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Barite-fluorite-lead mines of Hansonburg mining district in central New Mexico

By Frank E. Kottlowski, Director, New Mexico Bureau of Mines and Mineral Resources, and Rene S. Steensma, Hansonburg Mines, Inc., Socorro, NM

Abstract

In 1947 the Royal Flush, Mex-Tex, and Portales mines in the Hansonburg mining district of Socorro County, central New Mexico, were opened on surface outcrops of barite-galena-fluorite veins. Through 1962 about 37,500 tons of barite, 5,800 tons of lead, and 1,870 lbs of silver were mined. When the rich pockets of ore apparently played out, the mines closed.

Sporadic exploration during the past 20 years coupled with intensive geologic work in 1978 has now blocked out almost 1 million tons of ore. To make this ore economically producible, properties were consolidated, a ground-water supply was developed in this arid area, exploration was geologically guided, and innovative crushing and concentrating equipment was designed. Previously, only barite and galena have been recovered; now fluorite also can be separated from the gangue of calcite and quartz.

The ore occurs as open-space filling of shatter zones in massive limestones, adjacent to faults, with local replacement of favorable strata. Rare minerals such as linarite and murdochite are present in the barite-fluorite-galena ores.

Introduction

The Hansonburg mining district has been explored, worked, and studied since 1872. Significant production of barite and galena began in 1947 and continued through 1962. During the past 20 years, exploration and minor production has been sporadic, but recent exploration has blocked out considerable reserves. During 1947-1962 barite and galena were recovered; present plans include production of fluorite as well as barite and galena.

Location

The district lies along the northwest flank of the Oscura Mountains in southeast Socorro County, central New Mexico, (fig. 1), and consists of two parts. The western part includes fault-block hills lying west of the Oscura Mountains on the east edge of Jornada del Muerto, a desert plain stretching westward to the Rio Grande valley. Sparse red-bed copper and several narrow, barite-galena-fluorite deposits occur in this western part; though mined in 1916 and 1917, these deposits yielded less than 2,000 tons of ore.

The main barite-galena-fluorite deposits occur in the eastern part of the district on the northwest front of the Oscura Mountains. The Portales-Blanchard mine is in E½ sec. 1, T. 6 S., R. 5 E. The Mex-Tex, Hickey, and Ora mines lie along the section lines between sec. 36, T. 5 S., R. 5 E., and sec. 31, T. 5 S., R. 6 E. The Mountain Canyon and Royal Flush mines and adjoining prospects are now grouped as the Farris mines of Hansonburg Mines, Inc., and are 3.5 to 6 mi south of the Bingham post office, which is on US-380, 30 mi east of the town of San Antonio, New Mexico (fig. 2). San Antonio is the nearest shipping point on the Atchison, Topeka, and Santa Fe Railway. Socorro, the nearest city, is 11 mi north of San Antonio on I-25.

Physical features

The Hansonburg mining district in the Oscura Mountains is on the eastern edge of the Mexican Highlands section of the Basin and Range province. The region is characterized by isolated mountains separated by wide, aggraded semiarid plains. The Hansonburg Mines, Inc. property extends north-south for about 2.5 mi along the west edge of the Oscura Mountains. The sierra at its south end is a broken, eastward-tilted fault block that changes into the northward-plunging Oscura anticline farther to the north. East of the Oscura Mountains are valleys cut in red beds of the Abo Formation (Permian); these valleys are bordered on the east by Chupadera Mesa. West of the Oscuras is the wide, desolate, southward-sloping Jornada del Muerto, an intermontane alluvial plain. Isolated, north-south elongated fault-block ridges occur along the east side of Jornada del Muerto south of Bingham. The Jornada del Muerto lies at an average altitude of 5,000 ft above sea level; the elevations of the higher points on the property are about 6,200 ft above sea level. Oscura Peak, near the south end of the sierra, is 8,548 ft above sea level.

