

To accompany: GEOGRAPHICAL REPORT ON
 INDUCED POLARIZATION SURVEY OF EASTERN
 PART OF THE PROPERTY OF SHEBA COPPER
 MINES LTD. (N.P.L.), HIGHLAND VALLEY,
 KEMUNGOO M.D. By: Takeo Yokoyama,
 Sept 20, 1967

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 Supervising Engineer

SUMITOMO METAL MINING Co. of CANADA Ltd.	
PROJECT: SHEBA COPPER MINES	
CLAIM MAP (EAST HALF) OVER-LAY	
SCALE: 1" = 400'	DRAWING No. 1-8
DATE: SEPT., 1967	

SHEBA COPPER MINES LTD.

HIGHLAND VALLEY PROPERTY, B. C.

REPORT OF EXPLORATION WORK 1967 - 1968

MAY 22, 1968.

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CLAIM MAP (East Half) Over-Lay

In Pocket

SHEBA COPPER MINES LTD.

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REPORT OF EXPLORATION WORK 1967 - 1968

PART 1 - GENERAL

A - SUMMARY AND CONCLUSIONS

On the basis of the best available geologic information, the eastern half of the Sheba property was selected for detailed, thorough exploration. It was hoped to find a porphyry copper ore deposit of economic size and grade. In particular, it was hoped to find a high-grade breccia pipe deposit.

Actual field operations commenced early in May, 1967 and continued without interruption until mid-October, 1967 when all Phase I monies had been spent or committed. At the end of October it was decided to proceed with Phase II expenditures and first commitments were made early in November. Phase II diamond drilling was completed on December 16th. Small-hole percussion drilling was commenced in mid-January, 1968 and completed by mid-February. Some percussion drilling was done in mid-March to check some interesting values found in the last percussion hole drilled in the earlier program. This completed the exploration field work on the project.

The induced polarization (I.P.) geophysical survey failed to produce an important anomaly. Resistivity varied with the depth of overburden, frequency effects were low, and metal factors not significant. Scattered areas of higher readings were obtained, however, and most of these were investigated by trenching and/or drilling. No important mineralization was found.

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Geologic mapping defined, within reasonable limits, the favorable Bethlehem-Guichon contact and the Bethsaida intrusives. Hydrothermal alteration along the Bethlehem-Guichon contact was found to be small in extent and contained only minor mineralization. Alteration associated with the small Bethsaida intrusives was found to be weak and associated mineralization was weak and sporadic.

The geochemical soil survey revealed encouraging copper and weak molybdenum anomalies in the general vicinity of the Bethsaida intrusives. Minor copper anomalies occurred elsewhere on the property, especially in the vicinity of the Bethlehem-Guichon contact.

A total of more than $3\frac{1}{2}$ miles of bulldozer trenches investigated the higher frequency effect readings; all the major and many of the minor geochemical anomalies; and areas of hydrothermal alteration. Mineralization in all cases was very weak.

A total of 6569 feet of diamond drilling in 15 holes and 5250 feet of percussion drilling in 21 holes was completed. Drill hole assays confirmed the estimated of very low average grade obtained visually from trenches and outcrops.

It is concluded that a thorough search was made for an economic porphyry copper deposit in the more favorable eastern half of the Sheba property. The induced polarization survey failed to produce any encouragement for further exploration. The geological investigation, including trench and drill-hole data also failed to provide sufficient encouragement for additional exploration. The better geochemical anomalies were thoroughly investigated by trenching and drilling but no economic mineralization was found. The final conclusion is that no orebody exists on the eastern half of the Sheba property and that there is little possibility of such a body on the western half.

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B - INTRODUCTION

LOCATION AND TOPOGRAPHY

The property is located in the Highland Valley area of British Columbia on the north slope of Gnawed Mountain at Latitude $50^{\circ} 27'N$, Longitude $120^{\circ} 59'W$. Bethlehem mine lies to the north of the property across the Highland Valley. Lornex mines adjoins the property on the west and Highmont on the southwest.

