GEOLOGY AND GROUND-WATER RESOURCES OF LAWRENCE COUNTY, ALABAMA

A Reconnaissance

By Wiley F. Harris, Jr., and William M. McMaster

GEOLOGICAL SURVEY OF ALABAMA *BULLETIN 78*

GEOLOGICAL SURVEY OF ALABAMA

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BULLETIN 78

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Prepared by the United States Geological Survey
in cooperation with the
Geological Survey of Alabama

UNIVERSITY, ALABAMA

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The nomenclature in this report follows that of the Geological Survey of Alabama but does not necessarily follow that in use by the U.S. Geological Survey.

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University, Alabama
March 18, 1965

Honorable George C. Wallace
Governor of Alabama
Montgomery, Alabama

Dear Governor Wallace:

I have the honor to transmit the manuscript of a report entitled "Geology and Ground-Water Resources of Lawrence County, Alabama, a Reconnaissance" by Wiley F. Harris, Jr., and William M. McMaster, with a request that it be printed as Bulletin 78 of the Geological Survey of Alabama.

The major aquifers in the county are the Tuscumbia Limestone and Fort Payne Chert in the northern part of the county, and the Bangor Limestone in the central part. In some areas the Fort Payne, Tuscumbia, and Bangor reportedly yield as much as 225 gallons per minute to individual wells. Small to moderate quantities of water, generally less than 20 gallons per minute, are obtained from other geologic units in the county.

In general, ground water in Lawrence County is of good quality but may require treatment for some uses where it has excessive hardness. Water obtained from sandstone, sand, and gravel aquifers in the county is generally soft to moderately hard, and water from limestone, chert, and shale aquifers is generally hard to very hard.

The ground-water studies required mapping the geology of the area and resulted in describing the different rocks and minerals such as limestone, dolomite, and shale—the basic raw materials for the cement, brick, and refractory industries. Thus, these studies assist in locating potential new mineral resources and aid industrial development.

Respectfully,

Philip E. LaMoreaux

Philip E. LaMoreaux
State Geologist

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GEOLOGY AND GROUND-WATER RESOURCES OF LAWRENCE COUNTY, ALABAMA

A Reconnaissance

By Wiley F. Harris, Jr. and William M. McMaster

ABSTRACT

Lawrence County, in northwestern Alabama, has an area of 700 square miles and a population of 24,299 according to the 1960 census. Moulton, the county seat and largest town, has a population of 1,668. The climate is humid and temperate; the mean annual temperature is 61° F and the average annual precipitation is about 50 inches.

Rocks exposed in Lawrence County consist primarily of limestone, sandstone, shale, and dolomite that range in age from Early Mississippian to Early Pennsylvanian. The regional dip of the strata is generally to the south and southwest about 20 to 40 feet per mile, except where altered by local structures. Formations mapped in Lawrence County are the Fort Payne Chert, Tuscumbia Limestone, Gasper Formation and Ste. Genevieve Limestone undifferentiated, Hartselle Sandstone, Bangor Limestone, and Pennington Formation of Mississippian age; and the Pottsville Formation of Pennsylvanian age.

Major aquifers in the county are the Tuscumbia Limestone and Fort Payne Chert in the northern part of the county and the Bangor Limestone in the central part. In some areas the Fort Payne, Tuscumbia, and Bangor reportedly yield as much as 225 gpm (gallons per minute) to individual wells. Small to moderate quantities of water, generally less than 20 gpm, are obtained from other geologic units in the county.

In general, ground water in Lawrence County is of good quality but may require treatment for some uses where it has excessive hardness. Water obtained from sandstone, sand, and gravel aquifers in the county is generally soft to moderately hard and water from limestone, chert, and shale aquifers is generally hard to very hard. Locally, objectionable quantities of hydrogen sulfide, iron, or carbon dioxide are reportedly obtained from wells tapping the Fort Payne Chert, the Tuscumbia and Bangor Limestones, the Hartselle Sandstone, and the Pottsville Formation.

INTRODUCTION

Lawrence County, in northwestern Alabama, has an area of 700 square miles and a population of 24,299 according to the 1960 census. Moulton, the county seat and largest town, has a population of 1,668. Other incorporated towns in the county are Town Creek, Courtland, and Hillsboro.

The economy of the county is based primarily on agriculture and cotton is the major agricultural product. Beef cattle, hogs, and grain are other important sources of income. Timber also is a major source of income. Most of the county's 220,000 woodland acres are in the William B. Bankhead National Forest in the southern third of the county.

PURPOSE OF INVESTIGATION

The U.S. Geological Survey, in cooperation with the Geological Survey of Alabama, began a reconnaissance in September 1960 of the ground-water resources of Lawrence County (fig. 1). The study was made to obtain sufficient data on the occurrence, availability, and chemical quality of ground water to aid future industrial, municipal, and domestic development of these resources in the county. The work was done under the direct supervision of W. J. Powell, district geologist, Ground Water Branch, U.S. Geological Survey.

PREVIOUS INVESTIGATIONS

One of the earliest geologic maps of Lawrence County was prepared by Smith (1894). Butts included geologic information for several units in the county in his study of the Paleozoic rocks of north Alabama, which was included in Geological Survey of Alabama Special Report 14, "Geology of Alabama," by G. I. Adams and others (1926). Accompanying the text was a revision of Smith's (1894) earlier geologic map of the State. Welch (1958) measured four geologic sections in Lawrence County as a part of his stratigraphic study of the Upper Mississippian rocks in northern Alabama and northeast Mississippi.

Johnston (1933) included an inventory of 39 wells and 7 springs, and chemical analyses of water from 3 wells and 2 springs in the

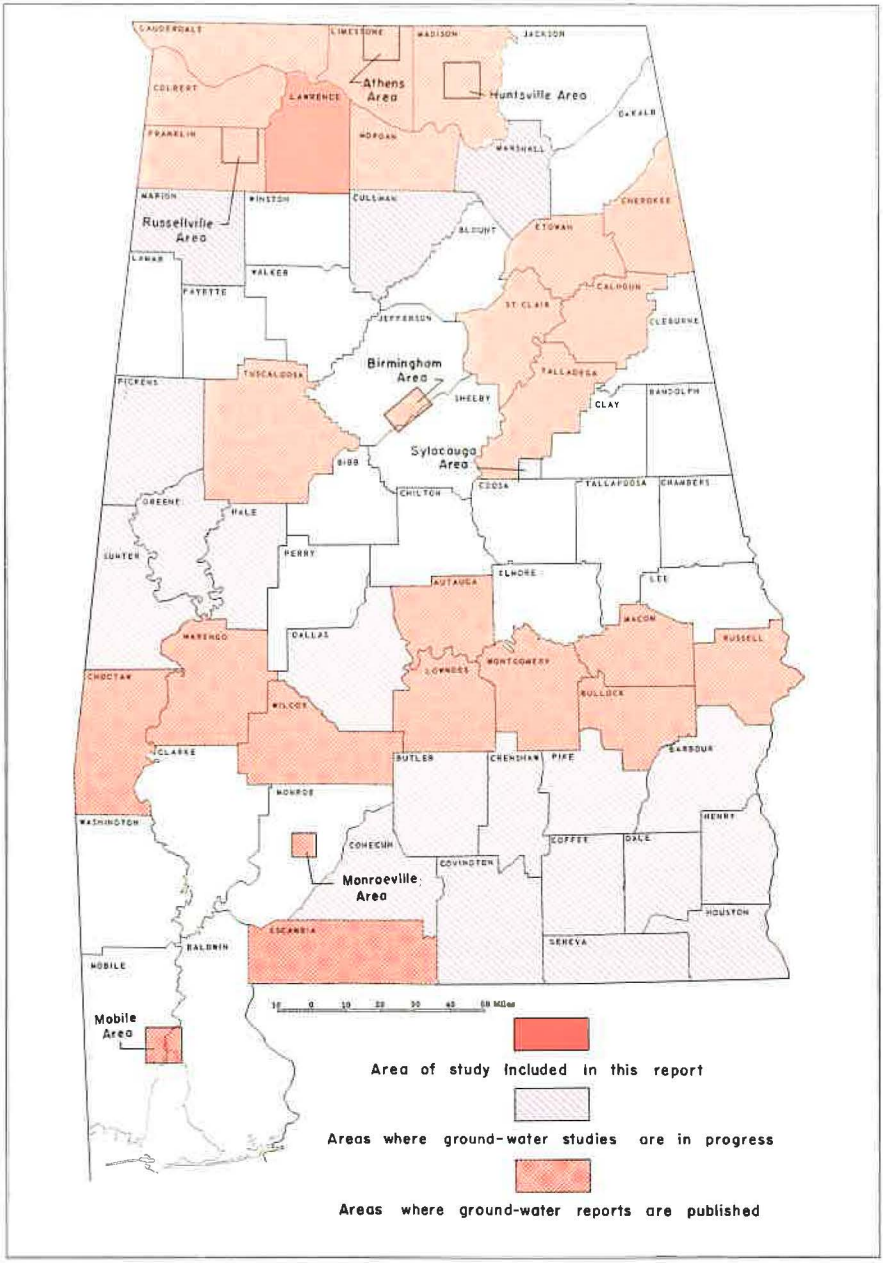

Figure 1.—Area studied and areas of other ground-water studies in Alabama.

county in Alabama Geological Survey Special Report 16, "Ground Water in the Paleozoic Rocks of Northern Alabama."

Oil test well logs from Lawrence County were included in compilations by Semmes (1929), Bowles (1941), Toulmin (1945), and McGlamery (1955).

WELL- AND SPRING-NUMBERING SYSTEM

The Federal system of land subdivision, which divided the public land into townships approximately 36 square miles in area, forms the basis for numbering wells and springs in Lawrence County. Each township is divided into 36 sections numbered from 1 in the northeast corner to 36 in the southeast corner. Similarly, townships are designated by letters in alphabetical order, beginning with "A" in the northeast township and ending with "X" in the southeast township (pl. 1). Within a township, the wells and springs are numbered consecutively, in the same order as sections, beginning in the northeast section, and are prefixed by the letter identifying the township; for example, N-1, N-2, N-3 (fig. 2).

PHYSIOGRAPHY AND DRAINAGE

A part of Lawrence County is in the Appalachian Plateaus province and a part is in the Interior Low Plateaus province. The distribution of physiographic divisions in the two provinces is shown in figure 3.

The Warrior Basin and Sand Mountain districts are included in the Cumberland Plateau section of the Appalachian Plateaus province. Johnston (1933, p. 255) considered the Warrior Basin district to extend over all of the Cumberland Plateau section in Lawrence County. The northern part of the Warrior Basin is a submaturely dissected plateau underlain by sandstone, shale, and limestone. The Warrior Basin ranges in width from 2 to 9 miles across the southern part of Lawrence County and in altitude from 560 feet at the base of the steep-sided valleys to 1,060 feet on the plateau. The high rolling sandstone upland that separates the Appalachian Plateaus and Interior Low Plateaus provinces is known in Lawrence and adjoining counties as Sand Mountain and is considered in this report as the Sand Mountain district—a separate topographic feature

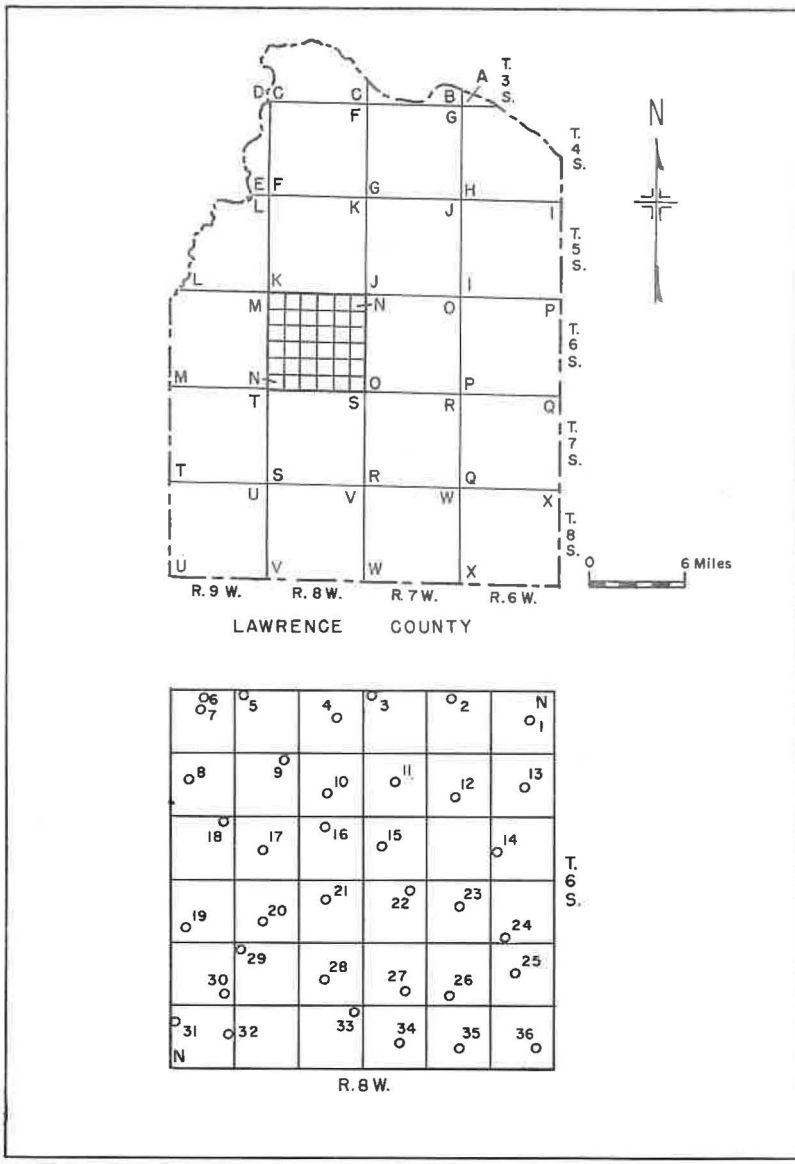

Figure 2.—Well- and spring-numbering system used in this report.

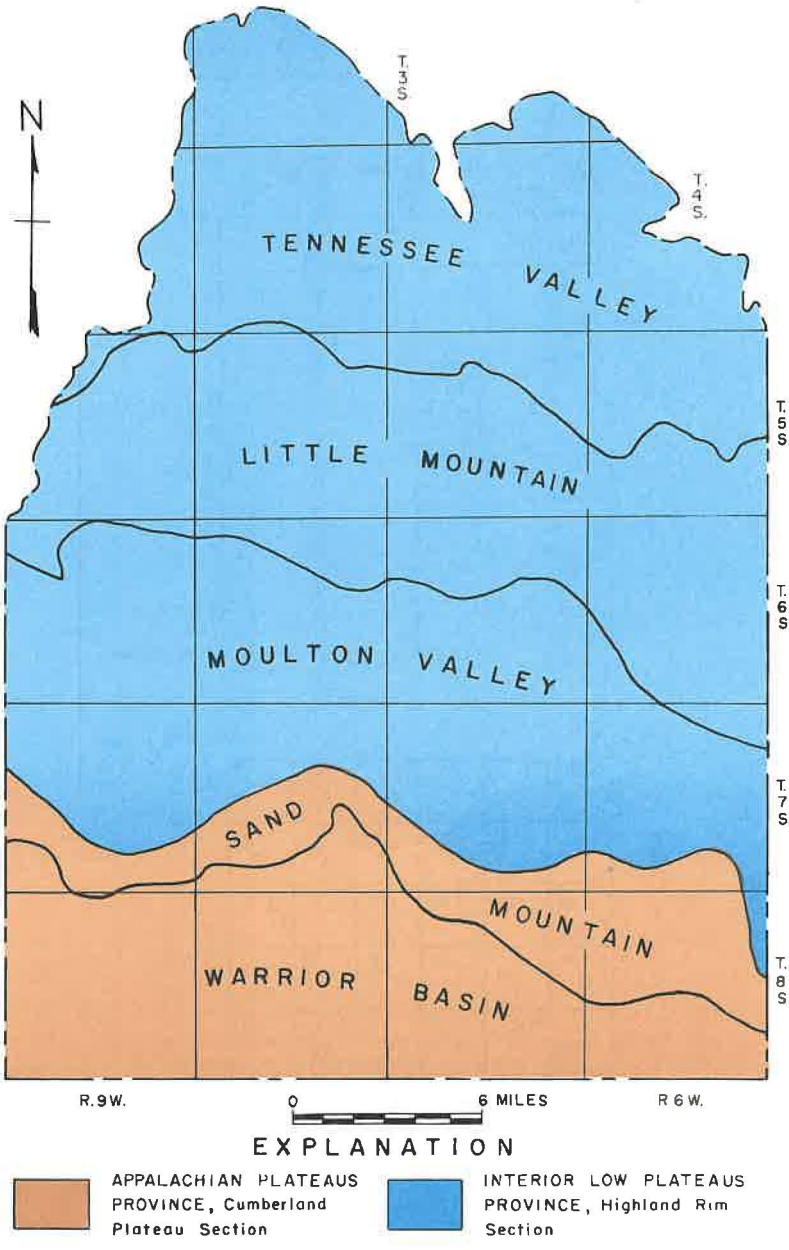

Figure 3.—Physiographic divisions of Lawrence County.

from Sand Mountain in Jackson, DeKalb, Marshall, Blount, and Etowah Counties. The Sand Mountain district in Lawrence County is a narrow, slightly rolling upland underlain by sandstone and shale which divides surface drainage between the Tennessee River to the north and the Black Warrior River to the south. The district ranges in altitude from 980 to 1,080 feet and in width from 1 to 5 miles.

Included in the Highland Rim section of the Interior Low Plateaus province are the Moulton Valley, Little Mountain, and Tennessee Valley districts (Johnston, 1933, p, 255). The Moulton Valley district is underlain by limestone and ranges in width from 4 to 8 miles. Its gently rolling surface ranges in altitude from 580 to 680 feet. North of the Moulton Valley, the hilly surface of the Little Mountain district is underlain by sandstone. A low escarpment forms the northern border of the Little Mountain district. The topography slopes southward from this escarpment. The district ranges in altitude from 600 feet in its incised stream valleys to 850 feet on its upland plateaus, and in width from 4 to 10 miles. The Tennessee Valley district in Lawrence County is underlain by limestone. It extends from the northern margin of the Little Mountain district to the Tennessee River. The district is a gently rolling area of low relief ranging in altitude from 510 to 650 feet. In some parts of the district a Karst topography has developed where roofs of solution cavities have collapsed to form sinks.

Major streams which drain into the Tennessee River are, from west to east, Town, Big Nance, Mallard, and West Flint Creeks. Borden, Bushy Fork, and Capsey Creeks drain southward to the Sipsey River in the Warrior Basin.

CLIMATE

Lawrence County has a humid temperate climate that rarely experiences extremes in temperature or precipitation. The mean annual temperature is 61° F. Average winter and summer temperatures, based on 22 years of record at TVA Station 381 at Moulton, are 42° F and 80° F. In 1960 the average annual precipitation for the 22-year period of record at Moulton was 48.26 inches. Based

on 25 years of record at TVA Station 52 at Wheeler Dam, the average annual precipitation was 51.70 inches. The length of the growing season is approximately 200 days.

ACKNOWLEDGMENTS

Appreciation is expressed to residents of the county who furnished information on wells and springs, use of water, and other data relative to the investigation. Acknowledgment is made to Messrs. Jesse Jeffreys, E. M. Edwards, and J. S. Blakemore, Water Works Superintendents for the towns of Town Creek, Courtland, and Moulton, respectively, for supplying pumpage data. Special thanks for well logs and samples are extended to local well drillers A. J. Hare, Johnnie Harris, and S. T. Little and to the Adams-Massey Drilling Co., Carrollton, Ga.; Crowe Drilling Co., Hartselle, Ala.; Gifford Miller Drilling Co., Lawrenceburg, Tenn.; and the H. W. Peerson Drilling Supply Co., Birmingham, Ala.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

GENERAL STRATIGRAPHY

Rocks cropping out in Lawrence County consist primarily of limestone, sandstone, shale, and dolomite that range in age from Early Mississippian to Early Pennsylvanian. The formations mapped include the Fort Payne Chert, Tuscumbia Limestone, Gasper Formation and Ste. Genevieve Limestone undifferentiated, Hartselle Sandstone, Bangor Limestone, and Pennington Formation, all of Mississippian age; and the Pottsville Formation of Pennsylvanian age (pl. 2). A generalized section of these formations, giving their thickness, description, and water-bearing characteristics, is given in table 1.

The Fort Payne Chert is underlain successively by the Chattanooga Shale of Devonian age, limestone and shale beds of Silurian age, and the Chickamauga Limestone of Middle and Late Ordovician age. The Chattanooga Shale, being relatively impermeable, yields little or no water to wells in Lawrence County. Permeable beds underlying the formation generally contain highly mineralized water

and the top of the Chattanooga is considered the lower limit of occurrence of usable ground water in Lawrence County.

