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Geology 409

Mineralographic Report on the
Dolly Varden Mine.

Skarn

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The Dolly Varden Mine is located at an elevation of 1700 feet in the Upper Kitsault River district, 16 miles north of the town of Alice Arm.

In 1915 the Dolly Varden Mines Company was formed and they commenced development work. In 1919 the holdings of Dolly Varden Mines Company passed into the hands of the Taylor Engineering Company. The Taylor Mining Company was formed and they mined 1,304,409 ounces of silver by 1921, when their operations ceased.

In the last few years a new company, Dolley Varden Mines Ltd. has been formed and they have been doing a lot of exploration and development work prior to starting production.

General Geology

The country rocks of the Dolley Varden mined are volcanic fragmental rocks of Triassic & Jurassic Age (Hazelton Gp) The Breccias at the Dolly Varden mine dip in a northerly direction and they may be part of the northern limb of a small anticline transverse to the general structure.

The orebody is in the form of a vein which grades into country rock on the footwall. The vein is a ~~silicay~~ silver bearing quartz-pyrite vein with an east-west trend - it has been cut by a number of transverse faults.

Hand Specimen.

The average country rock appears to be a dark-rock probably volcanic - shot through with masses of quartz. Many of the specimens are covered with a rusty iron oxide.

Minerals observed in the hand specimens were Native Silver, Argentite, Ruby Silver, pyrite and galena.

Microscopic Determination.

Minerals found by microscopic identification were

- Argentite Ag_2S
- Native Silver Ag
- Galena PbS
- Pyrite FeS_2
- Sphalerite $ZnFeS$
- tetrahedrite $(Cu,Fe,Ag,Hg,Zn)_7(As,Sb)_2S_8$
- pyargyrite Ag_3SbS_3
- ? proustite Ag_3AsS_3
- (polybasite ?) $(Ag,Cu)_{16}(Sb,As)_2S_{11}$

Gangue
qtz -
calcite -

Pyrite occurs in fairly good cubic crystals with many pits and a poor polish. The hardness is 6.

Sphalerite is greyish-brown, hardness 6-0 and isotropic. It has a white internal reflection on the powder and gives a Zinc microchem test.

Galena has a good polish, white colour and low hardness (B). It has triangular cleavage pits and slight anisotropism. $HgCl_2$, KCN and HNO_3 give negative etch tests. KOH tarnishes brown as does HCl.

Microscopic

$FeCl_3$ tarnishes galena irredescent.

Native Silver is white with a yellowish tarnish. It is very soft and sectile and appears anisotropic.

Argentite is very soft (A), grey-white colour and isotropic. It has a black streak and no internal reflection. $HgCl_2$ slowly stains brown to irredescent, KCN and $FeCl_3$ turn brown. All others are negative. HNO_3 tarnishes irredescent.

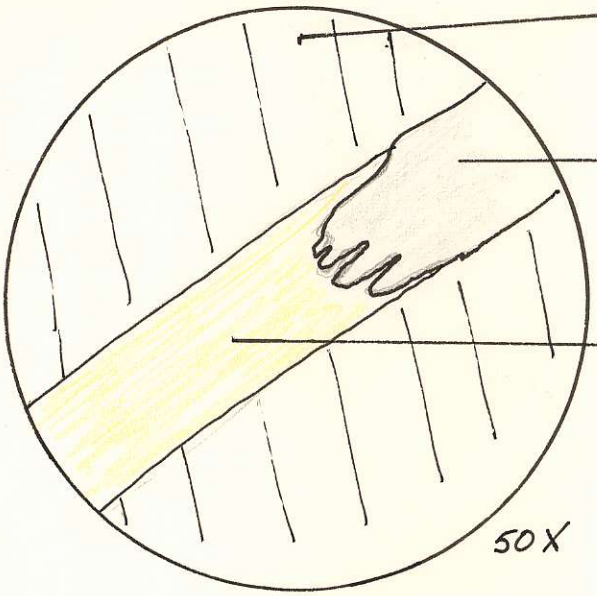
Tetrahedrite is grey-brown coloured, medium hardness and isotropic. it has no internal reflection. HCl etches and shows up scratches, tarnishes irredescent, HNO_3 tarnishes slightly, all others are negative. Tetrahedrite appears to be giving a silver test.

Pyargyrite has a fair polish, greyish-blue colour and a low hardness. It has a red internal reflection and a red streak. It has a distinct isotropism. $HgCl_2$ tarnishes dark brown, KOH instantly tarnishes irredescent to brown. $FeCl_3$ tarnishes faintly irredescent and HNO_3 tarnishes blueish grey. All other test are negative. It gives a positive Ag, Sb test and a negative Cu test.

