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Frank C. Barnes

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HISTORY OF DEVELOPMENT AND PRODUCTION OF OIL AND GAS IN THE SAN JUAN BASIN

By Frank C. Barnes
Assistant State Geologist

Introduction

The history of development and production of any oil or gas producing area is often a reflection of certain economic and geological factors that are not apparent on cursory examination. It is the purpose of this report to present in chronological order the events leading up to the present development and exploration of the petroleum resources of the San Juan Basin of Colorado and New Mexico. It is hoped that a review of past development will not only provide the oil man with a better understanding of the entire area, but will in addition present the degree of present development. This should in turn allow a more accurate evaluation of the future potential and exploration possibilities.

Acknowledgement

Information for this report was obtained primarily from records of the New Mexico Oil Conservation Commission and the New Mexico Bureau of Mines. Valuable additional information was provided by Glenn Staley, Conservation Engineer of the Lea County Operators Committee, and by Al Greer, District Oil and Gas Inspector for the New Mexico Oil Conservation Commission.

High-Lights of Development

1911 - Oil discovered at Seven Lakes.

1920 - Gas discovered at Aztec.

1921 - Gas at Ute dome and first commercial use of gas at Aztec.

1922 - Oil at Hogback.

1924 - Oil at Bloomfield, Rattlesnake, and Red Mountain, Colorado. Three-inch pipe line completed from Hogback to Farmington.

1925 - Gas at Barker Creek and oil at Table Mesa. Refineries completed at Aztec, Bloomfield, and Farmington.

1926 - Gas at Blanco and oil at Hospah.

1927 - Gas at Kutz Canyon-Fulcher Basin and oil at Mancos Creek, Colorado.

1928 - Oil at Stoney Butte.

1929 - Pennsylvanian oil at Rattlesnake. Pipe lines completed from Blanco pool to Aztec, Ute dome to Durango, Colorado, and from Kutz Canyon to Albuquerque and vicinity.

1934 - Oil at Red Mountain.

1935 - Oil at Price, Colorado.

1940 - Refinery completed at Prewitt.

1945 - Pennsylvanian gas at Barker Creek.

1946 - Blanco gas pool extended and development begun.

1947 - Dakota oil and gas at Kutz Canyon (Angel Peak).

1948 - Pennsylvanian gas at Ute dome and at Dove Creek, Colorado.

1949 - Gas at Gavilan and La Plata pools and oil at Lindrith. Gasoline absorption plant in operation at Kutz Canyon.

1950 - Gas at Largo pool and northwest La Plata. Gas in sand above Pictured Cliffs gas sand at Ignacio, Colorado. Oil reported in Morrison at Price, Colorado, and near Governador, New Mexico. Preliminary construction of 24-inch pipe line to west coast.

Development

The San Juan Basin was the scene of New Mexico's first oil or gas discovery. As a result, the initial exploration of the state's petroleum resources centered on this area. The first domestic use of natural gas within the state was also in the San Juan Basin. However, drilling and exploration have been irregular, and this area is ten years or more behind southeastern New Mexico in the development of its petroleum reserves. The Colorado portion of the basin is equally undeveloped and the first oil discovered there was in 1924, long after production had been established in other areas of the state. Reasons for this will be discussed at several places in this report.

The first oil discovery in the San Juan Basin occurred during 1911, in the Seven Lakes area of McKinley County, New Mexico. The discovery was accidental, and was made by Henry F. Brock (Bates 1942, p. 125) while drilling a water well in Sec. 18, T 18 N, R 10 W. This well encountered good shows of 30° gravity oil and gas at a depth of 300 to 400 feet in the Mesaverde formation. Considerable activity followed the discovery and Gregory (1917, p. 145) reported that: "Three thousand claims were located in twenty townships nearby." None of the subsequent wells produced more than a few barrels

of oil and within two years activity in the Seven Lakes area had virtually ceased. However, good oil shows die slowly, and up to January 1, 1950, at least fifty wells had been drilled in or near the Seven Lakes area. About half of all the wells drilled in this area have made shows of oil or gas, but no more than ten or twelve have achieved commercial production and this has seldom exceeded a total of 40 or 50 barrels per well. The accumulation is believed to be stratigraphic, and the details are available elsewhere in this book.

