North Carolina
Department of Conservation and Development
R. Bruce Etheridge, *Director*

Division of Mineral Resources
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Bulletin Number 51

# Ground Water

## IN THE

# Halifax Area, North Carolina

By

M. J. Mundorff

Prepared in Cooperation with the United States Geological Survey

Raleigh
1946

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## LETTER OF TRANSMITTAL

Raleigh, North Carolina
September 19, 1946

*To His Excellency,* HON. R. GREGG CHERRY,
*Governor of North Carolina.*

SIR:

I have the honor to submit herewith, manuscript for publication as Bulletin 51, "Ground Water in the Halifax Area, North Carolina," by M. J. Mundorff.

This report is one of a series which is being prepared as a part of the cooperative study of the ground water resources of the State by the North Carolina Department of Conservation and Development and the United States Geological Survey. As pointed out in Bulletin 47, "Progress Report on Ground Water in North Carolina," in some parts of the State ground water supplies are becoming more and more important, particularly for public schools, some manufacturing plants, and smaller towns. It is hoped that the present report and future ones will prove of assistance to those persons engaged in the development of such sources.

The study is being continued and additional reports, covering other areas, will be presented as rapidly as they are completed.

Respectfully submitted,

R. BRUCE ETHERIDGE,
*Director.*

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# ABSTRACT

The area covered by this report is in the northern part of the State, along the Fall Zone, and consists of Northampton, Halifax, Nash, Edgecombe, and Wilson Counties. The hydrologic and much of the geologic and physiographic data on which the paper is based were obtained during several months of field work during the winter of 1941-1942. The area contains 2,698 square miles and has a population of 239,800 (1940). The average annual precipitation is fairly uniform over the area, the seven stations averaging 45.45 inches.

Approximately the western two-fifths of the area is in the Piedmont province and the eastern three-fifths in the Coastal Plain province. The boundary between the two is the Fall Zone.

The rocks in the Piedmont area are chiefly slate, schist, gneiss, and granite of pre-Cambrian and Paleozoic age. At the Fall Zone these older rocks dip eastward beneath the sands, clays, and marls of Cretaceous and Tertiary age which comprise the deposits of the Coastal Plain. Overlying all the strata mentioned above is a thin blanket of sands and gravels comprising the Pleistocene terrace deposits. These have been eroded only slightly within the Coastal Plain, but erosion is progressively greater westward so that only isolated patches remain in the extreme western part of the area.

Small to moderate supplies of ground water are obtained from wells in the granite and somewhat larger supplies from wells in the slate, schist, and gneiss. Moderate to large supplies of water may be obtained from the deposits of Cretaceous age in the eastern part of the area, a few miles east of the Fall Zone. The Yorktown formation, of Miocene age, is a fair aquifer in this area, and the Pleistocene deposits generally yield small to moderate supplies to shallow wells. The area along the Fall Zone has been one of the most difficult in which to obtain satisfactory water supplies, because the crystalline bedrock is covered by a thin layer of sediments which prevents the use of surface outcrops in selecting favorable sites for drilling wells into it. Moreover, the sediments are so thin that many wells will fail to encounter satisfactory aquifers in them. Generally, the most satisfactory means of obtaining a water supply is to put down shallow well point systems or gravel-packed wells of shallow to moderate depths, obtaining water from the surficial Pleistocene deposits, the Yorktown formation or the Cretaceous deposits.

The water is generally potable, the principal objectionable constitutent usually being iron. The iron is either dissolved from the rock and is present when the water enters the well, or it comes from the corrosive action of the water on the iron casing, pipes, etc. In a few wells, especially in the granite and in some of the formations in the Coastal Plain, the water is rather hard. The hardness is nearly always due to calcium and magnesium bicarbonate. The temperature of the ground water averages about 62°F.

About 75 percent of the total population uses ground water. In the eastern half of the area there is a large supply of water in the strata of Cretaceous age, which is practically undeveloped.

The source and occurrence of ground water and the hydrologic properties of the several formations are described in this paper. Data on about 800 wells, chemical analyses of 49 samples of ground water, and the logs of a number of wells are given in connection with the county descriptions.

# GROUND WATER IN THE HALIFAX AREA, NORTH CAROLINA

## INTRODUCTION

This report gives the results of an investigation of the ground-water conditions in an area consisting of Edgecombe, Halifax, Nash, Northampton, and Wilson Counties. It is the first of a series of ground-water investigations being made through a continuing cooperative agreement between the Division of Mineral Resources, North Carolina Department of Conservation and Development, and the Geological Survey, United States Department of the Interior. The work was done under the general supervision of J. L. Stuckey, State Geologist, and O. E. Meinzer, and V. T. Stringfield of the Federal Geological Survey.

The field work of this investigation was done principally in the winter of 1941-42 and consisted of obtaining data on about 800 wells, a number of springs, and the 23 municipal water supplies, collecting samples of water from wells and springs, mapping the geology and physiography, and collecting data on the stratigraphy and lithology of the different formations. Information on the wells was obtained by interviewing the well-owners or operators and the well drillers. Much of the information was given from memory, and, therefore, some of it may not be absolutely accurate.

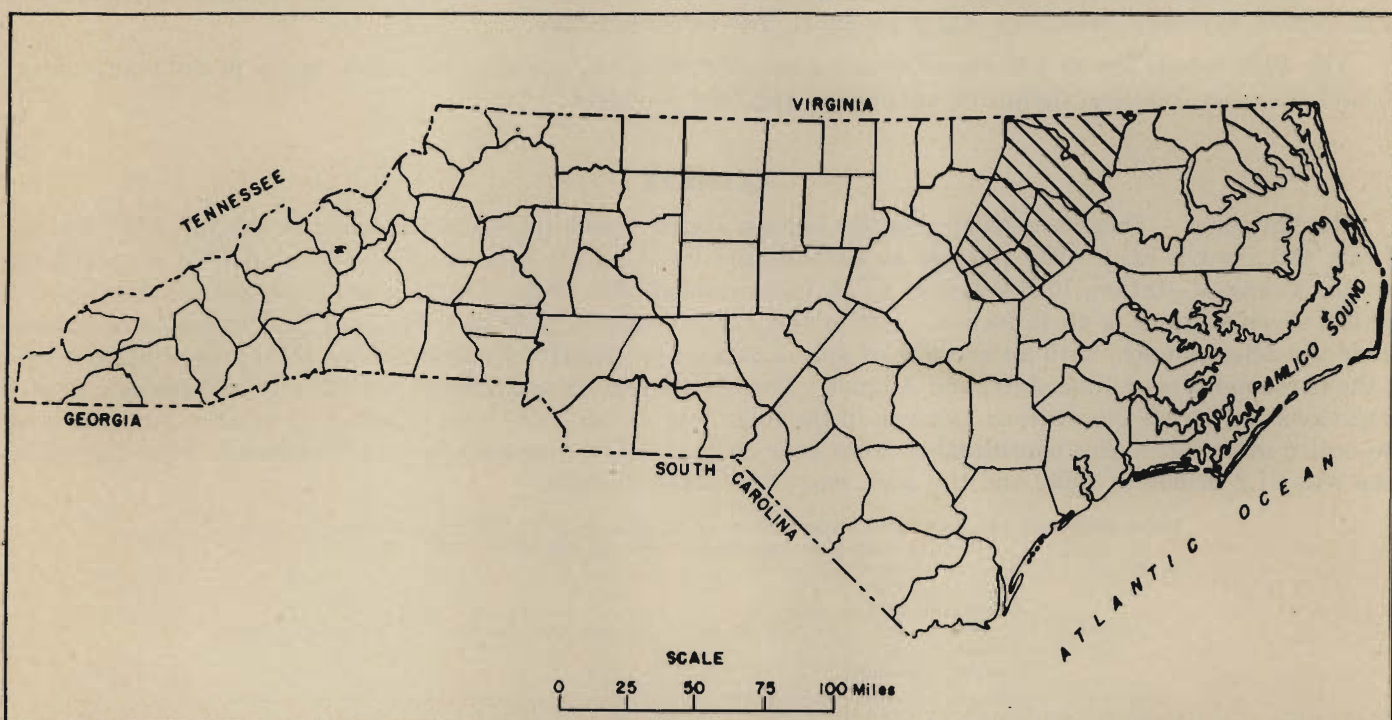


FIG. 1.—Index map of North Carolina showing the area covered by this report (shaded area).

The geology of the area was mapped during the course of the field work. However, the part of the geological map that covers the area within the Coastal Plain is based principally upon the geological map previously published by the State.[1] The map of the terraces is based on field observations made during the present investigation. In the southern half of the area, this mapping was aided by the use of topographic maps of the U. S. Geological Survey. As the northern half of the area has not been mapped topographically, the terraces are much less accurately delineated there.

[1] Clark, Wm. B; Miller, B. L.; and Stephenson, L. W., The Coastal Plain of North Carolina: North Carolina Geol. and Econ. Survey vol. III, 1912.

The chemical analyses were made by M. D. Foster, E. W. Lohr, and L. W. Miller, of the Federal Geological Survey.

The writer wishes to acknowledge the kind and courteous assistance given him by well owners, drillers, superintendents of public water supplies, and many others. Especial acknowledgment is due the well drillers, including the Carolina Drilling & Equipment Co., Heater Well Co., R. L. Jones, Layne Atlantic Co., C. W. Norton, Sydnor Pump & Well Co., and the Virginia Machinery & Well Co., who freely gave data from their files and from memory.

## GEOGRAPHY

The area described in this report is in the northeastern part of the State, bordering the Virginia State line, and includes Northampton, Halifax, Nash, Edgecombe, and Wilson Counties with a total area of 2,698 square miles. The location of the area is shown in figure 1.

The area had a population of 239,800 in 1940, according to the U. S. Census Bureau report, which was about 89 to the square mile. There are 43 incorporated cities and towns, with an aggregate population of 84,725, which is about 35 percent of the total population of the area. Two cities, Rocky Mount and Wilson, have more than 10,000 people, and nine have more than 1,000.

Agriculture is the most important occupation in the area, and the value of all farm products in 1939 was slightly more than $25,000,000, the value of the tobacco crop being about $13,300,000. Other products are peanuts, cotton, livestock, corn, hay, dairy products, and sweet potatoes.

The 1940 census shows 128 manufacturing establishments in the area, engaged chiefly in the manufacture of lumber, paper, textiles, furniture, chemicals, and food products.

### CLIMATE

**Precipitation.**—There are seven weather bureau stations within the area at which a record of the amount of rain and snow is kept. The stations at Tarboro and Weldon were established in 1871 and 1872, respectively; and the youngest station, Rocky Mount no. 2, was established in 1915. The average mean annual precipitation for the seven stations is 45.45 inches. July is the wettest month, with an average of 5.58 inches, and November is the driest month, with an average of only 2.25 inches. Nearly 33 percent of the total precipitation occurs in the three months of June, July, and August. The mean monthly and annual rainfall for each station, as well as the average for all the stations, is given in the following table. The precipitation is nearly uniform over the entire area, but varies considerably from year to year. The largest annual precipitation over the entire area was 61.2 inches in 1929, and the least was 32.6 inches in 1930.

MEAN MONTHLY AND ANNUAL PRECIPITATION, IN INCHES, AT U. S. WEATHER BUREAU STATIONS WITHIN THE AREA, FOR THE PERIOD OF RECORD TO 1943

| STATION | Elevation (feet above sea level) | Year station was established | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nashville | 190 | 1895 | 3.26 | 4.08 | 3.72 | 3.66 | 3.79 | 4.89 | 6.08 | 4.88 | 4.05 | 3.10 | 2.34 | 3.60 | 47.45 |
| Rocky Mount 1 | 105 | 1905 | 3.40 | 4.00 | 3.40 | 3.40 | 3.90 | 4.41 | 5.40 | 5.00 | 3.60 | 3.20 | 2.20 | 3.60 | 45.50 |
| Rocky Mount No. 2 | 105 | 1915 | 3.40 | 3.80 | 3.60 | 3.60 | 4.00 | 4.20 | 5.60 | 4.40 | 3.60 | 3.20 | 2.30 | 3.70 | 45.40 |
| Scotland Neck | 80 | 1905 | 3.20 | 3.80 | 3.60 | 3.40 | 3.60 | 4.60 | 5.50 | 4.40 | 3.40 | 2.80 | 2.20 | 3.60 | 44.10 |
| Weldon | 81 | 1872 | 3.10 | 3.39 | 3.85 | 3.26 | 3.72 | 4.60 | 5.43 | 4.75 | 3.37 | 2.74 | 2.28 | 3.50 | 43.99 |
| Enfield | 99 | 1910 | 3.20 | 3.60 | 3.80 | 3.60 | 3.60 | 4.60 | 5.20 | 4.80 | 3.80 | 2.70 | 2.10 | 3.70 | 44.70 |
| Tarboro | 50 | 1817 | 3.44 | 4.12 | 3.79 | 3.46 | 3.74 | 4.60 | 5.87 | 5.39 | 3.59 | 2.89 | 2.33 | 3.79 | 47.01 |
| Average | | | 3.29 | 3.83 | 3.68 | 3.48 | 3.76 | 4.56 | 5.58 | 4.80 | 3.63 | 2.95 | 2.25 | 3.64 | 45.45 |

The average annual snowfall is about 8 inches.

**Temperature.**—Records of temperature are kept by the U. S. Weather Bureau at Nashville, Scotland Neck, Tarboro, and Weldon. In addition, records of temperature are available for Eagleton, in Northampton County, from 1904 to 1922 and for Littleton from 1891 to 1905. The average mean annual temperature for these six stations is 59.6°F. January with an average mean temperature of 41.4°F. is the coldest month, and July with an average mean of 79.5°F. is the warmest month. Littleton, with an annual mean of 57.6° has the coldest temperature, which is to be expected since it is the farthest north and has the highest elevation of all the stations.

The average date of the last killing frost in the spring is about April 10, and the average date of the first killing frost in the autumn is about October 28, leaving an average growing season of about 201 days.

### DRAINAGE

The area is drained by a number of nearly parallel, southeastward flowing streams, the largest of which, listed in order of occurrence from north to south, are the Meherrin River, Roanoke River, Fishing Creek, Swift Creek, Tar River, and Contentnea Creek. All these streams rise in the Piedmont, west of the area described in this report. In the western half of the area they occupy valleys, generally 150 to 200 feet deep, with narrow flood plains; but east of the Fall Zone, the valleys are wider and less deep and have extensive flood plains. In general, the stream gradient ranges from 1.4 to 2.0 feet per mile above the Fall Zone, 2.5 to 5.0 feet per mile in the Fall Zone, and 0.5 to 1.25 feet per mile below the Fall Zone.

## PHYSIOGRAPHY

The area described in this report lies in two major physiographic provinces, about the western two-fifths being in the Piedmont province and the eastern three-fifths in the Coastal Plain province. The general slope of the upland surface in both provinces is southeastward, the direction in which the stream valleys trend. In the Piedmont province the older crystalline rocks are at or near the surface, but in the Coastal Plain province the erosion surface formed on them dips beneath the sedimentary formations of the Coastal Plain. The southeastward flowing streams have cut down into these sediments much more easily than into the crystalline rocks, and thus falls and rapids have been developed in all the streams along the southeastern margin of the Piedmont province.

According to Fenneman[1] the boundary between the two provinces should be drawn at the western limit of the Cretaceous formations, and where they are absent, at the western margin of the Tertiary. The boundary between the two also has sometimes been drawn at the western limit of the Pleistocene terrace deposits which overlap the Cretaceous and Tertiary formations. However, the topography developed on the higher terraces is much more typical of the Piedmont province than of the Coastal Plain, and furthermore, erosion has removed much of these terrace deposits so that the crystalline rocks form a large part of the surface. For these reasons, the boundary line as defined by Fenneman is used in this report. From north to south the boundary line passes approximately through Pleasant Hill and Weldon, thence through points near or west of Halifax, Enfield, Whitakers, Battleboro, Rocky Mount, and Wilson, thence veering westward south of Wilson, towards Selma in Johnston County.

In the western part of Northampton, Halifax, Nash, and Wilson Counties the topography is typical of the Piedmont province. Crystalline rocks are at the surface or are covered only by discontinuous patches of unclassified high-level sand and gravel and remnants of the Brandywine and Coharie terrace deposits. The relief is 150 to 200 feet near the larger streams where the surface has been eroded to approximate maturity. The interstream areas have much less relief and in places are poorly drained. The comparatively flat areas west of, and higher than, the westernmost Pleistocene terrace, were formed by erosion and are what is left of the extensive pre-Pleistocene peneplain. Along the western margin of the area, the upland is 300 to 400 feet above sea level. In the Piedmont province the eastward slope of the surface is 12 to 15 feet per mile, but in the Coastal Plain province the slope flattens out to about two or three feet per mile. The eastern edge of the area is only about 60 to 90 feet above sea level.

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[1] Fenneman, N. M.; Physiographic Divisions of the United States: Assoc. Am. Geographers Annals, vol. 18, no. 4, p. 290, 1928.

The Coastal Plain province is underlain by a wedge of Tertiary and Cretaceous sediments, which are 1,500 to 2,000 feet thick along the coast but become thinner westward until they disappear along the Fall Zone. However, these formations are rarely exposed at the surface as they are covered nearly everywhere by the Pleistocene terrace deposits. These terraces are the outstanding physiographic features of the Coastal Plain province, forming irregular belts extending northeast-southwest across the eastern part of the State. The highest terrace is believed to be the oldest, and the lower terraces are successively younger. The terraces were formed at the margin of the sea when it stood at different levels in Pleistocene time. They slope gently eastward and were formed during comparatively long halts in the fluctuation of the sea level. Each terrace is generally separated from the next higher one by a more or less pronounced scarp, which marks the shore line of the sea that formed it.

The Brandywine and Coharie terraces and part of the Sunderland terrace lie within the Piedmont province in the five counties described in this report. The Brandywine terrace is the oldest and highest of the Pleistocene terraces and is shown as a narrow belt on the geologic map, plate 2. However it has undergone considerable erosion and no longer forms a continuous surface. This terrace is about 270 feet above sea level at its western margin, the former shore line, and slopes eastward to about 230 feet above sea level. The Coharie terrace is next lower and younger and forms a similar belt east of the Brandywine terrace. It slopes eastward from

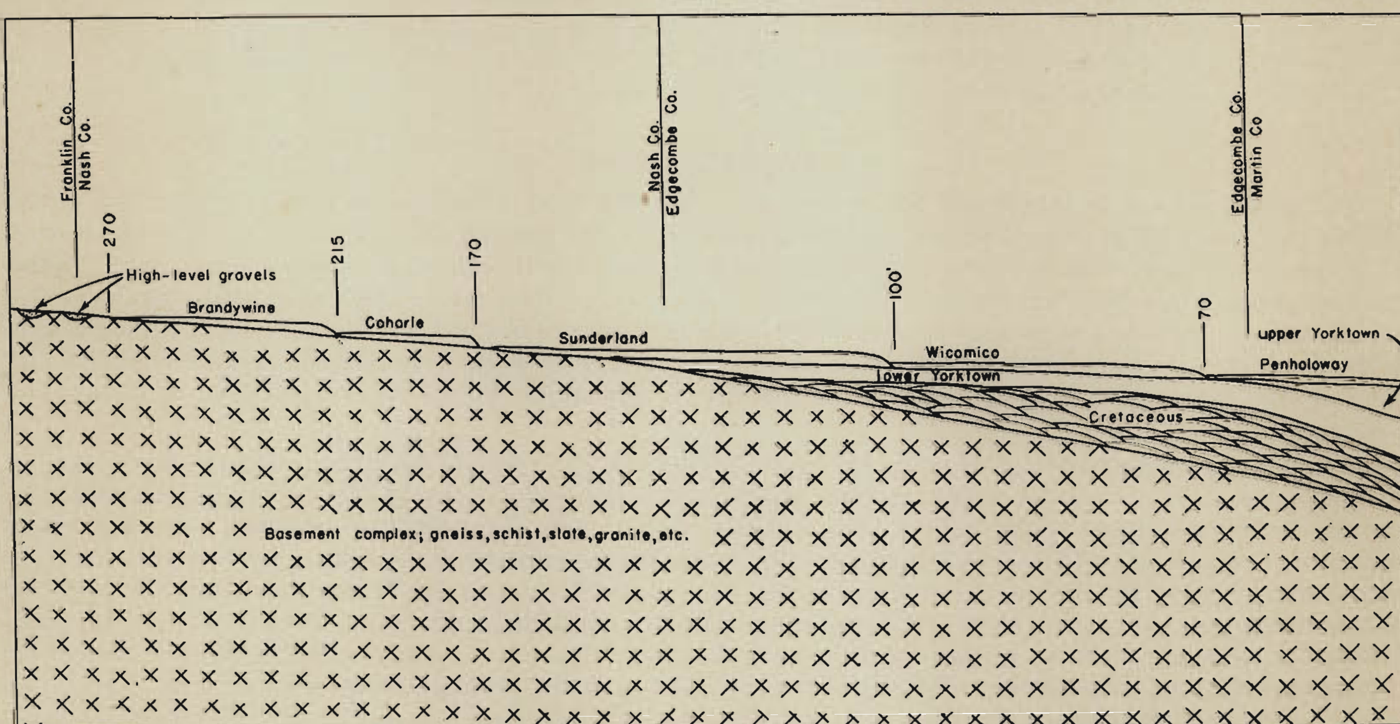


FIG. 2.—Generalized physiographic and geologic section of the Halifax area.

about 210 feet to 170 feet. The third terrace, the Sunderland, lies chiefly within the Coastal Plain province and is the most extensive terrace within the area, covering a belt 18 to 25 miles wide and occupying considerable areas in each of the five counties. Long tongues of this terrace border the major streams and extend for a number of miles west of the main belt. This and the lower terraces are much flatter and have undergone much less erosion than the two higher terraces. The Sunderland terrace slopes from about 170 feet at its inner boundary to about 110 feet. The Wicomico terrace is also quite extensive, its main development being in eastern and northern Edgecombe, and in eastern Halifax and southeastern Northampton Counties. It is quite flat, and considerable areas are poorly drained. At the inner margin it is about 100 feet, and along the seaward margin is about 65 to 70 feet above sea level. It usually is separated from the Penholoway terrace by a well-defined scarp. The Penholoway terrace, with an elevation of from 45 to 60 feet above sea level, has its most extensive development east of the area described, but tongues from the main belt extend up the principal streams. Its most extensive development within the area is north and west of Tarboro, in Edgecombe County. The two lowest terraces, the Talbot, at 30 to 40 feet, and the Pamlico, below 25 feet, are found only bordering the larger streams in the eastern part of the area.

# GEOLOGY

## STRATIGRAPHY

The formations of eastern North Carolina are listed in the following table. The oldest rocks are listed at the bottom of the table, and the formations toward the top are successively younger. The distribution of the formations is shown on the maps, plates 1 and 2.

GEOLOGIC FORMATIONS IN EASTERN NORTH CAROLINA

| Age | | | Formation | Description | Water-bearing properties |
|---|---|---|---|---|---|
| Cenozoic | Quaternary | Pleistocene | Pamlico formation†<br>Talbot formation†<br>Penholoway formation†<br>Wicomico formation†<br>Sunderland formation†<br>Coharie formation†<br>Brandywine formation† | Gravel, sand, and clay and sandy clays, often cross-bedded. Yellow brown, red color. 0-40′± thick. | Yields small to moderate supplies to shallow domestic wells. In some areas moderately large supplies are obtained from gravel-walled wells or groups of screened well points which penetrate clean sand and gravel. |
| | Tertiary | (?)* | Unclassified high-level gravels, sands, and clays† | Yellow and red clays, sandy clays and gravels in clay maxtrix; often cross-bedded. 0-60′ thick | Yields small supplies to shallow domestic wells and a few larger supplies to screened or gravel-walled wells. |
| | | Pliocene | Croatan sand‡<br>Waccamaw formation‡ | | |
| | | Miocene | Upper part of Yorktown formation‡<br>Duplin Marl‡<br>Lower part of Yorktown formation†<br>Trent marl‡ | Marine. Clays, sandy clays and shell marl; characteristically blue in color; some fine sand strata. 40-70′ thick (in this area) | Usually yields small supplies. The water is usually hard; often colored, and has objectionable odor. A few larger supplies are obtained from screened or gravel-walled wells which penetrate clean sand. |
| | | Eocene | Castle Hayne marl‡<br>Black Mingo formation‡ | | |
| Mesozoic | Cretaceous | Upper Cretaceous<br>Lower Cretaceous? | Peedee formation‡<br>Black Creek formation‡<br>Tuscaloosa formation‡<br>(undifferentiated)† | Clay, sand and sandy clay; some gravel; characteristically lenticular, often cross-bedded, drab, brown and reddish colors common. 0-400′±thick | Important water-bearing formation. Yields moderate to large supplies from sand and gravel lenses, a few miles east of Fall Zone. Smaller supplies are obtained father west as the formation becomes thinner. Water is usually soft and sometimes contains considerable iron. |
| Paleozoic | Carboniferous(?) | | Granites† | Medium grained granodiorite to coarse, porphyritic orthoclase granite. | None to small supplies in areas of massive rock, small to moderate supplies where the rock is more jointed and fractured and in upper, weathered zone. Water is free from iron, usually moderately soft. |
| Proterozoic | Pre-Cambrian (?) | | Slates and schists† | Slate, schist, and phyllites, metamorphosed lavas, tuffs, and volcanic breccias. In places cut by many quartz veins; also by some diabase dikes. | Yields small supplies from metamorphosed lavas and tuffs. Larger supplies are obtained from schists and phyllite, especially where quartz veins are plentiful. Water is usually soft; often contains objectionable amounts of iron. |
| | Pre-Cambrian | | Gneisses and schists† | Granite-gneiss, mica schist | Small supplies in areas of massive rock; moderate supplies where schistosity or jointing are well developed. Water is only moderately soft, sometimes contains objectionable iron. |

† Formation present in Halifax area.
‡ Formation not found in Halifax area but present in other parts of the Coastal Plain of North Carolina.
* The age of these deposits is indefinite. They may include representatives of several ages, some possibly as old as the the Cretaceous.

**Pre-Cambrian gneisses and schists:**—These rocks consist of gneisses and schists that were formed from granites and other igneous rocks and probably some sedimentary formations. They have undergone considerable metamorphism by heat and pressure and have been greatly deformed. The rocks include granite-gneiss and schists and quartz-mica schists. Although the stratigraphic relationship of these rocks to rocks of known age has not been determined in this area, they are considered to be pre-Cambrian because of the intense deformation they have undergone and their lithologic similarity to pre-Cambrian rocks in other areas.

**Pre-Cambrian (?) slates and schists:**—This is a thick sequence of slates, phyllites, and sericite schists which were metamorphosed from sedimentary and igneous rocks, including lavas, tuffs, and breccias. Sedimentary formations apparently predominated. The degree of metamorphism, except near the contact of the intrusive granite, is much less than in the gneisses and schists described above. The age of these rocks is probably pre-Cambrian.

**Carboniferous (?) granites:**—The granites range from a pink, orthoclase granite to quartz monzonite and quartz diorite. The orthoclase granite has both equigranular and porphyritic phases, but only equiangular phases of the quartz diorite were observed. The granites are intrusive into the slates and schists of pre-Cambrian (?) age and along the contact occasionally have developed a gneissic structure. Similar granites in other areas have been determined to be late Paleozoic in age and have been correlated with a period of intrusion in Carboniferous time. Intruded into the granites are diabase dikes which, in other areas, have been shown to be of Triassic age.

**Cretaceous deposits (undifferentiated):**—The undifferentiated Cretaceous deposits are the oldest sedimentary deposits recognized in the Coastal Plain of North Carolina. They consist of sands and clays and mixtures of the two varying proportions. The sands are fine to very coarse in texture, are commonly arkosic and often contain considerable mica. These strata rest directly upon igneous and metamorphic rocks of pre-Cretaceous age, and were deposited as stream and near-shore deposits at the margin of the sea lying to the east. Having been formed as stream deposits or as beach, bar, or lagoon deposits, none of the layers are of very great extent laterally but occur as lenses and stringers.

The strata range in thickness from a feather edge along their western margin to more than 400 feet at their maximum development 30 or 40 miles to the east. The oldest formation overlying these strata, in the Halifax area, is the lower part of the Yorktown formation of Miocene age; but a short distance south and east of Edgecombe and Wilson Counties they are overlain by the Black Creek formation of Upper Cretaceous age.

The basal Cretaceous deposits of North Carolina originally were called the "Cape Fear" by L. W. Stephenson[1] and were assigned to the Lower Cretaceous. A few years later he correlated the "Cape Fear" with the Patuxent formation in Maryland and Virginia, and abandoned the name "Cape Fear" in favor of Patuxent[2]. The Patuxent formation in Maryland and Virginia is of Lower Cretaceous age. However, in 1925 C. W. Cooke[3] showed that, in the southern part of the State, the formation under consideration is mostly, if not entirely, of Upper Cretaceous age and that it is chiefly the northward extension of the Tuscaloosa formation as recognized in Alabama and Georgia.

The Cretaceous deposits in the Halifax area are very similar in lithology, structure, and thickness to the Tuscaloosa formation in the southern part of the State and appear to form a continuous unit with the Tuscaloosa. However, similar beds in southeastern Virginia have been correlated with the Patuxent formation of Lower Cretaceous age. It is possible that both formations are represented in the Halifax area. In this report these deposits are called Cretaceous (undifferentiated).

**Miocene (Yorktown formation).**—The Yorktown formation consists predominantly of arenaceous marls and clays with subordinate sand strata. The color is characteristically blue and fossil shells are often present. The lower part of this formation forms a blanket over almost the entire part of the area that lies within the Coastal Plain, and few wells drilled to 60 feet or more have failed to encounter "blue clay" or "blue marl." In previous years the marl was dug extensively for applying to the soil because of the beneficial action of the lime.

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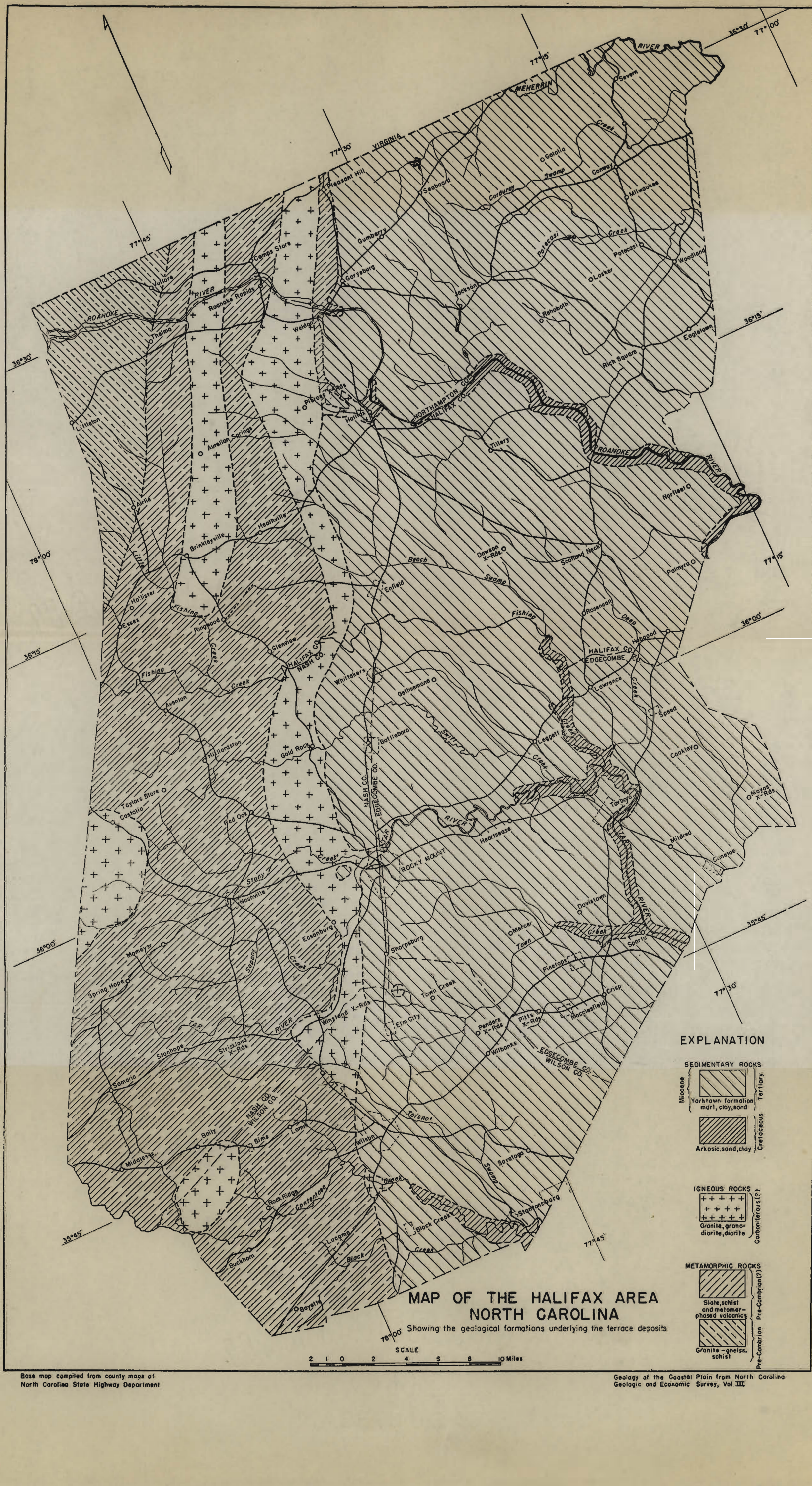
[1] Stephenson, L. W., Some facts relating to the Mesozoic deposits of the Coastal Plain of North Carolina: Johns Hopkins University Cir. new. ser. no. 7 (Whole no. 199), pp. 93-99, 1907.

[2] Clark, Wm. B.; Miller, B. L.; Stephenson, L. W., The Coastal Plain of North Carolina: North Carolina Geol. and Econ. Survey Vol. III part I, 1912.

[3] Cooke, C. Wythe, Correlation of the coastal Cretaceous beds of the southeastern states: U. S. Geol. Survey Prof. Paper 140 F, pp. 137-39, 1925 (1926).




Base map compiled from county maps of North Carolina State Highway Department

Geology of the Coastal Plain from North Carolina Geologic and Economic Survey, Vol. III

This formation was mapped in about 1910 by Benjamin L. Miller and was correlated with the St. Marys formation of Maryland[1]. A. Olsson[2], in 1917, proposed the name "Murfreesboro" for the lower part of the upper Miocene deposits extending from central Virginia to central North Carolina. He stated that this formation was much more closely related to the Yorktown than the St. Marys. W. C. Mansfield[3], in 1929, assigned the "Murfreesboro" stage of Olsson to the lower part of the Yorktown. Since the name "Murfreesboro" is pre-occupied by the Murfreesboro limestone, of Ordovician age, in Tennessee and Virginia, the formation should properly be known as Yorktown. Only the lower part of the Yorktown occurs within the Halifax area.

**Unclassified high-level gravels, sands, and clays of tertiary and Cretaceous (?) age:**—These deposits formerly were called the "Lafayette formation" which, as originally defined by L. W. Stephenson[4], included gravel, sand, and clay, in many places cross-bedded, of fluviatile and marginal marine origin between 230 and 400 feet above sea level. The age was given as Pliocene, and it was considered to have been deposited as a more or less continuous terrace deposit on an irregular erosion surface. It has since been shown by C. Wythe Cooke[5] that the formation, as originally defined and mapped, included the Brandywine terrace of Pleistocene age, which lies at 220 to 270 feet above sea level. Furthermore, the name "Lafayette" has been abandoned[6] because the deposits at the type locality were shown, by E. W. Berry, to be of Eocene age and did not represent the concept of the high-level gravels. Accordingly, in this report these deposits will be called "unclassified high-level gravel, sand, and clay" or, more briefly "high-level gravel". The deposits apparently are entirely continental and were formed as stream channel and flood plain deposits and basin fill over the eastern and central Piedmont. After their deposition, a long period of erosion formed a planation surafce beveling alike the fill and the crystalline rocks in which the channels and basins were cut. When the area was later uplifted, the streams cut new channels without regard to the courses of the previous streams; and, as a result, many of these channel fillings are found on the present interstream divides. Plate 6, B and C, show two such channels in schist at the western edge of Nash County. These deposits may include representatives of several different ages, some possibly as old as the Cretaceous.

**Pleistocene terraces and terrace deposits:**—The Pleistocene terraces of the Coastal Plain in North Carolina were first recognized by B. L. Johnson[7] who listed seven terraces between sea level and 320 feet above sea level. However, L. W. Stephenson[8], a few years later mapped the highest two terraces as a single terrace, the "Lafayette." More recent work, especially by C. Wythe Cooke[9], has resulted in the recognition of seven Pleistocene terraces and formations along the Atlantic Coastal Plain.

Seven Pleistocene formations, underlying the terraces of the same names, have been recognized in the present investigation. The terraces, from youngest to oldest with the elevation of the strand line, are: Pamlico, 25 feet; Talbot, 42 feet; Penholoway, 70 feet; Wicomico, 100 feet; Sunderland, 170 feet; Coharie, 215 feet; Brandywine, 270 feet. These terraces form roughly parallel belts trending northeast-southwest across the Coastal Plain, with the lowest terrace adjacent to the coast and the higher ones successively westward. The lowest two, however, are of limited extent within the area, occurring only as tongues extending up the major streams from the main body of the terrace to east.

The Pleistocene formations, which are cross-bedded in many places, consist of sands, clays, and mixtures of the two. They contain quartz pebbles, in some exposures, especially at the base of the formation. The colors of the deposits include gray, yellow, brown, and red, with the formations of higher elevation, which are also the oldest, having the most color. The formations of higher elevation also have more coarse material and more cross-bedding than those of lower elevation. The thickness ranges from a few feet to 60 feet or more, averaging about 25 or 30 feet.

The four highest terraces do not contain marine fossils and, therefore, are not definitely proven to be of marine origin. However, the continuity, uniform altitude and thickness, flat surface, well-developed scarps, and universal development are strong arguments in favor of a marine origin.

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[1] Op. Cit. (The Coastal Plain of North Carolina) p. 197.
[2] Olsson, Alex A., The Murfreesboro stage of our East Coast Miocene: Bull. Am. Paleontology; vol. 5, no. 28.
[3] Mansfield, W. C., The Chesapeake Miocene basin of sedimentation as expressed in the new geologic map of Virginia: Washington Acad. Sci. Jour., vol. 19, p. 266, 1929.
[4] Op. Cit. (The Coastal Plain of North Carolina)
[5] Cooke, C. Wythe, Correlation of coastal terraces, Jour. Geology, vol. 38, pp. 557-589, 1930.
[6] Matson, G. C., The Pliocene Citronelle formation of the Gulf Coastal Plain, U. S. Geol. Survey Prof. Paper 981, pp. 167-192. 1917.
[7] Johnson, B. L., Pleistocene terracing in the North Carolina Coastal Plain, Science, new. ser. vol. 26, pp. 640-642, 1907.
[8] Op. Cit. (The Coastal Plain of North Carolina).
[9] Cooke, C. W., Seven coastal terraces in the southeastern States: Washington Acad. Sci. Jour. vol. 21, no. 21, pp. 503-513, 1931.
Geology of the Coastal Plain of South Carolina: U. S. Geol. Survey Bull. 867, p. 130, 1936.
Geology of the Coastal Plain of Georgia: U. S. Geol. Survey Bull. 941, pp. 103-113, 1943.

## GEOLOGICAL HISTORY

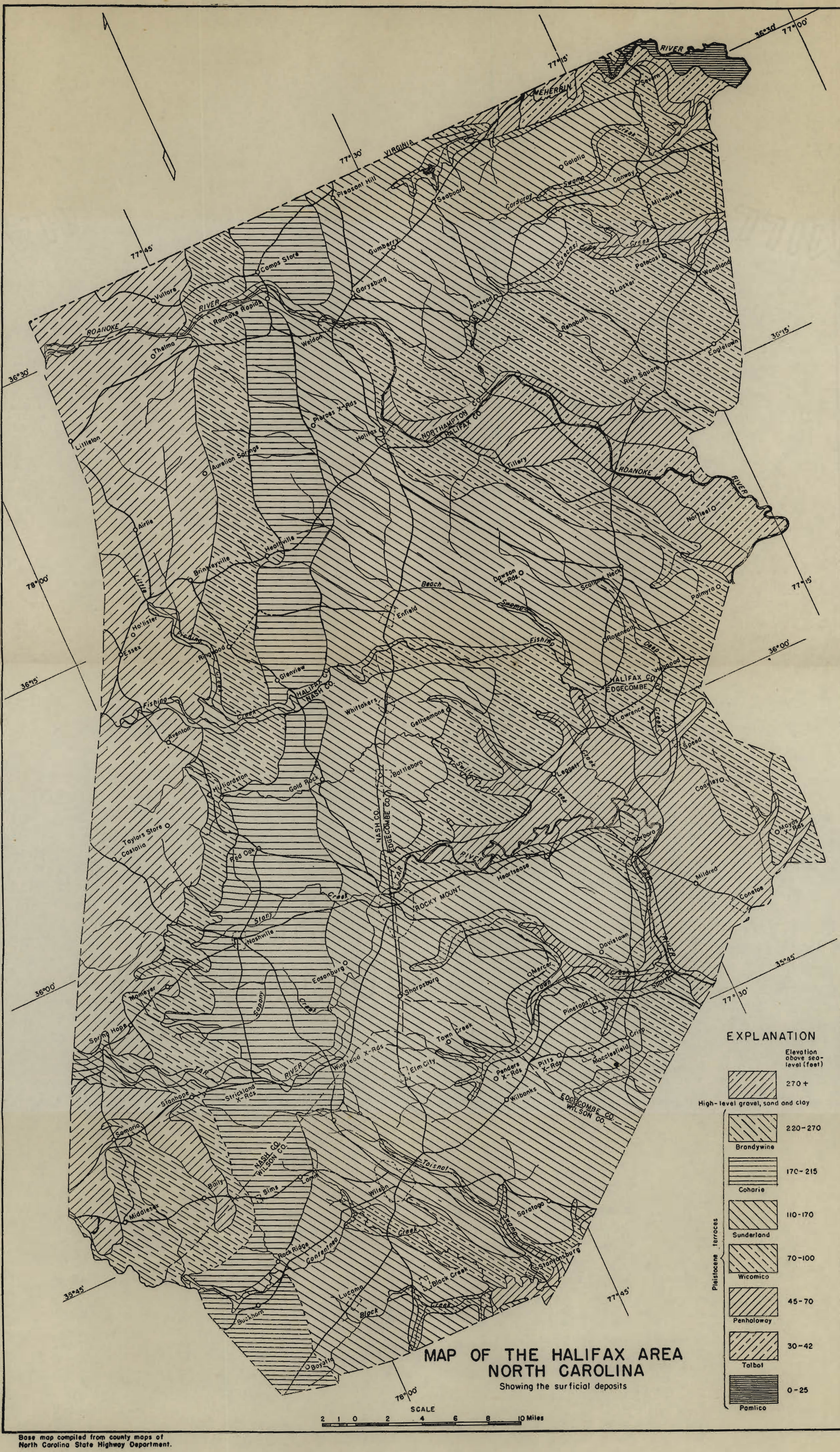
Geological history, in common with any other kind of history, is comparatively clear and definite regarding recent events, but becomes less definite as we trace it back to its beginning. Geological history is written in the rocks, their character and structure, in the evidences of life contained in them, and in the topography of the surface developed on them. Through geological time natural forces have been continually acting on the rocks—weathering, eroding, transporting, depositing, consolidating, and changing by heat and pressure—to obscure and destroy the earlier records. For these reasons, the earliest geological history of an area can only be interpreted in a broad and general way.

The oldest rocks in the Halifax area appear to be the metamorphic rocks in northwestern Halifax and Northampton Counties, which presumably are of Pre-Cambrian age. These gneisses and schists originated in part as granite and, probably, in part as sediments. It is probable that they underwent some metamorphism before the period in which the rocks now classed as metamorphic volcanics, slates, and schists were formed. These rocks are also believed to be of pre-Cambrian age and were formed as a great series of volcanic tuffs, breccias, lava flows, and interbedded sediments. Some of the pyroclastic material is very coarse, indicating that the source of the volcanics was near or within the area. This volcanic material issued from innumerable vents, and the deposits of this period are widespread in North Carolina and adjacent states, but not all of the rocks formed at this time are of volcanic origin because weathering an derosion attacked the rocks during long intervals of quiescence between the periods of volcanism. The products of land waste, from the granites, sedimentary, and volcanic rocks, were transported, sorted, and deposited as sediments. Some of these sediments may have been formed as continental deposits; others probably were deposited in the sea at times when the land was low enough for its encroachment.

After the formation of the volcanics and associated sediments, there is a very long interval, covering many millions of years, for which there is no record. During this interval the rocks were folded, faulted, and metamorphosed. No doubt the same processes of erosion, deposition and igneous activity continued, but all traces of any rocks formed during that interval has been removed. In late Paleozoic time the rocks were intruded by granite, the relative age of which cannot be determined in this area, but similar granite in other areas has been shown by its relationship to rocks of known age to be of Carboniferous age. Granite forms only under conditions of great pressure and is not believed to come closer than a mile or two of the surface at the time of its intrusion. Since large areas of the granite were exposed at the surface before the next younger rocks were formed, it is evident that thousands of feet of rock had been removed by erosion during this interval and that a very long time had elapsed. The only other record for the millions of years between the intrusion of the granite and the deposition of the basal Cretaceous deposits is the intrusion of diabase dikes of presumed Triassic age.

