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Southeastern New Mexico petroleum statistics

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Huapache Monocline. This anticline was tested in 1952 by the Continental Bass #1. The well was abandoned in Ellenburger dolomite at 5889 feet. The Continental Bass #1, drilled on top of the Huapache Monocline, did not find the thick Permo-Pennsylvanian section that was present six miles east in the Magnolia-State W#1. The thinning of section was an outstanding development of the subsurface geology on the west side of the Seven Rivers embayment which aroused considerable geological interest and renewed exploration activities.

During 1953, three more of the deep tests were spudded, the Standard of Texas drilled their Cass Ranch Unit well through a full pre-Permian section to the Devonian. Drill stem tests had slight shows in the lower Permian, and in the Pennsylvanian. The Devonian porosity made 7020 feet of sulphur water on DST and the well was plugged dry and abandoned. Stanolind drilled two wildcats, the Guadalupe Foot Hills Unit and the Lakewood Unit. Both wells found a full pre-Permian section present and had gas shows in the Wolfcamp and Pennsylvanian sections, but no commercial production. Salt water was recovered in the pre-Pennsylvanian porosity zones.

January 5, 1954, Continental completed the most recent deep test in the area. The Continental-East Texas Hill Unit #1, bottomed in Ellenburger dolomite at 10596 feet, was drilled four miles east of the Continental Bass #1 and down in the embayment area immediately east of the Huapache monoclinical flexure. At this location a section was drilled similar to that found in the Magnolia-State W-1 and again approximately 4000 feet of Permo-Pennsylvanian beds were present that were absent in the Continental-Bass #1.

The history of the exploration activities in the Seven Rivers embayment area has been marked by periods quiescence and renewed effort, and in all probability the cycle will be repeated in the future. The stratigraphic section now known in the area appears to have the geological features that can provide the conditions necessary for the generation and accumulation of oil in the Permian, Pennsylvanian, and Pre-Pennsylvanian beds. The problem remaining apparently is to find a suitable trap.

SOUTHEASTERN NEW MEXICO PETROLEUM STATISTICS

BY

Edward E. Kinney

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Oil in southeastern New Mexico was discovered in August 1923, in Eddy County in what became the Artesia pool. In late 1927, the Rhodes pool, on the south end of the Central Basin platform in Lea County, was found. The year 1928 saw considerable expansion of oil activity north along the platform.

In 1930, self-pro-rationing of oil production was instituted by the Hobbs pool operators with Mr. Glenn Staley as umpire. The group, known later as the Lea County Operators, conducted pro-rationing of oil in the Lea County area and southeast New Mexico.

In 1935, the New Mexico legislature passed the Oil Conservation Law and state supervised pro-rationing commenced.

In 1936, the first year after state pro-rationing, the state's oil wells produced 26.8 million barrels of oil. Lea County produced 94½% of the output; Eddy County produced 4% and the San Juan Basin produced 1½%.

In 1946, ten years later the oil wells of the state produced 36.7 million barrels of oil—a gain of 37% in

the decade. Lea County produced 85.3% of the oil output; Eddy County produced 13.6% and the San Juan Basin produced 1.1%.

