TEXAS STATE BOARD OF WATER ENGINEERS

C. S. Clark, Cnairman

A. H. Dunlap, Member

J. W. Pritchett, Member

WATER RESOURCES OF HARRISON COUNTY, TEXAS

Ву

W. L. Broadhurst and Si D. Breeding

Prepared in cooperation with the Geological Survey, United States Department of the Interior

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Figure 1. Geologic map of eight counties in northeast Texas. 2. Electrical logs of oil tests in Hurrison County, Texas. Map of Harrison County, Texas showing water wells and springs.

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W. L. Broadhurst and S. D. Breeding

INTRODUCTION

This report includes records of 195 wells and 5 springs, drillers' logs of 55 wells, brief descriptions of electrical logs of 5 wells, and results of partial chemical analyses of water from 141 wells and 5 springs in Harrison County, Texas. It includes 2 maps, one showing the locations of the wells and springs, and the other a geologic map of Harrison County and adjacent or nearby counties to the north and west (fig. 1) copied from the geologic map of Texas which was compiled in 1937 by the Geological Survey, U. S. Department of the Interior. It also includes a page of graphs (fig. 2) reproduced from the electrical logs of 5 oil tests in the county. The numbers shown on the well map and in figure 2 correspond to those in the tables of well records, well logs, and water analyses.

The records were obtained between October 17, 1941, and February 14, 1942, in connection with a state-wide program of ground-water investigation in Texas conducted by the State Board of Water Engineers in cooperation with the Geological Survey.

The report also includes a chapter on the supply of surface water available in the county from the Sabine River and Little Cypress Creek, which consists essentially of analyses of runoff based on measurements of the discharge of the Sabine River in Gregg County and Cypress Creek in Marion County.

The water analyses were made by W. W. Hastings, chemist of the Quality of Water Pivision of the U. S. Geological Survey, and by chemists employed by the Work Projects Administration under the supervision of Mr. Hastings and Dr. E. P. Schoon, Pirector of the Bureau of Industrial Chemistry of The University of Texas. The results of the analyses, which relate to the mineral constituents in the water and not to its sanitary character, are tabulated in parts per million on pages 45 to 51. For the convenience of those who prefer a different form of expression, the analyses of 20 of the samples are also given in equivalents per million on page 52.

TOPOGRAPHY, POPULATION AND ECONOMICAL DEVELOPMENT

Harrison County is about 150 miles east of Dallas, in the timbered region of northeast Texas, adjacent to the Louisiana border. The surface of the county is gently rolling to hilly and in general rises from east to west. The minimum elevation above sea level is about 200 feet and the maximum about 500 feet.

According to the census of 1940, Harrison County had a population of 50,900, and Marshall, the county seat and trading center, had 18,410.

The chief industries of Marshall include the railroad shops, a car-wheel foundry, commercial carbon plant, brick plant, flour mill, cottonseed cil mill, cotton compress, milk products plant, and a basket and crate factory. Other towns in the county and their population in 1940 are Hallsville, 1,000; Waskom, 564; and Karnack, 70.

The economic development of Harrison County is diversified. A part of the area is covered with second-growth loblolly and short-leaf yellow pine and hardwood which support a thriving lumber industry. Other natural resources that have been more or less extensively developed include gas, brick-clay, and lignite. The chief farm crops are cotton, corn, hay, ribbon cane, fruits, berries, and vegetables. Dairying is an important livestock industry, and a fairly large number of beef cattle and hogs are raised for market.

PRECIPITATION

Monthly records of the precipitation at Marshall from 1893 to 1899 and from 1908 to 1942, collected by the U.S. Weather Bureau, are shown in the following table. According to these records the average annual precipitation during 42 years was 45.55 inches. Among the wettest years were 1895 with 62.65 inches; 1896 with 61.48 inches; 1935 with 58.64 inches; 1940 with 55.28 inches; and 1941 with 58.62 inches. The driest year on record was 1936 with only 29.92 inches. Other dry periods include 1909 and 1910 with a yearly average of 33.62 inches; 1916, 1917, and 1918 with a yearly average of 34.13 inches; 1924 with 30.33 inches; and 1958 with 38.26 inches. The precipitation is not evenly distributed throughout the year but is lowest in the late summer and fell and highest in the winter and spring.

<u> </u>										-	-		
Year	Jan.	Feb.	war.	Apr.	llay	June	July	Aug.	Sept.	Oct,	Nov.	Dec:	Annual
1893	*0,38	*1.82	*2 . 88	*1.67	5,40	9.00	T	1.85	2,20	0.55	9.55	1.65	36,95
1894	4,30	*3,40	*7.07	5.30	2.60	1,95	5.15	4.75	5,25	1.85	1:80	2,60	46.02
1895	7.66	4.64	3,60	1.00	11.80	4.00	11.75	1,45	. 70	4.25	5,70	6.10	62.65
1896	15.40	13.10	5,15	*2.09	*2.42	*3.41	*3.78	1,47	*3,30	*6.66		*2.55	61,43
1897	*5.19	* .30	9.79	3,51	3.26		*3.03	*1.70	*2.16	2.48	.97		44,47
1898	7,88	3.19	4.10	1.28	2.82	9.00	. 70	2.32	3,75	1.90	4.28		43.77
1899	2.33	2.53	2.04		*6.87	*4.94		<u> 83</u>	* •43	*5.6C	*1.86		36.68
1908	*2.57	*5.79	*2.62		*10.30	*2.05	3,75	4.87	6.98	.17	1.73		48-61
1909	* •45	*3,74	*3.18	1.85	2.86	2.95	1.56	1.76	.90	4,67	1.94		34.33
1910	2.40	4.22	1.63	4.69	4,55	1 = 08	.72	3.16	.19	1.32	2.70		32.92
1911	.74	1.91	2.61	10.53	,95	•46	7.51	4.60	.61	1.24	1.24		40.75
1912	4.13	2,19	10.64	7.17	2.42	5.89	1.60	8,52	97ء	。 55	.18	4.72	48.98
1913	3.51	5.12	5.27	5.12	2.29	2.03	2.78	₌ 75	13.63	5-67	1.12	6.23	53.52
1914	1.21	5.15	6.59	4.24	5,68	.68	1.01	8.19	1.66	.15	6.15	9.78	50.49
1915	5.91	4.50	2.33	5.07	1.17	3.45	1.61	14.11	2,20	1.86	6:41	1.87	50.49
1916	7.36	05ء	1,64	3.43	5.28	1.70	2.77	1.12	2.34	2,41	3.41	2.91	34,42
1917	3.32	3.05	3.12	3.56	2.18	1.02	9.47	4,59	1.75	1.11	1.25	1.09	35.51
1918	2.99	• 78	2.20	7.37	1.23	3.10	6)ء	3.74	77	2.06	4,57	3,50	32,47
1919	4.09	4,26	2.66	3.93	2.97	5.80	2.59	5.40	2.13	10.37	6,35	2:37	55.42
1920	5.75	2.52	3.61	4.25	5.45	2.94	3.66	4.17	1,55	3.02	3.97	5,49	46.38
1921	*3.14	2.65	3.85	16.20	1.41	5.69	4.82	2.44	1.50	. 75	1.15	4-83	49.45
1922	5.32	6.35	9.25	6.85	2.27	5.30	4.54	2.2€	2,09	.77	3.09	1.80	49.89
1923	4.69	7.39	2,88	6.95	1.51	2.64	1.10	e 87	4,43	2.56	2,77	8.70	46.49
1924	5.07	3 🛮 85	4.60	3,43	6.31	e 97	${f T}$	1:10	•77	.06	1.92	2.25	30.33
1925	5.68	1.24	3.10	2.03	3,45	,85	4.01	<u> </u>	2:68	5.27	11.61	2:07	42.83
1926	4.75	و 97	9.51	4.22	2.91	6,92	6.40	2.72	1.01	4.17	1.52	7.75	52.85
1927	2.31	3.80	5.17	10.71	5.18	4.53	6.0೪	1.34	2,02	4.61	1.83	4,74	52.32
1928	•87	3.48	3.56	9.59	4.41	8.26	5.09	•40	.71	4.65	4.91	4.67	50.60
1929	4.36	2.57	3.49	*5.42	*6.50	*3.0l	*1,23	20ء	2.91	*2.44	*4,81	*4.35	41.30
1930	3.20	4.50	1.70	. 66	8.31	•93	1.05	2.55	2.71	7.02	5,86		43.19
1931	2.91	4.93	3.45	2,67	1.46	3.40	3.41	4.53	1,22	3,50	4.69	12,74	48.91
1952	13.13	7 c 53	5,30	2.45	2.40	2.58	1.14	,72	2.04	1,51	3.15	8.68	50.63
1933	8.68	4.58	7.38	4.39	8.20		13.01	1.13	56ء	2.40	1.02	7.29	58.64
1934	4.C3	3.30	6,02	4.80	3.20	1.12	1.34	1.24	1.24	• 50	9.73	2.95	39.48
1935		3:46	4.30		10.83	6,40	1.60	• 69	2.19	5.28	2.93	4.54	47.88
1936		1.82	2.57			•74	1.61	1.30	1.01	3,66	3,81	3,90	29.92
1937		1.93	3.96	2.49			2.38	, 78	3.15	4.03	8.58	7.60	45.10
1938	3.07	2.86	3.20	3.89		3.10		2.15	1.72	•57	5.34		38.26
1939		7.56	1.19	2.37		3.73	2,56	1.83	. 16	. 49	7.03		41.33
1940	1.48	2.56		4.75	3.04	6.96		7.00		3.25	10.65		55.28
1941	3,41	3.52		5.15		6.83		2.11	5.30	4.65	5,64		58.62
1942	1.15	•60	3.16	6.00	3.46	5,58	.30	9,05	3,19	1.45	1.36	3.68	38,96

^{*}rstimated from surrounding stations.

GROUND WATER

By

W. L. Broadhurst

This section of the report was prepared under the direct supervision and with the constructive criticism of W. N. White, englacer in charge of ground-water investigations in Texas.

SOURCE, OCCURRENCE, AND MOVLHER OF GROUND WATER

General principles

Ground water has been defined as the water that occurs in the zone of saturation below the surface of the earth. It is derived chiefly from precipitation or seepage from streams on the outcrop areas of the water—bearing beds. A part of the precipitation runs off directly in streams to the sea, a part is returned to the atmosphere by evaporation and transpiration through trees and other plants, a part is held near the surface of the earth as soil moisture, and a part sinks downward to the zone of saturation in which all the interstitial openings in the rocks are filled with water. After entering the zone of saturation the water is soldom ever still, but under the influence of gravity it continues to move slowly down the dip of the water-bearing beds until it is intercepted by wells or is discharged through some natural outlet, either into the sea, into spring and streams, or into some underlying or overlying beds. For detailed discussions of the fundamental principles of the occurrence and movement of ground water, the reader is referred to papers by Meinzer and Wenzel 1/.

Most of the aquifers, or water-bearing beds, in this area are sands and sandstones interbedded with clays and shales which are inclined at an angle with the land surface; the water occurs between the individual sand grains. Each aquifer appears at the surface in a band of outerop from which it dips beneath younger beds to increasingly greater depths beneath the surface.

On the outcrops of the aquifers the water is unconfined and does not rise in wells above the water table which is the upper surface of the zone of saturation. Down the dip, however, where the aquifers are confined between relatively impermeable strata, the water is usually under sufficient hydrostatic pressure to rise in wells above the level at which it is encountered. If the altitude to which the water will rise is greater than the altitude of the land surface flowing wells may be obtained.

In Harrison County the general slope of the land surface is eastward whereas the regional dip of the beds is westward and northwestward. Hence, although the water in the confined aquifers rises above the levels at which it is struck, the conditions over the area as a whole are not favorable for

1/ Meinzer, C. E., The occurrence of ground water in the United States: U. S. Geol. Survey Water-Supply Paper 489, 321 pp., 1923; Outline of ground-water hydrology: U. S. Geol. Survey Water-Supply Paper 494, 71 pp., 1923; Outline of methods for estimating ground-water supplies: U. S. Geol. Survey Water-Supply Paper 638C, pp. 99-145, 1931.

Wenzel: L. K., Mothod for determining permeability of water-bearing materials: U. S. Geol. Survey Water-Supply Paper 837, 192 pp., 1942.

Moinzer, O. E., and Wenzel, L. K., Physics of the Worth, vol. 9, Hydrology, pp. 585-478, McGraw-Hill, 1942.

obtaining flowing wells, the land surface in most places being at a higher altitude than the outcrops of the underlying confined beds. However, in relatively low area along the streams a few flowing wells have been drilled (see well map) and in similar areas others may be drilled.

When a well is pumped the water level in the well drops and an hydraulic gradient toward the well from all directions is developed in the surrounding water-bearing material. It is this hydraulic gradient that causes water to flow toward the well. Within limits the amount of water that will enter a well varies directly with the amount the water level is lowered. The rotio between the lowering of the water level, or draw-down while the well is being pumped, and the yield of the well is called the specific capacity and is usually expressed as the yield in gallons a minute per foot of draw-down. This ratio is commonly used as a gage of the productivity of a well.

GEOLOGIC FORMATIO S AND THEIR WATER-SEARING PROPERTIFS

Except for the alluvial and terrace deposits of silts, sends, and clays of Quaternary age, all the rocks that crop out in Harrison County are of Tertiary age and belong to the following geologic subdivisions: Wilcox group (undifferentiated), Carrizo sand, Mount Selman formation (Reklaw member, Queen City sand member, and Weches greensand member), and Sparta sand. (See fig. 1). The information given below is based on field investigations by the writer, maps compiled by the United States Geological Survey and the East Texas Geological Society, and the report by Sellards and others 2/of the Texas Bureau of Economic Geology to which the reader is referred for detailed descriptions of the rock formations. Beginning with the Wilcox group, the rocks are listed in the order in which they were deposited or in age from oldest to youngest. This is the order in which the outcrops are successively crossed as one travels over the county from southeast to northwest.

Tertiary system

Eccene series

Wilcox group (undifferentiated)

The Wilcox group, designated Ewi on the geologic map, crops out in the eastern and southern parts of Harrison County, and in general the beds dip northwestward into the East Texas syncline. The group consists of several hundred feet of clays or shales, sandy clays, sands, and thin beds of lignite. The sands are medium to fine-grained and in some places 50 feet or more in thickness. In general, however, the individual beds of sand are lenticular and, therefore, are difficult to correlate between wells, even wells a short distance apart. Relatively large quantities of potable water have been obtained from sands in the Wilcox group, but due to the extreme variations in the physical characteristics of the beds the quantity

^{2/} Sellards E. H., Adkins, W. S., and Plummer, F. B., The geology of Texas, vol. 1, Stratigraphy: Texas Univ. Bull. 3232 pp. 519-655, 1952.

of water available to wells can be only roughly estimated in unexplored parts of the county.

The sandy phase of the Wilcox group is underlain by 700 to 1,000 feet of clay, shale, and marl belonging to the lower part of the Wilcox group and the underlying Midway group. Below this clay section a sand of considerable thickness, presumably the Nacatoch sand of the Havarro group of Cretaceous age, has been recorded in the logs of several oil tests. (See table of drillers' logs). According to the meager information that is available the water from the Nacatoch sand in Harrison County is salty.

Claiborne group

Carrizo sand

The Carrizo sand, which rests unconformably on the Wilcox group, crops out in a narrow crescent-shaped belt across the east-central and the southern parts of the county. (See fig. 1). The average thickness of the sand is between 50 and 60 feet according to available well logs, but the thickness varies considerably within short distances due in part to the uneven surface on which the sand was deposited. In the outcrop area the Carrizo consists mostly of medium-grained quartz sand but contains some yellowish clay and ferruginous cementing material. The position of the sand in the geologic section can be identified on the surface and from electrical logs of some of the wells in the area, but in drillers' logs it is difficult to distinguish the Carrizo sand from sands of the Wilcox group below and the Reklaw member of the Mount Selman formation above.

In many parts of Texas the Carrizo sand yields large quantities of water of good quality to wells. In Harrison County the development of wells in the formation has been small, and the water contains considerable iron in areas on or near the outcrop where the formation can be identified in wells.

Mount Selman formation

Reklaw member -- The Reklaw member of the Mount Selman formation overlies the Carrizo sand and crops out in a belt about 2 to 5 miles in width adjoining the outcrop of the Carrizo sand on the west and northwest. It is about 100 feet in thickness and consists mostly of shales and sandy clays but in some localities contains beds of glauconite, glauconitic sand, and sandstone. Its outcrop is characterized by bright red clay soils. In general the Reklaw yields only small amounts of somewhat highly mineralized water to wells.

Queen City sand member — The outcrop area of the Queen City sand member occupies approximately the northwestern one-third of the county. The member has a maximum thickness of about 200 feet in this area and is composed mostly of light-gray cross-bedded medium to fine-grained quartz sand but contains some silt, clay, bentonite, greensand, and impure lighted it weathers into a light-colored sandy leam. Shallow dug wells in the outcrop of this sand member yield soft fresh water in sufficient quantities for domestic use and stock. No deep wells are known to have been completed

in the Queen City sand member in Harrison County.

We ches greens and member -- The We ches greens and member caps the hills and ridges or crops out along their slopes in the western and northwestern parts of the county. It contains iron ore in considerable quantities but is not known to yield water to wells except in small quantities.

Sparta sard

The Sparta sand, overlying the Weches greensand member of the Hount Selman formation, caps a few of the isolated hills in the northwestern part of the county. However, because of its small areal extent and lack of thickness, it is not economically important as a source of ground water.

Quaternary system

Recent series

Relatively thin Recent alluvial and terrace deposits of sand, silt, and clay, which are found in the valleys of the principal stream, yield small quantities of water to shallow domestic wells.

PRESENT DEVELOPMENT OF WATER SUPPLIES FROM WELLS

The public and industrial water supplies of Marshall, and the public supplies of Hallsville, Waskom, and Karnach, are obtained from wells. Most of these wells range from 150 to 470 feet in depth and draw water from sands in the Wilcox group. A few industrial wells at Marshall are less than 100 feet in depth. These shallow wells, and the city well at Hallsville which is 200 feet in depth, probably draw water from the Carrizo s.nd.

Most of the wells that were recorded in the rural areas are less than 50 feet in depth and furnish small supplies of water for county schools, farms, and small-town domestic use. Such supplies can be obtained almost enywhere in the county from shillow wells in bosene sands or alluvial deposits. In the western part of the county most of the wells are dug some of them are lined with tile or brick but many are open holes. In the eastern and southeastern parts of the county many of the farm wells are bored or drilk d and a few of them are finished with 6-inch tile or galvanized iron casing.

The position of the water-bearing sands and the development of ground water in different parts of the county are briefly discussed below.

Northwestern part of county

All of the water wells that were recorded in this part of the county are dug wells less than 50 feet in dapth. Such wells have furnished sufficient water for domestic use and stock and, as there has been no

industrial development in the area requiring large quantities of water, no deep water wells have been drilled. However, a few miles west of this area in Upshur County, wells that yield relatively large quantities of good water have been developed from sands ranging in depth from 200 to 600 feet below the surface.

Two oil tests, nos. 199 and 200, about 1,000 feet in depth, were found at distances of 13 and 11 miles, respectively, northwest of Marshall. (See map). The electrical log of well 199 from 50 to 865 feet, reproduced in figure 2, shows sands or sandy zones at 50 to 180, 280 to 350, and 700 to 750 feet. The electrical log of well 200 from 30 to 827 feet shows sands or sandy zones at 70 to 130, 200 to 300, and 660 to 680 feet. These sands or sandy zones, having a combined thickness of about 250 feet in well 199, and 180 feet in well 200, are believed to represent a part of the Queen City sand member of the Mount Selman formation, the Carrizo sand, and sands of the Wilcox group.

According to data furnished by the bast Texas Goological Society, the Wilcox group ranges in thickness from about 600 to 700 feet in the western and northwestern parts of Harrison County, and the overlying Carrizo sand, dipping northwestward at the rate of about 15 feet per mile, increases in thickness from about 50 feet on the outerop near Hallsville to more than 100 feet in the northwest corner of the county in the East Texas syncline.

Inasmuch as the Queen City sand member of the hount Schman formation, the Carrizo sand, and sands of the Wilcox group underlie most of this part of the county, the prospects should be fairly good for obtaining ground water in the area in sufficient quantities to meet moderate industrial demands. The evidence afforded by existing wells in the surrounding area indicates that no important fresh-water sands are to be expected at depth greater than about 800 feet or below the sendy phase of the Wilcox group.

Southwestern part of county in vicinity of Hallsville

The town of Hallsville is supplied with about 15,000 gallons of water a day from well 107. The mell was drilled in 1939 to a depth of 613 feet, and according to the drillers' log sands were encountered at 162 to 200, 275 to 285, and 501 to 592 feet. Samples of water that were obtained at depths of 275 and 500 feet, during the drilling of the well, apparently were not acceptable for modicipal supply as the well was plugged back to 201 feet. The well is equipped with a deep-well turbine-type pump driven by a 10-horsepower electrical motor. It is reported that the static water level was 90 feet below the surface when the well was drilled, and that the draw-downduring a pumping test was 35 feet ifter the well had been pumped at the rate of 100 gallons a minute for 10 hours. On this basis the specific capacity of the well (yield in gallons a minute per foot of draw-down) is about 3. The water is very soft and comparatively low in dissolved solids. A test well drilled for the city in 1938 to a depth of 932 feet, about one-fourth mile from the city well, was considered a failure and was abandoned.

Two wells, nos. 104 and 105, about 3 miles east of Hallsville, 272 and 250 feet in depth, respectively, yield water from a sand at about 215 feet. The wells are equipped with cylinder pumps driven by small electrical meters. Well 104 is said to have a yield of 50 to 75 gallens a minute. The water is moderately soft and low in dissolved solids. A sample from well 104,

however, contained 2.7 parts per million of iron which is considered high for domestic use.

Well 122, a drilled farm well $6\frac{1}{2}$ miles west of Hallsville, is 304 feet in depth and supplies a small quantity of fresh soft water for domestic purposes and stock. This well is also equipped with a cylinder pump driven by a small electrical motor.

Records were obtained of three oil tests in this part of the county. wells 128, 132, and 137. Well 128, reported to be 3,000 feet deep, is in the Sabine River bottoms about 6 miles south of Hallsville. The well has a very small flow of water at ground level and the water contains 1,340 parts per million of dissolved solids chiefly sodium, bicarbonate. and chloride. The log of the well could not be obtained and the dipth of this water bearing formation is unknown. A partial electrical log of well 152, about 32 miles southeast of Hallsville, shows sands from about 310 to 340 and 590 to 680 feet and mostly clay or shale from 680 feet to the bottom of the logged section of the well at 1,200 feet. In well 137, in the Sabine River bottoms about $7\frac{1}{2}$ miles southeast of Hallsville, sands were reported by the driller at 30 to 60, 135 to 200, and 1,665 to 1,676 feet. The well has a natural flow of about 15 gallons of vater a minute two feet above the ground, which is said to come from the sand at 185-200 feet. The water is very soft but contains 684 parts per million of dissolved solids, principally sodium bicarbonate.

