O T T A W A July 11th, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1261.

Copper-Gold Ore from the Camilla Canadian Mining Corporation Limited, Township of Scadding, Sudbury Mining District, Ontario.

(Copy No. 13)

BUREAU OF MINES
DIVISION OF METALLIC MINERALS

ORE DRESSING AND
METALLURGICAL LABORATORIES

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Copper-Gold Ore from the Camilla Canadian Mining Corporation Limited, Township of Seadding, Sudbury Mining District, Ontario.

Shipment:

A shipment of 16 pounds of ore was received on June 10th, 1942. The ore was stated to be average samples from the property of the Camilla Canadian Mining Corporation. The samples were submitted by John Grundeff, Barrister, Suite 501, Federal Building, 85 Richmond St. W., Toronto 2, Ontario.

Location of the Property:

The property is located in the township of Scadding, Sudbury mining district, northern Ontario.

Character of the Ore:

Selected specimens of the ore were subjected to microscopic examination of polished sections.

Gangue Minerals -

Gangue material consists of milky quartz with a small amount of finely disseminated carbonate in small patches and along narrow, irregular stringers.

Metallic Minerals -

Chalcopyrite is the only abundant metallic mineral visible in the polished surfaces. It occurs as small masses and irregular grains, medium to very fine in size, unevenly distributed through gangue. A small amount of pyrite is present as occasional, medium to small, irregular grains and subhedral crystals in gangue and in chalcopyrite.

Five small grains of native gold, ranging from 48 microns (-280+400 Tyler mesh) down to 12 microns (-1100+1600 Tyler mesh) in size, were observed in the sections. All occur free in gangue.

Purpose of the Investigation:

The investigation was made to determine the value of the ore and a satisfactory method of treatment prior to establishing a mill on the property.

Sampling and Analysis:

The shipment was sampled by standard methods and was found to contain:

(Continued on next page)

(Sampling and Analysis, cont'd) -

Gold (Au)	-	0.82 oz./ton.
Silver (Ag)	-	0.43 "
Copper (Cu)	-	5.90 per cent.
Iron (Fe)	-	8.05 "
Sulphur (S)	-	6.05 "
Arsenic (As)	-	None detected.
Nickel (Ni)	-	" "

Investigative Procedure:

The ore was treated by straight flotation and jigging followed by amalgamation and flotation.

Results:

53 per cent of the gold and 74 per cent of the copper were recovered at a grind of 70 per cent minus 200 mesh by straight flotation. A cleaner concentrate assayed 3.1 ounces gold per ton and 31.4 per cent of copper. Owing to free gold in the ore the tailing assayed 0.23 ounce of gold per ton, or 21.9 per cent of the gold reported in the flotation tailing.

Jigging the ore prior to flotation resulted in a recovery of 61 per cent by amalgamating the free gold in the jig concentrate.

Flotation of the jig tailing and amalgamated jig concentrate resulted in a concentrate assaying 1.7 ounces of gold per ton and 33.5 per cent of copper. The overall recovery of gold by this method was 95 per cent; that of copper, 93.4 per cent.

Details of the Tests:

Test No. 1. - Flotation.

A sample of the ore was ground in a ball mill, at a dilution of 4 parts solids to 3 parts of water, to give a product 70 per cent minus 200 mesh. The ground pulp was

(Test No. 1, cont'd) -

transferred to a flotation cell.

Reagents:

To ball mill:		Lb./ton
Lime	-	2.0

To flotation: (pH, 8.6)

Sodium ethyl xanthate	-	0.07
Cresylic acid	-	0.4

The flotation rougher concentrate was recovered within 7 minutes. The rougher concentrate was recleaned in a separate cell with 2.0 pounds of lime per ton.

The flotation tailing was examined for free gold by passing the tailing through a Hydraulic classifier and examining microscopically the concentrate obtained. This concentrate contained free particles of coarse gold, which appeared to be lighter in colour than pure gold.

Results of Flotation:

Products	Weight, per cent	Assays Au, oz./ton	Assays Cu, per cent	Distribution, per cent Au	Distribution, per cent Cu	Ratio of concentration
Feed	100.0	0.81	6.03	100.0	100.0	
Concentrate	14.1	5.06	31.36	53.1	74.4	7.1:1.
Middling	8.2	2.48	15.51	25.0	21.4	12.2:1.
Tailing	77.7	0.23	0.33	21.9	4.2	

The calculated assay of the rougher concentrate was 2.85 ounces gold and 25.53 per cent copper. The ratio of concentration was 4.5:1. This concentrate would make a suitable shipping grade concentrate without recleaning.

