THE SILVER KING PROPERTY

No references
No dates.
No diagrams or grain
size. Stromeyerite.
Geology not much use
without a map.

A problem submitted in partial fulfillment
of the requirements for
Geology 409, Mineralography
at the University of British Columbia

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CONTENTS

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THE SILVER KING PROPERTY

INTRODUCTION

This report is a description of the ores of the Silver King property near Nelson, British Columbia. This study was made as a mineralography problem.

I. LOCATION AND DESCRIPTION

Reference ?

The Silver King mine property is in the Bonnington Map-Area (lat. 49° 15' to 49° 30' N. long. 117° 15' to 117° 30' W.) of south east British Columbia. This area includes the northern part of the Bonnington Range of the Selkirk Mountain system.

The terrain is subalpine, fairly rugged with main peaks around 7000 feet and a maximum relief of 6000 feet. The ground has been subjected to continental glaciation during which the higher peaks were just covered as glacial erratics are rare above 6000 feet and only a few glacial striations are found above 7000 feet. Ice movement is believed to have been south to south east. Cirques, some with tarns at their bases, occur on the sides of some of the higher mountains.

The Silver King property is five miles almost due south of Nelson, B.C., in the north east corner of the Map-Area, and two miles north east of the 7200 foot peak of Toad Mountain. Access to the property is by a nine mile road to from ? Nelson.

II. HISTORY

The Silver King property was first staked in 1886. Small shipments of high grade silver-copper ore were made intermittently for many years by several owners and leasers. The property is currently held by Consolidated Mining and Smelting Company. Main production was during the late 1800's. In 1901, 20,000 tons of ore were taken out grading 16 oz./ton, silver, and 3% copper. In 1913, 13000 tons were produced grading 0.02 oz. gold, 8 oz. silver and 1½% copper. During most of the time between the two World Wars there was no production. Spasmodic attempts were made to revive the operation but the persons or companies went bankrupt before they had developed enough ore to start production. In the late 1940's some ore was shipped from the dumps and the latest information regarding the property is that during 1956 slightly over 500 tons were taken from some of the old shrinkage stopes. Total production has been somewhat greater than 200,000 tons.

III. GENERAL GEOLOGY

The granitic Nelson Intrusions occupy about one-third of the 200 square mile area, with the main occurrence in the south west corner of the area and a few small stocks scattered throughout the rest. The early Mesozoic Elise Formation occurs mainly in the northern part of the area. The rocks are intermediate to basic volcanics, with agglomerate, breccia and tuff the main types. The Mid-Mesozoic Hall sedimentary formation occurs over areas up to twelve to fifteen square miles in extent in about ten places on the sheet. This formation consists of siltstone, greywacke and conglomerate with some metamorphosed sediments - schist and quartz. The late Mesozoic (late Jurassic or Cretaceous) Beaver Mountain formation is similar in composition and rock types to the Elise formation. This formation forms a belt up to three miles wide slightly east of the center of the area and extends the full length.

In many places the Hall sediments occur between the two volcanic sequences and their identification is based on their relationship with the sediments. Where the Hall formation is absent or unrecognizable it has not been possible to differentiate between the two volcanic formations so they are there designated as the Elise and Beaver Mountain formation. An irregular, north west trending body of such rocks six miles long by two miles wide outcrops northeast of Toad Mountain and south of Nelson.

Immediately east of this volcanic sequence is an intrusion of Silver King quartz diorite porphyry about five square miles in extent.

IV. MINE GEOLOGY

Part of the Silver King porphyry and the Elise Beaver Mountain formations have been metamorphosed into a belt trending northwest, with a marked schistosity paralleling the trend. The attitudes strike N 40 W and dip SW. The belt appears to be on the east limb of a major syncline. Part of the schist is identifiable as sheared porphyry. The Silver King and several other properties lie along the axis of this shear zone. Cross fissures are the loci of ore deposition. The ore occurs in high grade stringers in the schist. When these stringers were sufficiently closely spaced to make whole blocks assay ore grade, it was possible to shrinkage stope the ore bodies. When large bodies were not available small operators were able to hand-pick the high grade material profitably.

MINERALOGY

1. Hand Specimen Description

The mineral suit consists of eight fairly distinct hand specimens with accompanying polished sections.

Number one and two are of massive bornite with a minor amount of quartz-carbonate (partly calcite) gangue.

Number three contains around 50% tetrahedrite and chalcopyrite with secondary azurite and malachite and a quartz-siderite gangue.

Number four is lower grade containing 5% bornite along fractures in quartz gangue.

Numbers five and seven are almost pure, massive chalcopyrite containing some orange, powdery limonite in elongate vugs and covered by a coating of brown hematite, azurite and black manganite. ?

Number six is about 50% chalcopyrite, coarsely disseminated (rather than massive) through a quartz-carbonate gangue and dark fragments of the pre-existing breccia.

Number eight is mainly tetrahedrite and black manganite. Malachite coats the tetrahedrite and fills vugs in the manganite. Some limonite also occurs in the crumbly manganite.

Number nine is principally carbonate rock containing 1/16 inch veinlets of quartz which give way to bornite and chalcopyrite within the veinlets.

2. Mineral Identification

(a) Primary Minerals:

Pinkish tan mineral. Isotropic. Tarnishes in a few hours to a bluish color. Hardness B. $FeCl_3$, KCN, HNO_3 positive.

