NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
BEN E. DOUGLAS, DIRECTOR

DIVISION OF MINERAL RESOURCES
JASPER L. STUCKEY, STATE GEOLOGIST

BULLETIN NUMBER 68

GEOLOGY AND GROUND WATER IN THE Statesville Area, North Carolina

BY

HARRY E. LeGRAND
GEOLOGIST, U. S. GEOLOGICAL SURVEY

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PREPARED COOPERATIVELY BY THE GEOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF THE INTERIOR

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LETTER OF TRANSMITTAL

Raleigh, North Carolina
February 15, 1954

To His Excellency, HONORABLE WILLIAM B. UMSTEAD
Governor of North Carolina

SIR:

I have the honor to submit herewith manuscript for publication as Bulletin No. 68, "Geology and Ground Water in the Statesville Area, North Carolina," by Harry E. LeGrand.

This report is another in the series being prepared on ground water in the State by the North Carolina Department of Conservation and Development in cooperation with the United States Geological Survey. In most parts of North Carolina, ground water is becoming increasingly important as a source of supply for industries, municipalities, and schools. It is believed that this report will be of value to those interested in ground water in the Statesville area.

Respectfully submitted,

BEN E. DOUGLAS,
Director

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GEOLOGY AND GROUND WATER IN THE STATESVILLE AREA, NORTH CAROLINA

By Harry E. LeGrand

ABSTRACT

The Statesville area is slightly west of the center of North Carolina and consists of Alexander, Catawba, Davidson, Davie, Iredell, and Rowan Counties. It includes 2,556 square miles and in 1950 had a population of 285,725. The people are engaged in both agriculture and manufacturing. In addition to the farmers, many industrial workers live in the rural areas; an outstanding feature is the great rural population and its relatively high standard of living.

The area lies in the Piedmont province. Topographically, it consists mostly of low, rounded hills and gentle slopes, although a few scattered mountains rise above the upland level. The numerous streams flow in valleys as much as 100 feet below the level of the upland. The major streams have moderately high gradients to the southeast.

Except for a small area of sedimentary rocks of Triassic age in Davie County, the area is underlain by igneous and metamorphic rocks consisting largely of schist, gneiss, granite, diorite, and a series of volcanic rocks. The volcanic rocks occur only in the southeastern parts of Davidson and Rowan Counties. Mica schists and mica and hornblende gneisses are the chief country rocks; they have been intimately intruded by granite in most of the area. Local changes in types of rocks are common, and large homogeneous masses of a single type of rock are rare. Crustal movements have tilted the rocks, many of which crop out in relatively thin bands. The most common trend of the outcrop belt is northeastward. Hiding the bedrock in most places is a thick layer of residual soil and weathered rock which supports much vegetation.

More than 35,000 individual wells furnish the domestic water supply for about two-thirds of the population. Drilled wells get water from fractures in the bedrock whereas the shallower dug and bored wells get water from the weathered material above bedrock.

Wells drilled in the basic rocks, such as hornblende gneiss, gabbro, and diorite, have a slightly higher average yield than wells in other rock units. The average yield of municipal and industrial wells in hornblende gneiss is about 60 gallons a minute; in all the rocks it is about 41 gallons a minute.

The amount of water yielded by wells is related to topographic location. The average yield of wells on hills is about half that of wells in other topographic locations and several times less than that of wells in draws. More than 80 percent of all existing wells are drilled on upland areas where conditions are unfavorable for large supplies of water. Thus the average yield of wells listed in this report is less than it would be if the wells were distributed evenly over all types of topography.

The amount of water that any specified well will yield is decided largely by chance and cannot be predetermined. However, if we consider a large number of wells, chance does not decide the yields. If we may use past wells as an index, the probabilities of future municipal and industrial wells are as follows: at least 60 percent will yield more than 18 gallons a minute, at least 40 percent will yield more than 33 gallons a minute, and at least 20 percent will yield more than 54 gallons a minute.

The amount of water contained in the rocks decreases with depth. The depth at which water is found cannot be predicted and is seldom known for existing wells. By analyzing the yields of wells of different depths, it is evident that the yield per foot of well generally decreases with depth. The chance of appreciably increasing the yield of a well by drilling deeper than 250 or 300 feet may be so slight that a new well might be more economical.

The withdrawal of water from wells is only a fraction of that available for recharging the underground reservoir. Recharge, coming from about 47 inches of rainfall annually, occurs in the interstream areas and discharge occurs chiefly in adjacent lowlands. The annual recharge and discharge are in natural balance, resulting in no perennial trend in the fluctuation of the water table. Its relatively quick circulation prevents the water from collecting much mineral matter in solution; with the exception of a high iron content in some places, the water is almost everywhere of good chemical quality.

Several tables were prepared to show the relation of yield to type of rock, to topographic location, and to depth of wells. The report contains a brief discussion of the ground-water resources of each county, with tables of well data and chemical analyses. A geologic map of each county is also included.

INTRODUCTION

This report deals with the ground-water resources of a part of the west-central Piedmont of North Carolina. The area includes Alexander, Catawba, Davidson, Davie, Iredell, and Rowan Counties (fig. 1), which represent an industrial and heavily populated rural section of the State. Although the numerous streams provide adequate water supplies to the large towns and industries, two-thirds of the population of the Statesville area, or more than 180,000 people, use wells as the source of domestic water supply. There are more than 35,000 individual wells, the great majority of which are installed with electric pumps. The problems arising in attempting to develop ground-water supplies are of three types relating chiefly to quantity rather than quality of water: (1) those in which the wells are so shallow that the water level is lowered below the bottoms of the wells during droughts or during periods of heavy withdrawal, (2) those in which wells do not penetrate water-bearing material and, (3) those due to the inability of water to move through the water-bearing material fast enough to satisfy the demands of individual wells. The present report discusses these problems and offers suggestions as to possible solutions. Moreover, the report shows that pumping from the underground reservoir is nowhere excessive, that there is no persistent lowering of the water table, and that the underground reservoir offers a perennially dependable source of water supply.

The investigations on which the report is based were made through a cooperative agreement between the North Carolina Department of Conservation and Development and the Geological Survey, United States Department of the Interior. The program is under the direction of J. L. Stuckey, State Geologist of North Carolina, and A. N. Sayre, Chief, Ground Water Branch, U. S. Geological Survey.

The field work in the Statesville area was done chiefly in the summer and autumn of 1950 and 1951, although some of the well data were collected in 1948 by M. J. Mundorff. It consisted of obtaining data on 821 wells and a number of springs, collecting samples of water, noting the geologic and topographic location of wells, and making a reconnaissance geologic map of the area. Information about the wells was obtained from the well owners and drillers. Much of the information was given from memory, and some of it, therefore, may not be wholly accurate.

The writer wishes to express appreciation for the work of M. J. Mundorff, in charge of the cooperative ground-water program in North Carolina between 1941 and 1948. Mr. Mundorff's intensive studies of the ground-water resources of some adjoining parts of the Piedmont, where simlar underground conditions exist, largely furnished the pattern for this report. Marjorie M. Streicher and James T. Bales of the Geological Survey compiled many of the data used in this report. The chemical analyses were made by the U. S. Geological Survey, under the direction of F. H. Pauszek, District Chemist, Raleigh, N. C.

The writer wishes to acknowledge the courteous and generous assistance of the well owners and well drillers who have furnished information for this report. Among the drilling companies who have contributed information are: R. E. Faw and Son, Hickory Well Supply Co., Carolina Well Drilling Co., Catawba Well and Pump Co., Kannapolis Well Drilling Co., A. L. Matlock, H. C. Huffman, W. R. Morrison, McCoy Huffman, J. W. Morrison, and T. A. Harris.

GEOGRAPHY

PHYSICAL FEATURES

The Statesville area lies within the Piedmont province, bordering the mountain province on the west. Most of the upland, or interstream, areas represent a peneplain that has been maturely dissected by streams. Consequently, the topography is characterized largely by low, rounded hills and gentle slopes. Streams have lowered the valleys through which they flow until they are generally more than 100 feet below the upland areas. The peneplain slopes southeastward, its elevation being about 1,200 feet in Alexander County and about 700 feet in Davidson County.

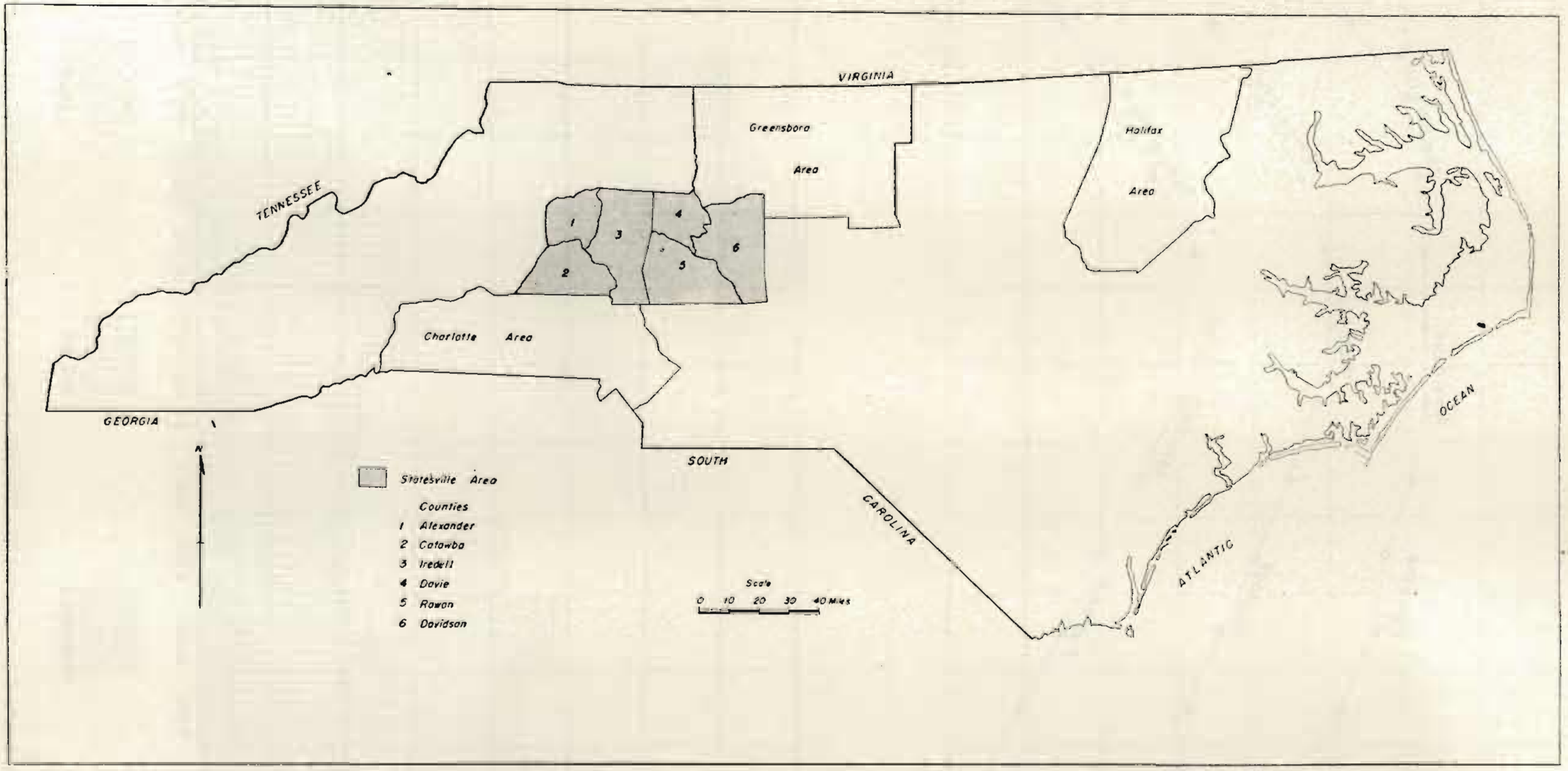


FIGURE 1.—*Map of North Carolina showing where major systematic ground-water investigations have been made.*

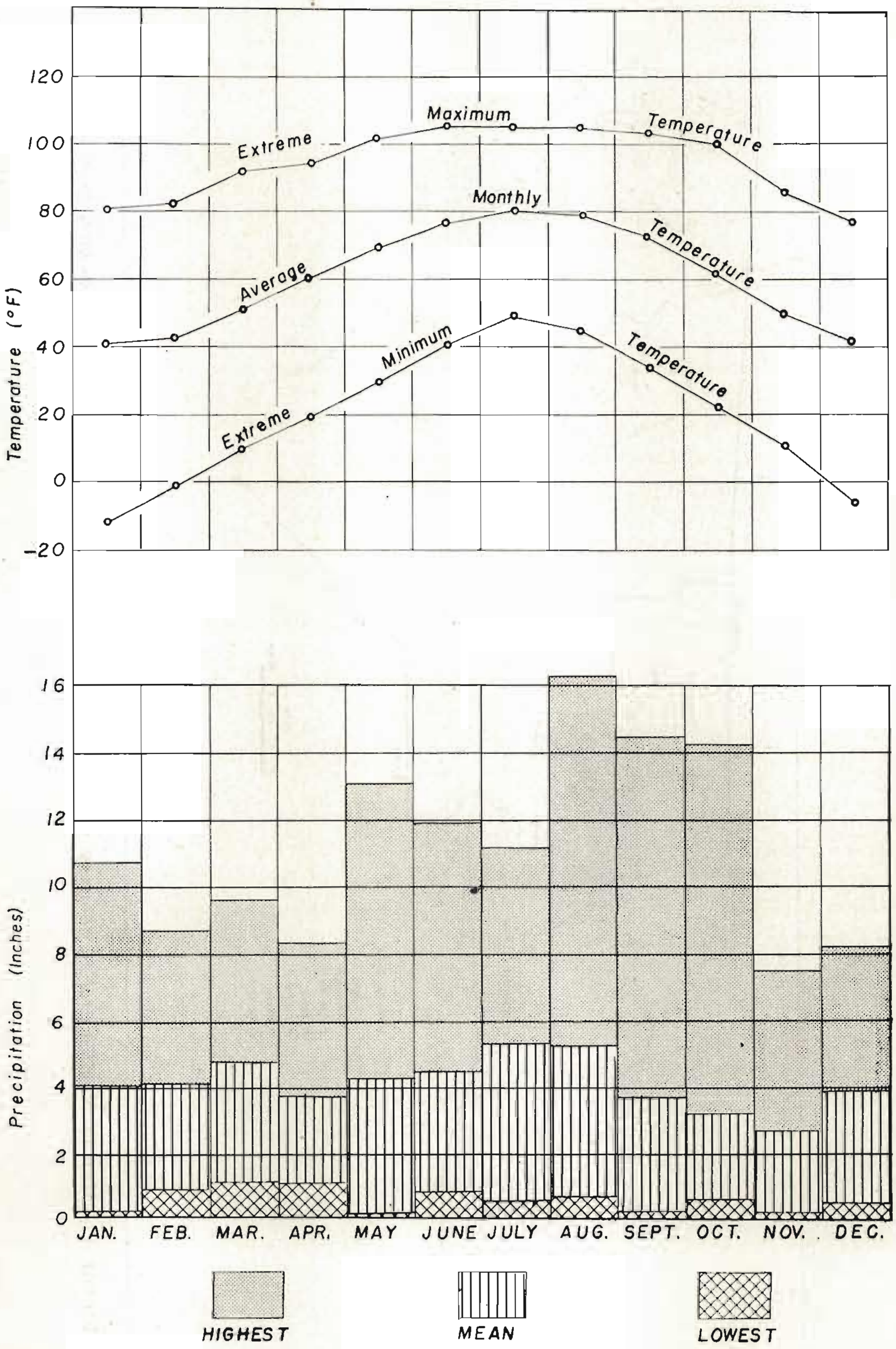


FIGURE 2.—*Climatic summary for Salisbury, Rowan County, based on records (1876-1945) of the Salisbury station of the U. S. Weather Bureau.*

Here and there prominent peaks, or monadnocks, rise several hundred feet above the peneplain. Most of these monadnocks are composed of rocks more resistant to erosion than those of the surrounding peneplain. Quartzite, sillimanite schist, and poorly fractured, massive granites and diorites are the common rocks forming the monadnocks, whereas the closely interlayered gneisses and schists and the smaller intrusive masses of granite and diorite are the common rocks underlying the peneplain. A heavy layer of soil and its veneer of vegetation cap the bedrock in most places.

The area is drained by two major streams, each having a general southeastward course. Davidson, Rowan, and Davie Counties and the eastern parts of Iredell and Alexander Counties lie in the Yadkin River basin. The remainder of the area lies in the Catawba River basin. A close network of tributary streams, whose courses are quite diverse, characterize the drainage. Parts of the courses of many of the streams are determined by the geologic structure of the area.

CLIMATE

Yearly precipitation is distributed almost evenly in the Statesville area. The average yearly precipitation at the six U. S. Weather Bureau stations in the area is about 47 inches. Figure 2 shows the general monthly distribution of precipitation at the station at Salisbury, Rowan County.

The average annual temperature ranges from about 58.5°F in Alexander County to about 60.5°F in Rowan County. Average, maximum, and minimum monthly temperatures at the Salisbury station are shown in figure 2.

GEOLOGY

The Statesville area is underlain by a complex series of igneous and metamorphic rocks. (A glossary, designed to clarify some of the geologic and hydrologic terms used in this report, is found on page 67.) Several weeks were spent during the course of this investigation making a geologic map of the area. Considering the large size of the area and the short time spent in mapping, it is apparent that the geology is necessarily greatly generalized and that the map can be considered only a reconnaissance map. Each rock unit shown on the map is not necessarily restricted to a single type of rock because the space occupied by the outcrop of a particular type of rock may be too small to show on a small-scale map. Also, many rocks are gradational between types.

The gradation between the rocks is of two types. The first can be seen in one outcrop where a progressive change from one petrologic type to another occurs within a distance of a few inches or a few feet. The other type, of greater magnitude, may represent a zone of many feet or a few miles where two rocks are interlayered and a progressive change in the dominant rock can be observed generally. In the latter case granite everywhere represents one of the types, and precise local contacts may be observed. Generally the rocks are so intimately interlayered that only the dominant rock can be shown except on very large-scale maps. On the small-scale maps in this report only a small proportion of geologic boundaries are shown. Best use of these maps can be made by assuming that the geologic contacts are approximate or arbitrary. The classification of rocks in the Statesville area used in this report is based on lithology and physical appearance.

The geologic history of the area is not well known. Very old sedimentary and igneous rocks were folded and faulted and were metamorphosed by pressure and heat into schists of various types. Tuffs and other volcanic materials covered some of the area and were altered to some degree. After these events igneous rocks, particularly granite, were intruded into the pre-existing rocks. The emplacement of granite was preceded by or accompanied by a general metamorphism of the crystalline schists. The high temperatures and directed pressures related to this metamorphism allowed granitic material to penetrate the schists intimately. The granite occurs as large, nearly homogeneous bodies, as veins and sheets, and as granitized country rock. The intrusion of granite into the older rocks occurred in the area west of the volcanic rocks which crop out in eastern Davidson and Rowan Counties.

It is generally thought that the last great earth movements and much of the granite emplacement occurred near the close of Paleozoic time. The youngest rocks of the area are sedimentary rocks in a relatively small downfaulted block in Davie County; these rocks and the diabase dikes which cut them are believed to be of Triassic age. Having been elevated during several geologic periods, all the rocks have been subjected to weathering and erosion, and much rock material has been stripped from above the present surface. The rocks, therefore, have been beveled by erosion and the present surface is generally formed by east-trending schistose rocks tipped on edge. A heavy layer of soil mantle the bedrock in most places, showing that the rate of erosion generally lags behind the rate of weathering.

AREAL DISTRIBUTION AND CHARACTER OF THE ROCKS

The rocks of the Statesville area represent, for the most part, a northeast extension of the same types found in the Charlotte area to the southwest and described in the Charlotte report (LeGrand and Mundorff, 1952). The following descriptions of the rock types have been largely adapted from that report.

Mica schist.—Thinly laminated rocks containing a large amount of mica and showing a strong schistose structure are abundant in the area and are interlayered with many other types of rocks. The schist is a common rock in western Davie County and in Iredell, Catawba, and Alexander Counties, where it occurs in general northeast-trending belts. Much of the original structure of the schist was destroyed by metamorphism before and at the time of the emplacement of the granite, but much of it is thought to have been shale.

Schist-granite complex.—Several types of mixed rocks result from the injection of granite into the mica schist. The schistose planes guided the intruded granitic material along these planes so that the schist and granite generally show a roughly parallel alinement. In some places the granitic material intruded the schist, assimilated it, and altered it into a sort of composite gneiss. Although this type of gneiss represents a part of the injection phenomena it is mapped as gneiss and not as a part of the schist-granite complex. The most conspicuous occurrence of the schist and granite is as alternating and separate bands ranging from a fraction of an inch to many hundreds of feet in width. For convenience in mapping and description of the rocks the resulting products are classified according to the amount of granite present. The subdivision of the complex is similar to that used by Read (1931, p. 91) in describing the Loch Choire injection complex of Scotland.

The following subdivisions of the schist-granite complex can be conveniently distinguished:

1. Mica schist containing little or no granitic material.
2. Injection area; mica schist dominant.
3. Injection area; granite dominant.
4. Granite, more or less homogeneous.

To some extent the schist is dominant in the injected areas near areas of homogeneous schist, and granite is dominant in injected areas near areas of homogeneous granite, but this gradation between the dominant rocks is not everywhere apparent. Perhaps the reason for this is that the emplacement of granite took place over large areas of the Appalachian Piedmont, and rather large masses of homogeneous granite are so common that it is not generally possible to relate one of these masses to a particular injection area. Under such a classification most of the contacts mapped are gradational and therefore should not be regarded as distinct boundaries between rock types.

Granite.—The granite of the injection complex and that forming the large homogeneous masses are regarded as of the same age (Kesler, 1944, p. 759) although the available evidence is not conclusive. The granites vary considerably in texture and physical appearance owing, in part, to the type of country rock penetrated, the degree of assimilation by the granite, and conditions of cooling of the granitic solutions. An exposure of granite that is typical in lithology but is less weathered than the average is shown in figure 3.

The normal constituents of the granites are quartz and several varieties of feldspar, mostly rich in potash and soda. In some places either muscovite or biotite forms an important accessory mineral. Near some areas of diorite and gabbro, hornblende is a common mineral in the granite but large areas of hornblende granite are not common. Some of the granite in Davidson, Rowan, and Davie Counties forms an intricate complex with diorite and is discussed in a later section. Much of the rock mapped and discussed as gneiss represents a product of a country rock pervaded and permeated by granite. Thus in a broad sense, it is likely that granite, in all its types of emplacement, underlies more than half the Statesville area.

The emplacement of much of the granite is believed to have occurred during late Paleozoic time when the country rocks were generally metamorphosed. During this metamorphism high temperatures and prevailing earth stresses influenced the invasion of the more volatile portion of magma by allowing it to be injected as veins and sheets into the country rock at great distances from the residual magma. Metamorphism resulting from the injection processes produced zones in the country rock rich in kyanite, sillimanite, and garnet. However, not in all places is it possible to distinguish between the effects of injection metamorphism and regional metamorphism of an earlier date.

FIGURE 3.—*Jointed and partially weathered granite near Woodleaf, Rowan County. Although typical of many massive granites, the rock is not as completely decomposed as most other rocks.*

Hornblende gneiss and schist.—Hornblende gneiss and schist (hereinafter called hornblende gneiss) occur over a wide area west of Davidson and Rowan Counties. Large bodies of this rock are not common, the usual occurrence being as beds a few inches or a few feet wide interlayered with other rock. The gneiss is similar to the Roan gneiss named by Keith and Sterrett (1931, p. 3) and mapped by them in the vicinity of Kings Mountain, Cleveland County. It is commonly composed of large quantities of hornblende and varying amounts of feldspar and quartz. However, other types of basic rocks occurring in subordinate amounts are included with the hornblende gneiss. In contrast to the granites and mica schists with which it is associated, the hornblende gneiss is dark in color where fresh and unaltered, and deep red or brown where weathered.

The age of the hornblende gneiss is not certain but its relation with other rocks indicates that it is older than all the other rocks of the area, with the possible exception of the mica schist and composite gneiss (see below) with which it is interlayered. Where the schistosity is strong the hornblende gneiss is interlayered with granite in northeast-trending belts, but the less schistose parts of the gneiss are cut transversely by dikes of granite. From field appearances it does not seem likely that the hornblende gneiss was modified much by injection metamorphism. At any rate, the rock now identifiable as hornblende gneiss is completely separate from the granite that intrudes it. Although the hornblende gneiss is a common rock it is generally subordinate to other types.

Composite gneiss.—Rocks of this unit include gneisses and schists, chiefly of granitic character, in which biotite is generally a conspicuous dark mineral. In many places it represents the gneissic portion of the type of rock mapped by Keith and Sterrett (1931, p. 3) as the Carolina gneiss. Part of Keith and Sterrett's description is applicable:

> "A portion of the Carolina gneiss is composed of banded granular layers of feldspar, quartz, and either muscovite or biotite or both, with accessory minerals. The texture is commonly much coarser and the foliation less pronounced than those of the mica schists. Some of this gneiss has developed from homogeneous rocks and therefore has a rather uniform texture and banding. Other parts of it have been derived from rocks of variable composition that produce a strong banding with variations in texture."

Some of the gneiss may represent granite that has been foliated as a result of earth movements; other parts of the gneiss are products of injection phenomena in which granitic material has permeated a host rock, probably of sedimentary origin, forming a composite rock.

The composite gneiss covers large areas in Iredell and Catawba Counties. In many places it is in contact with the schist-granite complex, and the separation of these two classes is difficult and arbitrary. The composite gneiss contains numerous lenses of granite and hornblende gneiss. The areas where hornblende gneiss is prominently interlayered with the composite gneiss are shown on the geologic maps in a special pattern.

Gabbro-diorite.—Rocks ranging locally from gabbro to diorite but which, as a whole, are intermediate between true gabbro and diorite are common in some parts of the Statesville area. The most prominent occurrence lies in a belt several miles wide extending northeastward from southern Iredell County through western Rowan County to the north-central part of Davie County. Similar rocks occur as small isolated masses in other parts of the area. The rock is typically exposed in the area around Cleveland, Rowan County.

The gabbro-diorite is distinctly massive and not closely jointed. As is characteristic of other homogeneous igneous rocks of the area, the gabbro-diorite is commonly exposed as rounded boulders or smooth outcrops projecting above the general surface of the ground. These exposures are not greatly weathered, although the mineral components are susceptible to weathering. The rock appears to be composed chiefly of hornblende or pyroxene and feldspar and varying amounts of quartz and accessory minerals. The color is generally dark, ranging from nearly black to green. Surficial alterations or parts of the rock to epidote accounts for most of the green color. The texture is generally coarse.

FIGURE 4.—*Partially weathered granite (light) and diorite (dark) in road cut along U. S. Route 29, about 3 miles west of Thomasville, Davidson County.*

Diorite-granite complex.—Rocks of this complex cover a large area in Davidson, Davie, and Rowan Counties. They are believed to have a wide distribution outside the Statesville area, although very little geological study has been made of the rocks of this complex.

An intermediate to basic component, chiefly diorite, and an acid component, chiefly granite, form this complex. The intermediate to basic component varies in composition, being a gabbro in some places and a diorite in others, but for convenience it is called diorite in this report. The acid component is granite in all places.

So closely spaced are the individual rock bodies within the complex that not even the larger homogeneous bodies can be shown on the accompanying maps. It was decided to split the complex proper into two units, one in which the diorite predominates and the other in which the granite predominates. In using this subdivision the boundaries between these units are necessarily arbitrary and somewhat indefinite.

The most conspicuous occurrence of the granite is as discrete bodies, apparently veining and penetrating the diorite in random fashion (fig. 4). Each type of rock is clearly separated from the other, and neither is modified appreciably.

The diorite is a dark-blue or gray medium-textured rock composed predominantly of hornblende and feldspar and varying amounts of quartz, biotite, pyroxene, and other accessory minerals. Epidote is common as an alteration product, apparently after the calcic feldspars. The rock granulates readily near the surface of the ground and the soil may be composed in part of disintegrated hornblende crystals typical of the Mecklenburg soil types. Dense light-green dikes of aplite commonly penetrate the diorite.

The granite forming the complex with the diorite is light in color, being composed almost entirely of feldspar and quartz. Biotite, muscovite,, and other accessory minerals common in most granites are not conspicuous. Like the diorite with which it is associated, the granite disintegrates readily near the surface, breaking down into pea-size aggregates of quartz and feldspar.

Some of the diorite is strongly schistose and much of the granite is sheared. The wide range in degree of metamorphism of the diorite suggests that basic rocks of different ages are included in this complex. It must be admitted that the relation of the diorite to the granite, as well as the relation of both to other rocks of the area, is somewhat obscure.

Slates and related volcanic rocks.—In the eastern part of Davidson and Rowan Counties a series of slates are interbedded with volcanic rocks. These rocks form the western edge of a northeast-trending belt which extends across the State and which is generally known as the Carolina Slate belt. The ore deposits they contain, chiefly gold, have led to detailed study of parts of the belt. A part of the belt lying in the east corner of Rowan County is described by Laney (1910) and a part lying in southern Davidson County is described by Pogue (1910).

A common rock of this unit is slate, which appears to represent sediments derived from volcanic rocks. The slates, blue and dense where fresh, show distinct bedding planes near the Rowan-Stanly County line. To the west, near its contact with igneous rocks, the slate is quite schistose and steeply dipping. The slates and the volcanic rocks which they enclose strike northeastward.

The volcanic rocks, chiefly tuffs of rhyolite and andesite, are interbedded with the slates and grade into them. The fine-grained tuff is dense and resembles chert; it grades into the slate and also into coarser tuffs which show fragments of coarse feldspar and quartz.

The rocks of the Slate belt represent, in time, a period of intermittent volcanic activity. During the active intervals lavas of rhyolite and andesite were thrown out. The commingling of volcanic ash and other ejecta with some land waste led to the formation of tuffs. During the quieter intervals the beds of finer material were deposited. Some of the beds, especially the finer tuffs and the rocks later converted to slate, are believed to have been deposited in water.

Included with the rocks of the Slate belt are greenstone schists, which are green in color and slightly to highly schistose, and are basic rocks of igneous origin. The typical greenstone is fine grained, and in the more massive facies phenocrysts of dark-green hornblende and greenish-yellow epidotized feldspar are distinguishable (Laney, 1910, p. 43). The greenstone in many places represents andesitic tuff. Granite is intermixed with the greenstone, forming a complex similar to that of the granite and diorite to the west. In fact, it is difficult to distinguish between the diorite-granite complex and the greenstone-granite complex.

Detailed studies of local areas in the Slate belt by Laney (1910), Pogue (1910), and Stuckey (1928) and regional studies by King (1949) indicate that the age of the rocks is conjectural, although they are known to be of Paleozoic age or older.

Granodiorite.—Bordering the southern part of the gabbro-diorite in western Rowan County is a rock that is tentatively classed as granodiorite. It appears to be intermediate in composition between the granite that borders it on the south and west and the gabbro-diorite that bodders it on the north. Its contacts with both the granite and the gabbro-diorite are indefinite and gradational.

Quartzite.—The only conspicuous outcrop of quartzite in the Statesville area is in eastern Catawba County. The quartzite forms a prominent northeast-trending ridge, the highest part of which is Anderson Mountain. The quartzite occurs as steeply dipping beds ranging in thickness from a few feet to several hundred feet, although the belt in which it is interbedded with schists is less than a mile wide. The belt is only about 5 miles long in Catawba County but it extends southwestward into Lincoln County.

Limestone and dolomite.—Crystalline limestone and dolomite occur in a small belt approximately parallel with the quartzite in Catawba County. In contrast with the quartzite, the rock weathers readily, and consequently outcrops are scarce. The areal extent of these rocks in Catawba County is not definitely known but probably is less than a square mile in the aggregate. The rocks are interbedded with schist. They are dense and are not known to contain solution channels.

Triassic rocks (Newark group).—Rocks including shale, sandstone, and conglomerate, cut by diabase dikes, occur in a downfaulted block in northwestern Davie County. These rocks, unlike other rocks of the area in appearance, composition, and degree of metamorphism, as similar to and undoubtedly equivalent to rocks in two other belts in North Carolina which are known to be of Triassic age. These rocks in Davie County were described in 1932 (Brown, pp. 525-528).

