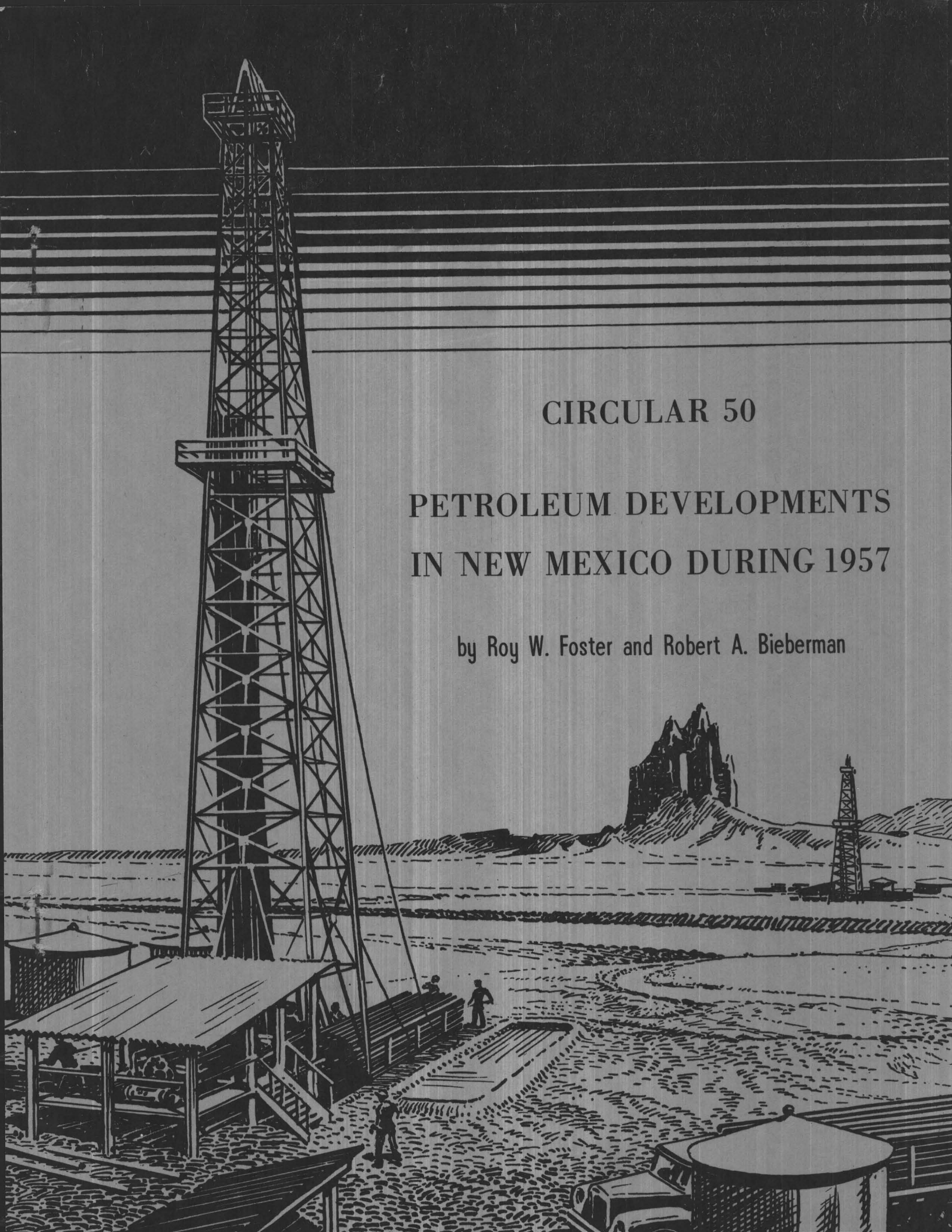

CIRCULAR 50

PETROLEUM DEVELOPMENTS IN NEW MEXICO DURING 1957

by Roy W. Foster and Robert A. Bieberman

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Cover drawing by David H. Moneypenny.

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ABSTRACT

The production of crude oil and natural gas continued to set new yearly records in New Mexico. Total production of crude oil and distillate in 1957 was 94,627,805 barrels, an increase of 6,707,316 barrels over 1956. Natural gas produced amounted to 728,645,000,000 cubic feet, more than 100 billion cubic feet higher than in 1956. New Mexico ranks 7th in oil, and 3d in natural gas production in the United States.

A total of 2,227 wells were drilled during the year , a slight increase over 1956. Wildcat exploration accounted for most of the gain, particularly in the San Juan Basin, where more than 200 wildcat wells were drilled. Drilling activity in the nonproducing counties declined from 34 wells in 1956 to 15 in 1957.

INTRODUCTION

hi 1957, the production of oil and gas reached an all-time high in New Mexico, with over 90 million barrels of crude oil and distillate , and over 700 billion cubic feet of gas, produced. Since 1950, the production of crude oil has almost doubled; during the same period, natural gas production has more than tripled (fig. 2). At the close of 1957, New Mexico ranked 7th in the production of crude oil, and 3d in the production of natural gas in the United States.

In addition to the setting of production records , a new high in well completions was established in 1957. Compared with 1956, there was a 3-percents increase in development drilling and a 20-percent increase in the number of wildcat wells drilled. More than half the wildcat wells were located in Rio Arriba and San Juan Counties, where testing of the Gallup sandstone greatly expanded the boundaries of the Bisti field. Elsewhere in the State, interest was centered in deep exploration in Lea and Eddy Counties and important new discoveries in Roosevelt County.

This report is a summary of production and drilling statistics for New Mexico during 1957. In addition to State and regional summaries, a discussion of the developments in each county is included, along with some historical data for those counties in which there was no drilling activity during the year. In the eight counties from which there was some oil or gas production, the status of each well drilled has been computed on the basis of its proximity to other producing wells or established pool boundaries on the date drilling of the well commenced. Wells located within 1 mile of a producing well or field that test rocks of the same geologic period or formation as the producing well or field are considered development or field wells. Wells spudded more than a mile from production, or that tested rocks previously nonproductive for a distance of at least 1 mile , are considered wildcats.

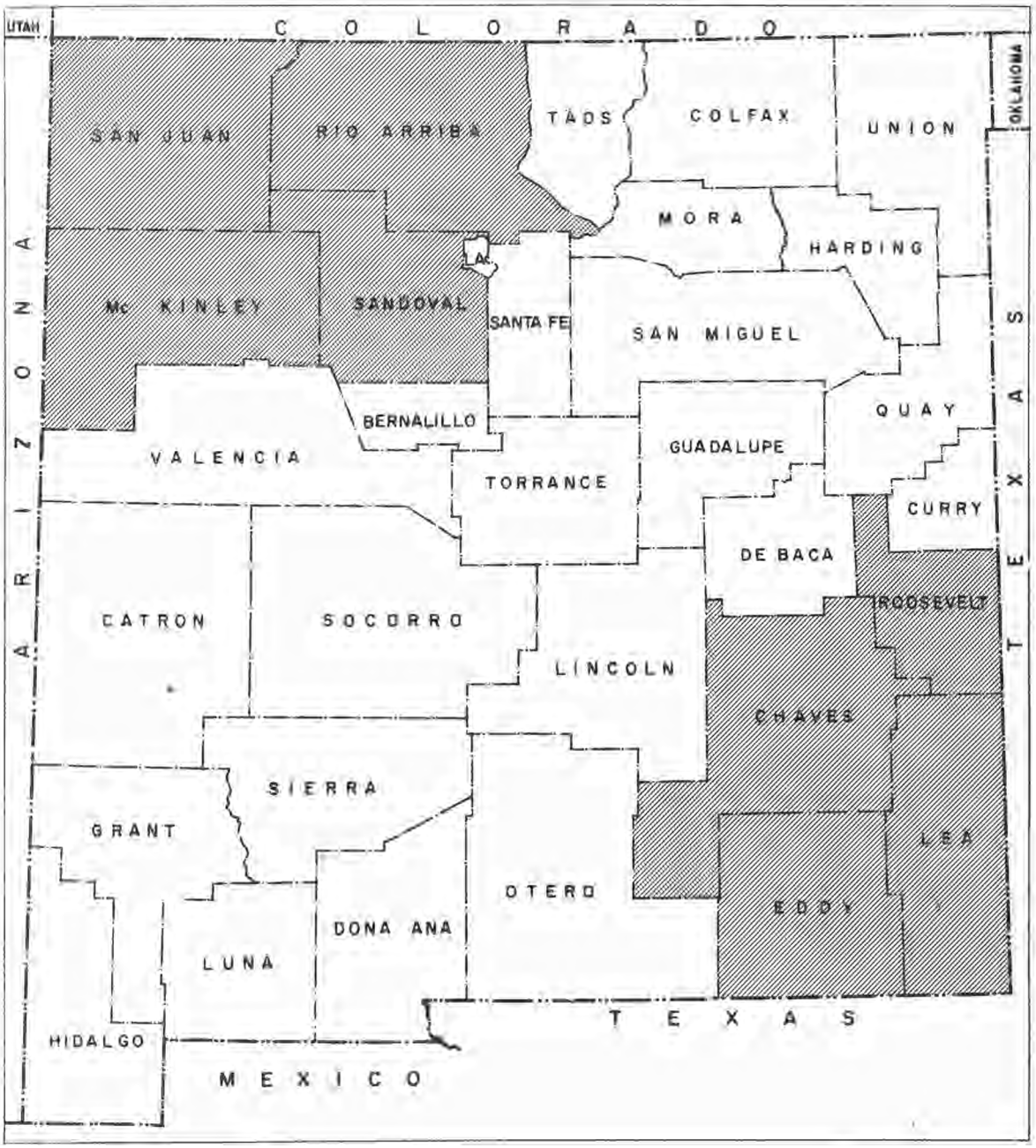


FIGURE I. COUNTY INDEX MAP OF NEW MEXICO, SHOWING PRODUCING COUNTIES

PRODUCTION SUMMARY

Oil production was reported from eight counties in New Mexico during 1957 (fig. 1). Over 99 percent of the total oil produced in the State came from four counties. Lea was the leader, with 86 percent of the total (fig. 3), followed by Eddy with 6.2 percent, Chaves with 4.5 percent, and San Juan with 2.4 percent. The less than 1 percent remaining came from Rio Arriba, Roosevelt, McKinley, and Sandoval Counties, in that order. Production of oil and distillate for the State showed an increase of 6,707,316 barrels over the previous record high set in 1956, for a total production of 94,627,805 barrels. Increases in production were reported from all counties except Chaves and McKinley, where there were slight decreases. Most of the production gain came from Lea County, although Roosevelt and San Juan Counties had the highest percentage gain over 1956 production figures.

