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MINERAL RESOURCE SURVEY OF TEXAS
Circular No. 4

A mineral resource survey of Texas has been started by the Works Progress Administration, the Bureau of Economic Geology of The University of Texas acting as sponsor. The purpose of the survey is to assemble information and make it available to the public. Through a separate project, sponsored by the State Planning Board, the results of the survey, as they are received in Austin, are being assembled for publication. The mineral resource survey is helping in the location of mineral products, from some of which it is reasonable to suppose industries of value to the State may be developed. The following report is based on work in Clay County. The investigations described in this circular were made in response to request from the City of Henrietta for an enlarged water supply.

REPORT ON A SHALLOW WATER INVESTIGATION AS PART OF A MINERAL RESOURCE SURVEY IN CLAY COUNTY, TEXAS

W.P.A. Project No. 3557

by Glen L. Evans, Supervisor

The Little Wichita River is more than a hundred miles long and, like other streams in this part of the state, has a very broad alluvial valley, averaging at least a mile wide over much of its lower course. Considering the size of its channel, Little Wichita River drains a large territory, a not inconsiderable portion of its flow being through the sands and gravel of its valley floor. The river flows diagonally across Clay County in a northeasterly direction and empties into Red River.

A few shallow wells that were dug in the stream valley previous to the survey investigation revealed the presence of a water-bearing sand and indicated a potential water supply for towns along the lower stretches of the valley or for stock-watering purposes.

The purpose of this investigation was to determine as far as possible the thickness, position, nature, and sub-areal extent of the water-bearing sands and gravels and to locate any excavations or trenchings in the bed rock floor in order to select a place from which a maximum production of water could be obtained from shallow wells.

Due to a limitation of time, the wells bored by the survey were necessarily restricted to a rather local area. Three lines of test wells bored at spaced intervals across the stream valley, with the lines about one mile apart, were dug between the river bed, which occupies the north side of its flood plain, and the slough (a cut-off partially filled portion of the river channel, about 10 miles long) on the south side. Since several of the wells showed almost identical conditions, it is not necessary to give a record of each well separately.

A record of nine tests, three from each line of wells, will be given:

	Depth in feet
First well, located on south side of the valley and in the line of wells farthest upstream.	
Sticky clay derived from the readily eroded Permian red beds of this region. Intermixed in the clay was some decomposed organic matter and a few small sharply angular claystone concretions	0 - 41
Fine-grained well-rounded sand carrying considerable water	41 - 46.5
Second well, located in middle of the valley.	
Clay alluvium	0 - 18
Dry sand; grains composed mostly of well-rounded, uniform-sized quartz particles	18 - 18.7
Clay alluvium	18.7 - 38
Water sand; upper part of sand bed fine grained and intermixed with silt and grading downward into a medium-grained clean quartz sand; water rose 9 feet in this hole in a very few minutes	38 - 45
Third well, located in north side of the valley.	
Clay, somewhat sandy	0 - 6
Dry sand containing some small sharply angular claystone concretions. This well was located only 500 feet from Little Wichita River in which the present water level is at least 7 feet above the lower level of the dry sand. Apparently the stream-deposited clays and silts which have accumulated in the river bed at this point effectively shut out the water from the upper sand	6 - 19
Clay alluvium with intermixed organic matter	19 - 33.5
Quartz sand grading into gravel in the bottom of the hole. Water came into the test faster than it could be removed with the slush bucket	33.5 - 46.4
Fourth well, located in south side of valley in middle line of wells.	
Clay alluvium	0 - 27
Medium-grained quartz sand carrying a strong flow of fresh water	27 - 33.2

Fifth well, located in middle of the valley in middle line of wells.

	Depth in feet
Clay alluvium	0 - 20.5
Dry sand, containing some river silt and organic matter	20.5 - 21
Alluvium	21 - 28
Sand, grading downward from a fine-grained silty sand at the top of a coarse sand and into gravel composed of pieces of the black iron- and manganese-impregnated sandstone concretions, claystone concretions, and some well-rounded pebbles of quartz and flint. Water rose in this test to within 23 feet of the surface	28 - 46.5

Sixth well, located in north side of the valley in the middle line of wells.

Clay alluvium	0 - 8
Dry sand	8 - 14.6
Clay alluvium, containing much decomposed organic matter	14.6 - 26.5
Water sand, fine-grained at the top with a downward gradation into coarser sand	26.5 - 35

Seventh well, located on the south side of the valley in the lines of wells farthest downstream.

Clay alluvium	0 - 16
Silty sand, carrying very little water	16 - 25
Clay alluvium	25 - 32.4
Water sand; water rose 19 feet in the hole	32.4 - 36

Eighth well, located in the middle of the valley in the line of wells farthest downstream.

Clay alluvium	0 - 17
Silty sand, containing very little water	17 - 18.2
Clay alluvium	18.2 - 26
Water sand; water rose 14 feet in the hole in a very few minutes	26 - 29.5

Ninth well, located on north side of the valley in the line of wells farthest downstream.

Clay alluvium	0 - 24.5
Water sand; water rose 15 feet in the well	24.5 - 30

It will be noted that none of these tests penetrated the entire thickness of the water-bearing sands and gravel. The equipment at hand was not sufficient to case off the strong flow of water which carried sand into the bore holes faster than it would be removed with a slush bucket. This condition prevented the location of irregularities in the valley floor. However, four wells have subsequently been dug which did reach bed rock. None of these wells passed through the valley sediments in less than 50 feet, and all of them found at least 20 feet of sand and gravel resting on the valley floor. Water taken from these wells is of good quality, being clear and tasteless, and contains very little mineral matter.

Wells dug in the river valley by farmers and stockmen prove the presence of this water-bearing sand for a number of miles both above and below the area tested by the survey. The surface of the valley is comparatively flat, but slopes, in the region of Henrietta, about 4 feet per mile in the direction of drainage.

Considering the gentle gradient, the relatively great volume of this water-bearing body, the fact that it rests for a number of miles on the impervious Permian clays and shales, and the fact that it is overlain by the hardly more permeable redeposited clays, there seems little reason to doubt that the sands and gravels confined to the Little Wichita valley, and conforming to a large extent to its topography, carry a subterraneous flow of water of sufficient volume to furnish an adequate and regular supply for small towns or for extensive stock-watering purposes, provided the wells are properly arranged for production and situated in favorable locations—that is, in places where the deepest channeling took place previous to the deposition of the valley sediments. This belief is further supported by the fact that shallow wells located in different places in the river valley and in the valleys of the larger creeks draining into it, which have correspondingly broad alluvial plains, have suffered no noticeable depletion of supply even in severe droughts.