MINERALOGRAPHY

OF

ERICKSEN-ASHBY MINES

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TABLE OF CONTENTS

ABSTRACT

Ericksen -Ashby Mines is located on Mt. Ericksen three miles from Tulsequah, British Columbia. Five mineralized showings in silicified limestone were sampled in 1963. Sections were cut from fourteen hand specimens, polished, and examined under the microscope. One thin section was cut for microscopic analysis of gangue minerals. The minerals identified are: pyrrhotite, marcasite, sphalerite, galena, sternbergite, meneghinite, tetrahedrite, calcite, quartz, rhodonite, and boulangerite. Most of the minerals are disseminated in silicates. Textures are replacement type. X-Ray analysis confirmed the presence of galena. ? the deposit is mesothermal open space and replacement type.

INTRODUCTION

Location:

Ericksen-Ashby Mines are located on the north end of MT. Ericksen about three miles east of Tulsequah in the Taku River area of British Columbia. The areas sampled range in elevation from 2500 feet to over 4000 feet. Number 1 showing is at 3800 feet; Number 2 at 4500 feet; Number 3 at 3100 feet; and Number 5 at 2500 feet. Horizontal range is approximately 3500 feet.

General Geology:

The structure of Mt. Ericksen consists of an anticline formed by Pre-Permian greenstones and argillites; a band of silicified Permian limestone, which is about 200 feet thick; and an overlying Triassic series of volcanics consisting of tuffs, graywackes, and argillites. The axis of the anticline plunges to the south about 30°, and strikes N 30°W. A vertical quartz monzonite dyke extends in a north-south line along the east side of the mountain. Near the contact with the dyke and the limestone is a large mineralized zone consisting of heavy black manganese and red limonite stains. This zone is exposed on the side of a glaciated cirque.

Seven separate mineralized areas were located

on the mountain; most are on the north side, and all are confined to the limestone. They are generally lenticular in form, and are apparently controlled by shearing along bedding planes in the limestone. It is felt that the limestone was silicified prior to folding, and that pressures during uplift caused shearing along certain more pure quartz beds. This shearing was followed or accompanied by the injection of mineralizing fluids. Evidence for the continued movement along the bedding planes is indicated by the alternating layers of sphalerite and galena in some of the showings. Most of the veins are formed by open space filling.

General:

The samples examined in this report consist of fourteen hand specimens from five separate mineralized veins on the property. These were taken by the author during the summer of 1963. Polished sections were made from each of the hand samples to determine differences in mineralogy from one area to another. Assay results indicated much higher silver, lead, and zinc values in Number 1 showing than in other areas.

History:

Ericksen-Ashby property was first staked in 1929 by Charles Ericksen and Chuck Ashby. Assessment work was done in succeeding years by prospectors. In 1951 COMINCO drilled one hole on the east side of the

mountain below the large Number 2 showing. No ore was encountered in this hole. The author mapped and sampled the property in 1963.

A mineralographic report was prepared by A.N.Bahan in 1949 on the Ericksen-Ashby prospect as a project in mineralography at the University of British Columbia. Five polished sections were examined and the following minerals reported: Arsenopyrite, Pyrite, Pyrrhotite, Quartz, Sphalerite, Chalcopyrite, Tetrahedrite, Boulangerite, and Calcite. Some of these have been confirmed in this report, while new ones have been detected.

MEGASCOPIC ANALYSIS

Most of the hand samples are covered with heavy dark red limonite and varying amounts of black manganese oxide. Disseminated sulfides are found in all freshly broken surfaces. These consist chiefly of pyrrhotite indicated by its bronze yellow color, hardness D, and weak magnetism; and galena indicated by its steel grey color, hardness B, and cubic cleavage. Most of the specimens are quite small having a volume of 3-4 cubic inches.

The sample from Number 1 vein consists of massive granular galena. Freshly broken surfaces are notably lacking in luster; and the galena ~~are~~ is dull grey generally darkening with time. Oxidized surfaces are black. The

sample gives a dark black streak. These features indicate the presence of silver in galena. ??

