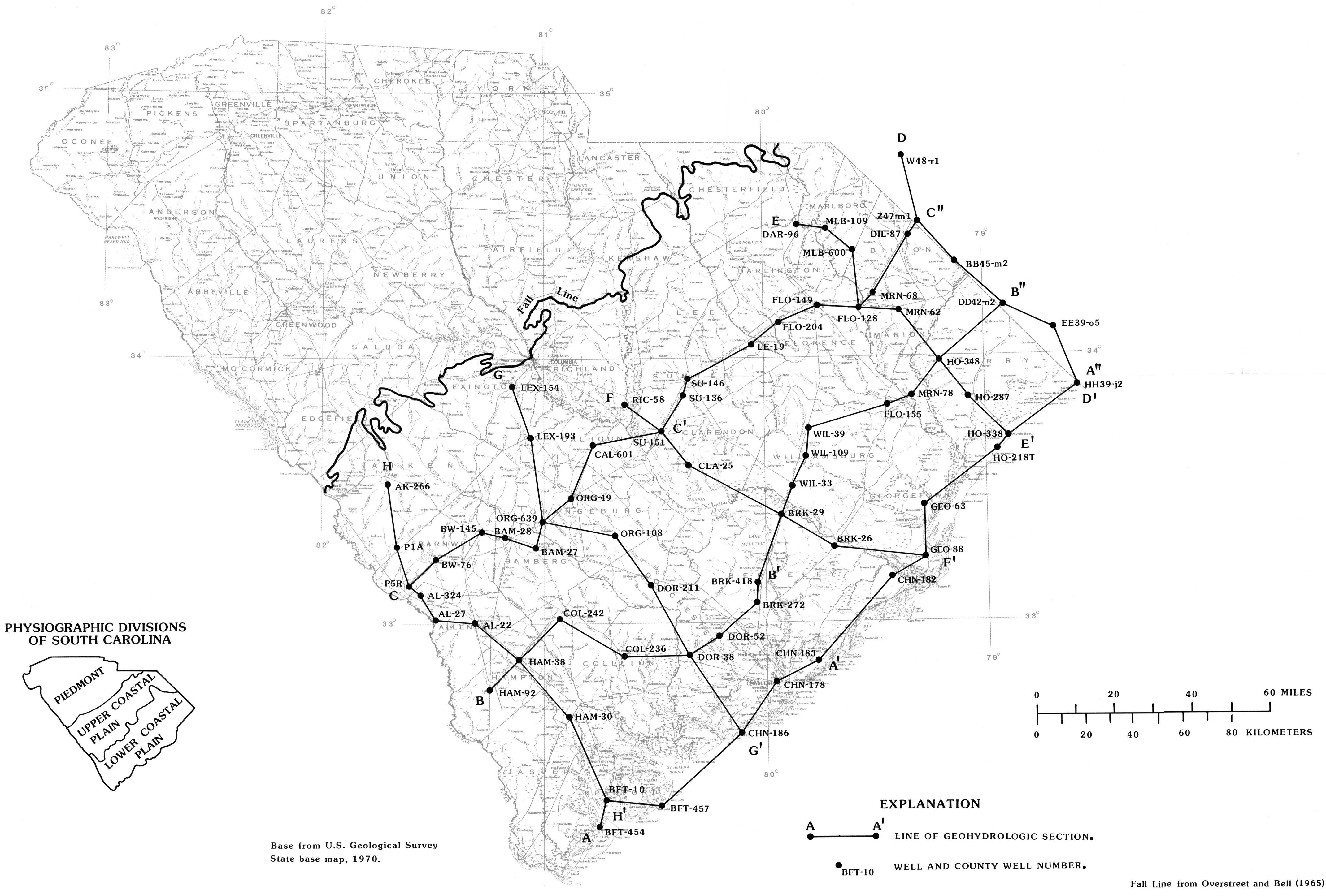

FIGURE 1.--LOCATION OF GEOHYDROLOGIC SECTIONS IN THE COASTAL PLAIN OF SOUTH CAROLINA.

INTRODUCTION

The U.S. Geological Survey is conducting a series of investigations of aquifers throughout the United States as a part of the RASA (Regional Aquifer System Analysis) program. These investigations provide a comprehensive regional understanding of ground-water resources throughout the Nation. The Coastal Plain aquifers in South Carolina are being studied as a part of this program.

