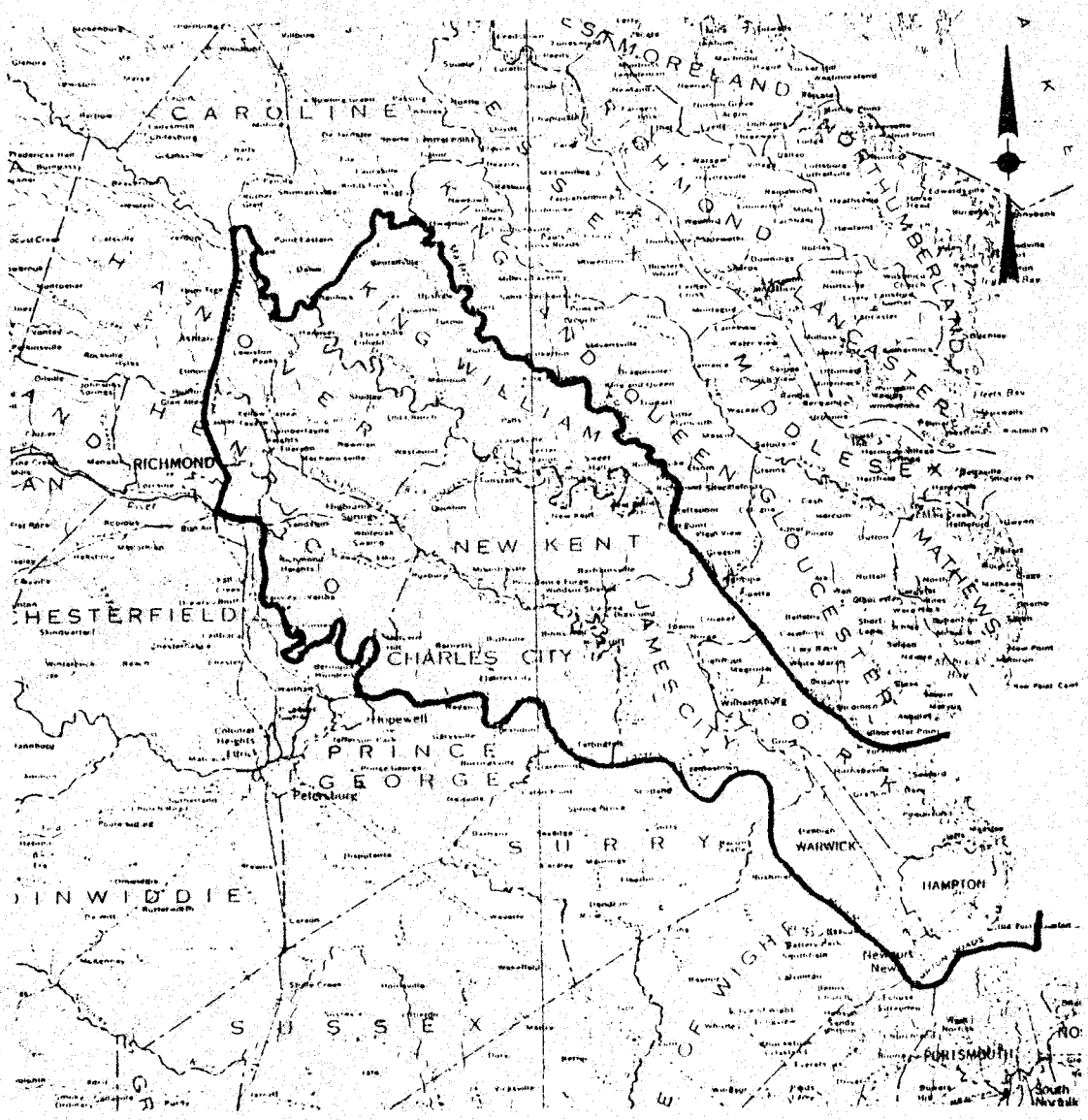
GROUND WATER OF THE YORK - JAMES PENINSULA, VIRGINIA



VIRGINIA STATE WATER CONTROL BOARD

BUREAU OF WATER CONTROL MANAGEMENT

RICHMOND, VIRGINIA

BASIC DATA BULLETIN 39

JUNE, 1973

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ABSTRACT

The York-James Peninsula is the portion of the Embayed Coastal Plain which lies between the York and Mattaponi Rivers on the north and the James River on the south. The land area of the Peninsula is about 1,752 square miles. The population is 707,125, of which more than 70% live in the areas of Newport News, Hampton and Richmond. The average annual precipitation of the area is about 42 inches.

Ground water in the York-James Peninsula occurs in the unconsolidated sediments of Tertiary and Quaternary age. These sediments have been deposited on a basement-rock complex of pre-Cretaceous age.

The basement-rock complex consists of several types of crystalline rock and scattered Triassic sedimentary rocks. Generally, the basement-rock complex dips eastward. Recent gravity and magnetic surveys of the area indicate that the surface of the basement-rock complex may exhibit some structural and erosional relief. There is evidence of tectonically active hingeline zones in the basement complex.

Sediments of Cretaceous age, which range in thickness from 20 feet in the west to 1700 feet in the east have been deposited on the basement-rock complex by fluvial and deltaic depositional processes. Some local marine deposition and reworking has probably occurred during the depositional history of the area.

Tributary channel, meandering channel, delta distributary and delta front facies have been observed in geophysical logs. The lithology of the Cretaceous deposits consists of discontinuous sands interbedded with silts and clays. The ratio of sand to silt and clay

and the size and sorting of the sand is variable and dependent upon the depositional environment.

Overlying the Cretaceous are Paleocene sediments which were deposited in a transgressive environment. The Paleocene, which is from 50 to 100 feet thick, consists of characteristically glauconitic silts and find-grained sands.

Deposits of Eocene sediments are found in parts of the York-James Peninsula. The Eocene, which consists of fine-grained sand and silt containing some glauconite, was deposited disconformably upon the underlying Paleocene by two marine transgressions.

The Miocene deposits of the York-James Peninsula reach a maximum thickness of more than 300 feet in the eastern part of the area. The Miocene is comprised of deposits of dark-colored silt and clay which grade transitionally upward into a unit composed of sands and shell fragments. A basal sand, 20 to 40 feet thick, occurs in the central and eastern part of the Peninsula.

Ground water in the York-James Peninsula is found in water table aquifers, an upper artesian aquifer system and the principal artesian aquifer system. The upper system, which is made up of Eocene and basal Miocene sands, is regionally artesian in the eastern part of the area and locally artesian in the central part of the area. This system is a reliable source of ground water for domestic, agricultural and institutional use. The principal artesian aquifer system, which occurs in the Cretaceous and lower Paleocene deposits, is found throughout the York-James Peninsula. In most areas this system has sufficient aquifer potential to supply ground water for municipal and industrial use.

Evidence indicates that much of the recharge to the principal aquifer system is derived from vertical leakage through confining beds. Potentiometric surface maps show a geohydrologic anomoly in the area between West Point and Williamsburg which is probably caused both by thinning of the aquifer system and by a decrease in permeability. Transmissibility in the principal aquifer is estimated to average from 3000 gpd/ft to 50,000 gpd/ft. Much of the recharge to the upper aquifer system probably is derived from vertical leakage through confining layers. The estimated transmissibility of this system is between 5000 gpd/ft and 15,000 gpd/ft.

Water from the upper artesian system is characteristically low in total dissolved solids but high in hardness. The principal artesian aquifer yields ground water which is low in hardness. Total dissolved solids and chloride increase to the east. In some parts of the eastern York-James Peninsula, total dissolved solids and chloride may make the ground water undesirable for some uses.

Throughout the York-James Peninsula withdrawals from the principal artesian aquifer system have lowered water levels about 50 feet since 1900. Large withdrawals of ground water in the West Point area and the Williamsburg area have lowered water levels about 80 feet

The ground water resources of the study area are largely undeveloped. Large quantities of high quality ground water are available in Charles City and New Kent Counties. East of Williamsburg there are even greater quantities of mineralized ground water.

ACKNOWLEDGMENTS

This Agency wishes to express its gratitude to the following Agencies and individuals who provided data and information to make this report possible: Virginia Division of Mineral Resources for well completion reports and the examination of geologic samples from wells; United States Geological Survey for publications, data and technical assistance; Mohamed A. Sabet of Old Dominion University for information and assistance on interpretations of gravity and magnetic surveys of the Coastal Plain; Virginia Department of Health for groundwater quality analyses and well data; Sydnor Hydrodynamics for well completion reports, technical assistance, and many of the geophysical logs used in this report; William H. Gammon Well Drilling Company; R. L. Magette, Layne-Atlantic Company, Mitchell's Well and Pump Company, C. H. Griffith, Fetterholf Brothers, and Douglas-Dickerson for well data; Chesapeake Corporation of Virginia, for ground-water quality data, observation well data, and pumpage data; Dow Badische Company for pumpage data and water-level records; the city of Williamsburg and the town of West Point for pumpage data, water quality data, and water-level records; the County of Henrico for well completion information, pumpage data, and various technical data on residential subdivisions within the county; and to many owners of private wells who have consented to allow this Agency to use their wells for water-level measurements and water-quality sampling.

CHAPTER I

INTRODUCTION

Location

The physical boundaries of the area of study are the Mattaponi and York Rivers on the north, the James River on the south, the Chesapeake Bay on the east, and the Fall Zone, which roughly corresponds to the location of Interstate 95, on the west (Plate 1).

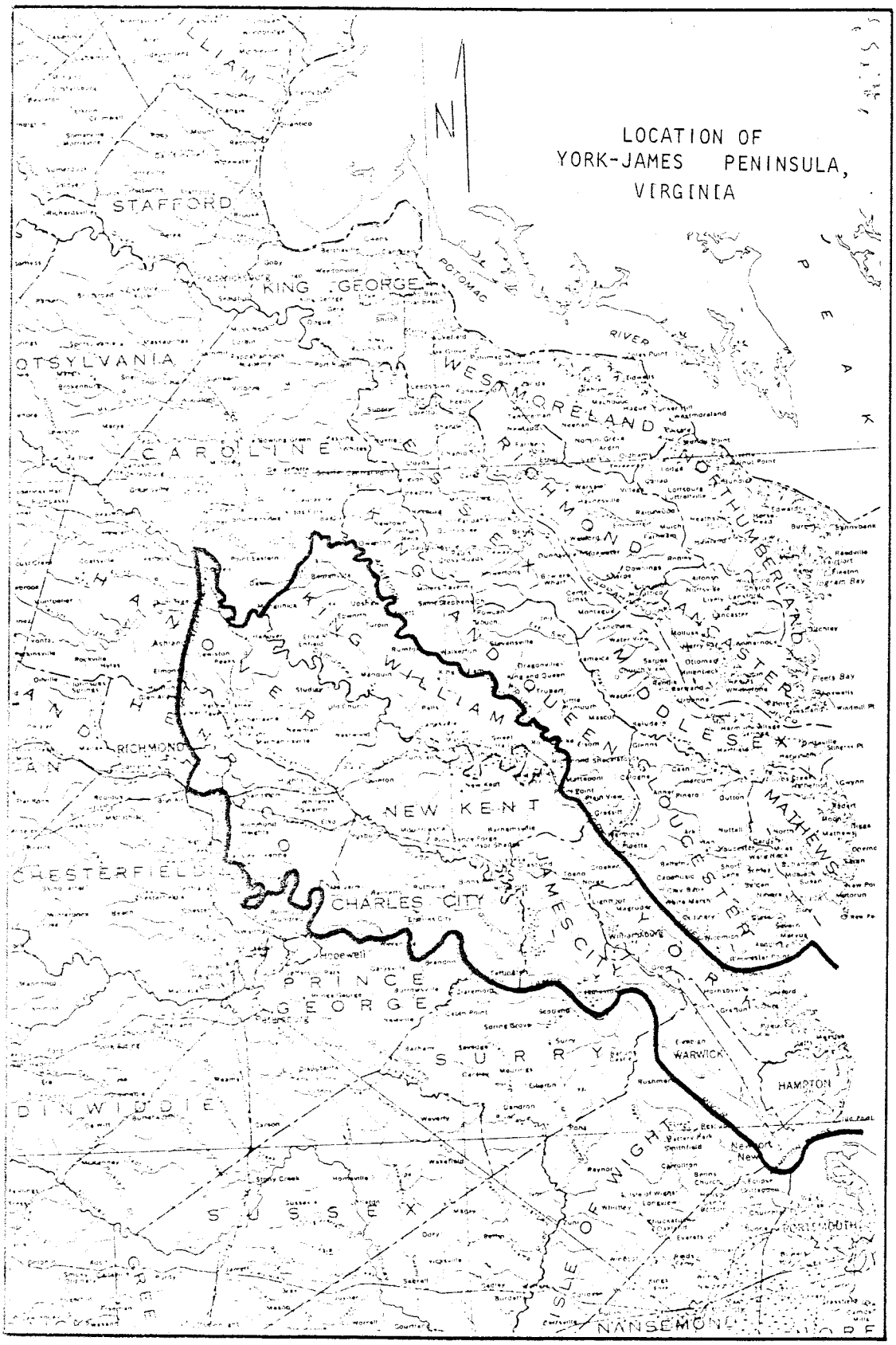
The political subdivisions of the York-James Peninsula include the counties of Henrico, Hanover, King William, New Kent, Charles City, James City and York and the cities of Richmond, Williamsburg, Newport News and Hampton.

The major population centers of the study area include the cities of Richmond, Williamsburg, Hampton and Newport News and the towns of Ashland and West Point (Table 1).

Scope of Investigation

This report will establish the present artesian ground-water situation of the York-James Peninsula in terms of quantity and quality of ground water, and its present use and development and interrelated effects. In addition, it is intended that the report will be used as an effective aid to future planning and development of the ground-water resource of the area. A third objective of the report is to furnish the basic data necessary for the construction of a computerized ground-water model of the York-James Peninsula.

In order to establish the geologic framework of the artesian aquifers, available publications, geologic or geophysical data and other current investigations were utilized. Sources of information available on the hydrology of the area include observation well data,



Source: Virginia State Water Control Board-BWCM

PLATE NO. 1

TABLE 1

POPULATION, LAND AREA AND CLIMATE
YORK-JAMES PENINSULA

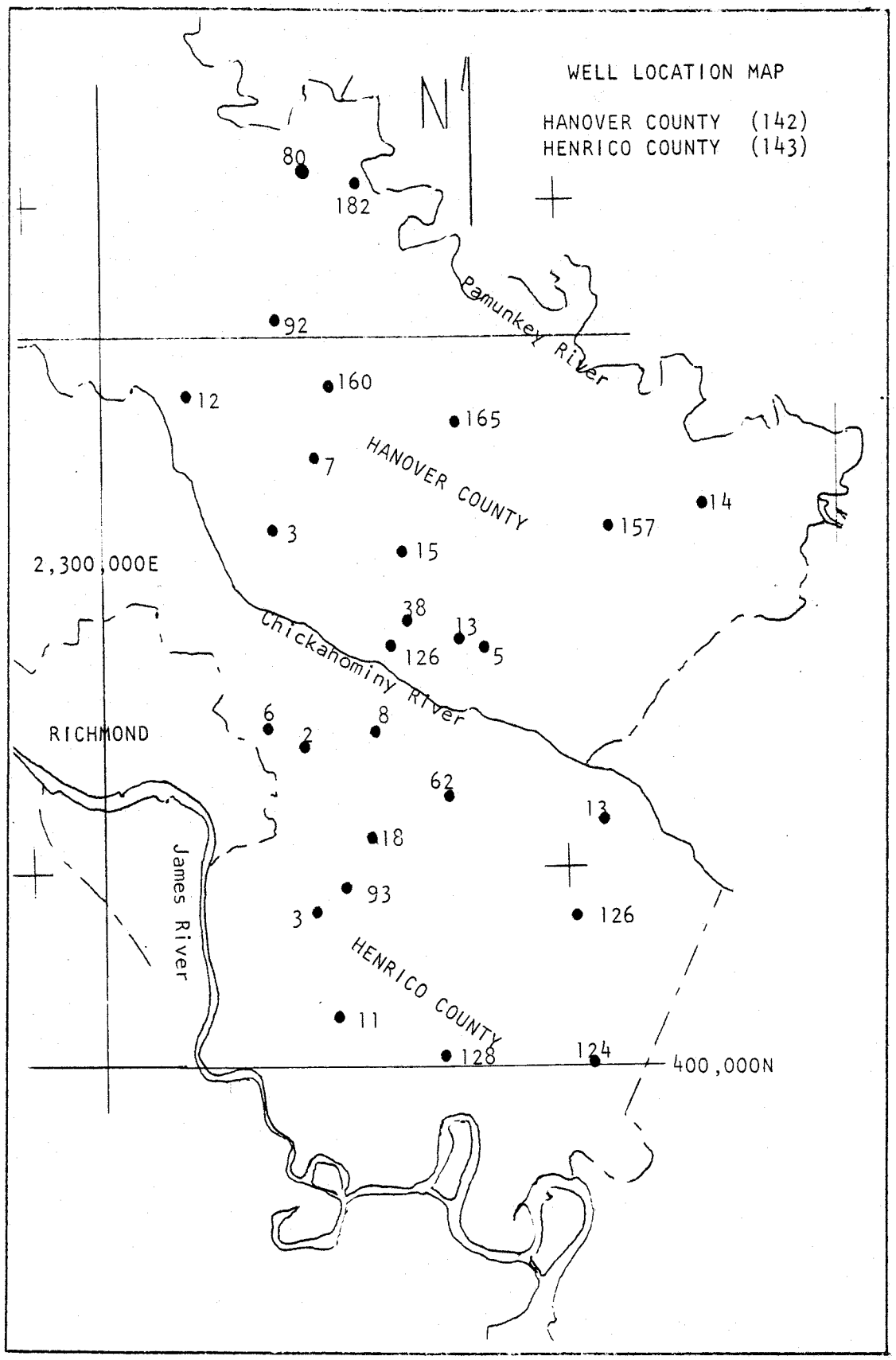
County or City	Population	Total Area (sq miles)	Average Temperature January	Average Temperature July	Average Rainfall
Charles City	6,158	204	42°	79°	43"
Hanover*	29,919	230 (Approx.)	38°	78°	40-42"
Henrico*	89,699	150 (Approx.)	38°	78°	43"
James City	17,893	182	42°	79°	41"
King William	7,497	287	41°	78°	43"
New Kent	5,300	221	39°	78°	
York	33,203	143	42°	79°	41"
Hampton	120,779	72			
Newport News	138,117	121			
Richmond	249,621	37			
Williamsburg	9,069	5			
TOTAL	707,215	1,752			

*Data for Hanover and Henrico Counties applies to that portion located in the Study Area

measurements of water levels from privately owned wells, pumpage records, pumping tests and previous publications.

Throughout this report, wells are identified by Bureau of Water Control Management (BWCM) well numbers. Each well number consists of two parts, e.g. 147-22. The first number, 147, denotes the county in which the well is located, and the second number, 22, is the sequential well number in the county. On the well location maps (Plates 2-7), the county number is shown in parentheses with the county name. Key wells are located on the maps.

All wells are located by the Virginia Plane Coordinate System (see Appendix B). In this grid system, coordinates refer to the distance east and north of the origin. Grid coordinate lines are shown on well location maps.



Source: Virginia State Water Control Board-BWCM

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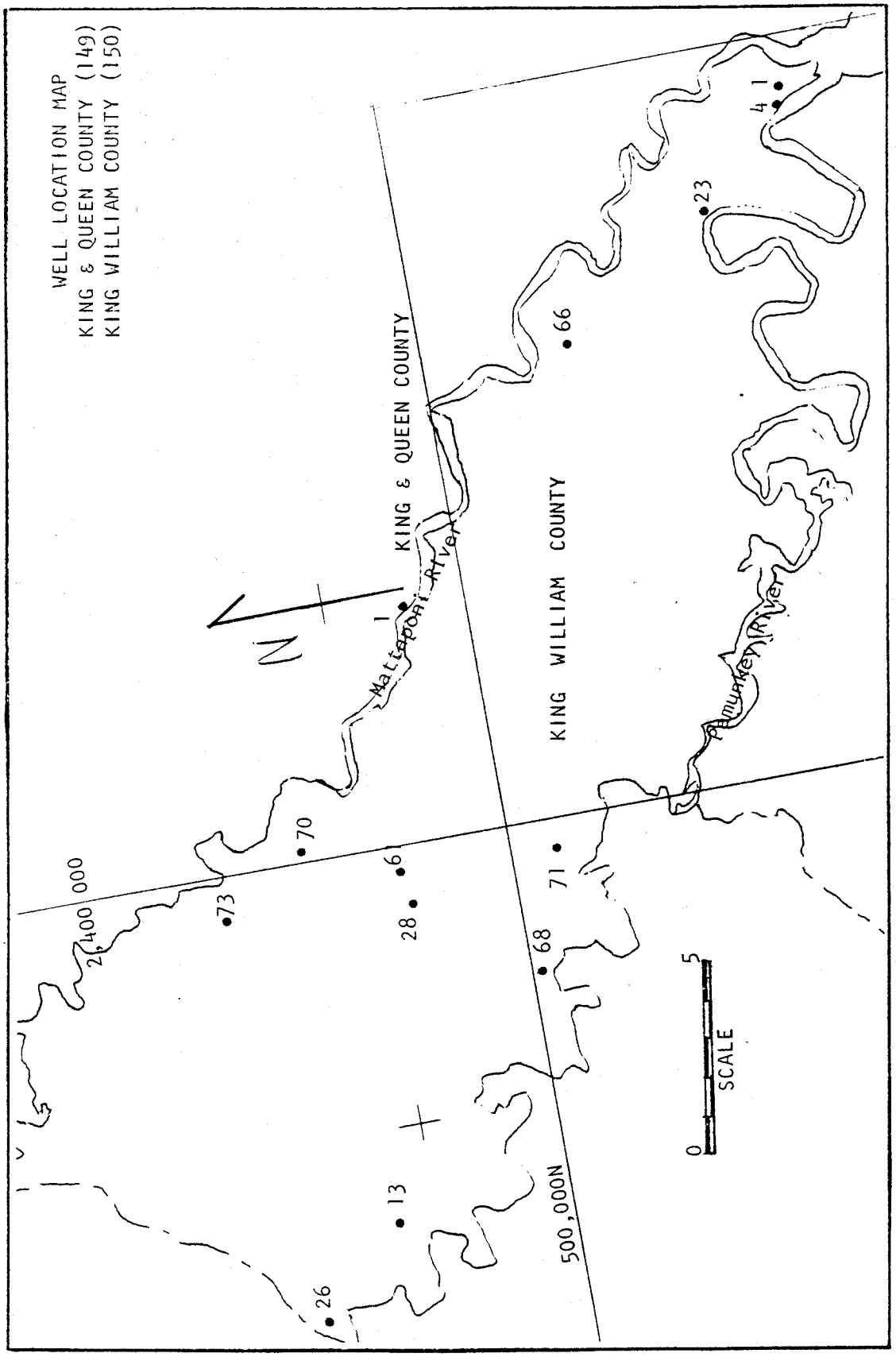

Source: Virginia State Water Control Board-BWCM

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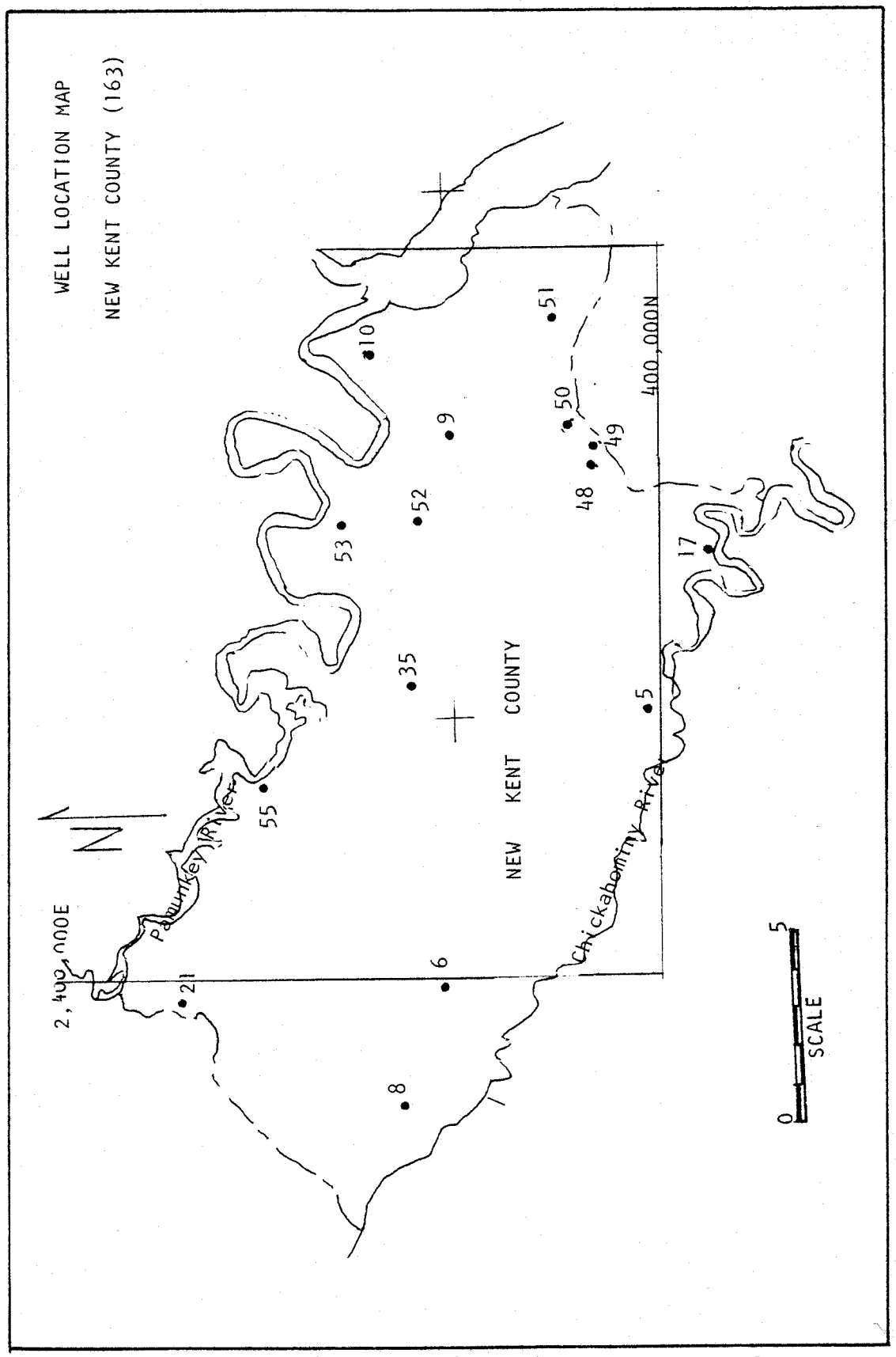

Source: Virginia State Water Control Board-BWCM

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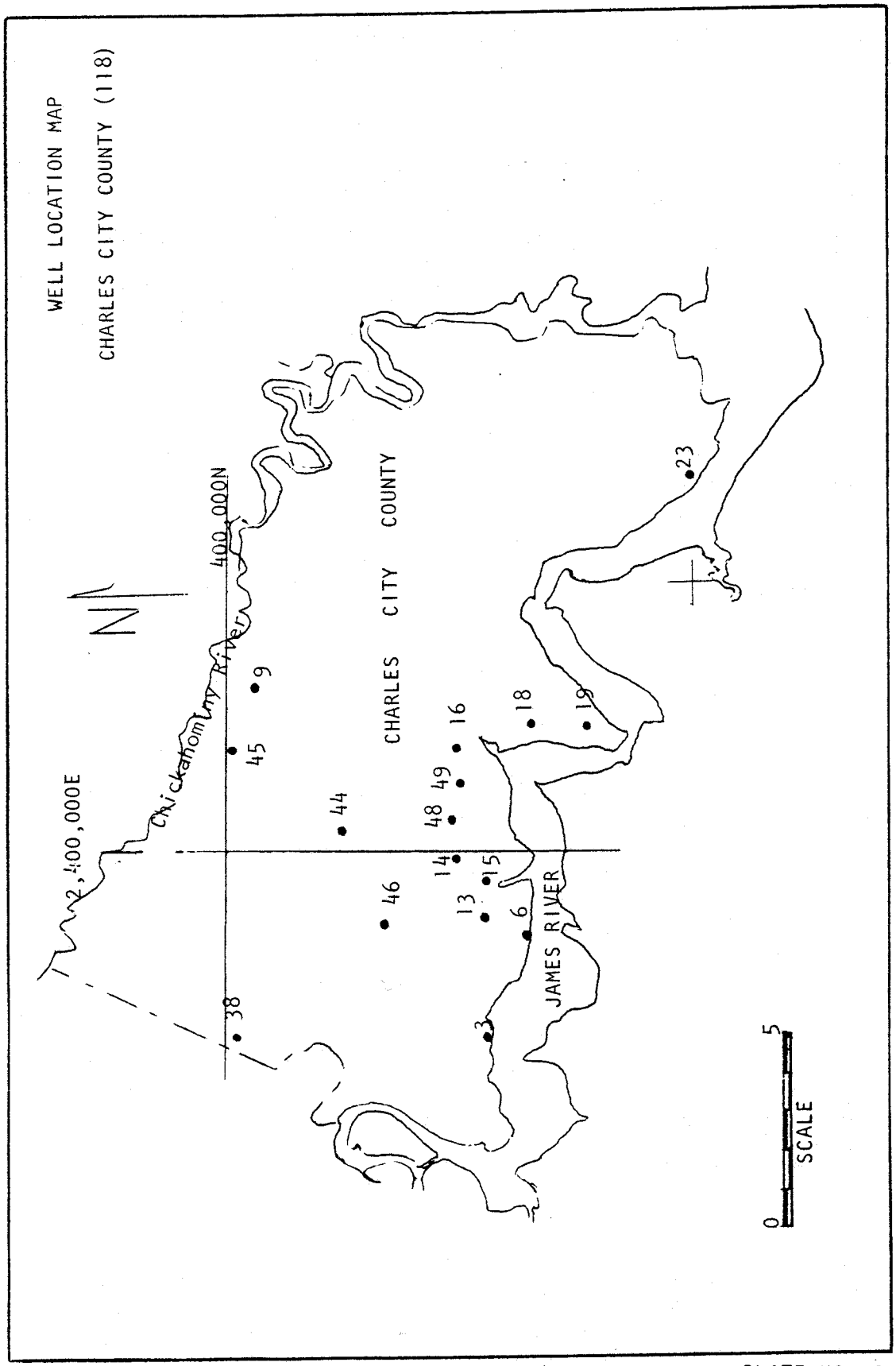

Source: Virginia State Water Control Board-BWCM

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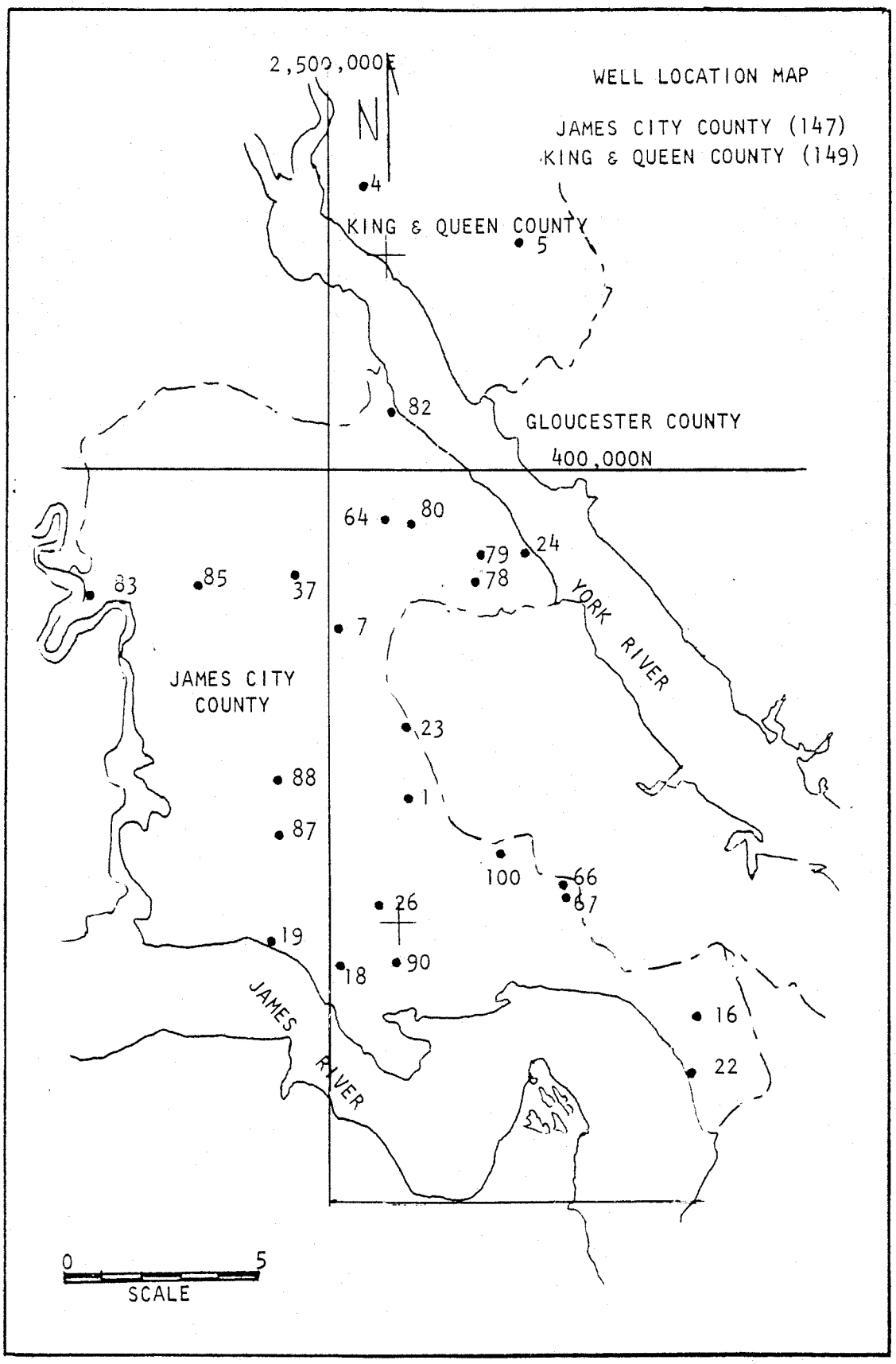

Source: Virginia State Water Control Board-BWCM

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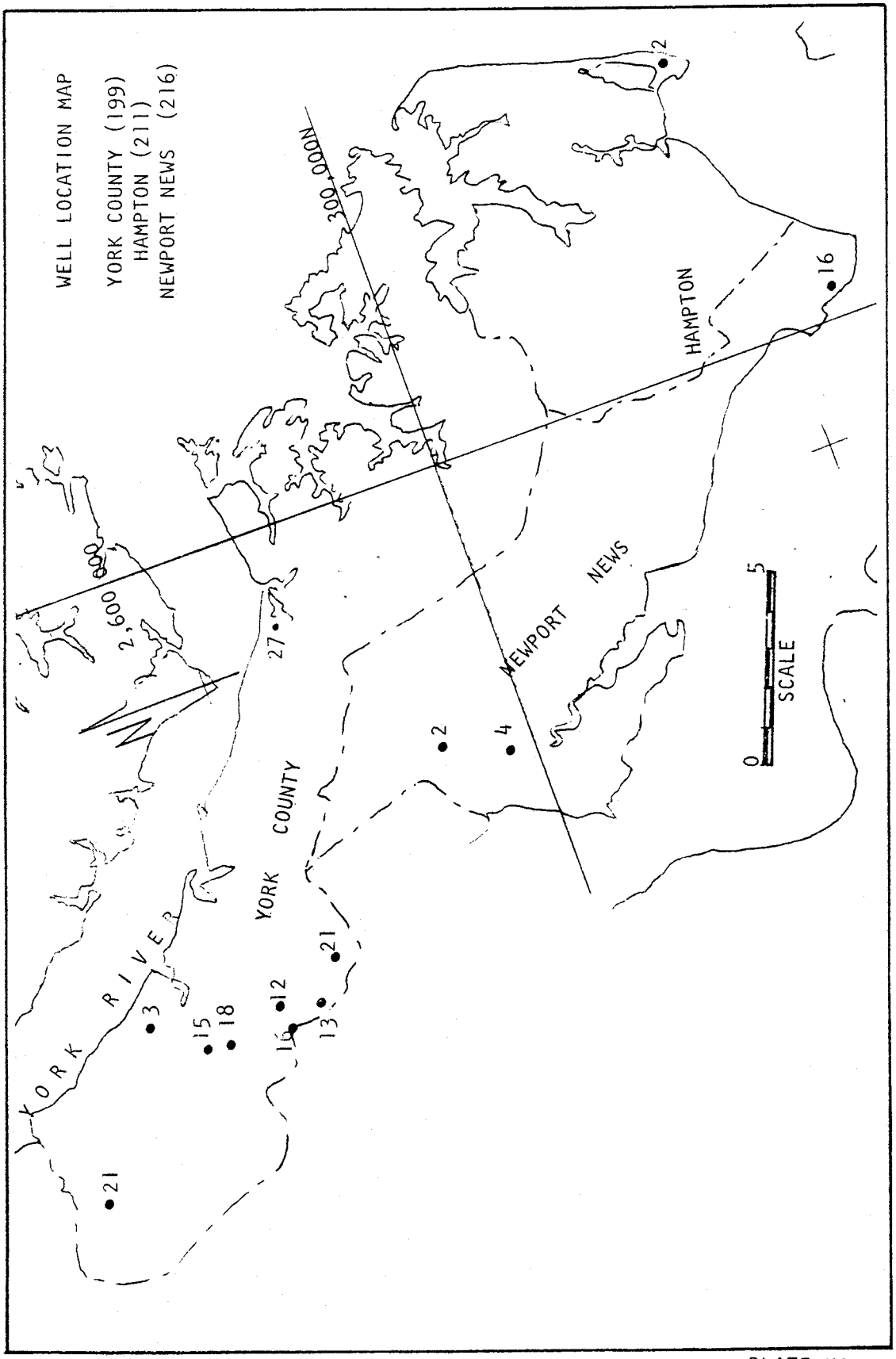


Source: Virginia State Water Control Board-BWCM

PLATE NO. 7

CHAPTER II

GEOLOGY

The York-James Peninsula lies wholly within the embayed section of the Atlantic Coastal Plain Province. The geologic formations of the area consist of unconsolidated sediments of Cretaceous, Tertiary and Quaternary age deposited on a basement complex of sedimentary, igneous and metamorphic rocks older than Cretaceous (Plate 8).

In this report, certain determinations of age and stratigraphy of the artesian aquifers which were investigated are made.

The formational boundaries used in this report are based on information from previous publications and on lithostratigraphic correlations and interpretations of geophysical logs, with the aid of well cuttings in selected areas.

Geologic Units

Pre-Cretaceous. The pre-Cretaceous basement-rock complex of the York-James Peninsula consists of consolidated sedimentary rocks and various types of crystalline rocks, similar to the Piedmont. Wells which have been drilled to basement have recovered granite, diorite and several varieties of Triassic sedimentary rocks.

