A MINERAGRAPHIC STUDY

600049

OF ORE FROM

THE CARIBOO HUDSON MINE,

Cariboo district, British Columbia.

by

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CONTENTS.

INTRODUCTION.

GENERAL STATEMENT.

This report is based upon study of polished sections of Cariboo Hudson ore. The ore is extremely friable and polished sections could only be obtained by mounting the specimens. The work was done under the supervision of Dr. H.V. Warren. Particular attention was given to the occurrence and associations of gold and the paragenesis of the minerals. The percentage of sulphide and gangue minerals was roughly estimated for each polished section. As the sections were made from one piece of ore, these percentages would not be of any particular economic importance. The writer was able to find only brief descriptions of the deposit in the mining literature, and has attempted to exclude all but the more pertinent features of the general geology.

LOCATION OF THE MINE.

The Cariboo Hudson property, which is rapidly approaching the status of a mine, is situated in the Cariboo gold belt in central British Columbia. The group is located at the head of Harvey and Cunningham Creeks, approximately twenty miles southeast of Barkerville, which is situated in the centre of the mining area, and is 260 miles north and 60 miles east of Vancouver. Barkerville is reached by a good motor-road, 50 miles in length, from

Quesnel, which is the northern terminal of the Pacific Great Eastern Railway. Quesnel is served also by a motor-highway which connects with the Canadian Pacific Railway, Canadian National Railway, and the Trans-Provincial Highway at Ashcroft, 200 miles east of Vancouver.

GEOLOGY.

GENERAL GEOLOGY OF THE DISTRICT.

The geology of the Cariboo district was first studied by Amos Bowman (1) in 1885. In 1932, W.L. Uglow (2) mapped a much smaller area in the near vicinity of the rich placer fields of Barkerville.

Dr. Dolmage (3) says, "All of the gold veins, as well as the placer deposits, lie within the confines of one series of very old rocks, called by Bowman, the "Cariboo Schists"and by Uglow the "Cariboo series". Bowman considered them to be of Lower Paleozoic age, while Uglow assigns them doubtfully to the pre-Cambrian. Uglow divides the series into ~~the~~ three formations, named from bottom to top, Richfield, Barkerville, and Pleasant Valley. The Richfield is much the largest, exceeding the others in both areal distribution and thickness. It occupies the southwestern portion of the area and contains all of the lode gold deposits which have yet been proved to have commercial possibilities, and likewise all the placer deposits of

1. Bowman, Amos,--Rep't. on the Geology of the Mining District of Cariboo, B.C., Geol. Surv. Can., Ann. Rep't., Vol.111, Pt. 1, 1887-88, pp.1C--49C.

value, excepting those parts of the placers which have been transported by the streams across the boundary separating the Richfield from the next over-lying formation (Barkerville). Therefore, the geology of the gold veins of Cariboo has to do almost exclusively with this one formation.

It is made up of "massive quartzite, quartz slate, quartz sericite schist, sericite schist, carbonaceous and clay slate, with minor incalations of limestone, calcareous argillite, and silicified tuff." The formation is generally referred to as the Cariboo schists, although schists constitute only a small portion of the total. However, it is in the most schistose sections that the main gold-belt is situated. Both in the schistose and non-schistose parts of the formation, great difficulty has been found in trying to delineate the various beds which make up the formation, partly because of a scarcity of outcrops, but more especially because of the obscurity of bedding planes and the extreme shortness of the lenses which make up the beds.

The next overlying formation is the Barkerville. Two bands, each averaging about one mile in width, extend along the northeastern part of the area, following in a general way the major factonic line of the Canadian cordillera but coalescing southeastern in the part of the map-area. This formation is composed mainly

(From previous page)

2. Uglow, W.L., and Johnson, W.A., -Placer and Vein Gold Dep's. of Barkerville, Car. Dist., B.C., Geol. Surv., Can., Memoir 149, 1926.