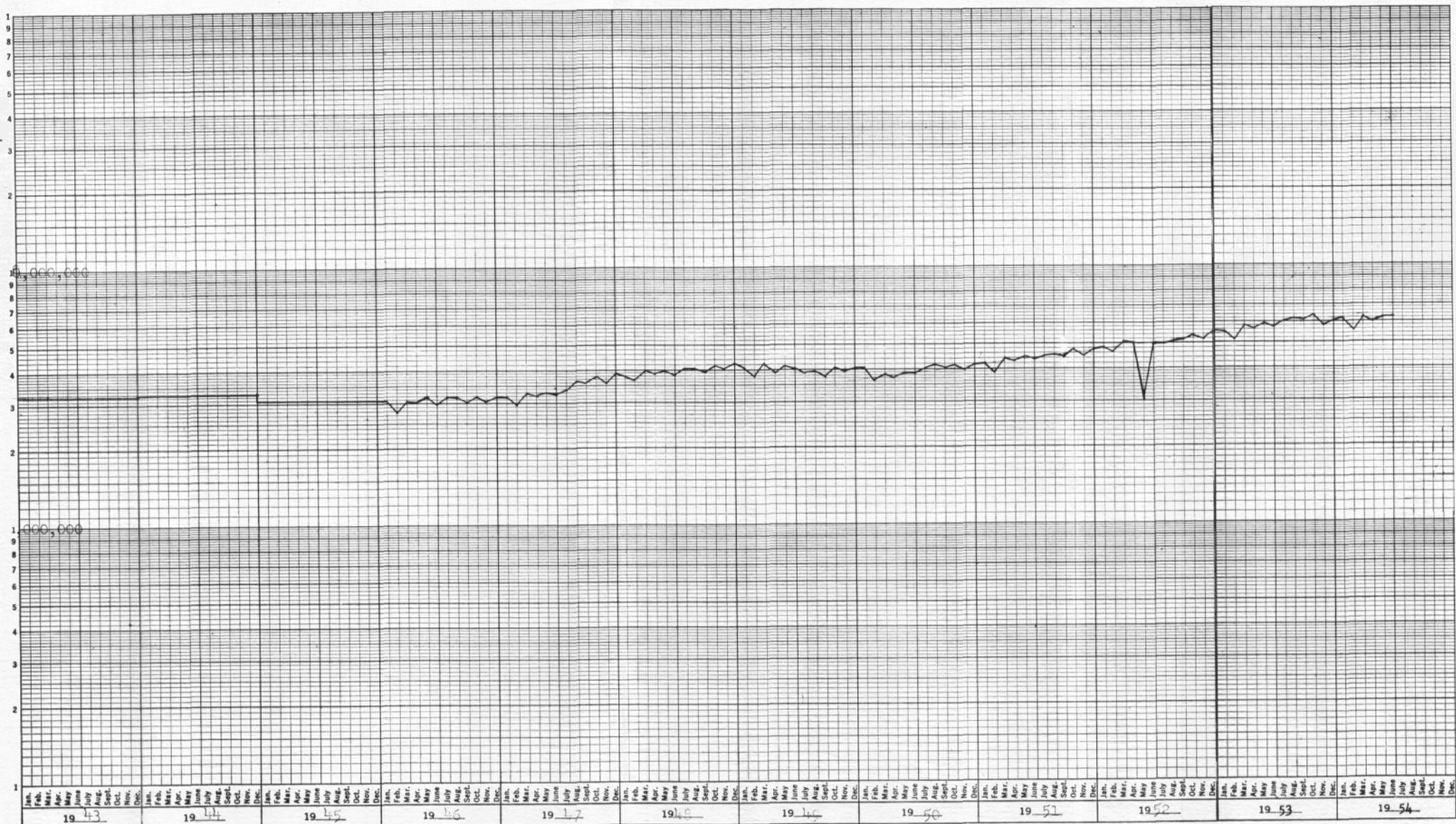
Now in 1953, the oil wells of the state yielded 70½ million barrels of the black gold—a gain of 92% in the past 7 years. Lea County produced 94.2% of the oil output; Chaves, Eddy and Roosevelt Counties produced 4.8% and the San Juan Basin produced 1%.

The accompanying ratio-graph shows gross monthly oil production in the state from 1943 to June 1954, inclusive. The daily average production of oil in 1953 was 192,500 barrels.

While the oil wells of the southeastern area were producing this large stream of oil in 1953, they were producing 209 million MCF of casing head gas and the gas wells were producing 109 million MCF of dry gas.

The gasoline plants in the southeast purchased 253 million MCF of the produced gas for processing in 1953. They sold 160 million MCF of dry gas to the pipe lines for use in the state and for export. They also produced 4¼ million barrels of natural gasoline and 2.8 million barrels of LPG (propane and butane).