Recent geophysical studies, including a magnetic survey conducted by the U. S. Naval Oceanographic Office (1964-1966) and a gravity survey conducted by Mohamed Sabet (personal communication, 1972), indicates that the basement complex may display considerable structural and topographic relief. The magnetic survey map (Plate 9) shows the magnetic trends of the basement complex of the York-James Peninsula. Sabet's gravity survey shows many similar trends. Intensity varia-

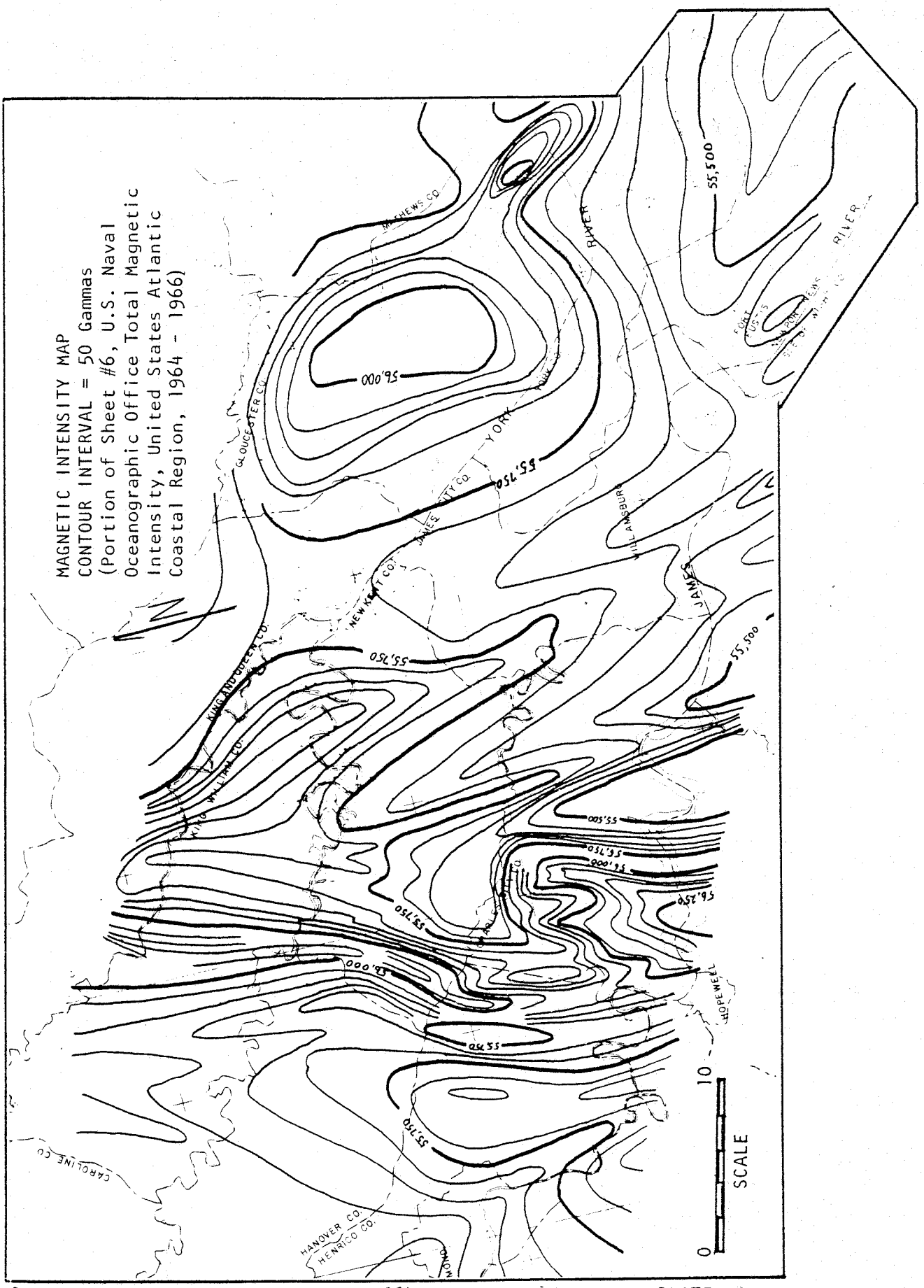
GEOLOGIC UNITS AND THEIR WATER-BEARING CHARACTERISTICS

SYSTEM	SERIES[1]	AGE[1]	FORMATION[2]	APPROXIMATE THICKNESS	LITHOLOGIC CHARACTER	HYDROLOGIC COMMENTS
Quaternary	Post-Miocene			20 - 100	Mostly sands and gravels of fluvial and terrace deposits	Supplies ground water to low-yield water table wells throughout the area
Tertiary	Miocene	Late Miocene Middle Miocene	Yorktown	0 - 150	Fossiliferous sands, marls, and coquinas	Supplies ground water to water table wells in parts of the area
			St. Mary's	0 - 150	Dark-colored sands, silts and clays; often referred to as "blue sand" and "blue clay"	Acts as a confining bed for the upper artesian aquifer system
			Calvert	0 - 60	Fossiliferous silts and sands, occasionally glauconitic	Upper artesian aquifer; yields sufficient water for domestic, subdivision and light agricultural and industrial purposes
	Eocene	Jackson	Chickahominy	0 - 30	Fine to medium grained sands, poorly to moderately sorted, occasionally glauconitic	
		Claiborne	Nanjemoy (Claiborne Age)	0 - 80		
	Paleocene	Midway	Nanjemoy (Wilcox Age) Aquia Mattaponi (Glauconitic Member)	0 - 100	Highly glauconitic sands, silts and clays; often referred to as "greensand" or "black sand"	Generally an aquitard; confining layer for principal aquifer system; basal sand is part of principle aquifer system
Cretaceous	Lower Cretaceous	F G H	Mattaponi (Lower) Potomac Group	0 -1500	Interbedded sands, silts and clays of fluvial and deltaic origin; some thin marginal marine beds; unit F dominantly silts & clays of interdelta region in extreme eastern part of the area	Capable of high yield with proper development in most areas of York-James Peninsula; mostly undeveloped at present time
Triassic					Predominantly soft red and brown shales; some thin beds of hard red shale and sandstone	Supplies ground water to a few low-yield water table wells in Ashland area
Pre-Triassic Crystalline Rock					Highly variable rock types	Supplies moderate quantities of ground water to deep wells near Fall Zone

1 Brown (1972)
2 Cederstrom (1957)

Source: Virginia State Water Control Board-BWCM

PLATE NO. 8



Source: US Naval Oceanographic Office

PLATE NO. 9

tions which appear on the magnetic and gravity surveys may, in the absence of control daya be caused by one or more of three things:

1) The intensity could be reflecting lithological differences in the pre-Cretaceous rocks.

2) The intensity may refer to anomolous densities within the rocks.

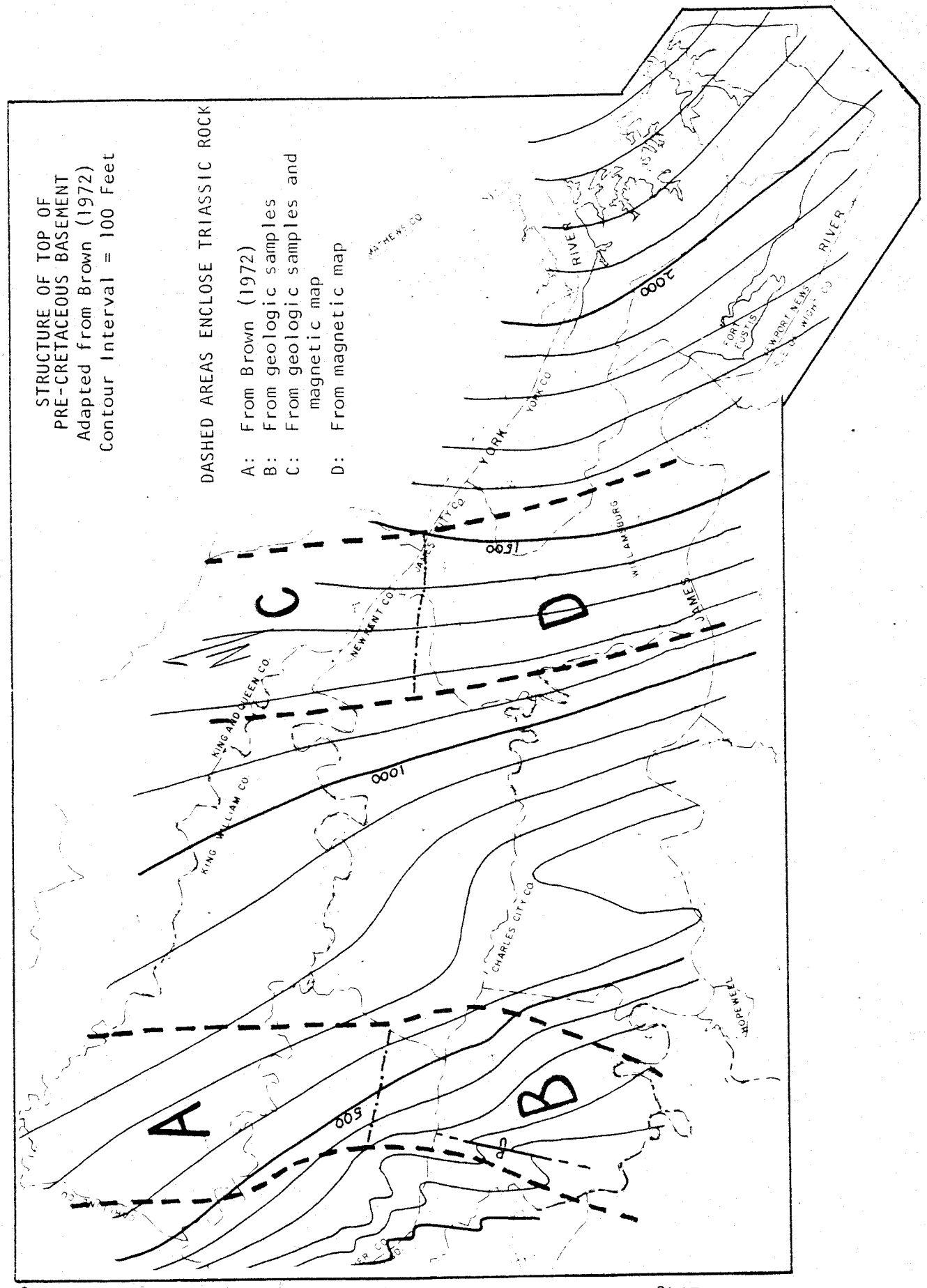
3) The intensity may reflect erosional and structural configuration of the pre-Cretaceous surface.

In the western part of the York-James Peninsula, a large Triassic basin has been found in the subsurface. This basin forms the basement in the eastern part of Chesterfield, Henrico and Hanover Counties and western King William County (Plate 10).

Magnetic and gravity surveys indicate the presence of a north-trending high area in western Charles City County. Two wells drilled to basement on this area, Wells 118-48 and 118-49, recovered altered chloritic diorite from the basement.

Pre-Cretaceous rock forming the basement complex in the area of West Point consists of Triassic sediments. A deep well in West Point encountered the characteristically red Triassic sandstones and shales at approximately 1255 feet below sea level. This Triassic trough may be the hingeline of a fault block (graben) along which active crustal deformation has occurred from Triassic through Miocene ages (Brown 1972). The hingeline controlled subsequent deposition in the West Point area.

The magnetic map shows a low magnetic intensity from the West Point area southward through eastern Charles City and western James City County. The low variation in magnetic intensity in this area



Source: US Geological Survey and
Virginia State Water Control Board-DWCM

PLATE NO. 10

may represent an extension of the Triassic basin found at West Point. No wells to date have been drilled to the pre-Cretaceous surface in this area. The depth to the basement complex is estimated to range from 800 feet below sea level in eastern Charles City County to 1,400 feet below sea level in central James City County.

The only information on the nature of the basement-rock complex east of Williamsburg is data from gravity and magnetic surveys and the record of Well 211-2 at Fort Monroe, in which crystalline rock was found at a depth of 2,243 feet below sea level. The magnetic and gravity surveys have located a high-intensity area centered in Gloucester County, north of the York-James Peninsula (Plate 9), and extending southward into York and eastern James City Counties. The geometry and areal extent of this anomoly indicate that the high intensity readings may be caused more by density differences in the basement rock complex than by variations in basement topography.

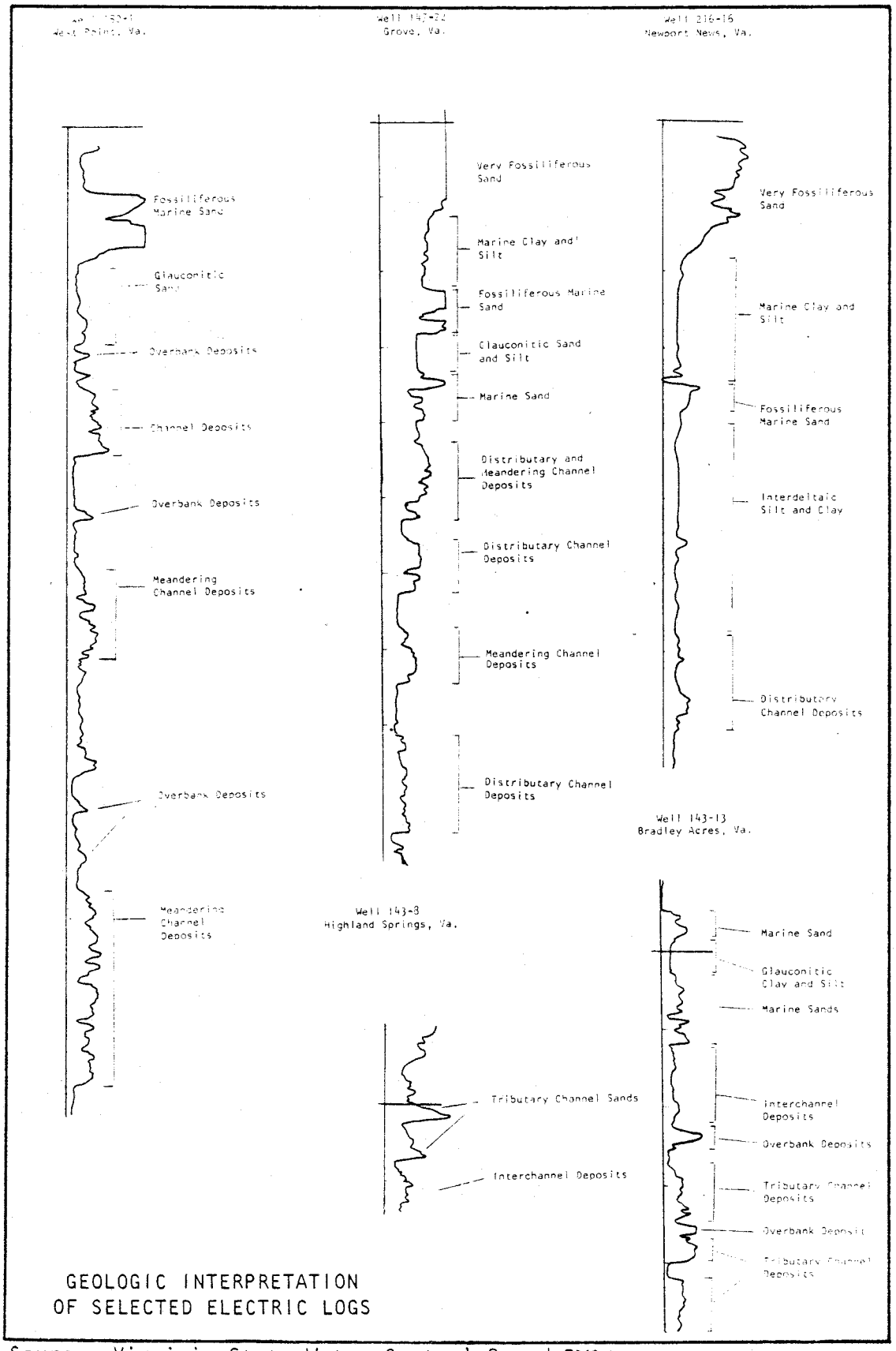
Cretaceous. In previous reports of the York-James Peninsula, the Cretaceous has been subdivided into the Lower Cretaceous Potomac group and the Upper Cretaceous Mattaponi formation. In a recent report by Brown (1972), the Cretaceous has been subdivided into three units named Unit H, Unit G and Unit F (Plate 8). Units H and G correspond to the classical Potomac group, while Unit F comprises both the upper portion of the Potomac group and the lower portion of the Mattaponi formation.

The Cretaceous of the York-James Peninsula was deposited in a fluvial-deltaic environment (Cederstrom, 1945). The facies which have been preserved are the meandering channel facies of the fluvial en-

vironment and the delta distributary, and delta front facies of the deltaic environment. Characteristic of all these facies are discontinuous sand bodies interbedded with silts and clays.

The slightly meandering channel facies (Fisher and McGowen, 1967), found in eastern Henrico and Hanover Counties and western King William, New Kent and Charles City Counties, is characterized by channel sand bodies which are coarse-grained at the base and become finer-grained upward. Geologic correlations made for this report indicate that the channel sands are 50 to 70 feet thick, one to three miles wide, and up to ten miles long (Plates 13, 17 and 21). In addition, smaller sands resulting from crevasse deposits overbank spills and tributary stream channels are found (Plate 11, Wells 143-8 and 143-15). The fluvial sands are generally subordinate to coarse and fine interchannel silt. The channel sands generally are good aquifers if the total sand thickness exceeds 100 feet. Interchannel deposits usually will not yield large quantities of ground water (Plates 15 and 19).

The sands of the highly meandering channel facies (Fisher and McGowen, 1967), found in eastern King William, New Kent, and Charles City Counties, James City County and western York County, are medium to coarse grained, moderately well sorted, and have an average thickness of about 100 feet (Plate 11, Wells 150-1 and 147-22). Sand bodies are discontinuous as shown in the geologic correlation of Well 150-1, 149-4, and 149-5 (Plate 17). Smaller sands associated with crevasse deposits and overbank spills are found. Overbank silts and clays are subordinate to sands in this facies. The dominant thick sands of this facies are generally good to excellent aquifers, from



GEOLOGIC INTERPRETATION
OF SELECTED ELECTRIC LOGS

Source: Virginia State Water Control Board-PVCM

PLATE NO. 11

which a properly constructed well can draw large quantities of ground water.

The delta distributary facies is characterized by medium-grained, moderately well-sorted sands, about 50 feet thick, with linear trends. In certain parts of this facies, interchannel swamp deposits, consisting of dark-colored silts and clays with sand stringers, are found. One such area is the extreme eastern tip of the Peninsula (Plate 15). Delta distributary sands are generally high yield aquifers, but the interchannel swamp deposits have very poor aquifer characteristics.

Delta front bar sands are found in Well 211-2 at Fort Monroe, City of Hampton, and in several wells in the cities of Portsmouth, Norfolk, and Virginia Beach. In general, these sands are 50 to 70 feet thick, fine to medium grained, and well sorted. Aquifer characteristics of the sands are good, but the ground water in the sands is highly mineralized.

Paleocene. The sedimentary interval between the lower Cretaceous Potomac group and the Miocene has classically been divided into the Upper Cretaceous to Paleocene Mattaponi formation and the Aquia, Nanjemoy, and Chickahominy formations of Eocene age. These formations and their boundaries have been described in a report by Cederstrom (1957).

In this report, the Mattaponi is described as being interbedded sands and clays overlain by a glauconitic, occasionally fossiliferous unit. Based on the presence of Paleocene fossils in the upper member and the lithologic similarity of the lower member to the Upper Cretaceous of southeastern Virginia and other areas, Cederstrom called

this unit the Mattaponi formation and assigned it to Upper Cretaceous and Paleocene. Overlying the Mattaponi are, from east to west, the Chickahominy, the Nanjemoy of Claiborne age, the Nanjemoy of Wilcox age, and the Aquia. Cederstrom (1957) notes that a basal sand found in the Aquia in the western part of the Peninsula correlates with a sand member which is overlain by sediments containing Paleocene foraminifera. His explanation is that the upper Mattaponi and Aquia represent a transgressive marine deposition. With the aid of more recent paleontological evidence and regional stratigraphy, Brown (1972) has recognized the presence of a Paleocene unit of Midway age. Based on a comparison of Cederstrom and Brown (Plate 8), the Paleocene, as defined by Brown, includes the glauconitic member of the Mattaponi formation, the Aquia formation and that part of the Nanjemoy formation assigned to Wilcox age by Cederstrom. Tectonic depositional controls postulated by Brown resulted in nondeposition during middle and late Cretaceous in the York-James Peninsula, and therefore the nonglauconitic portion of the Mattaponi has been assigned to lower Cretaceous. In his report, Cederstrom has cited evidence that such an interpretation could be valid.

Sediments of Paleocene age are found overlying the Cretaceous deposits throughout the western part of the York-James Peninsula except in those areas near the Fall Zone where they have been removed by erosion. The thickness of the Paleocene is between 50 and 100 feet in the area. The Paleocene consists of fine to medium grained sands interbedded with dark-colored silts and clays. To the east, the lower portion of the Paleocene is a fairly permeable sand which is hydro-

logically a part of the Cretaceous aquifer system. Along the central part of this area, there is an abrupt lithologic change as the sand becomes very silty and glauconitic. Near the Fall Zone in Hanover County, the Paleocene is almost entirely silt and clay.

In the central part of the York-James Peninsula, the Paleocene sediments are fine grained quartz sand with 10-75% glauconite and numerous relatively thin silty clay stringers. The Paleocene sediments are about 100 feet thick in the area.

In the eastern part of the York-James Peninsula, the Paleocene sediments are rather continuous as a whole throughout most of the area, although various individual sands wedge in and out from place to place. The Paleocene varies in thickness from about 100 feet in western James City County to 40 to 50 feet in Newport News.

The sediments consist of fine to medium grained sands interbedded with silty clays. In the Williamsburg area, some of the sands are composed largely of dark green to black glauconitic sands. A few scattered shells occur in the upper half of the Paleocene sediments.

Eocene. The Eocene is divided into Nanjemoy and Chickahominy formations (Cederstrom 1957). These are equivalent to sediments of Claiborne and Jackson age as they have been described by Brown (1972).

The Eocene sediments have lithologic uniformity and lateral continuity similar to the Paleocene sediments. The thickness of the Eocene varies considerably. In the western part of the Peninsula, the thickness averages about 75 feet. East of West Point the Claiborne thins considerably and the Jackson age sediments are found. In James

City County the Eocene thins to about 10-25 feet, and eastward it wedges out before Well 216-19 in Newport News.

The Eocene is made up of fine to medium grained sand, with varying concentrations of glauconite. Some of the glauconitic material is oxidized to a reddish-brown color. Silty material dispersed in varying percentages throughout the unit gives it a characteristically low amplitude curve on geophysical logs (Plate 11).

Both the Claiborne and Jackson units were deposited in a transgressive shallow marine environment. Regional and local lithologic correlations indicate that the sediments of Claiborne age are deposited disconformably on the underlying Paleocene. Cederstrom states that deposition during the Jackson age (Chickahominy formation) caused erosional thinning of the Claiborne sediments in the eastern part of the Peninsula. Brown (1972) shows a complete absence of Claiborne in some areas.

Miocene. The Miocene deposits of the Virginia Coastal Plain are divided into four formations which are the Calvert, the Choptank, the St. Marys and the Yorktown. Of these, all but the Choptank have been recognized in the York-James Peninsula.

The thickest Miocene deposits are found in the eastern part of the Peninsula. They range in thickness from about 200 feet in western James City County to a little more than 300 feet in the Hampton area. The top part of the Miocene consists of shells and shell fragments cemented with calcite. This unit grades transitionally downward into a fine-grained subround to round quartz grain sand, with a gradual decrease in shell fragment content. Traces of biotite and glauconite occur in the sand. At greater depth, the sand becomes more poorly

sorted. Along with the increase in silt matrix there is a corresponding decline in shell material. This part of the Miocene section is characteristically dark in color and is often called blue sand or blue clay in drillers' logs. Throughout most of this area there is a basal sand with scattered fossil fragments. This unit is about 20 to 40 feet thick and has a higher porosity than the overlying sediments. The base of the Calvert is marked by a marl or coquina over much of this area. This limestone varies in thickness from a few inches to a few feet.

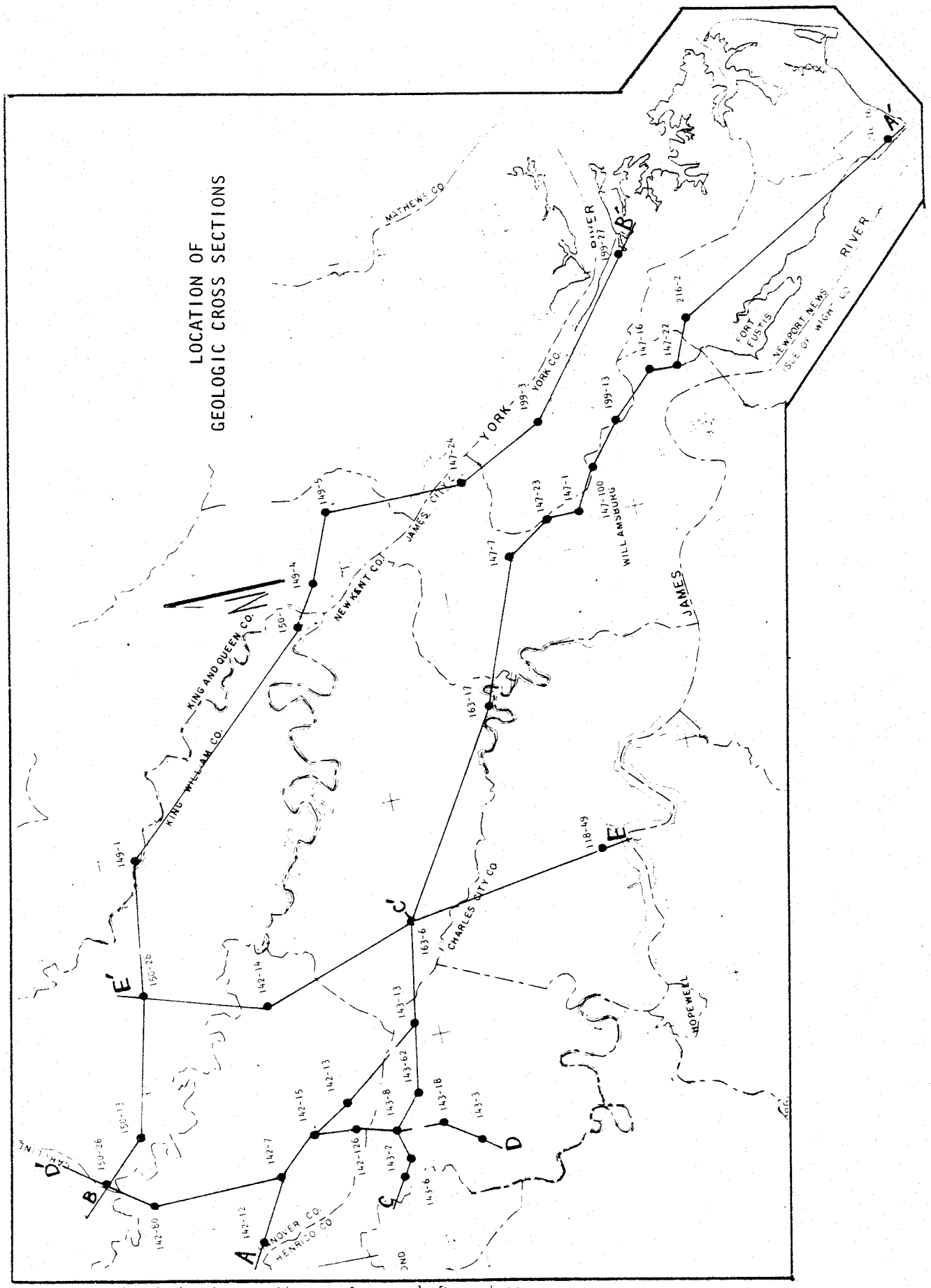
Miocene deposits cover most of the central part of the York-James Peninsula, but they become thin and irregular in the southern and western parts of this area. This is partly a result of removal of the Miocene by erosion, and may be partly a result of nondeposition caused by tectonic transition during early Miocene time (Brown 1972). In the central part of the Peninsula, the lower portion of the Miocene thickens to the northeast, reaching a thickness of about 100 feet in the area of the Mattaponi River. The upper Miocene thickens to the east, attaining a maximum thickness of 50 feet.

The lower part of the Miocene in the area is similar to that of the eastern part of the Peninsula, consisting of a basal fossiliferous sand, 20 to 40 feet thick, overlain by a dark, silty clay of variable thickness. Glauconite is occasionally found in the clay. The deposit of shells and shell fragments which is characteristic of the uppermost Miocene to the east, appears to grade laterally into a fossiliferous, medium to coarse grained quartz sand in the central part of the Peninsula.

In the western part of the York-James Peninsula, the Miocene forms a thin mantle less than 50 feet thick on the high stream divides. It consists of gray clays which contain some shell fragments.

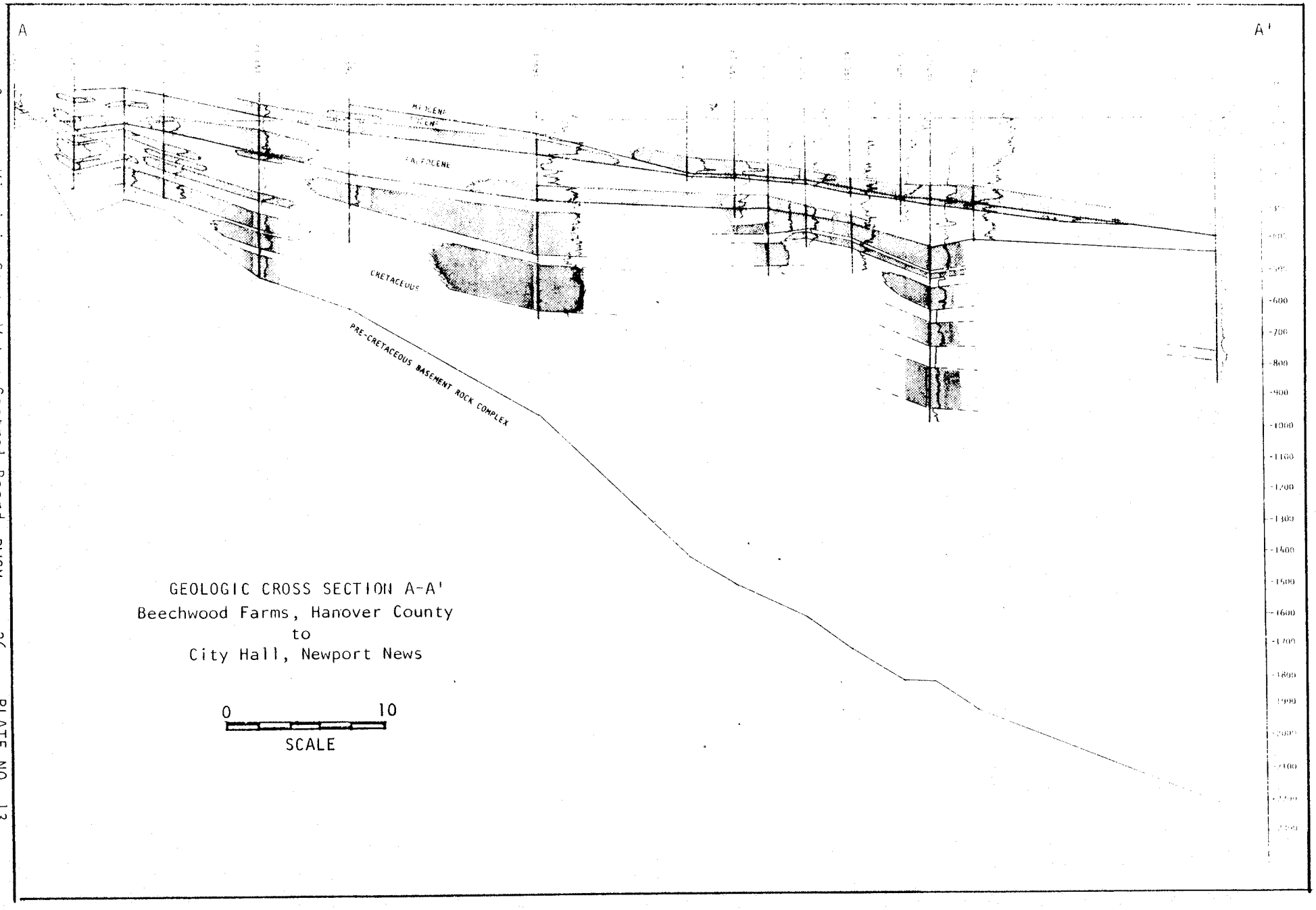
The Miocene sediments, having been deposited in a shallow marine environment, are fairly consistent lithologically and have a wide areal extent. The Miocene is easily identified on geophysical logs by its characteristic resistivity curve (Plate 11).

Post-Miocene. The deposits which overlie the Yorktown formation consist of sediments of the Pliocene and/or Pleistocene series (Bick and Coch 1969), the Pleistocene series and the Holocene or Recent series. Cederstrom (1957) describes the Columbia group of the Pleistocene series in the western and central part of the Peninsula as being deposits of sand, silt and clay of continental origin which form a mantle 30 to 60 feet thick over the area. In the eastern part of the Peninsula, Bick and Coch (1969), Coch (1971) and Johnson (1972) have collectively recognized the Sedley and Bacons Castle formations of the Pliocene and/or Pleistocene series, the Windsor, Norfolk and Sand Ridge formations of the Pleistocene series and deposits of the Holocene series. Each formation was subjected to erosion before deposition of the next younger formation so that all of the formations are discontinuous. Collectively, the Sedley, Bacons Castle, Windsor, Norfolk and Sand Bridge formations are a series of sands, silts and clays which were deposited in fluvial, estuarine and marginal marine environments. The collective thickness of the formations ranges from 25 to 75 feet in the inland areas, but along certain parts of the York and James Rivers the Norfolk formation becomes much thicker.



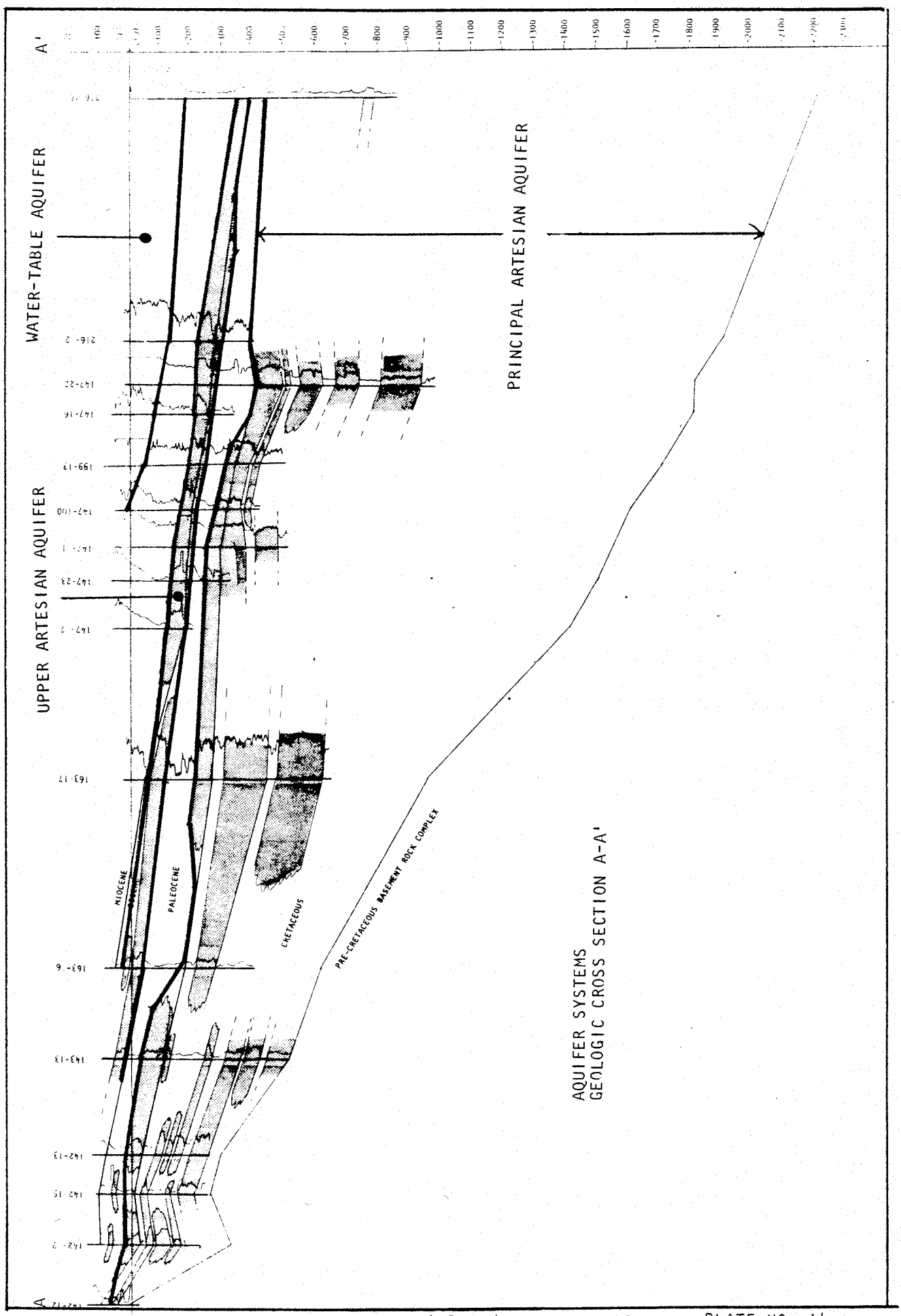
Source: Virginia State Water Control Board-BWCM

PLATE NO. 12



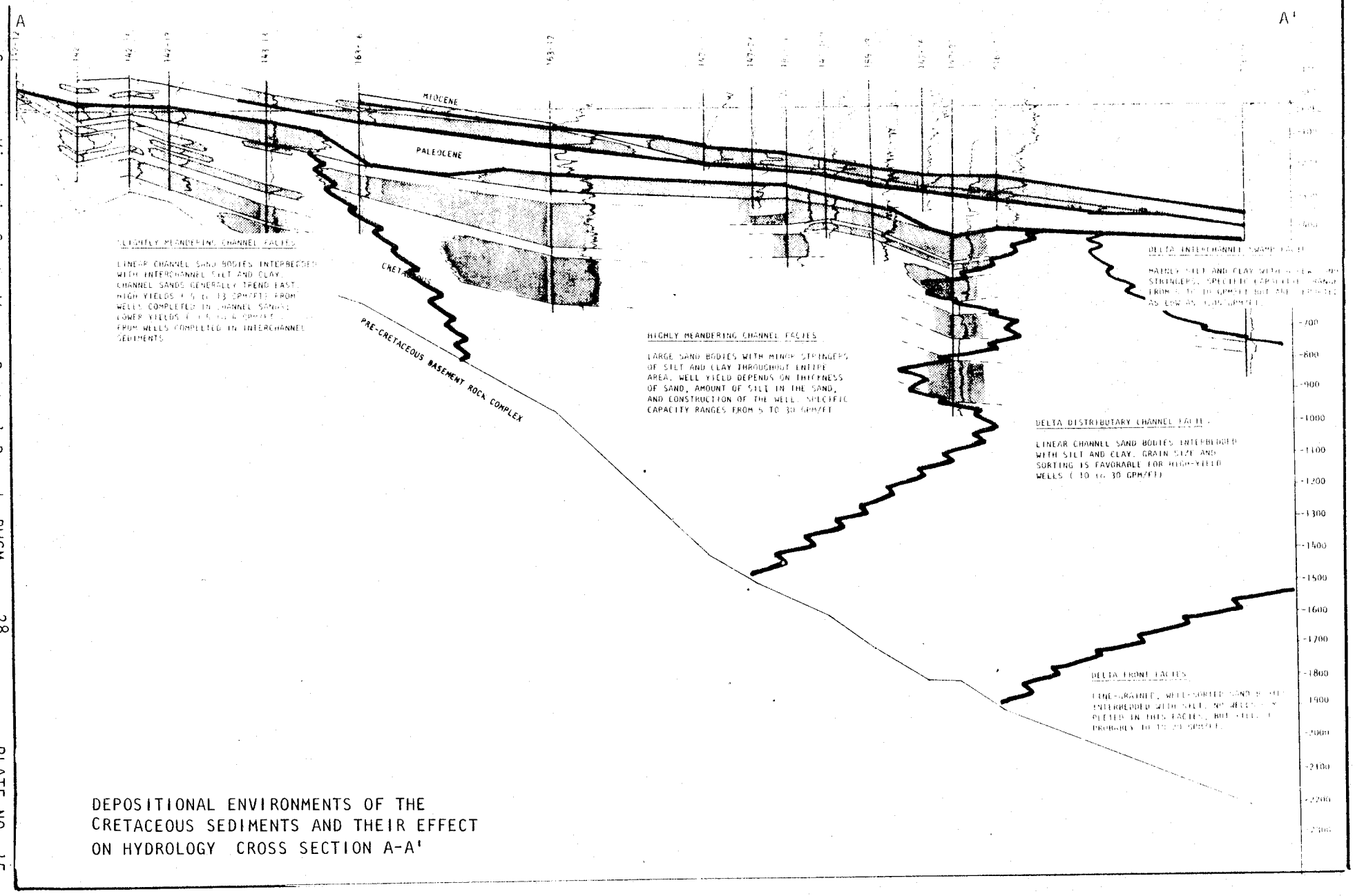
GEOLOGIC CROSS SECTION A-A'
Beechwood Farms, Hanover County
to
City Hall, Newport News