GENERAL STRUCTURE

Lawrence County is on the south flank of the Nashville dome. In the northern third of the county the strata dip south and southwest about 20 feet per mile and in the southern two-thirds of the county the dip is about 40 feet per mile in most areas. The regional dip is modified locally by minor structures. The configuration of the top of the Chattanooga Shale is shown on plate 3.

Depressions caused by rock collapse are common secondary structural features in many places along the northern margins of the belts of outcrop of the Hartselle Sandstone and the Pottsville Formation (pl. 2). Beds of sandstone in the Hartselle and Pottsville have slumped into cavities in the underlying limestones.

MISSISSIPPIAN SYSTEM

FORT PAYNE CHERT

The Fort Payne Chert is exposed in Lawrence County along the lower part of the bluff on the south bank of the Tennessee River and in Town and Big Nance Creeks (pl. 2). The average thickness of the formation in the county is about 180 feet. The formation is composed of siliceous limestone interbedded with dolomite, dolomitic limestone, shale, and chert. Limestone of the formation is typically light gray, crystalline, siliceous, and thin bedded to massive. The dolomite is light gray and finely crystalline and the shale is blue green and clayey. Chert in the Fort Payne is very light to light gray, opaque, and weathers yellow brown. At Courtland the formation yields an estimated 50,000 gpd (gallons per day) to municipal well G-31. On July 17, 1959, the reported drawdown in the well was 90 feet after pumping 200 gpm (gallons per minute) for several hours. During World War II, Courtland Air Base was supplied by two wells tapping Fort Payne aquifers. Several domestic wells tapping the formation in the county are reported to yield sulfurous water. The results of chemical analyses determined for water samples collected from 34 wells obtaining water

Table 1.—*Generalized section of the geologic units in Lawrence County, Ala., and their water-bearing properties*

System	Geologic unit	Thickness (feet)	Rock character	Water-bearing properties
Post-Pennsylvanian undifferentiated		0-90	Alluvial and residual clay, silt, sand, and gravel.	Locally yields sufficient water for domestic and stock use. Clay and chert gravels weathered from limestone yield a maximum of about 50 gpm to wells. Water is generally soft to moderately hard.
Pennsylvanian	Pottsville Formation	300±	Sandstone, gray, medium- to coarse-grained, medium-bedded to massive; interbedded with gray fissile shale. A conglomerate occurs near the base of the formation in some areas.	Generally yields less than 10 gpm of soft water to wells and springs. The water reportedly contains objectionable amounts of iron in several areas.
	Pennington Formation	60-140	Limestone, gray, oolitic, variable in bedding character, clayey; interbedded with shale.	Generally yields small to moderate quantities of water to springs, however, it has not been extensively developed as a source of water supply. Limited data indicate that the water is soft to moderately hard.
	Bangor Limestone	445	Limestone, medium-gray, finely crystalline, oolitic, partly fossiliferous, massive, interbedded with light-green and gray fissile shale. Upper part includes some light- to medium-gray massive chert and light-gray thin-bedded dolomitic limestone.	Wells tapping openings in the formation reportedly yield as much as 225 gpm and springs discharge as much as 2,000 gpm. Wells obtaining the largest yields are developed near the contact with the underlying Hartselle Sandstone. Water is generally very hard and is reported to be sulfurous in some areas.

Mississippian	Hartselle Sandstone	35-165	Sandstone, light-gray, medium- to coarse-grained, medium-bedded to massive, calcareous, asphaltic in places; locally includes beds of shale and limestone in the lower part.	Yields less than 10 gpm to wells and springs. Water is generally soft or moderately hard and is reported to contain hydrogen sulfide, iron, and carbon dioxide in several areas.
	Gasper Formation and Ste. Genevieve Limestone undifferentiated	110-230	Shale, medium- and olive-gray, calcareous in the western part of the county; very light to medium-gray finely crystalline or oolitic slightly cherty massive to irregularly bedded limestone interbedded with light- to medium-gray calcareous shale in the eastern part of the county.	Yields to wells and springs are generally less than 10 gpm. Water is generally hard or very hard and is reported to contain objectionable quantities of hydrogen sulfide and carbon dioxide in some areas.
	Tuscumbia Limestone	200	Limestone, gray, coarsely crystalline, massive; contains chert beds.	Wells tapping cavities and fractures in the formation reportedly yield as much as 150 gpm. Larger yields are probably available in some areas. Springs yield as much as 1,000 gpm. Water is generally hard or very hard and locally is reported to contain objectionable sulfurous traits.
	Fort Payne Chert	180	Limestone, light-gray, crystalline, siliceous, thin-bedded to massive; interbedded with dolomite, dolomitic limestone, shale, and chert.	Wells tapping cavities and fractures in the formation reportedly yield as much as 200 gpm. The water is generally moderately hard to very hard and locally is reported to contain objectionable sulfurous traits.

from the Fort Payne Chert indicate that the water is moderately hard or hard and has a median chloride content of 11 ppm (parts per million).

TUSCUMBIA LIMESTONE

The Tuscumbia Limestone overlies the Fort Payne Chert and crops out in an irregular belt 4 to 9 miles wide across the northern part of the county (pl. 2). The average thickness of the Tuscumbia in Lawrence County is about 200 feet. The limestone is generally gray, coarsely crystalline, massive, and contains beds of chert. Limestone has been quarried from the Tuscumbia for road metal but the quarries were abandoned because of problems of drainage. Town Creek is supplied by well F-20, which taps the Tuscumbia and reportedly yields 50,000 gpd. In the summer of 1937, well F-20 had a reported slight drawdown after pumping 150 gpm for 24 hours. Springs flowing from the Tuscumbia range in yield from less than 10 to 1,000 gpm. Wheeler Spring (G-39) at Wheeler, Ala., was estimated to flow 400 gpm on September 28, 1960. The spring formerly supplied a watering tower for steam locomotives. Among several reportedly large springs flowing from the Tuscumbia, but now covered by Wheeler Reservoir, are Big Head Spring, which is covered by backwater in Spring Creek, and a spring covered by backwater in Swoope Lake. Sulfurous water is reportedly obtained from wells tapping the Tuscumbia in some areas. The results of chemical analyses determined for water samples collected from 88 wells and springs obtaining water from the Tuscumbia Limestone indicate that the water is hard or very hard and low in chloride content (median 11 ppm).

GASPER FORMATION AND STE. GENEVIEVE LIMESTONE UNDIFFERENTIATED

Stratigraphic units from the top of the Tuscumbia Limestone to the base of the Hartselle Sandstone were studied by Welch (1958) in his report on the Upper Mississippian rocks of north Alabama and northeast Mississippi. The rocks described by Butts (1926, p. 177-189) as the Gasper Formation and the Ste. Genevieve Limestone were renamed the Pride Mountain Formation by Welch, who traced several members, which he named, from his type section in

Colbert County into the western part of Lawrence County. These members are not identifiable in the eastern part of Lawrence County; therefore, Butts' terminology is retained in this report. The Gasper Formation and Ste. Genevieve Limestone were not separately identified in Lawrence County.

The Gasper Formation and Ste. Genevieve Limestone undifferentiated crops out on the north slope of the Little Mountain escarpment, which extends in an east-west direction across the county. The lithology of the Gasper in the eastern part of the county is chiefly limestone and shale; however, in the western part it is predominantly shale. Accompanying this change is an increase in the thickness of the formations from east to west. The formations range in thickness from 110 feet in the Goyer no. 1 well (Semmes, 1929, p. 131-132) in the SW¼SE¼ sec. 29, T. 7 S., R. 6 W., to 230 feet in the Connors no. 1 well (Toulmin, 1945, p. 92-94) in the NE¼NE¼ sec. 17, T. 5 S. R 8 W.

The limestone is very light to medium gray, finely crystalline or oolitic, slightly cherty, and massive to irregularly bedded. In the eastern part of Lawrence County, shale is interbedded with the limestone and is light to medium gray and calcareous. In the western part of Lawrence County, the shale beds are medium and olive gray and calcareous. Sandstone occurs near the base of the formations and lenses out to the east. Welch (1958, section 19) describes a thin-bedded sandstone lens in sec. 10, T. 5 S., R. 7 W. The sandstone is light olive gray, very fine to fine grained, thin bedded, and lenticular. Several small road metal quarrying operations in limestone beds in the formations in Lawrence County have been discontinued. In many areas conditions are unfavorable for extensive quarrying because of solution of the limestone by circulating ground water and the consequent collapse of the overlying Hartselle Sandstone.

Yields to wells and springs tapping openings in the limestone or discharging from them are generally less than 10 gpm. Hydrogen sulfide and carbon dioxide were reported in water from the formations in many parts of the county. The results of chemical analyses determined for water samples collected from 38 wells and springs obtaining water from the Gasper Formation and Ste. Genevieve

Limestone undifferentiated indicate that the water is hard or very hard and low in chloride content (median 18 ppm).

HARTSELLE SANDSTONE

The Hartselle Sandstone crops out in an irregular band 4 to 10 miles wide across the central part of the county (pl. 2). It forms an escarpment and caps Little Mountain. The Hartselle generally ranges in thickness from 35 to 165 feet and averages about 105 feet. The sandstone is typically light gray weathering to yellow brown, medium to coarse grained, medium bedded to massive, calcareous, and locally is asphaltic. Beds of shale and limestone occur locally in the lower part of the formation. The most extensive asphalt impregnations observed in the sandstone are at Wolf Springs in sec. 15, T. 5 S., R. 9 W., and in sec. 35, T. 5 S., R. 6 W. Wells L-11, N-6, N-7, and O-30 penetrated asphalt zones in the sandstone. The Hartselle generally yields less than 10 gpm to wells and springs. The water was reported to contain hydrogen sulfide, iron, and carbon dioxide in several areas. The results of chemical analyses determined for water samples collected from 143 wells and springs obtaining water from the Hartselle Sandstone indicate that the water is soft to moderately hard and low in chloride content (median 18 ppm).

BANGOR LIMESTONE

The Bangor Limestone crops out north of Sand Mountain in an east-west trending belt 5 to 10 miles wide across the county (pl. 2). The thickness of the Bangor penetrated in the no. 1 United States of America oil test well in the SE¼SE¼ sec. 26, T. 7 S., R. 8 W. was 445 feet. This thickness is believed to be representative of that of the formation in other parts of the county. The Bangor contains medium-gray finely crystalline oolitic partly fossiliferous massive limestone, with some shale, chert, and dolomitic limestone. The shale is light green and gray, fissile, and discontinuous; it occurs throughout the formation. The chert is light to medium gray and weathers yellow brown, and is massive. The dolomitic limestone is light gray and thin bedded and is interbedded with limestone and chert in the upper part of the formation. The uppermost bed of dolomitic limestone is the key to recognition of the

contact between the Bangor and the overlying Pennington Formation. The formation is quarried for road metal in sec. 25, T. 7 S., R. 6 W., near the Morgan-Lawrence County boundary and in sec. 30, T. 6 S., R. 8 W., 2 miles northwest of Moulton.

Municipal wells O-36 and R-5 in Moulton yield a combined average of 150,000 gpd from the formation. Well O-36 had a reported drawdown of 21 feet after pumping 210 gpm for 24 hours on July 8, 1954, and well R-5 had a reported drawdown of 37 feet after pumping 225 gpm for 27½ hours on December 15, 1947. Drillers' logs indicate that the greatest quantity of water in the Bangor is generally available at or near its contact with the underlying Hartselle Sandstone. Springs flowing from the Bangor generally range in yield from 20 to 2,000 gpm.

Sulfurous water is reportedly obtained from numerous wells tapping the Bangor. The results of chemical analyses determined for water samples collected from 143 wells and springs obtaining water from the Bangor Limestone indicate that the water is very hard; 28 percent had hardnesses exceeding 300 ppm. The median chloride content was 25 ppm.

PENNINGTON FORMATION

The Pennington Formation crops out on the north slope of Sand Mountain (pl. 2). The formation generally ranges in thickness from 60 to 140 feet and averages about 84 feet. Limestone in the Pennington is gray, oolitic, clayey, and is variable in bedding character. In many areas the limestone is interbedded with shale that, in places, is red and green at the base of the formation. Some limestone in the formation has been mined for road metal, however, the quarries were not active in 1962. The Pennington generally yields small to moderate quantities of water to springs; however, the formation has not been extensively developed as a source of water supply. The results of chemical analyses determined for three water samples from the Pennington indicate that the water is soft to moderately hard and low in chloride content.

PENNSYLVANIAN SYSTEM

POTTSVILLE FORMATION

The Pottsville Formation overlies the Pennington Formation and crops out in the southern part of Lawrence County (pl. 2). The maximum thickness of the Pottsville is about 300 feet along Borden Creek near the Winston-Lawrence County boundary. The Pottsville is composed of sandstone and shale. The sandstone is typically gray weathering to yellow brown, medium to coarse grained, medium bedded to massive, and interbedded with gray fissile shale. A conglomerate that weathers to a sand and gravel residuum occurs near the base of the formation in some areas. The residuum has been mapped previously as the Tuscaloosa Group of Cretaceous age because of its lithology (Adams and others, 1926). The Pottsville generally yields less than 10 gpm to wells and springs. Owners of wells tapping the Pottsville in several areas report that the water contains objectionable amounts of iron. The results of chemical analyses determined for water samples collected from 30 wells and springs obtaining water from the Pottsville Formation indicate that the water is soft and low in chloride content (median 18 ppm).

POST-PENNSYLVANIAN UNDIFFERENTIATED

Alluvium and residuum of post-Pennsylvanian age overlie bedrock in most of Lawrence County. Thin alluvial deposits are present in basins of the larger tributaries and the residuum, the leached remains of underlying bedrock, overlies formations from which it has weathered. These deposits, because of their indistinct nature and limited thickness in places, were not mapped separately from other geologic units in the county. The residual deposits are as much as 90 feet thick in the outcrop area of the Tuscumbia Limestone and are thinnest, where present, in the outcrop areas of the more resistant beds in the Pottsville Formation and Hartselle Sandstone. Sandstone beds in the Pottsville and Hartselle are at or near the land surface in numerous areas on Sand and Little Mountains. Alluvial sand and gravel deposits locally yield enough water for domestic and stock use. Residual clay, silt, sand, and gravel weathered from the sandstone formations yield some water to wells. Clay weathered from shale yields little or no water to

wells. Chert gravel weathered from limestone yields a maximum of about 50 gpm to wells F-19 and F-24. The median hardness and chloride content determined for 54 water samples collected from the post-Pennsylvanian deposits was 92 and 18 ppm.

GROUND WATER

SOURCE

The source of ground water in Lawrence County is precipitation consisting of rainfall and an occasional light snowfall. A part of the precipitation runs off by surface drainage, a part evaporates or is transpired by plants, a part replenishes soil moisture, and a part moves downward by influent seepage into the earth to the zone of saturation; the zone in which all pore spaces and voids in the rock are filled with water.

OCCURRENCE AND STORAGE

Ground water is water in the zone of saturation. The upper surface of this zone is called the water table. Shallow unconfined ground water is under water-table conditions; it moves from higher to lower altitudes in response to gravity. As water in an aquifer moves downward between relatively impermeable beds of shale, dolomite, and limestone, it is generally confined under pressure exerted by water in the same aquifer at higher altitudes and is called artesian water. Water in a well penetrating the confining layer will rise above the base of the confining bed in response to pressure in the artesian aquifer. If the altitude to which the water will rise under this pressure is above that of the land surface, the well will flow. Well S-6 (pl. 1) is an artesian well that flows during periods of maximum rainfall.

Water occurs in limestone in solution cavities developed along fractures and bedding planes. Water occurs in sandstone in interstices, fractures, and along bedding planes. The quantity of water that an aquifer will yield is dependent on the porosity, or percentage of open space in a rock, and the permeability, or rate at which the aquifer can transmit water. Sandstone porosity is controlled by the shape, sorting, cementation, and compaction of the constituent

particles. Limestone porosity is dependent on the extent to which mineral matter has been removed through solution by percolating water, and on the number of joints and fractures in the rock.

RECHARGE

The water table declines during periods of little or no precipitation when discharge from ground-water reservoirs exceeds recharge. The amount of water that reaches the water table and recharges ground-water reservoirs is determined by the intensity and duration of precipitation, the slope of the land surface, the porosity and permeability of the soil, and the vegetative cover. The surface slopes of the Little Mountain, Sand Mountain, and Warrior Basin physiographic districts (fig. 3) are relatively steep, which allows precipitation only a short period of access to the underlying rock formations before draining into nearby tributaries. In the Tennessee Valley and Moulton Valley physiographic districts (fig. 3), surface slopes are gentle, allowing precipitation a longer period of access to the underlying formations. Also, larger quantities of recharge are received by aquifers in these districts because of the easy access to the subsurface provided by sinkholes formed by the collapse of solution cavities in underlying limestone.

WATER-LEVEL FLUCTUATIONS AND THEIR SIGNIFICANCE

Water-level fluctuations generally can be correlated with recharge or lack of recharge to the ground-water reservoirs, withdrawals by pumping, flows from wells and springs, variations in atmospheric pressure, ocean and earth tides, earthquakes, and other minor phenomena. Fluctuations in Lawrence County, for the most part, are seasonal or cyclic and are related directly to precipitation. The highest amplitude of seasonal fluctuation occurs in aquifers in the Tuscumbia Limestone and Fort Payne Chert. Smaller amplitudes occur in aquifers in the Hartselle Sandstone, Bangor Limestone, and post-Pennsylvanian deposits. Water levels reflecting seasonal changes in precipitation are normally lowest in the fall when precipitation is low and evaporation and transpiration rates are high. Water levels are normally highest in the late winter and spring because of an increase in precipitation.

Water-level fluctuations in wells F-32, F-37, G-28, and H-16 from September 1960 to August 1961 are shown in figure 4. Water-level measurements and precipitation totals for 14-day intervals are plotted to show their relationship. The hydrographs reflect chiefly the seasonal recharge from precipitation. Water-level lows for all but well G-28 were recorded in September 1960. Well G-28, which develops water from alluvial gravel deposits in the vicinity of Big Nance Creek, showed a fluctuation of 13 feet from November 30, 1960, to January 25, 1961. Smaller amplitudes in seasonal fluctuations for wells N-5, O-33, P-3, and Q-28 in response to precipitation are shown in figure 5. Well N-5, a low-yield well, also reflects withdrawals. The hydrograph for well O-33 is based on daily water-level lows. Hydrographs for wells N-5, P-3, and Q-28 are based on measurements taken at 14-day intervals. Excessive rainfall in September 1960 in the Moulton area caused water levels to be higher than normal in wells O-33, P-3, and Q-28. Figure 6 shows water-level fluctuations in wells R-23, S-6, and T-9 from September 1960 to August 1961. Water levels in well R-23, a low-yield well, reflect withdrawal in addition to seasonal variations in precipitation. Well S-6 is in an area of artesian flow from the Bangor Limestone. Water levels in wells S-6 and T-9 fluctuate primarily in response to seasonal changes in precipitation. Water-level lows for wells R-23 and T-9 for the period of record occurred in September 1960 and for well S-6 occurred in May and June 1961.

USE OF WATER

Moulton, Town Creek, and Courtland obtain municipal water supplies from drilled wells. Wells O-36 and R-5 supply Moulton with an average of 150,000 gpd. Well F-20 supplies Town Creek with an estimated average of 50,000 gpd. Wells G-31 and G-32 supply Courtland with an estimated average of 80,000 gpd. Per capita water consumption during 1960 in Moulton, Town Creek, and Courtland was 114, 60, and 160 gpd, respectively. Per capita water consumption for Moulton and Courtland are higher than Town Creek because of industrial use at Moulton.

Thirty percent of the domestic and stock wells are equipped with electric pumps; water is obtained manually from the remainder (table 4). Because of the large number of wells in rural areas where

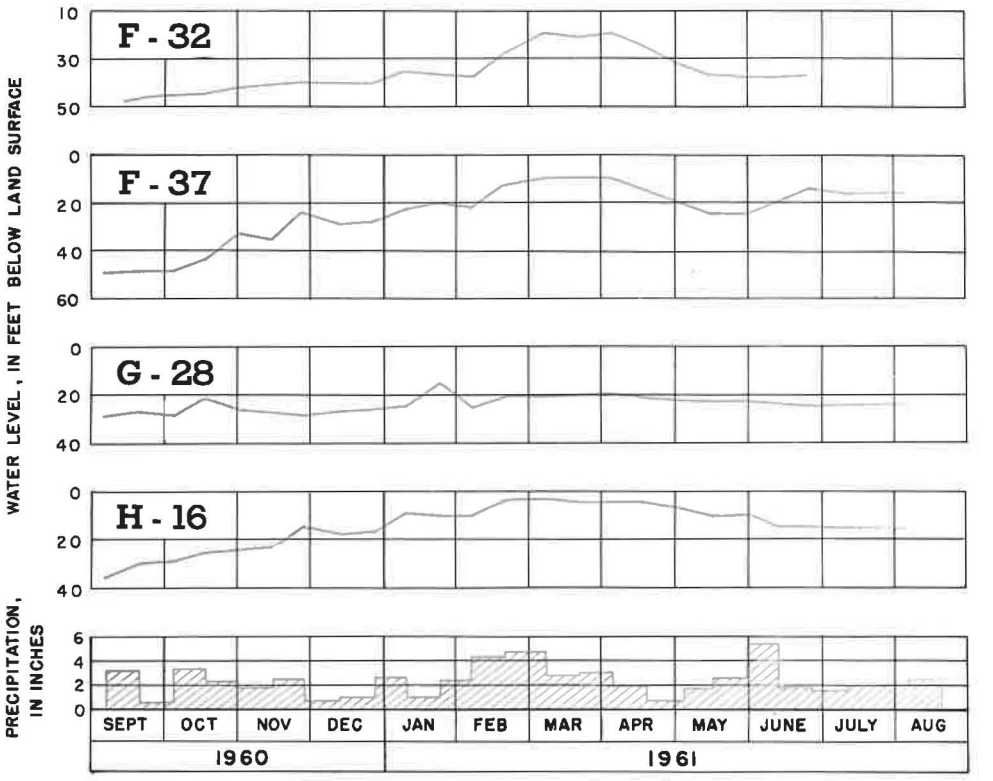

Figure 4.—Fluctuations in water level in wells F-32, F-37, G-28, and H-16 and precipitation at Wheeler Dam, 1960-61.