The five carbon black plants in the area had an



intake of 67 million MCF of gas, principally from gasoline plant residue but partially from other sources. The plants produced 60,390 tons of carbon black.

At one gasoline plant the residue gas was treated in a plant for sulfur removal. The plant produced 2,680 tons of raw sulfur in 1953.

The refineries in southeastern New Mexico ran to stills in 1953 the total of 4.9 million barrels of crude oil. This was 70% of the total refining in the state in that year. The New Mexico Asphalt & Refining Company's plant at Artesia has a TCC type catalytic cracking unit.

Drilling activity in the southeast in 1953 expanded 8% over 1952, and resulted in 820 well completions. The completions produced 573 oil wells, 59 gas wells and 189 dry holes. By far the greatest activity was in Lea County. The more important pools discovered by the drilling activity are: The Anderson Ranch field - a Permo-Pennsylvanian pool and a Devonian pool; the Bronco Devonian-Silurian pool and the Shoe Bar Devonian pool all in Lea County and the Empire Pennsylvanian gas pool in Eddy County.

The drilling activity in this area to August 11, 1954, amounted to 481 well completions resulting in 317 oil wells, 59 gas wells and 105 dry holes. The rate of drilling is off about 4% this year.

Geophysical activity in the southeast in 1953, amounted to 120½ crew-weeks of gravity work and 2049½ crew-weeks of seismograph work.

In the secondary recovery field, water flooding projects continued active. Water flooding was started in the Baish pool near Maljamar by the Buffalo Oil Co.; in the Penrose-Skelly pool by Humble-Skelly-Gulf Coast Western Oil Co. It is too early to know what success they may have. Water floods were continued in the North Shugart pool by J.C. Maxwell; in the Penrose-Skelly pool by Humble and Magnolia and in the Russell pool by Neil H. Wills. Likewise time is still too short to know what success will be obtained by these floods. A water flood in the Empire pool by Olen F. Featherstone was abandoned because the water channelled to the producers. The two big pressure maintenance projects continued their successful operation in the Langlie Mattix pool and in the Maljamar pool.

In conclusion, it must be noted that the petroleum industry in New Mexico is not only active in the search for new oil reserves, but is also seeking to increase recovery from present reserves and is obtaining all of the marketable products yielded by the wells thereby increasing the wealth of our people. The recent order of the Oil Conservation Commission prohibiting flaring of the gasoline plants and increase the amount of products recovered.

BELL LAKE UNIT NO. 1 FIRE

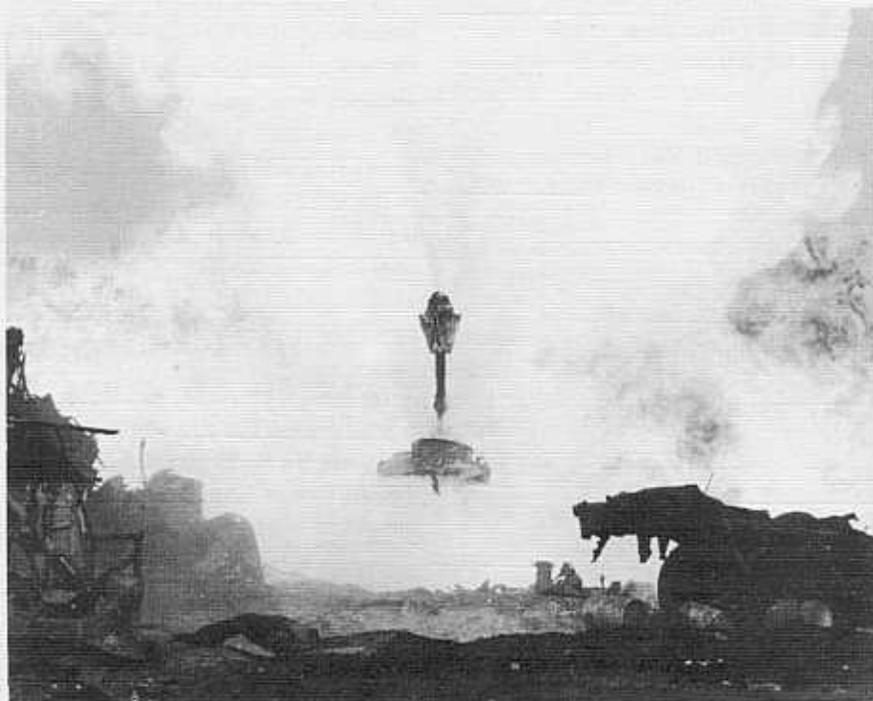
On March 13, 1954, the Delaware Basin became of age when the Continental Oil Company No. 1 Bell Lake Unit, on the northeast side of the basin, blew out and caught fire at 12,616', indicating the first major reserves of oil and gas in the deep basin formations.

