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MINERAL RESOURCE SURVEY
Circular No. 49

The information contained in this circular was gathered by a unit of the WPA Mineral Resource Survey of Texas, a project sponsored by The University of Texas, Bureau of Economic Geology. The purpose of this survey is to assemble information concerning mineral products and to gather other geological data and make it available to the public. With this information in the hands of the public, it is reasonable to suppose that industries of value to the State may be developed. The following report is based on work done in Young County by Work Project No. 3578, from February 7, 1936, to April 17, 1936.

GEOLOGIC STUDIES IN YOUNG COUNTY, TEXAS*

by D. R. Criswell, Supervisor

INTRODUCTION

Young County, located in the belt of Pennsylvanian and Permian formations of north-central Texas, is one of the important oil-bearing counties in the State. In 1930 a geologic map of the county was issued by the Bureau of Economic Geology of The University of Texas in cooperation with the American Association of Petroleum Geologists. In the southern part of the county the formations were mapped at that time in considerable detail, but in the northern part where the formations are difficult to follow owing to change of facies, the mapping is less satisfactory. The principal purpose of this project was to add to the accuracy of geologic mapping in the county, and for this purpose a limestone of the Harpersville formation was selected.

The detailed mapping of this limestone begins at a point approximately 3 miles southwest of Ft. Belknap near the northeast part of Texas Emigration and Land Company Survey, Block 3410, Fractional "B", and extends northward to New Castle, thence northeast along the outcrop of the Harpersville formation passing about 4 miles south of Jean, thence in an easterly direction past Loving to the Jack County line.

The limestone varies in thickness from 6 inches to 2½ feet. The lower portion is usually buff to gray in color grading upward into a purplish or reddish colored nodular rock containing many fossils. The outcrop was plane-tabled from an exposure in the northwest corner of Texas Emigration and Land Company Survey, Block 11, thence northeastward.

This limestone outcrops about 30 feet below the conglomerate that forms the escarpment of Turkey Mountain, a large escarpment about 100 feet in height extending from the northeast quarter of Texas Emigration and Land Company Survey, Block 282, northeastward into the southwest quarter of Texas Emigration and Land Company Survey, Block 613. It is easily traceable around Turkey Mountain and below the escarpment. Another escarpment similar to Turkey Mountain occurs in the central part of Texas Emigration and Land Company Survey, Block 615. The conglomerate forms the escarpment as at Turkey Mountain with the limestone outcropping about 30 feet below the conglomerate. In the vicinity of Loving and northward, due to a reversal in the drainage system, the limestone outcrops over a large area. The area south and west of Loving is drained by Salt Fork of the Brazos while the area to the north of Loving is drained by the west fork of Trinity River. Hence, streams north of Loving flow northward almost with the dip. The sandstone and conglomerate lying from 5 to 40 feet above the limestone contain many small fragments of plant fossils.

The identity of this limestone could not be definitely determined. The named limestones of the Harpersville formation as recognized in Young County by Lee (Univ. Texas Bull. 3801, pl. 4) are in order as follows: "01" limestone, Crystal Falls limestone, Upper Crystal Falls limestone, Belknap limestone, "*Myalina*-bearing" limestone, and Saddle Creek limestone. The limestone mapped lies near the middle of the formation.

MINERAL PRODUCTS

The principal mineral products of Young County are oil, gas, coal, underground water, and a supply of construction materials which includes building stones, sand and gravel, and small amounts of caliche.

Coal. — The first commercial development of Young County's natural resources was the mining of the locally extensive coal deposits of Harpersville age. The principal coal stratum is about 60 feet below the Saddly Creek limestone and quite consistent throughout the Harpersville formation. Mining operations in the county began as early as 1909. In September of that year the Wichita Falls and Southern Railroad was extended south from Olney to New Castle to serve the coal mining industry that was to thrive during the following decade. The coal industry was chiefly controlled and operated by the Belknap Coal Company. This company operated three mines; two were located about 0.5 mile north and the third about 1 mile south of New Castle. Throughout the period from 1909 to 1918 the mines operated steadily, employing from 300 to 500 miners. The coal brought a price of approximately $3.00 per ton at the mines, and miners received about $1.00 per ton for their labor.

The coal industry began to decline in 1918, and by 1921 operations were almost entirely abandoned. The contributing factors for this were the ratio of labor costs to the quality of the coal, the competition of higher grade coal, and the growing use of oil as a fuel. At present, little coal is mined in the county, and since 1921 the operations have been only to meet local demands. The "coal slope" type of

*Assistance in the preparation of these materials was furnished by the personnel of Works Progress Administration Official Project No. 65-66-5083, and Work Projects Administration Official Project No. 665-66-3-233.

mining is employed in this area. In some instances, where a coal vein has little overlying material, the coal is taken from the surface, and this type of mine is known as a "coal slip." Not more than three or four mines are operating in the county at present, and they only during the fall and winter months. The daily production from each is placed at 15 to 20 tons. The coal brings about $4.00 per ton at the mines. Many coal outcrops and abandoned "slopes" and "slips" are encountered throughout the outrop belt of the Harpersville formation. Numerous well logs also reveal the presence of the coal several miles down the dip from the surface outcrop. The thickness of the coal vein varies from 18 to 48 inches and the deposit is fairly uniform. However, it sometimes grades into black or dark gray shale.

