NEW MEXICO
BUREAU OF MINES AND MINERAL RESOURCES

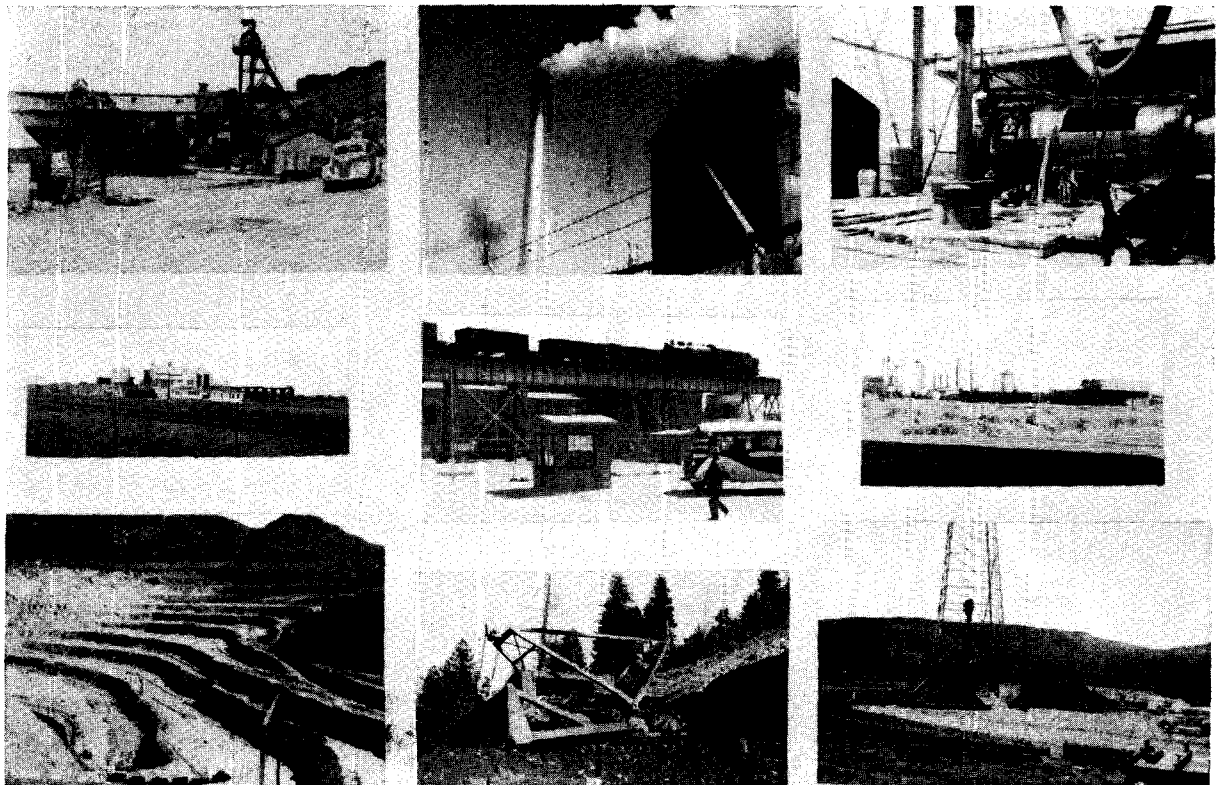
A DEPARTMENT OF THE SCHOOL OF MINES
E. C. ANDERSON
Director

BULLETIN 27

Contributions of New Mexico's Mineral Industry to World War II

Compiled by
T. D. BENJOVSKY

SOCORRO
1947



New Mexico's mineral industry at work.

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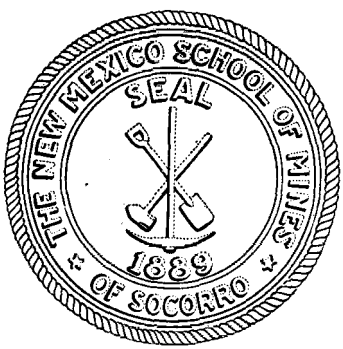

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THE NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES

The New Mexico Bureau of Mines and Mineral Resources, designated as "a department of the New Mexico School of Mines and under the direction of its Board of Regents," was established by the New Mexico Legislature of 1927. Its chief functions are to compile and distribute information regarding mineral industries in the State, through field studies and collections, laboratory and library research, and the publication of the results of such investigations. A full list of the publications of the New Mexico Bureau of Mines and Mineral Resources is given on the last pages of this Bulletin.

Contributions of New Mexico's Mineral Industry to World War II

Compiled by

T. D. BENJOVSKY

INTRODUCTION

GENERAL STATEMENT

The mineral industry of the nation during the war years supplied the tremendous manufacturing program with a huge supply of metals, nonmetals, petroleum, and natural gas. New Mexico won important rank among the states by its contribution of minerals to the war effort. This State ranked first in production of potash, tantalum, and pumice; second in zinc and tin; third in copper, molybdenum, and vanadium; fourth in beryl, lithium, and fluorspar; and seventh in oil and gas. It ranked fourteenth among the states in value of minerals produced. In a time of critical emergency it contributed essential minerals to the manufacture of the atomic bomb.

During the war the builders of airplanes, ships, tanks, and munitions received the publicity and acclaim for setting production records. But the raw material for this production came from the rocks, after exploration, extraction, transportation, beneficiation, smelting, refining, and chemical or electrolytic treatment. The less glamorous but vitally important mineral industry made possible the production records of the manufacturers.

Although the increased production for war was viewed by many Federal agencies and some operators with alarm, as a forced and rapid exhaustion of mineral resources, the ultimate effect was not so adverse as many expected. Increased exploration demonstrated that the potentialities of many known deposits were greater than had been estimated; that the possibilities of deposits only superficially prospected constitute a reserve for the future; and that there are extensive areas in which mineral de-posits may be concealed by alluvium and lava flows. Premature exhaustion of petroleum resources in New Mexico was effectively prevented by strong State and Federal conservation regulations and by careful practices on the part of the industry itself.

In January 1942, in response to a Presidential order to all state governors, Governor John E. Miles called a conference of New Mexico mining and petroleum operators. The purpose of

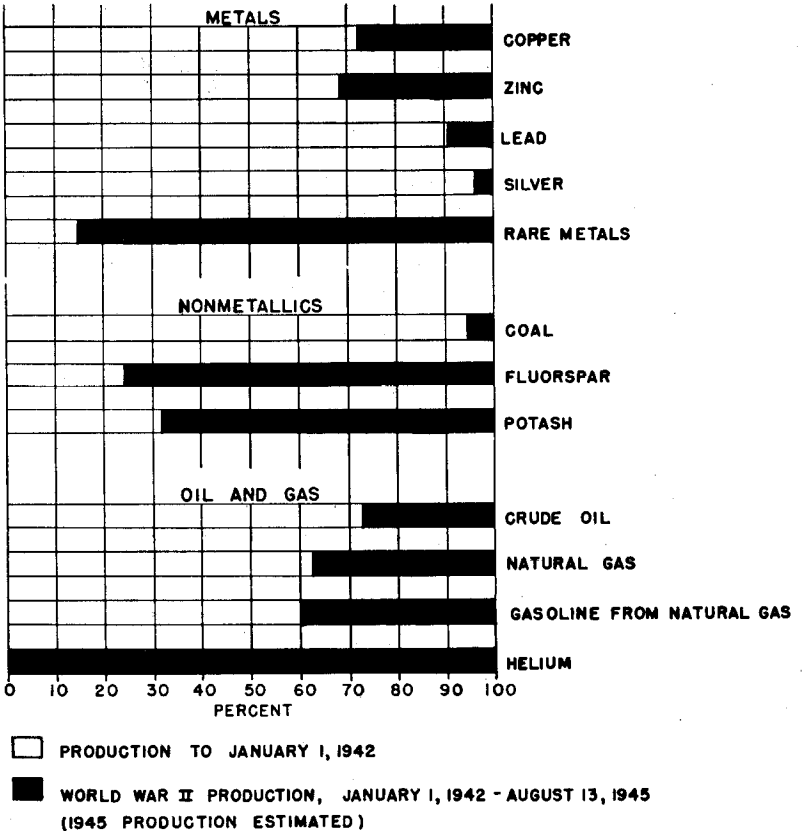


FIGURE 1. Pre-war mineral production of New Mexico compared with production during the war.

the conference was to ascertain the position of the State's mineral industry for an all-out war effort. The attendance was so unexpectedly large that the conference had to be divided into sessions on metals, nonmetals, and oil and gas. Speakers were selected to present different phases of the industry. Two outstanding features were brought out. First, the production of copper, molybdenum, and potash was already virtually at wartime capacity; additional equipment, already planned for, could increase potash production still further. Second, the production of other important materials, including lead; zinc, 'fluorspar, coal, and petroleum, could only be augmented by a program of exploration, development, construction, and additions to equipment. Critical factors in increasing the production of copper, lead, and zinc were additional supplies of water and power.

FAVORABLE FACTORS

The most significant favorable factors affecting New Mexico's mineral production were as follows.

1. Large known reserves of numerous minerals.

2. A store of information on these resources, compiled before and during the war by such agencies as the U. S. Geological Survey, the U. S. Bureau of Mines, and the New Mexico Bureau of Mines and Mineral Resources, as well as by private concerns, both large and small.

3. Foresight, aggressive action, and cooperation on the part of management. This was illustrated by the search for new deposits, the installation of new equipment, the application of new methods and processes, and the spirit of cooperation evident in the industry. Availability of New Mexico gas as a fuel allowed the construction of steam power plants to generate current for locomotives at the Santa Rita copper pit and for heavy equipment at the copper smelter, refinery, and lime plant at Hurley. By 1942 gas fuel from southeastern New Mexico was also serving the greater part of the mining industry of Arizona.

4. The determination of labor and New Mexico citizens in general to see the war effort to a successful conclusion.

5. The presence on the War Production Board of men experienced in the problems of mineral production.

6. The efforts of the U. S. Soil Conservation Service, the U. S. Forest Service, the State Highway Department, and the U. S. Bureau of Public Roads in the construction, improvement, and maintenance of highways and access roads.

7. The existence of an efficient and integrated transportation system—air, rail, truck, and pipe line—on which New Mexico is so vitally dependent. To meet the demand for greatly expanding transportation, the rail and truck lines extensively improved and modernized their equipment.

8. The persistence of the prospector and the wildcatter, and the willingness of the small investor to take chances.

ADVERSE FACTORS

New Mexico's wartime mineral production was made in spite of many adverse factors, some of which are enumerated below.

1. Great distances between mineral deposits and points of beneficiation, smelting, and refining.

2. Confusion resulting from policies and regulations set up by Federal agencies, especially in the early part of the war.

3. Shortages of tools and equipment.

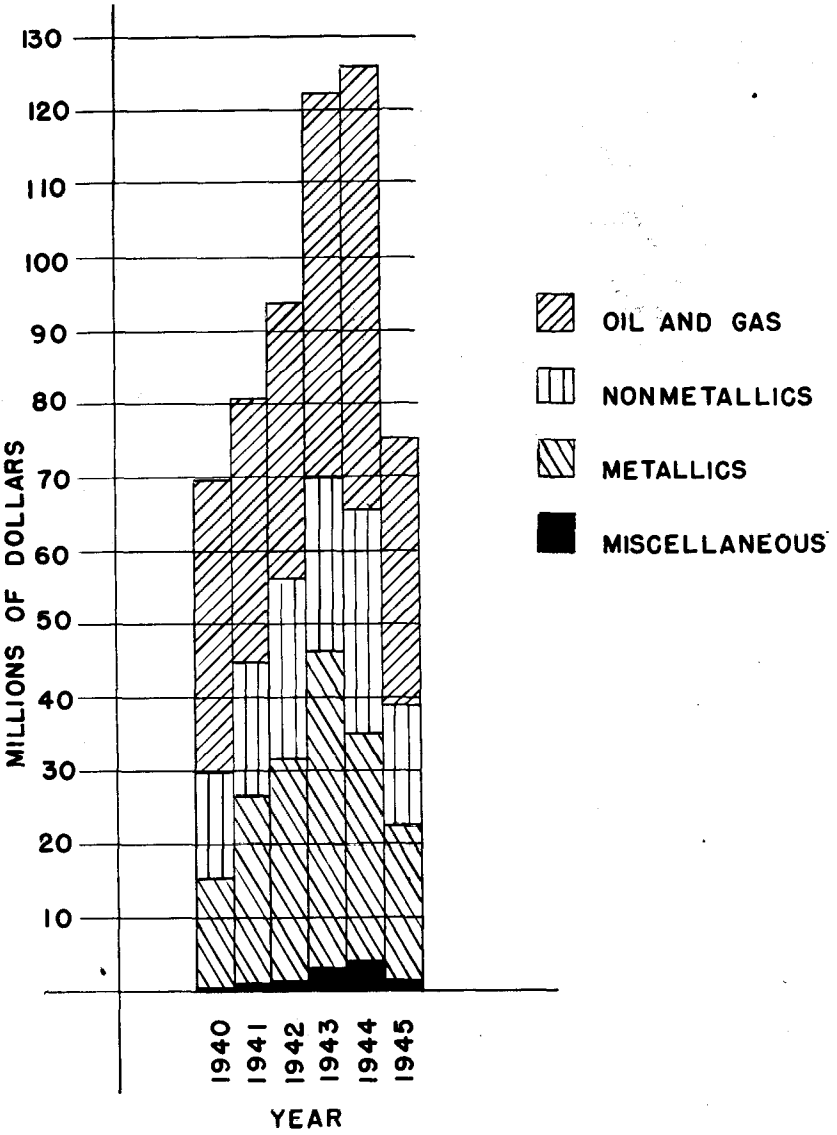


FIGURE 2. Value of New Mexico's mineral production, 1940-1945.

4. Until the end of 1942, the regulation restricting the hours of work per week for employees.

5. Acute shortages of manpower, occasioned both by drafting of men for the armed forces and by the migration of skilled and semi-skilled labor to higher-paid jobs in war plants.

6. The constant possibility that the Office of Price Administration would cancel on 30 days' notice the premium prices applied to copper, lead, and zinc.

PURPOSE OF THE REPORT

This bulletin records the contributions of the mineral industry of New Mexico to World War II. In addition to providing an outstanding record of achievement, the report may furnish a basis for future constructive planning in the mineral industry.

A feature of the report is a number of letters from companies, including the two transcontinental railroads that cross the State, outlining their activities in New Mexico during the war years. Production statistics are summarized in a number of tables, and several features of the wartime record are shown graphically.

ACKNOWLEDGMENTS

Among the numerous sources of information for the present report the compiler wishes to express his appreciation to the many company managers and operators that provided accounts of their wartime efforts or gave time for personal conferences; to the Santa Fe and Southern Pacific railroads; to the U. S. Forest Service, Grazing Service, and Soil Conservation Service; and to the State Highway Department.

The preparation of the report has been under the direction of E. C. Anderson, and the compiler has been assisted very materially by Robert L. Bates. Thanks are also due E. L. Murusky and Hobart E. Stocking for assistance in preparing and arranging the material.

METALLICS

As of December 7, 1941, the production of copper, lead, zinc, molybdenum, and manganese-iron in New Mexico was on the increase. The production of gold and silver from siliceous ores was declining, but both metals were being produced as by-products from complex ores. Major companies and individual operators had been engaged since 1938 in making plant additions, adding new equipment, improving metallurgical processes, prospecting, and exploring, as well as in producing from old and new mineral deposits.

The following factors contributed materially to the strong position of New Mexico's metallic-mining industry at the start of the war.

1. Extensive expansion of the copper-producing facilities of the Kennecott Copper Corporation at Hurley. This included rearrangement and additions to the crushing plant; construction of .a copper smelter and refinery; and installation of a new unit in the mill to recover molybdenum from the copper concentrates.

2. The construction by Raskob, Incorporated, of a copper flotation plant of 150 tons capacity at the San Pedro mine, Santa Fe County.

3. The reconditioning and addition of new equipment to the Blackhawk Consolidated mill at Hanover, by the American Smelting and Refining Company, increasing the mill's capacity from 250 to 400 tons per day.

4. Construction of a lead unit at the Empire Zinc Company's mill at Hanover.

5. Expansion of operations of the Peru Mining Company in Grant County.

6. The unwatering of the Waldo shaft at Magdalena, and the resumption of operations of a 200-ton milling plant there, by Raskob, Incorporated.

7. The advent into New Mexico of the United States Smelting Refining and Mining Company, which expended large amounts in the acquisition, diamond drilling, and underground exploration of lead and zinc deposits in Grant County. Before the end of the war this company became the State's largest lead and zinc producer.

8. Construction of the hydro-electric plant at. Elephant Butte Dam and the distribution of electric power over new trans-mission lines.

9. The enlargement of gas pipe lines from southeastern to southwestern New Mexico, making gas available as fuel for generating electric power for smelters and domestic use.

10. The establishment by the Santa Fe Railway of a favorable rate for iron-manganese ores and iron ores from New Mexico to the steel plant at Pueblo, Colorado.

At the outbreak of the war New Mexico was producing eight metallic-mineral products from 15 mines. In 1941 the total value of the five major metals was $25,476,416; the highest since 1918. Of this total copper represented 68 percent, zinc 22 percent, and gold, silver, and lead the remaining 10 percent. Molybdenum production was on the up-trend, owing to recovery from copper ores. Iron and manganese deposits were being prospected, and plans were under way to increase production of these metals.

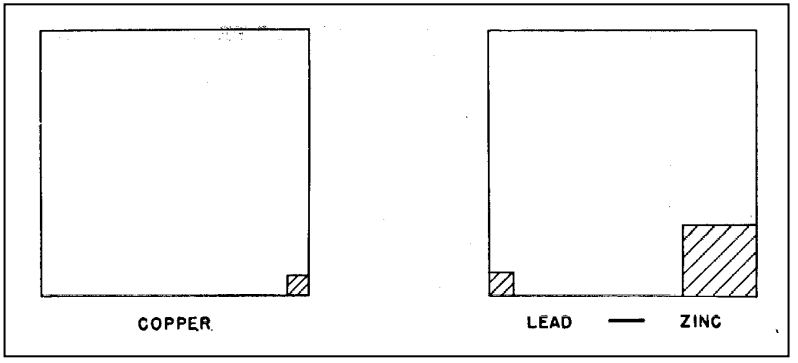


FIGURE 3. Amount of copper ore and lead-zinc ore mined during the war years (large squares) compared with amount of metal recovered (ruled squares).

The transition from peacetime to wartime conditions brought on many problems. A number of Federal and military regulations were placed on the industry. Nearly all minerals were termed strategic and were classified as critical, essential, or necessary. Equipment, machinery, tools, and supplies were requisitioned and distributed to phases of the industry where they would do the most good. Manpower was classified and distributed. All these matters were added to the industry's assortment of its own problems; but by the end of 1942, most of the difficulties between established concerns and Federal agencies had been cleared up. In the establishment of new operations by smaller concerns and individuals, however, much valuable time was lost and much unnecessary expense was incurred because of Federal restrictions. The retention into 1942 of the 40-hour work-week slowed up production by both major and minor companies.

Nevertheless, the production for 1942 was beyond expectations. This production came from 29 mining operations, compared to 15 in 1941; it was processed in the same number of plants as in 1941. The volume and value of 1942 production are shown in Table 1.

The year 1943 saw the momentum of production continued. Much machinery and equipment that had been ordered in 1941 and 1942 was delivered. For the first time in history women took the places of men on surface jobs at mines and plants. These factors, together with the ever-increasing resourcefulness of management and the extension of the work-week to 56 hours, made possible the highest annual production in the history of the State to that time.

The United States Smelting Refining and Mining Company's 300-ton mill at Bayard Station was put into operation; its capacity shortly reached 450 tons per day. The United Mining and

TABLE 1. VOLUME AND VALUE OF METALS PRODUCED IN NEW MEXICO IN 1942

Metal	Volume	Value
Copper	160,200,000 lbs.	$19,384,200
Gold	11.961 ozs.	418.835
Iron ore	107.306 tons	268.015
Lead	9,216,000 lbs.	817.491
Manganese ore (+ 35% Mn)	1.267 tons	34.589
Manganese-iron ore	89,009 tons	1,068,008
Molybdenum	2,034,148 lbs.	918.966
Silver	676,170 ozs.	480.832
Vanadium and uranium ore	2,300 tons	24.035
Zinc	92,922,000 lbs.	8,641,746
		$32,056,717

Milling Company started construction of a mill to treat manganese ores hear Socorro.

The close of 1943 saw 36 active metal-mining operations as compared with 29 in 1942. New metals added to the production list were magnesium, tantalum, tin, and tungsten. Although production of some metals decreased, others gained; prices were increased by Government premiums. The year's production is shown in Table 2.

