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REPORT ON THE ORE

OF

THE CALIFORNIA MINE

for

Geology 9

by

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April 1942

University of British Columbia

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THE CALIFORNIA MINE

INTRODUCTION

Acknowledgements

The writer wishes to thank Dr. H. V. Warren of the Geology Department of U.B.C. for his enthusiastic interest and valuable help, and also the many University colleagues who aided in their several ways with the preparation of this report.

Location

The California Mine is owned by Mrs. Mary Jane Wilson of Nelson, B. C. and is at present being worked under lease by L. Bobier and son.

The mine is situated above and to the south of Give-out Creek on Toad Mountain, about 3 miles south of Nelson. It may be reached by two roads, one a branch of the Silver King Road about 3 miles long and the other a branch of the Athabasca road about 6 miles long. Both these roads lead to the third level, which is at an elevation of 3500 feet. No. 3 level is connected to No. 1 and 2 by a single road.

General Geology

Formations of the Rossland Volcanics outcrop near the mine. The Hall series, the lowest member of the Rossland Group, is sedimentary and appears to be infolded

with volcanic rocks of contemporaneous age. Chiefly augite porphyry, and related pyroclastics. These formations are thought to be of Triassic age and are sheared and crushed, and consequently metamorphosed to chlorite and greenstone schist and quartz biotite schist.

The Nelson batholith of Jurassic age also outcrops near the mine. These rocks vary from true granite to quartz diorite. Stocks and tongues of this granite occur over a large part of the Nelson Map Area.

The rocks of the batholith have yielded to differential pressure of mountain building. Gneissic structure is evident and the foliation of the gneiss corresponds in strike and dip with that of the intruded schists.

Ore Deposit

The mine occurs in the schists near the contact of the Nelson granite. The rocks underground are highly altered but apparently belong to the Rossland Volcanics.

The strike of the schistocity and the bedding conform in general with the contact of the Nelson granite, having a westerly strike and a dip varying from 40° to 65° south to south west.

The deposit is in a mineralized shear zone in the schists. The vein has been traced by stripping and the strike and dip are similar to the strike and dip of the schistocity.

Besides the surface stripping, three drifts have been run in on the vein. No. 2 level is 170 feet above No. 3 and No. 1 is 106 feet above No. 2. (see page 3a)

Two separate veins were found in No. 1, an almost barren white quartz vein and another mineralized composite vein about 10 feet perpendicularly to the dip below the quartz vein.

The composite mineralized vein consists of elongated and parallel lenses of mineralized quartz alternating with bands of schist.

The width of the composite vein is about 3 feet, but the quartz containing the sulphides varies from 0" to 18".

MINERALOGY

Introduction

In the preparation of this report, samples were taken from the No. 1 level.

(1) High Grade -- specimens containing predominantly, sphalerite as the chief sulphide.

(2) Low Grade -- specimens containing pyrite as the chief sulphide.

Four polished sections were made from the high grade and two from the low grade. These sections were studied under a microscope and the following information was obtained..

No.1 Level.

No. 2 Level.

No.3 Level.

Loading Truck at No.1 Level
Muck Pile and Compressor in background.

Minerals Identified

Seven minerals were identified in the poly sections. These were: pyrite, quartz, sphaterite, pyrrhotite, galena, calcite, gold. Siderite was recognized in the hand specimen, but was not found in the sections. One mineral (metal) cadmium was tested for with the spectrascope by Mr. Bob Thompson and found to be present.

Paragenesis

Age -- Oldest at the top.

Pyrite

Fracturing.

Quartz

Fracturing.

Calcite with some free gold.

Sphalerite and Pyrrhotite.

Galena.

The first mineral to be deposited after the original shearing was pyrite. This pyrite was fractured and quartz was introduced to replace the pyrite and fill the fracture. The quartz was then fractured and calcite was introduced with some free gold. Sphalerite and pyrrhotite were deposited simultaneously, replacing some of the quartz and pyrite. The last mineral to be deposited was galena, which replaced some of the pyrite sphalerite and quartz.

Pyrite

In what was termed the low grade ore, pyrite was the most common sulphide. A vein up to 6" width would be found to be nearly entirely massive pyrite. Most of this pyrite had been intensely fractured and the interstices filled with quartz and calcite. (See diagrams 7 and 8.)

In the high grade ore, the pyrite was found to be more completely replaced by the sphalerite. (See diagram 9.)

The pyrite was assayed and found to carry up to one ounce of gold.

Quartz

The quartz was associated with all the other minerals and was found to fill fractures in the pyrite, (See diagrams 7 and 8.) and to be replaced by the sphalerite and galena. (See diagrams 3 and 5.) This would indicate the quartz was later than the pyrite but earlier than the sphalerite and galena.