3. Dolmage, V.,--The Cariboo and Bridge River Goldfields, B.C., Canadian Mining and Metallurgical Bulletin, August 1934, pp. 410--412.

of limestone, which has been classified by Uglow into a "thickly bedded, fine-grained, massive grey, unmetamorphosed type, and a medium grained, buff-colored crystalline type." In places, these beds are autoclastic, but they are not schistose. They contain no known ore deposits, but had an important influence on the localization, in certain restricted parts of the underlying Richfield formation, of the fracture zone in which the ore deposits were formed.

Overlying the Barkerville limestones, is the Pleasant Valley formation, also distributed in two parallel belts which conform in strike with, and alternate with, the two bands of Barkerville limestones. This formation is essentially argillaceous, the dominant type being a clay slate varying in colour from grey to pale brown to black, and possessing a well developed cleavage. Lenses and veins of quartz occur abundantly throughout this formation but none of these have yet been proved to be ore-bearing.

Dr. Uglow's most valuable contribution to our knowledge of the ore deposits of this district, consists in his recognition of two sets of veins, differing from one another in attitude, size, composition, and age, and only the younger of which carries commercial gold values. He named the non-commercial veins A veins and the productive ones B veins.

GENERAL CHARACTER OF THE ORE DEPOSIT.

Cockfield and Lang (4) presented notes in 1937 on the recent development of mineral properties of the Cariboo district. Their entire comment on Cariboo Hudson is "The deposit is in the form of a zone ofveins and lenses of quartz and has been traced at intervals in a di rection about south 45 degrees east for some 500 feet. Other veins, uncovered 1,000 feet still farther to the southeast, may represent the continuation of the same zone. One short adit has been driven in the hanging-wall of one of the veins, which at the surface has a maximum width of seven feet and is well mineralized with pyrite and galena, the sulphides probably averaging about ten per cent of the vein matter. Scheelite and ankerite occur as gangue minerals.

At the face the adit is off the main vein, but a number of stringers are exposed in rusty schist."

During a personal conversation with Dr. Cockfield the writer was informed that the deposit was in the Richfield formation, but that the veins were not the A or B type. Further work will probably disclose a new type of vein.

(4) Cockfield, W.E., and Lang, A.H.,--Geology and Mineral Developments of Cariboo Dis't., B. C., The Can. Inst. of Mining & Metallurgy 1937, p.469.

MINERALOGY

DESCRIPTION OF MINERALS.

The following minerals were identified:-

Pyrite

Sphalerite

Galena

Gold

Quartz

Pyrite (FeS_2) - Pyrite is the most conspicuous mineral of the ore and is highly fractured. The fractures have been healed by other sulphides and quartz and all the gold observed was in these fractures.

Sphalerite (ZnS) - Sphalerite is relatively abundant as irregular masses in pyrite where it is veined by galena and quartz, and also in narrow fractures in pyrite where it is intimately mixed with galena and quartz. Some fractures in the pyrite were observed to be cemented by sphalerite only.

Galena (PbS) - Galena has the same general distribution as sphalerite and is present in almost the same quantities. Relatively long inlets of galena occur in fractures in the pyrite, and contain crystals and irregular masses of pyrite, and sphalerite. Galena also replaces patches of sphalerite causing

irregular contacts. Near the contacts, small particles of sphaleritecould be seen by reflected light to grade into the galena. In several sections, galena is observed veining quartz. Large patches of galena show two cleavages nearly at right angles. Stress has caused bulging of the crystals--giving the cleavage lines a peculiar curved appearance.

Gold (Au) - Metallic gold was noted in fractures in the pyrite; particularly at the head of inlets of galena, where it occurs in veinlets associated with sphalerite and quartz. One relatively large concentration of gold was observed at the intersection of several veinlets of quartz, which occupied fractures in the pyrite. The gold is dark in color, and rather difficult to locate. It reacts readily with potassium cyanide.

