Alberni

— GEOLOGY 409 —

600010

MINERALOGRAPHIC REPORT ON SPECIMENS FROM THE LYNX ORE BODY AND PRICE SHOWING OF WESTERN MINES LIMITED NEAR BUTTLE LAKE, B.C.

RMT
April 21/65

Index

April 11, 1965

MINERALOGRAPHIC REPORT ON SPECIMENS FROM THE LYNX ORE BODY AND PRICE SHOWING OF WESTERN MINES LIMITED NEAR BUTTLE LAKE, B.C.

LOCATION OF THE LYNX AND PRICE ZONES (B.C. Dept. of Mines, 1961, 62, 63)

The Lynx and Price groups of mineral claims (which were optioned by Western Mines in May 1961) are in the vicinity of Myra and Price Creeks at the south end of Buttle Lake. The property comprises twenty-three crown-granted and forty-two recorded mineral claims covering an area of 6,000 by 21,000 feet.

The Lynx showings are at several locations between elevations of 1200 and 1700 feet on the north side of Myra Creek approximately two and one half miles west of the south end of Buttle Lake. The Price showings are on the east slope of Myra Mountain at several locations between elevations 900 and 1900 feet and are one half to one and one half miles southwest of the south end of Buttle Lake.

GENERAL GEOLOGY OF THE AREA (B.C. Dept. of Mines, 1961)

The mineral occurrence is in a generally northwesterly trending zone of sericite schists formed by shearing in ~~sed~~ volcanic rocks of the Vancouver group. Contained in the schists are silicified zones and innumerable narrow quartz stringers. The silica gangue is accompanied by calcite and barite. Pyrite, chalcopyrite, tetrahedrite, galena and sphalerite occur mainly in the siliceous lenses, either disseminated or in small veinlets. Small fractions of an ounce of gold and variable amounts of silver occur with the sulphide minerals.

SECTION I - LYNX ORE BODY

The suite studied from this ore body consisted of four polished sections and nine small pieces of drill core from diamond drill hole U13-160 between the levels 24.5 - 27.0 feet; and of seven large polished sections from an unspecified area of the ore body. The assays given for this suite were as follows:

Au	0.66 oz.
Ag	194.80 oz.
Cu	5.80 %
Pb	1.07 %
Zn	18.70 %

MEGASCOPIC DESCRIPTION

The nine pieces of drill core examined were similar in nature. They were brittle and had a high specific gravity (4.38 average) as one would expect from the above assays. Pyrite, chalcopyrite and sphalerite appeared to be replacing the quartz in a fine grained ground mass. The nature of the mineralization varied from a fine grained disseminated one to a more crystalline one (small crystals of pyrite and sphalerite were seen in some pieces).

Pyrite and chalcopyrite combined occupied 30 to 50% of the pieces of core; sphalerite, 15 to 40%; galena and bornite, minor amounts; calcite, up to 5% with the rest as other gangue components.

MICROSCOPIC DESCRIPTION

The following minerals were identified in this suite.

1. Pyrite (FeS_2).

This mineral, which was light yellow in color, had a polish which varied from good on euhedral crystals to poor and pitted on small blebs. It had a hardness of F and showed relief above surrounding minerals. In some polished sections, euhedral ~~crystals~~ grains of pyrite replaced quartz and in other sections subhedral pyrite grains were replaced by sphalerite, chalcopyrite, bornite and tetrahedrite. Also, euhedral pyrite grains were surrounded interstitially by galena. Inclusions of bornite, chalcopyrite, and sphalerite were observed within some pyrite grains suggesting core replacement of the pyrite.

The pyrite's grain size varied ~~from~~ 1 to 2 microns to 50 to 60 microns across.

2. Chalcopyrite ($CuFeS_2$).

This mineral had a brass yellow color, a good polish and a hardness of C. It was weakly anisotropic and varied in grain size from small blebs and veinlets a fraction of a micron across to large masses 50 to 75 microns across.

Chalcopyrite was observed as veinlets in pyrite and as blebs in galena, sphalerite and ~~qtz~~ quartz suggesting replacement of these minerals. (See paragenetic sequence for more details). It was also observed as ex-solution blebs, veinlets and rims in bornite associated with stromeyerite and at bornite-sphalerite contacts. Chalcopyrite was also being replaced by bornite which suggests an overlapping of deposition between the two. The grain size of the chalcopyrite varied from microscopic ex-solution blebs to ones over 150 microns across.

3. Sphalerite (ZnS).

This mineral was light gray in color and had a fair polish generally with small pits in its surface. It showed some resinous internal reflection and had a hardness of C⁻.

The sphalerite (which appeared to be massive) surrounded rounded grains of pyrite and corroded grains of quartz suggesting replacement of them. Sphalerite was replaced by chalcopyrite, interstitial galena, and by tetrahedrite (with which it had a mutual boundaries texture). Its grain size ranged from 10 microns across to well over 60 microns across.

4. Tetrahedrite $(Cu, Ag^?, Zn, Fe)_{12} Sb_4 S_{13}$.

This mineral was typically olive-gray in color and had a fair polish. It was isotropic and it was rather brittle with a hardness of D. Tetrahedrite blebs had a mutual boundaries texture with surrounding sphalerite. Blebs of tetrahedrite ~~next~~ in contact with galena (which replaces it) had a greenish tinge suggesting the presence of arsenic (perhaps in the form of tennantite - this was not proven microchemically). A silver test on the tetrahedrite was negative but it is suspected that the copper present blotted out the silver. The grain size of tetrahedrite was up to 15 to 20 microns across.