For 15 days the well burned, accompanied by a deafening roar. In Roswell, 97 airline miles away, the glow of the flames could be seen reflected on low lying clouds. Published sources reveal that on the second try, a 600 pound shot of solid nitroglycerin finally extinguished the fire, but twice thereafter it reignited and had to be shot out. In all 2,060 pounds of solid nitro was used. The well blew out of control for 51 days before being killed with mud and cement. Ultimately, because of a gas seep that necessitated recementing, 11,100 barrels of mud and 6,550 sacks of cement were used to bring the well under control. The drill pipe could not be recovered, and the hole had to be abandoned.

At this writing there is mixed opinion concerning the age of the gas producing zone. Some consider it Pennsylvanian, others believe it is lower Wolfcamp. A normal basin-type section was drilled down to the blowout zone. Wells now drilling on the Bell Lake Unit should settle the age question and verify whether a truly significant discovery has been made. The No. 1 well, in Section 31, T-23-S, R-34-E, was in an area formerly thought to be one of the deepest portions of the New Mexico segment of the Delaware Basin. Nearest production was 15 miles west on the Central Basin Platform.

NEW GEOLOGIC MAP OF NEW MEXICO IN PREPARATION

The New Mexico Geological Society records with approval that a new geologic map of New Mexico is being compiled by the United States Geological Survey with the cooperation of the New Mexico Bureau of



Continental Oil Company well No. 1, Bell Lake Unit, Sec. 31, T. 23S., R. 34E., Lea County, New Mexico, shortly after blowing out and catching fire. Photo by Ken Cobean.

Mines and Mineral Resources and the Department of Geology of the University of New Mexico. All published geologic data as well as unpublished data in the files of these organizations are being utilized in the compilation, and new detailed and reconnaissance field work is in progress and planned in areas where existing information is incomplete or inadequate. Much areal geologic mapping, to be utilized only in generalized form, is also being obtained through the generous cooperation of many companies operating in the State as they recognize the value of having generally available a new and more accurate picture of the geology of the whole State.

The geologic map of New Mexico compiled by the late N.H. Darton and printed by the United States Geological Survey in 1928 is now out of print. Although contributions from detailed and reconnaissance mapping by 28 other geologists, mostly on the staff of the United States Geological Survey, were acknowledged on that map, it represents in large part the result of Darton's own remarkable reconnaissance field work in New Mexico. Large areas of the State have since been mapped on detailed scales by numerous geologists. More detailed subdivisions of the rock units have been made. More accurate base maps of many areas, have been compiled and aerial photographs of much of the

State are available. The compilation of a new geologic map of the State is thus a large task of selection and synthesis. It can be completed successfully only by the continued collaboration of all sources of geologic information.

The geologic data are to be compiled on a new base map of the State in preparation by the United States Geological Survey, now scheduled for publication early in 1955 on a scale of 1:500,000 or about 8 miles to the inch, which will show highways and principal connecting roads and topographic contours at intervals of 200 feet. Topography will not be shown on the published geologic map in the interest of clarity.