0 10
SCALE

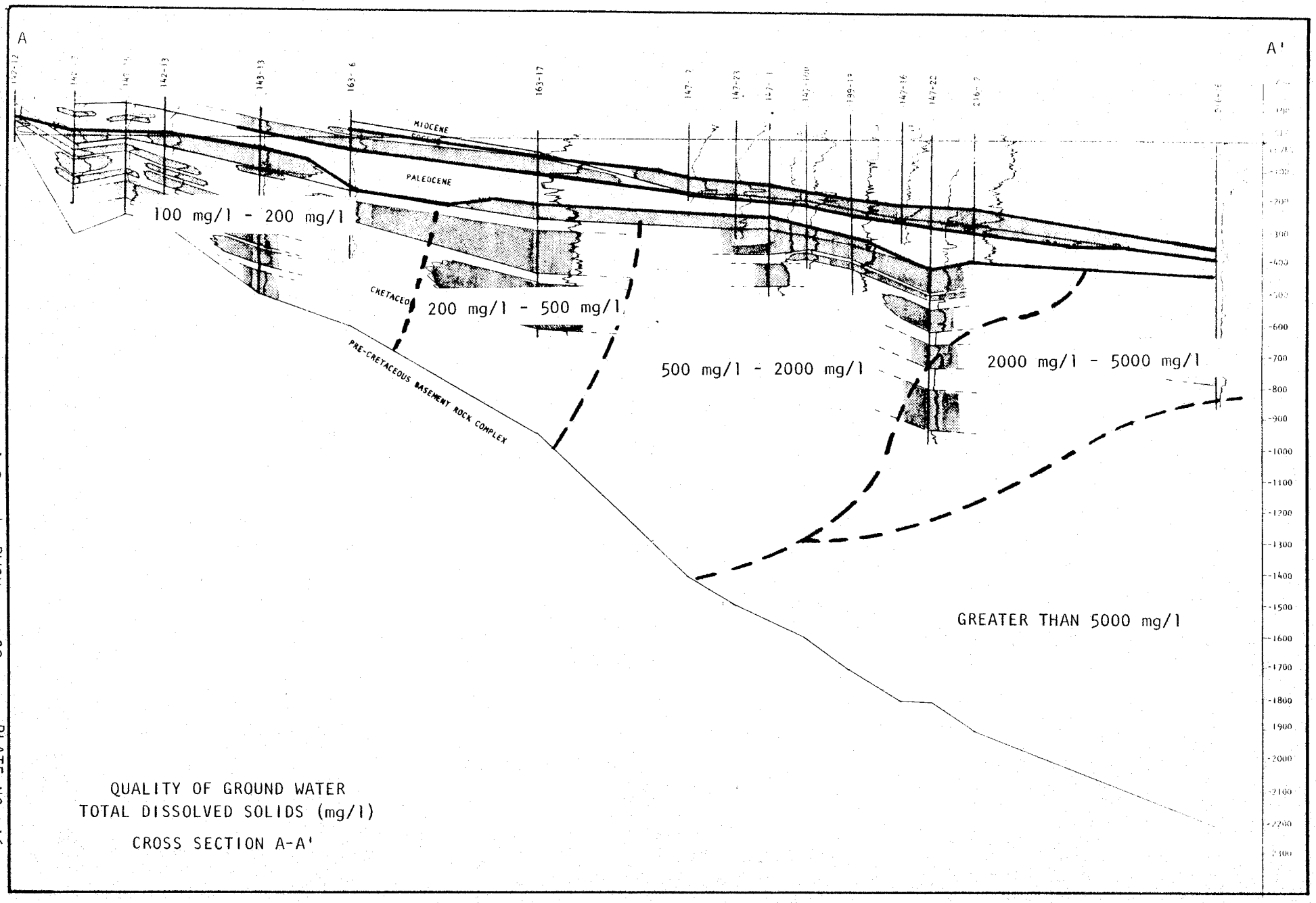


Source: Virginia State Water Control Board -BWCM

PLATE NO. 14



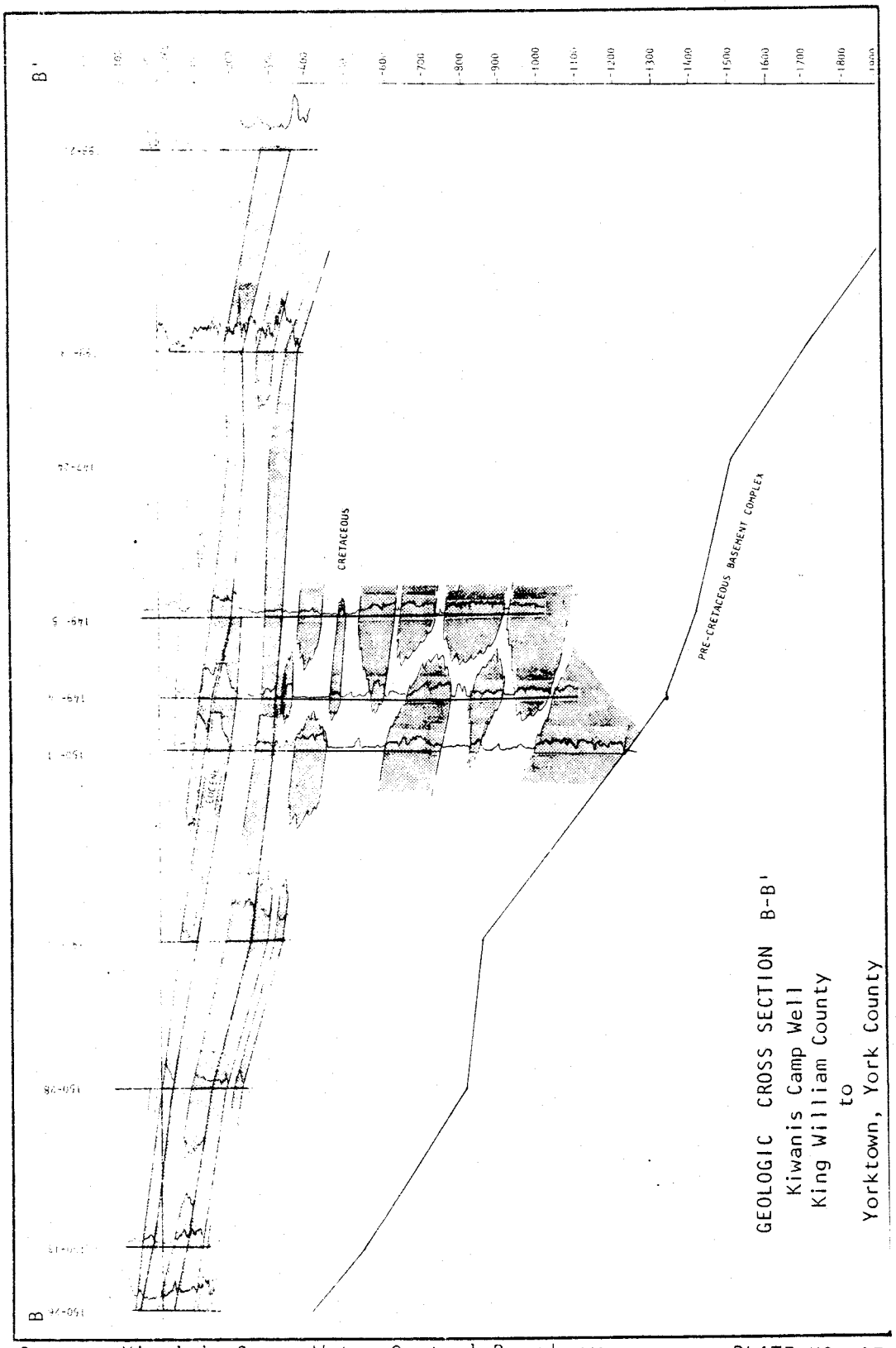
DEPOSITIONAL ENVIRONMENTS OF THE CRETACEOUS SEDIMENTS AND THEIR EFFECT ON HYDROLOGY CROSS SECTION A-A'



QUALITY OF GROUND WATER
TOTAL DISSOLVED SOLIDS (mg/l)

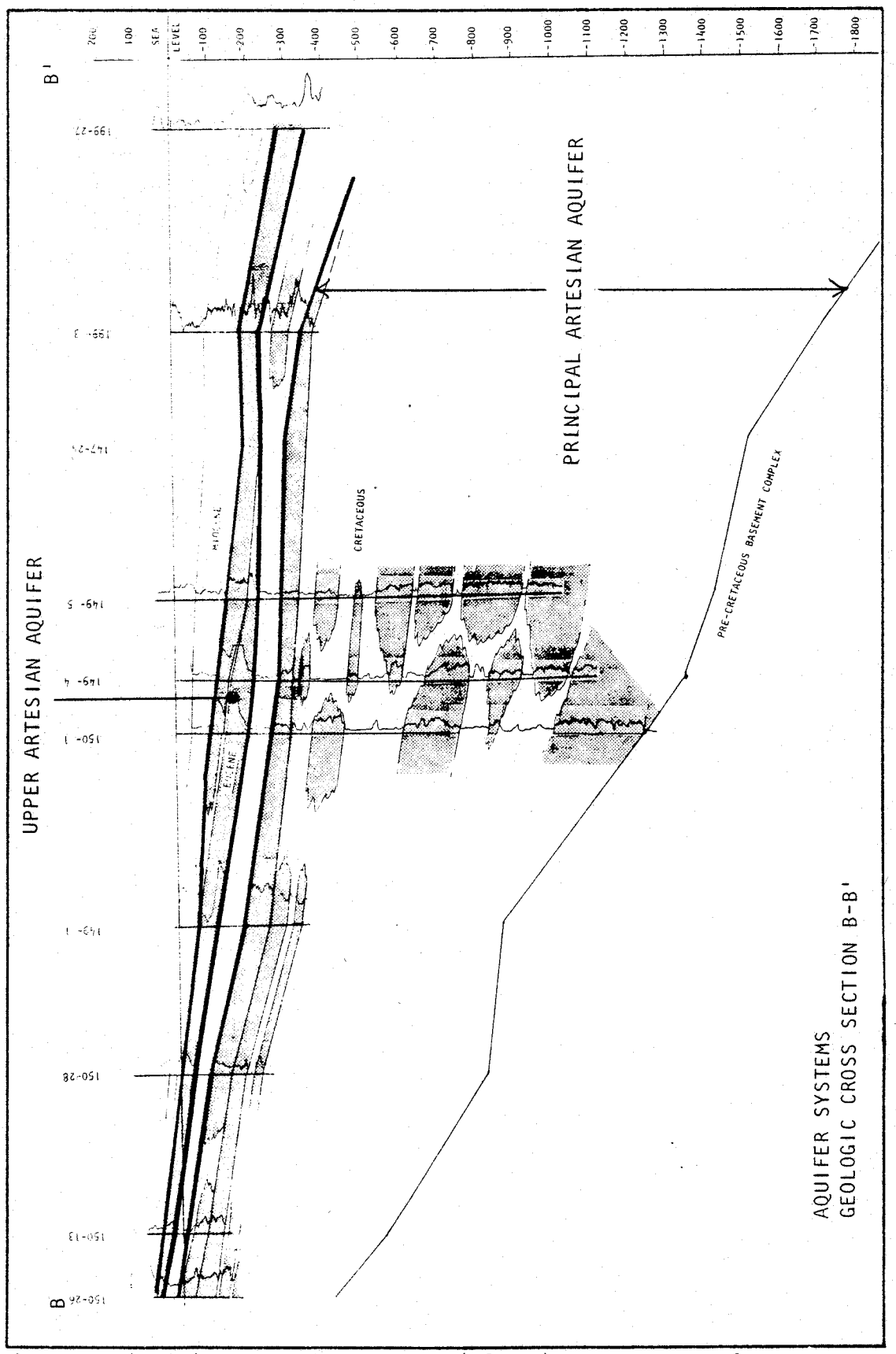
CROSS SECTION A-A'

Source: Virginia State Water Control Board -BWCM 29 PLATE NO. 16



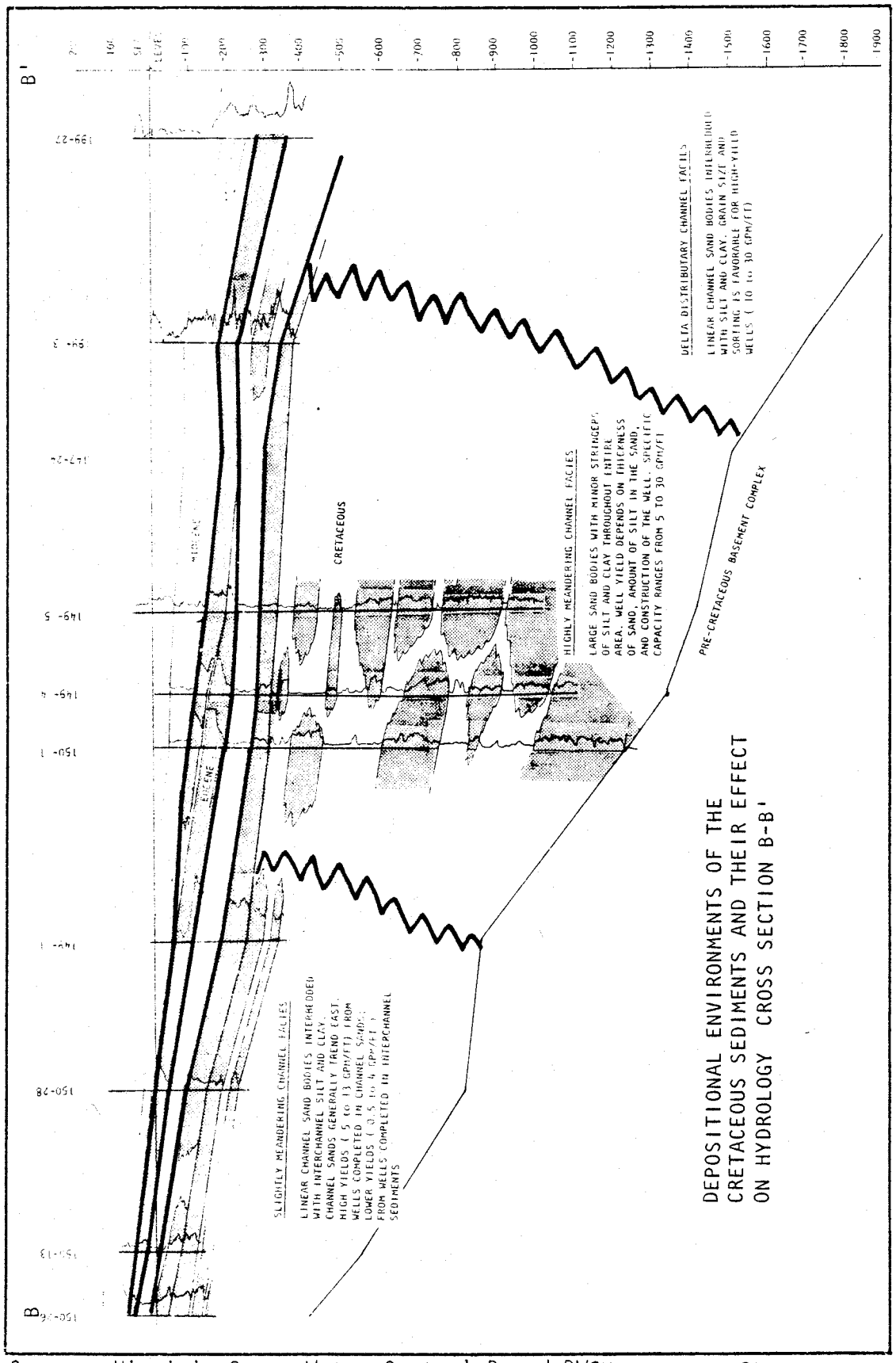
Source: Virginia State Water Control Board-DWCM

PLATE NO. 17



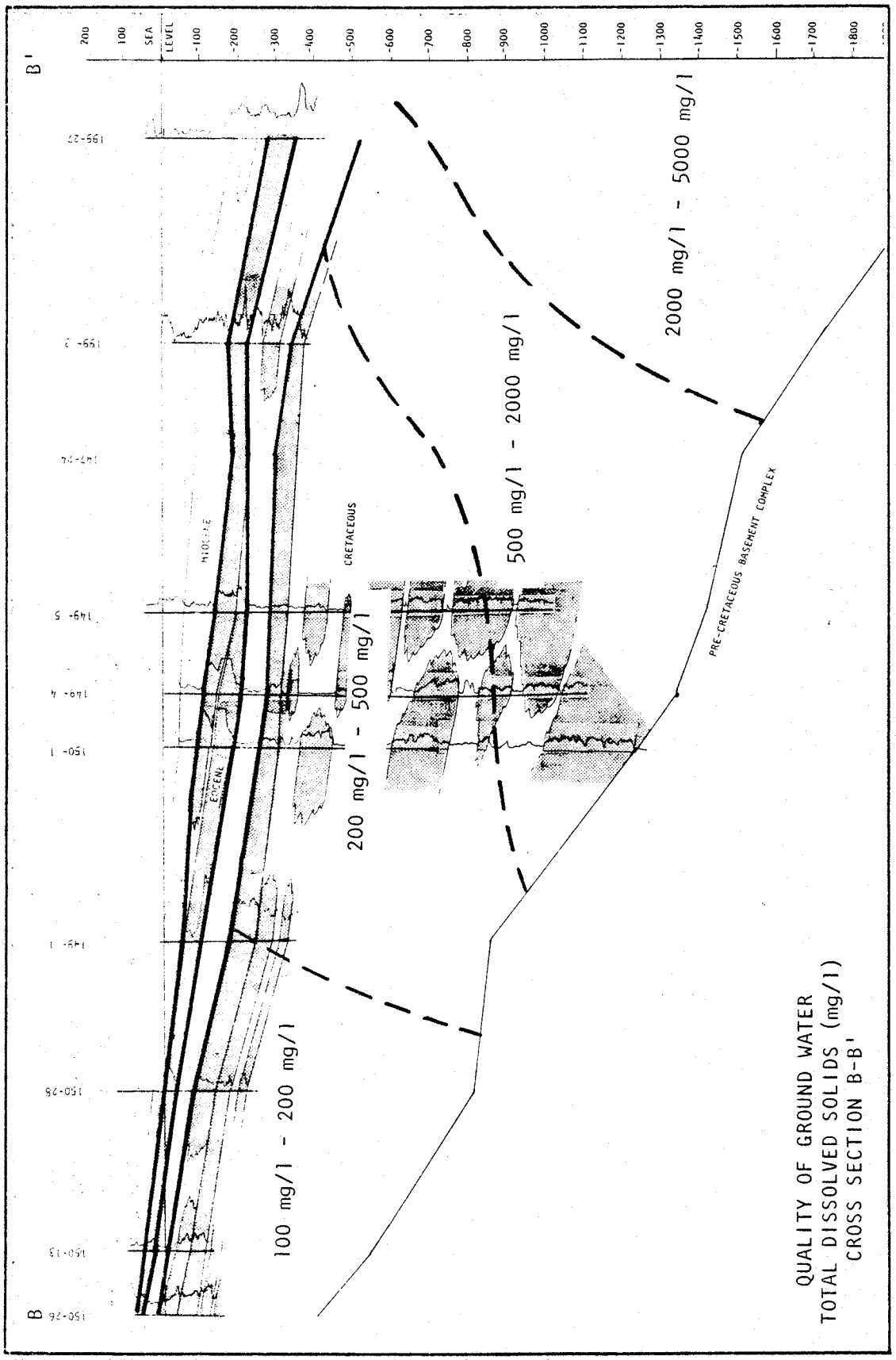
Source: Virginia State Water Control Board-DWCM

PLATE NO. 18



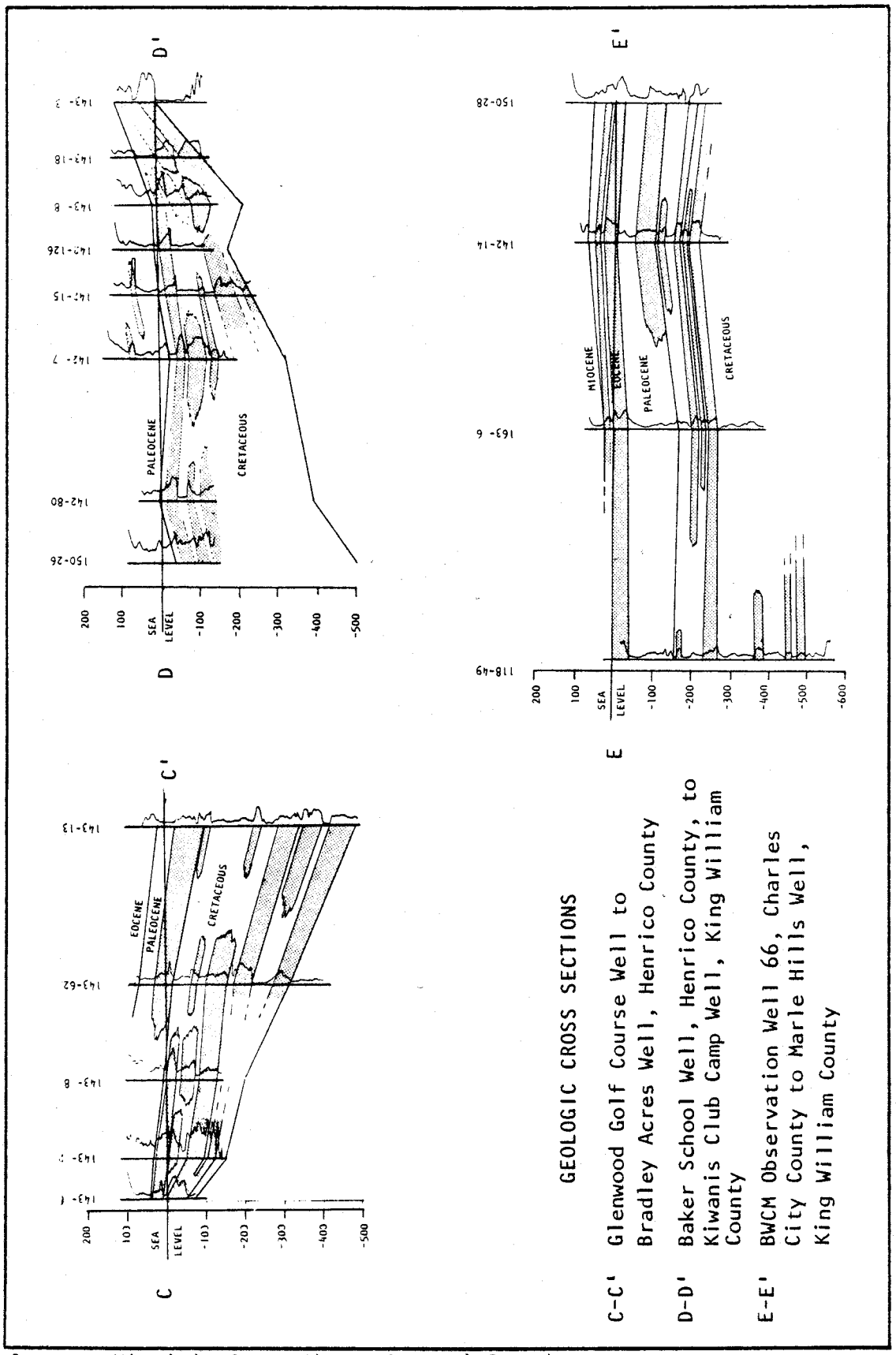
Source: Virginia State Water Control Board-BWCM

PLATE NO. 19



Source: Virginia State Water Control Board-BWCM

PLATE NO. 20



Source: Virginia State Water Control Board-BWCM

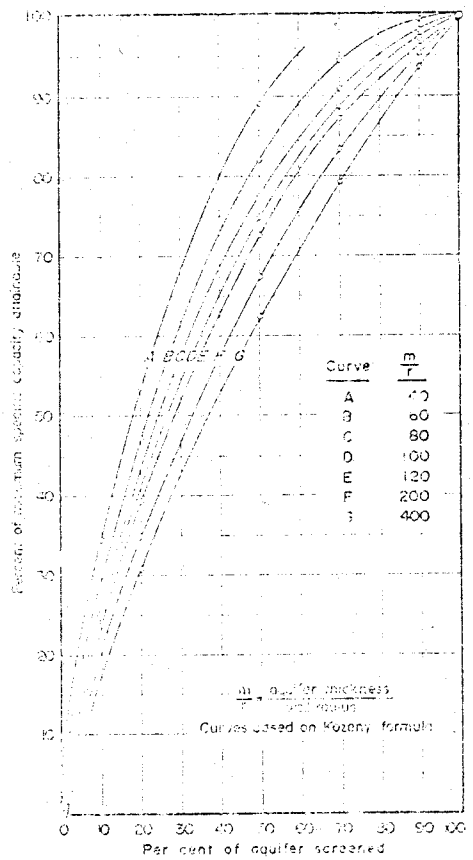
PLATE NO. 21

CHAPTER III

OCCURENCE AND USE OF GROUND WATER

In the York-James Peninsula, ground water occurs in three major aquifer systems. The uppermost aquifer system is the water-table aquifer found throughout the Peninsula. It consists of deposits of Tertiary, Pleistocene and Recent age. This aquifer is a reliable source of domestic ground-water supply in most of the area, but seasonal fluctuations and lack of sufficient storage make it impractical for industrial or municipal supplies. The second aquifer system of the York-James Peninsula is the upper artesian aquifer system, formed from sediments of Miocene and Eocene age. This system is artesian on a regional scale in the eastern part of the Peninsula. It is, however, locally artesian in parts of the central and western Peninsula. The third aquifer system is the principal artesian aquifer system comprising deposits of Paleocene and Cretaceous age. This system is found throughout the entire Peninsula.

PLATE 22: RELATIONSHIP OF PARTIAL PENETRATION AND ATTAINABLE SPECIFIC CAPACITY FOR WELLS IN HOMOGENEOUS ARTESIAN AQUIFERS



SOURCE: EDWARD E. JOHNSON, INC.

The most prevalent reliable hydrologic information available for most wells in the York-James

Peninsula is the specific capacity, which is defined as gallons per minute of discharge per foot of drawdown (gpm/ft). Therefore, specific capacity is used in this report as an indicator of aquifer potential. It should be noted that variations in well construction will have pronounced effects on the specific capacity of a well. However, in those areas where specific capacities are reported and accurate well completion information is available, specific capacities can be used as a reasonable comparative parameter of aquifer potential.

For wells on which construction data and geophysical logs are available, specific capacities have been corrected by means of a graph (Plate 22), constructed from the Kozeny formula, which compensates for well diameter, well construction, and partial penetration of the aquifer.

Water-Table Aquifers

The water-table aquifers are an important source of domestic ground-water supply in the York-James Peninsula. In addition, these aquifers supply ground water to some institutions, farms and other small users in the area. Bureau of Water Control Management data files show that the water table aquifers are the dominant source of domestic ground water in King William County and in many parts of Charles City, New Kent, James City and York Counties. These aquifers are not as dominant a source in eastern Henrico and Hanover Counties. In parts of Newport News and Hampton, there are areas where domestic ground water is supplied by wells 50-100 feet deep. Most of these

wells are probably completed in water-table aquifers, but insufficient geologic data prevent accurate determination of aquifer type.

Upper Artesian Aquifer System

Geologic and hydrologic information indicate that this system becomes regionally artesian along a line a few miles west of, and parallel to, the western border of James City County. This system is locally artesian in areas of higher elevation to the west as far as extreme eastern Henrico and Hanover Counties.

This system has a fairly consistent thickness of about 50 to 80 feet and a normal lithology of fine to medium grain sand moderately to poorly sorted with glauconite, usually referred to as green sand or black sand. The consistency of the system makes it a reliable source of domestic and subdivision ground-water supply. Specific capacities of wells completed in this system range from 1 gpm/ft to 10 gpm/ft. Depth to the top of this system varies from 60 feet above sea level in eastern Hanover County to 340 feet below sea level in Newport News (Table 2).

In James City and York Counties, this system is the ground-water source for many of the domestic and subdivision artesian wells, in addition to some institutional and agricultural supply wells. Most of the flowing wells along the lower Chickahominy River are completed in this system. An increasing number of domestic supply wells in Charles City, New Kent and King William Counties are being completed in the upper artesian aquifer system. In the western part of the area, the system is too thin for practical development.

TABLE 2

ELEVATION OF THE TOPS OF ARTESIAN AQUIFER SYSTEM IN SELECTED WELLS

County	BWCM Well Number	Elevation Top of Upper Aquifer System	Elevation Top of Principal Aquifer System
Henrico	143- 3	-	+105
	143- 6	-	+ 40
	143- 8	-	- 10
	143- 13	+55	- 25
	143- 62	-	+ 30
Hanover	142- 3	-	+ 30
	142- 6	-	- 20
	142- 7	-	0
	142- 10	-	+ 30
	142- 12	-	+ 60
	142- 13	-	+ 15
	142- 14	+30	- 55
	142- 15	-	- 10
	142- 50	-	- 10
	142- 80	-	- 5
	142-157	+60	- 90
	142-165	+55	- 60
King William	150- 1	-80	-250
	150- 15	+50	- 30
	150- 26	-	+ 15
	150- 28	+30	- 75

TABLE 2 (Cont.)

ELEVATION OF THE TOPS OF ARTESIAN AQUIFER SYSTEM IN SELECTED WELLS

County	BWCM Well Number	Elevation Top of Upper Aquifer System	Elevation Top of Principal Aquifer System
King & Queen	149- 1	- 50	-165
	149- 4	-100	-265
	149- 5	-130	-270
New Kent	163- 6	+ 20	-180
	163- 17	- 40	-180
Charles City	118-	-	-165
James City	147- 1	-145	-250
	147- 7	-120	-
	147- 18	-155	-270
	147- 22	-220	-340
	147- 23	-140	-240
	147- 24	-170	-285
	147- 26	-135	-245
	147-101	-165	-275
York	199- 3	-170	-350
	199- 27	-200	-
Newport News	216- 16	-345	-550

Principal Artesian Aquifer System

The principal artesian aquifer system contains a very large potential ground-water supply in the York-James Peninsula, although it is not presently developed in many areas. The system contains many sands that have a high-yield potential, and in those areas where aquifer transmissibility is low, the thickness of the system somewhat compensates for the low transmissibility. Depths to the top of the principal aquifer system vary from 90 feet above sea level in Henrico County to 540 feet below sea level in Newport News (Table 2).

Near the Fall Zone, the principal aquifer system is thin and the hydrology is somewhat erratic. Some of the factors which control the hydrology are the topography of the basement-rock complex, the presence of faults in the basement, the percentage of sand in the aquifer, and the thickness of the aquifer.

When the thickness of the system exceeds about 250 feet, the parameters which affect well yield are the sand percentage of the aquifer system, the thickness of the aquifer system, and the construction of the well. Sand percentage of the aquifers is higher in the area in which the sands were deposited by meandering river channels than in areas where sands were deposited by tributary stream channels (see GEOLOGY). The thickness of the aquifer system increases to the east and northeast in the area. The most efficient method of well construction in this area is the installation of multiple short screens in the various sands rather than a single long screen.

In the eastern portion of the York-James Peninsula, the principal aquifer system is very thick and has a great ground-water yield

potential, although this potential has not been developed in most of the area. Geohydrologic information indicates that the only areas in which poor aquifer characteristics exist are in the Newport News-Hampton area and in the West Point area. In the Newport News-Hampton area, a considerable portion of the principal aquifer system consists of silts and clays with a low percentage of sand. At West Point, the sands of the principal artesian aquifer system are poorly sorted, extremely discontinuous, and apparently have low transmissibilities. Uncorrected specific capacities from wells completed in this system range from 4.6 gpm/ft to 25 gpm/ft.

Specific capacities of wells completed in the principal aquifer system vary greatly. In parts of extreme eastern Henrico County, specific capacities are as low as 0.17 gpm/ft in sand-poor wells. In West Point, an industrial well completed within the principal aquifer has a corrected specific yield of 18.59 gpm/ft. Other wells in West Point which are completed in both the upper and principal aquifers have specific capacities as high as 30 gpm/ft. Near Williamsburg, specific capacities range from 11 gpm/ft to 20 gpm/ft. In Newport News, a corrected specific capacity of 5.2 gpm/ft is reported.

Use

The most extensive development of the lower artesian aquifer system has occurred in the Richmond Metropolitan Area of Henrico and Hanover Counties, in the West Point area, and in the Williamsburg area. In all three areas, the aquifer system has been under development for some time.

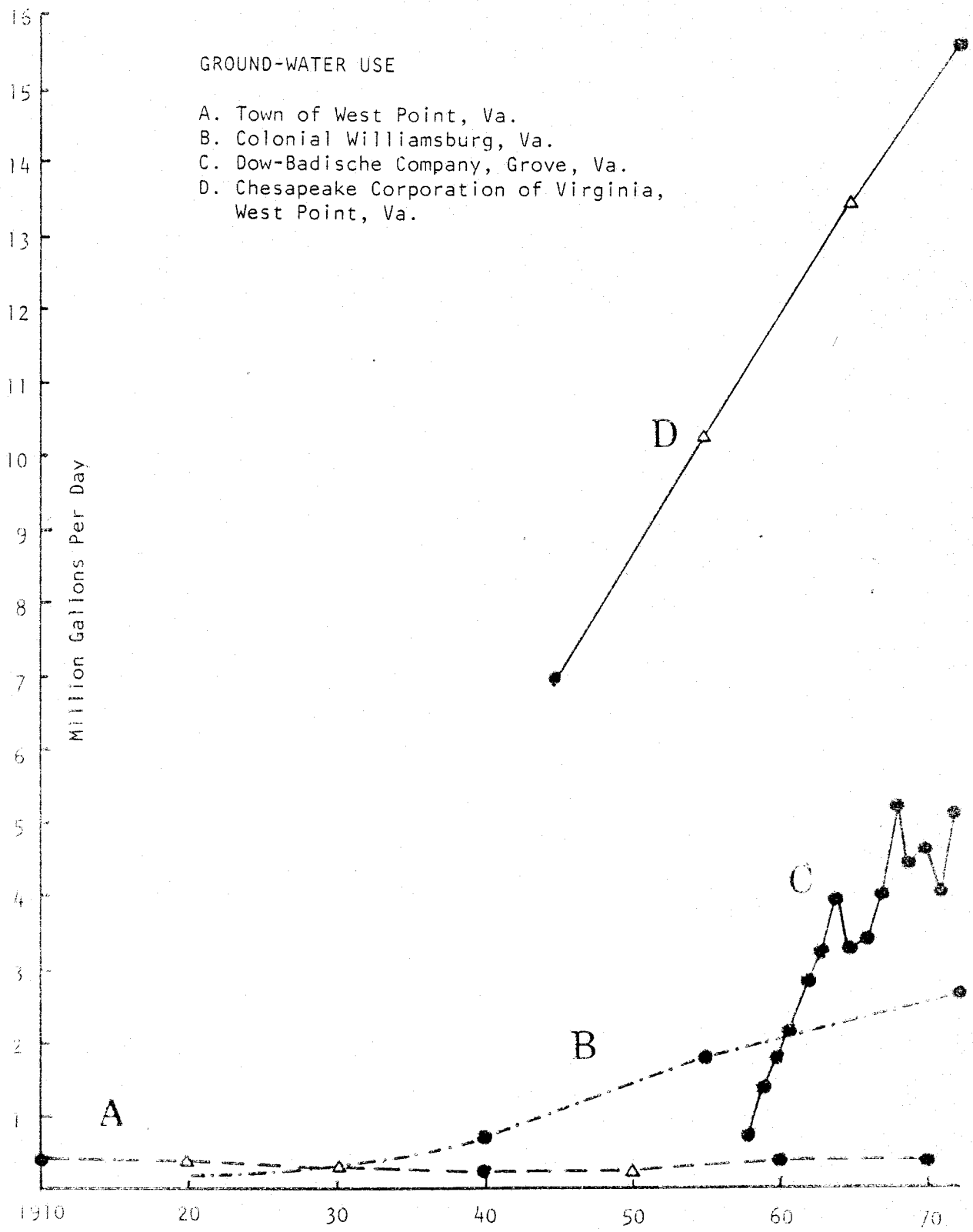
Most of Henrico County is supplied by surface water; however,

seventeen subdivisions and the towns of Sandston and Highland Springs use ground water for municipal and domestic purposes. Ground water supplied Sandston and Highland Springs in the 1940's (Cederstrom 1957). However, no actual record of total withdrawals is available during or prior to this time. During 1970-72, available records show the total withdrawal of ground water from the Sandston and Highland Springs area was about 1.0 million gallons per day.

The total pumpage from various subdivisions was estimated to be 1.66 million gallons per day in 1972. This figure was calculated from the available records. There are no records prior to 1970 relating to the withdrawal rates.

Hanover County receives most of its water from surface water sources. However, a number of subdivisions withdraw ground water for municipal and domestic purposes. From 1950-1970 approximately 0.2 million gallons per day were withdrawn. In 1971 sixteen subdivisions used approximately 0.3 million gallons per day.

From 1890-1930 the total withdrawals from the artesian aquifers in the West Point area was estimated to be approximately 0.39 million gallons per day (Plate 23). Wells were generally of small diameter and free flowing. The domestic and municipal pumpage was found to be approximately 0.35 million gallons per day in 1972, according to available records. In the 1930's the first high capacity industrial wells were drilled which are developed in the upper and principal artesian aquifer systems. From 1931 to 1940 ground water withdrawals increased to about 1.25 million gallons per day. From the period of 1941 to 1950 Cederstrom estimated the pumpage to be about 6.91 million



Source: Virginia State Water Control Board-BWCM

PLATE NO. 23

gallons per day. With additional industrial well construction, ground water withdrawals average 10.2 million gallons per day from 1951-1960. Further development of the well field raised the total pumpage to an average of 15.15 million gallons per day in 1972. During the period from 1961-1972 the total ground water withdrawals in the West Point area averaged 15.48 million gallons per day.

From the period of 1890-1920 the withdrawals from the artesian aquifers in the Williamsburg area were estimated to be about 0.1 to 0.2 million gallons per day, most of which came from free flowing wells. From 1921-1939 withdrawals increased to 0.7 million gallons per day. Plate 23 shows the increase was due to the installation of a well at William and Mary College in 1924. Most of the water from the William and Mary well was used for cooling purposes. From 1940-1961 the average withdrawals from the principal aquifer was increased to about 1.8 million gallons per day, due to the further development of wells in the Colonial Williamsburg area. The water was used for cooling and domestic purposes. With further development of Colonial Williamsburg, the withdrawals increased to an average of 2.6 million gallons per day during the summer months of 1972. The above figure is reduced 90 percent during the rest of the year.

In 1957 a group of high capacity industrial wells which were developed in the upper and principal aquifer system were drilled near Grove in James City County. In 1958 the total withdrawals from the artesian aquifers was estimated to be approximately 0.7 million gallons per day (Plate 23). From 1958-1964 there was an average lineal increase in withdrawals of approximately 1.22 million gallons per year.

There was a decrease in pumpage from 3.9 million gallons per day in 1964 to 3.3 million gallons per day in 1966. From 1967-1968 the total withdrawals increased to 5.2 million gallons per day. As can be seen from Plate 23 there was a slight decrease in total pumpage during 1971. At present the withdrawals average 5.1 million gallons per day.

Seven wells supplied Fort Eustis with water during the First World War. There are no available historical records on pumpage for this period.

Cederstrom reported that Fort Eustis was supplied during World War II by four wells. During the early to mid forties, the wells furnished 1.5 to 1.75 million gallons per day. Approximately at the same time, water from several wells was pumped into the Lee Hall and Skiffs Creek Reservoirs to alleviate the water shortage. Again the historical records on pumpage from the Fort Eustis area is not available however, an estimated quantity of 2 to 3 million gallons per day would be a conservative figure. At present the water requirements are supplied by surface water.

There are no records available on the withdrawal history of the Camp Peary area. However, most of the water was withdrawn between 1941 and 1950. Cederstrom estimated that approximately 2.00 million gallons per day was withdrawn during World War II. Most of the wells are dormant at present or on standby in case of fires. At present most of the industrial and municipal water requirements are largely supplied by surface water.

Current ground water withdrawal data is presented in Appendix D. Most of the wells in this tabulation are completed in the principal

artesian aquifer system. In addition to this listing there are scattered domestic, agricultural and institutional supply wells throughout the York-James Peninsula.

The only apparent impediment to more extensive development of the principal aquifer system is that the mineral content, especially chloride, increases in the eatern part of the Peninsula (see WATER QUALITY). High amounts of total dissolved solids make the water undesirable for some uses. In a subdivision east of Williamsburg, the water quality problem has been satisfactorily solved by the construction of a water supply system in which water of high mineral content from an artesian well is mixed with water of low mineral content from a water-table well. In areas where ground water from the principal aquifer system is high in dissolved solids, quality improvement by dilution with surface water or shallow ground water may be a practical solution.

CHAPTER IV

HYDROLOGY

Hydrologic data on the artesian aquifer systems in the York-James Peninsula consist mainly of specific capacity determinations from single-well pumping tests. Stratigraphic correlations, assembled from geophysical well logs and geologic samples from wells, give a reasonable picture of the hydrologic framework of the artesian aquifers.

Hydrology of the Principal Aquifer System

The principal aquifer system of the York-James Peninsula consists of Cretaceous fluvial and deltaic deposits and lower Paleocene marine sands. Individual aquifers in the Cretaceous are thick, discontinuous sand bodies interbedded with silt and clay, while the Paleocene sands are thinner but more continuous. The confining beds overlying the principal aquifer system consists of clay, silt and poorly sorted sand in the upper part of the Paleocene.

In Henrico, Hanover and western King William Counties recharge to artesian aquifers occurs near the outcrop area along the western edge of the Coastal Plain. For the remainder of the area substantial recharge occurs from vertical leakage between adjacent aquifers through aquitards. The rate of vertical flow is proportional to the difference in water levels in adjacent aquifers and the effective vertical permeability.

With heavy pumpage and increasing pressure differentials leakage can yield substantial quantities of water to pumped aquifers. In the West Point and Williamsburg areas water derived from vertical leakage is probably greater than that derived from lateral migration and the small amounts released from artesian storage.

A minimum value for leakage through the confining layer of the principal aquifer system can be estimated by using Darcy's Law, $Q = PIA$, where Q = recharge in gallons per day; P = permeability of the confining layer; I = hydraulic gradient, which, in this case, is the ratio of the head differential to the thickness of the confining layer; and A = areal extent of confining layer (U.S.G.S. Water Supply Paper 1536-E).

Laboratory permeameter tests of a core of a very low permeability clay taken from Well 118-49 (Appendix A) show an average permeability of 0.0025 inches per day, which is equal to 0.0015 gallons per day per square foot. In the West Point area, head differentials between two aquifers separated by a 70 foot thick confining layer vary between 40 feet and 60 feet. Assuming an average head differential of 50 feet, the hydraulic gradient imposed on the confining layer is 50 ft/70 ft or 0.71. For an area of one square mile, the recharge derived from leakage through the confining bed is:

$$Q = 0.0015 \text{ gpd/ft}^2 \times 0.71 \times (5.28 \times 10^3 \text{ ft})^2$$

$$Q = 0.0305 \times 10^6 \text{ gpd} = 30{,}500 \text{ gpd}$$

As previously stated, this estimate of leakage is a minimum value. Clay as impermeable as that in the core sample from Well 118-49 is not often found. The confining layer is usually made up of more silty material in which a permeability increase of one order of magnitude can be expected. The head differential in the West Point area is lower than normal because of heavy pumpage in both of the aquifers separated by the confining bed.

Estimates of the transmissibility of various portions of the

TABLE 3

ESTIMATED TRANSMISSIBILITIES OF SELECTED WELLS
COMPLETED IN THE PRINCIPAL AQUIFER SYSTEM

WELL NO.	TRANSMISSIBILITY	WELL NO.	TRANSMISSIBILITY
143- 10	24,000	147- 99	10,000
143- 11	28,000	147- 17	10,000
143- 62	18,000	147- 19	14,000
150- 1	29,000	147-100	40,000
150- 4	24,000	147- 98	28,000
142- 80	21,000	147-100	12,000
142-165	10,500	143- 2	13,000
142- 6	3,000	143- 7	15,000
142- 7	8,000	143- 8	17,000
142- 14	20,000	143- 13	11,000
142- 68	8,000	143- 31	8,000
142- 13	5,500	143- 18	9,000
142- 8	8,500	143- 1	8,000
142-119	8,000	143- 4	13,000
142-126	8,000	143- 9	9,000
142-168	5,500	143- 6	15,000

principal aquifer system have been made from available hydrologic and geologic data (Table 3). In the western part of the York-James Peninsula, transmissibilities vary from 3,000 gallons per day per foot (gpd/ft) to 20,000 gpd/ft.

In the central and eastern parts of the Peninsula, transmissibilities are probably in the range of 15,000 gpd/ft to 50,000 gpd/ft.

Fort Eustis Aquifer Test

An aquifer pump test was conducted at Fort Eustis from February 10, 1969 to February 12, 1969. This test utilized one pumped well and three observation wells, all of which were screened in the uppermost portion of the Cretaceous-Paleocene artesian aquifer system (Plate 24).

The test was initiated at 1:15 p.m. on February 10 with an initial discharge of 1,142 gallons per minute (gpm). This rate gradually diminished until 4:35 a.m., February 11, at which time the water level fell below the pump intake. Discharge was cut back and the final discharge was 884 gpm (Table 4). An average discharge of 1,060 gpm is used for calculations.

