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

BUREAU OF MINES
R. R. Sayers, Director

War Minerals Report 177

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WAR EAGLE MINE

JACKSON COUNTY, OREG.

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Mercury

WASHINGTON: 1943

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The War Minerals Reports of the Bureau of Mines are issued by the United States Department of the Interior to give official expression to the conclusions reached on various investigations relating to domestic minerals. These reports are based upon the field work of the Bureau of Mines and upon data made available to the Department from other sources. The primary purpose of these reports is to provide essential information to the war agencies of the United States Government and to assist owners and operators of mining properties in the production of minerals vital to the prosecution of the war.

WAR MINERALS REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

W.M.R. 177 — Mercury May 1943

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WAR EAGLE MINE

Jackson County, Oreg.

SUMMARY

The War Eagle mercury mine is about 26 miles north of Medford, Oreg., in the Tiller–Drew Trail area of northern Jackson County and southern Douglas County. Numerous occurrences of mercury ore have been discovered, and many small mines have been developed throughout the entire area. None of these have proved to be large or consistent producers. Their large number, however, indicates at least a fair possibility of developing one or more outstanding producers. The Pacific Syndicate and the Cinnabar King alone are important.

Ore bodies occur as ore shoots in shear zones or fissure veins and in sedimentary or metamorphic rocks, in recent volcanics, or in other rocks of igneous origin. The principal known ore bodies of the War Eagle property are two ore shoots in a fissure vein with well-defined walls (fig. 1). The stoped portions of these shoots indicate a greater continuity of ore than is found in most other mines of the area and suggest good possibilities for