Geologic names for stratigraphic units that are differentiated on the new geologic map will necessarily be in accordance with decisions of the Committee on Geologic Names of the United States Geological Survey. Some changes in the geologic nomenclature now accepted will certainly be necessary, but many problems may, for the present, have to be compromised rather than resolved.

Compilation of the new geologic map has been underway in the Albuquerque office of the Geologic Division of the Geological Survey since February 1953

and is at present time nearly completed for the north-western quarter of the State. Substantial progress has been made on compiling data also for other parts of the map. Geologists on the staff of the New Mexico Bureau of Mines are at present particularly concentrating on the task of discriminating and mapping lithologic and age subdivisions of the volcanic rocks, particularly in the southwestern part of the State. It is hoped to make preliminary printing in black and white with formations identified by letter symbols of the four quarters of the State separately as they are completed. Subsequently a full multicolor printing of the State map will be made, but the processing and printing of such maps is necessarily time consuming. In the meanwhile the preliminary editions of parts of the map will be available for use and for review.

MINING DISTRICTS OF SOUTHEASTERN NEW MEXICO

Until development of the potash mines of Eddy County began, southeastern New Mexico could not be considered a major mining region. Nevertheless, this part of the state contains important metallic and non-metallic mineral resources, and mines were worked early in the history of the state with a considerable quantity of minerals produced. The more important mining districts of these times include the Jicarilla, White Oaks, and Nogal districts, the Capitan Coal district, and the Jarilla district. Some sedimentary copper and lead deposits are known in the red beds of the Sacramento Mountains near Tularosa and east of Alamogordo and have been worked to a limited extent. When the potash mines of Eddy County were first opened in 1931 the value of minerals produced in southeastern New Mexico increased at a rapid rate. At the present time five potash mines are operating and the industry supplies 80 to 85 per cent of the potash used in the United States.

An extensive review of the mining industry in southeastern New Mexico is beyond the scope of this paper; however, a summary of the mineral occurrences is presented.

Jicarilla Mining District

The Jicarilla district is situated in the Jicarilla Mountains approximately eight miles southeast of Ancho. Reports state that placer gold deposits were worked as early as 1850. In the eighties prospecting for lode deposits was undertaken. Placer deposits have yielded a gold value of \$90,000 or more, but no

important mines have been developed in the lode deposits. The placer gold is derived from erosion of gold lodes which occur in the quartz monzonite porphyry that forms the main mass of the Jicarilla Mountains. Copper and silver as well as gold have been reported in some of the veins.

White Oaks Mining District

The White Oaks mining district is situated in a group of hills which constitute the northern end of the Sierra Blanca. The town of White Oaks at the northeastern base of Baxter Mountain was the center of operations. It is reported to have had a large population during its heyday but it is now a ghost city. As the prospector said,

"Her picks is rust, her bones is dust,
Its forty years since she went bust."

Placer gold was produced in the eighteen fifties and sixties and the gold veins were discovered in 1879. Mining flourished in the eighties and nineties and several mills were operated. The Old Abe was the most important mine of the district. Production values probably do not greatly exceed \$3,000,000 to date. One or more mines are still worked intermittently.

The gold ores are reported to be in monzonite which has intruded Cretaceous shale. Both igneous and sedimentary rocks are cut by lamprophyre dikes. The deposits form stringers and lodes which cut the monzonite, dikes, and shale.

Deposits of iron ore in the White Oaks district were described by V.C. Kelley, 1949.

Nogal Mining District

The Nogal mining district includes the sub-districts of Vera Cruz, Nogal, Parsons (Bonita), Schelerville (Church Mountain), Alto (Cedar Creek) and various isolated prospects. The district is situated chiefly on the eastern side of the Sierra Blanca, which in this vicinity is reported to consist of monzonite porphyry, cut by dikes of diorite porphyry. Andesite flows and tuff are reported to occur locally. Placer gold was found about 1865. Active prospecting began in 1882. Production values to 1910 are reported at about \$250,000. Very little work has been done in recent years.