The majority of the natural gas produced came from Lea County (fig. 3), which accounted for 57 percent of the total production. This represents a considerable decline from 1956, when Lea County supplied 65 percent of the natural gas production. The biggest gains were in Rio Arriba County, where production was more than double that of 1956, and in San Juan County, with a net gain of 58 billion cubic feet. Natural gas was produced in seven counties in 1957: (in order of production) Lea, San Juan, Rio Arriba, Eddy, Chaves, Roosevelt, and Sandoval. Total production for the State amounted to 728,645,000,000 cubic feet.

DRILLING SUMMARY

A total of 2,227 wells were completed in New Mexico in 1957, an increase of 152 tests from 1956. The biggest increases in drilling activity were in Lea, Eddy, and San Juan Counties, whereas decreases were recorded in Chaves, Sandoval, and the nonproducing counties. Drilling activity in San Juan and Rio Arriba Counties shifted from development of gas fields to wildcat exploration for oil and development of existing oil fields. In 1956, 105 oil wells and 666 gas wells were completed in the two counties; in 1957, 268 oil wells and 583 gas wells were completed. In San Juan County, oil well completions outnumbered those of gas wells. Lea County led in the number of wells completed, followed by San Juan, Rio Arriba, Eddy, Chaves, McKinley, Sandoval, and Roosevelt Counties.

Both wildcat and development drilling were highly successful during the year. Rio Arriba County led the State in successful completions, with 91 percent of the total wells and 70 percent of the wildcat tests proving commercial. Eighty percent of all the wells drilled in the State were successful, resulting in 1,143 oil wells, 629 gas wells, and 455 dry holes. Of the 384 wildcat tests drilled, 76 were completed as oil wells and 69 as gas wells; 239 were dry.

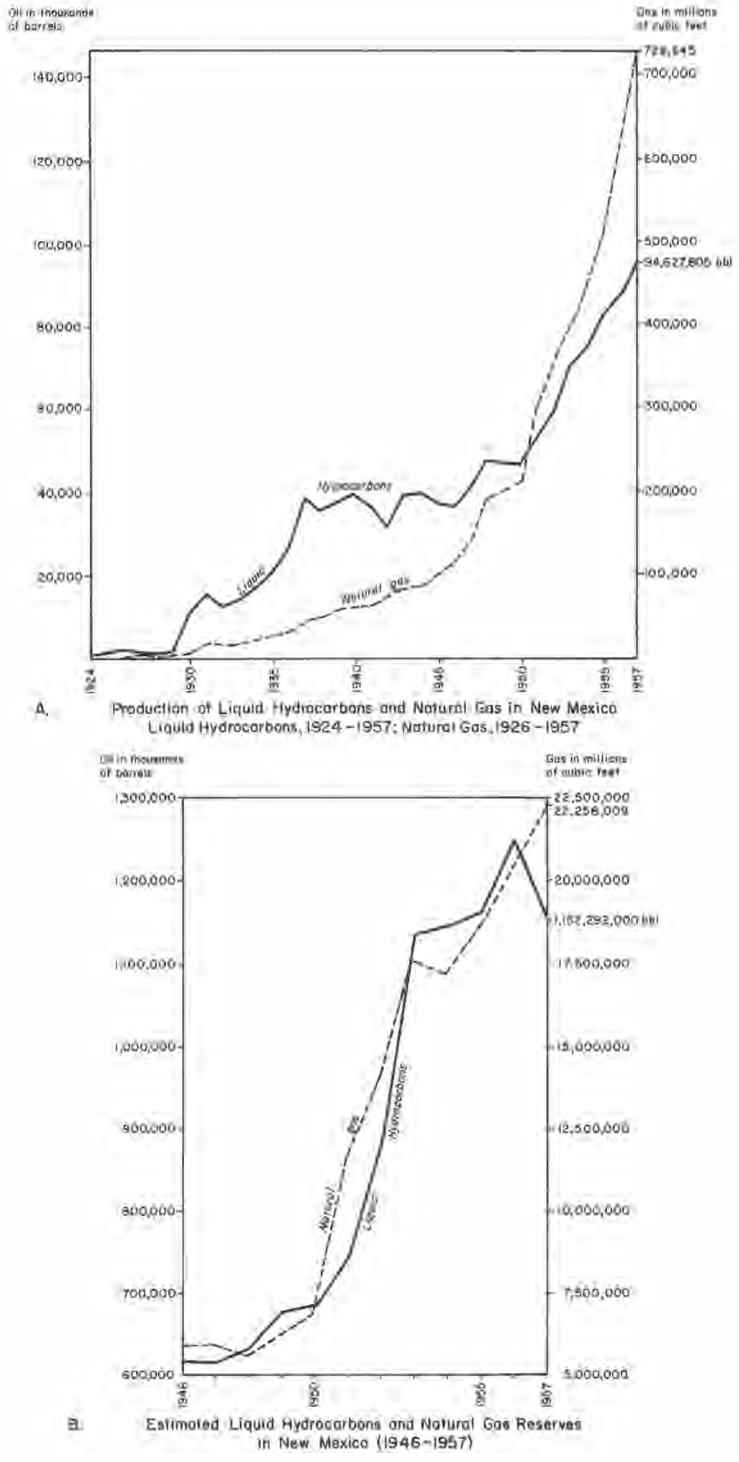


FIGURE 2. PRODUCTION AND RESERVES OF LIQUID HYDROCARBONS AND NATURAL GAS IN NEW MEXICO

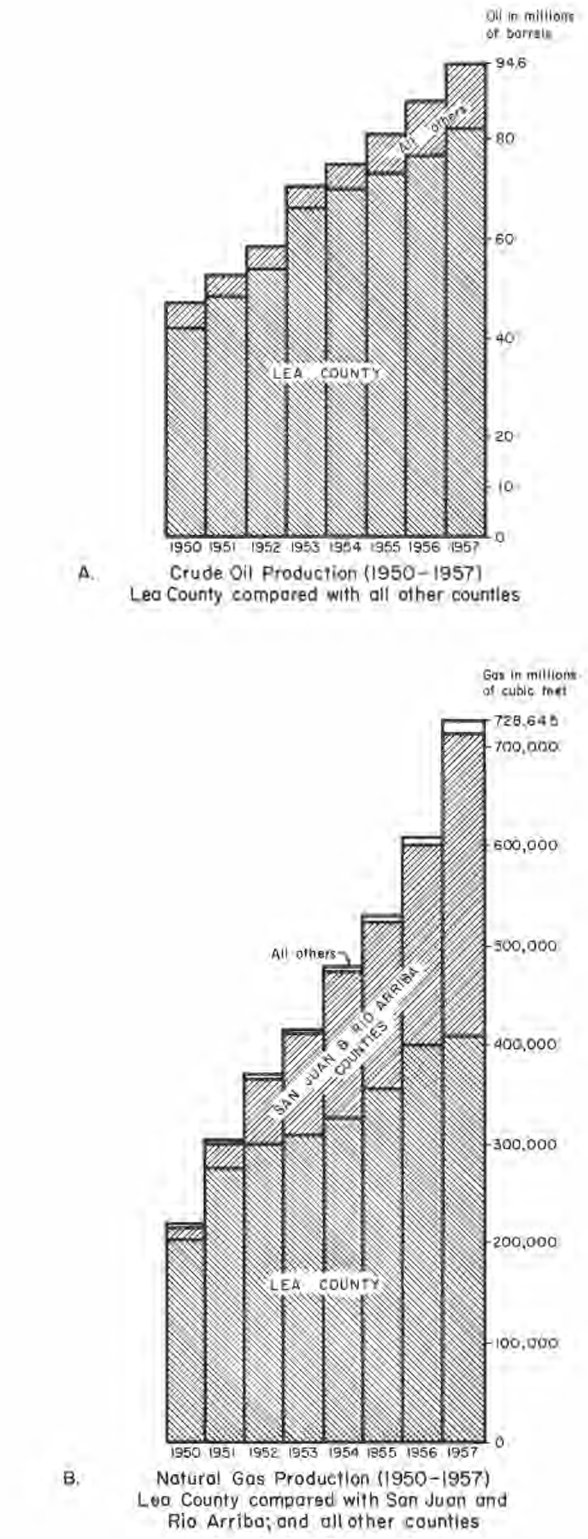


FIGURE 3. PRODUCTION OF CRUDE OIL AND NATURAL GAS IN LEA COUNTY COMPARED WITH PRODUCTION IN OTHER COUNTIES, 1950-1957

The average depth of wells drilled in New Mexico in 1957 was 4,947 feet, compared with 4,494 feet in 1956, and the national average of 4,122 feet. In the southeast, the average depth per well increased from 5,135 feet to 5,533 feet, and in the northwest, from 4,199 feet to 4,281 feet. The total footage drilled in the State amounted to 11,016,830 feet, of which 6,645,362 feet was drilled in the southeastern producing counties, and 4,327,935 feet in the northwest. Wildcat drilling in the nonproducing counties totaled 43,533 feet, for an average depth of 2,902 feet per well.

