MISSISSIPPI
STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, Ph.D.
Director

BULLETIN 58

GEOLOGY AND GROUND-WATER RESOURCES OF THE CAMP SHELBY AREA

By

GLEN FRANCIS BROWN

In cooperation with the
United States Geological Survey and the Mobile United States Engineer Office

UNIVERSITY, MISSISSIPPI

1944

EXPLANATION

Sedimentary Rocks

Miocene
- Pascagoula and Hattiesburg formations
- Catahoula sandstone

Chickasawhay and Older beds

Flowing water well

Non flowing water well

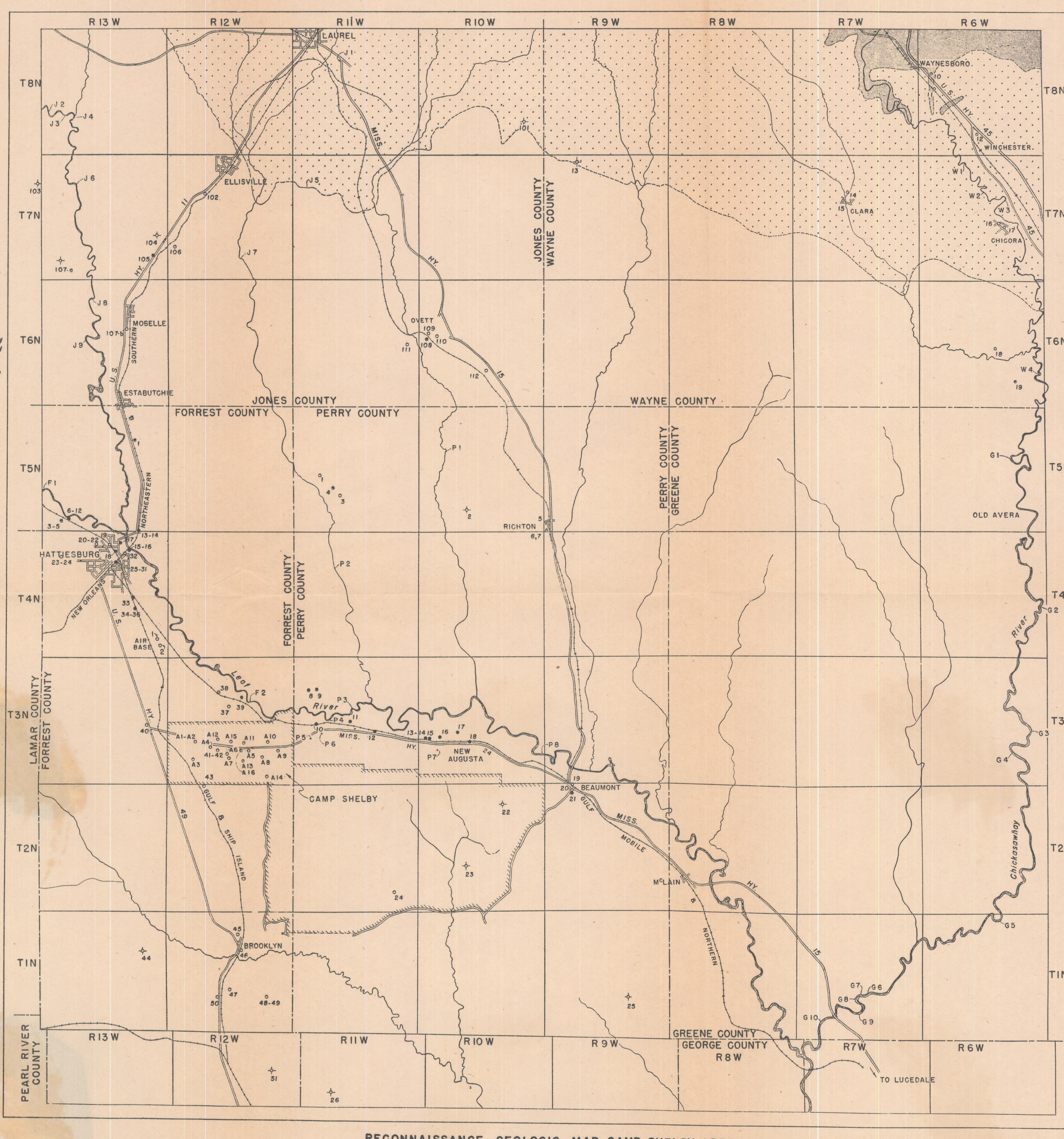
Oil prospect well

Wells are numbered in each county from north to south except at Hattiesburg Air Base and Camp Shelby in accordance with Tables 8 and 9.

A1 - A6: Wells at Camp Shelby
F1 - F2: Outcrops studied in Forrest County
G1 - G10: Outcrops studied in Greene County
J1 - J9: Outcrops studied in Jones County
P1 - P8: Outcrops studied in Perry County
W1 - W4: Outcrops studied in Wayne County

Datum is mean sea level
Base map from U. S. Forest Service

Geology by Glen F. Brown



RECONNAISSANCE GEOLOGIC MAP, CAMP SHELBY AREA

SHOWING LOCATION OF BORINGS AND SOME OUTCROPS

DECEMBER 1, 1943

SCALE

1 0 1 2 3 4 5 6 7 8 9 10 Miles

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MISSISSIPPI GEOLOGICAL SURVEY

COMMISSION

STAFF

LETTER OF TRANSMITTAL

Office of the Mississippi Geological Survey
University, Mississippi
May 9, 1944

To His Excellency,
Governor Thomas L. Bailey, Chairman, and
Members of the Geological Commission

Gentlemen:

Herewith is Bulletin 58, Geology and Ground-Water Resources of the Camp Shelby Area, by Glen Francis Brown, assisted by Robert Wynn Adams.

It is another report of the cooperative ground-water investigations of Mississippi by the Mississippi State Geological Survey and the U. S. Geological Survey — another investigation that was made at the request of the U. S. Army, and that was financed in part by the Mobile United States Engineer Office.

The survey showed that the screens in 16 of the wells were placed in the lower of the two sands of the Hattiesburg formation, that since January 1941 the daily pumpage ranged from 650,000 to 7,350,000 gallons — averaged 4,000,000 gallons. It revealed, furthermore, that although during the first 64 weeks of pumping the static or near-static water levels declined on an average of approximately 14 feet in 10 wells, thereafter the water levels fluctuated with pumping without a continuous downward trend — that the water levels were maintained by additional transmission from an outside source, perhaps from the Pleistocene gravels in the Leaf River valley and perhaps also from the shallower of the two Hattiesburg sands. From the survey the authors conclude that the water-level decline would be less than 5 feet even if the pumpage is increased to 5,000,000 gallons a day.

The investigations set more definite stratigraphic and geographic bounds to the three surface formations, the Catahoula sandstone, the Hattiesburg formation, and the Pascagoula formation. As in Bulletin 56, Geology and Ground-Water Supply at Camp Van Dorn, the present report on Camp Shelby records a series of well logs that reveal the nature of the subsurface beds, so important also to oil and gas explorations — as attested in a letter from the retiring President of the American Association of Petroleum Geologists concerning the last bulletin (56) on ground water.

The investigation, too, aids just so much more in the bigger problem of the ground-water resources of the whole State of Mississippi.

Very sincerely yours,

William Clifford Morse,
State Geologist and Director

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GEOLOGY AND GROUND-WATER RESOURCES OF THE CAMP SHELBY AREA

BY GLEN FRANCIS BROWN

ABSTRACT

Camp Shelby is situated in the Long Leaf Pine Hills of South Mississippi. Most of the hills are composed of clay overlain with a veneer of sand and gravel, but at depth sand aquifers are interbedded with the clays. The three subsurface formations of Miocene age that contain fresh water are, from oldest to youngest, the Catahoula sandstone, the Hattiesburg formation, and the Pascagoula formation. Disconformably overlying this comformable series of sediments are the Citronelle formation of Pliocene age and younger terrace and alluvial deposits.

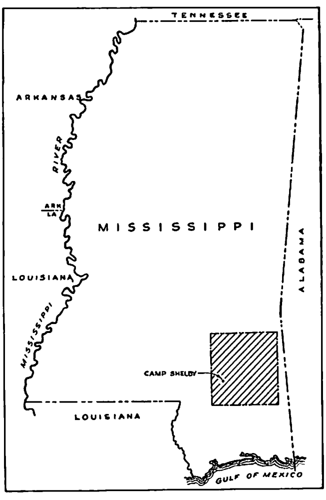


Figure 1.—Location of the Camp Shelby area.

The upper part of the Catahoula sandstone comprises 240 to 640 feet of interbedded clay, sand, sandstone, and gravel, all lying above a marine limestone tongue referred to as the *Heterostegina* zone. This tongue is considered part of the Catahoula sandstone and its upper surface marks the bottom of fresh water in the region extending south of Camp Shelby.

Overlying the Catahoula sandstone are beds of clay, silt, siltstone, and sand which are grouped together in the Hattiesburg formation. In outcrop they differ from the Catahoula in that gravel is absent and sand is scarce; in the samples examined, pink garnet is abundant. (Pink garnet and hornblende seem to be missing in the samples studied from the upper part of the Catahoula sandstone.) The Hattiesburg formation ranges in thickness from 1 to 600 feet.

The Pascagoula formation overlies the Hattiesburg formation, which it closely resembles, and underlies the Citronelle formation and other terrace deposits. The Hattiesburg - Pascagoula contact is believed to be about 15 miles south of the line on the 1928 reconnaissance geologic map of the state. The division is based on the assumption that the Pascagoula formation includes estuarine fossils, particularly *Rangia johnsoni,* whereas the Hattiesburg formation is essentially nonmarine. (Leaves resembling modern species of bald cypress, willow, and mulberry or hackberry were collected from exposures believed to be the Hattiesburg formation.) The Pascagoula - Hattiesburg contact may also be the base of Cogen's hornblende zone.

Sands found at depth in the Pascagoula and Hattiesburg formations appear as thin beds or are absent in outcrop areas northeast of the wells, in accordance with Richardson's observation that sands interbedded with nonmarine or lagoonal shales on the Gulf Coast tend to wedge out landward. The sands would be expected to increase in grain size and thickness toward their source areas, the continental hinterland northeast of the camp, if deposition were in a direct vertical cycle; final distribution was probably circuitous and was effected by shore-wise currents cutting across stream mouths. Thus, the sand bed supplying water to Camp Shelby can be correlated at least 12 miles along the strike and possibly 5 miles updip.

The Citronelle formation is mostly sand and chert gravel. On the crests of cuestas, it strongly overlaps the Pascagoula and Hattiesburg formation and, at least, part of the Catahoula sandstone.

Several flat areas, generally 75 to 100 feet below the crests of the higher cuestas, are underlain by terrace deposits of sand and gravel. At still lower elevations benches have been cut by the streams, and locally sand and gravel, presumably from the Citronelle formation and the higher terraces, have been left behind. Sometime during the Pleistocene epoch a stream cut a gorge about 80 feet beneath the Leaf River flood plain between Hattiesburg and Camp Shelby. This gorge was subsequently filled at least to present flood-plain and low terrace level with well-sorted sand and gravel.

The Catahoula sandstone contains large ground-water supplies which have been developed at Laurel and Hattiesburg. Most of these supplies are available under artesian head, and in the lowlands south of the outcrop belt the wells actually flow. Since 1940 water pressure has declined a net 2¾ feet in a well which penetrates the Catahoula sandstone at Hattiesburg. Seemingly there is no hydrologic connection between the supplies from the Hattiesburg formation and the Catahoula sandstone, because the decline in this well does not correlate closely with pumpage at Camp Shelby; the sands developed at the camp do not correlate with the sands developed at Hattiesburg; and there is a difference of about 20 feet in the two piezometric surfaces at the Hattiesburg Army Air Base. At Camp Shelby the top of the Catahoula sandstone is 600 to 700 feet beneath the surface, and, although the water from the sandstone was utilized in 1918, this source has not been developed during the present camp expansion.

In the Camp Shelby area the Hattiesburg formation contains two sands: the lower averages about 90 feet in thickness; the upper is thinner and more irregularly distributed. The well screens in 16 wells are placed in the lower sand. Since January 1941 daily pumpage has ranged from 650,000 to 7,350,000 gallons and has averaged about 4,000,000 gallons. During the first 64 weeks of pumping the former static or near-static water levels declined an average of approximately 14 feet in 10 wells. Thereafter water levels fluctuated with pumping without a continuous downward trend. The water pumped during the first period came from storage in and around the camp. After March 1942 the water levels were maintained by additional transmission from some outside source, probably Pleistocene gravels in the Leaf River valley and also probably from the shallower of the two sands of the Hattiesburg formation.

Coefficients of storage, as determined from pumping tests, range from 0.00018 to 0.00046 and average 0.00031. Coefficients of transmissibility, which are greatest in the wells along the northern and eastern camp boundary, range from 32,300 to 133,000 and average 67,000. A study of the pressure surface, whose shape results mainly from pumping Well A 5, indicates that the coefficient of transmissibility decreases northeast of the camp where the sand probably thins. If the average figures are assumed to be nearly correct, water levels should have declined at the Hattiesburg Army Air Base about 17 feet (an amount that agrees with actual measurements provided the original pressure of the Catahoula sandstone and the Hattiesburg formation were nearly equal), a vertical distance that should be considerably less than the lowering at the camp. Thus it appears that additional pumpage will change water levels only a few feet, if at all, and that the decline would probably be less than 5 feet if pumpage is increased to 5,000,000 gallons a day.

The shallow Citronelle formation and the terrace sands and gravels contain water in the lower few feet, but the water table is low, because the discontinuous deposits are elevated above the valley sufficiently to permit abundant perennial effluent seepage. On the other hand, the highly permeable gravels filling the valley beneath the Leaf River between Hattiesburg and Camp Shelby are saturated to within a few feet of the top, because of the lower position of the alluvial deposits. The geology and the shape of the piezometric surface suggest that these gravels are hydrologically connected to the sand furnishing camp supply, and that they are a good auxiliary reservoir.

LOCATION AND GENERAL FEATURES OF THE AREA

Camp Shelby in Forrest County extends from the Forrest-Perry County line to a point 5½ miles west of it. Mississippi Highway 24 skirts the camp on the north and intersects U. S. Highway 49, 2½ miles west of the camp headquarters, 7½ miles south of Hattiesburg, and 62 miles north of Gulfport. The camp is in the midst of the Long Leaf Pine Hills of South Mississippi and is a terrain of sand and gravel covered hills whose substratum is usually clay. The hilly topography is modified by rather wide and flat valleys along the larger streams and by older nearly flat terraces along the flanks of the valleys. Although much of the upland soil has been removed by erosion after deforestation, the remnants are composed of loam, silty loam, or sandy loam, all thoroughly oxidized. The alluvial and terrace deposits along stream valleys in most areas are capped with loam accompanying a silty loam subsoil, but both are locally absent.[1]

PURPOSE AND SCOPE OF THE STUDY

This study of geology and ground-water hydrology at Camp Shelby is primarily for the use of the Mobile District Engineer of the U. S. Engineers to aid in an understanding of anticipated water-level declines if camp pumpage is increased 25 per cent above the present rate. Of necessity, the report includes a discussion of contiguous supplies, particularly at Hattiesburg; and it includes also the geology of the southern parts of Jones and Wayne Counties as well as the geology of Lamar, Forrest, Perry, and Greene Counties, for the reason that all water supplies in the region are derived from wells.

A reconnaissance of the water supplies was begun in 1940 by V. M. Foster, whose work, together with information obtained during a study of the ground water in the Laurel area, is included. As the field work progressed in the summer of 1943, no outcrop belts were apparent in Forrest and Perry Counties of the sands from which the camp water supply is taken. Accordingly, the work was extended to include reconnaissance of the outcrops in southern Jones, southern Wayne, and Greene Counties.

A test hole was drilled near the center of the wells of the camp and a casing, screen, and recorder were installed to obtain a continuous record of water-level fluctuations (Well A 16). Samples from the cuttings of the rotary drilling process were taken about every 20 feet in this hole. Samples of the water-bearing sands from Camp Shelby wells, A 13 and A 14, and from wells at the Hattiesburg and Laurel Air Bases were supplied through the courtesy of the Area and Post Engineers and the drilling contractors. These samples were washed, tested for permeability, mechanically analyzed (Table 3), and separated with bromoform into light and heavy fractions for mineralogic study (Table 2). As many important outcrops of the sediments beneath the camp are exposed along stream banks north and east of the camp, the courses of the Leaf, Bouie, and Chickasawhay Rivers were followed by boat. Samples of outcrop sands along these streams, together with samples from other localities, were cleaned, and the heavy minerals were separated with bromoform for microscopic study. Correlations and, indirectly, the extent both of outcrop areas and of subsurface continuities of the aquifers are based on the mineralogy of the samples, on the position of the top of the *Heterostegina* zone of the Catahoula sandstone as reported from petroleum explorations, on the behavior of water levels, and on the drillers' logs. The geological work was supplemented by pumping tests at the camp and at the Hattiesburg Army Air Base. Elevations were established by leveling on several well collars at and near the military establishments.

The work cannot be considered quantitatively final, because operating conditions during pumping tests prevented accurate determination of transmissibility and storage and because the nature of the geological boundaries is imperfectly understood. However, enough information has been accumulated to warrant some confidence in tentative conclusions.

METHODS OF INVESTIGATION

ELECTRICAL LOGGING

An electrical survey was made near the center of the camp well field at test well A 16. A commercial firm which specializes in such surveys prepared a photographic record of electrical differences in the strata from the surface to a depth of 392 feet, 4 feet below the bottom of the sand bed which produces the camp supply. Briefly, the survey consisted of raising a multiple electrode from the bottom of the hole and automatically and simultaneously recording differences in resistivity and natural potential by photographing fluctuations of galvanometer and potentiometer needles. The circuits were grounded near the well collar. The electrical log permits relative comparison of the water-bearing strata, the shift to the left on this log (Plate 4) of the self-potential curve being in part a qualitative measure of the permeability, and the increase to the right of the resistivity curve being a qualitative measure of the amount of fresh water.[2,3]

The comparison of the permeabilities by means of the self-potential curve requires consideration of at least three other factors which have been described in literature on electrical logging; namely, (1) natural self potential, presumably existing in the earth between dissimilar strata, (2) an electrofiltration effect, resulting from fluid movement into or out of the permeable stratum because of the pressure differences between the drilling fluid column in the well and the natural hydrostatic pressure on the permeable stratum, and (3) the electrochemical or solution concentration effect, resulting from differences in ion dissociation in the water in the permeable stratum and in the drilling fluid.

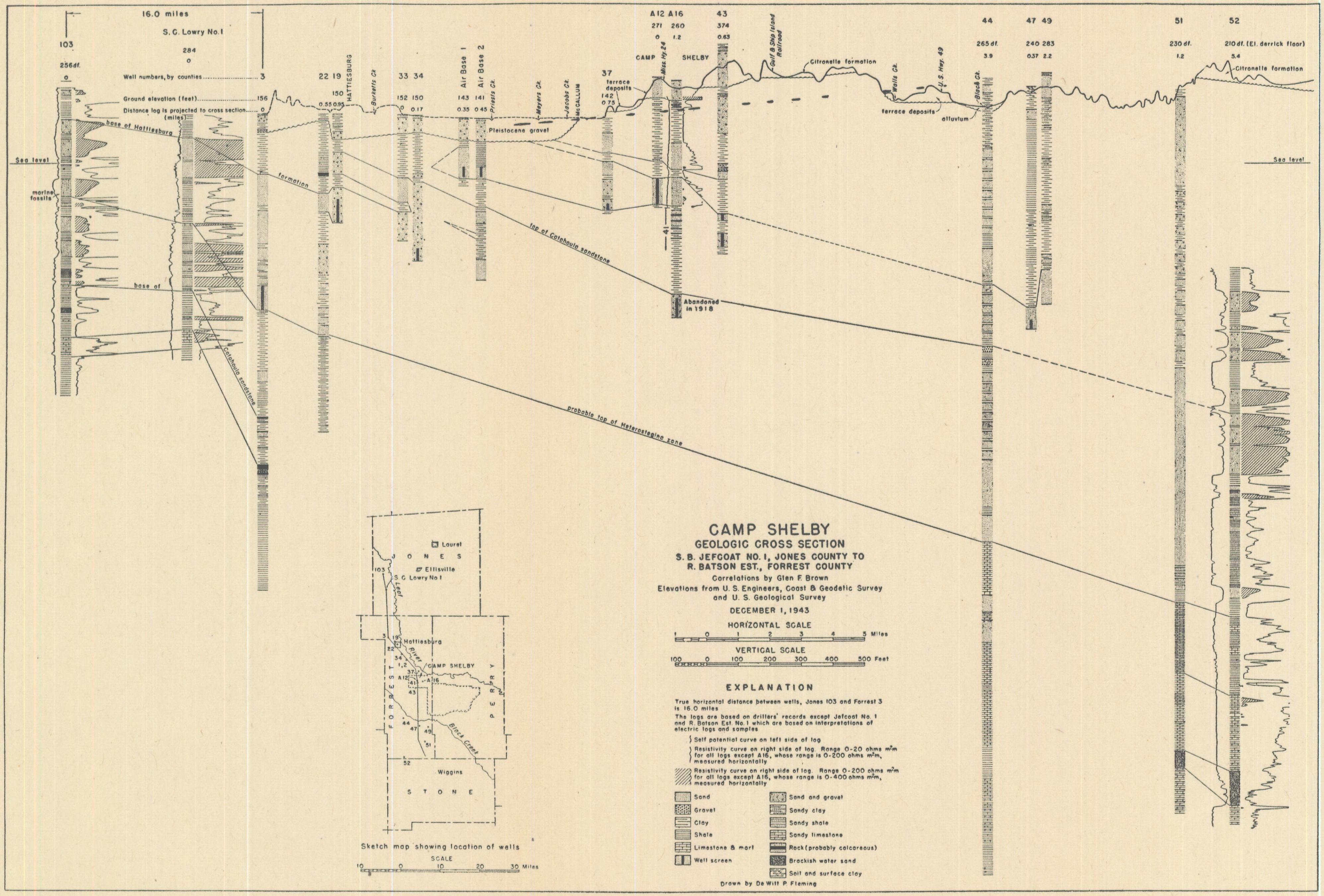
The so-called normal, third, and fourth resistivity curves are obtained by different electrode spacings in the well, in this case, 18 inches, 63 inches, and 20 feet, respectively. The normal resistivity curve is most useful for accurate marking of the lithologic boundaries, here contacts of sand, sandy clay or sandy shale, and shale, whereas the "space" or third and fourth curves reflect conditions at greater distances around the well. Their value is in a more accurate measure of interstitial fresh water away from the aureole of drilling mud penetration.

