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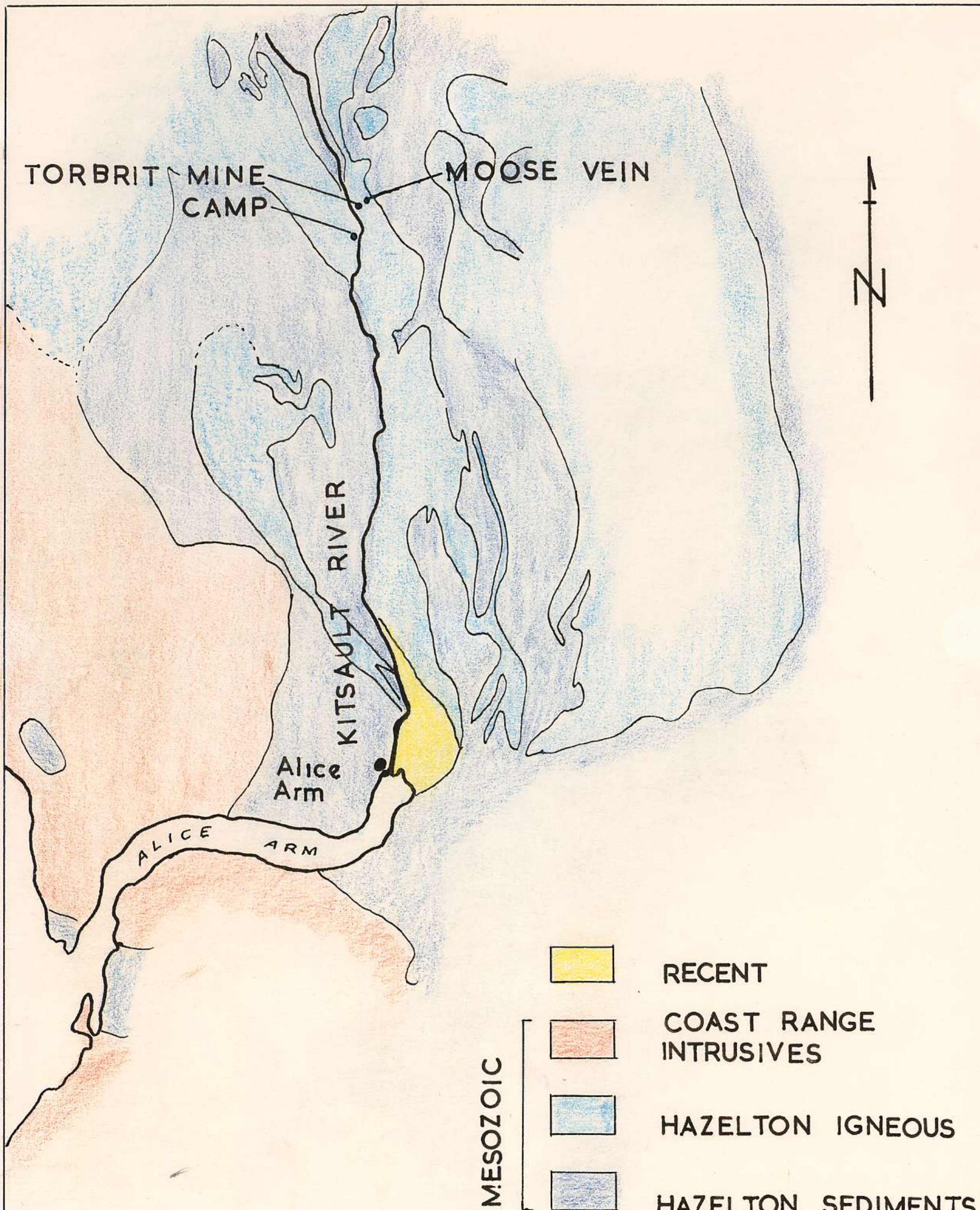
A Report On The Moose Vein, Alice Arm, B.C.