5. Galena (PbS).

This mineral was identified by its galena white color, triangular cleavage pits and isotropism. It replaced sphalerite interstitially and along sphalerite-tetrahedrite contacts (as rims). Its grain size varied from very small blebs 1 to 2 microns across to ones 30 to 40 microns across.

6. Bornite Cu_5FeS_4.

This mineral had a characteristic pinkish-brown color, a hardness of B and was isotropic. ~~It~~ On

Gold (Au).

N.B. Although gold was listed in the assays for this suite (its presence is common in the Pb concentrate also), none was observed in this examination.

addition to replacing all previously mentioned minerals. In addition to replacing chalcopyrite, ex-solution blebs of it were seen in the bornite. Also, remnants of bornite were seen in stromeyerite. The bornite's grain size varied widely from a few microns across in pyrite and stromeyerite to massive grains 50 to 60 microns across.

7. Stromeyerite ($CuAgS$ or $Cu_2S \cdot Ag_2S$).

This mineral was the only silver mineral observed and was seen in two polished sections of drill hole U13-160. ~~and~~ It was first recognized in a freshly polished section by its violet, purple, brown to black anisotropism. It was gray in color and had a hardness of B. Because of its sensitivity to light, it quickly acquired a brownish rough looking "dusty" tarnish which was then observed in the other polished section.

The stromeyerite was associated with bornite which it was replacing. Its grain size was generally less than 15 microns.

Etch Tests

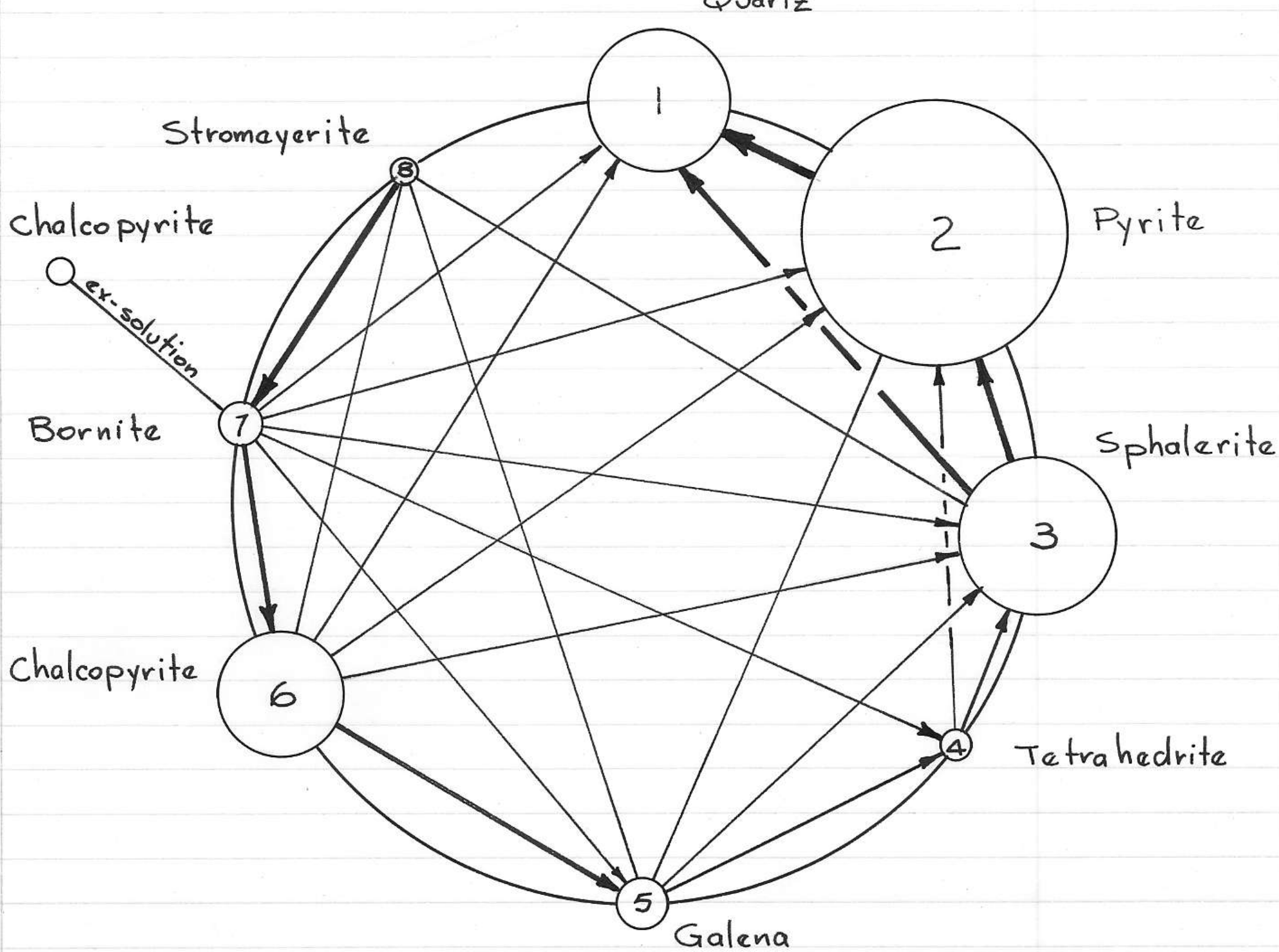
Reagent / Mineral	$HgCl_2$	KOH	KCN	HCl	$FeCl_3$	HNO_3 1:1	Aqua Regia
Pyrite	neg.	neg.	—	—	—	—	black tarnish
Chalcopyrite	neg.	neg.	—	—	—	differential brown stain	irredescent tarnish
Sphalerite	neg.	neg.	—	generally neg. but drop turned yellow.	—	fumes tarnished	effervesces; dark brown stain
Tetrahedrite	neg.	neg.	generally neg.	neg.	neg.	fumes tarnish	—
Galena	neg.	neg.	neg.	—	—	black stain	—
Bornite	neg.	neg.	brown tarnish	neg.	orange-yellow stain	effervesces; yw. brown stain	—
Stromeyerite	irredescent tarnish	neg.	—	—	irredescent tarnish	irredescent tarnish	—