(Details of Tests, cont'd) -

Test No. 2. - Flotation.

Reagents:

To ball mill:		Lb./ton
Lime	=	2.0
Sodium ethyl xanthate	=	0.05
Cresylic acid	=	0.20

Grind 85 per cent minus 200 mesh. pH, 8.5.

To flotation:

Sodium ethyl xanthate	=	0.02
Cresylic acid	=	0.20

The rougher concentrate was recleaned in a separate cell using 2.0 pounds of lime and 0.04 pound of cresylic acid per ton.

The flotation tailing from this test was examined microscopically and was found to contain considerable gold.

Results of Flotation:

Products	Weight, per cent	Assays Au, oz./ton	Assays Cu, per cent	Distribution, per cent Au	Distribution, per cent Cu	Ratio of concentration
Feed	100.0	0.82	6.23	100.0	100.0	
Concentrate	17.8	2.76	31.32	59.8	91.8	5.6:1.
Middling	4.1	3.26	7.62	16.4	5.2	24.2:1.
Tailing	78.1	0.25	0.24	23.8	3.0	

The calculated assay of the rougher concentrate was, gold, 2.85 ounces per ton and copper, 26.84 per cent. The ratio of concentration was 4.5:1. The grade of rougher concentrate would be of shipping grade without recleaning.

Free gold in the rougher concentrate reports in the middling, due in part to the greater dilution in the cleaning cell and also to the inhibiting reaction of lime on native gold. The free gold should be removed by a gold jig or traps prior to flotation.

(Details of Tests, cont'd) -

Test No. 3. - Jig Concentration; Amalgamation of Jig Concentrate; and Flotation of Jig Tailing and Amalgamated Concentrate.

A sample of ore was ground 85 per cent minus 200 mesh and jigged in a Denver laboratory mineral jig. The jig concentrate was barrel amalgamated.

After separating the mercury and amalgam the amalgamated concentrate was returned to the jig tailing. The amalgam was assayed for gold.

The pulp was transferred to a flotation machine and conditioned with 2.0 pounds of lime per ton for 15 minutes. Then 0.075 pound of sodium ethyl xanthate and 0.4 pound of cresylic acid per ton were added and a concentrate was recovered.

The rougher concentrate was recleaned in a separate flotation cell with 2.0 pounds of lime per ton.

Results:

Amalgamation -

Assay of feed - Au, 0.82 oz./ton.
Assay of flotation feed - Au, 0.32 oz./ton.

Recovery by amalgamation - 61.0 per cent.

Products	Weight, per cent	Assays Au, oz./ton	Assays Cu, per cent	Distribution, per cent In test, Au	Distribution, per cent In orig. feed, Au	Distribution, per cent Cu	Ratio of concentration
Feed	100.0	0.32	6.07	100.0	39.0	100.0	
Concentrate	12.5	1.70	33.47	65.9	25.7	68.7	8:1.
Middling	8.8	0.80	17.08	21.8	8.5	24.7	11:1.
Tailing	78.7	0.05	0.51	12.3	4.8	6.6	

The rougher concentrate assayed 1.33 ounces of gold per ton and 26.7 per cent copper. The ratio of concentration was 4.7:1. The recovery was 93.4 per cent of the copper in the feed and would be a shipping grade without recleaning.

Summary and Conclusions:

In order to obtain a maximum recovery of gold the ore has to be ground fine enough to liberate it from the gangue. Some particles of gold seen in gangue under the microscope were as small as 12 microns, or -1100 mesh.

Some particles of sulphides were seen in gangue particles in a grind of 85 per cent minus 200 mesh. To obtain a minimum tailing with ore similar to this sample, a grind of from 85 to 90 per cent minus 200 mesh will probably be necessary.

In barrel amalgamating the jig concentrate no trouble was experienced with fouled mercury. The gold amalgamated and reported in the amalgam.

The flow-sheet indicated by the tests is to grind the ore in closed circuit with a jig and classifier. The jig concentrate would be reground and the gold recovered by amalgamation. The amalgam barrel residues would be returned to the classifier.

The classifier overflow would then be floated to produce a copper-gold concentrate for sale to a smelter. If the size of the operation warrants it, the flotation tailing would be cyanided to obtain a further recovery of gold. Flotation practice would be such that the copper content of the flotation tailing would be reduced to a minimum to avoid excessive cyanide consumption.

The sample received for investigation may not be representative of the proposed mill feed, and the results obtained from this investigation can apply only to the sample submitted.

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