The year 1944 was noted for the continued demand by the armed forces for manpower. Critical to metal-mining was the induction of the younger men, ages 18 to 25. Replacements in

TABLE 2. VOLUME AND VALUE OF METALS PRODUCED IN NEW MEXICO IN 1943

Metal	Volume	Value
Copper	152,326,000 lbs.	$19,802,380
Gold	5.563 ozs.	194.705
Iron ore	41.744 tons	104.076
Lead	11.466.000 lbs.	858.450
Magnesium	[a]	[a]
Manganese ore (+ 35% Mn)	469 tons	12,083
Manganese-iron ore	72.967 tons	865.604
Molybdenum	3.285.000 lbs.	1.478.250
Silver	463.485 ozs.	329.659
Tantalum concentrates	6.000 lbs.	[a]
Tin	2.640 lbs.	1.372
Tungsten ore	58 tons	1.366
Vanadium and uranium ore	4.700 tons	49.115
Zinc	119,048,000 lbs.	12,857,184
		$36,554,244

[a] Figures not available.

the industry were at first made with women and older men. Later, men assigned to the prospecting and development of ore bodies were withdrawn from this work and placed on production jobs. This procedure had two effects : loss of new production that ordinarily comes from development of deposits, and rapid depletion of reserves.

The 'production and value of metals decreased, and at the end of 1944 metal mines numbered only 21, as compared with 36 in 1943. Metals newly produced in New Mexico were beryllium and lithium.

TABLE 3. VOLUME AND VALUE OF METALS PRODUCED IN NEW MEXICO IN 1944

Metal	Volume	Value
Copper	139,460,000 lbs.	$18,827,100
Gold	6.918 ozs.	272.130
Iron ore	33.460 tons	90.342
Lead	14.530.000 lbs.	1.162.400
Magnesium	[a]	[a]
Manganese ore (+ 35% Mn)	273 tons	10.663
Manganese-iron ore	100.683 tons	1.293.776
Molybdenum	2,956,500 lbs.	1,319,920
Silver	535.275 ozs.	380.640
Tin	[a]	[a]
Tungsten ore	496 tons	11,586
Vanadium and uranium ore	129 tons	1,860
Zinc	101.454.000 lbs.	11.565.756
Beryllium (28 tons), lithium (80 tons), tantalum concentrates (6,000 lbs.)		50,000
		$34,986,173

[a] Figures not available.

The metal-mining industry in 1945 was marked by a gradual decline. Four contributing factors were (1) continuing shortages of manpower; (2) easing of the demand for copper and certain other metals; (3) depletion of developed ore-bodies, other than copper, and the failure to keep development of known deposits ahead of extraction; and (4) the rescinding of the B and C bonuses on metal prices. "Since 1940 unit price realizations for minerals have increased only 23.2 percent, whereas prices for all commodities have risen 32.3 percent and those of farm products 82.1 percent." [1]

The advent of V-E Day, May 6, 1945, tended to ease demand for all metals. This was a relief to the extent that manpower vital to production could now be re-deployed, and development of new deposits could be undertaken. Again the maintenance

[1] Minerals Yearbook 1944: U. S. Bur. Mines, p. 7, 1946.

of mine properties and milling equipment could be taken up for the task of concluding the war with Japan. Production of metals was carried on at a rate sufficient for all needs of industry and the armed forces up to V-J Day, August 13, 1945.

TABLE 4. ESTIMATED VOLUME AND VALUE OF METALS PRODUCED IN NEW MEXICO IN 1945[a]

Metal	Volume	Value
Copper	92,960,000 lbs.	$ 9,667,640
Gold	4.612 ozs.	181.420
Iron ore	22.306 tons	53.757
Lead	9,286,666 lbs.	731,933
Manganese ore (+ 40% Mn)	3.500 tons	138.070
Manganese-iron ore	58.730 tons	754.083
Molybdenum	1.916.280 lbs.	1.277.520
Silver	312.242 ozs.	242.162
Zinc	67,636,000 lbs.	7,710,504
		$20,757,089

[a] Figures for beryllium, magnesium, tantalum concentrates, tin, tungsten, and vanadium-uranium are not available.

NONMETALLICS

At the outbreak of the war New Mexico was producing six nonmetallic minerals from 49 operating properties, as follows.

TABLE 5. MAJOR OPERATIONS FOR NONMETALLIC MINERALS IN NEW MEXICO AS OF DECEMBER 7, 1941

Product	Uses	County	Number of operations
Coal	Fuel	Bernalillo Colfax McKinley Rio Arriba Sandoval San Juan	28
Fluorspar	In manufacture of steel, high-octane gasoline; glass, hydrofluoric acid	Bernalillo Grant Hidalgo Luna	6
Potash	In manufacture of ammunition, fertilizer	Eddy	3
Pumice	Abrasives; insulation	Valencia	1
Salt	Domestic uses	Catron Lea Torrance	3
Sand and gravel	Construction	Various counties	8 (estimated)

The mine production of potash ore was beneficiated in three plants near Carlsbad; fluorspar was treated at two plants at Deming, one at Lordsburg, and one at Grants; and pumice was prepared for market in a mill at Grants. Sand and gravel were treated by washing and screening at numerous points of production.

In 1942 the nonmetallic mineral industry found an ever-increasing demand for its products. The enlarged need for pot-ash was quickly met by the addition of mine and plant equipment that had been planned for prior to Pearl Harbor. The demand for coal was such that the Koehler mine, the largest in New Mexico but idle since 1924, was brought back into production. Although the demand for fluorspar had been anticipated, it had

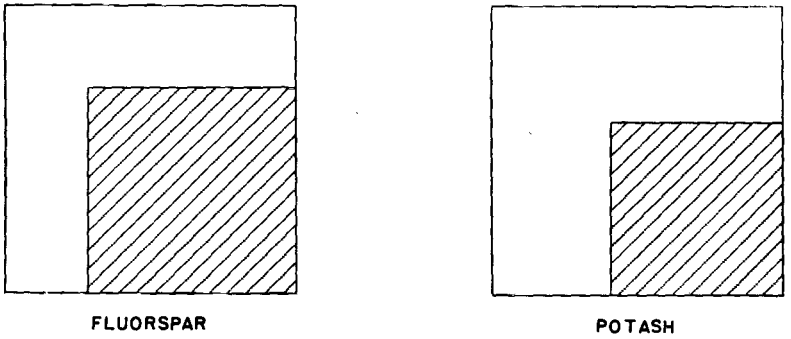


FIGURE 4. Amount of fluorspar ore and potash ore mined during the war years (large squares) compared with amount of concentrates and finished salts recovered (ruled squares).

not been planned for, so that there was considerable confusion in getting this industry moving. The fluorspar plants of the General Chemical Company at Deming, the Indian Metals Company at Lordsburg, and the Non-Metallic Corporation at Silver City, all added new equipment involving some new construction. The Zuni fluorspar mill of the Defense Plant Corporation at Los Lunas was taking on final form and was completed late in 1942. Notwithstanding much new construction, it was largely the same plants as were active in 1941 that made the 1942 production, which was valued as shown in Table 6.

In 1943 the nonmetallics industry, except for potash, was hard pressed to supply the ever-increasing wartime demands. This was particularly true of fluorspar and pumice. The demand for metallurgical fluorspar was so great that the Defense Plant Corporation began construction of a sink-float mill of 350 tons daily capacity at Gila, Grant County; this plant, finished in December 1943, operated throughout the following year. The Zuni

TABLE 6. VOLUME AND VALUE OF NONMETALLIC MINERALS PRODUCED IN NEW MEXICO IN 1942

Product	Volume	Value
Coal	1,696,000 tons	$ 5,257,350
Fluorspar	23.291 tons	530.075
Potash	3.035.549 tons	19.288.495
Pumice	7,396 tons	294,331
Salt	13.956 tons	47.265
Sand and gravel	261,358 tons	146,866
		$25,564,382

mill at Los Lunas and the Non-Metallic Corporation's mill at Silver City operated continuously through 1943 and furnished an increased supply of acid-grade spar. The price for fluorspar was raised $5.00 per ton in November 1942, and an additional $5.00 per ton on July 1, 1943.

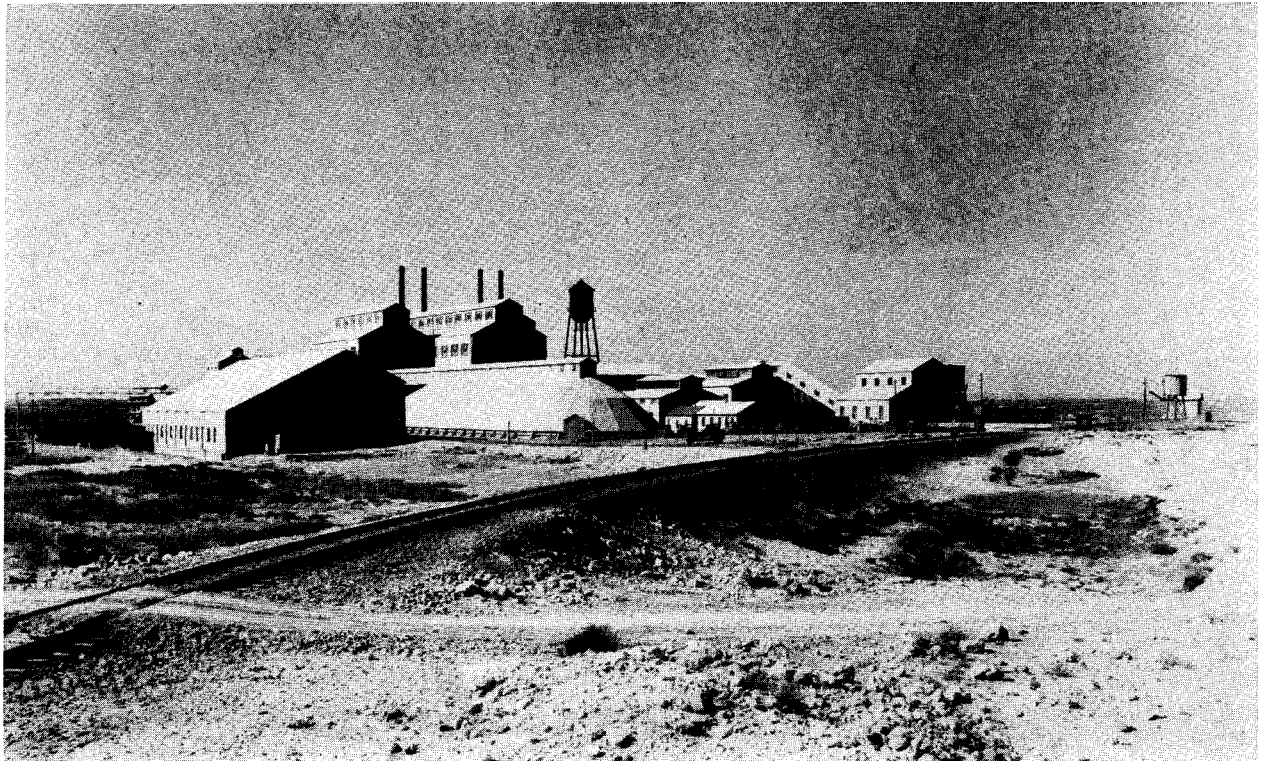
The Pumice Corporation of America improved its mining equipment and its preliminary milling process, so that the plant at Grants operated to increased capacity throughout 1943. The production of coal surpassed that of 1942, owing to increased mechanization in the mines and an increase in the number of mining operations.

TABLE 7. VOLUME AND VALUE OF NONMETALLIC MINERALS PRODUCED IN NEW MEXICO IN 1943

Product	Volume	Value
Clays (refractory)[a]	4,394 tons	$ 11,399
Coal	1.816.000 tons	6.065.440
Fluorspar	37.050 tons	986.094
Potash	3.433.243 tons	21.933.881
Pumice	4.837 tons	202.558
Salt	10.829 tons	21.427
Sand and gravel	230,458 tons	147,624
		$29,368,423

[a] From Grant and Dona Ana counties ; used at copper smelter at Hurley.

The year 1944 saw the high production of nonmetallics in-creased in spite of the widespread labor shortage. The handicap of inadequate labor supply was balanced by added mining efficiency and mechanization, and by cooperation between operators, so that the ultimate value of 1944 production considerably exceeded that of 1943. A feature of the year was the production of talc from a deposit in southern Socorro County; amount and value are not obtainable.



Potash refinery near Carlsbad.

TABLE 8. VOLUME AND VALUE OF NONMETALLIC MINERALS PRODUCED IN NEW MEXICO IN 1944

Product	Volume	Value
Clays (refractory)	7,694 tons	$ 14,699
Coal	1,753,500 tons	5,200,501
Crushed stone (railroad ballast)	591,660 tons	326,701
Fluorspar	42,973 tons	1,205,830
Mica	6,750 lbs.	31,200[a]
Potash	3,749,250 tons	24,739,507
Pumice	4,837 tons[b]	202,558[b]
Salt	23,759 tons	105,860
Sand and gravel	439,286 tons	292,601
		$32,119,457

[a] Value of approximately 6,750 pounds of trimmed punch and sheet mica produced between February 1, 1942, and January 15, 1945, from Rio Arriba County. (Data from Jahns, R. H., Mica deposits of Petaca District, Rio Arriba County, New Mexico : N. Mex. Bur. Mines and Min. Res. Bull 25, p. 104, 1946.)

[b] Estimated figures.

A notable accomplishment of 1945 was the doubling of the capacity of the Los Lunas fluorspar mill, from 200 to 400 tons per day; this change-over was carried out without interrupting regular operations. The increase in production of acid-grade fluorspar was made from ore already stockpiled. The fluorspar mines were beginning to feel the exhaustion of blocked-out ore reserves, and both coal and fluorspar were suffering from the shortage of labor. In spite of these factors, however, the following record was made by the industry up to V-J Day.

TABLE 9. ESTIMATED VOLUME AND VALUE OF NONMETALLIC MINERALS PRODUCED IN NEW MEXICO, JANUARY 1-AUGUST 13, 1945

Product	Volume	Value
Clays (refractory)	5,128 tons	$ 8,176
Coal	1,169,000 tons	3,539,320
Fluorspar	30,648 tons	701,876
Potash	2,499,496 tons	14,283,033
Pumice	3,224 tons	132,184
Salt	14,880 tons	57,109
Sand and gravel	292,856 tons	103,946
		$18,825,644

OIL AND GAS

In general, the oil industry of New Mexico was in a strong position at the start of the war. Prices of crude oil had risen appreciably from their 1938 low, and other favorable factors

were the construction of feeder pipe lines and the increases made in capacities of the main trunk lines leading out of the region. The State's 1941 oil production, which set a record still unsurpassed, totalled 39,569,000 barrels and placed New Mexico seventh among the states. This production was distributed as follows.

TABLE 10. DISTRIBUTION OF OIL PRODUCTION IN NEW MEXICO IN 1941

Area	Barrels	Percent
Southeastern New Mexico:		
Eddy County	5,009,000	12.6
Lea County	34,154,000	86.3
Northwestern New Mexico:		
McKinley and San Juan counties	406,000	1.1
Totals	39,569,000	100.0

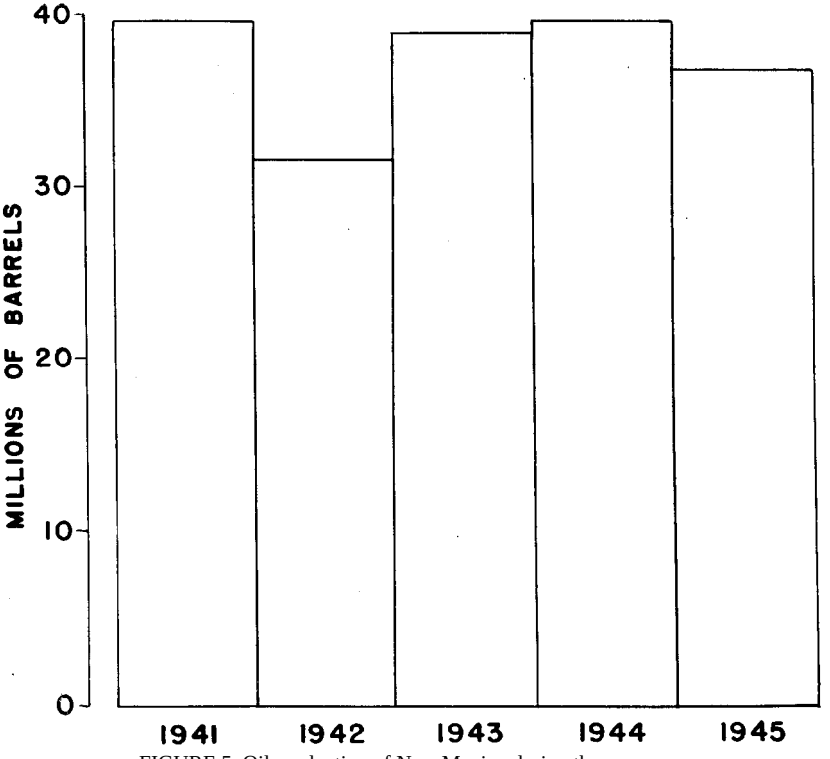


FIGURE 5. Oil production of New Mexico during the war years.

The 1941 gas production totalled over 148 billion cubic feet, of which 98 percent came from southeastern New Mexico. The value of petroleum and natural gas exceeded $40,000,000 in 1941.

More than 85 percent of the oil produced in New Mexico is moved by pipe line to refineries in other states. At the start of the war there were sixteen of these lines leaving southeastern New Mexico. Eight small refineries are located in New Mexico. Late in 1941 a 32-mile line of 4-inch pipe was completed to one of these refineries, at Prewitt, McKinley County, from the Hospah oil field.

Much of the natural gas from southeastern New Mexico was piped to El Paso and to communities farther west; gas from San Juan County was delivered by pipe line to Albuquerque, Santa Fe, and Belen, and to Durango, Colorado. Two gas repressuring projects, at the Loco Hills field, Eddy County, and the Langlie field, Lea County, were put into operation in 1941.

Drilling activity was only 68 percent of that for 1940, a reduction due chiefly to the recent finding of only small accumulations in discontinuous zones. A total of 402 completions were made in 1941, of which 301 were oil wells, 19 were gas wells, and 82 were dry holes. One new oil field and one new gas field, both small, were discovered by wildcatting in southeastern New Mexico. Plans were under way to construct plants in Lea County for production of casinghead gasoline and carbon black.

Production of crude oil dropped in 1942 to 31,544,000 barrels, a decrease of about 19 percent from the previous year. This decline resulted mainly from pipe-line proration ; during 1942 the main trunk-line capacity of West Texas and southeastern New Mexico was reduced from 440,000 to 401,000 barrels per day. Only 113,000,000 barrels of oil were moved out of the area in 1942 as against 142,000,000 barrels in the preceding year. A major part of this reduction is accounted for by disorganized transportation facilities owing to enemy sinkings of oil tankers.

In spite of wartime Government regulations and shortages of equipment and manpower, drilling was 81 percent of that of 1941. Two hundred fifty-four oil wells, 11 gas wells, and 74 dry holes were completed. Wildcat drilling in southeastern New Mexico discovered three small oil fields. The Square Lake field, Eddy. County, which had been discovered late in the preceding year, was developed by the drilling of 91 oil wells. Southeastern New Mexico's first deep well, to test early Permian and pre-Permian formations, was started in 1942 and was drilling below 8,000 feet at the close of the year. In August of 1942 the majority of. operators in the Maljamar area, Lea County, established a repressuring program, which by the end of the year was benefiting 125 wells.

An important development of 1942 was the drilling of the Continental Oil Company's No. 1 Navajo, at the south end of the

Rattlesnake field, San Juan County. Gas encountered at 6,948-50 feet was found to contain more than 7 percent of helium. There-upon the U. S. Government took over the lease, made plans to drill additional wells, and shortly started construction of a helium-treating plant a few miles away at Shiprock. The gas reserves of northwestern New Mexico were further increased by the discovery of gas in the Dakota sandstone at the Barker Creek dome.

The fact that New Mexico's 1942 slump in oil production was the result of external factors, reflected in proration, and was not due to inability to produce oil, was shown the following. year. In 1943 the State produced 38,896,000 barrels, nearly 20 percent more than in 1942 and over 98 percent of the all-time high of 1941. Much of the industry's efforts during 1943 were directed toward the expanding of production and the improvement of pipe-line facilities for moving the oil; the drilling of new wells decreased to only 75 percent of that for 1942. Of a total of 255 completions, 180 were oil wells, 10 were gas wells, and 65 were dry holes. Four minor oil pools were discovered. Thirty-four of the oil wells were completed in the rapidly developing Square Lake field, Eddy County.