GROUND WATER

OCCURRENCE AND MOVEMENT

The portion of the outer crust of the earth that contains ground water may be regarded as an underground reservoir. The underground reservoir in the Statesville area consists of two contrasting types, (1) the clayey and sandy soil and weathered material which underlies the surface to depths generally ranging from several feet to several tens of feet and (2) the underlying bedrock. In the soil and weathered rock, water occurs between the individual mineral grains, but in the underlying bedrock it occurs only in fractures. These fractures generally are not evenly distributed, so that they may be an inch or two or several feet apart. Many are interconnected sufficiently to allow ground water to circulate through them. In many places fracture openings are only a fraction of an inch wide, although there is a great variation in size of openings. The size and number of fractures appear to decrease with depth. As a result, most ground water occurs at a depth of less than 150 feet—much of it in the upper 30 feet of bedrock. Therefore, the lower limit of the reservoir is a thick, indefinite zone; the top, however, is a definite though fluctuating surface known as the water table.

Ground water moves slowly through the soil and fractures in the rock, always under the influence of gravity. After percolating downward en masse through the soil and mantle rock, ground water is restricted in circulation to fractures in the bedrock. The water does not generally move to great depths but instead is shunted almost laterally by "tight" or impermeable rocks to discharge points near the level of the perennial streams. Thus, in the Statesville area the movement of ground water from the recharge, or interstream, areas to the discharge, or stream, areas follows, in general, a short, sinuous path, the water flowing locally through interconnecting fractures.

THE WATER TABLE

The water table, or upper surface of the underground reservoir, continuously changes its position, reflecting changes in underground storage. There is a constant discharge of ground water by seepage into streams and by evaporation and transpiration by vegetation, generally along the streams. The discharge causes a gradual lowering of the water table except during and immediately after periods of significant precipitation, when recharge to the underground reservoir exceeds the discharge from it; as a result of these periods of precipitation the water table rises. Figue 5 shows the trends of water-level fluctuations in a well at Mocksville, Davie County. The water level in this well is controlled only by natural conditions, and its

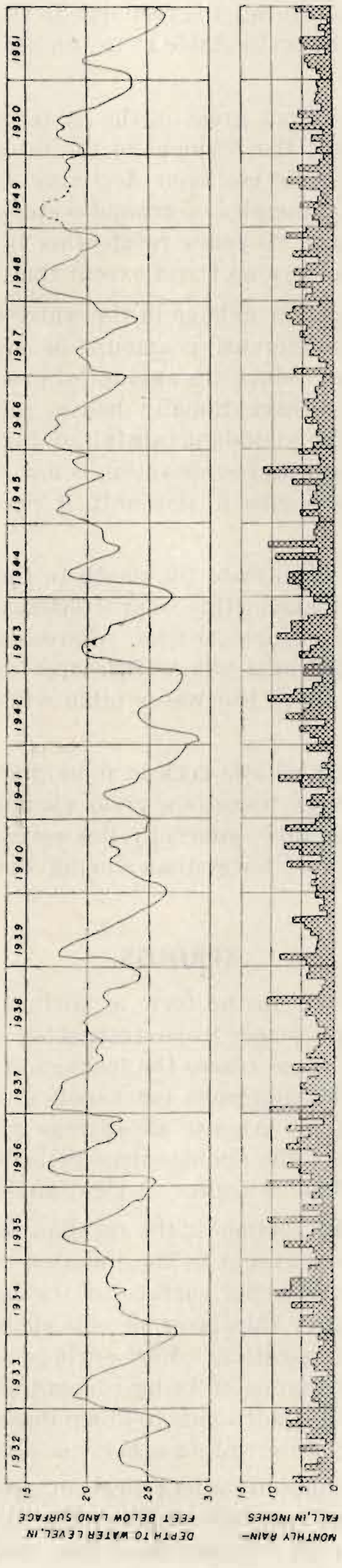


FIGURE 5.—*Chart showing fluctuation of the water level in a dug well at Mocksville, Davie County. The well, owned by L. S. Kurfees, is 32 feet deep.*

fluctuations are typical of those in the crystalline rocks of North Carolina. In the Statesville area the decline of the water table covers a longer aggregate period during a year and is more gradual than the rise of the water table. With a year of normal rainfall the recharge to the underground reservoir is approximately equal to the discharge from it, so that the water table at the end of the year is at about the same level as at the beginning of the year.

The withdrawal by pumping of wells is not great in the Statesville area, and the lowering of the water table around individual wells does not affect the regional water table. There appears to be no evidence to support the general belief that the water table has been declining during recent years. Both the logical deductions from an understanding of the principles of ground-water occurrence and movement and the actual measurements of water levels during the past 20 years refute this belief and show, instead, that the water table in unpumped or lightly pumped areas has no trend except that associated with climate.

In the Statesville area there is a noticeable change in the water table with the seasons. It generally begins to decline in April or May, owing to the increasing amount of evaporation and transpiration by plants, which not only consume ground water but reduce the amount of precipitation that can reach the water table. Although interrupted by minor rises due to exceptionally heavy rainfall, this decline generally continues through summer and autumn, in spite of the abundant rainfall of July and August. By November or December, when much of the vegetation is dormant and evaporation is low, the precipitation again becomes effective in producing recharge and the water table begins to rise until it reaches another high stage about April or May of the next year.

Aside from the above considerations of climate the depth to the water table in the Statesville area depends chiefly on topography and on the transmitting characteristics of fractures in the rocks. In valleys the water table generally is at or near the ground surface, whereas on hills the water table may be 70 feet or more below the surface. Beneath those hills where fractures are large and abundant enough to discharge water rapidly into the adjacent valleys the water table will be lower than where the rocks contain few fractures.

The water table lies in the residuum or mantle rock in most places, especially beneath the broad upland areas where the residuum is thick. Although there is a great variation in the depth to the water table and in the thickness of the residuum, the water table generally lies several feet above the base of the residuum. During droughts, when it may be several feet lower than during wet seasons, the water table is in the bedrock in some places.

SPRINGS

Leakage from the underground reservoir in the form of springs is extremely common in the Statesville area. The slopes are steep enough in many places to be transected by the water table, allowing water to leak from the underground reservoir. In some places the leakage of water is so small and so scattered that evaporation and transpiration use it all, leaving none for runoff in streams; in other places the leakage is concentrated enough to form a small spring. Almost all springs yield less than 10 gallons a minute and most yield 1 to 3 gallons a minute. Most of the springs show little fluctuation in yield, although some springs emerging from the upper slopes of hills show a decline in yield during dry seasons.

A major factor controlling the yield of springs is the residual soil that covers the bedrock almost everywhere. If the soil zone is extremely thin or absent at the junction of the water table and surface slope, the flow of water from the fractures or from the upper surface of the bedrock will be concentrated sufficiently for a spring to form. However, a moderately thin layer of soil allows water coming from the fractures to spread through it to be quickly lost by evaporation. Most springs occur in the heads of steep valleys where emerging ground water will have a good chance of being concentrated. Springs would be larger and more abundant if it were not for the fact that the soil tends to creep down the slopes toward the valleys and thus tends to cover the openings through which water might otherwise issue.

Their low yield and unfavorable locations in valleys prevent springs from being extensively used, although they are a source of water for some rural dwellings. The available analyses indicate that spring water contains much less mineral matter in solution than does well water, chiefly because spring waters generally circulate more rapidly and at shallower depths through the rocks. The water of spring D, Davidson

County, contains 99 parts per million of dissolved solids, more than that from any other spring whose water was analyzed, although it flows from gabbro, one of the most soluble rocks in the area. Typical well water from the same type of rock contains 100 to 400 parts per million of dissolved solids.

QUALITY OF GROUND WATER

Ground water is almost everywhere of good chemical quality in the Statesville area. The water percolates through highly siliceous rocks, which are relatively insoluble in pure water, but which in the presence of water containing carbon dioxide are somewhat soluble. Although a large amount of water passes through the rocks, the water is in contact with the rocks a relatively short time. Consequently, the water is generally low in dissolved mineral matter.

Water from granite and granite gneiss normally contains no undesirable quantities of dissolved solids. Although mica schist contains water low in mineral matter, in some places it contains iron in objectionable amounts. Water from diorite and hornblende gneiss contains almost three times as much mineral matter in solution as does water from granite, although rarely are the ingredients concentrated in undesirable quantities.

From the standpoint of chemical character of the rocks and of the water derived from them, the rocks of the Statesville area, like those of the Charlotte area to the south (LeGrand and Mundorff, 1952, p. 14), may conveniently be divided into two groups. The first includes granite, granite gneiss, mica schist, slate, and rhyolite flows and tuffs—rocks approximating granite in composition. The second group includes diorite, gabbro, hornblende gneiss, and andesite flows and tuffs—rocks approximating diorite in composition. Table 1 shows a classification of ground water in the area based on these two groups of rocks.

The chemical quality of ground water in each county is discussed in each county section. Analyses of water from wells and springs, prepared by the U. S. Geological Survey, follow the table of well data for each county.

TABLE 1.—SUMMARY OF CHEMICAL ANALYSES OF WELL WATER IN THE STATESVILLE AREA, N. C.
Parts per million

	Granite[1]				Diorite[2]				Granite and diorite[3]			
			Range				Range				Range	
	Median	Mean	Low	High	Median	Mean	Low	High	Median	Mean	Low	High
Silica (SiO_2)	27	27.5	10	39	32	33.8	21	50	30	29.9	24	36
Total iron (Fe)	.11	.26	.02	1.70	.21	.60	.06	5.70	.09	.21	.02	.76
Calcium (Ca)	8	9.3	2	37	21	35	4	174	7	12	6	22
Magnesium (Mg)	2	2.9	1	8	5	6.3	1	22	3	3	2	5
Sodium and potassium (Na+K)	7	7.7	4	13	10	11.7	3	35	8	7.8	6	11
Carbonate (Co_3)	0	0	0	0	0	0	0	0	0	0	0	0
Bicarbonate (HCO_3)	43	45.6	12	132	86	87.6	33	229	50	61.3	40	99
Sulfate (SO_4)	2	5.7	1	34	10	38.6	1	391	4	6.5	2	13
Chloride (Cl)	2	4.5	1	18	3	16	1	204	1	1.4	1	2
Fluoride (F)	.1	.29	0	1.5	.1	.3	0	2.2	.1	.14	.1	.2
Dissolved solids	80	81.4	25	187	175	196.6	70	696	80	93.4	77	120
Total hardness as $CaCO_3$	27	34.5	8	121	94	113.1	17	449	28	42.4	22	71
pH	6.5	6.55	5.8	7.0	7.0	7.12	6.3	8.2	6.7	6.88	6.6	7.6

[1] Water from wells in granite and granite gneiss. Represents 14 samples.

[2] Water from wells in diorite, gabbro, and hornblende gneiss. Represents 25 samples.

[3] Water from wells that penetrated both granite and diorite, and both granite and hornblende gneiss. Represents 8 samples.

FLOOD-PLAIN DEPOSITS

Many streams in the Statesville area are bordered by flat lowland areas, or flood plains, which are underlain by deposits of sand and gravel. The deposits, not shown on the geologic maps, are generally not thick or extensive.

These deposits have not been utilized as a source of ground water. Mundorff (1950) made a preliminary survey of the flood-plain deposits of the streams in the Piedmont and mountain provinces of North Carolina to determine their significance as water-bearing deposits. He made shallow test borings at one place in Catawba County, three places in Davidson County, and three places in Rowan County (1950, p. 3) and reached the general conclusions (p. 20) that:

> "The flood-plain deposits along many of the streams in the Piedmont and mountain sections of North Carolina at many places appear to contain deposits of permeable sands and gravels of sufficient thickness and extent to furnish large quantities of water to lines of wells or to galleries parallel to the streams where their perennial flow is adequate. Recharge from the stream would be induced by pumping the wells or galleries and lowering the water table below stream level. At many places one to several million gallons of water a day could be obtained by this method, and at some places, particularly in the western part of the State, where the flood-plain deposits appear to be thicker, substantially larger supplies might possibly be obtained."

The present study confirms the conclusions that Mundorff reached. Until a real effort is made to develop water supplies from these deposits it can be said that the ground-water resources of the Statesville area have not been fully explored.

YIELD OF WELLS

Data on 821 wells are tabulated and given with the county descriptions in this report. Tables were prepared showing the average depth, average yield, and other pertinent data for all drilled wells 3 inches in diameter or larger for which there were sufficient data.

Unless otherwise noted, the term "yield" as used in this report represents the quantity of water that a well is known to be capable of yielding. Because the yield of a well increases almost directly with an increase in drawdown of the water level, it would be desirable to know the drawdown at which a certain yield was measured. Unfortunately, most of the records are incomplete, in that the drawdown for the reported yield is seldom known. Therefore, the yield recorded for a well may be the maximum or only a fraction of the supply available.

It has long been known that the yields of individual wells show a great range in the area, even though they are in the same type of rock and are similar in depth and topographic location. One well may be an excellent producer, whereas another a short distance away may be a poor producer. Because the yield is generally the most important consideration, a large part of the study was devoted to a determination of the factors controlling the yield of individual wells. Unfortunately, it is not possible to determine with any degree of accuracy the yield of a well until water is pumped from it. However, the present study shows that if proper consideration is given to the factors affecting the yield it is generally possible to get an adequate water supply. Moreover, frequent curves have been drawn from the data (p. 20) from which it is possible to determine the chances of a well producing a given amount of water.

The entrance and movement of water into the ground are governed by certain geologic factors which need consideration. These factors, which furnish the criteria for selecting favorable well sites, are thickness of residuum, structure, rock type, and topography.

THICKNESS OF RESIDUUM

The land surface in most of the Statesville area is underlain by a layer of soil and weathered material called mantle rock or residuum. This residuum may be absent or a few feet thick in some places and more than 100 feet thick in other places. It averages about 35 feet thick. Although the contact between the residuum and underlying bedrock may be sharp, there is generally a gradational zone between them. The residuum is generally thick on broad, gently rolling uplands and thin on steep slopes.

The residuum is the result of chemical weathering of the underlying rock. A thick residuum may indicate that water could move with ease down through it and into some of the fractures in the underlying bedrock. Also, the thick layer of residuum, which generally is highly porous although not necessarily very permeable, serves as a reservoir to feed water into the fractures. This reservoir in thick residuum causes wells that penetrate the underlying bedrock to have a steady yield through the year, almost unaffected by droughts.

The depth to which a well is cased generally indicates the thickness of the residuum because most wells are cased to bedrock. A number of wells have been deepened by drilling in old dug or bored wells, themselves perhaps bottoming on bedrock, which procedure necessitated extending the casing several feet into the bedrock. Consequently, no definite relations could be established by plotting the depth of casings of the wells against the yields of the wells. Nevertheless, it is generally agreed that a well penetrating several tens of feet of residuum has a better chance of being successful than one penetrating only a few feet.

STRUCTURE

Almost all the rocks in the Statesville area have some structural planes along which are openings capable of transmitting water. Some of these structural planes may be due to faulting and folding (the latter resulting in so-called planes of schistosity). Others have developed along the borders of intrusive rocks and still others develop from other causes. All the openings made by the structural planes may, for the sake of convenience, be called joints.

Joints, generally trending northeastward and dipping steeply, are very prominent in the schists, slates, and gneisses. They generally are parallel and closely spaced, and consequently the openings may be small. Inasmuch as they form the major type of joints, the yield of wells penetrating them will depend largely on the size and number of openings, their continuity with sources of recharge, and the constancy of infiltration into them. Most of the intake area for such wells occurs where the penetrated schistose joints crop out or where they are in contact with the overlying residuum. If this intake area is on a steep hill where runoff is great and influent seepage is slight, the well may be a small producer. Therefore, it would be desirable to locate a well where the outcropping joints have access to the influent seepage (Herrick and LeGrand, 1949, p. 21), though in few cases is it possible to do this deliberately because the schistose rocks are generally covered by residuum.

Other types of joints cut the rocks at various angles, some of the joints having definite patterns of alinement. Wells drilled at places where the rock is closely jointed and sheared will generally yield more water than wells drilled in massive rocks. These joints must intersect each other and have contact with the residuum in order to transmit water continuously to a well. A type of jointing characteristic of massive rocks such as granite is called sheeting, or large-scale exfoliation. These joints are almost horizontal, being nearly parallel to the land surfaces but somewhat flatter. Their convexity on hills causes ground water to drain quickly toward the valleys (LeGrand, 1949, p. 110). Rocks that show pronounced sheeting yield considerably more water to wells in lowlands than on hills.

Veins and dikes commonly penetrating the rocks are nearly everywhere jointed or have joints along their contacts with the host rock. Stuckey (1929, p. 10) and Mundorff (1948, p. 26) have shown that quartz veins are very brittle and that water-bearing fractures in these veins are the source of supply for many successful wells. Even though rock outcrops may be scarce, there is generally evidence of the existence of a quartz vein in the form of white, resistant boulders of quartz on the surface.

EFFECT OF TOPOGRAPHIC LOCATION

In accordance with the method used by Mundorff (1948, p. 30), table 2 has been prepared to show the number of wells, average depth, and average yield of wells in five different types of topographic locations in the Statesville area. Figure 6 illustrates the five types. Although the classification appears to be a convenient one, the types grade into one another and it is not always easy to decide to which type a given well site should be assigned.

The most striking features of the table are the large number of wells drilled on hills and their relatively low yields. The average yield of a well on a hill is about half that of a well on a flat or slope and several times less than that of a well in a draw or valley. Wells in draws have the highest average yield, although only a small percentage of all wells are located in draws. It can be concluded from the table that most wells are located where there is the least chance of getting a large supply of water.

Explaining why wells drilled on hills yield less water than wells drilled in other locations Mundorff (1948, p. 31) says:

"There are several reasons why wells drilled on hills yield less water than wells drilled in other locations. In homogeneous rocks, hills are apt to be formed because the underlying rock is more resistant to erosion than it is in the surrounding area. In some places the greater resistance is due to a difference in rock which makes it harder but in most places the rock has more resistance to erosion because it is less jointed or fractured. Joints and fractures facilitate entrance of ground water which promotes chemical decay and permits mechanical erosion. Thus, depressions such as draws and valleys suggest that the rock underlying the depressions has more openings through which ground water can move than the rock underlying the hills. Flat areas usually are peneplane remnants and do not indicate anything about the resistance of the underlying rock. Theoretically, wells in flat areas should have about the same yield as the average for wells in all topographic locations. Actually, the average yield is somewhat larger than the average for all topographic locations possibly because in the flat areas recharge to ground water is apt to be greater than elsewhere. However, the average yield for all locations is lowered by the large number of wells drilled on hills as compared to the number of wells drilled in draws and valleys.

In non-homogeneous rocks such as the bedded gneisses and schists and the Triassic sedimentary rocks, the topography in many places is often controlled by the relative ease of circulation of ground water, just as in homogeneous rocks. In the bedded rocks, however, circulation of water occurs along cleavage and bedding planes as well as along joints and fractures. Where bedding planes and cleavage planes dip steeply, most wells will end in the same kind of rock as that exposed within a few hundred feet of the well.

A second reason that wells on hills yield less water than wells in valleys and draws is that the direction of movement of the ground water is towards the valleys where it discharges into the streams; therefore, the natural movement of the ground water is away from the wells drilled on the hills and toward the wells drilled in the valleys.

Draws include minor depressions which may or may not contain small streams. The distinction between a draw and a valley is more or less arbitrary and depends upon the interpretation of the observer. As used here, small, relatively narrow depressions with angular or rounded sides and bottom are considered to be draws. Valleys are much larger and generally have a flood plain or bottomland and a perennial stream. It seems probable that the reason for the better record of wells in draws is because the draws more exactly mark the location of the structural weakness in the rocks. Valleys may have originated at their present location because of a zone of weakness but this zone of weakness may be relatively small in comparison with the present size of the valley. Therefore, most of the wells drilled in the valleys quite possibly are not drilled into the zone of weakness that originally determined the course of the stream. On the other hand, a well drilled in a relatively narrow draw will have a very good chance of striking the zone of weakness. It would seem, then, that the minor topographic features are more important in choosing a well site than the larger features."

TABLE 2.—AVERAGE YIELD OF DRILLED WELLS ACCORDING TO TOPOGRAPHIC LOCATION

Topographic location	Number of wells	Average depth (feet)	Yield (gallons a minute)		
			Average	Per foot of well	Per foot of well below water Table[1]
Hill	213	233	11	0.06	0.07
Flat	114	215	30	.14	.17
Slope	156	224	27	.12	.14
Draw	14	280	75	.27	.31
Valley	23	155	35	.23	.29
All wells	520	224	24	.11	.13

[1] Assuming the water table to be an average of 35 feet below the surface.

EFFECT OF TYPE OF ROCK

The type of rock penetrated by a well may have a considerable bearing on the amount of water yielded. Except for the granular rocks of Triassic age, the rocks of the Statesville area are dense, and the interlocking of the mineral grains prevents circulation of water through the rock mass. Although the rocks may have similar primary characteristics, each type has responded differently to the structural forces and weathering to which it has been subjected since its formation. Consequently, the rock types are different in the readiness with which they yield water to wells penetrating them.

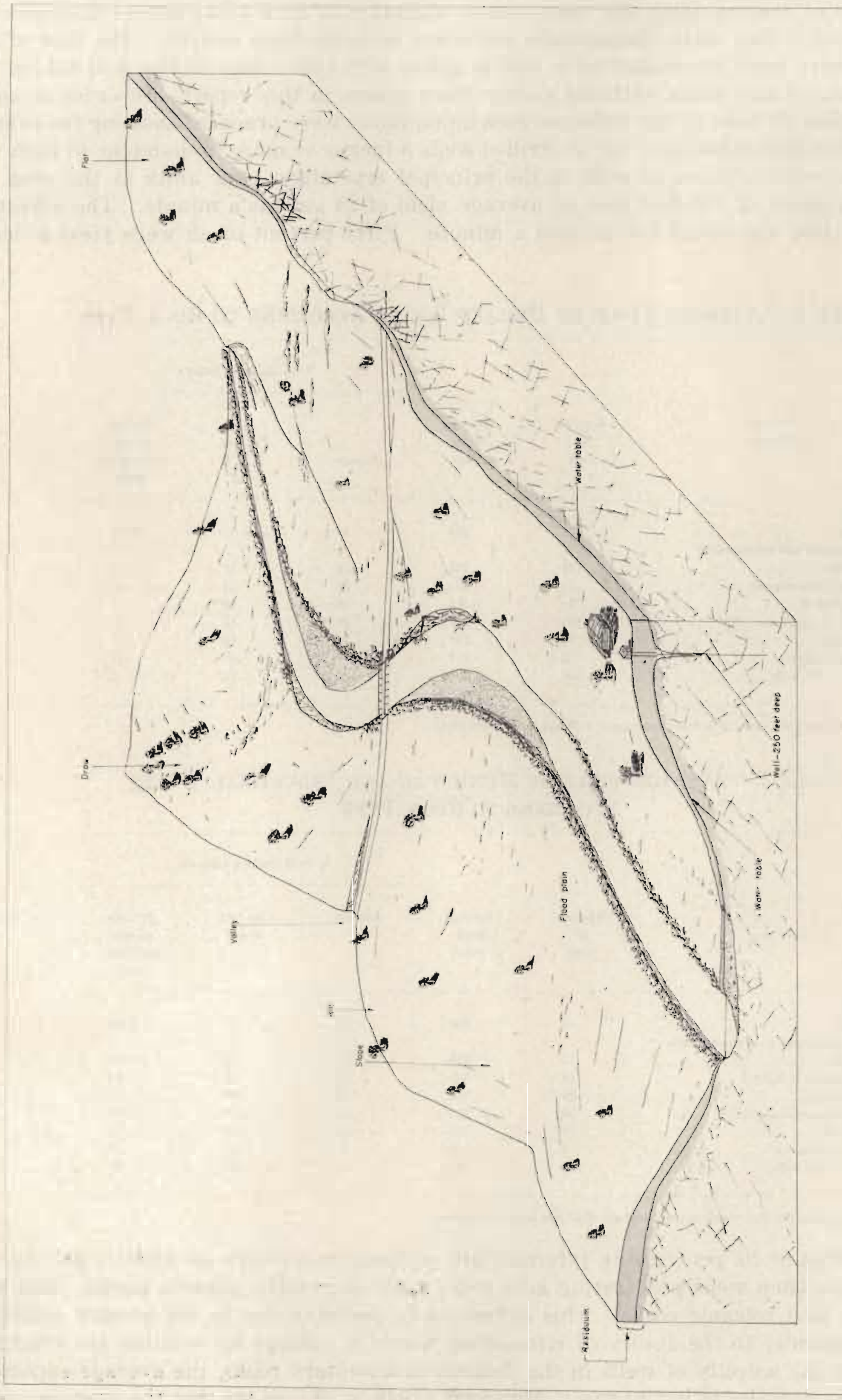


FIGURE 6.—*Diagrammatic sketch showing the types of topography discussed in this report, the decrease in joints with increasing depth in the bedrock, and some of the interrelations of the residuum, the water table, and the topography.*

The areas in which the different rock units occur are shown on individual county maps in the text. The reconnaissance nature of the mapping and the common variation of rock types within distances of tens of feet or even fractions of a foot make the geologic maps less accurate than desired. The type of rock penetrated or thought to have been penetrated by a well is given with other data in the well tables. The data on 821 wells are tabulated and given with the county descriptions in this report. In order to compare the water-yielding properties of wells in the different rock units, tables were prepared showing the average depth, average yield, and other important data for all drilled wells 3 inches or more in diameter in each rock unit.

Table 3 shows the relative yields of wells in the principal crystalline rock units in the area. The 520 wells have an average depth of 225 feet and an average yield of 24 gallons a minute. The lowest yield was zero and the highest yield was about 500 gallons a minute. Fifty percent of all wells yield at least 15 gallons a minute.

TABLE 3.—AVERAGE YIELD OF DRILLED WELLS ACCORDING TO ROCK TYPE

Rock type	Number of wells	Average depth (feet)	Yield (gallons a minute)		
			Average	Per foot of well	Per foot of well below water table[1]
Granite	75	254	17	0.07	0.08
Granite gneiss and schist-granite complex	175	205	23	.11	.14
Granite-diorite complex	21	258	35	.14	.16
Gabbro-diorite	54	302	30	.10	.11
Hornblende gneiss and schist	104	214	29	.13	.16
Mica schist	58	232	22	.10	.11
Slate and volcanics	33	133	15	.11	.15
All wells	520	225	24	.11	.13

[1] Assuming the water table to be an average of 35 feet below the surface.

TABLE 4.—AVERAGE YIELD OF MUNICIPAL AND INDUSTRIAL WELLS ACCORDING TO ROCK TYPE

Rock type	Number of wells	Average depth (feet)	Yield (gallons a minute)		
			Average	Per foot of well	Per foot of well below wate table[1]
Granite	14	506	27	0.05	0.06
Granite gneiss and mica schist-granite complex	37	320	32	.10	.11
Granite-diorite complex	10	328	52	.16	.18
Gabbro-diorite	29	413	38	.09	.10
Hornblende gneiss and schist	30	373	60	.16	.18
Mica schist	19	395	38	.10	.11
Slate and volcanics	4	260	31	.12	.14
All wells	143	377	41	.11	.12

[1] Assuming the water table to be an average of 35 feet below the surface.

The table shows that wells penetrating intermediate or basic rocks such as diorite, gabbro, and hornblende gneiss yield more than wells penetrating acid rocks such as granite, granite gneiss, mica schist, and the slates and related acid volcanic rocks. This difference is probably due to the greater solubility of the basic rocks and consequently to the ability of circulating water to enlarge by solution the fractures in the basic rocks. Owing to the scarcity of wells in the Triassic sedimentary rocks, the average expected yield of wells penetrating these deposits is not known. Mundorff (1948, p. 29) shows that the average yield of wells in similar rocks of Triassic age is 17 gallons a minute.

Table 3 does not necessarily give a true picture of the water-yielding characteristics of each rock because it includes data on domestic wells, whose yields in most cases are below the potential yields and below the reported yields of municipal and industrial wells. Table 4, summarizing the data for municipal and industrial wells which represent attempts to obtain the largest possible yields, also indicates that the basic rocks yield more water than the acid rocks. It shows that hornblende gneiss is the highest-yielding rock in the area. The average yield of municipal and industrial wells is higher than that of domestic wells because they are deeper and because they are pumped at a higher rate, resulting in greater drawdown and a lower pumping level.

RELATION OF DEPTH OF WELL TO YIELD

The relation of the depth of a well to the amount of water the well will yield is given in table 5.

Table 5 indicates that the deep wells have higher average yields than shallow wells. This apparent relation may be misleading because the greater yield of deep wells is due, not so much to the greater depth, but to the fact that deep wells are generally for municipal and industrial purposes and consequently are pumped at greater rates and have greater drawdowns than shallow wells, most of which are drilled for domestic supplies and are stopped when it becomes apparent that an adequate supply has been obtained. Table 5 shows that wells less than 100 feet deep have a greater average yield per foot of well than wells in any other depth range. It also shows that the yield per foot of well for wells more than 250 feet deep is much less than that of wells of shallower depth.

The fact that most wells do not increase their yields appreciably with increasing depth is due to the decrease in number and size of fractures with depth.

If a satisfactory supply of water is not available at a certain depth, it is, of course, difficult to decide how much deeper to drill. As a matter of hindsight it appears that some wells abandoned at depths greater than 400 feet because of lack of water should have been abandoned at much shallower depths; on the other hand, many wells abandoned at depths of about 150 feet might have yielded good supplies if they had been drilled deeper. The depth at which an inadequate well should be abandoned is largely an economic problem of the well owner.

TABLE 5.—AVERAGE YIELD OF DRILLED WELLS ACCORDING TO DEPTH

Range in depth (feet)	Number of wells	Average depth (feet)	Yield (gallons a minute)		
			Average	Per foot of well	Per foot of well below water table[1]
0–100	100	80	18	0.22	0.49
101-150	139	126	19	.15	.21
151–200	91	175	19	.11	.14
201–250	52	222	20	.09	.11
251–300	28	281	28	.10	.11
Deeper than 300	110	509	42	.08	.09
All wells	520	225	24	.11	.13

[1] Assuming the water table to be an average of 35 feet below the surface.

Drilling to great depths in the rocks of the Statesville area is seldom justified; if adequate water is not obtained above depths of 250 or 300 feet, there is little chance of obtaining a large amount at greater depths. However, as Mundorff (1948, p. 32) points out, if the well yields 40 gallons a minute at 250 feet and a yield of 50 gallons a minute is desired, the chances are good that the additional water can be obtained by drilling 75 or 100 feet more.

PROBABILITIES OF SUCCESSFUL WELLS

How much water can a prospective well owner expect his well to yield? Unfortunately no positive answer can be given to such an important question because the conditions in the underground reservoir penetrated by one well are not the same as those in the reservoir penetrated by another. The most important factors that control the yield of wells have been discussed, and an understanding of them will help solve most well problems.

Because there is a wide range in yields of individual wells, the yields were separated into convenient size groups, and tables showing their frequency distribution were constructed. Curves were constructed from these tables showing the percentage of wells for which the yields are equal to or more than any specified amount.