An important part of a description of the ground-water resources is the development of a geohydrologic framework. Such a framework delineates the aquifers through which ground water flows and the confining units which retard the flow of ground water between aquifers. This analysis incorporates hydrologic and geologic data to define the geohydrologic framework and to describe the aquifers and confining units of the Coastal Plain of South Carolina.

The Coastal Plain of South Carolina is underlain by a wedge of sediments that thickens from its inner margin, the Fall Line, to the coast and consists of sand, silt, clay, and limestone of Late Cretaceous to Holocene age. These sediments are underlain by pre-Cretaceous rocks consisting of consolidated sedimentary rocks of Triassic age and a complex of metamorphic and igneous rocks similar to those found near the surface in the Piedmont province of the State.

The purpose of this report is to describe a geohydrologic framework that divides the sediments of the South Carolina Coastal Plain into regional aquifers and confining units that represent the hydrology of the Coastal Plain aquifer system. The framework is delineated in this report by eleven geohydrologic sections and four maps showing the configuration of the top or base of individual aquifers. Although flow within the Coastal Plain aquifer system is three dimensional, simplifying the system by dividing it into a framework of discrete hydrologic units can aid significantly in understanding the hydrology of the system. This framework is the basis for the aquifers used in potentiometric mapping, transmissivity mapping, geochemical analysis, and ground-water flow modeling for the South Carolina RASA program.

The area described in this study is the Coastal Plain of South Carolina. Data from South Carolina and adjacent areas in North Carolina were used. Sheet 1, fig. 1, shows the location of the geohydrologic sections.

PREVIOUS INVESTIGATIONS

Several previous investigations are pertinent to the development of the geohydrologic framework for the Coastal Plain aquifers of South Carolina. Many of these investigations have dealt either primarily or exclusively with geology and have included little hydrologic analysis. Cooke's "Geology of the Coastal Plain of South Carolina" (1936) was the first significant detailed work on Coastal Plain geology. Siple (1946) provided more geological and hydrologic information pertinent to the geohydrology of the Coastal Plain and in 1959 published a description of the stratigraphic section of the Coastal Plain including the first structure map of the pre-Cretaceous surface underlying the sediments (Siple, 1959). Overstreet and Bell (1965) provided a revised map of the inner margin of Coastal Plain sediments in their work in the Piedmont. Swift and Heron (1969) produced an interesting concept regarding the method of deposition of the Coastal Plain sediments.

A notable increase in the understanding of the geology of the Coastal Plain of South Carolina has occurred since about 1975. The U.S. Geological Survey provided the first detailed geologic framework of the coastal areas of South Carolina (Gohn, Bybell, and others, 1978), (Gohn, Christopher, and others, 1978), and (Gohn and others, 1980). Brown and others (1979) provided a geologic framework that was mostly limited to the coastal areas in South Carolina. In addition, a detailed geologic description of the Upper Cretaceous sediments in South Carolina was provided by Valentine (1982).

Coastal Plain geology also has been studied at the University of South Carolina under the direction of D. J. Colquhoun. Publications pertinent to Statewide geohydrologic analysis resulting from this work are Woollen and Colquhoun (1977a and 1977b), Woollen (1978), and Oldham (1981). These works and others were incorporated and expanded upon in maps and sections by Colquhoun and others (1983) which comprise the first detailed comprehensive surface and subsurface geologic description of the Coastal Plain of South Carolina.

Many other detailed geologic reports exist. Because of the regional scope of this study, these reports are not discussed individually. The South Carolina Geological Survey published a bibliography of South Carolina geology that thoroughly covers the subject (Zupan and Tahirkheli, 1979).

Some local hydrologic studies have made useful contributions to the geohydrologic understanding of the Coastal Plain of South Carolina. These include studies by Siple (1967) in Aiken and Barnwell Counties; Siple (1975) in Orangeburg County; Zack (1977) in Horry and Georgetown Counties; Hayes (1979) in Beaufort, Colleton, Hampton, and Jasper Counties; Park (1980) in Sumter and Florence Counties; and Park (1985) in Berkeley, Charleston, and Dorchester Counties.

Publications resulting from RASA studies on the Floridan aquifer system (Miller, 1985) and on the clastic part of the Coastal Plain (Renken, 1984) have described the major regional aquifers and confining units of the Southeastern United States Coastal Plain primarily using geologic methods supplemented with hydrologic data.