The quartz is fractured, but not nearly as much as the pyrite, the fractures in the quartz in some places are filled with calcite. (See diagram 6.)

Sphalerite

The sphalerite is the red brown variety. It is the most important sulphide in the high grade. It fills

fractures in the quartz, (See diagrams 4 and 5.) and replaces the pyrite, See diagrams 1 and 9.) and is cut by galena, (See diagram 4.) which indicates that it is later than the quartz and pyrite, but earlier than the galena. Most of the sphalerite contains inclusions of pyrrhotite, which would lead us to believe these minerals are of contemporaneous age. (See diagrams 5 and 9.)

The sphalerite in the high grade carried up to 3 ounces of gold and some silver. Some sphalerite was found in the low grade.

Pyrrhotite

The pyrrhotite occurs as minute specks intergrown with the sphalerite and have smooth boundaries, indicating that these minerals crystallized simultaneously. (See diagrams 5 and 9).

Galena

The galena was found to cut the sphalerite, (See diagram 4.) and also the pyrite and quartz, (See diagrams 2 and 3.) which indicates that the galena is the last mineral to be deposited. The galena was chiefly found in the high grade and carried some silver values.

Calcite

The calcite was found to fill the fractures in the quartz and pyrite, (See diagrams 6 and 7.) and, therefore, is later. A few specks of what was thought to

be gold were found in a calcite vein, cutting quartz (See diagram 6.) in association with the high grade.

Gold

Some free gold was found in a calcite vein cutting the quartz. It was probably deposited contemporaneously with the calcite. Although gold was reported to assay up to 3 ounces in the sphalerite, the writer did not find any.

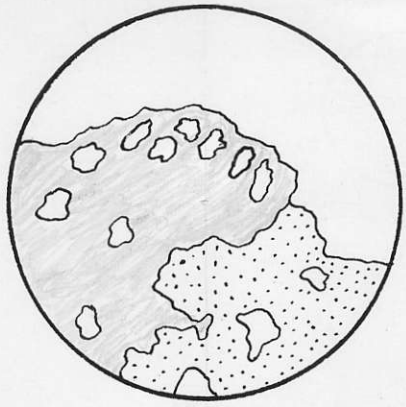
Cadmium

A few grams of sphalerite were carefully separated from the rest of the minerals by the author and an assistant on the super-panner, and the nearly pure sphalerite was tested by Mr. Bob Thompson of the Geology Department and found to contain .80% cadmium.

CONCLUSION

The California Mine was worked chiefly for its gold and silver. The gold was believed to be associated with the sphalerite, but the microscopic examination shows that some of the gold is associated with the calcite in fractures in the quartz. The cadmium is present as a solid solution in the sphalerite, and so was not seen under the microscope. The fact that the sphalerite ran .80% Cd. does not indicate that the ore is anywhere near that high, as the sphalerite is, as a rule, less than 15% of the ore, which would give us about $2.00 Cd. per ton of Ore.

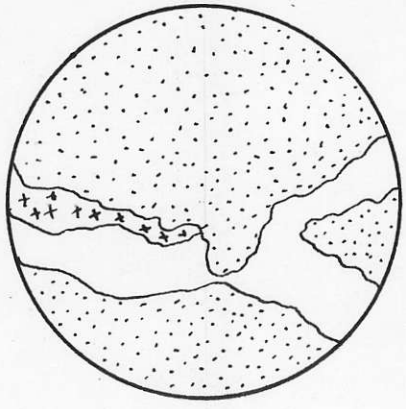
DIAGRAM 1



Quartz replacing Pyrite & Sphalerite replacing Pyrite & Quartz.

Mag. 60 X

DIAGRAM 2.

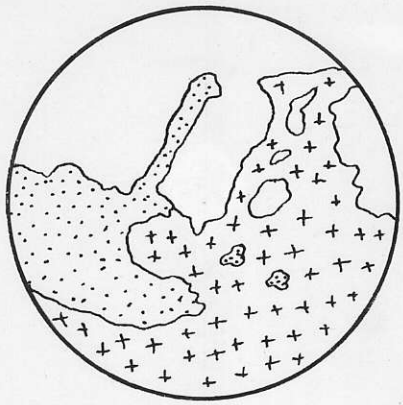


Quartz replacing Pyrite & Galena replacing Pyrite & Quartz.

Mag. 60X

Pyrite.
Quartz
Sphalerite
Galena

DIAGRAM 3



Quartz replacing Pyrite & Galena.
replacing Pyrite & Quartz.

