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MINERALOGY
OF THE
HIGHLAND BELL ORE.

A Geology 9 Report

submitted

by

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ILLUSTRATIONS.

INTRODUCTION.

The Wallace Mountain ore deposit is rather unique in that it is one of the few deposits in British Columbia mined primarily for silver. The high grade of the ore has made it possible for the camp to operate continuously during and since the last depression in spite of the low price of silver. It is with the ore from the largest camp, the Highland Bell, that this report deals.

LOCATION.

The Mine is located on Wallace Mountain about four miles from the town of Beaverdell. Beaverdell may be reached by road from Kelowna or Rock Creek, or by the Kettle Valley branch of the Canadian Pacific Railway.

GENERAL GEOLOGY.

The information used in the following description was obtained from a report written by Leopold Reinecke.[1]

Within the Beaverdell area, occurs the Wallace group of volcanic rocks with subordinate sediments, schists and coarse grained intrusives. They have been intruded and metamorphosed, first, by the Westkettle quartz diorite batholith, and later by the Beaverdell quartz monzonite batholith. It is in the latter that the Highland Bell Mine deposit occurs. The Curry Creek series of Oligocene conglomerates and tuffs lie unconformably over the older rocks. The youngest rocks are a series of lavas, probably

1 Reinecke, Leopold, "Ore Deposits of the Beaverdell Map-Area," Geol. Survey, Can., Mem. 79 (1915).

of Miocene Age, which overlie the Curry Creek as well as the other formations unconformably.

In certain localities the batholith has been intensely faulted. These faults have delineated the boundaries of the mineralized areas of Wallace Mountain, near Beaverdell. Block movements have arranged the silver-lead ores so that they subsequently have experienced varying degrees of erosion. Many subsidiary faults have caused small displacements in the remaining ore bodies. All types of faults occur. Normal faults predominate, and thus far have been of the most economic significance.

MINERALOGY.

Seven polished sections were studied under the microscope, and they are believed to be representative of the ore from the present workings in the mine.

The following primary minerals were identified: pyrite, arsenopyrite, quartz, sphalerite, galena, freibergite, pyrargerite, polybasite, chalcopyrite, native silver, and calcite.

PYRITE. (FeS_2) This mineral is the most abundant metallic constituent. It occurs in masses and is greatly fractured. The fractures are commonly filled with quartz, sphalerite, galena, silver sulphides and calcite.

ARSENOPYRITE. (FeAsS) Arsenopyrite is not as abundant as pyrite, but occurs in large amounts in some sections.

It occurs in quartz and in fractures in the pyrite often showing its characteristic diamond shaped crystal form. It also is greatly fissured and is healed by quartz and calcite.

QUARTZ. (SiO_2) This is the most abundant gangue mineral. It very often contains a good deal of ruby silver as inclusions and also occasional crystals of pyrite and arsenopyrite.

SPHALERITE. (ZnS) Sphalerite is quite abundant and occurs as irregular masses. It contains numerous inclusions of chalcopyrite and occasionally small inclusions of the silver sulphides.

GALENA. (PbS) This mineral is the last to be mentioned that is quantitatively abundant in the ore. It is found veining pyrite, arsenopyrite, and sphalerite. The galena nearly always contained inclusions of some of the silver sulphides, mainly pyrargerite and freibergite. Galena seems to be closely associated with the silver bearing minerals.

FREIBERGITE. (argentiferous tetrahedrite) Freibergite is probably the most abundant of the silver sulphides. It occurs as inclusions in galena and in fractures in pyrite, arsenopyrite and sphalerite. It is very closely associated with galena, pyrargerite, and native silver.

PYRARGERITE. (Ag_3SbS_3) This mineral is nearly as abundant as freibergite. It very often occurs as inclusions in

and associated with galena. It also occurs in small amounts with freibergite and native silver.

POLYBASITE. $(AgCu)_9SbS_4$ Polybasite occurs in small amounts intimately associated with pyrargerite and is very difficult to see unless etched. This is illustrated on plate IV.

CHALCOPYRITE. $(CuFeS_2)$ This mineral occurs in very small amounts as minute blebs in sphalerite and also in veinlets of calcite with the silver sulphides.