METHOD OF INVESTIGATION

Information from a number of sources was used in developing the geohydrologic framework. These sources include the results of previous investigations described in the previous section, geologic data, water-level data, and water-chemistry data. The definition of the South Carolina framework and the RASA framework for the Southeastern Coastal Plain (Renken, 1984) were done simultaneously.

Geologic data used in delineating the geohydrologic framework consisted primarily of geophysical well logs, particularly electric logs. They were used to determine most boundaries between aquifers and confining units and are incorporated on the geohydrologic sections, scale permitting. Electric logs were used to determine sand, clay, or limestone sequences at one well that could be correlated with similar sequences at another well. Descriptions of well cores and cuttings by geologists and drillers were used in interpreting the geophysical logs. In addition, detailed geologic work on the Clubhouse Crossroads wells (Gohn and others, 1977), two wells (DOR-211 on sheet 7, fig. 15, and MRN-78 on sheet 4, fig. 9) drilled by the U.S. Geological Survey as part of the RASA investigation and geologic contacts for wells P5R, SU-155, MRN-78, DOR-211 and DOR-38 (D. C. Prowell, 1985, written commun.) were used. The Cretaceous/Tertiary contact, which was used in delineating the framework, was determined from published reports previously mentioned and unpublished information (G. S. Gohn, 1982-84 written and oral commun.; D. C. Prowell, 1982-84, written and oral commum.).

Water-level data were used where available to assist in differentiating aquifers at a specific location. Water-level data from U.S. Geological Survey files representing both stressed and unstressed periods were utilized for this purpose. Potentiometric maps (Aucott and Speiran, 1985a, and 1985b) were also utilized to insure that the geohydrologic framework provided consistent flow patterns and potentiometric gradients.

An analysis of the geochemistry was used in defining the geohydrologic framework. Water-quality data from different water-bearing zones were compared for major ions and total dissolved solids. Changes in major ion geochemistry along flow lines were also examined to insure that aquifer and confining unit boundaries corresponded to reasonable interpretations of the geochemical processes involved in the flow system (Speiran and Aucott, 1985).

GEOHYDROLOGIC ANALYSIS

Examples

The use and analysis of geologic data has been noted in many of the previous investigations of the geology of the South Carolina Coastal Plain. Detailed discussions of the particular variations in water quality and potentiometric data and analysis are beyond the scope of this report. Examples of the use of this information are given to illustrate its utility in a geohydrologic analysis and are not intended to be comprehensive. More complete presentations of water quality and potentiometric data and analysis can be found in Speiran and Aucott (1985) and Aucott and Speiran (1985a, 1985b and 1985c).

An example of the use of unstressed water-level differences in separating aquifers is the 50-80 foot difference between water levels in the Middendorf aquifer and the Cape Fear aquifer in the eastern part of the lower Coastal Plain of South Carolina. Although data are sparse, it appears that this vertical difference is increasing as the overlying aquifers are stressed.

An example of the separation of aquifers by use of water levels in stressed conditions is in the Florence, S.C. vicinity where water-level differences have existed for many years between the Black Creek and Middendorf aquifers. Water levels in the Black Creek aquifer have remained fairly constant at 100-110 feet above sea level since the 1940s. Water levels in the Middendorf aquifer have declined, in response to withdrawals, from 104 feet above sea level in 1930 to 35 feet above sea level in 1960 to 40 feet below sea level in 1982 near downtown Florence (Aucott and Speiran, 1985a, 1985b). Large water-level differences occurring over long periods of time are indicative of sufficient independence of the respective flow systems and they are therefore described as separate aquifers with an intervening confining unit.

An example of the use of water quality analysis in aquifer differentiation is the water-quality difference between the Middendorf and Black Creek aquifers. In the Charleston area, water from the Middendorf aquifer has a concentration of total dissolved solids of 1,100 mg/L and is predominately a sodium bicarbonate water. The milliequivalents of bicarbonate comprise more than 80 percent of the total anions, while chloride comprises less than 20 percent. In contrast, water from the Black Creek aquifer near Charleston has a concentration of total dissolved solids of about 2,700 mg/L and is primarily a sodium chloride water. Milliequivalents of chloride comprise 50 to 60 percent of the total anions, while bicarbonate comprises only 40 to 50 percent.

