, S	Do
Be 17	Do	—	1903 (?)	60	do	30.0m	48	do	24.00m	Nov. 21, 1953	C, H	D, S	Do
Be 18	J. Raymond Callahan	—	1903 (?)	60	do	18.5m	48	do	11.20m	Nov. 21, 1953	R, E	D, F, S	Do
Be 19	Joseph B. Callahan	—	1941	40	Jetted	280	2½	Calvert and Piney Point(?)	40	Nov. 21, 1953	J, E	D, F, S	Do
Be 20	Do	—	1903 (?)	40	Dug	24	48	Pleistocene	18	Nov. 21, 1953	C, H	D, S	Do
Be 21	L. C. Willis	—	1903 (?)	50	do	40	48	do	33	Nov. 21, 1953	J, E	D, S	Do
Be 22	John P. Stafford	—	1903 (?)	40	do	39	60	do	30	Nov. 21, 1953	J, E	D, F, S	Do
Be 23	Griffin Sullivan	—	1928	50	do	24.2m	42	do	17.20m	Nov. 27, 1953	R, E	D, F, S	Do
Be 24	Martha Tilghman	—	1903 (?)	45	do	15.9m	42	do	8.20m	Nov. 27, 1953	C, H	D, F, S	Do
Be 25	Gus Melkie	—	1903 (?)	40	do	12.8m	42	do	8.10m	Nov. 27, 1953	C, H	D, F, S	Water reported poor.
Be 26	H. T. Slaughter	Harrison	1951 (?)	56	Drilled	154	2½–1½	Calvert(?)	32	1951	J, E	D, F, S	Water reported little "irony".
Be 27	Harry Laughery	—	1903 (?)	50	Dug	18.9m	48	Pleistocene	6.50m	Dec. 12, 1953	J, E	D, S	Water reported fairly good.
Be 28	H. A. Ziegler	—	1903 (?)	40	do	22.5m	48	do	11.50m	Dec. 12, 1953	R, E	D, S	Water reported very good.
Be 29	Do	—	1903 (?)	40	do	24	48	do	13	Dec. 12, 1953	R, E	F, S	Do
Be 30	Harry Laughery	—	1903 (?)	20	do	30.7m	42	do	16.00m	Dec. 12, 1953	J, E	D, S	Do
Be 31	Do	—	1903 (?)	20	do	18.2m	48	do	9.00m	Dec. 12, 1953	J, E	F, S	Do
Be 32	Do	—	1903 (?)	20	do	38.5m	48	do	17.50m	Dec. 12, 1953	C, H	D, F, S	Do
Be 33	A. M. Hutchinson	—	1903 (?)	50	do	18.0m	48	do	11.00m	Dec. 12, 1953	R, E	D, F, S	Do
Be 34	Temple Rhodes	—	1928	60	Driven	30	1½	do	20	1951	R, E	D, F, S	Do
Be 35	J. L. Walsh	—	1928	60	do	27	1½	do	18	1952	R, E	D, F, S	Water reported slightly "irony".
Be 36	Chas. A. Dulin	—	1930	55	do	29	1½	do	10	1952	R, E	D, F, S	Water reported very good.
Be 37	Wm. M. Brinsfield	—	1928	60	do	45	1½	do	12	Jul. 25, 1953	R, E	D, F, S	Water reported slightly "irony" and hard.
Be 38	Herman Behrens	—	1953	55	do	20	1½	do	10	Sep. 1953	R, E	D, F, S	Water reported very good.
Be 39	Do	—	1940	55	do	32	1½	do	7	Sep. 1953	R, E	D, F, S	Do
Be 40	Fritz Kummer	—	1903 (?)	55	Dug	17.6m	42	do	8.74m	Dec. 29, 1953	C, H	D, F, M	Do
Be 41	Henry Linderman	—	1903 (?)	56	do	20.7m	42	do	13.59m	Dec. 30, 1953	C, H	S	For fire protection.
Be 42	Do	—	1949	56	Driven	30	1½	do	15	1949	R, E	D, F, S	Water reported very good.
Be 43	Edward Hunteman	—	1953	56	do	40	1½	do	15	Nov. 1953	R, E	D, F, S	Do
Be 44	Coop. Ground-Water Program	Coop. Ground-Water Program	1953	18	do	34.6m	1¼	do	5.77m	May 3, 1954	N	O	Monthly record

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Be 45	Wm. M. Brinsfield	—	1953	50	Driven	22	1½	Pleistocene	18	Jun. 1953	C, H	D, S	Water reported very good. Temperature 55° F.
Be 46	Julian T. Brownell, Jr.	—	About 1928	50	do	27	1½	do	14	Sep. 1953	R, E	D, F, S	Water reported very good, soft.
Be 47	G. Elmer Collins	—	1947	75	do	21	1½	do	3.5	1952	R, E	D, F, S	Do
Be 48	John H. Munday	—	1928 (?)	73	do	21.8m	1½	do	8.87m	Jan. 9, 1954	C, H	D, F, S	Water reported very good, soft. Temperature 52° F.
Be 49	George M. Faulkner, Sr.	—	1903 (?)	60	Dug	20	48	do	14	Aug. 1953	R, E	D, F, S	Do
Be 50	Howard S. Redman	—	1903 (?)	60	do	30.5m	42	do	22.95m	Jan. 9, 1954	R, E	D, S	Do
Be 51	Do	—	1903 (?)	60	do	27	42	do	24	1952	C, H	F, S	Do
Be 52	James B. Callahan	—	1903 (?)	40	do	35	48	do	21.5m	Nov. 1953	J, E	D, F, S	Water reported slightly hard. Tempera ture 55° F.
Be 53	W. W. Hopkins	—	1903 (?)	40	do	24	42	do	11.8	Jun. 1953	C, H	D, F, S	Do
Be 54	Andrew F. Marsh	—	1903 (?)	73	do	22	48	do	16.5	Jul. 1951	J, E	D, F, S	Water reported good, soft.
Be 55	Rebecca Fisher	—	1903 (?)	60	do	22	42	do	16	1952	C, H	D, S	Do
Be 56	Do	—	1925	60	Driven	28	1½	do	12	1952	R, E	F, S	Do
Be 57	Ludwig A. Behrens	—	1927	60	Dug	12.2m	48	do	5.52m	Feb. 6, 1954	R, E	D, F, S	Water reported slightly hard. Temperature 55° F.
Be 58	Do	—	1927	60	do	10.4m	42	do	6.44m	Feb. 6, 1954	N	S	Temperature 55° F.
Be 59	Mrs. Ethel Newman	—	1903 (?)	63	do	20	42	do	10	Dec. 1953	C, H	F, M	Water reported very good. Temperature 55° F.
Be 60	Carlton A. Asche	—	1903 (?)	62	do	25	42	do	15.3	1951	R, E	D, F, S	Water reported slightly "irony".
Be 61	Fred Behrens	—	1903 (?)	70	do	15.7m	42	do	9.23m	Feb. 13, 1954	R, E	D, F, S	Do
Be 62	Melvin H. West	—	1903 (?)	60	do	20	42	do	12.5	1953	R, E	D, S	Water reported hard.
Be 63	Frank Cep	—	1903 (?)	76	do	17.3m	48	do	9.25m	Feb. 13, 1954	C H	D, S	Water reported good, soft. Temperature 50° F.
Be 64	Harry Ewing	—	1938	60	Driven	25	1½	do	16	1948	R, E	D, F, S	Water reported good, soft.
Be 65	Do	—	1903 (?)	60	Dug	16.4m	48	do	6.50m	Feb. 13, 1954	C, H	F, S	Water reported good, soft. Temperature 50° F.
Be 66	Chris R. Schlotzhaver	—	1903 (?)	70	do	13.9m	48	do	4.50m	Feb. 13, 1954	R, E	D, F, S	Do

Be 67	John A. Stewart	—	1943	50	Driven	22	1½	Pleistocene	8	1952	C, H	D, S	Water reported good, soft. Temperature 52° F.
Be 68	Do	—	1903 (?)	50	Dug	13.0^{m}	42	do	6.51^{m}	Feb. 20, 1954	N	N	Water reported good, soft.
Be 69	Earl Foster	—	1928	50	Driven	26	1½	do	12	1950	R, E	D, S	Do
Be 70	Do	—	1953	50	do	26	1½	do	12	1953	C, H	F, S	Do
Be 71	Wm. Deyke	—	1933	51	Jetted	180	3½	Calvert (?)	18	1952	R, E	D, F, S	Field analysis, Feb. 26, 1954: chloride 12 ppm, hardness 180 ppm, iron 0.9 ppm, pH 8.2. Temperature 57° F.
Be 72	Joseph Callahan	—	1930	60	Driven	30	1½	Pleistocene	8	1953	R, E	D, F, S	Water reported very good, soft.
Be 73	Herbert T. Chance	—	1903 (?)	70	Dug	18.6^{m}	42	do	10.19^{m}	Mar. 20, 1954	R, E	D, S	Do
Be 74	Do	—	—	70	Jetted	165	3½	Calvert	—	—	R, E	F, S	Do
Be 75	Robert C. Thompson	—	—	40	Dug	24.0^{m}	54	Pleistocene	17.00^{m}	Oct. 31, 1953	R, E	F, S	Do
Be 76	Mrs. Lidia Ransom	—	1928	60	Driven	25	1½	do	18	Dec. 1953	R, E	D, F, S	Do
Be 77	Chas. A. Dulin	—	1904 (?)	60	Dug	11.9^{m}	72	do	5.51^{m}	Jan. 9, 1954	N	N	For fire protection. Water reported very good, clear, and soft.
Be 78	Wm. M. Brinsfield	—	1950	60	Driven	44	1½	do	15	Jul. 25, 1953	R, E	D, F, S	Water reported slightly "irony" and hard.
Bf 1	Wm. T. Sherwood	—	1903 (?)	65	Dug	35	42	Pleistocene and Pliocene (?)	28	1952	J, E	D, F, S	Water reported good, soft.
Bf 2	George Asche	—	1948	40	Driven	47	1½	do	22	1948	R, E	F, S	Water reported good.
Bf 3	Do	—	1948	40	do	47	1½	do	21	1948	R, E	D, S	Water reported good, soft.
Bf 4	Do	—	1903 (?)	40	Dug	10.4^{m}	42	Pleistocene	4.42^{m}	Dec. 26, 1953	C, H	S	For fire protection.
Bf 5	Do	—	1903 (?)	60	do	20	48	do	10	1953	R, E	D, S	Water reported good, soft.
Bf 6	Do	—	1903 (?)	60	do	12	48	do	8	1953	R, E	F, S	Do
Bf 7	Mrs. Mary Dudley	—	1903 (?)	60	do	32	54	Pleistocene and Pliocene (?)	24	1952	R, E	D, F, S	Do
Bf 8	Mrs. James Moore	—	1903 (?)	70	do	30	30	do	22	Jul. 1953	R, E	D, F, S	Do
Bf 9	Carroll Shortall	—	1903 (?)	60	do	23.2^{m}	48	do	19.12^{m}	Dec. 28, 1953	N	N	
Bf 10	Hiram C. Dudley	—	1903 (?)	50	do	35	42	do	25	1952	J, E	D, S	Water reported very good, soft.
Bf 11	Do	—	1903 (?)	50	do	35	42	do	23	1952	R, E	F, S	Water reported good.
Bf 12	Michael Cherewko	—	1903 (?)	60	do	31.6^{m}	51	do	27.64^{m}	Dec. 28, 1953	R, E	D, F, S	Water reported good, soft.
Bf 13	Do	—	1903 (?)	60	do	29.4^{m}	54	do	21.25^{m}	Dec. 28, 1953	C, H	D, S	Water reported very good.
Bf 14	John M. Wade	—	1903 (?)	65	do	23	42	do	15	Jul. 12, 1953	R, E	D, F, S	Water reported very good, soft.
Bf 15	Edward Perry	—	1951	55	Driven	29	1½	do	19.5	May, 1951	R, E	D, F, S	Do
Bf 16	Chester Anderson	—	1903 (?)	50	Dug	26.4^{m}	48	do	20.55^{m}	Dec. 29, 1953	R, E	D, F, S	Water reported hard and "irony".
Bf 17	Harry Moore	—	1903 (?)	60	do	22.5^{m}	42	do	19.63^{m}	Dec. 29, 1953	R, E	D, F, S	Water reported very good, soft.
Bf 18	M. W. Fisher	—	1928 (?)	40	Driven	10	1½	Pleistocene	5	Jul. 1949	C, H	D, F, S	Do
Bf 19	Norman B. Salisbury	—	1903	45	Dug	20	42	do	11	Dec. 30, 1953	R, E	D, F, S	Do
Bf 20	George E. Markell	—	1903 (?)	50	do	29.7^{m}	48	Pleistocene and Pliocene (?)	21.12^{m}	Dec. 30, 1953	N	N	

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Bf 21	Joseph Eaton	—	1903 (?)	45	Dug	27.3^{m}	48	Pleistocene and Pliocene(?)	15.16^{m}	Dec. 30, 1953	J, E	F, S	Water reported very good, soft.
Bf 22	Joseph Eaton	—	1903 (?)	45	do	30	48	do	14	Aug. 1952	C, H	D, S	Water reported very good, soft.
Bf 23	John E. Andrew	—	1903 (?)	45	do	38	54	do	30.5	Aug. 1951	J, E	D, F, S	Water reported slightly "irony", hard.
Bf 24	R. H. Lednum	—	1903 (?)	45	do	33	48	do	20	Nov. 1953	R, E	D, F, S	Water reported very good, soft.
Bf 25	Fred Voshell	—	1949	45	Jetted	160	4	Calvert	29	Dec. 3, 1949	J, E	D, S	See log. Water reported slightly hard. Drawdown reported 10 feet after 2 hours pumping 30 gpm. Open hole 100–160 feet.
Bf 26	George Moore	—	1951	60	do	140	4	do	29	1951	J, E	D, F, S	Water reported slightly hard. Open hole 100–160 feet.
Bf 27	Edward Perry	—	1903 (?)	65	Dug	23.9^{m}	54	Pleistocene and Pliocene(?)	16.75^{m}	Dec. 31, 1953	R, E	D, F, S	Water reported slightly hard.
Bf 28	George E. Markell	—	1903 (?)	55	do	25	42	do	17	Aug. 1952	R, E	D, F, M	Water reported good, soft.
Bf 29	W. Otis Knotts	—	1928	55	Driven	30	1¼	do	18	1952	R, E	D, F, S	Water reported "irony".
Bf 30	Charles Stevens	—	1928	50	do	30	1¼	do	18	Dec. 1, 1953	C, H	D, S	Water reported good, soft.
Bf 31	Leonard Robinson	—	1903 (?)	50	Dug	14.6^{m}	42	Pleistocene	10.10^{m}	Dec. 31, 1953	R, E	D, S	Do
Bf 32	Do	—	1903 (?)	50	do	13.1^{m}	42	do	7.73^{m}	Dec. 31, 1953	C, H	F, S	Water reported good.
Bf 33	Mrs. Nina Miller	—	1927	50	Driven	30	1¼	Pleistocene and Pliocene(?)	20	1952	R, E	D, F, S	Water reported good, soft.
Bf 34	A. Kenneth Miller	—	1927	50	do	30	1¼	do	18	Dec. 1, 1953	R, E	D, F, S	Do
Bf 35	Ralph Steward	—	1903 (?)	45	Dug	20	42	do	14	1951	J, E	D, F, S	Do
Bf 36	Leo Gannon	—	1928	59	Driven	30	1¼	do	20	Aug. 1953	J, E	D, F, S	Do
Bf 37	John U. Voshell	—	1903 (?)	45	Dug	16	48	Pleistocene	8.7	Jul. 1951	R, E	D, F, S	Water reported slightly "irony" and hard.
Bf 38	J. McKinney Willis	Burgess	1953	55	Jetted	147	3	Calvert	7	Mar. 1, 1953	R, E	D, F, S	See log and chemical analysis. Open hole 115–147 feet.
Bf 39	Harvey P. Kinnamon	—	1903 (?)	55	Dug	20	42	Pleistocene and Pliocene(?)	11	Feb. 1953	R, E	D, S	Water reported slightly "irony" and hard.
Bf 40	Do	—	1926	55	Driven	33	1¼	do	22.5	1947	R, E	F, S	Water reported good.
Bf 41	R. H. Lednum	—	1903 (?)	55	Dug	16.6^{m}	42	Pleistocene	12.00^{m}	Jan. 1, 1954	C, H	D, S	Do
Bf 42	Do	—	1903 (?)	55	do	18	42	do	13	Oct. 1953	C, H	F, S	Do

Bf 43	L. C. Hopkins	—	1903 (?)	60	do	12.4m	42	do	7.29m	Jan. 23, 1954	R, E	D, S	Water reported good, soft.
Bf 44	Mrs. Earle Dulin	—	1903 (?)	65	do	17.8m	42	do	8.11m	Jan. 23, 1954	R, E	F, S	Do
Bf 45	Mrs. Earle Dulin	—	1903 (?)	65	do	18	42	do	9	1953	C, H	D, S	Water reported good, soft. Temperature 51° F.
Bf 46	Dan Geib	—	1928	50	Driven	30	1¼	Pleistocene and Pliocene(?)	10	1953	R, E	D, F, S	Water reported good, soft.
Bf 47	John Geib	—	1939	60	Jetted	67	4	Choptank	59	Jul. 1952	J, E	D, F, S	Water reported slightly "irony", hard.
Bf 48	Howard Eley	M. Pentz	1952	53	do	96.2m	4	do	27.08m	Mar. 20, 1954	R, E	D, F, S	See log. Drawdown reported 9 feet after 2 hours pumping 20 gpm. Open hole 63–90 feet.
Bf 49	Bernard Saathoff	—	1903 (?)	60	Dug	16	42	Pleistocene	10	1953	R, E	D, F, S	Water reported good, soft.
Bf 50	Robert Russ	—	1903 (?)	60	do	16.1m	48	do	5.85m	Feb. 27, 1954	C, H	F, S	Water reported good, soft. Temperature 52° F.
Bf 51	Do	—	1934	60	Driven	24	1¼	Pleistocene and Pliocene(?)	12	1952	C, H	D, S	Water reported good, soft. Temperature 54° F.
Bf 52	Donald Burkindine	—	1934	55	do	12	1¼	Pleistocene	8	1952	R, E	D, S	Water reported good, soft.
Bf 53	Do	—	1903 (?)	55	Dug	12.5m	42	do	8.54m	Feb. 27, 1954	C, H	F, S	Temperature 52° F.
Bf 54	Wm. S. George, Jr.	—	1934	60	Driven	36	1¼	Pleistocene and Pliocene(?)	10	1952	C, H	F, S	Do
Bf 55	Do	—	1935	60	do	30	1¼	do	10	Jan. 1954	C, H	D, S	Do
Bf 56	Henry Kellum	—	1903 (?)	50	Dug	14.8m	42	Pleistocene	6.60m	Mar. 6, 1954	C, H	D, F, S	Water reported good, soft. Temperature 48° F.
Bf 57	Mrs. Bertha Schwarten	—	1903 (?)	60	do	10	48	do	6	1952	N	N	For fire protection.
Bf 58	Do	—	1928	60	Driven	45	1¼	Pleistocene and Pliocene(?)	12	1952	R, E	D, F, S	Water reported good, soft.
Bf 59	Hackett Harris	—	1940	60	do	22	1¼	do	8	1953	R, E	D, F, M	Do
Bf 60	Aubrey A. Stinson	—	1903 (?)	60	Dug	22	48	do	14	1953	R, E	D, F, S	Do
Bf 61	Emmett Sylvester	—	1903 (?)	70	do	30	48	do	17	1952	R, E	D, F, S	Do
Bf 62	Taylor Messix	—	1903 (?)	70	do	15.4m	48	Pleistocene	11.41m	Dec. 26, 1953	R, E	D, F, S	Do
Bf 63	Alton Ewing	C. Rude	1947	60	Jetted	150	5	Calvert	15	Sep. 15, 1947	R, E	D, S	Water reported very "irony". Drawdown reported 3 feet after 12 hours pumping 8 gpm.
Bf 64	Board of Education	—	—	45	Driven	35	1¼	Pleistocene and Pliocene(?)	—	—	R, E	P, L	
Bf 65	Harry Gilloff	—	—	45	do	35	1¼	do	—	—	R, E	F, M	
Bf 66	Esskay Poultry Plant	Layne Atlantic Co.	1947	45	Drilled	990	14–8	Matawan(?) and Magothy(?)	90	Apr. 25, 1947	N	N	See log. Well abandoned, filled in. Drawdown reported 185 feet after 24 hours pumping 210 gpm.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Bf 67	Esskay Poultry Plant	Layne Atlantic Co.	1948	45	Drilled	292	—	Calvert(?)	—	—	T, E	I, L	Use approximately 150 gpm 8 hours per day from Bf 67 and 68.
Bf 68	Do	do(?)	1948	45	do	290	—	do	—	—	T, E	I, L	
Bf 69	Phillips Packing Co.	—	1938 (?)	55	—	250(?)	6	do	—	—	T, E	I, L	Water reported slightly hard. Average pumpage 8,800 gpd.
Bf 70	Do	—	1938 (?)	55	—	250(?)	6	do	—	—	T, E	I, L	Do
Bf 71	Do	Shannahan Artesian Well Co.	1940	55	Jetted	860	8–6	Monmouth(?) and Matawan(?)	60	Sep. 1940	T, E	I, L	See log. Water reported good. Screened 619–670 feet. Open hole 809–860 feet.
Bf 72	Esskay Poultry Plant	do	1954	42	Drilled	52	10	Pleistocene and Pliocene(?)	11	Sep. 1940	T, E	C, L	See log. Drawdown reported 14 feet after 4 hours pumping 175 gpm.
Bf 73	Do	do	1955	42	do	288^{m}	4	Calvert(?)	26.64^{m}	Mar. 10, 1956	—	O	See log.
Bf 74	Do	do	1955	42	do	$48\frac{1}{2}^{m}$	4	Pleistocene and Calvert(?)	10.90^{m}	Mar. 24, 1956	—	O	Do
Bf 75	Do	do	1954	42	do	348	4	Calvert(?)	—	—	—	T	Do
Bf 76	Do	do	1954	45	do	348	4	do	—	—	—	T	Do
Bf 77	Do	Layne Atlantic Co.	1947	45	do	330	10	Calvert(?) and Piney Point(?)	—	—	—	N	See log. Plugged and abandoned. Screened 275–295 feet and 310–331 feet.
Cb 1	S. Jackson, Jr.	Shannahan Artesian Well Co.	1949	8	do	448	4–2	Aquia	7	Mar. 11, 1949	Ic, E	D, S	Drawdown reported 32 feet after 6 hours pumping 35 gpm. Open hole 414–448 feet.
Cb 2	Harrison-Jarboe Cannery	A. L. Wilson	1948	10	do	357	2½	do	8.5	Mar. 23, 1948	R, E	I, M	Drawdown reported 8.5 feet after 11.5 hours pumping 12 gpm. Average pumpage 2,000 gpd. Screened from 337–357 feet.
Cb 3	Do	do	1946	10	do	396	1½	do	6	Sep. 5, 1951	R, E	I, M	See log. Drawdown reported 8 feet after 4 hours pumping 22 gpm. Average pumpage 1,100 gpd. Open hole 340–396 feet.

Cb 4	Harrison-Jarboe Cannery	Shannahan Artesian Well Co.	—	10	do	400(?)	1¼	do	—	—	R, E	I, L	Average pumpage 5,400 gpd. Probably well 19, Md. Geol. Survey, v. 10, p. 298.
Cb 5	S. N. Cameron	do	1948	15	Jetted	382	4-2	do	13	Aug. 28, 1948	A, E	D, S	See log. Drawdown reported 20 feet after 6 hours pumping 40 gpm. Open hole 334–382 feet.
Cb 6	Mrs. J. A. Miller	do	1948	14	do	431	4-2	do	12	Sep. 10, 1948	A, E	D, S	Drawdown reported 16 feet after 8 hours pumping 25 gpm. Screened.
Cb 7	E. H. Ilgenfritz	A. L. Wilson	1951	8	do	210	1¼	Piney Point(?)	8	Sep. 7, 1951	C, H	D, S	Drawdown reported 12 feet after 4 hours pumping 16 gpm. Water reported good. Open hole 147–210 feet.
Cb 8	Newton Harrison	do	1951	7	do	204	1¼	do	8	Sep. 27, 1951	C, H	D, S	Drawdown reported 13 feet after 4 hours pumping 10 gpm. Open hole 153–204 feet.
Cb 9	Theo Richardson	do	1951	7	do	202	1¼	do	8	Nov. 19, 1951	C, H	D, S	Drawdown reported 11 feet after 5 hours pumping 15 gpm. Water reported slightly "irony". Open hole 131–202 feet.
Cb 10	Harry A. Hyde	Burgess	1947	6	Jetted	413	1¼	Aquia	5.5	Jan. 13, 1947	J, E	D, S	Water reported excellent. Screened 407–413 feet.
Cb 11	Bernard Smith	J. W. Wilson & Sons	1948	12	do	387	3-2	do	8	Feb. 1948	C, H	D, S	Drawdown reported 12 feet after 4 hours pumping 20 gpm. Open hole 352–387 feet.
Cb 12	Mrs. Bertha Harrison	A. L. Wilson	1947	5	do	210	1¼	Piney Point(?)	8	Dec. 16, 1947	J, E	D, S	See log. Drawdown reported 7 feet after 3 hours pumping 10 gpm. Open hole 153–210 feet.
Cb 13	Albert Neavitt	do	1951	8	do	378	1¼	Aquia	7	Sep. 5, 1951	J, E	D, S	Drawdown reported 8 feet after 6 hours pumping 18 gpm. Screened 358–378 feet.
Cb 14	E. O. Jump	do	1948	8	do	408	1¼	do	6	Mar. 20, 1948	J, E	D, S	Drawdown reported 14 feet after 4 hours pumping 23 gpm. Open hole 370–408 feet.
Cb 15	Bulia Jump	J. W. Wilson	1952	10	do	210	1¼	Piney Point(?)	7	Sep. 26, 1952	R, E	D, S	Drawdown reported 12 feet after 4 hours pumping 15 gpm. Water reported good. Open hole 141–210 feet.
Cb 16	Chas. Spache Estate	Burgess	1950	10	do	403	1¼	Aquia	7	Jul. 23, 1950	J, E	D, S	Water reported very soft. Screened 397–403 feet.
Cb 17	Mrs. Harriett Vozza	do	1946	7	do	416	1¼	do	4.5	Mar. 7, 1946	R, E	D, I, S	See log. Water reported good. Open hole 363–416 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cb 18	William Cummings	C. Rude	1951	8	Jetted	210	1½	Piney Point(?)	8	Feb. 14, 1951	R, E	D, F, S	Water reported good. Open hole 168–210 feet.
Cb 19	Mrs. William A. Jackson	A. L. Wilson	1946	7	do	210	1½	do	6	Apr. 12, 1946	R, E	D, S	Drawdown reported 24 feet after 3 hours pumping 12 gpm. Water reported brackish at times. Open hole 140–210 feet.
Cb 20	Mrs. M. L. Havey	do	1946	7	do	402	1½	Aquia	4	Apr. 3, 1946	J, E	D, S	Drawdown 17 feet after 6 hours pumping 18 gpm. Water reported good. Open hole 370–402 feet.
Cb 21	Ormand Lednum	do	1951	10	do	212	1½	Piney Point(?)	9	Sep. 25, 1951	J, E	D, S	Drawdown reported 12 feet after 4 hours pumping 11 gpm. Water reported good. Open hole 158–212 feet.
Cb 22	Frank Palper	Burgess	1947	10	do	433	1½	Aquia	6.5	Feb. 12, 1947	E	D, S	See log. Screened 427–433 feet.
Cb 23	Mrs. J. Walter May	Shannahan Artesian Well Co.	1937	8	do	409	3–2	do	7	Nov. 24, 1937	J, E	D, S	See log. Water reported good. Open hole 375–409 feet.
Cb 24	Mrs. Fred George	A. L. Wilson	1947	10	do	210	1½	Piney Point(?)	4	Dec. 12, 1947	J, E	D, S	Drawdown reported 7 feet after 3 hours pumping 10 gpm. Open hole 147–210 feet.
Cb 25	Dr. H. O. Kerr	Shannahan Artesian Well Co.	1948	8	do	444	4–2	Aquia	9.	Oct. 20, 1953	A, E	D, S	See log. Open hole 405–444 feet.
Cb 26	R. L. Button	A. L. Wilson	1952	8	do	360	1½	do	4.0	Feb. 26, 1952	J, E	D, S	Drawdown reported 5 feet after 4 hours pumping 18 gpm. Open hole 340–360 feet.
Cb 27	Roy Thomas	C. Rude	1951	8	do	378	2½–1½	do	10	Dec. 14, 1951	J, E	D, S	Water reported good. Open hole 357–378 feet.
Cb 28	Sidney Bear	L. Rude & Son	1950	8	do	396	2½–1½	do	8	Feb. 15, 1950	J, E	D, S	Screened 378–396 feet.
Cb 29	Mrs. C. J. Abbott	Shannahan Artesian Well Co.	1952	11	do	418	4–2	do	8.5	Jan. 21, 1952	T, E	D, S	Drawdown reported 11.5 feet after 6 hours pumping 20 gpm. Open hole 188–418 feet.

Cb 30	Miss Ella Graubart	do	1946	7	do	428	4½–2	do	8	May 31, 1946	A, E	D, S	See log. Drawdown reported 26 feet after 6 hours pumping 50 gpm. Open hole 395–428 feet.
Cb 31	Ormon Lednum	A. L. Wilson	1948	8	do	397	1½	do	7	Jan. 17, 1948	J, E	D, S	Drawdown reported 8 feet after 6 hours pumping 15 gpm. Water reported good. Open hole 377–397 feet.
Cb 32	Carroll Harrison	do	1947	8	do	210	1½	Piney Point(?)	5	Dec. 22, 1947	J, E	D, S	Drawdown reported 10 feet after 3 hours pumping 12 gpm. Water reported good. Open hole 147–210 feet.
Cb 33	Frank Gratton	Burgess	1951	6	do	409	2½–1	Aquia	4	Jun. 2, 1951	J, E	D, S	Screened 403–409 feet.
Cb 34	West Sherwood Farms Inc.	Shannahan Artesian Well Co.	1936	8	do	500	—	do	—	—	T, E	D, F, M	Water reported good.
Cb 35	Manuel Alvarez	Burgess	1953	4	do	400	1½	do	4.64m	Mar. 23, 1953	N	D, S	See log. Water reported good. Screened 388–400 feet.
Cb 36	Walter West	do	1948	4	do	399	1½	do	5.5m	Nov. 10, 1948	J, E	D, S	Water reported good. Screened 391–399 feet.
Cb 37	James E. Morrison	J. Wilson & Sons	1947	4	do	387	1½	do	3	Jan. 30, 1947	J, E	D, S	Drawdown reported 19 feet after 4 hours pumping 22 gpm. Water reported good. Open hole 367–387 feet.
Cb 38	F. J. Barrett	Harrison	1943	8	do	212	1½	Piney Point(?)	—	—	J, E	D, S	Water reported good.
Cb 39	Stanley W. Cook	J. Wilson & Sons	1948	8	do	393	1½	Aquia	6	Mar. 1, 1948	J, E	D, S	Drawdown reported 9 feet after 6 hours pumping 10 gpm. Water reported good. Screened 378–393 feet.
Cb 40	F. O. Grattan	Burgess	1953	4	do	400	2½–1½	do	4	Feb. 12, 1953	N	D, S	Open bole 388–400 feet.
Cb 41	Herndon E. Steilke	do	1946	3	do	416	1½–1	do	5	Aug. 20, 1946	E	D, S	See log. Screened 412–416 feet.
Cb 42	Wm. McKenney	J. W. Wilson	1945	10	do	420	1½	do	5	Aug. 9, 1945	J, E	D, S	Drawdown reported 6 feet after 3 hours pumping 16 gpm. Water reported good.
Cb 43	N. L. Brundage	Burgess	1946	8	do	416	1½	do	6	Feb. 19, 1946	J, E	D, S	See log. Water reported good. Open hole 365–416 feet.
Cb 44	Do	—	—	8	do	450	3–2	do	6.61m	Mar. 23, 1953	C, H	P, S	
Cb 45	Capt. Dan Higgins	A. L. Wilson	1951	3	do	210	1½	Piney Point(?)	5	May 10, 1951	J, E	D, S	Drawdown reported 13 feet after 5 hours pumping 13 gpm. Open hole 153–210 feet.
Cb 46	Nelson Ball	C. Rude	1949	7	do	378	1½	Aquia	6	Apr. 1, 1949	R, E	D, S	Field analysis, Feb. 10, 1954: chloride 26 ppm, hardness 110 ppm, iron 0.1 ppm, pH 8.5. Temperature 56° F.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipmnet	Use of water	Remarks
Cb 47	Arthur Morris	A. L. Wilson	1948	12	Jetted	393	1½	Aquia	7	Feb. 2, 1948	R, E	D, S	Drawdown reported 7 feet after 4 hours pumping 17 gpm. Water reported good. Open hole 373-393 feet.
Cb 48	G. Conway	J. W. Wilson	1948	3	do	390	1½	do	5	Feb. 14, 1948	J, E	D, S	Drawdown reported 10 feet after 4 hours pumping 22 gpm. Water reported good. Open hole 330-390 feet.
Cb 49	George Palmer	Harrison	1949	12	do	410	1½	do	15	Oct. 30, 1949	C, H	D, S	Drawdown reported 15 feet after 4 hours pumping 20 gpm. Water reported good. Open hole 380-410 feet.
Cb 50	Wilbur Schweinsburg	C. Rude	1946	8	do	410	1½	do	6	Mar. 6, 1946	J, E	D, S	Drawdown reported 6 feet after 5 hours pumping 15 gpm. Water reported good. Open hole 336-410 feet.
Cb 51	Edward Burling, Jr.	Shannahan Artesian Well Co.	1951	12	do	370	3-2	do	9	Nov. 28, 1951	A, E	D, S	Drawdown reported 16 feet after 10 hours pumping 15 gpm. Water reported good. Open hole 318-370 feet.
Cb 52	Arthur Mason	A. L. Wilson	1952	12	do	356	1½	do	5	Feb. 18, 1952	J, E	D, S	Drawdown reported 11 feet after 4 hours pumping 12 gpm. Water reported good. Open hole 320-356 feet.
Cb 53	Arvel Jones	L. Rude & Son	1950	7	do	340	1½	do	10	Nov., 1950	R, E	D, S	Water reported good. Open hole 315-340 feet.
Cb 54	J. Walter Jones	do	1947	7	do	357	1½	do	8	Apr. 25, 1947	R, E	D, S	Water reported good.
Cb 55	Starkey	do	1946	7	do	330	1½	do	4	Oct. 10, 1946	Ic, E	D, S	Water reported good. Open hole 315-330 feet.
Cb 56	Roland Marshall, Sr.	A. L. Wilson	1951	9	do	378	1½	do	8	Sep. 14, 1951	C, H	D, S	Drawdown reported 8 feet after 4 hours pumping 10 gpm. Water reported good. Open hole 358-378 feet.
Cb 57	Wesley Sewell	do	1948	10	do	370	1½	do	6	Mar. 6, 1947	R, E	D, S	Drawdown reported 12 feet after 4 hours pumping 10 gpm. Water reported good. Open hole 350-370 feet.

Cb 58	Roy Sewell	J. Wilson & Son	1947	10	do	374	1½	do	6	Mar. 7, 1947	R, E	D, S	Drawdown 16 feet after 4 hours pumping 20 gpm. Water reported good. Open hole 354–374 feet.
Cb 59	Seth Harrison	Burgess	1950	9	do	168	1½	Piney Point(?)	7.5	Oct. 25, 1950	C, H	D, S	Water reported good. Open hole 126–168 feet.
Cb 60	William Marshall	A. L. Wilson	1951	5	do	380	1½	Aquia	5.5	Sep. 18, 1951	C, H	D, S	Drawdown reported 4.5 feet after 4 hours pumping 12 gpm. Water reported good. Open hole 360–380 feet.
Cb 61	Nick Cummings	L. Rude & Son	1946	10	do	350	1½	do	4	Oct. 1, 1946	N	N	See log. Water reported poor. Open hole 330–350 feet. Well abandoned.
Cb 62	Do	do	1946	10	do	350	1½	do	—	—	R, E	D, S	See log of Cb 61. Water reported fair.
Cb 63	Lloyd Knotts	A. L. Wilson	1951	10	do	378	1½	do	6	May 19, 1951	R, E	D, S	Drawdown reported 10 feet after 4 hours pumping 18 gpm. Water reported good. Screened 358–378 feet
Cb 64	Cummings, Marshall, & Jones	J. Wilson & Sons	1949	10	do	395	1½	do	10	Oct., 1949	R, E	D, M	Water reported good. Open hole 368–395 feet.
Cb 65	Mrs. Milton Kersey	A. L. Wilson	1946	10	do	405	1½	do	8	May 11, 1946	C, H	D, S	Field analysis, Feb. 10, 1954: chloride 30 ppm, hardness 145 ppm, iron 1.3 ppm, pH 8.5. Drawdown reported 19 feet after 5 hours pumping 20 gpm. Open hole 355–405 feet.
Cb 66	J. W. Fairbanks	do	1946	10	do	405	1½	do	8	May 7, 1946	R, E	D, M	Drawdown reported 19 feet after 6 hours pumping 22 gpm Water reported good. Open hole 360–405 feet.
Cb 67	George Jones	J. Wilson & Sons	1947	12	do	403	1½	do	11	Sep. 6, 1947	J, E	D, S	Water reported good. Drawdown reported 14 feet after 4 hours pumping 15 gpm. Open hole 357-403 feet.
Cb 68	George Jones	Jones	1952	12	Driven	19.6[m]	1½	Pleistocene	2.52[m]	Apr. 17, 1953	C, H	F, S	Water reported very hard.
Cb 69	William Brando	J. W. Wilson	1946	8	Jetted	405	1½	Aquia	5	May 17, 1946	R, E	D, S	Water reported good. Drawdown reported 17 feet after 5 hours pumping 21 gpm. Open hole 370–405 feet.
Cb 70	Do	Brando	1928	8	Drilled	154.9[m]	1½	Piney Point(?)	7.2[m]	Apr. 17, 1953	N	N	Well abandoned. Water reported very hard.
Cb 71	Avery Fairbanks	Burgess	1949	8	Jetted	147	1½	do	5.5	Oct. 24, 1949	C, H	D, S	Water reported good. Open hole 111–147 feet.
Cb 72	Dr. Raymond L. Johnston	A. L. Wilson	1951	6	do	378	1½	Aquia	6	Sep. 22, 1951	R, E	D, F, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 9 gpm. Open hole 358-378 feet.
Cb 73	Do	—	—	6	Dug	10.8[m]	20	Pleistocene	3.68[m]	Apr. 17, 1953	N	N	Water reported marshy and "irony".

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cb 74	Millard Fairbanks	A.L. Wilson	1946	10	Jetted	405	1¼	Aquia	4	Apr. 27, 1946	R, E	D, S	Water reported good. Drawdown reported 14 feet after 5 hours pumping 21 gpm. Open hole 365-405 feet.
Cb 75	Dewey Fairbanks	J. Wilson & Sons	1952	10	do	378	1¼	do	10	Oct. 2, 1952	R, E	D, S	Water reported good. Drawdown reported 6 feet after 6 hours pumping 15 gpm.
Cb 76	Walter R. Frake	do	1949	10	do	394	1¼	do	10	Oct., 1949	R, E	D, S	Water reported good. Open hole 354–394 feet.
Cb 77	Guy Putman	do	1950	11	do	410	1¼	do	12	Apr., 1950	R, E	D, S	Water reported good. Open hole 340–410 feet.
Cb 78	Hettie A. Harrison	do	1948	10	do	381	1¼	do	7	Mar. 25, 1948	R, E	D, S	Water reported good. Drawdown reported 13 feet after 4 hours pumping 25 gpm. Open hole 346–381 feet.
Cb 79	Bena E. Sewell	do	1947	10	do	357	1¼	do	6	Feb. 3, 1947	S, E	D, F, S	Water reported good. Drawdown reported 16 feet after 4 hours pumping 22 gpm. Open hole 336–357 feet.
Cb 80	Do	Brando	—	10	do	327[m]	1¼	do	6.22[m] 6.50[m]	Jun. 4, 1953 Sep. 11, 1953	C, H	F, S	Water reported good.
Cb 81	E. K. Harrison	J. Wilson & Sons	1948	11	do	374	1¼	do	8	Feb. 21, 1948	Ic, E	D, S	Water reported good. Drawdown reported 7 feet after 3 hours pumping 22 gpm. Open hole 329–374 feet.
Cb 82	Wm. F. Howeth	do	1947	11	do	387	1¼	do	8	Apr. 19, 1947	R, F	D, S	Water reported good. Drawdown reported 14 feet after 15 hours pumping 4 gpm. Open hole 345–387 feet.
Cb 83	Mrs. Merton Jarbo	do	1948	6	do	376	1¼	do	5	Apr. 17, 1948	Ic, E	D, S	Field analysis, Feb. 10, 1954: chloride 6 ppm, hardness 110 ppm, iron 0.1 ppm, pH 8.5. Temperature 53° F. Open hole 346–376 feet.
Cb 84	Mrs. M. Gillespie	do	1948	10	do	398	1¼	do	6	Dec. 10, 1948	C, H	D, S	Water reported good. Drawdown reported 6 feet after 10 hours pumping 25 gpm. Open hole 367–398 feet.

Ch 85	Mrs. Hendrik Booraem	Shannahan Artesian Well Co.	1947	3	do	417	4½-2	do	8	Feb. 18, 1947	A, E	D, S	See log. Water reported good. Drawdown reported 22 feet after 6 hours pumping 25 gpm. Screened 397–407 feet.
Ch 86	J. Harry Leonard	L. Rude & Son	1950	10	do	400	2½-1¼	do	10	Sep. 14, 1950	J, E	D, S	Screened 382–400 feet.
Ch 87	William J. Ledman	J. W. Wilson	1952	8	do	210	1¼	Piney Point(?)	7	Sep. 24, 1952	J, E	D, S	Water reported excellent. Drawdown reported 12 feet after 5 hours pumping 14 gpm. Open hole 141–210 feet.
Ch 88	Harrison-Jarboe	Shannahan Artesian Well Co.	1949	2	do	412.2[m]	4–2	Aquia	1.74[m] 2.27[m]	Jun. 2, 1953 Sep. 11, 1953	R, Ic, E	I, M	See log. Water tasted good. Drawdown reported 12.5 feet after 8 hours pumping 30 gpm. Average pumpage 3,000 gpd. Screened 354–374 feet. Open hole 374–413 feet.
Ch 89	Pan American Refining Corp.	Layne Atlantic Co.	1953	13	Drilled	1520	10–4	Magothy(?) and Raritan (?)	—	—	—	T	See log and chemical analyses. Two deep aquifers flow 915–980 ft. at 12 gpm and 1351–1420 ft. at 8.5 gpm from 7 ft. above land surface. Temperature of upper flow 68.5° F. Temperature of deeper flow 69° F. Waters very irony and low in dissolved solids. Well capped but not plugged.
Ch 90	Grace Littleton	J. Wilson & Sons	1947	8	Jetted	370	1¼	Aquia	8	Sep. 24, 1947	C, H	D, M	Water reported good. Drawdown reported 12 feet after 4 hours pumping 15 gpm. Open hole 330–370 feet.
Ch 91	Percy Marshall	do	1946	5	do	420	—	do	6	1946	R, E	D, S	See chemical analysis.
Cc 1	F. S. Bache	Shannahan Artesian Well Co.	1946	10	do	423	3-2	do	8.5	Jun. 22, 1946	Ic, E	D, M	See log. Water reported slightly "irony". Screened 413–423 feet.
Cc 2	N. M. Shannahan, Jr.	Shannahan Artesian Well Co.	1948	8	do	450	3-2	do	7	Sep. 7, 1948	A, E	D, S	See log. Drawdown reported 23 feet after 18 hours pumping 25 gpm. Open hole 363–450 feet.
Cc 3	A. R. Eason	Burgess	1949	5	do	357	1¼	Piney Point(?)	6	Nov. 21, 1949	J, E	D, S	See log. Water reported hard. Open hole 236–357 feet.
Cc 4	John & Minnie Smith	do	1948	5	do	360	1¼	do	6.5	Nov. 20, 1948	R, E	D, S	Field analysis, Feb. 10, 1954: chloride 70 ppm, hardness 93 ppm, iron <0.1 ppm, pH 8.5. Temperature 59° F. Open hole 235–360 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cc 5	Wm. J. Hook	Burgess	1950	5	Jetted	336	1¼	Piney Point(?)	9.63	Jun. 13, 1952	J, E	D, S	Water reported good. Open hole 221–336 feet.
Cc 6	Francis M. O'Brien	do	1948	3	do	357	2	do	8	Nov. 15, 1948	J, E	D, S	Water reported good. Open hole 234–357 feet.
Cc 7	Dennis Todd	do	1949	5	do	360	2	do	8	Mar. 31, 1949	J, E	D, F, M	Water reported good. Drawdown reported 12 feet after 8 hours pumping 25 gpm. Open hole 230–360 feet.
Cc 8	Paul Shortall	do	1952	12	do	273	3–2	do	10	Apr. 24, 1952	J, E	D, F, S	See log. Water reported good. Open hole 208–273 feet.
Cc 9	Mr. Calvert	do	1950	4	do	336	1¼	do	8	Jun. 27, 1950	E	D, S	Water reported good. Open hole 226–336 feet.
Cc 10	Gus Kilmon	do	1953	8	do	357	1¼	do	7	Jan. 28, 1953	C, H	D, S	Water reported good. Open hole 231–357 feet.
Cc 11	Roland Lloyd	do	1952	10	do	336	1¼	do	7.5	Jun. 28, 1952	R, E	D, S	Water reported good. Open hole 231–336 feet.
Cc 12	Roger Ringgold	L. Rude & Son	1946	8	do	420	2½–1¼	Aquia	12	Mar. 29, 1946	E	D, S	Drawdown reported 6 feet after 12 hours pumping 30 gpm. Screened 408–420 feet.
Cc 13	A. Rasmussen and R. N. Tilley	Burgess	1948	6	do	273	2½	Piney Point(?)	6.5	Sep. 14, 1948	R, E	D, S	Water reported good. Open hole 195–273 feet.
Cc 14	A. B. Scofield	Shannahan Artesian Well Co.	1951	4	do	442	4–2	Aquia	6.1	Dec. 12, 1951	A, E	D, S	See log. Drawdown reported 34 feet after 6 hours pumping 30 gpm. Screened 422–437 feet.
Cc 15	Milton G. Englert	do	1952	4	do	455	3–1¼	do	6.5	Sep. 20, 1952	E	D, S	Drawdown reported 18.5 feet after 4 hours pumping 13 gpm. Screened 435–455 feet.
Cc 16	Thomas S. Arms	C. Rude	1951	6	do	210	2½	Piney Point(?)	6	Sep. 27, 1951	J, E	D, S	See log. Water reported good. Open hole 147–210 feet.
Cc 17	Col. John B. Thompson	Shannahan Artesian Well Co.	1948	8	do	411	4–2	Aquia	11.5	May 28, 1948	A, E	D, S	Water reported good. Drawdown reported 23.5 feet after 10 hours pumping 35 gpm. Screened 372–382 and 395–405 feet.

Cc 18	A. G. Hayden and C. Fisher	Shannahan Artesian Well Co.	1947	3	do	410	4½–2	do	4	Oct. 17, 1947	A, E	D, S	Water reported good. Drawdown reported 56 feet after 10 hours pumping 50 gpm. Screened 399–409 feet.
Cc 19	Samuel Wood	do	1946	6	do	450	3–2	do	9.5	Jan. 12, 1946	R, E	D, S	Water reported good. Drawdown reported 40.5 feet after 6 hours pumping 45 gpm. Screened 445–450 feet.
Cc 20	John North	L. Rude & Son	1946	10	do	410	2½–1½	do	5	Jun. 15, 1946	J, E	D, S	Drawdown reported 3 feet after 36 hours pumping 30 gpm. Open hole.
Cc 21	John J. Yulias	Burgess	1948	10	do	440	1½	do	7	Apr. 24, 1948	E	D, S	See log. Water reported good. Open hole 410–440 feet.
Cc 22	Dr. R. S. Lecompt	do	1951	4	do	200	1½	Piney Point(?)	5.5	Jul. 15, 1951	J, E	D, S	Water reported good. Screened 195–200. feet.
Cc 23	Mrs. Margaret Baker	do	1951	3	do	231	1½	do	5	Jul. 15, 1951	C, H	D, S	Open hole 199–231 feet.
Cc 24	Angela Pentz	do	1950	3	do	231	1½	Calvert and Piney Point (?)	6.5	Jun. 5, 1950	R, E	D, S	Water reported slightly hard. Open hole 174–231 feet.
Cc 25	Mr. Marshall	do	1951	7	do	200	1½–1	Piney Point(?)	5.5	Aug. 2, 1951	C, H	D, S	Screened 195–200 feet.
Cc 26	Dr. Frank A. Quintaro	Shannahan Artesian Well Co.	1947	5	do	381	4½–2	Aquia	9	Nov. 3, 1947	A, E	D, S	See log and chemical analysis. Drawdown reported 21 feet after 6 hours pumping 30 gpm. Screened 370–380 feet.
Cc 27	Herman Kunse	Burgess	1949	8	do	414	4–2	Calvert, Piney Point(?) and Nanjemoy	8	Apr. 28, 1949	R, E	D, S	See log. Water reported excellent. Drawdown reported 17 feet after 16 hours pumping 20 gpm. Open hole 171–414 feet.
Cc 28	Town of St. Michaels	Shannahan Artesian Well Co.	1900	10	do	187^{m}	8	Calvert(?)	9.25^{m} 9.64^{m}	May 28, 1953 Sep. 11, 1953		P, S	Water reported very bad. Fire emergency well. See Md. Geol. Survey, v. 10, p. 298, well 36. Open hole 177–188 feet.
Cc 29	Do	do	1928	10	do	454.5	8	Aquia	8	1928	T, E	P, L	See chemical analysis. Average pumpage 14,800 gpd.
Cc 30	M. G. Pierce	Burgess	1946	12	do	250	2½–1½	Piney Point(?)	2	Feb. 4, 1946	R, E	D, S	Water reported hard. Drawdown reported 10 feet after 10 hours pumping 20 gpm. Open hole 194–250 feet.
Cc 31	Louis Dabney	do	1940	12	do	252	2½	do	7	May 10, 1940	R, E	D, F, S	See log. Water reported hard. Drawdown reported 13 feet after 6 hours pumping 40 gpm. Open hole 195–252 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cd 1	Charles H. Wieland, Jr.	L. Rude & Son	1940	15	Jetted	600	—	Aquia	—	—	C, E	D, S	Water reported soft.
Cd 2	Frank Collins	Shannahan Artesian Well Co.	1943	13	do	260	4	Piney Point(?)	—	—	C, W H	F, S	Water reported good.
Cd 3	William S. Willis	do	1945	15	do	586	3–2	Aquia	25	Apr., 1950	J, E	D, F, S	
Cd 4	T. Edgar Herbert	do	1940	15	do	576	—	do	—	—	R, E	D, S	Water reported good.
Cd 5	W. H. Coleman	do	1943	16	do	586	3	do	—	—	Ic, E	D, S	Do
Cd 6	Mrs. P. K. Wright	do	1913	15	do	600	—	do	—	—	R, E	D, S	Do
Cd 7	Gerard C. Smith	do	—	15	do	—	4	—	—	—	T, E	D, S	Do
Cd 8	Do	do	—	15	do	—	3	—	—	—	R, E	F, M	Do
Cd 9	Mr. Carey	S. Rude	1937	17	do	180	3	Calvert(?)	13	1945	R, E	D, S	Water reported "irony" and bad.
Cd 10	Glenn Dudrow	—	1945	17	do	320	3½	Piney Point(?)	14	—	J, E	D, F, M	Water reported hard and "irony".
Cd 11	William H. Adkins	—	1940	12	Dug	23.5^{m}	48	Pleistocene	19.6^{m}	Aug. 14, 1950	Ic, E	D, F, M	Water reported good.
Cd 12	William P. Kemp	Burgess	1947	12	Jetted	378	2	Piney Point(?)	11.5	Sep. 17, 1947	J, E	D, S	See log. Drawdown reported 13.5 feet after 8 hours pumping 20 gpm. Open hole 260–378 feet.
Cd 13	E. S. Linthicum	do	1947	12	do	378	2	do	9.5	Oct. 9, 1947	—	D, S	Open hole 267–378 feet.
Cd 14	G. W. Barner	do	1947	12	do	378	4–2½	do	9.5	Oct. 27, 1947	—	D, S	Drawdown reported 15.5 feet after 10 hours pumping 50 gpm. Open hole 264–378 feet.
Cd 15	Dr. Hillard L. Weer	Shannahan Artesian Well Co.	1948	12	do	558	4–2	Aquia	13	Feb. 21, 1948	A, E	D, S	See log. Water reported good. Screened 533–552 feet.
Cd 16	Jacob S. New	Burgess	1949	25	do	77	4–2½	Choptank(?)	10.5	Jan., 1949	—	D, S	Water reported slightly marshy.
Cd 17	Samuel G. Carroll	L. Rude & Son	1948	25	do	609	2½	Aquia	16	May, 1948	R, E	D, S	See log. Water reported good. Screened 580–600 feet.
Cd 18	Mrs. J. N. Critchlow	Shannahan Artesian Well Co.	1950	12	do	600	4-2	do	14.5	Mar. 9, 1950	A, E	D, S	Water reported slightly hard and yellow. Drawdown reported 10 feet after 6 hours pumping 15 gpm. Screened 572–592 feet.

Cd 19	Dr. Howard Kinnamon	L. Rude & Son	1947	12	do	582	2½–1½	do	14	Sep., 1948	R, E	D, S	See log. Water reported good. Screened 554–572 feet.
Cd 20	Mrs. Myra Kinnamon	do	1950	13	do	600	2½–1½	do	14	Oct. 20, 1950	R, E	D, S	Water reported good. Screened 588–600 feet.
Cd 21	L. J. Hathway	Shannahan Artesian Well Co.	1948	15	do	584	4–2	do	12	Apr. 8, 1950	A, E	D, S	See log. Water reported good. Screened 562–582 feet.
Cd 22	H. C. Forman	Burgess	1952	13	do	350	3–2	Piney Point(?)	9	Sep. 5, 1952	J, E	D, S	See log. Water reported slightly "irony". Open hole 219–350 feet.
Cd 23	H. W. Dodge	L. Rude & Son	1950	10	Jetted	521	2½–1½	Aquia	14	Mar. 29, 1950	J, E	D, S	See log. Water reported slightly "irony".
Cd 24	H. E. McCullough	Shannahan Artesian Well Co.	1950	8	do	334	3	Piney Point(?)	8.6	Oct. 21, 1950	A, E	D, F, M	Water reported to be slightly salty. Drawdown reported 18.3 feet after 10 hours pumping 20 gpm. Open hole 219–334 feet.
Cd 25	Dr. Randall Clifford	do	1946	8	do	307	4½–3	do	9.8	Apr. 9, 1946	J, E	D, F, M	See log. Water reported slightly marshy. Drawdown reported 10.75 feet after 6 hours pumping 30 gpm. Open hole 207–307 feet.
Cd 26	Peter Thompson	do	1950	9	do	312	3	do	12	Jun. 30, 1950	R, E	F, S	See chemical analysis. Drawdown reported 18 feet after 4 hours pumping 20 gpm. Open hole 209–312 feet.
Cd 27	Andrew Shortall	Burgess	1951	13	do	273	3–2	do	7.5	Oct. 2, 1951	J, E	D, F, M	See log. Water tasted good. Open hole 191–273 feet.
Cd 28	Alton Gregory	do	1950	13	do	252	2	do	9	Jan. 27, 1950	R, E	F, M	See log. Water reported to be good. Open hole 193–252 feet.
Cd 29	Wm. Daffin	do	1951	10	do	270	2	do	7.5	Oct. 12, 1951	J, E	D, S	Water reported hard. Open hole 190–270 feet.
Cd 30	Robert L. Bartlett	Shannahan Artesian Well Co.	1950	8	do	376	3	do	11	Aug. 30, 1950	A, E	D, S	See log. Water reported slightly hard. Drawdown reported 59 feet after 8 hours pumping 30 gpm. Open hole 262–376 feet.
Cd 31	Wm. Mitchell Price	Burgess	1949	8	do	400	4–2½	do	7.5	Jul. 18, 1949	N	N	Well capped. Open hole 237–400 feet.
Cd 32	Lars Anderson	Shannahan Artesian Well Co.	1948	8	do	595	6–3	Aquia	12	Nov. 27, 1948	J, E	D, M	Drawdown reported 8 feet after 10 hours pumping 30 gpm. Screened 565–595 feet.
Cd 33	Nils Anderson	do	1953	8	do	529	4–2	do	10	Mar. 25, 1953	J, E	D, M	Screened 508–528 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cd 34	Mrs. Margaret B. Schiller	Shannahan Artesian Well Co.	1951	14	Jetted	229	3–2	Piney Point(?)	9	Oct. 25, 1951	R, E	D, F, S	Water reported very good. Drawdown reported 21 feet after 6 hours pumping 15 gpm. Screened 210–225 feet.
Cd 35	Robert G. Henry	Burgess	1950	20	do	370	3	do	6.5	Apr. 15, 1950	R, E	D, S	Water reported very good.
Cd 36	Do	—	1903 (?)	20	Dug	19.6[m]	54	Pleistocene	6.08[m]	Feb. 20, 1954	R, E	F, S	
Cd 37	Do	Burgess	1950	20	Jetted	336	2½–1½	Piney Point	9	Apr., 1950	R, E	D, S	Water reported very good.
Cd 38	Do	—	1854 (?)	20	Dug	19.1[m]	54	Pleistocene	6.99[m]	Feb. 20, 1954	N	N	For fire protection. Temperature 53° F.
Cd 39	Alfred McNeal	—	1903 (?)	13	do	20.1[m]	60	do	11.54[m]	Mar. 27, 1954	R, E	D, F, S	Water reported very good.
Cd 40	Robert Cooper	—	1929 (?)	14	do	8.5[m]	42	do	1.28[m]	Mar. 27, 1954	C, H	D, S	Do
Cd 41	John F. Requardt	Burgess	1947	12	Jetted	270	2	Piney Point(?)	4.5	Nov. 15, 1947	R, E	D, S	See log. Water reported sligbtly hard. Drawdown reported 10.5 feet after 8 bours pumping 18 gpm. Open hole 194–270 feet.
Cd 42	Carl Daffin	do	1949	13	do	260	2	do	7	Sep. 6, 1949	R, E	D, F, S	Water reported very good. Open hole 195–260 feet.
Cd 43	Wm. P. Gregory	do	1945	13	do	270	2½–1½	do	7	Dec. 31, 1945	R, E	D, F, S	Water reported very good. Drawdown reported 7 feet after 8 hours pumping 20 gpm. Open hole 194–270 feet.
Cd 44	Carroll Daffin	do	1953	12	do	252	2	do	7	Jan., 1953	R, E	D, S	Water reported slightly hard. Open hole 237–252 feet.
Cd 45	Wm. Meilke	do	1952	12	do	262	1½	do	7	Oct. 17, 1952	R, E	D, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 25 gpm. Open hole 225–262 feet.
Cd 46	Percy Shortall	—	1904 (?)	9	Dug	18	48	Pleistocene	13	Dec. 5, 1953	J, E	F, S	Water reported very good.
Cd 47	Do	—	1904 (?)	15	do	15	36	do	12	Dec. 5, 1953	J, E	D, S	Do
Ce 1	Easton Utilities Comm.	Shannahan Artesian Well Co.	1901	15	Drilled	1015	10–8–6–4½–3	Monmouth(?) and Matawan (?)	45.90[m]	Oct. 7, 1948	T, E	P, L	See log and chemical analysis. Screened 782–788 and 1,000–1,015 feet. Temperature 64.5° F., Oct. 1948. Well 10, Md. Geol. Survey, v. 10, p. 298. Water level at land surface in 1901.

Ce 2	Easton Utilities Comm.	—	1910	20	do	110	6–5	Calvert	—	—	T, E	P, L	See chemical analysis. Temperature, 59° F., Oct. 1948.
Ce 3	Do	—	1929	15	do	1025	12–10–8–6	Aquia and Matawan(?)	41.88^{m}	Oct. 7, 1948	T, E	P, L	See chemical analysis. Screened 995–1,025 feet.
Ce 4	Do	—	1929	20	do	112	10	Calvert	—	—	T, E	N	
Ce 5	Do	American Drilling Co.	1947	35	do	1147.8	12	Magothy	67.31^{m}	Jan. 18, 1949	T, E	P, L	See log and chemical analysis.
Ce 6	Do	—	—	15	do	100+	3	Calvert	44.34^{m}	Oct. 7, 1948	N	N	Well abandoned.
Ce 7	Do	—	—	13	do	104^{m}	4	do	43.43^{m}	Oct. 7, 1948	N	N	
Ce 8	Do	—	—	15	do	102^{m}	4	do	43.48^{m}	Oct. 7, 1948	N	N	Well abandoned.
Ce 9	A. J. Grimes, Jr.	Shannahan Artesian Well Co.	1946	38	do	157^{m}	10–8	do	73.04^{m}	Oct. 8, 1948	T, E	C, L	See log. Drawdown reported 48 feet after 6.5 hours pumping 200 gpm. Open hole 116–160 feet.
Ce 10	Do	do	1946	38	Jetted	160	10–8	do	78	Dec., 1946	T, E	C, L	Drawdown reported 48 feet after 6.5 hours pumping 200 gpm. Open hole 114–160 feet.
Ce 11	Municipal Airport	Summers	1946	50	do	—	—	—	—	—	J, E	C, N	Water reported good.
Ce 12	Do	—	—	50	—	—	—	—	—	—	Ic, E	N	Water reported "irony".
Ce 13	Clair E. Price	Pritcherd	1947	68	Driven	30	1¼	Pleistocene	—	—	R, E	D, S	Water reported hard.
Ce 14	L. M. Plansoen	Burgess	1947	60	Jetted	231	4	Calvert	65	Mar., 1947	J, E	F, S	See log. Drawdown reported 25 feet after 12 hours pumping 48 gpm. Screened 219–231 feet.
Ce 15	Maryland State Roads Comm.	Shannahan Artesian Well Co.	1950	52	do	40.05^{m}	4	Choptank(?)	9.99^{m}	Aug. 7, 1950	C, H	P, M	Drawdown reported 20.5 feet after 10 hours pumping 35 gpm.
Ce 16	Mr. Wroten	—	—	60	Dug	11.3^{m}	60–48	Pleistocene	8.32^{m}	Aug. 8, 1950	R, E	D, M	Water reported good.
Ce 17	Dorsey Webb	—	1947	52	Driven	19.5^{m}	1¼	do	9.99^{m}	Aug. 8, 1950	C, H	D, S	
Ce 18	Richard G. Golt	—	1910	60	Dug	14.4^{m}	48	do	11.31^{m}	Aug. 8, 1950	R, E	D, S	
Ce 19	Harvey Engle	Engle	1949	60	Jetted	231	2	Calvert	23	Jul., 1949	R, E	D, F, M	Water reported good.
Ce 20	Harrison & Jarboe	—	—	51	Driven	35	1½	Pleistocene	—	—	R, E	I, L	Six similar wells connected to pump.
Ce 21	Do	Harrison	—	51	Jetted	100	3½	Choptank(?)	—	—	R, S	I, M	
Ce 22	Howard C. Taylor	Shannahan Artesian Well Co.	1947	55	do	160^{m}	4½	Calvert	38.8^{m}	Jan. 17, 1947	—	D, F, M	See log. Drawdown reported 15.5 feet after 6 hours pumping 20 gpm. Open 71–160 feet.
Ce 23	Percy Corkran	Corkran	1932	58	Dug	18.8^{m}	60	Pleistocene	13.78^{m}	Aug. 8, 1950	R, E	D, F, M	Water reported "irony".
Ce 24	Raymond Harrison	—	1943	70	do	30	48	do	13.97^{m}	Aug. 9, 1950	R, E	D, F, S	See chemical analysis.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ce 25	Helen Ewing	Shannahan Artesian Well Co.	1949	60	Jetted	250	3¼	Calvert	48	Mar., 1949	J, E	D, S	See log. Water reported good. Drawdown reported 12 feet after 6 hours pumping 7 gpm.
Ce 26	Paul B. Smith	M. Pentz	1947	65	do	160	3	do	27	1947	J, E	D, S	
Ce 27	J. E. Swann	—	1910	60	Dug	22	60	Pleistocene	16	1949	R, E	D, S	Water reported good.
Ce 28	Herbert L. Andrew	—	1925	60	do	23.8m	48	do	20.76m	Aug. 9, 1950	Ic, E	D, F, S	Do
Ce 29	Freeland	Roberts	1942	—	do	18.8m	60	do	7.93m	Aug. 10, 1950	R, E	F, S	Water reported to have marshy odor.
Ce 30	Carlton Todd	Burgess	1949	20	Jetted	160	2½–1½	Calvert	36.5	Jul. 29, 1949	J, E	D, M	See log. Water reported hard. Screened from 152–160 feet.
Ce 31	Winnie Schuyler	Harrison	1923	20	do	100	—	Choptank and Calvert(?)	3	1923	R, E	D, F, M	Water reported "irony".
Ce 32	Nelson Blann	—	1850	54	Dug	21.2m	48	Pleistocene	16.75m	Aug. 11, 1950	R, E	D, F, M	Water reported good.
Ce 33	A. T. Warner	—	1940	15	do	17.9m	36	do	15.25m	Aug. 14, 1950	R, E	D, S	Do
Ce 34	Abbotts Dairies	C. Pentz	1928	39	Jetted	128	6	Choptank and Calvert(?)	—	—	T, E	I, L	Do
Ce 35	Do	Shannahan Artesian Well Co.	1950	39	do	157	8	do	74.40m	Aug. 15, 1950	—	I, L	Drawdown reported 20 feet after 8 hours pumping 40 gpm. Open hole 132–157 feet.
Ce 36	Jacob Cohen	L. Rude & Son	1950	52	do	63	4	Choptank(?)	6	Aug. 7, 1950	R, E	C, M	Water reported "irony". Drawdown reported 8 feet after 12 hours pumping 30 gpm. Open hole 32–63 feet.
Ce 37	R. C. Davis	do	1948	68	do	651	2½–1½	Aquia	65	Apr. 9, 1948	J, E	D, S	See log. Water reported good. Screened 639–651 feet.
Ce 38	D. J. Shively	—	1949	52	Driven	25	—	Pleistocene	—	—	R, E	D, S	Water reported good.
Ce 39	Mrs. D. N. G. Bartlett	L. Rude	1946	50	Jetted	67	3	Choptank(?)	6	Jul. 5, 1946	R, E	D, F, S	Water reported hard. Drawdown reported 6 feet after 12 hours pumping 20 gpm.
Ce 40	Sigmund Russ	Burgess	1950	40	do	105	3	Calvert(?)	21	Jul. 15, 1950	R, E	D, S	Water reported good. Screened 99–105 feet.
Ce 41	Jacob W. Cohen	Shannahan Artesian Well Co.	1949	54	do	160	3	do	73	Nov. 2, 1949	J, E	D, S	See log. Drawdown reported 7 feet after 8 hours pumping 10 gpm. Open hole 105–160 feet.

