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BRITTON RESEARCH LABORATORIES
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VANCOUVER 3, B.C.

JOHN W. BRITTON, A.R.S.M., B.Sc., P.ENG.

October 26, 1965.

The Directors,
Tamarack Syndicate,
205 - 1201 West Pender Street,
Vancouver 1, B. C.

Dear Sirs:

Re: Concentration of Copper Ore

We give below a report on our tests on the samples of copper ore which we received from Mr. C. F. Millar, P. Eng. on August 13, 1965.

(a) Sample used for tests

A composite sample was made up from drill core samples 18901 to 18988 inclusive.

(b) Assay of composite head sample:

Copper	(Cu)	0.51%
Molybdenum	(MoS ₂)	0.003%
Gold	(Au)	0.008 oz. per short ton
Silver	(Ag)	0.04 oz. per short ton

(c) Specific gravity of ore:

2.68, equivalent to 12.0 cubic feet per short ton.

(d) Flotation test conditions

A 2000 gram sample of minus 10 mesh ore was ground to 75% minus 200 mesh and treated by flotation. A rougher concentrate, which was cleaned twice, and three scavenger concentrates were floated, using stage additions of various reagents, as follows:

(2)

Pounds per ton of ore

(1)	To grinding mill:	
	Sodium isopropyl xanthate	0.050
	Methyl isobutyl carbinol	0.015
(2)	To rougher flotation:	
	Sodium isopropyl xanthate	0.050
	Methyl isobutyl carbinol	0.015
	Pine oil	0.054
	Aerofloat 25	0.072
	Minerac A	0.076
(3)	To first scavenger flotation:	
	Sodium hydrosulphide	0.500
	Sodium isopropyl xanthate	0.050
(4)	To second scavenger flotation:	
	Minerac A	0.038
(5)	To third scavenger flotation:	
	Oleic acid	0.020
	Aerofloat 25	0.024
(6)	To first cleaning of rougher concentrate:	
	Sodium isopropyl xanthate	0.020
(7)	To second cleaning of rougher concentrate:	
	Sodium isopropyl xanthate	0.020

Frothing periods and pulp volumes were as follows:

	<u>Minutes</u>	<u>ML</u>
(1) Rougher flotation	10	4800
(2) First scavenger flotation	2	4800
(3) Second scavenger flotation	2	4800
(4) Third scavenger flotation	2	4800
(5) First cleaning of rougher concentrate	3	2600
(6) Second cleaning of rougher concentrate	3	1200

(e) Flotation test results

83.8% of the copper was recovered in the rougher concentrate and a further 2.7% in the combined scavenger concentrates, making a total recovery of 86.5%. The cleaned rougher concentrate weighed 1.47% of the feed, assayed 26.2% copper and contained 74.5% of the copper in the original ore. Allowing for recirculation of the cleaner tailings and scavenger concentrates, a recovery of about 80% of the copper is indicated when using direct flotation in a full-scale mill.

(f) Determination of tailing losses


A sample of the final tailing, which assayed 0.08% Cu, was screened and the fractions were assayed for copper. 45.8% of the total copper in the tailing was present in the plus 48 mesh fraction, which assayed 38.6% copper; almost all of this was present as native copper. A further 2.3% of the copper was present in the minus 48 plus 65 mesh fraction, mainly as native copper. The minus 65 plus 100 mesh fraction assayed only 0.03% Cu and the minus 100 mesh fraction assayed 0.04% Cu.

(g) Discussion of results

The results showed that flotation of the native copper was difficult and that it would be necessary to remove the coarse native copper by jigging before flotation. This could be done by placing a jig in the grinding circuit between the mill discharge and classifier. In this way, it should be possible to increase the overall copper recovery to at least 86%.

Yours very truly

BRITTON RESEARCH LABORATORIES


John W. Britton, P. Eng.
Consulting Metallurgist

✓ cc. Mr. C. F. Millar

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