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MINERALOGICAL INVESTIGATION OF AN IRON-COPPER ORE FROM YUKON FOR IMPERIAL MINES LIMITED

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by

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MINERAL SCIENCES DIVISION

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Mines Branch Investigation Report IR 64-63

MINERALOGICAL INVESTIGATION OF AN IRON-COPPER
ORE FROM YUKON FOR IMPERIAL MINES LIMITED

by

W. Petruk*

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SUMMARY OF RESULTS

The iron-copper ore samples from the Whitehorse copper belt, Yukon Territory, contain disseminated iron and copper minerals. The iron mineral is magnetite which occurs as irregular grains in the gangue. The copper minerals are bornite, chalcopyrite, chalcocite, covellite and native copper all of which occur as inclusions and veinlets in gangue and magnetite.

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INTRODUCTION

Samples of an iron-copper ore from the Whitehorse copper belt, Yukon Territory were received from R. P. Bailey of the Mineral Processing Division in April, 1964. Mr. Bailey stated that the ore was submitted to the Mines Branch by Dr. A. C. Skerl, Consulting Mining Geologist, 1758 Western Parkway, Vancouver, B. C., and that, according to Dr. Skerl, one of the copper minerals is valleriite*. Mr. Bailey requested that the samples be examined mineralogically.

SAMPLES

The following samples were received from Mr. Bailey:

- 1) Drill core crushed to about $\frac{1}{4}$ inch in size.
- 2) Head sample crushed to about - 10 mesh.
- 3) Copper recleaner concentrate.
- 4) Copper scavanger concentrate.
- 5) Copper cleaner tail.
- 6) Copper recleaner tail.

METHOD OF INVESTIGATION

The head sample was separated into fractions by means of heavy liquids (specific gravities of 2.96, 3.33 and 3.70). Oil immersion mounts were prepared from the float fractions, and polished sections were prepared from the 3.70 G. sink fraction, the crushed drill core sample, and the concentrate and tail samples. The minerals were identified by means of microscopical and X-ray diffraction studies.

*($\text{Cu}_2\text{Fe}_4\text{S}_7$?).

RESULTS OF INVESTIGATION

The ore is composed of disseminated metallic minerals in gangue. The metallic minerals are magnetite, bornite, chalcopyrite, chalcocite, native copper, covellite and pyrite. The non-metallic minerals are pyroxene, serpentine, amphibole, chlorite, calcite and garnet. No valleriite was found in the samples studied.

Magnetite is the most abundant metallic mineral. It is present in gangue as irregular grains up to several millimeters in size and occasionally contains inclusions and veinlets of chalcopyrite, bornite and chalcocite (see Figures 1 and 2).

The copper-bearing minerals are bornite, chalcopyrite, chalcocite, covellite, and native copper. They occur as irregular inclusions and veinlets in gangue and magnetite, and range from about 2 to 500 microns in size. The bornite and chalcocite are frequently intergrown with each other (see Figures 2 and 3).

The concentrate and tail samples (Samples 3, 4, 5 and 6) were studied under the ore microscope to determine the degree of liberation and textural relationships of the copper minerals. The degree of liberation is given in Table 1, and the textural relationships of the minerals in the copper recleaner concentrate are shown in Figure 3.

TABLE 1

Degree of Liberation of the Copper Minerals in Concentrate and Tail Samples Prepared from a Copper-Iron Ore from the Whitehorse Copper Belt

Sample	Size range of copper mineral (microns)	Liberation
Recleaner concentrate	2-150 (mostly 5-70)	largely free
Scavanger concentrate	5-50	largely as inclusions in gangue
Cleaner tail	2-100	largely as inclusions in gangue
Recleaner tail	2-50	largely as inclusions in gangue

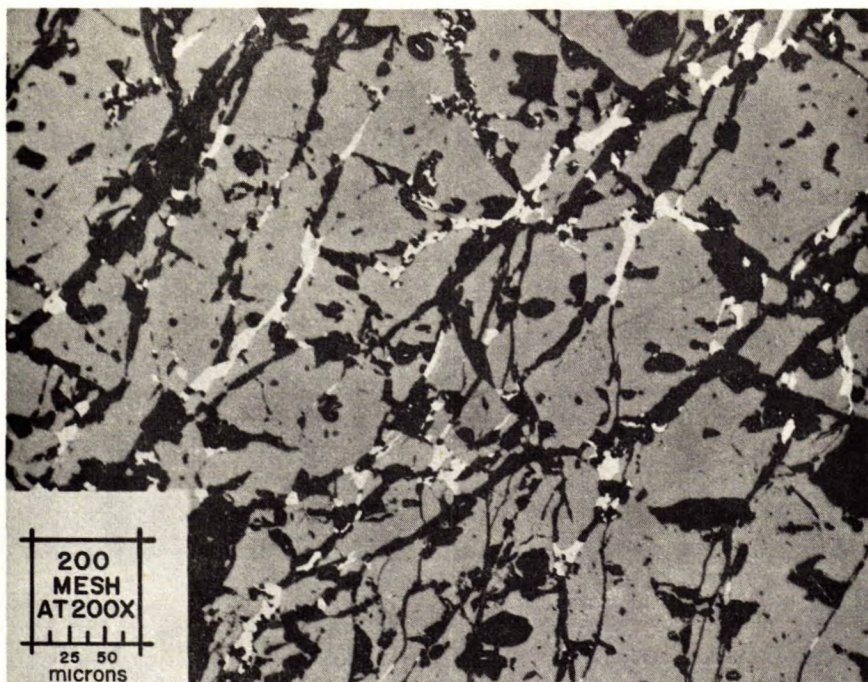


Figure 1 - Photomicrograph of a polished section showing magnetite (grey) with veinlets of chalcopyrite (white) and gangue (dark grey). Pits are black.

