Location sketch of mine? Details of collection. Location of ore minimum effort.

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MINERALOGRAPHIC STUDY OF THE POLARIS TAKU ORE

by

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Introduction

The main purpose of this study is to determine the mode of occurence of gold within the Polaris Taku ore.

Several specimens of ore assaying better than half an ounce of gold were selected for mineralographic study. from a suite collected by D.C

The ore is essentially an arsenopyrite-pyrite gold ore with some stibnite. Previous to this examination gold had neither been seen in handspecimens nor in polished sections of the ore. However, high gold values seem to be restricted to the presence of the small acicular arsenopyrite crystals (Galloway, 1932). Spectroscopic investigations further confirmed the existence of the gold with the arsenopyrite.

Massive stibnite characterizes some of the surface outcrops but diminishes markedly with depth. Most of the stibnite has no gold values although Dr. R.M. Thompson volatilized stibnite and very fine wires of gold were left as a residue.

History

The mineral showings were originally discovered and staked in 1929 by Art Hedman, Ray Walker, Ray Race and associates. The property was optioned twice and released before E.C. Congdon and associates commenced further exploration and development in 1935. Mining and milling were conducted from late in 1937 until 1942 when operations were discontinued owing to war-time restrictions. The mine had yielded up to that time 89,330 ounces of gold and 4,990 ounces of silver. Operations were resumed in 1946 and the mine was finally closed again in 1951.

Milling

In order to release the very fine arsenopyrite crystals that carry the gold, the ore had to be ground to 70 per cent minus 2oo mesh.

Investigations by the Ore Dressing Division of the Mines Branch, Ottawa, revealed that the gold was not recoverable by ordinary almalgamation or cyanidation but that practically all was obtainable by the flotation of the arsenopyrite. The arsenopyrite was roasted and the concentrates averaging 4 ounces per were shipped to the A.S. & R. Smelter at Tacoma.

Acknowledgements

This report was prepared under the supervision of Dr. R.M. Thompson and Mr. Papesik. To them I am indebted for much valuable assistance. To Mr. Donovan my thanks are due for careful preparation of the polished sections. I wish also to express my appreciation to Mr. Alan Archer for assistance in photography.

Location

The Polaris Taku mine is located on the west bank of the Tulsequah River, about 6 miles from its confluence with the Taku River. The city of Juneau, Alaska is 25 miles S.W. of the mine.

General Geology

The Polaris Taku mine occurs in Mesozoic volcanics along the eastern contact of the Coast Range batholith and about 5 miles east of the main batholith contact.

The rocks of the locality are greenstone, calcareous tuff and mica schist representing flow and tuffaceous volcanics, possibly in part sedimentary. The rocks are extensively altered and intruded by felsitic dykes which locally are associated with mineralized structures. Extensive post mineral faulting cuts the formation and in places have dislocated the mineralized zones.

Mineralization is confined to quartz carbonate stringers, compact carbonate veins, and shatter and shear zones within the volcanics.

Sericitization of the mineralized zones and the adjacent wall rock is also strongly developed. Light green micaceous areas and patches of fuchsite are a characteristic of the mineralized structures and altered wall rock.

Megascopic Descriptions

The rocks in which the ore occurs are fractured silicifed and carbonated tuffs. Most of the specimens are cut by at least two main sets of fractures at 45^{o} to each other. The earlier fractures have been filled with quartz while the later fractures contain both stibnite and quartz.

The arsenopyrite is finely disseminated and also occurs in irregular clusters throughout the rocks. The pyrite is closely associated with the arsenopyrite and also occurs in irregular clusters, although some pyrite is in veins apparently cutting the arsenopyrite.

The stibnite occurs with quartz and white carbonate in veins cutting the other minerals. There is some pyrite with stibnite but most occurs with the arsenopyrite.

Specimen P-17

The specimen is mainly stibnite in a quartz gangue. There is a little pyrite and arsenopyrite visible but no other minerals. The minerals and their estimated percentages are:

Stibnite	30%
Pyrite	1%
Arsenopyrite	1%
Gangue	68%

Specimen P-6

Specimen is of massive stibnite in a quartz carbonate gangue. Pyrite is present but is confined to the gangue. The estimated percentages are:

Stibnite	85%
Pyrite	1%
Gangue	14%

Specimen of #18 Vein

Specimen contains about 15% stibnite in a quartz gangue. There are some veins of barren calcite cutting the rock. Portions of the sample contain abundant arsenopyrite and pyrite in a green sericite and fuchsite gangue.

Specimen from 1-23 Stope

The sample assays better than 2 ounces of gold. The gangue is green sericite with some fuchsite. Veins of barren quartz and veins of quartz with stibnite cut the pyrite and arsenopyrite. A vein of pyrite apparently cuts the arsenopyrite. Native gold with stibnite was seen in this specimen. The minerals and their estimated percentages are:

Arsenopyrite	7%
Stibnite	2%
Pyrite	1%
Gangue	90%

Microscopic Description

Stibnite

The stibnite is white, soft, and has good cleavage. Stibnite, ~~as seen~~ under the microscope, is strongly pleochroic and anisotropic yellow to blue. Polysynthetic twinning of the stibnite is quite pronounced. The stibnite when etched with KOH instantly turned black.?

Negative results were obtained for a micro chem-test for gold in the stibnite.

The stibnite was observed under the microscope at 1800X to see if gold was present along cleavages. Gold was not seen but nothing definite could be stated. about what.

