HEDLEY OREGON SUITE

Suite No. 3

Geology 409

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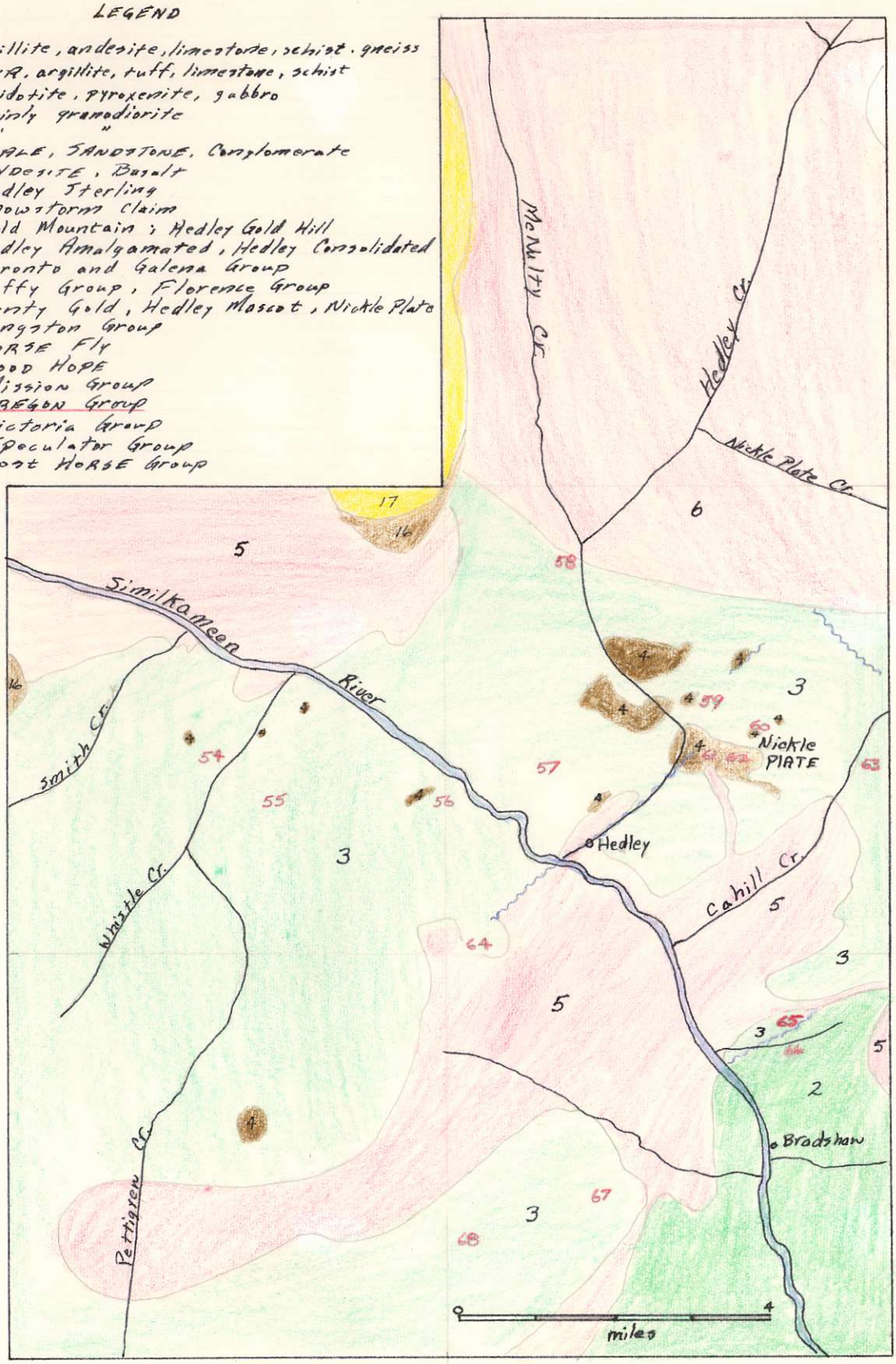
by Dale MacGregor

LEGEND

2	Argillite, andesite, limestone, schist, gneiss
3	LAVA, argillite, tuff, limestone, schist
4	Peridotite, pyroxenite, gabbro
5	Mainly granodiorite
6	" "
16	THALE, SANDSTONE, Conglomerate
17	ANDESITE, Basalt
54	Hedley Sterling
55	Snowstorm Claim
56	Gold Mountain ; Hedley Gold Hill
57	Hedley Amalgamated, Hedley Consolidated
58	Toronto and Galena Group
59	Duffy Group, Florence Group
60	Canty Gold, Hedley Mascot, Nickle Plate
61	Kingston Group
62	HORSE FLY
63	GOOD HOPE
64	Mission Group
65	OREGON Group
66	Victoria Group
67	Speculator Group
68	Lost HORSE Group