The surface at the beginning of the Cretaceous period was worn down to a relatively low plain with rounded hills and wide stream valleys, which sloped gently eastward to the sea. The rocks were deeply decayed and a thick layer of weathered material mantled the surface. At this time the land began to be tilted gently to the southeast so that eastern North Carolina was covered by a shallow sea which extended far up the broad valleys. The deeply weathered and decayed land waste to the west was carried seaward by the streams, resulting in the deposition of the sand and clay strata of Cretaceous age. Much of this material was deposited in the lower stream courses and in estuaries and bays. At first the materials deposited contained considerable coarse sand and gravel, but as the land to the west was worn down, the stream gradients were lowered and only finer materials could be transported. Following the deposition of these basal Cretaceous strata the sea receded and a long period of erosion followed. In middle Upper Cretaceous time the sea again encroached on the land and the Black Creek formation was deposited upon the eroded surface of the basal Cretaceous deposits. Subsidence continued so that in later Cretaceous time the land waste was deposited in the sea as marine deposits. At the end of the Cretaceous the land was elevated, relative to the sea, and a long period followed during which erosion removed much of the strata deposited previously.

During Eocene time at least part of the Coastal Plain of North Carolina was submerged, for small areas of strata referred to the Black Mingo formation are found northwest of Smithfield in Johnston County, near Garner in Wake County, and in various other places. In later Eocene time, the limestones and calcareous sandstones of the Castle Hayne marl were deposited in southeastern North Carolina. Apparently the present Coastal Plain




Base map compiled from county maps of
North Carolina State Highway Department.

of North Carolina stood entirely above sea level during Oligocene time, for no deposits of that period are found within the State. During early Miocene time, the sea again transgressed onto the land, and the Trent marl was deposited in the southeastern part of the State. In later Miocene time a more extensive submergence occurred and the sea extended inland to the present Fall Zone. It was in this sea that the marls, clays, and sands of the lower part of the Yorktown formation were deposited over the beveled edges of the Cretaceous formations. The great submergence appears to have been at the beginning of this period, and the sea withdrew gradually so that upper strata of the Yorktown are not found within the area of this report. Marine deposits of Pliocene age are found along the coast and a short distance inland in the southern part of the State, but most of North Carolina, including the Halifax area, remained above sea level during this period. In Pleistocene time the land was again submerged, the sea encroaching on the land to about the present 270-foot contour line. The sea withdrew and advanced a number of times thereafter, and at each successively lower stand, a terrace was formed, just as a terrace is being formed at the present time along the coast.

## GROUND WATER[1]

### SOURCE

The principal source of ground water in this area is from precipitation as rain or snow. The only other water that needs consideration in this report is that which was trapped in the sedimentary rocks at the time of their deposition or entered them during the later inundations by the sea.

The average yearly precipitation is about 45½ inches. Stream flow carries off about one-third of this as direct runoff, another one-third[2] is lost by evaporation and by transpiration through vegetation before reaching the water table, and the remaining one-third reaches the water table, so that recharge to ground water from precipitation is roughly about 15 inches a year. Although the ground-water level fluctuates considerably, the amount of water held in storage changes very little when considered for a period of years so that average annual recharge to the ground water is approximately equaled by the average annual discharge of ground water. Ground water is discharged through springs, seeps and wells, and by evaporation and transpiration. Most of the water discharged by the springs and seeps enters the streams and maintains their flow during periods of no rainfall.

Some sea water was trapped in the sediments when they were deposited or entered the rocks at times when the sea stood at high levels. After the sea receded from the land, this water began to drain out and to be diluted by fresh water from precipitation. In some areas the sea water has been entirely replaced by fresh water, but in others the flushing and dilution have been less complete and some of the original, or introduced, sea water remains. Sea water in the sediments at the time they were deposited is called connate water, and sea water introduced at some later time, when the land was again submerged, may be termed "intrudent" water. It is probable that if any connate or intrudent water is present within the area of this report, it is very dilute and occurs only locally. However, farther east, at depths of 100 to 500 feet, connate or intrudent water is common and the chloride content may be as high as 10,000 parts per million, which is about one-half as salty as sea water.

### OCCURRENCE

A large quantity of water occurs below the surface in the openings or interstices in the rocks. These interstices range in size from the minute pores in clays to large tunnels and caverns in lavas and limestone. There are two main types of interstices, the original interstices, which were formed when the rocks came into existence, and include the interstices between grains of any granular rock; and the secondary interstices, including fractures, joints, cleavage planes and solution channels, which formed later. Several types of interstices are shown in figure 3.

The porosity of a rock is the percentage of the total volume that is occupied by the interstices. When all of the interstices are filled with water, the rock is saturated. Natural rock materials differ greatly in por-

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[1] For a detailed discussion of the principles of ground water occurrence and movement, and for definitions, see U. S. Geol. Survey, Water Supply Papers 489 and 494.

[2] Meinzer, O. E., Hydrology, page 401, McGraw-Hill, 1942.

osity. The porosity of igneous rocks, such as granite, may not be more than 1 percent, while the porosity of some clays may be as much as 50 percent. The porosity of clean sands and gravels may be 30 or 40 percent. When sands and clays are cemented and compacted to form sandstones and shales, the porosity is decreased greatly.

The interstices in the igneous and metamorphic rocks are secondary and consist of joints, fractures, faults, cleavage planes, etc. Since many of these interstices are formed by weathering processes near the earth's surface, they decrease in size and number with depth. The soil itself may have a porosity of 50 percent, but as the subsoil, and then the partially decomposed and disintegrated bedrock is reached, the porosity decreases, and the solid bedrock may have a low porosity.

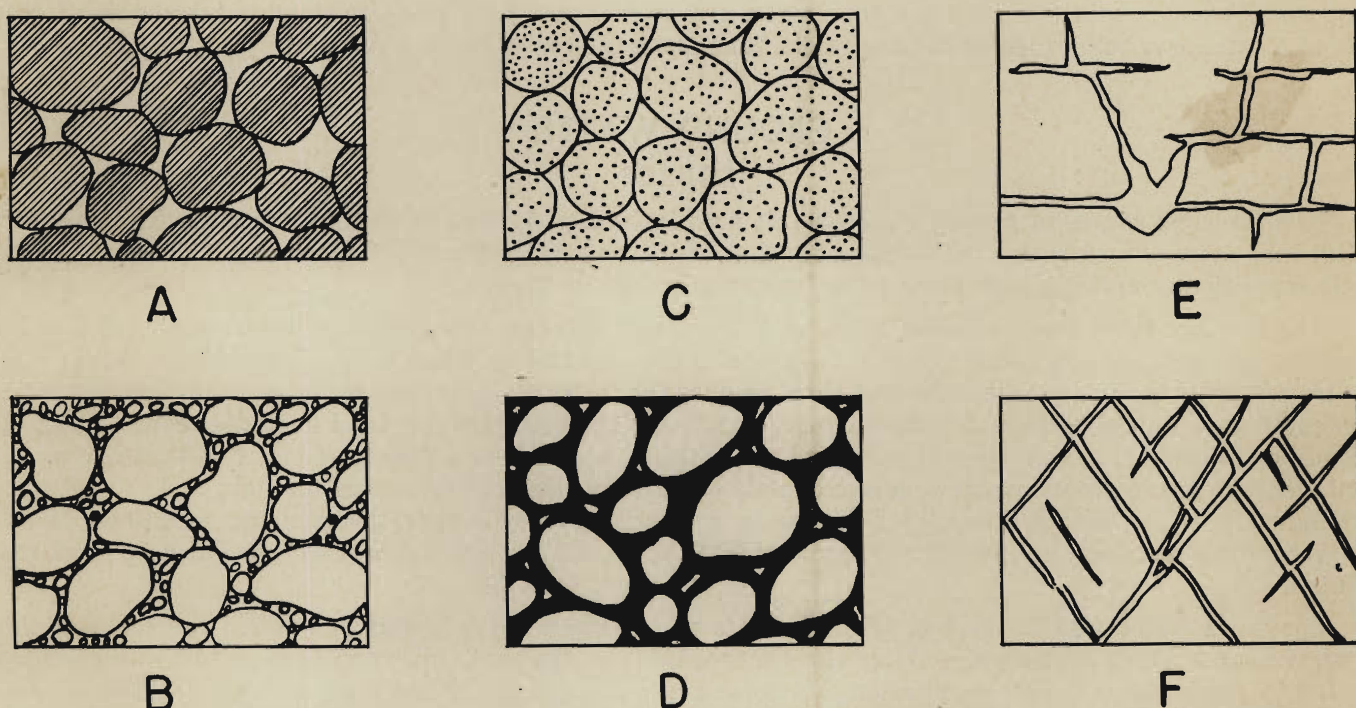



FIG. 3.—Diagram showing several types of rock interstices and the relation of rock texture to porosity. A, Well-sorted sedimentary deposit having high porosity; B, poorly sorted sedimentary deposit having low porosity; C, well-sorted sedimentary deposit consisting of pebbles that are themselves porous, so that the deposit as a whole has a very high porosity; D, well-sorted sedimentary deposit whose porosity has been diminished by the deposition of mineral matter in the interstices; E, rock rendered porous by solution; F, rock rendered porous by fracturing. (After O. E. Meinzer, U. S. Geological Survey, Water-Supply Paper 489.)

A rock or soil may have a large porosity and yet yield little water, even though allowed to drain for a long time. A clay, for example, with a porosity of 50 percent might not yield any water because of the smallness of the pores, the water being retained because of molecular attraction. Some water also may be retained in a rock because the pores are isolated or poorly interconnected. The ratio of the volume of water a saturated rock will yield by gravity to the total volume of rock is the specific yield and is stated as a percentage.

While porosity and specific yield are important factors in an aquifer, the most important characteristic of the acquifer is its ability to transmit and to yield water rapidly. This characteristic has little relation to the porosity; a clay, for example, may have a 50 percent porosity and not yield any appreciable amount of water, while a sand or gravel with only 30 percent porosity may yield large quantities in a short time. This ability of an aquifer to transmit and yield water is called its permeability. The reason that clays are impermeable is that the pores are so small that the water is held in place by molecular attraction. In silt and extremely fine sand the pores are larger and the molecular attraction is less but may still be so great that water is transmitted only very slowly. A small amount of clay or fine sand mixed in a medium or coarse sand will greatly decrease the permeability.

Ground water flows because of gravity, and, therefore, the intake or recharge area is at a higher elevation than the area of discharge. The velocity of ground water varies directly as the hydraulic gradient. In a humid region, such as eastern North Carolina, the ground water discharges to the perennial streams and lakes, and the lowest points on the water table are at these places. Rain falling on an area seeps downward to the water table and then moves toward the point of discharge in some stream valley, lake, or swamp. During the winter and spring, when the water level is high, the head is greater and the movement will be faster and the ground water discharge will be greater than in the autumn when the gradient may be very low.

## GROUND WATER IN DIFFERENT TYPES OF ROCKS

The ground water in sand and gravel occurs in the openings between the grains and moves by flowing through these interconnected pores. Water in clay occurs similarly but movement is practically negligible, and little water can be recovered from such material. Sandstone is formed by cementation of the sand grains, the cement filling in between the grains so that the porosity is greatly reduced and in a sandstone cemented by silica may be very small. Clay becomes shale by compaction or cementation or both, and porosity is very much less than in the unconsolidated sediments. The permeability of consolidated rocks, through the primary interstices, is usually very low. However, geologic forces acting on such a consolidated rock produce secondary interstices, such as joints, fractures, faults, etc., along which water can move.

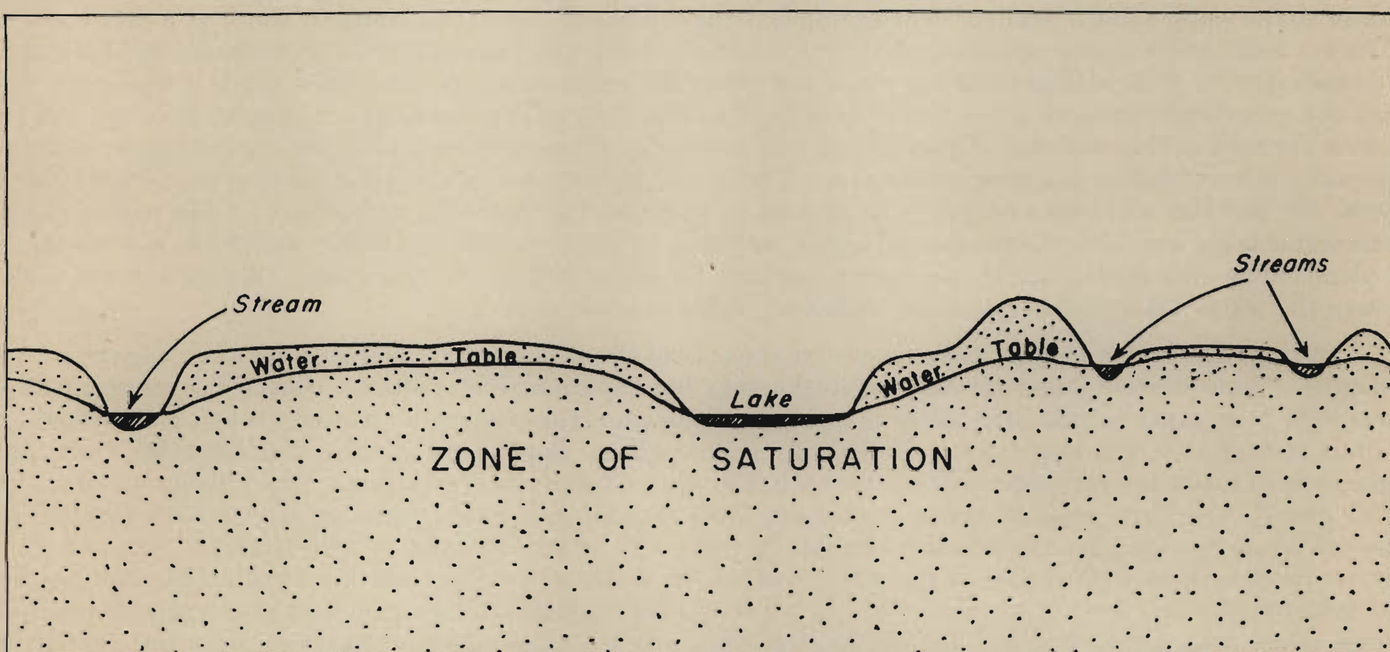



FIG. 4.—Diagramatic section illustrating the relation of the water table to topography.

Limestone usually has little primary porosity, but secondary openings such as joints, fractures, and solution cavities are important avenues of ground water movement. Enormous quantities of water may be transmitted through cavernous limestone and very large quantities through limestone with small solution channels.

In unweathered igneous and metamorphic rocks the water is contained and can move only in joints, fractures, faults, cleavage planes, and similar openings. When such fractures are pressed tightly together, little water can be held and movement is very slow. Because of the great weight of the overlying rock, fractures will not remain open at depths greater than a few thousand feet, and the size and number of such openings decreases rapidly in the first few hundred feet below the surface. This type of rock is usually weathered to a depth of 20 to 100 feet in eastern North Carolina, and near the base of the weathered zone the rocks are greatly fractured and broken but have not decomposed so greatly as to seal up the openings with clay; therefore, the zone just above the unweathered solid rock frequently has greater porosity and permeability than any other.

If the water can rise and fall freely with changes of hydrostatic head, and rain water can percolate downward directly to the zone of saturation in the aquifer, the water is termed phreatic water. The surface of the zone of saturation is called the water table, and the water in a well will stand at that level. In a humid region the water table is an undulating surface reflecting, in a modified way, the undulations of the topography. The undulations in the water table are less abrupt than the undulations in the topography, and the water table may be nearer the surface at the center of wide flat uplands than it does near the edge if ground water is discharged in the adjoining lowland. The depth to the water table is dependent largely upon climate, topography, and geology. Since the climate is nearly uniform throughout this area, the depth to the water table depends largely upon topography and the character of the rocks. In the more rugged areas of the western part, the water table may be 50 feet or more below the surface, while in flat areas in the Coastal Plain, the water level will be only a few feet below the surface. The relation of the water table to the topography is illustrated in figure 4.

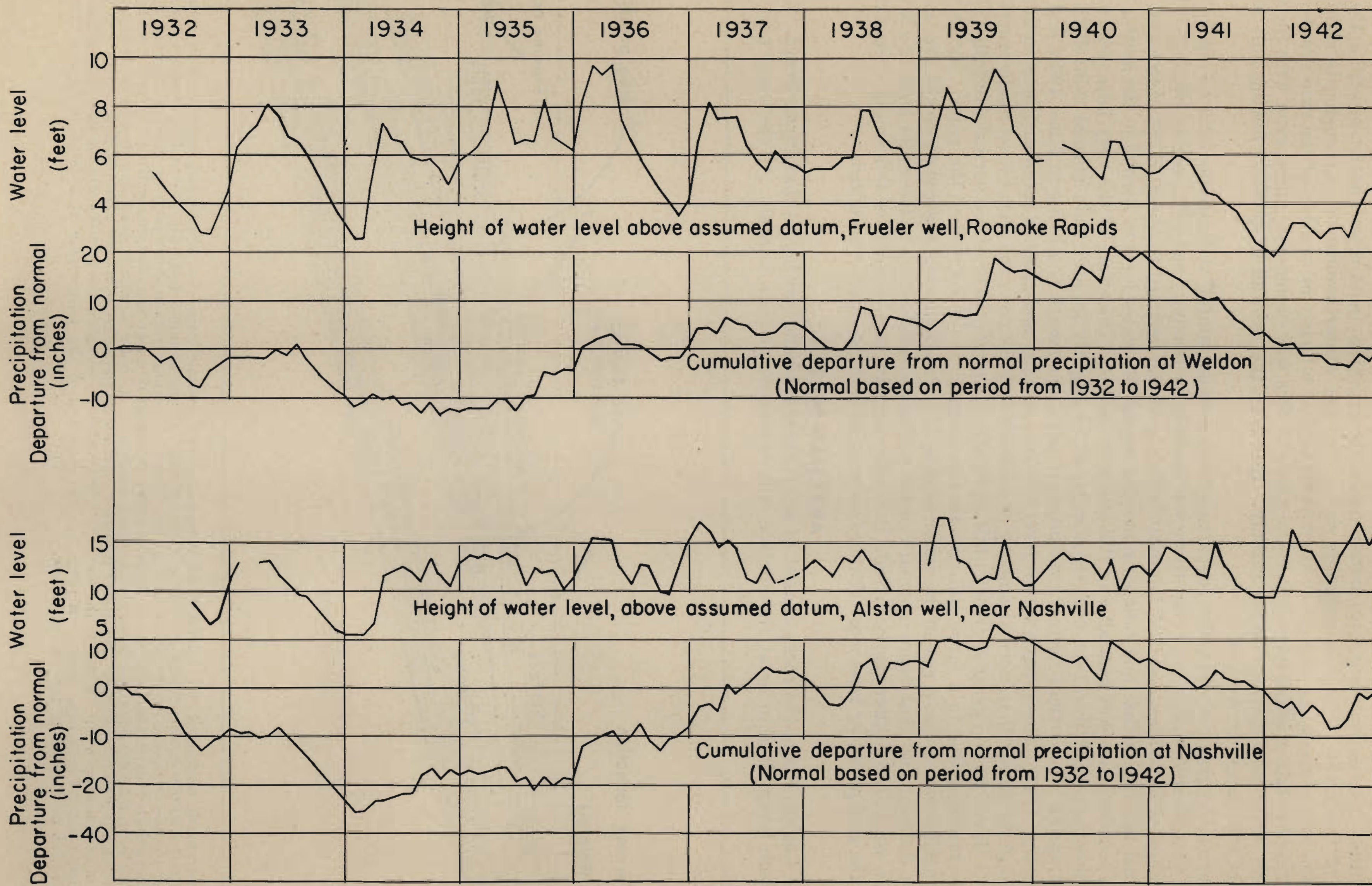
## FLUCTUATIONS OF THE WATER TABLE

The source of the ground water is precipitation and the ground-water level, or water table, will fluctuate with rainfall. However, a number of other factors complicate the correlation of rainfall ground-water level.

Several inches of rain falling in a very short time will not raise the water level as much as the same amount of rainfall over a longer period, all other things being equal, because the capacity of the soil to transmit the water to the water table is limited. For example, if the soil has the ability to transmit water at a rate equal to 2 inches a day and 4 inches fall in one day, then only half of the water can reach the water table, but if 2 inches fall each day for 2 days, then all of the water can reach the water table. On the other hand, if the soil is dry and the rain falls in showers, a fraction of an inch at a time, then all the water may evaporate from the soil between showers so that 4 inches of rain falling in a number of showers will not raise the water table as much as the same amount falling in a slow steady rain. Then again, soil which is composed of varying proportions of fine sand, silt, and clay will hold a considerable amount of water by the molecular attractions of the particles, and this water is not available for the ground water. After a long dry period this water, called the soil moisture, is depleted by evaporation and transpiration, perhaps for many feet below the surface. Before any water can reach the water table this soil moisture deficiency muse be made up.

During the summer months, the evaporative capacity of the air is several times as great as during the winter months. Transpiration losses through vegetation may have an even greater effect. During the winter months, plant life is dormant so that little water is lost by transpiration, the evaporative capacity is low, and little water is lost in that way, and rain is apt to fall slowly and steadily. During the summer transpiration losses and evaporative losses are very high, and the rain is apt to come in short heavy showers, which result in high surface runoff. For these reasons, the ground-water level recedes during the summer and autumn months, although these months have the heaviest rainfall. During the winter months, a little rainfall will raise the water level, because a large part of the water reaches the water table. Figure 5 shows graphically the relation of the ground-water level to rainfall. This figure shows the fluctuations in water level of the two observation wells in the area, one at Roanoke Rapids and the other about 8 miles south of Nashville near the Tar River, and the cumulative departure from normal at the two closest rain gaging stations. The water level in the well at Roanoke Rapids is recorded b ya continuous recorder, while the water level in the well near Nashville is measured twice a week by a local observer. The average monthly water level in both wells is given in feet above an assumed datum, which is near the bottom of the well. The ground-water level at any time not only reflects the last rainfall but, to a certain extent, previous rainfall and climatic conditions. Therefore, ground-water levels, which are a cumulative result, are not entirely comparable to the immediate rainfall. Accordingly, the cumulative departure of rainfall from monthly normal was plotted. Because the period of record for the observation wells is from 1932 to 1942, the normal monthly rainfall was computed for that period, disregarding entirely previous rainfall records, since rainfall occuring more than a year before the beginning of observation of the wells probably did not affect the water level in the wells. The heavy lines at the right end of the chart are the normal monthly rainfall, in inches, and the normal mean monthly water level, in feet, for the period 1932 to 1942, inclusive. These curves show that normally the ground-water level begins to rise in December, although the lowest rainfall comes in November. The water level continues to rise until April, after which it begins to decline, although the monthly rainfall is as great, or greater, than during the winter and

Fig. 5.—Fluctuations of water level in observation wells compared with precipitation at nearby stations.



spring months. This decline continues, with a minor interruption in August, until sometime the following November or December. The reason for the rise during the winter months of only moderate rainfalls is that transpiration and evaporation losses are very small so that a larger proportion of the rain reaches the water table. During the late spring and summer, the losses in this way becomes so large, even with increased rainfall, that the water level declines rather rapidly. However, the rainfall is so heavy during July and August, that a slight rise occurs in August.

Comparing the graph of cumulative departure from normal rainfall at Nashville with the mean water level in the well near Nashville, it is seen that there was steadily increasing total deficiency in rainfall in 1932 reaching 13.2 inches in September and that the mean water level had declined to about 3 feet in October. However, above normal rainfall in that and following months raised the water level to normal in the spring of 1933, although the total deficiency of rainfall was still about 10 inches. The effect of the very large deficiency during the first 9 months of 1932 had been entirely eliminated by slightly greater than normal rainfall the following winter and spring. Less than normal precipitation fell every month beginning in June, 1933, and continuing until February, 1934. The ground-water level declined steadily and reached its lowest level in January. Although a slightly larger than normal amount of rain fell in February, the water level made practically no recovery until March and no great recovery until April after two months of above normal rainfall. This delay in recovery is probably due to a large soil moisture deficiency. Comparison of the curves shows that above normal rainfall either causes a rise in the water level or, if the normal trend is strongly downward, a lessening in the rate of decline; and that below normal rainfall either causes a decline in the water level or a lower amount of rise than would have otherwise occurred. It further appears that cumulative deficient or excess rainfall does not affect the ground-water level more than a few months from the time it occurred.

## ARTESIAN WATER

In the Coastal Plain, the rocks consist of alternating sand and clay layers that dip eastward. A permeable sand stratum lying close to or at the surface will receive water from rainfall. As the water percolates down

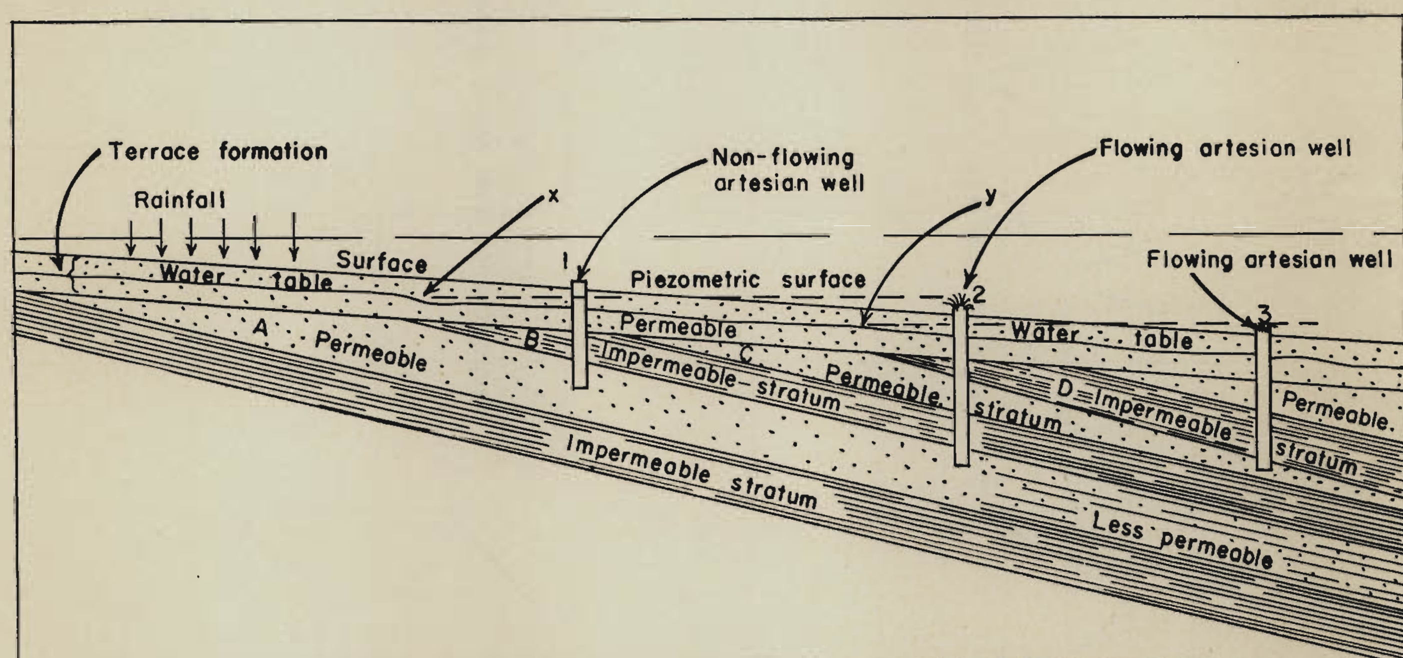



FIG. 6.—Diagramatic section of the Coastal Plain illustrating two common causes of flowing and nonflowing artesian wells. Precipitation enters aquifer A and percolates down the dip. (Some distance down dip the aquifer becomes less permeable so that the water cannot escape freely in that direction.) It cannot escape downward or upward because it lies between impermeable clay strata. The water in the aquifer therefore is under pressure and will rise in well 1 and 2. The water will rise to a height equal to the elevation of the water table at point x, minus head lost due to friction of the water in moving through the aquifer. The water in well 1 rises above the water table but does not flow. Well 2, at a lower elevation, is a flowing well. In well 3, the water is prevented from escaping freely down dip because permeable sand strata C pinches out between two impermeable layers. The elevation of the water table at point 6 is enough greater than the elevation of well 3 that the well will flow.

the dip through the saturated stratum, it is prevented from escaping upward by the presence of overlying impermeable strata. If a well is drilled through the impermeable strata, the water will rise above the saturated aquifer, and the well is an artesian well. The surface determined by the heights to which the water will rise in a number of wells penetrating the aquifer is called the piezometric surface. The height of the piezometric surface depends upon the height of the water table in the area of recharge and the permeability and rate of discharge of the aquifer. The surface nearly always slopes down the dip away from the recharge area, and in the North Carolina Coastal Plain, this is generally to the southeast. The land surface also slopes in that direction, and in some places, at a greater rate than the piezometric surface. Where the land surface is below the piezometric surface, wells will overflow at the surface. Conditions resulting in artesian wells and artesian flowing wells are illustrated in figures 6 and 9.

In the Halifax area, flowing wells have been drilled in the valleys of the Meherrin River, Kirby's Creek, Potecasi Creek, Roanoke River, Tar River, and Contentnea Creek. Most of these wells end in sands of Cretaceous age. Contours of the piezometric surface of water in the Cretaceous are shown in plate 4.

## UTILIZATION OF GROUND WATER

Water is usually obtained from the water-bearing formations through wells, springs, or infiltration galleries. The different types of wells include dug, bored, driven, and drilled.

**Wells.**—Dug wells in this area usually are less than 70 feet deep and are large enough for a man to enter. Dug wells have a large storage capacity, which is an advantage if the permeability of the water-bearing formation is very small. If, for example, the permeability is such that only one gallon a minute will flow into the well, a small diameter well would have to be pumped 100 minutes to furnish 100 gallons of water. One hundred gallons can be removed from a dug well in a few minutes, the water level will be lowered a few feet, and the well will gradually fill back up to the original level. Although the small diameter well might furnish as much water in a day, it would be necessary to pump it continuously. One disadvantage of dug wells is that many cannot be dug much below the water table, and they may go dry in periods of drought. Furthermore, in some areas of crystalline rocks, the water table falls below the weathered portion of the rock during dry periods, so that the well goes dry, and it is impossible to dig deeper because of the hardness of the rock. Another very important disadvantage of the dug well is the danger of pollution. These wells usually are shallow, and if cased, the casing is seldom tightly fitted. When water is withdrawn from a well, a cone of depression is created in the water table so that water flows towards the well from every direction. The extent of the cone of depression depends on the amount of water withdrawn and the extent, thickness, and permeability of the material. However, it usually extends not less than several hundred feet. If any source of harmful bacteria is within this area, it is quite probable that water containing such bacteria will reach the well. If the well is down slope from such a source of pollution, it is quite possible that the well will be contaminated even though the source is beyond the limit of the cone, because the natural ground-water gradient is usually down slope until it comes within the influence of the cone of depression. Dug wells have the additional disadvantage in that surface water may flow directly into the well, either at the top of the ground, or through loose joints or openings in the curbing, and this surface water is frequently polluted. Furthermore, many dug wells are open and foreign material may fall directly into the well. Frequently a part of the water being withdrawn from such a well will run back into the well carrying pollution from, or near, the top of the well.

If it proves necessary to use this type of well, certain precautions will reduce the possibility of pollution. The well should be several hundred feet from any possible source of pollution and preferably up gradient from such source; certainly not down gradient. The well should be cased tightly, and the curb at the top should be tight and covered. The surface should be graded up around the well so that surface water will drain away. The water should be tested periodically for possible contamination, preferably by the State Health Department.

Driven wells usually consist of several lengths of 1¼-inch pipe at the bottom of which is a well strainer and point. This is driven into the ground to the required depth, usually from 10 to 50 feet, and a suction pump is used to pump the water. Use of the small diameter driven well is practically limited to sand of at least moderate permeability, for the water must flow to the well at about the rate of withdrawal, because there is little or no storage within the well. Although many domestic supplies are obtained from driven wells, these water supplies are subject to many of the same possibilities of pollution as the dug wells, and the same precautions should be observed.

Bored wells are constructed with some type of earth auger, either hand operated or power driven and are practically restricted to clay, sandy clay, and to argillaceous sand. Those bored by hand usually cannot be constructed in clean sand because the sand caves into the well. The larger sizes, 12 to 24 inches, are usually cased with tile and are similar to dug wells. One advantage over dug wells is that they often can be bored farther below the water table so that there is less danger that they will go dry in periods of drought. However, if a boulder or loose or solid rock is encountered in a dug well, it can often be removed, while encountering such material in a bored well will necessitate abandonment of the hole. The smaller diameter bored wells sometimes are cased with tile and sometimes are left uncased. Uusally a 1¼ inch pipe and a pitcher pump are used to withdraw the water. Occasionally these wells are unsatisfactory in sand because, if cased, the casing shuts off the water, and if left open, the walls soon cave in shutting off the supply. If the hole will stay open for a short time, small gravel can be placed in the hole around a 1¼-inch pipe and strainer making, in effect, a gravel-packed well. The gravel should not fill the hole to the surface, but the last few feet should be filled with tamped clay to prevent surface water from running down from the top. These wells are subject to pollution to about the same degree as dug and driven wells.

Drilled wells are usually constructed by machine, but some are constructed by hand. The most common method of drilling wells in the Halifax area is the use of a cable tool machine which lifts a heavy drill and then allows it to drop, breaking the rock or other material. These wells are always drilled with water in the hole, and a bailer is used to remove the broken and loosened material. This type of construction is especially adapted to hard rock and for deep wells in any kind of rock.

Jetting, or "washing down", wells is another method of drilling wells, used only in unconsolidated or soft weathered rocks. In this method, a hollow pipe with a bit on the end is used for a drill and is alternately raised and dropped. The bit has one or two holes so that water can be forced down through the hollow stem, out the holes, and up to the surface inside the casing around the the drill. Sometimes, especially in small diameter wells, the casing itself is used as the drill. The bottom end of the casing is left open; water is forced down through it and returns to the surface around the outside of the casing. The jetting method is used in the unconsolidated formations in the Coastal Plain and in the soft, deeply weathered slates.

The rotary drilling method involves use of a cutting bit at end of a hollow drill stem. The bit is rotated and water is forced down the stem, returning to the surface in the casing and bringing the cuttings with it. Drilled wells of this type are usually restricted to unconsolidated or the softer consolidated rocks, and they are usually of large diameter. Wells 48 inches or more in diameter can be drilled to considerable depths by this method, and it is suitable for construction of gravel-packed or gravel-walled wells. The gravel-packed or walled wells are particularly useful in fine and medium fine grained sands. Wells of this type have been constructed at Scotland Neck, Halifax, and Enfield.

**Springs.**[1]—Springs are of minor importance in this area, being used for only a few domestic supplies. It is probable that most of the springs in the area are seepage springs in which the water percolates from a number of small openings. The water of all of the springs examined was brought to the surface because of an outcrop of the water table and are gravity springs. Probably the most common type of gravity spring is the depression spring, whose water flows because the ground surface is below the water table. These are found at the head of and along many streams. Another common type of spring is the contact spring in which the water flowing through permeable material is brought to the surface by an underlying impermeable layer or barrier which intersects the surface. Most of the springs given in the county descriptions are of this type. The many other types of springs are not known to occur in the area.

## USE

About 75 percent of the total population in the area use ground water.

Most domestic supplies within the area are from dug, bored, driven, or drilled wells. Most of the water is soft enough for all domestic uses, but sometimes an objectionable amount of iron is present. Also, some of the

[1] Meinzer, O. E., Outline of Ground-Water Hydrology, U. S. Geol. Surveyer Supply Paper 494, pp. 50-53, 1923.

water contains excessive carbon dioxide enabling the water to corrode the pipes with which it comes in contact, dissolving the iron. Excessive iron is not known to be biologically harmful but is not particularly pleasant to the taste. The principal objection to excessive iron is the staining of enamelled ware and laundry.

Of the 23 municipal supplies in the area, 18 are derived from wells and 5 are from surface sources. However, only 26 percent of the total population of the 23 places is supplied by ground water. Of the 18 ground-water supplies, 3 come from shallow wells (20 to 30 feet deep), 4 from wells of moderate depth (49 to 96 feet deep), and the remainder from wells more than 100 feet deep. Many of the supplies from wells are of satisfactory quality, both chemically and bacteriologically and are not treated.

Most public and semi-public places, such as schools, hospitals, county homes, and other institutions that do not have a municipal water supply, use drilled wells. Most of these supplies are satisfactory, but a few, in areas of crystalline rocks, are insufficient in quantity. Usually the water is not treated, but occasionally it has been necessary to make some provision for iron removal.

A large number of industries utilize ground-water supplies, although none use large amounts of water. The uses include processing as in paper and cotton mills, cleaning as in laundries and dry cleaners, cooling boiler feed water, and the manufacture of ice and soft drinks. The temperature of the ground water in this area ranges from 59 to 63 degrees, averaging about 62 degrees Fahrenheit. The water is usually soft, so that little trouble is experienced from boiler scale. Supplies of several million gallons of water a day could be obtained for industrial purposes in the eastern part of the area from the Cretaceous deposits.

In parts of the area within the Coastal Plain, water could be obtained in sufficient quantities for irrigation, but little water has been used for that purpose because rainfall has usually been adequate. However, it is quite possible that irrigation from ground-water supplies would be practical for certain crops in some parts of the Halifax area during periods of drought.

## ROCK FORMATIONS AND THEIR WATER-BEARING PROPERTIES

The areas in which the different rock formations crop out are shown on the accompanying geologic maps, plates 1 and 2. These are reconnaissance maps only and do not show the details of the occurrence of each rock formation. For example, in the belts shown as granite, that rock is the most important formation, but several small areas of metamorphic rock may also be included.

### PRE-CAMBRIAN GNEISSES AND SCHISTS

**Geology.**—Pre-Cambrian gneisses and schists underlie western Northampton and northwestern Halifax Counties. Their eastern boundary, which trends N. 30°E., is in contact with the slates and schists of pre-Cambrian (?) age. Westward they extend beyond the area mapped.

The gneiss exposed near Littleton consists of orthoclase, plagioclase, quartz, and biotite, and probably was originally a granite. It is coarse grained with rather broad banding. Both the banding and the schistosity strike about N. 18° E. Similar, granite gneiss is exposed at numerous other places.

A rock of somewhat similar mineralogical composition is exposed in Northampton County, about 2 miles west of Henrico. It is a quartz orthoclase gneiss which differs from the granite gneiss in that it has a much larger percentage of quartz and a much finer banding. At several places a quartz biotite schist is exposed and at other localities a quartz-serictie schist. Granular quartz is the predominant mineral in these last two, and they have every appearance of having been formed from sedimentary rocks.

**Water supply.**—Information was obtained for only a few wells ending in these rocks. The water-bearing properties of the more schistose rocks are similar to those of the slate and schist series, and the properties of the granite gneisses are similar to those of the granites. The more finely schistose strata will probably furnish the most water, whereas the massive, unjointed gneiss will furnish only small amounts. The water from the schist is soft but in many places contains objectionable amounts of iron. In contrast, the water from the gneiss is harder and usually free from iron. Analysis 2, Halifax County, is from the Littleton town well, which is in gneiss. This water had 84 parts per million of hardness and only 0.03 part of iron.

## PRE-CAMBRIAN (?) SLATES AND SCHISTS

**Geology.**—These metamorphic rocks crop out in the western half of Northampton and Halifax Counties in three narrow belts, trending about S. 30° E. Two of these unite in southwestern Halifax County, forming one broad belt through Nash County and the western half of Wilson County. Nearly one-third of the Halifax area is underlain by these rocks.

The commonest rock of this sequence is a low grade metamorphic rock, which appears to be a finely laminated slate or phyllite. Megascopic examination discloses that the principal minerals probably are quartz, chlorite, and sericite. Some of the rock may also contain volcanic ash. The rock is dark blue or greenish gray when fresh, becoming various shades of yellow, red, and purple when weathered, probably because of oxidation of the iron in the chlorite. The phyllite appears to grade into a low grade schist in which granular quartz is the predominant mineral. In this phase, the quartz grains are large enough to be clearly visible to the unaided eye. These rocks are especially prominent in the southeastern part of the area, in Wilson County, and southern Nash County. Farther north in Nash and in Halifax County, outcrops of metamorphosed tuff and lava are more common, although even in that area the phyllite and low grade schist are the major part of the metamorphic rock. The volcanic rocks are commonly gray, yellow, or brown in color, fine to medium grained, and the schistosity and cleavage usually are much less developed than in the phyllites and schists. A very coarse volcanic breccia crops out in the highway cut on the south side of Roanoke River at the north edge of Roanoke Rapids.

Where observed, the planes of schistosity and cleavage strike N. 25° E. to N. 40° E. and have a vertical, or nearly vertical, dip.

The rocks described above are all low grade metamorphic rocks, but near, or at the contact with the intrusive granite, the rocks are more intensely metamorphosed. A garnetiferous mica schist is exposed in a road cut about 2½ miles northeast of Red Oak, Nash County, and a mica hornblende schist, half a mile farther north. Both of these exposures are very near the main granite mass shown on the geologic map. In southern Nash County, along the Tar River, the more intensely metamorphosed rocks are present. A biotite schist, with hornblende, quartz and plagioclase, is exposed about a mile south of Easonburg. At several other places, rocks were found which, megascopically, have every appearance of representing a high grade of thermal metamorphism.

Most of the metamorphic rocks described above appear to have been derived from clays and sandy clays originally deposited as sediments. These sediments probably contained some volcanic ash, which seems to have been plentiful in the "Carolina Slate Belt" to the west. The structural relations of the tuffs, flows and volcanic breccias to the rocks of sedimentary origin were not determined, and the relative ages of the rocks are not known. All of these rocks have commonly been considered pre-Cambrian in age, but there seems to be little evidence for this classification except the fact that they are metamorphosed. However, as the metamorphism appears to be closely connected with the igneous intrusion, which is believed to have occurred in Carboniferous time, it is possible that some of the metamorphic rocks may be of Paleozoic age. Quartz veins are very prominent in some areas of the metamorphic rocks and serve as important avenues for the movement of ground water. The veins range in width from a fraction of an inch to a foot or more. Many follow the planes of schistosity, but others cut across at any angle, apparently following fractures or faults. In some places quartz veins and lenses are found at the axis of sharp folds. Often there will be several veins a few inches wide and a few feet apart, which are parallel to the schistosity. Between these larger veins are networks of thin quartz veinlets. Quartz veins are less common in the metamorphosed volcanic rocks because of the poor development of the schistosity and cleavage. The vein quartz is always crushed and broken, indicating considerable stress after it was formed.

Diabase and other dark colored dike rocks are also found in the area; these are commonly termed "trap" dikes.

**Water Supply.**—This series is one of the best of crystalline rocks for the development of ground-water supplies, especially where quartz veins are plentiful. Deformation of the rocks since the formation of the veins has broken and fractured the quartz and caused a certain amount of rotation of the angular fragments so that small interconnected cavities were left throughout the veins. It is possible that circulating ground waters have removed some of the surrounding country rock by solution. At any rate, these veins now serve as passageways for the circulation of ground water, and concentrations of quartz veins indicate places favorable for drilling. Many drillers know this and search for exposures of "flint rock" when locating a well.

The metamorphic rocks usually are weathered very deeply, often 75 to 100 feet, and, therefore, drilling is comparatively easy. Drilling is not difficult in the unweathered rock, except in the more intensely metamorphosed rocks, which sometimes are tougher than granite. Because of the deep weathering of the schists, jetting or "washing down" of small diameter wells is practicable, and this type of well is common. Wells up to 160 feet deep have been drilled by hand in this way, and many of the jetted wells range from 90 to 100 feet in depth. A 1¼-inch casing is nearly always used, which for several reasons seems to be generally undesirable. In the first place, if a hard layer is struck before obtaining a sufficient supply of water, the small diameter of the casing prevents use of a drill heavy enough to break through, and the hole must then be abandoned. By using a larger casing, 2 to 3 inches in diameter, a heavier drill can be used and the hard layer broken through. It frequently happens that a good supply of water is found just beneath the hard layer, which was serving as a barrier to upward circulation. In the second place, a deep-well pump cannot be used on a 1¼-inch casing, and, therefore, the water level of these wells can only be lowered to 25 or 30 feet below the suurface, which is the limit of lift of a vacuum pump. If the diameter of the casing is 2 inches or more, a deep-well pump can be used, and the water level may be lowered almost to the bottom of the well. During the present investigation, a number of 1¼-inch wells were found that had never been used because the depth to the water level was greater than the limit of the lift of a vacuum pump. Others had been satisfactory previously, but because of the long dry period, the water level had receded beyond the limit of lift of the vacuum pump. Besides the wells that furnished no water at all for these reasons, many others yielded insufficient supplies because the static water level was so low. Some wells have been made effective by digging a hole around the casing so that a well cylinder can be placed closer to the water surface. However, this usually costs many times the additional amount necessary to use a 2 or 2½-inch casing instead of a 1¼-inch casing when drilling the well.

