REPORT OF INVESTIGATIONS

INVESTIGATION OF CAPITAN IRON DEPOSITS
LINCOLN COUNTY, N. MEX.
SUPPLEMENT TO R. I. 4022

BY

JOHN H. SOULE
A Century of Conservation
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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

INVESTIGATION OF CAPITAN IRON DEPOSITS, LINCOLN COUNTY, N. MEX.¹

Supplement to R. I. 4022

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INTRODUCTION AND SUMMARY

Although known since 1902, the Capitan iron deposits have not been mined, mainly because of the low grade of the ore. Only a small amount of exploratory work has been done since the discovery. C. H. Johnson, district engineer of the Bureau of Mines in New Mexico in 1942-45, visited the property; as a result,

¹/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is made: "Reprinted from Bureau of Mines Report of Investigations 4514."

²/ Mining engineer, Bureau of Mines.
preliminary sampling of the property was done in 1943.\textsuperscript{3} Owing to the results of this preliminary work, an extensive development program by wagon drilling was planned and executed early in 1944.\textsuperscript{4} Equipment available at that time was limited in the depths that could be reached; and, as geologic studies indicated the possibility that other limestone beds below the surface might have been replaced by iron minerals, a supplementary development program by churn drilling to reach greater depths was prosecuted in late 1947 and early 1948, with the author as project engineer.

The following sections note the location and accessibility of the deposits and mention the physical features, climate, labor and living conditions. Property and ownership are outlined, the history and production of the property stated briefly, and the ore deposits are described. The work done by the Bureau of Mines is explained and supported with maps, sections, and assay logs.

From March 1, 1944, to June 1, 1944, 179 wagon-drill holes totaling 3,490 feet and 4 test pits totaling 75 feet were completed, and from November 1947 to February 1948 seven churn-drill holes totaling 2,488 feet were drilled and sampled. Metallurgical tests are summarized and referenced.

ACKNOWLEDGMENTS

With respect to this report, special acknowledgment is due to J. H. Hedges, chief, Tuscan, Ariz., Branch, Mining Division, and to W. R. Storms, engineer-in-charge of the Silver City, N. Mex., field office. Acknowledgment also is due to J. Bruce Clemmer, chief, Tuscan Branch, Metallurgical Division, for analyses done in the last phase of this project, and to Dr. Vincent Kelley of the Federal Geological Survey for his cooperation during this work.

LOCATION AND ACCESSIBILITY

The Capitan iron deposits are in secs. 10, 11, 13, 14, and 15, T. 8 S., R. 14 E., central Lincoln County, N. Mex., as shown on figures 1 and 2. The only known large deposit upon which the Bureau did development work lies around the common corner of secs. 10, 11, 14, and 15, as shown in figures 2 and 3, and just southwest of and in the foothills of the Capitan Mountains. This range of mountains trends east and west. The elevation of the highest peak is 10,205 feet.

The deposits are reached by traveling on State Highway 43 from Capitan north for 4 miles, to a point just inside the Lincoln National Forest fence and thence east over a poor dirt road for 1.2 miles. Just over a small wooden bridge, the left-fork is taken, and the poor road is followed to the deposits, a further distance of 1.1 miles (see fig. 1). This road follows the fence to and through the Davis ranch. All the roads from Capitan to the deposits are dirt roads but are impassable only for short periods during and after heavy rain or snow.

\textsuperscript{3} M. J. Sheridan, mining engineer.

Figure 2. - Claim map.
Figure 3. - Isometric plan of drilling.
Capitan, 6.3 miles to the south, and Carrizoza, 20 miles west of Capitan over a good paved road (U. S. Highway 380), are the nearest supply points. Only minor supplies can be obtained at either place. Major supplies can be obtained at El Paso, Tex., 178 miles southwest.

Carrizoza is the nearest railroad point and is on the main line of the El Paso-Tucumcari branch of the Southern Pacific Railroad. Telephone and telegraph facilities are available in Capitan.

**PHYSICAL FEATURES AND CLIMATE**

The deposits are in a region of gentle topography at altitudes between 6,800 and 7,000 feet. There are no permanent streams in the area, and all water needed must be hauled or piped in. Some water was found in churn-drill hole 7, but the quantity is unknown. Near-surface water at Capitan is full of mineral and not desirable for drinking purposes. Most drinking water at Capitan is rainwater collected in cisterns or water hauled from a spring west of the town.

No electric power is available closer than Capitan, and the small plant there could furnish but a small part of the requirements for a mining or concentrating plant. Coal has been mined at Capitan; and, although it is reported to be of good quality, the seams are narrow. All of the old mines are caved, entry into them is impossible, and they must be rehabilitated completely before any coal can be produced. The cheapest fuel would be oil from the fields about 100 miles east of Capitan. Gas also is available at these east New Mexico fields, but no pipeline passes within reasonable distance of Capitan.

Annual precipitation is about 15 inches, mostly in the form of summer thundershowers and winter snows. Snowfall is seldom extreme and remains on the ground only a few days at a time. Operations will be hampered little by adverse weather.

Vegetation consists of pinon pine and juniper interspersed with scrub oak. Ponderosa pine is available within a few miles of the deposits. There are two small logging operations and saw mills a few miles north of the deposits (in 1948).

**LABOR AND LIVING CONDITIONS**

Skilled mining labor is unavailable in the district and unskilled labor is not plentiful. The prevailing daily wage for unskilled labor was about $8 in 1948. There are no active mining districts nearby, although a few small intermittent operations occur occasionally.