The Queen City sand member of the Mount Selman formation is relatively thin or absent in this part of the county, and the Carrizo sand is present only in its outcrop area and to the north of the outcrop. The Mileox group, which is about 600 to 700 feet in thickness in this area, crops out along the Sabine River and dips northwestward. On the whole the evidence afforded by existing wells does not appear very encouraging for obtaining moderately large to large supplies of ground water low in dissolved solids in the area. Conditions are believed to be more favorable in the area north and northwest of Hallsville.

Central part of county in vicinity of Marshall

Ten municipally owned wells, nose 61 to 70 inclusive, ranging from 200 to 473 feet in depth, supply the city of Marshall with about 1,000,000 gallons of water a day. The wells are equipped with doop-well turbine-type pumps driven by electrical motors and yield from 88 to 210 gallons a minute each; their maximum combined yield amounts to about 2,000,000 gillons a day. Six of the wells, nose 61 to 66, drilled at different times from 1906 to 1936, are at the old water works pumping station in the valley of a small creek about three miles northeast of the city. Some of the wells are roported to have had a natural flow when drilled but the static water level was about 20 feet below the surface in November 1941. Four of the municip : wells, nos. 67 to 70, are within the city li its and were drilled during the three-year period 1936 to 1938. A large part of the city water supply is obtained from these four wells and as a result the water levels in the wells have declined considerably. The water levels in wells 68 and 69 were reported to have been 100 feet below the surface when the wells were drille', but in November 1941, after the pumps had been shut down for several divi., the measured water levels were 181 feet below the surface. The water the the wells both at the old plant and with the city is soft and low in

dissolved solids (see table of analyses).

Exploratory wells at Marshall about 1,000 feet in depth failed to find any appreciable supply of water below 500 feet. Logs of 5 of the city wells and 6 core tests put down by the city are given in the table of drillers' logs.

Seven wells, nose 90 to 96 inclusive, supply the Darco Corporation plant near the western city limits of Marshell with about 400,000 gallons of water a day. The wells range from 50 to 248 feet in depth and yield from 22 to about 130 gallons a minute each. The water is low in dissolved solids but is hard and high in iron.

The supply of water pumped from about 20 wells in or near the city of Marshall averages about 2,000,000 gallons a day. Sy proper location and construction of wells, additional supplies of considerable magnitude should be obtainable in this part of the county.

Northeastern part of county in vicinity of Karnack

No large supplies of ground water have been developed in this part of the county. Nater wells have been drilled near Karnack, ranging in depth from 100 to 430 feet but have encountered only a relatively small amount of water-bearing sand.

Well 29, put down in February 1942 for the tom of Karnack, was originally drilled to a depth of 430 feet but was partly filled and completed at 306 feet, the principal sand being between 200 and 230 feet (see log). The yield was 30 gallons a minute during the development of the well. The static water level was about 71 feet below the surface in March 1942.

Well 30, at the Longhorn Ordnance Works plant in Karnack, is 133 feet in depth. The log shows 31 feet of sandy shale (reported as waterbearing) from 75 to 106 feet and 25 feet of sand from 108 to 133 feet. The maximum yield of the well is reported to be 20 gallons a minute.

Well 36, at the Caddo Lake State Park, l_{\pm}^3 miles northwest of Karnack, is 315 feet in depth and the water level was 163 feet below the surface in October 1941. The yield is reported to be 8 gallons a minute.

There is considerable variation in the cumical character of water from the wells in this area although the water in most of the shallow wells is acceptable for domestic purposes.

Electrical logs of 2 oil tests, nos. 26 and 39, 3 miles southwest and 4 miles northeast of Karnack, respectively, are shown in figure 2. According to an interpretation of the logs, the base of the sandy zine of the Wilcox group was reached about 270 feet below the surface in well 26 and about 125 feet in well 39 which is somewhat farther up the dip. About 900 feet of clay or shale occurs below the sandy zone in each well.

Three oil tests in the area, wells 27, 35, and 52, have small flows of water. The water from two of them, wells 27 and 52, is soft and from, but the water from well 35, which is reported to be about 1,000 foot in term.

is very salty and is believed to come from the Nacatoch sand.

Only small quantities of water low in dissolved solids are likely to be developed from wells in this area.

South-central part of county

Most of the wells that were recorded in this area range from about 40 to 350 feet in depth and furnish small supplies of water for domestic use and stock.

Well no. 138, in Panola County, $14\frac{1}{3}$ miles southwest of Marshall, is 343 feet in depth and flows about 50 gallons a minute 2.5 feet above the surface. The water is very soft but contains 1,225 parts per million of dissolved solids principally sodium, bicarbonate, and chloride. It supplies the industrial and domestic requirements at a saw mill.

Well no. 165, about 9 miles southeast of Marshall, is 150 feet in depth and yields about 7 gallons a minute. It supplies water for the Humble Pipe Line pump station.

Several wells ranging from 40 to 150 feet in depth were drilled on farms of the Government negro resettlement project about 8 to 14 miles south of Marshall, but the farmers reported that the water was not suitable for domestic use. The well logs show that lignite was encountered at depths of from 30 to 60 feet.

Large quantities of water low in dissolved minerals are not likely to be developed from wells in this area,

Southeastern part of county in vicinity of Waskem

Several attempts have been made to develop ground-water supplies in and near Waskom, some of which were successful and others were not. Well 179, about 3 miles southwest of Waskom, an unused well about 270 feet in depth, is said to have had a very sm ll yield, but well 180, a nearby unused well 164 feet in depth, formerly provided sufficient water for the operation of oil drilling rigs. Well 188, east of Waskom, about 400 feet in depth, is reported to be a "dry hole," but well 189, about 100 yards away and 200 feet in depth, yields about 100 gallons a minute. Wells 185 and 187, 150 feet in depth, yield about 100 gallons a minute each and supply the town of Waskom. Well 190, one mile southeast of Waskom, is 200 feet in depth and yields about 150 gallons a minute. It supplies water for the Waterman Lumber Company.

The quality of water from the wells in this area varies materially. In most of the shallow wells the water is sertand low in dissolved solids, but in a few it is very hard and contains more than 1,000 parts per million of dissolved solids.

Drillers' logs of several gas wells (not included in this report) in the gas field south of Waskom indicate that the base of the sandy zone of the Wilcox group is about 250 feet below the surface, and a sand (probably Macatoch) carrying salty water was encountered approximately 1,000 feet below the surface. Wells that will yield relatively large quantities of water low in dissolved solids may be developed in some places, but in general no large supplies of good water are to be expected in the area.

SURFACE WATER

Ву

S. D. Breeding

Harrison County is drained by numerous small streams tributary to the Sabine River which forms a part of the southern boundary of the county, and by Little Cypress Creek which passes through the northwestern part of the county. No continuous records of stream flow have been obtained on any streams within or bordering the county except the Sabine River near Tatum, where a gaging station has been maintained since January 1939. These records are of too short duration to be of much value and longer records collected nearby will be used here.

Continuous records of the flow of Cypress Creek have been obtained from July 1924 to date at a gaging station in Parion County, 8 miles west of Jefferson. Continuous records of the flow of the Sabine River have been obtained at two points upstream from the west boundary of Harrison County; one near Langview, where a gaging station was maintained from January 1904 to December 1906, and from October 1923 to December 1932; and the other at Gladewater, where measurements have been made from October 1932 to date. These records were collected by the Surface-Water Division of the U. S. Geological Survey in cooperation with the Texas Board of Vater Angineers and have been published annually in Geological Survey Water-Surply Papers. Copies of these records may be obtained at the Washington office of the Geological Survey or at the Austin office of the Survey and Texas Board of Water Engineers.

The Cypress Creek drainage basin above the gaging station near Jefferson has an area of 848 square miles in Harion, Upshur, Morris, Camp and Titus counties and probably has an annual rainfall comparable with that in Harrison County. The records of the discharge of the creek for the period 1925 to 1941, show on average annual runoff of 406,000 acre-feet. (An acre-foot is the amount of water required to cover one acre to a depth of 12 inches and is equivalent to about 326,000 gullons). This amounts to a runoff of 479 acre-feet per square mile, or a depth of 8.98 inches. During the same period the average annual rainfall over the basin according to records at Jofferson, Mount Pleasant and Naples (Finley), was about 45 inches. The minimum flow during 12 consecutive months occurred from May 1939 to April 1940, and amounted to 91,500 acre-feet, representing 108 acro-feet per square mile, or a depth of 2.02 inches. The minimum flow during 6 consecutive months occurred from July to December 1939, when the runoff was 4,330 acre-feet, representing 5.1 acre-feet per square mile, or a depth of 0.10-inch. There were periods of no flow in 1925 and 1939 - the longest being 45 days from September 24, to November 8, 1939. During the 17-year period, the flow was less than 20 acre-feet per day at times in every year except 1927, 1928, and 1941.

A study of the available data indicates that the relation between the

annual rainfall and runoff in Cypress Creek basin above the gaging station has been about as follows:

Relation between rainfall and runoff in Cypress Creek Basin, 1925 to 1941

Annual rainfall	Anj	nual runoff
(in inches)	Depth in inches	Acre-feet per sq. mi.
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30	2.4	128
35	4.0	213
40	6.2	331
45	9.0	480
50	12.3	656
55	15.9	846

The runoff resulting from a given amount of rainfall depends to a considerable extent upon the distribution and intensity of the rainfall whereas the above figures are based on the average annual runoff resulting from varying amounts of annual rainfall during the 17-year period. However, the figures are believed to give a fair indication of the annual surfacewater yield that may be expected from large areas in Harrison County.

The following table gives a few pertinent facts obtained from the records of the daily flow of the Sabine River near Longview and Gladewater about 6 miles and 18 miles, respectively, upstream from the western boundary of Harrison County.

Runoff of Sabine River near Gladewater and Longview, Texas

Station	Period of record	Average during period (acre-feet per duy)	Average during minimum 12 consecutive months (acre-feet per day)	
Gladewater	1932-41	3,132	€28	11
Longview	1902-06- 1924-32	4,047	617	28

Based on the records given in part in the above table the annual runoff of the river near Longview during the years 1902-06 and 1924-32 averaged 1,478,000 acre-feet from an area of 3,013 square miles and the minimum runoff during a period of 12 consecutive months amounted to 225,160 acre-feet. The annual runoff near Gladewater during 1932-41 averaged 1,143,150 acre-feet from an area of 2,846 square miles and the minimum runoff during operiod of 12 consecutive months amounted to 229,500 acre-feet. In the 6 driest years of record the daily runoff was less than 30 acre-feet (9,775,000 gallons) during the following number of days: 1925, 6 days; 1934, 18 days; 1936, 34 days; 1938, 13 days; 1939, 70 days; 1940, 7 days.

The date indicate that abundant supplies of surface water are available in Harrison County from Little Cypress Creek and the Sabine River and some

of their larger tributaries but if a large dependable continuous supply of good water is to be obtained storage will have to be provided.

SUMMARY

Three geologic formations or groups of formations containing extensive water bearing sands crop out in Harrison County. Listed in the order of their age from oldest to youngest and in the order in which they are encountered in traveling across the county from southeast to northwest they are as follows: Wilcox group, Carrizo sand, and Mount Selman formation (fig. 1). In the Mount Selman formation the principal aquifer is the Queen City sand member. In general the bods in these formations dip toward the north and northwest. Water suitable for downstic use and stock and for many industrial uses is obtainable from wells throughout the county.

Conditions for the development of large quantities of ground water of good quality are believed to be most favorable in the northwestern part of the county and in the Marshall area in the central part of the county. They are less favorable in the eastern and southern parts of the county where the sands of the Wilcox group alone are present and are not very thick, but where adequate supplies nevertheless are available for domestic use and stock.

Abundant supplies of surface water are available from Sabine River and Little Cypress Creek and some of their larger tributaries, but storage will have to be provided if a dependable continuous supply of good water is to be obtained. In some areas, if the requirements are not too high, it may be possible to use a combination supply of ground water and surface water and thereby eliminate or materially reduce the amount of surface-water storage which otherwise would be required.

Records of wells and springs in Harrison County, Texas

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	northwest !	N. S. P. P. P. S.		! 		-	
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12 13 14 15 16 17 18	11 miles northwest 70 miles northwest do.  44 miles northwest 44 miles northeast 8 miles northeast 104 miles north 115 miles northeast 12 miles northeast 12 miles northeast	St. James School  Hickory Grove Rosenwall School  Macadonia School  Henderson School  Woodlawn Inde- pendent School  Frank Davis  Ware School  Beckham Colored School		1932 01d 01d 1935 1935 1938	57 Spring 16 37 13 13 16 30 15	76 (in.) 36	ground (ft.) 0 3.0 2.8 3.5 3.5

a/ Plus (+) indicates water level is above ground.
b/ T, turbine; A, air, steam or natural gas lift; H, hand pump or bucket and rope;
C, cylinder; G, gasoline; E, electric; W, windmill. Number indicates horsepower.

Chemical analyses of water from some of these

Well	Water Belcw	level Date of	: Mothod	i · Use	Remarks
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	1			water	•
		t .		5 .	1
	(ft.) <u>a</u> /	; !	<u>b</u> /	<u>c</u> /	
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4	27.6	do,	! H	P	Do.
	1		1	I	
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	1		i	: !	
7	61.04	do.	H	D,S	Do.
	61.00	7	1	<del>                                                                _     _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _   _</del>	
8	21.00	do.	C,E	D,S	Do.
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17		Feb. 11,	H	D,S	Do.
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21	1	<del></del>	!		Oil test. See log.
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	, public su ater le <b>ve</b> l				stock; Ind, industrial; N, not used.

Records of wells and springs in Harrison County--Continued

	Reco	rds of wells and spi	rings in Harrison	Count	yCont	inued	
Tell	Distance from larshall	Owner	Driller	Date com-	Depth of		
22	83 miles northeast	Edmond Key	poli Mila	1910	34	100	Library congressment in a concession
	6g miles northeast	Nancy Harris	-10 3 HZ	1918   		36	, 5.3
	94 miles 'northeast	W. T. Slater	pr() p()	1936	177	, 24	
Nell	Distance from Karnack	Owner	Driller	com- ple-		Disher eter of rell	reight of measuring point above ground (ft.)
25	3 miles southwest	ī. J. Taylor	A. G. Foster	1940	150	al as a such consequence	No. 2002
	3 miles southwest	do .	Thurman	; ;	5,852	Application and subsequential transferred by the parties of the pa	programs  gragers  f
	্রিন্ত miles southwest	do	1	1931	64	12	2
28	lā miles southeast	Geo. Washington Carver Colored Scl		1940 !	105	6	f put pric 2 put pric 3
	4 mile	T. J. Taylor	do,	1942	306	12,	7.00
	a mile east	Longhorn Ordnance Works	do.	1942	153	6	part this is
	In Karnack	Karnack Inde- pendent School	do.	1940	105 !	6	pang sang gang sang t
	'ā mile ' 'northwest '	Miss Elizabeth Baker	1 we prod	1890	18	:	2.8
	ੈ mile northwest	A. G. Foster	· A. G. Foster	1941		4	0
	iwest	V. H. Moore	do.	1940	,		0
	la miles northwest	Caddo Lake State Park	!	1905		5/8	1
	la miles northwest	do.	C. O. C.	1935	315	7	1.0
	24 miles	W. E. Hartzo	A. G. Foster	1941	133	4	i man pan. I
	24 miles northeast	Fred R. Mayfield	do.	1940	100	4	]
	44 miles northeast	Smith	Barnwell and Dowlearn	; ; !	1	7 <b>-</b> : 7/8 :	
	4 miles northeast	Gus Noble	3. F. Eddington	; 1940 ;	1	3 :	)
41	,	Johnson Ranch	A. G. Foster	1940	103	4	) med gree
42		Dallas-Caddo Hunting Club	do,	1941	125	. 4.	7 bell 5-74 1 3
43	4 miles ;	Moore	: Moore		; 301 ;	<u>.</u>	1.0

v	, Water	lowel				
Well	1		of Met	had! IT.	ae :	Renarks
LOTT	, below measuring			3		veriar ve
		· ment	,	ft 'wat		
	(ft.) a/	1	, 11 , b,		c/ ;	
	; (10°) <u>a</u> /	\$ 1	1 2	' ; -	<u>~</u> /	
22	32.92	Feb 1	1, H	I	D	Dug well.
		1942		; ;		reference White skips approximate whosp and the control of the con
23	[ [	Feb. 1  1942		; ]	D	Do•
24	10.53	Feb. 1	1, H	, D	, S	Do.
-	1	1942	1			
	Water	level	1	1	1	
Well	5	•			se	Remarks
	measuring	;measur	re-, oi	f   01	f	
	; point	ment	: li:	ft  wat	ter	
	(ft.) <u>a</u> /	i 1	; <u>b</u> ,	/ ; ;	<u>c</u> /	
	! !	 		1		
25	1 1 t		$N_0$	ne i I	N :	See log.
26	! !	·	!			Oil test. Electric log from 100 to 2,050 feet
	; ;	1	,	j		in files of the Texas State Board of Water
	f (	; ;		i	1	Engineers shows base of sandy zone at 270 feet.
27	1 +	Oct. 2	8, Flc	ws D	,S	Oil test. Measured   See figure 2.
~.	)	1941	, , , , , ,	WE3 ; 2	, 0	flow, 1.5 gallons a minute. Temperature 68° F.
28	; ;	,	C,3	<del>याः ।</del> ।	P :	11.0%, 170 Satisfies a Hillard. Tourpois and to
20	! !	)		1 1 1 1 1	<b>ا</b> ،	
29	71.58	Mar. 1	0,;	Ind	l,P	Measured yield 30 gallons a minute when drilled
		1942	, ,	1		Supplies town of Karnack. See log.
30	<u>d</u> / 25	Mar.	; C,I	$\Xi$ ; $\Xi$	Ρ.	Reported yield, 20 gallons a minute, with draw-
·	1	1942	1	1	, 1 1	down of 42 feet when drilled. See log.
31		,	C,3	E . I	Ρ '	Sand reported from 80 to 105 feet.
32	10.81	00+ 2	7,1 C,1	F , D	,S	Dug well:
02	10.01	1941	,,, O,±		, 0	Dug well:
33	54.26		O, Nor	ne   I	<u>_</u>	See log.
	1	1942		; ;		_
34	78.92	ı	8, Nor	ne ¦ 1	V	Sand reported from 98 to 107 and 219 to 229
75	1	1941	777	1	· 	feet.
35	; T	! —— !	Flov	NS ; i	T.	Cil test.
56	164.27	Oct. 2	7, A,I	E, ; I	P ;	Reported yield, 8 gallons a minute.
	]	1941	1 4	4 ;	1	
37	- <b>-</b>		C,I	E ; I	) ;	Reported yield, 8 gallons a minute. See log.
חמ			1 (1) 7	<u> </u>		Daniela de la 10 11-a a circula Daniela de la 10 11-a a circula de la 10 11-a
38	; <del></del> -	·	Т,1		) .	Reported yield, 18 gallons a minute. Tempera- ture 67° F.
39	! 		<del>-</del>			
99				1	1	Oil test. Electric log from 117 to 1,450 feet
	I		ŧ	1 1	ŧ	in files of the Texas State Board of Water
	1 7 7 7 6	T	· · ·	<del>,</del>		Engineers, shows base of sandy zone at 125
40	<u>d</u> / 18	June	[ 0,1		) ;	Sand reported from 98 [foet. See figure 2.
		1940	<del>-                                    </del>	<del></del>		to 103 feet.
41			C, 7	5 ! !	) ;	Sand reported from 97 to 102 feet.
42	head gards		, C,I	3   1	<del>)                                    </del>	Sand reported from 105 to 125 feet.
			· <u></u>			
43	14.54		3, Nor	ne ¦ ì	, T	Supply reported insufficient for domestic use.
	•	1941		!		

= 19 ...

Records of wells and springs in Harrison County--Continued Height of Well Distance Owner Driller Date Depth Diam - 'measuring from eter comof point Karnack plewell οf above ted (ft.) 17011 ground (in.)ft.)  $44 \cdot 5\frac{1}{4}$  miles A. G. Foster Johnson Bros. 1941 358 least 45;4 miles 36 Lake Chapel 35 2.0 ₁936 southeast Colored School 46,6ਵੇਂ miles Pleasant Hill 13 24 1937 2.0 southeast School 47 10 miles Mt. Zion Colored 30 1939 18 2.0 -School southeast 48:11 miles õ Old Border School. 21 0).d 36 ma ==4 southeast and Church 49'9 miles Hart School 17 42 3.0 south 50,9 miles .01a . 5 Shilo Baptist 19 30 pag. : se south Church 51.54 miles D. V. Blocker 1933  $\overline{205}$ 10, Benson -southeast 52:44 miles 1,9004 Mrs. A. C. 1930 12 2.0 Mason southeast Baldwin 53.54 miles Annie Glade 1932 13 36 2.0 M. p. southwest School Height of Tell Distance Owner Driller Depth Diam measuring from comof eter point Marshall plewell of above . well ted ground (in.)(ft.) 54:8克 miles -- Colored School. Old  $2\overline{4}$ 2.0 11 northeast 55.44 miles Rock Hill Colored 1925 31 36 3.0 east School 56:5 miles William Jones Charles Watson 36 , 1938 177 1,5 northeast 57 2호 miles O. H. Clark Core Drill 6, 1937 300 southeast Corp. 58.2 miles S. E. Wood 1929 362 southeast 59|2 miles Paul Whaley Paul Whaley 6 : 1932 155 274 proeast 60; do. George Pendergast do. 1932 155 6 61;3 miles City of Marshall Ed Mills 2CC 1906 10 , 2.0 northeast 62 do. do. do. 1936 240 8 63 5 do. do. 1932 do. 300 ; 10 2.3 64 de. do. do. 1925 300 10 2.8 65: do، do. Fred Fielder and: 1928. 300 8 ---Ed Mills €6 do٠ do. Fred Fielder 1927 300 8

	Water	level			I
Well		·Date of	:Method	ITse	Remarks
	measuring	•	of	of of	, HOMALPO
	point	ment	lift	'water	
	(ft.) a/		b/	c/	1
	$\frac{1}{2}$	i 1	27	: =	, 1
44	1	1	C,E	, N	See log.
45	8.06	.Feb. 12,	H	+ <del>-</del> P	· Dug well.
	1	1942	i 	1	,
46	8.85	do.	; H ,	· P ;	Do.
47	7.90	do.	H	, P	Do.
48	12.30	do.	H H	P	, Do.
49	10.04	do.	H	. P	Do.
50	9.35	. go.	H	P	. Do.
51	1		C,E	D,S	Reported yield 7 gallons a minute.
	j !	1	1		
52	,	Feb. 12,	;Flows		Oil test. Estimated flow, 1 gallon of water a minute.
53	6.55	, dc.	H	P	Dug well.
to make the second second second	Water	level	)		,
Well	1		'Method	Use	Remarks
	measuring	1	of'	of	,
	, -	ment	1 -	water	•
	(ft.) <u>a</u> /		<u>b</u> /	<u>c</u> /	
54		Feb. 13,	H	P	Dug well.
55	18.85	Feb. 9,	H	P	Do.
56	6.70	Feb. 11,	; H	D,S	Do.
		;1942	1		,
57		,	C,E,	l D	Measured yield, 10 gallons a minute Supplies
1	1	1	3	1	·water for five residences.
58	' 1 1	; ;	None	, N	See log.
59		; ——	C,E	D	Sand reported from 140 to 155 feet.
60	I	·	C,E	D	r
<u>-61</u>	!	:	 	1	T.
	15.97	Nov- 17,	1	; P	Measured yield, 88 gallons a minute. See log.
62	,	Nov. 17,	20 T,E,	P P	  :Measured yield, 145 gallons a minute. Tempera-
62	24.50	1941 Nov. 18,	20 T,E, 20 T,E,	1	: Measured yield, 145 gallons a minute. Tempera- ture 65° F. See log. Measured yield, 132 gallons a minute. Tempera-
	24.50	1941	20 T,E, 20	P	Measured yield, 145 gallons a minute. Temperature 65° F. See log. Measured yield, 132 gallons a minute. Temperature 64.5° F. Measured yield, 145 gallons a minute. Tempera-
63 64	24.50	1941 Nov. 12,	20 T,E, 20 T,E, 15 T,E,	P	Measured yield, 145 gallons a minute. Temperature 65° F. See log. Measured yield, 132 gallons a minute. Temperature 64.5° F. Measured yield, 145 gallons a minute. Temperature 64.5° F.
63	24.50	1941 Nov. 12,	20 T,E, 20 T,E, 15 T,E, 15 T,E,	P	Measured yield, 145 gallons a minute. Temperature 65° F. See log. Measured yield, 132 gallons a minute. Temperature 64.5° F. Measured yield, 145 gallons a minute. Tempera-
63 64	24.50	1941 Nov. 12,	20 T,E, 20 T,E, 15 T,E,	P	Measured yield, 145 gallons a minute. Temperature 65° F. See log.  Measured yield, 132 gallons a minute. Temperature 64.5° F.  Measured yield, 145 gallons a minute. Temperature 64.5° F.

