

Little Billie

600435

Geology 409

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## Little Billie.

Location: The little Billie mine, in the Nanaimo Mining Division, is near Vananda on the north-eastern coast of Texada Island. The mine and workings are about one half ~~a~~ mile south-easterly along the coast from the village of Vananda.

Mineralogy of ore bodies: The ore bodies contain bornite, chalcopyrite and in part magnetite, in a gangue consisting mainly of green or brown garnets wollastonite and diopside. <sup>EP, clove!</sup> Although chalcopyrite and bornite occur together ~~SP~~ in both the green and brown garnet bodies, the chalcopyrite favors the brown garnet magnetite bodies and the bornite favors the green garnet, wollastonite diopside bodies.

Sulphides occurring in small amounts include molybdenite and pyrrhotite. Molybdenite is found disseminated in small amounts in all the altered rocks and particularly in the white phases of the quartz diorite. Small amounts of pyrrhotite are found along joints in some altered greenstones.

## Megascopic Description.

### Hand Specimen #1.

This specimen is a roughly rectangular piece of massive chalcopyrite and bornite measuring 2" x 3" x 1". Chalcopyrite is the major mineral with some bornite and small blebs of Calcite averaging  $\frac{1}{8}$ " x  $\frac{1}{4}$ ". One face has a bunch of the peacock blue bornite tarnish.

### Hand Specimen #2

This specimen is a coarsely crystalline piece of ?classical skarn?. It is roughly tetrahedral in shape and measures approximately 3" on an edge. The majority of the rock is coarse grained calcite and quartz. Also present are several large euhedral, radiating crystals of actinolite and an abundance of fine grained interstitial diopside. The only ore mineral present is chalcopyrite which occurs in several large blebs which exhibit conchoidal fracture.

### Hand Specimen #3

This specimen is a tabular piece of coarse grained wollastonite rock measuring about  $1\frac{1}{2}$ " x 2" x 3". Also present is an abundance of fine grained massive bornite and chalcopyrite.

## Minerals Identified.

Magnetite:  $Fe_3O_4$

Color: Pale grey

Magnetic

Hardness: F

Chalcopyrite:  $CuFeS_2$

Color: Brassy yellow

Hardness: C

Pyrite:  $FeS_2$

Color: yellow white

Hardness: F

Polish: Poor

Molybdenite:  $MoS_2$

Hardness: B<sup>+</sup>

Anisotropism: strong pink - blue.

Color: grey

Etch: Neg. to all reagents.

Pyrrhotite:  $Fe_{1-x}S$

Color: creamy brown

Hardness: D<sup>-</sup>

Anisotropism: strong greenish-~~red~~sh brown

Sphalerite:  $ZnS$

Color: grey

Hardness: 4

Internal reflection: red brown

Polish: Good.

