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REPORT ON DEEPENING OF DUNHAM #1 WELL
SAN JUAN BASIN, RIO ARRIBA COUNTY, NEW MEXICO.

July 12, 1949

In November 1948, Dunham #1 test well in SW¼ NW¼ section 14-T. 25N. R. 2 W. was drilled to a total depth of 2702 feet where it was believed to have reached the Lewis Shale and shown absence of the Pictured Cliffs sand which was the chief objective of the test. Being so far removed on the east flank of the San Juan Basin made correlation very difficult. In the following December we drilled Kates #1 in SW¼ section 32-26N.-2W. to a depth of 3635 ft. and became convinced from the findings there that Dunham #1 had not reached the Pictured Cliffs level.

Now in July 1949 we have completed the job of cleaning out the hole and deepening Dunham #1. The top of the Pictured Cliffs sand was found at a depth of 3417 ft. with 63 ft. of sand from 3417 to 3480 and drilled on in Lewis Shale to 3492 ft. Above the Pictured Cliffs sand a coal bed 7 feet thick was found from 3316 to 3323 and another bed 21 feet thick was found 3362 to 3383. These coal beds cleared up the correlation and when found showed we were approaching the Pictured Cliffs sand although coal beds were generally believed to be absent in this portion of the San Juan Basin.

When the Pictured Cliffs sand was reached, gas showed in the cuttings and cores from 3417 to 3435 with the gas containing a notable percentage of light oil distillate. Casing of 5½" diameter was then run and cemented at 3417 feet and cable tools moved in to drill the remainder of the hole. The gas and distillate volume gauged 277,000 cu. ft. per day. We then shot the sand with 190 quarts of nitroglycerine but to prevent injury to the casing did not shoot the top 8 feet which carried the main flow. The shot did not bring any water into the hole and did not increase the volume of gas or oil condensate. The well gauged the same volume after the shot as before. The pressure was encouraging since on shutting in the well the pressure gauge on casing built up to 725 pounds per square inch.

The Western Gas Company, which is the operating branch of the El Paso Natural Gas Company, has obtained a sample of the gas for analysis at their Jal, New Mexico, refinery to determine the percentage or gallons per 1000 cu. ft. of condensate oil in the gas. At this date of writing their report has not been received but is expected soon. It is our opinion that the oil content of the gas indicates that the Pictured Cliffs sand will on further drilling prove to be an oil producing sand in this area. There is plenty of gas in the sand to flow oil wells nicely should they come in at slightly lower levels on the structure. We believe therefore, as others do, that our discovery is a very important one for this big stratigraphic trap on the east flank of the basin. Mr. Frank Barnes, geologist for the New Mexico Conservation Board, stated in print in the Albuquerque Tribune of June 18th that it is "probably the most important discovery on the east side of the San Juan Basin in the last 20 years."

The facts remain for demonstration by more development to determine which would be the more meaningful and of more economic importance, to have had a gas well of much larger volume with no condensate oil or to have had a small gas well which carries light gravity oil and may lead to an oil field near it as we suspect will be the case in this particular Pictured Cliffs sand.

In drilling the Kates well which is two miles north and three miles west of Dunham we found the Farmington sand from 2960 to 2985 feet carried crude oil saturation which we were unable to test in the rotary hole. That sand must be tested for oil production. It has pinched out to the eastward and was not present in Dunham as proven by electric-log correlation as well as by drilling samples. It stands as a stratigraphic trap all its own. We are now convinced also that the Kates well did not reach the coal beds and lacked about 160 feet of reaching the Pictured Cliffs sand to further demonstrate the difficulty of correlation in our original drilling. It could be an oil producer there at about 250 feet lower on structure than at Dunham #1.

We are approached now by parties who wish a deal to drill a well near Kates #1 to test both the Farmington and Pictured Cliffs sands. They also wish a deal submitted to them drill a test to the Pictured Cliffs sand about 5 miles north of Dunham #1. Possibly we will work out something quite soon for approval of our partners along this line.

Another matter of current interest is the drilling well now under way by Magnolia Petroleum Company and Delhi Oil Company in our area. They are drilling a 7000 ft. test near Lindrith in $SE\frac{1}{4}$ $SE\frac{1}{4}$ section 20-24N.-2W. It is 7 miles south and one mile west of Dunham #1. They had gas in the Pictured Cliffs sand topped at 3095 and continuing to 3145 (50 ft.) and are now below 4000 ft. depth in Lewis Shale. Their surface elevation of 7222 makes their top of Pictured Cliffs sand at 4127 ft. above sea level while Dunham with surface elevation of 7325 and top of Pictured Cliffs at 3417 gives a level of 3908 above sea level. Thus their well is 219 ft. higher structurally than Dunham. This means considerable structure in the sub-surface as either a cross-fold or some dome or anticlinal fold in the area that sufficient drilling will clarify. The Magnolia-Delhi well should soon reach the sands of the Mesaverde formation and later the Dakota sands as favorable prospects. It is a valuable test for our holdings.

At about 13,000 feet under this area the Lower Pennsylvanian limes and sands are likely to be present in permeable character as contrasted with the dense beds of the Upper Pennsylvanian which overlaps on the granite of the Nacimiento Mountains to the east. This is a future prospect for deep testing. In our judgment, Magnolia and Delhi are warranted in drilling on to the Lower Pennsylvanian provided they do not find production in higher levels but so far as we know, they have not figured on doing that in this test. One of the best sub-surface geologists we know in a study of the Pennsylvanian, Mr. W. Z. Miller, believes the Lower Pennsylvanian is an excellent prospect in this area and with that we fully agree. But it will take big money to go down to that level.

The situation is very interesting as it now stands. We have proven that the geological theory is correct as to structure. In Dunham #1 the permeability of the lower portion of the Pictured Cliffs sand is blocked by the occurrence of white kaolin or volcanic ash so that it does not hold gas, oil or water. The permeability is there restricted to the top portion of the sand. At a removed point the porosity and permeability may change more favorably like it does in the Fulcher-Kutz Canyon field on the west flank of the basin. Wells there vary from 250,000 cu. ft. to 3,500,000 cu. ft. per day of gas depending on permeability and thickness of the pay sand. They all market gas regardless of size.

There is no pipe line for either gas or oil to our district at present. It is about 25 miles to the Southern Union gas line which runs from the west part of the basin eastward to the Los Alamos atomic bomb plant near Albuquerque. Should Magnolia-Delhi develop sizeable production of oil or gas at their well they will be quite influential in getting pipe line markets established for our area.

The San Juan Basin needs two measures in order to properly move off development of the basin. First, the approval of the Federal Power Commission to permit the El Paso Natural Gas Company to build their line to market gas to California. There are 75 to 100 wells waiting to drill in proven areas of the basin once this authority is granted. Second, a wise measure on the part of the gas companies would be to raise the price from 5¢ per 1000 cu. ft. at the well-head to 10¢ per 1000. That would lead to a great deal of drilling to find the big supplies of gas that they will be needing. And in the course of drilling for gas much oil is likely to be discovered for oil lines westward also to meet Pacific Coast demand. The basin is still in its youth for development. It is one of the major basins of the Rocky Mountain area with many sands at various depths to merit much exploration. Why the Federal Power Commission should hold up approval of pipe line construction out of the area is beyond our power to comprehend. Much pressure is being put on them for favorable action and possibly something will break soon to allow the line to go ahead. Some congressmen are pouring it on the commission for their assumed authority.

Respectfully submitted,

James H Gardner