600402

MINERALOGRAPHIC REPORT

ON THE MOLYBDENUM PROPERTY

AT PITMAN B.C.

This is the last of four problems submitted as partial fulfilment of the course Geology 409 at the University of British Columbia.

Submitted by:

H. Ewanchuk

April, 1960

INDEX

INTRODUCTION

Problem

The nature of this problem is to determine the manner in which the Molybdenite was implaced in the host rock.

Location

The property is located near Pitman, B.C. Pitman is 85 miles in a straight line east-north east of Prince Rupert, and 17 miles north east of Terrace.

Topography

The area lies along the eastern border of the Coast Range Mountains and is characterized by high peaks and deeply incised valleys. It is best illustrated 6 miles southwest of Pitman at Usk, B.C. The town, at an elevation of 290', lies at the base of Kitsalas Mountain which in contrast has an elevation of 5000'.

As a rule the mountain slopes are steep below 4000' elevation as a result of glacial erosion and rapid erosion by youthful streams. Between 4000'-5000' the mountains are rounded, and gently sloping. This apparently represents a Tertiary erosion surface that has been modified by continental glaciation.

Glaciers are still found on the north side of most peaks over 5000'.

The Skeena River flows in a southerly direction between Pitman and Usk, and is joined by many youthful streams. Near Pitman it

ACKNOWLEDGEMENTS

The writer wishes to thank Dr. R.M. Thompson, for photographic work, unpublished information and helpful advice and Dr. W.H. White for his valuable assistance.

is joined by Hardscrapple and Sand Creeks.

The main valleys and low mountain slopes are heavily forested with a fine growth of hemlock, spruce, balsam, cedar and poplar. Timberline is approximately 4500'.

Regional Geology

The Terrace area lies along the eastern contact zone of the Coast Range batholith which occupies a belt 90 miles wide running in a north west direction along the Pacific Coast.

The eastern border of the batholith intrudes a wide belt of Mesozoic volcanic and sedimentary rocks ranging in age from Triassic to Cretaceous.

The batholithic, volcanic, and sedimentary rocks are intruded by many dykes of varying rock types.

In the Terrace area the Hazelton Group makes up a thick assemblage of volcanic rocks of lower Jurassic age and a thick upper sedimentary division of probable middle and upper Jurassic age.

This group forms the country rock of most of the mineral deposits in the area.

The lower volcanic division consists of a thick series of andesite and andesite porphyry flows with local area's of tuff and volcanic breccia. The formation outcrops along the Skeena River between Kitsalas and Pitman.

Reference: Geological Survey of Canada Memoir #212
E.D. Kindle.

DESCRIPTIVE GEOLOGY

Geology of the Property

The geology of the property can be described briefly as granitic apophysis from the Coast Range batholith, intruding volcanic and sedimentary rocks.

Due to alteration, the granitic rocks show much sericite and chlorite.

The property is cut by large quartz veins which bear some mineralization. The whole area has been badly fractured and faulted.

Previous Studies & History

Somewhere around 1941-42, two prospectors did some exploratory work in this area but found no encouraging evidence of mineralization. They staked no claims and eventually abandoned the property.

In 1958 it was staked by J. Bell and in 1959 optioned by Heustis Molybdenum Corp. Ltd. (N.P.L.), who in that year staked more claims and did some developmental work. At the same time the property was examined by Dr. W.H. White and Dr. K.C. McTaggart of the Department of Geology at U.B.C. and microscopic work was done by Dr. R.M. Thompson also of the University Geology Department. On the basis of their report further work is to be done on the property in 1960.

Megascopic

The hand-specimens of this problem which were examined can be divided into three groups: 1) a pink granitic rock 2) a grey biotite granite 3) and quartz from a quartz vein.

The pink granitic rock has a variety of textures from specimen to specimen. These textures are aplitic as in specimen (#H.M.1), brecciated as in (example #H.M.2), and subhederal, fine to medium grained as in specimen (#H.M.4).

Some small quartz veinlets are seen cutting through the granitic specimens. This is shown in specimen (example #H.M.12).

Disseminated throughout these specimens are metallic minerals, the most common of which is Pyrite although some Molybdenite and Magnetite appear in some specimens.

All these specimens have been altered, and most of them to quite a degree. Some of the alteration products visible are sericite, chlorite and some clay minerals.