MICROSCOPIC ANALYSIS

Sections were cut from each of the fourteen hand samples, polished, and examined under the reflecting microscope. The following minerals were indentified by microscopic analysis:

Pyrrhotite $Fe_{1-x}S$

Pyrrhotite was found in all the samples except those from Number 1 and Number 3. It was the earliest mineral to be formed, and has been replaced by subsequent minerals. It occurs mainly as disseminated grains ranging in size from .5 - 10mm

Identification- Brownish cream color, hardness D-, poor polish, strong anisotropism with colors ranging from light grey to brown, and weak magnetism.

Etch tests- Negative

Microchemical tests- Fe

Marcasite FeS_2

Marcasite is found in minor amounts in some of the samples, but occurs chiefly as replacements along fractures in pyrrhotite where it has a distinct zoned texture. Grains vary in size from .2 - 1mm.

Identification- pale brass yellow color, hardness E+, and strong anisotropism with colors ranging from

yellow to blue.

Etch tests- HNO_3 stains brown to iridescent with slow effervescance.

Microchemical tests- Fe

Sphalerite ZnS

Sphalerite occurs chiefly as bands in Number 1 showing. It is found as small disseminated grains in galena in polished section. Size ranges from 1 - 8mm.

Identification- gray color, poor polish, hardness C-, brownish-yellow internal reflection, and associated minerals.

Galena PbS

Galena occurs in massive granular form in Number 1 showing, and as disseminated grains elsewhere. It replaces sphalerite.and marcasite.Grain size 1 - 10mm

Identification- White color, good polish, hardness B, isotropism, triangular surface pits, and X-ray analysis.*

Sternbergite Ag_2S Fe_4S_5

Sternbergite is the main silver-bearing mineral. It occurs as minute inclusions along cleavage planes in galena, and on contacts between galena and sphalerite. Grain size ranges from .01 - 3mm.

Identification- slight pleochroism with color ranging from galena white to light brown, hardness B, very strong anisotropism from yellowish grey

* See Appendix I

to brown, prismatic texture under crossed nicols, and associated minerals.

Etch tests- HNO_3 fumes tarnish brown, HCl fumes tarnish slowly, $FeCl_3$ stains surface brownish to bluish iridescent, KOH stains differentially iridescent with changing colors for two minutes. Others negative.

Microchemical tests- Fe

This mineral was very difficult to identify. Repeated attempts to get a microchem test for silver were unsuccessful in spite of the fact that silver assays from massive galena are quite high. An X-Ray analysis was also unsuccessful.

Meneghinite $4PbS\ Sb_2S_3$

Meneghinite occurs as vertically striated prisms replacing galena along cleavage planes. Grain size ranges from 5 - 10microns.

Identification- slight greenish color against galena, polishing hardness less than galena, strong anisotropism light grey to steel blue.

Etch tests- HNO_3 effervesces, surface stains black, HCl fumes tarnish. Others negative.

Microchemical tests- Cu, Sb

Tetrahedrite $(Cu,Fe)_{12}Sb_4S_{13}$

Tetrahedrite is the main sulfide present in Number 3 showing where it occurs in slightly massive form. It is also found more disseminated in Numbers 2

and 5. It apparently accounts for the low silver values in these areas.

Identification- brownish olive grey color, isotropism, hardness D, and dark brown to black streak.

Etch test- HNO_3 fumes tarnish brown. Others negative.

Microchemical tests- Fe, Cu, Sb

Boulangerite $5PbS\ 2Sb_2S_3$

Boulangerite is found only in one specimen from Number 3 showing where it occurs in fibrous form filling a fracture in tetrahedrite and quartz. Crystals range in size from .3-1mm.

Identification- pale yellowish white color, fibrous texture, hardness B+, and strong anisotropism with colors from white to brownish grey.

Etch tests- HNO_3 effervesces, surface stains black. Action slow in starting. Others negative.

Microchemical tests- Pb, Sb

Gangue Minerals

The main gangue mineral is quartz (SiO_2), although a large amount of rhodonite ($MnSiO_3$) is also present.* Calcite is a minor mineral in the ores. It replaces galena, tetrahedrite, and sternbergite, but is replaced by later silicates.