The poor showing of the wells at Seven Lakes considerably reduced enthusiasm for extensive additional drilling, and such activity was at low ebb until 1919-1920. The intervening years saw continuous geological activity by various companies and the United States Geological Survey, throughout most of the San Juan Basin. The period from 1911 to 1920 was one of study and valuation of the overall oil possibilities. The old Continental Oil Company, Gypsy Oil Company, Midwest Refining Company, Mutual Oil Company, Standard Oil Company of California and many independent operators were active in the San Juan Basin during this time. Glenn Staley, Conservation Engineer for the Lea County Operators Committee and former State Geologist of New Mexico (1927-1930) represented a number of independents in the basin from 1911 to 1927. Dr. E. H. Wells, former President of the New Mexico School of Mines and the first State Geologist (1925-1927) was also active in the area. There are many well known and prominent geologists and oil men who were among the pioneers of petroleum development in the San Juan Basin. However, it would require considerable space to do them justice individually, and it is not the purpose of this report to deal extensively with the personalities involved. Although the first oil discovery in the San Juan Basin was an accident, the indications of petroleum had been noted by the early settlers since the late eighteen hundreds. Small gas seeps and occasional oil streaks were known along the Animas River near Aztec and on the San Juan River near Farmington. It was logical that the next drilling effort should take place in the vicinity of these seeps.

The second San Juan Basin strike occurred in 1920, one mile south of Aztec, New Mexico. The Aztec Oil Syndicate completed their No. 1 State, in Sec. 16, T 30 N, R 11 W, for an initial production of three to four million cubic feet of gas per day from the Farmington sandstone. Production was found at a depth of about 1,000 feet. A well drilled four years previously, in Sec. 18, T 30 N, R 12 W, eight miles west of Aztec and four miles north of Farmington, encountered only shows of oil and gas, and was abandoned at 1,157 feet. This well, the Lanier No. 1, was drilled by the Mesaverde Oil Company. The gas discovered south of Aztec was piped into town and used domestically throughout most of the 1920's. This is the first commercial use of natural gas in New Mexico or the San Juan Basin.

Following the discovery of gas near Aztec, the Midwest Refining Company of Casper, Wyoming (now Stanolind Oil and Gas Company) discovered gas at Ute dome in October of 1921. The discovery well, Ute No. 1, was located in T 32 N, R 14 W, San Juan County, New Mexico, and was completed for about 4,000,000 cubic feet of gas per day from the Dakota sandstone at a depth of 2,325 feet. The following year, a second well was completed in the Dakota sandstone for 37,000,000 cubic feet of gas per day. Although there was no market for this gas, and the wells on Ute dome were shut in until 1929 when a 6-inch line was completed to Durango, Colorado, nevertheless, this ranked as one of the most important discoveries of its time. The significance of this discovery was due to the fact that it represented the first strike in a formation known to be highly productive in other areas. It was the first concrete evidence of any substantial productive potential in the San Juan Basin and did much to encourage further drilling and exploration. On the other hand, enthusiasm did not run rampant over the Ute dome gas discovery, and in 1921, N. H. Darton (1921, p. 174) had this to say regarding oil in New Mexico: "In general, New Mexico has not been regarded with favor by most of the oil and gas geologists of the country, notwithstanding the fact that surface indications of oil are known at several points in the state and oil in small amounts has been found near Dayton and Seven Lakes. This disfavor is not without some foundation, for there are several adverse considerations, of which the following are perhaps the most important:" He then lists five reasons why New Mexico did not appear to be particularly favored geologically as an oil-producing state. In conclusion, Darton (op. cit., p. 175) stated: "On the whole, the Carboniferous and Cretaceous areas of eastern New Mexico and the Cretaceous areas of the northwestern (San Juan Basin) portion of the state, west of the Nacimiento Uplift, probably offer greater encouragement for the discovery of commercial oil fields than other portions of the state." The unfavorable attitude of many geologists toward the San Juan Basin was based on an incomplete knowledge of the type of accumulation present and the local problems involved. This adverse point of view is still held by certain geologists both familiar and unfamiliar with the area and has done much to discourage development.