Some of the samples have been subjected to much shearing as some of the small quartz veinlets like those visible in specimen (#H.M.12) have been deformed. This is illustrated by (#H.M.2).

Along some of the shears Molybdenite has been deposited. This is illustrated by its presence on one face of a specimen only.

The biotite granite exhibits a greenish to greenish-grey color, and a heavy concentration of mafic minerals. On closer examination the mafic proved to be biotite. (example #H.M.5).

The texture exhibited here seems to be anhedral to subhedral and medium grained. This is illustrated by specimen (#H.M.10B).

These specimens are disseminated with Pyrite ranging from fine to coarse grain.

Some Magnetite is present but this is finely disseminated.

These specimens are altered - feldspars to sericite and clay minerals and biotite to sericite and chlorite. The alteration products could be responsible for some of the specimen's colouration.

The quartz specimens were removed from large quartz veins which are quite common on the property.

The texture shown by the quartz is one of shearing and faulting.

The accessory mineral found in these quartz specimens is Pyrite. The concentration and grain size varies from place to place. (example #H.M.9 and #H.M. 14).

The specimens were injected with quartz and Molybdenite after the shearing and faulting had occurred.

There are two specimens in the group which cannot be classified in the above manner. They are specimens #H.M.8 and #H.M.13.

Specimen #H.M.8 is a combination of the 3 groups mentioned above.

This specimen seems to have been taken near a contact of a quartz vein and the granitic body. It can best be described if divided into three sections.

First the quartz vein about ½" wide is found on one side of the specimen. On one side of this vein there is a fine dissemination of Molybdenite.

The next section of the specimen is about 1" wide measured from the quartz vein. This is pink granite and has the same textural features as this granitic group described earlier. Some Molybdenite is disseminated in it and varies in degree of dissemination away from quartz vein. This is followed by some Pyrite dissemination restricted to a narrow zone.

This is followed by a gradual change into a biotite type granite. The mafic increase and color changes.

The whole specimen has been subjected to alteration.

Specimen #H.M.13 is quite small and is highly altered.

The significant feature of this specimen is a thin film of black material on one side only. Although it possibly could have been Graphite it proved to be gouge. This gouge appears to be a result of movement.

Microscopic

Thin-Section

A study of the thin sections was done to determine the metallic minerals present and to obtain further data which may help determine how the metallics were implaced.

The examination of the thin-sections determined the presence of Pyrite, Magnetite and Molybdenite.

Pyrite is found disseminated throughout the granitic rock mass. In some places the Pyrite is being replaced by feldspars. PLATE 1

In other sections Pyrite is being separated by some small quartz veinlets.

Magnetite, found in the sections, is near or surrounded by altered biotite. PLATE 2

This Magnetite could be a product of the alteration of biotite which contains Fe. Other minerals may have been added when feldspars were deposited.