Minerals Present (volume % determined visually)

Polished Section / Mineral	Large plasticene mounted sections *							Briquttes from drill hole U13-160, 24.5-27.0 feet.			
	1	2	3	4	5	6	7	①	②	③	④
Pyrite	75	30	60	23	52	65	30	20	35	25	15
Chalcopyrite	trace	trace	trace	1	trace	trace	2	15	33	30	30
Sphalerite	20	65	27	70	35	20	55	45	30	20	35
Tetrahedrite	1	3	5	5	3	5	5	4	trace	4	7
Galena	1	1	3	1	5	5	5	10	2	10	10
Bornite	3	1	5	trace	5	5	3	2	trace	1	trace
Stromeyerite	—	—	—	—	—	—	—	4	—	10	3

* These sections can be identified by the number of yellow blebs of plasticene in the bottom of their white plasticene bases.

Paragenetic Sequence



The sulfides are located in silicified 'lenses' and innumerable narrow quartz stringers in sericite schists which were formed by shearing in the volcanic rocks of the Vancouver group.

The first sulfide deposited was pyrite which showed major replacement of the quartz. Sphalerite and tetrahedrite respectively followed the pyrite and were probably close together in time of deposition. The sphalerite showed replacement of both quartz and pyrite and the tetrahedrite replaced sphalerite and pyrite.

Contrary to the common order of deposition of sulfides of this type, galena ~~followed~~ (rather than chalcopyrite) followed the tetrahedrite, replacing it and sphalerite. The galena also filled interstitial voids between pyrite grains but no major replacement of pyrite occurred.

Chalcopyrite and bornite are next in the sequence and their respective times of deposition definitely overlap. While bornite shows a replacement of chalcopyrite in some areas, chalcopyrite is exsolving out of the bornite in others. Both of these minerals show replacement of the previously deposited sulfides and quartz. (The replacement of galena by chalcopyrite was especially noticeable).

Stromeyerite, a low temperature mineral, came very late in the sequence and shows a major replacement of bornite.

Temperature Type of Deposit.

This deposit is most likely a hypothermal one (very common for sulfide deposits of this type) of a medium temperature range as evidenced by the presence of sphalerite, tetrahedrite, galena and bornite and the absence of higher temperature minerals such as pyrrhotite, magnetite, hematite, etc.

Application to Ore Dressing.

Remarks about this topic are presented in a later section following the discussion of the minerals in the Price showing which follows.

SECTION II - PRICE SHOWING (2000 FT. LEVEL)

This suite consisted of one large hand sample, two smaller pieces of the same material, one polished section and one thin section. No assays were provided.

MEGASCOPIC DESCRIPTION

The large hand specimen was roughly 4 in. by 3 in. by 3 in. in size and had a high specific gravity (the two smaller pieces of the same material had an average specific gravity of 3.68). The specimen was generally light gray in color and it showed some schistocity with very narrow openings between some of the layers of gangue.

The specimen was obviously high in mineral content because it contained massively banded sulfides (pyrite, sphalerite and chalcopyrite, mainly). Also, several cross-cuts of banded sulfides were noted. In addition, fine grained pyrite and chalcopyrite were disseminated throughout. Some limonitic alterations were noticeable on its surfaces and a few blebs of iridescent tarnish (presumably on bornite) were visible.

The two smaller pieces were approximately one inch in maximum dimension and light gray in color also. They had been sawn to shape and fine grained pyrite and chalcopyrite were disseminated throughout the quartz inclusions on their faces.

MICROSCOPIC DESCRIPTION

Thin Section

(The nature of the thin section was explained to the author by other students in his Geology 409 section).

The thin section shows an isotropic ground mass with a foliated texture. The quartz - sericite schist present has been nearly totally replaced. "S" shaped lenticular remnants of sericite 1 to 2 mm. in length show evidence of shearing. Also, irregularly shaped grains of quartz have been strained because they did not show sudden extinction from white to black but rather went from white to dark grey to black. Fine grains of sulfide minerals 0.1 to 0.2 mm. across are disseminated throughout the section.

Polished Section

Quartz, pyrite, sphalerite, tetrahedrite, galena and chalcopyrite were visible in the polished section with similar properties to those listed for them in the Lynx section of this report. Neither bornite nor stromeyerite were seen in the polished section. Also, the presence of arsenopyrite reported in the B.C. Department of Mines 1929 Report was not observed.

