# GEOLOGY 24 REPORT



by

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Submitted as a Partial Requirement for

the Degree of

MASTER OF APPLIED SCIENCE

in the Department of

GEOLOGY

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The University of British Columbia

April, 1939

P A R T  A

A Mineralogical Study of the

SHEEP CREEK MINING CAMP

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INDEX

# INTRODUCTION

The following is a report on the study of ore from the Sheep Creek Gold Mining Camp. The ore came from the Kootenay Belle, Gold Belt, Sheep Creek and Reno mines.

The chief objects of the study were to determine the mode of occurrence of the gold and to see if there were any similarities or differences in the mineralogy of the various mines.

Laboratory procedure consisted of cutting, mounting and polishing sections of ore from different parts of the various mines. These sections were then examined under the microscope and the various minerals and their relationships were determined. The determination of the minerals was carried out by means of etch tests and microchemistry.

The work was carried out under the supervision of Dr. H.V. Warren as a partial requirement for the degree of Master of Applied Science in Geology.

# THE SHEEP CREEK MINING CAMP

## Location

The Sheep Creek Mining Camp is located about 8 miles southeast of the town of Salmo in the Kootenay District of southeastern British Columbia.

## General Geology[I]

There are four rock formation exposed in the Sheep Creek Mining Camp. These are as follows:-

| Age | Formation |
|---|---|
| Post Triassic | Nelson Batholith |
| Late Pre-Cambrian | Pend d'Oreille Series<br>Reno Formation<br>Quartzite Range Formation |

The Quartzite Range formation consists essentially of massive, white quartzite in the lower part. This is

I Walker, J.F.; Memoire I72, Geological Survey of Canada, I934.

overlain by a 200 foot band of argillaceous quartzites and slaty argillites. Above the argillite is more quartzite with a final top member which consists of interbedded quartzites and slates.

The Reno formation varies greatly in character. The lower part is composed of interbedded quartzites, argillites, limestone and schists. The upper part of the formation consists of brittle quartzites.

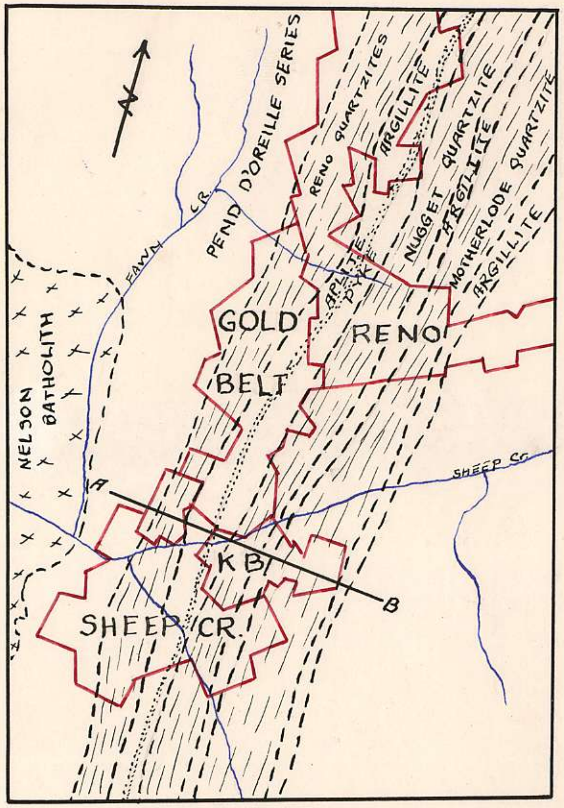
The Pend d'Oreille series is composed chiefly of dark grey to black phyllites. In the lower part of the series the phyllites grade into beds of dark grey quartzites and four well defined limestone horizons are present. Where the phyllites have contained carbonaceous matter and are sheared, they give place to graphitic schists.

The portion of the Nelson batholith exposed near the mining camp is porphyritic granite composed mainly of flesh colored orthoclase.

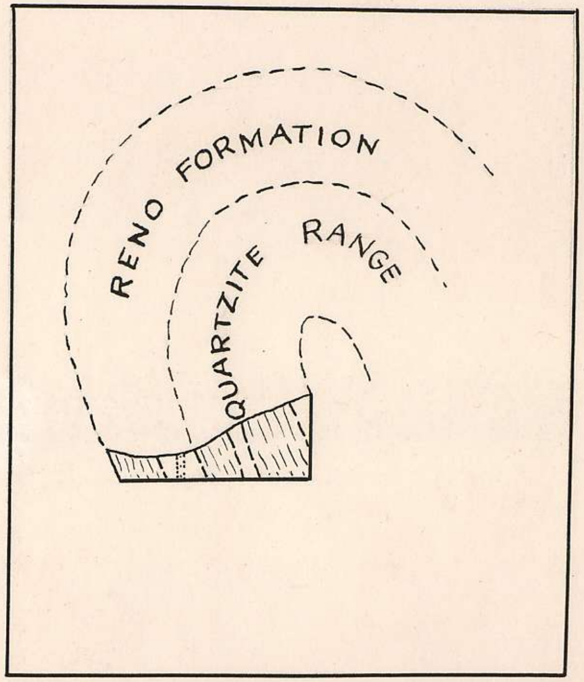
## Structural Geology[I]

The four mines with which this report is concerned are all located on the steeply dipping west

I Walker, J.F.; Memoire 172, Geological Survey of Canada, 1934.