Although Lea County's first deep test was completed as a failure at a total depth of 9,594 feet, at the end of the year two

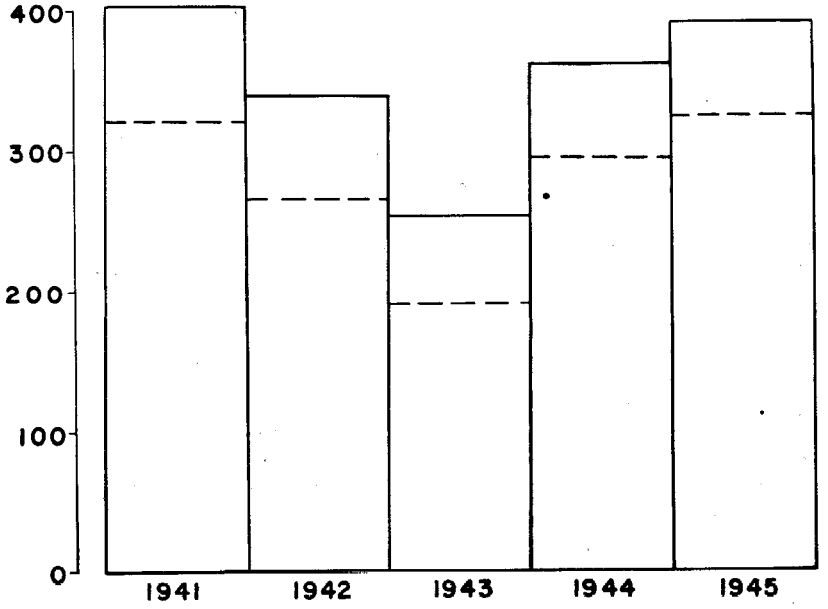


FIGURE 6. Total wells drilled (solid lines) and field producers drilled (dashed lines) during the war years.

more deep tests were drilling and a third had been located. A test in Eddy County was drilling below 6,500 feet.

The Maljamar Cooperative Repressuring project was operating with marked success, returning gas to the reservoir and increasing the production of 141 wells. A similar repressuring project was being planned for the Grayburg-Jackson field in Eddy County.

Under contract with the U. S. Bureau of Mines, in 1943 the Continental Oil Company drilled a second deep well in the Rattlesnake field. It was completed at 7,049 feet with an open flow of 17,300,000 cubic feet of gas per day, adding materially to the known helium reserves of the field. The Government's plant to process the helium-bearing gas was put into operation in 1943.

In 1944 New Mexico produced 39,555,000 barrels of oil, an increase over the preceding year and only 14,000 barrels less than in 1941. Drilling activity was well above that of 1943, with 362 completions. Of these, 283 were oil wells, 12 were gas wells, and 67 were dry holes. A notable strike was the West Lovington pool, discovered in June; by the end of the year 14 wells had been drilled, some of which were capable of producing 100 barrels of oil per hour without acidizing or shooting the pay zone.

The outstanding feature of 1944 in southeastern New Mexico was the discovery of oil at depths below those previously producing. Gulf Oil Corporation completed its No. 1 Drinkard for an initial production of 782 barrels in 14 hours at a total depth of 6,508 feet; the Humble Oil and Refining Company drilled its No. 1 Leonard to 11,969 feet and secured a flow of 297 barrels per day from the Ellenburger formation of Ordovician age; and the Continental Oil Company found a deep pay zone in the Skaggs area, of which the discovery well produced 269 barrels per day.

Geophysical prospecting, especially with the seismograph, increased markedly during 1944. At the end of the year six seismograph crews were active in southeastern New Mexico, in addition to four gravimeter and two torsion-balance parties. Geophysical activity was also marked in northwestern New Mexico, where exploration of the depths of the San Juan Basin was being carried on.

A deep test was started in 1944 on the Barker Creek dome of San Juan County; at the end of the year it was drilling below 7,600 feet.

Between January 1 and August 13, 1945 (V-J Day), New Mexico produced approximately 23,000,000 barrels of oil; this was at a rate slightly below that of 1944. Drilling activity was maintained at roughly the same level. Further deep producing zones were discovered in southeastern New Mexico; the Paddock and Blinebry pools made commercial production prior to the end of the war. Added impetus to deep drilling was furnished by a ruling of the New Mexico Oil Conservation Commission, which

granted an increased daily allowable production to deep wells, commensurate with the depth to the pay zone.

Early in 1945 the Southern Union Production Company completed its No. 9 Barker, first deep test on the Barker Creek dome in San Juan County, for an initial daily production of 42,000,000 cubic feet of gas from depths of 8,419-90 and 8,620-30 feet. This discovery, which added materially to the known gas reserves of northwestern New Mexico, highlighted the year's activities in that part of the State.

Geophysical activity continued to expand, in both southeastern and northwestern New Mexico. Over 20 parties were active during the year.

CONTRIBUTIONS OF FEDERAL AND STATE AGENCIES

U. S. GEOLOGICAL SURVEY

Throughout the war the U. S. Geological Survey turned its attention to the. investigation of strategic minerals and to regional studies on oil and gas geology. Numerous projects were carried on in New Mexico. Extensive work was done on the State's fluorspar deposits, in conjunction with work of the U. S. Bureau of Mines; an exhaustive study was made of the mica deposits in the Petaca district, Rio Arriba County; and a bulletin was issued on the beryllium and tungsten deposits at Iron Mountain, Sierra and Socorro counties. Oil and gas investigations resulted in the publication of seven geologic maps and charts of areas in New Mexico, and others prepared during the war are in press. A complete and much-needed revision of the boundaries of the oil and gas pools in southeastern New Mexico was made, largely as a result of studies and recommendations by the Roswell office of the Survey's Conservation Branch.

U. S. BUREAU OF MINES

A highly important contribution by the Federal Bureau of Mines to the war effort was the development of helium production from gas at the Rattlesnake field in San Juan County, and the subsequent construction of a helium-treating plant at Shiprock, a 92-mile high-pressure pipe line to Gallup, McKinley County, and a loading rack at Gallup.

During the war the U. S. Bureau of Mines also obtained a great deal of information on the extent and reserves of numerous ores. Copper deposits were diamond-drilled and explored by drifting in Hidalgo and Guadalupe counties; manganese deposits southwest of Socorro were drilled and trenched; lead-zinc deposits in Sierra County were drilled; diamond drilling was done for new reserves in the potash fields east of Carlsbad; and the State's fluorspar deposits were extensively drilled, trenched, and sampled. Several of these exploratory projects were followed by

mining development and production by private interests through-out the war years.

NEW MEXICO SCHOOL OF MINES

The faculty and facilities of the New Mexico School of Mines, an integral part of the State's mineral industry, were turned over to the U. S. Army for a period of nine months during the war. Three hundred students of the Army Specialized Training program, were quartered and instructed at the School.

NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES

Five publications on the State's geology and mineral re-sources were issued by the Bureau during the war. These included reports on the potentially oil-bearing rocks of Pennsyl-

TABLE 11. WARTIME CONSTRUCTION OF MINE-ACCESS ROADS BY PUBLIC AGENCIES

County	Mining district	Mineral production affected	Miles constructed
	By the U. S. Forest Service		
Bernalillo	Tijeras Canyon	Fluorspar	4.5
Catron	Whitewater	Fluorspar	2.7
Grant	Pinos Altos	Lead and zinc	4.8
	Burro Mountains	Fluorspar	3.6
	Telegraph	Fluorspar	8.5
	Central	Lead and zinc	2.0
Rio Arriba	Petaca	Mica	15.3
San Miguel	Elk Mountain	Mica	13.1
Sierra	Tierra Blanca	Copper, lead, zinc	1.1
	By the U. S. Grazing Service		
Dona Ana	----------	Lead and zinc	2.8
Grant	Steeple Rock	Lead and zinc	4.0
	Carpenter	Lead and zinc	17.0
Guadalupe	Pastura	Copper	2.7
Hidalgo	Lordsburg	Copper, lead, zinc	5.2
	Lordsburg	Copper	2.4
	Red Hill	Manganese	0.25
	Steeple Rock	Lead	5.2
Luna	Florida	Manganese	14.0
	Cooks Peak	Fluorspar	9.75
Santa Fe	Cerrillos	Lead and zinc	4.4
Socorro	Magdalena	Lead and zinc	3.8
	San Andres	Talc	10.5
	Red Hill	Manganese	7.9
Torrance		Iron	20.6
	By the State Highway Department		
Eddy	---------	Potash	11.8
Taos	Picuris	Tantalum, lithium	9.4
Valencia	Zuni Mountains	Fluorspar	23.9
Total miles of access roads constructed			212.1

vanian age; the oil and gas resources of New Mexico; manganiferous iron-ore deposits near Silver City; stratigraphic studies of Cretaceous rocks in northern New Mexico ; and a bibliography of New Mexico geology, mining, and petroleum. In addition, the Bureau collaborated with the U. S. Geological Survey in making a geologic map and report on a 980-square-mile quadrangle in the central part of the State.

U. S. FOREST SERVICE, U. S. GRAZING SERVICE, AND STATE HIGHWAY DEPARTMENT

Over 200 miles of mine-access roads were constructed in New Mexico during the war, helping to increase the output of 11 mineral products from 22 mining districts, as shown in Table 11.

STATEMENTS FROM INDUSTRY

As it was felt that the value and interest of this report would be greatly enhanced by the inclusion of letters or statements from the mineral industry itself, a request for such statements was made to all the companies that operated in New Mexico during the war years. A similar request was made to the two transcontinental railroads that cross the State, because of the vital part that these lines play in New Mexico's mineral economy. The New Mexico Bureau of Mines and Mineral Resources is pleased to present the following replies to its requests for statements from industry.

METALLICS

Kennecott Copper Corporation
Chino Mines Division
Hurley, New Mexico
October 4, 1945

A BRIEF HISTORY OF OPERATIONS DURING THE WAR YEARS

It was fortunate in connection with Chino Mines' participation in the successful prosecution of the war that during the years preceding the war in Europe the Company had entered upon an extensive program to modernize its plants and increase plant capacities.

The mines and plants had been entirely closed down from October 1934 to January 1937 due to unfavorable conditions in the copper market and high production costs. It was realized that Chino's survival as a producing mine depended on its ability to lower costs, by the installation of additional and more efficient equipment to increase plant capacities, and by the construction of a copper smelter.

The construction program which was initiated late in 1936 was further expanded due to a shortage of copper resulting from

the war in Europe and to the preparedness program in the United States.

At the mine several latest-type electric shovels were purchased and pit haulage was electrified. At the mine a copper precipitation plant was constructed to recover copper from the waste dumps. At the reduction-plant concentrator, capacity was in-creased by the installation of additional crushing, grinding and concentrating equipment. Increased power requirements were met by the installation of a high-pressure gas-fired boiler and a 10,000 K.W. high-pressure turbo-generator. A copper smelter was erected and placed in operation in May 1939, and a copper fire refining plant was installed and placed in operation in May 1942.

The erection of the. smelter and fire refining plant increased copper smelting and refining capacities in the United States by approximately twelve million pounds of copper per month. The fire refining plant reduced the time required for refining its blister copper production by approximately 90 days; thereby the delivery of finished copper to the producers of armaments was materially speeded up.

The expansion of mine and reduction-plant facilities enabled the Company to produce copper during the war period far in excess of that produced in any previous period.

From January 1, 1942 to August 31, 1945 copper production was nearly 500,000,000 pounds. The average daily tonnage of ore treated in the concentrator was about 20,000 tons. Ore and waste handled by the power shovels averaged in excess of 36,000 tons per day.

The peak all-time copper production was in 1942 when 146,000,000 pounds was produced from all sources. By way of comparison, the largest pre-war production was in 1929 when 85,000,000 pounds of copper was produced. The average daily mill tonnage during that year was 11,200 tons.

Due to the demand for copper as a result of the war in Europe, the mines and' reduction plant were placed on a full-time operating schedule in October 1939. In May 1941 the workweek of employees was increased from 44 to 48 hours. From January 1, 1942 to October 27, 1944 the property operated to reduction-plant capacity, 24 hours per day, 7 days per week without cessation of operations on account of holidays or other reasons. This continuous operation continued over a period of 1,031 days. During this period swing men were used to provide manpower on the seventh day of the workweek.

On January 1, 1942 the Company had 1,941 employees. Due to a very large number of employees entering the Armed Services and others leaving to accept employment in the West Coast ship-yards and aircraft plants, a serious manpower shortage developed. This became progressively worse in spite of the fact

that the Company replaced many of those who left with women, Indians, physically handicapped persons, and, during the summer school vacations, with boys between 16 and 18 years of age. Most of these were employed as laborers on cleanup and track work. The maximum, number of women employed was 163, boys 88, and Indians about 50.

However, by October 27, 1944 the number of employees had decreased to 1,603, a loss of 338 as compared with January 1, 1942. It was impossible to continue full-time operation and the mine and reduction plant operating schedules were reduced on October 27, 1944 to 6 days per week.

Although Chino Mines Division was eventually forced by manpower shortage to reduce its working time and thus reduce copper production, it was not until the most critical copper situation had passed and not until several months after all other large U. S. copper producers had been forced to similar curtailment.

From the inception of the Selective Training Program to August 31, 1945, 649 employees of the Company had left its employ to enter some branch of the Armed Services. This number is equivalent to 33.4% of the number of employees as of January 1, 1942, and 44% of the number presently employed. To date less than 50 of these have been discharged from the Armed Services and been re-employed.

The employees appreciated the difficulties the Company was encountering by reason of the manpower shortage and it was only because they cooperated fully and put forth extra efforts that the Company was able to maintain its production at the maximum.

A large percentage of Company employees purchased United States War Bonds under the Payroll Allotment Plan. The mine employees were awarded the Treasury T Flag for meeting the requirements of the Treasury Department as to percentage of employees purchasing bonds under the plan, and as to percentage of total payroll money allotted to the purchase of bonds.

The Company materially assisted Grant County in meeting its War Bond quotas by the purchase of War Bonds.

Tucson, Arizona
October 5, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

I am pleased to reply to your letter of August 30th as regards the Pastura copper production in 1943, and none of this information is confidential.

There are 160 acres owned by my brother, Hubert H. d'Autremont, and myself comprising:

Lot 6
NE ¼ SW ¼ Section 6, Township 7 North, Range 20 East,
NW ¼ SE ¼ Guadalupe County.
SW ¼ NE ¼

From the southwest corner of the NW ¼ of SE ¼ from the 30th of April to the 6th of September, 1943, I shipped 3,521 dry tons of siliceous copper ore which yielded 340,980 pounds of copper, 421 ounces of silver, and no gold, for an average of approximately 4.84% copper per ton.

The ore was shipped to the American Smelting & Refining Company at El Paso, Texas, and loaded at the Guadalupe siding 2 miles southeast of the mine.

The orebody occurred in a gently sloping sandstone bed and outcropped at the south property line, which adjoins the Stauber mine. I stripped off the overburden, which averaged about 8 feet, blasted out the ore, which averaged 5 feet thick, and shovelled the ore into trucks which hauled it to a ramp at the siding and automatically dumped into the railroad gondolas.

My only regret is that there was not enough of this ore so that I still would be operating the property. . . .

Very truly yours,
Maurice d'Autremont

United States Smelting Refining and Mining Company
Bayard Department
Bayard, New Mexico
January 30, 1946

BRIEF HISTORY OF OPERATIONS IN THE CENTRAL MINING DISTRICT

As of January 1, 1942 the United States Smelting Refining and Mining Company had obtained options to a number of more or less contiguous groups of mining claims in the Central Mining District, Grant County, New Mexico and had carried on examination of the various outcrops along with a study of the geology.

During the years prior to 1942 the different owners had merely scratched the surface with pits and shallow shafts which, with a high degree of selectivity, had resulted in some instances in small production of zinc and gold ores; also, three of the larger mining companies had each done a small amount of relatively deep diamond drilling but all with rather unfavorable results.

The deepest working was the Bullfrog Incline Shaft sunk to 170 feet from surface adjacent to Gold Gulch near the town of Bayard. The U. S. Company had equipped and extended this incline to the 400 level and driven short laterals on both the 250 and 400 levels, which with diamond drilling disclosed zinc ore of commercial size and grade on the Magazine vein. This exploration work was continued in the early part of the year with favorable results, which along with an urgent need for zinc and lead due to the war prompted the U. S. Company to get the prop-

erty into production as soon as possible. Therefore in May 1942 plans and preparations were immediately started toward the construction of a concentrator, mine plant, mine buildings, housing and other facilities including the sinking of a new main operating shaft, also the acquisition of equipment and supplies.

Adjacent to the new millsite selected near the top of the hill east of the Bullfrog No. 1 Incline Shaft, a 3-compartment vertical shaft, designated as the Bullfrog No. 2 Shaft, was sunk from the surface, raised and sunk from the 250 level and raised from the 400 level (these levels are also tributary to the No. 1 Incline Shaft)—all at the same time. It was completed to the 400 level late in 1942 and to the 670 level or present bottom level early in 1943.

Many difficulties common throughout the country in wartime were met and overcome. A steel headframe was located at an inactive mine in Arizona, dismantled, hauled to Bayard, and re-assembled with attendant necessary alterations and reinforcement. Some buildings were covered with old and used sheet metal, others were covered with tar paper, but most were with-out inside lining. Government restrictions and regulations were ever present.

During the 10-month period from May 1942, when the decision to go ahead was made, until March 1943 when milling operation was started, a 3-compartment shaft was sunk to the 550 level and a 250-ton mill was constructed and equipped ; also, bins, hoist and compressor-house, shops, warehouse, assay office, general office, engineering office and a number of houses were constructed and made ready for occupancy by employees.

From 1940, when the company entered the Central Mining District, it gradually increased exploration work and rushed its development program in order to keep pace with the war effort. And early in 1942 diamond drilling near the Barringer Fault developed a bedded deposit of zinc-lead ore in Shingle Canyon and located approximately 10 miles northeast of the Bullfrog property. For its development, a 2-compartment vertical shaft was started in August 1943 and sunk to a depth of 230 feet, and by the end of the war approximately 80 tons of ore per day were being trucked from this shaft to the Bullfrog Mill.

Also, near the Barringer Fault in an area west of the town of Fierro and about midway between the Bullfrog and Shingle Canyon developments, other deposits of zinc ore were indicated by diamond drilling near an old open pit from which iron ore was mined by the Hanover Bessemer Iron and Copper Company in the last years of that company's operations, and also is in close proximity to an old 2-compartment vertical shaft, known as the Pearson Shaft of the old Iron Head Mine. By the end of the war, work was in progress repairing and deepening this Pearson Shaft preparatory to the development of this zinc ore.

Southwest of the Bullfrog No. 1 Incline Shaft and about ¼ mile distant is situated the Slate shaft, originally of one and one-half compartments. During the years prior to 1942 this inclined shaft was sunk on the dip of the vein from surface to a depth of approximately 115 feet and laterals were extended along the strike of the vein at the 90-foot point from which a winze was extended to the 130-foot level. These workings and small stopes extended therefrom had yielded a small tonnage of zinc-lead ore. The U. S. Company has deepened this Slate Incline Shaft to the 640-foot point and extended laterals at the 90, 200, 300, 400 and 550 levels, also has enlarged the incline to 2 compartments. Prior to these developments, diamond drilling had disclosed the persistence in depth of the Slate Vein and zinc-lead ore which in depth was in sulphide form, while above the 300 level the ore was in large part oxidized. This Slate operation has been in production since 1943 and in the past year has steadily contributed an appreciable tonnage of zinc-lead to the company production.

Due to foresight in planning the Bullfrog Mill, the capacity as originally designed has been doubled by means of relatively few minor changes and additions. Since the beginning of the milling operations there has been no serious interruptions of operations, the mill being operated on a 3-shift basis, 7 days per week, while mine operation has been on a 2-shift basis, 6 days per week.

A review of the history of the company's activities in this district in connection with the war effort would be incomplete without some discussion of manpower, its accomplishments and its failures. Since early in the war there was practically no time when the company could not have used effectively more men—this shortage of manpower prevailed throughout the entire district. Of course, such shortage placed a heavy burden on the supervisory force responsible for production. The company's splendid contribution to the war is in large measure due to the loyalty and constant efforts of the supervisory force and the skilled miners that were faithful in staying on the job. However, there was a large percentage of unexcused absenteeism which the unskilled workers and "floaters" were largely responsible for.

The fine spirit of cooperation among the various mines in the district was highly commendable. When a breakdown or a scarce article of equipment threatened to slow up production, a telephone call to a neighboring mine would bring immediate help. In spite of priorities, restrictions and regulations necessarily imposed by the Federal Government, it was possible to obtain vital supplies and equipment although at times there was inconvenience from delays. The local Federal Employment Agency and Draft Board gave their cooperation whenever possible.

In conclusion it is quite probable that the war production of this company and all the companies in the district, under normal

operating conditions, would have been larger—but the willing and enthusiastic cooperation of all branches of the industry in the war effort cannot be questioned.

Peru Mining Company
Silver City, New Mexico
September 7, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

Your letter of August 30 has been received and carefully read.