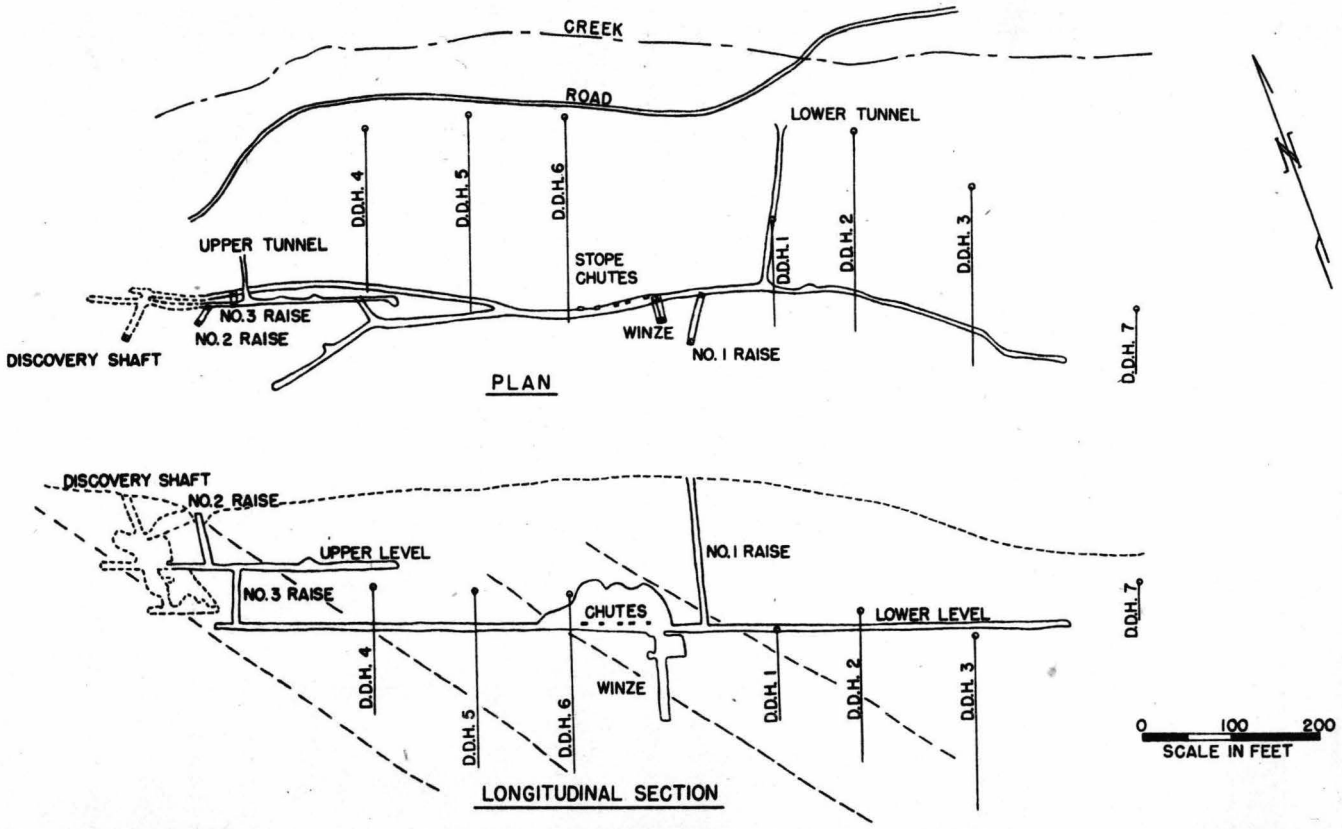

FIGURE I. WAR EAGLE MINE

finding more ore below the present workings. Other such possibilities would be beyond the lateral limits of the present development headings.

About half a mile east of the vein deposit is a faulted coal seam containing cinnabar (fig. 2). Some of this material was mined and concentrated by flotation. It is of little importance, however, because of its limited quantity and low grade.

The ore from the fissure vein contains considerable pyrite and marcasite and some arsenic. In the past operators seem to have had difficulty in treating it. It could probably be handled successfully in a modern, well-regulated furnace.

According to Schuette,[1] total output from the property to the end of 1937 was 640 flasks of mercury from 3,300 tons of ore. The grade of the ore, therefore, was about 15 pounds per ton.

INTRODUCTION

The property was visited in October by an engineer[2] of the Bureau of Mines in company with Allan Parsons, president of the company, who made all records of the company and maps of the underground workings available for study.

The mine is situated 26 miles north of Medford, Jackson County, Oreg., in secs. 8, 16, and 17, T. 34 S., R. 2 W.

HISTORY

The deposits were discovered by Carl Burtelson in 1916. The first development work was done by the Rainier Mining Co. In 1917 a Johnson McKay retort was placed in operation, and in the three succeeding years 565 flasks of quicksilver was produced. A 25-ton Scott furnace was built on the property in 1921. This is said to have been a good plant and operated

1 Schuette, N. C., Quicksilver in Oregon: Oregon Department of Geology and Mineral Industries, Bull. 4, 1938.
2 O. H. Metzger, senior mining engineer.

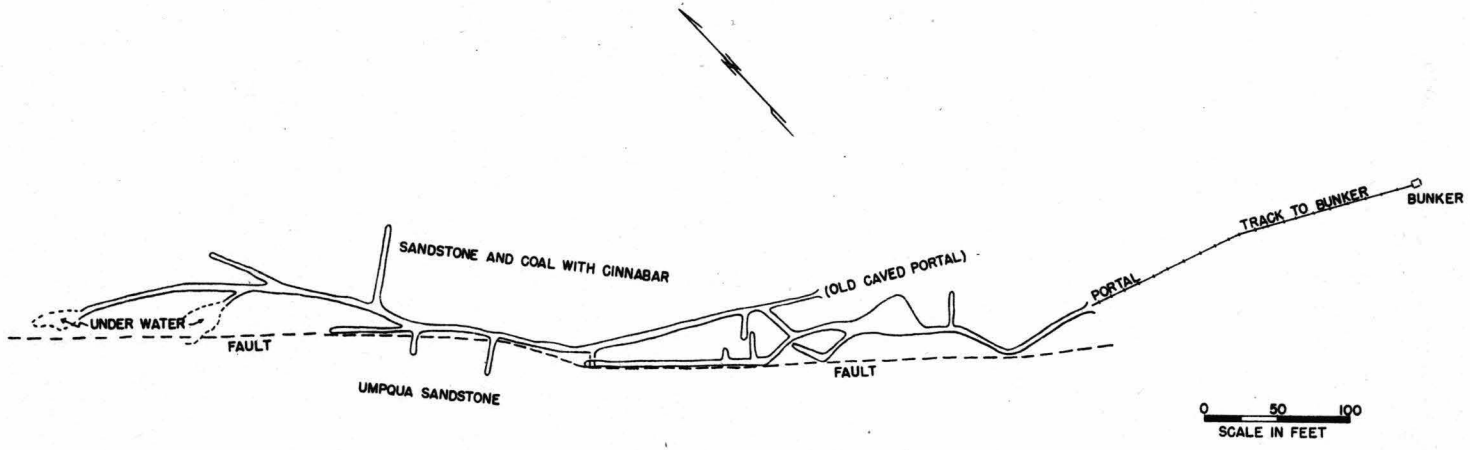

FIGURE 2. PLAN OF COAL ADIT

normally, but metallurgical difficulty soon developed as arsenic trioxide condensed with the mercury. The total production of the mines to the end of 1937 was 640 flasks. Nearly all of this was from the pyrite vein deposits.