In 1922, the first oil strike of any consequence, within the San Juan Basin was made by Midwest Refining Company at the Hogback field. The discovery well was located in Sec. 19, T 29 N, R 16 W, San Juan County. The well flowed 375 barrels of 60° gravity oil per day from the Dakota sandstone at 796 feet. Owing to the lack of storage or transportation for the oil, there was for several years, considerable uncertainty as to the magnitude of this discovery. In 1924, a 3-inch line was completed to Farmington, New Mexico, and the oil shipped by rail from there to Salt Lake City, Utah.

Since 1925-26, the oil has been processed in the

Continental Oil Company's refinery at Farmington. Although this was an important discovery in the same sense as Ute dome and helped create further interest in additional drilling, it did not touch off a major boom due to the uncertainty that any substantial or sustained production had been discovered.

Writing in 1923, R. W. Ellis (1923, p. 5) reported: "During the two years following the summer of 1920, the interest in New Mexico as an oil-producing state gradually died down. The number of new wells started decreased and many of those that had been started were abandoned." However, the discovery of oil at Hogback changed this picture somewhat, and Ellis (op. cit., p. 27) concluded: "The present outlook for a moderate production of oil and gas in the state may be said to be rather more encouraging than the outlook in 1920. The San Juan Basin continues to be the most promising of any part of the state, and this region seems to hold the center of interest."

The year 1924 saw the discovery of two fields in New Mexico and the first definite indications of oil or gas in the Colorado portion of the San Juan Basin. During that year, 55° gravity oil was discovered in the Farmington sandstone at Bloomfield in T 29 N, R 11 W, and 63° gravity oil in the Dakota sandstone at Rattlesnake in T 29 and 30 N, R 19 W, both in San Juan County. In addition, oil of 42° gravity was discovered at Red Mesa in T 33 N, R 12 W, Montezuma County, Colorado.

From 1924 to 1928, there was modest but more or less continuous drilling activity within the basin. Exploration was confined to surface geology until 1926 when, according to Glenn Staley, the first geophysical exploration was attempted. The instrument used was the magnetometer, but there is very little record of who first introduced it or the results achieved. From 1924 to 1928, there was an average of almost three new discoveries per year. During 1925, 56° gravity oil was discovered in the Dakota sandstone at Table Mesa, and gas in the same formation at Barker Creek, all in San Juan County, New Mexico. In 1926, 30° gravity oil was found in the Mesaverde formation at Hospah and commercial gas was found at Blanco, also in the Mesaverde. The year 1927 saw the discovery of 34° gravity oil in the Mancos shale and considerable drilling activity at Mancos Creek in Colorado. The Kutz Canyon-Fulcher Basin, Pictured Cliffs sandstone gas pool of New Mexico was also discovered that year. The year 1928 saw the culmination of four years of continuous activity with the discovery of the Stoney Butte field, New Mexico, producing 31° gravity oil from the Mesaverde. Another event that profoundly affected exploration in the San Juan Basin occurred during 1928. This was the discovery of the Hobbs oil field in southeastern New Mexico. The discovery of this field focused attention on the Permian Basin which quickly became the center of drilling and exploration within the state. The Permian Basin is today the major producing area of New Mexico.

The depression years were years of almost complete inactivity insofar as oil exploration within the San Juan Basin was concerned. However, a significant test was completed at Rattlesnake in 1929 when Well No. 17 made 40° gravity oil in the Pennsylvanian at about 6,700 feet. This was the first commercial production below the Upper Cretaceous and opened up a wide field of exploration that has not been fully exploited even today. The discovery well was not properly completed and produced a large percentage of water, which combined with the more prolific discoveries in southeastern New Mexico, completely eclipsed the relative importance of this discovery.