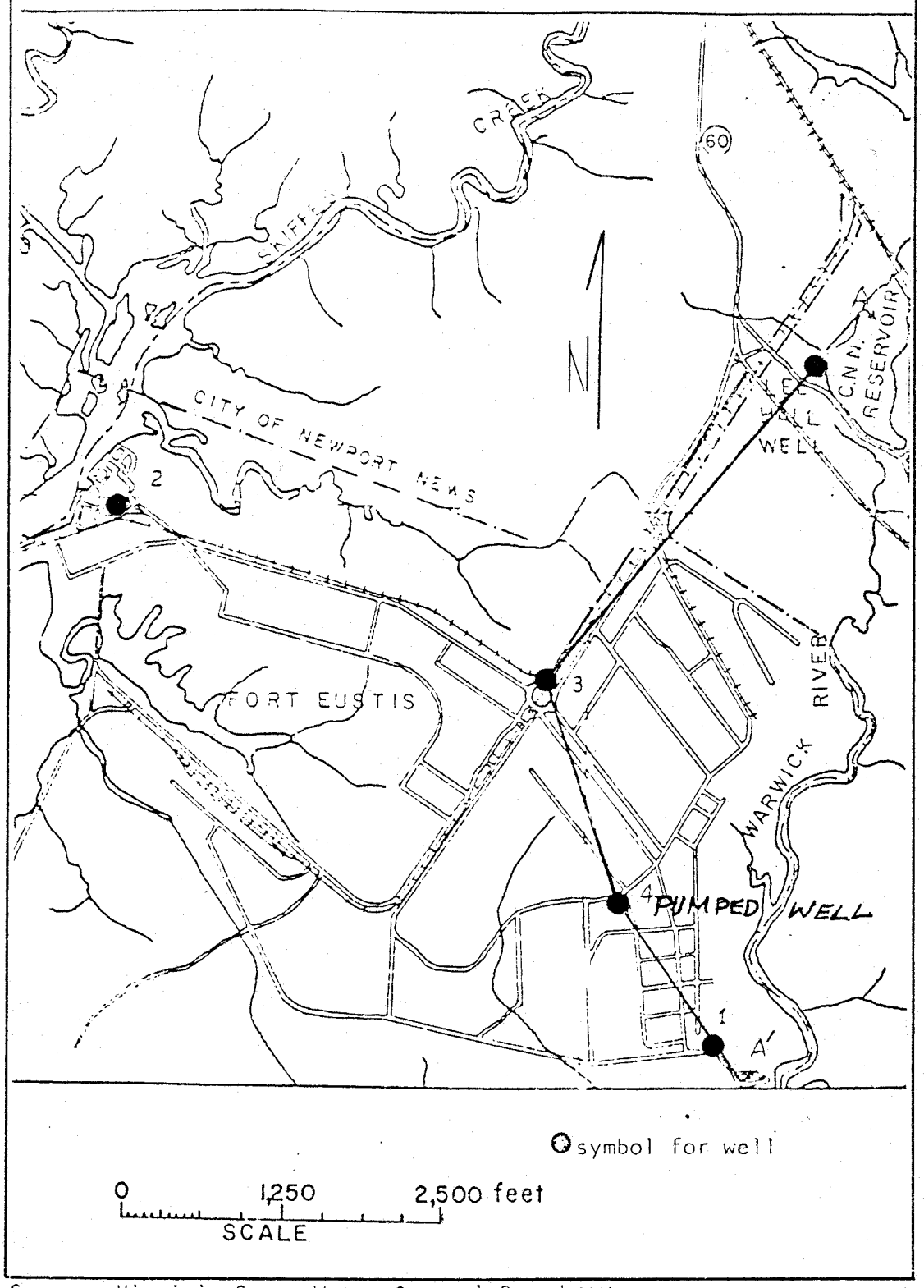
Of the three observation wells, only Well #1, 2,100 feet from the pumped well, showed significant drawdown due to pumping. The drawdown in this well is shown in Plate 25.

It was assumed that no localized pumping had an effect on the results of the aquifer test. The nearest pumped wells, located five miles away, had negligible influence on water levels for the duration of the test.

The results of the aquifer test were calculated from values derived from the Theis graphical superposition method. The field data

LOCATION OF WELLS

FORT EUSTIS AQUIFER TEST

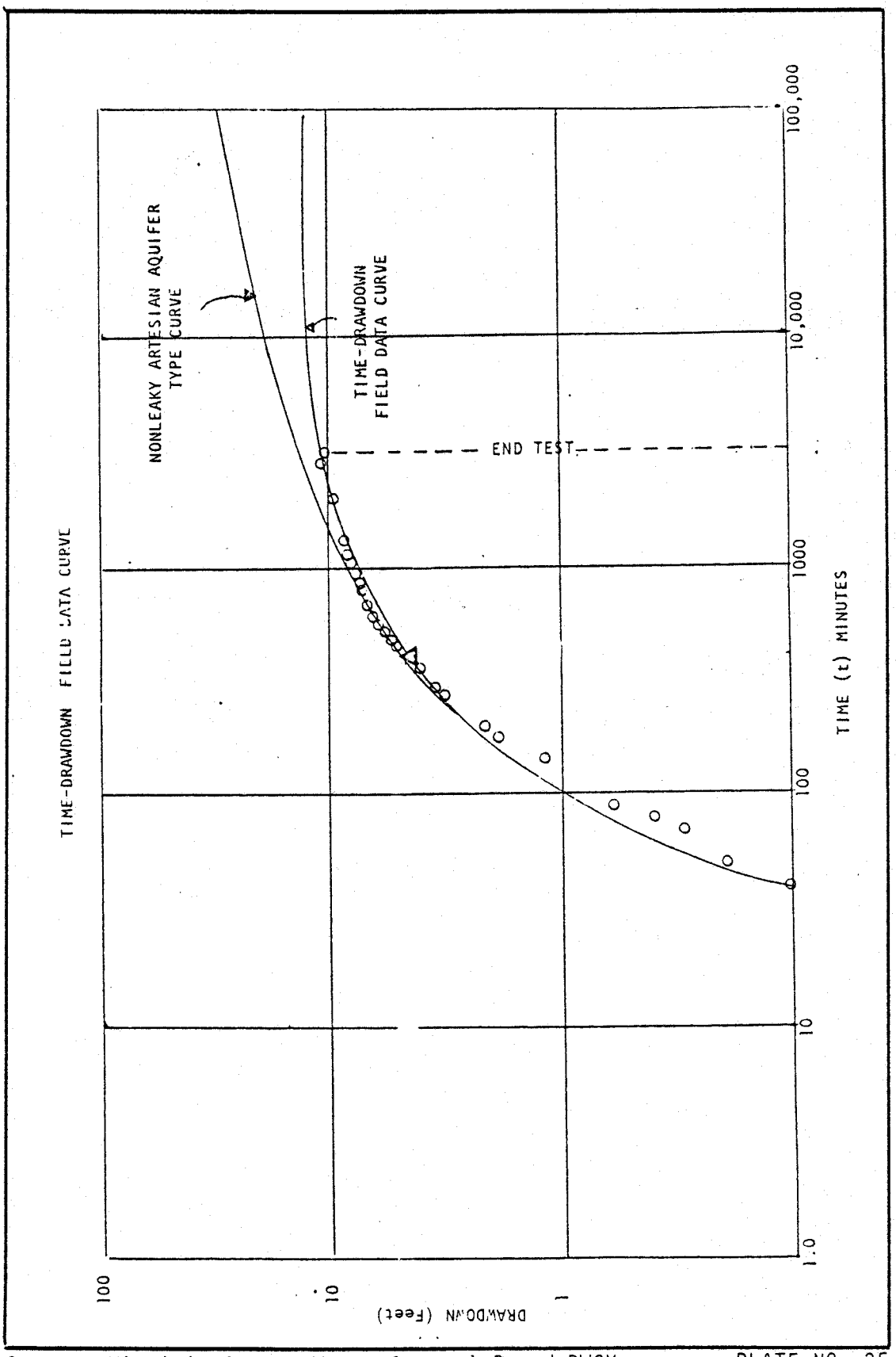


Source: Virginia State Water Control Board-LWCM

PLATE NO. 24

TABLE 4: DRAWDOWN IN WELL 1
FORT EUSTIS AQUIFER TEST

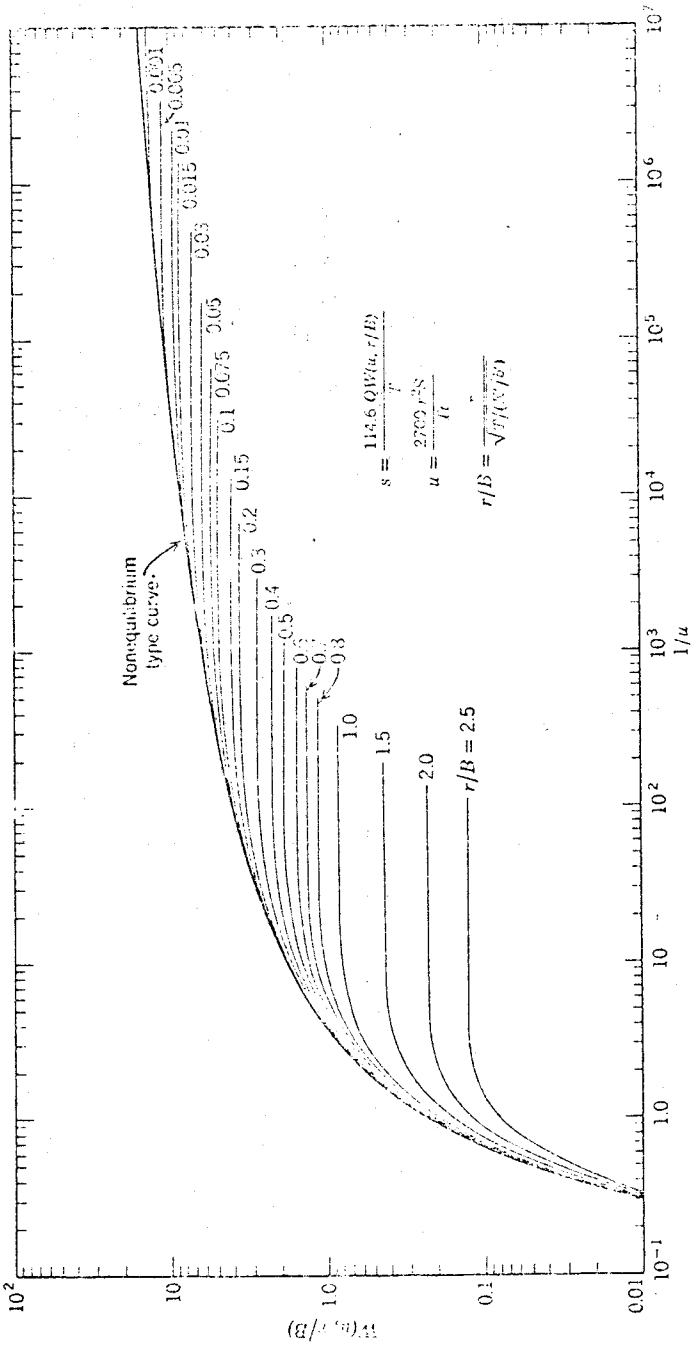
DATE	HOUR	Δt(min)	ELAPSED TIME t(min)	DEPTH TO WATER (ft)	Δs(ft)	s(ft)
2/10/69	1:15 PM	0	0	61.4	0.0	0.0
		½	½	61.4	0.0	0.0
		½	1	61.4	0.0	0.0
		1	2	61.4	0.0	0.0
		1	3	61.4	0.0	0.0
		2	5	61.4	0.0	0.0
		2	7	61.4	0.0	0.0
		3	10	61.4	0.0	0.0
		3	13	61.4	0.0	0.0
		3	16	61.4	0.0	0.0
		4	20	61.4	0.0	0.0
		5	25	61.4	0.0	0.0
	1:45 PM	5	30	61.4	0.0	0.0
		5	35	61.4	0.0	0.0
		10	40	61.5	0.1	0.0
		10	50	61.6	0.1	0.2
	2:45 PM	10	60	61.6	0.0	0.2
		10	70	61.7	0.1	0.3
		10	80	61.8	0.1	0.4
	2:45 PM	10	90	62.0	0.2	0.6
		10	100	----	---	---
		10	110	----	---	---
2/10/69	3:15 PM	10	120	----	---	---
		25	145	62.8	0.8	1.4
		15	160	----	---	---
		20	180	63.3	0.5	1.9
		20	200	63.6	0.3	2.2
2/10/69	5:45 PM	70	270	64.7	1.1	3.3
	6:05 PM	20	290	64.9	0.2	3.5
	7:00 PM	55	345	65.5	0.6	4.1
	7:55 PM	55	400	66.0	0.5	4.6
	9:00 PM	65	465	66.7	0.7	5.3
	10:05 PM	65	530	67.1	0.4	5.7
	10:57 PM	52	582	67.6	0.5	6.2
2/11/69	12:04 AM	67	649	68.0	0.4	6.6
	1:06 AM	62	711	68.2	0.2	6.8
	2:05 AM	59	770	68.6	0.4	7.2
	3:01 AM	56	826	68.8	0.2	7.4
	4:00 AM	59	885	68.9	0.1	7.5
	5:00 AM	60	945	69.1	0.2	7.7
	7:05 AM	125	1070	69.7	0.4	8.1
	8:30 AM	85	1155	69.7	0.2	8.3
	11:30 AM	180	1335	71.2	0.5	8.8
2/11/69	11:55 PM	745	2080	71.2	1.0	9.8
2/12/69	11:00 AM	725	2805	71.8	0.6	10.4
2/12/69	6:00 AM	360	3165	71.8	0.0	10.4



Source: Virginia State Water Control Board-BWCM

PLATE NO. 25

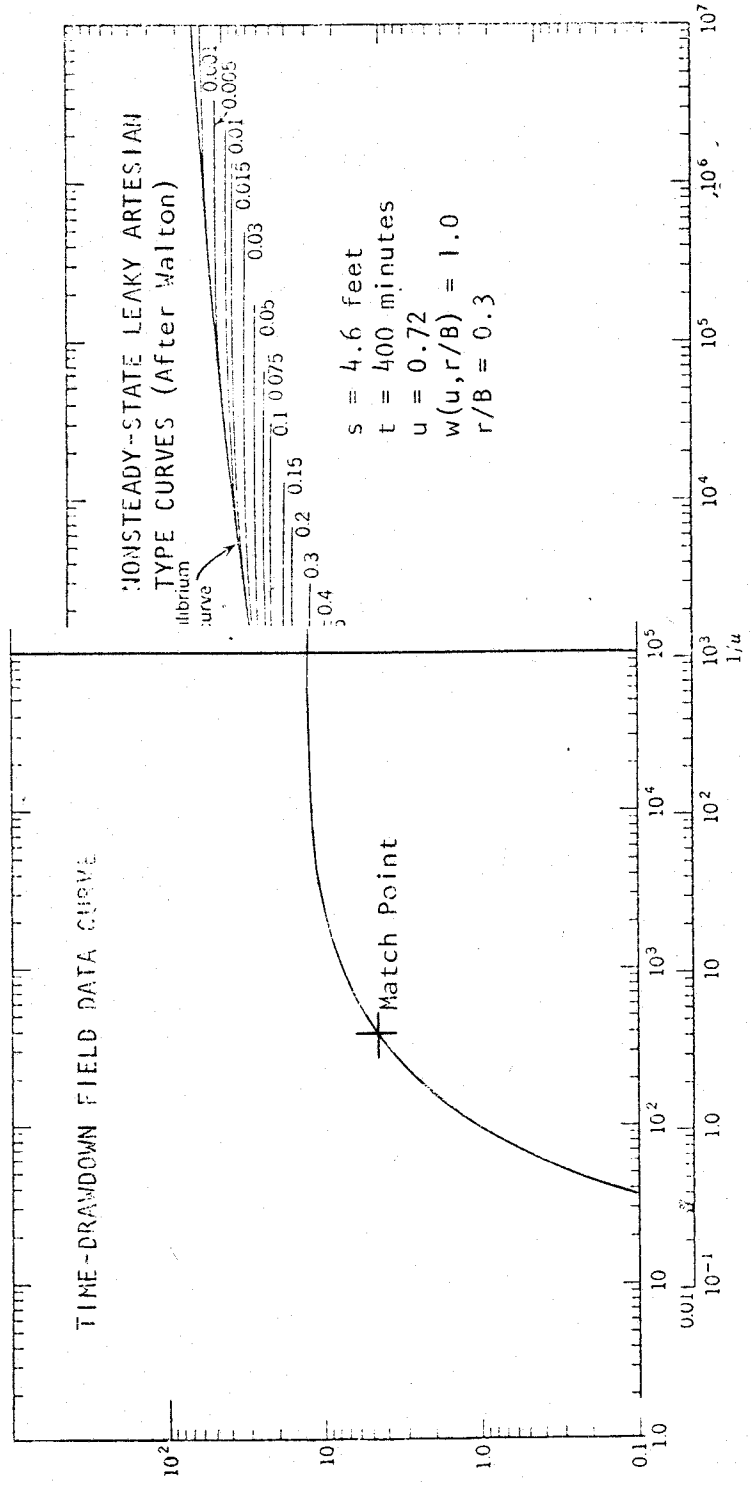
NONSTEADY-STATE LEAKY ARTESIAN TYPE CURVES (After Walton)



Source: Davis and DeWiest

PLATE NO. 26

MATCH POINT OF TIME-DRAWDOWN FIELD DATA CURVE AND NONSTEADY-STATE ARTESIAN TYPE CURVE



Source: Virginia State Water Control Board-BWCM

PLATE NO. 27

is plotted on a logarithmic graph which is superimposed on a type-curve graph of non-steady state leaky artesian aquifer curves (Plate 26). The point at which the test curve most closely matches the type curve, called a match point, is selected (Plate 27). From this point, it is possible to select values for time and drawdown from the field data graph and the integral (u) and W(u), the well function of (u) from the type curve graph. In addition, as the test curve begins to deviate from the non-leaky aquifer type curve, it is possible to select the leaky aquifer type curve which most closely corresponds to the test curve.

The values used for calculations in the Theis formula are defined as follows:

Q = discharge of pumped well
r = distance to observation well
s = drawdown in test well in feet
t = time elapsed since initiating test in minutes
u = variable function of aquifer hydraulics
W(u,r/B) = well function of (u) for leaky aquifers
b' = thickness of aquifer in feet
r/B = function based on distance to observation well and leakage factor of confining bed
T = transmissibility in gallons per day per foot
S = storage coefficient
K = hydraulic conductivity of aquifer
K = hydraulic conductivity of confining bed

The following data were measured:

Q = 1,060 gpm
r = 2,100 feet

The following data were taken from the match point by the Theis superposition method:

$s = 4.6$ feet

$t = 400$ minutes

$u = 0.72$

$W(u,r/B) = 1$

$r/B = 0.3$

The following data were estimated based on available geologic data:

b = approximately 400 feet

b' = approximately 100 feet

From the Theis formula for transmissibility

$$T = \frac{114.6\ Q\ W(u,r/B)}{s}$$

$$= \frac{114.6 \times 1{,}060 \times 1}{4.6}$$

$$= \frac{121{,}476}{4.6}$$

$= 26{,}407.8$ gpd/ft (26,400 rounded)

From the Theis formula for storage:

$$S = \frac{Tut}{2{,}693r^2}$$

$$= \frac{(2.64 \times 10^4)\ (7.2 \times 10^{-1})\ (4 \times 10^2)}{(s.693 \times 10^3)\ (6.76 \times 10^6)}$$

$$= \frac{76.032 \times 10^5}{18.205 \times 10^9}$$

$= 0.00042$ Storage Coefficient

From the formula for hydraulic conductivity of a confining bed:

$$K' = \frac{Tb'\ (r/B)^2}{r^2}$$

$$= \frac{(2.64 \times 10^4)\ (1 \times 10^2)\ (9 \times 10^{-2})}{6.76 \times 10^6}$$

$$= \frac{23.7 \times 10^4}{6.76 \times 10^6}$$

$$= 0.035 \text{ gpd/ft}^2$$

From the formula for hydraulic conductivity of an aquifer:

$$K = T/b$$

$$= \frac{2.64 \times 10^4}{4 \times 10^2}$$

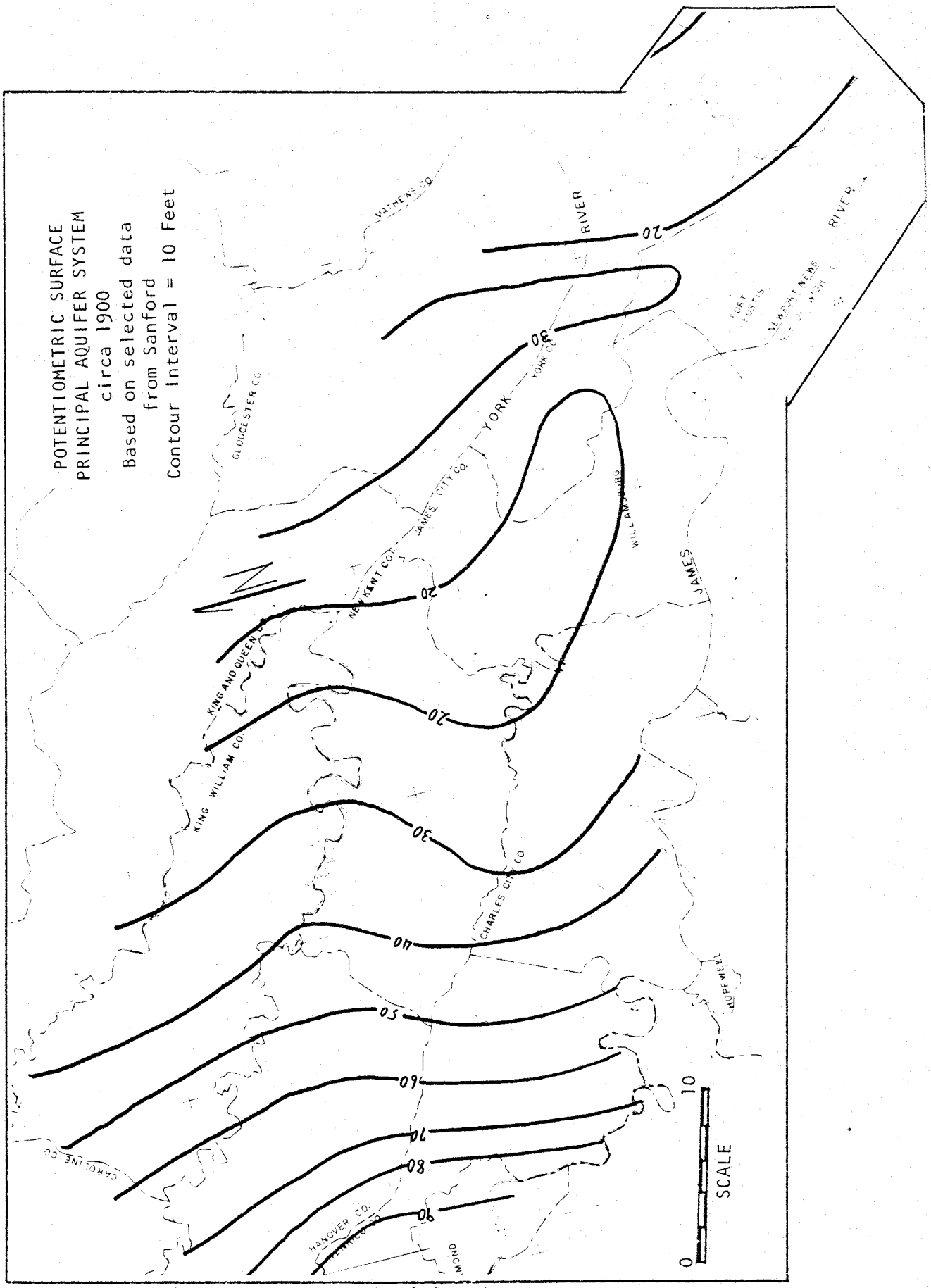
$$= 66 \text{ gpd/ft}^2$$

Camp Peary Pumping Tests

In 1946, a series of pumping tests were conducted at Camp Peary in western York County. These tests were described by Cederstrom (1957) in his report on the York-James Peninsula. In the pumping tests, which utilized eight wells, the following values for transmissibility in gallons per day per foot were calculated: 22,000, 36,000, 39,000, 41,000, 46,000, 50,000, 52,000, and 85,000. Calculated coefficient of storage ranged between 1.0×10^{-4} and 1.9×10^{-4}.

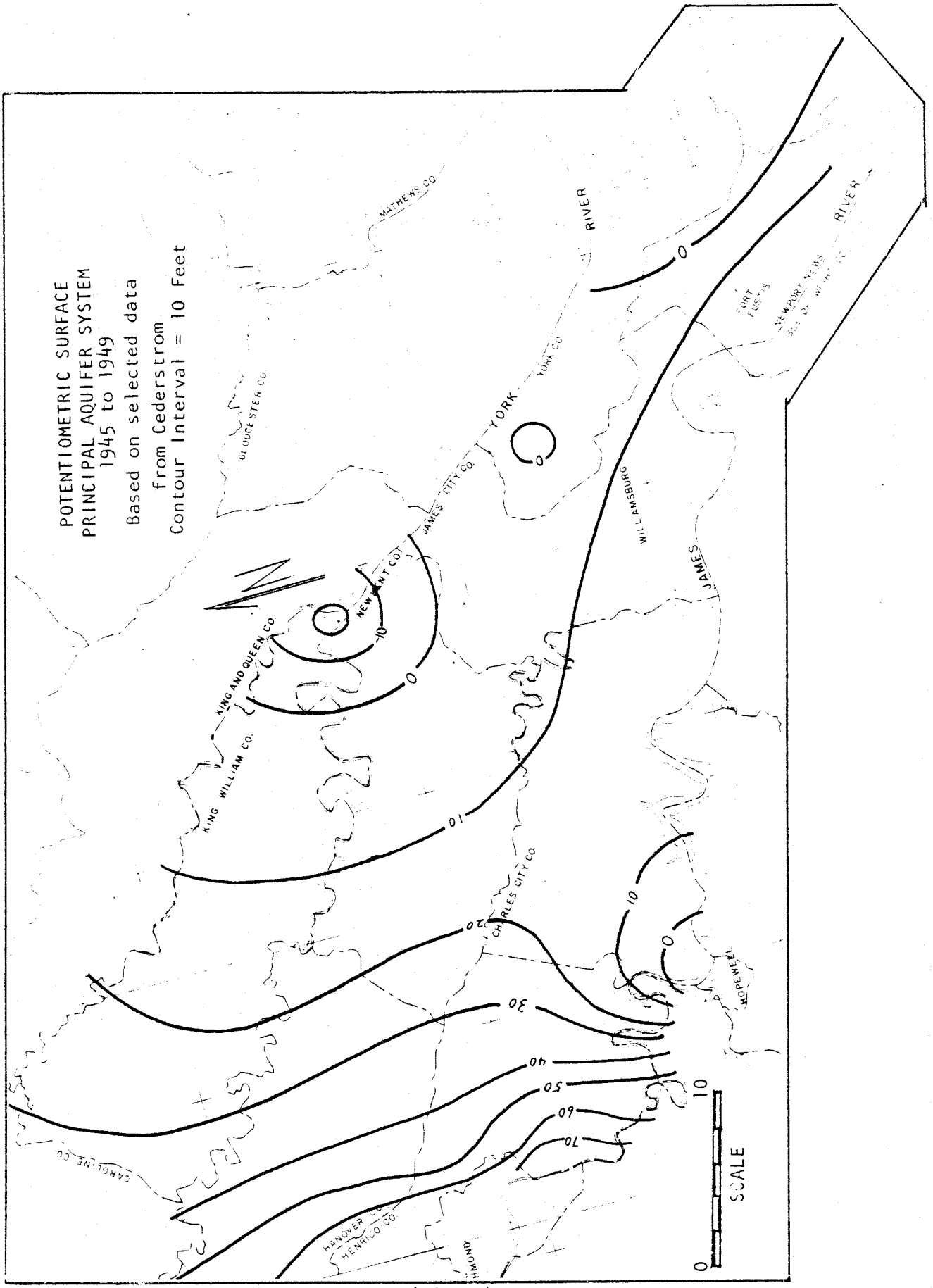
Water Levels in the Principal Aquifer System

Ground-water resources studies of the York-James Peninsula have been conducted by Sanford (1913) and Cederstrom (1957). Selected data from these studies, along with subsequent investigation and study by the Bureau of Water Control Management, were used to prepare historical potentiometric-surface maps of the area (Plates 28 and 29). These surfaces are, of course, approximations of the conditions for time period indicated and may be in error. However, the surfaces are necessary in order to determine historical trends in water levels and they are necessary paramaters for construction of a computerized ground-water model of the York-James Peninsula.



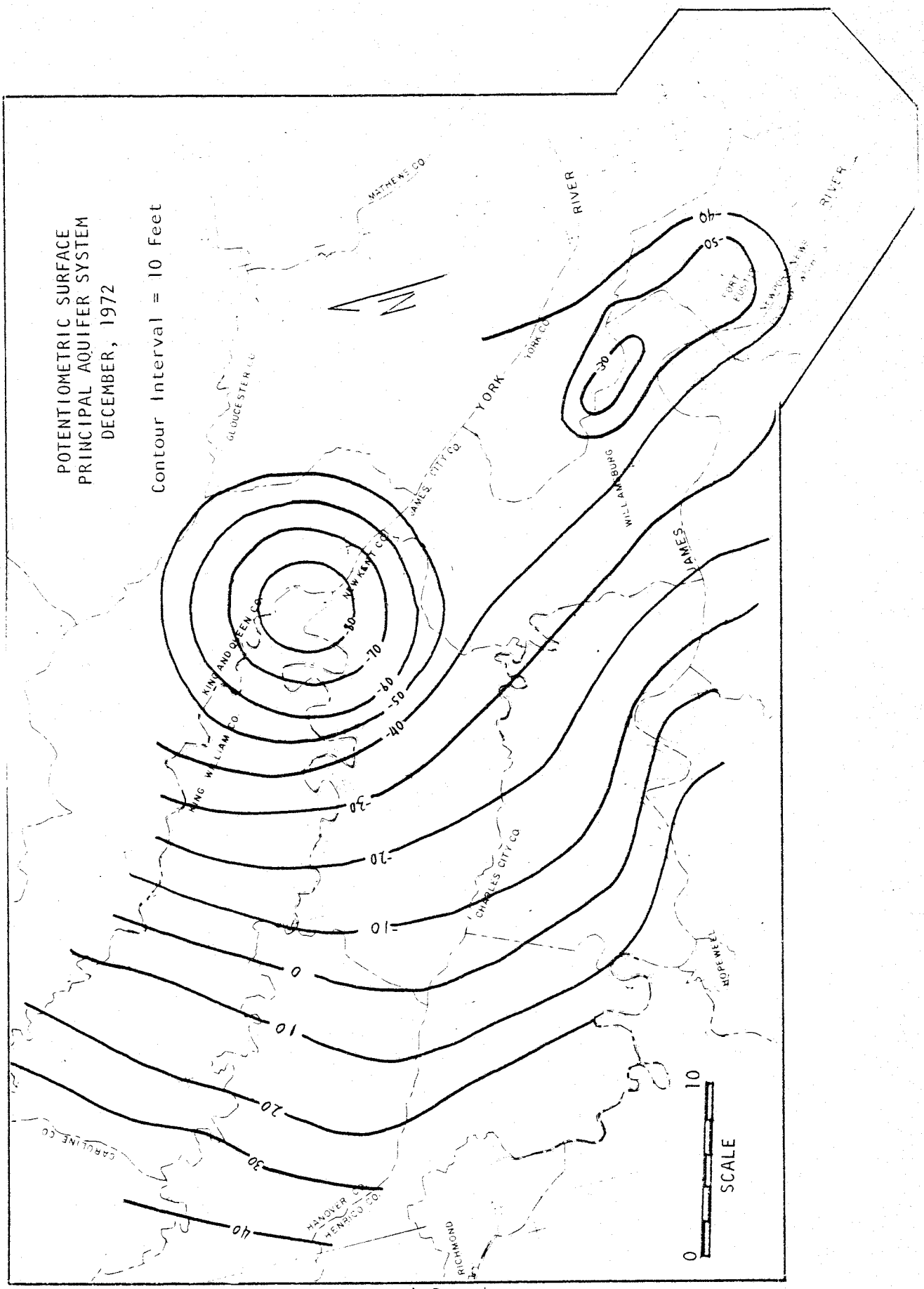
Source: Virginia State Water Control Board-BWCM

PLATE NO. 28



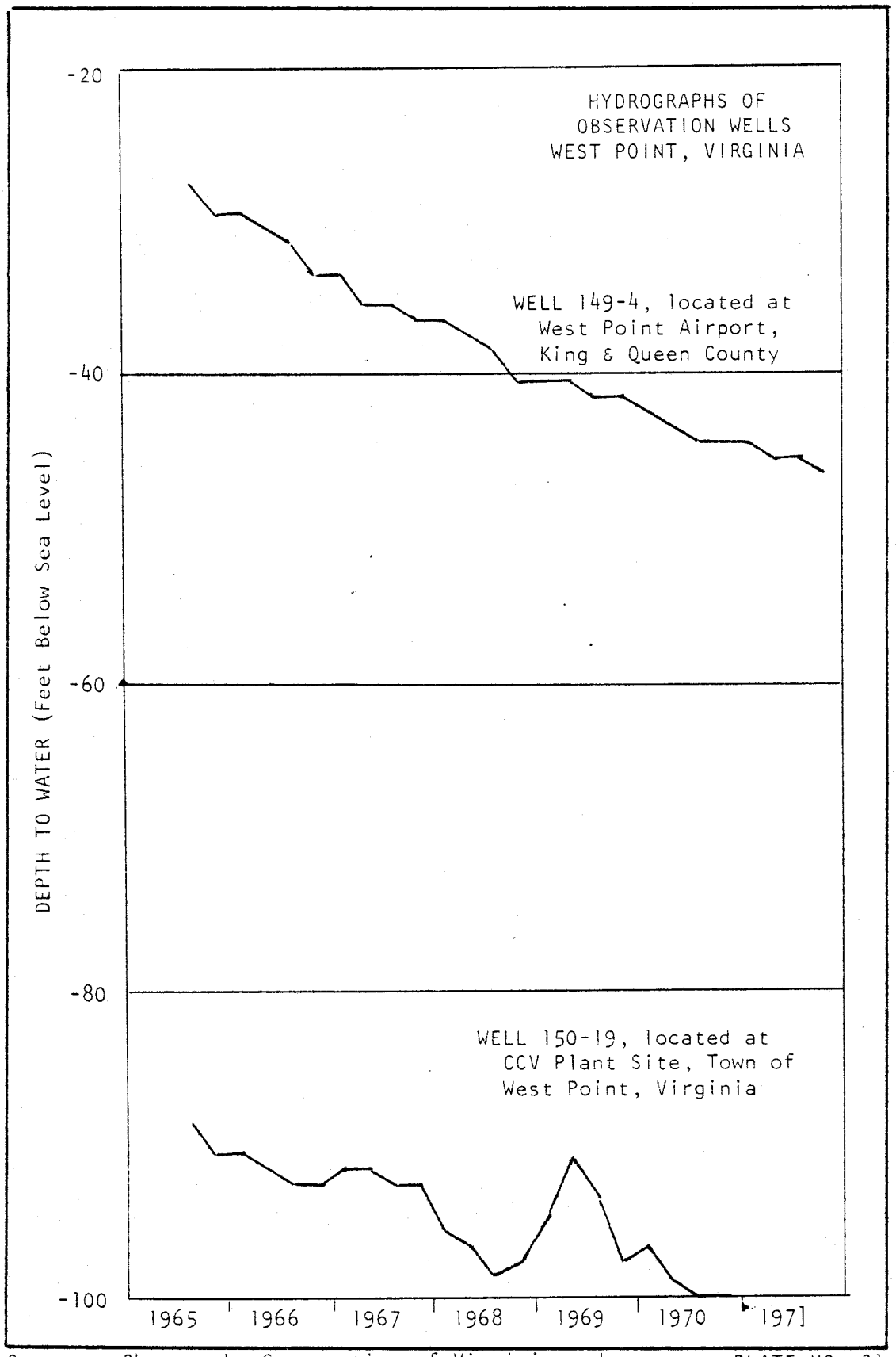
Source: Virginia State Water Control Board-BWCM

PLATE NO. 29



Source: Virginia State Water Control Board-BWCM

PLATE NO. 30



Source: Chesapeake Corporation of Virginia and Virginia State Water Control Board-BWCM

PLATE NO. 31

TABLE 5

WATER LEVELS IN SELECTED WELLS
COMPLETED IN PRINCIPAL AQUIFER
Measured December 1972
Datum is Mean Sea Level

COUNTY	BWCM WELL #	WATER LEVEL	COUNTY	BWCM WELL #	WATER LEVEL
Charles City	118- 6	- 6	Henrico	143- 11	+ 41
	118- 9	- 20		143- 93	+ 22
	118- 13	- 14		143-124	+ 7
	118- 14	- 13		143-126	+ 8
	118- 18	- 16		143-128	+ 19
	118- 19	- 10	James City	147- 18	- 37
	118- 38	+ 3		147- 19	- 28
	118- 44	- 12		147- 66	- 51
	118- 45	- 16		147-100	- 52
	118- 46	- 20	King & Queen	149- 4	- 79
Hanover	142- 3	+ 9		149- 5	- 61
	142- 5	+ 9	King William	150-	
	142- 14	+ 4		150- 23	- 75
	142- 15	+ 13	New Kent	163- 5	- 24
	142- 38	+ 6		163- 9	- 69
	142- 80	+ 36		163- 17	- 21
	142- 92	+ 37	York	199- 3	- 33
	142-157	+ 8		199- 12	- 59
	142-160	+ 32		199- 16	- 57
	142-165	+ 25	City of Newport News	216- 2	- 50
	142-182	+ 36		216- 4	- 49

On all three surfaces (Plates 28, 29 and 30), anomalous situations are found. On the 1900 surface, a depression is found between West Point and Williamsburg. On the 1946-1949 surface, contour lines in the eastern part of the Peninsula tend to follow the trend of the James River. A similar situation was shown by Cederstrom (1945) in southeastern Virginia. The December, 1972 surface shows that cones of depression at West Point and in the Williamsburg area deviate from the type of cone of depression found in fairly homogeneous aquifers. These anomolous situations are probably a result of thinning and/or permeability changes along the postulated hingeline zone near West Point (Brown, 1972), thinning and/or permeability changes along the James River, and a change in the dip direction of the top of the principal aquifer system from east to northeast in the eastern part of the York-James Peninsula.

Since about 1900, water levels in the principal aquifer system have fallen about 50 feet. In the West Point area, water-level declines range from 70 to 100 feet, and in the Williamsburg area, water levels have fallen about 80 feet. Hydrographs from three observation wells at West Point show water-level trends in the area (Plate 31).

Hydrology of the Upper Artesian Aquifer

The upper artesian aquifer system is made up of fairly homogenous sands which are areally extensive. The sands are fine to medium grained, moderately to poorly sorted (see GEOLOGY) with an average thickness of about 50 feet. The overlying confining layer consists of silts and clays which increase somewhat in thickness to the east.

Although there are many areas where, in the absence of a confining

layer, this system is laterally recharged from water table aquifers, much of the recharge to the system is probably derived from vertical leakage through the confining silts and clays. This system in turn supplies recharge to the principal aquifer system by vertical leakage through the confining bed separating the two systems when a pressure differential exists.

There is little available hydrogeologic information from which estimates of transmissibility in the upper aquifer system can be made. In James City County, the transmissibility of this system is about 10,000 gpd/ft. Transmissibility of the aquifer in other areas probably is 5,000 gpd/ft to 15,000 gpd/ft.

CHAPTER V

WATER QUALITY

Chemical quality data on the ground water of the York-James Peninsula is shown in Appendix C. This data is in part a summary of water quality surveys conducted by the Bureau of Water Control Management and in part is a summary of chemical data collected by the Bureau from other sources. An important chemical relationship in the chemical analyses is the ratio of total solids to carbonate hardness, because it serves as an indicator of the source of the ground water (Table 6). Chemical analyses in which hardness is high and total dissolved solids are low indicate that the water is supplied by the upper artesian aquifer system. The hardness of the ground water from this system is caused by solution of calcite shells in the aquifer sands. Ground water from the principal artesian aquifer has a very low hardness and moderate to high amount of dissolved solids. Some analyses show that the ground water is high in both hardness and dissolved solids, indicating that the well from which the sample was taken is screened in both aquifer systems. In the absence of well completion data, the ratio of hardness to total dissolved solids can be used to determine the aquifer system in which a well is completed.