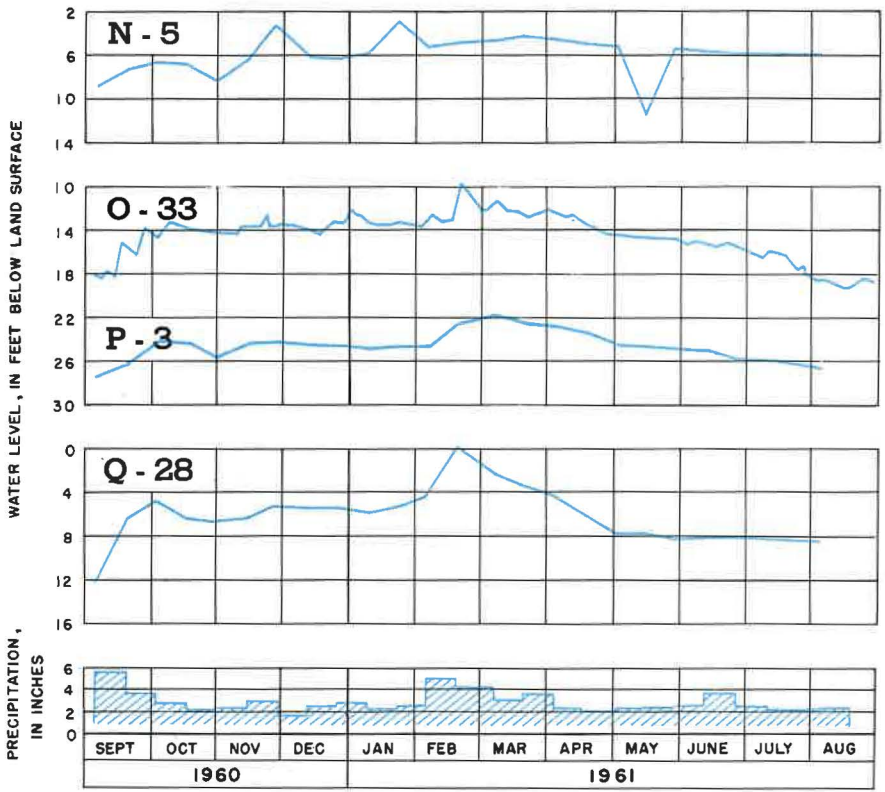

Figure 5.—Fluctuations in water level in wells N-5, O-33, P-3, and Q-28 and precipitation at Moulton, 1960-61.

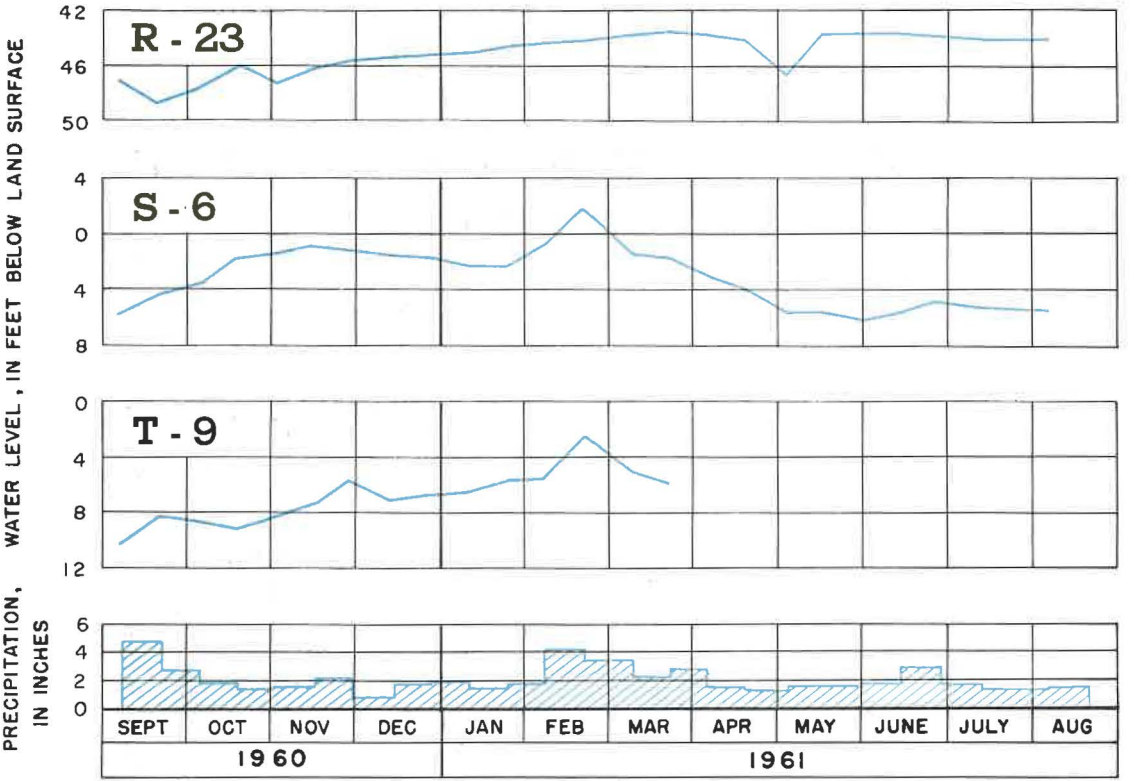

Figure 6.—Fluctuations in water level in wells R-23, S-6, and T-9 and precipitation at Moulton, 1960-61.

water is obtained manually, the lower per capita rate of water consumption at Town Creek, 60 gpd, is used to estimate the average per capita rate for Lawrence County. Based on this rate of consumption, about 1,500,000 gpd is used in Lawrence County. Estimated minimum yield for 28 springs inventoried in Lawrence County is 2,000,000 gpd. Minimum runoff from all springs in Lawrence County is at least double the total amount of ground water being used. Abundant ground-water reserves are available in the county for future development of industrial, municipal, and domestic supplies.

QUALITY OF WATER

Water that falls as precipitation contains small amounts of dissolved minerals. Additional minerals are leached from the soil and rocks by the water. The amount and type of dissolved minerals in water depends chiefly on the chemical composition and character of rocks through which the water passes, the duration of contact, and the presence or absence of carbon dioxide, which increases its solvent action. Water samples were collected from 533 wells and springs in Lawrence County for analysis of hardness and chloride content (table 2).

General terms are used in this report to describe hardness. The terms and the range in hardness, expressed as calcium carbonate ($CaCO_3$), that govern the use of each are as follows:

Term	Hardness range (ppm)
Soft	0-60
Moderately hard	61-120
Hard	121-180
Very hard	181+

The hardness of ground water generally varies with the type of rock the water is stored in. The Hartselle Sandstone and Pottsville Formation are comprised chiefly of sandstone aquifers and the remainder of the formations in Lawrence County, with the exception of unconsolidated alluvial and residual deposits, are comprised of limestone, chert, and shale aquifers. Of the 173 water samples collected from sandstone aquifers and analyzed, about 50

percent contained soft water and about 25 percent contained moderately hard water (fig. 7). Of 303 water samples collected from limestone, chert, and shale aquifers, about 65 percent contained very hard water and about 25 percent contained hard water. Analyses of 54 water samples from wells completed in beds of sand and gravel in alluvium and residuum indicate that soft to moderately hard water is obtained from about 60 percent of the wells. Bar graphs showing distribution of hardnesses determined from samples collected from the various formations are shown in figure 8. Maximum, median, and minimum values of hardness and chloride content are shown in table 2 for each formation that crops out in the county. Median values of hardness range from 40 to 246 ppm.

Laboratory analyses of water samples from municipal wells O-36 in Moulton, F-20 in Town Creek, and G-32 in Courtland are shown in table 3. The U.S. Public Health Service (1962) drinking water standards indicate domestic and municipal supplies preferably should not contain more than 0.3 ppm of iron, 0.05 ppm of manganese, 250 ppm of sulfate, 250 ppm of chloride, from 0.8 to 1.7 ppm of fluoride, 45 ppm of nitrate, and 500 ppm of dissolved solids. Analyses in table 3 indicate that the standards for dissolved solids were exceeded in the sample from Town Creek, and standards for iron were exceeded in the sample from Moulton. The iron content of the sample from Courtland was equal to the recommended maximum amount. The sulfate content of the sample from Town Creek was moderately high, but well below the recommended maximum amount. There is no sulfurous taste or odor in water from the municipal system in Town Creek.

Chloride is present in all natural waters and in Lawrence County the amounts are generally very small. Locally, water obtained from a few wells contains sufficient chloride to give it an objectionable taste. Median values of chloride content in Lawrence County range from 7 to 25 ppm (table 2).

Ground water obtained from wells and springs in Lawrence County generally ranges in temperature from 62° to 64° F.

Objectionable quantities of iron, hydrogen sulfide, and carbon dioxide were reported to occur locally in ground water from wells tapping the Hartselle Sandstone. Sulfurous water also was reportedly

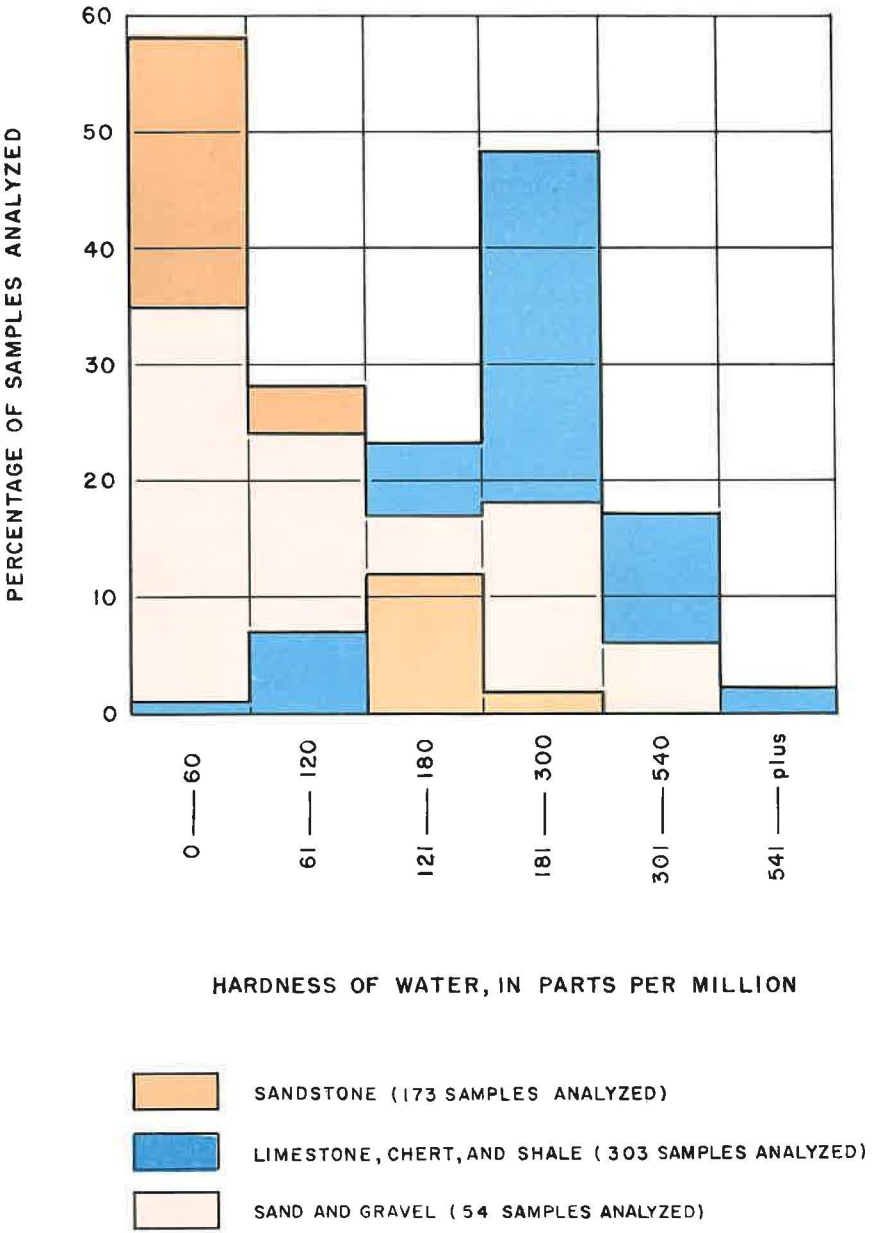

Figure 7.—Hardness of ground water from the various types of rocks in Lawrence County.

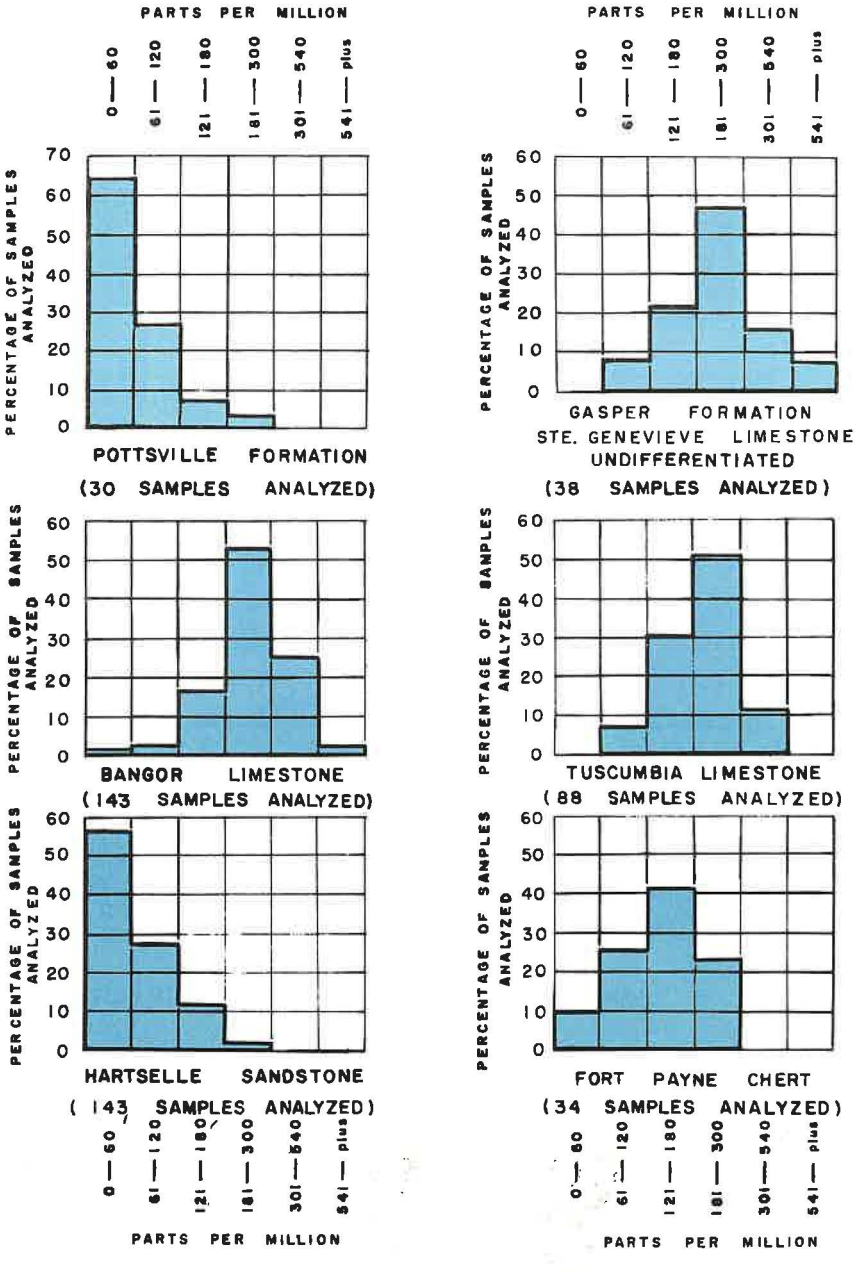

Figure 8.—Hardness of ground water by formations in Lawrence County.

Table 2.–*Hardness and chloride content of ground water in Lawrence County*

Stratigraphic unit	Number of samples	Hardness as $CaCO_3$ Calcium, magnesium			Chloride (Cl)		
		Minimum	Median	Maximum	Minimum	Median	Maximum
Post-Pennsylvanian undifferentiated	54	16	92	352	7	18	117
Pottsville Formation	30	8	40	158	4	18	117
Pennington Formation	3	56	60	96	7	7	7
Bangor Limestone	143	40	246	1,310	4	25	145
Hartselle Sandstone	143	6	46	254	4	18	248
Gasper Formation and Ste. Genevieve Limestone undifferentiated	38	90	240	2,480	4	18	273
Tuscumbia Limestone	88	92	204	434	4	11	110
Fort Payne Chert	34	20	136	296	2	11	188

Table 3.—*Chemical analyses of water from municipal wells in Lawrence County*

Well	Date of collection	Water-bearing unit	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids	Hardness as $CaCO_3$		Free carbon dioxide (CO_2)	pH
			Parts per million																Total	Non-carbonate		
[1] F-20	10- 5-59	Mt-Mfp	10.0	nil	nil	..	82.9	....	11.5	0.1	317.2	0	105.4	10.7	....	nil	nil	547.0	231.4	.....	23.7	7.1
[2] G-32	12-15-53	Mfp	9.4	0.6	0.3	0	31.4	15.6	18.4	2.2	207.4	0	2.1	12.0	tr	0.03	tr	303.0	146.4	142.6	4.4	7.8
[1] O-36	7-12-54	Mb-Mh	12.3	...	.7	..	23.2	16.3	45.5	....	106.4	0	5.3	5.3	....	....	...	228.0	127.7	.....	14.0	7.6

[1] Southern Testing Laboratories, Inc.
[2] Picard Testing Laboratories, Inc.

obtained from wells tapping the Fort Payne Chert and the Tuscumbia and Bangor Limestones in some areas. The water from wells tapping the Pottsville Formation in several areas is reported to contain objectionable quantities of iron. Several domestic wells reportedly yield small quantities of gas and related petroliferous material from the Hartselle Sandstone.

SUMMARY AND CONCLUSIONS

Major aquifers yielding water to wells in Lawrence County are the Fort Payne Chert and the Tuscumbia and Bangor Limestones. The Fort Payne Chert yields as much as 200 gpm to wells in some areas. Wells tapping the Tuscumbia Limestone in the northern part of the county may yield as much as 300 gpm and wells tapping the Bangor Limestone will probably yield 300 gpm or more in places. Small to moderate yields, generally less than 20 gpm, are obtained from the Gasper Formation and Ste. Genevieve Limestone undifferentiated, Hartselle Sandstone, Pennington and Pottsville Formations, and post-Pennsylvanian rocks undifferentiated.

The ground-water consumption in Lawrence County is estimated to be 1,500,000 gpd. The estimated minimum yield of 28 springs inventoried in the county is 2,000,000 gpd. Minimum runoff from all springs is at least double the total amount of ground water being used.

Water from aquifers in Lawrence County is generally of good quality but may require treatment for some uses where it has excessive hardness. Water obtained from sandstone, sand, and gravel aquifers is generally soft to moderately hard and water from limestone, chert, and shale aquifers is generally hard to very hard. Locally, sulfurous water is reportedly obtained from wells tapping the Fort Payne Chert and the Tuscumbia and Bangor Limestones. Objectionable quantities of hydrogen sulfide, iron, and carbon dioxide are reported to occur locally in the Hartselle Sandstone. Locally, objectionable amounts of iron are reportedly obtained from wells tapping the Pottsville Formation.

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BASIC DATA

Table 4.—*Records of wells and springs in Lawrence County*

Well or spring: Numbers correspond to those in tables and plates.

Type: D, drilled; Du, dug; S, spring.

Depth of well and water level: Depths shown in feet are reported; those shown in feet and tenths are measured.

Altitude: Altitudes are taken from published topographic quadrangle maps.

Method of lift: M, manual; N, none; Pp, pitcher; Pv, rod; T, turbine; Tj, jet; Ts, submergible.