There was little drilling and no new discoveries from 1929 to 1934. In 1934 the small Red Mountain field was discovered in New Mexico with production from the Mesaverde. This was the first fault structure to show production in the basin. The following year, the first substantial production in the Colorado portion of the basin was discovered at Price in T 33 N, R 1 and 2 E, Archuleta County, where 32° gravity oil was found in the Dakota sandstone. This caused a flurry of drilling, but results were disappointing except at Price, and after 1935-36 another long period of comparative inactivity began. This period of quiescence lasted until just prior to World War II when activity increased in 1941 and 1942. The shortage of material during the war prevented extensive wildcatting, but there was moderate development.

Present activity began at the close of World War II and has been increasing in intensity ever since. Pennsylvanian gas was discovered at Barker Creek in 1945 and development and extension of the Blanco-Mesaverde gas pool began in 1946. Oil and gas were found in the Dakota sandstone in the Kutz Canyon area (Angel Peak) by Byrd-Frost in 1947. During 1948, Pennsylvanian gas and distillate was discovered at Dove Creek, Colorado, in T 38 N, R 19 W, by Western Natural Gas et al. and Pennsylvanian gas was discovered at Ute dome, New Mexico, by Stanolind Oil and Gas Company. The following year, gas was discovered on the east side of the basin in the Pictured Cliffs sandstone, and the eastward extension of commercial gas in this formation was proved by the Gardner Petroleum Company at Gavilan, New Mexico. This was the first commercial discovery on the extreme east rim of the basin, located in T 25 N, R 2 W, and was followed the same year by the discovery of Dakota sandstone oil in T 24 N, R 2 W, near Lindrith, New Mexico, by Delhi and Magnolia. The oil discovery near Lindrith, New Mexico represents the first completely geophysical discovery within the San Juan Basin. Drilling was founded on seismograph exploration.

The year 1949 also saw the discovery of a new Mesaverde gas pool by Southern Union Production Company. This discovery has been named the La Plata pool, and is in T 31 N, R 12 W, San Juan County, New Mexico.

During 1950, Herbert Herff et al. discovered commercial Mesaverde gas in T 27 N, R 8 W, for the new Largo gas pool. Another significant discovery for 1950 was the report of commercial oil in the Morrison formation in the Price field, Colorado. Possible Morrison gas was also found in T 26 N, R 6 W, Rio Arriba County, New Mexico. This is the first record of Morrison production in the San Juan Basin and represents what may be a new producing horizon in some areas. By June of 1950 there were over 30 wells drilling in the basin, an all-time record for any one period. The year 1950 also saw the successful conclusion of a long dispute between the Federal Power Commission and El Paso Natural Gas Company for permission to build a 24-inch gas line to connect the San Juan Basin with the west coast cities. Preliminary construction of this line will probably begin before the close of 1950.

Production

The production of oil and gas in the San Juan Basin has not always paralleled the discovery of new fields. An outstanding example is the Blanco gas pool, discovered in 1926. The discovery well was shut in until 1929 when a 4-inch gas line was completed to serve the town of Aztec. Subsequently, development of this field was almost completely suspended until 1946, 17 years later, when the Florance Drilling Company under M. J. Florance began a drilling and development program. By June, 1950, the field was under the control of Delhi and Stanolind. There were twelve commercial wells, but only the original well was on production as there is no real market for the gas.

An extremely limited local market in addition to a lack of transportation facilities to outside markets have been the greatest deterrents to development of the San Juan Basin. This situation is being slowly remedied and the 24-inch gas line to California should alleviate this situation for a time. Early production was as irregular as exploration. There was no actual commercial production from the San Juan Basin until 1921, after the discovery of gas at Aztec. Commercial oil production did not begin until 1924. It was 13 years following the first oil discovery before anything approaching commercial production was achieved in the San Juan Basin. This was another reason why many oil companies were hesitant to commit large sums for exploration in the basin.