During the last part of 1940, realizing the war was inevitable, as it had already started in Europe, Peru Mining Company increased its operations by more work at Pewabic Mine so that eventually it more than doubled the production of zinc concentrates. For the years 1941, 1942 and 1943 this mine was No. 1 west of the Mississippi River in the production of zinc per man working underground; it was No. 3 in the United States.

As soon as the production had gone up to a maximum at Pewabic Mine, at the request of the War Production Board we started developing two additional mines, Copper Flat and Kearney. The production from these mines has augmented the supply of zinc when zinc was scarce, and it looks now as if both of these mines will continue to be producing for a long time.

In our operations here we received the aid and cooperation of the War Production Board, the United States Bureau of Mines, the United States Geological Survey, and the War Manpower Commission. It is now our intention to continue operations employing the men as they come out of the services and we have a standing order with the United States Employment Service for a large number of men. We believe the mining industry will be able to employ a considerable number of men over the next several months as they are cut off from other occupations. I trust this will give you the information you desire.

Very truly yours,
Jos. H. Taylor, Vice-President,

Black Range Development Company
Hurley, New Mexico
September 29, 1945

A BRIEF HISTORY OF OPERATIONS, JANUARY 1, 1942, TO SEPTEMBER 1, 1945

The mines operated by the company consisted of the Grand View, Columbia, and Patsy, situated in the Carpenter Mining District, in the Black Range Mountains about 30 miles by road east of Santa Rita, New Mexico.

All ore mined during this period was delivered by truck over

mountain roads to the American Smelting & Refining Co. concentrator at Hanover, New Mexico, a distance of approximately 33 miles. The principal metal values were zinc and lead.

Mining operations were continuous from January 1, 1942 to March 31, 1945. The number of employees at the mines varied from a maximum of 35 to a minimum of 10. The company like all other mines in the area experienced extreme manpower short-age. During the last year of operation manpower was not avail-able to perform necessary development work. By March 1945 the developed ore was practically exhausted. In order to mine ore which was exposed in the bottom of stopes on the lower tunnel level it would have been necessary to sink a shaft and drift under this ore. This would have required several months, and with the probability that the Premium Price Plan for metals would be discontinued in July 1945 and the manpower shortage become even more serious, it was decided to discontinue operations on March 31, 1945.

Mine production delivered to American Smelting & Refining Co. concentrator at Hanover, New Mexico from January 1, 1942 to March 31, 1945 was as follows:

Dry tons ore	19,366
Metal content	
Zinc	3,569,881 lbs.
Lead	1,424,795 lbs.
Copper	13,376 lbs.
Silver	20,426 ozs.

Arthur Montgomery
New York 17, N. Y.
July 27, 1946

WAR PRODUCTION AT THE HARDING MINE

Tantalum.—Most people are completely unfamiliar with the rare metal, tantalum. Yet it was one of the really vital war materials. It was ranked ahead of high-octane gasoline through much of the war in the list of the few most-needed items; all through the war it ranked as No. 2 war mineral.

Tantalum is very rare in nature, and the U. S. is especially deficient in it. When the need for it in radar became really drastic on the war's outbreak, new and extensive sources had to be found in far-off places. Australia had supplied the whole world with its small pre-war demand; it was now out of the picture. Brazil finally became the chief supplier. Its whole production was flown into this country by plane.

In 1942 the Brazilian source had not yet adequately developed and the need for tantalum was really critical. It was to try and help this situation through discovery and development of a domestic source, however small, that the Harding Mine was explored, and finally leased, late in 1942.

In December, 1942, a small crew began mining. The difficulties in arranging for a lease had been endless; there were plenty of other troubles, such as determination of the market-ability of the unique tantalum ore-mineral at the Harding, microlite, and arranging for milling of a wholly new ore. The lessee had requested the Geological Survey to make a thorough examination of the property. Through the efforts of Dr. R. H. Jahns of the Survey, the U. S. Bureau of Mines became interested in the Harding. Mr. C. H. Johnson, Bureau District Engineer in Silver City, not only found the deposit worthy of a war-mineral diamond-drilling project, but also made it possible for all of the earliest-mined tantalum ore to be shipped to the Bureau experimental plant at Rolla, Mo., for milling experimentation and actual milling. Sufficient credit cannot be given to such men as Jahns and Johnson who were untiring in their efforts to see critical war minerals produced.

By the summer of 1943 enough high-grade microlite ore had been mined and shipped to Rolla for the Bureau to have produced a total of over six thousand pounds of tantalum concentrates. These concentrates were of an exceptionally high grade. They went to the government when the demand for tantalum was still crucial. Three tons of very high-grade concentrates is a lot of tantalum, and it was an achievement of which the Harding Mine could well be proud. Only a few hundred pounds of tantalum concentrates were produced elsewhere in the U. S. throughout the entire war.

After drilling the Harding pegmatite, the Bureau estimated that very large, but very low-grade, tantalum ore reserves were present. There was a rich spodumene (ore of lithium) content also, and spodumene was in demand for war use. For a while it looked as if the W.P.B. would surely arrange for a loan and a large-scale operation of the mine for tantalum and lithium. Such an operation would have broken even, or better. It was never forthcoming, for the government preferred to back the good-neighbor policy for all it was worth in countries like Brazil rather than bother with a single producer in New Mexico who was unknown and who refused to carry on any lobbying campaign in Washington. The sad truth is that millions had to be spent in developing the Brazilian source and flying the production into this country, while at least half the entire supply needed in 1943 could have been produced at the Harding at no loss to the taxpayer whatsoever.

Somewhat disillusioned by all this but still determined to produce as much U. S. tantalum as possible on his own, the lessee continued to mine and hand-sort on a very small scale during the rest of the war. Milling had to be carried out at small experimental plants in Utah and Colorado. Several more lots of high-grade concentrates, amounting to about six thousand pounds

more, were shipped to Metals Reserve Co., in 1944 and 1945. High-grade pockets of small size and very scattered distribution supplied this ore, in an area of the pegmatite separate from the low-grade orebody.

Spodumene.—When the tantalum mining was just getting well started in the winter of *1943,* a call came from the W.P.B. for spodumene. The main source of spodumene concentrates, a mill in South Dakota, had just burned down. The Harding spodumene could only be hand-sorted, at considerable labor and expense, but it seemed the right thing to do to tackle the job any-way. A crew of fourteen more men were hired, a mining friend became superintendent, and a mineralogist friend from Easthampton, Mass., came out to take charge of all the complex sorting. With no air compressors available for love or money, it became a tremendous hand-drilling proposition.

A carload of hand-sorted crystals was finally trucked to the railroad after several months of heartbreaking work. The loss was considerable, for such mining is not economic. Lessee did not mind that part of it quite as much as the struggle he had on his hands obtaining the price promised by the W.P.B. for his spodumene. At any rate the carload helped the lithium situation at a bad time; soon after, the large new mill in North Carolina commenced producing and the South Dakota mill had been rebuilt.

Beryl.—Towards the end of 1943 several tons of high-grade beryl were found in one of the Harding dumps. At this time beryl was one of the really critical war minerals (we know now that it was needed for the atomic bomb), and great efforts were being made to produce it in quantity as a by-product of pegmatite (feldspar, mica, etc.) mining all over the U. S. It seemed advisable to look into the beryl situation at the Harding.

On top of the pegmatite and underneath the schist at one end of the quarry was a small exposure of pure beryl. It was part of a very steep face and hard to get at, but there it was. A small operation was started above the pegmatite at this point. The small knob of beryl continued back under the schist; widened, thickened, grew out of all sensible proportion. Finally the occurrence died out, but before it did, that one continuous knob had produced about 24 tons of white beryl. A total of 27½ tons of high-grade beryl was shipped to Metal Reserves Co. through Colonial Mica Corp. The lessee was surprised and proud later to find that this shipment amounted to about $^{7}/_{8}$% of the total U. S. beryl production for 1943.

Conclusion.—Thus the Harding Mine in its small way contributed something very definite to the war effort, supplying quantities of

three very critical war minerals at times when they were most needed. Tantalum was of course by far the most important.

Looked at from the economic side, the record is not impressive. Some early publicity over the sudden production of fabulously valuable tantalum ore "from a small mine in northern New Mexico" rather gave the impression that it was a highly profit-able enterprise. This was never so. The tantalum ore was extremely valuable when concentrated, but against that were end-less costs of leasing, development, labor, small-scale expensive mining, prohibitive milling expense for all later ore. There was very little profit at the end, financially, even though this little mine produced over $50,000.00 value in a little over two years' time.

The profits came from something else. Satisfaction from a hard job faithfully performed. Knowledge that good jobs had been given to worthy, local people and that the mine operation had not been a drain on the community but had decidedly improved general living conditions. Realization that the entire aim and purpose of the job, to help war production, had been fulfilled. The spirit of the enterprise had been kept intact, through the endless difficulties, disappointments and disillusionments that plagued all small mining operations during the war. The Harding did its part, small as it was, and New Mexico can feel proud of such a unique mine and such a record of production of rare metals critically needed for war industry.

Fort Sumner, New Mexico
September 28, 1945

New Mexico Bureau of Mines and Mineral Resources

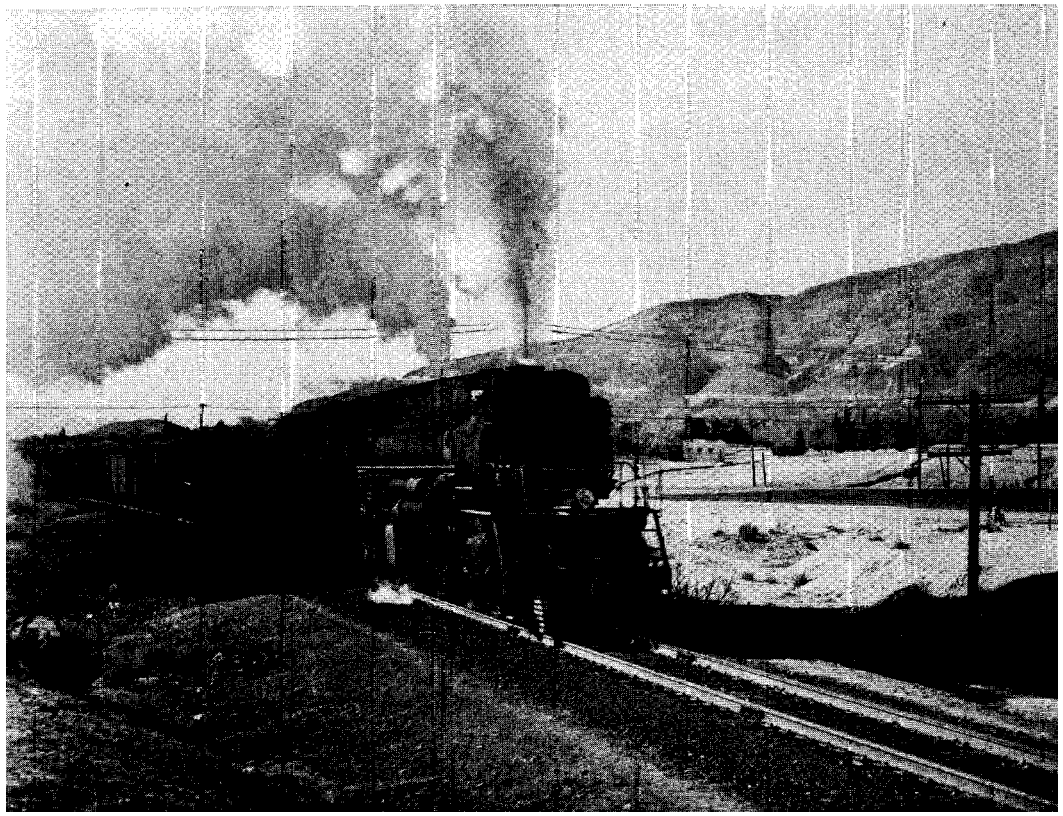
Gentlemen:

I have your letter of August 30th, 1945, requesting a history of operations on Magnetite Lode Mine, and I am glad to furnish same.

The property is situated in the Jicarilla Mining District, Lincoln County, and is about eight miles from Ancho which was the shipping point. Operations began in June 1942, and ceased in September 1943. Production was 2,400 gross tons, shipped to C. F. & I. at Pueblo, Colo. Ore averaged 57% iron on the above tonnage and sold for .09¢ per unit. .

Analyses on 4 carlots were as follows.

Iron	*Insoluble*	*Phosphorus*	*Sulfur*	*Moisture*
58.6	11.4	.028	.08	1.8
58.6	11.4	.028	.08	1.8
56.2	13.2	.032	.08	2.0
56.2	13.2	.032	.08	2.0



(Southern Pacific photo.)

A 6,000-horsepower Southern Pacific locomotive hauling wartime freight in New Mexico.

Freight was $2.45 per gross ton. Ore was mined in an open pit. The. ore was about 30 ft. wide on surface but was about 12 ft. wide at 35 ft. in depth. It was chiefly magnetite, but contained some hematite which is grey; drill cuttings from this part were red enough to be Venetian red and may be valuable for paint pigment.

Operations were conducted by the Magnetite Mining Company of Ancho, and the property is owned by the writer. . . .

Very truly yours,
Herbert Ellis

NONMETALLICS

Burro Chief Mines
Tyrone, New Mexico
September 26, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . Burro Chief Mines started from scratch in May, 1943, and to July 1, 1945, produced and supplied to the Gila Plant some 40,000 tons of fluorspar ore and supplied approximately 3,000 tons of ore to the concentrating plants at Deming for the making of acid grade, making a total of 43,000 tons of an average spar content of 64.63%.

All of this production has come from the 265 level upward to the surface. During this period the mine was opened by re-habilitating the shaft at the 265 level and drifts and raises run for development of the ore bodies. A washing plant has been in-stalled and the property is now producing metallurgical as well as mill grade ores. The war production has made it possible to develop what appears to be a very considerable deposit of fluorspar minerals.

The operation has been under the direction of myself as sole owner of the leasehold operation. . . .

Very truly yours,
H. E. McCray,
Gen. Mgr.

Potash Company of America
Carlsbad, New Mexico
November 20, 1945

New Mexico Bureau of Mines and Mineral Resources Gentlemen :

. . . During the period under consideration, our output was very substantially increased. As a matter of fact, we had started on an increase in 1939, when it became apparent that imports from Europe would soon be cut off. After that time, our output

was more than doubled. Like all other industries, we suffered from a shortage of experienced and competent labor, and not only was this the case, but the actual number of employees declined. In spite of this, we were able to increase production, by the installation of a great deal of new equipment, all of which was financed by the Company without government aid except to obtain priorities for us. One of the reasons why we were able to make the showing which we did, was because we installed an incentive bonus system, which was very helpful in keeping our production up and increasing it. During the period we received the Army-Navy "E" award, with three stars awarded subsequently to the original flag.

Of our employees, 216 entered the various armed services, and 7, of these sacrificed their lives.

It should be noted that the "E" award is to the men and women of the Company, and is a recognition of the accomplishments of all concerned. . . .

Sincerely yours,
G. F. Coope,
President.

Phelps Dodge Corporation
Stag Canon Branch
Dawson, N. M.
October 6, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . In our opinion, the coal furnished by the New Mexico mines was an important factor in winning the war. A large portion of New Mexico coal is used for locomotive fuel and the demand for railroad coal was taken care of, and this demand was tremendously increased due to war traffic. Thus the coal mines helped the railroads in their wonderful performance. Not only were the domestic requirements taken care of by the New Mexico mines, including greatly increased requirements by the Government, but some of the mines in Colfax County were able to take care of some export demand.

The mine at Dawson produces in the neighborhood of four hundred thousand tons per year, most of which is for railroad consumption, and this tonnage was maintained during the years 1942 to this date, in the face of the loss of 121 of our young men to the armed forces. It was impossible to replace these skilled young men with experienced workers. Coal mining is considered very arduous work, even for a young man. Under the circumstances it meant that the older men had to shoulder the burden, work longer hours, and produce the necessary coal to meet our wartime demand, and this was done. As an illustration,

in their effort to take care of the war demands, many holidays were worked. In 1942 they worked on Armistice Day, Thanks-giving, and Christmas, and by the time Christmas arrived in 1943, all the holidays in 1943 had been worked, but Christmas in 1943 was taken as a holiday. The loss in manpower is illustrated by stating that the average number of men underground in 1942 per day was 239, with a steady decline each year thereafter, reaching a low of 175 for the first 8 months of 1945, but there was an increase of about 1 ton per manshift in 1945 over 1942.

The coal mines in New Mexico should be proud of their war-time record— a record that was accomplished under very trying conditions, especially from a labor and supply standpoint.

This corporation has been a pioneer in the adoption of methods and devices for improving the preparation of coal, and this practice continued during the war. In June 1945 there was put in operation at Dawson a Link-Belt Simon-Carves washer to clean all the coal between six inches and $^{3}/_{8}$", the coal over 6 inches in size being crushed down to 6 inches and less. With this modern washery, positive uniformity will be automatically and constantly maintained.

Yours truly,
W. G. Moore,
General Sales Agent.

St. Louis, Rocky Mountain & Pacific Company
Raton, New Mexico
September 11, 1945

BRIEF HISTORY OF WARTIME OPERATIONS

The coal output of the St. Louis, Rocky Mountain & Pacific Company (which is sold or distributed by its wholly-owned subsidiary, Raton Coal Company) with coal properties in Colfax County, reached its lowest level in 1941, for which year production was 240,000 tons; the company had only one mine in operation with a payroll of about 135 mine employees.

The all-time peak production of 1,754,000 tons was reached in 1917 during World War I, with a payroll of 2,000 miners and mine employees—in those days coal was hand-mined. The company had in operation during World War I batteries at Koehler and Gardiner totalling 510 beehive coke ovens, which were scrapped shortly after World War I because of loss of market due to conversion of copper smelters in the southwest to the reverberatory-type furnace and the use of natural gas and fuel oil instead of coke.

In the past ten to fifteen years the greatly increased use of natural gas, liquefied petroleum gases, fuel oil, diesel power and electricity as substitutes for coal, forced Colfax County coal producers to gradually retrench. From a peak of six going mines, two coking plants and employment of 2,000 men, operations re-

ceded to one mine with little more than a handful of employees at the outbreak of World War II.

Fortunately, the company has immense coal reserves and has always kept several years ahead in development work to anticipate increased requirements. Officials of the company . . . felt and hoped that the use of coal would again come into its own, and for 20 years prior to the Pearl Harbor attack kept intact with skeleton crews two of its largest operations, maintaining pumps, ventilating fans and other necessary underground and outside facilities and activities ; repairing and repainting regularly miners' houses so they would continue to be habitable. Furthermore, a program of mechanization was started and the mines were thoroughly mechanized at the outbreak of World War II. As one example, over 100 mules were used underground for haul-age during World War I—now, none are used, the work being done by 10 mechanical mules or electric storage-battery loco-motives.

With the declaration of war on December 8, 1941, the demand for coal increased. The Van Houten mine was reopened and was delivering coal within a few weeks; the Koehler mine was started up and in several weeks was producing 500 tons daily; within another six months it was shipping 1,200 tons daily. Unlike many other war industries and mines it was not necessary to start from the grass roots; the mines were there with sufficient development work, machinery and accommodations to care for a large number of workmen; the mining, loading and preparation machinery needed only a few squirts of oil or grease, and while this machinery was not of the latest type, it nevertheless provided the means for immediate production. Miners and their families began moving to Van Houten and Koehler, and the coal so urgently and vitally needed started pouring out of the mines.

Within a year the coal output was doubled to 521,000 tons and in 1943 the output was increased 60% over the previous year, a total of 800,000 tons having been shipped with some 600 mine employees, and an approximate value of the coal produced of $2,750,000.

This coal served a most vital need in the war effort. Coal from these mines is bituminous, coking, and especially adapted for by-product ovens (steel manufacturing), for locomotive use and for steam use by industrial plants, and for heating purposes in dwellings, buildings, etc.

Considerable tonnage was supplied to the Santa Fe and Southern Pacific for locomotive use and those railroads were transporting to the limit of their facilities troops and war materials. A large daily tonnage was supplied to the steel mill at Pueblo, Colorado, which was producing vitally needed steel and war material. Large tonnages likewise were supplied to vari-

ous defense industries such as aluminum, zinc, and metal firms, and to various construction companies erecting the many army camps that mushroomed into growth immediately after the declaration of war.

The company supplied through the Army quartermasters hundreds of thousands of tons of coal for various army camps in the Southwest, such as the large Army Air Fields at Dalhart, Marfa, La Junta, Clovis, Ft. Sumner, Colorado Springs; ordnance depots at Bellemont, Arizona, and Pueblo, Colorado; Bruns General Hospital at Santa Fe; Army Air Transport camp at Las Vegas, New Mexico; prisoner-of-war camps at Hereford, Texas, and Trinidad, Colorado, and branch prisoner-of-war camps throughout Colorado, New Mexico, Texas and Arizona; War Relocation Camp at Granada, Colorado. Considerable coal also was shipped to various smaller army installations, housing authorities, internment camps, post office and other government buildings, Indian agencies, and veterans hospitals, in Texas, Colorado, New Mexico, Arizona, and California. A large tonnage of coal was shipped to western Arizona and eastern California camps for the Desert Theatre of Operations while training was going on in that area.