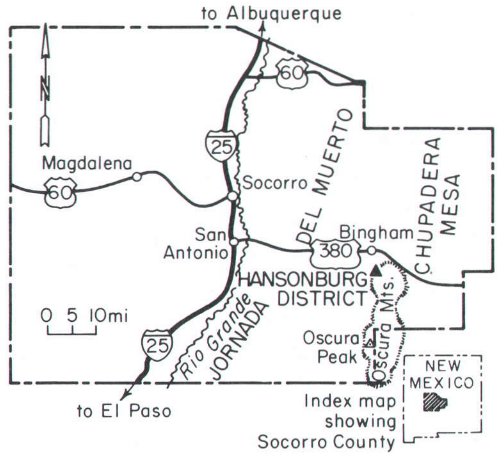

FIGURE 1—LOCATION OF HANSONBURG MINING DISTRICT, SOCORRO COUNTY.

Julian Arroyo is cut through the north end of the range, between the Royal Flush and the Mountain Canyon mines, and drains westward onto Jornada del Muerto.

A juniper-piñon forest covers the higher parts of the Oscura Mountains, but only scattered small trees occur amid cacti, yucca, creosote bush, and ocotillo on the lower slopes. Precipitation averages about 11 inches a year, most of which falls during the summer. Mean annual temperature is about 59° F. Water is a major problem, and must be obtained either from wells on the property, or trucked considerable distances from ranch stock wells.

The more resistant limestones of the Oscura Mountains form cliffs and ledges. Sandstone and shale beds—as well as thin-bedded and nodular limestones—weather to soil and rubble-mantled slopes, obscured in many places by the talus from overlying massive limestones. At the foot of the range, slope wash covers the bedrock. The single deep arroyo in the area is partly filled by a thick braided wash of silt, sand, and gravel.

History

The Hansonburg mining district was named by Jones (1904, p. 103) for a prospector, Hanson. Ore was first discovered in the district by Pat Higgins in 1872. The red-bed copper deposits of the west part of the district first attracted attention when a carload of copper ore was shipped in 1901 by Alcazar Copper Co. In 1916 and 1917, 15 carloads were shipped from the Hansonburg copper mine.

Lindgren and others (1910, p. 203) noted many lead ore prospect pits in the east part of the district; Wootton (Johnson, 1928, p. 123-124) reported on the Hansonburg lead mine of the Western Minerals Products Co. on six claims acquired in 1916 near the present Portales-Blanchard mine. Lasky (1932) examined the area in some detail in 1929. In addition to the copper ore shipped in 1916-1917 from the west part, the Rim Rock-Hansonburg lead mine had shipped several carloads of lead concentrates; however, neither mine was working in 1929.

In 1943, Rothrock, Johnson, and Hahn (1946, p. 174-176) examined the Hansonburg area and described the fluorspar deposits of the McCarthy lead mine (Portales-Blanchard lead mine) then owned by F. L. Blanchard. By 1947, the Portales Mining Co. was working the Hansonburg lead mine, developing milling methods to separate the barite and fluorite, and selling some barite for drilling muds (Clippinger, 1949, p. 16-18). Exploration by open cuts was in progress on the Mex-Tex and Royal Flush claims; several carloads of lead ore were shipped.

In 1952, the Hurlow Mining & Milling Co. erected a mill on the northeast end of the district, and was exploring the northern extension of the Royal Flush fault zone. The Portales mine and the open pits of the Mex-Tex Co. (at the Mex-Tex mine, Hickey and Ora mines) were trucking about 150 tons of ore daily to their respective mills in San Antonio, a distance of 30 mi. The Portales mill produced lead concentrates, whereas the Mex-Tex mill produced barite, galena and minor fluorite. At the south end of the present property, Mr. Barrett was developing open cuts in favorable ore beds. Ore from the