Plate 4 shows three water-bearing beds: the lower part of the high terrace deposits whose base is at 64 feet, a sand in the depth interval 192 to 276 feet, and the sand from which camp supply is derived at a depth of 297 to 392 feet. Yet another fresh-water sand lies below this aquifer, as shown by electrical logs obtained by petroleum exploration companies near Camp Shelby and by the record of a well drilled to 720 feet at the camp in 1918 (Plates 2, 3).

The terrace material is highly permeable; hence, a maximum resistance in excess of 400 ohms per cubic meter on the normal curve and a negative shift of the self potential of about 20 millivolts (when compared with the underlying shale) was measured in well A 16. The lower two sands shown on the electrical log, both considered within the Hattiesburg formation, grade upward into fine silty sand and clay, the highly permeable zone being in the lower part of each sand. This permeable zone in the upper sand is about 9 feet thick with a narrow maximum resistance of about 240 ohms per cubic meter on the normal curve and a negative self-potential shift of 26 millivolts (when compared with the underlying shale). The space curves reach a maximum of 300 ohms per cubic meter. The highly permeable zone at the base of the lower sand is 32 feet thick and measured a maximum of

GEOLOGIC FORMATIONS CONTAINING FRESH WATER IN THE CAMP SHELBY REGION

SYSTEM	FORMATION	KNOWN THICKNESS (feet)	PHYSICAL CHARACTER	HYDROLOGIC PROPERTIES
Pleistocene	Alluvium Low terraces	0-85	Gravel and sand, minor clay reported in the lower 20 feet. Seen only in the Leaf-Bouie valley but may be present elsewhere. Mined for gravel.	A productive source hydrologically connected to the Leaf-Bouie River. It probably serves as an auxiliary reservoir for the sands from which Camp Shelby derives water.
	High terraces	0-100	Sand, gravel, and clay, irregularly cross-bedded; the gravel is in lenses and is composed of pebbles of dark and light-gray chert, rarely black; rounded to nearly angular clay and silt; white and rose quartz; some limonite in the lower part.	Ground water under water-table conditions in lower few feet furnishes water to numerous farm wells and springs. Probably not capable of producing large supplies because of perched position of sand and gravel.
Pliocene	Citronelle	0-135	Sand, gravel, and clay. Most pebbles are chert; many have been intensely weathered.	The lower few feet contain water in sufficient quantity for farm and small domestic wells.
Miocene	Pascagoula	0-730 (?)	Clay, silty clay, silt, sandy clay, and sand, containing lenses of marine or estuarine fossil beds.	The sand lenses yield artesian water south of Camp Shelby.
	Hattiesburg	0-600 (?)	Clay, silty clay, laminated silt, siltstone, fine sandstone, and sand. Contains plant fossils and locally thin layers of calcareous nodules.	Sands in the lower part of the formation yield large supplies, as at Camp Shelby
	Catahoula sandstone (above the *Heterostegina* zone)	240-640	Sand, sandstone, clay, gravel in nonmarine irregularly deposited lenses.	Yields large supplies at Hattiesburg and Laurel.


16.0 miles
S. G. Lowry No. 1
Well numbers, by counties
Ground elevation (feet)
Distance log is projected to cross section (miles)
Sea level
marine fossils
base of Hattiesburg
formation
top of Catahoula sandstone
Catahoula sandstone
probable top of Heterostegina zone
Pleistocene gravel
terrace deposits
CAMP
SHELBY
Citronelle formation
terrace deposits
alluvium
Abandoned in 1918
HATTIESBURG
Air Base 1
Air Base 2
210 df. (El. derrick floor)
CAMP SHELBY
GEOLOGIC CROSS SECTION
S. B. JEFCOAT NO. 1, JONES COUNTY TO
R. BATSON EST., FORREST COUNTY
Correlations by Glen F. Brown
Elevations from U. S. Engineers, Coast & Geodetic Survey
and U. S. Geological Survey
DECEMBER 1, 1943
HORIZONTAL SCALE
1 0 1 2 3 4 5 Miles
VERTICAL SCALE
100 0 100 200 300 400 500 Feet
EXPLANATION
True horizontal distance between wells, Jones 103 and Forrest 3 is 16.0 miles
The logs are based on drillers' records except Jefcoat No. 1 and R. Batson Est. No. 1 which are based on interpretations of electric logs and samples
Self potential curve on left side of log
Resistivity curve on right side of log. Range 0-20 ohms m²m for all logs except A16, whose range is 0-200 ohms m²m, measured horizontally
Resistivity curve on right side of log. Range 0-200 ohms m²m for all logs except A16, whose range is 0-400 ohms m²m, measured horizontally
Sand
Gravel
Clay
Shale
Limestone & marl
Well screen
Sand and gravel
Sandy clay
Sandy shale
Sandy limestone
Rock (probably calcareous)
Brackish water sand
Soil and surface clay
Drawn by De Witt P. Fleming
Laurel
J O N E S
Ellisville
S. G. Lowry No. 1
Hattiesburg
CAMP SHELBY
F O R R E S T
P E R R Y
Black Creek
Wiggins
S T O N E
Sketch map showing location of wells
SCALE
10 0 10 20 30 Miles

225 ohms per cubic meter resistance on the normal curve, but the third and fourth curves extend beyond 400 ohms per cubic meter. Thus the lower sand shows higher storage capacity (more available interstitial water) than the upper sand. The self-potential shift of about 12 millivolts suggests a greater volumetric permeability but not as great a maximum permeability as the 9-foot zone at the base of the shallower sand, if it is assumed that the self-potential shift solely results from permeability differences. An explanation of the self-potential shifts opposite the two sands may be summarized as follows: (1) The self-potential shift is less in the lower sand because the natural hydrostatic pressure is more than 142 feet of water greater than in the upper sand, or (2) the permeability is less in the lower sand, or (3) movement of water by pumpage at surrounding wells has been such as to decrease the natural potential, or (4) some artificial condition, such as elevated bottom-hole temperature or fractionation of the drilling fluid (this does not seem likely). Probably the shape of the curve is a resultant of a combination of two or more of these factors. The rotary cuttings from the lower sand gave coefficients of permeability nearly twice those of the upper sand (Table 3), and other evidence suggests that the natural hydrostatic pressure in the upper sand is at least as great as and probably greater than the pressure in the lower sand. The evidence at hand suggests that the differences of dissociation in the two sands are negligible and that the shape of the curve largely results from the natural pre-boring differences and possibly from the electrofiltration effect. The lower sand has been heavily pumped and the water level fluctuates several feet in well A 16 as near-by well pumps are turned on or off. This pumpage probably affects the self-potential differences and helps explain why the lower sand appears less permeable. The shape of the self-potential curve opposite the upper sand might also be affected by this pumpage if there is a hydrologic connection between the two sands.

PUMPING TESTS

The pumping tests to determine coefficients of storage and transmissibility were made during the period May 23 to June 15, 1943, when well A 5, near the center of the camp, was pumped continuously. The other well pumps were started or stopped to permit measurement of recovery of water level or interference between wells at times not interfering with pumping for camp supply. Thus wells in the western part of the camp were turned off to permit maximum recovery while camp supply was derived from the easternmost wells (distances of 2 to 4 miles). Because camp demands fluctuated between 2,747,000 and 5,552,000 gallons daily during the period of the tests, the operation of wells was irregular and not all the interference between wells could be evaluated. The discharge measurements needed for the analyses were obtained from permanently installed integrating flow meters located on the discharge mains at each well.

The methods used to calculate the coefficients of transmissibility and storage follow those developed by C. V. Theis,[4,5] involving nonequilibrium, except that sufficient interference was measured in two observation wells (A 7 and A 13 when A 6 was pumped) to permit a calculation of transmissibility by the Thiem[6] method, based on the assumption that conditions of equilibrium exist.

GEOGRAPHY

PRECIPITATION

The precipitation at Hattiesburg is fairly evenly distributed throughout the year (Table 1) and may be considered indicative of general conditions throughout the area wherein meteoric water is added to the ground-water supply for the camp.

PHYSIOGRAPHY AND DRAINAGE

Camp Shelby and the pertinent catchment areas lie within the drainage basin of the Pascagoula River. The Leaf River, flowing southeast by the camp, is the largest tributary and drains an area of slightly more than 3,500 square miles north and east of the camp. Its recorded discharge measurements reported to 1943 range from 732 to 47,700 second-feet at a gauge near McLain, Greene County. Black Creek drains the region south of Camp Shelby, parallels Leaf River, and joins the Pascagoula River about 12 miles below the Leaf - Pascagoula confluence.

Leaf River and Black Creek flow at the heels of cuestas — ridges or divides whose northeastern slopes are steep compared to the southwestern long gentle slopes facing the Gulf. Consequently, tributary streams are mostly on the north sides of the

TABLE 1

PRECIPITATION AT HATTIESBURG, FORREST COUNTY
MONTHLY, ANNUAL, AND AVERAGE AMOUNTS IN INCHES

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1890	--	--	--	2.47	2.36	4.95	10.42	4.70	2.70	4.55	1.45	2.10	----
1891	4.60	6.79	0.35	1.75	4.14	2.06	8.25	4.85	1.60	T	4.91	4.35	43.65
1892	5.95	3.46	--	---	3.21	6.90	9.04	6.07	1.84	2.03	3.88	5.08	----
1893	4.40	4.41	3.22	---	---	4.40	5.82	8.04	5.84	1.01	6.90	3.31	----
1894	3.14	5.92	5.07	2.55	2.50	1.65	7.46	6.43	2.49	0.30	0.97	4.78	43.26
1895	6.79	3.46	7.04	1.20	3.76	7.68	2.81	5.50	1.90	---	---	---	----
1900	4.88	11.41	5.05	14.85	1.58	18.48	4.61	2.17	2.38	--	---	---	----
1901	--	--	--	---	--	--	8.68	8.69	2.15	0.26	1.69	5.47	----
1902	6.22	4.22	7.04	2.92	3.95	1.31	5.27	7.16	7.17	4.20	2.98	5.15	57.59
1903	5.53	10.22	8.14	1.18	4.29	4.35	4.97	3.41	1.20	2.71	1.07	5.01	52.08
1904	3.69	4.57	2.69	2.19	4.43	--	--	---	--	---	--	3.72	----
1905	6.90	10.00	5.80	7.96	4.98	1.80	2.44	4.80	4.25	2.31	2.94	8.13	62.31
1906	5.15	2.64	8.78	1.03	4.09	5.98	4.40	3.08	11.66	1.08	1.96	3.56	53.41
1907	2.04	2.94	3.68	4.82	13.92	4.34	13.16	4.22	8.48	2.20	8.24	5.30	73.34
1908	5.62	6.46	2.14	10.42	7.04	5.79	6.16	3.84	6.36	1.40	0.34	2.78	58.35
1909	2.86	5.20	6.98	10.24	6.12	8.54	---	4.88	5.64	0.56	1.44	6.40	----
1910	2.08	5.08	0.94	0.80	7.52	7.68	---	3.58	4.12	1.98	1.98	2.86	----
1911	--	1.16	2.04	8.45	4.27	5.05	8.52	2.96	1.56	0.96	4.38	5.50	----
1912	6.60	2.30	11.96	9.02	3.26	3.12	--	---	--	--	1.82	6.86	----
1913	6.00	5.72	9.80*	3.10	3.80	3.01	6.80	4.06	5.15	2.72	3.62	3.70	----
1914	0.88	5.06	4.80	6.68	1.92	2.78	5.54	6.65	3.66	2.02	2.40	4.44	46.83
1915	7.62	10.20	2.92	2.54	10.39	3.18	4.20	6.32	8.32	2.12	2.56	---	----
1916	7.24	3.38	3.73	3.27	4.96	2.87	15.23	4.43	0.75	3.21	2.73	4.08	55.98
1917	8.49	5.80	6.46	2.49	2.15	2.20	4.36	6.79	2.34	0.39	0.91	3.48	45.86
1918	5.95	2.01	1.56	9.32	1.58	6.32	1.77	3.28	0.97	14.53	3.72	6.03	57.04
1919	7.25	8.35	7.44	3.08	12.72	2.59	5.81	8.38	1.94	4.02	7.44	4.81	73.83
1920	5.69	3.36	5.13	9.47	4.23	2.33	7.72	10.70	1.75	1.41	2.08	9.90	63.77
1921	2.70	3.54	11.67	7.37	0.98	4.08	11.19	3.58	2.91	0.54	1.31	4.47	54.34
1922	7.96	4.24	7.95	2.83	6.59	6.07	4.98	2.46	1.18	0.66	3.03	5.67	53.62
1923	2.97	5.42	4.17	6.12	11.89	5.95	2.79	6.75	2.46	4.29	6.97	7.11	66.89
1924	7.39	6.10	3.35	1.93	2.88	5.83	2.44	0.62	1.26	0.36	0.40	8.49	41.05
1925	12.30	4.97	1.64	0.01	4.10	1.66	7.35	2.18	4.09	8.97	3.08	2.19	52.54
1926	10.78	4.13	10.56	5.67	3.07	3.54	8.12	8.41	0.72	1.60	4.56	7.20	68.36
1927	0.81	9.34	6.76	3.02	2.39	6.53	4.58	2.36	2.18	5.70	4.18	8.94	56.79
1928	0.86	3.41	5.55	7.85	4.04	17.01	4.64	3.63	2.12	0.67	5.49	4.59	59.86
1929	5.97	11.81	10.77	3.99	6.30	5.69	7.41	6.43	6.34	4.20	8.75	3.74	81.40
1930	6.28	3.76	5.24	0.49	4.07	1.35	5.82	3.91	9.12	2.21	9.37	4.87	56.49
1931	4.54	3.62	4.10	1.54	4.68	2.99	5.43	3.62	1.22	1.33	4.17	13.15	50.39
1932	9.29	4.21	2.50	4.20	7.21	3.45	5.36	5.70	3.46	6.88	3.67	8.63	64.56
1933	2.58	8.74	4.93	9.84	2.32	1.44	14.23	7.60	2.90	0.30	1.43	1.87	58.18
1934	7.48	7.59	5.27	4.44	6.26	2.68	4.31	7.25	2.97	4.22	7.46	2.18	62.11
1935	3.47	5.42	9.22	8.79	4.26	5.10	10.12	5.45	1.54	1.21	3.39	6.64	64.61
1936	7.35	5.60	1.62	4.54	4.39	0.08	11.39	5.75	1.90	0.10	2.31	8.71	53.74
1937	8.19	2.72	5.51	5.06	5.54	7.15	2.60	6.54	1.87	8.72	5.76	2.65	62.31
1938	3.79	3.04	4.88	7.06	0.75	2.41	5.04	4.19	2.59	1.07	4.26	5.22	44.30
1939	4.01	6.02	6.92	2.99	9.68	5.62	7.70	7.72	4.46	3.93	0.52	2.78	62.35
1940	2.09	7.37	4.48	5.01	0.95	7.27	10.83	3.52	1.88	0.88	1.97	9.43	55.68
1941	2.51	2.14	5.79	4.76	0.62	3.01	6.75	1.38	2.96	3.03	4.46	8.57	45.98
1942	5.15	3.82	7.52	1.87	8.12	5.72	5.34	7.17	4.04	1.75	4.31	7.58	62.39
1943	3.21	3.95	15.10	6.77	2.59	3.04	3.56	4.77	7.48	0.36	3.56	4.71	59.10
1944	5.25	4.61											
Avg.	5.26	5.30	5.71	4.85	4.72	4.73	6.64	5.13	3.49	2.59	3.55	5.45	57.42

*Estimated from surrounding stations   T less than 0.01 inch
Altitude: 157 feet   Records from U. S. Weather Bureau

southeast-flowing larger streams, and the drainage pattern is essentially that developed on gently dipping unconsolidated strata characteristic of the Gulf Coastal Plain. During Pleistocene and possibly Pliocene time extensive deposits of sand, gravel, and clay were laid down over the area, more or less as a blanket. Streams developed on the extensive surficial deposits supposedly would follow during their early life the slopes resulting from the shape of the depositional surface. As the larger streams cut down through the sedimentary cover, the position of the underlying tilted sediments would control the distribution of the smaller tributaries and cause the larger tributaries to move southwest in their valleys. The master stream, Pascagoula River, cuts across the older structural pattern as well as the consequent pattern developed on the Citronelle and the higher terrace deposits.

Foster[7] described two groups of terraces which he designated the high and low terraces and which are partly associated with the present drainage system. The higher and older group of three more prominent surfaces culminates in the Eatonville Plain between the Leaf and Bouie Rivers in northern Forrest County where the plain reaches an altitude of about 300 feet. It can be followed both north and south and is the terrace whereon most of Camp Shelby is built. Many divides throughout the region are concordant with the Eatonville Plain which is 75 to 100 feet below the crests of cuestas where typical sands and gravels of the Citronelle formation are exposed. The lower terraces rise above the flood plains in 5 to 15-foot scarps, four of which are prominent along Tallahala Creek in northern Perry County. They represent benches formed since the drainage system assumed its present general outline and probably coalesce with coordinate marine benches cut along the Mississippi Gulf Coast.

GEOLOGY AND GROUND-WATER HYDROLOGY

STRATIGRAPHY

The first attempt to subdivide beds now known as the Catahoula standstone, the Hattiesburg formation, and the Pascagoula formation, which are of primary concern for water supply, was made by L. C. Johnson[8] who published the following descriptions in 1893:

"Whilst at work for the U. S. Geol. Survey (1889), the Grand Gulf was explored, to a considerable extent in Louisiana, Mississippi, and Alabama.

"Dr. Hilgard, for Mississippi, divided it lithologically into two phases: the first well seen at Grand Gulf, in which quartzites prevail; the second, most abundant, has the peculiar characteristic silicious clay-stones, found in such masses nowhere outside of this group.

"It was the fortune of the writer to observe two other phases in Mississippi:

"(1) The quartzitic phase — being only a phase of the next — roughly estimated, extends from the north-west corner of the formation on Big Black River, to a curved line drawn across from Rodney to Pelahatchie. It is most largely developed on Bayou Pierre and Coles Creek. For convenience it may be called the 'Bayou Pierre Phase.'

"(2) The second, having very irregular boundaries, may have its southern line drawn from Tunica, in Louisiana, by Columbia, Miss., by the mouth of Okatoma Creek, by the Falls on Leaf River near Estabuchie, passing to the southward of Ellisville and crossing Chickasawhay River between Winchester and Waynesboro. For convenience this division will be called the Fort Adams, or the Ellisville phase.

"(3) More remote from the Great River, and southing farther, the less silicious the formation becomes, at Hattiesburg, and on that part of Leaf River from Okatoma to Rogers Creek, and on Chickasawhay above Leakesville, a third phase is exhibited, abounding in phytogene remains — almost lignitic. This is the Hattiesburg phase or formation.

"(4) A fourth manifests itself below Leakesville on the Chickasawhay, on the Lower Leaf River and Pascagoula — being clays of a more tenaceous quality — abounding in specks and nodules of calcareous material, and in a few places holding shells of mollusks. One locality of the last, where first discovered, is the Shell Landing below Roberts Bluff, four miles south-west of Vernal postoffice. This is the Pascagoula phase or formation."

These lithologic differences were recognized by later workers (with somewhat different time connotations) and the two upper units, Hattiesburg and Pascagoula, are now considered formations whose type localities are those designated by Johnson. The Catahoula sandstone, as now used by the U. S. Geological Survey, refers to type deposits at Catahoula Parish, Louisiana,[9] which have been correlated with Hilgard's Grand Gulf. G. C. Matson[10] changed the descriptions of the Hattiesburg and Pascagoula formations by including in the Hattiesburg that portion of the "Fort Adams or Ellisville phase that extends from the mouth of Okatoma Creek eastward past the falls on Leaf River near Estabutchie to Chickasawhay River between Winchester and Waynesboro," and by including in the Pascagoula formation the portion of the Fort Adams or Ellisville phase extending from Tunica, Louisiana, to Columbia, Mississippi. The course of the Chickasawhay River between Winchester and Waynesboro traverses part of the outcrop belt of the Catahoula sandstone.

In general, the stratigraphic units of Matson are followed in this report. However, the formation boundaries are believed to be somewhat different from the positions shown on the latest geologic map.[11]

The Citronelle formation, of Pliocene age, is found only on the crests of the divides where it disconformably overlaps the Pascagoula and Hattiesburg formations and possibly the Catahoula sandstone. High terrace deposits of similar composition are intimately associated with the Citronelle formation, but the relationships are obscure. Still younger deposits exposed beneath benches flanking present streams presumably were deposited by the streams which formed the valleys.

TERTIARY SYSTEM — MIOCENE

CATAHOULA SANDSTONE

GENERAL GEOLOGY

The Catahoula sandstone is a nonmarine formation where exposed in an outcrop belt about 10 miles wide some 30 miles northeast of Camp Shelby. The belt extends in a northwesterly direction from northern Wayne County to Vicksburg (Plate 1). The Catahoula is part of the thick Tertiary sediments exposed on the northern limb of the Gulf Coast geosyncline, and its strike is northwest rather than west, because the sandstone was deposited on a surface somewhat modified by the Mississippi Embayment, an auxiliary trough whose axis trends at right angles to the axis of the geosyncline. Thus the Catahoula sandstone lies at depths beneath younger Miocene sediments to the south and west and at increasing depths away from the outcrop belt.

The exposures are composed of clay, silt, siltstone, and gravel, besides the sand and sandstone for which the formation is named. In the buried extensions south of the outcrops, marine tongues have been described,[12] and beneath the camp the bottom of fresh water appears to be the top of the most prominent marine tongue — limestone and sandy limestone containing a characteristic fauna of the foraminifera *Heterostegina israelskyi, Heteroste-*

gina texana, and several species of *Miogypsina*.[13] D. W. Gravell and M. A. Hanna[14] called the tongue the *Miogypsina - Heterostegina* zone, and it is widely referred to as the *Heterostegina* zone or the *Heterostegina* limestone. In deep wells nonmarine sand and shale beneath the *Heterostegina* zone range from 100 to 700 feet in thickness according to Gravell and Hanna,[15] but, as the limestone has not been recognized in outcrop, its stratigraphic position within the Catahoula sandstone is indefinite. The nonmarine sand, shale, and gravel above the *Heterostegina* zone are here correlated with material ranging from 240 to 640 feet.