-- 2r cords of wells and springs in Harrison County--Continue

	,	1	rings in Harrison				Height of
ell	Distance	Owner	· ·	Date		Diam-	measuring
	from	į. Į	•	com-	; of	eter	point
	Marshall	; •	<u> </u>	ple-	well	of	, above
		f ,	1	ted	(ft.)	rell	ground
	]  -	i †	•	ı	į.	(in.)	' (ft.)
67	In Marshall	City of Marshall	Layne-Texas	1937	475	13, 8	To yet the second secon
68	do.	do.	do.	1937	375	16,	1.0
	) }	1	1	į.	1	, 8	† \$
69	do•	do,	I. B. White	1.936	; 351	7 18,	, 5
70	do.	do.	Layne-Texas	1938	422	16,	Treat SPS 1
71	do.	do.		1936	376	O	propos um upomonopolipo de 19 na 19 na 19 na , amo 19
				L	· · · · · · · · · · · · · · · · · · ·		a number of the contract of the
72	do,	do.	Core Drill Corp,	1937	970	8	J. 84.
73	do.	doe	do.	<u>,</u> 957	335	logie in rightatic shiftman — mg). go de 1979	. And the second
74	do.	do.	; do,	· <u>193</u> 7	360	Page Sec.	) artine interestrativas republicano a liberar A gado que
ا.سيجي			1	1	;	1	·
75	do.	do.	do.	1937	400	2002 2005	and one.
76	do.	de.	par dw.	1936	496	85	E Profit mediated Marine Schemer, rate descriptions, range 2 gard Schill  1
77	do.	Texas and Pacific	To the state of th	PR ans	286	1 } pre-see	**************************************
· · · · · · · · · · · · · · · · · · ·		R.R. Co.	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	í F	1	1	i I
78	do•	do.	pre aut	, pro proj	; 417	and end	I second
79	do.	do.	, praimi	best to	444	; pre pre	s Par street common sur sell sures common sures de common sur sell sures common sur sell sures common sures comm Sent a commo
1	j		:	:	1	1	, ;
80	do.	do.	To gen 2 service 1	and one	: 453	ter his	L Joseph Company
81,	do.	Southwestern Gas	year red	1906	580	8	i
1		and Electric Co.	;	1000	300	;	, । ।
82	doo	do.	Layne-Texas	1926	, 450±	1	} }
1			: 00	1020	, ±J∪ <b>n</b>		1 848 E-1
83	do.	do.	do.	1936	· · 458	12	2.0
í				1	; =50	1 76	, 2.0
84	doa	Independent Ice	J. C. Boling	1936	323	12,	; ************************************
1		Co,	i or northe	1000	1 020	, مَـٰ 8	, and per
85	do.		Walter A. Meiler	1929	. 300±		-0
1		Dairy	1	,	1	, ,,,,,	,
86	la miles	Darco Corp.	Layne-Texas	1937	806	t <del>Nadis-Assassas</del>	l Indiana para-Apartan manazaparan ya partangan 1 ray kar
1	west	<b>r r</b>	; <u>Co</u> ,	: 00,	1 300	,	,
87;	ão.	do.	do	1937	765	1 pageor	
1	1						•
88	do.	do.	Limited the settled the state of the settled the settl	1936	180	) proper 1	rootsparsers to the processor allowance allowed and a second and a sec
89	do	do,	) 	1936	<del></del>		moleculatio Servatoria nel James Language espera
		uu ,	t and gold }	7290	183	وسواسم ا	ene pro
90	do.	do.		1926	, 243	5	
i	1	u	1	#-0 €-0	, A±0		PRI PRI
91	do,	do:	d prof (M2)	1927	192	6	Partie and Prince Community of the International Association (International Associationa) (Internationa) (International Associationa) (Internationa) (Internationa) (Internationa) (Internationa)
92	do,	do.		7000	1	-	
1	3	uo s	gur sen 1	1927	201	6	2476 _296
		* * * * * * * * * * * * * * * * * * * *				• •	
:	i				i		

1	Water	level	* 1	<u> </u>	
Tell	Below	Date of	Method	Use	Remarks
1	measuring			' of	:
1				water	1
1	(ft.) <u>a</u> /	) 1	; <u>b</u> /	: <u>c</u> /	•
3		]	<u> </u>	1	t. Ja de jako sikustjunga i tikolijanin kalaba kina singi. Sapis pada sikus kina kina singa singa singa singa nagangan nagangan singa sing
67,	Secret 1	June	T,E,	. P	Measured yield, 210 gallons a minute. See lcg.
		1937	40		
68;		Nov. 12,	,	P	Measured yield, 198 gallons a minute. Tempera
1		1941	30	1	ture 69 ⁰ F. See log.
69	182.29	¹ do.	TE,	ı F	'Measured yield, 145 gallons a minute. See log
		! !	30	<u> </u>	
70;		·	· T,E,	F	Measured yield, 158 gallons a minute. Tempera-
1		1	' 30		ture 71° F. See log.
71'		i			City test well 2. See log.
;		) 			
72			;		City test well 4. See log.
		1	1	1	
73¦		1	·	<del></del>	City test well 5 Measured yield, 18 gallons a
1		!	1	,	minute. See lcg.
74		]			City test well 6. Yeasured yield, 50 gallons a
1		<i>1</i>	i		minute. See log.
75		·	;	1	City test well 7. Measured yield, 41 gallons a
<u> </u>		ļ			'minute. See log.
76		;		!	City test well. See log.
! }		; ;	1	<u> </u>	
77			None	N	Owner's well 1. See log.
			!	<u> </u>	
78	name where	j	None	N	Owner's well 2. See log.
<u> </u>		! 	1	, ,	1
79		!	None	N	Owner's well 3. See log.
		! !		ļ	
80		]	None	N	Owner's well 4. See log.
	3/30	1.7.0.10	·	· 	1
81	₫/ 90	1940	A.E,	Ind	Owner's well 1. Measured yield, 120 gallons a
1		i T	35	; 	minute with a reported drawdown of 50 to 60
881	THE DISA	1	None	N	Cwner's well 2. feet.
83	131.58	77 70	, 1 at -	1	
001		Nov. 18,	None	N	Owner's well 3. Vell is not equipped with
941		1941	; ₇₀	T 3	pump. Originally yielded 90 gallons a minute.
34		<u></u>	A,E, 20	Ind	Reported yield, 47 gallons a minute. See log.
0= 1	74 07	· · · · · · · · · · · · · · · · · · ·	· <del></del>	1 7 %T	Temperature 670 F. See log.
85	74.83	Nov. 17,	None :	N	Reported originally visided 150 gallons a
0.6	·	1941	ļ	<u> </u>	minute.
86		·	!	·	Test well 1. Sea log.
07	 	1	1 	; 1	
87		1	;	!	Test well 2. See log.
00	: L	1	<u> </u>	) <del></del>	Timble Dall Control
88			1		Lignite prospect test hale 1. See lag.
39	<del> </del>	,	<del>-</del>		Lignite prospect test hole 20 See log.
<b>೨</b> ೪		1	;	1	rightre brosherr rest mote v. pae roff.
90			A	Ind	Reported yield, 80 gallons a minute.
7U	. <del></del>		į Et 1	ind	neported yield, of garrons a minute.
91	!		<del>!</del> A	i Ind	Reported yield, 80 gallons a minute. See log.
コエ		1	A.	, THO	. Mehorien Arean' on Sarrous a millinge. See rog.
92			; A	Ind	Reported yield. 60 gallons a minute. See log.
36	!		, A.	,	Thorner Atern. on Rattoms a minnee. Dec tok.
	1	1	· · · · · · · · · · · · · · · · · · ·		·

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	Record	s of wells and sp					
1				Date	'Depth	Dian-	Height of
əll	Distance	Owner	Driller	com-	· oÎ		measuring
1	from				rell	10	point
,							
1	Marshall		,	ted	; (ft.)	well	
:			•	ı		!(in.)	ground
1	. 2			ı			. (t+.)
93	14 miles	Darco Corp.	Malter A. Heller	1934	III	16,	Professional Participation of the Contract of
	west	عن عن	•		1	; 9	
94	AND AND ADDRESS OF THE PARTY OF	do s	erione, months distributed respectively and the second second second second second second second second second	1940	<del>; 5</del> 0		A STANDARD CONTRACTOR OF STANDARD CO. S. P. LA
J-1:	u0 e	uo.		TO=0	1	. 48	
كما جديد جديد	-	ر و المراد و منا مرسالا مناسبة المرادية المرادية و المر	on whose stores is the interest or against channel by the state of the				Laguages in segmenting most arbitraries are:
95	do.	do.	B. F. Eddington	1941	128	10	i ex man
i				,	•	1	
96;	dos	. do.	do.	1941	125	10	gas pag
			1				
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97;	14 miles	. O. D. Hays	William H.	SHC 2000	-000° و 1 .	10	) p=1 ptg
!	north		Atkinson (	_	:		i
98;	2 miles	Perla Lumber Co	3. F. Eddington	7070	770	6	and the same of th
		Type Hamber 00a	re budanguon	1.000	. 210	O	,
	ngrthwest	e v salikuudu, sali ahkkikuudiga, eessejingsaliks sülistiili-tu, jos valiksed valusus kussassassa	· · · · · · · · · · · · · · · · · · ·	Mariania sinan	و جنستانغاتاند دهما		1 
	24 miles	: Frank Granbery	Richard Louston	1940	254	4	• 5
:	west	•	·	,	•	•	
100:	4 miles	Ebenezer Colored	to Colores Armanicambas de maria de al Maria de Maria de Maria de Maria Decembra de Maria de Armanica	1910	30	: 33	
1	northwest	School					•
	54 miles	Potter's Creek	rike. Azadesside windowski populari populari populari populari populari populari populari populari populari po	3026	<del></del>		<del></del>
			a Aurille	1932	25	56	<i>(</i> i)
		Colored School				;	•
102	4층 miles	· P. B. Bailey	t ps/2 ===	1934	. 30	. 60	2,5
1	scuthwest	ř.				1	
	7g miles	Rose Fill Colored	ngmite ubbriographic mater as the same understand the material and understand the same and understa		. 25	. 48	3.0
	· <del>-</del>		,		, 20	1 40	0.0
	southwest	School	k Borrathonirrangia projegorjes samming "Bargsaniarskernigier volklete, a lasin a simenagarisme som	<del>Tallings out for art the</del> con	1	Non-Manufacturilla - Manufacturi	1
1	soutnwest	School	kan makasar manda magamanga magala (1804) samaylan nga mahiya ka sami a gibi nagaraga saga ng mahana aman sama magamanga mahala di sami danan sandana ta calap sadan sami sama danasah s	Si aggirappi, materi Aren Lande (1944 - 1944) Si Qilife ngalifatay sagarani (1978) si sasa si sa sag	1 Servedina ar 100 Servedina (Serve Amerikaa) Servedina Servedina (Servedina)	Place Server Medical Serve Server Ser	: Height of
i	ngellingskapen, demokratiske flygring med progress fallende fillede index for early filled filled in the first Fille das samtle, filter de en depth Talk in the Filled Standard set, date (Index for experience)	indirondiro Microl Fredhermin, anto, esper alimo, arcado, seje emples fondalment, hacempe REPARTACO, fondalmente de provincia (alimo de vidiro, film especial de la California (california accessor cal	Driller	Date	Dersth	Oiam-	Height of
i	Distance	School Owner		-			measuring
ell	Distance from	indirondiro Microl Fredhermin, anto, esper alimo, arcado, seje emples fondalment, hacempe REPARTACO, fondalmente de provincia (alimo de vidiro, film especial de la California (california accessor cal		com-	of	oter	measuring point
ell	Distance	indirondiro Microl Fredhermin, anto, esper alimo, arcado, seje emples fondalment, hacempe REPARTACO, fondalmente de provincia (alimo de vidiro, film especial de la California (california accessor cal		com- ple-	of ·well	oter of	measuring point ahove
ell	Distance from	indirondiro Microl Fredhermin, anto, esper alimo, arcado, seje emples fondalment, hacempe REPARTACO, fondalmente de provincia (alimo de vidiro, film especial de la California (california accessor cal		com- ple-	of	oter	measuring point
ell	Distance from	indirondiro Microl Fredhermin, anto, esper alimo, arcado, seje emples fondalment, hacempe REPARTACO, fondalmente de provincia (alimo de vidiro, film especial de la California (california accessor cal		com- ple-	of ·well	oter of woll	measuring point above ground
ell	Distance from Hallsville	Owner:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	com- ple- ted	of well (ft.)	oter of woll (in.)	measuring point above ground ft.)
ell	Distance from Hallsville 3 miles	Owner:		com- ple- ted	of well (ft.)	oter of woll	measuring point above ground
ell ;	Distance from Hallsville 3 miles	Owner  E. H. Lowry	3. P. Eddington	com- ple- ted	of well (ft.)	oter of woll (in.)	measuring point above ground ft.)
ell	Distance from Hallsville 3 miles east	Owner:	3. P. Eddington	com- ple- ted	of well (ft.)	oter of woll (in.)	measuring point above ground ft.)
[e11 ]	Distance from Hallsville 3 miles	Owner  E. H. Lowry	3. P. Eddington	com- ple- ted	of well (ft.)	oter of woll (in.)	measuring point above ground ft.)
104;	Distance from Hallsville 3 miles east do:	Owner  E. H. Lowry  U. C. Lovry	2. P. Eddington	com- ple- ted 1941	of well (ft.)	oter of woll (in.)	measuring point above ground (ft.)
104;	Distance from Hallsville  3 miles east do.	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored	3. P. Eddington	com- ple- ted	of well (ft.)	oter of woll (in.)	measuring point above ground ft.)
104 105	Distance from Hallsville  3 miles east do. 3 mile. southeast	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  Figh School	B. F. Eddington do.	com- ple- ted 1941 1941	of well (ft.) 272	oter of woll (in.)	measuring point above ground (ft.)
104 105	Distance from Hallsville  3 miles east do:	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  High School  City of	B. F. Eddington  do.  Mack Alford  Layne-Texas	com- ple- ted 1941	of well (ft.)	oter of woll (in.)	measuring point above ground (ft.)
104; 105; 106;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  Figh School	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.	com- ple- ted 1941 1941 1941	of well (ft.) 272 230	oter of woll (in.)	measuring point above ground (ft.)
104 105	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  High School  City of	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.	com- ple- ted 1941 1941	of well (ft.) 272	oter of woll (in.)	measuring point above ground (ft.)
104; 105; 106;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Figh School City of Hallsville	do.  Mack Alford  Layne-Texas  Co.	com- ple- ted 1941 1941 1941	of well (ft.) 272 230	oter of woll (in.)	measuring point above ground (ft.)
104; 105; 106; 107;	Distance from Hallsville  3 miles east do. 3 mile. southeast In Hallsville	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Eigh School City of Hallsvilks	do.  do.  Mack Alford  Layne-Texas  Co.  do.	com- ple- ted 1941 1941 1959	of well (ft.) 272 250 17 201	oter of woll (in.)	measuring point above ground (ft.)
104; 105; 106; 107; 108;	Distance from Hallsville  3 miles east do. 3 mile. southeast In Hallsville do. 4 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Figh School City of Hallsville	do.  do.  Mack Alford  Layne-Texas  Co.  do.	com- ple- ted 1941 1941 1941	of well (ft.) 272 230	oter of woll (in.)	measuring point above ground (ft.)
104 105 106 107 108	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4, miles northeast	Owner  E. H. Lowry  U. C. Lovry  Brooks Colored  High School  City of  Hallsvills  do:	do.  Mack Alford  Layne-Texas  Co. do.  Buck Coleman	com- ple- ted 1941 1941 1959 1938	of well (ft.) 272 230 17 251	oter   of   woll   '(in.)   7     7	measuring point above ground (ft.)
104; 105; 106; 108; 109;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 6 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Eigh School City of Hallsvilks	do.  do.  Mack Alford  Layne-Texas  Co.  do.	com- ple- ted 1941 1941 1959	of well (ft.) 272 250 17 201	oter of woll (in.)	measuring point above ground (ft.)
104; 105; 106; 108; 109;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4, miles northeast	Owner  E. H. Lowry  U. C. Lovry  Brooks Colored  High School  City of  Hallsvills  do:	do.  Mack Alford  Layne-Texas  Co. do.  Buck Coleman	com- ple- ted 1941 1941 1959 1938	of well (ft.) 272 230 17 251	oter   of   woll   '(in.)   7     7	measuring point above ground (ft.)
104 105 106 107 108 109	Distance from Hallsville  3 miles east do.  4 miles to. Hallsville do.  4 miles northeast 6 miles north	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Figh School City of Hallsville do: - Loung  E. L. Barnes	B. F. Eddington  do.  Nack Alford  Layne-Texas  Co.  do.  Buck Coleman	com- ple- ted 1941 1941 1935 1938	of well (ft.) 272 230 17 201 932 25	oter   of	measuring point above ground (ft.)
104 105 106 107 108 109 110	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 64 miles north 65 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Figh School  City of Hallsville do.  Toung  E. L. Barnes  Cartersville	do.  Mack Alford  Layne-Texas  Co. do.  Buck Coleman	com- ple- ted 1941 1941 1959 1938	of well (ft.) 272 230 17 201 932 25	oter   of   woll   '(in.)   7     7	measuring point above ground (ft.)
104; 105; 106; 107; 108; 110;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do,  4 miles northeast 6 miles north	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  High School  City of  Hallsvills  do.  L. L. Barnes  Cartersville  Colored School	do.  Mack Alford  Layne-Texas  Co. do.  Buck Coleman  L. Barnes	com- ple- ted 1941 1941 1959 1938 1941	of well (ft.) 272 250 250 25 25 27	oter of woll (in.) 7	measuring point above ground (ft.)
104; 105; 106; 107; 108; 110; 111;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 6 miles north 6 miles north 8 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored	B. F. Eddington  do.  Nack Alford  Layne-Texas  Co.  do.  Buck Coleman	com- ple- ted 1941 1941 1935 1938	of well (ft.) 272 230 17 201 932 25	oter   of	measuring point above ground (ft.)
104; 105; 106; 107; 108; 110; 111;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 6 miles north 8 miles northwest	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  High School  City of  Hallsvills  do.  L. L. Barnes  Cartersville  Colored School	do.  Mack Alford  Layne-Texas  Co. do.  Buck Coleman  L. Barnes	com- ple- ted 1941 1941 1959 1938 1941	of well (ft.) 272 250 250 25 25 27	oter of woll (in.) 7	measuring point above ground (ft.)
104; 105; 106; 107; 108; 110; 111;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 6 miles north 8 miles northwest	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored High School City of Hallsville do:  - Young  Cartersville Colored School Hebron Colored School	do.  Mack Alford  Layne-Texas  Co. do.  Buck Coleman  L. Barnes	com- ple- ted 1941 1941 1959 1938 1941	of well (ft.) 272 250 250 25 25 27 20	oter of woll '(in.) 7	measuring point above ground (ft.)  1.5  2.5
104; 105; 106; 109; 110; 111;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 64 miles north 65 miles north 8 miles northwest 10 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.  do.  Buck Coleman  1. L. Barnes	com- ple- ted  1941  1941  1941  1935  1941  1930	of well (ft.) 272 250 250 25 25 27	oter of woll (in.) 7	measuring point above ground (ft.)
104 105 106 107 108 109 110 111	Distance from Hallsville  3 miles east do.  4 miles southeast In Hallsville  do,  4 miles northeast 64 miles north 65 miles north 8 miles northwest 10 miles northwest	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Figh School  City of Hallsvills do.  Young  E. L. Barnes  Cartersville  Colored School Hebron Colored School Seff Davis	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.  do.  Buck Coleman  L. Barnes	com- ple- ted  1941  1941  1941  1935  1941  1930	of well (ft.) 272 230 17 201 932 25 27 20 16	oter of soll (in.) 7	measuring point above ground (ft.)  1.5  2.5  2.6
104 105 106 107 108 109 110 111	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 64 miles north 6 miles north 9 miles northwest 9 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored High School City of Hallsville do:  - Young  Cartersville Colored School Hebron Colored School	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.  do.  Buck Coleman  1. L. Barnes	com- ple- ted  1941  1941  1941  1935  1941  1930	of well (ft.) 272 250 250 25 25 27 20	oter of woll '(in.) 7	measuring point above ground (ft.)  1.3  2.5
104; 105; 106; 107; 108; 110; 111; 113; 114;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville  do,  4 miles northeast 6 miles north 8 miles north 8 miles northwest 10 miles northwest 9 miles northwest	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored  High School  City of  Hallsvills  do.  Le L. Barnes  Cartersville  Colored School  Hebron Colored  School  Seff Davis  J. Bussey	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.  do.  Buck Coleman  L. Barnes	com- ple- ted  1941  1941  1959  1938  1941  1930  1941  1930	of well (ft.) 272 250 27 25 25 27 20 16	loter of	measuring point above ground (ft.)  1.5  2.5  2.5
104; 105; 106; 107; 108; 110; 111; 113; 114;	Distance from Hallsville  3 miles east do.  4 mile. southeast In Hallsville do.  4 miles northeast 64 miles north 6 miles north 9 miles northwest 9 miles	Owner  E. H. Lowry  U. C. Lowry  Brooks Colored Figh School  City of Hallsvills do.  Young  E. L. Barnes  Cartersville  Colored School Hebron Colored School Seff Davis	B. F. Eddington  do.  Mack Alford  Layne-Texas  Co.  do.  Buck Coleman  L. Barnes	com- ple- ted  1941  1941  1941  1935  1941  1930	of well (ft.) 272 230 17 201 932 25 27 20 16	oter of soll (in.) 7	measuring point above ground (ft.)  1.5  2.5  2.6  3.0