The textures of the sulfides varied somewhat from those in the Lynx suite. The grain sizes of pyrite and chalcopyrite were noticeably smaller in general (see tabulation below). The replacement of pyrite by sphalerite and chalcopyrite was much further advanced. The pyrite exhibited an "ice-cake" texture in the sphalerite. In the larger grains of pyrite (some of which retained evidence of their cubic form), relatively large blebs and veinlets of chalcopyrite were evident. Replacement relationships shown by galena and tetrahedrite were similar to those described previously.

Minerals Present (volume % determined visually)

		grain size
pyrite	30%	most grains 1 to 5 microns; a few, up to 50 microns
sphalerite	60%	20 to 25 microns
tetrahedrite	3%	up to 15 microns
galena	1%	3 to 4 microns
chalcopyrite	6%	8 to 10 microns

Paragenetic Sequence

While the proportions of the sulfides vary somewhat, the paragenetic sequence of the Price showing is essentially the same as that of the Lynx ore body. The replacement of pyrite by sphalerite and chalcopyrite is much further progressed however. This indicates that the pyrite was deposited such that it was more accessible to the later sulfides.

Temperature Type of Deposit

Like the Lynx ore body, the Price showing is ~~also~~ probably one of a medium temperature hypothermal type of deposit also.

Application to Ore Dressing

In spite of the fact that there are several recoverable metals present (Zn, Cu, Pb, Ag, Au?) and that their host minerals are generally less than 200 mesh (74 microns) in size, there is no reason to believe that an efficient, economical recovery can not be made.

Recovery of these metals could be made using proper reagent additions and strict pH control in differential flotation circuits. To prevent contamination of these circuits by gangue slimes, a bulk float could be made at a relatively coarse size (between 50 to 65 % passing 200 mesh) from which copper and lead could be floated ~~differentially~~ together while the sphalerite and pyrite were depressed. The sphalerite and pyrite could then be separated by differential flotation producing a Zn concentrate and pyrite tailings.

The Cu, Pb concentrate would probably also contain the Ag and Au (stromeyerite with the bornite and the Au with the galena). To upgrade this concentrate, a regrind to -325 mesh would probably be necessary due to the fineness of the respective grains. Depending further on the economics involved, a combined Cu-Pb concentrate could be made or separate Cu and Pb concentrates made by differential flotation.

One extremely important point is that if the Price showing turns out to be economic in grade and tonnage and it is to milled with the ore from the Lynx ore body, they will have to be carefully blended because of the small quantity of bornite in the Price 'ore'. (It is very advantageous to maintain reasonably constant heads in flotation circuits if good recoveries are to be realized).

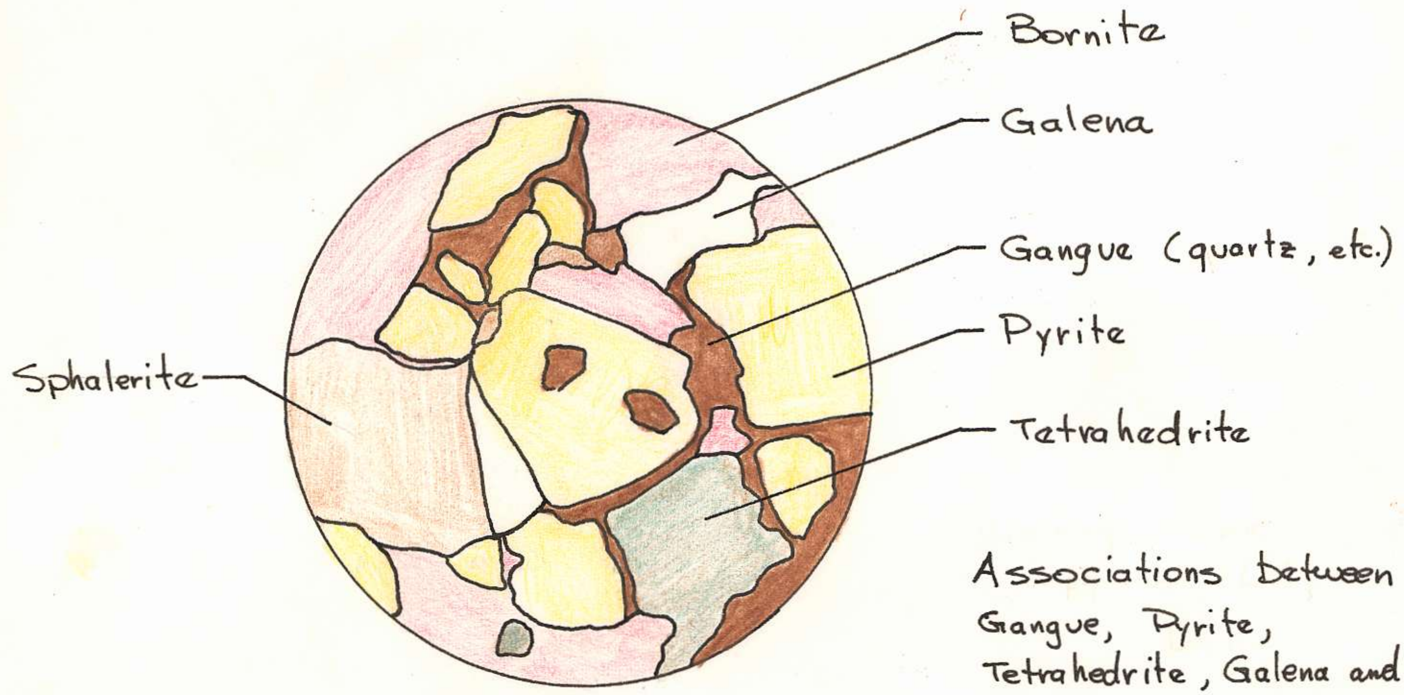
REFERENCES

(other than normal texts)

