

UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

BUREAU OF MINES

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War Minerals Report 46

BRETZ MINE, MALHEUR COUNTY, OREG.
CORDERO MINE, HUMBOLDT COUNTY, NEV.

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Since production began in August 1941, ore from the Cordero mine has contained 3 to 12 pounds of mercury per ton, averaging about 7 pounds; in 1941 and 1942 ore from the Bretz averaged about 4 pounds a ton.

Production from the Cordero recently has been at the rate of 250 to 300 flasks a month; at the Bretz an output of about 90 flasks a month has been maintained. The Cordero has operated continuously since August 1941 and has produced an approximate total of 2,100 flasks; the Bretz, operating intermittently since 1931, has produced about 11,500 flasks.

At both properties it has been difficult to keep exploration and development far enough ahead of mining to maintain production at the current rate. This difficulty is due partly to shortage of labor and partly to insufficient understanding of the geological conditions that controlled the deposition of the ore.

INTRODUCTION

The Bretz mine was first visited by an engineer from the Bureau of Mines¹ in October 1941. Samples from the sides of abandoned open-cuts indicated the probability that considerable low-grade ore remained. The sides of all of the pits, as well as many of the waste dumps, were sampled during the winter and spring of 1942. Results indicated 91,725 tons of 1.4-pound ore in place and 72,438 tons of 1.6-pound ore in the waste dump.

The Cordero mine was visited in January 1942. After the company's maps had been examined, the surface and underground workings were inspected in company with D. Ford McCormick, the resident manager. It was not necessary for the Bureau to sample the ore, as all of the workings had

¹ M. Clair Smith, mining engineer.

been sampled and mapped by the company. It was therefore decided that surface exploration of the property by trenching was the greatest immediate need.

A geophysical survey of the Cordero deposits was made during August and September 1942 by Edgar L. Stephenson of the Federal Geological Survey. When the results of this survey are made known, it may prove advisable to modify the original trenching program.

HISTORY

The Cordero and Bretz mines are relatively recent discoveries. Most of the Cordero claims were located by Basque sheep herders during the past 10 to 15 years. The discoveries probably were made in dry washes where subsurface formations were exposed. Certain surface and underground developing was done by the Bradley Mining Co. of San Francisco. Later, the property was acquired by the Sun Oil Co., Portland, Oreg. Development was extended, and in the summer of 1941 a Nichols-Herreshoff plant was built. This went into operation in August 1941, and has since been operating continuously.

The Bretz mine was discovered by W. S. Bretz of Portland, Oreg., in 1917. Except for assessment work, very little was done on the property until 1931, when it was acquired by the Bradley Mining Co. It operated intermittently from 1931 to 1936 and continuously from 1940 to date.

OWNERSHIP

Most of the Cordero claims are held by location by a number of stockmen and sheepherders who live in McDermitt and Winnemucca. The Sun Oil Co., S. H. Williston, president, 909 Studio Building, Portland, Oreg., holds leases on all of the claims.

The Bretz mine is owned by W. S. and T. H. Bretz of Portland, Oreg. It is leased to the Bradley Mining Co., Crocker National Bank Building, San Francisco, Calif.

PHYSICAL FEATURES

All of Humboldt County lies in the arid and semi-arid basin between the Sierra Nevadas on the west and the Rocky Mountains on the east. Precipitation in the vicinity of McDermitt, however, is probably slightly greater than in the areas farther south. Most of it occurs in midwinter, when snow lies on the ground for many weeks.

Vegetation consists almost entirely of sagebrush and other typical desert varieties.

The Bretz mine is at an altitude of about 5,000 feet, 500 to 700 feet above the Quinn River valley. Snowfall, therefore, is slightly greater than at McDermitt.

