60-65
I think that a minimum of effort went into this.

STIBNITE IN POLARIS TAKU ORE

Report submitted in partial
fulfilment of the course
Geology 409 at the University
of British Columbia

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Gentlemen:

I take pleasure in submitting my report, Stibnite in Polaris Taku Ore, as required for the course Geology 409, entitled "Mineralography".

Yours respectfully,

S. J. Andrews

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INTRODUCTION

This study was carried out to find the association of stibnite in Polaris Taku Ore, and to find, if possible, if any other antimony mineral were present. At the same time, associated minerals in the specimen were also examined.

For some time the mill at Polaris Taku has been shipping a gold-bearing arsenopyrite (with some stibnite) concentrate to a smelter. Stibnite, which is very fusible and capable of entraining gold, prohibits the use of roasting and leaching as a process for gold recovery. If the stibnite present in the ore is free, and a method is found for extracting it, roasting and leaching would then be possible with much greater recovery.

STIBNITE IN POLARIS TAKU ORE

Mine Location *

The Polaris Taku Mine is located in the Tulsequah river valley in the Atlin Mining Division. It is 38 Airline miles north east of Juneau, Alaska, and 6 miles north west of Tulsequah, B.C. The mine's elevation is 75 feet above sea level.

Previous Findings *

Veins and Faults

Two types of veins occur as follows:

1. Along contacts between schist and massive greenstone.
2. Transverse veins in massive greenstone.

Both vein systems are of similar age and mineralization.

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* Sharpstone, D.C., Canadian Mining and Metallurgical Bulletin, Bulletin 320, pp. 481-500, December 1938.

Both pre- and post-mineralization faulting is found in the mine and the most common type is a horizontal offset of 10 to 40 feet, although one is suspected to be 100 feet. The faulting contains very little gouge but commonly contains some ankerite and sometimes other mineralization is present. Several faults have also been found to have a hinge movement.

Ore Shoots and Mineralization

Vein mineralization consists of arsenopyrite, pyrite, stibnite and possibly pyrrhotite, and gold in gangue of quartz and carbonate. Gold values in the veins show remarkable continuity and uniformity, and usually bear a direct relationship to the amount of arsenopyrite present. Although some arsenopyrite carries more gold than others, it is never 'barren'. The gold, which seldom exceeds 1.5 oz. per ton and averages between 0.25 and 0.60 oz. per ton, is suspected of being either in solid solution or in extremely small intergrowths with arsenopyrite. The average 'sulphide' content of the ore is from 4 to 5%, with arsenopyrite predominating and pyrite next.

Mineralization occurred at three different times as follows:

1. First, there was an intense replacement of greenstone and schist along shear zones by carbonate, some pyrite and an abundance of fuschite. The replacement also went into the wallrock.

2. Second, abundant arsenopyrite and pyrite replaced carbonate rock. The arsenopyrite of this period occurs as very fine needles, (pyrite also fine). Most of the gold also entered at this period.
3. The third period consisted of several stages when varying amounts of sulphides, quartz and carbonates entered. The quartz and carbonate veins sometimes cross each other. The final stage of mineralization consisted of carbonates and stibnite which occur as stringers, cutting earlier material.

Investigation

Sampling

The original sample consisted of approximately 100 lbs. of ore taken from the picking belt of the mill at Polaris Taku. This sample was in turn picked over to find representative specimens, with special consideration for stibnite-bearing specimens. From the samples, six sections were cut, mounted, ground and polished for microscopic examination. These sections are believed to contain all the different types of occurrences of stibnite.

Examination and Determination

Specimen No. 1

This section is an example of stibnite occurring

in carbonate and quartz. The stibnite stringers have no consistency as to direction and vary in width from one millimeter to a tenth of a millimeter. The greatest majority of the stibnite is in carbonate, but some of it is entirely enclosed by quartz. A microphotograph of a typical occurrence is attached, showing stibnite within carbonate, which is in turn within quartz.

Specimen No. 2

In this section arsenopyrite and pyrite are present in what is termed 'greenstone'. The pyrite was present in grains, some of which were bunched together and others which were dispersed through the greenstone. From a series of twenty-five measurements with the micrometer, the average grain size was found to be approximately 0.1 x 0.08 m.m. In some grains there was evidence of replacement in the form of fragmentary crystals. However, these crystals of pyrite may have been distorted by subsequent heat and stresses.

The arsenopyrite is very finely divided, and consists of needles, star and diamond-shaped crystals. Approximately 90% of these grains were needle shaped and averaged .0076 x .068 m.m. in dimensions.

Specimen No. 3

A vein of stibnite-bearing carbonate and quartz cuts through an area of finely divided arsenopyrite and pyrite in this section. Numerous stringers of carbonate and quartz also traverse the section. The grain size of the

arsenopyrite was found to be .008 x .03 m.m. (needles), while the pyrite grain size was slightly larger. An attached micro-photograph shows a veinlet of stibnite which stems from the main vein, and extends almost to the arsenopyrite-greenstone at the vein wall. This was found to be the closest approach of the two minerals stibnite and arsenopyrite.

This section indicates the extremely complicated make-up of ore in some parts of this mine. However none of the minerals are intimately mixed with each other.

Section #4

In this section numerous carbonate stringers traverse greenstone in all directions. Two small grains of stibnite were found in the carbonate stringers. A very narrow vein of pyrite (small grains) is present, and the main mass of greenstone contains very small grains of arsenopyrite, which is widely dispersed.