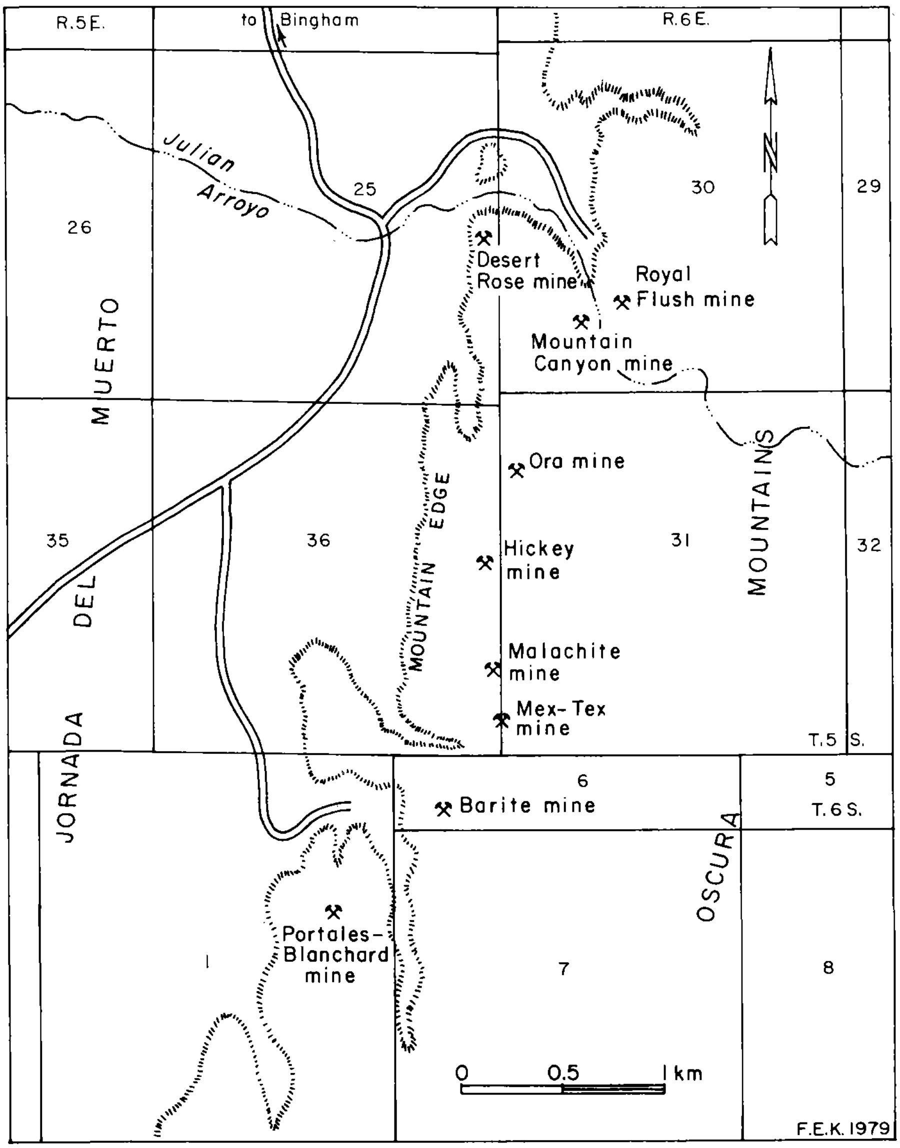

FIGURE 2—INDEX MAP OF EASTERN HANSONBURG DISTRICT.

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COMING SOON

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- Tucson gem and mineral show
- Fayette Jones, Mining Engineer, 1859-1936
- Directory of commercial analytical laboratories in New Mexico

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TABLE 1—MINING PRODUCTION FROM EASTERN PART OF HANSONBURG DISTRICT.