# Sheep Creek Mine Camp




# Section on AB

## Reconstruction of Anticline

After Vere McDowell; The Kootenay Belle Gold Mine; The Miner; July, 1935 limb of an asymmetrical anticline. (See diagram)

Mineralization

The mineral deposits consist of fissure veins carrying values principally in gold with minor amounts of the base metals. The fissures are tight and are not known to be of commercial value where they cut softer rocks such as argillite and limestone. Where they cut the brittle quartzites of the upper Reno formation and the Quartzite Range formation, ore-shoots may occur. The formation of ore-shoots if further controlled, to some extent at least, by the amount of movement along the fissures. In several cases it is evident that movement along a sinuous fissure resulted in the opening of certain parts and produced intense compression in other parts. This has happened along vertical as well as horizontal directions, and, as a result, pinching and swelling of vein matter filling a fissure follows various directions, thus producing irregularly shaped ore-shoots with an average width of less than stoping width.

The original vein matter consisted of quartz, pyrrhotite, pyrite, sphalerite, galena and free gold. Oxidation of the sulfides extends to considerable depths with a certain amount of enrichment an apparent result.

Secondary lead and zinc minerals have been almost entirely removed. Gold values are seldom found where there is not some indication of original sulfide mineralization.

The depth to which primary gold values may persist depends on the character of the formation, its structure, the persisting of the fissure, and the proximity of the underlying granite batholith from which the mineralizing solutions are believed to have come.

# THE KOOTENAY BELLE MINE

## Introduction

Eight polished sections of ore from the Kootenay Belle Mine were studied. These sections are:

| | |
|---|---|
| Sections MI | From the 6th level East. |
| Sections M2 | From the 303 stope. |
| Sections M3 | From the 303 Raise. |
| Section M4 | High-Grade Specimen donated by Mr. Turnbull. |

## Sections MI

### Minerals Identified

| | | |
|---|---|---|
| Pyrite | Sphalerite | Electrum |
| Quartz | Chalcopyrite | |
| Pyrrhotite | Galena | |

### Mineral Relationships

The pyrite appears to have been the first vein mineral to crystallize. It is not very abundant in the sections which were examined. Where observed, the pyrite occurs as regular cubes or as sharp-angled fragments. Most of the pyrite is surrounded by quartz, although a few crystals occur scattered through the galena and sphalerite. In general, the pyrite boundaries are the straight, smooth edges of crystal faces, but, occasionally, they contain deep irregular embayments which are filled with quartz, sphalerite or galena. Many small, rounded patches of sphalerite and galena can be seen in the central parts of various pyrite crystals.

Quartz is quite abundant. It surrounds pyrite cubes and fragments and fills fractures in the larger cubes. The quartz, in turn, is fractured and these fractures are filled with sphalerite, galena and a few scattered bodies of chalcopyrite.

In most cases, the boundaries between the sphalerite and quartz or between the galena and quartz are such that the minerals appear to have solidified simultaneously.

Galena is abundant. It occurs in irregular masses associated with sphalerite and quartz. Often, the galena fills fractures in the quartz and veins the sphalerite. Scattered, small, rounded blebs of pyrrhotite occur in the galena.

Sphalerite is also common, but not quite as plentiful as galena. It fills fractures in quartz in some places and elsewhere it shows rounded contacts. With galena, the sphalerite usually exhibits mutually rounded boundaries, but occasionally, the latter is veined by the former. A very few rounded blebs of pyrrhotite are seen in the sphalerite, usually near a patch of galena. A little shalcopyrite can be seen in the sphalerite.

Pyrrhotite is very rare. It is most common as small rounded blebs in galena but is sometimes present also in the sphalerite.

Chalcopyrite is very scarce. In most cases it occurs in small, irregular patches in quartz. A very few small blebs of chalcopyrite are present in the sphalerite.

Electrum is visible in two of the sections. It occurs in the galena as rounded blebs. In two places it is along galena-quartz contacts.

This group of sections showed that the electrum occurs in the galena. Although all of the galena does not carry electrum, all of the electrum visible is in galena. It was further noted that wherever there was electrum in the galena, there was also a small amount of pyrrhotite in the galena. Here again, however, often there was pyrrhotite in the galena without any electrum.

Sections M2

Minerals Identified

| | | |
|---|---|---|
| Pyrite | Galena | Calcite |
| Quartz | Chalcopyrite | |
| Sphalerite | Electrum | |

Mineral Relationships

The mineral relations are essentially the same in these sections as those in sections MI. However, three small differences were noted:- A small piece of electrum, not accompanied by galena, was seen in a fracture in quartz. Also, chalcopyrite was more plentiful in this section. It occurs as fair sized masses in quartz near sphalerite and in sphalerite. Finally, a new gangue mineral, calcite, was determined. It is fairly abundant in fractures in the other minerals.