March 1956

Alex Burton



PART OF PORTLAND CANAL AREA

After G. Hansen Map 307 A

Scale: 1 Inch to 4 Miles

Introduction

With the permission of Mr. R.W. Burton, Manager, Torbrit Silver Mines Limited, a suite of specimens from the Moose vein near the Torbrit mine was examined as part of the course work in Geology 409 (Mineralography) at the University of British Columbia.

In the field it was noted that high silver assays were reported from a hematite rich portion of the vein in which no silver minerals could be seen.

The purpose of this examination was to find out what silver minerals were present, their association, and their distribution.

Some high grade specimens of ruby silver from the Torbrit mine were also examined in order to identify an unknown mineral associated with the pyrargyrite veinlets.

History

The Moose vein outcrops about 1000'feet east and 1000 feet up the mountainside from the Torbrit mine shaft. The Torbrit mine is on the east bank and the camp is on the west bank of the Kitsault River, about eighteen miles from Alice Arm, B.C. A good road leads from the camp to Alice Arm where there is steamer and air service.

The prospectors who originally staked the ground which now comprises Torbrit Silver Mines found two veins. The upper vein, now called the Moose vein, was trenched, had short adits developed in two places, and was abandoned.

The lower vein has been developed into the Torbrit mine.

During the summer of 1955 the writer examined the Moose vein for Torbrit Silver Mines. Geological mapping, sampling, trenching, and a diamond drilling program was carried out.

In the fall of 1955 samples from the vein were collected and sent to the writer who made twelve polished sections and examined them under the metallographic microscope.

Geology

Rocks in the area are the Hazelton Group of Jurassic age. (1) The Moose vein is in the igneous rocks of the Hazelton Group which, in this area, Hanson describes as

> "Mainly massive and fragmental rhyolite--dacite and related types"

Around the Moose vein the country rock is a grey-green to reddish purple volcanic breccia. The rock is usually massive and shows no foliation, bedding, or lineation. Hanson considered the larger portion to be intrusive, but near the Moose vein there may be more volcanic breccia and tuff. In places reddish-purple and darker green angular breccia fragments up to three inches across can be seen in sharp outline or as ghosts in the otherwise massive greenish rock. The inferred contact of the volcanics and the underlying argillite is about 1000 feet to 2000 feet east of the Moose vein.

(1) Hanson, G. Portland Canal Area, British Columbia G.S.C. Memoir 175

Moose Vein

The Moose vein outcrops about 1000 feet east and 1000 feet above the Torbrit vein and is similiar to it. Both veins strike N.W., dip steeply to the east, are narrow at the surface, are mainly composed of barite, quartz, calcite,jasper, and contain silver minerals.

The Moose vein is about ten feet wide and has beem traced about 1000 feet. It dips steeply into the hillside and its trace is diagonally across the slope of the hill. This surface trace probably represents the original crest of the vein. That is to say, the angle between horizontal and the surface trace of the vein is the plunge of the vein, and the vein never extended further above this line. The vein is missing in places along its trace and this is thought to represent places, where because of irregularities or slightly retarded erosion the vein has not yet been exposed and is here "blind". Faulting may complicate this. The vein dies out suddenly at the S.E. end at its highest point or apex. Here it was covered or capped with country rock and could never have extended further or higher.

Mineralogy of Moose Vein

The vein is a coarse grained mixture of barite, quartz, calcite, jasper, and hematite, with minor fragments and stringers of altered country rock. It contains small amounts of fine grained pyrite, micaceous and amorphous hematite,galena, sphalerite, and freibergite. Pyrite is the most abundant sulphide, galena, sphalerite, and freibergite are sparse, and hematite is restricted to one area. No silver bearing minerals other than freibergite, and galena were identified.