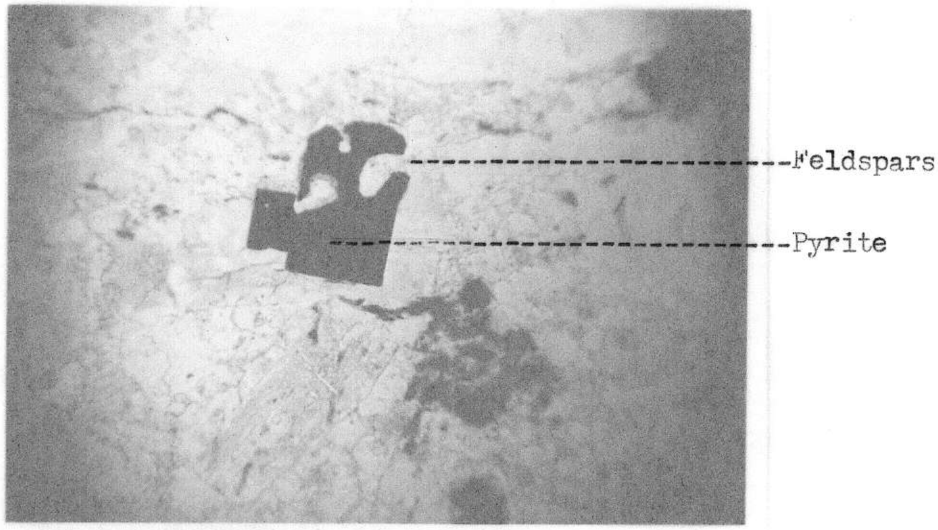

PLATE 1

(X 50) 1 Nicol 1 Second

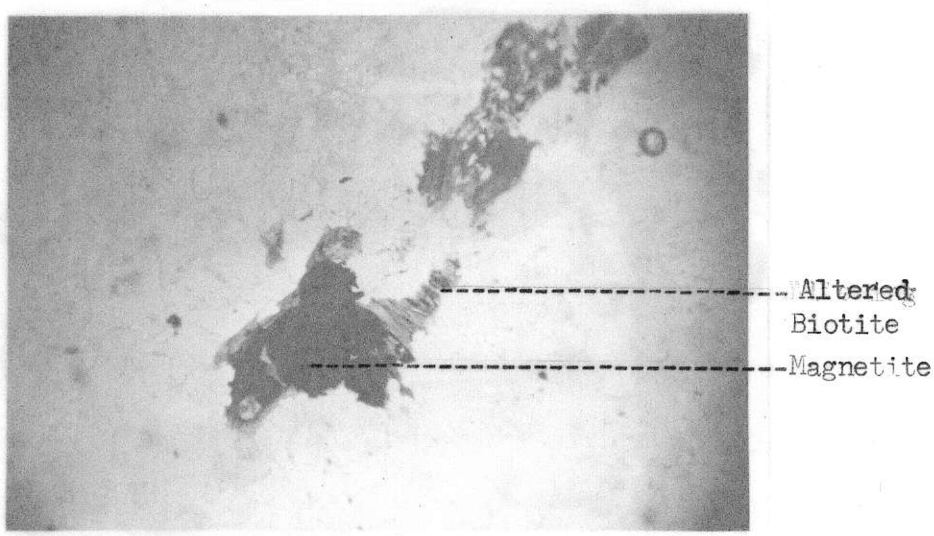

PLATE 2

(X 50) 1 Nicol 1 Second

PLATE 1

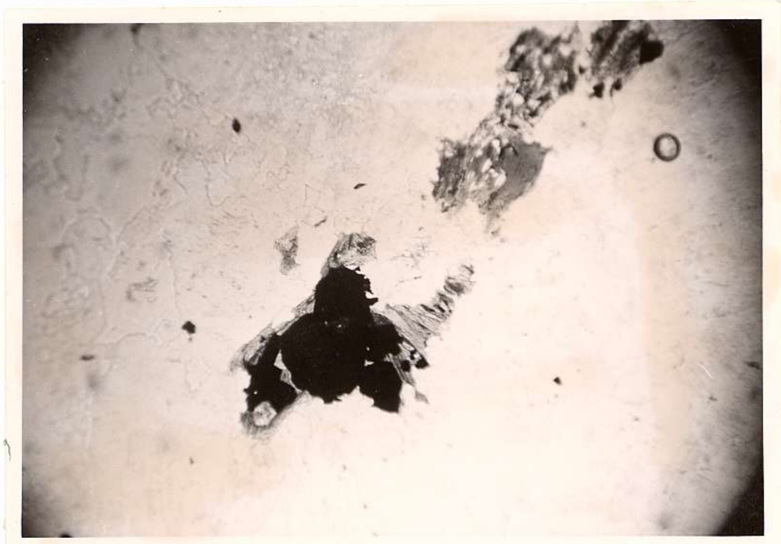

PLATE 2

In some places Magnetite is found in the feldspar and seems to be an accessory mineral.

In some sections Molybdenite is found disseminated in the feldspar; PLATE 3, in others it seems to have been brought in by small quartz veinlets and in still others it is found associated with altered biotite. PLATE 4

The texture of most of these sections is subhedral, medium to fine grained. The rocks have been greatly altered from feldspars to predominantly sericite, calcite and clay minerals and from biotite to sericite and chlorite. PLATE 5 & PLATE 6. Biotite may also be the source of Magnetite as previously suggested.

Polished Sections

The polished sections were also studied to determine the metallic minerals present to study their textures and to obtain further data which might help determine how they were implaced.

Polished Section #1

This section contains both Molybdenite and Pyrite. Both minerals seem to have been brought in after the main granitic mass was intruded.

The Molybdenite exhibits a disseminated texture in the veinlet, and appears to have suffered some post mineral deformation. PLATE 7 & PLATE 8.

