600294

GEOLOGY 409

SILVER STANDARD MINE
GLEN MOUNTAIN
BRITISH COLUMBIA

MINERALOGRAPHIC REPORT

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GENERAL GEOLOGY

The area is underlain by sedimentary greywackes, shales, sandstones and tuffs of the Hazelton Group, and local intrusions of quartz feldspar porphyry and granodiorite. The ore lies in subparallel fractures trending northward and dipping to the east. These fractures cut all country rocks, including the intrusives.

MEGASCOPIC CHARACTERISTICS

1300 level, South drift:

The wallrock consists of light green, highly altered sediments. Chlorite and small pyrite crystals are disseminated throughout. Numerous small quartz and calcite crystals occupy cavities in the veins. Also present are small (0.5 cm.) sphalerite octahedrons, boulangerite prisms, galena cubes and octahedrons, and bourmonite crystals. Vein material is predominantly massive white quartz and light green-brown siderite. Some galena, boulangerite, tetrahedrite and massive sphalerite also occurs. One specimen shows crustification banding, quartz having been emplaced earliest in the fracture, followed by sphalerite, then tetrahedrite. Small fractures filled with rosettes of chlorite cut all other fractures and veins. Other minerals present in minor amounts are chalcopyrite, and pyrrhotite.

#6 vein, 1400 stope:

"Typical ore" specimens from this stope consist of massive galena and sphalerite. The galena displays a distinct gneissic texture; a crude foliation has developed, presumably as a result of shearing, although no brecciation has resulted. This texture is not evident in

the sphalerite. No specimens of gangue were taken from the stope. From the specimens available, the galena:sphalerite ratio is estimated at approximately 2:1.

#8 vein, North drift, 1500 level:

In this vein, galena and small amounts of tetrahedrite have filled numerous fractures and interstices in the quartz gangue. Galena is estimated at approximately 35%, tetrahedrite at approximately 5%. The quartz has been well shattered; some hand specimens are quite friable, thus indicating possible further shearing after the emplacement of quartz.

MICROSCOPIC CHARACTERISTICS

PYRITE: Estimated ~ 1% in veins

Pyrite occasionally occurs in small euhedral crystals but more often occurs as pitted, corroded, and fractured crystals, associated in the veins with pyrrhotite. Pyrite is also disseminated throughout the wallrock as an alteration mineral.

PYRRHOTITE:

Only one section (unnumbered) was seen which contained pyrrhotite, therefore percentage values are difficult to estimate. The pyrrhotite seen was in association with sphalerite and contained veinlets of galena with associated ruby silver.

The polish was poor and pitted.

SPHALERITE: Estimated 15%

Sphalerite is usually massive, although a few replacement remanents are sometimes seen. The polish is generally poor. A deep red internal reflection is commonly observed.

TETRAHEDRITE: Estimated 5%

Tetrahedrite is usually seen as small irregular bodies and is rarely massive. In specimens from the South drift, tetrahedrite has been replaced by, and has reacted with, boulangerite to form a reaction rim of bournonite (see figures 1 and 2). In specimens from the #6 vein, 1400 stope, tetrahedrite has been replaced by galena (see figure 3). Silver values in excess of a thousand ounces per ton have been reported from selected specimens of tetrahedrite from the South drift.

CHALCOPYRITE:

Only minor amounts of chalcopyrite were seen. It is generally associated with the sphalerite as veinlets, and in small irregular masses. It has replaced pyrite and sphalerite but has been replaced by galena.

GALENA:

Galena is the most abundant sulphide present, and shows good polish and abundant triangular cleavage pits. In specimens from the 1400 stope, #6 vein, minor contortion is evident as cleavage traces are bent. In specimens from the #8 vein, 1500 level, galena fills interstices between quartz fragments. No effects of shearing after deposition of the galena are evident.

BOULANGERITE:

Colour - white

Polish - good

Hardness - B

Pleochroism - slight

Anisotropism - great, blue to yellow-brown

Twinning - none

Internal Reflection - none

Association - tetrahedrite, bournonite

Etch Tests:

$HgCl_2$	(-)ve
KOH	(-)ve
KCN	(-)ve
HCl	brings out scratches, fumes tarnish
$FeCl_3$	(-)ve
HNO_3	black wave advances across drop, effervescence

Boulangerite is massive and replaces tetrahedrite (see figures 1 and 2).

BOURNONITE:

Colour - with galena - light grey; with boulangerite - slight violet tint

Polish - good

Hardness - C+

Pleochroism - none

Anisotropism - distinct grey to dark brown

Internal Reflection - none

Etch Tests:

$HgCl_2$	(-)ve

KOH	(-)ve
KCN	(-)ve
HCl	(-)ve
$FeCl_3$	(-)ve
HNO_3	(-)ve
Aqua Regia	iridescent

The AZOLITMIN etch test as described in Uytenbogaardt was also attempted but results were negative. Bournonite forms reaction rims around tetrahedrite (see figures 1 and 2) and also occurs as small blade-like inclusions in galena in specimens from #8 vein, North drift.