Pyrite, hematite, and sphalerite were identified by etch tests and their optical properties under the microscope. Galena shows an anomalous anisotropism under crossed nicols and the freibergite is much softer than its standard hardness. X-ray powder photographs taken by Dr. R.M. Thompson identified both the galena and freibergite. X-ray patterns of the freibergite match more closely the X-ray pattern of silver rich freibergite from the Dolly Varden mine than the pattern from silver poor, copper rich tetrahedrite from the Bitannia mine. Silver probably occurs in both the freibergite and galena.

Throughout most of its length mineralization in the vein is disseminated and sparse. At the N.W. end of the vein it is heavily pyritized and assays show little silver. At the S.E. end or apex of the vein there is much hematite and silver values are higher. The specimens examined wre taken from the apex at the S.E. end of the vein.

Suggested Sequence of Vein Formation

Formation of the vein has been divided into three stages. They are:

(1) Jasper stage

(2) Quartz, barite, calcite stage.

(3) Barite stage.

Stage one in vein formation

First was the formation of a brownish-red to red jasper, possibly by replacement and some fissure filling of the country rock. Most of the jasper so formed is massive and shows no special textures. In a few places it shows colloform banding with alternating and gradational layers of fine grained hematite and pyrite. Later pyrite veins this. The banding is found mainly at the extreme apex of the vein. It is suggested that the last of the solutions precipitating jasper, possibly from a colloidal gel, became enriched in iron and began precipitating alternating bands of jasper, hematite, and pyrite. No "ore" minerals were deposited at this time. Figure 1

Stage two in vein formation

After completion of the jasper phase the vein was brecciated, then filled and replaced by quartz, barite, and calcite. Little or no "ore" minerals accompanied this period of vein formation.

Stage three in vein formation

In the final phase the vein was brecciated, then filled with coarse grained white barite, some calcite, and minor quartz. Deposition of the "ore" minerals started at the begining of this phase and probably died out before it had ended. Pyrite, galena, sphalerite (light brown), freibergite, and some hematite were all deposited in this last period of vein formation. Pyrite deposition started early in the third phase and may have continued throughout it. This was soon followed by galena, sphalerite, freibergite, and hematite.

Figure 2

Galena, sphalerite, and freibergite were deposited at the same time and show mutual boundary textures. Figure 3

Deposition of galena and sphalerite may have continued longer than the deposition of freibergite, as isolated grains of galena and sphalerite are found without freibergite in the later formed portions of the barite or third stage. Barite continued after sulphide mineralization had finished. Micaceous hematite was deposited during the third stage and is largely confined to the upper portion of the vein near the apex. Figure 4

The apparent association seen in the field between the silver values and the micaceous hematite in the Moose vein is probably fortuitous. The hematite was deposited primarily at the apex of the vein and will more than likely decrease sharply with depth. The silver mineralization in this place happened to reach to the apex of the vein and should continue down unaccompanied by hematite. Why?

In the Torbrit mine the coarse grained white barite-rich portions of the vein are often barren. It is suggested that this corresponds to the third stage of vein formation after the silver mineralization had been completed.

Native silver may or may not be present. In one of the polished sections examined minute grains a few microns across, which were similiar to native silver, were seen between lamelle of micaceous hematite. Definite identification could not be made due to their scarcity and small size.

Conclusions

There were three periods of vein formation.

(1) Jasper stage.

Brecciation

(2) Quartz, barite, calcite stage.

Brecciation

(3) Barite stage. (With sulphides)

Sulphide deposition occurred mainly during the third or barite stage of vein formation, and terminated before the end of this phase. Mineralization consisted of pyrite, galena, sphalerite, freibergite, and hematite. Freibergite is associated with galena and sphalerite. Galena and freibergite were the only silver bearing minerals found.

The apparent association of hematite and silver values is accidental. Hematite is largely confined to the uppermost portion of the vein. The silver mineralization should continue in depth unaccompanied by hematite. *What results from drilling?*

If the sequence of vein formation and mineralization in the Moose vein is applicable to the Torbrit vein it may be a useful tool in the search for new orebodies.