<del></del>	Water	level			
Well	1 Martin Company of the Company of t	Date of	Mathod	· Use	Remarks
	measuring	measure-	$\circ f$	of	
	point	ment		water	
	(ft.) a/		<u>b</u> /	c/	
	1 (10-7 2)		27	≌⁄	·
93	1		A	Ind	Reported yiell. 80 gallons a minute. See log.
94	1	The state of the s	C,E,	Ind	Dug well. Reported yield, 22 gallons a minute
95	,		10 T,E,	Ind	See log. Reported yield, 130 gallons a minute. See log
96	) }	in after ordered to an anti-	' 7동 ' T,E,	Ind	, Do.
97	! !		7 <del>1</del> C,E	D	oll test. Plugged back to 1,000 feet and used
	; }		1	1	as a water well. See log.
98	] 		C,G	. N	Reported yield. 20 gallons a minute.
99	1	Nov. 17, 1941	. C,G	N	
100	]	<b>~</b> -	H	; P	Dug well.
101	17.84	Feb. 17, 1942	H	P	Do.
102		Jan. 28, 1942	C,E	D	Do.
103		do.	: H	. P	Do.
}	! !				I
		level			
Well	Below	Date of	Method	Use	Remarks
	measuring	measure-	of	of	[  -
	point			water.	ı I
:	(ft.) a/		<u>b</u> /	, <u>c</u> /	, ,
;	1	1	* ************************************		
104	1	the same and the s	: C,E	D,S	Reported yield, 50 to 75 gallons a minute.
105	f		C,E	D,S	
106	12.57	Jan. 27.	, H	P	Dug well.
	; ;	1942	1		
107	<u>d</u> / 90	1939	T,E, : 10	P	Reported yield, 100 gallons a minute. See log.
108	} }		None	' N	Supply reported insufficient for city use.
109	i	Feb. 17;	H	D,S	Dug well.
110	;		H	D, Ind	Dug well. Supplies cotton gin.
111	; ;	Jan. 30,	1	D,Ind	Dug well. Supplies cotton gin. Dug well.
	5.47	Jan. 30, 1942 Jan. 29,	H	1	
111	5.47	Jan. 30, 1942 Jan. 29, 1942	H	; P	Dug well.
111	5.47 14.98	Jan. 30, 1942 Jan. 29, 1942 do.	H	: P : D	Dug well. Temperature 59° F.
111	5.47 14.98 21.90	Jan. 30, 1942 Jan. 29, 1942 do. June 17, 1936	H	D,S	Dug well. Temperature 59° F.  Dug well.

F 25 ...

Records of wells and springs in Harrison County -- Continued Height of Vell : Distance Date Depth Diam-measuring Owner Driller f.com :eter point como f : dallsville ple- well , OJ above (ft.) well. ground (in. ft.) 116 7 miles Lily Fill School , Sam Bridges 56 ngrthwest ll7 3월 miles . H. Schaffer 1936 30 3.2 northwest Noonday Camp 118: do me 0<2 Spring Ground 119:47 miles 'northwest 120,35 miles Johnson Colored northwest School Mrs. Nora Davis 121,3 miles 55 west 122:6克 miles Dell Everett 10,; J. C. Boling . 1937 304 west 123,45 miles E. G. Barker Old 36 24 southwest 124; 34 miles Maple Springs C. I. 1936 16 24 southwest School Southerland 125:7 miles Gum Springs 1932 22 48 southwest School 126,7 $rac{1}{4}$  miles Friendship 1941 23 48 3.0 southwest Colored School 127 7 miles J. K. Bivens J. E. Messon 1937 18 southwest Farm Co. 128:64 miles do. : 3,000±; 14 1,5 south John V. Scott 129:4章 miles 1927 40 2,0 southwest 130:2<del>1</del> miles J. B. Cullen Henry Alford 1940 32 56 3.8 southwest 131:3 miles George Welch Est. 1910 26 2.0 ; southeast 132:3층 miles R. Bonner No. 1 , Bay Oil Corp. 1941 3.000 southeast 133; 32 miles Sweet Home 1936 20 : 2,5 southeast Colored School 134 6 miles Red Oak School 1939 26 48 2.5 , southeast 135:7 miles Atlas Colored 18 48 2.5 ·southeast School 136,45 miles Cooperville Bob Newhouse 1925 28 40 3.0 southeast Colored School 137'7 miles Will T. Cock E. O. Butler 1935 2.548 southeast

	Water	level	1	1	
Well			'Method	Use	Remarks
1	measuring			of	,
	pcint	ment	lift	water	
,	(ft.) <u>a</u> /		: <u>b</u> /	် င္/	
		and the second s	1		
116	بمسيح بمحسوليين بمنتفع بنبيب ومستاه بنب	Jan. 29, 1942	1	P	Dug well.
117		Jan 28, 1942	H	D,S	De.
118	4	do:	Flows	פ	Estimated yield, 2 zellons a minute. Tempera- ture 64° F.
119;	VIII		1 1	1	Oil test. See partial log.
120	26.30	Jan. 28, 1942	1	P	· Dug well- Tamperature 64° F.
121	print trade	To the state of th	, C,™	D,S	Dug well.
122	open was	1	C,E	D,S	See log.
123	24.87	Jan. 27, 1942	H	D,S	Dug well.
124	5.38	do.	; H	P	Dc.
125		1 1	C,E	P	Do.
126		Jan. 27,	H	· P	. Do.
127	and West	1	H	, D	t .
128	+	3 4004 3004	Flows	' S	Oil test used as water well for stock.
129		Ncv. 4,	C,E	D	'Dug well.
130		Jan. 27, 1942	H	D,S	: Do.
131	13.47	do,	C,G	D,S	Do.
132	B==	3	   	}	Oil test. Electric log in files of the Texas State Board of Water Engineers shows sands from 310 to 340 590 to 880, and mostly clay
133	7.80	Jan. 28, 1942	H	P	Dug well. from 190 to 1.200 feet. See fixine .
134		10.	H	; P	·Dug well. Temperature 64½° F.
135	16.57	do.	H	P	Dug well.
136		Jan. 27,	; H	P	Do ·
137		Nov. 14,	Flows	. S	Oil test used as water well for stock. Esti- mated flow 15 gallons a minute. See log.

------Records of wells and springs in Harrison County -- Continued

	1	•					Height of
ell	Distance	Owner	Driller	,Date	1 ~	1 1	measuring
	from	•	:	com-	of	eter	point
	! Marshall		1	ple-	lwell	of	above
	1			ted	(ft.)	lwell !	ground
	,		•	1	(-00)	(in.)	(ft.)
138	.144 miles	Lingo Lumber Co.	A & Poston	1941	343	4 1	2,5
T00	:southwest	. Timeo namber 004	, we can top ter	; 1257. :	: 040	± '	G , O
		f	a landa and a same and a same and a same and a	l Haringanian		, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Annalm Conference Annual State of the Conference of the Lot
198	, l) miles	Cave Spring		Old	1 4-2 (200	24	cm 1-4
	southwest	School	ı	,	i	;	
140	94 miles	Fairpoint Colored	grap years	) pro pro-	25	43	2.0
	southwest	School	1			1	
141	84 miles	D. C. Driskell	<ul> <li>monomente referente aggir i un accupangular un mandragen qualificaçõe proprieta e um é problema.</li> </ul>	3rd 1rd	Spring		0
	southwest		<b>,</b>	1	i parana		ŭ
1.49	·8g miles	E. T. Rosehorough	s. Antonomialin a vigoralizatio di tribiti in suggi formo se gazarino antono e forme massano e commente tretto e di	01d	350	##1713	the activities produced the second
¥±Ω		,	t and the	; O.Lu	, 550	, , ,	and but
	south	; Sr.		! ; ;amolarbranen roubus:	l	t Curumba Mr Finis Asiyi	photographic physical
143	5g miles	. М. G. Blalock	L. C. Houston	1941	225	3,	gart Loa
	southwest	1		· .	1	4 '	
144	44 miles	'Grange Hall Inde-	or Years Discreditional force (Africance and Associated Africa Andreas Association affices of the Association of the Association and Association affices of the Association affices and Association af	1940	7 28	36 .	3:4
	southwest	pendent School	i	; !	:	1 1	
145		W. M. Dinkle	aglana, ke arina milimuh magpungkaranan dibendiar dahaparanya 13 kisaber 20 ka es L	1910	250	4	ing his
∨ شیو	,	· v, s m* DillFTA		; <u> </u>	. 200	! # !	proc end
7112	3 miles	The state of the s	i Landonia de la companya de la compa	·			e pillant de million de la communicación de distribuido combine en million de la compansión de la compansión d
140		Fairview School	AT DO	2-404		) ————————————————————————————————————	See Sud
_	south	1		! 	<u> </u>		
147	,4 miles	K. H. Power	y gers poor	Old	24	36	0
	southeast	1	1			<u> </u>	
148	5g miles	Van LicClellon	afalon, irre - Morrello (n. Periodes passer irreducionales - Propalem alternativo describir de la colonia de l Serie pales	1910	45	36	1.5
,	south	ينان عريز فالم حاصة	1	, 10,10 ,	1	1 1	٠
7/0	84 miles	Lewis Anderson	TT TET	1937			a December 1980 - Marie Andrews Andrews Stevenson (1980)
TAO	. –	Lewis Anderson	V. E. West	1937	65	3	per ses
	southeast			: } <del>(************************</del>	<u>.</u>		-
150	9호 miles	; Johnnie Tatum	; do.	1937	; 120	3	žm3 Krež
	southeast	1			; 1	1	
151	94 miles	. L. C. Mitchell	do.	1937	40	· 3	etaneMeastan unantenagu sakeseturafe papar 1941-1944
	southeast	1			1	!	
152	.94 miles	Dudley Morgan	do	1937	175	1 3	danse valendarina traditionale
202	south	, pagrey morean	1 00,	1 1201	1 110		deset funds
100		1		! !	<del> </del>	<u> </u>	
	, 104 miles	Sidney Reed	do.	1237	92	; 3 !	r⊷: ¢me
	, south	;			( :	1 1	
154	li miles	Willie Mitchell	do.	1937	112	1	
	south	i v		, 1	i	I ;	
155		Arthur Fisher	do.	1937	105		
,	· uoa	1	1	1001	, 200	. ,	
156	ll miles	E. V. Williams	Sabine Drilling	100E	. 2	1 - 7 - 1	The state of the s
700	. –	D, vo Williams	, -	TAND	2,508	12	0
	south		Сов		)	1 	(141 Annual Annu
157	ll miles	Mrs. Jarrett	1 per 2:4	1918	91	4意	- 1
	southeast	Gibson	!	; 1	1	1	
158	700	· do.	. The Texas Co.	1919	:2,600I	12	on and
		f	1		1	1 1	
759	'l2 miles	do.		1924	75	10	- Patter P. Waller and the submitted and the Submitted Spirit
	southeast	- 0.03	, seep Limit	トンで作	1)	, LU	bed 3-4C
	7		Company of the state of the sta	, 	·	1	
TOO	134 miles	Community Center	. L. E. Fawcett	1940	147	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	RW 3/40
	southeast	1		1	t s	;	
161	, do,	i do.	duck Lebon	1939	521		
	i	4	1		1	1	•
160	: : 10 miles	. John Wood	Committee of the Market States of the States	1912	<del> </del>	<u>i — — ,                                </u>	~ ~ ~
		i ontiti Maad	and the	1912		. 6	0,5
	southeast	The state of the s	eritera de artiga distribunta a ragisterri da a alternito de a aposto de estableca.	**************************************	 <del> </del>	1	
163	E miles	Blocker Est.	Atlas Pipe Line	1932	, 75	10 ;	1.5
	southeast						

4	Water:		1		
ell				I .	Remarks
1	measuring point	'measure-	of lift	! of	
: :	(ft.) a/		_	, water	
i	(10.7 2)	1	; =	. <i>=</i> /	
138;	+	Feb. 14,	Flows	Ind	Estimated flow, 50 fallons a minute. See log.
139		1	H	. P	Dug well.
140		Jan. 28, 1942	;	P	Dug well. Temperature 63° F.
141		'Feb. 14, '1942			Estimated yield, 5 gallons a minute. Sold for medicinal purposes.
142		!	None		See log.
143			C,G	, D,S	Measured yield, 6 gallons a minute. Temperature 670 F.
144		Nov. 4,	C,E	; P	Dug well.
145		Street Street	1	D,S	
146			H	; P	Dug well.
147	: :	Feb. 17,	1	D .	Do.
148		do.	:	D,S	
149			H !	† D	See log.
150;			H	N	Do.
151		1	H	N	Do.
152		1	i Fi	l D	Do.
153			H	; N	Do.
154		1	H	D :	Do.
155 ¦	I	1	H	i N	Do.
156	+	Nov. 4,	1	1	Oil test. Estimated flow, ½ gallon of water a minute. Temperature 67° F
157	:		H	N	
158			1	]	, Oil test.
159			H	D,S	
160		,	C,G,	P	See log.
161			! None	N .	Do-
162		1941	Flows	N	Oil test. Estimated flow, 1 gallon a minute. Temperature 68 ^C F.
163		Feb. 13,	; H	D	

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	Reco	rds of wells and sp			ı		Height of
ell	Distance	Owner	Driller ;	Date	Depth	Diam-	measuring
	from	·	,	com- ;	of	eter	point
	Marshall	,	į.	ple~	well	of ·	above
			!	ted	(1t.)	well	ground
			; }		1	(n.)	(ft.)
165	85 milos	Humble Pipe Line	Applebaum :	1931	150		me bet
,,,,,	southeast	Co.	To 10 mg		:		
1.66	,10 miles	H. V. Scott	To the total designation of the second desig	1840	35	<del>50</del>	4.5
	southeast				ŧ.		•
167	124 miles	Claude Hercer	print park	1919	32	· 36	3.0
<b>,</b> .	southeast	,	;		,		
168	14 miles	Jess Woodley	· Toodley and	1925	3,005		gaganggin ngar menunan pangsapan bermani dali P
200	southeast	· ooss woodsoy	Collins '	, ,	,	1	
de la Principa del Principa de la Principa del Principa de la Principa del Principa de la Principa de la Principa del Principa de la Principa	- DOW ALLOWD A	The administration of the control of	A THE PROPERTY OF THE PROPERTY AND A SECURE	THE RESERVE OF THE PARTY OF THE	Bern School on the transferential in a fallent, good tradper statements on a a	AMERICAN AND PROPERTY OF THE PARTY OF THE PA	For walk of all
	1	:		D 1	' 15 4-1-	3.5	Height of
ell	Distance	! Owner	Driller		Derth		messuriac
	from	:	•	com-	, of	ober	point
	Waskom		•	plc-	well	റച്	above
	1	\$ {	1	ted	(ft.)	well	ground
	*		! ,	-	7 oljka-Laruskov odnor obromonistir	:(in-)	'(ft.)
169	្រាំ Miles	. 9	L. C. Houston	1937	204	4	) have lead
	southwest	; School	· · · · · · · · · · · · · · · · · · ·			ende ante municipalitation	
170	়7ই miles	W. L. Rudd	And State 1	Old	17	33	, 0
	!southwest		! ;		;	; .)	:
171	'6輩 miles	# 202 kell	Sec box.	100 BAC	13	36	1.5
	southwest	Ī	!		: !	1	
172	77 niles	Long Ridge School	2 pag 540	20° 524	33	30	2.5
	west	:	;			1	
T CHICAGO	American Communication of the	Action day property and the control of the control	Administrative Principles and Administrative and Administrative Principles and Administrative Ad	THE WAY COMMENTS	-	in had believed	.Height of
ell	Distance	Owner	Driller :	Date	Denth		measuring
	from	, 300,101	, 21,1,101 ,	com-	of	eter	
	Marshall	1	1	ple⊶	well	of	above
	; rarshall	1	<u>'</u>	2			
	v		:	ted	(14.)	rell	. •
107	77-2	to the second se	t Grande an terrodomination distribute, se alfa , absendant distribute. Distrib	<u> </u>		(in.)	(ft.)
110	7g miles	Verhalen Nursery	sees erek	Old	98		2000 Land 1
7 57 4	southeast	·			! 		,
174	:,7호 miles		A STATE OF THE PARTY SHAPE AND A STATE OF THE PARTY SHAPE OF THE PARTY SHAPE AND A STATE OF THE PARTY SHAPE OF		0.50		· n
		do,	2 EN 142	1930	27	108	4
	southeast	'	1		1	1	1 1
175	southeast 74 miles	do.	production of the state of the	1930 1935	1	108 120	t de
	southeast 74 miles east	, do.		1935	28	120	1 1
	southeast 74 miles east 84 miles	'			1	1	1 1
	southeast 74 miles east	, do.	1 1 2 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1935	28	120	1 1
176	southeast 74 miles east 84 miles	, do.	1 1 2 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1935	28	120	1 1
176	southeast 74 miles east 84 miles	, do.	1 1 2 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1935 1920	28	120	leight of
	southeast 7½ miles east 8¼ miles east	, do.		1935 1920 Date	28 40	120 133 133	Height of
176	southeast 74 miles east 84 miles east Distance	, do.		1935 1920 Date	28 1 40 1 Dept.	l20 Jian-	Height of measuring point
176	Southeast 74 miles east 84 miles east Distance from Waskom	, do.		1935 1920 Date com- ple-	28 40 Depti. of well	lian- eter	Ileight of poasuring point; above
176	southeast 74 miles east 84 miles east Distance from	, do.		1935 1920 Date	28 1 40 1 Dept.	Jian- eter of yell	Ileight of moasuring point above ground
176 Well	southeast 74 miles east 84 miles east Distance from Waskom	do. do. Owner		1935 1920 Date com- ple-	28 40 Deption of well (ft.)	Jian- eter of well (in.)	Height of point point above pround (ft.)
176 Well	southeast 74 miles east 84 miles east Distance from Waskom	, do.		1935 1920 Date com- ple-	28 40 Depti. of well	Jian- eter of well (in.)	Ileight of moasuring point above ground
176 Gell	Southeast 74 miles east 84 miles east Distance from Waskom	do.  do.  Owner  Webb Rogers	Driller	1935 1920 Date compleded	Depth of well (ft.)	Jian- eter of well (in.)	leight of measuring point above ground (ft.)
176 /e11	Southeast 74 miles east 84 miles east  Distance from Waskom  74 miles northwest	do.  do.  Owner  Webb Rogers  Gulf Service		1935 1920 Date com- ple-	28 40 Deption of well (ft.)	Jian- eter of well (in.)	Height of point point above pround (ft.)
176 /e11 177 178	southeast 74 miles east 84 miles east Distance from Waskom 74 miles northwest 4 miles	do.  do.  Owner  Webb Rogers  Gulf Service Station	Driller  A. Priester	1935 1920 Date completed	Depti, of well (ft.) Spring	Jian- eter of well (in.)	Teight of poasuring point; above ground (ft.)
176 /e11 177 178	southeast 74 miles east 84 miles east  Distance from Waskom  74 miles northwest 4 miles west	do.  do.  Owner  Webb Rogers  Gulf Service	Driller  A. Priester	1935 1920 Date compleded	Depti, of well (ft.) Spring	Jian- eter of well (in.)	leight of measuring point above ground (ft.)
176 /e11 177 178	southeast 74 miles east 84 miles east  Distance from Waskom  74 miles northwest 4 miles west 24 miles southwest	do.  Owner  Webb Rogers  Gulf Service Station Rex Drilling Co.	Driller  F. Priester  H. D. Rogers	1935 1920 Date com- ple- ted 1940 1939	28 40 Dept. of well (ft.) Spring 30 272	Jian-eter of well (in,)	Teight of poasuring point; above ground (ft.)
176 /e11 177 178	southeast 74 miles eest 84 miles east  Distance from Waskom  74 miles northwest 4 miles west 24 miles southwest	do.  do.  Owner  Webb Rogers  Gulf Service Station	Driller  A. Priester	1935 1920 Date completed	28 40 Dept. of well (ft.) Spring	Jian- eter of well (in.)	Teight of poasuring point; above ground (ft.)
176 /e11 177 178 179	southeast 74 miles east 84 miles east  Distance from Waskom  74 miles northwest 24 miles southwest 22 miles southwest	do.  Cwner  Webb Rogers  Gulf Service Station Rex Drilling Co.	Driller  F. Priester  F. D. Rogers  do:	1935 1920  Date com- ple- ted  1940 1939	28 40 Deption of well (ft.) Spring 30 272 134	Jian-eter of well (in.)	Height of measuring noint above ground (ft.)
176 Jell 177 178 179	southeast 74 miles eest 84 miles east  Distance from Waskom  74 miles northwest 4 miles west 24 miles southwest	do.  Owner  Webb Rogers  Gulf Service Station Rex Drilling Co.	Driller  F. Priester  H. D. Rogers	1935 1920  Date com- ple- ted 1940 1939	28 40 Dept. of well (ft.) Spring 30 272	Jian-eter of well (in,)	Height of measuring noint above ground (ft.)