*See Appendix II

ORDER OF ABUNDANCE

The minerals listed in order of their abundance are as follows:

Number 1 showing

70%	Galena
10	Sternbergite
10	Sphalerite
5	Marcasite
3	Meneghinite
2	Calcite
100	

Number 2 showing

30%	Silicates
25	Pyrrhotite
20	Sphalerite
15	Tetrahedrite
10	Galena
100	

Number 3 showing

35%	Silicates
35	Tetrahedrite
20	Marcasite
9	Galena
1	Boulangerite
100	

Number 5 showing

70%	Silicates
10	Galena
10	Pyrrhotite
5	Marcasite
5	Tetrahedrite
100	

TEXTURES

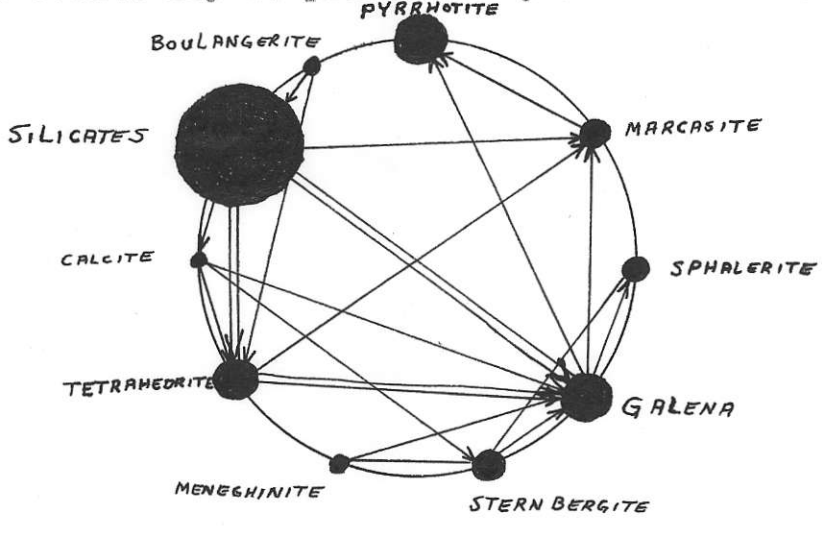
Textures are mainly repalcement type. Marcasite replaces pyrrhotite along fractures forming zoned blebs in the old mineral. Galena replaces sphalerite; and Sternbergite replaces galena at contacts with sphalerite and along cleavage planes. Meneghinite replaces galena forming straited prisms along cleavage planes in the latter. Tetrahedrite replaces galena, marcasite, and pyrrhotite. Calcite replaces galena, sternbergite, tetrahedrite, and marcasite. Quartz and rhodonite replace all the earlier formed minerals. Boulangerite fills an open fracture in tetrahedrite and quartz.

PARAGENESIS

The probable sequence of events is as follows:

1. Fracturing and opening of spaces along bedding in silicified limestone.
2. Injection of mineral-bearing hydrothermal solutions.
3. Deposition of pyrrhotite.
4. Slight change in chemical balance of solutions resulting in alteration of some pyrrhotite to marcasite.
5. Deposition of sphalerite, galena, sternbergite, meneghinite, and calcite.
6. Cessation of mineralization in region of Number 1 vein.
7. Continued movement in other areas resulting in deposition of tetrahedrite, calcite, and silicates.
8. Later fracturing in region of Number 3 vein with deposition of boulangerite.

These events may be presented by a Van der Veer diagram:



TYPE OF DEPOSIT

The minerals and general geology of Ericksen-Ashby Mines indicate that this is a medium temperature hydrothermal open space and replacement vein deposit. Pyrrhotite was probably deposited over 500°C, while boulangerite, sternbergite, and meneghinite were deposited below 300°C.