Year	barite (short ton)	lead (short ton)	silver (kg)	southern mines & claims (Blanchard-Hansonburg-Portales)	central & northern mines (Royal Flush, Mountain Canyon, Ora, Hickey, and Mex-Tex mines)
1947	0	few	—	Portales Mining Co.	various claims
1948	0	120	—	"	"
1949	0	150*	—	"	Scott Mining Co.
1950	400*	253	38 (.150)	"	Mex-Tex Mining Co.
1951	1700*	750*	—	" (inactive)	"
1952	4530*	847	108 (.128)	"	"
1953	6260*	1031	39 (.038	"	"
1954	5200*	800	—	"	"
1955	4620*	528	—	"	"
1956	4059	407	78 (.192)	"	"
1957	4441	441	79 (.179)	"	"
1958	4474	440*	—	Sunshine Mining Co.	"
1959	320	3*	—	"	Galbar, Inc.
1960	492	5*	—	"	"
1961	600	6*	—	"	"
1962	252	2*	—	"	"

(Data: Annual Reports U.S. Bureau of Mines; Annual Reports, New Mexico State Inspector of Mines. *Denotes estimated production. Figures in parentheses are kilograms of silver per ton of lead.)

Royal Flush mine produced in 1951 and 1952 was reported to contain 30-55 percent barite, 12-23 percent fluorite, and about 5 percent galena, in a gangue of quartz, calcite, and limestone (Kottlowski, 1953).

Samples from the Mex-Tex mine, analyzed by Williams (1964, p. 43), yielded 59 percent barite, 12 percent fluorite, 19 percent SiO_2, and 9 percent $CaCO_3$.

In the early 1960's, Galbar Inc. mined and explored the Mex-Tex, Royal Flush, Mountain Canyon, and Malachite mines, shipping several carloads of lead concentrates by truck and rail to the ASARCO smelter in El Paso, Texas, 220 mi to the south. Some of these concentrates contained one percent copper, traces of gold, 225 grams-per-ton silver (Kopicki, 1962), and some zinc. At that time, the Sunshine Mining Co. was exploring the Blanchard-Portales mine area, both underground and by surface cuts. Sporadic mining and exploration continued until 1966 (Lewchalermvog, 1973). Beginning in 1972, Basic Earth Science Systems, Inc. conducted exploration—including core drilling—for a period of several years. In 1977, the present owners of the property, Hansonburg Mines, Inc., began extensive exploration, beginning with 9 drill holes that cored the ore zones to a depth of 650 ft. Recent drilling, mainly in the southern area, has been on 20-ft centers.

Production from the eastern part of the Hansonburg mining district (determined from incomplete records) is given in table 1.

The lead concentrates contain varying amounts of silver; some yearly comparisons are shown in table 1.

Total ore production of eastern part of district has been about 37,500 tons of barite, 5,800 tons of lead, and about 1,900 lbs of silver, as well as a few tons of copper and zinc.

Geology

A mile south of the Portales-Blanchard mine, the western fault-scarp of the Oscura Mountains exposes cliff-forming Pennsylvanian (Upper Carboniferous) limestones that rest on Precambrian granite. The rocks are broken into several fault blocks by nearly vertical north-trending faults. The western sides, in most places, are downdropped, and the uplifted eastern blocks tilted so that the strata dip eastward. Near the north end of the range, the fault blocks merge into the northward-plunging Oscura anticline. To the north, the Pennsylvanian strata are overlain by the red beds of the Abo Formation (Permian).

Stratigraphy

Precambrian, Pennsylvanian, Permian, mid-Tertiary, and Quaternary rocks crop out in or near the mining district. The Precambrian is mainly pink muscovite granite that intruded gray quartzite. Pennsylvanian gray limestones, greenish sandstones, and shales overlie the beveled surface of the Precambrian rocks, and Permian red beds rest disconformably on the upper Pennsylvanian strata. A few sills and dikes of mid-Tertiary monzonite-diorite intruded the Pennsylvanian and Permian beds. Quaternary alluvium fills the valleys and blankets most of the surface of the Jornada del Muerto to the west.

Wilpolt and Wanek (1951) mapped the Pennsylvanian strata in the area as the Sandia Formation overlain by the Madera Limestone. Thompson (1942), on the basis of fusulinid zonation and detailed measurements of sections, subdivided the Pennsylvanian into 15 formations which are useful in mapping the mine areas on a small scale. Units mapped in the area are the Bolander Group of Desmoinesian (Westphalian, B, C, and D) age; the Coane, Adobe, Council Spring, Burrego, and Story Formations of Missourian (Lower Stephanian) age; and the Del Cuerto, Moya and Bruton Formations of Virgilian (Upper Stephanian) age.

