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OIL AND GAS TESTS IN LINCOLN COUNTY, NEW MEXICO

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INTRODUCTION

The conference area, relative to petroleum exploration, remains unexplored. The area extends from T. 1 S. through T. 13 S., and from R. 8 E. through R. 19 E. and contains approximately 5,100 square miles. Eighteen dry exploratory tests have been drilled in the area. Three were drilled in the same section, and two in another section. The tests give an effective ratio of less than one test per 350 square miles which is not a firm basis to draw many conclusions on as to the future petroleum potential of the majority of Lincoln County. Of the eighteen tests probably as many as eight were geologically or geophysically located.

The primary objective of all these tests has been the shallow beds ranging in age from Cretaceous through Permian. The average depth of test drilled was 1,620 feet (excluding one 8,050 foot test on the west side of Area 3). The average depth of test covers a minimum depth of 400 feet, and a maximum of 3,429 feet. Of twelve tests considered, 5 probably bottomed in the Yeso, 4 in the Abo, and 3 in igneous rocks underlying the Abo. One test bottomed in the Cretaceous, and one in the Precambrian after penetrating a Pennsylvanian section.

Exploration activity in the Lincoln County area began with the drilling of the National Exploration No. 1 Picacho in November, 1919, and has continued until recently when the Bryce Dugger No. 1 Federal was plugged and abandoned in March 1963. The majority of drilling was done during the early 1950's.

Exploratory drilling in the conference area has been the natural outcome of several factors. The very productive San Andres Formation in Eddy and Lea Counties, to the southeast, can be seen in outcrop throughout much of the area. Similarly, the Dakota Sandstone which is productive to the north can be seen in scattered portions of the area. The presence of the petroliferous San Andres in conjunction with mappable surface structures would naturally give rise to exploratory drilling. Of most significance to the exploration history of this area is probably the long and often reported occurrences of oil slicks, and rainbow shows of oil in water tanks, and in wells of some parts of the area. In addition, a few small dead oil seeps have been reported.

Encouraged by structure, seeps, shows of oil in water wells, or only the close proximity to a main road, the tests were drilled. Several tests encountered shows of oil, and completion was attempted, but no commercial production has yet been found.

EXPLORATION AREAS

Lincoln County can be divided into three exploration areas for the purposes of this report (See figures 1, and 2).

Area 1 is primarily the dip slope of the Sacramento-Sierra Blanca-Jicarilla Mountains. Area 2 contains the intrusive complex of the Northern Sacramento, and Jicarilla Mountains and the Sierra Blanca. Area 3 is in the northern Tularosa Basin and extends north to the Chupadera Mesa and Gran Quivira area, and is predominately Permian sedimentary rocks covered in some areas by Quaternary basalt flows.

Area 1, the dip slope of the Sacramento-Sierra Blanca-Jicarilla Mountains, appears to be the least structurally deformed of the three divisions considered. It also contains 10 of the eighteen exploratory tests drilled in the conference area. Seven of the tests in Area 1 are well enough distributed in a north-south direction to provide a reasonable strike relationship of a very regional nature.

Three tests have penetrated igneous rocks in the Permian sedimentary rocks. In addition, three of the ten tests have penetrated probable Precambrian rocks, and have indicated the sedimentary section is a minimum of 1,600 feet thick, and a present known maximum thickness of 2,315 feet. Because of the large portion of red beds found in the Abo, and the evaporitic and associated facies of the Yeso, the prospective thickness of the sedimentary section present is probably much less than one-half the section penetrated.

The earliest test drilled in the area was the National Exploration No. 1 Picacho. This test was spudded approximately 900 feet below the Glorieta outcrop, and penetrated 1,630 feet of sedimentary section before reaching a total depth at 2,191 feet in igneous rock. No shows of oil or gas were reported. The test, drilled in 1919, is in the NE¼ sec. 21, T. 11 S., R. 18 E.

The most recent test, the Elliott Production No. 1-10 Federal, in sec. 10, T. 5 S., R. 16 E., was plugged and abandoned in April 1962. This test was drilled on the basis of a gravity high. The well spudded in the San Andres. The Yeso and Abo were thinner than was anticipated, and contained a high percentage of red beds and evaporitic rocks. At 2,240 feet this test encountered "Granite Wash" underlying rocks of the Abo Formation, and encountered Precambrian granitic (quartz diorite) rocks at a depth of 2,570 feet. At a total depth of 3,429 feet the test was still in igneous rock.