Most of the ore is found in stringers and lodes in the

porphyry. Gold, pyrite, and sphalerite are found in a gangue of quartz and dolomite. Galena and sphalerite occur sparingly. Gold also occurs in veins in the andesite. Several copper and lead-silver prospects have been opened.

Capitan Coal Mining District Of Lincoln And Otero Counties

The Capitan coal district is one of several areas in the Sierra Blanca region of Lincoln and Otero Counties where coal occurs in the Mesaverde formation of Cretaceous age. C.B. Read, et al, estimates a total of 1,416.6 millions of tons of coal as representing the reserves of Lincoln County occurrences of the Sierra Blanca region. The coal is of bituminous rank.

In 1897 a branch of the El Paso and Southwestern Railroad, now the Southern Pacific, was built from Carrizozo to Capitan to transport the coal, much of which was used by the railroad for fuel. With the coming into use of other fuels, the demand for coal slackened and the branch railroad was abandoned. Since that time very little coal has been mined. Several mines were opened in the Capitan area. Perhaps the largest of these were known as Capitan No. 1 and No. 2. The coal beds are reported to be much faulted and in places intruded by dikes, and these features have interfered to a considerable extent with mining operations. Coal prospects are present elsewhere in the Sierra Blanca region, and a considerable quantity of coal has been mined near White Oaks.

Jarilla Mountains

The Jarilla Mountains are a few miles northwest of Orogrande in Otero County. They are composed chiefly of an irregular mass of monzonite porphyry which has intruded limestone of Carboniferous age. The limestone is mineralized at the contact and contains iron oxides. Contact metamorphic deposits in the limestone contain pyrite, chalcopyrite, and associated gold and silver. Placer gold occurs near the mineralized areas.

Prospecting in the district began in 1879. Considerable iron ore from several mines was shipped to Pueblo, Colorado from 1916 to 1921. These iron ore deposits are briefly described in another part of this report. Gold, silver, copper, and lead was produced from this district and according to reports production between 1904 and 1929 reached a total value of approximately one and one-half million dollars.

Iron Ore Deposits

The iron ore deposits of New Mexico have been described by V.C. Kelley. The principal iron ore deposits of the southeastern part of the state are in Lincoln and Otero Counties.

According to Kelley the iron deposits of Lincoln County are numerous along a north-trending belt through the western part of the county. The more important occurrences are in an area about 20 miles wide and 50 miles long extending from near Capitan and Carrizozo on the south to Corona on the north. Deposits are known in or near the Capitan, Jicarilla, Tecolote, and Gallinas Mountains. The Capitan deposits are the largest and best known and have estimated reserves of approximately one million tons of medium grade ore. The ore deposits are reported to be replacements of limestone along beds, breccia zones, or contacts in the Yeso or San Andres formations. The ores are chiefly magnetite. The principal deposits of the Capitan Mountain region are situated about six miles north of Capitan. They have been explored by test pits and shallow drill holes. Magnetite is the dominant ore mineral; hematite is common and other iron oxides occur. Kelley states that the controlling structure for the localization of the ore deposits was a pre-intrusive, pre-ore collapse structure or sink hole; and that the fluids associated with the Capitan Mountain intrusive sought out this structure for deposition.

Other iron deposits of Lincoln County are described by Kelley.

The iron deposits of Otero County, further described by Kelley, are best developed in the Jarilla Mountains in the Orogrande district. There they are associated with intrusives. Considerable iron ore has been produced in this district. The ores are chiefly magnetite and hematite. Several mines have been operated in past years. Kelley (1949) reports that the output of iron ore from Otero County amounted to 258,852 tons, and that most of it came from the Orogrande district during the period 1913-1921.