## Sections M3

### Minerals Identified

| | |
|---|---|
| Pyrite | Chalcopyrite |
| Quartz | Galena |
| Sphalerite | Calcite |

### Mineral Relationships

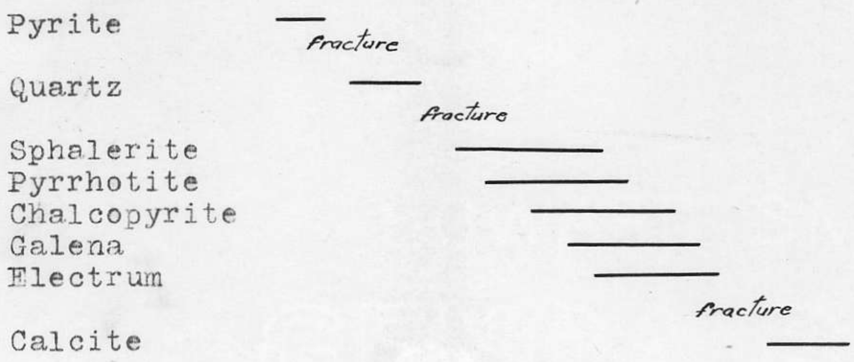
The mineral relations in this section are similar to those already described.

The sections are predominantly pyrite and quartz with small amounts of the other minerals. The chalcopyrite is mostly free in the quartz, but an occasional bleb is present in sphalerite.

## Section M4

This section contains much electrum. The mineral relationships are the same as described for the previous sections. Here, as before, the electrum occurs in and with galena. Occasionally, a bit of electrum is seen in fractures in the quartz without any galena near it.

Paragenesis




Conclusion

From the polished sections which were examined it is apparent that the gold occurs as the gold-silver alloy "electrum." This electrum is intimately associated with the galena and occurs usually as inclusions in the galena, but very occasionally in fractures in quartz near galena. The sections containing electrum had galena as a major constituent.

Pyrrhotite is present in small amounts in the ore but it apparently bears no relation to the electrum.

Chalcopyrite occurs only sparingly in the sphalerite. It does not appear to bear any relation to the electrum.

# THE GOLD BELT MINE

## Introduction

Five polished sections of ore from the Gold Belt mine were examined. These sections were from various parts of the mine as follows:

| | | | |
|---|---|---|---|
| No.MI | From the I850 level | No vein specified. |
| No.M2 | From the 2I00 level | 8000 vein. |
| No.M3 | From the I780 level | 8000 vein. |
| No.M4 | From the I780 level | 8200 vein. |
| No.M5 | From the I975 level | 8200 vein. |

## Section MI

### Minerals Identified

Pyrite

Quartz

Chalcopyrite

### Mineral Relationships

The section consists mostly of pyrite. This pyrite is badly fractured and the fractures are filled with quartz and chalcopyrite. Some chalcopyrite seems to occur also as small bodies in the pyrite but apparently not in fractures, however, this may be because of the fact that the section can only be examined in a single dimension.

Sections M2 and M3

Minerals Identified

| | |
|---|---|
| Pyrite | Chalcopyrite |
| Quartz | Calcite |
| Pyrrhotite | |

Mineral Relationships

Pyrite and quartz are the pre-dominating minerals present. Pyrrhotite is common and chalcopyrite is very scarce. In section M3 pyrite, quartz and calcite are the only minerals visible.

The pyrite occurs as large fractured masses and as small isolated cubes. Quartz and pyrrhotite surround the pyrite and fill in the fractures. The boundaries between the quartz and pyrrhotite are smooth and rounded, thus seeming to indicate that both minerals solidified at approximately the same time. The chalcopyrite seems to be a little later than the pyrrhotite and quartz because it, in places, veins the pyrrhotite. Calcite is present as a filling in fractures in the other minerals.

Assay of Rejects From Sections

Trace of gold.

Section M4

Minerals Identified

| | |
|---|---|
| Pyrite | Pyrrhotite |
| Quartz | Chalcopyrite |
| Sphalerite | Calcite |

Mineral Relationships

The relationships of the various minerals are the same for this section as for section M2 except that there is one additional mineral present, namely, sphalerite. This latter mineral fills fractures in quartz and it, in turn, contains small bodies of pyrrhotite and chalcopyrite which look to be strung out along fractures in the sphalerite. The chalcopyrite is most abundant along sphalerite-pyrrhotite contacts and so seems to be slightly later than those two minerals.

Assay of Rejects From Section

0.16 oz. Au per ton.

Section M5

Minerals Identified

| | |
|---|---|
| Pyrite | Chalcopyrite |
| Quartz | Galena |
| Sphalerite | Electrum |
| Pyrrhotite | Calcite |

Mineral Relationships

The pyrite, quartz, sphalerite, pyrrhotite, chalcopyrite and calcite relationships are the same as those described for section M4. Two new minerals are present in this section. These are galena and electrum. They are apparently of a very late period of deposition and are younger than all of the other minerals except calcite. The galena is most abundant in small angular and strung-out bodies in fractures in the sphalerite but it is also common as similar shaped masses in fractures in the quartz. Quite commonly the galena is spread along quartz-sphalerite contacts.

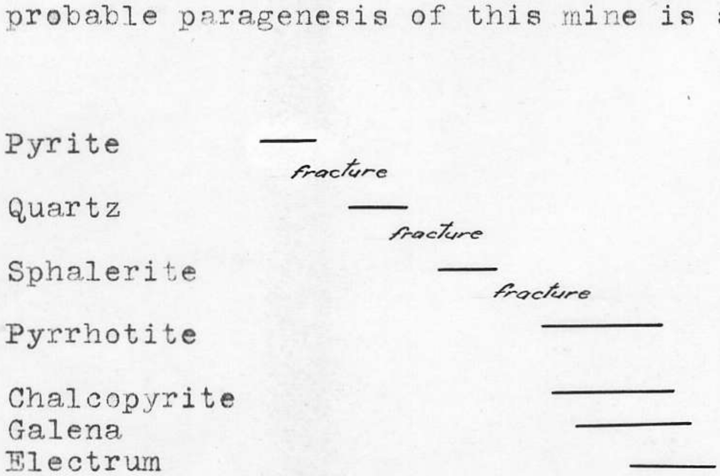
The electrum is very fine and can only be seen with the oil immersion lens . It occurs as small blebs in the galena and is often near quartz contacts

Assay of Rejects From Sections

3.4 oz. Au per ton.