GEOHYDROLOGIC UNITS

The general configuration of the aquifers and confining units in the South Carolina Coastal Plain is summarized in the generalized geohydrologic correlation chart on (sheet 1, table 1). Names used to designate the aquifers have been adopted from common usage and the names of the generally associated geologic formation. An aquifer may not consist of the same formations in all areas and locally an aquifer may consist of additional formations not listed. Confining units have not been named.

The boundaries between aquifers and confining units are not always sharp because of the complex deposition of sediments in the Coastal Plain of South Carolina. In many places either a sandy clay forms part of an aquifer or a clayey sand forms part of a confining unit. An extreme example is the Cape Fear aquifer and the confining unit above it in many areas, as for example in wells particularly FLO-149 and FLO-128 (sheet 5, fig. 11). The Cape Fear Formation which makes up this aquifer and part of the confining unit above it is fluvial to upper delta plain in origin. Lithologically, it is generally comprised of thin lenses of coarse sand separated by thicker beds of silty clay. In some areas the coarser sand occurs higher in the formation than in other areas. Although individual lenses of coarse material are probably not areally extensive, they interact hydraulically as one regional aquifer. This is indicated by the similar water-quality characteristics of ground-water samples from discrete intervals of the coarse sand. Although water-level differences occur within this unit, they are not as large as the difference across the marine clay overlying the Cape Fear aquifer. However, due to the composition of this formation, it is difficult to select a definitive boundary above which there is little sand to be included in the confining unit and below which there is little clay to include in the aquifer. Thus, the selection of this and other specific aquifer-confining unit boundaries may be somewhat subjective.

Aquifer Units

Surficial Aquifer

The surficial aquifer consists of coastal terrace deposits. These sediments are generally less than 40 feet thick and consist primarily of sand, shell, and clay that were deposited in a series of transgressions and regressions of the sea during the Pleistocene Epoch. The surficial aquifer is a water-table aquifer and is present throughout the lower Coastal Plain. It overlies the Floridan aquifer system in the western part of the lower Coastal Plain and the Black Creek aquifer in the eastern part of the lower Coastal Plain. The surficial aquifer has not been described in detail or included in the cross sections because it is beyond the need and scope of the RASA study to do so.

Floridan Aquifer System

The Floridan aquifer system is generally known in South Carolina as the Tertiary limestone aquifer and in Beaufort and Jasper Counties as the principal artesian aquifer. The Floridan aquifer system generally consists of white to creamy-yellow limestone of Oligocene to middle Eocene age. This aquifer system consists of sediments comprising parts of the Cooper Formation, the Ocala Limestone and Santee Limestone (see table 1). Where present the Cooper Formation overlies the Ocala Limestone which in turn overlies the Santee Limestone.

The extent of the Floridan aquifer system has been defined by Miller (1982a, 1982b and 1985) throughout the Southeastern United States, including South Carolina. The Floridan aquifer system as defined by Miller has been revised in this report to include the permeable limestone of the Santee Limestone in outcrop and subsurface in South Carolina (sheet 2, fig. 2) (Miller, 1985, written commun., and Renken and others, 1985). The Floridan aquifer system as now defined exists throughout the southwestern quarter of the Coastal Plain of South Carolina.

The hydraulic characteristics of the Floridan aquifer system result from both primary and secondary permeability. Shell hash, found particularly in the upper part of the Ocala Limestone in South Carolina, is highly permeable. Secondary permeability resulting from the dissolution of calcium carbonate is probably not a significant factor in the Floridan aquifer system in South Carolina, especially when compared to its importance in the cavernous limestones in some parts of Florida. The permeability of the Santee Limestone is generally lower than that of the Ocala because the clay content of the Santee is greater and because of the general absence of extensive shell hash deposits in the Santee Limestone. The net result is that the transmissivity of the Floridan aquifer system is higher in Beaufort and Jasper Counties, where the Ocala Limestone is present, than in areas where it is not present (Hayes, 1979).

Tertiary Sand Aquifer

The Tertiary sand aquifer, previously designated as aquifer A2 (Aucott and Speiran, 1985a, 1985b; and Renken, 1984), consists of an upper and a lower part. The upper part is the sand facies equivalent of the Floridan aquifer system and extends from near the Fall Line to the sand-limestone facies interface near the revised updip limit of the Floridan aquifer system (sheet 2, fig. 2). Sediments comprising the upper part of this aquifer include the Barnwell, McBean, and Congaree Formations. They range in age from early to late Eocene and consist of red, gray, and greenish-yellow, fine to coarse grained sand, and lenses of gray to green clay and greenish marl (Siple, 1959). Clay and marl are particularly notable in the McBean Formation.