PROUSTITE: Estimated trace

Pyrargyrite

Section - no number

Hardness - B

Colour - blue

Internal Reflection - bright red

Anisotropism - strong, blue to dark brown

Pleochroism - none

Association - galena, tetrahedrite

Etch Tests:

$HgCl_2$	brown to iridescent
KOH	brown, then rapidly black
KCN	pits surface, grey, then black
HCl	brings out scratches
$FeCl_3$	(-)ve
HNO_3	brown in spots

Proustite was seen with tetrahedrite, bournonite, and galena in veins in pyrrhotite. No other occurrences were seen. From textural

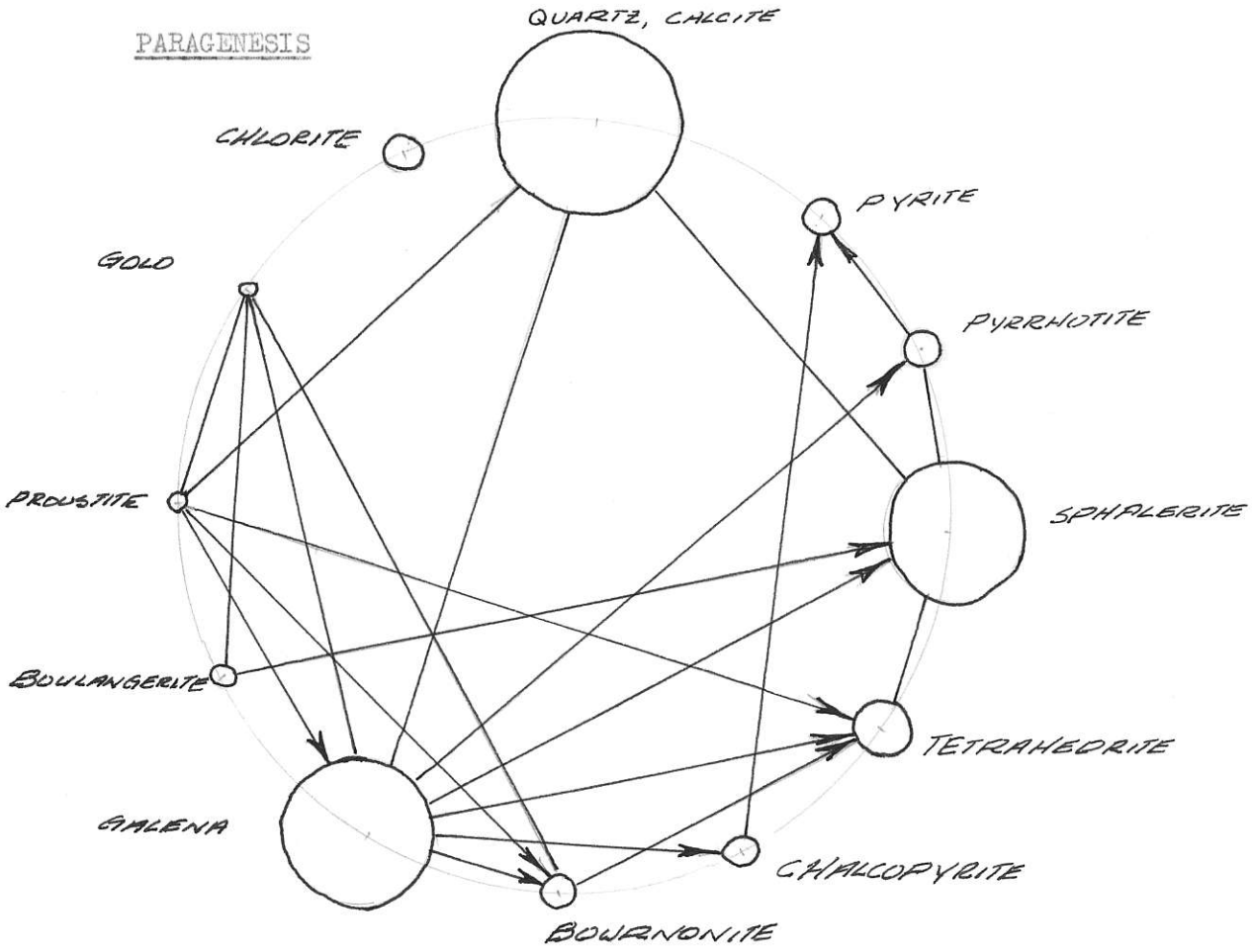
relations, proustite has replaced tetrahedrite and galena (see figure 4). In some instances, it has been emplaced along galena-bournonite contacts, or galena-gangue contacts.