Section #5

This is another example of carbonate stringers traversing greenstone, but in this section pyrite is present in large grains. At the same time pyrite is found with arsenopyrite disseminated through the main mass. No stibnite is present. Extremely complicated makeup is indicated again by this specimen.

Section #6

Quartz, carbonate, and stibnite separate greenstone and a schist-like formation of arsenopyrite. The main mass of stibnite is in carbonate but some veinlets from this

penetrate solely in quartz. The arsenopyrite, in the form of a schist, is very finely disseminated. The grain size compares with those measured in sections 2 and 3. The greenstone in this case contains scattered pyrite grains and patches of arsenopyrite (fine grains) some of which is almost in vein form.

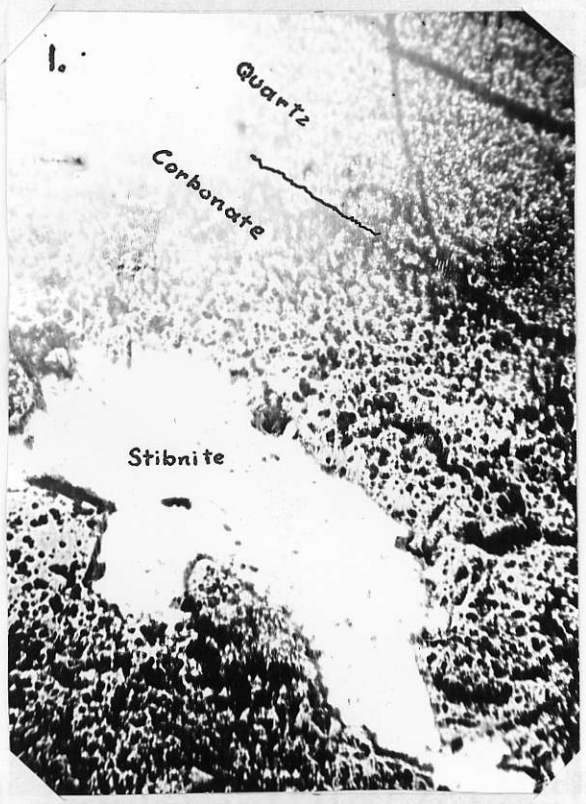
Conclusions

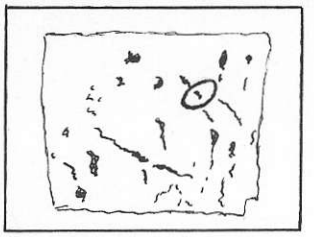
The stibnite in this set of sections was found to be free in all cases, and to be in the form of stringers and isolated blebs. In some cases the stringers were as narrow as 0.1 m.m., but approximately 95% of them were larger. Except in a few isolated shoots the stibnite was present in carbonate which was the main body of the stringer. In the isolated shoots the stibnite was in quartz, but in no instance was it contained in greenstone or other minerals. No new antimony mineral was seen in any of the sections examined, and no new minerals apart from those mentioned were found.

Arsenopyrite and pyrite do not appear intimately mixed, although arsenopyrite is found dispersed through areas containing pyrite. Pyrite grains are larger than arsenopyrite grains in all sections examined.

No gold was seen in any specimen, and it is assumed, (as in Mr. Sharpstone's report), that the gold is present either in solid solution or as very minute intergrowths. The slightly brassy color of arsenopyrite when carrying high gold

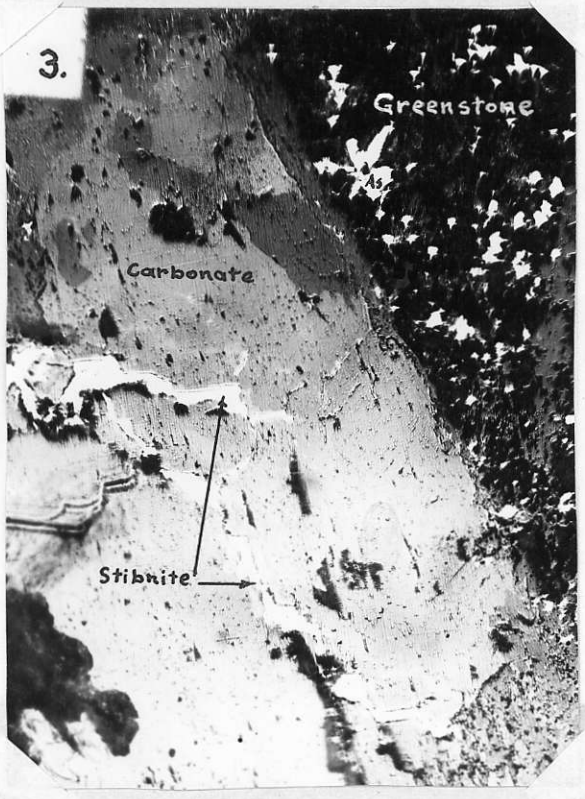
values, as also mentioned by Mr. Sharpstone, is evident in Section #3. ??

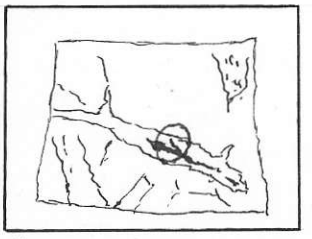




#1 Polaris Taku

Photographed area circled.
X-100. No etch.
Typical occurrence of stibnite in carbonate and quartz.





#3. Polaris Taku

Photographed area circled.
X-100. No etch.
The closest approach of stibnite to arsenopyrite.

As - arsenopyrite