The Pyrite and Molybdenite are confined to the small veinlets which penetrate the granite. PLATE 9. This is true of this whole polished section although the Molybdenite appears disseminated in the granitic mass.

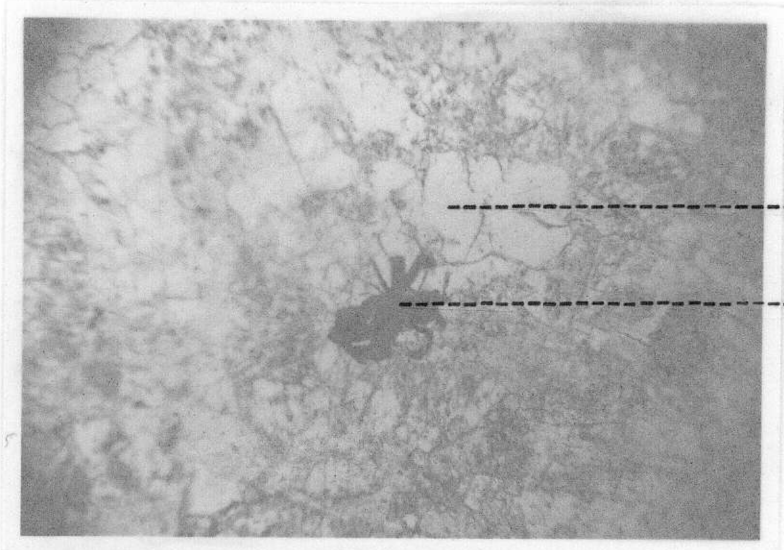

PLATE 3

(X 50) 1 Nicol 1 Second

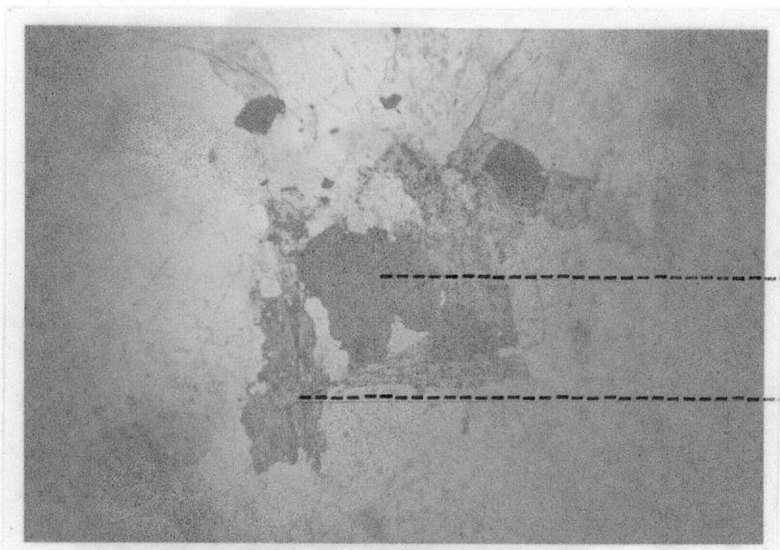

PLATE 4

(X 50) 1 Nicol 1 Second

PLATE 3

PLATE 4

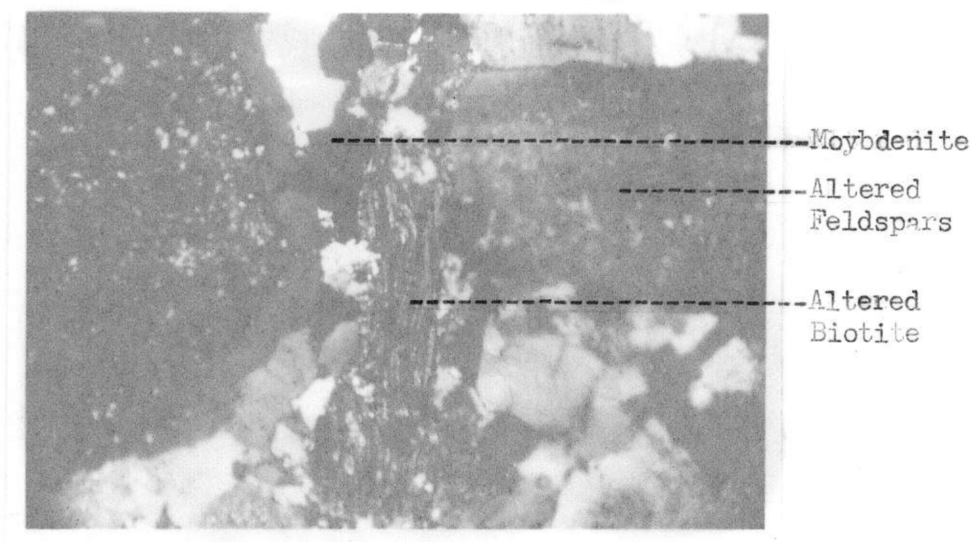

PLATE 5

(X 50) Crossed Nicols 2 Seconds

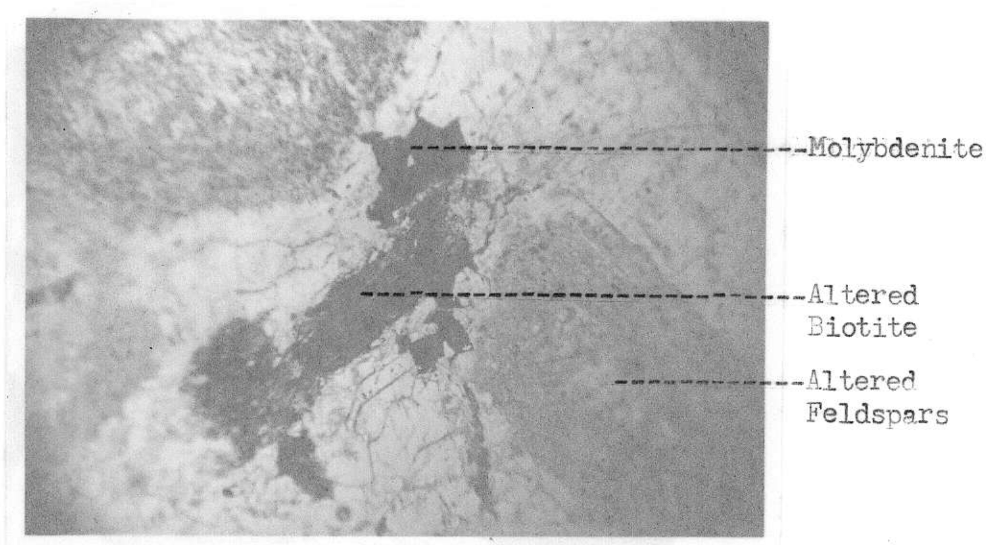

PLATE 6

(X 50) 1 Nicol 1 Second

PLATE 5

PLATE 6

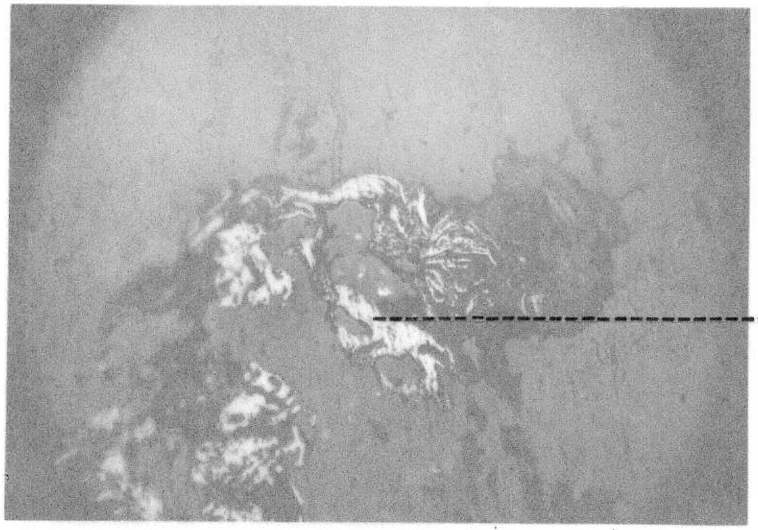

PLATE 7

(X 50) 1 Nicol 2 Seconds

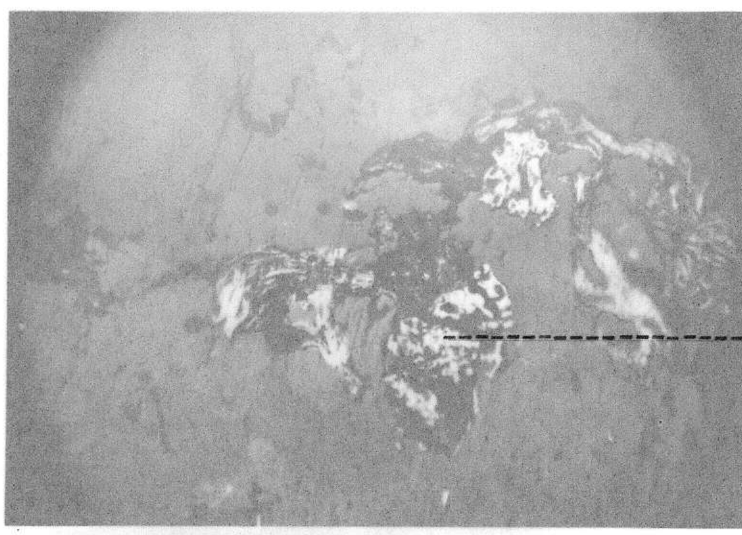

PLATE 8

(X 50) 1 Nicol 2 Seconds

PLATE 7