Chunk chalcopyrite

GOLD:

Gold occurs in small blebs to 25 microns. It is associated largely with bournonite in the reaction rims, and with proustite (see figures 1, 2 and 4). Values to 4 ounces per ton have been reported from specimens from the South drift, but the average grade is no doubt considerably lower than this.

PARAGENESIS



Shearing and fracturing of the country rock was followed by the deposition of quartz and calcite in the fractures. Further shearing followed the deposition of quartz in the #8 vein, at least. Pyrite and pyrrhotite were deposited in minor amounts in the veins, and metasomatic pyrite was emplaced in the wallrock. Sphalerite was deposited next, followed by tetrahedrite and chalcopyrite. Chalcopyrite veins sphalerite, and tetrahedrite is younger by caries textures. Bournonite was probably deposited next although this is not clearly visible. Galena, deposited next, appears to have replaced the bournonite in specimens from the #8 vein, North drift. Shearing or dyomation occurred sometime after the deposition of the galena, as evidenced by the gneissic texture of specimens from the #6 vein, 1400 stope. Deposition of boulangerite and proustite

followed. Proustite has replaced galena, tetrahedrite, and bournonite. Gold is restricted mainly to proustite and bournonite associations, and was deposited next. Chlorite occurs in rosettes in fractures which cut veinlets of pyrite in the wallrock, and was assumed to have been deposited last. Some specimens of ore with slickensided surfaces have been observed, indicating a shearing later than the deposition of the mineralization.

TYPE OF DEPOSIT AND ECONOMIC CONSIDERATIONS

Evidence of open space filling is abundant in specimens from this mine. Crusification banding and vugs filled with crystals of quartz, sphalerite, galena etc. are indicative of an epithermal deposit. Areal distribution of mineralization is not known, therefore the deposit may or may not show zoning.

Gold values are associated mainly with the bournonite in reaction rims, and with the ruby silver. Judging from the small amount of ruby silver observed in the suite, it is concluded that only a small percentage of silver is obtained from this mineral, and the bulk of the silver is associated with tetrahedrite.

Other minerals reported from the property but not observed are jamesonite, scheelite, and cosalite.

Figures 1 and 2

REACTION RIM TEXTURE

Bournonite rims tetrahedrite (high relief), in a matrix of boulangerite. Note gold as white blebs near and in boulangerite rims.

Figure 3

Tetrahedrite remanent in galena

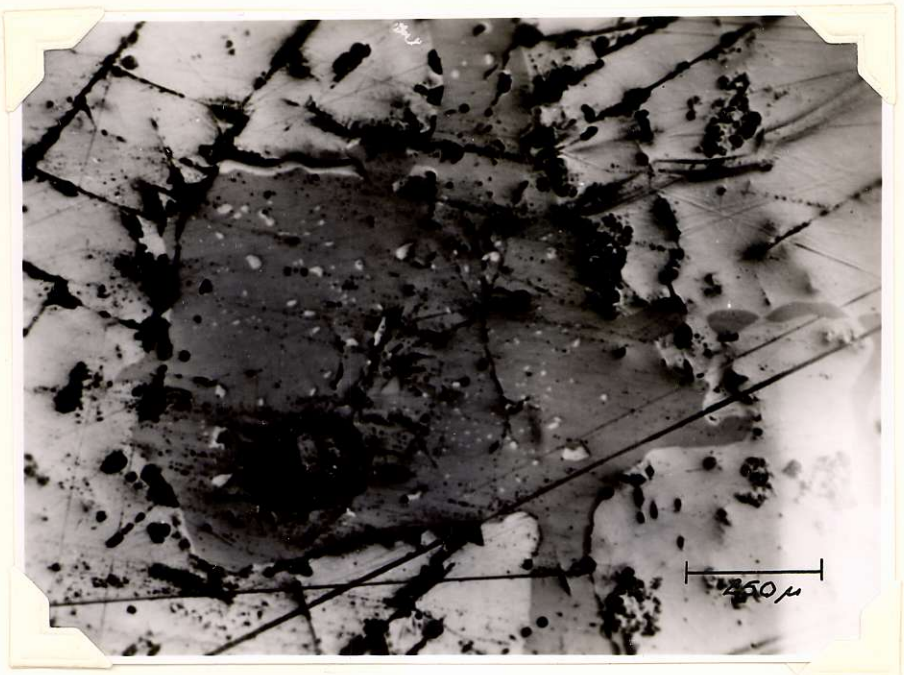


Figure 4

Proustite (grey) in galena. Note gold as small white blebs in proustite.