The fact that three of the ten tests drilled in Area 1 have penetrated igneous sills in the Permian is very suggestive of the presence of more complex structural conditions than may be realized. This combined with the very large Capitan Mountain Tertiary intrusive which nearly divides Area 1, may indicate much more igneous activity than is exposed. This is not, however, implying the area be condemned because of possible igneous activity. Despite the fact that small amplitude structures do exist in Area 1 and some sedimentary section is pre-

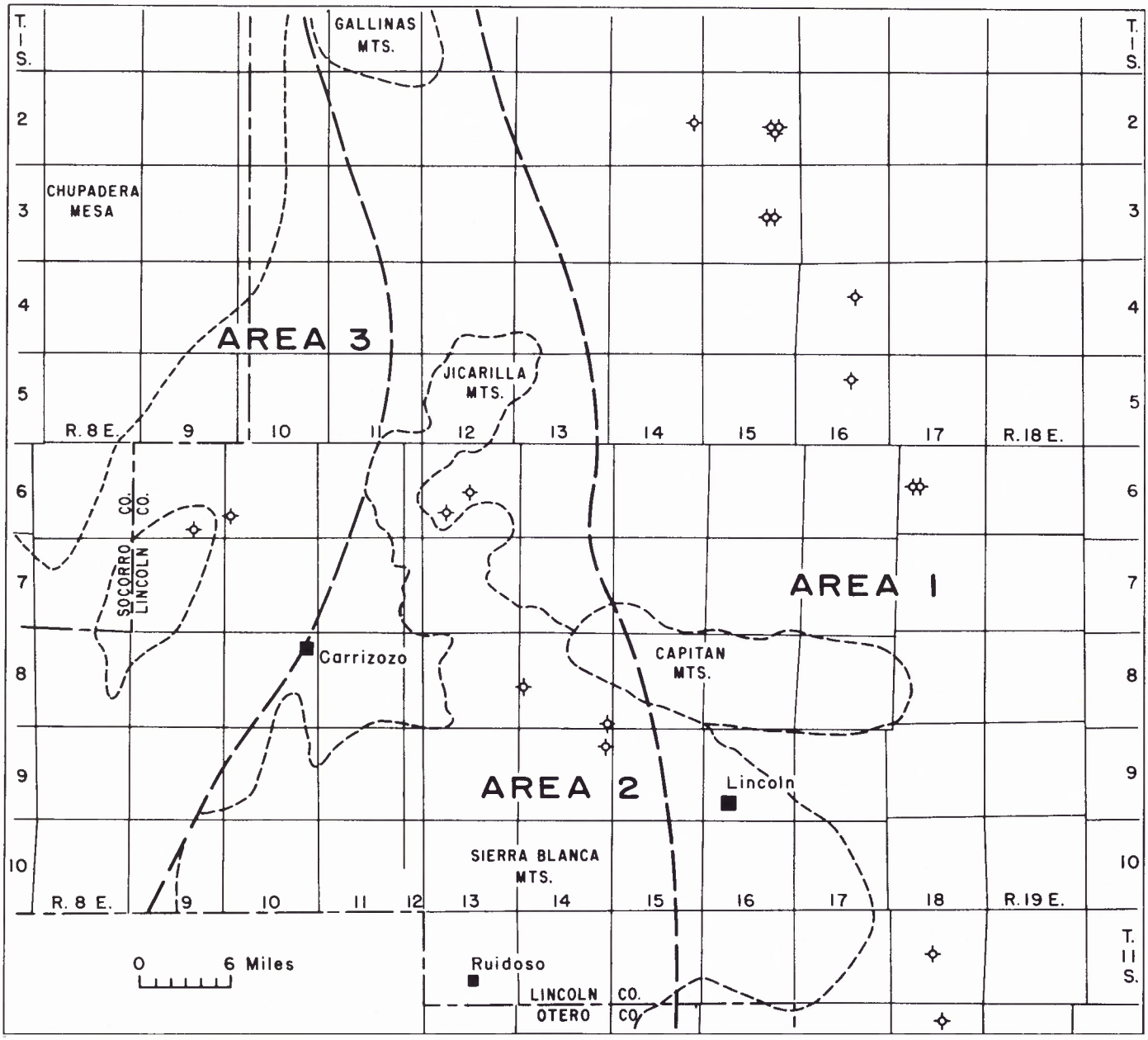

Figure 1. — Map showing oil and gas tests and exploration areas in Lincoln County, New Mexico.

sent, the thinness of the sedimentary section, the lack of source and resevoir beds below the generally dissected San Andres, and the absence of good shows of oil and gas, do not offer much encouragement for additional petroleum exploratory drilling throughout most of Area 1.

