GEOLOGY 9 REPORT

on

MICROSCOPIC EXAMINATION OF ORE SAMPLES taken from the B.D.Q. GOLD PROSPECT FRANKLIN RIVER, B. C.

Submitted by
Wilfrid O. Williams
Geological Engineering '39
The University of British Columbia
April 1939.

----------oOo----------

CONTENTS

ILLUSTRATIONS

------oOo------

Report to be accompanied by eight polished sections, and hand specimens of the ore.

------oOo------

GEOLOGY 9 REPORT

on

ORE MINERALS

of the

B.D.Q. GOLD PROSPECT.

INTRODUCTION

The following is a report of observations made from microscopic examination of polished sections of ore samples taken from the B.D.Q. gold prospect, Alberni Mining Division, B. C. The object of study was to determine the paragenesis of the ore minerals and to discover the association and mode of occurrence of the gold.

The property is owned by A. E. Sprange, of Vancouver, B. C. It is located on Granite Creek, a tributary of Franklin River, which flows northward into Alberni Canal at a point about 10 miles south of Alberni. The deposit was discovered only a few months ago, early in 1939, and so probably is not yet listed in any standard report. The first claims in the district, however, were staked in the 1890's. One of these first-found prospects is the "W.W.W.;" It is the closest property to the "B.D.Q." Probably the next nearest is the "Havilah" claim.

GENERAL GEOLOGY.

Franklin River cuts mostly through rocks which are mapped[1] by C. H. Clapp as "Saanich Granodiorite." This formation occurs in several large patches throughout the map-area, cutting the rocks of the "Vancouver Volcanics" formation. The following notes on this formation are taken from the map sheet: "(Largely Lower Jurassic but probably including Middle Jurassic, Triassic and possibly Palaeozoic members.) Metamorphic andesite, augite andesite, amygdaloids, porphyries, tuffs and breccias with dacite tuffs and intrusive dikes and sills of andesite and basalt porphyrites."

[1] Map 17A. "Southern Vancouver Island, British Columbia." Scale 6 miles to 1 inch. G.S.C., 1911.

The body of Saanich Granodiorite which underlies the Franklin River intrudes rocks of this volcanic formation. The B.D.Q. mineral deposit lies on a contact of these two formations, west of the head of Granite creek.

MINERALOGY.

Pyrite

The pyrite of the examined sections is found to be both massive and crystalline, and is intimately associated with arsenopyrite and, in some places, quartz. Some sections show massive pyrite enveloping crystals of quartz,

therefore the introduction of the pyrite was probably preceded by a deposition of quartz. Likely a small amount of quartz also came in with the pyrite.

Pyrite occurs also in another form. Here and there in several of the sections examined appear particles of a bright, metallic mineral, with a peculiar shell-like structure, associated with masses of pyrrhotite (see Fig. 1.) Tiny veinlets of it seem to be intergrown with the pyrrhotite. The structure of this mineral is suggestive of marcasite, but none of its exposed sections show even slight anisotropism; etch tests give the same result as for pyrite. At the time of deposition with the pyrrhotite, the form of this mineral was probably marcasite, but since that time it has evidently been altered to pyrite.

Arsenopyrite.

As stated above, the arsenopyrite is found closely associated with the pyrite; like the pyrite it occurs in both massive and crystalline forms. Its deposition has been contemporaneous with that of pyrite. Evidence of this may be seen in Fig. II which shows pyrite and arsenopyrite crystals in juxtaposition, and fractured permitting the intrusion of a later quartz.

Quartz.

Quartz appears to have been deposited during only the

early stages of mineralization of the B.D.Q. mineral zone. Crystals of it are found enveloped by pyrite and later minerals, showing that it was probably the first mineral to be deposited. Some of it fills fractures in pyrite and arsenopyrite (Figs. II and III), and therefore came in subsequent to these minerals. Quartz of this later stage is seen to contain fragments of the "shell-like" pyrite (pseudomorph after marcasite, (seen in section #8) and also, blebs of chalcopyrite and sphalerite (Fig. III), showing that it was later than this pyrrhotite (described below) and that it brought in some chalcopyrite and sphalerite.

The latest non-metallic gangue mineral to enter the zone was a soft, white mineral, probably barite. Further reference to it is made below.

Pyrrhotite.

Pyrrhotite seems to have been deposited during two stages. Section #8 shows fragments of pyrrhotite and altered marcasite (?) included in quartz, therefore some of these minerals were deposited before the end of the quartz stage. This early-stage-pyrrhotite and marcasite (?) is seen (in Fig. IV) to be fractured admitting veins of the later, soft white gangue mineral.