Use of water: D, domestic; Ind, industrial; N, not used; P, public supply undifferentiated; Pc, church; Pm, municipal; Ps, school; S, stock.

Water-bearing unit: Mfp, Fort Payne Chert; Mt, Tuscumbia Limestone; Mgs, Gasper Formation and Ste. Genevieve Limestone undifferentiated; Mh, Hartselle Sandstone; Mb, Bangor Limestone; Mp, Pennington Formation; IPpv, Pottsville Formation; pIP, post-Pennsylvanian undifferentiated.

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
B- 1	Bob McWhorter		D		6	pIP	665	57.5	9-22-60	Tj	D	..	11	34	
C- 1			D	89.5	6	Mfp	565	18.5	9-22-60	Tj	D	..			
C- 2			D	65.5	6	Mfp	585	36.8	9-22-60	Tj	D	..			
C- 3	W. J. Terry	J. B. Cotton	D	87	6	Mfp	572	11		Tj	D	..	11	20	
C- 4	do	do	D	97	6	Mfp	585	21		Tj	D	..	4	78	
C- 5	Bayles Fishing Camp.	Otis Terry	D	80	6	Mfp	525			Tj	P	..	18	184	Supplies cafe and 22 cabins. Reported to contain sulfur.
C- 6	Cole Foster Estate		D	74	6	Mfp	585	24		Pv	D	63	21	210	

C- 7	William Lee		D	132.0	6	Mfp	615	59.0	9- 9-60	M	D	64	4	165	Supplies 4 houses.
C- 8	M. H. Harris		D	67.4	6	Mfp	618	63.5	9-22-60	M	D	64	18	36	Inadequate for domestic supply.
C- 9	Jimmy Blair		Du	43.0	36	pIP	620	37.9	9-22-60	M	D	..	14	32	
C-10	M. H. Harris		Du	33.1	36	pIP	565	32.1	9-22-60	M	D	..	14	26	Do.
C-11	George Wilson		D	100.0	6	Mfp	555	36.3	9- 9-60	Tj	D	63	11	128	
C-12	Stella King		D	112.3	6	Mfp	578	60.4	9- 9-60	M	D	62	11	110	
C-13	Susie Campbell		D	155.0	6	Mfp	592	71.1	9- 9-60	M	D	62	11	136	Supplies 3 houses.
C-14	A. J. Terry		D	73.5	6	Mfp	593	66.0	9- 9-60	M	D	64	4	124	
C-15	William Lee		D	79.9	6	Mfp	575	66.8	9- 9-60	M	D	63	11	142	
C-16	J. B. Cotton		D	121	6	Mfp	602	86.3	9- 8-60	Tj	D	..	4	120	
C-17	Dr. O. D. Brackin		D	200	6	Mfp	582	61.1	9-14-60	Tj	D	..	11	148	
C-18	T. A. Bowles		Du	43.4	36	pIP	565	29.6	9-14-60	N	N	..	...	....	
C-19	M. H. Harris		D	85	6	Mfp	580	60	.....	Ts	D	..	7	32	
C-20	...do		Du	28.7	36	pIP	600	24.4	9-19-60	M	D	..	14	26	Inadequate for domestic supply.
E- 1	Ray Burden		D	60	6	Mfp	550	32.4	9- 8-60	Tj	D	..	11	140	
E- 2	J. H. Lile		D	43.6	6	Mt	541	15.4	9- 8-60	Tj	D	63	11	166	
E- 3	Janie Preuit		D	35	6	Mt	555	29	.....	Tj	D	..	7	134	
E- 4	C. M. Robinson		D	.....	6	Mt	562	40.4	9- 8-60	Tj	D	63	7	190	Well No. 1 (Johnston, 1933, pt. 2, table 26). Supplies 2 houses and dairy. Drilled below 46 ft. after 1950.
E- 5	D. C. Brackin		D	70	6	Mt	561	38	.....	Pv	D	..	4	174	Supplies 3 houses.
E- 6	C. J. Young		D	150	6	Mt	559	34.7	9- 8-60	Tj	D	63	35	96	Supplies 3 houses. Reported to contain sulfur.
E- 7	Pauline Dawson		D	30	6	Mt	549	23	.....	Tj	D	..	14	222	Water is reported to have an objectionable taste.
E- 8	G. H. Brackin		D	65.1	6	Mt	573	43.7	9- 8-60	M	D	63	7	184	
F- 1	Jimmy Blair		Du	34.0	36	pIP	583	32.7	9-19-60	M	D	64	18	32	Inadequate for domestic supply.
F- 2	T. A. Bowles, Jr		D	67.3	6	Mfp	539	15.9	9-19-60	M	D	64	7	62	
F- 3	Garner Estate		D	82	6	Mfp	570	47.9	9-14-60	Tj	D	..	2	84	
F- 4	Matilda Garner		D	61.1	6	Mfp	552	39.0	9- 8-60	M	D	63	18	176	Supplies 3 houses.
F- 5	J. B. Cotton		D	107	6	Mfp	559	60	.....	Tj	D	..	4	140	Do.
F- 6	Preuit Estate		D	56.7	6	Mt	570	54.1	9-14-60	M	D	62	4	198	Develops water at top of bedrock.
F- 7	Willy and Susy Fitzgerald.		D	47.6	6	Mfp	535	28.6	9-14-60	M	D	63	11	202	
F- 8	Irving Norwood		D	130.9	6	Mfp	559	45.1	9- 8-60	M	D	63	7	136	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
F- 9	Ed Mauldin		D	55.8	6	Mt	550	40.8	9-14-60	M	D	63	14	194	
F-10	Jean Brackin		D	70	6	Mt	575	50.1	9-14-60	Pv	D	..	18	178	
F-11	R. N. Harris, Jr		D	65	6	Mfp	561	40		Tj	D,S	..	7	160	
F-12	... do		D	49.5	6	Mfp	557	47.5	9-19-60	N	N	..	...	.....	Inadequate for domestic supply.
F-13	Jimmy Blair		S	.....	...	Mt	538	.....	.....	..	N	65	7	216	Estimated flow 50 gpm on 9-19-60.
F-14	R. E. Simpson		D	80	6	Mt	575	65	.....	Ts	D	..	7	112	
F-15	Winnie Reed		D	82.7	6	Mt	558	57.6	9-19-60	M	D	65	11	204	
F-16	Ed Mauldin		D	79.8	6	Mt	558	41.0	9-14-60	M	D	63	21	222	
F-17	Ed Fennel		D	200	6	Mt	552	18.5	9-14-60	M	D	62	14	298	Reported to contain sulfur.
F-18	Mrs. J. B. Spangler		D	97	6	Mt	569	52.5	9-14-60	Pp	N	..	...	.....	
F-19	Ed Mauldin		Du	45	36	pIP	581	29	.....	Tj	D	..	11	222	Supplies 5 houses.
F-20	City of Town Creek	H. W. Peerson Drilling Supply Co.	D	180	8	Mt-Mfp	563	.....	.....	T	Pm	62	11	216	Reported slight drawdown after 24 hrs. pumping 150 gpm in summer of 1937. Municipal supply for about 800 people. Average pumpage 50,000 gpd. See chemical analysis in table 3.

F-21	Ed Mauldin	W. L. Hawk	D	71.7	6	Mt	563	44.6	9-29-60	N	N	64	11	208	Casing: 6-in. to 45 ft. Develops water from 70 to 80 ft. Reported to pump 50 gpm. Supplied steam gin in 1904; municipal supply prior to 1957 when Ala. State Dept. of Public Health condemned well. Reported to contain sulfur.
F-22	Cliff Taliaferro		D	102.3	6	Mt	565	49.3	9- 6-60	N	N	..	...	.....	
F-23	Mr. Hanson		D	44.8	6	Mt	567	18.3	9- 8-60	N	N	..	...	.....	
F-24	Ed Mauldin		Du	40	36	pIP	580	32	.....	Tj	D	..	11	244	Supplies 3 houses.
F-25	.....	.....	D	84.9	6	Mt	610	65.7	9-19-60	M	D	65	11	242	
F-26	D. L. Martin		D	33.1	6	Mt	590	20.2	9-23-60	M	D	..	11	248	
F-27	Porter Hitt		D	29.0	6	Mt	569	25.8	9-23-60	M	D	..	11	204	
F-28	City of Courtland	Miller Drilling Co.	D	76.0	6	Mt	579	35.2	9-28-60	Ts	Pm	..	11	216	Casing: 6-in. to 22 ft.; develops water from 56 to 60 ft.; bail tested at 30 gpm. Supplies 16 apartment units at Courtland Downs. See driller's log in table 5.
F-29	H. D. Bynum		S	.....	...	pIP	558	.....	.....	..	N	64	11	130	Known as Bynum Spring. Nonflowing on 9-23-60.
F-30	Rocky Hill Elementary School.		D	101.2	6	Mt	583	24.1	9-23-60	M	Ps	64	11	222	Supplies 78 students. Water contains an iron precipitate.
F-31	State of Alabama	Hurst Machine Works.	D	240	12	Mfp	582	50	.....	Tj	S	..	14	264	Casing: 12-in. to 55 ft. Supplied Courtland Basic Flying School from 1942 to 1946. Reported yield, 200 gpm. Now supplies 1,500 cattle. See driller's log in table 5.
F-32	... do		D	200	12	Mfp	582	48.7	9-15-60	N	N	..	...	.....	Listed as Law-2 in Federal observation well network, Alabama district. Casing: 12-in. to 55 ft. Supplied Courtland Basic Flying School from 1942 to 1946.
F-33	G. D. Bynum		D	75	6	Mt	622	64.5	9-23-60	Pv	D	..	11	326	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
F-34	Mrs. Edgar Odell	.....	D	160	6	Mfp	586	100	.....	Tj	D	..	11	296	Supplies 3 houses. Inadequate supply in summer of 1960.
F-35	Clyde Goode	.....	D	53.1	6	Mt	577	35.7	9-22-60	M	D	63	11	280	
F-36	E. V. Blyth	.....	D	145	6	Mt	566	36	.....	Tj	D	..	4	274	
F-37	Mrs. Jackson	.....	D	74.3	6	Mt	590	49.8	9- 7-60	M	D	63	11	286	Observation well.
F-38	Junior Campbell	.....	D	52.8	6	Mt	581	16.4	9-22-60	M	D	63	60	308	
F-39	H. J. Brackin	.....	D	131	6	Mt	622	42	.....	Tj	D	..	60	294	Develops water at 109 ft. Drawdown 3 ft. after bailing 20 gpm.
F-40	J. C. Sugg	.....	D	58.3	6	Mt	620	33.4	9-23-60	M	D	63	18	366	
F-41	Arnold Hughes	.....	D	65	6	Mt	588	48	.....	Tj	D	..	11	284	
F-42	Frank Gilman	.....	D	128.1	6	Mt	564	20.3	9-23-60	M	D	63	50	292	
G- 1	Joe Wheeler Estate	.....	Du	37.1	36	pIP	624	28.8	9-29-60	M	D	64	11	134	
G- 2	Mrs. Malcolm Lane	Adams-Massey Drilling Co.	D	283	...	Mfp	649	.....	.....	...	...	...	...	.....	Abandoned dry test well. Casing pulled. See driller's log in table 5.
G- 3	R. J. Blankenship	.....	D	.....	6	Mfp	560	.....	.....	Tj	P	..	11	136	Casing: 6-in. to 90 ft. Supplies cafe, store, and 8 cabins at Spring Creek Fish Camp.
G- 4	Mrs. R. H. Tweedy, Sr.	.....	D	55.6	6	Mfp	571	19.4	9-28-60	M	D	64	11	138	
G- 5	Eva Fowler	.....	D	38.5	6	pIP	580	28.2	9-29-60	M	D	64	11	20	

G- 6	Jimmy Blair	.....	S	.....	...	Mt	540	.....	.....	...	N	62	11	136	Known as McDonald Spring. Well No. 40 (Johnston, 1933, pt. 2, table 27). Estimated flow 50 gpm on 9-19-60.
G- 7	... do	.....	D	64.1	6	Mt	582	42.6	9-28-60	M	D	..	11	144	Reported to contain sulfur.
G- 8	Dr. H. W. Prichett..	.....	D	62.6	6	Mt	589	59.5	9-29-60	M	D	64	11	128	
G- 9	Mrs. W. A. Toms ...	.....	D	47.9	6	Mt	572	23.8	9-28-60	M	D	64	11	144	
G-10	V. G. Moore	.....	D	81.6	6	Mt	588	38.7	9-29-60	M	D	64	11	148	
G-11	Joe Wheeler Estate.	.....	D	184.4	6	Mfp	609	80.9	9-29-60	M	D	63	11	96	
G-12	... do	.....	D	30.0	6	Mt	587	24.4	9-29-60	M	D	64	11	102	
G-13	... do	.....	Du	31.4	36	plP	589	28.1	9-29-60	M	D	65	11	84	
G-14	... do	.....	D	52.5	6	Mt	592	40.5	9-29-60	M	D	64	11	92	
G-15	Miss Lavinia Chardavoyne.	.....	D	61.7	6	Mt	581	46.2	9-28-60	M	D	64	11	184	
G-16	W. G. Houston	.....	D	164.6	6	Mfp	585	47.2	9-28-60	M	D	..	11	92	
G-17	Lynn Cross.....	.....	D	71	6	Mt	572	20	.....	Tj	D	..	11	208	
G-18	Katie Sykes	.....	D	43.6	6	Mt	575	27.7	9-30-60	M	D	64	11	304	Water contains an iron precipitate.
G-19	Joe Wheeler Estate.	.....	D	33.4	6	Mt	572	18.1	9-30-60	M	D	..	11	184	
G-20	J. L. Green.....	.....	D	140	6	Mt	565	45	.....	Ts	D	..	11	172	
G-21	E. S. Ballentine, Sr.	.....	S	.....	...	Mt	550	.....	.....	...	N	62	...	.....	Known as Swopes Pond and Swoope Lake. Well No. 41 (Johnston, 1933, pt. 2, table 26). Rock fissure at southeast corner of lake is now covered by Wheeler Reservoir. Estimated flow 200 gpm on 9-30-60.
G-22	Joe Wheeler Estate.	.....	D	46.5	6	Mt	585	31.2	9-29-60	M	D	64	11	124	
G-23	Claude Dyar.....	.....	D	54.3	6	Mt	611	50.9	10- 4-60	M	D	64	7	122	
G-24	Coleman Terry.....	.....	D	44.7	6	Mt	580	22.7	9-30-60	Tj	D	..	11	196	
G-25	Daniel Gilchrist, Jr.	.....	D	31.3	6	Mt	581	23.9	10- 4-60	M	D	..	39	136	Inadequate for domestic supply.
G-26	Fred Redmond	.....	D	75	6	Mt	592	.....	.....	Tj	D, S	..	18	150	
G-27	D. L. Martin, Jr....	.....	D	181.5	6	Mfp	566	31.7	9-30-60	M	D	63	11	184	
G-28	P. L. Swope.....	.....	D	39.6	6	plP	565	27.6	9- 7-60	M	D	63	11	192	Observation well.
G-29	C. L. Terry	W. H. Copeland ..	D	201	6	Mfp	569	25.0	3-16-61	Ts	P	..	14	200	Bedrock at 35 ft. Reported to hit cave at 201 ft. Supplies cafe, store, and 6 cabins.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
G-30	City of Courtland...	Adams-Massey Drilling Co.	D	238	8	Mfp	574	30.0	12- 3-53	N	N	..	...	.....	Municipal supply from 1953 to 1959. Reported 70 ft. drawdown after 24 hrs. pumping 202 gpm on 11-30-53. Well was filled in 1959. Water is reported to have slight sulfurous odor. See driller's log in table 5.
G-31	... do	Miller Drilling Co.	D	226	8	Mfp	574	135.0	9-28-60	T	Pm	63	14	181	Casing: 8-in. to 30 ft. Reported 90 ft. drawdown after pumping 200 gpm on 7-17-59. Water level measured with airline. Estimated daily pumpage 50,000 gpd. See driller's log in table 5.
G-32	... do	H. W. Peerson Drilling Supply Co.	D	165	8	Mfp	564	27	.....	T	Pm	62	...	.....	Well No. 4 (Johnston, 1933, pt. 2, table 26). Reported to pump 100 gpm. Estimated average daily pumpage 30,000 gpd. See chemical analysis in table 3.

G-33	Lelia S. Martin.....	.....	D	150	6	Mt	576	.....	.....	Ts	D,S	..	25	190	
G-34	Miss Mary Hotchkiss	.....	D	66.7	6	Mt	596	37.3	9-30-60	M	D	..	11	248	
G-35	Daniel Gilchrist, Jr.	.....	D	40.8	6	Mt	596	3.1	9-30-60	N	N	..	...	.....	
G-36	Joe Wheeler Elementary School.	.....	D	.....	6	Mt	586	16.5	9-28-60	Tj	Ps	..	11	206	Supplies 34 students.
G-37	Wheeler Elementary School.	.....	D	.....	6	Mt	598	25	.....	Tj	Ps	..	4	162	Supplies 83 students.
G-38	Daniel Gilchrist, Jr.	.....	D	30.6	6	Mt	592	7.2	9-30-60	M	D	..	18	220	
G-39	Southern Railway ..	.....	S	.....	...	Mt	595	.....	.....	..	N	62	11	154	Known as Wheeler Spring. Spring No. 42 (Johnston, 1933, pt. 2, table 27). Supplied steam engine boilers when used by railway. Estimated flow 400 gpm on 9-28-60.
G-40	Daniel Gilchrist, Jr.	.....	D	41.0	6	Mt	592	26.4	10- 4-60	M	D	64	7	164	
G-41	Woodrow Hamilton ..	.....	D	60.0	6	Mt	595	46.3	10- 4-60	M	D	64	4	202	
H- 1	E. M. Farrior	A. G. Hare	D	307	6	Mfp	622	.....	.....	Ts	D	63	188	172	See driller's log in table 5.
H- 2	... do	... do	D	230	6	Mfp	595	50.7	10- 4-60	Ts	D	..	25	70	
H- 3	Joe Wheeler Estate .	.....	Du	31.6	36	pIP	610	18.9	10- 4-60	M	D	..	25	40	
H- 4	Daniel Gilchrist, Jr.	.....	Du	28.7	36	pIP	600	24.1	10- 4-60	M	D	64	11	28	
H- 5	A. H. Turner.....	.....	Du	28.6	36	pIP	610	24.8	10- 4-60	M	D	..	25	36	Inadequate for domestic supply.
H- 6	R. L. Foster	.....	Du	22.9	36	pIP	600	19.2	10- 7-60	M	D	..	18	60	Do.
H- 7	Hattie Davis	.....	Du	27.7	36	pIP	579	25.1	10- 7-60	M	D	..	18	50	
H- 8	Elizabeth Chandler.	.....	S	.....	...	Mt	558	.....	.....	..	N	..	...	.....	Known as Blue Spring. Wheeler Reservoir covers spring flow.
H- 9	... do	.....	Du	28.0	36	pIP	598	20.4	10- 7-60	M	D	64	25	212	
H-10	Robert Locklayer ..	.....	Du	27.7	36	pIP	581	18.5	10-11-60	Tj	D	..	7	20	
H-11	Mrs. J. L. Bibb	.....	D	80.4	5	Mt	622	65.2	10- 7-60	M	D	..	25	172	
H-12	Bynum Estate	.....	D	46.8	6	Mt	581	28.5	10- 7-60	M	D	64	39	166	
H-13	William Watkins	.....	D	19.8	6	Mt	570	14.6	10- 7-60	Tj	D	..	46	206	
H-14	Matilda Foster	.....	D	42.9	6	Mt	579	25.3	10- 7-60	M	D	..	25	166	
H-15	Fred Redmond	.....	D	175.1	6	Mfp	589	29.5	10- 7-60	M	D	62	11	102	
H-16	Darmer McBride, Sr.	.....	D	94.9	6	Mt	596	35.2	9- 7-60	M	D	63	18	198	Observation well.
H-17	Frank Shackeford...	.....	D	70.3	6	Mt	596	31.0	10- 7-60	M	D	..	18	204	
H-18	Ola Birgan	.....	D	59.2	5	Mt	585	25.8	10-11-60	M	D	64	21	244	
H-19	Lawrence Davis	.....	D	38.0	6	Mt	585	24.7	10-11-60	M	D	..	18	154	
H-20	Robert Locklayer...	.....	Du	43.0	36	pIP	610	38.5	10-11-60	M	D	..	11	86	Inadequate for domestic supply.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
I- 1	P. Lacy		D	42.0	6	pIP	584	28.9	10-11-60	M	D	63	11	30	
I- 2	John Joseph		D	34.0	6	pIP	585	15.7	10-12-60	M	D	..	11	72	
I- 3	C. C. Collins		D	53	6	Mt	583	13.2	10-12-60	Tj	P,D	..	11	150	Bedrock at 21 ft. Supplies 2 houses, cafe, and service station.
I- 4	State of Alabama		S	.....	...	pIP	585	....	.....	..	N	64	11	90	Estimated flow 5 gpm on 10-11-60.
I- 5	.....		D	69.8	6	Mt	585	8.4	10-12-60	M	D	..	11	162	
I- 6	Cary Miller		D	29.9	6	Mt	596	20.6	10-12-60	M	D	..	110	300	
I- 7	J. D. Walker		D	54.0	6	Mt	592	36.7	10-11-60	M	D	63	11	96	
I- 8	Hillsboro Elementary School.		D	72	6	Mt	606	50	.....	Tj	Ps	..	11	172	Supplies 101 students.
I- 9	Garnett Ennis		D	89	6	Mt	605	50	.....	Tj	D	63	11	228	Well No. 12 (Johnston, 1933, pt. 2, table 26).
I-10	Tennessee Valley High School.		D	50	6	Mt	610	22.6	10-11-60	Tj	Ps	..	11	188	Supplies 343 students.
I-11	Raymond Council		D	32.8	6	Mt	596	12.4	10-12-60	M	D	..	53	176	
I-12	J. G. Finley		Du	37.6	36	pIP	602	26.6	10-12-60	Tj	D	64	46	192	Supplies 7 houses.
I-13	S. P. Lile		Du	27.2	24	pIP	607	21.8	10-11-60	M	D	..	32	142	Inadequate for domestic supply.
I-14	W. E. Pitt		D	72.2	6	Mgs	632	9.2	10-12-60	Tj	D	..	7	206	
I-15	Theodis Scruggs		D	31.6	6	pIP	643	10.7	10-12-60	M	D	..	35	92	
I-16	E. A. Hannay		D	54.3	6	Mt	615	8.4	10-12-60	M	D	63	4	180	