Ce 42	Barclay H. Trippe	Shannahan Artesian Well Co.	1949	35	do	185	4	do	16	May 1949	—	D, F, S	See log. Water reported good. Drawdown reported 24 feet after 6 hours pumping 8 gpm. Open hole 125–185 feet.
Ce 43	Elmer R. Golt	L. Rude	1947	52	do	100	3	do	2	Feb. 25, 1947	R,E	C, L	Water reported "very irony". Drawdown reported 13 feet after 12 hours pumping 50 gpm. Open hole 30–100 feet.
Ce 44	Raymond Elliot	Burgess	1947	40	do	140	3	do	56.5	Jun. 12, 1947	J, E	D, S	Water reported hard and "irony". Open hole 100–140 feet.
Ce 45	Charles Howard	Burgess	1947	40	do	160	2	do	68	Jun. 2, 1947	J, E	D, S	Water reported good. Open hole 100–160 feet.
Ce 46	W. T. Townsend	Townsend	1950	60	Driven	20	2	Pleistocene	7	Jan. 1950	R, E	D, S	Water reported good.
Ce 47	Standard Oil Co.	L. Rude & Son	1948	52	Jetted	100	2	Calvert	—	—	R, E	C, M	Water reported slightly "irony".
Ce 48	W. S. Pricher	do	1947	52	do	110	3	do	—	—	R, E	C, M	Water reported very "irony".
Ce 49	Thomas Smith	Burgess	1950	20	do	126	3-2	do	12	Jan. 17, 1950	J, E	D, F, M	See log. Water reported good. Screened 115–121 feet.
Ce 50	Easton Utilities	Shannahan Artesian Well Co.	1952	20	do	630	10-6	Aquia	29	Jan. 24, 1952	T, E	P, L	See chemical analysis. Water reported good. Drawdown reported 167 feet after 24 hours pumping 362 gpm. Screened 570–623 feet.
Ce 51	Ernest Sard	—	1928	74	Driven	35	1¼	Pleistocene	13	1947	R, E	D, F, S	Water reported very good.
Ce 52	Howard Adams	L. Rude & Son	1946	54	Jetted	600	2½–1¼	Aquia	55	Dec. 20, 1946	J, E	D, F, S	See log. Field analysis, Feb. 26, 1954: chloride 10 ppm, hardness 25 ppm, iron 0.3 ppm, pH 8.5. Temperature 57° F.
Ce 53	Do	—	1954	54	Dug	8.6^m	42	Pleistocene	4.41^m	Feb. 20, 1954	R, E	D, S	Water reported good. Temperature 53° F.
Ce 54	Warrington Baker	—	1915	54	Driven	14	1¼	do	8	1951	C, H	D, F, S	Water reported good. Temperature 45° F.
Ce 55	Mrs. A. Littleton	—	1904 (?)	56	Dug	18.8^m	48	do	11.22^m	Feb. 20, 1954	C, H	D, S	Water reported good. Temperature 51° F.
Ce 56	Vernon W. Sard	—	1904 (?)	70	do	21.8^m	54	do	13.00^m	Mar. 20, 1954	R, E	D, F, S	Water reported good, soft.
Ce 57	Peoples Ice Co.	—	1914	38	Jetted	200	6	Calvert	—	—	T, E	C, L	Reported yield 250 gpm.
Ce 58	Easton Utilities	—	—	25	do	100	4½	do	—	—	T, E	C, L	Reported yield 50 gpm.
Cf 1	Jas. Fountain	—	1928	67	Driven	30	1¼	Pleistocene	17	1952	R, E	D, F, S	Water reported very good.
Cf 2	Howard Eley	M. Pentz	1950	55	Jetted	220	4	Calvert	40	Jun. 1950	J, E	D, F, S	Water reported hard.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Cf 3	Mrs. J. B. Brooks	—	1951	45	Driven	39	1½	Pleistocene	8	Apr. 1951	C, H	D, S	Water reported very good. Temperature 52° F.
Cf 4	Do	—	1929	45	do	38	1½	do	9	1952	C, E	F, S	Do
Cf 5	Robert M. Williams	—	1904 (?)	40	Dug	16.9m	42	do	9.00m	Jan. 23, 1954	R, E	D, F, S	Water reported good, soft.
Cf 6	J. Raymond Councell	—	1929 (?)	60	Driven	30	1½	do	9	1953	R, E	D, F, S	Do
Cf 7	Harry Price	—	1904 (?)	50	Dug	24	42	do	14	1952	R, E	D, F, S	Do
Cf 8	Daniel Bridges	—	1904 (?)	50	do	22	42	do	7.5	1952	R, E	D, F, S	Do
Cf 9	Alton Geib	—	1904 (?)	50	do	20.9m	48	do	14.74m	Mar. 6, 1954	R, E	D, S	Do
Cf 10	Lewis H. Smith	—	1930	45	do	22	60	do	17	1931	R, E	D, S	Water reported slightly bard.
Cf 11	Lewis H. Smith	—	1904 (?)	45	Dug	22	48	Pleistocene	19	1951	R, E	D, S	Water reported very good.
Cf 12	Carroll Callahan	—	1904 (?)	30	do	25	42	do	16	1953	R, E	F, S	Do
Cf 13	Do	Bailey	1949	30	Jetted	180	2½	Calvert	28	1949	J, E	D, S	Water reported hard. Open hole 80–180 feet.
Cf 14	Katherine Hedderich	—	1904 (?)	30	Dug	17.9m	54	Pleistocene	5.10m	Mar. 13, 1954	C, H	D, F, S	Water reported very good. Temperature 52° F.
Cf 15	Percy Stoops	—	1904 (?)	55	do	18	48	do	13	1952	R, E	D, S	Water reported good, soft.
Cf 16	Do	—	1904 (?)	55	do	22	60	do	13	1952	R, E	F, S	Do
Cf 17	Shannahan Estates	—	1904 (?)	20	do	22	48	do	12	Jul. 1952	R, E	D, S	Water reported good, soft. Temperature 52° F.
Cf 18	Do	—	1904 (?)	20	do	17	48	do	10	1952	C, H	F, S	Do
Cf 19	James Fountain	—	1904 (?)	67	do	28.6m	54	do	18.50m	Mar. 20, 1954	N	N	For fire emergency.
Cf 20	Fox Canning Co.	—	1931	50	Jetted	60	4	Choptank	—	—	R, S	I, L	Average pumpage 22,200 gpd.
Cf 21	H. Williams	M. Pentz	1953	30	do	120	3	do	17	Mar. 5, 1953	J, E	D, S	See log. Water reported good. Drawdown reported 18 feet after 2 hours pumping 50 gpm. Open hole 63–120 feet.
Cg 1	Stuart Harrington	M. Pentz	1952	40	do	90	3	do	14	Aug. 26, 1952	R, E	D, S	See log. Water reported hard. Drawdown reported 16 feet after 1 hour pumping 20 gpm. Open hole 42–90 feet.

Cg 2	Col. E. J. Twist	M. Penta	1953	40	do	81	3	do	15	May 22, 1953	J, E	D, S	Water reported slightly "irony". Drawdown reported 15 feet after 2 hours pumping 30 gpm. Open hole 42-81 feet.
Da 1	M. B. Snow	A. L. Wilson	1930	3	do	210	1¼	Piney Point	4	Feb. 18, 1936	J, E	D, S	See log. Water reported little "irony". Drawdown reported 8 feet after 4 hours pumping 15 gpm. Open hole 126-210 feet.
Da 2	Harry Ervin	do	1950	5	do	210	1¼	do	6	Mar. 1, 1950	J, E	D, S	Drawdown reported 8 feet after 3.5 hours pumping 14 gpm. Open hole 126-210 feet.
Da 3	J. C. Harrison	do	1950	10	do	210	1¼	do	9	Mar. 30, 1950	J, E	D, S	See log. Water reported good. Drawdown reported 14 feet after 4 hours pumping 10 gpm. Open hole 105-210 feet.
Da 4	Mrs. Emma Faulkner	do	1951	8	do	210	1¼	do	10	May 15, 1951	J, E	D, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 28 gpm. Open hole 105-210 feet.
Da 5	Thomas Faulkner	J. Wilson & Sons	1947	3	do	231	3½-1¼	do	5	Feb. 11, 1947	C, H	D, S	
Da 6	Tilghman Vol. Fire Co.	Harrison	1950	10	do	230	5	do	15	Jan. 1950	E	P, S	
Da 7	Warren Lowery	A. L. Wilson	1945	8	do	200	1¼	do	6	Nov. 26, 1945	R, E	D, S	See log. Water reported good. Drawdown reported 14 feet after 6 hours pumping 20 gpm. Open hole 110-200 feet.
Da 8	Harry Fairbanks	do	1946	9	do	210	1¼	do	3	Dec. 6, 1946	J, E	D, M	Water reported good. Drawdown reported 12 feet after 3 hours pumping 21 gpm. Open hole 110-210 feet.
Da 9	Norman Howeth	do	1946	8	do	204	1¼	do	6	Apr. 22, 1946	R, E	D, S	Water reported good. Drawdown reported 14 feet after 3 hours pumping 15 gpm. Open hole 100-204 feet.
Da 10	H. R. Howeth	do	1945	8	do	203.5^{m}	1¼	do	12.19^{m} 14.12^{m}	Jun. 2, 1953 Sep. 11, 1953	N	N	Drawdown reported 9 feet after 3 hours pumping 15 gpm. Open hole 110-200 feet.
Da 11	Pete Willey	J. Wilson & Sons	1949	7	do	200	1¼	do	5	Oct. 29, 1949	R, E	D, S	Water reported good. Open hole 120-200 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Da 12	Charles F. Martin	Harrison	1949	4	Jetted	230	1½	Piney Point	0	Jul. 1949	R, E	D, S	Field analysis, Feb. 10, 1954: chloride 12 ppm, hardness 75 ppm, iron 0.2 ppm, pH 8.5. Temperature 53° F. Drawdown reported 10 feet after 4 hours pumping 10 gpm.
Da 13	Daniel Murphy	J. W. Wilson	1948	5	do	210	1½	do	12	Mar. 4, 1948	R, E	D, S	Water reported good. Drawdown reported 8 feet after 3 hours pumping 10 gpm. Open hole 105–210 feet.
Da 14	W. W. Fluharty, Jr.	do	1947	5	do	210	1½	do	9	Aug. 27, 1947	R, E	D, S	See log. Water reported good. Drawdown reported 11 feet after 4 hours pumping 15 gpm. Open hole 105–210 feet.
Da 15	Harry Leonard	do	1948	4	do	210	2½	do	10	Oct. 13, 1948	R, E	D, S	Water reported good. Open hole 105–210 feet.
Da 16	Marvin Caplan	A. L. Wilson	1946	5	do	210	1½	do	5	Apr. 18, 1946	R, E	D, S	Water reported good. Drawdown reported 20 feet after 4 hours pumping 16 gpm. Open hole 100–210 feet.
Da 17	Gerald W. Wilson	J. Wilson & Sons	1947	6	do	210	2½	do	8	Sep. 11, 1947	E	D, S	Water reported good. Drawdown reported 12 feet after 2 hours pumping 19 gpm. Open hole 105–210 feet.
Da 18	Walter Cummings	A. L. Wilson	1951	8	do	210	1½	do	9	Aug. 24, 1951	R, E	D, S	Water reported good. Drawdown reported 12 feet after 4 hours pumping 14 gpm. Open hole 105–210 feet.
Da 19	Ray Miller	do	1949	8	do	210	1½	do	8	Dec. 5, 1949	R, E	D, S	Water reported good. Drawdown reported 12 feet after 3.5 hours pumping 10 gpm. Open hole 105–210 feet.
Da 20	James Jackson	J. Wilson & Sons	1948	8	do	200	1½	do	14	Aug. 4, 1948	C, H	D, S	Water reported good. Open hole 105–200 feet.
Da 21	Robert Lednum	A. L. Wilson	1951	8	do	210	1½	do	10	Aug. 22, 1951	C, H	D, S	Water reported good. Drawdown reported 12 feet after 4 hours pumping 13 gpm. Open hole 105–210 feet.

Da 22	Arthur Jamart	J. W. Wilson	1952	8	do	210	1½	do	8	Sep. 20, 1952	C, H	D, S	Water reported good. Drawdown reported 13 feet after 4 hours pumping 10 gpm. Open hole 105–210 feet.
Da 23	Marion E. Lednum	A. L. Wilson	1951	8	do	210	1½	do	9	Sep. 1, 1951	C, H	D, S	Water reported good. Drawdown reported 13 feet after 4 hours pumping 13 gpm. Open hole 106–210 feet.
Da 24	Vincent Haddaway	J. Wilson & Sons	1947	8	do	210	1½	do	9	Jan. 3, 1947	R, E	D, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 12 gpm. Open hole 105–210 feet.
Da 25	Edward Tyler, Jr.	A. L. Wilson	1951	8	do	210	1½	do	8	Aug. 30, 1951	R, E	D, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 14 gpm. Open hole 105–210 feet.
Da 26	Wm. Cummings	J. Wilson & Sons	1948	10	do	210	1½	do	10.5	Nov. 25, 1948	R, E	D, S	Water reported good. Drawdown reported 4.5 feet after 4 hours pumping 5 gpm. Open hole 110–210 feet.
Da 27	Henry Reeser	A. L. Wilson	1950	5	do	210	1½	do	8	Mar. 5, 1950	R, E	D, S	Water reported good. Drawdown reported 15 feet after 4 hours pumping 12 gpm. Open hole 105–210 feet.
Da 28	Dr. Guy Reeser, Sr.	J. Wilson & Sons	1947	6	do	220	1½	do	14	Feb. 2, 1947	R, E	D, S	Water reported good. Drawdown reported 8 feet after 3 hours pumping 12 gpm. Open hole 100–220 feet.
Da 29	Do	A. L. Wilson	1951	5	do	210	1½	do	8	May 6, 1951	R, E	D, C, M	Water reported good. Drawdown reported 14 feet after 3 hours pumping 12 gpm. Open hole 105–210 feet.
Da 30	John S. Murphy, Sr.	do	1949	6	do	210	1½	do	12	Dec. 23, 1949	C, H	D, S	Water reported good. Drawdown reported 13 feet after 4 hours pumping 10 gpm. Open hole 105–210 feet.
Da 31	Margretta Harrison	do	1950	10	do	210	1½	do	10	Feb. 12, 1950	C, H	D, S	Water reported good. Drawdown reported 13 feet after 4 hours pumping 12 gpm. Open hole 105–210 feet.
Da 32	David Faulkner	do	1950	10	do	201m	2½	do	11.06m	Apr. 23, 1953	N	N	Drawdown reported 18 feet after 3.5 hours pumping 16 gpm. Open hole 105–201 feet. Original depth 210 feet.
Da 33	Norwood Phillips	J. Wilson & Sons	1947	10	do	220	1½	do	14	Jan. 6, 1947	R, E	D, S	Water reported good. Open hole 100–220 feet.
Da 34	Paul Haddaway	A. L. Wilson	1951	8	do	210	1½	do	11	May 23, 1951	R, E	D, S	Water reported good. Drawdown reported 13 feet after 4 hours pumping 12 gpm. Open hole 105–210 feet.
Da 35	Dewey Faulkner	J. Wilson & Sons	1948	10	do	210	1½	do	12	Nov. 20, 1948	R, E	D, S	Water reported hard. Drawdown reported 9 feet after 4 hours pumping 12 gpm. Open hole 110–210 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level		Pumping equipment	Use of water	Remarks
									Feet below land surface	Date of measurement			
Da 36	George Jensen	A. L. Wilson	1949	10	Jetted	210	1½	Piney Point	10	Dec. 10, 1949	R, E	C, M	See chemical analysis. Drawdown reported 12 feet after 3 hours pumping 11 gpm. Open hole 105-210 feet.
Da 37	Mrs. Samuel Phillips	J. Wilson & Sons	1947	10	do	220	1½	do	13	Jan. 10, 1947	R, E	D, S	Water reported good. Drawdown reported 9 feet after 3 hours pumping 14 gpm. Open hole 100–220 feet.
Da 38	Leonard Haddaway	do	1947	10	do	220	1½	do	14	Jan. 18, 1947	R, E	D, S	Water reported good. Drawdown reported 8 feet after 3 hours pumping 13 gpm. Open hole 100–220 feet.
Da 39	Dobson Harrison, Jr.	do	1948	10	do	210	2½	do	12	Mar. 20, 1948	Ic, E	C, M	Water reported good. Drawdown reported 10 feet after 3 hours pumping 24 gpm Open hole 105–210 feet.
Db 1	Neavitt Ball	L. Rude & Son	1950	6	do	210	1½	do	10	Nov. 20, 1950	R, E	D, S	See log. Water reported good. Open hole 105–210 feet.
Db 2	Thomas E. Haddaway	do	1947	6	do	210	2	do	5	Feb. 20, 1947	R, E	D, S	Water reported good. Open hole 100–210 feet.
Db 3	Kennard Hambleton	Burgess	1951	4	do	231	1½	do	4	Jun. 2, 1951	R, E	D, S	Water reported good. Open hole 200–231 feet.
Db 4	Irvin Ball	Burgess	1951	5	do	231	1½	do	3.5	Jul. 9, 1951	R, E	D, S	Water reported good. Open hole 193–231 feet.
Db 5	Neavitt Methodist Church	do	1951	5	do	231	1½	do	5	Jul. 11, 1951	C, H	D, S	Do
Db 6	Wm. W. Robey	do	1950	6	do	231	1½	do	8	May 4, 1950	C, H	D, S	Water reported good. Open hole 172-231 feet.
Db 7	Carroll Tamer	do	1950	8	do	231	1½	do	6	May 12, 1950	C, H	D, S	Water reported good. Open hole 173–231 feet.
Db 8	Harry Standiford	do	1950	8	do	231	1½	do	6	May 15, 1950	J, E	D, S	Do
Db 9	George Thomas	do	1950	3	do	231	1½	do	7.5	Apr. 30, 1950	R, E	D, S	Water reported good. Open hole 172–231 feet.
Db 10	Charles Sapp	do	1950	3	do	231	1½	do	7.5	Apr. 25, 1950	R, E	D, S	Water reported good. Open hole 173–231 feet.

Db 11	Harvey Jones	do	1947	6	do	228	1½	do	6	Feb. 18, 1947	R, E	D, S	Water reported good. Open hole 188–228 feet.
Db 12	Weldon Bridges	do	1947	6	do	228	1½	do	5.5	Mar. 11, 1947	R, E	D, S	Water reported good. Open hole 189–228 feet.
Db 13	Samuel Phillips	do	1947	6	do	228	1½	do	6	Feb. 27, 1947	J, E	D, S	Water reported good. Open hole 188–228 feet.
Db 14	William Hunt	L. Rude & Son	1946	6	do	220	2	do	5	Oct. 23, 1946	J, E	D, S	Water reported good. Open hole 80–220 feet.
Db 15	Albert Scharch	Burgess	1946	6	do	220	1½	do	6	Mar. 11, 1946	C, H	D, S	Field analysis, Feb. 10, 1954: chloride 8 ppm, hardness 145 ppm, iron 0.2 ppm, pH 8.2. Temperature 57° F. Open hole 188–220 feet.
Db 16	John T. Harrison	do	1945	6	do	225	1½	do	6.5	Sep. 23, 1945	C, H	D, S	See log. Water reported good.
Db 17	Dr. R. S. Lloyd	do	1950	4	do	210	1½	do	5	Feb. 3, 1950	J, E	D, S	Water reported good. Open hole 174–210 feet.
Db 18	Wm. Johnson	do	1946	10	do	220	1½	do	7	Feb. 20, 1946	C, H	D, F, M	See log. Water reported good. Open hole 173–220 feet.
Db 19	Ralph Balazs	Shannahan Artesian Well Co.	1916	6	do	400	4	Aquia(?)	—	—	J, E	D, F, M	See chemical analysis. Reported to flow.
Db 20	A. J. Cassatt	Burgess	1952	7	do	220	2½-1½	Piney Point	6	Jul. 19, 1952	J, E	F, S	See log. Water reported good. Screened 210–220 feet.
Db 21	A. Henefer	do	1947	5	do	174	1½	do	5	Jul. 23, 1947	C, H	D, M	Water reported good.
Db 22	Daniel Higgins	do	1949	3	do	231	1½	do	5	Oct. 13, 1949	J, E	D, S	Water reported good. Open hole 189–231 feet.
Db 23	J. Morton Camper	do	1952	5	do	210	1½	do	6	Jul. 7, 1952	—	D, S	Open hole 170–210 feet.
Db 24	Arthur Cummings	A. L. Wilson	1951	10	do	210	1½	do	8	Sep. 29, 1951	R, E	D, S	Water reported good. Drawdown reported 12 feet after 4 hours pumping 12 gpm. Open hole 131–210 feet.
Db 25	Oscar Sinclair	do	1951	7	do	202	1½	do	7	Feb. 6, 1951	R, E	D, S	Water reported good. Drawdown reported 9 feet after 6 hours pumping 12 gpm. Open hole 129–202 feet.
Db 26	Harry T. Barton	do	1950	5	do	200	2½	do	8	Aug. 25, 1950	R, E	D, S	Water reported hard. Drawdown reported 10 feet after 4 hours pumping 20 gpm. Open hole 147–200 feet.
Db 27	Edward Tadlock	do	1950	6	do	200	1½	do	10	Aug. 30, 1950	R, E	D, M	Water reported good. Drawdown reported 12 feet after 6 hours pumping 10 gpm. Open hole 136–200 feet.
Db 28	Ted Weller	do	1950	6	do	200	2½	do	10	Sep. 5, 1950	R, E	D, S	Water reported hard. Drawdown reported 12 feet after 4 hours pumping 18 gpm. Open hole 150–200 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Db 29	Stanley Cummings	A .L. Wilson	1953	10	Jetted	182.7^{m}	2½	Piney Point	6.95^{m}	Mar. 17, 1953	N	N	
Db 30	Howard Sinclair	do	1951	12	do	178^{m}	2½	do	8.99^{m}	Mar. 17, 1953	N	N	See log. Drawdown reported 10 feet after 5 hours pumping 22 gpm. Open hole 126–178 feet. Original depth 202 feet.
									10.27^{m}	Sep. 11, 1953			
Db 31	Geo. T. Harrison	do	1951	7	do	210	1½	do	6	Aug. 1951	N	N	Drawdown reported 9 feet after 4 hours pumping 13 gpm. Open hole 126–210 feet.
Db 32	Frank Stone	do	1946	6	do	205	2½–1½	do	6	Apr. 1946	R, E	D, S	See log. Water reported good. Drawdown reported 20 feet after 3 hours pumping 15 gpm. Open hole 105–205 feet.
Db 33	Do	—	1905	6	Drilled	400	1½	Aquia	3.72^{m}	Mar. 18, 1953	N	N	Water reported to have odor and bad taste.
Db 34	Do	J. Wilson & Sons	1948	6	Jetted	197.8^{m}	1½	Piney Point	6.81^{m}	Mar. 18, 1953	N	N	Water reported good. Open hole 105–210 feet.
Db 35	Kenneth Harrison, Jr.	A. L. Wilson	1946	3	do	200	1½	do	3	Dec. 1946	R, E	D, S	Water reported good. Drawdown reported 15 feet after 4 hours pumping 18 gpm. Open hole 100–200 feet.
Db 36	Edward Gowe, Jr.	do	1945	6	do	200	1½	do	4	Dec. 1945	R, E	D, M	Water reported good. Drawdown reported 14 feet after 4 hours pumping 17 gpm. Open hole 110–200 feet.
Db 37	Tilghman Packing Co.	do	1946	5	do	200	1½	do	6	Mar. 22, 1946	R, E	D, S	Water reported good. Drawdown reported 9 feet after 4 hours pumping 12 gpm. Open hole 100–200 feet.
Db 38	Do	Shannahan Artesian Well Co.	1950	5	Drilled	442	6–3	Aquia	9	May 6, 1950	Ic, E	I, M	See log. Water reported good. Drawdown reported 46 feet after 10 hours pumping 100 gpm. Screened 412–442 feet. Average pumpage 3,200 gpd.
Db 39	Tilghman Packing Co.	—	Prior 1940	5	—	400	1½	do	—	—	R, E	I, S	Water reported poor.

Db 40	Do	Shannahan Artesian Well Co.	Prior 1940	5	Drilled	400	6	Piney Point	—	—	Ic, E	I, M	
Db 41	Do	do	1946	5	do	418	10-6-4½-3	do	2	Mar. 25, 1946	Ic, E	I, M	Water reported good. Drawdown reported 103 feet after 24 hours pumping 100 gpm. Screened 391–416 feet.
Db 42	Do	J. Wilson Sons	1936 (?)	5	do	—	—	—	—	—	R, E	I, M	Water reported good.
Db 43	Do	A. L. Wilson	1951	5	do	210	1¼	Piney Point	7	Mar. 17, 1951	R, E	D, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 18 gpm. Open hole 108–210 feet.
Db 44	Do	—	1900 (?)	5	do	400	—	Aquia	—	—	R, E	I, M	Water reported good.
Db 45	Do	—	1900 (?)	5	do	—	1¼	—	—	—	R, E	D, S	Do
Db 46	Kenneth Harrison, Sr.	J. Wilson & Sons	1948	5	Jetted	200	1¼	Piney Point	10	Jul. 28, 1948	R, E	D, S	Water reported good. Open hole 105–200 feet.
Db 47	Do	do	1948	5	do	200	1¼	do	10	Aug. 9, 1948	C, H	D, S	Do
Db 48	Marian Lednum	do	1948	7	do	210	1¼	do	12	Apr. 3, 1948	R, E	D, S	Water reported good. Open hole 105–210 feet.
Db 49	George T. Harrison	A. L. Wilson	1951	12.5	do	210	1¼	do	7	Aug. 10, 1951	R, E	D, M	Water reported hard. Drawdown reported 10 feet after 4 hours pumping 12 gpm. Open hole 126–210 feet.
Db 50	Do	do	1951	12	do	210	1¼	do	8	Aug. 12, 1951	N	N	Drawdown reported 12 feet after 4 hours pumping 12 gpm. Open hole 126–210 feet.
Db 51	Mrs. T. D. Harmon	do	1951	10	do	210	2½	do	7	Jun. 2, 1951	Ic, E	C, M	Water reported good. Drawdown reported 9 feet after 6 hours pumping 32 gpm. Open hole 109–210 feet.
Db 52	Do	do	1951	12	do	203	2½	do	8	Mar. 15, 1951	R, E	D, S	Water reported good. Drawdown reported 11 feet after 4 hours pumping 30 gpm. Open hole 147–203 feet.
Db 53	James H. Baines	L. Rude & Son	1946	7	do	420	2½-1¼	Aquia	10	Jun. 7, 1946	J, E	D, S	See log. Drawdown reported 4 feet after 15 hours pumping 20 gpm.
Db 54	Laura Kirby	do	1946	4	do	400	1¼	do	4	Jun. 1, 1946	C, H J, E	D, S	See log. Water tasted good. Open hole 350–400 feet.
Db 55	Dr. R. G. Kiddle	Burgess	1952	4	do	220	2½	Piney Point	6	Oct. 30, 1952	C, H	D, S	See log. Water reported good. Open hole 179–220 feet.
Db 56	Mrs. Margaret Newman	do	1952	4	do	220	1¼	do	6.5	Jul. 2, 1952	C, H	D, S	See log. Water tasted excellent. Open hole 178–220 feet.
Db 57	Margretta Harrison	A. L. Wilson	1951	6	do	210	1¼	do	8	Apr. 10, 1951	R, E	D, S	Water reported hard. Drawdown reported 13 feet after 4 hours pumping 12 gpm. Open hole 105–210 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Db 58	George Harrison	J. Wilson & Sons	1946	5	do	220	1¼	Piney Point	14	Nov. 20, 1946	Ic, E	D, S	Water reported hard. Drawdown reported 8 feet after 5 hours pumping 10 gpm. Open hole 178–220 feet.
Db 59	Irving Hiestand	—	—	1	Drilled	378[m]	1¼	Aquia	0.69[m] 1.11[m]	Jun. 2, 1953 Sep. 11, 1953	N	N	Abandoned. Well reported to flow until 1945.
Dc 1	Town of Oxford	Shannahan Artesian Well Co.	1929	6	do	639	—	do	—	—	T, E	P, L	Water reported good.
Dc 2	Do	do	1949	6	do	577	10–6	do	8	Jan. 10, 1949	R, E	P, L	See log and chemical analysis. Drawdown reported 21 feet after 10 hours pumping 46 gpm. Screened 539–559 feet.
Dc 3	Fred Harper	Burgess	1948	6	Jetted	420	2¼	Piney Point and Nanjemoy	5.5	Jun. 3, 1948	J, E	D, S	See log. Water reported good. Drawdown reported 16.5 feet after 6 hours pumping 35 gpm. Open hole 238–420 feet.
Dc 4	J. T. Love, Jr.	do	1951	8	do	357	3–2	Piney Point(?)	5.8	Apr. 21, 1951	Ic, E	D, S	See log. Water reported good. Open hole 237–357 feet.
Dc 5	H. Gannon	do	1945	8	do	376	2½–1¼	do	4	Nov. 6, 1945	R, E	D, S	Water reported good. Drawdown reported 1.75 feet after 8 hours pumping 20 gpm. Open hole 231–376 feet.
Dc 6	D. Sutherland	Shannahan Artesian Well Co.	1951	8	do	287	6–3	Choptank and Calvert	9	May 11, 1951	J, E	D, F, M	Water reported slightly "irony". Drawdown reported 24 feet after 6 hours pumping 20 gpm. Open hole 229–287 feet.
Dc 7	G. Leidner	Burgess	1946	6	do	400	2½–1¼	Piney Point	7	Jul. 6, 1946	C, H	D, S	Water reported slightly hard. Open hole 231–400 feet.
Dc 8	Dr. G. W. Gardner	do	1951	5	do	315	2	do	4.3	Apr. 11, 1951	R, E	D, S	See log. Water reported good. Open hole 230–315 feet.
Dc 9	C. Hollinsworth	L. Rude & Son	1949	8	do	483	2½–1¼	Aquia	6	Jan. 24, 1950	R, E	D, S	Screened 465–483 feet.

Dc 10	Randolph and Laura Brooks	Shannahan Artesian Well Co.	1950	8	do	340	3	Piney Point(?)	13	Jan. 24, 1950	J, E	D, M	See log. Water reported good. Drawdown reported 3 feet after 6 hours pumping 20 gpm. Open hole 236–340 feet.
Dc 11	R. B. Spiers	Burgess	1946	6	do	400	2½–1½	do	6.5	Sep. 17, 1946	C, H	D, S	See log. Water reported good. Ope hole 281–400 feet.
Dc 12	Jay Hodel	L. Rude & Son	1950	7	do	315	2½	do	7	Mar. 20, 1950	J, E	D, S	Water reported good. Open hole 250–315 feet.
Dc 13	Robert Valliant	Burgess	1949	6	do	350	2½–1½	do	6	May 18, 1949	J, E	D, S	Water reported good. Open hole 242–350 feet.
Dc 14	Edward T. Newman	do	1951	7	do	334	2	do	7.5	Dec. 29, 1951	C, H	D, S	Water reported good. Open hole 249–334 feet.
Dc 15	Olean and Willard Carroll	do	1949	8	do	315	2	do	6.5	Nov. 21, 1949	J, E	D, S	Open hole 236–315 feet.
Dc 16	Ed. T. Bromfield	Shannahan Artesian Well Co.	1946	8	do	528	4½–2	Aquia	6.5	May 16, 1946	Ic, E	D, M	Water reported good. Drawdown reported 37 feet after 6 hours pumping 30 gpm. Screened 516–526 feet.
Dc 17	J. Holt Wright	Burgess	1949	8	do	357	2½	Piney Point	7	Nov. 5, 1949	J, E	D, S	Open hole 237–357 feet.
Dc 18	Ernest Gardner	do	1950	8	do	315	2	do	7.5	Jul. 10, 1950	E	D, S	Open hole 236–315 feet.
Dc 19	Joseph Conrad Spahn	do	1952	5	do	357	2	do	8	Feb. 25, 1953	E	D, S	Open hole 233–357 feet.
Dc 20	Marion Roe	do	1946	5	do	400	1½	do	5.5	Dec. 41, 1946	C, H J, E	D, S	Water reported good. Open hole 236–400 feet.
Dc 21	S. G. Barnes	do	1950	4	do	315	2	do	6	Mar. 20, 1950	J, E	D, S	Water reported good. Field analysis Feb. 10, 1954: chloride 20 ppm, hardness 77 ppm, iron <0.1 ppm, pH 8.5. Temperature 51° F. Open hole 237–315 feet.
Dc 22	C. A. Beddow	do	1949	7	do	313	2½–2	do	4.5	Mar. 26, 1949	R, E	D, S	See log. Open hole 236–313 feet.
Dc 23	Dr. G. W. Gardner	do	1945	15	do	378	1½	do	6.5	Oct. 18, 1945	J, E	D, S	Water reported good. Open hole 238–378 feet.
Dc 24	Phillip Carroll	do	1952	5	do	315	2	do	7.5	Aug. 23, 1952	E	D, S	Open hole 235–315 feet.
Dc 25	C. E. Aydelotte	do	1951	5	do	278	2	do	7.5	Aug. 24, 1951	R, E	D, S	Open hole 231–278 feet.
Dc 26	Walter Fenrich	L. Rude & Son	1952	8	do	556	2½–1½	do	10	Apr. 9, 1952	J, E	D, S	See log. Water tasted good. Screened 538–556 feet.
Dc 27	Irving List	Burgess	1949	5	do	360	2½	do	6.5	Jun. 26, 1949	J, E	D, S	Water reported good. Open hole 246–360 feet.
Dc 28	Russell Newman	L. Rude & Son	1950	6	do	315	2½	do	12	Nov. 20, 1950	J, E	D, S	Water reported slightly "irony". Open hole 260–315 feet.
Dc 29	Wm. Stanfield	Burgess	1952	5	do	315	2	Piney Point(?)	6.5	Jul. 26, 1952	C, H	D, S	See log. Water reported good. Open hole 235–315 feet.
Dc 30	Fred Lewis	do	1952	5	do	315	2	do	7	Aug. 5, 1952	J, E	D, S	Do

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dc 31	Federal Leather Co.	Burgess	1947	8	Jetted	274	4	Piney Point(?)	4.5	Aug. 25, 1947	R, E	D, F, M	See log. Water reported good. Drawdown reported 5.5 feet after 4 hours pumping 35 gpm. Open hole 192–274 feet.
Dc 32	J. R. Speer, Jr	do	1951	7	do	360	3–2	do	7	Apr. 7, 1951	E	F, M	Water reported good. Open hole 147–360 feet.
Dc 33	S. Huston Poole	do	1947	7	do	315	1½	do	7	Jul. 10, 1947	C, H	D, S	Water reported good. Open hole 236–315 feet.
Dc 34	Lester Pasterfield	do	1949	6	do	360	2	do	6.5	Aug. 15, 1949	R, E	D, S	Water reported good. Open hole 237–360 feet.
Dc 35	Mrs. Wm. Crouse	do	1952	6	do	567	3–2	Aquia	9.5	Feb. 9, 1952	R, E	D, S	See log. Water reported good. Screened 546–556 feet.
Dc 36	Raymond Stewart	do	1950	4	do	336	2	Piney Point(?)	6	Mar. 4, 1950	E	D, S	Open hole 236–336 feet.
Dc 37	James Wallace	L. Rude & Son	1950	3	do	315	2½	do	8	Sep. 14, 1950	J, E	D, S	Water reported good. Open hole 260–315 feet.
Dc 38	D. A. Stroh	Burgess	1950	3	do	330	2½	do	7	Sep. 13, 1950	J, E	D, S	Water reported good. Open hole 233–330 feet.
Dc 39	T. M. Wood	L. Rude & Son	1950	3	do	315	2½	do	10	Nov. 20, 1950	J, E	D, S	Water reported good. Open hole 260–315 feet.
Dc 40	Paul J. Fowler	C. Rude	1952	4	do	315	2	do	10	Oct. 22, 1952	J, E	D, S	Open hole 225–315 feet.
Dc 41	Elliott M. Campbell	do	1947	4	do	565	2½–1½	Aquia	10	Apr. 15, 1947	J, E	D, S	See log. Water reported good. Screened 535–547 feet.
Dc 42	William P. Lewis	—	—	3	do	270[m]	1½	Piney Point(?)	6.03[m]	May 28, 1953	N	N	
Dc 43	A. S. Clark	Shannahan Artesian Well Co.	1931	10	do	428	4	Piney Point and Nanjemoy	—	—	C, W	D, S	Water reported good.
Dc 44	George Scott Wallace	Hammond	1919	7	do	375	2	Piney Point	—	—	J, E	D, M	Do
Dc 45	W. Harold Kinlock	L. Rude & Son	1922	8	do	450	3	Aquia	—	—	J, E	D, M	Do
Dc 46	P. H. Morris, Jr.	—	1947	10	do	450	4	do	—	—	R, E	D, M	Do
Dc 47	Terrence Burrows	Burgess	1945	10	do	280	2	Piney Point	—	—	R, E	D, M	Do

Dc 48	W. A. Turner	Shannahan Artesian Well Co.	—	10	do	300	—	do	—	—	J, E	D, M	See chemical analysis. Reported to be flowing.
Dd 1	J. A. Ferguson Estate	do	1947	6	do	551	4–3–2	Aquia	6.5	Nov. 22, 1947	—	—	See log. Drawdown reported 43.5 feet after 6 hours pumping 40 gpm. Screened 533–548 feet.
Dd 2	Grady Jump	Burgess	1948	14	do	640	3–2	do	21	Apr. 5, 1948	C, H	D, S	See log. Field analysis, Feb. 4, 1954: chloride 16 ppm, hardness 330 ppm, iron 2 ppm, pH 8.5. Temperature 47° F. Screened 620–640 feet.
Dd 3	Andrew Porter	Shannahan Artesian Well Co.	1947	5	do	583	4½–2	do	7.5	May 10, 1947	J, E	D, S	See log. Water reported good. Screened 567–572.5 and 577–582 feet.
Dd 4	Walter White	Burgess	1948	15	do	313	3–2	Piney Point	11.5	Jan. 2, 1948	C, E	D, S	Water reported to taste marshy. Drawdown reported 18.5 feet after 6 hours pumping 10 gpm. Screened 305–313 feet.
Dd 5	B. C. Voshell	Shannahan Artesian Well Co.	1946	5	do	647	4½–2	Aquia	22.5	Nov. 21, 1946	J, E	D, M	See log. Water reported good. Drawdown reported 22.5 feet after 6 hours pumping 20 gpm. Screened 607–627 feet.
Dd 6	E. Hazen	do	1948	12	do	567	4–2	do	7.5	Jul. 26, 1948	R, E	D, S	See log. Water reported good. Screened 555–565 feet.
Dd 7	C. B. Kugler, Jr.	do	1947	10	do	593	4½–3–2	do	7	Apr. 25, 1947	A, E	D, S	See log. Water reported good. Drawdown reported 23 feet after 6 hours pumping 25 gpm. Screened 581–591 feet.
Dd 8	Guy Willey	L. Rude & Son	1947	6	do	568	2½–1½	do	9	May 12, 1947	R, E	D, F, M	See log. Water reported good. Screened 556–568 feet.
Dd 9	S. N. Hersloff	Shannahan Artesian Well Co.	1948	6	do	566	4–2	do	7	Aug. 11, 1948	J, E	D, S	Water reported good. Drawdown 23 feet after 8 hours pumping 30 gpm Screened 547–557 feet.
Dd 10	T. Harris Smith	do	1951	10	do	620	4–2	do	11.5	Jun. 19, 1951	T, E	D, S	Drawdown reported 19.5 feet after 6 hours pumping 12 gpm. Screened 600–615 feet.
Dd 11	Samuel Sands	L. Rude & Son	1950	12	do	599	2½–1½	do	20	May 8, 1950	A, E	D, S	See log. Water reported good. Screened 580–598 feet.
Dd 12	Do	do	1950	10	do	599	2½–1½	do	18	Feb. 1, 1950	J, E	D, F, M	Screened 581–599 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dd 13	S. N. Hersloff	Shannahan Artesian Well Co.	1952	9	Jetted	607	4–2	Aquia	10	Mar. 7, 1952	C, H	N	Water tasted salty. Drawdown reported 10 feet after 6 hours pumping 10 gpm. Screened 585–601 feet.
Dd 14	Joseph Appel	do	1951	8	do	619	4–2	do	13.7	May 25, 1951	R, E	D, S	Water reported good. Drawdown reported 23.3 feet after 8 hours pumping 15 gpm. Screened 598–613 feet.
Dd 15	Andrew W. Porter	do	1951	9	do	595	4–2	do	9.7	Mar., 1951	J, E	D, F, M	Water reported good. Drawdown re ported 20 feet after 6 hours pumping 10 gpm. Screened 571–586 feet.
Dd 16	J. Mulford Swing	Shannahan Artesian Well Co.	1951	10	do	370	4–2	Piney Point	41	Sep. 5, 1951	J, E	D, F, M	See log. Water reported good. Drawdown reported 29 feet after 6 hours pumping 15 gpm. Open hole 273–370. feet.
Dd 17	Louis Startt	L. Rude & Son	1951	10	do	588	2½–1¼	Aquia	10	Mar., 1951	J, E	D, F, M	Water reported good. Screened 570–588 feet.
Dd 18	D. C. Burroughs	do	1951	10	do	588	2½–1¼	do	—	—	J, E	D, S	Water reported good.
Dd 19	J. G. Marks	Burgess	1950	10	do	588	3–2	do	12	Sep. 2, 1950	J, E	D, S	See log. Water reported good. Screened 580–588 feet.
Dd 20	J J. Shipherd	L. Rude & Son	1951	10	do	588	2½–1¼	do	10	Mar., 1951	J, E	D, S	Water reported good. Screened 570–588 feet.
Dd 21	Wm. LaBeaume	Shannahan Artesian Well Co.	1951	12	do	605	4–2	do	20	Apr. 14, 1951	J, E	D, S	Water reported good. Drawdown reported 16 feet after 8 hours pumping 15 gpm. Screened 595–605 feet.
Dd 22	R. M. Lewis	do	1950	12	do	586	4–2	do	10.2	Jan. 10, 1950	J, E	D, S	See log. Water reported good. Drawdown reported 10.7 feet after 6 hours pumping 15 gpm. Screened 560–580 feet.
Dd 23	John W. Noble	do	1951	10	do	573	3–2	do	12.5	Aug. 17, 1951	J E	D, M	Water reported good. Drawdown reported 27.5 feet after 8 hours pumping 25 gpm. Screened 553–568 feet.

Dd 24	Mrs. W. Alton Jones	Shannahan Artesian Well Co.	1947	18	do	580	4½-3-2	do	18	Mar. 17, 1952	J, E	F, M	See log. Water reported good. Drawdown reported 32 feet after 6 hours pumping 20 gpm. Screened 570–580 feet.
Dd 25	Carroll Elliott	L. Rude & Son	1950	8	do	590	3-2½	do	10	Jan. 24, 1950	R, E	D, S	See log. Water reported good. Screened 572–590 feet.
Dd 26	James T. Kirby	Shannahan Artesian Well Co.	1951	8	do	633	3-2	do	22.8	Oct. 1, 1951	J, E	D, S	Water reported "irony". Drawdown reported 42 feet after 8 hours pumping 12 gpm. Screened 605–620 feet
Dd 27	M. Stephen Bremer	Bradshaw	1951	12	do	619	2½-1¼	do	—	—	J, E	D, S	Water reported good.
Dd 28	Charles Wheeler	Shannahan Artesian Well Co.	1949	16	do	606	4-2	do	9	Aug. 18, 1949	J, E	D, S	Water reported good. Drawdown reported 20 feet after 6 hours pumping 20 gpm.
Dd 29	William H. Norris	do	1947	8	do	559	4½-3	do	6	Apr. 4, 1947	J, E	D, S	Water reported good. Drawdown reported 34 feet after 6 hours pumping 25 gpm. Screened 549–559 feet.
Dd 30	James B. Brickel	L. Rude & Son	1947	18	do	624	3½-1¼	do	24	Apr. 2, 1947	J, E	D, S	See log. Water reported good. Drawdown reported 10 feet after 12 hours pumping 40 gpm. Screened 612–624 feet.
Dd 31	Howard Eddy	do	1950	18	do	609	2½	do	—	—	J, E	D, S	Water reported slightly hard.
Dd 32	James Spencer	Burgess	1951	18	do	610	2½-1¼	do	28.69m	May 7, 1952	J, E	D, S	See log. Screened 602–610 feet.
Dd 33	Mrs. Wm. Alton Jones	Shannahan Artesian Well Co.	1951	19	do	630	6-3-2	do	27	May 12, 1951	E	F, M	Water reported good. Drawdown reported 29 feet after 10 hours pumping 15 gpm. Screened 610–625 feet.
Dd 34	Mrs. G. D. B. Darby	Burgess	1946	5	do	378	1¼	Piney Point	7.5	May 7, 1946	C, H	D, S	See log. Water reported good. Open hole 286–378 feet.
Dd 35	George M. McAlnsh	Shannahan Artesian Well Co.	1949	6	do	592	4-2	Aquia	16.4	Aug. 20, 1949	R, E	D, S	Water reported good. Drawdown reported 20.6 feet after 8 hours pumping 33 gpm. Screened 570–591 feet.
Dd 36	Frank L. Boarman	do	1951	6	do	600	4-2	do	16	May 9, 1951	A, E	D, S	See log. Water reported good. Drawdown reported 14 feet after 10 hours pumping 18 gpm. Screened 570–580 feet.
Dd 37	Philip Anderson	Burgess	1951	10	do	336	2	Piney Point	7.5	Aug. 6, 1951	J, E	D, S	Water reported good. Open hole 265–336 feet.
Dd 38	Wm. N. Starkey	do	1951	10	do	336	2	do	7	Aug. 13, 1951	C, H	N	Open hole 265–336 feet.
Dd 39	Clyde M. Blades	do	1946	9	do	376	2	do	9	Dec. 3, 1946	C, H	D, S	See log. Water reported good. Open hole 242–376 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.)	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Dd 40	Gugy A. E. Irving	Burgess	1949	5	Jetted	360	1½	Piney Point	8.5	Feb. 15, 1949	R, E	D, S	See log. Water reported good. Open hole 255–360 feet.
Dd 41	Charles Schuck	L. Rude & Son	1950	5	do	336	2½	do	7	Mar. 5, 1950	J, E	D, F, M	Water reported good. Open hole 262–336 feet.
Dd 42	Robert W. Tilly	C. Rude	1950	5	do	336	2½	do	7	Mar. 10, 1950	J, E	D, S	Water reported good. Open hole 262–336 feet.
Dd 43	W. R. Helmholz	Burgess	1950	4	do	357	2½–1½	do	6.5	Nov. 2, 1950	J, E	D, S	Water reported good. Open hole 248–357 feet.
Dd 44	Robert LeCompte	do	1952	7	do	357	1½	do	8	Nov. 12, 1952	R, E	D, F, M	Water reported good. Open hole 236–357 feet.
Dd 45	Howard Maeder	do	1952	9	do	609	3–2	Aquia	9	May 31, 1953	J, E	D, S	Screened 599–609 feet.
Dd 46	Herbert P. Orth	do	1952	8	do	378	3–2	Piney Point	9.5	Jun. 10, 1952	J, E	D, S	Water reported good. Open hole 268–378 feet.
Dd 47	Howard M. Sharp	do	1950	7	do	566	2½–1½	Aquia	10	Dec. 18, 1950	C, H	N	See log. Screened 548–566 feet.
Dd 48	J. S. Wilford	—	—	5	—	150	4	Calvert	—	—	N	N	See chemical analysis.
Dd 49	Do	C. Rude	1953	5	Jetted	600(?)	4	Aquia	20	Dec., 1953	J, E	D, S, M	Water reported good.
Dd 50	Evans Hall	—	—	5	do	300(?)	—	Piney Point	—	—	R, E	D, S	See chemical analysis
Dd 51	Do	C. Rude	1953	5	do	660	6	Aquia	—	—	E	I, M	
De 1	I. L. Lowman	—	—	48	Driven	17.0^{m}	1¼	Pleistocene	1.22^{m}	Apr. 1, 1954	N	O	Monthly record.
De 2	James M. Warner	—	1950	35	Dug	23	60	do	18	Aug. 11, 1950	R, E	D, S	Water reported hard and "irony".
De 3	Defender Packing Co.	M. Pentz	1918	55	Jetted	35	4	do	—	—	R, S	I, M	Estimated average pumpage 1500 gpd.
De 4	J. Schwaninger	Schwaninger	1940	55	do	140	2½	Calvert	43	Aug., 1949	J, E	D, S	Field analysis, Feb. 4, 1954: chloride 12 ppm, hardness 215 ppm, iron 1.0 ppm, pH 8.5. Temperature 55° F.
De 5	D. Cohen	Burgess	1948	35	do	336	4	Piney Point	28	Sep. 2, 1948	—	D, F, S	See log. Open hole 216–336 feet.
De 6	Granville Wise	Jarrett	1952	40	do	399	2½–1½	do	65	Jan. 15, 1952	J, E	D, F, M	Water reported good. Drawdown reported 2 feet after 8 hours pumping 18 gpm.
De 7	Do	do	1952	40	do	399	2½–1½	do	—	—	J, E	D, F, M	Field analysis, Feb. 4, 1954: chloride 6 ppm, hardness 95 ppm, iron <0.1 ppm, pH 8.5.

De 8	James Warner	L. Rude & Son	1951	35	do	168	3	Calvert(?)	26	Apr., 1951	J, E	D, F, M	See log. Water reported good. Open hole 122–168 feet.
De 9	N. C. Baker	Cusick	1947	28	do	667	2½–1¼	Aquia	30	Apr. 1, 1947	J, E	D, S	Water reported good. Drawdown reported 3 feet after 6 hours pumping 18 gpm. Screened 657–667 feet.
De 10	Clark Sewell	Burgess	1951	30	do	378	3	Piney Point	32	Mar. 5, 1951	J, E	D, F, M	See log. Water reported hard. Drawdown reported 18 feet after 10 hours pumping 40 gpm. Open hole 107–378 feet.
De 11	W. G. Ludlow	Shannahan Artesian Well Co.	1951	20	do	632	3–2	Aquia	27	Nov. 24, 1951	J, E	D, S	Water reported slightly cloudy. Drawdown reported 83 feet after 6 hours pumping 25 gpm. Screened 615–630 feet.
De 12	Harrison and Jarboe	do	1950	40	do	393	4–3	Piney Point	65	Jun. 10, 1950	J, E	I, M	See log. Water reported good. Drawdown reported 35 feet after 6 hours pumping 25 gpm. Open hole 376–394 feet.
Df 1	C. Henderson	do	1949	40	do	378	4–2	do	36	May 31, 1949	J, E	D, S	See log. Water reported good. Drawdown reported 22 feet after 8 hours pumping 18 gpm. Screened 358–378 feet.
Df 2	Olen Whiteley	—	1951	30	Driven	35	1¼	Pleistocene	—	—	J, E	D, S	Water reported "irony" and hard.
Df 3	Mrs. A. F. Whiteley	—	—	10	Dug	13.1[m]	48	do	9.13[m]	Apr. 29, 1954	E	D, S	Water reported slightly "irony".
Ed 1	Rev. C. Keller	Shannahan Artesian Well Co.	1948	10	Jetted	379	4–2	Piney Point	59.5	Oct. 2, 1948	J, E	D, F, M	See log. Water reported good. Drawdown reported 15.5 feet after 8 hours pumping 25 gpm. Screened 346–356 and 364–374 feet.
Ed 2	E. Borden-Smith	L. Rude & Son	1951	8	do	399	2½	do	42	Mar., 1951	J, E	D, F, M	See log. Water reported good. Open hole 315–399 feet.
Ed 3	Thomas Firth	Shannahan Artesian Well Co.	1947	5	do	372	4½–2	do	46	Dec. 20, 1947	—	—	See log. Drawdown reported 20 feet after 6 hours pumping 10 gpm.
Ed 4	Paul Cox	do	1950	7	do	590	4	Paleocene	8.5	Aug. 10, 1950	E	D, S	See log. Water reported good. Drawdown reported 31.5 feet after 6 hours pumping 30 gpm. Screened 570–585 feet.
Ed 5	Roger Firth	do	1950	10	do	416	3–2	Piney Point	46.6	Nov. 8, 1950	J, E	D, F, M	See log. Drawdown reported 23 feet after 8 hours pumping 15 gpm Screened 331–352 feet.

TABLE 35—*Continued*

Well number (Tal-)	Owner or name	Driller	Date	Altitude (ft.)	Type of well	Depth of well (ft.	Diameter of well (in.)	Water-bearing formation or series	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping equipment	Use of water	Remarks
Ed 6	Roger Firth	L. Rude & Son	1939	10	Jetted	327m	1½	Piney Point	35.90m	Apr. 23, 1952	N	N	
Ed 7	Dr. Robt. White	Shannahan Artesian Well Co.	1952	15	do	380	3–2	do	42.53m	May 15, 1952	—	D, S	Drawdown reported 13 feet after 6 hours pumping 10 gpm. Field analysis, Feb. 5, 1954: chloride 8 ppm, hardness 160 ppm, iron 0.5 ppm, pH 8.5. Temperature 51° F. Screened 330–350 feet.
Ee 1	Town of Trappe	do	1929	56	Drilled	400	2	do	—	—	T, E	P, L	See chemical analysis. Field analysis, Feb. 5, 1954: chloride 8 ppm, hardness 77 ppm, iron <0.1 ppm, pH 8.5. Temperature 65° F.
Ee 2	Charles B. Adams	Cook	1910	45	Jetted	125	4½	Calvert	62.5	Jul., 1951	T, E	I, L	See chemical analysis.
Ee 3	Do	do	1910	45	do	80	4½	do	—	—	J, E	I, M	
Ee 4	Do	do	1910	45	do	80	4½	do	—	—	J, E	I, M	
Ee 5	Trappe Frozen Foods	Shannahan Artesian Well Co.	1945	55	do	36	10	Pleistocene	—	—	Ic, E	I, L	
Ee 6	Do	do	1945	55	do	36	10	do	—	—	Ic, E	I, L	
Ee 7	Do	do	1945	55	Drilled	420	10–8–6	Piney Point	80	Mar. 6, 1946	T, E	I, L	See chemical analysis. Open hole 360–420 feet.
Ee 8	Do	do	1946	55	do	1245	10–6	Raritan(?)	68	Jun. 12, 1946	T, E	I, L	See log. Water reported good. Drawdown reported 178 feet after 1.5 hours pumping 240 gpm. Screened 407–427 and 913–925 feet.
Ee 9	Alice Schwanager	—	—	45	Dug	12	48	Pleistocene	—	—	C, H	D, S	See chemical analysis.
Ee 10	Trappe Frozen Foods	Shannahan Artesian Well Co.	1916	55	Drilled	400(?)	6–2	Piney Point	—	—	T, E	I, L	Water reported good. See Md. Geol. Survey, v. 10, p. 298, well 40.
Ee 11	Do	—	1909	55	do	375	—	do	—	—	—	N	Well abandoned. See Md. Geol. Survey, v. 10, p. 298, well 39.

Ee 12	C. B. Adams Canning Co.	Shannahan Artesian Well Co.	1951	45	do	126	3	Calvert	63	Jul., 1951	J, E	I, M	See chemical analysis.
Ee 13	L. Blanche	Bradshaw	1940	17	Jetted	365	—	Piney Point	—	—	R, E	D, S	Water reported good.
Ee 14	R. Fehsenfeld	do	—	11	do	407	2	do	—	—	Ic, E	D, S	See chemical analysis.
Ee 15	H. K. Bryan	L. Rude & Son	1948	28	do	400	3-1¼	do	69	Mar. 20, 1948	J, E	D, S	See log. Water reported good. Open hole 358–400 feet.
Ee 16	Dr. W. L. Winters	Shannahan Artesian Well Co.	1951	10	do	378	3-2	do	60.5	Jul. 20, 1951	J, E	D, F, M	See log. Water reported good. Screened 369–378 feet.
Ee 17	A. B. Highley	do	1949	14	do	427	6-2	do	64	Aug. 20, 1949	J, E	F, C, M	See log. Water reported good. Drawdown reported 16 feet after 10 hours pumping 13 gpm. Screened 392–417 feet.
Ee 18	H. K. Bryan	Todd	1947	22	do	404	2½	do	63	Mar. 7, 1947	Ic, E	D, S	Water reported good. Open hole 387–404 feet.
Ee 19	E. D. Hirst	Shannahan Artesian Well Co.	1949	45	do	417	4-2	do	—	—	J, E	D, S	See log. Drawdown reported 12 feet after 6 hours pumping 7.5 gpm.
Ee 20	C. D. Sheridan	Burgess	1951	60	do	180	3-2	Calvert(?)	43	Mar. 24, 1951	J, E	D, F, S	Water reported hard. Drawdown reported 12 feet after 8 hours pumping 16 gpm. Open hole 94–180 feet.
Ee 21	B. Smith	Cook	1932	30	do	400	4	Piney Point	—	—	J, E	D, F, S	Water reported hard.
Ee 22	Do	do	1908	30	do	311	4	Calvert	15	1908	N	N	See Md. Geol. Survey, v. 10, p. 298, well 41. Well abandoned and plugged.
Ee 23	A. V. Highley	Shannahan Artesian Well Co.	1929	14	do	398	4	Piney Point	21	Sep., 1929	J, E	D, F, M	Water reported good.
Ee 24	Gus Mende	Bradshaw	1950	20	do	404	2½-1¼	do	70	Aug. 15, 1950	R, E	D, S	
Ee 25	J. McKinney Willis	C. Rude	1951	55	do	412	3-2	do	80	Sep., 1951	J, E	D, F, M	See log. Water reported good. Screened 388–412 feet.
Ee 26	Roy Brooks	Shannahan Artesian Well Co.	1943	30	do	430	4½	do	53	1943	T, E	D, F, M	See log.
Ee 27	D. Repetti	—	1949	40	Driven	20	1¼	Pleistocene	—	—	R, E	D, S	Water reported slightly "irony".
Ef 1	W. H. Dawson	Shannahan Artesian Well Co.	1947	26	Jetted	445	4-2	Piney Point	53	Sep. 15, 1947	J, E	D, S	See log. Water reported good. Screened 424–445 feet.
Ef 2	Elmer Bryan	—	—	40	Dug	13.3[m]	—	Pleistocene	9.21[m]	Apr. 29, 1954	R, E	F, S	Water reported slightly "irony".