The later pyrrhotite is that which occurs with the late sphalerite, chalcopyrite and galena (see Figs. V to VIII). The smooth contacts of these minerals, and their association

with the soft gangue where all of them fill fractures and cavities in the shattered quartz, show contemporaneous deposition, and also show that these minerals formed after the termination of the quartz stage.

Sphalerite.

Wherever sphalerite occurs in the specimens it is intimately mixed with chalcopyrite. Only a small amount of these minerals came in with the quartz of the earlier periods. Most of it was deposited during the later periods of mineralization, when it came in with the soft gangue, galena, and late pyrrhotite. All sections of sphalerite are threaded with veinlets and blebs of chalcopyrite. Larger masses of these two minerals form smooth contacts with each other (Fig. V). Figs. V and VI show that these later minerals fill spaces in the older, fractured quartz.

Chalcopyrite.

The occurrence of this mineral is described in the above paragraph. It is fairly abundant in the specimens, and is found always with sphalerite -- smooth contacts seen in Fig. VI show contemporaneous deposition. This association of chalcopyrite with sphalerite is typical of many ores, and has led to the theory that the two minerals are often deposited in solid solution, after which, owing to supersaturation caused by later cooling, the chalcopyrite is separated from the sphalerite by unmixing.

Galena.

Small amounts of cubic galena are found scattered here and there in the specimens. The galena seems to belong only to the latest stage of mineralization -- that of the soft gangue -- whereas the other soft metallic minerals (pyrrhotite, sphalerite, and chalcopyrite) were introduced at both the early and later periods. It exhibits smooth boundaries with late chalcopyrite and pyrrhotite (Fig. VI), and also occupies parts of the same spaces in the fractured quartz; therefore is contemporaneous with these other sulphides.

One section shows galena cutting sphalerite and pyrrhotite (Fig. VII). It appears, therefore, that the galena was among the last, if not the last mineral to enter the zone of the deposit.

Gold.

In spite of careful searching in the eight polished sections made of the specimens, the writer was able to find only one definite particle of gold. This occurred in the middle of a small mass of galena (Fig. VIII). Two samples of the specimens were assayed by Elliot A. Schmidt. One of these was mostly pyrrhotite, and showed a gold content of 0.08 ounces of gold per ton. The other was mostly sphalerite, containing some galena; it showed a gold content of 0.42 ounces per ton.

CONCLUSIONS.

The following diagram shows approximately the order of paragenesis of the minerals:

Paragenesis Diagram.

Quartz ————————————————————

Pyrite and Arsenopyrite ————————————

Pyrrhotite and Marcasite ————————————

Pyrrhotite, Chalcopyrite and Sphalerite ————————————————

Soft white gangue ————————————————

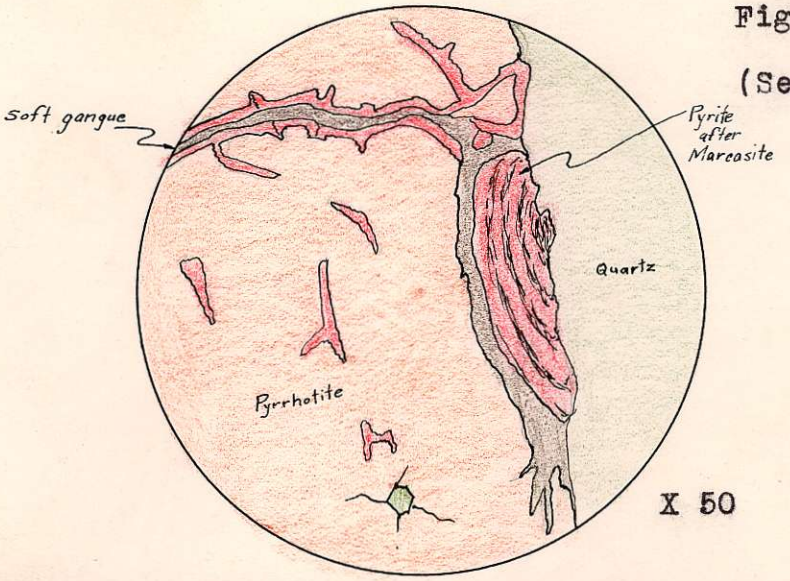
Galena and Gold ————————————————

It is noticed by those who have done development work on the property that the higher gold values occur in high-sphalerite rather than in high-pyrrhotite samples of the deposit. The only explanation for this as revealed in the polished sections would be that the galena, which probably carries the gold, is more plentiful where sphalerite is abundant. Most of the pyrrhotite may have come in during the early pyrrhotite stage, at which time no galena was introduced. Galena is seen to belong to the last mineral stage, when most of the sphalerite was deposited.

Assuming that the above is correct, it is safe to say that the richer ore will be found where sphalerite, and galena, are abundant.

Figure I.