Potash Mines Of The Carlsbad District

The potash mines are situated in Eddy County in an area on the plains of southeastern New Mexico approximately twenty miles east of Carlsbad. Mining of potassium minerals began in 1931 and since that time has developed into a large and important industry with

five operating mines.

The search for potash in the United States was accelerated during World War I, when imports from Germany were cut off. J.A. Udden had found potash in the brine of a well drilled for water in Dickens County, Texas in 1912. In 1915 he found potassium salts in two wells, one in Potter County, and one in Randall County. The potassium minerals were not identified. Chemical examination of cuttings from various wells was made but it was not until 1921 that potash minerals were definitely identified in the Permian Basin. In that year R.K. Bailey of the United States Geological Survey found polyhalite in the cuttings from a well in Midland County and another in Dawson County. Polyhalite was also found in a well in Ward County in the same year.

The first sylvite discovery in the Permian Basin was made in 1925 by R.K. Bailey in cuttings from the Snowden and McSweeney well No. 1 (McNutt) in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 4, T. 21 S., R. 40 E. Although chemical analysis showed the percentage in terms of potassium oxide to be low, the discovery led to the drilling of a core test nearby and richer deposits of sylvite were encountered. Further prospecting led to the development of the first potash mine in New Mexico.

At the present time the United States Potash Company, International Minerals and Chemical Corporation, Potash Company of America, Southwest Potash Corporation, and Duval Sulphur and Potash Company are producing potash. The mines are operated on a large scale, modern machinery is employed, and a large tonnage of ore is handled. The crushed ore is run through a refinery where the material is processed, and the potassium minerals recovered and prepared for shipment.

The potassium minerals occur principally in the Salado formation of Permian age and are concentrated in nearly horizontal beds or zones. Mining is through shafts and the minable material is excavated by the room and pillar method. The Salado formation is chiefly salt with interbedded anhydrite. The potassium minerals are interbedded or disseminated with the salt, and in general at a depth from the surface of less than 1,000 feet in the vicinity of the potash mines, and of greater depths to the east in Lea County.

Prospecting for potash is by core-drilling through the salt. The cores are recovered, carefully examined,

and the data recorded. The known potash reserves are quite large, and the industry is growing. Most of the refined potash is shipped to the fertilizer and chemical industries.

The Carlsbad district supplies between 80 and 85 per cent of the potash consumed in the United States and produces between 90 and 93 per cent of the total domestic production. Foreign imports account for the difference. More than 60 million tons of crude ore having a potash content in excess of 14.5 million tons have been mined in the potash area. Present production is as follows:

Average daily tonnage of ore hoisted:	26,645 tons.
Average daily production of refined products:	7,730 tons.

SELECTED BIBLIOGRAPHY

- HOOTS, H.W.
Geology of a part of western Texas and southeastern New Mexico with special reference to salt and potash. U.S. Geol. Survey, Bull. 780-B, 1925.
- KELLEY, V.C.
Geology and economics of New Mexico iron-ore deposits. Univ. of N. Mex. Pub. in Geol., 1949.
- LASKY, S.G. and WOOTTON, T.P.
The metal resources of New Mexico and their economic features. N. Mex. Bur. Mines and Min. Res., Bull. 7, 1933.
- LINDGREN, W., GRATON, L.C., and GORDON, C.H.
The ore deposits of New Mexico. U.S. Geol. Survey, Professional Paper 68, 1910.
- SMITH, H.I.
Potash development in southeastern New Mexico. Amer. Inst. Min. & Met. Eng. Contribution No. 52, 1933.
- SMITH, H.I.
Potash. Printed in Industrial Minerals and Rocks, 1949.
- STORMS, W.R.
Diamond drilling of potash reserves in Eddy County, New Mexico. U. S. Bureau of Mines, R.I. 4098, 1947.