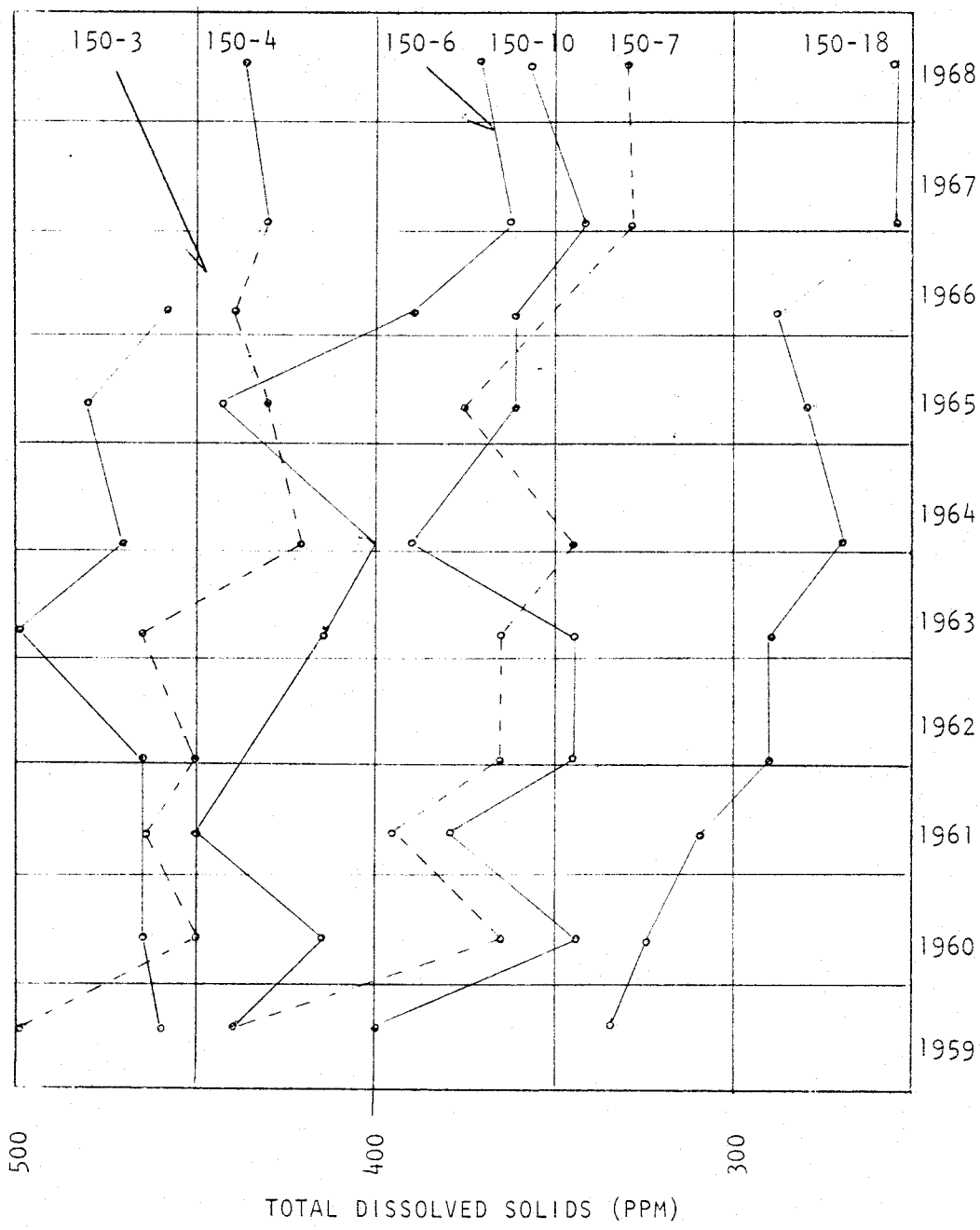
No current data is available on the chemical quality of ground water of the principal aquifer system in the extreme eastern portion of the York-James Peninsula, but historical data from Cederstrom (1957) shows that chlorides in some deep wells exceed 1000 parts per million (ppm) and dissolved solids range from 1500 ppm to 9000 ppm. Current data show that total dissolved solids range from 1000 ppm to 2000 ppm in a zone between Fort Eustis and Yorktown. In western York County

and in Williamsburg area of James City County, total dissolved solids in water from the upper part of the principal aquifer system range from 880 ppm to 1200 ppm. Several miles west of Williamsburg, total dissolved solids drop abruptly to a range of 250 ppm to 450 ppm (Plates 16 and 20). In Charles City, New Kent, and King William Counties, total dissolved solids in most samples are between 200 ppm and 400 ppm, but water from the lower portion of the principal aquifer system at West Point has about 990 ppm total dissolved solids. In the Richmond Metropolitan Area, dissolved solids in ground water range from 100 ppm to 200 ppm. In this area, some samples from wells screened near basement rock are high in iron, manganese, and calcium, which indicates that some of the water is being drawn from the basement-rock complex.

Plates 16 and 20 show the spatial relationships of ground water quality in the York-James Peninsula. The relationships shown, especially in the eastern part of the Peninsula, are based on available data and on detailed water quality studies conducted by the Bureau of Water Control Management in a similar area of southeastern Virginia.

The graphs in Plate 32 show the fluctuations in total dissolved solids during a ten-year period in ground water from deep wells at West Point. The general trend of the graphs indicate a decrease in dissolved solids during the period of record. This decrease indicates that continuous pumping flushes the aquifer system of water which is high in dissolved solids. Because much of the recharge to the principal aquifer in this area is derived from vertical leakage through the confining layers, the fluctuations may partially reflect the amount of annual precipitation, but the period of record is too short to define this relationship.

VARIATION IN TOTAL DISSOLVED SOLIDS
IN GROUND WATER FROM PRINCIPAL AQUIFER SYSTEM
AT WEST POINT, VIRGINIA



Source: Virginia State Water Control Board-SWCM

PLATE NO. 32

TABLE 6

TOTAL DISSOLVED SOLIDS AND CARBONATE
HARDNESS IN SELECTED CHEMICAL ANALYSES

WELL NO.	T.D.S.	HARDNESS	RATIO
Wells Completed in Principal Artesian Aquifer			
147- 1	1,067	29	36.7
149- 1	242	2	121.0
150-61	179	4	44.7
163- 9	456	17	26.8
Wells Completed in Upper Artesian Aquifer			
147- 7	178	84	2.1
147-23	235	93	2.5
150-56	214	100	2.1
163-10	214	51	4.2
163-35	167	120	1.4
Wells Completed in Both Aquifers			
147-19	412	36	11.4
147-16	795	84	9.4

CHAPTER VI

CONCLUSIONS

The upper artesian aquifer system is found throughout much of the York-James Peninsula. This system is a reliable source of good quality ground water throughout its extent. Aquifer thickness and hydraulic conductivity of the aquifer preclude development of high-yield wells or well fields in this aquifer in most places, but the fairly shallow occurrence of the aquifer and the good quality of its ground water make the upper aquifer system an excellent source of domestic ground-water supply. This system has sufficient aquifer potential to be developed for institutional, agricultural, and light municipal and possibly light industrial uses. In addition, ground water from this system can be used as a supplement to a ground water supply completed in the principal aquifer system, especially if the water from the principal aquifer alone is of undesirable quality.

The principal aquifer system is found throughout the entire York-James Peninsula and has a high yield potential throughout most of the area. Quality of water in this system varies with location. Records show that dissolved solids increase toward the eastern part of the Peninsula. In addition, dissolved solids probably increase with depth of the aquifer. Throughout most of its extent, the principal aquifer is capable of supplying high-yield wells or well fields, but some locations are more favorable than others. Development of the principal aquifer system at West Point and in the Williamsburg area has caused a lowering of water levels in the system, the maximum decline of about 120 feet occurring at West Point. However, ground water withdrawals at this time seem to be well within the yield limits of the principal aquifer.

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APPENDIX A

OBSERVATION WELL #66

The Bureau of Water Control Management Observation Well #66 is located approximately one mile west of Charles City Courthouse on the south side of State Route 5. The total depth of the well is 591 feet. The elevation of the well is 35 feet. Drilling was commenced on March 2, 1973 and the well was completed on March 30, 1973.

Aquifers were found from 283 feet to 310 feet, 403 feet to 425 feet, 484 feet to 497 feet, and 510 feet to 530 feet.

During the drilling of the well, sand samples were taken and described at 10-foot intervals. In addition, a 13-foot section was cored from 207 feet to 220 feet and a 5-foot section of crystalline basement rock found at 583 feet was cored. Geophysical logs were run, including an electric log, a gamma density log, a nuclear log, a caliper log and a sonic log.

The screened aquifers were tested individually, and a composite test was conducted. During the tests water samples were analyzed for specific conductivity, chloride content, and temperature. Water samples were taken at intervals for laboratory analysis.

Geologic Description of Observation Well #66

The lower portion of the Cretaceous, approximately 160-170 feet thick, contains very coarse-grained subangular quartz sand with scattered mica, feldspar, pyrite, and traces of the chloritic diorite found in the pre-Cretaceous basement. At the top of the coarse sand interval, a gray silty clay with fossil fragments is found.

The sediments found within the lower portion of the Cretaceous

are characteristic of fluvial deposits. The occurrence of feldspars and micas with subangular sands would indicate that the source was not appreciably distant. The coarseness of the sediments and the fact that they change very little in grain size upward would indicate a rather high-energy fluvial environment.

The absence of any indication of reducing environments such as lignites or dark-colored clays is because the basin of deposition was unstable and rapidly subsiding to such a degree that peat bogs and swamps typically associated with channel deposits were not being formed, or because the lignite deposits and dark-colored clays were poorly preserved.

The thin unit of gray silty fossiliferous clay overlying the coarse sand may represent a period during which sediment transport and deposition was negligible. Marine or brackish waters may have encroached and deposited the silty clay in an estuarine environment, as indicated by the fact that the silty clay contains marine shell fragments rather small in size which may indicate a restricted environment, and the fact that the discontinuity of clays between wells indicates limited areas of deposition.

The middle portion of the Cretaceous, approximately 70 feet in thickness, contains medium-grained subangular quartz sand with traces of muscovite and feldspar. It is somewhat poorly sorted and overlain by a thin, gray silty clay containing fossil fragments. The overall composition and texture indicates deposition in a lower-energy deltaic environment.

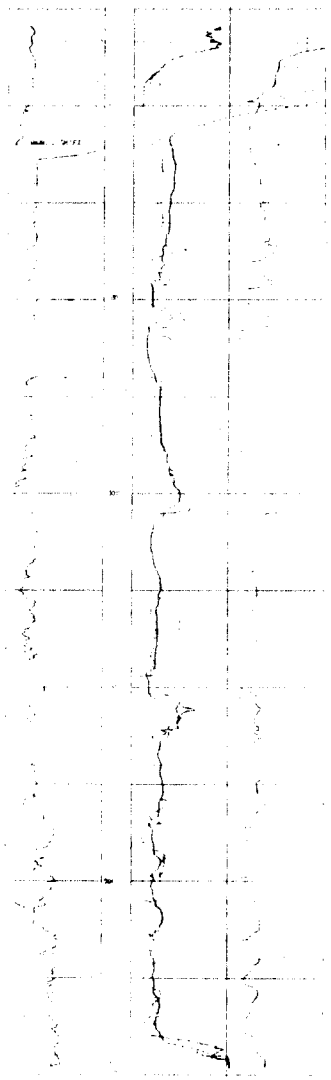
About 85 feet of fine-grained quartz sand, well-sorted with about

5% glauconite, overlies the medium-grained sand. From the overall composition, texture and distribution of the sediment, it resembles a marginal marine environment. It was subjected to brackish water encroachment, involving a reworking and winnowing of the sediments.

Overlying the fine-grained quartz sand is about 10-20 feet of gray-brown clay with tints of red, referred to as Marlboro by Cederstrom (1957). The clay is burrowed and contains very fine muscovite flakes. The mineralogical composition of the clay indicates that it was deposited as overbank mud in a meandering fluvial environment.

BUREAU OF WATER CONTROL MANAGEMENT OBSERVATION WELL #66

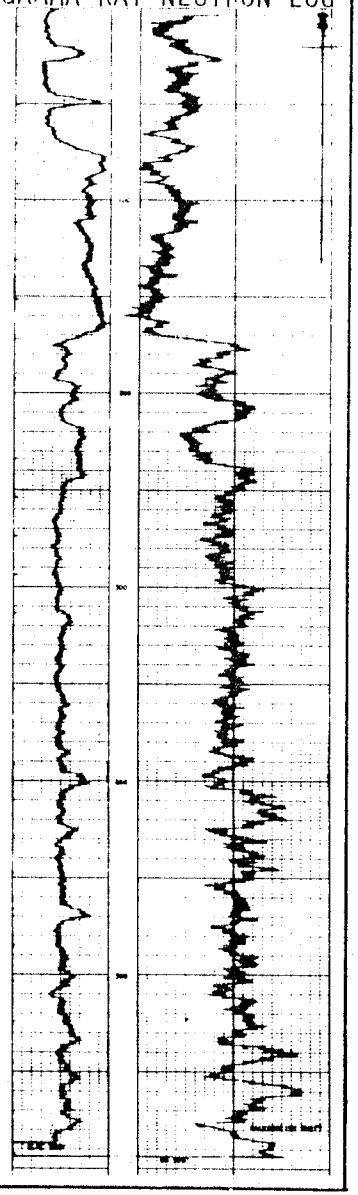
ELECTRIC LOG



SAMPLE DESCRIPTION

0 - 10	YELLOWISH-TAN, FINE TO MEDIUM-GRAINED QUARTZ SAND, SOME TOPSOIL
10 - 20	TAN, FINE-GRAINED QUARTZ SAND WITH 50% GRAY CLAY CONTAINING TRACES OF GLAUCONITE
20 - 30	TAN, FINE-GRAINED QUARTZ SAND WITH A FEW GRAINS OF GLAUCONITE
30 - 40	SAME
40 - 50	SAME
50 - 60	FINE-GRAINED QUARTZ SAND, WELL-SORTED AND SUBROUND; CONTAINS 20-30% GLAUCONITE; SCATTERED SHELL FRAGMENTS
60 - 70	SIMILAR; 10 - 20% SHELL FRAGMENTS, 40% GLAUCONITE WITH SOME PYRITE AND MICA
70 - 80	SAME
80 - 90	BLACK SAND; 80 - 90% GLAUCONITE, A FEW SUBANGULAR QUARTZ GRAINS
90 - 100	70% BLACK SAND, 20% POORLY SORTED SUBANGULAR QUARTZ, 10% FOSSIL FRAGMENTS
100 - 110	BLUE - GRAY CLAY; SILTY CLAY, SCATTERED FOSSIL FRAGMENTS, TRACE OF GLAUCONITE
110 - 120	GRAY AND RED SILTY CLAY, SOME COARSE QUARTZ GRAINS, TRACE OF GLAUCONITE
120 - 130	GRAY AND RED SILTY CLAY, 10 - 20% GLAUCONITE, SCATTERED COARSE SAND GRAINS
130 - 140	FINE-GRAINED GLAUCONITIC SAND, 80% WELL-SORTED QUARTZ, 10 - 20% RED AND GRAY CLAY, SCATTERED FOSSILS
140 - 150	FINE-GRAINED GLAUCONITIC SAND, LESS QUARTZ THAN ABOVE, 10 - 20% CLAY, SCATTERED SHELLS
150 - 160	SIMILAR; INCREASE IN CLAY
160 - 170	SIMILAR
170 - 180	80% GLAUCONITE WITH LARGE ANGULAR QUARTZ GRAINS, SHELL FRAGMENTS
180 - 190	FINE, WELL-SORTED QUARTZ SAND, 20 - 30% GLAUCONITE, TRACE OF SHELLS
190 - 200	SIMILAR, 5% GLAUCONITE
200 - 210	SIMILAR
210 - 220	FINE TO MEDIUM-GRAINED QUARTZ SAND, SUBROUNDED, 15 - 20% GLAUCONITE
220 - 230	MEDIUM TO COARSE-GRAINED QUARTZ SAND, ANGULAR TO SUBANGULAR, 10 - 15% GLAUCONITE, SCATTERED SHELLS
230 - 240	RED AND GRAY CLAY, SCATTERED GLAUCONITE, SOME SILT
240 - 250	MEDIUM TO COARSE-GRAINED SAND, SCATTERED GRAVEL, TRACE OF SHELLS AND RED CLAY
250 - 260	FINE TO MEDIUM-GRAINED SAND, 10% GLAUCONITE, TRACE OF SHELLS AND SHARK TEETH
260 - 270	SIMILAR
270 - 280	SIMILAR, NO FOSSILS, 3 - 5% GLAUCONITE
280 - 290	SIMILAR
290 - 300	FINE-GRAINED, WELL-SORTED QUARTZ SAND, SCATTERED LARGE ROUNDED QUARTZ GRAINS
300 - 310	SIMILAR, SLIGHT INCREASE IN COARSE MATERIAL
310 - 320	SIMILAR
320 - 330	SIMILAR, SLIGHT INCREASE IN COARSE MATERIAL
330 - 340	SIMILAR
340 - 350	SIMILAR
350 - 360	SIMILAR
360 - 370	SIMILAR, NO COARSE MATERIAL
370 - 380	SIMILAR
380 - 390	FINE TO MEDIUM-GRAINED SAND WITH SOME REDDISH SILTY CLAY
390 - 400	SIMILAR, NO CLAY
400 - 410	SIMILAR
410 - 420	FINE TO COARSE-GRAINED QUARTZ SAND, ANGULAR, 10% FINE GRAVEL
420 - 430	SIMILAR, LESS COARSE MATERIAL
430 - 440	SIMILAR
440 - 450	FINE GRAINED QUARTZ SAND, 10 - 20% GLAUCONITE
450 - 460	SIMILAR, 5 - 10% GLAUCONITE
460 - 470	MEDIUM-GRAINED WELL-SORTED QUARTZ SAND
470 - 480	SIMILAR
480 - 490	SIMILAR
490 - 500	SIMILAR, 5 - 10% COARSE-GRAINED SAND
500 - 510	MEDIUM TO COARSE-GRAINED ANGULAR SAND
510 - 520	SIMILAR
520 - 530	SIMILAR
530 - 540	SIMILAR
540 - 550	SIMILAR
550 - 560	SIMILAR, INCREASE IN FELDSPAR, MICA, PYRITE
560 - 570	SIMILAR
570 - 580	SIMILAR, INCREASE IN FELDSPAR, MICA, PYRITE
580 - 583	SIMILAR
583	ALTERED CHLORITIC DIORITE

GAMMA RAY-NEUTRON LOG



Source: Virginia State Water Control Board - BWCM

PLATE NO. 1-A

TABLE 1-A

RESULTS OF CORE TEST

DEPTH OF SAMPLE in Feet	MINERALOGICAL COMPOSITION* (Based on X-Ray Analysis) Mineral	Percent	POROSITY** Percent	PERMEABILITY** Darcys	Inches/Day
207-208	Sand	-	36.2	5.46×10^{-5}	1.86
209-210	Sand	-	37.8	3.30×10^{-5}	1.12
211-212	Sand	-	37.5	7.74×10^{-5}	2.63
214-215	Quartz	74.6	44.8	1.30×10^{-7}	0.004
	Kaolinite	10.0			
	Illite	11.7			
	Mixed-Layer Clays	3.7			
215-216	Clay	-	44.6	5.2×10^{-8}	0.002
217-218	Quartz	77.0	40.8	1.02×10^{-7}	0.003
	Kaolinite	7.9			
	Illite	11.1			
	Mixed-Layer Clays	3.5			
219-220	Quartz	72.3	36.8	3.0×10^{-8}	0.001
	Kaolinite	10.0			
	Illite	13.0			
	Mixed-Layer Clays	4.6			

* X-Ray Analysis by Virginia Division of Mineral Resources
** Analysis by Virginia Department of Highways

Source: Virginia State Water Control Board - BWCM

TABLE 2-A

COMPOSITE PUMP TEST

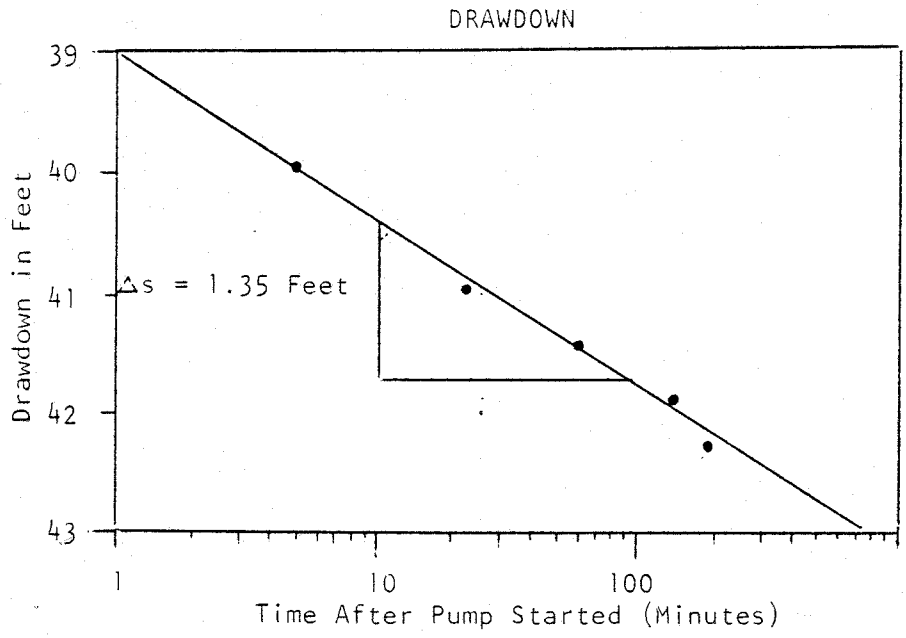
1200 Hours to 1630 Hours, March 30, 1973

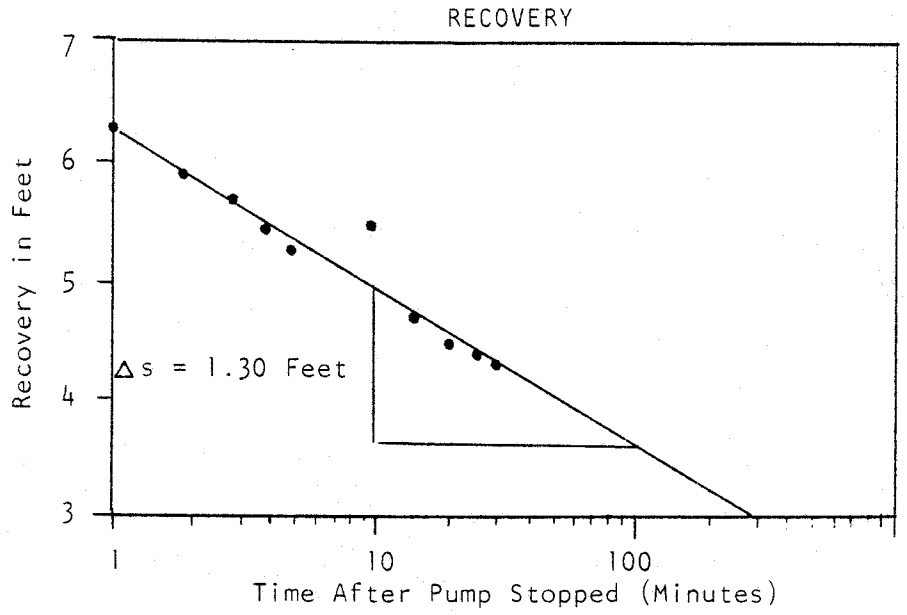
PUMP SETTING: 244.64 Feet

TIME	CONDUCTIVITY (Micromhos/cm)	WATER LEVEL	YIELD (gpm)
1155		50.83	195
1200	1160		195
1202	650		195
1203	940		195
1205	950	90.76	195
1207	1135		195
1219	1270		195
1221	1260		195
1225		91.80	195
1232	1300		195
1240	1300		195
1252	1320		195
1258	1310		195
1305		92.30	195
1321	1320		195
1333	1320		195
1400	1320		195
1416	1300	92.70	195
1435	1320		195
1457	1320		195
1510		93.13	195

Source: Virginia State Water Control Board - BWCM

PUMPING TEST
OBSERVATION WELL #66
MARCH 30, 1973





Source: Virginia State Water Control Board - BWCM

PLATE NO. 2-A

APPENDIX B

Well Data

The following table is a listing of well data on wells in the York-James Peninsula. This table and Appendices C and D can be used to obtain detailed ground-water information in an area of interest within the Peninsula. The information in Appendix B includes:

- Bureau of Water Control Management Well Number (BWCM No.)
- Name and Location of the well
- Virginia Plane Coordinate locations of the well. Virginia Plain Coordinate location grids appear on the well location maps in this report and on all U.S.G.S. topographic quadrangles. The north and east coordinates provide the exact location of the well
- Static water level below land surface (SWL LSD) in the well and the date of measurement
- Total Depth (TD) of the well
- Elevation (ELEV) of the well
- Casing Diameter (CAS DIA)
- Pump Test Data, which include the specific capacity (SP CAP) in gallons per minute per foot of drawdown and the duration (HRS) of the pump test.
- Available well logs, which include Drillers Log (D), Electric Log (E) and Gamma-Ray Log (G)
- The depth of the screens in the well
- The number of the U.S.G.S. Topographic Quadrangle on which the well is located (TOPO #) (See Table 1-B)

The information in Appendix B can be used to determine the depth to aquifers, the water levels in the aquifers and the yield capabilities of the aquifers. In addition, chemical analyses for many of the wells listed are presented in Appendix C.

TABLE 1-B

USGS TOPOGRAPHIC QUADRANGLE NAMES

BWCM MAP #	QUADRANGLE NAME	BWCM MAP #	QUADRANGLE NAME
35-B	Newport News South	99-A	Dutch Gap
65-A	Poquoson East	99-B	Drewrys Bluff
65-B	Poquoson West	99-D	Hopewell
65-C	Newport News North	123-C	Shacklefords
65-D	Hampton	124-A	Truhart
66-A	Yorktown	124-B	King and Queen
66-B	Hog Island	124-C	New Kent
66-D	Mulberry Island	124-D	West Point
67-A	Surry	125-A	King William
67-B	Claremont	125-B	Old Church
96-B	Gressitt	125-C	Quinton
96-C	Williamsburg	125-D	Tunstall
96-D	ClayBank	126-A	Studley
97-A	Toano	126-B	Yellow Tavern
97-B	Walkers	126-C	Richmond
97-C	Brandon	126-D	Seven Pines
97-D	Norge	148-C	Beulahville
98-A	Providence Forge	148-D	Aylett
98-B	Roxbury	149-C	Ashland
98-C	Westover	149-D	Hanover
98-D	Charles City		

POOR
QUALITY

ORIGINAL(S) FOLLOW

THIS IS THE BEST COPY
AVAILABLE

*VCE
DOCUMENT
CONVERSION*

TABLE 2-B

DATE 06/01/75

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

* * * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	* * * * * SCREEN * * * * * FROM	TO	FROM	TO	FROM	TO	TOPO *
118	CHARLES CITY																				
1	YMCA CAMP W-YANOKE	2	365100	2376100	6	68	45	215	20	04		.27	008	DEG	0172	0177	0181	0196			98-[illegible]
2	NAT FISH HATCHERY	2	368200	2380500		35		150	30	03											98-C
3	CARTER WILLIAMS	2	363700	2374450	8	65	34	219	35	06	04			DF	0142	0182					98-B
4	ALSOP	2	371900	2361800		08		355	20												99-C
5	RICHARD CRANE	2	358600	2393300		30		280	20	04											98-C
6	BLACK	2	358400	2388850				143	20												98-C
7	NEAR BERKELEY	2	360800	2383900			18	157	45												98-C
8	NEAR BERKELEY	2	360300	2383550			12	157	30												98-C
9	C D RICHARDSON	2	395900	2422800		46	110	304	90												98-A
10	DR GOLDMAN	2	364800	2407400		33	67	235	40	04											98-D
11	SACHETT	2	375200	2366200		43		204	30	06											98-C
12	HARRISON	2	376500	2366950		60		252	53												98-C
13	J A RUFFIN	2	365000	2391450		65	39	300	25												98-C
14	J A RUFFIN	2	368450	2399650		61	63	320	50												98-C
15	J A RUFFIN	2	364250	2395950		67	43		35												98-C
16	EAST ELEM SCHOOL	2	369700	2414250		46	39	220	45	03											98-D
17	A G COPLAND	2	359100	2418700		20		340	70	04											98-D
18	A G COPLAND	2	359100	2417900			76	280	60												98-D
19	TAYLOR	2	351400	2416900			20	375	10	06											98-D
20	LAWRENCE LEWIS	2	352100	2413700		20		210	10	04											98-D
21	LAWRENCE LEWIS	2	351700	2413800		20		200	10	04											98-D
22	DR KENT	2	399700	2424750				250	20	03											98-A
23	STANLEY HULA	2	335800	2450350		05		248		04											67-B
24	I R NANTZ	2	414600	2391000				290		04											
25	JAMES T ALVIS	2	358800	2420500					60	04											
26	J C SMITH	2	332900	2453800			27	225	5	03											67-B
27	HENRY BAHNSON	2	354400	2414200						04											98-D
28	H C ROWAN	2	395650	2423600		39		248	65	02											
29	W HURST	2	379950	2460800				117	10	02											97-C
30	DR KENT	2	399700	2424600				190	20	02											98-A
31	M P DUTSON	2	339850	2448700		35		212	20	04											97-C
32	A E TATE	2	363350	2458450				210	45	03											97-C
33	P GARRISON	2	339000	2447300		32		210	20	02											97-C
34	BUCK NOLAND	2	379650	2453850				235	95												97-C
35	EUREKA BRICK CO	2	358200	2434400				360	20	04											98-D
36	BOCH	2	414000	2390050		33		250	90												98-B
37	ROXBURY FISHERY	2	414500	2394400																	98-B
38	WINDSOR BUILDERS				05	72	142	275		04					0262	0272					
39	VA DEPT OF HIGHWAYS	2	376150	2414060						04											98-D
40	TATE HUNTING CABIN	2	373350	2458500						02											97-C
41	DOWNS	2	380000	2460800						02											97-C
42	MOONE AIRY	2	374400	2460300						02											97-C
43	GRAVES	2	387000	2455000						02											97-B
44	LITTLE ELAM CHURCH	2	383950	2402400			133	200	121	04											98-A
45	R C CHRISTIAN	2	338960	2414550			121	400	105	04											98-A
46	WEST ELEMENTARY SCH	2	372550	2390150			54	350	55	04											98-C

TABLE 2-B (Cont.)

PAGE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

	WCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP SP	TEST CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM	TO	FROM	TO	FROM	TO	TOPO #
118		CHARLES CITY																				
	47		2	398600	2375000			142		145	04											
	48	LIPPERT, GADDY				12	71		760	38	10				F							
	49	OBSERVATION WELL #66	2	364750	2417400	3	73	290	593	40	02	00			DEG	0310	0404	0424	0486	0496	06	98-D
																0510	0530					
	50	B W C M TEST WELL	2	364750	2417400	2	73		591	40												98-D
142		HANOVER																				
	1	R W STARKE	2	465700	2330500	1	67	129	300		05	04	.21		DF	0209	0220	0261	0271			126-D
	2	E G WADE	2	469700	2319850	12	68	177	600	140	06		1.66	008	D	0184	0209					126-C
		MEADOWBRIDGE SUB																				
	3	SYDNOR,MAYFIELD FARMS	2	473000	2323700	5	62	149	290	190	06		.83	024	D	0217	0227	0253	0273			126-B
	4	SYDNOR,MAYFIELD FARMS	2	473150	2323750	4	58		316						F							
	5	COLD HARBOR VISIT CEN	2	457950	2351500	4	62	135	280	175	06	04	.26	007	DE	0255	0270					126-D
	6	SYDNOR, MEADOW GATE						157	306	160	06		.40	006	DE	0198	0218	0228	0238	0258	0273	
	7	SYDNOR, AVONDALE SUB	2	482850	2329200	12	66	143	370	185	06	04	2.65	005	DE	0238	0248	0270	0300			126-A
	8	RICHMOND FOOD STORES	2	477550	2316650	1	67	125	275	185	06		.56	008	DF	0164	0174	0202	0232			126-B
	9	RICHMOND FOOD STORES	2	477550	2316650	1	67	135	708	140	06		.13	004	D							126-B
	10	HANOVER WATER CO	2	481000	2316800	12	65	157	395	200	06		.25	005	DEG	0186	0216	0242	0252			126-B
		CRANEY ISLAND ESTA																				
	11	SUNNOCO OIL CO				3	70	149	245	175	04		.21		D							
	12	BEECHWOOD SERV CORP	2	490730	2310600	4	67	110	640	185	06		.07	009	DE	0118	0123	0145	0160	0175	0180	126-B
		BEECHWOOD FARMS																				
	13	SYDNOR, HANOVER FARMS	2	458000	2348100	1	64	135	401	150	06	06	1.23	007	DE	0233	0253	0258	0273	0290	0305	126-D
	14	H S SPENCER	2	476800	2381250	12	65	144	444	150	04		.55	004	DE	0303	0313	0344	0364			125-B
	15	SYDNOR, CHERRYDALE	2	470600	2340400	5	68	140	412	170	06		.50	007	DEG	0320	0370					126-D
	19	SIGNAL HILL MEM PARK	2	514150	2330350	11	68	125	266	180	06		1.61	014	D	0246	0266					126-A
	28	TOTOPOTOMOY INC				6	68		300	190	06		.64	024								126-B
	29	HANOVER COUNTRY CLUB						51	624						E							
	37	SYDNOR, WALNUT GROVE	2	463850	2334200	4	69		304	130	06		.58	007	D	0264	0289					126-D
	38	SYDNOR	2	460300	2340900	4	69		370	180	06	04	2.54	007	D	0279	0285	0298	0313	0321	0339	126-D
		HIGH POINT FARMS																				
																0346	0354					
	47	BEECHWOOD SERV CORP				7	69	21	310		06		.55	010	D							126-B
		BEECHWOOD FARMS																				
	49	JETER BROTHERS	2	465300	2337050	2	72	175	330	170	06		1.64	073	D							126-C
		ASPEN HILL FARM																				
	50	HANOVER COUNTY	2	465850	2323400	4	61	195	276	180	06				DE	0200	0210	0225	0240	0245	0255	126-C
		WINDY HILLS																				
	51	HANOVER COUNTY	2	465850	2323400	4	62	164	608	180				024	DF	0200	0210	0223	0238			126-C
		WINDY HILLS																				
	60	MITCHELLS WELL & PUMP				6	62	142	520		06					0305	0315					126-D
		DOGWOOD KNOLL																				
	61	MITCHELLS WELL & PUMP				6	62	142	520		06		.59	075	D	0305	0315					126-D
		DOGWOOD KNOLL																				
	65	SYDNOR, HOLLY RIDGE				2	67	165	274		06			006	D	0231	0251	0253	0263			126-B

TABLE 2-B (Cont.)

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP SP	TEST CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM TO	FROM TO	FROM TO	DPD #
118	CHARLES CITY																	
47		2	398600	2375000			142		145	04								
48	LIPPERT, GADDY				12	71		760	38	10				F				
49	OBSERVATION WELL #66	2	364750	2417400	3	73	290	593	40	02 00				DEG	0310 0404 0424 0486 0496 06 0510 0530			98-D
50	B W C M TEST WELL	2	364750	2417400	2	73		591	40									98-D
142	HANOVER																	
1	R W STARKE	2	465700	2330500	1	67	129	300		05 04		.21		DE	0209 0220 0261 0271			126-D
2	E G WADE MEADOWBRIDGE SUB	2	469700	2319850	12	68	177	600	140	06		1.66	008	D	0184 0209			126-C
3	SYDNOR,MAYFIELD FARMS	2	473000	2323700	5	62	149	290	190	06		.83	024	D	0217 0227 0253 0273			126-B
4	SYDNOR,MAYFIELD FARMS	2	473150	2323750	4	58		316						F				
5	COLD HARBOR VISIT CEN	2	457950	2351500	4	62	135	280	175	06 04		.26	007	DE	0255 0270			126-D
6	SYDNOR, MEADOW GATE						157	306	160	06		.40	006	DE	0198 0218 0228 0238 0258 0273			
7	SYDNOR, AVONDALE SUB	2	482850	2329200	12	66	143	370	185	06 04		2.65	005	DE	0238 0248 0270 0300			126-A
8	RICHMOND FOOD STORES	2	477550	2316650	1	67	125	275	185	06		.56	008	DE	0164 0174 0202 0232			126-B
9	RICHMOND FOOD STORES	2	477550	2316650	1	67	135	708	140	06		.13	004	D				126-B
10	HANOVER WATER CO CRANEY ISLAND ESTA	2	481000	2316800	12	65	157	395	200	06		.25	005	DEG	0186 0216 0242 0252			126-B
11	SUNNOCO OIL CO				3	70	149	245	175	04		.21		D				
12	BEECHWOOD SERV CORP BEECHWOOD FARMS	2	490730	2310600	4	67	110	640	185	06		.07	009	DE	0118 0123 0145 0160 0175 0180			126-B
13	SYDNOR, HANOVER FARMS	2	458000	2348100	1	64	135	401	150	06 06		1.23	007	DE	0233 0253 0258 0273 0290 0305			126-D
14	H S SPENCER	2	476800	2381250	12	65	144	444	150	04		.55	004	DE	0303 0313 0344 0364			125-B
15	SYDNOR, CHERRYDALE	2	470600	2340400	5	68	140	412	170	06		.50	007	DEG	0320 0370			126-D
19	SIGNAL HILL MEM PARK	2	514150	2330350	11	68	125	266	180	06		1.61	014	D	0246 0266			126-A
28	TOTOPOTOMOY INC				6	68		300	190	06		.64	024					126-B
29	HANOVER COUNTRY CLUB						51	624						E				
37	SYDNOR, WALNUT GROVE	2	463850	2334200	4	69		304	130	06		.58	007	D	0264 0289			126-D
38	SYDNOR HIGH POINT FARMS	2	460300	2340900	4	69		370	180	06 04		2.54	007	D	0279 0285 0298 0313 0321 0339 0346 0354			126-D
47	BEECHWOOD SERV CORP BEECHWOOD FARMS				7	69	21	310		06		.55	010	D				126-B
49	JETER BROTHERS ASPEN HILL FARM	2	465300	2337050	2	72	175	330	170	06		1.64	073	D				126-D
50	HANOVER COUNTY WINDY HILLS	2	465850	2323400	4	61	195	276	180	06				DE	0200 0210 0225 0240 0245 0255			126-C
51	HANOVER COUNTY WINDY HILLS	2	465850	2323400	4	62	164	608	180				024	DE	0200 0210 0223 0238			126-C
60	MITCHELLS WELL & PUMP DOGWOOD KNOLL				6	62	142	320		06					0305 0315			126-D
61	MITCHELLS WELL & PUMP DOGWOOD KNOLL				6	62	142	320		06		.59	075	D	0305 0315			126-D
65	SYDNOR, HOLLY RIDGE				2	67	165	274		06			006	D	0231 0251 0253 0263			126-B

TABLE 2-B

DATE 06/01/77

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

* * * * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE Z	COORD NORTH	COORD EAST	DATE MO	DATE YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP SP	TEST CAP	TEST HRS	LOG	SCREENS FROM	SCREENS TO	SCREENS FROM	SCREENS TO	SCREENS FROM	SCREENS TO	TOPO
118	CHARLES CITY																				
	1 YMCA CAMP W-YANOKE	2	365100	2376100	6	68	45	215	20	04		.27	008	DEG	0172	0177	0181	0196			98-[illegible]
	2 NAT FISH HATCHERY	2	368200	2380500		35		150	30	03											98-C
	3 CARTER WILLIAMS	2	363700	2374450	8	65	34	219	35	06	04			DE	0142	0182					98-B
	4 ALSOP	2	371900	2361800		08		355	20												99-B
	5 RICHARD CRANE	2	358600	2393300		30		280	20	04											98-C
	6 BLACK	2	358400	2388850				143	20												98-C
	7 NEAR BERKELEY	2	360800	2383900			18	157	45												98-C
	8 NEAR BERKELEY	2	360300	2383550			12	157	30												98-C
	9 C D RICHARDSON	2	395900	2422800		46	110	304	90												98-A
	10 DR GOLDMAN	2	364800	2407400		33	67	235	40	04											98-D
	11 SACHETT	2	375200	2366200		43		204	30	06											98-C
	12 HARRISON	2	376500	2366950		60		252	53												98-C
	13 J A RUFFIN	2	365000	2391450		65	39	300	25												98-C
	14 J A RUFFIN	2	368450	2399650		61	63	320	50												98-C
	15 J A RUFFIN	2	364250	2395950		67	43		35												98-C
	16 EAST ELEM SCHOOL	2	369700	2414250		46	39	220	45	03											98-D
	17 A G COPLAND	2	359100	2418700		20		340	70	04											98-D
	18 A G COPLAND	2	359100	2417900			76	280	60												98-D
	19 TAYLOR	2	351400	2416900			20	375	10	06											98-D
	20 LAWRENCE LEWIS	2	352100	2413700		20		210	10	04											98-D
	21 LAWRENCE LEWIS	2	351700	2413800		20		200	10	04											98-D
	22 DR KENT	2	399700	2424750				250	20	03											98-A
	23 STANLEY HULA	2	335800	2450350		05		248		04											67-B
	24 I R NANTZ	2	414600	2391000				290		04											
	25 JAMES T ALVIS	2	358800	2420500					60	04											
	26 J C SMITH	2	332900	2453800			27	225	5	03											67-B
	27 HENRY BAHNSON	2	354400	2414200						04											98-D
	28 H C ROWAN	2	395650	2423600		39		248	65	02											
	29 W HURST	2	379950	2460800				117	10	02											97-C
	30 DR KENT	2	399700	2424600				190	20	02											98-A
	31 M P DUTSON	2	339850	2448700		35		212	20	04											97-C
	32 A E TATE	2	363350	2458450				210	45	03											97-C
	33 P GARRISON	2	339000	2447300		32		210	20	02											97-C
	34 BUCK NOLAND	2	379650	2453850				235	95												97-C
	35 EUREKA BRICK CO	2	358200	2434400				360	20	04											98-D
	36 BUCH	2	414000	2390050		33		450	90												98-B
	37 ROXBURY FISHERY	2	414500	2394400																	98-B
	38 WINDSOR BUILDERS				05	72	142	275		04					0262	0272					
	39 VA DEPT OF HIGHWAYS	2	376150	2414060						04											98-D
	40 TATE HUNTING CABIN	2	373350	2458500						02											97-C
	41 DOWNS	2	380000	2460800						02											97-C
	42 MOUSE AIRY	2	374400	2460300						02											97-C
	43 GRAVES	2	367000	2455000						02											97-B
	44 LITTLE ELAM CHURCH	2	383950	2402400			133	200	121	04											98-A
	45 R C CHRISTIAN	2	398960	2414550			121	400	105	04											98-A
	46 WEST ELEMENTARY SCH	2	373950	2390150			54	350	55	04											98-C

TABLE 2-B (Cont.)