The lower curve of figure 7 reveals the frequency of wells yielding at least a certain amount, this curve including industrial, municipal, and domestic drilled wells. The data are not altogether accurate, the reported yields being too high in some cases and too low in other cases. Nevertheless, there appears to be a nearly complete compensation of the inaccuracies in the data, and consequently the curve is thought to be repre-

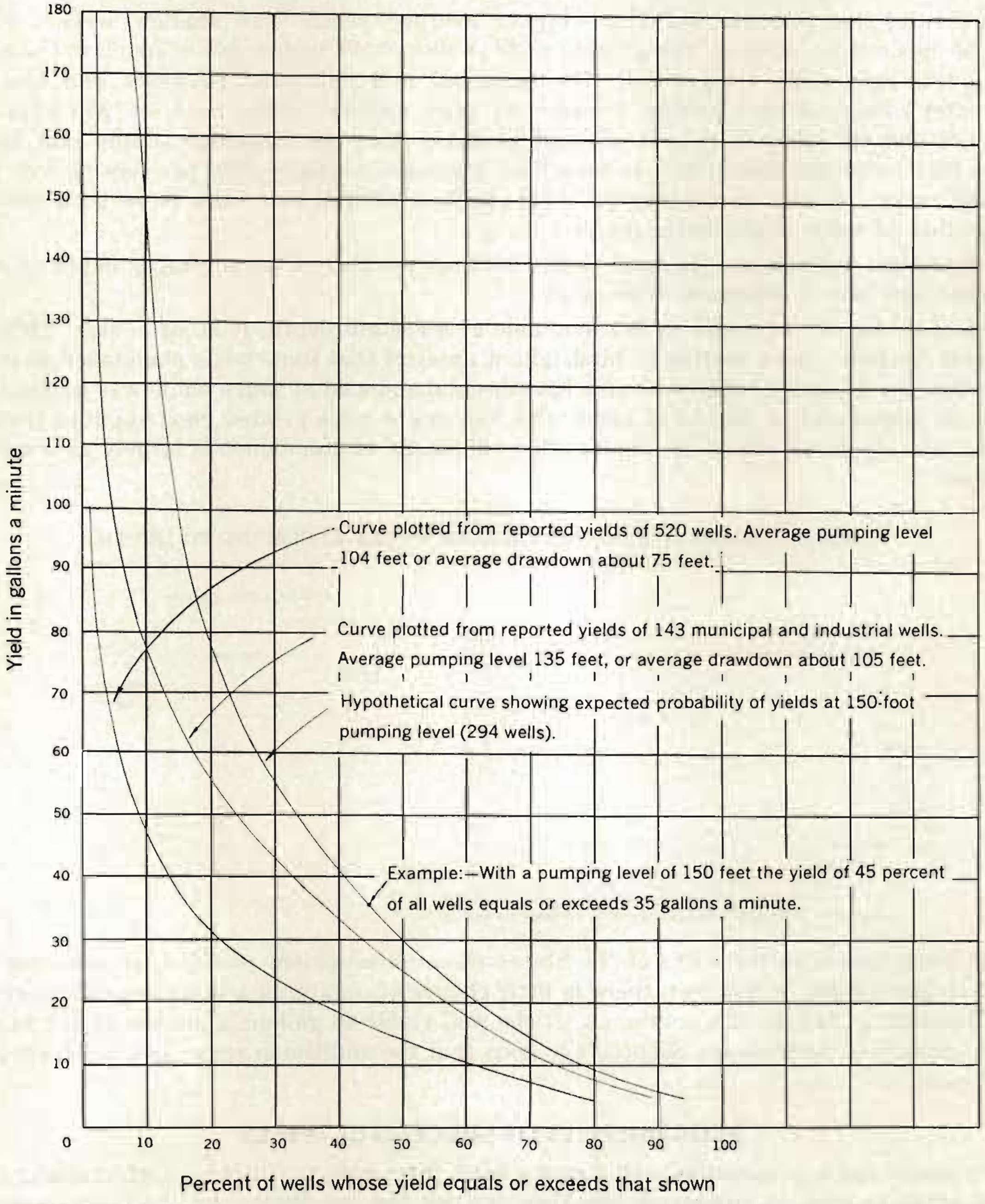


FIGURE 7.—*Probability Curves of Yields of Wells in the Statesville Area.*

sentative of actual conditions. The middle curve represents the frequency of yields of industrial and municipal wells. Wells plotted on this curve naturally have higher expected yields than those on the lower curve because they are pumped at greater rates.

The upper curve is a hypothetical curve which attempts to show the expected frequency of yields at a pumping level of 150 feet. The curve was derived in the following way: The specific capacity (yield per foot of drawdown) for each well on which data were available was determined, and the yield of each well was then calculated at a pumping level of 150 feet. The calculated yield was then reduced by 30 percent so as to be conservative. (Many tests were of short duration, with bailer instead of pump, and consequently the water level may still have been lowering at a given rate of withdrawal when the tests ended. The reported yields of these wells, therefore, may have been too great. The calculated yield may also have been too great because the specific capacity of a well under water-table conditions may be less with greater drawdowns. The correction of 20 percent is arbitrary but is considered reasonable.) After the corrected yields for the wells were calculated they were grouped in frequency-distribution tables and then plotted as the upper curve. Although this curve is not based on precise data, the fact that it is a "higher yielding" curve and similar to the municipal-and-industrial curve, which represents a pumping level of 135 feet, suggests that it is usable.

The wells used in plotting the lower curve were separated according to topographic locations and replotted as curves on figure 8. These curves show clearly the relative merits of topographic locations. For example, the percentage of wells yielding 30 gallons a minute or more on hills is 9, on slopes 31, on flats 46, and in valleys or draws 64.

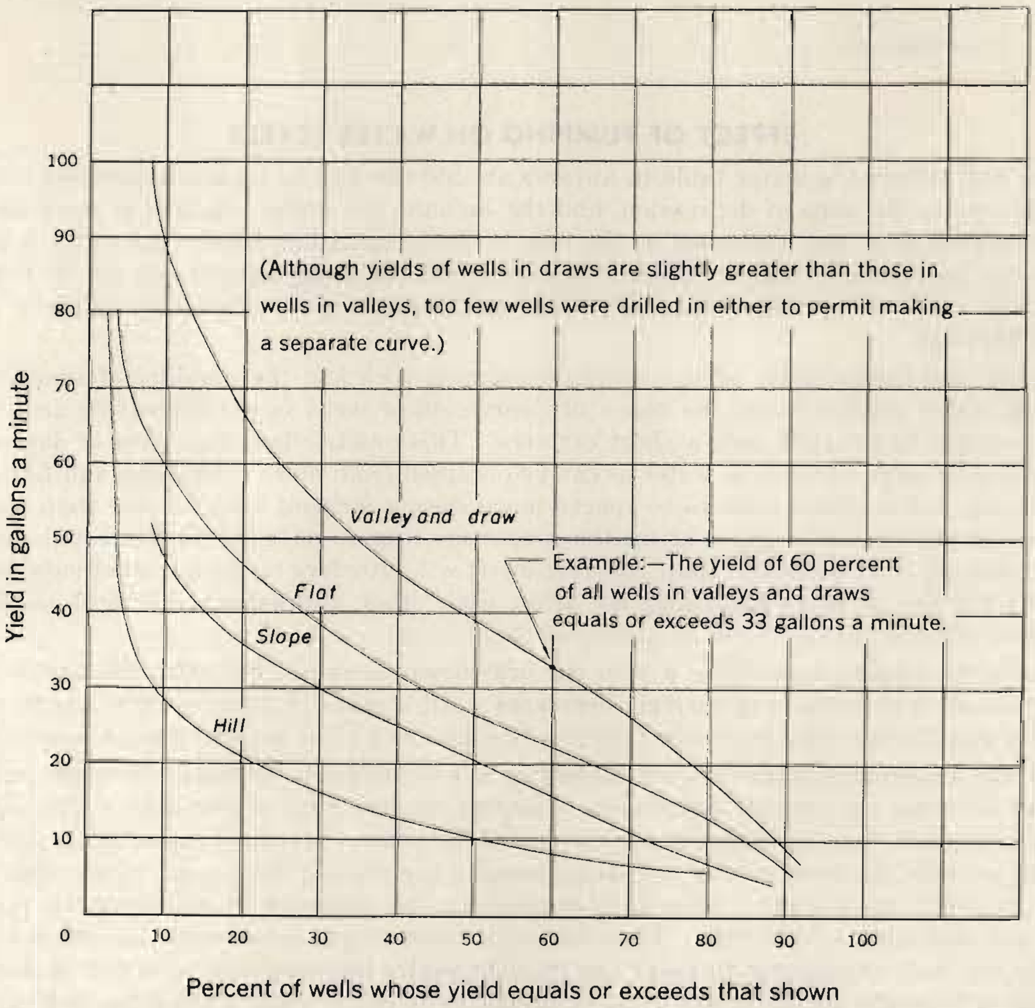


FIGURE 8.—*Probability curves of yields of wells in the Statesville area according to topographic location.*

The curves do not distinguish the merit of wells according to depth or to type of crystalline rock penetrated. Figures of yield taken from the curves might be too great for wells in bare granite and they might be too low for wells penetrating hornblende gneiss under a heavy mantle of soil. Nevertheless, the curves are believed to be adaptable to most conditions in the crystalline rocks of the Statesville area.

The amount of water that a particular well may be expected to yield is decided largely by factors that cannot altogether be predetermined. Not knowing what the yield of his proposed well will be except that it probably will be between zero and 500 gallons a minute, the well owner is likely to have such a confused philosophy about underground water that he may discredit all factors except luck or chance. But when we consider a large number of wells, chance no longer decides. Of the industrial and municipal wells, at least 60 percent will yield more than 18 gallons a minute, at least 40 percent will yield more than 33 gallons a minute, and at least 20 percent will yield more than 54 gallons a minute. These probabilities are derived from the records of existing wells whose locations were selected for convenience. Their locations were mostly unfavorable for large supplies. Consequently, the probabilities of large yields would have been still greater if the wells had been more favorably located.

Table 6, below, shows the frequency pattern of municipal and industrial wells whose yields are within certain ranges.

TABLE 6.—RANGE IN YIELD OF MUNICIPAL AND INDUSTRIAL WELLS IN THE STATESVILLE AREA.

Yield (gallons a minute)	0-5	6-10	11-20	21-40	41-80	More than 80
Percent of total wells	9	9	19	25	30	8

EFFECT OF PUMPING ON WATER LEVELS

Pumping a well lowers the water table in an area around the well to form a depression in the water surface, which is known as the cone of depression, and the amount the water surface is lowered is the drawdown. The drawdown in a well increases as the rate of pumping is increased. As water is pumped out of a well more water moves in to take its place. When the rate of pumping exceeds the rate of recharge, or replenishment, the cone of depression becomes larger and deeper until sufficient recharge is intercepted to balance the withdrawal.

The relatively low permeability of the weathered mantle rock and the inability of fractures in the bedrock to transmit water readily cause the cones of depression of wells in the Statesville area to deepen considerably while extending laterally only a short distance. This constriction of the cone of depression prevents a well from yielding as large a supply of water as can be obtained from more productive aquifers in other parts of the United States, but it allows wells to be spaced more closely without interference than would otherwise be the case. No exact rule can be given about the proper spacing of wells in the Statesville area, but it can be stated that generally two wells less than 200 feet apart will interfere with each other substantially, whereas wells spaced 1,000 feet or more apart may not affect each other appreciably. Almost no data are available to indicate locally the lateral extent of a cone of depression.

During the early stages of pumping a well the drawdown is rapid, but with continued pumping at a given rate the rate of drawdown progressively decreases until a state of near equilibrium is reached. This apparent state of equilibrium may be reached after a few hours or after several tens of hours of pumping.

In spite of the apparent equilibrium established in a well between discharge through pumping and recharge by water entering the cone of depression, a continuous lowering of water level has been noted in a few wells that have been heavily pumped over a period of years. In these cases it is probable that the rate of pumping exceeds the local rate of recharge, causing the cone of depression to broaden and deepen as more water is drawn from storage. This overpumping can be overcome by reducing the pumping rate or by letting the well rest some of the time. Unfortunately, some people erroneously use the lowering of water level in a particular well as evidence to point out that the entire underground reservoir is being depleted of water. Actually a lowering of the water level is necessary to cause water to flow toward the well and only a persistent lowering gives evidence of local overdevelopment of the ground-water supply.

COUNTY DESCRIPTIONS

In the following pages the geography, geology, and ground-water conditions of the Statesville area are described briefly by counties, in order from west to east and north to south: Alexander, Catawba, Iredell, Davie, Rowan, and Davidson. With each county description are included two maps, one showing the geology and the other the location of wells inventoried for this report. At the end of each county description are tables of well data.

Because much of the information about the wells was given from memory by well drillers and well owners, there are some inaccuracies. Moreover, some explanations about the data are necessary in order that the reader's interpretations will be reliable. For example, the depths of casing listed indicate the depth to hard, dense rock; this is especially true in the case of industrial and municipal wells, but some domestic wells have casing penetrating as much as 10 to 15 feet of bedrock because they were drilled in older dug or bored wells which themselves extended to bedrock. The water-bearing materials listed are reasonably accurate, although many wells penetrated two or more types of rock. The water levels listed are the static, or nonpumping, levels reported by the well drillers and owners or measured by the writer. The information about the yield of wells, in gallons a minute, varies greatly in degree of accuracy. Many of the yields listed are based on bailer tests, some of which may be inaccurate because the tests were of short duration. In others the drawdown was small and the potential yield of the well is much greater than is shown. As the yield increases with an increase in drawdown, in only a few cases are the yields known for individual wells at two or more pumping levels; some listed, especially in Catawba County, represent bailer tests rather than true pumping tests.

After the table of well data is a table of analyses of water from wells and springs in the county. The numbers at the heads of the columns are the numbers of the wells from which the water samples came.

Population figures given are from the 1950 census.

ALEXANDER COUNTY

(Area: 255 square miles. Population: 14,554)

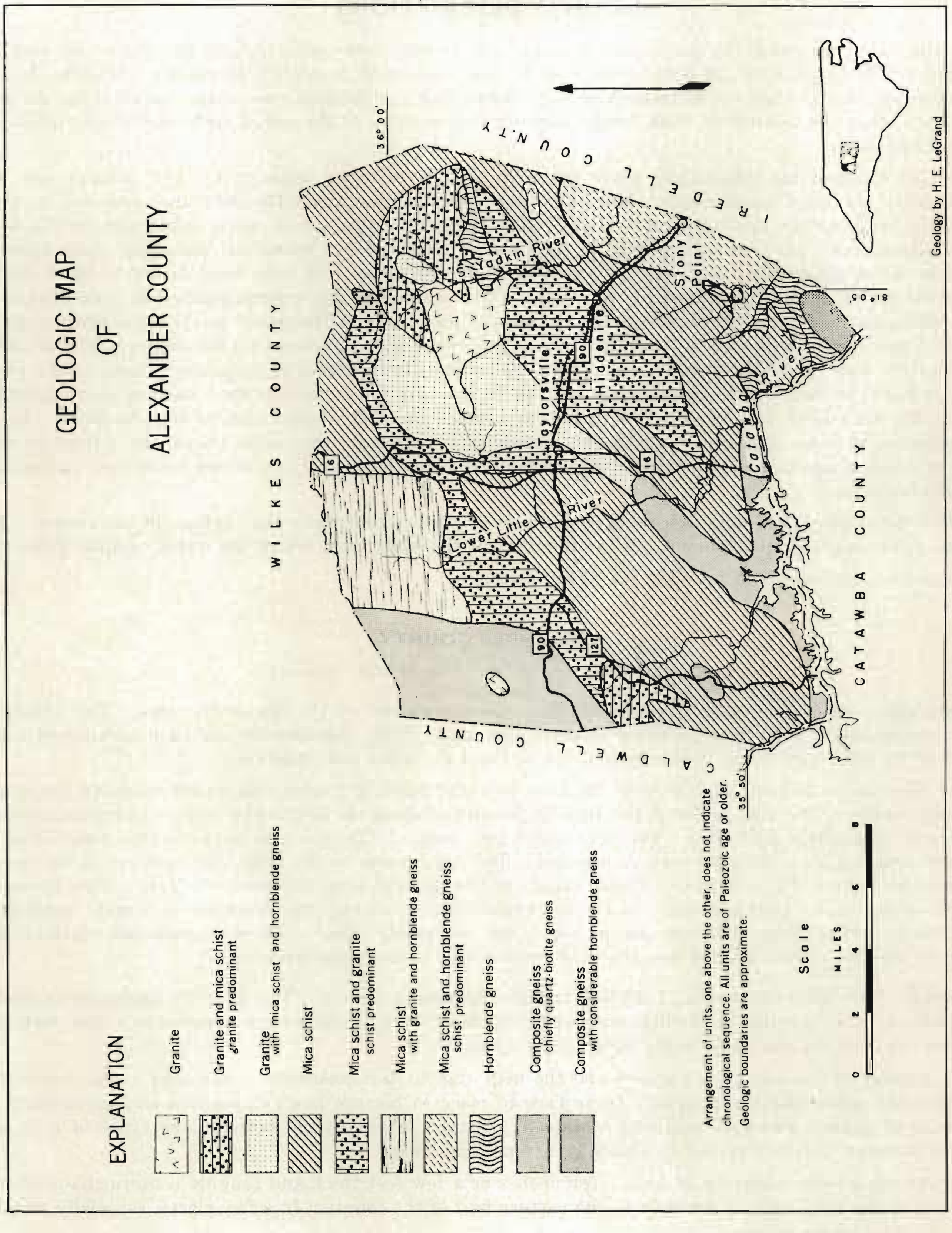
Geography.—Alexander County forms the northwestern corner of the Statesville area. The county is chiefly agricultural, the main crops being tobacco, corn, and cotton. Taylorsville, with a population of 1,310, is the only incorporated town; Hiddenite and Stony Point are other communities.

The topography is hilly, especially in the area west and north of Taylorsville where mountain peaks and ridges are common. Several peaks of the Brushy Mountains along the northern boundary of the county have elevations of more than 2,500 feet. The area south and east of Taylorsville is a southeastward-sloping peneplain dissected by a close network of streams. The headwaters of the larger streams are in the mountain sections in the north and west. The drainage in the general area northeast of Taylorsville is southeastward to the South Yadkin River. In the remainder of the county the drainage is largely southward toward the Catawba River. The streams are swift and commonly clear. Their courses are devious and apparently are not closely related to structural weaknesses in the underlying rocks.

Geology.—An immense series of schists underlie Alexander County. The schist in aggregate is mostly a quartz-mica rock, varying in fissility from place to place. In a broad sense it represents a host rock into which granite and various basic rocks have been intruded.

The geology of the county is complex and the map (fig. 9) is necessarily generalized. One reason for this is that the schist changes gradually from place to place in texture and composition and particularly in the amount of granite and basic material contained. Distinct local contacts between the types of rock are, of course, common, but they cannot be shown on a small-scale map.

Hornblende gneiss, occurring as beds a few inches or a few feet thick and roughly conformable with the schistosity of the host rock, is common in the eastern half of the county. In a few places, especially in some valleys, it forms larger masses.



Arrangement of units, one above the other, does not indicate chronological sequence. All units are of Paleozoic age or older. Geologic boundaries are approximate.

Geology by H. E. LeGrand

FIGURE 9.—*Geologic map of Alexander County.*

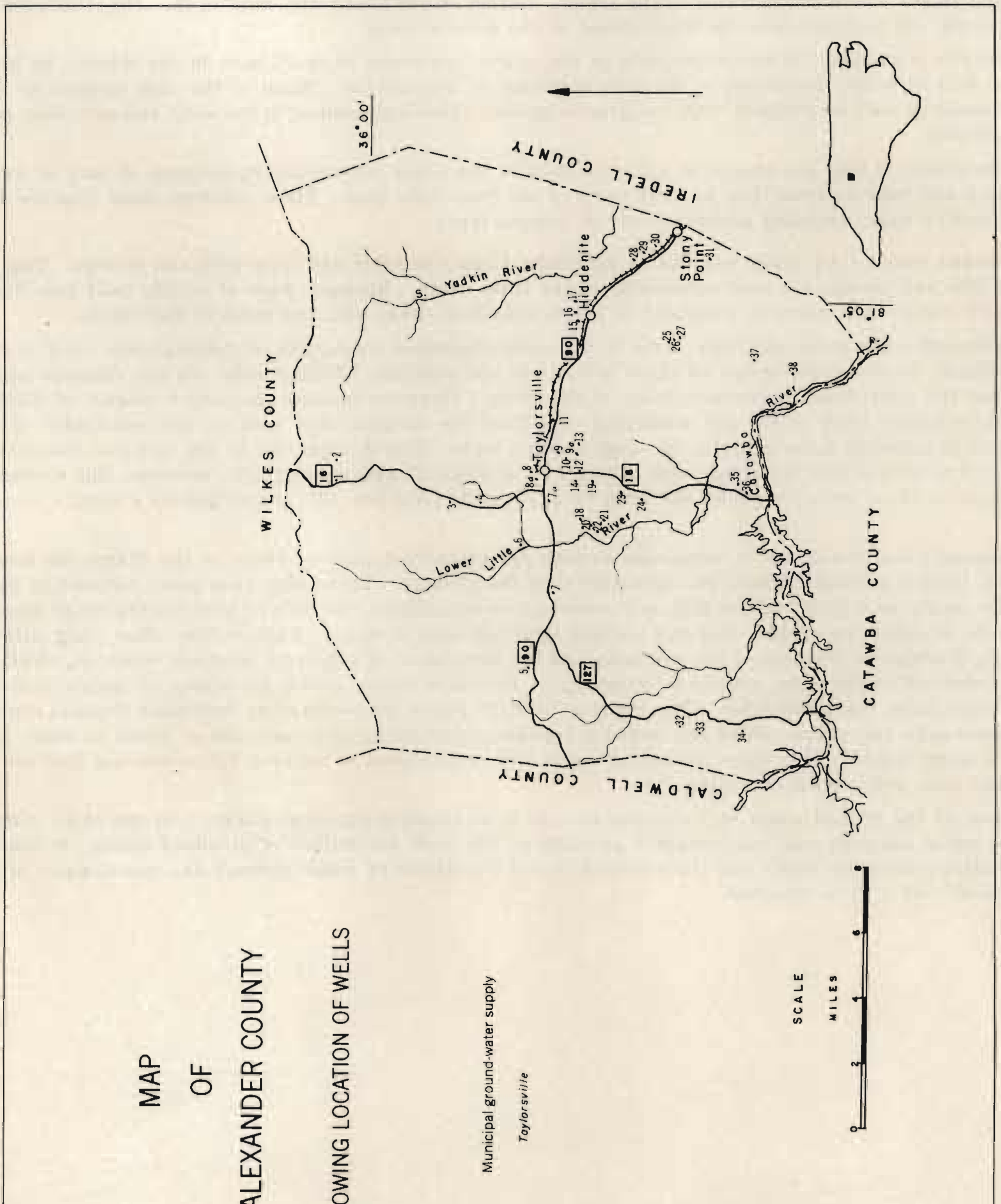


FIGURE 10.—*Map of Alexander County showing location of wells.*

Sillimanite is a common mineral in the quartz-mica schist. Its relative insolubility results in pronounced hills and ridges where concentrated in the schist. Garnet also is locally abundant in the schist; its presence darkens the soil and increases the iron content of the ground water.

Granite is abundant in almost all parts of the county, generally as small beds in the schist. In larger masses it is especially prominent in the area northeast of Taylorsville. Much of the area mapped as mica schist could as well be grouped with the granite gneiss, which is prominent in the south and northwest parts of the county.

The county is hilly and erosion is active on most of the slopes. Consequently, outcrops of bare or weathered rock are more common than in other parts of the Statesville area. These outcrops show that the beds are tipped on edge, revealing alternate beds of varying types.

Ground water.—All water supplies in Alexander County are obtained from wells and springs. Dug and bored wells and springs are used extensively in the rural areas. Springs, most of which yield less than 5 gallons a minute, are common, especially in the mountainous areas west and north of Taylorsville.

Although some rocks and some parts of the county doubtless are capable of yielding more water to wells than others, detailed information on these points was not obtained. Drilled wells are not common enough to reveal the water-bearing characteristics of the rocks. However, because the area southeast of Taylorsville has a deeper layer of soil and weathered rock than the mountainous area in the remainder of the county, it is probably more favorable for large-yielding wells. This is suggested by the fact that the average yield of 9 municipal and industrial wells in this area is about 67 gallons a minute; however, this average is high because three wells owned by the town of Taylorsville yield 300, 125, and 80 gallons a minute, respectively.

Ground-water conditions in Alexander County are probably typical of those in the Statesville area in general, though perhaps slightly less favorable than the average. There may be a great contrast in yields of wells locally as a result of the hilly and mountainous topography, the wells on hills yielding small amounts and wells on lower topographic features yielding large amounts of water. Factors that affect yield unfavorably are the relative thinness of the residuum and the abundance of relatively insoluble rocks, in which the enlargement of fractures by solution is retarded. A favorable factor is the prevalence of highly schistose rocks, containing many fractures. The streams in many places are bordered by flood-plain deposits containing coarse sand and gravel, which are probably capable of furnishing large amounts of water to wells; however, it seems unlikely that these sources of water will be developed in the near future because they are not near rail lines and population centers.

Most of the ground water in Alexander County is of excellent chemical quality. Of the three samples of well water analyzed only one contained as much as 105 parts per million of dissolved solids. In view of the relatively insoluble rocks and the relatively rapid circulation of water through the rocks, water of low mineral content is to be expected.

RECORDS OF WELLS IN ALEXANDER COUNTY

Well no.	LOCATION	OWNER	Date Completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
1	7 miles N of Taylortville	Janfu Orchard	1947	Slope	533	6	37				
2	do	C. F. Brethall	1946	do	100	6	34		65	3	Pumping level 75 feet.
3	3 miles NW of Taylorsville	Woodside Grocery	1947	do	184	3	55		25	5	do
4	2 miles NW of Taylorsville	Clyde Herman		do	350	6	21	Mica schist	55	8	Pumping level 145 feet. Analysis.
5	6 miles W of Taylorsville	Allendale School	1940	do	210	6	55	do		6	
6	3 miles NW of Tayorsville	Kenneth Little		do	500	6	40	do		50	
7	4 miles W of Taylorsville	Luther Price	1949		172	6	114	do	55	5	
7a	1 mile W of Taylorsville	Clyde Watts		Slope	120	2		do			
8	Taylorsville	Town of Taylorsville	1948	do	565	8	98	do	200	125	Pumping level 310 feet.
8a	do	Schneider Mills	1947	Draw	210	8	32	do	75	80	
9	do	Town of Taylorsville	1946	do	400	8		do	25	300	Originally tested at 436 gallons a minute. Analysis.
9a	do	Floyd Adams	1950		332	6	22	do	58	10	
10	do	C. L. Earp	1946	Slope	150	6	81	do	16	8	Pumping level 80 feet.
11	1 mile E of Taylorsville	Alexander Ice & Coal Co.	1949	Hill	710	6	45	do	60	15	
12	1 mile S of Taylorsville	J. A. Gant	1949	Slope	117	6	40	do		20	Pumping level 75 feet.
13	do	G. O. Davis	1946	do	53	6	40	do	20	25	Pumping level 27 feet.
14	do	North Carolina Highway commission		Hill	247	6	40	do		30	
15	Hiddenite	E. E. Lackey	1945	Slope	235	6	25	Granite	15	1	
16	do	W. C. Lowe	1947	Flat	133	6	33				
17	do	W. W. Stockman	1945	Slope	138	6	81			4	
18	2 miles SW of Taylorsville	Taft Childers		do	111	6		Mica schist		20	
19	2 miles S of Taylorsville	Cecil Frye	1948	Hill	105	6		do		5	
20	3 miles SW of Taylorsville	Liledown Mill	1940	Slope	205	6	39	do	38	5	Pumping level 120 feet.
21	do	do	1940	Hill	215	6	76	do		5	
22	do	Brookwood Fabrics	1946	do	458	6	53	do	40	9	Pumping level 145 feet.
23	2 miles S of Taylorsville	G. G. Burgess	1942	Slope	205	6	37	do		15	
24	3 miles S of Taylorsville	Alexander County Home		do	235	2		do			Analysis.
25	2 miles S of Hiddenite	J. W. Morrison	1948	Hill	110	6	35	do		9	
26	do	C. M. Allen	1944	do	100	6	40			0	
27	do	Glenn R. Allen	1944	do	203	6	60			1	
28	2 miles NW of Stony Point	Worth Spinning Company		Slope	300	8		Mica schist	50	50	Pumping level 150 feet.
29	1 mile NW of Stony Point	Stony Point School	1947	do	260	6	16		65	2	
30	do	do	1947	do	556	6	54		54		
31	1 mile SW of Stony Point	Stacy Martin	1942	do	64	4	64			10	
32	9 miles SW of Taylorsville	Horney Deal		Flat	170	6	100	Mica schist		10	
33	do	Howard Richie		Hill	100	2		do			
34	10 miles SW of Taylorsville	Bethlehem School	1940	Flat	252	6	56			8	
35	6 miles S of Taylorsville	Wittenburg School	1947	Slope	201	6	88	Mica schist	40	45	Pumping level 120 feet.
36	do	S. H. Jolley	1947	do	126	6	46	do	47	30	Pumping level 70 feet.
37	4 miles SW of Stony Point	Fred Fox	1947	Hill	130	6	40			7	
38	6 miles SW of Stony Point	Jatwell Alexander		do	200	2	40	Mica schist		1	

CHEMICAL ANALYSES OF GROUND WATER FROM ALEXANDER COUNTY
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	4	9	24
Silica (SiO_2)	8.0	28	30
Iron (Fe), Total	.16	.16	.78
Iron (Fe), in solution	.04		.03
Calcium (Ca)	1.6	16	9.0
Magnesium (Mg)	.4	1.6	2.4
Sodium and patassium (Na+K)	2.8	9.6	9.1
Carbonate (CO_3)	0		0
Bicarbonate (HCO_3)	8	56	44
Sulfate (SO_4)	1.3	16	13
Chloride (Cl)	1.8	3.0	1.6
Fluoride (F)	.0	.1	.1
Nitrate (NO_3)	1.7	.3	.0
Dissolved Solids	23	105	87
Total Hardness as $CaCO_3$	6	46	32
pH	6.1	6.8	6.9
Rock type	Mica schist	Mica schist	Mica schist
Date of collection	Aug. 30, 1951	Oct. 24, 1946	

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

CATAWBA COUNTY

(Area: 406 square miles. Population: 61,794)

Geography.—Catawba County is the most densely populated county in the area. Hickory, with a population of 14,755, is the largest community. Other towns are Newton, the county seat, Conover, Claremont, Catawba, and Maiden. Manufacturing of textiles, including hosiery, is the leading industry; furniture making also is an important industry. The fertile soils of most of the county are suitable for farming. Catawba County has an excellent system of paved roads and is served by two railroad systems.

Catawba County has a variety of topographic forms. The interstream areas represent a peneplain which has been dissected by moderately swift streams, most of which flow eastward or southeastward. A few mountains rise several hundred feet above the upland plain. The most prominent are Anderson Mountain, composed of quartzite, and Baker Mountain, composed of sillimanite schist. Many streams are as much as 150 feet below the general surface of the upland. The upland surfaces, in most places, are broad and smooth and are underlain by a thick layer of soil and decayed rock. With the exception of the quartzite and sillimanite schist, all the rocks weather readily, the hornblende gneiss in, and south of, the vicinity of Newton being especially susceptible to weathering.

The Catawba River forms the north and east boundaries and drains the entire county. Some of the small tributaries flow eastward toward the Catawba River, but two of the largest tributaries, the South Fork of the Catawba River and Clark Creek, flow more nearly southward to join the Catawba at the South Carolina State line. All the streams have meandering courses; in part the meanders are incised and are not bordered by flood plains. The flood plains range in width from a few feet to several hundred feet.

Geology.—A great variety of rocks, most of which show a strong foliation or schistosity, occur in Catawba County. In general, the rocks trend northeastward and are tipped on edge, but local variations in structural features are common.

The composite gneiss is widespread, being especially prominent in the area around Hickory. In this area it is a light-colored rock, largely granitic, with a pronounced foliation. Where schistosity is great, mica and sillimanite are common. Beds of hornblende gneiss are scarce in the Hickory area but are common in the composite gneiss in other parts of the county.

Quartz-mica schist occurs in the southwestern part of the county and also in a belt trending southwestward from the town of Catawba. With the exception of a higher degree of schistosity, the schist is similar to the composite gneiss, and the contact between them is arbitrary. Sillimanite and kyanite are common minerals in the schist, and where concentrated they appear to be the cause of the presence of some hills and mountains. Garnet, another common mineral in the schist, is the probable source of the high iron content of some of the ground water and the cause of the deep red soil in many places. Areas where lenses of granite and hornblende gneiss are common are shown on the geologic map.

A broad belt of hornblende gneiss and similar rocks trends northeastward through the county, passing through Newton and Conover. Exposures of fresh rock are rare; instead, the rock is covered by a layer of soft yellow saprolite (decayed rock) which shows the general rock structure and which is covered by a thick layer of red soil. Lenses of granite are common in the area north of Newton.

The largest area of granite shown on the map occurs in the southeast corner of the county. Because the composite gneiss north of this area is largely granitic there is no definite contact between the gneiss and granite. Outcrops are so scarce that it is not possible to describe the granite accurately. It forms a light-colored sandy soil. In the area east of Maiden the granite has intruded the mica schist to such an extent that much of the schist has recrystallized into a coarse quartz-mica rock.