Early in 1942 a flotation mill was built to treat the cinnabar-bearing material from the coal seam. Later, a small retort was installed to retort the concentrates from this mill. The mill was operated for only a short time in the spring of 1942. Little if any mercury was produced.

The property was involved in a great many changes of ownership from its discovery in 1916 until the present time. It is now owned by the Mineral Mines, Inc., Allan Parsons, president.

LABOR AND LIVING CONDITIONS

A boarding house and fairly good living quarters for 25 to 30 men are on the property.

A limited number of underground workers and other laborers is available from Medford, Grants Pass, and other towns to the south. Wages range from $6 to $7.50 per day for unskilled labor and from $7 to $9 per day for skilled labor.

PHYSICAL FEATURES

The mine is accessible from Medford over about 10 miles of hard-surfaced road, 16 miles of fairly good graveled road, and about half a mile of mine road.

Freight and express shipments are handled at Medford, on the Shasta Route of the Southern Pacific Railroad. The nearest telegraph station is also Medford.

The altitude at the mine workings ranges from about 2,100 to 2,500 feet. Annual precipitation is heavy and occurs chiefly from about November to May. Snow is common in winter but seldom remains on the ground for

more than a few days. Outside exploration work can be done during the entire year, but precautionary steps must be taken to keep water lines from freezing in midwinter.

Vegetation consists mostly of evergreen forests with a dense undergrowth of deciduous shrubs and bushes. Timber suitable for construction and mining is available on all parts of the property.

Evans Creek is the nearest permanent water supply. Water from this source would have to be pumped through a pipe line about 2,500 feet laterally and 400 to 500 feet vertically. Enough water is available from the mine workings for diamond drilling but not for the company flotation mill, except during the rainy season.

PLANT AND EQUIPMENT

Plant and equipment consists of a small flotation mill of about 25-tons-per-day capacity, a small Diesel electric-power unit, a small revolving retort, a Diesel-driven compressor, a machine shop, and an assay office. The company also has a small office building, a boarding house, and living quarters for about 25 men.

THE DEPOSIT

The country rock at the west end of the property, where the principal mine workings are located, is schist. The ore bodies consist of ore shoots in a fissure vein that bears N. 70° W. The dip is to the north and ranges from 70° to nearly vertical. Two ore shoots, one about 175 feet long and one 200 feet long, have been developed on two levels and partly mined out. They have a flat rake to the east, as shown in figure 1. Their apparent continuity indicates that they may persist for an appreciable distance below the lower of the two levels. Other ore shoots, now unknown, may possibly exist beyond the lateral limits of the present mine workings.

The vein ranges in width from 3 to 10 feet, averaging about 4-1/2 feet. It contains considerable pyrite and marcasite and appreciable amounts of arsenic. A sample taken from a pillar in one of the stopes assayed 8.0 percent iron, 8.4 percent sulfur, 0.47 percent arsenic, and 6.6 pounds per ton of mercury.

Sedimentary rocks comprising shales, sandstones, and coal seams are found about 2,000 feet to the east of the deposits just described. In 1916, cinnabar was discovered in a coal seam of this area. Cinnabar mineralization is confined to a narrow area adjacent to an east-west bearing fault that cuts the seam. Considerable drifting was done in the area, but only a small amount of low-grade ore was developed. Information available does not justify further exploration by the Bureau at this time.

METALLURGY

The War Eagle mine is probably the only quicksilver mine in the United States in which the ore contains appreciable quantities of arsenic. The sublimation temperature of arsenic oxide is considerably lower than the boiling point of mercury. It therefore contaminates the mercury to an objectionable extent in a normal condensing process. Former operators probably experienced difficulty in separating the arsenic from the mercury before bottling. According to Schuette,[1] mercury in arsenical soot can be separated from the arsenious oxide by adding 5 parts of water to 1 part soot and agitating for 30 minutes.

The owners of the mine maintain that the ore can be treated by direct distillation, but that the corrosive effect on iron is so great that all iron parts with which the ore comes in contact must be replaced periodically. Tests made by the Bureau of Mines at Salt Lake City confirm this statement. A straight distillation test by means of an air current through an iron-pipe

retort extracted 95 percent of the mercury, but corrosive action destroyed the bottom of the retort. A second test made in a similar manner but with 10 percent quicklime mixed with the ore indicated a recovery of about 99 percent with no noticeable corrosion of the retort. The mercury thus obtained assayed only 0.043 percent in arsenic.