NATIVE SILVER. (Ag) Native silver occurs as an almost white mineral associated with pyrargerite and especially with freibergite. It is not as plentiful as these two minerals but nevertheless occurred in nearly all the sections examined.

CALCITE. $(CaCO_3)$ This mineral is next to quartz the most abundant gangue mineral. It occurs filling fractures in pyrite, arsenopyrite, sphalerite and galena. The silver sulphides, chalcopyrite and native silver seem to be most often found in veinlets of calcite.

PARAGENESIS.

Pyrite was the first mineral introduced. Some arsenopyrite was contemporaneous with pyrite and some was introduced immediately after. This is indicated by the fact that some of the arsenopyrite seems to be filling fractures in pyrite, although the rest is found contacting pyrite with smooth even boundaries. This is illustrated on plates

I and II. Both arsenopyrite and pyrite were fractured and then healed with quartz. More fracturing occurred and sphalerite was introduced. Some chalcopyrite is observed in the sphalerite and it is probably contemporaneous. Galena, ruby silver and freibergite then were introduced in fractures in pyrite, arsenopyrite and sphalerite as illustrated on Plates III and IV. Lastly more freibergite and ruby silver along with native silver, chalcopyrite and calcite were introduced and healed the fractures in the other minerals. This is illustrated on plates V, VI, VII, and VIII.

There is an indication of a second generation of quartz which may have occurred immediately after the galena was introduced. This is based on the fact that galena and pyrite occur engulfed in quartz as shown on Plate IX.

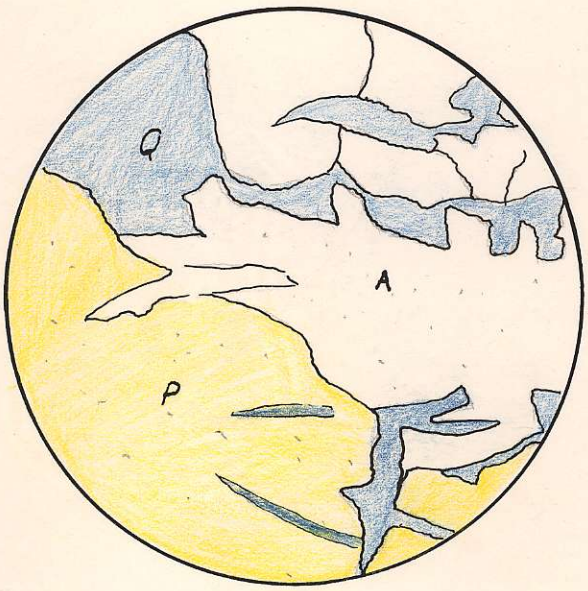
CONCLUSIONS.

1. The silver values are chiefly associated with galena, and are contributed largely by freibergite, ruby silver and native silver.

2. The deposit is of the fissure type and the ore probably belongs to the mesothermal zone of deposition.

3. The silver bearing minerals give every indication of being primary, and other conditions being favourable there seems no reason why the ore body should not go to depth.

PLATE I SECTION 5



X 50

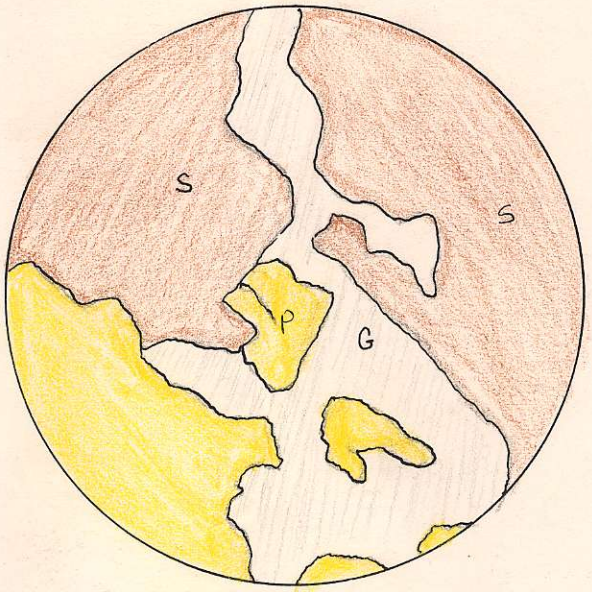
Section showing quartz (Q), veining pyrite (P), and arsenopyrite (A).