COUNTY SUMMARIES

Bernalillo County

Only 11 oil tests have been drilled in Bernalillo County, the earliest spudded in 1921 and the most recent plugged in 1948. Four of the wells, located on the east side of the Sandia Mountains , are the only ones to have penetrated rocks of Cretaceous age or older. The remaining tests were drilled in the Rio Grande Valley and probably bottomed in valley fill or the Santa Fe group.

Catron County

There is very little information about the 14 tests that have been drilled in Catron County since the early 1920's. Only two wells have been drilled to the Precambrian to test the available Paleozoic section, which is limited, for the most part, to rocks of Permian age. Neither test reported any shows of oil or gas.

Chaves County

Only 63 wells were drilled in Chaves County during 1957, compared with 123 in 1956 and 323 in 1955. Most of the drilling activity was centered in the Caprock-Queen area, which accounted for 26 of the 31 oil wells completed in the county. The remaining five wells were completed in the Brown pool. The total footage drilled was 166,112 feet, and the average depth 2,637 feet, compared with figures of 371,793 feet and 3,023 feet for 1956.

Sixteen wildcat tests were drilled during the year, a decrease of 11 tests from 1956. Only one of the wildcats was successful (fig. 4), finding gas in the Queen formation about 12 miles west of the Caprock-Queen pool. The average depth of wildcat wells was 2,736 feet, with only two pre-Permian tests drilled. Although almost all the present production in Chaves County comes from the Caprock-Queen pool, deeper drilling in the Wolfcamp, Pennsylvanian, and Devonian should uncover new reserves. At present, the deeper possible pay intervals are largely unexplored.

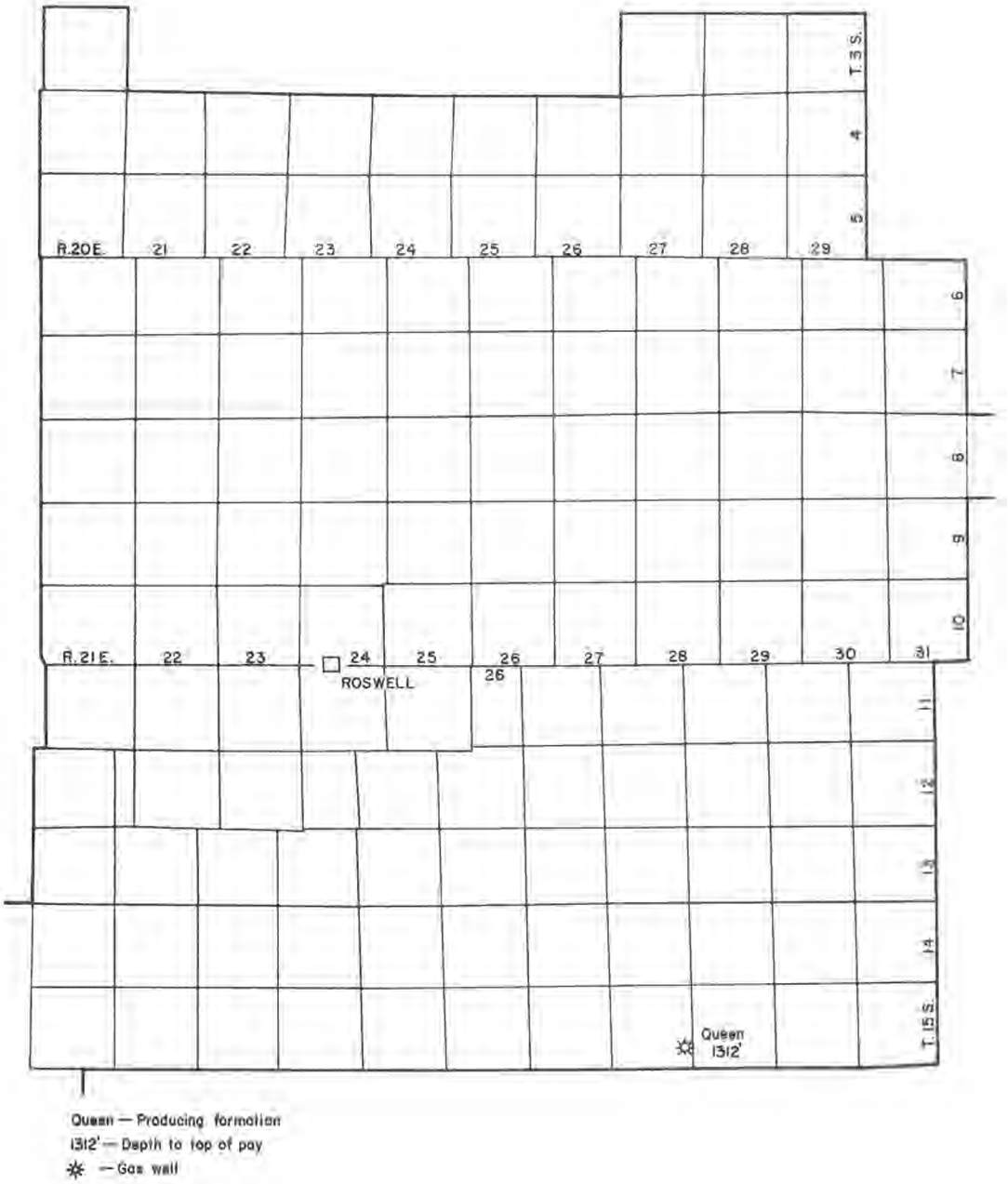


FIGURE 4. CHAVES COUNTY, 1957 DISCOVERIES

Production of oil decreased by almost 500,000 barrels from the high set in 1956, to 4,289,242 barrels. The county now ranks third in the production of oil in the State. Gas production increased to 2,405,725,000 cubic feet, almost 800 million cubic feet higher than in 1956.

Colfax County

A test of the Dakota sandstone in sec. 27, T. 25 N. , R. 21 E. , was the only well drilled in Colfax County in 1957. The well was located a few miles west of Springer and was spudded in the Niobrara formation. Samples received from the test included the interval from 500 to 1,070 feet, and some core from 1,086 to 1,125 feet. Formation tops estimated from the samples are: Carlile, 500 feet; Greenhorn, 725 feet; Graneros, 760 feet; Dakota, 925 feet; and Morrison, 1,105 feet .

Curry County

There were no oil tests in Curry County during 1957. A total of 21 wells have been drilled in the county, with shows of oil or gas reported from several of them. Three of the tests were drilled to Precambrian rocks.

De Baca County

Three shallow Permian wells were drilled in the county in 1957. A small show of oil was reported in the lower part of the San Andres limestone in one of the tests.

Dona Ana County

Twelve oil tests have been drilled in the county since the earliest report in 1930. Although there is little information on most of these wells, the majority probably did not drill through valley fill. The most recent test was completed in 1949.

Eddy County

For the second consecutive year, the production of crude oil and distillate increased by about 20 percent over the preceding year. The 1957 production figures show a total production of 5,909,657 barrels of oil, compared with 4,564,655 barrels

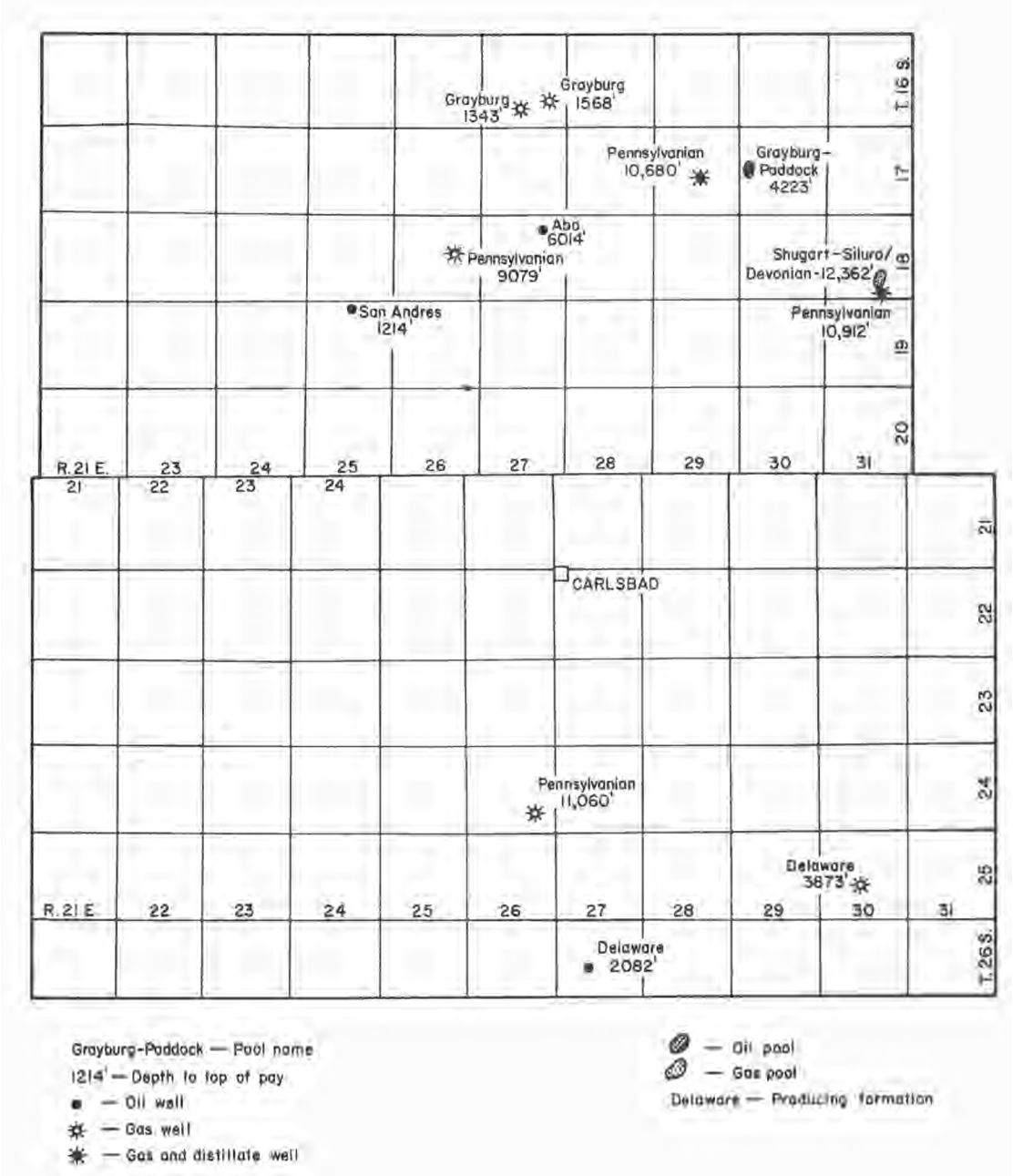


FIGURE 5. EDDY COUNTY, 1957 DISCOVERIES

in 1956, and 3,765,175 barrels in 1955. Natural gas production also increased; from 7,654,762,000 cubic feet in 1956 to 9,676,518,000 cubic feet in 1957. In the State, Eddy County ranks second in the production of oil and fourth in the production of natural gas.