Torbrit Ore

Six polished sections were made from high grade ruby silver ore collected by the writer from the Torbrit mine. Previous work had shown an unknown mineral associated with the veinlets of pyrargyrite. Microscopic examination showed this mineral to be stephanite ($5Ag_2S \cdot Sb_2S_3$). This was checked with an X-ray powder photograph taken by Dr. R.M. Thompson.

Figures 5 and 6

Figure 1 X4 Jasper, stage one showing alternating colloform bands of jasper, hematite, and pyrite.

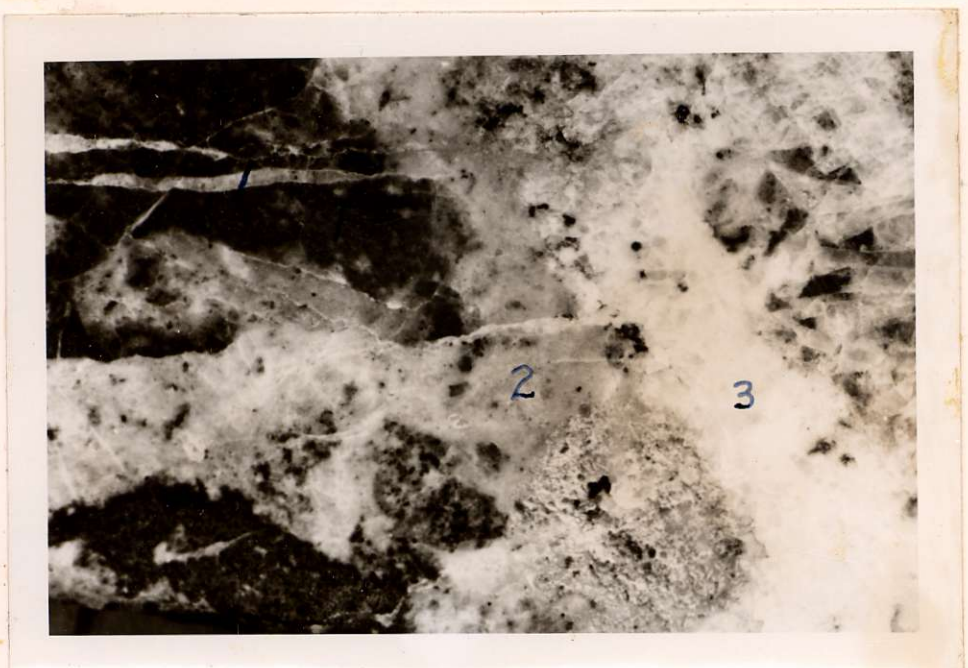


Figure 2 X4 The three stages of vein formation
1. Jasper stage.
2. Quartz, barite, calcite stage.
3. White barite stage.

