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CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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MINERALOGICAL INVESTIGATION OF A GOLD-SILVER ORE FROM KLEANZA MOUNTAIN, TERRACE AREA, BRITISH COLUMBIA

by

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MINERAL SCIENCES DIVISION

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SUMMARY OF RESULTS

A sample of gold-silver ore from Kleanza Mines Ltd., Terrace area, northern British Columbia was investigated mineralogically. The ore consists of granular pyrite aggregates in quartz. The pyrite contains inclusions of gold-silver-lead-bismuth tellurides together with trace amounts of chalcopyrite, sphalerite, and goethite. The gold and silver values come from the tellurides which are present as several related phases within any one inclusion. No free grains of the tellurides were noted in the mill products or head samples obtained from this ore.

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INTRODUCTION

Several samples of gold-silver ore from the Terrace area of northern British Columbia were received from Mr. A. Stemerowicz of the Mineral Processing Division in March, 1972. Mr. Stemerowicz stated that 390 pounds of the ore had been submitted to the Mines Branch by Mr. R.H. Bates of Kleanza Mines Ltd.; Post Office Box 580, Terrace, British Columbia, for beneficiation test. A mineralogical examination of the samples was requested. The samples received included several hand specimens, a head sample crushed to minus 10 mesh and a jig-table concentrate that was obtained during the beneficiation tests.

The mining property is located approximately 7 miles east of Terrace, British Columbia, on Kleanza Mountain, at an elevation of 2150 feet (topographic map 103 I 9/w; Lat. 54°32'; Long. 128°27').

METHOD OF INVESTIGATION

The hand specimens were sawn and a polished section was prepared from one of them. This section was studied under the reflecting microscope and several telluride minerals were found. These minerals were identified by electron microprobe analyses and two of them were examined by X-ray diffraction methods.

The head sample was screened into several size fractions between 10 and 270 mesh. These fractions were separated into float and sink sub-fractions in heavy liquids as follows:

1. 48 to 150 mesh in liquids having specific gravities of 2.96, 3.33, and 3.7;
2. 150 to 200 mesh and 200 to 270 mesh in liquids having specific gravities of 2.96 and 3.33;
3. minus 270 mesh in liquids having specific gravities of 2.96 and 4.20.

The sink and float portions were prepared as polished sections and studied by means of a reflecting microscope and by X-ray diffraction.

Three polished sections of the jig-table concentrate were studied using the reflecting microscope.

RESULTS OF INVESTIGATION

General Description of the Ore Samples

The hand specimen consists of friable pyrite aggregates in milky white quartz. Some of the aggregates are crudely banded, and the pyrite is oxidized.

Mineralogy

The ore consists of pyrite and quartz (see Figure 1) with trace amounts of chalcopyrite, sphalerite, goethite, tellurides, and native gold.

Pyrite

Massive and spongy varieties of pyrite are present in the ore. The massive pyrite occurs as dense, homogeneous material (see Figure 2) and is relatively free of inclusions.

The spongy pyrite (see Figure 2) is characterized by containing numerous rounded inclusions of quartz, chalcopyrite, sphalerite, and tellurides. Because of these inclusions, the polished surface of the pyrite is often strongly pitted.

Tellurides

Several Au-Ag-Bi-Pb tellurides were noted and identified by using the electron microprobe. These included the following:

Name	Composition (wt %)		Formula
Altaite	Pb	60.70	$Pb_{1.06}Te_{1.00}$
	Te	35.36	
Hessite	Ag	61.95	$Ag_{2.05}Te_{1.00}$
	Te	35.73	
Petzite (possibly)	Ag	40.75	$Ag_{1.43}Au_{0.33}Te_{1.00}$
	Au	17.04	
	Te	33.83	
Volynskite	Ag	15.04	$Ag_{0.42}Bi_{0.53}Te_{1.00}$
	Bi	37.00	
	Te	46.29	
Pb-Tellurbismuth	Pb	15.15	$Pb_{0.20}Bi_{0.52}Te_{1.00}$
	Bi	38.87	
	Te	45.99	

The tellurides occur as rounded inclusions in pyrite (see Figure 3) and as veinlets and/or interstitial fillings between pyrite grains (see Figure 4). Most of the inclusions are smaller than 30 microns in diameter and consist of complex intergrowths of two or more tellurides. The small grain size of the tellurides renders identification difficult, nevertheless, electron microprobe analyses were obtained for each of the 5 minerals referred to above. The Pb Tellurbismuth has, as yet, not been named, but further work will be attempted to more fully characterize its physical and chemical properties.

Native Gold

One very small grain of native gold, approximately 2 microns in diameter, was found. It occurred together with a telluride inclusion within pyrite.

Goethite

Minor amounts of goethite occur as encrustations on pyrite grains. These particular grains were noted in samples of mill products but no goethite was observed in the hand specimens examined.

CONCLUSIONS

The gold and silver in this ore are present largely as tellurides which occur as inclusions and fillings in spongy pyrite. The gold values are in petzite whereas the silver values are in hessite, petzite, and volynskite.

The telluride grains are so small that very fine grinding would be required to liberate even the coarser ones. This conclusion was reached after detailed examinations of mill products and tabled pyrite concentrates failed to locate free tellurides in the pyrite aggregate.