SKETCH MAP

OREGON GROUP

The Oregon group of eight claims lies about 4 miles south east of Hedley and about a mile east of the highway. Here a tongue of the Coast Intrusions cuts limestone of the Nicola group close to the Bradshaw fault. In 1917, three adits were driven to explore the mineral deposit. The upper adit, 35 feet long, was in ore most of the way, but the two lower workings failed to pick up its downward extension. Two samples taken by the Resident Engineer returned: copper, 1%; silver, 0.9 oz/ton; and gold, 0.06 oz/ton; copper, 3.90%; silver, 3.40 oz/ton; and gold 0.12 oz/ton.

Megascipic Description:

The hand specimens are in general a greenish-brown coloured aphanitic rock. This rock type probably resulted when the Coast Intrusive intruded the calcareous and siliceous sediments of the area. The aphanitic rock is probably a skarn and where crystals can be seen, these are a light to dark green pyroxene which probably is close to the diopside-heddenbergite series. The brownish colour in the rock is probably due to garnet. Very minor amounts of epidote and wollastonite make up the rest of the rock.

Mineralization seems to be confined to areas of later fracturing with silicification and calcification. Bornite and chalcopyrite are the most abundant minerals. Molybdenite occurs as large (1") clumps scattered throughout the rock. The arsenopyrite and cobaltite seem to be located in or near quartz veins. Bismuth appears to be quite plentiful (7%) and occurs as large clumps (1/4") showing good basal cleavage and a low hardness. A very thin, black, soft material occurs along some fractures and this could be Hedleyite. Gold is the most striking mineral. It occurs in the calcite veins or along calcite coated fractures as scaly sheets that are quite visible or as tiny grains in the fractures.

Telluride Minerals:

Hedleyite Bi_7Te_3

In plates giving flexible and slightly elastic folia; tin-white with an iron-black tarnish; basal cleavage and hardness is A.

This species was desribed by Warren and Peacock (1945) from the Good Hope mineral claim, Hedley, B.C. Hedleyite occurs as thick plates often intercalated with Joseite B, native bismuth, and gold and associated with arsenopyrite, molybdenite, pyrrhotite and quartz and skarn.

Telluride Minerals :

Joseite A $Bi_{4+x}Te_{1-x}S$ Joseite B $Bi_{4+x}Te_{2-x}S$

As sheets and plates with occasional straight edges yeilding soft, flexible inelastic folia. It has a silver-white color with a high metallic luster tarnishing lead grey. It has a perfect basal cleavage; hardness is 2 (A orB).

Joseite B is identical to Joseite A except for a difference in specific gravity. Joseite A is 8.10 and and Joseite B is 8.3

Joseite B is known to occur in the Hedley area so once it was found in the suite, (I assumed the writer it was the B variety.

Other tellurides found in this district are as follows:

Good Hope Claim (a reporter?)
near hedley, Osoyoos Mining Division
Joseite B, Hedleyite

Hedley Monarch Mine
Olalla, Osoyoos Mining Division
Altaite, Hessite, Petzite

Hedley Yuniman Gold Fields Limited
Bradshaw Creek, Osoyoos Mining Division

/. Contributions to Canadian Mineralogy, 1949 pages 364- 377.

Microscopic Description

Mineral	Molybdenite MoS_2
Color	greyish-white
Hardness	B
Pleochroism	weak greys
Anisotropism	white, pink and grey
Cleavage	perfect basal
Etch tests :	
	negative to all etch tests

Mineral	Chalcopyrite $CuFeS_2$
Color	brass yellow
Hardness	C
Anisotropism	weak greens and yellows
Etch tests:	
HNO_3	fumes tarnish

Mineral	Bornite Cu_5FeS_4
Color	pinkish brown
Hardness	B
Anisotropism	neg.
Etch tests:	
HNO_3	stains yellowish-brown
$FeCl_3$	stains orange

Mineral	Arsenopyrite FeAsS
Color	galena-white
Hardness	F
Anisotropism	greenish-yellow and brown
Etch tests:	
HNO_3	stains brown

Mineral	Bismuth Bi
Color	coppery-pink
Hardness	A
Anisotropism	yellow and pink
Etch tests:	
$HgCl_2$	neg.
KOH	neg.
KCN	neg.
HCl	stains black
$FeCl_3$	instantly black
HNO_3	stains black