A total of 338 wells were drilled, compared with 277 in 1956 and 170 in 1955. Footage drilled amounted to 975,954 feet, for an average depth of 2,887 feet per well; both figures represent increases over 1956. A breakdown of the wells drilled reveals that 72 percent were completed as producing oil or gas wells. Field wells numbered 288 and resulted in 226 oil wells, 4 gas wells , and 58 dry holes. Of the 50 wildcats drilled, 12 found production (fig. 5), with the completion of 4 oil wells and 8 gas wells.

Most of the drilling activity was centered in the older fields, such as Artesia with 37 completions, the Grayburg-Jackson with 30, and the Atoka pool with 27. There was, however, considerable drilling done in the Cave-Grayburg and West Henshaw-Grayburg pools, both of which were discovered in 1956.

Although the wildcat activity in Eddy County was almost evenly divided between the back reef or shelf area and the Delaware Basin, 9 of the 12 successful wildcats were drilled on the shelf along the Artesia-Vacuum trend. Of the 20 wells drilled in the Delaware Basin during the year, there was only one deep test. The well was completed in the lower Pennsylvanian for an estimated daily production of 6 million cubic feet of gas. This is the second successful deep well drilled in the Basin; the first, completed in 1956, also produces gas from the Pennsylvanian. Only two of the remaining shallow wildcats drilled in the Basin were successful, one finding oil, the other gas, in the Delaware formation. The oil well tested at 31.5 barrels of oil and 17.5 barrels of salt water per day. Estimated production from the gas well was 2 million cubic feet per day.

Successful wells on the shelf found production in the Grayburg, San Andres, Paddock, Abo, Pennsylvanian, and Siluro /Devonian intervals. Two Grayburg gas wells were completed in T. 16 S. , R. 27 E.; one of the wells for an estimated flow of 1 million cubic feet of gas per day. The nearest Grayburg production is about 6 miles south in the Red Lake area. A shallow San Andres discovery in T. 19 S. , R. 25 E. , is the most westerly producing well in southeastern New Mexico. The well tested at 46 barrels of oil per day, with pay interval from 1,214 to 1,230 feet. The discovery well of the Grayburg-Paddock pool was drilled as a Pennsylvanian test about a quarter of a mile southeast of the Anderson-Pennsylvanian gas pool. No shows were encountered in the Pennsylvanian, and the well was plugged back to the Paddock zone and completed for 20 barrels of oil and 60 barrels of salt water per day. It is the only well producing from the Glorieta in Eddy County. Abo production was found in T. 18 S. , R. 27 E. , about 2 miles southwest of the Empire-Wolfcamp pool. The well tested at 84 barrels of oil per day, with a gas-oil ratio of 1,503 to 1. In addition to the Pennsylvanian gas discovery in the Delaware Basin, three other gas wells were completed in this interval in the shelf area. Initial potential tests on these wells varied from 6 million to 22 million cubic feet of gas per day. Distillate production for one of the tests was reported as 35.7 barrels per million cubic feet of gas.

The first pre-Pennsylvanian producing well drilled in Eddy County was completed during the year for an initial production of 8,053,000 cubic feet of gas and 516 barrels of distillate per day from the Siluro/Devonian interval. The well is about 6 miles southwest of the nearest Devonian production, near Maljamar in Lea County.

Deep drilling in Eddy County proved highly successful during 1957, with 9 tests drilled to depths below 10,000 feet, and 5 completed as producing wells in the pre-Permian rocks at depths of nearly 10,000 feet or deeper.

Grant County

Six tests have been drilled in the county. The most recent was completed in 1951. The deepest test drilled bottomed at 1,900 feet in Tertiary sediments. No shows have been reported.

Guadalupe County

The deepest part of the New Mexico portion of the Palo Duro Basin lies in Guadalupe County, making it one of the most attractive wildcat areas in the State. Although none of the 33 wells drilled in the county have found commercial quantities of oil or gas, numerous shows have been reported. Although there was no drilling activity in 1957, the prospects for future exploration are good.

Harding County

The entire present production of carbon dioxide gas in New Mexico comes from Harding County. The gas is produced from several intervals at the Bueyeros field, including two conglomeratic sandstones in the Triassic, a fine-grained sandstone in the Yeso, and coarse arkosic conglomerates in the Sangre de Cristo formation. Production for 1957 totaled 358,446,000 cubic feet of gas, from which 34,428,894 pounds of dry ice was produced. Carbon dioxide gas also occurs in San Miguel, Torrance, Colfax, Mora, and Union Counties.

Hidalgo County

The first test of lower Paleozoic rocks drilled in Hidalgo County was completed in 1957. Ground-level elevation of the well was given as 4,349 feet, and the total depth as 2,726 feet. The well was spudded in the Mississippian Escabrosa limestone in the SW1/4 sec. 12, T. 30 S. , R. 15 W. Formation tops are as follows: Percha shale, 750 feet; Montoya group, 1,395 feet; El Paso limestone, 1,515 feet; and Precambrian(?) , 2,720 feet. The Fusselman limestone apparently is not present in the Big Hatchet Mountains a short distance to the west, and it is considered to be absent in this well.

Lea County

A total of 787 wells were completed in 1957, compared with 721 completions in 1956. Eighty-one percent of the wells were successful, resulting in 596 oil wells, 33 gas wells, 7 dual completions, and 151 dry holes. Field wells numbered 712, of which 578 were completed as oil wells, and 30 as gas wells. Twenty-nine percent of the 75 wildcat wells drilled in the county during the year found production, with the completion of 18 oil wells, 3 gas wells, and 1 dual oil well. The total footage drilled during 1957 amounted to 5,392,487 feet, giving an average depth of 6,894 feet per well. This represents a considerable increase over 1956, when the total footage drilled was 4,691,386 feet and the average depth per well was 6,507 feet. In the last 3 years, the average depth of wells in Lea County has increased by more than 1,200 feet. This is directly attributable to the high success ratio of tests drilled into pre-Permian rocks, particularly the Devonian.

Most of the drilling activity in the county was centered in the Eumont field, where 146 tests were drilled; the Gladiola-Devonian pool, with 64 completions; Jalmat, with 55; South Eunice, with 51; and Langlie Mattix, with 47. The greatest footage drilled in any one field was in the Gladiola-Devonian pool, with a total of 768,979 feet.

Production of crude oil and distillate increased from the previous record high of 76,954,315 barrels produced in 1956 to 81,405,720 barrels in 1957. The total gas production amounted to 409,863,954,000 cubic feet, a little over 9 billion cubic feet higher than in 1956. Approximately 86 percent of the oil and 56 percent of the gas produced in the State comes from Lea County (fig. 3). Most of the large pools in the State are also located in this county, the only exceptions being the Caprock-Queen pool, which lies mostly in Chaves County, and a small portion of the Maljamar pool, which overlaps into Eddy County. The 10 largest oil fields in the State, based on 1957 production figures, are (in order): Denton-Devonian, Eunice Monument, Caprock-Queen, Gladiola-Devonian, Eumont, Vacuum, Hobbs,