Beds of quartzite and crystalline limestone occur in a northeast-trending belt in the southeastern part of the county. The quartzite is largely confined to the ridge composing Anderson Mountain and extending northeast of it for about 3 miles. It is a light-colored dense rock made up of quartz with subordinate amounts of muscovite and various dark minerals. In contrast to the quartzite, the limestone has no conspicuous natural outcrops. It weathers so easily that a thick layer of soil covers it everywhere except in the beds of

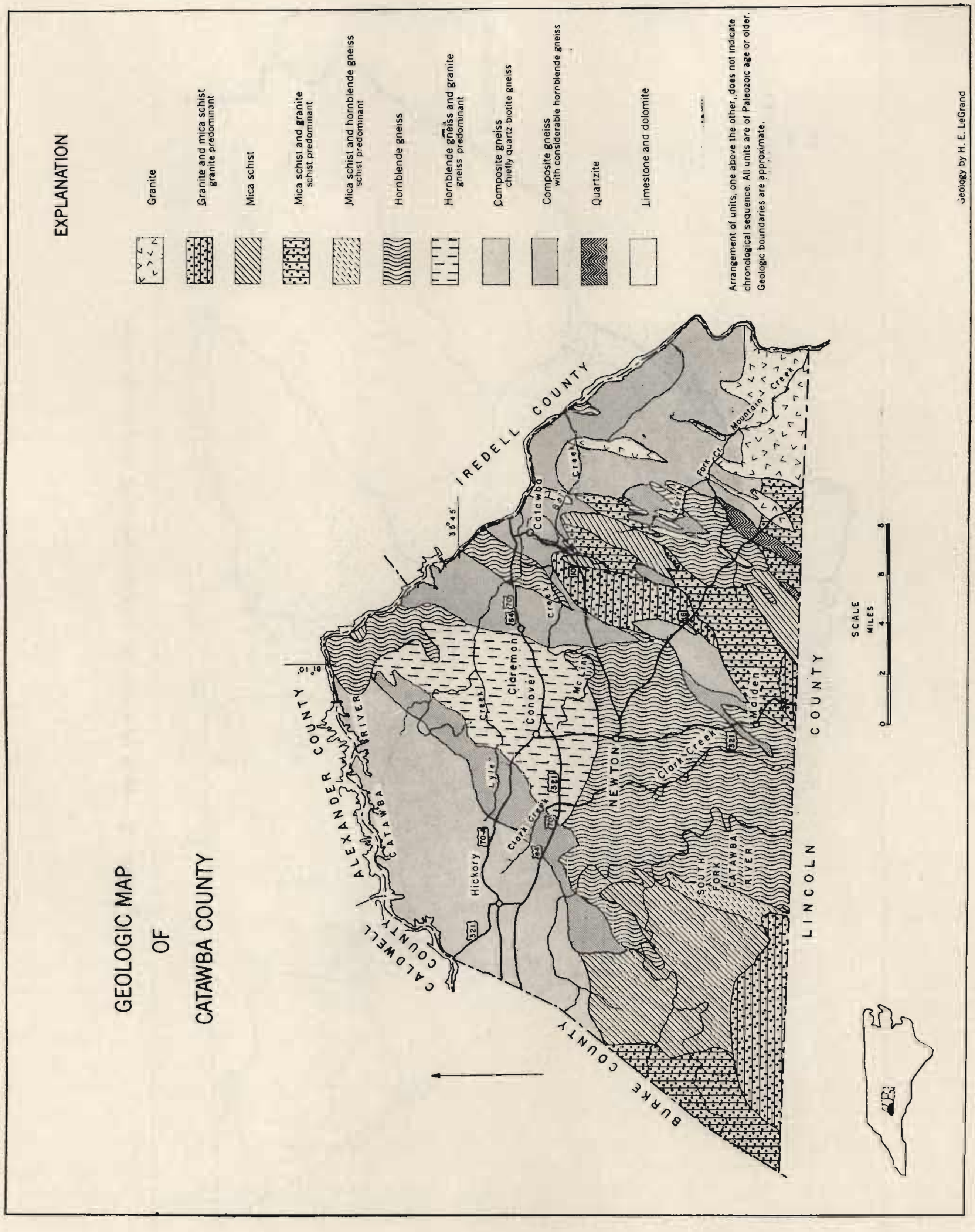


FIGURE 11.—Geologic map of Catawba County.

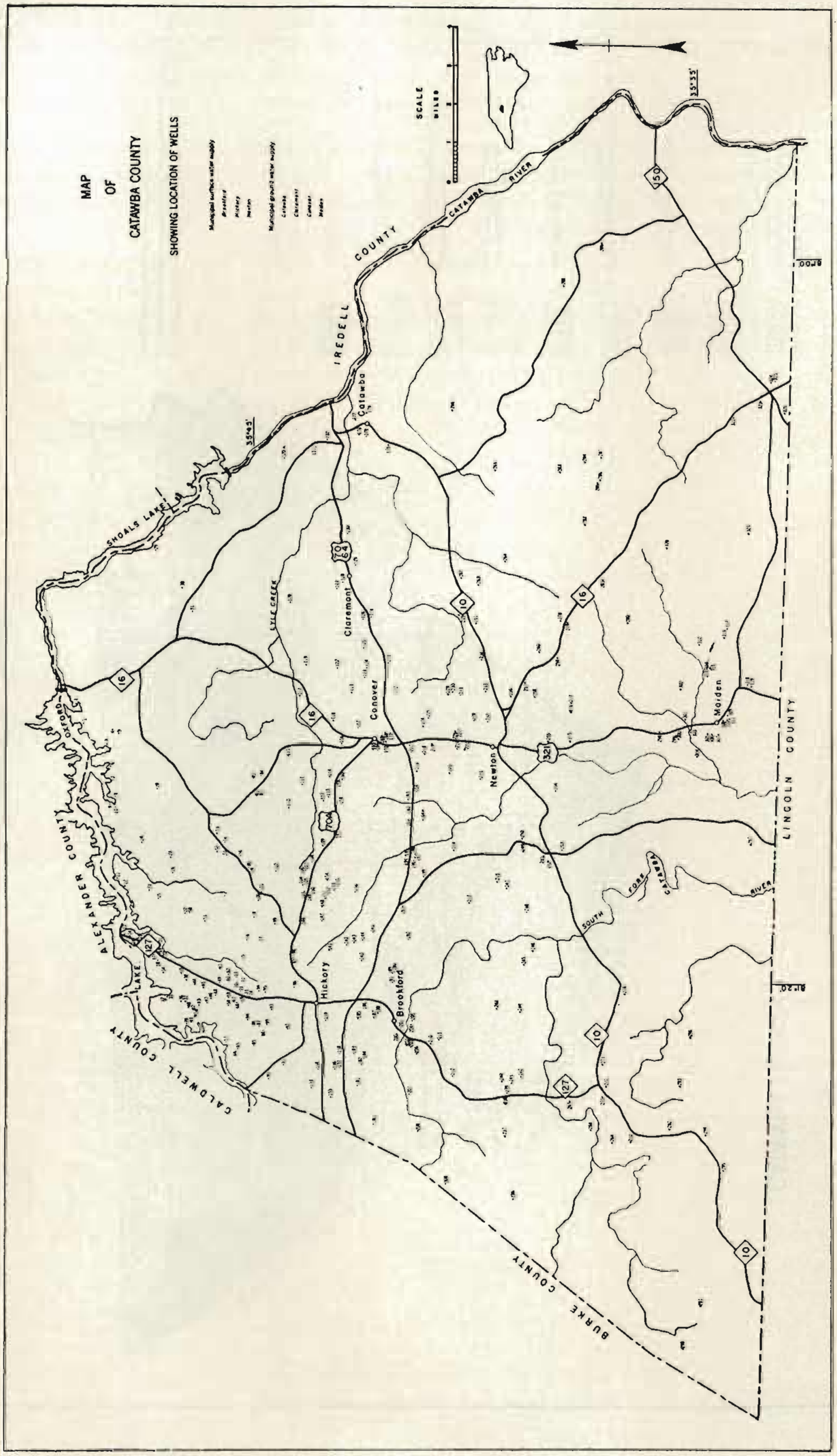


FIGURE 12.—*Map of Catawba County showing location of wells.*

streams in which the only exposures are found. It occurs in at least two thin belts west of the quartzite, but its true areal extent has not been determined. In some places it is represented at the surface by graphite schist. According to Bulletin 28 (Loughlin and others, 1921, pp. 76-78) two quarries have been worked intermittently for limestone. The rock ranges in color from light to dark. It is generally dolomitic and massive.

Ground water.—With the exception of the municipal supplies of Hickory and Newton, all domestic water supplies come from wells and springs, but principally from wells. Four towns, many industries, and most of the rural people use water from wells. Several hundred wells 6 inches or more in diameter have been drilled, of which 326 are listed in the well tables.

The rocks at most places in Catawba County are strongly foliated and fractured. The percolation of water downward through the fractures has resulted in the formation of a layer of residual weathered material and soil at the land surface and the enlargement of the fractures in the bedrock by solution as water moves downward and laterally through fractures to discharge points in the valleys. The more soluble rocks, such as hornblende gneiss and limestone, have larger fractures and a thicker cover of soil and weathered material than the less soluble rocks, such as granite, granite gneiss, and quartzite. Generally speaking, the belt of hornblende gneiss extending northeastward through the center of the county has the best wells. However, no extensive area seems especially poor.

The characteristics of individual wells are similar to those of other counties in the area covered by this report. Topography, as well as geology, affects the yields. Wells on hills have a large range in yield, although generally they are poor. The broad upland areas underlain by hornblende gneiss yield more water to wells than upland areas underlain by other rocks; in fact, yields of 35 gallons a minute are not uncommon from wells penetrating hornblende gneiss on hills.

The yields of many of the wells in Catawba County were measured by means of bailer tests. These bailer tests, seldom exceeding 2 hours, give an indication of the relative yields, especially for low-yielding wells, but they do not give nearly as accurate results as do pumping tests of greater duration. Correspondingly, many of the pumping levels listed are not absolutely accurate.

Complete chemical analyses were made of 17 samples of well water in the county. The analyses indicate that the ground water is of good chemical quality. The concentration of dissolved solids in all samples was less than 177 parts per million and in nine samples less than 100 parts per million. Only three samples contained as much as 0.4 part per million in iron. Other mineral matter is correspondingly low.

The average temperature of the ground water is about 60°F.

RECORDS OF WELLS IN CATAWBA COUNTY

Well no.	Location	Owner	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	Remarks
1	8 miles N of Conover	Ralph Bettini	1948	Slope	225		28	Granite gneiss	28	10	Pumping level 100 feet.
2	do	Hickory Spinners	1949	do	415	6	59	do	42	36	Pumping level 50 feet.
3	7 miles N of Conover	Henry Herman	1949	do	80	6	31	do	45	36	Pumping level 65 feet.
4	do	St. Peter's Lutheran Church	1947	Hill	124	6	100	do	30	8	Pumping level 70 feet.
5	do	do	1948	Flat	100	6	50	do	22	10	Pumping level 100 feet.
6	do	L. D. Warlick		Valley	126	6	38	do	28	20	Pumping level 32 feet.
7	do	Charles Best	1950	do	82	6	64	do	15	48	Drawdown very slight.
8	do	Dr. F. W. Jones	1947	Slope	56	6	22	do	18	36	
9	do	Dr. J. A. Young		do	141		8	do	43	1	
10	do	Dr. K. L. Clonninger	1949	do	110		60	do	15	5	Pumping level 100 feet.
11	6 miles NE of Hickory	T. R. Owens	1947	Valley	109		98	do	15	43	Pumping level 65 feet.
12	do	Forest Schrum	1947	Hill	120		44	do	70	2	Pumping level 112 feet.
13	5 miles NE of Hickory	Dr. H. E. Hellar	1945	do	95	6	75	do	51	15	Drawdown very slight.
14	do	John Terrill	1950	do	153		62	do	25	10	Pumping level 75 feet.
15	do	Charles J. Presslear	1943		90						
16	do	Elwood Carpenter		Hill	540	6	136	Granite gneiss	135	5	Pumping level 250 feet.
17	4 miles NE of Hickory	A. L. Little	1940	do	172	6	66	do		5	Pumping level 120 feet.
18	do	E. E. Whisnant	1938	do	120	6	66	do		10	
19	do	J. L. Jones	1938	do	77	6	115	do		25	
20	do	Paul Teague		do	200	6	70	do	51	6	Pumping level 140 feet.
21	do	City of Hickory	1950	Slope	120	6		do	2	20	Analysis. Temperature 59½° F. Pumping level 120 feet.
22	do	H. L. Propst	1942	do	190	6	90	do		10	
23	5 miles NE of Hickory	K. T. Williams	1951	Flat	214	6	42	do	25	36	Pumping level 60 feet.
24	6 miles NE of Hickory	Mrs. A. M. Hoke	1945	Hill	136	6	44	do		1	
25	5 miles NE of Hickory	M. C. Isenhour	1946	Flat	152	6	94	do	25	12	
26	do	Vernon O. Sipe	1948	Hill	144		37	do	35	8	Pumping level 144 feet.
27	do	W. G. Stamey	1947	Flat	103		60	do	59	24	Pumping level 90 feet.
28	7 miles NE of Hickory	Vance Eckard	1948	Hill	283	6	56	do	90	9	Pumping level 185 feet.
29	7 miles NE of Conover	C. I. Carpenter	1949	Slope	108	6		Hornblende gneiss	45	4	Pumping level 150 feet.
30	6 miles NE of Conover	Bethel Lutheran Church	1947	Hill	166		58	do	45	12	Pumping level 100 feet.
31	do	Oxford School	1950	do	255	6	88	do	40	30	Pumping level 150 feet.
32	4 miles N of Hickory	Piedmont A. C. Camp	1948	Valley	125	6	38	Granite gneiss	30	30	Pumping level 80 feet.
33	do	John Newton	1948	Slope	399	6	47	do	30	7	Pumping level 120 feet.
34	do	Lloyd Bowman	1949	Hill	391			do	100	5	Pumping level 290 feet.
35	do	Alfred B. Raby	1946	Draw	48	6	22	do	12	45	Pumping level 25 feet.
36	3 miles N of Hickory	Shore Neal and Sammy Bell	1946	Slope	100	6	40	do	25	15	Drawdown very slight.
37	do	E. A. Baker	1939	do	281	6	54	do		10	Pumping level 100 feet.
38	do	W. B. Stronach	1946	do	91	6	74	do	35	20	Pumping level 91 feet.
39	do	L. C. Goodson	1945	Hill	340	6	58	do	70	6	Pumping level 90 feet. Rock at 10 feet.
40	do	R. E. Faw		Flat	158	6	110	do	25	30	Pumping level 40 feet.
41	do	L. C. Goodson	1938	Hill	375	6	62	do		3	Pumping level 250 feet.
41a	do	Paul Fuller	1946	do	356	6	55	do	55	2	Pumping level 356 feet.
42	do	D. P. Poe		do	202	6	46	do	65	30	Pumping level 100 feet.
43	do	H. C. Huffman	1948	Draw	191	6	144	do	15	60	Pumping level 75 feet.
44	do	H. G. Mitchell, Jr.	1946	Hill	132	6	52	do	45	10	Pumping level 85 feet.
45	do	Tally Bowman	1945		110	6	46	do		15	
46	do	Ralph Bolick	1941		195	6	35	do		20	
47	do	H. C. Huffman		Flat	125	6	40	do	35	25	Pumping level 105 feet.
48	do	Howard D. Murphy		Hill	125	6	96	do	40	25	Do
49	do	Alex A. Teague	1940	do	220	6	75	do		3	
50	4 miles NE of Hickory	H. L. Propst	1944		700	6		do		5	
51	do	J. V. Bunton	1946	Flat	94	6	77	do	15	4	Pumping level 94 feet.
52	5 miles NE of Hickory	L. R. Hefner	1947	Hill	124	6	44	do	27	6	Pumping level 120 feet.
53	do	William W. Lail	1947	do	206	6	154	do	50	6	Pumping level 125 feet.
54	do	D. J. Herman	1946	Flat	122	6	64	do		5	
55	do	St. Stephen's Lutheran Church	1944	do	200	6	68	do	35	65	Pumping level 120 feet.
56	4 miles NE of Hickory	G. F. Sipe, L. E. Sipe, and R. G. Sipe	1947	Slope	128	6	55	do	35	30	
57	3 miles NW of Hickory	W. J. Boettcher and Co.	1947	Draw	138	6	38	do	20	25	Pumping level 35 feet.
58	2 miles N of Hickory	R. E. Faw	1946	Flat	145		75	do	28	20	Pumping level 80 feet.
59	do	J. H. Rhodes	1947	Hill	274	6		do	40	5	Pumping level 105 feet.
60	do	W. F. Parks		do	231	6	72	do	41	3	Pumping level 100 feet.
61	3 miles N of Hickory	C. C. Reitzel	1946		180	6	71	do	26	2	
62	2 miles N of Hickory	Z. W. Brown		Valley	187	6	31	do	13	15	Pumping level 30 feet.
63	do	Roger Adkins	1945	Hill	120	6	93	do	40	5	Pumping level 50 feet.
64	2 miles NW of Hickory	Bill Cox	1945		117	6	30	do	40	7	
65	do	E. Y. Morris	1945	Slope	112	6	70	do	25	15	Pumping level 70 feet.

RECORDS OF WELLS IN CATAWBA COUNTY—*Continued*

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
66	2 miles N of Hickory	W. B. Shuford	1945	Flat	250	8	84	do	35	80	Pumping level 95 feet.
67	do	Roy Poovey		Hill	200	6	130	do	45	6	Pumping level 105 feet.
68	do	Roy Rooney	1948	do	273	6	21	do	45	4	Do
69	do	Ball Creek Broom Co.			118		97	do			
70	do	John Yount		Hill	136	6	35	Granite	32	16	Pumping level 90 feet.
71	do	Roy N. Price		Flat	100	6	53	Granite gneiss	20	12	Pumping level 35 feet.
72	do	Everett C. Drum	1946	do	124	6		do	36	25	Pumping level 66 feet.
73	do	Henry Clontz	1948	do	107	6	35	do	59	30	Pumping level 60 feet.
74	do	D. O. Whisnant	1946	Valley	179	6	56	do	18	12	Pumping level 21 feet.
75	2 miles NE of Hickory	E. A. Shroyer	1947	Flat	139	6	61	do	23	25	Pumping level 60 feet.
76	do	H. C. Bowman	1951	do	84	6	56	do	41	3	Pumping level 75 feet.
77	do	G. L. Davis and C. W. Davis	1949	Hill	131	6	71	do	30	36	Pumping level 90 feet.
78	3 miles NE of Hickory	Henry Holler	1945	do	170	6	102	do	40	6	Pumping level 75 feet.
79	4 miles NE of Hickory	James Yount	1942		91	6	43	do		10	
80	do	James Bolick	1946	Flat	100	6	86	do		30	
81	3 miles NW of Conover	V. O. Sipe	1949	do	88	6	61	do	25	45	Pumping level 65 feet.
82	do	Sipe's Orchard	1949	do	357	6	88	do	35	24	Pumping level 100 feet.
83	do	Catawba County Home	1941	do	155	6	111	do	21	30	Pumping level 120 feet.
84	do	George Sipe	1948	do	152	6	75	do	25	20	Pumping level 115 feet.
85	2 miles NW of Hickory	J. B. Sills	1944		93	6	50	do			
86	do	R. L. Clemmer	1940		185	6	145	do		12	
87	do	C. L. Whisnant	1942		290	6	81	do		5	Pumping level 17 feet.
88	do	J. E. Owens	1938		150	6	95	do		15	
89	do	H. P. Williams		Flat	253	6	66	do	40	70	Pumping level 60 feet.
90	do	Oliver Frye		Slope	143	6	43	do	45	20	Pumping level 65 feet.
91	do	Ellis Hosiery Co.		Valley	343	6	41	do	10	55	Pumping level 140 feet.
92	1 mile NW of Hickory	Dr. Baisinger		Flat	140	6	62	do	35	30	Pumping level 60 feet.
93	1 mile N of Hickory	Jack Ketner		Hill	140	6	80	do	40	22	Pumping level 80 feet.
94	2 miles N of Hickory	Jack Walters		Valley	73	6	37	do	4	80	Pumping level 11 feet.
95	do	Howard Fox		Slope	125	6	68	do	35	25	Analysis. Pumping level 57 feet.
96	1 mile NE of Hickory	Sam Lavitt	1949	Flat	130		89	do	35	36	Pumping level 80 feet.
97	do	Hickory Steam Laundry	1947	do	400	6		do	94	60	Pumping level 150 feet.
98	do	do		do	330	6	71	do	74	70	Pumping level 125 feet.
99	do	Hollar Construction Co.	1946	do	150	6	97	do	30	20	Pumping level 80 feet.
100	3 miles NE of Hickory	Saint Stephen's School		Hill	215	6		do	50	25	Pumping level 100 feet.
101	do	Saint Stephen's Lutheran Church	1948	do	363	6	125	do	62	7	Pumping level 175 feet.
102	4 miles NE of Hickory	Joe Spencer	1946	Flat	118	6	74	do	27	20	Pumping level 60 feet.
103	3 miles E of Hickory	O. C. Huffman	1949	Hill	195	6	36	do	95	7	Pumping level 180 feet.
104	do	C. G. Fox Lumber Co.		Slope	338	8	50	do	120	50	Pumping level 120 feet.
105	do	C. G. Fox Plant	1939	Flat	275	6	78	do	30	45	Pumping level 115 feet.
106	do	C. A. Danner	1949	Slope	101	6	85	do	45	25	Pumping level 70 feet.
107	do	M. V. Miller, Jr.	1949	Hill	92		80	do	35	20	Pumping level 85 feet.
108	do	Wilkes Florist	1939		215	6	51	do		5	
109	4 miles E of Hickory	Floyd Shook	1946		146		124	do		7	
110	5 miles E of Hickory	H. P. Pitts	1946	Hill	153	6	69	do	27	5	
111	2 miles NW of Conover	W. R. Gurganus	1947	do	100	6	80	do	65	5	Pumping level 90 feet.
112	do	Marion A. Simmons	1950	do	112	6	70	do	60	5	Pumping level 100 feet.
113	do	C. L. Sipe	1948	Flat	148	6	53	do	35	30	Pumping level 70 feet.
114	do	Crip Sipe Service Station	1946	Hill	153	6	94	do	55	8	Pumping level 150 feet.
115	2 miles N of Conover	Osborne Eckard	1951	do	165	6	60	Hornblende gneiss	45	7	Pumping level 160 feet.
116	1 mile north of Conover	Raymond O. Hunsucker	1951	do	99	6	74	do	50	5	Pumping level 70 feet.
117	2 miles NE of Conover	Horace J. Isenhour	1948	do	165	6	77	do	65	20	Pumping level 150 feet.
118	1 mile NE of Conover	W. A. Brady	1948	do	136		78	do	38	20	Pumping level 70 feet.
119	2 miles NE of Conover	Saints John's Lutheran Church	1945	do	159	6	102	do	38	30	Pumping level 90 feet.
120	2 miles NW of Claremont	W. A. Carpenter	1941		179	6	75	do	68	5	
120a	2 miles NW of Catawba	V. O. Sipe	1948	Hill	133		94	do	48	24	Pumping level 90 feet.
121	1 mile NE of Conover	Vance Haller	1946	Slope	127	6	68	do	20	7	Pumping level 80 feet.
122	2 miles NE of Conover	Guy Rockett	1950	Hill	245	6	84	do	80	10	Pumping level 125 feet.
123	1 mile E of Conover	C. H. Rockett	1942		142	6	80	do		3	
124	do	Guy Rockett	1950	Hill	245	6	84	do	80	10	Pumping level 125 feet.
125	2 miles E of Conover	W. H. Hewry	1949	do	88		60	do	40	12	Pumping level 80 feet.
126	3 miles E of Conover	Clarence Hollar	1949	Flat	80	6	49	do	40	8	Pumping level 65 feet.
127	Claremont	City of Claremont		Slope	350	6	60	do	30	45	Pumping level 150 feet.
128	do	do		Hill	500	6	50	do	50	90	Pumping level 150 feet. Analysis.
129	do	do		do	600		60	Granite gneiss	50	7	
130	1 mile E of Claremont	C. F. Martin	1950	do	100	6	97	do	35	5	Pumping level 95 feet.
131	1 mile NW of Catawba	J. C. Sigmon		do	110	6	50	Hornblende gneiss		10	

RECORDS OF WELLS IN CATAWBA COUNTY—*Continued*

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
132	do	Grover Stewart		Slope	127	6	117	do	3	12	Analysis. Pumping level 60 feet.
133	2 miles W of Hickory	H. E. Campbell	1951	Flat	50	6	26	Granite gneiss	15	30	Pumping level 20 feet.
134	do	Ivey Weavers, Inc.	1941		298	6	120	do			
135	do	Hickory Spinning Co.	1942	Flat	402	8	92	do		75	
136	2 miles SW of Hickory	Hickory Well supply Co.		Hill	57	6	37	do	30	5	Pumping level 55 feet.
137	do	do		do	90	6	65	do	30	15	Pumping level 85 feet.
138	1 mile SW of Hickory	G. S. Jones	1948	do	61		42	do	45	20	Pumping level 50 feet.
139	Hickory	Ida Lutz Newell		Slope	160	6	70	do	43	25	Analysis. Pumping level 85 feet.
140	2 miles SE of Hickory	E. W. Clover and B. B. Bishop	1945		209	6	43	do	47	3	
141	1 mile E of Hickory	Fred Kirby	1950	Hill	120	6	44	do	41	8	Pumping level 110 feet.
142	2 miles SE of Hickory	M. L. Lowman	1946	do	126	6	81	do	53	4	Pumping level 80 feet.
143	do	Carroll Reese	1946		132		73	do		6	
144	do	E. P. Bolick	1939		460	6	30	do		4	
145	do	Radio Station WIRC	1948	Slope	95	6	50	do	20	30	Pumping level 60 feet.
146	2 miles E of Hickory	R. E. Faw	1948	Valley	160	8	122	do	5	30	Pumping level 140 feet.
147	do	R. D. Barker	1945		190	6	28	do		6	
148	do	M. M. Miller	1950	Flat	205	6	18	do	55	17	Pumping level 130 feet.
149	3 miles E of Hickory	Hickory Packing Co.	1939	do	401	6	54	do	56	45	Do
150	do	do	1947	Hill	489		8	do	80	180	Pumping level 150 feet.
151	do	Ted Cline	1946	do	248	6	69	do		0	
152	do	E. E. McNeely	1945		90	6	45	do		7	
153	3 miles SE of Hickory	Clyde Bumgarner	1946	Slope	75	6	38	do	40	25	
154	3 miles E of Hickory	B. T. Robertson	1944		170	6	132	do			Reported to be a good well.
155	3 miles SE of Hickory	Frank Duncan	1950	Hill	103	6	39	do	30	5	Pumping level 100 feet.
156	do	McCoy A. Huffman	1946	Flat	110	6	94	do	30	35	Pumping level 70 feet.
157	3 miles NW of Conover	C. W. Hawn and J. L. Hawn	1947	Hill	183	6	143	do	60	6	Pumping level 105 feet.
158	2 miles NW of Conover	Saint Timothy Church	1945	Slope	142	6	60	do	30	17	
159	1 mile NW of Conover	Herman-Sipe Co.		Hill	416	6		Hornblende gneiss		16	
160	do	do		Slope	165	6		do		11	Temperature 61¾°F.
161	2 miles SW of Conover	Robert Punch		Hill	180	6		do	30	15+	
162	do	Burl Haver		do	137	6		do	35	30	Pumping level 110 feet.
163	do	Miller Lynch and Glenn Hefner	1947	do	107		99	do	40	6	Pumping level 100 feet.
164	do	Glenn Seitz	1949	Flat	118	6	72	do	25	20	Do
164a	do	Frank Seronce	1948	Hill	62		49	do	27	12	Pumping level 62 feet.
165	Conover	City of Conover	1938	do	1200			do		7	
166	do	do		Draw	535	6		do	25	76	Analysis. Temperature 60½°F.
167	do	do		Hill	600	6		do	40	27	Analysis. Temperature 61¾°F. Pumping level 200 feet.
168	do	Lenoir Chair Co.	1942	Flat	201	6	43	do	28	90	
169	do	City of Conover	1951	Draw	406	8	44	do	28	228	Pumping level 190 feet.
170	do	do	1947	Valley	264	10	82	do	4	47	Pumping level 225 feet.
171	do	Lenoir Chair Co.	1943		300	6	70	do			
172	1 mile SE of Conover	H. L. Coyner	1945	Flat	110	6	76	do	30	8	
173	2 miles E of Conover	Stream line Tool Co.	1946	do	217	6	64	do	33	48	Pumping level 80 feet.
174	1 mile SW of Claremont	Dr. O. L. Ellmaker	1944		104	6	74	do		2	
175	1 mile SW of Catawba	D. B. Nichols	1946		150	6	89	Granite gneiss			
176	Catawba	Town of Catawba	1933	Flat	365	6	150	do	60	60	Analysis. Pumping level 150 feet.
177	do	do		Slope	352	6	100	do	35	60	Do
178	do	do	1936	do	285	6	103	do		32	Analysis.
179	do	W. R. Keith			112	2		Granite		8	
180	4 miles SW of Hickory	Conley Brown	1951	Hill	86		59	Granite gneiss	50	15	Pumping level 70 feet.
181	2 miles SW of Hickory	Marlow Hosiery Mill	1943	Flat	284	6	70	do		25	
182	do	R. C. Houser	1944	Hill	116	6	50	do		10	
183	do	C. H. Brittain	1944		115	6	53	do		10	
184	do	Howard Rowe		Slope	83	6	60	do	45	25	Pumping level 75 feet.
185	1 mile S of Hickory	S. M. Walker	1943		100	6		do			
186	do	Mr. Lowdermilk	1943		100			do			
187	2 miles S of Hickory	Ralph Hauser	1947	Hill	144	6	65	do	61	1	Pumping level 140 feet.
188	do	I. J. Jones	1948	do	129	6	21	do	30	5	Pumping level 75 feet.
189	2 miles SE of Hickory	C. B. Goodman			150	6	41	do		0	
190	do	do	1948	Hill	94	6	48	do	40	10	Pumping level 85 feet.
191	do	Fred Goodman	1945	Draw	105	6	48	do	27	50	Reported drawdown is slight.