					· — >0 · · ·
	Water	level	1	!	!
"7e11	· · · · · · · · · · · · · · · · · · ·	Date of	Method	Use	Remarks
	measuring			of	1
	point		lift	water	t .
	(ft.) <u>a</u> /	3 2 3 4	. <u>b</u> /	<u>c/</u>	· · · · · · · · · · · · · · · · · · ·
165	Communication to the second se	1	· C,E,	D, Ind	Reported yield, 7 gallons a minute.
166	9.9	Feb. 17,		D	Dug well.
		1942	, _		1 248 11077
167		do.	H	D,S	Do.
168	-		)	·	Oil test. See partial log.
	, 				
*** - 3 7	Water	level	, }	, T'T	T
Well		Date of			Remerks `
	measuring	1		of	•
	point (ft ) c/	ment	1	water	
	(ft.) <u>a</u> /	1	<u>b</u> /	: <u>c</u> /	
169	) 	) 	C,E	. P	
TOA	, —— !	!	∪, <b>≞</b>	. F	
170	17	Feb 13,	H	, D,S	Dug well.
	] 	1942	1	,	
171	3.99	do.	Tone	N	Do.
172	7.40	do	; H	P	Do.
			i	1 ]	
	<u>Water</u>	level	4	1	
Well		Date of			Remar's
	measuring	•		of	ı
	point	ment		water	,
	(ft.) <u>a</u> /	1	<u>b</u> /	<u>:</u> <u>c</u> /	1
173			None		See log
174		Feb. 9,		D	Dug well.
175		1942	C,E	D, Ind	Do.
į		; <del></del>	ئدو ب	, 11 , 11111. ;	, DO.
176		1	Н	D	Do.
				! !	
1	Water	level	,	1	
Well		Date of		•	Renarks
i	measuring			of	
:	point	ment	lift	water	
•	(ft.) <u>a</u> /	•	<u>b</u> ,/		· ·
	· · · · · · · · · · · · · · · · · · ·		1 1	1 7	
177	,	Feb. 13, 1942		, D,S	Estimated yield 5 to 10 gallons a minute.
178	***	4-100 Paris	C,E	Ind	
179			None	, Iv	
<u></u>		, , [ <del>, , , , , , , , , , , , , , , , , , ,</del>		) Yannama a mananan d	and the second s
180			None	N	Formerly used by several cil companies for drilling operations.
1.81			None	N	
•	1	1		:	

**~ 5**1. =

Records of wells and springs in Harrison County--Continued Well Distance Owner Driller Date Depth ! Diam- measuring from com-; of eter Waskcm ·ple- 'well  $\cap f$ above (ft.) ted well : ground (in.) '  $182 \cdot 2\frac{1}{4}$  miles 92 6 United Gas Pipe! Dixie Gulf Gas 1926 |scuthwest Line Co. 1926 90 8 dc. do. 184:1 mile Arkansas Fuel Cil: W. A. Meller 1940 90 southwest Cc. do. đo. 1940 90 185 do. ĉ W. M. Waterman 151 186 In Waskom Allen Thomas 1924 5/<u>੪</u> 7 3.5 187 1925 150 do. <u>do.</u> ao. 1940 404 188,<del>3</del> mile Waterman Brick H. D. Rogers scutheast and Tile Co. 200 12: do. đe. 200 6 190'1 mile Frost Lumber Cc. W. M. Waterman 1924 southeast 1927 165 6 d٥٠ United Gas Pipe Magnolia Petrc-191; leum Co. Line Co. 170 1927 192 do. do. do. 193 do. do. 1927 161 6 do. 22 1925 24 2.5  $194!4\frac{1}{2}$  miles Gainesville ___ isouth Colored School Old 36 30 195;5 miles Edwin Spears 'southwest 112 4 1967 miles Don B. Long Don P. Long : 1940 southwest 25 36 1.0 Old 197: do. do. 198;6 miles Willow Wayside . 1940 51 30 Colored School south 'Height of Diam- measuring Well :Distance Driller Date i Depth : Owner eter · pcint Οî from comcf . above Marshall plewell (ft) well , ground (in.) · Edson Petroleum · 1939 : 1,000 199 11 miles Lee Ragon northwest Corp. 200 13 miles Al Oney dr. 1939 995 ncrthwest

a/ Plus (+) indicates water level is above ground.

T, turbine, A, air, steam or natural gas lift; H, hand pump or bucket and rope;
C, cylinder, G, gasoline; E, electric; W, windmill. Number indicates horsepower.

	Water	level	2		
Well		Date of			Remarks
	measuring			of	1
	' point			water:	
	(ft.) <u>a</u> /	· ·	<u>b</u> /	' <u>c</u> /	: : !
182	18.70	Oct. 31, 1941	. A	D	
183	T en el denn		. A	И	; ; ;
184	1		A	N	
185	1 1 1	######################################	A	N	
186			T,E,	P	Partially supplies the City of Waskin.
187	82.50	Oct. 29, 1941	T,E,	P	Do.
188	1	and the second s	Mone	N	See log.
189	1		A	:D,Ind	Estimated yield, 100 gallons a minute.
190		P	T,E,	.D, Ind	Estimated yield, 150 gallons a minute- Temperature 67° F.
191	1 —		A	Ind	
192		Printer allege	A	Ind	
193			A	Ind	Combined yield of wells 191, 192 and 193 was 43 gallons a minute October 31, 1941.
194	17.11	Feb. 15, 1942	H ¦	P	Dug well.
195	9.2	do.	H	D,S	Do.
196			Mone	N	
197	4.0	Feb. 13, 1942	C,E	D	Dug well.
198	16.73	do.	; H	. P	
	Water	level		1	
Well	-	Date of	Method	Use	Remarks
	measuring			of	
	,	ment		water	; }
	(ft.) <u>a</u> /		<u>b</u> /	<u></u>	· · ·
199	1		None	. N	Core test. Electrical rog from 50 to 865 feet
Taa	·	i	i MOHE	118	in files of the Texas State Board of Water
	1	1	,	<u>t</u>	Engineers shows sandy zones from 50 to 180 and
		! !	: !	:	280 to 350 feet and shale or clay with thin
	i	; ;			sands from 350 to 865 feet. See figure 2.
200	1	<u> </u>	None	+- <u>N</u>	· Core test. Electrical log from 30 to 827 feet
200			None	ŤA.	in files of the Texas State Board of Water
			1		
	1 1	I :	1 ₹	·	Engineers shows sandy zones from 70 to 130 feet
	1	; ;	; )		end 300 to 500 feet and shale or clay with thin
	1	ir.nlw D	3		sands from 300 to 827 feet. See figure 2.

c/P, public surply; D, domestic; S, stock; Ind, industrial; N, not used.
d/ Water level reported by driller or owner.

	Thickness (feat)	Depth (feet)		Thickness (feet)	Depth (feet,
Well 21,	partial log		Well 29C	ontinued	
Mrs. C, C. Bohler, S	, riles north	neast of	Blue shale	33	, 55
Marshall, Corona Pe	troleum Cc	driller,	Send	11	66
Clay	15	15	Shele	34	100
Sand and lignite	55	70	Sandy shale	37	137
Gumbo and send	100	170	Rock	1	, 138
Sand rock	4	174	Sandy shale	22	160
Gumbo and send	46	, 230	Lignite	5	: 165
Rock	5	225	Shele	38	203
Gumbo and sand	45	270	Shale with streaks of	00	!
Pock	2	272	sand	87	290
Sand	28	300	Rock	1	291
Gumbo and send	20 50	350	Gumbo and shale	139	. 430
		352	Guil O and Share		
Rock Sand with streaks of	. 2	1 002	1870 7 7	70	
	21	373	Well	<u> </u>	
shale	21 4	. 373	Tallot Tanahana Ondrasa	Tilosolea -	l milo
Rock			Flat, Longhorn Ordnan		
Shale	25	400	east of Karnack. B. F	· nacinitoi	Ω,
Send end shale	50	450	driller.	3.5	-1 r-
Gumbo and sand	88	538	Surface soil	15	. 15
Rock	3	541	Sand, fine brown	7.0	1
Sand and boulders	20	561	gravel and iron ore	30	45
Gurbo and sand	30	501	Blue shele	30	75
Shale and boulders	78	669	Sandy shale, water-		1
Chalk rock	1	670	bearing	31	100
Rock	4_	674	Rock	2	108
Shale and sand	166	840	Sand	25	133
Gumbo, shale and					
boulders	577	: 1417	Well	53	
Sand	5	; 142?		5	
Shale	14	1436	Lowland. 1. G. Foster		
Rock	2	1436	of Kernack. 1. G. Fos-	ter, drille	
Sand	27	1465	Clay	92	. 83
Shale	105	1570	Sand	18	; 110
Shele and sand	175	: 1745	Sandy shale	7	117
Chalk and lime ith			Dark-gray sand	13	130
shale breaks	65	1810	Shale	1	131
TOTAL DEPTH		3097	Yellow send	32	1 43
Wel	1 25		Well	3 <b>7</b>	
	7 . 33 -		mgaringengani au	_	
On ridge, I. J. Tayl			Lowland. W. E. Hartzo		
west of Karnack, I.	•		of Karnack. A. G. Fost	,	
Sand and clay	45	45	Surface soil	62	. 62
Quicksand	15	60	Hard gray rock	1	: 63
Dark-gray sand	23	, 83	Sandy shale	15	, 78
Shale	47	130	Water sand	27	: 105

Rock

Sand

106

On Hilltop. T. J. Taylor,  $\frac{3}{4}$  mile southwest of Karnack. P. F. Eddington, driller.
Surface soil 22 38

Well 29

Т	hickness (feet)	Depth (feet)	13	nickness (feet)	Depth (fect)
Wel	1 44		Well 61Con	cinued	
Edge of Caddo Lake.	Johnson	Bros., 54	Lignite	1	131
miles east of Karnac			Gray sand	6	; 139
driller.		1	Hard rock	21	; 160
Sand and clay	28	, 23	Sand and clay	12	172
Shale	81	109	Lignite	៊	175
Hard sand	16	125	Sand and gray cla-	15	: 190
Shale	51	1 176	Lignite	3	193
Medium-grained hard		1	White sand	1.7	210
sand	4	130	Lignite	1	211
Shale	12	192	! Gray sand	29	277
ledium-grained	2	1	Not given	1	: 238
sand	10	202	Sandstole	ĺ	239
Shale	2	204	Gray clay	3	242
Sand	۵ 2	206	Coarse-grained said	7	219
Shale	152	358	Lignite	4.	
Jiaio	100	000	White sand, water	4	253
דאר אמר	3 50	Ì	· ·		257
we .	1 58		Lignite	1	258
^ • • • • • • • • • • • • • • • • • • •			Gray sand	15	275
On ridge. S. E. Woo			Lignite	5	, 280
of Karshall. Elevat	-	1	Gray clay and sand	10	290
Eurface sand	16	. 16	Gray sand	20	310
later sand	27	; 43	Clay and lignite	10	, 320
Humbo	3	46	Gray clay	10	330
Lignite	4	50	Lignite	Ş	, 332
Gumbo	10	60	Sand and clay	1	333
Gray sand with strea	ks	,	"Shelly" rock	3	. 336
of lignite	158	, 218	Sharp sand	51	367
Shale	90	3.08	Soft gray sand rock	51	418
lock	22	350	Hard sand rock	1	419
Sand	32	362	Soft gray rock	06	505
			Hard rock	3	508
Wel	1 61		Sand rock	2	510
77 0	<u> </u>	i i	Sand and clay	10	520
Creek bottoms. City	of Mara	-ell 3	Hard rock	6	526
*		i	Pipe clay	22	548
miles northeast of M	arshall.	Ed alls	Hard rock	1	. 549
driller.	7	7	Gray sand	28	1
Surface soil	1	. ]	Pire clay	د ن 6	577
Sand and clay	11	12	Lignite	1	583
Red and yellow rock		26	Gray sand rock		584
Lignite	1	, 55	,	11	. 595
Fray sand	17	14	Lignite, clay and san	a ib	610
Gray clay	23	. 37	N	7 00	
Soft dark-brown clay		75	. 0 .	1 32	
Lignite	5	. 60	Creak battam- 3:4	- 5 Take 1	77 9 .
Clay	1	, 84	Creek bottoms. City	ol rarsha	ull, ó mi
Lignite	8	92	northeast of Warshall	• LCL "11.1	.lS,
hite clay	8	. 100	driller.		
Sandstone	1	101	Surface soil	3	. 5
Cray clay	11	112	Blue gunbo	21	24
Froy sand	4	: 118	Quicksand	C	30
Lignite	1	' 117	Send, gravel and	;	<b>!</b>
Iray elay	4	121	water	10	40
Sandstone	3	12.	Sand and water	20	GC
Tray clay	6	100	Lignite	2 '	62
, — J			(Continued		

Well 62Continued   Well 68	(fect)
Cray gumbo	
Later   Sand	
Nater sand   S	Layne
Nater   Sand   1	,
Lignite	4
Gray jumbo	
Unlinown   22	C
And lignite   17   Lignite   15   Sand and shale   14   Rock   1	53
Lignite   15	i
Sand and shale   11	70
City of Marshall, in Marshall.       Layne-       Rock       1         Temas Co., driller.       5       5       Silty send with       20         Rotery       5       5       Silty send with       1         Surface soil       3       8       layers of shale       70         Red clay       12       20       Sand with layers of       55         Gray said and mice       20       Silty send with       1         Layers of shale       70       Sand with layers of       55         Soft rock       1       47       Fine-grained sand with       25         Soft gray shale and silty       50       Rock       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       <	35
Texts Co., driller.   Gray said and mice   20	99
Rotery         5         5         Silty sand with           Surface soil         3         8         layers of shale         70           Red clay         12         20         Sand with layers of         9           Gray sandy shale         26         46         shale         53           Soft rock         1         47         Fine-grained sand with         25           Soft gray shale         15         32         layers of lighte         25           Soft gray shale         15         32         Rock         1           Ine-grained sand         25         Rock         1           Sand         47         109         Fine-grained sand with         25           Rock         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	100
Surface soil         3         8         layers of shale         70           Red clay         12         20         Sand with layers of         53           Gray sandy shale         26         46         shale         53           Soft rock         1         47         Fine-grained sand with         25           Soft gray shale         15         32         layers of shale         25           Lignite, shale and sand sand sand sand sand         47         109         Fine-grained dark-gray         1           Sond with layers of shale         1         1         1         1         1         1         1         25         1         1         1         1         1         1         1         2         2         1         2         2         3         1         2         2         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3	120
The clay   12   20   Sand with layers of   Gray sandy shele   26   46   Shale   55   Shale   5	;
Gray sandy shale         26         46         shale         53           Soft rock         1         47         Fine-grained sund with           Soft gray shale         15         62         layers of lighte         25           Lighte, shale and sand         47         109         Fine-grained sund with         1           sand         47         109         Fine-grained dark-gray         1           sand         45         Rock         3         3           Soft shale         16         140         Dark-gray sand         47           Soft shale         9         150         Soft roch         1           Soft rock         1         151         Rock         3           Soft rock         1         151         Rock         1           Soft shale         35         186         Rock         1           Soft shale and silty         59         215         Soft shale         92           Soft shale and silty         61         69         City of Marshall, in Farshall.         61           Soft shale with layers         10         Soft shale         10         Soft shale         10	190
Soft rock  Soft gray shale  Lignite, shale and sand  Fine-grained sand with  layers of lignite  Rock  Rock  Fine-grained dark-gray  sand  Soft shale  Soft shale  Soft shale  Soft rock  I 151  Soft rock  I 151  Soft shale	
Soft gray shale 15 32 layers of lignito 25 Lignite, shale and sand 47 109 Rock 1  Fine-grained dark-gray sand 45  Soft shale 16 140 Dark-gray sand 47  Soft shale 9 150 Coarse-grained sand 18  Soft rock 1 151 Rock 1  Soft shale 35 186 Rock 92  Soft shale and silty send 29 215  Hard shale 12 227  Fine-grained silty send 16 243  Soft shale with layers 18	243
Lignite, shale and sand 47 109 Fine-grained dark-gray sand 45 Rock 3 Soft shale 16 140 Dark-gray sand 47 Soft rock 1 151 Soft shale 9 150 Coarse-grained sand 18 Rock 1 Soft rock 1 151 Rock 1 Soft shale 35 186 Soft shale and silty sand 29 215 Hard shale 12 227 City of Marshall, in Farshall. Soft shale with layers 16 Soft shale with layers 18	268
sand 47 109 Fine-grained dark-gray sand 45 Rock 3 Bark-gray sand 47 Soft shale 16 140 Dark-gray sand 47 Soft rock 1 121 Soft rock 1 Soft rock 1 Soft shale and silty sand 29 215 Hard shale 12 227 Fine-grained silty send Soft shale with layers 5 Soft shale with layers 6 Soft shale with layers 7 Soft shale with layers 8 So	269
sand 15 124 Rock 3 Soft shale 16 140 Dark-gray sand 47 Kard rock 1 121 Soft roch 1 Soft shale 9 150 Coarse-grained sand 18 Rock 1 Soft rock 1 151 Rock 1 Soft shale and silty sand 29 215 Hard shale 12 227 Fine-grained silty send 16 243 Soft shale with layers	1 203
sand 15 124 Rock 3 Soft shale 16 140 Dark-gray sand 47 Hard rock 1 1-1 Soft roch 1 Soft shale 9 150 Coarse-grained sand 18 Rock 1 Soft rock 1 151 Rock 1 Soft rock 1 Soft roch 1 Soft shale and silty send 29 215 Hard shale 12 227 Fine-grained silty send 16 243 Soft shale with layers 18 Soft shale with layers 18 Soft shale Rock 3 Dark-gray sand 47 Soft roch 1 Soft roch 1 Soft roch 2 Soft roch 2 Soft shale 9 Soft shale 9 Soft shale 9 Soft shale 9 Soft shale 18 Sof	; 314
Soft shale 16 140 Dark-gray sand 47  Hard rock 1 111 Soft roch 1  Soft shale 9 150 Coarse-grained sand 18  Soft rock 1 151 Rock 1  Hard gray shale 35 186 Soft shale 92  Soft shale and silty send 12 227  Fine-grained silty send 16 243 White, driller.  Soft shale with layers 18	317
Hard rock 1 151 Soft rock 1 Soft rock 1 Soft shale 9 150 Coarse-grained sand 18 Rock 1 Soft shale and silty send 12 227 Fine-grained silty send Soft shale with layers 150 Soft rock 1 Soft rock 1 Rock 1 Soft shale 92 Soft shale	364
Soft shale 9 150 Coarse-grained sand 18 Soft rock 1 151 Rock 1 Soft shale and silty send 12 227 Fine-grained silty send 16 243 Soft shale with layers 150 Coarse-grained sand 18 Rock 1 Soft shale 92 Soft shale 92 Coarse-grained sand 18 Rock 9 Soft shale 92 Coarse-grained sand 18 Rock 1 Soft shale 92 Soft shale	365
Soft rock I ard gray shale 35 186 Soft shale 92 Soft shale and silty send 29 215 Hard shale 12 227 Fine-grained silty send 16 243 White, driller. Soft shale with layers	333
Soft shale and silty send Soft shale Soft sh	384
Soft shale and silty send Eight Sand Soft shale and silty Send Soft shale with layers  Soft shale with layers  Soft shale with layers  Soft shale with layers	476
send 29 215 Hard shale 12 227 Fine-grained silty 243 Soft shale with layers 26  29  215  City of Marshall, in Farshall. White, driller. Surface soil 12	
Hard shale 12 227  Fine-grained silty City of Marshall, in Farshall.  send 16 243 White, driller.  Surface soil 18	
Fine-grained silty send Soft shale with layers  City of Marshall, in Farshall. White, driller. Surface soil 18	
Soft shale with layers  16 243 White, ariller. Surface soil 18	I. B.
Soft shale with layers   Surface soil 12	
	. 13
Via to a figure VV OC 10. Extricorr	: 26
grained sand 30 ; 275   Shale and lighte 24	· 50
Fine-grained sand and Gummy shale with streaks	t 1
blue shale 28   501   of lignite 35	85
Rock 1 302 Shale and boulders 20	105
Fine-grained dark- Fine-grained gray sand 13	118
colored sand 45 347 Shale 39	157
Fire-grained sand Rock 3 Shale 14	160
and share as 1 339 1 5	174
100a,	175
But since what	185
	200
1 0 0 0 0 0	235
DOLO Shalo With	1 200
1	253
3 $3$ $3$ $3$ $3$ $4$ $4$ $4$ $4$ $4$ $4$ $4$ $4$ $4$ $4$	254
Soft shale 41 526 Sand and shale 10	264
(Continued on next page	

	ickness (feet)	Depth (feet)	T	liclmess (fect)	Depth (feet)
Well 69C	ontinued	,	Well 71-Cor	itinued	
Fine-grained gray san	Ą		Sand rock	٦	. 100
and boulders	<b>1</b> 5	; 200	Gummy shale and	1	166
Shale	35	235	boulders	19	3.00
Dark-gray fine-		) 1	Gumbo and streaks of	10	, 185
grained sand	18	253	lignite	20	205
Rock	1	254	Fine-grained sand and	20	;
Sand and shale	10	264	boulders	10	215
Gray water sand	87	551	Shale and lignite	20	255
Sand and shale	20	371	Lignite and shale	10	275
777 N	7 50		Shale	1C	235
MeT	1 70		Sand and shale mixture	35	320
City of Marshall, in I	Marshall.	Layne-	Gray vater sand	56	; 376
Telas Co., driller. Red clay	26	. 26	wel	1 72	
Coarse-grained loose	20	. 20			
gray sand	38	€4	City of Marshall, in I	Marshall.	Core
Pine-grained gray	-	1	Drill Corp., driller. Surface sand	7.0	7.0
sand and shale	87	151	Good light-colored	10	. 10
Took	1	152	water sand	<b>5</b> 0	30
Sand	5	! 157	Sand with streaks of	30	} 50
Lignite	3	160	shale	95	155
Soft blue shale and		,	Rock	1	156
fine-grained sand	:2	202	Light-colored tight	~	1
Rock	5	207	sand	114	270
Hard brown shale with		i i	Hard rock	2	272
layers of sand	33	240	Tight gray sand	138	410
Lignite	5	245	Sand with streaks		1
Fine-grained silty sand	17	202	of shale	180	590
Soft shale and fine-	} سلو	1 202	Hard rock	S	592
grained dark-gray		1	White sand	73	; 67C
sand	67	329	Rock with streaks of		1
Fine-grained dark-gra		1	sand	10	580
sand and shale	37	366	Sand Sand shale	30	710
Sand	6	ა72	Shale	30 30	1 740
Mard rock	1	; 573	Sand and shale	10 20	. 100
Dark-gray sand	3C	403	Rock	10	? 77C . 780
llock	2	205	Sand and shale	90	. 760 ! 870
Sticky brown shale	74	479	Shale with boulders	10	; 88C
777 7	# P3		Sand and shale	10	390
MeT	1 71		Shale and rock	lo	900
Oite of Noraholl in	3° 3 - 77		Shale	30	930
City of Marshall, in		ı	Shale and rock	10	940
_levation 340,5 feet,		' 76	Shale and sand	10	950
Surface sand and clay Fine-grained sand	· 15 15	15 30	Shale, sand, and		i i
Lignite and shale	63	93	small boulders	20	, 970
Rock	2	95			
Hard lignite with	~	1			
streaks of sand	22	117			
Lignite	8	125			
Sand	30	155	4		
Sand and lignite	10	. 165	11		