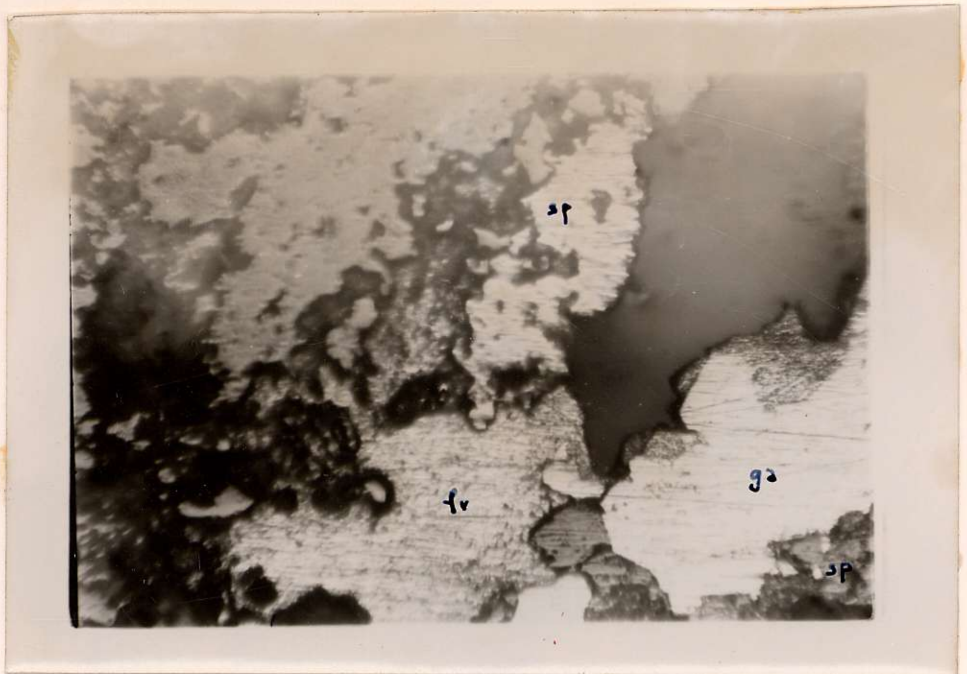


Figure 3 X100
Galena(ga), freibergite(fr), and sphalerite(sp).

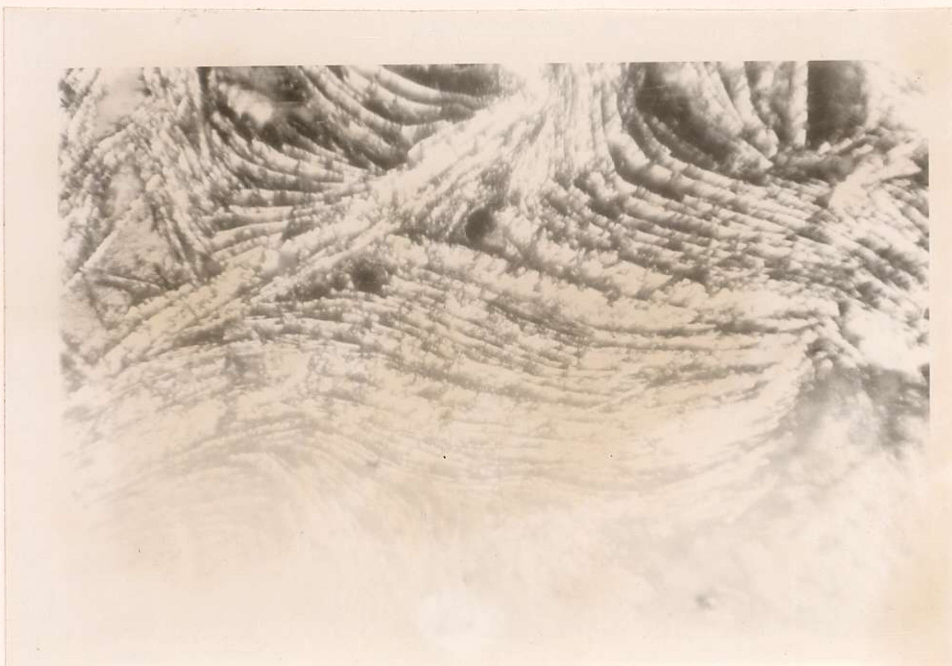


Figure 4 X100
Lamelle of micaceous hematite.

Figure 5   X100

Stephanite(st), and pyrargyrite(pg), veinlets.

Figure 6   X100

Stephanite(st), and pyrargyrite(pg), veinlets.

Laboratory Tests.

Mineral #1.

~~Poti~~.