PLATE 8

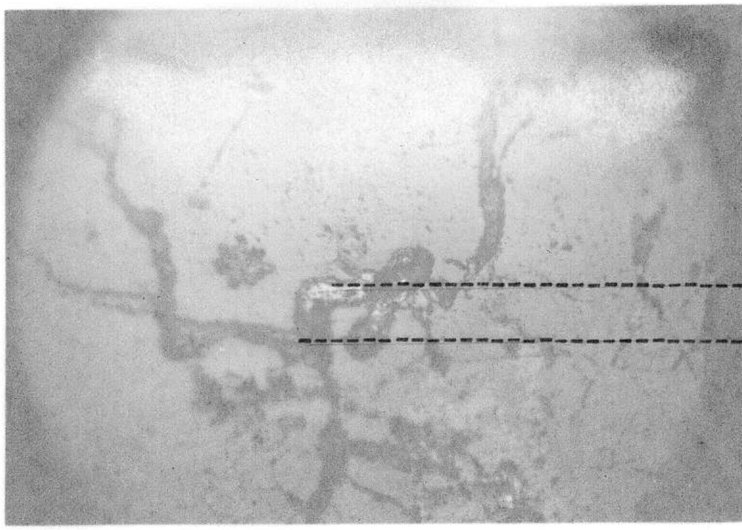

PLATE 9

(X 50) 1 Nicol 2 Seconds

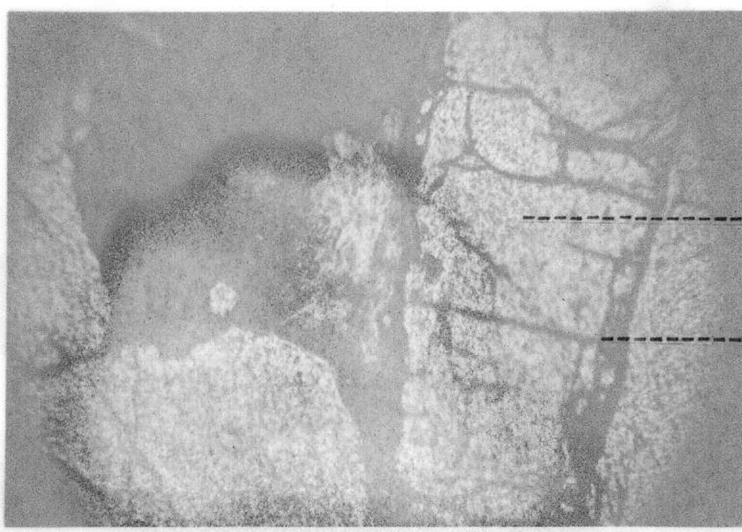

PLATE 10

(X 50) 1 Nicol 2 Seconds

PLATE 9

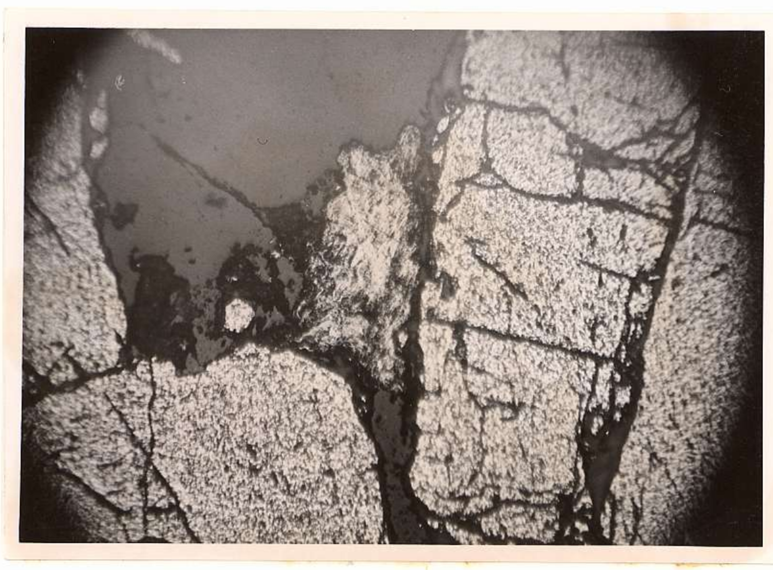

PLATE 10

The one large grain of Pyrite present may be accounted for as an accessory mineral which came in with the granite.

Polished Section #2

In this section small quartz veinlets divide the Pyrite as the quartz was injected. PLATE 10

Along one division, a little Pyrrhotite has been injected later than the Pyrite and a slight Molybdenite coating on the Pyrite must also have been deposited later.

Polished Section #3

This section exhibits massive Pyrite on one side, while the other side there is quartz containing some Pyrite and Molybdenite disseminated through it.

The dissemination can be accounted for as a later stage of quartz bearing Molybdenite. The Pyrite could have been carried in by the later quartz phase. This later quartz is found along fractures in the previously deposited quartz.

Inclusions of the early quartz phase are seen trapped in the later phase. PLATE 11

Polished Section #4

This section shows Molybdenite brought into the original quartz vein by small quartz veinlets. The original vein or pod is fractured and then the second phase, injected carrying Molybdenite and Pyrite. Molybdenite appears in a disseminated form in the veinlets but Pyrite is confined to minute fractures.