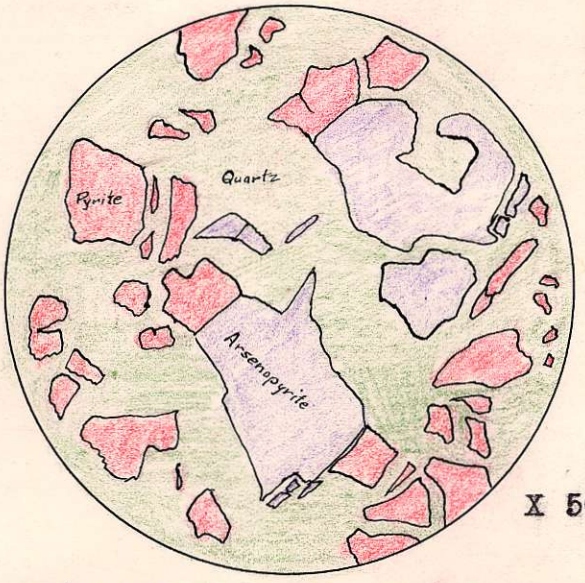
(Section #2)



Shows the soft gangue intruding pyrrhotite and "shell-like" pyrite (pseudomorph after marcasite.) Order: quartz crystal; pyrrhotite and marcasite; massive quartz; soft gangue.

Figure II.

(Section #8)



Shows quartz intruding fractured arsenopyrite and pyrite. Arsenopyrite and pyrite crystals in juxtaposition show contemporaneous deposition.

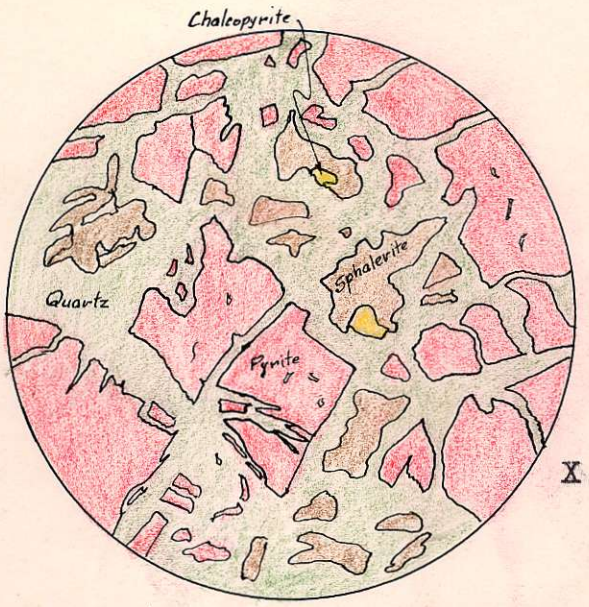


Figure III.

(Section #8)

X 50

Shows sphalerite and chalcopyrite-bearing quartz intruding fractured pyrite.

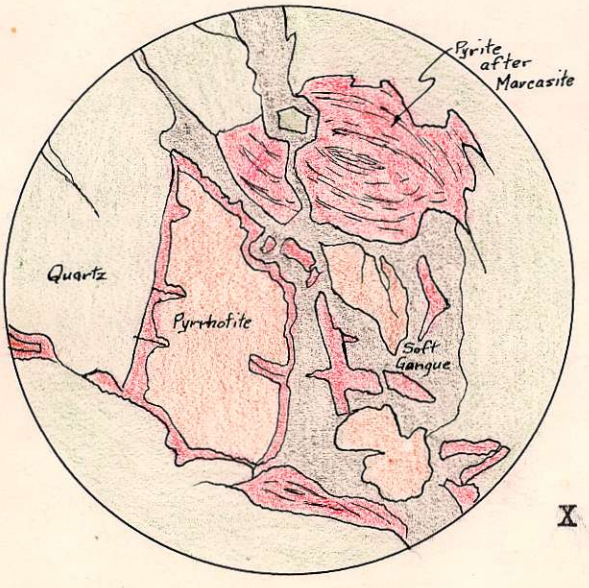


Figure IV.

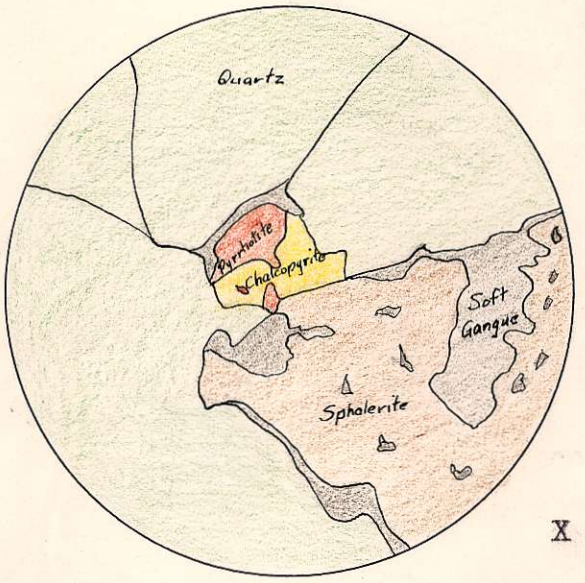
(Section #1a)

X 50

Shows the soft gangue intruding fractured pyrrhotite, marcasite (now pyrite) and quartz. Order: quartz crystal; pyrrhotite and marcasite; massive quartz; soft gangue.

