GEOLOGY 409

FOURTH REPORT

MINERALOGY OF THE SILVER DIAMOND CLAIMS

NEAR ATLIN

By NORMAN TRIBE

MINERALOGY OF THE SILVER DIAMOND CLAIMS NEAR ATLIN

General Geology

The main rock in this area is a basic volcanic with some intrusive phases of similar composition. There are quartzites and limestones interbedded with the volcanics. Into this formation is intruded a granite, called alaskite, which has few or no mafic minerals. The mineralization is in a fluorite greissen similar to that of the Bolivian tin deposits and other tin deposits throughout the world. The area has long been known for minor occurances of stream tin which can be panned from some of the creeks in the area. The greissen vein rock contains minerals of iron, copper, lead, tin, tungsten and bismuth. There is a great abundance of lead in the quartz veins which have no fluorite. The veins are not directly adjacent to the alaskite intrusion, but appear to be closely related to it.

Megascopic Description

Greissen Vein Rock

Most of the greissen rock is coarse-grained with a distinct banding. In the finer grained rocks the banding is more distinct with fluorite, quartz-rich bands alternating with sulphide bands. The rock is crumbly and has a very high porosity.

The following minerals were identified in hand specimen:

- fluorite - pale purple
- quartz
- wolframite
- scheelite
- chalcopyrite
- galena
- pyrite
- pyrrhotite
- cassiterite

Quartz Vein Rocks

The gangue is composed of a coarse-grained quartz with a bundant interstitial cavities. The mineralization is chiefly open space filling of these cavities.

The following minerals were identified in hand specimen:

- quartz
- galena
- pyrite
- chalcopyrite
- wolframite
- unknown mineral (Atlinite)

The unknown mineral which appears as a smear on specimen 10 - 21 will be called Atlinite throughout this report. The mineral is a metallic silver-white color with one good cleavage (at least) and a hardness of 2 - 3. It appears in trench #10 in the quartz vein at the eastern edge of the mineralized zone.

Microscopic Description

Two polished sections were made of the fluorite-rich samples and five were made of the quartz vein material. The following minerals were identified:

Galena

- polish - good
- color - creamy white
- hardness - B-
- texture - massive
- cleavage - very poor triangular pits
- anisotropism - very slight to isotropic
- etch test
  - HCl_2 - negative
  - KOH - negative
  - KCN - yellow-brown to irridescent
  - HCl - stains black
  - $FeCl_3$ - negative
  - HNO_3 - 1" stains black
- michrochemical test
  - Negative results for Fe, Ni, Co, Zn, Cd, Sb, As, Ag, Hg, Te, Se, Sn
  - Positive results for Bi, Pb, and Cu (weak)

Pyrite - FeS_2

- Hardness - F
- polish - stippled
- color - pale yellow
- isotropic
- square crystals

Wolframite (Fe, Mn) WO_4

- polish - fair
- color - grey-brown
- hardness - D
- streak - yellow-orange
- anisotropism - slight
- deep red internal reflection
- microchemical tests
  - Negative results for Cu, Zn, Ni, Co, Cd
  - Positive results for Fe

Chalcopyrite

- polish - good
- color - yellow
- hardness - C
- anisotropic - distinct

Cerussite

- polish - good
- color - blue-grey
- effervesces in acid
- associated with galena

Anglesite

- polish - good
- color - blue-grey
- does not effervese in acid
- associated with galena

Arsenopyrite

- polish - poor
- color - pale yellow blades
- anisotropic - green - yellow - brown
- hardness - E
- associated with chalcopyrite and wolframite
- etch test
  - HNO_3 - negative
  - $FeCl_3$ - negative
  - HCl - negative
  - KCN - negative
  - KOH - negative
  - $HgCl_2$ - negative

Pyrrhotite

- color - yellow-brown
- anisotropic
- polish - poor - fair
- hardness - D
- magnetic
- microchemical tests
  - Positive results for Fe
  - Negative results for Cu, Zn, Ni, Co, Cd

Marcasite

- color - yellow - lighter than pyrrhotite
- polish - poor
- hardness - F
- isotropic
- replaces the pyrrhotite

Stannite - Cu_2FeSnS_4

- polish - good
- color - light olive-brown
- hardness - D
- anisotropis - good
- cleavage - tiny triangular pits
- etch test
  - HNO_3 - irridescent
- microchemical test
  - Positive results for Cu
  - Not definite for Sn
- grain size - 20 μ.