Polish.	rough, varies greatly due to texture.
Color	silvery grey
H.	E - F (brittle)
Streak	black, sometimes a red-brown tint.
Texture	in curved micaceous plates and amorphous masses.
Anisotropism	yes
Pleochroism	not seen (weak - Uytenbogaardt)
Twinning	not seen
Internal Reflection	bright red on thin edges.
Texture X nicols	same.
Cleavage	none seen.
Etch tests	negative to all standard reagents.
Association	amorphous or massive type associated with colloform banded jasper. Micaceous type fills around breccia pieces of jasper.

Mineral is <u>Hematite</u> (Fe_2O_3)

Mineral #2

Polish	rough.
Color	yellow
H.	F
Streak	–
Texture	anhedral to euhedral crystals.
Anisotropism	no
Pleochroism	no
Twinning	not seen.
Internal Reflection	no.
Texture X nicols	same.
Cleavage	none
Association	as seperate or groups of crystals.
Etch Tests	negative to all standard reagents.

Mineral is <u>pyrite</u> (FeS_2)

Mineral #3

Polish	good.
Color	galena white
H.	B.
Streak	black to silvery
Texture	plain
Anisotropism	(no Uytenbogaardt), here shows anomalous anisotropism.
Pleochroism	no
Twinning	no
Internal Reflection	no
Texture X nicols	same.
Cleavage	not seen
Association	with freibergite and sphalerite.
Etch tests	HCl · stains black
	HNO_3 · stains black.
	$FeCl_3$ · strongly iridescent
	KCN · negative
	$HgCl_2$ · negative
	KOH. · negative
X-ray	gives galena pattern

Mineral is galena (PbS)

Mineral #4

Polish	good, reflection low.
Color	grey
H.	C
Streak	black
Texture	plain
Anisotropism	no.
Pleochroism	no
Twinning	no
Internal Reflection	a faint light brown
Texture X nicol	plain
Cleavage	not seen
Etch tests	negative to all standard reagents.
Association	with freibergite and galena.

Mineral is Sphalerite (ZnS)

Mineral #5

Polish	good reflectivity appears about same as galena.
Color	galena white (under binoculars is whiter than galena.)
H.	B (D - Uytenbogaardt.)
Streak	black
Texture	plain
Anisotropism	no ~~anomalous aniso~~
Pleochroism	no
Twinning	no
Internal reflection	not seen (uncommon - brownish-red)
Texture X nicols	plain
Cleavage	not seen
Association	with galena, sphalerite
Etch	HCl · negative
	HNO_3 · negative or faint (slowly stains brown - Uytenbogaardt)
	$FeCl_3$ · negative (stains iridescent - ")
	KCN · darkens (negative - ")
	$HgCl_2$ · slightly (almost neg, spotted residue - ")
	KOH · negative
X-ray	gives silver rich tetrahedrite pattern. Discrepancy in H. due to high silver content. Etch reaction differences probably due to high silver content.

Mineral is Freibergite $\{5(Cu,Ag)_2S \cdot 2(Cu,Fe)S \cdot 2Sb_2S_3\}$

Mineral #6

A few minute grains of a mineral similiar to native silver were seen between plates of micaceous hematite. The mineral has a silvery white color, takes a good polish, is evidently much softer than hematite, and probably is isotropic. No other properties could be ascertained due to small size and scarcity of this mineral. It may possibly be native silver.

Mineral #7.

Polish	good, about the same as pyrargrite
Color	pinkish brown against blue of pyrargyrite
H	B+ (same as pyrarygrite)
Streak	?
Texture	plain
Anisotropism	almost isotropic (partially X'd nicols = dark yellow green to black)
Pleochroism	no
Twinning	not seen
Internal Reflection	no
Texture X nicols	plain
Cleavage	not seen
Association	mutual boundary with pyrargyrite veinlets only.
Etch	HCl : neg
	HNO_3 : brings out boundary; minor darkening or spots.
	$HgCl_2$: spots surface with black dots
	KOH : stains black
	KCN : stains black
	$FeCl_3$: negative or very faint.
X-ray	

Mineral is Stephanite ($5Ag_2S \cdot Sb_2S_3$)