1. B.C. Department of Mines Reports 1920, 23, 29, 30, 61, 62, 63.

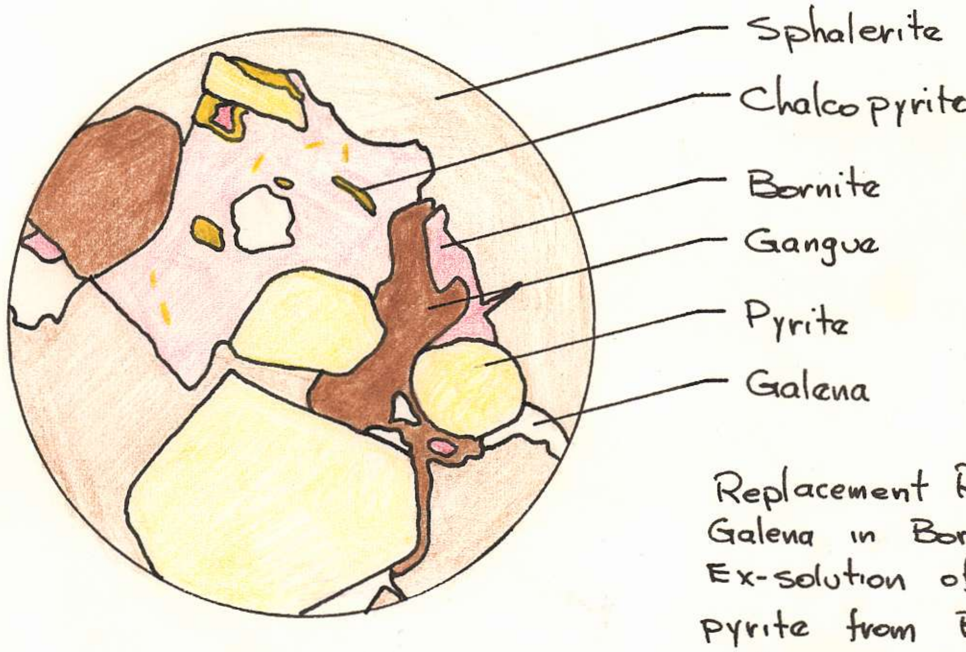
2. Geological Survey of Canada Summary Report, 1930.
(Part A, pages 56 to 78)

LYNX ORE BODY



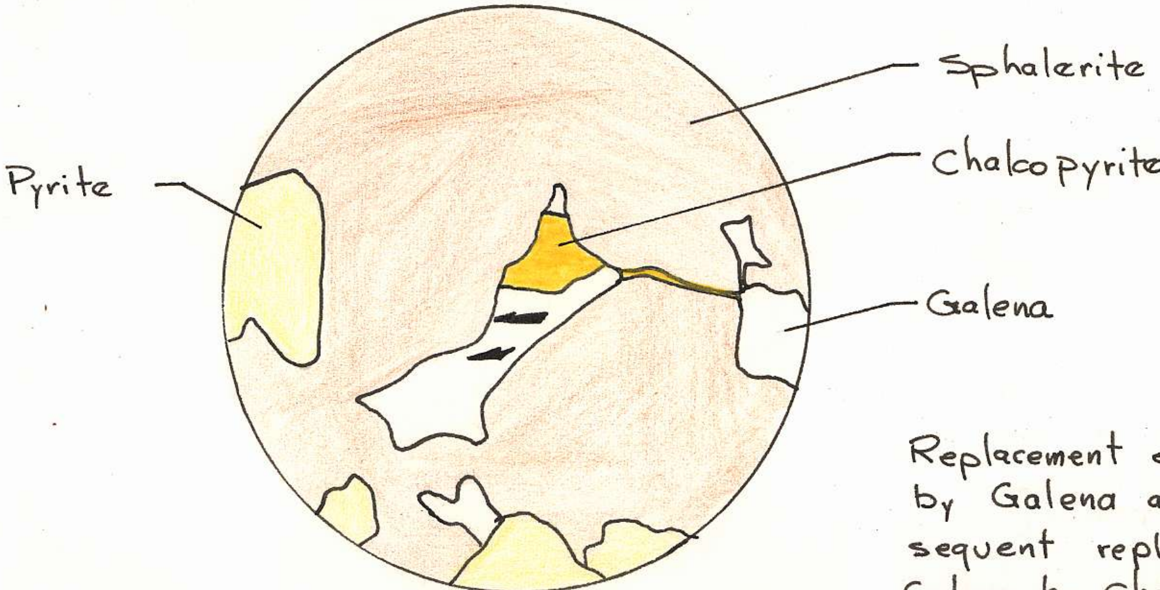
X 200

Associations between Gangue, Pyrite, Tetrahedrite, Galena and Bornite.