Dug wells in the slate and schist have usually obtained satisfactory supplies of water. Because of the softness of the rock and the deep weathering, it is nearly always possible to dig the well deep enough to assure that it will not go dry during long periods of drought. However, dug wells in this rock are as liable to contamination and pollution as any dug well. If it is necessary to use such a well, the precautions outlined on page 15 should be closely observed.

The yields of some of the wells drilled in the slate and schists were measured accurately, some at the time of drilling and others since the wells were placed in service. However, the capacity of many others was measured only approximately by a bailer test or was merely estimated by the driller. For other wells, the yield reported is that amount of water actually used and may be only a fraction of the possible yield. While the yield of some wells may have been overestimated, it is probable that most of them will yield more than the figures given in the tables of wells which are given with the county descriptions. Data of varying degrees of accuracy were obtained for 128 drilled wells, from 4 to 8 inches in diameter, and average yields at arbitrary depths are given in the following table:

AVERAGE YIELD OF WELLS ENDING IN PRE-CAMBRIAN (?) SLATES AND SCHISTS AT SPECIFIED DEPTHS. (INCLUDES ONLY WELLS 4 OR MORE INCHES IN DIAMETER.)

| Depth (feet) | Number of Wells | Average Depth (feet) | Yield (gallons a minute) | | Percent of wells yielding less than 5 gallons a minute |
|---|---|---|---|---|---|
| | | | Range | Average | |
| 0—100 | 52 | 80 | 1—100 | 16 | 10 |
| 101—150 | 48 | 121 | 2—100 | 17.5 | 8.3 |
| 151—200 | 21 | 172 | 1—100 | 24.3 | 5 |
| above 200 | 7 | 300 | 9—300 | 88.5 | 0 |
| Total and average of all wells | 128 | 123 | 1—300 | 22 | 7.8 |

A very slight increase in yield is indicated for wells 101 to 150 feet deep as compared to the wells less than 100 feet deep. An increase of 50 percent is indicated in the group from 151 to 200 feet over the wells less than

100 feet. The increase from an average of 24.3 gallons per minute in the 151-200-foot group to an average of 88.5 gallons per minute in the wells over 200 feet deep would seem to indicate that more than twice as much water is obtained per foot of depth below 200 feet than above. However, it is probable that these figures are misleading. Most of the shallower wells, which are included in the first three groups in the table, are domestic wells which have never been tested to full capacity, and it is probable that the average for them is too low. Furthermore, only 7 wells are included in the last group, which is too small a number to allow accurate statistical analysis. For example, if the best two wells are excluded, the average yield for the five remaining is only 35 gallons per minute. The figures for average yield should not be given too much importance; nevertheless, they do give some idea of what to expect from wells drilled in schist and slate.

The last column in the table shows the percent of the wells in each group which yield less than 5 gallons per minute. According to the figures shown, 92.2 percent of all the wells will yield more than that amount.

The figures for yield are especially significant when compared with those for wells drilled in granite, page 22. The average yield for all wells in schist is almost twice as great as it is for wells in granite, and the percentage of wells in schist that yield less than 5 gallons a minute is about 8, as compared to 29 for wells in granite. Only five of the 128 wells in schist yielded less than 2 gallons a minute, as compared to 14 of the 80 wells in granite.

Analyses of water from twelve wells that are believed to end in slate or schist are given in the tables of chemical analyses with the county descriptions and include numbers 9, 18, and 104 in Halifax County; 48, 85, 128, 153, and 215 in Nash County; and 50, 71, 164, and 191 in Wilson County. Six analyses show total dissolved solids ranging from 59 to 136 parts per million and averaging 101. Total hardness ranges from 15 to 80, averaging 42. The maximum sulfate is 10, and the maximum chloride, 18 parts per million. Five analyses reporting iron show less than 0.5 part per million, but two others show 8.7 and 17. Thus, it is seen that water from the slate and schist is uniformly soft and free from objectionable mineral matter, except for iron. Iron is excessive in two of the seven analyses showing it, and it is probable that this proportion will hold good for all the wells in the area. That is, about one-third of the wells have objectionable amounts of iron. It seems certain that there are two distinct causes of high iron content in these wells. One reason for high iron is the solution of iron minerals in the rock so that the water, as it comes from the ground, has large amounts of iron. The other cause is the corrosive action of the water, in part due to high carbon dioxide content, which enables the water to attack the iron casing, pump, and pipes. In any specific well, it is not always apparent which cause is operative. Corrosive action of the water on the casing seems to have been the cause in a number of domestic wells, larger diameter wells being much worse than those of small diameter. The reason for this is that so much water is held in storage in a 6-inch casing (about 1.5 gallons per lineal foot) that the water stands in the pipe for long periods before being used. On the other hand, water from a 1¼-inch well is mostly withdrawn directly from the rocks as used and is in contact with the casing for only a short time. Larger municipal and industrial supplies will not have this difficulty, because such a large quantity of water is used that it does not remain long in contact with the casing. However, in some wells the water apparently contains considerable iron before reaching the casing. A sample of water from the well supplying the town of Lucama, for example, had 8.7 parts per million. The pump delivers 60 gallons a minute, and it is inconceivable that such a large amount of iron could be dissolved by the water in the short time that it is in contact with the casing.

## CARBONIFEROUS (?) GRANITES

**Geology.**—Granite is exposed in two belts extending northeast-southwest through western Northampton and Halifax Counties, Nash County, western Wilson County. The only known exposure in Edgecombe County is along the Tar River, just below Rocky Mount. The eastern granite belt is nearly continuous, extending from the Virginia State line west of Pleasant Hill to Wilson. The northern part of its eastern boundary, near Weldon and Halifax, is the schist which dips underneath the sediments of the Coastal Plain a few miles farther east. South of Halifax the granite itself dips under the sedimentary formations, and therefore, the eastern extent of this granite belt is not fully known. The belt to the west is not as continuous. South of Halifax County it is exposed only in two relatively small areas, one extending southwestward from Castalia in western Nash County, the other lying south of Bailey in Nash and Wilson Counties. The elongation of these belts of granite is parallel to the schistosity of the slate and schist belt.

There are several kinds of igneous rock included in these intrusive belts, but all have been mapped together under the general name of granite, because that is the principal rock. It is probable that these different rocks differentiated from the same magma and are part of the same batholith. The granite of this area commonly contains about 55 percent orthoclase, 20 percent quartz, 20 percent plagioclase, and 5 percent biotite; and often it also contains some magnetite. Most commonly the granite is pinkish owing to the orthoclase which varies from a light pink to a deep salmon pink color. The granite is often porphyritic, and about as many exposures of porphyritic granite were seen as of non-porphyritic. At the crossing of the Atlantic Coast Line railroad over Contentnea Creek, south of Wilson, salmon pink orthoclase phenocrysts form more than 50 percent of the exposed rock; and at Battle Park, in Rocky Mount, the granite contains orthoclase phenocrysts measuring several inches in length.

The granite apparently grades laterally into granodiorite and diorite. At Gold Rock in northern Nash County, the rock is a medium-grained gray grandiorite. Feldspar, nearly all of which appears to be plagioclase, makes up about 70 percent of the rock. The rest of the rock is composed of 15 percent quartz and 15 percent shiny black biotite with possibly some garnet. Another exposure a few miles west of Garysburg has no orthoclase and appears to be a normal quartz diorite.

Most of these igneous rocks have the normal granitic and porphyritic textures, but at some places a gneissic structure was observed. This occurs only near the contact with slates and schists. The gneissic structure was noted particularly about three miles southwest of Rocky Mount, about one mile east of Red Oak, and about three miles north of Red Oak. On Fishing Creek, about four miles southwest of Enfield, both gneissic granite and true gneisses as well as quartz-feldspar schist were observed.

Although jointing has developed to some extent in the granite, large areas are very massive and free from joints or fractures. Especially noteworthy areas of massive granite are exposed at the Roanoke Rapids Country Club, near Roanoke Rapids, and near the water treatment plant at Rocky Mount. However, at Battle Park, in Rocky Mount, the jointing is very well developed in places, and at the east edge of the Park the porphyritic granite described above has a very well developed joint system. The main set strikes N. 9° W. and dips 78° E. These are a secondary set of less well developed joints which strike N. 30° W. and dip 55° to the NE.

**Water Supply.**—The granite belts are generally not very favorable for development of even moderate supplies of ground water and, in many places, are distinctly unfavorable for the development of even small domestic supplies. As discussed previously, granite is impervious except where secondary interstices have been formed, and all movement of ground water is along joints, fractures, and like channels. In many places the granite is massive and relatively free from joints or fractures, and, after entering solid rock, a well in granite may be drilled for hundreds of feet without intersecting a fracture. Even if a fracture or joint is encountered, the amount of water moving along the minute opening may be very small. The quarry about one mile west of Sims affords an illustration of the common paucity of water available from granite. The rock here is a normal granite with a slightly greenish tinge due to epidote. The rock is not greatly jointed, and only a few feet of weathered material overlie fresh rock. The quarry covers 6.7 acres and has a maximum depth of 137 feet. It was not in operation in the spring of 1942, but the water was kept pumped out, the pump being located in a sump at the bottom. The water pumped out in order to keep it dry amounted to only 30 or 40 gallons a minute. It is readily apparent that a six or eight-inch well, drilled in the same rock, would have little chance of obtaining a satisfactory water supply. Near the surface the granite in this quarry is broken into horizontal sheets, and other joints are also plentiful. Examination disclosed that a large proportion of the water was seeping into the quarry within the first 25 or 30 feet below the surface. The significance of this last fact cannot be overemphasized for it means that most or all of the water will be obtained within this zone in a large percentage of wells drilled in granite. The following table gives the average yield of wells ending in granite:

AVERAGE YIELD OF WELLS ENDING IN GRANITE AT SPECIFIED DEPTHS (INCLUDES ONLY WELLS 4 OR MORE INCHES IN DIAMETER)

| Depth (feet) | Number of wells | Average Depth (feet) | Yield (gallons a minute) | | Percent of wells yielding less than 5 gallons a minute |
|---|---|---|---|---|---|
| | | | Range | Average | |
| 0—100 | 33 | 71 | 0—40 | 7.8 | 36 |
| 101—150 | 24 | 123 | 0—30 | 10.4 | 12.5 |
| 151—200 | 12 | 180 | 0—50 | 17 | 33 |
| 200+ | 9 | 273 | 0—40 | 12.3 | 44 |
| Total and average of all wells | 78 | 128 | 0—100 | 10.6 | 29 |

It may be noted that wells between 0-100 feet deep, with an average depth of 71 feet, yield an average of 7.8 gallons a minute. With an increase in depth to an average of 123 feet, a 73 percent increase, the increase in the yield is only 33 percent. A notable increase seems to appear between 151 and 200 feet. However, if the well at Bullocks School, which is exceptional, is excluded, the average for the remaining eleven wells is less than 10 gallons a minute.

PLATE 3

A.—Flowing well at Bullocks School in Wilson County. This well is drilled in granite and is 159 feet deep. When drilled, the flow was 60 gallons a minute, and the water would rise 12 feet above the surface.

B.—Granite quarry at Sims. This is the same body of granite in which the Bullocks School well is drilled. The granite is very massive and relatively free from joints. Most of the water issues from horizontal joints. Such joints are more plentiful near the surface.

Of the 78 wells included in the table, 14 yield less than two gallons per minute. Excluding the well at Bullocks School, which is described below, the average yield of the remaining 44 wells that are more than 100 feet deep is about 10.7 gallons a minute, an increase of only 37 percent in yield with an increase in average depth from 71 to 172 feet, which is 142 percent. This statistical evidence confirms the previously mentioned fact that most of the water from granite is obtained in the weathered and broken portion, just above the fresh, unweathered rock. This is further confirmed by many drillers and well-owners who reported that most of the water was found in that zone. Often in wells 200 to 500 feet deep, most of the water is obtained from depths just below the bottom of the casing and relatively close to the surface.

Because most of the water is obtained from such a shallow depth, particular care should be exercised in preventing any possible contamination of the water supply.

The well at Bullocks School, number 57, is unique and deserves special mention. It is in the northwest corner of Wilson County near the bottom of a long slope, at an elevation of about 245 feet. It is not far from the highest point in the county, the surface sloping upward from Bullocks School to an elevation of about 300 feet, a mile to the west. In drilling the well solid granite was struck near the surface and continued without interruption to 159 feet, at which point a fracture or similar break was found, and water from it overflowed at the surface. It is reported that the well flowed 63 gallons a minute 2.5 feet above the ground and that, when con-

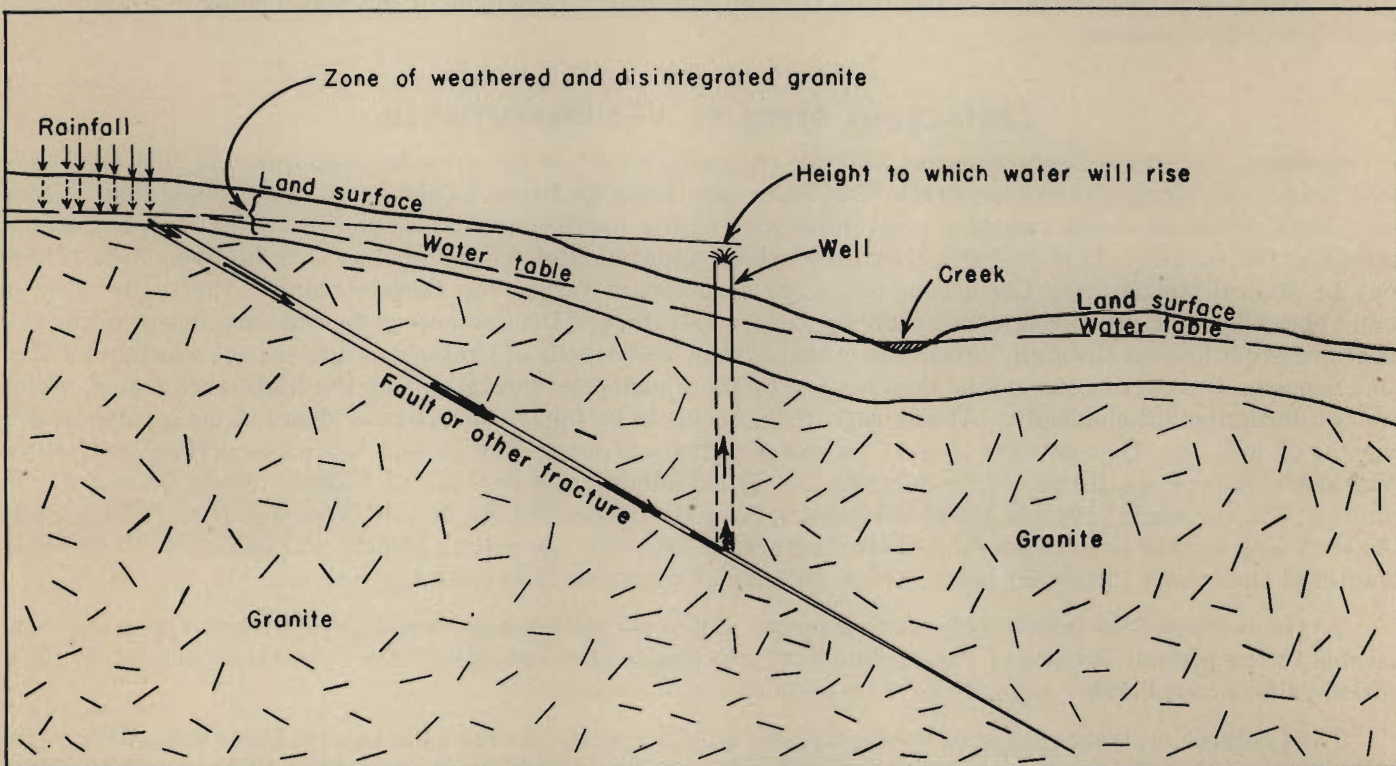



FIG. 7.—Diagramatic section through well at Bullocks School, Wilson County, illustrating the probable reason for flow. Rain, falling on higher land west of the school, percolates downward through the weathered zone and enters a fracture or fractured zone which slopes underneath the school. The water moves downward along the fracture until it reaches the well and then rises in the well because of the head of water above. It will rise to a height equal to the elevation of the water table at the point of entrance into the fracture minus the head lost due to friction.

fined, it would flow out the top of the standpipe, which is 12.3 feet above the surface. When visited, the casing, which went down to solid granite, had become loosened, so that 8 or 10 gallons a minute was flowing out around the base. However, even with that much leakage, the water level rose to 6.5 feet above the surface within a few minutes. Despite the leakage around the base, the well flowed about 30 gallons a minute, four feet above the ground. The source of the water is undoubtedly the hill west of Bullocks School. Rain water, seeping into the ground, travels down along joints and fractures, or possibly along a fault-zone, and is unable to escape until it reaches the well. Figure 7 illustrates the probable reason for the flow.

Dug wells in granite areas usually furnish satisfactory amounts of water for small domestic supplies. However, in some areas the granite is so resistant to weathering that hard, fresh rock is close to the surface, and it is difficult to dig wells deep enough to obtain a satisfactory supply of water. In some areas the water level drops below the weathered zone during long dry periods, and most of the wells go dry. One such area in northwestern Wilson County is described on page 67.

Small springs, mostly of the contact type, are usually plentiful in granite areas. Precipitation seeps downward through the weathered and broken mantle rock on the hills, then moves laterally, on the surface of the fresh unweathered granite. It comes to the surface of the ground at a lower elevation on a hillside or in a valley, where the fresh rock intersects the surface of the ground.

When it is necessary to use water from dug wells and springs, every precaution should be taken to prevent pollution of the water, and bacteriological analyses should be made frequently to check its purity.

Analyses of water from six wells that are believed to obtain their water from granite and granite gneiss are given in the tables of chemical analyses with the county descriptions. These are numbers 2, 48, and 83 in Halifax County, 53 in Nash County, and 8 and 57 in Wilson County. Hardness ranges from 22 to 248 parts per million, averaging 108. Except for well 83, at Enfield, the chloride is very low, averaging 6 parts per million. The average hardness is more than 2½ times as great as in water from wells in schist. However, only one sample shows excessive iron; this is also from the well at Enfield. Nearly all of the wells ending in granite yield water low in iron content.

## CRETACEOUS DEPOSITS (UNDIFFERENTIATED)

**Geology.**—Strata of Cretaceous age underlie the eastern half of the area, but exposures in this area have been found only along Contentnea Creek, Tar River, and Roanoke River, as shown on the geologic map. However, the Cretaceous strata extend several miles west of the westernmost areas shown on the map but do not appear at the surface. It is probable that they extend approximately as far west as U. S. highway 301. There may be several reasons why Cretaceous rocks are not exposed farther up these streams. First, the river in many places has not cut through the overlying Miocene strata, and the Cretaceous deposits are absent in the few places where it has cut through. Also, it is probable that, where beds of Cretaceous age are not overlain by Miocene deposits, the Cretaceous is mistaken for one of the Pleistocene formations or the high-level gravel, which are not dissimilar lithologically. At any rate, there seems to be fairly conclusive evidence, from a considerable number of well logs, that patches of the Cretaceous sediments occur 70 or 80 feet below the surface at Halifax, Whitakers, Battleboro, three or four miles east of Rocky Mount, and possibly at Wilson. Wells 59 and 67b at Halifax; 83a at Enfield; 10c and 10e at Whitakers; 54 at Battleboro; 54, 55, 57, and 58 east of Rocky Mount; and 100 at Wilson appear to have penetrated the Cretaceous deposits. A well at Enfield was reported[1] to have encountered shell marl (Miocene) below which red clay (Cretaceous?) extended to bedrock.

As the bedrock floor upon which the Cretaceous sediments were deposited was quite irregular, possibly comparable to the present surface of the Piedmont, it is probable that tongues of the Cretaceous extend up these buried valleys considerably beyond the main body of the deposits.

The Cretaceous strata consist of sand, clay, and a little gravel. So far as is known, there is no lime in the deposits. In places the sands are argillaceous, often containing enough clay to make them impermeable. They are also commonly quite arkosic, containing many grains of decomposed feldspar, and considerable mica. Because these sediments were deposited in the broad valleys, estuaries, bays, and along the irregular margin of the sea, the strata do not form continuous beds but rather occur as lenses and stringers.

**Water Supply.**—The Cretaceous strata underlie approximately the eastern half of the area and, except along its thin western margin, is the most important source of industrial and municipal water supplies and of domestic supplies using drilled wells. Along the western margin of the Cretaceous, and for several miles eastward, it is not very thick. The clays are so impermeable as to furnish no water at all, and many of the sand layers also contain considerable clay and, therefore, are practically impermeable. However, occasional lenses of cleaner sands may be found that will furnish considerable quantities of water.

The Cretaceous strata were deposited on an irregular surface formed by stream erosion. It is probable that the streams were flowing to the east or southeast, so that the direction of elongation of the lenses of basal Cretaceous sands filling their channels would be in an easterly or southeasterly direction. This possibly should not be overlooked in exploring for water-bearing sands in the Cretaceous. Farther away from the old land mass

[1] Clark, Wm. B., et. al., "The Coastal Plain of North Carolina", North Carolina Geol. and Econ. Survey, vol. III, p. 411.

and higher in the section, strata may have been deposited in estuaries, bays, and along the shore line as beach and bar deposits, so that the lenses may be elongated in other directions as well. It appears, however, that the lenses are usually not extensive enough to be traced except by fairly closely spaced drilling. For this reason, little actual evidence is available regarding their shape and extent. The data on the wells in Cretaceous strata indicate that the possibilities of obtaining satisfactory supplies of water from them increased markedly a few miles east of its western margin. Not only are the strata considerably thicker, so that the chance of striking a lens of permeable sand is greater, but apparently the sand is more completely sorted from the clay. Also, along the thin western margin, the lenses are less likely to be interconnected, as is indicated by the difference in artesian water level in wells ending in the Cretaceous deposits. Farther east the level to which artesian water will rise is approximately the same in wells of different depths in this formation.

As has been pointed out previously, the thickness of the Cretaceous sediments increases to the east at a rate per mile nearly equal to the slope of the underlying bedrock. The top of the Cretaceous deposits is approximately at sea level in the Halifax area and, accordingly, can be estimated approximately from plate 4, which shows the altitude of the bedrock which underlies the Cretaceous. The distance below sea level of the bedrock is roughly the same as the thickness of Cretaceous deposits. This holds true only within the area covered by this report, as farther east the thickness of overlying formations becomes greater, and the top of the Cretaceous is below sea level.

Where the thickness of Cretaceous strata is 150 to 200 feet or more, moderate to large supplies can usually be developed, except in a few localities as in the vicinity of Jackson, in Northampton County. It is entirely possible, however, that wells in these strata, a short distance from Jackson, might furnish large supplies. It is significant that, whereas considerable difficulty was experienced in obtaining a satisfactory supply at Tillery, an excellent supply was obtained at the Caledonia Prison farm, which is several miles closer to the Roanoke River. It may be that the present Roanoke River has approximately the same course as a major stream prior to Cretaceous time, and that permeable water-bearing lenses of the Cretaceous were deposited in this ancestral stream basin. There is some indication that other major streams in North Carolina also follow the approximate course of the pre-Cretaceous streams.

No attempt has been made to obtain an estimate of the average yield of wells in the Cretaceous strata as was done for those in crystalline rocks, because the yield of a well in sand depends largely on the way in which it is completed. In many domestic wells ending in the Cretaceous, the casing extends down through the strata until the water-bearing sand is reached and drilling is stopped at that point. Therefore, all the water must enter the well through a small area of sand equal to the cross-section area of the casing. Many domestic wells, 1¼ to 6 inches in diameter, in these strata have yielded 10 to 50 gallons a minute in this way, and it is obvious that the yield would be many times as great if a properly selected screen were used.

The water in all wells definitely known to end in the Cretaceous is under artesian pressure and will rise above the aquifer. In some areas, where the land surface is low, the water will rise to the surface and flow from the well. Most of these areas are along the valleys of the Meherrin and Tar Rivers, Potecasi and Contentnea Creeks, and possibly along Roanoke River and Fishing Creek. The piezometric surface of water in the Cretaceous strata is shown in plate 4.

Little precipitation falls directly on the Cretaceous sediments because of the limited extent of its exposures. Recharge to it occurs principally by downward percolation of rain water through the overlying formations. Part of the recharge comes through the terrace formations and then through the Miocene. Some of the recharge probably comes directly to the Cretaceous from the terraces where the Miocene is absent.

The high area of the piezometric surface in eastern Edgecombe County indicates local recharge to the Cretaceous. The Yorktown formation may be absent there or may consist of more permeable materials than elsewhere so that precipitation can percolate downward into the Cretaceous sediments. Other high areas of the piezometric surface may also indicate local recharge.

Analyses were made of 16 samples of water from wells ending in the Cretaceous and are given in the tables of analyses with the county descriptions. The samples are from wells 25, 40, 85, and 102-103 in Edgecombe County; 73, 133, and 146 in Halifax County; 20, 31, 42, 46, 78, 87, and 98 in Northampton County; and 131 and 150 in Wilson County.

Of the 12 samples showing iron, three had more than 1.0 part per million, and the average for the 12 was 0.74 part per million. Hardness ranged from 5 to 152 parts per million and averaged 55. The 16 samples can be divided into two groups upon the basis of hardness. The first group consists of nine of the samples in which the hardness ranged from 5 to 24 parts and averaged 16 parts per million. The second group consists of seven samples in which the hardness ranged from 74 to 152 and averaged 104 parts per million. No samples collected had a hardness between 24 and 74 parts per million. In the first group, five samples had a large proportion of sodium bicarbonate with relatively large amounts of total dissolved solids, and the other four were very low in total dissolved solids. Of the five samples with relative large sodium bicarbonate content, four were from the deepest wells. In the second group also, four samples which were only moderately hard had an appreciable amount of sodium bicarbonate and were from the deeper wells of that group. The relations of depth, hardness, and percent sodium are shown in the following table: (Samples very low in total solids are not included).

| County | Well Number | Depth (feet) | Hardness (parts per million) | Percent sodium† |
|---|---|---|---|---|
| Northampton | 87 | 264 | 5 | 97 |
| Halifax | 73 | 216 | 17 | 89 |
| Edgecombe | 25 | 200 | 24 | 87‡ |
| Northampton | 20 | 190 | 16 | 83 |
| Edgecombe | 40 | 160 | 74 | 41 |
| Edgecombe | 102-103 | 155 | 79 | 28 |
| Wilson | 150 | 151 | 92 | 46 |
| Northampton | 78 | 124 | 83 | 32 |
| Northampton | 42 | 113 | 132 | 3‡ |
| Halifax | 146 | 100 | 152 | 15‡ |
| Edgecombe | 66 | 85 | 114 | 28‡ |
| Northampton | 31 | 85(?) | 14 | 91 |

† Percent sodium calculated by dividing the equivalents per million of sodium (and potassium) by the total equivalents per million of the cations (all of the samples were low in chloride).
‡ Calculated from incomplete analysis.

It appears that water near the top of the Cretaceous strata has considerable calcium and magnesium bicarbonates due to the action of carbon dioxide on the lime in the overlying Yorktown formation of Miocene age. As the water moves downward through the Cretaceous strata, these bicarbonates are reacted upon by base exchange silicates such as glauconite, and the calcium and magnesium are replaced by sodium. This process is described in detail by Rennick[1], and natural softening of water has been recognized in other parts of the Coastal Plain[2]. The data in the table indicate that the extent of the softening reaction is approximately proportional to the distance the water has traveled through the sand.

The fact that the deeper waters of the Cretaceous deposits are the softest is very important in obtaining the most satisfactory water supply.

## YORKTOWN FORMATION

**Geology.**—The Yorktown formation, which underlies approximately the eastern three-fifths of the area included in this report, is overlain nearly everywhere by 20 to 30 feet of sand and clay of the Pleistocene formations, so that the Yorktown crops out only in road cuts, along streams, and at the surface where erosion has removed the Pleistocene deposits. The Yorktown lies unconformably upon the Cretaceous in the eastern half of the area, but to the west it extends beyond the Cretaceous and lies directly upon the crystallines. The area covered by this formation is shown on the geological map, plate 1.

The deposits of the Yorktown formation consist mostly of blue arenaceous clay and argillaceous sand, but marl beds are very common. Marl from this formation has been dug at many places in each county described in this report. The marl consists of sandy clay with a varying percentage of calcium carbonate and usually a considerable amount of fossil shell material. These marl strata occur at almost any level within the Yorktown formation, as is suggested by the well log given with the county descriptions. In some places lenses of fairly clean sand are found, and sometimes pebbly layers are encountered, usually near the base of the formation.

[1] Rennick, B. C., Base exchange in ground water by silicates as illustrated in Montana: U. S. Geol. Survey Water Supply Paper 520, p. 68, 1924
[2] Maher, J. C., Fluoride in the ground water of Avoyelles and Rapides Parishes, Louisiana: Louisiana Dept. Cons. Geol. pamphlet no. 1, 23 pp. Carlston, C. W., Fluoride in the ground water of the Cretaceous area of Alabama: Alabama Geol. Survey, Bull. 52, pp. 17-20, 1942.

The base of the formation, which is exposed at many places along the Roanoke River, Tar River, and Contentnea Creek, usually is only a few feet above the water level, and the top of the formation is about 25 feet below the surface. The thickness, calculated by subtracting the elevation of the base from the elevation of the top, is 50 to 70 feet, which accords closely with the thickness shown by numerous well logs.

**Water Supply.**—Although this formation occurs in about three-fifths of the area, only a relatively few wells obtain their water from it. In the first place, the strata generally contain so much clay that the permeability is low and only small supplies can be obtained. Secondly, the water is generally hard and frequently contains some suspended matter which gives the water a bluish cast and often a peculiar odor and taste. At some places, however, lenticular layers of clean sand have been found which furnish moderate supplies of water. The Miocene deposits should not be overlooked as a source of water, particularly along the Fall Zone where the Cretaceous sediments are thin or absent. This zone, through Weldon, Halifax, Enfield, Whitakers, Battleboro, Rocky Mount, Elm City, Wilson, and Black Creek, has proven to be a very difficult one in which to obtain satisfactory water supplies. Usually the crystalline rocks are covered so deeply that drilling into them is a gamble with the odds greatly against obtaining more than a few gallons a minute. Properly constructed screened, or gravel-packed, wells in the Miocene strata may furnish moderate supplies. However, it is usually necessary to do considerable test drilling before finding a satisfactory location. The water supply for the city of Halifax comes from two gravel-walled wells 49 and 51 feet deep, that end in the Miocene and furnish about 15 gallons per minute each. At Scotland Neck, well 132, one of the three gravel-packed wells furnishing the town supply ends in Miocene strata at a depth of 59.5 feet. A test indicated it yielded 205 gallons per minute with a drawdown of 44 feet. At Rich Square well 99, owned by the town, probably ends in Miocene strata at 76 feet. It was pumped at a rate of 120 gallons per minute. Another well at Rich Square ends in a very coarse sand between 40 and 70 feet and was reported to have yielded 250 gallons per minute. Two wells at the Rich Square Ice and Coal Company are 48 feet deep, 2 inches in diameter, and have a combined yield of 55 gallons per minute.

Analyses were made of three samples from wells ending in the Yorktown formation. These analyses are given in the tables with the county descriptions and are number 60 in Halifax County and 97 and 99 in Northampton County. The water from wells 60 and 99 is soft and that from well 97 is moderately soft. However, well 99 is not used because the water has an objectionable amount of iron.

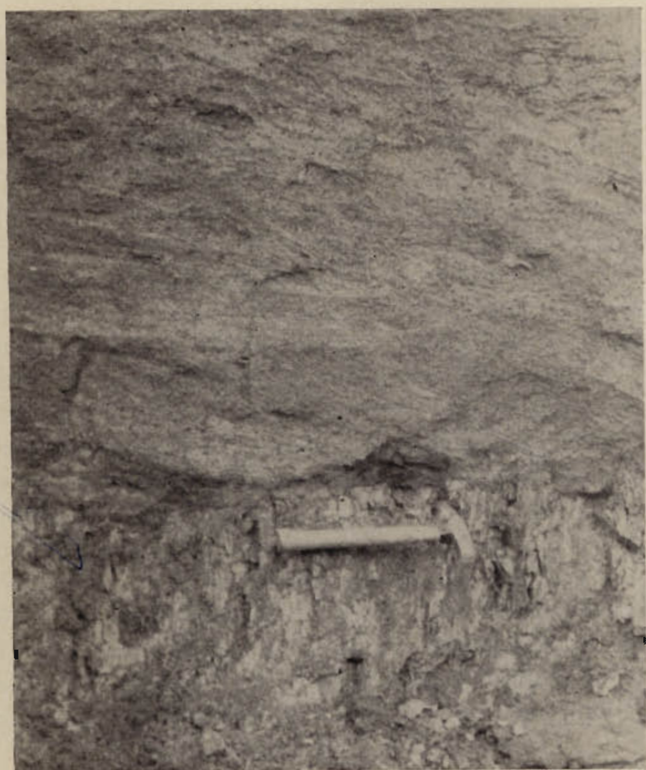
## UNCLASSIFIED HIGH-LEVEL GRAVEL, SAND, AND CLAY

**Geology.**—This unit, as limited in this report, consists of sands, clays, and gravels, mostly of fluviatile origin deposited as stream channel, stream terrace, and basin filling. It is found only above 270 feet and occurs in isolated patches and pockets. So far as is known, it is underlain entirely by pre-Cretaceous crystalline rocks in the area of this report. West of the area, in some places, it is underlain by Triassic rocks. The strata are commonly cross-bedded, and the color is predominantly reddish. The sands are coarse but usually have a clay matrix. Beds consisting of smooth, round white quartz pebbles and cobbles in a sandy clay matrix are not uncommon. The thickness ranges from a feather edge to possibly 50 feet or more. The relation of this formation to the underlying bedrock is excellently shown in road cuts in southwestern Nash County. A number of narrow, steep-sided channels cut into the crystalline schists and filled with high-level gravel, sand, and clay have been cross-sectioned by the road cuts, as is shown in plate 5, B and C. The contact of the high-level gravels with the underlying slates is marked by a thin layer of quartz pebbles covering the bottom and side slopes of the stream channel.

**Water Supply.**—The high-level gravel usually is a poor aquifer because of more or less clay in the strata. However, lenses of cleaner sands and gravels do occur, especially where the beds are thicker. In some places, the crystalline rocks are very poor aquifers, and the possibility of obtaining a supply of water from a pocket of sand in the high-level gravels should not be overlooked.

No water samples were obtained from wells in the high-level gravels, but the water is probably similar to that obtained from the Pleistocene formations.

PLATE 5



A.—Base of Brandywine formation unconformably overlying schist in Nash County. The formation is about 15 feet thick here, but only the basal 4 feet are shown. The material is red and yellow clayey sand and very cross-bedded.

B.—High-level gravels in western Nash County. These gravelly and sandy clays fill former stream channels in the schist, with pebbles and cobbles at the base of the channel filling. B shows 2 such filled channels. An erosion surface has been formed, beveling both the schist and the high-level gravels.

C.—Near view of the left side of B.

## PLEISTOCENE FORMATIONS

**Geology.**—Seven Pleistocene formations, blanketing the eastern three-fifths of the area, are included in this group. The area covered by each formation is shown in the geological map, and a generalized cross section is shown in figure 2. The formation having the greatest elevation above sea level is the oldest, and the lower ones are successively younger. The maximum thickness of any of these formations is about 40 or 50 feet, and the average is probably not more than 25 or 30 feet. The materials consist mostly of arenaceous clay, argillaceous sand, and some gravels. Sorting is usually poor, and the strata are often cross-bedded and lenticular. Red, brown, and yellow colors predominate. The older Pleistocene formations have a larger proportion of coarse material, are more frequently cross-bedded, show poorer sorting, and are usually brighter colored than the younger Pleistocene formations. Plate 5, A, shows the Brandywine formation lying uncomfortably upon schist.

**Water Supply.**—The Pleistocene formations furnish most domestic supplies in areas where they occur. The older of these formations, including the Brandywine and parts of the Coharie, only rarely have lenses of clean sand with good permeability. Usually the water is furnished by argillaceous sands, and the permeability is so low that dug wells must be used. By using dug wells with considerable storage capacity, one hundred to several hundred gallons a day can be taken from the well, even though it will yield at a rate of only a fraction of a gallon per minute. Where the sands are more permeable, hand-bored or machine-drilled wells can be utilized, and this is particularly true of the younger Pleistocene formations, including the Sunderland, Wicomico, and Penholoway. Frequently wells are bored with a 6- or 8-inch auger and a 1¼-inch pipe placed in the well to

UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY
IN COOPERATION WITH
NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT

STATE BULLETIN 51, PLATE 6


MAP OF THE HALIFAX AREA
NORTH CAROLINA
Showing location of wells and springs tabulated in this report

Base map compiled from county maps of North Carolina State Highway Department withdraw the water. Often trouble is experienced because of the sand caving in at the bottom of the well and coming into the bottom of the draw pipe. This can usually be overcome by placing pea-size gravel around the bottom of the pipe as is done in gravel-walled wells. It probaby would be advisable to use a coarse screen or strainer at the end of the draw pipe; or to perforate, or slot, the end of the pipe to permit free entrance of the water. It should be remembered that wells drilled in these formations are shallow and, therefore, more liable to contamination than deeper wells. If it is necessary to utilize this shallow ground water, the precautions outlined on page 15 should be followed.

Analyses of water from five wells in the Pleistocene formations are given in the tables with the county descriptions. Included are numbers 84 in Halifax County, 11 and 157 in Nash County, 96 in Northampton County, and 82 in Wilson County. Of the five samples, only one, number 11 at Whitakers in Nash County, had an objectionable amount of iron. The water from the shallow wells at Enfield, only a few miles away, had only .01 part per million of iron. It appears that the occurrence of iron in shallow ground water is very erratic and unpredictable. The five samples were all soft, hardness ranging from 12 to 27 and averaging 20 parts per million.

## GROUND WATER IN THE FALL ZONE

This area, extending several miles east and west of a line through Weldon, Halifax, Enfield, Rocky Mount, and Wilson, presents some of the most difficult problems of ground water supply. Although there is no easy solution to the problem, careful planning will assist greatly in developing adequate water supplies in that area. In the first place, no one source can be designated as the best and all possible sources should be investigated. The records of the previous wells in the vicinity of a given location will give very valuable clues as to the possibilities of the various sources.

At Halifax and Whitakers it has been practically impossible to get even moderate supplies from the bedrock. The overlying sediments made it impossible to base the location of a well on topographical and geological evidence, and a well drilled into the bedrock under such conditions has little chance of obtaining more than a small supply of water. Unless records of other wells are very favorable, it appears that these rocks should only be considered as a last resort.

Permeable sands at the base of the Sunderland formation have proven a satisfactory source for the towns of Enfield and Whitakers and for a number of industrial and domestic supplies all along this zone. Usually these sands are not more than 25 to 40 feet deep and are frequently overlooked as a source of supply for towns and industries. These sands should be considered thoroughly in searching for a ground-water supply along the Fall Zone. Since the sands are lenticular, it may require a considerable amount of test drilling, but a large number of test holes can be drilled in this formation for the price of one deep well. Shallow wells have certain disadvantages, such as, decreasing yield during periods of drought and increased danger of pollution. Decreased yield can be minimized by spacing the wells over a considerable area and by choosing an area where the normal water table does not decline too far below the surface. Danger of pollution can be guarded against by removing any possible source of pollution for at least several hundred feet from the well field.

Another possible source of supply is sand lenses occurring in the Miocene deposits from 45 to 70 feet below the surface. Such permeable sand lenses, if they can be found, are apt to have certain advantages over the shallower sands. Usually fewer wells will be required, less decrease in yield will occur during periods of drought, and there is less danger of pollution. Sand lenses in the Miocene deposits furnish the water supply for Halifax and should not be overlooked as a possible source of supply in parts of the area where they occur.

The Cretaceous strata apparently occur in isolated patches along this zone and are a possible source, although no satisfactory water supplies are definitely known to have been obtained from this source in this zone. However, a few miles east of the Fall Zone the Cretaceous becomes thicker and is the most important source of supply. Properly constructed wells in it usually will furnish moderate to large supplies, and there is little danger of decreased yield during drought.

# COUNTY DESCRIPTIONS

## INTRODUCTION

Ground water conditions of each county are described in the following pages. Included with each county description are tables containing data on wells in the county, analyses of water from wells and springs, and records of strata encountered in drilling some of the wells.

The location listed in the first column of the tables of well data is the place on the accompanying map, plate 6, to which the well is nearest. In the second column, the name of the owner appears first, and if the place is occupied by a tenant, the tenant's name appears immediately below and slightly indented. The name of a co-owner is not indented. Information regarding depth of the well was usually supplied by the owner, or driller, and is reasonably accurate. The information in the column headed "Geologic formation and Chief aquifer" is based on the study of rock outcrops and interpretation of data supplied by the drillers and owners. The depth to water is the measured depth only when a single unqualified figure is used. Otherwise, the depth given is reported depth. The yield given for most wells is the amount reported by the driller or owner.

As very few wells are given a thorough pumping test, the reported yield of many of them probably is not entirely accurate. The yields given usually are based on short bailer tests or are estimates based on the performance of the wells in service. Information regarding actual pumping tests is given in the column headed "Remarks."

## EDGECOMBE COUNTY

**(Area 511 square miles; Population 49,162)**

### TOPOGRAPHY AND PHYSIOGRAPHY

The topography of all but the northern fourth of Edgecombe County has been mapped and is included in the Rocky Mount, Tarboro, Parmele, and Falkland Quadrangle maps of the U. S. Geological Survey.

Edgecombe County lies entirely within the Coastal Plain physiographic province, and its surface is formed by the terraces of the Penholoway, Wicomico and Sunderland formations of Pleistocene age.

The Penholoway terrace forms a belt several miles wide on the north and east side of the Tar River, but is comparatively narrow on the other side. It also extends for a considerable distance up the principal tributaries of the Tar River. The terrace is generally very flat, and large areas are poorly drained.

The Wicomico terrace covers a considerable area in the north and eastern part of the county where it is quite flat. It also occupies relatively narrow strips south and west of the Tar River and along its tributaries.

The Sunderland terrace occupies a large part of the county south and west of the Tar River and along the western edge of the county. Because the river in the southwest part of the county is relatively close to the higher terraces, the Wicomico and Sunderland, the tributary streams here have cut much farther below the surface and dissection is considerably greater in this part of the county. The lowest point in the county is on the Tar River, as it leaves the county, and is about ten feet above sea level. The highest elevations, about 140 feet, are along the western edge of the county.

Edgecombe County is drained by Tar River and its tributaries, the principal ones of which are Fishing Creek, Swift Creek, Deep Creek, Conetoe Creek, Cokey Swamp, and Town Creek. Tar River is a large, through-flowing stream that has cut down 60 to 70 feet below the general land surface.

### GEOLOGY

Edgecombe County is underlain by the crystalline "basement" rocks which dip gently eastward beneath the surface from or beyond the western boundary of the County. The only known exposure of this basement rock within the county is at its western edge along the Tar River. Crystalline rocks are encountered in wells at depths of 12 to about 140 feet along the Edgecombe-Nash County line and were entered at 328 feet in a deep well drilled at Tarboro[1] and at 342 feet in a well drilled at Pinetops. Depth to the crystalline rock is shown on the map, plate 4.

Lying upon the irregular, sloping surface of the crystalline basement rocks are the Cretaceous strata. These strata are absent or very thin at the western boundary of the county, becoming thicker eastward at the rate of about 20 feet to the mile; that is, the base of the Cretaceous, resting on the irregular erosion surface of the basement rocks, dips southward about 20 feet to the mile while the upper, eroded top of the formation is nearly parallel with the land surface. Exposures of this upper eroded top of the Cretaceous are found along the Tar River from about halfway between Rocky Mount and Tarboro to beyond the eastern limit of the county. The thickness of the Cretaceous sediments probably amounts to 400 feet or more in the easternmost parts of the county.

Lying upon the irregular erosion surface of the Cretaceous strata is the Yorktown formation of Miocene age. This formation extends beyond the western boundary of the county and overlaps the western margin of the Cretaceous for several miles lying in depressions in the irregular surface of the crystalline rocks. The Yorktown is usually only 30 to 60 feet thick but apparently forms an almost continuous sheet over all older formations in the county. The base of the formation is exposed at many places along the Tar River, where it lies uncomfortably upon the Cretaceous and is nearly parallel to, and about 40 to 80 feet below, the general land surface.

Practically the entire surface of the county is formed by the Penholoway, Wicomico, and Sunderland formations of Pleistocene age. The formations are generally about 20 to 30 feet thick and consist chiefly of yellow argillaceous sands and sandy clays which are cross-bedded in places.