Figure 2.—Catahoula sandstone, near the top of the formation, 3 miles east of Ellisville. (Station J 5, SW.¼, NE.¼, Sec. 7, T. 7 N., R. 11 W.), Jones County.

The upper part of the Catahoula sandstone encountered in wells in Covington County[16] has been described as nonpersistent sand and shale beds; however two horizons, a bed of red-mottled light-gray and sandy shale and a bed of gravel and sand, were found throughout the northern part of the county. The shale is described as 80 to 100 feet thick and about 140 feet below the overlying Hattiesburg formation; the gravel, as 60 feet thick and about 35 feet below the shale. Of the two sands penetrated in the water wells at Laurel, Jones County, the upper sand is the most productive aquifer, locally containing coarse sand and gravel which may be the equivalent of the sand and gravel near the middle of the section in Covington County. Coarse sand and gravel have also been logged in the upper part of the Catahoula sandstone at Hattiesburg and Camp Shelby.

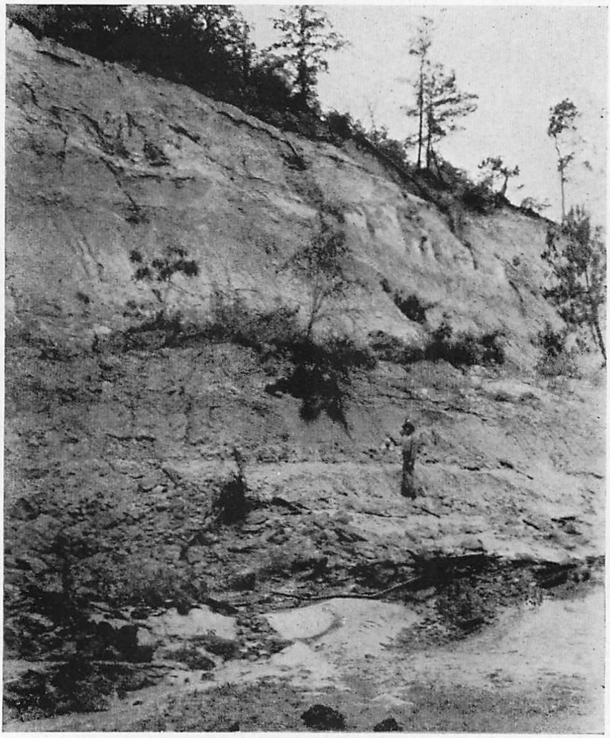


Figure 3.—Catahoula sandstone in a bluff on the Chickasawhay River. (Station W 2, SW.¼, SW.¼, Sec. 10, T. 7 N., R. 6 W.), Wayne County.

The upper part of the Catahoula sandstone contains clay and is characterized by fine sandstone and siltstone ledges and poorly sorted sand and sandstone which weather light gray or white (Figures 2, 3). Many of the clays are mottled by oxidized iron stain; some layers are reported bentonitic.[17] The top of the Catahoula in outcrop was described by the Mississippi Geological Society as follows:[18]

"The top most member [of the Catahoula sandstone] is a gray silty clay with red ferruginous mottlings which become brown and limonitic toward the base. In some areas this horizon becomes a silt or claystone, due to weathering and case hardening. Immediately below this, there is a soft silty sand which is more rarely seen than the bed above.

"This zone is readily traceable throughout the east half of its exposure in the State and it is a good horizon on which to work surface detail."

The reconnaissance boundary shown on Plate 1 is essentially this contact, or slightly below it. Sand lenses directly below it do not contain garnet, whereas in the sand lenses stratigraphically higher pink garnet is abundant — as far as the writer was able to determine from scattered sampling. W. O. George and H. X. Bay[19] described the base of the Catahoula as marked by an abundance of brown tourmaline, garnet, and zircon, not found in underlying beds, but this characteristic may refer to sediments below the Catahoula sandstone as the term is used in this report. The sands from wells at Laurel contain an abundance of feldspar.

An exposure of the upper part of the Catahoula sandstone in a bluff on the Chickasawhay River, Wayne County, reveals the type of sediments (Figure 3):

SECTION OF THE BLUFF OF THE CHICKASAWHAY

(Station W 2, SW.¼, SW.¼, Sec. 10, T. 7 N., R. 6 W.)

	Feet	Feet
Citronelle formation or high terrace deposits		33.0
Sand, yellow; contains a few pebbles and flakes of clay	33.0	
Catahoula sandstone		77.4
Clay, sandy, and clay; weathers gray, red, and purple	5.0	
Sand, gray, medium to fine	1.5	
Clay, gray and yellow sandy	3.5	
Sand, fine; weathers yellow; somewhat indurated	2.0	
Clay; weathers red	1.0	
Sand and sandstone, gray and yellow; very clayey; steeply cross-bedded	17.0	
Clay, gray; red stain at the top	12.5	
Sand, gray clayey and silty; thin-bedded at base where it is stained yellow	6.3	
Clay, gray and somewhat waxey	18.0	
Sand, gray and yellow; slightly coarser near base; thin strata of light-gray kaolinitic clay	10.6	

The Catahoula sandstone rests on the Chickasawhay limestone, the top of the thickest Tertiary marine sequence outcropping in Mississippi. It lies beneath the Hattiesburg formation, seemingly with conformable relations, so that the sandstone appears to be the basal coarse unit for the deltaic and estuarine deposits, associated with the delta of the Mississippi River, that possibly range in age from Miocene to Recent.

HYDROLOGY OF THE CATAHOULA SANDSTONE

Abundant ground-water supplies are obtained from the Catahoula sandstone at Laurel and Hattiesburg. The beds of clay in the formation and over it confine the water nearly everywhere so that throughout the flood plains and low terraces in the Pascagoula basin the wells flow. In recent years the hydraulic head has been lowered at Laurel and at Hattiesburg. Wells at Hattiesburg continue to flow, but the pressure surface is only a few feet above the flood plain of the Leaf-Bouie River. The decline has been most marked since 1940 when Camp Shelby began to expand, the hydraulic head of the low period during the fall of 1943 being about 2¾ feet below that of the corresponding period in 1940. Plate 5 shows pumpage at Camp Shelby and the decline at Hattiesburg in water levels in well 30 which penetrates the Catahoula sandstone. Casual inspection suggests that camp production in 1941 caused a lowering of the water level, but a decrease in camp production during 1942 and 1943 did not show a corresponding increase in water level. Also it should be noted that there is a difference of about 20 feet in the static level in the sands of the Hattiesburg formation at the Hattiesburg Army Air Base and in the Catahoula sandstone in the near-by Forrest County 33 well. Accordingly, a more likely explanation is that there is no hydrologic connection between the wells in the Catahoula sandstone at Hattiesburg and the wells in the sand of the Hattiesburg formation at Camp Shelby, but rather that the variations are due to production changes at Hattiesburg where fluctuation of population is somewhat in sympathy with the changes in population at the camp. The geology furnishes additional support for this interpretation (Plate 2).

A well (Forrest County 41) drilled to a depth of 720 feet at Camp Shelby in 1918 penetrated 75 feet of sand and gravel, probably the Catahoula sandstone. This aquifer contains a large potential supply should the upper sands in the Hattiesburg formation as presently utilized prove inadequate.

HATTIESBURG FORMATION

GENERAL GEOLOGY

The Hattiesburg formation extends across South Mississippi in a belt paralleling and south of the Catahoula sandstone, which it overlies. Along the Chickasawhay River the sediments of the Hattiesburg are exposed for an airline distance of about 35 miles, and beds of similar appearance are well exposed along the banks of the Leaf and Bouie Rivers (Plate 1, and Figures 4-6).

The upper boundary of the Hattiesburg formation would seemingly be at the top of the nonmarine deposits which characterize

Figure 4.—Cross-bedded clay and silt in the lower part of the Hattiesburg formation beneath 2 feet of flood-plain gravel containing silicified tree trunks (just below the roots), Bouie River. (Station F 1, NW.¼, NW.¼, Sec. 30, T. 5 N., R. 3 W.), Forrest County.

it. The first marine fossils observed in a detailed survey by boat down the Chickasawhay River was at Station G 7, about 1 mile upstream from the type locality of the Pascagoula formation at Shell Landing, about 15 miles south of the contact as shown on the reconnaissance geologic map of Mississippi.[11] At no place to the north, either on the Leaf or the Chickasawhay Rivers, was

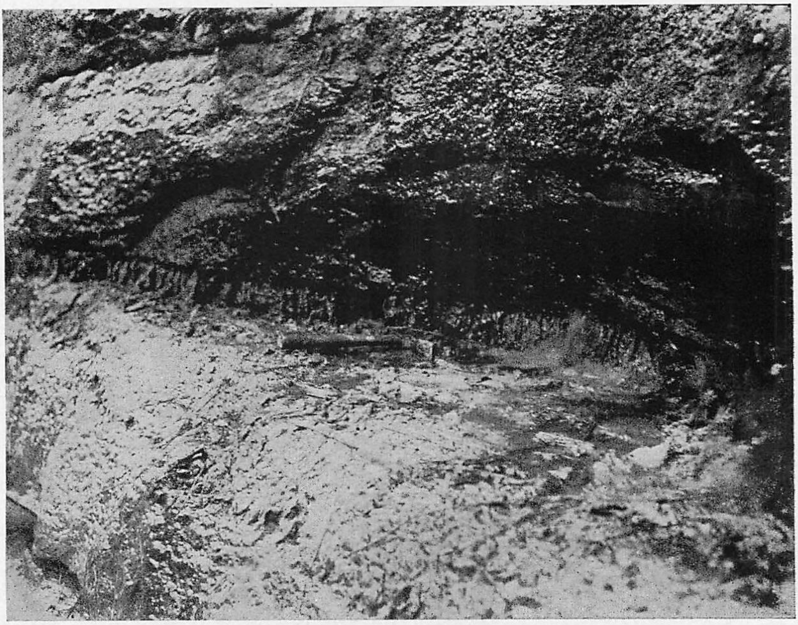


Figure 5.—A thin bed of sand in clay in the upper part of the Hattiesburg formation. The fluted appearance of the lens cross section seems to be a surface phenomenon connected with rill wash. (Station F 2, NE.¼, NE.¼, Sec. 15, T. 3 N., R. 12 W.), Forrest County.

Figure 6.—Silty clay of the Hattiesburg formation, typical exposure along the lower Leaf River. (Station P 8, NW.¼, SE.¼, Sec. 25, T. 3 N., R. 10 W.), Perry County.

difference in lithology noted which would justify separation from the Hattiesburg-type sediments. The idea that the Pascagoula-Hattiesburg contact is farther south is not original with the writer, for H. N. Toler, Southern Natural Gas Company, suggested before field work was begun that the Pascagoula-Hattiesburg contact was much farther south than heretofore shown on a published map. However, the contact was not mapped and subsurface separation was not attempted, because of insufficient data and because the question does not have a direct bearing on the water supply at Camp Shelby.

If the dip is about 25 feet a mile, the Hattiesburg formation is 875 feet thick where the Chickasawhay River crosses it. The Lucedale-Wiggins structural ridge doubtless decreases the dip in the south part, so that 600 feet would be a better estimate of its thickness.

These river exposures contain beds of clay, silty clay, laminated silt, siltstone, fine sandstone, and minor beds of sand (Figures 4-6). Locally, as in a road cut at New Augusta, Perry County, and Station F 2, calcareous nodules are prominent. Nearly all the exposures are composed of gray-green and blue-green silty clay. In the lower 50 feet of the formation siltstone ledges are prominent, especially along the Leaf River and Tallahala Creek in southern Jones County. Several samples of sand were collected from these exposures and the common heavy minerals and some of the feldspars are listed in Table 2. The minerals studied which help to differentiate the Hattiesburg formation from the Catahoula sandstone are almandite garnet and green hornblende. The hornblende was not abundant in any of the samples but it seemed most common in samples from the upper part of the Hattiesburg. It is much more abundant in the samples from the overlying Pascagoula formation in wells along the Gulf Coast. Additional study may indicate that the hornblende can be used to separate the Hattiesburg formation from the Pascagoula formation, for W. M. Cogen[20] has shown that heavy mineral zones have some stratigraphic significance on the Gulf Coast but that the boundaries of the zones are not sharp.

Details of lithology of the Hattiesburg formation may be gained from a study of a series of bluffs along the Leaf and Chickasawhay Rivers and in cuts along State Highway 24.

TABLE 2

DISTRIBUTION OF HEAVY MINERALS AND SOME FELDSPARS IN OUTCROPS IN THE CAMP SHELBY REGION AND IN WELLS AT THE HATTIESBURG AND LAUREL ARMY AIR BASES AND AT CAMP SHELBY

LOCALITY OR WELL NUMBER (PLATE 1 AND TABLE OF WELLS)	DEPTH INTERVAL IN WELL (feet)	MAGNETITE[1]	LIGHT OPAQUE GRAINS[2]	ZIRCON	STAUROLITE	BROWN TOURMALINE	KYANITE	SILLIMANITE	EPIDOTE	ALMANDITE GARNET	GREEN HORNBLENDE	RUTILE	MONAZITE	CEYLONITE (?)	ORTHOCLASE	MICROCLINE	ALBITE ANDESINE	ANDESINE OLIGOCLASE
Terrace deposits																		
Camp Shelby																		
Well A-13	15- 80	x	x	x	x		x	x		x		x		x				
Pascagoula formation																		
G-6		x	x	x	x	x	x		x	x		x						
G-7		x	x	x	x	x	x		x			x						
G-8		x	x	x	x	x	x		x	x	x	x	x		x	x		
Hattiesburg formation																		
W-4		x	x	x	x	x	x	x				x						
J-2		x	x	x	x	x	x	x		x		x	x		x	x		
J-3		x	x	x		x				x			x					
J-4		x	x	x	x	x	x			x		x	x	x				
J-8		x	x	x	x	x	x	x	x			x			x	x		
J-9		x	x	x	x	x	x	x	x			x			x	x	x	
J-10		x	x	x	x	x	x	x	x			x			x	x	x	
G-1		x	x	x	x	x	x		x	x		x	x	x		x		
G-2		x	x		x		x		x		x	x	x					
G-3		x	x	x	x	x	x		x	x	x	x		x				
G-5		x		x	x	x	x		x									
P-3		x	x	x	x	x	x		x	x	x	x		x				
Camp Shelby																		
Well A-13	315-398	x	x	x	x	x	x	x	x	x	x[3]	x						
Well A-14	257-278	x	x	x	x	x	x	x	x	x	x[3]	x						
Well A-14	405-428	x	x	x	x	x	x	x	x	x								
Well A-16	195-255	x	x	x	x	x	x		x	x			x	x				
Well A-16	255-274	x	x	x	x	x	x		x	x			x	x	x	x		x
Well A-16	325-345	x	x	x	x	x	x		x	x			x	x				
Well A-16	365-385	x	x	x	x	x	x		x	x			x	x	x	x		x
Hattiesburg Army Air Base																		
Well A-2	180-277	x	x	x	x	x	x	x	x	x				x	x	x		x
Upper part of Catahoula sandstone																		
W-3		x	x	x	x		x	x	x			x		x	x	x		
J-1		x	x		x	x	x	x				x			x	x		
J-1a[4]		x	x	x	x	x	x	x	x			x		x	x	x		
Laurel Army Air Base																		
Well 1	177-218			x		x	x		x									
Lower part of Catahoula sandstone																		
W-1		x	x	x	x	x	x			x		x	x					
Laurel Army Air Base																		
Well 1	263-268			x		x			x	x					x	x		x

[1] Includes ilmenite, chromite, and other dark opaque grains

[2] Includes leucoxene, collophane, and other light-colored opaque grains

[3] Very rare

[4] From an outcrop of Catahoula sandstone 3 miles northeast of Laurel (not shown on Plate 1)

SECTION OF THE LOWERMOST BEDS OF THE HATTIESBURG FORMATION IN A BLUFF ON THE EAST BANK OF THE LEAF RIVER (STATION J 6, SW. ¼, NE. ¼, SEC. 8, T. 7 N., R. 13 W.), JONES COUNTY

	Feet	Feet
Citronelle formation or younger deposits		9.0
Sand and gravel; weathers orange, red, and gray	8.0	
Gravel, light-gray chert; siltstone weathers yellow	1.0	
Hattiesburg formation		86.1
Clay; weathers gray and red	9.0	
Siltstone and fine sandstone; clayey and slightly bedded; weathers yellow	4.0	
Clay, blocky; weathers gray and red	15.0	
Siltstone and silt forming ledge; light gray	2.5	
Clay, massive; weathers medium gray and brown	5.1	
Clay and silt; some thin yellow laminations; weathers light gray	10.0	
Sand, gray medium-grained quartz	2.0	
Clay, gray massive	5.0	
Clay and sand; partly covered; weathers gray	9.0	
Sand, clay, and sandy clay; weathers gray; some sand weathers yellow	6.0	
Shale and clay, thin-bedded; contains lenses of fine gray sand and carbonaceous plant fragments	2.0	
Siltstone, hard; base very irregular; forms prominent bench; from 0.3 to	1.5	
Clay; contains light-gray bentonitic concretions and iron-stained red blotches	6.0	
Claystone, blocky	1.0	
Clay, gray blocky	8.0	

SECTION AT THE WEST END OF THE LONG BLUFF ON THE WEST BANK OF CHICKASAWHAY RIVER, IN THE LOWER PART OF THE HATTIESBURG FORMATION (STATION G 1, SE. ¼, NW. ¼, SEC. 14, T. 5 N., R. 6 W.), GREENE COUNTY

	Feet	Feet
Alluvial deposits		15.0
Loam, sandy	3.0	
Sand and fine gravel, cross-bedded	12.0	
Hattiesburg formation		24.5
Clay and sand, thin-bedded; marked horizontal laminae; more sand in eastern part of outcrop; from 10.0 to	12.0	
Sand, very clayey; weathers red, yellow, and gray (Minerals studied)	2.5	
Clay; thin sand streaks; gray-green	5.0	
Clay; weathers brown	5.0	

SECTION IN UPPER PART OF HATTIESBURG FORMATION IN A CUT ON STATE HIGHWAY 24, ONE MILE EAST OF EAST GATE, CAMP SHELBY (STATION P 5, SW. ¼, SW. ¼, SEC. 20, T. 3 N., R. 11 W.), PERRY COUNTY

	Feet	Feet
High terrace deposits		15.0
Gravel and sand; mostly quartz and brown chert	15.0	
Hattiesburg (?) formation		16.3
Clay, gray silty; some red splotches in lower part	6.0	
Sand; medium at base grading up to very clayey silt	2.3	
Clay, gray gritty; blockier than below	2.7	
Clay, gray gritty; weathers brown with manganese stain near the roadbed	5.3	

SECTION IN UPPER PART OF HATTIESBURG FORMATION IN CUT ON STATE HIGHWAY 24, 1.5 MILES EAST OF EAST GATE, CAMP SHELBY (STATION P 6, NE.¼, SW.¼, SEC. 20, T. 3 N., R. 11 W.), PERRY COUNTY

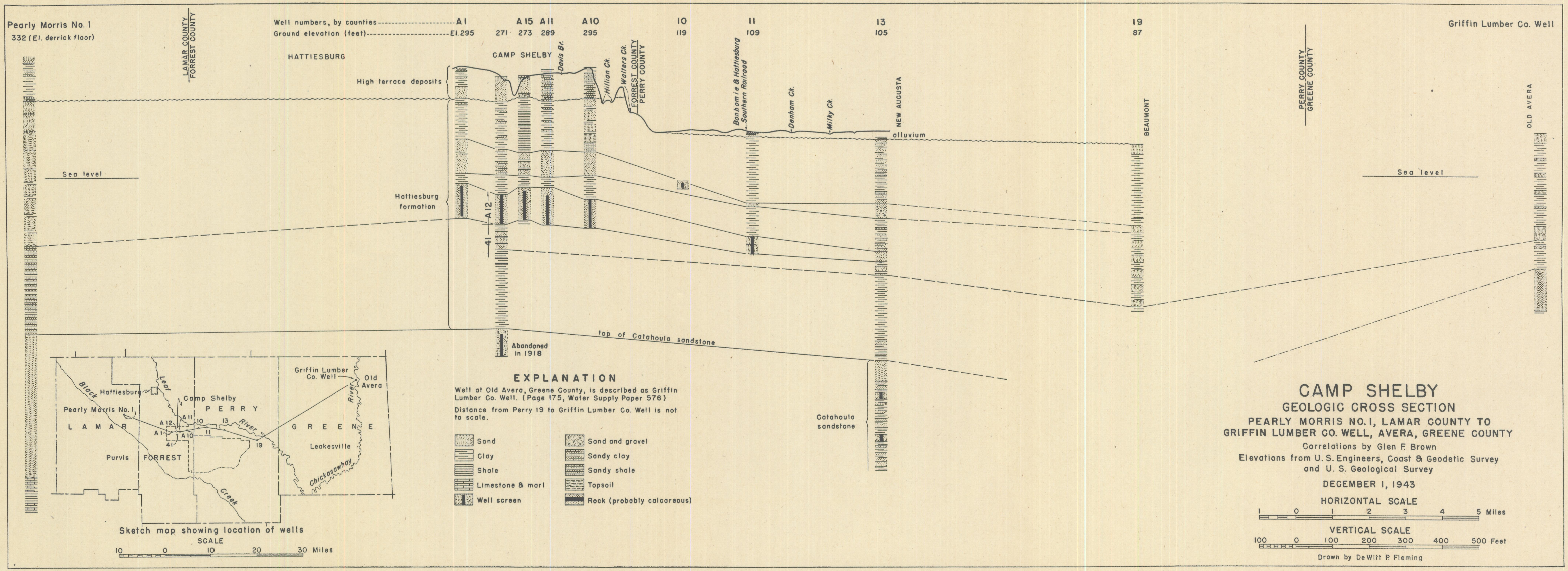
	Feet	Feet
High terrace deposits		12.0
Sand and gravel; mostly quartz and brown chert	12.0	
Hattiesburg formation		47.2
On south side of road		
Clay; weathers dark gray and brown, locally yellow	10.3	
Clay, light-gray; silt	6.0	
Clay; weathers yellow	1.5	
Clay, blue-gray; weathers loose	6.0	
Clay and silt, medium-grained gray massive	4.0	
Silt and sand; weathers bright yellow	1.0	
Silt and clay, thin-bedded	3.0	
Clay, brown and blue-gray; weathers loose; some fairly pure	4.1	
On north side of road		
Clay, silty; weathers pale yellow	1.0	
Clay, dark-gray loose	1.8	
Silt, thin-bedded; weathers gray-green	2.0	
Sand, fine; somewhat more silty	1.0	
Sand, fine white	2.2	
Silt, thin-bedded; weathers gray-green	3.3	

Beneath the surface in Forrest and Perry Counties, the Hattiesburg formation contains at least two prominent sand beds which produce the water supply at Camp Shelby. These beds can be followed along the strike for 18 miles (Plate 3) by correlation of drillers' logs; but along the dip correlations are more difficult. Furthermore, in the outcrop area, sand thicknesses could not be found comparable to those in wells beneath the camp. However, violent erosion cycles during the Pleistocene could have removed the sands along the Leaf River between Hattiesburg and the camp, leaving only the clays exposed to view above the river gravels.