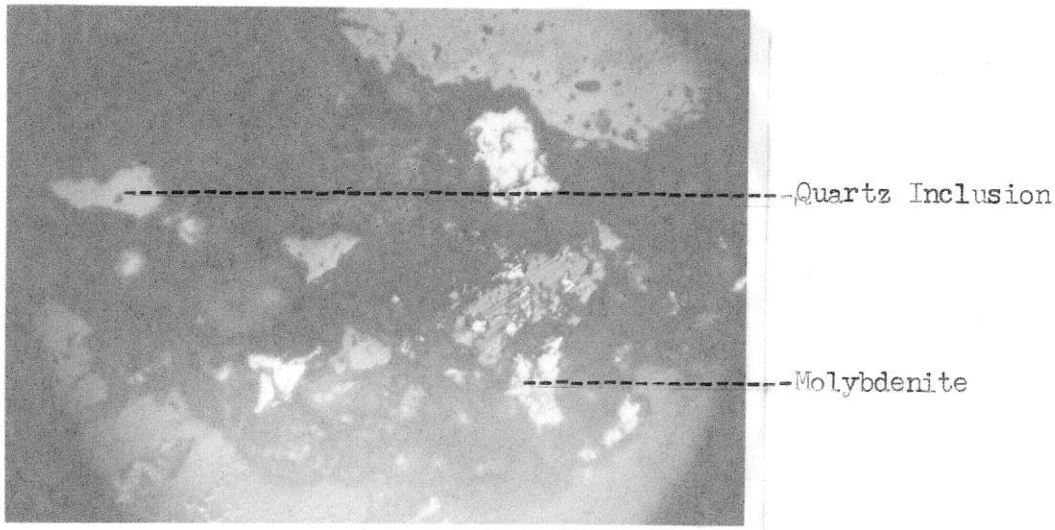

PLATE 11

(X 50) 1 Nicol 2 Seconds

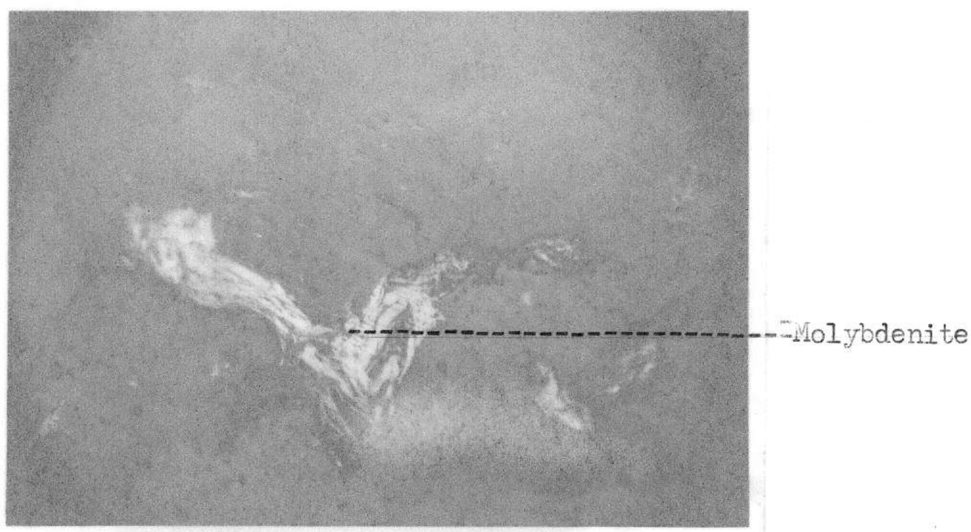

PLATE 12

(X 50) 1 Nicol 2 Seconds

PLATE 11

PLATE 12

Polished Section #5

This section again shows in detail the Molybdenite being brought in by quartz veinlets which follow fractures in the main granitic mass. The mineral is chiefly in the veinlets and only a very small amount is present in the granitic rock mass itself. The Molybdenite is disseminated and exhibits a texture which probably is due to post mineral deformation. PLATE 12.

X-ray Determination

An X-ray determination was done on the Molybdenite hand specimen #H.M.14 which was thought to contain Graphite. The result proved no Graphite was present.

Summary of Mineralogy

The metallic minerals present in ~~this problem~~ these samples are as follows in decreasing amount:

1) Pyrite
2) Molybdenite
3) Magnetite
4) Pyrrhotite

Paragenesis

As this granitic mass cooled the accessory minerals crystallized out first. These accessory minerals were present only in very small amounts. The order in which they crystallized out is as follows:

1) Molybdenite
2) Magnetite
3) Pyrrhotite
4) Pyrite

Pyrite was by far the greatest in concentration with only relatively small amounts of the other minerals.

Biotite crystallized before the feldspars. As the feldspars crystallized out, Pyrite crystallized earlier was partly replaced. Biotite seems to have been altered in part to sericite, chlorite and iron oxide. The presence of Magnetite surrounded by biotite and its alteration products could be accounted for by the contribution of iron from biotite and other elements from the remaining hydrothermal fluids.