Paragenesis

The probable paragenesis of this mine is as follows:



Calcite | *fracture* ——

Conclusion

The microscopic study of the preceding sections together with the assay results indicate that the gold occurs as the gold-silver alloy electrum which is very finely disseminated with and in the galena. Values are very low or absent where there is no galena. The other minerals show no apparent important relationship to the occurrence of electrum.

The 8200 vein seems to be the valuable vein in this mine.

# THE QUEEN MINE

## Introduction

Thirteen sections of ore from the Queen(now Sheep Creek) mine were polished and examined. These sections were from two suites of ore. Suite No.I was from the old Queen workings. The sections from this suite are:

| | | |
|---|---|---|
| No.MI | from the 760 | Stope West. |
| No.M2 | from the 8I0 | Stope East. |
| No.M3 | from the 520 | Stope West. |
| No.M4 | from the West ore Chute No.2. | |

The second suite consisted of ore from the newer workings. The sections from this suite are:

| | | |
|---|---|---|
| No.M5 | from No.2 level | 8I Vein. |
| No.M6 | from No.2 level | 83 Vein. |
| No.M7 | from No.2 level | 92 Vein. |
| No.M8 | from No.3 level | Queen Vein. |
| No.M9 | from No.5 level | 75 Vein. |
| No.MI0 | from No.5 level | 76 Vein. |
| No.MII | from No.7 level | 8I Vein. |
| No.MI2 | from No.7 level | 92 Vein. |
| No.MI3 | from No.9 level | Queen Vein. |

Section MI

Minerals Identified

Pyrite | Chalcopyrite
Quartz | Calcite
Pyrrhotite

Mineral Relationships

The pyrite is present in two forms. It occurs as crystals and as irregular masses. Apparently the two types are of different periods of deposition, because, in one place, the irregular type can be seen veining a cube. Quartz everywhere surrounds isolated bodies of pyrite and fills spaces between crystals. Pyrrhotite and chalcopyrite occur as small patches both in the quartz and in the pyrite. Calcite occurs in fractures in the other minerals.

Section M2

Minerals Identified

Quartz | Chalcopyrite
Pyrrhotite | Electrum

Mineral Relationships

This section consists mostly of quartz. Pyrrhotite occurs as fair sized bodies in the quartz. A few small pieces of chalcopyrite can be seen with the pyrrhotite. One small piece of electrum was identified in a fracture in the quartz near some pyrrhotite.

Section M3

Minerals Identified

| | |
|---|---|
| Pyrite | Sphalerite |
| Quartz | Galena |
| Chalcopyrite | Electrum |

Mineral Relationships

Quartz and sphalerite form the bulk of this section. The other minerals occur only as small scattered bodies.

Pyrite seems to be present as two distinct generations. It occurs in cubes and as thin veinlets in cracks in the sphalerite. Quartz occurs in large isolated bodies and as filling in fractures in sphalerite. A few specks of chalcopyrite are present in the quartz and sphalerite. Electrum occurs in the sphalerite, particularly near quartz-sphalerite contacts. A small amount of galena is present in the section.

Section M4

Minerals Identified

| | |
|---|---|
| Pyrite | Pyrrhotite |
| Quartz | Sphalerite |
| Chalcopyrite | Calcite |

Mineral Relationships

Pyrite is the most abundant and seems to be the oldest mineral present. It is badly fractured and the fractures are filled with quartz, chalcopyrite and calcite. A few small, rounded blebs of pyrrhotite can be seen in the pyrite. A very small amount of chalcopyrite occurs in the quartz.

Section M5

Minerals Identified

| | |
|---|---|
| Pyrite | Galena |
| Quartz | |

Mineral Relationships

The section is composed mostly of quartz with a small amount of pyrite and a little bit of galena.

The pyrite is fractured and the fractures are filled with quartz. Under the oil-immersion lens, a few small bodies of galena can be seen in fractures in the quartz.

Assay of Rejects From Section

2.38 ounces of gold per ton.

Section M6

Minerals Identified

| | |
|---|---|
| Pyrite | Pyrrhotite |
| Quartz | Chalcopyrite |

Sphalerite Electrum

Galena

Mineral Relationships

The section is predominantly sphalerite with quartz, pyrite, and galena present in smaller amounts. Chalcopyrite is scarce. Electrum is quite common.

As in the previous sections, the pyrite is fractured and the fractures are filled with quartz and other sulfides. The quartz, in turn, is fractured and the fractures are filled with the later sulfides. The sphalerite is fractured and contains pyrrhotite and galena in these fractures. Pyrrhotite occurs, also, as small blebs in the sphalerite.

Gold occurs as the alloy"electrum." It is seen scattered in small irregular bodies in the sphalerite, usually near galena.

Assay of Rejects From Section

I.2 ounces of gold per ton.