Fossil leaves were collected on the west bank of Tallahala Creek about 10 miles east of Hattiesburg (Station P 2, NE.¼, NE.¼, Sec. 8, T. 4 N., R. 11 W.), Perry County, from sandy and silty shale believed to be in the middle or upper part of the Hattiesburg formation. As identified by Dr. Roland W. Brown of the U. S. Geological Survey, they are:

Monocotyledonous fragments that may be palm, cattail, grass, or sedge leaves
Taxodium sp. (bald cypress)
Salix sp. (willow)
Morus sp. or *Celtis* sp. (mulberry or hackberry)

"The monocotyledonous fragments in this collection have little significance. The *Taxodium* is apparently the same as the modern bald cypress. The *Morus* (or *Celtis*) and *Salix* species have



EXPLANATION

Well at Old Avera, Greene County, is described as Griffin Lumber Co. Well. (Page 175, Water Supply Paper 576)

Distance from Perry 19 to Griffin Lumber Co. Well is not to scale.

- Sand
- Clay
- Shale
- Limestone & marl
- Well screen
- Sand and gravel
- Sandy clay
- Sandy shale
- Topsoil
- Rock (probably calcareous)

CAMP SHELBY

GEOLOGIC CROSS SECTION

PEARLY MORRIS NO. 1, LAMAR COUNTY TO GRIFFIN LUMBER CO. WELL, AVERA, GREENE COUNTY

Correlations by Glen F. Brown

Elevations from U. S. Engineers, Coast & Geodetic Survey and U. S. Geological Survey

DECEMBER 1, 1943

HORIZONTAL SCALE

1 0 1 2 3 4 5 Miles

VERTICAL SCALE

100 0 100 200 300 400 500 Feet

Drawn by DeWitt P. Fleming

TABLE 3

MECHANICAL ANALYSES AND COEFFICIENTS OF PERMEABILITY OF WATER-BEARING SANDS FROM WATER WELLS IN CAMP SHELBY AREA (BASED ON ROTARY CUTTINGS)

Depth in feet	DIAMETER OF SCREEN OPENINGS ON WHICH EACH FRACTION RESTS (PERCENT)							Laboratory coefficient of permeability (Meinzer's units)
	2.0 mm. Granule gravel	1.0 mm. Very coarse sand	0.5 mm. Coarse sand	0.25 mm. Medium sand	0.125 mm. Fine sand	0.062 mm. Very fine sand	0.00 mm. Silt, clay	
Camp Shelby A 13								
15 - 80	0.0	2.0	20.6	53.8	23.2	0.4	0.0	704
190 - 280	0.0	0.0	1.4	52.2	45.0	1.3	0.1	584
315 - 390	0.0	0.1	3.8	82.3	13.4	0.4	0.0	869
Camp Shelby A 14								
226 - 257	0.0	0.2	10.6	65.8	21.7	1.7	0.0	779
257 - 278	0.7	2.0	6.6	49.1	37.4	2.8	1.4	535
363 - 385	0.0	0.0	1.9	90.0	7.9	0.2	0.0	1151
385 - 405	0.0	0.0	6.9	81.3	11.5	0.3	0.0	976
Camp Shelby A 16								
195 - 215	0.7	5.3	10.8	56.5	25.7	0.9	0.1	640
215 - 235	1.2	2.2	4.1	45.2	46.4	0.8	0.1	550
235 - 255	5.5	8.6	12.8	54.3	18.3	0.4	0.1	673
255 - 274	4.4	8.3	12.9	55.5	18.3	0.5	0.1	673
325 - 345	0.0	0.0	1.1	69.4	27.2	1.8	0.5	666
345 - 365	0.0	0.1	25.1	68.1	6.3	0.3	0.1	1235
365 - 385	0.0	0.1	8.3	85.4	5.7	0.3	0.2	1185
Hattiesburg Army Air Base 1								
10 - 20	0.9	8.3	37.6	49.8	3.3	0.1	0.0	1560
20 - 43	1.2	9.7	39.8	46.9	2.4	0.0	0.0	1629
43 - 65	1.1	5.8	29.9	57.3	5.7	0.2	0.0	2029
65 - 88	0.5	0.4	2.5	41.1	54.1	1.4	0.0	484
Hattiesburg Army Air Base 2								
160 - 180	0.0	0.2	6.0	86.1	7.3	0.4	0.0	919
180 - 200	0.3	2.5	20.3	67.3	9.2	0.4	0.0	908

never been reported from the Tertiary of the southeastern states and resemble species now living in that region."

As no marine fossils were found and as carbonaceous fragments and effervescent salt crystals are scattered through many outcrops, it seems likely that the Hattiesburg formation was deposited in a brackish water environment as part of a deltaic mass wherein plant remains would be partly preserved.

Recently, Carl B. Richardson, of the Barnsdall Oil Company, in an address to the Mississippi Geological Society, described a principle which he had found applicable in the Gulf Coast of Texas. In his experience, beds of sand between nonmarine or lagoonal shales tend to wedge out landward, and beds of sand between marine shales almost always wedge out seaward. He has compiled maps from U. S. Coast and Geodetic Survey data showing the distribution of bottom sediments in the Gulf of Mexico and has correlated the distribution of sand with the currents in the Gulf. Thus sands deposited in the Gulf by streams are distributed along the strike by shore-wise currents (witness the offshore islands on the outer edge of the Mississippi Sound), but stream position, seasonal changes, or even individual storms could change the source material, thereby submerging the sand under finer clastic material. Richardson's careful analysis would explain the distribution of sand in the Hattiesburg formation in the Camp Shelby region, for certainly his thought regarding sand between nonmarine shale is demonstrated here.

HYDROLOGY OF THE HATTIESBURG FORMATION

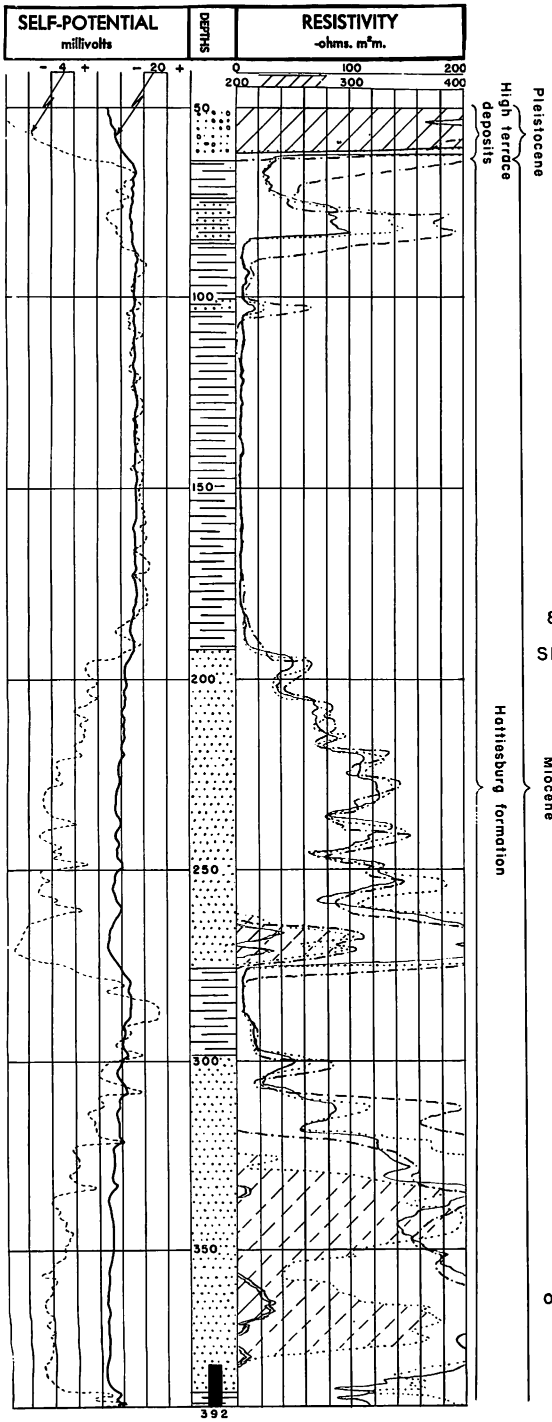
BY ROBERT WYNN ADAMS

The lower of two sands in the Hattiesburg formation, wherein wells are screened at the camp, wedges out updip and in the direction of Hattiesburg (Plate 2); and, further, water-level changes suggest that there is no hydrologic connection between wells at Hattiesburg and at the camp. On the other hand, pumpage at Camp Shelby has lowered the water level in Perry County well 10 which penetrates only the upper sand and which is 2¼ miles northeast of camp well A 9; and well logs show a considerable variance in thickness of the clay between the two sands — evidence indicating that the two sands are hydrologically connected. The water levels obtained when pumps were turned off for several hours at the camp rose from 12 to 22 feet higher than

PLATE 4

CAMP SHELBY, MISSISSIPPI

ELECTRICAL LOG OF WELL A 16



EXPLANATION

Well screen

LITHOLOGIC UNITS

Clay

Sand

Sand and gravel

Silt

LOCATION

70 ft. east of 39th St.
80 ft. south of 2nd. Ave.

SE ¼ NW ¼ sec. 27

T. 3 N., R. 12 W.

Forrest County

Resistivity of natural mud 5.7 ohm-meters at 96° F.

Altitude 259.9 ft.

Hole diameter 7 in.

Resistivity curves

NORMAL ————

THIRD CURVE ··········

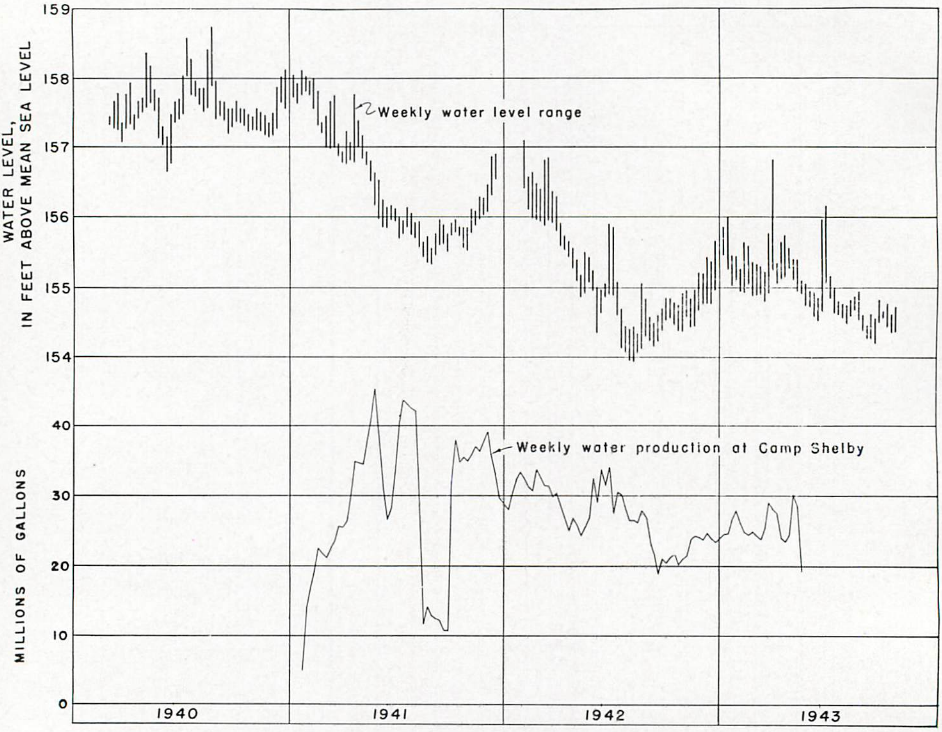
FOURTH CURVE —·—·—

Electrode spacings

AM	18 inches
AM'	63 inches
OA	20 feet

Observer, George M. Yoder
July 16, 1943

Plate 5

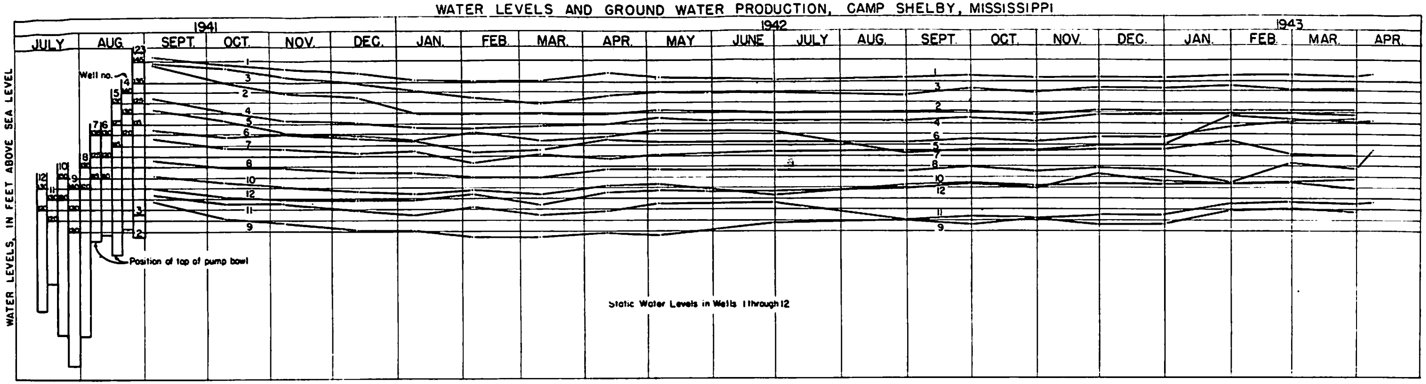


Graphs showing fluctuations of water level in an observation well (Forrest 30) at Hattiesburg, Mississippi, and the weekly production of water at Camp Shelby.

the static level in Perry County well 11, which is 3½ miles east of the camp and which is screened only in the lower of the two sands, suggesting that under the present conditions of development the hydrostatic pressure in the upper sand is higher than that in the lower sand. This view is further strengthened by the geological evidence that the upper sand lies against the gravels in the old Pleistocene river channel beneath part of the Leaf River between Hattiesburg and Camp Shelby (Plate 2). From the beginning of camp pumpage in January 1941 until March 1942, the water levels in the camp wells declined. Since March the levels have remained nearly the same, fluctuating up and down with pumping changes (Plates 6-7). During the first period the water was withdrawn from storage, and hydraulic gradients beneath the camp and the surrounding area were

PLATE 6

WATER LEVELS AND GROUND WATER PRODUCTION, CAMP SHELBY, MISSISSIPPI



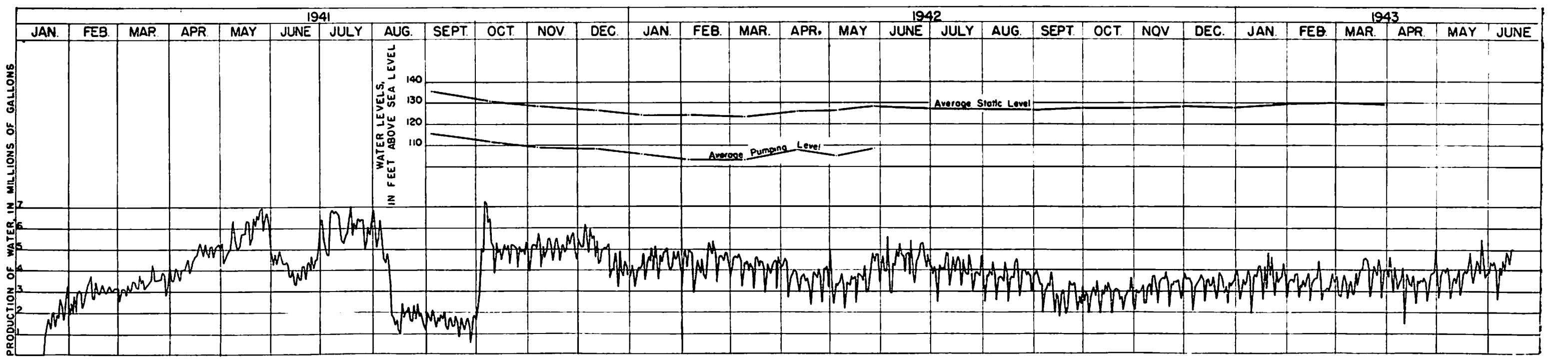
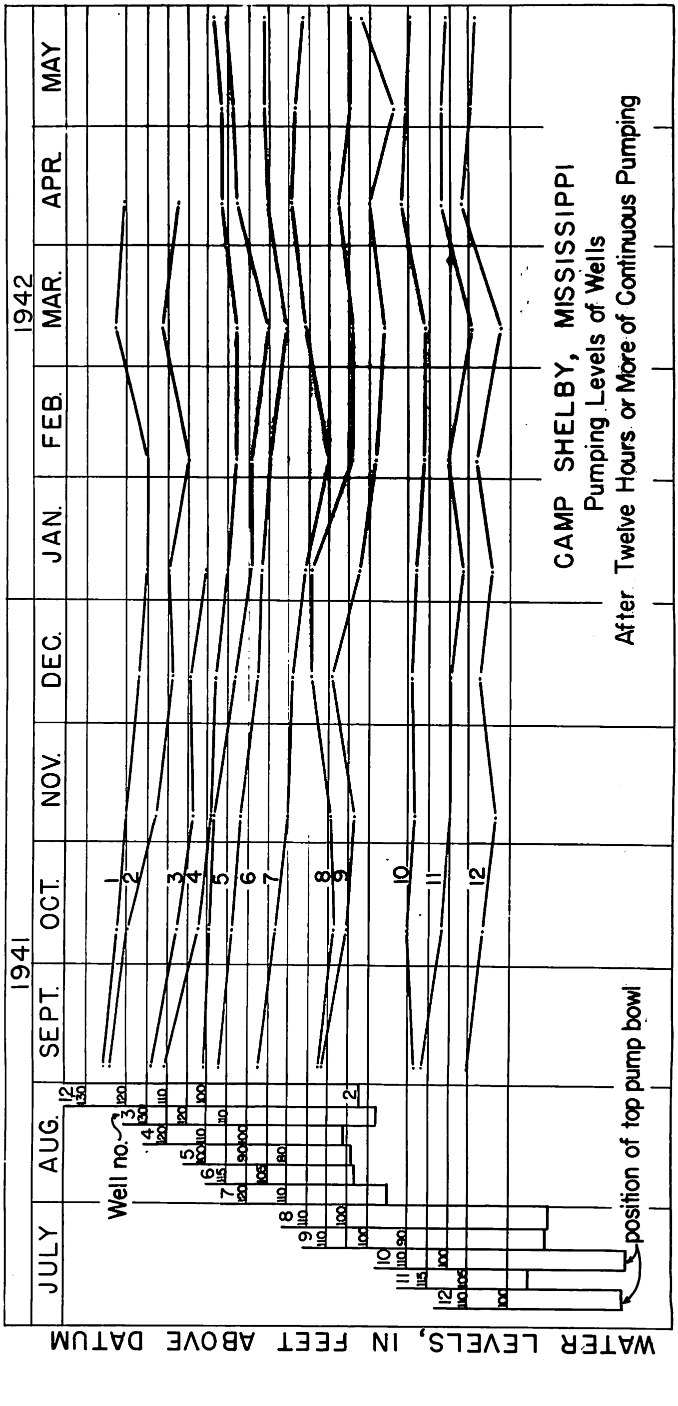


PLATE 7


CAMP SHELBY, MISSISSIPPI
Pumping Levels of Wells
After Twelve Hours or More of Continuous Pumping
1941
1942
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
Well no.
1
2
3
4
5
6
7
8
9
10
11
12
position of top pump bowl
WATER LEVELS, IN FEET ABOVE DATUM

steepened. Presumably in March 1942 these gradients were sufficiently steep to cause lateral movement of water from the Pleistocene gravels along Leaf River north of the camp into the upper sand, thence into the lower pressure areas in the lower sand beneath the camp. If this interpretation is correct, the problem of estimating future water levels will be primarily concerned with the transmission ability and extent of both sands, if they are connected, and of the hydrologic efficiency of the probable channelways between them. The exceedingly coarse gravels along the Leaf River indicate that the ultimate source of water would probably be more than the sand could transmit under conditions of safe yield.

The results of pumping tests to determine the coefficients of storage and transmissibility at Camp Shelby and the Hattiesburg Army Air Base are shown in Tables 4-6.