Arsenopyrite

how fine

The arsenopyrite occurs in fine acicular needles in clusters and disseminated throughout the green sericitic and carbonated rocks.

The arsenopyrite is white, takes a good polish, has a hardness of about 6, and is weakly anisotropic. Nitric acid stains arsenopyrite black. Size of most the arsenopyrite is 10-30 mu

Arsenopyrite is definitely one of the earliest minerals as quartz veins, quartz-stibnite veins and even pyrite veins cut through the clusters of arsenopyrite.

Tetrahedrite

Tetrahedrite occurs in very small amounts within the stibnite. The tetrahedrite was negative to all reagents is slightly anisotropic, and is hard. ?

Pyrite

The pyrite occurs mostly in the rocks containing abundant arsenopyrite, although some pyrite is found with stibnite. The pyrite is irregularly distributed throughout the rocks and occurs as grains 300 microns to 30 microns in size.

Gold

how - in fractures
evenly disseminated

The gold seen in polished section was associated with and replacing arsenopyrite. The largest grain of gold seen was 30 microns and the smallest visible grain was 5 microns.

More gold was visible under higher powers, (2500X). However, not enough gold was seen to account for the high gold values of the specimen. Therefore, it is assumed that most of the gold is submicroscopic and associated with the arsenopyrite.

Paragenesis

The paragenetic sequence can be almost completely determined by handspecimen examination. The minerals all show vein cutting relationships.

The paragenesis from earliest mineral to last is

1. Arsenopyrite
2. Gold
3. Pyrite
4. Tetrahedrite
5. Stibnite

The primary minerals and their estimated amounts are:

Arsenopyrite	7%
Pyrite	2%
Stibnite	1%

The deposit is relatively shallow not exceeding, at the most, 2,000 feet. The arsenopyrite indicates a high temperature while the stibnite indicates a low temperature. Therefore, probably, the deposit can best be classified as Leptothermal.

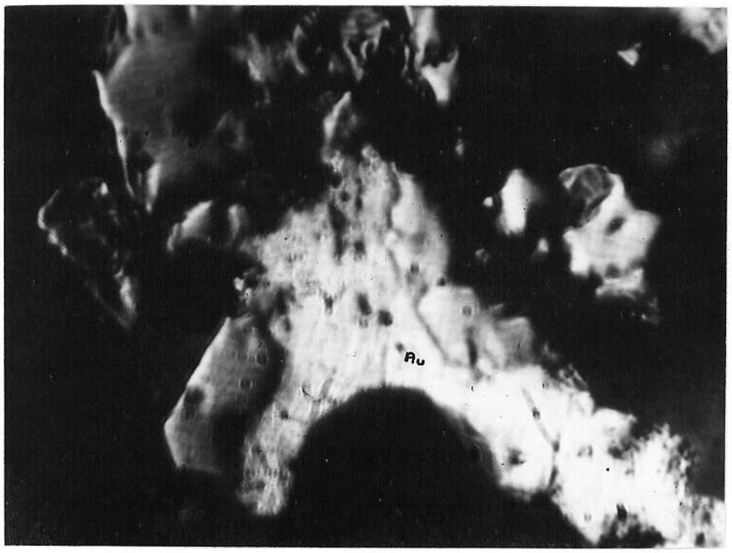
Conclusions

The gold is visible in handspecimen and polished section, although most of the gold is submicroscopic.

Most of the gold occurs with the arsenopyrite. The stibnite may have some gold, but its gold content can probably be attributed to a gathering of gold from the arsenopyrite, rather than the gold being deposited along with stibnite. This seems plausible since most of the stibnite contains no gold values and the stibnite diminishes with depth while good gold values continue with depth.

Silver would be recovered with the stibnite as tetrahedrite was found only with stibnite.

Figure 1: Gold in Arsenopyrite 2540X



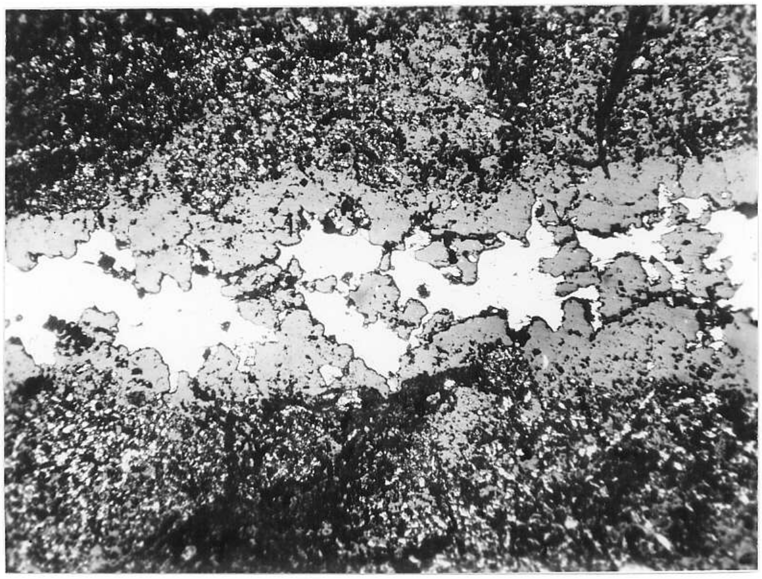


Figure 2: Stibnite-quartz vein cutting pyrite and arsenopyrite 1560X

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