## GROUND WATER

Nearly all domestic water supplies are obtained from the ground, mostly from wells, only a few springs being used. The majority of wells are shallow and obtain their water from the Pleistocene formations. Bored and driven wells predominate, only a few dug wells being used. Bored wells are used where the strata contain some clay or where clay layers are found above the water-bearing stratum because of the difficulty in driving a well under such conditions. In the vicinity of Pinetops, Macclesfield, and Sharpsburg, bored wells predominate, and many bored wells are also uused east of Battleboro and Whitakers. In the eastern part of the county, driven wells are more plentiful. The reason for this is that the water table is generally closer to the surface there, and also the lower terrace formations contain a greater proportion of sand which is favorable to driving wells.

In some places the marl of the Yorktown formation is close to the surface, and shallow wells must get their water from this formation. Usually only small supplies are obtained, and the water from most of the wells is hard and from some has an unpleasant taste and odor. For this reason, drilled wells are more common in these places than elsewhere. This is especially true of the area around Speed.

Records were obtained for about 100 drilled wells in the county. Only a few drilled wells are used that end in the Yorktown formation, most of the drilled wells ending in Cretaceous strata. About the only wells ending in the Yorktown formation are a few drilled in the western part of the county where the Cretaceous sediments are absent or are too thin to furnish any water. The Yorktown furnishes only small amounts of water to drilled wells, and the water usually is quite hard.

Except for a strip three to five miles wide along the western margin of the county, most of the wells ending in the Cretaceous deposits have been successful in obtaining satisfactory supplies of water, and, even in that strip, there are a number of successful wells ending in the Cretaceous. As these strata consist of interfingering lenses and sand and clay, the success of a well depends on striking a permeable sand lens. The chances of striking a permeable sand stratum in the formation are generally favorable if the thickness is more than 60 or 80 feet; therefore, the chances for finding a good aquifer increase eastward as the thickness of the formation increases.

Two areas in which a number of failures have been recorded are in the vicinity of Macclesfield and north of Leggett. The reason for the failures appear to lie in the fineness of the sand. However, other wells in these

[1] Clark, William B., et. al., "The Coastal Plain of North Carolina": North Carolina Geol. and Econ. Survey, vol. III, pp. 404-405, 1912.

areas have been fairly successful, and it appears that moderate supplies can be developed there by using the proper size of screen and careful development of the well. Larger supplies could probably be obtained from gravel-walled wells.

The only flowing wells in the county are found along the Tar River at Tarboro and Princeville and near Old Sparta. All of these end in Cretaceous strata. It is probable that flowing wells could also be obtained along Deep Creek near Speed and possibly at places along Fishing Creek and Town Creek.

No large supplies have been obtained from Cretaceous deposits within the county, probably because, except for the city of Tarboro, no large supplies of water are needed. Quantities obtained generally have proven very adequate to supply the demand. Comparison of the logs and the records of the wells with like records from other areas where large amounts of water have been obtained from beds of Cretaceous age indicates that large supplies of water, possibly 500 or more gallons a minute, can be obtained from properly constructed gravel-walled wells in most parts of the county except along the western edge. Moderate supplies, possibly as much as 200 gallons a minute, can probably be obtained from properly constructed, screened wells.

Analyses of samples of water from wells 25, 40, 66, 102, and 102a, Edgecombe County, are given in the table of analyses. The sample from well 66, an 85-foot well in the Cretaceous, was the hardest, having 114 parts per million of hardness. A composite sample from wells 102 and 102a, which are 155 feet deep and are the source of the city supply at Pinetops, had a hardness of 79 parts per million. Well 25, a 200-foot well at the Speed High School, is the deepest of the five wells and yields the softest water. It is a typical soft, bicarbonate water often found in the deeper beds of the Cretaceous sands in the Coastal Plain. Water from well 40 at Leggett School had a hardness of 74 parts per million and is very similar to the water at Pinetops.

## MUNICIPAL SUPPLIES

Tarboro and Pinetops have the only municipal supplies in Edgecombe County with the exception of Rocky Mount, Battleboro, and Whitakers which were described with Nash County because the source of supply is in that county.

Pinetops, population 713, has had a municipal supply since 1926, obtaining its water from two drilled wells, 102 and 102a in the table, which are 160 and 175 feet deep, respectively. The water comes from a sand stratum in the Cretaceous deposits, and the wells yield about 75 gallons a minute each. The wells are equipped with deep-well turbine pumps, capable of pumping 50 gallons per minute each, which discharge directly into the mains. A 75,000-gallon elevated tank supplies storage with a maximum pressure of about 55 pounds to the mains. The average consumption is about 50,000 gallons a day, and the water is not treated.

Tarboro, population 7,148, has had a municipal supply since 1888 or 1889. From that date until 1897, the water was taken from Hendricks Creek and was used only for fire protection. In 1897, wells were drilled and a distribution system installed to supply the inhabitants. In 1912, just prior to abandoning the well water supply, 14 wells, 50 to 100 feet deep and 4 to 8 inches in diameter, were used. These wells were pumped by a single vacuum pump, yielding about 85 gallons per minute. The deeper wells overflowed, and the pressure was reported to have been sufficient to raise the water 16 feet above the bed of Hendricks Creek. From 1912 to the present time, Tarboro has obtained its water supply from the Tar River. The water is pumped from the river by three electrically-driven centrifugal pumps with a total capacity of 2,950 gallons a minute. It is treated by prechlorination and the addition of lime and alum and then is filtered. Secondary lime, ammonia, calgon, and chlorine are added after filtering. Three booster pumps, two electrically and one-gasoline-driven, with a total capacity of 2,750 gallons a minute, are used to distribute the water. Storage is provided by two concrete reservoirs, one of 1,000,000-gallon and one of 275,000-gallon capacity and two 100,000-gallon elevated tanks. The pressure is maintained at about 64 pounds at the plant, and the pressure at fire hydrants is about 60 pounds. The capacity of the plant is about 1,500,000 gallons a day, and maximum consumption is about 500,000 gallons a day. Average consumption is about 400,000 gallons a day, of which about 25 percent is used by industry.

### RECORDS OF WELLS IN EDGECOMBE COUNTY

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Whitakers | H. T. Latham | C. W. Norton | drilled | 118 | 5 | Granite | 11 | 6–8 | Cased 76 feet. |
| 2 | Whitakers | Mrs. W. T. Braswell | (?) | drilled | 100 | 6 | Granite | | 6–8 | Cased 60 feet. Water contains much iron. Not in use. |
| 3 | Whitakers | Town | (?) | jetted | 65 | 1¼ | Yorktown, marl (?) | | 5± | Public well; on street corner |
| 4 | Enfield | Bricks Rural Life School | Virginia Mach. & Well Co. | drilled | 326 | 8 | Schist | 18 | 110+ | Tested at 110 gallons per minute with 24-foot draw-down. |
| 5 | Whitakers | Davenport & Bland Lumber Co. | Heater Well Co. | jetted | 20 | | Sunderland, sand | | 20 | Two wells furnish 20 gallons per minute. |
| 6 | Whitakers | R. W. Baker | | dug | 11.5 | 36 | Sunderland, sand and clay | 8½ | | |
| 7 | Whitakers | R. W. Baker | | bored | 22 | 4 | Sunderland, sand and clay | | 5–7 | Cased 15 feet. |
| 8 | Whitakers | B. C. Pittman | R. L. Jones | bored | 16 | 8 | Sunderland, fine sand | | 5 | Screen, 6 feet at bottom. |
| 9 | Whitakers | B. C. Pittman | R. L. Jones | drilled | 130 | 4¼ | Cretaceous | | 0 | Marl at 35 feet; blue mud below to crystalline rock at 130 feet. No water. |
| 10 | Whitakers | M. L. Pittman | Seiwert & Nagel | drilled | 93 | 4½ | Cretaceous, sand | 6 | 10–15 | Strong supply. |
| 11 | Gethsemone | Harvey Weeks | R. L. Jones | drilled | 150 | 4¼ | Cretaceous, sand | 12 | 8–10 | Not used at present because of broken pump |
| 12 | Gethsemone | R. L. Anderson | R. L. Jones | drilled | 100 | 4¼ | Cretaceous sand, | | 15 | |
| 13 | Gethsemone | H. N. Gregory | Seiwert & Nagel | drilled | 80 | 4½ | Cretaceous, sand | 17 | 5–6 | Water has a slight sulfur taste and odor; contains iron. |
| 14 | Gethsemone | G. R. Quincy | John Johnson | drilled | 269 | 4½ | Cretaceous, sand | | 0 | Not enough water; never used. |
| 15 | Leggett | Mrs. R. S. Weeks | Seiwert & Nagel | drilled | 79 | 4½ | Cretaceous, sand | 6 | 10–15 | Water contains iron. Good supply. |
| 16 | Leggett | G. R. Gammons | John Johnson | drilled | 75 | 4½ | Cretaceous, sand | | 15–18 | Drilled at sawmill which has been abandoned. |
| 17 | Leggett | Mrs. J. W. Corbett J. R. Crisp | O. B. Truby | drilled | 185 | 6 | Cretaceous, sand | | | |
| 18 | Leggett | M. C. Anderson | O. B. Truby | drilled | 150 | 6 | Cretaceous, sand | 8± | | Not used. |
| 19 | Lawrence | Z. V. Long | R. L. Jones | drilled | 60 | 4¼ | Cretaceous, sand | | 20 | |
| 20 | Lawrence | Mrs. Dicy Howell | R. L. Jones | drilled | 120 | 4½ | Cretaceous, sand | | 8 | |
| 21 | Speed | H. G. Shelton | R. L. Jones | drilled | 110 | 4¼ | Cretaceous, sand | 20± | 10 | |
| 22 | Speed | A. R. Savage | R. L. Jones | drilled | 65 | 4¼ | Cretaceous, sand | 33½ | 8–10 | |
| 23 | Speed | John Lane Pure Oil Station | | drilled | 100 | 4¼ | Cretaceous, sand | 3 | 6 | |
| 24 | Speed | B. E. Vick | B. E. Vick | jetted | 110 | 2 | Cretaceous, sand | 15± | 5–6 | |
| 25 | Speed | Speed High School | R. L. Jones | drilled | 200 | 4¼ | Cretaceous, sand | 28± | 10 | See analysis in table |
| 26 | Speed | I. C. Howell | R. L. Jones | drilled | 200 | 4¼ | Cretaceous, sand | | 10 | Soft muck from 200 to 300 feet. Did not hit basement rock at 300 feet. |
| 27 | Speed | D. H. Parker | R. L. Jones | drilled | 130 | 4¼ | Cretaceous, sand | 20± | 10 | |
| 28 | Speed | E. W. Speed | R. L. Jones | drilled | 80 | 4¼ | Cretaceous, sand | | 10± | |
| 29 | Speed | Mrs. Henry Cherry | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand | | 10 | Screen used. |
| 30 | Speed | Mrs. Fannie Lucas | R. L. Jones | drilled | 80 | 4¼ | Cretaceous, sand | | 8–10 | |
| 31 | Speed | John Edwards | R. L. Jones | drilled | 100 | 4¼ | Cretaceous, sand | | 8 | |
| 32 | Speed | Mrs. Mattie Ivey | R. L. Jones | drilled | 150 | 4¼ | Cretaceous, sand | | 6–8 | |
| 33 | Speed | Kelly Turner | R. L. Jones | drilled | 150 | 4¼ | Cretaceous, sand | | 6–8 | |
| 34 | Speed | Mrs. A. J. Parker | R. L. Jones | drilled | 90 | 4¼ | Cretaceous, sand | | 8 | |
| 35 | Speed | Shade Marks | R. L. Jones | drilled | 70 | 4¼ | Cretaceous, sand | | 5 | Screen; gravel-packed. |
| 36 | Leggett | Mrs. Z. V. Long | (?) | drilled | 110 | 4 | Cretaceous, sand | | | |
| 37 | Leggett | Colored School | John Johnson | drilled | 110 | 4½ | Cretaceous, sand | 9½ | 15 | |
| 38 | Leggett | Mra. Barbara House C. L. Fountain | Seiwert & Nagel | drilled | 80 | 4½ | Cretaceous, sand | | 5± | Water contains iron. |
| 39 | Leggett | M. E. Allsbrook | John Johnson | drilled | 100+ | 3 | Cretaceous, sand | | 3–4 | |
| 40 | Leggett | Leggett School | John Johnson | drilled | 160+ | 4¼ | Cretaceous, snad | | 10 | Water-bearing sand at 75 and 160 feet. Analysis in table. |
| 41 | Leggett | W. H. MacNair | | driven | 20 | 1¼ | Cretaceous, sand | 12± | 6–8 | |
| 42 | Battleboro | Miss Bettie Powell | C. W. Norton | drilled | 155 | 6 | Cretaceous, sand | 13 | 3 | |
| 43 | Battleboro | H. N. Davenport | | bored | 24 | 1¼ | Cretaceous, sand | 12± | 5–6 | |
| 44 | Battleboro | Mt. Moria Farm | Morgan ? | drilled | 180 | 6 | ? | | 4–5 | |
| 45 | Battleboro | Mrs. H. B. Bryan | Morgan | drilled | 90(?) | 6 | ? | | 3–4 | |
| 46 | Rocky Mount | East Carolina Training School | Heater Well Co. | drilled | 86 | 6 | Hard gray granite | 13 | ½ | Not used; insufficient water Went through marl at 50 feet. Cased 76 feet. |

RECORDS OF WELLS IN EDGECOMBE COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 47 | Rocky Mount | East Carolina Training School | A. R. Bobbit | drilled | 65 | 6 | Granite | | 3 | Cased 55 feet. |
| 48 | Rocky Mount | E. G. Battle | Morgan ? | drilled | 152.5 | 8 | Granite | 28 | 20? | Cased 60 feet. Reported to yield hard water. |
| 49 | Rocky Mount | Old Town Farm M. C. Braswell | | bored | 12 | 1¼ | Penholoway, sand | 7± | | Strainer used. |
| 50 | Heartsease | Mrs. S. W. Grimes | J. T. Moore | bored | 20 | 6 | Penholoway, sand | | | Adequate supply. |
| 51 | Rocky Mount | City Ice Plant | C. W. Norton | drilled | 318 | 6 | Grantie | 11 | 25 | Cased 12 feet. Not in use. |
| 52 | Rocky Mount | Colonial Ice Co. | A. R. Bobbit | drilled | 90? | 6 | ? | 2 | 100 | Used for cooling. |
| 53 | Rocky Mount | J. F. Doughtridge | G. L. Morgan (Truby) | drilled | 65 | 6 | Granite | 10± | 14 | Cased 60 feet. |
| 54 | Rocky Mount | D. E. Riley | Heater Well Co. | drilled | 63 | 4 | Cretaceous (?), sanstone ? | 10 | 20 | Cased 45 feet. Yielded 20 gallons per minute with drawdown of 10 ft. |
| 55 | Rocky Mount | Meadowbrook Dairy | Heater Well Co. | drilled | 131 | 6 | Granite | 9± | 30 | Cased 80 feet. Yielded 11½ gallons per minute with drawdown of 9 feet. Granite at 100 feet. See log. |
| 56 | Rocky Mount | H. A. Kincaid Mrs. E. O. B. Gibbs | Heater Well Co. | drilled | 148 | 5 | Cretaceous (?), sandstone | 10–12 | 10 | Cased 136 feet. Hard blue sandstone from 136 to 148 feet. |
| 57 | Rocky Mount | W. L. Edwards | R. L. Jones | drilled | 153 | 4½ | Cretaceous, sand | | 6–8 | Cased 153 feet. Granite at depth of 150 feet. |
| 58 | Rocky Mount | G. W. Bradley | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand | 6± | 8+ | Granite at depth of 120 feet. |
| 59 | Rocky Mount | Mrs. Bailey W. J. Eason | R. L. Jones | drilled | 170 | 4¼ | Cretaceous, sand and gravel | | 8± | |
| 60 | Rocky Mount | W. J. Eason | R. L. Jones | drilled | 160 | 4¼ | Cretaceous, sand and gravel | | 8± | |
| 61 | Tarboro | J. C. Powell | R. L. Jones | drilled | 160 | 4¼ | Cretaceous, gravel | 28 | 1± | |
| 62 | Tarboro | H.M. Phillips Johny Grimes | R. L. Jones | drilled | 140 | 4¼ | Cretaceous, sand | | 8± | White clay at 120 feet. |
| 63 | Tarboro | J. C. Powell | R. L. Jones | drilled | 220 | 6 | Cretaceous, sand | | 5–10 | Cased 140 feet. Red clay at 140 feet, sand from 215 to 220 feet. |
| 64 | Tarboro | J. A. Whitehurst | A. F. Seiwert & Nagel | drilled | 108 | 4½ | Cretaceous, gray sand | 15 | 50 | |
| 65 | Tarboro | Henderson Lumber Co. Hope Lodge Farm | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand | | 8 | Screen. |
| 66 | Tarboro | Henderson Lumber Co. | R. L. Jones | drilled | 85 | 6 | Cretaceous, sand | 21 | 60 | About 9 feet of drawdown while pumping approximately 20 gallons per minute. See analysis in table. |
| 67 | Tarboro | B. F. Taylor Taylor Bottling Works | ? | drilled | 90 | 6 | Cretaceous, sand | | 10–20 | Not used now. |
| 68 | Tarboro | J. A. Blake, Elite Laundry & Dry Cleaners | | dug | 35 | 36 | Wicomico, sand | 9½ | 3–6 | The 2 wells yield 3 to 6 gallons per minute depending on water table level. |
| 69 | Coakley | B. C. Mayo | R. L. Jones | drilled | 43 | 4¼ | Gravel (?) | | 8+ | |
| 70 | Coakley | W. Z. Wilson | John Johnson | drilled | 230 | 4¼ | Cretaceous, sand | 38 | 10 | Not in use. |
| 71 | Coakley | Buck Whitehurst Jones Farm | R. L. Jones | drilled | 160 | 4¼ | Cretaceous, sand | | 10 | |
| 72 | Coakley | Columbus Mayo | R. L. Jones | drilled | 152 | 4¼ | Cretaceous, sand | 54 | 10 | |
| 73 | Tarboro | Mrs. L. J. Mewbern Mewbern Grist Mill | L. T. Mewborn | jetted | 130 | 2 | Cretaceous, sand | +2 to 5 | 10± | The 3 wells flow 1 to 2 gallons per minute each and yield about 10 gallons per minute to a suction pump. |
| 74 | Tarboro | Tarboro Town | Sydnor Pump & Well Co. | drilled | 349 | 8 | | | 0 | Abandoned. (Listed in Volume 3 of North Carolina Geological and Economic Survey, 1912, pages 404 and 405.) See log, page —. |
| 75 | Tarboro | Tarboro Veneer Co. | | bored | 30 | 6 | Wicomico, sand | | 10± | The 5 wells, bored with hand auger, together furnish about 10 gallons per minute. |
| 76 | Tarboro | Prison Camp | R. L. Jones | drilled | 110 | 6 | Cretaceous, sand | 23± | 20 | |

RECORDS OF WELLS IN EDGECOMBE COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 77 | Tarboro | W. H. Shirley & W. J. Eason | (?) | drilled | 175 | 6 | Cretaceous, sand | 16 | 10± | Formerly used for county home. |
| 78 | Tarboro | Mrs. Mamie Britt | R. L. Jones | drilled | 168 | 4¼ | Cretaceous, sand | 21½ | 10± | Not used. |
| 79 | Rocky Mount | Upper Coastal Plain Test Farm | Carolina Drilling & Equipment Co. | drilled | 68 | 6 | Cretaceous, coarse sand | 20 | 30 | Sand stratum is below marl. |
| 80 | Rocky Mount | West Edgecombe School | R. L. Jones | drilled | 150 | 5½ | Granite |  | 10 |  |
| 81 | Rocky Mount | West Edgecombe School | Carolina Drilling & Equipment Co. | drilled | 65 | 6 | Granite |  | 10± |  |
| 82 | Rocky Mount | West Edgecombe School | Carolina Drilling & Equipment Co. | drilled | 70 | 6 | Granite |  | 10 |  |
| 83 | Rocky Mount | West Edgecombe School | (?) | drilled | 285 | 6 | Granite |  | 0 |  |
| 84 | Rocky Mount | Mrs. Ruth Brake J. A. Brake |  | bored | 36 | 1¼ | Sunderland, sand | 13.26 |  |  |
| 85 | Rocky Mountain | W. H. Worsley | Seiwert & Nagel | drilled | 125 | 6 | Cretaceous (?), sand ? |  |  | Hard water reported. |
| 86 | Rocky Mount | J. B. A. Doughtridge | Heater Well Co. | drilled | 162.5 | 6 | Basement rock, "Blue slate" | 18 | 18 | Cased 100 feet. Went through shell marl stratum. |
| 87 | Rocky Mount | Wm. H. Brake | Seiwert | drilled | 100 | 4 | Rock | 15± | 3 |  |
| 88 | Rocky Mount | Wm. H. Brake | Wm. H. Brake | bored | 50 | 6 | Yorktown, sand and shell rock | 15± | 3–4 | Water contains iron. |
| 89 | Rocky Mount | J. L. Worsley | R. L. Jones | drilled | 100 | 4¼ | Rock |  | 20 | Cased 60 feet. |
| 90 | Rocky Mount | Kelly Gay W. D. Moody | Seiwert | drilled | 84 | 6 | Rock |  | 3–5 | Cased 53 feet. |
| 91 | Pinetops | C. D. Womble | (?) | drilled | (?) | 6 | Cretaceous, sand | 34 |  | Not in use. |
| 92 | Pinerops | T. C. Carlton | Price | bored | 28 | 6 | Sunderland, sand | 20± | 3 |  |
| 93 | Old Spara | W. W. Eagles & J. T. Denny | R. I. Jones | drilled | 95 | 4¼ | Cretaceous, sand | 35 | 8–10 | See log. |
| 94 | Old Sparta | W. W. Eagles Cicero Denton | R. L. Jones | drilled | 110 | 4¼ | Cretaceous, sand |  | 8–10 | Water contains iron. |
| 95 | Tarboro | H. T. Latham Fred Marquette, Jr. | R. L. Jones | drilled | 95 | 4¼ | Cretaceous, sand | 17½ | 5 |  |
| 96 | Mayos X Road | Mayo School | John Johnson | drilled | 176 | 5 | Cretaceous, sand | 13 |  | Not in use. Formerly used for school which has been moved. |
| 97 | Conetoe | Horace Wilkins | R. L. Jones | drilled | 160 | 4¼ | Cretaceaus, sand | 15½ | 10 |  |
| 98 | Conetoe | J. D. Harrell | R. L. Jones | drilled | 100 | 4¼ | Cretaceous, sand | 5 | 12 | Went through red clay from 90 to 100 feet. Water comes from white sand at 100 feet. |
| 99 | Conetoe | H. H. Simons |  | driven | 22 | 1¼ | Penholoway, sand | 15–18 | 7–7 | Screen used. |
| 100 | Old Sparta | E. P. Williamson | Warren | jetted | 115? | 1¼ | Cretaceous, sand | +4 |  | Flows about ¼ gallon a minute. |
| 101 | Old Sparta | James T. Edwards | ? | jetted | 110 | 1¼ | Cretaceous, sand |  |  | Abandoned; formerly flowed about 5 gallons a minute. |
| 102 | Pinetops | Pinetops Town | C. W. Norton | drilled | 155 | 6 | Cretaceous, sand | 30± | 75 | See analysis in table. |
| 102a | Pinetops | Pinetops Town | C. W. Norton | drilled | 155 | 6 | Cretaceous, sand | 30± | 75 |  |
| 103 | Pinetops | Pinetops Town | Virginia Mach. & Well Co | drilled | 446 | 8 |  |  |  | Granite at 342 feet. See log in table. |
| 104 | Macclesfield | Lyman Eason |  | dug | 29 | 24 | Sunderland; clay, sandy | 17 |  | Went dry summer of 1941. |
| 105 | Macclesfield | Frank Eason Esso Station | C. W. Norton | drilled | 190 | 6 | Cretaceous, sand | 17 | 0 |  |
| 106 | Macclesfield | Macclesfield School | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand | 23 | 30 |  |
| 107 | Macclesfield | J. C. Bridges | C. W. Norton | drilled | 116 | 6 | Cretaceous, sand |  | 5± |  |
| 108 | Macclesfield | J. A. Forbes | C. W. Norton | drilled | 156 | 6 | Cretaceous, sand | 60? | 2 | Reported to yield hard water. |
| 109 | Maclesfield | Mrs. Mary E. Webb |  | drilled | 65 | 1¼ | Cretaceous, sand | 26? | 5± | Only fair supply, slightly hard. |
| 110 | Crisp | W. W. Eagles | C. W. Norton | drilled | 149 | 6 | Cretaceous, sand | 60± | 10± | Supplies about a dozen families. |
| 111 | Crisp | Crisp School | R. L. Jones | drilled | 130+ | 6 | Cretaceous, sand | 38 | 10± | Supplies school. |

ANALYSES OF GROUND WATER FROM EDGECOMBE COUNTY, NORTH CAROLINA
(Numbers at heads of columns correspond to numbers in table of well data)
Parts per million.

| | 25 | 40 | 66 | 102-102a |
|---|---|---|---|---|
| Silica ($SiO_2$) | | 31 | | 34 |
| Iron (Fe) | | .40 | | .0 |
| Calcium (Ca) | | 21 | | 24 |
| Magnesium (Mg) | | 5.2 | | 4.7 |
| Sodium and Potassium (Na+K) | | 24 | | 14 |
| Carbonate ($CO_3$) | | 0 | | 0 |
| Bicarbonate ($HCO_3$) | 228 | 138 | 179 | 116 |
| Sulphate ($SO_4$) | 5* | 6.0 | 2* | 7.8 |
| Chloride (Cl) | 4 | 4.5 | 5 | 4 |
| Fluoride (F) | .6 | | .4 | .4 |
| Nitrate ($NO_3$) | | .1 | .0 | .10 |
| Total dissolved solids | | 160 | | 139 |
| Total hardness as $CaCO_3$ | 24** | 74 | 114** | 79 |
| Date of collection | Jan. 15, 1942 | April 8, 1943 | Jan. 15, 1942 | Dec. 9, 1941 |

* By turbidity
** Soap hardness
Analyst: 25, 66, 102-102a, M. D. Foster; 40, E. W. Lohr.

LOG OF WELL 4, NEAR ENFIELD, IN EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand | 3 | 3 |
| Clay | 9 | 12 |
| Sand, white, water-bearing | 3 | 15 |
| Miocene, Yorktown formation: | | |
| Clay, blue | 20 | 35 |
| Sand, water-bearing | 6 | 41 |
| Clay, blue | 7 | 48 |
| Basement rock: | | |
| Rock, sandy | 3 | 51 |
| Granite, hard, gray | 5 | 56 |
| Rock, flinty red | 7 | 63 |
| Granite, gray (Bailer tests indicate yield was 5 gallons per minute at this depth) | 233 | 296 |
| (Crevice) | 2 | 298 |
| Rock, soft, black | 8 | 306 |
| (Crevice) | 1 | 307 |
| Red flinty formation | 19 | 326 |
| (Large amount of water at 296 feet and below) | | |

LOG OF WELL 24, NEAR SPEED, IN EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Wicomico formation: | | |
| Clay | 7 | 7 |
| Clay, red, tough | 21 | 28 |
| Miocene, Yorktown formation: | | |
| Mud, blue | 22 | 50 |
| Sand, fine, blue | 5 | 55 |
| Marl | 20 | 75 |
| Cretaceous (undifferentiated): | | |
| Sand, becoming progressively coarser | 35 | 110 |

LOG OF WELL 55, NEAR ROCKY MOUNT, IN EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand and soil | 3 | 3 |
| Clay | 10.5 | 13.5 |
| Clay, red, tough | 1.5 | 15 |
| Sand, fine, water-bearing | 1.5 | 16.5 |
| Miocene, Yorktown formation: | | |
| Gumbo, black | 1.5 | 18 |
| Shell marl, black and mushy | 62 | 80 |
| Cretaceous (undifferentiated): | | |
| Sandstone, blue | 20 | 100 |
| Basement rock: | | |
| Granite | 31 | 131 |

LOG OF WELL 74, AT TARBORO, EDGECOMBE COUNTY
(Modified from log in "The Coastal Plain of North Carolina:" North Carolina Geological and Economic Survey, vol. III, 1912, p. 104)

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Penholoway (?) formation | | |
| Sand, white | 15 | 15 |
| Miocene, Yorktown (?) formation: | | |
| Sand, caving | 10 | 25 |
| Clay, sandy | 15 | 40 |
| Sand, white | 25 | 65 |
| Cretaceous (undifferentiated): | | |
| Clay, stiff bluish | 8 | 73 |
| Clay, sandy yellow | 12 | 85 |
| Sand, white | 5 | 90 |
| Clay, white stiff | 5 | 95 |
| Clay, bloodred, and slate (?) | 10 | 105 |
| Clay, sandy, white and pink | 10 | 115 |
| Sand, coarse, white (with a little water) | 10 | 125 |
| Clay, sandy yellow | 3 | 128 |
| Sand, yellow | 4 | 132 |
| Clay, red and yellow | 18 | 150 |
| Clay, sandy yellow | 2 | 152 |
| Clay, stiff red and yellow | 18 | 170 |
| Clay, sandy yellow | 4 | 174 |
| Clay, sandy, and coarse gravel | 8 | 182 |
| Sand, coarse (little water) | 8 | 190 |
| Clay, stiff yellow | 4 | 194 |
| Clay, sandy yellow | 2 | 196 |
| Sand, coarse | 3 | 199 |
| Clay, stiff, red, yellow, brown, tan, white, and black | 54 | 253 |
| Sand, yellow | 3 | 256 |
| Sand, fine | 1 | 257 |
| Clay, yellow, blue and red | 21 | 278 |
| Sand, fine | 4 | 282 |
| Marl, rock | 2 | 284 |
| Clay, stiff blue | 6 | 290 |
| Clay, hard red | 10 | 300 |
| Sandstone, red | 3 | 303 |
| Clay, hard red | 2 | 305 |
| Clay, dark | 6 | 311 |
| Clay, dark and gravel | 17 | 328 |
| Basement rock: | | |
| Clay, dark, like rotten soapstone | 4 | 332 |
| Clay, tan | 2 | 334 |
| Rock | 4 | 338 |
| Clay, tan | 2 | 340 |
| Clay, hard and gravel (?) | 3 | 343 |
| Rock, dark | 3 | 346 |
| Clay, hard and gravel (?) mixed | 3 | 349 |
| Sandstone, hard | | 439 |

LOG OF WELL 88, NEAR ROCKY MOUNT, EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, yellow and red, and sand | 20 | 20 |
| Miocene, Yorktown formation: | | |
| Muck, black | 28 | 48 |
| Sand | ½ | 48½ |
| Marl | ½ | 49 |

LOG OF WELL 110, AT CRISP, EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 16 | 16 |
| Quicksand | 14 | 30 |
| Miocene, Yorktown formation: | | |
| Marl, with shells | 40 | 70 |
| Cretaceous (undifferentiated): | | |
| Sand and soft brown sand rock | 80 | 150 |

LOG OF WELL 103, AT PINETOPS, EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Top soil and red clay | 27 | 27 |
| Miocene, Yorktown formation: | | |
| Sand—some water | 30 | 57 |
| Marl, blue, and shells | 18 | 75 |
| Cretaceous (undifferentiated): | | |
| Clay, chocolate colored | 5 | 80 |
| Clay, red | 25 | 110 |
| Sand, water-bearing | 5 | 115 |
| Clay, red | 15 | 130 |
| Sand, water-bearing | 10 | 140 |
| Clay, gray | 5 | 145 |
| Clay, red tough | 170 | 315 |
| Clay and talc (?) | 5 | 320 |
| Clay, red tough | 22 | 342 |
| Basement rock: | | |
| Granite, gray | 104 | 446 |

LOG OF WELL 93, AT OLD SPARTA, EDGECOMBE COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Cretaceous (undifferentiated): | | |
| Sand, coarse, gravelly | ? | 75 |
| Clay, red | 20 | 95 |
| Sand, fine, micaceous | | |

## HALIFAX COUNTY

**(Area, 722 square miles. Population, 56,512, 1940 census)**

### TOPOGRAPHY AND PHYSIOGRAPHY

Halifax County lies within two physiographic provinces, the western half of the county being in the Piedmont province and the eastern half in the Coastal Plain province, U. S. highway no. 301, from Enfield to Halifax, approximately forming the boundary. No topographic maps of any part of the county are available.

The Wicomico and Sunderland terraces occupy approximately the eastern half of the county and are prevailingly flat or very gently rolling. The principal interruptions in the flat topography are the scarps separating the terraces, which are especially prominent along the Roanoke River, near Tillery and Roseneath. In the western half of the county are also considerable areas of flat or gently rolling upland formed by the Sunderland and higher terraces. However, these areas occur in discontinuous patches interrupted by areas of much more rugged topography, usually adjacent to the streams. Along Roanoke River, Fishing Creek, Little Fishing Creek, and other streams in the northwestern and southwestern parts of the county, the surface is maturely dissected with a relief of 100 to 200 feet. The lowest elevation is where the Roanoke River turns eastward near Palmyra and is less than ten feet above sea level. The town of Littleton is at an elevation of about 388 feet and is probably one of the highest places in the county.

Halifax County is drained by Roanoke River and Fishing Creek and their tributaries, all of which enter the main streams within the county boundaries. About two-thirds of the drainage of the county goes into Fishing Creek and one-third into Roanoke River.

### GEOLOGY

In the western part of the county are belts of gneiss, granite, and slate and schist trending in a north-south direction. Eastward these crystalline rocks dip beneath the land surface with a slope of 15 or 20 feet to the mile and forms the "basement" or "floor" upon which the much younger sediments of the Coastal Plain were deposited. The easternmost exposures of crystalline bedrock are in the Roanoke River and Quankey Creek at Halifax and a few miles southwest of Enfield on Fishing Creek.

Overlying and in direct contact with the crystalline bedrock are the sand and clay strata of Cretaceous age. In the extreme eastern part of the county the thickness of these beds is probably about 350 feet. As their lower contact dips eastward 15 or 20 feet to the mile and the upper contact with the overlying Yorktown formation of Miocene age is nearly horizontal, it thins rapidly to the west. Its western margin probably extends as far west as Enfield and Halifax. The Yorktown formation everywhere overlies the Cretaceous and extends a few miles westward of it, so that the only exposures of the Cretaceous deposits are along Fishing Creek and Roanoke River, these streams having cut through the Yorktown exposing it in a number of places. Well logs and records furnish the only other information regarding the Cretaceous strata. The Yorktown is probably not more than 60 to 70 feet thick within the county.

Unconformably overlying the Yorktown formation are the Pleistocene formations, where surfaces form the terraces of the same name. Of these formations, the Pamlico, Talbot, and Penholoway occur only along the Roanoke River, with the Penholoway possibly occurring along Fishing Creek to a limited extent. The Wicomico formation covers a considerable area in the northeastern and southeastern part of the county around Tillery, Palmyra, and Hobgood. The Sunderland formation occupies a considerable area on both sides of the highway between Enfield and Halifax and extends eastward to Scotland Neck. The two higher Pleistocene formations, the Coharie and the Brandywine, are found farther west but, because of greater erosion, do not form a continuous area as the lower formations. The high-level gravels of Pliocene (?) age are found in discontinuous patches in the western part of the county at elevations above 270 feet.

## GROUND WATER

Nearly all domestic water supplies, a number of industrial supplies, and four of the six municipal supplies are obtained from wells. The principal source of domestic supplies is shallow wells.

In the western part of the county, most of the wells are dug and are from 30 to 60 feet deep. These wells yield water from the weathered crystalline bedrock or from the sandy clays of the high-level gravels, or from the Brandywine or Coharie formations. Through the central part of the county, both dug and bored wells are used. Bored wells are used mainly where the terrace deposits are thick and permeable enough to furnish a satisfactory supply without the necessity of depending on the larger storage capacity of the dug wells. Where the material is very fine and clayey and of very low permeability, dug wells predominate. Through the eastern part of the county, bored and driven wells are most common. A few dug wells are also used in this area, especially where the terrace deposits contains a considerable amount of clay.

Records for about 150 drilled wells were obtained in Halifax County. In that part of the area lying west of U. S. highway 301, most of the drilled wells obtain their water from the crystalline bedrock, and a few get their water from relatively shallow sands and gravels at the base of the terrace deposits. Of about 65 wells drilled in the crystalline rock, only three or four yielded less than 2 gallons a minute. All of these wells are in granite; 3 of them at the Roanoke Rapids Country Club are in an unproductive area, because the granite is at, or within, a few feet of the surface and is unweathered and unjointed. Few of the wells in the crystalline rocks yield more than 20 or 25 gallons a minute, and, if larger supplies are needed, the chances are that more than one well will be necessary. It may be noted that all the failures were in granite, and in general, the wells in the slate, schist, and gneiss yield more satisfactory supplies than in the granite. Some of the wells obtain fairly large supplies from the weathered and disintegrated bedrock, which overlies the solid rock, and it is probable that more wells obtain their water from this zone than the reported records indicate. One of the most difficult areas in which to obtain adequate municipal and industrial supplies is in the area along the Fall Zone from Weldon through Halifax and Enfield. It appears that relatively shallow wells are the most satisfactory, either utilizing a number of well points in a "well field" which can be pumped by one centrally located pumping plant or using one or more gravel-walled wells. This problem is discussed more fully on page 29.

A few miles east of this area satisfactory supplies have usually been obtained from wells drilled into the lenticular sand beds of the Cretaceous strata. As these strata probably pinch out at, or near, Enfield and Halifax, it is quite thin for two or three miles eastward. However, it thickens rapidly, being at least 170 feet thick at the Caledonia State Prison Farm. Large supplies probably can be obtained by properly constructed wells in the Cretaceous strata in the eastern one-third of the county. The strata are lenticular, and the fact that satisfactory wells are obtained at a given depth in a certain locality does not assure that permeable sand strata will be penetrated at the same depth some distance away. However, in this area, conditions are favorable for penetrating a permeable lens of sand in the Cretaceous at some depth.

A few wells, from 40 to 80 feet deep, obtain their water from the Yorktown formation, but usually even the more sandy strata contain so much clay as to be nearly impermeable. However, two of the wells at Scotland Neck, which apparently end in the Yorktown formation, are gravel-walled wells and yield very satisfactory quantities of water. Most domestic wells ending in this formation yield only small amounts of water, and often the water has a bad taste and odor.

There are a number of small springs in western Halifax County, a few of which are used for domestic supplies and for cattle. Aurelian Springs consist of about seven seepage springs at the head of a draw. They are apparently contact type springs flowing only a few gallons a minute. Not being used at present, they have filled in and have become overgrown by vegetation. Roper Springs, near Littleton, consist of several seepage-depression springs yielding a total of about 20 gallons a minute. They also are overgrown with vegetation and are used to only a very limited extent. Magazine spring, at Halifax, is reported to have received its name when used to store powder during the Revolutionary War. It is apparently a contact spring, the water coming to the surface along an impermeable clay layer near or at the base of the Sunderland formation. Only about 0.1 gallon a minute flows from the rock basin, but considerably more flows around the base of the basin. As this spring is reported to have supplied the town for many years, it presumably yielded considerably more water formerly than at present. Rhea's Spring, about five miles southwest of Roanoke Rapids, is a contact spring brought to the surface by the emergence of the underlying granite. It is reported to yield 50,000 gallons a day.

Analyses of 13 samples of water from wells and one sample from a spring in Halifax County are given in the table of analyses. The analyses for well 83a is very unusual for a well drilled in crystalline rock. The large amount of total solids, hardness, sodium bicarbonate, and chloride are not usually found in water from this type of rock and this far inland. The chemical characteristics of this water indicate that the water is a diluted sea water which, because of some structure impending its free movement, has not been entirely flushed out since the rocks were saturated in Miocene or Pleistocene times.

The sample collected October 29, 1941, had a hardness of 248, a chloride content of 126, and a sulfate content of 202 parts per million. The sample collected April 8, 1943, had a hardness of 206, a chloride content of 36, and a sulfate content of 57 parts per million. Pumping the well 1.5 years has caused a marked decrease in hardness, chloride, and sulfate content. It is probable that most of the sea water will be removed within a few years with a considerable improvement in the quality of the water. The other five samples, from wells 2, 9, 18, 44, and 104 in the crystalline rocks, are very similar and are the type of water to be expected from such rocks, except that the sample from well 2 is unusually high in fluoride. The average hardness of the five analyses is 48 parts per million. The iron and chloride content is low in all five.

The seven analyses of water from the sedimentary rocks are quite characteristic of these rocks. All of these samples were soft, except the sample from a well at Hobgood which was only moderately hard. Well 59 is not being used because the water has an excessive amount of iron, as is shown by the analysis. This water and the water from well 146 evidently contain a small amount of sodium bicarbonate, while the water from the well at the Caledonia State Prison Farm has a large amount. The analyses of the water from Magazine Spring, at Halifax, shows a soft water low in mineral content.

Measurements were made of the temperature of several wells in Halifax County. Well 2 had a temperature of 63° F.; well 60, 61° F.; well 83a, 63° F. Magazine Spring had a temperature of 56° F. on April 5, 1943.

## MUNICIPAL SUPPLIES

There are six municipal water supplies in the county, and four of these supplies are from wells.

Enfield, population 2,208, has had a municipal water supply since 1923. The water is obtained from three shallow gravel-walled wells, eleven shallow wells with well points, and one deep well. See nos. 83a and 84 to 86b in the table of well date. The shallow wells yield water from a sand strata near the base of the Sunderland formation, and the deep well yields water from the crystalline bedrock which is apparently a schist. The combined yield of the 14 shallow wells is 100 gallons a minute, and the yield of the deep well is 200 gallons a minute. The deep well is not used, except in case of emergency, because of the excessive hardness of the water. It appears, however, that the mineral content of the water is decreasing as the well is pumped, and it is possible that this water will eventually be satisfactory for municipal use. The 14 shallow wells discharge into a 150,000-gallon round concrete reservoir, from which the water is pumped into the mains. The deep well discharges directly into the mains. A 100,000-gallon elevated tank, connected to the mains, serves as an additional storage and maintains uniform pressure. Maximum pressure is about 55 pounds. The water is not treated. Consumption averages about 75,000 gallons a day.

Halifax, population 374, has had a municipal water supply since 1940, being supplied from three gravel-walled wells, 59 to 61 inclusive in the table of wells. Two of the wells are about 50 feet deep and yield water from sand strata in the Yorktown formation of Miocene age. The third well is about 110 feet deep and yields water from sand in Cretaceous strata. The wells are pumped with deep-well turbine pumps and discharge into the aeration and filter tank. Well 62 is also connected to the system for use in emergencies. Well 59 has not been used much because of excessive iron in the water. A 75,000-gallon elevated tank serves as storage and to maintain a uniform pressure. An electrically-driven booster pump forces the water into the mains from the filter tank. Pressure varies between about 49 to 65 pounds per square inch. The average consumption is about 17,000 gallons a day. Treatment consists of aeration and filtration.

Littleton, population 1,200 has had a municipal supply since 1921. The water is obtained from well 2, which is a drilled well 358½ feet deep. It yields 120 gallons a minute and is pumped by a deep-well turbine pump, which discharges directly into the mains. A 60,000-gallon elevated tank is interconnected with the mains. A 100,000-gallon round concrete reservoir furnishes additional storage, water being pumped from it by a gasoline motor-driven pump in case of an emergency such as a fire. Consumption averages about 100,000 gallons a day of which 20 percent is industrial. The water is not treated.

Roanoke Rapids, population 8,545, has had a municipal supply since 1933. The system is owned by the Simmons Company and is operated by the Roanoke Rapids Sanitary District. The source of supply is the Roanoke River, the water usually being pumped from a canal by two centrifugal pumps, but water can be taken directly from the river in case of emergency. Two centrifugal pumps, with a total capacity of 2,000 gallons a minute, force the water into the mains from the 1,250,000-gallon concrete, clear-water reservoir. A 500,000-gallon elevated tank, in the center of the town, serves to distribute the load and maintain the pressure. Filter capacity is about 2,250,000 gallons a day. Maximum consumption is about 2,000,000 and averages about 1,500,000 gallons a day, of which about 70 percent is used b yindustries. The water is treated by addition of alum, soda ash, activated carbon, and anhydrous ammonia and is filtered and chlorinated.

Scotland Neck, population 2,559, has had a municipal supply since 1916. From 1916 to 1937 the water came from springs and wells. The supply from the springs was inadequate during dry seasons, and several wells were drilled to augment the supply. These wells were screened and obtained water from the sand. Three wells were drilled between 30 and 40 feet deep and yielded about 10 gallons a minute each, and one was drilled to 200 feet, yielding about 20 gallons a minute. In 1937 three gravel-walled wells, 132 to 134 in the table, were drilled. These wells, from 60 to 96 feet deep, obtain their water from sand strata in the Yorktown formation and Cretaceous deposits. They yield from 75 to 200 gallons a minute each and have entirely replaced the former supplies. The water is pumped by an electrically-driven turbine pump at each well which discharges a fine spray into a 15 x 10 x 8 foot concrete reservoir at each well. Booster pumps are used to force the water into the mains. Storage is obtained in a 200,000-gallon round concrete tank and a 75,000-gallon elevated tank. Average pressure is about 45 pounds per square inch. Average consumption is about 125,000 gallons a day. Aeration at the wells is the only treatment.