Usual access to the property is from Ashcroft south along the Highland Valley road for about 26 miles and then by local roads to the property.

The property varies in elevation from about 4000 feet on the north side to 5500 feet on the south. The average elevation of the project area is about 5000 feet.

The climate is continental. There is normally snow on the ground from late October or November until early May. Winter temperatures are usually above $0^{\circ}F$ although some sub-zero weather and, occasionally, very cold weather (colder than $-30^{\circ}F$) will occur during the winter. Some rain is to be expected during the spring but rainfall during the summer is light. Summer temperatures on the property occasionally rise to $80^{\circ}F$ and even higher but the daytime average is probably about 65 to $70^{\circ}F$.

The area has been subject to numerous forest fires although the most recent appears to have been at least 15 years ago. At the present time, the property has an almost continuous forest cover of lodgepole pine. Some fir and spruce occur in the wetter sections. Other species are to be found but are not common. In places windfalls hamper travel on the property.

The area has been glaciated by the continental ice sheet. Valley

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glaciation, if there was any, does not appear to have been significant. The ice sheet moved from north-north-west to south-south-east. The bedrock surface was eroded with minor ridges trending parallel to the direction of the ice movement. Depressions in bedrock were partially filled with boulder clay. Depth of overburden is mostly less than 20 feet but in some places is known to exceed 60 feet. Overburden depths as great as 100 feet may exist in places. Meltwater streams from the last of the ice sheet have modified the topography in detail but were not a major factor on the Sheba property.

PREVIOUS WORK

Copper mineralization has been known on the property for at least 40 years. Very old claim posts and old pits excavated by hand have been found although no records are known to exist of this early work. Scanty records refer to old mineral discoveries on Gnawed Mountain adjacent to the Sheba property.

Recent exploration on the property dates from 1955 when many claims were staked after the Bethlehem property began to attract attention. Prior to 1957, however, very little exploration work was done.

During 1957 ASARCO geologists did reconnaissance mapping of the Sheba property and investigated showings on the west boundary adjoining the Skeena property.

During 1958 and 1959 Kennco Explorations did considerable exploration work on claims in the Gnawed Mountain area including parts of what is now the Sheba property. Work on the ground now held by Sheba was in two parts. In 1958 silt sampling and limited soil sampling was done on the north central part of the property.

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This was supplemented by prospecting and a single line of I.P. survey. Work on the southern part was done during 1959 and was part of their Gnawed Mountain exploration program. On the Sheba property this work consisted mostly of geologic mapping on a compilation scale of 1 inch = 1000 feet.

In the course of road constructing in 1961 Peel Resources discovered very interesting copper mineralization on the JAY 101 claim in the south central part of the property. This discovery was followed up by drilling and trenching.

The Anaconda company optioned the Sheba property, along with adjoining properties in late 1963, and in 1964 and 1965 did a considerable amount of exploration work. The JAY 101 showing was thoroughly explored and while it was found to be of good grade, the tonnage was very small. Exploration elsewhere on the property consisted of geologic mapping, soil sampling, an I. P. survey, and one or two drill holes. This work was concentrated in the southern and western parts of the property.

After Anaconda dropped their option in 1965, Sheba did some trenching and drilled one or two shallow holes primarily to cover assessment work requirements.

To summarize, then, previous work had been concentrated near Gnawed Mountain and on the central and western part of the property. Results from this work showed little encouragement. The eastern and northeastern parts of the property had received little attention.

PURPOSE AND METHODS

Purpose

After careful consideration of the geologic environment of the porphyry copper deposits of the Highland Valley, it was concluded

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that the known orebodies occur in two general geologic environments:

- a) along the contact of the Bethlehem quartz-diorite with the Guichon quartz-diorite and
- b) along the contact of the Bethlehem quartz-diorite with the Bethsaida granodiorite.

Work was confined to the eastern half of the property for the following reasons:

- a) the contacts referred to above occur only on or close to the eastern half of the property.
- b) the rest of the property had been explored and the geology was known but there had been very little work done on the eastern part and
- c) the JAY 101 showing, while lying just outside of the eastern half of the property had been thoroughly explored and was, evidently, very small.