The lower beds of the Pennsylvanian are in the Sandia Formation. In the northern part of the Oscura Mountains, the formation consists of arenaceous limestone, green to black shale, and greenish sandstone, 16.5-42.5 ft thick. The Madera Limestone is conformable on the Sandia Formation, and is 721-1,100 ft thick in the Oscura Mountains. The middle and upper part of the Madera of Wilpolt and Wanek (1951) are the same beds as Thompson's (1942) Bolander Group and overlying units; these were mapped in the mining district.

The Bolander Group is of gray to buff cherty limestones, about 131 ft thick. The overlying Coane Formation, 59-79 ft thick, is of gray to buff limestones with scattered chert nodules; uppermost beds form a massive cliff, 23-33 ft thick. Above is the Adobe Formation, 49 ft thick, of gray limestones, gray shales, and arkosic sandstones, that weathers to form a broken slope between the thick limestone cliffs of the Coane Formation below and the Council Spring Limestone above. At the base of the formation is a green fossiliferous arkosic sandstone with conglomeratic lenses and fresh angular feldspar grains.

The Council Spring Limestone is light gray, coarse-to-fine crystalline massive, and in most places forms a single, 23-ft-thick cliff. This unit forms the persistent and distinctive cliff along the mountain front at the level of the mines; much of the ore extracted is from fractured zones in this formation.

The overlying Burrego Formation, 52.5 ft thick, consists of massive to thin-bedded nodular limestones, with lenses of dark-gray to purplish shale and brownish sandstone in the lower part. Two distinctive thin beds of green to purple, crinoidal, arenaceous limestone, grading laterally into micaceous calcareous argillaceous sandstones occur in the lower part of the formation. The limestone beds crop out as a series of partly covered ledges above the cliff formed by the Council Spring Limestone. Much ore is found in the lower part of this formation.

The next higher unit is the Story Formation, composed of a lower 23 ft of reddish-brown shale, arkosic and micaceous sandstone, and gray shale, and an upper 39.5 ft of light-gray, massive fossiliferous limestone. Above is the Del Cuerto Formation, 79 ft thick, of nodular gray limestone, red, green, and brown arkosic sandstone, limestone conglomerate, and gray to red shale. The formation crops out as scattered ledges on a covered slope partly buried by rubble from the overlying Moya Limestone. The Moya consists of massive to nodular light-gray limestone that forms high cliffs 53 ft thick. Most of the dip slopes in the Oscura Mountains are capped by the Moya Limestone.

The youngest Pennsylvanian unit is the Bruton Formation, 115 ft thick, of red shales, purple arkosic sandstones and conglomerates, and interbedded nodular limestones.

Lower Permian units of Wolfcampian (Sakmarian) age are the Bursum Formation and overlying Abo red beds. The Bursum Formation, 92-246 ft thick, consists of thick beds of dark purplish-red and green shale interbedded with thin beds of arkose, arkosic conglomerate, and gray limestone. Thick massive limestones at the top of the formation contain Wolfcampian fusulinids. The Abo Formation, about 754 ft thick, consists of dark-red shale, sandstone, arkose, and conglomerate, in lenticular cross-laminated beds containing plant imprints, current ripplemarks, and desiccation cracks.

The formation erodes to the reddish-brown slopes and ledges that characterize the northern end of Sierra Oscura along US-380.

Sills and dikes of Oligocene monzonite and diorite were intruded into the Paleozoic strata of the region. Near the mines a sill of hornblende diorite is altered, with ophitic texture of hornblende laths set in a matrix of plagioclase crystals, with outer edges very fine grained, and containing some barite.