Mineral	Cobaltite CoAsS
Color	Pinkish-grey
Hardness	G
Anisotropism	isotropic
Etch tests:	
HNO_3	stains brown but generally negative
	all other tests are negative

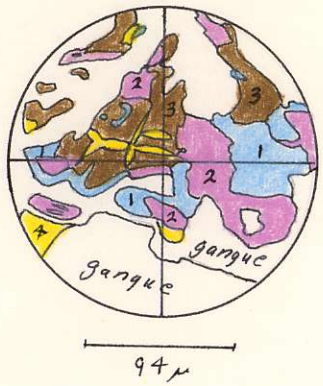
Mineral	Pyrrhotite $Fe_{1-x}S$
Color	brownish
Hardness	D
Anisotropism	grey and brown
Etch tests:	
$HgCl_2$	neg.
KOH	turns brown
KCN	neg.
HCl	stains brown
$FeCl_3$	neg.
HNO_3	stains brown

Mineral	Hedleyite Bi_7Te_3
Color	yellowish-white
Hardness	A
Anisotropism	light to dark grey
Cleavage	perfect basal
Etch tests:	
HNO_3	turns grey
$FeCl_3$	stains brown
	all other reagents are negative

Mineral	Joseite B $Bi_{4+x}Te_{2-x}S$
Color	light grey
Hardness	B
Anisotropism	generally isotropic
Cleavage	perfect basal
Etch tests:	
HNO_3	effervesces and turns dark grey
HCl	stains light grey
$FeCl_3$	stains light grey
	all other reagents are negative

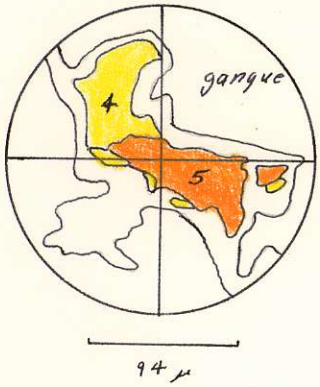
Mineral	Tennantite $(5Cu_2S.2(Cu,Fe)S.2As_2S_3)$
Color	grey
Hardness	D
Anisotropism	neg.
Etch tests:	
HNO_3	turns slightly brown
KCN	stains light brown

As mucochem.