After the feldspars and accessory minerals crystallized out, a concentration of quartz material remained, which was injected under pressure into many fractures, and the plastic granitic rock. This accounts for the large quartz pods and veins as well as the many little veins which cut the granitic rock.

Pyrite accompanied the quartz in some areas since the quartz veins have Pyrite disseminated throughout.

This area was then subjected to faulting and fracturing and later injected with hydrothermal fluids and gases which may have come from an adjacent small granitic intrusion. One of these hydrothermal fluids was a quartz bearing Molybdenite and Pyrite. It was injected under pressure into the surrounding granitic rock and quartz vein and deposited in small fractures and faults.

In some fractures where Pyrite and quartz were present from the first phase injection, the Molybdenite and quartz from the second phase separated the Pyrite crystals and covered them with a thin coating of Molybdenite.

As the hydrothermal fluids and gases moved through the rocks, the rock became altered and some Molybdenite and Pyrite was disseminated into a narrow zone of rock adjacent to the quartz veinlets.

CONCLUSION

The nature of this problem is to determine the manner by which the Molybdenite was implaced into the host rock.

The data obtained from the study of rock samples and the structural geology of the area in question indicate the following conclusions.

1) Part of the Molybdenite present in the rock specimen originated as an accessory mineral in the magma.
2) After the crystallization of feldspars and the primary quartz injection, hydrothermal gases and fluids were injected. Molybdenite with quartz was implaced in small veinlets and disseminated in the granitic rock by these fluids and gases.

The evidence available suggests that this is a high temperature hydrothermal deposit.

Needs more critical thin section work.