Tetrahedrite

- polish - good
- color - olive-brown
- isotropic
- hardness - D
- dark orange streak
- grain size - 40 μ.

Atlinite - Specimen 10 - 21

- polish - good
- color - galena white
- hardness - B
- semisectile
- anisotropic - green - yellow - pink - black

Atlinite (Cont'd)

- etch test
  - $HgCl_2$ - negative
  - KOH - negative
  - KCN - negative
  - HNO_3 - negative
  - Aqua Regia - dissolves and stains black
- microchemical tests
  - positive results for Pb and Bi

Unknown Mineral

Same as laths in exsolution with galena in the third problem. Eric Mountjoy calls the mineral galenobismuthinite, but I disagree as the mineral is isotropic in all places throughout the section.

Properties

- polish - good
- color - galena white
- hardness - B
- isotropic
- associated with galena
- lath like habit
- etch tests
  - $HgCl_2$ - negative
  - KOH - negative
  - KCN - negative
  - HCl - negative
  - $FeCl_3$ - negative
  - HNO_3 - positive stains black
- X-rayed - No. 4187

In thin section

- Scheelite
  - high relief
  - high birefringence
  - uniaxial
  - fluoresces

Minerals in Order of Abundance

- gangue
  - fluorite - 80%
  - quartz - 15%
  - sericite - 5%

- primary minerals
  - pyrrhotite - 50%
  - wolframite - 25%
  - chalcopyrite - 10%
  - pyrite - 8%
  - galena - 5%
  - atlinite - 1%
  - scheelite - trace
  - cassiterite - trace
  - unknown mineral - trace
  - arsenopyrite - trace
  - tetrahedrite - trace

- secondary minerals
  - marcasite - 80%
  - cerussite and anglesite - 20%

Textures

The commonest texture between the minerals is caries texture, but most of the minerals associated with the quartz gangue are open space filling with very little evidence of replacement of the quartz. The arsenopyrite shows a pseudo-graphic texture (Fig. No. 1) against the chalcopyrite and wolframite, resulting from replacement around the laths of arsenopyrite.

There are exsolution blebs of tetrahedrite and stannite (Fig. No. 7) in the chalcopyrite. The marcasite replaces the pyrrhotite (Fig. No. 3 and 4) starting along the fractures and working in toward the center, developing a rim replacement texture. The secondary lead minerals are along cleavage planes in the galena in a lattice replacement texture against the wolframite (Fig. No. 6).

Temperature of Deposition

This ore was probably deposited over a wide range of temperatures. It is considered that minerals such as cassiterite, wolframite and pyrrhotite are formed above 500°C. Minerals such as galena, tetrahedrite, stannite and fluorite are formed below 500°C and minerals such as marcasite are deposited below 300°C. The marcasite may be considered to be secondary, thus, reducing the range from 550°C to possibly 400°C.

The porosity of the fluorite veins indicates a low pressure of formation. This is the type of deposite that Buddington would class as zenothermal, high temperature, low pressure.

Appendix

Thin Sections

Specimen 3

Handspecimen
- dark, fine-grained dioritic rock

Thin Section
- fine-grained altered volcanic rock with a quartz plagioclase matrix

Specimen 1 - 10

Handspecimen
- banded vein rock containing quartz and fluorite gangue with chalcopyrite and wolframite

Thin Section
- fluorite - 50%
- quartz - 15%
- sericite - 5%
- opaques - 30%

Specimen 1 - 13

Handspecimen
- iron stained ultra basic rock, medium-grained and containing chalcopyrite and pyrrbotite

Thin Section
- fluorite
- opaques
- minor remnants of pyroxenea
- serpentine
- minor quartz
- highly altered plagioclase in radiating spherulites

Fluorite	- 40%
Opaques	- 20%
Plagioclase	- 25%
Quartz	- 5%
Pyroxenes and Serpentine	- 10%

