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UNITED STATES DEPARTMENT OF THE INTERIOR  
Harold L. Ickes, Secretary

BUREAU OF MINES  
R. R. Sayers, Director

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War Minerals Report 69

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PROPERTY OF  
STATE DEPT OF GEOLOGY &  
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SOURDOUGH MINE  
CURRY COUNTY, OREG.

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Chromium

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WASHINGTON: 1943

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WAR MINERALS REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

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W.M.R. 69 - Chromium

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SOURDOUGH MINE

Curry County, Oreg.

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SUMMARY

The Sourdough mine has opened one of the largest chromium deposits in southwestern Oregon. A small amount of development and exploration work has been done on the property during the past several years, but no ore has been extracted since 1918. Eighty to ninety percent of the original reserves, or 30,000 tons, remains intact. Further development and exploration may reveal a greater tonnage.

The ore consists of relatively high-grade chromite banded or disseminated in dunite or its altered equivalent. Some ore can be sorted for direct shipping. Chromite concentrates containing more than 50 percent  $\text{Cr}_2\text{O}_3$  have been made. The average grade of the ore as mined probably would assay 15 to 20 percent  $\text{Cr}_2\text{O}_3$ . Concentrates containing 40 percent or more  $\text{Cr}_2\text{O}_3$  can be produced with a chromium-iron ratio of about 3 to 1.

The Bureau of Mines plans to undertake diamond-drilling and trenching operations to develop ore reserves of chromite to meet the need of increased demand created by the war.

## INTRODUCTION

The Sourdough mine was examined in June 1942 by an engineer<sup>1</sup> of the Bureau of Mines accompanied by a foreman of the Rustless Mining Corporation, which owns the property.

This mine and others in the vicinity were examined in 1939 by geologists<sup>2</sup> of the Federal Geological Survey. Their findings have been published in Geological Survey Bulletin 922-P.

## HISTORY

The deposits were worked to a limited extent in 1917 and 1918. The ore was mined partly from open cuts and partly from shallow underground workings. Old caved workings indicate that square setting may have been done. Production records are not available.

## PHYSICAL FEATURES AND COMMUNICATION

The mine is in the Klamath Mountains and is accessible by an unsurfaced mountain road extending about 9 miles southwest from O'Brien. This road is kept in good condition by the Forest Service in summer and fall. Some of the high passes are likely to be blocked by snow for short periods in midwinter. The low-water bridge over one of the creeks, about 2 miles from the mine, is flooded and impassable for 1 to 2 months during the spring run-off. By the expenditure of a small amount of time and effort for repairs and maintenance work, the road could be made an all-season thoroughfare.

O'Brien is on U. S. Route No. 199; Grants Pass, located about 40 miles northeast of the property, is the nearest railroad point and is on the main line of the Southern Pacific Railroad.

The climate of southwestern Oregon is characterized by heavy precipitation, most of which occurs during winter and spring. No definite information is available on snowfall, but it is probable that snow storms are

<sup>1</sup> O. H. Metzger, senior mining engineer.

<sup>2</sup> F. G. Wells, geologist; L. R. Page and H. L. James, assistant geologists.

frequent during December, January, and February. The most favorable period for operating is from June to October, inclusive.

The entire region is covered by a dense growth of large timber and brush. Timber for all purposes is available at the mine.

A limited water supply may be obtained from a spring at the mine camp, the flow of which is probably sufficient to run one diamond drill, even during the dry season in July, August, and September. The water would have to be piped or hauled to the diamond-drill sites, however. The most remote of these sites is half to three-fourths of a mile laterally and about 400 feet vertically above the spring. In event of failure of this supply, water would have to be hauled from Bald Face Creek, 2 miles by road to the southwest and 1,000 feet vertically below the deposits.

#### PROPERTY OF THE RUSTLESS MINING CORPORATION

The deposits are covered by several mining claims owned by the Rustless Mining Corporation. Equipment consists of a portable air compressor, several rock drills, and some miscellaneous mining equipment. A boarding house and sleeping quarters for about 15 men constitute the only building improvements.

#### DESCRIPTION OF DEPOSITS

The deposits lie on the steep west slope of Bald Face Canyon about 2,000 feet above sea level.

The geology of the district is described by Wells, Page, and James in Geological Survey Bulletin 922-P.

Peridotite cut by diorite dikes is the country rock of the deposits. It consists of two types, saxonite and dunite, both of which are partly serpentinized. The chromite deposits are restricted to the dunite bodies, which occur as layers and irregular masses gradational into saxonite.