Section M7

Minerals Identified

Pyrite Chalcopyrite

Quartz Galena

Sphalerite

Mineral Relationships

The pyrite-quartz-sphalerite-galena relations are the same as those described in the previous sections.

Chalcopyrite is quite abundant in this section. It occurs as fairly large masses in fractures in the quartz and sphalerite. In the sphalerite, the chalcopyrite is often present as closely spaced bodies which are joined by numerous thin veinlets.

Assay of Rejects From Section

2.5 ounces of gold per ton.

Section M8

Minerals Identified

| | |
|---|---|
| Pyrite | Pyrrhotite |
| Quartz | Electrum |
| Sphalerite | |

Mineral Relationships

The minerals seem to have the typical relationships in this section as in those sections described previously. An exception seen in this section was the veining of pyrrhotite by pyrite. A piece of electrum was seen at a quartz-sphalerite boundary near pyrrhotite.

Assay of Rejects From Section

o.46 ounces of gold per ton.

## Section M9

### Minerals Identified

| | | |
|---|---|---|
| Pyrite | Pyrrhotite | Galena |
| Quartz | Chalcopyrite | |
| Sphalerite | Electrum | |

### Mineral Relationships

The section is mostly quartz with lesser amounts of pyrite and small amounts of the other minerals.

The pyrite-quartz-sphalerite-galena-pyrrhotite relations are similar to the other sections.

Electrum is quite plentiful in large sized pieces in this section. It occurs unassociated in quartz fractures, in galena near quartz contacts, in pyrrhotite at quartz contacts and at sphalerite-quartz contacts.

A point of interest noted under the oil-immersion lens is the occurrence of chalcopyrite as very numerous, tiny blebs near the margins of several sphalerite bodies. This was not in evidence in any of the other sections.

### Assay of Rejects From Section

Very high.

## Sections MIO, MII, MI2, MI3,

### Minerals Identified

Pyrite, Quartz

Mineral Relationships

Similar to those described for the other sections.

Assays of Rejects From Sections

MI0 6.6 ounces of gold per ton.

MII Trace of gold.

MI2 2.I0 ounces of gold per ton.

MI3 Trace of gold.

Paragenesis

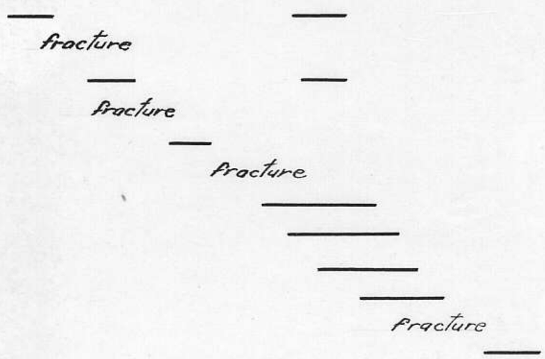
Pyrite

Quartz

Sphalerite

Pyrrhotite
Chalcopyrite
Galena
Electrum

Calcite




Conclusion

The study of the ore from this mine indicates that the gold is very late, probably the last of the metallic minerals, in the mineralogical sequence. The gold occurs as the gold-silver alloy "electrum." This electrum is irregularly distributed as rather fair sized bodies. Values are usually best when galena is present, but they are often quite high, also, near sphalerite. In most instances, the electrum was located in fractures in quartz with galena or sphalerite.

# THE RENO MINE

## Introduction

Six sections from the Reno mine were examined. These sections were cut, mounted and polished by Mr. Jim Donnan. The sections were made from specimens which had been previously examined (I938) by Mr. Wm. Dayton and they are numbered to correspond to his system of numbering.

## Sections No.IA and IB

### Minerals Identified

| | |
|---|---|
| Quartz | Pyrrhotite |
| Chalcopyrite | Electrum |

### Mineral Relationship

These sections are predominantly pyrrhotite and quartz. The quartz is apparently the oldest mineral. It is fractured and the fractures are filled with pyrrhotite and a small amount of chalcopyrite. The pyrrhotite and chalcopyrite solidified at approximately the same time. A very small amount of electrum was identified in these sections. Where it was visible, the electrum was in fractures in quartz and it was associated with chalcopyrite and pyrrhotite.

Section No.2

Minerals Identified

| | |
|---|---|
| Quartz | Galena |
| Sphalerite | Electrum |
| Pyrrhotite | |

Mineral Relationships

The quartz is the most abundant and the oldest mineral present. It is badly fractured and the fractures contain sphalerite, pyrrhotite, galena and electrum. The sphalerite is not very abundant. It is veined by galena and pyrrhotite. These latter two minerals seem to have been deposited simultaneously, since they occur in the same manner and, when in contact with each other, they have smooth boundaries.

The electrum is plentiful in this section. The color of the electrum varies from deep yellow to pale yellow and so probably indicates a variation in the gold-silver ratio. The mineral occurs chiefly with galena in fractures in quartz. It is usually along the galena-quartz boundaries. Occasionally small bits of electrum can be seen isolated in the quartz but, in every case, the electrum was in a fracture. A few pieces of the alloy were seen associated with sphalerite and pyrrhotite, but the relationship was as that with the galena. Apparently this electrum was introduced very late in the period of deposition of the minerals and it is associated very intimately with galena since it is seldom seen where there is none of this latter mineral quite nearby.