Geologic structure

Sierra Oscura is a tilted fault-block range. The mountain front is a steep west-facing fault-line escarpment and the east slope is a rolling, dissected upland. The main Oscura fault borders the range on the west, strikes N. 15° E., has many small branch and parallel faults, and is concealed by alluvium except at a few places. The throw of the fault zone decreases from south to north, and dies out northward in the Oscura anticline. Another fault zone, about a mile east of the Oscura fault, occurs near the base of the west-facing escarpment in the mining district. Beneath the Malachite and Mex-Tex mines, this fault has a throw of about 550 ft with the base of the Bursum Formation dropped on the west opposite the Bolander Group limestones. This fault zone trends north-south, but at intervals of about 1,700 ft is interrupted and progressively offset to the east, or curves to the east before dying out northward. A complex system of small faults with displacements less than 100 ft are parallel or subparallel to the major faults. Throughout the area are two intersecting sets of joints. One set strikes from north to N. 20° W., and the other set strikes from north to N. 35° E.

Almost all the faults are marked by a narrow (2-40 inches) silicified or mineralized zone associated with an irregular, wider brecciated zone (6-50 ft wide). Many of the joint surfaces are coated with siderite or calcite and scattered crystals of ore minerals.

Ore deposits

Most of the mineralization occurs in the Council Spring Limestone and in the lower part of the overlying Burrego Formation. Small mineralized zones are present in the Coane, Story, and Del Cuerto Formations. The ore deposits are open-space fillings with minor local replacement of favorable strata. Characteristically, the ore has a banded structure, in which a silicified limestone 0.8 to 4 inches thick is bounded on both sides by a mesh of galena and aqua-colored fluorite cubes. Spaces between these bands are 2-24 inches wide and are mostly filled by tabular barite crystals with a few galena and fluorite cubes. Vugs are lined in places with tiny drusy masses of quartz crystals; locally coarse-crystalline quartz is intergrown with the ore. The banded texture is similar (Roedder and others, 1968) to the coon-tail texture of fluorite deposits in Illinois.

Minerals are large and well crystallized, with fluorite and galena cubes 2 inches across, and tabular barite crystals 6 inches long. Common minerals are barite, fluorite, quartz, galena, and calcite, with supergene minerals anglesite, cerussite, covellite, malachite, and azurite, and the unusual minerals linarite and murdochite (Sun, 1957).

The ore deposits are, for the most part, open-space fillings in fissures, fault breccia, and small caves. Individual deposits are relatively small, discontinuous, elongate, lenticular bodies, in most places lying with long axes parallel to the north-south-trending minor faults, particularly in locations where massive beds of noncherty limestones, such as the Council Spring Limestone, have been intensely broken and shattered. Locally, argillaceous beds in the lower part of the Burrego Formation appear to have trapped mineralizing solutions and caused formation of ore zones in underlying brecciated and sheeted limestones.

Developments

Prospect pits, trenches, shallow shafts, and adits testing the numerous ore outcrops, silicified zones, and fractured areas along faults are the most favorable methods of exploration. Although drilling is expensive in the hard cherty limestones, exploration drilling by previous companies, and by Hansonburg Mines, Inc., has blocked out considerable ore reserves. The present exploration program began with widely spaced deep drilling to verify previous testing and results of surface trenching. This has been followed by more trenching, 15-40 ft deep, and closely spaced drilling, with drill holes spaced 20 ft apart in places. As a result, throughout the eastern part of the mining district, from Royal Flush mine southward to the Portales-Blanchard mine area, reserves are estimated at 1 million tons of ore containing an average of 6 percent galena, 20 percent barite, and about 10 percent fluorite.

One of the major steps in the development has been to obtain title to all of the mines and claims in the eastern area, allowing the total reserves to be available to a single company. Another crucial step was the locating of a water supply for the milling process. Deep wells drilled in the Pennsylvanian and Permian bedrock of the range were dry; even a well at the mouth of Julian Arroyo had low yields. A 350-ft-deep well spotted by W. K. Summers and Associates about 3.5 mi north of the mines and a mile north of US-380 along a deep arroyo that drains the west slopes of Chupadera Mesa produces sufficient mill water from alluvium and from Permian rocks. The water is piped 5 mi to the mill site located northwest of the Portales-Blanchard mine.