RECORDS OF WELLS IN CATAWBA COUNTY—*Continued*

ll	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
	3 miles SE of Hickory	R. L. Sigmon	1948	Hill	108	6	78	do	37	20	Pumping level 65 feet.
	do	J. P. Mull	1948	do	194	6	114	Hornblende gneiss	55	24	Analysis. Pumping level 100 feet.
	4 miles SE of Hickory	J. R. Turner	1944	do	121	6	49	do	40	3	Pumping level 100 feet.
	do	Ellsworth Wolfe	1949	Flat	70	6	43	do	30	2	Pumping level 65 feet.
96	do	Horace H. Phillips	1948	Hill	144	6	112	do	40	8	Pumping level 120 feet.
197	do	A. A. Lail	1948	Slope	170	6	112	do	45	24	Pumping level 170 feet.
198	do	Memorial Park		Hill	500		90	do	55	5	
199	do	New Jeruselam Church	1943	do	185	6	40	do	55	10	
200	Brookford	C. F. Jolley		do	227	6	70	Granite gneiss	120	20	Pumping level 170 feet.
201	do	Brookford Mill			129	6	40	do			
202	1 mile SW of Brookford	Orin F. Abee	1947	Hill	110	6	62	do	70	8	Pumping level 105 feet.
203	do	Fred Deitz	1944		260	6	60	do		4	
204	Brookford	Fred Copas		Hill	131	6	48	do	37	22	Pumping level 80 feet.
205	do	Reid Isenhour		do	109	6	51	do	58	11	Pumping level 85 feet.
206	1 mile SW of Brookford	Charlie Rhinehart		do	121	6	36	do	45	11	Pumping level 84 feet.
207	2 miles SW of Brookford	James Hefner	1949	do	407	6	35	do	123	50+	Could not bail lower than 130 feet.
208	3 miles SW of Brookford	Joe E. Brannock	1947	do	65		56	do	40	20	Pumping level 55 feet.
209	4 miles SW of Brookford	C. H. Reed	1948	do	102		71	do	45	24	Pumping level 80 feet.
210	1 mile SW of Brookford	Ban Oak School		do	225	6	105	do	50	24	Pumping level 200 feet.
211	do	H. L. Wallace			100	6	60	do	40	2	Pumping level 100 feet.
212	2 miles SW of Brookford	Mountain View School	1945	Hill	135	6	51	do	43	15	Pumping level 85 feet.
213	4 miles SE of Brookford	Roney L. Mitchell	1949	do	114			do	35	7	Pumping level 100 feet.
214	3 miles NW of Newton	Ed Merritt		Slope	195	6	50	Hornblende gneiss	50	9	Pumping level 120 feet.
215	3 miles W of Newton	Catawba Country Club	1946	Flat	400	8	51	do	82	58	Pumping level 158 feet.
216	1 mile SW of Conover	J. M. Propst	1948	Slope	236		105	do	25	15	Pumping level 80 feet.
217	1 mile S of Conover	A. T. Smyre	1950	Flat	155	6	92	do	20	20	Pumping level 90 feet.
218	do	R. V. Smyre	1949	do	89		47	do	20	45	Pumping level 45 feet.
219	2 miles S of Conover	Southern Glove Mfg. Co.	1950	do	70	6	43	do	30	30	Pumping level 55 feet.
220	1 mile NW of Newton	Charles Reitzel	1951	Hill	143		55	do	55	1	Pumping level 143 feet.
221	1 mile N of Newton	Roscoe Yount		Flat	99	6	30	do	27	11	Pumping level 90 feet.
222	do	W. J. Smith		Hill	160	6	58	do	40	22	Pumping level 80 feet.
223	1 mile NW of Newton	Newton Radio Station	1948	Flat	94	6	52	do	18	25	Pumping level 60 feet.
224	2 miles NE of Newton	Mr. Martin		do	150	6	85	do	40	9	Pumping level 84 feet.
225	do	H. L. Arndt	1938		222	6	73	do		2	
226	1 mile NE of Newton	Clyde Fabrics, Inc.	1948	Hill	996	8		do	90	20	Pumping level 200 feet.
227	do	do		Slope	601	10	60	do	42	74	Analysis. Pumping level 156 feet.
228	do	T. G. McConnell	1946	Hill	412	6	74	do	70	2	Pumping level 150 feet.
229	2 miles NE of Newton	Balls Creek Broom Co.			118	6	97	do			
230	do	do	1947	Flat	401	8	117	do		20	
231	do	E. C. Banby	1949	Slope	139		76	do	30	15	Pumping level 125 feet.
232	Newton	Roosevelt Sherrill	1950	Flat	143	6	40	do	40	1	
233	1 mile E of Newton	W. E. Padgett	1948	Slope	69	6	64	do	35	25	Pumping level 60 feet.
234	2 miles E of Newton	Emmett W. Cline	1951	Flat	75	6	64	do	33	32	Pumping level 74 feet.
235	3 miles NE of Newton	H. Fred Harbison	1951	Hill	140		71	do	50	8	Pumping level 140 feet.
236	6 miles SW of Brookford	J. E. Shook	1944	do	144	6	80	Granite gneiss		2	
237	4 miles SW of Brookford	Radio Station WHKY	1947	do	155	6	60	do	103	15	Pumping level 150 feet.
238	do	Deward Huffman	1947	Flat	87	6	46	do	33		
239	3 miles SW of Brookford	Gaither Huffman	1947	Hill	171	6	84	do	54	3	Pumping level 150 feet.
240	do	Deward Huffman	1945		200	6	42	do		3	Pumping level 175 feet.
241	do	G. F. Huffman	1944		147	6	35	do		6	
242	4 miles SW of Brookford	Fred N. Whisnant	1948	Hill	401	6	32	do	80	70	Pumping level 150 feet.
243	3 miles S of Brookford	W. A. Pitts	1944	do	108	6	38	do	35	20	
244	do	L. E. Sain	1944	do	189	6	28	Hornblende gneiss	90	5	
245	4 miles SE of Brookford	A. L. Whisnant	1946		224	6	186	do	46	5	Pumping level 130 feet.
246	do	W. L. Caldwell		Hill	105	6	32	do	55	12	Pumping level 90 feet.
247	4 miles W of Newton	Mrs. Mamie Hahn	1942	do	158	6	65	do		25	
248	4 miles SW of Newton	A. L. Shuford, Sr.	1949	do	311	6	46	do	60	35	Pumping level 85 feet.
249	3 miles SW of Newton	Kemp Lail		Slope	135		52	do	44	8	Pumping level 100 feet.
250	2 miles SW of Newton	Reformed Church	1946	do	102	6	41	do	19	5	Pumping level 60 feet.
251	3 miles SW of Newton	Startown School		Hill	227	4		do	35	14	Analysis.
252	do	E. M. Pope		do	147	6	51	do	45	6	Pumping level 75 feet.
253	do	J. C. Scronce	1947	Flat	85		52	do			
254	2 miles S of Newton	J. A. Lutz	1944	Hill	192	6	28	do		1	
255	1 mile S of Newton	H. P. Sigmon	1942		120	6	73	do	45	5	Pumping level 70 feet.
256	1 mile SE of Newton	Newton Development	1946	Slope	206	6	98	do	32	25	Pumping level 150 feet.
257	2 miles SE of Newton	Rupert Edwards	1949	do	96	6	38	do	35	20	Pumping level 45 feet.
258	do	W. D. Isenhour	1945	Hill	127	6	42	do	55	4	
259	3 miles SE of Newton	Fred McRee	1950	do	100	6	67	do	45	25	Pumping level 85 feet.
260	do	H. B. Yount Dairy	1944	do	126	6	100	do		30	

RECORDS OF WELLS IN CATAWBA COUNTY—*Continued*

Well No.	LOCATION	OWNER	Date Completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
261	do	Paul Rink		Slope	130		70	do	37	33	Pumping level 52 feet.
262	4 miles E of Newton	Frank Witherspoon	1948	Flat	117	6	95	Granite gneiss	34	18	Pumping level 112 feet
263	do	Bethany Church	1947	Slope	98	6	70	do	30	6	Pumping level 98 feet.
264	5 miles E of Newton	Paul A. Brittian	1950	Hill	119	6	50	Granite	50	6	Pumping level 119 feet.
265	7 Miles E of Newton	Shiloh Church	1948	Slope	100	6	39	Mica Schist	30	12	Pumping level 65 feet.
266	2 miles S of Catawba	Miss Anthea Drum	1948	Hill	109	6	97	do	40	5	Pumping level 100 feet.
267	5 miles SW of Brookford	L. T. Weaver	1941	Slope	116	6	70	do	39	10	Pumping level 44 feet.
268	6 miles SW of Brookford	W. L. Whisnant	1943		160	6		do			
269	do	E. M. Bledroe	1949	Hill	128		87	do	45	4	Pumping level 125 feet.
270	7 miles SW of Brookford	Roy Stallings	1949	do	131		87	do	45	12	Do
271	6 miles SW of Brookford	Eugene Clay	1948	Slope	59	6	22	do	20	30	Pumping level 59 feet.
272	do	Scott Workman	1949	Flat	48	6	40	do	32	36	Pumping level 35 feet.
273	5 miles S of Brookford	J. J. Hilton	1946		99	6	100	do			
274	6 miles S of Brookford	Blackman's School		Flat	49	60		Hornblende gneiss	25	10	
275	2 miles S of Newton	D. R. Young	1949	Slope	135		34	do	15	36	Pumping level 65 feet.
276	do	Mrs. Ed Deal	1945		124	6	52	do		15	
277	do	J. F. Pressley	1948	Hill	159		122	do	35	8	Pumping level 100 feet.
278	4 miles SE of Newton	D. C. Ratchford		do	160	6	100	do	40	20	Pumping level 90 feet.
279	do	Fred McRee	1950	Slope	100		67	do	45	25	Pumping level 85 feet.
280	5 miles SE of Newton	J. T. Hendrix	1948	Hill	150	6	132	Granite gneiss	55	9	Pumping level 150 feet.
281	do	Wilford Lee	1948	Slope	149		122	do	20	12	Pumping level 100 feet.
282	6 miles SE of Newton	Balls Creek School		Hill	165	4		Granite	35	16	Pumping level 80 feet.
283	7 miles E of Newton	Foy T. Goodin	1948		230	6	18	Mica schist	18	1	
284	7 miles SE of Newton	Carolina Glove Co.	1946	Hill	224	6	62	do	32	2	Pumping level 135 feet.
285	do	J. Mackie	1950	do	198	6	84	Hornblende gneiss	45	24	Pumping level 75 feet.
286	do	Jay Mackie	1951	Flat	71	6	27	do	50	20	Pumping level 60 feet.
287	8 miles SE of Newton	Paul Mackie	1950	Hill	133	6	77	do	35	12	Pumping level 75 feet.
288	6 miles SE of Catawba	Coyle Gabriel	1947	do	146	6	124	Granite gneiss	30	20	Pumping level 146 feet.
289	8 miles SE of Catawba	Sherrill Ford School		Flat	220	6		do		12	Pumping level 100 feet.
290	11 miles SW of Brookford	Guy Reep		Hill	136	6	21	Granite	35	30	Pumping level 70 feet.
291	do	Voyt Rudisell		do	190	8	70	Mica schist	55	15	Pumping level 105 feet.
292	11 miles W of Maiden	Marlow Stallings	1949	Slope	154		79	do	20	18	Pumping level 130 feet.
293	9 miles W of Maiden	Blume Wilson	1944		132	6	67	do		10	
294	11 miles W of Maiden	Ralph Stallings	1950	Slope	184	6	90	Granite	35	8	Pumping level 175 feet.
295	12 miles W of Maiden	Ban Oak School	1951	Hill	345	6	44	do	90	40	Pumping level 150 feet.
296	8 miles W of Maiden	Bain Scronce	1944		143	6	100	Mica schist			Good well.
297	3 miles SW of Maiden	Ed Reinhart	1949	Hill	105		90	Hornblende gneiss	20	12	Pumping level 100 feet.
298	2 miles N of Maiden	Catawba Nursery	1925	do	121	2	37	do			Good well.
299	1 mile N. of Maiden	Zeb Haynes		do	371	6	75	do	50	15	
300	do	do	1951	do	146	6	112	do	40	22	Pumping level 100 feet.
301	do	Howard Young	1940		115	6	71	do		10	
302	1 mile NE of Maiden	E. A. Harmen		Slope	200	6		do		50	
303	1 mile N. of Maiden	Carolina Mills	1947		333	6	124	do	54	9	Pumping level 82 feet.
304	1 mile NW of Maiden	Clarence Whisnant		Flat	330	6	43	do	20	12	Pumping level 26 feet.
305	Maiden	Town of Maiden		Valley	252	6		do	18	30	Pumping level 110 feet.
306	do	do		Slope	165	6		do	18	30	Pumping level 120 feet. Analysis.
307	do	do	1951	Hill	200	6	77	do	50	57	Pumping level 140 feet.
308	do	do	1948	Slope	245	8	75	do		6	Pumping level 193 feet.
309	do	do	1945	do	529	8	84	do	20	30	Analysis. Pumping level 140 feet.
310	do	do		Valley	82	6	75	do	15	60	Analysis. Pumping level 65 feet.
311	do	do		do	100	6		do	15	60	Analysis. Pumping level 70 feet.
312	2 miles E of Maiden	J. W. Cooke	1949	Hill	100		48	Mica schist		1	Pumping level 90 feet.
313	1 mile E of Maiden	J & J Spinning Co.	1944	Flat	102	6	54	do		50	
314	do	do	1948	Slope	156		73	do	20	12	Pnmping level 100 feet.
315	do	do	1948	do	215	6	53	do	28	15	Pumping level 115 feet.
316	2 miles E of Maiden	Ira Bost	1948	Flat	183		122	do	12	20	Pumping level 160 feet.
317	do	Thomas W. McCoskin	1950	Hill	118	6	85	do	35	12	Pumping level 90 feet.
318	1 mile SE of Maiden	J & J Spinning Co.	1947	Slope	200	6	49	do	20	10	Pumping level 100 feet.
319	do	do	1946	do	285	6	28	do	22	7	Pumping level 150 feet.
320	5 miles E of Maiden	Mt. Ruhama Baptist Church	1950	Flat	206	6	102	do	45	22	Pumping level 75 feet.
321	do	Grady Laney	1950	Hill	103	6	54	do	40	4	Pumping level 100 feet.
322	8 miles E of Maiden	Roy O. Smith	1948		125	6	77	Granite	78	2	Pumping level 150 feet.
323	do	Everette Caldwell	1951	Hill	166	6	65	do	45	5	Pumping level 160 feet.
324	9 miles SE of Maiden	James Gilleland	1951	Flat	129	6	60	do	36	15	Pumping level 80 feet.
325	do	F. R. Fisher	1950	Hill	131	6	30	do	40	22	Pumping level 95 feet.
326	8 miles SE of Maiden	Jesse Carpenter	1948		50		35	do	27	8	Pumping level 50 feet.

CHEMICAL ANALYSES OF GROUND WATER FROM CATAWBA COUNTY
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	21	95	128	132	139	166
Silica (SiO_2)	31	36	25	38		24
Iron (Fe), total	.44	.76	.08	.20	2.9	.09
Iron (Fe), in solution	.06	.08		.06		
Calcium (Ca)	8.6	5.6	21	4.2		20
Magnesium (Mg)	1.8	2.0	4.6	1.6		3.0
Sodium and potassium (Na+K)	7.1	11	6.4	7.2		6.8
Carbonate (CO_3)	0	0	0	0		0
Bicarbonate (HCO_3)	48	40	99	35		74
Sulfate (SO_4)	2.7	10	8.6	.8		13
Chloride (Cl)	1.2	1.1	1.4	1.1		1.8
Fluoride (F)	.1	.2	.2	.4		.1
Nitrate (NO_3)	.1	.0	.1	.8	.4	.1
Dissolved solids	78	86	120	73		106
Total hardness as $CaCO_3$	29	22	71	17	33	62
pH	6.8	7.0	7.6	7.0		6.6
Rock Type	Granite gneiss	Granite gneiss	Hornblende gneiss	Hornblende gneiss	Granite gneiss	Hornblende gneiss and granite
Date of collection	July 18, 1950	July 11, 1951	Feb. 3, 1949	Feb. 14, 1951	July 11, 1951	Dec. 2, 1946

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

CHEMICAL ANALYSES OF GROUND WATER FROM CATAWBA COUNTY—*Continued*
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	167	176	177	178	193	227
Silica (SiO_2)	30	38	34	35	32	24
Iron (Fe), total	.17	.10	.14	.13	.16	.39
Iron (Fe), in solution					.06	.06
Calcium (Ca)	22	7.8	17	8.7	6.6	18
Magnesium (Mg)	3.8	1.9	5.8	3.6	2.6	2.8
Sodium and potassium (Na+K)	7.6	9.7	10	7.1	8.9	34
Carbonate (CO_3)	0	0	0	0	0	0
Bicarbonate (HCO_3)	88	35	55	53	52	86
Sulfate (SO_4)	11	2.7	3.7	1.3	2.0	31
Chloride (Cl)	2.0	4.5	18	2.4	1.1	19
Fluoride (F)	.2	.9	.4	.2	.1	.2
Nitrate (NO_3)	.1	10	16	4.0	.1	.1
Dissolved solids	120	100	143	90	80	176
Total hardness as $CaCO_3$	70	27	66	36	27	56
pH	7.1	6.55	6.7	6.8	6.7	7.3
Rock type	Hornblende gneiss and granite	Granite gneiss	Granite gneiss	Granite gneiss	Hornblende gneiss and granite	Hornblende gneiss
Date of collection	Dec. 2, 1946	Aug. 3, 1948	Aug. 3, 1948	Aug. 3, 1948	Dec. 13 1950	Mar. 22, 1951

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

CHEMICAL ANALYSES OF GROUND WATER FROM CATAWBA COUNTY—*Concluded*

(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	251	306	309	310	311	
Silica (SiO_2)	27	32	33	30	28	
Iron (Fe), total	.31	.06	.11	.06	.06	
Iron (Fe), in solution	.05					
Calcium (Ca)	8.0	14	8.6	9.6	10	
Magnesium (Mg)	2.9	4.2	3.4	3.6	3.4	
Sodium and potassium (Na K)	5.7	8.0	4.5	5.7	5.6	
Carbonate (CO_3)	0	0	0	0	0	
Bicarbonate (HCO_3)	48	74	49	48	49	
Sulfate (SO_4)	2.1	3.4	2.2	1.7	1.9	
Chloride (Cl)	1.5	2.6	1.1	3.0	2.5	
Fluoride (F)	.1	.1	.0	.1	.1	
Nitrate (NO_3)	.3	1.9	1.4	6.9	6.5	
Dissolved solids	78	106	79	86	88	
Total hardness as $CaCO_3$	32	52	55	39	39	
pH	6.6	7.4	7.5	6.7	6.95	
Rock type	Hornblende gneiss and granite	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss	
Date of collection	Dec. 12, 1950	Oct. 28, 1947	Oct. 28, 1947	Oct. 23, 1947	Oct. 28, 1947	

Analyzed by the Quality of Water Branch U. S. Geological Survey.

IREDELL COUNTY

(Area: 591 square miles. Population: 56,303)

Geography.—Iredell County is near the center of the area covered by this report and is the largest county in size. Statesville, the county seat, with a population of 16,901 and Mooresville with a population of 7,121 are the largest communities. Textiles and furniture are the most important industrial products. The fertile soils in most sections of the county result in successful farms. Railroads adequately serve the southern half of the county, and there is a good system of paved roads.

Iredell County is in the heart of the Piedmont physiographic province. The uplifted peneplain of the Piedmont has been dissected by a network of east-flowing streams. The land surface is gently rolling, having a relief of as much as 150 feet near some of the large streams. In spite of the pronounced relief and the many streams, a thick layer of soil and weathered rock underlies most of the surface. On some hills it is not uncommon for wells to penetrate more than 100 feet of rather soft weathered rock. The deep weathering has resulted in rounded slopes coated with vegetation.

Most of the county is drained by the South Yadkin River, which flows eastward through the center of the county. Lying in the drainage basin of the South Yadkin River along the south are several streams, including Fourth and Third Creeks, which also have nearly parallel eastward courses before joining the South Yadkin River in Rowan County. Although the Catawba River flows along the southwestern boundary the tributaries entering it from Iredell County are short and small. As a result, the divide between the Catawba and South Yadkin Rivers is as close as 5 miles to the Catawba River in several places. This divide is followed by U. S. Highway 21 northward from Mecklenburg County to Troutmans and then trends northwestward followed by a rural road, to Alexander County.

Geology.—A variety of rocks occur in Iredell County, and these rocks have been separated into twelve divisions on the geologic map.

The most abundant rock is the composite gneiss. It contains chiefly mica schist interlayered with granite. Beds of hornblende gneiss are common in many places, and these places are shown on the geologic map by a special pattern. Although the mica gneiss is variable in composition it generally consists of banded granular layers of feldspar, quartz, and muscovite and biotite mica. Where beds of hornblende gneiss are scarce the soils are sandy and light in color, resembling the soils of granite.

Hornblende gneiss is common, both as large mappable bodies and as thin sill-like bodies in other rocks. Except along the hilly slopes several miles northwest of Statesville the hornblende gneiss is deeply weathered. The soils are deep red. The structure and texture of the gneiss are preserved in the decayed, blocky saprolite which can be observed in some road cuts. Although an area east of Turnersburg has been included with the hornblende gneiss, both soapstone and a coarsely crystalline enstatite rock have scattered occurrences. In this area the soils are lighter than those on typical hornblende gneiss.

One large area of gabbro occurs along U. S. Route 70 in the eastern part of the county and another in the southwestern corner of the county. Outcrops of the gabbro are scarce but its characteristic brown and yellow soil is an aid to mapping its area.

Rocks of the granite-diorite complex have limited occurrences along the southern and eastern borders of the county. The composition and texture and the structural relationship of the granite and diorite are similar to those in Davie and Rowan Counties where the complex is more extensive.

The largest area of granite is in the Mooresville area. It underlies a broad interstream area where weathering is deep. The few fresh outcrops observed show that the granite varies considerably in texture, although it is commonly porphyritic. The boundary between the granite around Mooresville and other rocks is very indefinite. The soils from the composite gneiss southeast of Troutmans and those of the granite are similar. Moreover, a gradational contact occurs between the granite and gabbro southwest of Mooresville where feldspar phenocrysts characteristic of the granite also occur in the rocks of the border zone. Most of the other occurrences of granite in Iredell County represent countless thin lenslike bodies interlayered with schist and gneiss.

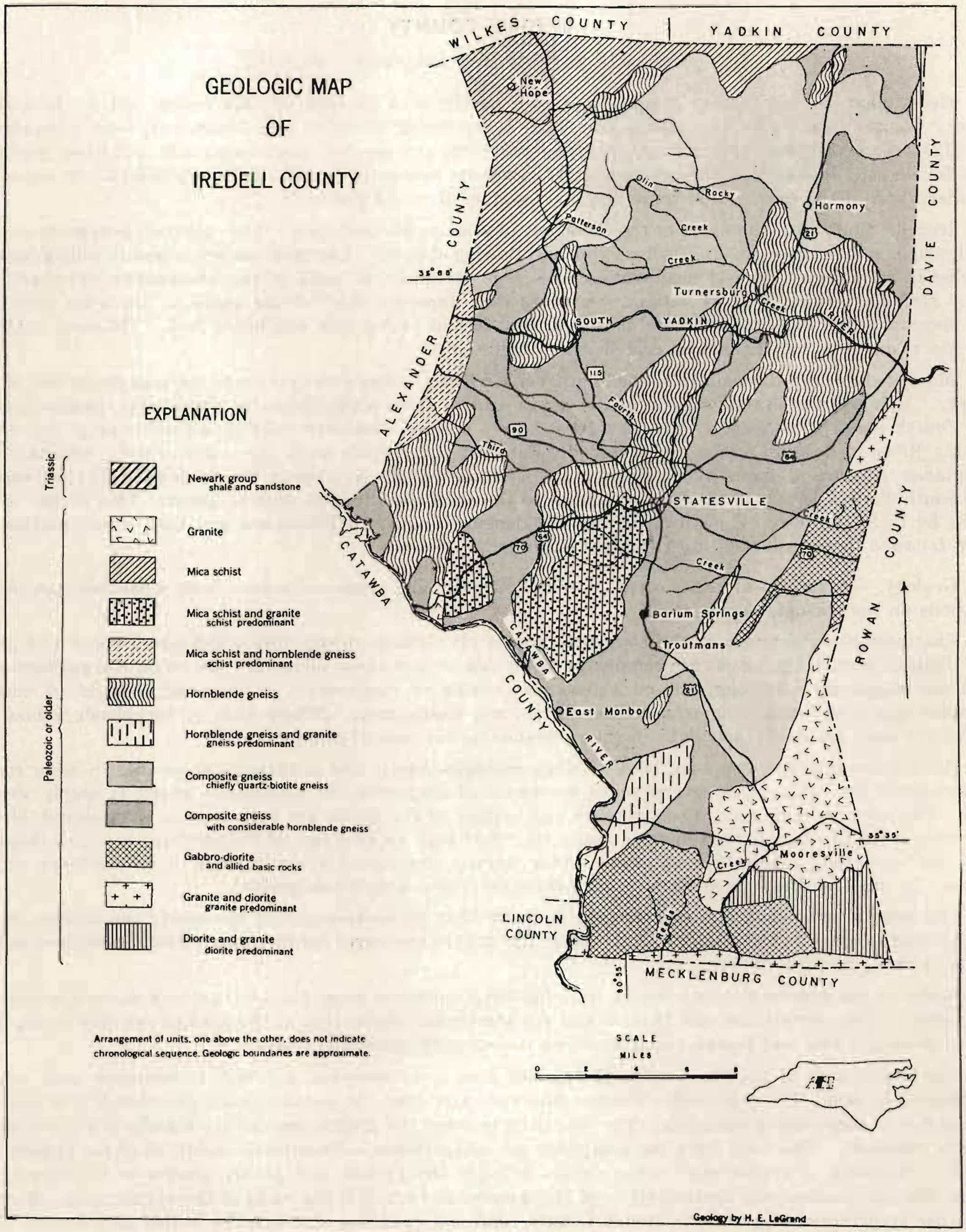


FIGURE 13.—*Geologic map of Iredell County.*

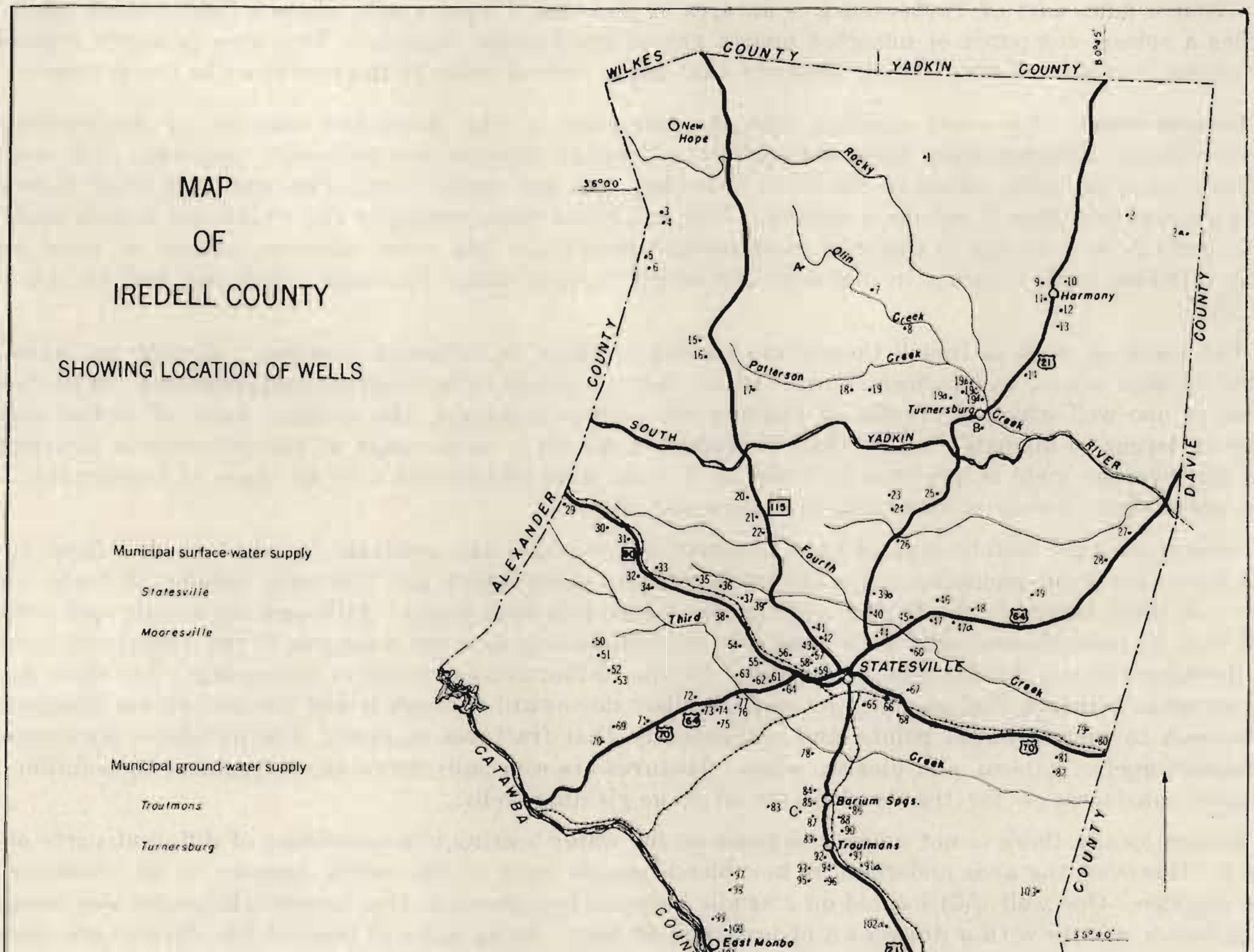


FIGURE 14.—*Map of Iredell County showing location of wells.*

About 5 miles east of Turnersburg is an area of less than 1 square mile where a light-colored sandy soil overlies a subsoil composed of unsorted quartz gravel and arkosic material. This area probably represents an outlying remnant of the Triassic deposits that occur several miles to the northeast in Davie County.

Ground water.—All water supplies, with the exception of the municipal supplies of Statesville and Mooresville, are obtained from wells and springs. Although springs are extremely common, they are not generally used, probably owing to the facts that they are not readily accessible and that their individual yields average less than 3 gallons a minute. Dug and bored wells ending in the weathered mantle rock and drilled wells 2- to 4- inches in diameter penetrating bedrock are the most common sources of rural water supply. Drilled wells 6 inches in diameter and larger furnish water for large rural uses and for some industries.

The yields of wells in Iredell County are similar to those in adjacent counties. Almost all wells are located on hills where, as has been shown earlier, they are prone to be relatively unproductive. With the exception of one well which is capable of yielding 500 gallons a minute, the average yield of drilled wells 6 inches or larger in diameter is less than 19 gallons a minute. As a result of the unfavorable locations of wells this average yield is less than it would be if wells were distributed over all types of topographic locations, particularly if they were located in valleys and draws.

Several geologic factors suggest that adequate well supplies are available for most needs. Most of the rocks have prominent gneissoid and schistose structures along which are fractures capable of transmitting water. A thick layer of mantle rock overlies the bedrock in most places. Although the mantle rock contains much clay it, nevertheless, acts as a reservoir to continuously feed the fractures in the underlying bedrock. The thickness of the mantle rock is indicated by the 70-foot average depth of well casing. The thick mantle rock serves as evidence that precipitation can percolate downward through it and the underlying fractures in the bedrock to surface outlet points, and consequently, that fractures do exist. The extensive occurrence of hornblende gneiss, gabbro, and diorite, whose fractures are especially prone to enlargement by solution, is a favorable consideration for the development of large-yielding wells.

Except locally there is not much difference in the water-bearing characteristics of different parts of the county. However, the area underlain by hornblende gneiss west of Statesville appears to be favorable for large supplies. One well (56) located on a saddle between two draws in this hornblende gneiss was tested at 660 gallons a minute with a drawdown of less than 60 feet. Along parts of most of the streams are deposits of sand and gravel which are believed capable of furnishing large supplies of water to wells.

Analyses of ten samples of water from wells in Iredell County are given in the table of analyses. Nine of the samples are from wells in granite and granite gneiss and one is from a well in hornblende gneiss.

Eight of the samples from granite and granite gneiss had a hardness of less than 45 parts per million and the iron content of five samples was 0.5 part per million or less. Well 99, supposedly in granite, yielded water having a total hardness of 124 parts per million and a dissolved-solids content of 187 parts per million. Because the quality of water in this well is more nearly characteristic of hornblende gneiss than of granite, it is probable that one or more beds of hornblende gneiss were penetrated.

Well 56, in hornblende gneiss, yielded water that had a total hardness of 68 parts per million, or about twice that of the average sample from granite.

The temperature of well waters range from 50° to 61°F.