I-17	Darmer McBride, Sr.	.....	D	35.8	6	Mt	626	10.8	10-12-60	M	D	..	11	238	
I-18	R. B. Harris.....	.....	D	35.0	6	Mgs	645	4.3	10-12-60	M	D	63	11	298	
I-19	Fred Redmond	.....	D	38.6	6	Mgs	652	28.8	10-13-60	M	D	..	124	108	
I-20	W. W. Hutto	.....	D	88.6	6	Mgs	705	11.3	10-12-60	M	D	63	32	582	
I-21	A. C. Lance	.....	D	76.9	6	Mt	622	10.9	10-13-60	M	D	63	25	342	
I-22	Frank Lamon	.....	D	30	6	Mt	622	16	.....	Tj	D	..	25	120	
I-23	A. L. Roberts	.....	D	100	6	Mt	642	20	.....	Tj	D	..	11	328	
I-24	W. C. Alexander ...	.....	Du	20.7	40	plP	810	2.6	10-18-60	Tj	D	..	11	16	
I-25	Buddy Roberson ...	.....	Du	27.5	6	plP	685	9.1	10-13-60	M	D	64	39	176	Dug 36 inches in diameter, then installed 6-in. casing and filled around outside.
I-26	J. R. Pitt	.....	D	54	6	Mh	822	36.8	10-13-60	Tj	D	..	7	40	Inadequate for domestic supply.
I-27	H. D. Wilhoit	.....	D	30.8	6	Mh	810	21.9	10-13-60	M	D	63	11	24	
I-28	G. W. Eady.....	.....	D	68.0	6	Mgs	720	49.6	10-18-60	Tj	D	..	131	292	
I-29	Orrville Terry	.....	S	.....	...	Mh	765	....	.....	..	N	63	11	86	Known as Sulphur Spring. Estimated flow 20 gpm on 10-13-60.
I-30	Claude Turner	.....	D	46.5	6	Mh	783	13.4	10-18-60	M	D	..	18	18	
I-31	E. C. Bowling	S. T. Little	D	206	6	Mh-Mgs	795	51.4	10-18-60	Ts	D	63	4	144	Small cavity at 65 ft. See driller's log in table 5.
I-32	Dan Aday	.....	D	41.5	6	Mh	778	15.3	10-18-60	M	N	..	...	.....	
I-33	J. R. Runager	.....	D	131.6	6	Mh-Mgs	810	44.5	10-13-60	M	D	63	14	150	
I-34	H. L. Montgomery ..	.....	D	60	6	Mh	790	8	.....	Tj	D	..	7	110	
I-35	Willard Hawk	.....	D	82.6	6	Mgs	772	42.1	10-13-60	Tj	D	..	7	162	
J- 1	Joe Wheeler Estate.	.....	D	38.8	6	Mt	606	25.6	10-18-60	M	D	..	18	238	
J- 2	... do	.....	D	28.5	6	Mt	616	9.5	10-18-60	M	D	..	11	240	Supplies 5 houses.
J- 3	... do	.....	D	39.6	6	Mt	625	33.1	10-18-60	M	D	..	18	240	Quality of water reported to be poor.
J- 4	Grady Orr	.....	D	45.0	6	Mt	582	25.8	10-19-60	M	D	..	11	246	
J- 5	Roland Cross.....	.....	D	50.0	6	Mt	587	27.5	10-18-60	M	D	..	11	322	
J- 6	Leroy Owens	.....	Du, D	62.6	36, 6	Mgs	657	48.8	10-21-60	Tj	D	62	18	412	Dug 36-in. to 56 ft., then drilled 6-in. to 63 ft.
J- 7	J. P. Letson	.....	S	.....	...	Mh	780	....	.....	..	N	60	4	76	Known as Spout Spring. Spring No. 43 (Johnston, 1933, pt. 2, table 26). Estimated flow 10 gpm on 10-21-60.
J- 8	Joe Wheeler Estate.	.....	D	61.3	6	Mgs	680	45.8	10-18-60	M	D	65	25	764	Reported to contain sulfur.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
J- 9	Joe Wheeler Estate		D	28.7	6	Mgs-Mt	653	18.7	10-18-60	M	D	..	39	230	
J-10	Darmer McBride, Sr.		D	79.2	6	Mt	647	36.3	10-19-60	M	D	..	11	320	
J-11			D	31.1	6	Mgs	647	29.1	10-19-60	N	N	..	...	.....	
J-12	Melvin Hutto		D	57	6	Mh	861	37	.....	Tj	D	63	53	14	Well No. 9 (Johnston, 1933, pt. 2, table 26).
J-13	J. P. Letson		D	79.1	5	Mh	810	76.5	10-21-60	M	D	..	4	60	
J-14	Mrs. Gurney Wilson		S	.....	...	pIP	630	....	.....	..	N	60	7	78	Estimated flow 5 gpm on 10-21-60.
J-15	D. L. Martin, Jr		S	.....	...	pIP	680	....	.....	..	N	63	11	88	Known as Sulphur Spring. Spring No. 44 (Johnston, 1933, pt. 2, table 27). Estimated flow 20 gpm on 10-24-60.
J-16	Jimmy Landers		D	79.8	6	Mgs	628	25.8	10-24-60	N	N	..	...	.....	
J-17			D	37.5	6	Mh	782	19.2	10-21-60	N	N	..	...	.....	Well No. 10 (Johnston, 1933, pt. 2, table 26).
J-18	Robert Ray		D	39.6	6	Mh	822	26.6	10-21-60	M	D	..	4	12	
J-19	P. W. Letson		D	44.0	6	Mh	810	39.3	10-21-60	N	N	..	7	20	
J-20	... do		D	38	6	Mh	795	17	.....	Tj	D	..	39	42	
J-21	State of Alabama		S	.....	...	Mh	770	....	.....	..	N	62	11	14	Known as Bluff Spring. Estimated flow 10 gpm on 10-21-60.
J-22	J. E. Stewart		D	52.4	6	Mgs	657	13.7	10-21-60	M	D	..	46	490	

J-23	R. H. Hale	Johnnie Harris	D	66.7	6	Mh	800	20.0	10-24-60	Tj	D	..	4	22	Casing: 6-in. to 15 ft. See driller's log in table 5.
J-24	R. L. Wade		D	63.1	6	Mh	785	41.1	10-24-60	M	D	63	11	16	
J-25	Claude Dyar		D	47.0	6	Mh	775	26.6	10-24-60	M	D	..	67	24	
J-26	T. T. Terry		D	34.8	6	Mh	790	23.5	10-24-60	Tj	D	..	43	20	
J-27			S			Mh	648				N	58	7	84	Known as Sinking Creek Spring. Estimated flow 100 gpm on 10-24-60.
J-28	G. D. Letson		D	34.1	6	Mh	792	12.2	10-25-60	M	D	..	11	16	
J-29	Miss Ethel Cross		D	41.1	6	Mh	780	27.1	10-24-60	M	D	..	11	36	
J-30	Roy Nelson		D	102.0	6	Mh	742	33.4	10-24-60	Tj	D	..	11	18	
J-31	G. D. Letson		D	91.3	6	Mh	708	28.3	10-24-60	M	D	63	39	16	
J-32	Malcolm Hazle		D	205	6	Mgs	730	66.3	10-25-60	Tj	D	..	11	316	
J-33	Odean Kelley		D	54.8	6	Mh	763	48.3	10-25-60	N	N	..	...	.....	
J-34	Roy Grimm		D	46.4	6	Mh	738	32.2	10-24-60	M	D	63	18	18	
J-35	Chalybeate Junior High School.	A. G. Hare	D	100	6	Mh	775	35		Tj	Ps	..	11	24	Supplies 310 students. See driller's log in table 5.
J-36	C. E. Buttran	Johnnie Harris	D	65	6	Mh	790	50		Tj	P	..	11	16	Develops water at 50 ft. Reported bail tested at 10 gpm. Supplies cafe, store, and 1 house.
K- 1	Daniel Gilchrist, Jr.		D	36.6	6	Mt	570	24.9	10-25-60	M	D	..	4	260	
K- 2	W. H. Witt	Johnnie Harris	D	99	6	Mt	592	60		Tj	D	..	11	272	Bedrock at 18 ft. See driller's log in table 5.
K- 3	Cecil Norton		D	69.0	6	Mt	583	40.4	10-25-60	M	D	63	25	252	
K- 4	George Bain		D	52.2	6	Mgs	608	2.8	10-26-60	M	D	..	273	2,480	
K- 5	Luther Kay		S			Mgs	680				N	61	4	114	Known as Brooks Spring. Estimated flow 5 gpm on 10-25-60.
K- 6	Ellick Irving		D	44.5	6	Mh	835	26.7	10-26-60	N	N	..	...	.....	
K- 7	D. H. Tolbert		D	113.6	6	Mgs	595	15.0	10-26-60	M	D	..	252	1,330	
K- 8	Robert Berryman		D	99.0	6	Mh	772	82.0	10-26-60	M	D	63	4	16	
K- 9	Dewey Lovelady		D	82.7	6	Mh	811	50.1	10-26-60	M	D	63	11	104	
K-10	Rupert Terry		Du	16.3	18	plP	601	2.2	10-26-60	M	D	..	11	96	Inadequate for domestic supply.
K-11	Robert Livingston		D	57	6	Mt	575	37		Tj	D	..	32	434	
K-12	Lilbern Terry		D	61.9	6	Mgs	592	10.4	11- 1-60	Tj	D	..	18	148	
K-13	Daniel Gilchrist, Jr.		D	61.7	6	Mt	601	29.3	10-25-60	M	D	63	11	380	
K-14	Ed Martin		D	27.8	6	Mgs	580	10.7	10-28-60	M	D	..	74	172	
K-15	Roy Lee Terry		D	64	6	Mgs	593	34		Tj	D	..	32	240	
K-16	Coy Walter		D	55	6	Mgs	592			Tj	D	..	89	598	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
K-17	M. O. Connors	Reynolds Metals Co.	D	300	13, 10	Mh	780	64.0	10-26-60	N	N	65	11	40	Oil test No. 1G130 (Toulmin, 1945, p. 92-94; and McGlamery, 1955, p. 217-246). Casing: 13-in. to 20.7 ft.; 10-in. to 312 ft.; 6 5/8-in. to 3,054 ft. Cemented below 300 ft.
K-18	Elmer Patterson....	.....	D	75.6	6	Mgs	740	31.7	10-26-60	Tj	D	..	11	190	
K-19	Leon Beck	.....	D	83.2	8	Mh	708	58.3	11- 1-60	M	D	62	32	128	
K-20	W. B. Vines	.....	D	39.2	6	Mh	720	24.5	10-26-60	M	D	..	18	32	
K-21	Coburn Terry	.....	D	47.0	6	Mh	752	17.6	11- 1-60	M	D	63	18	36	
K-22	Ed Terry, Jr.....	Otis Terry	D	100	6	Mh	744	70	.....	Tj	D	..	11	88	
K-23	Lelton Martin.....	.....	S	.....	...	Mh	635	.....	.....	..	N	60	4	106	Known as Horton Spring. Estimated flow 10 gpm on 10-28-60.
K-24	Bernard King	.....	D	76.8	6	Mh	732	42.1	11- 1-60	M	D	63	67	68	
K-25	Layton Wilson	.....	D	43.8	6	Mh	692	13.7	11- 1-60	Tj	D	..	4	154	
K-26	Mrs. Ellie Jackson .	.....	D	32.5	6	Mh	692	17.9	11- 1-60	M	D	..	89	28	
K-27	Malvina Mardies ...	.....	D	23.5	6	Mh	692	18.5	11- 1-60	M	D	..	18	34	
K-28	Luther Norton.....	Johnnie Harris...	D	110	6	Mh	682	.....	.....	Tj	D	..	11	100	See driller's log in table 5.
K-29	Little Estate	.....	D	75	6	Mgs	682	40.8	11- 2-60	Tj	D	..	18	212	Estimated to pump 20 gph.

K-30	.....	.....	D	50.9	6	Mh	700	19.1	11- 2-60	M	D	63	11	32	
K-31	Price Sherrill.....	.....	D	38.7	6	Mh	692	27.5	11- 2-60	M	D	..	11	26	
K-32	New Liberty Church.	.....	D	28.6	6	Mh	742	16.6	11- 1-60	M	Pc	..	11	10	
K-33	C. O. Terry.....	.....	D	69.4	6	Mh	712	49.4	11- 1-60	M	D	63	11	6	
K-34	Bueford Pearson ...	.....	D	25.0	6	Mh	752	10.9	10-28-60	M	D	..	11	16	
L- 1	.....	.....	D	93.0	6	Mgs	583	26.3	11- 3-60	N	N	..	53	188	
L- 2	D. L. Berryman	.....	D	59	6	Mh	734	35	.....	Tj	D	..	11	18	
L- 3	.....	.....	D	150.0	6	Mgs	550	46.2	11- 3-60	Tj	D	..	53	90	
L- 4	Neal Cox.....	.....	D	55.4	6	Mh	722	22.9	11- 3-60	Tj	D	..	11	32	
L- 5	Mrs. J. R. Berryman	.....	D	120.7	6	Mgs	725	64.9	11- 3-60	N	N	..	...	.....	
L- 6	J. T. Parker	.....	D	47.3	6	Mh	760	30.0	11- 3-60	M	D	..	60	46	
L- 7	C. M. Briley.....	.....	D	70.6	6	Mh	743	38.9	11- 3-60	Tj	D	..	18	58	
L- 8	Dewey Parker	.....	D	23.3	6	Mh	727	21.7	11- 3-60	M	N	..	18	22	
L- 9	John Jeffreys.....	.....	D	38.5	6	Mh	690	27.0	11- 3-60	M	D	63	18	80	
L-10	Hollis Lowery	.....	D	107.6	6	Mgs	570	16.5	11- 4-60	N	N	..	25	178	
L-11	A. J. Colbum	Johnnie Harris...	D	62.1	6	Mh	698	11.6	11- 4-60	M	D	..	4	14	See driller's log in table 5.
L-12	C. B. Willis	.....	D	42.5	6	Mh	740	18.2	11- 3-60	M	D	..	32	34	
L-13	Ted and Gabe Poole	.....	S	.....	...	Mh	670	.....	.....	..	N	..	18	62	Known as Wolf's Springs (Semmes, 1929, p. 126). Estimated flow 5 gpm on 11-3-60.
L-14	Vester Simmons....	.....	D	92.5	6	Mh	750	31.3	11- 4-60	M	D	62	11	18	
L-15	George Nesmith....	.....	D	24.4	6	Mh	696	14.4	11- 4-60	M	D	..	11	24	
L-16	William Saint	.....	D	31.5	6	Mh	705	20.9	11- 4-60	M	D	..	11	22	
L-17	Wolf Springs Elementary School.	.....	D	47.3	6	Mh	703	28.5	11- 3-60	Tj	Ps	..	4	20	Supplies 62 students.
L-18	Oscar Nichols	.....	D	68.0	6	Mh	650	10.5	11- 4-60	M	D	63	4	24	
L-19	Roy Cole.....	.....	D	46.6	6	Mh	672	34.2	11- 4-60	M	D	63	11	28	
L-20	T. B. Masterson ...	.....	D	76.9	6	Mh	633	48.2	11- 4-60	M	D	63	89	96	
L-21	Lowaine Harrison ..	.....	D	33.5	6	Mh	605	6.3	11- 4-60	M	D	..	39	112	
L-22	Dr. W. R. Taylor ...	.....	D	54.7	6	Mh	656	24.1	11- 4-60	M	D	63	11	88	
L-23	Clarence Jeffreys ..	.....	D	60	6	Mh	652	40	.....	Tj	D	..	39	56	
L-24	Sanderson Chapel Methodist Church.	.....	D	56.9	6	Mgs	663	15.8	11- 4-60	Tj	Pc	..	32	350	
M- 1	W. C. Nesmith	.....	D	52.3	6	Mh	632	4.4	11- 7-60	M	D	63	4	116	
M- 2	Clyde Anderton	.....	D	68.9	6	Mb	638	24.5	11- 7-60	N	N	..	53	322	Reported to contain sulfur.
M- 3	W. O. Masterson ...	.....	D	56	6	Mh	595	16	.....	Tj	D	..	4	100	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
M- 4	R. B. Little		D	38.5	6	Mh	585	10.2	11- 7-60	N	N	..	...	.....	
M- 5	Alton Bradford		D	60.3	6	Mgs	589	39.7	11- 7-60	Tj	D	..	25	322	
M- 6	C. C. Smith Elementary School	Johnnie Harris	D	114	6	Mgs	589	15.6	11- 7-60	Tj	Ps	..	18	238	Supplies 76 students.
M- 7	W. R. Portwood		D	42.1	6	pIP	582	1.6	11-17-60	M	D	63	103	348	
M- 8	J. L. Craig		D	34.1	6	Mh	605	11.5	11- 7-60	M	D	..	53	58	
M- 9	W. R. Taylor		D	36.2	6	Mb	621	9.5	11-11-60	M	D	..	74	418	
M-10	E. E. Borden		D	29.2	6	Mb	642	13.1	11- 7-60	M	D	..	32	198	
M-11	W. R. Taylor		D	90	6	Mh	645	.....	.....	Tj	D	..	18	96	
M-12	Mrs. L. E. Hurst		D	111.1	6	Mh	632	40.8	11-11-60	M	D	62	53	68	Reported to contain excessive iron.
M-13	J. M. Downey		D	51.3	6	Mb	627	8.0	11-11-60	M	D	63	46	208	
M-14	G. N. Craig		D	85.6	6	Mh	635	44.4	11-11-60	M	D	63	46	132	
M-15	Paul Sutton		D	72.1	6	Mb	617	24.7	11-11-60	Tj	D	..	124	1,060	Reported to contain sulfur.
M-16	W. A. Kirby		D	35.3	6	Mh	585	6.0	11-17-60	Tj	D	..	11	92	
M-17	F. R. Hicks		D	49.6	6	Mh	593	15.5	11-17-60	M	D	64	32	48	
M-18	Will Smith		D	97.6	6	Mh	603	28.2	11- 7-60	M	D	62	103	178	
M-19	N. J. Portwood		D	30.5	6	Mb	616	12.7	11- 7-60	M	D	63	67	456	
M-20	P. H. Leigh		D	38.9	6	Mh	598	18.3	11-17-60	M	D	..	32	128	
M-21	Frank Cagle		D	48.8	6	Mh	590	31.9	11-17-60	M	D	63	25	132	
M-22	Tommy Bruton		D	120	6	Mh	602	17.7	11-11-60	Tj	D	..	18	16	
M-23	James Heathcraft		D	39.7	6	Mh	632	8.9	11-11-60	M	D	63	96	108	