The lower part of the Tertiary sand aquifer extends south from its outcrop in the north-central part of the Coastal Plain. It underlies much of the upper part of the Tertiary sand aquifer and all of the Floridan aquifer system. The lower part of the aquifer consists of sediments of early Eocene and Paleocene age, including the more permeable upper part of the Black Mingo Formation.

Sediments from these Tertiary sand formations are grouped together in this report and called the Tertiary sand aquifer because on a regional basis they act hydraulically as a single aquifer. This is indicated by the general absence of a significant vertical hydraulic gradient between these formations except in areas adjacent to Georgia and near the Fall Line.

The Tertiary sand aquifer and the Floridan aquifer system can be treated as a single hydrologic unit in South Carolina because there are no significant water-level differences between them and no evidence of an intervening confining unit (Aucott and Speiran, 1984b).

Black Creek Aquifer

The Black Creek aquifer consists mostly of sediments of the Black Creek Formation and its stratigraphic equivalents but may locally include sediments of overlying formations or the underlying Middendorf Formation. It is the uppermost regional aquifer consisting of Cretaceous-age sediments. This aquifer is also known as aquifer A3a2 (Aucott and Speiran, 1984a, 1984b; and Renken, 1984) and the upper part of the former Tuscaloosa aquifer (Siple, 1967) in the western part of the upper Coastal Plain. The updip limit of the Black Creek aquifer is located in the upper Coastal Plain and is generally parallel to the Fall Line. This aquifer crops out in the eastern part and subcrops in the western part of its updip limit (sheet 2, fig. 3).

The lithology of sediments comprising the Black Creek aquifer, inferred from previous investigations, examinations of well cuttings and cores and geophysical log analysis, varies areally. The Black Creek Formation historically has been described as a lithologic entity primarily in eastern and southern South Carolina (Cooke, 1936; Siple, 1946 and 1959; and Zack, 1977). In these areas sediments that comprise the Black Creek Formation include thinly bedded micaceous sand interbedded with thin laminated layers of dark-gray to black carbonaceous clay. Parts of the sand layers are cemented with calcium carbonate. The clay content of the aquifer generally increases to the south. Sediments of the Black Creek Formation were primarily deposited in the marginal marine environment. In the western part of the upper Coastal Plain, such as in wells AK-266 through AL-22 shown on sheet 7, fig. 15, sediments of the Black Creek aquifer are typically less marine in origin and contain less clay, less calcium carbonate, and more coarse-grained sand than sediments included in this aquifer to the east and south.

In the eastern part of the Coastal Plain, the permeability of the Black Creek aquifer sediments is relatively uniform. As a result, the transmissivity becomes greater as the aquifer thickens toward the coast, but is fairly constant in the coastal area where the aquifer thickness and permeability are relatively uniform. In the western part of the upper Coastal Plain, the permeability of the Black Creek aquifer is higher because the aquifer consists primarily of coarse sand and less clay. As a result, the transmissivity of the aquifer is greater in the west than in the east. In the southern part of the State (see wells BFT-454 through CHN-183 on sheet 3, fig. 6) the permeability and transmissivity of the Black Creek aquifer are much lower because sediments are richer in clay content than in the upper Coastal Plain or along the coast to the east. The few wells that have been completed in this aquifer in Charleston and Beaufort Counties have low yields and produce water of poor quality.

Middendorf Aquifer

The Middendorf aquifer consists mostly of sediments of the Middendorf Formation and their stratigraphic equivalents but may locally include sediments of the overlying Black Creek Formation or the underlying Cape Fear Formation. This aquifer has also been known as all or part of the former Tuscaloosa aquifer (Siple, 1967; and Park, 1980) and as aquifer A3a3 (Aucott and Speiran, 1984a, 1984b; and Renken, 1984).

In both outcrop and subsurface in the upper Coastal Plain, sediments of this aquifer are primarily light-gray, white to buff sand frequently interfingered with lenses of white, pink, or purple clay that were deposited in an upper delta plain environment. In the lower Coastal Plain, the sediments of the Middendorf aquifer are lithologically similar to those of the Black Creek aquifer. They were probably deposited in a similar marginal marine or lower delta plain environment but are stratigraphically equivalent to the Middendorf Formation. This aquifer exists throughout the Coastal Plain of South Carolina and crops out along the Fall Line, except in parts of Aiken County as shown in sheet 2, fig. 4. The aquifer generally thickens from the Fall Line toward the coast.