RECORDS OF WELLS IN IREDELL COUNTY

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
1	7 miles NW of Harmony	Iredell County Schools		Flat	300	2		Granite gneiss			Good yield reported.
2	3 miles N of Harmony	R. H. Kennedy			200	2	80	Hornblende gneiss		5	
2a	4 miles NE of Harmony	Wade Smith			120			Granite gneiss		40	
3	3 miles SW of New Hope	D. R. Milsaps		Hill	326	2	60	Mica schist		0	
4	do	do		Slope	77	2		do		4	
5	5 miles SW of New Hope	Fred Clanton		Hill	169	2	40	do		10	
6	do	Ed Clanton		Flat	243	2	60	do	35	5	
7	5 miles W of Harmony	Hardindale Farm	1944	Hill	261	6	100	do	54	10	
8	4 miles SW of Harmony	T. D. Moore		do	240	2	65	do		0	
9	Harmony	Harmony Baptist Church		Slope	105	6		do		0	
10	do	L. S. Williams		Hill	99	6	78	do	32	6	Drawdown 66 feet.
11	do	Iredell County Schools		Flat	200	2					Good yield reported.
12	do	Mr. Deerman		do	160	2	60	Granite gneiss		2	
13	1 mile S of Harmony	Ed Massey		do	150	2	60	do		6	
14	2 miles S of Harmony	W. A. Jones		Hill	74	6	44	Mica schist	35	3	Drawdown 39 feet.
15	6 miles S of New Hope	Mrs. Ruth Shaver		Flat	251	2	57	Granite gneiss	40	3	
16	do	Iredell County Schools		Slope	300	4		do	25	14	Drawdown 35 feet.
17	7 miles W of Turnersburg	Henry Hicks		Hill	140	2	65	do		4	
18	3 miles W of Turnersburg	W. C. Church		Slope	253	2	59	do		6	
19	do	R. C. Church		do	260	2	76	do	59	5	
19a	Turnersburg	Rocky Creek Mills	1951	do	476	6	40	Hornblende gneiss	50	22	18 gallons a minute at 150 foot Pumping level. 22 gallons a minute at 200 foot Pumping level.
19b	do	C. V. Henkle	1951	Hill	159	6	44	do	45	3	Pumping level 150 feet.
19c	do	do	1951	do	162	6	65	do	85	10	Do
19d	do	do	1951	do	150	6	98	do	45	20	Pumping level 105 feet.
20	7 miles NW of Statesville	W. O. Weston		do	210	2	40	Granite gneiss	60	5	
21	6 miles NW of Statesville	Ken Watt		do	145	2	99	do	52	2	
22	5 miles NW of Statesville	Mr. Marlowe		do	220	2		do	65	4	
23	6 miles NE of Statesville	Harry Patterson		do	250	2	40	Hornblende gneiss		0	
24	do	do		Slope	68	2		do		5	
25	do	W. P. Frazier			260	2	40	do		6	
26	5 miles NE of Statesville	Roy Thomas		Hill	142	2	65	do		5	
27	5 miles SE of Turnersburg	Iredell County County		do	300	3		Granite gneiss		11	Pumping level 80 feet.
28	6 miles SE of Turnersburg	B. C. Robertson		Slope	130	2		do		3	
29	10 miles NE of Statesville	Mr. White		Valley	43	2	42	do	18	4	
30	8 miles NW of Statesville	Brights Fiemster		Flat	149	2	120	do	30	5	
31	do	Iredell County Schools		do	190	4		do	25	17	Pumping level 65 feet.
32	7 miles NW of Statesville	R. D. Murdock		Hill	90	2		do	40	8	Analysis. Temperature 59½°F.
33	do	M. W. Brown		do	100	2	80	do	55	5	
34	6 miles NW of Statesville	Mrs. T. W. Vickery		do	233	2	60	do	60	3	
35	5 miles NW of Statesville	M. J. Hutto		Slope	90	2	60	do	22	5	Analysis. Temperature. 60½°F.
36	do	L. W. Stevens		Hill	108	2	80	do	60	5	Analysis. Temperature 59½°F.
37	do	P. S. West	1948	do	931	6	67	do	34	3	Pumping level 200 feet.
38	do	Davie Cooke		do	247	2	60	do	70	7	
39	3 miles NW of Statesville	Walter Morrison		do	210	2		do	50	4	
39a	3 miles N of Statesville	Paul Lippord		Slope	89	2	73	Hornblende gneiss		5	
40	do	Lorin Gibson		do	190	2	100	do	42	5	Temperature 62°F.
41	2 miles N of Statesville	Bill Moore		Flat	45	2	42	do		5	
42	do	Gaither's Store		Hill	135	2	44	do	30	8	
43	do	R. F. Gray		Flat	80	2		do		8	
44	1 mile N of Statesville	Jack Wagner	1950	Hill	216	6	38	do	45	15	Pumping level 123 feet.
45	2 miles NE of Statesville	Shelton Miller		do	256	2	60	Granite gneiss		0	
46	4 miles NE of Statesville	C. A. Sykes	1950	do	370	6	28	do	34	11	Pumping level 275 feet.
47	3 miles NE of Statesville	Gurley's Tavern	1948	Slope	104	6	17	do	15	7	Pumping level 80 feet.
47a	4 miles NE of Statesville	J. C. Lackey	1951	Flat	175	6	16	do	25	44	Pumping level 35 feet.
48	do	H. Shelton Miller	1949	Hill	83	6	55	do	35	18	Pumping level 70 feet.
49	6 miles NE of Statesville	Fred Sharpe		do	160	2	30	do	30	0	
50	8 miles W of Statesville	A. E. Gray		Slope	240	2		Hornblende gneiss		2	
51	do	do		do	189	2		do		5	
52	7 miles W of Statesville	Rochelle Brown		Flat	122	2	80	do		5	
53	do	T. E. McNeely			102	2	63	do		5	
54	3 miles W of Statesville	Woodrow Lyton		Hill	189	2	12	do	30	0	
55	2 miles W of Statesville	Mr. Coleman		Slope	146	2	50	do	17	10+	Reported to be a good well.
56	do	Carnation Milk Co.	1940	do	503	10	150	do	34	500+	Analysis. Temperature 61½°F. Tested for 22 hours, yielding 660 gallons a minute with 91 foot pumping level.

RECORDS OF WELLS IN IREDELL COUNTY—*Continued*

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
57	Statesville	Phoenix Mills	1944	Hill	775	10	57	Mica schist		0	
58	do	do	1943	do	779	10	56	do		15	
59	do	do	1944	do	802	10	57	do		0	
60	2 miles E of Statesville	Roy Blackwelder			167	2	52	Granite gneiss		5	
61	2 miles W of Statesville	Mr. Freeze		Slope	115	2	59	Hornblende gneiss	35	1	
62	do	Ivy Bridges		Hill	168	2	80	do		5	
63	do	C. A. Sykes	1947	do	93	6	67	do	40	12	Pumping level 90 feet.
64	1 mile W of Statesville	Hines' Grocery		Flat	49	2	44	do		8	
65	Statesville	Stimpson Hosiery Mills		Hill	500	8	61	Mica schist	40	20	Pumping level 110 feet.
66	do	Iredell County Schools		Flat	300	2		Granite gneiss			Good yield.
67	1 mile E of Statesville	Paul Lippord		Hill	179	2	36	do		3	
68	1 mile SE of Statesville	Silver Pine Grill	1944	do	383	6		do	50	1	Pumping level 125 feet
69	8 miles SW of Statesville	W. V. Fox	1949	do	326	6		Mica schist		0	
70	do	do	1950	Flat	85	6	64	do	45	30	Pumping level 60 feet.
71	7 miles SW of Statesville	Beaver Service Station			130	2		Granite gneiss		5	
72	6 miles SW of Statesville	Mr. Ingram		Slope	80	2	63	do	18	4	Analysis. Temperature 59°F.
73	do	N. D. Steele	1939	Hill	175	4½	122	do	30	7	Pumping level 110 feet.
74	5 miles SW of Statesville	Iredell County Schools		do	220	4		do		14	Pumping level 70 feet.
75	do	do		do	92	2	65	do		4	
76	3 miles SW of Statesville	Ralph Cody		do	155		90	Hornblende gneiss		5	
77	do	Ervin Gregory	1946	Slope	88	6	50	do	37	20	Pumping level 85 feet.
78	2 miles S of Statesville	Don Shephard		Hill	200	2	75	Mica schist		5	
79	7 miles SE of Statesville	C. L. Reitzel	1948	Flat	220	6	44	Diorite	45	20	Pumping level 100 feet.
80	do	Parks Shell		do	100	2	42	do		6	
81	do	Robertson Chemical Co.	1950	Slope	1100	6	144	Granite gneiss	29	20	Pumping level 150 feet.
82	do	do	1950	do	330	6	127	do	40	20	Pumping level 110 feet.
82a	9 miles NW of Troutmans	W. K. Sigmon		Hill	92	2	69	Granite			
83	3 miles NW of Troutmans	Arthur Little		Slope	55	2	53	Mica schist		5	
84	2 miles N of Troutmans	Presbyterian Orphan Home		do	300	8		Granite gneiss		40	
85	do	do		Hill	350	6		do		18	
86	do	do	1924	Slope	60	6		do		24	Analysis.
87	do	Tom Morse		do	60	2	45	do		5	
88	1 mile N. of Troutmans	Blanton Moore			173	2	63	do		5	
89	Troutmans	Town of Troutman	1924	Hill	500	8	100	do		25	Analysis.
90	do	do	1942	Draw	560	8	111	do	32	60	Analysis. Pumping level 150 feet.
91	do	Troutman Shirt Co.	1942	Slope	350	8	111	do		35	
91a	do	American Thread Co.	1942	do	400	8	104	do	48	27	Analysis. Pumping level 150 feet.
92	do	Town of Troutmans	1950	do	376	6	69	do	35	45	Pumping level 125 feet.
93	do	James Goodman		Hill	95	2	74	do		5	
94	do	Town of Troutmans	1941	Slope	263	6		do	48	45	Pumping level 150 feet.
95	1 mile SW of Troutmans	Albert Winecoff		do	151	2	73	do		5	
96	do	Junior Malcom		do	208	2	140	do	60	3	
97	4 miles W of Troutmans	Frank Elliott		Hill	210	2	110	Mica schist		5	
98	do	Will Ostwalt		do	179	2	77	do			Fair yield.
99	4 miles SW of Troutmans	Superior Yarn Mills	1948	Valley	415	10	185	Granite gneiss	15	23	Analysis. Pumping level 205 feet.
100	do	do	1943	Hill	400	8	54	do		6	
101	do	do	1943	do	400	8	102	Mica schist		3	
102	do	do	1943	do	505	8	45	Granite gneiss		3	
102a	2 miles SE of Troutmans	R. L. Privette	1950	Flat	140	6	105	do	70	25	Pumping level 95 feet.
103	5 miles E of Troutmans	Iredell County Schools		do	300	6		do		24	
104	4 miles S of Troutmans	Mr. McDaniels		Hill	79	2	64	do		5	
105	7 miles NW of Mooresville			do	119	2	70	do		3	
106	6 miles NW of Mooresville	Walter Howard		do	101	2	94	Hornblende gneiss	40		
107	do	Troy Roberson		do	80	2		do	35	5	
108	5 miles NW of Mooresville	Forrest Thompson		Slope	202	2	107	do		5	
109	2 miles N of Mooresville	R. C. Millsap	1948		500	6		Granite			
110	2 miles NE of Mooresville	Mr. Carrigan		Flat	117	2½	50	do		4	
111	do	Sam Alexander		do	120	2½	50	do		4	
112	Mooresville	Mrs. C. P. McNeely		Slope	150	6		do		20	
113	do	Johnston Ice Co.	1920	do	148	6		do	25	12	Pumping level 100 feet.
114	do	Mooresville Furniture Co.		do	270	2		do	25	7±	
115	do	Town of Mooresville		do	400	6		do	25	80	Drawdown 100 feet. Well abandoned.
116	5 miles W of Mooresville	Iredell County Schools		Hill	400	6		Diorite	35	22	Pumping level 9 feet.
117	2 miles SW of Mooresville	W. H. Keeter		Slope	197	2	133	Granite		5	
118	2 miles S of Mooresville	Gene Miller		do	124	2	42	do		5	
119	do	James Honeycutt		do	79	2	43	do		5	

RECORDS OF SPRINGS IN IREDELL COUNTY

No.	LOCATION	OWNER OR NAME	Chief Aquifer	Yield (gpm)	REMARKS
A	15 miles N of Statesville	Eupeptic Springs	Hornblende gneiss	1	According to N. C. Economic Paper 15, p. 112 water has total solid content of 122 parts per million.
B	Turnersburg	Town of Turnersburg	do	7	Analysis. Temperature 59½°F. Spring emerges from base of cove about 350 feet south of Rocky Creek.
C	½ mile W of Presbyterian Orphanage (2 miles N of Troutmans).	Barium Springs	Granite gneiss	1½	A series of 9 springs, Barium Springs being the largest. Described in N. C. Economic Paper 15.
D	2 miles S of Mooresville	Greswell Spring	Granite	½	According to N. C. Economic Paper 15 water has total solid content of 315 parts per million.
E	3 miles S of Mooresville	Mt. Mourne Spring	do	16	Analysis. Flows from top of bedrock at the base of a steep draw.

CHEMICAL ANALYSES OF GROUND WATER FROM IREDELL COUNTY

(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	32	35	36	56	72	86
Silica (SiO_2)	9.9	34	31		31	12
Iron (Fe), total	.50	1.3	.96	.18	8.7	.10
Iron (Fe), in solution	.06	.02	.02		.07	.03
Calcium (Ca)	1.8	6.8	6.5		5.3	1.9
Magnesium (Mg)	.8	2.4	2.9		2.7	1.1
Sodium and potassium (Na + K)	3.5	8.6	7.6		10	4.3
Carbonate (CO_3)	0	0	0		0	0
Bicarbonate (HCO_3)	15	48	50	78	37	12
Sulfate (SO_4)	1.2	3.7	1.6	14	13	2.3
Chloride (Cl)	1.1	1.4	1.2	1	1.1	2.2
Fluoride (F)	.1	.1	.1	.1	.2	.1
Nitrate (NO_3)	.1	.1	.0		.1	3.6
Dissolved solids	25	80	77		80	33
Total hardness as $CaCO_3$	8	27	28	68	24	9
pH	6.1	6.7	6.7		6.5	5.75
Rock type	Granite gneiss	Granite gneiss and hornblende gneiss	Granite gneiss	Hornblende gneiss	Granite gneiss	Granite gneiss
Date of collection	May 24, 1950	May 24, 1950	May 24, 1950	Nov. 30, 1943	May 24, 1950	July 28, 1948

	89	90	91a	99	B	E
Silica (SiO_2)	31	24	26	24	17	15
Iron (Fe), total	1.7	.13	.11	5.7	.99	.04
Iron (Fe), in solution			.02	.07	.02	.02
Calcium (Ca)	7.6	11	4.6	37	7.1	2.2
Magnesium (Mg)	3.1	4.0	2.1	7.6	3.8	.8
Sodium and potassium (Na + K)	10	4.7	6.9	13	5.5	4.9
Carbonate (CO_3)	0	0	0	0	0	0
Bicarbonate (HCO_3)	44	55	38	132	28	15
Sulfate (SO_4)	9.8	1.5	1.5	34	2.7	.7
Chloride (Cl)	5.2	3.0	1.5	2.8	8.5	2.0
Fluoride (F)	.1	.0	.1	1.5	.0	.1
Nitrate (NO_3)	.1	4.0	.2	.1	9.4	4.0
Dissolved solids	93	84	65	187	77	39
Total hardness as $CaCO_3$	32	44	20	124	33	9
pH	6.55	6.5	6.5	7.0	6.0	5.8
Rock type	Granite gneiss	Granite gneiss	Granite gneiss	Granite gneiss	Hornblende gneiss	Granite
Date of collection	Sept. 24, 1948	Sept. 24, 1948	July 28, 1948	May 25, 1950	June 21, 1950	Apr. 10, 1951

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

DAVIE COUNTY

(Area: 240 square miles. Population: 15,420)

Geography.—Davie County is the smallest county in size and population in the Statesville area. The county is entirely rural except for Mocksville, the county seat, and Cooleemee. A textile mill at Cooleemee is the largest single industry. Tobacco, dairy products, and corn represent the chief cash crops. There is a close network of paved and improved roads.

Davie County lies on the divide between the Yadkin and South Yadkin Rivers. The Yadkin River flows southward in a crooked valley to form the east boundary of the county. It is joined at the southern point of the county by the South Yadkin River which flows southeastward to form the south boundary. Numerous, closely spaced tributaries of both rivers extend to all parts of the county. Most of these tributaries flow south and east and apparently are not related to the underlying rock structures. Between the streams and their related smaller valleys and rising as much as 100 or 150 feet above them are rounded hills and ridges which appear to be of the same general level. No pronounced hill or mountain stands above the surrounding land in Davie County. Most of the land has a heavy soil and vegetal cover, although gullying is common within 2 miles of both rivers.

Geology.—A wide variety of rocks occur in Davie County, and the relation of one with another is not clearly known.

Large areas of basic rocks extend from north to south through the center of the county. It is difficult to make a sharp distinction between the different types, and consequently both the classifications and the contacts shown on the map (fig. 15) are arbitrary. Gabbro and diorite underlie a large area near Farmington where dark soils of the Mecklenburg type are prominent. Extending outward from the main area of gabbro and diorite, granite also is present in small and large bodies intermixed with the basic rocks.

Along the Yadkin River in the extreme eastern part of the county is an area of porphyritic granite. Feldspar crystals about half an inch long, weathered from the granite, give the soil a gravelly texture in much of the area. In contrast with many other granites of the Statesville area, this granite weathers readily and is generally covered with a moderately thick layer of soil.

Mica schist, containing numerous interlayered beds of granite, occurs in a north-trending strip near the west border of the county. The light-colored sandy soil overlying the schist contrasts sharply with the dark-colored soil of the diorite which borders the schist in some places on the east.

The most distinctive rocks of the county are the semiconsolidated beds of shale and sandstone occurring in the extreme northwest corner of the county. These sedimentary rocks are similar to those in Stokes and Rockingham Counties, which represent clastic deposits in an area downfaulted during Triassic time. It is probable that these deposits were continuous with those in Davie County before post-Triassic erosion removed the deposits in the 25-mile area separating them. The small size and irregularity of the area underlain by these deposits in Davie County suggest that they are thin—probably less than 200 feet thick at any place. Several diabase dikes a few feet wide penetrate the deposits.

Ground water.—Almost all ground water used in Davie County is for rural use. Since Mocksville abandoned its wells in 1947, both it and Cooleemee have depended on treated surface supplies. Most of the wells in the county are shallow dug and bored wells, ending in the weathered rock, or 2- to 4-inch drilled wells penetrating the hard fractured rock.

The scarcity of drilled wells of tested capacity prevents an accurate appraisal of ground-water conditions in the county. With the exception of the small area of Triassic sedimentary rocks in the northwestern corner of the county, the geology and, consequently, the ground-water conditions should be similar to those in adjacent counties. No particular area is suspected of being a poor well-producing area, although hills should be avoided in locating wells if a large yield is desired. The probability curves (figs. 7 and 8) should give a fair indication of the probable yields of prospective wells.

The only chemical analysis of ground water in Davie County is for a dug well (1) in the Triassic sedimentary rocks. The low mineral content of this sample suggests that these rocks contain water of good chemical quality. In the remainder of the county the diorite, gabbro, and hornblende gneiss may yield water that is harder and that contains more mineral matter than water in the granites and mica schist. The chemical character of the ground water from all rocks should be suitable for most uses, but for some industrial processes that require water of low hardness and iron, treatment for softening and removal of iron may be required.

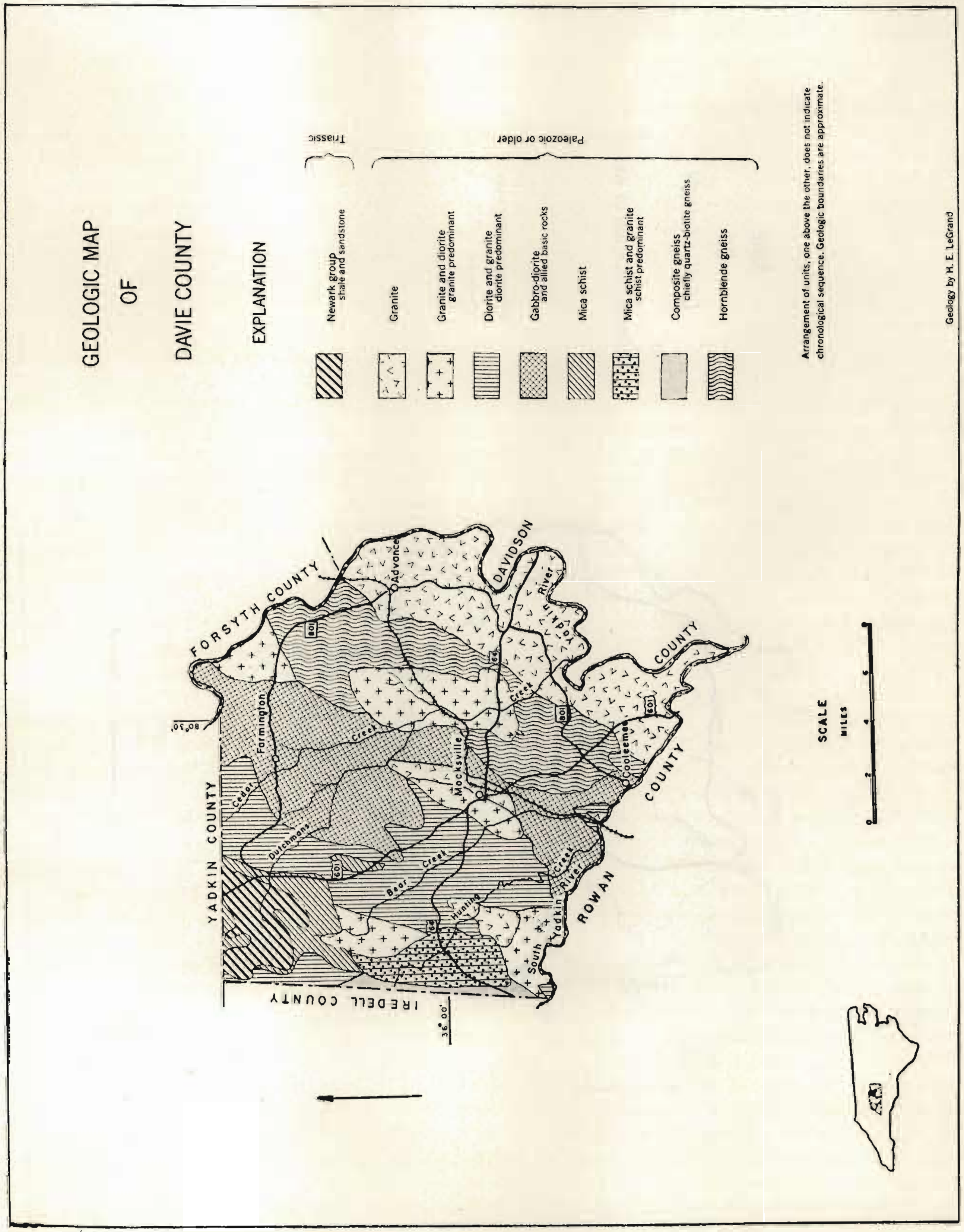


FIGURE 15.—*Geologic map of Davie County.*

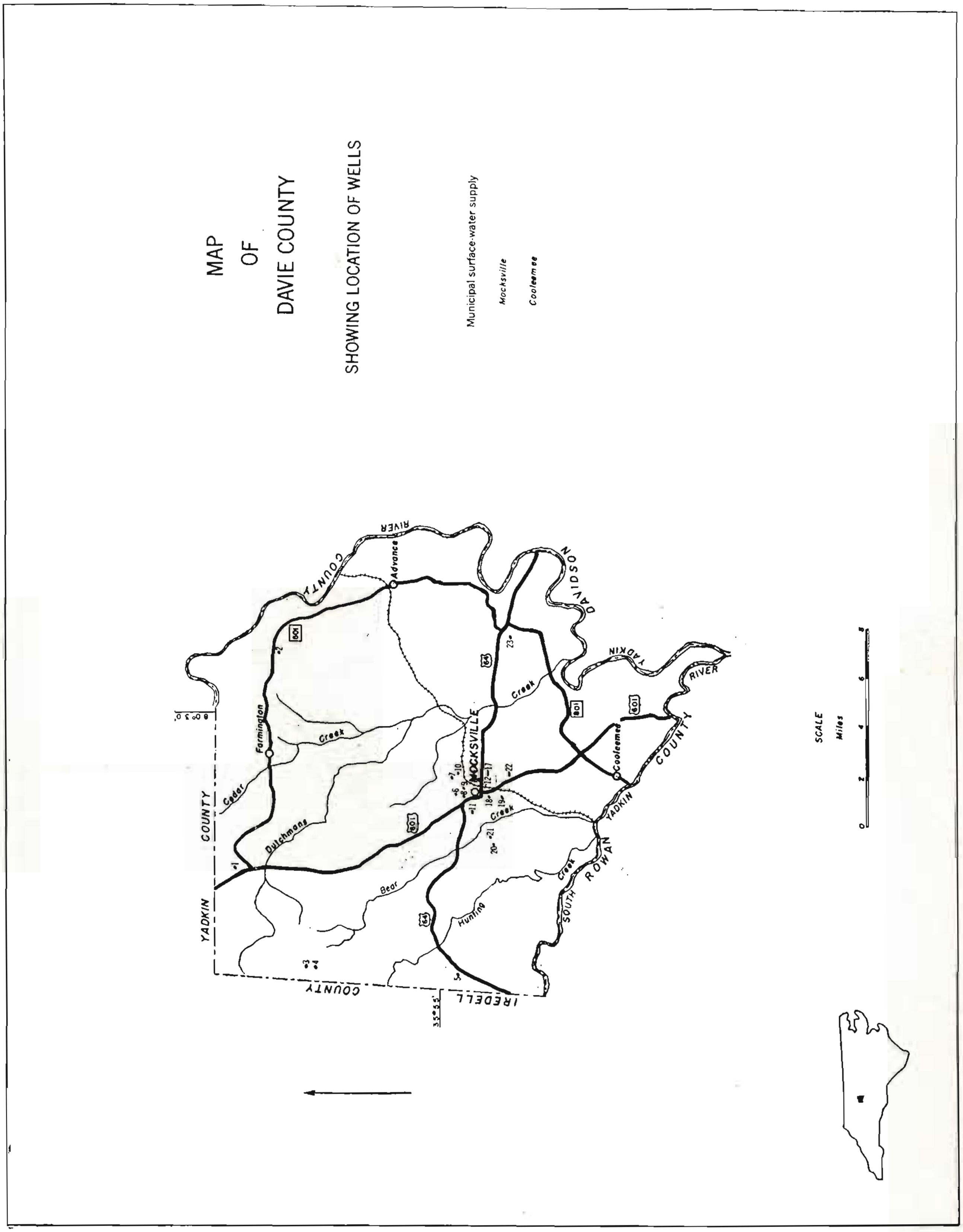


FIGURE 16.—*Map of Davie County showing location of wells.*

RECORDS OF WELLS IN DAVIE COUNTY

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
1	10 miles NW of Mocksville	W. E. Allen		Flat	19	19	19	Triassic shale	15		Analysis.
2	10 miles NE of Mocksville	Macedonia Church		do	57	2½		Hornblende gneiss	25	7±	
3	8 miles NW of Mocksville	R. C. Foster	1947	Hill	180	6		Diorite	41	12	Pumping level 161 feet.
4	do	do		do	120	6		do	50	20	Pumping level 80 feet.
5	8 miles W of Mocksville	T. J. Tawl	1950	do	111	6	60	Schist	30	10	Pumping level 75 feet.
6	Mocksville	Town of Mocksville		do	100	3		Granite	80	8	Originally yielded 20 gallons a minute.
7	do	do		do	185	3		do		8	
8	do	do		do	350	10		do	80	6	
9	do	do		do	300	8		do	100	20	Originally yielded 60 gallons a minute.
10	do	City Ice Plant		Slope	100	3		Gabbro		20	
11	do	Town of Mocksville		Hill	115	3		Granite		10	
12	do	do		do	120	3		do		15	
13	do	Chair Factory		Flat	300			do		5	
14	do	Town of Mocksville		Slope	1161	8		do		1	
15	do	Davie County Courthouse		do	200	3		do		10	
16	do	Mocksville Laundry		do	180	3		do		15	
17	do	Town of Mocksville		do	90	3		do		20	
18	do	do		Hill	280	8	30	do	45	20	
19	do	do		Flat	185	3		do		8	
20	2 miles W of Mocksville	Davie County Home		Hill	140	4		Diorite-granite			Pumping level 120 feet. Adequate Supply.
21	do	North Carolina State Prison		Slope	120	6		do		20	
22	Mocksville	Town of Mocksville		Flat	120	3		Gabbro		18	
23	Fork	Fork Baptist Church	1948	Hill	100	6	57	Granite		5	Pumping level 70 feet.

CHEMICAL ANALYSIS OF GROUND WATER FROM DAVIE COUNTY

(Number at head of column corresponds to well number in table of well data)

Parts per million

	1
Silica (SiO_2)	15
Iron (Fe), total	.52
Iron (Fe), in solution	.04
Calcium (Ca)	22
Magnesium (Mg)	.9
Sodium and potassium (Na + K)	4.3
Carbonate (CO_3)	0
Bicarbonate (HCO_3)	78
Sulfate (SO_4)	.7
Chloride (Cl)	2.2
Fluoride (F)	0
Nitrate (NO_3)	.2
Dissolved solids	84
Total hardness as $CaCO_3$	59
pH	6.8
Rock type	Sandstone
Date of collection	June 6, 1951

Analyzed by the Quality of Water Branch, U. S. Geological Survey

ROWAN COUNTY

(Area: 517 square miles. Population: 75,410)

Geography.—Rowna County is a typical county of North Carolina, having one good-sized city and several towns and villages. Salisbury, with a population of 20,102, is the county seat and center of activity. All the centers of population are located on interstream areas and are served by railroads. Textile manufacture and granite quarrying are leading industries. Cotton, dairy products, and corn are the leading farm products.

The county is composed of numerous rolling hills separated by a close network of valleys, the deeper of which contain streams. Most of the slopes are covered with a deep layer of soil; however, on some of the steep slopes the soil has been removed at a faster rate than it could form. Two mountains, which stand slightly higher than the surrounding land and which have little or no soil covering, are Young Mountain, 2 miles east of Cleveland, and a long northeast-trending ridge forming Dunns Mountain, near Granite Quarry. Except for the two mountains the difference in elevation between most hills and adjacent valleys is less than 125 feet.

All of Rowan County, except a few square miles in the southern part, is drained by the Yadkin River and its main tributary, South Yadkin River. These two rivers form the north and east boundaries of the county and flow southeastward. As a result, most of the drainage within the county is northeastward toward the Yadkin River.

Geology.—Two large geologic units are represented in Rowan County. They are the volcanic and allied rocks of the Carolina Slate belt in the eastern corner of the county and the plutonic rocks, chiefly granite and diorite, in the remainder of the county.

The rocks of the Slate belt were described in detail by Laney (1910) in connection with a study of gold deposits in the area around the village of Gold Hill. According to his report (p. 22) they:

> "represent a great sedimentary series of shales with which are interbedded volcanic flows, breccias, and tuffs . . ."
>
> "The volcanic flows, breccias and tuffs . . . apparently represents two kinds of lava, a rhyolitic and an andesitic type."

The slates are believed to have been formed from rather pure volcanic ash containing varying amounts of land waste. In most places it is difficult to find a precise contact between the slate and the tuffs. Both the slates and the interbedded tuffs and breccias have, in some places, been mashed and squeezed into large folds. The intrusion of aplite dikes and quartz veins and the chemical alteration by heated solutions have modified many parts of the entire belt.

Most of the rocks of the Slate belt are high in silica content and consequently do not readily undergo chemical alteration as a result of weathering. In most places, therefore, the soil is very thin and relatively unproductive. Because beds of greater and lesser solubility alternate and are tipped on edge, the less soluble beds becomes ridges whereas the more soluble beds generally form the valleys. Most of the ridges and valleys trend northeastward, parallel with the trend of the beds.

According to Laney (1910, p. 65) the rocks of the Slate belt are separated from the plutonic rocks on the west by a great fault of undetermined throw, called the Gold Hill fault. This supposed fault trends slightly east of north, passing about a mile west of the village of Gold Hill.

Most of the rocks west of the Slate belt range in composition from gabbro to granite. Schistose rocks, characteristic of counties to the west, are not prominent, although zones of schistose basic rocks occur locally.

An area centering around Cleveland and including a large part of western Rowan County is underlain by basic rocks, chiefly diorite and gabbro-diorite. This area was described by Watson and Laney (1906, pp. 119-120) who noted local occurrences of gabbro but described the country rock as a typical diorite which varies from place to place in the essential minerals, hornblende and plagioclase. Some bodies of granite (perhaps less than 10 percent of the total area) are included in the area mapped as diorite and gabbro-diorite. Another large area of diorite and gabbro-diorite occurs as an irregular northeast-trending belt extending from Cabarrus County on the south to Davidson County on the north; it is interrupted in the vicinity of Rockwell by a body of diorite and granite.