M-24	-- Horton	Lawrence County Oil & Development Co.	D	1,446	6	Mh	645	.....	.....	N	N	..	...	.....	Oil test well (Semmes, 1929, p. 134; Bowles, 1941, p. 29-30). Penetrated water-bearing zone from 103 to 134 ft. Casing pulled.
M-25	J. R. Wallace	.....	D	30.2	6	Mb	641	13.4	11-11-60	M	D	63	103	454	
M-26	Arthur Borden	.....	D	52.4	6	Mb	660	29.6	11-18-60	M	D	63	25	364	
M-27	Chester Borden	.....	D	24.9	6	Mb	630	12.5	11-18-60	Tj	D	..	53	318	
M-28	Masterson Estate	.....	D	41.4	6	Mb	592	15.2	11-18-60	Tj	D	..	18	312	
M-29	Ray Massey	.....	D	85	6	Mb	603	35	.....	Tj	D	..	11	382	
M-30	Julie Blackwell	.....	D	49.7	6	Mb	602	11.3	11-17-60	M	D	63	11	272	
M-31	Sam Karrh	.....	D	190	6	Mh	619	39.1	11-17-60	Tj	D	..	89	22	Reported high carbon dioxide in water.
M-32	R. L. Camp	.....	D	84.0	6	Mb	618	4.3	11-17-60	N	N	..	...	.....	
M-33	Morris Smith	.....	D	69.6	6	pIP	650	53.0	11-17-60	M	D	63	67	76	
M-34	Willy Gadson	.....	D	38.1	6	Mb	620	24.7	11-18-60	M	D	63	103	1,280	
M-35	Ernest Murphee	.....	D	58.4	6	pIP	640	26.1	11-18-60	M	D	63	18	16	
M-36	Lennie Stevenson	.....	D	47.3	6	Mb	650	13.4	11-18-60	M	D	..	25	162	
N- 1	W. A. Elkins	A. G. Hare	D	100	6	Mgs	685	49.6	11-21-60	Ts	D	..	18	266	
N- 2	Wilburn Terry	-- Campbell	D	200	6	Mgs	682	77.1	11-21-60	M	D	62	39	174	
N- 3	Wesley Davis	.....	Du	22.8	36	pIP	702	10.7	11-21-60	N	N	..	...	.....	
N- 4	Garner Terry	.....	D	99.6	6	Mh	680	30.6	11-21-60	M	D	63	11	74	
N- 5	N. P. Campfield	.....	D	48.3	6	Mh	680	9.9	9- 6-60	M	D	63	18	62	Observation well (see fig. 5).
N- 6	Hatton Elementary School.	A. G. Hare	D	370	6	Mh	705	27	11-16-54	Tj	Ps	..	...	.....	Three old wells at school will produce a total of 1½ to 3 gpm. Supplies 292 students. See driller's log in table 5.
N- 7	Hatton High School	... do	D	269	6	Mh	700	45	3- -55	Tj	Ps	..	152	42	Two old wells at school will produce a total of ½ gpm. Supplies 283 students. Penetrated water-bearing zone from 100 to 103 ft. Bail tested at 30 gpm with less than 5 ft. of drawdown. See driller's log in table 5.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
N- 8	Cecil Smith.....	.....	D	85.7	6	Mh	622	24.7	11-18-60	M	D	63	11	34	
N- 9	Sanford Allen.....	.....	D	81	6	Mh	665	27	.....	Tj	D	..	7	90	Develops water at 74 ft.
N-10	H. C. Harville	.....	D	153.6	6	Mh	609	6.2	11-21-60	M	D	..	248	18	
N-11	P. W. Thompson ...	.....	D	113	6	Mh	662	23.2	11-21-60	Tj	D	..	18	104	
N-12	T. E. Terry	Johnnie Harris ..	D	120.0	6	Mh	654	15.2	11-21-60	M	D	63	152	136	Develops water from 40 to 50 ft. See driller's log in table 5.
N-13	Mt. Moriah Elementary School.	.....	D	165	6	Mgs	662	30	.....	Tj	Ps	..	18	260	Supplies 34 students.
N-14	J. D. Terry	.....	D	30	6	Mh	640	15	.....	Tj	D	..	4	108	
N-15	Ira Terry.....	.....	D	30.8	6	Mb	601	4.9	11-22-60	M	D	..	131	474	
N-16	Jim Steadmon.....	.....	D	125	6	Mh	632	37.9	11-22-60	Tj	D	..	74	160	
N-17	W. J. Montgomery ..	.....	D	47.4	6	Mh	622	26.3	11-22-60	M	D	..	60	32	
N-18	Malcolm Hurst	.....	D	67.8	6	Mb	611	30.9	11-18-60	M	D	..	46	256	
N-19	Lonnie Rutherford..	.....	D	27.8	6	Mb	622	10.3	11-22-60	M	D	64	60	350	
N-20	Pete Russell	.....	D	47.8	6	Mb	626	13.6	11-22-60	Tj	D	..	32	330	
N-21	Mitchell Latham ...	.....	D	35.0	6	Mb	605	4.6	11-22-60	M	D	63	39	286	
N-22	Elsie Rutherford ...	.....	D	26.7	6	Mb	606	8.3	11-22-60	M	D	63	53	724	
N-23	Alexander Estate ..	.....	D	55.7	6	Mb	617	11.5	11-22-60	M	D	63	53	238	
N-24	Chug Wonder	.....	D	27.1	6	Mb	612	5.3	11-22-60	M	D	..	39	254	
N-25	Ottis Wallace.....	.....	D	35.0	6	Mb	630	22.1	11-28-60	M	D	..	18	162	
N-26	W. H. Goodwin.....	.....	D	52.4	6	Mb	620	11.8	11-28-60	Tj	D	..	67	352	
N-27	G. W. Jeffreys	.....	D	24.2	6	Mb	650	7.0	11-28-60	M	D	64	131	148	
N-28	Ben Dutton	.....	D	60	6	Mb	630	8	.....	Tj	D	..	32	222	

N-29	Drayton Borden	.....	D	189.4	6	Mgs	640	52.1	11-18-60	M	D	63	53	256	Reported to contain carbon dioxide and gas.
N-30	Lee McCord	.....	D	116.1	6	Mh	660	38.9	11-18-60	Tj	D	..	32	124	
N-31	Johnnie Stevenson..	.....	Du	21.1	36	pIP	655	10.9	11-29-60	M	D	..	39	166	
N-32	J. M. McCary	.....	D	30.0	6	Mb	640	6.2	11-29-60	M	D	..	74	138	
N-33	D. M. Stevenson ...	.....	D	55.6	6	Mb	660	16.3	11-28-60	N	N	..	...	.....	Well No. 18 (Johnston, 1933, pt. 2, table 26).
N-34	Apostolic Christian Church.	.....	D	.....	6	Mb	630	5	.....	Pp	Pc	..	11	188	
N-35	Clark Latham.....	.....	Du	10	36	pIP	620	2	.....	Tj	D	..	11	170	Supplies 4 houses and store.
N-36	J. P. Letson.....	.....	D	58	6	pIP	650	18	.....	Tj	D	..	18	24	Develops water at 43 and 56 ft.
O- 1	L. P. Jones	.....	D	48.3	6	Mh	738	28.9	11-30-60	M	D	..	11	20	
O- 2	Bertha Cole	.....	D	21.4	6	Mh	703	3.5	11-30-60	M	D	..	32	114	
O- 3	.....	.....	S	.....	...	Mh	659	.....	.....	...	N	63	...	.....	Known as Chalybeate Spring. Nonflowing on 11-30-60.
O- 4	Thomas Hale	.....	S	.....	...	Mh	678	.....	.....	...	D	62	11	122	Estimated flow 5 gpm on 11-29-60.
O- 5	Willy Glover.....	.....	D	39.7	6	Mh	692	6.5	11-29-60	M	D	..	39	32	
O- 6	Mary E. Letson	.....	D	71.4	6	Mh	668	12.7	11-28-60	M	D	63	25	74	
O- 7	J. H. Jones.....	.....	D	35.3	6	Mh	712	10.2	11-28-60	M	D	..	32	108	
O- 8	Leone Gipson	.....	D	80.5	6	Mh	695	6.9	11-28-60	M	D	63	11	24	
O- 9	B. B. Jones	S. T. Little	D	108	6	Mh	647	38	.....	Tj	D	..	18	28	See driller's log in table 5.
O-10	Charlie Montgomery.	.....	D	54.4	6	Mgs	635	13.3	11-29-60	M	D	63	11	252	
O-11	Louie Pruitt.....	.....	D	55.9	6	Mh	703	2.8	11-29-60	M	D	..	25	18	
O-12	Luther Thrasher ...	.....	D	41.2	6	Mh	675	16.1	11-30-60	M	D	..	25	70	
O-13	Pat Gillespie.....	.....	D	33.9	6	Mh	703	10.1	11-30-60	M	D	..	60	144	
O-14	Lizzie M. Turner...	A. G. Hare	D	125	6	Mb-Mh	692	10	.....	Tj	D	..	18	386	Do.
O-15	M. D. Welborn.....	.....	D	44.1	6	Mh	679	3.0	11-30-60	M	D	63	53	182	
O-16	L. M. Austin.....	.....	D	35.9	6	Mh	693	14.5	11-29-60	M	D	..	25	40	
O-17	Bertha Boyd.....	.....	D	103.8	6	Mh	655	14.5	11-29-60	M	D	62	89	254	
O-18	Clark Hodges.....	.....	Du	23.9	36	pIP	673	8.2	11-29-60	M	D	..	32	110	
O-19	Anderson Livingston	.....	D	102	6	Mh	651	40	.....	Tj	D	..	18	102	
O-20	... do	.....	D	76.9	6	Mb	632	16.8	12- 5-60	M	D	63	4	212	
O-21	T. J. Moates.....	A. G. Hare	D	205	6	Mh	635	20	.....	T	D	..	18	90	Bedrock at 21 ft. Reported to contain carbon dioxide and iron. See driller's log in table 5

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
O-22	J. T. Lemay		D	33.5	6	Mh	653	14.5	12- 5-60	Tj	D	..	11	218	
O-23	W. E. Montgomery		D	32.5	6	Mh	685	5.5	12- 5-60	M	D	63	18	32	
O-24	Neal Austin		Du	24	36	pIP	675	14	.....	Tj	D	..	82	216	Bedrock at 24 ft. Inadequate for domestic supply.
O-25	Virgil Sandlin		Du	18.2	36	pIP	685	4.2	12- 2-60	Tj	D	..	...	.....	
O-26	.....		D	22.7	6	Mh	650	10.5	12- 2-60	N	N	..	11	124	
O-27	H. C. Gillespie		D	168	6	Mh	635	78	.....	Tj	D	..	4	132	
O-28	.....		D	21.0	6	Mb	660	19.8	12- 5-60	N	N	..	25	212	
O-29	Rotha McAfee		D	200	6	Mh	650	46.6	12- 5-60	M	D	62	67	20	
O-30	H. J. Steele	Johnnie Harris	D	174	6	Mh	655	40	.....	Ts	D	..	117	24	Casing: 6-in. to 24 ft. Develops water at 50 ft. Bail tested at 10 gpm in August 1960. See driller's log in table 5.
O-31	Thomas Owen		D	40	6	Mb	630	15	.....	Tj	D	..	11	240	
O-32	City of Moulton		S	.....	...	Mb	620	....	.....	...	Pm	64	21	268	Known as Gin Spring. 20,000 gpd pumped to filter plant. Estimated flow 50 gpm on 12-2-60.
O-33	... do	A. G. Hare	D	260	6	Mb	650	15.3	12- 2-60	N	N	..	...	.....	Observation well (see fig. 5). Listed as Law-1 in

																Federal observation well network, Alabama district. Casing: 6-in. to 20 ft. Pump tested at 20 gpm. See driller's log in table 5. Water reported to contain sulfur.
O-34	... do	... do	D	143	6	Mb	640	9.8	6-22-54	N	N	..	...	.....	Casing pulled. Dry test well. See driller's log in table 5.
O-35	... do	.....	S	.....	...	Mb	630	.....	.....	...	Pm	63	14	158	Known as Town Spring. Spring No. 46 (Johnston, 1933, pt. 2, table 27). 20,000 gpd pumped to filter plant. Estimated flow 50 gpm on 12-2-60.
O-36	... do	H. W. Peerson Drilling Supply Co.	D	254	10, 8, 6	Mb-Mh	655	13.2	7- 8-54	T	Pm	64	7	126	Original 6-in. well drilled by A. G. Hare. Casing: 10-in. to 22 ft.; 8-in. to 159 ft.; perforated from 22 to 159 ft. Reported drawdown 21 ft. after 24 hrs. pumping 210 gpm on 7-8-54. Yields 75,000 gpd. See driller's log in table 5 and chemical analysis in table 3.
O-37	Franklin Smith	.....	Du	17.6	36	plP	665	9.9	12- 5-60	Tj	D	..	25	208	
O-38	Arthur Simmons	.....	D	36.2	6	Mb	650	25.8	12- 5-60	M	D	63	74	272	
O-39	A. J. Terry	.....	D	21.0	6	Mb	640	12.7	12- 2-60	M	D	..	32	312	
O-40	.....	.....	D	35.6	6	Mb	660	22.8	12- 2-60	N	N	..	53	252	
P- 1	G. W. Burch	.....	D	51.4	6	Mh	758	41.5	12- 6-60	M	D	..	14	34	
P- 2	Ervin Armor	.....	D	51.3	6	Mh	783	42.5	12- 6-60	M	D	..	32	62	
P- 3	Hopson Gillespie...	.....	D	67.4	6	Mh	740	28.4	9- 7-60	M	D	63	11	42	Observation well (see fig. 5).
P- 4	John Blalock	.....	D	54.4	6	Mh	762	29.3	12- 6-60	Tj	D	..	11	84	
P- 5	B. C. Compton	.....	D	49	6	Mh	738	25	.....	Tj	P D	..	11	52	Supplies cafe, store, service station, barber shop, and 4 houses. Water contains sulfur.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
P- 6	-- Bonds		D	32.6	6	Mh	700	23.2	12- 6-60	M	D	..	18	26	
P- 7	W. H. Moles		D	15.1	6	Mh	745	2.7	12- 6-60	M	D	..	4	12	
P- 8	Morris Chapel		D	71.6	6	Mgs	715	25.9	12- 6-60	N	N	..	11	162	
P- 9	S. T. Reeves		D	92.6	6	Mgs	703	30.5	12- 6-60	M	D	..	4	162	
P-10	O. E. Shelton	E. G. Delashaw	D	64.3	5	Mh	765	42.2	9- 7-60	Tj	D	..	11	96	
P-11	Midway Elementary School.	do	D	100	4	Mgs	750	50	1950	Tj	Ps	66	11	268	Inadequate supply for 141 students. Water reported to contain iron.
P-12	Talmadge Barnes		D	63.3	6	Mh	768	44.1	12- 6-60	M	D	63	18	22	
P-13	Alva Wade		D	54.8	6	Mh	770	34.3	12- 6-60	M	D	..	7	78	
P-14	Mrs. R. H. McCullough.		D	48.6	6	Mh	711	30.8	12- 9-60	M	D	..	32	36	
P-15	C. N. Butler		D	115.6	6	Mh	730	28.4	12- 9-60	M	D	63	18	42	Inadequate for domestic supply.
P-16	Ward Gillespie		D	85	6	Mh	738	26.4	12- 9-60	Tj	D,S	..	25	48	Supplies 10,000 chickens and 2 houses.
P-17	Guy Shelton		D	58.5	6	Mh	695	3.6	12- 9-60	M	D	63	11	54	
P-18	Vera Compton		D	39.4	6	Mgs	690	13.5	12- 9-60	M	D	..	18	202	
P-19	Concrete Products Co.		D	100	6	Mgs	655	20	.....	Tj	Ind	..	18	194	Develops water at 60 ft. Supplies cement block plant.
P-20	T. L. Hill		D	27.7	6	Mh	672	18.2	12- 9-60	M	D	62	11	52	
P-21	Charles McWhorter		D	20.6	6	Mh	686	3.8	12- 9-60	M	D	..	25	40	
P-22	J. W. Byars		D	38.9	6	Mgs	668	4.0	12- 9-60	M	D	..	18	348	

P-23	J. A. McWhorter....	.....	D	31.2	6	Mh	720	13.1	12- 9-60	M	D	..	11	28	
P-24	.....	.....	D	57.0	6	Mh	716	24.2	12- 9-60	N	N	..	11	32	
P-25	G. W. Hill.....	.....	D	27	6	Mh	652	15	.....	Tj	D	..	18	82	
P-26	Earl Clark.....	.....	D	104.9	6	Mgs	640	19.1	12-13-60	M	D	62	18	180	
P-27	Kyle Clark	.....	D	74	6	Mgs	660	25	.....	Tj	D	..	11	278	Inadequate domestic supply before drilling from 62 to 74 ft.
P-28	A. L. Bryant	.....	D	40.2	6	Mh	655	4.9	12-13-60	Pp	D	..	39	118	
P-29	Almon McWhorter...	.....	D	156	6	Mh	665	60	.....	Tj	D	..	18	24	
P-30	Ernest Sapp	.....	D	54.9	6	Mh	620	4.0	12-13-60	M	D	63	18	40	
P-31	Mrs. J. W. Tucker ..	.....	D	45.1	6	Mh	660	11.8	12-13-60	M	D	..	18	62	
P-32	W. E. Coffey	.....	D	74.8	6	Mh	680	37.9	12-13-60	M	D	63	89	160	
P-33	C. V. Jacobs	.....	D	54.0	6	Mb	670	24.6	12-13-60	M	D	63	46	374	
P-34	Alice Jo Young	.....	D	73.6	6	Mb	645	22.4	12-13-60	M	D	63	53	394	Develops water above bedrock. Reported to be good domestic supply.
P-35	Wilbur Jackson	.....	D	69.4	6	Mb	645	39.6	12-14-60	M	D	63	25	352	
P-36	Benson Bryant.....	.....	D	32.5	6	pIP	620	7.1	12-14-60	M	D	..	18	312	
P-37	Cleo Clark	.....	D	62.9	6	Mh	625	34.8	12-13-60	M	D	63	11	106	
Q- 1	Harold Jenkins	.....	D	50.6	6	Mh	605	23.3	12-19-60	M	D	63	32	164	
Q- 2	Enon Church	A. G. Hare	D	150	6	Mh	620	.....	.....	Tj	D	..	96	24	Reported to contain carbon dioxide and sulfur. See driller's log in table 5.
Q- 3	Sally West	.....	D	133.0	6	Mh	605	19.7	12-30-60	M	D	63	67	60	
Q- 4	Talbert Brown	.....	D	49.4	6	Mb	645	40.1	12-30-60	M	D	..	60	164	
Q- 5	Ada Waits.....	.....	D	41.4	6	Mb	640	22.0	12-30-60	M	D	..	32	242	
Q- 6	Otis Gentry.....	.....	D	81.7	5	Mh	645	20.8	1- 4-61	M	D	63	11	104	
Q- 7	Paul Wiley	.....	D	63.7	6	Mb	635	10.4	1- 3-61	M	D	63	18	168	
Q- 8	T. L. Cartwright ...	.....	D	61.6	6	Mb	640	31.4	12-30-60	M	D	63	11	146	
Q- 9	Emmett Bussey	.....	D	50.7	6	Mb	630	38.2	12-30-60	N	N	..	11	214	
Q-10	Maude Sullivan	.....	Du	17.6	36	pIP	625	17.0	12-30-60	M	D	..	39	226	
Q-11	George Burchell ...	.....	D	32.6	6	Mb	620	14.2	12-30-60	M	D	..	18	240	
Q-12	Laura Owen	.....	D	53.3	6	Mb	650	13.8	12-19-60	M	D	..	131	616	
Q-13	Eulus Hill	.....	D	73.0	6	Mb	650	22.1	12-19-60	Tj	D	63	46	204	
Q-14	Carl Ratcliff	.....	D	63.3	6	Mb	625	16.7	12-19-60	M	D	..	60	242	
Q-15	U. C. Speake	.....	Du	29.9	36	pIP	645	23.5	12-30-60	Tj	D	..	25	220	
Q-16	Tommy Gipson.....	.....	D	41.8	6	Mb	620	5.8	12-30-60	M	D	..	67	286	
Q-17	Grady Gillespie	.....	D	164.0	6	Mb	630	8.4	1- 3-61	M	D	63	60	362	Reported to contain sulfur.
Q-18	Edward Gillespie...	.....	D	99.3	6	Mb	650	6.6	1- 3-61	M	D	63	11	240	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
Q-19	Mrs. W. R. Jackson	.....	D	59.5	6	Mb	640	13.1	1- 3-61	M	D	..	32	240	Inadequate for domestic supply.
Q-20	Don Alexander	.....	D	45.4	6	Mb	645	6.1	1- 3-61	N	N	..	46	246	
Q-21	Speake High School.	A. G. Hare	D	140	6	Mb	640	10	10- -53	Tj	Ps	..	25	232	Casing: 6-in. to 14 ft. Develops water at 82 ft. Reported 10 ft. drawdown after bailing 500 gallons. Supplies 475 students. See driller's log in table 5.
Q-22	Mac Wiley	.....	D	37.2	6	Mb	625	14.1	12-30-60	M	D	..	11	176	
Q-23	Louis Osborne	.....	D	34.8	6	Mb	645	11.6	1- 4-61	Pp	D	..	18	238	
Q-24	-- Sandlin	Greater Huntsville Oil and Gas Co.	D	2,001	...	.....	636	.....	.....	..	N	..	...	.....	Oil test well (Semmes, 1929, p. 136-138; Bowles, 1941, p. 30-32).
Q-25	J. A. Templeton	.....	D	59.1	6	Mb	635	5.0	12-19-60	M	D	63	39	262	
Q-26	F. W. Looney	.....	D	48.7	6	Mb	685	9.0	1- 4-61	M	D	..	67	1,310	
Q-27	Mrs. Olene Heidt	.....	D	90.3	6	Mb	640	13.0	9- 7-60	M	D	63	46	182	
Q-28	Luther Hampton	.....	D	42.0	6	Mb	642	13.3	9- 7-60	M	D	..	74	246	Observation well (see fig. 5).
Q-29	Shirley Smith	Moulton Valley Oil Co.	D	2,120	...	.....	655	.....	.....	..	N	..	...	.....	Oil test well Goyer No. 1 (Semmes, 1929, p. 131-132; and Bowles, 1941, p. 32-33).