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

RWCM NO	NAME AND LOCATION	VA PLANE COORD Z NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	SCREENS FROM	TO	FROM	TO	FROM	TO	TOPO #
142	HANOVER																			
161	HENSLEY	2 482200	2299200																	149-B
162	HENSLEY	2 482150	2298700				145													149-B
163	HANOVER WAYSIDE	2 500590	2323280	3	77	121	196		06	3.66	024	D		0191	0195					
164	SYDNOR	2 484100	2325800	4	70	146	451	190	06	4.07	008	D		0230	0260	0302	0312			126-A
	SWANNANOA ESTATES																			
165	SYDNOR,RANIER ESTATES			5	70	143	452	170	06	1.88	008	DE		0355	0365	0392	0422			
166	RICHMOND FOOD STORES			12	70	145	257		06	.63	012	D		0178	0188	0212	0232			126-B
167	TOWN OF ASHLAND					3	700	220	08											
168	SYDNOR, AVONDALE SUB	2 484500	2330650	7	72	143	362	165	06	.95	024	DE		0246	0256	0280	0300			126-C
170	NAT CEMETERY,COLD HAR	2 459600	2353400			119	448	110												126-D
171	SYDNOR, CHERRYDALE	2 473100	2339500	8	72	178	394	190	06	1.96	024	D		0344	0384					126-A
172	EVA S PEMBERTON	2 543200	2291800		37		150	184	02											149-C
173	R N PEMBERTON	2 541400	2291500				160		06											150-D
174	R N PEMBERTON	2 541300	2291400				200		06											150-D
175	R V LOWE	2 461100	2332200		45		160	160	02											126-D
176	BATTLEFIELD PARK H S	2 474000	2348500		35		195	190	06											
177	DOUGLAS FLEET			9	71	19	372		06 04	1.91	008	D		0285	0295	0310	0330			
178	L O SNEAD			11	71	95	405		05	.08	007	D								
179	TOTUPOTOMOY INC			10	71		300					D								
182	HANOVER SCH FOR BOYS	2 520300	2334600			55	210	102	08	2.97	082			0185	0206					149-D
	KOSMO VILLAGE																			
183	LEE-DAVIS HIGH SCHOOL					132	292		06	1.16	024									126-D
185	BATTLEFIELD PK EL SCH				35	115	228		06	.57										126-D
186	WASH. HENRY ELEM SCH			9	39	130	224		06	.21				0200	0212					
188	BETHANY ELEM SCHOOL			1	58	30	168		06	.53										
189	EAST END ELEM SCHOOL			5	59	100	292		06					0247	0262					
191	DOSWELL SCHOOL				67	80	200		06	.12	024									
192	ELMONT ELEM SCHOOL				67	60	225		06	.50	048									
194	FEARNOW BROS CANNERY					30	50		30											
195	FEARNOW BROS CANNERY					30	50		30											
197	SYDNOR			04	72	172	335		06	5.14	024	D		0233	0238	0258	0278	0283	0288	
														0296	0316					
198	ROBIN RIDGE SUB																			
199	VA DEPT OF HIGHWAYS	2 125100	2463300		56		241	20	06											
200	HANOVER COUNTY						230		06	.03	012									
	BATTLEFIELD FARMS																			
204	PEARSON CORNER SCHOOL	2 491150	2321450						06	.05	012									
206	WASH. HENRY ELEM SCH			10	72	180	431		06	1.70	005	D		0411	0431					
207	SYDNOR, HANOVER FARMS			11	72	143	346		06	.20	024	D		0223	0228	0270	0280	0290	0300	
														0312	0322	0332	0342			
209	HANOVER VIL SHOP CENT			1	73	162	315		06	3.12	024	D								
143	HENRICO																			
1	THE FLINTKOTE CO	2 430100	2335800	4	59	147	285	160	06	1.78			DE	0172	0182	0230	0255			126-C
2	FAIRFIELD WATER CORP	2 441700	2327300	5	66	159	302	160	08	2.27	025		DE							126-D
	HEC [illegible] VILLAGE																			

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

	BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP SP	TEST CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM	TO	FROM	TO	FROM	TO	TOPO #
142		HANOVER																				
	66	SYDNOR, HOLLY RIDGE	2	477500	2321100	1	67	175	632	205	06			005	DE							126-B
	67	PIG PARLOWS WATER SUP				10	67	310	3510		05	04	.17	002	D	2770	297					
	68	S D FLEET				12	65	19	369		06	04	1.30	016	E	0292	0332					
	69	T O LEADBETTER				6	68	26			06		.89	036								
	70	MITCHELLS WELL & PUMP BRANDY CREEK ESTAT				3	69	165	325		06			028	D	0305	0325					
	71	MITCHELLS WELL & PUMP BRANDY CREEK ESTAT				6	62	148	320		06		6.75	010	D							
	72	NAT PARK SERV	2	453800	2350500	12	61		199	150	04				D	0181	0191					126-D
	73	HANOVER COUNTY RIDGEVIEW ESTATES				6	61	167	301		06		1.20	012	D	0227	0247	0269	0284			
	74	JANIE P BARRETT SCHOO	2	506300	2332750	12	49	134	277	125	08		2.87	024	D	0249	0265					126-D
	75	N KIRBY				6	55	113	326		06		1.26		D	0234	0249	0303	0319			
	77	T W JONES							150		06			002	D							
	80	BARKSDALE THEATRE	2	522200	2327150			65	234	80					E							
	81	WALTER F PAYNE				10	59	117	197		04		.68	008	D							
	89	RICHMOND BATTLE PARK				6	65		196	180	04											
	90	RAINBOW LAKE MOTEL				1	55	33	290		06		.02	007	D							
	94	E C C WOODS				8	55		120		04											
	104	LEE-DAVIS HIGH SCHOOL				4	69	140	286		06		2.08	012	D							126-D
	109	ARTHUR P FLIPPO				5	65		280		05				D	0019	0029					
	116	SYDNOR,BURNSIDE FARMS D D EANIS	2	473150	2319750	1	57		270	175	05				E	0174	0189					
	117	HANOVER WATER CORP CRANEY ISLAND ESTA				9	58	128	305		06		.32	048								126-B
	119	SONS INC BLUF STAR ESTATES	2	485500	2321050	10	65	150	600		06		.35	024	DE	0200	0300					
	121	BEECHWOOD SERV CORP BEECHWOOD FARMS				4	69		653	160	06				D	0167	0187					
	122	BEECHWOOD SERV CORP BEECHWOOD FARMS				6	69	78	136		04				D	0076	0096	0110	0120			
	123	MECHANICSVILLE SAN DI							261		10					0217	0247					
	124	MECHANICSVILLE SAN DI							225		08					0195	0220					
	125	MECHANICSVILLE SAN DI							498		06											
	126	1ST BAPTIST BENE ASSO	2	457350	2339300				298	165					E	0182	0197	0281	0291			
	145	V E PORTWOOD	2	478200	2355500	6	50	130	356		04		.15	005	D							
	151	SYDNOR,SPRING MEADOWS KOSMO VILLAGE	2	467800	2334350	8	58		350	165					E							126-D
	152	SYDNOR,SPRING MEADOWS	2	469000	2334350					145												126-D
	153	SYDNOR,SPRING MEADOWS	2	465700	2332600	4	65	139	320	140	08		1.00	008	D	0258	0278	0285	0300			126-D
	157	MATTAQUIN CORP OAK HILL ESTATES	2	473300	2368800			142	350	150					E							125-B
	158	SYDNOR, CHERRYDALE													E							
	159	TOTUPOTOMOY INC				5	72	100	330		06				D							126-B
	160	SYDNOR COLONIAL FOREST	2	493050	2331000			153	320						G							

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	SCREENS FROM	TO	FROM	TO	FROM	TO	TOPO #
143	HENRICO																			
34	HENRICO COUNTY SANDSTON	2 435450	2344000		18	128	272	165	10 08	6.81				0222	0262					126-D
35	HENRICO COUNTY SANDSTON	2 432200	2345275	6	55	135	312	153	08	11.17			D							126-D
36	HENRICO COUNTY SANDSTON	2 432175	2346820	1	61	152	322	158	08	2.61	024		D	0237	0277					126-D
37	HENRICO COUNTY SANDSTON	2 435100	2347900	5	64	160	292	152	08	2.70	033		D G							126-D
39	HENRICO COUNTY ROBINHOOD, VA HTS	2 434550	2333300	2	61	138	300	160	06	12.44	024		DE	0220	0260					126-D
40	HENRICO COUNTY VIRGINIA HEIGHTS	2 434000	2334950	3	55	125	212	160	08	1.12	024		D	0175	0206					126-D
41	HENRICO COUNTY VIRGINIA HEIGHTS	2 434000	2334950	7	60	154	340	160	06	.47	005		DE	0218	0238	0249	0259			126-D
42	HENRICO COUNTY WINDSOR PLACE	2 439450	2326250	3	56	124	237	150	08	2.83	026		D	0206	0237					126-D
43	SYDNOR, MAYFIELD SUB						338		08											
44	SYDNOR, MAYFIELD SUB						230		08											
50	HENRICO COUNTY OAK HILL SUB			9	55	146	330		08 06	3.07			D							
51	N W CARRINGTON			11	43	62	389		06											126-C
55	SYDNOR, RIDGE CREST SAN RAFAEL COURT																			
56	SYDNOR, RIDGE CREST						348													
57	SYDNOR,WOODLAWN FARMS																			
58	SYDNOR,WOODLAWN FARMS																			
59	SYDNOR,WESTWOOD MANOR																			
60	B C COBB GILBERT GARDENS			5	47	120	290		08	5.00	024		D							
61	B C COBB GILBERT GARDENS			6	48	112	302		06	6.75	012		D							
62	HENRICO COUNTY SANDSTON	2 436000	2346270	5	69	155	540	150	10 08	3.03	072		DE	0304	0312	0318	0360	0404	0456	126-D
63	KELLY'S RESTAURANT	2 443800	2329600	10	69	162	286	150	04	.97	008		DE	0252	0272					126-D
66	FRANKLIN A TRICE			5	49	138	260		06	1.00	014		D	0197	0260					
67	VA DEPT OF HIGHWAYS			4	58	30	290		08	.85										
68	HIGHLAND SPRINGS SCH	2 442860	2339850	2	61	164	350	160	08	1.08	024		D							126-D
69	FRANKLIN A TRICE			8	49	135	267		06 04	1.11	018		D	0233	0267					
70	FRANKLIN A TRICE			4	49	142	262		08	.51	012		D	0232	0262					
71	AIR REDUCTION SALES			2	49	30	350		08	.75	032		D							
72	HENRICO COUNTY OAK HILL SUB			9	49	131	268		08	1.87	016		D	0190	0217					
73	AIRLINE TAVERN			2	50	135	227		06	.65	006		D							
74	BAUGHAN BROTHERS INC				56		20	5	18											
75	FRANKLIN A TRICE			6	49	136	256		06	3.05	018		D	0178	0235					
76	COMMONWTH OF VIRGINIA			3	50	107	392			1.73	017		D							

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	SCREENS FROM	TO	FROM	TO	FROM	TO	TOPO #
143	HENRICO																				
3	VARINA HIGH SCHOOL	2	420150	2328600	7	61	89	266	142	06		.15	002	DE	0105	0120	0123	0138			99-A
4	VARINA HIGH SCHOOL	2	416700	2326100	10	61	210	712	140	07		.06	009	DE	0698	0710					99-B
5	GEORGE STONEMAN JR	2	421800	2318400	2	67	134	244	160	04		.34	004	DE	0193	0208					99-B
6	GLENWOOD GOLF COURSE	2	445500	2322300	2	66	144	227	135	04		.18	010	D	0176	0196	0216	0222			126-C
7	HENRICO COUNTY	2	442600	2323700	7	64		267	155					D							126-C
8	SHU-LU CORP	2	445050	2336700	11	66	157	314	160	06		1.04	005	DE							126-D
9	BAKER E SE VARINA H S	2	420600	2328500	4	62	138	287	147					E							99-A
10	COMMONWEALTH SAND&GRA	2	431750	2324900	9	64	125	296	155	06				DE	0210	0230	0240	0255			126-C
11	VARINA ELEM SCHOOL	2	406400	2332350	4	63	96	234	142	06		.52	024	DE							99-A
12	NAT PARK SERVICE	2	400050	2327550	6	65	36	187	130	04				E	0075	0090	0117	0122			99-A
13	HENRICO COUNTY	2	433000	2367500	11	67	137	605	140	08		11.42	024	EG	0370	0387	0430	0453	0462	0474	
	BRADLEY ACRES														0475	0481	0492	0505	0516	0541	
															0563	0601					
14	FAIRFIELD WATER CORP	2	443000	2330500	9	58		330	150					E							126-D
	HECKLER VILLAGE																				
15	HENRICO COUNTY	2	440400	2338400	4	64	152	375	170	08		1.38	032	G							126-D
	YORK MANOR																				
16	FAIRFIELD WATER CO				3	57	102	297				1.33	008								
	HECKLER VILLAGE																				
17	LEWIS GARDENS SER COR	2	430700	2336400	5	67	150	290	160	06			008	E	0180	0210					126-D
	LEWIS ROAD APARTME																				
18	LEWIS GARDENS SER COR	2	432500	2336800	8	63	153	301	160	06				DE	0240	0245	0254	0264	0268	0273	126-D
19	HENRICO COUNTY SCHOOL	2	439430	2342000	3	61	165	326	168	08		3.33	031	D	0248	0288					126-D
20	HENRICO COUNTY	2	438800	2334100	3	65	137	340	150	08		2.89	024	D	0263	0290	0297	0307	0311	0328	126-D
	HIGHLAND SPRINGS																				
21	COMMONWEALTH NAT GAS				12	68		100		13											
22	SYDNOR	2	435500	2327500	11	59		265	155	10				DE							126-D
	EASTOVER GARDENS																				
25	HENRICO COUNTY	2	445000	2339800			111	269		10	08				0247	0265					126-D
	HIGHLAND SPRINGS																				
26	HENRICO COUNTY	2	444450	2341150		35	133	306	150	10	06				0215	0306					126-D
	HIGHLAND SPRINGS																				
28	HENRICO COUNTY	2	441000	2339950	6	58	163	350	157	08		5.76	030	D	0243	0274					126-D
	HIGHLAND SPRINGS																				
29	HENRICO COUNTY	2	433920	2329200	3	62		300	165					E							126-D
	LAWNDALE SUB																				
30	HENRICO COUNTY				3	57	120	292		08					0213	0248					
	LAWNDALE FARMS																				
31	HENRICO COUNTY	2	434250	2338000	8	64	153	350	155	08		.48	012	DE	0215	0220	0228	0243	0280	0290	126-D
	SANBURNE PARK SUB																				
															0305	0310					126-D
32	HENRICO COUNTY	2	435200	2336400	6	63	175	370	150	08		2.00	024	D G							126-D
	SANBURNE PARK SUB																				
33	HENRICO COUNTY	2	434950	2343850		18		267	165	08	06				0241	0267					126-D
	SANDSTON																				

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD,
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

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BWCM NO	NAME AND LOCATION	Z	VA PLANE COORD NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	SCREENS FROM	TO	FROM	TO	FROM	TO	TOPO #
147	JAMES CITY																				
2	AMOCO SERVICE STATION	2	370800	2507800				395	80	04											96-C
3	JAMES CITY RESCUE SQU	2	386000	2491700				395	90												97-A
4	HOLIDAY INN TRAIL PK	2	343450	2473100				210	5												97-D
5	JAMESTOWN PARK	2	329100	2499300	3	56	9	345	15	06		2.31	007		0309	0319	0326	0336			67-A
6	JAMESTOWN PARK	2	323400	2500950					5												67-A
7	NORGE ELEM SCHOOL	2	377800	2503900	10	66	121	301	90	06			008	E	0221	0261					97-D
8	K A NIVER	2	342970	2532800					80	03											96-C
9	DOW BADISCHE CO	2	316400	2548500			77	500	20			42.50									66-A
10	DOW BADISCHE CO	2	315600	2548600			80	500	46			21.75									66-A
11	DOW BADISCHE CO	2	317000	2550000			104	500	47			39.56									66-A
12	DOW BADISCHE CO	2	317500	2548200		57	91	500	45	18		45.55									66-A
13	DOW BADISCHE CO	2	319100	2550000	3	65	55	563	48			26.55	024	D							66-A
14	CHISMAN CONCRETE CO	2	324200	2550650				500													96-C
15	CARTERS GROVE PLANTAT	2	321500	2546700			100	465		04											
16	M B HUTCHINS	2	326300	2549200			75	495	50	04	02	1.76		DE	0475	0495					66-A
17	SYDNOR, JAMES TERRACE	2	344000	2531900	3	61	90	502	70	06	04	12.77	002								96-C
18	OBSERVATION WELL #18 EDGE MARSH POINT	2	327300	2501900				342	10					E							67-A
19	SYDNOR, FIRST COLONY	2	334800	2491800	9	63	20	475	10	06	04	20.25	024	DE							67-A
20	REYNOLDS, WINDY HILL TRAILER COURT	2	325700	2548500				475	60												97-D
21	HUMBLE OIL CO	2	393400	2491000					100-												
22	DOW BADISCHE CO	2	317200	2548400				1028	20					E							
23	SYDNOR OLD STAGE MANOR	2	366250	2512400		65		430	100	06		10.00	012	DE	0240	0285					
24	RIVERVIEW PLANTATION	2	388420	2526675	4	64		258	50	06				DE	0238	0258					
25	LOCK JOINT PIPE CO				5	42	98	268		08		.80		D	0245	0265					96-C
26	SYDNOR, WHITE OAK SUB				11	65	87	425		07	04	.92	007	DE	0212	0252					97-D
27	WILLIAMSBURG AIRPORT				12	45	101	281		06		1.08	043	D							96-C
28	MARLE HILLS SUB					58	75	255		08		1.12	024	D	0236	0246					
29	WALSINGHAM ACADEMY				8	50	53	437		08	06	.71	008	D	0380	0411	0419	0430			96-C
30	J S TERRELL				4	63	44	204		05		.45	012	D							
31	M B HITCHENS	2	326300	2549200	1	65	8	72		04		1.00		D	0050	0070					66-A
32	SPRING LAND CORP EWELL HALL SUB				5	67	122	330		06		16.00	009	G	0282	0302					
33	JAMESTOWN PARK	2	323400	2501200					10												67-A
34	BERKELEY SCHOOL	2	346650	2513600					102	08											96-C
35	JAMESTOWN PARK	2	327700	2499100				500	15												67-A
36	JAMESTOWN 4-H CAMP	2	330300	2497400					12												
37	CANNERY, TOANO	2	342300	2508700				285		03											
38	SYDNOR JAMESTOWN FARMS	2	342300	2508700					70												97-D
39	O B DRYDEN NORGE COURT	2	381100	3502300				280	90	03											97-D
40	REYNOLDS, WINDY HILL TRAILER COURT	2	324900	2549900					40	04											66-A

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * * *

	BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM	TO	FROM	TO	FROM	TO	TOPO #
143		HENRICO																				
	78	HENRICO CO SCHOOLS				9	50	90	213		06		.45	012	D	0200	0211					99-A
	79	HENRICO COUNTY	2	442300	2341850	7	53	160	270	140	08 06	4.50		012	D	0227	0269					126-D
	80	HENRICO COUNTY				1	55	98	173	150	06	1.00		010	D							
	83	SYDNOR, PINE HEIGHTS	2	434150	2353950				236	160												126-D
	87	MCDONALDS RESTAURANT				9	70	166	295		04		.81	006	D	0252	0272					
	91	C & P TELEPHONE CO				7	70	163	300		06		.29	024	D							
	92	FAIRFIELD WATER CO HECKLER VILLAGE				9	71	152	310		08	3.35		024	D	0232	0262	0266	0276	0292	0297	
	93	NABISCO INC	2	424400	2332850	1	72	60	345	155	06		.07	008	DE	0149	0159	0199	0209			99-A
	94	HENRICO COUNTY DEEP RUN MANOR				6	56	107	119		05											
	95	HENRICO COUNTY GLENWOOD FARMS							307		08 06					0269	0307					
	96	VALLEY PLATING CO							300													
	97	HENRICO COUNTY WHITESIDE PARK				8	49		460													
	98	MASONIC HOME					99	105	217		08 06					0190	0201					
	99	MASONIC HOME				3	28	110	252		10	2.08				0197	0218	0228	0252			
	100	CONCRETE BUILDING UNI				4	63		520		06					0200	0255					
	101	HENRICO COUNTY				05	72		610		10				D							126-D
	105	HENRICO COUNTY GLENWOOD FARMS					47	135	270		10	1.53		024								
	106	HENRICO COUNTY GLENWOOD FARMS					48	135	290		10	1.53		024								
	108	SYDNOR, KILDARE SUB HIGHLAND SPRINGS							275													126-C
	109	LAKESIDE COUNTRY CLUB																				
	110	LAKESIDE COUNTRY CLUB																				
	118	OBSERVATION WELL #55 SANBOURNE PARK								155	08											126-D
	120	FORT HARRISON				2	63	36	187		04				E	0075	0090	0117	0122			
	121	WATKINS & CO				7	72	30	200		06		.56	024	D							
	123	C & P TELEPHONE CO	2	438200	2344500	7	72		310	164	05 04		.02	008	DE							126-D
	124	GLENDALE NAT CEMETERY	2	403800	2367200			133	232	140	06											98-B
	125	C D JONES	2	412600	2372400				286	150	04											98-B
	126	VA DEPT OF BLDGS&GRND	2	420600	2364900			132		140	10											98-B
	127	MOSMILLER GREENHOUSE	2	450800	2331200			179	303	175	06											126-D
	128	JOHN TEPPER	2	401300	2346000			81	300	100	06											99-A
	129	CURLES NECK FARM	2	386700	2351900		00	33	725	30	08											99-A
	130	ROBINWOOD SUB	2	429400	2334100					160	06											126-D
	131	U S TOBACCO CO						36	600				.77									
	132	FORT HARRISON																				
147		JAMES CITY																				
	1	OBSERVATION WELL #1 EASTERN STATE HOSP	2	355650	2512400	1	67	115	605	92	08	33.33			DEG	0410	0435	0500	0550			96-C

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM TO	FROM TO	FROM TO	TOPO #
147	JAMES CITY																
87		2 349550	2493650					90	04								
88	JAMES RIVER BAPT CH	2 357400	2993450					98	04								97-D
89	MRS EDDY	2 344450	2486100				483		04								97-D
90	THE COLONY SUB	2 332950	2509650					50	06								97-D
91	PENINSULA SCOUT RESER	2 370600	2497050		66			110	04								66-B
92	HOLIDAY INN TRAIL PK	2 344200	2474000						04								97-D
93	COLONIAL WILLIAMSBURG	2 346500	2521800	4	40	75	439	85	08 06	4.62	008	D		0409 0432			96-C
94	COLONIAL WILLIAMSBURG			4	52	72	481		08 06	6.05	024	D		0431 0478			96-C
95	COLONIAL WILLIAMSBURG	2 345100	2524100	6	53	62	485	77	02 75			D		0397 0412 0436 0456 0471 10			96-C
96	COLONIAL WILLIAMSBURG	2 346600	2525900		55	170		81	06								96-C
97	COLONIAL WILLIAMSBURG	2 349600	2524350	3	56	55	457	70	10 08	3.14	024	D		0396 0411 0421 0446			96-C
98	COLONIAL WILLIAMSBURG	2 347400	2524800	2	61		477	59				E		0350 0370 0410 0445			96-C
99	COLONIAL WILLIAMSBURG	2 345150	2523550	8	62	109	500	75		12.04		E		0408 0418 0425 0440 0446 0466			96-C
100	COLONIAL WILLIAMSBURG	2 347100	2523300	3	65	101	501		12 08	9.06	008	DE		0399 0412 0416 0428 0438 0444			96-C
														0447 0460 0464 0471			
101	COLONIAL WILLIAMSBURG	2 350500	2524400	2	67	95	500		10 08	10.89	008	DE		0369 0381 0388 0412 0426 0450			96-C
102	MAX RIEG			9	40	91	281		06	.09	014	D					96-C
103	WMSBURG STEAM LAUNDRY			1	37	76	425		06 05	3.51	013	D		0401 0422			96-C
104	M B DANA	2 406000	2510500				225	30									96-C
105	BOYD SMITH	2 325500	2548700			105	500	40	02								
106	PAUL E BRADLEY	2 342750	2533150				435	10									66-A
107	DULA	2 376700	2516500					100	04								96-C
																	96-C
150	KING WILLIAM																
1	CHESAPEAKE CORP	2 446300	2490300	9	62	37	1689	25	12 08	6.00	024	DE		1051 1061 1082 1097 1105 1115			124-D
														1126 1138 1157 1173 1186 1192			
														1206 1212 1221 1232 1241 1252			
														1261 1277			
2	CHESAPEAKE CORP	2 447700	2489500	12	63	90	811	24	24 10	25.35	024	D		0340 0350 0355 0360 0370 0375			124-D
						38								4039 4040 6041 1041 6042 1			
														0432 0442 0455 0465 0610 0620			
														0635 0650 0678 0683 0694 0704			
3	CHESAPEAKE CORP	2 443000	2491600	3	51	17	709	5	18 08			D		0368 0383 0405 0425 0607 0617			
						63								8064 8066 9067 9			
4	CHESAPEAKE CORP	2 446500	2490200	4	56	62	900	25	16 08	8.08	010	D		0367 0393 0405 0526 0430 0444			124-D
5	CHESAPEAKE CORP	2 449200	2487700	12	64	105	812	25	24 10	39.13	024	D		0316 0321 0326 0336 0356 0361			124-D
														0367 0372 0381 0386 0396 0401			
														0423 0428 0435 0440 0451 0456			
														0590 0595 0608 0613 0630 0640			
														0646 0656 0660 0670 0677 0682			
														0686 0691			
6	CHESAPEAKE CORP	2 444900	2491200	3	36	30	640	25	26 08	4.61		DE		0204 0210 0229 0234 0253 0258			124-D
														0295 0306 0381 0391 0412 0423			
														0438 0444 0533 0538 0548 0559			
														0615 0638			

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA

	BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP SP	TEST CAP	HRS	LOG	SCREENS FROM	TO	FROM	TO	FROM	TO	TOPO #
147		JAMES CITY																				
	41	REYNOLDS,WINDY HILL TRAILER COURT	2	251002	549900					50	04											66-A
	42	BRUNK MECHANICAL ENT				11	72	105	280		06	0				0260	0280					
	43	DOW BADISCHE CO				1	65	24	120		06		31.57	008	D							
	49	REYNOLDS,WINDY HILL TRAILER COURT	2	254900	2550200					40												66-A
	50	HOLIDAY INN TRAIL PK	2	343350	2474200					25												97-D
	51	HOLIDAY INN	2	343750	2475100					30												97-D
	52	HICKORY GROVE TRAIL C	2	232820	0254620	0			350	70	04											66-A
	53	HICKORY GROVE TRAIL C	2	328100	2546400	0		100	400	70	04											66-A
	54	J R LEWIS	2	334700	2491800	0			385	10												67-A
	55	LOCK JOINT PIPE CO	2	364000	2513700	0			285	80	03											96-C
	56	LOCK-JOINT PIPE CO	2	364000	2513700				285	80	03											96-C
	57	HERITAGE DEV CO WINDSOR FOREST						110	302		06		10.90	057	D							
	58	DOW BADISCHE CO				5	69	72	495		18	08	18.03	024		0430	0440	0450	0495			
	59	DOW BADISCHE CO				5	60	26	125		04			005	D	0104	0114					
	60	DOW BADISCHE CO				3	69	36	162		10	08	18.42	012	DE	0078	0088	0098	0118			
	61	DOW BADISCHE CO				7	42	8	70		02				E	0049	0062					
	62	WILLIAMSBURG MOTOR CT				2	52	87	310		06		3.00	004	D	0269	0282					96-C
	63	SHELDON LUMBER CO					50		180		02											97-A
	64	VA DEPT OF HIGHWAYS	2	392500	2507600	3	65	168	325	103	04			018								97-A
	65	SOUTHERN MATERIALS				2	61	104	301		04			018								96-B
	66	SYDNOR, JAMES TERRACE	2	343950	2532000		50	65	503		08	06	20.50	005								
	67	SYDNOR, JAMES TERRACE							500													
	68	MITCHELL CANTERBERRY HILLS				10	59	31	85		06		.75			0075	0085					
	69	MITCHELL CANTERBERRY HILLS							280							0270	0280					
	70	R K TAYLOR, TOANO							37													97-A
	71	SYDNOR, INDIGO PARK					55	77	390		08	06	4.28	009		0371	0382					97-A
	72	POPLAR HILL PLANTATN																				
	73	POPLAR HILL PLANTATN																				
	74	COLLEGE OF W & M	2	346500	2519300				500	75	04											96-C
	75	J P NASH	2	404950	2484500	2	72			120	04											97-A
	76	RUSSELL SMITH	2	397500	2487300				240	120	04											97-A
	77	STUCKEYS RESTAURANT	2	391600	2497050					130	04											97-A
	78	C M CHANDLER	2	384350	2519500				293	90	04											96-B
	79	L B CHANDLER	2	388230	2520800					100	04											96-B
	80	WOODLAND FARMS	2	393250	2511000	8	72				04											96-B
	81	WOODLAND FARMS	2	393350	2511400	8	72				04											96-B
	82	MIHALCOE	2	408550	2508500					35	04											96-B
	83	L W MARTIN	2	383500	2467600				273	32	04											97-B
	84	DR CHOHANY	2	379400	2467500					5	04											97-C
	85		2	384000	2482000				250	102	04											97-A
	86	RURAL SITE DEVEL CORP FOREST GLEN SUB	2	363200	2498400	06	72	116	428	110	08	06	44.00	024	D	0225	0240	0262	0277			97-D

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP. CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM TO	FROM TO	FROM TO	TOPO #
150	KING WILLIAM																
61	KING WILLIAM HIGH SCH	2	515700	2396200		26	155	585	170	06							125-B
62	T M ABRAMS	2	503100	2389450				300	90								125-B
63	G D TOWNSEND	2	496100	2382300			45	290	40	03							125-B
64	DAVIS	2	513600	2375800				320	140								125-B
65	T M ABRAMS	2	503200	2389300			40	305	90								125-B
66	W M UPSHAW	2	479600	2463260	08	72	105	245	110	04							124-B
67	WAKEMA	2	484350	2463800					5	02							124-B
68	J F TOWNSEND	2	498300	2379700			52	320	65	04							125-B
69	CHESTNUT GROVE	2	528350	2401200				360		04							148-D
70	AYLETT LUMBER MILL	2	513400	2383700			31	340		04							125-B
71	J F TOWNSEND JR	2	494050	2395900			124		130	06							125-B
72	J F TOWNSEND JR	2	493150	2394050		36				03							148-C
73	HERRING CREEK MILL	2	539580	2394000				288		03							148-C
74	UNKNOWN	2	456050	2463450				400		03							124-C
75	SANDY POINT PARK	2	497050	2453750					5	02							124-B
76	MRS PAUL	2	486400	2446120	08	72		365	125	04							124-B
77	NEAR WHITEOAK LANDING	2	498450	2442200				124		02							124-B
78	NEAR HORSE LANDING	2	503300	2436000		28		115	5	03							124-B
79	NEAR COHOKE					15		125		02							
163	NEW KENT																
1	LANEXA POST OFFICE	2	400800	2464000				120	20								97-B
2	STANDARD OIL & GAS	2	400700	2463200				180	35								97-B
3	DIASCOND CAMPGROUND	2	407500	2473400				120	30								97-B
4	CITY OF NEWPORT NEWS	2	395400	2453700		43		262	15	03				0246	0262		97-B
5	DIV OF FORESTRY	2	401850	2437500			54	326	30								
6	WOODHAVEN SHORES INC	2	426500	2409900	7	60	99	503	110	08	13.05	024	DEG	0315	0335	0340 0350 0355 0375	98-A
7	THOMAS M BROOKS FIVE LAKES SUB	2	430150	2383500	10	68	79	306	87	06	2.37	045	D	0286	0306		125-C
8	THOMAS M BROOKS BROOKWOOD MANOR	2	434700	2382400	10	65		305	130	06				0285	0305		125-C
9	FIELD UNIT #16	2	427500	2474650		57	158	439	70	06	.43						97-A
10	WASH. BURGESS INN	2	437850	2485670			33	365	13								
11	1.6MI N OF PROVIDENCE FORGE							330	120	04			E	0310	0357		
12	WINDSOR CUSTOM BUILDE QUINTON SUB	2	433800	2389100	10	72	156	360	150	04 02	1.17	003	D	0323	0333 0339 0349		125-D
13	NEW KENT ELEM SCHOOL						189	380	160								125-C
17	OBSERVATION WELL #17 WALKERS DAM	2	395200	2453900				623	10	06 04			DE				97-B
18	D S GARDNER	2	454100	2407000				300	80								125-D
19	F S JAUNTERAY	2	454400	2407400				315									125-D
20	SOUTHERN RR	2	457000	2427900		93		210		02							125-D
21	WALLACE	2	466400	2396600				410		06							125-C
24	E W OPP	2	411200	2495900		55		253	30	08							97-A

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP	CAP	HRS	LOG	* * * * * SCREENS * * * * * FROM TO	FROM TO	FROM TO	TOPO #
150	KING WILLIAM																	
7	CHESAPEAKE CORP	2	444000	2492000	7	44		667	20	18 08				DE	0390 0400	0550 0570	0580 0600	124-D
8	CHESAPEAKE CORP	2	444500	2493400	7	44		763	20	20 08				DE	0430 0450	0570 0580	0635 0645	124-D
															0660 0680	0700 0710		
9	CHESAPEAKE CORP	2	444700	2493300	9	45	43	189	15	08	2.90			D	0153 0189			124-D
10	CHESAPEAKE CORP	2	442000	2492000	11	41		454	5	18 08				D	0210 0240	0380 0390	0405 0445	124-D
11	CHESAPEAKE CORP				9	45	21	163		08	7.63			D	0141 0163			124-D
12	BLEAK HILL FARMS	2	524350	2349600	3	37	124	305	85	06	.18	006		D	0288 0305			149-D
13	BLEAK HILL FARMS	2	525400	2347850	12	39	60	213	75	06	.35	016		D	0183 0200			149-D
14	BLEAK HILL FARMS	2	523400	2349600	11	61	101	302	138	04	.09	010		D	0281 0301			149-D
15	BLEAK HILL FARMS							270										
16	TOWN OF WEST POINT	2	440200	2493200	6	66	137	526						DE				
17	CHESAPEAKE CORP	2	443400	2491600	9	45	27	164	10	08	6.14			D	0139 0164			124-D
18	CHESAPEAKE CORP				4	17		335		13 08				D	0318 0335			124-D
19	CHESAPEAKE CORP				11	55	80	852		04	2.48	006		D	0390 0410	0547 0557	0640 0650	124-D
															0692 0702	0737 0747	0768 0778	
															0830 0840			
20	CHESAPEAKE CORP	2	442900	2491550	11	29		465	5	26 08	10.97			D	0312 0327	0368 0448		124-D
21	CHESAPEAKE CORP				9	45	42	185		08	1.95			D	0162 0185			124-D
22	KING WILLIAM SCHOOLS	2	499100	2423450	8	50	100	429	125	04	5.00	015		D				125-A
23	VA STATE POLICE	2	457450	2478600	3	70	171	437		04	.62	007		D	0417 0437			124-D
24	W T SMITHDEAL	2	533500	2320900	7	48	40	130	90	06	.62	012		D	0106 0116			149-C
25	TOWN OF WEST POINT	2	440600	2493800	12	36		377	10	06				D				124-D
26	KIWANIS CLUB	2	535475	2337300				320	190	04				EG				149-D
27	I H GOODMAN				12	60	35	327		04	2.53	006		D	0303 0323			
28	C & N CORP				12	72	147	400		06	4.16	024		D	0246 0266	0358 0378		125-B
	MARLE HILL SUB																	
29	LARRY A LIPSCOMB				2	73	134	430		06	3.57	024		D	0250 0260	0388 0408		
	VENTER HEIGHTS SUB																	
32	K H DUNN	2	461500	2436800				535	45	03								124-C
33	A W LEWIS JR	2	531700	2403150				370	10	04								
34	TARRANT FOX	2	535700	2401700				385	30									148-D
35	T P CRASS	2	531500	2401950				368	55	03								148-D
36	FRED FOX	2	533150	2402600					20	03								148-D
37	W N FITSGERALD	2	517550	2410250				340	20									125-A
38	JOHN R WILLIMS	2	484150	2411700				220	85	03								125-A
39	LESTER MANOR CLUB	2	458400	2436800			110	335	10	03								124-C
51	HAMILTON HOLMES SCH	2	509000	2408500			110	800	160									125-A
52	W O ADAMS	2	505700	2388100			165	365	90	04								125-B
53	W C CLEMENTS	2	512600	2383100				365										
54	W H HUGHES	2	497800	2383450				310	50	04								125-B
55	JOHNSON	2	459900	2451100					30									124-C
56	COHOKE FISH CLUB	2	457100	2449100				215	20									124-C
57	WES WORSHAM	2	451900	2448600				260	15									124-C
58	J WINTON EDWARDS	2	453650	2448200					5									124-C
59	HORSELEY	2	492750	2401550				300	40									125-A
60	HORSELEY	2	473100	2401750				235	40									125-A

TABLE 2-B (Cont.)

DATE 08/01/2[illegible]

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * *

	BWCM NO	NAME AND LOCATION	VA PLANE COORD Z	NORTH	EAST	DATE MO	YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP GP	TEST CAP	HRS	LOG	SCREENS FROM	TO	FROM	TO	FROM	TO	TOPO #
199		YORK																				
	10	NAVAL WEAPONS STATION	2	334700	2565400		41		480	35	08				D	0480	0500					66-A
	11	SYDNOR, NELSON PARK				11	53	87	514		06				D							
	12	SYDNOR, NELSON PARK	2	344700	2532950	5	64	80	507	82	08	05	10.37	010	D	0450	0460	0474	0494			
	13	SYDNOR	2	339200	2536550		54	70	506	82	08		10.50	010	D	0450						
		CARVER GARDENS																				
	14	SYDNOR					62		465	60	08					0411	0425	0442	0452			
		PARKWAY ESTATES																				
	15	SYDNOR, QUEENS LAKE	2	356250	2534900				439	40	06					0386	0396					96-C
	16	SYDNOR, YORK TERRACE							502		08											
	17	DIXIE HOSPITAL				1	72	6	400		04		.26	008	D	0082	0092	0110	0120	0138	0148	
	18	SYDNOR, QUEENS LAKE	2	354650	2536900																	96-C
	19	W T HOLLAND	2	369200	2521200				200	80	04											96-C
	20	COLONIAL CAMPGROUND	2	379250	2519750				400	95	04											96-C
	21	WMSBG COUNTRY CLUB	2	335050	2541100					85	08											66-D
	22	SPRING LAND CORP				10	66	120	490		06		1.52	032	G	0470	0490					
		SPRINGFIELD TERRAC																				
	23	YORK PUBLIC UTILITIES	2	339100	2536500				596	70												
		CARVER GARDENS																				
	24	W T HOLLAND				10	72	98	290		04		2.00			0280	0290					
	27	OBSERVATION WELL							440	50	10	07										
		COAST GUARD STATIO																				
211		HAMPTON																				
	1	CITY OF HAMPTON	2	289950	2644750		96		1172	3	03											65-D
	2	US ARMY, FORT MONROE	2	252100	2640050		02		2254	3	15	09										65-D
216		NEWPORT NEWS																				
	1	U S ARMY, FORT EUSTIS	2	307700	2559300	4	41	20	550	36	18	08	36.55		D	0490	0550					66-A
	2	OBSERVATION WELL	2	312700	2563400	12	41		497	20	10	06			D							66-B
		LEE HALL RESERVOIR																				
	3	U S ARMY, FORT EUSTIS	2	301700	2562000	2	41	13	498	26	18	08	10.22		D	0448	0488					66-A
	4	U S ARMY, FORT EUSTIS	2	303900	2560500	3	41	20	543	30	18	08	15.00		D	0493	0543					66-A
	5	U S ARMY, FORT EUSTIS	2	289400	2558600	1	47	2	485	10	12	04	20.75		D							66-D
	6	JAMES R RESERVE FLEET	2	298700	2547100		49	50	200	5	08		6.11									66-A
	7	U S ARMY, FORT EUSTIS				3	41	18	692		18	08	8.42		D	0610	0660					
	8	CITY OF NEWPORT NEWS				3	31		736						D							
	9	CITY OF NEWPORT NEWS	2	321025	2558000			35	527		20	08	13.68									66-A
	10	NEWPORT NEWS FARM	2	278900	2574700				595						D							66-D
	11	SKIFFES CREEK DEV																				
	12	CITY OF NEWPORT NEWS	2	320450	2558175						10											66-A
	13	VEPCO	2	240900	2668900		44	38	1082	12	18	08			D							35-B
	14	VA FARMS CROP STORAGE	2	245060	2686100		44		813	10					D							35-B
	15	CITY OF NEWPORT NEWS							576													66-B
	16	WARWICK HEAT & PLUMB	2	241900	2550000	7	70	43	900		16	06	5.65	012	DF	0800	0850					

TABLE 2-B (Cont.)