10

165

Sand and lignite

Thickness   Depth (feet)   Thickness (feet)	(feet)  255 290 290 215 320 240 558 400  Eleva- 15 35 50 65 8
City of Marshall, in Marshall. Core         Hard rock         5           Drill Corp., driller. Elevation, 349.3         Sand         55           feet.         Sand and shale         35           Surface soil and sand         10         10         Hard rock         5           Sand         40         50         Sandy shale         20         5           Sand         20         90         Hard rock         12         Sandy shale         20         Hard rock         12         Sandy shale         12         Sandy shale         12         Sandy shale         18         Sandy shale         18         Sandy shale         18         Sandy shale         19         Sandy shale         10         Sandy shale         10         Sandy shale         10         Sandy shale	230 7 015 220 7 240 558 400 Eleva- 15 35 50 65 8
Drill Corp., driller.         Elevation, 349.3         Sand         55           feet.         Sand and shale         35           Surface soil and sand         10         10         Hard rock         5           Sand         40         50         Sandy shale         20           Lignite         20         70         Hard rock         12           Sand         20         90         Sandy shale         48           Rock         10         100         Sandy shale         48           Sandy shale         10         160         Mell 76           Sand shale         10         160         Mell 76           Sand shale         10         180         Mell 76           Sand shale, and         Surface sand and clay         15           Sand rock         10         190         Fine-grained gray sand         50           Hard shale         10         200         Gummy shale         15           Sand         50         250         Fine-grained gray sand         50           Gumbo         31         291         Lignite and shale         25           Good water sand         19         310         Shale with streaks of sand	230 7 015 220 7 240 558 400 Eleva- 15 35 50 65 8
Surface soil and sand         10         10         Hard rock         5           Sand         40         50         Sandy shale         20           Lignite         20         70         Hard rock         12           Sand         20         90         Sandy shale         48           Rock         10         100         Sandy shale         48           Shale and gumbc         50         150         Well 76           Shale and shale         10         160         Sandy shale         48           Sandy shale         10         160         Sandy shale         48           Sand and shale         10         100         Well 76           Shale         10         160         Sandy shale         48           Sandy shale         10         160         Sandy shale         48           Sand and shale         10         160         Sandy shale         48           Sandy shale         10         160         Sandy shale         10         Include of the shale         10         Sandy shale         15         Sandy sha	' C15
Surface soil and sand         10         10         Hard rock         5           Sand         40         50         Sandy shale         20           Lignite         20         70         Hard rock         12           Sand         20         90         Sandy shale         48           Rock         10         100         Sandy shale         48           Shale and gumbc         50         150         Well 76           Shale         10         160         Sandy shale         Well 76           Sand shale         10         170         City of Farshall, in Marshall.         tion, 326.3 feet.         Surface sand and clay         15           Sand, shale, and         10         190         Fine-grained gray sand         20           Hard shale         10         200         Gummy shale         15           Sand         50         250         Fine-grained gray sand         20           Broken boulders         10         260         Shale         15           Good water sand         19         310         Shale with streaks of sand         35           Hard sand         10         320         Lignite         25           Boulders and t	220 740 558 400 Eleva- 15 7 35 50 65 8
Sand         40         50         Sandy shale         20           Lignite         20         70         Hard rock         12           Sand         20         90         Sandy shale         48           Rock         10         100         Sandy shale         48           Shale and gumbc         50         150         Well 76           Shale         10         160         Sandy shale         Well 76           Sandy shale         10         160         Sandy shale         Well 76           Sand shale         10         180         Sandy shale         Image: City of Farshall, in Marshall, in Ma	15 558 400 558 400 51eva- 15 50 65 8
Lignite         20         70         Hard rock         12           Sand         20         90         Sandy shale         48           Rock         10         100         Mell 76           Shale and gumbc         50         150         Mell 76           Shale and gumbc         10         160         Mell 76           Sandy shale         10         160         City of Farshall, in Marshall.           Sand and shale         10         180         tion, 326.3 feet.           Sand, shale, and         Surface sand and clay         15           sand rock         10         190         Fine-grained gray sand         20           Hard shale         10         200         Gummy shale         15           Sand         50         250         Fine-grained sand         15           Broken boulders         10         260         Shale         15           Good water sand         19         310         Shale with streaks of sand         35           Hard sand         10         320         Lignite         25           Boulders and tight         Shale and boulders         20	552 400 Sleva- 15 35 50 65 8
Sand         20         90         Sandy shale         48           Rock         10         100         Well 76           Shale and gumbc         50         150         Well 76           Shale and gumbc         10         160         Well 76           Sandy shale         10         160         City of Garshall, in Marshall.           Sand and shale         10         180         tion, 326.3 feet.           Sand, shale, and         Surface sand and clay         15           sand rock         10         190         Fine-grained gray sand         20           Hard shale         10         200         Gummy shale         15           Sand         50         250         Fine-grained sand         15           Broken boulders         10         260         Shale         15           Gumbo         31         291         Lignite and shale         25           Good water sand         19         310         Shale with streaks of sand         35           Hard sand         10         320         Lignite         25           Boulders and tight         Shale and boulders         20	400 Sleva- 15 35 50 65 8
Rock         10         100           Shale and gumbc         50         150         Well 76           Shale and gumbc         10         160         Well 76           Shale         10         160         City of Farshall, in Marshall.           Sand and shale         10         180         tion, 326.3 feet.           Sand, shale, and         Surface sand and clay         15           sand rock         10         190         Fine-grained gray sand         20           Hard shale         10         200         Gummy shale         15           Sand         50         250         Fine-grained sand         15           Broken boulders         10         260         Shale         15           Gumbo         31         291         Lignite and shale         25           Good water sand         19         310         Shale with streaks of sand         35           Hard sand         10         320         Lignite         25           Boulders and tight         Shale and boulders         20	Eleva- 15 ; 35 50 65 8 •
Shale and gumbc 50 150	15 ; 35 50 65 8
Shale 10   160   City of Farshall, in Marshall. Sand and shale 10   180   tion, 326.3 feet. Sand, shale, and   Surface sand and clay 15   sand rock 10   190   Fine-grained gray sand 20   Hard shale 10   200   Gummy shale 15   Sand 50   250   Fine-grained sand 15   Froken boulders 10   260   Shale 15   Cood water sand 19   310   Shale with streaks of sand 35   Lignite and boulders 25   Shale and boulders 20   Shale and boulders 20	15 ; 35 50 65 8
Sandy shale 10 170 City of Farshall, in Marshall. Sand and shale 10 180 tion, 326.3 feet. Sand, shale, and sand rock 10 190 Fine-grained gray sand 20 Hard shale 10 200 Gummy shale 15 Sand 50 250 Fine-grained sand 15 Broken boulders 10 260 Shale 15 Cumbo 31 291 Lignite and shale 25 Good water sand 19 310 Shale with streaks of sand 35 Hard sand 10 320 Lignite 25 Shale and boulders 20	15 ; 35 50 65 8
Sand and shale Sand, shale, and Sand rock Hard shale Sand Sand Sand Sand Sand Sand Sand Sand	15 ; 35 50 65 8
Sand, shale, and sand rock l0 l90 Fine-grained gray sand 20 Hard shale l0 200 Gummy shale l5 Sand l0 250 Fine-grained sand l5 Froken boulders l0 260 Shale l15 Gumbo Good water sand l9 310 Shale with streaks of sand 35 Hard sand l0 320 Lignite Shale and boulders 20	; 35 50 65 8·
sand rock 10 190 Fine-grained gray sand 50 Hard shale 10 200 Gummy shale 15 Sand 50 250 Fine-grained sand 15 Proken boulders 10 260 Shale 15 Gumbo 31 291 Lignite and shale 25 Good water sand 19 310 Shale with streaks of sand 35 Hard sand 10 320 Lignite 25 Shale and boulders 20	; 35 50 65 8·
Hard shale 10 200 Gummy shale 15 Sand 50 250 Fine-grained sand 15 Broken boulders 10 260 Shale 15 Gumbo 31 291 Lignite and shale 25 Good water sand 19 310 Shale with streaks of sand 35 Hard sand 10 320 Lignite 25 Boulders and tight Shale and boulders 20	50 65 8 ·
Sand 50 250 Fine-grained sand 15 Broken boulders 10 260 Shale 15 Gumbo 31 291 Lignite and shale 25 Good water sand 19 310 Shale with streaks of sand 35 Hard sand 10 320 Lignite 25 Boulders and tight Shale and boulders 20	65 8 ·
Broken boulders10260Shale15Gumbo31291Lignite and shale25Good water sand19310Shale with streaks of sand35Hard sand10320Lignite25Boulders and tightShale and boulders20	8 ·
Gambo 31 291 Lignite and shale 25 Good water sand 19 310 Shale with streaks of sand 35 Hard sand 10 320 Lignite 25 Boulders and tight Shale and boulders 20	
Good water sand 19 310   Shale with streaks of sand 35   Hard sand 10 320   Lignite 25   Shale and boulders 20	
Hard sand 10 320 Lignite 25 Boulders and tight Shale and boulders 20	105
Boulders and tight Shale and boulders 20	140
	165
Sandstone of 560 H Lighte 20	185
	205
Well 74 Gummy shale 21 Lignite and streaks of	. 526
Well 74 Lignite and streaks of sand	250
City of Marshall, in Marshall. Core Sand and shale mixed 20	270
Drill Corp., driller. Elevation, 328.54   Gummy shale and boulders 21	291
feet. Fine-grained gray water	<i>た</i> ∌ I
Surface sand and clay 40 47 sard 87	373
Sand 30 , 70   Shale and sand mixed 72	450
Lignite . 22 92 Coarse-grained sand 15	465
Hard sand 18 110 Gummy shale 31	496
Rock 10 120	
Gray sand 30 150 Well 77	
Sand, shale and lignite 110 '260	
Shale and sand 19 279 Texas & Pacific R.R.Co., in Mars	nall.
Hard rock 1 280 Elevation, 336 feet.	
Sandy shale 50 ! 330   Surface clay 10	10
Hard rock 1 331   Sand 43	53
Good water sand 29 360   Lignite 22	. 75
Shale and sand 198	. 273
Well 75 Rock 2	, 275
Shale 11	286
City of Marshall, in Marshall. Core	
Drill Corp., driller. Elevation, 337.06 feet.	
Clay and surface rock 10 10 Texas & Pacific R. R. Co., in Ma	rshall.
Sand 72 82 Elevation, 333 feet	
Lignite 18 100 Surface clay 10	10
Sand 50 : 150   Sand 40	. 50
Sand rock 5 155 Lignite 15	• 65
Sand 45 · 200   Sand and shale 111	176
Rock 6 206 Rock 2	178
Sand 14 220 (Continued on next page)	

- 39 - Table of Drillers' Logs, Marrison County--Continued

	Thickness (feet)	Depth (feet)		Thickness (fect)	Depth (fect)
Mall co	Continued	12000/		(2001)	(±0, 0,
well to		de como e como esta de como est	Tell 830	ontinued	
Sand and shale Sand	48 60	226	Sand	o 7	216
Sand and sha	65	; 351	Shale	63	352
Shale	14	365	Sand	31	315
Sand	41	406	Shale	47	360
Shale	11	417	Sand	15	375
		<del></del>	Shale	30	405
	Well 79	* 1	Rock Shale	4	400
-	The later with all the later with th		Gunbo	7	110
Texas & Pacific R.	R. Cos. in M	arshall.	Sand	29	445
Llevation, 337 fee			Dailu	13	450
Surface clay	10	10	τιΓ_	11 9/	
Sand	44	54	We were	11 34	
Lignite	18	72	Independent Ice Co.	in Tamahal	7
Sand	63	135	J. C. Bolin; drill		L /L a
Shale	15	: 150	Sand and quicksend	68	, 58
Sand	175	325	Blue shale	5	73
Rock	2	327	Vater sand	2	75
Sand	42	369	Brown shale	12	87
lock	2	371	Blue shale	5	92
Sand	51	422	Water sand	8	100
S'hale	22	444	Limestone	2	102
			Brown shale	17	119
	Well 80		Water sand	16	135
	talkan en		Broth shale	10	145
letas & Pacific R.	R. Co., in M	Marshall.	Gumbo	33	178
Elevation, 335 fee			Blue shale	5	184
Surface clay	8	. 8	Water sand	3	137
Sand	46	. 54	Blue shale	3	190
Lignite	15	: 69	Sandy shale	5	195
Sand	21	90	Water sand	35	230
Shale	22	, 112	3lue sandy shale	20	250
Sand	56	168	Gray shale	18	260
Shale	11	179	Water sand	13	280
Sand	11	190	Sandy shale	1C	; 320
Shale	172	: 362	Gum'oo	5	323
Rock	2	354	75 feet of 23-inch	svrlece casi	.ng; 250
Sand	55	419	feet of 8-inch; 30	feet of 6-in	ch line
Shale	14	: 433	extending 7 feet up	inside 8 in	ch.
			White discrete makes to the first first programming implications and place control of the contro	- Alle alle alle alle alle alle alle alle	
	Well 85		We	11 86	
Slope. Southweste	ern Gas & Elec	trie Co	Darco Corp. 1 mile	s west of Ma	urshall.
in Marshall. Layr			Layne-Texas Co., dr		
Elevation, 385.0 f			Red clay and sand	22	, 22
Surface clay	10	10	Red sand	13	38
Rock	3	13	Gray water sand	33	7 į.
Olay	10	23	Hard gray sand and	-	1 5.
Sandy clay	22	45	lignite	15	86
Shole	90	135	Thite sand	ß	94

White sand

3lue shale

Lignite

Hard brown shale

8

33

7

30

(Continued on next page)

94

127

134

164

90

ð

25

10

6

135

138

153

173

179

Shale

Rock

Shale

Suale

Lignite

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 86-		No. of the second secon	Well 870	Continued	
Sand oppil on distribution of Salating Statement of Salating Statement of Salating Statement of Salating Statement of Salating Sa	*1	1 705	Werdelfinde beliebelderhaat in Personalisaat Baar Ages consum	ra Maria , Sha a an Pira an Maria - Afrika dirika ja kipa ang jang pad	
Rock	1 5	165	Gray water sand and		
Shale	3	110	layers of hard wete		
Fine-grained light-	5 7		sand	13	121
gray sand	11	181	Shale	3	124
provn shale and			White water sand	16	140
lignite	47	223	Lignite	2	142
Rock	1	; 229	Soft shale	12	154
Gray shale and			Rock	1	155
lignite	43	272	Soft shale	8	163
Rock	1	273	Rock	1	154
Soft gray shale	26	299	Soft shale	4	168
Lignite	5	304	Rock	· 2	170
Fine-grained white		i	Lignite	13	, 183
sand	11	315	Soft blue shale	23	211
Fine-grained gray			Hard fine-grained	20	طر عدر فيها ا
sand, shale and		1	gray sand	25	: 236
lignite	22	337	Soft blue shale	16	252
Fine-grained light-		.	Lignite	4	25€
gray sand, mica and	3		Soft brown shale	65	23e 321
shale	24	361	Hard rock		
	22	383	l .	1	322
Shale Hard blue shale	14	397	Soft shale	22	344
		, 001	Lignite	4	348
Soft blue shale and t			Shale, fine gray		r
layers of fine-grai	inea	: 430	water sand and		1
sand	33	1	lignite	J8	384
Hard blue shale	29	459	Soft shale	4	. 388
Fine-grained sand	12	471	Fine-grained sand and	ī	1
Soft shale	17	483	shale	16	404
Soft brown shale	45	535	Soft gray shale	81	485
Roelt	1	534	Hard shale	35	520
Hard shale	25	559	Hard dark-colored fir	ìe⊷	1
Soft shale	23	: 582	grained sand	16	; 536
lock	1	583	Hard brown shale	12	548
Soft brown shale	134	717	Rock	ĩ	549
Soft brown shale and		1	Hard sticky shale	22	571
oulders	89	808	Hard shale and boulde		606
to the second of			Soft gray shale	36	542
Well	87		Hard rock	4	
			1		646
Darco Corp., $1\frac{3}{4}$ mile	s west of M	Marshall.	Hard gray shale	92	738
Layne-Texas Co., dri			Hard rock	1	739
Surface soil	2	. 2	Hard gray shale	26	; 7€5
	20	22			
Red clay	12	34	Wo.l	<u>11 88</u>	
Soft brown shale		; 35	D 0	,	
Took	1		Darco Corp., $1\frac{3}{5}$ riles		arshall.
Hard red sand	8	43	Layne-Tenas Co. dri		
Loose red sand	15	58	Red clay	8	8
fock	1	59	Blue clay	9	. 17
Ted sand	7	, 66	Surface water sand	4	21
Cray water sand and		· · · · ·	Yellow sandy clay	18	: 39
thin layers of roc		107	3lack sand	20	59
Poek	1	; 108	Gray packsand	10	: 69
			Sandy shale	20	' 89
			(Continued of	on next pag	e.)
					•

Table of Drillers' Logs, Harrison CountyContinued					
Th	ickness (feet)	Depth (feet)		Thielness (.est)	Depth (feet)
Printer Beruter de Marie (Paralle of British de La Caralle of British d	(1000)	TOCO,	The section of the se	(1000)	Carlo Carlo Sancarante
Mell 88-Con	tinued		Toll 91-	ued	•
Water sand	11	100	Water sand	13	105
Peat and rotten		•	Packsand	8	· 113
lignite	3	103	Foulty lignite	5	; 118
Packsand	7	110	Gumbo	13	136
Sandy shale	18	128 •	Faulty lignite	7.2	148
Nater sand	10	' 138	Gumbo	2	150
Black sand	12	150	Sandy shale	24	; 174
3lue shale	4	154	Gumbo	5	; 179
Brown shale	3	; 157	Water sand	13	192
llack gumbo	4	; 161	CASING: 192 feet o		
Lignite	2	163	from 90 to 110 and	14. to 192	fect.
Black gumbo	2	165	6-inch casing in 11		
Lignite and peat	3	, 168	space filled rith	eshed grav	el.
Brown shale	6	174			
Blue sandy shale	ි	; 180	.Ve	011 02	
Well 89	<u>}</u>		On slope, Darco Co	orp., lā mi	les west
Darco Corp., $1\frac{3}{2}$ miles w	rest of .	Marshall.	Surface clay	3	. 6
Red clay	12	12	Water sand	6	12
Yellow sandy clay	13	25	Blue clay	2	14
Gray sand and boulders		: 60	Loose sand		•
later sand	24	84	Water sand	15 17	; 29 ; 46
Packsand and boulders	26	110	Rock	1	47
Sandy shale and			Gray sand	16	63
boulders	16	: 126	Sandy shale and		i I
Jater sand	9	135	boulders	25	88
Sandy shale	15	: 150	Water sand	.6	94
Gray sold and		:	Sand and boulders	10	104
boulders	18	. 163	Sandy shale and gum		; 109
Lignite	4	: 172	Sand and boulders	.) .4 	112
Black gumbo	6	: 178	Iron ore, rock	4	116
Lignite and peat	3	181	Sand Gumbo	ĵ.	119
Dluc shale	5	184	Tater sand	4	123
Later sand	1	: 185	Faulty lignite	11 14	134
Pro-miles - May replace the production of the TPE Annual Control of Control o	· · · · · · · · · · · · · · · · · · ·	es a differentia establista a de una cope escapa en di la contrativa de a sener	Gumbo Figure		148
Well 9:	L		Shale	2	152 154
the Company of the Co			Gumbo	11	135
On slope, Darco Corp.,	l을 mile	s west of	Shalo	5	170
larshall.			Gumbo	6	176
Red clay	7	7	Water sand	9	135
Water sand	6	. 13	Gumbo	11	196
Packsaad	5	• 13	Brown shale	5	201
Sandatone	1	• 19	CASING: 201 feet of		Sareen from
Yellow and brown		,	75 to 201 feet. 6-		
sand	21	40	inch hole, annular		
Rock	2	42	washed gravel.	<u>.</u> <u> </u>	
Foor water sand	7	. 49		- Andrewson	
Rock	1	, 50	₹ 1		
Packsand	3	53			
Grown sand	7	; 30	d the state of the		
Gray sand	7	. 67			
Sendy shale and	~ -	,			
boulders	25	92	•		

·		
	Thickness	Depth
	(feet)	(feet)
to a second control of the second control of the second control of the second control of the second control of		The state of the state of the state of
Well	93	

On slope. Darco Corp., 13 miles west of Marshall. Walter A. Meller, driller. 7 Surface clay Surface sand 16 23 8 31 Gravel 22 53 Healy water sand 54 1 Rock Sand 6 60 6 Shale 66 Sand 16 82 Gumbo 5 87 Vater sand 15 102 Cumbo 9 111 CASING: 111 feet of 16 inch, 111 feet of 9 inch. Screens from 32 to 53 and 71 to 111 feet, annular space between casings filled with washed gravel.

#### Well 94

Darco Corp.,  $l_4^3$  miles west of Marshall. Top soil 1 Red clay Gravel 10 Gray gumbo 5 15 Red sandy clay 10 25 Grav water sand 16 41 Red sand rock 6 47 3 Red sand 50 CASIFG: 50 feet of 48 inch. One foot annular space outside of casing filled with washed gravel.

