A MICROSCOPIC STUDY OF THE ORE OF THE CARIBOO HUDSON GOLD MINE BARKERVILLE DISTRICT, B.C.

by

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Acknowledgment

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LOCATION

The Cariboo Hudson group of claims is located in the Keithley Map Area, 25 miles southwest of Barkerville, at an elevation of 5,800 feet. Transportation is by truck from Barkerville to the base camp at Cunningham Creek, and then by wagon for the 6 miles from the base camp to the property. There is a plentiful supply of timber and of water near the mine.

GENERAL GEOLOGY

The property is situated in the youngest member of the Cariboo series, the Richfield formation. This consists of quartzites, argillites and limestones, so much metamorphosed that they are fissile and schistose and in some places altered to quartz sericite schists.

The deposit is in the form of a zone of veins and lenses of quartz, well mineralized with pyrite, sphalerite and galena. Some scheelite and ankerite occur in the quartz gangue.

CONCLUSIONS

From the work done on this ore, the following conclusions have been drawn:

1) The gold appears to be all in the free state in fractures in the pyrite, closely associated with the sphalerite and galena. No evidence of gold being contained in the body of the pyrite was seen.

2) The deposit is of the lower temperature type, with the gold the younger mineral, in accordance with the ores of the other mines in the district, the Cariboo Gold Quartz and the Island Mountain.

3) Since the gold occurs in the fractures, relatively coarse grinding should be sufficient to free the gold for cyanidation. The fractured state of the pyrite should result in low crushing costs.

4) A clean pyrite and galena product should be readily obtained, but the ~~pyrite~~ sphalerite would probably contain some galena and pyrite, due to the inclusions, away from all fractures, of these minerals in it.

5) The ore should be readily amenable to cyanidation, and flotation of the cyanide tailings should give a good recovery of the base metals.

ASSAYS

A number of assays were made of picked samples, some pure minerals, and others containing two or more minerals. The results were as follows:

Sample No.	Composition	Assay oz. au/ton
1	SiO_2	trace
2	PbS	trace
3	FeS_2	0.05
4	ZnS	0.40
5	PbS + FeS_2	2.00
6	ZnS + FeS_2	1.90
7	PbS + ZnS	0.10
8	FeS_2 + SiO_2	0.80
9	ZnS + SiO_2	4.55
10	Mixture FeS_2, PbS, ZnS, SiO_2	4.39
11	Fines	0.70
12	Coarse	0.90

It is seen from the above that practically all the values lie in the mixed minerals and not in the pure minerals themselves. This would point to the conclusion that the gold lies in the contacts of the minerals, or in fractures of one mineral which are healed with another mineral.

It might appear that No.4 assay, on sphalerite, does not bear this out, but subsequent microscopic work showed that the sphalerite contains a number of minute inclusions of pyrite and galena, so it would be extremely difficult to get a pure sample of sphalerite; and so that assay should be classed as a "mixture" rather than as a "pure mineral".

SUMMARY OF WORK

The minerals found in the sections studied were:

Pyrite
Sphalerite
Galena
Gold

The gangue was quartz.

The galena showed evidence of having another mineral very finely dispersed within it. With the equipment at hand, this could not be determined. One grain of another mineral was noted, but was not determined.

The pyrite all appears to be very badly shattered and fractured. It is evidently the oldest mineral; and since the surrounding minerals, quartz and sphalerite, do not show the same amount of fracturing, there must have been movement in the mineralized zone after the pyrite, and before the other minerals, were deposited. Possibly this movement was related to the second mineralization by the sphalerite and galena.

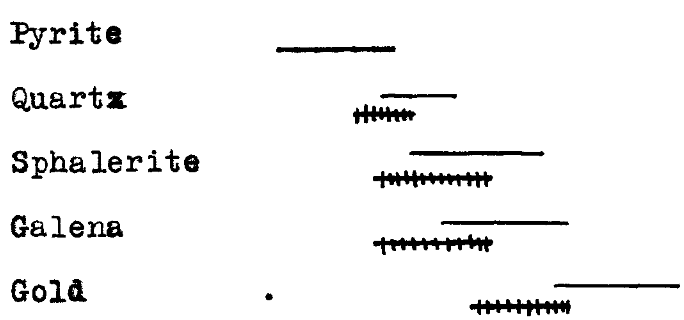
The sphalerite, intermediate in age between the pyrite and galena, is much more compact than the pyrite. In it are a large number of inclusions of pyrite and galena.