Section No.7A

Minerals Identified

Quartz
Chalcopyrite
Pyrrhotite

Mineral Relationships

This section is composed mostly of quartz. The quartz is fractured and the fractures are filled with pyrrhotite and a small amount of chalcopyrite. The pyrrhotite is probably slightly earlier than the chalcopyrite.

Section No.7B

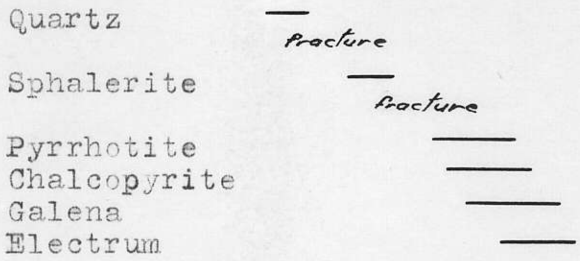
Minerals Identified

Quartz
Galena
Sphalerite

Mineral Relationships

Quartz again occupies most of the section. It is fractured and the fractures are filled with sphalerite and galena. The sphalerite is fractured and these fractures contain galena.

Paragenesis




Conclusion

The Reno mineralization appears to be quite characteristic of the Sheep Creek Mine Camp. The gold occurs as the gold-silver alloy "electrum" which is intimately associated with galena in fractures in quartz. Values (as determined from visible electrum) seem to be important only where galena occurs. The sulfides other than galena do not seem to bear any important relationship to the electrum.

## Notes on the Electrum

During the microscopic study of the ore from the Sheep Creek Mining Camp, it was found that the "gold" did not give very satisfactory etch test reactions for gold. The reactions corresponded better with those listed for the silver-gold alloy "electrum." Consequently, it was desirous to determine the actual composition of the mineral present in the ore. A quantity of this mineral was extracted from crushed ore from each of the four mines by means of the Haultain super-panner. The clean mineral was then assayed for gold and silver. The results of the assays showed:

| Mine | % Ag. | % Au | Ag/Au Ratio. |
|---|---|---|---|
| Reno | 30.24 | 69.76 | .434 |
| Kootenay Belle | 27.28 | 72.72 | .375 |
| Sheep Creek | II.69 | 88.3I | .I32 |
| Gold Belt | I7.47 | 82.53 | .2II |

Production figures from the I937 B.C. Minister of Mines Report are as follows:

| Mine | Oz. Ag. | Oz. Au | Ag/Au Ratio. |
|---|---|---|---|
| Reno | 9,373 | 22,8II | .4I0 |
| Kootenay Belle | 5,476 | I6,098 | .340 |
| Sheep Creek | 8,4I9 | 23,923 | .352 |
| Gold Belt | not listed | | |

The silver-gold ratios of the Reno and Kootenay Belle mines from the two tables correspond quite closely enough to suggest that the electrum could account for the total silver production as well as the gold production from the mine. The ratios from the Sheep Creek mine do not check, but the production ratio is very similar to those of the Reno and Kootenay Belle.

An attempt was made to find the silver content of clean galena from these mines. However, insufficient clean galena for an accurate assay could be panned out of the crushed ore.

Measurements of electrum grains under the "ultro pack" showed variations in size from I3 microns to 300 microns, with an average of I00 microns.

## GENERAL CONCLUSION

The mineralogy of the four mines from the Sheep Creek mining camp is very similar. The minerals present in the ores include pyrite, quartz, sphalerite, pyrrhotite, chalcopyrite, galena and electrum.

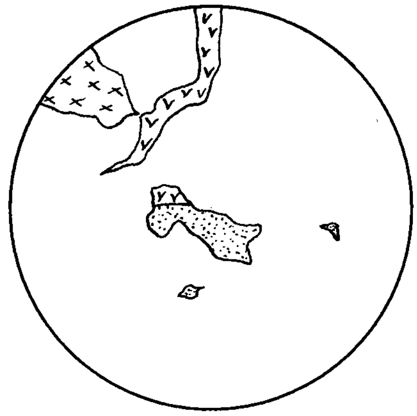
With one single difference (in the Sheep Creek Mine) the paragenesis is the same for all mines. The Sheep Creek mine appears to have two generations of pyrite of which the other mines show no evidence.

Gold occurs in all mines as the alloy "electrum." This mineral is somewhat unevenly distributed in relatively large grains. It is most frequently found in, or beside galena, although sometimes it can be seen in fractures in the quartz, usually near some galena. Apparently the electrum came in with the galena as the last of the metallic minerals to be deposited. The other sulfides do not seem to bear any significant relationship to the electrum.

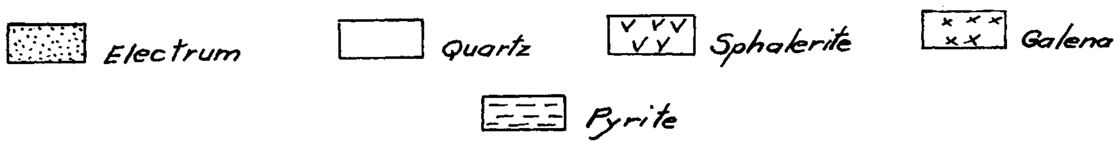
Pyrrhotite is quite abundant in all mines except the Kootenay Belle, where it is scarce.

Chalcopyrite is nowhere abundant. It is not often included as blebs in sphalerite, although, in a few cases, it did occur in that manner.