After the oil discoveries at Hogback, Rattlesnake, Table Mesa, and Hospah, there was sufficient productive potential to warrant construction of several small refineries. The first refinery to start operations was the Continental plant at Farmington which was completed in April of 1925. A small topping plant was completed at Bloomfield during 1925 to handle the high-gravity oil from the Farmington sandstone. There was also a small gasoline absorption unit and topping plant at Aztec which operated for several years, starting in 1925. In 1940 a refinery was completed at Prewitt, New Mexico to refine the oil from Hospah. Southern Union completed a large gasoline absorption plant at Kutz Canyon in 1949 to process gas from that area and Barker Creek. A refinery at Alamosa, Colorado has processed the oil from Price for many years and there was a small refinery in Albuquerque for a short time. As an interesting side-light, during 1926 and 1927 gasoline was produced at Blanco from the discovery well by allowing the Mesaverde gas to blow against a large corrugated iron plate. The liquid hydrocarbons were cooled and condensed on this plate and accumulated in drums. This Blanco "dew" was marketed in Aztec by Al Greer and Associates. This method was wasteful, but worked well in cool weather.

Pipe Line

The first pipe line in the San Juan Basin was constructed in 1921 to carry gas from the Aztec gas wells into the town of Aztec. This was a 3-inch or 4-inch line and was approximately two miles long. The second line was completed in 1924 to carry oil from the Hogback field to Farmington. This was a 3-inch line and was 20 miles long. In 1926, 96 miles of 4-inch line were laid from Rattlesnake to Gallup, New Mexico. This line transported oil to the railroad, but at present oil from Rattlesnake is processed in the Continental refinery at Farmington. A line connecting Rattlesnake to Hogback and Farmington had been constructed in 1925. Twelve miles of 4-inch line connecting Aztec to the Blanco gas area were placed in service in 1929 and a 6-inch line 32 miles long from Ute dome to Durango, Colorado was also completed that year. The first substantial gas production from the San Juan Basin was made possible in 1929 by completion of the Southern Union Production Company gas line from the Kutz Canyon area to Albuquerque and vicinity. This was a 10- and 12-inch line to Albuquerque with an 8-inch branch from Bernalillo to Santa Fe and a 5-inch extension to Belen. The capacity of this system was substantially increased during 1948-49 and a branch was built through Cuba to Los Alamos.

Conclusion

After a slow start and many interruptions, the San Juan Basin is now beyond the threshold of a period of development that should exceed anything in its previous history. Gas, once a complete drug on the market, has achieved a value almost equal to liquid hydrocarbons in our industrial

civilization. Where once new gas discoveries in the San Juan Basin were considered in the same light as a dry hole, now they are sought with increasing intensity. It is quite possible that the considerable coal deposits within the San Juan Basin may one day be combined with the large gas reserves to produce synthetic products which could mean a substantial industrialization of the area.

Basically, the history of exploration and development in the San Juan Basin has been a story of periodic stagnation due to unfavorable marketing and transportation conditions. The poor showing of the San Juan Basin as compared to other areas within the Rocky Mountain Petroliferous Province may not be due to any lack of productive possibilities. It may be due rather to a lack of interest or economic feasibility in developing these possibilities. Every period of intensive exploration in the basin has produced new discoveries, and if the present interest can be sustained it is possible that the San Juan Basin will become one of the major oil and gas producing areas of the Rocky Mountains.

Selected References

Bates, R. L. (1942) The oil and gas resources of New Mexico: N. Mex. Bur. Mines and Min. Res.

Darton, N. H. (1922) Geologic structures of parts of New Mexico: U. S. Geol. Survey Bull. 726.

Ellis, R. W. (1923) Oil and gas in New Mexico: Univ. N. Mex. Bull. 112.

Gregory, H. E. (1917) Geology of the Navajo country: U. S. Geol. Survey Prof. Paper 93.

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