And while supplying this coal to essential users, the company took care of requirements of its retail dealer trade and utility customers, all of which was greatly increased because of war needs.

In 1943 and 1944 the company shipped about 20,000 tons of coal for the Procurement Division of the Treasury Department to San Francisco for lend-lease use by Russia; likewise, furnished several steamship lines with bunker coal at Los Angeles Harbor, and at the present time is shipping heavy tonnage to Galveston for export to European ports to help alleviate distress caused by coal famine on that continent.

While at times the heavy demand and urgent need taxed the facilities and ingenuity of the company, in the four wartime years we do not know of an instance where any railroad, war industry, Army post or other customer to whom the company obligated itself to furnish fuel had its activities curtailed or delayed for lack of service.

Of course, these achievements were made possible only by the willingness and cooperation of the mine employees, office employees and officials; and also due to the splendid cooperation of the Santa Fe Railway in supplying the necessary empty coal-car equipment and transportation facilities.

To prepare for the post-war market, the Company has been modernizing its plants so far as priorities, materials and labor permit. To furnish coal of improved preparation and lower ash content, the coal-washing plants at Brilliant and Koehler mines will enable the company to ship a constant and uniform product

with a pre-determined fixed ash content. The Brilliant washer is now in operation; the one at Koehler will be completed and operating in November 1945. . . .

Albuquerque and Cerrillos Coal Company
Madrid, New Mexico
September 10, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . While our efforts at Madrid have not been of the spectacular character as to be the cause of special acclaim or the occasion for letters of recognition or public citation or award, still we have been complimented by the various individuals in the war departments and industries serving the Government requirements for our efforts and the help we have been able to render them in their efforts toward a successful termination of the war.

Coincident with activities and the establishment of training camps and concentration of troops, we placed at the disposal of the Procurement Division of the Army 8th and 9th Corps Areas all of our facilities and productive ability. Coal from Madrid was shipped to California for requirements at Fort Ord, Presidio of Monterey, San Francisco, and War Department activities in the Bay Area. Also in both northern and southern Arizona, West Texas and New Mexico, Appreciation was ex-pressed many times for the cooperative effort of this operation upon which they could depend at all times for immediate and individual shipment when they found themselves in what might be termed as a pinch.

When a more efficient system of purchase and distribution had been worked, out we found ourselves called upon to take care of those requirements in the more immediate or adjacent areas,—Air Depot Training Station at Albuquerque, Bruns Hospital at Santa Fe; later for the supplying of the entire requirement at the Los Alamos Project, which included the responsibility of truck delivery to their fuel dump, a distance of just under 100 miles. This latter was an operation growing without the benefit of precedent or previous experience, and the winter of 1943-44 was a nightmare to both the administrative personnel at Los Alamos and ourselves. Rain, snow, sleet, cold winds, all made most difficult the winding mountainous roads. The roads had not yet been improved and were kept open with snow plows operated by caterpillars.

We do not want to appear as taking entire credit for the successful development of the atomic bomb, but we are proud of the part we were permitted to take in its development.

During the period 1942 and 1945, it was the privilege and pleasure of the mines at Madrid to make further contribution to

the war effort by continuing in production and supplying tonnages to various activities, such as :

The U. S. Engineers at various Gulf of Mexico ports (galley coal); the Union Pacific and Santa Fe Railways with anthracite for coach heating, looking to the health and convenience of troops in movement; the Santa Fe Railway for the generation of steam at the large shops and power plant at Albuquerque; carbon to the Kaiser Steel plant in California for experiments in open-hearth processing of steel ; the Basic Magnesium plant in Nevada; and pea coal for foundry facings and carbon for use by the Pacific Graphite. Regular and continuing tonnages of anthracite in tonnages of thousands of tons, hundreds of thousands totals over the period, to the zinc smelters at Amarillo, and Machovec or Dumas, Texas. We feel we have materially contributed to the successful operation of the production of copper in the Globe-Miami district, as from Madrid was shipped in a steady and sufficient flow the anthracite necessary for the production of lime so necessary as a fluxing agent.

During this same period we have participated in the domestic demand, assuring the continued health, convenience, and public necessity to the end that suffering has not been the part of those living in New Mexico.

Taken all in all we feel a certain degree of personal pride in what we have been able to accomplish. Many of our employees were volunteers or called into the service of the various branches of the armed service, the shipyards, airplane plants, or special services. We might well have adopted as our slogan a feeling which may best be expressed by paraphrase of a well-known quotation, "They serve most who serve their best in all things great or small."

Sincerely yours,
V. R. McKnight.

Pumice Corporation of America
Grants, New Mexico, U.S.A.
September 18, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

This brief resume of our contribution to the war just concluded is in response to your recent request. We are indeed proud of the extent and scope of requirements Valencia Pumice supplied.

Each naval craft, prior to acceptance by the United States Navy, received a coat of skid-proof deck paint, to conform to Navy Specifications 51-P-16, which contained as a major constituent pumice, which in addition to supplying a skid-proof surface contains high acoustical as well as fire-proof properties.

Carload quantities were supplied direct to the Navy Yards, from Mare Island on the Pacific Coast to Norfolk, Virginia on the Atlantic seaboard, as well as to major paint manufacturers throughout the nation to be used in fulfilling Navy contracts.

The high acoustical properties of pumice have resulted in our government specifying its incorporation in the interior finishing of our Veterans Hospitals, Administrative and Federal Buildings. For example, the Pentagon Building in Washington, D. C., which houses our administrative Army and Navy personnel, contains fifty carloads of pumice from the Grants mine.

To conform to your request that we be as brief as possible may we merely mention some of the other uses? Pumice was used in quantities to abrade and polish various precision parts in aircraft and artillery plants, was used as a catalyst in producing high-octane fuel, by the Dental Corps in preparing dentures and other dental uses. Also supplied to various manufacturers of mechanics' cleaning powders and hand soaps used in war plants, in fact to afford you a perspective of the scope, the latter use alone required amounts far in excess of two hundred tons monthly.

We are cognizant of the fact that we were fortunate in being able to maintain national distribution for civilian requirements throughout the war. The vital role Valencia Pumice played is manifest in the high priority extended us to assure uninterrupted production and adequate stocks.

In summarizing, the transition from wartime to peacetime production is not a problem of consequence in our industry as in many other fields. As normalcy again returns the opportunity to replace impaired equipment, make plant improvements and maintain personnel sufficient and capable of tracking the course necessary to post-war progress will be welcomed.

Very truly yours,

J. A. Freeman, Jr.,

Gen. Mgr.

La Purisima Division
General Chemical Company
Deming, New Mexico
October 10, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

We are pleased to outline below a brief history of our operations in New Mexico since January 1942.

We have operated fluorspar mines and concentrating mill in Deming at capacity throughout the entire war period. The fluorspar concentrates produced at this location have been used in this Company's manufacture of aqueous and anhydrous hydrofluoric acid and fluorides. These products have had a vital part in the

prosecution of the war, for among the important industries making use of them were those which produced :

High-octane (aviation) gasoline
Steel, including stainless steel
Aluminum
Tantalum (a metal used in airplanes, battleships and other war equipment)
Equipment for radar, fire control, etc.

The importance of this contribution to the war program can-not be over-emphasized. We are sure also that it is but a part of the record of war service of which New Mexico may well be proud, and are pleased that General Chemical Company has been able to participate therein.

Very truly yours,
P. M. LeBaron,
Superintendent.

Zuni Milling Company
Albuquerque, New Mexico
September 7, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. The mine operated by Zuni Milling Company is located 21 miles south of Grants, Valencia County, New Mexico, in the Zuni Mountains. The early history of this property is very hazy some mining was carried on intermittently as far back as 1907. The first real survey of the fluorspar deposits in the Zuni Mountains was made by James Mallery and his associates prior to World War II. With the advent of the armament programs just prior to World War II, Mr. Mallery and his partner, Vernon Taylor, Jr., started extensive prospecting by means of trenches, shallow pits, and uncovering the veins by moving the overburden. After receiving some additional financial assistance in 1942, the prospecting was extended over 3 veins, 2 of which were opened for a distance of 4,000 feet each, and shafts were sunk to a 300-foot depth. During the year of 1942, shipments of metallurgical-grade fluorspar were made.

During 1942, arrangements were made with the Defense Plant Corporation to construct a mill for the production of acid-grade fluorspar concentrates. Early in 1943 the mill was completed and ore shipments from the mine were treated at both the Grants jig mill and the Los Lunas flotation mill. In November of 1943 the entire operation was taken over by the Zuni Milling Company, a subsidiary of the Shattuck Denn Mining Corporation. At the beginning of 1944, the new owners, at the request of the War Production Board, ceased operations at the Grants jig

mill and the entire production went to the flotation mill at Los Lunas.

During 1944, the Zuni Milling Company installed heavier mining equipment and expanded development at two shafts. During that year a great deal of research work was accomplished with regard to fluorspar flotation, of which little was known prior to the beginning of the war. This research work, carried on by Mr. Wayne Fowler, Metallurgist, and Mr. Coyne Hunt, Superintendent of the Los Lunas mill, resulted in a vast improvement in recoveries and in the grade of concentrates produced.

During the first six months of 1945, at the request of the government, shipments of ore from the mine were suspended and all ore milled was obtained from a stock-pile of high-grade ore purchased by the government from Mexican mines. The Zuni mines were converted entirely to a development program and the only ore removed was from this operation. Such ore was trucked to Grants, New Mexico, and stocked near the railroad. During the first half of 1945, Zuni Milling Company extended one shaft to a 500-foot depth, and expects to deepen both shafts to a 600-foot level.

During the period from 1942 to the first of July, 1945, steady progress was made in mining and milling methods, and by the closing date of this report Zuni Milling Company had acquired the enviable position of having the most up-to-date and efficient fluorspar milling plant in the west. They had succeeded in producing a grade of concentrates approaching 98% CaF_2 with an average recovery of 90%. During the peak production periods of 1944 and 1945, Zuni had maintained the position of third largest producer of acid-grade fluorspar in the United States. The following is a report of production for the years 1943, 1944 and the first six months of 1945:

Year	Tons ore mined	Acid grade concentrat	Ceramic grade concentrates	Metallurgical grade
1943	46,408	13,171	2,390	4,613
1944	48.529	17.362	0	0
1945	13,726	8,877	0	0
Totals ----------	108,663	39,410	2,390	4,613

The future position of Zuni Milling Company is contingent on the extent to which acid-grade fluorspar will be used in industry and the relative value of their product to other costs. The present large reserves of ore are well established and, with a few exceptions, the mines are well equipped to continue for an indefinite number of years.

Acknowledgment should be given to the untiring services

of Mr. George Warner, General Superintendent, and Mr. W. F. Caley, Chief Clerk, for their successful operation of the plant.

Yours very truly,

J. A. Wilcox,
Manager.

OIL AND GAS

American Republics Corporation
Artesia, New Mexico
October 9, 1945

HISTORY OF OPERATIONS FROM JANUARY 1942 TO SEPTEMBER 1945

Prior to the war years of 1942-1945 all oil producers operating in New Mexico produced oil under a strict Proration Order by the New Mexico Oil Conservation Commission. Under this order a certain amount of oil was allocated to the State of New Mexico each month. This allocation was then prorated by the New Mexico Oil Conservation Commission throughout the several fields in the State, each operator being allowed thereby to produce and market his equitable share of the total monthly allocation.

Under this system of proration the American Republics Corporation produced from January 1942 to September 1945 a total of 730,115 barrels of oil from twenty-six oil wells. During this period three oil wells were drilled in Lea and Eddy counties for above top-allowable producers. One dry hole was also drilled during this period, this being a west extension to the Vacuum pool in Lea County.

Oil and gas was produced by the American Republics Corporation from eight widely scattered leases over a distance of one hundred and fifty miles, by a personnel of seven employees located in New Mexico.

The above report does not give any picture of the human effort which went into the producing of this amount of oil and gas. The war years went by without the voluntary loss of one day's production in New Mexico. It is surely a compliment to the industry as a whole that the armed forces accepted the daily flood of high-octane gas and other petroleum products as unending and inexhaustible. Thru the inevitable control and regimentation of war time, scarcity of equipment and supplies of all kinds, not excepting skilled labor, the job of producing oil and gas called for some ingenuity at times, and a lot of patience and cooperation on the part of all concerned. Equipment that was ready for replacement at the outbreak of war ran until it unravelled, and a lease man either accepted it philosophically, cried or cussed, according to his individual temperament, then fixed it to run a while longer. Economics were shelved, or in some instances thrown out of the window. The question was no longer .how much will it cost to fix it, but rather how long will it take. The

wheels kept turning and oil kept going to the tanks. The cost of labor increased, the cost of material increased, the cost of all services increased, but the price of crude oil remained at prewar level.

New Mexico is proud of its war record, and the American Republics Corporation is proud to have contributed its part.

The Atlantic Refining Company
Carlsbad, New Mexico
October 5, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . The Atlantic Refining Co. was not too active during the war period. The following is a brief history of this activity, practically all in southeastern New Mexico.

Maintained the following departments:

1. Geological, geophysical, and scouting;
2. Land & Lease;
3. Production;
4. Engineering;
5. Pipe Line.

Was the chief contributor and supported the drilling of the first Ordovician test (deep), in southeastern New Mexico, this being the R. Olson-Langlie (Justis) #1, located in Sec. 11-25S-37E, Lea County, N. M. The well was drilled to a depth of 9,592', bottomed in granite. Good showings of oil were encountered in the Ellenburger dolomite of Ordovician age at about 9,140' to 9,150'. This zone was thoroughly tested, but due to mechanical difficulties it was not completed as a commercial well. Undoubtedly another well will be drilled in the immediate area.

Drilled one exploratory well to a depth of 8,245' in Sec. 33-14S-33E, Lea County. No shows of oil or gas were encountered, and the well has been temporarily abandoned; however, it may be deepened at a later date.

Supported and contributed acreage and money to a test well now drilling in Sec. 29-11S-32E, Lea County. This well started operations August 4, 1945, and is now drilling at a depth of 4,224'.

Produced approximately 1,500,000 bbls. of oil from our own operated wells. This of course does not include oil accruing to us from joint-interest wells which are operated by other companies and will no doubt be reported by them. I do not have the figures on the total amount of oil transported by our pipe line….

Did some geophysical and surface work in the San Juan

Basin of northwestern New Mexico, and also some seismograph work in west central Lea County. . . .

Yours very truly,
R. M. Knoepfel

Barnsdall Oil Company
Tulsa, Okla.
October 4, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. During the wartime period from January, 1942, to September, 1945, Barnsdall Oil Company operated 24 producing wells in the State of New Mexico. These wells are in the following pools:

Pool	County	No. of Wells
Anderson	Eddy	4
Grayburg-Jackson	Eddy	6
Cooper-Jal	Lea	3
Lovington	Lea	2
Monument	Lea	8
Penrose-Skelly	. Lea	1

In this period, when materials and labor were critically scarce, Barnsdall Oil Company made every effort to operate its properties so that every barrel allowed by the New Mexico Oil Conservation Commission was produced. Our production during the wartime emergency was approximately 760,000 barrels of crude petroleum. In addition, gas produced with most of this oil was processed by natural gasoline plants whose products were in great demand by numerous war industries. . . .

Very truly yours,
Barnsdall Oil Company
By: H. F. Beardmore

Cities Service Oil Company
Odessa, Texas
September 27, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

During the war period from January 1942 to September 1945 the Cities Service Oil Company confined its direct contribution to the war effort to the production of oil already established in the southeastern parts of the state. Considerable help, both money and acreage, was given other companies and individuals to promote the development of new resources.

The war, I feel, was directly responsible in placing before our company, as well as others, the unlimited oil potentialities of the entire state. Before, most people were reluctant to leave the rich Permian reservoir in the southeastern part of the state. Short-handed though we were, geological investigations were undertaken throughout the entire state which I feel certain will bear fruit in the near future.

….I feel that our share, together with the contributions of other companies and individuals, will place the state of New Mexico well in the foreground in natural resources contributing to the war effort.

Very truly yours,
Cities Service Oil Company
By: P. D. Larson,
Dist. Geologist.

Fren Oil Company
Monahans, Texas
September 22, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . The first well on our lease in section 19, T. 17S., R. 31 E. . . . was commenced in June 1943. The company has drilled on said lease five . . . excellent producers from what is known as the Seven Rivers pay stratum. The Fren Oil Company has been acknowledged as the….first one to produce commercially from the said shallow—2,000'—stratum.

The Fren Oil Company itself has produced, up to the first of September 1945, a total of 61,838 barrels. . . .

Yours very truly,
Fren Oil Company
By: Max Friess

Devonian Oil Company
Fort Worth 2, Texas
October 1, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. The Devonian Oil Company's operations from January, 1942 through August, 1945 were confined chiefly to producing properties that had been developed before this time. The following is the amount of production by years:

Year	Barrels
1942	156,329.54
1943	179,348.08
1944	177,457.82
1945 (through August)	108,391.37
Total	621,526.81

The 1943 and 1944 production shows an increase of approximately 14 percent over that of 1942. This crude was purchased by major pipe-line companies, who in turn made it into war products at their refineries.

During this time we were actively engaged in leasing, and supported a number of wildcat tests. Besides these tests, we drilled two wildcats :

Windfohr-State, Sec. 25-11S-35E, Lea County—a dry hole, and No. 1 State, Sec. 32-17S-34E, Lea County—a small producer.

Yours very truly,
R. R. Porterfield.

Gulf Oil Corporation
Gypsy Division
Tulsa 2, Oklahoma
October 13, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . During the period mentioned in your letter, the company drilled 28 development wells and two wildcats. Both of the latter wells resulted in discoveries, one our Vivian No. 1 in Section 30-22S-38E, which opened the Drinkard-Yeso Pool; and the other, the Paddock No. 1 in Section 1-22S-38E, which opened the Paddock Pool. In addition, the company participated with others in drilling of the Penrose test in Section 9-22S-37E, which was an Ellenburger discovery at the total depth of 8,400'.

From January, 1942 to September, 1945, the company produced 14,610,902 barrels of crude, operating at the end of the period 337 producing wells. During this same time, Gulf Re-fining Company's pipe lines gathered 14,640,497 gross barrels....

Yours very truly,
Rush Greenslade,
Vice President.

Kenwood Oil Company
Tulsa 3, Oklahoma
September 28, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . On Dec. 31, 1944, Addison Oil Company was merged with and into our company. . The following information covers the activities of Addison Oil Company as well as of Ken-wood Oil Company.

During the period Jan. 1, 1942 to Aug. 31, 1945, we operated twelve wells of an average depth of 3,471', from which we produced 163,053.31 barrels of crude oil. One of them was drilled

during 1942. From five of them, we also produced 547,630 M.C.F. of commercial casinghead gas.

Our activities also included the drilling of two dry holes, one of which was 3,535' and the other 1,804'. We also assisted a neighboring operator in the drilling of a small gas well by contributing to his costs. . . .

Yours truly,
Kenwood Oil Company
By: Mott Dunham

Skelly Oil Company
Hobbs, New Mexico
November 13, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . It is not necessary to remind you that the period from January 1942 to September 1945 . . . called for accomplishment of the impossible by the oil industry as a whole. New Mexico oil operators played no small part in this effort and we are proud of the part carried out by the Skelly Oil Company in the co-operative and consolidated "Oil Front" which was largely responsible for victory.

At the start of the period in question, Skelly had a total of 148 producing oil wells and operated a total of 23 Geo. F. Getty, Inc., wells. The combined oil production for the year 1942 was 1,409,897 barrels. At the end of the period our total number of producing wells had been increased by development of new wells to 174 Skelly wells and 26 Getty wells, with increased production to the rate of approximately 1,700,000 barrels per year.

In spite of serious labor shortages, transportation difficulties and scarcity of materials, a total of 29 producing oil wells were completed, and in our efforts to further increase this productive figure a total of 9 dry holes were drilled. These dry holes were all wildcat operations drilled in attempts to increase reserves and open new areas for development. There is no merit in drilling a dry hole, except in the light it is indicative of an all-out effort to provide oil in increased quantities from New Mexico to back up the war effort.

As a development and producing operator in New Mexico, the main objective of Skelly Oil Company was to develop new production and to maintain maximum oil production on proper-ties where development programs had been completed.