Weldon, population 2,341, has had a municipal supply since 1908. They now obtain their water from the Roanoke River at Roanoke Rapids through a 12-inch supply line. The water is taken from the same canal that supplies the city of Roanoke Rapids. The head is sufficient to deliver 1,200 gallons a minute at Weldon by gravity, but booster pumps are available at the intake for increasing the delivery to 1,800 gallons a minute. There is a 500,000-gallon, earthern, raw-water reservoir at the filter plant, and the treated water is pumped into the mains by a 750-gallons-a-minute centrifugal pump. A 75,000-gallon elevated tank serves as storage and to equalize the load and pressure. Treatment consists of the addition of alum, soda ash, ammonia, and copper sulfate and in chlorination and filtration. The capacity of the plant is 1,250,000 gallons a day. Maximum consumption is about 200,000 gallons, and average consumption is about 180,000 gallons a day, of which about 12 percent is used by industry.

RECORDS OF WELLS IN HALIFAX COUNTY

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Littleton | Orange Crush Bottling Plant | Sam Brown | drilled | 67 | 6 | Gneiss | | 12 | Cassed 60 feet. |
| 2 | Littleton | Town | Virginia Mach. & Well Company | drilled | 358½ | 8 | Gneiss | 25 | 120 | Cased 40 feet? See analysis in table. Temperature 63°. Tested 100 gallons per minute with 43 foot drawdown. |
| 3 | Littleton | Mrs. Jack Johnston | Virginia Mach. & Well Company | drilled | 158 | 6 | Gneiss | | 12 | Used at sawmill. |
| 4 | Littleton | Mrs. Jack Johnston | Truby & Brown | drilled | 97 | 6 | Gneiss | 13 | 8 | Not used. |
| 5 | Littleton | McIver High School | (?) | drilled | 67 | 6 | Gneiss | 22 | 6 | |
| 6 | Littleton | Alonzo Williams | T. P. Price | dug | 33.74 | 24 | Sand and clay | 26 | | Clay tile casing. |
| 7 | Roper Springs | Sterling Hamiell | Sam Brown | drilled | 48 | 4¼ | High-level gravels, sand and gravel | 28 | 5 | Has 5 foot screen. |
| 8 | Between Roanoke Rapids and Littleton | New Hope School | Sam Brown | drilled | 97 | 6 | Schist | 8? | 12 | Cased 47 feet. |
| 9 | Roanoke Rapids | C. T. Johnson | White Well Co. | drilled | 65 | 4 | Schist | 28 | 100 | Cased 55 feet. See analysis in table. Water reported to come from below quartz vein. |
| 10 | Roanoke Rapids | Jesse Shell | | bored | 28 | 3 | Sunderland, sand | | | Suction pump, 3-inch tile 1¼-inch pipe and strainer. |
| 11 | Roanoke Rapids | W. P. Cooke | | bored | 28 | 6 | Sunderland, sand and gravel | | 5± | Hole is 6 inches; 1¼-inch pipe. |
| 12 | Roanoke Rapids | John Armstrong Chaloner Colored School | Truby & Brown | drilled | 107 | 6 | Granite | | 8? | Cased 60 feet. Supply reported to be inadequate. |
| 13 | Roanoke Rapids | J. E. Mathews | P. L. Mathews | drilled | 338 | 8 | Slate | 60 | 23 | Cased 110 feet; 50 to 60 foot drawdown reported. |
| 14 | Roanoke Rapids | Roanoke Grade School | P. L. Mathews | drilled | 206 | 4½ | Granite | 50-60 | 6 | Cased 63 feet. Not used. |
| 15 | Roanoke Rapids | O. S. Thompson Ice Plant | O. L. Smith | drilled | 65 | 6 | Sunderland (?), gravel | 16± | 24 | Reported to yield 24 gallons per minute with less than 30 foot drawdown. |
| 16 | Roanoke Rapids | Patterson Mill | Sydnor Pump & Well Company | drilled | 480 | 10 | ?, rock | 50 | 100 | Cased 90 feet. Not used. |
| 17 | Roanoke Rapids | Rosemary Mfg. Co. | Sydnor Pump & Well Company | drilled | 499 | 4½ | ?, rock, very hard | | 6 | Cased 60 feet; 100 foot drawdown reported. Not in use. |
| 18 | Roanoke Rapids | Colonial Ice Co. | White Well Co. | drilled | 140-190 | 8-6 | Schist | 27 | 10 | Five wells in group are 8 inches; four, 6 inches. Four in use; 10 gallons per minute from all four. See analysis in table. |
| 19 | Roanoke Rapids | Roanoke Mill Co., Mill no. 2 | St. Sing | drilled | 85 | 8 | Gravel | 40± | 10-15 | Not used. |
| 20 | Roanoke Rapids | W. P. Taylor Drug Store | Truby | drilled | 108 | 6 | ?, rock | 10 | Good Supply | Reported good supply. Not in use. |
| 21 | Roanoke Rapids | O. L. Smith | Truby | drilled | 97 | 6 | ?, rock | 12 | 10 | Cased 60 feet. Not in use. |
| 22 | Roanoke Rapids | Halifax Paper Co. | Sydnor Pump & Well Co. | drilled | 478 | 8 | ?, rock | 10± | 150 | Cased 40 feet; 240 foot drawdown reported. |
| 23 | Roanoke Rapids | Roanoke Mill Co., Mill No. 1 | St. Sing | drilled | 86 | 8 | Gravel | 60? | 25 | Cased to bottom. Not in use. |
| 24 | Roanoke Rapids | Mitchell Lumber Co. | | drilled | 80 | 6 | ? | | 40 | Cased 74 feet. |
| 25 | Roanoke Rapids | Mitchell Lumber Co. | Sam Brown | drilled | 35 | 4 | Sunderland, gravel, coarse | 27 | | |
| 26 | Roanoke Rapids | T. W. Mullen | White Well Co. | drilled | 150 | 6 | Granite | 20± | 4 | Cased 85 feet. |
| 27 | Roanoke Rapids | Roanoke Rapids Country Club | Virginia Mach. & Well Co. | drilled | 200 | 6 | Granite | | 1½ | Insufficient water; not used. |

RECORDS OF WELLS IN HALIFAX COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | Roanoke Rapids | Roanoke Rapids Country Club | Virginia Mach. & Well Co. | drilled | 210 | 6 | Granite | | 0 | |
| 29 | Roanoke Rapids | Roanoke Rapids Country Club | Virginia Mach & Well Co. | drilled | 120 | 6 | Granite | | 0 | |
| 30 | Weldon | Grant Brick Works | Sam Fannen | drilled | 30 | 5 | Sunderland, sand | 26± | 1–2 | Small yield. |
| 31 | Weldon | E. W. Batchelor | Heater Well Co. | drilled | 60 | 6 | Granite, hard blue | 14 | 25 | Cased 33 feet. |
| 32 | Weldon | Mandeville Mills | Sam Brown | drilled | 77 | 4 | | | | Cased to bottom. Supplies about ten families. |
| 33 | Halifax | Roanoke Farms No. 157 | Heater Well Co. | drilled | 167 | 4 | Rock | | 2.5 | Cased 80 feet. |
| 34 | Halifax | Roanoke Farms No. 151 | Heater Well Co. | drilled | 47 | 4 | Sunderland, sand | ? | 3± | Cased to bottom. |
| 35 | Halifax | Roanoke Farms No. 158 | Hudson Well Co. | drilled | 156 | 4 | Rock | | 2¾ | Cased 95 feet. |
| 36 | Halifax | Roanoke Farms No. 166 | | drilled | 162 | 4 | Rock | | 3± | |
| 37 | Halifax | County Home | Heater Well Co. | drilled | 207 | 6 | Schist | | 20 | Cased 68 feet. Pumping level 70 feet below surface at 20 gallons per minute. |
| 38 | Halifax | Prison Camp | ? | | 190 | 6 | Schist | | 20 | Temperature 60°F. |
| 39 | Halifax | Roanoke Farms No. 171 | Heater Well Co. | drilled | 90 | 4 | Schist | | | Cased 57 feet. |
| 40 | Halifax | Roanoke Farms No. 174 | Heater Well Co. | drilled | 31 | 4 | Schist | | 5 | Cased to bottom. |
| 41 | Halifax | Roanoke Farms No. 172 | Heater Well Co. | | 41 | 4 | Sunderland, sand | | 4 | Cased to bottom. |
| 42 | Halifax | Roanoke Farms No. 179 | Heater Well Co. | | 50 | 4 | ? | | | Cased to bottom. |
| 43 | Roanoke Rapids | W. M. Morecock | O. L. Truby | drilled | 100 | 6 | Rock | 16 | 4 | Cased 60 feet. |
| 44 | Roanoke Rapids | S. P. Johnston | Sam Brown | bored | 18 | 2 | Coharie, sand | | | |
| 45 | Roanoke Rapids | Jack Smith, a F. A. Rhe | Sam Brown | drilled | 67 | 6 | Granite | | 4 | Cased 10 feet. |
| 46 | Roanoke Rapids | Richard Green | Sam Brown | drilled | 108 | 4 | Slate | 25± | 10 | Cased 88 feet. |
| 47 | Roanoke Rapids | G. W. Green | Sam Brown | drilled | 67 | 4 | Granite | 30± | 10 | Cased 62 feet. |
| 48 | Aurelian Springs | School | O. L. Truby | drilled | 87 | 6 | Granite ? | 30± | 10 | Cased 40 feet. Main supply; see analysis in table. |
| 49 | Aurelian Springs | School | O. L. Truby | drilled | 185 | 6 | Granite | 30± | 10 | Hand pump. |
| 50 | Halifax | Roanoke Farms No. 276 | Hudson Well Co. | drilled | 95 | 4 | ? | | 3 | Cased 85 feet. |
| 51 | Halifax | Roanoke Farms No. 282 | Hudson Well Co. | drilled | 98 | 4 | Granite | | 1¾ | Cased 56 feet. |
| 52 | Halifax | Roanoke Farms No. 232 | Heater Well Co. | drilled | 31 | 4 | Sunderland, sand | | 5 | Cased to bottom. |
| 53 | Halifax | Roanoke Farms No. 235 | Heater Well Co. | drilled | 69 | 4 | Granite | | 3–4 | Cased 35 feet. |
| 54 | Halifax | Roanoke Farms No. 241 | Heater Well Co. | drilled | 97 | 4 | Granite | | 5 | Cased 40 feet. |
| 55 | Halifax | Roanoke Farms No. 295 | Hudson Well Co. | drilled | 35 | 4 | Granite | | 4 | Cased 28 feet. |
| 56 | Halifax | Town | Carolina Drilling & Equipment Co. | drilled | 130 | 6 | Rock | | | Test well. |
| 57 | Halifax | Town | Carolina Drilling & Equipment Co. | drilled | 115 | 6 | Rock | | | Test well. |
| 58 | Halifax | Town | Carolina Drilling & Equipment Co. | drilled | 110 | 6 | Rock | | | Test well. |
| 59 | Halifax | Town | Carolina Drilling & Equipment Co. | drilled | 135 | 6 | Cretaceous, sand | | 31 | Gravel packed to 110 feet; water contains too much iron for use. |
| 60 | Halifax | Town | Carolina Drilling & Equipment Co. | drilled | 51 | 6 | Yorktown, sand | 30± | 15 | Gravel packed; see analysis in table; temperature 61°F. |
| 61 | Halifax | Town | Carolina Drilling & Equipment Co. | drilled | 49 | .6 | Yorktown ,sand | 30± | 15 | Gravel packed. |
| 62 | Halifax | M. W. Perry | | drilled | 315 | 6 | ?, rock | | 20–25 | Sometimes used to augment city supply. |
| 63 | Halifax | Halifax Grade School | Truby & Brown | drilled | 204 | 6 | ?, rock | 20± | 20 | Cased 100 feet. |
| 64 | Halifax | Mrs. Sterling Gary | Sydnor Pump & Well Company | drilled | 183 | 6 | ?, rock | 50± | 8.5 | Cased 140 feet. |
| 65 | Halifax | Halifax School (old) | Truby & Brown | drilled | 162 | 6 | ?, rock | 34 | 20 | Cased 100 feet. Not in use |
| 66 | Halifax | Mrs. Jesse Gregory | Mitchell | drilled | 200 | 6 | Bedrock | | | |
| 67 | Halifax | Town | Carolina Drilling & Equipmenr Co. | drilled | 285 | 6 | Rock | | 5 | Test well for city; not used because of insufficient quantity. |
| 68 | Halifax | Halifax Milling Co. | Sam Brown | drilled | 61 | 6 | Schist | 16± | 7–8 | Cased 41 feet. |
| 69 | Halifax | Roanoke Farms, Office | Heater Well Co. | drilled | 190 | 6 | Granite | | 0 | Not sufficient water. |
| 70 | Halifax | D. J. Milikin | Sam Brown | drilled | 56 | 4¼ | Yorktown (?), sand | 30± | 6 | Five-foot screen. |
| 71 | Halifax | T. S. Dickens | Fisher | drilled | 128 | 6 | Rock | 55± | 6–8 | Cased to bottom. |
| 72 | Halifax | W. D. Dickens | | drilled | 165 | 6 | Rock | | 5± | |

RECORDS OF WELLS IN HALIFAX COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 73 | Tillery | Caledonia State Prison Farm | Truby & Brown | drilled | 216 | 4 | Cretaceous, sand | Above surface | 75 | Reported to have flowed 30 to 35 gallons per minute when completed in 1926. Was yielding 60 gallons per minute with the pumping level 17 feet below the surface in February, 1942. |
| 74 | Tillery | School | Heater Well Co. | drilled | 158 | 6 | (?), "shell rock" | | 7 | First attempt drilled to 325 feet, no water; see log. |
| 75 | Tillery | Will Pope | Sam Brown | drilled | 30 | 4¼ | Wicomico, sand and gravel | 20± | 6 | Has 5-foot screen. |
| 76 | Tillery | Charles Hines | Sam Brown | drilled | 30 | 4¼ | Wicomico, sand and gravel | 12± | 8 | Has 5-foot screen. |
| 77 | Tillery | Wallace Hines | Sam Brown | drilled | 29 | 4¼ | Wicomico, sand and gravel | 20± | 6 | Has 5-foot screen. |
| 78 | Tillery | Bartley Phillips | Sam Brown | drilled | 35 | 4¼ | Wicomico, gravel | 16± | 8 | Has 5-foot screen. |
| 79 | Tillery | Wm. Davis | Sam Brown | drilled | 25 | 4¼ | Wicomico, gravel | 12± | 10 | |
| 80 | Tillery | Lee Johnson | | drilled | 33 | 4¼ | Wicomico, sand and gravel | 18± | 10 | |
| 81 | Tillery | J. S. Riddick | | driven | 42 | 1¼ | Sand | | | |
| 82 | Tillery | R. F. Edmunds | R. L. Jones | drilled | 155 | 6 | Cretaceous, sand | 50? | 9 | |
| 83a | Enfield | Town | Virginia Mach. & Well Co. | drilled | 350 | 10–8 | Schist | 17 | 200 | Cased 90 feet. See analyses in table. |
| 83b | Enfield | Town | Sydnor Pump & Well Company | drilled | 171 | 4½ | Schist | | | |
| 84 | Enfield | Town | Layne Atlantic Co. | drilled | 26 | 48 | Sunderland, sand | 13 | | Gravel walled. Combined yield of wells 84, 85, 86a, three gravel-walled, and 86b eleven driven wells is 100 gallons per minute. |
| 85 | Enfield | Town | Layne Atlantic Co. | drilled | 23 | 30 | Sunderland, sand | 18 | | |
| 86a | Enfield | Town | Layne Atlantic Co. | drilled | 26.5 | 38 | Sunderland, sand | 15 | | |
| 86b | Enfield | Town | | driven | 26 | 1¼ | Sunderland, sand | | | |
| 87 | Enfield | R. Hunter Pope Hudson residence | Rice | drilled | 110 | 4½ | Rock | 10± | 8 | |
| 88 | Enfield | Eden Rosenwald School | Sam Brown | drilled | 87 | 6 | Bed rock | 17 | 30? | Cased 83 feet. |
| 89 | Enfield | J. W. Hardee | O. L. Truby | drilled | 75 | 6 | Schist | | 7 | Cased 30 feet. |
| 90 | Enfield | Z. A. Hardee | O. L. Truby | drilled | 80 | 6 | Schist | 25± | 5 | Cased 40 feet. |
| 91 | Enfield | Hardrawee School | Truby & Brown | drilled | 90 | 6 | Schist | | 10 | |
| 92 | Enfield | Mrs. J. R. Locke | ? | drilled | 80 | 6 | Schist | | 8 | Cased 40 feet. |
| 93 | Enfield | B. A. Whitley | ? | drilled | 80 | 6 | Schist | 25± | 5 | Cased 40 feet. |
| 94 | Enfield | Mrs. S. A. Whitley | Truby | drilled | 79 | 6 | Schist | 11± | 8 | Cased 60 feet. |
| 95 | Enfield | Woods Ice Plant | Heater Well Co. | jetted | 30 | 2 | Sunderland, sand | | 15 | Three wells; yield above 15 gallons per minute each. |
| 95a | Enfield | Woods Ice Plant | Heater Well Co. | drilled | 596 | 6 | Granite | | 20 | Cased 140 feet. |
| 96 | Brinkleyville | U. S. Bureau of Mines | Bureau of Mines | core drilled | 302 | 1⅝–1⅛ | Granite-Schist contact at 247 feet | +2 | 5 (flow) | Water encountered at 247 feet when core drilling for molybdenum. Hole is at foot of high, steep hill |
| 97 | Brinkleyville | S. T. Thorne | O. L. Truby | drilled | 129 | 6 | Granite | 50± | 10 | Cased 70 feet. |
| 98 | Brinkleyville | V. I. Mohorn | Sam Brown | drilled | 75.5 | 4½ | Granite | 23½ | 4± | Dug 28 feet, drilled rest of way. Cased to bottom |
| 99 | Brinkleyville | W. R. Bowers | Sam Brown | drilled | 38 | 4¼ | Weathered bedrock | 20± | 1 | Cased to bottom. |
| 100 | Hollister | T. C. Qualls | Bridges ? | drilled | 150 | 6 | Schist | | 10–15? | Not used. |
| 101 | Hollister | T. C. Qualls | ? | drilled | 100 | 6 | Schist | 20± | 10? | Formerly used to supply a hotel. |
| 102 | Hollister | T. C. Qualls | | dug | 30.6 | 24 | Clay | 24 | | Clay tile casing. |
| 103 | Hollister | J. M. Simmons | ? | drilled | 100 | 6 | Schist | 27 | | |
| 104 | Hollister | Hollister Grade School | White Well Co. | drilled | 150 | 4 | Schist | | | Reported good yield—see analysis in table. |
| 105 | Essex | R. P. Harris | | dug | 35 | 24 | Weathered bedrock | 27 | | |
| 106 | Essex | R. P. Harris | Todd | jetted | 138 | 1¼ | Schist | | 0 | Cased about 90 feet. |
| 107 | Ringwood | E. B. Branch | Truby & Brown | drilled | 67 | 6 | Schist | | 10 | Cased 52 feet. |
| 108 | Ringwood | Ringwood School | Truby & Brown | drilled | 87 | 6 | Schist | | 10 | Cased 75 (?) feet. |
| 109 | Ringwood | E. D. Tippette | Truby | drilled | 75 | 6 | Schist | | 5 | |
| 110 | Ringwood | R. Branch, George Nickerson | Brown | drilled | 48 | 4¼ | Weathered bedrock | 20± | 6 | Cased to bottom. |
| 111 | Ringwood | C. O. Fleming | Truby & Brown | drilled | 75 | 6 | Schist | | 5–10 | |
| 112 | Ringwood | M. E. Cousins, Jr. | O. L. Truby | drilled | 125 | 6 | Schist | | 10 | |
| 113 | Ringwood | G. D. Moddlin | O. L. Truby | drilled | 90 | 6 | Schist | | ? | |

RECORDS OF WELLS IN HALIFAX COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 114 | Ringwood | Whiteoak Rosenwald School | Truby & Brown | drilled | 87 | 6 | Schist |  | 10 | Cased to bottom. |
| 115 | Ringwood | W. E. Spruill, Walter Jones | Sam Brown | dug & drilled | 65? | 6 | Schist | 47 |  | Drilled 12 feet below bottom of dug well. |
| 116 | Ringwood | W. S. Minchew | ? | drilled | 165 | 5 | Schist |  |  |  |
| 117 | Ringwood | W. M. Hardy |  | dug | 50 | 42 | Weathered bedrock, clay | 49 |  |  |
| 118 | Glenview | G. G. Viverette | Truby | drilled | 60 | 6 | Schist | 15 | 5 | Cased to bottom. |
| 119 | Enfield | Mrs. John Lawrence |  | bored | 20 | 6 | Sunderland, clay |  |  | Uncased, 6-inch hole, Vacuum pump. 1¼-inch pipe. |
| 120 | Enfield | Lawerence Whitaker | J. K. Bridges | drilled | 225 | 4 | ?, rock ? | 15½ | 3-4 | See analysis in table. |
| 121 | Dawsons x Roads | L. W. Barnhill |  | dug | 32 | 18 | Sunderland, sand | 7 |  | Clay tile casing. |
| 122 | Scotland Neck | Mrs. A. L. P. | R. L. Jones | drilled | 120 | 4 | Cretaceous, sand | 20± | 8 | Has 10 feet of brass screen. |
| 123 | Roseneath | C. M. Cotton, C. A. Twisdale | R. L. Jones | drilled | 130 | 4¼ | Cretaceous, sand | 27 | 8 | Has 10 feet of No. 10 brass screen. |
| 124 | Roseneath | R. B. Douglas | ? | drilled | 160 | 6 | Cretaceous, sand |  | 10±? | Large supply reported. |
| 125 | Roseneath | J. A. Whitehead | R. L. Jones | drilled | 139 | 4¼ | Cretaceous, sand | 44 |  | Reported adequate. |
| 126 | Roseneath | T. R. Whitehead | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand, white | 20 | 10 | Has 10 feet of no. 10 brass screen. |
| 127 | Roseneath | C. E. Cotten | R. L. Jones | drilled | 110 | 4 | Cretaceous, sand, white | 20± | 8 | Has 10 feet of brass screen. |
| 128 | Roseneath | County School | R. O. Heater | drilled | 122 | 6 | Cretaceous, sand |  |  | Yellow clay to 122 feet, no screen. |
| 129 | Hills X Roads | L. G. Barnhill | Barnhill | bored | 51 | 2 | Yorktown (?), sand |  | 4+ |  |
| 130 | Scotland Neck | R. J. Madery | R. L. Jones | drilled | 160 | 4¼ | Cretaceous, sand | 20± | 10 | Reported to yield 10 gallons per minute with 40 foot drawdown. |
| 131 | Scotland Neck | Brawlie High School | Sam Brown | drilled | 55 | 6 | Yorktown, sand and gravel | 20± | 20 |  |
| 132 | Scotland Neck | Town | Layne Atlantic Co. | drilled | 59.5 | 26 | Yorktown, sand | 10.5 | 205 | Gravel-packed, yields 205 gallons per minute, 44 foot drawdown, log in in table. |
| 133 | Scotland Neck | Town | Layne Atlantic Co. | drilled | 96 | 18 | Cretaceous, sand | 35 | 200 | Gravel-packed well; drawdown 55 feet. Analysis in table. Test well drilled to 215 feet, log in table. |
| 134 | Scotland Neck | Town | Layne Atlantic Co. | drilled | 80 | 18 | Yorktown, sand | 23 | 75 | Gravel-packed well, drawdown 51 feet. Test well drilled to 210 feet, log in table. |
| 135 | Scotland Neck | J. N. Smith Estate Cotton gin | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand |  | 30 | Abandoned. |
| 136 | Scotland Neck | R. P. Blackfoot Ice Plant |  | bored | 25 | 2 | Sunderland, sand |  | 5-10 | Four wells together yield 25 to 30 gallons per minute. |
| 137 | Scotland Neck | Town | Sydnor Pump & Well Company | drilled | 607 | 6 | ?, rock | 35± | 1 | Abandoned. Hit bedrock at 349 feet. |
| 138 | Norfleet | T. D. Temple | George R. Todd | drilled | 160 | 4 | Cretaceous, sand | 12-15 |  | Poor yield reported. |
| 139 | Norfleet | Atlantic Coast Line R. R. |  | drilled | 34 | 6 | ?, sand | 6 | ? |  |
| 140 | Norfleet | John W. Clark | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand | 20? |  |  |
| 141 | Palmyra | B. B. Everett Home | R. L. Jones | drilled | 176 | 4¼ | Cretacous, sand |  | 10+ |  |
| 142 | Palmyra | B. B. Everett (Fate Baker Home Place) | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand | 23 | 10+ | Yields about 10 gallons per minute with 20 foot drawdown. |
| 143 | Hobgood | G. L. Harrell |  | bored | 38 | 1¼ | Yorktown, quicksand, blue |  | 8± | Shell marl reported above sand. |
| 144 | Hobgood | D. W. Davis | R. L. Jones | drilled | 100 | 4¼ | Cretaceous, sand, micaceous | 10± | 10 | Reported drawdown 10 ft. |
| 145 | Hobgood | Hobgood City Well | R. L. Jones | drilled | 107 | 4 | Cretaceous, sand | 12±? | 19 | Reported drawdown 10 ft. |
| 146 | Hobgood | L. F. Whitehurst | R. L. Jones | drilled | 100 | 4¼ | Cretaceous, sand, mica | 10? | 10 | Reported drawdown 10 ft. |
| 147 | Hobgood | W. L. Bailey | R. L. Jones | drilled | 100 | 4¼ | Cretaceous, sand, mica | 26 | 10 | Reported drawdown 10 ft. |
| 148 | Hobgood | Mrs. Roxy Burnett | R. L. Jones | drilled | 140 | 4¼ | Cretaceous, sand, mica | 10± | 50 | Reported to yield 50 gallons per minute with 4 foot drawdown. |
| 149 | Hobgood | L. F. Whitehurst | R. L. Jones | drilled | 120 | 4¼ | Cretaceous, sand, mica | 10± | 10 | Reported drawdown 10 ft. |
| 150 | Hobgood | Jim Warren | R. L. Jones | drilled | 120 | 5 | Cretaceous, sand | 23 |  |  |
| 151 | Hobgood | Hobgood School | Heater Well Co. | drilled | 105 | 6 | Cretaceous, sand, black | 30 | 20+ | Bailer test showed more than 20 gallons per minute No screen. |
| 152 | Hobgood | L. N. Whitehead | R. L. Jones | drilled | 81 | 4¼ | Cretaceous, sand, white | 20± | 10? | Brass screen. |
| 153 | Hobgood | A. C. House | R. L. Jones | drilled | 80± | 4¼ | Sand |  |  |  |

RECORDS OF SPRINGS IN HALIFAX COUNTY

| Location | Owner | Name of Spring | Chief Aquifer | Geologic Formation | Yield | Remarks |
|---|---|---|---|---|---|---|
| A Littleton | | Roper Springs | Sand and silt | Recent | 20± | Seepage, depression spring |
| B Aurelian Springs | | Aurelian Springs | Sand and gravel | High-level gravels | 15.20 | Seepage, depression spring |
| C Roanoke Rapids | Mrs. J. W. Sledge | Rhea's Spring | Granite | | 30± | Contact spring. |
| D Halifax | Town | Magazine Spring | Sand and gravel | Sunderland | 1-2 | Contact spring; temperature 56° F., April 5, 1943 |

ANALYSES OF GROUND WATER FROM HALIFAX COUNTY, NORTH CAROLINA
(Numbers at heads of columns correspond to numbers in table of well data.)
Parts per million

| | 2 | 9 | 18 | 48 | 59 | 60 | 73 |
|---|---|---|---|---|---|---|---|
| Silica ($SiO_2$) | 26 | -------- | 16 | -------- | 21 | 11 | 26 |
| Iron (Fe) | .03 | -------- | .4 | -------- | 8.1 | .03 | .62 |
| Calcium (Ca) | 25 | -------- | 10 | -------- | 13 | 1.6 | 3.0 |
| Magnesium (Mg) | 5.2 | -------- | 4.5 | -------- | 3.8 | 1.7 | 2.4 |
| Sodium and Potassium (Na+K) | 11 | -------- | 7.3 | -------- | 20 | 9.5 | 62 |
| Carbonate ($CO_3$) | -------- | -------- | -------- | -------- | 0 | 0 | 0 |
| Bicarbonate ($HCO_3$) | 98 | 28 | 35 | 35 | 70 | 4.0 | 157 |
| Sulphate ($SO_4$) | 14 | *1 | 3.6 | *1 | 9.9 | 2.3 | 6.9 |
| Chloride (Cl) | 6 | 8 | 18 | 3 | 16 | 11 | 11 |
| Fluoride (F) | 1.7 | .2 | .2 | .5 | .2 | -------- | .2 |
| Nitrate ($NO_3$) | .1 | 16 | 1.1 | .0 | 1.4 | 13 | .3 |
| Total dissolved solids | 143 | -------- | 94 | -------- | 130 | 56 | 195 |
| Total hardness as $CaCO_3$ | 84 | **33 | 43 | **22 | 48 | 11 | 17 |
| Date of collection | Oct. 24 1941 | Oct. 28 1941 | Oct. 17 1941 | Oct.27 1941 | Nov. 6 1941 | April 5 1943 | Nov. 7 1941 |

| | 83a | 83a | †84 | 104 | 120 | 133 | 146 | D |
|---|---|---|---|---|---|---|---|---|
| Silica ($SiO_2$) | 21 | 24 | 10 | -------- | -------- | 17 | -------- | 24 |
| Iron (Fe) | 2.8 | 1.1 | .01 | -------- | -------- | .04 | -------- | .08 |
| Calcium (Ca) | 63 | 51 | 5.7 | -------- | -------- | 4.6 | -------- | 1.9 |
| Magnesium (Mg) | 22 | 19 | 1.8 | -------- | -------- | 2.0 | -------- | 1.4 |
| Sodium and Potassium (Na+K) | 164 | 63 | 9.7 | -------- | -------- | 11 | -------- | 5.1 |
| Carbonate ($CO_3$) | 0 | 0 | 0 | -------- | -------- | 0 | -------- | 0 |
| Bicarbonate ($HCO_3$) | 259 | 283 | 13 | 76 | 26 | 11 | 212 | 5.0 |
| Sulphate ($SO_4$) | 202 | 57 | 4.8 | *1 | *5 | 4.1 | *1 | 5.7 |
| Chloride (Cl) | 126 | 36 | 14 | 12 | 6 | 14 | 3 | 5.0 |
| Fluoride (F) | .6 | -------- | -------- | .5 | .4 | .3 | .6 | -------- |
| Nitrate ($NO_3$) | 1.1 | -------- | 9.1 | 3.5 | -------- | 12 | .0 | 5.6 |
| Total dissolved solids | 748 | 378 | 68 | -------- | -------- | 78 | -------- | 57 |
| Total hardness as $CaCO_3$ | 248 | 206 | 22 | **60 | **20 | 20 | **152 | 10 |
| Date of Collection | Oct. 29 1941 | April 8 1943 | April 8 1943 | Oct. 27 1941 | Dec. 29 1941 | Oct. 30 1941 | Oct. 30 1941 | April 5 1943 |

* By turbidity

** Soap hardness

† Sample of combined yield of wells 84, 85, 86a and 86b.

Analyst: 2, 9, 18, 48, 59, 73, 83a (1941), 104, 120, 133, 146, M. D. Foster; 60, 83a (1943), 84, D, E. W. Lohr.

### LOG OF WELL 55, WEST OF HALIFAX, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, red and top soil | 20 | 20 |
| Clay, white | 15 | 35 |
| Miocene, Yorktown formation: | | |
| Clay, blue | 16 | 51 |
| Sand | | 51 |

### LOG OF WELL 59, AT HALIFAX, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Soil | 2 | 2 |
| Clay, yellow | 38 | 40 |
| Miocene, Yorktown formation: | | |
| Clay, blue, and marl | 20 | 60 |
| Sand | 2 | 62 |
| Cretaceous (undifferentiated): | | |
| Clay, red | 23 | 85 |
| Sand and clay | 12 | 97 |
| Clay, red | 13 | 110 |
| Basement rock: | | |
| Rock, decomposed | 3 | 113 |
| Crystalline | 22 | 135 |

### LOG OF WELL 67A, AT HALIFAX, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, yellow | 21 | 21 |
| Miocene, Yorktown formation: | | |
| Clay, blue | 39 | 60 |
| Clay, blue and sand | 17 | 77 |
| Clay, blue | 48 | 125 |
| Basement rock: | | |
| Rock | 160 | 285 |

### LOG OF WELL 67B, AT HALIFAX, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, yellow | 40 | 40 |
| Miocene, Yorktown formation: | | |
| Clay, blue and marl | 20 | 60 |
| Sand and clay | 2 | 62 |
| Cretaceous (undifferentiated): | | |
| Clay, red | 48 | 110 |
| Basement rock: | | |
| Rock | 20 | 130 |

### LOG OF WELL 67C, AT HALIFAX, HALIFAX COUNTY

| | Thickness (feet) | Dept (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, red | 32 | 32 |
| Sand, coarse | 4 | 36 |
| Miocene, Yorktown formation: | | |
| Clay, blue | 3 | 39 |
| Clay, yellow | 10 | 49 |
| Sand | 7 | 56 |
| (?) (missing from record) | 4 | 60 |
| Clay, blue | 52 | 112 |
| (?) (missing from record) | 3 | 115 |
| Basement rock: | | |
| Rock, crystalline | | 115 |

### LOG OF WELL 67D, AT HALIFAX, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Soil | 5 | 5 |
| Clay, yellow | 27 | 32 |
| Miocene, Yorktown formation: | | |
| Clay, blue | 16 | 48 |
| Clay, yellow (?) | 31 | 79 |
| Yellow (?) Sandy clay (?) | 5 | 84 |
| Clay, blue | 26 | 110 |
| Basement rock: | | |
| Rock, crystalline | | 110 |

### LOG OF WELL 74, TILLERY, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Cretaceous (undifferentiated): | | |
| (?) (no record to 105 feet) | 105 | 105 |
| Clay, reddish | 35 | 140 |
| Clay, blue | 18 | 158 |
| Shell stone (?) | 10 | 168 |
| Shell rock (?) | 20 | 188 |
| Sandstone, red | 17 | 205 |
| Basement rock (?) per-Cambrian slate (?): | | |
| Shale, brown | 90 | 295 |
| Lime rock | 23 | 318 |
| Rock, blue | 7 | 325 |

### LOG OF WELL 83A, AT ENFIELD, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand and marl | 5 | 5 |
| Clay, yellow | 15 | 20 |
| Sand, water-bearing | 3 | 23 |
| Miocene, St. Marys formation: | | |
| Clay, yellow | 22 | 45 |
| Marl, blue | 30 | 75 |
| Creataceous (undifferentiated): | | |
| Clay, tough and yellow | 25 | 100 |
| Clay, chocolate colored | 25 | 125 |
| Basement rock: | | |
| Rock, soft | 4 | 129 |
| Sandstone, red | 21 | 150 |
| (well relined at 135 feet to cut out sand and broken rock) | | |
| Rock, red, flinty | 16 | 166 |
| Granite, red colored | 19 | 185 |
| Rock, soft rotten, contains a little water | 2 | 187 |
| Granite, whittish | 15 | 202 |
| Slaty formation | 18 | 220 |
| Sandstone, red | 5 | 225 |
| Slaty formation | 15 | 240 |
| Sand, red, with hard streaks | 12 | 252 |
| Granite, hard gray—lime water | 28 | 280 |
| Slaty formation | 20 | 300 |
| Flint, red | 5 | 305 |
| Slate, mixed and flint, red | 3 | 308 |
| Crevices and broken rock, predominantly red flint, water-bearing | 12 | 320 |
| Grainte, hard gray | 25 | 345 |
| Flint, red | 5 | 350 |

### LOG OF WELL 84, ENFIELD, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 12 | 12 |
| Sand and clay | 14 | 26 |

### LOG OF WELL 85, AT ENFIELD, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 17 | 17 |
| Sand | 2 | 19 |
| Sand and gravel | 4 | 23 |

### LOG OF WELL 86, AT ENFIELD, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 13½ | 13½ |
| Sand, red | 13 | 26½ |

### LOG OF WELL 133, AT SCOTLAND NECK, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, sandy | 18 | 18 |
| Miocene, Yorktown formation: | | |
| Sand, brown and gray with little blue sand | 56 | 74 |
| Cretaceous (undifferentiated) | | |
| Sand, light gray | 22 | 96 |
| Clay, tough red | 70 | 166 |
| Sand, brown, with clay | 49 | 215 |

LOG OF WELL 134, AT SCOTLAND NECK, HALIFAX COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Top soil | 2 | 2 |
| Clay, red, sandy | 14 | 16 |
| Sand, coarse, brown | 25 | 41 |
| Miocene, Yorktown formation: | | |
| Marl, blue, with sand and shells | 12 | 53 |
| Clay, soft | 5 | 58 |
| Sand, gray, with oyster shells | 21 | 79 |
| Cretaceous (undifferentiated): | | |
| Clay, tough | 41 | 120 |
| Clay, soft red | 16 | 136 |
| Pocket | 2 | 138 |
| Hard pan | 2 | 140 |
| Pocket | 2 | 142 |
| Clay, tough, red | 21 | 163 |
| Sand and clay, gray | 16 | 179 |
| Pocket | 3 | 182 |
| Clay, soft, red | 28 | 210 |
| Clay, tough, red | | |

## NASH COUNTY

**(Area 552 square miles, Population 55,608)**

### TOPOGRAPHY AND PHYSIOGRAPHY

Nash County lies mostly within the Piedmont (Physiographic) province, according to the definition used in this report. However, because the Pleistocene terraces cover considerable areas, the topography is not as mature as the topography which is typical of the piedmont farther west. The topography of the southern half of the county has been mapped and is included in the Rocky Mount, Spring Hope, and Kenly quadrangle maps of the U. S. Geological Survey.

The Sunderland terrace forms comparatively flat areas of considerable extent in a belt crossing the county from south to north and extending 3 to 5 miles west of the eastern boundary of the county. The Coharie terrace lies west of and roughly parallel to the Sunderland terrace. It has been dissected considerably more than the Sunderland, and, except for a few areas, it is quite rolling. However, it has not been dissected so much that it cannot be readily traced across the county. The highest terrace, the Brandywine, forms a very irregular belt extending north and south across the western half of the county. It has been thoroughly dissected and is difficult to trace, especially across that part of the county not mapped topographically. The surface of the western half of the county is quite rolling and should probably be classified as mature or sub-mature topography. The maximum relief is 150 to 200 feet.

The largest stream in Nash County is Tar River, which flows from west to east, in a very irregular course, across the county. This river leaves the county at Rocky Mount at the lowest elevation of any point in the county, about 72 feet. Tar River and its tributaries, of which the important ones in the county are Stony Creek and Sapony Creek, drains the central half of the county, while Fishing Creek, along the northern boundary, and Swift Creek, which enters Fishing Creek in Edgecombe County, drain the northern quarter of the county. The extreme southern part of the county is drained by Toisnot Swamp, Turkey Creek, and Moccasin Creek, all of which eventually flow into Contentnea Creek.

### GEOLOGY

The entire county is underlain by crystalline rocks which crop out at the surface or are encountered at comparatively shallow depths below the surface. These crystallines consist of two types, the metamorphic slates, schists, and volcanic rocks of pre-Cambrian age; and the younger granites (Carboniferous?) which have been intruded in them. The areas occupied by these rocks are shown on the accompanying geologic map, plate 1. In the western part of the county, outcrops are numerous, and it is comparatively easy to trace the approximate contact between the granite and the metamorphic rocks. In the eastern part of the county, erosion has not cut through the overlying terrace deposits except along the larger streams making it difficult to map the contact accurately. However, the bedrock is exposed along these streams, and on a few road cuts, and additional information was obtained from owners of wells and from well drillers, and it is believed that the map is fairly accurate.

The Cretaceous deposits, which overlie the crystalline bedrock as it dips eastward under the Coastal Plain, are not definitely known to be present in Nash County, but their presence is inferred from logs of wells at Whitakers and Battleboro.

The Yorktown formation, of Miocene age, which lies on the irregular erosion surface of the Cretaceous strata east of Nash County, extends westward into Nash County, in several places, upon the irregular surface of the granite. This formation consists of clay and shell marl with a few layers of sand and sandy clay. There are a number of abandoned marl pits along tributaries of the Tar River west and northwest of Rocky Mount. The westernmost occurrence reported is about 3 miles west of Rocky Mount, and marl is also reported along Beaverdam Swamp 3 or 4 miles west of Whitakers. Shell marl is reported in drilled and bored wells in South Rocky Mount, Rocky Mount, Battleboro, and Whitakers. The thickness of the Yorktown at Whitakers is apparently about 38 to 40 feet, and at Battleboro about 25 feet. The log of well 60, in South Rocky Mount, is not available; but as the well was in shell rock at 57 feet, the thickness probably is between 30 and 40 feet.

Uncomformably overlying the Yorktown formation and the crystalline rocks are the Pleistocene formations. These crop out in roughly north-south belts across the county, their surfaces forming terraces of the same name. The formations consist of clay, sand, and sandy clays and average 20 to 30 feet in thickness but in some places may be as much or 50 or 60 feet thick.

## GROUND WATER

There are a considerable number of drilled wells in the county, although most of the domestic wells are dug, bored, or driven. Most of the shallow domestic wells yield water from the terrace formation or from decayed and disintegrated rock in the upper part of the crystalline bedrock. Most drilled wells obtain their supplies from the crystalline rocks, with a few wells obtaining supplies from the Yorktown formation. Most of the western two-thirds of Nash County is underlain by the metamorphic slates and schists, and moderate supplies are obtained in this rock. A well at a cotton gin at Taylor's Store was reported to have yielded 60 gallons a minute. Pumped at the maximum capacity of a pitcher pump, about 15 gallons a minute, the water level lowered only to 3.5 feet below the surface, a drawdown of 2.5 feet. Several wells in the schist at Red Oak yield from 20 to 45 gallons a minute, each. The main city well at Nashville yields 300 gallons a minute, while several others yield 25 to 100 gallons a minute. The two town wells at Spring Hope yield 75 and 155 gallons a minute each and a number of others yield from 20 to 40 gallons a minute each. Around Bailey and Middlesex are a number of wells which yield from 20 to 50 or more gallons a minute. Besides the examples given, which are 6 or 8-inch wells, a large number of 1¼-inch jetted or "washed down" wells are used for domestic purposes. The discussion of this type of well on page 16 applies particularly to Nash and Wilson Counties. These wells usually yield satisfactory supplies for domestic purposes. Wells drilled in the granite area around and south of Castalia, have usually not been so successful as a well in the metamorphic rock, and several wells in this granite area have been complete failures. Wells drilled in the granite belt in the eastern third of the county show considerable variation in yield. Yields from 0 to 45 gallons a minute are reported. It appears that wells drilled in the granite along the western margin of the belt, near the contact with schist, are considerably better than wells drilled farther from the contact. The average yield of five wells in the granite near the contact is about 16 gallons a minute while the average yield of 18 wells, two or more miles from the contact, is about 9 gallons a minute.

A few wells near Rocky Mount and at Whitakers are drilled or bored into more sandy strata of the Yorktown formation. Usually the supply is small, and a number of wells in this formation have been abandoned because of the bad taste and odor of the water.

There are a number of springs in Nash County, a few of which furnish domestic water supplies. Most of these are either depression or contact springs. Most of them furnish only a few gallons a minute. One of the strongest, on the farm of J. W. Moore, about one mile south of Red Oak, flows about 40 gallons a minute. This is a contact spring, the water issuing at the base of a permeable arkosic sand stratum lying upon an impermeable clay stratum, both of which belong to the Coharie formation. There is a thin band of gravelly sand just above the clay. The water issues from this layer several feet above the bottom, in the side of a gulley. A hydraulic ram is used to deliver water to an elevated tank.. A spring at Rocky Cross, about 3 miles west of Samaria, yields about 16 gallons a minute. It issues from the ground near the base of a hill and also appears to be a contact spring. A masive quartz vein, cutting across the slope, apparently acts as a barrier to downward percolation and forces the water to the surface at this point. The water is used for domestic purposes and for cattle. Harris Spring, in Taylor Park at Rocky Mount is another contact spring, brought to the surface by the intersection of underlying massive granite with the surface. The main spring, emptying into a round concrete basin, yields about 1 gallon per minute, and there are a number of other small seeps in addition.

Analyses of water from eight wells and one spring are given in the table of analyses. The water from wells 11 and 157, from a sand stratum in the Pleistocene formations, is very soft and potable, but that from well 11 contains an excessive amount of iron. Analyses 48, 85, 128, 153, and 215 are from wells drilled in schist. All of the samples were moderately soft, averaging about 50 parts per million, and very potable. The iron content was very low in all these samples, although a number of wells drilled in the schist have excessive iron.

The anaysis of well 53, at Battleboro, drilled in granite, shows a very much harder water, with a large percentage of sodium bicarbonate, than the other samples from this county.