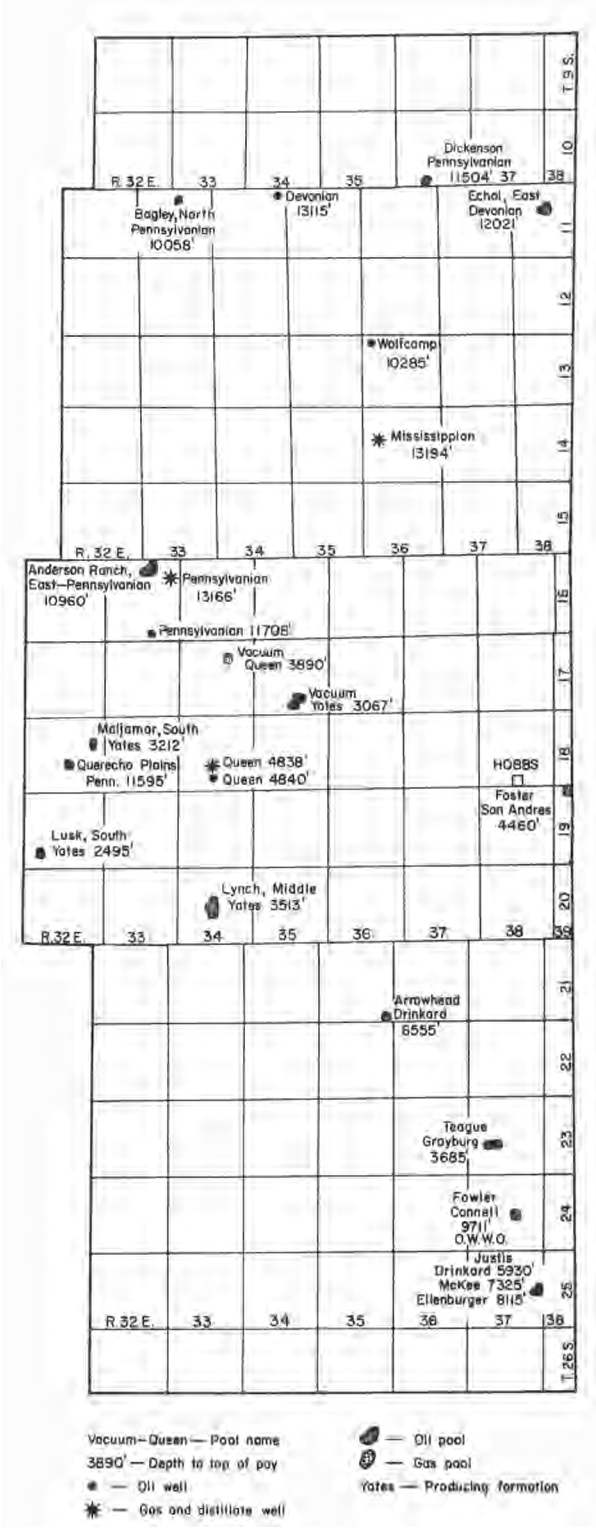


FIGURE 6. LEA COUNTY, 1957 DISCOVERIES

Townsend-Wolfcamp, Maljamar , and Jalmat. By late 1957, however , the Gladiola-Devonian pool led in monthly production figures. The largest gas fields in the county are the Jalmat, Eumont, and Blinebry. In production, they rank behind the Blanco-Mesaverde pool of Rio Arriba and San Juan Counties, which is the largest gas pool in the State.

Of the 22 successful wildcats drilled in the county (fig. 6) , 4 were completed in the Yates, 3 in the Queen, 1 each in the Grayburg, San Andres, Drinkard, and Wolfcamp, 6 in the Pennsylvanian, 1 in the Mississippian, 2 in the Devonian, 1 in the Ellenburger , and a dual completion in the Drinkard and McKee. The Yates discoveries are in the shelf area of central Lea County in the vicinity of other Yates production. Eight tests were drilled in the Vacuum-Yates pool during the year, 6 of them completed as oil wells , and the remaining 2 temporarily abandoned. Initial potential tests varied from 64 to 88 barrels of oil per day; no water was reported. The average depth to the pay interval is 3,048 feet. The discovery wells were the only tests drilled in the other three Yates pools. Initial potential tests of these 3 wells were below 60 barrels of oil per day. Salt water at the rate of about 4 barrels a day was reported from the South Lusk well.

The Vacuum-Queen discovery in the Vacuum trend is about 5 miles from other Queen production in the Corbin and Hume pools. Initial production tests gaged 5 million cubic feet of gas per day, with perforations from 3,890 to 3,916 feet in the upper part of the Queen. The other two Queen discoveries are almost 2 miles east of the boundary of the E. K. - Queen pool, in an area of considerable production from the Queen formation.

The Grayburg discovery in the multipay Teague field of southeastern Lea County and the San Andres discovery east of Hobbs are relatively small, but important new stepouts for both these intervals. The Teague-Grayburg pool is a considerable distance south of the nearest Grayburg production at the Penrose Skelly pool, which formerly was the southernmost Grayburg pool in the county. The San Andres discovery is 3 miles east of the present boundaries of the Hobbs pool.

The first test drilled in T. 13 S. , R. 36 E. , resulted in discovery of oil in the Wolfcamp, with the top of pay at 10,285 feet. Initial production tests recovered 240 barrels of oil per day. The well bottomed in the Devonian at 14,393 feet, with no other shows reported.

Widely scattered Pennsylvanian discoveries were made in northern Lea County during the year. The Dickenson-Pennsylvanian discovery well was completed for an initial production of 151 barrels of oil per day, and the North Bagley-Pennsylvanian well for 531 barrels per day and a gas-oil ratio of 4,445 to 1. A south offset to the North Bagley well found 7.8 barrels of oil and 519,000 cubic feet of gas per day on drill stem test. Four tests were drilled in the East Anderson Ranch-Pennsylvanian pool, in T. 16 S. , R. 33 E. Two of these tests were plugged and abandoned after encountering salt water and shows of oil and gas in the Pennsylvanian. A wildcat test drilled in section 12 halfway between the East Anderson Ranch- and

Kemnitz-Pennsylvanian pools found gas and distillate in the lower Pennsylvanian. Another wildcat in section 34 of the same township had an initial production of 1,056 barrels of oil per day from the upper part of the Pennsylvanian. The southernmost Pennsylvanian discovery in Lea County during the year was the Querecho Plains wildcat, in T. 18 S. , R. 32 E. The nearest Pennsylvanian production is in eastern Eddy County in the Fren area.

The wildcat test in T. 14 N., R. 36 E. , is the third well in southeastern New Mexico from which production has been obtained from rocks of Mississippian age. The other two wells, in the Crossroads and Denton fields, were abandoned in 1950 and 1951, respectively, after a short period of small production. The present well is the first gas well completed in the Mississippian in the county. Initial tests recovered 10,300,000 cubic feet of gas per day, with a gas-oil ratio of 15,500 to 1. Gravity of the distillate is 52° A. P. I.

There were 2 Devonian discoveries in Lea County in 1957, compared with 7 in the preceding year. A total of 4 wells were drilled in the East Echol-Devonian pool, resulting in 2 oil wells and 2 dry holes. The new field is about 3 miles from other Devonian production at the Moore, Gladiola, and Echol pools. The other Devonian discovery, in T. 11 S. , R. 34 E. , is a considerable distance from the nearest Devonian production.

The Justis-Ellenburger pool, discovered in June , is located on the Central Basin Platform in one of the most intensely drilled areas in the State. The first pre-Permian test in Lea County was drilled in this township, but there has been little deep exploration since. Three offsets to the discovery well were drilled in late 1957, and all were completed, with initial potentials in excess of 400 barrels of oil per day. Another test drilled in the same area was completed as a dual oil well, with production found in the Drinkard and McKee intervals. The McKee was tested at 274 barrels of oil per day, and the Drinkard zone at 33 barrels per day.

The Connell discovery in T. 24 S. , R. 37 E. , was originally drilled in 1950 and completed for 350 barrels of oil per day from the Ellenburger. The test was deepened in 1956, and in 1957 was plugged back and completed in the Connell for 32 barrels a day.

Lincoln County

There have been about 14 oil tests drilled in Lincoln County, the most recent completed in 1956. Certain areas in the county are worthy of further exploration.

Los Alamos County

Los Alamos County is not open to leasing or drilling. The area is underlain by Tertiary volcanics and sediments of unknown thickness.

Luna County

About 13, generally shallow, oil tests have been drilled in Luna County. The deepest test drilled was completed in 1924, at a total depth of 6,171 feet, in Tertiary sediments.

McKinley County

Whereas all the 1956 oil production in McKinley County came from the Hospah pool, there was, in addition, a small amount of production in 1957 from the old Red Mountain pool, discovered in 1934. Total production for 1957 amounted to 129,248 barrels, with no gas reported.

Twenty-eight wells were drilled in the county during the year, 1 of them an offset to the Walker Dome-Mancos pool, and the others wildcats; all were dry and abandoned. The total footage drilled was 70,462 feet, and the average depth per well 2,517 feet. Only 5 of the tests drilled through the Cretaceous section, and only 1 bottomed below the Morrison formation.

Mora County

Mora County has had only 4 oil tests, with 2 reporting shows of carbon dioxide gas. The most recent test was the Shamrock No. 1 McArthur, completed in 1953.

Otero County

One test, the Eisner No. 1 Federal, was drilled in Otero County in 1957. The well was spudded in the Yeso formation, with a derrick-floor elevation of

4,911 feet, and bottomed in upper Pennsylvanian beds at 1,775 feet. The test was located in sec. 21, T. 24 S., R. 12 E., on Otero Mesa.

Quay County

Although there was no drilling activity in Quay County during 1957, almost 50 wells have been drilled in the county since the first test was spudded in 1920. Many of the tests had shows of oil or gas.

Rio Arriba County

Natural gas production in Rio Arriba County was more than double the previous record high set in 1956. Production amounted to 91,887,006,000 cubic feet, compared with the 1956 production of 43,040,091,000 cubic feet. Oil and distillate production increased by almost 70,000 barrels over 1956, for a total production of 472,615 barrels. Crude oil production decreased slightly, but distillate production was more than double that of the preceding year. Most of the gas production comes from the Blanco-Mesaverde and the South Blanco-Pictured Cliffs pools. Ninety percent of the crude oil produced comes from the South Blanco-Tocito pool, and most of the distillate from the Blanco-Mesaverde pool.

Wells completed in 1957 numbered 395, for a total footage of 1,760,667 feet, and an average depth per well of 4,457 feet. Corresponding figures for 1956 were 362 completed wells, a total footage of 1,500,983 feet, and an average depth of 4,146 feet. Of the wells drilled in the county, 11 tested down to the Morrison formation, and 7 others bottomed in the Dakota sandstone; no pre-Morrison tests were drilled. Field wells drilled numbered 329 and resulted in 5 oil wells, 244 gas wells, 62 duals completed as gas wells, and 18 dry holes. The 5 oil wells were producing from the Gallup sandstone in an undesignated area, but were drilled within 1 mile of Gallup production. In 25 of the 62 dual gas wells completed, part of the production was found in the Pictured Cliffs, Chacra, Mesa-verde , or Dakota intervals in previously undesignated areas; thus, in a sense , they are wildcat discoveries. They are included in the wells plotted in Figure 7. The most actively drilled fields in the county were the South Blanco-Pictured Cliffs, with 129 completions , and the Blanco-Mesaverde, with 102 completions.