The diorite and gabbro-diorite in most places undergo considerable alteration near the surface as a result of weathering. They are, perhaps, the most soluble igneous rocks in the Statesville area. Therefore,

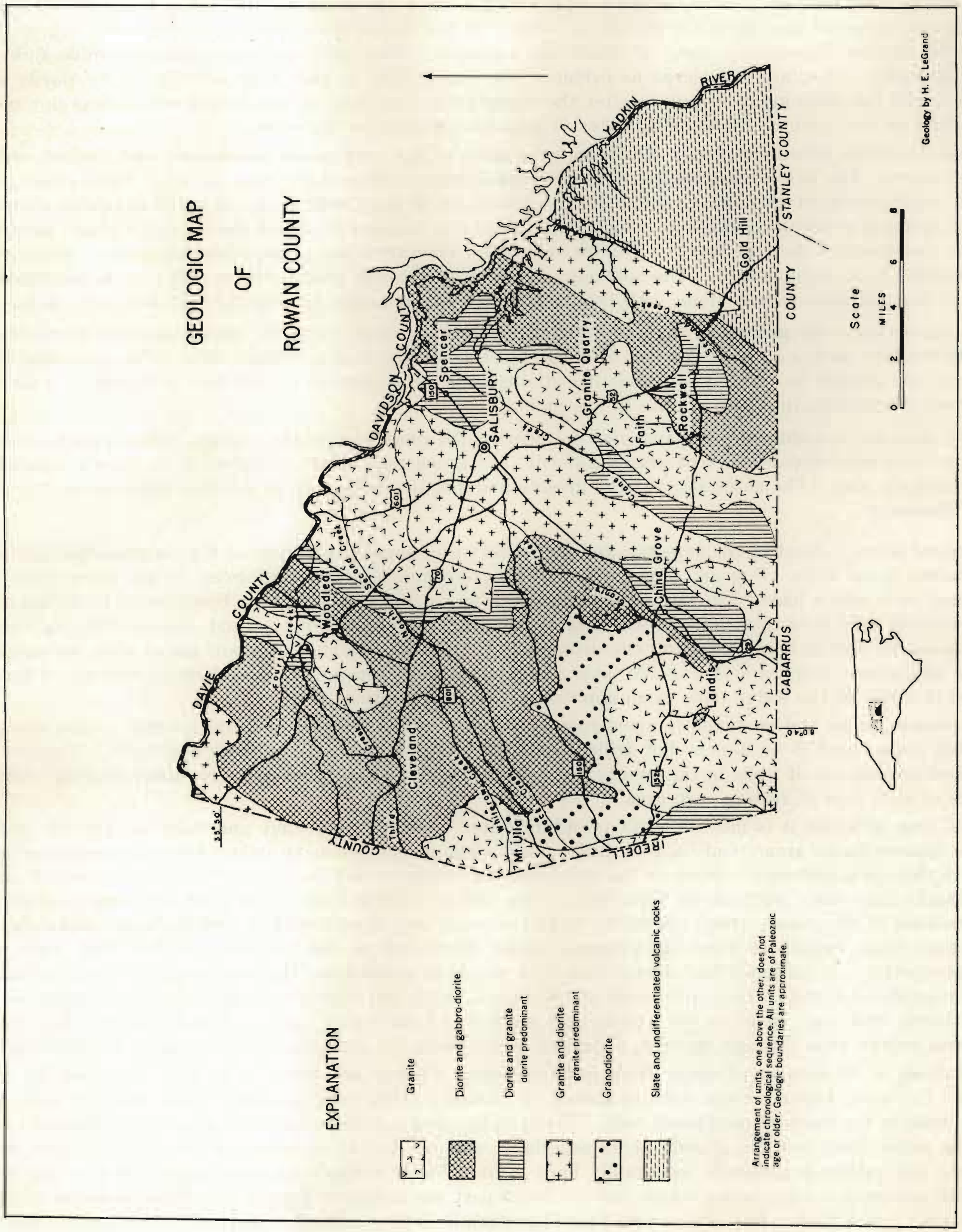


FIGURE 17.—*Geologic map of Rowan County.*

a thick layer of soil, representing the nearly insoluble residue of the surficial layer of rocks already dissolved away, covers most of their area of outcrop. The soils, generally known as the Mecklenburg and Iredell types, are deep red, or brown, and are relatively fertile. Many of the interstream areas are broad and nearly flat, except for shallow depressions, some of which are enclosed. These enclosed depressions resemble sinks in limestone rocks. They are considered as evidence (LeGrand, 1952, p. 584) that solution in the diorite and gabbro-diorite has been great enough to alter the topography, not only on the interstream areas but more particularly in the valleys where more water is available to dissolve the rocks.

Granite occurs interlayered with diorite in some parts of the county and as separate and distinct bodies in other parts. The five largest bodies of granite are shown on the geologic map (p. 51). TThe granite extending southwestward through Granite Quarry and Faith to the Cabarrus County line is conspicuous because it forms a pronounced ridge on which bare granite is exposed in many places. This ridge probably owes its resistance to the fact that the granite has so few fractures that percolating subsurface waters cannot penetrate it to decompose it. The sparseness of fractures in this granite has resulted in its development as a building and monumental stone. All the granites are characterized by thin light-colored sandy soils.

Lying between the granite in the southwestern part of the county and the diorite and gabbro-diorite in the northwestern part is an irregular belt of rocks, tentatively classified as granodiorite. The granodiorite is similar to the granite on the south in that it contains large phenocrysts of feldspar although it contains much more hornblende than any granite in the county.

The complex including granite and diorite underlies the remainder of the county. The complex consists of distinct but intermixed bodies of granite, diorite, and greenstone schist, too small to be shown separately on the geologic map. The association of the granite and diorite can be seen in several road cuts on the west side of Salisbury.

Ground water.—Most of the domestic and industrial water supplies and four of the six municipal supplies are obtained from wells. Dug and bored wells, which are common in the rural areas, obtain water from the weathered zone above hard rock. In some places, such as the granite ridge near Faith and Granite Quarry, the weathered zone is so thin that the water table lies below it, in the bedrock, and consequently successful wells cannot be dug or bored. During the drought in the fall of 1951 many dug and bored wells became dry or gave inadequate supplies as the water table fell. Substantial rains during the following winter and spring resulted in a rise of the water table to an approximate normal position.

In recent years, and particularly since recent droughts, there has been a definite trend toward the use of drilled wells—both 2- or 3-inch shot-drilled wells and 4- to 8-inch percussion-drilled wells. Records of yields and drawdowns of wells in the county are not adequate to show accurately the water-bearing characteristics of each type of rock in each area.

The area in which it is most difficult to obtain water appears to be that underlain by granite in the Granite Quarry-Faith area. Only a few drilled wells yielding as much as 20 gallons a minute each have been drilled in this area, probably because of the sparseness of fractures and the thinness of the weathered zone; it is thought that many parts of the Slate belt, in the vicinity of Gold Hill, are poor for the same reasons. In the remainder of the county fractures in the rocks are larger and more abundant and the weathered material is generally thick enough to store and transmit water downward to the fractures so that most wells are fairly productive. Experience has shown that hills should be avoided and that draws are the most favorable sites for productive wells. However, some of the broad, nearly flat interstream areas having a heavy cover of weathered rock may yield, on the average, as much as 35 gallons of water a minute to individual wells. The broad upland area through Spencer, Salisbury, and Landis, for example, contains many successful wells.

Analyses of 17 samples of water from wells in Rowan County are given in a table following the well records. Of these, 13 were from wells in gabbro or diorite, 2 from wells in granite (nos. 134 and 135), and 2 from wells in the residual weathered rock. The samples show a wide variation in dissolved solids and hardness, the water from wells in granite being especially soft and low in mineral matter. Water from wells in diorite and gabbro is generally moderately hard to hard but is suitable for most uses. Most of the wells in diorite and gabbro yield water which has 0.1 to 0.3 part per million of fluoride. Ground water underlying Landis has a much higher fluoride content than that examined from any other part of the Statesville area.

Ground-water temperatures range from 60° to 63°F. and average about 62°F.

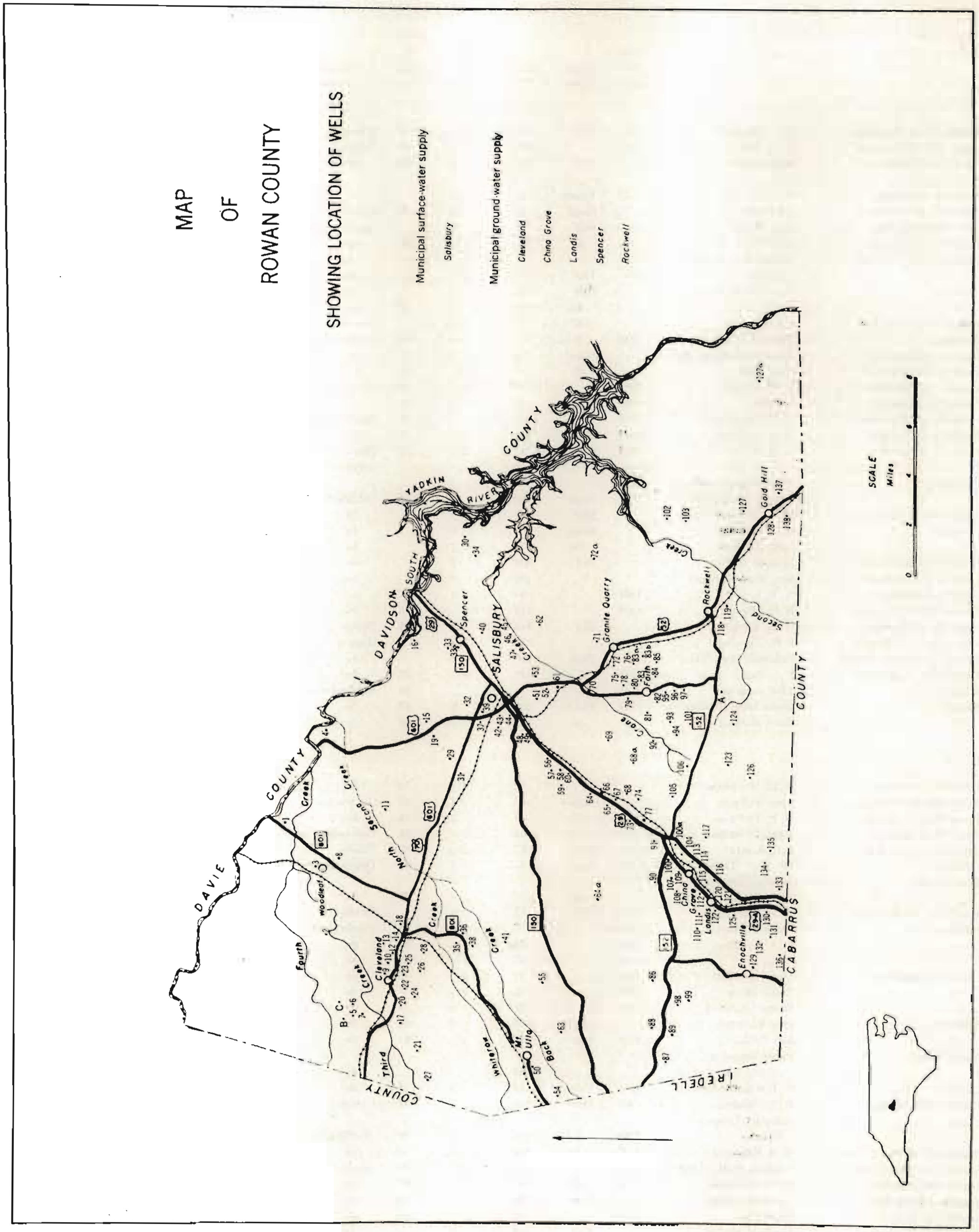


FIGURE 18.—*Map of Rowan County showing location of wells.*

RECORDS OF WELLS IN ROWAN COUNTY

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
1	3 miles NE of Woodleaf	T. C. Hendrix		Flat	49	2½	8	Diorite	18	11	Temperature 61°F. Analysis.
2	1 mile NW of Woodleaf	C. G. Wise	1948		104	2½	51	Granite		3	
3	1 mile N of Woodleaf	Bailey Quarry		Hill	225	6	40	do	120	30	Drawdown 30 feet. Well at edge of quarry.
4	6 miles E of Woodleaf	H. B. Fowler	1945	Valley	24	20		do		4	
5	2 miles N. of Cleveland	Ira Hodge		Slope	40	12	40	Diorite	30		Analysis.
6	1 mile S of Woodleaf	Ross Wood		Hill	40	12		Gabbro-diorite	28		Do
7	2 miles N of Cleveland	Jack Ford		do	150	2½	100	do		5	Do
8	3 miles NE of Cleveland	Lebanon Lutheran Church	1948	Flat	163	2½	42	do	15	4	
9	Cleveland	Town of Cleveland		Hill	110	6		do	45	6	Well abandoned.
10	do	do		do	220	6	82	do	25	3	
11	3 miles SE of Woodleaf	Gays Chapel		do	179	2½		Granite	35	5	
12	Cleveland	Town of Cleveland	1948	do	187	8	90	Gabbro-diorite	45	35	Analysis.
13	1 mile E of Cleveland	Euraka Recreation Hall		Slope	119	6	15	do	45	32	Pumping level 63 feet.
14	2 miles E of Cleveland	Cody Fink		do	97	2½	30	do	25	8	
15	3 miles N of Salisbury	C. W. Weant	1948		159	2½	90	Granite	28	7	
16	2 miles N of Spencer	Joe Floyd	1948		202	2½	54	do		5	
17	1 mile W of Cleveland	A. D. Davis, Jr.	1948		156	2½	88	Gabbro-diorite			
18	2 miles E of Cleveland	W. A. Graham	1948	Flat	119	2½	47	do	20	3	
19	2 miles N of Salisbury	G. H. Weant	1948	do	100	2½	26	Diorite-granite complex	13	8	
20	Cleveland	W. E. Graham and Sons, Contractors		Slope	150	8	50	Gabbro-diorite		0	
21	2 miles SW of Cleveland	M. Culbertson		Hill	45	10		do	34		
22	Cleveland	M. S. Graham		Slope		2		do			
23	do	Glen Wilhelm		do	95	2		do	20	9	Analysis.
24	1 mile S of Cleveland	Leonard Hoffner		Hill	200	2		do	30	5	
25	1 mile E of Cleveland	Mrs. Dora Redman			100	3		do			
26	1 mile S of Cleveland	N. B. Kesler	1951		96	2	28	do	22		
27	3 miles SW of Cleveland	R. Lee Beaver	1948		315	2½	196	do			
28	1 mile SE of Cleveland	R. W. Barber		Hill	140	2	55	Diorite	50	2	
29	4 miles NW of Salisbury	J. R. Chambers	1948		126	2½	63	Granite	18	3	
30	3 miles NE of East Spencer	Dukeville High School		Slope	120	6		do		9	
31	4 miles NW of Salisbury	I. A. Fink	1948		162	2½	30	do			
32	Salisbury	Allen Johnson	1949				40	Diorite-granite	29	10	
33	Spencer	Boone Rock Bottling Co.	1948	Flat	300	6	50	do	35	90	
33a	do	Town of Spencer		do	189	8	60	do	40	80	Drawdown 80 feet. Private analysis shows total hardness 93 parts per million and total solids 170 parts per million.
34	2 miles E of Spencer	H. H. Henderson			81	2½	79	do	16	6	
35	3 miles SE of Cleveland	Alice Huffman		Slope	100	3	40	Gabbro-diorite			
36	2 miles SE of Cleveland	D. R. Huffman		do	78	3	35	do			
37	1 mile W of Salisbury	John H. Gardner	1948		205	2½	95	Diorite-granite	7	6	
38	3 miles S of Cleveland	J. C. Kluttz	1949	Hill	137	2½	90	Diorite		10	
39	Salisbury	Dr. W. C. Taylor	1949	Slope	124	2	64	Diorite-granite	50	6	Pumping level 120 feet.
40	East Spencer	Isenhour Brick and Tile Co.		do	445	6	97	do	3	40	
41	4 miles SE of Cleveland	N. F. Hall Dairy	1923	Hill	145	3		Diorite		10	
42	Salisbury	Frank P. Brown	1949		177	2½	45	Diorite-granite	20	2½	
43	do	E. A. Goodman	1948		200	2½	121	do	7½	6	
44	do	do	1949		167	2½	56	do		7½	
45	1 mile E of Salisbury	David Goodlett	1950		97	2½	19	do	12	2	Pumping level 60 feet.
46	do	Frank Dixon	1950		92	2½	37	do	27	2½	Do
47	do	Walter Blackwell	1951		57	3	26	do	26	2	Pumping level 42 feet.
48	Salisbury	John Foreman		Slope	130	6	63	do		50	
49	do	Mr. Pittman	1948	Flat	81	2½	51	do			
50	Mount Ulla	Public School of Mount Ulla			250	2		do		3	
51	Salisbury	C. D. Blackwelder	1949	Valley	100	6	98	do	8	20	Pumping level 38 feet.
52	1 mile S of Salisbury	R. E. Goodman	1949	Slope	200	6	85	Granite		35	
53	do	Salisbury Drive-in Theatre	1950	do	198	6	89	Diorite-granite	22	30	Pumping level 65 feet.
54	2 miles SW of Mount Ulla	R. S. Edmiston	1947	do	406	6	49	do	35	14	Pumping level 100 feet.
55	3 miles E of Mount Ulla	Graham Brothers Dairy		do	270	2½	55	Diorite	40	10	
56	1 mile S of Salisbury	M. B. Havrelson	1948	do	187	2½	131	do		4½	
57	2 miles S of Salisbury	Circle M. Ranch		Flat	365	6	40	do	40	40	
58	1 mile S of Salisbury	Dave Bare	1949		163		150	do	10	8	Pumping level 60 feet.
59	2 miles S of Salisbury	Circle M Ranch		Flat	335	6	90	do	25	25	
60	do	do		do	325	6	174	do	30	30	
61	1 mile N of Granite Quarry	J. F. Fisher		Hill	175	6	25	Granite		5	

RECORDS OF WELLS IN ROWAN COUNTY—*Continued*

Well no.	LOCATION	OWNER	Date Completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
62	2 miles NE of Granite Quarry	W. D. Honeycutt	1948	Slope	122	6	81	do		35	
63	2 miles S of Mount Ulla	Graham Brothers	1949			2½	62	Diorite	24	6	
64	3 miles S of Salisbury	North Carolina State Prison Camp	1934	Flat	219	6	70	do		40	Pumping level 100 feet. Analysis.
64a	6 miles SW of Salisbury	T. R. Upright	1945	Slope	90	2	25	do		7	Water reported hard.
65	3 miles S of Salisbury	Carl Rufty	1950		150	2½	56	do		0	Well Dynamited.
66	do	J. L. Stiller	1950	Flat	170	2½		do	14	4½	Pumping level 60 feet.
67	do	do	1948	do	123	2½	94	do	10	6	
68	do	Taylor Clay Products		Hill	398	6	98	do	30	18	
68a	do	Edgar Holt	1949		87		63	do	19	6	Pumping level 42 feet.
69	2 miles S of Salisbury	W. A. Abasher	1950	Slope	93	6	41	Diorite-granite	15	8	
70	3 miles S of Salisbury	H. P. Hardimon	1948	Valley	200	6	18	Granite			Low yield.
71	1 mile NE of Granite Quarry	Rowan County Schools		Hill	140	2½		do	25	3½	Pumping level 138 feet.
72	Granite Quarry	Summie Morgan	1950	Slope	52	6	20	do	30	1	Well dynamited.
72a	2 miles E of Granite Quarry	C. T. Trexler	1948	do	101	2½	40	Diorite-granite		4	Pumping level 38 feet.
73	4 miles S of Salisbury	I. M. Powell		Flat	115	3	42	Diorite		12	
74	do	Taylor Clay Products	1950	Slope	396	6	90	Granite		20	Pumping level 180 feet.
75	Granite Quarry	P. H. Lyerly		do	300	6	10	do		0	Bedrock at surface.
76	do	R. J. Lyerly		do	448	6		do	8	40	Pumping level 18 feet.
77	5 miles W of Granite Quarry	S and W Farm Supply	1948	Draw	240	6	70	Diorite-granite	4	30	
78	1 mile N of Faith	J. E. Michael	1950	Slope	158	6	55	Granite	21	60	
79	Faith	David M. Earnhart	1948		165	2½	88	do			
80	do	Faith High School	1926	Hill	48	6		do		11	
81	do	Ida Trevethan		do	130	6		do		2	
82	do	June Fesperman	1948	Flat	182	6	123	do		30	
83	do	Mr. Deal		do	135	6	35	do		30	
83a	Granite Quarry	Miss Beulah Lyerly	1931	Slope	462	6	16	do	10		Good yield. Furnishes several homes.
83b	do	do		Hill	294	6	40	do		2	
84	Faith	Mr. Fink	1948		103	6	21	do			
85	1 mile E of Faith	Gardner Granite Co.		Hill	200	6	30	do		15	
86	5 miles W of China Grove	F. H. Corriher	1930	Slope	360	6	55	do	20	10	Pumping level 80 feet.
87	7 miles NW of Landis	Fred Jenkins		Flat	125	2½	47	do	40	3	
88	6 miles NW of Landis	John Huffman		do	109	2½	100	do	35	4	
89	do	James Shinn		do	135	2½	50	do	40	4	
90	1 mile NW of China Grove	O. W. Barnhardt	1951	Slope	153	2½	69	do	18	4	Pumping level 60 feet.
91	China Grove	J. W. McDaniel	1948		125	2½	63	Diorite	20	7	Pumping level 40 feet.
92	2 miles W of Faith	Howard Sheehs	1948	Hill	188	6	11	Granite	90	5	Pumping level 145 feet.
93	Faith	V. L. Hopkins		do	136	6	63	do		30	
94	1 mile W of Faith	John Deal		Flat	130	6	42	do		25	
95	Faith	W. C. Lingle		do	103	6	20	do		20	
96	do	Lutheran Church	1949	Slope	94	6	21	do	10	20	
97	do	do		Hill	177	6	68	do		4	
98	5 miles NW of Landis	Clinton Blalock		do	140	2½		do	65	0	
99	do	do		do	180	2		do	65	0	
100	China Grove	Town of China Grove	1926	Flat	404	8	81	Gabbro	28	60	Pumping level 168 feet. Abandoned.
100a	do	do	1925	do	319	8	61	do	50	30	Pumping level 200 feet. Analysis.
101	1 mile S of Faith	Gardner Brothers	1948	do	90	6	56	Granite			
102	3 miles NE of Rockwell	J. C. Eagle	1920	Hill	119	3	60	do	25		
103	do	do	1933	do	197	3	85	do	35	6	Pumping level 60 feet.
104	China Grove	Town of China Grove	1946	Draw	750	8	168	Gabbro	20	40	Pumping level 200 feet. Analysis.
105	1 mile E of China Grove	Mr. Allen	1948		154	2½	95	Diorite-granite	6	3	
106	3 miles E of China Grove	Ray Klutz		Flat	427	6		do	40	40	
107	China Grove	Town of China Grove	1931	Hill	714	10	123	Gabbro	72	90	Analysis. Temperature 62°F. Yield declined to 60 gallons a minute in 1951 with 200 foot pumping level.
108	1 mile N of Landis	Robert Mull	1950		96		58	Granite	20	7	
109	China Grove	T. B. Marlin	1950		155	2½	87	Gabbro	15	4½	
110	Landis	Roy Sloan	1950		194	2	97	do	12	2	Pumping level 42 feet. Well dynamited.
111	do	Town of Landis	1946	Flat	406	6	70	do	28	30	Analysis. Temperature 60°F. Pumping level 180 feet.
112	do	Lynn Mills Co.	1949	do	1008	8	80	do		60	Analysis.
113	China Grove	China Grove Cotton Mill Co.	1941	do	141	8	68	do		10	
114	do	do	1940	do	601	8	68	do	75	60	Pumping level 157 feet.
115	Landis	A. Y. Thurmond		do	208	6	86	do	25		

RECORDS OF WELLS IN ROWAN COUNTY—*Continued*

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
116	China Grove	China Grove Cotton Mill	1951	Slope	775	8	21	do	18	30	Pumping level about 300 feet.
117	1 mile S of China Grove	George Ryers	1949		194	2½	18	Diorite-granite	16	4	Pumping level 60 feet.
118	Rockwell	Town of Rockwell		Slope	630	8	118	do		75	Pumping level 110 feet. Well was deepened from 122 feet in 1950. Most water struck at 560 feet.
119	do	do	1939	do	144	8		do	30	100	Analysis.
120	Landis	Town of Landis	1949	Flat	1108	8	110	Gabbro	35	38	Do
121	do	do	1946	do	604	8	80	do	32	60	Analysis. Temperature 61°F. Pumping level 60 feet.
122	do	Tom Rankin	1948		165	2½	71	Granite		1¼	
123	4 miles E of Landis	N. A. Smith	1948		108	2½	37	Gabbro			
124	6 miles E of Landis	O. B. McLeod	1948	Slope	152	6	28	Granite	35	2	
125	1 mile S of Landis	J. U. Alexander Estate		Flat	150	6		do		20	
126	4 miles E of Landis	Claude Green	1950		44	2½	31	Gabbro	19	1½	
127	Gold Hill	Russello Service Station		Slope	60	2	21	Tuff	15	8+	Water reported to contain sulphuric acid. Water contaminated by contact with sulphide ores.
127a	5 miles E of Gold Hill	Roy Kirk		do	200	2	60	Slate	20	5	
128	Gold Hill	Mary Goodman		Flat	60	4		Tuff		20	Water is acid.
129	2 miles W of Kannapolis	Dewitt Greene	1950		151	2½	25	Granite	50	2	Pumping level 84 feet.
130	Kannapolis	Kannapolis Ice and fuel Co.	1948	Flat	500	6	41	do	45	14	
131	do			do	185	4	75	do		25	
132	do	Rowan County Board of Education	1948	do	152	6	75	do	20	30	
133	do	John Riggs, Jr.	1950		180	2½	78	do	9	5	Pumping level 63 feet.
134	do	T. H. Powers	1941		163	4	60	do	12		Analysis. Furnishes several houses.
135	do	do	1948	Slope	161	8	80	do	9	26	Do
136	1 mile W of Kannapolis	White Hill Dressing Plant	1950	Hill	369	6	69	do	56	10	
137	Gold Hill	Dr. Shafer		Flat	72	6	42	Tuff	15	8	
138	do	W. H. Martin		Hill	55			do	30	15	

RECORDS OF SPRINGS IN ROWAN COUNTY

No.	LOCATION	OWNER OR NAME	Chief Aquifer	Yield (gpm)	REMARKS
A	3 miles W of Rockwell	O. P. Shuping	Diorite-granite	3	Temperature 60½°F. Analysis.
B	3 miles N of Cleveland	Ira Hodge	Gabbro-diorite	1½	Analysis.
C	do	Ross Wood	do	2	Do

CHEMICAL ANALYSES OF GROUND WATER FROM ROWAN COUNTY
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	1	5	6	7	12	23
Silica (SiO_2)	50			34	47	46
Iron (Fe), total	.20			.59	.30	.37
Iron (Fe), in solution	.06			.10		.05
Calcium (Ca)	23			6.2	38	6.2
Magnesium (Mg)	11			2.9	16	4.9
Sodium and potassium (Na+K)	8.1			3.7	9.5	11
Carbonate (CO_3)	0			0	0	0
Bicarbonate (HCO_3)	87			39	127	59
Sulfate(SO_4)	26			1.3	23	4.4
Chloride (Cl)	12			1.1	25	3.0
Fluoride (F)	.2			.1	.1	.2
Nitrate (NO_3)	5.5			.4	22	1.7
Dissolved solids	191	30	50	71	260	110
Total hardness as $CaCO_3$	103	13	22	27	161	36
pH	8.2			6.8	6.6	6.8
Rock type	Diorite	Diorite	Diorite	Diorite	Diorite	Diorite
Date of collection	July 20, 1950	Aug. 16, 1950	Aug. 16, 1950	Aug. 16, 1950	July 6, 1948	Aug. 16, 1950

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

CHEMICAL ANALYSES OF GROUND WATER FROM ROWAN COUNTY—*Continued*
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	64	100a	104	107	111	112
Silica (SiO_2)	37	30	35	26	37	35
Iron (Fe), total	.13	.17	.06	.21	.40	1.6
Iron (Fe), in solution	.02					.06
Calcium (Ca)	13	57	57	47	9.4	37
Magnesium (Mg)	5.2	5.4	5.3	4.9	.6	1.7
Sodium and potassium (Na+K)	3.3	12	13	11	12	9.9
Carbonate (CO_3)	0	0	0	0	0	0
Bicarbonate (HCO_3)	50	103	123	111	54	63
Sulfate (SO_4)	9.8	98	84	63	3.6	59
Chloride (Cl)	3.6	3.2	2.5	2.5	2.2	2.8
Fluoride (F)	.0	.1	.3	.2	.2	.6
Nitrate (NO_3)	6.0	.3	.1	.0	.1	2.7
Dissolved solids	120	268	259	219	92	185
Total hardness as $CaCO_3$	54	164	164	137	26	99
pH	7.1	7.8	7.75	7.7	6.8	6.3
Rock type	Diorite	Diorite	Diorite	Diorite	Diorite	Diorite
Date of Collection	Mar. 29 1951	May 22, 1947	Apr. 5, 1949	May 22, 1947	Mar. 30, 1948	Dec. 30, 1949

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

CHEMICAL ANALYSES OF GROUND WATER FROM ROWAN COUNTY—*Continued*
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	119	120	121	134	135	A
Silica (SiO_2)	27	31	23	30	24	44
Iron (Fe), total	.09	.49	.06	.07	.14	.25
Iron (Fe), in solution				.02	.02	.07
Calcium (Ca)	9.1	174	54	7.7	4.1	7.8
Magnesium (Mg)	1.4	3.5	2.0	1.6	1.5	3.8
Sodium and patassium (Na + K)	7.0	15	17	4.4	4.0	7.0
Carbonate (CO_3)	0	0	0	0	0	0
Bicarbonate (HCO_3)	48	82	100	33	24	55
Sulfate (SO_4)	1.7	391	86	.8	1.6	1.2
Chloride (Cl)	1.6	2.0	2.5	2.8	2.2	2.2
Fluoride (F)	.1	1.8	2.2	.1	.0	.3
Nitrate (NO_3)	.2	.2	.1	4.0	.9	.2
Dissolved solids	71	696	246	73	52	96
Total hardness as $CaCO_3$	28	449	143	26	16	35
pH	6.7	7.3	7.8	6.4	6.5	7.1
Rock type	Granite	Diorite	Diorite	Diorite and granite	Granite	Diorite and granite
Date of collection	Mar. 10, 1948	June 10, 1949	Mar. 30, 1948	Feb. 2, 1950	Feb. 2, 1950	July 17, 1950

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

CHEMICAL ANALYSES OF GROUND WATER FROM ROWAN COUNTY—*Continued*
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	B	C
Silica (SiO_2)		
Iron (Fe), total		
Iron (Fe), in solution		
Calcium (Ca)		
Magnesium (Mg)		
Sodium and potassium (Na + K)		
Carbonate (Co_3)		
Bicarbonate (HCO_3)		
Sulfate (SO_4)		
Chloride (Cl)		
Fluoride (F)		
Nitrate		
Dissolved solids	89	74
Total hardness as $CaCO_3$	39	31
pH		
Rock type	Gabbro-diorite	Gabbro-diorite
Date of collection	Aug. 16, 1950	Aug. 16, 1950

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

DAVIDSON COUNTY

(Area: 547 square miles. Population: 62,244)

Geography.—Davidson County is the easternmost county discussed in this report. Lexington, the county seat, and Thomasville are the only large towns. Leading industries are agriculture and the manufacture of textiles and furniture. Dairying and the growing of wheat, oats, corn, and hay are the chief rural activities. Railroads and paved highways serve the populated areas of the county.

Davidson County is in the heart of the Piedmont Plateau. Its surface is formed by the uplifted and partly dissected peneplain that was developed on the underlying crystalline rocks. Most of the hills are smoothly rounded and covered by vegetation. Except where flood plains border the streams, the slopes are steep enough to cause the land to be well drained. A few shallow enclosed depressions, in which water rarely stands, occur on the broad interstream areas underlain by gabbro in the area around Linwood. The topography is most hilly along the valley of the Yadkin River near the west and south borders of the county.

The drainage within the county is mostly southward to the Yadkin River. The streams are small but numerous. The heads of the streams are springs that emerge from reentrants in the interstream areas. Although the springs are small, they are numerous enough to produce fair-sized creeks having perennial flows. Parts of many streams appear to follow structural weaknesses of the underlying rocks, particularly in the Slate belt in the southeastern part of the county. However, in general the causes for the particular courses of the streams are not obvious, and until detailed geologic work can be done the extent of adjustment of streams to rock structures probably will not be known.

Geology.—Although a great variety of rocks occur in Davidson County they may conveniently be divided into the following four major groups: granite, diorite, gabbro, and the volcanic rocks.

Granite underlies a large area in the northwestern part of the county. It is typically exposed in the area north, west, and southwest of Welcome. It is a light-colored rock containing large phenocrysts of feldspar and upon weathering, forms a gravelly and sandy soil. Outcrops of fresh granite are not common, but the soil zone is thin enough in many places to allow parts of the weathered rock to be exposed. The nearly horizontal type of jointing, called sheeting, is very common.