Mineral - Bornite

Brass yellow mineral. Isotropic. Harness C, but not sectile. All reagents negative.

Mineral - Chalcopyrite

Gray mineral. Hardness D-E. Streak black. Isotropic. All reagents negative.

Mineral - Tetrahedrite.

Gray mineral - darker than tetrahedrite. Soft. Strongly anisotropic. Violet-brown colors. HNO_3, HCl, KCN, $FeCl_3$ all positive. (KCN & HNO_3 turns mineral black).

Mineral - Stromeyerite.

Galena white mineral occurring as small grains in bornite. Isometric, soft (B), HNO_3 blackens, HCl tarnishes. Etches for $FeCl_3$ confused by the bornite. No pits showing.

Mineral - Galena

Blue mineral with pitted surface, soft. Highly anisotropic. Often occurs at contact of tetrahedrite and bornite. KCN stains black.

Mineral - Covellite

(b) Secondary Minerals

Bright blue, non-metallic, powdery mineral coating the copper minerals.

Mineral - Azurite.

Similar mineral but green in color.

Mineral - Malachite.

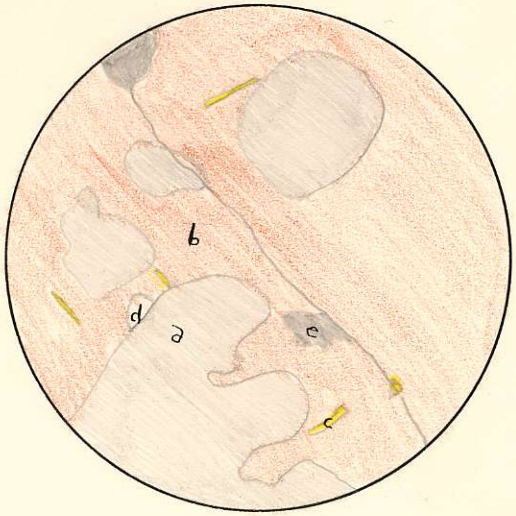
3. Textures

The only good textures observed in these specimens were breccia replacement, Caries texture, and Widmanstatten texture. Caries texture was shown by both galena and tetrahedrite in the bornite. The tetrahedrite occurred as very smoothly elliptical blebs up to 2 mm. in diameter in the massive bornite. Where chalcopyrite was the dominant ore mineral it also contained fairly regular masses of tetrahedrite in relationships which cannot be defined more specifically than caries texture. In some, tetrahedrite predominated and held regular blebs of chalcopyrite.

Chalcopyrite exsolution lamellae in bornite show excellent Widmanstatten texture. The laths are the regular shape characteristic of exsolution rather than replacement.

Sketch showing caries texture of tetrahedrite in bornite and exsolution texture of chalcopyrite in bornite

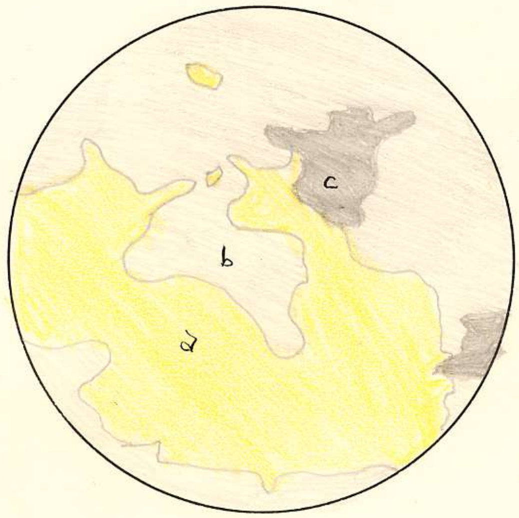
(a) tetrahedrite
(b) bornite
(c) chalcopyrite
(d) galena
(e) carbonate or quartz



X 50

Sketch showing caries texture of chalcopyrite in tetrahedrite

(a) chalcopyrite
(b) tetrahedrite
(c) gangue



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Wallrock breccia fragments are replaced and interstices filled in by the sulphides.

Where stromeyerite occurred it filled in late fractures in the gangue and in some places in the early sulphides.

VI. PARAGENETIC SEQUENCE

That tetrahedrite, bornite and chalcopyrite were deposited contemporaneously is fairly clear. The large tetrahedrite blebs and the exsolution lamellae establish this. That the stromeyerite is later is supported by its filling of fractures in both gangue and early sulphides. The relationship of the galena is not clear but probably is later than the early sulphides, but earlier that the stromeyerite. This is indicated by the blebs at the contact of bornite and tetrahedrite. The rare covellite occurs as a secondary corrosion or alteration on the bornite.

The malachite and azurite have been formed through surface oxidation, as have the limonite and manganite coatings.

VII. TEMPERATURE OF FORMATION

The first formed sulphides are a characteristically mesothermal assemblage. Furthermore, the chalcopyrite exsolution suggests a temperature of 475^{o} C. Therefore this writer believes that it is a mesothermal deposit. The only pressure indicated is the filling of the breccia interstices, which suggests fairly low pressure. The deposits were small and changed rapidly with depth. This fact also suggests low pressure.

BIBLIOGRAPHY

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