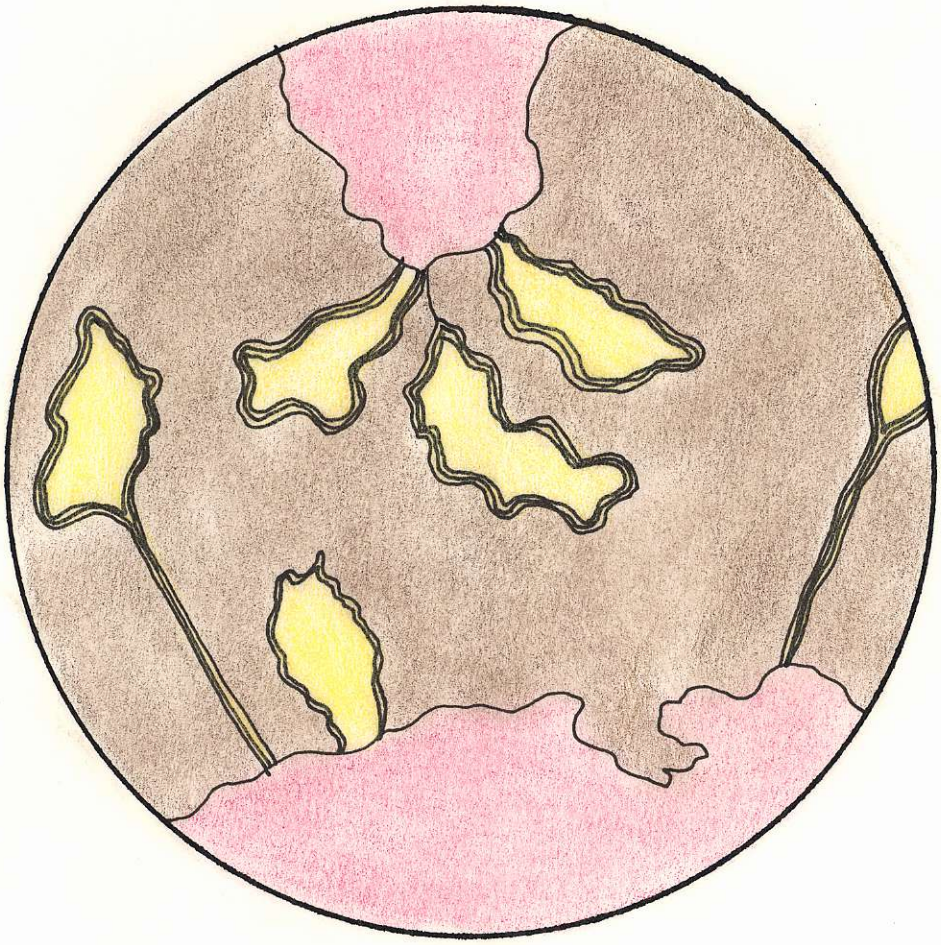


Figure 1. X 60 Number 5 Showing

Zoned marcasite replacing pyrrhotite along fractures.