28 x



QUEEN

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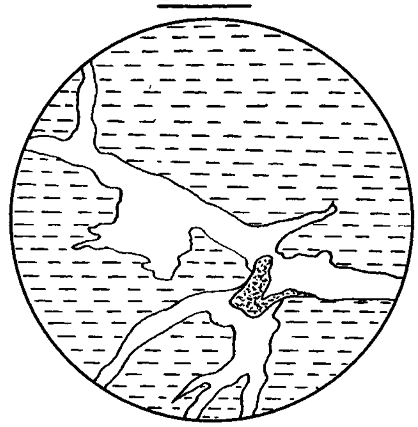
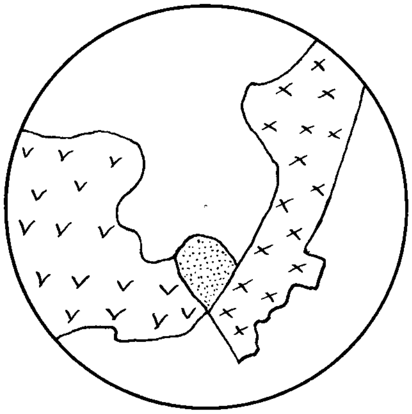


QUEEN

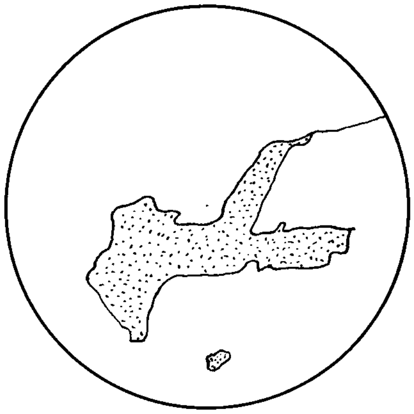
330 X



QUEEN

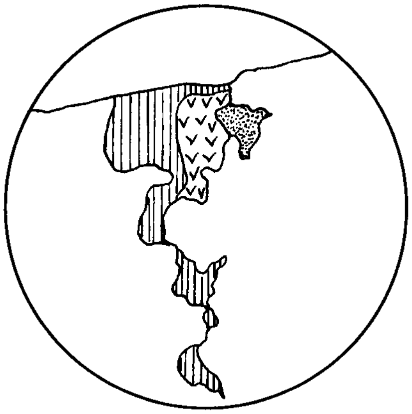
Electrum Quartz Sphalerite Galena

330 X



QUEEN

115 X



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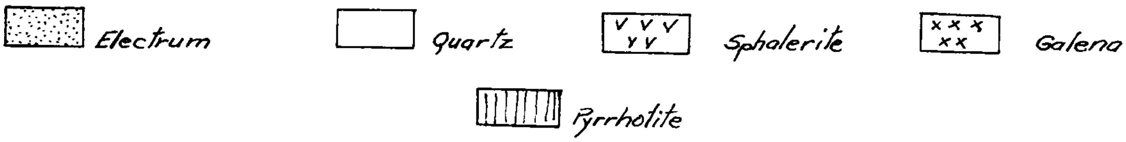


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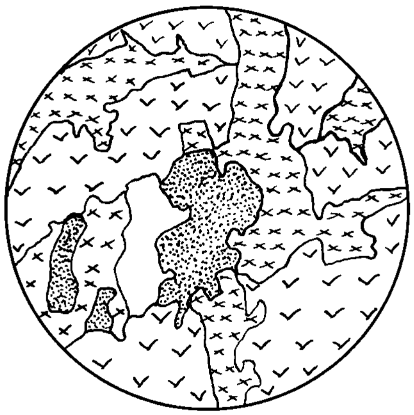
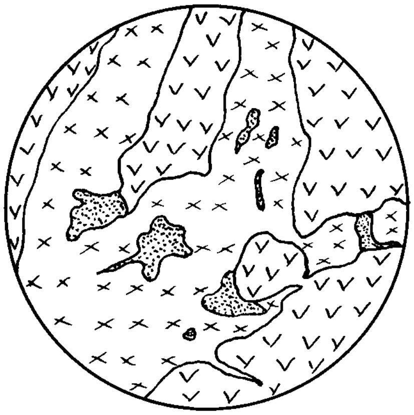
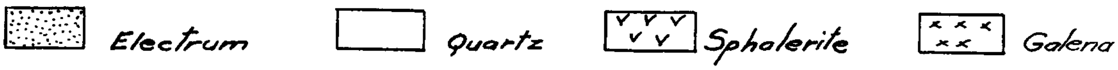


GOLD BELT

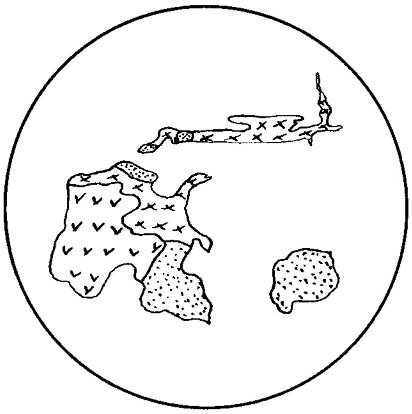
330 X



GOLD BELT




28 X



RENO

# P A R T B

## A Study of Tailings

## from the

## CHELAN MINE

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# A STUDY OF MILL TAILINGS FROM THE CHELAN MINE

## Introduction

The following paper is a report on preliminary work carried out by Mr. A.F. Killin and the writer on rougher tailings from the Chelan mine by means of the "infra-sizer" and the "super-panner" to determine the distribution of the gold. Due to lack of material, the tables could not be completely filled out. (The work has since been completed in detail by Messers. Davis and White.)