Sixty-six wildcats were drilled, and 46 were successfully completed, resulting in 10 oil wells and 36 gas wells (fig. 7). The oil wells are producing from the Gallup sandstone, and all but one are located in the extreme southwestern

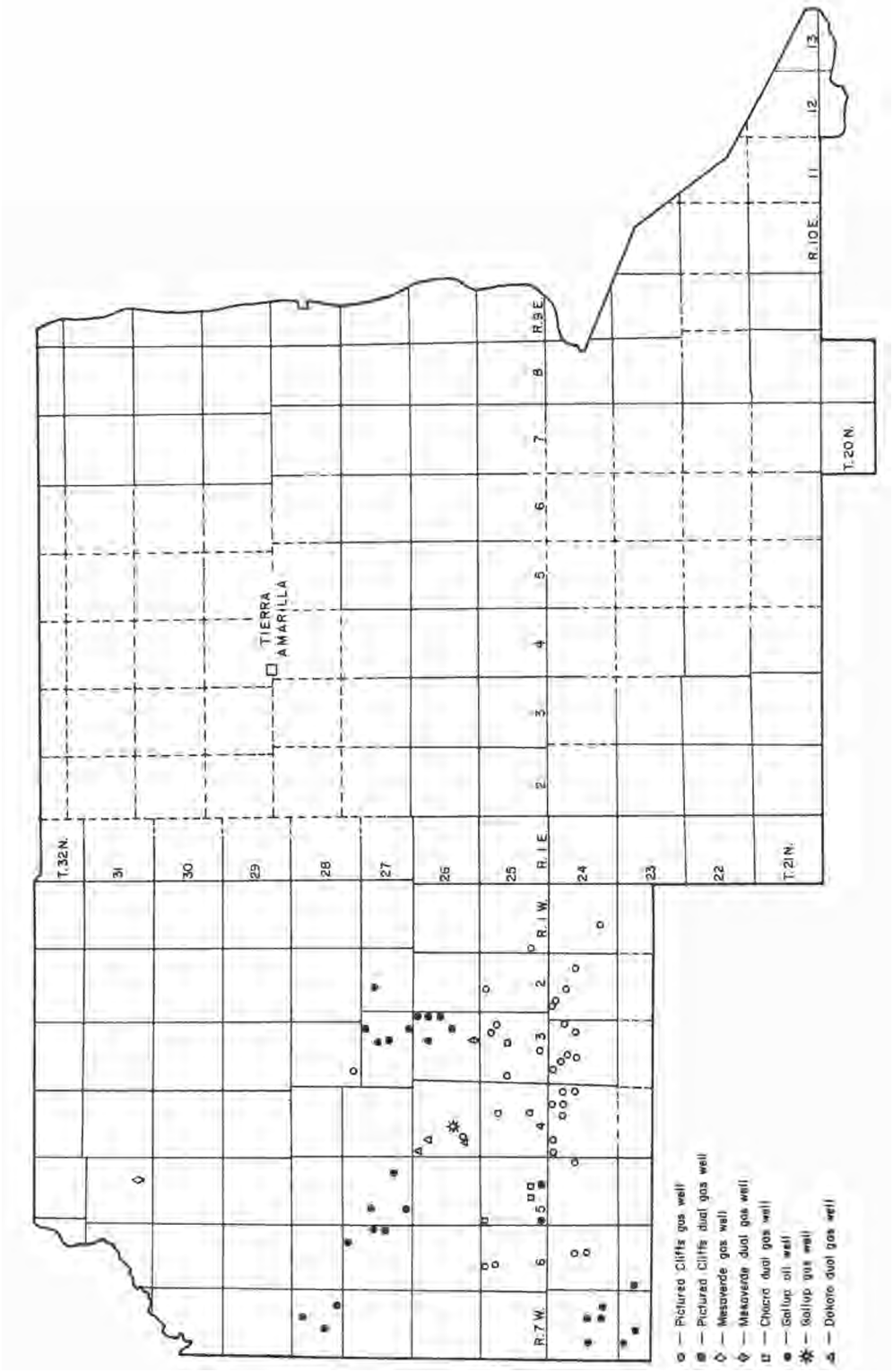


FIGURE 7. RIO ARRIBA COUNTY, 1957 DISCOVERIES

corner of the county adjacent to similar discoveries in San Juan and Sandoval Counties. The average depth to the top of the pay interval is 5,750 feet, and initial production tests ranged from a low of 6 to a high of 192 barrels of oil per day. The Gallup outpost in T. 27 N. , R. 2 W. , is the northernmost well producing from this interval in Rio Arriba County. The well tested at about 6 barrels of oil in 3 hours, with the top of pay at 7,264 feet. Gas in the Gallup was discovered in *sec.* 21 T. 26 N. , R. 4 W. , and gaged at 5,663,000 cubic feet per day. Top of the pay was given as 6,794 feet.

A total of 34 Pictured Cliffs wildcat gas wells were drilled in the county. By the end of the year, 19 of these wells were included in the South Blanco-Pictured Cliffs pool; 1 each in the Canyon Largo- and Gavilan-Pictured Cliffs pools; and 3 each in the Otero- and Tapicito-Pictured Cliffs pools. The remaining 7 wells were undesignated.

The Mesaverde wildcat in T. 31 N. , R. 5 W. , was undesignated at the end of the year. The well is a little over a mile east of the present boundaries of the Blanco-Mesaverde pool.

Roosevelt County

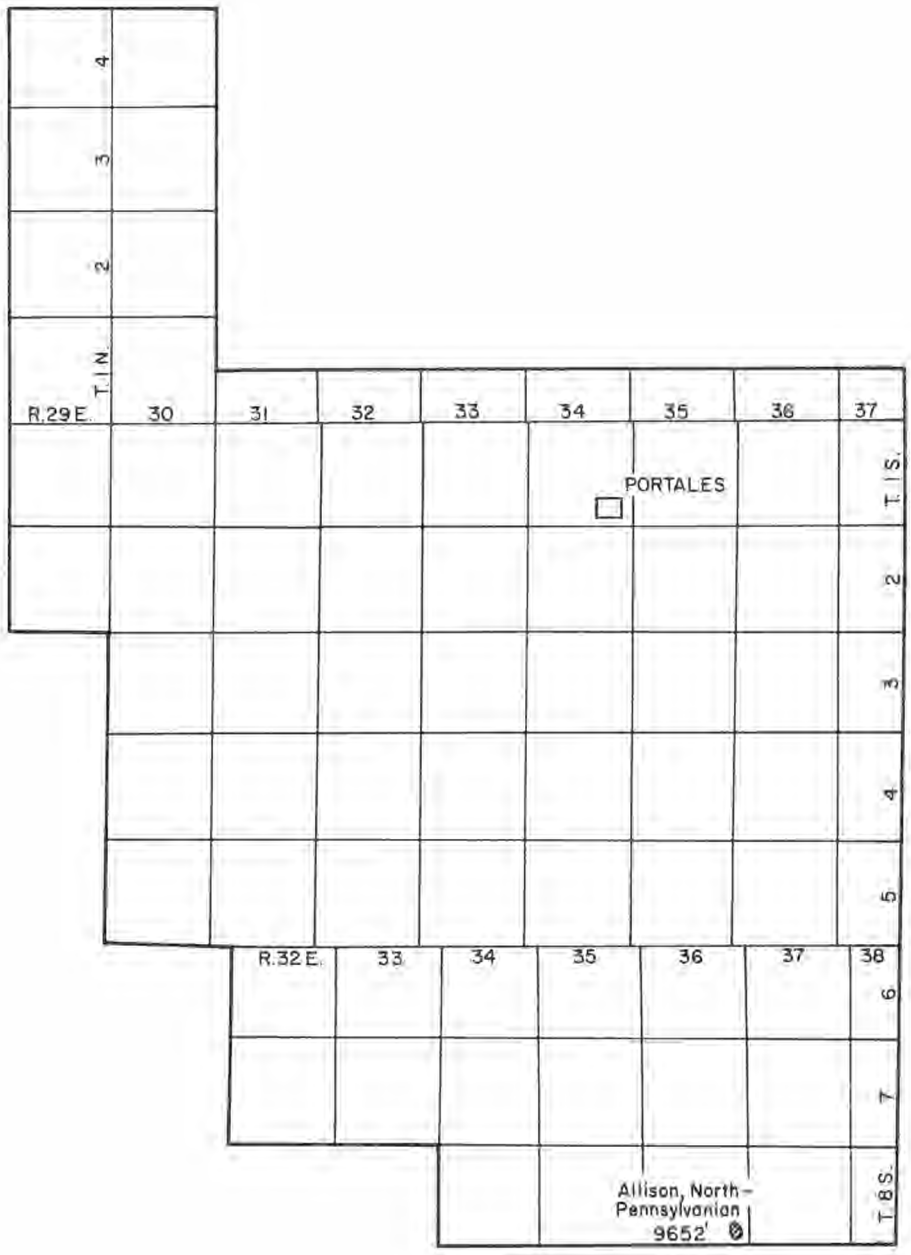
Thirteen wells were drilled in Roosevelt County, 7 of them in the Milnesand-Pennsylvanian pool which was discovered in 1956. Six of these wells were completed as oil wells, and 1 was temporarily abandoned. The average depth to the top of the pay interval is 9,246 feet. Another Pennsylvanian discovery was completed during the year some 12 miles east of the Milnesand pool (fig. 8) , and about a mile north of Pennsylvanian production in the Allison pool in northern Lea County. Initial production was 359 barrels of oil a day, with top of pay at 9,652 feet. The area has been designated as the North Allison-Pennsylvanian pool.