TABLE 4

COEFFICIENTS OF TRANSMISSIBILITY OF SANDS IN THE LOWER PART OF THE HATTIESBURG FORMATION AS COMPUTED FROM RECOVERY OF WATER LEVELS IN WELLS AT CAMP SHELBY

Well	Period of test (1943)	Length of pumping time (hours)	Period after termination of pumping used in computation (hours)	Coefficient of transmissibility	Field coefficient of permeability	Appearance of recovery curve
A 4	May 30 - June 2	18.2	70.9	64,000	681	Alignment in a neat curve
A 6	May 23-25	8.2	42.7	46,500	447	Alignment in a neat curve
A 6	May 26	25.7	10.8	46,200	444	Alignment good
A 12	June 1-2	31.2	16.4	51,000	633	Alignment fair
		Average		51,900	551	

TABLE 5

COEFFICIENTS OF TRANSMISSIBILITY OF SANDS IN THE LOWER PART OF THE HATTIESBURG FORMATION AS COMPUTED FROM OBSERVED DRAW-DOWN IN WELLS AT CAMP SHELBY AND HATTIESBURG ARMY AIR BASE

Well	Period of test (1943)	Time of observation (hours)	Coefficient of transmissibility	Field coefficient of permeability	Alignment of curve
A 6	May 25-26	12.5	32,300	311	Fair
A 12	May 31	10.8	70,000	853	Fair
Air Base 1	June 16	2.5	43,600	436	Good
		Average	48,600	533	

TABLE 6

COEFFICIENTS OF TRANSMISSIBILITY AND STORAGE OF SANDS IN THE LOWER PART OF THE HATTIESBURG FORMATION AS COMPUTED FROM INTERFERENCE BETWEEN WELLS AT CAMP SHELBY AND HATTIESBURG ARMY AIR BASE

(THEIS' GRAPHICAL METHOD)

Observation well	Pumped well	Period of test (1943)	Length of pumping time (hours)	COEFFICIENTS		
				Trans-missi-bility	Storage	Field permea-bility (aver-aging thick-nesses of sand at wells used)
A 6	A 12	May 31-June 1	31.0	54,500	.00018	586
A 7	A 6	May 25-26	20.0	62,000	.00046	608
A 8	A 9	June 12	22.8	133,000	.00033	1593
A 12	A 4	May 29-30	18.0	118,000	.00037	1229
A 15	A 12	May 31-June 1	30.0	110,000	.00030	1279
Air Base 2	Air Base 1	June 16	2.8	124,000	.00024	1771
		Average		100,250	.00031	1178

Besides these tests which utilize Theis' nonequilibrium formula, one Thiem test, based on the assumption that conditions of equilibrium exist, was made at Wells A 6, A 7, and A 13. The coefficient of transmissibility was 65,000 and the field coefficient of permeability was 677, based on an average sand thickness of 96 feet for the three wells involved.

The decline in water level in the lower sand would be about 17 feet at the Hattiesburg Army Air Base (using an average coefficient of storage of 0.00031 and an average coefficient of transmissibility of 67,000) if the pumpage at Camp Shelby continued for 1.23 years — when the water levels no longer continue to decline. This estimate agrees fairly well with water-level measurements, if it is assumed that water levels in the aquifers were formerly nearly the same, as suggested by the topography. The anticipated greater decline at the camp was apparently compensated by recharge, possibly from the upper sand through imperfect hydrologic connections which might cause sufficient lag to justify the assumption that these coefficients can be applied only to the lower sand during the short-term pumping tests, or that water is coming from storage from surrounding beds of clay and shale, or both.

PASCAGOULA FORMATION

The Pascagoula formation overlies the Hattiesburg formation and presumably strikes nearly west across the southern part of the state. It dips south beneath the Gulf Coast where numerous flowing wells derive water from the sand beds. The Pascagoula formation was deposited in a more marine or estuarine environment than was the Hattiesburg formation. The series of clays,

Figure 7.—A 3-foot bed of fine gray sand, about 4 feet above water level, in a 65-foot section of clay and silt of the Hattiesburg formation in a bluff on the west bank of the Chickasawhay River. (Station G 4, SW.¼, SW.¼, Sec. 24, T. 3 N., R. 6 W.), Greene County.

silts, and sands in the Pascagoula have much the same appearance in outcrop as the Hattiesburg sediments but contain lenses wherein marine or brackish water fossils abound. The most characteristic of these fossils is *Rangia johnsoni*, but A. R. Mincher [21] has described seven species of ostracoda, three species and one genus of foraminifera, and a large oyster, *Ostrea westi*, which he collected from Shell Landing and near-by localities

(Stations G 7, G 8, G 9, and G 10). He also found a fossil gar at Station G 10; and a crocodile tooth was found at Station G 9 (Shell Landing). A cursory examination of the sands in these exposures indicates that the minerals are the same as those in the Hattiesburg formation. However, hornblende is more abund-

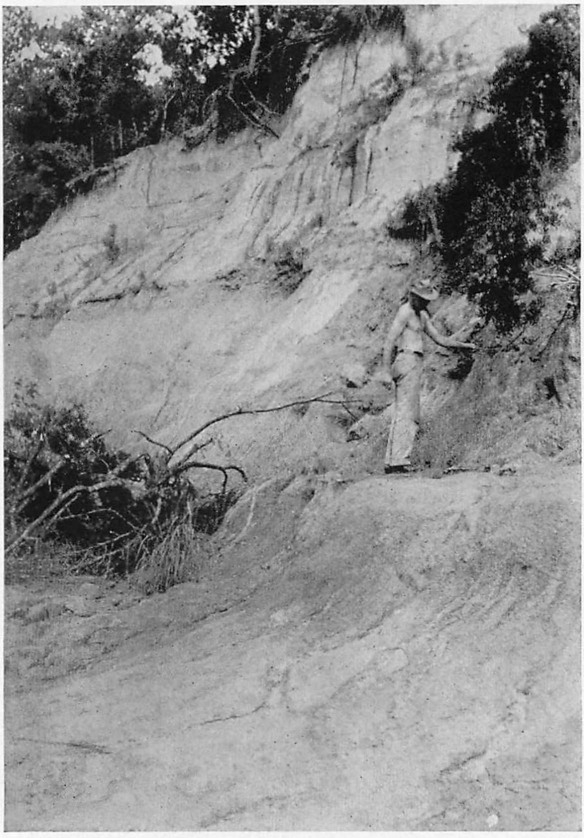


Figure 8.—Supposed contact, indicated by the figure's left hand, of the Hattiesburg and Pascagoula formations, on the west bank of the Chickasawhay River. (Station G 6, NE.¼, NW.¼, Sec. 22, T. 1 N., R. 7 W.), Greene County.

ant in samples from wells along the coast, and an intensive study might reveal other differences.

Details of the lithology of the Pascagoula formation may be gained from a consideration of the exposures along the Chickasawhay River.

SECTION OF THE WEST BANK OF CHICKASAWHAY RIVER, SOME 11 MILES SOUTHEAST OF MCLAIN (STATION G 6, NE.¼, NW.¼, SEC. 22, T. 1 N., R. 7 W.), GREENE COUNTY

	Feet	Feet
Citronelle (?) formation		30.0
Sand; weathers yellow; grades up into sandy loam at top of cut	5.0	
Sand, clayey; weathers yellow	1.0	
Sand, medium to fine gray and yellow; contains a few clay balls	5.5	
Clay, sandy gray thin-bedded	5.0	
Sand, medium to fine; slightly coarser at base where it weathers yellow and contains a few small quartz pebbles and numerous well-rounded clay balls, up to 2 inches in diameter, stained with manganese on the outside	13.5	
Pascagoula formation		66.0
Clay, gray and blue-gray somewhat sandy	60.0	
Sand and silt, cross-bedded fine gray; forms ledge	2.0	
Clay, hard blue; hackly fracture	1.0	
Sand, clayey; weathers gray, but is blue gray where unweathered; grades laterally into clay (Minerals studied)	3.0	
Hattiesburg formation		11.0
Clay and sandy clay; weathers blue gray and red	11.0	

SECTION OF THE WEST BANK OF CHICKASAWHAY RIVER, 100 YARDS WEST OF MOUTH OF GATLING CREEK (STATION G 7, SW.¼, NW.¼, SEC. 22, T. 1 N., R. 7 W.), GREENE COUNTY (MINCHER'S LOCALITY 5)

	Feet	Feet
Soil and alluvial deposits		
Pascagoula formation		31.0
Clay and silt; weathers brown and green	12.0	
Sand, silt, and clay; *Rangia johnsoni* near the base (Minerals studied)	3.0	
Clay and sand; mottled and conglomeratic; weathers brown and light green	1.0	
Clay, blue-gray and silty; breaks with hackly fracture	15.0	

SECTION AT GIVENS LANDING OF THE WEST BANK OF CHICKASAWHAY RIVER (STATION G 8, NW.¼, NE.¼, SEC. 28, T. 1 N., R. 7 W.), GREENE COUNTY (MINCHER'S LOCALITY 4)

	Feet	Feet
Pascagoula formation		37.0
Clay; weathers gray green and gray; similar to material below; fossils	15.0	
Clay and sandy clay; weathers gray and yellow; some thin beds of laminated sand	4.0	
Clay, sandy clay, and sand; contains *Rangia johnsoni* molds	2.0	
Sand, clayey; weathers brown; numerous *Rangia johnsoni* molds (Minerals studied)	2.0	
Clay, blue-green; contains irregular masses of fossiliferous marl; fossils mostly *Rangia johnsoni*	3.0	
Clay, sandy; forms ledge and contains iron-stained mollusc borings in upper part; fossils in the borings	6.0	
Clay, blue-green; weathers light green	5.0	

Some of the sands, clays, and gravels in the upper beds beneath the camp may belong in the Pascagoula formation, but the samples from well A 16 were mineralogically similar throughout the section beneath the terrace deposits. Also, the northernmost definite outcrop of the Pascagoula is near the junction of the Leaf and Chickasawhay Rivers, a position which would place the base of the Pascagoula several miles south of Camp Shelby. On the Gulf Coast the Pascagoula formation is probably 700 to 800 feet thick.

TERTIARY SYSTEM — PLIOCENE

CITRONELLE FORMATION

The Citronelle formation is the oldest and highest of the so-called surficial or blanket deposits. It covers the crests of the highest hills in the Camp Shelby region by overlapping the Pascagoula and Hattiesburg formations, and part or all of the Catahoula sandstone. The sands, gravels, and clays of the Citronelle are usually bright red, tan, and mauve, because of intense weathering. Most of the cobbles and coarse grains are brown chert and light-gray quartz. The formation is 135 feet thick in the McLaurin municipal well (Forrest County 43) on the crest of the hill south of Camp Shelby, according to the driller's record.

The lower few feet of the sands and gravels yield water to numerous farm wells and to springs on the slopes of the hills. Effluent discharge doubtless keeps the water table low in the Citronelle, and for this reason large perennial supplies probably could not be developed in it.

QUATERNARY SYSTEM — PLEISTOCENE

HIGH TERRACES

During Pleistocene time material of the Citronelle formation was eroded, reworked, and deposited by streams which stood 75 to 150 feet above their present channels. These cross-bedded and lenticular sands, gravels, and clays now compose the high terraces. The minerals and rocks are similar to those of the Citronelle, and their appearance in outcrop suggests that grain size in individual lenses is more evenly distributed. The thickness of these deposits ranges up to 100 feet, and their areal distribution is somewhat less extensive and certainly less continuous than the Citronelle formation.

The high terrace deposits contain water in the lower few feet, but, like the Citronelle formation, effluent discharge through springs keeps the water table low. However, numerous farm supplies and the small supply developed on the artillery range at the camp are derived from the basal part of these deposits.

LOW TERRACES AND ALLUVIAL DEPOSITS

As the streams cut into their valleys below the high terraces, numerous benches were coated with sand and gravel and left behind. Some time during the Pleistocene epoch a stream cut down to approximately 85 feet beneath the flood plain of the Leaf River between Hattiesburg and Camp Shelby. Subsequently this gorge was filled with gravel and sand. As the water table is near the surface of the flood plain and as the alluvial fill is hydrologically connected to the streams, this gorge contains a large and undeveloped source of ground water. The geological cross sections (Plates 2, 3), the piezometric surface, and the behavior of water levels at Camp Shelby and Hattiesburg Army Air Base suggest that this source is being tapped by pumpage at Camp Shelby.

QUALITY OF WATER

The chemical character of the waters from wells at Camp Shelby and Hattiesburg Army Air Base and from other wells in the region (Table 7) shows that the waters contain only a moderate amount of dissolved mineral matter and that they are rather uniform in composition. All of the waters are soft and are suitable for most ordinary purposes. The relatively high concentrations of silica would probably make them objectionable for use in steam boilers, particularly if the boilers are to be operated at high pressures. The pH of most of the samples analyzed is less than 7, the neutral point, which may result in a tendency for some of these waters to be corrosive to plumbing. The maximum concentrations of fluoride in the samples for which fluoride is reported are 0.2 parts per million. The similarity in composition of the waters from the Catahoula sandstone and from the Hattiesburg formation in the depth interval of 93 to 740 feet is to be expected because both formations within this interval are of nonmarine origin and are not very different mineralogically.

TABLE 7

CHEMICAL ANALYSES OF SAMPLES OF WATER FROM WELLS AT CAMP SHELBY AND NEAR-BY SUPPLIES (PARTS PER MILLION EXCEPT pH)

	CAMP SHELBY														
WELL NUMBER (Tables 8, 9)	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	A 9	A 10	A 11	A 12	A 13	A 14	A 15
Date of collection	7/16 1943	7/16 1943	7/16 1943	7/16 1943	7/16 1943	7/16 1943	7/16 1943	7/16 1943	7/17 1943	7/17 1943	7/17 1943	7/17 1943	5/3 1942	5/7 1942	8 1942
Depth of sand below surface (feet)	313-410	....	346-432	290-400	303-415	311-415	312-412	352-439	358-438	359-437	320-423	320-402	315-398	354-415	306-396
Silica (SiO_2)		54				58			50		57		51	29	20
Iron (Fe)		1.0				1.0			.28		.65		1.5	.2	.18
Calcium (Ca)		12				6.7			4.7		6.0		6.6	9.2	12
Magnesium (Mg)		3.8				2.8			2.4		2.5		2.9	4.5	3.7
Sodium and potassium (Na + K)		16				21			21		23		26	14	14
Bicarbonate (HCO_3)	90	84	79	75	77	76	74	77	65	100	78	74	85	61	74
Sulfate (SO_4), by turbidity	5	4.8	4	6	7	5.6	6	7	7.8	4	6.3	5	7.1	12	5.8
Chloride (Cl)	4	4.1	4	3	4	3.8	4	4	4.2	4	4.0	4	6	6.3	5.6
Fluoride (F)	.1	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1			
Nitrate (NO_3)	.0	.1	.2	.0	.1	.0	.0	.0	.0	.0	.0	.0	0	0	0
Free carbon dioxide (CO_2)													18	33	21
Total dissolved solids	146	138	147	140	146	136	138	140	123	146	138	139	128	133	141
Total hardness as calcium carbonate ($CaCO_3$)	54	46	45	39	34	28	36	24	22	32	25	39	28	41	45
pH	6.7	6.7	6.6	6.6	6.7	6.6	6.7	6.6	6.5	6.9	6.6	6.6	6.8	6.2	6.5

TABLE 7 — continued

CHEMICAL ANALYSES OF SAMPLES OF WATER FROM WELLS AT CAMP SHELBY AND NEAR-BY SUPPLIES (PARTS PER MILLION EXCEPT pH)

WELL NUMBER (Tables 8, 9)	HATTIESBURG ARMY AIR BASE		FORREST COUNTY			JONES COUNTY				PERRY COUNTY	WAYNE COUNTY
	1	2	3-12	25a	49	107b	108	Laurel Army Air Base 2	City of Laurel	4	10c
Date of collection	7/16 1943	4 1942	7/17 1943	7 1919	7/16 1943	8 1919	7/17 1943	9/18 1942	10/13 1930	7/16 1943	8 1914
Depth of sand below surface (feet)	93-193	153-193	----	589-694	620-729	445-525	-212	414-471(?)	-400	-294	-740
Silica (SiO_2)	51	37		20	52	20	17	19	50		5.0
Iron (Fe)	1.4	Trace		1.1	1.0	4.3	.65	.16	.17		.8
Calcium (Ca)	7.4	11		8.2	3.6	11	15	6.9	2.7		2.3
Magnesium (Mg)	3.3	3.8		3.6	1.5	3.6	4.8	.5	.9		1.8
Sodium and potassium (Na + K)	18	12		31	39	47	20		33		2.8
Bicarbonate (HCO_3)	67	66	80	107	105	155	103	61	81	142	7.3
Sulfate (SO_4), by turbidity	8.1	7.9	8	10	7.4	12	9.1	13	13	7	4.2
Chloride (Cl)	4.5	5.5	3	3.5	4.4	3.5	4.4	3.9	7	3	6.5
Fluoride (F)	.1		.1		.1		.0			.2	
Nitrate (NO_3)	.1	0	.0	.45	.0	.21	.0	0	0	.0	.0
Free carbon dioxide (CO_2)		23						15			
Total dissolved solids	127	111	116	129	160	179	120	159	150	166	20
Total hardness as calcium carbonate ($CaCO_3$)	32	43	36	35	15	42	57	20	10	32	13
pH	6.5	6.6	6.8		7.4		7.3	6.8		8.1	

Wells A 1 to A 15, 1, 2, and 49 are developed in the Hattiesburg formation; all other wells in the Catahoula sandstone.

Wells A 13 to A 15 and Laurel Army Air Base 2 were analyzed by Mississippi State Board of Health; well at City of Laurel, by Mississippi State Chemical Laboratory; all other wells, by U. S. Geological Survey.

[a]Well 13, U. S. Geol. Survey Water-Supply Paper 576, p. 165

[b]Well 19, U. S. Geol. Survey Water-Supply Paper 576, p. 255

[c]Well 2, U. S. Geol. Survey Water-Supply Paper 576, p. 485

CONCLUSIONS

The records of static and pumping water levels at Camp Shelby show that the aquifer is yielding water under conditions of equilibrium or near equilibrium; that is, water is coming into the sands under sufficient hydraulic head to balance that withdrawn. The relation of static to pumping levels has also remained nearly constant for the period of record available; that is, the specific capacities of the wells have not changed to any extent. During part of the 1.23 years in 1941 and 1942, when camp supply was coming from storage, pumpage averaged about 5,750,000 gallons a day. In May and June 1943 the average production was about 4,000,000 gallons a day. Thus, a pumpage increase of 25 percent of present supply would probably not alter operations materially, and the greatest change that could be expected would be a lowering of less than 5 feet beneath present pumping levels. This estimate is based on the premise that the sand or sands of the Hattiesburg formation supplying the camp are hydrologically connected to the Pleistocene gravels in the valley of the Leaf River north of the camp. There is also some evidence that the sand of the Hattiesburg formation above the sand supplying the camp is also serving as an auxiliary reservoir, thereby helping to maintain steady-state. Inasmuch as withdrawal from storage had caused the pumping surfaces to decline, pump bowls were lowered in four wells during the summer of 1942. At that time the water levels in the four wells were 10 feet or a few feet more than 10 feet above the pump bowls, and in one well, A 3, the top of the bowls may have emerged. Well efficiencies could be improved somewhat by placing all pump bowls the same few feet below the known maximum drawn-down. Their combined capacities and locations, as well as the excellent hydrologic conditions in the sands, are all favorable to increasing the pumpage without drilling additional wells or without materially altering operating conditions.

ACKNOWLEDGMENTS

The writer is indebted to O. E. Meinzer and V. T. Stringfield of the U. S. Geological Survey and to W. C. Morse, State Geologist of Mississippi, for constructive criticism. The late V. M. Foster's field notes and well measurements are included in the tables. R. W. Adams and H. D. Padgett, Jr., of the U. S. Geological Survey, assisted with part of the field work, and Mr. Adams calculated results of the pumping tests. Mr. H. N. Toler, Southern Natural Gas Company, Mr. U. B. Hughes, Consulting Geologist, and Mr. J. T. McGlothlin, Gulf Refining Company, discussed some phases of the geology with the author, and Mr. Toler pointed out fossil localities and the southern extension of the Hattiesburg formation in Greene County. Several well drillers gave their logs of water wells; special thanks are due to Mr. Fred Sutter who supplied valuable drilling records.

The hydrologic data at Camp Shelby were furnished through the courtesy of the Post and Area Engineers of the U. S. Engineers at Camp Shelby. Major A. P. Banta of the U. S. Engineer Office, Mobile, Alabama, encouraged and made possible the study. Mr. J. L. Arledge and Mr. J. L. Pringle have supplied for several years water-level records at Hattiesburg and at the camp.

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GEOLOGIC LOGS OF BORINGS IN THE CAMP SHELBY-HATTIESBURG AREA

Camp Shelby A 1
Altitude: 295.8 feet — Driller: Water Producers, Inc.