The analyses of the water from the spring, Rocky Cross, show a soft water, very low in mineral content and is characteristic of shallow ground water.

### MUNICIPAL SUPPLIES

There are seven public water supplies in Nash County, and six of them are from wells. All of these supplies are municipally owned.

Bailey completed its water supply in 1942. The source of the supply is well 191, drilled 247 feet deep with a yield of 40 gallons a minute. The water comes from the metamorphic rock of pre-Cambrian (?) age; the water is pumped with a deep-well turbine pump which discharges directly into the mains. A 100,000-gallon elevated tank, interconnected to the system, serves as storage and to maintain a uniform pressure. Average consumption is 40,000 gallons a day, about 30 percent of this being used by the railroad. The water is treated.

The public supply at Battleboro, which was installed in 1942, is obtained from a drilled well 250 feet deep, 54 in the table; the log of this well is given on page 57. It yields 25 gallons a minute and is pumped with a deep-well turbine pump that discharges directly into the distribution system. A 75,000-gallon elevated tank is interconnected in the system and serves as storage and to equalize the pressure, which varies between 40 and 55 pounds. Well 53, at the Battleboro Cotton Oil Mill is connected with the distribution system and can be used in emergencies. Average consumption is about 6,000 gallons a day. The water is not treated. Analysis of the water from well 53 is given in the table.

Middlesex has had a municipal supply since 1934, and obtains its water from two drilled wells, 215 and 216 in the table, which were drilled about 1908 for the Montgomery Lumber Company who had a complete water system for the mill village. The mills have long been abandoned, and in 1934 the wells were cleaned out for use by the town. Well 215 is the main supply, and it is equipped with a deep-well turbine pump with a capacity of 50 gallons a minute. Well 216, equipped with a 25-gallon-a-minute deep-well piston pump, is used as an auxiliary well and is reported to have a capacity of more than 50 gallons a minute. The water is pumped directly from the wells into the distribution system. A 30,000-gallon elevated tank furnishes storage capacity and maintains a pressure of 30 to 40 pounds. Average consumption is about 13,000 gallons a day. The water is not treated. Analysis of water from well 215 is given in the table of analyses.

Nashville has had a city supply since 1915. The source is two drilled wells, 85 and 86 in the table, which yield 300 and 55 gallons a minute, respectively. They are both equipped with deep-water turbine pumps. The pump at well 85 discharges directly into the mains at the rate of 250 gallons a minute. A 60,000-gallon elevated tank is connected with the distribution system for storage and to maintain a uniform presure. The other well, used as an auxiliary supply, discharges into a 110,000-gallon, round concrete tank at ground level. Three pumps are available to force the water from the concrete reservoir into the distributing system. The water pressure in the system ranges from 40 to 50 pounds. Consumption averages about 50,000 gallons a day. The only treatment consists of the addition of sodium hydroxide directly into the distribution system at well 85. Analysis of the untreated water from this well is given in the table of analyses.

Rocky Mount has had a municipal supply since 1898. From 1898 to 1909 the water was taken from Stony Creek but since 1909 has been obtained from Tar River. The pumping and treatment plant is on the bank of the river at the western edge of the city. After treatment with alum, lime, and charcoal, the water is filtered and settled and then ammonia and chlorine are added. Clear water storage consists of one 1,500,000 and one 500,000-gallons reservoirs. Two electrically-driven and one gasoline-driven pumps force the water into the main. A 1,000,000-gallon elevated tank in the eastern part of the city serves as additional storage and to maintain pressure on the mains which ranges from 50 to 55 pounds. The capacity of the plant is 6,750,000 gallons a day; maximum consumption is about 2,500,000 and averages about 2,000,000 gallons a day. About 50 percent of the water is used by industries.

Spring Hope has had a municipal water supply since 1920. The water is obtained from two drilled wells, 128 and 129 in the table, which have a capacity of 155 and 80 gallons a minute, respectively. Both are equipped with deep-well turbine pumps which discharge directly into the distribution system. A 100,000-gallon elevated tank is the only storage. Pressure varies between 40 and 45 pounds, and consumption averages about 75,000 gallons a day. The water is not treated. Analysis of the water from well 128, which is the main supply, is given in the table of chemical analyses.

The water supply of the town of Whitakers was installed in 1937. A number of test wells were drilled, one to 405 feet, with poor results. Logs of these wells are given. Well 12 was completed satisfactorily and tested at 40 gallons a minute for 36 hours. However, after using this well for several years, the yield decreased, and it was found necessary to provide more water. The present supply consists of 30 wells in three lines 50 feet apart. The wells are about 20 feet apart in each line. They are 1½ inches in diameter and average about 27½ feet in depth. They were jetted down using a jetting point with a screen. The yield of the individual wells is reported to have been 18 to 40 gallons a minute each, but the total combined yield for the field was 90 gallons a minute on a 36-hour test. These wells were put in service in 1941. The well field is pumped with a piston-vacuum pump at the pumping and treatment plant. Treatment consists of pre-chlorination, areation, addition of lime and alum, settling and filtering. A centrifugal pump with a capacity of 75 gallons a minute forces the water into the distribution system. A 75,000-gallon elevated tank, near the center of town, serves as storage and to maintain the pressure, which averages about 50 pounds. Maximum consumption is about 50,000 gallons and the average is about 20,000 gallons a day. Analyses of the untreated water is given under 11 in the table of analyses.

RECORDS OF WELLS IN NASH COUNTY

| Well Number | LOCATION | OWNER | DRILLER | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Taylor's Store | J. T. Taylor, Ben Bailey | Heater Well Co. | drilled | 87.5 | 6 | Schist | | 10 | Cased 65 feet. |
| 2 | Aventon | F. D. Avent, Cotton Gin | R. L. Jones | drilled | 165 | 6 | Schist | | 10± | Abandoned. |
| 3 | Aventon | Walter P. Avent | R. L. Jones | drilled | 185 | 6 | Schist | | | |
| 4 | Aventon | J. H. Jurnigan | R. L. Jones (?) | drilled | 76 | 4 | Schist | 30± | | Cased 45 feet. Not in use. |
| 5 | Aventon | T. M. Ward, Tenant house | John Broadie | jetted | 63 | 1¼ | Schist | 25–30 | 4–5 | Cased 35 feet. |
| 6 | Whitakers | Mrs. O. S. Woody | C. W. Norton | drilled | 105 | 6 | Granite | 15± | 4–5 | Cased 105 feet. Not in use since town system was installed. |
| 7 | Whitakers | Mrs. T. N. Partin | C. W. Norton | drilled | 75 | 6 | Granite | | 5–6 | Not in use since town system was installed. |
| 8 | Whitakers | Mrs. J. C. Braswell | C. W. Norton | drilled | 187 | 6 | Granite | | | Not in use since town system was installed. |
| 9 | Whitakers | L. L. Draughon | C. W. Norton | drilled | 153 | 6 | Granite | 9 | 4–5 | Not in use since town system was installed. |
| 10a | Whitakers | Mrs. G. W. Taylor | R. L. Jones (?) | drilled | 100± | 4 | Granite | 5 | | Pitcher pump used; good supply reported. |
| 10b | Whitakers | Town | Heater Well Co. | drilled | 126 | 8 | Sandstone ? | | | Test well no 1, "sandstone" at 125 feet. |
| 10c | Whitakers | Town | Heater Well Co. | drilled | 82 | 8 | Granite ? | | | Test well no. 2, see log. |
| 10d | Whitakers | Town | Heater Well Co. | drilled | 200 | 8 | ? | | 0 | Test well no 3, marine clay with sand and shells to bottom reported. |
| 10e | Whitakers | Town | Virginia Machinery & Well Company | drilled | 405 | 8 | Granite | | 0 | Test well, see log. Cased 157 feet. |
| 10f | Whitakers | J. M. Ethridge | Heater Well Co. | drilled | 80 | 4 | Cretaceous, sandstone? | | 12 | Cased 48 feet. |
| 10g | Whitakers | Z. E. Mann | | drilled | 80 | 4 | Cretaceous, sandstone? | | 7 | Cased 50 feet. |
| 11 | Whitakers | Town | Heater Well Co. | jetted | 27½ | 1½ | Sunderland, sand | | 18–40 | Battery of 30 wells in field. Combined yield 90 gallons per minute on 36-hour test. See analysis. |
| 12 | Whitakers | Town | Heater Well Co. | drilled | 52 | 4 | Yorktown, sand | | 40–20 | Yielded 40 gallons per minute at first; decreased to 20 gallons per minute. See log. |
| 13 | Whitakers | Whitakers School | C. W. Norton | drilled | 100 | 6 | Yorktown, marl | | 8 | Bottom is gravel packed. Water reported to contain iron. |

RECORDS OF WELLS IN NASH COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 14a | Hillardston | L. F. Williams | R. L. Jones | drilled | 165 | 4¼ | Schist | 30± | ¾ | Abandoned; water never cleared up. Cased 160 feet. |
| 14b | Hillardston | W. F. Woodruff | Heater Well Co. | drilled | 116 | 6 | Slate | | | Cased 95 feet. |
| 15 | Taylor's Store | Cedar Grove School | John Broadie | jetted | 55 | 1¼ | High-level gravels. | | 3-4 | Cased to bottom. |
| 16 | Taylor's Store | Griffin school | C. W. Norton | drilled | 160 | 6 | Schist | 8-10 | 40 | Yields water from quartz veins. Cased 65 feet. |
| 17 | Taylor's Store | J. T. Taylor, Cotton Gin | R. L. Jones | drilled | 60 | 6 | Schist | | 60 | Cased to bottom. Used for cooling oil engine at cotton gin. Pumping 15 gallons a minute, with pitcher pump only lowered water level 2.5 feet. |
| 18 | Taylor's Store | W. B. Taylor | (?) | jetted | 160 | 1¼ | Schist | | 2-3 | Cased 110 feet. |
| 19 | Taylor's Store | J. T. Taylor | Suggs | jetted | 138 | 1¼ | Schist | | 4-5 | Cased 120 feet. |
| 20 | Castalia | C. W. Lassiter Cotton Gin | (?) | drilled | 90 | 6 | Granite | 15 | 10± | Not used; formerly supplied boiler for cotton gin. |
| 21 | Castalia | L. W. Bobbitt | John Broadie | jetted | 104.5 | 1¼ | Granite | | 10? | Cased 100 feet. |
| 22 | Castalia | W. J. Lancaster | C. W. Norton | drilled | 400 | 4½ | Granite | | 0 | |
| 23 | Castalia | Castalia School | C. W. Norton | drilled | 110 | 6 | Granite | 20± | 8-10 | Cased 75 feet. Maximum yield is 10 gallons a minute |
| 24 | Castalia | Roy C. Pullen | John Broadie | jetted | 47 | 1¼ | Weathered Granite | 20± | 6 | |
| 25 | Castalia | Roy C. Pullen | Sydnor Pump & Well Company | drilled | 90+ | 6 | Granite | | 0 | Granite very close to surface. |
| 26 | Spring Hope | E. D. May | C. W. Norton | drilled | 132 | 5 | Granite | 23 | 20? | Rock at 65 feet. Cased 98 feet. |
| 27 | Spring Hope | B. E. Morgan, Hugh Wester | Heater Well Co. | drilled | 101 | 5 | Granite | | 5 | Cased 97 feet. |
| 28 | Nashville | G. M. Strickland Boddie Mill Farm | Sydnor Pump & Well Company | drilled | 75 | 6 | Schist ? | | 0.5 | Cased 10 feet. |
| 29 | Nashville | G. M. Strickland M. W. Nelms | Heater Well Co. | drilled | 187 | 6 | Schist | | 10 | Cased 132 feet. |
| 30 | Nashville | Snow Hill School | Powell | jetted | 108 | 1¼ | Schist | | 4-5 | Cased 95 feet. |
| 31 | Nashville | H. E. Chappell | John Broadie | jetted | 148 | 1¼ | Schist | | | Cased 125 feet. |
| 32a | Nashville | Wm. G. Collins | John Broadie | jetted | 48 | 1¼ | Schist | 25± | 5 | Cased 45 feet. Abandoned during drought of 1941-42. Water level too low for vacuum pump. |
| 32b | Nashville | Wm. G. Collins | Heater Well Co. | drilled | 76 | 6 | Schist | | 20 | Drilled in 1942. Cased 29 feet. |
| 33 | Taylor's Store | W. T. Williams | | drilled | 190 | 6 | Schist | ? | 8-10 | Reported 190 feet deep, measured 63 feet deep January 7, 1943. Not in use. |
| 34 | Taylor's Store | W. T. Williams, H. G. Williams | Charlie Griffins | jetted | 90 | 1¼ | Schist | 10-12 | | |
| 35 | Red Oak | Fred McIntyre | R. L. Jones | drilled | 119 | 6 | Schist | | 20 | Cased about 40 feet. |
| 36 | Red Oak | Rev. R. L. Mays | Tom Taylor | jetted | 65 | 1¼ | Schist | | 6-7 | Cased to bottom. |
| 37 | Red Oak | N. E. Bass, Smith | J. W. Moore | jetted | 98 | 1¼ | Schist | 12± | 10 | Cased 65 feet. Not in use. |
| 38 | Red Oak | Mrs. H. D. Griffin | R. L. Jones | drilled | 122 | 6¼ | Schist | | 20 | |
| 39 | Red Oak | Red Oak School | R. L. Jones | drilled | 130 | 6 | Schist | | 15-20 | Cased 100 feet. Abandoned; well caved in. |
| 40 | Red Oak | Red Oak School | Heater Well Co. | drilled | 125 | 8 | Schist | | 45 | Cased 98 feet. |
| 41 | Red Oak | Mrs. G. E. May | | bored | 20 | 6 | Coharie, sand | | 7½ | Clay tile casing to bottom; 1¼-inch draw pipe |
| 42 | Red Oak | J. W. Moore | J. W. Moore | jetted | 97 | 6-2 | Schist | 20± | 5-6 | Cased 18 feet. Not used. |
| 43 | Red Oak | J. W. Moore | | dug | 25± | 27 | Coharie, clay | 22½ | | |
| 44 | Red Oak | R. T. Whitfield | Arch Bobbitt | drilled | 90 | 4 | Schist | 12± | 10 | Cased 86 feet. |
| 45 | Red Oak | J. A. Tharrington | A. R. Bobbitt | drilled | 92 | 6 | Schist | 20± | 10 | Cased 90 feet. |
| 46 | Red Oak | H. O. Coley | C. W. Norton | drilled | 125 | 6 | Granite | 20± | 20? | Cased 80 feet. |
| 47 | Red Oak | J. R. Ellen | Truby | drilled | 78 | 6 | Granite | 20± | 5-6 | Cased 65 feet. Water contains iron. |
| 48 | Red Oak | John Griffin | Heater Well Co. | drilled | 144 | 6 | Schist ? | 20± | 20 | Cased 107 feet. "Soft rock"; analysis in table. Temperature 61.5°F. |
| 49 | Rocky Mount | R. R. Bosemand | R. L. Jones | drilled | 106 | 6 | Granite | | 6 | Cased about 50 feet. |
| 50 | Rocky Mount | E. P. Spruill | Jones & Bobbitt | drilled | 150 | 6 | Granite | | 10 | Cased 60 feet. |

RECORDS OF WELLS IN NASH COUNTY—*Continued*

| Well Number | LOCATION | OWNER | DRILLER | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 51 | Battleboro | J. C. Braswell L. T. Warren | | drilled | 140 | 6 | Granite | 15± | 4–5 | Cased 40 feet. |
| 52 | Battleboro | J. T. Fisher | J. K. Bridges | drilled | 182 | 8 | Granite | 12–14 | 8–10 | Cased 100 feet. Water reported to be slightly hard. |
| 53 | Battleboro | Battleboro Cotton Oil Co. | J. K. Bridges | drilled | 140 | 6 | Granite | 20± | 25 | Cased 138 feet. Connected with town water system. Analysis in table. |
| 54 | Battleboro | Town | White Well Co. | drilled | 250 | 8 | Granite | 86? | 40 | Cased 175 feet. Log given. First well drilled encountered granite at 165 feet and failed to yield sufficient water. |
| 55 | Rocky Mount | R. T. Griffin, Jr. | Heater Well Co. | drilled | 200 | 6 | Granite | 19 | 5 | Cased 100 feet. |
| 56 | Rocky Mount | R. T. Griffin, Jr. | R. T. Griffin | bored | 60 | 6 | Sunderland, sand and clay | 20± | ½ | Cased 25 feet, with tile. |
| 57 | Rocky Mount | T. E. Jolliet, M. B. Vendrick | | drilled | 180 | 6 | Granite | | 6–8 | |
| 58 | Rocky Mount | Nash Brick Co. | (?) | drilled | 140 | 4 | Granite ? | | ? | Abandoned; supply insufficient. |
| 59a | Rocky Mount | C. S. Blount | Heater Well Co. | drilled | 55 | 4 | Yorktown (?), shell rock | | | Cased 45 feet. Abundant supply. |
| 59b | Rocky Mount | L. I. McCall | (?) | bored | 55 | 6 | Yorktown (?), shell marl | | ½ | Cased to bottom. |
| 60a | Rocky Mount | W. B. Riley | Heater Well Co. | drilled | 57 | 4 | Yorktown (?), shell rock | 11± | 12 | Cased 53 feet. Water reported to be hard. |
| 60b | Rocky Mount | W. A. Crandall | Heater Well Co. | drilled | 40 | 6 | Granite | 15–20 | 8 | Cased 25 feet. Use vacuum pump. |
| 60c | Rocky Mount | L. A. Simmons | Heater Well Co. | drilled | 60 | 4 | Granite | | 21 | Contains no iron. |
| 61a | Rocky Mount | Williford School | C. W. Norton | drilled | 150 | 6 | Granite | 8± | 10 | Cased 35 feet. |
| 61b | Rocky Mount | C. T. Colbert | Heater Well Co. | drilled | 36 | 6 | Granite | | 3½ | Cased 11 feet. |
| 62 | Rocky Mount | H. A. Easley | C. W. Norton (?) | drilled | 80 | 4 | Granite | 1± | | Cased 12 feet. Flows into pool just below surface. |
| 63 | Rocky Mount | Carolina Power & Light Co. | Heater Well Co. | drilled | 97 | 6 | Weathered granite | 5± | 8 | Cased 73 feet. Water reported to be hard. |
| 64 | Rocky Mount | P. H. Johnson | A. R. Bobbitt | drilled | 44 | 6 | Granite | | 0 | Cased 22 feet. |
| 65 | Rocky Mount | A. S. Jarlett | | dug | 16 | 24 | | 12 | | |
| 66 | Rocky Mount | J. B. Overton | A. R. Bobbitt | drilled | 52 | 4 | Granite | 16 | 6.5 | Cased 42 feet. |
| 67 | Rocky Mount | Benvenue Country Club | A. R. Bobbitt | drilled | 55 | 4 | Granite | | 0 | Cased 48 feet. |
| 68 | Rocky Mount | Benvenue Country Club | A. R. Bobbitt | drilled | 55 | 4 | Granite | | 3± | Cased about 48 feet. |
| 69 | Rocky Mount | Jefferies School | Powell | jetted | 80 | 1¼ | Weathered granite | 25± | 3–4 | Cased to bottom. |
| 70a | Rocky Mount | C. G. Shearin, Texaco Station | | dug | 30 | 36 | Sunderland, sandy clay | 9 | | |
| 70b | Rocky Mount | S. E. Ballentine | Heater Well Co. | drilled | 36 | 4 | Granite | | 6 | Cased 30 feet. |
| 70c | Rocky Mount | S. E. Ballentine | Heater Well Co. | drilled | 35 | 4 | Granite | | 8 | Cased 10 feet. |
| 71 | Rocky Mount | Little Easonburg School (colored) | John Broadie | jetted | 45 | 1¼ | Slate or schist | | 5 | Cased 30 feet. |
| 72 | Easonburg | Macklin Colored School | John Broadie | jetted | 60 | 1¼ | Slate or schist | flows | 10 | Cased to bottom. Flows ½ gallon a minute. |
| 73 | Easonburg | F. W. Langley | C. W. Norton | drilled | 40 | 6 | Granite ? | 4½ | 10 | |
| 74 | Easonburg | S. B. Weaver | C. W. Norton | drilled | 65 | 6 | Granite ? | 15± | 10–12 | Cased 25 feet. |
| 75 | Nashville | Jim Battles | John Broadie | jetted | 65 | 1¼ | Slate | | 5 | Cased 60 feet. |
| 76 | Nashville | K. E. Bone | John Broadie | jetted | 103 | 2 | Schist | 22 | 6 | Cased 92 feet. |
| 77 | Nashville | K. E. Bone | John Broadie | jetted | 104 | 1¼ | Schist | | 5 | Cased 65 feet. |
| 78 | Westry | Oak Level School | A. R. Bobbitt | drilled | 101 | 6 | Triassic dike (?), diabase ? | | 6 | Cased 75 feet. |
| 79 | Westry | DeLeon Carter | C. W. Norton | drilled | 140 | 6 | Schist | | 4+ | |
| 80a | Westry | R. E. Bunn | Jenkins | jetted | 83 | 1¼ | Schist | | 2–3 | Cased 80 feet. Water contains some iron. |
| 80b | Westry | R. L. Dozier | Heater Well Co. | drilled | 109 | 6⅝ | Slate | | 20 | Cased 95 feet. |
| 81 | Westry | M. Williamson, Robt. Davis | | jetted | 58 | 1¼ | Slate | 34 | | Not used because water level is below limit of lift of vacuum pump. |
| 82 | Nashville | Clarence Beal | Jenkins | jetted | 103 | 1¼ | Slate | | | |
| 83 | Nashville | Nashville Lumber Co. | C. W. Norton | drilled | 100 | 6 | Slate and schist | 20± | 5 | |
| 84 | Nashville | Nashville Supply & Gin Co. | Roberson | drilled | 180 | 6 | Schist | 8± | 26 | Not used at present. Formerly used to help supply town in periods of emergency. |
| 85 | Nashville | Town | Sydnor Pump & Well Co. | drilled | 239.3 | 8 | Schist | 10± | 300 | Analysis in table. |

RECORDS OF WELLS IN NASH COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 86 | Nashville | Town | J. K. Bridges | drilled | 300 | 10 | Schist | 30± | 55 | Cased 15 feet; 10-inch hole to 200 feet. 6-inch to 300 feet. |
| 87 | Nashville | Nashville Grocery Co. | J. K. Bridges | drilled | 130 | 6 | Schist | 15± | 100 | Cased 30 feet. |
| 88 | Nashville | Nash County Training School (colored) | John Broadie | jetted | 65 | 1¼ | Gravel ? | | 10 | Combined yield of two wells is 10 gallons a minute |
| 89 | Nashville | John Broadie | John Broadie | jetted | 48 | 1¼ | Schist | 20± | 5 | Cased 37 feet. |
| 90 | Nashville | W. L. Green | John Broadie | jetted | 55 | 1¼ | Schist | | | Cased 40 feet. Single vacuum pump for both wells 90 and 91. |
| 91 | Nashville | W. L. Green | John Broadie | jetted | 60 | 1¼ | Schist | | | Cased 42 feet. |
| 92 | Nashville | C. E. Smith, J. F. Brown | John Broadie | jetted | 78 | 1¼ | Schist | | 5 | Cased 70 feet. |
| 93 | Nashville | J. C. Smith | C. W. Norton | drilled | 84 | 5 | Schist | | | |
| 94 | Nashville | Mrs. S. F. Austin | | drilled | 80 | 6 | Schist | | | Cased 57 feet. |
| 95 | Nashville | E. V. Griffin | John Broadie | jetted | 65 | 1¼ | Schist | 22± | 5 | Cased 48 feet. |
| 96 | Nashville | E. V. Griffin | | dug | 14 | 28 | Coharie, sand | 13 | | |
| 97 | Nashville | Union Hill Church | John Broadie | jetted | 48 | 1¼ | Schist | 18± | 5+ | |
| 98 | Nashville | Z. V. Jenkins, B. L. Caroll | B. L. Caroll | jetted | 41 | 1¼ | Coharie, gravel | | 2½ | Cased to bottom. |
| 99 | Nashville | Z. V. Jenkins M. Chaplin | Cooper | jetted | 160 | 1¼ | Schist | | 2½ | Cased 70 feet. |
| 100 | Nashville | Mrs Joe Vick | Arthur Vanhook | jetted | 80 | 1¼ | Schist | | | |
| 101 | Nashville | H. E. Nobles | Jenkins | jetted | 120 | 1¼ | Schist | | | |
| 102 | Nashville | Mr. Joe Whitley | | jetted | 60 | 1¼ | Schist | | | Good supply; formerly used by school. |
| 103 | Momeyer | Willard Cockerell | Jenkins | jetted | 85 | 1¼ | Schist | | | |
| 104 | Momeyer | S. A. Cockerell | Harry Jenkins | jetted | 68 | 1¼ | Schist | 20± | 2½ | Cased 45 feet. |
| 105 | Momeyer | L. W. Mathews | George Davis | jetted | 56 | 1¼ | Schist | 15–18 | 5–6 | Cased 40 feet. |
| 106 | Momeyer | W. D. Manning | George Davis | jetted | 100 | 1¼ | Schist | | | |
| 107 | Nashville | State Prison Camp | Heater Well Co. | drilled | 117 | 6 | Schist | | 44 | Cased 79 feet. Water comes from fractured quartz veins in schist. |
| 106 | Momeyer | Civilian Conservation Corps | Heater Well Co. | drilled | 146.5 | 6 | Schist | | 16 | |
| 109 | Momeyer | Mrs. Jordan Batchelor | Heater Well Co. | drilled | 96 | 6 | Schist | 26± | 20 | Cased 85 feet. Yeilds 20 gallons a minute with 30 feet drawdown. |
| 110 | Momeyer | Momeyer School | C. W. Norton | drilled | 150 | 6 | Schist | 20–25 | 8 | Cased 100 feet. Water contains some iron. |
| 111 | Momeyer | Bass Bros. Store | R. L. Jones | drilled | 113 | 6 | Schist | | 16 | |
| 112 | Momeyer | Bass Bros. M. H. Privett | R. L. Jones ? | drilled | 90 | 6 | Schist | 13 | 16 | Furnished boilers at sawmill. |
| 113 | Momeyer | W. E. Mathews | Heater Well Co. | drilled | 106 | 6 | Schist | 21½ | 25 | Cased 85 feet. |
| 114 | Momeyer | Bass Bros. R. D. Lamb | H. Jenkins | jetted | 40 | 1¼ | Schist | | 6–8 | Cased to bottom. |
| 115 | Momeyer | Mrs. A. E. Bass | H. Jenkins | jetted | 73 | 1¼ | Schist | | 6+ | |
| 116 | Momeyer | D. J. Leonard Broadie Lee | H. Jenkins | jetted | 78 | 1¼ | Schist | 6± | | Cased 45 feet. |
| 117 | Momeyer | A. E. Bass J. H. Pridgeon | H. Jenkins | jetted | 136 | 1¼ | Schist | 20± | | Cased 90 feet. |
| 118 | Spring Hope | I. N. Syme | C. W. Norton | drilled | 63 | 5 | Schist | 40 | 18–20 | Cased 58 feet. |
| 119 | Spring Hope | Mrs. O. G. Edwards Frank Marshall | | dug | 28.1 | 24 | Clay | 26½ | | Water level reported lowest in 9 years (12/1/41) |
| 120 | Spring Hope | Mrs. O. G. Edwards A. C. Creedmore | | dug | 30.5 | 24 | Clay | 30 | | Water level very low (12/1/41) |
| 121 | Spring Hope | Spring Hope Grade School | J. D. Morris | drilled | 104 | 4 | Schist | | 6 | Cased 92 feet. Abandoned. |
| 122 | Spring Hope | Brantley & Wood Co. | Heater Well Co. | drilled | 106 | 6 | Schist | | 10 | Cased 85 feet. |
| 123 | Spring Hope | R. I. Mitchell | Heater Well Co. | drilled | 66 | 6 | Schist | | 10 | Cased 22 feet. |
| 124 | Spring Hope | R. I. Mitchell | C. W. Norton | drilled | 160 | 6 | Schist | | ? | Well is yielding 3.5 gallons a minute. |
| 125 | Spring Hope | R. I. Mitchell | C. W. Norton | drilled | 180 | 6 | Schist | | 9+ | |
| 126 | Spring Hope | O. B. Baines Shop | J. D. Morris | drilled | 185 | 4 | Schist | | 11? | Cased 169 feet. Abandoned |
| 127 | Spring Hope | Spring Hope Oil Mill | J. D. Morris | drilled | 120 | 4 | Schist | | 30 | Cased 60 feet. Has always been adequate. |

## RECORDS OF WELLS IN NASH COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 128 | Spring Hope | Town | Virginia Machinery &Well Co. | drilled | 507 | 6 | Schist | | 155 | Cased 237 feet. Main supply. Analysis of water in table. |
| 129 | Spring Hope | Town Emergency Well | C. W. Norton | drilled | 135 | 10 | Schist | 20± | 80 | Cased 90 feet. Auxiliary supply. |
| 130 | Spring Hope | Mrs. Annie Brantley | C. W. Norton | drilled | 126 | 6 | Schist | | 10± | Supplies four families and stock. |
| 131 | Spring Hope | H. L. Griffin | J. D. Morris | drilled | 67 | 4½ | Schist | | 6–8 | Cased 50 feet. Abandoned. |
| 132 | Spring Hope | N. F. Finch | J. D. Morris | drilled | 114 | 6 | Schist | | 20 | Cased 92 feet. Abandoned. |
| 133 | Spring Hope | Tobacco Drying Plant | J. D. Morris | drilled | 83 | 4½ | Schist | | 25 | Cased 48 feet. Abandoned. |
| 134 | Spring Hope | A. F. May | J. D. Morris | drilled | 151 | 4½ | Schist | | 8–10 | Cased 136 feet. Abandoned. |
| 135 | Spring Hope | R. W. Green | J. D. Morris | drilled | 133 | 4½ | Schist | | 10 | Cased 113 feet. Abandoned. |
| 136 | Spring Hope | Dr. H. Brantley | J. D. Morris | drilled | 89 | 4½ | Schist | | 30–40 | Cased 77 feet. Abandoned. |
| 137 | Spring Hope | Dr. J. R. Wheless | J. D. Morris | drilled | 167 | 4½ | Schist | | 10–15 | Cased 128 feet. Abandoned. |
| 138 | Spring Hope | Montgomery Lumber Co. C. W. Lassiter | J. D. Morris | drilled | 74.5 | 4½ | Schist | | 45 | Cased 62 feet. Abondoned. |
| 139 | Spring Hope | Montgomery Lumber Co. | J. D. Morris | drilled | 66.5 | 4½ | Schist | | 30–40 | Cased 61 feet. Abandoned. |
| 140 | Spring Hope | S. L. Edwards | Heater Well Co. | drilled | 70 | 6 | Schist | 40± | 12 | Cased to bottom. |
| 141 | Spring Hope | H. M. Edwards Hurbert Green | H. M. Edwards | drilled | 102 | 2 | Schist | 25± | 1± | Cased 70 feet. Vacuum pump. Probably wolud furnish more to a deep-well pump. |
| 142 | Spring Hope | J. L. Barbee | J. D. Morris | drilled | 86 | 4 | Schist | | 6– | Cased 20 feet. Abandoned; water contains iron. |
| 143 | Spring Hope | Webb Mill Company | C. W. Norton | drilled | 90 | 6 | Schist | | | Not in use. Water contains iron. |
| 144 | Spring Hope | Webb Mill Company | Heater Well Co. | drilled | 66 | 6 | Slate and schist | 20± | 7 | Cased 43 feet. Water contains very little iron. |
| 145 | Spring Hope | B. F. Boone Service Station | J. D. Morris | drilled | 73 | 4½ | Schist | 25± | 5–6 | Cased 14 feet. Water contains no iron. |
| 146 | Spring Hope | J. C. Mathews | J. D. Morris | drilled | 100 | 4½ | Schist | | 12 | Cased 45 feet. Not in use. |
| 147 | Spring Hope | W. T. Brantley Wilson Dairy | C. W. Norton | drilled | 109 | 6 | Schist | 40± | | |
| 148 | Spring Hope | J. H. Cox Esso Service Station | Heater Well Co. | drilled | 115 | 4 | Schist | 40± | 1–2 | Cased about 110 feet. |
| 149 | Spring Hope | Dr. H. Brantley Thomas Strickland | ? | drilled | 110 | 6 | Schist | 12± | 2 | Cased 100 feet. |
| 150 | Spring Hope | Mrs. Dixon; Sinclair Service Station | | dug | 41.5 | 36 | Clay | 40 | | |
| 151 | Samaria | B. S. Strickland | Charley Norton | drilled | 172 | 6 | Schist | 12± | | Reported good supply. Supplies water for cotton gin. |
| 152 | Samaria | A. S. Carter | O. L. Truby | drilled | 101 | 6 | Schist | 23½ | 8–10 | |
| 153 | Samaria | Ferrells School | C. W. Norton | drilled | 1[illegible]0 | 6 | Schist | 10± | 10 | Cased 70 feet. |
| 154 | Spring Hope | Taybrons School | Powell | jetted | [illegible]0 | 1¼ | Schist | | 8–10 | Cased to bottom. |
| 155 | Spring Hope | J. H. Brantly J. B Patterson | | jetted | [illegible]0 | 1¼ | Schist | | | |
| 156 | Stanhope | A. C. Glover | | dug | 22 | 24 | Brandywine, sand | 19 | | |
| 157 | Stanhope | Hugh Dillard Curtis Edwards | J. Wells | jetted | 32 | 1¼ | Brandywine, sand and clay | | 6 | Cased to bottom. Analysis in table. |
| 158 | Stanhope | Stanhope School | C. W. Norton | drilled | 140 | 6 | Schist | 10± | 8 | Cased about 85 feet. |
| 158a | Stanhope | Stanhope School | Heater Well Co. | drilled | 1[illegible]0 | 6 | Schist | | 15 | Cased 111 feet. |
| 159 | Stanhope | Stanhope Ginning Co. | J. D. Morris | drilled | 131 | 4½ | Schist | | 15 | Cased 63 feet. |
| 160 | Stanhope | Mrs. Kerry Brantley | J. P. Underwood | jetted | [illegible]9 | 1¼ | Schist | | 5 | Cased 45 feet. |
| 161 | Stanhope | G. H. Lamm | J. D. Morris | drilled | 72 | 4½ | Schist | | 15–20 | Cased 60 feet. Abandoned. |
| 162 | Stanhope | Mrs. W. R. Edwards | | jetted | 84 | 1¼ | Schist | | 5± | Cased 83 feet. |
| 163 | Stanhope | G. W. Edwards B. E. Jones | George Davis | jetted | 96 | 1¼ | Schist | | 5–6 | |
| 164 | Strickland X Road | Mrs. John Sykes Z. V. Collins | J. D. Morris | drilled | 75 | 4½ | Gravel ? | | [illegible]–5 | Cased to bottom. |
| 165 | Strickland X Road | R. P. Joyner | J. D. Morris | drilled | 42 | 4½ | Coharie, gravel | | 10–15 | Cased to bottom. |
| 166 | Strickland X Road | J. R. Hendrick | Richard Barnes | jetted | 6[illegible] | 1¼ | Schist | 9 | 6 | Cased 40 feet. |
| 167 | Strickland X Road | C. B. Braswell | Richard Barnes | jetted | [illegible]2 | 1¼ | Schist | 8 | 5+ | Cased 40 feet. |

RECORDS OF WELLS IN NASH COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 168 | Strickland X Road | Macedonia School & Church | J. D. Morris | drilled | 62 | 4½ | Schist | 5½ | 15–20 | Cased 58 feet. Water contains no iron. |
| 169 | Strickland X Road | Mrs. Della Powell | J. D. Morris | drilled | 101 | 4½ | Schist | | 6–8 | Cased 75 feet. Not in use. |
| 170 | Strickland X Road | O. B. Baines, Perry Place | | bored | 20 | 6 | Schist | | | Adequate supply. |
| 171 | Strickland X Road | O. B. Baines | | dug | 25 | 36 | Coharie, sand | 24½ | | Badly contaminated with gasoline from tank which had been located 60 feet from well. Tank removed in 1937, but contamination reported to become greatest in fall of 1941. |
| 172 | Strickland X Road | D. F. Thompson | Heater Well Co. | drilled | 85 | 5 | Schist | 19± | 30 | Cased 32 feet. |
| 173 | Strickland X Road | Dr. Julian C. Brantley J. H. Robbins | C. W. Norton | drilled | 98 | 6 | Schist | | 6–7 | Cased 60 feet. |
| 174 | Winstead X Road | Alston | | dug | 25 | 30 | Coharie, sand and clay | | | Observation well. |
| 175 | Sandy Cross | Coopers School | C. W. Norton | drilled | 160 | 6 | Schist | 8± | 40 | Cased 65 feet. Water comes from rock below a dike. Reported yield is 40 gallons a minute with 30 feet drawdown. |
| 176 | Sandy Cross | Mrs. Maud S. Eason | (?) | drilled | 108 | 4 | Schist | | 5–6 | |
| 177 | Sandy Cross | W. O. Baker | C. W. Norton | drilled | 110 | 6 | Schist | | 8–10 | Cased 60 feet. |
| 178 | Winstead X Road | B. Viverette | R. L. Jones | drilled | 65 | 6 | Granite | | | Cased 20 feet. |
| 179 | Sharpsburg | E. P. Weaver | A. R. Bobbitt | drilled | 48 | 4 | Granite | | | Cased 44 feet. |
| 180 | Sharpsburg | Sharpsburg School | C. W. Norton | drilled | 168 | 6 | Granite | 10± | 40 | Reported yield is 40 gallons a minute with 40 feet drawdown. Cased 70 ft. |
| 181 | Sharpsburg | J. E. Smith | J. T. Moore | bored | 36 | 6 | Sunderland, clay, sand | 4± | | |
| 182 | Sharpsburg | J. T. Moore | J. T. Moore | bored | 28 | 6 | Sunderland, sand, clay | 3± | 5 | |
| 183 | Strickland X Road | L. P. Williams | C. W. Norton | drilled | 170 | 6 | Schist | | | Adequte supply for domestic use. |
| 184 | Strickland X Road | C. E. Williams | C. W. Norton | drilled | 105 | 6 | Schist | 10–12 | | Cased 86 feet. |
| 185 | Strickland X Road | B. C. Griffin | | jetted | 72 | 1¼ | Schist | | 2–3 | Cased to bottom. Water contains a little iron. |
| 186 | Bailey | Norfolk & Southern R.R. | George Morgan | drilled | 100± | 3 | Schist | 0–10 | 50+ | Five wells; the four used are pumped by one vacuum pump yielding about 50 gallons a minute. |
| 187 | Bailey | J. S. Collins | J. D. Morris | drilled | 130 | 4½ | Schist | | 30 | Cased 85 feet. Water contains a tittle iron. |
| 188 | Bailey | C. F. Bissette | C. W. Norton | drilled | 80 | 6 | Schist | | | Large supply reported. |
| 189 | Bailey | J. R. Beard | J. D. Morris | drilled | 85 | 4½ | Schist | | 10 | Cased 67 feet. Not in use. |
| 190 | Bailey | Dan Bissette | | jetted | 70 | 1¼ | Schist | 12± | | Cased 40 feet. Supplies six or more families. |
| 191 | Bailey | Town | Heater Well Co. | drilled | 246.5 | 8 | Schist | 8± | 45 | Cased 108 feet. Yields 45 gallons a minute with a drawdown of 32 feet. Water from just below quartz veins at 187 feet. |
| 192 | Bailey | Bailey Grade School | J. D. Morris | drilled | 104 | 4½ | Schist | | 7 | Cased 89 feet. Abandoned. |
| 193 | Bailey | J. W. Stone Sawmill | Heater Well Co. | drilled | 159 | 6 | Schist | 6± | 25+ | Cased 70 feet. |
| 194 | Bailey | Bailey School | C. W. Norton | drilled | 350 | 8 | Schist | 2± | 40 | Large supply of water at 125 feet which would not clear up. |
| 195 | Bailey | A. P. Farmer Geo. Brantley | J. P. Underwood | jetted | 190 | 1¼ | Schist | 8± | 6+ | Cased 50 feet. Two pumps, each draw from both wells 195 and 196. |
| 196 | Bailey | A. P. Farmer Geo. Brantley | J. P. Underwood | jetted | 100 | 1¼ | Schist | 8± | 6+ | Cased 45 feet. |
| 197 | Bailey | Mrs. J. E. Williams | C. W. Norton | drilled | 112 | 6 | Schist | 11 | 20 | Water contains much iron. |
| 198 | Bailey | M. B. Glover | Tom Taylor | jetted | 167 | 1¼ | Schist | | 6+ | Furnishes four families. Water contains no iron. |
| 199 | Bailey | John Corbett | ? | jetted | 80 | 1¼ | Schist | | 6+ | Cased 50 feet. |
| 200 | Bailey | J. D. Boswell | J. P. Underwood | jetted | 75 | 1¼ | Schist | | 5 | Cased 25 feet. |
| 201 | Bailey | J. P. Underwood | J. P. Underwood | jetted | 40 | 1¼ | Schist | | 7+ | Cased 20 feet. |
| 202 | Bailey | W. H. Farmer | W. H. Farmer | jetted | 60 | 1¼ | Schist | | 40? | |
| 203 | Bailey | W. H. Farmer Cotton Gin | W. H. Farmer | jetted | 60 | 3 | Schist | | | |

RECORDS OF WELLS IN NASH COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 204 | Bailey | C. C. Glover | Ben Morgan | jetted | 85 | 2 | Schist | 20± | 8+ | Cased 55 feet. Water contains no iron. |
| 205 | Bailey | M. F. Morgan | C. W. Norton | drilled | 140 | 6 | Schist | 14 | 4+ | Cased 90 feet. |
| 206 | Bailey | Mt. Pleasant School | C. W. Norton | drilled | 165 | 6 | Schist | 8-10 | 40 | Cased 80 feet. Water contains no iron. Yields 40 gallons a minute with a 40 foot drawdown reported. |
| 207 | Bailey | Amos Griffin Elemer Manning | | jetted | 65 | 1¼ | Schist | | 6 | |
| 208 | Bailey | E. W. Brannen | | dug | 13.5 | 24 | High-level gravels, clay | 13 | | |
| 209 | Bailey | W. S. Privette Tenant House | | jetted | 50 | 1¼ | Schist | | 2 | |
| 210 | Bailey | H. G. Brantley | Wiley Powell | jetted | 70 | 1¼ | Schist | 8± | 7-8 | Cased 60 feet. |
| 211 | Middlesex | G. G. Lewis, Jesse Lewis | Leland Daniel | jetted | 50 | 1¼ | Schist | | 3 | Cased 45 feet. |
| 212 | Middlesex | W. S. Williams Cotton Gin | Sydnor Pump & Well Co. | drilled | 138 | 6 | Schist | 9 | 20± | Yields 11 gallons a minute with 10 feet drawdown (measured). |
| 213 | Middlesex | Mrs. K. W. Balentine | C. W. Norton | drilled | 100± | 4½ | Schist | 17 | ? | |
| 214 | Middlessex | Middlesex Union High School | C. W. Norton | drilled | 130 | 6 | Schist | | 12 | |
| 215 | Middlesex | Town | (?) | drilled | 103 | 6 | Schist | 18± | 50+ | See analysis in table. |
| 216 | Middlesex | Town | (?) | drilled | 103 | 6 | Schist | 18± | 50+ | Auxiliary supply. |

RECORDS OF SPRINGS IN NASH COUNTY

| | Location | Owner | Name | Geologic formation and Chief aquifer | Yield gallons per minute | Remarks |
|---|---|---|---|---|---|---|
| A | Red Oak | J. W. Moore | | Sunderland, sand and gravel | 40 | Contact spring, discharges from sand and gravel above a clay stratum. Supplies a ram. |
| B | Rocky Mount | City | Harris Spring | Granite | 1+ | Contact spring, issues on surface of unweathered granite. |
| C | Samaria | H. S. Strickland | | Schist | 16 | Contact spring, temperature 61°F. |

ANALYSES OF GROUND WATER FROM NASH COUNTY, NORTH CAROLINA
(Numbers at heads of columns correspond to numbers in table of well data.)
Parts per million.

| | 11 | 48 | 53 | 85 | 128 | 153 |
|---|---|---|---|---|---|---|
| Silica ($SiO_2$) | | | | | | 22 |
| Iron (Fe) | 1.8 | | .23 | .16 | .02 | .03 |
| Calcium (Ca) | 7.7 | | 50 | 16 | 25 | 6.3 |
| Magnesium (Mg) | 1.5 | | 9.0 | 2.5 | 4.4 | 3.2 |
| Sodium and Potassium (Na+K) | 6.7 | | 52 | 6.6 | 9.9 | 3.6 |
| Carbonate ($CO_3$) | 0 | | 0 | 0 | 0 | 0 |
| Bicarbonate ($HCO_3$) | 18 | 42 | 258 | 67 | 111 | 36 |
| Sulphate ($SO_4$) | 12 | *1 | 6.4 | 3.3 | 6.1 | 2.7 |
| Chloride (Cl) | 9 | 4 | 5 | 4 | 3 | 2.8 |
| Fluoride (F) | .0 | 0.2 | .2 | .2 | .2 | |
| Nitrate ($NO_3$) | .0 | 2.4 | .0 | .0 | .0 | .5 |
| Total dissolved solids | 73 | | 250 | 102 | 124 | 59 |
| Total hardness as $CaCO_3$ | 25 | **36 | 162 | 50 | 80 | 29 |
| Date of collection | Nov. 19, 1941 | Nov. 14, 1941 | Nov. 19, 1941 | Nov. 19, 1941 | Nov. 19, 1941 | April 9, 1943 |

| | 157 | 215 | C |
|---|---|---|---|
| Silica ($SiO_2$) | | | 19 |
| Iron (Fe) | | .05 | .01 |
| Calcium (Ca) | | 9.7 | 3.3 |
| Magnesium (Mg) | | 3.4 | 1.6 |
| Sodium and Potassium (Na+K) | | 7.2 | 4.4 |
| Carbonate ($CO_3$) | | 0 | 0 |
| Bicarbonate ($HCO_3$) | 5 | 57 | 20 |
| Sulphate ($SO_4$) | *1 | 2.8 | 3.5 |
| Chloride (Cl) | 3 | 3 | 3.0 |
| Fluoride (F) | 0.5 | .0 | |
| Nitrte ($NO_3$) | 0 | .0 | .10 |
| Total dissolved solids | | 87 | 44 |
| Total hardness as $CaCO_3$ | **12 | 38 | 15 |
| Date of collection | Nov. 18, 1941 | Nov. 17, 1941 | April 9, 1943 |

* By turbidity
** Soap hardness
Analyst: 11, 53, 85, 128, 215, M. D. Foster and L. W. Miller; 48, 157 ,L. W. Miller; 153, C, E. W. Lohr.

