It is obvious that the writer
did not read this after writing.
Spelling poor — feeble effort!

A STUDY OF THE ORE MINERALS OF THE FITZSIMMONS PROPERTY

50%?

ALTA LAKE

BRITISH COLUMBIA

A report submitted as partial
fulfilment of the Geology 409
Coarse at the University of
British Columbia.

LESTER RAYMOND CLARK

15 April 1951

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Lester R. Clark

15 April 1951

A B S T R A C T

Seven specimens of ore from the Fitzsimmon Group, Alta Lake, B.C. were studied to determine the mineralogy, associations, origin, and paragenesis. It is mainly a sphalerite - chalcopyrite ore but two specimens show a large percentage of galena. It is a high to medium temperature replacement type of ore (probably metasomatic) with good milling qualities.

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BRITISH COLUMBIA

Date of Examination

The ore specimen and the polished sections were studied during the winter session 1950-51 at the University of British Columbia.

Location of the Property

The Fitzsimmon group is situated on Fitzsimmon Creek, 4 miles from Alta Lake, which is on the Pacific Great Eastern Railroad at 2,200 feet elevation 40 miles north east of Squamish.

There is a good trail from the head of the lake to the property at 2,650 feet elevation.

History and Geology of the Property

The Fitzsimmons Group was staked in 1901 and Crown Granted in 1911. In 1918 the Property was bonded to the

Consolidated Mining, Smelting, and Power Company, of Trail. Since that time the Company has carried out an extensive program of trenching and diamond drilling.

The drilling and trenching showed that there were two main types of minerals present, a pyrite - zinc mineralization in a lime gangue and a pyrite - chalcopyrite mineralization in a contact metamorphic gangue of mainly epidote.

The zinc showings occur as massive out crops 30 feet wide. The intervening gangue was mostly pyritized limestone. Only a very few of these bodies went to any great depth.

The copper bearing rocks lie south of the zinc zone. There are some good surface out crops of chalcopyrite veins in this area but none of them go over a few feet.

Purpose of the Study

The purpose of the study was to learn the relationships of the minerals to each other, the Paragenesis of the ore, and to study the ore for ascertaining methods of milling.

Unmarked Section No. 1

Macroscopic Study

A study of the hand specimen shows the ore to be fine to medium grained massive sphalerite replacement with an abundance of coarsely crystaline pyrite present. There is a small amount of disseminated chalcopyrite present in both the pyrite and the sphalerite.

There is an area showing banding which might possibly be evidence of there having been replacement of bedded deposits.

Microscopic Study

Microscopic study of the polished section shows that there are but three minerals present in this specimen, The main mineral is sphalerite. It was identified by the internal reflection under an arc lamp and its negative reaction to all the etch reagents but HNO_3. The HNO_3 fumes tarnished the surface of the mineral.

The chalcopyrite is present in close relationship to the sphalerite. The chalcopyrite was identified by its low hardness, extremely good polish, brass yellow color, and the fact that it reacts to the etch tests the same way that sphalerite does.

The pyrite, identified by its shape, color, hardness, and its negative reaction to all reagents, occurs as highly fractured crystals.

Paragenesis

The pyrite was the first mineral deposited in the rock. It has been highly fractured and the sphalerite and chalcopyrite are encroaching on it through these cracks.

The sphalerite and chalcopyrite show contemporaneous deposition and now show an exsolution intergrowth of rounded blebs of sphalerite in chalcopyrite and similar blebs of chalcopyrite in the sphalerite. The largest percentage of the chalcopyrite is present along the contacts with the pyrite. This substantiates the supposition that the chalcopyrite and sphalerite replace the pyrite because the pyrite is there to supply the Fe and S for the chalcopyrite. This section shows a large percentage of pyrite. About 75% of the surface area is pyrite while 15% is sphalerite and 10% is chalcopyrite.

Unmarked Section No. 2

Macroscopic Study

The macroscopic study of this specimen shows it to be very similar if not identical to specimen 1. The banding mentioned in specimen 1 is not present in this specimen but this is probably due to the fact that the fragment of material is much smaller.

Microscopic Study

The only new information brought out by this section is that the siliceous gangue mineral replaces the pyrite and is in turn replaced by sphalerite and chalcopyrite. The sphalerite in contact with the pyrite is coarsely crystaline and has the reddish color denoting a high percentage of iron.

