Report on the Ore

of

THE WHITEWATER MINE.

For Geology 9

by

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CONTENTS

I N T R O D U C T I O N .

LOCATION.

The Whitewater mine is situated in the Ainsworth district of the Slocan Mining Division in south-eastern British Columbia. The mine is about 13 miles north-west of the town of Kaslo which is on the western shore of Kootenay Lake. A road connects the mine with the Canadian Pacific Railway station at Retallack which is about 1 mile away.

GENERAL GEOLOGY.[1]

The rocks in the vicinity of the mine are mostly carbonaceous slates, slaty argillites, and impure limestones. The beds lie towards the base of the limestone zone of the Slocan series, a zone which contains an abundance of slaty argillaceous rocks but which is particularly characterised by a number of thick limestone strata. Interbedded with the slate and limestone near the mine are a few beds of quartzite whose outcrops are commonly distinguished by their

1. Cairnes, C.E. — Geol. Surv., Can., Mem. 184.

grey color, massive structures, and by a network of quartz veins and lenses. The sediments strike from nearly east to southeast. The general dip is to the south or southeast, but the structure is complicated by minor folds and faults so that northerly dips are observable both underground and at the surface. A few basic dykes cut the various strata.

ORE DEPOSITS.

The ore deposits of the Whitewater mine are associated with a strong zone of fissuring and shearing which is referred to as the "Whitewater Lode". This lode varies from a foot or more to 50 or 60 feet in thickness and, in the upper levels it averages 5 feet wide. The mineralization is concentrated along the lode which occurs mainly in slaty, argillaceous sediments. The lode filling is composed of crushed rock, siderite, quartz, and other ore minerals which include galena, sphalerite, tetrahedrite, oxidized products, and some copper and iron pyrites.

MINERALOGY.

INTRODUCTION.

In the preparation of this report four samples of ore from various parts of the mine were examined;

A - a picked sample of tetrahedrite from the upper level.

1 galena and sphalerite from the 1472 stope.

4 sphalerite and siderite from J stope on the 13 th level.

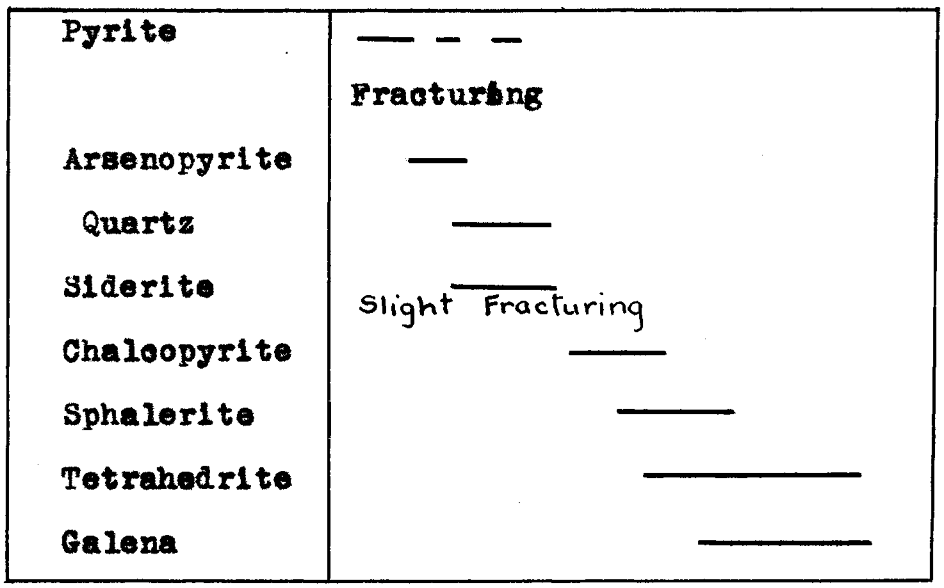
7 predominantly sphalerite with galena from the Larsen stope on the 9th level.

Polished sections were made of representative pieces from each sample of ore and these sections were examined under the microscope. From the study of the ore was obtained the information which follows.

Minerals Identified.

Eight minerals were identified in the ore examined. These are named in order of abundance: sphalerite, galena, pyrite, tetrahedrite, siderite, quartz, chalcopyrite, and arsenopyrite.

Paragenesis.



The first mineral to be deposited after the original shearing was the pyrite. After this had in part solidified there occurred another period of movementduring which the pyrite was fractured. The magma containing arsenopyrite, quartz, and siderite then flowed into the fracture zone and these minerals came out of solution in the order given. Again there was fracturing but this time very slight. The chalcopyrite then commenced to deposit and filled in some of the fractures in the pyrite and siderite. Soon sphalerite and tetrahedrite joined the chalcopyrite and these three sulfides were deposited simultaneously for a time. Later the chalcopyrite deposition was completed and the galena began to appear with the sphalerite and tetrahedrite. Next, the sphalerite source was exhausted and the tetrahedrite and galena continued to be deposited together for a short legnth of time.