The average depth of wells drilled in Roosevelt County was 8,524 feet, based on a total footage drilled of 110,809 feet. The average depth of the 6 wildcats was 7,622 feet, with 1 test drilled to the Precambrian.

Production of oil increased from 10,533 barrels in 1956 to 176,036 barrels in 1957, and gas produced with oil from 7,387,000 cubic feet to 241,690,000 cubic feet. Roosevelt County, which ranked last in production of oil among the 8 producing counties in 1956, now ranks 6th.

Sandoval County

The 1957 oil production for Sandoval County amounted to 17,929 barrels; gas production was 8,445,000 cubic feet. This is an increase over 1956 of about



Allison, North - Pennsylvanian — Pool name
9652' — Depth to top of pay
— Oil pool

FIGURE 8. ROOSEVELT COUNTY, I957 DISCOVERIES

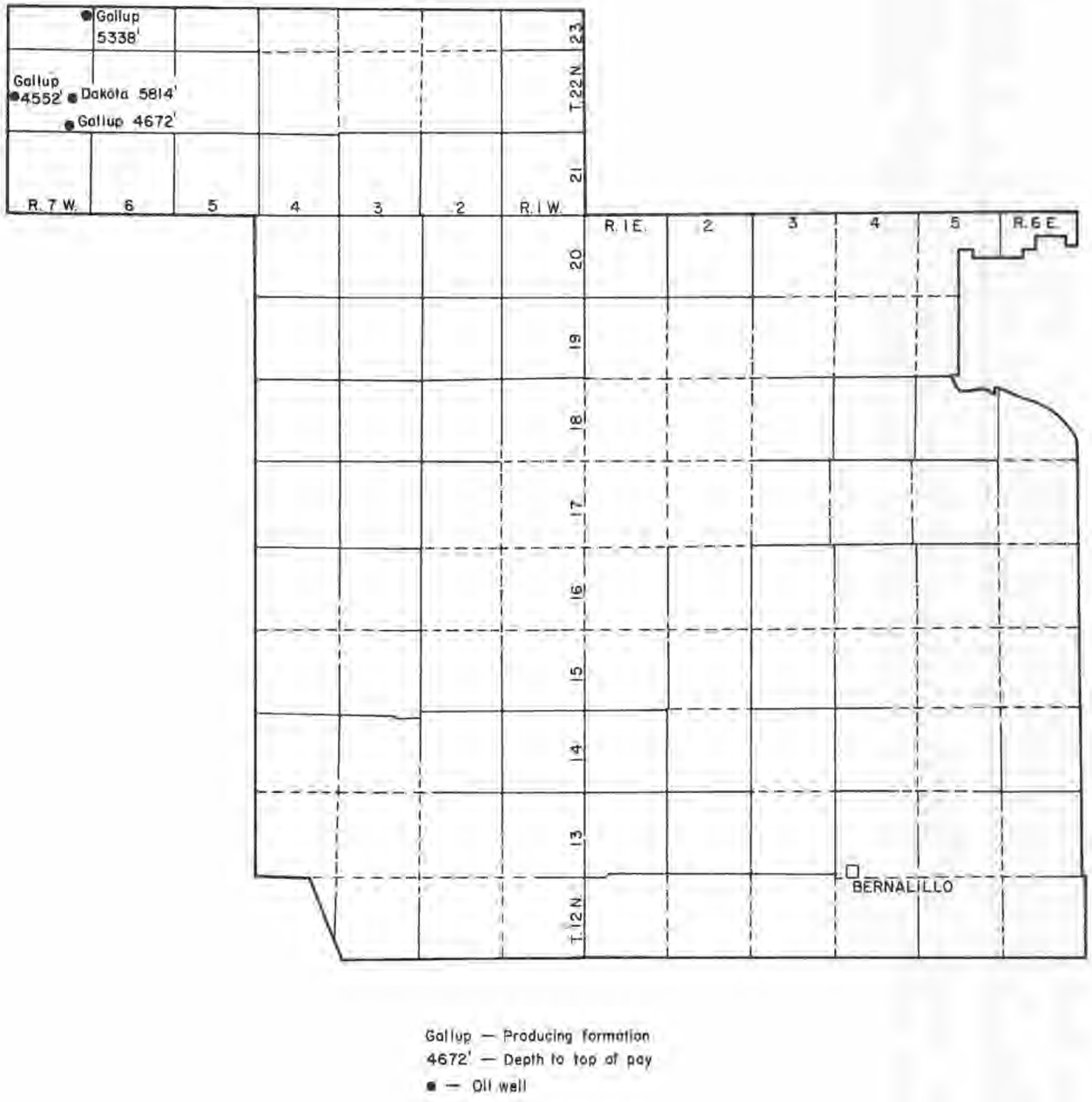


FIGURE 9. SANDOVAL COUNTY, 1957 DISCOVERIES

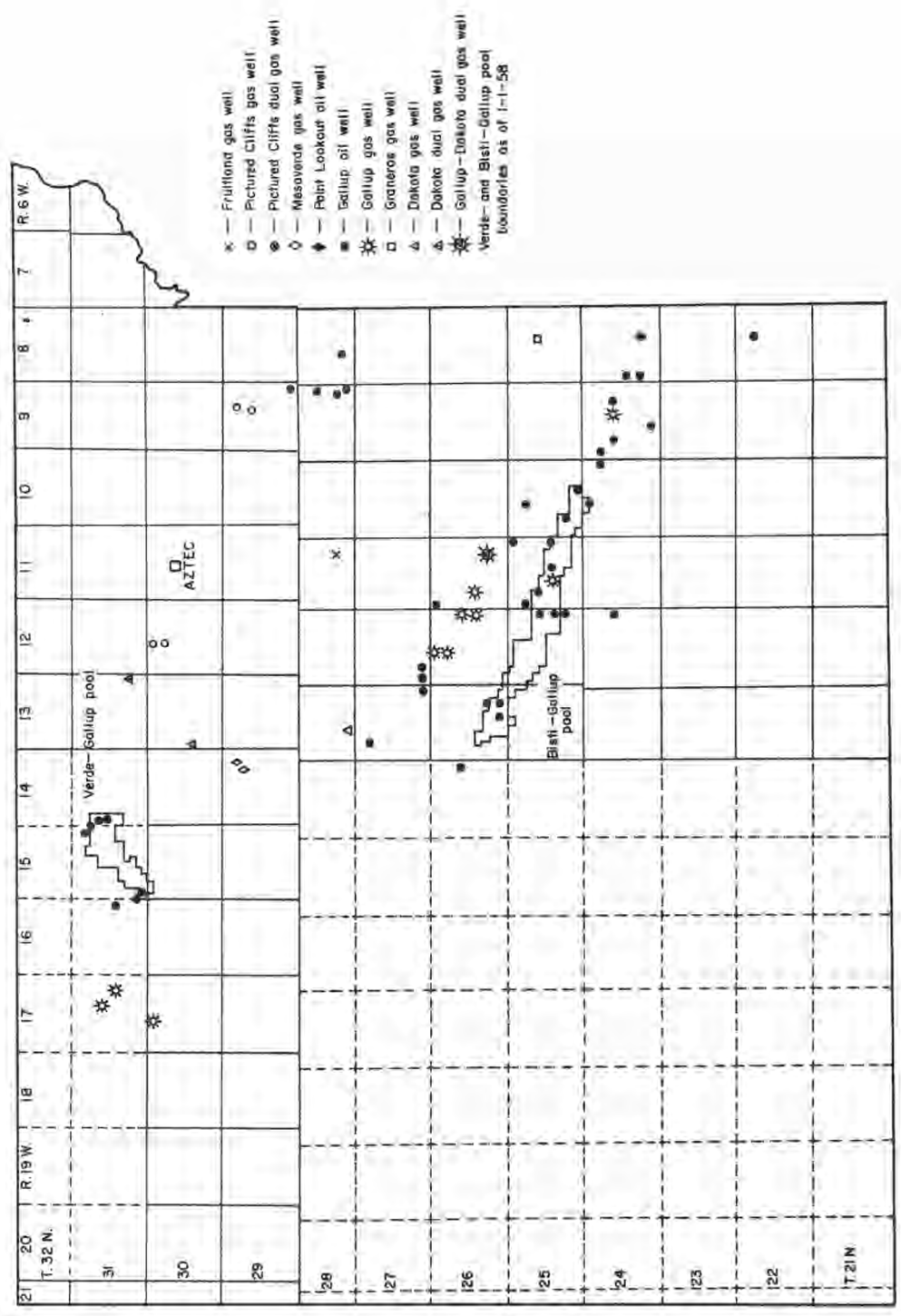


FIGURE 10. SAN JUAN COUNTY, 1957 DISCOVERIES

1,000 barrels of oil and 3 million cubic feet of gas. Most of the crude oil produced came from undesignated Gallup wells, and most of the natural gas from the Otero-Sanastee pool. There was no production reported from pre-Cretaceous rocks.

Seventeen wells were completed in the county during 1957 for a total footage drilled of 82,817 feet, and an average depth per well of 4,872 feet. Two tests were drilled in the Torreon-Mesaverde oil pool, resulting in 1 plugged and 1 temporarily abandoned well. Oil discoveries continued in the extreme northwest corner of the county, where 10 of the 15 wildcats were drilled (fig. 9). Four oil wells were completed, 3 in the Gallup and 1 in the Dakota sandstone. Initial production reported ranged from 24 to 80 barrels of crude per day.