In many cases it was necessary to make changes in operations in order to meet special requirements or specifications. On the Getty Dooley lease 16 miles northeast of Carlsbad it was found that the oil produced . . . could be used as a diesel fuel, as well as refined into a high-grade road oil for use in roadwork, airbase runways and highway construction. In order to use it as

a diesel fuel it was necessary to construct and maintain an extensive water knock-out and treating system. This diesel fuel was sold to the International Minerals & Chemical Corporation at their Carlsbad mines nearby, and since their operations were powered with diesel engines and run by diesel fuel developed from crude oil from the Skelly-operated Getty lease, we feel we share a part of the Navy "E" which was awarded the International potash mines. The road oil refined from this crude played no small part in the construction of the many airbases in south-east New Mexico, from which bases many pilots were trained who played a most important part in the winning of the war.

In addition to the actual development and operation work carried on by Skelly employees, War Bond purchases by payroll deduction averaged 15% of the total payroll in our New Mexico District, Red Cross drives were subscribed 100%, War Fund contributions reached 100% participation, and many employees donated time and effort to activities associated with the war effort. All this was done in an attempt to at least back employees who had entered the armed forces with moral support as well as actually furnishing a part of the oil necessary to the winning of the war. . . .

Yours very truly,
J. N. Dunlavey,
Superintendent, New Mexico District.

Standard Oil Company of Texas
Houston 1, Texas
October 3, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

….Our biggest interest in production activities in New Mexico is in connection with the operation of the New Mexico Federal Unit. This joint venture is operated by the Continental Oil Company. . . .

The Standard Oil Company of Texas has production in the Hobbs, Eunice, and Vacuum fields in New Mexico. Production during January 1942 amounted to 5,000, 5,000, and 18,193 barrels for the month, for the fields involved. During August, 1945, production had risen to 5,624, 5,472, and 20,152 respectively. We have not drilled any field wells during the past three years.

During May, 1944, we completed and abandoned two dry holes drilled near Carlsbad, New Mexico, the Ed. C. Smith Goat Cave Unit 23, well #1, and the H. H. Wilson Four Section Unit 3**,** well #1. Both of these wildcat wells were drilled by our company in an effort to test the shallow zones in that area. . . .

Yours very truly,
L. W. Clark,
Assistant Secretary.

Westates Petroleum Corporation
Long Beach 6, California
October 9, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . This corporation holds under lease 1,280 acres of U. S. Government Land in the Langlie Area, Lea County, New Mexico, upon which were drilled eleven wells to completion during 1939 and 1940. Since the completion of this drilling program, we have done no further development to date.

The production by years is as follows:

Year	Oil (barrels)	Gas (MCF)	Casinghead gasoline
1942	66,957	103,219	729,391
1943	56,858	977,207	613,193
1944	39,576	784,729	556,795
July 1945	18,123	371,452	289,147

Yours very truly,
R. A. Earle,
Vice President.

Witt Ice & Gas Co.
Los Angeles 1, California
March 27, 1946

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

We….are glad to supply such information as is available on the production of dry ice at our plant in Torrance County, New Mexico.

During the year 1945 we produced approximately 1,000 tons of dry ice from the gas bodies in the Estancia Valley. The gas resources in the areas that have been drilled have so diminished that it is no longer considered production in commercial quantities. Our production facilities cannot be operated economically on the volume of gas available and production from that plant was suspended in December, 1945.

We also operate a plant in Harding County, New Mexico, near Bueyeros. This plant is owned by R. W. Adams and/or Ute Carbonic Co. . . . The production for 1945 amounted to approximately 4,000 tons.

For general purposes it takes approximately 20 MCF of CO_2 gas to make a ton of dry ice, or roughly, on the basis of 10 cubic feet per pound. The total value in dollars and cents of the year's gross sales does not have any particular significance as to the value of the gas resources, as items of transportation costs, distribution expense, etc., are involved in making up the total gross

sales. It is generally accepted, however, that a value of $20.00 per ton is a fair market value for dry ice at the point of production.

Yours very truly,
A.L. Mill,
Secretary.

The Ohio Oil Co.
Hobbs, New Mexico
September 26, 1945

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

. . . We submit the following facts.

Total oil produced for the period—4,014,465 bbls.
Gas delivered to gasoline plants—5,520,215,000 cu. ft. New wells drilled—5.
Added to office force—1 geologist, 1 petroleum engineer, 1 land man, and 3 stenographers.
From our work force to Military Service—5; to essential industry—8.

Cordially yours,
P. B. Stewart,
District Foreman.

RAILROADS

The Atchison, Topeka and Santa Fe Railway System
Chicago 4, Illinois
October 31, 1946

WARTIME ACTIVITIES IN NEW MEXICO DURING THE WAR YEARS

In peace and in turbulent times the railroads have sustained an importance in the welfare of New Mexico that has reflected over the nation and into the home.

The greatest demonstration of coordination and patriotic cooperation was recorded during the years of World War II. The war's impact found the railroads and railroad officials speeding into action. The transition from peacetime service to military effort, following the onslaught of the Japanese, proved that officials of the railways were alert. Moving into the flurry of service demanded by military exigencies earned one of the early commendatory military communiques for the railways.

There was much planning behind the railways' alertness on December 1. For years, railway officials, shippers, and government representatives studied means of swinging into any emergency. Faults of operation in World War I, when the railroads were under government control, were studied and eliminated. Increased efficiency of operation, greater speeds, improved facilities, and other essentials to a smooth-functioning railway network were inaugurated by management.

The importance of New Mexico to the Union of States during the war years was fostered by the railroads, as it had been in normal times. The interweaving of railway transportation with the development of the State and its progress and its importance to the individual cannot be over-emphasized.

An outstanding and historic example of mutual benefits which have developed between railways and the commonwealth is the Atchison, Topeka and Santa Fe Railway, known generally throughout the State and nation as the "Santa Fe."

This relationship between territory and railway goes back to the conquest of Raton Pass and the ultimate development of the Santa Fe, until today it is an integral part of the State through its varied and extensive services, its far-flung personnel, its enormous payrolls, and its contribution of taxes to the State by which the functions of many governmental bodies are made possible. There are several thousand employees scattered throughout the State and its annual payroll runs into the millions. In Albuquerque alone there are more than 1,900 persons with an annual payroll of nearly $5,500,000.

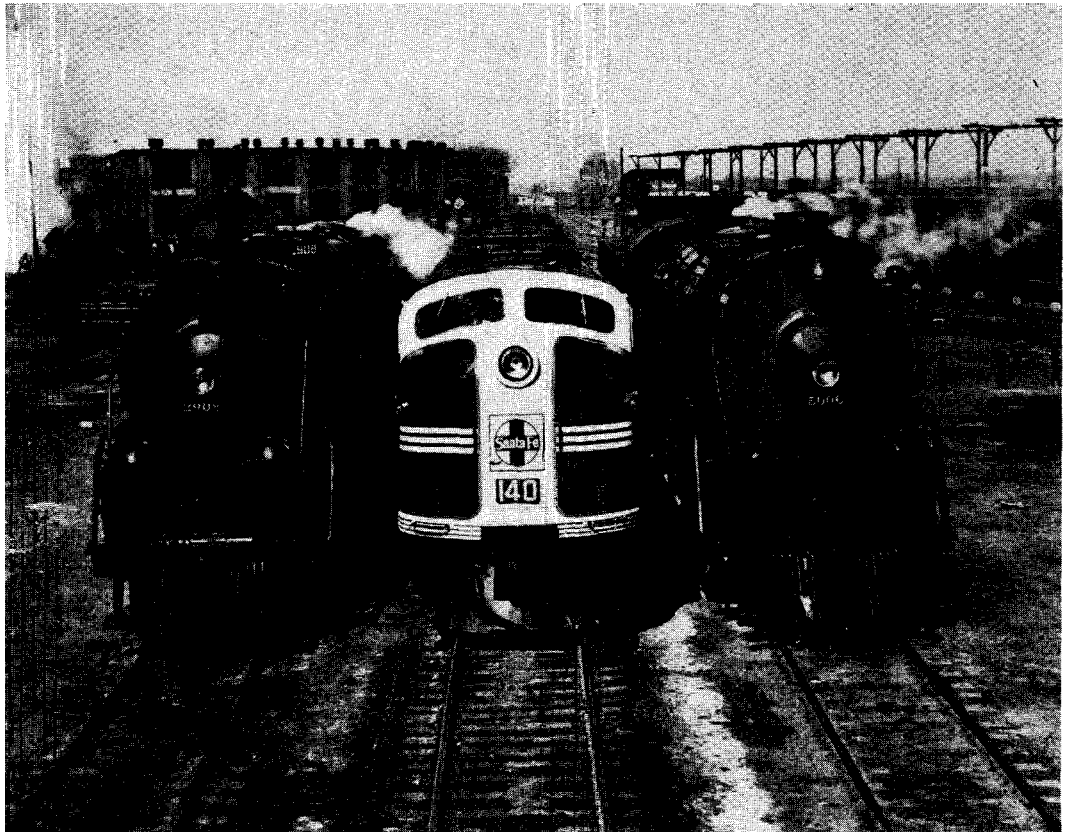
New Mexico is traversed by two main lines of the Santa Fe. The Northern District line of the New Mexico division, with operating headquarters at Las Vegas, goes through Albuquerque. The Southern District, functioning as the Pecos division, goes through Belen. Other lines include the routes from Albuquerque through the Mesilla Valley to El Paso and . . . from Clovis through the Pecos Valley to Carlsbad and on to Pecos, Texas.

These services, plus branch and feeder lines, are vital to the industrial progress of the State. The vast mineral wealth of New Mexico would have been isolated from industry had it not been for the availability of railway transportation.

Serving the major mining and mineral areas of the State, the Santa Fe handled record-breaking movements of products during the war years. Potash, copper, coal, petroleum, manganese, fluorspar, and many other products were moved in unending trainloads to strategic points where they were employed in the war effort and for civilian purposes.

An enormous increase in the movement of livestock and agricultural products established increased records successively in each of the years of the international conflict.

The greatest movement of manpower and war material in the history of the world was observed. War industries were aided in their functions through the extension of trackage necessary to handle emergency production. Military bases were speeded into activation by the extension of trackage. . . . Even the atomic-bomb tests in New Mexico relied heavily on the Railway. This concerned the shipment of an especially designed tower, weighing 740,000 pounds, which required construction



(Santa Fe photo.)

Motive power of the Santa Fe, pictured in the yards at Clovis.

of a flat car with fourteen axles to carry the important load safely. . .

Not only did the Santa Fe devote 24-hour service in aid of the military program, but contributed in many other ways. The famous 713th Railway Operating Battalion was activated at Camp Reed, Clovis, and earned an enviable record in Africa, Italy, France, and Germany. Its officers and men were selected largely from Santa Fe personnel. Then too, more than 12,000 Santa Fe employees, many hundreds of them from New Mexico, saw active military service, and many New Mexicans lost their lives in action.

While there was unprecedented movement of manpower and war power the ingredients which went into materials had to be shipped from New Mexico. One of the outstanding States in mineral production, New Mexico's products of mines and wells had to be hurried to foundries and into finished articles. The mineral production of the State hit new highs and all preceding records were smashed in the movement of tonnage in each successive war year.

One of the State's most important minerals, potash, from the wealthy fields of the Carlsbad area, increased in 1941 to 16,000 carloads. In 1942 it jumped to more than 21,000 carloads and by 1945 reached more than 27,000 carloads. Increased carload movements of copper, manganese, fluorspar, coal, petroleum and its by-products, and other minerals established new transportation records….

The Santa Fe was aided initially in its state service through its extensive facilities in the State which include nearly fourteen hundred miles of track and represent the greatest mileage of any single railway operation in the State.

The Railway represents nearly fourteen per cent of the total assessed property valuation of the State. It is the State's heaviest taxpayer. The Railway pays about one million dollars annually in State taxes and of this sum more than $530,000 goes for the support of State, County, and district schools. . .

Santa Fe management, under the direction of President Fred G. Gurley during the war years, was able to cope with military and civilian demands because of foresight in maintaining equipment and roadway. Despite the problem of securing new equipment and supplies because of priorities, a splendid job of maintenance was accomplished not only in New Mexico but else-where over the System. Definite strides were made in New Mexico with the introduction of centralized traffic control, inaugurated on extensive segments between Clovis and Belen with a total of 201 miles of control installed which expedited the movement of freight and passenger traffic to an exceptional degree. Centralized traffic control proved one of the greatest innova-

tions in New Mexico in speeding this heavy east-west military and civilian traffic.

The heavy beating taken by track from war traffic called for the installation of replacements and the extension of many miles of sidings and yard facilities, particularly at Clovis and Belen.

High-powered Diesel freight locomotives were placed in service over New Mexico. These Diesels, operating over the Southern District through Belen, aided mightily in the war task. It was through the centering of Diesel power in New Mexico and on the Pacific Coast that an important part of the war load was handled so successfully.

The partnership between State and railways continues and the mutual welfare is expected to flourish in the future as people and conditions resume normalcy, with the Railway which bears the name of the State's capital eager to do its share.

Southerh Pacific Company
San Francisco 5, California
September 10, 1946

New Mexico Bureau of Mines and Mineral Resources

Gentlemen:

….780 miles of Southern Pacific track stretch across New Mexico, and through the state passes all traffic on this railroad's two transcontinental routes across the Southwest. Southern Pacific property in New Mexico is assessed at more than 20 mil-lion dollars, and on it approximately $500,000 in taxes is paid annually. An average of 2,000 S.P. workers were paid about $3,950,000 annually in this state in the war years.

Southern Pacific was in the thick of the big job of moving men and military material throughout the war. It served on its eight-states system more military and naval establishments than any other railroad in America, and on its Golden State and Sun-set routes through New Mexico it was setting all-time traffic records in the war years, each year greater than the one preceding.

In addition to carrying vast quantities of goods through the state, Southern Pacific shared with other railroads in moving a total of 14 million tons of freight that originated in New Mexico in the war period, according to statistics of the Interstate Commerce Commission. Mines were the leading shippers. [See Tables 12, 13, 14.]

Total number of passenger-miles (number of passengers multiplied by the miles they traveled) was 2,130,155,634 on Southern Pacific in New Mexico in the war years. Peak was reached in December, 1945, when through Tucumcari terminal on the Golden State route alone the railroad handled approxi-

mately 5,000 passenger train cars. These included more than 100 troop trains. In an average war year approximately 6,000 passenger and freight trains rolled through the state along the Golden State route between El Paso and Tucumcari, and about 14,500 along the tracks between Arizona and El Paso.

In handling its heavy passenger and freight trains Southern Pacific makes use of some of the most powerful locomotives operated anywhere in the West. They include the famous "Daylight-type" locomotives and the huge 3800-class coal burners. Less than a year after war's end, orders were placed for three new Diesel-electric locomotives to pull new streamliners on the Golden State route.

Southern Pacific entered the postwar era with its physical plant in the Southwest at greatest capacity. Large investments have been made in improvements on the Golden State and Sunset routes in recent years, reducing grades, strengthening track, easing curves—all of which contribute to the faster, smoother and more economical operation of trains.

During the war period approximately 200 miles of new heavy rail was laid on SP's main lines in New Mexico. Numerous additions to sidings and yard tracks to facilitate the movement of wartime traffic, including tracks to service industries, were constructed and put into operation, including signal changes and re-spacing of the automatic block signal system.

Bonito dam near Carrizozo was raised 19 feet . . . to restore the capacity of Bonito reservoir which had been reduced by heavy influx of silt. Water from Bonito reservoir is distributed by pipe line for use in locomotives and for domestic purposes at stations on 107 miles of main line from Carrizozo to Pastura.

Southern Pacific track in New Mexico is the major part of the Rio Grande division of the railroad, whose 1,111 miles were supervised in wartime by Superintendent H. S. Fairbank at his El Paso headquarters. Superintendent Fairbank, retired, has been succeeded by V. M. Petterson.

The railroad here is also served by offices elsewhere, among them the advertising and industrial offices located throughout the nation to promote travel and attract industries. The rail-road's expenditures to advertise the advantages of its territory to the business man as well as to the tourist and future home-owner are measured in hundreds of thousands of dollars annually, because one of the basic theories underlying Southern Pacific policy is that the railroad can prosper permanently only by helping create more business in and for the region it serves.

Yours truly,
K. C. Ingram,
Assistant to the President.

TABLE 12. TONS OF FREIGHT ORIGINATED ON RAILROADS IN NEW MEXICO DURING THE WAR YEARS[a]

	1942	1943	1944	1945
Products of agriculture	237.486	234.736	218.141	293.153
Animals and products	186.981	180.199	201.796	219.186
Products of mines	1,408,075[b]	1,769,651[b]	1,475,737	1,274,588
Products of forests	219,580	177,329	194,829	127,651
Manufacturers and miscellaneous	1,412,507[b]	1,610,608[b]	1,898,857	1,888,959
Totals	3,464,629	3,972,523	3,989,360	3,803,537

[a] The figures in this table and in Tables 13 and 14 are from the Interstate Commerce Commission and are furnished through the courtesy of the Southern Pacific Company.

[b] Segregation of tonnage of ores, copper (manufactured), and explosives has been estimated; hence totals shown for these groups are not precise, although grand total for all commodities is correct.

TABLE 13. TONS OF MINERAL PRODUCTS ORIGINATED ON RAILROADS IN NEW MEXICO DURING THE WAR YEARS

	1942	1943	1944	1945
Coal	501,367	723,143	655,830	730,934
Ores	407.237[a]	475.090[a]	542.071	382.986
Sand and gravel	142.173	184.811	106.936	66.730
Crude petroleum	80.221	71.601	65.769	34.287
All other	277,077[a]	315,006[a]	105,131	59,651
Totals	1.408,075	1,769,651	1,475,737	1,274,588

a Segregation of tonnage of ores, copper (manufactured), and explosives has been estimated ; hence totals shown for these groups are not precise, although grand total for all commodities is correct.

TABLE 14. TONS OF MANUFACTURED AND MISCELLANEOUS PRODUCTS ORIGINATED ON RAILROADS IN NEW MEXICO DURING THE WAR YEARS

	1942	1943	1944	1945
Fertilizers	1,028,447	1,157,137	1,296,994	1,344,859
Petroleum products	74.471	82.849	81.432	141.778
Scrap iron	40,604	24,939	33,862	25,612
Copper (manufactured)	70.000"	70.000[a]	67.830	56.236
Explosives	70,000'	103.000[a]	234.757	117.125
All other	128,985a	172,683[a]	183,982	203,349
Totals	1,412,507	1,610,608	1,898,857	1,888,959

[a] Segregation of tonnage of ores, copper (manufactured), and explosives has been estimated; hence totals shown for these groups are not precise, although grand total for all commodities is correct.

WARTIME OPERATING COMPANIES

No report of this type would be complete without an enumeration of the operators, both large and small, that made possible New Mexico's outstanding contribution to the war effort, The following pages list the wartime operators of metal mines, non-metallic mines other than coal, coal mines, oil and gas properties, concentrating plants, oil refineries, gasoline plants, and dry-ice plants.

TABLE 15. OPERATORS OF METAL MINES IN NEW MEXICO DURING THE WAR YEARS

Operator	Address	Name of mine	County	Metal
Alloy Metals Division of Continental Machines	El Paso, Texas	Adele	Sierra	Tungsten, beryllium
American Smelting and Refining Company	Vanadium	Ground Hog	Grant	Lead, zinc, copper
American Smelting and Refining Company	Magdalena	Waldo[a]	Socorro	Lead, zinc
Anderson, Robert	Albuquerque	Sandstone	Sandoval	Manganese
Atwood Mining Company	Lordsburg	Atwood	Hidalgo	Copper
Banner Mining Company	Lordsburg	Bonney	Hidalgo	Copper
Black Hawk Consolidated Mines	Silver City	Combination; Hobo	Grant	Lead, zinc
Black Range Development Company	Hurley	Grand View; Columbia; Patsy	Grant	Lead, zinc
Cerrillos Lead Zinc Company	Santa Fe	Pennsylvania	Santa Fe	Lead, zinc
Continental Ore and Chemical Company	Silver City	Savanna	Grant	Lead, zinc
d'Autremont, Maurice	Tucson, Arizona	Pastura	Guadalupe	Copper
Ellis, Herbert	Fort Sumner	Magnetite Lode	Lincoln	Iron
Empire Zinc Company	Hanover	Hanover	Grant	Lead, zinc
Everheart, Thaddeus, and Miller, Dan	Socorro	Sunny South	Sierra	Manganese
Exploration Syndicate, Inc.	Duncan, Arizona	Carlisle	Grant	Silver
Foster, R. R.	Silver City	Cleveland	Grant	Lead, zinc
Guadalupe Mining Company	Santa Fe	Stauber	Guadalupe	Copper
Hallett Construction Company	Hillsboro	Gold Dust	Sierra	Gold
Harrison, W. S., and Hunt, J. G.	Pinos Altos	Manhattan	Grant	Lead, zinc
Hematite Mining and Transportation Company	Corona	Iron Cap	Lincoln	Iron
Hughes, Kenneth	Magdalena	Lynchburg; Center	Socorro	Lead, zinc
Hutchinson, Charles	Lordsburg	Miser Chest	Hidalgo	Copper
Kennecott Copper Corporation	Hurley	Chino	Grant	Copper, molybdenum
		Oswaldo	Grant	Zinc
Lincoln Ore and Metal Company	Carrizozo	Corona	Lincoln	Iron
Luck Mining and Construction Company	Silver City	Boston Hill	Grant	Manganese-iron
Luna Manganese Company	Deming	Luna	Luna	Manganese
Marsten, E. J.	Colorado Springs, Colorado	Apache No. 2; Carbonate King	Hidalgo	Lead Zinc

[a] Waldo mine operated by Ozark Mining and Smelting Company, 1942.