PYRITE.

The pyrite occurs associated with all of the minerals identified in the polished sections. The largest mass was found in section # A. In this case the Pyrite was intensely fractured and the interstices were filled with quartz, chalcopyrite, sphalerite, and tetrahedrite (see diagram 1.) In nearly all other instances the pyrite was in the form of small euhedral and subhedral crystals scattered throughout the other minerals. Thefact that the fractures in the pyrite are filled with the other minerals and also that the pyrite occurs in regularly shaped crystals seems to indicate that the pyrite is the oldest mineral present in the ore.

ARSENOPYRITE.

Arsenopyrite was discovered only in section #4. Here it occurs as euhedral crystals in siderite and quartz and in a few places as masses surrounding and in part replacing crystals of pyrite. This evidence would place the arsenopyrite as being younger than the pyrite and older than the quarts and siderite.

Quartz.

The quartz , like the pyrite , is associated with all of the other minerals. It is found filling the fractures in the pyrite and as both subhedral and euhedral crystals in tetrahedrite, sphalerite, and galena. Such occurrences indicate that the quartz is later than the pyrite and older than the other sulfides.

Where quartz and siderite are in contact, sometimes the boundaries are straight and smooth and sometimes they are irregular. This would indicate that the quartz and siderite are contemporaneous.

The quartz is slightly fractured but not nearly as much as is the pyrite. Quartz is not abundant.

Siderite.

This mineral was only identified in sample # 4. In this section the siderite seems to be replacing pyrite. (see diagram 6.) The siderite is slightly fractured and the fractures are filled with chalcopyrite (see diagram 6.) , sphalerite, and galena. From the above facts it is evident that the siderite is younger than the pyrite but older than the chalcopyrite, sphalerite, and galena.

Chalcopyrite.

Chalcopyrite is found filling cracks in pyrite and siderite The largest masses are in the siderite. The mineral also occurs as very small rounded bodies in sphalerite and tetrahedrite. (see diagram 2.) and along the sphalerite-galena boundaries. (see diagram 3.) Apparently the chalcopyrite came in after the pyrite and siderite and was still being deposited when the sphalerite and tetrahedrite began to appear.

SPHALERITE.

Tge sphalerite is of the dark brown variety. It occurs very abundantly and was identified in all of the sections. It is present filling the fractures in pyrite and siderite and also as bodies which cut the quartz and siderite. From these facts it is assumed that the sphalerite is later than the pyrite, quartz, and siderite.

The relationship between the sphalerite and tetrahedrite would indicate that the two minerals are partly contemporaneous and in part the tetrahedrite is later. In most contacts, the boundaries are smooth butin one place (see diagram 2.) the tetrahedrite veins the sphalerite.

The galena-sphalerite relationship is similar to that of the tetrahedrite and sphalerite. In some places the boundaries between the two are smooth and straight (see diagram 3.) and in other places the galena appears to have replaced part of the sphalerite (see diagram 4.). Apparently the sphalerite and galena are partially contemporaneous and in part the galena is younger than th e sphalerite.

The sphalerite contains chalcopyrite in numerous small blebs the most of which have smooth boundaries.

TETRAHEDRITE.

The tetrahedrite in this ore is of the variety"Freibergite". It fills the fissures in pyrite and siderite and contains euhedral quartz crystals. This indicates that the tetrahedrite is younger than these three minerals.

In regard to the relation to sphalerite, as explained previously, it appears that the tetrahedrite is partly contemporaneous with and partly later than that mineral. Like the sphalerite, the tetrahedrite contains small blebs of chalcopyrite but not so abundantly.

Tetrahedrite occurs in the galena as small inclusionsand also as large masses with smooth contacts. This would indicate that the two minerals are contemporaneous. In another case, however, galenaappears to replace tetrahedrite (see diagram 5.) This would make the galena partly later than the tetrahedrite.

GALENA.

The galena contains a few pyrite crystals and fills cracks in siderite. Such indications place the galena as younger than the pyrite and siderite.

As explainedpreviously, the gäena seems to be partly contemporaneous with the sphalerit and tetrahedrite and partly younger than both. Nowhere does the galena contain blebs of chalcopyrite as do the sphalerite and tetrahedrite.

C O N C L U S I O N.

