O T T A W A August 23, 1940.

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ORE DRESSING AND METALLURGICAL LABORATORIES

Investigation No. 887

Concentration Tests on Samples of Copper-Gold Ore from Dungannon Township, Hastings County, Ontario.

BUREAU OF MINES
DIVISION OF METALLIC MINERALS
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CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH
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Shipment:

Three small test pit samples, numbered 1, 2, and 3, and weighing 12, 7, and 5 pounds respectively, were received on July 29, 1940. The samples were submitted by Mr. A. T. Westbrook, 268 London Street, Peterborough, Ontario.

Location of Property:

The samples were taken from a property located on Lot 23, Third Concession of Dungannon Township in the County of Hastings, Ontario.

Character of the Ore:

Eighteen polished sections, six of each sample, were prepared and examined microscopically for the purpose of determining the character of the ore.

Samples from Pits 1 and 2.

Since the character of the ore in these two samples is essentially the same, they will be described together. Their chief difference is that the metallic mineral content is much greater in amount, and much more severely oxidized in the sections made from Sample No. 2 than in those made from Sample No. 1.

Gangue - The gangue is variable in character and consists of: (a) Fine-textured quartz which carries abundant iron-free carbonate as finely disseminated grains; (b) highly siliceous, dark-grey material which carries a much smaller amount of disseminated carbonate. The quartz bears local reddish-brown stains of iron oxides, and, in one section, it is of a light-green colour, perhaps due to stains of copper.

The gangue in the sections from Sample No. 2 is composed almost entirely of the dark siliceous material carrying a small amount of carbonate, and, since the metallic mineralization is much heavier in them, it is much less in amount than in Sample No. 1.

Metallic Minerals - The metallic minerals are represented chiefly by chalcopyrite and cubanite with minor amounts of "limonite" and covellite.

Chalcopyrite occurs as coarse to fine irregular grains and small masses disseminated in gangue. It contains numerous inclusions of gangue and has been extensively attacked and replaced by "limonite" and covellite around margins and along fractures.

Cubanite ($Cu_2S.Fe_2S_5$), the next most abundant metallic, has the same modes of occurrence as chalcopyrite, with which it is usually intergrown.

"Limonite" is common as replacement veinlets and rims always in or around chalcopyrite and cubanite. It is also visible alone in gangue as small irregular grains which have probably resulted from the complete replacement of sulphide.

Covellite, like "limonite," is common as narrow veinlets and small scales in chalcopyrite and cubanite.

Arsenopyrite is present in practically negligible quantity as rare medium to small irregular grains and crystals scattered among the other sulphides.

Sample from Pit 3.

The character of the ore in this sample is different from that in Samples No. 1 and 2. The gangue appears to be free of carbonate, and evidence of surface alteration is absent. Pyrite and magnetite are the major metallics; cubanite is not visible and chalcopyrite only in comparatively small amount. A short description follows:

Pyrite predominates as coarse to fine irregular grains and small masses in gangue. It contains inclusions of gangue and is slightly fractured, and the fractures filled with gangue.

Magnetite is common as small granular masses and as clouds of medium to small irregular grains disseminated through gangue. It is also present as small grains in pyrite, and itself contains inclusions of gangue and the other sulphides.

Chalcopyrite is present in small amount, largely as medium to fine irregular grains erratically scattered through gangue; also as occasional small grains in pyrite.

Pyrrhotite is visible as rare small particles in pyrite and magnetite. Its total amount is negligible.

Summary - The microscopic examination of the three samples of copper-gold ore from Hastings County reveals that Samples No. 1 and 2 are very similar in character. They differ only in the extent of mineralization and oxidation. Sample No. 3 is quite different in character, as described above.

In spite of careful examination of all eighteen polished surfaces, under low and high powers of magnification, no native gold was observed, and nothing was learned as to this metal's mode of occurrence.

Sampling and Assaying:

The samples were assayed individually, and reported as follows:

(On next page)

	Gold oz./ton	Copper, per cent
Sample No. 1	0.06	3.43
Sample No. 2	0.19	15.05
Sample No. 3	0.02	0.71

Experimental Tests:

One flotation test was conducted on Sample No. 1 in which a good grade of concentrate was produced. No experimental work was done on Samples No. 2 and No. 3, since one of them was very high grade, and the other was low grade.

Details of the test conducted on Sample No. 1 are as follows:

The ore was ground 60 per cent through 200 mesh with lime added at the rate of 2.0 pounds per ton. A concentrate was then floated with the following reagents:

Butyl Xanthate	0.05 pound per ton
Cresylic Acid	0.20 pound per ton

The concentrate was cleaned without additional reagents. Microscopic examination of the products with the aid of a Superpanner did not reveal the presence of any free gold.

Summary of Results

Product	Weight, per cent	Assay		Distribution, per cent	
		Au, oz./ton	Cu, per cent	Au	Cu
Flotation Concentrate	11.8	0.36	27.72	58.8	89.2
Cleaner Tailing	1.9	0.20	4.12	5.3	2.1
Flotation Tailing	86.3	0.03	0.37	35.9	8.7
Feed (Cal.)	100.0	0.07	3.67	100.0	100.0

Conclusions:

The results of this test show that the ore can be concentrated and that probably 60 per cent of the gold will be recovered in the concentrate. This sample of ore is oxidized to some extent and better results can be expected when ore from depth is being treated.

Some of the copper in the ore is present as the mineral "cubanite," which is lower in copper than chalcopyrite. The grade of concentrate produced will be governed to some extent by the amount of this mineral present.

JDJ:EPF