PLATE II SECTION 4

X 50

Section showing arsenopyrite (A), filling fractures in pyrite (P), and quartz (Q) healing fractures in pyrite and arsenopyrite.

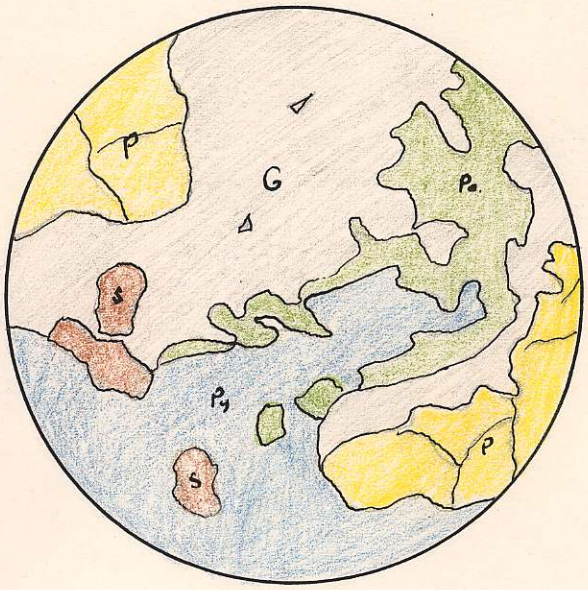
PLATE III SECTION 5



X 50

Section showing galena (G), veining sphalerite (S), and pyrite (P).

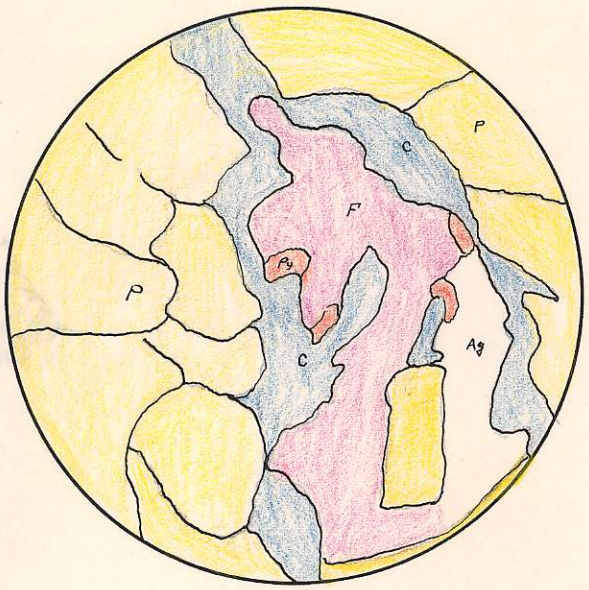
PLATE IV SECTION 3



X 50

Section showing galena (G), pyrargerite (Py), and polybasite (Po), veining pyrite (P).

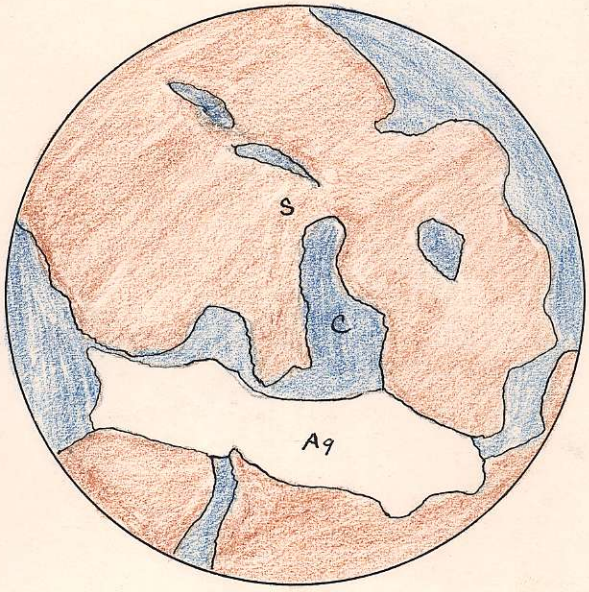
PLATE V SECTION 4



X 50

Section showing freibergite (F), pyrargerite (Py), native silver (Ag), and calcite (C), veining pyrite (P).