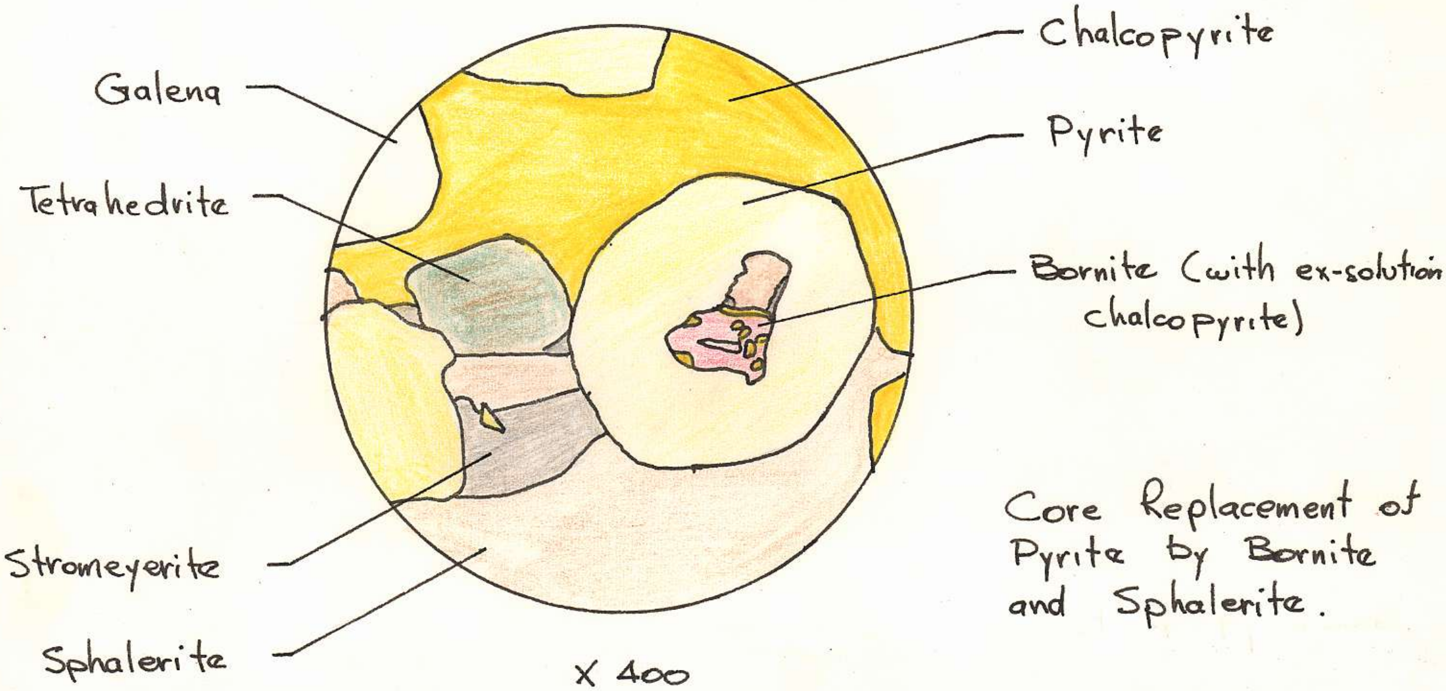
X 200

Replacement Remnant of Galena in Bornite and Ex-solution of Chalcopyrite from Bornite. (also replacement of sphalerite by bornite)



X 200

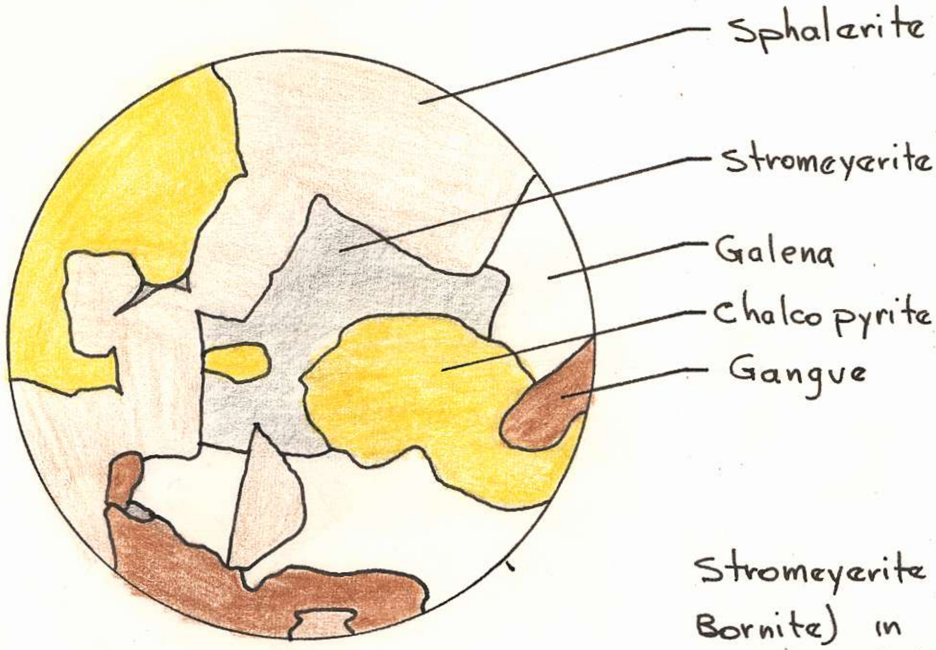
Replacement of Sphalerite by Galena and subsequent replacement of Galena by Chalcopyrite