**PROPERTY AND OWNERSHIP**

The iron-ore deposits are covered by claims as shown on figure 2 and are owned by two groups of owners. Four patented claims, Pittsburgh Iron Lode (Survey 1442), Pittsburgh Iron Lode No. 1 (Survey 1443), Great Eastern Iron Lode (Survey 1441), and the Greenville Iron Lode (Survey 1440) are owned by the Southwestern Ore Co. of Los Angeles, Calif., a subsidiary of the Union Oil Co. The surveyed but unpatented Grace Nos. 3, 4, 5, 7, 8, 9, 10, 11, 12, and 3049
13 claims (Surveys 1951, 1952, and 1953) were owned in 1943 by Gordon Wells and his sister, Mrs. Frances A. Hunt, of Roswell, N. Mex. Soon after that date Wells died, and in 1947 Mrs. Hunt relocated the Grace Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. The ore body developed by the Bureau of Mines lies in the Pittsburgh Iron Lode, Pittsburgh Iron Lode No. 1, Grace No. 4, and Grace No. 5 claims.

HISTORY AND PRODUCTION

Interest in the Capitan iron deposits was manifest in 1902, when the first four claims were located. These four claims were patented in 1911. The other claims were located in 1919 and were surveyed for, but not patented, in 1926. Other than a small amount of exploratory work, no progressive development has occurred, and no production has resulted.

Preliminary sampling and mapping by the Bureau of Mines and the Federal Geological Survey were begun in June 1943. Because of results of this work, a development program was conducted by the Bureau of Mines during March, April, and May 1944. Additional mapping was done by the Federal Geological Survey at that time. Churn drilling was done by the Bureau of Mines in late 1947 and early 1948 to test depths it was impossible to reach with previous equipment (see fig. 3).

No development has been done on this property other than a few test pits, and equipment of any kind for mining must be imported.

ORE DEPOSITS

Of several known ore deposits in this area, only one was large enough to warrant the development work done by the Bureau.

This deposit is fairly flat and tabular, roughly annular in plan, with iron ore in the center connecting to the annulus on the east side. This is shown on figure 4. Erosion probably caused the break in the ring on the southwest. The diameter of the ring averages about 1,400 feet, and the width averages about 150 feet. The average thickness of the indicated ore is 16.5 feet, with thicknesses to 45 feet in the southern part of the ring. The deposit has a very gentle dip southwest. This attitude of the ore body lends itself to cheap, easy mining.

The other deposits noted were all small and can contribute but little to the ore reserves.

The ores are typically contact metamorphic and are similar to other such ores in Lincoln County. A large, intrusive igneous mass of aplite underlies the deposit at depths of 200 to 300 feet, with smaller sills of similar material above it. The ores are replacement of a certain member or members of the limestone of the Chupadera (Permian) formation. The iron ores often butt sharply into or overlap marbleized or unaltered limestone on the outer perimeter of the ring. The center of the ore ring consists chiefly of silicated sedimentaries of the same series. These silicated sedimentaries consist chiefly of epidote, tremolite, chlorite, calcite, a mica, and minor fluorite. Magnetite
Figure 4. - Isometric sections of ore body.
Figure 5. - Assay logs, Grace claims.
Figure 6. - Assay logs No. 1, Pittsburg claims.
Figure 7. - Assay logs No. 2, Pittsburg claims.
Figure 8. - Rock and assay logs, churn drill holes.
is often present in the silicated areas, and the ore of the ring frequently grades insensibly into them. Only a few small silicated areas were noted outside of the ring. Much disseminated magnetite occurs in the limestone in the southern portion of the ore body, and this low-grade material constitutes the bulk of the overburden in that area.

Magnetite is the chief iron mineral, with subordinate amounts of hematite and traces of limonite. The magnetite occurs massive, although in most places it is porous and broken and lightly cemented. Some of the highest-grade ore is sandy in character and light-colored in appearance. This light coloration probably is due to a thin coating of calcite over the magnetite grains. This characteristic made visual inspection of the ores difficult at times.

The broken nature of a large part of the ore body will tend to indicate low mining costs, as much of the ore can be mined readily with little preliminary drilling and blasting.

WORK BY THE BUREAU OF MINES

The first development work by the Bureau was begun March 1, 1944, and completed June 1, 1944. It consisted of 179 wagon-drill holes totaling 3,490 feet and 4 test pits totaling 75 feet to verify the results obtained by wagon drilling. The results of this work are described in Bureau of Mines Report of Investigations 4022, cited in footnote 4. The assay results of this work are shown in figures 5, 6 and 7. (The word "composite" or abbreviation "comps." shown on figures 5, 6, and 7 denotes assay composite of samples indicated and not calculated average unless noted as such).

As the above-described wagon drilling was limited in the depths that could be drilled, and geologic studies indicated the possibility that there might be other lower beds of limestone replaced by iron ore, a second phase or churn-drilling program of development was begun in November 1947 and completed in February 1948. Seven holes were drilled for a total of 2,488 feet. (See figs. 3, 4, and 8 for the results of this work.)

Sampling was done by catching the sludge bailed from the hole and passing it through a sample splitter. The desired portion, if too large, was again passed through the splitter and the sample dried, weighed and analyzed, when thought necessary. A sample from every drilled interval was washed, examined and logged. A total of 496 samples were taken during this second phase of the work and 59 of these were analyzed.

METALLURGICAL TESTS

Two composite samples were submitted to the Bureau of Mines laboratories at Rolla, Mo., and the results of this testing are described in Report of Investigations 4022. A brief summary of the metallurgical tests shows that the Capitan ore is readily amenable to concentration by magnetic methods with recoveries of better than 88 percent of the iron ore in a concentrate containing more than 62 percent iron.