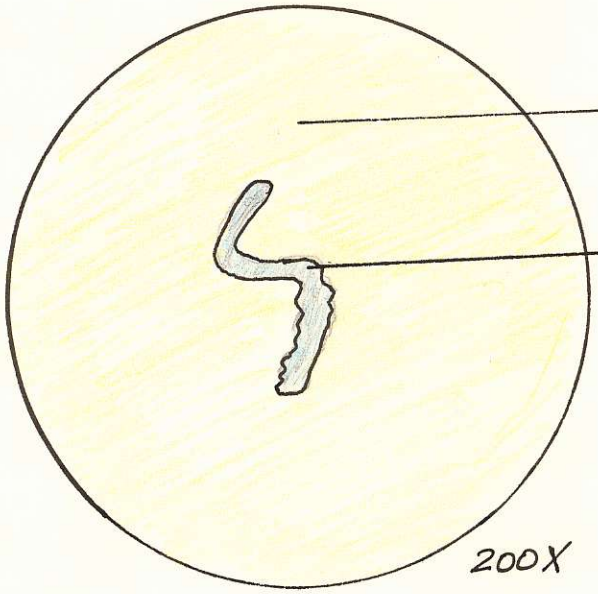
Proustite is greyish with a blue tinge. Soft and isotropic. Has a bright red internal reflection and a red streak. It light etches rapidly and tarnish fast with ordinary light. KCN and KOH stain dark brown to black. Others are negative. Gives a positive Ag_2S test.

Polybasite is uncertain. It is grey with a greenish tinge and anisotropic. It has a low hardness and faint red internal reflection; KCN slowly turns black, $HgCl_2$ slowly turns brown. All others are negative, gives microchem tests for Ag, As but no copper. So it may just be proustite.

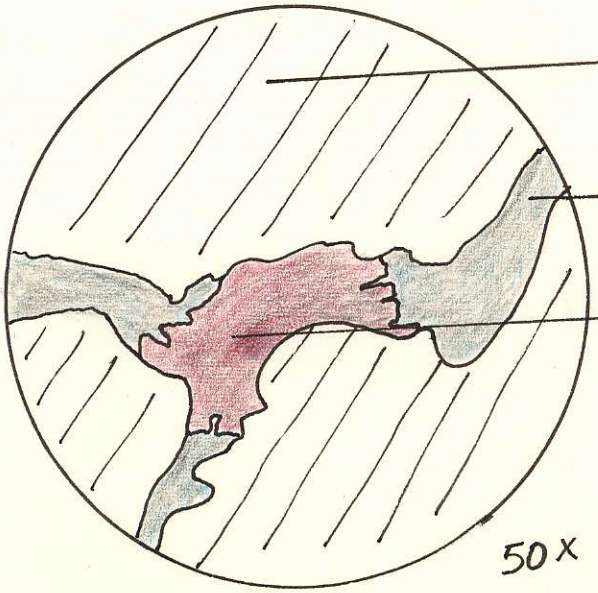
Textures



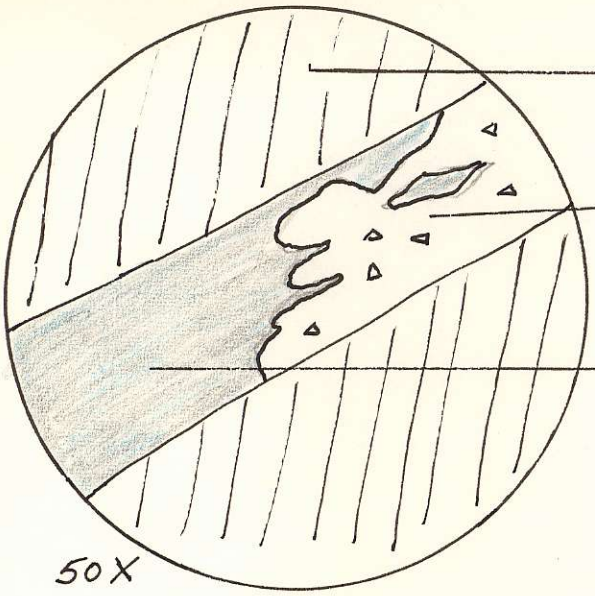
Native Silver has replaced Argentite



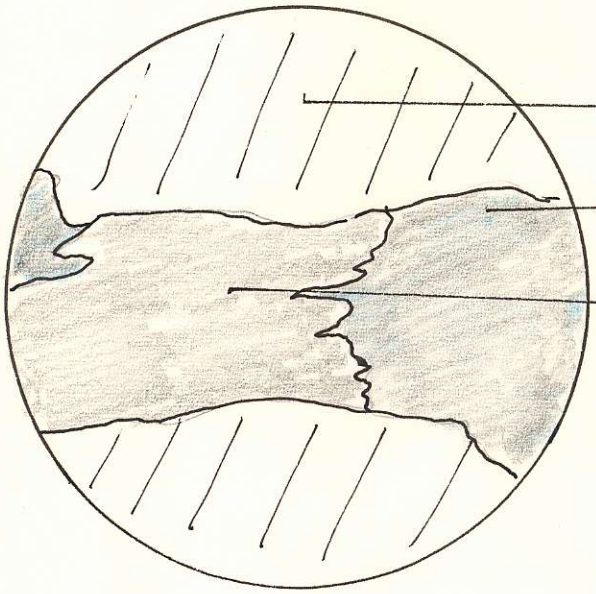
Silver has replaced pyrargyrite.