8. TALMAGE, S.B. and WOOTTON, T.P.
The non-metallic mineral resources of New Mexico and their economic features. N. Mex. Bur. Mines and Min. Res., Bull. 12, 1937.
9. UNITED STATES BUREAU OF MINES.
Minerals Yearbook, 1950.
10. WELLS, E.H. and WOOTTON, T.P.
Gold mining and gold deposits in New Mexico (revised). N. Mex. Bur. Mines and Min. Res., Circular No. 5, 1940.

ADVENTURES AND EXPLOITS OF PECOS PIONEERS

by
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Various tribes of Indians, chiefly Apaches and Comanches, held undisturbed possession of southern New Mexico from time immemorial. The sixteenth century Spanish explorers showed little interest in the land along the Pecos hemmed in by the dreaded Staked Plains on the east, and on the west by mountains, the sections of which were named White, Sacramento, Hueco, and Guadalupe. Coronado's party crossed and re-crossed the Pecos in their search for fabulous Quivira. Some forty years later the colonizer, Espejo, made a return journey to the province of New Biskay by descending the Pecos some 150 leagues until he reached the Rio Grande near its junction with the Conchos. Progressing at the leisurely rate of 15 miles a day from 5th of July to 15th of August, his party gathered a few details about the tributary streams and the general aspect of the country. The Indians luckily were friendly, but exceedingly plentiful at places. The Spaniards diverging up one of the larger affluents (probably the Hondo) found it practically one continuous settlement of Indians for several miles.

The seventeenth and eighteenth centuries are practically blank so far as the Pecos country is concerned. It continued to be a haunt of wandering tribes. Mexican buffalo hunters and traders with the Comanches beat a roadway from the northern settlements in New Mexico out into the Staked Plains and across them into San Antonio. When the Americans appeared sporadically in the 19th century, they also ignored the Pecos country.

The record shows but one expedition in search of buffalo or beaver. In 1832 a party of about 80, comprising both Mexicans and Americans assembled at Taos and started for the plains and water courses of Texas. They went down the Pecos to Anton Chico and Bosque Redondo (Ft. Sumner), but became so torn by dissension that the expedition was wrecked. A segment however, survived in which was the redoubtable mountain man, Bill Williams. This smaller party went eastward by Portales and Lubbock (to use the modern names) and on across Texas. Some of them persisted until they reached Ft. Smith, almost three months from the date of setting out. One of this group, Albert Pike, a young man from Massachusetts, estimated that they had traveled 1,400 miles, 650 miles of which were accomplished by walking.

No sooner did the United States acquire this vast tract we know as the Spanish Southwest than it commenced an extensive program for qualifying it for American settlement. Army officers and engineers busily explored for better or shorter routes or eligible sites for military posts, as well to impress the Indians with the power of the federal government. The outcome was material additions to knowledge about portions of the country - hitherto a varitable terra-incognito. Mountain canyons, desert lands, rivers, and minor water-courses, practicable and impracticable, were accurately mapped and described in voluminous reports.

In 1849, shortly after the conclusion of the Mexican War, government attention was given to southern New Mexico. One of the accepted routes to California was via Santa Fe, and then turning down the Rio Grande some 150 miles, to proceed through Arizona by a much used Spanish trail. Captain Randolph B. Marcy who was well fitted by experience in explorations in Texas and Utah Territory was appointed leader of the expedition. In carrying out this assignment, Captain Marcy was directed not only to "ascertain and establish the best route from Ft. Smith to New Mexico and California," but also to find if possible a cut-off that might reduce the journey, especially "from some point on the Del Norte about 180 or 200 miles below Santa Fe". After a month's rest in Santa Fe, Marcy decided to attempt an alternate route for the return. When he sought the services of a special guide familiar with the country infested with Apaches and other hostile tribes, he found but few Mexicans who knew anything about the country and they declined to serve as guides and return home alone through the Indian country. Finally he found at San Miguel the old Comanche named Manuel, "Who was born and raised directly in the country over which we