Mag. 60 X

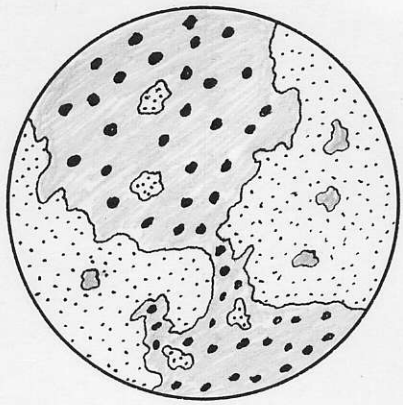
DIAGRAM 4

Sphalerite containing diseminated
specks of Pyrrhotite replacing Quartz &
Galena replacing Quartz & Sphalerite.

Mag. 60 X

Pyrite
Quartz
Galena
Pyrrhotite
Sphalerite

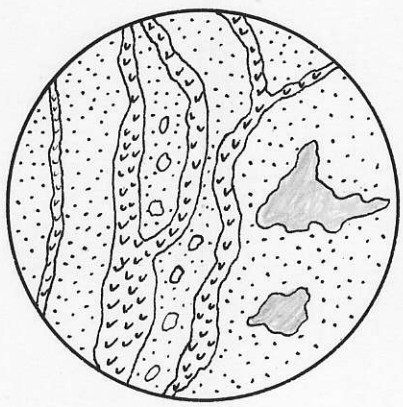
DIAGRAM 5



Sphalerite with included Pyrrhotite replacing Quartz.

Mag. 60 X

DIAGRAM 6

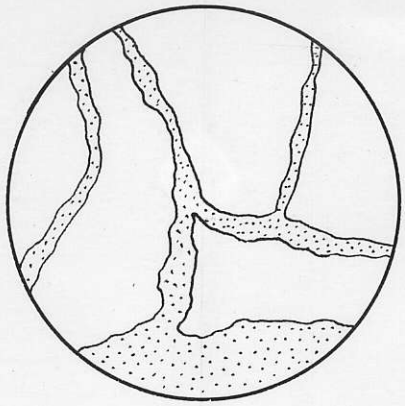


Fractures in Quartz occupied by Calcite, Quartz contains pyrite & is replaced by sphalerite.

Mag. 100 X

Pyrite.
Quartz.
Pyrrhotite.
Sphalerite.
Calcite.

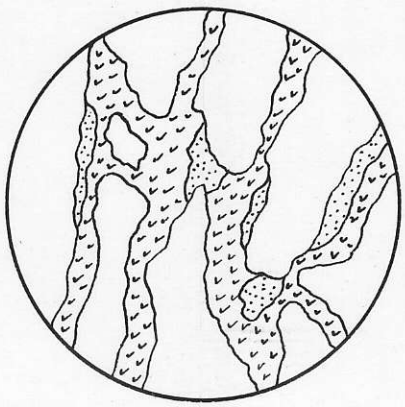
DIAGRAM 7



Quartz replacing Pyrite along Fractures.

MAG. 60X

DIAGRAM 8

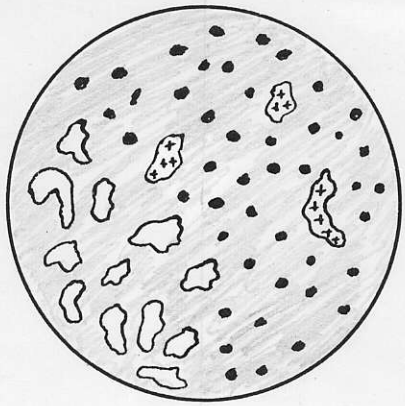


Fractures in Pyrite containing Calcite replacing Quartz.

MAG. 60X

Pyrite
Quartz
Calcite

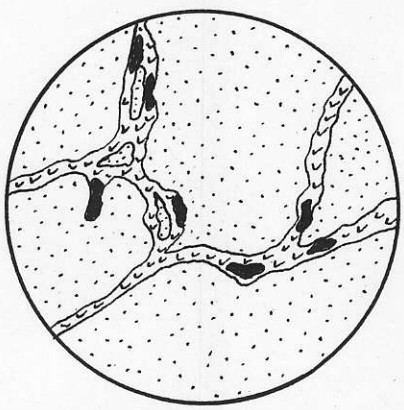
DIAGRAM 9



Sphalerite with Pyrrhotite inclusions replacing Pyrite. Galena replacing Sphalerite.

MAG. 60X

DIAGRAM 10



Calcite filling fractures & replacing Quartz. Gold in the Calcite.

MAG. 100X

Pyrite.
Quartz.
Pyrrhotite.
Galena.
Calcite
Gold