The galena appears to be the latest of the base metals, and the least abundant. It occurs mainly as stringers and tongues along pyrite-sphalerite, and sphalerite-quartz boundaries.

All the particles of gold seen were in fractures in the pyrite, or at pyrite-sphalerite contacts. The fractures also contained sphalerite and galena, or lead off from a sphalerite mass. No evidence was obtained, either visually or from the assays, of the gold being contained within the other minerals. In all instances, the gold appears to be the last mineral deposited.

PARAGENESIS

The following is the order of mineral deposition as shown in the slides studied:



Slide No. 1

This slide is approximately 50% mineral and 50% quartz. The quartz is badly fractured, with some of the main fractures running into the mineral mass.

Microscopically the mineral mass is composed of a fine mixture of galena, pyrite and sphalerite with some intermingled quartz.

The pyrite is apparently the first mineral, being in rounded or angular blocks, with the galena running into and around it. The sphalerite, mainly in one corner, is also interlaced with the galena. Blocks of the pyrite also appear in the sphalerite, indicating the order pyrite, sphalerite and galena for the mineral deposition. (Fig.1) The galena appears as filling in the fractures in the quartz, while there are usually definite, sharp boundaries between the pyrite and the quartz.

In some cases the fracture-filling galena will include some grains of pyrite. It is possible that the pyrite, although older than the quartz, has been carried into the fracture by the galena.

Slide No. 2

This section is approximately 50% sphalerite, of the dark brown variety, 40% pyrite and 10% galena. The sphalerite -pyrite contact is quite irregular, with stringers of sphalerite running into the pyrite, while the galena-pyrite contact is more regular.

Microscopically the pyrite is much fractured, with the larger fractures filled with quartz, and some galena and sphalerite. The sphalerite is quite dense, with only a few large fractures, and it contains a number of blebs of galena.

Two pieces of gold were seen in this slide, the first (Fig.2) contained largely in the sphalerite, but with one side in contact with the pyrite, and the second (Fig.3) in a fracture in the pyrite, leading off from a mass of sphalerite. In the first case the gold has either replaced, or filled a fracture in the sphalerite, and a tongue of it runs along the pyrite-sphalerite contact. The gold is evidently the latest mineral in both instances.

Slide No. 3

Megascopically this slide is mainly quartz with several stringers of galena running through it. A little pyrite and sphalerite are present in the corners.

Microscopically the pyrite is badly fractured, with quartz stringers running in from the main mass and cementing the pyrite together. The sphalerite contains small grains of pyrite within it, and appears to be more or less contemporaneous with the quartz around it.

The galena is later than the quartz, filling fractures in it and in some cases replacing it. An illustration of the latter is shown in Fig. 4. The galena has worked its way into the quartz without following a definite visible fracture.

Section No. 4 Bakelite Section

Two pieces of the ore are contained in the bakelite, both of similar character, largely quartz and sphalerite.

Microscopically, the sphalerite is dotted with particles of pyrite and galena, with a predominance of the former. Some of these are quite large sized crystals, while others are so small as to appear like dust in the sphalerite. (Fig.5) There are some particles of pyrite in the quartz, also. Megascopically there appears to be a definite boundary between the quartz and sphalerite; but under the microscope, there are inclusions of quartz all through the sphalerite.

The galena appears to have come in mainly along the sphalerite-quartz contact.

In this section, some of the quartz is older than the sphalerite, the latter extending as tongues and bays into the quartz. (Fig.6) There is no pyrite present to establish the relation between this quartz and the pyrite.

Slide No. 5

Megascopically this slide is about 80% pyrite, 12% sphalerite, and the rest mainly galena, with a little quartz. The pyrite is badly fractured, much more so that the sphalerite and galena.

Microscopically the pyrite is just a mass of fractures, healed with sphalerite and some quartz. In the mass of the pyrite, the filling is largely quartz, while near the sphalerite this mineral has filled up the fractures.

Several pieces of gold were seen, one in a fracture of the pyrite at the tip of a sphalerite tongue (Fig.7) and another in a fracture in the pyrite, with the rest of the fracture filled with sphalerite and galena.

Slide No.6 Bakelite

Megascopically this section contains pyrite, sphalerite, quartz and galena, in that order of abundance.

Excepting two particles of gold, nothing of interest was found in this slide. Both particles were in fractures of the pyrite, with galena and sphalerite present in the same fractures.