TABLE 15. OPERATORS OF METAL MINES IN NEW MEXICO DURING THE WAR YEARS (CONCLUDED)

Operator	Address	Name of mine	County	Metal
McDonald and Dodson	Magdalena	Nitt	Socorro	Lead, zinc
Moline Mining and Milling Company	Cerrillos	Franklin	Santa Fe	Lead, zinc
Molybdenum Corporation of America	Questa	Phyllis group	Taos	Molybdenum
Montgomery, Arthur	New York, N. Y.	Harding	Taos	Lithium, beryllium, tantalum
National Zinc Company	Lordsburg	McGee; Ruth	Hidalgo	Lead, zinc
Newalpitt Corporation	Deming	Manganese Valley	Luna	Manganese
		Lake Valley	Sierra	Manganese
New Mexico Consolidated Mining Company	Silver City	Copper Flat; Kearney	Grant	Lead, zinc
New Mexico Manganese Company	Silver City	Mocking Bird	Grant	Manganese
New Mexico Ore Processing Company	Central	Peerless	Grant	Lead, zinc
Owen, John and Al	Hurley	Royal John	Grant	Lead, zinc
Peru Mining Company	Silver City	Pewabic	Grant	Zinc
Phelps Dodge Corporation	Tyrone	Burro Mountain	Grant	Copper
Sanchez, Julius	Socorro	Iron Horse	Socorro	Iron
Shepard, B. O.	Pinos Altos	Huston Thomas	Grant	Lead, zinc
Sierra Metals Company	Santa Fe	Tom Payne; Black Hornet	Santa Fe	Lead, zinc
Silver Creek Mining Company	Silver City	Bearup[b]	Catron	Silver
Silver Hill Mining Company	Pinos Altos	Silver Hill	Grant	Lead, zinc
St. Louis Smelting and Refining Company	Hanover	El Paso	Grant	Iron
Strand and Elaver	Santa Rita	Percha	Sierra	Lead, zinc
Teal, H. A.	San Lorenzo	Spates	Grant	Lead, zinc
United Mining and Milling Company	Socorro	Red Hill	Socorro	Manganese
United States Smelting Refining and Mining Company	Bayard	Bullfrog; Iron Head; Slate; Shingle Canyon	Grant	Lead, zinc
Walker and McDonald	Hachita	Red Hill	Hidalgo	Lead
White, D. B.	Silver City	Cleveland (mill tailings)	Grant	Lead, zinc
Wilder, Carl	Hachita	Hornet	Grant	Lead, zinc
Wosley, Ernest R.	Las Cruces	Merrimack	Dona Ana	Lead, zinc
Yacamo and Fuller	Silver City	Copper Sulphite; Three Brothers;' Contact	Grant	Lead, zinc

[b] Bearup mine operated by W. L. Brown, 1942.

TABLE 16. OPERATORS OF NONMETALLIC MINES (OTHER THAN COAL) IN NEW MEXICO DURING THE WAR YEARS

Operator	Address	Name of mine	County	Mineral
Brown-Johnson Corporation	Silver City	Clum[a]; Bluebird[b]	Grant	Fluorspar
		Big Spar	Catron	Fluorspar
Cox Fluorspar Company	Cutter	Apache	Sierra	Fluorspar
Curry and Forbes	Duncan, Arizona	Curry	Grant	Fluorspar
Ellis, R. T.	Duncan, Arizona	Ellis	Grant	Fluorspar
General Chemical Company	Deming	Shrine[c]	Grant	Fluorspar
Globe Mines, Inc.	Pueblo, Colorado	Globe	Rio Arriba	Mica
Grattan, P. L.	El Paso, Texas	Sadler	Luna	Fluorspar
Heim, William	Grants	Mirabal	Valencia	Fluorspar
Hunt and Winkler	Duncan, Arizona	Mohawk	Grant	Fluorspar
International Minerals & Chemical Corporation	Carlsbad	Union	Eddy	Potash, magnesium
McCabe, B. F.	Lordsburg	Great Eagle	Grant	Fluorspar
McCray, H. E.	Tyrone	Burro Chief	Grant	Fluorspar
Montag, Joe	Willow Road	Sunnyside	Sandoval	Pumice
Navajo Fluorspar Company	Grants	Twenty-one; Twenty-seven	Valencia	Fluorspar
Newalpitt Corporation	Deming	Tonuco	Dona Ana	Fluorspar
Potash Company of America	Carlsbad	P.C.A.	Eddy	Potash
Pumice Corporation of America	Grants	Bluebell	Valencia	Pumice
Schneider, R. L.	La Madera	Cribbenville	Rio Arriba	Mica
Sierra Talc Company	Rincon	Red Rock[d]	Socorro	Talc
Slick Mining Company	Lordsburg	Separ	Grant	Fluorspar
Southwestern Mineral Company[e]	Duncan, Arizona	Mohawk	Grant	Fluorspar
United States Potash Company	Carlsbad	U. S.	Eddy	Potash

[a] Glum mine operated by A. C. McAtee, 1942.
[b] Bluebird mine operated by Lewis Mantes, 1942.
[c] Shrine mine operated by Pat Osmer, 1942.
[d] Red Rock mine operated by Watson Rich, Jr., and C. M. Nelson, 1945.
[e] Southwestern Mineral Company converted to custom mill for lead and zinc, 1944.

TABLE 17. OPERATORS OF COAL MINES IN NEW MEXICO DURING THE WAR YEARS

Operator	Address	Name of mine	County	Product
Albuquerque and Cerrillos Coal Company	Madrid	No. 4 Anthracite	Santa Fe	Anthracite
		No. 4 Lamb; Jones	Santa Fe	Bituminous
Biava, John	Gallup	Biava	McKinley	Bituminous
Boardman, William	Gallup	Boardman	McKinley	Bituminous
Caranta, Annie	Monero	Caranta	Rio Arriba	Subbituminous
Chiaramonte Brothers	Gallup	Chiaramonte	McKinley	Bituminous
Defiance Coal Company	Albuquerque	Mentmore	McKinley	Bituminous
Erler, Arthur	Monero	Rainbow	Rio Arriba	Subbituminous
Franks, Charles, and Trossello, M. P.	Albuquerque	Ferro	Bernalillo	Bituminous
Gallup Gamerco Coal Corporation[a]	Gamerco	Navajo	McKinley	Bituminous
George, Frank	Gallup	George	McKinley	Bituminous
Jack, William	Kirtland	Black Diamond	San Juan	Bituminous
Kinney, B. H.	Albuquerque	Tokay	Socorro	Bituminous
Luciani, Nick, and Sons	La Ventana	Peacock	Sandoval	Subbituminous
Maschio, Valentina	Raton	Yankee	Colfax	Bituminous
Montoya, M. G.	La Ventana	La Ventana	Sandoval	Subbituminous
Mutual Coal Company	Gallup	Mutual	McKinley	Bituminous
Phelps Dodge Corporation	Dawson	Stag Cañon	Colfax	Bituminous
Plese, Joe	Gallup	Aztec	McKinley	Bituminous
Sanchez, Isias	Albuquerque	San Ysidro	Sandoval	Subbituminous
Smouse, Mrs. Sam	Fruitland	Smouse	San Juan	Bituminous
Sonchar, Joe	Raton	Sonchar	Colfax	Bituminous
Southwestern Coal Company	Gallup	Southwestern	McKinley	Bituminous
St. Louis, Rocky Mountain & Pacific Company	Raton	Brilliant; Koehler; Van Houton	Colfax	Bituminous
Tafoya, Juan	Lumberton	Amargo	Rio Arriba	Subbituminous
Turner, Thomas	Raton	Turner	Colfax	Bituminous
Western Coal Company	La Ventana	Western	Sandoval	Subbituminous
Yasbez, Frank	Raton	Frank	Colfax	Bituminous

[a] Took over operation of mine from Gallup American Coal Company, 1945.

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS[a]

Operator	Address	County	Product
Acrey and Acrey	Artesia	Eddy	Oil
Adams and McGahey	Amarillo, Texas	Harding	Carbon dioxide
Addison Oil Company[b]	Tulsa, Oklahoma	Lea, Eddy	Oil
Aid, Herbert	Artesia	Eddy	Oil
Allen and Fair	Tyler, Texas	Eddy	Oil
Amerada Petroleum Corporation	Tulsa, Oklahoma	Lea	Oil
American Republics Corporation	Houston, Texas	Lea, Eddy	Oil, gas
Anco Oil Company	Artesia	Eddy	Oil
Anderson, Mac T.	Artesia	Eddy	Oil
Anderson-Prichard Oil Corporation	Oklahoma City, Okla.	Lea	Oil
Archer and Jones	Artesia	Eddy	Oil
Arbogast, Hibbs, Stamos and Rosenbaum	Artesia	Lea	Oil
Argo Oil Corporation	Denver, Colorado	Lea	Oil, gas
Aston and Fair	Roswell	Eddy	Oil
Atkins, Geo.	Artesia	Eddy	Oil
Atlantic Refining Company	Carlsbad	Lea	Oil, gas
Baldwin-Reed Drilling Company	Wichita Falls, Texas	Eddy	Oil
Banner Oil Company	Artesia	Eddy	Oil
Barnsdall Oil Company	Hobbs	Lea, Eddy	Oil
Bassett-Birney, et al.	Artesia	Eddy	Oil
Bennett, E. C.	Hobbs	Lea	Oil
Bowers and Bowers	Artesia	Eddy	Oil
Bradley, Edwin G.	Wichita, Kansas	Eddy	Gas
Brainard, Fred	Artesia	Eddy	Oil
Breeding, D. and Baker, F. E.	McCamey, Texas	Eddy	Oil
Breeding D. and Elder, J. H.	McCamey, Texas	Eddy	Oil
Brewer Drilling Company	Artesia	Lea, Eddy	Oil
Bridgeport Oil Company, Inc.	Wichita, Kansas	Lea	Oil
Bright and Gordon	Tyler, Texas	Eddy	Oil
Brock, Brock and Freundlich	Artesia	Lea	Oil

[a] From Year Book and Directory of the New Mexico Oil Conservation Commission, pp. 72-110, 1943.

[b] Merged with Kenwood Oil Company, December 31, 1944.

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONTINUED)

Operator	Address	County	Product
Brock Drilling Company	Artesia	Lea	Oil
Brown, C. W.	Artesia	Eddy	Oil
Brown, Mrs. Eva	Artesia	Eddy	Oil
Buck, C. B.	Artesia	Eddy	Oil
Burnham Oil Company	Artesia	Eddy	Oil
Byrd-Frost, Inc.	Dallas, Texas	Lea	Oil
Carbonic Chemicals Corporation	Solano	Harding	Carbon dioxide
Carper Drilling Company	Artesia	Lea, Eddy	Oil
Carter, Sanders, Vandegriff	Artesia	Eddy	Oil
Carter, Amon G.	Ft. Worth, Texas	Lea	Oil
Cities Service Oil Company	Hobbs	Lea	Oil
CIark, E. B.	Wichita Falls, Texas	Lea	Oil
Clower, J. C.	Eunice	Lea	Oil
Cockburn, Barney	Artesia	Lea, Eddy	Oil
Cockburn, Johney	Artesia	Lea	Oil
Cone, Gordon M.	Lovington	Eddy	Oil
Continental Oil Company	Ponca City, Oklahoma	Lea, Eddy, San Juan	Oil, gas
Culbertson and Irwin, Inc.	Midland, Texas	Lea	Oil
Cusack, J. P., Inc.	Hobbs	Lea	Oil
Dalport Oil Corporation	Dallas, Texas	Lea	Oil
Danciger Oil and Refining Company	Ft. Worth, Texas	Eddy	Oil
Danglade-Clower	Eunice	Lea	Oil
Devonian Oil Company	Tulsa, Oklahoma	Lea	Oil
Dixon and Yates Oil Company	Artesia	Eddy	Oil
Dodson, et al.	Artesia	Eddy	Oil
Dominion Oil and Gas Company	Roswell	Eddy	Oil
Dooley, Wm. P.	Artesia	Eddy	Oil
Drilling and Exploration Company, Inc.	Dallas, Texas	Lea	Oil
East, C. L.	Artesia	Eddy	Oil, gas
Eastham, Harris G., Jr.	Midland, Texas	Eddy	
Eastland Oil Company	Monahans, Texas	Lea, Eddy	

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONTINUED)

Operator	Address	County	Product
Elder, J. H.	Midland, Texas	Eddy	Oil
Elder and Willingham	Midland, Texas	Lea	Oil
Elliott, L. E.	Roswell	Lea	Oil
Emperor Oil Company	Ft. Worth, Texas	Eddy	Oil
English, Paul B.	Artesia	Lea, Eddy	Oil, gas
Ennishope Oil Company	Big Spring, Texas	Lea	Oil, gas
Eppenauer Drilling Company	Pecos, Texas	Lea	Oil
Etz Oil Company, Inc.	Roswell	Eddy	Oil
Fair, R. W.	Tyler, Texas	Eddy	Oil
Fair, Foundation, and Allen	Tyler, Texas	Lea	Oil
Fair and Baish	Tyler, Texas	Lea	Oil
Fair & Fair Foundation	Tyler, Texas	Eddy	Oil
Fair & Bright	Tyler, Texas	Eddy	Oil
Fidel, John N.	Artesia	Eddy	Oil
Fields, Bert	Dallas, Texas	Lea	Oil
Flint Production Company	Artesia	Eddy	Oil
Flynn, Welch and Yates	Artesia	Eddy	Oil
Franklin Petroleum Corporation	Roswell	Eddy	Oil
Fren Oil Company	Monahans, Texas	Eddy	Oil
Friendship Oil Company	Tyler, Texas	Eddy	Oil
Fullerton Oil Company	Los Angeles, California	Eddy	Oil
Fulton, E. L.	Artesia	Eddy	Oil
Getty, George F., Inc.	Los Angeles, California	Lea, Eddy	Oil, gas
General Crude Oil Company	Houston, Texas	Lea	Oil
Golden Oil Company	Hobbs	Lea	Oil
Graybug Oil Company of New Mexico	Artesia	Eddy	Oil
Great Western Producers, Inc.	Lubbock, Texas	Lea	Oil
Green Bay Company, The	Roswell	Eddy	Oil
Gulf Oil Corporation	Tulsa, Oklahoma	Lea	Oil, gas
Hammond, T. B.	Artesia	Eddy	Oil

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONTINUED)

Operator	Address	County	Product
Hegwer, C. T.	Artesia	Eddy	Oil
Helmerich and Payne, Inc.	Tulsa, Oklahoma	Lea	Oil, gas
Hightower, Nay	Artesia	Eddy	Oil
Hightower and Plovhar	Artesia	Eddy	Oil
Hover, A. H., et al.	Artesia	Lea	Oil
Hudson, Wm.	Artesia	Eddy	Oil
Humble Oil Si Refining Company	Houston, Texas	Lea	Oil, gas
Johnson, Bob	Abilene, Texas	Eddy	Oil
Johnson and Johnson	Jal	Lea	Oil, gas
Jones, R. J.	Loco Hills	Eddy	Oil
Jones and Yates	Artesia	Eddy	Oil
Kan-Mex Corporation	Dallas, Texas	Lea	Oil
Kenwood Oil Company	Tulsa, Oklahoma	Lea, Eddy	Oil
Keohane and Saunders	Roswell	Eddy	Oil
Kersey and Company	Artesia	Eddy	Oil
Kewanee Oil Company	Philadelphia, Pennsylvania	Lea	Oil, gas
Key, Geo. D.	Artesia	Eddy	Oil
Keyes and Atwood	Roswell	Eddy	Oil
Kinfolks Trust, R. W. Fair, Trustee	Tyler, Texas	Eddy	Oil
King, Carl B., Drilling Company	Midland, Texas	Lea	Oil
Kleiner and Brookover	Cisco, Texas	Eddy	Oil
Krupp-Flaherty Oil Company	El Paso, Texas	Lea	Oil, gas
Lane, John	Hobbs	Lea	Oil
Leonard, Harry	Roswell	Eddy	Oil
Leonard Oil Company	Roswell	Lea	Oil, gas
Levers and Carper	Roswell	Eddy	Oil
Livermore, Geo. P., Inc.	Lubbock, Texas	Lea	Oil
Long, Ben and Priscilla	Artesia	Eddy	Oil
Mac and Stauffer Drilling Company	Tulsa, Oklahoma	Lea	Gas
Magnolia Petroleum Company	Dallas, Texas	Lea	Oil
Magruder, R. S.	El Paso, Texas	Eddy	Oil

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONTINUED)

Operator	Address	County	Product
Malco Refineries, Inc.	Artesia	Lea, Eddy	Oil
Maliamar Oil and Gas Corporation	Artesia	Lea	Oil
McDannald and Williams	Houston, Texas	Eddy	Oil
McKee, R. E.	Artesia	Eddy	Oil
McKee and Bassett	Artesia	Eddy	Oil
Me-Tex Supply Company	Hobbs	Lea, Eddy	Oil, gas
Mid-Continent Petroleum Corporation	Midland, Texas	Lea	Oil
Mizel, Sam, and Randel, 0. H.	El Paso, Texas	Eddy	Oil
Montecito Corporation	Dallas, Texas	Lea	Oil, gas
Montgomery, Mrs. Sam	Artesia	Eddy	Oil
Moore, Bishop	Jal	Lea	Oil
Morton and Elder	Artesia	Eddy	Oil
Murchison and Closuit, Inc.	San Antonio, Texas	Eddy	Oil
Murchison and Closuit and Paul Sergent	San Antonio, Texas	Eddy	Oil
Murray, J. M., Partnership	Hobbs	Lea	Gas
Nash, Windfohr and Brown	Ft. Worth, Texas	Eddy	Oil
Nix, et al.	Artesia	Eddy	Oil
Nolen, B. H.	Hobbs	Lea	Oil
Nolen, B. H., and Byrom	Hobbs	Lea	Oil
North Shore Corporation	Dallas, Texas	Lea	Oil, gas
Ohio Oil Company	Findlay, Ohio	Lea	Oil
Oil Well Drilling Company	Dallas, Texas	Lea	Oil
Olsen Oil Company	Oklahoma City, Oklahoma	Lea	Oil
Oro Peso Oil Company	Midland, Texas	Lea	Oil
Parker Drilling Company	Tulsa, Oklahoma	Lea	Oil, gas
Paton Brothers	Artesia	Eddy	Oil
Paton Brothers and Sargent	Artesia	Eddy	Oil
Pennsylvania Surgical Manufacturing Company and Bay Petroleum Company	Midland, Texas	Eddy	Oil
Penrose, Neville G., Inc.	Ft. Worth, Texas	Lea	Oil, gas

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONTINUED)

Operator.	Address	County	Product
Petroleum Products Refining and Producing Company	Prewitt	McKinley	Oil
Phillips Petroleum Company	Bartlesville, Oklahoma	Lea	Oil, gas
Phillips and Ramsey	Artesia	Eddy	Oil
Phipps Oil Company	Ft. Worth, Texas	Lea	Oil
Plains Production Company	Dallas, Texas	Lea, Eddy	Oil
Pollard, C. C.	Ft. Stockton, Texas	Lea	Oil
Pottorff, S. O., Trustee	Artesia	Eddy	Oil
Prater, L. M.	Wink, Texas	Lea	Oil
Premier Petroleum Company	Artesia	Eddy	Oil
R. G. B. Oil Company, The	Dallas, Texas	Lea	Oil
Randel, O. H.	El Paso, Texas	Eddy	Oil
Red Lake Oil Company	Artesia	Eddy	Oil
Repollo Oil Company	Tulsa, Oklahoma	Lea, Eddy	Oil, gas
Richmond Drilling Company	Midland, Texas	Lea	Oil
Rodman, E. G.	Midland, Texas	Lea	Oil
Rose City Oil Company	Tyler, Texas	Eddy	Oil
Rosley Oil Company	Chicago, Illinois	Lea	Oil
Rowan Drilling Company and N. G. Penrose, Inc.	Ft. Worth, Texas	Lea	Oil
Rudco Oil and Gas Company	Tyler, Texas	Eddy	Oil
Rush, J. M., Estate	Dallas, Texas	Lea	Oil
Saikin and Aid	Artesia	Eddy	Oil
Samedan Oil Corporation	Hobbs	Lea	Oil
Sanders Brothers	Artesia	Eddy	Oil
Schermerhorn Oil Corporation	Dallas, Texas	Lea	Oil
Schuster and Messinger	Artesia	Eddy	Oil
Shell Oil Company, Inc.	Hobbs	Lea	Oil, gas
Sikes, J. H.	Artesia	Eddy	Oil
Simon, Julian E.	Ft. Worth, Texas	Eddy	Oil
Skelly Oil Company	Tulsa, Oklahoma	Lea, Eddy	Oil; gas
Solt, Walter	Artesia	Eddy	Oil