San Juan County

Over 250 oil wells were completed in San Juan County in 1957, and the production of oil increased by more than 100 percent over the previous record high set in 1956. Total oil and distillate production was 2,227,358 barrels, compared with 1,060,802 barrels in 1956. Almost all the oil production comes from the Gallup sandstone , with minor amounts from the Dakota and Pennsylvanian intervals. Natural gas produced during the year totaled 214,561,662,000 cubic feet, an increase of over 58 billion cubic feet. Seventy-four percent of all the gas produced in the county comes from the Blanco-Mesaverde pool.

Wells completed during 1957 totaled 571, an increase of 63 over 1956. Eighty-seven percent of these wells were successfully completed, resulting in 253 oil wells, 199 gas wells, 42 dual gas wells, and 77 dry holes. Drilling activity was concentrated in the Bisti-Gallup area, with 148 wells drilled; the Blanco-Mesaverde field, with 77 completions; and the Verde-Gallup area, with 46 completions. The total footage drilled in San Juan County was 2,413,989 feet for an average depth per well of 4,228 feet, compared with 1,805,037 feet and 3,553 feet in 1956. Field wells numbered 457, with the completion of 215 oil wells, 179 gas wells, 41 dual gas wells, and 22 dry holes. Of the 41 dual completions, 5 found gas in the Pictured Cliffs sandstone, and 1 in the Dakota sandstone, in undesignated areas. Thirty-five of the oil wells and 3 of the gas wells were also undesignated at the end of the year, but were drilled within 1 mile of wells producing from the same interval.

San Juan County ranked first in the State in the number of wildcat wells drilled, with 114 completions. Fifty-one percent of the wells found production, with the completion of 38 oil wells, 20 gas wells, 1 dual gas well, and 55 dry holes (fig. 10). Thirty-seven of the oil wells were completed in the Gallup sandstone, and 1 in the Point Lookout sandstone. At the end of the year , 13 of the Gallup wells were included in the Bisti-Gallup pool, and 6 in the Verde-Gallup pool. The 8 oil

wells southeast of the present boundary of the Bisti pool are on a line with similar discoveries in Rio Arriba and Sandoval Counties; they extend the, as yet, undesignated limits of the pool about 25 miles to the east. The average depth to the top of the pay interval in this area is 5,185 feet, and the average initial production is 93 barrels a day. The Point Lookout well in this same area is an offset to a similar discovery completed in 1956.

Thirteen additional Gallup wells were completed several miles north of the Bisti pool following the discovery of gas in this area in 1956. Seven of the tests were completed as oil wells, and 6 as gas wells. The average initial production of the oil wells was 198 barrels a day, with an average depth to the top of the pay interval of 5,114 feet. The gas wells , all located in T. 26 N. , R. 11 and 12 W. , had an average initial production of 2,293,000 cubic feet per day, with pay interval at an average depth of 5,085 feet. One of the gas wells was also completed in the Dakota sandstone.

Other wildcat gas discoveries in San Juan County were completed in the Fruitland, Pictured Cliffs , Mesaverde, Gallup, Graneros , and Dakota formations. The Gallup wells, located west of the Horseshoe-Gallup pool, found production at depths of less than 1,000 feet.

Seven wildcat tests of pre-Mesozoic rocks were drilled in the northwestern part of the county during the year. The deepest test, which was in T. 30 N. , R. 16 W. , bottomed in the Devonian at a depth of 10,808 feet.

San Miguel County

Three wells were completed in the county in 1957; 1 was temporarily abandoned. In January, the Rown No. 1 Salano test, in the SE 1/4 sec. 3, T. 13 N. , R. 15 E., was plugged after being drilled into Precambrian granite. The well was located near the base of Glorieta Mesa in the same section where four other wells were drilled in 1926. Numerous shows of oil and gas at shallow depths in the Sangre de Cristo and Madera formations were reported in the earlier tests. Samples from the Rown well had many skips , but included the interval from surface to the total depth of 2,112 feet. The Permian Sangre de Cristo formation was drilled from surface to 540 feet, the top of the Pennsylvanian Madera formation. Other tops were the Sandia formation at 1,480 feet, Mississippian limestone at 1,810 feet, and Precambrian at 1,925 feet.

Glorieta SE 1/4

In July, the Frankfort Oil Company spudded its No. 1 Lucero on top of Mesa, south of the village of Villaneuva. Location of the test was in the sec. 15, T. 11 N. , R. 15 E. The derrick-floor elevation was estimated at 5,895 feet, and total depth was given as 4,325 feet. The well was spudded in the Bernal formation, and the top of the San Andres limestone was at 160 feet, Glorieta

sandstone at 165 feet, Yeso formation at 595 feet, Sangre de Cristo formation at 1,320 feet, Madera formation at 2,585 feet, Sandia formation at 3,890 feet, Mississippian limestone at 4,230 feet, and the Precambrian at 4,295 feet. The Glorieta sandstone is unusually thick in this area compared with outcrop sections a short distance to the north; a similar thickness was encountered, however, in the Roberts No. 1 Aaron test drilled one-half mile east of the Frankfort well.

The final test completed during the year was the Miami No. 1 Bell Ranch, in the SE 1/4 sec. 34, T. 15 N., R. 26 E. The test was spudded in the Triassic Chinle formation east of Conchas reservoir. Derrick-floor elevation was given as 4,422 feet, and the total depth as 2,672 feet. The well was reported to have bottomed in Precambrian rocks. Tops for this test are the Bernal formation at 540 feet, San Andres limestone at 720 feet, Glorieta sandstone at 1,020 feet, Yeso formation at 1,295 feet, and Sangre de Cristo formation at 1,910 feet.

Near the end of 1957, the Hancock No. 1 Sedberry test, in sec. 25, T. 17 N., R. 16 E. , was temporarily abandoned. Several shows of oil and gas have been reported in this area from a series of wells drilled from 1926 to 1934, and flammable gas was reported from the Sedberry well at 4,649 feet in the Pennsylvanian. The well was spudded in Upper Cretaceous rocks, probably near the base of the Carlile shale. Other tops are as follows: 500 feet, Morrison formation; 790 feet, Wanakah formation; 840 feet, Entrada sandstone; 900 feet, Chinle formation; 2,960 feet, Sangre de Cristo formation; 3,840 feet, Pennsylvanian; and 5,010 feet, Precambrian.

Santa Fe County

All the 15 tests drilled in Santa Fe County are located in the southern half of the county, where Mesozoic and Paleozoic rocks are exposed or not deeply buried by later sediments. There have been several reports of oil and gas shows.

Sierra County

There have been over 20 tests drilled in Sierra County, most of them east of the Rio Grande River, in the Jornada del Muerto. Most of the wells were shallow and must be considered incomplete tests. Several deep wells were drilled in the Rio Grande Depression, near Truth or Consequences. These tests have supplied some information about the complex structure that underlies the nearly horizontal beds of the Santa Fe group which occur at the surface. There was no drilling activity in 1957.

Socorro County

The approximately 25 tests that have been drilled in the county are located, for the most part, on surface structures. The majority of the wells were drilled to test the Pennsylvanian section, which consists of about 2,000 feet of mostly marine limestones, sandstones, and shales. Locally, the Pennsylvanian rocks are absent, because of early Tertiary faulting and erosion. All the test wells were dry and abandoned. There were no wells drilled in the county in 1957.

Taos County

Taos and Los Alamos are the only counties in the State that have not been tested for oil. Over most of Taos County, Tertiary flows and continental sediments directly overlie the Precambrian. The only notable exceptions are in the Sangre de Cristo Mountains, where there are fairly thick sections of marine Pennsylvanian rocks present locally.

Torrance County

Torrance County, with a total of some 66 tests , ranks as the most actively drilled county in the State outside of the producing areas. Carbon dioxide gas was formerly produced in the county near the town of Estancia. There was no drilling activity in 1957.

Union County

Four wells were drilled in Union County in 1957: the Continental No. 1 Federal Land Bank, in the SE 1/4 sec. 2, T. 24 N. , R. 36 E.; Trend No. 1 Brown, in the SE 1/4 sec. 29, T. 32 N. , R. 31 E.; Galbreath No. 1 Britt, in the SE 1/4 sec. 14, T. 24 N. , R. 30 E.; and the Atkinson No. 1 Quinby, in the NE 1/4 sec. 15, T. 31 N. , R. 36 E.

The Continental test was drilled to a total depth of 5,308 feet, with derrick-floor elevation of 4,688 feet. Tops for this test are as follows: Surface, Ogallala formation; 55 feet, Dakota sandstone; 250 feet, Morrison formation; 440 feet,

Wanakah formation; 530 feet, Exeter sandstone; 610 feet, Chinle formation; 1,215 feet, Santa Rosa sandstone; 1,300 feet, Whitehorse formation; 1,340 feet, Alibates dolomite; 1,660 feet, San Andres limestone; 2,050 feet, Glorieta sandstone; 2,085 feet, Yeso formation; 2,685 feet, Sangre de Cristo formation; 4,670 feet, Pennsylvanian; 5,005 feet, Mississippian; and 5,270 feet, Ordovician(?)

The Trend test was spudded in alluvium over the Triassic Chinle formation, north of the Dry Cimarron River. The well was drilled to a total depth of 3,586 feet and bottomed in Precambrian granite. The top of the Santa Rosa sandstone was at 540 feet; Whitehorse formation, 670 feet; Alibates dolomite, 755 feet; San Andres limestone, 945 feet; Glorieta sandstone, 1,000 feet; Yeso formation, 1,260 feet; Sangre de Cristo formation, 1,390 feet; Pennsylvanian, 2,995 feet; and Precambrian, 3,305 feet.

Samples were not received for the remaining tests in Union County.

Valencia County

The Williams and Gore No. 1 Land and Cattle Company test, in the NW 1/4 sec. 27, T. 7 N., R. 4 W. , was the only well drilled in Valencia County in 1957. The well was spudded in the lower part of the Triassic and bottomed in Pennsylvanian limestone.