Quartz (SiO_2) - Quartz is the only conspicuous gangue mineral. It appears to have been introduced at different times, although the apparent generations may be due to recrystallization. At least some of the quartz has been recrystallized as evidenced by radiating needle-like crystals at contacts. One generation of quartz is quite dark in colour. It is fractured and veined by galena and i n places by a much

lighter colored quartz. The contacts between the light and dark quartz were free from any other minerals. The lighter colored quartz was not observed to be fractured. The writer believes only one generation of quartz is present and that the lighter quartz represents a recrystallized phase.

PARAGENESIS.

The following paragenesis is suggested:-

(1) (oldest) Pyrite

(2) Fracturing

(3) Sphalerite and quartz

(4) Fracturing

(5) Galena and gold, and recrystallized quartz.

DESCRIPTION OF POLISHED SECTIONS.

Polished Section #A.

This section consists of:-

Pyrite	45%
Sphalerite	25%
Galena	20%
Gold	<1%
Quartz	9%

The pyrite is highly fractured and is veined by sphalerite, galena and quartz, which also occupy large relatively homogeneous patches in the section.

Two concentrations of gold were observed in this section and are shown in detail in views number (1) and (2).

View number (3) shows fractured quartz veined by galena and quartz which is assumed to be recrystallized.

View number (4) shows fractured quartz veined by galena and recrystallized quartz. This quartz showed crystals at contacts.

60x

PYRITE

GALENA

SPHALERITE

GOLD

SECTION # A--VIEW # (1)

Shows fractured pyrite, veined by galena and sphalerite. The gold was readily visible at the head of an inlet of galena and occurs in a veinlet with sphalerite.

60 x

PYRITE

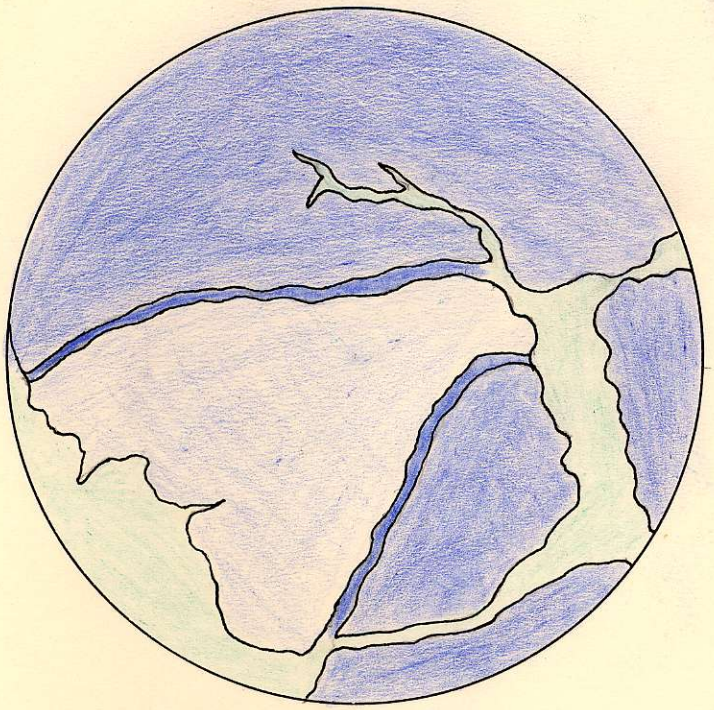
QUARTZ

GOLD

SECTION # A --VIEW # (2)

Shows fractured pyrite, veined by quartz. A large spot of gold occupies the intersection of several quartz veinlets.