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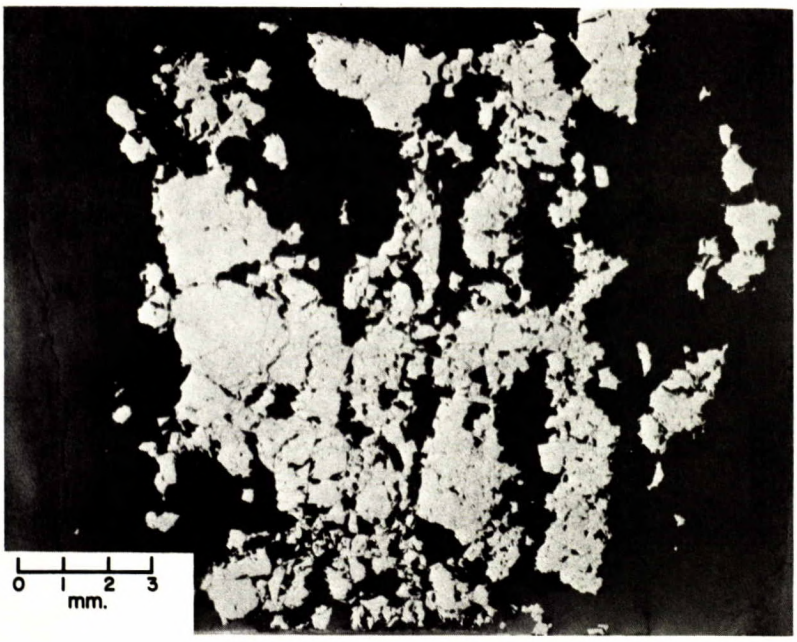

Figure 1. Pyrite aggregate in quartz.

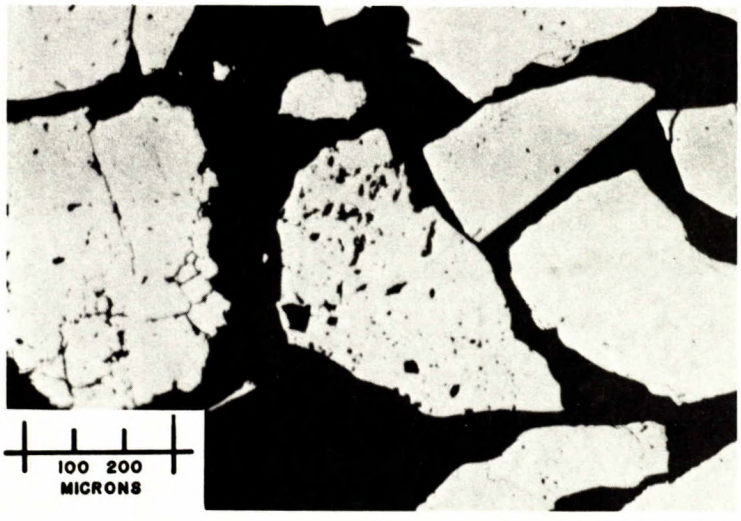

Figure 2. Photomicrograph of a sample of mill product which includes both massive pyrite and spongy pyrite.

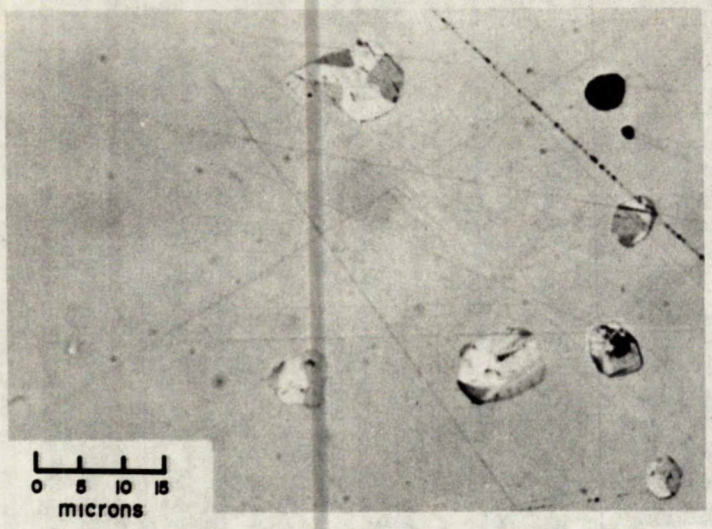

Figure 3. Rounded inclusions of multi-phase Pb-Bi-Au-Ag telluride in pyrite.

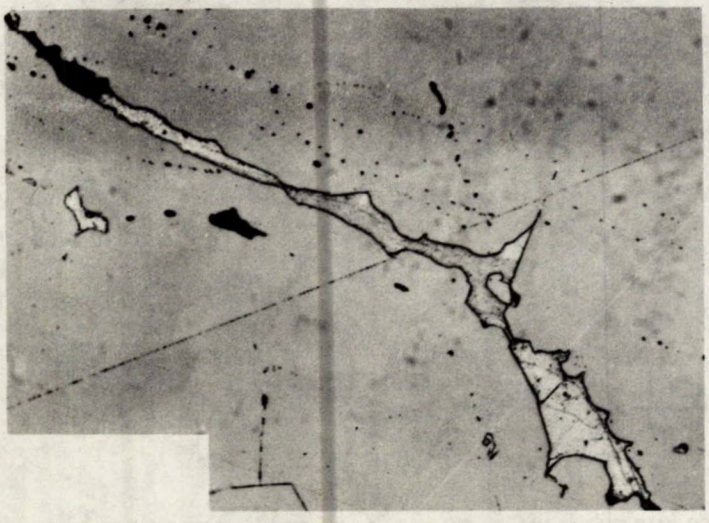

Figure 4. Interstitial multi-phase Pb-Bi-Au-Ag telluride in pyrite.