- Altered volcanic rock

Specimen 1 - 7

Handspecimen
- coarse-grained fluorite rich vein rock

Thin Section
- fluorite - 60%
- quartz - 5%
- sericite - 5%
- opaques - 30%

Specimen 1 - 5

Handspecimen
- banded fluorite-rich rock with fine-grained texture near the edges with a coarser grain in the center

Thin Section
- fluorite - 40%
- opaques - 30%
- quartz - 2%
- sericite - 28%

Specimen 10 - 2

Handspecimen
- dark, fine-grained showing veinlets of wolframite

Thin Section
- fluorite - 25%
- wolframite - 40%
- quartz - 25%
- sericite - 10%

Specimen 10 - 14

Handspecimen
- leached out fluorite-rich rock, medium-grained and light in color

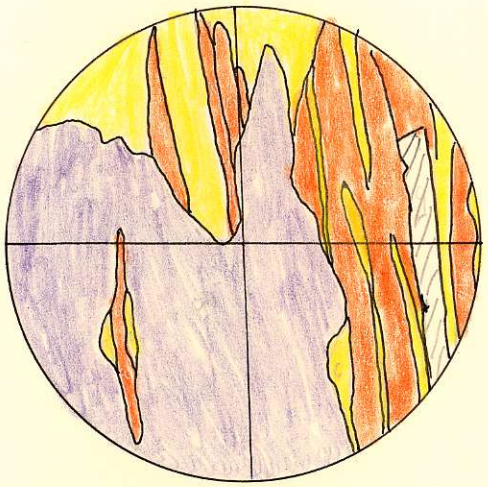
Thin Section
- quartz - 5%
- opaques - 5%
- fluorite - 25%
- sericite - 75%

Specimen 10 - 22

Handspecimen
- dark, coarse-grained norite

Thin Section
- orthopyroxine
  - hypersthine - 45%
- clinopyroxine
  - diopside - 15%
- calcite - 5%
- argerine - 1%

- quartz - 33%
- scheelite - 1%



20μ.

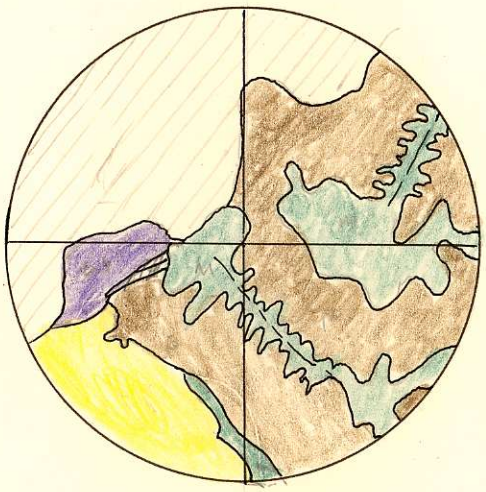
Fig. No 1

100 μ.

Fig. No. 2.

Legend

- Arsenopyrite
- Wolframite
- Chalcopyrite
- Gangue.
- Galena
- Secondary Pb. Minerals
- Pyrrhotite
- Marcasite
- Tetrahedrite
- Stannite
- Unknown Pb-Bi. Sulphosalt.
- Pyrite

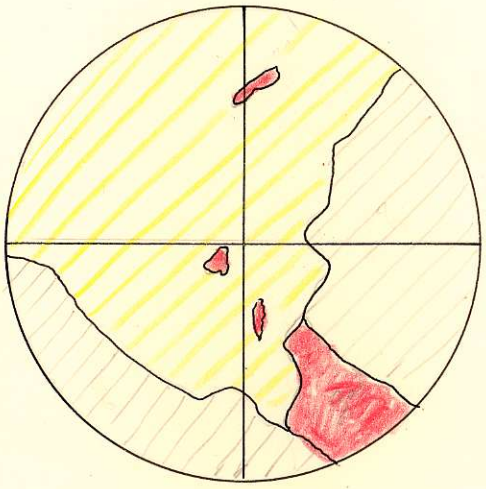


100 μ.