LEGEND

Pyrrhotite

Quartz

Marcasite

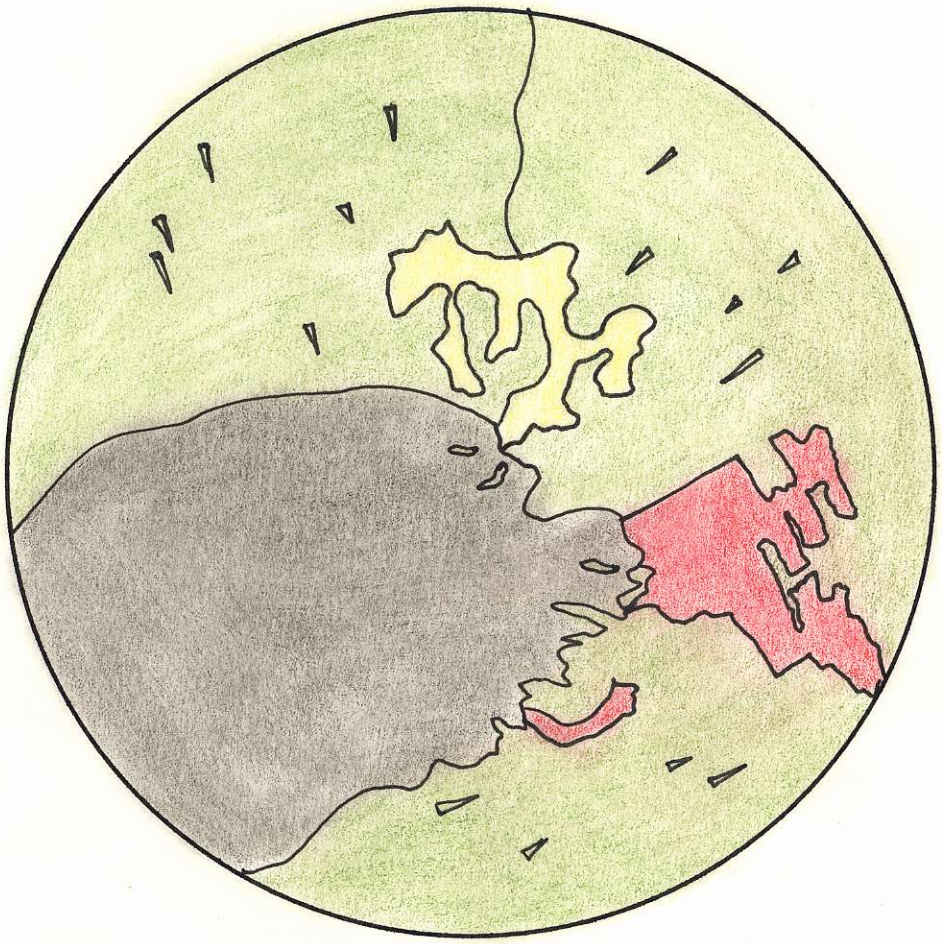
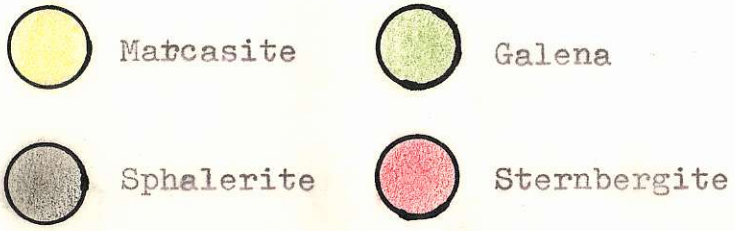


Figure 2, X 100 Number 1 Showing Galena replacing marcasite and sphalerite. Sternbergite replacing galena along cleavage planes.

