

Report No. 252

Experimental tests on Long Lake tailings

by J. S. Godard

Shipments: One shipment consisting of 23 samples, gross weight 200 pounds, was received July 17, 1926. Mr. Leo H. Timmins of Alderson and MacKay was the shipper.

Characteristics of the tailings: The tailings were those from an old cyanide plant operated from 1912 to 1915 by the Canadian Exploration Co. It is reported that the head sample at the time of operation was about 0.36 oz/ton gold, and a tailing of 0.07 - 0.08 oz/ton was discharged. The ore was crushed in stamps and tube mills to about 150 mesh. The tailings as represented by the composite sample approximated 65 mesh. The sulphide minerals are pyrite and arsenopyrite, with which the gold is associated. The sulphides are partly oxidized and evidently the tailings have become concentrated, as the composite sample assayed 0.20 oz/ton

Sampling & Analysis: A composite sample of the twenty three samples was made by cutting a proportionate cut from each one at -65 mesh. It was sampled in duplicate. Analysis -

Sample No. 1	Gold 0.21 oz/ton	Silver 0.05 oz/ton	Arsenic 1.88%
" 2	0.20	0.05	2.09

Purpose of Tests: The purpose of these tests was to ascertain if the gold could be profitably extracted from these tailings by regrinding and cyanidation, or by concentration of the sulphides and retreatment of the concentrates.

Cyanide tests

Tests Nos. 1 & 2. - details

Test	Dilution	KCN %	Time of agitation	Crushing
1	1:3	0.075	48 hrs	-65 mesh
2	1:3	0.050	48	Crushed wet -200 mesh

Results: Test	Head	Tails	Extraction %	Reagents consumed	
				KCN	CaO
1	0.20	.098	51	3.76	37.40
2	0.20	.09	55	2.85	25.90

Tails from Test No. 1 were screened and assayed -

Mesh	Weight %	Assay	% of values
+100	15.7	0.10	15.9
+150	27.8	0.09	25.5
+200	17.0	0.06	10.4
-200	39.5	0.12	48.2

Average tailing 0.098 oz/ton

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Tests Nos. 3, 4, 5, & 6 - details

Test	Dilution	KCN %	Time of agitation	Crushing
3	1:2	0.05	48 hrs.	-65 mesh dry
4	1:2	0.10	48	"
5	1:2	0.05	48	(-65 mesh water washed and filtered)
6	1:2	0.10	48	

Results: -(2nd. composite head sample)

Test	Head	Tails	Extractn %	Reagents consumed	
				KCN	CaO
3	0.25	0.093	62.8	1.5	33.0
4	0.25	0.055	78.0	2.7	33.0
5	0.25	0.100	60.0	1.25	18.2
6	0.25	0.076	69.6	2.2	18.4

Screen test on cyanide tailings:

Test	Mesh	Weight %	Assay	% of values	
3	+100	20.2	0.07	15.2	Average tailing 0.093 oz/ton
	+150	15.5	0.08	13.4	
	+200	22.5	0.07	17.1	
	-200	41.8	0.12	54.3	
4	+100	21.4	0.04	15.4	Average tailing 0.055 oz/ton
	+150	14.0	0.04	10.1	
	+200	20.3	0.05	18.4	
	-200	44.3	0.07	56.1	
5	+100	15.9	0.08	12.6	Average tailing 0.10 oz/ton
	+150	13.5	0.08	10.7	
	+200	36.6	0.08	29.2	
	-200	34.0	0.14	47.5	
6	+100	21.2	0.09	23.9	Average tailing 0.076 oz/ton
	+150	17.8	0.06	14.1	
	+200	17.7	0.07	16.4	
	-200	43.3	0.08	45.6	