The hydraulic characteristics of the Middendorf aquifer have a classic pattern. The permeability of the Middendorf sediments in the upper Coastal Plain remains relatively constant for some distance from the Fall Line. Because the aquifer thickens away from the Fall Line and toward the coast, the transmissivity generally increases in that direction. Transmissivity is greatest in a band roughly parallel to the Fall Line in the lower part of the upper Coastal Plain (Siple, 1957). The permeability and transmissivity in the band of highest transmissivity are higher toward the west (Barnwell County) than to the east (Florence County) because the sediments comprising this aquifer are generally the same thickness but have less clay and are generally comprised of coarser sand in the west (sheet 4, fig. 8 and 9).

In the lower Coastal Plain, the permeability of the sediments of the Middendorf aquifer generally decreases toward the coast as the percentage of clayey material increases. This results in a general decrease in transmissivity despite a small increase in thickness in most areas. Despite the decrease in transmissivity in the lower Coastal Plain, the transmissivity of the Middendorf aquifer near the coast is generally equal to or greater than that of adjacent aquifers. This is indicated by lithologic data and by the fresher quality of the water, which indicates more complete flushing of the Middendorf aquifer than adjacent aquifers (Speiran and Aucott, 1985).

Cape Fear Aquifer

The Cape Fear aquifer consists of part of the Cape Fear Formation (Sohl, 1976 a2nd Gohn and others, 1977) and underlying Cretaceous units (K1, and K2 of Gohn and others, 1978 and unit F of Brown and others, 1979) and is the basal aquifer in the Coastal Plain aquifer system of South Carolina. In most areas it consists of sand, silt, and gravel separated by relatively thick silt and clay layers. This unit has not been well defined in the Coastal Plain of South Carolina but it probably occurs only in the lower Coastal Plain and in the eastern part of the upper Coastal Plain and is not known to crop out in South Carolina (sheet 2, fig. 5). The extent of the Cape Fear aquifer is not well defined because it is rarely penetrated by wells, because it is deeper and generally is less productive than the overlying Middendorf aquifer, and because the aquifer contains poor quality water in the lower Coastal Plain.

The hydraulic characteristics of the Cape Fear aquifer are also difficult to determine because of sparse data. It is doubtful that the transmissivity is high anywhere in South Carolina. However, the transmissivity of this aquifer may be greater in the eastern part of the upper Coastal Plain and the western part of the lower Coastal Plain than elsewhere because of greater permeabilities in these areas.

Confining Units

The confining unit between the surficial aquifer and underlying aquifers is not comprised of a single formation. As such, its characteristics probably vary significantly. Where the surficial aquifer is underlain by the Cooper Formation, in the central and eastern part of the lower Coastal Plain (Colquhoun and others, 1983), this confining unit can be expected to be very effective in inhibiting the vertical movement of water through it. Even within the coastal terrace deposits, many discrete layers of clayey material occur in the surficial aquifer locally creating artesian conditions in the surficial aquifer at shallow depths below the water-table.

The confining unit in the Coastal Plain aquifer system that has the greatest effects on the flow system consists of clayey Paleocene sediments. This Paleocene clay is located below the Tertiary sand aquifer and the Floridan aquifer system and above the Black Creek and Middendorf aquifers. This confining unit is particularly notable on sheet 7, fig. 15 at wells DOR-211 (380-440 feet below sea level), DOR-38 (570-670 feet below sea level) and CHN-186 (900-1,000 feet below sea level). This is the same confining unit recognized by Siple (1967) as the Ellenton Formation in the western part of the upper Coastal Plain. The Paleocene clay, typically 40 to 100 feet thick, is so effective in inhibiting the vertical movement of water in the southern part of the Coastal Plain that the flow systems in the Tertiary aquifers and that of the Black Creek aquifer are separated better than the flow systems of any other sets of adjacent aquifers in the Coastal Plain (Aucott and Speiran, 1985b). Where this confining unit thins and becomes sandier toward its updip limit, it becomes less effective in inhibiting the vertical movement of water through it.