60 x



QUARTZ

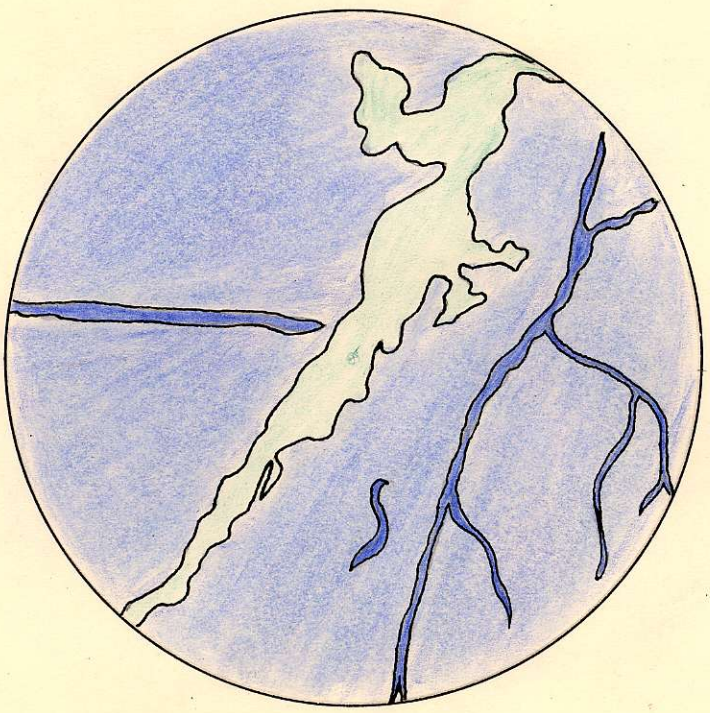
QUARTZ (secondary)

GALENA

SECTION # A - VIEW # (3)

Shows fractured quartz, veined by galena and quartz which is assumed to be recrystallized.

60x



QUARTZ

GALENA

SECTION # A -- VIEW # (4)

Shows quartz fractured and veined by galena and recrystallized quartz.

POLISHED SECTION # B.

		%
The section consists of	Pyrite	90
	Galena	2%
	Quartz	7%
	Sphalerite	<1%

The pyrite is highly fractured and is veined by quartz and galena. The galena occurs in two principal fractures, and shows the effect of stress. It replaces pyrite, and quartz to some extent, and is not fractured.

The pyrite is mainly cemented with quartz. Extremely small amounts of sphalerite accompany the quartz, which is fractured to a much less extent than the pyrite.

Gold was not observed in this section.

POLISHED SECTION # C

This section consists of :- Pyrite 75%
Galena 18%
Quartz 5%
Sphalerite 2%

The pyrite is highly fractured and is veined by sphalerite, galena and quartz. View # 1 shows sphalerite replacing pyrite and galena replacing sphalerite and pyrite. Quartz and sphalerite are intimately mixed in fractures in the pyrite, making it difficult to determine their order of introduction.

View # 2 shows quartz replacing pyrite and galena replacing qaurtz.

The quartz is fractured to a small extent--the fracturesbeing healed by quartz.

Gold was not observed in this section.

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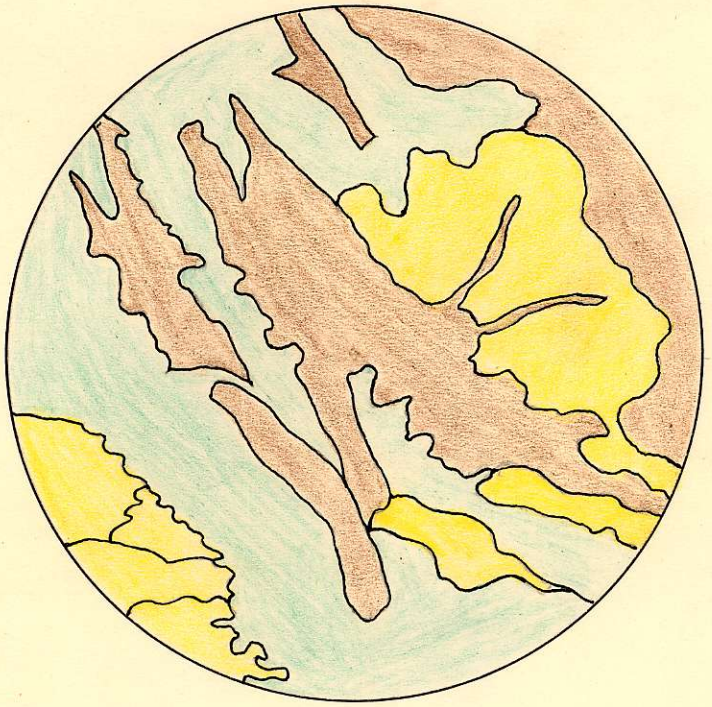
60 x