Figure V.

(Section #4)

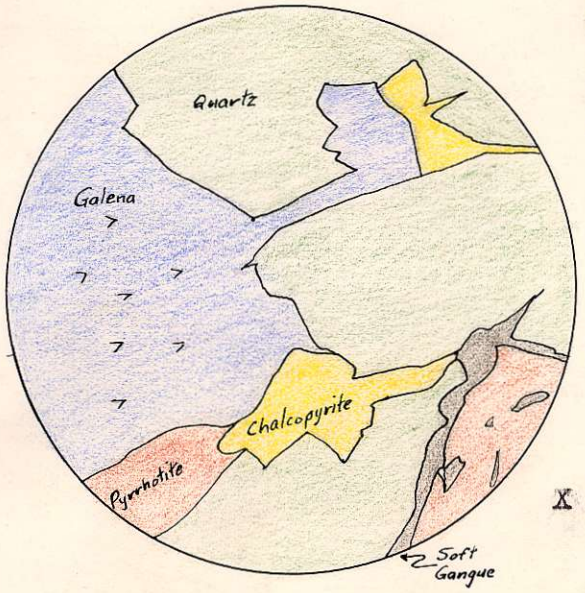


X 50

Shows the soft gangue with sphalerite, chalcopyrite, and pyrrhotite filling a cavity in fractured quartz.

Figure VI.

(Section #4)

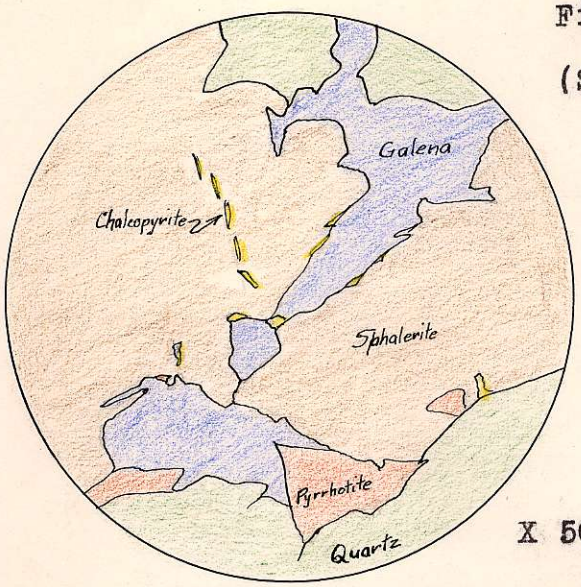


X 50

Shows the soft gangue with chalcopyrite, pyrrhotite, and galena filling cavities in fractured quartz.

Figure VII.

(Section #1a)

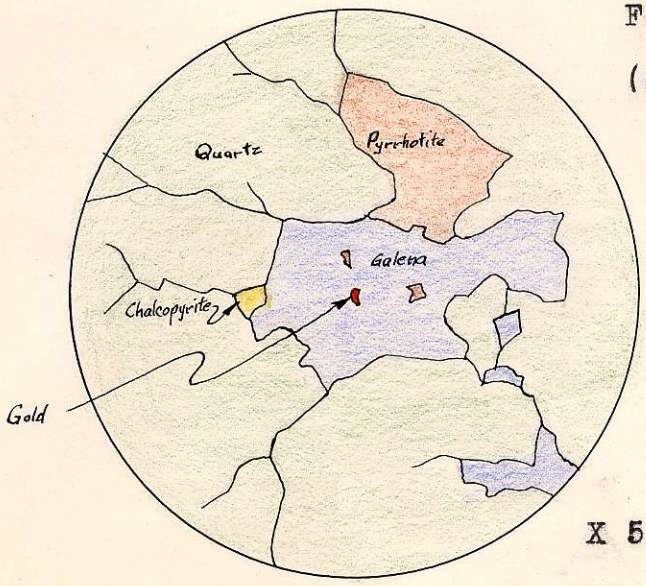


X 50

Shows a late intrusion of galena into sphalerite which, with chalcopyrite and pyrrhotite has filled a cavity in fractured quartz.

Figure VIII.

(Section #7)



X 50

Shows the occurrence of gold in galena.