McDermitt is on U. S. Route 95. Winnemucca, the nearest railroad point, is 71 miles south of McDermitt at the junction of U. S. Routes 40 and 95. Main lines of the Western Pacific and Southern Pacific Railroads pass through Winnemucca. Motor transport for express and freight is available between Winnemucca and McDermitt. The Cordero mine is served by a partly graveled road running southwest from McDermitt. The Bretz mine is served by a fairly good unsurfaced road running northeast from McDermitt. The ore is hauled over a similar road from the mine to the Opalite plant, about 10 miles to the west.

Water for the Cordero mine comes from wells about 2,500 feet north-east of the mine, from which it is pumped to a tank at a central point near the mine. Water from this tank will be made available to the Bureau for

diamond drilling; it can be piped or hauled to the various drilling stations. Very little, if any, pumping will be necessary, and if the water has to be hauled by truck, the longest haul will probably be less than three quarters of a mile, with few or no steep grades.

No dependable supply of water is available in the immediate vicinity of the Bretz mine. A small stream flows through some of the open-cut workings during the rainy seasons, but usually disappears during prolonged dry spells. Cottonwood Creek, about 4 miles west of the mine, is the nearest permanent stream.

THE DEPOSITS²

The Cordero deposits lie at an elevation of about 4,500 feet on the north slope and near the foot of a low range of hills in the Quinn River valley. The area in the immediate vicinity is relatively flat, with a gradual slope to the northeast. The monotonous contour of the ground is broken in only a few places where freshets from the hills to the southeast have cut through the top soil and into the underlying formations.

Cinnabar is distributed sporadically over a northeast-trending area about 1,000 feet wide and 4,500 feet long. The only natural rock exposures in this area are small knobs of chalcedony locally known as 'opalite.' All of these outcrops are surrounded by an alluvial mantle in most places 5 to 10 feet thick. The ore bodies are in partly silicified clays and tuffs, which overlie rhyolitic breccias. The beds dip steeply to the northwest and are broken by minor faults that trend from north to northeast. The tuffs have been silicified in places to form bodies of chalcedony. Cinnabar occurs in the chalcedony and also in unaltered clays and tuffs. The ore bodies are of

² Abstracted, with additions, from Federal Geological Survey Bull. 931 N by R. G. Yates, and from unpublished reports by E. H. Bailey, of that Survey.

two kinds - small, high-grade, veinlike bodies in or below fault zones, and larger but lower-grade tabular masses of mineralized chalcedony. There are two principal zones of mineralization - one at the southwestern end of the property and the other at the northeastern end. So far as known, profitable ore does not extend deeper than 85 feet, but further exploration might prove ore at greater depths.

Parts of the chalcedony or 'opalite' bodies consist of a breccia of hard fragments of chalcedony cemented with soft, claylike material. This material holds up well in underground workings without timbering. Caving and considerable loss of water must be expected if the ground is to be diamond drilled, and great precautions will have to be taken to obtain good core recovery.

The Bretz deposits lie in an area of low, rounded hills at an elevation of about 5,000 feet. The overburden, which ranges in depth from 4 to 8 feet or more on the hills, has been almost completely removed by erosion from a few places in the gulches. This explains why most of the prospecting and nearly all of the discoveries have been made in or near gulches.

There are two chief kinds of rocks in the vicinity of the Bretz mine - volcanic rocks composed of tuff, breccia, and agglomerate with relatively few flows, and lake sediments. The latter rocks, which are somewhat younger than the volcanic rocks, are largely well-bedded shales and range from white to nearly black in color, but they also include some light-colored sandstone and a little conglomerate. The volcanic rocks and lake beds dip toward the south at low angles and are disturbed by several east-trending faults or fracture zones that dip south and have acted as conduits for mineralizing solutions.

Some cinnabar occurs in silicified tuffs and other volcanic rocks, but most of the ore mined came from soft lake beds south of the main belt of silicified volcanic rocks. The ore occurs in two separate zones - one near the western end and one toward the eastern end of the property.

Ore bodies that have been developed and mined ranged in width from 20 to 50 feet and in length from 100 to over 300 feet. Ore of profitable grade (about 4 pounds of mercury per ton) persists to depths of 75 to 100 feet. Substantial amounts of ore carrying 1 to 1.5 pound of mercury per ton were left in the bottoms and along the sides of the open cuts.