#### Well 95

On slope. Darco Corp.,  $l_{\frac{1}{4}}^{\frac{3}{4}}$  miles west of Marshall. B. F. Eddington, driller. 26 Surface clay Red water sand 28 54 Green water sand 61 115 Salt and pepper sand 13 128 and lignite

#### Well 96

On slope. Darco Corp.,  $1\frac{3}{4}$  miles west of Marshall. B. F. Eddington, driller. ned clay 59 65 lied water sand 38 Green water sand 103 White water sand 12 115 2 117 Lignite 125 Sand and lignite

T	nickmess	Depth
yakeyi Balife'le v. Tuardhalja. ii Maadiiniyde	(feet)	(feet)

## Well 97

Creek bottoms below pond. O. D. Hays,  $1\frac{1}{4}$  miles north of Marshall. illiam H. Atkinson, driller. Surface material 80 80 Water sand 30 110 Clay 87 197 Shale and boulders 308 505 Shale and shells 415 920 Shale 625 1545 Chalk 15 1560 Shale 210 1770 Chalk 25 1795 Broken chalk 125 1920 Chalk 350 2270 Shale 160 2430 Sand 60 2490 Shale and shells 90 2580 Shale 120 2700 Hard shale 107 2807 Shale 43 2850 Hard lime 20 2850

### Well 107

City of Hallsville, in Hallsville. Layne-Texas Co., driller. Sandy white clay 3 Yellow clay 10 13 Sticky black shale 106 119 1 120 Shale and boulders 22 142 Sandy shale 20 162 White sand 38 200 Blue shale 44 244 Rock 1 245 Sandy shale 7 252 Black sand 17 269 Sandy shale 6 275 Sand 10 285 Sandy shale 33 318 Brittle shale 68 386 Black shale 69 455 Sandy shale 46 501 Fine-grained gray sand 91 592 Shale 10 602 Rock 1 603 Shale and lignite 10 613 Well plugged back at 201 feet,

## Well 119, partial log

Owner --, 44 miles northwest of Hallsville. Surface sand and clay 110 · (Continued on next page)

- 42 = Table of Drillers' Logs, Harrison County--Continued

Table of Difficit		· ·		
Thickness (feet)	Depth (feet)	i .	ickness (feet)	Depth (feet)
Well 119, partial logCon-	tinued	Well 138Jonainued		
Sand and boulders 60	170	Lignite	9	37
Gunbo 13	193	Shale	200	237
Shale and boulders 62 :	245	Sand	31	238
Sand and boulders 47	292	Shale	32 :	300
Rock 3	295	Sand	43	343
Shale 5	500	10 inch hole. Set 20		
Rock 1	501	perforated pipe in uppe		3 feet
Shale 759	1060	set in bottom.		
TOTAL DEPTH	Unlaleum	the second secon	province and another continuous and another to a	القائلة مراجعة الأوسود ويسيفه وساو
Well 122	A STATE OF THE STA	Well 1	42	
Promothy applications of the promote and trained	1	On ridge. E. T. Rosebo	rough Sr.	, , 8 <del>-</del>
On slope. Dell Everett, $6\frac{1}{2}$ mile	es west	miles south of Marshall		•
of Hallsville. J. C. Boling, d.	riller.	Unknown	20	20
Quicksand 129,	129	Lignite	5 :	25
Sandy shale 21	150	Water-bearing sand	175 '	200
Sand, muddy 15	165	Lignite	25 ;	225
Sandy shale 45	210	Water-bearing sand	125	350
Sand, muddy 10	220	the special and the special an		
Sandy shale 18	238	Well 1	.49	
Water sand 42	280	-		
Shale 24 '	304	Lewis Anderson 3 mile		st of
T-T % % % (2) (**)		Marshall, V. E. West,	_	_
Well 137		Yellow sandy shale	€ .	8
Theman bulletin market market and the second	1 .,	Yellow and blue shale	0 1	1.0
River bottoms. Will T. Cock, 7		mixed	8 ; 4 ;	16 20
southeast of Hallsville. E. O.	Jutier,	Sand    Yellow shale	7 ;	20 27
driller. Soil 5	5	Gravel	5	30
Clay 25	30	White sand	6	. 36
Sand 30	60	Yellow shale	3 ;	39
Shale 110	170	Blue sand	3	42
Lime 15	185	Blue shale	12	54
Sand 15	200	Dark-colored sand	9 ;	63
Line 15	215	Serial Relations in the Control of t		
Shale 185	400	Tell :	L':0	
Shale and boulders 25	425		waller to the same of the same	
Shale 625	1050	Johnnie Tatum, 91 miles	s southeas	t of
Sandy shale 450	1500	Marshall. V. F. West,		
Hard shale 160	1660	Sandy shale	lC	10
Lime 5	1805	Red and blue shale	8	18
Sand 10	1675	Yellow shale	5	23
Shale 175	1850	Sand	5	28
Chall: 520	2370	Yellow shale and		
Shale 143	2513	gravel mixed	10	38
Lime 4	2517	Blue shale	Ą.	42
Sand and shale 31	2548	Dark-colored sand	5	47
		Blue shale	6 3	53
Well 138		Dark-colored sand Blue shale	ა 16	56 72
7. 7	74	Dark-colored sand	10 3	75
liver bottoms. John N. Lingo,		Blue shale	9	: 84
southwest of Marshall. A. G. F	oster,	Dark-colored sand	3	87
driller,	, ac	(Continued on		-
Surface material 28	. 28	1)	Page	,

	hickness	Depth	arrison CountyContin	Thickness	Depth
Bury of the self-registrating rate approximately the approximately reduced to the research indicate and the self-research indicates and the self-research indi	(feet)	(feet)		(feet)	(feet)
Well 150Cont	inued		Well 153-	-Continued	
Blue shale	19	106	Blue shale	7	. 77
Dark-colored sand	13	119	Dark-colored sand	7	. 8=
3lue shale	1	! 120	Shale	2	3 85
דיר " ל " יוד	- >		Dark-eclored sand	6	1 93
Well 15	****		Ne	11 154	
L. C. Mitchell, $9\frac{3}{4}$ mile Marshall. V. E. West,		st of	O. Jorgan "16772 . 3	רו חרונים	
Sandy shale	6	3	On level. Villie M south of Marshall.		
Yellow shale	8	14	Red sandy shale	5	. urante 5
White sand	4	18	Yellow state	9	, 14
Yellow shale	3	21	Yellow sand	14	28
White sand	4	25	Coarse-grained whit		
Blue send	4	29	sand	10	; 38
Lignite	11	40	Blue shale, sand	20	
— Guerra 2.			breaks	4	42
Well L	52		Blue shale	12	54
	-udo error		Dark-colored sand	2	55
Dudley Morgan, 94 miles	s south of	i 1	Blue shale	11	67
Marshall. V. E. West,			Dark-colored sand		70
Sandy shale	12	. 12	Blue shale	6	76
3lue shale	21	33	Dark-colored sand	3	79
Hard lignite	ĩo	43	Blue shale	11	90
Blue shale	7	50	Lignica	4	94
Light-blue sandstone	9	59	3lue shale	2	96
Light-colored soft	Ü		Lignite	4	100
sandstone	.11	70	Jlue shale	5	105
31ue shale	11	81	Fine-grained sand	3	108
Lignite	8	89	3lue shale	4	112
Red shale	8	97	27.7.0		i ran
Light-gray shale	11	108	- 10	77 755	
Sand	3	111	. I	11 155	
blue shale	13	124	On alone Anthum E	idahan li w	. <b></b>
Sand	6	130	On slope. Arthur F		
Bang Blue shale	28	158	of Marshall V. E.	Nest, dril	
Hard sandstone	23 3	151	Yellow sandy shale Blue shale	1	7
	4	165	1 1	3 2	13
llue shale	4	; 100	Ccarse gravel    Blue s'ale		; 15
Blue sand with shale	3.0	1 300	1 1	13	: 28
breaks	10	175	Fine-grained sand	3 <b>7</b>	34
T(1,017,7	57		Dlue shale	2	41
Well 1	<i>00</i>		Fine-grained send		43
On Jama's Can- D	103		3lue shale	<u> </u>	47
On level. Sidney Reed			Fine-grained sand	7	54
of Karshall. V. E. We	_		3lue shale	~	60
Sandy shale	7 11	7	Fine-grained dark-c		1
Light-blue shale	11	18	sand	3	63
Sandstone	5 4	. 23	Blue shale	4	67
Yellow shale	4 5	27	Dark-colored sand	3	; 70
	in .	32	3lue shale	8	78
Ilue shale			11 771		ì
Lignite	1	33	Fine-grained dark-	_	
Lignite Blue shale	1 9	±2	colored sand	1	82
Lignite Blue shale Dark-colored sand	1 9 6	48 48	colored sand 3lue shale	5	87
Lignite Blue shale	1 9	±2	colored sand 3lue shale Dark-colored sand		87 94

Table of Drillers' Logs, Harrison County--Continued

			errison CountyContinued		TO a cardinal
1r.	ickness (feet)	Depth (fect)	1	Rickness (feet)	Dept.i (feet)
tion and the contract of the c	e enderson de la companya de la comp		hameman's sain. After your apparets and as the research exploreries of all their residence in the saintenance.	r - danim bersing regions screens besse factor excensions	arthum de l'Aren Marce ette 90
Well 155Co	ntinued		Tell 168, partial	logConti	nued
Blue shale	3	97	Shale	5	; 99
Dark-colored sand	8	105	Sand	41	140
			Hard sand rock	22	162
Well 16	30		Sand	65	227
<b>Sharayihttps://aps/distratives.org/s</b>		5	Rock	2	229
On level. Community (			Sand	26	: 255
scutheast of Marshall.	, A. E. F	Paucett,	Hard rock	1	256
driller.			Sand with hard streaks	119	375
Top soil and clay	10	10	Shale and boulders	95	470
Blue shale	10	20	Pock	1	471
Lignite and rock	2	. 22	Gummy shale	11	482
Dark-colored shale	5	27	Shale and loulders	98	580
Sand	13	40	Gummy shale	20	600
Dark-colored shale	53	93	Shale and boulders	30	630
Sand and sandy shale,		•	Rock	1	631
tested for water, no	)	i i	Shale and boulders	140	771
good	22	115	Rock	1	772
Dark-colored shale	14	, 129	Shale and boulders	208	980
Good water sand	18	147	Lime rock	1	981
ting diamental desiration and the contract to a state of the contract to the c	an managang dipagai danah managan pendangan pendang	-Milatolina (Milatolina)	Shale with streaks of	•	,
Well 1	61		send	3	984
Angeles (Personal Personal Pe	MEST THE LANG		Shale with streaks	7	991
Community Center, $13\frac{3}{4}$	miles sou	utheast	Brown lime	2	998
of Mershall. Buck Le			Shale	60	: LC53
Top soil	3	: 3	Sandy shale	32	1085
Yellow clay	18	21	Gumbo	30	1115
Dlue clay	7	28	TOTAL DEPTH		3003
Rock	6	34		The second se	17-14-14-14-14-14-14-14-14-14-14-14-14-14-
Dark-colored shale	16	50	Well	173	
Dark-colored hardpan	6	; 56		The state of the s	
Sandy shale	26	82	On ridge. Verhalen Nu	rsery, 7분기	miles
Dark-colored shale	6	. 88	southeast of Marshall.	· ·	
Sandy shale	5	93	Red clay	12	; 12
Fine-grained sand	8	101	Fine-grained sand	12	24
Hard rock	2	! 103	Blue shale	5	29
Soft sandy shale	<del>1</del> 0	143	Dark-colored sand	24	53
Shale and houlders	8	151	Hard gumbo	7	60
Sandy shale, boulders		174	Lignite	1	61
Hard rock	7	161	Gumbo	4.	65
Tine-grained gray		•	Gray sand	11	; 76
water sand	55	256	[ Gumbo	4	; 80
Shale	70	30€	Gray send	18	98
Sand	15	321		Parameter of the self-line of the self-l	
			Well	1.88	
<u>Well 168, p</u>	artial lo	<u>E</u>		3	
		•	Waterman Brick and Til		
Jess Toodley, $14\frac{3}{4}$ mil			southeast of Waskom.	H. D. Roge	rs,
Harshall Hoodley an			driller.	<u>.</u>	
drillers. Elevation,			Surface material	17	17
Surface clay and sand		31	Sand	3	20
Lignite	3	34	Gumbo	330	350
Sand	40	74	Boulders	30	380
Rook	1	75	Gumbo	24	404
Sand	19	94			

Analyzed at The University of Texas under the direction of W. W. Hackings, Chemist, U. S. Department of the Interior Geological Survey, and Dr. E. P. Schoch, Director of the Bureau of Industrial Chemistry. Results are in parts per million.

Well numbers correspond to numbers in table of well records.

***************************************		Depth	Date	Total	Cal-	Magne-	Sodium and	l; picar	Sul	Chlo-	Fluor-	! Ni-	Total
Well	Owner	îoî	of	dissolved		sium	Potassium	bonate	fate	ride	ide	trate	hardness
	1	well	collection	solids	$_{!}(Ca)$	(Mg)	(Na + K)	$(HCO_3)$	(SOL)	(ca)	(F)	(NO ₂ )	las CeCO3
		(ft.)	1	1 1			(calc.)	!	4/	1	. (-)	1	(calc.)
-	l John Walker	16	Jan. 29, 1942	211	6.8	17	36	0.0	97	32		22	85
	2 E. L. Carrington	35	do.	85	a/		22	12	10	16		26	16
	3 Morton School	32	do ∙	328	_a/ 15	<u>b/</u> 15	90	18	2	196	-1	e/	99
	4 Smyrna S:hool	39	do.	126	21	<u>b</u> /	30	134	3	4.5	.2	<u>c</u> / c/	55
	5 Smyrna Jolored												
	School	13	do,	40	8.8	_b/	3.7	6	3	14	.2	c/	25
	6 Harleton School	23	do.	49	a/		7.1	12	3	6.0	.2	<u>c</u> / 20	22
	7 D. D. Croft	61	do.	105	<u>a</u> / 6.0	4.4	26	37	30	20	•3	c/	33
	3 C. A. Clark	34	do.	41	a/	<u>þ</u> /	13	6	10	1.2	****	<u>c/</u> <u>c</u> /	5
	9 New Zion Colored												
	School	22			a/	b/	37	6	49	20	.2	c/	10 📲
	O Piney School	Spring			a/	<u>b</u> /	5.1	6	2	4.5	,l	ੁ	10 .5
	1 Friendly School	57	do.	71	a/ a/ a/	\d.\d.\d	18	6	30	13	.2		16 🦡
	.2 St. James School	Spring	Jan. 30, 1942	22	<u>a</u> /	<u>b</u> /	8.7	12	2	4.5	.1	<u>c</u> /	0
1	3 Hickory Grove												
	Rosenwall School	16	do.⁴	49	<u>a/</u> a/ 10	<u>b</u> /	15	6	.3 26	24	.1 .1	<u>c</u> /	11
	4 Macadonia School	37	do.	56	<u>a</u> /	<u>5</u> /	17	6	26	8.0	.1	<u>c/</u>	7
	5 Henderson School	16	Mar. 10, 1942	40	10	p/b/b/	2.1	31	2	2.5	.1	c/ c/ c/	31
7	.6 Woodland Indepen-	,											
	dent School	26	Nov. 3, 1941	42	a/ a/ a)	b/ b/ 3.6	12	24	10	5.0		<u>c/</u>	11
	7 Frank Davis	16	Feb. 11, 1942	35	<u>a</u> /	b/	9.0	12	7	8.5		ු ු	11
	8 Ware School	30	do .	29	<u>a</u> ,'	3.6	4.4	18	2	3.0	.1	<u>c</u> /	17
Ţ	9 Beckham Colored												
1/5	School	15	do.	18	<u>a</u> /	b) b)	5.1	12	2	3.0	.1	<u>c/</u>	6
	O W. H. Nesbett	45	do .	55	14	<b>b</b> /.	5.8	55	. 2	4.5		<u>c</u> /,	41
	2 Edmond Key	34	do.	24	<u>a</u> / 6.8	<u>b</u> /	3.0	0	* 2	4.5	***	<u>c</u> / 55	11
	3 Nancy Harris	32	Feb. 10, 1942	189		b/	53	12	14	52			27
	4 W. T. Slater	17	Feb. 11, 1942	203	14	16	34	18	<u>بر</u>	88		35	100
a/ L	ess than 5 parts per	million	1 -	c/ Less	than	20 par	ts ner mill	ion		en - marin and - marine an		and the second s	يعيين المتناسبة المعاوض المال المعاو

a/ Less than 5 parts per million.

b/ Less than 3 parts per million.

c/ Less than 20 parts per million.

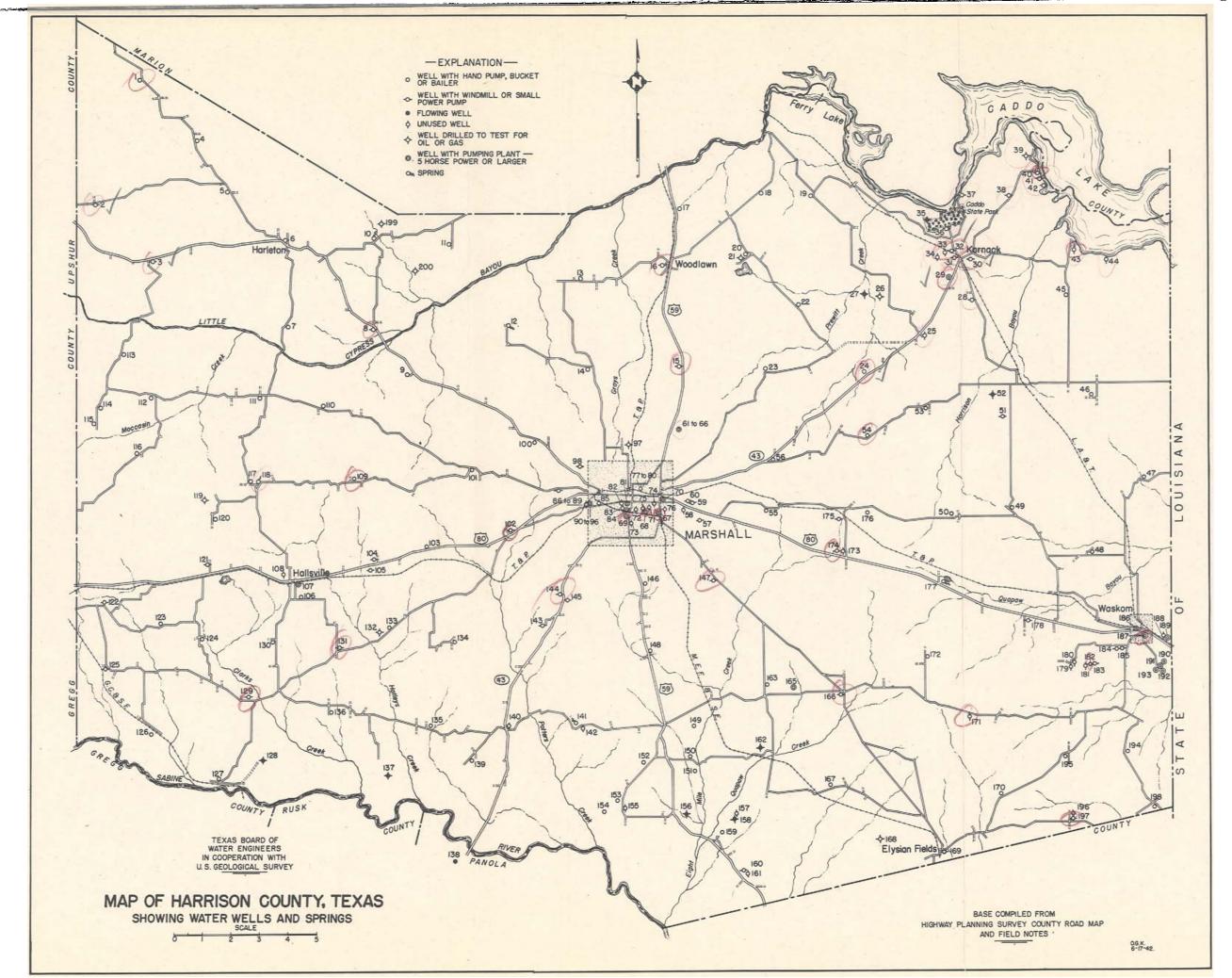
d/ Analyses of water from selected wells and springs are given in equivalents per million on page 52.

Partial analyses of water from wells and springs in Harrison County---Continued

	<b>t</b>		<b></b>	F	esult	s ere in										
	; I	Depth	4	ate				Magne-	Sodium and	Picar-	Sixl-	'Chlo-	Fluor-	Ni-	; Total	
Well	Owner	$\circ f$	ì	f		dissolved			Potassium						hardnes	
		vell	c 11	locti	.on	solids	(Ca)	;(Mg)		'(HCO ₃ )	$(SO_L)$	(C1)	(3)	¦(№03)	as CaCC	
***************************************		(ft.)				·	7	·	(calc.)		, · · · · · · · · · · · · · · · · · · ·	1 ; 			(calc.)	1
	T. J. Taylor	64	Oct.	28,	1941	587	<u>a</u> /	<u>b</u> /	234	354	$L_{\downarrow}$	1681		<u>c</u> /	22	
<u>d</u> / 28	George Washington															
	Carver Colored					,								,		
_	School.	105	Oct.			367	24	20	91	252	42	52	•2		142	
	T. J. Taylor	120	Feb.			514	39	19	123	146	120	141	.2	<u>c</u> /,	177	
29		306	_{н,} ер.	21,	1942	375	10	<u>b</u> /	142	299	30	41+	.1	<u>c</u> /	31	
<b>3</b> 0	Longhorn Ordnance	7.00					, ,			0/0	3.0	F-1	2	,	0.0	
27	Works	133				446	6.8	3.6	174	360	10	74	.1	<u>c</u> /	32	
3⊥	Karnack Independent	10=	0 1	0.53	2	0.50	,	~ .	0.5	0.07	2 ~		~	,	0.0	
20	School	105	Oct.		1941	259	<u>a</u> / 236	54	95	201	15	40	•5		33	
	Miss Flizabeth Baker	19	T2 1	do.	3010	1,834	230	75	326	268	3.7	758	.2 .5	2/	901	
_	A. G. Foster	137	Feb.			213	: <u>.</u> g		111	159	64	50 46	• 5	9/,	27 17	
	V. H. Moore Caddo Lake State	228	Oct.	28,	1941	34^	<u>a</u> /	4.1	133	256	31	40		<u>c</u> /	1/	1
))		1,000+	20+	217	10/3	5,064	42	11	1 022	122	9 3	3,015			152	j⊱.
36		315	000.	ر / م do •	1741	320	,		1,933 128	256	25 ⁻	38	.4	 c/	11	ì
_	W. E. Hartzo	133	Nov.		1941	918	a/ a/ a/ a/ a/	<u>b</u> / <u>b</u> / 11	330	366	2	3.12	o ++	<u>c/</u>	10	
	Fred R. Mayfield	100	Oct.			344	<u>a/</u>	<u>5</u> 7	120	244	23	66			57	
	Gus Noble	103	000.	do.	エンサエ	305	<u>a</u> /	b/	121	220	23	50			11	
THE REAL PROPERTY.	Johnson Ranch	103	Nov.		7.07.7	275	<u>a</u> /	<u>b</u> /	109	271	31	34	- ,3	<u>c</u> /	11	
	Dallas-Caddo	رىد	NOV.	2,	1541	~()	₫/	<u>8</u> /	T02	2 1	ノエ	24	8 D	5/	-A1-	
4~	Hunting Club	125	Oct.	28	19/.7	369	7.6	9.0	127	171	21	120	•3	<u>c</u> /	56	
1.5	Lake Chapel Colored	ريت	000.	وديم	1. 741	JU 7	7.0	7 9 7 9 7	IZ (	-L ( -L	~.1	LEU	• )	<u> </u>	)0	
47	School	36	Feb	7 ^	1942	91	/ د	4.9	26	6	17	34	.2	cl	20	
1.6	Pleasant Hill School	18	. 60 •	do,	1/42	55	<u>a</u> / a/	b/	19	12	10	17	.1	<u>c/</u> c/	5	
	Mt. Zion Colored	10		uo,		))	Ξ/	5)	± /	±≈	10	+ (	6 -1	2)		
71	School	18		do .		104	23	<u>b</u> /	14	85	11	9.5	.1	c/	67	·
48	Old Border School	-10		uo.		±014	~)	<i>≌</i> /	74	٥٦		1:2	•	2)	<b>V</b> 1	
40	and Church	21		do.		36	6.4	<u>b</u> /	6.0	24	2	8.0	.1	<u>c</u> /	21	
J.Ω	Hart School	17		do.		300	118	56	108	232	2	401	•3	,	525	
	Shilo Baptist Church	17 19		do.		259	a/	)0 11	81	رم 31	20	129	.2	<u>c/</u>	52 52	
	SHIIO Baperse Church			un.		<u> </u>	<u> a/</u>	<u> </u>	OT	- JT	20	127	- 66	<u> </u>	) K	

a/ Less than 5 parts per milli n. b/ Less than 3 parts per million.

c/ Less than 20 parts per million.
d/ Analyses of water from selected wells and spring are given in equivalents per million on page 52.