LEGEND



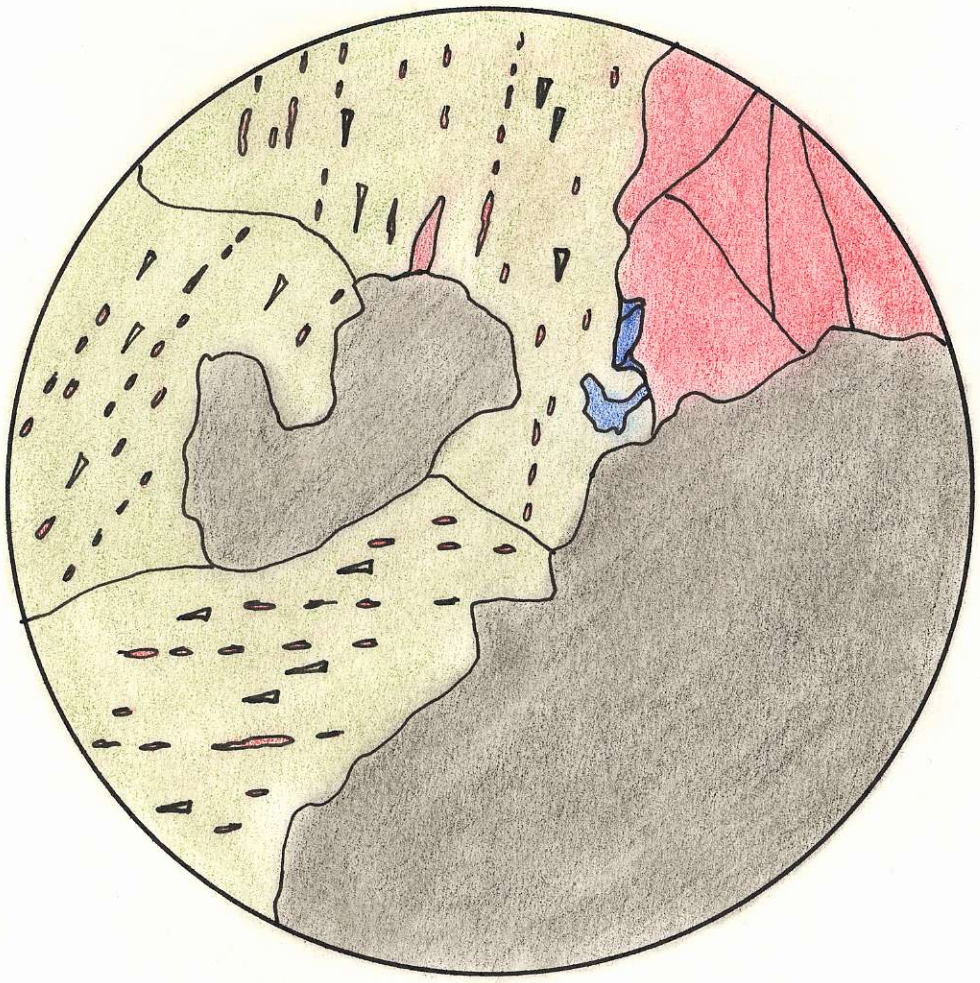


Figure 3. X 100 Number 1 Showing

Sternbergite replacing galena along cleavage planes. Largest concentrations are on contacts with sphalerite. Calcite is the last mineral to form.

LEGEND

Sphalerite

Sternbergite

Galena

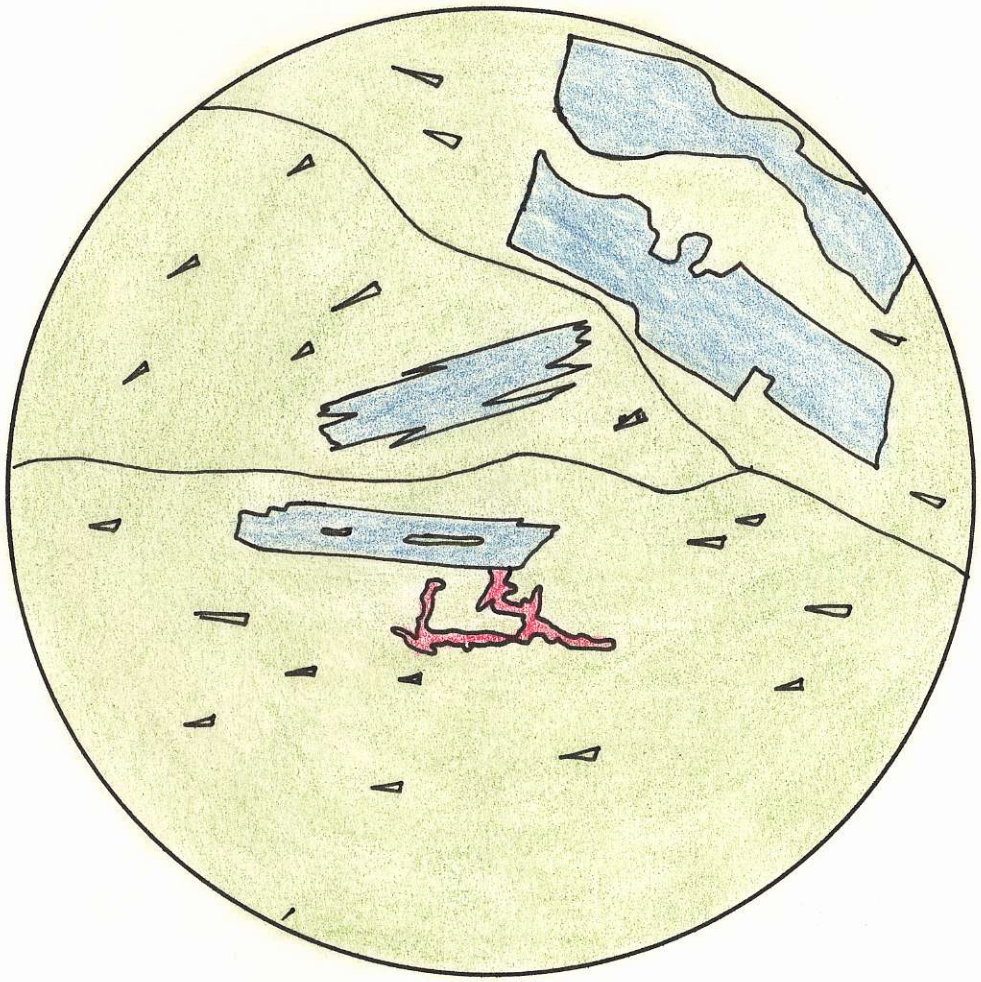


Figure 4. X 100 Number 1 Showing

Meneghinite replacing Galena along cleavage planes.