Previous operations had obtained galena and barite concentrates from the ore but had poor recovery of fluorite. The Hansonburg Mines, Inc. mill will utilize two new processes, a concentrating machine based mainly on gravity separation of the ore, and an impact crusher to take the

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Hansonburg mining district

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place of secondary crushing and grinding (Steensma, 1978). With recovery of silver from the galena concentrates, the large amount of blocked-out ore, and with recovery of fluorite in addition to lead and barite, this relatively small operation (about 400 tons per day) should be economical.

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Abstracts

(continued from page 31)

ment of those resources will require use of water resources that are already over-appropriated in virtually every western state—water resources that often are equally necessary for balanced, indigenous economic growth. As a measure of the increasing demand on western water resources, the Western States Water Council estimates that by 1990 energy production in the region will require an increased annual commitment of approximately 2.3 to 3.1 million acre-ft of water. The purpose of this study is to contribute to the growing knowledge about the feasibility of energy centers, particularly in relation to utilization of hitherto unallocated and mainly unusable ground water in the Western States. Specifically the suitability of the Tularosa Basin in south-central New Mexico as the site for a regional energy center is studied. The center is assumed to be primarily nuclear with varying potentials for fossil, solar, geothermal, and wind energy-generating facilities. The analysis also considers anticipated socio-economic and environmental impact on the region. (ERA citation 03:050430)

N.M. Bureau of Mines & Mineral Resources

ENERGY RESOURCES OF NEW MEXICO *by Frank E. Kottlowski and Sam Thompson III*

Translation of Spanish text of a paper presented by the junior author to the Mexican Geological Society (Sociedad Geologica Mexicana, A.C.), Chihuahua District, February 3, 1979.

New Mexico's energy resources are diverse and generally abundant. The subsurface resources are ranked in order of Btu value: 1) uranium—542 $\times$ 10^{17}Btu (952 $\times$ 10^{3}tons U_3O_8), 2) coal—2.84 $\times$ 10^{16}Btu (128 $\times$ 10^{9}tons), 3) gas—19.7 $\times$ 10^{15}Btu (18.29 $\times$ 10^{12}cu ft), 4) oil—7.30 $\times$ 10^{15}Btu (1.26 $\times$ 10^{9}barrels), and 5) geothermal energy—5.97 $\times$ 10^{15}Btu (1.75 $\times$ 10^{12}kilowatt-hours). These estimates include proved reserves and probable resources of producing districts, but exclude the speculative resources of unexplored areas, which could increase the totals by many orders of magnitude.

Northwestern New Mexico contains the largest reserves of uranium (in Jurassic sandstones) and coal (in Cretaceous formations), nearly half of the gas resources (in Cretaceous sandstones), a small part of the oil resources (in Pennsylvanian limestones and Cretaceous sandstones), and some of the best geothermal prospects (in the Jemez area on the western margin of the Rio Grande rift). Southeastern New Mexico contains the largest reserves and resources of oil and gas (in Paleozoic carbonates and sandstones). The energy resources in the remainder of the state are still being explored.

Surface resources include solar, hydroelectric, and wind power. Of these, solar energy has the greatest potential. □

Coal conference

The second annual NATIONAL ABANDONED MINE LANDS CONFERENCE was held in Albuquerque, NM, April 4-6, 1979. Hosts were the Federal Office of Surface Mining, State Bureau of Surface Mining (Mining and Minerals Division of Energy and Minerals Department), and New Mexico Bureau of Mines and Mineral Resources. Major topics were reclamation of coal surface-mined lands in the west, particularly in New Mexico, and inventories of disturbed lands. The sessions included a field trip to Anaconda's Paguate open-pit uranium mine, McCarty's Basalt flows, Red Rock State Park, Acoma, and Pittsburg and Midway Coal Mining Company's McKinley coal surface mine northwest of Gallup. The road log was prepared by John Wright and Don Baker of New Mexico Bureau of Mines & Mineral Resources. □

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