

DIVISION OF  
ORE DRESSING AND  
METALLURGY



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DEPARTMENT OF MINES  
CANADA

MINES BRANCH

O T T A W A July 21st, 1932.

R E P O R T  
of the

ORE DRESSING AND METALLURGICAL LABORATORIES

Report No. 443

Cyanidation of Flotation Concentrates  
from Bralorne Mines, B.C.

By

Alex. K. Anderson

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Shipments -

8 bags of material weighing approximately 625 lb. were received at the Ore Dressing and Metallurgical Laboratories on May 6, 1932, from Bralorne Mines Ltd., Bralorne, British Columbia, per R. Bosustow.

The shipment consisted of damp sulphide flotation concentrates in a fine state of division.

Purpose of Experimental Tests -

The shipment was made to determine what recovery of gold could be made by cyanidation. The results of the test work indicated that 90% of the gold can be extracted by this method.

Sampling and Analysis -

The entire lot was passed through a 14 mesh screen to break up lumps, thoroughly mixed and a representative portion of 10 lbs. taken out. This was dried and after further reduction in size, a sample was obtained which showed the shipment to contain 9.56 oz. gold, 3.32 oz. silver per ton.

Experimental Tests -

The test work included batch cyanide tests with different periods of agitation, a study of the effects of lead acetate and sodium peroxide and a cycle test to note the effect of the ore on the solutions.

Test #1 -

A series of tests was made on representative portions of the concentrates. These were agitated for 24, 48 and 72 hours, 1:3 dilution with a sodium cyanide solution equivalent to 5.0 lb. KCN per ton. Lime was added to maintain protective alkalinity.

Results:

Test No.:	Period hrs.	Sol. Strength: KCN lb/ton	Lime: lb/t	Acetate: lb/ton	Assay		Extr'n.		Reagent Consumption	
					Lead : Cyanide	Tails: Au : AG	Au : AG	KCN: CaO		
1	48	5.0	15.0	---	0.96	0.94	90.0	71.7	2.4	11.6
2	48	5.0	15.0	1.0	0.98	1.12	89.7	66.3	2.1	11.8
3	72	5.0	15.0	---	0.94	0.89	90.2	73.2	3.0	9.9
4	72	5.0	15.0	1.0	0.96	0.94	90.0	71.7	3.0	11.6
5	24	5.0	20.0	---	0.97	0.86	89.9	74.1	2.25	15.5
6	24	5.0	10.0	---	0.97	0.96	89.9	68.1	1.8	7.9

These results indicate that changes in the use of lead acetate, time of agitation, strength of solution or amounts of lime added do not affect recovery. 90% of the gold apparently is the maximum that can be recovered.

Test #2 -

A sample of the concentrates was agitated for 24 hours, 1:3 dilution with a 3.0 lb. per ton KCN solution. 10 lb. lime per ton was added for protective alkalinity. After 24 hours, the pulp was filtered and a fresh 1 lb. per ton KCN solution added together with 6 lb. lime and a further 24 hours agitation given. At the end of this time the pulp was filtered and the tailing assayed. This was found to have a value of 0.95 oz. gold per ton, an extraction of 90%.

Test #3 -                      - Cycle Test -

A representative portion of the ore was agitated for 24 hours, 1:3 dilution with a 3.0 lb. KCN solution. 10 lb. lime per ton was added to maintain protective alkalinity. After agitation, the test was filtered, washed with water equal to 1/5 the weight of the ore. This wash water was added to the pregnant solution which was then precipitated with zinc dust and filtered. The barren solution was made up to 3.0 lb. KCN per ton and used for the next cycle.

A second series was run similar to the above, but with 1.0 lb. lead acetate per ton added.

Cycle: No.	Without Lead Acetate				With Lead Acetate			
	Tailing Assay		Extraction		Tailing Assay		Extraction	
	Au oz/t	Ag oz/t	Au	Ag	Au oz/t	Ag oz/t	Au	Ag
1	0.96	0.95	90.0	71.4	0.98	1.07	89.7	67.8
2	0.965	1.09	89.9	67.2	0.99	1.02	89.6	69.3
3	1.04	1.11	89.1	66.6	1.05	1.10	89.0	66.9
4	1.03	1.13	89.2	66.0	1.04	1.09	89.1	67.2
5	1.29	1.14	86.5	65.7	1.17	1.13	87.8	66.0
6	1.28	1.21	86.6	63.6	1.33	1.16	86.1	65.1
7	1.37	1.21	85.6	63.6	1.63	1.29	82.9	61.1

These results indicate that the solutions become foul after repeated use and lose their efficiency. The use of lead acetate appears to be detrimental.

Test #4 -

A test was made to note the effect of adding sodium peroxide during agitation.

A sample of the concentrate was agitated 1:3 dilution with a 3.0 lb. KCN per ton solution. 7 lb. lime per ton was added and 0.5 lb. sodium peroxide. After 6 hours' agitation, an additional 0.5 lb. peroxide was added. Agitation was continued for 40 hours.

This treatment gave a residue containing 0.97 oz. gold per ton, representing an extraction of 89.9%.

Sodium peroxide does not improve recoveries.

Summary and Conclusions -

An average extraction of 90% of the gold is indicated. This leaves \$18.20 in the residues.

The solutions after contact with the concentrate become foul, resulting in decreased extraction.

Sodium peroxide or lead salts are not beneficial.

Cyanidation of this material could best be done in batch lots, discarding the solutions at a point where the re-use falls below the economic point.

Disposal of the rich residue also would be a factor. The values in this might about balance the smelting costs on the raw concentrate.

The problem is one of economics best decided by the management of the property.