The ore does not respond readily to gravity concentration. Flotation tests indicate that concentrates assaying 4.7 percent, or 94 pounds, mercury per ton can be made with a rejection of over 90 percent of the iron, sulfur, and arsenic; however, only 80 percent of the mercury is recovered. This procedure would probably not be economical.

MINE WORKINGS

The western deposits are developed by two levels – one at about 2,340 feet and the other at 2,415 feet above sea level. The upper level comprises about 50 feet of crosscut from the portal to the vein and 330 feet of drifting on the vein. In addition, there are three raises – one from the lower level to the surface, one from the lower level to the upper level, and one from the upper level to the surface.

The coal-bed deposit is developed for a distance of about 750 feet along the area adjacent to the north side of the fault (fig. 2). The area is explored by numerous drifts and crosscuts totaling 1,500 feet. Sampling and visual inspection of material exposed in the workings indicate that cinnabar mineralization extends from the fault plane northward for about 40 feet. All of the workings are on the coal seam. The main drift is approximately parallel to the fault. It has a downgrade of 4 to 8 percent from the portal to the face. For this reason, pumps must be operated continuously to keep the workings from becoming flooded.

ORE RESERVES

From 4,000 to 5,000 tons of low-grade ore have been developed by drifts and crosscuts in the cinnabar-bearing coal seam. This ore is of little importance because of its low grade (2 to 2-1/2 pounds per ton) and the metallurgical difficulties involved in its treatment.

Considerable ore probably remains above the backs of the stope in the vein deposit to the west. Because the stopes are inaccessible, it is impossible to estimate grade and tonnage of this ore.

The apparent continuity of the ore shoots on the lower level indicates possibilities for developing ore below this level. One ore shoot has a length of 180 feet and the other 200 feet. With an average width of 4-1/2 feet, the potential reserves would be about 150 tons per foot of depth. In addition, there should be a fair possibility for developing ore beyond the lateral limits of the present development headings.

Usually, the ore was stoped from the backs of the drifts without leaving pillars. The only samples taken were from a pillar about 15 feet above the lower level in one of the stopes. These samples indicate ore averaging about 6.5 pounds mercury per ton. This pillar was left presumably because it was too low-grade to be mined under conditions prevailing when that part of the ore body was mined. The average grade of the ore mined was probably considerably higher than 6 pounds of mercury per ton. On this basis it should not be unreasonable to expect a considerable tonnage assaying between 6 and 10 pounds of mercury per ton below the lower level.

PROPOSED EXPLORATION BY BUREAU OF MINES

Exploration work should consist of diamond drilling. Trenching along the outcrop of the vein probably would be unsatisfactory owing to the timber

and heavy overburden. Seven proposed diamond-drill holes are shown in figure 1. These range in length from 120 to 380 feet. One would be drilled from an underground station and six from surface stations. In addition, the lateral extensions of the vein should be explored beyond the present drift headings by at least 2 holes. Drilling would aggregate 2,150 feet.

All accessible workings on the vein should be sampled. It is known that the unstoped parts of the vein were too low-grade to be mined when the mine was last operated. It is possible, however, that appreciable amounts of low-grade or submarginal ore may have been left intact.

The winze below the lower level, the backs of the stopes, and probably most of the raises are inaccessible. Workings known to be accessible for sampling comprise 250 feet of drift on the upper level and 800 feet of drift on the lower level, a total of 1,050 feet. If sampled at 10-foot intervals, a minimum of 105 samples would be required.

COST ESTIMATES

Estimates of the cost of the foregoing program, based upon a time limit of 3 months, are as follows:

Diamond drilling, 2,150 feet at $4.80	$10,320
Labor and supervision	3,405
Supplies and equipment	205
Miscellaneous expenses	420
	14,350

CONCLUSIONS

Showings in present mine workings indicate that approximately 150 tons of ore per foot of depth, ranging in grade from about 6 to 10 pounds mercury per ton, may possibly be developed below the lower level. In addition, an undetermined amount can be mined from stopes above the present workings.

Flotation tests for the concentration of cinnabar and the rejection of iron, sulfur, and arsenic proved unsatisfactory owing to the low recovery of mercury.

If it is found that the ore can be handled successfully in a furnace of the Herschoff type, arrangements might be made for treating it in the plant of the Pacific Syndicate, 6 miles from the War Eagle mine.

Tests made by the Bureau of Mines indicate that the corrosive effect of the ore upon iron contact parts can be greatly reduced by adding quicklime.

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