PYRITE

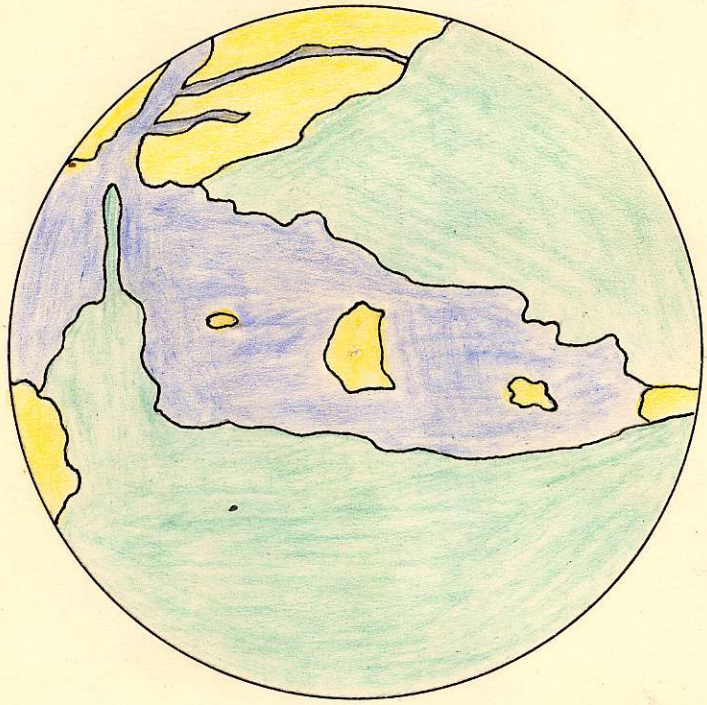
SPHALERITE

GALENA

SECTION # C- VIEW # (1)

Shows sphalerite replacing pyrite and galena replacing sphalerite and pyrite.

60 x



GALENA

QUARTZ

PYRITE

SECTION # C -- VIEW # 2.

Shows quartz replacing pyrite and galena replacing quartz.

The following sections, namely; D-E-F-G-H-I and J, confirmed the relations illustrated in the views of sections A and C and did not show any additional relationships.

Gold was observed only in section A. The approximate percentages of minerals is given for the sections.

SECTION "D" -	Consists of	Pyrite	60%
		Sphalerite	15%
		Galena	15%
		Quartz	10%
SECTION "E" -	Consists of	Pyrite	45%
		Galena	35%
		Sphalerite	10%
		Quartz	10%
SECTION "F" -	Consists of	Galena	60%
		Pyrite	22%
		Sphalerite	13%
		Quartz	5%
SECTION "G" -	Consists of	Quartz	80%
		Galena	19%
		Sphalerite and Pyrite	1%

SECTION "H" -	Consists of	Pyrite	45%
		Sphalerite	40%
		Galena	15%
SECTION "I" -	Consists of	Quartz	60%
		Sphalerite	30%
		Pyrite	6%
		Galena	4%
SECTION "J" -	Consists of	Pyrite	75%
		Sphalerite	15%
		Galena	10%

CONCLUSION

It is unfortunate that only one section contained gold. Where gold was observed it occurred in fractures in the pyrite and was associated with galena and sphalerite in one case, and quartz in another. The position of the gold at the head of inlets of galena, in veinlets with sphalerite, suggest the gold and galena are contemporaneous and that the gold has replaced the sphalerite.

The writer hesitates to offer an explamation for the occurrence of gold with quartz. Secondary minerals are not present, so the gold may be assumed to be primary.

Pyrite is definitely the oldest mineral, as it is highly fractured and veined by all other minerals.

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