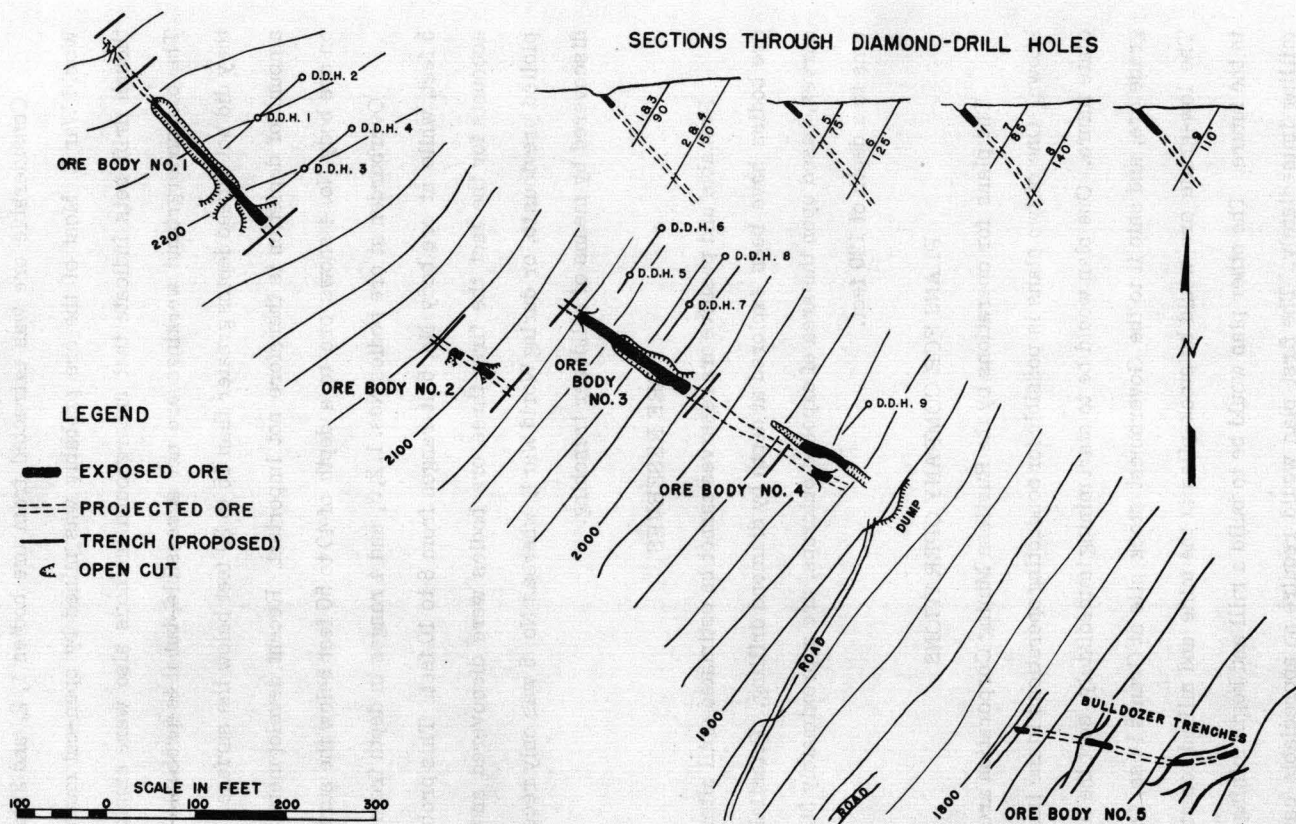
Outcrops of tabular-shaped ore bodies occur in a zone 150 to 200 feet wide and 3,000 to 4,000 feet long. The strike of the ore bodies (N. 45° W. to N. 65° W.) is roughly the same as the strike of the zone; the dip is 35° to 55° to the northeast. Ore bodies of commercial importance occur along the northwest or upper end of the zone for a distance of about 1,500 feet along the strike.

Five ore bodies, ranging in length from 60 feet to 200 feet and in width from 2-1/2 to 8 feet, are exposed or partly exposed by old and recent workings. They are designated on the map (fig. 1) as 'ore body No. 1' to 'ore body No. 5,' inclusive.