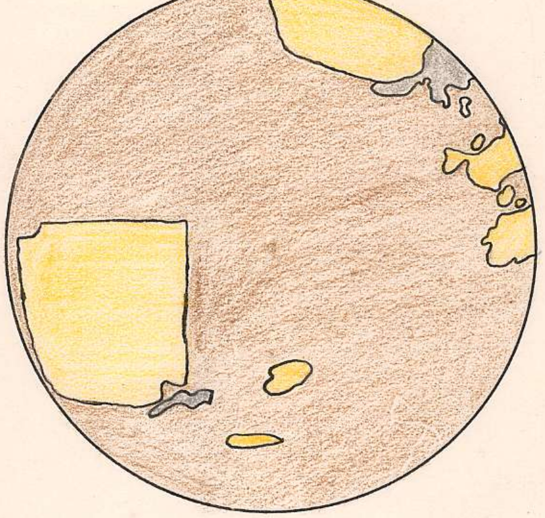


FIG. № 1.

FIG. № 2.

Sphalerite

Pyrite

Galena.

Gold

Quartz

FIG. № 3

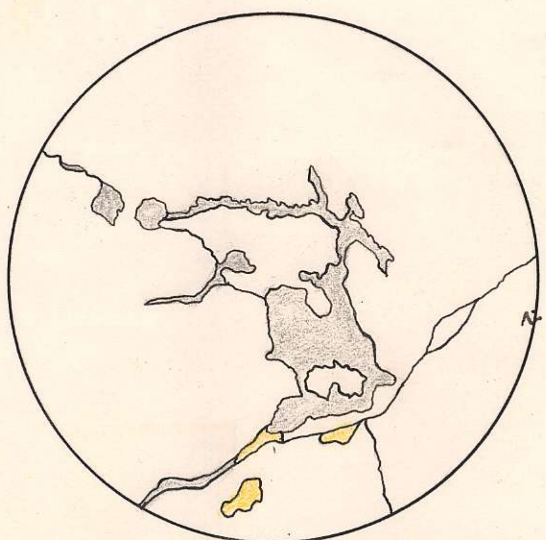


FIG. № 4.

Sphalerite.

Pyrite.

Galena

Gold.

Quartz

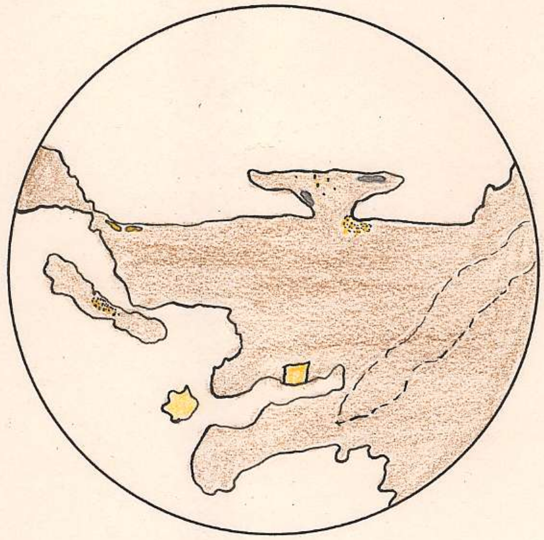


FIG. № 5

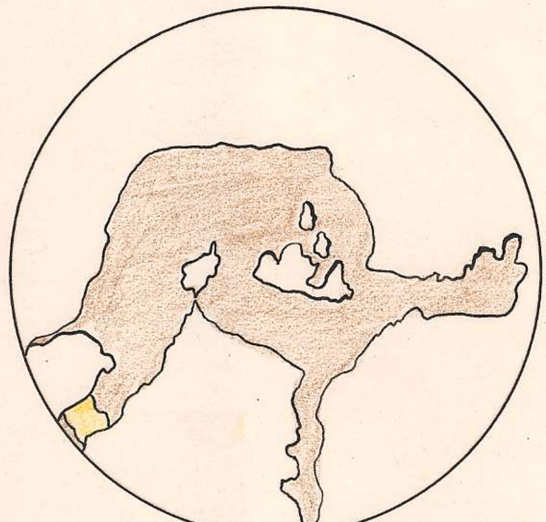


FIG. № 6.

Sphalerite

Pyrite

Galena

Gold

Quartz

FIG. Nº 7

Sphalerite
Pyrite
Galena
Gold
Quartz