LOG OF WELL 10C, AT WHITAKERS, NASH COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand and clay | 5 | 5 |
| Sand and mud | 20 | 25 |
| Miocene, Yorktown formation: | | |
| Clay, blue, with shell | 35 | 60 |
| Lime rock, soft | 1½ | 61½ |
| Limestone, hard | 6½ | 68 |
| Cretaceous (?), (undifferentiated): | | |
| Gravel, mud, and sand with some water | 1 | 69 |
| Basement rock: | | |
| Granite rock | 13 | 82 |

LOG OF WELL 10E, AT WHITAKERS, NASH COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 40 | 40 |
| Miocene, Yorktown formation: | | |
| Marl | 40 | 80 |
| Cretaceous (undifferentiated): | | |
| Clay, sandy | 13 | 93 |
| Sand with muck | 42 | 135 |
| Basement rock, Carboniferous (?): | | |
| Granite, blue, gray, and brown | 270 | 405 |

LOG OF WELL 12, AT WHITAKERS, NASH COUNTY

| | Thickness (feet) | Depth (feet |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, yellow | 24 | 24 |
| Sand, brown; and yellow clay | 10 | 34 |
| Miocene, Yorktown formation: | | |
| Sand, coarse, clean, water-bearing | 16 | 50 |
| Mud, blue | 2 | 52 |

LOG OF WELL 54, AT BATTLEBORO, NASH COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Top soil | 19 | 19 |
| Sand, fine | 15 | 34 |
| Sand, water-bearing | 10 | 44 |
| Miocene, Yorktown formation: | | |
| Sand and clay | 5 | 49 |
| Marl and shell | 20 | 69 |
| Cretaceous (undifferentiated): | | |
| Clay, brown | 20 | 89 |
| Muck, sand and clay | 50 | 139 |
| Basement rock: | | |
| Granite, soft | 30 | 169 |
| Granite, hard | 70 | 239 |

LOG OF WELL 107, NEAR NASHVILLE, NASH COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Per-Cambrian (?) slate and schist: | | |
| Clay, red | 20 | 20 |
| Clay, tough | 20 | 40 |
| Quartz, white, hard and soft (quartz veins in weathered schist?) | 15 | 55 |
| Clay, sandy (weathered schist and slate)- | 5 | 60 |
| Clay, brown (weathered schist) | 5 | 65 |
| Quartz and sand, water-bearing strata (16.2 gallons a minute, bailer test) | 5 | 70 |
| Clay, brown (weathered schist) | 30 | 100 |
| Clay, brown (weathered schist) and quartz viens | 10 | 110 |
| Quartz, white (44.8 gallons a minute) | 5 | 115 |
| Shale, hard brown (weathered schist) | 2 | 117 |

## NORTHAMPTON COUNTY

**(Area, 540 square miles; Population, 28,299, 1940 census)**

### TOPOGRAPHY AND PHYSIOGRAPHY

About 50 square miles of the western part of Northampton County is in the Piedmont province, and the remainder of the county is in the Coastal Plain province. The topography in the Piedmont province, west of Camps Store, is rolling and hilly with a relief of 100 to 250 feet. The maximum elevation, which is in the vicinity of Vultare, is about 350 feet. East and southeast of Camps Store, the surface becomes progressively less rolling and hilly, and the area southeast of Jackson and around Rich Square is quite flat. The lowest elevations in the county are where the Meherrin and Roanoke Rivers leave the county at an elevation of about 10 feet above sea level.

All of the seven Pleistocene terraces are represented in the county; however, the lower three occur only along the main streams, especially along the Meherrin and Roanoke Rivers. The highest terraces form roughly parallel belts across the county, trending somewhat east of north. The Wicomico terrace, with a height of between 70 and 90 feet, is exceptionally well-developed around Rich Square.

The County is drained by two major through-flowing streams, the Roanoke and Meherrin Rivers and their tributaries. About two-thirds of the drainage of the county goes to the Meherrin and its tributaries, the most important of which, in Northampton County, are Cypress Creek, Kirby Creek, and Potecasi Creek, and Urahaw Swamp. Drainage to the south goes into the Roanoke through Occoneechee Creek, Gumberry Swamp, and numerous smaller tributaries.

### GEOLOGY

Most of the county is underlain by the Pleistocene formations and the unclassified high-level gravels and sands. Only in the narrow western part of the county, in the vicinity of Henrico and Vultare, do the older formations cover any area of appreciable size. The three lowest and youngest Pleistocene formations, the Pamlico, Talbot, and Penholoway, are found only along the streams, principally along the Roanoke and Meherrin Rivers and cover a relatively minor part of the county. The formation next higher in elevation, the Wicomico, covers a considerable part of the county in a belt extending south and southwest from Severn. The Sunderland formation occurs in a wide belt extending southwest from Margaretsville and Seaboard. The Coharie formation, with its eastern edge near Garysburg and Pleasant Hill, extends a few miles west of Camps Store. The Brandywine formation occupies a narrow, north-south belt west of the Sunderland. West of the Brandywine formation discontinuous patches of unclassified high-level gravels and sands extend to the western boundary of the county. In places, these older deposits become quite thick, possibly as much as 60 to 80 feet. The Pleistocene deposits are generally not more than 20 or 30 feet thick. All are underlain by older rocks of two principal types, crystalline and sedimentary. Crystalline rocks outcrop at the surface in the extreme western part of the county and are exposed in road cuts and stream valleys westward nearly to Garysburg. These rocks consist of gneiss, schist, and slate of pre-Cambrian age and granite of Carboniferous age, outcropping in alternate belts extending north and south across the county. In the vicinity of Garysburg, as explained earlier, the crystalline rocks slope eastward underneath the sedimentary formations of the Coastal Plain at the rate of 15 to 20 feet to the mile, and the only record of their presence is from well logs.

These basement rocks are overlain by Cretaceous strata whose thin western margin extends about as far west as Garysburg. Eastward these strata rapidly increase in thickness, as shown by well logs, probably reaching a thickness of 400 to 500 feet at the eastern limit of the county. The only known exposures of the Cretaceous within the county are along the Roanoke River. Unconformably overlying the Cretaceous deposits and probably extending somewhat west of its western margin, and therefore lying in contact with the crystalline rocks, is the Yorktown formation. This formation increases only moderately in thickness to the east, never becoming more than 60 or 70 feet thick. It is exposed in numerous places along streams and in road cuts, but nowhere crops out extensively, as it is overlain by the formations of Pleistocene age as previously explained.

## GROUND WATER

Practically all the water used in Northampton County is taken from the ground, but there are no very large users of ground water.

Most domestic supplies are obtained from dug, bored, or driven wells 10 to 70 feet deep. The shallow wells generally obtain their supplies from the sand, gravels, and clays of the terrace deposits or from the disintegrated and broken crystalline rocks. Most of the drilled and jetted wells obtain their supplies from the sands of the Cretaceous deposits, with a few getting their supplies from the Yorktown formation. Records were obtained for only about 100 drilled wells. In the extreme western part of the county, dug wells predominate, with a few drilled wells near Camps Store and Vultare. Most of the dug wells in this section obtain their supplies from the gravelly and sandy clays of the Brandywine formation and the high-level gravels, or from the broken and disintegrated material of the upper part of the crystalline bedrock. Dug wells are used because the low permeability of the strata requires large storage capacity and the heterogeneity of the material make it difficult to bore or drive wells.

Near Garysburg dug wells are not satisfactory because of a layer of fine sand which causes caving. Most of the wells are bored or drilled and obtain their water from the sand, gravel, and clays of the Coharie and Sunderland formations or from the disintegrated crystalline rock just beneath the terrace deposits.

East of Garysburg, also, bored and driven wells predominate. At Gumberry most wells are driven to depths of about 30 feet and obtain their water from sand near the base of the Sunderland formation. Some dug wells are used at Margaretsville, but many wells 20 to 30 feet deep are bored with a hand auger. Many of these wells yield water from sand that is overlain by a thin bed of clay. Since the sand caves badly, most bored wells are curbed with 6-inch clay tile. There are also a number of jetted wells at Margaretsville, nearly all of them ending in the same sand horizon in the Cretaceous strata, at about 190 to 200 feet below the surface. Water in the wells in the bottom land along Cypress Creek comes very close to the surface or overflows. Most of the wells around Jackson are bored or driven to moderate depths. There are a few drilled wells in and around Jackson, but some of these wells were unsuccessful. In that area the Cretaceous strata consists mostly of fine sand and chocolate-colored clays which are relatively permeable. The successful wells at Jackson penetrate permeable sands which probably are lenticular and of limited extent.

At several places in the county, as at Severn and a few miles west of Galatia, the marl of Miocene age is so close to the surface that shallow wells obtain their water from the marl. However, the water is of poor quality, and the yield is small. Wells drilled into the underlying Cretaceous sands are used to a greater extent in these areas than elsewhere.

In the southeastern part of the county in the vicinity of Conway, Faisons, Creeksville, Potecasi, Woodland, and Rich Square, the majority of wells are bored, driven or bored part way and driven the rest of the way. There are a few dug wells. Most of the wells are 20 to 40 feet deep and obtain their water from the more permeable horizons of the terrace deposits, but a few are as much as 60 or 70 feet deep and evidently get their water from sandy phases of the Miocene deposits. There are a number of drilled wells in this area, most of which end in Cretaceous sands. Usually they furnish satisfactory amounts of water.

Flowing wells are found along Cypress Creek near Margaretsville, the Meherrin River near Severn, Kirby Creek near Conway, and along Potecasi Creek. No flowing wells were located along the Roanoke River, but it seems probable that flowing wells could be obtained from Cretaceous strata on the lower terraces along this river.

The water from both the shallow and the deeper wells in Northampton County is usually soft and low in total dissolved solids. Analyses of ten samples of water from wells in Northampton County are given in the table of analyses. The water from well 42, between Seaboard and Galatia, is the only hard water collected, but in two other wells, 78 and 97, the water is only moderately soft. Some of the wells ending in the marl of Miocene age are reported to have hard water.

Iron is the only mineral constitutent in the water that causes trouble in Northampton County. Excessive iron is common in shallow wells in many areas. Many domestic water supplies take up iron by the corrosive action of the water on casing, pump, and supply pipes. However, in other cases, it seems certain that the iron is taken into solution as the water travels through the ground. Some of the deeper supplies have excessive iron, also, probably for the same reasons as the shallow water.

### MUNICIPAL SUPPLIES

There are four towns in the county that have municipal water supplies, all municipally owned, and all four are obtained from wells.

Jackson, population 758, whose system was constructeded in 1937, gets its water from six shallow wells at the north edge of the town (no. 69 in table). These wells are about 40 feet deep and are spaced about 25 feet apart. There is a two-horsepower electrically driven vacuum pump for each two wells, three pumps in all, pumping directly into the mains. When ground-water levels are high, the combined yield is 60 to 70 gallons per minute, but the yield decreases to 30 or 40 gallons per minute during periods of drought. A 75,000-gallon elevated tank is the only storage. Water pressure in the distribution system varies between 40 and 50 pounds. The only treatment consists of the addition of sodium hydroxide by a small pump directly into the system. The average consumption of water is about 25,000 gallons per day.

Rich Square, population 942, has had a municipal supply since 1938. Its water is obtained from two drilled wells of moderate depths, 98 and 99, yielding 140 and 120 gallons a minute, respectively. Well 98 is used almost entirely as the water contains much less iron than well 99 which is used as an auxiliary supply. Analyses of the water from these two wells are given in the table of analyses. Each well is equipped with a 15 horsepower electrically-driven deep-well turbine pump, delivering directly into an 8-inch main. A 100,000-gallon elevated tank, the top of which is 130 feet above the ground, serves as a reservoir and to equalize the pressure on the system. The maximum pressure is about 533 pounds with much less out on the ends of the lines. Average consumption is about 50,000 gallons a day. The water is not treated.

Seaboard, population 562, has two drilled wells, 45 and 46. The system was built in 1942. Well 46, yielding 80 gallons a minute, is the main supply; and well 45, yielding 46 gallons a minute, is used as an auxiliary supply. Analysis of the water is given in the table of analyses. The wells are pumped by electrically-driven deep-well turbine pumps, delivering directly into the mains. A 100,000-gallon elevated tank serves to equalize the pressure and as a reservoir. The presure maintained is about 45 pounds. Average consumption is about 10,000 gallons a day. The water is not treated.

Woodland, population 486, completed its water system in 1942. The water is obtained from two deep-drilled wells, 87 and 88, which yield, respectively, about 35 and 60 gallons a minute. Analysis of the water from well 87 is given on page 64. The water is high in sodium bicarbonate and is exceptionally soft. The wells are pumped by electrically-driven deep-well turbine pumps delivering directly into the mains. A 100,000-gallon elevated tank is connected with the mains and serves as a reservoir and to equalize the pressure. Maximum pressure is about 54 pounds. Average consumption is about 10,000 gallons a day. The water is not treated.

RECORDS OF WELLS IN NORTHAMPTON COUNTY

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Vultare | J. A. Bradley | O. L. Truby | drilled | 107 | 6 | Gneiss | 22½ | 5 | Water contains too much iron for use in washing clothes. |
| 2 | Vultare | G. C. Bradley | O. L. Truby | drilled | 48 | 6 | Geniss | | | Never used because water had too much iron. |
| 3 | Vultare | Gaston Colored School | Sam Brown | drilled | 87 | 4½ | Gneiss, ? | 40± | 15 | Cased to bottom. |
| 4 | Vultare | J. A. Shaw | | dug | 67 | 30 | High-level gravels, sand | 20± | | Reported to end in sand containing round quartz pebbles. |
| 5 | Vultare | Mrs. Mollie King | O. L. Truby | drilled | 93 | 6 | Gneiss | | 6± | Cased 83 feet. Water contains no iron. |
| 6 | Camps Store | Dayfield Colored School | Sam Brown | drilled | 103 | 3 | Weathered granite ? | | 7 | Reported to be 50 feet in "hard sandstone." |
| 7 | Camps Store | Bethan_ School | Sam Brown | drilled | 97 | 3 | Weathered granite ? | 11½ | 7 | Same as above. |
| 8 | Camps Store | Gaston High School | Sam Brown | drilled | 87 | 4½ | Slate | 18± | 30 | Cased 40 feet. Water contains no iron. |
| 9 | Camps Store | Gaston High School (at Dormitory) | Sam Brown | drilled | 93 | 4½ | Slate | | 10 | Cased 40 feet. |
| 10 | Camps Store | G. A. Brewer | Sam Brown | drilled | 48 | 4½ | Pleistocene (?), sand (?) | 20± | 2 | Cased 40 feet. Water contains no iron. |
| 11 | Camps Store | Elmer Newsom | Elmer Newsom | bored | 24 | 6 | Coharie, sand | 3 | | Water contains some iron and is soft. |
| 12 | Pleasant Hill | Methodist Parsonage | ? | drilled | 125 | 6 | (?) | 55 | | Probably drilled into crystalline bedrock. |
| 13 | Seaborad | J. J. Harris | | dug | 23 | 48 | Sunderland, sand | 19 | | Dug about 1860, has never gone dry. |
| 14 | Margaretsville | Dr. C. L. Vick | Ellis Well Co. | jetted | 190 | 2½ | Cretaceous, sand | | | Abandoned. |
| 15 | Margaretsville | J. G. Bottoms | White | bored | 85 | 4 | Cretaceous, sand | | | Not in use. |
| 16 | Margaretsville | M. B. Garris | Ellis Well Co. | jetted | 190 | 3 | Cretaceous, sand | | | Water contains much iron. |
| 17 | Margaretsville | J. E. Pilane | Ellis Well Co. | jetted | 200 | 3 | Cretaceous, sand | 0± | 10 | Sulfur odor; formerly flowed. |
| 18 | Margaretsville | H. C. Bottoms | Ellis Well Co. | jetted & dug | 188 | 2½ | Cretaceous, sand | 22± | | Water flows into dug well, 42 feet deep. |
| 19 | Margaretsville | J. S. Jenkins at Cotton Gin | Ellis Well Co. | jetted | 188 | 2½ | Cretaceous, sand | ¾ | 15± | Sulfur odor; formerly flowed. |
| 20 | Margaretsville | Baptist Church | Ellis Well Co. | jetted | 190 | 2½ | Cretaceous, sand | +1 | ½ | Flows. Suflur odor. Temperature 59°F. Analysis in table. |
| 21 | Margaretsville | P. E. Kee | Ellis Well Co. | jetted | 190 | 3 | Cretaceous, sand | 10± | | Drilled for vacated Negro school. Not used now. |
| 22 | Severn | W. J. Barkley | Ellis Well Co. | jetted | 148 | 2 | Cretaceous, sand | +2 | ¾ | Flows. |
| 23 | Severn | R. T. Woodard | Ellis Well Co. | jetted | 133 | 2 | Cretaceous, sand | 18± | 2± | Water contains a little iron and sulfur. See log. |
| 24 | Severn | Mrs. A. M. Fleetwood | Ellis Well Co. | jetted | 132 | 2 | Cretaceous, sand | | 5+ | Water contains no iron. |
| 25 | Severn | G. D. Barnes | Ellis Well Co. | jetted | 150 | 2 | Cretaceous, sand | | 5+ | |
| 26 | Severn | R. P. Watson | Ellis Well Co. | jetted | 110 | 3 | Cretaceous, sand | | ? | Formerly supplied cotton gin; now used by towns people. |
| 27 | Severn | Ernest Howell | Ellis Well Co. | jetted | 200 | 2 | Cretaceous, sand | 45? | 8–10 | |
| 28 | Severn | Severn School | J. W. Mathews | jetted | 195 | 3 | Cretaceous, sand | | 10+ | Water contains a little iron. |
| 29 | Severn | M. A. Britt | Ellis Well Co. | jetted | 115 | 2 | Cretaceous, sand | 19 | | Sulfur odor. |
| 30 | Severn | D. R. Davis | Ellis Well Co. | jetted | 150 | 2 | Cretaceous, sand | +3 | 4 | No screen. Flows 4 gallons per minute 3 feet above surface. |
| 31 | Severn | D. R. Davis | Ellis Well Co. | jetted | 85 | 2 | Cretaceous, sand | +16 | 35 | No screen. Flows 35 gallons a minute 4 feet above surface. Temperature 62°. Analysis in table. |
| 32 | Severn | D. R. Davis | Ellis Well Co. | jetted | 90 | 2 | Cretaceous, sand | +9 | 35 | No screen. Sulfur odor. |
| 33 | Severn | D. H. Barnes | Ellis Well Co. | jetted | 130 | 2 | Cretaceous, sand | +12 | 12 | Flows 12 gallons per minute 31 feet above surface. Sulfur odor. |
| 34 | Severn | C. M. Forhan | Ellis Well Co. | jetted | 144 | 2 | Cretaceous, sand | +3± | 2± | Drilled in 1910; flow has decreased. Water is soft, contains no iron. |

RECORDS OF WELLS IN NORTHAMPTON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 35 | Conway | J. R. Simmons | ? | jetted ? | 122 | 1¼ | Cretaceous, sand | +2½ | 1 | Flows. Sulphur odor and taste. |
| 36 | Conway | N. B. Boone | ? | jetted ? | 115 | 1¼ | Cretaceous, sand | +2½ | 1¼ | Flows. Sulfur odor and taste. |
| 37 | Conway | B. D. Stephenson | ? | jetted ? | 125 | 1¼ | Cretaceous, sand | +2 | ¾ | Flows. Slight sulfur odor and taste. |
| 38 | Conway | Conway School | | dug | 22 | 120 | Sunderland, clay and sand | 14 | 10± | Water contains much iron. |
| 39 | Conway | Economy Lumber Co. | | bored (hand) | 50 | 1¼ | Yorktown, sand, fine white | 8 | 12± | Not used for many years. |
| 40 | Conway | Mrs. E. Davis | White Well Co. | drilled | 118 | 4½ | ? Shell marl ? | 34 | 5± | Water contains much iron; never entirely clear (bluish mud). |
| 41 | Seaboard | F. C. Greeson | Fisher | drilled | 167 | 4 | Cretaceous, sand | 40± | 1± | |
| 42 | Seaboard | Mrs. Emma J. Taylor | Fisher | drilled | 113 | 4 | Cretaceous, sand | 11½ | 4± | Analysis in table. |
| 43 | Seaboard | B. Taylor | Fisher | drilled | 121 | 4 | Cretaceous, sand | 1½ | 20± | Hard water, but contains no iron. |
| 44 | Seaboard | L. W. Taylor J. T. Davis | Fisher | drilled | 113 | 4 | Cretaceous, sand | 1½ | 20± | |
| 45 | Seaboard | Town | Virginia Machinery & Well Co. | drilled | 154 | 8 | Cretaceous, sand and gravel | 43½ | 46 | Has 10-foot screen. Yields 46 gallons a minute with a 122-foot drawdown. See log in table. |
| 46 | Seaboard | Town | Virginia Machinery & Well Co. | drilled | 85 | 8 | Cretaceous, sand and gravel (?) | 32 | 60 | Has 10-foot screen. Yields 60 gallons a minute with a 31-foot drawdown, analysis and log in tables. |
| 47 | Seaboard | Seaboard School | O. L. Truby | drilled | 265 | 6 | Granite | 70? | 10–15(?) | Hit granite at 230 feet Supply adequate for school. |
| 48 | Seaboard | W. L. Harris | Ellis Well Co. | jetted | 200 | 4 | Cretaceous, sand, fine | | | Adequate supply, but water often muddy and red; unsatisfactory. |
| 49 | Gumberry | Mrs. J. L. Taylor | | dug | 20 | 48 | Sunderland, clay, sandy | 8 | | |
| 50 | Gumberry | C. P. Gay | | driven | 67 | 1¼ | Yorktown, sand | 20± | 5± | Water soft; contains no iron. |
| 51 | Garysburg | W. T. Stephenson | | bored 30′ driven 15′ | 45 | 1¼ | Sunderland, sand and gravel | 20± | | |
| 52 | Garysburg | J. W. Harris | | bored | 18 | 1¼ | Sunderland, clay, sandy | 14± | | |
| 53 | Garysburg | Mrs. S. S. Suiter | O. L. Truby | drilled | 128 | 6 | ?, Crystalline bedrock | 20± | 8 | Cased 90 feet. Water slightly hard; contains no iron. |
| 54 | Garysburg | Mrs. W. T. Davis | ? | drilled | 140 | 6 | ? | | | Abandoned; chief supply was at 67 feet. |
| 55 | Garysburg | R. W. Thompson | Sam Brown | bored | 35 | 6 | Weathered bedrock | 27± | 4± | Water contains a little iron. |
| 56 | Garysburg | W. A. Buffaloe | Sam Brown | bored & drilled | 37 | 3½ | Weathered bedrock | 16± | 4± | |
| 57 | Garysburg | R. R. Weston | ? | drilled | 56 | 3 | Weathered bedrock | | 2–3 | Water contains some iron. |
| 58 | Garysburg | Robert Allen | Sam Brown | drilled | 67 | 4 | Weathered bedrock | | 10± | Water soft, contains no iron. |
| 59 | Garysburg | Wilson Glasgow | | drilled | 55 | 4 | Weathered bedrock | | 6± | |
| 60 | Garysburg | R. G. Young | Sam Brown | drilled | 56 | 4 | Weathered bedrock | | 4± | Water contains some iron. |
| 61 | Garysburg | J. W. Riddle | Sam Brown | drilled | 58 | 4 | Weathered bedrock | 46± | 9± | Water contains no iron but is slightly hard. |
| 62 | Garysburg, 3 miles west of | Oak Grove Colored School | Sam Brown | drilled | 60 | 3 | ? | | 4–5 | Use pitcher pump. |
| 63 | Garysburg, 4 miles S.E. of | W. J. Long | | drilled | 65 | 6 | Yorktown, sand | | 12+ | |
| 64 | Garysburg, 4 miles S.E. of | W. J. Long | Sydnor Pump & Well Co. | drilled | 300 | 6 | ? | | ½ | Supply inadequate; not used. |
| 65 | Jackson, 3 miles north of | John Hughes | Mitchell | drilled | 75 | 4 | ?, sand and clay | | | Water unsatisfactory, never cleared up. |
| 66 | Jackson | State Prison Camp 112 | Heater Well Co. | drilled | 248 | 6 | Cretaceous, sand | | 14 | First well hit granite at 296 feet; no water. |
| 67 | Jackson | E. S. Bowers | Fisher | drilled | 300 | 4 | | | | Unsuccessful; never used. |
| 68 | Jackson | H. L. Joyner | Sydnor Pump & Well Co. | drilled | 168 | 4 | Cretaceous, sand | 52 | 12–15 | No screen. Water contins no iron. |

RECORDS OF WELLS IN NORTHAMPTON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 69 | Jackson | Town | Bill Mathews | bored | 40 | 1¼ | Sunderland, sand | | 75 | Six wells yield 75 gallons a minute when water level high. |
| 70 | Jackson | George Burgwyn | O. L. Truby | drilled | 97 | 6 | Cretaceous, sand | 12± | 6–8 | Has 8-foot screen. |
| 71 | Jackson | County | Sydnor Pump & Well Co. | drilled | 270 | 4 | Cretaceous, sand | | | Cased 150 feet; water muddy and never cleared up. Well abandoned. |
| 72 | Jackson | Mrs. E. J. Gay | Fisher | drilled | 153 | 4 | Cretaceous, sand | | | Screen? Supply always satisfactory; water contains some iron. |
| 73 | Jackson | Town | Layne Atlantic Co. | | 260 | 20–8 | Cretaceous, sand and gravel | | 20 | Gravel-walled well; screen from 220 to 240 feet. Log given. |
| 74 | Jackson | Miss Emma Long | Ellis Well Co. | jetted | 90 | 4 | ? | | | Not used now. |
| 75 | Jackson, 5 miles east of | B. L. Allen | | bored | 17 | 1¼ | Wicomico, sand and gravel | | 7 | Water contains much iron. |
| 76 | Potecasi, 2.5 miles west of | Junior G. Futrell Mrs. N. T. Blowne | ? | jetted | 60 | 1¼ | Cretaceous, sand | +3⅔ | 2 | Flows. Sulfur odor and taste. Reported depth 90 feet; measured, 60 feet. |
| 77 | Potecasi | E. B. Lassiter Lonnie Bradley | Lonnie Bradley | bored | 45 | 1¼ | Sand | +½ | ¾ | |
| 78 | Potecasi | Seaboard Railway | Heater Well Co. | drilled | 145 | 4½ | Cretaceous, sand | +1 | 6½ | Flows 6.5 gallons a minute 1 foot above surface. Analysis in table. Temperature 60°F 4/9/43. |
| 79 | Potecasi | E. B. Lassiter Sawmill | | bored | 50 | 1¼ | Yorktown, sand | | 10–15 | Water forms boiler scale; contains no iron. Strainer used. |
| 80 | Potecasi | E. B. Lassiter Sawmill | | bored | 45 | 1¼ | Yorktown, sand | | 10–15 | Two wells as above but no strainer used. |
| 81 | Potecasi | F. C. Jenkins | | bored & driven | 50 | 1¼ | Yorktown, sand | 10± | 10± | Went through pipe clay. Water contains too much iron for washing clothes. |
| 82 | Potecasi | S. N. Parker | ? | drilled | 160 | 3 | Cretaceous, sand | 15 | 8 | Has 116 feet of casing; water contains much iron. |
| 83 | Woodland | Woodland School | | bored & driven | 35 | 1¼ | Wicomico, sand and clay | | | Two wells; water contains much iron. Supply sometimes inadequate. |
| 84 | Woodland | Mrs. Lewter McDaniel | E. J. Mead | jetted | 205 | 2 | Cretaceous, sand | | | Water contains much iron. |
| 85 | Woodland | Dr. W. R. Parker | E. J. Mead | jetted | 205 | 3–2 | Cretaceous, sand | 30± | | Screen used; good supply; water contains no iron. |
| 86 | Woodland | J. M. Taylor, Jim Bolton | E. J. Mead | jetted | 200 | 2 | Cretaceous, sand | | | Suction pump; water contains no iron. |
| 87 | Woodland | Town | Sydnor Pump & Well Co. | drilled | 264 | 8 | Cretaceous, sand and clay | 27 | 35 | Has 10-foot screen at 250 feet; tested at 35 gallons a minute with 157-foot drawdown 24 hours |
| 88 | Woodland | Town | Sydnor Pump & Well Co. | drilled | 182 | 8 | Cretaceous, sand and clay | 22 | 60 | Has 10-foot screen at 172 feet; tested at 60 gallons a minute with 108-foot drawdown. 24 hours. |
| 89 | Woodland | J. M. Brown Co. | | bored & driven | 50 | 1¼ | Yorktown, sand ? | | 4–5 | Suction pump; water contains no iron. |
| 90 | Rich Square | W. H. Spivey | | driven | 65 | 1¼ | Yorktown ? sand ? | | | Water contains iron. Adequate supply. |
| 91 | Rich Square | W. H. Spivey | | driven | 20 | 1¼ | Wicomico | | | Suction pump used. |
| 92 | Rehoboth | Mrs. Will Barham | | bored | 45 | 1¼ | ? | 20± | | Water contains iron. Suction pump used. |
| 93 | Boones X Road | Turner Brothers | | bored | 55 | 2½–1¼ | Yorktown, sand | | | Strainer. Deep-well pump, with cylinder 8 feet below surface. |
| 94 | Rich Square | C. M. Robbins | | driven | 18 | 1¼ | Wicomico, sand, fine | | | Suction pump used; water contains iron. |
| 95 | Rich Square | Rich Square School | Heater Well Co. | drilled | 165 | 4 | Cretaceous, sand, hard | | 15 | Water comes from sand between 160 and 165 feet. |
| 96 | Rich Square | W. C. Worrell | | bored & driven | 22 | 1¼ | Wicomico, sand, fine | 15± | 1–2 | Strainer. Analysis in table |

RECORDS OF WELLS IN NORTHAMPTON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 97 | Rich Square | W. C. Worrell | | driven | 42 | 1¼ | Yorktown ?, sand | 15± | | Strainer. Analysis in table. |
| 98 | Rich Square | Town | Sydnor Pump & Well Co. | drilled | 100 | 8 | Cretaceous, sand | | 140 | Has 15-foot screen. Analysis in table |
| 99 | Rich Square | Town | Sydnor Pump & Well Co. | drilled | 70 | 8 | Yorktown, sand | | 120 | Screen. Water contains much iron. |
| 100 | Rich Square | Robert Griffin | Heater Well Co. | drilled | 70 | 6 | Yorktown sand | 13 | 250 | Sand 40 to 70 feet; has 6 feet of no. 80 screen. |
| 101 | Rich Square | Rich Square Coal & Ice Co. | | bored | 40–48 | 2 | Yorktown ?, sand | 13½ | 40± | Three wells; two in use furnish 55 gallons a minute. One tested at 40 gallons a minute. |
| 102 | Rich Square | Rich Square Coal & Ice Co. | | bored | 28 | 1¼ | Wicomico, sand | | 25–30 | Two wells yield 55 gallons a minute. |
| 103 | Rich Square | R. T. Joyner | | bored 12′ driven | 55 | 1¼ | Yorktown, sand | | | Strainer. Adequate supply water contains iron. |

ANALYSES OF GROUND WATER FROM NORTHAMPTON COUNTY, NORTH CAROLINA
(Numbers at heads of columns correspond to numbers in table of well data)
Parts per million

| | 20 | 31 | 42 | 46 | 78 | 87 |
|---|---|---|---|---|---|---|
| Silica ($SiO_2$) | 41 | 35 | | 22 | 32 | 15 |
| Iron (Fe) | .83 | .01 | | .20 | .11 | .06 |
| Calcium (Ca) | 2.6 | 2.7 | | 5.7 | 19 | .8 |
| Magnesium (Mg) | 2.2 | 1.8 | | 1.7 | 8.6 | .7 |
| Sodium and Potassium (Na+K) | 34 | 60 | | 7.0 | 18 | 79 |
| Cabonate ($CO_3$) | 0 | | | 0 | 0 | 0 |
| Bicarbonate ($HCO_3$) | 92 | 162 | 148 | 26 | 134 | 200 |
| Sulfate ($SO_4$) | 7.2 | 7.7 | **5 | 9.1 | 7.0 | 9.1 |
| Chloride (Cl) | 4.0 | 2 | 3 | 4 | 3.0 | 3 |
| Fluoride (F) | | | .1 | .0 | | |
| Nitrate ($NO_3$) | .0 | .0 | .25 | .0 | .0 | .0 |
| Total dissolved solids | 135 | 190 | | 55 | 148 | 208 |
| Total hardness as $CaCO_3$ | 16 | 14 | †132 | 21 | 83 | 5 |
| Date of collection | April 6, 1943 | March 27 1942 | March 28 1942 | Feb. 26, 1942 | April 8, 1943 | March 26 1942 |

| | 96 | 97 | 98 | 99 |
|---|---|---|---|---|
| Silica ($SiO_2$) | | | 40 | |
| Iron (Fe) | | | 1.2 | *18 |
| Calcium (Ca) | | | 2.4 | |
| Magnesium (Mg) | | | 1.0 | |
| Sodium and Potassium (Na+K) | | | 9.5 | |
| Carbonate ($CO_3$) | | | 0 | |
| Bicarbonate ($HCO_3$) | 9.0 | 3.0 | 24 | 31 |
| Sulfate ($SO_4$) | **1 | **1 | 4.1 | **1 |
| Chloride (Cl) | 10 | 71 | 2 | 11 |
| Fluoride (F) | .0 | .1 | 1.3 | .0 |
| Nitrate ($NO_3$) | 14 | 79 | .75 | .0 |
| Total dissolved solids | | | 86 | |
| Total hardness as $CaCO_3$ | †27 | †74 | 10 | †21 |
| Date of collection | March 26 1942 | March 26 1942 | March 28 1942 | March 26 1942 |

* Iron in sediment
** By turbidity
† Soap hardness
Analyst: 20, 78, 87, E. W. Lohr; 31 ,42, 46, 96. 97. 98, 99, M. D. Foster.

LOG OF WELL 23, AT SEVERN, NORTHAMPTON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Wicomico formation: | | |
| Sand and clay | 15 | 15 |
| Miocene, Yorktown formation: | | |
| Marl | 60 | 75 |
| Cretaceous (undifferentiated): | | |
| Sand, fine becoming progressively coarser with depth, some mica | 58 | 133 |

LOG OF WELL 45, AT SEABOARD, NORTHAMPTON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| (no record or samples to 136 feet) | | |
| Cretaceous (undifferentiated): | | |
| Clay, reddish brown, some very fine sand, slightly micaceous | 11 | 147 |
| Sand, medium to coarse, a little clay, micaceous | 7 | 154 |

LOG OF WELL 46, AT SEABOARD, NORTHAMPTON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| ? | | 2 |
| Clay, brown, with some medium sized quartz sand grains | 24 | 26 |
| Miocene, Yorktown formation: | | |
| Clay, gray-blue, with a few grains of fine quartz sand and some mica flakes | 34 | 60 |
| Cretaceous (undifferentiated): | | |
| Sand, medium to coarse, and grey clay | 15 | 75 |
| Sand (no sample) | 10 | 85 |

LOG OF WELL 87, AT WOODLAND, NORTHAMPTON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Wicomico formation: | | |
| Clay, yellow | 29 | 29 |
| Sand, yellow and clay | 20 | 49 |
| Miocene, Yorktown formation: | | |
| Clay and sand (water-bearing) | 10 | 59 |
| Clay, blue | 44 | 103 |
| Cretaceous (undifferentiated): | | |
| Clay, gray and sand | 46 | 149 |
| Clay, red | 12 | 161 |
| Sand, gray and clay | 25 | 186 |
| Clay, hard sound | 15 | 201 |
| Clay, gray (sticky) | 51 | 252 |
| Clay, sand (water-bearing) | 13 | 265 |

LOG OF WELL 73, AT JACKSON, NORTHAMPTON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Top soil | 2 | 2 |
| Clay, tough | 10 | 12 |
| Clay, red | 3 | 15 |
| Clay, sandy | 2 | 17 |
| Sand, fine | 1 | 18 |
| Clay, red | 2 | 20 |
| Miocene, Yorktown formation: | | |
| Clay, light | 8 | 28 |
| Sand, fine gray | 18 | 46 |
| Hard sand and marl | 18 | 64 |
| Cretaceous (undifferentiated): | | |
| Clay, very hard gray | 22 | 86 |
| Clay, red | 10 | 96 |
| Clay, blue; hard pan | 54 | 150 |
| Clay, soft blue | 10 | 160 |
| Hard pan | 40 | 200 |
| Sand, fine | 10 | 210 |
| Sand, coarser | 28 | 238 |
| Sand, fine and red clay | 7 | 245 |
| Clay, hard brown | 15 | 260 |
| Basement rock: | | |
| Rock | | |

LOG OF WELL 88, AT WOODLAND, NORTHAMPTON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Wicomico formation: | | |
| Top soil | 3 | 3 |
| Clay, hard yellow | 16 | 19 |
| Sand, yellow, and clay | 14 | 33 |
| Sand, coarse, yellow and clay | 2 | 35 |
| Miocene, Yorktown formation: | | |
| Sand, brown and clay (wet) | 5 | 40 |
| Clay, blue | 20 | 60 |
| Sand, gray and clay | 13 | 73 |
| Sand, gray and clay (some gravel ?) | 6 | 79 |
| Cretaceous (undifferentiated): | | |
| Clay, stiff, gray and sand | 4 | 83 |
| Sand, gray and clay (dry) | 31 | 114 |
| Clay, soft, gray and sand | 14 | 128 |
| Clay, stiff, gray and red | 13 | 141 |
| Clay, stiff, gray | 21 | 162 |
| Clay, sand (water-bearing) | 10 | 172 |

## WILSON COUNTY

**(Area, 373 square miles; Population, 50,219)**

### TOPOGRAPHY AND PHYSIOGRAPHY

The topography of the entire county has been mapped by the U. S. Geological Survey and is included in the Spring Hope, Rocky Mount, Tarboro, Kenly, Wilson, and Falkland quadrangle maps. The western part of the county is in the Piedmont province, and the eastern part is in the Coastal Plain province. U. S. Highway 301, from Sharpsburg, through Wilson and Lucama, approximately marks the boundary between these provinces, although there is no pronounced topographic break between the two. The surface of the eastern part of the county, in the Coastal Plain province, is formed principally by the nearly flat and gently eastward sloping Sunderland terrace at an elevation of 110 to 140 feet. The continuity of this terrace is interrupted in a few places by broad shallow valleys of the eastward and southeastward flowing streams. The difference in elevations between the flat upland and the stream bottoms, which are often swampy, is generally about 50 feet. The Wicomico terrace, at an elevation of 70 to 95 feet, forms narrow benches on both sides of and parallel to the streams. The Sunderland terrace rises gradually westward, (on the underlying slate, schist, and granite) east of U. S. Highway 301, to about 160 feet, and is only slightly more rugged in this part of the county, which is considered as part of the Piedmont province, than it is farther east. West of the Sunderland terrace, the Coharie terrace forms an irregular, comparatively narrow, north-southwest belt at an elevation of 170 to 215 feet. This terrace is considerably more dissected than is the Sunderland and, except in the extreme souuthwest part of the county, has the rolling surface of sub-mature topography. The Brandywine terrace, the highest and oldest Pleistocene terrace, occupies only a small area in the northwestern part of the county, west and southwest of Sims. It has an elevation of 230 to 270 feet and is quite rugged.

About 80 percent of Wilson County is drained by Contentnea Creek and its tributaries, the principal ones being Moccasin Creek, Turkey Creek, Bloomery Swamp, Toisnot Swamp, and Black Creek. The only considerable area not drained by Contentnea Creek is in the northeastern corner of the county and is drained by Town Creek and tributaries, flowing into Tar River in Edgecombe County.

## GEOLOGY

The western half of the county is underlain by metamorphosed slates and schists of pre-Cambrian age and the granite, of supposed Carboniferous age, which has intruded them. These crystalline rocks crop out in many places along streams and on hillsides, and slopes, where erosion has been sufficient to remove the overlying terrace deposits which in past geologic time probably formed a more or less continuous blanket over all older formations. Exposures of the crystalline rock are found at the surface as far east as Elm City and Wilson, eastward, drilled wells have entered this rock at progressively greater depths. The slope of the irregular surface of this rock, which underlies all of the Coastal Plain of North Carolina, is about 20 feet to the mile. The irregular surface of this basement rock is overlain by the deposits of Cretaceous age. Outcrops of the Cretaceous deposits are found along Contentnea Creek and south of Black Creek at elevations of 50 to 60 feet. The thickness of the Cretaceous, at the extreme eastern part of the county, is nearly 300 feet, but it rapidly thins westward, pinching out approximately on a line through Elm City, Wilson, and Black Creek. Since these strata were deposited on the irregular erosion surface of the older rocks, it probably does not form a continuous sheet along its thin western margin but occurs in pockets and lenses, which are probably not connected in a north-south direction. The Yorktown formation of Miocene age lies unconformably upon the erosion surface of the Cretaceous strata, and in some places, extends beyond their western margin, lying directly upon the crystalline rocks. It has been encountered in many wells in the vicinity of Wilson and in wells near Elm City and Black Creek. Marl of the Yorktown formation has been dug on Toisnot Creek north of Wilson, on Hominy Creek just west of Wilson, and in the vicinity of Lucama. Clays and marls of the Yorktown formation are encountered in most wells driled in the eastern half of the county, and the contact of this formation with the underlying Cretaceous strata is exposed in several places along Contentnea Creek. The average thickness of the Yorktown formation is about 45 feet and nowhere has been found to be more than 60 or 65 feet thick. The uppermost strata in the county are the terrace deposits of Pleistocene age, which rest upon the Yorktown formation in the eastern part of the county, and upon the crystalline rocks in the western part, thus forming a more or less continuous blanket over all older formations. The Wicomico formation is the youngest, and lowest, of the Pleistocene formations and is found only bordering the streams in the eastern part of the county. The Sunderland formation forms the flat interstream areas in the eastern and central part of the county. In the western part of the county, the Coharie and Brandywine deposits are less continuous for much of the terrace deposits has been removed by erosion. These terrace deposits are generally not more than about 25 to 30 feet thick.

## GROUND WATER

Nearly all domestic supplies, many industrial supplies, and three of the four municipal supplies in Wilson County are obtained from wells. Drilled wells of moderate depth furnish the water for the municipal and most industrial supplies and a considerable number of domestic supplies; but most of the domestic supplies come from shallow wells.

In the western part of the county dug, bored, and jetted wells predominate, while in the central and eastern part, bored and driven wells are most common. A few springs are also used mostly in the more rugged areas in the western part of the county.

Jetted ,or "washed-down" wells are very common in the slate and schist rocks in the western half of the county. They are inexpensive to construct and are nearly always successful. These wells are usually about 60 to 80 feet deep, but wells up to 150 feet deep have been constructed in this way. They are drilled only into the weathered upper portions of the slate and schist, it being impossible to drill this type of well into the fresh, hard rock.

The small area underlain by granite, west and southwest of Sims, presents a difficult problem of water supply, especially in periods of drought, as in 1941. The granite is massive, and fresh, hard rock is near the surface so that wells drilled into it have yielded very meagerly. It is impossible to dig wells very deep, because the unweathered rock is so close to the surface that, during dry periods, many of the dug wells go dry. In January, 1942, many of the dug wells near Connor were dry and about a dozen families were dependent on water from Jet Spring.