	Thick. feet	Depth feet
High terrace deposits		
Top soil, sandy	10	10
Clay, white and red	15	25
Sand, pink, and clay	5	30
Clay	22	52
Sand, white sharp and coarse	31	83
Hattiesburg formation		
Clay	12	95
Sand, white	5	100
Clay, soft	5	105
Clay, hard crumbly	55	160
Clay, blue	35	195
Sand, fine white	35	230
Clay, soft yellow	5	235
Sand, white angular	53	288
Clay, hard crumbly	25	313
Sand, coarse white	67	380
Sand, white	20	400
Sand	10	410

Camp Shelby A 3
Altitude: 312.9 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay, sandy yellow	8	8
Clay, mottled	60	68
Sand and gravel	31	99
Hattiesburg formation		
Clay, blue	145	244
Sand, yellow, and gravel	80	324
Clay, hard blue	22	346
Sand, gray, and gravel	86	432

Camp Shelby A 4
Altitude: 276.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay, sandy	25	25
Sand, yellow	48	73
Hattiesburg formation		
Clay and thin strata of sand	69	142
Shale, blue	70	212
Thin strata of sand and clay	58	270

Clay	20	290
Sand, muddy	16	306
Sand, medium-grained	84	390
Sand, coarse-grained	10	400

Camp Shelby A 5
Altitude: 264.4 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay	12	12
Sand, yellow	58	70
Hattiesburg formation		
Clay, sandy	70	140
Shale	60	200
Sand	30	230
Clay, sandy	10	240
Sand, fine	40	280
Clay	15	295
Clay, sandy	8	303
Sand, medium-grained	99	402

Camp Shelby A 6
Altitude: 283.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay, sandy	30	30
Sand, yellow	44	74
Hattiesburg formation		
Clay	48	122
Clay, sandy	18	140
Shale	80	220
Clay, sandy	70	290
Clay	21	311
Sand, fine	22	333
Sand, medium-grained	82	415

Camp Shelby A 7
Altitude: 285.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay, sandy	28	28
Sand, yellow	57	85
Hattiesburg formation		
Clay	15	100
Shale	146	246
Sand	32	278
Clay, sandy	4	282

Sand	12	294
Clay	18	312
Sand, fine	18	330
Sand	82	412

Camp Shelby A 8

Altitude: 290.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay	54	54
Clay, sandy	33	87
Hattiesburg formation		
Clay	141	228
Sand, fine muddy	5	233
Sand, fine dirty	24	257
Sand, fine	67	324
Clay	28	352
Sand	87	439
Clay	1	440

Camp Shelby A 9

Altitude: 256.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Sand	39	39
Hattiesburg formation		
Clay	161	200
Sand and clay	110	310
Clay, tough	10	320
Sand, fine	12	332
Clay, sandy	26	358
Sand	80	438
Clay	2	440

Camp Shelby A 10

Altitude: 296.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay	15	15
Clay, sandy	68	83
Hattiesburg formation		
Sand and thin strata of clay	120	203
Sand and clay	25	228
Quicksand	66	294
Clay	65	359
Sand	78	437

Camp Shelby A 11

Altitude: 290.4 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay	15	15
Clay, sandy	69	84
Hattiesburg formation		
Clay and sand	85	169
Clay, hard	51	220
Quicksand, fine	73	293
Clay	27	320
Sand	103	423

Camp Shelby A 12

Altitude: 272.8 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Sand	67	67
Hattiesburg formation		
Clay	17	84
Clay and sandy clay	146	230
Clay, sandy	37	267
Clay	53	320
Sand	82	402

Camp Shelby A 13

Altitude: 260.6 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay, sandy	15	15
Sand and fine gravel	65	80
Hattiesburg formation		
Clay	110	190
Sand and thin strata of clay	90	280
Clay	35	315
Sand	83	398
Clay	7	405

Camp Shelby A 14

Altitude: 254.3 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Soil	4	4
Clay	10	14
Gravel	6	20

Hattiesburg formation		
Sand	25	45
Clay	15	60
Sand	35	95
Clay	105	200
Shale, hard	26	226
Sand and thin strata of shale	31	257
Sand	25	282
Clay	28	310
Sandy shale	33	343
Sand	5	348
Clay	6	354
Sand	61	415
Clay	20	435
Sand, fine; thin strata of shale	45	480

Camp Shelby A 15
Altitude: 273.0 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
High terrace deposits		
Clay, sandy	10	10
Sand, dirty	40	50
Sand and gravel, dirty	10	60
Hattiesburg formation		
Clay	35	95
Shale	30	125
Clay	8	133
Shale	9	142
Clay	8	150
Shale, hard	62	212
Sand, fine; thin strata of shale	62	274
Clay	32	306
Sand, water-bearing	90	396
Clay	10	406

Camp Shelby A 16
Observation well (Based on cuttings, drillers' log, and electrical log)
Altitude: 259.9 feet — Driller: Delta Drilling Company

	Thick. feet	Depth feet
High terrace deposits		
Sand and *gravel*, coarse at the base; contains mostly quartz, chert, and limonite; some coarse staurolite, black chert, chalcedony in oolitic structure, schist, and quartzite	64	64
Hattiesburg formation		
Clay, no samples	10	74
Silt, light-gray micaceous clayey somewhat oxidized	12	86
Clay, light-gray micaceous	15	101

Sand, silty; somewhat cemented	2	103
Clay, blue-green; contains a few grains of quartz sand and glauconite; non-calcareous and more indurated than lower clays	89	192
Sand, medium to fine gray; mostly semi-transparent quartz, about 10 percent microcline and orthoclase; minor amounts of secondary pyrite, black chert, magnetite; other dark opaque mineral grains, sodic plagioclase, zircon, gray opaque grains, epidote, garnet, kyanite, staurolite, brown tourmaline, monazite, rare ceylonite(?)	71	263
Sand, medium; minerals as above, but greater permeability.	9	272
Sand, fine gray; minerals as above	4	276
Clay, blue-green; contains a few grains of quartz and glauconite	21	297
Sand, fine dark-gray; mostly clear quartz, about 10 percent microcline and orthoclase; some black chert, secondary pyrite, magnetite, and other dark opaque grains. Minor amounts of zircon, sodic plagioclase, gray and brown opaque grains, epidote, garnet, kyanite, staurolite, brown tourmaline, monazite and rare ceylonite(?)	25	322
Sand, medium gray; minerals as above in addition to glauconite	34	356
Sand, medium to coarse light-gray; minerals as above; highly permeable	32	388
Clay, sandy and silty blue-gray non-calcareous; much green and white mica	27	415

Hattiesburg Army Air Base 1

Altitude: 144.4 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
Top soil	5	5
Pleistocene alluvial deposits		
Sand and gravel	66	71
Hattiesburg formation		
Shale (driller's term, soapstone)	22	93
Sand, muddy	55	148
Sand	45	193
Clay, tough	22	215

Hattiesburg Army Air Base 2

Altitude: 142.9 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
Top soil	2	2
Pleistocene alluvial deposits		
Sand	5	7
Sand and gravel	66	73

Hattiesburg formation		
Shale, sandy	80	153
Sand	25	178
Sand, coarse	15	193
Shale and clay	57	250
Clay, tough	29	279
Catahoula sandstone		
Shale, sandy	16	295
Sand, fine	37	332
Clay, sandy	31	363
Clay, tough	17	380
Clay, sandy	65	445
Sand, muddy	65	510

J. J. NEWMAN TEST HOLE FOR CLAY SAMPLES

Forrest County 2

Altitude: Driller: Works Project Administration
V. M. Foster, Supervisor

	Thick. feet	Depth feet
Top soil, light-brown sandy loam	2	2
Hattiesburg formation		
Clay, gray; streaked with red and light-brown grading downward to gray; arenaceous slightly carbonaceous, micaceous, very plastic	6	8
Sand, gray; grades downward to light brown; very fine-grained, increasingly argillaceous and silty with depth, non-plastic	4	12
Clay, light-brown; streaked with gray; increasingly arenaceous with depth, semi-plastic, massive	7	19
Sand, gray; grades into light brown; interbedded with silt and small pebbles of clay; slightly micaceous very fine-grained grading downward to an argillaceous coarse grain sand	10	29
Clay, light-gray streaked with brown; grades down through a light-brown to dark-gray; arenaceous, limonitic, micaceous; interbedded with thin layers of partly consolidated sand; semi-plastic	10	39
Sand, light-green-gray; stained with yellow; slightly argillaceous; contains occasional lumps of partly consolidated argillaceous sand. Small dark mineral grains (glauconite?), silty, slightly limonitic, occasional carbon specks	7	46
Clay, light-brown; grades down to a brown-gray; limonite-stained arenaceous, micaceous, semi-plastic	2	48
Sand, very fine-grained, silty light-brown argillaceous, micaceous; limonite-stained, slightly plastic, becoming more argillaceous with depth	5	53

Clay, dark-brown; grades downward to dark-blue-brown; arenaceous, limonite-stained slightly micaceous; a few carbon specks, semi-plastic	2	55
Sand, light-blue-brown argillaceous, micaceous, very limonitic	3	58
Clay, steel-gray arenaceous, micaceous, slightly limonitic, carbonaceous, semi-plastic	8	66

CITY OF HATTIESBURG WELL 2

Forrest County 3
Altitude: 156.2 feet — Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	5	5
Pleistocene alluvial deposits		
Sand and gravel	25	30
Clay, blue	20	50
Gravel, coarse	10	60
Hattiesburg formation		
Clay, blue	130	190
Catahoula sandstone		
Sand, fine white	100	290
Clay, blue	14	304
Sand, coarse	106	410
Clay, blue	12	422
Sand, fine	40	462
Clay, blue	13	475
Sand and clay pockets	67	542
Sand, coarse white	76	618
Sand and clay pockets	14	632
Clay, hard blue	30	662
Clay, hard blue; mixed with sea shells	79	741
Clay, hard blue	69	810
Sand, fine gray	35	845
Clay, soft	20	865
Clay, hard	15	880
Gummy shale, soft	38	918
Clay, blue	38	956
Chickasawhay limestone and older sediments		
Rock, hard; contains pyrite	6	962
Clay	7	969
Rock, hard	2	971
Clay	29	1000
Rock, hard	2	1002
Sand; mixed with sea shells	15	1017
Rock, hard	1	1018

Clay, soft chalky	30	1048
Rock, hard	2	1050
Sand	6	1056
Clay, gray chalky	51	1107
Rock, hard	3	1110
Rock, soft	8	1118
Clay and boulders	13	1131
Rock, soft	5	1136
Clay and shale	111	1247
Shale, soft gummy blue	253	1500

CITY OF HATTIESBURG WELL 3

Forrest County 4
Altitude: 163.2 feet — Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	5	5
Clay and sand	5	10
Hattiesburg formation		
Clay, light-blue	60	70
Clay, dark-blue	120	190
Catahoula sandstone		
Sand, fine	95	285
Clay	10	295
Sand	95	390
Clay	15	405
Shale and clay	15	420
Clay, hard, or sand rock	10	430
Sand and some rock	30	460
Sand and clay pockets	35	495
Clay	40	535
Sheet rock	1	536
Clay	4	540
Sand	87	627

CITY OF HATTIESBURG WELL 4

Forrest County 5
Altitude: 156.2 feet — Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	5	5
Pleistocene alluvial deposits		
Sand and gravel	25	30
Hattiesburg formation		
Clay, blue	165	195
Catahoula sandstone		
Sand	225	420

Clay	10	430
Sand	35	465
Clay	12	477
Sand and clay pockets	53	530
Sand, water-bearing	91	621

CITY OF HATTIESBURG WELL 15

Forrest County 6
Altitude: 155± feet Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Pleistocene alluvial deposits		
Gravel and sand	22	22
Hattiesburg formation		
Clay, soft blue	96	118
Clay, hard blue	10	128
Clay, yellow	51	179
Shale, very hard rock	2	181
Catahoula sandstone		
Sand, fine white	129	310
Clay, blue	8	318
Sand, white medium-grained	126	444
Clay		

CITY OF HATTIESBURG WELL 9

Forrest County 7
Altitude: 153.4 feet Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	7	7
Hattiesburg formation		
Clay, blue; sand pockets	179	186
Catahoula sandstone		
Sand, white	100	286
Clay	31	317
Sand, medium-grained	40	357
Sand, coarse; some gravel	88	445

CITY OF HATTIESBURG WELL 10

Forrest County 8
Altitude: 155.3 feet Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	10	10
Pleistocene alluvial deposits		
Sand and gravel	6	16
Hattiesburg formation		
Clay, pipe	54	70

Clay and sand pockets	20	90
Sand and gravel	10	100
Clay, pipe	95	195
Sand	90	285
Clay	5	290
Sand	15	305
Clay	21	326
Sand, medium-grained	64	390
Sand; some gravel	70	460

CITY OF HATTIESBURG WELL 11

Forrest County 9
Altitude: 150.3 feet

Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	8	8
Pleistocene alluvial deposits		
Gravel and coarse sand	6	14
Hattiesburg formation		
Clay, blue, soft and fine	111	125
Clay, hard blue	21	146
Clay, soft yellow	62	208
Catahoula sandstone		
Sand, fine white	48	256
Sand, fine white; clay pockets	22	278
Sand, fine white	44	322
Clay, blue	18	340
Sand, fine white; grades to coarse gravel	118	458
Clay	70	528
Gravel, pea size; shale	7	535
Gravel, pea size; sand	60	595
Clay, tough blue	5	600
Sand and clay pockets	55	655
Clay, tough	13	668

CITY OF HATTIESBURG WELL 13

Forrest County 10
Altitude: 150 feet

Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil (clay)	8	8
Pleistocene alluvial deposits		
Sand and gravel	13	21
Hattiesburg formation		
Clay, blue	79	100
Clay, white	50	150
Clay, yellow	28	178

Catahoula sandstone		
Sand, fine	47	225
Sand, medium-grained	100	325
Gravel; pea size to larger	73	398
Clay, very soft yellow	2	400

CITY OF HATTIESBURG WELL 12

Forrest County 11
Altitude: 152 feet — Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	5	5
Pleistocene alluvial deposits		
Gravel, coarse; sand	15	20
Hattiesburg formation		
Clay, soft blue	190	210
Catahoula sandstone		
Sand, gray; fine to medium grained	110	320
Sand, coarse gray	40	360
Gravel, pea size; and fine to medium-grained gray sand	15	375
Sand, gray medium-grained	47	422
Clay, blue hard, tough	28	450

CITY OF HATTIESBURG WELL 14

Forrest County 12
Altitude: 154.7 feet — Driller: Blakemore Drilling Company

	Thick. feet	Depth feet
Top soil	14	14
Pleistocene alluvial deposits		
Sand and gravel	14	28
Hattiesburg formation		
Clay, blue	184	212
Catahoula sandstone		
Sand, medium to coarse-grained	240	452
Clay, tough blue	28	480
Sand, coarse white	10	490
Clay, tough blue	35	525
Sand, coarse, and pebble gravel	100	625
Sand, medium to coarse-grained	95	720

PAT ROGERS

Forrest County 13
Altitude: 153 feet — Driller: Fred Sutter

	Thick. feet	Depth feet
Clay, red	6	6
Pleistocene alluvial deposits		
Sand and gravel	72	78

Hattiesburg formation		
Clay, blue	120	198
Catahoula sandstone		
Sand and gravel	118	316

MERIDIAN FERTILIZER COMPANY

Forrest County 19
Altitude: Driller: John Sutter

	Thick. feet	Depth feet
Pleistocene alluvial and low terrace deposits		
Sand, yellow	10	10
Clay, yellow	20	30
Sand, coarse	10	40
Clay, yellow	15	55
Sand and gravel	25	80
Hattiesburg formation		
Clay, soft blue	40	120
Sand, coarse; gravel	70	190
Clay, very hard blue	40	230
Catahoula sandstone		
Sand and gravel; water-bearing	113	343

HERCULES POWDER COMPANY WELL 1

Forrest County 22
Altitude: Driller:

	Thick. feet	Depth feet
Clay, green	16	16
Low terrace and alluvial deposits		
Sand, fine white	6	22
Hattiesburg formation		
Clay, yellow	68	90
Clay, blue	30	120
Shale	65	185
Sandstone	10	195
Clay, tough blue	10	205
Clay, soft blue	45	250
Catahoula sandstone		
Sand, fine gray water-bearing	58	308
Clay, blue	102	410
Sand, gray; gravel	97	507
Clay and sand, fine	103	610
Sand, fine gray	20	630
Sand and clay	70	700
Clay and sandstone	302	1002

SOUTHERN RAILWAY SYSTEM

Forrest County 32
Altitude: 149 feet — Driller: Layne Central Company

	Thick. feet	Depth feet
Clay, sandy	4	4
Pleistocene alluvial deposits		
Sand and gravel	92	96
Hattiesburg formation		
Clay	48	144
Shale and clay	76	220
Catahoula sandstone		
Sand, fine; shale	20	240
Clay, hard	10	250
Sandy shale	22	272
Sand, water-bearing	148	420

BURKHART

Forrest County 33
Altitude: 153.9 feet — Driller: John Sutter

	Thick. feet	Depth feet
Clay, yellow sandy	8	8
Pleistocene alluvial deposits		
Sand and gravel	52	60
Clay, blue	138	198
Catahoula sandstone		
Sand	78	276
Clay, blue	28	304
Sand and gravel	93	397

DIXIE PINE PRODUCTS COMPANY

Forrest County 34
Altitude: 150 feet — Driller: Fred Sutter

	Thick. feet	Depth feet
Surface sand and bark	8	8
Pleistocene alluvial deposits		
Sand and gravel	48	56
Hattiesburg formation		
Clay, blue very hard	130	186
Sand and gravel	13	199
Clay, blue	13	212
Catahoula sandstone		
Sand and gravel	248	460

MRS. HARTFIELD NEAR MCCALLUM

Forrest County 37
Altitude: 142.3 feet

Driller: John Sutter

	Thick. feet	Depth feet
Hattiesburg formation		
Clay, yellow	45	45
Sand, gray	65	110
Clay, blue	26	136
Sand, green water-bearing	44	180
Clay, blue	12	192
Sand, gray, and gravel, fine, water-bearing	54	246
Clay, blue	8	254
Sand, gray, and gravel, water-bearing	36	290
Clay, blue		

CAMP SHELBY PUMPING STATION, 1918 (abandoned)

Forrest County 41
Altitude: 230 feet

Driller: John Sutter

	Thick. feet	Depth feet
High terrace deposits and colluvium		
Clay, yellow sandy	10	10
Sand, yellow, and gravel	42	52
Hattiesburg formation		
Clay, soft blue	170	222
Sand, green; gravel	8	230
Clay, green	55	285
Sand, blue, and gravel, water-bearing	75	360
Clay, hard	20	380
Thin strata of sandstone	50	430
Clay, blue	8	438
Thin strata of sandstone and clay	32	470
Clay, blue	175	645
Catahoula sandstone		
Sand, gray, and gravel, water-bearing	75	720

TOWN OF MCLAURIN

Forrest County 43
Altitude: 375.4 feet

Driller: Carloss Well Supply Company

	Thick. feet	Depth feet
Citronelle formation		
Clay	10	10
Sand, red	10	20
Sand and heavy gravel	115	135
Hattiesburg formation (?)		
Clay, white	20	155

Muck, soft sandy	9	164
Sand, red coarse; grades to fine gravel	116	280
Gumbo	95	375
Gumbo and boulders	23	398
Sand, coarse red	27	425
Gumbo	25	450
Undescribed	35	485
Clay, hard white	48	533
Sand, muddy white	23	556
Clay	39	595
Sand, fine	20	615
Sand; coarser than the above and cleaner	10	625
Sand	14	639
Gumbo	21	660

U. S. FOREST SERVICE

Forrest County 47
Altitude: 240.4 feet — Driller: Blevins Drilling Company

	Thick. feet	Depth feet
Hattiesburg formation; possibly some deposits of Pascagoula formation near top		
Soil and clay	72	72
Sand	32	104
Shale	286	390
Rock	1	391
Sand and shale	33	424
Gumbo	46	470
Rock	1	471
Gumbo	43	514
Sandy shale	47	561
Gumbo	136	697
Sand	70	767

U. S. FOREST SERVICE

Forrest County 49
Altitude: 284 feet — Driller: R. B. Laird

	Thick. feet	Depth feet
Top soil	1	1
High terrace deposits		
Clay, sandy	8	9
Sand	71	80
Pascagoula (?) and Hattiesburg formations		
Sand and "chalk"	84	164
Sand	2	166
Gumbo	6	172
Sand	8	180
Gumbo	89	269

Sand and "chalk"	30	299
Gumbo	36	335
Marl, blue	80	415
Sand	18	433
Gumbo	8	441
Sand	1	442
Gumbo	11	453
Sand	14	467
Gumbo	53	520
Marl, blue	52	572
Sand	10	582
Gumbo	4	586
Sand	15	601
Gumbo	5	606
Sand	10	616
Gumbo	1	617
Sand	2	619
Gumbo	1	620
Sand, water-bearing	109	729

MARGARET OVERLAND 5 MILES NORTHEAST OF MOSELLE

Jones County 106* Driller:

	Thick. feet	Depth feet
High terrace deposits		
Clay, hard yellow	12	12
Sand, soft red	20	32
Chalk (white clay)	10	42
Quicksand, red water-bearing	16	58

*U. S. Geological Survey Water-Supply Paper 576, p. 252.

GRIFFIN LUMBER COMPANY AT BLODGETT

Jones County 112* Driller:

	Thick. feet	Depth feet
Hattiesburg formation		
Chalk (clay)	63	63
Catahoula (?) sandstone		
Sand, fine	10	73
Marl, blue	20	93
Sand, fine	10	103
Marl, blue	47	150
Sand, fine	10	160
Gumbo, blue	22	182
Sand, fine	34	216
Sand, water-bearing	160	376

*U. S. Geological Survey Water-Supply Paper 576, p. 252.

U. S. FOREST SERVICE

MAHNED CAMP AND PICNIC GROUNDS

Perry County 11

Altitude: 112.0 feet — Driller: R. B. Laird

	Thick. feet	Depth feet
Soil, white sandy	2	2
Alluvial deposits		
Clay, sandy	3	5
Sand, white	7	12
Hattiesburg formation		
Clay, blue	180	192
Sand	10	202
Gumbo	81	283
Sand	20	303
Gumbo	1	304
Sand, white	24	328
Gumbo	1	329

FEDERAL WORKS AGENCY AT NEW AUGUSTA

Perry County 13

Altitude: 107.4 feet — Driller: Carloss Well Supply Company

	Thick. feet	Depth feet
Clay	6	6
Hattiesburg formation		
Sand	10	16
Thin strata of sand and clay	78	94
Sand, fine; clay	11	105
Clay, hard	42	147
Clay, sandy	10	157
Thin strata of sand and clay	23	180
Sand, coarse; gravel	40	220
Gumbo	25	245
Gumbo and sand, fine	43	288
Clay, soft sandy	22	310
Sand, coarse	27	337
Gumbo, tough	13	350
Sand, fine	14	364
Gumbo, blue	6	370
Sand and clay	5	375
Clay shale, white (driller's term, soapstone)	177	552
Sand, fine	10	562
Gumbo and shale	33	595
Gumbo and boulders	10	605
Catahoula sandstone		
Sand, fine	57	662
Sand and clay	22	684

Clay, hard	7	691
Sand, white water-bearing	19	710
Gumbo and thin strata of fine sand	52	762
Sand, gray	7	769
Thin strata of sand and clay	21	790
Gumbo, hard	15	805
Sand, water-bearing	20	825
Gumbo	12	837
Sand, gray	5	842
Gumbo	14	856
Thin strata of sand and clay	22	878
Sand, gray	15	893
Gumbo, tough	10	903

PERRY COUNTY AT NEW AUGUSTA

Perry County 14
Altitude: 112.6 feet — Driller: John Sutter

	Thick. feet	Depth feet
Clay, gray	12	12
Pleistocene (?) Alluvial deposits		
Sand and gravel	74	86
Hattiesburg formation		
Clay, blue	261	347
Sand	84	431
Clay, blue	267	698
Catahoula sandstone		
Sand and gravel	88	786

CIVILIAN CONSERVATION CORPS CAMP AT RED HILL

Perry County 24
Altitude: 280 feet — Driller: Fred Sutter

	Thick. feet	Depth feet
High terrace deposits		
Sand, red, and mud	112	112
Hattiesburg formation		
Clay, blue	468	580
Sand	73	653

J. C. MASHBURN AT CHICORA

Wayne County 16
Altitude: 150 feet — Driller: J. C. Mashburn

	Thick. feet	Depth feet
Alluvial deposits and Catahoula sandstone		
Clay and blue marl	60	60
Sand and gravel, water-bearing	10	70

Clay and blue marl	30	100
Sand, water-bearing	4	104
Chickasawhay limestone		
Marl, blue; clay; sandstone	163	267
Limestone	10	277
Bucatunna clay member of Byram formation		
Sand, water-bearing	10	287

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Table 8

WELLS AT CAMP SHELBY AND AT HATTIESBURG ARMY AIR BASE DEVELOPED IN A SAND IN THE LOWER PART OF THE HATTIESBURG FORMATION OF MIOCENE AGE. COMPILED FROM RECORDS OF U. S. ENGINEERS AND FROM MEASUREMENTS BY U. S. GEOLOGICAL SURVEY AND BY U. S. ENGINEERS.