Paragenesis

The paragenesis of this specimen is very similar to that of specimen 1. The only difference is that the gangue mineral replaces the pyrite and is then replaced by sphalerite and chalcopyrite.

Section 1578E

Macroscopic Study

A macroscopic study with the hand lens shows only a massive fine to medium grained sphalerite in association with a silicate gangue mineral. The contact between the sphalerite and the gangue mineral is very irregular. There are some inclusions of the gangue in the sphalerite.

Microscopic Study

A microscopic study of the polished section shows it to be a massive replacement body of sphalrite in a siliceous gangue.

In the sphalrite are small blebs of chalcopyrite which vary in size from 1.5 microns to 135 microns.

Also present throughout the sphalrite and in the chalcopyrite are a number of crystals of arsinopyrite. The arsinopyrite was identified by its hardness, color, crystal form, anisotropism, and etch reactions. These crystals average about 70 microns.

Paragenesis

In this section the sphalerite and chalcopyrite show an exsolution intergrowth and are the first minerals to appear after the formation of the gangue. The arsenopyrite is the last mineral to appear.

Section 1579E

Macroscopic Study

Massive, fine grained sphalerite replacement in a siliceous gangue. This specimen is very similar to specimen 1578E.

Microscopic Study

The microscopic study of this section shows that it is almost identical to section 1578E. The only difference is in the size of the arsinopyrite crystal and the size of the chalcopyrite blebs in the sphalerite. The arsinopyrite crystals average about 80 microns in size and the chalcopyrite blebs vary from 2 microns to 150 microns. The greatest percentage of them are over 10 microns.

Paragenesis

The paragenesis of this specimen is essentially the same as in specimen 1578E.

Section 1536E

Macroscopic Study

The hand specimen is a piece of limestone with disseminated crystals of metallic minerals scattered throughout.

Microscopic Study recrystallized or what'?

A microscropic study of the polished section showed the specimen to be limestone with four minerals disseminated throughout it.

The main metallic mineral is pyrrhotite . It was identified by its lathe like crystals, strong anisotropism, pinkish yellow color, and hardness. Etch tests would not work on this mineral because the surface was too pitted for a reaction to be easily seen and the carbonate counteracted some of the reagents.

There was a small amount of replacement of the pyrrhotite by chalcopyrite at the ends of the lathes.

In numerous places there were irregular masses of boulangerite present some of which were in contact with the pyrrhotile. These

Identification

measured up to 45 microns. This mineral was identified by its softness, white color, fibrous form, and by microchemical tests for Pb and S6.

There were also a number of crystals of pyrite scattered throughout the section.

Paragenesis

The paragenesis of this specimen is difficult to ascertain because the individual minerals are seldom in contact with each other. There is evidence of the chalcopyrite being later than the pyrrhotite. Since the boulangerite has a low milling point it is plausible for the beulangerite to come later in the sequence than the chalcopyrite. Therefore, the sequence of deposition will be pyrrhotile, chalcopyrite, boulangerite and pyrite.

Section 1535A

Macroscopic Study

The hand specimen is a piece of coarsely crystaline galena and pyrite replacement of a siliceous gangue mineral. There is also a small amount of chalcopyrite present in association with the pyrite.

Microscopic Study

A microscopic study of the polished section shows a total of four metallic minerals present. These are galena, sphalerite, chalcopyrite, and pyrite.

The galena, identified by its softness, color, and the triangular pits on the surface, comprises the largest percentage of the metallic minerals. It is present in large masses and as small inclusions in the gangue and sphalerite. The chalcopyrite is present in small inclusions in the sphalerite and galena and as fairly large masses near the pyrite.

Paragenesis

The paragenesis of this ore seems to be - pyrite followed by galena and then followed by the sphalerite and chalcopyrite

Section 1535B

In all respects this section is the same as section 1535A.

Milling Qualities

The milling of these ores are quite high. The contacts between most of the minerals are regular and sharp giving rise to few middling particles. To make a complete separation of the minerals it would be necessary to grind past a 2 micron size but a grind of 10 micron size would allow a high percentage of separation.

What of the cost!

Conclusions

The ore from the Fitzsimmons Group is a high to medium temperature lead and zinc replacement ore in limestone. There is also a large amount of copper in the form of chalcopyrite present. If found in sufficeint quantities it would make good grade ore. The milling processes for the recovery of the minerals should be quite simple as the mineralogy is very simple.

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