Area 2 contains outcrops of Tertiary intrusives; the Cretaceous Mesaverde Formation, Mancos Shale, and Dakota Sandstone; the Triassic Dockum Group; and the Permian Artesia Group, San Andres Limestone, Glorieta Sandstone, and Yeso Formation. The area is highly intruded, possibly one-fifth or more of the outcrop is Tertiary intrusives. Some mineralization has taken place around the contacts of these intrusives. The area is faulted and fractured; the majority of faults are normal, and down-thrown to the west. The structural grain, as determined by dike trends, faults, and intrusion zones, seems to be oriented north-northeast (approximately N. 15° E.).

Five test wells have been drilled in this part of the area. The first test chronologically was the Ray N. Sipple No. 1 H. E. Kelt, located in the SE¼NW¼ sec. 29, T. 6 S., R. 13 E. This well was spudded January, 1949 in the Cretaceous Mancos Shale. It penetrated the Greenhorn Limestone at 30 feet, the Dakota Sandstone at 300 feet, the Dockum Group at 515 feet, and bottomed at 1,027 feet in red shale. Two miles

OIL AND GAS TESTS, LINCOLN COUNTY, NEW MEXICO

Operator	Well	Farm	Location	Total Depth	Spudded	Completed	Status
Basabe & Rupe	1	Gyberg	1,980' FNL & FEL 24-2S-14E	1,320' sh	10- 1-52	12-10-52	P&A
B & B Oil Co.	1	Garger-Fed	1,980' FNL & FWL 23-2S-15E	570' ls	3- 1-55	10-12-55	Temp Abn
Malcolm & Morrow	1	C. C. Franks	871' FSL & 1,820' FWL 23-2S-15E	2,120' ls	9-22-53	5-12-54	Temp Abn
Malcolm & Morrow	1	C. C. Franks	2,013' FSL & 680' FWL 23-2S-15E	2,140' ls	8-13-52	9- 8-53	Temp Abn
Johnson & Spencer	1	Johnson	690' FNL & 660' FWL 23-3S-15E	900' ls	5-14-56	6- 5-56	Wtr Well
Johnson	1	Johnson-Fed	660' FNL & FWL 23-3S-15E	600' sh	1-12-56	2-15-56	Temp Abn
Albuquerque Expl.	1	Federal	660' FNL & 2,188' FWL 15-4S-16E	1,962' sh	10-10-53	2-29-56	P&A
Elliott Prod. Co.	1-10	Federal	660' FSL & 1,980' FWL 10-5S-16E	3,429' ign	3-16-62	4-23-62	P&A
Standard of Texas	1	Heard	1,980' FNL & FWL 33-6S-9E	8,050' ign	6-16-50	4-18-51	P&A
Bryce Dugger	1	Federal	1,655' FNL & 506' FWL 30-6S-10E	1,500' sh	1-25-63	3-12-63	P&A
Mark Vaughn	1	Chrenshaw	330' FNL & FEL 21-6S-13E	400'	6- 5-58	8- 5-59	P&A
Ray N. Sipple	1	Kelt	1,980' FNL & 2,310' FWL 29-6S-13E	1,027' sh	1- 6-49	6- 6-49	P&A
K. G. Miller	1	Miller	660' FNL & 1,980' FWL 20-6S-18E	782' ls	7-22-54	11-10-54	P&A
Western Ranchers	1	Beecher	1,650' FNL & 377' FWL 19-8S-14E	1,342' ls	2-15-59	2- 5-59	P&A
L. Capco	1	Spencer	330' FSL & FEL 36-8S-14E	2,181' ign	11-19-58	8- 5-59	P&A
L. Capco	1	Pearson	2,156' FSL & 1,660' FWL 12-9S-14E	1,005' ls	1-18-59	8- 5-59	P&A
National Expl.	1	Picacho	NE corner 21-11S-18E	2,191' ign	11-27-19	?	D&A
Stanolind	1	Picacho	660' FNL & 760' FWL 10-12S-18E	2,843' ign	1- 1-45	7-23-45	D&A

southwest, another test the Mark Vaughn No. 1 Chrenshaw, was drilled in 1959. It is located in the NE¼-NE¼NE¼ sec. 21, T. 6 S., R. 13 E. The test spudded in Cretaceous Mancos Shale, reached a total depth of 400 feet, and probably bottomed in the Dakota. A questionable report of a slight show of oil which may have been from the Dakota was indicated at 335 feet.