The Whitewater mine was worked chiefly for the silver values which occur in the ore. One of the purposes of the examination of the ore was to attempt to determine where these silver values were located. To do this, crushed ore was hand picked and separate samples, as clean as could be selected with the aid of a hand lense, were taken of sphalerite, galena, and tetrahedrite. These samples were assayedfor silver and gave the following results;

1. Clean sphalerite;- 2.5 oz ag per ton
2. Clean galena ;- 93.75 oz ag per ton
3. Clean tetrahedrite;-4500 oz ag per ton[1]

Upon microscopic examination of specimens as taken for the assays it was seen that the galena contained as much as 2 to 3% of tetrahedrite (which would be approximately equivalent to 93 oz of silver per ton) whereas the sphalerite contained no visible tetrahedrite.From these results it is deduced that the silver values are almost all, if not all due to the occurrence of tetrahedrite or freibergite, as it is properly classified.

Diagram 1

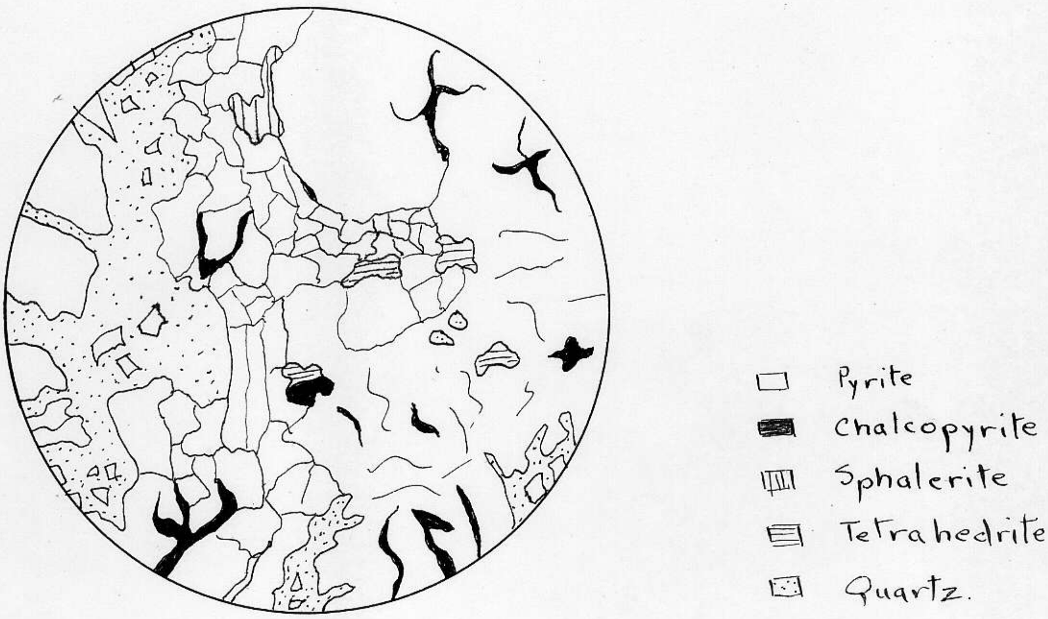


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Diagram 2.

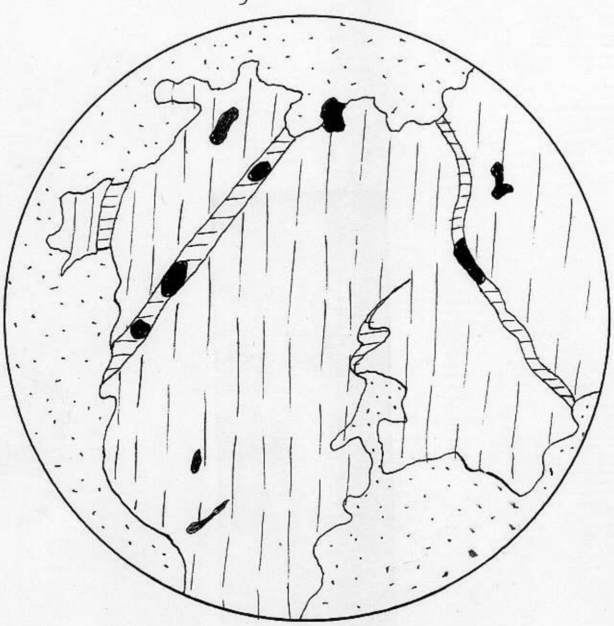

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Diagram 3.

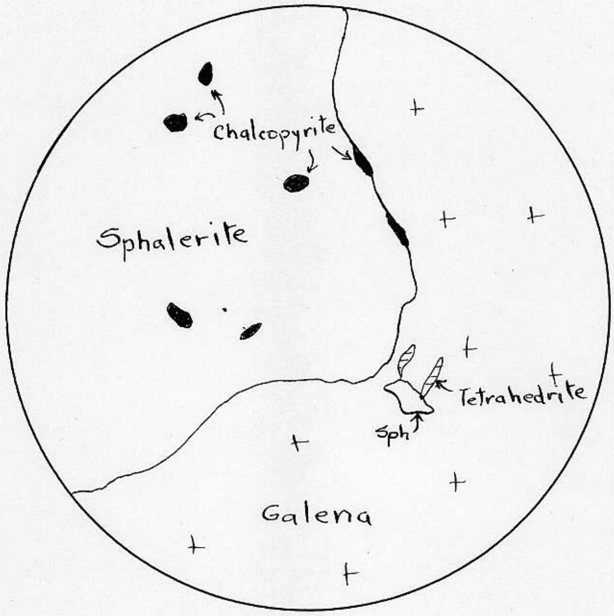

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Diagram 4.