Tarmed and types of water from wells and springs in Harrison County-Continued

					Rosu	lts ar	o in pa	rts per mil	lior.					~	
-	1	Der th	Dat					- Sodiam and	Dicar-	Sul-	Chlo-	Fluor-	- Ni -	Total	
Well		· of	i ot	•	dissolved	cium	sium	'Potassium	bone te	fate	'ride	ide		hardness	
	ŧ	rell	collec		solids	(Ca)	(Mg)	(Na + K)	-(HCQ ₃ )	_'( SO ₄ )	(Cl)	(F)	$(NO_3)$	as CaCO3	
	t 1	(fi.)				1		(calc.)	1					(calc.)	
₫/ ⁷ 5Ī	D. V. Blocker	203	Feb. 1	1, 1942	53	a/	4.9	11	49	2	1.0	-4	<u>c/,</u>	20	
52	Mrs. A. J. Baldwin	1,900+	Feb. 13	2, 1942	166	<u>a</u> / 6,3	3.6	<i>5</i> 8	183	2	4.0	.1	c/ c/ c/	32	
	Annie Glade School	13	d		137	<u>a</u> / <u>a</u> /	3,5	38	6	6	79	.2	<u>c</u> /,	40	
	Colored School	11	Feb. 1	3, 1942	55	a./	<u>b</u> /	17	12	12	17	.2	_⊆∕	10	
	Rock Hill Colored														
	School	31	Fah.	7, 1942	39	<u>a/,</u>	6.1	5.1	37	3	4.0	.1	S/ S/,	29	
56	William Jones	17	For, I	L, 1042	16	<u>a</u> /	<u>b</u> /	1.2	6	2	3 5		⊈.	12	
d/ 57	O. H. Clark	<b>3</b> 00	Nov. $1$	₹, 1941	. 128	10	5.4	33	104	13	11	•4	<u>c/</u>	48	
	Paul Whaley	155	d	· .	75	<u>a</u> /	5,4	19	73	2	8.0	-	<u>c/</u> <u>c/</u> ,	33	
60	George Pendergast	155	ਟੇ	٠.	93	₹.3	6.6	21	79	3	12		<u>c/</u>	44	
61	. Vity of Marshall	200	Nov. I	7, 1941	71	10	5.4	4,3	6	40	8.0		<u>c/</u>	48	
62	do,	240	Nov. l	2, 1941	. 67	7.6	9.0	2.5	31	26	6.5		<u>c</u> /	56	
63	3 do.	3^0		າ ູ້	121	10	5.4	2.8	0	93	6.5		<u>c/</u>	48	
61	do.	300	ð	) ,	88	<u>a</u> /	6.6	16	24	42	7.0		<u>c/</u>	39	
67	do.	473	4	١) ،	329	18	b/	103	177	100	18	.1		51	1
68	do.	375	d	э,	276	10	3.9	89	165	77	15	.2	<u>c/</u>	42	417
69	do,	351	Nov. 1	3, 1941	302	15	<u>b</u> /	100	139	77	16	,2	<u>c</u> /.	40	ī
70	) do.	422	Mov. 1	2, 1941	345	6.0	ıĪ	109	195	103	20	0	್ರ/	52	·
d/ 83	Southwestern Cas &			•											
	Flectric Co.	580	Nov. 1	3, 1941	443	26	4-1	141	287	100	36	.1.	<u>c/</u> c/,	\$3	
31	Independent Ice Co.	. 323	d	ء ٥	383	104	9.0	23	275	100	12	٠3	<u>c</u> /	296	
	Darco Corp.	248	d	0.	129	22	9.0	11	0	23	64	***	<u>c</u> /	91	
91		192	d	O a	324	23	24	45	0	50	132	0	<u>c</u> /	155	
92	o.	2)1	d	υ <b>.</b>	400	19	24	84	0	38	185	****		145	
9.	3 do.	111	ď	ه ٥	377	20	20	46	0	81	208	_	c/	1.32	
91	₊ ₫ე.	50	d	0 。	82	10	b/	17	12	4	42	•	<u>c/,</u>	37	
9"		128		0,	151	20	13	16	85	46	14	.2	⊡/,	103	
96	•	125		0.	247	44	25	5.3	116	100	16		9/,	210	
	7 O. D. Hays		Nov, l			12	5.4	119	262	72	14	٦Ļ	c/ <u>c</u> /	53 153	
	Frank Granbery	254	Nov. 1	7, 1941	L 156	27	21	2,8	146	22	10	.7	<u>c</u> /	153	
100	Ebenezer Colored						_					-	,		
	School	30	Jan, 30	), 1942	31	<u>a</u> /	6.I	17	13	20	25	٠2	<u>c</u> /	34	
101	L Potters Creek												,		
	Colored School	23	Feb. 1	7, 1942	24	<u>a</u> /	<u>b</u> /	4.4	6	<u>\$</u>	5.0	.3	<u>c/</u>	12	
	Teas than 5 parts no			- /	Togg then	200									

a/ Less than 5 parts per million.
b/ Less than 3 parts per million.

c/Less than 20 parts per million.
d/Analyses of water from selected wells and springs are givennin

tarcial analyses of water from wells and springs in Harrison County -- Continued

Results are in parts per million. Total Cal- Magne - Socian and Bicar- Sul- Chlo-Fluor -Depth Date Well oí of Potassium bonate, fate ride ıde trate hardness dissolved cium 'sium Owner W=]]  $(HCO_3)^{+}(SO_L)^{+}(C1)$ (NO3) as Cacoa collection solids (Ca) (Mg)  $\cdot$  (Ma + K) (ft.) (calc.) (calc 102 P. B. Bailey Jan. 28, 1942 6.0 22 24 116 33 30 4.4 50 103 Rose Hill Colored School. 25 do. b/ 37 a/ 71 7.3 104 E. H. Lowery 272 Oct. 17, 1941 79 69 65 197 47 21 14 57 18 49 105 U. C. Lowery 250 210 9.6 6.1 59 98 do. 106 Brooks Colored High School Jan. 27, 1942 77 1.0 107 Jity of Hallsville 201 Oct. 17, 1941 114 156 105 17 14 331 <u>b/</u> 3.6 109 -- Young Jan - 27, 1942 26 29 5.1 4.0 11 5 14 Jan. 30, 1942 22 d/110 E. L. Barnes 27 161 53 92 3 lll Cartersville Colored School 20 do. 32 b/ 12 12 8.0 0 3 112 Hebron Culored <u>b</u>/ 5.6 School Jan. 29, 1942 6.7 10 77 113 Seff Davis 10 28 23 108 29 24 34 do. 9 (d | d | d | 116 Lily Hill School 33 12 8.0 0 2) do. 6 5 117 W. H. Schaffer Jan. 28, 1942 32 90 10 4.0 118 Noonday Camp Ground Spring 19 16 14 120 Johnson Colored School 25 b/6 b/b/b/b/b 8.3 0 do. 121 Mrs. Nora Davis 55 9,2 12 6.0 23 9, 1942 Feb. d/122 Dell Everett 4, 1941 220 79 165 22 Nov. 123 E. G. Barker 36 Jan. 27, 1942 101 30 18 22 12 124 Maple Springs School 129 40 18 60 14 12 16 do. 125 Gum Spring School Jan. 29, 1942 24 12 11 4.6 126 Friendship Colored School Jan. 27, 1942 <u>a</u>/ <u>b</u>/ 11 12 11 11 127 J. K. Bivens Farms Co. 18 234 13 98 do. 44 10 91 18 128 do. 3,000+ 1,340 5.3 422 .8 <u>c</u>/ 32 do. 540 738 d/129 John W. Scott b/ b/ 27 Nov. 4, 1941 22 3.9 6 5.0 11 <u>a</u>/ <u>c</u>/ 130 J. B. Cullen 32 Jan. 27, 1942 12 3.5 10

a/ Less than 5 parts per million.

b/ Less than 3 parts per million.

c/ Less than 20 parts per million.

Analyses of water from selected wells and springs are given in equivalents per million on page 52.

Pactual analyses of water from wells and springs in Parkison County-Continued Results are in parts per million.

					Resu	lts are	ea air	rts per mil	lon.						
	1	Depth	Da	ite	Total	Cal-	Magne-	Sodiam and	.'31.car-	Sıl-	Chlo-	Fluor-	ľi	! Total	
Vell	; Cwner	of	; 0	t'	dissolved	cium	sium	∂otassivm	·bonate	fate	iride .	ide	trate	hardness	ł
	1	well	coll	ection	solids	(Ca)	(Mg)	$\left( Na + K \right)$	'(HCO ₂ )	(SO,)	) (Cl)	(平)	$(NO_3)$	as Caro	1
	1	(ft.)			1	1		(calc.)	` 2'	4		, ,		:(calc.)	ı
131	George Welch Est.	26	Jan.	27, 1942	313	0,0	7 1	36	6	2	38	1.2	120	44	•
133	Sweet Home Colored														
	School	20	Jan.	2ª, 1942	37	a/	b/	12	12	3	12	.1	c/	5	
134	Red Jak School	26		do.	25	ය/ a/	<u>b</u> /	2.1	6	2	7.5	.1	ୁ ଆ	17	
1.35	Atlas Colored					<i>→</i>					, ,			'	
	School	18		do,	20	<u>a</u> /	<u>b</u> /	6.9	6	2	3.0	.1	<u>c</u> /	0	
136	Jooperville Colore	đ				/	/	•							
-	School	28	Jan.	27, 1942	30	a/	3.5	3,5	6	2	5.5	_	<u>c/,</u>	17	
d/137	Will T. Cock	2,548		14, 1941	684	<u>a</u> / <u>a</u> / 3	<u>b</u> /	291	595	3	44		<u> </u>	2	
133	Lingo Lumber Co.	343		14, 1942	1,225	3	<u>2</u> ,0	<b>5</b> 05	763	5	338	_	~~	8	
	Cave Spring			,	エゥんむノ	-				ĺ					
	School		voy	4, 1941	43	<u>a</u> /	6.6	6.2	24	2	13	-	<u>c/</u>	34	
14)	Fairpoint Jolored			,, , ,	,				•				/		
	School	25	Jan.	28, 1942	124	a/	3.5	25	0	2	36	«3	50	40	
141	D. C. Driskell	Spring		14, 1942		135	93 [^]	143		899	101	, Š		666	
143	M. G. Blalock	225		14, 1941	100	7.6	7.5	21	95	13	3.5		<u>c/</u> c/	50	3
	Grange Hall Inde-	·				,	, ,								
	pendent School	28	Nov.	4, 1941	53	8.0	b/	3.9	18	20	2.5	.4	c/	32	
d/145	W. M. Dinkle	250		18, 1941	96	11	<u>b</u> / 6.6	16	67	18	11	.3	<u>c/</u> <u>c/</u>	54	
	Fairview School	_	Feb.	17, 1942		<u>a</u> /		35	18	20	32	<u>,2</u>	<u>s</u> /,	6	
147	K. H. Power	24		do,	308	$1\overline{3}$	<u>b</u> / 36	36		146	69	. 1	<u>-</u> /	183	
d/148	Van McClellan	43		do.	134	23	3.6	25	122	15	7.0	***	<u>c/,</u>	72	
	Lewis Anderson	63	Nov.	14, 1941	29	<u>a</u> /	b/	5.5	24	2	5.0	~~	$\overline{c}/$	17	
152	Dudley Morgan	175		do.	372	24	<u>b</u> / 13	109	311	23	50	_	<u>c</u> /	113	
	Willie Mitchell	1]2		đი.	34	5.6	<u>b</u> /	<b>5.</b> 3	24	2	7.5		<u>z/</u> ,	21	
	Arthur Fisher	105	Nov.	4, 1941	352	52	3 <del>9</del>	35	372	2	41	_	<u>c</u> /,	289	
	F. V. Williams	2,508		do.	419	a/	<u>b</u> /	173	433	4	24		<u></u> /	17	
	Mrs. Barrett	) /			-+ -/		/	-12	722	7	~~		27	1	
	Gibson	91	Nov.	14, 1941	544	31	15	174	519	12	57		<u>c/</u>	139	
158	doa	2,600÷		do.	389	30	b/	113	153	7	148	,8	c/	37	
159		73		do.	1,883	128	155	364		238	620	.1	<u> </u>	956	
	Community Center	147		do.	304	7,6	<u>b/</u>	119	317	~ ju	12	.3	<u>s</u> /	26	
	John Mood		Nov.	4, 1941		<u>a</u> /	<u>b</u> /	186	415	5	50	.3	<u>c/</u>	12	
	Blocker Estate	73		13, 1942		6.4		13	55	2	1,0	ره	5/	21	
	es then 5 parts non			175 1146	16		- +la ova							~ <del>~</del> ~ <del>~</del> ~	-

a/ Less than 5 parts per million.

b/ Less than 3 parts per million.

c/ Less than 20 parts per million.
d/ Analyses of water from selected wells and springs are given in equivalents per million on page 52.

Partial enalyses of water from wells and springs in Hermson County-Continued

		1.		Re	sul	ta ere in	<u>marts</u>	per mi	llion				er i≃ veen entersoon			
		Depth	; Da			Total	Cal- !	Magne-	Sodium and	Bicar-	Sul-	Ch] o -	Fl.vor	! Ni	Total	
Well	Owner	of	0	f	i	dissolved	;cium ;	sium	Potassium	;bonate	fate	ride :	ide	trate	hardnes	3
1	 	well	coll	ection	. !	solids	(Ca)	(Mg)	: (Na +''K)	(HCO ₂ )	(SO)	:(C1) ·	(F)	(NO3)	as Cacc	10
1	1 1	(ft.)	1				: ,		(calc,)	7 - 27	,	,	(- /		(calc )	
165	Humble Pipe Line	****					,		1(0.002 0 )	· · · · · · · · · · · · · · · · · · ·				latinates and	مكمو مركز التاجيح المرا	•
	Co	150	Feb.	13, 19	42	289	a/	b/	115	262	10	28	-1	c/	17	
166	H. W. Scott	35		17, 19		561	<u>a</u> / 20	<u>b</u> / 18	140	67	67	127	,2	1,551	126	
	/ Claude Mercer	32		do.		870	59	52	191	177	19	398	****	64	362	
d/169	Elysian Fields	-				·	, .	•	·							
	School	204	Oct.	29. 19	41	125	14	b/	33	1.22	4	11	.2	c/'	47	
170	) W. L. Rudd	17		13, 19		18	,	b/b/b/b/c/b/3	4.6	12	Li.	1.5		<u>c/</u> c/,	6	
171		1.3		do,		33	a/	$\widetilde{\mathrm{b}}/$	8.7	18	5	7.0	·	<u>.c/</u>	11	
d/172	Long Ridge School	33		do		33 25	a/ a/ a/ a/ 31	b/	4.8	12	4	4.5	.1	<u>c</u> /,	12	
	Verhalen Nursery	27	Feb	0, ]9	42	46	a/	চ/	10	6	2	8.5	_	c/	12	
175	do,	28		do,		76	$\overline{a}/$	b,/	18	12	17	20	**	c/	22	
176	do .	40		д ₀ ,		261		13	52	195	26	41	_		133	
177	7 Webb Rogers	Spring	Feb.	13, 19	42	22	<u>a</u> / 6.8	<u>b</u> / 3.6	5,8	6	2	5-0	.1	c/	5	
	Gulf Service Sta.	30		do.		57	3.8	3.6	11	49	4	80		<u>c</u> /	32	1
<u>d</u> /182	? United Gas Pipe															ر. ج
	Line Co.	92	Cct.	31, 19	41	94	ತೆ.0	b/ 16	22	67	2	16	.1	<u>c/,</u>	32	ر م
136	Allen Thomas	151	ാct.	29, 19	41	540	16	17	172	262	77	130	_	<u>c</u> /	105	ţ
<u>d</u> /139	Waterman Prick and															
	Tile Co.	200		do.		297	39	22	144	171	18	90	••	<u>c/</u>	189	
	) Frost Lumber Co.	200		do.		1,043	60	11	319	31.7	192	305	.1	<u>c</u> /	197	
192	? United Gas Pîpe															
	Line Co,	170	Oct.	31, 19	41	538	13	15	177	293	77	112	_	<u>c</u> /.	94	
193		161		do,		572	5.6	- , 0	180	268	65	110		<u>c</u> /	51	
194	, Gainesville															
	C lored School	22	Feb.	13, 19	142	136	8.4	<u>b/</u>	45	92	10	24	-9	<u>c/,</u>	26	
	5 Edwin Spears	36		do.		58	<u>a</u> /	<u>b</u> /	18	12	23	7.5	.1	<u>c</u> /,	6	
	7 Don B. Long	25		do.		268	<u>a</u> / 10	7.3	34	37	8	141		<u>c</u> /	55	
198	Willow Wayside															
	Colored School	21		do.		77	a/_	_b/	27	12	2	32	.2	c/	6	
a/ Le	ess than 5 parts per	million	•			c/ L	ess tha	an 20 p	arts per mi	illion.						

a/ Less than 5 parts per million.

b/ Less than 3 parts per million.

c/Less than 20 parts per million.
d/ Analyses of water from selected wells and springs are given in equivalents per million on page 52. : "...

# Determinations of iron (Fe)

## parts per million

Well No.	1 2	Iron (Fe)	
29 .		0.10	
30		0	
51		10	
52		1.1	
69		0.10	
90		35	<u>e</u> ′
91		55	<u>e</u> /
92		50	<u>e</u> /
93		55	<u>e</u> ′
94		2.5	<u>e</u> /
95		15	<u>e</u> ′
96		15	<u>e</u> /
164		2.7	
175		0.05	İ
126		3	
137		3	
141		5	
158		6.0	
165		0.05	,

e/ Determination by Darco Corporation.

			Results are i	<u>n</u> eq://	"en enga bë	r million		·/			uma i maginarana s	<u></u>	~
		Depth		Cal-	Magne-	Sodium and	4					Total	
Well	Owner	of '	of	cium ;	sium	Potassium	bonate			ide	trate	hardness	
	1	well	collecti n	' (Ca) ⊹	(Mg)	(Na + K)	(HCO3)	(so ₄ );	(Cl)	, (F)	$(NO_3)$	. as CaCO3	
	1	(ft.)		1		(calc.)		,		*		(calc.) -	_
4	Smyrna School	39	Jan. 29, 1942	1.04	0.06	1.30	2,20	0.06	0.13	0.01	0.01	1.10	
11	Friendly School	57	do.	.16	.16	<b>.</b> 79	.10	.624	•37	.01	1.5	.32	
20	W. H. Fesbett	45	Feh. 11, 1942	.72	.10	.25	.90	.04	.13		•0	.82	
28	Geo. ™ashington												
	Carver Colored												
	School	105	Oct. 27, 1941	1.20	1.54	3.96	4.30	.38	1.47	.01	.15	2.84	
40	Gus Noble	103	Oct. 28, 1941	.08	.14	5,27	3.50	.43	1.41			.22	
51	D. V. Blocker	205	Feb. 14, 1942	,0	.40	.49	.80	.04	03،	.02	.0	.40	
57	O. H. Clark	300	Nov. 13, 1941	.52	.44	1.44	1.70	.37	.31	.02	-	.96	
81	Southwestern Gas		•										
	and Electric Co.	580	do.	1.32	- 34	6,14	4.70	2.03	1.02	,005	***	1.66	
110	E. L. Barnes	27	Jan. 30, 1942	.14	•30	2,32	.0	.06	2.59	-	.11	0/1/4	
122	Dell Everett	304	Nov. 4, 1941		.24	3-45	2,70	.96	21	.02	_	· 4+4+	i
129	John W. Scott	27	d٥.	.08	. 14	.17	.10	.15	.14			. 22	0
137	Will T. Cock	2,500	Nov. 14, 1941	.00	.04	12.67	11.40	.06	1.24		.Ol	-04	ξ
145	W. M. Dinkle	250	Nov. 18, 1941	.54	- 54	.70	1.10	•37	، 31	015ء	4	1.08	1
148	Van McClellan	43	Feb. 17, 1942		. 30	1.07	2.00	.31	.20		0,	1.44	
163	Blocker Est.	73	Feb. 13, 1942		.10	· 57	. 90	.O <i>l</i> 4	۰03		<b>.</b> 02	.42	
169	Flysian Fields												
	School	20 <i>l</i> ₊	Oct, 29, 1941	.70	24	1.45	2,00	,08	. 31	·Ol		<b>.</b> 94	
172	Long Ridge School	33	Feb. 13, 1942	.01	,20	.21	.20	,03	.13	.01	.03	•24	
132	United Gas Pipe											4	
	Line Co.	92	Oct. 31, 1941	,40	. 24	<b>^95</b>	1.10	.OL	.45	,005		.64	
139	Waterman Brick and												
	Tile Co.	200	Oct. 29, 1941	1.94	1.84	1,93	2~30	.37	2.54			3.78	
195	Edwin Spears	35	Feb. 13, 1942	,02	:10	80	.20	.43	.21	.Ol	٥02	.12	

	T	1	·	Approximate	· ·	1
System	Series	Group	, Subdivisions	thickness (feet)	Character of rocks	Water-boaring
Quater- nary	Recent		Alluvium	0- 25	Sand, silt and	Yields small cuantities of vater to shallow domestic wells.
		;	Sparta sand	1- 50	Chiefly uncon-	Yields water of goo quality to shallow wells.
	The state of the s	1	Weches green- sand member	9= 50		Yields only small quantity of mineralized water.
	randa - Ada - Lapina - Lapina Ada Ada Ada Ada Ada Ada Ada Ada Ada Ad		sand sand using member	Topic and the second se	Light-gray fine- grained massive and cross-bedded sand with inter- bedded clay and lignite.	Yields water of good quality to many domestic wells.
Ter- tiary	Eocene	Clai-	Reklaw timember	0-130	Consists mostly of clay, glau-conitic sand and impure lignite.	In general yields only small quantities of rather highly mineralized water.
	service that were defined and or the American		Carrizo sand		Fine to medium- grained guartz sand interbedded with clay.	Yields moderate to large quantities of water in some areas.
			Wilcox group (undifferent	iated)	Medium to fine- grain.d massive and lenticular sands interbedded with clay or shale. Thin buds of lignite.	somewhat highly minaralized water
	Paleo- cene	Midway	Midway group (undifferent		Clay, silt, glau- conidic sand and lentils of lime- stone.	Not know to yield water in material quantities.