Q-30	... do	B. E. Davis	D	1,603	8	Mb	655	21.3	1- 3-61	N	N	..	18	282	Oil test well (McGlamery, 1955, p. 241-246).
Q-31	... do	.....	S	.....	...	Mb	655	.....	.....	..	N	62	11	214	Known as Miller Spring. Estimated flow 20 gpm on 1-3-61.
Q-32	Mrs. W. R. Jackson.	Mid-Southern Petroleum Co.	D	2,001	10	.....	640	.....	.....	..	N	..	...	.....	Oil test well (McGlamery, 1955, p. 217-227).
Q-33	Shirley Smith	.....	D	38.0	6	Mb	655	25.2	1- 3-61	N	N	..	39	244	
Q-34	... do	.....	D	18.2	6	Mb	665	10.3	1- 4-61	M	D	..	11	152	
Q-35	Chenault Estate ...	.....	D	55.7	6	Mb	675	21.4	1- 4-61	M	D	..	46	298	
Q-36	Ursley Wallace	.....	D	13.5	6	Mb	670	4.6	1- 4-61	M	D	..	18	264	
Q-37	A. V. Aday	.....	D	47.0	6	Mh	720	24.6	1- 4-61	M	D	63	25	136	
Q-38	Ernest Sanford	.....	D	62.3	6	Mh	675	17.5	1- 4-61	M	D	63	18	174	
R- 1	Grady Moody	.....	D	212	6	Mh	625	52.0	1- 4-61	Ts	D,S	63	18	166	Reported to contain sulfur.
R- 2	Luther Sherrill	.....	D	52.3	6	Mb	640	34.4	1- 6-61	M	D	..	18	242	
R- 3	Will Shelton	.....	D	28.8	6	plP	640	20.5	1- 6-61	M	D	..	18	48	
R- 4	Amanda Priest	.....	D	80.0	6	Mb	665	12.7	1- 6-61	M	D	..	96	344	
R- 5	City of Moulton	H. W. Peerson Drilling Supply Co.	D	185	10, 8	Mb	665	27	12-15-47	T	Pm	63	11	168	Well No. 1. Original 6-in. well drilled by A. G. Hare. Casing: 10-in. to 40 ft.; 8-in. to 90 ft.; perforated from 70 to 90 ft. Reported 37 ft. drawdown after 27½ hrs. pumping 225 gpm on 12-15-47. Average pumpage 75,000 gpd. See driller's log in table 5.
R- 6	... do	... do	D	250	6	Mb-Mh	650	13	7- -46	T	N	63	7	130	Well No. 3. Develops water from 40 to 44 ft. Reported 50 ft. drawdown after bailing 30 gpm July 1946. Used for public supply in summer and fall of 1953. Reported to contain sulfur. See driller's log in table 5.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
R- 7	Guy Free	.....	D	9.4	6	Mb	640	6.5	1- 6-61	N	N	..	...	.....	
R- 8	City of Moulton	A. G. Hare	D	260	6	Mb	655	18.8	6-22-54	N	N	..	...	.....	Test well No. 11. Bail test indicated 6 gpm yield. Casing pulled. See driller's log in table 5.
R- 9	Bob Almon	.....	D	27.4	6	Mb	650	9.6	1- 6-61	M	D	..	25	204	
R-10	W. L. Parker	.....	D	61.9	6	Mb	665	15.6	1- 6-61	M	D	63	25	258	Inadequate for domestic supply. Nearby well 185 ft. deep reported to contain sulfur.
R-11	A. G. Hare	A. G. Hare	D	312	6	Mh-Mgs	655	8	1- -61	Tj	D	..	11	150	Develops water at 260 ft. See driller's log in table 5.
R-12	Grady Sanderson ...	.....	D	54.6	6	Mb	660	10.0	1- 6-61	M	D	63	46	174	
R-13	Charlie Aldrich	.....	D	60.4	6	Mb	640	17.4	1- 6-61	Tj	D	..	18	204	
R-14	.....	.....	D	45.0	6	Mb	650	21.1	1- 4-61	N	N	..	...	.....	
R-15	-- Jacobs	Fidelity Oil & Gas Co.	D	1,500	..	.....	645	.....	.....	..	N	..	...	.....	Oil test well (Semmes, 1929, p. 135; and Bowles, 1941, p. 28-29). Develops water from 205 to 225 ft.
R-16	J. H. Preuit	.....	D	42	6	Mb	645	.....	.....	Tj	D	..	11	188	

R-17	... do	.....	S	.....	..	Mb	640	.....	.....	..	S	63	4	178	Estimated flow 300 gpm on 1-6-61.
R-18	Wayne Gentry	.....	D	57.2	6	Mb	655	13.1	1- 9-61	M	D	..	53	190	
R-19	Louis Melson	.....	D	28.8	6	Mb	660	10.4	1- 9-61	M	N	..	32	176	
R-20	J. H. Preuit	.....	D	73.4	6	Mb	650	14.4	1- 9-61	M	D	63	39	336	
R-21	Lester Cole	.....	D	34.9	6	Mb	660	16.3	1- 9-61	M	D	..	11	204	
R-22	Wren Elementary School.	.....	D	20	6	Mb	665	8	.....	Tj	Ps	..	18	228	Well No. 33(Johnston, 1933, pt. 2, table 26). Supplies 23 students.
R-23	C. M. Montgomery ..	Johnnie Harris ...	D	333	6	Mh	670	47.3	9- 6-60	M	N	67	74	18	Observation well (see fig. 6). Water reported to contain carbon dioxide.
R-24	Jack Ellis	.....	D	67.4	6	Mb	675	2.9	1- 9-61	M	D	..	145	432	
R-25	J. Armstrong	.....	D	60	6	Mb	690	50	.....	Tj	D	..	18	258	
R-26	R. E. Ellis	A. G. Hare	D	125	6	Mb	680	13	1957	Tj	D	..	25	294	Casing: 6-in. to 6 ft.
R-27	Frank Simpson	.....	D	60.8	6	Mb	665	13.8	1-10-61	M	N	64	74	526	
R-28	Arthur Rogers	.....	D	35.0	6	Mb	670	8.8	1- 9-61	M	D	..	18	250	
R-29	Jess Sparks	.....	D	52.7	6	Mb	645	18.0	1- 9-61	M	D	..	18	220	
R-30	... do	.....	D	62.7	6	Mb	660	39.8	1- 9-61	M	D	63	60	240	
R-31	Louis Melson	.....	D	23.5	6	Mb	655	8.8	1- 9-61	N	N	..	18	200	
R-32	Ed Welborn	.....	D	57.0	6	Mb	685	16.0	1-10-61	M	N	..	11	178	
R-33	G. P. Montgomery ..	.....	D	43.6	6	Mb	675	4.5	1-10-61	M	D	..	32	304	
R-34	Emmett Ellis	.....	D	48.3	6	Mb	740	46.0	1-10-61	M	D	..	11	186	
R-35	J. G. Woodard	.....	Du	33.4	6	IPpv	1,035	21.8	1-10-61	M	D	63	18	150	Well No. 35 (Johnston, 1933, pt. 2, table 26). Dug 36 inches in diameter then installed 6-in. casing and filled around outside.
R-36	.....	.....	D	85.3	6	IPpv	1,010	23.1	1-10-61	M	D	63	18	186	
R-37	Irving Preston	.....	S	.....	..	Mb	710	.....	.....	..	...	63	11	130	Known as Blowing Spring. Estimated flow 100 gpm on 1-10-61.
R-38	G. Parker	.....	D	58.8	6	Mb	705	22.8	1-10-61	M	D	..	18	290	
R-39	G. W. Sparks	.....	D	200	6	Mb	745	79.7	1-10-61	Ts	D	..	11	186	
R-40	Louis Melson	.....	D	63.9	6	Mb	705	53.6	1- 9-61	M	D	..	25	370	
R-41	Jake Alexander Estate.	.....	D	50.2	6	Mb	685	34.8	1- 9-61	N	N	..	103	658	
S- 1	Henry Pearson	.....	D	17.5	6	Mb	645	2.3	1-11-61	M	D	..	11	278	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
S- 2	Orie Jackson		D	42.1	6	Mb	645	11.0	1-12-61	M	D	..	25	236	
S- 3	... do		D	38.1	6	Mb	660	22.2	1-12-61	M	D	..	25	200	
S- 4	Gladys Burch		D	52.2	6	Mb	640	6.1	1-18-61	M	D	..	18	196	
S- 5	Landersville Elementary School.		D	90.5	6	plP	640	28.5	1-17-61	Tj	Ps	63	32	22	Supplies 21 students. Reported to contain sulfur.
S- 6	Young Bros.		D	28.6	6	Mb	640	5.9	9- 6-60	N	N	..	32	170	Observation well (see fig. 6). Flows part of year.
S- 7	Arthur Young		D	38.5	6	Mb	635	1.2	1-12-61	M	D	..	32	234	
S- 8	Young Bros.		D	38.5	6	Mb	660	13.8	1-12-61	M	D	63	46	362	
S- 9	Farris Hood		D	43.4	6	Mb	670	8.3	1-12-61	M	D	63	18	304	
S-10	Bennie Owens		D	59.8	6	Mb	700	9.4	1-12-61	M	D	..	46	182	
S-11	Roy Cammon		D	26.9	6	Mb	655	8.9	1-12-61	M	D	..	18	276	
S-12	J. T. Letson		D	35.4	6	Mb	665	2.8	1-11-61	M	D	..	11	328	
S-13	Buck Montgomery		D	97.0	6	Mb	705	26.2	1-11-61	M	D	63	60	160	
S-14	Roy Oliver		D	60.4	6	Mb	770	20.5	1-11-61	M	D	..	11	242	
S-15	Dalton Appleton	A. G. Hare	D	430	6	Mb	740	127.5	1-12-61	M	D	..	11	208	
S-16	W. H. Blankinship		D	35.0	6	Mb	685	6.5	1-17-61	M	D	..	32	304	
S-17	Will Ware		D	103.0	6	Mb	685	34.9	1-17-61	M	D	64	46	300	
S-18	John Dotson		D	38.8	6	Mb	640	9.9	1-17-61	M	D	..	46	308	
S-19	R. B. Young		D	100.8	6	Mb	680	13.8	1-17-61	M	D	64	39	214	
S-20	Young Bros.		D	35.0	6	Mb	670	.6	1-17-61	M	D	..	32	256	

S-21	Benny Owens	.....	D	18.9	6	Mb	675	3.3	1-17-61	M	D	..	18	224	
S-22	Mrs. Evelyn Garrison.	.....	Du	27.0	36	pIP	720	23.6	1-12-61	M	D	..	18	74	Inadequate for domestic supply.
S-23	Huff Speaks	.....	S	.....	..	Mb	720	.....	.....	..	S	63	4	244	Known as Warren Spring. Estimated flow 75 gpm on 1-11-61.
S-24	Glenn Whisenant	.....	D	46.9	6	IPpv	1,010	18.6	1-12-61	M	D	64	18	16	
S-25	J. O. Blankinship	.....	D	28.1	6	Mb	675	6.6	1-17-61	M	D	..	11	118	
S-26	Young Bros.	.....	D	64.3	6	Mb	740	53.4	1-17-61	M	D	..	4	306	
S-27	J. W. Mitchell	.....	D	95.6	6	Mb	680	36.7	1-17-61	N	N	65	4	98	Inadequate for domestic supply.
S-28	Hoyt Whisenant	.....	D	49.0	6	IPpv	970	31.3	1-17-61	M	D	..	11	158	
T- 1	Hubert Elkins	.....	D	43.2	8	Mb	630	15.9	1-18-61	M	D	64	39	266	
T- 2	Fanny Stevenson	.....	D	36.2	6	pIP	645	21.5	1-18-61	M	N	..	117	108	
T- 3	E. K. Martin	.....	D	42.9	6	Mb	620	24.5	1-18-61	M	D	..	32	362	
T- 4	Ben Abbott	.....	D	52.3	6	Mb	645	7.3	1-18-61	M	D	..	18	166	
T- 5	R. L. Camp	.....	D	61.1	6	pIP	620	10.7	1-18-61	N	N	63	11	132	
T- 6	.....	.....	Du	18.2	36	pIP	645	7.9	1-18-61	Tj	D	..	39	284	
T- 7	R. H. Gaston	.....	D	93.1	6	Mb	680	26.1	1-18-61	M	D	64	124	394	
T- 8	Wyatt Counts	.....	D	26.2	8	pIP	645	11.6	1-18-61	M	D	..	60	90	
T- 9	Mt. Hope Church of Christ.	.....	D	53.5	6	Mb	650	22.3	9- 6-60	N	N	..	7	168	Observation well (see fig. 6).
T-10	Neal Williams	.....	D	47.0	6	Mb	640	16.0	1-23-61	Pp	D	..	18	170	
T-11	H. W. Mitchell	.....	D	29.0	6	Mb	625	6.7	1-18-61	N	N	..	18	174	
T-12	Clay Councill	.....	Du	17.0	36	pIP	640	12.4	1-23-61	M	D	..	11	180	
T-13	Grady Martin	.....	D	33.8	6	Mb	640	7.6	1-23-61	M	D	..	25	280	
T-14	Mrs. Womack	.....	D	64.3	6	Mb	640	12.1	1-23-61	M	N	..	11	242	
T-15	J. E. Counts	.....	D	27.6	6	Mb	640	1.4	1-23-61	M	D	..	39	302	
T-16	Mt. Hope High School.	A. G. Hare	D	370	6	Mh	655	.....	.....	Tj	Ps	..	138	'18	Supplies 4 rest rooms for 330 students. Reported high carbon dioxide content.
T-17	Mrs. Smith	.....	Du	16	36	pIP	655	10	1- -61	Tj	Ps	..	11	182	Supplies lunchroom and drinking fountains for 330 students at Mt. Hope High School.
T-18	Will Alexander	.....	D	59.3	6	Mb	660	17.6	1-24-61	M	N	..	11	210	
T-19	Horace Smith	.....	Du	10	36	Mb	670	8	.....	Tj	D,S	..	32	424	
T-20	J. D. Reed	.....	D	68.8	6	Mb	710	8.6	1-24-61	N	N	..	4	300	
T-21	... do	.....	Du	26.1	36	pIP	745	19.1	1-24-61	M	D	..	11	36	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
T-22	J. D. Reed	.....	D	74.2	6	Mb	700	8.6	1-24-61	M	N	64	11	216	
T-23	... do	.....	D	42.6	6	Mb	645	6.3	1-23-61	M	N	..	53	264	
T-24	W. D. Martin	.....	D	37.7	6	Mb	645	2.0	1-23-61	M	D	..	74	340	
T-25	A. M. Stephenson	.....	Du	9.7	36	pIP	675	1.5	1-23-61	N	N	..	39	352	Reportedly went dry once in 60 years.
T-26	Ray Hopkins	.....	D	62.5	6	Mb	670	7.1	1-23-61	M	N	..	53	280	
T-27	Phil Boyles	.....	D	72	6	Mb	665	20	1- -61	Tj	D	..	25	278	Develops water at 25 ft.
T-28	Joe Thrasher	.....	D	18.8	6	Mb	730	11.7	1-24-61	M	S	64	18	270	
T-29	Howard Shields	.....	Du	21.4	36	pIP	740	4.1	1-24-61	M	D	..	18	134	
U- 1	William B. Bankhead National Forest.	.....	S	.....	..	IPpv	950	.....	.....	..	N	60	7	16	Known as Poplar Spring. Estimated flow 2 gpm on 1-30-61.
U- 2	... do	.....	Du	27.9	36	IPpv	995	23.3	1-30-61	M	D	..	7	18	
U- 3	J. L. Sanford	.....	S	.....	..	IPpv	940	.....	.....	..	N	58	11	14	Estimated flow 2 gpm on 1-30-61.
U- 4	William B. Bankhead National Forest.	.....	S	.....	..	IPpv	815	.....	.....	..	N	58	4	8	Known as Kinlock Spring. Supplied CCC Camp in 1935. Estimated flow 5 gpm on 1-30-61.
V- 1	... do	.....	Du	23.7	36	IPpv	1,005	7.0	2- 2-61	M	D	..	103	106	
V- 2	... do	.....	S	.....	..	Mb	640	.....	.....	..	N	..	...	.....	Reported flow 1,500 gpm in January 1961.
V- 3	... do	.....	S	.....	..	Mb	640	.....	.....	..	N	..	...	.....	Reported flow 200 gpm in January 1961.

V- 4	... do	.....	Du	17.8	36	IPpv	970	14.3	1-30-61	N	N	..	103	82	
V- 5	Hudson Sandlin	.....	Du	40.2	36	IPpv	960	35.2	2- 2-61	Tj	D	..	25	58	
V- 6	William B. Bankhead National Forest.	.....	Du	40	36	IPpv	990	26	.....	Tj	D	..	11	40	Supplies house, warehouse, and ranger's office.
V- 7	... do	.....	S	.....	..	Mp	620	.....	.....	..	N	60	11	60	Estimated flow 20 gpm on 1-30-61.
V- 8	... do	.....	S	.....	..	Mb	620	.....	.....	..	N	60	4	146	Do.
V- 9	... do	.....	D	45	6	IPpv	900	39.4	2- 2-61	M	D	..	11	46	
W- 1	Shirley Smith	.....	Du	35.0	36	IPpv	960	28.0	2- 3-61	Tj	D	..	39	76	
W- 2	William B. Bankhead National Forest.	.....	Du	17.5	60	IPpv	865	1.0	2- 3-61	N	N	..	18	96	
W- 3	... do	.....	Du	40.2	36	IPpv	895	7.4	2- 3-61	M	D	..	53	56	
W- 4	... do	.....	S	.....	..	IPpv	900	.....	.....	..	D	60	7	20	Nonflowing on 2-3-61.
W- 5	John England	.....	D	55.9	6	IPpv	750	51.2	2- 3-61	N	N	..	18	34	Inadequate for domestic supply.
W- 6	M. P. Borden	.....	D	68.2	6	IPpv	885	47.2	2- 3-61	M	D	60	11	92	Reported to contain objectionable quantities of iron.
X- 1	Olon Hill	A. G. Hare	D	100	6	Mb	675	6	2- -61	Tj	D	..	25	420	Develops water from 75 to 80 ft.
X- 2	William B. Bankhead National Forest.	.....	S	.....	..	Mp	680	.....	.....	..	N	58	11	56	Estimated flow 20 gpm on 2-8-61.
X- 3	... do	.....	D	47.3	6	IPpv	840	21.2	2- 8-61	N	N	..	32	26	
X- 4	G. D. Sims	.....	D	40.5	6	Mp	750	23.5	2- 9-61	M	D	..	11	96	
X- 5	B. J. Crow	.....	D	51.0	6	Mb	660	11.1	2- 9-61	Tj	D	..	11	184	
X- 6	Jim Asherbranner ..	H. N. Crowe Drilling Co.	D	65.2	6	Mb	680	30.5	2- 9-61	M	D,S	62	11	40	Develops water from 51 to 54 ft. Reported to contain sulfur. See driller's log in table 5.
X- 7	G. D. Sims	.....	Du	19.7	36	IPpv	940	3.8	2- 9-61	N	N	..	18	20	
X- 8	L. Z. Williams	.....	D	111.7	6	IPpv	980	94.4	2- 9-61	M	N	..	...	.....	Inadequate for domestic supply.
X- 9	William B. Bankhead National Forest.	.....	Du	35.2	36	IPpv	865	20.3	2- 3-61	M	D	..	11	38	
X-10	... do	.....	Du	34.9	36	IPpv	980	26.7	2- 3-61	N	N	..	...	.....	
X-11	... do	.....	Du	19.1	36	IPpv	1,005	7.6	2- 8-61	M	D	..	18	26	
X-12	... do	.....	Du	27.9	36	IPpv	1,000	16.9	2- 8-61	M	D	..	18	26	
X-13	... do	.....	Du	22.4	36	IPpv	890	5.9	2- 8-61	N	N	..	32	50	
X-14	... do	.....	D	31.8	6	IPpv	900	19.9	2- 8-61	M	D	63	53	88	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (° F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
X-15	William B. Bankhead National Forest.	....	S	.....	..	IPpv	880	.....	....	..	N	60	18	62	Known as Cave Spring. Estimated flow 5 gpm on 2-8-61.
X-16	... do	....	D	93.9	6	IPpv	920	12.1	2- 9-61	M	D	..	117	76	Water reported to contain objectionable quantities of iron.
X-17	J. C. York	....	Du	30.3	36	IPpv	905	12.6	2- 9-61	Tj	D	..	89	54	
X-18	G. W. Luker	....	D	100	6	IPpv	965	30	....	Tj	D	..	25	34	Develops water at 30 ft.

