## A REPORT

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## ON

# THE BLACK HILLS ANTICLINE CHAVES COUNTY, NEW MEXICO

BY

J. B. HEADLEY

### THE BLACK HILLS ANTICLINE CHAVES COUNTY, NEW MEXICO

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#### A Report on Structure

Scope of Report. The purpose of this report is to describe briefly the above mentioned structure, to be accompanied by a map showing more definite detail and to accompany a Unit Plan of Operation, submitted by the owners of the oil and gas leases thereon to the Department of the Interior for approval. The map itself has been previously submitted to the Department as part of a former unit plan now cancelled.

The anticline was discovered by the author in the early part of 1925 and he is believed to be the first to map and report the structure. After a reconnaissance survey the structure was thoroughly mapped in detail, by the plane table method, by the author with the assistance of Mr. H. R. Van Gilder, instrument man. The work consumed several weeks' time and the entire survey was based on a camp situated in the area.

Location. The Black Hills Anticline is located in Southwestern Chaves County, New Mexico, in Townships 17 South, Range 19 East; 17 South, Range 20 East; 18 South, Range 19 East; and 18 South, Range 20 East. It is approximately 10 miles due west of the Town of Hope.

<u>Topography</u>. The topography is that of rough limestone hills with greatest relief of 500 feet above the deepest cut drainage. The area is part of the hilly limestone country west of the plains of the Pecos Valley and being the forerunner of the foothills of the Sacramento Mountains some 40 miles to the west. The Penasco River, a tributary to the Pecos River, flows east along the northern flank of the structure and a few of its small tributaries dissect the limestone hills in small deep-cut arroyas heading near the apex of the structure. The Penasco generally runs water the year around. Walnut Creek, another tributary to the Pecos, parallels the Penasco on the south flank of the structure.

A graded main highway from Artesia to Hope to Cloudcroft borders the structure to the north and all transportation will approach the area by means of this highway. A few ranch roads or trails traverse the area and these are mostly on hard limestone, are rough, but will be serviceable in any weather.

<u>Stratigraphy</u>. The outcropping rocks belong to the lower portion of the San Andres formation, a part of the general classification of Chupadera, so named by Darton. The upper 250 feet of outcrop is composed of dense gray to dark gray, thinly bedded limestones with inter-bedded redbeds and gypsum. The lower portion of the outcrop is composed of massive dense dark gray to black limestone, fossiliferous and containing ferruginous nodules. These lower beds weather into massive jutting outcrops with steepsidded jagged cliffs and make an abrupt change in the local detailed topography, differing from the softer slopes of the overlying beds. The contact between these two formations was used as the datum for mapping the structure.

It is thought that the above lie approximately 700 feet above the Glorietta Sandstone, the latter being 50 feet to 100 feet in thickness, and the dividing formation between the San Andres above and the Yeso formation below. The Yeso formation, usually of redbeds, has shale with sands as found in the Texas Duncan Well seven miles to the west, and is approximately 2,000 feet thick. Below the Yeso is the Abo formation consisting of Red Sands, arkosic material, red shales, some limestones; is 1100 feet thick as found in the Texas Duncen Dome Well. Immediately underlying the Abo is the Magdelena of the Pennsylvanian period and is estimated to be 1500 feet thick. This consists of dark petroliferous limestones with several inter-bedded sands. Below the Pennsylvanian the following are estimated: 150 feet of Lake Valley, Mississippian; 100 feet of Percha, Devonian; 130 feet of Fusselman, Silurian;

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180 feet of Montoya; and 250 feet of El Paso, making a total of 6560 feet plus of section to be drilled to thoroughly test the sedimentary section petroleum possibilities.

Structure. The structure is that of an anticline, located immediately east of an over-thrust fault. The fault, known as the YO fault, is a prominent feature extending several miles southwest of the structure and running in a northeasterly direction for many miles and has been traced by the writer to the northeastern part of Township 14 South, 23 East, and from all indications extends many miles beyond that point. The fault, as measured by the writer, has a throw of 137 feet along its vertical trace as observed in the north bank of the Penasco River in Section 2, Township 17 South, Range 19 mast.

The anticlinal axis runs from Section 5-18S-19E northeasterly to Section 14-175-20E. Along the axis are several domes or highs, the chief of which is located in Sections 25 and 36, 17 South, 19 East and Sections 29, 30, 31 and 32 in 17 South, 20 Past, forming the main feature of the entire structure. The apex of the dome is located in the Northwest Guarter of Section 31-175-20E. The closure on this dome itself is 130 feet. The closure of the anticline, as mapped, is the same but a considerably greater closure against the YO fault is indicated. The structural dips are rather steep and extend for long distances to the north and east, less steep to the east and south but extending as far as outcrops are observed to the gravel caliche plain below. To the west the dips are interrupted by several highs and reversals but eventually culminate against the fault. North and west of the anticlinal axis is a syncline forming the north and west closures before the beds are again folded against the fault. To the south is a syncline along Walnut Creek limiting the structure to the south. A study of the attached map gives a much better conception than the above description.

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<u>Conclusion</u>. The Black Hills Anticline is one of the main structural features, from an oil prospecting point of view, in the limestone hill country west of the Fecos River. Two other prominent features, Menning Dome in 14 South, 17 East, and Duncan Dome in 17 South, 18 East, have been drilled without discovery of commercial oil. The Duncan Dome was drilled to 4900 feet with a show of gas in the Abo and Pennsylvanian but was not drilled deep enough to completely test the Pennsylvanian nor the older formations. The Manning Dome, being located approximately in the mountains, encountered igneous rock at 4014 feet, therefore not testing the Pennsylvanian and lower formations. The Picacho Structure in 12 North, 18 East is now being tested.

The Black Hills Anticline is the only one of these that is located completely out of the mountains and on the basin-ward side of the YO fault. The oil and gas possibilities, being unknown, are left to the conjecture of the reader, it being inferred that the only one who reads this far is the one who is sufficiently interested to have made a study of the general area of Southeastern New Mexico and can make his own deductions.

Respectfully submitted,

) Headley B. Headley

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