LEGEND

Sternbergite

Galena

Meneghinite

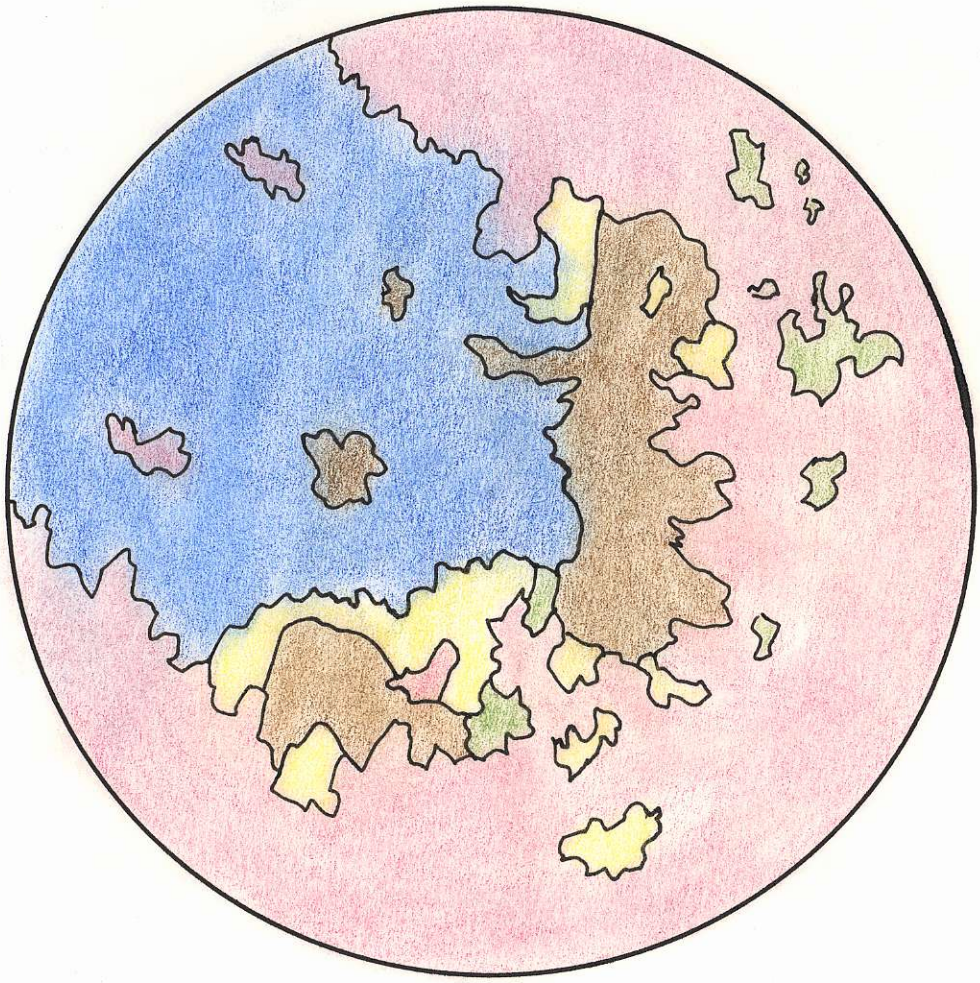


Figure 5. X 60 Number 3 Showing Tetrahedrite replaces marcasite. Calcite and quartz replace all the earlier formed minerals.