TABLE 36

Logs of Wells in Caroline County
(*P* is Maryland well permit number)

	Thickness (feet)	Depth (feet)
Care-Ad 2 (Altitude: 74 feet)		
Pleistocene and Pliocene(?) series:		
Sand, white and brown	20	20
Clay, dark brown	12	32
Miocene series:		
Choptank formation:		
Sand, fine, gray	3	35
Clay, dark gray	25	60
Clay and shells	5	65
Clay, dark gray	15	80
Clay, light green	19	99
Sand, fine; shells and some clay	3	102
Calvert formation:		
Clay, gray	118	220
Sand and clay, black, white and green	32	252
Missing	23	275
Care-Bc 2 (Altitude: 65 feet) P 5036		
Pleistocene series:		
Clay and sand	20	20
Clay	10	30
Sand, coarse, clear (water)	20	50
Pliocene(?) series:		
Sand, coarse, brown (water)	10	60
(Screen 50–60 feet)		
Care-Bd 1 (Altitude: 50 feet) P 7306		
Pleistocene, Pliocene(?) and Miocene(?) series:		
Choptank formation:		
Sand, gravel, and clay (no water)	60	60
Clay, soft, blue; sand, very fine	40	100
Calvert(?) formation:		
Clay, blue	58	158
Clay, blue; shell; sand rock, gray (small amount of water)	110	268
Eocene series (based on Bd 18):		
Clay, blue; shell; sand rock, gray	100	368
(Uncased hole 160–368 feet)		
Care-Bd 2 (Altitude: 60 feet) P 7305		
Pleistocene series:		
Sand, yellow, and gravel	30	30
Miocene series:		
Choptank(?) formation:		
Clay, blue-black, with wood particles	40	70
Sand, coarse, and ½-in. gravel (water)	8	78
(Screen 70–78 feet)		

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Care-Bd 6 (Altitude: 60 feet) P 5007		
Pleistocene series:		
Sand, yellow, and gravel	37	37
Miocene series:		
Choptank(?) formation:		
Clay, blue	13	50
Clay, tough, blue-black	20	70
Sand, coarse; gravel; shells	20	90
Clay, tough, black	30	120
Calvert(?) formation:		
Sand, gray; shells; water 60 gpm. with 100 feet drawdown	30	150
Clay, blue-black; sand, fine	30	180
Sand, argillaceous, fine, hard	120	300
Eocene series:		
Piney Point(?) formation:		
Sand, argillaceous, coarse to fine	100	400
Aquia(?) greensand:		
Sand, argillaceous, coarse, dry	180	580
(Uncased hole 178–580 feet)		
Care-Bd 18 (Altitude: 60 feet) P 11137		
Recent series:		
Soil	3	3
Pleistocene series:		
Sand, yellow	22	25
Miocene series:		
Choptank(?) formation:		
Clay, dark green, and sand	45	70
Sand, coarse, gray	20	90
Clay, dark green, and sand	31	121
Calvert(?) formation:		
Sand, green, and clay	159	280
Clay, green	20	300
Eocene series:		
Piney Point(?) formation:		
Sand, coarse, gray, and shells	20	320
Sand; clay; shells	15	335
Clay, green, and sand	62	397
Care-Bd 45 (Altitude: 55 feet)		
Miocene(?) series:		
Choptank formation:		
Clay and sand	20	20
Sand, coarse, gray and white; clay	18	38
Sand, coarse, gray and white	7	45
Clay, brown	21	66
(Screen 35.5–45.5 feet)		

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Care-Cc 1 (Altitude: 60 feet) P 2		
Pliocene(?) series: (based on Cc 2)		
Clay	10	10
Clay and sand	10	20
Sand, coarse, yellow (water)	50	70
(Screen 66–70 feet)		
Care-Cc 2 (Altitude: 60 feet) P 200		
[Composite of the driller's log and a sample log. The geologic interpretation is guided by the paleontology on Care-Dc 122 at West Denton.]		
Pliocene(?) series:		
Sand, coarse to fine, red, brown	40	40
Sand, medium, brown, some gravel	38	78
Miocene series:		
St. Marys formation:		
Silt, clay and sand, very fine, gray	12	90
Choptank formation:		
Sand, medium, light gray, shells	8	98
Hard, shell fragments	1.5	99.5
Sand, medium, light gray, shell fragments	4.5	104
Silt and clay, light olive-gray	34	138
Sand, medium to fine, gray	11	149
Calvert(?) formation:		
Hard bed, limey and quartzitic	1.5	150.5
Sand, medium, gray, and small shell fragments	5.5	156
Silt, clay, and sand, very fine, gray	10	166
Hard	1	167
Sand, medium, gray, and shell fragments	13	180
Silt, clay and sand, very fine, buff and gray	50	230
Hard	1	231
Silt, clay and sand, very fine, buff and gray	68	299
Eocene series:		
Piney Point formation:		
Sand, medium to coarse, gray, and shell fragments	13	312
Sand, tight (silty), gray	5.3	317.3
Hard, shell fragments	.4	317.7
Sand, medium, gray	9.3	327
Hard, shell fragments	1	328
Sand, gray, tight (silty)	5	333
Hard, shell fragments	3	336
Sand, gray, tight (silty)	4	340
Sand and crust, shell fragments	10	350
Clay, tough, gray	—	350
(Uncased hole 297–350 feet)		
Care-Cc 7 (Altitude: 60 feet)		
Pleistocene series:		
Sand and clay	25	25

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Pliocene(?) series:		
Sand, yellow	48	73
Miocene series:		
St. Marys formation:		
Clay, black, sand and shells	27	100
Choptank(?) formation:		
Hard pan	3	103
Clay and sand, black	47	150
Calvert formation:		
Hard pan	2	152
Clay and sand, black	4	156
Hard pan	1	157
Clay, sand, and shells	107	264
Clay and sand	36	300
Hard pan	2	302
Eocene series:		
Sand and shells	12	314
Clay, sand, and shells	21	335
Hard pan	2.5	337.5
Hard pan and clay	5.5	343
Sand, green, and clay	197	540
Paleocene series:		
Clay, green	151	691
Care-Cc 11 (Altitude: 70 feet) P 1297		
Pleistocene and Pliocene(?) series:		
Clay	8	8
Clay and sand	18	26
Sand, coarse to fine, yellow and white	50	76
(Screen 53–75 feet)		
Care-Cc 51 (Altitude: 60 feet) P 13213		
Recent, Pleistocene and Pliocene(?) series:		
Soil and sand	23	23
Gravel and sand (water)	38	61
Miocene series:		
St. Marys(?) formation:		
Clay, blue	7	68
Choptank formation:		
Sand, yellow (water)	10	78
(Screen 68–78 feet)		
Care-Cd 2 (Altitude: 20 feet) P 1672		
Pleistocene series:		
Sand and clay	24	24
Clay, brown	9	33
Pliocene(?) series:		
Sand and gravel	10	43

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank(?) formation:		
Sand and shells	33	76
Clay, brown	76	152
Calvert(?) formation:		
Sand, gray (water)	41	193
Clay, brown	77	270
Eocene series:		
Sand, gray (water)	33	303
(Screen 279–303 feet)		
Care-Cd 4 (Altitude: 40 feet) P 10276		
Pleistocene and Pliocene(?) series:		
Sand	16	16
Gravel	7	23
Clay, brown	4	27
Miocene series:		
St. Marys(?) formation:		
Clay, blue	73	100
Choptank(?) formation (top based on care-Dc 122):		
Clay, blue	20	120
Hard	10	130
Clay, brown	44	174
Sand	16	190
Hard	2	192
Sand	20	212
Calvert(?) formation:		
Clay	127	339
Eocene(?) series:		
Sand	35	374
(Screen 340–360 feet)		
Care-Db 4 (Altitude: 50 feet) P 10686		
Pleistocene and Pliocene(?) series:		
Sand and clay	23	23
Gravel	14	37
Miocene series:		
Choptank(?) formation:		
Clay, blue	28	65
Gravel	7	72
Clay	18	90
Shells and sand	16	106
(Uncased hole 87–106 feet)		
Care-Db 8 (Altitude: 50 feet) P 12676		
Pleistocene series:		
Sand, yellow	19	19

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank (?) formation:		
Clay	16	35
Sand, coarse	11	46
Clay	35	81
Shells	5	86
Sand	9	95
(Uncased hole 81–95 feet)		
Care-Dc 57 (Altitude: 13 feet)		
Pleistocene series:		
Sand, yellow, and gravel	17	17
Miocene series (based on Dc 122):		
St. Marys formation:		
Clay, soft, blue	24	41
Clay, brown; fine sand lenses	22	63
Clay, blue; fine sand lenses	40	103
Choptank formation:		
Sand layers, hard, silica-cemented	5	108
Sand, coarse; gravel; shells	23	131
(Uncased hole 103–131 feet)		
Care-Dc 67 (Altitude: 13.5 feet) P 7826		
[Composite of two drillers' logs and one partial sample log. The geology is based on paleontology of Dc 122.]		
Pleistocene series:		
Sand, medium and coarse, brown	10	10
Sand, medium to fine, gray, and gravel	5	15
Miocene series:		
St. Marys formation:		
Silt, clayey, tough, blue	5	20
Clay, silty, sandy, blue and brown	5	25
Sand, medium to fine, gray	5	30
Silt, sandy, blue; fossil fragments at 43 feet	22	52
Clay, gray, and fossil fragments	36	88
Choptank formation:		
Sand, fine, and shell fragments	7	95
Shells and hard layers	5	100
Sand, very fine, and tiny shell fragments	6	106
Sand, medium to fine, well sorted, light olive-gray	33	139
Hard layer, coarse shell fragments	1	140
Sand, medium, gray; some shell fragments	20	160
Sand, medium, greenish-gray; shell fragments and microfossils	15	175
Sand, fine	3	178
Calvert formation:		
Hard layer	1	179
Sand, medium to fine, gray	6	185

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Hard layer, shell fragments	1	186
Clay, gray	6	192
Sand, medium, gray	1	193
Hard layer	1	194
Sand, medium, gray; shell fragments	16	210
Sand, fine, gray and brown, with silt, clay and shell fragments	30	240
Sand, medium to fine, light olive-gray	10	250
Clay, shell and rock	10	260
Sand and shells	58	318
Clay	2	320
Eocene series:		
Piney Point formation:		
Sand and shells	6	326
Clay, gray, and sand	2	328
Sand and shells	6	334
Clay	2	336
Sand and shells	8	344
Clay	2	346
Sand and shells	144	490
Aquia(?) greensand:		
Sand and shells	28	518
(Uncased hole 314–518 feet)		
Care-Dc 68 (Altitude: 5 feet) P 7826B		
Pleistocene series:		
Sand, yellow	20	20
Miocene series (based on Dc 122):		
St. Marys formation:		
Clay, blue	60	80
Choptank formation:		
Sand	11	91
Rock, cemented, hard	2	93
Gravel; sand; shells	22	115
Rock, sand, and shells in alternating layers	53	168
(Uncased hole 93–115 feet)		
Care-Dc 74 (Altitude: 40 feet) P 9744		
Pleistocene series:		
Gravel, yellow, and sand	20	20
Miocene series (based on Dc 122):		
St. Marys formation:		
Clay, blue; shells	98	118
Choptank formation:		
Rock	2	120
Clay, blue	10	130
Sand and shells	20	150
(Uncased hole 118–150 feet)		

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Care-Dc 75 (Altitude: 28 feet) P 9784		
Pleistocene or Miocene series:		
Clay	10	10
Sand	15	25
Miocene series (based on Dc 122):		
St. Marys formation:		
Clay	5	30
Sand and shells	12	42
Clay, brown	56	98
Choptank formation:		
Rock	1	99
Sand, gray (water)	60	159
(Uncased hole 105–159 feet)		
Care-Dc 93 (Altitude: 55 feet)		
Pleistocene series:		
Sand	21	21
Miocene series:		
St. Marys formation:		
Clay	96	117
Choptank formation:		
Sand and shells	10	127
Care-Dc 100 (Altitude: 12 feet) P 10819		
Pleistocene series:		
Sand	19	19
Miocene series:		
St. Marys formation (based on Dc 122);		
Clay, blue	26	45
Choptank(?) formation:		
Sand and silt	15	60
Clay, blue	50	110
Sand	16	126
(Uncased hole 84–126 feet)		
Care-Dc 122 (Altitude: 15 feet) P 11234		
[Composite sample and driller's log, formations based on paleontology.]		
Pleistocene series:		
Sand, very coarse to medium, some small gravel	8	8
Silt, sand, brown to gray	5	13
Sand, silty, buff	13	26
Silt, gray, brown and green	11	37
Sand, buff	3	40
Miocene series:		
St. Marys formation:		
Silt, sandy, gray to brown; shells	42	82
Choptank formation:		
Silt, brown, and shells	15	97

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Silt, gray	9	106
Rock	4	110
Silt, gray; sand, fine with shell fragments	37	147
Rock and shells	3	150
Shells with silt, gray; sand, fine	12	162
Silt, gray, fine sand and shells	23	185
Rock	1	186
Silt, gray, fine sand and shells	6	192
Calvert formation:		
Silt, gray; sand, fine; shells and foraminifera	4	196
Rock and shells	2	198
Silt, olive-gray, diatomaceous	9	207
Silt and clay, olive-gray; some fine sand and shell fragments	46	253
Clay and silt, sandy, gray	78	331
Eocene series:		
Piney Point formation:		
Sand, coarse, glauconitic, olive-brown; some silt and clay	92	423
Sand, medium, glauconitic, olive-brown; some silt and clay	65	488
Nanjemoy formation:		
Clay, silty, sandy, green and gray, some shells	23	511
Clay, green and gray; shells; some red and green shale; hard layer at 522 feet (Marlboro clay ?)	11	522
Aquia greensand(?):		
Clay, green and gray	14	536
Clay, gray	73	609
Paleocene series:		
Brightseat(?) formation:		
Clay, green and gray, lignitic	182	791
Clay, sandy, green, lignitic	7	798
Clay, green, lignitic, partly tough	38	836
Clay, sandy, green	14	850
Rock	3	853
Upper Cretaceous series:		
Monmouth or Matawan(?) formations:		
Clay, tough, some shells	34	887
Black sand	3	890
Clay, tough, some shells	20	910
Clay, green, soft	23	933
Clay, sandy	9	942
Sand, coarse to fine, olive-brown, free	28	970
Clay, sandy	10	980
(Overlap in 8-inch and 4-inch casing 332–490 feet; screen 944–965 feet)		
Care-Dd 1 (Altitude: 42 feet)		
Pleistocene(?) series:		
Missing	12	12

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
St. Marys formation (based on Dc 122):		
Clay	58	70
Shells	3	73
Marl	38	111
Choptank(?) formation:		
Missing	73.5	184.5
Rock	3	187.5
Sand	4.5	192
Clay	6	198
Rock	3	201
Clay	1.3	202.3
Rock	2	204.3
Clay	4.1	208.4
Rock	2	210.4
Sand	1.4	211.8
Rock	.5	212.3
Calvert(?) formation:		
Clay	46.2	258.5
Rock	21.5	280
Missing	10	290
Sand	25	315
Clay, green	43	358
Gravel and shells (not free)	3	361
Eocene series:		
Piney Point formation:		
Sand (water)	39	400
Care-Dd 2 (Altitude: 35 feet)		
Pleistocene series:		
Sand, clay streaks	25	25
Miocene series:		
St. Marys formation (based on Dc 122):		
Clay	47	72
Marl; sand, free; shells	8	80
Clay	18	98
Marl; sand, loose; shells	4	102
Clay, soft, blackish	6	108
Choptank formation:		
Marl; sand, loose; shells	11.5	119.5
Rock, hard	1.8	121.3
Clay, sandy, green	33.7	155
Marl; sand and shells	15	170
Clay, tough, black	10.2	180.2
Rock, soft	1.5	181.7
Rock, hard	.1	181.8
Sand and shells	5.5	187.3
Rock	1	188.3

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Sand	3	191.3
Rock	.1	191.4
Missing	2	193.4
Rock	.6	194
Sand; shells and clay	8	202
Rock	.8	202.8
Sand	.4	203.2
Rock	3.3	206.5
Clay, tough, green	9	215.5
Sand	3.5	219
Calvert formation:		
Rock	.2	219.2
Clay, soft, green	57.8	277
Rock	1.5	278.5
Clay, gray	16.5	295
Sand and shells	21	316
Clay, green	34	350
Sandy	2.1	352.1
Eocene series:		
Piney Point formation:		
Rock	.5	352.6
Sand and shells	3.5	356.1
Crust	.1	356.2
Sand	11.8	368
Crust	.1	368.1
Sand and shells	14.9	383
Sand	8.5	391.5
Rock	.8	392.3
Sand	9.7	402
Care-Dd 5 (Altitude: 42 feet) P 5405		
Pleistocene series:		
Sand, yellow, and gravel	40	40
Miocene series:		
St. Marys formation (based on Dc 122):		
Clay, dark; shells; sand, fine	50	90
Choptank formation:		
Clay, blue; shells	80	170
Shells and sand	35	205
(Uncased hole 107–205 feet)		
Care-Dd 6 (Altitude: 45 feet) P 11341		
Recent and Pleistocene series:		
Soil and sand	18	18
Sandstone	1	19
Sand, yellow	4	23

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
St. Marys formation:		
Clay, blue	37	60
Sand, gray (water)	5	65
(Uncased hole 45–65 feet)		
Care-Dd 8 (Altitude: 45 feet)		
Pliocene(?) series:		
Sand, irony	37	37
Miocene series:		
St. Marys formation:		
Clay, blue	8	45
Shells	1	46
Clay, blue	54	100
Choptank formation:		
Shells and sand, fine	80	180
Clay, blue	50	230
Calvert(?) formation (based on Dc 122):		
Clay, blue	30	260
Shell bed	—	260
Sand, fine, gray	10	270
Clay, blue	130	400
Care-Ec 1 (Altitude: 32 feet) P 9070		
Pleistocene series:		
Clay, sandy	10	10
Sand and gravel	10	20
Clay, soft	10	30
Pliocene(?) series:		
Sand, brown	21	51
Boulders	9	60
Miocene series:		
St. Marys formation:		
Shells, hard, brown	32	92
Clay, green, and shells	7.5	99.5
Rock	.5	100
Choptank(?) formation:		
Sand(?) and shells	10	110
Clay, green, and shells	10	120
Clay, dark	31	151
Rock	4	155
Sand, free; crusts; shells	25	180
Calvert(?) formation:		
Clay, dark	26	206
Rock	3	209
Sand; clay streaks	21	230
(Uncased hole 152–230 feet)		

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Care-Ee 1 (Altitude: 40 feet) P 8211		
Recent and Pleistocene series:		
Soil; sand; gravel	21	21
Miocene series:		
St. Marys formation:		
Clay, soft, blue	49	70
St. Marys and Choptank formations:		
Clay, blue	80	150
Choptank formation:		
Shells; sand (water)	20	170
(Uncased hole 106–170 feet)		
Care-Fb 1 (Altitude: 35 feet) P 1936		
Pleistocene and Pliocene(?) series:		
Sand, coarse, buff	6	6
Gravel and sand	11	17
Miocene series:		
St. Marys formation:		
Clay	23	40
Sand, gray	10	50
Choptank(?) formation:		
Clay	30	80
Sand and shells	10	90
Clay	30	120
Sand; hard places	43	163
Calvert(?) formation:		
Clay	35	198
Sand, gray	9	207
Clay	15	222
(Uncased hole 84–222 feet)		
Care-Fc 1 (Altitude: 50 feet) P 104		
Pleistocene series:		
Sand	10	10
Sand, free, and gravel	20	30
Pliocene(?) series:		
Clay, tough, blue	10	40
Sand, free, red	21	61
Boulders	2	63
Miocene series:		
St. Marys formation:		
Clay; streaks of sand, free, gray	14	77
Clay, blue	24	101
Clay, blue, and shells	3	104
Sand, free, gray, and fine shells	5	109
Clay, blue; sand streaks	26	135
Hard	1.5	136.5
Clay, blue	6.5	143

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Choptank(?) formation:		
Hard	.5	143.5
Sand and shells	4.5	148
Hard	.5	148.5
Sand and shells	4.5	153
Hard	.7	153.7
Sand and shells	10	163.7
Hard	.3	164
Sand and shells; hard places	21	185
Clay; hard places	33	218
Calvert(?) formation:		
Sand, free, and shells (water)	32	250
Shells, hard	1	251
Sand, tight; hard places	24	275
(Uncased hole 197–275 feet)		
Care-Fc 2 (Altitude: 50 feet) P 4730		
Pleistocene series:		
Clay, sandy	8	8
Clay	4	12
Sand	12	24
Sand and gravel	10	34
Pliocene(?) series:		
Clay, blue	5	39
Sand and gravel	22	61
Gravel, tight	5	66
Miocene series:		
St. Marys formation:		
Clay	27	93
Sand; shells; clay	19	112
Rock	.1	112.1
Clay	25.9	138
Rock	2	140
Choptank(?) formation:		
Clay; sand; shells	10	150
Rock	3	153
Crusty	10	163
Sand, tight, and shells	25	188
Clay, brown	27	215
Shells and sand	6	221
Sand	5	226
Calvert(?) formation:		
Sand and clay crusts	20	246
Sand	14	260
(Uncased hole 203–260 feet)		
Care-Fc 4 (Altitude: 50 feet) P 7926		
Pleistocene and Pliocene(?) series (based on Fc 1):		
Sand, yellow, and clay		35

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Sand (water)	7	42
(Screen 35–42 feet)		
Care-Fd 1 (Altitude: 35 feet)		
Pleistocene series:		
Walston silt:		
Sand, fine	15	15
Beaverdam sand: (water)		
Sand, coarse; gravel; some clay	10	25
Sand coarse	10	35
Clay	1	36
Sand, coarse	8	44
Miocene(?) series:		
Clay	—	—
(Concrete screen 20.5 to 44 feet)		
Care-Fd 2 (Altitude: 35 feet)		
Pleistocene series:		
Walston silt:		
Sand, fine	10	10
Beaverdam sand: (water)		
Gravel, hard, sand and boulders	10	20
Sand and gravel	5	25
Sand, medium-coarse	10	35
Sand, coarse	6	41
Miocene(?) series:		
Clay	—	—
(Concrete screen 18.5–41 feet)		
Care-Fd 5 (Altitude: 40 feet) P 5376		
Recent series:		
Soil	5	5
Pleistocene series:		
Sand, buff and brown, and gravel	43	48
Miocene series:		
St. Marys formation:		
Clay, blue	12	60
Clay, sandy	46	106
Rock, soft	20.4	126.4
Choptank formation:		
Shells, clay	13.6	140
Clay, tough	17	157
Rock	1	158
Sand and shells	8	166
Crusty; clay streaks	24	190
Sand, crusty	38	228
Calvert formation:		
Rock	.8	228.8

TABLE 36—*Continued*

	Thickness (feet)	Depth (feet)
Sand, free	8.5	237.3
Rock, hard	.7	238
Sand, crusty	19	257
Rock, soft	1	258
Sand, crusty	50	308
(Uncased hole 228.5–308 feet)		
Care-Fd 8 (Altitude: 40 feet) P 5468		
Recent and Pleistocene series:		
Soil, sand, and gravel	10	10
Sand, coarse, white and gray; gravel	20	30
Miocene series:		
St. Marys formation:		
Clay	4	34
Sand, coarse, white	9	43
Sand, coarse, yellow; gravel	16.5	59.5
Clay, dark gray	36.5	96
St. Marys and Choptank formations:		
Clay, gray; sand, fine; shells	50.5	146.5
Choptank formation:		
Shells; sand, fine; clay	57.5	204
Clay, brown	20	224
Clay, brown; sand; shale	11.4	235.4
Calvert(?) formation:		
Hardpan; sand, fine	1.6	237
Sand, fine; clay	8.8	245.8
Clay, green; shells; sand, fine, hard	16.2	262
Clay, brown	7	269
Sand, coarse, gray and white; shells	29.7	298.7
(Screen 273–299 feet)		

TABLE 37

Logs of Wells in Dorchester County

(P is Maryland well permit number)

	Thickness (feet)	Depth (feet)
Dor-Ah 2 (Altitude: 38 feet) P 2104		
Pleistocene series:		
Clay	5	5
Sand	3	8
Clay	2	10
Sand and gravel, white	29	39
Miocene series:		
St. Marys and Choptank formations:		
Clay, sandy	22	61
Sand	6	67
Clay, blue	31	98

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Hard	.2	98.2
Sand, gray; shells; hard streaks	52.8	151
Dor-Ah 3, test well (Altitude: 35 feet)		
Pliocene(?) series:		
Sand, coarse to medium, red-brown	13	13
Sand, medium, buff	3	16
Sand, granules to medium, red-brown	29	45
Miocene series:		
St. Marys formation:		
Clay and granules	5	50
Clay, blue-gray	25	75
Clay, gray	15	90
Clay, gray; some white streaks	13	103
Choptank(?) formation:		
Sand, medium to fine, gray; shell fragments	17	120
Sand, coarse, gray; shell fragments	3	123
Clay, sandy, gray; fine shells	10	133
Clay, greenish-gray; shell fragments	12	145
Clay, sandy, greenish-gray; fine shells	10	155
Sand, medium to fine, gray; fine shells	19	174
Sand, medium to fine, gray, hard	2	176
Sand, coarse to very fine, gray	9	185
Sand, medium to fine, gray	5	190
Sand, coarse to fine, gray; fine shell fragments	5	195
Sand, medium to fine, gray, silty	20	215
Sand, coarse to fine, green and brown	14	229
Calvert(?) formation:		
Sand, fine, gray	10	239
Sand, silty, gray	10	249
Sand, coarse to fine, hard, gray	8	257
Rock, hard drilling	2	259
Sand, fine, gray; shell fragments	15	274
Sand, medium to fine, silty, gray	10	284
Sand, medium to fine, silty, grayish-brown; shell fragments	16	300
Sand, fine, silty, grayish-brown	15	315
Sand, medium to fine, silty, brown; shell fragments; hard drilling at 325 feet	12	327
Sand, hard layer	2	329
Hard layer, (no sample)	3	332
Sand, fine to very fine, silty, gray and green	4	336
Sand, fine to very fine, silty, gray and green	11	347
Sand, medium to fine, silty, gray, green and brown	10	357
Sand, medium to fine, gray; black particles	33	390
Sand, very coarse to fine, gray; shell fragments; black particles	20	410
Sand, fine, gray, hard	2.5	412.5
Sand, medium to fine, gray	7.5	420
Sand, coarse to fine, gray; shell fragments; black particles	5	425

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, gray; black particles	16	441
Sand, coarse to fine, gray; shell fragments; black particles	5	446
Sand, medium to fine, gray; black particles	6	452
Sand, medium to fine, silty, gray; black particles	35	487
Eocene series:		
Piney Point formation:		
Rock, hard drilling	.8	487.8
Rock and sand	4.2	492
Rock	2	494
Rock and sand, fine	8	502
Sand, coarse, gray-brown; shell fragments; black particles	7	509
Sand, coarse to fine, gray brown; shell fragments; black particles	7	516
Sand, fine, silty, brown to gray; black particles; hard layer at 519 feet	4	520
Sand, fine, gray; black particles	20	540
Sand, fine, silty, light gray; shell fragments; black particles; hard layer at 551 feet	11	551
Sand, fine to very silty, olive-gray	6	557
Dor-Bb 8 (Altitude: 5 feet) P 1361 (Described from samples)		
Pleistocene series:		
Silt, buff	10	10
Sand, very fine, buff	10	20
Sand, fine, buff	10	30
Miocene series:		
Choptank and Calvert formations:		
Sand, fine, gray	10	40
Sand, medium, gray	10	50
Silt, sandy, light gray	20	70
Sand, medium to fine, gray	10	80
Clay, silty, sandy, dark gray	10	90
Silt, sandy, gray; shell fragments	10	100
Sand, medium, and shells	20	120
Sand, fine, gray; shell fragments	20	140
Silt, sandy, light gray	20	160
Silt, coherent, white, diatomaceous (?)	60	220
Eocene series:		
Piney Point(?) formation:		
Shells and limestone, light blue	10	230
Sand, coarse, slightly glauconitic, and shells	10	240
Sand, coarse, glauconitic, dark green, and shells	10	250
Sand, coarse, glauconitic, green; gravel, fine, quartz	30	280
Sand, medium to fine, glauconitic, greenish-black; shell fragments	10	290
Nanjemoy formation:		
Sand, medium to coarse, glauconitic, green; clay balls, gray	10	300
Sand, coarse, glauconitic, green; grit and fine gravel	40	340
Sand, medium to coarse, glauconitic, green, and limestone	10	350

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Greensand, fine to medium; quartz sand, coarse to granules	10	380
Greensand, coarse; gravel, fine, gritty, quartz	20	400
Clay, glauconitic, sandy, gritty, blue-green	40	440
Aquia greensand:		
Sand, medium, pebbly, glauconitic, deep green	20	460
Sand, fine to medium, glauconitic, olive-green; silt, gray	20	480
Dor-Bc 4 (Altitude: 5 feet) P 4920		
Pleistocene series:		
Clay, yellow	6	6
Sand, yellow	19	25
Miocene series:		
Choptank and Calvert formations:		
Clay	124	149
Sand, coarse, white	3	152
Clay	88	240
Rock	1	241
Sand, fine	14	255
Eocene series:		
Piney Point formation:		
Sand, coarse, and shells	85	340
Nanjemoy formation:		
Earth, black	70	410
Clay	70	480
Clay and earth	45	525
Aquia greensand:		
Sand and gravel, brown	42	567
Dor-Bc 6 (Altitude: 3 feet) P 1505		
Pleistocene series:		
Sand, fine, silty, light tan; small gravel	10	10
Sand, medium to fine, gray; granule size gravel	30	40
Miocene series:		
Choptank and Calvert formations:		
Sand, medium to fine, silty, light olive-gray	20	60
Sand, medium to fine, silty, gray; shell fragments	20	80
Silt and sand, fine, light brown; shell fragments	20	100
Sand, medium, gray; shell fragments	20	120
Sand, medium to fine, silty, light brown	10	130
Sand, medium, gray, brown; shell fragments	10	140
Sand, medium, gray; silt	40	180
Silt and sand, fine, light gray	10	190
Silt and sand, fine to very fine, light gray; clay; few shell fragments	100	290
Eocene series:		
Piney Point formation:		
Sand, medium, gray; shell fragments	10	300
Sand, medium, rust brown; brown glauconite; limonite; granule size gravel	10	310

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, gray; black particles	10	320
Sand, medium, blue-gray; shell fragments	20	340
Sand, medium, tan-gray; black particles	50	390
Sand, fine and silt, gray and tan; black particles	10	400
Sand, medium, gray; black particles	10	410
Sand, fine and silt, light gray; fine black particles	10	420
Nanjemoy formation:		
Sand, medium, brown; black particles; silt	40	460
Glauconite, medium to fine, olive-green; black particles; shell fragments	40	500
Paleocene series:		
Glauconite, medium to fine, blue-green; gray silty particles	20	520
(Uncased hole 514–527 feet)		
Dor-Bd 4 (Altitude: 15 feet) P 206		
Pleistocene series:		
Missing	30	30
Miocene series:		
Choptank and Calvert formations:		
Clay	146.5	176.5
Shells, hard	1	177.5
Clay	89.7	267.2
Hard	.6	267.8
Clay	30.1	297.9
Rock, soft	1.8	299.7
Clay, sandy	20.3	320
Eocene series:		
Piney Point formation:		
Sand (water)	70	390
Nanjemoy(?) formation:		
Clay, tough	150	540
Paleocene(?) series:		
Clay, tough	77	617
Clay, and sand, coarse, gray	24.8	641.8
Clay	8.2	650
Clay, soft	40	690
Clay, tough	24	714
Upper Cretaceous(?) series:		
Monmouth(?) formation:		
Rock, soft	2	716
Clay	3	719
Rock, soft	2.7	721.7
Clay	10	731.7
Sandstone(?)	2.6	734.3
Rock	.5	734.8
Rock, soft	.6	735.4
Rock	1.6	737
Crusty	11	748

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Matawan(?) formation:		
Clay	105.2	853.2
Rock	2.1	855.3
Clay	15.7	871
Sandstone(?)	.5	871.5
Sand, fine, micaceous, brown; wood	12.5	884
Clay, soft	18	902
Clay, hard	22	924
Magothy(?) formation:		
Sand and clay, white	4.8	928.8
Sand, medium to coarse	2	930.8
Sandstone	4.2	935
Sand, hard	2	937
Sand and clay, brown	60	997
Sandstone	.5	997.5
Raritan and Patapsco(?) formations:		
Clay, red streaks, and sand, brown	27.5	1025
Clay, sandy	14.5	1039.5
Sand, coarse	1.5	1041
Rock, hard	—	1041
Dor-Bf 1 (Altitude: 27 feet)		
Pleistocene series:		
Sand and gravel	35	35
Miocene series:		
St. Marys and Choptank formations:		
Clay, gray	15	50
Marl	5	55
Clay, gray	49	104
Shells and sand, hard	4	108
Shells and sand	3.3	111.3
Sand, crusty, and shells	5.5	116.8
Hard	1	117.8
Sand and shells	7.2	125
Clay, sandy	5	130
Hard	3	133
Clay, soft	24.5	157.5
Hard	1	158.5
Clay, sandy	20.2	178.7
Calvert formation:		
Clay, hard	1.3	180
Clay	2.7	182.7
Hard and soft	5.7	188.4
Clay, sandy	29.3	217.7
Clay, sandy; hard place	39.3	257
Clay, hard	5	262
Hard and soft streaks	6	268
Sand, very fine (little water)	25	293

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay	14.5	307.5
Hard place	1.5	309
Clay	82	391
Clay, gray, sandy	7	398
Clay, hard	1.5	399.5
Rock	1.9	401.4
Clay	3.5	404.9
Hard place	2	406.9
Eocene series:		
Piney Point formation:		
Rock, very hard	1.5	408.4
Soft and hard	1.6	410
Clay and sand, coarse	7	417
Sand, gray, soft and hard	27	437
Hard place	1	438
Clay	1	439
Sand, coarse, brown; crusts	32	471
Dor-Bf 24, test well (Altitude: 35 feet)		
Recent series		
Soil, black	1.5	1.5
Pleistocene series:		
Parsonsburg sand:		
Sand, coarse to medium, brown	3.5	5
Sand, clayey, brown	5	10
Beaverdam sand:		
Sand, medium to fine, white to buff	11	21
Sand, coarse to medium, buff	9	30
Pliocene(?) series:		
Sand, coarse to medium, yellow	10	40
Sand, coarse to medium, brownish-red	5	45
Sand, and granules, brownish-red	3	48
Miocene series:		
St. Marys(?) formation:		
Clay, gray	54	102
Choptank formation:		
Sand, medium, silty, gray; abundant shell fragments	23	125
Sand and clay, greenish; abundant shell fragments	17	142
Sand, medium to fine, gray green; abundant shell fragments	10	152
Sand, medium to fine, gray; shell fragments	69	221
Calvert(?) formation:		
Sand, medium to fine, gray	52	273
Sand, medium to fine; clay, gray	21	294
Sand, medium to fine, hard, gray	7	301
Dor-Bf 26, test well (Altitude: 45 feet)		
Recent series:		
Soil, dark brown	1.5	1.5

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Parsonsburg sand:		
Sand, coarse to medium fine, brown	8.5	10
Beaverdam sand:		
Sand, coarse to medium, white	15	25
Sand, coarse, white	15	40
Pliocene(?) series:		
Sand, coarse, red; granules	6	46
Sand, fine, light brown	1.5	47.5
Sand, coarse to medium, red-brown	5.5	53
Sand, coarse, buff; granules	2	55
Miocene series:		
St. Marys(?) formation:		
Clay, gray	53	108
Choptank formation:		
Sand, fine; silt and clay, gray; shell fragments	18	126
Dor-Bf 28, test well (Altitude: 51.6 feet)		
Recent series:		
Sandy loam	1	1
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, silty, brown	11.5	12.5
Sand, medium, light tan	7.5	20
Beaverdam sand:		
Sand, coarse, white	16	36
Pliocene(?) series:		
Sand, coarse, brown	3	39
Clay, red	5	44
Clay, gray	2	46
Clay and granule, red and gray	4	50
Sand, coarse; granule, buff to light red	11	61
Sand, coarse to medium, hard, red	19	80
Miocene series:		
St. Marys(?) formation:		
Clay and silt, gray; sand, coarse, red	43	123
Choptank formation:		
Sand, medium to fine, silty, gray; shell fragments with sand, coarse, red	52	175
Sand, fine, silty, gray	35	210
Dor-Bf 29, test well (Altitude: 39.5 feet)		
Recent series:		
Soil	1	1
Pleistocene series:		
Beaverdam sand:		
Sand, medium, buff	9	10
Sand, medium, white	10	20
Sand, coarse, white; granules	10	30

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Pliocene(?) series:		
Sand, coarse to medium, orange; granules and clay	3	33
Sand and granules, buff	2	35
Sand and clay, red	1	36
Sand, coarse, buff; granules, and red clay	9	45
Sand, coarse to medium; granules, orange to red	15	60
Miocene series:		
St. Marys(?) formation:		
Clay, gray	50	110
Choptank formation:		
Sand, fine, and silt, greenish-gray; shell fragments	45	155
Sand, fine, silty, gray; few shell fragments	18	173
Sand, fine, silty, gray	37	210
Dor-Bg 3, observation well (Altitude: 40 feet)		
Pleistocene and Pliocene(?) series:		
Sand, medium, brown	4	4
Sand, medium, brown; clay; abundant gravel up to 1-inch size; some granules	3.5	7.5
Clay, plastic, buff-brown	3.5	11
Clay, sandy, iron-brown	3	14
Sand, very coarse to medium, clayey, iron-brown	2	16
Dor-Bg 7 (Altitude: 40 feet) P 5469		
Pleistocene and Pliocene(?) series:		
Sand; clay and gravel, white	20	20
Sand and gravel, white and yellow	11	31
Sand, fine; gravel, white and yellow	21	52
Sand, coarse, and gravel, yellow; some iron-cemented sand	5	57
Sand, white and yellow	8	65
Sand and clay, yellow and white	2	67
Sand, fine, white	8	75
Miocene series:		
St. Marys, Choptank and Calvert formations:		
Clay, gray	30	105
Clay, dark gray	29	134
Clay, sand, fine; shells	10	144
Sand; hard pan	7	151
Clay; sand, fine; shells	34	185
Sand and shells; hard pan	3	188
Clay; sand, fine, gray; shells	6	194
Sand, gray; shells	20	214
Clay, dark gray	10	224
Clay and sand, fine	12	236
Clay, dark brown	5	241
Sand, fine; hard pan	8	249
Sand; clay and shells	25	274
Clay, brown; sand, coarse, gray; shells	18	292

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Dor-Bg 18, test well (Altitude: 40 feet)		
Pleistocene series:		
Sand, medium, silty, buff	5	5
Sand, coarse to medium, buff to red-brown	5	10
Sand, very coarse to medium, buff	5	15
Sand, coarse to medium, buff	6	21
Sand, coarse to medium; grit, buff	5	26
Sand, coarse to medium, buff	5	31
Pliocene(?) series:		
Sand, medium, orange	5	36
Sand and granules	4	40
Miocene series:		
St. Marys and Choptank formations:		
Clay, buff	2	42
Clay, buff and gray	5	47
Clay, gray	47	94
Clay, some sand, gray	21	115
Sand, medium, clayey, gray; shell fragments	21	136
Sand, medium, gray; shell fragments	74	210
Calvert(?) formation:		
Clay, sandy, gray	5	215
Clay, sandy, gray; shell fragments	7	222
Sand, very fine, silty, clayey, gray	9	231
Clay, sandy, gray and red; shell fragments	5	236
Sand, very fine, silty and clayey, red	5	241
Sand, very fine, silty	6	247
Sand, fine, silty, buff; shell fragments; black particles	5	252
Sand, very fine, silty, buff	5	257
Sand, very fine, silty; clay at 263 feet, buff	7	264
Sand, very fine, silty; clay ending at 265 feet, buff; shell fragments	5	269
Sand, medium to fine, gray; shell fragments; black particles	4	273
Sand, very fine, silty, clayey, gray-brown	5	278
Sand, very fine, silty, gray-brown; shell fragments	6	284
Sand, very fine, silty, gray; particles of gray and brown clay	7	291
Sand, medium to fine, gray-brown; shell fragments	3	294
Sand, very fine, silty, clayey, gray-brown	16	310
Sand, medium, silty, gray-brown; shell fragments	5	315
Sand, medium to fine, gray-brown; shell fragments; clay particles, gray	4	319
Clay, sandy; shell fragments	5	324
Sand, very fine, silty, clayey, brown	5	329
Sand, medium to fine, silty, brown-gray; clay particles brown; shell fragments	5	334
Clay, sandy, gray and red	3	337
Sand, very fine, silty; clay, lumpy, gray	5	342
Sand, fine, silty, gray-brown; shell fragments	5	347
Sand, fine, gray-brown; shell fragments	5	352

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine to very fine, silty, gray-brown	4	356
Sand, medium to fine; shell fragments	2	357
Sand, fine, very silty, gray-brown	3	360
Rock, very hard; sand, fine, silty; rock particles	1.5	361.5
Dor-Bg 32 (Altitude: 40 feet) P 12567		
Pleistocene series:		
Walston silt(?):		
Clay, sandy, brown	8	8
Beaverdam(?) sand:		
Sand, coarse, light	30	38
Sand, white	14	52
Pliocene(?) series:		
Iron ore	1	53
Sand, brown	12	65
Sand and gravel	20	85
Sand, coarse, red	19	104
Miocene series:		
St. Marys formation:		
Clay	—	104
(Screen 66–82.7 feet)		
Dor-Bg 33, test well (Altitude: 40 feet) P 21806		
Pleistocene series:		
Beaverdam(?) sand:		
Sand, coarse to medium; granule gravel, dark buff	18	18
Clay	1	19
Sand, coarse to medium; gravel, dark buff	14	33
Sand, medium; granule gravel, light brown	12	45
Sand, very coarse to medium; gravel, dark buff	18	63
Pliocene(?) series:		
Sand, very coarse to medium; granule gravel, red-brown	29	92
Miocene series:		
St. Marys formation:		
Clay, hard, gray 92–92.5 feet	7	99
(Screen 85–90 feet)		
Dor-Cc 4 (Altitude: 4 feet) P 8474		
Recent:		
Earth, dark	4	4
Pleistocene and Pliocene(?) series:		
Sand, red	8	12
Sand, gray	20	32
Gravel and sand	6	38
Miocene series:		
Choptank and Calvert formations:		
Clay, blue	17	55
Sand, gray	35	90

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Gravel and sand	5	95
Clay, blue	171	266
Eocene series:		
Piney Point formation:		
Rock, hard	1	267
Sand, gray and black	66	333
Dor-Cc 5 (Altitude: 2 feet) P 3825		
Pleistocene and Pliocene(?) series:		
Sand, red	14	14
Sand, gray	4	18
Clay, blue	18	36
Gravel and sand	2	38
Miocene series:		
Choptank and Calvert formations:		
Clay, blue	3	41
Gravel and sand	1	42
Clay, blue	18	60
Shells, hard	3	63
Clay, blue	7	70
Sand and shells, hard	10	80
Clay, blue	38	118
Sand; rock, hard	1	119
Clay, blue	51	170
Sand, dark brown	40	210
Clay, blue	116	326
Eocene series:		
Piney Point formation:		
Sand, black	47	373
Dor-Cc 6 (Altitude: 5 feet) P 4847		
Pleistocene series:		
Clay	8	8
Sand	20	28
Miocene series:		
Choptank and Calvert formations:		
Clay	72	100
Sand	10	110
Clay and shells	140	250
Eocene series:		
Piney Point formation:		
Sand	75	325
Nanjemoy formation:		
Earth, black	125	450
Clay	40	490
Aquia greensand or Paleocene series:		
Sand	32	522

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Dor-Cc 10 (Altitude: 6 feet) P 1360		
Missing	10	10
Miocene series:		
Choptank(?) formation:		
Sand, fine to very fine; silt, gray; shell fragments	20	30
Silt and sand, fine to very fine, gray	20	50
Sand, fine to very fine, gray; abundant shell fragments	20	70
Silt and sand, fine to very fine, light gray	20	90
Sand, fine to very fine, silty, gray; shell fragments	40	130
Calvert(?) formation:		
Silt and sand, fine to very fine, light olive-gray	40	170
Silt and sand, fine to very fine, light olive-gray; shell fragments	20	190
Sand, medium to fine, gray	20	210
Sand, fine to very fine, silty, gray	20	230
Silt and sand, fine to very fine, gray	30	260
Silt and sand, fine to very fine, gray; shell fragments	20	280
Silt and sand, very fine, light gray (diatomaceous)	20	300
Silt and sand, fine to very fine, gray	10	310
Eocene series:		
Piney Point formation:		
Sand, medium, glauconitic, greenish-blue	60	370
Dor-Cc 13 (Altitude: 3 feet) P 4271		
Pliocene(?) series:		
Sand, red	14	14
Miocene series:		
Choptank and Calvert formations:		
Sand, gray	6	20
Gravel and sand	2	22
Sand, gray	18	40
Clay, brown	28	68
Sand and shells, hard	3	71
Clay, blue	35	106
Sand and shells, gray	40	146
Clay, blue	164	310
Eocene series:		
Piney Point formation:		
Sand, coarse, gray	13	323
Sand, black	53	376
Dor-Cd 11 (Altitude: 12 feet) P 4984		
Pleistocene and Pliocene(?) series:		
Clay	6	6
Sand, red	22	28
Clay	4	32
Sand, fine, green	18	50
Sand and gravel, red	35	85

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank and Calvert formations:		
Clay	20	105
Sand, fine; shell layers	15	120
Clay, blue	185	305
Eocene series:		
Piney Point formation:		
Rock	2	307
Sand, fine, green	18	325
Sand, coarse	30	355
Dor-Cd 16, observation well (Altitude: 5 feet)		
Pleistocene series:		
Pamlico formation:		
Sand, medium, clayey, brown to gray	3	3
Clay, sandy, black	1	4
Clay, silty, loose and mushy, blue	5	9
Dor-Cd 35 (Altitude: 5 feet) P 2317		
Pleistocene series:		
Clay, light gray	7	7
Sand, brown	3	10
Sand, white	6	16
Sand, coarse, gray	22	38
Gravel and sand	6	44
Miocene series:		
Choptank(?) formation:		
Clay, brown	11	55
Sand, gray; shells, hard	45	100
Calvert formation:		
Clay, brown	60	160
Sand, light gray	20	180
Clay, light blue	138	318
Eocene series:		
Piney Point formation:		
Sand, rock	—	318
Sand, green; clay, brown	15	333
Sand, black, and shells	47	380
Dor-Ce 1 (Altitude: 18 feet)		
Pleistocene series:		
Clay, sandy and soft	13.5	13.5
Clay	12	25.5
Sand	6	31.5
Miocene series:		
Choptank formation:		
Clay	27.5	59
Marl	23	82
Rock, soft	1	83

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay, sandy	9	92
Hard	1.3	93.3
Clay, dark	49.7	143
Shells	2	145
Calvert formation:		
Clay	65.2	210.2
Shells	.8	211
Clay	77.7	288.7
Sand, hard; clay streaks	24.9	313.6
Clay	32.4	346
Rock, very hard	1.6	347.6
Clay	7.7	355.3
Sandy	4	359.3
Eocene series:		
Piney Point formation:		
Rock, soft	3.7	363
Sand	21	384
Hard	11.5	395.5
Hard crusts	119.5	515
Nanjemoy formation:		
Clay, green	10	525
Clay, soft	29	554
Clay, tough	26	580
Paleocene series:		
Clay and crusts	174	754
Upper Cretaceous series:		
Monmouth(?) formation:		
Clay, tough, gray	22	776
Hard	8	784
Clay, soft	12	796
Hard	.5	796.5
Matawan(?) formation:		
Clay, soft, and sand, coarse	29.5	826
Crust	.2	826.2
Clay	29.5	855.7
Hard	—	855.7
Clay	48.3	904
Sandy	—	904
Shells and sand	15.3	919.3
Clay	6.7	926
Magothy(?) formation:		
Sand, free streaks; wood	.2	926.2
Clay, sandy; crust at 935 feet	8.8	935
Sand, fine	11	946
Crust	12	958
Sand, very free	4	962
Crust	.2	962.2
Sand, free	3.8	966

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Dor-Ce 2 (Altitude: 15 feet)		
Pleistocene series:		
Pamlico formation:		
Missing	5	5
Sand, very fine, and silt, light brown	5	10
Sand, very fine, and silt, light gray	5	15
Clay, silty, light brown	5	20
Miocene series:		
Choptank formation:		
Clay, silty, light gray	10	30
Sand, fine, silty, light gray	10	40
Clay, silty, light gray	5	45
Clay, tough, light gray to brown	10	55
Clay, silty, light gray-green; shell fragments	5	60
Shell fragments	5	65
Sand, fine, light gray-blue; shell fragments	5	70
Sand, fine, light gray; shell fragments	10	80
Shell fragments; sand, fine, light gray	5	85
Clay, silty, light gray	7	92
Hard clayey particles, light gray; rock; shell fragments	4	96
Sand, medium to fine, light gray; shell fragments	9	105
Calvert formation:		
Clay, silty, light olive-gray	25	130
Clay, silty, light olive-green	13	143
Sand, medium, light gray	7	150
Sand, medium, light gray; shell fragments	12	162
Clay, silty, light gray	18	180
Clay, silty, light olive-green	38	218
Sand, medium, gray; clay; shell fragments	2	220
Sand, medium, gray; shell fragments	2	222
Clay, silty, light olive-green	13	235
Clay, silty, light olive-green; shell fragments	5	240
Clay, silty, light olive-green to gray	40	280
Sand, medium, light gray-blue	20	300
Clay, silty, light olive-green to gray	49	349
Sand, medium, light gray-blue; clay	.5	349.5
Clay, light gray; sand, medium	1.5	351
Sand, clayey, medium, light gray-brown	4	355
Sand, silty, clayey, coarse to medium, light gray-brown	6.8	361.8
Sand, slightly clayey, medium, light gray	2.2	364
Eocene series:		
Piney Point formation:		
Sand, very coarse to medium, light gray-blue; clay, silty, gray	4	368
Sand, very coarse to medium, light olive-blue; clay, silty, green	12	380
Sand, very coarse to medium, light gray-blue; granule and pea-sized gravel	6	386
Sand, very coarse to medium, light gray-brown; granules and pea-sized gravel	4	390
Sand, very coarse to medium, light gray-brown; clay balls, green	22	412

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Dor-Ce 3 (Altitude: 15 feet) P 174		
Pleistocene series:		
Pamlico formation:		
Clay, brown	13	13
Clay, gray	13	26
Miocene series:		
Choptank formation:		
Clay and sand, gray; shell fragments	12	38
Clay, gray; shell fragments	22	60
Clay, gray; shells	26	86
Sand; shells, hard cemented	1.5	87.5
Clay, sandy, gray	7.3	94.8
Sandstone, hard	.8	95.6
Soft	1	96.6
Sandstone, hard, gray	.9	97.5
Clay, sandy, gray; shells	14.5	112
Calvert formation:		
Clay, gray	43	155
Clay, sandy, gray	67	222
Clay, sand; shells	18	240
Clay; shells	40	280
Sand, hard	20	300
Clay, hard, gray	51	351
Rock	2	353
Clay; shells	13	366
Eocene series:		
Piney Point formation:		
Sand, coarse, gray; shells	22	388
Sand, coarse, gray, some brown; shells	97	485
Nanjemoy formation:		
Clay, gray to green	55	540
Clay, sticky, gray	50	590
Paleocene series:		
Clay, sticky, gray; hard from 604–675 feet	93	683
Clay, soft	77	760
Upper Cretaceous series:		
Monmouth(?) formation:		
Clay, soft	18	778
Shells, crust; sand, black; wood	6	784
Clay, gray	7	791
Rock, green	7	798
Clay, green	4	802
Rock, green	7	809
Matawan(?) formation:		
Clay, gray	81	890
Clay, dark gray	18	908
Magothy(?) formation:		
Clay, light gray; much wood	4	912
Clay, sandy, gray	8	920

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay, tough, crusty, gray	5	925
Clay, sandy, hard, green	3.5	928.5
Clay, dark gray	2	930.5
Clay, gray; very hard 934.5–936.1 feet	7.5	938
Wood	2	940
Sand, white and gray; some coarse sand; few clay streaks; crusts	31.5	971.5
Raritan(?) formation:		
Clay, tough, gray	5.5	977
Dor-Ce 4 and 5 (Altitude: 18 feet)		
Pleistocene series:		
Pamlico formation:		
Clay	2	2
Clay, sandy	6	8
Clay, blue	2	10
Miocene series:		
Choptank formation:		
Clay, sandy	76.5	86.5
Sandrock, soft	1	87.5
Clay, sandy	1.2	88.7
Sandrock	.8	89.5
Clay, sandy	7.2	96.7
Sandrock	3.8	100.5
Clay, sandy	23.5	124
Shellrock	.5	124.5
Calvert formation:		
Clay, sandy	21.5	146
Clay, soft	64	210
Clay, sandy	14	224
Shellrock	1.5	225.5
Sand	4.5	230
Clay	60	290
Clay, sandy	5	295
Rock	.8	295.8
Sand	16.2	312
Clay	40.3	352.3
Rock, soft	.3	352.6
Clay	.5	353.1
Rock, hard	.5	353.6
Clay	4.4	358
Sand	7	365
Eocene series:		
Piney Point formation:		
Rock, soft	5	370
Sand and shells; hard streaks	15	385
Sand	20	405

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Dor-Ce 6 (Altitude: 20 feet)		
Pleistocene series:		
Soil	3	3
Clay, sandy, red	7	10
Clay, sandy, tough, blue	16	26
Miocene series:		
Choptank formation:		
Quicksand(?) dark	22	48
Shell rock, hard	7	55
Clay, yellow; shells	28	83
Sandstone, hard	7	90
Clay, sandy, blue	27	117
Shell rock	1	118
Calvert formation:		
Clay, sandy, soft	102	220
Clay, sandy	33	253
Clay, soft	25	278
Shell rock, hard	2	280
Clay, sandy, blue	67	347
Rock, very hard	2	349
Clay, soft, yellow	11	360
Eocene series:		
Piney Point formation:		
Shell rock, soft	8	368
Sand, tight, black and white	85	453
Clay, soft, yellow, some blue	10	463
(Uncased hole 365–463 feet)		
Dor-Ce 9 (Altitude: 25 feet)		
Pleistocene series:		
Clay and sand, yellow; mucky	14	14
Mud and gravel, greenish-black	6	20
Mud, blue	36	56
Miocene series:		
Choptank formation:		
Clay and sand, light brown; shells	20	76
Sand, light gray; shell rock	11	87
Mud, light gray; shells	6	93
Sand, light gray; shell rock	2	95
Mud and shell, bluish-gray	30	125
Calvert formation:		
Mud and shells, greenish-brown	17	142
Sand rock, olive-green	14	156
Clay and sand, olive-green	31	187
Mud, olive-green	98	285
Mud, stiff, sandy, olive-green	10	295
Sand rock, gray	19	314
Sand rock, olive-green	16	330

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Marl, bluish-gray	19	349
Sand rock, gray	1.5	350.5
Sand and clay, greenish-brown	5.5	356
Sand, coarse, and clay, gray	8	364
Eocene series:		
Piney Point formation:		
Rock; tight shell and gravel	4	368
Sand, gray; shells; gravel; clay	17	385
Sand, greenish-gray; shells and gravel; a little clay	28	413
Dor-Ce 10 (Altitude: 6 feet)		
Pleistocene series:		
Shells	2	2
Marsh mud, soft, blue	6	8
Sand, white	10	18
Clay, blue	14	32
Miocene series:		
Choptank formation:		
Sand, hard, gray; shells	35.6	67.6
Rock, hard	4.7	72.3
Sand, hard, green	15.8	88.1
Sand and sandstone, hard	9.9	98
Calvert formation:		
Clay, soft, green	21	119
Sand, green; shell and black sand	46	165
Clay, soft, green	10	175
Clay, soft, very sandy, bluish; abundant shells	25	200
Clay, soft, sandy, greenish; streaks of sand	73	273
Shell rock, hard	.3	273.3
Clay, soft, green	26.7	300
Clay, hard, green	24.7	324.7
Eocene series:		
Piney Point formation:		
Rock	1.6	326.3
Sand, free, green; gravel; shells	12.7	339
Rock, soft	4	343
Sand; shells (water)	32	375
(Uncased hole 335–375 feet)		
Dor-Ce 13 (Altitude: 18 feet) P 1645		
Pleistocene series:		
Sand and clay	4	4
Sand	18	22
Miocene series:		
Choptank formation:		
Clay and marl	63	85
Calvert formation:		
Rock	6	91
Clay	53.8	144.8

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Rock	.4	145.2
Clay	24.8	170
Clay, sandy	30	200
Clay	157	357
Rock	1	358
Sand (water)	12	370
Eocene series:		
Piney Point formation:		
Rock	5	375
Sand (water)	55	430
Dor-Ce 15 (Altitude: 6 feet) P 1220		
Recent:		
Shells, oyster	5	5
Pleistocene series:		
Clay	5	10
Sand	11	21
Miocene series:		
Choptank formation:		
Marl, sandy	39	60
Missing	14	74
Calvert(?) formation:		
Rock, hard	4	78
Clay	32	110
Hard	10	120
Clay, dark	74	194
Hard	2	196
Clay	3	199
Hard	5	204
Clay	61	265
Sand, hard	20	285
Clay	49.8	334.8
Hard	1.6	336.4
Clay, sandy	14.4	350.8
Eocene series:		
Piney Point formation:		
Rock, soft	2.2	353
Sand and shells	77	430
Sand, streaks	20	450
Clay	4	454
Clay, sandy	40	494
Nanjemoy(?) formation:		
Clay	106	600
Paleocene series:		
Clay	124	724
Upper Cretaceous series:		
Monmouth(?) formation:		
Clay, hard	44	768
Boulders	27	795

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Matawan(?) formation:		
Clay, soft	21	816
Hard	2	818
Crusty	9.5	827.5
Clay, soft	30.7	858.2
Hard	2.8	861
Clay	14.7	875.7
Rock, hard	2.3	878
Clay	24	902
Sand	2	904
Clay, gray	21	925
Clay, red	10	935
Magothy(?) formation:		
Sand, fine, crusty, white	1	936
Sand, coarse	19	955
Sand, free	4	959
Crusty	2	961
Sand, free	6.9	967.9
Crusty	5.6	973.5
Dor-Ce 28 (Altitude: 25 feet) P 5448		
Pliocene(?) series:		
Sand, red	10	10
Clay, brown	4	14
Miocene series:		
St. Marys(?) and Choptank formations:		
Sand, gray	6	20
Clay, brown	55	75
Sand, hard, gray; shells	51	126
Clay, blue	9	135
Calvert(?) formation:		
Sand, hard, gray	91	226
Clay, blue	14	240
Sand, gray	40	280
Clay, blue	105	385
Eocene series:		
Piney Point formation:		
Rock, hard	1	386
Sand, coarse, gray	9	395
Sand, dark green	41	436
Dor-Ce 61 (Altitude: 15 feet) P 9474		
Miocene series:		
Choptank formation:		
Sand, gray, and gravel, fine	15	15
Silt, gray	19	34
Clay and silt, gray	21	55
Silt, gray; shell fragments	10	65

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine, gray; clay, green; shell fragments	22	87
Clay, green; shell gragments	13	100
Calvert(?) formation:		
Sandstone, fine, hard, olive-green	4	104
Clay, diatomaceous (?), green	56	160
Clay, diatomaceous, gray, greenish	63	223
Sandstone, hard; shell fragments	3	226
Silt, sandy, diatomaceous (?), hard, light gray	66	292
Sandstone, crusty	2	294
Clay, green, and silt, gray	63	357
Eocene series:		
Piney Point formation:		
Rock, hard sandstone	2	359
Clay, green; sand, gray; shells	12	371
Clay, sandy, gray	11	382
Clay, glauconitic, green	5	387
Sand, coarse; clay, olive-green	4	391
Sand, coarse, grit and gravel, angular (water)	27	418
Sand, coarse; hard fragments	32	450
Dor-Ce 65 (Altitude: 8 feet)		
Pleistocene series:		
Sand, buff, and gravel	35	35
Miocene series:		
Choptank formation:		
Silt, sandy, black	40	75
Sand, medium to fine, gray; shell fragments	10	85
Marsh gas	—	85
Missing	90	175
Dor-Cf 5 (Altitude: 21 feet) P 4704		
Pliocene(?) series:		
Sand, red	10	10
Miocene series:		
St. Marys and Choptank formations:		
Clay, blue	14	24
Gravel	6	30
Clay, blue	60	90
Sand, hard, gray; gravel and shells	70	160
Clay, blue	10	170
Calvert formations:		
Sand, black and gray	40	210
Dor-Cf 6 (Altitude: 10 feet) P 4848		
Miocene series:		
St. Marys and Choptank formations:		
Clay	6	6
Sand	34	40

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay	50	90
Sand and shell layers (some water)	30	120
Clay and sand	40	160
Calvert formation:		
Sand, loose	30	190
Dor-Cf 8 (Altitude: 12 feet) P 12341		
Pleistocene series:		
Sand, silty, medium, brown	10	10
Miocene series:		
St. Marys formation:		
Sand, silty, medium to fine, tan; nodules of silty sand; mica	10	20
Sand, medium to fine, light tan; mica	10	30
Sand, medium to fine, light tan; mica	10	40
Sand, medium to fine, light tan; mica	10	50
Sand, medium, light tan;	10	60
Sand, very coarse, mixed color	10	70
Sand, granular, and silt, gray	10	80
Silt and granular sand, gray	10	90
Sand, silty, fine to very fine, gray	10	100
Sand, silty, very fine to fine, gray	10	110
Choptank(?) formation:		
Sand, silty, fine, gray; shell fragments	10	120
Sand, medium to fine, gray; many shell fragments	10	130
Sand, medium, gray; many shell fragments	10	140
Sand, medium, gray; many shell fragments	10	150
Sand, medium, gray; many shell fragments	10	160
Sand, medium to fine, gray; shell fragments	10	170
Sand, medium to fine, gray; many shell fragments	10	180
Sand, fine to very fine, gray; shell fragments	14	194
(Screen 174–194 feet)		
Dor-Db 1 (Altitude: 4 feet) P 3556		
Pleistocene and Pliocene(?) series:		
Clay, yellow	8	8
Sand, red	7	15
Miocene series:		
Choptank and Calvert formations:		
Sand, gray	6	21
Clay, blue	9	30
Sand, gray	12	42
Clay, blue	88	130
Sand, coarse, gray	10	140
Clay, blue	20	160
Sand, gray; shells	10	170
Clay, blue	25	195
Rock, hard crust	.2	195.2
Clay, blue	119.8	315

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Sand, gray and black	39	354
Dor-Db 14 (Altitude: 4 feet) P 8473		
Pleistocene and Pliocene(?) series:		
Clay, yellow	6	6
Sand, red	8	14
Miocene series:		
Choptank and Calvert formations:		
Clay, blue	12	26
Sand, brown	2	28
Sand and gravel	6	34
Clay, blue	226	260
Eocene series:		
Piney Point formation:		
Sand, black	30	290
Dor-Dd 1 (Altitude: 4 feet) P 5125		
Pleistocene series:		
Sand, medium to fine, slightly silty, tan and gray	10	10
Sand, fine, slightly silty, tan and gray	10	20
Sand, medium, tan and gray; silt	20	40
Miocene series:		
St. Marys(?) formation:		
Silt and clay, pinkish-gray	10	50
Clay and silt, pinkish-gray	10	60
Choptank(?) formation:		
Sand, fine to very fine; silt, gray; shell fragments	20	80
Sand, fine to very fine; silt, gray	10	90
Silt and sand, fine to very fine, hard, gray; shell fragments	10	100
Silt and sand, fine to very fine, light gray	30	130
Calvert(?) formation:		
Silt and sand, very fine, dark gray	20	150
Silt and sand, fine to very fine, light olive, gray	60	210
Sand, fine, gray; shell fragments	20	230
Sand, fine to very fine; silt, light gray; diatomaceous	100	330
Silt and sand, fine to very fine; clay, gray	10	340
Sand, medium to fine, silty, dark gray	10	350
Eocene series:		
Piney Point formation:		
Sand, medium, gray; shell fragments	10	360
Sand, medium, tan and greenish; abundant black glauconite	24	384
Dor-Dd 2 (Altitude: 3 feet) P 6647		
Pliocene(?) series:		
Sand, red	6	6

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank(?) formation:		
Sand, gray	34	40
Sand, hard, gray	48	88
Calvert formation:		
Clay, blue	237	325
Eocene series:		
Piney Point formation:		
Rock	1	326
Sand, black and gray	84	410
Nanjemoy(?) formation:		
Clay, blue	220	630
Paleocene(?) series:		
Clay and sand, black	70	700
Upper Cretaceous(?) series:		
Monmouth(?) and Matawan(?) formations:		
Clay, blue	98	798
Magothy(?) formation:		
Rock, hard	1	799
Sand, white; pink clay	36	835
Dor-De 1 (Altitude: 6 feet) P 5020		
Pleistocene and Pliocene(?) series:		
Clay, yellow	8	8
Sand, red	4	12
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, gray	6	18
Clay, blue	4	22
Sand, gray	8	30
Clay, blue	87	117
Rock, shells, hard	1	118
Sand, gray	8	126
Clay, blue	240	366
Eocene series:		
Piney Point formation:		
Rock	2	368
Sand, brown to black	20	388
Sand, hard, gray	51	439
Dor-Df 10 (Altitude: 7 feet) P 6781		
Pleistocene and Pliocene(?) series:		
Clay, yellow	5	5
Sand and gravel	2	7
Sand, red	13	20
Miocene series:		
St. Marys and Choptank formations:		
Sand, white	62	82

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue	80	162
Sand, gray	26	188
Calvert formation:		
Clay, blue	27	215
Rock	2	217
Clay, blue	43	260
Sand, hard, gray	40	300
Dor-Dh 8 (Altitude: 10 feet)		
Pleistocene and Pliocene(?) series:		
Clay and sand	20	20
Sand, yellow	40	60
Miocene series:		
St. Marys and Choptank formations:		
Clay, black	112	172
Clay, black, and shells	18	190
Hard pan	1	191
Sand and shells	14	205
Hard pan and shells	5	210
Calvert formation:		
Shells and sand	46	256
Hard pan	1	257
Sand and shells	58	315
(Uncased hole 205–315 feet)		
Dor-Ec 1 (Altitude: 5 feet) P 2845		
Pleistocene and Pliocene(?) series:		
Clay, dark	10	10
Sand, red	5	15
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, gray	20	35
Sand and gravel, gray	9	44
Clay, blue	34	78
Sand, fine, and shells	37	115
Clay, blue	65	180
Clay, brown	150	330
Eocene series:		
Piney Point formation:		
Rock, sand, hard	3	333
Sand, brown and black	54	387
Dor-Ec 4 (Altitude: 3 feet) P 4983		
Pliocene(?) series:		
Sand, red	10	10
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, gray	10	20

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue	60	80
Sand, gray; shells	46	126
Clay, blue	34	160
Sand, hard, gray; shells	40	200
Clay, blue	150	350
Eocene series:		
Piney Point formation:		
Rock, hard	2	352
Clay, brown	6	358
Sand, hard, gray; shells	35	393
Dor-Ec 5 (Altitude: 3 feet) P 6780		
Pleistocene series:		
Clay, yellow	6	6
Sand, brown	8	14
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Clay, blue	4	18
Sand, gray	22	40
Sand and gravel	4	44
Sand, gray	6	50
Clay, blue	20	70
Sand, gray	20	90
Clay, blue	12	102
Sand, gray	20	122
Sand, soft, gray; shells	62	184
Clay, blue	173	357
Eocene series:		
Piney Point formation:		
Rock, hard	2	359
Sand, coarse, gray	9	368
Sand, hard, gray and black	32	400
Dor-Ed 3 (Altitude: 2 feet) P 614		
Pleistocene series:		
Pamlico(?) formation:		
Silt and clay; very fine sand, light gray	10	10
Sand, fine to very fine, silty, light tan	10	20
Sand, fine to very fine; silt, grayish-tan	10	30
Beaverdam(?) sand:		
Sand, medium, gray; shell fragments	10	40
Miocene series:		
St. Marys formation:		
Sand, fine, silty, gray; abundant shell fragments	30	70
Sand, fine to very fine, gray-tan	10	80
Silt, clayey; very fine sand, brownish-gray	20	100
Silt and clay; very fine sand, light olive-gray	10	110
Silt, clayey; very fine sand, brownish-gray	10	120
Choptank(?) formation:		
Sand, medium to fine, gray	20	140

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine to very fine, silty, brownish gray; shell fragments	30	170
Sand, fine to very fine; silt, light gray	10	180
Calvert(?) formation:		
Silt and fine to very fine sand, tan-gray	20	200
Sand, fine to very fine, and silt, brownish-gray	10	210
Sand, fine to very fine, and silt, light greenish-gray	10	220
Silt and sand, very fine, light olive-gray	10	230
Sand, fine to very fine, and silt, light olive-gray	100	330
Sand, fine to very fine; silt, gray	50	380
Eocene series:		
Piney Point formation:		
Sand, medium, tan; abundant black particles	10	390
Sand, medium, dark tan; abundant black particles	49	439
Dor-Ed 8 (Altitude: 2 feet) P 2188		
Pleistocene series:		
Clay	12	12
Sand	14	26
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Clay; sand streaks	50	76
Sand	13	89
Crust	—	89
Sand	16	105
Hard	.5	105.5
Clay	109.5	215
Clay, tough	50	265
Sand	24	289
Clay and shells	33	322
Rock	1	323
Clay	66	389
Eocene series:		
Piney Point formation:		
Rock	4	393
Sand and hard layers	67	460
Sand	30	490
Rock	4	494
Sand, hard	14	508
Nanjemoy(?) formation:		
Clay	41	549
Rock	3	552
Rock, hard	2	554
Clay	46	600
Rock	1	601
Paleocene(?) series:		
Clay; sand, coarse, black	59	660
Clay	20	680
Clay, hard	51	731
Rock, soft	2	733

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Hard and soft layers	12	745
Sand, tight	35	780
Sand	10	790
Dor-Ed 9 (Altitude: 3 feet) P 4923		
Pliocene(?) series:		
Sand, fine yellow	11	11
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, fine, gray	22	33
Silt, sandy, gray	10	43
Sand, fine, gray	11	54
Clay, silty, blue; little sand	10	64
Silt, sandy, blue; shell fragments; black particles	11	75
Silt, sandy, gray-green; shell fragments; black particles	30	105
Sand, medium to fine, light green; shell fragments	10	115
Silt, sandy, gray-green; abundant shell fragments	20	135
Silt, sandy, olive-green; abundant shell fragments	20	155
Sand, fine, olive-green; abundant shell fragments	10	165
Silt, sandy, olive-green; shell fragments	10	175
Silt and clay, olive-green; shell fragments	10	185
Silt, sandy, olive-green; shell fragments	10	195
Clay and silt, olive-green; shell fragments	35	230
Clay and silt, sandy, olive-green; shell fragments	20	250
Sand, medium, olive-gray; shell fragments	44	294
Clay and silt, olive; shell fragments	21	315
Clay and silt, sandy, olive; shell fragments	13	328
Clay and silt, olive; shell fragments	50	378
Eocene series:		
Piney Point formation:		
Rock; hard drilling	2	380
Sand, medium, olive	11	391
Sand, medium, olive; hard drilling	3	394
Sand, medium, dark olive; abundant black particles; glauconite	24	418
Sand, coarse to medium, olive-green; black particles; glauconite	2	420
Sand, coarse to medium; silt, olive-green; black particles; glauconite	13	433
Sand, medium, olive-green; yellow clay; black particles; glauconite	5	438
Sand, coarse to medium, olive; yellow clay; black particles	4	442
Sand, coarse, olive-green; yellow clay; black particles	14	456
Sand, very coarse, yellow-green; black particles	9	465
Dor-Ed 10 (Altitude: 2 feet) P 7407		
Pliocene(?) series:		
Sand, red	8	8
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Clay, blue	4	12

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, gray	8	20
Clay, blue	10	30
Sand, gray	10	40
Clay, blue	5	45
Sand, gray	23	68
Sand and gravel	2	70
Sand, gray	8	78
Sand and gravel	11	89
Clay, blue	37	126
Rock, sand, hard	1	127
Boulder, rock	1	128
Clay, blue	18	146
Sand, gray	34	180
Clay, blue	85	265
Sand, hard, gray; shells	15	280
Clay, blue	113	393
Eocene series:		
Piney Point formation:		
Rock, sand, soft	4	397
Sand, green	22	419
Clay, blue	14	433
Sand, gray-brown	88	521
Dor-Fc 1 (Altitude: 7 feet) P 1199		
Pliocene(?) series:		
Clay, red	3	3
Sand, red	17	20
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, gray (water, irony and salty)	40	60
Clay, blue	60	120
Sand, gray; shells	60	180
Clay, brown	200	380
Eocene series:		
Piney Point formation:		
Rock	3	383
Sand, gray	26	409
Sand, hard, brown and black	34	443
Dor-Fc 21 (Altitude: 5 feet) P 7053		
Pleistocene series:		
Clay, yellow	7	7
Sand, brown	5	12
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, white	26	38
Sand and gravel	5	43
Clay, blue	46.5	89.5
Sand, gray; shells, hard	70.5	160

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Dor-Fd 9 (Altitude: 5 feet) P 3911		
Pleistocene and Pliocene(?) series:		
Clay, yellow	6	6
Sand, red	5	11
Sand and gravel	5	16
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, gray	34	50
Clay, blue	9	59
Sand, fine, gray	6	65
Clay, pink	27	92
Clay, blue	48	140
Sand, gray, and shells	8	148
Clay, blue	24	172
Sand, gray, and shells	8	180
Clay, brown	40	220
Clay, blue	175	395
Eocene series:		
Piney Point formation:		
Rock, sand, hard	1	396
Clay, brown	14	410
Sand, coarse, gray	25	435
Sand, black; yellow clay streaks	35	470
Dor-Fd 15 (Altitude: 4 feet) P 3661		
Pleistocene and Pliocene(?) series:		
Clay, yellow	6	6
Sand, red	6	12
Miocene series:		
St. Marys, Choptank, and Calvert formations:		
Sand, gray	6	18
Clay, brown	8	26
Sand, gray; shells	2	28
Clay, blue	110	138
Sand, gray; shells	19	157
Clay, brown	5	162
Sand, hard, gray; shells	8	170
Clay, blue	229	399
Eocene series:		
Piney Point formation:		
Rock; sand	1	400
Sand, coarse, gray	25	425
Sand, hard, gray	10	435
Sand, soft, black	49	484
Dor-Fe 4 (Altitude: 2 feet) P 5021		
Pleistocene series:		
Pamlico(?) formation:		
Sand, medium, buff to gray-brown	12	12

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, light gray	7	19
Clay, sandy, gray	3	22
Clay, sandy, orange-red	1	23
Miocene series:		
Yorktown and Cohansey formations(?):		
Sand, coarse to medium, light tan	18	41
Sand, coarse, light tan	10	51
Sand, medium to fine, light tan	9.5	60.5
Sand, very coarse to coarse, light tan; granules and clay	10.5	71.
Sand, medium, light tan	3	74
Sand, medium, light tan; small gravel	6	80
Sand, medium, light tan	5	85
St. Marys formation:		
Sand, medium to fine, greenish-gray; abundant black particles; clay	6	91
Sand, medium to fine, olive-green; shell fragments; black particles; little clay	11	102
Sand, fine, clayey, gray-brown; abundant large shell fragments and black particles	13	115
Clay, sandy, brown; shell fragments; abundant black particles	10	125
Clay, sandy, brown to gray-green; shell fragments; black particles	12	137
Clay, sandy, gray-green; shell fragments; black particles	9	146
Clay, sandy, olive-brown; shell fragments; black particles	12	158
Clay, olive-grey; shell fragments; abundant black particles; glauconite	9	167
Clay, sandy, fine, light olive-gray; abundant black particles; little glauconite	12	179
Choptank formation:		
Sand, medium, silty, olive-gray; abundant shell fragments	9	188
Sand, fine, silty, light olive; shell fragments; black particles; glauconite	42	230
Silt, sandy, medium, olive-brown; shell fragments; black particles; glauconite	21	251
Calvert(?) formation:		
Clay, sandy, fine to very fine, olive-brown to olive-green; shell fragments; black particles	63	314
Sand, medium to fine, clayey, olive-brown; shell fragments; black particles	12	326
Sand, medium, olive-gray; shell fragments, black particles	21	347
Sand, medium, clayey, brown-olive; shell fragments; black particles	9	356
Sand, medium to fine, silty, brown; shell fragments; black particles	21	377
Silt, sandy, fine, olive-brown; shell fragments; black particles	12	389
Sand, fine, silty, light olive-green; shell fragments; black particles	30	419
Sand, fine, silty, olive-brown; shell fragments; black particles	12	431
Sand, fine, silty, light olive-green; shell fragments; black particles	21	452