A number of successful wells have been drilled in and around Wilson, some of which are in granite and some in schist. The wells ending in granite have generally not been quite as successful as the ones ending in schist, and a number of wells in the granite have been failures, whereas nearly all the wells drilled in the slate and schist have been successful.

In about the eastern one-third of the county, nearly all of the drilled wells obtain their water from the sand strata of Cretaceous age. Properly constructed screened or gravel-walled wells will furnish moderate to large quantities of water in most places in this area.

There are numerous small springs in the western part of Wilson County, only a few of which are used for domestic water supply. Jet Spring, in the westernmost corner of the county, issues from crevices and fractures in the granite at the bottom of a small draw. It appears to be brought to the surface by the emergence of the granite from beneath the mantle rock. The flow from the main spring was about 15 gallons a minute with about 5 to 10 gallons additional nearby, when visited in January, 1942. A number of families were using water from it at this time because their dug wells had gone dry due to the drought. "Strickland" spring near Rock Ridge issues from a crevice in the schist on a branch of Contentnea Creek. The flow was 12 gallons a minute, January 23, 1942.

Analyses of ten samples of ground water from Wilson County are given in the table of analyses. Seven of the samples were soft water, and the other three were moderately soft to moderately hard. The 187-foot well at Elm City, which is reported to end in "blue granite", had the hardest water, with 124 parts per million. The water from the well at Stantonsburg, ending in the Cretaceous, had a hardness of 92 parts per million. The samples from well 50 at Sims and well 164 at Lucama, both of which end in the pre-Cambrian (?) schist and slate, were very high in iron. However, samples from wells 71 and 191, also in the schist, contained very little iron. Water from two of the wells ending in Cretaceous strata, 131 and 150, also had excessive iron, and this is the most objectionable constituent of the ground water in Wilson County.

Temperature of the water from three wells in Wilson County was: well 38, 62° F.; well 50, 63° F.; well 85, 61° F.

## PUBLIC SUPPLIES

There are four public water supplies in Wilson County, all municipally owned, three being obtained from wells and one, by far the largest, from a stream. The total (?) amount of water used by the three towns utilizing wells averages about 50,000 gallons a day.

Elm City, with a population of 946, has had a public supply since 1914. Two drilled wells, nos. 8 and 9, 187 and 210 feet deep, and presumably ending in granite, furnish the water. They have a capacity of 100 gallons a minute and 30 gallons a minute, respectively. The water is pumped by deep-well turbine pumps discharging directly into the mains. Storage consists of two elevated tanks with 50,000 and 75,000 gallons capacity, which are connected to the mains by standpipes. Average pressure is about 42 pounds, and average consumption is about 25,000 gallons a day. The water is not treated. An analysis of the water from well 8 is given in the table of analyses.

Lucama, with a population of 362, has had a water supply since 1937. The source is a single well, no. 164 in table, which is 191 feet deep, and yields 100 gallons a minute. This well is drilled in schist. It is pumped by a deep-well turbine pump, with a capacity of 60 gallons a minute discharging into an aerating tank. Treatment consists of chlorination, aeration over coke, the addition of lime, and filtration. A 40 gallons a minute centifugal pump is used to distribute the processed water. A 100,000 gallons elevated tank supplies storage. Water pressure averages about 45 pounds. The consumption of water averages about 15,000 gallons a day. An analysis of the untreated water from well 164 is given on page 75. The large amount of iron was a very objectionable feature for several years, but has been overcome by installation of the treatment plant.

Stantonsburg, population 595, has had a public supply since 1924. Well 149, which is 151 feet deep, was used until 1939 when a gravel-walled well, 124 feet deep, was completed. Well 150, the gravel-walled well, has a capacity of 300 gallons a minute and is pumped by a deep-well turbine pump with a capacity of 200 gallons a minute, delivering directly into the main. Well 149 has a capacity of 24 gallons a minute and is used only as an emergency supply. Well 148, belonging to the Stantonsburg Lumber Company is connected to the distribution system and can be used in emergency. The company generates its own electric power, by steam, so that this well can be pumped in case a power failure causes a shutdown of the town wells. Storage is supplied by a 30,000-gallon elevated tank which is connected to the mains by a standpipe. Average pressure is about 32 pounds and consumption averages about 13,000 gallons a day. The water is not treated. An analysis of water from well 150 is given in the table of analyses.

Wilson, population 19,234, has had a city water supply since 1892. Formerly the source of supply was Toisnot Swamp, but now water is taken from Contentnea Creek, about 3 miles southwest of Wilson. A low dam impounds about 40,000,000 gallons of water in a lake on Contentnea Creek which was built chiefly as a power project. The present water supply intake is near the head of the lake so that only a small amount of the total storage can be utilized. Pumps have been installed at the dam, but the pipe line connecting with the present supply line has not been installed. In 1941, an extremely dry year, the flow in Contentnea Creek was not sufficient to supply the consumption at Wilson, and the lake receded four feet, to a level of one foot above the intake, before increased stream flow replenished the supply. There are three electrically-driven centrifugal pumps, with a total capacity of 4,000,000 gallons a day at the intake which delivers the water to the treatment plant. Treatment consists of the addition of lime and soda ash, settling, chlorination, filtration, addition of ammonia and secondary lime and part chlorination. The capacity of the filter plant is about 3,000,000 gallons a day, and 2,000,000 gallons storage is available in a concrete, clear water reservoir. Steam-driven pumps, with a capacity of 4,750,000 gallons a day, and two electrically-driven pumps, with a capacity of 3,750,000 gallons a day, are used for distributing the treated water to the consumers. A 1,000,000-gallon elevated tank is located in the city, for additional storage and to equalize the load and pressure. The maximum water pressure on the system is about 65 pounds, and the average is about 50 pounds. The maximum consumption is about 1,750,000 gallons a day, and the average consumption is about 1,500,000 gallons a day.

RECORDS OF WELLS IN WILSON COUNTY

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | New Hope | John Thompson | C. W. Norton | drilled | 100 | 6 | Schist | 14 | 10± | Cased 85 feet. Water contains some iron. |
| 2 | New Hope | Z. R. Bissette | C. W. Norton | drilled | 107 | 5 | Schist | 1½ | 30± | Nearly flows. Water reported hard, with no iron. |
| 3 | New Hope | W. D. Adams, Jr., F. E. Owens | C. W. Norton | drilled | 48 | 6 | Schist | 1 | 25± | Cased about 15 feet. Nearly flows. Water contains some iron. |
| 4 | New Hope | W. R. Pridgeon | Morgan & Truby | drilled | 57 | 6 | Granite, ? | | 5–6 | Cased about 25 feet. Soft water, contains some iron. |
| 5 | New Hope | Morrison Williams | | dug | 18 | 36 | Sunderland, sand and clay | 16 | | |
| 6 | Elm City | J. C. Langley | | dug | 14 | 36 | Sunderland, sand and clay | 7½ | | |
| 7 | Elm City | K. L. Clark, A. C. Farmer | | dug | 20 | 36 | Sunderland, sand and clay | 12 | | |
| 8 | Elm City | Town | Virginia Machinery & Well Co. | drilled | 187 | 6 | (?) | 12 | 100 | Cased 60 feet. Main supply. Tested at 100 gallons a minute 10 hours a day for 5 days with a 62-foot drawdown. See analysis. Granite at 74 feet. |
| 9 | Elm City | Town | (?) | drilled | 210 | 6 | (?) | | 30 | Auxiliary supply. |
| 9a | Elm City | Town | Heater Well Co. | drilled | 450 | 6 | Granite, ? | | 25 | Cased 60 feet. |
| 10 | Town Creek | Town Creek School | C. W. Norton | drilled | 105 | 6 | Schist | | | |

RECORDS OF WELLS IN WILSON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Town Creek | Mrs. W. T. Batts | A. R. Bobbitt | drilled | 150 | 4 | Cretaceous ,sand | 15½ | 9+ | Reported to have been tested at 9 gallons a minute for 48 hours with about 5-foot drawdown. Formerly used for soft drink bottling plant. Water comes from sand at 80 feet. Rock encountered at 150 feet. |
| 12 | Town Creek | A. H. Bryant | | bored | 27 | 8 | Sunderland, sand and gravel | 12 | | |
| 13 | Penders X Road | Frank Eason Edward Eason | ? | drilled | 165 | 6 | Cretaceous, sand | 34 | 6–8 | Soft water; contains no iron. |
| 14 | Elm City | J. H. Johnson | | bored | 36 | 6 | (?), sand | 20± | 2–3 | Water obtained from sand below blue clay. |
| 15 | Wilson | W. L. Mathews | C. W. Norton | drilled | 150 | 5 | Slate | 12± | 15± | Cased 106 feet. Rock at 90 feet. |
| 16 | Wilson | M. C. Campbell J. W. Pender | Truby | drilled | 150 | 5 | (?) | 16 | 6–8 | |
| 17 | Wilson | Lloyd B. Wiggs | | dug | 13.3 | 36 | Sunderland, sand, fine | 2½ | | Water obtained from sand beneath clay at 12-13 feet and is under slight artesian head. |
| 18 | Wilson | Lloyd B. Wiggs | | bored | 18± | 6 | Sunderland, quicksand | | | Good supply; soft water contains no iron. |
| 19 | Wilson | W. L. Adams | C. W. Norton | drilled | 114 | 6 | Granite ? | 8½ | 12–15 | Water contains considerable iron |
| 20 | Wilson | J. W. Byrd | | jetted | 55± | 1¼ | Schist | | 8–10 | Cased about 45 feet. Water slightly hard; contains no iron. |
| 21 | Wilson | Roy Moore | C. W. Norton | drilled | 123 | 6 | Granite ? | | 4 | Cased 80 ? feet. Water contains very little iron. |
| 22 | Wilson | H. C. Dillon | C. W. Norton | drilled | 102 | 6 | Schist | 6½ | | Cased 30 ? feet. Good supply. Water contains much iron. |
| 23 | Wilson | Dr. H. B. Best | Heater Well Co. | drilled | 165 | 6 | Schist | | 3 | Cased 68 feet. |
| 24 | New Hope | L. E. Williams L. C. Taylor | C. W. Norton | drilled | 103 | 6 | Schist | 7–10 | 25± | Cased 32 feet. Water contains a little iron. |
| 25 | New Hope | B. J. Dew | C. W. Norton | drilled | 108 | 6 | Granite | 13½ | 10± | Cased 35? feet. Water slightly hard. |
| 26 | New Hope | B. J. Dew | | dug | 18± | 36 | Sunderland, sand and clay | 13 | | |
| 27 | New Hope | Mrs. Charlie Dew | O. L. Truby | drilled | 90 | 6 | Granite | | | |
| 28 | New Hope | Mrs. George Dew C. E. Thompson | O. L. Truby | drilled | 104 | 6 | Schist | | | Water contains too much iron for use. |
| 29 | New Hope | Elementary School | C. W. Norton | drilled | 132 | 6 | Schist | | | Adequarte supply. |
| 30 | New Hope | J. B. Moore, Joe Garner | C. W. Norton | drilled | 88 | 6 | Schist | 16 | | Water contains no iron. |
| 31 | New Hope | State Highway Dept. | C. W. Norton | drilled | 92 | 6 | Schist | 15± | 60 | Cased 40 feet. |
| 32 | New Hope | J. J. Mathews | C. W. Norton | drilled | 84 | 6 | Schist | 8 | 25 | Cased 40 feet. Water contains some iron. |
| 33 | New Hope | J. J. Mathews | | dug | 11 | 42 | Sunderland, quicksand | 5 | | |
| 34 | New Hope | O. L. High | C. W. Norton | drilled | 86 | 6 | Schist | 10–12 | 2–4 | Water slightly hard; contains no iron. |
| 35 | New Hope | S. P. Clark, Jenie Vick | C. W. Norton | drilled | ? | 6 | Schist | | | Good supply; hard water; contains too much iron for washing clothes. |
| 36 | New Hope | Mrs. Mary E. Perry Davis Farm | C. W. Norton | drilled | 96 | 6 | Schist | | 5–6 | Furnishes strong flow to pitcher pump. Water contains too much iron for washing clothes. |
| 37 | New Hope | E. T. Taylor | C. W. Norton | drilled | 70 | 4 | Schist | 9 | 10+ | Cased 30 feet. Water contains no iron. |
| 38 | Wilson | Doane Herring | C. W. Norton | drilled | 200 | 5 | Slate | | | Cased 87 feet. |
| 39 | Wilson | J. T. Abernethy | C. W. Norton | drilled | 195 | 5 | Slate | 20± | 10 | Cased 90 ? feet. Water contains some iron. |
| 40 | Lamm | J. T. Boyette | C. W. Norton | drilled | 79 | 6 | Schist | 10± | 5+ | Cased 11 feet. Water contains no iron. |
| 41 | Lamm | J. C. Taylor | C. W. Norton | drilled | 84 | 6 | Schist | 18± | | Cased 16 feet. Soft water; contains no iron. |
| 42 | Lamm | J. C. Taylor | C. W. Norton | drilled | 80 | 8 | Schist | | | Cased 21 feet. Soft water; contains no iron. |

RECORDS OF WELLS IN WILSON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 43 | Lamm | G. T. Lamm Arthur Farmer | C. W. Norton | drilled | 80 | 6 | Schist | 16 | | Supply failed during summer of 1941. |
| 44 | Lamm | Lamms School | C. W. Norton | drilled | 70 | 6 | Schist | | | Good supply, but water contains much iron. |
| 45 | Lamm | G. T. Lamm | C. W. Norton | drilled | 86 | 6 | Schist | 12½ | | |
| 46 | Lamm | Mrs. T. R. Simpson | C. W. Norton | drilled | 64 | 6 | Schist | | 3 | Water contains too much iron for washing clothes. |
| 47 | Sims | Howard S. Williamson | C. W. Norton | drilled | 115 | 6 | Slate | 6 | 25 | Cased 28 feet. Water contains too much iron for washing clothes. |
| 48 | Sims | H. S. Williamson | | dug | 8 | 24 | Coharie, sand | 5½ | | Sand caves badly. |
| 49 | Sims | Mr. J. F. Nichols | C. W. Norton | drilled | 95 | 6 | Slate | 8 | 6–8 | Not used because water contains too much iron. Reported to contain iron from beginning. |
| 50 | Sims | Mrs. W. H. Jones | C. W. Norton | drilled | 96 | 6 | Schist | 6½ | 6–8 | Cased 50 feet. Water contains much iron. See Analyses. Temperature 63°F. |
| 51 | Sims | Mrs. J. T. Boyette | C. W. Norton | drilled | 195 | 6 | Schist | 6 | 6–8 | Not used, water contains too much iron. |
| 52 | Sims | W. H. Nichols | | dug | 14 | 24 | Sand | 11 | 6–8 | |
| 53 | Sims | Sims School (white) | C. W. Norton | drilled | 128 | 6 | Schist | | 15± | Water contains much iron. |
| 54 | Sims | Colored School | C. W. Norton | drilled | 220 | 6 | Schist | | 8–10 | |
| 55 | Sims | Raleigh Granite Co. Quarry | C. W. Norton | drilled | 104 | 6 | Granite | | 15? | Not in use. |
| 56 | Sims | Ransome Boykin | C. W. Norton | drilled | 72 | 6 | Granite | | 1± | Water contains no iron. |
| 57 | Sims | Bullocks School | C. W. Norton | drilled | 159 | 6 | Granite | +12 | 100± | Flowed 63 gallons a minute when drilled. Water will rise at least 12 feet above surface. See analysis. |
| 58 | Rock Ridge | Mrs. R. J. Eatman | C. W. Norton | drilled | 172 | 6 | Granite | | 0 | Cased 18 feet. No water. |
| 59 | Rock Ridge | Sylvester Bailey L. P. Perry | | dug | 33± | 36± | Weathered granite | 31½ | | Dug to solid granite. |
| 60 | Rock Ridge | C. R. Roper Romer Sullivan | | jetted | 117 | 1¼ | Schist | 35–40 | 102 | Had to dig 25 feet deep around casing in order to get pump cylinder within reach of water. |
| 61 | Rock Ridge | C. R. Roper | | jetted | 65 | 1¼ | Schist | | | |
| 62 | Rock Ridge | H. G. Wilkerson | C. W. Norton | drilled | 110 | 6 | Slate | | 10± | Not in use. Water contains too much iron. |
| 63 | Rock Ridge | L. H. Boykin | Luthur Flowers | jetted | 55 | 1¼ | Schist | | 5–6 | Water contains no iron. |
| 64 | Rock Ridge | Clifton High | | jetted | 42 | 1¼ | Slate | | 1–2 | Water contains no iron. |
| 65 | Rock Ridge | L. C. Barnes | Luthur Flowers | dug & jetted | 61 | 1¼ | Slate | | | Dug 45 feet, 1¼-inch pipe 16 feet below bottom of dug well. |
| 66 | Rock Ridge | Miss Etta Haynes | C. W. Norton | drilled | 66 | 6 | Schist | 28 | 6–8 | Water contains no iron. |
| 67 | Rock Ridge | H. L. Boykin | Luthur Flowers | jetted | 50 | 1¼ | Schist | 20± | 5–6 | Cased 20 feet. Water contains no iron. |
| 68 | Rock Ridge | H. L. Boykin | Luthur Flowers | jetted | 63 | 1¼ | Schist | 20± | 5–6 | Cased 20 feet. Water contains a little iron. |
| 69 | Rock Ridge | N. R. Boykin | | jetted | 68 | 1¼ | Schist | | 2–3 | Cased 30 feet. Water contains no iron; pumps a little mica. |
| 70 | Rock Ridge | Mrs. R. L. Barnes | Truby & Norton | drilled | 96 | 6 | Granite | 25± | 10 | Cased 23 feet. Clear; water contains considerable iron. |
| 71 | Rock Ridge | Rock Ridge High School | C. W. Norton | drilled | 240 | 7 | Schist | | 12–20 | Water contains no iron. See analysis. |
| 72 | Rock Ridge | Rock Ridge School Gymnasium | Truby | drilled | 160 | 6 | Slate | | 6 | Not in use; water contains no iron. |
| 73 | Rock Ridge | Ernest Barnes | | jetted | 96± | 1¼ | Slate | | 5–6 | Water contains no iron. |
| 74 | Wilson | Walter Horne | | jetted | 73 | 1¼ | Slate | | | Water contains no iron. |
| 75 | Wilson | W. O. Harrison J. H. Boswell | C. W. Norton | drilled | 55 | 6 | Schist | 13 | 5–6 | Cased 40 feet. Water contains much iron. |
| 76 | Wilson | W. O. Harrison J. H. Boswell | | dug | 20± | 24 | Coharie, sand and clay | 17½ | | Dry during summer of 1941. |

RECORDS OF WELLS IN WILSON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 77 | Wilson | W. M. Morris | | jetted | 23 | 1¼ | Slate | | 4-5 | Water contains no iron. |
| 78 | Wilson | S. J. Smith | Truby | drilled | 130± | 6 | Schist ? | | 10-12 | Water contains no iron. |
| 79 | Wilson | Scotts School | C. W. Norton | drilled | 43 | 6 | Granite ? | 11 | | Not used, school abandoned in 1941. |
| 80 | Wilson | J. H. Williamson | C. W. Norton | drilled | 97 | 6 | Slate | 4½ | 10 | Cased 50 feet. Water contains considerable iron. |
| 81 | Wilson | Tom High, Clarence Thompson | C. W. Norton | drilled | 104 | 6 | Schist | | | Abandoned. |
| 82 | Wilson | Mrs. Thomas Jordan | | bored | 24 | 6 | Sand and clay | 19 | 1-2 | See analysis. |
| 83 | Scotts | M. L. Smith | Truby | drilled | 60+ | 6 | Schist | | | Good supply; water contains some iron. |
| 84 | Wilson | J. B. Boyette, L. H. Goodwin | C. W. Norton | drilled | 100+ | 4 | Schist | 17 | 10-15 | Water contains much iron; cannot use for laundry. |
| 85 | Wilson | T. E. Davis | | drilled | 130 | 6 | Schist | 6 | 8-10 | Cased 15 ? feet. Water contains iron; temperature 61°F. |
| 86 | Wilson | D. C. Williams, Ernest Garris | C. W. Norton | drilled | 120 | 6 | Schist | | 1-2 | Water contains no iron. |
| 87 | Wilson | Walter Mercer | C. W. Norton | drilled | 88 | 6 | Schist | 15± | 20± | Water contains much iron; cannot use for laundry. |
| 88 | Wilson | C. H. Pulley | Heater Well Co. | drilled | 95 | 6 | Granite, pink | | ¾ | Cased 32 feet. Not enough water for use. |
| 89 | Wilson | C. H. Pulley | Heater Well Co. | drilled | 305 | 6 | Granite, gray | | 1½ | Cased 66 feet. |
| 90 | Wilson | Wilson Country Club | C. W. Norton | drilled | 125 | 6 | Granite | | 35 | Reported to be only 8 feet to rock. |
| 91 | Wilson | J. B. Lamm | C. W. Norton | drilled | 52 | 6 | Granite | | | Water contains no iron. |
| 92 | Wilson | Malcolm Yeaman | Heater Well Co. | drilled | 55 | 6 | Granite, red | 12± | 40 | Cased 23 feet. Water contains no iron. Yields 10 gallons a minute with 7-foot drawdown. |
| 93 | Wilson | H. G. Watson, J. W. Taylor | C. W. Norton | drilled | 70 | 6 | Granite | 9½ | | Water contains no iron. |
| 94 | Wilson | W. H. Gurganus | Heater Well Co. | drilled | 77 | 6 | Granite, red | | 17 | Cased 22.5 feet. Reported to yield 17 gallons a minute without appreciable drawdown. |
| 95 | Wilson | Nathan Daniel, Billy Fenn | C. W. Norton | drilled | 120 | 5 | Slate | | 2-3 | Water contains no iron stain. |
| 96 | Wilson | J. L. Boswell | C. W. Norton | drilled | 100 | 6 | Slate | | 5± | Water contains no iron stain. |
| 97 | Wilson | H L. Waller | C. W. Norton | drilled | 68 | 6 | Granite | 12-14 | 3 | Cased 40 feet. Water contains a little iron stain. |
| 98 | Wilson | M. L. Smith | Heater Well Co. | drilled | 81 | 4 | Slate, blue | | 9 | Cased 73 feet. Water contains no iron. |
| 99 | Wilson | County Home | C. W. Norton | drilled | 72 | 6 | Granite | | 8 | Water contains no iron. Not used because of contamination with gasoline. Truck overturned about 150 feet away and well reported to have becone contaminated within two weeks. |
| 100 | Wilson | Prison Camp No. 406 | Butler | drilled | 124 | ? & 6 | Cretaceous, sand | | 18 | Gravel-walled well. See analysis. |
| 101 | Wilson | Mrs. J. C. Herndon | C. W. Norton | drilled | 115 | 6 | Schist | | 5-10 | Cased 30 ? feet. |
| 102 | Wilson | J. F. Downing | | dug | 35± | 30 | Sunderland, sand and clay | 13 | | Good supply. Water contains no iron. |
| 103 | Wilson | T. L. Herring | C. W. Norton | drilled | 108 | 6 | Schist | | | Water contains no iron. |
| 104 | Wilson | Mrs J. P. Price | | bored | 49 | 6 | Sunderland, sand | | 3-4 | Water contains a little iron. |
| 105 | Wilson | 5-points School | C. W. Norton | drilled | 90 | 6 | Granite | | | Not in use; use city water. |
| 106 | Wilson | Contentnea Guano Co. | Heater Well Co. | drilled | 164 | 8 | Schist | | 40 | Cased 50 feet. |
| 107 | Wilson | Barnes-Harrell, Coca-Cola Plant | C. W. Norton | drilled | 146 | 6 | Schist | 2-3 | 6-8 | Cased 60 feet. Water contains no iron. |
| 108 | Wilson | Mrs. J. D. Ferrior, Lamms Market | O. L. Truby | drilled | 200 | 6 | Granite, ? | | 50 | Used in market. Formerly used for pepsi-cola plant. |
| 109 | Wilson | Wilson Floral Co. | C. W. Norton | drilled | 150 | 6 | Schist ? | | 10 | Cased 80 feet. Water contains no iron. |
| 110 | Wilson | J. T. Barnes | C. W. Norton | drilled | 159 | 6 | Granite | | | |
| 111 | Wilson | Dr. T. J. Blackshear | C. W. Norton | drilled | 118 | 6 | Granite | | 15± | |

RECORDS OF WELLS IN WILSON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 112 | Wilson | S. H. Anderson | C. W. Norton | drilled | 140± | 6 | Granite | | 7–8 | Cased 80 feet. |
| 113 | Wilson | Hackney Bros. Body Co. | Heater Well Co. | drilled | 538 | 8 | Schist | | 5 | Cased 50 feet. |
| 114 | Wilson | Hackney Bros. Body Co. | C. W. Norton | drilled | 101½ | 6 | Schist | 5± | 15 | Reported to have been tested at 30 gallons a minute with 25-foot drawdown, but does not yield that amount now. |
| 115 | Wilson | Mrs. C. E. Tudor | C. W. Norton | drilled | 122 | 6 | Schist | | 10–15 | |
| 116 | Wilson | W. G. Carr, F. A. Jefferson | C. W. Norton | drilled | 140 | 6 | Schist | | | |
| 117 | Wilson | James G. Watson, Paul Thornton | C. W. Norton | drilled | 90 | 6 | Schist | 15 | 15± | Reported to be hard water. |
| 118 | Wilson | James G. Watson | C. W. Norton | drilled | 135 | 6 | Schist | 12± | 15± | Cased 100 feet. Water contains a little iron. |
| 119 | Wilson | J. C. Eagles, Jr., R. L. Baldree | | bored | 25 | 6 | Sunderland, sand | 20± | ½–1 | Water soft, contains a little iron. |
| 120 | Wilson | Sidney Cozart, M. G. Watson | C. W. Norton | drilled | 140 | 6 | Schist | | | |
| 121 | Wilson | Sidney Cozart M. P. Whitley | C. W. Norton | drilled | 165 | 6 | Schist | | | |
| 122 | Wilson | H. B. Lane, Henry Lane | | drilled | 212 | 6 | Cretaceous, sand | 16 | 5± | Yields only one or two gallons a minute to a suction pump. |
| 123 | | A. P. Moore Stephen Holloman | | dug | 17½ | 24 | Sunderland, sand | 14 | | Water soft, contains no iron |
| 124 | Wilson | A. N. Daniel C. C. Davis | C. W. Norton | drilled | 100 | 6 | Schist | | 1–2? | Water contains no iron. |
| 125 | Wilson | H H Walston R. C. Barfield | C. W. Norton | drilled | 57 | 6 | Granite | 9 | 4–5 | Water contains considerable iron. |
| 126 | Wilson | H. H. Walston Oscar Dawson | C. W. Norton | drilled | 110± | 6 | Granite | | | Water contains considerable iron |
| 127 | Wilson | W. J. Davis F. P. Whitley | | bored | 23.6 | 6 | Sunderland. sand | 9 | | Water reported to be very hard. |
| 128 | Wilson | W. D. Adams J. H. Durham | | drilled | 114 | 6 | Cretaceous, sand | 22± | 5–6 | Water contains much iron. |
| 129 | Wilson | W. M. Woodard | C. L. Truby | drilled | 200 | 6 | Cretaceous, sand | 19½ | | Water contains a little iron. |
| 130 | Wilbanks | S. A. Glover | C. W. Norton | drilled | 108 | 6 | Cretaceous, sand | 2–8+ | 8–10 | Water hard; contains no iron. |
| 131 | Wilbanks | Garners School | C. W. Norton | drilled | 118 | 6 | Cretaceous, sand | 28 | 25± | Water contains much iron; has sulfur odor. Water is aerated and run over coke bed; analysis of untreated water in table. |
| 131b | Wilbanks | Garners School | | bored | 59.5 | 6 | Yorktown, sand | | | |
| 132 | Wilbanks | Garners School | C. W. Norton | drilled | 200 | 6 | Granite ? | | 3 | Not used. |
| 133 | Wilbanks | Dr. A. B. Williams J. H. Hamilton | Heater Well Co. | drilled | 340 | 5 | Schist ? | 40 | 6 | Crystalline bedrock at 245 feet. See log |
| 134 | Wilbanks | Pate Walston | | bored | 35 | 6 | Sunderland, sand | 12 | 6–7 | |
| 135 | Wilbanks | J. J. Stephenson | | jetted | 90 | 1¼ | Yorktown, sand and clay | | 2–3 | Bad taste, color and odor water comes from blue sandy mud with shells. Not used |
| 136 | Wilbanks | J. T. Varnell | | bored | 38 | 6 | Sunderland, sand | 8½ | 2–3 | Water contains some iron. |
| 137 | Saratoga | Dr. C. S. Eagles Albert Owens | | jetted | 60 | 1¼ | Yorktown, sand, white | 8± | | Screen at bottom. |
| 138 | Saratoga | Dr. C. S. Eagles Albert Owens | | dug | 14 | 24 | Sunderland, sand | 7 | | Water contains very little iron. |
| 139 | Saratoga | J. S. Whitley A. G. Mangum | | dug | 14 | 36 | Sunderland | 11 | | Good supply; water contains no iron. |
| 140 | Saratoga | H. M. Mercer | | dug | 17 | 48 | Wicomico, sand, fine and clay | 8 | | |
| 141 | Saratoga | M. A. Tyson Sawmill | | bored | 20 | 1¼ | Sunderland, sand and gravel | | 19 | No. screen. Used in boilers of sawmill; water reported soft with no iron. |
| 142 | Saratoga | M. A. Tyson, Sawmill | C. W. Norton | drilled | 140 | 6 | Cretaceous, sand | 40± | | Not used. |

RECORDS OF WELLS IN WILSON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 143 | Saratoga | H. M. Thigpen Smith & Langley | | bored | 25 | 6 | Sunderland, sand | | 8–10 | |
| 144 | Saratoga | Saratoga School | C. W. Norton | drilled | 140 | 6 | Cretaceous, sand | 54 | 10± | Moderately soft water with a little iron. |
| 145 | Stantonsburg | Wiley Webb, Ed.Cook | Wiley Webb | jetted | 110 | 1¼ | Cretaceous, sand | +5 | 1 | Flows 1 gallon a minute 2½ feet above the surface. Water contains some iron has sulfur odor and taste. |
| 146 | Stantonsburg | Mrs. B. J. Thompson J. H. Lane | | jetted | 50± | 1¼ | Cretaceous, sand | +1+ | 25? | Reported to have flowed 25 gallons a minute. Flowing only a trickle now due to obstruction. Tape would not enter casing more than 6 feet. Water has sulfur odor. |
| 147 | Stantonsburg | Dr. T. E. Pearson | | jetted | 60–70 | 1¼ | Cretaceous, sand | +1 | 8 | Flows about 8 gallons a minute. |
| 148 | Stantonsburg | Stantonburg Lumber Co. | O. L. Truby | drilled | 108 | 6 | Cretaceous, sand | 20± | 10+ | Connected to town supply for use in emergency. |
| 149 | Stantonsburg | Town | C. W. Norton | drilled | 151 | 6 | Cretaceous, sand | 20 | 24 | Six feet of No. 20 screen. Used only as emergency. |
| 150 | Stantonsburg | Town | Carolina Drilling and Equipment Co. | drilled | 165 | 24–8 | Cretaceous, sand | | 300 | Main supply; 24-inch hole, gravel-walled well. Analysis in table. |
| 151 | Stantonsburg | W. R. Rogers | Mr. Whitley | jetted | 52 | 1¼ | Cretaceous, sand | +5 | 1+ | Flows about 1 gallon a minute a foot above the surface; water has sulfur taste and odor. |
| 152 | Stantonsburg | Dr. S. H. Crocker, Dairy | | jetted | 65 | 1¼ | Cretaceous, sand | 0 | | Flows 2 or 3 gallons a minute into a reservoir about 1 foot below the surface. |
| 153 | Stantonsburg | R. M. Whitley | | bored | 15 | 6 | Sunderland, sand | | | |
| 154 | Stantonsburg | J. C. Eagles, St. FairfieldDairy | | drilled | 170 | 6 | Cretaceous, sand | | 8–10 | |
| 155 | Black Creek | C. C. Menshew | | bored | 18 | 6 | Sunderland, sand and clay | | 4–5 | |
| 156 | Black Creek | Mrs. Addie Mathews | | dug | 13± | 36 | Sunderland, quicksand | 10 | | |
| 157 | Black Creek | Jonas Owens | Truby (?) | drilled | 330± | 6 | Granite, ? | 18± | 19 | Cased 100 ? feet. Formerly used for school. |
| 158 | Black Creek | Anderson Bass | | bored | 26 | 6 | Sunderland | | | |
| 159 | Black Creek | Lee-Woodward High School | C. W. Norton | drilled | 125± | 6 | Granite | | 6–8 | Cased 55 feet. Granite at 55 feet. Water contains no iron. |
| 160 | Black Creek | J. S. Tomlenson | C. W. Norton | drilled | 95 | 5 | Schist | | 7–8 | Water contains no iron. |
| 161 | Lucama | Hubert Bass, D. P. Howell | | dug | 17 | 36 | Sunderland, sand | 15 | | |
| 162 | Lucama | Claudius Aycock | C. W. Norton | drilled | 158 | 6 | Schist | 8½ | 18+ | Cased 40 feet. Measured pumping 18 gallons a minute with an 11-foot draw-down. Soft water. |
| 163 | Lucama | Lucama High School | C. W. Norton | drilled | 135 | 6–4½ | Schist | | 5 | Water contains some iron. |
| 164 | Lucama | Town | Sydnor Pump & Well Co. | drilled | 191 | 8 | Schist | | 100 | Analysis in table. |
| 165 | Lucma | Atlantic Coastline Railroad | | drilled | 42 | 6 | Schist | | 8± | Was pumped for ½ day without failure. |
| 166 | Lucama | Garland Newsome | Hinnant | jetted | 75 | 1¼ | Schist | | | Water contains much iron. |
| 167 | Buckhorn | Williamson Colored High School | C. W. Norton | drilled | 60 | 6 | Schist | 1± | 30± | Water contains some iron. |
| 168 | Buckhorn | J. L. B. Hinnant Harry Turner | C. W. Norton | drilled | 100 | 6 | Schist ? | | 2–3 | Water contains no iron. |
| 169 | Lucama | J. D. Aycock | | jetted | 70 | 1¼ | Schist | | 2± | Cased 20 feet. Water contains no iron. |
| 170 | Buckhorn | J. R. Peele | C. W. Norton | drilled | 100+ | 6 | Schist | | 4–5 | Water contains some iron. |
| 171 | Buckhorn | J. R. Peele | | jetted | 100+ | 1¼ | Schist | 18± | 2–3 | |
| 172 | Buckhorn | C. F. Barron | | dug | 34 | 36 | Weathered Schist | 28½ | | |
| 173 | Buckhorn | Kermit Barme | O. L. Truby (?) | drilled | 65 | 6 | Rock | 13± | 10–12 | Water contains some iron. |
| 174 | Buckhorn | Buckhorn School | R. L. Jones | drilled | 135 | 6 | Schist | | 10 | Cased 35 feet. Water obtained from crevice in quartz vein. |

RECORDS OF WELLS IN WILSON COUNTY—*Continued*

| Well Number | Location | Owner | Driller | Type of Well | Depth of Well (feet) | Diameter of Well (inches) | Geologic Formation and Chief Aquifer | Depth to Water Level (feet) | Yield Gallons Per Minute | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 175 | Buckhorn | Roland Hinnant | Luthur Flowers | jetted | 38 | 1¼ | Schist | 15± | 5-6 | Water contains no iron. |
| 176 | Buckhorn | Roland Hinnant | | dug | 20 | 36 | Coharie, sand | 13 | 5 | |
| 177 | Buckhorn | A. C. Hinton | | bored | 25± | 6 | Coharie, sand | 5 | 0 | Has filled in with "quick-sand". Gravel-packing around a screen would prevent this. |
| 178 | Buckhorn | Jack Raper J. R. Renfrow | | drilled | 177 | 6 | Schist | 11 | 8-10 | |
| 170 | Buckhorn | Mrs. T. T. Barnes Nathan Raper | D. Hinnant | jetted | 83 | 1¼ | Schist | | 8-10 | Cased 60 feet. Pumps mica |
| 180 | Buckhorn | Mrs. T. T. Barnes Nathan Raper | | jetted | 71 | 1¼ | Schist | 4-5 | 5-6 | Cased 40 feet. Water contains much iron. |
| 181 | Boyette | Howard Watson Dave Bynum | O. L. Truby | drilled | 112 | 6 | Schist | | 10 | Cased 93 feet. Water contains much iron. |
| 182 | Boyette | Howard Watson Johnny Peacock | O. L. Truby | drilled | 84 | 6 | Schist | 10½ | 10 | Water contains much iron |
| 183 | Boyette | Howard Watson Rubin Murray | O. L. Truby | drilled | 78 | 6 | Schist | 10± | 20 | Cased 72 feet. Water contains much iron. |
| 184 | Boyette | St. Marys School | C. W. Norton | drilled | 160 | 6 | Schist | | 10-12 | Water contains a little iron. |
| 185 | Boyette | Howard Watson Sidney Horton | O. L. Truby | drilled | 45± | 6 | Schist | | 20? | |
| 186 | Boyette | H. L. Atkinson | | dug | 15 | 36 | Coharie, clay | 8 | | |
| 187 | Boyette | H. L. Atkinson | | jetted | 66 | 1¼ | Schist | | 3-4 | Cased 40 feet. Water contains much iron. |
| 188 | Boyette | James Atkinson | | jetted | 80 | 1¼ | Schist | | 5-6 | Cased to bottom. Water contains no iron. |
| 189 | Boyette | Mrs. G. M. Morris S. V. Morris | | jetted | 77 | 1¼ | Schist | 15-20 | 3-4 | Water contains no iron. |
| 190 | Boyette | Mrs. Nathanial Kirby | O. L. Truby | drilled | 95 | 6 | Schist | | 8-10 | Water contains much iron. |
| 191 | Boyette | Walter Kirby | O. L. Truby | drilled & jetted | 64 | 1¼ | Schist | 20± | 5-6 | This well jetted inside of well 75 feet deep 6 inches in diameter. Water in the 6-inch well contained too much iron for use. Water from 1¼-inch well contains iron. Analysis in table. |
| 192 | Boyette | R. P. Kirby | O. L. Truby | drilled | 120 | 6 | Schist | 16± | 8-10 | Cased 90 feet. Not used. water contains too much iron. |
| 193 | Boyette | R. P. Kirby | | jetted | 82 | 1¼ | Schist | 15± | 2-3 | Cased 72 feet. Water contains no iron. |
| 194 | Boyette | Jesse Poythress | Richard Barnes | jetted | 98 | 1¼ | Schist | | 5± | Cased 85 feet. Water contains no iron. |
| 195 | Boyette | Simon Hooks Cotton Gin | O. L. Truby | drilled | 80(?) | 6 | Schist | 20 | | Not used. |

RECORDS OF SPRINGS IN WILSON COUNTY

| Location | Owner | Name | Geologic formation and Chief aquifer | Yield gallons per minute | Remarks |
|---|---|---|---|---|---|
| A Sims | Farmer's Trading Co. | Jet Spring | Granite | 12 | Contact Spring; issues in draw at base of weathered rock. |
| B Rock Ridge | H. L. Boykin | "Strickland" Spring | Schist | 20-25 | Fissure Spring; issues from crevice in schist. |

### ANALYSES OF GROUND WATER FROM WILSON COUNTY, NORTH CAROLINA
(Numbers at heads of columns correspond to numbers in table of well data.)
Parts per million

| | 8 | 50 | 57 | 71 | 82 | 100 |
|---|---|---|---|---|---|---|
| Silica ($SiO_2$) | 27 | | | | | |
| Iron (Fe) | .0 | *17 | | | | |
| Calcium (Ca) | 36 | | | | | |
| Magnesium (Mg) | 8.1 | | | | | |
| Sodium and Potassium (Na+K) | 31 | | | | | |
| Carbonate ($CO_3$) | 0 | | | | | |
| Bicarbonate ($HCO_3$) | 190 | 14 | 66 | 15 | 1.0 | 10 |
| Sulfate ($SO_4$) | 20 | **10 | **10 | **1 | **1 | **1 |
| Chloride (Cl) | 10 | 3 | 5 | 14 | 7 | 11 |
| Fluoride (F) | .1 | 0.0 | 1.5 | 0 | 0.1 | .0 |
| Nitrate ($NO_3$) | .0 | .0 | .0 | | 12 | 14 |
| Total dissolved solids | 220 | | | | | |
| Total hardness as $CaCO_3$ | 124 | †21 | †15 | †15 | †12 | †15 |
| Date of collection | Jan. 30, 1942 | Jan. 20, 1942 | Jan 23, 1942 | Jan. 22, 1942 | Jan. 22, 1942 | Jan. 21, 1942 |

| | 131 | 150 | 164 | 191 |
|---|---|---|---|---|
| Silica ($SiO_2$) | | 23 | 42 | |
| Iron (Fe) | 3.4 | 2.0 | 8.7 | |
| Calcium (Ca) | | 19 | 22 | |
| Magnesium (Mg) | | 11 | 4.2 | |
| Sodium and Potassium (Na+K) | | 36 | 10 | |
| Carbonate ($CO_3$) | | 0 | 0 | |
| Bicarbonate (HCO) | 22 | 174 | 98 | 37 |
| Sulfate ($SO_4$) | **11 | 11 | 7.4 | **1 |
| Chloride (Cl) | 4 | 12 | 4 | 3 |
| Fluoride (F) | 0.2 | .2 | .4 | .0 |
| Nitrate ($NO_3$) | .0 | .25 | .0 | .25 |
| Total dissolved solids | | 199 | 136 | |
| Total hardness as $CaCO_3$ | †21 | 92 | 72 | †33 |
| Date of collection | Feb. 4, 1942 | Jan. 29, 1942 | Jan. 27, 1942 | Jan. 27, 1942 |

* Iron in sediment
** By turbidity
† Soap hardness
Analyst: M. D. Foster

### LOG OF WELL 12, NEAR TOWN CREEK, WILSON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Soil, black | 2 | 2 |
| Clay, yellow, with a little fine sand | 16 | 18 |
| Sand, medium, and yellow clay | 1 | 19 |
| Sand, medium-coarse, yellow and fine gravel; water | 1 | 20 |
| Miocene, Yorktown formation: | | |
| Mud, blue | 7 | 27 |

### LOG OF WELL 100, AT WILSON, WILSON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand | 20 | 20 |
| Clay | 20 | 40 |
| Miocene, Yorktown formation: | | |
| Sand | 5 | 45 |
| Marl | 15 | 60 |
| Sand | 8 | 68 |
| Sand clay | 7 | 75 |
| Cretaceous (undifferentiated): | | |
| Clay | 11 | 86 |
| Sand | 11 | 97 |
| (?) | 27 | 124 |

### LOG OF WELL 133, NEAR WILBANKS, WILSON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Miocene, Yorktown formation: | | |
| Clay, blue and shell | 60 | 60 |
| Cretaceous (undifferentiated): | | |
| Sand | 98 | 158 |
| Sand and clay, red | 57 | 215 |
| Clay, brown | 30 | 245 |
| Basement rock (per-Cambrian (?) slates): | | |
| Rock, soft green | 55 | 300 |
| Shale | 15 | 315 |
| Sand rock | 20 | 335 |

### LOG OF WELL 134, NEAR WILBANKS, WILSON COUNTY

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay, yellow and red | 24 | 24 |
| Miocene, Yorktown formation: | | |
| Clay, blue | 1 | 25 |
| Sand, clean, fine, white, with some wood | 10 | 35 |

### Log of Well (Abandoned) at Wilson, Wilson County
(Log modified from "The Coastal Plain of North Carolina," North Carolina Geological and Economic Survey, vol. III, 1912, p. 225.)

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand, fine argillaceous, yellow | 10 | 10 |
| Sand, fine, slightly argillaceous, yellow | 10 | 20 |
| Clay, finely arenaceous, pink and white | 10 | 30 |
| Miocene, Yorktown formation: | | |
| Clay, bluish drab | 20 | 50 |
| Clay, sandy, greenish gray, with a few shell fragments | 5 | 55 |
| Sand, coarse and much shell | 10 | 65 |
| Clay, calcareous, greenish-gray | 10 | 75 |
| Basement rock (per-Cambrain (?) slates): | | |
| Rock, crystalline, weathered in upper portion | 38 | 113 |

### Log of Well 136, Near Holdens X Road, Wilson County

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 14 | 14 |
| Sand | 1 | 15 |
| Miocene, Yorktown formation: | | |
| Mud, blue and shell | 23 | 38 |

### Log of Well 137, at Saratoga, Wilson County

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Sand, yellow, clayey | 22 | 22 |
| Miocene, Yorktown formation: | | |
| Mud, blue | 38 | 60 |
| Sand, medium grained white | ? | 60 |

### Log of Well 144, at Saratoga School, Wilson County

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Pleistocene, Sunderland formation: | | |
| Clay | 20 | 20 |
| Miocene, Yorktown formation: | | |
| Sand | 15 | 35 |
| Clay, tough, blue | 20 | 55 |
| Sand, fine and water | 8 | 63 |
| Cretaceous (undifferentiated): | | |
| Clay, tough, light colored | 77 | 140 |
| Sand, white and water | | 140 |