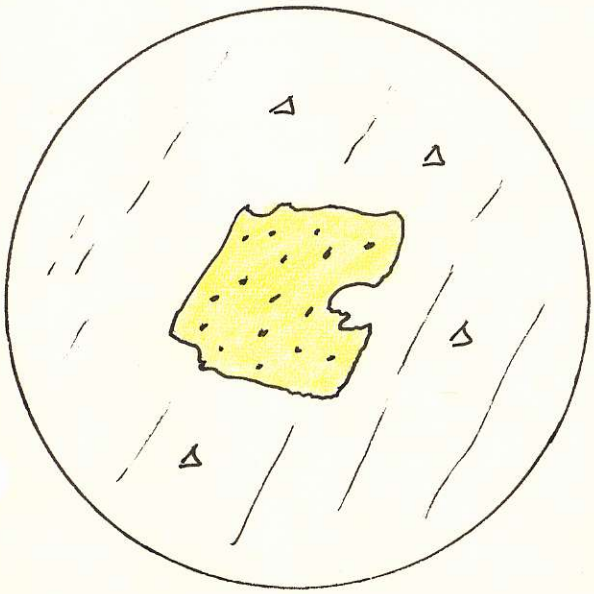
pyargyrite has replaced sphalerite



Pyragyrite has replaced Galena



Pyrargyrite has replaced tetrahedrite



Galena

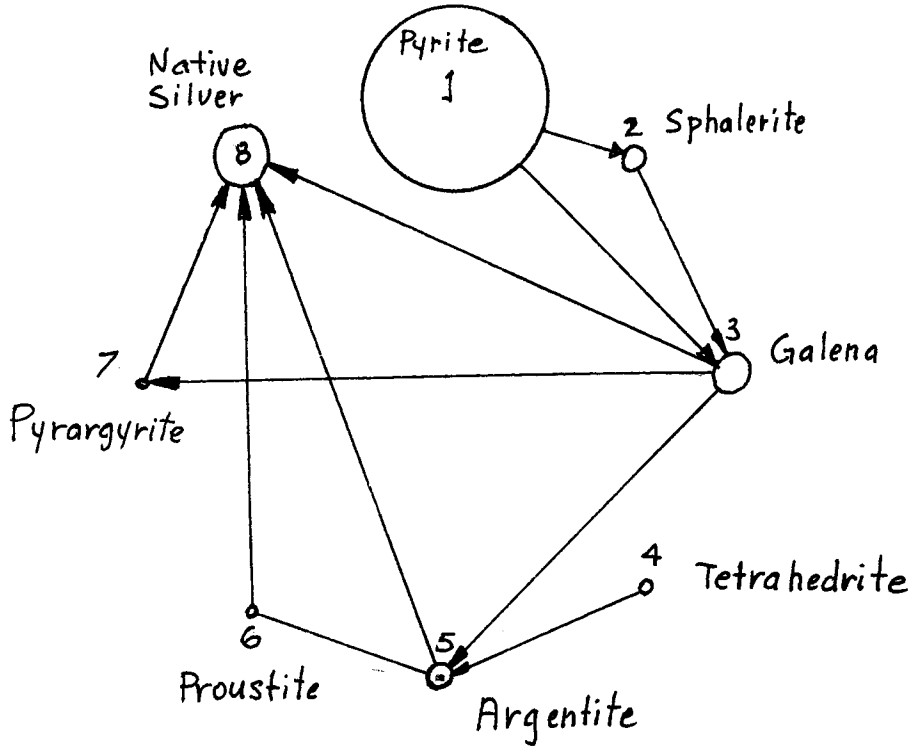
Pyrite

Galena has replaced Pyrite

Textures

Other textures indicate that silver has replaced all other minerals it is in contact with and pyrite has been replaced by all minerals it is in contact with.

Paragenesis



Pyrite is definitely the first mineral formed and the relationship between Pyrite, galena, and sphalerite is quite clear. The relationship between Argentite, Proustite and pyrargyrite is not too clear but it is probably the order suggested.

Paragenesis & Temperatures

The orebody was formed in Mesozoic time and so it is unlikely that it would be related to the present surface but apperently it is. This suggest the silver minerals could be a secondary enrichment feature. The fact that ~~there~~ there are two temperature assemblages of minerals supports this idea. [Galena, sphalerite - medium temp, argentite, pyrargyrite - low temp]

This is generally the case in many silver deposits containing native silver and ruby silvers.

Thus the primary ore was formed at a temperature of less than 450°C and the secondary ore was formed at much lower temperatures - 100°C perhaps