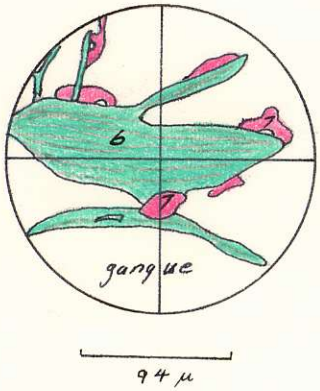
1. Section No. 2

1. Arsenopyrite
2. Tennantite
3. Bornite
4. Chalcopyrite



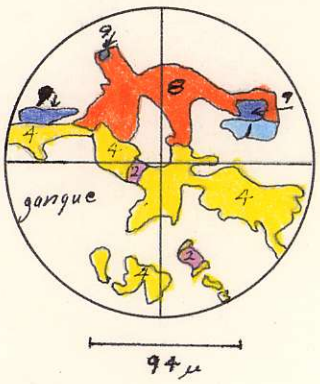
2. Section No. 3

4. Chalcopyrite
5. Bismuth



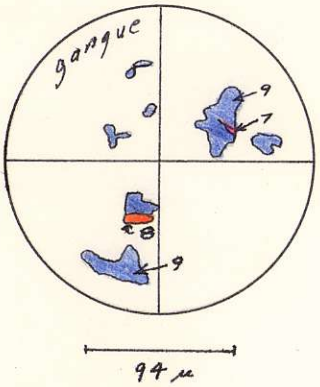
3. Section No. 10

6. Molybdenite
7. Hedleyite



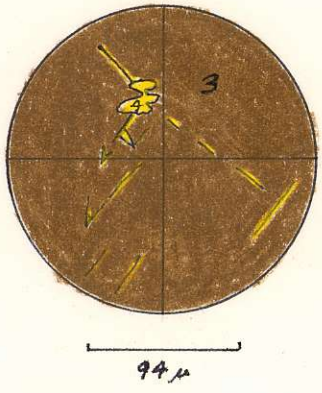
4. Section No. 11

1. Arsenopyrite
2. Tennantite
4. Chalcopyrite
8. Gold
9. Joseite B



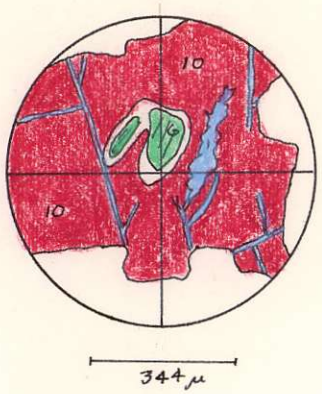
5. Section No. 11

7. Hedleyite
8. Gold
9. Joseite B



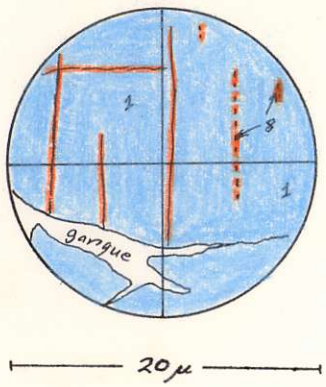
6. Section No. 12

3. Bornite
4. Chalcopyrite



7 Section No. 14

1. Arsenopyrite
6. Molybdenite
10. Cobaltite



8 Section No. 14

1. Arsenopyrite
8. Gold

Primary minerals in decreasing order of abundance:

Bornite	30%
Chalcopyrite	20%
Molybdenite	15%
Cobaltite	10%
Arsenopyrite	10%
Bismuth	7%
Gold	3%
Tennantite	2%
Joseite	1%
Hedleyite	1%
Pyrrhotite	1%

Textural Description:

1. Section No. 2

   Chalcopyrite occurs as exsolution laths in bornite. The bornite has surrounded and in places replaced the arsenopyrite as evidenced by the skeletal remains of an arsenopyrite crystal. Tennantite seems to have no preferance for the mineral it surrounds. Generally though it is associated with chalcopyrite.

2. Section No. 3

   The native bismuth comes in contact with relatively few minerals and most often it is in contact with chalcopyrite.

3. Section No. 10

   Although molybdenite is abundant in hand specimens it is fairly scarce in the polished sections. This section shows the typically curved crystals of molybdenite but what appears to be most unusual is its association with hedleyite. In most cases bismuth is in contact with the molybdenite and it is possible that the hedleyite has replaced the bismuth.

4. Section No. 11

   This section shows associations which are not duplicated anywhere else in the suite. Tennantite is in contact with the chalcopyrite and joseite B is in contact with chalcopyrite, arsenopyrite, and gold. The gold is most often in isolated blebs surrounded by calcite. Joseite B is usually found this way too.

5. Section No. 11

   This section shows one of the few places where hedleyite and joseite are in contact. It would appear that the hedleyite was the first to form with the joseite enclosing it.

6. Section No. 12

   Chalcopyrite occurs here as exsolution intergrowths in bornite. About half of the chalcopyrite in this suite is a result of exsolution. The other half is probably the result of a 'chalcopyrite rich solution" which formed isolated grains of chalcopyrite.

Textural description:

7. Section No. 14

Arsenopyrite occurs in two different ways in this suite. The one shown here is where the arsenopyrite has replaced cobaltite along fractures. This particular section was viewed under partially crossed nicols to distinguish the arsenopyrite more easily.