X 400

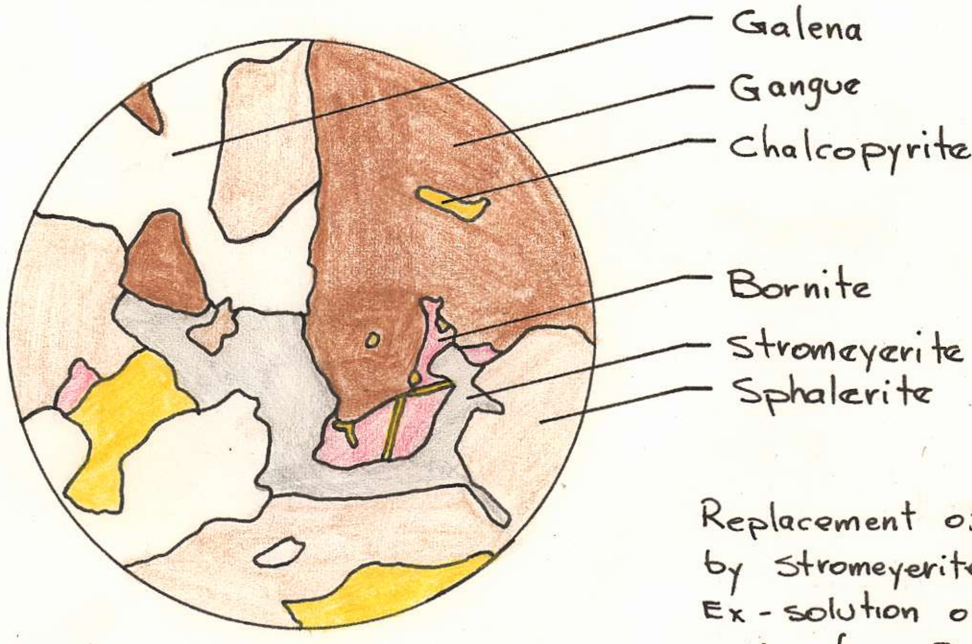
Core Replacement of Pyrite by Bornite and Sphalerite.

LYNX (Cont.)



X 200

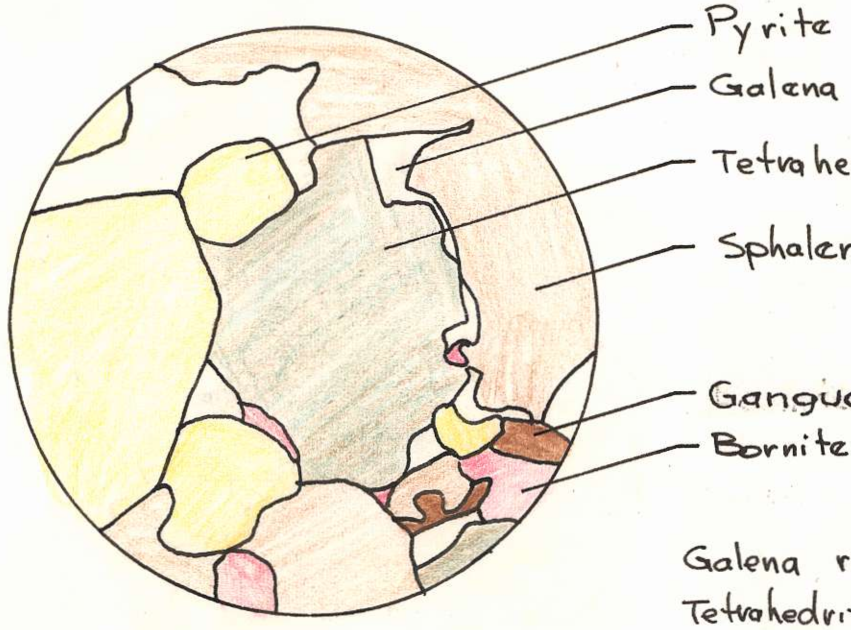
Stromeyerite (replaced Bornite) in contact with Sphalerite, Galena, chalcopyrite



X 200

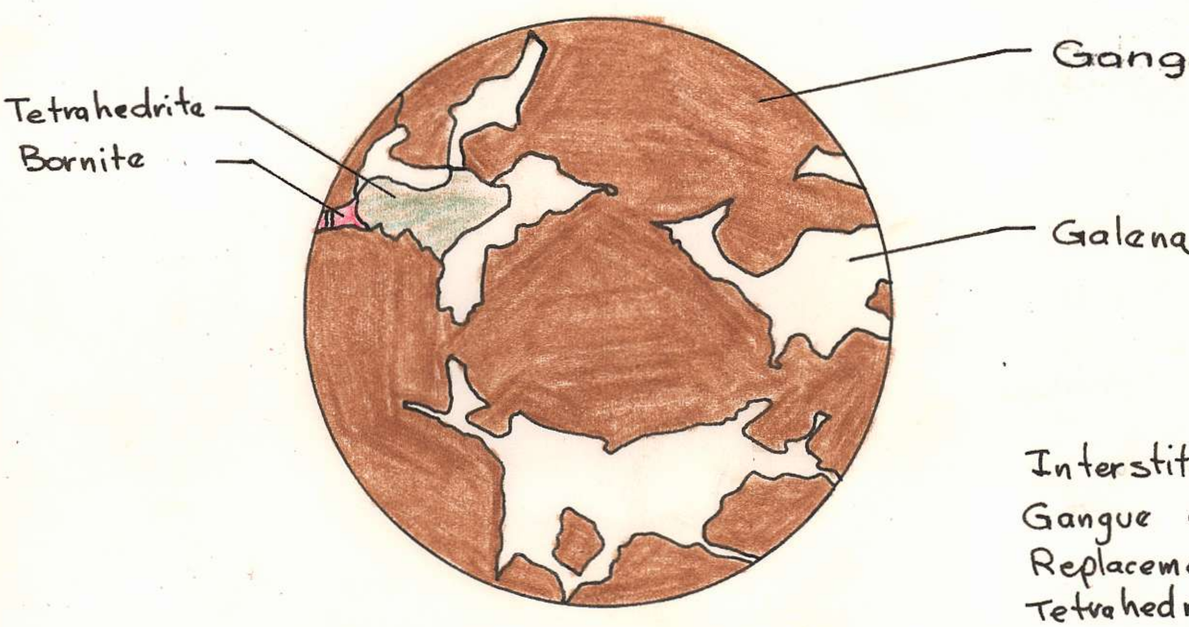
Replacement of Bornite by Stromeyerite and Ex-solution of Chalcopyrite from Bornite (Bornite also replaces chalcopyrite)