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Eocene(?) series:		
Piney Point formation:		
Hard rock	3	455
Sand, medium, gray; little silt; shell fragments; black particles	6	461
Sand, medium to fine, olive-brown; little clay; shell fragments; black particles	20	481
Sand, medium, salt and pepper, greenish-white	39	520
(Uncased hole from 473 ft. to 520 ft.) (On the basis of the sand log, the pronounced lithologic change occurs at 481 feet which may be the top of the Piney Point formation. Then the medium grained sand encountered from 455 to 481 feet may be the Fairhaven member of the Calvert formation)		
Dor-Fe 12 (Altitude: 2 feet) P 4841		
Pleistocene series:		
Parsonsburg(?) sand:		
Clay, yellow	7	7
Sand, brown	9	16
Pamlico(?) formation:		
Clay, blue	30	46
Sand, gray	2	48
Miocene series:		
St. Marys formation:		
Clay, blue	57	105
Choptank(?) formation:		
Sand, gray	25	130
Sand and gravel	3	133
Clay, sandy, blue; shell fragments	12	145
Sand, gray; shells	10	155
Clay, brown; forams	11	166
Sand, hard, and shells	34	200
Clay; sand; forams; spines	8	208
Calvert(?) formation:		
Silt, blue-gray; forams	201	409
Eocene(?) series:		
Piney Point formation:		
Rock		409
Sand, medium, greenish-white; many shell fragments	23	432
Sand, silty, hard, gray	39	471
Greensand, fine to medium	15	486
(The silty gray sand between 432 and 471 feet has a Calvert appearance. The top of the Eocene could be placed at 471 feet. However, the rock and sand from 409 to 432 feet have the typical appearance of Cambridge aquifer)		
Dor-Fe 27 (Altitude: 2 feet) P 6747		
Pleistocene series:		
Clay, yellow	10	10
Sand	32	42

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown(?) formation:		
Sand, fine; shells	27	69
St. Marys, Choptank, and Calvert formations:		
Clay	216	285
Sand, fine	30	315
Clay, blue	110	425
Eocene series:		
Piney Point formation:		
Rock	2	427
Sand, fine, loose	28	455
Sand, coarse; shells, hard	32	487
Dor-Fe 30 (Altitude: 4 feet) P 8125		
Recent series:		
Soil and earth	3	3
Pleistocene series:		
Parsonsburg(?) sand:		
Sand, red	17	20
Beaverdam(?) sand:		
Sand, gray	20	40
Miocene series:		
St. Marys formation:		
Clay, blue	60	100
Choptank(?) formation:		
Sand, gray	30	130
Clay, blue	20	150
Sand, gray; shells	80	230
Calvert(?) formation:		
Clay, blue	90	320
Sand, gray; shells	20	340
Clay, blue	72	412
Eocene series:		
Piney Point formation:		
Rock	1	413
Sand, green	28	441
Rock, hard	14	455
Sand	23	478
Dor-Fe 36 (Altitude: 3 feet) P 519		
Pleistocene series:		
Parsonsburg(?) sand:		
Sand, medium to fine, light tan; gray silt particles	10	10
Sand, medium, buff; some very coarse to coarse size	10	20
Pamlico(?) formation:		
Missing	5	25
Peat and silt, black; marshy fibrous material	4	29
Sand, fine to very fine, silty, tan-gray	1	30

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Beaverdam(?) sand:		
Sand, medium, light gray	10	40
Miocene series:		
Yorktown and Cohansey formations(?):		
Sand, fine to very fine, gray; small shell fragments	40	80
St. Marys (?) formation:		
Shell, gray; silt	10	90
Sand, fine to very fine, and silt, gray; shell fragments	20	110
Silt and clay, gray-pink; shell fragments	20	130
Silt and clay, pinkish-gray; shell fragments	40	170
Choptank(?) formation:		
Sand, fine to very fine, silty, gray; shell fragments	10	180
Sand, fine to very fine, silty, reddish-gray; shell fragments	10	190
Sand, medium, gray; shell fragments	10	200
Sand, fine to very fine, silty, pinkish-gray; shell fragments	10	210
Calvert(?) formation:		
Silt and very fine sand, light gray	20	230
Missing	90	320
Sand, fine to very fine, and silt, greenish-gray; shell fragments	10	330
Sand, fine to very fine, and silt, light green	20	350
Silt and very fine sand, light gray	80	430
Eocene series:		
Piney Point formation:		
Sand, medium, some silt, gray; shell fragments	10	440
Sand, fine to very fine, silty; shell fragments	30	470
Sand, medium, slightly silty, light gray	30	500
Dor-Ff 3 (Altitude: 10 feet) P 5237		
Pleistocene(?) series:		
Parsonsburg(?) sand:		
Sand, red	10	10
Sand, brown	4	14
Pamlico(?) formation:		
Clay, blue	14	28
Beaverdam(?) sand:		
Sand, gray	26	54
Sand and gravel	11	65
Miocene series:		
St. Marys and Choptank formations:		
Clay, blue	13	78
Clay, brown	7	85
Clay, blue	20	105
Sand, gray	17	122
Clay, blue	108	230
Sand, gray	48	278
Calvert(?) formation:		
Clay, blue	60	338
Sand, gray	18	356
Clay, blue	119	475

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Sand, gray	30	505
Sand, hard, gray	29	534
Dor-Ge 1 (Altitude: 2 feet) P 1114		
Recent series:		
Marsh material	2	2
Pleistocene series:		
Parsonsburg(?) sand:		
Clay, yellow	8	10
Beaverdam(?) sand:		
Sand, white	10	20
Sand, brown	20	40
Miocene series:		
Yorktown and Cohansey formations(?):		
Sand, fine, gray	20	60
St. Marys(?) formation:		
Clay, blue	40	100
Clay, brown	40	140
Choptank(?) formation:		
Clay, pink	40	180
Sand, gray; shells	40	220
Calvert formation:		
Clay, blue	230	450
Eocene series:		
Piney Point formation:		
Rock, sand	1.5	451.5
Sand, fine, gray	28.5	480
Sand, hard	40	520

TABLE 38

Logs of Wells in Talbot County

(*P* is Maryland well permit number)

	Thickness (feet)	Depth (feet)
Tal-Ae 17 (Altitude: 67 feet) P 1101		
Pleistocene series:		
Sandy	8	8
Clay	7	15
Sand	3	18
Clay, sandy	22	40
Miocene series:		
Calvert(?) formation:		
Rock, soft	4	44
Sand	17	61
Rock	—	61
Sand	4	65

TABLE 37—*Continued*

	Thickness (feet)	Depth (feet)
Clay	22	87
Rock	.5	87.5
Sand (water)	14.5	102
Sand and clay	7	109
Clay, green	28	137
Rock	—	138
Sand	12	150
(Uncased hole 87–150 feet)		
Tal-Bb 3 (Altitude: 15 feet)		
Pleistocene series:		
Pamlico formation:		
Sandy	15	15
Miocene series:		
Calvert formation:		
Clay	75.5	90.5
Sand	9.5	100
Eocene series:		
Nanjemoy formation:		
Clay	202.5	302.5
Aquia greensand:		
Sand	5.6	308.1
Crust	—	308.1
Sandy and crusts	18.7	326.8
Crust, hard	5	331.8
Sandy, hard in places	3	334.8
Sand, fine, dark	29.8	364.6
(Uncased hole 314–364.6 feet)		
Tal-Bc 1 (Altitude: 9 feet) P 5843		
Pleistocene series:		
Pamlico formation:		
Clay	15	15
Clay, soft	10	25
Miocene series:		
Calvert(?) formation:		
Marl	50	75
Clay, soft	5	80
Clay, solid	65	145
Sand, free	20	165
Eocene series:		
Piney Point(?) formation:		
Sand (water)	65	230
Nanjemoy formation:		
Clay	151	381
Aquia greensand:		
Sand, hard	1	382

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, free	24	406
Crusty and free places	10	416
(Screen 389–410 feet)		
Tal-Bc 3 (Altitude: 13 feet) P 6570		
Pleistocene Series		
Clay	5	5
Sandy	10	15
Clay, soft	16.5	31.5
Miocene series:		
Calvert(?)		
Clay, solid	113.5	145
Sand, gray	5	150
Clay	5	155
Eocene series:		
Piney Point(?) formation:		
Sand (water)	59	214
Nanjemoy formation:		
Clay	146	360
Clay, tough	5	365
Clay, less tough	24	389
Aquia greensand:		
Sand, hard	4	393
Sand, loose	10	403
Hard	1	404
Sand, free	16	420
Crusty, free in places	20	440
(Screen 409.5–430 feet.)		
Tal-Bc 4 (Altitude: 12 feet) P 844		
Pleistocene series:		
Parsonsburg(?) sand:		
Soil; clay, yellow, and sand	15	15
Sand, red, and gravel (water)	10	25
Miocene series:		
Calvert(?) formation:		
Sand, fine, gray; shell crusts	18	43
Sand; clay, blue	13	56
Clay, blue, and small stones	24	80
Clay, brown	56	136
Sand, hard, gray; fine shells	24	160
Eocene series:		
Piney Point(?) formation:		
Sand, hard, black and white	29	189
Sand, soft, black; clay, brown	4	193
Sand, brown and black; gravel, coarse	117	310
Nanjemoy formation:		
Clay, blue; sand, black	68	378

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Aquia greensand:		
Sand, white; gravel, coarse	10	388
Clay, yellow; sand, brown; gravel	24	412
Sand, coarse, brown; gravel	18	430
(Screen 422–430 feet.)		
Tal-Bd 18 (Altitude: 13 feet) P 4620		
Recent and Pleistocene series:		
Pamlico formation:		
Soil; clay, yellow; fine sand	12	12
Sand, yellow; gravel (water)	10	22
Clay, black, soft	6	28
Miocene series:		
Calvert(?) formation:		
Sand, fine, gray	8	36
Hard crust of sand and shells	1	37
Clay, light blue; sand	11	48
Clay, very light, sandy	36	84
Sand, hard, gray; clay, blue	17	101
Clay, brown; fine shells	59	160
Sand, gray; shells	18	178
Eocene series:		
Piney Point formation:		
Hard crust of sand and shells; sand, black	11	189
Clay crusts, yellow; sand, brown and black; gravel	11	200
(Uncased hole 195–200 feet)		
Tal-Bd 23 (Altitude: 17 feet) P 8559		
Pleistocene series:		
Pamlico formation:		
Sand, yellow	12	12
Sand; mud; rotten wood	12	24
Clay, soft; rotten wood	28	52
Miocene series:		
Calvert(?) formation:		
Sand, gray; fine shells	38	90
Clay, gray	30	120
Clay, sandy	30	150
Hard crust of shells and sand	1	151
Clay, brown	38	189
Shells; sand crusts	2	191
Sand, gray	32	223
Eocene series:		
Piney Point(?) formation:		
Hard layer of sand and shells	8	231
Sand, soft; mud	8	239
Gravel, brown; sand, black	76	315
(Uncased hole 240 to 315 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Be 6 (Altitude: 11 feet)		
Pleistocene(?) series:		
Not reported	25	25
Clay	10	35
Miocene series:		
Choptank(?) formation:		
Marl	66	101
Calvert formation:		
Sand, gray	11	112
Clay	75.5	187.5
Hard	1	188.5
Clay	15.9	204.4
Eocene(?) series:		
Piney Point(?) formation:		
Sand (water)	106.4	310.8
Clay	2	312.8
Sand	15.9	328.7
Nanjemoy formation:		
Clay	101.3	430
Aquia greensand:		
Sand	1	431
Clay, hard	2.5	433.5
Sand	9	442.5
Sand, free	3	445.5
Hard	1.5	447
Sand, free	19.3	466.3
(Screen 456–466 feet)		
Tal-Bf 25 (Altitude: 60 feet) P 5039		
Pleistocene series:		
Sand, yellow; clay, light	30	30
Miocene series:		
Choptank(?) formation:		
Clay, blue; sand, gray	55	85
Sand and shells	10	95
Calvert formation:		
Clay	5	100
Sand and shells, hard	60	160
(Uncased hole 100–160 feet)		
Tal-Bf 38 (Altitude: 55 feet) P 11747		
Pleistocene series:		
Sand, yellow	20	20
Pliocene(?) series:		
Sand, red; gravel	22	42
Sand, yellow; gravel and sand, red	28	70
Miocene series:		
Calvert(?) formation:		
Sand, fine, gray; clay, dark	45	115

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, hard; shell crust	6	121
Sand, gray; fine shells	26	147
(Uncased hole 115–147 feet)		
Tal-Bf 48 (Altitude: 53 feet) P 10685		
Pleistocene series:		
Sand; clay; gravel	47	47
Miocene series:		
Choptank(?) formation:		
Clay, blue	31	78
Shells and sand	12	90
(Uncased hole 63–90 feet)		
Tal-Bf 66 (Altitude: 45 feet) P 462		
Pleistocene series:		
Walston(?) silt:		
Clay, sandy	3	3
Clay, sandy; gravel	2	5
Beaverdam(?) sand:		
Sand, gravelly	14	19
Sand, coarse, gravelly	8	27
Pliocene(?) series:		
Sand, medium; clay, red and brown	8	35
Sand, medium; clay, red and brown; gravel streaks	8	43
Miocene series:		
Choptank(?) formation:		
Sand, fine; clay, blue	13	56
Sand, fine; shells; hard sand streaks	19	75
Sand, fine; shells; clay, blue	2	77
Calvert formation:		
Sand, fine, hard, with some clay	22	99
Clay, dark brown	6	105
Clay, dark brown; shells	5	110
Shell rock and shells; hard	2	112
Clay, blue; and streaks of shellrock	4	116
Clay, blue; shells	17	133
Shell rock, hard	3	136
Clay, blue; shells	37	173
Clay, blue	8	181
Clay, blue; shells	4	185
Clay, sandy, blue	13	198
Sand, fine; mud, blue	15	213
Sand, fine, clean	7	220
Clay, blue, sandy	8	228
Clay, blue	40	268
Sand, coarse to fine, clean	6	274
Clay and sand layer	4	278

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand	15.2	293.2
Hard layer	1	294.2
Eocene series:		
Piney Point(?) formation:		
Sand, fine, gray; mud increasing with depth; sand, black	108.8	403
Nanjemoy formation:		
Sand, muddy, becoming harder, black; clay	101	504
Clay, blue	67	571
Clay, blue; streaks of very fine, black sand	8	579
Sand, very fine, black; thin layers of gummy clay	11	590
Paleocene series:		
Clay, hard; thin streaks black sand	11	601
Clay, sand	1	602
Sand; clay, blue and brown	8	610
Clay, hard, blue	13	623
Clay, hard, blue; thin streaks of sand	16	639
Sand, hard	1.2	640.2
Clay, hard; sand	7.8	648
Sand, fine	10.5	658.5
Hard	1.3	659.8
Clay, hard	2	661.8
Sand; clay; shell	6.4	668.2
Clay, very hard	.8	669
Shells, very hard	2.8	671.8
Shells, hard-packed; streaks of clay	5	676.8
Shells with hard streaks	28.5	705.3
Sand, fine, black; shells; clay, white	3.7	709
Shells, hard	.7	709.7
Cretaceous(?) series:		
Monmouth(?) formation:		
Shells, fine; clay, white	32.3	742
Shells, very hard; clay, blue	20.3	762.3
Clay, blue; sand	2.7	765
Clay, sandy (black), blue	5	770
Clay, blue	3.6	773.6
Clay, sandy (black), blue	2.4	776
Clay, blue	2	778
Sand, fine, black; clay	12.3	790.3
Matawan(?) formation:		
Clay, hard; sand, black	34.7	825
Sand, fine, dark brown	27	852
Sand, fine, dark brown; streaks of fine gravel	23	875
Sand, fine, dark brown and black	14	899
Clay, blue	9	908
Magothy(?) formation:		
Clay, blue, grading to white	20	928
Sand, black; clay, blue and white	12	940

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, black and brown; clay	19	959
Hard	2	961
Sand, black and brown; gravel, fine	29	990
(Screen 866–886 feet and 975–990 feet.)		
Tal-Bf 71 (Altitude: 55 feet)		
Pleistocene series:		
Walston(?) silt:		
Clay, sandy	4	4
Clay, very sandy	8	12
Beaverdam(?) sand:		
Gravel, sandy	3	15
Sand, free, and gravel	7.5	22.5
Miocene series:		
Choptank(?) formation:		
Clay, tough, brown	1.5	24
Clay, tough, green; shells	33	57
Clay, green; sand and shells	21	78
Calvert formation:		
Sandstone, hard, gray	0.3	78.3
Sand and shells; green clay, tight	36.7	115
Clay, green	3	118
Sand and shells	17	135
Clay, firm, green	57.8	192.8
Rock	1.2	194
Sand	2	196
Sand and gravel, tight	5	201
Clay, brown and green	3	204
Clay, green	85.5	289.5
Sand and shells, tight	1.5	291
Sand, gray	.5	291.5
Shells, tight	.5	292
Sand, free, gray; shells	16	308
Clay, firm	0.8	308.8
Eocene series:		
Piney Point(?) formation:		
Hard	0.4	309.2
Gravel, fine, tight	3.8	313
Hard places and sand, loose	8	321
Sand, loose	179	500
Nanjemoy formation (or Paleocene series):		
Clay, green	108.7	608.7
Paleocene(?) series:		
Sand, hard	7.3	616
Sand, softer	9	625
Sand, hard	4	629
Sand, free	17	646
Crusty	0.7	646.7

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Hard place	.5	647.2
Sand, free	6.8	654
Crusty	1	655
Sand, free	2	657
Crusty	1	658
Very hard	0.5	658.5
Crusty	1.3	659.8
Hard	0.3	660.1
Very hard	0.2	660.3
Sand, soft	0.7	661
Very hard	0.2	661.2
Sand, soft	8.1	669.3
Hard	0.4	669.7
Sand	1.1	670.8
Hard	0.4	671.2
Sand	3.3	674.5
Very hard	0.2	674.7
Rock	0.8	675.5
Sand, tight	0.4	675.9
Rock	0.2	676.1
Sand, tight	0.2	676.3
Rock	0.2	676.5
Sand, tight	1.0	677.5
Rock	0.5	678
Sand	1.5	679.5
Rock, hard	0.8	680.3
Sand	1.2	681.5
Rock, hard	0.3	681.8
Sand	0.2	682
Rock, hard	0.7	682.7
Sand	1.9	684.6
Rock, hard	0.4	685
Sand	2.8	687.8
Rock, hard	0.4	688.2
Sand	1.9	690.1
Rock, hard	0.4	690.5
Sand	2.3	692.8
Rock	0.3	693.1
Sand	1.8	694.9
Rock	0.6	695.5
Sand	1.2	696.7
Rock	0.7	697.4
Sand	5.3	702.7
Rock	0.5	703.2
Sand	5.3	708.5
Rock	0.2	708.7
Sand	3.7	712.4
Rock	0.9	713.3

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Cretaceous(?) series:		
Monmouth formation:		
Hard places with clay, sandy, gray	56.7	770
Clay, green; sand, fine, black	10	780
Clay, dark, soft; hard streaks and shells	8	788
Matawan(?) formation:		
Clay, light green	47	835
Sand, coarse, tight, brown	4	839
Hard places	2	841
Sand, light brown and gray	19	860
Hard	2	862
(Slot No. 14 screen 619–629 feet; slot No. 20 screen 629–670 feet; Uncased hole 809–862 feet)		
Tal-Bf 72, (Altitude: 42 feet) P 16235		
Pleistocene series:		
Walston(?) silt:		
Clay, sandy, brown	10	10
Beaverdam(?) sand:		
Sand, medium, brown and white	20	30
Pliocene(?) series:		
Sand, brown; gravel, fine	23	53
Miocene series:		
Choptank(?) formation:		
Clay, gray	12	65
(Screen 31–52 feet)		
Tal-Bf 73, test well (Altitude: 42 feet) P 21641		
Pleistocene series:		
Walston(?) silt:		
Sand, medium, silty, brown	2	3
Sand, medium, silty, and granule gravel, brown	7	10
Beaverdam(?) sand:		
Sand, medium, and granule gravel, light brown to gray	14	24
Pliocene(?) series:		
Sand and granule gravel, red-brown; white at 34–35 feet	11	35
Sand, medium, and granule gravel, red-brown	14	49
Miocene series:		
Choptank(?) formation:		
Clay, silty and peat, dark brown	12	61
Clay, gray; shells	4	65
Clay and sand, fine, gray-green; shells	10	75
Clay and sand, fine, green; shells	21	96
Calvert formation:		
Sand, fine; clay, dark brown and green; shells	6	102
Clay, peaty, brown; sbells	9	111
Sand, fine; little clay, brown to light green; shells	6	117
Sand, fine; clay, light green; shells	9	126

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine; clay, light green and gray; shells	11	137
Sand, fine; clay, light brown-green; few shells	10	147
Sand, fine; clay, light green-gray	8	155
Silt, clay, sand, fine, light green-gray	13	168
Clay, silty, light green; hard	9	177
Sand, fine, little clay, light gray-green; shells	1	178
Silt; clay; sand, fine, light green-gray; diatomaceous	101	279
Sand, medium, silty, olive-gray	2	281
Sand, medium, olive-gray; shells	11	292
Eocene series:		
Piney Point(?) formation:		
Silt, clay, sand, fine, olive-gray	3	295
(Screen 283-288 feet)		
Tal-Bf 74, test well (Altitude: 42 feet) P 21805		
Pleistocene series:		
Walston(?) silt:		
Sand, medium, and clay, brown	5	5
Sand, medium and granule gravel, light brown	5	10
Beaverdam(?) sand:		
Sand, coarse to medium, granule gravel, light brown and gray	20	30
Pliocene(?) series:		
Sand, very coarse to medium, granule gravel, red-brown; hard layer 38-39 feet	19	49
Miocene series:		
Choptank(?) formation:		
Clay, peaty, dark brown	1	50
(Screen 43-48 feet)		
Tal-Bf 75, test hole (Altitude: 42 feet) P 14666		
Pleistocene series:		
Walston(?) silt:		
Clay, sandy; gravel, brown	11	11
Beaverdam(?) sand:		
Sand, fine; gravel, white and brown	21	32
Pliocene(?) series:		
Sand, brown; gravel, fine	16	48
Miocene series:		
Choptank(?) and Calvert formations:		
Clay, gray	15	63
Sand, coarse	6	69
Clay, sandy; shells	55	124
Clay, sandy	24.8	148.8
Rock	1.2	150
Clay, sandy, green	25	175
Clay, sandy, green; shells	103	278
Sand, medium, gray (water)	13	291

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point(?) formation:		
Sand and clay; shells	39	330
Clay, hard, gray	20	350
Tal-Bf 76, test hole (Altitude: 45 feet) P 14667		
Pleistocene series:		
Beaverdam(?) sand:		
Sand and gravel, white and brown	11	11
Clay, sandy, white	1	12
Sand and gravel, white and brown	11	23
Pliocene(?) series:		
Sand and gravel, brown	21	44
Sand and gravel, brown; iron ore	2	46
Miocene series:		
Choptank(?) formation:		
Clay, gray; shells	14	60
Sand, gray; shells	4	64
Clay; shells	6	70
Calvert formation:		
Clay, gray	20	90
Clay; shells	54	144
Rock, hard, crusty	5.8	149.8
Soft	.2	150
Rock, hard	1.8	151.8
Clay	18.2	170
Clay; shells	40	210
Clay, sandy	69.9	279.9
Sand and shells; clay streaks	13.6	293.5
Eocene series:		
Piney Point(?) formation:		
Rock	1	294.5
Clay, sandy; gravel	14.4	308.9
Clay, sandy; shells	20.6	329.5
Clay, hard	20.5	350
Tal-Bf 77 (Altitude: 45 feet)		
Missing	184	184
Miocene series:		
Calvert formation:		
Sand, fine, gravel, clay, blue; shells	57	241
Clay, blue; sand, fine	30	271
Sand, white	25	296
Eocene series:		
Piney Point(?) formation:		
Sand, fine and coarse, black; clay	68	364
Sand, fine and coarse, black; mud, blue	31	395
Sand, fine and coarse, black; mud, blue, increasing with depth	31	426

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Nanjemoy(?) formation:		
Sand, fine and coarse; mud, black	84	510
Mud, blue; sand streaks	50	560
(Screen 275–295 feet and 310–330 feet)		
Tal-Cb 3 (Altitude: 10 feet) P 132		
[Based on samples, paleontology and driller's log]		
Pleistocene series:		
Parsonsburg sand:		
Sand, fine to very fine, yellow	10	10
Sand, medium to very fine, yellow	10	20
Pamlico formation:		
Silt, sandy, a little clayey, buff	10	30
Sand, fine to very fine, silty, buff-gray	10	40
Miocene series:		
Calvert formation:		
Silt, sandy, light gray	10	50
Sand, medium to very fine, gray; few shell graments	10	60
Sand, fine to very fine, silty, gray; few shell fragments	20	80
Silt, sandy, tan-gray; few shell fragments	10	90
Sand, fine to very fine, silty, gray; some lignite and few shell fragments	20	110
Sand, medium to very fine, gray; some shell fragments	20	130
Eocene series:		
Piney Point(?) formation:		
Sand, medium to fine, very glauconitic, black and brown; some shell fragments	10	140
Sand, coarse to fine, very glauconitic, black and brown; few shell fragments	40	180
Nanjemoy formation:		
Sand, very coarse to fine, very glauconitic, black and brown; few shell fragments	60	240
Sand, medium to fine, very glauconitic, silty, dark gray; few shell fragments	10	250
No sample	10	260
Sand, medium to fine, very glauconitic, black	10	270
Sand, very coarse to fine, very glauconitic, black	30	300
Sand, coarse to fine, very glauconitic, black	30	330
Aquia greensand:		
Sand, coarse to fine, black and brown; few shell fragments	30	360
Sand, medium to fine, some coarse, silty, black and brown; few shell fragments	10	370
Sand, medium to fine, some coarse, black and brown; few shell fragments	20	390
Sand, medium to fine, some coarse, silty, black and brown; few shell fragments	6	396
(Uncased hole 340–396 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Cb 5 (Altitude: 15 feet) P 3063		
Pleistocene series:		
Sand	8	8
Clay	4	12
Miocene series:		
Calvert formation:		
Clay, tough	4	16
Clay, sandy	9	25
Clay, sandy, hard	13	38
Clay, soft and hard; shells	17	55
Clay, hard, green	39	94
Sand, tight	14	108
Eocene series:		
Piney Point(?) formation:		
Rock, hard, gray	1.5	109.5
Sand, free	20.5	130
Nanjemoy formation:		
Clay, green	146	276
Clay; sand, hard	34	310
Aquia greensand:		
Hard places	32	342
Sand, loose	40	382
(Uncased hole 333.5–382 feet)		
Tal-Cb 12 (Altitude: 5 feet) P 2117		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	5	5
Sand, yellow	24	29
Mud, soft	11	40
Gravel and sand	7	47
Miocene series:		
Calvert formation:		
Clay, blue	73	120
Sand, gray; shells	30	150
Eocene series:		
Piney Point(?) formation:		
Rock, hard	10	160
Sand, greenish (water)	30	190
Rock, very hard	8	198
Sand, black	12	210
(Uncased hole 153–210 feet)		
Tal Cb 17 (Altitude: 7 feet) P 250		
Recent and Pleistocene series:		
Soil and sand, yellow	12	12
Marsh mud, black	8	20

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert formation:		
Clay, blue	15	35
Sand, gray, and clay, blue	23	58
Clay, blue, hard	2	60
Sand, gray, and clay, blue	30	90
Clay, brown, soft	25	115
Sand, gray; shells	25	140
Eocene series:		
Piney Point(?) formation:		
Sandstone	1	141
Sand, gray, and fine black sand; shells (water)	6	147
Sand, black, and gravel (water)	83	230
Nanjemoy formation:		
Sand, black; clay, dark	90	320
Aquia greensand:		
Sand, coarse, black and white; green sand	20	340
Clay, yellow	13	353
Clay, hard, yellow; sand and gravel, tough	3	356
Clay, yellow, soft	2	358
Clay and sand, hard, yellow	5	363
Hard crusts	9	372
Clay, yellow, soft	3	375
Hard crust	4	379
Sand, coarse, and gravel, brown and black	37	416
(Uncased hole 363–416 feet)		
Tal-Cb 22 (Altitude: 10 feet) P 1066		
Pleistocene series:		
Pamlico formation:		
Sand and clay, yellow	15	15
Clay, blue, and mud	7	22
Sand, coarse	2	24
Miocene series:		
Calvert formation:		
Rock, hard	3.5	27.5
Clay and sand, blue	35.5	63
Sand, gray	7	70
Clay, brown	45	115
Sand, fine, very hard, gray	11	126
Eocene(?) series:		
Piney Point(?) formation:		
Sand, hard, and shells	8	134
Sand, coarse, white; shells	11	145
Sand, black, and gravel	60	205
Nanjemoy formation:		
Sand, black, and clay, blue	125	330

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Aquia greensand:		
Clay, yellow, and sand, brown	85	415
Sand, coarse, brown	18	433
(Screen 427–433 feet)		
Tal-Cb 23 (Altitude: 8 feet)		
Pleistocene series:		
Pamlico formation:		
Clay	10	10
Sand	4	14
Clay, dark	40	54
Sand	31	85
Gravel	—	85
Miocene series:		
Calvert formation:		
Clay, marl	42	127
Sand, gray	16	143
Eocene series:		
Piney Point(?) formation:		
Rock	0.3	143.3
Sand	56.7	200
Nanjemoy formation:		
Clay	90	290
Clay, sandy	46	336
Clay	13	349
Aquia greensand:		
Hard place	4.5	353.5
Sand	12.4	365.9
Hard	1.1	367
Sand, free	3	370
Hard	2	372
Sand, free	1.3	373.3
Hard	1.2	374.5
Sand, free	0.9	375.4
Hard	1.5	376.9
Sand, hard	12.1	389
Sand, soft, free	16	405
Sand, hard, free	3.8	408.8
(Uncased hole 375–408.8 feet)		
Tal-Cb 25 (Altitude: 8 feet) P 3053		
Pleistocene series:		
Pamlico formation:		
Clay	8	8
Sandy	8	16
Missing	2	18
Clay	.5	18.5
Gravel	11.5	30
Sand, free	18	48

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert formation:		
Sand, hard	9.7	57.7
Clay	2.3	60
Clay, sandy	60	120
Clay	9	129
Sand, gray	16	145
Eocene series:		
Piney Point(?) formation:		
Rock	.5	145.5
Sand	45.5	191
Nanjemoy formation:		
Clay	151	342
Aquia greensand:		
Sand	15	357
Crusty	8.5	365.5
Sand	13.5	379
Crusty	6	385
Sand	10	395
Crusty	10	405
Sand, hard	39	444
(Uncased hole 405–444 feet)		
Tal-Cb 30 (Altitude: 7 feet) P 465		
Pleistocene series:		
Pamlico formation:		
Clay	14	14
Sand	2	16
Clay, soft	14	30
Sand and gravel	4	34
Miocene series:		
Calvert formation:		
Clay	32	66
Marl	2	68
Clay	55	123
Eocene(?) series:		
Piney Point(?) formation:		
Sand	27	150
Sand, soft	26.5	176.5
Nanjemoy formation:		
Sand, hard	.5	177
Clay	123	300
Clay; sand, coarse	30	330
Aquia greensand:		
Sand, hard (water)	9	339
Sand, hard	12	351
Sand	6	357
Sand, loose	3	360

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand	12	372
Crusts	3	375
Sand	15	390
Sand, hard	5	395
Sandstone	14	409
Sandstone, soft (water)	19	428
(Uncased hole 395–428 feet)		
Tal-Cb 35 (Altitude: 4 feet) P 11597		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	10	10
Sand, fine, yellow	11	21
Marsh mud; sand	24	45
Miocene series:		
Calvert formation:		
Clay, dark	39	84
Sand, gray; shells	36	120
Clay, brown	27	147
Sand, gray; shells	21	168
Eocene series:		
Piney Point(?) formation:		
Sand, black; clay crusts	10	178
Sand, black; gravel (water)	52	230
Nanjemoy formation:		
Earth, black	90	320
Clay, gray; earth, black	40	360
Aquia greensand:		
Clay, yellow; sand, brown	20	380
Sand, brown; gravel; shells, fine, white	20	400
(Screen 388–400 feet)		
Tal-Cb 41 (Altitude: 3 feet) P 650		
Pleistocene series:		
Pamlico formation:		
Sand and clay, yellow	15	15
Sand, yellow	6	21
Clay, brown	11	32
Miocene series:		
Calvert formation:		
Clay, light, hard, and sand	10	42
Sand, gray	22	64
Sand, fine, gray	14	78
Sand, fine, gray; clay, blue	6	84
Sand, gray; clay, brown; shells	11	95
Clay, brown	35	130
Sand, gray, and shells (water)	27	157

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point(?) formation:		
Sand, black, and mud	3	160
Rock, soft	1	161
Sand, black and gray; shells, fine (water)	7	168
Sand, coarse, and gravel	63	231
Nanjemoy formation:		
Sand, black, and clay, blue	138	369
Aquia greensand:		
Sand, fine, green, brown, and black; clay, yellow	30	399
Rock, hard	1	400
Sand, hard, brown; clay, yellow (water)	8	408
Sand, soft, brown (water)	8	416
(Screen 412–416 feet)		
Tal-Cb 43 (Altitude: 8 feet) P 234		
Recent and Pleistocene series:		
Soil; clay and sand, yellow	20	20
Pamlico formation:		
Sand, yellow	15	35
Shell crusts, hard; gravel	4	39
Miocene series:		
Calvert formation:		
Sand, yellow, and shells	13	52
Clay, blue, hard	43	95
Clay, blue, soft	15	110
Sand, fine, gray and black	37	147
Eocene(?) series:		
Piney Point(?) formation:		
Clay and sand, fine, black; shells	23	170
Shell and sand, crusty, gray	2	172
Sand and gravel, black (water)	73	245
Nanjemoy formation:		
Sand, black, and clay, blue	67	312
Aquia greensand:		
Sand, coarse, black and white	11	323
Crusts, hard, of clay, yellow, and sand, coarse, black and white	13	336
Clay, yellow, and sand, black and brown	21	357
Clay, hard, yellow; sand and gravel, brown; shells	8	365
Sand and gravel, brown; clay crusts	51	416
Tal-Cb 61 (Altitude: 10 feet) P 880		
Pleistocene series:		
Pamlico formation:		
Clay, gray, and wood	12	12
Sand, white (water)	6	18

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert formation:		
Clay, blue	10	28
Sand; shells	23	51
Clay; shells	58	109
Eocene series:		
Piney Point(?) formation:		
Sand, white	32	141
Sand, black (water)	19	160
Nanjemoy formation:		
Sand, black; clay	170	330
Aquia greensand:		
Sand, brown (water)	20	350
(Uncased hole 330–350 feet)		
Tal-Cb 85 (Altitude: 3 feet) P 1098		
Pleistocene series:		
Pamlico formation:		
Clay	6	6
Clay, sandy; gravel at 16 feet	10	16
Clay	29	45
Sand, free	16	61
Miocene series:		
Calvert formation:		
Rock	1	62
Clay	67.5	129.5
Sand	25.5	155
Rock	—	155
Sandy	2	157
Eocene series:		
Piney Point(?) formation:		
Rock	1	158
Sand (water)	72	230
Nanjemoy formation:		
Clay	139	369
Sandy	6	375
Aquia greensand:		
Sand streaks, free	5	380
Sand	9	389
Crusts	6	395
Sand, free	22	417
(Screen 397–407 feet)		
Tal-Cb 88 (Altitude: 2 feet) P 3735		
Miocene series:		
Calvert formation:		
Shells	32	32
Clay, sandy	58	90

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand	30	120
Clay	20	140
Eocene series:		
Piney Point(?) formation:		
Sand	9	149
Nanjemoy formation:		
Clay	167	316
Aquia greensand:		
Sand	5	321
Crusty	30.7	351.7
Sandy	32.3	384
Hard	1	385
Sandy	2	387
Sand, hard	35	422
(Screen 354–374 feet)		
Tal-Cb 89, test well (Altitude: 13 feet) P 12546		
[Based on samples, paleontology, electrical and driller's log]		
Pleistocene series:		
Parsonsburg sand:		
Silt, sandy, brown-buff	16	16
Pamlico formation:		
Sand, medium, light chocolate	6	22
Clay, silty, soft, blue	22	44
Miocene series:		
Calvert formation:		
Clay, soft, gray	95	139
Eocene series:		
Piney Point(?) formation:		
Sand, medium to coarse, salt and pepper, olive-green	6	145
Silt and clay, sandy, grayish-green	35	180
Sand, coarse to medium, black; small white gravel	8	188
Nanjemoy formation:		
Silt and clay, soft, olive-green	18	206
Sand, coarse, silty, greenish-black	6	212
Sand, silty, soft, greenish-black; white granules	12	224
Silt, sandy, sticky, olive-green	26	250
Silt and streaks of coarse sand	24	274
Silt and sand, hard, medium gray, green	31	305
Aquia greensand:		
Sand, coarse, some granule size, brown	15	320
Shell rock, soft; granules	25	345
Silt, sandy, soft, green	20	365
Sand, coarse, brown; silt, green; shell fragments	9	374
Shell rock, hard, carbonaceous	29	403
Sand, very coarse, brown; shells and carbonaceous shale	10	413
Sand, very coarse to coarse; silt and clay, green to gray; clay and sand layers interfinger	20	433

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, coarse, silty, olive-gray	5	438
Sand, coarse to medium, white, gray; black particles; small shell fragments	6	444
Sand, very coarse to coarse, some granules; abundant shell fragments	20	464
Sand, coarse, medium, silty, soft, brown, black	51	515
Sand, medium to fine, buff and black; shells	10	525
Sand, medium to fine, silty, buff and black; shells	11	536
Paleocene series:		
Brightseat formation:		
Sand, medium-fine, buff and black; shell fragments (hard layer 538–540)	20	556
Sand, fine, black; shell fragments	6	562
Clay, hard, gray	4	566
Clay, hard, gray; shells	4	570
Shale, hard, gray; shells	5	575
Clay, gray-brown	12	587
Clay, silty, gray-brown	9	596
Clay, slightly sandy, gray-brown	11	607
Upper Cretaceous series:		
Monmouth formation:		
Clay, silty; shells 615–616	11	618
Clay, silty; black sand and shells; gravel	10	628
Clay, silty, sandy	10	638
Clay, silty, sandy, gray	11	649
Clay, silty; sand and gravel, hard, black	10	659
Clay, silty, hard, gray	10	669
Clay, gray; sand, hard	21	690
Clay, hard, dark gray and green	5	695
Clay, dark gray and green; much gravel	5	700
Matawan(?) formation:		
Clay, sandy, gray; hard zones	153	853
Magothy formation:		
Sand, clayey, gray-white	54	907
Sand, silty	8	915
Sand, medium to coarse, white	65	980
Raritan, Patapsco and Arundel formations:		
Clay, tough, red-brown and gray; sand	62	1,042
Sand, medium-fine, gray; silt	23	1,065
Clay, sandy, grayish-white	10	1,075
Clay, hard, grayish-white	10	1,085
Clay, hard, gray; sand; red-brown streaks	25	1,110
Sand, medium-fine, clean, black and green	10	1,120
Clay, gray	10	1,130
Clay, red and gray	10	1,140
Clay, hard, light brown and pink	40	1,180
Clay, silty, red-brown; sand, crusty	30	1,210
Clay, silty, chocolate-brown; sand	6	1,216

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Rock	4	1,220
Clay; sand	6	1,226
Sand, fine, silty	10	1,236
Clay, silty, gray-brown	10	1,246
Rock	1	1,247
Clay, silty, gray-brown	16	1,263
Sand, fine, silty, buff	4	1,267
Clay, silty, brown	6	1,273
Sand, medium, silty, buff	5	1,278
Clay, hard, red	9	1,287
Shale, sticky, pink and red; sand	36	1,323
Sand, medium, pink-gray	10	1,333
Shale, red-gray; sand	3	1,336
Sand, medium, pink-gray	5	1,341
Sand, silty, brown-gray	10	1,351
Sand, medium, hard, pinkish; some silt (water)	69	1,420
Clay, red-blue; sand, hard	18	1,438
Sand, silty, brown and pink	41	1,479
Clay, sandy, brown	10	1,489
Clay, red-brown	10	1,499
Sand, clayey, tight, pink	10	1,509
Clay, very hard, red-brown	11	1,520
Tal-Cc 1 (Altitude: 10 feet) P 464		
Miocene(?) series:		
Calvert formation:		
Clay	10	10
Marl	5	15
Clay, dark	131	146
Sand, gray	21	167
Eocene series:		
Piney Point(?) formation:		
Rock	1	168
Sand	5	173
Sand	63	236
Nanjemoy formation:		
Clay	152	388
Aquia greensand:		
Hard	10	398
Sand, hard	2	400
Sand, free	4	404
Crusty	6	410
Sand, free	13	423
(Screen 413–423 feet)		
Tal-Cc 2 (Altitude: 8 feet) P 3124		
Pleistocene series:		
Clay	6	6
Gravel	34	40

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert formation:		
Clay	39	79
Rock	1	80
Clay	60	140
Sand	19	159
Eocene series:		
Piney Point(?) formation:		
Rock	1	160
Sand	6	166
Rock	1	167
Sand	11	178
Rock	1	179
Sand	14	193
Sand, free	7	200
Rock	1	201
Sand, hard	17	218
Nanjemoy formation:		
Clay	107	325
Sand, free	36	361
Clay	10	371
Aquia greensand:		
Sand	20	391
Sand, tight	10	401
Sand, free	11	412
Crusts and sand	24	436
Rock	1	437
Sand	13	450
(Uncased hole 363–450 feet)		
Tal-Cc 3 (Altitude: 5 feet) P 5028		
Recent series:		
Clay and fill dirt	9	9
Pleistocene series:		
Pamlico formation:		
Sand, fine, yellow	11	20
Sand, gray; mud, black	5	25
Sand and clay, gray	17	42
Sand, fine, gray	14	56
Wood, rotten (dark water)	4	60
Miocene series:		
Calvert formation		
Sand, fine; clay, gray	10	70
Clay, gray	57	127
Sand, gray; shells	14	141
Clay, brown	38	179
Sand, gray; clay, brown	11	190
Sand, coarse, gray; shells	23	213

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point(?) formation:		
Sand and clay crusts	23	236
Sand, black; gravel, brown	121	357
(Uncased hole 236–357 feet)		
Tal-Cc 8 (Altitude: 12 feet) P 9554		
Pleistocene series:		
Pamlico formation:		
Clay	6	6
Sand and clay, thin layers, white	62	68
Sand, coarse, and gravel	4	72
Miocene series:		
Calvert formation:		
Clay, blue	47	119
Sand and shells, hard	3	122
Sand, fine; clay, gray	13	135
Clay, tough, brown	37	172
Sand and clay, soft, brown	17	189
Sand, gray	13	202
Eocene series:		
Piney Point(?) formation:		
Rock, soft	2	204
Clay and gravel, crusty	4	208
Gravel and sand	65	273
(Uncased hole 208–273 feet)		
Tal-Cc 14 (Altitude: 4 feet) P 9101		
Pleistocene series:		
Pamlico formation:		
Clay	5	5
Sand	15	20
Clay	30	50
Sand, free	20	70
Miocene series:		
Calvert formation:		
Clay	88	158
Sand, gray	6	164
Clay, sand	12	176
Eocene series:		
Piney Point(?) formation:		
Rock, soft	4	180
Sand streaks	115	295
Nanjemoy formation:		
Clay	73	368
Hard	—	368
Clay	28	396
Aquia greensand:		
Sand, hard	1	397

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, free	6	403
Hard	—	403
Crusts	17	420
Sand	9	429
Crusts	—	429
Sand	13	442
(Screen 422–437 feet)		
Tal-Cc 16 (Altitude: 6 feet) P 8773		
Pleistocene series:		
Pamlico formation:		
Clay	10	10
Sand	8	18
Clay	17	35
Miocene series:		
Calvert formation:		
Sand and shells	30	65
Clay	55	120
Sand, gray	15	135
Eocene series:		
Piney Point(?) formation:		
Sand, brown	75	210
(Uncased hole 147–210 feet)		
Tal-Cc 21 (Altitude: 10 feet) P 2511		
Pleistocene series:		
Pamlico formation:		
Clay and sand, yellow	22	22
Mud and wood, rotten	5	27
Miocene series:		
Calvert formation:		
Clay and sand, gray; shells	57	84
Clay, brown	56	140
Clay and sand, coarse	15	155
Eocene series:		
Piney Point(?) formation:		
Clay and sand, hard, crusty	10	165
Sand, gravel, and clay crusts	75	240
Nanjemoy formation:		
Sand, black; clay, gray	110	350
Sand, hard, white and green; clay, light	45	395
Aquia greensand:		
Clay, hard, yellow, sand, black and brown	15	410
Sand and gravel, brown	30	440
(Uncased hole 410–440 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Cc 26 (Altitude: 5 feet) P 2051		
Pleistocene series:		
Pamlico formation:		
Clay	5	5
Sand	13	18
Miocene series:		
Calvert formation:		
Clay	54	72
Rock	1.8	73.8
Clay	58.2	132
Sand	22	154
Eocene series:		
Piney Point(?) formation:		
Rock	1.5	155.5
Sand	41.4	196.9
Sand	33.1	230
Nanjemoy formation:		
Clay	120	350
Hard	2	352
Sand	2	354
Tight	6.8	360.8
Aquia greensand:		
Sand	4.4	365.2
Sand (water)	15.8	381
(Screen 370–380 feet)		
Tal-Cc 27 (Altitude: 8 feet) P 3823		
Pleistocene series:		
Pamlico formation:		
Sand, yellow	20	20
Mud, black; clay, soft	9	29
Sand	11	40
Miocene series:		
Calvert formation:		
Shells, hard layer; sand	1	41
Sand, gray; shells, fine	43	84
Clay, blue, gray	63	147
Clay, sandy, blue	10	157
Shells, fine, hard crust; sand	2	159
Clay, brown	51	210
Sand, coarse, gray	15	225
Eocene series:		
Piney Point(?) formation:		
Rock, soft	2	227
Sand, black; clay crusts	10	237
Nanjemoy formation:		
Sand, fine, black; mixed with clay, bluish, gray	177	414
(Uncased hole 171–414 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Cc 31 (Altitude: 20 feet) P 2642		
Pleistocene series:		
Soil, yellow; sand, white	20	20
Wood, rotten; clay, black	4	24
Clay, blue; sand	10	34
Clay, light; gravel; sand	16	50
Miocene series:		
Choptank formation:		
Clay, blue; shells	19	69
Calvert formation:		
Sand, fine, gray; clay	29	98
Clay, blue	12	110
Clay, brown	45	155
Sand, gray; shells	15	170
Rock, soft	4	174
Mud, black; sand, black	4	178
Clay, hard crust; sand, black	17	195
Eocene(?) series:		
Piney Point formation:		
Sand, brown; gravel	57	252
(Uncased hole 195–252 feet)		
Tal-Cd 12 (Altitude: 12 feet) P 1832		
Recent and Pleistocene series:		
Soil and sand, yellow and gray	10	10
Pamlico formation:		
Sand, gray; marsh mud	10	20
Clay and sand, coarse	10	30
Miocene series:		
Choptank(?) formation:		
Clay, light blue	20	50
Sand, coarse, gray; shells (water)	13	63
Calvert formation:		
Sand, hard, gray	42	105
Sand and clay	10	115
Clay, brown	42	157
Sand and shell rock	3	160
Clay, brown	76	236
Clay, soft, brown; sand	6	242
Eocene series:		
Piney Point(?) formation:		
Rock, hard	0.5	242.5
Sand and mud, black; pyrite	9.5	252
Clay, blue; gravel and sand, coarse	8	260
Sand and gravel; mixed with clay, blue (water)	118	378
(Uncased hole 260–378 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Cd 15 (Altitude: 12 feet) P 2052		
Pleistocene series:		
Pamlico(?) formation:		
Clay	8	8
Sand	77	85
Miocene series:		
Calvert formation:		
Clay	143	228
Sand	9	237
Eocene series:		
Piney Point(?) formation:		
Rock	.8	237.8
Sand	2.2	240
Sandy	150	390
Nanjemoy formation:		
Clay	138	528
Aquia greensand:		
Hard	2	530
Sand; hard streaks	28	558
(Screen 533–552 feet)		
Tal-Cd 17 (Altitude: 25 feet) P 2630		
Pleistocene series:		
Clay	10	10
Sand	20	30
Miocene series:		
Choptank and Calvert formations:		
Sand and shells	96	126
Clay	63	189
Eocene(?) series:		
Piney Point(?) formation:		
Sand, green	21	210
Clay	60	270
Sand, gray	36	306
Nanjemoy formation:		
Clay	9	315
Sand and clay, black	255	570
Aquia greensand:		
Sand, brown	39	609
(Screen 580–600 feet)		
Tal-Cd 19 (Altitude: 12 feet) P 3167		
Pleistocene series:		
Clay, yellow	12	12
Sand, white	8	20
Clay, white	5	25
Sand, white; clay	55	80

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert formation:		
Clay; shells	188	268
Eocene series:		
Piney Point(?) formation:		
Rock, hard	1	269
Sand, black	102	371
Nanjemoy formation:		
Sand, black; clay	70	441
Clay, gray	21	462
Clay; sand, black	90	552
Aquia greensand:		
Sand, brown (water)	30	582
(Screen 554–572 feet)		
Tal-Cd 21 (Altitude: 15 feet)		
Pleistocene series:		
Sand	16	16
Clay	19	35
Sand and gravel	5	40
Miocene series:		
Choptank(?) and Calvert formations:		
Clay	20	60
Clay, sandy	46	106
Sand, hard places	28	134
Clay	127	261
Eocene series:		
Piney Point(?) formation:		
Sand	89	350
Nanjemoy formation:		
Clay	194	544
Aquia greensand:		
Sand, hard	2	546
Clay, sandy	6	552
Crusty	8	560
Sand	24	584
(Screen 562–582 feet)		
Tal-Cd 22 (Altitude: 13 feet) P 10902		
Pleistocene series:		
Pamlico(?) formation:		
Clay, yellow; sand, fine	15	15
Sand, gray; clay, dark	8	23
Sand, yellow; shells; gravel	62	85
Miocene series:		
Calvert formation:		
Clay, blue	30	115
Shell crust	2	117

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay, gray	30	147
Clay, brown	33	180
Sand, gray; shells	29	209
Eocene series:		
Piney Point(?) formation:		
Rock, soft	3	212
Sand, black; clay crusts	7	219
Gravel, brown; sand, black	131	350
(Uncased hole 219–350 feet)		
Tal-Cd 23 (Altitude: 10 feet) P 5451		
Pleistocene series:		
Pamlico formation:		
Clay	8	8
Sand	8	16
Clay	28	44
Sand; gravel; shells	51	95
Miocene series:		
Calvert formation:		
Sand; clay	30	125
Sand; gray	11	136
Clay	49	185
Sand, gray	25	210
Eocene series:		
Piney Point(?) formation:		
Sand, brown (water)	105	315
Nanjemoy formation:		
Sand, black	95	410
Sand, clay	75	485
Sand, black	15	500
Aquia greensand:		
Sand, brown (water)	21	521
(Screen 503–521 feet)		
Tal-Cd 25 (Altitude: 8 feet) P 365		
Pleistocene series:		
Pamlico formation (channel fill ?)		
Clay	10	10
Missing	20	30
Gravel	19	49
Clay	83	132
Gravel, sandy, dark	8	140
Miocene series:		
Calvert formation:		
Clay	67	207
Eocene series:		
Piney Point(?) formation:		
Rock	1	208

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand; clay streaks	99	307
(Uncased hole 207–307 feet)		
Tal-Cd 27 (Altitude: 13 feet) P 8779		
Recent series:		
Soil; clay, dark	6	6
Pleistocene series:		
Pamlico formation:		
Sand, yellow	12	18
Marsh; sand	17	35
Clay, sandy, blue	54	89
Miocene series:		
Calvert formation:		
Clay, blue	37	126
Sand; shells; clay	10	136
Clay, brown	24	160
Sand, gray; shells	20	180
Eocene series:		
Piney Point(?) formation:		
Rock, soft	5	185
Sand, black; clay crusts	6	191
Sand, black; gravel	82	273
(Uncased hole 191–273 feet)		
Tal-Cd 28 (Altitude: 13 feet) P 5255		
Recent series:		
Soil; clay	3	3
Pleistocene series:		
Pamlico formation:		
Sand, fine, yellow	16	19
Sand, coarse, gray; gravel mixed with soft clay (water)	21	40
Clay, blue	22	62
Miocene series:		
Calvert formation:		
Clay, hard, blue; sand	4	66
Clay, blue; shells	58	124
Clay, brown	49	173
Sand, gray; shells	10	183
Eocene series:		
Piney Point(?) formation:		
Rock, soft	2	185
Sand, black; clay crusts	8.5	193.5
Sand, black; gravel, brown	58.5	252
(Uncased hole 193.5–252 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Cd 30 (Altitude: 8 feet) P 6028		
Pleistocene series:		
Pamlico formation:		
Sandy	16	16
Sand; gravel	13.6	29.6
Miocene series:		
Calvert formation:		
Clay	112.4	142
Hard place	2	144
Clay	104.8	248.8
Sand	9.7	258.5
Eocene series:		
Piney Point(?) formation:		
Hard rock	.8	259.3
Clay	20.7	280
Sand	35	315
Tight	30	345
Sand	10	355
Tight	13	368
Clay	8	376
(Uncased hole 262–376 feet)		
Tal-Cd 41 (Altitude: 12 feet) P 2044		
Pleistocene series:		
Parsonsburg(?) sand:		
Sand, yellow	16	16
Pamlico formation:		
Marsh mud; rotten wood	9	25
Clay, blue	10	35
Gravel, coarse	5	40
Miocene series:		
Calvert formation:		
Clay, blue	28	68
Clay, sandy, blue	18	86
Sand, hard crust; shells	1	87
Clay, blue; fine sand	22	109
Clay, brown; sand, fine, dark	18	127
Clay, brown	23	150
Sand, gray; shells	22	172
Eocene series:		
Piney Point(?) formation:		
Rock, soft	2	174
Mud, black; sand with clay crusts	15	189
Clay, hard	5	194
Sand, black; gravel, brown	76	270
(Uncased hole 194–270 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Ce 1 (Altitude: 20 feet)		
Pleistocene series:		
Fill dirt	5	5
Pamlico(?) formation:		
Marl and shells	30	35
Miocene series:		
Choptank(?) formation:		
Clay, light green	15	50
Clay, dark brown	30	80
Clay, dark green	19	99
Calvert formation:		
Rock, sandy	1	100
Clay, sandy, green	4	104
Sand, light gray; shark teeth, shells, and large pieces of bone (water)	31	135
Clay, sandy, light green	35	170
Sandstone, soft	1	171
Clay, sandy, green	19	190
Sandstone	.5	190.5
Clay, green, black specks	79.5	270
Clay, hard, blue	1	271
Sand, coarse, light	9	280
Eocene series:		
Piney Point formation:		
Rock, soft and hard; blue clay	2.5	282.5
Clay, light green	16.5	299
Boulder	1.5	300.5
Sand, black; marl	5.5	306
Crust, hard	1	307
Nanjemoy formation:		
Clay, sandy, black	263	570
Aquia greensand:		
Sand and gravel, yellow, white and black; water level −6 feet (water)	30	600
Sand, fine, black; boulders	51	651
Clay, sandy, white; boulders	31	682
Paleocene series:		
Clay, white	6.5	688.5
Sandstone, soft	.5	689
Clay, sandy, white; hard streaks and gravel	38.6	727.6
Sandstone, soft	.6	728.2
Clay, white	1.3	729.5
Sandstone, soft	1	730.5
Upper Cretaceous series:		
Monmouth(?) formation:		
Clay; greensand, brown; black sand	71.5	802
Sand, clayey, yellow	32	835

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay, white; hard and soft streaks of shells and sand	35	870
Clay, sandy	18	888
Clay, sandy, soft, black	72	960
Matawan(?) formation:		
Rock, soft	.5	960.5
Clay, sandy, black	5.5	966
Rock, soft	1	967
Clay, sandy, black	28	995
Sand, white	20	1015
(Screen 782–788 and 1000–1015 feet)		
Tal-Ce 5 (Altitude: 35 feet) P 2261		
Pleistocene series:		
Missing	21	21
Pamlico formation:		
Sand, medium to fine, salt and pepper color; few shell fragments	20	41
Miocene series:		
Choptank(?) formation:		
Sand, fine, salt and pepper color; abundant shell fragments	10	51
Shell fragments	20	71
Calvert formation:		
Shell fragments and silt, sandy, gray	10	81
Silt, sandy, gray; shell fragments	10	91
Silt, sandy, light gray; fine sand; shell fragments	50	141
Sand, medium to fine, gray; shell fragments	40	181
Sand, silty, fine, buff; few shell fragments	10	191
Silt, sandy, buff; few shell fragments	20	211
Sand, fine to very fine, light gray; silt; shell fragments	20	231
Silt, sandy, buff; shell fragments	10	241
Silt, buff; fine sand	42	283
Eocene series:		
Piney Point(?) formation:		
Sand, fine to very fine, some silt, slightly glauconitic, greenish-gray; forams of Jackson, Eocene age	18	301
Silt, sandy, greenish-gray shell fragments and glauconite	19	320
Sand, medium to fine, glauconitic; shell fragments and grit	111	431
Nanjemoy formation:		
Silt, sandy and clayey, greenish-gray; mica, glauconite, and few shell fragments	130	561
Sand, fine, medium, silty, gray-green; glauconite and shell fragments	30	591
Aquia greensand:		
Sand, coarse to medium, little fine, brown and black; shell fragments and glauconite (water)	10	601
Sand, fine to coarse, gray-brown; shell fragments and glauconite	20	621
Sand, fine to coarse, some grit, silty, greenish; shell fragments and glauconite	50	671
No sample	10	681

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Paleocene(?) series:		
Silt, sandy, grit, gray; shell fragments	20	701
Silt, sandy, light gray	60	761
Upper Cretaceous series:		
Monmouth(?) formation:		
Sand, fine, silty, greenish-gray, slightly glauconitic; few shell fragments	95	856
Silt, little sandy, gray-white; few shell fragments	50	906
Silt, sandy, glauconitic, greenish-gray; brown pebbles and grit	50	956
Matawan(?) formation:		
Silt, sandy, glauconitic, gray; shell fragments; mica	40	996
Silt, sandy, tan-gray; mica	30	1026
Sand, medium to fine, some grit, brown and gray (water)	66	1092
Silt, clayey, gray	10	1102
Magothy(?) formation:		
Silt, sandy; clay, gray; grit	33	1135
Sand, coarse to fine, grit, slightly silty, gray; shell fragments (water)	10	1145
Raritan formation:		
Clay, silty, white; grit	22	1167
Clay, silty, red and white: grit and few pebbles	10	1177
Sand, coarse, consisting of particles of cemented sand; grit	11	1188
(Screen bottom at 1147.8 feet)		

Tal-Ce 9 (Altitude: 38 feet) P 957

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Sandy	11	11
Gravel	5	16
Miocene series:		
Choptank(?) formation:		
Clay	54	70
Clay, dark	10	80
Clay, blue	42	122
Calvert formation:		
Rock, soft	.5	122.5
Clay	4.5	127
Sand (water)	23	150
Clay	10	160
(Uncased hole 116.5–160 feet)		

al-Ce 14 (Altitude: 60 feet)

	Thickness (feet)	Depth (feet)
Pleistocene and Pliocene(?) series:		
Sand, red, and gravel	20	20
Sand, white; fuller's earth	5	25
Sand, coarse, white (water)	10	35
Gravel, coarse, and sand	6	41

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank formation:		
Sand, fine, gray; clay, blue	22	63
Clay, blue	17	80
Calvert formation:		
Clay, reddish-brown; dark mud	60	140
Clay, soft, dark	28	168
Clay; sand; shells	10	178
Sand, fine, gray	10	188
Streaks of blue clay and fine, gray sand	58	246
Sand, coarse; shells, fine; clay, blue	34	280
Clay, brown; sand, gray (no water)	40	320
(Screen 219–231 feet)		
Tal-Ce 22 (Altitude: 55 feet) P 1081		
Pleistocene(?) series:		
Clay	10	10
Sand	40	50
Miocene series:		
Choptank formation:		
Clay, dark	39	89
Calvert formation:		
Rock, soft	2	91
Clay, sandy	1	92
Clay	16	108
Sand	44	152
Clay	8	160
(Uncased hole 71–160 feet)		
Tal-Ce 25 (Altitude: 65 feet) P 5404		
Pleistocene series:		
Clay	28	28
Sand, brown, and gravel	6	34
Miocene series:		
Choptank(?) formation:		
Clay, blue	16	50
Calvert(?) formation:		
Marl	60	110
Clay, tough	30	140
Clay	40	180
Clay, tough	10	190
Crusty	30	220
Clay	10	230
Sand, free	20	250
(Uncased hole 112.8–250 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Ce 30 (Altitude: 20 feet) P 4400		
Pleistocene series:		
Sand, yellow; clay	22	22
Sand, white	4	26
Iron ore, hard crust; stones	2	28
Miocene series:		
Choptank(?) formation:		
Clay, black; shells, coarse	10	38
Clay, hard, dark	14	52
Clay, sand; shells	23	75
Calvert formation:		
Clay, tough, blue	45	120
Sand; clay	20	140
Sand, coarse, gray	20	160
(Screen 152–160 feet)		
Tal-Ce 37 (Altitude: 68 feet) P 2430		
Pleistocene series:		
Clay, yellow	10	10
Sand; gravel	8	18
Miocene series:		
Choptank(?) formation:		
Sand; shells	20	38
Clay, brown	14	52
Sand; shells	18	70
Calvert formation:		
Clay, blue	17	87
Sand, gray	36	123
Clay, blue	162	285
Sand, gray	61	346
Eocene series:		
Piney Point(?) formation:		
Sand, black (water)	74	420
Nanjemoy formation:		
Sand, black (no water)	200	620
Aquia greensand:		
Sand, brown (water)	31	651
(Screen 639–651 feet)		
Tal-Ce 41 (Altitude: 54 feet)		
Pleistocene series:		
Clay	10	10
Gravel	4	14
Sand and gravel	6	20
Miocene series:		
Choptank formation:		
Clay, blue	1	21
Sand, black; shells	39	60
Clay, gray	83	143

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Calvert formation:		
Rock	3	146
Sand	14	160
(Uncased hole 105–160 feet)		
Tel-Ce 42 (Altitude: 35 feet) P 3688		
Pleistocene series:		
Clay, sandy	14	14
Sand, water	6	20
Clay, blue	17	37
Sand	1.5	38.5
Miocene series:		
Choptank(?) formation:		
Sand; clay streaks	11.5	50
Hard places	.5	50.5
Sand; clay streaks	7.5	58
Calvert(?) formation:		
Clay	28	86
Sandy	13	99
Sand	2	101
Clay, sandy	3	104
Hard crusts	5	109
Clay, hard	20	129
Sand, light; crusts	14	143
Sand, free	3.5	146.5
Clay	6.5	153
Rock	2	155
Clay	30	185
(Uncased hole 125–185 feet)		
Tal-Ce 49 (Altitude: 20 feet) P 5206		
Pleistocene series:		
Parsonsburg(?) sand:		
Soil; sand, red	3	3
Sand, yellow	14	17
Clay, sticky, orange	2	19
Sand, dark red (water)	6	25
Pamlico(?) formation:		
Mud, black; rotten wood	5	30
Clay, blue	15	45
Mud; shells, fine	15	60
Miocene series:		
Calvert formation:		
Shells, fine; sand, gray	10	70
Clay, hard, dark	20	90
Shells, hard crust; sand	10	100
Sand, gray; shells, fine	26	126
(Screen 115–121 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Ce 52 (Altitude: 54 feet) P 1094		
Pleistocene series:		
Clay, yellow	13	13
Sand, white	7	20
Miocene series:		
Choptank and Calvert formations:		
Clay, gray; shells	88	108
Calvert formation:		
Sand, gray (water)	47	155
Clay, blue; shells	85	240
Eocene series:		
Piney Point formation:		
Sand, black (water)	110	350
Nanjemoy formation:		
Sand, black	240	590
Aquia greensand:		
Sand, brown (water)	19	609
(Screen 597–609 feet)		
Tal-Cf 21 (Altitude: 30 feet) P 11742		
Recent and Pleistocene series:		
Soil; sand	18	18
Miocene series:		
Choptank formation:		
Clay, blue	17	35
Shell; clay, soft	6	41
Clay, blue	52	93
Shell; sand	27	120
(Uncased hole 63–120 feet)		
Tal-Cg 1 (Altitude: 40 feet) P 10877		
Pleistocene series:		
Sand, yellow	17	17
Miocene series:		
Choptank formation:		
Sand, blue; clay	18	35
Clay, blue	47	82
Sand	8	90
Rock	—	90
(Uncased hole 42–90 feet)		
Tal-Da 1 (Altitude: 3 feet) P 5366		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	10	10
Sand, yellow	16	26
Miocene series:		
Calvert formation:		
Shells and gravel	25	51
Clay, blue	105	156

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Sand, black; shells (water)	54	210
(Uncased hole 126–210 feet)		
Tal-Da 3 (Altitude: 10 feet) P 5502		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	10	10
Sand, yellow; gravel	16	26
Miocene series:		
Calvert formation:		
Clay, soft, gray; shells	27	53
Clay, blue	73	126
Eocene series:		
Piney Point formation:		
Sand, black (water)	84	210
(Uncased hole 105–210 feet)		
Tal-Da 7 (Altitude: 8 feet) P 131		
Pleistocene series:		
Pamlico formation:		
Sand, yellow	10	10
Mud	20	30
Gravel	5	35
Miocene series:		
Calvert formation:		
Clay, blue	55	90
Shell bed	10	100
Clay, blue	10	110
Eocene series:		
Piney Point formation:		
Sand, black (water)	30	140
Rock, hard	5	145
Sand, black	55	200
Sand and clay, black		
(Uncased hole 110–200 feet)		
Tal-Da 14 (Altitude: 5 feet) P 1747		
Pleistocene series:		
Pamlico formation:		
Clay, silty, yellow	10	10
Clay, silty, light tan	10	20
Miocene series:		
Calvert formation:		
Silt, sandy, light gray; few shell fragments	10	30
Sand, fine to very fine, silty, light gray; few shell fragments	10	40
Clay, silty, buff	30	70
Shell fragments	20	90
Sand, fine to very fine, silty, brown-gray; few shell fragments	20	110

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine to very fine, gray; shell fragments	10	120
Sand, fine to very fine, light gray; few shell fragments	10	130
Sand and shells; fine sand, gray	10	140
Eocene series:		
Piney Point formation:		
Sand, medium to fine, gray-brown; few shell fragments	20	160
Sand, fine to very fine, yellow-brown; few shell fragments	10	170
Sand, medium to very fine, gray-brown; few shell fragments	20	190
Sand, medium to fine, some coarse, little grit, gray-brown; few shell fragments	10	200
Missing	10	210
(Uncased hole 105–210 feet)		
Tal-Db 1 (Altitude: 6 feet) P 7075		
Pleistocene series:		
Pamlico(?) formation:		
Clay	8	8
Sand	10	18
Clay	7	25
Miocene series:		
Calvert(?) formation:		
Sand and shells	15	40
Sand and clay	58	98
Clay	27	125
Sand, gray	25	150
Eocene series:		
Piney Point formation:		
Sand, black (water)	60	210
(Uncased hole 105–210 feet)		
Tal-Db 16 (Altitude: 6 feet) P 55		
Pleistocene series:		
Pamlico formation:		
Sand, medium to very fine, yellow, tan; few small shell fragments and little mica	10	10
Sand, fine to very fine, silty, yellow, tan; few small shell fragments, little lignite and mica	11	21
Sand, medium to very fine, tan; little mica and few small shell fragments	10	31
Miocene series:		
Calvert formation:		
Sand, fine to very fine, some medium; little silt, tan-gray; little mica	30	61
No sample	17	78
Silt, sandy, tan	6	84
Clay, silty, tan; some shell fragments	20	104
Clay, silty, tan-gray	22	126