Oil. — Hardly had Young County's coal activities subsided before the oil industry sprang forth to hold a commanding position in the State's oil-producing counties. Drilling in the southern part of the county began on the South Bend prospect in 1918, though commercial production was not discovered until 1920. From this date to the present time hundreds of wells have been drilled to the sands of Strawn (Pennsylvanian) age and to the deeper seated porous limestone horizons of the Bend group (Pennsylvanian). The comparatively recent use of hydrochloric acid to react on the porous limestones brightened considerably the outlook for production from the Bend, since this practice greatly increases the potential of the wells and is expected to increase the ultimate recovery with reacidization at intervals of one to three years.

The major structural feature of the area is a broad northward plunging anticline known as the Bend arch. This originates in the Central Mineral region of Llano and Burnet counties, extinding northward to its terminus in northern Young county. The movement which caused the arch has continued with the later deposits but to a lesser degree. The gravity of the oil varies from 37 to 42 degrees. A map has been prepared which shows the location and approximate size of all the oil pools of Young County as of 1936.

Gas. — There is no commercial production of natural gas in Young County, and little if any has ever been produced commercially. However, in the Strawn and Bend horizons of southern Young County, oil wells often show a high gas potential, but this is more valuable to the operator in the production of oil than if placed on the market. West and northwest of New Castle gas horizons occur in the lower Cisco below the Gunsight limestone at depths varying from 600 to 800 feet. The shallow wells show a high potential considering their depth but are not producing due to the lack of a market.

Casinghead gas. — There is a small production of gasoline from casinghead gas in Young County. Several such plants are operating in the area and some of the casinghead gas comes from producing oil wells of Young County. No figures are available as to the amount produced.

Underground water. — Throughout the entire county underground water is encountered at shallow depths varying from 20 to 300 feet. The water comes from various horizons of the lenticular sands throughout the entire thickness of the Cisco group of formations. The best water-producing horizons lie below the Breckenridge and the Blach ranch limestone. These sand bodies vary in thickness from 10 to 30 feet, are almost continuous, and capable of producing a generous supply of water. All of the water-bearing strata of Young County contain mineral salts in various amounts. Many water wells, examined throughout the Harpersville formation, showed a high percentage of mineral and, in springs along the Brazos, deposits of gypsum, ferruginous compounds, and small amounts of sulphur were found where the spring water had evaporated, a higher degree of salinity being more apparent in the water-producing strata at or near the coal horizon of Harpersville age.

Building stone. — Numerous thin-bedded sandstones and limestones outcropping in the county are suitable for building purposes. The earliest use of stone for building in the county was in the construction of Ft. Belknap in the years 1851-53. Several buildings were constructed of sandstone and stood for many years, until long after the abandonment of the fort. Most of these stones were later used in the construction of buildings in New Castle in 1909-10-11. In the present reconstruction of Ft. Belknap, which was begun early in 1936, the same type of sandtone structures as were in the original fort are being restored. The source of supply is a thin-bedded sandstone, 18 to 20 inches thick, found a few feet below the Belknap limestone which outcrops along the east bank of Brazos River, about 0.7 mile west of the fort. In the early part of 1936 construction was also begun on a gymnasium for the New Castle high school. This is a sandstone structure 72 by 86 feet, with walls 28 feet high and 20 inches thick. The stone comes from the J. B. Terrell land about 2 miles west of New Castle. In several places in the county sandstones have been utilized in the construction of stone veneer houses.

Conglomerates in and about the city of Graham are used in the construction of veneer type structures. Little use has been made of the limestones of the county in building, but it is quite possible that the Blach ranch and Breckenridge limestones might be used for such purposes. The former in its outcrop across the county usually occurs in two members, having a uniform thickness of 15 to 20 inches and lying from 4 to 10 feet apart. It is a hard, durable, dark-colored limestone containing few fossils and is often found weathering in large rectangular slabs.

The Breckenridge limestone usually contains a stratum that is sufficiently uniform in thickness to render it suitable for building purposes, although in many places it is too fragmentary to be of any economic value in the construction of buildings. This fragmentary limestone makes an excellent road material. Other limestones in the county are not considered suitable for building material, since they are usually very brittle and weather into angular fragments, but, like the Breckenridge, they may be used in highway construction. Prospective users of limestone should consult the geologic map of Young County, issued by the Bureau of Economic Geology, for locating the outcrops of the various limestones.