LYNX (cont.)



Galena rim between Tetrahedrite and Sphalerite

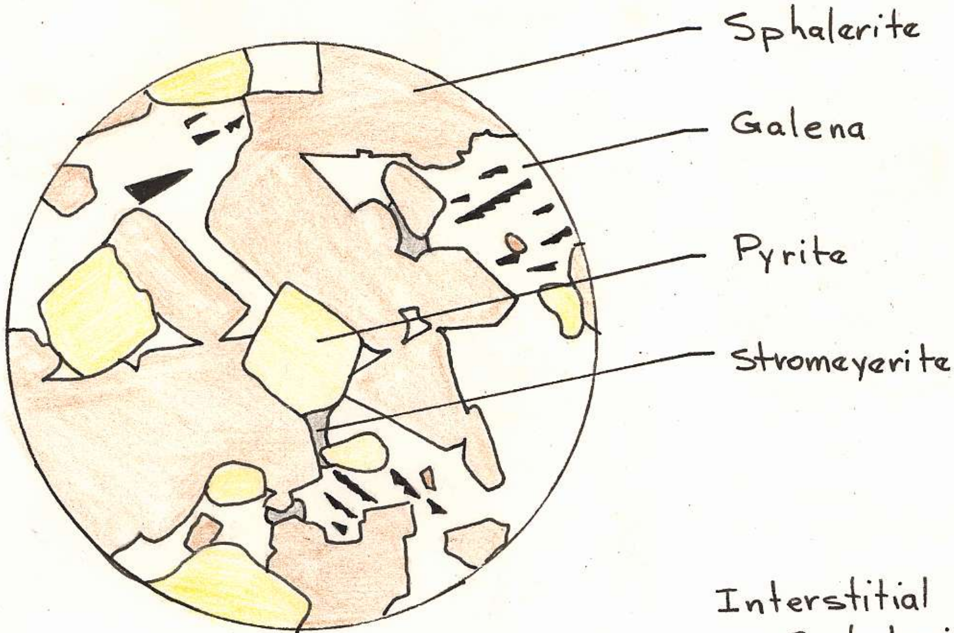
X400



Interstitial Galena in Gangue and showing Replacement of Tetrahedrite.

X200

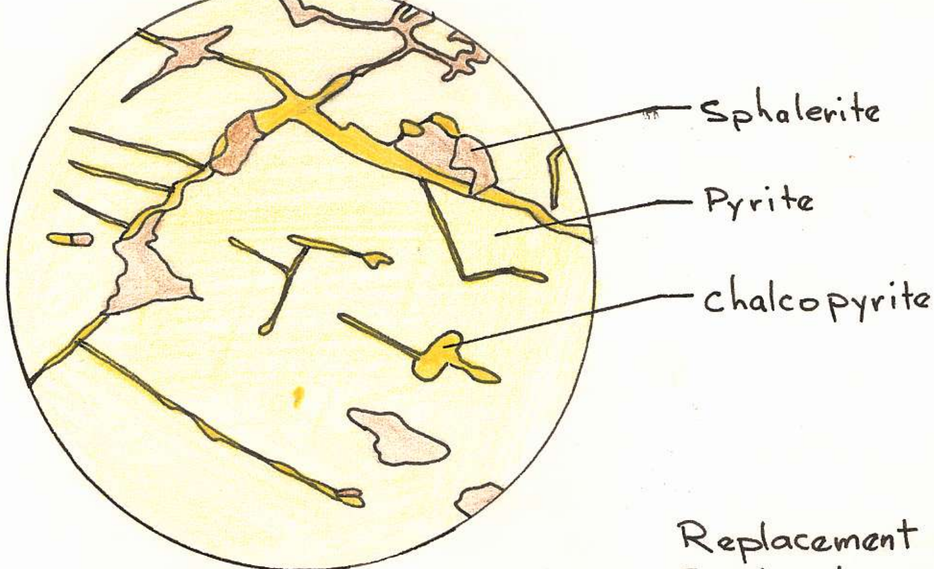
LYNX (Cont.)



X 100

Interstitial Galena in Sphalerite

PRICE SHOWING (2000 FT. LEVEL)



X 400

Replacement of Pyrite by Sphalerite and Chalcopyrite.