## Procedure

I200 grams of the tailings were taken and run through the Bell mechanical screening machine. Five products were obtained and assays were run on each. The results of these assays can be seen in table No I.

| Size mesh | Weight in grams | Weight per cent | Assay mg in 15g | Gold Content in mg. | % Total Gold |
|---|---|---|---|---|---|
| +65 | 29.52 | 2.46 | 0.01 | 0.0197 | 2.46 |
| +100 | 132.11 | 11.10 | 0.01 | 0.0881 | 11.01 |
| +150 | 219.23 | 18.26 | 0.01 | 0.1461 | 18.26 |
| +200 | 251.52 | 20.85 | 0.01 | 0.1675 | 20.94 |
| -200 | 552.35 | 46.10 | 0.01 | 0.3680 | 46.06 |
| Actual Total | 1184.73 | 98.77 | — | 0.7894 | 98.73 |
| Theoretical Total | 1200 | 100 | 0.01 | 0.8000 | 100 |

Table No. I

500 grams of the -200 mesh product were run through the "infra-sizer" and seven products were obtained. Each product was assayed with results as shown in table No 2.

| Size no. 1 largest | Weight in grams | Weight per cent | Assay mg in 15g | Gold Content in mg | % Total Gold |
|---|---|---|---|---|---|
| 1 | 83.85 | 16.77 | 0.01 | 0.056 | 16.8 |
| 2 | 106.80 | 21.36 | 0.01 | 0.071 | 21.4 |
| 3 | 99.27 | 19.85 | Tr. | — | — |
| 4 | 60.57 | 12.12 | Tr. | — | — |
| 5 | 43.92 | 8.78 | Tr. | — | — |
| 6 | 33.63 | 6.73 | Tr. | — | — |
| 7 | 67.46 | 13.49 | Tr. | — | — |
| Actual Total | 495.50 | 99.10 | — | — | — |
| Theoretical Total | 500 | 100 | 0.01 | .333 | 100 |

Table No. 2

Each product from the "infra-sizer" was run over the "super-panner" and three products were obtained: pyrite, middling and gangue. Assays were run on each of these products. The results appear in table No 3.

| Size from infrasizer no. 1 coarsest | Total Wt. panned on super-panner | PYRITE | | | MIDDLING | | | GANGUE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Wt. in gms Recovered | % of Total Wt. Panned | Assay mg/15gm | Wt. in gms Recovered | % of Total Wt. Panned | Assay mg/15gm | Wt. in gms Recovered | % of Total Wt. Panned | Assay mg/15gm |
| 1 | 50 gm. | 16.99 | 33.98 | 0.04 | — | — | — | 30.84 | 61.68 | 0.03 |
| 2 | 60 gm | 8.04 | 13.40 | Tr | 4.59 | 7.65 | Tr | 46.77 | 77.95 | Tr |
| 3 | 60 gm | 6.07 | 10.11 | Tr | 2.60 | 4.33 | Tr | 49.37 | 82.28 | Tr |
| 4 | 50 gm | 5.70 | 11.40 | Tr | 1.93 | 3.86 | Tr | 41.75 | 83.50 | Tr |
| 5 | 30 gm | 1.45 | 4.83 | Tr | 1.61 | 5.36 | Nil | 25.48 | 84.93 | Tr |
| 6 | 20 gm | 0.92 | 4.60 | Tr | — | — | — | 18.36 | 91.80 | Tr |
| 7 | Too fine to Separate | | | | | | | | | |

Table No. 3

Conclusions

The results obtained, as is shown by the tables, indicate that 46% of the gold is contained in the -200 mesh product. Of this, assays show that most of the gold was contained in the pyrite and gangue of the No I product from the "infra-sizer."

## REPORT ON POLISHED SECTIONS OF CHELAN ORE

I6 polished sections of ore from 6 parts of the mine were examined. Assays of rejects from polished sections gave gold values of significance in 2 sections from the I500 foot haulage crosscut and in 3 from the contact specimens. These 5 sections were examined very carefully to see if any free gold could be found but with no success. The remaining sections were given a quick examination to get a general idea of the mineralogical relations.

The sulfides identified were: pyrite, chalcopyrite, pyrrhotite and sphalerite with quartz and sericite as gangue.

In order of relative abundance in sections the minerals were:

I. Quartz and sericite
2. Sphalerite
3. Pyrrhotite and chalcopyrite
4. Pyrite

The probable paragenesis is:

Pyrite ——
fracture
Quartz ——
fracture

Sphalerite ————

Chalcopyrite ————

Pyrrhotite ————

Pyrite is not very abundant in most sections. It is fractured and corroded with quartz filling the spaces.

The quartz usually forms the bulk of the sections but occasionaly occurs as anhedral crystals in sphalerite and chalcopyrite. Some indications are present that there may possibly be two generations of quartz.

The sphalerite, chalcopyrite and pyrrhotite are of almost simultaneous deposition showing, usually, mutually smooth boundaries. A few irregularities show that the sphalerite probably began to solidify first, then chalcopyrite and finally pyrrhotite.

Recent work on these sections by Messrs. White and Davis who used the "pan-phot" and super polish has revealed minute specks of free gold in the quartz gangue.