In 1959 three tests were drilled within a five mile radius of the town of Capitan. The Western Ranchers Oil Co., No. 1 Beecher, located in the NW¼SW¼-NW¼ sec. 19, T. 8 S., R. 14 E., reached a total depth of 1,342 feet. Tops reported were as follows: alluvium at surface, Santa Rosa Sandstone at 60 feet, Artesia at 440 feet, San Andres at 680 feet. The test is close to a major fault in an area dominated by Mesaverde outcrops and is possible that the Santa Rosa reported at 60 feet may be the Dakota Sandstone. The site has not been examined by the writer. No shows of oil or gas were reported.

The two remaining tests in Area 2 were drilled by the El Capoco Corp. The No. 1 Spencer, located in the SE¼SE¼SE¼ sec. 36, T. 8 S., R. 14 E., spudded in November 1958 in the Santa Rosa. It penetrated the San Andres at 560 feet, the Glorieta at 1,255 feet, the Abo(?) at 1,575 feet, and rhyolite at 2,120 feet. Total depth was 2,181 feet. Slight shows of oil were found at 600-630 feet, and 690-710 feet, but completion was not attempted. The No. 1 Pearson, in the NW¼NE¼SW¼ sec. 12, T. 9 S., R. 14 E., reached a total depth of 1,005 feet. It also spudded in the Santa Rosa. The well encountered fresh water at 200 feet, and flowed an estimated 60 barrels of fresh water per day. A completion was attempted from 806-834 feet by acidizing with 2,000 gallons, but the interval was swabbed dry with only a rainbow show of oil. The San Andres possibly was found at approximately 650(?) feet.

Area 3 consists of folded Permian sediments that are capped in part by Quaternary basalt flows or alluvium.

Two tests have been drilled in Area 3. The first is in the SE¼NW¼ sec. 33, T. 6 S., R. 9 E., and is the Standard Oil Company of Texas No. 1 J. F. Heard. The test was spudded June 1950 in Quaternary basalt overlying San Andres. Total depth reached was 8,050 feet. The sedimentary section penetrated included rocks from the Permian San Andres down through the Pennsylvanian Atoka. Of significance to regional interpretations, the Standard Oil Company of Texas test penetrated a Bursum to upper Virgil age "Pow Wow" type conglomerate from approximately 4,800 feet to 6,050 feet. Of additional interest is the occurrence of a salt section in the Upper Permian rocks. The absence of salt in outcrop probably is due to solution, and the structural closure mapped around this test may have been caused, in part, by the differential solution of salt and the resulting slump of overlying rocks.

The most recent test is the Bryce Dugger No. 1 Federal, in the SW¼NW¼ sec. 30, T. 6 S., R. 10 E., and was drilled on the western edge of the Carrizozo "malpais" Quaternary basalt flows. Total depth of the well was 1,500 feet. The top of the Glorieta was reported at 975 feet, and the Yeso at 1,145 feet. A show of oil was found in percussion cores of the San Andres from approximately 476-492 feet. An attempt was made to complete the well in the San Andres but the attempt failed primarily due to a lack of porosity. This writer's understanding is that Mr. Dugger intends to attempt drilling another test located slightly down dip in search of porosity.

CONCLUSIONS

Numerous shows of oil have, over the years, been reported from various stratigraphic units in the area including the Dakota, San Andres, Glorieta, and the Yeso. However, the majority of oil shows reported are from the San Andres. The writer has observed the San Andres and correlative carbonates in this area and as far west as central Arizona. Much of the formation has a fetid to petroliferous odor, and often contains porosity. It is difficult to imagine that in this vast expanse there would be no coincidence of hydrocarbons, reservoir rock, and trap. The old saying may be very applicable to San Andres exploration in this area, "Where there's smoke . . ."

From the writer's observations, the most likely possibility for potential accumulation other than San Andres would be in the Pennsylvanian rocks. Exposures in the Sacramento and Oscura Mountains suggest that reservoir quality rocks are present in the area. The problem here, of course, is finding an adequate thickness of Pennsylvanian rocks off the structurally high Pedernal landmass. Exploration in this region would of necessity be confined to Area 3, which is nearly entirely outside of Lincoln County.

With our present economic climate and state of knowledge, the "Frontier" area of Lincoln County will probably not see active exploration by the major oil companies, or the large independents. Exploration and investigation will have to be continued by individual geologists with imagination, and the drilling and "oil finding" will be done by men like the Bryce Duggers.

As we all know, one well per 350 square miles is not sufficient density to condemn any county. One good commercial well would surely change the entire picture. Perhaps when the density of wells approaches 1 per 50 square miles, we might then have some basis for critical evaluation.