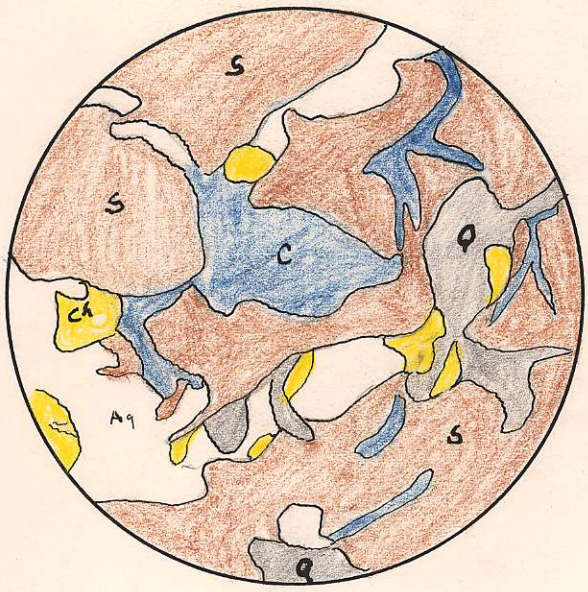
PLATE VI SECTION 7



X 50

Section showing calcite (C), and native silver (Ag), veining sphalerite (S).

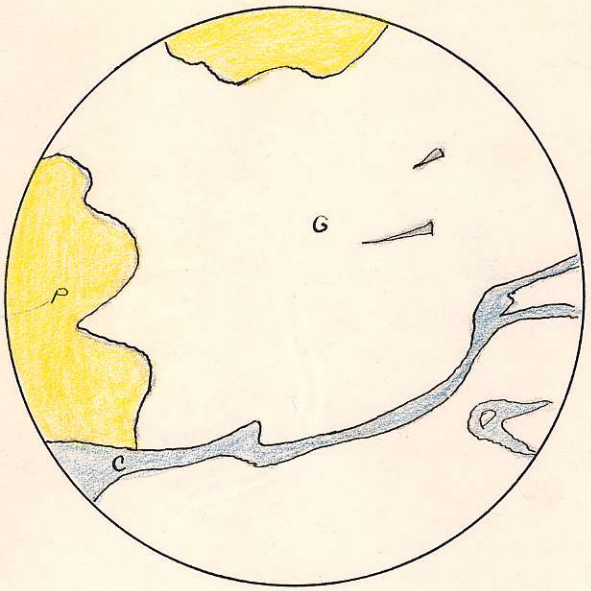
PLATE VII SECTION 7



X 50

Section showing native silver (Ag), chalcopyrite (Ch), calcite (C), and quartz (Q) veining sphalerite (S).

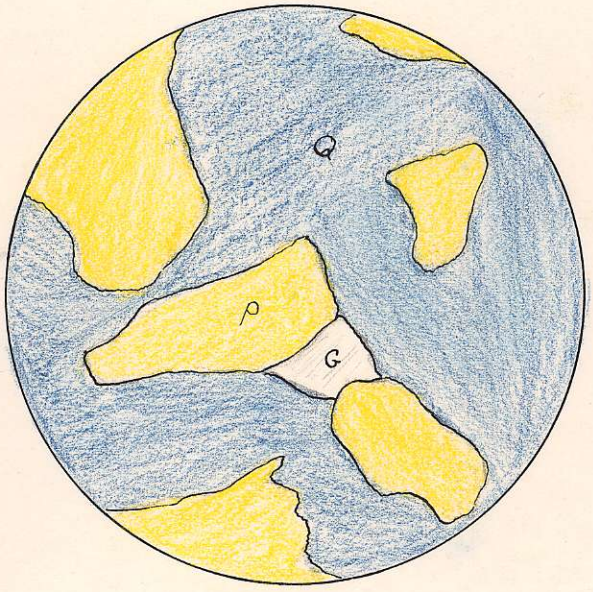
PLATE VIII SECTION 7



X 50

Section showing calcite (C) veining galena (G) and pyrite (P).

PLATE IX SECTION 5



X 50

Section showing second generation of quartz (Q), containing pyrite (P) and galena (G).