

O T T A W A May 6th, 1943.

R E P O R T
of the
ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1403.

Flotation Concentration of a Copper Ore
from the Forwood Mining Syndicate,
Dobie Station, Ontario.

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Shipment:

Six bags of ore were received, on April 5th, 1943, from the Forwood Mining Syndicate, per E. B. Wood, President and Managing Director, Kitchener, Ontario. The shipment had a total net weight of 418 pounds.

A covering letter from Mr. Wood stated that he was desirous of securing the following information:

1. Chemical analysis of the ore.
2. Ore grinding problems.
3. Flotation for concentrates.

An additional request was made for a report on what prospects the ore might have.

The ore showed some oxidation and weathering and heavy mineral concentration in places.

Location of Property:

The property of the Forwood Mining Syndicate, from which the samples were said to be taken, is at Dobie, Ontario.

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Sampling and Analysis:

The contents of the six bags were combined, ground to minus 14 mesh, and a sample taken by standard methods for assay and analysis. The remainder was bagged for investigative purposes. The results of the analyses were as follows:

	<u>Per cent</u>
Copper	- 1.77
Lead	- Nil.
Zinc	- Nil.
Iron	- 5.73
Sulphur	- 1.87
Arsenic	- Nil.
Bismuth	- Nil.
Antimony	- Nil.
Insoluble	- 69.4
	<u>Oz./ton</u>
Gold	- 0.0025
Silver	- 0.26

Characteristics of the Ore:

Six polished sections were prepared and examined under the reflecting microscope for the purpose of determining the character of the ore.

Gangue -

In the polished sections, gangue material consists essentially of milky white quartz, transected by narrow sinuous fractures and bearing local stains of iron and copper.

Metallic Minerals -

Metallization is strong and is represented preponderantly by chalcopyrite, which is the only really abundant metallic mineral present in the polished surfaces.

This mineral is largely massive but a small percentage occurs in gangue as coarse to fine disseminated grains.

As well as exhibiting rusty brown stains in the gangue, limonite is present also as small inclusions and numerous hair-like veinlets in chalcopyrite, as tiny uneven grains in the

(Characteristics of the Ore, cont'd) -

gangue, and as narrow rims along the borders of chalcopyrite and pyrite.

A very small amount of malachite is visible in the gangue as small masses and irregular grains against chalcopyrite, and a few tiny crystals of pyrite embedded in gangue occur in one section.

Covellite is also visible, in negligible quantity, as minute particles associated with limonite in chalcopyrite.

Details of Investigative Tests:

Test No. 1.

Grinding, 56.4 per cent minus 200 mesh.

Reagents Added: (lb./ton)

Copper Circuit

To Grinding -

Ca(OH)₂ - 3.0

To Conditioning -

5 minutes.

Potassium ethyl xanthate - 0.1

To Flotation -

7 minutes.

Pine oil - 0.15

pH - 9.4

Results:

Product	:Weight, : per : cent	Assays,			Distribution,		
		: per cent	: Cu	: Fe	: S	: Cu	: Fe
Feed	: 100.00:	: 1.77:	: 5.73:	: 1.87:	: 100.00:	: 100.00:	: 100.00
Copper concentrate	: 6.71:	: 24.40:	: 24.70:	: 24.38:	: 94.60:	: 29.10:	: 94.00
Flotation tailing	: 93.29:	: 0.10:	: 4.35:	: 0.109:	: 5.40:	: 70.90:	: 6.00
Total	: 100.00:	: 1.73:	: 5.71:	: 1.74:	: 100.00:	: 100.00:	: 100.00

Gold Assays:

Copper concentrates - 0.01 oz./ton.
Flotation tailing - Trace.

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(Details of Investigative Tests, cont'd) -

Test No. 2.

Grinding, 59.9 per cent minus 200 mesh.