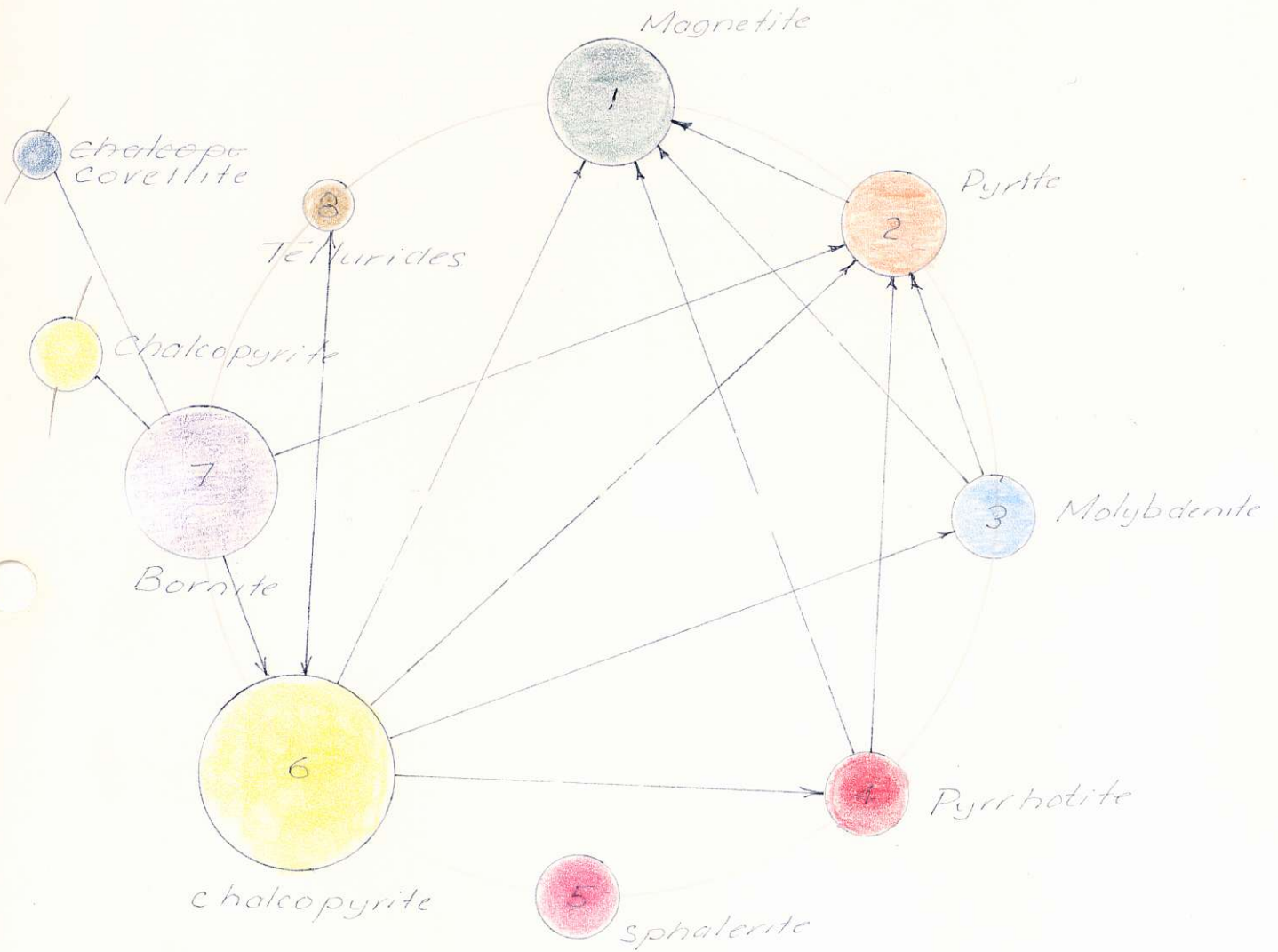
Bornite.  $3\text{Cu}_2\text{S Fe}_2\text{S}$   
color: pinkish brown  
hardness: B  
polish: good

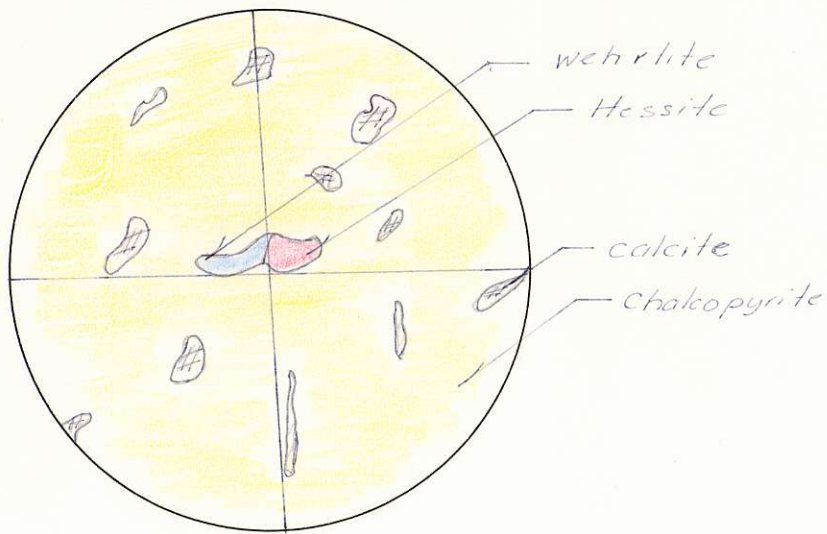
Wehrlite:  $\text{Bi}_{2+x}\text{Te}_{3-x}$   
color: tin white to steel grey  
Anisotropism: weak, light to dark grey  
Etch:  $\text{HNO}_3$  - black  
 $\text{HCl}$  - light to grey brown  
 $\text{KCN}$  - neg  
 $\text{FeCl}_3$  - iridescent  
 $\text{KOH}$  - neg  
 $\text{HgCl}_2$  - neg