DATE 06/01/73

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
SELECTIVE RETRIEVAL SYSTEM

WELL DATA
* * * * * * * * * * * * * * * * *

BWCM NO	NAME AND LOCATION	VA PLANE COORD Z NORTH	EAST	DATE MO YR	SWL LSD	TD (FT)	ELEV	CAS DIA	PUMP TEST SP CAP HRS	LOG	* * * * * SCREENS * * * * * FROM TO	FROM TO	FROM TO	TOPO #
163	NEW KENT													
25	W G CHAPMAN	2 413200	2487000		114	288	90	06						97-A
26	HUNT CLUB	2 426900	2492700			218	30	02						97-A
27	TABERNACLE CHURCH	2 414200	2493100			260	100	02						
28	CHICKAHOMINY PUMP STA	2 395300	2453700		30	262	12	03						97-B
29	CHICKAHOMINY OUTPOST	2 394500	2455000				10	02						97-B
30	CHICKAHOMINY OUTPOST	2 395600	2453400				2							97-B
31	CHICKAHOMINY DAM	2 394600	2453900	20		241								97-B
32	U S GOVERNMENT	2 394600	2454100	42		241	10	02						97-B
33	E P BINNS JR	2 412600	2411900	30		338	55	04						98-A
34	O C BRENNEMAN	2 408900	2423300	38	53	286	29	02						98-A
35	NEW KENT HIGH SCHOOL	2 433900	2440450	30	120	246	125							124-C
36	CARL LEE	2 391800	2458300			210	1	02						97-B
37	NELLY HOWE	2 400200	2468600				60							97-B
38	E T CHAPMAN	2 436600	2384700			375		04						125-C
39	J F WALLS	2 398800	2464200			215	30	02						97-B
40	PAUL RICHMOND	2 388400	2463100		9		10	02						97-B
41	PAUL RICHMOND	2 390100	2464700		4	109	5	02						97-B
42	PAUL RICHMOND	2 391500	2464600		9	110	5	02						97-B
43	PAUL RICHMOND	2 386900	2462200				3	02						97-B
45	WOODHAVEN WATER CO WOODHAVEN SHORES			1 72	119	400		06	9.35	012 D				
46	JERRY LEVINSON PROJEC			4 72	110	295		06	2.50					
47	ROCKAHOCK	2 391900	2457950					02						097-B
48	MR TRIPLETT	2 909000	2471750			225		04						097-A
49	MR TRIPLETT	2 408850	2473350			230		04						097-A
50	A L BURRAGE	2 412050	2475420					04						097-A
51	C C DAVIS	2 413950	2491300			200		04						097-A
52	YMCA CAMP	2 430000	2460000					04						129-C
53	GEORGE LANGE	2 442880	2452000			400		04						129-C
54	KOA KAMPGROUND	2 456350	2404200	64		485		04						125-D
55	DEPT OF NAVAL RESEARC	2 453150	2426300			156		04						
199	YORK													
1	CAMP PERRY	2 371100	2534100											
2	CAMP PERRY	2 375400	2533000											
3	OBSERVATION WELL CAMP PERRY	2 362900	2540300			387	20	10 08						
4	NAVAL WEAPONS STATION	2 334900	2554900	3 56	46	538	40	08	12.16	024 DE	0436 0447 0456 0477 0499 0509 0518 0529			66-A
5	NAVAL WEAPONS STATION	2 345600	2559700	18		445	20	10						96-D
						500	60							96-C
6	USMC CHEATHAM ANNEX	2 348300	2541500	43										
7	USMC CHEATHAM ANNEX	2 340700	2549800			400								96-C
8		2 344600	2536700				80							96-C
9	COLONIAL NAT PARK			5 58		346		04		D				

TABLE 1-C

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP CONDUCT	[illegible]	PH	[illegible]
CHARLES CITY COUNTY 118																					
1	CAMP WEYANOKE	6-10-71	32	0.00		6.4	3.0	170	12	408	12	53	1.5	0.3	496	28	0	800	22	7.8	0
2	NAT FISH HATCHERY	08-21-68										34						725			
3	KIMAGES WHARF	12-06-72	37	0.14		5.6	2.4	170	10	383	16	56	1.6	0.9	488	24	0	790		8.1	10
3	KIMAGES WHARF	8-15-69	29.0			7.6	1.7	164.0	12.0	376	16.0	53.0	1.7	0.6	471	26	0	800		7.8	
4	UPPER SHIRLEY	8-15-69	24.0			2.6	1.3	138.0	5.5	207	21.0	85.0	1.7	0.2	384	12	0	680		8.5	
5	WESTOVER PLANTATION	6-10-71	32	0.00		10	2.8	150	8.8	366	17	52	0.9	0.3	472	36	0	770	19	7.9	5
5	WESTOVER PLANTATION	8-20-69	27			12	1.1	158	9.0	370	18	56	1.8	0.4	474	34	0	810		7.9	
6	HARRISONS LANDING	12-06-72	36	0.42		8.9	2.5	140	10	336	15	38	1.3	0.4	426	32	0	670		8.2	7
6	HARRISONS LANDING	8-15-69	29.0			11.0	1.7	125.0	10.0	331	14.0	36.0	1.5	0.1	401	34	0	670		7.9	
7	BERKELY	8-15-69	31.0			2.6	0.7	116.0	8.6	283	18.0	25.0	0.6	0.1	346	10	0	565		7.8	
9	PROVIDENCE FORGE	12-06-72	35	0.05		4.6	1.2	73	9.5	214	11	2.0	1.2	0.3	238	16	0	358		8.0	7
9	PROVIDENCE FORGE	6- 9-71	32	0.00		4.9	1.3	72	7.5	214	8.6	0.3	1.4	0.0	232	18	0	350	23	7.9	5
9	PROVIDENCE FORGE	8-20-69	27			6.2	0.8	79	7.8	211	12	2.7	1.5	0.3	237	19	0	368		8.0	
10	CHARLES CITY	6-10-71	25	0.22		2.1	0.7	94	6.5	251	8.0	8.6	1.5	0.2	282	8	0	430	20	8.1	5
10	CHARLES CITY	8-25-69	29			3.2	0.5	101	10	250	9.4	11	1.6	0.2	289	10	0	431		8.0	
11	CHARLES CITY	6-10-71	32	0.32		1.0	0.4	84	4.3	199	9.8	17	1.3	0.0	264	4	0	400	21	8.0	5
11	CHARLES CITY	8-20-69	28			1.2	0.5	86	3.9	195	13	20	1.5	0.3	257	5	0	400		8.0	
12	DARGAM FARM	8-18-69	28.0			1.2	0.1	86.0	3.9	196	12.0	19.0	1.2	0.3	253	4	0	400		8.0	

APPENDIX C

Ground-Water Chemical Quality Data

The following table contains chemical quality data on ground water in the York-James Peninsula. Well numbers on this table can be cross-referenced to Appendix B to determine the location and construction of the wells from which quality samples were taken. The data listed in Appendix C include:

- Bureau of Water Control Management Well Number (DWR No.)
- Owner and/or location of the well
- The date the water sample was taken
- The following chemical constituents in milligrams per liter (mg/l):
  - Silica (SIO2)
  - Iron (Fe)
  - Manganese (Mn)
  - Sodium (Na)
  - Potassium (K)
  - Bicarbonate (HCO3)
  - Sulfate (SO4)
  - Chloride (CL)
  - Fluoride (F)
  - Nitrate (NO3)
  - Total Dissolved Solids (SOLIDS)
  - Carbonate Hardness (Ca, Mg)
  - Non-Carbonate Hardness (NON CARB)
- Specific Conductivity in Micromhos per Centimeter (SP COND)
- Temperature in Degrees Celcius (T)
- pH of the Water
- Color of the Water

The data in Appendix C is a composite listing of water samples taken by the Bureau of Water Control Management, by other governmental agencies and by various industries.

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
CHARLES CITY COUNTY 118																					
24	ROXBURY	6- 9-71	28	0.00		2.4	0.9	75	8.7	216	11	0.8	0.8	0.0	238	10	0	365	18	8.2	5
25	CHARLES CITY	6- 9-71	29.0	0.00		3.5	1.0	120.0	8.4	301	9.0	13.0	1.8	0.0	334	12	0	525	21	8.3	5
26	TETTINGTON	6- 8-71	33.0	0.04		0.4	0.2	84.0	3.1	228	6.6	2.7	0.4	0.0	250	2	0	372	24	8.1	5
27	CHARLES CITY	6- 8-71	33.0	0.06		0.9	0.4	93.0	3.0	240	11.0	7.7	0.4	0.1	270	4	0	420	24	8.1	5
28	PROVIDENCE FORGE	6- 9-71	25.0	0.11		40.0	3.8	4.7	2.0	152	5.0	1.6	0.2	0.1	161	110	0	250	19	7.8	5
29	HOLDCROFT	6-10-71	29	.09		13	2.9	50	8.3	184	5.0	4.0	0.5	0.2	199	44	0	300	16	7.8	5
29	HOLDCROFT	10-28-43		.55						194	6	4	.6	0.0		52					
31	CHARLES CITY	6- 9-71	3.5	0.12		0.6	0.2	87.0	3.3	229	7.2	2.2	0.8	0.0	252	2	0	380	21	8.1	5
32	HOLDCOFT	6-10-71	3.4	0.00		3.4	1.9	14.0	1.2	9	0.4	29.0	0.1	0.0	70	16	9	130	22	5.9	5
36	ROXBURY	6-11-71	18	0.18		11.0	4.3	49.0	12.0	193	1.8	1.6	0.5	0.0	204	45	0	340	20	7.7	5
37	ROXBURY FISHERY	6-11-71	31.0	0.00		2.2	0.7	94.0	8.1	256	9.0	1.4	1.2	0.0	272	8	0	420	16	8.2	0
46	WEST ELEM SCHOOL	12-06-72	38	0.02		0.4	0.2	82	6.5	207	10	3.6	1.5	0.2	238	2	0	360		8.1	15
47	MALVERN HILL	12-06-72	29	0.03		18	6.8	28	21	179	8.7	3.2	0.3	1.2	190	73	0	315		8.0	15

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
CHARLES CITY COUNTY 118																					
13	CHARLES CITY	8-19-69	30.0			3.2	0.7	175.0	10.0	388	15.0	52.0	2.0	0.2	492	11	0	769		8.0	
14	BUCKLERS POINT	12-06-72	38	0.36		1.6	0.6	140	7.6	319	12	23	2.0	0.2	372	6	0	580		8.3	15
14	BUCKLERS POINT	8-19-69	28.0			3.2	1.0	147.0	10.0	395	3.2	25.0	2.0	0.2	398	12	0	720		7.6	
15	BUCKLERS POINT	12-06-72	34	0.44		3.2	1.0	110	8.4	268	9.1	16	1.5	0.3	316	12	0	485		8.3	20
15	BUCKLERS POINT	1- -70	27.0	0.19		3.8	0.7	118.0	11.0	286	11.0	18.0	1.5	0.0	313	12	0	540		8.2	
16	EAST ELEM SCHOOL	12-07-72	30	0.06		5.0	0.8	84	7.1	236	8.7	3.1	1.6	0.2	250	16	0	390		8.0	10
16	EAST ELEM SCHOOL	6- 8-71	31	0.04		24	2.0	62	6.5	240	7.0	8.4	1.1	0.1	268	67	0	400	22	7.8	5
16	EAST ELEM SCHOOL	8-25-69	25			31	5.0	57	10	233	6.8	10	0.8	0.1	253	98	0	397		7.9	
17	CHARLES CITY	6-10-71	32	0.04		7.8	2.9	290	12	413	27	210	1.6	0.1	795	32	0	1340	18	7.9	5
17	CHARLES CITY	8-19-69	28			10	1.9	280	14	404	30	201	1.7	0.3	777	34	0	1318		7.9	
18	CHARLES CITY	12-07-72	25	0.07		5.2	1.7	140	12	282	22	54	1.5	0.3	400	20	0	640		7.6	5
19	CHARLES CITY	12-07-72	36	0.59		1.9	0.8	83	4.9	217	6.8	3.8	0.2	0.2	244	8	0	360		8.2	25
19	CHARLES CITY	6- 8-71	34	0.08		1.8	0.7	81	4.6	228	6.0	2.7	0.3	0.0	244	8	0	375	20	8.0	5
19	CHARLES CITY	8-19-69	25			2.8	0.6	83	6.6	228	1.8	5.2	0.3	0.4	250	10	0	364		8.1	
20	CHARLES CITY	6- 8-71	33	0.08		1.9	0.5	84	3.6	234	5.2	3.2	0.3	0.0	246	6	0	385	19	8.1	5
20	CHARLES CITY	8-19-69	24			2.4	1.1	90	5.0	229	7.0	5.0	0.3	0.2	253	10	0	369		8.1	
21	CHARLES CITY	6- 8-71	33	0.04		1.9	0.5	84	3.6	231	6.4	3.5	0.3	0.0	250	6	0	380	24	8.1	5
21	CHARLES CITY	8-19-69	21			2.4	1.2	90	4.7	228	7.0	5.4	0.3	0.3	256	11	0	365		8.1	
21	CHARLES CITY	10-10-43								232	13	7	.3	0.0		12					
22	PROVIDENCE FORGE	6- 9-71	31.0	0.02		1.6	0.5	76.0	5.0	214	8.2	1.2	1.2	0.2	242	6	0	365	20	7.9	5
23	CHARLES CITY	6- 9-71	34.0	0.06		0.6	0.2	84.0	3.5	229	7.4	0.3	0.5	0.0	252	2	0	380	19	8.1	5

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
HANOVER COUNTY 142																					
67	HOLLY RIDGE SUB #2	2-13-67	19.0	0.15	0.00	46.5	2.6	37.9		229	8.2	9.0	0.0	0.2	281	127	0			7.6	
72	WATT HOUSE	12-01-72	14	0.04		18	4.9	25	13	138	15	1.9	0.4	0.5	154	65	0	275		7.9	15
72	WATT HOUSE	02-05-68	14.8	0.08	0.03	18.4	4.2	18.8	1.5	63	11.5	2.0	0.2	0.3	151	63	0			8.1	
74	JANIE PORTER SCHOOL	12-05-72	41	0.04		36	6.6	19	11	160	16	14	0.2	0.0	218	120	0	325		8.2	10
74	JANIE PORTER SCHOOL	6-16-70	32	0.31		42	4.4	16	10	162	18	14	0.2	0.2	216	122	0	315		7.2	5
74	JANIE PORTER SCHOOL	03-16-48		0.20	0.00	35.7	5.0			181	30.4	12.3	0.2		207	110	0			7.5	
90	HANOVER C.H.	6- -70	39.0	0 0		27.0	11.0	10.0	5.2	145	17.0	2.0	0.2	0.2	190	112	0	258		7.[illegible]	0
92	HANOVER WAYSIDE PARK	12-05-72	48	0.02		41	7.6	14	9.5	186	16	3.3	0.2	0.1	232	130	0	330		7.8	12
92	HANOVER WAYSIDE PARK	6- -70	37.0	0.00		43.0	8.5	11.0	8.4	186	16.0	5.7	0.2	0.2	224	143	0	315		7.9	0
123	MECHANICSVILLE #1	08-04-61		0.09	0.00					143		1.6	1.0	0.7						7.8	
124	MECHANICSVILLE #2	08-04-61		0.18	0.00					183		2.0	1.0	1.0						7.6	
125	MECHANICSVILLE #3	08-04-61		0.20	0.00					269		205.3	2.6	0.8						8.1	
151	SPRING MEADOWS SUB	7-09-70	20.0	0.01		23.0	8.9	26.0	20.0	172	26.0	6.2	0.2	0.6	206	94	0	343		7.7	0
151	SPRING MEADOWS SUB	03-12-59		0.28	0.00					135		2.5	0.0	0.2						7.9	
152	SPRING MEADOWS SUB	7-09-70	20.0	0.01		22.0	9.2	25.0	20.0	168	25.0	5.1	0.2	0.3	206	93	0	341		7.7	0
157	OLD CHURCH	12-01-72	22	0.03		5.9	2.2	48	19	160	10	1.9	0.3	1.2	183	24	0	310		7.8	10
160	COLONIAL FOREST	11-28-72	33	0.26		36	7.6	12	9.0	172	11	5.9	0.3	0.1	191	120	0	330		7.7	20
165	RAINIER ESTATES	11-28-72	33	0.44		1.2	.6	45	26	126	21	2.0	0.4	0.1	180	6	0	283		7.6	20

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
HANOVER COUNTY 142																					
1	MECHANICSVILLE	4-17-70	14.0	0.05		22.0	6.0	21.0	18.0	154	12.0	4.0	0.4	0.0	170	80	0	258		7.6	3
3	MAYFIELD FARMS	11-28-72	34	0.10		30	11	36	18	220	38	6.0	0.4	1.1	266	120	0	440		7.4	10
3	MAYFIELD FARMS	4-17-70	24.0	0.01		43.0	7.0	42.0	16.0	232	35.0	8.6	0.5	1.4	294	136	0	425		7.3	4
4	MAYFIELD FARMS	07-25-58		0.51		39.5	13.3	59.7		249	52.6	3.6	0.5	1.9	350	153	0			8.1	
5	RICH NAT BFLD,HDQTS	02-05-68	8.4	1.5	0.09	18.4	2.6	4.4	0.9	18	27.5	19.5	0.8	2.8	111	57	42			7.1	
6	MEADOW GATE SUB	7-05-67	4.0	1.40	0.10	20.0	5.6	23.8		142	4.1	5.0	1.1	0.4	211	73	0			7.0	
7	AVONDALE SUBDIVISION	11-28-72	42	0.38		37	10	22	12	202	15	6.6	0.4	0.5	196	130	0	390		7.5	15
7	AVONDALE SUBDIVISION	12-17-66	3.0	0.40	0.00	38.0	5.2	31.6		198	5.3	10.0	0.1	0.2	235	116	0			8.3	
8	RICHMOND FOODS #1	01-30-67	3.0	0.15	0.00	29.0	5.6	36.3		198	1.2	8.0	0.8	0.2	247	95	0			7.6	
11	MECHANICSVILLE	06- -70	9.0	0.01		16.0	3.4	10	7.2	88	13.0	1.4	0.2	0.1	111	53	0	179		7.6	5
14	OLD CHURCH	12-01-72	25	0.05		2.4	.9	65	9.9	172	13	1.8	0.5	0.3	238	10	0	330		8.1	10
14	OLD CHURCH	12-01-65		1.20												17				8.1	
15	CHERRYDALE SUB	11-28-72	20	0.28		16	6.8	16	19	132	16	1.5	0.4	0.2	156	68	0	270		7.7	20
19	SIGNAL HILL MEM GARD	12-05-72	32	0.13		30	6.6	12	9.6	152	9.8	3.9	0.1	0.1	181	100	0	270		7.7	12
19	SIGNAL HILL MEM GARD	6- -70	7.0	0.00		19.0	1.0	2.1	1.7	56	6.2	5.2	0.0	1.6	75	50	4	114		7.0	0
37	WALNUT GROVE ESTATES	11-28-72	17	0.23		32	5.4	24	23	124	19	3.5	0.4	0.2	167	52	0	300		7.7	20
38	HIGH POINT FARMS	11-28-72	22	0.12		14	4.7	15	25	134	15	2.2	0.2	0.0	146	54	0	250		7.7	10

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
HENRICO COUNTY 143																					
9	VARINA HIGH SCHOOL	8-20-69	22			43	4.2	17	6.2	190	8.2	5.0	0.1	0.3	189	124	0	321		8.0	
10	COMMONWEALTH SA & GR	08-20-69	26.0			12.0	2.1	56.0	13.0	177	13.0	9.0	0.2	0.6	213	39	0	345		7.8	
11	VARINA ELEM SCHOOL	11-27-72	45	0.00		3.1	1.2	13	3.4	36	6.8	4.6	0.4	0.0	96	12	0	104		6.7	10
11	VARINA ELEM SCHOOL	08-20-69	21.0			3.8	0.6	16.0	2.7	44	6.6	5.2	0.3	0.1	73	12	0	91		6.7	
12	RICH NAT BFLD,SUP RES	02-05-68	42.0	0.18		12.8	0.1	25.2	1.3	112	10.5	3.5	0.1	0.2	167	32	0			8.2	
13	BRADLEY ACRES #1	12-04-67	5.5	0.08	0.00	2.0	0.2	63.9		142	8.2	13.0	0.1	0.5	201	6	0			8.3	
14	HECHLER VILLAGE	08-20-69	14.0			16.0	3.4	50.0	11.0	187	10.0	5.2	0.2	0.1	199	54	0	336		8.0	
14	HECHLER VILLAGE	09-26-58		0.05	0.00					220		5.4	0.7	0.3						7.9	
15	YORK MANOR	8-20-69	33			23	3.4	33	6.6	168	7.6	3.5	0.1	0.9	183	72	0	290		7.8	
15	YORK MANOR	5- 1-64		0.06		6.8	1.4	48.2		161	3.5	2.5	0.3	0.0	204	22				8.2	
16	HECHLER VILLAGE	08-20-69	25.0			21.0	1.7	37.0	8.6	172	8.8	3.2	0.2	0.3	177	60	0	300		7.8	
16	HECHLER VILLAGE	02-17-59		0.18	0.00	15.2	4.9	47.7		181	4.4	4.0	0.1	0.1	200	58	0			8.0	
16	HECHLER VILLAGE	11-26-58		0.96	0.09					166		6.7	0.1	0.1						8.6	
17	LEWIS GARDENS #3	06-06-51		1.20	0.35	22.9	2.7			103	2.7	11.5			186	68	0			7.1	
18	LEWIS GARDENS #2	06-06-51		3.60	0.35	21.3	2.6			93	1.8	9.7			155	64	0			7.1	
19	HIGHLAND SPRINGS	8-20-69	31			26	2.9	30	8.6	176	6.6	3.3	0.1	0.1	185	77	0	298		7.6	
19	HIGHLAND SPRINGS	5-26-61		0.12	0.00	29	7.4	21		172	2.0	3.5			160	103					
22	EASTOVER GARDENS	08-20-69	19.0			10.0	2.3	61.0	12	185	17.0	6.8	0.2	0.3	219	36	0	352		7.8	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
HANOVER COUNTY 142																					
170	OLD COLD HARBOR CEM.	8-18-71	13.0	0.09		15.0	5.4	17.0	21.0	134	10.0	2.0	0.2	1.1	152	60	0	245	20	7.7	3
176	BATTLEFIELD PARK SCH	8-22-71	14	0.07		19	5.6	18	25	149	11	2.2	0.1	0.8	169	70	0	260	20	7.7	3
182	HANOVER IND SCHOOL	03-10-52		0.20	0.06	37.6	10.0			182	7.2	15.8	0.2	0.3	203	135	0			7.9	
197	ROBIN RIDGE SUB	11-28-72	46	0.00		42	11	19	8.8	228	6.2	5.2	0.3	0.2	238	150	0	415		7.5	10
199	VDH,OLD CHURCH	8-17-71	24	0.11		37	11	10	24	212	9.2	2.8	0.3	0.1	220	140	0	350	20	7.7	5
200	BATTLEFIELD FARMS	02-25-59		0.52	0.05					164		2.0	0.3	0.1	169					7.8	
204	PEARSON ELEM SCHOOL	12-05-72	56	0.02		35	9.0	16	7.3	182	12	4.4	0.2	0.2	218	120	0	315		7.7	12
208	GARTWRIGHT HOUSE	02-05-68	3.2	0.02		20.8	0.2	1.4		20	0.1	26.5	0.1	4.4	93	53	36			7.1	
HENRICO COUNTY 143																					
4	VARINA HIGH SCHOOL	12-01-72	0.7	0.23		82	12	400	4.7	54	140	2200	0.9	0.0	4270	250	210	7400		8.3	20
1	INSULROCK CO	8- -69	12			19	2.7	14	2.7	36	32	20	0.8	2.7	124	60	30	220		6.6	
2	HECHLER VILLAGE	8-20-69	14			15	4.0	55	14	198	8.2	6.8	0.3	0.6	208	54	0	350		7.8	
2	HECHLER VILLAGE	5- 4-66	3.0	0.02	0.00	21.0	6.9	47.9		207	2.9	6.0	0.1	0.2	210	81				8.2	
5	G STONEMAN,OSBORNE PK	08-20-69	26.0			9.8	2.8	56.0	8.6	171	12	8.2	0.3	0.5	190	36	0	322		7.8	
6	GLENWOOD GOLF COURSE	8-14-69	15			26	5.3	21	14	158	11	2.2	0.2	0.1	178	86	0	288		6.8	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
HENRICO COUNTY 143																					
111	LEWIS GARDENS #1	02-23-50		2.00	0.30	22.3	1.9			76	4.4	10.3	0.5	0.3	169	63	1			6.8	
115	CIVIL DEF,DABBS HOUSE	09-14-67	39.2	0.08	0.04	28.9	.2			179	5.4	38.0	0.1	0.1	199	102	0			7.7	
115	CIVIL DEF,DABBS HOUSE	10-29-69		0.87	0.03	25.6	9.6	20.2		167	3.5	2.3	0.2	0.4	[illegible]	87	0			6.4	
115	CIVIL DEF,DABBS HOUSE	04-01-65		1.84	0.03	25.4	8.7	10.9		136	9.7	1.8	0.1	0.4		99	0			8.3	
115	CIVIL DEF,DABBS HOUSE	07-28-64	5.5	0.10		24.0	9.2	20.6		140	4.1	4.0	0.4		187	98	3			8.2	
124	GLENDALE NAT CEMETRY	11-27-72	31	0.08		28	10	24	24	219	6.9	3.0	0.3	0.1	222	110	0	390		7.7	15
127	CREIGHTON ROAD	12-01-72	18	0.05		5.8	2.0	60	16	177	14	3.0	0.3	0.5	201	22	0	330		7.7	15
128	UNION GROVE CHAPEL	11-27-72	35	0.22		.2	.1	64	.4	135	11	7.8	0.2	2.1	185	1	0	275		6.9	30
129	CURLES NECK	11-27-72	39	0.06		.4	.4	78	8.1	141	11	34	0.2	0.0	234	2	0	370		7.2	15
JAMES CITY COUNTY 147																					
1	OBS WELL #1,E ST HOSP	03-29-72	1.0	0.04		18	1.3	10	1.5	76	0.6	10	0.1	0.0	89	50	0			8.1	
1	OBS WELL #1,E ST HOSP	03-20-67	32.8	00.18		9.6	1.2	390.0	8.0	353	38.0	452.5	1.2		1067	29	0	155	15	7.9	5
2	LIGHTFOOT	7-12-71	48	0.01		20	4.7	30	7.7	158	8.0	4.8	0.5	0.0	196	70	0	285	21	7.6	0
2	LIGHTFOOT	9- -68										3.7						295			
3	TOANO	7-15-71	56	0.03		46	2.8	12	4.9	162	14	5.3	0.2	0.4	216	130	0	300	26	7.5	2
3	TOANO	9- -68										2.4						320			
4	HOLIDAY INN CAMP GR	7-14-71	38	0.06		0.8	0.3	100	4.8	241	6.2	11	5.5	0.0	280	4	0	460	21	8.0	5
4	HOLIDAY INN CAMP GR	9- -68										21						440			
5	JAMESTOWN PARK	7- -71	25	0.13		0.7	0.3	150	7.3	335	9.0	34	3.5	0.0	402	3	0	650	22	7.9	0
5	JAMESTOWN PARK	9- -68										19						640			

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
HENRICO COUNTY 143																					
25	HIGHLAND SPRINGS #1	11-05-36		0.40		14.1	1.8			219	9.9	1.0	0.0		186	43	0				
27	HIGHLAND SPRINGS	05-13-54		0.26	0.00	28.9	5.3			157	5.1	10.3	0.1	0.1	189	94	0			7.5	
28	HIGHLAND SPRINGS #4	08-04-58		0.12	0.00	32.2	5.6	25.7		192	2.7	2.1	0.1	0.5	226	103	0			8.0	
33	SANDSTON #1	12-10-68	2.0	0.18	0.00	26.0	7.6	25.8		173	3.3	5.0	0.0	0.2	199	96	0			7.8	
34	SANDSTON #2	01-20-69	5.5	0.70		27.0	7.6	27.3		183	3.3	4.0	0.0	0.3	208	99	0			7.8	
34	SANDSTON #2	12-10-68	6.0	5.10	0.00	27.0	7.9	22.1		178	3.7	5.0	0.2	0.3	213	100	0			7.7	
34	SANDSTON #2	12-30-43	44	.03		29	10	22		183	7.9	2.4	0.0	0 .1	200	114			17		
35	SANDSTON #3	12-10-68	4.0	0.14	0.00	26.5	7.8	22.4		166	3.9	5.0	0.0	0.2	192	98				7.5	
36	SANDSTON #4	12-10-68	3.5	0.05	0.00	29.0	8.2	25.3		178	3.7	5.0	0.0	0.2	194	106				7.6	
37	SANDSTON #5	12-10-68	4.5	0.13	0.00	27.0	7.4	28.9		183	3.5	5.0	0.0	0.2	204	98				7.8	
63	KELLY'S RESTAURANT	06- -70	15.0	0.04		13.0	2.3	61.0	15.0	207	7.4	7.8	0.2	0.1	226	42	0	348		8.0	0
83	PINE HEIGHTS	11-28-72	20	0.00		34	14	2.6	18	209	3.9	1.9	0.2	0.4	204	140	0	350		7.7	20
102	BYRD AIRPORT	07-25-40		1.40						195		7.0								7.4	
103	CANTERBURY SUB #3	01-27-61		0.38	0.25	33.6	5.6	37.5		148	5.6	2.9	1.9	0.0	180	107	0			8.0	
107	HIGHLAND SPRINGS #5	04-10-61		0.39	0.00	13.5	3.8	61.2		200	1.6	1.7	0.5	0.7	205	49	0			8.3	
111	LEWIS GARDENS #1	06-06-51		2.50	0.35	18.1	4.0			97	2.7	10.3			169	62	0			7.1	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
JAMES CITY COUNTY 147																					
15	CARTER GROVE	11- -68										284						1610			
16	GROVE	- -68										362.0						2100			
17	JAMES TERRACE	- -68										218.0						1550			
18	EDGE MARSH PT	04-27-72	6.8	0.02		22	10	180	13	258	2.0	200	1.8	4.9	572	96	0	1000	13	7.4	3
19	FIRST COLONY SUB	11-29-72	37	0.03		0.3	0.2	120	4.1	267	8.1	19	3.8	0.0	330	2	0	540		8.1	10
19	FIRST COLONY SUB	07-12-71	32.0	0.08		7.9	3.9	140	13.0	264	8.0	83.0	1.0	0.7	412	36	0	700	19	8.0	5
19	FIRST COLONY SUB	05-23-69										20						530			
19	FIRST COLONY SUB	10-04-64		0.02	0.00	3.0	0.1	99.4		231	4.6	16.3	3.4	0.4	349	8	0			8.2	
19	FIRST COLONY SUB	09-27-63	12.4	0.10		1.8	0.9	117.5		256	4.3	26.0			353	8	0			8.3	
21	HUMBLE OIL CO,TOANO	09- -68										4.1						275			
23	OLD STAGE MANOR SUB	04-19-66	23.2	0.73		36.5	0.4				4.9	3.0	0.4	0.0	235	93	0			7.9	
23	OLD STAGE MANOR	11-29-72	40	0.10		13	1.7	61	7.2	194	7.3	3.2	0.8	0.0	224	40	0	340		8.1	5
23	OLD STAGE MANOR	07-22-65	44.0	0.20		9.5	2.6	65.7		183	7.8	6.0	0.7	0.4	253	34	0			8.3	
24	YORKSHIRE PLANTATION	12-07-72	38	0.00		4.4	0.9	93	7.0	236	11	7.9	0.9	0.2	268	14	0	415		8.6	15
24	YORKSHIRE PLANTATION	12- -67	26.5	0.10						235		18.2		1.0	274	9				7.8	
24	YORKSHIRE PLANTATION	08-11-69	27.0			7.2	1.0	97	7.8	231	11.0	9.9	0.9	0.8	277	22	0	445		8.7	
25	EWELL	05-08-42		2.50						235	8.0	4				42				7.8	
26	WHITE OAK SUBDIVISION	11-29-72	35	0.04		8.9	4.2	160	17	272	16	120	1.1	1.5	476	40	0	880		7.9	10
28	MARL HILLS SUB	03-24-59		0.15	0.00	14.5	3.8	120.1		268	3.0	60.2	0.8	0.9	390	52	0			8.2	
28	MARL HILLS SUB	04-29-58		0.10						268		78.0	1.3							8.2	
30	RALEIGH SQUARE	01-22-64		0.10	0.00	8.2	2.0	118.4		277	0.9	30.6	1.4	0.3	328	29	0			8.5	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
JAMES CITY COUNTY 147																					
5	JAMESTOWN PARK	04-12-62				3.5	0.4			336		17.5	3.4	0.4	357	10	0			8.5	
5	JAMESTOWN PARK	05-14-58		0.00	0.00	6.9	0.8	132.1		342	7.6	4.3	3.3		392	20	0			8.4	
5	JAMESTOWN PARK	4-10-56	2.4	0.10		0.6	1.0	143.3		315	7.4	24			202					8.1	
5	JAMESTOWN PARK	03-30-56		0.00						420		23.0								7.5	
6	JAMES CITY PARK	08-29-68								56		56.0						560			
7	NORGE ELEM SCHOOL	06-29-71	40	0.02		28	3.4	19	5.7	144	6.0	1.2	0.3	0.0	178	84		250	20	7.4	5
8	WILLIAMSBURG	08-30-68										36						1750			
9	DOW BADISCHE CO	7-14-71	23	0.01		2.0	1.2	300	9.1	407	30	250	3.6	0.0	820	10	0	1460	24	7.8	0
9	DOW BADISCHE CO	10-27-69	20			2.5	0.8	314	13	398	26	250	3.0	0.1	834	10	0	1465		8.5	
9	DOW BADISCHE CO	11- -68										264						1480			
10	DOW BADISCHE CO	7-14-71	26	0.00		2.8	1.1	320	9.4	413	27	240	3.2	0.1	834	12	0	1460	21	7.9	5
10	DOW BADISCHE CO	10-27-69	21			2.1	0.7	314	13	400	25	235	3.1	0.1	808	8	0	1410		8.5	
10	DOW BADISCHE CO	11- -68										236						1430			
11	DOW BADISCHE CO	7-14-71	24	0.05		3.6	1.9	400	12	417	41	370	2.6	0.1	1090	17	0	1950	22	7.8	2
11	DOW BADISCHE CO	10-27-69	21			3.3	1.2	402	17	412	34	367	2.6	0.0	1092	13	0	1850		8.1	
11	DOW BADISCHE CO	11- -68										375						1950			
12	DOW BADISCHE CO	7-14-71	25	0.00		2.8	1.1	320	9.7	415	29	250	3.2	0.2	860	12	0	1500	22	7.8	5
12	DOW BADISCHE CO	10-27-69	20			2.7	0.9	314	13	410	28	252	2.9	0.1	862	10	0	1490		8.0	
12	DOW BADISCHE CO	11- -68										253						1490			
13	DOW BADISCHE CO	7-14-71	24	0.02		3.8	1.3	400	10	415	38	370	2.9	0.3	1060	15	0	1870	22	7.9	0
13	DOW BADISCHE CO	10-27-69	21			3.0	1.1	402	16	416	35	360	2.7	1.2	1030	12	0	1860		8.1	
13	DOW BADISCHE CO	11- -68										366						1950			
14	CHISMAN CONCRETE CO	10- -68										434						2170			
15	CARTER GROVE	6-29-71	19	0.24		3.0	1.1	350	13	426	36	290	3.0	0.2	940	12	0	1680	24	7.8	10

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
JAMES CITY COUNTY 147																					
55	FIRST COLONY SUB	07-12-71	35.0	0.05		0.8	0.5	120	4.3	273	12.0	19.0	3.8	0.0	342	4	0	525	21	8.0	5
56	EWELL	07-27-71	36.0	0.02		4.8	2.1	72	8.0	208	11.0	4.7	1.0	0.0	241	20	0	360	19	8.2	5
62	WILLIAMSBURG TOUR CT	02-08-52		0.10						268		11					0	1300	20	8.0	5
64	VDH,CROAKER	12-07-72	60	0.31		25	3.5	24	8.9	152	7.1	2.4	0.4	0.7	205	77	0	260		8.1	20
66	JAMES TERRACE #1	11-29-72	19	0.08		3.7	1.5	400	12	427	37	320	2.5	0.2	1020	15	0	1900		8.0	5
66	JAMES TERRACE #1	11-21-58		0.00	0.00	5.9	1.9	370.8		440	27.5	297.0	2.0	1.1	795	23	0			8.3	
67	JAMES TERRACE #2	11-29-72	18	0.03		4.2	1.6	400	12	423	37	330	2.4	1.2	1020	17	0	1950		8.0	5
68	CANTERBERRY HILLS #1	01-08-60		0.01	0.05	46.5	0.8	4.1		143	1.7	4.4	0.0	0.6	155	119	2			7.2	
69	CANTERBERRY HILLS #2	01-08-60		0.13	0.08	17.7	4.8	148.2		268	10.5	104.6	0.8	1.6	479	64	0			8.2	
70	TOANO (PUB SUPPLY)	12-17-62		0.00	0.00	88.2	8.0	00.0		247	8.2	11.0	0.1	15.0	280	253	51			7.8	
71	INDIGO PARK	10-14-58		0.14	0.00	7.7	2.9	207.7		361	0.7	117.5	1.7	0.3	487	31	0			8.1	
72	POPLAR HILL PLANTAT	05-15-67	20.8	0.04		64.9	5.0	17.0	1.2	235	6.7	5.5	0.2		249	183	0			7.2	
73	POPLAR HILL PLANTAT	05-15-67	21.6	0.10		2.5	2.7	390.0	15.2	393	35.0	364.0	3.7		1092	17	0			8.3	
74	WILLIAM & MARY COLL	09-05-68										114						810			
74	WILLIAM & MARY COLL	04-12-43		1.00		27.0				421	205.0	12.5								8.4	
75	TOANO	12-01-72	66	0.06		37	2.6	20	6.3	168	8.3	4.0	0.2	0.4	226	100	0	288		8.0	10

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
JAMES CITY COUNTY 147																					
31	GROVE	07-14-71	21.0	0.02		30.0	2.2	270.0	8.7	373	27.0	240.0	2.0	0.4	795	84	0	1400	17	7.7	5
33	JAMESTOWN PARK	07-01-71	23.0	0.03		1.1	0.4	120.0	7.1	313	5.6	3.5	3.0	0.0	322	4	0	500	22	8.0	0
34	BERKELEY JR HIGH SCH	07-08-71	29.0	0.20		8.5	4.1	160.0	15.0	306	15.0	94.0	1.1	0.6	480	38	0	820	22	7.9	10
37	TOANO	11-29-72	53	0.03		37	2.7	14	5.9	148	9.8	3.0	0.2	0.4	195	100	0	285		7.4	5
37	TOANO	11-29-72	53	0.03		37	2.7	14	5.9	148	9.8	3.0	0.2	0.4	195	100	0	550	24	8.0	3
38	WILLIAMSBURG	07-08-71	31	0.04		8.5	4.2	150	14	270	14	100	1.1	0.6	464	38	0	800	22	7.9	0
39	NORGE COURT	04-01-59		0.05	0.00	41.3	3.7	8.6		159	4.5	2.6	0.2	0.2	197	118	0			7.9	
40	WINDY HILL TRAILER CT	07-14-71	22.0	0.02		4.8	1.4	4.1	12.0	428	40.0	380.0	2.9	0.5	1100	18	0	2000	24	7.8	5
41	WINDY HILL TRAILER CT	07- -71	21.0	0.01		4.2	1.4	400.0	11.0	431	39.0	370	2.9	0.7	1090	16	0	1950	20	7.8	0
49	WINDY HILL TRAILER CT	07-14-71	9.7	0.00		99.0	5.8	22.0	2.7	232	8.2	71	0.2	21.0	422	270	80	645	18	7.1	0
50	HOLIDAY INN TR PARK	07-14-71	38.0	0.04		0.8	0.5	100.0	4.6	237	8.0	12	5.5	0.0	284	4	0	458	27	7.9	5
51	HOLIDAY INN LODGE	07-14-71	31.0	0.00		5.6	1.7	84.0	9.4	216	9.0	23	1.1	0.3	260	21	0	440	19	8.0	5
52	HICKORY GROVE TR CT	07-15-71	20.0	0.09		3.8	1.6	380	13	444	38.0	330	3.2	0.0	1025	16	0	1840	22	7.7	5
53	HICKORY GROVE TR CT	07-15-71	19.0	0.04		3.8	1.8	380	12	431	41.0	350	3.0	0.5	1050	17	0	1900	24	7.9	5

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
JAMES CITY COUNTY 147																					
99	COL WMSBURG, LODGE G	09-06-68										198						1280			
100	COL WMSBURG, PALACE	12-19-72	18	0.03		4.4	1.6	350	14	419	37	280	2.0	1.4	930	18	0	1600		8.2	17
100	COL WMSBURG, PALACE	07-13-71	23	0.00		5.2	1.3	340	13	421	32	280	2.2	1.1	900	18	0	1580	16	7.8	0
100	COL WMSBURG, PALACE	09-06-68										300						1640			
101	COL WMSBURG, CASCADE	07-13-71	17	0.00		5.8	3.2	360	16	419	41	340	2.2	0.1	990	28	0	1800	19	7.8	2
101	COL WMSBURG, CASCADE	09-06-68										344						1740			
104	MT FOLLY PLANTATION	07- -71	24	0.20		3.5	0.9	90	8.8	248	4.8	2.3	0.3	0.2	256	12	0	400	20	8.2	5
105	CARTERS GROVE	07- -71	19	0.09		4.4	1.7	370	12	425	40	340	3.1	0.5	1015	18	0	1850	20	7.8	0
106	MCGRUDER HEIGHTS	07-07-71	19	0.00		18	2.0	300	12	391	29	240	2.0	0.2	810	53	0	1420	20	7.8	0
KING WILLIAM COUNTY 150																					
1	CHESAPEAKE CORP	6-20-68	17							600	33	204						1300		8.1	
1	CHESAPEAKE CORP	1-26-67	16							630	45	220			930					8.3	
1	CHESAPEAKE CORP	3- 8-66	18							631	49	200			930					8.3	
1	CHESAPEAKE CORP	5-11-65	13							704	40	180			930					8.3	
1	CHESAPEAKE CORP	1- 9-64	17							625	19	220			975					8.4	
1	CHESAPEAKE CORP	3-19-63	12							659	72	202								8.2	
1	CHESAPEAKE CORP	9-25-62	10							659	86	240								8.1	
2	CHESAPEAKE CORP	6-20-68	27							416	10	20			390					8.0	
2	CHESAPEAKE CORP	1-26-67	29							416	14	18			348					8.3	
2	CHESAPEAKE CORP	4- 8-66	29							403	10	17			405					8.3	
2	CHESAPEAKE CORP	5-11-65	17							416	9	20			425					8.3	
2	CHESAPEAKE CORP	5-25-64	25							422	12	12			365					8.1	
3	CHESAPEAKE CORP	6-20-68	37							452	10	39			436					8.0	
3	CHESAPEAKE CORP	1-26-67	36							457	17	37			430					8.1	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
JAMES CITY COUNTY 147																					
77	STUCKEYS,TOANO	11-29-72	52	0.06		30	3.3	19	8.0	156	6.6	2.4	0.3	0.6	198	88	0	295		7.7	15
78	CROAKER	12-07-72	61	0.02		7.8	2.4	53	19	178	9.1	3.2	0.7	0.4	238	30	0	310		8.3	20
79	CROAKER	12-07-72	66	0.02		11	3.2	45	13	162	8.9	4.0	0.6	0.4	236	40	0	285		7.9	12
80	WOODLAND FARMS #1	12-07-72	51	0.66		18	3.7	33	10	164	5.4	4.1	0.5	0.3	208	60	0	265		8.1	30
82	SYCAMORE LANDING	12-07-72	22	0.11		4.5	1.1	70	7.3	196	11	3.7	0.9	0.1	218	16	0	340		8.6	35
91	PENINSULA SCOUT RES	12-01-72	28	0.10		6.5	2.0	330	16	367	45	300	1.4	1.5	900	24	0	1570		8.1	20
92	HOLIDAY INN TRAVEL PK	12-01-72	44	0.08		0.8	0.2	100	5.4	237	8.3	9.2	4.8	0.0	292	3	0	440		8.4	15
93	COL WMSBURG,GOODWN BD	07-13-71	23	0.02		6.2	1.9	270	13	408	23	200	2.1	0.6	735	24	0	1300	20	8.0	0
93	COL WMSBURG,GOODWN BD	09-06-68										206						1290			
95	COL WMSBURG, CTRY CLB	09-06-68										281								8.0	
96	COL WMSBURG, CAPITOL	07- -71	16	0.11		4.6	1.7	340	14	428	37	280	2.0	0.4	925	18	0	1650	21	8.1	5
96	COL WMSBURG, CAPITOL	12-19-72	18	0.06		4.6	1.7	350	14	417	34	280	2.0	1.4	940	18	0	1600		8.2	17
96	COL WMSBURG, CAPITOL	09- -68										306						1650			
97	COL WMSBURG, MTR INN	09- -68										329						1700			
98	COL WMSBURG, LAUNDRY	12-19-72	18	0.02		4.2	1.5	360	14	427	37	300	2.2	1.2	964	16	0	1680		8.0	12
98	COL WMSBURG, LAUNDRY	07- -71	19	0.01		5.2	1.4	360	12	425	33	320	2.4	0.2	980	19	0	1800	20	8.0	5
98	COL WMSBURG, LAUNDRY	09-06-68										320						1700			
99	COL WMSBURG, LODGE G	07-13-71	18	0.05		3.8	1.2	280	11	422	24	190	2.6	0.6	730	14		1560			