Sand and gravel. — Little sand and gravel is found in Young County except along the course of Brazos River where coarse grades of gravel may be found within the old stream terraces. In the present stream bed of Brazos River are great quantities of sand and gravel. In the southwestern part of New Castle there is a gravel deposit about 4 feet thick with an areal extent of approximately three acres along a former stream terrace of Brazos River. Other such deposits, lying about 100 feet above the present level of the river, are noted northwest of New Castle. The gravel is composed of small rounded pebbles up to boulders of 2 inches in diameter, and all of the gravel observed contained various amounts of shale which render it unusable except in the construction of secondary roads.

A power pump unit, located in the bed of Brazos River at the New Castle bridge, pumps, washes, and screens sand and gravel from the stream bed to supply local construction needs. An adequate water supply for pumping purposes is furnished by the water flowing through the sand and gravel.

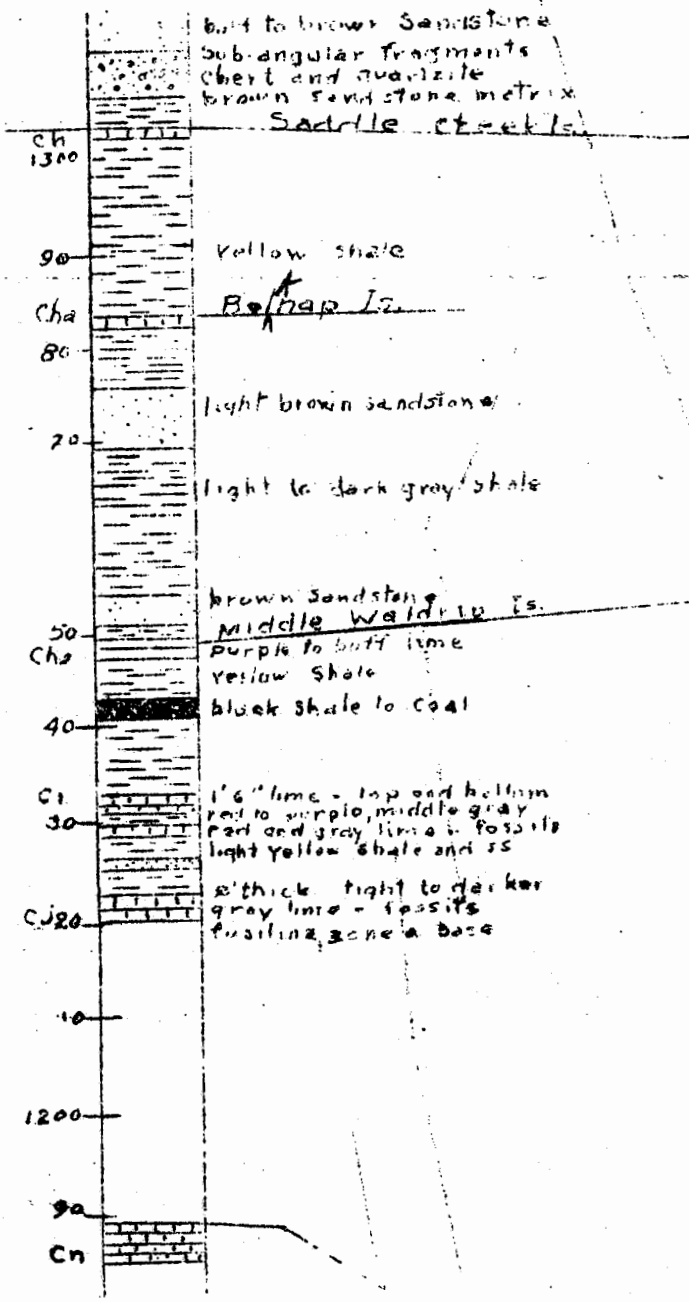
Caliche. — Deposits of caliche are infrequent in the county and those that are found are usually impregnated with shale and surface oil. Test holes were dug in several caliche deposits along the calcareous zones of the Harpersville formation, and the deposits were found to be very thin and impure. However, in the central part of Texas Emigration and Land Company Survey, Block 4, 0.5 mile southwest of New Castle, a small deposit of caliche, estimated at 5000 cubic yards, was found to be high in calcareous content and free of impurities.

Along the outcrop of the Breckenridge limestone, caliche deposits are sometimes found where they have been formed by infiltration processes in the calcareous shale zone above the limestone. There is a deposit of this nature about 4 miles west of Eliasville along the Eliasville-Woodson road which is being used for road surfacing.

SECTIONS OF HARPERSVILLE FORMATION

YOUNG COUNTY

NE PART T.E.& L SURVEY
BLOCK 5410 FRAC. B
THENCE EASTWARD



WASHINGTON CO. RR SURVEY, A- 1290
CENTRAL PART, SOUTH