CAMP SHELBY

Number	Location	Date drilled	Well diameters (inches): Upper casing	Lower casing	Screen	Gravel wall	Well depths (feet below top concrete pump base): Total depth	Top of screen	Top of pump bowls	To pump suction	To top of lower casing	Length of screen (feet)	Length of air line (feet)	Length of upper casing (feet)	Thickness of sand (feet)	Depth position of sand (feet)	Measuring point (feet): Elevation of point	Height above bench mark	Height above floor	Below center of air gauge	Description	Reference bench mark: Elevation of bench mark (feet)	Description	Water levels below measuring point: Earliest reported static level (feet)	Date measured	Lowest reported pumping level (ft.)	Date measured	Average rate pumped (g.p.m.) June 1-15, 1943	Temp. of water (F. °)
A1.	At Camp Shelby in pumphouse on northern slope 133 feet N. of elevated storage tank and 137 feet W. of First Ave.; NW¼ NW¼, Sec. 29, T. 3 N., R. 12 E.	1936	6				410	323				80			97	313-410	295.8	0.5	0.5	0	Center of air gauge	295.3	Top of bolt on concrete pump base	150	Sept. 4, 1941			333	
A2.	In pumphouse 107 feet S. of elevated storage tank on crest of ridge and 128 feet W. of First Ave.; NW¼ NW¼, Sec. 29, T. 3 N., R. 12 E.	1939					422		240				240				302.2	0.4	1.8	0.28	Top of air line east side of pump	301.8	Cross on concrete pump base	160	Sept. 4, 1941			416	
A3.	In brick pumphouse on crest of low knoll 50 feet N. of junction Warehouse Ave. and 12 St.	Oct., 1940	10	none	10		432	360	240	266.5		70.2	240	360	86	346-432	312.9	0.45	1.6	0.29	Top of air line east side of pump	312.48	Top of concrete pump base	169.2	Oct., 1940	198.2	May 27, 1942	551	70
A4.	In brick pumphouse on northern slope; 46 feet E. of 18th St. and 241 feet N. of 4th Ave.	Nov., 1940	10	8	8		402	319.5	200	226.5	309.5	80	200	318.5	110	290-400	276.6	0.9	1.8	0.40	Top of air line north side of pump	275.7	Top of concrete pump base	135	Nov., 1940	173.0	Mar. 10, 1942	550	71
A5.	In brick pumphouse on southern slope 96 feet E. of 44th St. and 155 feet S. of 2nd Ave.	Nov. 1940	10	8	8		406	323.5	200	226.5	313.5	80	200	319.5	99	303-402	264.4	1.0	1.9	0.40	Top of air line west side of pump	263.6	Top of concrete pump base	128	Sept. 19, 1940	178.7	Mar. 10, 1942	515	71
A6.	In brick pumphouse on hilltop, 1,050 feet due S. of intersection of 30th St. and 4th Ave.	Nov., 1940	10	8	8		409	326.5	200	226.5	316.5	80	200	326	104	311-415	283.6	0.8	1.6	0.37	Top of air line east side of pump	282.8	Top of concrete pump base	150	Nov. 5, 1940	182.6	Mar. 10, 1942	532	70
A7.	In brick pumphouse on hilltop, 1,320 feet W. of 35th St. and 1,850 feet S. of 4th Ave.	Nov., 1940	10	8	8		414	331.8	200	226.5	321.8	80	200	332	100	312-412	285.6	0.85	1.8	0.26	Top of air line south side of pump	284.8	Top of concrete pump base	150	Nov. 7, 1940	185.4	Feb. 5, 1942	533	
A8.	In brick pumphouse on crest of knoll 105 feet N. of 8th Ave., 293 feet W. of 51st St.	Nov., 1940	10	8	8		435	352.8	240	266.5	342.8	80	240	352	87	352-439	290.6	0.5	1.4	0.60	Top hole in pump base plate	290.1	Top of concrete pump base	150	Nov. 19, 1940	191.2	Mar. 10, 1942	504	71
A9.	In brick pumphouse on terrace 200 feet E. of 62nd St. and 450 feet S. of 2nd Ave.	Nov. 1940	10	8	8		440	357.8	200	226.5	347.8	80	200	358	80	358-438	256.6	1.0	1.8	0.40	Top of hole in pump base plate	255.8	Top of concrete pump base	118	Nov. 28, 1940	162.0	May 5, 1942	502	71
A10.	In brick pumphouse on ridge crest 250 feet S. of Avenue G., 89 feet E. of 54th St.	Dec. 1940	10	8	8		439	357	240	266.5	347	80	240	356	78	359-437	296.6	0.84	1.7	0.26	Top of air line south side of pump	295.8	Top of concrete pump base	160.8	Dec. 14, 1940	190.0	Mar. 10, 1942	551	71
A11.	In brick pumphouse near ridge crest 145 feet W. of 43rd St., 170 feet S. of G. Ave.	Nov. 1940	10	8	8		425	343	200	226.5	333	80	200	338	103	320-423	290.4	0.4	1.7	0.45	Top of hole in pump base plate	290.0	Top of concrete pump base	153.4	Dec. 20, 1940	186.0	Mar. 10, 1942	543	70
A12.	In brick pumphouse 55 feet E. of 22nd Ave. and 100 feet S. of C. Ave.	Nov. 1940	10	8	8		404	322	200	226.5	312	80	200	319	82	320-402	272.8	0.75	1.8	0.20	Top of air line	272.0	Top of concrete pump base	138.75	Dec. 17, 1940	170.3	Mar. 10, 1942	522	70½
A13.	In brick pumphouse on small vale 67 feet S. of 8th Ave., 115 feet E. of 40th St.	April, 1942	12	10	10		400	318.7	200	226.5	309.2	79.3	200	315	83	315-398	260.6	0.65	1.8	0.35	Top of air line	260.2	Top of concrete pump base	128	Apr. 28, 1942			855	
A14.	In brick pumphouse in small vale 84 feet W. of 51st St., 146 feet S. of 19th Ave.	April, 1942	12	10	10		417	353	200	226.5	343	61	200	354	61	354-415	254.3	0.4	1.65	0.73	Top of hole in pump base plate	253.65	Top of concrete pump base	118	May 6, 1942	154.2	May 25, 1943	899	
A15.	In brick pumphouse on hillside, 210 feet W. of 32nd St., 55 feet N. of Hospital Road 4.	1942	12	10	10		319	316	200	226.6	301	80	200	305.6	90	306-396	273.0	0.5	1.6	0.61	Top of hole in pump base plate	272.5	Top of concrete pump base	146	Aug. 28, 1942				
A16.	80 feet S. of 2nd Ave. and 70 feet E. of 39th St.	July, 1943	4	3	3		416.4	381.6	—	—	217.6	10	—	217.6	66	322-388	260.4	0.51	0.51		Top of casing flange	259.9	Concrete floor at casing	135.44	July 27, 1943				

HATTIESBURG ARMY AIR BASE

Number	Location	Date drilled	Upper casing	Lower casing	Screen	Gravel wall	Total depth	Top of screen	Top of pump bowls	To pump suction	To top of lower casing	Length of screen (feet)	Length of air line (feet)	Length of upper casing (feet)	Thickness of sand (feet)	Depth position of sand (feet)	Elevation of point	Height above bench mark	Height above floor	Below center of air gauge	Description	Elevation of bench mark (feet)	Description	Earliest reported static level (feet)	Date measured	Lowest reported pumping level (ft.)	Date measured	Average rate pumped (g.p.m.) June 1-15, 1943	Temp. of water (F. °)
1.	In brick pumphouse on plain 75 feet S. of SW leg of elevated storage tank, 200 feet NW of SW corner of old hangar.	Feb., 1942	18	10	10	32	194.5					30	41.1	154	100	93-193	144.3	1.1	1.1	0.5	Top of hole in pump base	143.2	Floor of pumphouse	—9.85	May 20, 1943	20.66	July 16, 1943	297	
2.	In brick pumphouse on plain W. of railroad and 970 feet SE of well 1.	March, 1942	18	10	10	32	193.7	159			94	30	38.6	153	40	153-193	142.85	0.5	1.1	0.5	Top of hole in pump base	142.5	Top of concrete pump base	—8.32	May 20, 1943			306	

Table 9

WELLS IN PERRY COUNTY

Number	Location	Owner or name	Driller	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	Aquifer: Thickness (feet)	Aquifer: Character of material	Aquifer: Geologic horizon	Measuring point: Altitude above m.s.l.	Measuring point: Height above ground (feet)	Measuring point: Description	Water level (feet above (+) or below (—) measuring point): Earliest reported level	Water level: Date of measurement	Water level: Later measurement	Water level: Date of measurement	Yield (gallons per minute): Earliest reported yield, Flow	Yield: Earliest reported yield, Pump	Yield: Date of measurement	Yield: Later measurement, Flow	Yield: Later measurement, Pump	Yield: Date of measurement	Temp. water (F.)	General information
1.	On wooded slope 100 yards east of N. gravel road, NE¼ NW¼ sec. 20, T. 5 N., R. 11 W.	Mrs. Suzie Chappel		1918	8	650					Catahoula								8½		Mar. 26, 1940				68¾	Equipped with hydraulic ram.
2.	SW¼ sec. 28, T. 5 N., R. 10 W.	Donald No. 1	R. M. Duran, et al	1924		1980						160		Surface of land												Abandoned oil prospect well.
3.	At west end of residence E. of small creek in Runnelstown, NW¼ NW¼ sec. 28, T. 5 N., R. 11 W.	J. L. Draugh		1912	2	285+				sand and rock	Catahoula			Surface of land		March, 1940										Well 11, Water-Supply Paper 576, p. 386.
4.	25 feet N. of Hattiesburg, Richton road at Runnelstown in front of school, NE¼ NE¾ sec. 29, T. 5 N., R 11 W.	Cons. School	Carloss Well Co.	1925	2	294	274(?)	20			Catahoula		1.2	Well elbow	+5.18	Mar. 26, 1940	+5.10	July 10, 1943	7½		Mar. 26, 1940				69	See chemical analysis.
5.	In pump house east of high school in Richton, NW¼ SW¼ sec. 31, T. 5 N., R. 10 W.	High School		1922	6	728	628	100	100	sand	Catahoula			Top of well casing	—24	1922				250	1922					
6.	In SE corner pump house beneath stand-tank SW of ice plant in Richton, SW¼ SW¼ sec. 31, T. 5 N., R. 9 W.	Richton Ice & Produce Co.		1911	6	800				sand	Catahoula					1911										Abandoned and capped.
7.	In SW corner of pump house with well 6	Richton Ice & Produce Co.		1907	8	1142		150-200			Catahoula (?)		—9.4	Top of well casing	—7.6	1937	6.29	Mar. 25, 1940		75	1937					
8.	On hillside 25 ft. W. of secondary road NW¼ SE¼ sec. 7, T. 3 N., R. 11 W.	Col. Woods		1930	3	111				sand	Catahoula	120	1.5	Top of well casing								3 (est.)		July 9, 1943		
9.	On rear porch of residence, NW¼ SW¼ sec. 8, T. 3 N., R. 11 W.	Mr. Yance		1927	1½	150					Catahoula	120±	6.35	Top of well tee	+10.75	Mar. 22, 1940	+2.50	July 9, 1943	5		July 9, 1943				67	
10.	200 ft. N. of rr. at Belleville, and 10 ft. west of home, NE¼ NW¼ sec. 20, T. 3 N., R. 11 W.	C. A. Loveland		1908	1½	138					Catahoula	122.14	2.8	Top of casing joint	+13.7	Mar. 21, 1943	+3.50	May 26, 1943	5½		Mar. 21, 1943	3		May 26, 1943	66¾	
11.	720 feet N. of old State Highway 24, in picnic park NE¼ NE¼ sec. 21, T. 3 N., R. 11 W.	U. S. Forest Service		1937	4	352				sand	Catahoula	112.01	2.55	Top of elbow on fountain	+1.61	Mar. 22, 1940	+1.10	May 28, 1943	2½		1940	2½		1943	68	
12.	At SE corner owner's residence in Mahned, NE¼ SE¼ sec. 22, T. 3 N., R. 11 W.	J. B. Kennedy	Mr. Cooper	1910	1¼	425					Catahoula	112	0	Surface of land	+5	1910			5		1910	3		1940	70¼	Equipped with hydraulic ram.
13.	In pump house in swale 100 yards W. of court house, NW¼ SE¼ sec. 19, T. 3 N., R. 10 W.	Federal Works Agency	Carloss Well Co.	1943	8-6-4	825	691 & 805	19 & 20	19 & 20	sand	Catahoula	107.39	2	Top of concrete pump foundation	+34.70	May 28, 1943			150		1943					Equipped with deep well turbine pump.
14.	10 feet E. of office building S. of court house at New Augusta, NW¼ SE¼ sec. 19, T. 3 N., R. 10 W.	County	John Sutter	1912	4	786	756(?)	30	88	sand and gravel	Catahoula	112.62	2.0	Top of well tee	+40	1912										Well 6, Water-Supply Paper 576, p. 386.
15.	One block E. and ½ block S. of court house at New Augusta, 50 ft. W. of gravel road, SE¼ SE¼ sec. 19, T. 3 N., R. 10 W.	C. C. Dearman	Swenson	1913	2	744	600	2 scr'ns		sand and gravel	Catahoula	111.4	—0.5	Top of well tee	+23(+)	1913	+29.5	May 27, 1943	2½		1913 (?)	5 (est.)		May 27, 1943		Well 4, Water-Supply Paper 576, p. 386.
16.	At New Augusta High School, SW¼ SW¼ sec. 20, T. 3 N., R. 10 W.	School	John Sutter	1918	3	740		30+		sand	Catahoula	112	1.8	Top of well elbow	+50	1918	+40.1	Mar. 27, 1940	175		1918				73½	Well 5, Water-Supply Paper 576, p. 386.
17.	In barnyard E. of residence 1¼ mile E. New Augusta, NE¼ SE¼ sec. 20, T. 3 N., R. 10 W.	W. I. Martin	John Sutter	1918	3	760	740(?)	20(?)	20	sand	Catahoula		3.4	Top of well tee	+40(+)	1918	33.7	Mar. 22, 1940	70		1918	60+		Mar. 22, 1940	70½	Well 7, Water-Supply Paper 576, p. 386.
18.	In residential yard between railroad and Highway U. S. 24 in Wingate, SW¼ SE¼ sec. 21, T. 3 N., R. 10 W.	County	Deep Well Co.	1929	2	723	703	20			Catahoula		2.0	Top of well tee			22.5	Mar. 25, 1940							74	

Table 9—Continued

WELLS IN PERRY COUNTY

Number	Location	Owner or name	Driller	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	Aquifer: Thickness (feet)	Aquifer: Character of material	Aquifer: Geologic horizon	Measuring point: Altitude above m.s.l.	Measuring point: Height above ground (feet)	Measuring point: Description	Water level (feet above (+) or below (—) measuring point): Earliest reported level	Water level: Date of measurement	Water level: Later measurement	Water level: Date of measurement	Yield (gallons per minute): Earliest reported yield, Flow	Yield: Earliest reported yield, Pump	Yield: Date of measurement	Yield: Later measurement, Flow	Yield: Later measurement, Pump	Yield: Date of measurement	Temp. water (F.)	General information
19.	NE of railroad and N. of station in road fork of U. S. Highway 15 in Beaumont, NE¼ NW¼ sec. 5, T. 2 N., R. 10 W.	F. E. Davis	Owner	1936	2	455		no screen	12	sand	Catahoula															See log.
20.	NE of street tee ½ block SW of railroad station in Beaumont, NE¼ NW¼ sec. 5, T. 2 N., R. 10 W.	Town of Beaumont	F. E. Davis	1937	2	567		no screen		sand	Catahoula								13		Mar. 26, 1940					
21.	At NW corner Southernmost school building Beaumont school, NE¼ NW¼ sec. 5, T. 2 N., R. 10 W.	Cons. School	F. E. Davis	1935	2	460		no screen		blue silty sand	Catahoula				+35(+)	1935			20		Mar. 26, 1940					Abandoned oil prospect well.
22.	At SW corner sec. 2, T. 2 N., R. 10 W.	J. J. Newman Lbr. Co. No. 2	F. E. Courson, et al	1936		3027						188		Derrick floor (?)												Abandoned oil prospect well.
23.	660 feet N. 660 feet W SE corner SE¼ SW¼ sec. 21, T. 2 N., R 10 W.	J. J. Newman Lbr. Co. No. 1	Phillips Pet. Co.	1938		8427						210		Derrick floor (?)												Abandoned oil prospect well.
24.	On crest of ridge 100 yds. S. of residence NE¼ NE¼ sec. 35, T. 2 N., R. 11 W.	C. C. C.	Fred Sutter		4	653			73	sand	Catahoula	280		Surface of the land	—155					20						See log. Abandoned.
25.	250 feet E. 250 feet S. NW corner sec. 26, T. 1 N., R. 9 W.	J. J. Newman Lbr. Co. No. 1	F. E. Courson, et al	1936		3026						175		Derrick floor (?)												Abandoned oil prospect well.
26.	907 feet S. and 660 feet W. center sec. 17, T. 1 S., R. 11 W.	Bond Lbr. Co. No. 1	Fohs Oil Co.	1940		7586						229		Derrick floor												Abandoned oil prospect well.

WELLS IN FORREST COUNTY

Number	Location	Owner or name	Driller	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	Aquifer: Thickness (feet)	Aquifer: Character of material	Aquifer: Geologic horizon	Measuring point: Altitude above m.s.l.	Measuring point: Height above ground (feet)	Measuring point: Description	Water level: Earliest reported level	Water level: Date of measurement	Water level: Later measurement	Water level: Date of measurement	Yield: Earliest reported yield, Flow	Yield: Earliest reported yield, Pump	Yield: Date of measurement	Yield: Later measurement, Flow	Yield: Later measurement, Pump	Yield: Date of measurement	Temp. water (F.)	General information
1.	On S. bank of creek 1.2 mile S. of Jones County line, NE¼ SW¼ sec. 11, T. 5 N., R. 13 W.	R. B. Gunn	Mr. Tony	1912	2	250	244	6			Catahoula	177	7.4	Top of 2 in. stand pipe	—2.19	Feb. 26, 1940			10						68	Found flowing.
2.	0.35 mile SE of road junction and 90 feet E. of road centerline 35 feet below crest of ridge NW¼ NE¼ sec. 8, T. 5 N., R. 14 W.	J. J. Newman	W. P. A.	1939		66.3					Hattiesburg															A test hole for clay samples.
3.	At municipal waterworks ½ mile NW of Hattiesburg city limits on S. side of collection reservoir NE¼ SE¼ sec. 31, T. 5 N., R. 13 W. (City Well 2)	City of Hattiesburg	Blakemore Drilling Co.	1930	10	622.3	542.3	77	76	coarse white sand	Catahoula	156.20	0	Surface of the land	+5.07	Dec. 8, 1930			90	900	1939				68	Used as a reserve municipal supply.
4.	Do., at NE corner of collection reservoir (City Well 3)	Do.	Do.	1931	10	614.2	540.3	73.9	87	sand	Catahoula	163.19	0.09	Top of 10-in. casing	—2.83	1931			80	900	1939				68	Used as a reserve municipal supply.
5.	Do., 500 feet E. of collection reservoir (City Well 4)	Do.	Do.	1931	10	621.3	539	86.9	91	sand	Catahoula	156.15	0	Surface of the land		1931			137		1931	170		1931	68	Later increased yield due to siphon effect. Part of mun. supply.
6.	Do. SW¼ NW¼, sec. 32, T. 5 N., R. 13 W. on the bank of Bouie River (City Well 15)	Do.	Do.	1934	10	444	367	81.7	126	medium white sand	Catahoula					1934			80		1934	300		1934	66.5	Later increased yield due to siphon effect. Part of mun. supply.
7.	At municipal waterworks ½ mile NW of Hattiesburg city limits on south side of collection reservoir, 240 feet E. of N-S water main on N. side G. & S. I. Railroad (City Well No. 9)	City of Hattiesburg	Blakemore Drilling Co.	Mar. 1931	10	353		87.7	88	coarse sand and gravel	Catahoula	153.4	0	Surface of the land	+9.9	1931			320		1931				66.5	Part of municipal supply.
8.	Do., 540 feet SE of well 7 along railroad (City Well 10)	Do.	Do.	Mar. 1931	10	456.3	(app.) 368	87.7	70	sand and gravel	Catahoula	155.3	0.3	Top of 10-in. casing		1931			306		1931	410		1931		Later increased yield to siphon effect. Part of municipal supply.