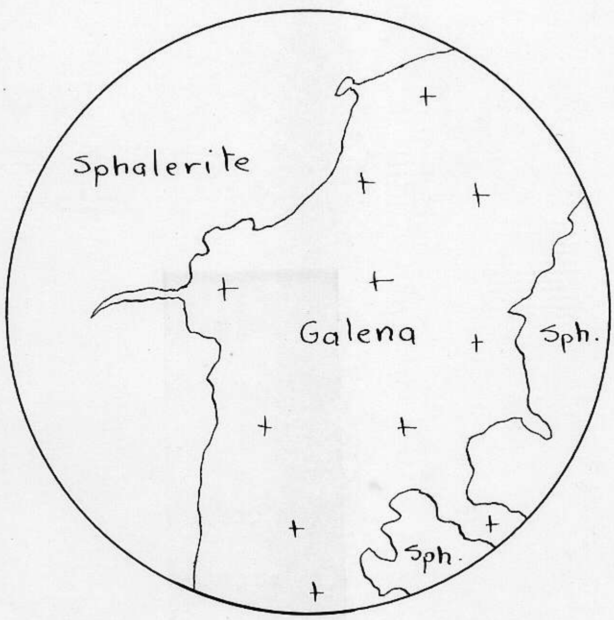

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Diagram 5.

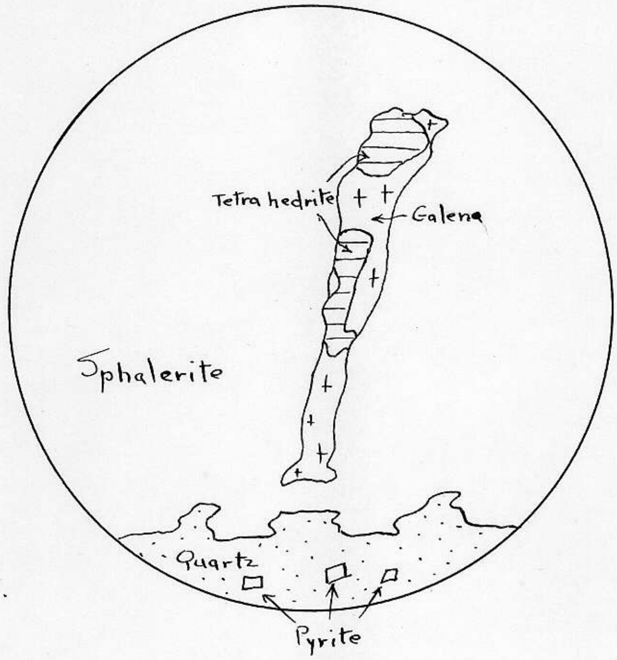

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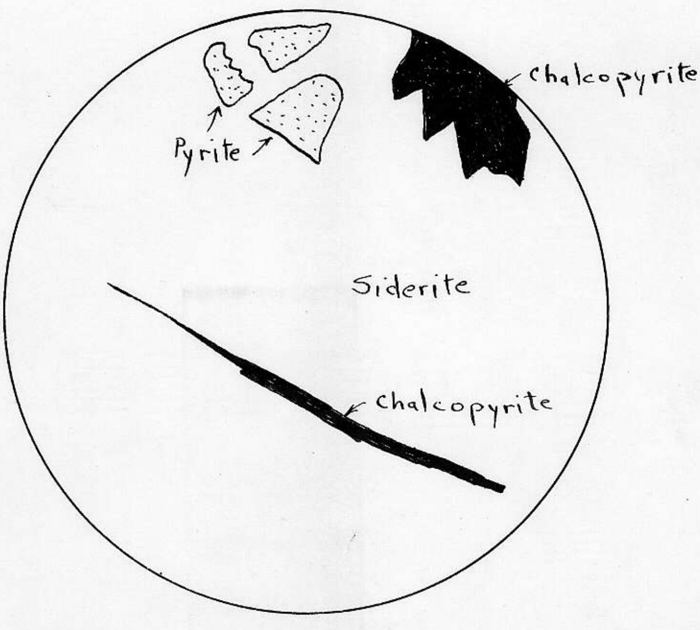
Diagram 6.



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