Reagents Added: (lb./ton)

	<u>Copper Circuit</u>	
To <u>Grinding</u> -		
Ca(OH) ₂	-	1.0
To <u>Conditioning</u> -		<u>5 minutes.</u>
Potassium ethyl xanthate	-	0.1
To <u>Flotation</u> -		<u>7 minutes.</u>
Pine oil	-	0.1
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	pH	- 8.5

Results:

Product	:Weight, : per : cent	: Assays, : per cent			: Distribution, : per cent		
		: Cu	: Fe	: S	: Cu	: Fe	: S
Feed	:100.00	: 1.77	: 5.73	: 1.87	:100.00	: 100.00	: 100.00
Copper concentrate	: 6.44	:28.34	:29.44	:27.50	: 96.06	: 32.69	: 100.00
Flotation tailing	: 93.56	: 0.08	: 4.17	: Trace	: 3.94	: 67.31	: Trace
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Total	:100.00	: 1.90	: 5.80	: 1.77	:100.00	: 100.00	: 100.00

Gold Assays:

Copper concentrates - 0.01 oz./ton.
Flotation tailing - Trace.

Test No. 3.

Grinding, 70.0 per cent minus 200 mesh.

Reagents Added: (lb./ton)

	<u>Copper Circuit</u>	
To <u>Grinding</u> -	-	1.0
Ca(OH) ₂	-	1.0
To <u>Conditioning</u> -		<u>5 minutes.</u>
Potassium ethyl xanthate	-	0.1
To <u>Flotation</u> -		<u>7 minutes.</u>
Pine oil	-	0.1
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	pH	- 8.6

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(Test No. 3, cont'd)

Results:

Product	Weight, per cent	Assays, per cent			Distribution, per cent		
		Cu	Fe	S	Cu	Fe	S
Feed	100.00	1.77	5.73	1.87	100.00	100.00	100.00
Copper concentrate	6.44	28.12	26.71	27.02	95.81	30.77	100.00
Flotation tailing	93.56	0.08	4.14	Trace	4.19	69.23	Trace
Total	100.00	1.89	5.59	1.74	100.00	100.00	100.00

Gold Assays.

Copper concentrates - 0.010oz./ton.
 Flotation tailing - Trace.

Test No. 4.

Grinding, 70.2 per cent minus 200 mesh.

Reagents Added: (lb./ton)

Copper Circuit.

To Grinding -

Ca(OH)₂ - 1.0

To Conditioning -

5 minutes.

Potassium ethyl
xanthate - 0.06

Potassium amyl
xanthate - 0.04

To Flotation -

7 minutes.

Pine oil - 0.10

pH - 8.6

Results:

Product	Weight, per cent	Assays, per cent			Distribution, per cent		
		Cu	Fe	S	Cu	Fe	S
Feed	100.00	1.77	5.73	1.87	100.00	100.00	100.00
Copper concentrate	6.61	26.54	26.03	25.98	94.83	30.34	100.00
Flotation tailing	93.39	0.10	4.23	Trace	5.17	69.66	Trace
Total	100.00	1.85	5.67	1.72	100.00	100.00	100.00

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(Test No. 4, cont'd) -

Gold Assays:

Copper concentrates - 0.010oz./ton.
Flotation tailing - 0.005oz./ton.

CONCLUSIONS:

The ore, as represented by the sample, proved to be particularly amenable to flotation concentration and consequently only four tests were considered necessary, all of which showed very good results.

From the analysis of the ore, as shown, no elements were to be expected which would interfere with flotation and subsequent concentrate treatment.

Gold and silver values were low and testing developed into a straight chalcopyrite concentration which offered no difficulties and resulted in a good grade of copper concentrate and a high extraction. Satisfactory results should be obtained in actual mill operation.

The ore could be classed as medium hard, as referred to its resistance to grinding, but since results of flotation testing were as satisfactory at a grind of 60 per cent minus 200 mesh as at 70 per cent minus 200 mesh, ore-grinding problems should be easily solved.

A simple reagent combination is indicated.

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