Hessite  $\text{Ag}_2\text{Te}$   
color: light grey  
Hardness:  $2\frac{1}{2}$   
Anisotropism: grey to steel blue  
Etch:  $\text{HNO}_3$  - black  
 $\text{HCl}$  - black (slow)  
 $\text{KCN}$  - black (slow)  
 $\text{FeCl}_3$  - iridescent  
 $\text{HgCl}_2$  - light brown

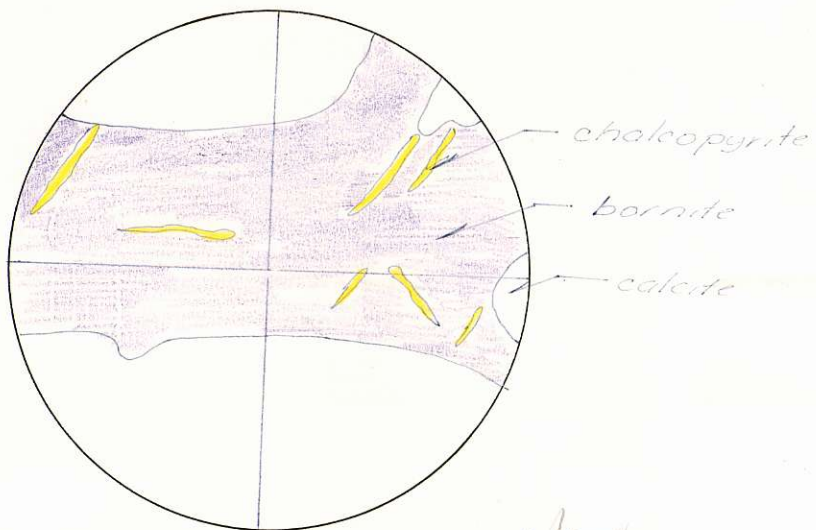
Tellurbismuth  $\text{Bi}_2\text{Te}_3$   
color: pinkish white  
hardness: A  
Anisotropism: yellow to dark grey  
Etch:  $\text{HNO}_3$  - black  
 $\text{FeCl}_3$  - iridescent.

Vanderveer Diagram.





95μ



bornite exsolving *part of* chalcopyrite

## Relative Abundance

Chalcopyrite	20%
Bornite	15%
Magnetite	5%
Pyrite	3%
Molybdenite	2%
Pyrrhotite	2%
Sphalerite	42%
Tellurides	<1%

Textures: The general occurrence of the ore minerals is interstitial in a calcium silicate skarn host rock.

Exsolution texture: Bornite with exsolved chalcopyrite is widespread. According to Edwards, Chalcopyrite and Bornite form extensive solid solutions at temperatures above 475°C. If bornite predominates, which is the case in this suite, blades of chalcopyrite develop in the 111 planes of bornite. Frequently the exsolved mineral forms elongated, often narrow grains in the grain boundaries or at the contacts of the host mineral giving a rim texture somewhat comparable with the rim texture resulting from replacement. This feature is also observed in this suite.



## Temperature Type Deposit

This appears to be a typical contact metasomatic deposit. occurring at temperatures in excess of  $475^{\circ}\text{C}$  as evidenced by the exsolution chalcopyrite in borinte.