DEVELOPMENT, MINING METHODS, PLANTS

Several of the Cordero ore bodies, ranging in width from 15 to 30 feet and in length from 100 to 400 feet, have been partly developed and mined. The outcrops are located and delimited by removing the overburden with a bulldozer and by drilling lines of shallow holes across the strike. This is followed by sinking vertical shafts 80 to 100 feet deep. From these shafts, drifts are run along the strike of the deposits at vertical intervals of 50 to 100 feet.

Power shovels mine the ore from open cuts to a depth of about 60 feet. At greater depths, considerable waste will have to be removed, or underground methods will have to be applied.

The Cordero plant consists of crushing and conveying equipment, bins for coarse and fine ore, a 12-burner Nichols-Herreshoff furnace, and condensing equipment. Temperatures and pressures in every part of the plant are regulated from an instrument and control room near the superintendent's office. Production costs are low because of almost complete mechanization

of mining and high plant efficiency. Ore running as low as 2 pounds mercury a ton could probably be mined and treated at a slight profit if plant capacity could be expanded to 150 to 200 tons a day.

At the Bretz mine the ore is loaded by power shovels from open cuts and hauled by trucks to a stock pile several hundred feet away. From the stock pile it is handled several times through a raise and an adit and is then dumped into storage bins. From these it is drawn into trucks and hauled about 10 miles to the reduction plant at the Opalite mine. Here it is again handled and rehandled several times before it finds its way into the crusher bins. All of this handling and rehandling, plus a 10-mile truck haul on contract at \$1.20 per ton, adds greatly to the cost of production. A plant at the mine and equipped to eliminate as much handling as possible would probably reduce costs to such extent that 2- to 2.5-pound ore could be mined and treated at a profit.

PROPOSED EXPLORATION BY BUREAU OF MINES

Exploration on the Cordero property will comprise large-scale trenching with a bulldozer. Sampling will be limited to excavations and openings made by the Bureau, as all underground and surface openings have been sampled thoroughly by the Company and the results are available.

Trenching will consist of 5 trenches totaling 4,500 lineal feet in length across the strike of the ore-bearing zone. Top soil is 2 to 6 feet deep in most places; in isolated spots it may be deeper. If its results justify, trenching will be followed by churn or diamond drilling; some drilling probably can be planned immediately. A drilling program will be adopted as soon as locations for holes can be determined.

For the Bretz mine, only bulldozer trenching with sampling will be adopted at first.³ Five proposed trenches, a total of 2,000 lineal feet, will

³ Maps showing the location of the trenches with respect to present mine workings are on file in the Washington and Salt Lake City offices of the Bureau of Mines and may be consulted by authorized persons.

cut across both of the ore-bearing structures and the intervening area; when the first trench is completed it may prove necessary to trench only the ore-bearing structures.

The above-described work probably can be done at the following cost:

Diamond or churn drilling, 1,200 feet @ \$5	\$6,000
Rental of 1 bulldozer tractor, R. D. No. 7 or 8, or equivalent, 240 hours at \$8	1,920
Labor and supervision, 2 months	<u>3,180</u>
	11,100
Equipment:	
1 1-1/2 ton truck	1,000
Small tools	<u>150</u>
	1,150
	<u>12,250</u>

CONCLUSIONS

Ore reserves that may be developed by the foregoing program will depend almost entirely upon the finding of new deposits. Most known ore bodies are approaching exhaustion.

The Cordero property has been in production about 12 months, during which time about 2,100 flasks of mercury has been produced from less than one-fourth the known potential producing area. It may be presumed, however, that the most productive part of this area has been exploited. The ore reserves, therefore, that remain in the unexplored part of the area cannot be expected to maintain the same ratio to the total area.

The Bretz mine has been operated intermittently since 1931. Total production to date is about 11,500 flasks. About half of the potential producing area remains unexplored and offers reasonable promise of additional ore bodies.

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