TABLE 9—Continued

WELLS IN FORREST COUNTY

Number	Location	Owner or name	Driller	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	Aquifer: Thickness (feet)	Aquifer: Character of material	Aquifer: Geologic horizon	Measuring point: Altitude above m.s.l.	Measuring point: Height above ground (feet)	Measuring point: Description	Water level (feet above (+) or below (—) measuring point): Earliest reported level	Date of measurement	Later measurement	Date of measurement	Yield (gallons per minute): Earliest reported yield, Flow	Earliest reported yield, Pump	Date of measurement	Later measurement, Flow	Later measurement, Pump	Date of measurement	Temp. water (F.)	General information
9.	Do., about 540 feet N. of well 8 (City Well 11)	Do.	Do.	1934	10	635	533	102	122	sand & gravel clay pockets	Catahoula	150.31	0.3	Top of 10-in. casing	+14.5	1934			115		1931				68	Part of municipal supply.
10.	Do., about N-S center line NW¼ sec. 32, T 5 N., R. 13 W., 540 feet SE of well 8 (City Well 13)	Do.	Do.	Feb. 1934	10	398	316	81.7	220	sand and gravel	Catahoula	150±	0	Above surface of land	+3.67	1934			240		1934				66.5	Part of municipal supply.
11.	Do., about 600 feet N. well 10 (City Well 12)	Do.	Do.	1931	10	414	342	72	212	sand and gravel	Catahoula	152	0	Surface of the land	+11.72	Mar. 28, 1931			270		Mar. 28, 1931				66.5	Part of municipal supply.
12.	Do., about 500 feet. N. well 11 (City Well 14)	Do.	Do.	1934	10	609.5	522	87.3	100	sand and gravel	Catahoula	154.69	0	Surface of the land	+7.15	1934			175		Mar. 28, 1931				68	Part of municipal supply.
13.	At road fork on W. side southern railroad at Petal, SW¼ SE¼ sec. 35, T. 5 N., R. 13 W.	Pat Rogers	Fred Sutter	1932	4	316	276	40	118	sand and gravel	Catahoula	153	2.0	Top of well tee	+13.0	1932	+11.9	Feb. 23, 1940	125		1932	21	8	Feb. 23, 1940	68	Used manufacture soft drinks; found flowing.
14.	150 feet N. of paved street, 200 feet E. U. S. Highway 11, 300 feet W. of Southern Railroad NE¼ NW¼ sec. 2, T. 4 N., R. 13 W.	Clinton Lbr. Co.	D. N. Porter	1939	4-2	390+					Catahoula	151	0.9	Top of well ell	+10.25	Feb. 23, 1940			18		Feb. 1940					Found flowing.
15.	155 feet NE of well 30	J. J. Newman Lbr. Co.		1908	6	320			76(?)	gravel	Catahoula	146	3	Top of casing	+9	1908			300		1908	8		Feb. 11, 1939	69	Found flowing, 1939.
16.	100 yds. E. junction Miss. Central Railroad and Southern RR in Hattiesburg, SW¼ SW¼ sec. 2, T. 4 N., R. 13 W.	J. J. Newman Lbr. Co.	John Sutter	1923	6	336	260(?)		76	sand	Catahoula	143	2.0	Top of overflow					26		Feb. 11, 1939				69	Found flowing, 1939.
17.	On Bowie St. at NE corner ice plant between 7th and 8th St. in Hattiesburg NW¼ SE¼ sec. 3, T. 4 N., R. 13 W.	Home Ice & Coal Co.	Fred Sutter	1938	6	375					Catahoula	156	0.3	Top of well cap	+6.1	Feb. 19, 1940			72		Feb. 19, 1940				68¾	Found flowing.
18.	At SW corner abandoned school building on 5th and New Orleans St. in Hattiesburg; SW¼ SW¼ sec. 3, T. 4 N., R. 13 W.	City Schools			6						Catahoula	155	2.2	Top of well tee	+5.2	Feb. 11, 1940			18		Feb. 11, 1940				68¾	Found flowing.
19.	By reservoir 2 miles N. 7th St. in plant yard in Hattiesburg; NW¼ SW¼ sec. 4, T. 4 N., R. 13 W.	Meridian Fertilizer Co.	John Sutter	Aug. 1928	8-6	343	268	75	113	sand and gravel	Catahoula			Surface of the land		Mar., 1940			144		Mar. 8, 1940				68	Found flowing.
20.	0.1 mile West of Providence St., 1050 feet N. 7th St. in plant yard at Hattiesburg; NE¼ SW¼ sec. 4, T. 4 N., R. 13 W. (Hercules Powder Co. Well 8)	Hercules Powder Co.	Layne Central	1927	18-8	501	430(?)	71	91	gray sand and gravel	Catahoula			Surface of the land	—13	1934				1200	1934					For industrial use.
21.	100 yards SW of well 18 NE¼ SW¼ sec. 4, T. 4 N., R. 13 W. (Hercules Powder Company Well 5	Do.		1920	6	500	410(?)	80	90	sand and gravel	Catahoula			Surface of the land		1940										Abandoned.
22.	Near Well 21 (Hercules Powder Co. Well 1)	Do.		1920	6	1002			97	sand and gravel	Catahoula			Surface of the land												Abandoned.
23.	In SW corner of power house on campus Hattiesburg State Teachers College; NE¼ NE¼ sec. 7, T. 4 N., R. 13 W.	State Teachers College			6							211	3	Top of casing	—6.2	Feb. 19, 1940										Abandoned; observation well.
24.	70 feet S. and 70 feet W. of road junction at SE corner power house on campus Hattiesburg State Teachers College, NE¼ NE¼ sec. 7, T. 4 N., R. 13 W.	Do.	Gray Artesian Well Co.	1920	6	601.2			82	sand and gravel	Catahoula	216	2.3	Top of casing		1920	—49.3	Feb. 17, 1940								Abandoned.
25.	Under City Hall, Forrest and Front Street, Hattiesburg, SE¼ NW¼ sec. 10, T. 4 N., R. 13 W.	City of Hattiesburg	John Sutter	1917	6	694	589(?)		105	sand	Catahoula	155	0	Surface of the land	+15	1917										Abandoned. Well 13, Water-Supply Paper 576, p. 158.

TABLE 9—Continued

WELLS IN FORREST COUNTY

Number	Location	Owner or name	Driller	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	Aquifer: Thickness (feet)	Aquifer: Character of material	Aquifer: Geologic horizon	Measuring point: Altitude above m.s.l.	Measuring point: Height above ground (feet)	Measuring point: Description	Water level (feet above (+) or below (—) measuring point): Earliest reported level	Water level: Date of measurement	Water level: Later measurement	Water level: Date of measurement	Yield (gallons per minute): Earliest reported yield: Flow	Yield: Earliest reported yield: Pump	Yield: Date of measurement	Yield: Later measurement: Flow	Yield: Later measurement: Pump	Yield: Date of measurement	Temp. water (F.)	General information
26.	Under front steps City Hall, Forrest and Front St., Hattiesburg, SE¼ NW¼ sec. 10, T. 4 N., R. 13 W.	Do.	Do.	1920 (?)	6	430				sand	Catahoula	155				1940										Abandoned; flowing into fish pond in 1940.
27.	At NW corner of U.S.O. Building, Front St., Hattiesburg, SE¼ NW¼ sec. 10, T. 4 N., R. 13 W.	Do.	Carloss Well Supply Co.	1924	10	700	610(?)	80		sand	Catahoula	152	0	Surface of the land		1940										Abandoned and capped.
28.	Under center of U.S.O. Bldg., Front St., Hattiesburg, SE¼ NW¼ sec. 10, T. 4 N., R. 13 W.	Do.	Do.	1924	10	400	320(?)	80		sand	Catahoula	153	0.9	Top of well tee	+4.7	Feb. 20, 1940									66	Abandoned and capped.
29.	Under north end U.S.O. Bldg., Hattiesburg, SE¼ NW¼ sec. 10, T. 4 N., R. 13 W.	Do.	Do.	1924	10	700	620(?)	80		sand	Catahoula	157	3.95	Top of 10-inch bushing	+0.6	Feb. 28, 1940	+0.44	Oct. 29, 1940							72	Abandoned and capped.
30.	Under southern end of U.S.O. Building, Hattiesburg, SE¼ NW¼ sec. 10, T. 4 N., R. 13 W. Stilling well behind (E) of building	Do.	Do.	1924	10	390	310(?)	80		sand	Catahoula	159.46	6.75	Top of stilling well casing	—1.78	Feb. 27, 1940		1943							69	Recorder maintained on well since March, 1940.
31.	Lot 1, Block 72, Kanyser and Whimery Addition between Southern and Laurel Avenues on Walnut St., Hattiesburg, NE¼ SW¼ sec. 10, T. 4 N., R. 13 W.		Mrs. M. Hemphill	1904	5	325				sand	Catahoula	147±	0	Surface of the land	+8.0	1904			60		1904					Found flowing, 1940.
32.	At southern railroad depot on Newman St. between Tipton and Ash St., Hattiesburg, NE¼ NE¼ sec. 10, T. 4 N., R. 13 W.	Southern Railroad	Layne Central	Aug. 1939	8	420	350	60	148	sand	Catahoula	149	0.5	Top of well tee		1939			163		1939					Flows freely into surface reservoir.
33.	In abandoned lumber yard between Miss. Central and B. H. & S. railways; SE¼ NW¼ sec. 23, T. 4 N., R. 13 W.	Mr. Burkhart	John Sutter	1918	6-4-3	397			93	sand and gravel	Catahoula	153.95	2.0	Top of 4-inch well elbow	+15.0	1918	+0.14	May 21, 1943	50		1918	2		May 21, 1943		See drillers log.
34.	20 feet SW of extractor plant, SE¼ SW¼ sec. 23, T. 4 N., R. 13 W.	Dixie Pine Products Co.	Fred Sutter	1937	6	460	420	40	248	sand and gravel	Catahoula	150	0	Surface of the land	+4.0	July, 1937			75	500	1937					Industrial use. See drillers log.
35.	300 feet N. of extractor plant, SE¼ SW¼ sec. 23, T. 4 N., R. 13 W.	Do.	John Sutter	1919	6-4	460		40			Catahoula	150	0	Surface of the land		1935				400	1940					Industrial use.
36.	50 feet N. of extractor plant; SE¼ SW¼ sec. 23, T. 4 N., R. 13 W.	Do.	Fred Sutter	1935	6	458		40			Catahoula	150	0	Surface of the land					125	500	1935					Industrial use.
37.	15 feet S. of Hartfield home, 50 feet W. of old highway 49, 300 feet NW McCallum Creek bridge, NW¼ SW¼ sec. 9, T 3 N., R 12 W.	Mrs. Hartfield	John Sutter	Aug. 1918	3	290	270	20	36	gray sand and gravel	Catahoula	142.30	0.25	Top of 3-inch casing	+0.25	Aug., 1918	—10.81	May 25, 1943								See drillers log.
38.	In small pump house 350 feet E. of B. H. & S. Railroad, NE¼ SW¼ sec. 9, T. 3 N., R. 12 W.	M. W. Thompson	Mr. Tony	1919	2	87		none		sand	Catahoula (?)	134.77	1.10	Top of well collar	+6	1919	.85	May 25, 1943							68	
39.	In pasture ¼ mile E. B. H. & S. Railroad, SE¼ SW¼ sec. 10, T. 3 N., R. 12 W.	M. W. Thompson	Mr. Tony	1919	2	140		none		sand	Catahoula (?)	135±	0	Surface of the land	+22	1919						15		Mar. 8, 1940		Flows freely from erosive pit.
40.	At SW corner of porch at rear of residence NE¼ NE¼ sec. 23, T. 3 N., R. 13 W.	W. M. Beard	John Moore	1939	6	44.5		none		sand	Citronelle	284±	4.6	Top of well curbing	—41.20	Oct. 18, 1941	—37.46	May 22, 1943								Domestic, abandoned observation well.
41.	In small valley NE¼ SE¼ sec. 28, T. 3 N., R. 12 W.	U. S. Army	John Sutter	June 1918	6	720	660	60	75	gray sand and gravel	Catahoula	230	0	Surface of the land	—95	June, 1918										Abandoned and filled.

TABLE 9—Continued

WELLS IN FORREST COUNTY

Number	LOCATION	OWNER OR NAME	DRILLER	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	AQUIFER: Thickness (feet)	AQUIFER: Character of material	AQUIFER: Geologic horizon	MEASURING POINT: Altitude above m.s.l.	MEASURING POINT: Height above ground (feet)	MEASURING POINT: Description	WATER LEVEL (FEET ABOVE (+) OR BELOW (—) MEASURING POINT): Earliest reported level	Date of measurement	Later measurement	Date of measurement	YIELD (GALLONS PER MINUTE): Earliest reported yield: Flow	Earliest reported yield: Pump	Date of measurement	Later measurement: Flow	Later measurement: Pump	Date of measurement	Temp. water (F.)	GENERAL INFORMATION
42.	In small valley, NE¼ SE¼ sec. 28, T. 3 N., R. 12 W.	U. S. Army	C. H. Harma	1917	6	363⅔			80	sand and gravel	Catahoula	230	0	Surface of land	—30(?)	1917										Abandoned & filled; Well 3, Water-Supply Paper 576, p. 161, log. p. 159.
43.	50 feet N. of E-W. gravel road on hilltop N. outskirts of the town of McLaurin	Town of McLaurin	Carloss Well Supply Co.	1943	8-6	638	533-595	20-40	23-44	sand	Catahoula	375.43	1.0	Top of concrete pump foundation	—247	March, 1943										
44.	1,620 feet W., 350 feet N. of SE corner sec. 11, T. 1 N., R. 3 W.	Batson-Hatton Lbr. Co.	Gulf Refg. Co.	1935		3007						265		Derrick floor												Abandoned oil prospect well.
45.	In pump house W. of elevated storage tank. At agricultural High School, Brooklyn, NW¼ NE¼ sec. 10, T. 1 N., R. 12 W.	High School		1932		623				sand	Catahoula	219	0.7	Top of concrete pump foundation											70	School supply.
46.	In pump house at NW corner Brooklyn Grammar School, SE¼ SW¼ sec. 10, T. 1 N., R. 12 W.	Brooklyn Consol. Sch.		1927		500+				sand	Catahoula	157	0.5	Top of well tee												School supply.
47.	In meadow on hillcrest 600 feet W. of gravel road and 1.1 mi. south U. S. Highway 49 at Brooklyn, NW¼ SW¼ sec. 22, T. 1 N., R. 12 W.	U. S. Forest Service	Blevins Drilling Co.	Sept. 1939	6	767	747(?)	30	70	sand	Hattiesburg	240.44	0.45	Center of measuring hole	—96.45	Sept., 1939	—93.30	July 22, 1943								Abandoned.
48.	At Ashe Nursery, Brooklyn, 300 feet E., well 49; NE¼ NE¼ sec. 26, T. 1 N., R. 12 W.	U. S. Forest Service	Robert B. Laird	May 1936	8	725	607(?)		109	sand	Hattiesburg	265	0.5	Top of concrete pump foundation						350						Used for irrigation.
49.	At Ashe Nursery, Brooklyn, NE of cow shed; NE¼ NE¼ sec. 26, T. 1 N., R. 12 W.	U. S. Forest Service	Robert B. Laird	1936	4	728	613(?)		109	sand	Hattiesburg	284	1.0	Top of concrete pump foundation	—142	1936				100						Used for irrigation.
50.	Behind manager's residence 200 yards W. of U. S. Highway 49 at Dixie Station NW¼ NE¼ sec. 28, T. 1 N., R. 12 W.	Dixie Tung Empire Corp.		1926	6½	60		none			Citronelle (?)	263.78	5.8	Top of tile curbing on E. side	—48.04	Aug. 31, 1940	—48.54	July 22, 1943								A domestic supply.
51.	1980 feet N., 1732 feet W. of SE corner sec. 10, T. 1 S., R. 12 W.	Batson-Hatten Lbr. Co.	Fohs Oil Co.	1941		8752						230		Derrick floor												Electrical log. Abandoned oil prospect well.
52.	NW¼ SW¼ sec. 35, T. 1 S., R. 13 W.	R. Batson Est.	Placid Oil Co.	1942		5285						210		Derrick floor												Abandoned oil prospect well; elec. log.

Table 9—Continued

WELLS IN SOUTHERN JONES COUNTY

Number	LOCATION	OWNER OR NAME	DRILLER	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	AQUIFER: Thickness (feet)	AQUIFER: Character of material	AQUIFER: Geologic horizon	MEASURING POINT: Altitude above m.s.l.	MEASURING POINT: Height above ground (feet)	MEASURING POINT: Description	WATER LEVEL (FEET ABOVE (+) OR BELOW (—) MEASURING POINT): Earliest reported level	WATER LEVEL: Date of measurement	WATER LEVEL: Later measurement	WATER LEVEL: Date of measurement	YIELD (GALLONS PER MINUTE): Earliest reported yield: Flow	YIELD: Earliest reported yield: Pump	YIELD: Date of measurement	YIELD: Later measurement: Flow	YIELD: Later measurement: Pump	YIELD: Date of measurement	Temp. water (F.)	GENERAL INFORMATION
101.	NW¼ SW¼ sec. 25, T. 8 N., R. 10 W.	Wausau So. Lbr. Co.	Sinclair Wyoming			7509						315		Derrick floor												Abandoned oil prospect well, elec. log.
102.	Midway between U. S. Highway 11 and Southern R.R. at power house, NE¼ SE¼ sec. 8, T. 7 N., R. 12 W.	Ellisville State School	Fred Sutter	1929	8	540					Catahoula									250						
103.	SE¼ NE¼ sec. 12, T. 7 N., R. 14 W.	S. B. Jefcoat No. 1	A. H. and C. L. Rowan	1942		8793						259		Derrick floor												Abandoned oil prospect well, elec. log.
104.	400 ft. S., 200 ft. W. of center of sec. 24, T. 7 N., R. 13 W.	Watson Estate No. 1	Snow-Black Pet. Co.	1933		4754						324		Derrick floor (?)												Abandoned oil prospect well.
105.	W. side of U. S. Highway 11, 0.7 mile SW of Tawanta at rear of residence.	M. Brannon	Mr. Patterson	1939	8	90				sand	Catahoula	352	3.2	Top of well curb at base of hinged corner	—74.69	Sept. 29, 1940	69.87	Jan. 28, 1942								Observation well which has been measured repeatedly.
106.	NW¼ sec. 30, T. 7 N., R. 12 W.	Margaret Overland		1908 (?)	7	58			16	red sand	Catahoula (?)				—50	1908 (?)										Well 20, Water-Supply Paper 576, p. 253. See log in Water-Supply Paper 576, p. 252.
107.	0.8 mile S. and 0.1 mile W. of RR station, Moselle, NW¼ NW¼ sec. 14, T. 6 N., R. 13 W.	P. M. Ikeler	Layne-Bowler	1916	4	525	465	60		white sand	Catahoula	228(?)	—30	Surface of land	—30	1916										Well 19, Water-Supply Paper 576, p. 253.
108.	150 yds. W. RR crossing at Ovett and 200 ft. S. of highway, NE¼ SW¼ sec. 18, T. 6 N., R. 10 W.	Town of Ovett	County	1929	2	212		none			Catahoula	175	0.8	Top of well elbow	+3.58	Mar. 14, 1940	+2.08	July 10, 1943	14		Mar. 14, 1940				67	Observation well which has been measured repeatedly. Uncased hole.
109.	100 yds. N. RR crossing at Ovett and 50 ft. W. of owner's residence, NW¼ SE¼ sec. 18, T. 6 N., R. 10 W.	A. F. Walters	Owner	1925	2	190		none			Catahoula	175		Surface of land		Mar., 1940			10						67	
110.	On W. bank small creek on eastern part of Ovett, NW¼ SE¼ sec. 18, T. 6 N., R. 10 W.	Town of Ovett	L. Tony	1908	2	212		none			Catahoula	189		Surface of land		Mar., 1940										30 ft. of 2 in. casing; remainder uncased hole.
111.	100 yds. SE of road junction 1.25 mile W. of RR crossing at Ovett, NE¼ NW¼ sec. 24, T. 6 N., R. 11 W.	A. F. Walters	L. Tony	1918	2	190		none			Catahoula	176	2.33	Top of well tee		Mar., 1940									67½	Decline in flow noted since 1920. 80 feet of casing.
112.	NW¼ sec. 27, T. 6 N., R. 10 W.	Griffin Lbr. Co.		1920		375.5			159.5		Catahoula															Well 2, Water-Supply Paper 576, p. 253.

Table 9—Continued

WELLS IN SOUTHERN WAYNE COUNTY

Number	LOCATION	OWNER OR NAME	DRILLER	Date completed	Diameter (inches)	Depth (feet)	Depth to top of screen (feet)	Length of screen (feet)	Depth to which well is cased (feet)	PRINCIPAL WATER-BEARING BED			PRESSURE HEAD or WATER LEVEL		Measuring point above mean sea level (approx., ft.)	YIELD (g. p. m.)		Use of water	REMARKS
										Thickness (feet)	Character of material	Geologic horizon	Above (+) or below (—) measuring point (ft.)	Date of measurement		Flow	Pump		
10.	On hillside 50 yards from old U. S. Highway 45, NW¼ NE¼, Sec. 18, T. 8 N., R. 6 W.	Mrs. E. Huggins	Spring								sand	Citronelle or Catahoula				8		Drinking	Described in U. S. Geol. Survey Water-Supply Paper 576, p. 484. Complete chemical analysis.
11.	At SW corner of home NE¼ NE¼, Sec. 19, T. 8 N., R. 6 W.	Ellis Moore	Owner	1941	1¼	42	37	5	42			Terrace or Catahoula	—20	1941			Pitcher	Domestic	
12.	At SE corner of grammar school SW¼ SE¼, Sec. 28, T. 8 N., R. 6 W.	Wayne County	Owner	1942	8	42			42		sand	Terrace	—37.97	Sept. 30, 1942	190		Bucket	School	
13.	Center of SW¼ NE¼, Sec. 5, T. 7 N., R. 9 W.	Kalmia Realty Co.	Hill & Hill W. L. Stewart	1940		6,536	521-6,536		electric log										Abandoned oil prospect well.
14.	SE corner high school building SW¼ SE¼, Sec. 9, T. 7 N., R. 7 W.	Clara School	Wayne County	1928	3	185			185(?)		sand	Citronelle and Catahoula	—		203		Compressed air	School	
15.	15 feet W. of road junction NE¼ NW¼, Sec. 16, T. 7 N., R. 7 W.	T. L. Martin	Cooper	1928	3	145			145		sand	Citronelle and Catahoula	—6 (reported)		190				Abandoned.
16.	On W. side machine shop NE¼ NE¼, Sec. 22, T. 7 N., R. 6 W.	J. C. Mashburn	Owner	1931	3	287	267	open	267	8-10	sand	Bucatunna	0		150	3	Pitcher	Public supply	Supplies six families; flow measured 6 feet beneath surface.
17.	At abandoned hill site SW¼ NW¼, Sec. 23, T. 7 N., R. 6 W.	Robinson Land & Lbr. Co.	C. W. Stallenwalck	1911	3(?)	750						Vicksburg group (?)	+		150	2			Abandoned.
18.	Behind home NE¼ NE¼, Sec. 22, T. 6 N., R. 6 W.	Esra Douglas	Owner	1931	2	610			610		clay	Catahoula and Chickasawhay	+			1		Domestic and stock	Only 2 feet of sand in well at a depth of 380 382 feet.
19.	SW corner resident NW¼ SE¼, Sec. 26, T. 6. N., R. 6 W.	Gus Douglas	Kinch		3	600		open	160		clay and sand	Catahoula	+20			3	Hydraulic	Domestic and stock	