In eastern South Carolina, this confining unit is composed of silt, clay and marl sediments of the Peedee Formation. Because the sediments of the Peedee Formation are less able to inhibit the vertical movement of water than are the Paleocene clays that occur to the west, a major alteration in flow paths between overlying and underlying aquifers results (Aucott and Speiran, 1985b).

The confining bed between the Black Creek aquifer and the Middendorf aquifer does not appear to be as effective in restricting the vertical movement of water across it as other confining units in the system. Under unstressed conditions, the flow systems of these aquifers appear to be quite similar. However, under stressed conditions in the vicinity of Florence, S.C., a major pumping center in the Middendorf aquifer, significant water-level differences have existed for many years between these aquifers.

The tight marine clay between these aquifers which forms the confining unit between the Middendorf and Cape Fear aquifers is quite effective in separating the flow systems of these aquifers in the eastern part of the lower Coastal Plain, as indicated by water-quality and water-level differences between the aquifers. Differences in water levels between the Middendorf and Cape Fear aquifers are much less pronounced in the eastern part of the upper Coastal Plain although water-quality differences between the two exist there. In the western part of the lower Coastal Plain the effectiveness of this confining unit is somewhat questionable because limited data indicate that important water-quality differences appear to exist but water-level differences appear to be minor.

Pre-Cretaceous Units

Underlying the Coastal Plain aquifer system of South Carolina are pre-Cretaceous metamorphic and igneous rocks similar to those found near the surface in the Piedmont, and consolidated sedimentary rocks of Triassic age (Overstreet and Bell, 1965; Marine and Siple, 1974; Gohn and others, 1977; and Daniels and Zietz, 1978). The pre-Cretaceous rocks in South Carolina are much lower in permeability than the overlying sediments comprising the aquifers of the Coastal Plain and they are separated by the weathered mantle of saprolite of low permeability. The boundary between the Coastal Plain and the underlying pre-Cretaceous rocks is, therefore, an important boundary with respect to the flow of ground water in the Coastal Plain aquifers.

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Table 1. — Generalized geohydrologic correlation chart (Adapted from Siple, 1959)

Aquifer	System	Geologic formations[1]	Description
Surficial	Quaternary	Coastal terrace deposits	Sand and clay, reddish-brown, orange and white.
Floridan aquifer system[2] (downdip)	Tertiary	Cooper Formation[3] (lower part)	Limestone and marl, gray to white, silty to sandy, phosphatic .
		Ocala Limestone	Limestone, white to cream, calcitized, fossiliferous, glauconitic.
		Santee Limestone	Limestone, white to creamy yellow, fossiliferous, glauconitic; interbedded in part with gray to yellow sandstone.
Tertiary sand (updip)	Tertiary	Barnwell Formation	Sand, red to brown, fine-to coarse-grained, massive.
		McBean Formation	Sand, green to yellow, fine-grained, glauconitic; gray-green glauconitic marl.
		Congaree Formation	Sand and sandstone, yellowish-brown to green, fine-to coarse-grained, quartzose, glauconitic; dark green to gray clay.
		Black Mingo Formation (Upper Part)	Shale, gray, sandy; black sandy limestone may be carbonaceous and fossiliferous in places.
Black Creek	Cretaceous	Black Creek Formation	Sand, gray to white, quartzose, calcareous, micaceous, phosphatic, glauconitic; dark gray to black thinly laminated clay containing nodules of pyrite and marcasite and fragments of lignite.
Middendorf	Cretaceous	Middendorf Formation	Sand, light-gray, fine-to coarse-grained, micaceous, glauconitic, and in part calcareous; green, purple, and maroon clay; greenish-gray micaceous silty sandstone.
Cape Fear	Cretaceous	Cape Fear Formation	Clay, reddish-brown, gray and green; yellow to white fine-to coarse-grained sand with traces of mica.

[1] These are geologic formations that are generally associated with a given aquifer. However, a given aquifer may not consist of the same formations in all areas, and locally an aquifer may consist of parts of additional formations not listed.
[2] Carbonate equivalent of the Tertiary sand aquifer.
[3] Since this report was prepared the Cooper Formation in South Carolina has been raised to group rank and its members to formation rank (Weems and Lemon, 1984).

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GEOHYDROLOGIC FRAMEWORK OF THE COASTAL PLAIN AQUIFERS OF SOUTH CAROLINA

BY
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