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DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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DMEA 2448, Mt. Diablo Quicksilver Mine

Contra Costa County, California

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U. S. Geological Survey

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Reviewed by
DMEA OPERATING COMMITTEE
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Summary

A DMEA application was filed in December, 1952 by Mr. Maurice Smith requesting Government aid to explore the Mt. Diablo mercury mine in Contra Costa County, California. The field examination was made by E. H. Pampeyan, J. F. Robertson, and D. B. Tatlock, of the U. S. Geological Survey.

The original application proposed two phases of underground exploration with a total project cost of $75,000. On the advice of the Geological Survey, Mr. Smith filed an alternate proposal that changes the first phase to 330 feet of shaft sinking and 625 feet of drifting and crosscutting at a cost of $73,050. Phase two, which would depend on the results of phase one, consists of an additional 1300 feet of drifting at a cost of $52,000, bringing the total cost to $125,050.

At the present market price of mercury, the first phase of exploration might develop enough ore to permit the applicant to repay the Government's share of the exploration costs. Phase two, however, appears to offer much less hope for potential production. The application for exploration for phase one is recommended if the current need for mercury justifies Government participation.

Introduction

The Mt. Diablo Quicksilver mine is located in the SW¼ of sec. 29, T. 1 N., R. 1 E., MDBM, on the northeast side of Mt. Diablo Contra Costa County, California. The property is owned by the Mt. Diablo Quicksilver Company, Ltd., of Clayton, California, and has been leased to Maurice Smith. The mine is 46 miles by payed road from San Francisco and is easily accessible by automobile. It is reached by travelling 1½ miles southeast from Clayton on the Marsh Creek road, then turning right on the Livermore road for ¼ mile to Mine Way, which is the entrance to the property.

The Mt. Diablo mine area was visited by E. H. Pampeyan, J. F. Robertson, and D. B. Tatlock, of the U. S. Geological Survey, for several days between December 1952 and February 1953. During this time, a topographic and geologic plane table map of the area under consideration was made.

The property was discovered between 1857 and 1875 and has been operated sporadically since that time. According to Mr. Vic Blomberg president of the Mt. Diablo Quicksilver Company, principal mercury production from the western end of the property was from 1875 to 1877. As much as 3,000 flasks of mercury is said to have been produced, but the amount probably was closer to 300 flasks judging by the extent of the underground workings. The greatest recorded production was between 1937 and 1947 when 10,464 flasks of mercury were produced from the Hill workings at the eastern end of the property. The most recent production was from November 1951 to January 1952 when 123 flasks were produced from the open

pit operations in the Mill area. This operation was halted by landslides into the pit that rendered surface work no longer feasible.

Workings

The workings in the Mill area amounted to some 3,400 feet of drifting and crosscutting on four levels with a vertical range of 210 feet. The proposed exploration would be at an elevation of 600 feet, or about 100 feet below the lowest level, on the down-dip extension of the ore zone. The adit level, as well as lower levels of the Mill Workings was caved at the beginning of 1952. Most of the workings above the 50 level were uncovered by open pit operations.

Underground work at the western end of the property consisted of 2,100 feet, more or less, of drifting and crosscutting with a vertical range of 230 feet. The Camp, Jones, and Lyne tunnels have been caved for almost 15 years. The Kitchen tunnel is open but does not expose any ore.

The surface workings consist of a pit 500 feet long, in an east-west direction, by 200 feet wide and 150 to 200 feet deep, with three main benches. The highest bench, No. 5 on the map, was being mined for ore when slides from the steep south face terminated the operation.

The property has furnacing, retorting, and housing facilities, all of which are in good condition and could be put into use on short notice.

Geology

The mines are located on the northeast side of the "plug" of Franciscan rocks and serpentine which has intruded Jurassic and younger sediments in a way comparable to the intrusion of a salt dome. The Franciscan formation in the mine area is made up of massive, poorly bedded silicified sandstone, in part greywacke, with lesser amounts of sheared shale and thin-bedded chert. Serpentine intrudes the Franciscan rocks as irregular lenticular masses, the contacts of which strike from N. 50° W. to west and dip about 50° northeast. This trend is pronounced in the regional structure. To the north and east, just beyond the limits of the mapped area, lower Cretaceous shales are exposed and form low rolling slopes. About one mile to the east, some Tertiary biotite andesite intrudes the Cretaceous sediments.

Silica carbonate rock, or hydrothermally altered serpentine, appears throughout most of the mapped area. It is similar to the silica-carbonate rock of other Coast Range quicksilver deposits and consists largely of chalcedony and quartz, with some dolomite and other carbonates with small amounts of pyrite, marcasite, and opal. Usually massive, it is locally banded or laminated in white and black. The bands are, in some places, parallel to the foliation of the serpentine and probably represent relic textures.