Table 5.—*Drillers' logs of selected wells in Lawrence County*

	Thickness (feet)	Depth (feet)
Well F-28		
Owner: City of Courtland — Driller: Miller Drilling Co.		
Soil	20	20
Limestone and chert	36	56
Weathered rock (water zone)	4	60
Limestone and chert	16	76
Well F-31		
Owner: State of Alabama — Driller: Hurst Machine Works		
Soil	53	53
Limestone and chert	17	70
Limestone	35	105
Limestone and chert	30	135
Limestone	5	140
Chert	5	145
Limestone and chert	10	155
Limestone	45	200
Limestone and chert	40	240
Well G-2		
Owner: Mrs. Malcolm Lane — Driller: Adams-Massey Drilling Co.		
Soil	80	80
Limestone and chert	115	195
Limestone - hard, gray	75	270
Shale - dark gray	13	283
Well G-30		
Owner: City of Courtland — Driller: Adams-Massey Drilling Co.		
Mud - rock at 3.5 ft	4	4
Mud	15	19
Cave	2	21
Limestone rock	4	25
Limestone - hard (water at 46 ft.)	21	46
Limestone - hard (water at 96 ft.)	50	96
Limestone - hard (water at 107 ft.)	11	107
Limestone - medium hard	18	125
Limestone - medium hard, chert at top (water at 208 ft.)	113	238

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well G-31		
Owner: City of Courtland	Driller: Miller Drilling Co.	
Soil	28	28
Lime rock	13	41
Crevice (water zone)	1	42
Soft lime rock	86	128
Broken lime rock - chert at top	14	142
Broken lime rock	23	165
Solid lime rock	33	198
Lime - hard	10	208
Broken zone (main water source)	1	209
Lime	17	226
Well H-1		
Owner: E. M. Farrior	Driller: A. G. Hare	
Soil	47	47
Limestone and chert (water at 95 ft.)	48	95
Limestone and chert	70	165
Limestone and chert	95	260
Shale	10	270
Limestone - contained an 18-in. cavity	5	275
Limestone and shale	32	307
Well I-31		
Owner: E. C. Bowling	Driller: S. T. Little	
Soil	7	7
Sand rock (cavity at 65 ft.)	58	65
Limestone and soapstone	141	206
Well J-23		
Owner: R. H. Hale	Driller: Johnnie Harris	
Soil	8	8
Sand rock	57	65
Limestone	1.7	66.7

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well J-35		
Owner: Chalybeate Junior High School — Driller: A. G. Hare		
Soil	20	20
Sandstone	50	70
Limestone, sandy	10	80
Limestone, gray	20	100
Well K-2		
Owner: W. H. Witt — Driller: Johnnie Harris		
Soil	18	18
Lime rock, gray	81	99
Well K-28		
Owner: Luther Norton — Driller: Johnnie Harris		
Soil	10	10
White sand (water at 85 ft.)	75	85
White sand	25	110
Well L-11		
Owner: A. J. Colburn — Driller: Johnnie Harris		
Soil	10	10
White sand - asphaltic (water at 16 ft.)	6	16
White sand	42	58
Soapstone	4.1	62.1
Well N-6		
Owner: Hatton Elementary School — Driller: A. G. Hare		
Soil	16	16
Shale, sandy	14	30
Sandstone	2	32
Silt	19	51
Sandstone - asphaltic	34	85
Limestone - sandy	10	95
Sandstone - olive gray	6	101
Limestone - light gray	29	130
Shale	61	191

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well N-6—Continued		
Limestone - light gray	39	230
Shale	50	280
Limestone	90	370
Well N-7		
Owner: Hatton High School	Driller: A. G. Hare	
Soil	15	15
Shale	5	20
Sandstone	15	35
Silt	20	55
Sandstone - asphaltic	35	90
Limestone - sandy	20	110
Sandstone - olive gray	14	124
Limestone	16	140
Shale	60	200
Limestone	40	240
Shale	29	269
Well N-12		
Owner: T. E. Terry	Driller: Johnnie Harris	
Soil	10	10
White sand	30	40
Sandstone (water zone)	10	50
White sand	60	110
Soapstone	10	120
Well O-9		
Owner: B. B. Jones	Driller: S. T. Little	
Soil	10	10
White sand and sandy shale	98	108
Well O-14		
Owner: Lizzie M. Turner	Driller: A. G. Hare	
Soil	15	15
Limestone - gray	30	45

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well O-14—Continued		
Limestone - sandy	15	60
Sandstone	65	125
Well O-21		
Owner: T. J. Moates	Driller: A. G. Hare	
Soil	21	21
Limestone - gray	15	36
Limestone - sandy	14	50
White sandstone - shale at base	100	150
Limestone and shale	55	205
Well O-30		
Owner: H. J. Steele	Driller: Johnnie Harris	
Soil	10	10
Broken lime and open zones	14	24
Lime rock - (water zone at 50 ft.)	26	50
Lime rock - sandy at base	80	130
Sandstone and soapstone - asphalt, gas, and water in sandstone in upper part	44	174
Well O-33		
Owner: City of Moulton	Driller: A. G. Hare	
Red clay	10	10
Boulders and clay	8	18
Limestone - gray	72	90
Limestone - (water zone)	5	95
Limestone - gray	40	135
Limestone - sandy	25	160
Sandstone	97	257
Shale - dark bluish-black	3	260
Well O-34		
Owner: City of Moulton	Driller: A. G. Hare	
Soil	13	13
Broken rock, boulders	9	22

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

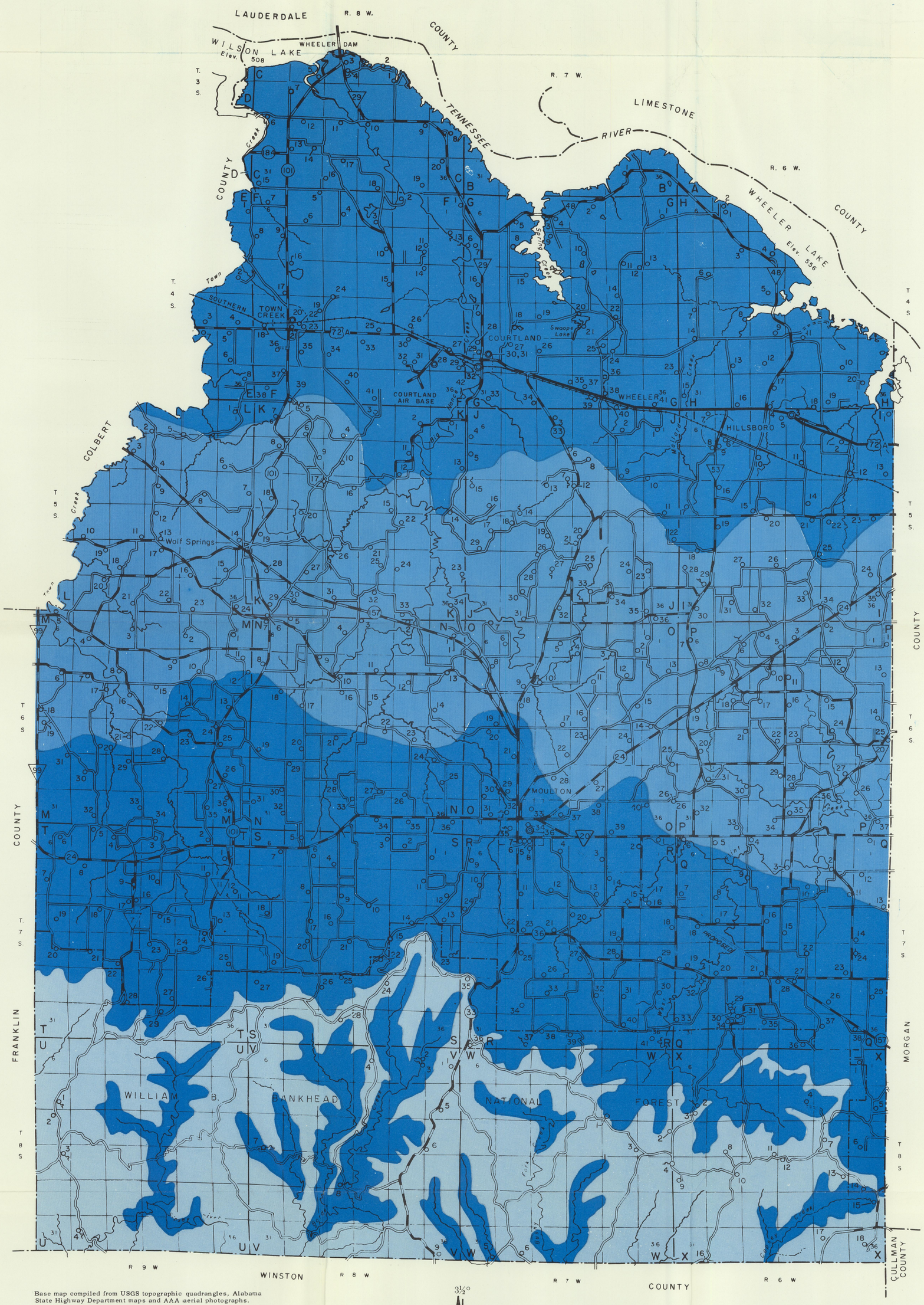
	Thickness (feet)	Depth (feet)
Well O-34—Continued		
Limestone	121	143
Well O-36		
Owner: City of Moulton	Driller: A. G. Hare	
Soil	13	13
Lime rock	12	25
Broken lime rock (water zone)	34	59
Lime rock	14	73
Broken lime rock (water zone)	55	128
Lime - gray	7	135
Lime - sandy	20	155
Sandstone - (water zone) shale at base	93	248
Shale - black	6	254
Well Q-2		
Owner: Enon Church	Driller: A. G. Hare	
Soil, broken lime rock, and sand	75	75
Sandstone	45	120
Sand (water zone)	5	125
Sandstone - shale at base	19	144
Limestone	6	150
Well Q-21		
Owner: Speake High School	Driller: A. G. Hare	
Soil	10	10
Limestone - dark gray (water at 40 ft.)	30	40
Limestone - (water at 82 ft.)	42	82
Limestone	58	140
Well R-5		
Owner: City of Moulton	Driller: A. G. Hare	
Red clay	24	24
Lime boulders & clay	5	29
Solid lime rock	11	40

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well R-5—Continued		
Blue shaley lime	5	45
Lime rock	8	53
Blue shaley lime	1	54
Lime rock, crevices and unconsolidated	16	70
Honeycomb lime (water bearing)	20	90
Lime rock	53	143
Gummy shale	42	185
Well R-6		
Owner: City of Moulton — Driller: H. W. Peerson Drilling Supply Co.		
Soil and sandy clay	14	14
Lime rock	13	27
Solid lime	13	40
Soft lime (water zone)	4	44
Solid lime	6	50
Broken lime (possibly more water)	5	55
Solid lime	5	60
Lime rock with soft places	15	75
Hard lime rock	12	87
Lime rock	16	103
Lime with soft places	22	125
Sandy shale	11	136
Soft lime	14	150
Hard lime	20	170
Lime - sandy	5	175
Soft lime	5	180
Rotten lime - sandy	20	200
Sand rock	35	235
Sand rock	10	245
Shale	5	250
Well R-8		
Owner: City of Moulton — Driller: A. G. Hare		
Soil	25	25
Limestone	125	150
Sandstone	100	250
Limestone	10	260

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well R-11		
Owner: A. G. Hare	Driller: A. G. Hare	
Soil	25	25
Limestone	135	160
Sandstone (water zone)	100	260
Shale and lime	52	312
Well X-6		
Owner: Jim Asherbranner	Driller: H. N. Crowe Drilling Co.	
Dirt and clay	24	24
Limestone - gray	27	51
Limestone - (water zone)	3	54
Limestone - gray	11.2	65.2



Base map compiled from USGS topographic quadrangles, Alabama State Highway Department maps and AAA aerial photographs.

Prepared by
UNITED STATES GEOLOGICAL SURVEY
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GEOLOGICAL SURVEY OF ALABAMA

AVAILABILITY OF GROUND WATER AT DEPTHS OF LESS THAN 200 FEET

Water in limestone, dolomite, and chert

Wells yield adequate supplies for domestic use in most areas and in places yield sufficient quantities for municipal and industrial use. Locally, wells yield as much as 225 gpm, and springs discharge as much as 2,000 gpm. Larger yields from wells can probably be obtained in structurally low areas. Water is generally moderately hard to very hard and locally is reported to have sulfurous traits.

Water in sandstone, shale, and limestone

Most wells adequate for domestic and stock supplies; generally yield 10 gpm or less. Water is soft to very hard and locally contains objectionable quantities of hydrogen sulfide, iron, and carbon dioxide.

Water in sandstone and shale

Most wells adequate for domestic and stock supplies; generally yield 10 gpm or less of soft water that reportedly contains objectionable amounts of iron in several areas.

EXPLANATION

WELLS

Domestic or stock well

Spring

Oil test well

Public supply well

ROADS

Hard surface, four or more lanes

Hard surface

Improved dirt road

U.S. highway

State highway

County highway

916 Bench mark and elevation

LOCATION OF WELLS AND SPRINGS AND GENERAL AVAILABILITY OF GROUND WATER AT DEPTHS OF LESS THAN 200 FEET IN LAWRENCE COUNTY, ALABAMA

1964

EXPLANATION

PENNSYLVANIAN

IPpv — Pottsville Formation
Sandstone, gray, medium- to coarse-grained, medium-bedded to massive, weathers yellow brown, interbedded with gray fissile shale. Includes conglomerate near the base in some areas

MISSISSIPPIAN

Mp — Pennington Formation
Limestone, gray, oolitic, variable in bedding character, clayey, interbedded with shale

Mb — Bangor Limestone
Limestone, medium-gray, finely crystalline, oolitic, partly fossiliferous, massive, interbedded with light-green and gray fissile shale. Upper part includes some light- to medium-gray massive chert and light-gray thin-bedded dolomitic limestone

Mh — Hartselle Sandstone
Sandstone, light-gray, weathers yellow brown, medium- to coarse-grained, medium-bedded to massive, calcareous, asphaltic in places, locally includes beds of shale and limestone in the lower part

Mgs — Gasper Formation and Ste. Genevieve Limestone Undifferentiated
Shale, medium- to olive-gray, calcareous in the western part of the county; very light to medium-gray finely crystalline or oolitic slightly cherty massive to irregularly bedded limestone interbedded with light- to medium-gray calcareous shale in the eastern part of the county

Mt — Tuscumbia Limestone
Limestone, gray, coarsely crystalline massive, contains chert beds

Mfp — Fort Payne Chert
Limestone, light-gray, crystalline, siliceous, thin-bedded to massive, interbedded with dolomite, dolomitic limestone, shale, and chert

CARBONIFEROUS

916△ Bench mark and elevation

Geologic contact
Dashed where inferred

Quarry

LAUDERDALE COUNTY · WHEELER DAM · WILSON LAKE · TENNESSEE RIVER · LIMESTONE COUNTY · WHEELER LAKE · COLBERT COUNTY · FRANKLIN COUNTY · MORGAN COUNTY · WINSTON COUNTY

TOWN CREEK · COURTLAND · SWOOP LAKE · WHEELER · HILLSBORO · WOLF SPRINGS · MOULTON · WILLIAM B BANKHEAD NATIONAL FOREST

T. 3 S. · T. 4 S. · T. 5 S. · T. 6 S. · T. 7 S. · T. 8 S.

R. 9 W. · R. 8 W. · R. 7 W. · R. 6 W.

Base map compiled from USGS topographic quadrangles, Alabama State Highway Department maps, and AAA aerial photographs.

Prepared by
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
GEOLOGICAL SURVEY OF ALABAMA

GENERALIZED GEOLOGIC MAP OF LAWRENCE COUNTY, ALABAMA

By Wiley F. Harris, Jr. and William M. McMaster

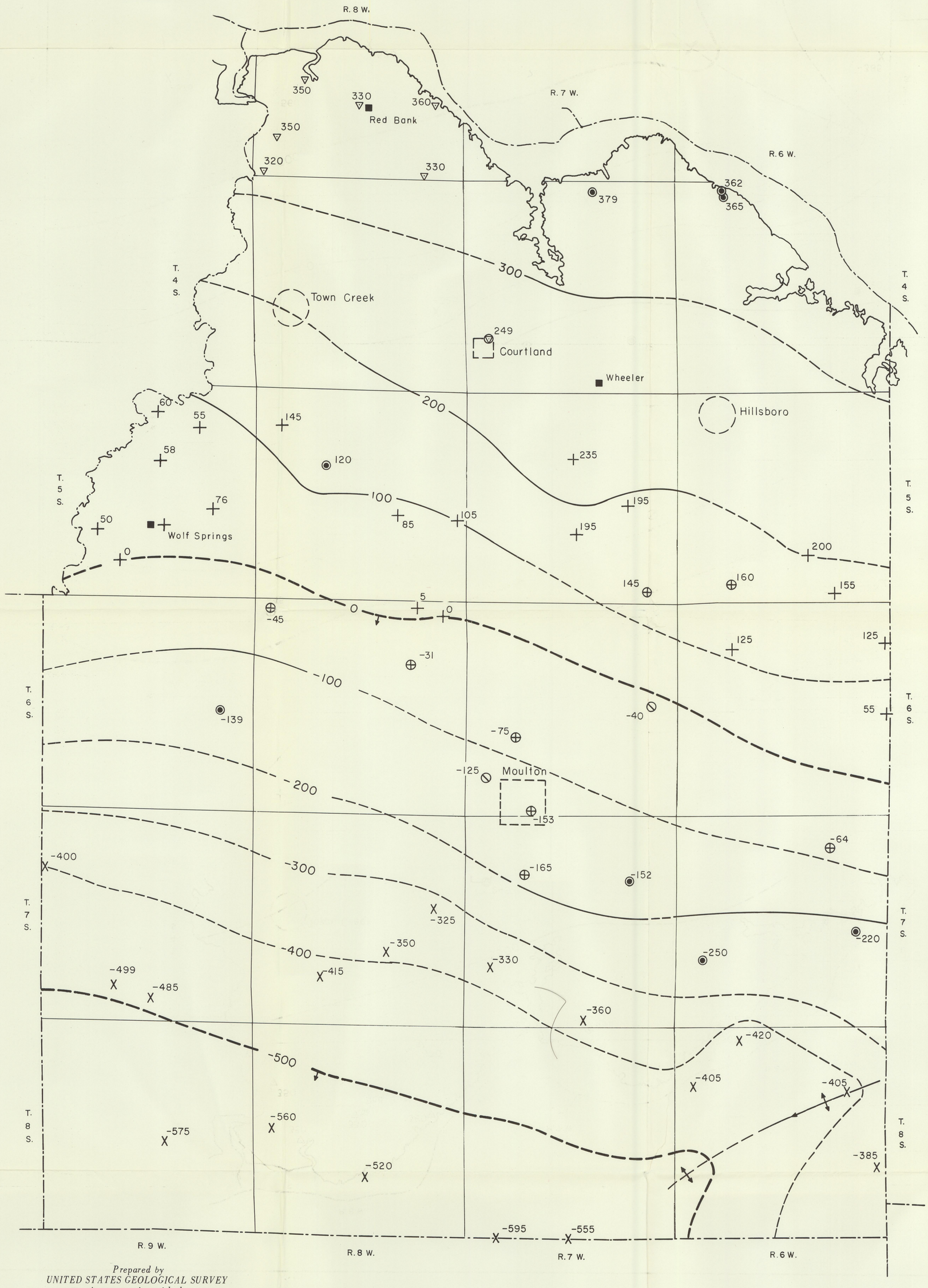
1963

3½° TRUE NORTH / MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1964

1 0 1 2 3 Miles

The nomenclature in this report follows that of the Geological Survey of Alabama but does not necessarily follow that in use by the U.S. Geological Survey



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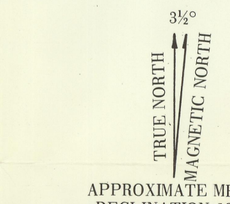
EXPLANATION

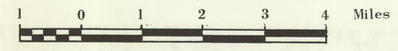
Structural contours showing configuration of top of Chattanooga Shale. *Contours dashed where inferred; arrow on contour shows direction of dip. Contour interval is 100 feet; datum is mean sea level.*

Anticline
Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located.

- *Top of* Chattanooga Shale *in well.*
- *Top of* Fort Payne Chert *in outcrop and estimated altitude of top of* Chattanooga Shale.
- *Top of* Fort Payne Chert *in well and estimated altitude of top of* Chattanooga Shale.
- \+ *Top of* Gasper Formation *and* Ste. Genevieve Limestone *in outcrop and estimated altitude of top of* Chattanooga Shale.
- ⊕ *Top of* Gasper Formation *and* Ste. Genevieve Limestone *in well and estimated altitude of top of* Chattanooga Shale.
- ⊘ *Top of* Hartselle Sandstone *in well and estimated altitude of top of* Chattanooga Shale.
- × *Top of* Pennington Formation *in outcrop and estimated altitude of top of* Chattanooga Shale.



APPROXIMATE MEAN
DECLINATION 1955



STRUCTURE MAP OF LAWRENCE COUNTY, ALABAMA

SHOWING CONFIGURATION OF THE TOP OF THE CHATTANOOGA SHALE

1964