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONTINUED)

Operator	Address	County	Product
Southern Petroleum Exploration, Inc.	Sisterville, West Virginia	Lea	Oil, gas
Southern Union Production Company	Dallas, Texas	San Juan	Gas
Stampfli and Martin	Monahans, Texas	Lea	Oil
Standard Oil Company of Texas	Houston, Texas	Lea	Oil
Stanolind Oil and Gas Company	Tulsa, Oklahoma	Lea, San Juan	Oil, gas
Stout, Waddell Drilling Company	Artesia	Eddy	Oil
Street and Ulmer	San Antonio, Texas	Lea	Oil
Stroup and Yates Oil Company	Artesia	Eddy	Oil
Sudderth, W. A. and Hicks, H. A.	Artesia	Eddy	Oil, gas
Sun Oil Company	Dallas, Texas	Lea	Oil
Sunray Oil Company	Tulsa, Oklahoma	Eddy	Oil
Suppes, G. B.	Tulsa, Oklahoma	Eddy	Oil
Texas Company, The	Ft. Worth, Texas	Lea	Oil, gas
Texas Pacific Coal and Oil Company	Ft. Worth, Texas	Lea	Oil, gas
Texas Trading Company, Inc.	Dallas, Texas	Eddy	Oil
Thomas, D. D., et al.	Artesia	Eddy	Oil
Three Sands Oil Company	Artesia	Eddy	Oil
Tide Water Associated Oil Company	Tulsa, Oklahoma	Lea	Oil, gas
Trinity Drilling Company	Dallas, Texas	Lea	Oil, gas
Turner, Fred, Jr.	Midland, Texas	Lea	Oil, gas
Turner, Dr. George	El Paso, Texas	Eddy	Oil
Two States Oil Company	Dallas, Texas	Lea	Oil
United Producing Company	Hobbs	Lea	Oil
Uscan Drilling Company	Oklahoma City, Oklahoma	Lea	Oil
Valley Refining Company	Artesia	Eddy	Oil
Vandegriff, Lee	Artesia	Eddy	Oil
Walker Oil Corporation	Wichita, Kansas	Lea	Oil
Wallingford and Smith	Artesia	Lea	Oil
Warren, Forrest	Artesia	Eddy	Oil
Weier Drilling Company	Monahans, Texas	Lea	Oil

TABLE 18. OIL AND GAS OPERATORS IN NEW MEXICO DURING THE WAR YEARS (CONCLUDED)

Operator	Address	County	Product
Welch, Marion C.	Artesia	Lea	Oil
Welch, V. S.	Artesia	Eddy	Oil
Welch and Welch	Artesia	Eddy	Oil
Wentz, L. H.	Ponca City, Oklahoma	Lea	Oil
Westates Petroleum Corporation	Long Beach, California	Lea	Oil
Western Gas Company	El Paso, Texas	Lea	Oil, gas
Western Production Company	Artesia	Eddy	Oil
Westmount Oil Company	Dallas, Texas	Lea	Oil, gas
Williams .Oil Company	Artesia	Lea	Oil
Williams, Ployhar and Williams	Artesia	Eddy	Oil
Willingham, C. E.	Midland, Texas	Lea ,	Oil
Wills, Neil H., et al.	Carlsbad	Eddy	Oil, gas
Wilson Oil Company	Santa Fe	Lea	Oil
Winkler-Koch Engineering Company	Wichita, Kansas	Lea, Eddy	Oil
Witt Ice & Gas Company	Los Angeles, California	Torrance	Carbon dioxide
Woodley Petroleum Company	Houston, Texas	Lea	Oil, gas
Woods, Mrs. E. G.	Artesia	Lea	Oil
Woolley, A. S.	Los Angeles, California	Eddy	Oil
Woolley, Roland Rich	Los Angeles, California	Eddy	Oil
Worth Drilling Company, Inc.	Ft. Worth, Texas	Eddy	Oil
Wynn, Sproesser	Ft. Worth, Texas	Lea	Oil.
Yates, et al.	Artesia	Eddy	Oil
Yates, Harvey E.	Artesia	Eddy	Oil
Yates, Martin, Jr.	Artesia	Lea, Eddy	Oil
Yates, S. P.	Artesia	Eddy	Oil
Young, Sam D. and Randel, O. H.	El Paso, Texas	Eddy	Oil

TABLE 19. CONCENTRATING PLANTS

Operator	Plant			
	Location	County	Product	Capacity (tons/24 hrs.)
	Base metals			
American Smelting and Refining Company	Hanover	Grant	Copper, lead, zinc	250
American Smelting and Refining Company	Magdalena	Socorro	Lead, zinc	200
Banner Mining Company	Lordsburg	Hidalgo	Copper	500
Continental Ore and Chemical Company	Silver City	Grant	Lead, zinc	50
Empire Zinc Company	Hanover	Grant	Lead, zinc	300
Kennecott Copper Corporation	Hurley	Grant	Copper[a]	20,000
Kennecott Copper Corporation	Santa Rita	Grant	Copper[b]	
Peru Mining Company	Deming	Luna	Zinc	400
Phelps Dodge Corporation	Tyrone	Grant	Copper[b]	
United States Smelting Refining and Mining Company	Vanadium	Grant	Copper, lead, zinc	450
	Rare Metals			
Colonial Mica Corporation	Santa Fe	Santa Fe	Beryllium, columbium, lithium[c]	
Kennecott Copper Corporation	Hurley	Grant	Molybdenum	
Molybdenum Corporation of America	Questa	Taos	Molybdenum	50
	Nonmetals			
Colonial Mica Corporation	Santa Fe	Santa Fe	Mica[d]	
Continental Ore and Chemical Company	Silver City	Grant	Fluorspar	50
General Chemical Company	Deming	Luna	Fluorspar	75
P. L. Grattan	Deming	Luna	Fluorspar	75
International Minerals & Chemical Corporation	Gila	Grant	Fluorspar	350
International Minerals & Chemical Corporation	Carlsbad	Eddy	Potash	5,000[e]
Navajo Fluorspar Company	Grants	Valencia	Fluorspar[f]	200
Navajo Fluorspar Company	Los Lunas	Valencia	Fluorspar[g]	250
Phelps Dodge Corporation	Dawson	Colfax	Coal[h]	
Potash Company of America	Carlsbad	Eddy	Potash	5,000[e]
Pumice Corporation of America	Grants	Valencia	Pumice	50
Rocky Mountain Fluorspar Company	Albuquerque	Bernalillo	Fluorspar	25
J. K. Stanland	Las Cruces	Dona Ana	Fluorspar	25
St. Louis, Rocky Mountain & Pacific Company	Raton	Colfax	Coal[h]	
United States Potash Company	Carlsbad	Eddy	Potash	5,000[e]

a Kennecott Copper Corporation also operated throughout the war a copper. smelter and refinery at Hurley.
b Precipitating plant.
c Hand-sorting operation.
d Hand-rifting operation.
e Estimated capacity.
f Gravity mill.
g Flotation mill.
h Washing and treating plant.

TABLE 20. OIL REFINERIES[a]

Operator	Location	Refinery county	Capacity (bbls./day)
Aerex Company	Bloomfield	San Juan	100
Continental Oil Company	Artesia	Eddy	1,500
Continental Oil Company	Farmington	San Juan	750
Malco Refineries, Inc.[b]	Artesia	Eddy	3,500
McNutt Oil & Refining Company	Brickland	Dona Ana	1,500
New Mexico Asphalt & Refining Company	Artesia	Eddy	3,000
Petroleum Products Refining & Producing Company	Prewitt	McKinley	1,500
Valley Refining Company	Roswell	Chaves	2,500
Warren Petroleum Company	Monument	Lea	[c]

[a] From Year Book and Directory of the New Mexico Oil Conservation Commission, pp. 111-112, 1943.
[b] Refinery sold to Continental Oil Company, February, 1946.
[c] Refinery in conjunction with gasoline plant.

TABLE 21. GASOLINE PLANTS[a]

Operator	Plant Location	County	Production (gals./day)
El Paso Natural Gas Company	Jal	Lea	125,000
Loco Hills Pressure Maintenance Association, Inc.	Loco Hills	Eddy	1,000
Maljamar Cooperative Repressuring Agreement'	Maljamar	Lea	3,500
Phillips Petroleum Company	Buckeye	Lea	37,000
Phillips Petroleum Company	Eunice	Lea	100,000
Phillips Petroleum Company	Hobbs	Lea	40,000
Skelly Oil Company	Eunice	Lea	20,000
Warren Petroleum Corporation	Monument	Lea	15,000

aFrom Year Book and Directory of the New Mexico Oil Conservation Commission, p. 117, 1943.

TABLE 22. DRY-ICE PLANTS

Operator	Location	County
Ute Carbonic Company	Bueyeros	Harding
Witt Ice & Gas Company	Witt	Torrance

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Figures in *italic* indicate main references.

PUBLICATIONS

PUBLICATIONS OF THE MINERAL RESOURCES SURVEY

No.	*Title and Author*	*Date*	*Price*
1	The Mineral Resources of New Mexico; Fayette A. Jones	1915	Out of print
2	Manganese in New Mexico; E. H. Wells	1918	Out of print
3	Oil and Gas Possibilities of the Puertecito District, Socorro and Valencia Counties, New Mexico; E. H. Wells	1919	Out of print

PUBLICATIONS OF THE NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES

BULLETINS

No.	*Title and Author*	*Date*	*Price*
4	Fluorspar in New Mexico; W. D. Johnston, Jr. (Superseded by Bulletin 21)	1928	Out of print
5	Geologic Literature of New Mexico; T. P. Wootton (Superseded by Bulletin 22)	1930	Out of print
6	Mining and Mineral Laws of New Mexico; Charles H. Fowler (Superseded by Bulletin 16)	1930	Out of print
7	The Metal Resources of New Mexico and their Economic Features; S. G. Lasky and T. P. Wootton	1933	.50
8	The Ore Deposits of Socorro County, New Mexico; S. G. Lasky	1932	.60
9	The Oil and Gas Resources of New Mexico; Dean E. Winchester (First edition; superseded by Bulletin 18)	1933	Out of print
10	The Geology and Ore Deposits of Sierra County, New Mexico; G. Townsend Harley	1934	.60
11	The Geology of the Organ Mountains, with an Account of the Geology and Mineral Resources of Dona Ana County, New Mexico; Kingsley Charles Dunham	1935	1.00
12	The Non-Metallic Mineral Resources of New. Mexico and their Economic Features (Exclusive of Fuels); S. B. Talmage and T. P. Wootton	1936	.50
13	Geology and Economic Features of the Pegmatites of Taos and Rio Arriba Counties, New Mexico; Evan Just	1937	.50
14	Some New Mexico Fusulinidae; C. E. Needham	1937	.50
15	The Geology and Ore Deposits of Northeastern New Mexico (Exclusive of Colfax County) ; G. Townsend Harley	1940	.60
16	Mining, Oil, and Mineral Laws of New Mexico; C. H. Fowler and S. B.. Talmage (Supersedes Bulletin 6)	1941	.75
17	Pennsylvanian System in New Mexico; M. L. Thompson	1942	.50

BULLETINS (CONTINUED)

18	The Oil and Gas Resources of New Mexico; compiled by Robert L. Bates (Second edition; supersedes Bulletin 9)	1942	2.50
19	Manganiferous Iron-ore Deposits near Silver City, New Mexico; Lawson P. Entwistle	1944	.50
20	Stratigraphy of the Colorado Group, Upper Cretaceous, in Northern New Mexico; Charles H. Rankin	1944	Out of print
21	Fluorspar Resources of New Mexico; H. E. Rothrock, C. H. Johnson, and A. D. Hahn. (Supersedes Bulletin 4)	1946	2.50
22	Geologic Literature of New Mexico Through 1944; Robert L. Bates and Marian R. Burks (Supersedes Bulletin 6)	1945	.30
23	Stratigraphy and Oil-producing Zones of the Pre-San Andres Formations of Southeastern New Mexico—A Preliminary Report; Robert E. King	1945	.50
24	Building Blocks from Natural Lightweight Materials of New Mexico; Donn M. Clippinger	1946	.60
25	Mica Deposits of the Petaca District, Rio Arriba County, New Mexico, with Brief Descriptions of the Ojo Caliente District, Rio Arriba County, and the Elk Mountain District, San Miguel County; Richard H. Jahns	1946	2.00
26	Geology of the Gran Quivira Quadrangle, New Mexico; Robert L. Bates, Ralph H. Wilpolt, Archie J. MacAlpin, and Georges Vorbe	1947	.60
27	Contributions of New Mexico's Mineral Industry to World War II; compiled by T. D. Benjovsky	1947	.50

CIRCULARS

1	An Outline of the Mineral Resources of New Mexico; E. H. Wells	1930	Out of print
2	Geology and Ore Deposits of the Ground Hog Mine, Central District, Grant County, New Mexico; S. G. Lasky	1930	Out of print
3	First, Second, and Third Annual Reports of the Director, and Preliminary Report for the Fourth Year; E. H. Wells	1931	Out of print
4	The Hobbs Field and Other Oil and Gas Areas, Lea County, New Mexico; Dean E. Winchester	1931	Out of print
6	Gold Mining and Gold Deposits in New Mexico; E. H. Wells and T. P. Wootton, 1932; revised by T. P. Wootton	1940	No charge
6	Carbon Dioxide in New Mexico; E. H. Wells and A. Andreas (Superseded by Circular 9)	1938	Out of print
7	Outlook for Further Ore Discoveries in the Little Hatchet Mountains, New Mexico; S. G. Lasky	1940	Out of print
8	Selected Bibliography on Coal in New Mexico; Robert L. Bates	1943	No charge

CIRCULARS (CONTINUED)

9	Carbon Dioxide in New Mexico; Sterling B. Talmage and A. Andreas (Reprinted from Bulletin 18)	1942	No charge
10	Natural Light-weight Building-block Materials of New Mexico; T. D. Benjovsky and D. M. Clippinger	1945	No charge
11	Reconnaissance Survey of the Headstone Mining District, Rio Arriba County, New Mexico; T. D. Benjovsky	1945	No charge
12	Future Oil Possibilities of New Mexico; Robert L. Bates	1946	No charge
13	Compilation of State Tax Law Relating to Mineral Properties in New Mexico; E. P. Ripley	1946	No charge
14	Oil and Gas Production Data, Eddy County, New Mexico, 1943-1945; compiled by N. Raymond Lamb and W. B. Macey	1947	No charge

ANNUAL REPORT

1	For the Fiscal Year July 1, 1945 - June 30, 1946; E. C. Anderson	1946	No charge

OIL AND GAS MAP

	Oil and Gas Map of New Mexico; Dean E. Winchester, 1931; revised by Robert L. Bates to July, 1942. Scale about 16 miles to 1 inch. (This map is included in Bulletin 18.)	1942	$ .75

WELL LOGS

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BULLETINS

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859	Geology of the Santa Rita Mining Area, New Mexico; A. C. Spencer and Sidney Paige	1935	.40
860-A	The Coal Field from Gallup Eastward toward Mount Taylor; Julian D. Sears	1934	.35
860-B	The Mount Taylor Coal Field; Charles B. Hunt	1936	1.00
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*870	Geology and Ore Deposits of the Bayard Area, Central Mining District, New Mexico; Samuel G. Lasky	1936	.80
*885	Geology and Ore Deposits of the Lordsburg Mining District, Hidalgo County, New Mexico; Samuel G. Lasky	1938	1.25

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BULLETINS (CONTINUED)

922-C	Manganese Deposits in the Little Florida Mountains, Luna County, New Mexico—A Preliminary Report; S. G. Lasky	1940	.25
922-M	Tin Deposits of the Black Range, Catron and Sierra Counties, New Mexico; Carl Fries, Jr.	1940	.50
945-C	Beryllium and Tungsten Deposits of the Iron Mountain District, Sierra and Socorro Counties, New Mexico; R. H. Jahns	1944	1.25

PROFESSIONAL PAPER

*200	Geology and Ore Deposits of the Magdalena Mining District, New Mexico; G. F. Loughlin and A. H. Koschmann	1942	2.00

MAPS AND CHARTS

	Topographic map of New Mexico. Scale about 8 miles to 1 inch; contour interval 100 meters	1925	.75
	Geologic Map of New Mexico; N. H. Darton. Scale about 8 miles to 1 inch; contour interval 100 meters	1928	1.50
	A Reconnaissance and Elevation Map of Southeastern New Mexico; Walter B. Lang. Scale 4 miles to 1 inch	1943	1.50
	Maps Showing Thickness and General Character of the Cretaceous Deposits in the Western Interior of the United States; J. B. Reeside, Jr. Scale 225 miles to 1 inch. **Preliminary Map 10**, Oil and Gas Investigations	1944	.25
	Geologic Map and Stratigraphic Sections of Permian and Pennsylvanian. Rocks of Parts of San Miguel, Santa Fe, Sandoval, Bernalillo, Torrance, and Valencia Counties, North Central New Mexico; C. B. Read and others. Scale 3 miles to 1 inch. **Preliminary Map 21**, Oil and Gas Investigations	1944	.60
	Stratigraphic Distribution of the Pennsylvanian Fusulinidae in a Part of the Sierra Nacimiento of Sandoval and Rio Arriba Counties, New Mexico; Lloyd G. Henbest and others. **Preliminary Chart 2**, Oil and Gas Investigations	1944	.25
	Correlation of Basal Permian and Older Rocks in Southwestern Colorado, Northwestern New Mexico, Northeastern Arizona, and Southeastern Utah; N. W. Bass. **Preliminary Chart 7**, Oil and Gas Investigations	1944	.40
	Map of Eddy and Lea Counties, Showing Oil and Gas Fields by Colors. Scale about $5\frac{1}{2}$ miles to 1 inch	1945	No charge
	Geology and Asphalt Deposits of North-central Guadalupe County, New Mexico; Joseph M. Gorman and Raymond C. Robeck. Scale 1 mile to 1 inch. **Preliminary Map 44**, Oil and Gas Investigations	1946	.60

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MAPS AND CHARTS (CONTINUED)

Lucero Uplift, Valencia, Socorro, and Bernalillo Counties, New Mexico; V. C. Kelley and G. H. Wood. Scale 3 miles to 1 inch. **Preliminary Map 47,** Oil and Gas Investigations	1946	.60
Stratigraphic Relations of Eocene, Paleocene, and Latest Cretaceous Formations of Eastern Side of San Juan Basin, New Mexico; C. H. Dane. **Preliminary Chart 24,** Oil and Gas Investigations	1946	.35
Geologic Maps of a Part of the Las Vegas Basin and of the Foothills of the Sangre de Cristo Mountains, San Miguel and Mora Counties, New Mexico; S. A. Northrop, H. H. Sullwold, Jr., A. J. MacAlpin, and C. P. Rogers, Jr. Scales, 2/3 mile to 1 inch and 4 miles to 1 inch. **Preliminary Map 54,** Oil and Gas Investigations	1946	.60
Geology of Nacimiento Mountains, San Pedro Mountain, and Adjacent Plateaus in Parts of Sandoval and Rio Arriba Counties, New Mexico; S. A. Northrop and G. H. Wood. Scale 1⅝ miles to 1 inch. **Preliminary Map 57,** Oil and Gas Investigations	1946	.60
*Geologic Map and Stratigraphic Sections of Paleozoic Rocks of Joyita Hills, Los Pinos Mountains, and Northern Chupadera Mesa, Valencia, Torrance, and Socorro Counties, New Mexico; R. H. Wilpolt, A. J. MacAlpin, R. L. Bates, and Georges Vorbe. Scale 1 mile to 1 inch. **Preliminary Map 61**, Oil and Gas Investigations	1946	.65
Topographic maps of approximately 80 quadrangles in New Mexico and adjacent parts of Arizona and Texas. Scales range from 1,000 feet to 1 inch, to 4 miles to 1 inch		.20 each

PUBLICATIONS OF THE UNIVERSITY OF NEW MEXICO, FOR SALE BY THE NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES

BULLETIN

Title and Author	*Date*	*Price*
Minerals of New Mexico; Stuart A. Northrop	1942	3.00

MAP

Mining Districts of New Mexico; Stuart A. Northrop. Scale, 20 miles to 1 inch. (This map is included in the above bulletin.)	1942	.75

PUBLICATION OF THE STATE INSPECTOR OF MINES, FOR SALE BY THE NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES

Title	*Date*	*Price*
Mining Laws of New Mexico	1946	.25.

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