The plan was therefore, to explore the eastern part of the property, especially the Bethlehem-Guichon contact, with the purpose of finding a porphyry copper deposit.

Methods

Since the ultimate object was to find a porphyry copper orebody of sufficient size and grade for profitable mining, the program was designed as follows:

- 1) Investigation was based on a picket line grid with a 400-foot line spacing. Any orebody that could escape detection with this line-spacing would necessarily be too small to be economic unless it were very high grade. Even then, it is very probable that there would be a considerable halo of alteration and mineralization to indicate its existence.
- 2) Known, proved methods of exploration for porphyry copper deposits were selected.
 - a) Geological mapping with especial attention to rock types and hydrothermal alteration.
 - b) Geochemical survey for copper and molybdenum. Molybdenum analyses were made at a wider spacing than copper as molybdenum is only a very minor constituent of ore bodies associated with the Bethlehem-Guichon contact.
 - c) Induced polarization geophysical survey. I.P. is recognized as a fairly satisfactory indicator for most porphyry

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copper deposits. Other geophysical methods are useful only in special circumstances.

- d) Trenching where overburden conditions permit to provide a rapid and relatively inexpensive method of assessing geochemical and geophysical anomalies and areas of geologic interest.
 - e) Diamond drilling to provide additional geologic information and a fairly accurate idea of the copper and molybdenum content in areas of known or suspected mineralization.
- 3) As work progressed on the property two methods of exploration were added.
- a) Hammer seismic survey to determine the depth to bedrock as a guide to trenching and a help in interpreting I.P. anomalies.
 - b) Small diameter percussion drilling to determine approximate metal content of anomalous and known mineralized areas

FIELD WORK

Considering the limitations of the agreement between Sumitomo and Sheba, it was decided to conduct the geological, geochemical, and geophysical investigations simultaneously. Favorable results were followed up with trenching and drilling.

The initial line cutting program was commenced on May 6, 1967 and completed about the end of June. Lines were extended on the southwest and west side of the original area during July and August. The line-cutting was done under contract by Ken Owens of Ashcroft. In all about 45 miles of picket line and about 4 miles of base line were cut in very satisfactory manner.

The geophysical survey was conducted by Sumitomo's crew. From the point of view of this project there were two advantages: (1) lower cost and (2) the availability of an experienced Sumitomo geophysicist with geological training to personally supervise the work and provide earlier and better interpretation of the results. This arrangement

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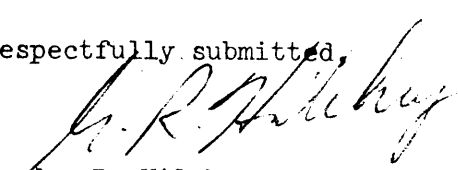
proved highly satisfactory. Work was commenced about May 15th. and was completed about July 6. A few additional miles of line were surveyed during the latter part of August.

Trenching was done with two D-7 Caterpillar bulldozers on an hourly-rate basis. Mr. A. Kirshfelt of Kamloops supplied the equipment and operators. The equipment was in good condition and the operators competent, resulting in an efficient operation. Trenching was commenced early in August and finally completed in January, 1968. The same equipment was used for building access roads and preparing drill-sites.

Diamond drilling was done under contract by Deeg Drilling Ltd., of Ashcroft. Drilling commenced on August 17, 1967, suspended on October 16, resumed on November 16 and finally completed on December 16, 1967.

After completion of the diamond drilling program it was decided to do small-hole percussion drilling to complete exploration of the remaining areas which were thought to have some potential. Percussion drilling was preferred to other types of drilling because of speed and lower cost consistent with the accuracy of data required. This work was done under contract by Deeg Drilling Ltd., of Ashcroft. Percussion drilling was conducted from mid-January to mid-February and for about one week in the middle of March.

Respectfully submitted,


Gordon R. Hilchey, P. Eng.,
Exploration Manager.

ACKNOWLEDGEMENTS

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Y. Hirata, C. E., P. Eng.	Geologist
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