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, coarse to fine, gray; shell fragments	31	157
Sand, coarse to medium, some fine, dark gray; few shell fragments	11	168
Eocene series:		
Piney Point formation:		
Sand, medium to fine, little coarse, black and brown	30	198
Sand, very coarse to medium, some medium and grit, black and brown	20	218
Sand, coarse to fine, black and brown	7	225
Tal-Db 18 (Altitude: 10 feet) P 236		
Pleistocene series:		
Pamlico formation:		
Sand, red and brown	22	22
Marsh mud, black	6	28
Miocene series:		
Calvert formation:		
Sand, fine, gray	14	42
Clay, greenish-brown	52	94
Clay, brown; fine shells	12	106
Clay, soft, brown	10	116
Sand, fine, gray; shells	16	132
Sand; shells; clay, brown	28	160
Eocene series:		
Piney Point formation:		
Clay, black; sand and gravel, crusty, brown	13	173
Sand, coarse; gravel; layers of clay and sand crusts	47	220
(Uncased hole 173–220 feet)		
Tal-Db 20 (Altitude: 7 feet) P 10488		
Pleistocene series:		
Pamlico formation:		
Soil; clay, yellow	10	10
Sand, fine, yellow	14	24
Miocene series:		
Calvert formation:		
Clay, blue	6	30
Sand, fine	54	84
Clay, blue	56	140
Clay, brown; shells	10	150
Sand, gray; shells	10	160
Eocene series:		
Piney Point formation:		
Sand, black; clay crusts	11	171
Sand and gravel	49	220
(Screen 210–220 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Db 30 (Altitude: 12 feet) P 7288		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	9	9
Sand, yellow	17	26
Miocene series:		
Calvert formation:		
Shells; mud, soft	6	32
Sand, gray; shells	13	45
Clay, blue	88	133
Eocene series:		
Piney Point formation:		
Sand, black (water)	69	202
(Uncased hole 126–202 feet)		
Tal-Db 32 (Altitude: 6 feet) P 293		
Pleistocene series:		
Pamlico formation:		
Sand, yellow	10	10
Mud, soft	10	20
Gravel, coarse	6	26
Miocene series:		
Calvert formation:		
Clay, blue	64	90
Shell bed	5	95
Clay, blue	25	120
Eocene series:		
Piney Point formation:		
Sand, black (water)	20	140
Rock, hard	5	145
Sand, black; clay	60	205
(Uncased hole 105–205 feet)		
Tal-Db 38 (Altitude: 5 feet) P 5555		
Pleistocene series:		
Pamlico formation:		
Sandy	15	15
Gravel	2	17
Miocene series:		
Calvert formation:		
Clay, soft	129	146
Eocene series:		
Piney Point formation:		
Rock, hard	3	149
Sand (water)	41	190
Nanjemoy(?) formation:		
Clay, firm	179	369
Aquia greensand:		
Sand, hard and soft	18	387

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, soft	24	411
Sand, hard	11	422
Sand, crusty	20	442
(Screen 412–442 feet)		
Tal-Db 53 (Altitude: 7 feet) P 371		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	7	7
Sand, yellow (water)	12	19
Miocene series:		
Calvert formation:		
Clay, gray	91	110
Sand, gray	41	151
Eocene series:		
Piney Point formation:		
Sand, black (water)	54	205
Nanjemoy(?) formation:		
Sand, black (no water)	155	360
Aquia greensand:		
Sand, brown (water)	60	420
Tal-Db 54 (Altitude: 4 feet) P 267		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	10	10
Sand, yellow (water)	10	20
Clay, blue	6	26
Sand, white	4	30
Miocene series:		
Calvert formation:		
Clay, gray	92	122
Sand, gray	20	142
Eocene series:		
Piney Point formation:		
Sand, black (water)	48	190
Nanjemoy formation:		
Sand, black (no water)	160	350
Aquia greensand:		
Sand, brown (water)	50	400
(Uncased hole 350–400 feet)		
Tal-Db 55 (Altitude: 4 feet) P 11276		
Pleistocene series:		
Pamlico formation:		
Clay, blue	10	10
Sand, yellow	10	20
Clay, dark; marsh mud	18	38
Sand, gray, fine	25	63

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Gravel	2	65
Sand	19	84
Miocene series:		
Calvert formation:		
Clay, dark; shells	74	158
Sand, gray; shells	12	170
Eocene series:		
Piney Point formation:		
Clay crusts; sand, black	9	179
Sand, black; gravel	41	220
(Uncased hole 179–220 feet)		
Tal-Db 56 (Altitude: 4 feet) P 10398		
Pleistocene series:		
Pamlico formation:		
Soil and clay, yellow	10	10
Sand, yellow	8	18
Clay, dark	60	78
Iron ore crust and gravel	3	81
Miocene series:		
Calvert formation:		
Clay, blue	45	126
Clay, blue; shells, fine	14	140
Clay, brown	28	168
Sand, gray; clay, soft	7	175
Eocene series:		
Piney Point formation:		
Rock, soft	1	176
Clay crusts; sand, black	13	189
Sand, brown; gravel	31	220
(Uncased hole 178–220 feet)		
Tal-Dc 2 (Altitude: 6 feet) P 3172		
Pleistocene series:		
Pamlico formation:		
Clay	7	7
Sand	2	9
Clay	15	24
Sand and gravel	22	46
Miocene series:		
Calvert formation:		
Clay	14	60
Marl	52	112
Hard	4	116
Sand and shells	5	121
Rock	1	122
Marl	27	149
Clay	34	183

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Rock	1	184
Clay	59	245
Clay	15	260
Eocene series:		
Piney Point formation:		
Rock	2	262
Clay	4	266
Rock	1	267
Clay	114	381
Rock, hard	1	382
Nanjemoy formation:		
Clay	139	521
Aquia greensand:		
Sand, hard	3	524
Sand, soft	36	560
Sand, tight	17	577
(Screen 539–559 feet)		
Tal-Dc 3 (Altitude: 6 feet) P 2703		
Pleistocene series:		
Pamlico formation:		
Sand, medium to very fine, some silt, yellow brown; few shell fragments	21	21
Sand, very fine, silty, tan; few shell fragments	10	31
Shell fragments, silt; fine sand, tan	11	42
Shell fragments, silt; fine sand and grit	10	52
Miocene series:		
Calvert formation:		
Silt and fine sand, light gray; few shell fragments	21	73
Sand, medium to very fine, light gray; few shell fragments	11	84
Sand, medium to very fine, light gray; shell fragments	21	105
Silt, sandy, little clayey, light tan-gray	42	147
Silt, sandy, little clayey, light tan-gray; few shell fragments	52	199
Sand, medium to very fine, silty, little coarse, light gray; few shell fragments	11	210
Rock, hard	1	211
Sand, coarse to fine, slightly glauconitic, black and gray; few shell fragments	17	228
Eocene series:		
Piney Point(?) formation:		
Clay, hard, dark	3	231
Sand, coarse to fine, little silt, glauconitic, black and brown	10	241
Sand, medium to fine, glauconitic, tan and black	11	252
Sand, coarse to fine, glauconitic, black and brown	10	262
Sand, very coarse to very fine, glauconitic and grit; quartz, black and brown	32	294
Sand, medium to very fine, little silt, glauconitic, black and brown	10	304

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, very coarse to fine, glauconitic, black and brown	11	315
Sand, coarse to very fine, glauconitic, black and brown	32	347
Sand, coarse to very fine, some silt, glauconitic, black and brown	10	357
Nanjemoy formation:		
Sand, medium to very fine, very glauconitic, black; mica	42	399
Sand, medium to very fine, gray, black; clay, very glauconitic, blue; mica	21	420
(Uncased hole 238–420 feet)		
Tal-Dc 4 (Altitude: 8 feet) P 7656		
Pleistocene series:		
Pamlico formation:		
Clay, yellow; sand	17	17
Clay, soft, dark; wood, rotten	5	22
Sand, fine, gray	18	40
Sand, gray; gravel (water)	26	66
Miocene series:		
Calvert formation:		
Hard crust	1	67
Sand, coarse, gray; shells, fine (water)	21	88
Sand, gray; clay	7	95
Hard crust	1	96
Clay, blue; sand	11	107
Clay, tough, blue	61	168
Clay, sandy, blue	12	180
Clay, brown	25	205
Sand, coarse, gray; fine shells	18	223
Rock, hard	2	225
Eocene series:		
Piney Point(?) formation:		
Sand, black; mud	3	228
Sand, black; clay crusts	9	237
Sand, black; gravel	120	357
(Uncased hole 237–357 feet)		
Tal-Dc 8 (Altitude: 5 feet) P 7517		
Pleistocene series:		
Parsonsburg(?) sand:		
Clay, yellow; sand, red	12	12
Pamlico formation:		
Marsh mud and rotten wood	10	22
Miocene series:		
Calvert formation:		
Sand, gray; clay, soft	33	55
Clay, soft, dark	8	63
Clay, hard, dark; fine shells	20	83
Sand, gray (water)	20	103
Clay, tough, gray	23	126

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay, gray-brown	63	189
Sand, gray	23	212
Eocene series:		
Piney Point(?) formation:		
Rock, soft	2	214
Sand, black; gravel and clay crusts	16	230
Sand, black; gravel	85	315
(Uncased hole 230–315 feet)		
Tal-Dc 10 (Altitude: 8 feet) P 5204		
Recent series:		
Soil	4	4
Pleistocene series:		
Sand and gravel, free	46	50
Miocene series:		
Calvert formation:		
Clay	67	117
Hard spots	7	124
Clay	106	230
Sandy	6	236
Rock	1	237
Clay	3	240
Eocene series:		
Piney Point(?) formation:		
Rock	1	241
Sand (water)	44	285
Sand, free (water)	55	340
(Uncased hole 236–340 feet)		
Tal-Dc 11 (Altitude: 6 feet) P 680		
Recent and Pleistocene series:		
Soil and clay, yellow	10	10
Sand, white and yellow	40	50
Miocene series:		
Choptank(?) formation:		
Marl and sand, gray (water)	8	58
Calvert(?) formation:		
Clay, brown	35	93
Shell and sand, hard, crusty, gray	11	104
Clay, blue; sand, gray	16	120
Clay, blue	78	198
Clay, brown	17	215
Sand, coarse, gray; shells	12	227
Rock, soft	3	230
Mud; pyrite	3	233
Eocene series:		
Piney Point(?) formation:		
Shells, hard; sand, crusty	3	236
Sand, fine; clay, soft	36	272

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay, hard; gravel, coarse	9	281
Gravel and sand, coarse, brown; clay, gray (water)	119	400
(Uncased hole 281–400 feet)		
Tal-Dc 22 (Altitude: 7 feet) P 3758		
Pleistocene series:		
Parsonsburg(?) sand:		
Clay, yellow; sand	18	18
Iron ore crust; gravel, coarse	2	20
Pamlico formation:		
Sand, gray; clay	15	35
Clay, soft, dark	23	58
Sand, gray; wood, rotten; gravel	26	84
Miocene series:		
Calvert formation:		
Clay, soft, blue	16	100
Clay, hard, dark	68	168
Clay, soft, brown	20	188
Clay and sand, mixed	17	205
Eocene series:		
Piney Point(?) formation:		
Rock, soft	3	208
Sand, black; clay crusts	28	236
Sand, black; gravel, brown	77	313
(Uncased hole 236–313 feet)		
Tal-Dc 26 (Altitude: 8 feet) P 9783		
Pleistocene series:		
Clay	6	6
Sand	12	18
Clay	12	30
Sand	18	48
Miocene series:		
Calvert formation:		
Clay	52	100
Sand, gray	18	118
Clay	111	229
Sand, gray	12	241
Eocene series:		
Piney Point(?) formation:		
Rock	2	243
Clay and sand	5	248
Sand, black	52	300
Sand and clay	235	535
Sand, brown	21	556
(Screen 538–556 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Dc 29 (Altitude: 5 feet) P 10486		
Pleistocene series:		
Pamlico formation:		
Sand, yellow; clay	24	24
Sand; gravel	6	30
Sand	30	60
Miocene series:		
Calvert formation:		
Clay, brown; shells	24	84
Shell crusts, hard	1	85
Sand, gray; shells	35	120
Clay, blue	69	189
Clay, brown; shells, fine	20	209
Sand, gray; shells	16	225
Eocene series:		
Piney Point(?) formation:		
Rock, hard	1	226
Sand, black and gray; clay crusts	5	231
Clay crusts, hard	4	235
Sand, black; gravel, brown	80	315
(Uncased hole 235–315 feet)		
Tal-Dc 31 (Altitude: 8 feet) P 1704		
Pleistocene series:		
Pamlico(?) formation:		
Clay, blue and yellow	8	8
Sand, fine, yellow	10	18
Sand, gray; clay, light	12	30
Clay, blue	12	42
Sand, clay; iron ore	14	56
Miocene series:		
Calvert formation:		
Shell, hard	4	60
Clay, blue; sand	45	105
Sand, gray; some clay	35	140
Clay, brown; shells, fine	24	164
Sand, gray; shells, fine	16	180
Eocene series:		
Piney Point(?) formation:		
Rock, soft	1	181
Sand, black; gravel, fine	8	189
Clay, yellow; sand, black; gravel	7	196
Sand, black; gravel	78	274
(Uncased hole 192–274 feet)		
Tal-Dc 35 (Altitude: 6 feet) P 9413		
Pleistocene series:		
Sand, yellow	18	18
Sand (water)	7	25

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert formation:		
Clay, blue	17	42
Sand; shells	28	70
Shells, hard crust of; sand	1	71
Sand, fine; shells	49	120
Clay, sandy, hard, blue	6	126
Clay, brown	78	204
Clay; shell crusts	2	206
Clay, blue	20	226
Clay and sand	16	242
Eocene series:		
Piney Point(?) formation:		
Gravel, brown; sand, black (water)	118	360
Nanjemoy formation:		
Clay, dark; sand, black	40	400
Clay, dark; sand, black and white	104	504
Aquia greensand:		
Clay, yellow; sand, brown	21	525
Clay, hard crusts of; sand	21	546
Gravel, coarse; sand, brown	21	567
(Screen 546–556 feet)		
Tal-Dc 41 (Altitude: 4 feet) P 1326		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	12	12
Sand and gravel	51	63
Miocene series:		
Choptank(?) formation:		
Clay, gray; shells	10	73
Calvert(?) formation:		
Clay; shells	32	105
Sand; shells	31	136
Clay, blue	92	228
Sand, gray	24	252
Eocene series:		
Piney Point(?) formation:		
Sand, coarse to fine, quartz and glauconite, brown and black (water)	148	400
Nanjemoy formation:		
Sand, glauconitic, green-black (no water)	20	420
Clay and sand, glauconitic, greenish-black	115	535
Aquia greensand:		
Sand, brown (water)	30	565
(Screen 535–547 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Dd 1 (Altitude: 6 feet) P 1958		
Pleistocene series:		
Pamlico (?) formation:		
Sand	18	18
Clay	27	45
Sand and gravel	31	76
Miocene series:		
Calvert(?) formation:		
Sand	18	94
Clay	74	168
Sand	4	172
Rock	1.5	173.5
Clay	42.5	216
Sand	19.5	235.5
Clay	2.5	238
Clay	14.8	252.8
Eocene series:		
Piney Point(?) formation:		
Sand	34.6	287.4
Sand, fine	27.6	315
Clay, sandy	10	325
Sand	10	335
Clay, sandy	12	347
Nanjemoy(?) formation:		
Clay	168.5	515.5
Aquia greensand:		
Sand	35.5	551
(Screen 533–548 feet)		
Tal-Dd 2 (Altitude: 14 feet) P 2240		
Pleistocene series:		
Pamlico(?) formation:		
Sand, yellow; clay	12	12
Marsh mud; sand	6	18
Clay, gray; sand	24	42
Clay, blue	24	66
Miocene series:		
Choptank formation:		
Sand, gray; shells, coarse	18	84
Sand, fine, gray; clay	52	136
Calvert formation:		
Clay, brown	16	152
Clay, blue; sand	42	194
Sand, fine, gray	58	252
Clay, brown; sand	21	273
Sand, gray	19	292

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Rock, hard	1	293
Mud, soft, sandy	1	294
Rock, soft	2	296
Sand, black; clay, gray	83	379
Sand, black; clay, brown	71	450
Nanjemoy formation:		
Clay, gray; sand, fine, black	115	565
Clay, sticky, blue; sand, fine, black	32	597
Aquia(?) greensand:		
Sand, hard, brown	23	620
Sand, coarse, brown; gravel	20	640
(Screen 620-640 feet)		
Tal-Dd 3 (Altitude: 5 feet) P 1399		
Pleistocene series:		
Pamlico(?) formation:		
Clay, sandy	16	16
Sand, free	2	18
Clay, sandy	29	47
Miocene series:		
Choptank(?) formation:		
Clay	32	79
Hard	1	80
Sand	35	115
Calvert(?) formation:		
Clay	10	125
Sand	35	160
Clay	110.3	270.3
Eocene series:		
Piney Point formation:		
Rock	.7	271
Clay	45	316
Clay; gravel	104	420
Nanjemoy(?) formation:		
Clay	124	544
Aquia greensand:		
Sand, hard	8.7	552.7
Hard	3.3	556
Sand	8	564
Sand, hard	2	566
Sand	17	583
(Screen 567–572.5 feet and 576.8–582 feet)		
Tal-Dd 5 (Altitude: 5 feet) P 843		
Pleistocene series:		
Pamlico(?) formation:		
Sand	20	20

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, dark	3	23
Sand	32	55
Miocene series:		
Choptank(?) formation:		
Rock	1	56
Sand	14	70
Clay	20	90
Sand	5	95
Calvert(?) formation:		
Clay	100	195
Sand, gray	13	208
Clay	52	260
Clay, brown	37	297
Eocene series:		
Piney Point formation:		
Rock	3	300
Sand (water)	67	367
Rock	0.2	367.2
Nanjemoy(?) formation:		
Clay	234.8	602
Aquia greensand:		
Sand, hard	5	607
Sand; clay streaks	20	627
Clay	20	647
(Screen 607–627 feet; annular opening between 3-inch and 2-inch casing at 298 feet)		
Tal-Dd 6 (Altitude: 12 feet) P 2866		
Pleistocene series:		
Pamlico(?) formation:		
Clay, sandy	35	35
Gravel	15	50
Miocene series:		
Choptank(?) formation:		
Clay, soft	25	75
Clay	45	120
Calvert(?) formation:		
Marl	10	130
Sand, hard	4	134
Sand, free	11	145
Clay	111	256
Sand	6	262
Eocene series:		
Piney Point formation:		
Rock, soft	2	264
Sandy	13	277
Crust	—	277
Nanjemoy(?) formation:		
Clay	258	535

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Aquia greensand:		
Sand, hard	13	548
Sand	5	553
Sand, free	11	564
Crusty	3	567
(Screen 555–565 feet)		
Tal-Dd 7 (Altitude: 10 feet) P 1355		
Pleistocene series:		
Pamlico formation:		
Sand, fine to very fine, light gray; silt; few shell fragments	53	53
Clay, silty, buff	22	75
Miocene series:		
Choptank(?) formation:		
Sand, fine, little silty, gray; small shells and shell fragments; mica	16	91
Sand, fine to very fine, silty, light gray	26	117
Sand, medium to fine, light gray; shell fragments; mica	38	155
Clay	6	161
Calvert(?) formation:		
Silt, clayey, light green-gray	2	163
Sand, mostly medium, well sorted, gray; few shell fragments; mica	125	288
Sand, fine to very fine, silty, light gray	20	308
No sample	10	318
Silt, sandy, gray	10	328
Eocene series:		
Piney Point formation:		
Sand, medium to fine, some coarse, some silt and grit, olive-brown	72	400
Nanjemoy(?) formation:		
Sand, fine to very fine, some medium, silty, gray-brown; few shell fragments	20	420
Silt, sandy, gray-brown; few shell fragments	130	550
Silt, clayey; little sand; few shell fragments	12	562
Missing	7	569
Aquia greensand:		
Sand, medium to fine, gray and brown	24	593
Tal-Dd 8 (Altitude: 6 feet) P 1325		
Pleistocene series:		
Pamlico(?) formation:		
Clay and sand	8	8
Sand and gravel	12	20
Miocene series:		
Choptank and Calvert formations:		
Clay, blue	11	31
Shells; sand	32	63
Clay	42	105
Sand; shells; some rock	33	138

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue; some rock	62	200
Clay, blue	52	252
Eocene series:		
Piney Point formation:		
Sand, brown	63	315
Nanjemoy(?) formation:		
Sand, black (water)	95	410
Sand, black (no water)	21	431
Clay	32	463
Sand, black	62	525
Aquia greensand:		
Sand, brown (water) (Screen 556–568 feet)	43	568
Tal-Dd 11 (Altitude: 12 feet) P 5838		
Pleistocene series:		
Pamlico(?) formation:		
Clay	10	10
Sand	8	18
Miocene series:		
Choptank and Calvert(?) formations:		
Clay	14	32
Sand and shells	26	58
Clay	222	280
Eocene series:		
Piney Point formation:		
Sand, gray	30	310
Clay, gray	24	334
Sand, gray and black	12	346
Sand, brown	40	386
Nanjemoy(?) formation:		
Sand and clay	192	578
Aquia greensand:		
Sand, brown (water) (Screen 580–598 feet)	21	599
Tal-Dd 16 (Altitude: 10 feet) P 8116		
Pleistocene series:		
Pamlico(?) formation:		
Sandy	22	22
Miocene series:		
Choptank and Calvert formations:		
Marl	28	50
Clay, soft	15	65
Rock, soft	5	70
Clay, sandy	20	90
Clay, good	106	196
Rock, soft	2	198

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay	74.5	272.5
Rock	1.0	273.5
Clay	39.8	313.3
Eocene series:		
Piney Point formation:		
Rock, soft	8.0	321.3
Sand	3.7	325
Sand, loose	15	340
Hard and free places	10	350
Rock, soft	1	351
Sand, free	3	354
Rock, soft	1	355
Sand, loose	6	361
Rock, soft	1	362
Sandy	3	365
Rock, hard	1	366
Nanjemoy(?) formation:		
Clay	4	370
(Uncased hole 273–370 feet)		
Tal-Dd 19 (Altitude: 10 feet) P 6157		
Pleistocene series:		
Pamlico(?) formation:		
Soil; clay, hard, yellow	6	6
Sand, fine, yellow	15	21
Clay, soft, dark	3	24
Sand, gray; clay	18	42
Miocene series:		
Choptank and Calvert formations:		
Sand, coarse; fine shells	10	52
Clay, sandy, gray	48	100
Clay, dark	24	124
Clay, gray	44	168
Clay, hard, gray	40	208
Clay, brown	44	252
Sand, coarse, gray; soft (water)	37	289
Eocene series:		
Piney Point formation:		
Rock, soft	2	291
Clay; sand, black	9	300
Clay; sand, coarse, brown (water)	85	385
Nanjemoy(?) formation:		
Clay, dark; earth, black	175	560
Clay, yellow; sand	10	570
Aquia greensand:		
Gravel, coarse, brown; sand	18	588
(Screen 580–588 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Dd 22 (Altitude: 12 feet) P 5027		
Pleistocene series:		
Pamlico(?) formation:		
Sand and gravel	35	35
Miocene series:		
Choptank and Calvert formations:		
Clay	80	115
Clay, hard	130	245
Sandy	14.2	259.2
Hard place; clay, sandy	4.8	264
Eocene series:		
Piney Point formation:		
Rock, crusty; sand	21	285
Nanjemoy(?) formation:		
Clay	258	543
Aquia greensand:		
Sand	11	554
Free	18	572
Crusty	10	582
Clay	4	586
(Screen 560–580 feet)		
Tal-Dd 24 (Altitude: 18 feet) P 1112		
Pleistocene series:		
Pamlico(?) formation:		
Clay	37	37
Miocene series:		
Choptank(?) formation:		
Marl	14	51
Clay	8	63
Clay, tough	17	80
Calvert(?) formation:		
Marl	2	82
Clay	175	257
Sand, gray	17	274
Eocene series:		
Piney Point formation:		
Rock	2.3	276.3
Nanjemoy(?) formation:		
Clay	284.3	560.6
Aquia greensand:		
Hard	3.6	564.2
Sand	3.8	568
Hard	2	570
Sand, loose	4	574
Crust, free	6	580
(Screen 570–580 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Dd 25 (Altitude: 8 feet) P 5290		
Pleistocene series:		
Pamlico(?) formation:		
Clay	10	10
Sand	20	30
Miocene series:		
Choptank and Calvert formations:		
Clay, gray	30	60
Clay, green	87	147
Sand	3	150
Clay	105	255
Eocene series:		
Piney Point formation:		
Sand, gray	15	270
Nanjemoy(?) formation:		
Sand, black	150	420
Clay, gray	30	450
Sand, black	110	560
Aquia greensand:		
Sand, brown (water)	30	590
(Screen 572–590 feet)		
Tal-Dd 30 (Altitude: 18 feet) P 1269		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	10	10
Sand, gray	10	20
Miocene series:		
Choptank(?) formation:		
Clay, gray; few shells	64	84
Calvert formation:		
Clay, blue; sand	221	305
Eocene series:		
Piney Point(?) formation:		
Sand, white; speckled by glauconite, green-black	31	336
Clay, sandy, gritty, blue-gray	31	367
Sand, medium, glauconitic, black and brown; fragments of blue limestone	68	435
Nanjemoy formation:		
Clay and sand, glauconitic, green-black	125	560
Sand, fine, glauconitic, black	25	585
Aquia greensand:		
Sand, coarse to medium, glauconitic, brown and green (water)	39	624
(Screen 612–624 feet)		
Tal-Dd 32 (Altitude: 18 feet) P 7725		
Pleistocene series:		
Pamlico(?) formation:		
Sand, yellow and red	10	10

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Sand, white; clay	2	12
Clay, dark; sand; mud	8	20
Miocene series:		
Choptank formation:		
Clay, light blue	18	38
Clay, blue; sand	12	50
Shell crust; sand	1	51
Sand, fine, gray; shells	12	63
Sand, gray; clay	37	100
Calvert(?) formation:		
Clay, blue	121	221
Sand, gray; shells, fine	26	247
Clay, brown	33	280
Clay, brown; sand	20	300
Eocene series:		
Piney Point formation:		
Rock, soft; sand	15	315
Sand, black; clay, gray	85	400
Nanjemoy(?) formation:		
Earth, black; clay, gray	180	580
Aquia greensand:		
Clay, yellow, gray; sand, black and brown	23	603
Sand, free, coarse	7	610
(Screen 602–610 feet)		
Tal-Dd 34 (Altitude: 5 feet) P 415		
Pleistocene series:		
Pamlico(?) formation:		
Clay; sand	14	14
Marsh mud; shells	8	22
Miocene series:		
Choptank(?) formation:		
Clay, blue	24	46
Sand; shells	12	58
Calvert(?) formation:		
Sand, fine	5	63
Sand, fine; shells	27	90
Clay; little sand	15	105
Sand and clay, gray	31	136
Sand (water)	29	165
Sand; clay	7	172
Sand; shells	17	189
Sand; shells; clay	11	200
Sand, gray; clay	10	210
Clay, brown	10	220
Sand, black	11	231
Sand, fine, gray	10	241
Sand, gray; shells	16.5	257.5

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Rock, hard	.5	258
Sand and mud, black and gray; pyrite	8	266
Sand, black and gray	7	273
Clay; sand and gravel	13	286
Gravel, coarse, brown	10	296
Sand, coarse, black	82	378
(Uncased hole 286–378 feet)		
Tal-Dd 36 (Altitude: 6 feet) P 7728		
Pleistocene series:		
Pamlico(?) formation:		
Clay	4	4
Sand	4	8
Clay	8	16
Clay, blue	14	30
Miocene series:		
Choptank(?) formation:		
Sand; shells	25	55
Clay; sand streaks	35	90
Calvert(?) formation:		
Clay	50	140
Hard	2	142
Sand	8	150
Clay	35	185
Hard	2	187
Clay	5	192
Hard	1	193
Clay	66	259
Eocene series:		
Piney Point formation:		
Rock	2	261
Sand	2	263
Rock, hard	1	264
Sandy	126	390
Nanjemoy(?) formation:		
Clay	160	550
Aquia greensand:		
Hard	8	558
Free	22	580
Sand, tight	20	600
(Screen 570–580 feet)		
Tal-Dd 39 (Altitude: 9 feet) P 845		
Pleistocene series:		
Pamlico(?) formation:		
Soil; clay, yellow; sand, fine	18	18
Mud, marsh	4	22

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Clay, brown	13	35
Sand, gray and sand, coarse, white	49	84
Miocene series:		
Calvert(?) formation:		
Clay, blue	26	110
Sand, fine	25	135
Clay, brown	65	200
Clay, brown; sand, fine	22	222
Sand, coarse, gray	9	231
Eocene series:		
Piney Point formation:		
Rock, soft	3	234
Sand, soft, black; mud	4	238
Clay, blue; gravel	4	242
Clay and sand, hard	42	284
Sand, hard; gravel	31	315
Sand, soft; gravel	61	376
(Uncased hole 242–376 feet)		
Tal-Dd 40 (Altitude: 5 feet) P 3593		
Pleistocene series:		
Pamlico(?) formation:		
Clay, yellow; sand, fine	14	14
Clay, gray	11	25
Miocene series:		
Choptank(?) formation:		
Sand, fine; shells; clay	25	50
Calvert(?) formation:		
Clay, tough, dark	33	83
Sand, hard; shells, fine; bits of rotten wood	42	125
Clay, gray; sand	22	147
Clay, brown	63	210
Clay, sandy, dark	19	229
Sand, coarse, gray	13	242
Eocene series:		
Piney Point formation:		
Rock, hard	1	243
Sand, fine, black; crusts of gray clay	12	255
Sand, black; gravel, coarse, brown	105	360
(Uncased hole 255–360 feet)		
Tal-Dd 47 (Altitude: 7 feet) P 7187		
Pleistocene series:		
Pamlico(?) formation:		
Clay	5	5
Sand	5	10
Clay	20	30

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Calvert(?) formation:		
Sand; shells	10	40
Clay	23	63
Sand, gray	37	100
Clay	170	270
Eocene series:		
Piney Point formation:		
Sand, gray	20	290
Sand, brown (water)	62	352
Nanjemoy(?) formation:		
Sand; clay	193	545
Aquia greensand:		
Sand, brown (water)	21	566
(Uncased hole 548–566 feet)		

	Thickness (feet)	Depth (feet)
Tal-De 5 (Altitude: 35 feet) P 2965		
Pleistocene series:		
Walston(?) silt:		
Soil; clay, yellow	8	8
Clay, white; gravel	4	12
Beaverdam(?) sand:		
Sand, yellow; clay	8	20
Pamlico(?) formation:		
Clay, dark; mud	5	25
Miocene series:		
Choptank(?) formation:		
Shells, coarse; streaks of dark clay	59	84
Sand, gray; shells, fine	42	126
Calvert(?) formation:		
Sand, fine; clay, light	10	136
Rock, soft	3	139
Clay, soft, brown	10	149
Sand, gray; clay, light	19	168
Clay, tough, blue	11	179
Sand, soft, gray	10	189
Clay, tough, gray	27	216
Clay, becoming sandy, gray	14	230
Sand, greenish-gray (water)	22	252
Clay, gray; sand; shells, fine (water)	42	294
Sand, gray; shells, fine	6	300
Eocene series:		
Piney Point formation:		
Rock, soft	1	301
Sand, fine, gray; clay, blue, gray	14	315
Clay, soft, brown; shells	21	336
(Uncased hole 216–336 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Dc 8 (Altitude: 35 feet) P 7528		
Pleistocene series:		
Clay	5	5
Sand; gravel	27	32
Miocene series:		
Choptank(?) formation:		
Clay	3	35
Sand; gray	13	48
Clay	2	50
Sand, gray	19	69
Clay	7	76
Calvert(?) formation:		
Sand; shells	10	86
Clay, green	26	112
Sand; shells	2	114
Rock	8	122
Sand (water)	46	168
(Uncased hole 122–168 feet)		
Tal-De 10 (Altitude: 56 feet) P 7269		
Pleistocene series:		
Parsonsburg(?) sand:		
Soil; sand, yellow	20	20
Sand, white and red (water)	10	30
Miocene series:		
Choptank(?) formation:		
Clay, blue	25	55
Sand; marl	29	84
Clay, blue	42	126
Calvert(?) formation:		
Sand, fine, gray; shells	21	147
Clay, blue; clay, soft, brown; shells, fine	13	160
Rock, soft	2	162
Marl; sand, fine	22	184
Clay, brown	26	210
Sand, fine; shells	20	230
Clay, brown	106	336
Sand, gray; clay, gray	16	352
Eocene series:		
Piney Point formation:		
Rock, soft	2	354
Sand, gray	8	362
Rock	16.5	378.5
(Uncased hole 107.5–378.5 feet)		
Tal-De 12 (Altitude: 40 feet) P 5694		
Pleistocene series:		
Sandy	30	30

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank(?) formation:		
Clay, sandy	76	106
Clay	34	140
Marl	19	159
Calvert(?) formation:		
Clay	1	160
Rock	7	167
Clay	81	248
Rock	3	251
Clay	63	314
Rock, hard	2	316
Clay	30	346
Hard	2	348
Clay	27	375
Eocene series:		
Piney Point formation:		
Rock	5	380
Sand	12	392
Rock	1	393
Sand	1	394
Rock	—	394
(Uncased hole 376–394 feet)		
Tal-Df 1 (Altitude: 40 feet) P 3657		
Pleistocene series:		
Parsonsburg(?) sand:		
Sand, medium to fine, yellow-tan; few shell fragments	20	20
Beaverdam(?) sand:		
No sample	10	30
Sand, medium to fine, little silt, grayish-tan; shell fragments	30	60
Miocene series:		
Choptank(?) formation:		
Clay, silty, light gray; few shell fragments	20	80
Shell fragments and pebbles; clay, gray	5	85
Clay, silty, light gray; few shell fragments	46	131
Sand, fine, little silty, gray; few shell fragments	13	144
Silt, sandy, light gray; few shell fragments	6	150
Sand, fine to very fine, silty, gray; few shell fragments	40	190
Calvert(?) formations:		
Silt, sandy, gray; few shell fragments	23	213
Sand, fine, silty, light gray; shell fragments	31	244
Silt, sandy, light gray	11	255
Silt, clayey and little sandy, light gray	32	287
Sand, medium to fine, silty, gray; few shell fragments	2.9	289.9
Sand, fine, silty, tan-gray	25	314.9
Silt, little clayey and sandy, light tan	33.1	348

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Sand, medium to fine, little silty, gray; shell fragments	8	356
Sand, coarse to fine, gray; few gray shell fragments	22	378
(Screen 358–378 feet)		
Tal-Ed 1 (Altitude: 10 feet) P 3052		
Pleistocene series:		
Parsonsburg(?) sand:		
Sand	18	18
Pamlico formation:		
Clay	10	28
Miocene series:		
Choptank formation:		
Marl	52	80
Clay	20	100
Sand, hard	2	102
Calvert(?) formation:		
Clay	23	125
Sand	10	135
Clay	10	145
Clay, hard	5	150
Sand	5	155
Rock	3	158
Clay	42	200
Hard	4	204
Clay	117	321
Rock	1.5	322.5
Sand	3.5	326
Eocene series:		
Piney Point formation:		
Rock, hard	4	330
Sand	2	332
Rock	1	333
Sand	7	340
Sand, hard	19	359
Sand	20	379
(Screen 346.5–356.5 feet and 364.5–374.5 feet)		
Tal-Ed 2 (Altitude: 8 feet) P 7408		
Pleistocene series:		
Pamlico(?) formation:		
Clay	3	3
Sand; gravel	21	24
Clay	31	55
Miocene series:		
Choptank formation:		
Sand, gray	25	80
Clay	10	90

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Calvert(?) formation:		
Clay, sandy, gray	20	110
Sand, gray (water)	35	145
Clay, green	53	198
Rock	2	200
Clay	115	315
Eocene series:		
Piney Point formation:		
Rock	10	325
Sand, gray (water)	74	399
(Uncased hole 315–399 feet)		
Tal-Ed 3 (Altitude: 5 feet) P 1900		
Pleistocene series:		
Pamlico(?) formation:		
Gravel; sand	32	32
Clay	6	38
Miocene series:		
Choptank(?) formation:		
Clay, dark	39.4	77.4
Clay, dark	4.6	82
Hard	8	90
Calvert(?) formation:		
Clay	54	144
Hard	4	148
Sand	39	187
Clay	54.9	241.9
Hard	1.3	243.2
Clay	59.5	302.7
Hard	.6	303.3
Sand	5.0	308.3
Eocene series:		
Piney Point formation:		
Rock	.7	309
Soft	2	311
Rock, soft	5.9	316.9
Sand	7.1	324
Hard	1.6	325.6
Sand	39.4	365
Clay	7	372
Tal-Ed 4 (Altitude: 7 feet) P 6334		
Pleistocene series:		
Pamlico formation:		
Clay, sandy	16	16
Beaverdam(?) sand:		
Sand, coarse; gravel	44	60
Boulders	16	76

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Choptank(?) formation:		
Hard	.5	76.5
Calvert(?) formation:		
Clay, soft	55.5	132
Rock	8	140
Sand, hard	20	160
Clay	107	267
Rock	1	268
Soft	1	269
Eocene(?) series:		
Piney Point(?) formation:		
Rock	7	276
Nanjemoy formation or Aquia(?) greensand:		
Clay	264	540
Paleocene series:		
Sand, hard	1.7	541.7
Sand	3.3	545
Crusty	20	565
Very free	11	576
Crusty and free places	14	590
(Screen 570–585 feet)		

	Thickness (feet)	Depth (feet)
Tal-Ed 5 (Altitude: 10 feet) P 6907		
Pleistocene(?) series:		
Pamlico(?) formation:		
Sand	25	25
Miocene series:		
Choptank(?) formation:		
Clay	60	85
Calvert(?) formation:		
Sand	63	148
Sand; free in places	43	191
Rock, soft	9	200
Clay	70.3	270.3
Hard	.2	270.5
Clay	35.8	306.3
Eocene series:		
Piney Point formation:		
Rock	1.2	307.5
Clay, sandy	3.2	310.7
Sand	12.3	323
Rock	.2	323.2
Sand (water)	61.8	385
Clay	31	416
(Screen 331–351.7 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Ee 8 (Altitude: 55 feet) P 895		
Pleistocene series:		
Walston silt(?):		
Clay, sandy	10	10
Beaverdam sand:		
Sand and gravel	20	30
Miocene series:		
Choptank(?) formation:		
Clay, green	30	60
Shale	30	90
Calvert(?) formation:		
Clay, green; shells	87	177
Rock	1	178
Clay, green	192	370
Sand, gray	3	373
Eocene series:		
Piney Point formation:		
Rock	4	377
Sand, gray; shells	9	386
Sand, gray; clay	116	502
Nanjemoy(?) formation:		
Clay, glauconitic, greenish-gray	103	605
Paleocene(?) series:		
Clay, gray	225	830
Upper Cretaceous series:		
Monmouth(?) formation:		
Clay, green	81	911
Matawan(?) formation:		
Sand, brown	22	933
Clay, gray	33	966
Clay, dark gray; wood	10	976
Clay, with crusts, gray	24	1,000
Clay, green	30	1,030
Magothy(?) formation:		
Clay; wood	37	1,067
Rock	—	1,067
Clay, gray	36	1,103
Gravel, white; clay	30	1,133
Clay, green	36	1,169
Raritan(?) formation:		
Clay, white and red	21	1,190
Clay, green; much wood	12	1,202
Clay, gray	13	1,215
Clay, red, pink, white	30	1,245
(Screen 407–427 feet and 913–925 feet)		

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Tal-Ee 15 (Altitude: 28 feet) P 2343		
Pleistocene series:		
Pamlico formation:		
Clay, yellow	13	13
Sand, gravel	23	36
Clay, gray	20	56
Miocene series:		
Choptank formation:		
Sand; shells	21	77
Choptank and Calvert formations:		
Clay, gray	64	141
Calvert formation:		
Clay, blue	124	265
Sand, gray (no water)	93	358
Eocene series:		
Piney Point formation:		
Sand, gray and black (water)	42	400
(Uncased hole 358–400 feet)		
Tal-Ee 16 (Altitude: 10 feet) P 8117		
Pleistocene series:		
Pamlico formation:		
Sandy	19	19
Miocene series:		
Choptank(?) formation:		
Clay	61	80
Calvert(?) formation:		
Sand, free	30	110
Clay, sandy	30	140
Clay, soft	61	201
Hard	4	205
Clay	52.5	257.5
Rock, soft	1.5	259
Clay	67	326
Eocene series:		
Piney Point formation:		
Rock, hard	5	331
Sandy	3	334
Crusty	2	336
Sand, loose	8	344
Crusty	2	346
Sand, loose	6	352
Hard	.2	352.2
Sand, loose	9.8	362
Hard and soft sections	8	370
Sand, loose	5	375

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Hard	3	378
(Screen 369–378 feet)		
Tal-Ee 17 (Altitude: 14 feet) P 4463		
Pleistocene series:		
Pamlico formation:		
Clay, sandy, brown	15	15
Clay, sandy, gray	25	40
Miocene series:		
Choptank formation:		
Marl	44	84
Hard	3	87
Sand, gray; clay	19	106
Rock	3	109
Clay, sandy	6	115
Hard, very	5	120
Calvert(?) formation:		
Clay, soft	56	176
Clay, hard	3	179
Hard	.2	179.2
Clay, soft	26.5	205.7
Rock	2	207.7
Sand, fine	13.3	221
Clay, sandy	34	255
Clay	91.7	346.7
Eocene series:		
Piney Point formation:		
Rock	2	348.7
Sand, coarse, gray	8.3	357
Rock	5	362
Sand	6	368
Rock	2	370
Sand	1	371
Rock	1	372
Sand	55	427
(Screen 391.9–417.2 feet)		
Tal-Ee 19 (Altitude: 45 feet) P 5009		
Pleistocene series:		
Beaverdam sand(?):		
Sand	41	41
Miocene series:		
Choptank formation:		
Marl; clay	59	100
Calvert formation:		
Clay	47	147
Hard	.3	147.3
Clay; marl	9.7	157

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Rock	.7	157.7
Clay	199.3	357
Rock	.7	357.7
Clay, sandy	3.3	361
Eocene series:		
Piney Point formation:		
Rock, hard	4	365
Clay, hard	4	369
Sand	7.9	376.9
Sand, crusty; clay	40.1	417
Tal-Ec 25 (Altitude: 55 feet) P 8772		
Pleistocene series:		
Walston silt(?):		
Clay	9	9
Beaverdam sand(?):		
Sand	9	18
Miocene series:		
Choptank formation:		
Clay	8	26
Sand, gray	17	43
Clay	17	60
Sand; shells	25	85
Choptank and Calvert formations:		
Clay	50	135
Calvert formation:		
Rock	2	137
Sand	18	155
Clay	230	385
Eocene series:		
Piney Point formation:		
Rock	2	387
Sand; rock (water)	25	412
(Screen 388–412 feet)		
Tal-Ec 26 (Altitude: 30 feet)		
Pleistocene series:		
Clay, brown	7	7
Clay, sandy, blue	29	36
Miocene series:		
Choptank formation:		
Clay, dark	36	72
Clay, sandy	30	102
Rock, soft	3.5	105.5
Sand; shells	28.5	134
Calvert formation:		
Sand, hard	7	141
Clay	11	152

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Rock, soft	2	154
Sandy	10	164
Rock, soft	5.1	169.1
Clay, green	84.9	254
Rock, very soft	2.7	256.7
Clay	22.3	279
Rock, very soft	2	281
Clay	6	287
Rock, very soft	3	290
Clay, green	37	327
Hard	11	338
Clay	44	382
Sandy	7.5	389.5
Sand, hard; soft streaks	1.5	391
Eocene series:		
Piney Point formation:		
Rock, hard	.2	391.2
Rock, soft	.8	392
Rock, hard	.3	392.3
Rock, soft	3.7	396
Rock, very hard	3.1	399.1
Sand, hard	6.4	405.5
Rock, very soft	1	406.5
Sand, coarse, hard and soft, greenish; shells	24	430.5
Tal-Ef 1 (Altitude: 26 feet) P 1973		
Recent series:		
Soil	4	4
Pleistocene series:		
Parsonsburg(?) sand:		
Sand	14	18
Miocene series:		
St. Marys(?) formation:		
Clay	12	30
Choptank formation:		
Marl	48	78
Hard	2	80
Clay	14	94
Marl	18	112
Clay	40	152
Calvert(?) formation:		
Hard	2	154
Clay; rock, soft	154	308
Rock, hard	1	309
Clay	79	388
Rock	7	395
Sand	5	400

TABLE 38—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Rock, soft	2	402
Clay, sandy	9	411
Sand (water)	34	445
(Screen 424–445.5 feet)		

The Surface-Water Resources

BY

ARTHUR E. HULME

INTRODUCTION

The principal streams in Caroline, Dorchester and Talbot Counties flow southward or southwestward and drain into central or lower Chesapeake Bay. They 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, particularly in lower Dorchester County and the coastal areas of Talbot County.

The relief in Dorchester County varies from mean sea level to 20 feet above in the southern and western parts to 50 feet above in the northeast corner; Talbot County varies from mean sea level in the western coastal plain to near 70 feet in the north central section, and Caroline County varies from near mean sea level in the southwest corner to near 80 feet in the extreme north.

The larger streams are all rather sluggish, but some of the small upstream tributaries are more flashy.

U. S. Weather Bureau records for Eastern Shore Maryland and Delaware, based on a 54-year average period of record for six rain gages, indicate an average annual rainfall of nearly 45 inches. Rainfall is generally adequate for farming and irrigation is not wide-spread, although the practice is increasing.

Many small grist mills were operated in the past, as evidenced by the number of mill ponds scattered throughout the area, but most of the 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 39, 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 11.

STREAMFLOW MEASUREMENT STATIONS

Gaging stations discussed in this report are classified broadly as complete-record and partial-record gaging stations. Five complete-record stations are operated in the tricounty area in cooperation with the Maryland Department of Geology, Mines and Water Resources, and other State and Federal agencies; five others are operated in the state of Delaware on streams tributary to the tricounty area. One partial-record station was operated during the period December 1950 to September 1952 and eight others from October 1951 to September 1952.

TABLE 39

Drainage Areas of Streams in the Tricounty Area

Drainage basin and name of stream	Tributary to:	Drainage areas in square miles			
		Total	In Maryland	In Delaware	At USGS Gage
Nanticoke River Basin					
Gravelly Fork (head of Nanticoke River) near Bridgeville, Del.	Tangier Sound	75.4		75.4	75.4
Nanticoke River at Seaford, Del.	do.	214		214	
James Branch (head of Laurel River)	Nanticoke River				
Trap Pond Outlet near Laurel, Del.	James Branch	16.7		16.7	16.7
James Branch at mouth	Nanticoke River	125		125	
Laurel River (formerly Broad Creek) at Laurel, Del.	do.				
Holly Branch near Laurel, Del.	Laurel River	2.19		2.19	2.19
at Del.-Md. State line	Tangier Sound	393	7.5	386	
Marshyhope Creek near Adamsville, Del.	Nanticoke River	44.8		44.8	44.8
Marshyhope Creek at Del.-Md. State line	do.	84.6	4.0	80.6	
Faulkner Branch at Federalsburg, Md.	Marshyhope Creek	7.10	7.10		7.10
Marshyhope Creek at mouth	Nanticoke River	214	123	91.2	
Chicone Creek near Reids Grove, Md.	do.	4.69	4.69		*4.69
at mouth	Tangier Sound	815	325	490	
Transquaking River Basin					
Chicamacomico River near Salem, Md.		15.0	15.0		15.0
Choptank River Basin					
Choptank River at Del.-Md. State line at Marydel (below Tappahanna Ditch)	Chesapeake Bay	29.1	7.5	21.6	
Shades Branch near Chapeltown, Del.	Choptank River	11.6		11.6	11.6
near Greensboro, Md.	Chesapeake Bay	113			113
at Greensboro, Md.	do.	138	45.2	92.8	
Forge Branch at Greensboro, Md.	Choptank River	9.84	9.84		*9.84
Forge Branch at mouth	do.	18.5	18.5		
Chapel Branch at mouth	do.	18.2	11.3	6.94	
Watts Creek near Hobbs, Md.	do.	14.3	11.4	2.90	*14.3
Watts Creek at mouth	do.	24.2	21.3	2.90	
above Tuckahoe Creek	Chesapeake Bay	263	160	103	

Discharge measurements, or measurements of flow (Pl. 16, figs. 1, 2), are made periodically and at various stages of the stream in order to derive a

TABLE 39—*Continued*

Drainage basin and name of stream	Tributary to:	Drainage areas in square miles			
		Total	In Maryland	In Delaware	At USGS Gage
Choptank River Basin—Continued					
Long Marsh Ditch (head of Mason Branch) at Baltimore Corner, Md.	Choptank River	14.5	14.5		
Long Marsh Ditch above Beaverdam Ditch	do.	18.4	18.4		
Mason Branch (head of Tuckahoe Creek) above German Branch	do.	48.3	48.3		
German Branch at mouth	Tuckahoe Creek	24.0	24.0		
Tuckahoe Creek near Ruthsburg, Md.	Choptank River	85.2	85.2		85.2
Tuckahoe Creek at Hillsboro, Md.	do.	99.8	99.8		
Knott Millpond near Hillsboro, Md.	Tuckahoe Creek	8.45	8.45		*8.45
Tuckahoe Creek at mouth	Choptank River	152	152		
Hog Creek near Bethlehem, Md.	do.	3.64	3.64		*3.64
Kings Creek near Easton, Md.	do.	8.67	8.67		*8.67
Beaverdam Branch at Matthews Md.	Kings Creek	5.85	5.85		5.85
Kings Creek at mouth	Choptank River	21.1	21.1		
Miles Creek near Trappe, Md.	do.	5.70	5.70		*5.70
Miles Creek at mouth	do.	13.6	13.6		
Hunting Creek at mouth	do.	24.5	24.5		
Cabin Creek at Cabin Creek, Md.	do.	6.05	6.05		*6.05
Tred Avon River at mouth	do.	45.8	45.8		
at mouth	Chesapeake Bay	795	692	103	
Miles River Basin					
Miles River at mouth	Eastern Bay	54.4	54.4		
Wye River Basin					
Wye East River at Wye Mills, Md.	Wye River	10.2	10.2		
Wye East River below Sallie Harris Creek near Wye Mills, Md.	do.	24.4	24.4		
Mill Creek near Wye Mills, Md.	Wye East River	5.48	5.48		*5.48
Wye River at mouth	Eastern Bay	90.6	90.6		

* Partial-record gaging stations.

stage-discharge relation for the station. The discharge for any stage can then be determined provided the channel conditions remain stable. A typical discharge rating curve is illustrated in figure 12.

The selection of a gaging station site requires careful appraisal of various conditions. The stability of the stream channel, the height of banks and their

FIGURE 11. Map of Caroline, Dorchester, and Talbot Counties showing Principal Streams and Locations of Gaging Stations.

relative freedom from overflow, the suitability of conditions for installation and maintenance of gage structures, 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

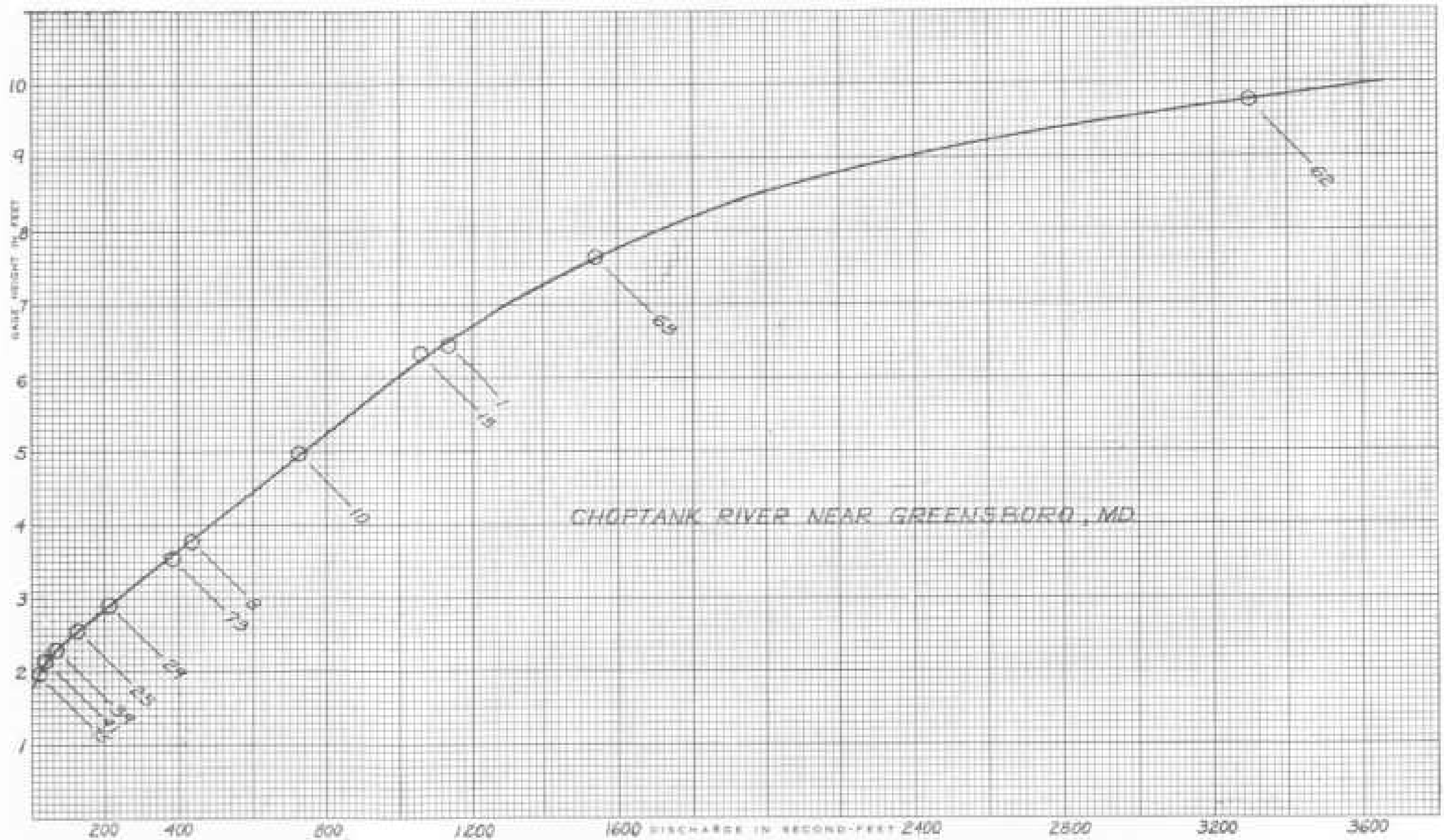

FIGURE 12. Typical Rating Curve showing Relation between Stage and Discharge at a Stream-gaging Station.

higher stages are considered. The site selected may not meet all requirements. 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 non-recording. A recording station is equipped with 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 13. A non-recording station usually is equipped with a vertical staff-gage, a wire-weight gage, or reference point from which readings are made by an observer. The complete-record stations in Maryland are all recording stations, but the partial-record stations are non-recording.

Both permanent and temporary types of recorder structures are in use in the tricounty area. The permanent-type structures (Pl. 17, fig. 1) at the newer stations are of concrete-block construction, inside dimensions 4 ft 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 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 consisting of a vertical corrugated-iron culvert pipe to act as the stilling well with a small box-like wooden shelter for the recorder fastened thereon. This structure is used where short-term records are anticipated, as most of the materials can be salvaged and reused. Monthly inspection of the recorder in order to remove the chart (Pl. 17, fig. 2), wind the clock and flush intakes is all the attention usually required except for a yearly maintenance trip to remove silt from the well and make general repairs.

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.

Discharge measurements at the stations in the tricounty 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 station depending upon the stability of the rating. At a station equipped with an effective artificial control, the rating may need to be checked by discharge measurements bi-monthly only or even less frequently. On the other hand, a station with an unstable stream bed subject to shifting, or af-

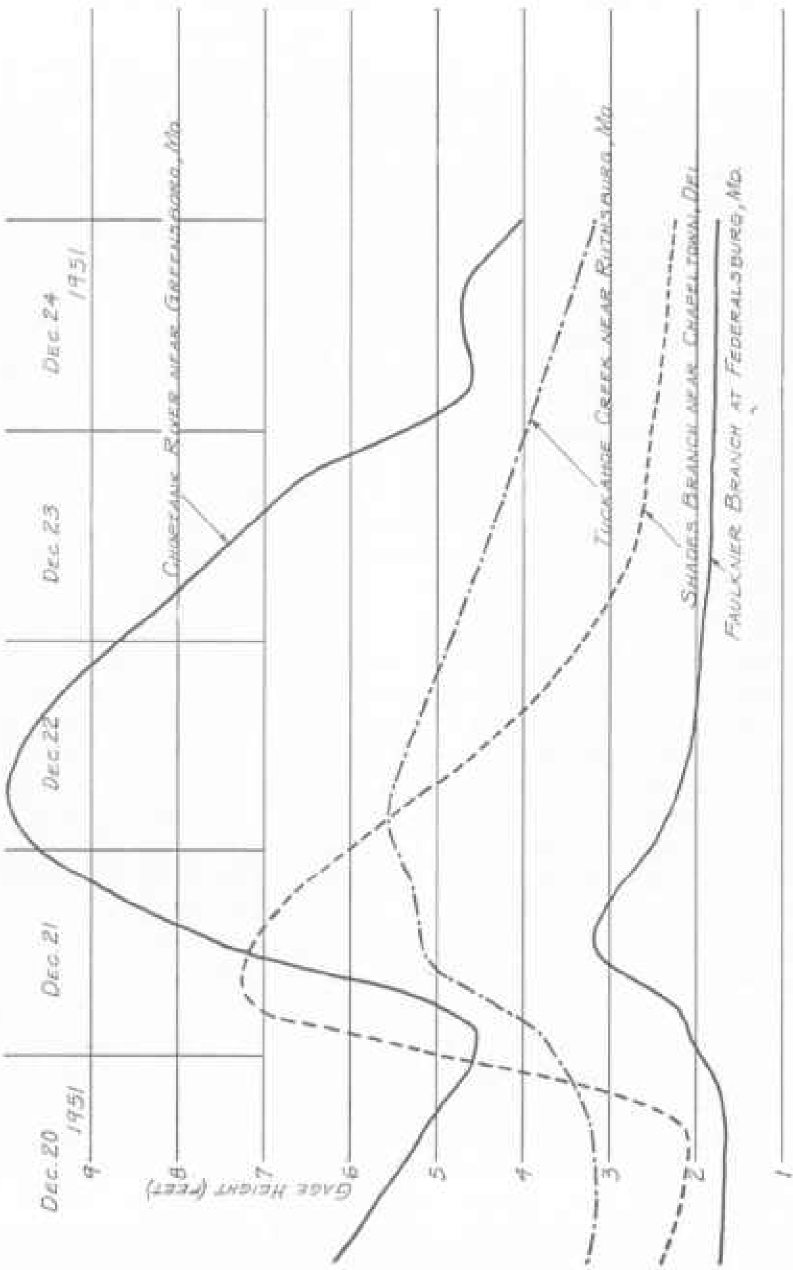

FIGURE 13. Graphs of River Stages from Automatic Water-stage Recorders.

fected by backwater from weeds or other sources, may require measuring bi-weekly or more often. Special trips usually are required to secure measurements with which to define the extreme low water and high water portions of the station rating curve.

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 entitled "Surface Water Supply of the United States", Part 1, or in Part 1B subsequent to 1950.

DEFINITION OF TERMS

Explanations of some of the technical terms used in stream flow records are:

Second-feet.—A term used in expressing the rate of flow. It is synonymous with "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.

Water year.—A special annual period selected to facilitate water studies, commencing October 1 and ending September 30. The minimum flow of most streams usually occurs near the end of the water year.

GAGING STATIONS IN THE TRICOUNTY AREA

Complete-Record Gaging Stations

The longest streamflow record in the area is that for Choptank River near Greensboro which began in January 1948. Two other complete-record gaging stations were established in July 1950, and one each in March and April 1951. Of the five complete-record gaging stations on tributary streams in Delaware, two have been in operation since April 1943, and the other three were established in August 1950, January 1951, and June 1951. Drainage areas of streams in the tricounty area and tributary streams in Delaware and the years of record for both complete-record and partial-record gaging stations, are given in Tables 39 and 40 and their locations are shown in figure 11.

Partial-Record Gaging Stations

To extend the gaging coverage and to provide at least a limited amount of information on as many streams as practicable, nine partial-record stations

TABLE 40
Stream Gaging Stations in the Tricounty Area

No. on map	Stream-gaging stations	Drainage area (square miles)	Records Available*
1	Gravelly Fork near Bridgeville, Del	75.4	Apr. 1943–
2	Trap Pond Outlet near Laurel, Del	16.7	June 1951–
3	Holly Branch near Laurel, Del.	2.19	Aug. 1950–
4	Marshyhope Creek near Adamsville, Del.	44.8	April. 1943–
5	Faulkner Branch at Federalsburg, Md.	7.10	July 1950–
6	Chicone Creek at Reids Grove, Md.†	4.69	Dec. 1950–Sept. 1952
7	Chicamacomico River near Salem, Md.	15.0	April. 1951–
8	Shades Branch near Chapeltown, Del.	11.6	Jan. 1951–
9	Choptank River near Greensboro, Md.	113	Jan. 1948–
10	Forge Branch at Greensboro, Md.†	9.84	Oct. 1951–Sept. 1952
11	Watts Creek near Hobbs, Md.†	14.3	Oct. 1951–Sept. 1952
12	Tuckahoe Creek near Ruthsburg, Md.	85.2	Mar. 1951–
13	Knott Millpond near Hillsboro, Md.†	8.45	Oct. 1951–Sept. 1952
14	Hog Creek near Bethlehem, Md.†	3.64	Oct. 1951–Sept. 1952
15	Kings Creek near Easton, Md.†	8.67	Oct. 1951–Sept. 1952
16	Beaverdam Branch at Matthews, Md.	5.85	July 1950–
17	Miles Creek near Trappe, Md.†	5.70	Oct. 1951–Sept. 1952
18	Cabin Creek at Cabin Creek, Md.†	6.05	Oct. 1951–Sept. 1952
19	Mill Creek near Wye Mills, Md.†	5.48	Oct. 1951–Sept. 1952

* Stations without closing date are still in operation.
† Partial-record gaging station.

were established, 2 in Dorchester County, 3 in Talbot County and 4 in Caroline County, (Table 40 and fig. 11). At each site either a staff gage or a reference point was established. The period of operation for one of these partial-record stations was 22 months and for the others 12 months, extending through September 1952. Data collected at these sites, consisting of current-meter discharge measurements once or twice a month (depending upon the stability of the stage-discharge relationship) supplemented by intermittent gage readings, are published under "Miscellaneous Discharge Measurements" in the annual water-supply papers of the U. S. Geological Survey, Part 1B, for 1951 and 1952.

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 a nearby 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. These tests showed that the use of this method resulted in a standard error of estimate of the monthly discharge from one-fourth to one-half smaller than that indicated by the plotting of discharge measurements and concurrent discharges. 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 indicated standard error of estimate.

RUNOFF IN THE TRICOUNTY AREA

Maximum Flood Runoff

Based on streamflow records from stations near the tricounty area, comprising the period October 1929 to September 1953, the maximum flood of record occurred Aug. 23, 24, 1933. The United States Weather Bureau records show the 24-hour rainfall was 6.34 inches at Bridgeville, Delaware, and 7.40 inches at Pocomoke City, Worcester County. As further indication of the ex-

TABLE 41

Average Discharge from Streams in the Tricounty Area (in cfs per sq. mi.)

Period of record			Drainage area in sq. mi.																		
From	To	Water years	75.4	16.7	2.19	44.8	7.10	4.69	15.0	11.6	113	9.84	14.3	85.2	8.45	3.64	8.67	5.85	5.70	6.05	5.48
1944	1948	5	1.13	—	—	1.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1949	1955	7	1.13	—	—	1.12	—	—	—	—	1.14*	—	—	—	—	—	—	—	—	—	—
1944	1955	12	1.13*	—	—	1.15*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1951		1	.679	—	0.024	.757	0.772	—	—	—	.847	—	—	—	—	—	—	0.773	—	—	—
1952		1	1.79	1.41	.391	1.96	1.87	1.51*	1.47	2.41	2.10	2.04*	1.73*	1.82	2.62*	1.79*	1.23*	1.78	1.42*	2.36*	1.99
1953		1	1.27	1.08	.308	1.43	1.38	—	1.12	1.70	1.44	—	—	1.56	—	—	—	1.55	—		
1952	1955	4	1.24	.973*	.190	1.25	1.26	—	1.07*	1.42*	1.26	—	—	1.22*	—	—	—	1.23	—	—	
1951	1955	5	1.13	—	.159*	1.15	1.16*	—	—	—	1.18	—	—	—	—	—	—	1.14*	—	—	—
Station No. on map			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Gaging station			Gravelly Fork near Bridgeville, Del.	Trap Pond Outlet near Laurel, Del.	Holly Branch near Laurel, Del.	Marshyhope Creek near Adamsville, Del.	Faulkner Branch at Federalsburg, Md.	Chicone Creek at Reids Grove, Md.[a]	Chicamacomico River near Salem, Md.	Shades Branch near Chapeltown, Del.	Choptank River near Greensboro, Md.	Forge Branch at Greensboro, Md.[a]	Watts Creek near Hobbs, Md.[a]	Tuckahoe Creek near Ruthsburg, Md.	Knott Millpond near Hillsboro, Md.[a]	Hog Creek near Bethlehem, Md.[a]	Kings Creek near Easton, Md.[a]	Beaverdam Branch near Matthews, Md.	Miles Creek near Trappe, Md.[a]	Cabin Creek at Cabin Creek, Md.[a]	Mil Creek near Wye Mills, Md.[a]

* Longest period of record.
[a] Partal-record station.

tent and severity of this storm, Baltimore recorded 7.62 inches, which was the city's highest 24-hour rainfall since the beginning of records in 1871.

Minimum Drought Runoff

Extreme drought conditions prevailed throughout Maryland from 1930 to 1934. The drought commenced in 1930 when precipitation in the State averaged only 24 inches compared with a 54-year average of 42 inches. Details on drought studies are contained in 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%) was lower than that recorded by any of the thirty humid states, not only for 1930, but also for their most severe drought year. Streamflow records are not available for the tricounty area prior to January 1948, but from all associated reports the 1930 drought was undoubtedly the most severe known.

Average Runoff

Streamflow records in this area span periods of only one to seven water years, except for the stations on Gravelly Fork and Marshyhope Creek in Delaware which cover a period of 12 years. Table 41 summarizes the average discharge in cubic feet per second per square mile for the periods of records for all gaging stations in the area.

The average discharge for the two stations on Gravelly Fork and Marshyhope Creek for the 12 water years (1944–55) was 1.13 and 1.15 cfs per square mile, respectively. Records from these two streams are believed to be representative of the general runoff per square mile in Dorchester, Talbot and Caroline Counties, based on comparisons with the stations for the short periods of concurrent operation during water years 1951 through 1955. The average discharge per square mile for Gravelly Fork and Marshyhope Creek for water year 1952, for example, was almost identical with the average for all nineteen complete and partial-record stations weighted by drainage area.

Although the average of 1.1 to 1.2 cfs per square mile may be representative of general runoff conditions throughout the 12-year period covered by available records for the area, none of the records is long enough to reflect the unique minimum streamflow conditions of the early 1930's. An estimated average runoff figure of slightly over 1.0 cfs per square mile for the 26-year period, 1930–55, for this tricounty area seems to be indicated on the basis of comparisons with records for Beaverdam Creek near Salisbury (Bull. 16, 1955) and other long-term records in the State.