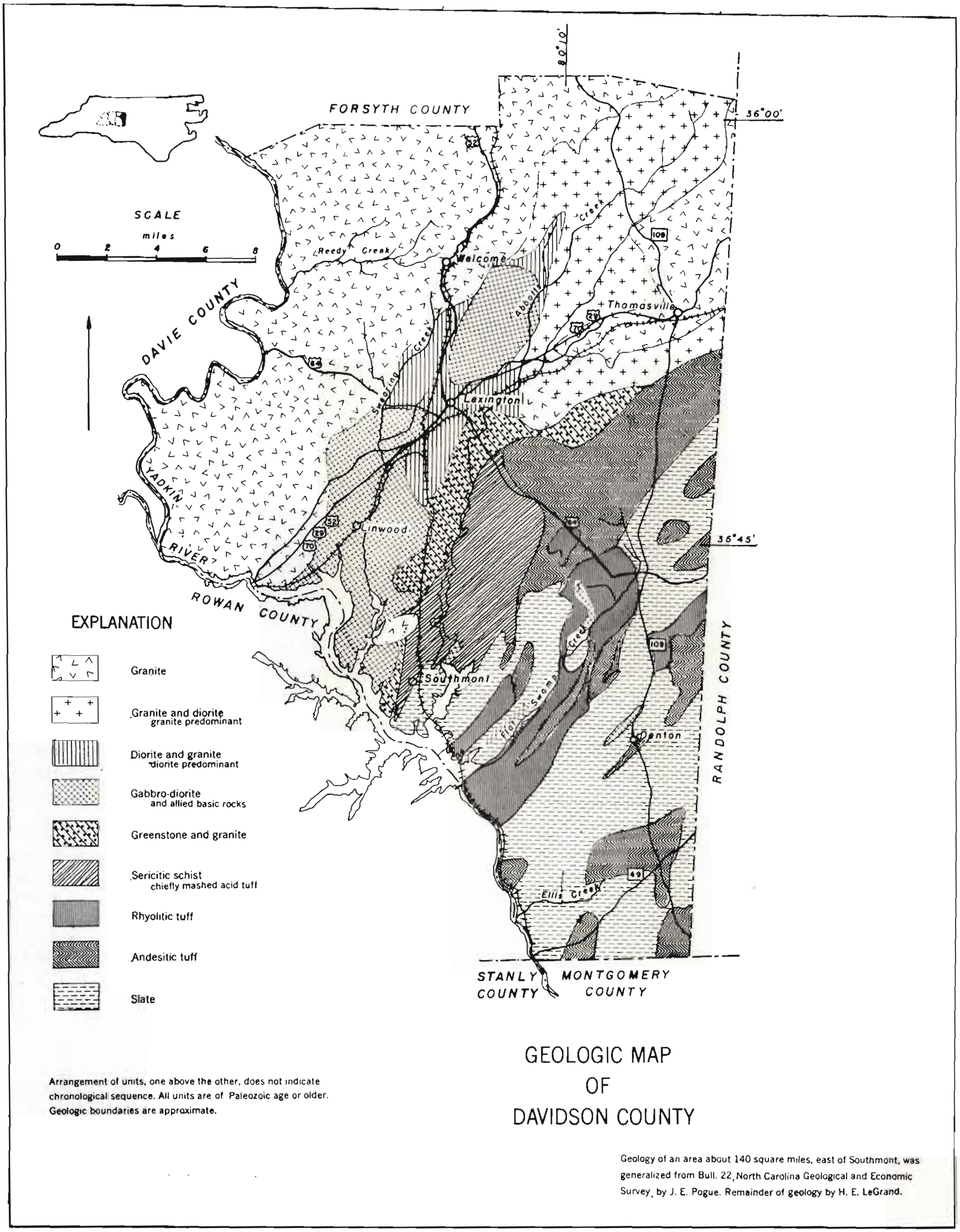
The boundaries of the granite with other rocks have not been precisely determined. In an area west of Lexington gabbro and diorite are in contact with the granite, but in most places only the approximate contact, as shown on the geologic map (p. 60), is represented by a zone in which there is an increase in the quantity of diorite bodies to the east. In fact, rocks of the granite and diorite complex occur in an extensive area east of the large granite area and seem to grade into both the porphyritic granite and the gabbro.

Gabbro occurs in two large areas and in several small areas. As classed in this report it is a basic rock which varies considerably from place to place in composition but which more nearly approximates gabbro than any other rock. It occurs typically in the area around Linwood. Its area is characterized by a thick mantle of red and brown soil on the uplands.

Rocks of the Carolina Slate belt occur in the southeastern part of Davidson County. A part of this belt, including the Cid mining district, was mapped by Pogue whose description follows (1910, p. 26):

> "Wide bands of a sedimentary, slate-like rock, composed of varying admixtures of volcanic ash and land waste, have the greatest areal extent. Intercalated with these occur strips and lenses of acid and basic volcanic rocks, represented by fine- and coarse-grained volcanic ejecta and old lava flows. The acid rocks include fine tuffs, coarse tuffs, and breccias, chiefly of a rhyolitic and dacitic character; together with flows of rhyolite and dacite. The basic series embraces fine tuffs, coarse tuffs, breccias, and flows of an andesitic and trachy-andesitic stamp. Gabbro and diabase dikes cut the other formations."

Like those of the remainder of the county the rocks of the Slate belt have been folded and faulted sufficiently to be tipped on edge and to have a prevailing northeast trend. In general the topography is hillier and the soil zone thinner than in the western part of the county.



Arrangement of units, one above the other, does not indicate chronological sequence. All units are of Paleozoic age or older. Geologic boundaries are approximate.

Geology of an area about 140 square miles, east of Southmont, was generalized from Bull. 22, North Carolina Geological and Economic Survey, by J. E. Pogue. Remainder of geology by H. E. LeGrand.

FIGURE 19.—*Geologic map of Davidson County.*

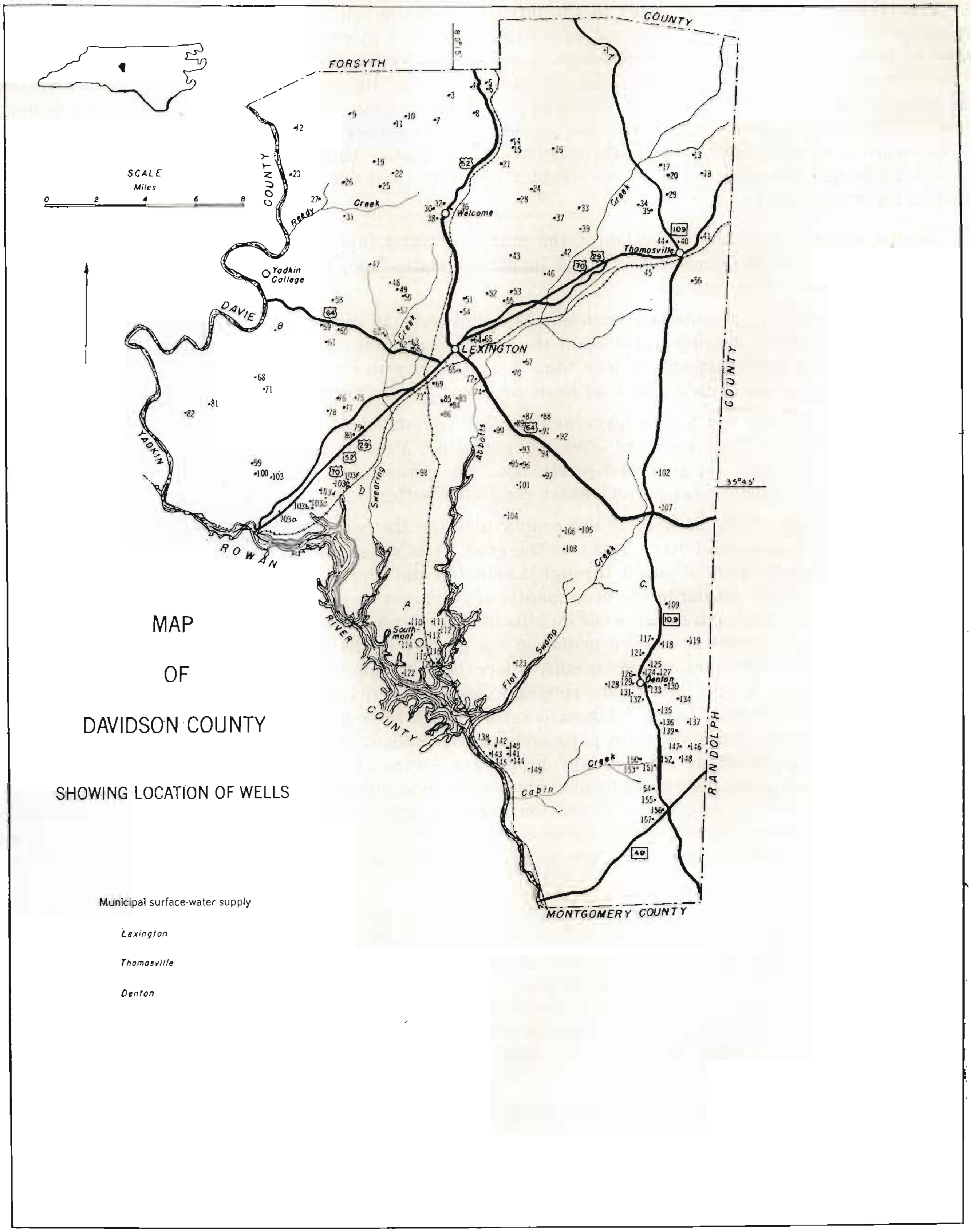


FIGURE 20.—*Map of Davidson County showing location of wells.*

The relation of the volcanic rocks to the intrusive rocks on the west is not clear. The intrusive rocks are composed of a network of granite and more basic rocks of a dioritic character. Some of the dioritic material adjacent to the volcanic belt represents mashed and altered andesitic tuff, whereas other parts appear to be intrusive diorite. It is probable that the development of the granite and diorite complex represents a late stage in the igneous activity that produced the volcanic rocks. Although numerous minor faults, and possibly major faults, occur in the belt, the present reconnaissance study did not produce evidence to show the existence of a major fault between the intrusive and extrusive belts. Unraveling the development of the volcanic rocks and the adjacent intrusive complex posed the most difficult problem with which the writer was faced in the Statesville area.

Ground water.—With the exception of the municipal water supplies of Lexington and Thomasville, which come from streams, most domestic and many industrial water supplies are from wells. A few domestic supplies are obtained from springs.

Many rural supplies are obtained from dug or bored wells 18 inches or larger in diameter. These wells, being relatively shallow, develop water from the clayey residual material above bedrock. They are generally satisfactory for domestic purposes if less than 2 gallons of water a minute is needed. They may fail during dry seasons if the water table declines near, or below, the bottoms of the wells.

In recent years there has been a large increase in the number of drilled wells in the rural parts of the county. Two-inch shot-drilled wells are especially common. Most of them are capable of furnishing 3 to 8 gallons a minute—adequate for general domestic use. The present investigation deals chiefly with 3 inch and larger drilled wells, which reveal ground-water conditions better than other types of wells.

The records of the yields of wells in the county indicate the water-yielding properties of the different kinds of rocks only in a general way. Many of the good wells penetrate gabbro or diorite. The gabbro and diorite trending slightly west of south through Lexington and Linwood probably are capable of larger yields than are the other rocks. Owing to the deep mantle of residuum on the hills, wells on hills in the gabbro and diorite should be more productive than wells on hills in other types of rocks. A large number of wells yielding less than 10 gallons a minute have been drilled in the granite in the northwest part of the county. Almost all these unsuccessful wells were drilled on hills, where the residuum is too thin to store much water and where the prominent openings in the granite are convex exfoliation joints which allow water to drain readily away from the hills to the valleys. Large feldspar crystals, which have been disengaged from the granite on the hills and washed into the lowlands, form permeable gravel beneath the flood plains along some of the streams. These gravel deposits constitute a potentially productive source of ground water—probably capable of furnishing more than 500 gallons a minute to individual wells in a number of places in the western part of the county. The slates and volcanic rocks of the southeastern part of the county are similar to other rocks in water-yielding properties. However, the slates and acid volcanic rocks in general are covered by only a thin layer of residuum, suggesting that they are poorer water-bearing rocks than the basic volcanic rocks and gabbro.

Analyses of six samples of water from wells and two samples from springs are given in a table following the well records. All the samples were from diorite or gabbro except well 19, from granite, and spring C, from acid tuff. Although only one sample of water was collected from granite in the county, the analysis of this water is typical of those from granite everywhere in the Statesville area. The water from diorite and gabbro contains about three times as much dissolved solids as does water in granite. The mineral content of the water from well 56 is probably as great as that from any other well water in the county. It is probable that water from well 103d, containing 172 parts per million of dissolved solids, is typical of that from diorite and gabbro.

Temperatures of well waters range from about 58° to about 63°F.

RECORDS OF WELLS IN DAVIDSON COUNTY

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
1	5 miles NE of Welcome	Walburg School		Slope	250	6		Granite			Adequate supply. Water reported slightly hard.
2	do	Baptist Orphanage		Flat	80	6		do		5	Water reported slightly hard.
3	3 miles N of Welcome	L. G. Nifong		Hill	47	30	35	do	42		Water reported soft. No Iron.
4	do	B. B. Kinlow	1947	do	400	5⅝		do			Good supply.
5	3 miles NE of Welcome	J. S. Swain	1940	Slope	114	6		do		9	Water reported soft. No Iron.
6	do	Irvin Beck	1943	Hill	87	6	47	do		4	Do
7	2 miles N of Welcome	C. T. Evans		do	62	20	62	do	51		
8	do	Raymond Sink	1947	Slope	196	5⅝	14	do		2	
9	3 miles NW of Welcome	James Voncannon		do	48	24		do	37		
10	2 miles N of Welcome	S. C. Crater		Hill	526	6		do		15	Furnishes water to 4 families.
11	do	E. A. Noltz			78	3	46	do		5	
12	3 miles NW of Welcome	Norman Byerly		Hill	39	18		do	32		
13	3 miles N of Thomasville	C. M. Cecil		Flat	50	6		do	27	4	Water reported soft.
14	2 miles NE of Welcome	W. T. Portis		Slope	350	3		do	29		Large supply. Slight drawdown. Water reported soft. No Iron.
15	do	Garland Jones			59	20		do	41		Large supply reported.
16	3 miles NE of Welcome	H. B. Leonard		Valley	25	36		Granodiorite	18		Supplies 2 houses and concrete block plant.
17	2 miles N of Thomasville	C. B. Cortlebough	1937	Slope	111	6		do			Adequate supply. Very hard water.
18	do	J. R. A. Cecil			50	36		Granite	38		
19	3 miles NW of Welcome	Arcadia School		Slope	226	6		do		23	Analysis.
20	2 miles N of Thomasville	George A. Craven			160	4		do			Adequate supply.
21	2 miles NE of Welcome	Midway School		Slope	550	6		do		20	Water level lowered slightly by bailing.
22	1 mile N of Welcome	Robert C. Hege		do	36	24	15	do	32		
23	3 miles W of Welcome	Mr. Story	1940	Hill	120	6		do	85		
24	3 miles NE of Welcome	Charlie Everhart		do	73	5		Diorite	41	6	Soft water.
25	1 mile NW of Welcome	Paul F. Evans	1938	Slope	300	6	38	Granite	32	10	Slightly hard. No stain.
26	2 miles NW of Welcome	W. M. Walser	1948	do	55	24	55	do	47		
27	2 miles W of Welcome	Reed Creek School		Flat	400+	6		do			
28	2 miles NE of Welcome	Jess Everhart		Hill	83	3		Diorite		3	Hard water.
29	1 mile W of Thomasville	J. W. Hedrick		do	37	24		Granite	33		Do
30	1 mile N of Welcome	Welcome School		do	250+	6		do		3	Tested at 9 gallons a minute.
31	2 miles W of Welcome	Dean Hartley		Valley	20	24		do	5		
32	1 mile NE of Welcome	Welcome School		Flat	242	6	20	do	30	15	
33	2 miles NW of Thomasville	Hollis Motsinger	1946	Draw	155	6	18	Granodiorite	22	5	Soft water.
34	1 mile NW of Thomasville	Mrs. Minnie Jones		Slope	52	6		Granite	15		Hard water.
35	1 mile N of Thomasville	Guy Harris		do	90	6		do	22	1	Slightly hard.
36	1 mile E of Welcome	Welcome Milling Co.	1918	Draw	116	4		do		5	
37	3 miles NW of Thomasville	O. F. Tate			105	3	57	Diorite	27	5	
38	Welcome	L. C. Ripple		Slope	160	4		Granite		16	Supplies 33 houses, and filling station.
39	2 miles NW of Thomasville	Mrs. Blanche Evans		do	87	3		do			Plenty water. Slightly hard.
40	Thomasville	Town of Thomasville		do	550	12		Diorite		120	Abandoned.
41	1 mile E of Thomasville	do		Hill	1108	12		Granite		60	
42	2 miles SE of Welcome	C. M. Sink			103	3		Diorite		3	Hard water.
43	1 mile SE of Welcome	Joe H. Sink		Slope	94	5⅝		do	54	16	Hard water. No iron.
44	Thomasville	Thomasville Chair Co.		Flat	450	8		do		25	Formerly used by City.
45	1 mile SW of Thomasville	Town of Thomasville		Slope	600	12		Granite		120	
46	2 miles SE of Welcome	Grady Sink		Flat	127	6		Diorite	44		Adequate supply. Moderately soft.
47	2 miles SW of Welcome	B. F. Byerly		Slope	45	30		Granite	37		Soft. No iron.
48	do	T. C. Whisnant		do	86	6	40	do		9	
49	2 miles S of Welcome	Charles Freeman		Flat	77	6	40	Diorite	40	11	Soft. No iron.
50	do	V. C. Leonard		Slope	50	24		do	49		
51	2 miles SE of Welcome	D. T. Fritts, Jr.	1930	do	395	3	44	do			Large supply reported.
52	do	T. Frank Sink		do	17	30		do	16		Temperature 58¾°F.
53	do	C. E. Sheets	1929	do	61	3		do			Analysis. Adequate domestic supply. Water hard.
54	do	D. T. Fritts, Sr.		Hill	140+	3		do			
55	do	M. H. Conrad	1930	Slope	45	3		do			Adequate supply. Hard water
56	1 mile S of Thomasville	Economy Hoisery Finishers		do	280	8	35	do		20	Analysis.
57	2 miles SW of Thomasville	Lea. Phillips			38	24		do	31		
58	3 miles NW of Thomasville	Dr. F. L. Mock		Hill	150	6	10	Granite	75	1	Inadequate supply.
59	3 miles SW of Lexington	George Hunley		do	100	6		do	70+	2	
60	2 miles NW of Lexington	Reeds Crossroad School		do	360	6	10	do	80	5	
61	3 miles NW of Lexington	Homer Craver		Slope	210	6	2	do	70	4	

RECORDS OF WELLS IN DAVIDSON COUNTY—*Continued*

Well no.	LOCATION	OWNER	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	REMARKS
62	1 mile NW of Lexington	Fritts Packing Co.		do	138	6		Diorite-granite	30	30	
62a	2 miles NW of Lexington	do	1950	do	200	6		do	40	20	
63	1 mile NW of Lexington	H. G. Fritts		Hill	107	6		do	52	6	
64	1 mile NE of Lexington	Coble Dairy Products, Inc.		Slope	210	6		do		30	
65	1 mile N of Lexington	do		do	220	6		do		30	Yield has declined from 100 gallons a minute.
65a	Lexington	do		Flat	805	10	50	do		20	Water level is lowered to 150 feet after 10 hours pumping.
66	2 miles NW of Lexington	H. G. Fritts		Hill	168	6		do	50	2	
67	2 miles NE of Lexington	Holly Grove School		do	256	6		Granite		15	
68	4 miles W of Lexington	Tyro School		do	308	6		do	40	4	Pump set deep, pumps air.
69	Lexington	Winnonah Cotton Mills	1902	Slope	602	8		Diorite	25	31	Pumping level 250 feet.
70	3 miles E of Lexington	Davidson County Home		Hill	225	8		Granite	50+		Adequate supply.
71	3 miles W of Lexington	E. W. Rentz	1944	Flat	215	4	25	do	30	10+	
72	Lexington	J. C. Burkhard		do	82	4	19	Diorite	28	6+	
73	do	Dacotah Cotton Mills		Slope	200	6		do			Abandoned. Formerly supplied entire mill.
74	1 mile SE of Lexington	Arlin Briggs		do	63	4	40	Slate	20	10+	
75	2 miles SW of Lexington	Coble Dairy Products, Inc.	1944	do	214	6		Diorite	27	10	Drawdown 50 feet.
76	do	do	1948	Hill	146	6	115	do	50	15	
77	do	do	1948	Flat	241	6	100	do	45	50	
78	3 miles SW of Lexington	do		do	212	6	175	do		50	Analysis.
79	2 miles SW of Lexington	O. A. Narabee	1946	do	160	6	93	do	16	20	
80	do	Mrs. Hobart Yarborough	1946	Slope	210	8	60	do	25	15	Drawdown 25 feet.
81	4 miles W of Lexington	Churchland School		Hill	575	4		Granite	60	17	
82	5 miles W of Lexington	W. L. Grubb		Slope	225	6		do		5	
83	1 mile S of Lexington	Hugh Martin		do	65	6		Diorite		20	
84	do	R. L. Shoaf		do	135	6	119	do		10	
85	do	Richard Davis	1948	Draw	72			do	27	40	
86	do	Fred O. Sink, Jr.	1946	Slope	153	8	79	do	35	3	
87	3 miles SE of Lexington	John Beck		do	100			Slate	40	14	
88	2 miles SE of Lexington	Brice Young		Flat	78	4	32	Tuff	35	6	Drawdown 25 feet.
89	do	John Beck		Hill	630	6		Slate	40	5	Drawdown 75 feet.
90	do	Frank Burkhard		do	135	4	40	Tuff	60	3	
91	do	Henry Lime		do	120	3	20	do	45	1	
92	do	Deaton Young		Slope	108	4	60	do	8	25+	Drawdown slight.
93	do	Calvin Kesler		do	135	4	30	do	30	2	Drawdown considerable.
94	do	Walter Surratt		do	100	3		Volcanic rock	30	5	
95	do	Mr. Hedrick		Hill	233	2½	28	Andesite tuff	65	0	
96	do	do		do	85	2½	28	do	25	1	
97	do	Chaney Beck		Valley	133	4	20	do	20	15	
98	do	Junior Order Orphanage		Slope	556	10		Gabbro-diorite	4	52	Water reported hard. Pumping level 190 feet.
99	5 miles NW of Southmont	Orell's Grocery		do	127	2½		Granite		4	
100	do	do		Valley	156	6		do		7	
101	2 miles SE of Lexington	Foy Swain		Hill	199	4	4	Andesite tuff	65	0	
102	4 miles N of Denton	M. L. Varner		Valley	78	6	71		8		
103	4 miles NW of Southmont	J. W. Wilson		Hill	212	4	90	Granite	37		
103a	do	A. W. Jacobs	1949	do	166	2½	42	do		6	Well dynamited.
103b	3 miles NW of Southmont	Clark Poultry Farm		Flat	309	6	100	Diorite	30	20	
103c	3 miles SW of Lexington	Charlie Graham		Slope	135	6	38	do	35	35	Drawdown slight.
103d	3 miles NW of Southmont	do		Hill	200	2		do	40		Analysis. Temperature 61°F. Large yield reported.
103e	do	Linwood Manufacturing Co.		Flat	300	6	35	do	15	25	
103f	3 miles SW of Lexington	do		do	200	6		do	15	40	
104	3 miles SE of Lexington	Robert Hedrick		Slope	94	4	50	Andesite tuff	40	25	Drawdown slight.
105	4 miles SE of Lexington	Homer Young	1948	Valley	52	6	17	Slate	+1	40	Natural flow 3 gallons a minute.
106	do	do		do	10	50		Massive slate	4	20	
107	3 miles N of Denton	Silver Valley School		do	254	6				100+	
108	4 miles NW of Denton	Hurt Hedrick		Slope	85	4	30	Slate and tuff	28	10	
109	2 miles NE of Denton	Dallas Ward		Valley	74		6				
110	1 mile NE of Southmont	C. D. Lookabill		Slope	152	4		Gabbro-diorite		5	
111	do	Harry Cunningham		do	65	6	20	Schist	16	15	
112	do	Ardell Lanier		do	50	6		do	15	10	
113	1 mile E of Southmont	Winston-Salem Southbound Railroad	1910	Flat	150	6		Gabbro-diorite	25	30	Water reported hard.

Records of Wells in Davidson County—*Continued*

Well no.	Location	Owner	Date completed	Topography	Depth (ft.)	Diameter (in.)	Depth of casing (ft.)	Water-bearing material	Water level (ft.)	Yield (gpm)	Remarks
114	Southmont	C. C. Rush		Slope	125	4		Slate		40	
115	do	A. C. Godwin		Flat	60	4		Gabbro-diorite	25	40	
116	1 mile E of Southmont	Mrs. E. C. Willis		do	200	6		Diorite	20	40	Analysis.
117	1 mile N of Denton	C. M. Bean		Hill	52	4	22	Tuff		0	
118	1 mile NE of Denton	W. J. Ward		do	85	4		do	25		
119	do	E. H. Miller		do	85	4	60	do		1	
120	1 mile SE of Southmont	P. A. Myers, Jr.		Valley	59	6	40	Schist	12	15	
121	1 mile NE of Southmont	M. L. Parker		do	87	4	18	Tuff		3	
122	1 mile S of Southmont	S. M. Hedrick		Slope	60	6		Diorite	30	35	
123	2 miles SE of Southmont	William Jarrell		Hill	100 +	6		Slate	45		
124	Denton	Mr. Wrightsville		Valley	200	4	20				
125	do	Cleveland Motor Co.		Flat	100	4	20				
126	do	Town of Denton		Slope	400	8		Slate		35	
127	do	Denton School		do	116	4		Tuff		25	
128	1 mile W of Denton	Walter Frank		Hill	175	8		Slate	35	6	
129	Denton	Town of Denton	1942	Flat	200	6		Tuff		55	Water reported hard.
130	do	do		Slope	238	8		do		15+	Originally tested at 23 gallons a minute. Water reported hard.
131	do	Denton Teacherage		Flat	200	4	20	do			Small supply.
132	do	Roller Mill		Slope	160	4		do		22	
133	do	Town of Denton		do	200	8		do		18	Originally tested at 43 gallons a minute. Water reported hard.
134	1 mile SE of Denton	E. M. Hunt		Valley	105	4	16	do	+1		Natural flow 1 gallon a minute.
135	do	Mr. Skeen		Slope	100	4			60		
136	do	C. Bisher		Valley	125	4	23				Pumping level 100 feet.
137	do	Dalton Gallimore		Hill	86	4	30		22		
138	3 miles SE of Southmont			do							Record not available.
139	2 miles SE of Denton	W. L. Skeen		do	95	6	24	Tuff	75	6	
140	3 miles SE of Southmont	Mr. Cole		Valley	105	5	32		11		
141	do	J. W. Murray		Hill	127	4	32				
142	do	W. A. Jarvis		Valley	65	5	17		13		
143	do	Winston-Salem Southbound Railroad		do	400	10	20				Low yield.
144	do	Town of High Rock		Slope	85	4	12				
145	do	Winston-Salem Southbound Railroad		Valley	135						Low yield.
146	2 miles SE of Southmont	Lonnie Hughes		Slope	80	4	30				
147	do	W. E. Skeen		Hill	84	6	24	Tuff		10	
148	do	Edgar F. Snyder		do	100	4	24		19		
149	3 miles SW of Denton	A. L. Bean		Slope	125	4	30		18		
150	2 miles S of Denton	E. W. Morris		Hill	150	4	30		25		
151	do	W. A. Carroll		Slope	95	4	30	Tuff	8	10+	
152	2 miles SE of Denton	Gowin Elliott		Hill	96	4	36	do	20	5	
153	3 miles S of Denton	W. A. Carroll		Slope	100	4	30	do	30	4	
154	2 miles S of Denton	Olon Smith		Hill	81	4	31				
155	do	do		do	75	4					
156	3 miles S of Denton	Elliott Brothers		Slope	50	4	30		11		
157	do	Henry Lox		do	71	4		Tuff		4	

Records of Springs in Davidson County

No.	Location	Owner or Name	Chief Aquifer	Yield (gpm)	Remarks
A	1 mile N of Southmont	Cool Springs Service Station	Sheared granite	3	Flow from 36 inch terra cotta pipe surrounded by brick curbing. Temperature 58°F. Valley.
B	5 miles NW of Lexington	Webster Koontz	Granite	5	No improvements and not in use. Several points of seepage. Temperature 58°F. Draw.
C	4 miles N of Denton	A. L. Bean		2	Flows from terra cotta pipe. Analysis. Slope.
D	3 miles SW of Lexington	Cicero McCrary	Gabbro	2	2 openings flow into concrete reservoir. Temperature 60°F. Steep draw. Analysis.

CHEMICAL ANALYSES OF GROUND WATER FROM DAVIDSON COUNTY
(Numbers at heads of columns correspond to well numbers in table of well data)

Parts per million

	19	53	56	78	103d	116
Silica (SiO_2)	39	32	21	50	42	24
Iron (Fe), total	.11	.29	1.9	.12	1.1	5.7
Iron (Fe), in solution	.04	.06	.05	.06	.09	.16
Calcium (Ca)	5.4	60	94	13	21	64
Magnesium (Mg)	1.5	15	22	6.1	10	12
Sodium and potassium (Na+K)	9.6	16	35	11	8	18
Carbonate (CO_3)	0	0	0	0	0	0
Bicarbonate (HCO_3)	43	229	106	90	91	215
Sulfate (SO_4)	1.3	13	24	2.2	5.8	8.3
Chloride (Cl)	1.6	28	204	3.5	3.2	44
Fluoride (F)	.2	.1	.1	.1	.0	.1
Nitrate (NO_3)	1.3	5.4	.4	.6	32	.1
Dissolved solids	81	284	477	132	172	278
Total hardness as $CaCO_3$	20	211	325	58	94	209
pH	6.8	6.85	6.95	6.85	6.7	7.0
Rock type	Granite	Diorite	Diorite	Diorite	Diorite	Diorite
Date of collection	Aug. 11, 1948	Aug. 12, 1948	June 9, 1948	June 9, 1948	Apr. 10, 1951	Feb. 21, 1950

	C	D
Silica (SiO_2)	18	33
Iron (Fe), total	1.3	.47
Iron (Fe), in solution	.04	.03
Calcium (Ca)	2.0	11
Magnesium (Mg)	1.5	4.9
Sodium and potassium (Na+K)	4.3	2.8
Carbonate (CO_3)	0	0
Bicarbonate (HCO_3)	16	36
Sulfate (SO_4)	3.0	3.0
Chloride (Cl)	2.8	9.8
Fluoride (F)	.1	.2
Nitrate (NO_3)	.2	8.4
Dissolved solids	40	99
Total hardness as $CaCO_3$	11	48
pH	5.7	6.6
Rock type	------------	Gabbro
Date of collection	Mar. 23, 1950	Nov. 1, 1950

Analyzed by the Quality of Water Branch, U. S. Geological Survey.

GLOSSARY

(The definitions of the terms listed below are for the benefit of the layman and driller and are not necessarily as precise as those found in scientific textbooks.)

Acid rock—an igneous rock composed chiefly of light-colored minerals.

Alluvium—deposits of clay, sand, and gravel beneath the flood plains of streams.

Aplite—a dense light-colored, frequently greenish fine-grained acid rock, generally occurring as dikes penetrating granite, diorite, and greenstone.

Basic rock—an igneous rock composed chiefly of dark-colored minerals.

Composite gneiss—a banded rock formed by the intrusion of granite into, and along the parting planes of, a schist.

Cone of depression—depression produced in the water level around a pumped well.

Diorite—a medium- to dark-colored granitelike rock composed chiefly of hornblende and feldspar; generally produces a dark-red soil; called black granite by some drillers.

Draw—a broad ravine, or the headward part of a valley.

Drawdown—difference, in feet, between the static water level and the pumping water level of a well.

Flat—a small upland plain, or an area having no appreciable slope.

Flood plain—a flat area, underlain by alluvium, bordering parts of some streams.

Gabbro—a dark-colored crystalline rock composed chiefly of feldspar and pyroxene; generally produces a dark-red soil; called black granite by some drillers.

Gneiss—a banded crystalline rock showing alinement of some minerals. If the composition is that of granite, it is a granite gneiss.

Granite—a light-colored crystalline rock composed chiefly of quartz and feldspar; generally produces a light-colored soil; called by some drillers "white granite" and by others "sand rock."

Greenstone—a green rock of the diorite class.

Hill—an upland area rising above the surrounding land.

Injection complex—a group of rocks formed from the intrusion of granites into schists. Alternate bands of schist and granite result.

Residuum—weathered material, including the soil, down to fresh, unweathered rock.

Saprolite—soft, rotten rock; bottom part of residuum.

Schist—a foliated metamorphic rock showing strong alinement of beds; called slate by some drillers. Schists described in this report contain considerable light-colored mica.

Schistosity—the property of schists and some gneisses to flake in parallel planes.

Slate—a fine-grained, strongly foliated rock formed from clayey material or volcanic ash. It may be easily split along the planes of foliation (parting planes).

Slope—an inclined surface of the land—the most extensive topographic feature in the area studied. Most wells are located on upland slopes or lowland slopes.

Topography—the surface features of an area.

Tuff—a hardened volcanic rock composed largely of volcanic ash.

Valley—an elongated depression in the land through which a stream may flow.

Water table—upper surface of the zone of saturation.

Weathering—decomposition of rocks near the surface of the ground, forming soft, rotten rock, or saprolite.

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