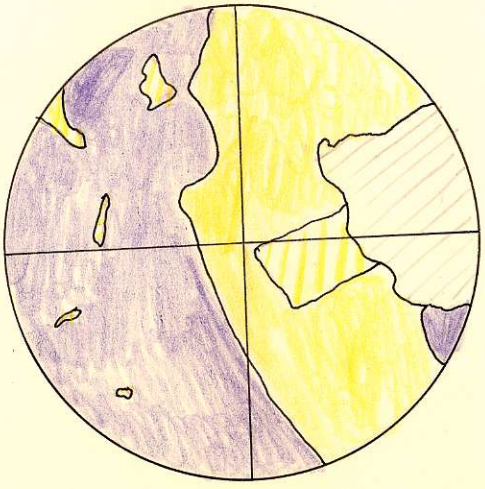
Fig No 3

100 μ.

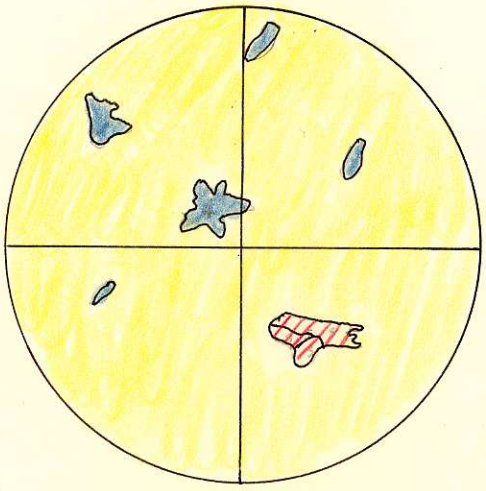
Fig No 4



20μ. Fig No 5

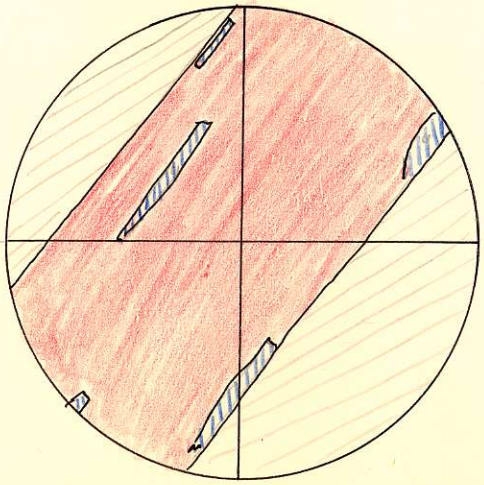


20μ. Fig. No 6



20μ.