DISCHARGE RECORDS

NANTICOKE RIVER BASIN

1. Gravelly Fork near Bridgeville, Del.

Location.—Lat. 38°43′42″, long. 75°33′43″, on left bank at county highway bridge, 0.3 mile downstream from Gum Branch, 1.4 miles upstream from Greens Pond, and 2.5 miles southeast of Bridgeville.

Drainage area.—75.4 square miles.

Records available.—April 1943 to September 1955.

Gage.—Water-stage recorder and timber control. Altitude of gage 15 feet (from topographic map). Prior to Apr. 19, 1947, staff gage at same site and datum.

Average discharge.—12 years, 85 2 second-feet.

Extremes.—Maximum discharge, 830 second-feet June 5, 1948 (gage height, 6.40 feet); minimum, 6.3 second-feet Sept. 29, 1943.

Monthly discharge of Gravelly Fork near Bridgeville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943						
April 11–30	380	87	146	1.94	1.44	1.25
May	87	45	64.2	.851	.98	.550
June	52	25	34.0	.451	.50	.291
July	30	16	22.3	.296	.34	.191
August	20	9.6	13.6	.180	.21	.116
September	14	6.6	10.1	.134	.15	.087
The year						
1943–44						
October	70	8.4	17.9	0.237	0.27	0.153
November	58	22	30.0	.398	.44	.257
December	48	19	23.9	.317	.37	.205
January	245	26	82.7	1.10	1.27	.711
February	81	45	57.0	.756	.82	.489
March	362	75	184	2.44	2.82	1.58
April	400	93	171	2.27	2.53	1.47
May	145	40	73.9	.980	1.13	.633
June	42	23	31.1	.412	.46	.266
July	26	12	17.5	.232	.27	.150
August	23	12	15.9	.211	.24	.136
September	150	14	38.3	.508	.57	.328
The year	400	8.4	61.9	.821	11.19	.531

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Gravelly Fork near Bridgeville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944–45						
October	74	27	39.7	0.527	0.61	0.341
November	269	29	54.8	.727	.81	.470
December	253	71	112	1.49	1.71	.963
January	323	94	144	1.91	2.20	1.23
February	175	74	103	1.37	1.42	.885
March	195	68	104	1.38	1.59	.892
April	195	54	86.8	1.15	1.28	.743
May	88	40	59.1	.784	.90	.507
June	76	29	40.7	.540	.60	.349
July	435	24	127	1.68	1.94	1.09
August	175	42	78.6	1.04	1.20	.672
September	94	32	44.4	.589	.66	.381
The year	435	24	82.9	1.10	14.92	.711
1945–46						
October	94	34	45.5	0.603	0.70	0.390
November	142	38	65.5	.869	.97	.562
December	695	76	219	2.90	3.35	1.87
January	600	106	178	2.36	2.71	1.53
February	185	106	131	1.74	1.82	1.12
March	142	68	96.2	1.28	1.47	.827
April	142	49	78.9	1.05	1.17	.679
May	158	54	82.2	1.09	1.26	.704
June	61	29	39.8	.528	.59	.341
July	540	32	128	1.70	1.96	1.10
August	106	32	51.0	.676	.78	.437
September	45	23	27.4	.363	.41	.235
The year	695	23	95.4	1.27	17.19	.821
1946–47						
October	42	25	31.3	0.415	0.48	0.268
November	32	24	27.8	.369	.41	.238
December	68	21	28.6	.379	.44	.245
January	195	29	101	1.34	1.54	.866
February	113	56	74.4	.987	1.03	.638
March	150	56	85.5	1.13	1.31	.730
April	304	49	106	1.41	1.56	.911
May	364	42	96.3	1.28	1.47	.827
June	91	32	52.2	.692	.77	.447
July	65	26	37.3	.495	.57	.320
August	40	20	23.7	.314	.36	.203
September	36	13	19.7	.261	.29	.169
The year	364	13	56.8	.753	10.23	.487

Monthly discharge of Gravelly Fork near Bridgeville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1947–48						
October	29	18	20.7	0.275	0.32	0.178
November	43	18	33.7	.447	.50	.289
December	72	37	45.6	.605	.70	.391
January	460	61	185	2.45	2.82	1.58
February	397	97	180	2.39	2.58	1.54
March	362	121	193	2.56	2.95	1.65
April	458	74	150	1.99	2.22	1.29
May	479	70	196	2.60	2.99	1.68
June	770	74	298	3.95	4.40	2.55
July	169	46	69.8	.926	1.07	.598
August	350	49	136	1.80	2.08	1.16
September	51	29	38.1	.505	.56	.326
The year	770	18	128	1.70	23.19	1.10
1948–49						
October	216	28	62.7	0.832	0.96	0.538
November	560	48	125	1.66	1.85	1.07
December	575	135	294	3.90	4.50	2.52
January	458	114	238	3.16	3.64	2.04
February	410	153	236	3.13	3.26	2.02
March	439	127	207	2.75	3.16	1.78
April	257	66	135	1.79	2.00	1.16
May	153	41	62.9	.834	.96	.539
June	46	26	34.2	.454	.51	.293
July	32	14	22.7	.301	.35	.195
August	40	14	20.8	.276	.32	.178
September	31	15	18.8	.249	.28	.161
The year	575	14	121	1.60	21.79	1.03
1949–50						
October	120	14	20.9	0.277	0.32	0.179
November	190	32	48.1	.638	.71	.412
December	35	29	31.3	.415	.48	.268
January	43	28	30.7	.407	.47	.263
February	80	41	50.9	.675	.70	.436
March	206	44	87.1	1.16	1.33	.750
April	88	51	65.0	.862	.96	.557
May	200	45	88.4	1.17	1.35	.756
June	163	42	75.6	1.00	1.12	.646
July	100	29	43.1	.572	.66	.370
August	64	25	30.6	.406	.47	.262
September	75	22	35.3	.468	.52	.302
The year	206	14	50.5	.670	9.09	.433

Monthly discharge of Gravelly Fork near Bridgeville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
October	30	22	25.9	0.344	0.40	0.222
November	108	20	31.5	.418	.47	.270
December	63	33	44.0	.584	.67	.377
January	60	37	44.0	.584	.67	.377
February	159	40	78.7	1.04	1.09	.672
March	154	52	81.1	1.08	1.24	.698
April	146	50	74.9	.993	1.11	.642
May	106	35	45.8	.607	.70	.392
June	224	31	74.0	.981	1.09	.634
July	144	29	55.3	.733	.85	.474
August	78	22	33.9	.450	.52	.291
September	89	20	28.0	.371	.41	.240
The year	224	20	51.2	.679	9.22	.439
1951–52						
October	45	22	28.1	0.373	0.43	0.241
November	273	60	111	1.47	1.64	.950
December	725	58	206	2.73	3.15	1.76
January	560	134	233	3.09	3.56	2.00
February	512	111	211	2.80	3.02	1.81
March	500	147	252	3.34	3.86	2.16
April	560	88	181	2.40	2.67	1.55
May	367	60	115	1.53	1.76	.989
June	408	35	96.9	1.29	1.43	.834
July	197	25	44.1	.585	.67	.378
August	590	26	104	1.38	1.59	.892
September	62	29	35.9	.476	.53	.308
The year	725	22	135	1.79	24.31	1.16
1952–53						
October	31	22	25.7	0.341	0.39	0.220
November	220	21	50.5	.670	.75	.433
December	183	51	91.0	1.21	1.39	.782
January	339	108	170	2.25	2.60	1.45
February	339	75	132	1.75	1.82	1.13
March	450	84	213	2.82	3.26	1.82
April	340	86	179	2.37	2.65	1.53
May	172	47	85.8	1.14	1.31	.737
June	151	33	55.4	.735	.82	.475
July	66	22	30.0	.398	.46	.257
August	330	20	85.5	1.13	1.31	.730
September	45	26	32.3	.428	.48	.277
The year	450	20	95.8	1.27	17.24	.821

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Gravelly Fork near Bridgeville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1953–54						
October	159	20	34.2	0.454	0.52	0.293
November	99	37	65.3	.866	.97	.560
December	209	54	93.6	1.24	1.43	.801
January	192	53	95.0	1.26	1.45	.814
February	166	64	93.8	1.24	1.30	.801
March	240	92	130	1.72	1.99	1.11
April	210	65	97.2	1.29	1.44	.834
May	156	43	76.5	1.01	1.17	.653
June	46	24	32.9	.436	.49	.282
July	128	22	43.7	.580	.67	.375
August	75	18	22.7	.301	.35	.195
September	161	21	45.6	.605	.68	.391
The year	240	18	69.1	.916	12.46	.592
1954–55						
October	30	19	23.2	0.308	0.36	0.199
November	68	21	37.2	.493	.55	.319
December	105	38	66.3	.879	1.01	.568
January	96	45	62.5	.829	.96	.536
February	98	46	73.0	.968	1.01	.626
March	288	86	137	1.82	2.10	1.18
April	280	66	104	1.38	1.54	.892
May	143	45	69.5	.922	1.06	.596
June	242	38	78.6	1.04	1.16	.672
July	47	23	31.2	.414	.48	.268
August	640	21	147	1.95	2.24	1.26
September	155	51	74.3	.985	1.10	.637
The year	640	19	75.3	.999	13.57	.646

Yearly discharge of Gravelly Fork near Bridgeville

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 million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1944	61.9	0.821	11.19	0.531	73.3	0.972	13.24	0.628
1945	82.9	1.10	14.92	.711	93.4	1.24	16.81	.801
1946	95.4	1.27	17.19	.821	74.9	.993	13.50	.642
1947	56.8	.753	10.23	.487	57.9	.768	10.42	.496
1948	128	1.70	23.19	1.10	161	2.14	28.98	1.38
1949	121	1.60	21.79	1.03	88.8	1.18	15.99	.763
1950	50.5	.670	9.09	.433	50.7	.672	9.12	.434
1951	51.2	.679	9.22	.439	71.6	.950	12.90	.614
1952	135	1.79	24.31	1.16	120	1.59	21.62	1.03
1953	95.8	1.27	17.24	.821	97.9	1.30	17.63	.840
1954	69.1	.916	12.46	.592	63.6	.844	11.46	.545
1955	75.3	.999	13.57	.646				
Highest	135	1.79	24.31	1.16	161	2.14	28.98	1.38
Average	85.2	1.13	15.37	.731	86.6	1.15	15.61	.743
Lowest	50.5	.670	9.09	.433	50.7	.672	9.12	.434

NANTICOKE RIVER BASIN

2. Trap Pond Outlet near Laurel, Del.

Location.—Lat. 38°31′40″, long. 75°29′00″, on left bank at downstream end of concrete spillway channel, 200 feet below Trap Pond dam and 5 miles southeast of Laurel.

Drainage area.—16.7 square miles.

Records available.—June 1951 to September 1955.

Gage.—Water-stage recorder and concrete control. Altitude of gage 20 feet (from topographic map).

Extremes.—Maximum discharge, 200 second-feet Jan. 29, Mar. 25, 1952 (gage height, 2.74 feet); minimum, 0.01 second-foot Aug. 22, 23, 29, 30, 1954 (gage height, 0.50 foot).

Remarks.—Flow regulated by Trap Pond.

Monthly discharge of Trap Pond Outlet near Laurel

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951						
July	18	1.6	4.89	0.293	0.34	0.189
August	7.9	.7	2.72	.163	.19	.105
September	9.4	.6	1.83	.110	.12	.071
The year						
1951–52						
October	8.4	0.7	3.21	0.192	0.22	0.124
November	58	9.4	19.1	1.14	1.28	.737
December	107	11	29.2	1.75	2.01	1.13
January	178	21	43.6	2.61	3.01	1.69
February	138	22	43.6	2.61	2.81	1.69
March	178	29	58.7	3.51	4.05	2.27
April	154	11	30.6	1.83	2.04	1.18
May	50	9.4	17.0	1.02	1.17	.659
June	76	4.7	14.9	.892	.99	.577
July	13	.6	4.17	.250	.29	.162
August	52	3.1	15.3	.916	1.05	.592
September	9.8	2.3	4.54	.272	.30	.176
The year	178	.6	23.6	1.41	19.22	.911

Monthly discharge of Trap Pond Outlet near Laurel—*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	4.7	1.4	2.20	0.132	0.15	0.085
November	72	1.7	12.0	.719	.80	.465
December	46	13	20.5	1.23	1.42	.795
January	93	20	35.8	2.14	2.47	1.38
February	100	14	29.6	1.77	1.85	1.14
March	132	17	40.9	2.45	2.82	1.58
April	83	15	34.3	2.05	2.29	1.32
May	21	5.4	11.6	.695	.80	.449
June	20	3.0	6.46	.387	.43	.250
July	17	.7	2.03	.122	.14	.079
August	135	.9	17.3	1.04	1.20	.672
September	7.9	2.0	3.54	.212	.24	.137
The year	135	.7	18.0	1.08	14.61	.698
1953–54						
October	11	0.96	2.18	0.131	0.15	0.085
November	20	2.1	6.76	.405	.45	.262
December	39	7.4	12.7	.760	.88	.491
January	38	7.3	15.7	.940	1.09	.608
February	23	10	14.2	.850	.89	.549
March	61	13	23.2	1.39	1.60	.898
April	125	9.4	27.0	1.62	1.80	1.05
May	48	9.8	17.1	1.02	1.18	.659
June	21	2.5	6.47	.387	.43	.250
July	8.2	1.2	2.43	.146	.17	.094
August	1.1	.03	.553	.033	.04	.021
September	38	.12	4.44	.266	.30	.172
The year	125	.03	11.0	.659	8.98	.426
1954–55						
October	7.6	0.40	1.89	0.113	0.13	0.073
November	18	2.3	5.11	.306	.34	.198
December	32	5.9	14.8	.886	1.02	.573
January	12	6.9	9.36	.560	.65	.362
February	20	7.4	14.4	.862	.90	.557
March	62	15	25.3	1.51	1.74	.976
April	21	10	13.8	.826	.92	.534
May	21	5.2	9.07	.543	.63	.351
June	141	4.5	23.2	1.39	1.55	.898
July	14	1.6	4.92	.295	.34	.191
August	76	.40	14.1	.844	.97	.545
September	30	5.6	13.1	.784	.88	.507
The year	141	.40	12.4	.743	10.07	.480

NANTICOKE RIVER BASIN

3. Holly Branch near Laurel, Del.

Location.—Lat. 38°32′30″, long. 75°35′55″, on left bank 5 feet upstream from culvert on county road, 1½ miles southwest of Laurel, 2.6 miles upstream from mouth.

Drainage area.—2.19 square miles

Records available.—August 1950 to September 1955.

Gage.—Water-stage recorder and wooden control. Datum of gage is 24.86 feet above mean sea level, datum of 1929.

Average discharge.—5 years, 0.349 second-foot.

Extremes.—Maximum discharge, 12 second-feet Mar. 24, 1952 (gage height, 1.69 feet); no flow for many days each year.

Monthly discharge of Holly Branch near Laurel

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
August 15–31	0.23	0	0.084	0.038	0.02	0.025
September	.39	0	.013	.0059	.007	.0038
The year						
1950–51						
October	0	0	0	0	0	0
November	.12	0	.004	.0018	.002	.0012
December	0	0	0	0	0	0
January	.01	0	.0003	.00014	.0002	.000090
February	.30	0	.115	.053	.05	.034
March	.49	0	.215	.098	.11	.063
April	.40	0	.176	.080	.09	.052
May	.24	0	.038	.017	.02	.011
June	.45	0	.082	.037	.04	.024
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	0	0	0	0	0	0
The year	.49	0	.052	.024	.31	.016

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Holly Branch near Laurel—*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	0	0	0	0	0	0
November	.02	0	.0007	.00032	.0003	0.00021
December	.46	0	.144	.066	.08	.043
January	3.9	.34	.879	.401	.46	.259
February	4.8	1.1	1.88	.858	.92	.555
March	8.0	1.4	3.13	1.43	1.65	.924
April	7.4	1.0	2.30	1.05	1.17	.679
May	3.1	.54	1.05	.479	.55	.310
June	1.6	.21	.608	.278	.31	.180
July	.16	0	.043	.020	.02	.013
August	.68	0	.282	.129	.15	.083
September	.16	0	.029	.013	.01	.0084
The year	8.0	0	.857	.391	5.32	.253
1952–53						
October	0	0	0	0	0	0
November	.06	0	.004	.0018	.002	.0012
December	.29	0	.152	.069	.08	.045
January	1.6	.26	.915	.418	.48	.270
February	3.1	.48	1.29	.589	.61	.381
March	5.4	1.1	2.37	1.08	1.25	.698
April	4.2	1.3	2.28	1.04	1.16	.672
May	1.3	.29	.643	.294	.34	.190
June	.39	0	.144	.066	.07	.043
July	0	0	0	0	0	0
August	1.0	0	.320	.146	.17	.094
September	.15	0	.021	.0096	.01	.0062
The year	5.4	0	.674	.308	4.17	.199
1953–54						
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December	.05	0	.007	.0032	.004	.0021
January	.35	0	.045	.021	.02	.014
February	.32	0	.109	.050	.05	.032
March	.43	.05	.216	.099	.11	.064
April	2.2	0	.193	.088	.10	.057
May	1.3	.02	.376	.172	.20	.111
June	.21	0	.019	.0087	.01	.0056
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	0	0	0	0	0	0
The year	2.2	0	.081	.037	.49	.024

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Holly Branch near Laurel—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1954–55						
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December	0	0	0	0	0	0
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	.24	0	.140	.064	.07	.041
April	.08	0	.008	.0037	.004	.0024
May	0	0	0	0	0	0
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	1.7	0	.581	.265	.31	.171
September	.44	.11	.244	.111	.12	.072
The year	1.7	0	.082	.037	.50	.024

Yearly discharge of Holly Branch near Laurel

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 million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1951	0.052	0.024	0.31	0.016	0.064	0.029	0.39	0.019
1952	.857	.391	5.32	.253	.858	.392	5.32	.253
1953	.674	.308	4.17	.199	.661	.302	4.09	.195
1954	.081	.037	.49	.024	.080	.037	.49	.024
1955	.082	.037	.50	.024	—	—	—	—

NANTICOKE RIVER BASIN

4. Marshyhope Creek near Adamsville, Del.

Location.—Lat. 38°51′00″, long. 75°40′29″, on left bank 10 feet upstream from county highway bridge 1.5 miles northeast of Adamsville, 1.7 miles upstream from Saulisbury Creek, and 5.3 miles northwest of Greenwood.

Drainage area.—44.8 square miles.

Records available.—April 1943 to September 1955.

Gage.—Water-stage recorder. Altitude of gage 30 feet (from topographic map). Prior to Nov. 24, 1953, wire-weight gage and crest-stage indicator at site 10 feet downstream at same datum.

Average discharge.—12 years, 51.7 second-feet.

Extremes.—Maximum discharge not determined, occurred July 1, 1946 (gage height, 9.63 feet); minimum, 2.7 second-feet Sept. 19, 1943.

Maximum stage known, 14.5 feet in August 1937, from information by local residents.

Monthly discharge of Marshyhope Creek near Adamsville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943						
April 9–30	432	26	74.9	1.67	1.37	1.08
May	31	14	21.4	.478	.55	.309
June	16	7.0	9.99	.223	.25	.144
July	56	4.9	9.49	.212	.24	.137
August	4.8	3.1	3.99	.089	.10	.058
September	4.2	2.8	3.28	.073	.08	.047
The year						
1943–44						
October	29	3.3	6.30	0.141	0.16	0.091
November	46	7.5	13.1	.292	.33	.189
December	50	7.0	9.65	.215	.25	.139
January	464	8.8	74.6	1.67	1.92	1.08
February	80	22	33.7	.752	.81	.486
March	488	52	157	3.50	4.03	2.26
April	472	38	109	2.43	2.71	1.57
May	60	12	23.8	.531	.61	.343
June	12	5.6	8.87	.198	.22	.128
July	5.6	3.8	4.58	.102	.12	.066
August	124	3.4	11.2	.250	.29	.162
September	87	3.0	9.46	.211	.24	.136
The year	488	3.0	38.5	.859	11.69	.555

Nanticoke River Basin—*Continued*

Monthly discharge of Marshyhope Creek near Adamsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944–45						
October	56	7.2	11.6	0.259	0.30	0.167
November	379	8.0	42.1	.940	1.05	.608
December	232	25	58.8	1.31	1.51	.847
January	486	30	97.3	2.17	2.50	1.40
February	200	23	59.5	1.33	1.38	.860
March	200	24	48.2	1.08	1.24	.698
April	288	17	61.6	1.38	1.53	.892
May	150	17	38.6	.862	.99	.557
June	27	9.5	15.1	.337	.38	.218
July	602	6.8	138	3.08	3.55	1.99
August	578	14	77.3	1.73	1.99	1.12
September	154	10	22.5	.502	.56	.324
The year	602	6.8	56.0	1.25	16.98	.808
1945–46						
October	53	10	15.5	0.346	0.40	0.224
November	241	13	45.6	1.02	1.14	.659
December	734	33	187	4.17	4.82	2.70
January	486	38	83.5	1.86	2.15	1.20
February	171	41	70.5	1.57	1.64	1.01
March	150	30	54.9	1.23	1.41	.795
April	142	21	38.7	.864	.96	.558
May	165	17	43.5	.971	1.12	.628
June	508	8.0	30.5	.681	.76	.440
July	894	18	173	3.86	4.45	2.49
August	58	12	20.3	.453	.52	.293
September	31	7.6	10.9	.243	.27	.157
The year	894	7.6	64.9	1.45	19.64	.937
1946–47						
October	24	11	13.8	0.308	0.36	0.199
November	15	9.8	11.4	.254	.28	.164
December	79	8.9	17.6	.393	.45	.254
January	366	21	107	2.39	2.76	1.54
February	90	28	40.4	.902	.94	.583
March	182	24	57.3	1.28	1.48	.827
April	274	21	60.2	1.34	1.50	.866
May	212	16	40.0	.893	1.03	.577
June	31	10	16.0	.357	.40	.231
July	16	6.4	9.11	.203	.23	.131
August	20	5.0	6.64	.148	.17	.096
September	18	4.6	6.15	.137	.15	.089
The year	366	4.6	32.2	.719	9.75	.465

Monthly discharge of Marshyhope Creek near Adamsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1947–48						
October	9.5	4.4	5.48	0.122	0.14	0.079
November	25	5.4	11.9	.266	.30	.172
December	44	9.7	14.0	.312	.36	.202
January	645	17	144	3.21	3.72	2.07
February	516	37	118	2.63	2.84	1.70
March	384	40	111	2.48	2.85	1.60
April	504	27	93.9	2.10	2.34	1.36
May	762	26	165	3.68	4.25	2.38
June	682	23	156	3.48	3.89	2.25
July	57	15	24.4	.545	.63	.352
August	375	13	60.5	1.35	1.56	.873
September	12	8.9	10.1	.225	.25	.145
The year	762	4.4	76.1	1.70	23.13	1.10
1948–49						
October	102	9.3	21.2	0.473	0.55	0.306
November	684	16	104	2.32	2.58	1.50
December	568	43	196	4.37	5.05	2.82
January	504	42	174	3.88	4.48	2.51
February	435	58	146	3.26	3.38	2.11
March	504	42	121	2.70	3.12	1.75
April	192	23	55.7	1.24	1.39	.801
May	62	13	21.7	.484	.56	.313
June	15	6.8	9.84	.220	.24	.142
July	7.8	3.6	5.37	.120	.14	.078
August	7.4	2.9	4.06	.091	.10	.059
September	4.2	2.8	3.37	.075	.08	.048
The year	684	2.8	71.5	1.60	21.67	1.03
1949–50						
October	34	3.2	5.00	0.112	0.13	0.072
November	101	6.5	13.8	.308	.34	.199
December	13	6.6	8.33	.186	.21	.120
January	17	8.9	10.5	.234	.27	.151
February	103	15	31.6	.705	.73	.456
March	196	20	55.3	1.23	1.42	.795
April	52	21	31.1	.694	.77	.449
May	58	20	33.9	.757	.87	.489
June	66	12	25.9	.578	.64	.374
July	14	6.3	9.85	.220	.25	.142
August	9.7	4.4	5.90	.132	.15	.085
September	206	3.8	43.0	.960	1.07	.620
The year	206	3.2	22.7	.507	6.85	.328

Monthly discharge of Marshyhope Creek near Adamsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
October	24	14	16.2	0.362	0.42	0.234
November	154	11	25.5	.569	.63	.368
December	65	22	34.8	.777	.90	.502
January	63	23	32.5	.725	.84	.469
February	270	27	77.0	1.72	1.79	1.11
March	177	27	55.3	1.23	1.42	.795
April	142	26	45.6	1.02	1.13	.659
May	72	13	24.1	.538	.62	.348
June	277	12	46.2	1.03	1.15	.666
July	251	8.7	32.5	.725	.84	.469
August	44	7.0	13.7	.306	.35	.198
September	18	5.4	7.25	.162	.18	.105
The year	277	5.4	33.9	.757	10.27	.489
1951–52						
October	16	5.2	9.03	0.202	0.23	0.131
November	431	30	90.3	2.02	2.25	1.31
December	931	29	154	3.44	3.96	2.22
January	535	54	156	3.48	4.00	2.25
February	449	39	104	2.32	2.51	1.50
March	495	48	147	3.28	3.80	2.12
April	661	32	109	2.43	2.72	1.57
May	277	18	56.1	1.25	1.44	.808
June	562	15	71.8	1.60	1.79	1.03
July	264	8.3	31.4	.701	.81	.453
August	1,080	8.3	112	2.50	2.88	1.62
September	32	10	13.5	.301	.34	.195
The year	1,080	5.2	88.0	1.96	26.73	1.27
1952–53						
October	12	7.3	8.93	0.199	0.23	0.129
November	215	6.1	28.6	.638	.71	.412
December	257	24	75.7	1.69	1.95	1.09
January	496	59	145	3.24	3.72	2.09
February	429	33	82.6	1.84	1.92	1.19
March	464	34	152	3.39	3.91	2.19
April	454	30	108	2.41	2.69	1.56
May	325	24	64.1	1.43	1.65	.924
June	137	13	37.3	.833	.93	.538
July	113	7.1	18.7	.417	.48	.270
August	254	7.3	40.2	.897	1.04	.580
September	12	5.9	8.48	.189	.21	.122
The year	496	5.9	64.1	1.43	19.44	.924

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Marshyhope Creek near Adamsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1953–54						
October	23	6.7	8.51	0.190	0.22	0.123
November	40	9.1	19.3	.431	.48	.279
December	248	16	49.0	1.09	1.26	.704
January	182	21	55.1	1.23	1.42	.795
February	153	26	43.6	.973	1.01	.629
March	219	40	84.9	1.90	2.19	1.23
April	293	32	67.3	1.50	1.68	.969
May	101	14	38.5	.859	.99	.555
June	13	6.5	9.27	.207	.23	.134
July	67	5.8	13.8	.308	.36	.199
August	11	4.1	5.20	.116	.13	.075
September	88	4.4	14.6	.326	.36	.211
The year	293	4.1	34.1	.761	10.33	.492
1954–55						
October	9.6	5.9	6.84	0.153	0.18	0.099
November	120	6.0	19.2	.429	.48	.277
December	152	15	48.1	1.07	1.24	.692
January	85	17	30.8	.687	.79	.444
February	91	18	46.6	1.04	1.08	.672
March	293	32	91.1	2.03	2.34	1.31
April	111	21	39.7	.886	.99	.573
May	42	11	18.4	.411	.47	.266
June	203	9.5	35.2	.786	.88	.508
July	192	7.6	22.2	.496	.57	.321
August	685	6.7	89.7	2.00	2.31	1.29
September	21	10	13.5	.301	.34	.195
The year	685	5.9	38.5	.859	11.67	.555

Yearly discharge of Marshyhope Creek near Adamsville

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 million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1944	38.5	0.859	11.69	0.555	45.5	1.02	13.81	0.659
1945	56.0	1.25	16.98	.808	67.6	1.51	20.48	.976
1946	64.9	1.45	19.64	.937	47.5	1.06	14.37	.685
1947	32.2	.719	9.75	.465	31.2	.696	9.46	.450
1948	76.1	1.70	23.13	1.10	100	2.23	30.51	1.44
1949	71.5	1.60	21.67	1.03	46.8	1.04	14.17	.672
1950	22.7	.507	6.85	.328	26.9	.600	8.12	.388
1951	33.9	.757	10.27	.489	48.7	1.09	14.76	.704
1952	88.0	1.96	26.73	1.27	76.3	1.70	23.18	1.10
1953	64.1	1.43	19.44	.924	61.1	1.36	18.51	.879
1954	34.1	.761	10.33	.492	33.9	.757	10.27	.489
1955	38.5	.859	11.67	.555				
Highest	88.0	1.96	26.73	1.27	100	2.23	30.51	1.44
Average	51.7	1.15	15.68	.746	53.2	1.19	16.75	.767
Lowest	22.7	.507	6.85	.328	26.9	.600	8.12	.388

NANTICOKE RIVER BASIN

5. Faulkner Branch at Federalsburg, Caroline County

Location.—Lat. 38°42′45″, long. 75°47′35″, on right bank 25 feet downstream from highway bridge on Nichols road, 0.9 mile upstream from mouth and 1 mile northwest of Federalsburg.

Drainage area.—7.10 square miles.

Records available.—July 1950 to September 1955.

Gage.—Water-stage recorder and concrete control. Altitude of gage 15 feet (from topographic map).

Average discharge.—5 years, 8.27 second-feet.

Extremes.—Maximum discharge, 433 second-feet Aug. 13, 1955 (gage height, 4.10 feet), from rating curve extended above 79 second-feet on basis of slope-area determination of peak flow; no flow for part of each day Aug. 8, 11, 14, Oct. 14, 1954, July 23, 24, July 26 to Aug. 7, 1955; minimum daily discharge, 0.2 second-foot Aug. 2, 1955.

Remarks.—Diversion for irrigation of about 100 acres above station since 1954.

Monthly discharge of Faulkner Branch at Federalsburg

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
July 15–31	30	2.8	6.36	0.896	0.57	0.579
August	7.5	1.9	2.83	.399	.46	.258
September	18	1.7	5.32	.749	.84	.484
The year						
1950–51						
October	4.4	3.0	3.45	0.486	0.56	0.314
November	18	2.4	3.86	.544	.61	.352
December	13	4.6	6.34	.893	1.03	.577
January	7.7	4.6	5.64	.794	.92	.513
February	13	5.5	7.98	1.12	1.17	.724
March	20	5.8	8.17	1.15	1.33	.743
April	20	5.8	8.53	1.20	1.34	.776
May	9.9	3.6	5.05	.711	.82	.460
June	20	3.2	6.98	.983	1.10	.635
July	12	2.6	4.30	.606	.70	.392
August	7.2	1.9	3.36	.473	.55	.306
September	13	1.5	2.36	.332	.37	.215
The year	20	1.5	5.48	.772	10.50	.499

Monthly discharge of Faulkner Branch at Federalsburg—*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	4.5	1.7	2.28	0.321	0.37	0.207
November	29	4.6	9.79	1.38	1.54	.892
December	133	6.1	19.0	2.68	3.08	1.73
January	92	12	24.7	3.48	4.02	2.25
February	61	10	18.5	2.61	2.81	1.69
March	52	11	20.2	2.85	3.27	1.84
April	75	8.3	17.4	2.45	2.74	1.58
May	20	6.1	10.4	1.46	1.70	.944
June	53	3.9	9.24	1.30	1.45	.840
July	25	2.4	4.50	.634	.73	.410
August	108	2.2	18.3	2.58	2.98	1.67
September	13	3.6	5.18	.730	.81	.472
The year	133	1.7	13.3	1.87	25.50	1.21
1952–53						
October	3.9	2.2	2.78	0.392	0.45	0.253
November	35	2.1	6.52	.918	1.03	.593
December	36	7.9	13.4	1.89	2.17	1.22
January	51	12	21.3	3.00	3.45	1.94
February	36	9.1	13.8	1.94	2.02	1.25
March	46	9.1	19.0	2.68	3.08	1.73
April	36	8.7	17.6	2.48	2.77	1.60
May	14	4.9	8.24	1.16	1.34	.750
June	15	3.2	5.21	.734	.82	.474
July	10	1.4	2.32	.327	.38	.211
August	33	1.4	5.52	.777	.90	.502
Spetember	4.2	1.5	2.35	.331	.37	.214
The year	51	1.4	9.81	1.38	18.78	.892
1953–54						
October	8.3	1.4	2.05	0.289	0.33	0.187
November	5.2	2.0	3.27	.461	.51	.298
December	21	3.4	7.00	.986	1.14	.637
January	23	4.5	9.05	1.27	1.47	.821
February	19	6.1	9.42	1.33	1.38	.860
March	30	9.0	14.5	2.04	2.36	1.32
April	25	6.4	8.87	1.25	1.39	.808
May	14	3.4	6.92	.975	1.12	.630
June	3.6	1.2	2.12	.299	.33	.193
July	18	1.2	3.97	.559	.64	.361
August	3.4	.6	1.43	.201	.23	.130
September	13	1.0	1.96	.276	.31	.178
The year	30	.6	5.88	.828	11.21	.535

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Faulkner Branch at Federalsburg—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1954–55						
October	2.0	0.7	1.23	0.173	0.20	0.112
November	4.7	1.4	1.99	.280	.31	.181
December	8.2	2.0	3.86	.544	.63	.352
January	5.0	2.8	3.82	.538	.62	.348
February	7.8	3.2	5.78	.814	.85	.526
March	35	7.8	13.0	1.83	2.10	1.18
April	23	5.8	8.48	1.19	1.33	.769
May	9.0	3.4	5.24	.738	.85	.477
June	30	2.8	6.44	.907	1.01	.586
July	4.2	.6	2.16	.304	.35	.196
August	241	.2	24.3	3.42	3.95	2.21
September	14	4.2	6.14	.865	.96	.559
The year	241	.2	6.89	.970	13.16	.627

Yearly discharge of Faulkner Branch at Federalsburg

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 million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1951	5.48	0.772	10.50	0.499	6.94	0.977	13.29	0.631
1952	13.3	1.87	25.50	1.21	12.6	1.77	24.16	1.14
1953	9.81	1.38	18.78	.892	8.94	1.26	17.11	.814
1954	5.88	.828	11.21	.535	5.43	.765	10.37	.494
1955	6.89	.970	13.16	.627	—	—	—	—

NANTICOKE RIVER BASIN

6. Chicone Creek near Reids Grove, Dorchester County

Location.—Lat. 38°31′55″, long. 75°49′06″, on upstream side of bridge on county road ½ mile east of Reids Grove, and 4¼ miles upstream from mouth.

Drainage area.—4.69 square miles.

Records available.—December 1950 to September 1952 (discontinued).

Gage.—Staff gage: read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 29 discharge measurements from Dec. 21, 1950 to Oct. 2, 1952. Standard error of estimate of monthly discharge, about 20 percent except for the period December 1950 to April 1951 which is about 30 per cent.

Monthly discharge of Chicone Creek near Reids Grove

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
December			0.993	0.212	0.24	0.137
January			1.43	.305	.35	.197
February			2.66	.567	.59	.366
March			3.04	.648	.75	.419
April			3.61	.770	.86	.498
May			1.61	.343	.40	.222
June			1.62	.345	.39	.223
July			1.56	.333	.38	.215
August			.535	.114	.13	.074
September			4.78	1.02	1.14	.659
The year						
1951–52						
October			1.08	0.230	0.27	0.149
November			4.95	1.06	1.18	.685
December			9.32	1.99	2.29	1.29
January			16.8	3.58	4.14	2.31
February			14.7	3.13	3.39	2.02
March			13.9	2.96	3.42	1.91
April			13.7	2.92	3.26	1.89
May			4.11	.876	1.01	.566
June			2.42	.516	.58	.333
July			.979	.209	.24	.135
August			2.02	.431	.50	.279
September			.994	.212	.24	.137
The year			7.06	1.51	20.52	.976

TRANSQUAKING RIVER BASIN

7. Chicamacomico River near Salem, Dorchester County

Location.—Lat. 38°30′45″, long. 75°52′50″, on left bank 30 feet downstream from Big Mill Pond dam, 1.6 miles east of Salem, 3.5 miles northwest of Vienna, and 13 miles upstream from mouth.

Drainage area.—15.0 square miles.

Records available.—April 1951 to September 1955.

Gage.—Water-stage recorder. Altitude of gage 10 feet (from topographic map).

Extremes.—Maximum discharge, 326 second-feet Jan. 28, 1952 (gage height, 3.92 feet); minimum, 1.0 second-foot Dec. 7, 22, 1954, result of freezeup; minimum gage height, 0.24 foot Dec. 7, 1954.

Remarks.—Regulation by Big Mill Pond.

Monthly discharge of Chicamacomico River near Salem

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 11–30	16	9.5	12.1	0.807	0.60	0.522
May	25	4.8	10.8	.720	.83	.465
June	37	1.8	10.8	.720	.80	.465
July	38	5.5	8.79	.586	.68	.379
August	12	3.6	5.34	.356	.41	.230
September	56	3.4	9.10	.607	.68	.392
The year						
1951–52						
October	12	5.7	7.38	0.492	0.57	0.318
November	36	10	15.4	1.03	1.14	.666
December	124	10	26.5	1.77	2.03	1.14
January	177	18	43.5	2.90	3.35	1.87
February	160	20	39.1	2.61	2.81	1.69
March	140	22	43.2	2.88	3.32	1.86
April	202	14	37.5	2.50	2.79	1.62
May	39	13	18.0	1.20	1.38	.776
June	57	8.3	12.6	.840	.93	.543
July	18	4.6	7.24	.483	.56	.312
August	27	4.6	8.08	.539	.62	.348
September	9.4	4.9	5.86	.391	.44	.253
The year	202	4.6	22.0	1.47	19.94	.950

Monthly discharge of Chicamacomico River near Salem—*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	5.9	4.6	5.12	0.341	0.39	0.220
November	55	4.8	12.0	.800	.89	.517
December	37	11	16.3	1.09	1.25	.704
January	66	19	29.5	1.97	2.27	1.27
February	78	17	26.7	1.78	1.85	1.15
March	91	19	34.9	2.33	2.69	1.51
April	55	16	27.5	1.83	2.05	1.18
May	31	10	16.8	1.12	1.29	.724
June	24	7.5	11.3	.753	.84	.487
July	9.0	2.8	5.35	.357	.41	.231
August	74	3.7	11.2	.747	.86	.483
September	6.1	4.2	4.85	.323	.36	.209
The year	91	2.8	16.8	1.12	15.15	.724
1953–54						
October	60	3.7	8.06	0.537	0.62	0.347
November	20	7.2	11.3	.753	.84	.487
December	40	9.0	15.0	1.00	1.16	.646
January	45	9.7	19.0	1.27	1.46	.821
February	55	12	19.8	1.32	1.38	.853
March	66	16	28.1	1.87	2.16	1.21
April	90	11	21.2	1.41	1.58	.911
May	30	8.8	16.8	1.12	1.29	.724
June	31	5.1	8.42	.561	.63	.363
July	10	4.4	5.77	.385	.44	.249
August	4.8	3.6	4.12	.275	.32	.178
September	25	3.6	5.27	.351	.39	.227
The year	90	3.6	13.5	.900	12.27	.582
1954–55						
October	7.5	2.6	3.58	0.239	0.27	0.154
November	17	4.1	6.09	.406	.45	.262
December	16	4.1	7.67	.511	.59	.330
January	9.1	5.6	7.22	.481	.55	.311
February	17	5.8	9.76	.651	.68	.421
March	41	11	17.8	1.19	1.37	.769
April	26	8.9	13.8	.920	1.03	.595
May	16	7.3	9.75	.650	.75	.420
June	29	6.1	9.36	.624	.70	.403
July	20	1.8	5.85	.390	.45	.252
August	264	4.4	38.1	2.54	2.93	1.64
September	36	9.6	13.1	.873	.98	.564
The year	264	1.8	11.9	.793	10.75	.513

CHOPTANK RIVER BASIN

8. Shades Branch near Chapeltown, Delaware

Location.—Lat. 39°04′45″, long. 75°41′05″, on downstream side of right abutment of bridge on county highway 223, 1.6 miles south of Chapeltown, 3.0 miles upstream from mouth, and 3.1 miles west of Willow Grove.

Drainage area.—11.6 square miles.

Records available.—January 1951 to September 1955.

Gage.—Water-stage recorder. Altitude of gage 45 feet (from topographic map).

Extremes.—Maximum discharge, 642 second-feet Dec. 21, 1951 (gage height, 7.27 feet); no flow for part of each day July 22 to Aug. 2, Aug. 13, 19, Sept. 7, 9, 10, 1954, and July 22, 23, 1955; minimum daily discharge, 0.3 second-foot Aug. 1, 14, 18, 23, 24, 1954 and July 20, 1955.

Remarks.—Diversion for irrigation above station during summer months since 1954.

Monthly discharge of Shades Branch near Chapeltown

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951						
January 23–31	15	7.0	10.3	0.888	0.30	0.574
February	101	8.4	26.8	2.31	2.41	1.49
March	60	8.0	15.8	1.36	1.57	.879
April	61	8.8	14.5	1.25	1.39	.808
May	30	6.0	9.75	.841	.97	.544
June	50	4.2	10.3	.888	.99	.574
July	64	2.9	8.06	.695	.80	.449
August	9.8	2.4	3.41	.294	.34	.190
September	3.9	1.7	2.18	.188	.21	.122
The year						
1951–52						
October	3.7	1.4	1.92	0.166	0.19	0.107
November	265	11	48.3	4.16	4.65	2.69
December	463	10	54.5	4.70	5.41	3.04
January	156	16	44.7	3.85	4.45	2.49
February	202	9.2	26.7	2.30	2.48	1.49
March	112	12	37.6	3.24	3.74	2.09
April	290	8.4	43.1	3.72	4.15	2.40
May	194	6.0	22.4	1.93	2.23	1.25
June	300	4.2	22.5	1.94	2.16	1.25
July	56	2.8	7.46	.643	.74	.416
August	166	2.4	17.5	1.51	1.74	.976
September	67	2.8	9.16	.790	.88	.511
The year	463	1.4	28.0	2.41	32.82	1.56

Monthly discharge of Shades Branch near Chapeltown—*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	3.4	2.1	2.46	0.212	0.24	0.137
November	139	1.1	11.7	1.01	1.12	.653
December	132	8.8	25.0	2.16	2.49	1.40
January	126	14	39.6	3.41	3.94	2.20
February	159	8.4	28.1	2.42	2.52	1.56
March	141	7.3	40.2	3.47	4.00	2.24
April	91	10	30.8	2.66	2.97	1.72
May	228	9.4	38.7	3.34	3.85	2.16
June	116	5	14.8	1.28	1.43	.827
July	6.7	1.2	2.43	.209	.24	.135
August	5.7	.9	2.16	.186	.21	.120
September	2.4	.5	.76	.066	.07	.043
The year	228	.5	19.7	1.70	23.08	1.10
1953–54						
October	20	0.6	2.08	0.179	0.21	0.116
November	8.8	2.2	4.61	.397	.44	.257
December	162	4.4	18.4	1.59	1.83	1.03
January	85	6.1	22.1	1.91	2.20	1.23
February	32	7.2	13.2	1.14	1.18	.737
March	60	12	23.6	2.03	2.34	1.31
April	31	8.6	13.1	1.13	1.26	.730
May	81	5.2	13.1	1.13	1.30	.730
June	4.6	.8	2.39	.206	.23	.133
July	6.1	.4	1.21	.104	.12	.067
August	4.1	.3	.67	.058	.07	.037
September	20	.4	1.83	.158	.18	.102
The year	162	.3	9.71	.837	11.36	.541
1954–55						
October	3.2	0.5	0.87	0.075	0.09	0.048
November	14	.8	2.79	.241	.27	.156
December	44	1.8	7.99	.689	.79	.445
January	15	2.4	6.45	.556	.64	.359
February	40	1.6	11.3	.974	1.01	.630
March	79	8.3	23.7	2.04	2.36	1.32
April	18	6.3	9.02	.778	.87	.503
May	10	2.5	5.00	.431	.50	.279
June	31	2.2	7.72	.666	.74	.430
July	3.5	.3	1.46	.126	.15	.081
August	249	.5	23.4	2.02	2.32	1.31
September	8.1	3.1	4.80	.414	.46	.268
The year	249	.3	8.72	.752	10.20	.486

CHOPTANK RIVER BASIN

9. Choptank River near Greensboro, Caroline County

Location.—Lat. 38°59′50″, long. 75°47′10″, on left bank at county highway bridge, 0.1 mile upstream from Gravelly Branch and 2.0 miles northeast of Greensboro.

Drainage area.—113 square miles.

Records available.—January 1948 to September 1955.

Gage.—Water-stage recorder and concrete control. Altitude of gage 5 feet (from topographic map).

Average discharge.—7 years, 129 second-feet.

Extremes.—Maximum discharge, 3,640 second-feet Dec. 22, 1951 (gage height, 9.99 feet); minimum, 6.5 second-feet July 29, 30, 1949 (gage height, 1.81 feet).

Remarks.—Some regulation at low flow by mill above station.

Monthly discharge of Choptank River near Greensboro

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948						
January 14–31	1,540	90	375	3.32	2.22	2.15
February	1,200	80	247	2.19	2.36	1.42
March	1,000	100	296	2.62	3.02	1.69
April	968	87	229	2.03	2.26	1.31
May	1,130	69	297	2.63	3.03	1.70
June	1,190	50	234	2.07	2.31	1.34
July	150	34	48.4	.428	.49	.277
August	900	25	147	1.30	1.50	.840
September	38	23	26.3	.233	.26	.151
The year						
1948–49						
October	67	24	33.0	0.292	0.34	0.189
November	1,220	29	127	1.12	1.25	.724
December	1,570	115	440	3.89	4.49	2.51
January	1,160	131	441	3.90	4.50	2.52
February	937	168	348	3.08	3.20	1.99
March	990	122	277	2.45	2.83	1.58
April	496	67	152	1.35	1.50	.873
May	322	44	130	1.15	1.33	.743
June	58	19	30.2	.267	.30	.173
July	31	6.5	14.2	.126	.15	.081
August	51	8.5	13.2	.117	.13	.076
September	43	8.0	15.8	.140	.16	.090
The year	1,570	6.5	168	1.49	20.18	.963

Monthly discharge of Choptank River near Greensboro—*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	51	11	16.9	0.150	0.17	0.097
November	132	21	37.4	.331	.37	.214
December	63	21	34.0	.301	.35	.195
January	90	23	38.0	.336	.39	.217
February	478	60	130	1.15	1.20	.743
March	915	42	180	1.59	1.84	1.03
April	148	42	77.4	.685	.76	.443
May	264	44	115	1.02	1.18	.659
June	232	15	66.3	.587	.65	.379
July	104	13	27.8	.246	.28	.159
August	32	8.5	15.0	.133	.15	.086
September	824	8.5	114	1.01	1.13	.653
The year	915	8.5	70.6	.625	8.47	.404
1950–51						
October	106	25	40.6	0.359	0.41	0.232
November	602	32	97.1	.859	.96	.555
December	165	46	91.6	.811	.94	.524
January	181	60	98.9	.875	1.01	.566
February	602	65	215	1.90	1.98	1.23
March	471	85	151	1.34	1.54	.866
April	478	69	133	1.18	1.31	.763
May	430	35	95.4	.844	.97	.545
June	715	28	113	1.00	1.12	.646
July	452	17	73.0	.646	.74	.418
August	63	13	27.1	.240	.28	.155
September	97	10	23.8	.211	.24	.136
The year	715	10	95.7	.847	11.50	.547
1951–52						
October	47	12	29.2	0.258	0.30	0.167
November	1,390	71	307	2.72	3.03	1.76
December	3,140	83	451	3.99	4.60	2.58
January	1,280	160	401	3.55	4.10	2.29
February	1,340	113	261	2.31	2.49	1.49
March	972	118	362	3.20	3.69	2.07
April	2,370	69	378	3.35	3.73	2.17
May	956	50	175	1.55	1.79	1.00
June	1,700	34	184	1.63	1.81	1.05
July	450	25	71.9	.636	.73	.411
August	992	25	160	1.42	1.63	.918
September	328	28	63.6	.563	.63	.364
The year	3,140	12	237	2.10	28.53	1.36

Monthly discharge of Choptank River near Greensboro—*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	40	20	28.6	0.253	0.29	0.164
November	832	21	102	.903	1.01	.584
December	848	80	179	1.58	1.82	1.02
January	964	125	310	2.74	3.16	1.77
February	1,180	97	239	2.12	2.20	1.37
March	998	104	354	3.13	3.61	2.02
April	900	83	275	2.43	2.71	1.57
May	1,200	63	275	2.43	2.81	1.57
June	728	31	118	1.04	1.17	.672
July	72	17	29.0	.257	.30	.166
August	97	17	31.3	.277	.32	.179
September	26	13	16.2	.143	.16	.092
The year	1,200	13	163	1.44	19.56	.931
1953–54						
October	198	12	26.3	0.233	0.27	0.151
November	97	29	53.3	.472	.53	.305
December	1,050	40	148	1.31	1.51	.847
January	662	44	175	1.55	1.79	1.00
February	291	50	114	1.01	1.05	.653
March	580	109	227	2.01	2.31	1.30
April	338	64	134	1.19	1.32	.769
May	570	32	111	.982	1.13	.635
June	32	16	25.3	.224	.25	.145
July	130	12	24.4	.216	.25	.140
August	29	11	14.9	.132	.15	.085
September	72	12	20.8	.184	.21	.119
The year	1,050	11	89.6	.793	10.77	.513
1954–55						
October	29	11	15.5	0.137	0.16	0.089
November	62	20	30.8	.273	.30	.176
December	250	29	70.0	.619	.71	.400
January	220	32	64.7	.573	.66	.370
February	209	40	103	.912	.95	.589
March	584	90	204	1.81	2.08	1.17
April	195	48	93.7	.829	.93	.536
May	95	29	43.2	.382	.44	.247
June	531	24	86.1	.762	.85	.492
July	28	10	16.2	.143	.17	.092
August	1,100	9.2	189	1.67	1.93	1.08
September	68	24	38.0	.336	.38	.217
The year	1,100	9.2	79.6	.704	9.56	.455

Yearly discharge of Choptank River near Greensboro

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 million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1949	168	1.49	20.18	0.963	125	1.11	14.99	0.717
1950	70.6	.625	8.47	.404	82.4	.729	9.89	.471
1951	95.7	.847	11.50	.547	143	1.27	17.12	.821
1952	237	2.10	28.53	1.36	197	1.74	23.72	1.12
1953	163	1.44	19.56	.931	156	1.38	18.75	.892
1954	89.6	.793	10.77	.513	80.2	.710	9.63	.459
1955	79.6	.704	9.56	.455	—	—	—	—
Highest	237	2.10	28.53	1.36	197	1.74	23.72	1.12
Average	129	1.14	15.51	.739	131	1.16	15.68	.747
Lowest	70.6	.625	8.47	.404	80.2	.710	9.63	.459

CHOPTANK RIVER BASIN

10. Forge Branch at Greensboro, Caroline County

Location.—Lat. 38°59′05″, long. 75°49′00″, on downstream center pile of bridge on county road 1 mile northwest ot Greensboro, and 3.5 miles upstream from mouth.

Drainage area.—9.84 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 16 discharge measurements from Oct. 15, 1951 to Oct. 7, 1952. Standard error of estimate of monthly discharge about 18 percent.

Monthly discharge of Forge Branch at Greensboro

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			2.13	0.216	0.25	0.140
November			20.8	2.11	2.36	1.36
December			23.7	2.41	2.78	1.56
January			40.9	4.16	4.80	2.69
February			28.1	2.86	3.08	1.85
March			32.5	3.30	3.81	2.13
April			37.7	3.83	4.27	2.48
May			12.0	1.22	1.41	.789
June			14.9	1.51	1.69	.976
July			6.09	.619	.71	.400
August			17.7	1.80	2.08	1.16
September			5.19	.527	.59	.341
The year			20.1	2.04	27.83	1.32

CHOPTANK RIVER BASIN

11. Watts Creek near Hobbs, Caroline County

Location.—Lat. 38°51′50″, long. 75°48′30″, on right bank 100 feet upstream from bridge on county road 1.2 miles west of Hobbs, and 2.8 miles upstream from mouth.

Drainage area.—14.3 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 16 discharge measurements from Oct. 15, 1951 to Oct. 7, 1952. Standard error of estimate of monthly discharge about 20 percent.

Monthly discharge of Watts Creek near Hobbs

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			2.61	0.183	0.21	0.118
November			15.2	1.06	1.19	.685
December			38.3	2.68	3.09	1.73
January			43.3	3.03	3.49	1.96
February			33.8	2.36	2.55	1.53
March			42.5	2.97	3.42	1.92
April			34.7	2.43	2.71	1.57
May			19.8	1.38	1.60	.892
June			15.2	1.06	1.18	.685
July			6.18	.432	.50	.279
August			40.7	2.85	3.28	1.84
September			4.72	.330	.37	.213
The year			24.8	1.73	23.59	1.12

CHOPTANK RIVER BASIN

12. Tuckahoe Creek near Ruthsburg, Queen Annes County

Location.—Lat. 38°58′00″, long. 75°56′35″, on downstream side of right abutment of bridge on county road, 0.1 mile downstream from Blockston Branch, 2.6 miles downstream from confluence of German Branch and Mason Branch, 2.6 miles south of Ruthsburg, and 3.4 miles north of Queen Anne.

Drainage area.—85.2 square miles.

Records available.—March 1951 to September 1955.

Gage.—Water-stage recorder. Altitude of gage 10 feet (from topographic map).

Extremes.—Maximum discharge, 1,620 second-feet Aug. 13, 1955 (gage height, 5.87 feet); minimum, 14 second-feet July 31, Aug. 1, 2, 4, 5, 14, 15, Sept. 5–7, 28–30, Oct. 1, 2, 4, 5, 6, 11–14, 1954, and Aug. 7, 1955; minimum gage height, 0.18 foot Aug. 4, 5, Oct. 13, 14, 1954.

Monthly discharge of Tuckahoe Creek near Ruthsburg

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951						
March 16–31	250	78	136	1.60	0.95	1.03
April	250	59	104	1.22	1.36	.789
May	249	36	82.3	.966	1.11	.624
June	406	30	83.8	.984	1.10	.636
July	120	23	43.9	.515	.59	.333
August	103	18	26.8	.315	.36	.204
September	272	18	43.6	.512	.57	.331
The year						
1951–52						
October	68	18	29.4	0.345	0.40	0.223
November	312	52	131	1.54	1.72	.995
December	1,370	47	233	2.73	3.15	1.76
January	759	132	230	2.70	3.11	1.75
February	860	94	193	2.27	2.44	1.47
March	627	112	225	2.64	3.05	1.71
April	1,420	81	266	3.12	3.49	2.02
May	560	65	141	1.65	1.91	1.07
June	649	34	106	1.24	1.39	.801
July	671	27	92.8	1.09	1.26	.704
August	526	28	123	1.44	1.66	.931
September	512	36	87.6	1.03	1.15	.666
The year	1,420	18	155	1.82	24.73	1.18

Monthly discharge of Tuckahoe Creek near Ruthsburg—*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	52	31	35.3	0.414	0.48	0.268
November	550	30	93.4	1.10	1.22	.711
December	544	70	137	1.61	1.86	1.04
January	605	105	226	2.65	3.06	1.71
February	628	98	195	2.29	2.38	1.48
March	741	99	284	3.33	3.84	2.15
April	676	87	233	2.73	3.05	1.76
May	659	77	191	2.24	2.58	1.45
June	354	35	82.2	.965	1.08	.624
July	249	24	47.4	.556	.64	.359
August	478	22	54.0	.634	.73	.410
September	30	16	20.1	.236	.26	.153
The year	741	16	133	1.56	21.18	1.01
1953–54						
October	234	18	34.5	0.405	0.47	0.262
November	86	26	48.8	.573	.64	.370
December	502	35	111	1.30	1.50	.840
January	311	47	116	1.36	1.57	.879
February	188	59	91.1	1.07	1.11	.692
March	413	90	158	1.85	2.14	1.20
April	192	56	96.5	1.13	1.26	.730
May	228	34	72.5	.851	.98	.550
June	74	22	29.4	.345	.38	.223
July	350	15	45.5	.534	.62	.345
August	39	14	19.3	.227	.26	.147
September	46	14	18.0	.211	.24	.136
The year	502	14	70.1	.823	11.17	.532
1954–55						
October	41	14	18.1	0.212	0.24	0.137
November	67	18	28.3	.332	.37	.215
December	163	19	37.6	.441	.51	.285
January	99	23	36.8	.432	.50	.279
February	141	25	70.0	.822	.86	.531
March	315	66	117	1.37	1.58	.885
April	104	49	68.5	.804	.90	.520
May	64	23	34.5	.405	.47	.262
June	140	19	43.6	.512	.57	.331
July	163	16	28.3	.332	.38	.215
August	1,260	14	181	2.12	2.45	1.37
September	95	27	40.0	.469	.52	.303
The year	1,260	14	58.7	.689	9.35	.445

CHOPTANK RIVER BASIN

13. Knott Millpond near Hillsboro, Caroline County

Location.—Lat. 38°52′55″, long. 75°55′35″, on downstream center pile of bridge on county road 0.9 mile upstream from mouth and 2.5 miles south of Hillsboro.

Drainage area.—8.45 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks—Partial-record station with monthly discharge only; records based on 17 discharge measurements from Oct. 10, 1951 to Oct. 7, 1952. Standard error of estimate of monthly discharge about 23 percent.

Monthly discharge of Knott Millpond near Hillsboro

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			3.56	0.421	0.49	0.272
November			16.0	1.89	2.12	1.22
December			17.7	2.09	2.41	1.35
January			29.2	3.46	3.98	2.24
February			29.6	3.50	3.77	2.26
March			26.8	3.17	3.66	2.05
April			49.1	5.81	6.49	3.76
May			27.4	3.24	3.74	2.09
June			17.6	2.08	2.33	1.34
July			16.7	1.98	2.28	1.28
August			19.2	2.27	2.62	1.47
September			12.5	1.48	1.65	.957
The year			22.1	2.62	35.54	1.69

CHOPTANK RIVER BASIN

14. Hog Creek near Bethlehem, Caroline County

Location.—Lat. 38°45′50″, long. 75°55′00″, on upstream left wing wall of bridge on State highway 578, 2 miles northeast of Bethlehem, and 2.0 miles upstream from mouth.

Drainage area.—3.64 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 15 discharge measurements from Oct. 9, 1951 to Oct. 6, 1952. Standard error of estimate of monthly discharge about 20 percent.

Monthly discharge of Hog Creek near Bethlehem

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			1.22	0.335	0.39	0.217
November			3.94	1.08	1.21	.698
December			8.27	2.27	2.62	1.47
January			12.0	3.30	3.79	2.13
February			9.69	2.66	2.87	1.72
March			11.1	3.05	3.52	1.97
April			10.2	2.80	3.14	1.81
May			6.17	1.70	1.95	1.10
June			4.28	1.18	1.31	.763
July			3.23	.887	1.02	.573
August			6.05	1.66	1.91	1.07
September			2.00	.549	.61	.355
The year			6.51	1.79	24.34	1.16

CHOPTANK RIVER BASIN

15. Kings Creek near Easton, Talbot County

Location.—Lat. 38°47′20″, long. 76°00′35″, on right bank 200 feet upstream from bridge on county road, 0.8 mile downstream from confluence of Wootenaux Creek and Galloway Run, and 3.5 miles east of Easton.

Drainage area.—8.67 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 16 discharge measurements from Oct. 15, 1951 to Oct. 6, 1952. Standard error of estimate of monthly discharge about 18 percent.

Monthly discharge of Kings Creek near Easton

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			1.16	0.134	0.15	0.087
November			9.69	1.12	1.25	.724
December			14.2	1.64	1.89	1.06
January			14.2	1.64	1.88	1.06
February			14.9	1.72	1.86	1.11
March			20.8	2.40	2.76	1.55
April			21.1	2.43	2.72	1.57
May			8.26	.953	1.10	.616
June			4.25	.490	.55	.317
July			6.44	.743	.86	.480
August			8.28	.955	1.10	.617
September			5.71	.659	.73	.426
The year			10.7	1.23	16.85	.795

CHOPTANK RIVER BASIN

16. Beaverdam Branch at Matthews, Talbot County

Location.—Lat. 38°48′40″, long. 75°58′15″, on left bank 50 feet upstream from bridge on State highway 328, 1 mile west of Matthews, 1.2 miles upstream from mouth, and 6 miles northeast of Easton.

Drainage area.—5.85 square miles.

Records available.—July 1950 to September 1955.

Gage.—Water-stage recorder and concrete control. Altitude of gage 10 feet (from topographic map).

Average discharge.—5 years, 6.65 second-feet.

Extremes.—Maximum discharge, 371 second-feet Aug. 12, 1955 (gage height, 5.19 feet), from rating curve extended above 140 second-feet by conveyance studies; no flow for part of each day Aug. 14–16, Sept. 8, 9, 1950, Sept. 8–11, 13, 14, 1951.

Monthly discharge of Beaverdam Branch at Matthews

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
July 17–31	2.7	0.09	0.421	0.072	0.04	0.047
August	2.0	.04	.204	.035	.04	.023
September	106	.05	10.5	1.79	2.00	1.16
The year						
1950–51						
October	9.2	1.4	2.40	0.410	0.47	0.265
November	94	1.7	7.13	1.22	1.36	.789
December	22	2.9	6.40	1.09	1.26	.704
January	16	3.8	6.16	1.05	1.21	.679
February	20	3.6	8.75	1.50	1.56	.969
March	31	4.0	7.02	1.20	1.38	.776
April	28	2.4	5.69	.973	1.09	.629
May	33	.40	3.45	.590	.68	.381
June	44	.25	3.72	.636	.71	.411
July	2.8	.21	.428	.073	.08	.047
August	1.5	.06	.236	.040	.05	.026
September	85	.04	3.37	.576	.64	.372
The year	94	.04	4.52	.773	10.49	.500

Monthly discharge of Beaverdam Branch at Matthews—*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	5.9	0.09	0.915	0.156	0.18	0.101
November	80	2.7	10.5	1.79	2.01	1.16
December	162	2.6	16.1	2.75	3.17	1.78
January	64	6.2	16.9	2.89	3.34	1.87
February	116	6.5	15.6	2.67	2.88	1.73
March	60	6.6	17.9	3.06	3.53	1.98
April	141	7.0	19.3	3.30	3.68	2.13
May	20	2.2	6.93	1.18	1.37	.763
June	40	.29	2.88	.492	.55	.318
July	74	.18	3.96	.677	.78	.438
August	112	.24	8.54	1.46	1.68	.944
September	117	.49	5.85	1.00	1.12	.646
The year	162	.09	10.4	1.78	24.29	1.15
1952–53						
October	3.7	0.56	0.800	0.137	0.16	0.089
November	86	.63	8.20	1.40	1.56	.905
December	86	3.7	10.5	1.79	2.06	1.16
January	46	7.3	16.5	2.82	3.24	1.82
February	66	5.6	11.5	1.97	2.05	1.27
March	61	4.9	16.2	2.77	3.20	1.79
April	49	4.1	14.4	2.46	2.75	1.59
May	129	2.7	17.1	2.92	3.37	1.89
June	63	.63	4.81	.822	.92	.531
July	17	.29	1.50	.256	.30	.165
August	118	.35	7.10	1.21	1.40	.782
September	1.3	.24	.333	.057	.06	.037
The year	129	.24	9.08	1.55	21.07	1.00
1953–54						
October	40	0.24	2.35	0.402	0.46	0.260
November	12	.70	3.59	.614	.69	.397
December	72	2.0	7.35	1.26	1.45	.814
January	29	2.0	7.99	1.37	1.57	.885
February	27	2.4	5.98	1.02	1.06	.659
March	46	4.4	11.3	1.93	2.22	1.25
April	73	3.0	10.0	1.71	1.91	1.11
May	47	.86	5.89	1.01	1.16	.653
June	2.1	.22	.576	.098	.11	.063
July	4.1	.07	.407	.070	.08	.045
August	.40	.07	.181	.031	.04	.020
September	1.4	.04	.222	.038	.04	.025
The year	73	.04	4.65	.795	10.79	.514

CHOPTANK RIVER BASIN—*Continued*

Monthly discharge of Beaverdam Branch at Matthews—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1954–55						
October	0.60	0.10	0.223	0.038	0.04	0.025
November	3.3	.27	.648	.111	.12	.072
December	11	.38	1.90	.325	.37	.210
January	2.4	.68	1.28	.219	.25	.142
February	14	.86	3.88	.663	.69	.429
March	45	2.6	8.07	1.38	1.59	.892
April	11	1.8	3.79	.648	.72	.419
May	26	.63	2.49	.426	.49	.275
June	86	.27	6.37	1.09	1.22	.704
July	38	.10	2.13	.364	.42	.235
August	212	.10	22.3	3.81	4.39	2.46
September	11	.77	1.88	.321	.36	.207
The year	212	.10	4.60	.786	10.66	.508

Yearly discharge of Beaverdam Branch at Matthews

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 million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1951	4.52	0.773	10.49	0.500	5.50	0.940	12.76	0.608
1952	10.4	1.78	24.29	1.15	9.75	1.67	22.71	1.08
1953	9.08	1.55	21.07	1.00	8.57	1.46	19.89	.944
1954	4.65	.795	10.79	.514	3.77	.644	8.72	.416
1955	4.60	.786	10.66	.508	—	—	—	—

CHOPTANK RIVER BASIN

17. Miles Creek near Trappe, Talbot County

Location.—Lat. 38°40′15″, long. 76°01′45″, on left downstream abutment of bridge on county road 1.8 miles northeast of Trappe, and 3.5 miles upstream from mouth.

Drainage area.—5.70 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 18 discharge measurements from Oct. 10, 1951 to Oct. 6, 1952. Standard error of estimate of monthly discharge about 36 percent.

Monthly discharge of Miles Creek near Trappe

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			2.03	0.356	0.41	0.230
November			4.53	.795	.89	.514
December			6.51	1.14	1.32	.737
January			9.48	1.66	1.92	1.07
February			11.8	2.07	2.24	1.34
March			12.7	2.23	2.57	1.44
April			12.3	2.16	2.41	1.40
May			8.94	1.57	1.81	1.01
June			9.85	1.73	1.93	1.12
July			4.72	.828	.95	.535
August			9.87	1.73	2.00	1.12
September			4.48	.786	.88	.508
The year			8.08	1.42	19.33	.918

CHOPTANK RIVER BASIN

18. Cabin Creek at Cabin Creek, Dorchester County

Location.—Lat 38°37′35″, long. 75°54′50″, on downstream side of bridge on State highway 16 at Cabin Creek, 2.7 miles west of Hurlock, and 3.1 miles upstream from mouth.

Drainage area.—6.05 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 19 discharge measurements from Oct. 4, 1951 to Oct. 2, 1952. Standard error of estimate of monthly discharge about 20 percent.

Monthly discharge of Cabin Creek at Cabin Creek

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			4.73	0.782	0.90	0.505
November			8.74	1.44	1.61	.931
December			11.1	1.83	2.11	1.18
January			26.6	4.40	5.07	2.84
February			21.1	3.49	3.76	2.26
March			20.2	3.34	3.85	2.16
April			19.6	3.24	3.62	2.09
May			15.9	2.63	3.04	1.70
June			12.5	2.07	2.31	1.34
July			6.68	1.10	1.27	.711
August			18.4	3.04	3.51	1.96
September			6.41	1.06	1.18	.685
The year			14.3	2.36	32.23	1.53

WYE RIVER BASIN

19. Mill Creek near Wye Mills, Talbot County

Location.—Lat. 38°54′55″, long. 76°03′50″, on upstream side of bridge on U. S. highway 50, 2 miles southeast of Wye Mills, and 2½ miles upstream from mouth.