#### THE ORE

The ore consists of relatively high-chromium chromite in dunite and its altered equivalent, and is both banded and disseminated. Selected samples assay as high as 40 percent  $\text{Cr}_2\text{O}_3$ , and some ore can be sorted and shipped direct. Most of the material, however, must be concentrated to make a usable product. Analyses of concentrates made by Rustless Mining Corporation and quoted on page 470 of Bulletin 922-P indicate that the cleaned chromite contains more than 50 percent  $\text{Cr}_2\text{O}_3$  with a Cr/Fe ratio of about 3 to 1. The grade, indicated by nine samples, ranges from 11.5 to 40.6 percent  $\text{Cr}_2\text{O}_3$  and averages 21.53 percent. Locations, widths, and assays of all samples are shown below:

<u>Sample No.</u>	<u>Ore body</u>	<u>Width, ft.</u>	<u><math>\text{Cr}_2\text{O}_3</math>, percent</u>
11	No. 4, drift	1.0	40.61
14	No. 3, open cut	7.0	28.33
15	No. 3, open cut	5.0	11.54
16	No. 1, open cut	2.5	20.49
18	No. 1, open cut	7.0	20.73
19	No. 1, open cut	6.0	18.50
20	No. 3, open cut	2.5	13.98
21	No. 5, open cut	2.5	35.65
22	No. 5, open cut	3.5	23.03



## MINE WORKINGS

Considerable ore was extracted from ore bodies 1, 2, and 3 during World War I. Most of the ore probably was mined by open-cut methods, though drift sets indicate that underground methods also were employed. The old underground workings are not accessible, but it is probable that they did not exceed depths greater than 15 to 20 feet below the surface. The amount of depletion is therefore not important. Recent development work on ore body No. 4 shows ore to a depth of 40 to 50 feet below the surface.

Overburden at ore bodies Nos. 1, 2, 3, and 4 ranges in depth from 3 to 5 feet, while at ore body No. 5 it ranges from 8 to 10 feet. This probably accounts for the fact the first three ore bodies were discovered and exploited previous to, or during World War I, whereas No. 5 was only recently discovered by means of bulldozer trenching.

## ORE RESERVES

Probable and positive ore reserves cannot be estimated until after the ore bodies have been explored at depth by diamond drilling. Potential reserves, based upon the area of exposed outcrops, are approximately 30,000 tons to a depth of 120 feet.

## PLANS FOR COMPANY OPERATIONS

The plans for operations by the Rustless Mining Corporation are not known. One of two plans is possible for conducting operations in the immediate future. One plan would be to start mining immediately, sort the high-grade ore, and ship it to the Government stock pile at Grants Pass, Oreg. The low-grade ore would be stock-piled at the mine and milled sometime in the future. The other plan would be to build a mill and begin mining and milling immediately. The first plan would require no appreciable capital



expenditure, as the company has enough equipment on the ground to begin extracting ore. The second plan would require a capital expenditure of \$150,000 to \$200,000, provided diamond drilling indicated adequate reserves.

#### PROPOSED WORK BY BUREAU OF MINES

Considerable trenching should be done to show whether the ore bodies extend beyond their present known limits. Eight proposed trenches are shown on the map (fig. 1); others may be found necessary as the work progresses. Most of this work can be done by hand methods as the overburden is not very deep. If a bulldozer is available, however, it should be used.

According to data available, ore bodies Nos. 1, 3, and 4 are the only ones large enough to justify exploration at depth by diamond drilling. Figure 1 shows the locations and inclination of nine proposed diamond-drill holes, four for ore body No. 1, four for ore body No. 3 and one for ore body No. 4. The following tabulation shows the location, length, inclination and estimated depth at which each hole will pierce the ore bodies.

Hole No.	Length, feet	Inclination, degrees	Estimated depth, feet
1	90	60	60
2	150	60	120
3	90	60	60
4	125	60	120
5	75	60	60
6	125	60	120
7	85	60	60
8	140	60	120
9	110	60	<sup>1</sup> 50
10	100	--	--
11	<u>100</u>	--	--
	1,190		

<sup>1</sup> From floor of drift.

Estimated cost of drilling, based upon a time requirement of 4 months with one machine, are as follows:

Diamond drilling (1,190 ft. at \$5.25) . . . . .	\$6,247.50
Labor . . . . .	3,840.00
Supervision . . . . .	2,000.00
Equipment . . . . .	125.00
Miscellaneous . . . . .	<u>700.00</u>
	12,912.50

### CONCLUSIONS

Geological conditions at the Sourdough property indicate that extensions of known ore bodies might be developed. The Bureau of Mines, in cooperation with the Geological Survey, plans to explore by diamond drilling and trenching at an estimated cost of \$12,912.50. The results of exploration will determine if the capital expenditure required to build a concentrating plant would be justified.

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