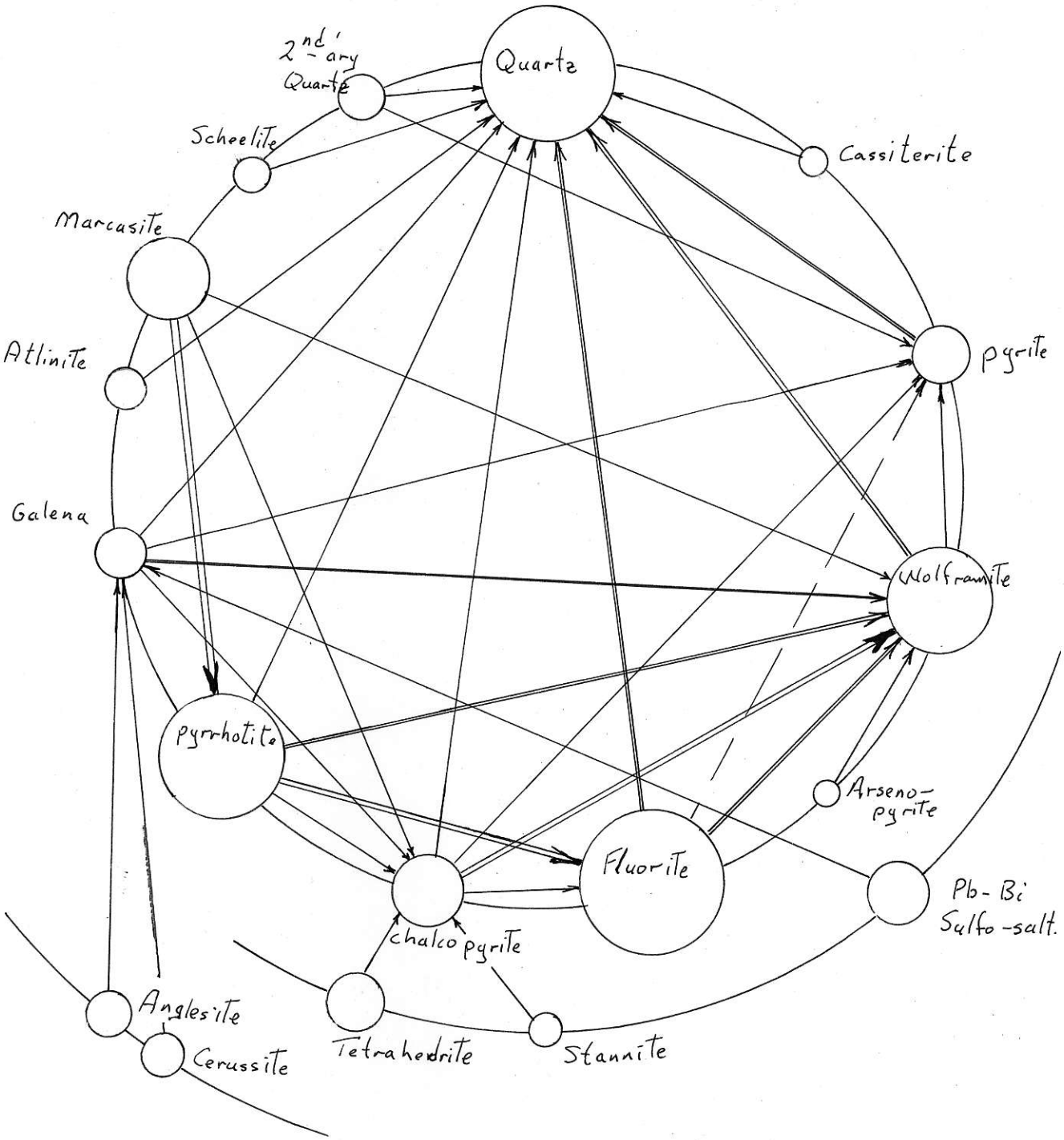
Fig No 7



20μ.

Fig No 8

Paragenesis



TR 7

TR 6

TR 3

TR 2

TR 8

TR 1

See Insert No.1

TR 4

Old Trench

TR 9

TR 5

TR 11

TR 10

See Insert No 2

TR 12

2 N

1 N

1 S

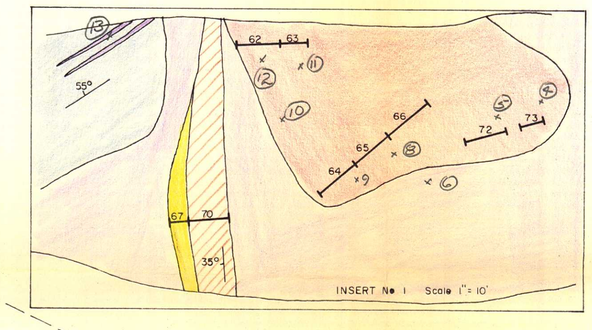
2 S

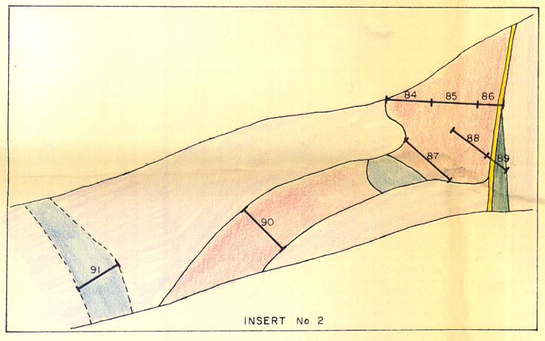
2 W

1 W

1 E

2 E





SILVER DIAMOND

4 3

400' to claim corner

LEGEND

- Limestone
- Quartzite
- Alaskite
- Basic Volcanics - Intrusives
- Diopside Zones
- Quartz Veins
- Rusty Quartzose Zones
- Mineralized Zones
- Sample Number 83

PREFIX ON SAMPLES REFERS TO the TRENCH No.

SILVER DIAMOND CLAIMS
ATLIN, B.C.

SURFACE PLAN

Scale 1" = 50' Aug. 1963