Drainage area.—5.48 square miles.

Records available.—October 1951 to September 1952 (discontinued).

Gage.—Tape-down point: read intermittently.

Remarks.—Partial-record station with monthly discharge only; records based on 19 discharge measurements from Oct. 16, 1951 to Oct. 6, 1952. Standard error of estimate of monthly discharge about 31 percent.

Monthly discharge of Mill Creek near Wye Mills, Md.

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			3.06	0.558	0.64	0.361
November			5.78	1.05	1.18	.679
December			11.0	2.01	2.32	1.30
January			9.32	1.70	1.96	1.10
February			10.1	1.84	1.99	1.19
March			14.8	2.70	3.11	1.75
April			19.2	3.50	3.92	2.26
May			13.0	2.37	2.73	1.53
June			10.9	1.99	2.22	1.29
July			7.88	1.44	1.66	.931
August			12.5	2.28	2.63	1.47
September			13.0	2.37	2.65	1.53
The year			10.9	1.99	27.01	1.29

Salinity Studies in Estuaries of the Eastern Shore

BY

J. J. MURPHY

ABSTRACT

Increasing interest has been shown in the use of surface waters for supplemental irrigation on the Eastern Shore of Maryland. Many of the waters are tidal and subject to encroachment of saline water from Chesapeake Bay which limits their use for irrigation.

A reconnaissance was made during the growing season, July to October 1952, when the normal flow of the streams is low and the extent of tidal penetration is most significant. Five major streams were studied in tidal areas—Pocomoke, Wicomico, Nanticoke, Choptank, and Chester Rivers. Each stream was sampled at three or more sites on dates coinciding, whenever possible, with lunar cyles producing maximum tidal variations.

Chemical analyses of the non-tidal water of the area show quality generally favorable for most uses. It is relatively low in dissolved solids and hardness. Except for the Pocomoke River basin, chemical analyses of water collected throughout the tidal reaches of each of the river basins show penetration of water from Chesapeake Bay. Geographic configuration, stream discharge and tidal variations influence the extent and degree of penetration of water from the bay.

The Pocomoke River and its tributaries above Pocomoke City did not show change in chloride concentration with tidal variations.

In the Wicomico River basin increases of chloride concentration were observed at high tide as far as eleven miles upstream to Upper Ferry.

The Nanticoke River basin was found subject to chloride concentration as high as 500 parts per million at high tide up to Vienna, a distance of 18 miles upstream.

The Choptank River showed small increases of chloride concentration at high tide approximately 26 miles upstream to Denton.

High concentration of chloride was observed in the Chester River from its mouth to Crumpton, a distance of 23 miles.

The chemical data were obtained during a period of average precipitation and river discharge rates. Periods of intense rainfall or drought would alter the results considerably.

INTRODUCTION

The United States Geological Survey in cooperation with the Maryland Department of Geology, Mines and Water Resources initiated a program on

July 1, 1952, to study the extent of saline penetration from the Chesapeake Bay during tidal movements in the major streams draining the Eastern Shore to obtain basic data on the general chemical characteristics as well as salinity of the surface water in the area for utilization as supplemental water for irrigation. The survey was limited almost exclusively to periodic measurements of the extent and amount of salinity in the several river basins. More comprehensive investigations (Lamar, 1940) that would establish relations between salinity and stream discharge would require more frequent salinity and discharge measurements.

The data in this study were obtained during the period July through October 1952 by the Water Resources Division of the Geological Survey, under the general supervision of W. F. White, Chief, Chemical Quality Section, Quality of Water Branch. Stream discharge data were obtained from the Surface Water Branch, College Park, Maryland, F. LeFever, district engineer.

There are five major rivers in the area, all of which are tidal (fig. 14).

1. Pocomoke River
2. Wicomico River
3. Nanticoke River
4. Choptank River
5. Chester River

Since they drain most of the area, the studies were concentrated in these river basins. They empty either directly into Chesapeake Bay or into inlets of the bay; and, as a result of tidal influence, encroachment of water from the bay may occur into the main stem and its tributaries.

STREAM DISCHARGE

Most of the stream-gaging stations are located on tributaries or on the headwaters of the streams. Generally, it was necessary to collect samples for analyses downstream from the gaging station, so that the discharge data in this report are estimates based on unit runoff figures from the gaging stations. Because of the incomplete water-discharge data at the sampling sites, direct correlation between salinity and water discharge was not attempted other than to generalize on the effect of river stage on the salinity in the stream. The water discharge values used are the estimated mean daily flow past the sampling site.

TIDES

The alternate rising and falling of the level of the sea occurs at most places twice in a lunar day which averages 24 hours and 50 minutes. The rise and fall of the tide at any particular place varies from day to day, due principally to variations in the position of the moon in relation to the earth. Tides are affected also by winds and other meteorological factors. The variations in tides produce marked variations in the salinity of tide waters and also in the extent of

FIGURE 14. Map of Eastern Shore showing Streams sampled in Quality of Surface-water Study.

the penetration of salt water into estuaries. Other factors involved in affecting salinity concentration and movement in rivers are wind velocity, discharge rates, density, currents, and physical configuration of the shores and stream beds.

In estuaries, there are periods of slack and turning of the current which tend to flatten out the normal tide curve. These periods of slack may last for several hours depending upon the many variables affecting tides.

SAMPLING PROCEDURE

Each river and its major tributaries were sampled at periodic intervals during tide cycles at three or more sites selected on the basis of their relation to tidal movements in the stream. Water samples were obtained on at least three dates at most sites. These dates were arranged whenever possible to coincide with lunar cycles involving maximum tidal variations. Factors inducing increased stream discharge, such as heavy rainfall, were avoided to enable study of the stream under conditions conducive to maximum effect of tidal movements. The non-tidal streams of the region were sampled to obtain a background of the chemical character of the surface water. These data were obtained mainly from streams on which gaging stations are located.

Sample Collection

Samples were collected from the surface, mid-depth, and bottom of the stream to determine chemical composition and chloride variations at different depths. Where the stream bed was very wide, samples were also collected from sides of the channel, otherwise center sampling was employed. A portable conductivity meter was used to monitor the number and type of water samples to be obtained and observe variations in chemical concentrations of the water. This meter is a battery-powered instrument that measures the electrical conductance of the water directly in micromhos ($K \times 10^6$). This measurement is a preliminary indication of the approximate concentration of dissolved constituents in the water.

Expression of Results

The specific conductance, which varies with the amount and kind of mineral salts in solution, was used in the field as a preliminary indicator for the presence of high salinity in the water. The concentration of chloride ion determined in the laboratory was used as an indicator of the degree and extent of encroachment of water from the bay into the stream. Background conductivity and chloride measurements on non-tidal reaches of the river and at low tide in tidal areas were used as base values to estimate the amount of variation in salinity as the tide water rose and receded in the river. All determinations except field conductivity measurements were made in the Geological Survey laboratory. The results of analyses in this report are in parts per million (ppm) except pH and specific conductance. A part per million is a unit weight of a constituent in a million unit weights of water.

QUALITY OF SURFACE WATER OF THE EASTERN SHORE

Non-tidal Reaches of Streams

The quality of the water in non-tidal reaches of the streams throughout the area is generally favorable for most uses without costly treatment. The water is relatively low in dissolved solids, not exceeding 100 ppm, and the hardness is less than 50 ppm. The chemical quality of most streams can be expected to be in the range of concentrations given in Table 42.

TABLE 42

Range of Chemical Constituents in Non-tidal Reaches of Streams of the Eastern Shore

(parts per million except pH and color)

Constituent	Maximum	Minimum
Silica (SiO_2)	25	3
Iron (Fe), dissolved	4	0.1
Calcium (Ca)	17	2
Magnesium (Mg)	4	1
Sodium and potassium (Na + K)	15	5
Bicarbonate (HCO_3)	50	5
Sulfate (SO_4)	20	2
Chloride (Cl)	12	3
Fluoride (F)	0.5	.0
Nitrate (NO_3)	5	.5
Dissolved solids	100	30
Hardness as ($CaCO_3$)	45	8
pH	7.4	6.0
Color	300	5

Some streams carry relatively high amounts of iron and silica in solution, which may be significant factors in the utilization of the water. These constituents cannot be relegated to any specific stream or basin, but seem to occur in surface water throughout the peninsula. Chemical analyses of the surface water in the major river basins are given in Table 43.

Tidal Reaches of the Streams

Pocomoke River

The main stem of the Pocomoke River was sampled from Pocomoke to the Maryland-Delaware State line. The uppermost reach of tidal influence was Shockley's Crossing, about 25 miles from the mouth of the stream, and a sampling site was established there. Two other sites on the main stem, one at

Snow Hill and the other at Pocomoke, were also selected. The river water was sampled at high and low tides and at intermediate periods in the cycle at these locations. Nassawango and Dividing Creeks, two major tributaries, were also sampled periodically to insure more complete coverage of the extent of saline penetration. Figure 15 shows the maximum salinity measurements for the main stem of the river.

Chemical analyses of samples taken periodically at both high and low tide showed little or no variation in composition that could not be explained by pollution or changes in discharge rates, i.e., natural dilution or concentration of dissolved solids by increased or decreased stream flow. No evidence of penetration of water from the bay could be detected in the chemical analyses. Table 44 shows values for conductivity, chloride, pH and discharge for the Pocomoke River at Pocomoke.

Above Pocomoke, little or no variation in chemical content of the water was evidenced regardless of tide stage in the river. Below Pocomoke the river runs through an extensive semi-marshland where spreading of water from the bay occurs.

Wicomico River

The Wicomico River through an approximate 17 mile reach from Whitehaven, 1 mile above the mouth, to Salisbury, above which the river is not affected by tides, gave conclusive evidence of penetration of water from the bay into the main stem and tributaries. A noticeable increase in chloride in the river was found 10 miles upstream from the mouth, at Upper Ferry. Figure 15 shows the maximum salinity measurements for the main stem and major tributaries of the river.

Table 45 shows that the river at Whitehaven is subject to high salinity concentrations at all times. The amount of salinity at Upper Ferry would be either greater or less than that shown depending upon the discharge rate, but it is evident that the river at this point is affected by saline encroachment at high tide. At Salisbury the chemical character of the river water was relatively unchanged regardless of the tide stage.

The tributaries downstream from Upper Ferry are subject to increased salinity during high tide stages in the river (Table 46). Increase in the chloride content in Wicomico Creek was found as far upstream as Allen, where on August 25 the chloride concentration increased from 9 ppm at low tide to 69 ppm at high tide. Increases in the other chemical constituents were observed also.

Nanticoke River

Investigations in the Nanticoke River basin involved more extensive use of tributaries to determine chemical quality conditions in the main stem of the river because of the relative inaccessibility of the river below Vienna and the

TABLE 43

Chemical Constituents and Related Physical Measurements in Non-tidal Reaches of Major River Basins on the Eastern Shore, July to October, 1952

Place and date of collection	Discharge (cfs)	Temperature (°F)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$: Calcium-Magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
Jacob's Creek near Sassafras																			
June 30	6.0	65	13	0.81	7.5	1.8	4.2	2.0	24	3.8	6.1	0.2	5.2	74	26	6	81.7	7.1	30
Unicorn Branch near Millington																			
June 30	17	77	13	.01	4.0	1.7	3.5	1.0	16	1.0	5.9	.0	3.3	60	17	4	66.1	6.6	12
Red Lion Branch near Crumpton																			
Oct. 27	—	54	—	—	—	—	6.0		19	4.8	5.2	—	2.8	—	17	1	103	6.9	—
Morgan Creek near Kennedyville																			
June 30	9.6	64	12	1.0	11	1.4	3.8	2.5	37	4.5	6.0	.2	2.0	74	33	3	90.0	7.1	40
Southeast Creek near Church Hill																			
June 30	9.6	68	16	.16	14	2.2	4.8	3.1	38	12	8.0	.1	2.7	103	44	8	124	6.8	25
Sallie Harris Creek near Carmichael																			
July 1	4.3	61	18	.76	17	1.0	4.5	1.7	46	13	4.0	.2	2.5	103	46	9	120	7.3	52
Chester River at Millington																			
Oct. 27	—	54	16	.45	9.2	3.5	4.9	2.5	30	20	6.2	.0	1.2	71	37	13	97.7	7.1	—
Tuckahoe Creek near Ruthsburg																			
June 30	53	68	16	.58	9.2	1.2	4.6	2.0	29	8.0	5.9	.4	2.6	83	28	4	88.1	7.0	55
Choptank River at Greensboro																			
Sept. 18	—	74	15	.70	7.2	2.2	4.8	2.0	24	11	7.0	.3	1.5	75	27	7	84.2	6.9	20
Choptank River near Greensboro																			
June 30	36	71	15	1.5	8.4	1.3	4.9	1.6	23	9.8	6.5	.2	1.8	77	26	7	82.4	7.1	70
Garland Creek at Bridge on State Highway 313																			
Sept. 18	—	75	10	.2	3.5	1.1	4.0	1.9	13	3.8	5.5	.2	2.9	51	15	4	53.7	6.9	15

Mill Creek near Williston																			
Sept. 18	—	76	11	0.76	4.2	2.8	3.7	1.9	21	3.8	6.5	0.7	1.2	63	22	5	61.2	6.9	60
Beaverdam Branch at Matthews																			
July 1	.84	64	12	.81	10	1.9	5.2	2.0	29	12	7.8	.2	1.6	82	33	9	97.9	7.1	55
Choptank River at Denton																			
Sept. 18	—	77	3.3	.50	5.5	2.7	8.0	2.3	27	9.4	9.5	.7	.6	60	25	3	86.3	6.9	45
Chicamacomico Creek near Salem																			
July 1, 1952	8.9	84	5.8	2.0	1.7	.7	4.1	1.5	10	2.8	5.0	.3	.6	39	7	0	39.5	6.6	80
Rewastico Creek near Hebron																			
July 1	4.7	80	19	.39	4.0	1.0	7.5	1.3	20	3.8	7.5	.3	1.0	66	14	0	65.6	6.9	50
Quantico Creek at Quantico																			
Aug. 12	—	75	16	.07	3.5	.8	5.0		10	4.0	6.6	—	1.8	43	12	3	49.5	5.8	280
Faulkner Branch at Federalsburg																			
July 1	3.9	63	12	.49	4.0	1.5	6.2	2.0	11	3.2	8.0	.2	6.5	66	16	2	71.2	6.8	2
Marshyhope Creek near Eldorado																			
Aug. 11	—	76	7.0	.65	3.7	.4	2.2	1.8	7.0	9.2	3.0	.0	1.1	32	11	5	41.1	5.8	100
Nanticoke River at Sharptown																			
Aug. 11	—	78	3.9	.90	3.7	.9	5.7	1.8	16	7.0	7.5	.0	.6	47	13	0	64.0	6.8	45
Beaverdam Creek near Salisbury																			
July 1	16	77	9.9	.58	3.1	.8	7.0	1.4	21	4.0	5.0	.0	.8	51	11	0	55.8	7.0	40
Wicomico River at Salisbury																			
Aug. 12	—	81	15	.03	4.2	1.1	7.0	3.0	19	5.5	7.2	.0	.5	76	15	0	76.0	6.7	55
Tonytank Creek near Salisbury																			
Aug. 26	—	64	—	—	—	—	7.3		20	5.0	6.0	—	1.1	—	15	0	68.6	6.7	—
Pocomoke River near Willards																			
July 2	15	64	23	3.6	5.3	1.9	7.4	1.0	24	7.8	7.2	.4	.9	90	21	1	72.6	6.9	160
Pocomoke River at Schockley's Crossing																			
July 22	—	69	25	1.3	7.0	1.8	7.1	1.8	23	11	7.5	.1	1.0	94	25	6	89.3	6.5	150
Pocomoke River at Snow Hill																			
July 22	—	87	17	.95	4.8	1.7	9.0	2.2	23	9.8	9.2	.3	1.3	88	19	0	89.0	6.6	120
Nassawango Creek near Snow Hill																			
July 2	4.2	65	22	1.6	2.2	.6	7.2	1.4	12	7.0	7.7	.0	2.0	92	8	0	55.9	6.0	300

TABLE 43—*Continued*

Place and date of collection	Discharge (cfs)	Teemperature (°F)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
Dividing Creek near Pocomoke City																			
Aug. 26	—	71	20	2.0	3.6	1.9	7.3	1.1	3	17	8.8	0.1	0.8	91	17	14	82.4	5.4	80
Burnt Mills Creek near Willards																			
Aug. 25	—	68	—	5.5	—	—	11		14	14	12	—	.9	—	20	9	84.7	5.9	—
Manokin Branch near Princess Anne																			
July 2	0.4	69	20	1.1	4.2	1.6	9.2	1.4	16	14	8.3	.2	.6	83	17	4	84.0	7.0	45
Aug. 26	—	61	—	—	—	—	14		21	18	9.0	—	.5	—	19	2	94.8	6.6	—
Baron Creek at Mardella Springs																			
Aug. 27	—	74	17	.23	2.9	1.6	6.6	.7	14	7.0	7.0	.2	1.1	55	14	2	61.9	6.2	35

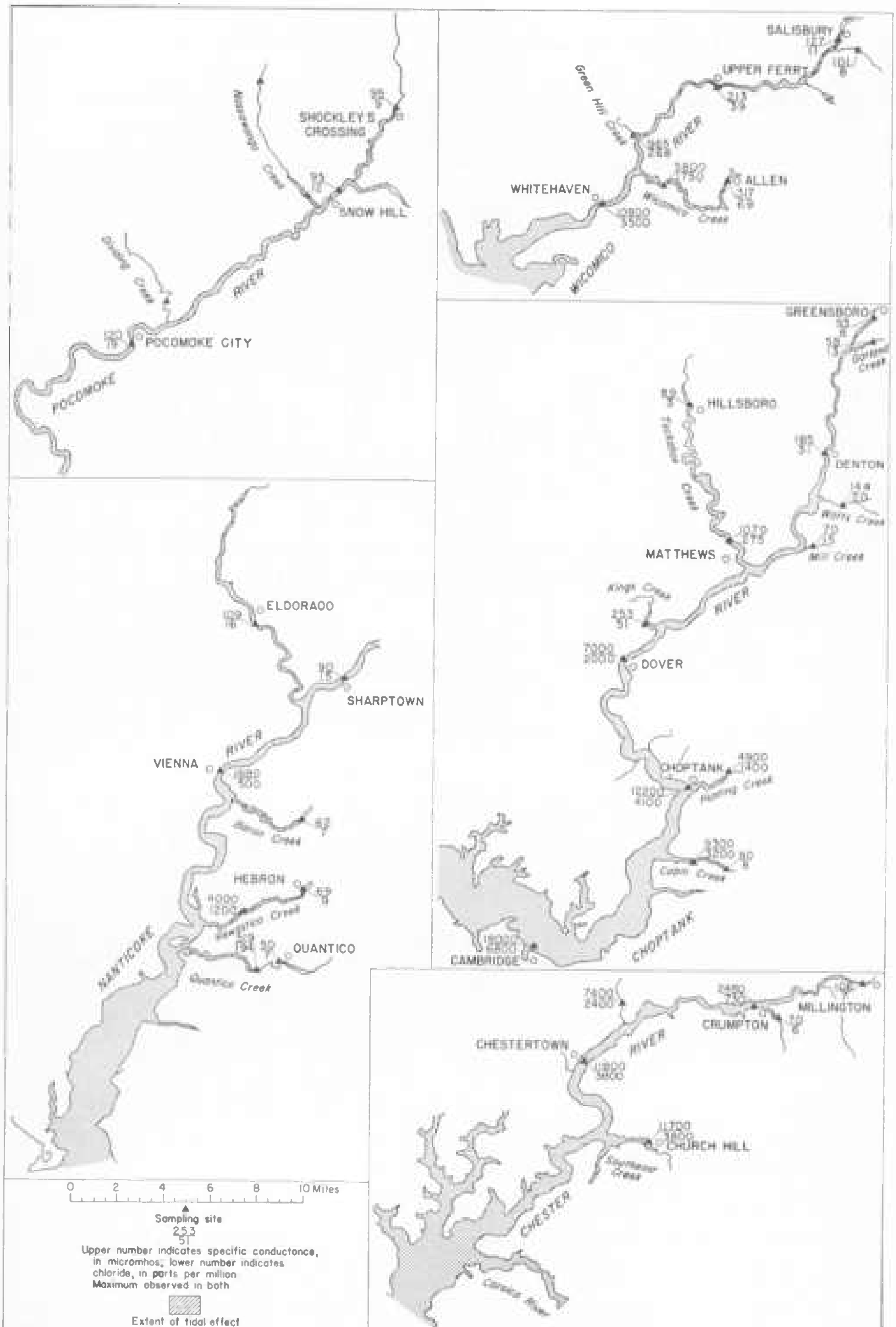

FIGURE 15. Observed Maximum Specific Conductance and Chloride at Surface-water Sampling Sites.

lack of boat facilities for obtaining representative water samples of the river. Tables 47 and 48 show chemical analyses of the river and tributary waters.

The analyses show upstream saline penetration at high tide in the river and

TABLE 44

Chemical and Physical Data for Pocomoke River at Pocomoke, July to August 1952

Date	Estimated mean daily discharge (c.f.s.)	Tide stage	Chloride (ppm)	Specific conductance (micromhos)	pH
July 22	60	High	14	108	6.7
July 22	60	Low	13	89.3	6.3
Aug. 25	180	High	11	95.9	6.9
Aug. 26	160	Low	9	82.2	6.8

TABLE 45

Chemical and Physical Data for Wicomico River, August 11–12, 1952

(parts per million except conductance and pH)

Constituent	Sampling Sites					
	Whitehaven		Upper Ferry		Salisbury	
	Low tide	High tide	Low tide	High tide	Low tide	High tide
Sodium and potassium	950	2,200	10	35	10	9.8
Chloride	1,600	3,500	13	39	7.0	7.5
Hardness	800	1,200	10	28	15	16
Specific conductance (micromhos)	6,000	10,800	98	213	75	85
pH	7.0	7.3	6.9	7.4	6.7	6.9

TABLE 46

Chemical and Physical Data for Tributaries of Wicomico River at High Tide, August 11, 1952

(parts per million except conductance and pH)

Constituents	A	B	C	D	E
Sodium and potassium	158	988	42	7.3	6.7
Chloride	268	1,750	69	6.0	6.0
Hardness	95	610	50	18	14
Specific conductance (micromhos)	965	5,800	317	68.6	58.0
pH	6.8	7.2	6.6	6.7	6.6

A. Green Creek at bridge on route Md. 352.
B. Wicomico Creek at Ferry Road (about 4 miles below Allen).
C. Wicomico Creek at Allen.
D. Tonytank Creek about 1 mile below Salisbury.
E. East Branch Wicomico River at Salisbury.

its tributaries to a point between Vienna and Sharptown, a distance of at least 20 miles.

TABLE 47

Chemical and Physical Data for Nanticoke River, August 11, 1952

(parts per million except conductance and pH)

Constituent	Vienna		Sharptown	
	High tide	Low tide	High tide	Low tide
Sodium and potassium	185	34	12	7.5
Chloride	310	47	14	7.5
Specific conductance (micromhos)	1,150	215	90.2	64.0
pH	7.0	6.8	6.7	6.8

TABLE 48

Chemical and Physical Data for Tributaries of Nanticoke River at High Tide

(parts per million except conductance and pH)

Constituent	A	B	C	D	E
Sodium and potassium	7.3	8.8	694	5.0	86
Chloride	7.0	7.5	1,220	6.6	134
Specific conductance (micromhos)	61.9	65.6	4,070	49.5	519
pH	6.2	6.9	6.9	6.8	6.8

A. Baron Creek at Mardella Springs.
B. Rewastico Creek at Rewastico Pond.
C. Rewastico Creek 4 miles below Rewastico Pond.
D. Quantico Creek at Quantico.
E. Quantico Creek 2 miles below Quantico.

TABLE 49

Chloride, Conductivity, and Discharge Measurements for Nanticoke River at Vienna

Date	Estimated mean daily discharge (cfs)	Chloride (ppm)	Specific conductance (micromhos)
July 1, 1952	320	475	1,680
July 2, 1952	280	498	1,750
Aug. 11, 1952	4,300	348	1,280

Quantico and Rewastico Creeks join the Nanticoke River approximately 8 and 9 miles upstream from the mouth of the river, respectively. Saline water is prevalent in the tidal reaches of both these streams at high tide. Above the tidal reach the waters are quite low in dissolved solids and chloride.

Table 49 gives the relative concentrations of salinity in the river 2 hours after high tide at Vienna during different stream discharge rates. It shows that the salinity of the river water decreases as the stream flow increases, as is generally the case in estuaries.

Figure 15 shows the maximum salinity measurements of the water in the Nanticoke River and its principal tributaries.

Choptank River

Salinity measurement in the Choptank River basin extended from Cambridge, 1 mile above the mouth of the river, to Greensboro, approximately 40 miles above the mouth of the river. Sampling sites were selected at Denton and Dover and at the aforementioned points. Tuckahoe Creek, a major tributary was sampled from the bridge on Rt. 457 near Matthews. King's Creek and Hunting Creek were also investigated for possible saline encroachment during tide cycles. Hunting Creek was sampled at its junction with the Choptank River, and the results of analyses are considered representative of quality of water conditions in the main stem. Figure 15 shows the maximum salinity measurements in the river and its tributaries.

TABLE 50

Chemical and Physical Data for Choptank River at Denton

Date	Mean daily discharge (cfs)	High tide		Low tide	
		Chloride (ppm)	Specific conductance (micromhos)	Chloride (ppm)	Specific conductance (micromhos)
September 18	63	9.0	85.2	9.5	86.3
October 28	48	31	185	10	90.3

The farthest point upstream at which a significant increase in specific conductivity and chloride concentrations at high tide occurred was at Denton, approximately 26 miles upstream from the mouth of the river. This occurred only on October 28. Throughout the river basin, the concentrations observed on this date were greater than on any other sampling date.

Table 50 shows the variations in salinity concentrations in the river at Denton at high and low tide on October 28 compared to September 18 which shows conditions that were generally prevalent during the investigation.

With the exception of the sample for October 28 at Denton, salinity variation, as related to tide cycles in the river, occurred no further upstream than to Tuckahoe Creek near Matthews. At Matthews, chloride concentrations varied from 7 ppm. to 275 ppm. in a single tide cycle. Below this point the concentration of chloride ion in the main stem of the river and its tributaries differed with the distance from the mouth of the river, rate of discharge, and factors affecting the tidal movements in the Chesapeake Bay. Concentrations of several chemical constituents in the river and tributaries at high tide are shown in Table 51. A through F, arranged in downstream order, show increase in salinity concentrations as the mouth of the river is approached both in the main stem and in the tributaries.

TABLE 51

Chemical and Physical Data for Choptank River and Tributaries at High Tide

(parts per million except conductance and pH)

Constituents	A	B	C	D	E	F
Sodium and potassium	33	531	832	1,537	1,875	3,130
Chloride	44	920	1,440	2,550	3,200	5,450
Hardness	39	336	510	850	1,065	1,820
Specific conductance	218	3,130	4,900	7,820	9,300	15,300
pH	6.9	6.9	6.8	6.9	6.9	8.3

A. Kings Creek near Easton.
B. Choptank River at Dover.
C. Hunting Creek 2 miles above Choptank.
D. Hunting Creek at Choptank.
E. Cabin Creek near Cabin Creek.
F. Choptank River at Cambridge.

TABLE 52

Chemical and Physical Data for Chester River, October 27, 1952

(parts per million except conductance and pH)

Constituent	Chestertown		Crumpton		Millington	
	Low tide	High tide	Low tide	High tide	Low tide	High tide
Sodium and potassium	1,764	2,160	212	353	7.4	9.2
Chloride	2,960	3,820	360	625	6.2	7.6
Hardness	990	1,320	150	248	37	31
Specific conductance (micromhos)	9,140	11,800	1,380	2,330	97.7	106
pH	7.1	7.1	6.9	6.9	—	7.0

Chester River

The Chester River from Millington to its mouth is about 27 miles in length. Sampling sites were selected at Chestertown, Crumpton and Millington. Figure 15 shows the maximum salinity measurements.

Table 52 shows the occurrence of high chloride upstream for a distance of at least 23 miles to the sampling site at Crumpton. High concentrations of chloride were present at both high and low tides. At Millington no appreciable increase or decrease in conductivity or chloride content was observed during tide cycles.

Samples collected at high tide from tributaries upstream from Crumpton show no evidence of saline contamination that could be attributed to tidal movements in the river. Morgan Creek, located about 2 miles above Chestertown showed definite changes in chloride content through the tide cycle.

Wye, Chicamacomico, and Manokin Rivers

Three smaller rivers, Wye River, Chicamacomico River, and Manokin River, were also sampled. The analyses of samples collected at high tide from the tidal and non-tidal sections of these rivers are shown in Table 53. Evidence of saline penetration is observed in all three streams. The saline encroachment extends through most of their length (fig. 14).

TABLE 53

Salinity Measurements in Manokin, Chicamacomico and Wye Rivers

(parts per million except conductance and pH)

Constituent	A	B	C	D	E	F
Sodium and potassium	14	74	5.6	92	6.3	2,438
Chloride	9.0	108	5.0	152	5.8	3,950
Hardness	19	69	7	49	30	1,290
Specific conductance (micromhos)	94.8	520	39.5	583	138	11,700
pH	6.6	6.5	6.6	6.5	6.9	7.4

A. Manokin River at Princess Anne (non-tidal reach).
B. Manokin River at Princess Anne (tidal reach).
C. Chicamacomico River near Salem (non-tidal reach).
D. Chicamacomico River at New Bridge (tidal reach).
E. Wye River near Queenstown (non-tidal reach).
F. Wye River near Carmichael (tidal reach).

Profile Samples

Salinity variations at different depths at a given stage in a tide cycle were investigated. Lack of facilities for obtaining representative samples limited sampling in the Wicomico River to Salisbury. Top and bottom samples at Salisbury showed little or no variation from low to high tide since the river is unaffected by saline penetration this far upstream. The same would be true of the Pocomoke River where the chemical characteristics of the stream remained relatively unchanged during tide cycles.

In the Nanticoke, Choptank and Chester Rivers, variation in chloride concentrations occurred at several stations during the period from low to high tide. In every case, the salinity of the water was greater near the bottom of the stream. Table 54 shows specific conductance and chloride values for top and bottom samples during rising tide stage.

TABLE 54

Specific Conductance and Chloride in Top and Bottom Samples

Location	Chloride		Specific conductance	
	Top	Bottom	Top	Bottom
1	49	60	231	259
2	310	330	1150	1210
3	5350	5720	15000	15700
4	5450	5680	15300	16300
5	518	560	1860	1970
6	920	1030	3130	3480
7	3250	3400	10500	10700
8	3820	4000	11600	11800
9	538	540	1990	2080
10	638	660	2280	2330

1. Nanticoke River at Vienna—3 hours before high tide.
2. Nanticoke River at Vienna—at high tide.
3. Choptank River at Cambridge—3 hours before high tide.
4. Choptank River at Cambridge—at high tide.
5. Choptank River at Dover—3 hours before high tide.
6. Choptank River at Dover—at high tide.
7. Chester River at Chestertown—1 hour before high tide.
8. Chester River at Chestertown—at high tide.
9. Chester River at Crumpton—1 hour before high tide.
10. Chester River at Crumpton—at high tide.

TABLE 55

Chemical and Physical Characteristics of Water from the Sea, Chesapeake Bay, and Streams of the Eastern Shore

Constituents	A	B	C	D	E	F	G
Sodium and potassium (Na + K)	11,000	3,900	1,900	2,050	694	3,880	2,160
Bicarbonate (HCO_3)	150	65	53	60	39	60	62
Sulfate (SO_4)	2,690	1,100	484	580	140	1,060	560
Chloride (Cl)	19,350	6,820	3,450	3,550	1,220	6,750	3,820
Hardness	6,390	2,250	1,280	1,200	406	2,250	1,320
Specific conductance (micromhos)	—	18,100	11,100	10,800	4,070	19,000	11,800
pH	—	7.5	7.5	7.1	6.9	7.0	7.1

A. Sea water—Challenger Expedition—Average of 75 samples.
B. Chesapeake Bay at Bay Bridge—Oct. 29, 1952, high tide.
C. Chesapeake Bay at Bay Bridge—Oct. 29, 1952, low tide.
D. Wicomico River at Whitehaven—August 25, 1952, high tide.
E. Rewastico Creek below Hebron—August 12, 1952, high tide.
F. Choptank River at Cambridge—October 28, 1952, high tide.
G. Chester River at Chestertown—October 27, 1952, high tide.

TABLE 56

Principal Mineral Constituents at Low and High Tide in the Estuaries of the Eastern Shore, July to October 1952

(parts per million except pH and specific conductance)

Constituents	Pocomoke River[a]		Nassawango Creek[b]		Wicomico River[c]		Wicomico Creek[d]		Nanticoke River[e]		Quantico Creek[f]		Choptank River[g]		Tuckahoe Creek[h]		Chester River[i]	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Silica (SiO_2)	19	17	17	18	5.0	4.2	16	15	3.5	0.9	16	13	4.2	4.0	0.7	0.6	6.6	6.0
Calcium (Ca)	5.3	4.8	4.0	4.2	4.0	5.7	7.6	8.5	4.6	11	3.5	6.9	46	61	5.9	5.9	17	26
Magnesium (Mg)	1.7	1.7	1.7	1.8	1.1	3.3	3.1	7.1	3.5	21	.8	8.2	78	155	3.7	4.9	26	45
Sodium (Na)	8.5	9.0		8.7		30	5.8		31	176		80			5.4	30	198	
			11		1.4			42			5.0		680	1,260				352
Potassium (K)	1.7	2.2		1.8		4.5	2.3		3.2	8.8		5.9			2.3	2.6	14	
Bicarbonate (HCO_3)	23	23	22	22	28	41	28	28	20	20	10	15	35	41	26	26	37	36
Sulfate (SO_4)	9.0	9.8	7.5	7.8	7.0	12	11	19	13	49	4.0	31	179	330	9.0	20	78	100
Chloride (Cl)	8.8	9.2	9.0	8.9	10	39	9.5	69	47	310	6.6	134	1,220	2,240	9.0	43	360	625
Nitrate (NO_3)	1.2	1.3	1.3	1.3	.7	.5	.6	1.1	.7	.0	1.8	1.5	1.0	1.2	.6	.6	.8	1.0
Hardness as $CaCO_3$	20	19	17	18	14	28	32	50	26	114	12	51	430	790	30	35	150	250
pH	6.6	6.6	6.6	6.5	7.9	7.3	6.6	6.9	6.8	7.0	5.8	6.3	7.0	6.9	6.5	7.0	6.9	6.9
Specific Conductance ($K \times 10^6$)	86.1	89.0	78.8	80.0	98.3	213	102	317	215	1,150	49.5	519	4,190	7,370	84.3	209	1,380	2,330

a Snow Hill, June 22, 1952.
b Near Snow Hill, June 22, 1952.
c Upper Ferry, August 12, 1952.
d Allen, August 12, 1952.
e Vienna, August 11, 1952.
f Below Quantico, August 27, 1952.
g Dover, August 28, 1952.
h Near Matthews, September 18, 1952.
i Crumpton, October 27, 1952.

Table 55 shows the relative concentrations of constituents in several streams as compared to sea water and water from the Chesapeake Bay.

Table 55 shows that the water in Chesapeake Bay at the Chesapeake Bay Bridge is somewhat more dilute than sea water, that there is a marked similarity in the water from the lower reaches of Choptank River and from the Bay at high tide, and that there is a similarity in concentrations in the water from the Wicomico and Chester Rivers at high tide and the Bay at low tide. These similarities are principally related to the proximity of the sampling sites to the Bay.

Table 56 summarizes the principal mineral constituents of water in the several river basins.

USE OF WATER FOR IRRIGATION

Data on the use of water from estuaries for irrigation in the Eastern United States are sparse, although publications listing limiting amounts of soluble salts in irrigation waters and in soils are available. The United States Salinity Laboratory (Wilcox, 1948; U. S. Salinity Laboratory Staff, 1954) provides empirical classifications which are used as a guide in preliminary evaluation of water for irrigation, but the classifications are tentative and were developed principally for use in Western United States. Their applicability to conditions on the Eastern Shore of Maryland is open to question and requires a careful appraisal of the many hydrologic, geologic, and topographic factors and farming practices that are involved.

Basically, the water is divided into four classes, the dividing points being 250, 750, and 2250 micromhos respectively, ranging from a *low-salinity water*, that can be used for irrigation with most crops on most soils with little likelihood that soil salinity will develop, to very *high-salinity water*, which is not suitable for irrigation under ordinary conditions but may be used occasionally under special circumstances.

A second grouping is based on percent sodium, ranging from *low-sodium water* to *very high-sodium water*. Percent sodium is the percentage of sodium in the sum of calcium, magnesium, sodium and potassium in which the concentrations of the individual constituents are expressed in equivalents per million. The adverse effect on the soil is more closely related to the ratio of sodium to the total cations in the water than to the absolute concentration of sodium. Waters having percent sodium greater than 60 are generally not satisfactory for irrigation.

The amount of boron in the water is another factor in the classification; however, boron determinations were not made in this investigation.

Fig. 16 denotes the range of specific conductance and percent sodium content of the water in each of the five streams at high and low tide. Using Wilcox's salinity groupings as a standard, the specific conductance scale in figure 16

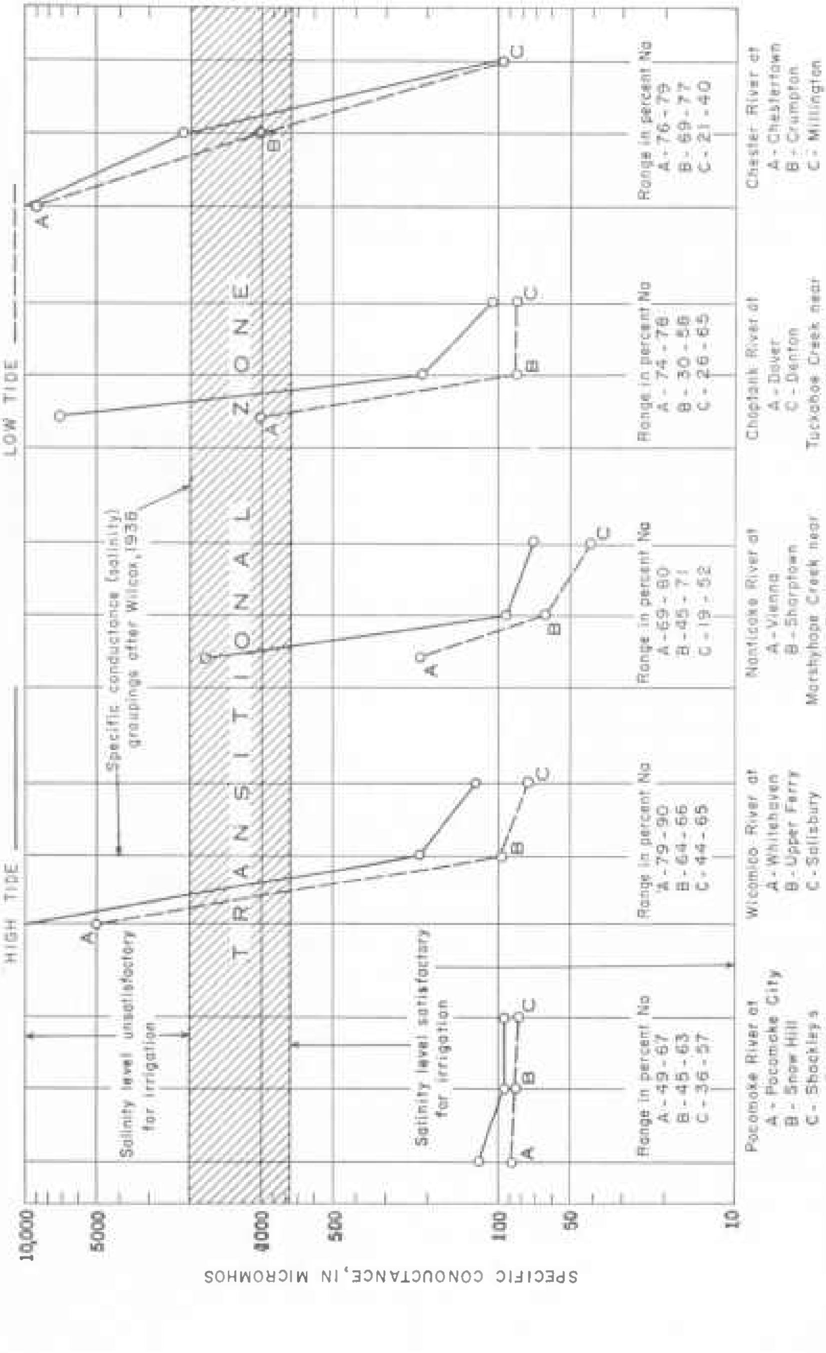

FIGURE 16. Maximum and Minimum Specific Conductance observed for Streams on Eastern Shore.

delineates general suitability of the water in the streams for supplemental irrigation at maximum and minimum observed concentrations.

The following conclusions may be given regarding the suitability of the water for irrigation purposes.

1. The Pocomoke River, which is low in specific conductance regardless of the water stage, would have an excellent rating for irrigation, although percent sodium at times exceeds 60.

2. The Wicomico River from Upper Ferry upstream, regardless of tide stage, is satisfactory for irrigation although percent sodium at times exceeds 60.

3. The Nanticoke River is satisfactory for irrigation from Vienna on upstream at low tide. However, at high tide, the specific conductance of the stream at Vienna falls in the transition or questionable zone. Here also, the percent sodium content averaged 76. The combination of the two factors relegates the water to a doubtful category for irrigation.

4. Choptank River appears suitable as a supplemental source of irrigation water regardless of tide stage upstream from Tuckahoe Creek. At Dover, its use would be dependent upon the tide stage of the river. At low tide the conductivity of the stream was approximately 1150 micromhos and the percent sodium was 77, making its use for irrigation water doubtful. At high tide the stream is definitely unsatisfactory.

5. The Chester River at Millington appears to be satisfactory for irrigation regardless of the tide stage. However, from Crumpton downstream the water would range from doubtful to unsatisfactory regardless of the tide stage.

The time and extent of water withdrawals during tide cycles would influence greatly the use of the water for supplemental irrigation. The data in figure 16 are maximum and minimum observations during the investigation period. Variations in tide cycles and stream discharge rates may change the specific conductivity and percent sodium content of the water at a given site. These factors would be particularly influential at upstream locations where noticeable fluctuations occur in the quality of the water at various tide stages in the river.

SUMMARY

Results of chemical analyses of the water in five major estuaries on the Eastern Shore, during the period of July through October 1952, indicate that the Wicomico, Nanticoke, Choptank and Chester River basins are subject to extensive encroachment of salt water from Chesapeake Bay, whereas the chemical quality of the Pocomoke River basin was unaffected. Tide stages, discharge rates, and precipitation all affected the degree and extent of this encroachment.

Near the mouth of the streams regardless of tide stage or water discharge, the water was highly saline at all times. Other sites, depending upon their proximity to the mouth of the stream, varied in the concentration of chloride. These data were obtained during average climatological conditions and river

discharge rates. They would be altered considerably by periods of drought or intensive rainfall resulting in below normal and above normal runoff in the area.

This preliminary study supplies the minimum basic data necessary in obtaining a view of some of the fundamental chemical quality conditions in the surface waters of the Eastern Shore. With respect to the suitability of the surface water for supplemental irrigation at specific withdrawal sites, further investigations relating the tide stage and discharge rate with chemical quality are necessary to assure adequate coverage for extreme conditions affecting the quality of water.

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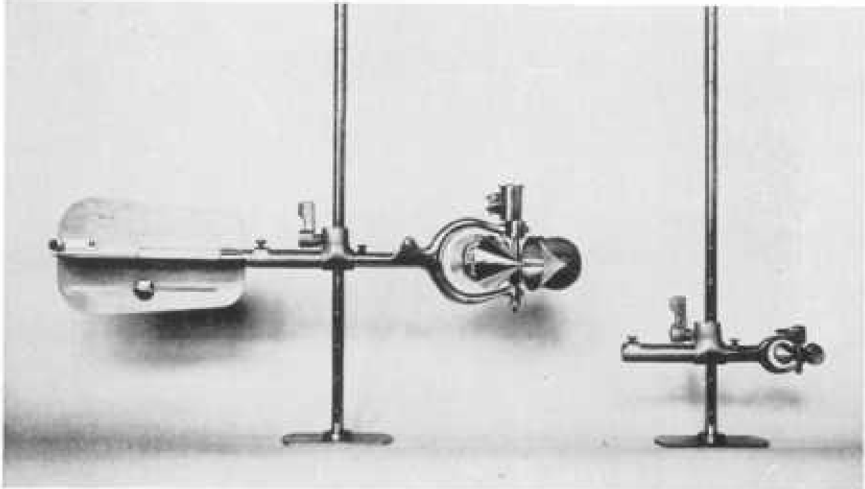


FIGURE 1. Price Standard Current Meter and Pygmy Meter, suspended on Wading Rods, used to measure Discharge.

FIGURE 2. Engineer making Discharge Measurements by Wading

FIGURE 1. Gage House on Choptank River near Greensboro, Caroline County

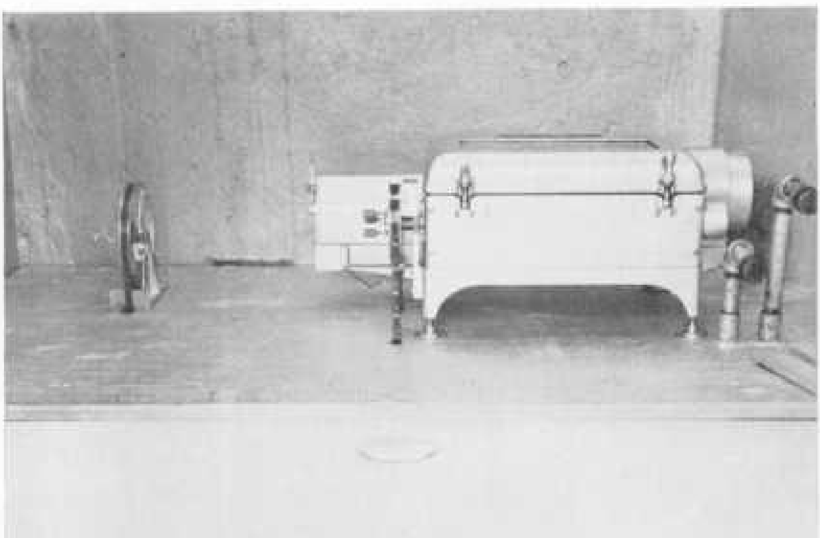
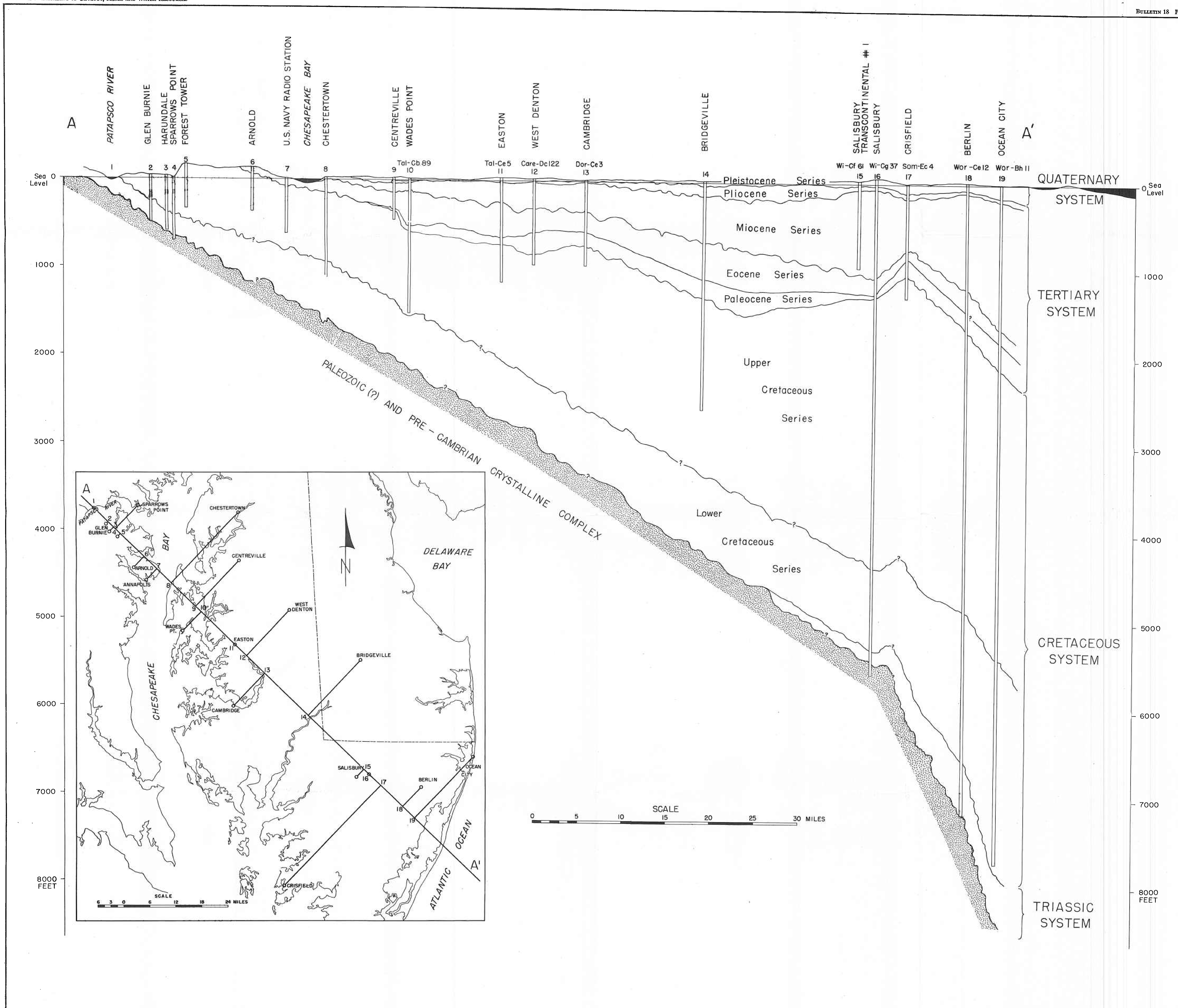
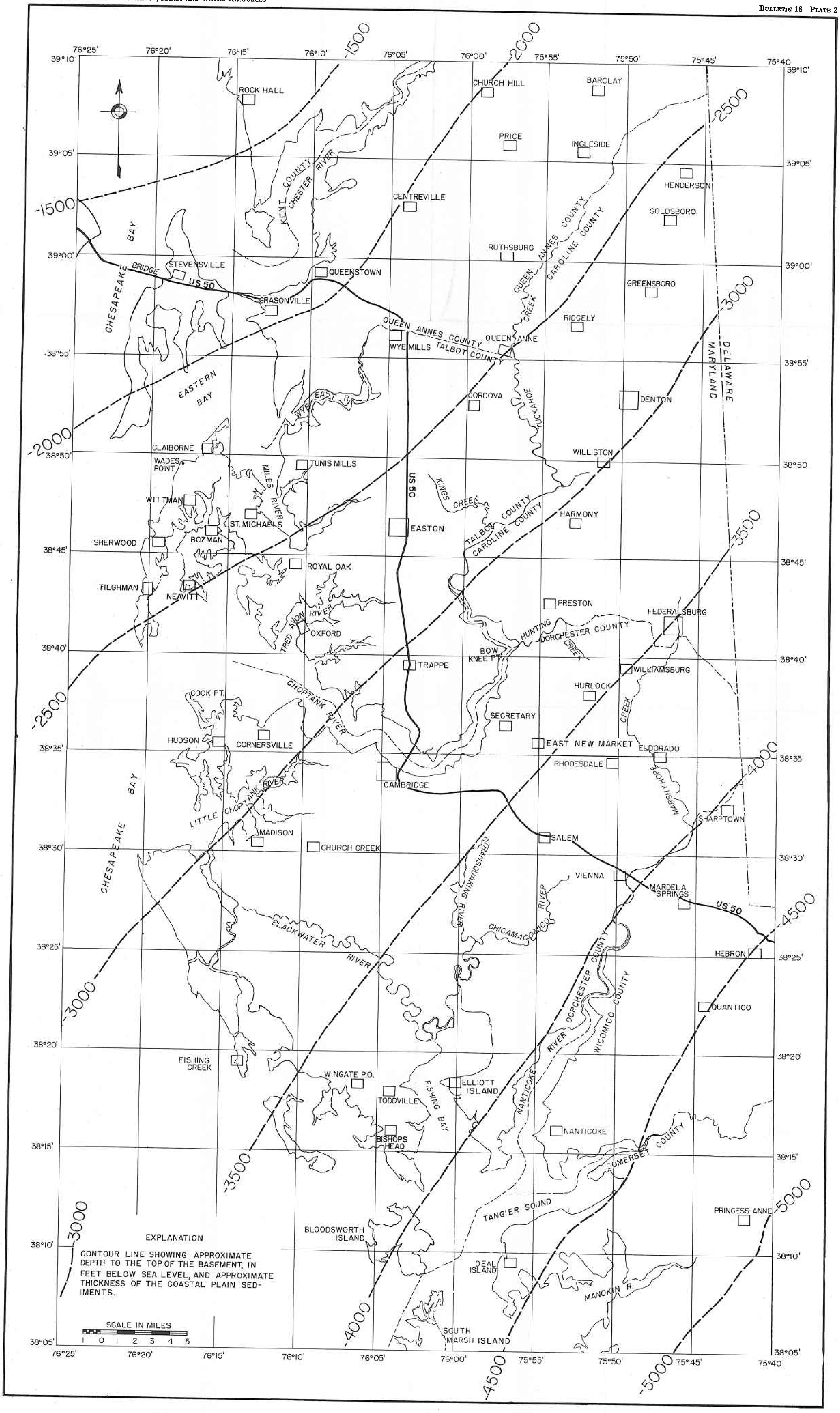


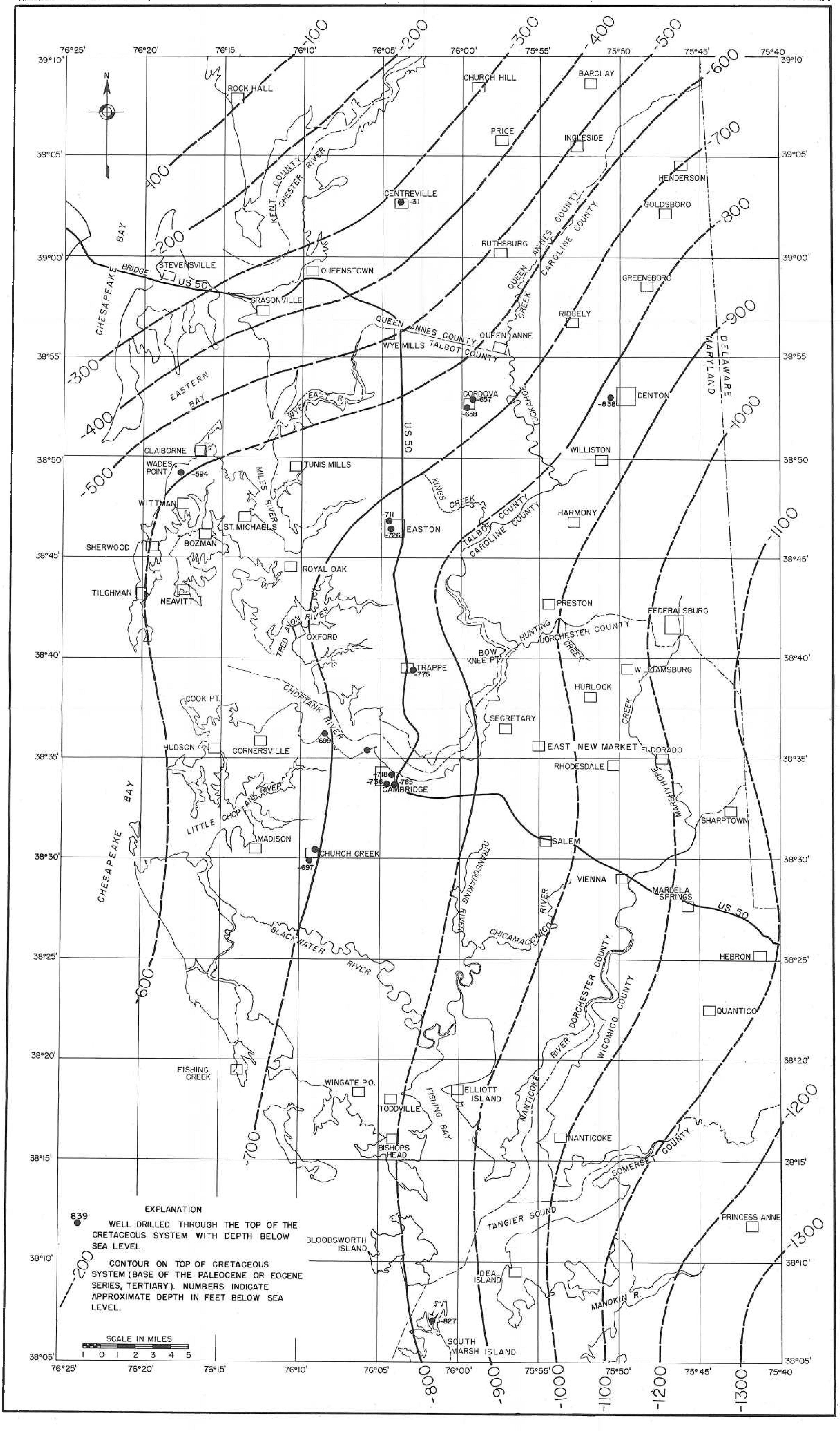
FIGURE 2. Automatic Water-Stage Recorder with Reference Tape Gage and Intake-Flushing Valve Handles in Gage House

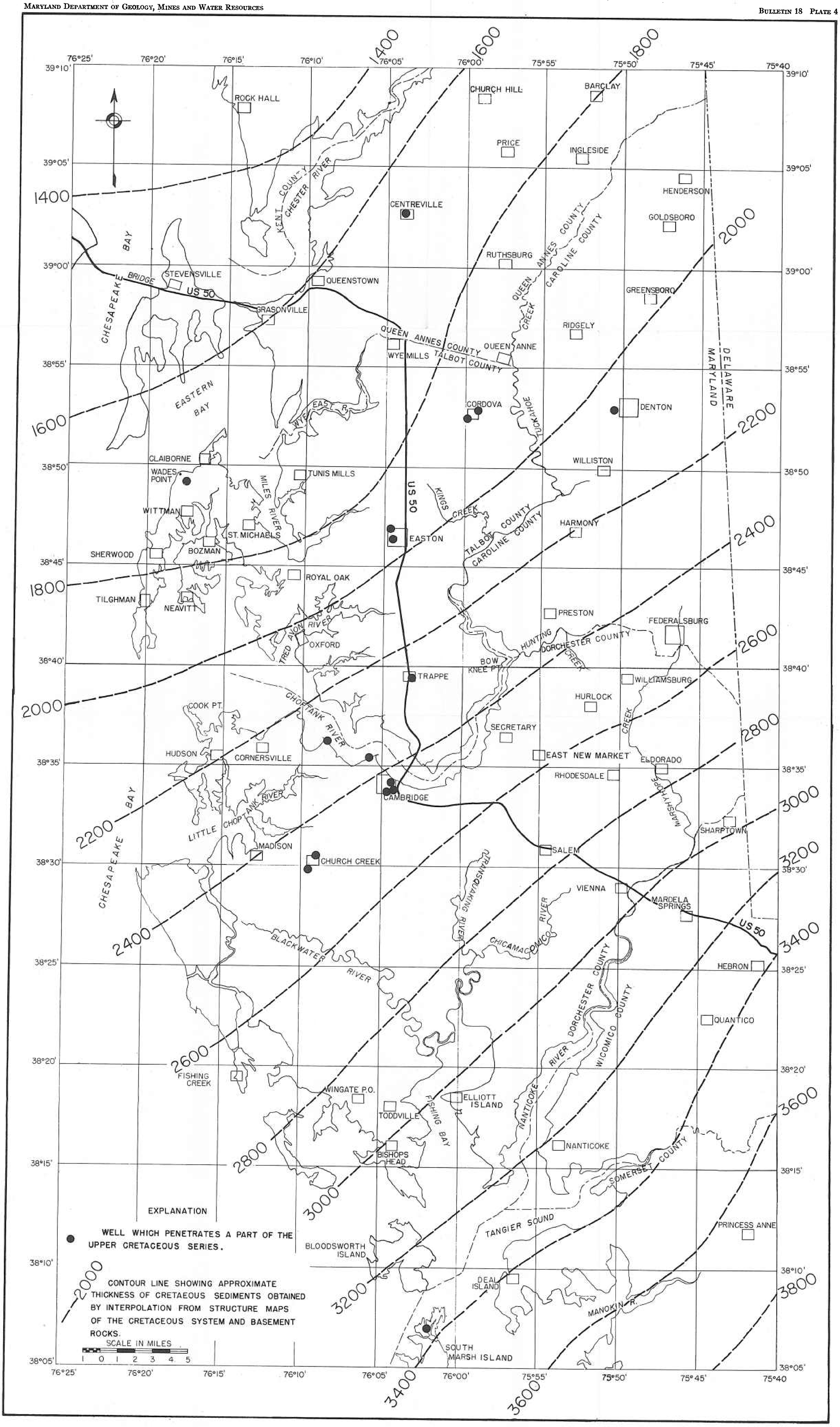
INDEX*

* Page numbers in **Boldface** type indicate detailed descriptions.