Ore Deposits

The ore minerals are metacinnabar and cinnabar that occur filling fractures and shear zones in the silica-carbonate rock and, to a lesser degree, as disseminations throughout the serpentine and silica-carbonate rock. Apparently the shales immediately above and below the silica-carbonate rock formed an impermeable barrier to the ore-bearing solutions for the enclosing sediments are barren. The main ore shoot was on the fault along the south side of the open pit which forms the contact between silica-carbonate rock and underlying sediments. However, mineralization was not limited to this lower contact and ore bodies were present along other shears in silica-carbonate rock. Ore mined during the 1936-1947 period from the Mill workings averaged 10 pounds of mercury to the ton.

Metacinnabar is the predominant ore mineral in the Mill workings whereas cinnabar forms the ore in the old mines at the western end of the property. Marcasite and pyrite occur in the silica-carbonate rock and some stibnite is also present. The rich ore-bodies encountered in the past are said to have been closely associated with massive iron sulphides. Mineralization is believed to have taken place in Tertiary time for some cinnabar was reported 1/ to have been found along the contact of Tertiary andesite and Cretaceous shales about one mile to the east of the mines.

Exploration

In his original DMEA application, Mr. Smith proposed to drive a 700-foot drift under the Mill Workings from the east to connect with the 270 level. He also proposed a second phase of work to explore the old mines at depth by drifting an additional 1300 feet westerly.

The U. S. Geological Survey conferred with the operator and suggested that a more efficient program could be carried out by sinking a shaft, then driving exploratory drifts and crosscuts from the bottom.

C. N. Sbhuette, consulting engineer for Mr. Smith, submitted a new application requesting 75 percent Government participation in a $125,050 program. The new proposal, in two parts, is as follows:

Phase 1. Sink a 330 foot shaft from a point 50 feet north of the new stock and then explore by 625 feet of drifting and crosscutting the ground 100 feet below the lowest mine level.

Phase 2. (To follow upon successful completion, and review by the Government and operator, of phase 1.) Drift northwesterly 1300 feet to explore the old Jones tunnel area at depth.

1/Turner, H. W., Geology of Mt. Diablo, Bull. GSA 2:391-2, 1890

(Breakdown of cost figures are to be found in the application with Form MF-103). The application states that the work will be contracted out at $135.00 per foot for sinking and $35.00 per foot for drifting and crosscutting. With the added cost of engineering, geology, assays, etc., the first phase would cost $73,050 and be completed in seven months, while the second phase, taking nine months, would cost an additional $52,000. Total cost of the project would be $125,050.

The first part of the revised application appears to offer the best means of exploring the ore deposit. The advantages of sinking a shaft at the proposed site rather than drifting in from the east are numerous, some of which are: 1 - it would be sunk in ground underlain by sediments, mainly sandstone, that have greater strength than the fractured and altered rocks over the ore body; 2 - it would explore new ground 100 feet below any existing workings; 3, waste would be dumped at no greater distance than 300 feet from the shaft, either into the open pit or just north of the ridge; 4, it would have the advantage of elevation as the collar would be higher than the mill; 5 - it would be only 60 feet from the existing grizzly, ore bin, and conveyor belt to the mill.

On the basis of cross section A-A', about 200 feet of crosscutting S. 24° W. from the bottom of the shaft, will be necessary to reach the main ore zone leaving some 425 feet of tunneling to be used in drifting on the mineralized fault zone. The log of drill hole no. 6, projected 120 feet to plane of section A-A', reports only 12 feet of silica-carbonate rock at the 447 foot mark. However, a cursory examination of the core proved that almost 40 feet of silica-carbonate rock is present below the 300-foot marker. The core is not complete; therefore, more silica-carbonate rock might be encountered than has been proved. Some cinnabar was observed in the core and it was reported that some eight-pound ore was cut -- probably in the missing section of core -- in this hole. Also, assays made from the mineralized zone in the winze below the 165 level (see enlarged portion of section A-A') show that good ore does occur below the lowest level of caved workings.

The second phase of the project would appear to offer less hope for discovering ore. Surface mapping and the logs of two old diamond drill cores indicate that there are about 600 feet of barren Franciscan sediments between the northwest end of the drift proposed in phase one and the first possible ore-bearing rocks to the west.

The Government's share of $73,050 for phase one will be $54,787 Under the 5 percent repayment schedule, and providing that the price of mercury does not drop, production of 4,980 flasks with a gross value of $1,095,740 would be necessary for the Government to recover it's share of the cost. It seems possible that at least half of the necessary ore might be found above the proposed level, but the additional ore would have to be found below the proposed level. Phase two, with a total cost of $52,000 would cost the Government $39,000 and require the production of 3,545 flasks with a gross value of about $780,000 for repayment of the loan.

Recommendations and Conclusions

At the present market price of mercury, phase one could conceivably pay it's way while phase two offers less promise of being able to repay the loan. The application for exploration under phase one is recommended. Exploration under phase two should be dependent upon the success of phase one, as the added exploration would only be worth the high risk involved if the mine were producing from good ore found as a result of the phase one exploration.