Tests Nos. 7, 8, 9, & 10

- No. 7 - Tailings 750 gms at -65 mesh ground three hours in a pebble mill using 1:1 pulp, 0.025% KCN solution and lime 25 lbs/ton. Cyanided 48 hours 1:2 pulp using 0.05% KCN
- No. 8 - Tailings 600 grams at -65 mesh, ground three hours in a pebble mill using 1:1.5 pulp, 0.025% KCN solution and lime 25 lbs/ton. Cyanided 48 hours using 1:3 pulp, 0.05% KCN
- No. 9 - Tailings 600 grams at -65 mesh ground 3 hours in pebble mill using 1:1.15 pulp with lime 10 lbs/ton. Cyanided 48 hours 1:3 pulp, 0.075% KCN
- No.10 - Tailings 600 grams at -65 mesh, ground 3 hours in 1:1.5 pulp then dewatered and filtered. Cyanided 48 hours, 1:3 pulp, 0.075% KCN

Results: - Head sample 0.25 oz/ton

Test	Tailing	Extraction %	KCN	CaO
7	0.04	84.0	2.5	41.5
8	0.02	92.0	3.0	48.3
9	0.02	92.0	3.4	32.1
10	0.03	88.0	2.1	26.5

Conclusions: Tests 1-6 inclusive showed poor extraction s by cyanidation. The tailings were high in all the sizes. The cyanide consumption was moderately high. The lime consumption very high. Water washing reduced the cyanide consumption and cuts the lime consumption by 45%. In tests 7-10 inclusive where the tailings were very finely ground, good extractions were obtained. The consumption of cyanide and lime was high. Water washing reduced both of these.

Concentration Tests

Test No. 11 - Tabling at -65 mesh

Product	Weight %	Assay		% of values	
		Au oz	As %	Au	As
Table conc.	21.0	0.54	4.20	60.8	53.2
" tailing	64.2	0.10	0.80	34.4	31.0
Slimes	14.8	0.06	1.77	4.8	15.8
Head from products		0.19	1.66		

Test No. 12 - Flotation, tabling flotation tailing

Flot. conc.	22.5	0.57	6.02	67.7	66.2
Table "	7.0	0.48	3.31	17.8	11.3
" tailg	49.1	0.03	0.39	7.8	9.3
Slimes	21.4	0.06	1.26	6.7	13.2
Head from products		0.19	2.05		

Test No. 13 - Flotation, tabling flotation tailing

Flot. conc.	20.0	0.75	6.56	75.5	68.8
Table "	3.6	0.54	3.97	9.8	7.5
" tailg	45.1	0.03	0.31	6.8	7.3
Slimes	31.3	0.05	1.00	7.9	16.4
Head from products		0.20	1.91		

Flotation Reagents:

Test No. 12 - Coal Tar 40% Coal Tar Creosote 60%, 0.3 lb/ton, Soda ash 7.0 lb/ton, Cresylic acid 0.08 lb/ton, added to ball mill and ground 30 minutes. Added to cell Sulphuric acid 5.0 lb/ton, Copper sulphate 1.0 lb/ton, Xanthate 0.5 lb/ton, Pine oil 0.1 lb/ton

Test No. 13 - #1580 0.4 lb/ton, Sulphuric acid 5 lb/ton, Copper sulphate 1.0 lb/ton, Xanthate 0.3 lb/ton, ground 40 minutes in ball mill. Added to cell, Sulphuric acid 10 lb/ton Xanthate 0.10 lb/ton, Pine Oil 0.1 lb/ton

Conclusions:

1. Tabling - Tabling produced very poor results
2. Flotation and tabling - Flotation followed by tabling the flotation tailing was much superior to straight tabling. The combination method showed a ratio of concentration of 1:4.4. The slimes were higher than the sand tailing in both gold and arsenic. The very fine material is too oxidized to float. Relatively large amounts of reagents are required for the flotation.

Summary: The tests on the composite sample indicate that fine grinding and cyanidation is the better method of recovering the gold from these tailings. Water washing previous to cyanidation seems advisable. The present price of $3\frac{3}{4}$ is too low to warrant saving the arsenic.