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	TDS	MG CARB	PH
KING WILLIAM COUNTY 150																	
6	CHESAPEAKE CORP	4-17-56	32								2	24					8.1
6	CHESAPEAKE CORP	9- 2-54	28									26					8.1
6	CHESAPEAKE CORP	3-13-53	29									16					8.2
6	CHESAPEAKE CORP	3-15-51	34									24					8.2
6	CHESAPEAKE CORP	6- 6-50	33									26					8.2
6	CHESAPEAKE CORP	2-17-49	34									24					8.3
6	CHESAPEAKE CORP	1- 7-48	31									28					8.2
6	CHESAPEAKE CORP	2-26-47	34									26					8.3
6	CHESAPEAKE CORP	4-30-46	36									30					8.0
7	CHESAPEAKE CORP	6-20-68	30							361	7	16			330		8.1
7	CHESAPEAKE CORP	1-26-67	34							381	14	17			328		8.3
7	CHESAPEAKE CORP	3- 8-66	33							385	10	17			390		8.1
7	CHESAPEAKE CORP	7-15-65	29							376	8	14			375		8.2
7	CHESAPEAKE CORP	5-25-64	29							407	12	16			345		8.1
7	CHESAPEAKE CORP	3-19-63	26							400	15	20			365		8.3
7	CHESAPEAKE CORP	1-16-62	22							424	15	22			365		8.2
7	CHESAPEAKE CORP	6- 5-61	31							424	20	18			395		8.3
7	CHESAPEAKE CORP	4-28-60	28							415	13	12			365		8.2
7	CHESAPEAKE CORP	6-13-59	25							415	4	24			440		8.2
7	CHESAPEAKE CORP	4-17-56	31								1	16					8.1
7	CHESAPEAKE CORP	9- 2-54	29									22					8.1
7	CHESAPEAKE CORP	3-13-53	29									14					8.2
7	CHESAPEAKE CORP	3-15-51	33									20					8.2
7	CHESAPEAKE CORP	6- 6-50	34									22					8.2
7	CHESAPEAKE CORP	2-17-49	33									20					8.1
7	CHESAPEAKE CORP	1- 7-48	32									20					8.2
7	CHESAPEAKE CORP	2-26-47	33									20					8.3
7	CHESAPEAKE CORP	1-19-46	36									21					8.0
7	CHESAPEAKE CORP	3-15-45										35					
8	CHESAPEAKE CORP	6-20-68	29							383	9	17			364		8.1
8	CHESAPEAKE CORP	1-26-67	31							405	17	15			342		8.3
8	CHESAPEAKE CORP	3- 8-66	29							401	11	16			390		8.2
8	CHESAPEAKE CORP	5-11-65	18							411	10	16			362		8.2
8	CHESAPEAKE CORP	1- 9-64	32							395	15	18			390		8.5
8	CHESAPEAKE CORP	3-19-63	24							414	19	17			370		8.3
8	CHESAPEAKE CORP	1-16-62	20							436	17	20			380		8.2
8	CHESAPEAKE CORP	5-15-61								414	26	18			380		8.2
8	CHESAPEAKE CORP	4-28-60	32							423	12	12			415		8.1

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
KING WILLIAM COUNTY 150																					
3	CHESAPEAKE CORP	3- 8-66	37							457	11	36			458					8.1	
3	CHESAPEAKE CORP	5-11-65	29							463	16	33			480					8.1	
3	CHESAPEAKE CORP	1- 9-64	38							448	21	36			470					8.3	
3	CHESAPEAKE CORP	3-19-63	32							488	24	41			500					8.2	
3	CHESAPEAKE CORP	1-16-62	28							500	23	34			465					8.2	
3	CHESAPEAKE CORP	5-15-61	34							470	28	36			465					8.3	
3	CHESAPEAKE CORP	4-28-60	38							454	13	24			465					8.2	
3	CHESAPEAKE CORP	6-13-59	29							473	4	36			460					8.1	
3	CHESAPEAKE CORP	4-17-56	33								1	36								8.1	
3	CHESAPEAKE CORP	9- 2-54	31									42								8.1	
3	CHESAPEAKE CORP	3-13-53	33									21								8.1	
4	CHESAPEAKE CORP	6-20-68	31							452	10	39			436					8.0	
4	CHESAPEAKE CORP	1-26-67	36							457	17	37			430					8.1	
4	CHESAPEAKE CORP	3- 8-66	28							427	15	27			440					8.1	
4	CHESAPEAKE CORP	5-11-65	23							442	10	25			430					8.1	
4	CHESAPEAKE CORP	1- 9-64	30							422	19	26			420					8.4	
4	CHESAPEAKE CORP	3-19-63	26							456	24	25			465					8.2	
4	CHESAPEAKE CORP	1-16-62	22							463	21	30			450					8.2	
4	CHESAPEAKE CORP	5-15-61	30							431	24	26			465					8.2	
4	CHESAPEAKE CORP	4-28-60	33							447	13	18			450					8.1	
4	CHESAPEAKE CORP	6-13-59	43							439	4	26			500					8.2	
4	CHESAPEAKE CORP	4-17-56	33								2	44								8.3	
5	CHESAPEAKE CORP	6-20-68	26							416	10	20			390					8.1	
5	CHESAPEAKE CORP	1-26-67	29							430	14	17			385					8.2	
5	CHESAPEAKE CORP	3- 8-66	28							434	10	18			425					8.2	
5	CHESAPEAKE CORP	5-11-65	19							447	9	20			458					8.2	
6	CHESAPEAKE CORP	6-20-68	32							395	10	29			370					8.0	
6	CHESAPEAKE CORP	1-26-67	34							407	17	25			362					8.3	
6	CHESAPEAKE CORP	3- 8-66	32							401	11	25			390					8.1	
6	CHESAPEAKE CORP	5-11-65	27							409	11	24			440					8.2	
6	CHESAPEAKE CORP	1- 9-64	36							405	17	24			400					8.4	
6	CHESAPEAKE CORP	3-19-63	28							431	19	26			415					8.2	
6	CHESAPEAKE CORP	1-16-62	12							344	24	16			290					8.5	
6	CHESAPEAKE CORP	5-15-61	29							409	28	28			450					8.2	
6	CHESAPEAKE CORP	4-28-60	35							415	12	16			415					8.3	
6	CHESAPEAKE CORP	6-13-59	25							415	4	24			440					8.1	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, NON CARB	HARDNESS MG, NON CARB	SP CONDUCT	PH	COLOR
KING WILLIAM COUNTY 150																				
17	CHESAPEAKE CORP	1-26-67	28							298	9	8			255				8.7	
17	CHESAPEAKE CORP	3- 8-66	27							300	5	8			280				8.7	
17	CHESAPEAKE CORP	5-11-65	22							233	4	9			275				8.3	
17	CHESAPEAKE CORP	1- 9-64	29							356	9	4			225				8.7	
17	CHESAPEAKE CORP	3-19-63	20							231	9	3							8.8	
17	CHESAPEAKE CORP	1-16-62	23							261	4	4							8.6	
17	CHESAPEAKE CORP	5-15-61	25							241	13	6							8.6	
17	CHESAPEAKE CORP	4-28-60	31							244	4	3							8.4	
17	CHESAPEAKE CORP	6-13-59	18							244	0	4							8.5	
17	CHESAPEAKE CORP	4-17-56	26								2	2							8.5	
17	CHESAPEAKE CORP	9- 2-54	21									10							8.5	
17	CHESAPEAKE CORP	3-13-53	21									7							8.5	
17	CHESAPEAKE CORP	3-15-51	26									6							8.5	
17	CHESAPEAKE CORP	6- 6-50	25									6							8.5	
17	CHESAPEAKE CORP	2-17-49	27									6							8.5	
17	CHESAPEAKE CORP	1- 7-48	29									10							8.5	
17	CHESAPEAKE CORP	2-26-47	25									6							8.7	
17	CHESAPEAKE CORP	1-19-46	28									10							7.7	
17	CHESAPEAKE CORP	3-15-45										15								
18	CHESAPEAKE CORP	6-20-68	29							276	7	10			255				8.1	
18	CHESAPEAKE CORP	1-26-67	30							287	11	10			255				8.4	
18	CHESAPEAKE CORP	3- 8-66	29							286	8	9			288				8.4	
18	CHESAPEAKE CORP	5-11-65	20							300	7	10			280				8.3	
18	CHESAPEAKE CORP	1- 9-64	28							312	15	14			270				8.5	
18	CHESAPEAKE CORP	3-19-63	23							326	19	12			290				8.4	
18	CHESAPEAKE CORP	1-16-62	18							344	15	14			290				8.3	
18	CHESAPEAKE CORP	5-15-61	29							319	14	14			310				8.4	
18	CHESAPEAKE CORP	4-28-60	32							337	9	8			325				8.3	
18	CHESAPEAKE CORP	6-13-59	24							329	3	12			335				8.3	
18	CHESAPEAKE CORP	4-17-56	17								2	16							8.1	
18	CHESAPEAKE CORP	9- 2-54	24									20							8.3	
18	CHESAPEAKE CORP	3-15-53	26									16							8.3	
18	CHESAPEAKE CORP	3-15-51	26									17							8.3	
18	CHESAPEAKE CORP	6- 6-50	28									20							8.3	
18	CHESAPEAKE CORP	2-17-49	31									16							8.2	
18	CHESAPEAKE CORP	1- 7-48	29									20							8.3	
18	CHESAPEAKE CORP	2-26-47	27									14							8.4	
18	CHESAPEAKE CORP	1-19-46	32									18							7.9	
18	CHESAPEAKE CORP	3-15-45										27								
18	CHESAPEAKE CORP	1-12-44	32									16			275					

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND(C)	PH	COLOR
KING WILLIAM COUNTY 150																				
10	CHESAPEAKE CORP	5-15-61	28							407	26	16			380				8.4	
10	CHESAPEAKE CORP	4-28-60	33							422	9	10			345				8.3	
10	CHESAPEAKE CORP	6-13-59	18							493	2	16			400				8.2	
10	CHESAPEAKE CORP	4-17-56	29								2	16							8.2	
10	CHESAPEAKE CORP	9- 2-54	21									20							8.3	
10	CHESAPEAKE CORP	3-13-53	24									13							8.3	
10	CHESAPEAKE CORP	3-15-51	27									18							8.3	
10	CHESAPEAKE CORP	6- 6-50	32									19							8.3	
10	CHESAPEAKE CORP	2-17-49	26									18							8.3	
10	CHESAPEAKE CORP	1- 7-48	28									20							8.2	
10	CHESAPEAKE CORP	2-26-47	26									18							8.4	
10	CHESAPEAKE CORP	1-19-46	29									20							8.0	
10	CHESAPEAKE CORP	3-15-45										27								
10	CHESAPEAKE CORP	1-12-44	28									19			335					
11	CHESAPEAKE CORP	6-20-68	25							256	6	6			223				8.5	
11	CHESAPEAKE CORP	1-26-67	24							267	7	5			235				8.7	
11	CHESAPEAKE CORP	3- 8-66	21							269	5	5			245				8.7	
11	CHESAPEAKE CORP	5-11-65	18							272	3	7			228				8.6	
11	CHESAPEAKE CORP	1- 9-64	26							268	9	8			240				8.8	
11	CHESAPEAKE CORP	3-19-63	18							285	4	6							8.8	
11	CHESAPEAKE CORP	1-16-62	14							297	4	7							8.5	
11	CHESAPEAKE CORP	5-15-61	21							278	21	8							8.6	
11	CHESAPEAKE CORP	4-28-60	27							256	5	1							8.4	
11	CHESAPEAKE CORP	6-13-59	17							281	1	8							8.4	
11	CHESAPEAKE CORP	4-17-56	26								2	10							8.5	
11	CHESAPEAKE CORP	9- 2-54	20									14							8.5	
11	CHESAPEAKE CORP	3-13-53	21									11							8.5	
11	CHESAPEAKE CORP	3-15-51	23									10							8.5	
11	CHESAPEAKE CORP	6- 6-50	25									14							8.5	
11	CHESAPEAKE CORP	2-17-49	29									10							8.5	
11	CHESAPEAKE CORP	1- 7-48	23									14							8.5	
11	CHESAPEAKE CORP	2-26-47	26									10							8.7	
11	CHESAPEAKE CORP	1-19-46	26									20							7.9	
11	CHESAPEAKE CORP	3-15-45										15								
16	TOWN OF WEST POINT	6-20-68	16							416	10	12			410				8.5	
16	TOWN OF WEST POINT	12-11-67	18							451	10	14			425				8.6	
17	CHESAPEAKE CORP	6-20-68	27							229	4	5			190				8.5	

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
KING WILLIAM COUNTY 150																					
33	AYLETT	08-02-71	30	0.10		0.2	0.1	63	3.5	160	14	1.6	0.5	0.0	196	1	0	280	20	7.9	0
34	AYLETT	08-02-71	28	0.13		0.4	0.1	70	4.6	168	14	1.4	0.5	0.2	197	2	0	285	26	8.0	3
35	AYLETT	08-02-71	28	0.00		0.3	0.2	62	4.6	162	13	1.6	0.5	0.1	190	1	0	280	22	7.8	0
36	AYLETT	08-02-71	30	0.03		0.3	0.1	67	4.6	170	15	1.9	0.6	0.4	201	1	0	290	19	7.9	0
37	AYLETT	08-02-71	31	0.01		0.2	0.2	70	3.6	174	13	2.4	0.9	0.0	208	2	0	300	17	8.0	0
38	PALLS	08-03-71	47	0.00		32	16	24	16	216	32	2.9	0.5	0.0	270	150	0	400	23	7.6	0
39	LESTER MANOR	08-03-71	39	0.35		0.6	0.2	64	4.8	176	6.6	3.4	0.5	0.1	213	2	0	290		8.1	10
51	HOLMES ELEM SCHOOL	08-11-71	16	0.02		1.5	0.5	100	11	286	11	2.3	1.2	0.1	286	6	0	460		8.3	2
52	MANQUIN	08-11-71	29	0.05		0.8	0.3	72	5.7	188	13	1.8	0.6	0.0	215	3	0	330	19	8.0	2
53	MANQUIN	08-11-71	23	0.03		1.4	0.5	76	8.3	204	13	1.4	0.9	0.0	220	6	0	350	22	8.0	0
54	MANQUIN	08-12-71	24	0.07		1.7	0.6	74	8.6	204	13	2.3	0.7	0.2	230	6	0	355	22	7.9	0
55	COHOKE	08-10-71	31	0.26		0.5	0.2	120	7.4	323	8.8	3.7	2.8	0.1	336	2	0	530	24	8.1	2
56	COHOKE	08-04-71	45	0.02		24	10	30	10	198	7.0	3.0	0.5	0.0	214	100	0	320	21	7.6	0
57	COHOKE	08-04-71	29	0.20		2.3	0.8	110	8.7	295	7.8	2.6	2.6	0.1	312	9	0	490	24	8.0	2

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP CONDUCT	T	P H	COLOR
KING WILLIAM COUNTY 150																					
18	CHESAPEAKE CORP	- -36										20									
20	CHESAPEAKE CORP	6-13-59	18							283	2	6								8.4	
20	CHESAPEAKE CORP	4-17-56	26								2	8								8.3	
20	CHESAPEAKE CORP	9- 2-54	21									14								8.5	
20	CHESAPEAKE CORP	3-13-53	23									11								8.4	
20	CHESAPEAKE CORP	3-15-51	28									10								8.4	
20	CHESAPEAKE CORP	6- 6-50	29									15								8.3	
20	CHESAPEAKE CORP	2-17-49	32									14								8.5	
20	CHESAPEAKE CORP	1- 7-48	27									16								8.4	
20	CHESAPEAKE CORP	2-16-47	26									12								8.6	
20	CHESAPEAKE CORP	1-19-46	29									15								8.0	
20	CHESAPEAKE CORP	3-15-45										18									
20	CHESAPEAKE CORP	1-12-44	27									16			250						
20	CHESAPEAKE CORP	- -36										20									
21	CHESAPEAKE CORP	1-26-67	30							237	7	3			205					8.5	
21	CHESAPEAKE CORP	3- 8-66	30							231	5	5			205					8.7	
21	CHESAPEAKE CORP	5-11-65	22							240	4	2			200					8.5	
21	CHESAPEAKE CORP	1- 9-64	35							241	9	5			225					8.4	
21	CHESAPEAKE CORP	3-19-63	22							251	6	1								8.5	
21	CHESAPEAKE CORP	1-16-62	20							263	4	7								8.2	
21	CHESAPEAKE CORP	5-15-61	27							244	24	2								8.5	
21	CHESAPEAKE CORP	4-28-60	27							293	6	8								8.3	
21	CHESAPEAKE CORP	6-13-59	22							232	0	2								8.4	
21	CHESAPEAKE CORP	4-17-56	29								2	2								8.3	
21	CHESAPEAKE CORP	9- 2-54	27									6								8.5	
21	CHESAPEAKE CORP	3-13-53	26									7								8.5	
21	CHESAPEAKE CORP	3-15-51	28									6								8.5	
23	VA STATE POLICE	12-07-72	33	0.01		1.3	0.3	110	4.8	292	8.1	2.6	1.8	0.0	310	4	0	480		8.4	15
25	TOWN OF WEST POINT	08-10-71	17	0.01		1.4	0.5	180	10	451	13	8.2	2.6	0.1	454	6	0	750	19	8.3	2
26	KIWANIS CLUB	06-16-70	30	0.03		23	5.2	7.9	6.0	104	10	3.3	0.2	0.1	149	78	0	192	18	6.9	0
32	LESTER MANOR	08-03-71	34	0.17		0.2	0.1	90	4.7	226	9.2	2.6	1.7	0.2	260	1	0	370	24	8.0	0

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND(C)	pH	COLOR
KING WILLIAM COUNTY 150																				
78	HORSE LANDING	12-08-72	71	0.06		42	6.4	19	12	222	6.9	2.5	0.3	0.1	256	130	0	340	8.2	10
79	COHOKE	12-08-72	58	0.08		23	8.9	30	12	200	7.9	2.4	0.4	0.3	234	94	0	330	8.3	15
NEW KENT COUNTY 163																				
1	LANEXA POST OFFICE	12-01-72	48	0.08		13	3.6	30	9.9	144	3.7	2.9	0.5	0.6	182	48	0	240	7.8	10
1	LANEXA POST OFFICE	08-16-68										3.8						300		
2	LANEXA	08-16-68										3.6						325		
3	DIASCUND CAMPGROUND	08-16-68										2.7						325		
4	WALKERS	10-10-68										14						760		
5	NEW KENT FORESTRY CTR	12-06-72	43	0.11		2.4	0.8	120	8.8	309	8.5	3.1	2.7	0.0	348	10	0	500	8.3	12
5	NEW KENT FORESTRY CTR	10-10-68										3.0						560		
6	WOODHAVEN SHORES	05-23-69										1.6						360		
7	FIVE LAKES SUB	10- 9-69	29			1.2	0.2	60	6.2	146	14	1.5	0.5	0.0	194	4	0	300	7.9	
7	FIVE LAKES SUB	11-13-68		0.53	0.06					154			0.6						8.4	
8	BROOKWOOD MANOR	06-17-71	25	0.18		4.0	0.4	59	6.2	168	11	1.9	0.5	0.2	195	12	0	300	20 8.6	5
9	FIELD UNIT #16	12-06-72	27	0.00		4.2	1.5	160	12	418	13	20	2.2	0.4	452	16	0	730	8.4	15
9	FIELD UNIT #16	09-15-69	19			4.4	1.5	157	14	414	15	19	1.9	0.7	456	17	0	710	8.2	
10	WASH-BURGESS INN	12-07-72	52	0.00		14	3.6	42	10	178	5.8	3.4	0.4	0.1	220	50	0	295	8.0	15

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
KING WILLIAM COUNTY 150																					
58	RIVERVIEW FARMS	08-04-71	44	0.04		25	8.7	35	12	212	7.0	4.4	0.5	0.0	236	98	0	350	24	7.7	0
59	CHERICOKE	08-12-71	26	0.09		2.0	0.6	93	9.7	245	10	3.0	2.2	0.0	262	8	0	400	22	8.0	5
60	CHERICOKE	08-12-71	17	0.01		24	5.5	7.8	20	60	22	13	0.2	35	166	82	34	265	20	6.4	0
61	KING WILLIAM HIGH SCH	12-21-72	32	0.07		1.0	0.4	67	5.4	165	14	1.2	0.6	0.4	204	4	0	300		8.0	7
61	KING WILLIAM HIGH SCH	08-07-71	16	0.07		1.1	0.3	62	4.7	156	16	1.9	0.7	0.0	179	4	0	280	22	8.2	0
62	MANQUIN	08-13-71	26	0.00		8.4	3.0	75	12	238	12	2.7	0.9	0.1	262	34	0	380	19	7.9	2
63	MANQUIN	12-08-72	37	0.14		0.6	0.2	70	5.2	178	17	1.0	0.5	0.1	229	2	0	310		8.3	10
63	MANQUIN	08-13-71	30	0.04		0.5	0.2	69	5.3	176	16	1.8	0.5	0.0	206	2	0	300	21	8.1	0
64	MANQUIN	08-13-71	21	0.06		3.9	1.2	62	10	166	19	1.4	0.5	0.0	192	14	0	300	20	8.2	0
65	MANQUIN	08-13-71	27	0.02		1.9	0.6	74	7.6	198	13	2.1	0.6	0.0	226	7	0	340	20	8.0	2
66	ROSE GARDEN	12-20-72	51	0.01		36	11	15	12	210	7.1	2.9	0.4	0.1	230	140	0	350		7.7	10
67	WAKEMA	12-20-72	48	0.06		31	9.0	28	14	216	2.7	5.1	0.4	0.6	241	110	0	360		8.1	20
68	MANQUIN	12-08-72	36	0.04		0.9	0.3	68	5.6	180	12	0.8	0.4	0.0	204	3	0	305		7.7	15
70	AYLETT	12-08-72	38	0.24		0.4	0.2	60	3.6	151	14	1.2	0.5	0.3	184	2	0	270		8.2	20
71	MANQUIN	08-17-72		0.08		0.4	0.1			164		1.4	0.7	0.0				290		7.6	
73	HERON CREEK MILL POND	12-08-72	23	0.02		2.2	0.7	66	9.5	181	15	1.3	0.5	0.5	201	8	0	320		8.3	17

TABLE I-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
NEW KENT COUNTY 163																					
48	CAMP NORFOLK #1	12-06-72	57	0.15		24	3.2	28	8.6	156	7.9	4.2	0.4	0.4	208	73	0	265		7.9	23
49	CAMP NORFOLK #2	12-06-72	53	0.13		25	3.2	27	8.7	152	6.8	6.4	0.4	0.2	203	76	0	260		7.9	15
50	BARHAMSVILLE	12-06-72	60	0.12		27	3.2	25	8.5	162	7.5	3.6	0.4	0.3	213	80	0	275		7.9	7
51	WINDY KNOLL FARM	12-20-72	49	0.16		33	3.0	22	6.4	160	7.3	3.8	0.3	0.3	208	95	0	284		7.9	17
52	YWCA CAMP	12-07-72	38	0.10		15	5.1	34	8.0	168	4.8	2.6	0.4	0.1	197	58	0	280		8.3	15
53	CHESTNUT GROVE LNDING	12-07-72	20	0.52		20	3.2	19	5.0	120	12	0.8	0.3	1.2	142	63	0	225		7.3	35
55	ITT,WHITE HOUSE SITE	12-19-72	23	0.02		24	8.8	36	12	216	4.4	3.9	0.3	0.2	219	96	0	354		7.8	17
YORK COUNTY 199																					
1	CAMP PERRY	9-18-68										162						1030			
2	CAMP PERRY	9-18-68										70						815			
3	OBS WELL #3,CMP PERRY	04-28-72	3.1	0.04		1.6	0.5	420	13	408	5.2	420	2.7	1.1	1115	6	0	2000	16	9.1	20
4	NAVAL WEAPONS STATION	10-16-68										400						2100			
6	USMC, CHEATHAM ANNEX	10-24-68										420						2150			
7	USMC, CHEATHAM ANNEX	10-24-68										408						2250			

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND	T (C)	P H	COLOR
NEW KENT COUNTY 163																					
10	WASH BURGESS INN	10-27-69	35			14	4.0	42	11	173	3.4	2.8	0.5	0.4	214	51	0	282		8.2	
21	TUNSTALL	06-16-71	26	0.25		1.9	1.1	80	8.6	223	11	1.1	1.0	0.2	242	9	0	380	20	8.2	10
24	BARHAMSVILLE	06-20-71	35	0.00		23	3.1	30	7.4	162	0.0	2.8	0.4	0.0	196	70	0	273	21	7.6	0
25	BARHAMSVILLE	06-20-71	40	0.04		30	3.0	23	6.4	164	7.0	3.0	0.5	0.0	203	88	0	283		7.6	0
27	TABERNACLE CH,BARHVLE	06-20-71	38	0.04		30	3.0	22	6.5	160	7.0	2.4	0.3	0.0	193	88	0	270	20	7.7	5
28	WALKERS DAM	06-22-71	25	0.08		4.0	.9	150	9.4	387	12	12	2.0	0.0	412	14	0	640	26	7.8	0
29	WALKERS DAM	06-22-71	18	0.01		15	3.7	35	6.7	152	7.4	3.0	0.4	0.0	166	52	0	260	19	7.7	0
30	WALKERS DAM	06-22-71	21	0.00		14	2.9	42	6.4	160	7.4	3.7	0.6	0.0	172	47	0	270	21	7.7	0
33	PROVIDENCE FORGE	06-22-71	27	0.06		1.0	0.3	120	8.4	308	13	4.4	1.5	0.0	328	4	0	480	20	8.0	5
34	PROVIDENCE FORGE	06-24-71	30	0.00		1.5	.5	92	8.6	246	13	2.1	1.1	0.1	268	6	0	399	19	7.9	5
35	NEW KENT HIGH SCHOOL	12-07-72	30	0.02		28	11	14	6.7	172	6.4	3.0	0.2	0.2	187	120	0	280		8.2	15
35	NEW KENT HIGH SCHOOL	06-24-71	20	0.00		30	11	12	5.4	170	2.0	1.4	0.3	0.4	167	120	0	280	21	7.8	2
36	CHICKAHOMINY SHORES	06-24-71	19	0.00		11	2.6	47	7.2	166	6.6	3.2	0.5	0.0	181	38	0	280	19	7.7	11
37	LANEXA	07-08-71	46	0.21		34	4.8	18	8.0	176	7.0	3.2	0.3	0.0	209	110	0	290	20	7.6	2
38	QUINTON	06-17-71	35	0.30		.4	.5	55	4.8	140	17	1.7	0.3	0.0	176	3	0	265	19	7.8	5
41	LANEXA	07-21-71	32	0.01		13	4.4	48	9.0	184	10	3.4	0.7	0.0	204	50	0	320	17	7.9	0

TABLE 1-C (Con't)

GROUND-WATER CHEMICAL QUALITY DATA

DWR NO	OWNER AND/OR PLACE	DATE SAMPLED	SIO2	FE	MN	CA	MG	NA	K	HCO3	SO4	CL	F	NO3	SOL-IDS	HARDNESS CA, MG	HARDNESS NON CARB	SP COND(C)	T	P H	COLOR
YORK COUNTY 199																					
8	WILLIAMSBURG	08-30-68										371						2000			
10	NAVAL WEAPONS STATION	10-16-68										5.9						340			
11	NELSON PARK	10- -53		0.30						408		73.0								8.1	
12	NELSON PARK	08-29-72	20	0.03		4.8	1.8	420	15	424	43	360	2.5	0.1	1040	20	0	2100		8.0	15
12	NELSON PARK	06-19-64		0.05	0.00	9.3	2.7	427.5		427	30.5	402.1	2.3	1.4	1021	21	0			8.4	
13	CARVER GARDENS	11-29-72	19	0.08		4.1	1.6	380	16	454	38	310	3.0	0.2	970	16	0	1900		8.1	15
13	CARVER GARDENS	02-14-61		1.16	0.00	8.2	1.9	376.2		426	40.3	314.9	2.7	1.3	981	28	0			8.1	
14	PARKWAY ESTATES	02-06-62		0.43	0.05							366.7	1.8								
15	QUEEN LAKE	04-19-66		0.07						423		353.5			1133					8.7	
15	QUEEN LAKE	01-12-66		0.12	0.00	5.9				444		360	2.2	1.3	1079					8.3	
15	QUEEN LAKE	10-12-60		0.70	0.00	12.4	2.4	417.8		430	45.2	376	2.3	1.1	977	41	0			8.0	
15	QUEEN LAKE	02-26-59		0.30	0.00	9.7	2.2	406.3		421	47.1	403.6	1.2	0.4	1075	34	0			7.9	
16	YORK TERRACE	11-29-72	20	0.04		4.5	1.6	420	16	424	46	350	2.5	0.0	1050	18	0	2050		8.0	15
16	YORK TERRACE	09-27-61		0.15	0.00	6.7	2.1	394.7		420	35.9	336.8	2.1	1.2	1151	25	0			8.6	
20	COLONIAL CAMP GROUND	12-07-72	46	0.21		4.2	1.5	97	12	266	7.1	3.8	1.1	0.1	302	16	0	425		8.0	20
21	WILLIAMSBURG CTRY CLB	11-29-72	19	0.08		3.6	1.4	420	14	434	41	350	2.5	0.0	1050	15	0	2000		7.6	20
22	SPRINGFIELD TERRACE	07-26-71	18	0.17		5.2	3.4	400	14	439	46	380	2.5	0.2	1100	27	0	2030	21	8.0	7
22	SPRINGFIELD TERRACE	05-01-67	9.0	0.14		6.0	1.8	330.0	8.0	422	45.0	360.0	2.3	0.1	1110	22	0			8.5	
27	OBS WELL #27,YORKTOWN	3- 2-72	3.4	0.02		1.1	2.8	890	28	602	12	1000	1.2	0.2	2300	14	0	3800	16	9.4	10

Source: Virginia State Water Control Board - BWCM

TABLE 1-D

WATER CONTROL BOARD
BUREAU OF WATER CONTROL MANAGEMENT
GROUND-WATER WITHDRAWALS IN MILLION GALLONS PER DAY

SYSTEM AND LOCATION	NO OF WELLS	NO OF SPR	1965 MGD	1966 MGD	1967 MGD	1968 MGD	1969 MGD	1970 MGD	1971 MGD	1972 MGD	1973 MGD
HANOVER CO											
PUBLIC SYSTEMS											
AVONDALE SUB	1								0.016		
BEECHWOOD FARMS	1								0.002	0.012	
BELL CREEK ESTATES	X								0.009		
BLUE STAR ESTATES	X									0.012	
BRANDY CREEK ESTATES	1			0.010						0.050	
BURNSIDE FARMS	1			0.021					0.013		
CHERRYDALE SUB	1								0.021		
COLONIAL FOREST SUB	1								0.010		
COUNTRY CLUB HILLS	X					0.006					
CRANEY ISLAND ESTATES	2					0.009	0.010	0.011	0.012		
DOGWOOD KNOLL SUB	2			0.015						0.030	
ELLERSON FARMS	X									0.017	
HANOVER COUNTY											
BATTLEFIELD FARMS	1							0.006			
FULL VIEW MANOR	1							0.021			
MECHANICSVILLE FARMS	1							0.076			
RIDGEVIEW ESTATES	1							0.052			
WINDY HILL ESTATES	1							0.055			
HANOVER FARMS	1		0.007						0.020		
HANOVER SCH FOR BOYS	X					0.030					
HIGH POINT FARMS	1								0.008		
HOLLY RIDGE SUB	1								0.014		
JANIE PORTER SCHOOL	1					0.020					
KOSMO VILLAGE	2								0.025		
LIBERTY HALL HILLS	X								0.004		
MAYFIELD FARMS	2								0.039		
MEADOWGATE SUB	1								0.013		
MECHANICSVILLE	X			0.145							
OAK HILL ESTATES	3						0.006	0.006	0.006		
RANIER ESTATES	1									0.001	
ROBIN RIDGE SUB	1									0.009	
SPRING MEADOWS	3								0.087		
SWANNANOA ESTATES	X								0.010		
TOTOPOTOMOY SUB	X										
WALNUT GROVE SUB	1									0.010	
INDUSTRIAL SYSTEMS											
FEARNOW BROS CANNERY	2				0.008	0.003	0.004	0.004			
FELDSPAR CORP	1				0.007			0.006			
MOBIL CHEMICAL CO	2				0.013	0.013	0.015				
VCU-MCV RESEARCH FAC	1								0.010		

APPENDIX D

Ground-Water Use

The following table is a listing of withdrawals by the larger ground-water users in the York-James Peninsula. The data include the name and location of the system, which can be cross-referenced to Appendix B in order to determine well locations, the number of wells or springs in service (x denotes an unknown number), and the ground-water withdrawals in millions of gallons per day.

TABLE 1-D (Con't)

GROUND-WATER WITHDRAWALS IN MILLION GALLONS PER DAY

SYSTEM AND LOCATION	NO OF WELLS	NO OF SPR	1965 MGD	1966 MGD	1967 MGD	1968 MGD	1969 MGD	1970 MGD	1971 MGD	1972 MGD	1973 MGD
JAMES CITY CO-WILLIAMSBURG (CONTINUED)											
PUBLIC SYSTEMS											
COLONIAL WILLIAMSBURG	9		2.400	2.400	2.500	2.500	2.600	2.600	2.700		
EWELL HALL SUB	1									0.024	
FIRST COLONY	1			0.008					0.011		
INDIGO PARK	1			0.022					0.023		
JAMES SHIRE SETTLEMENT	X									0.006	
JAMES TERRACE	2			0.095					0.056		
JAMESTOWN FESTIVAL PARK	1			0.100					0.010		
JAMESTOWN NATIONAL PARK	3									0.001	
MAGRUDER HEIGHTS	1			0.026						0.012	
MARL HILLS SUB	1			0.006							
NORGE	1					0.035					
OLD STAGE MANOR	1			0.002						0.004	
POPLAR HALL PLANTATION	X									0.006	
RALEIGH SQUARE	1			0.004						0.004	
THE COLONY	X			0.025			0.008				
TOANO	1			0.025					0.030	0.025	
WHITE OAK SUB	1								0.003		
WILLIAMSBURG WEST	X									0.005	
YORKVIEW PLANTATION	X									0.002	
INDUSTRIAL SYSTEMS											
DOW BADISCHE CO	5		2.900	4.300	4.300	4.500	4.500	4.500	4.500	5.165	
PUBLIC USE-- 2.978 MGD			INDUSTRIAL USE-- 4.500 MGD				TOTAL USE-- 7.478 MGD				
KING WILLIAM CO											
PUBLIC SYSTEMS											
WEST POINT	2		0.236	0.258	0.274	0.276	0.297	0.306	0.288	0.280	
INDUSTRIAL SYSTEMS											
CHESAPEAKE CORP	13					14.250			15.324	15.075	
PUBLIC USE-- 0.288 MGD			INDUSTRIAL USE--15.324 MGD				TOTAL USE--15.612 MGD				
NEW KENT CO											
PUBLIC SYSTEMS											
BRIAN WOODS SUB	X									0.001	

TABLE 1-D (Con't)

GROUND-WATER WITHDRAWALS IN MILLION GALLONS PER DAY

SYSTEM AND LOCATION	NO OF WELLS	NO OF SPR	1965 MGD	1966 MGD	1967 MGD	1968 MGD	1969 MGD	1970 MGD	1971 MGD	1972 MGD	1973 MGD
HANOVER CO (CONTINUED)											
INDUSTRIAL SYSTEMS											
RICHMOND FOOD STORES	3								0.006		
PUBLIC USE-- 0.849 MGD INDUSTRIAL USE-- 0.041 MGD TOTAL USE-- 0.890 MGD											
HENRICO CO-RICHMOND											
PUBLIC SYSTEMS											
BILTMORE	1			0.034					0.012		
BRADLEY ACRES	1									0.028	
CHAMBERLAYNE FMS,HGTS,HILLS	X			0.160			0.179				
EASTOVER GARDENS	1			0.039					0.017		
GILBERT GARDENS	2			0.075					0.075		
GLENWOOD FARMS	3								0.100		
GLENWOOD GARDENS	1			0.030						0.042	
HECHLER VILLAGE	3			0.250							
HIGHLAND SPRINGS	7						0.375			1.487	
LEWIS GARDENS	3							0.020			
MASONIC HOME	1									0.010	
MECHANICSVILLE GARDENS	1			0.010					0.002		
MONTEZUMA PARK	1			0.017						0.018	
PINE HEIGHTS	1			0.008					0.008		
SANDBURNE PARK	X						0.053				
STATE POLICE HDQTRS	X									0.004	
INDUSTRIAL SYSTEMS											
BAUGHN BROS,INC		1				0.001					
THE FLINTKOTE CO	1					0.021			0.005		
KOPPERS CO	1					0.009					
RICHMOND GALVANIZING CO	1								0.001		
U S TOBACCO CO	1					0.005		0.009	0.006		
VALLEY PLATING CO	1								0.005		
PUBLIC USE-- 2.305 MGD INDUSTRIAL USE-- 0.027 MGD TOTAL USE-- 2.332 MGD											
JAMES CITY CO-WILLIAMSBURG											
PUBLIC SYSTEMS											
CANTERBURY HILLS	1			0.010						0.032	

TABLE 1-D (Con't)

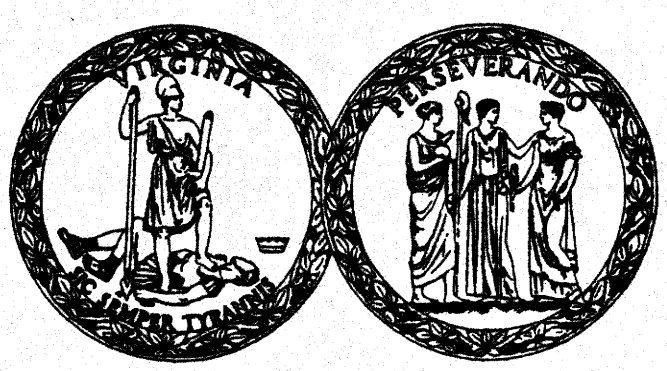
GROUND-WATER WITHDRAWALS IN MILLION GALLONS PER DAY

SYSTEM AND LOCATION	NO OF WELLS	NO OF SPR	1965 MGD	1966 MGD	1967 MGD	1968 MGD	1969 MGD	1970 MGD	1971 MGD	1972 MGD	1973 MGD
NEW KENT CO (CONTINUED)											
PUBLIC SYSTEMS											
BROOKFIELD RIDINGS SUB	X									0.002	
BROOKWOOD MANOR	1				0.001				0.002		
FIELD UNIT #16	1							0.011		0.010	
FIVE LAKES	1					0.002					
WOODHAVEN SHORES	1			0.015						0.058	
PUBLIC USE-- 0.075 MGD			INDUSTRIAL USE-- 0.000 MGD				TOTAL USE-- 0.075 MGD				
YORK CO											
PUBLIC SYSTEMS											
CARVER GARDENS	1			0.026					0.023		
NELSON PARK	1			0.053					0.019		
SPRINGFIELD TERRACE	1					0.036				0.017	
YORK TERRACE	1					0.100			0.044		
PUBLIC USE-- 0.103 MGD			INDUSTRIAL USE-- 0.000 MGD				TOTAL USE-- 0.103 MGD				
CITY OF NEWPORT NEWS											
INDUSTRIAL SYSTEMS											
JAMES RIVER RESERVE FLEET	1								0.002		
PUBLIC USE-- 0.000 MGD			INDUSTRIAL USE-- 0.002 MGD				TOTAL USE-- 0.002 MGD				

GRAND TOTAL

PUBLIC	06.598 MGD
INDUSTRAL	19.894 MGD
TOTAL	26.492 MGD

Source: Virginia State Water Control Board-BWCM


VIRGINIA
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