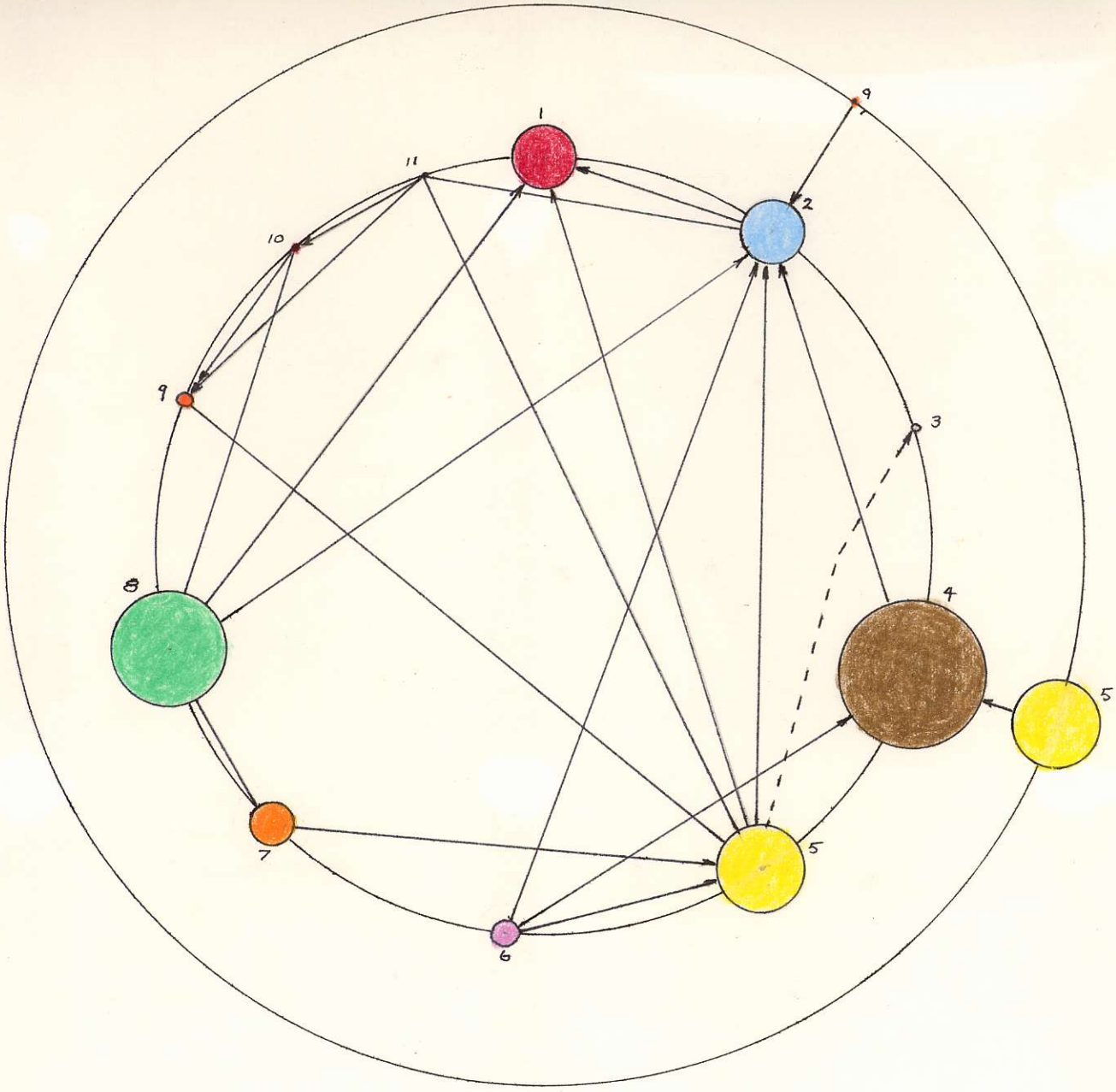
8. Section No. 14

With the use of an extremely high-powered liquid-immersion lense, it was possible to distinquish minute , parallely aligned, inclusions of gold in arsenopyrite. Gold was also observed along what appeared to be fractures and I believe this gold was introduced at a later date.

Paragenetic Sequence:

listed in order of crystallization:

Cobaltite
Arsenopyrite and gold
Pyrrhotite
Bornite and chalcopyrite
Chalcopyrite
Tennantite
Bismuth
Molybdenite
Gold
Hedleyite
Joseite B



Van der Veer diagram

1. Cobaltite
2. Arsenopyrite
3. Pyrrhotite
4. Bornite
5. Chalcopyrite
6. Tennantite
7. Bismuth
8. Molybdenite
9. Gold
10. Hedleyite
11. Joseite B

Origin and control of the ore:

The ore was probably formed from hydrothermal solutions originating in the magmas of the coast intrusion. This solution was probably rich in silica which would have reacted with the limestone to form the skarn. At about this time the cobaltite was introduced and with continued deformation by the intrusion, the cobaltite was fractured and replaced by the gold bearing arsenopyrite. A very minor amount of pyrrhotite was introduced at this time as well as bornite. Chalcopyrite formed as a result of exsolution in bornite and also as primary chalcopyrite. With further cooling and fracturing, bismuth, tennantite, molybdenite, and gold were introduced in conjunction with calcite. Of the Nickel Plate mine, Warren and Cummings (1945, page 37) say:

"The association of gold with it (calcite) is interesting because if this gold were introduced in colloidal form, the deposition of the calcite may well have been the cause of the deposition of the gold. Calcite is known to have dispersive properties and its removal from the solutions containing the colloidal gold may well have been related to the deposition of the precious metal."[1]

The tellurides, hedleyite and joseite B were probably the last minerals to form.

The temperature of the deposit as indicated by the unmixing of chalcopyrite in bornite is 475 degrees centigrade[2] which would put the deposit in the hydrothermal range.

Try proof reading - your spelling is lousy

A
MA

1. Geology and Mineral Deposits of the Princeton Map-Area, British Columbia; H.M.A.Rice; page 71
2. Textures of the Ore Minerals: A.B.Edwards; page 102