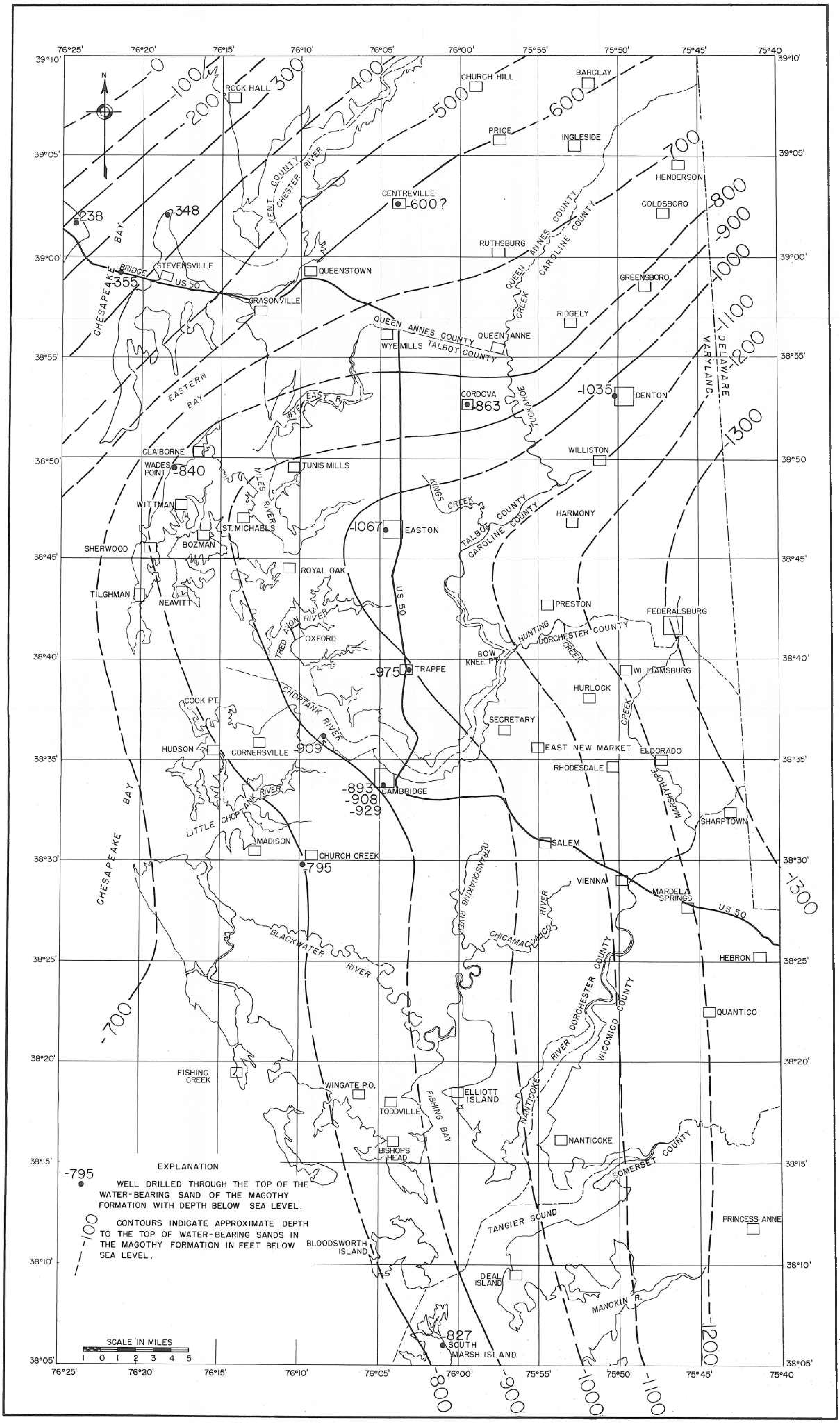

A
A′
PATAPSCO RIVER
GLEN BURNIE
HARUNDALE
SPARROWS POINT
FOREST TOWER
ARNOLD
U.S. NAVY RADIO STATION
CHESAPEAKE BAY
CHESTERTOWN
CENTREVILLE
WADES POINT
EASTON
WEST DENTON
CAMBRIDGE
BRIDGEVILLE
SALISBURY
TRANSCONTINENTAL # 1
SALISBURY
CRISFIELD
BERLIN
OCEAN CITY
Tal-Cb 89
Tal-Ce 5
Care-Dc 122
Dor-Ce 3
Wi-Cf 61
Wi-Cg 37
Som-Ec 4
Wor-Ce 12
Wor-Bh 11
Sea Level 0
1000
2000
3000
4000
5000
6000
7000
8000 FEET
Pleistocene Series
Pliocene Series
Miocene Series
Eocene Series
Paleocene Series
Upper Cretaceous Series
Lower Cretaceous Series
PALEOZOIC (?) AND PRE-CAMBRIAN CRYSTALLINE COMPLEX
QUATERNARY SYSTEM
TERTIARY SYSTEM
CRETACEOUS SYSTEM
TRIASSIC SYSTEM
SCALE
0 5 10 15 20 25 30 MILES
DELAWARE BAY
ATLANTIC OCEAN
CHESAPEAKE
BAY
ANNAPOLIS
WADES PT.
SCALE
6 3 0 6 12 18 24 MILES

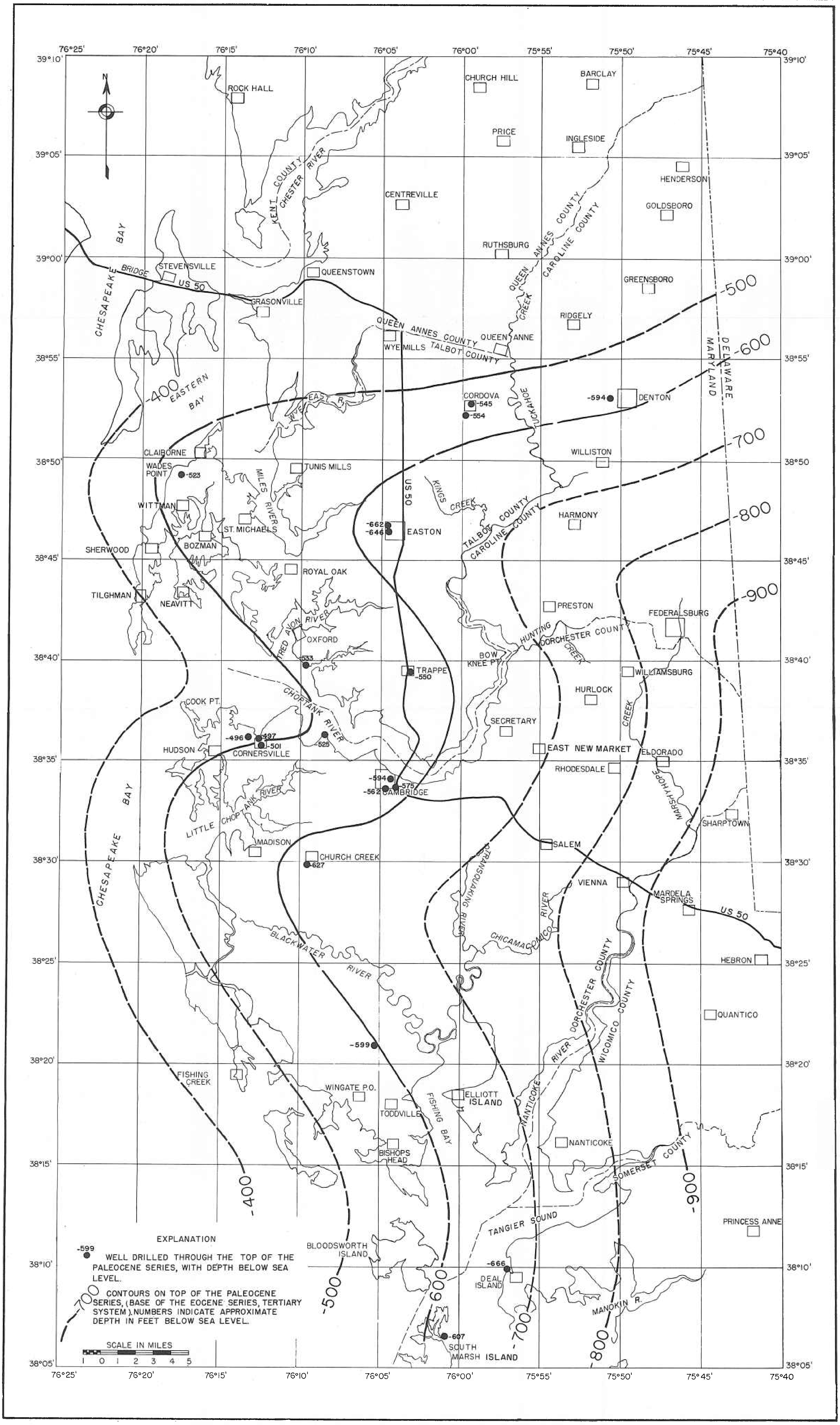

EXPLANATION
CONTOUR LINE SHOWING APPROXIMATE DEPTH TO THE TOP OF THE BASEMENT, IN FEET BELOW SEA LEVEL, AND APPROXIMATE THICKNESS OF THE COASTAL PLAIN SEDIMENTS.
SCALE IN MILES
1 0 1 2 3 4 5
-1500
-2000
-2500
-3000
-3500
-4000
-4500
-5000
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
GOLDSBORO
CENTREVILLE
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
GRASONVILLE
GREENSBORO
RIDGELY
QUEEN ANNE
WYE MILLS
CORDOVA
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
WILLISTON
WITTMAN
ST. MICHAELS
EASTON
HARMONY
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
OXFORD
PRESTON
FEDERALSBURG
TRAPPE
BOW KNEE PT.
WILLIAMSBURG
HURLOCK
COOK PT.
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
SHARPTOWN
MADISON
CHURCH CREEK
SALEM
VIENNA
MARDELA SPRINGS
HEBRON
QUANTICO
FISHING CREEK
WINGATE P.O.
TODDVILLE
ELLIOTT ISLAND
BISHOPS HEAD
NANTICOKE
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
SOUTH MARSH ISLAND
CHESAPEAKE BAY
BRIDGE
US 50
EASTERN BAY
KENT COUNTY
CHESTER RIVER
QUEEN ANNES COUNTY
TALBOT COUNTY
CAROLINE COUNTY
DORCHESTER COUNTY
WICOMICO COUNTY
SOMERSET COUNTY
DELAWARE
MARYLAND
WYE EAST R.
MILES RIVER
TUCKAHOE CREEK
KINGS CREEK
TRED AVON RIVER
CHOPTANK RIVER
LITTLE CHOPTANK RIVER
HUNTING CREEK
MARSHYHOPE CREEK
TRANSQUAKING RIVER
CHICAMACOMICO RIVER
BLACKWATER RIVER
NANTICOKE RIVER
FISHING BAY
TANGIER SOUND
MANOKIN R.
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'
76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40

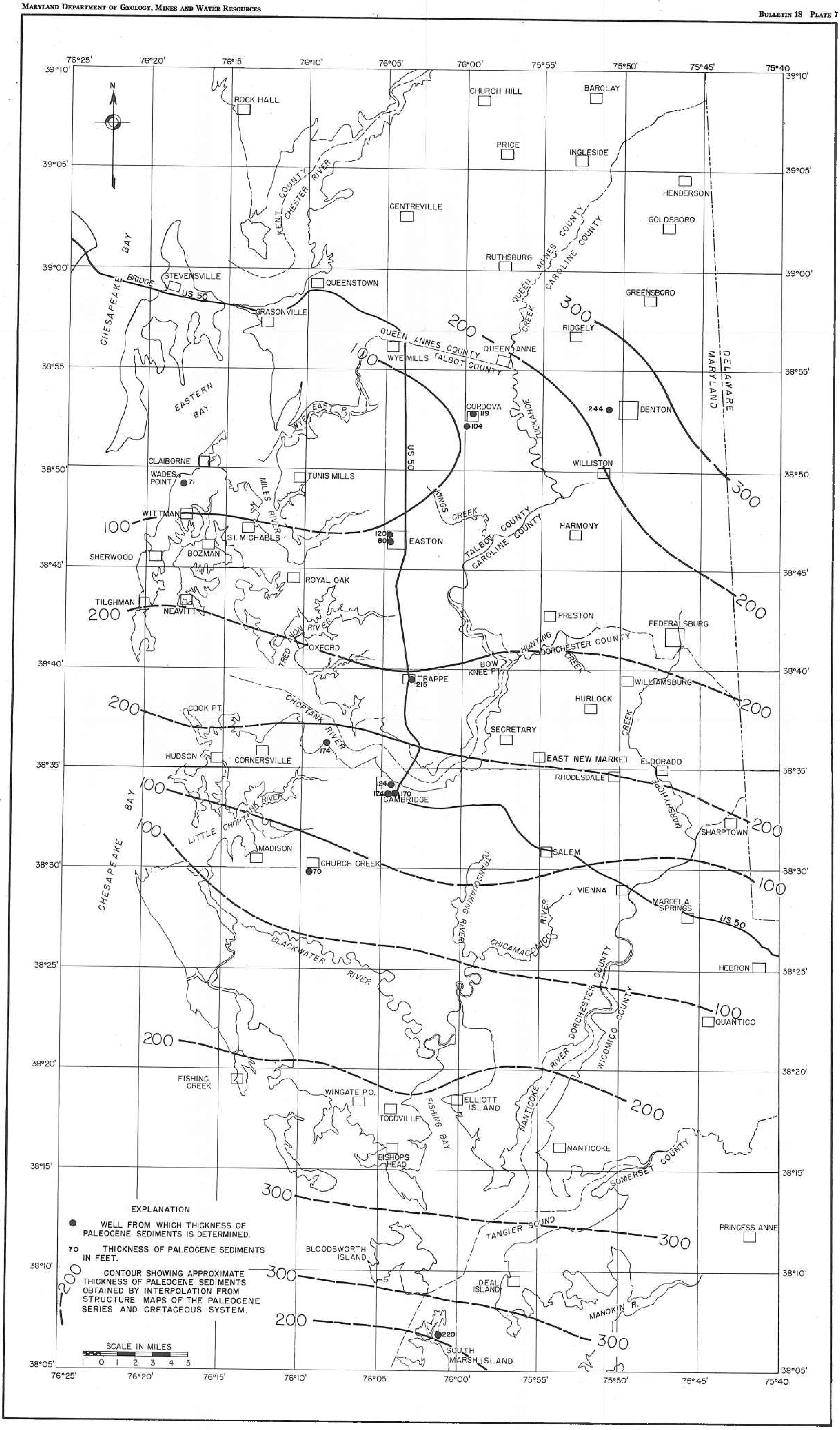

EXPLANATION
839 WELL DRILLED THROUGH THE TOP OF THE CRETACEOUS SYSTEM WITH DEPTH BELOW SEA LEVEL.
-200 CONTOUR ON TOP OF CRETACEOUS SYSTEM (BASE OF THE PALEOCENE OR EOCENE SERIES, TERTIARY). NUMBERS INDICATE APPROXIMATE DEPTH IN FEET BELOW SEA LEVEL.
SCALE IN MILES
1 0 1 2 3 4 5
CHESAPEAKE BAY
EASTERN BAY
CHESAPEAKE BAY BRIDGE
US 50
CHESTER RIVER
KENT COUNTY
QUEEN ANNES COUNTY
TALBOT COUNTY
CAROLINE COUNTY
DORCHESTER COUNTY
WICOMICO COUNTY
SOMERSET COUNTY
DELAWARE
MARYLAND
CHOPTANK RIVER
LITTLE CHOPTANK RIVER
TRED AVON RIVER
MILES RIVER
WYE EAST R.
KINGS CREEK
TUCKAHOE CREEK
HUNTING CREEK
MARSHYHOPE CREEK
BLACKWATER RIVER
TRANSQUAKING RIVER
CHICAMACOMICO RIVER
NANTICOKE RIVER
MANOKIN R.
FISHING BAY
TANGIER SOUND
BOW KNEE PT.
COOK PT.
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
CENTREVILLE
GOLDSBORO
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
GRASONVILLE
GREENSBORO
RIDGELY
QUEEN ANNE
WYE MILLS
CORDOVA
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
WILLISTON
WITTMAN
ST. MICHAELS
EASTON
HARMONY
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
FEDERALSBURG
OXFORD
TRAPPE
WILLIAMSBURG
HURLOCK
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
SHARPTOWN
SALEM
MADISON
CHURCH CREEK
VIENNA
MARDELA SPRINGS
HEBRON
QUANTICO
FISHING CREEK
WINGATE P.O.
TODDVILLE
ELLIOTT ISLAND
BISHOPS HEAD
NANTICOKE
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
SOUTH MARSH ISLAND
-311
-657
-658
-838
-594
-711
-726
-775
-699
-718
-736
-765
-697
-827
-100
-200
-300
-400
-500
-600
-700
-800
-900
-1000
-1100
-1200
-1300
76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'
N

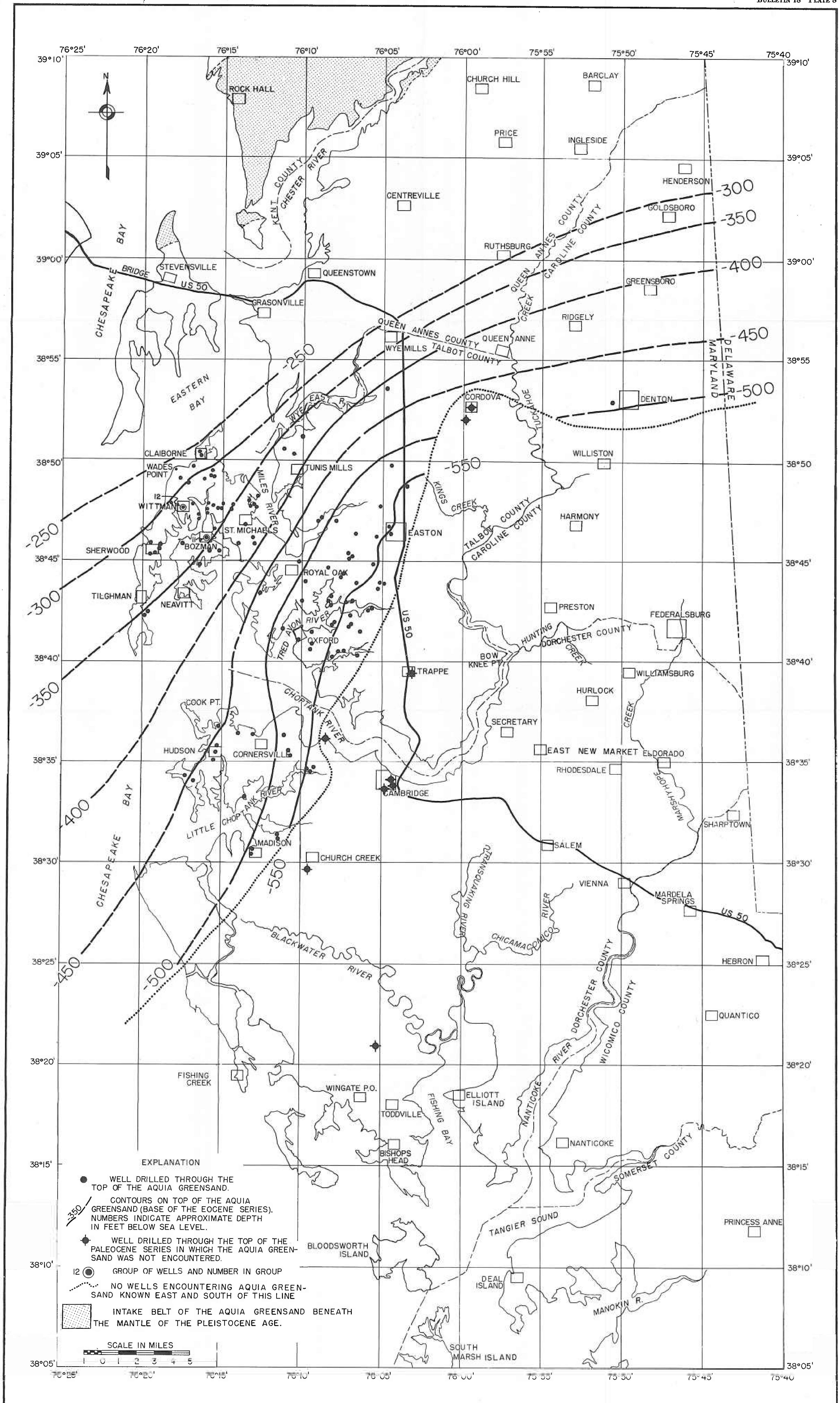


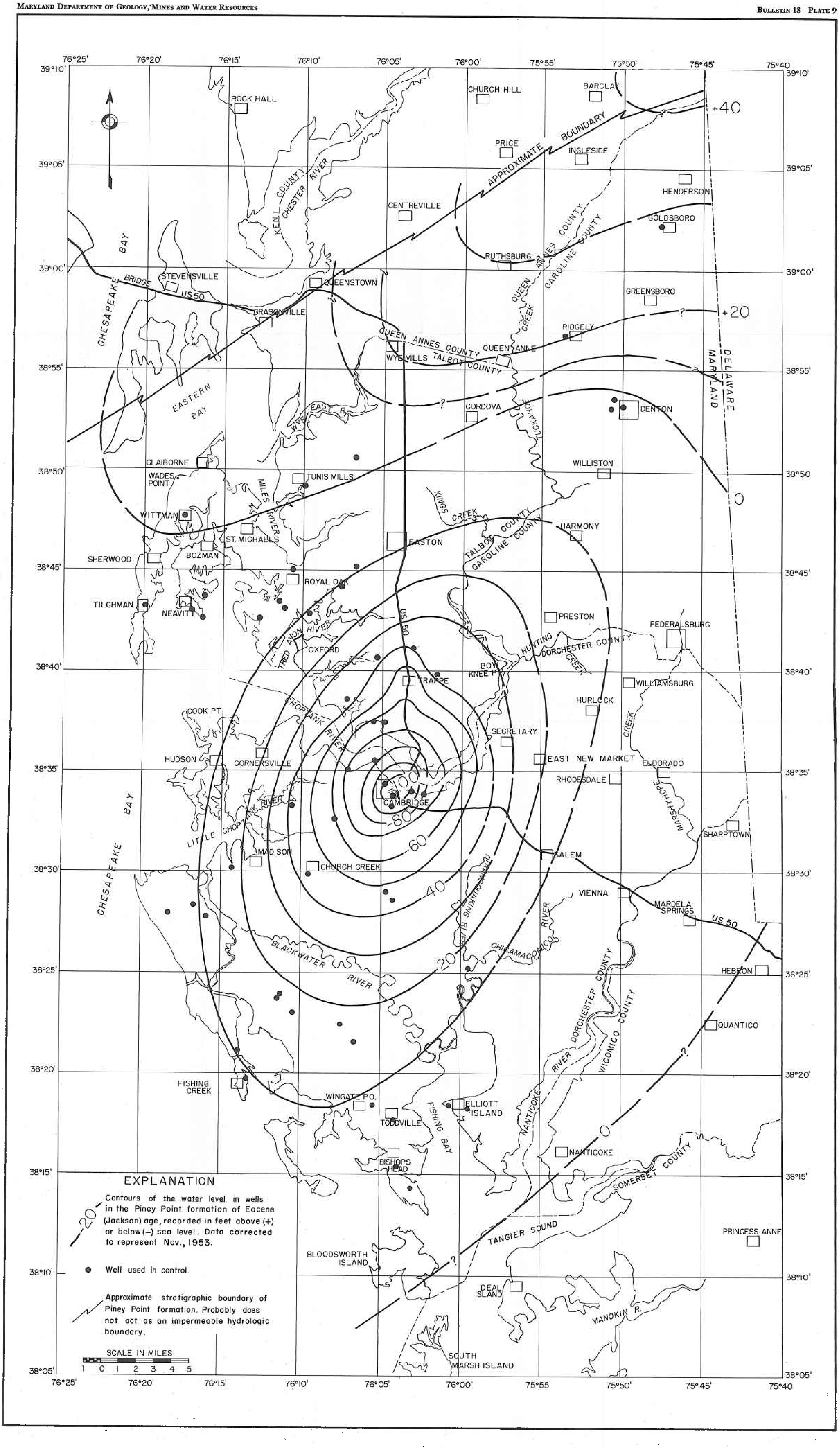
EXPLANATION
WELL WHICH PENETRATES A PART OF THE UPPER CRETACEOUS SERIES.
2000
CONTOUR LINE SHOWING APPROXIMATE THICKNESS OF CRETACEOUS SEDIMENTS OBTAINED BY INTERPOLATION FROM STRUCTURE MAPS OF THE CRETACEOUS SYSTEM AND BASEMENT ROCKS.
SCALE IN MILES
1 0 1 2 3 4 5
76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
CENTREVILLE
GOLDSBORO
KENT COUNTY
CHESTER RIVER
RUTHSBURG
QUEEN ANNES COUNTY
CAROLINE COUNTY
CHESAPEAKE BAY
BRIDGE
STEVENSVILLE
US 50
QUEENSTOWN
GRASONVILLE
GREENSBORO
RIDGELY
QUEEN ANNE
WYE MILLS
TALBOT COUNTY
DELAWARE
MARYLAND
EASTERN BAY
WYE EAST R.
CORDOVA
TUCKAHOE
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
WILLISTON
MILES RIVER
KINGS CREEK
WITTMAN
ST. MICHAELS
EASTON
HARMONY
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
FEDERALSBURG
TRED AVON RIVER
OXFORD
HUNTING CREEK
DORCHESTER COUNTY
BOW KNEE PT.
TRAPPE
WILLIAMSBURG
HURLOCK
COOK PT.
CHOPTANK RIVER
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
MARSHYHOPE
SHARPTOWN
LITTLE CHOPTANK RIVER
MADISON
CHURCH CREEK
SALEM
TRANSQUAKING RIVER
VIENNA
MARDELA SPRINGS
CHICAMACOMICO RIVER
BLACKWATER RIVER
HEBRON
WICOMICO COUNTY
QUANTICO
FISHING CREEK
NANTICOKE RIVER
WINGATE P.O.
ELLIOTT ISLAND
TODDVILLE
FISHING BAY
NANTICOKE
BISHOPS HEAD
SOMERSET COUNTY
TANGIER SOUND
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
MANOKIN R.
SOUTH MARSH ISLAND

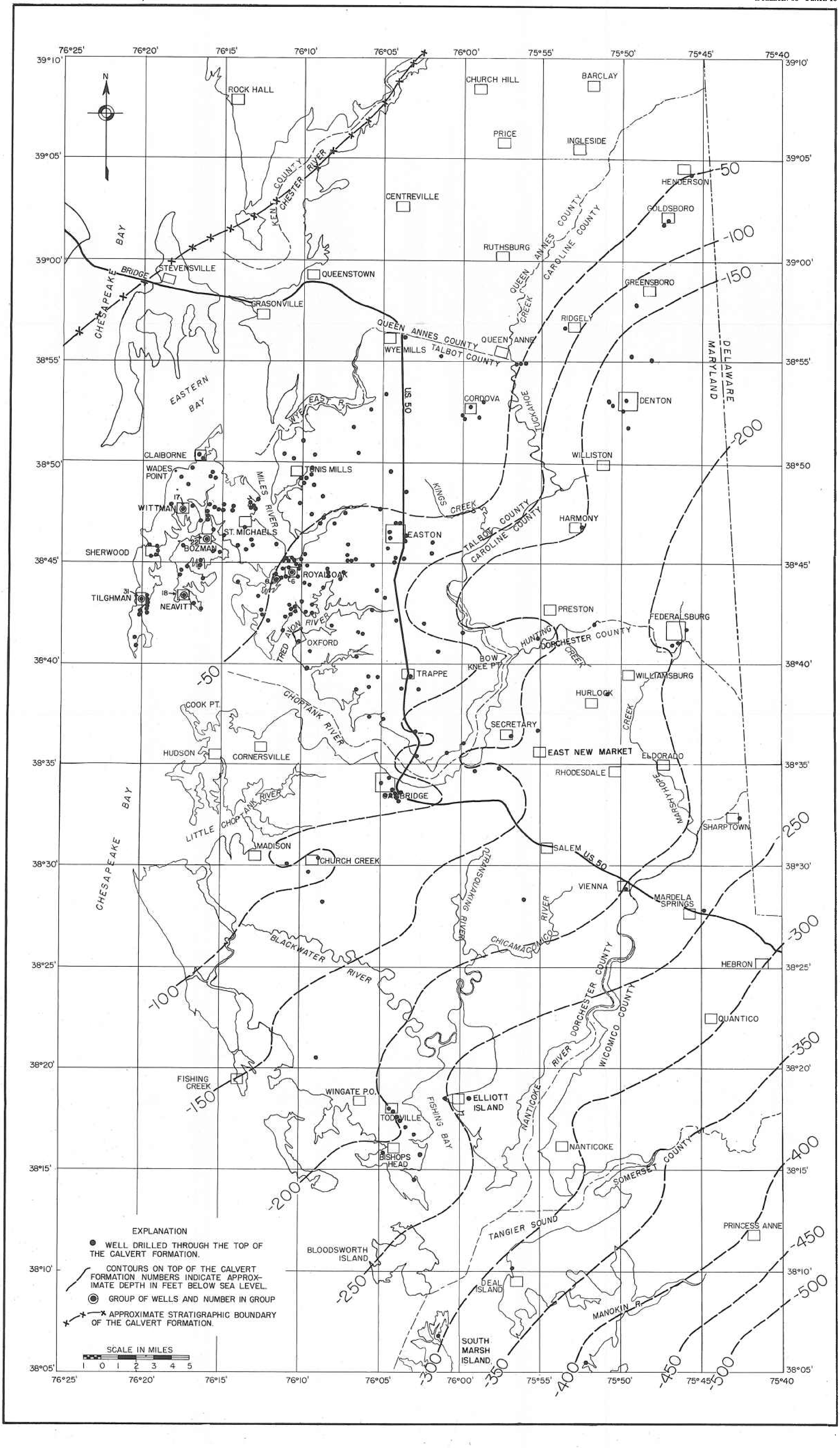

76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'
N
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
CENTREVILLE
-600?
GOLDSBORO
-238
-348
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
GREENSBORO
BRIDGE
-355
US 50
GRASONVILLE
RIDGELY
QUEEN ANNES COUNTY
TALBOT COUNTY
QUEEN ANNE
WYE MILLS
KENT COUNTY
CHESTER RIVER
QUEEN ANNES COUNTY
CAROLINE COUNTY
CREEK
CHESAPEAKE BAY
EASTERN BAY
WYE EAST R.
CORDOVA
-863
TUCKAHOE
-1035
DENTON
MARYLAND
DELAWARE
CLAIBORNE
WADES POINT
-840
TUNIS MILLS
WILLISTON
MILES RIVER
KINGS CREEK
WITTMAN
TALBOT COUNTY
CAROLINE COUNTY
HARMONY
ST. MICHAELS
-1067
EASTON
BOZMAN
SHERWOOD
ROYAL OAK
TILGHMAN
NEAVITT
US 50
PRESTON
FEDERALSBURG
TRED AVON RIVER
OXFORD
HUNTING CREEK
DORCHESTER COUNTY
BOW KNEE PT.
-975
TRAPPE
WILLIAMSBURG
HURLOCK
COOK PT.
CHOPTANK RIVER
SECRETARY
CREEK
HUDSON
CORNERSVILLE
-909
EAST NEW MARKET
ELDORADO
RHODESDALE
-893
-908
-929
CAMBRIDGE
MARSHYHOPE
SHARPTOWN
LITTLE CHOPTANK RIVER
MADISON
SALEM
CHURCH CREEK
-795
TRANSQUAKING RIVER
VIENNA
MARDELA SPRINGS
US 50
RIVER
CHICAMACOMICO
BLACKWATER RIVER
HEBRON
DORCHESTER COUNTY
WICOMICO COUNTY
QUANTICO
NANTICOKE RIVER
FISHING CREEK
WINGATE P.O.
TODDVILLE
FISHING BAY
ELLIOTT ISLAND
BISHOPS HEAD
NANTICOKE
SOMERSET COUNTY
TANGIER SOUND
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
MANOKIN R.
-827
SOUTH MARSH ISLAND
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
-1000
-1100
-1200
-1300
-700
-800
-900
-1000
-1100
-1200
-1300
EXPLANATION
-795
WELL DRILLED THROUGH THE TOP OF THE WATER-BEARING SAND OF THE MAGOTHY FORMATION WITH DEPTH BELOW SEA LEVEL.
-100
CONTOURS INDICATE APPROXIMATE DEPTH TO THE TOP OF WATER-BEARING SANDS IN THE MAGOTHY FORMATION IN FEET BELOW SEA LEVEL.
SCALE IN MILES
1 0 1 2 3 4 5

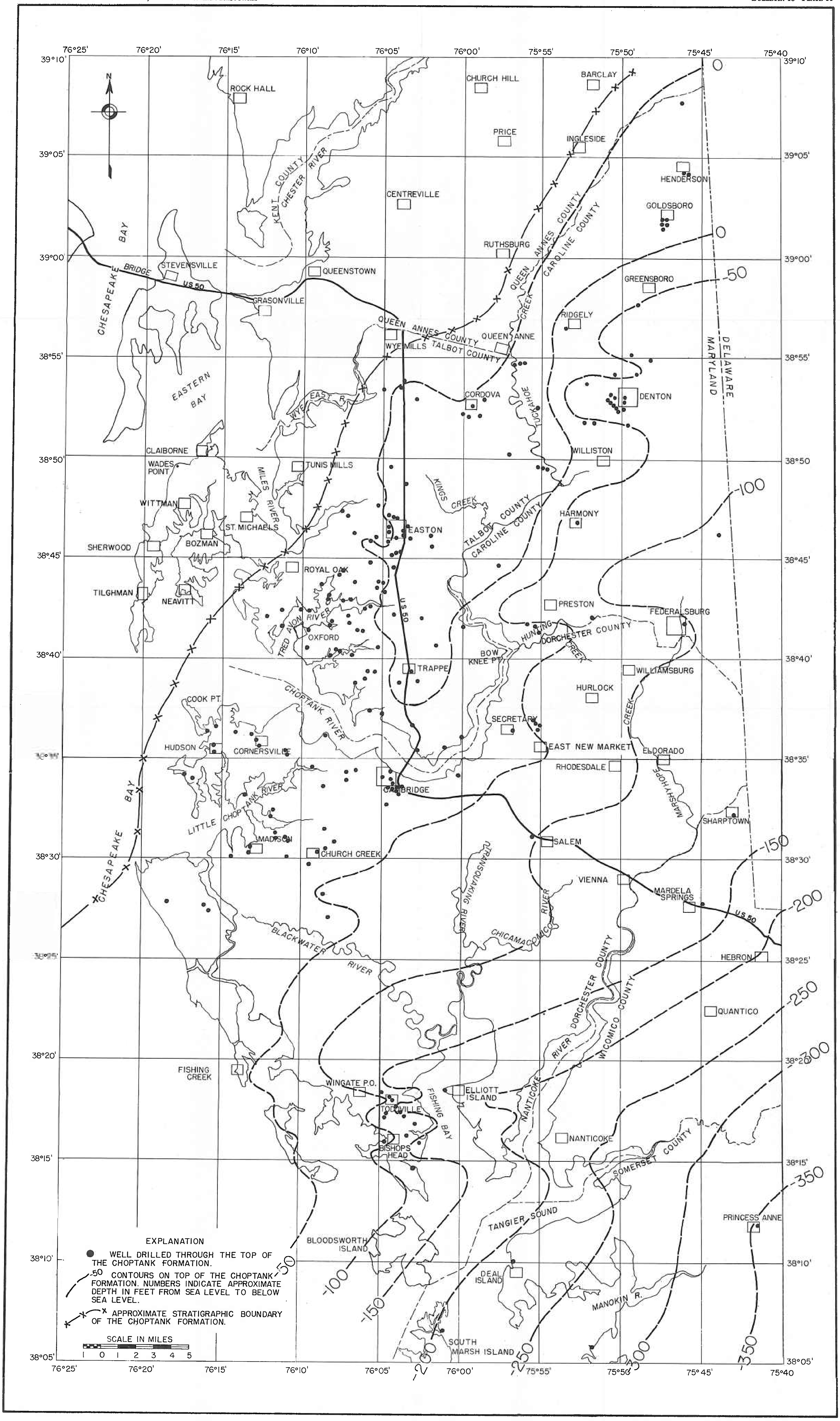

76°25' 76°20' 76°15' 76°10' 76°05' 76°00' 75°55' 75°50' 75°45' 75°40
39°10' 39°05' 39°00' 38°55' 38°50' 38°45' 38°40' 38°35' 38°30' 38°25' 38°20' 38°15' 38°10' 38°05'
N
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
KENT COUNTY
CHESTER RIVER
CENTREVILLE
GOLDSBORO
BAY
QUEEN ANNES COUNTY
CAROLINE COUNTY
RUTHSBURG
CHESAPEAKE BRIDGE
STEVENSVILLE
US 50
QUEENSTOWN
GREENSBORO
GRASONVILLE
CREEK
RIDGELY
CHESAPEAKE
QUEEN ANNES COUNTY
QUEEN ANNE
WYE MILLS TALBOT COUNTY
DELAWARE
MARYLAND
-500
-600
-400
EASTERN BAY
WYE EAST R.
CORDOVA
-545
-554
TUCKAHOE
-594
DENTON
-700
CLAIBORNE
WADES POINT
-523
TUNIS MILLS
MILES RIVER
WILLISTON
US 50
KINGS CREEK
TALBOT COUNTY
CAROLINE COUNTY
WITTMAN
-662
-646
EASTON
HARMONY
-800
ST. MICHAELS
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
-900
FEDERALSBURG
TRED AVON RIVER
OXFORD
HUNTING CREEK
DORCHESTER COUNTY
BOW KNEE PT.
-533
TRAPPE
-550
WILLIAMSBURG
HURLOCK
COOK PT.
CHOPTANK RIVER
SECRETARY
CREEK
-496
-497
-501
-525
CORNERSVILLE
HUDSON
EAST NEW MARKET
ELDORADO
RHODESDALE
-594
-562
-575
CAMBRIDGE
MARSHYHOPE
LITTLE CHOPTANK RIVER
SHARPTOWN
MADISON
SALEM
CHURCH CREEK
-627
TRANSQUAKING RIVER
VIENNA
CHESAPEAKE BAY
MARDELA SPRINGS
US 50
BLACKWATER RIVER
CHICAMACOMICO RIVER
DORCHESTER COUNTY
WICOMICO COUNTY
HEBRON
QUANTICO
-599
FISHING CREEK
WINGATE P.O.
ELLIOTT ISLAND
TODDVILLE
FISHING BAY
NANTICOKE RIVER
BISHOPS HEAD
NANTICOKE
SOMERSET COUNTY
-400
-900
TANGIER SOUND
PRINCESS ANNE
BLOODSWORTH ISLAND
-666
DEAL ISLAND
-500
-600
-700
MANOKIN R.
-800
-607
SOUTH MARSH ISLAND
EXPLANATION
-599
WELL DRILLED THROUGH THE TOP OF THE PALEOCENE SERIES, WITH DEPTH BELOW SEA LEVEL.
-700
CONTOURS ON TOP OF THE PALEOCENE SERIES, (BASE OF THE EOCENE SERIES, TERTIARY SYSTEM). NUMBERS INDICATE APPROXIMATE DEPTH IN FEET BELOW SEA LEVEL.
SCALE IN MILES
1 0 1 2 3 4 5

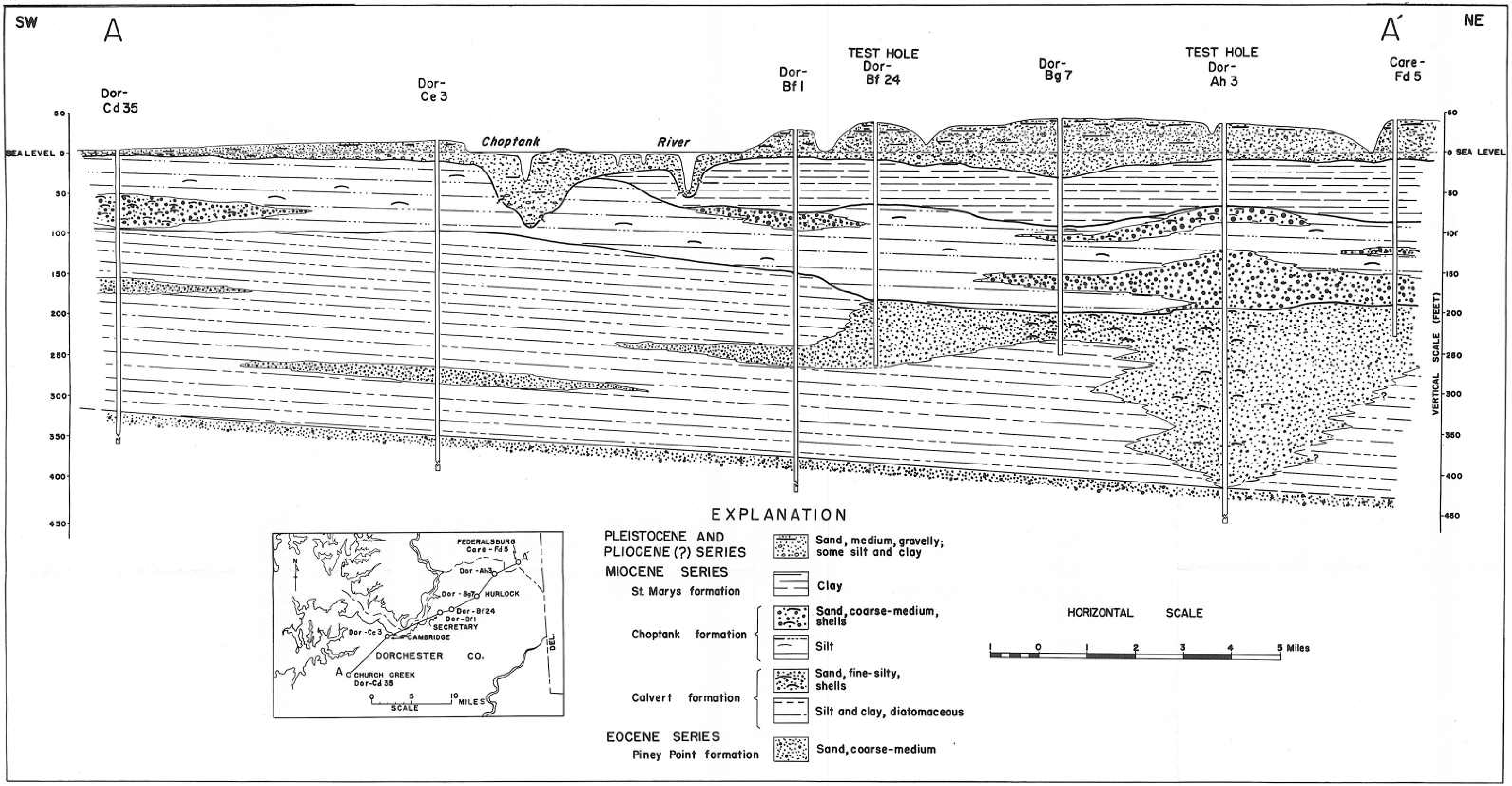

EXPLANATION
WELL FROM WHICH THICKNESS OF PALEOCENE SEDIMENTS IS DETERMINED.
70 THICKNESS OF PALEOCENE SEDIMENTS IN FEET.
CONTOUR SHOWING APPROXIMATE THICKNESS OF PALEOCENE SEDIMENTS OBTAINED BY INTERPOLATION FROM STRUCTURE MAPS OF THE PALEOCENE SERIES AND CRETACEOUS SYSTEM.
SCALE IN MILES
1 0 1 2 3 4 5
CHESAPEAKE BAY
EASTERN BAY
CHESTER RIVER
KENT COUNTY
QUEEN ANNES COUNTY
TALBOT COUNTY
CAROLINE COUNTY
DORCHESTER COUNTY
WICOMICO COUNTY
SOMERSET COUNTY
DELAWARE
MARYLAND
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
CENTREVILLE
GOLDSBORO
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
GREENSBORO
GRASONVILLE
RIDGELY
WYE MILLS
QUEEN ANNE
CORDOVA
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
WILLISTON
WITTMAN
ST. MICHAELS
EASTON
HARMONY
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
FEDERALSBURG
OXFORD
TRAPPE
BOW KNEE PT.
WILLIAMSBURG
HURLOCK
COOK PT.
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
SHARPTOWN
MADISON
CHURCH CREEK
SALEM
VIENNA
MARDELA SPRINGS
HEBRON
QUANTICO
FISHING CREEK
WINGATE P.O.
ELLIOTT ISLAND
TODDVILLE
BISHOPS HEAD
NANTICOKE
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
SOUTH MARSH ISLAND
TANGIER SOUND
MANOKIN R.
FISHING BAY
NANTICOKE RIVER
BLACKWATER RIVER
TRANSQUAKING RIVER
CHICAMACOMICO RIVER
LITTLE CHOPTANK RIVER
CHOPTANK RIVER
TRED AVON RIVER
MILES RIVER
WYE EAST R.
KINGS CREEK
TUCKAHOE CREEK
HUNTING CREEK
MARSHYHOPE CREEK
US 50
BRIDGE
76°25' 76°20' 76°15' 76°10' 76°05' 76°00' 75°55' 75°50' 75°45' 75°40
39°10' 39°05' 39°00' 38°55' 38°50' 38°45' 38°40' 38°35' 38°30' 38°25' 38°20' 38°15' 38°10' 38°05'
100 200 300
244 119 104 120 80 215 174 124 124 170 70 220

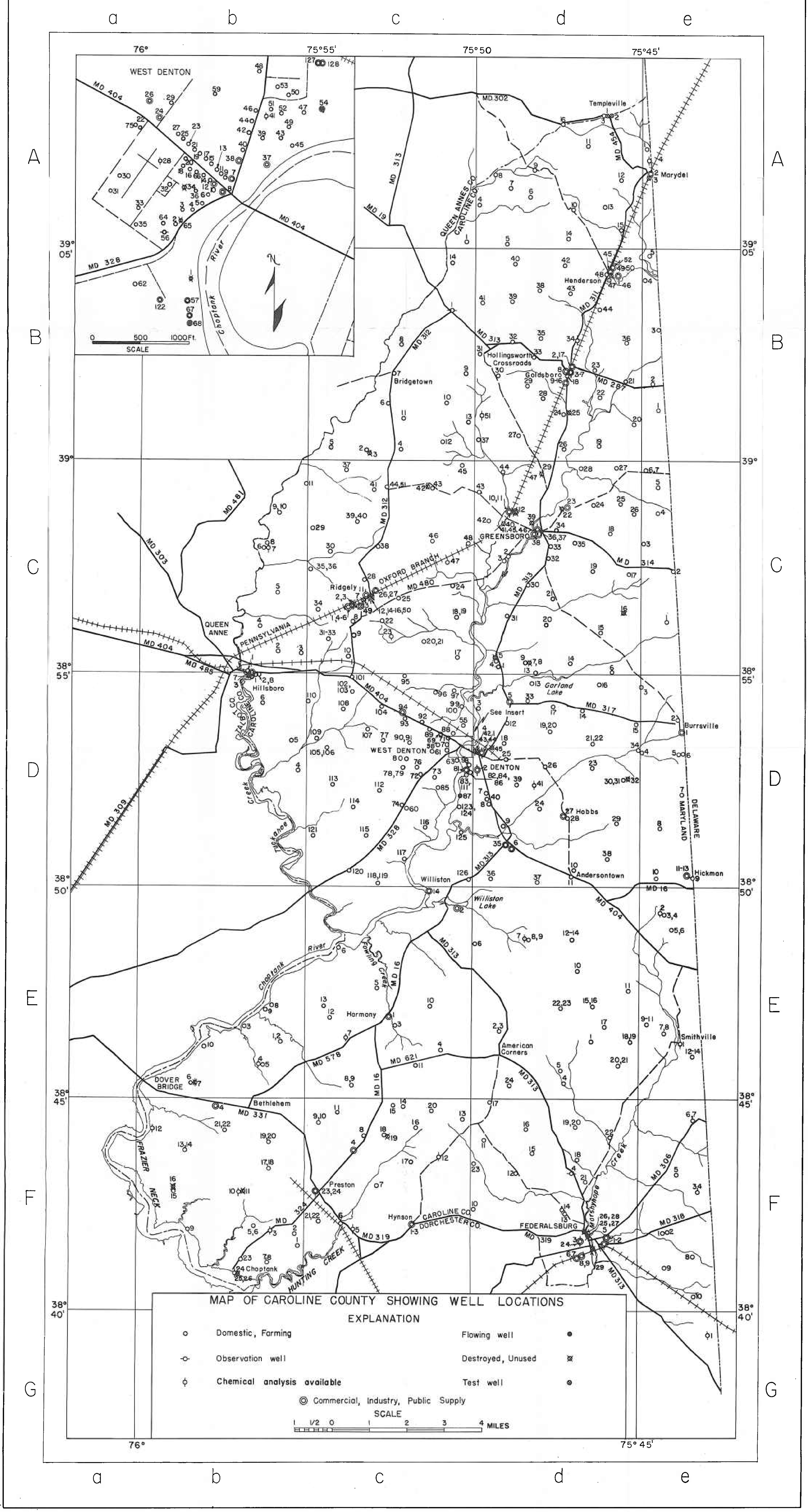

EXPLANATION
WELL DRILLED THROUGH THE TOP OF THE AQUIA GREENSAND.
CONTOURS ON TOP OF THE AQUIA GREENSAND (BASE OF THE EOCENE SERIES). NUMBERS INDICATE APPROXIMATE DEPTH IN FEET BELOW SEA LEVEL.
WELL DRILLED THROUGH THE TOP OF THE PALEOCENE SERIES IN WHICH THE AQUIA GREENSAND WAS NOT ENCOUNTERED.
GROUP OF WELLS AND NUMBER IN GROUP
NO WELLS ENCOUNTERING AQUIA GREENSAND KNOWN EAST AND SOUTH OF THIS LINE
INTAKE BELT OF THE AQUIA GREENSAND BENEATH THE MANTLE OF THE PLEISTOCENE AGE.
SCALE IN MILES
1 0 1 2 3 4 5
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
CENTREVILLE
GOLDSBORO
KENT COUNTY
CHESTER RIVER
QUEEN ANNES COUNTY
CAROLINE COUNTY
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
CHESAPEAKE BRIDGE
US 50
GRASONVILLE
GREENSBORO
RIDGELY
QUEEN ANNE
WYE MILLS
TALBOT COUNTY
DELAWARE
MARYLAND
EASTERN BAY
CORDOVA
DENTON
TUCKAHOE
WYE EAST R.
CLAIBORNE
WADES POINT
WITTMAN
MILES RIVER
TUNIS MILLS
WILLISTON
KINGS CREEK
HARMONY
ST. MICHAELS
BOZMAN
EASTON
SHERWOOD
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
FEDERALSBURG
TRED AVON RIVER
OXFORD
HUNTING CREEK
DORCHESTER COUNTY
BOW KNEE PT.
TRAPPE
WILLIAMSBURG
HURLOCK
COOK PT.
CHOPTANK RIVER
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
MARSHYHOPE
SHARPTOWN
LITTLE CHOPTANK RIVER
SALEM
MADISON
CHURCH CREEK
TRANSQUAKING RIVER
VIENNA
CHICAMACOMICO RIVER
MARDELA SPRINGS
BLACKWATER RIVER
HEBRON
WICOMICO COUNTY
QUANTICO
NANTICOKE RIVER
FISHING CREEK
WINGATE P.O.
ELLIOTT ISLAND
TODDVILLE
FISHING BAY
BISHOPS HEAD
NANTICOKE
SOMERSET COUNTY
TANGIER SOUND
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
MANOKIN R.
SOUTH MARSH ISLAND
CHESAPEAKE BAY
-250
-300
-350
-400
-450
-500
-550
12
11
76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40'
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'

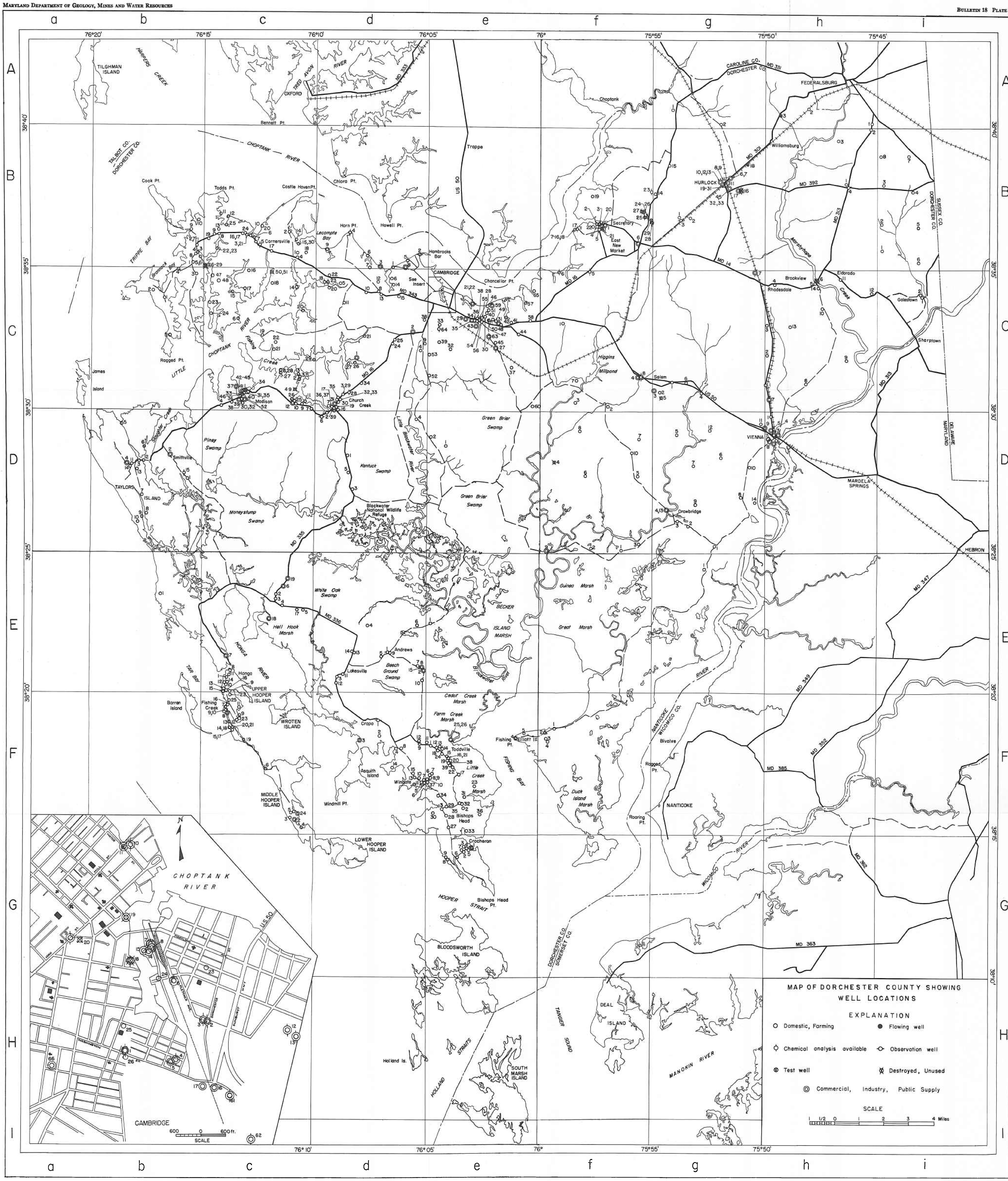

EXPLANATION
Contours of the water level in wells in the Piney Point formation of Eocene (Jackson) age, recorded in feet above (+) or below (–) sea level. Data corrected to represent Nov., 1953.
Well used in control.
Approximate stratigraphic boundary of Piney Point formation. Probably does not act as an impermeable hydrologic boundary.
SCALE IN MILES
1 0 1 2 3 4 5
APPROXIMATE BOUNDARY
+40
+20
0
20
40
60
80
100
CHESAPEAKE BAY
EASTERN BAY
TANGIER SOUND
FISHING BAY
DELAWARE
MARYLAND
KENT COUNTY
QUEEN ANNES COUNTY
TALBOT COUNTY
CAROLINE COUNTY
DORCHESTER COUNTY
WICOMICO COUNTY
SOMERSET COUNTY
CHESTER RIVER
WYE EAST R.
MILES RIVER
TRED AVON RIVER
CHOPTANK RIVER
LITTLE CHOPTANK RIVER
BLACKWATER RIVER
TRANSQUAKING RIVER
CHICAMACOMICO RIVER
NANTICOKE RIVER
MARSHYHOPE CREEK
HUNTING CREEK
KINGS CREEK
TUCKAHOE CREEK
MANOKIN R.
US 50
BRIDGE
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
CENTREVILLE
GOLDSBORO
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
GREENSBORO
GRASONVILLE
RIDGELY
QUEEN ANNE
WYE MILLS
CORDOVA
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
WILLISTON
WITTMAN
HARMONY
ST. MICHAELS
EASTON
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
FEDERALSBURG
OXFORD
BOW KNEE P.
TRAPPE
WILLIAMSBURG
HURLOCK
COOK PT.
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
SHARPTOWN
MADISON
CHURCH CREEK
SALEM
VIENNA
MARDELA SPRINGS
HEBRON
QUANTICO
FISHING CREEK
WINGATE P.O.
ELLIOTT ISLAND
TODDVILLE
NANTICOKE
BISHOPS HEAD
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
SOUTH MARSH ISLAND
76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'

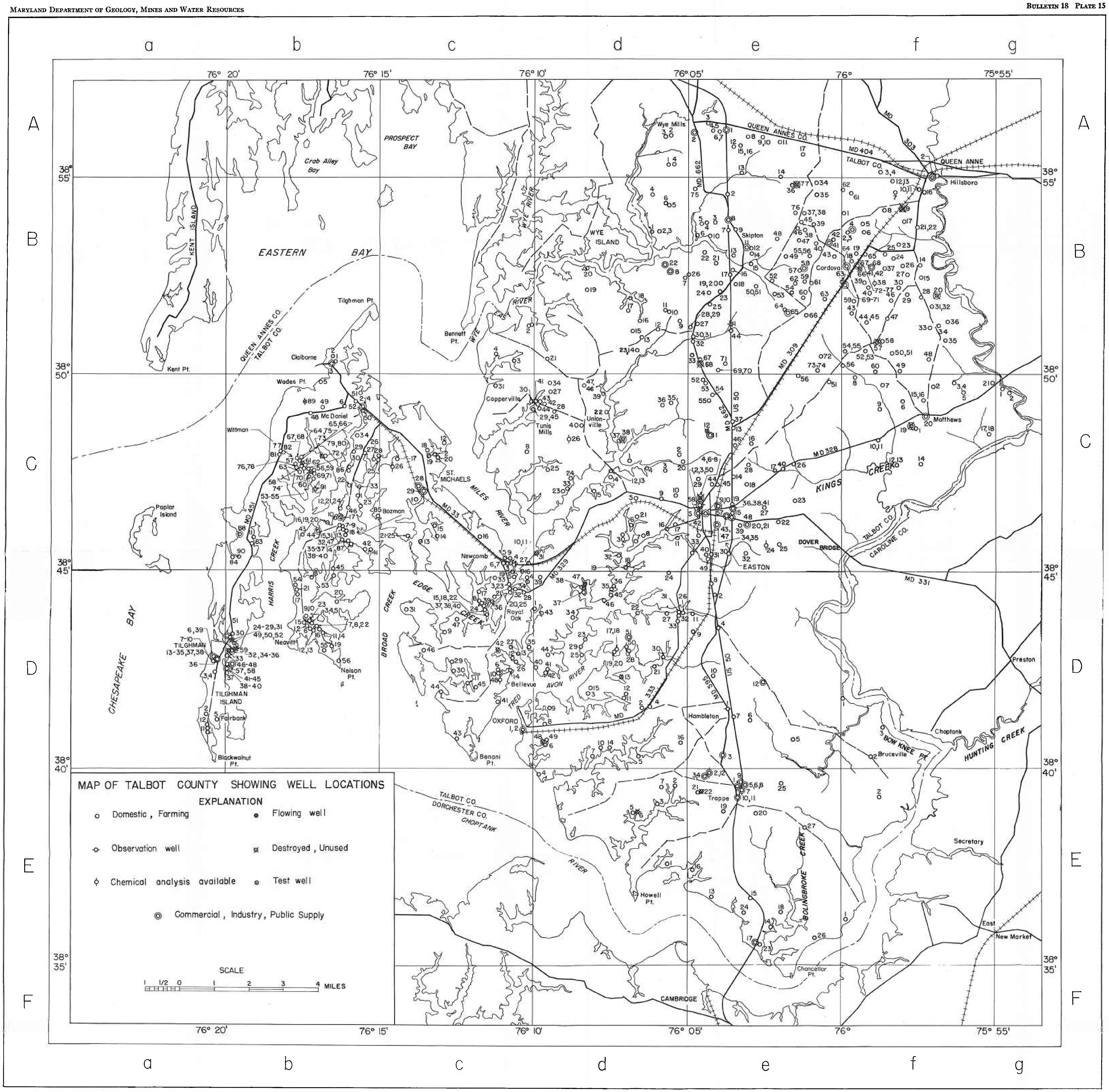

EXPLANATION
WELL DRILLED THROUGH THE TOP OF THE CALVERT FORMATION.
CONTOURS ON TOP OF THE CALVERT FORMATION. NUMBERS INDICATE APPROXIMATE DEPTH IN FEET BELOW SEA LEVEL.
GROUP OF WELLS AND NUMBER IN GROUP
APPROXIMATE STRATIGRAPHIC BOUNDARY OF THE CALVERT FORMATION.
SCALE IN MILES
1 0 1 2 3 4 5
CHESAPEAKE BAY
EASTERN BAY
CHESAPEAKE BRIDGE
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
CENTREVILLE
HENDERSON
GOLDSBORO
RUTHSBURG
STEVENSVILLE
QUEENSTOWN
GRASONVILLE
GREENSBORO
RIDGELY
QUEEN ANNE
WYE MILLS
QUEEN ANNES COUNTY
TALBOT COUNTY
CAROLINE COUNTY
KENT COUNTY
CHESTER RIVER
DELAWARE
MARYLAND
CORDOVA
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
WILLISTON
WITTMAN
ST. MICHAELS
EASTON
HARMONY
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
FEDERALSBURG
OXFORD
TRAPPE
BOW KNEE PT.
DORCHESTER COUNTY
WILLIAMSBURG
HURLOCK
COOK PT.
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
RHODESDALE
ELDORADO
CAMBRIDGE
SHARPTOWN
MADISON
CHURCH CREEK
SALEM
US 50
VIENNA
MARDELA SPRINGS
HEBRON
QUANTICO
WICOMICO COUNTY
SOMERSET COUNTY
FISHING CREEK
WINGATE P.O.
TODDVILLE
ELLIOTT ISLAND
BISHOPS HEAD
NANTICOKE
FISHING BAY
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
TANGIER SOUND
SOUTH MARSH ISLAND
MANOKIN R.
CHOPTANK RIVER
LITTLE CHOPTANK RIVER
BLACKWATER RIVER
TRANSQUAKING RIVER
CHICAMACOMICO RIVER
NANTICOKE RIVER
MARSHYHOPE CREEK
HUNTING CREEK
TUCKAHOE CREEK
KINGS CREEK
TRED AVON RIVER
MILES RIVER
WYE EAST R.
-50 -100 -150 -200 -250 -300 -350 -400 -450 -500


EXPLANATION
WELL DRILLED THROUGH THE TOP OF THE CHOPTANK FORMATION.
-50 CONTOURS ON TOP OF THE CHOPTANK FORMATION. NUMBERS INDICATE APPROXIMATE DEPTH IN FEET FROM SEA LEVEL TO BELOW SEA LEVEL.
APPROXIMATE STRATIGRAPHIC BOUNDARY OF THE CHOPTANK FORMATION.
SCALE IN MILES
1 0 1 2 3 4 5
N
76°25'
76°20'
76°15'
76°10'
76°05'
76°00'
75°55'
75°50'
75°45'
75°40
39°10'
39°05'
39°00'
38°55'
38°50'
38°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
38°05'
0
-50
-100
-150
-200
-250
-300
-350
ROCK HALL
CHURCH HILL
BARCLAY
PRICE
INGLESIDE
HENDERSON
GOLDSBORO
CENTREVILLE
RUTHSBURG
KENT COUNTY
CHESTER RIVER
QUEEN ANNES COUNTY
CAROLINE COUNTY
BAY
CHESAPEAKE BRIDGE
STEVENSVILLE
US 50
QUEENSTOWN
GRASONVILLE
GREENSBORO
RIDGELY
QUEEN ANNE
WYE MILLS
TALBOT COUNTY
DELAWARE
MARYLAND
EASTERN BAY
WYE EAST R.
CORDOVA
TUCKAHOE
DENTON
CLAIBORNE
WADES POINT
TUNIS MILLS
MILES RIVER
WILLISTON
KINGS CREEK
WITTMAN
ST. MICHAELS
EASTON
HARMONY
SHERWOOD
BOZMAN
ROYAL OAK
TILGHMAN
NEAVITT
PRESTON
TRED AVON RIVER
OXFORD
FEDERALSBURG
HUNTING CREEK
DORCHESTER COUNTY
BOW KNEE PT.
TRAPPE
WILLIAMSBURG
HURLOCK
CHOPTANK RIVER
COOK PT.
SECRETARY
HUDSON
CORNERSVILLE
EAST NEW MARKET
ELDORADO
RHODESDALE
CAMBRIDGE
LITTLE CHOPTANK RIVER
MARSHYHOPE
SHARPTOWN
MADISON
CHURCH CREEK
SALEM
TRANSQUAKING RIVER
VIENNA
MARDELA SPRINGS
CHICAMACOMICO RIVER
BLACKWATER RIVER
HEBRON
QUANTICO
NANTICOKE RIVER
WICOMICO COUNTY
FISHING CREEK
WINGATE P.O.
ELLIOTT ISLAND
TODDVILLE
FISHING BAY
NANTICOKE
BISHOPS HEAD
SOMERSET COUNTY
TANGIER SOUND
PRINCESS ANNE
BLOODSWORTH ISLAND
DEAL ISLAND
MANOKIN R.
SOUTH MARSH ISLAND


SW
A
A′
NE
Dor-Cd 35
Dor-Ce 3
Dor-Bf 1
TEST HOLE Dor-Bf 24
Dor-Bg 7
TEST HOLE Dor-Ah 3
Care-Fd 5
Choptank
River
SEA LEVEL
50
100
150
200
250
300
350
400
450
VERTICAL SCALE (FEET)
EXPLANATION
PLEISTOCENE AND PLIOCENE (?) SERIES
Sand, medium, gravelly; some silt and clay
MIOCENE SERIES
St. Marys formation
Clay
Choptank formation
Sand, coarse-medium, shells
Silt
Calvert formation
Sand, fine-silty, shells
Silt and clay, diatomaceous
EOCENE SERIES
Piney Point formation
Sand, coarse-medium
HORIZONTAL SCALE
1 0 1 2 3 4 5 Miles
FEDERALSBURG Care-Fd 5
Dor-Ah 3
Dor-Bg 7
HURLOCK
Dor-Bf 24
Dor-Bf 1
SECRETARY
Dor-Ce 3
CAMBRIDGE
DORCHESTER CO.
A
CHURCH CREEK Dor-Cd 35
DEL.
0 5 10 MILES
SCALE


MAP OF CAROLINE COUNTY SHOWING WELL LOCATIONS
EXPLANATION
Domestic, Farming
Observation well
Chemical analysis available
Commercial, Industry, Public Supply
Flowing well
Destroyed, Unused
Test well
SCALE
1 1/2 0 1 2 3 4 MILES
WEST DENTON
SCALE
0 500 1000 Ft.
Choptank River
76°
75°55'
75°50
75°45'
39° 05'
39°
38° 55'
38° 50'
38° 45'
38° 40'
a b c d e
A B C D E F G
Templeville
Marydel
Henderson
Hollingsworth Crossroads
Goldsboro
Bridgetown
Greensboro
Oxford Branch
Ridgely
Pennsylvania
Queen Anne
Hillsboro
See Insert
Denton
West Denton
Garland Lake
Burrsville
Hobbs
Andersontown
Hickman
Williston
Williston Lake
Harmony
American Corners
Smithville
Dover Bridge
Bethlehem
Preston
Hynson
Federalsburg
Choptank
Frazier Neck
Hunting Creek
Marshyhope Creek
Tuckahoe Creek
Choptank River
Cowling Creek
Queen Annes Co.
Caroline Co.
Talbot Co.
Dorchester Co.
Delaware
Maryland
MD 302
MD 313
MD 19
MD 454
MD 311
MD 312
MD 287
MD 481
MD 303
MD 480
MD 314
MD 404
MD 485
MD 309
MD 317
MD 328
MD 16
MD 578
MD 621
MD 331
MD 319
MD 306
MD 318


MAP OF DORCHESTER COUNTY SHOWING WELL LOCATIONS
EXPLANATION
Domestic, Farming
Flowing well
Chemical analysis available
Observation well
Test well
Destroyed, Unused
Commercial, Industry, Public Supply
SCALE
1 1/2 0 1 2 3 4 Miles
CAMBRIDGE
600 0 600 ft.
SCALE
CHOPTANK RIVER
US 50
76°20'
76°15'
76°10'
76°05'
76°
75°55'
75°50'
75°45'
38°40'
38°35'
38°30'
38°25'
38°20'
38°15'
38°10'
TILGHMAN ISLAND
HARRIS CREEK
OXFORD
TRED AVON RIVER
CAROLINE CO.
DORCHESTER CO.
FEDERALSBURG
Choptank
Bennett Pt.
TALBOT CO.
DORCHESTER CO.
CHOPTANK RIVER
Trappe
Williamsburg
Cook Pt.
Todds Pt.
Castle Haven Pt.
Choptank Pt.
HURLOCK
Secretary
East New Market
TRIPPE BAY
Cornersville
Lecompte Bay
Horn Pt.
Howell Pt.
Hambrooks Bar
CAMBRIDGE
See Insert
Chancellor Pt.
Rhodesdale
Brookview
Eldorado
Galestown
SUSSEX CO.
DORCHESTER CO.
Sharptown
James Island
Ragged Pt.
LITTLE CHOPTANK RIVER
Fishing Creek
Higgins Millpond
Salem
Madison
Church Creek
Green Brier Swamp
DELAWARE
MARYLAND
VIENNA
Smithville
Pinkey Swamp
Little Blackwater River
Kentuck Swamp
TAYLORS ISLAND
Moneystump Swamp
Blackwater National Wildlife Refuge
Drawbridge
MARDELA SPRINGS
HEBRON
White Oak Swamp
Guinea Marsh
Hell Hook Marsh
BECKER ISLAND MARSH
Great Marsh
HONGA RIVER
Andrews
Beech Ground Swamp
Lakesville
Blackwater River
TAR BAY
Honga
UPPER HOOPER ISLAND
Barren Island
Fishing Creek
WROTEN ISLAND
Cedar Creek Marsh
Farm Creek Marsh
Crapo
Fishing Pt.
Elliott
NANTICOKE RIVER
WICOMICO CO.
Bivalve
Toddville
Asquith Island
Wingate
Little Creek Marsh
FISHING BAY
Ragged Pt.
Duck Island Marsh
NANTICOKE
MIDDLE HOOPER ISLAND
Windmill Pt.
Bishops Head
Roaring Pt.
LOWER HOOPER ISLAND
Crocheron
WICOMICO RIVER
HOOPER STRAIT
Bishops Head Pt.
BLOODSWORTH ISLAND
DORCHESTER CO.
SOMERSET CO.
DEAL ISLAND
TANGIER SOUND
MANOKIN RIVER
Holland Is.
HOLLAND STRAITS
SOUTH MARSH ISLAND
MD 331
MD 392
MD 313
MD 14
MD 16
MD 343
MD 335
MD 336
MD 347
MD 349
MD 352
MD 385
MD 362
MD 363
US 50
US 50
a b c d e f g h i
A B C D E F G H I


MAP OF TALBOT COUNTY SHOWING WELL LOCATIONS
EXPLANATION
Domestic, Farming
Flowing well
Observation well
Destroyed, Unused
Chemical analysis available
Test well
Commercial, Industry, Public Supply
SCALE
1 1/2 0 1 2 3 4 MILES
EASTERN BAY
PROSPECT BAY
Crab Alley Bay
KENT ISLAND
Kent Pt.
QUEEN ANNES CO.
TALBOT CO.
Tilghman Pt.
Claiborne
Wades Pt.
McDaniel
Wittman
Poplar Island
CHESAPEAKE BAY
HARRIS CREEK
TILGHMAN
TILGHMAN ISLAND
Fairbank
Blackwalnut Pt.
Neavitt
Nelson Pt.
BROAD CREEK
Bozman
ST. MICHAELS
MILES RIVER
WYE RIVER
WYE ISLAND
Bennett Pt.
Copperville
Tunis Mills
Unionville
Wye Mills
Skipton
Cordova
Queen Anne
Hillsboro
Matthews
KINGS CREEK
DOVER BRIDGE
EASTON
Newcomb
Royal Oak
Bellevue
OXFORD
Benoni Pt.
TRED AVON RIVER
Hambleton
Trappe
Bruceville
BOW KNEE PT.
Choptank
HUNTING CREEK
Preston
Secretary
East New Market
CAROLINE CO.
DORCHESTER CO.
CHOPTANK RIVER
Howell Pt.
BOLINGBROKE CREEK
Chancellor Pt.
CAMBRIDGE
US 50
MD 33
MD 309
MD 328
MD 331
MD 404
MD 303
MD 662
MD 565
MD 333
MD 329
MD 451
76° 20'
76° 15'
76° 10'
76° 05'
76°
75° 55'
38° 55'
38° 50'
38° 45'
38° 40'
38° 35'
a b c d e f g
A B C D E F