LEGEND

Marcasite

Calcite

Galena

Quartz

Tetrahedrite

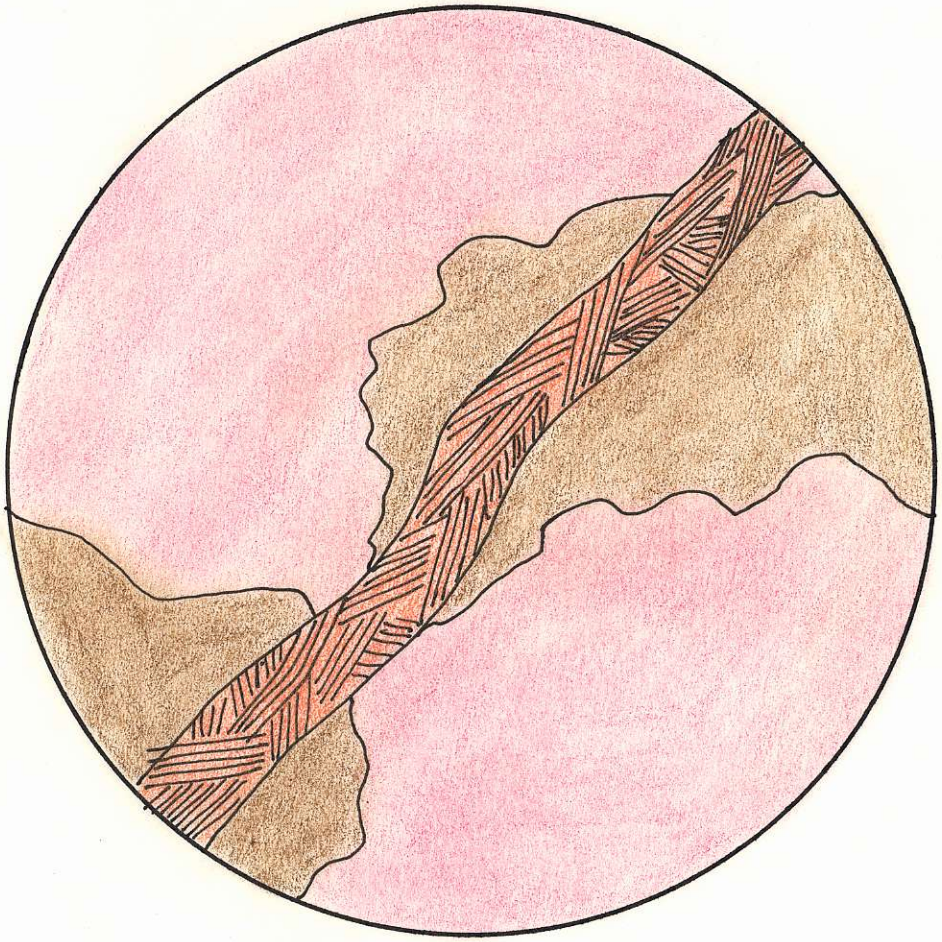


Figure 6. X 60 Number 3 showing
Fibrous boulangerite fills fracture in tetrahedrite and quartz.

LEGEND

Tetrahedrite

Boulangerite

Quartz

Appendix I

X-Ray Analysis: 4371 Cr/V filter

I	L	R	L+R	20	0	d Spacing
10	347	739	1086	392	1.96	341
10	316	771	1087	455	2.28	296
1	305	782	1087	477	2.39	283*
1	294	792	1086	498	2.49	272*
1	288	800	1088	512	2.56	265*
9	212	874	1086	662	3.31	210
8½	146	942	1088	796	3.98	178
1	138	948	1086	810	4.05	176*
6	125	964	1088	845	4.23	174

These results confirm the presence of Galena. An attempt was made to analyze Sternbergite, but the grains were too small to be extracted by themselves. Thus Galena was the only mineral revealed in the X-Ray examination.

Appendix II

Thin Section Analysis:

The following minerals were identified by optical methods using a thin section prepared from one of the hand samples:

Quartz- SiO_2
- colorless
- no cleavage
- no twinning
- very low relief
- optically (+)
- low birefringence .009
- uniaxial + interference figure

Rhodonite- $MnSiO_3$
- pale yellowish, pinkish, greenish. (color varies)
- relief medium-high n>balsam
- optically (+) $2V=60^{\circ}$
- cleavage parallel 110
- birefringence .013-.027
- extinction angle 25°

Rhodonite appears to comprise a large part of the gangue minerals associated with the ore and is probably the source for the black manganese stains that are found on the samples and in the veins.

References

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