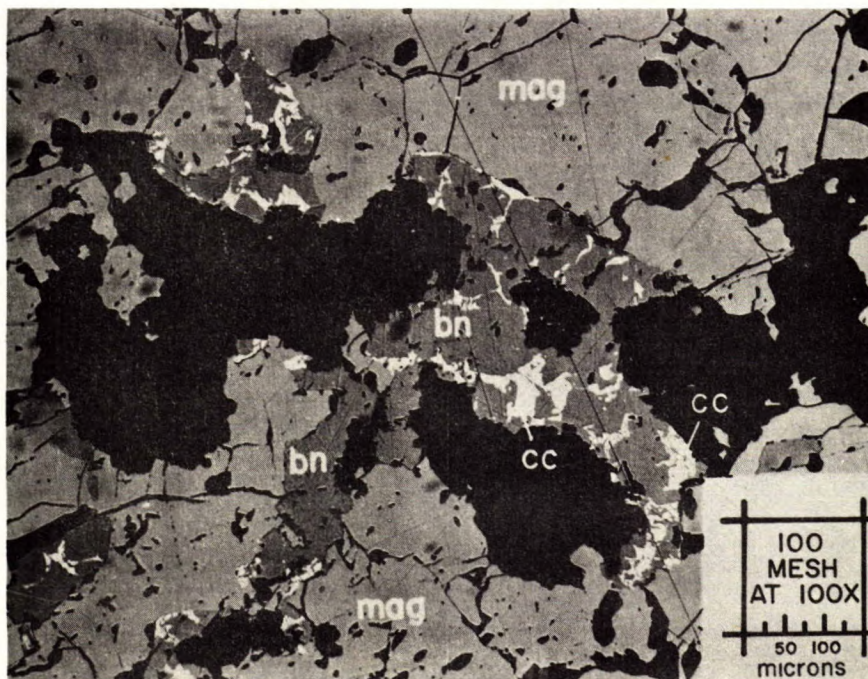


Figure 2 - Photomicrograph of a polished section showing magnetite (mag) with inclusions of bornite (bn), chalcocite (cc), and gangue (black). Note that the chalcocite is intergrown with bornite. Pits are black and indistinguishable from gangue.

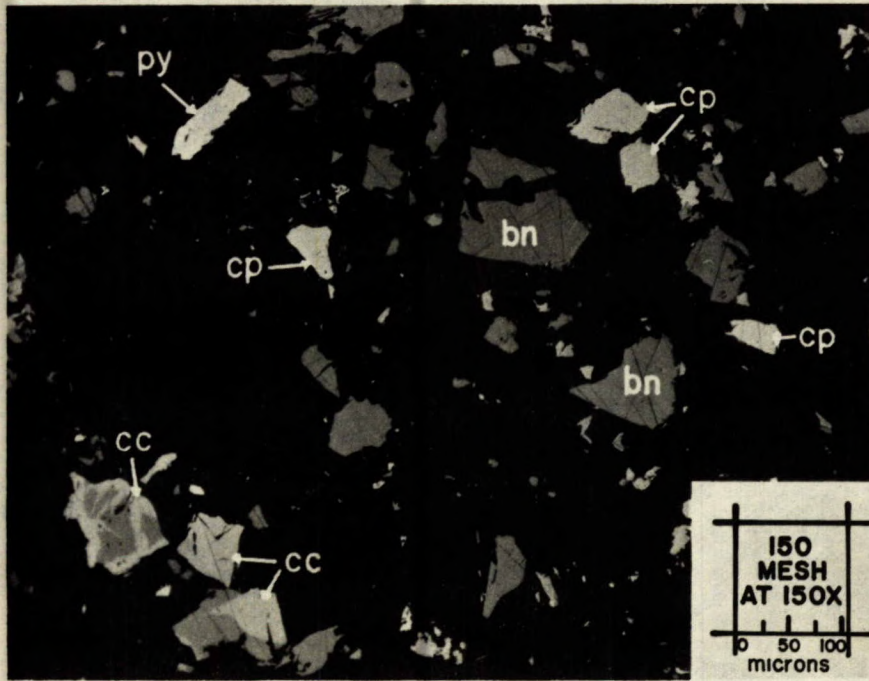


Figure 3 - Photomicrograph of a polished section of the copper recleaner concentrate (Sample 3). It shows bornite (bn), chalcopyrite (cp), chalcocite (cc) and pyrite (py). The dark grey background represents mounting medium. Pits are black.

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