O T T A W A September 9th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1083.

Concentration of a Gold Tailing from the Cordova Mine, Hastings County, Ontario.

BUREAU OF MINES
DIVISION OF METALLIC MINERALS
ORE DRESSING AND
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CANADA
DEPARTMENT
OF
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Shipment:

A 100-pound lot of tailings was received on April 24th, 1941, and a further 338 pounds was received on May 15th, 1941.

The shipments were delivered personally by Mr. C. A. Seaton, Cordova Mines, Ontario, who is considering milling operation of the portion of the Cordova Mines tailing which was represented by the shipments.

Location of the Property:

The tailings dump from which the shipments were taken is part of the dump of the old Cordova mine, in Hastings county, Ontario.

Sampling and Assaying:

After cutting and grinding the shipments by standard methods, representative portions were obtained which assayed as follows:

	Shipment No. 1. (100 pounds)	Shipment No. 2. (334 pounds)
Au, oz./ton.	0.23	0.25
S, per cent	6.36	5.80
Fe, "	32.56	32.50

Investigative Work:

Mr. Seaton reported as follows:

"On this property there is approximately 2,000 tons of gold sulphide concentrate running around 0.20 ounce gold per ton. It is very much oxidized. It was apparently obtained by 'tabling' the tailing from the old stamp mill which was operated here some 25 years ago."

On Shipment No. 1, blanket concentration was attempted. By this method some 36 per cent of the gold was recovered in the blanket concentrate, assaying approximately 1.3 ounces gold per ton.

On Shipment No. 2, the minus 65 mesh material was screened out and passed over a Wilfley slime table with a recovery of 42 per cent of the gold concentrate, assaying 0.72 ounce gold per ton.

Another portion of the No. 2 shipment was concentrated by flotation.

(Continued on next page)

(Investigative Work, cont'd) -

This method gave a flotation concentrate assaying 9.3 ounces gold per ton and a recovery of 57 per cent of the gold.

Details of Test Work:

SHIPMENT NO. 1.

Test No. 1. - Blanket Concentration.

In this test the dump material was passed over a corduroy blanket table set at a slope of 2.5 inches per foot. The material was fed to the blanket in the same state as it was received.

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S	Ratio of concentration
Feed	100.00	0.25©	32.21©	5.84©	100.0	100.0	100.0	
Blanket conc.	10.69	0.86	43.00	3.30	36.4	14.3	6.1	9.3:1.
" tailing	89.31	0.18	30.92	6.14	63.6	85.7	93.9	

© Calculated.

Test No. 2. - Blanket Concentration.

In this test the material was passed through a 10-mesh screen prior to blanket concentration. Conditions otherwise were similar to Test No. 1.

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S	Ratio of concentration
Feed	100.00	0.255©	34.29©	6.01©	100.0	100.0	100.0	
Blanket conc.	6.53	1.34	38.60	4.46	34.2	6.5	4.8	15.3:1.
" tailing	93.47	0.18	34.30	6.12	65.8	93.5	95.2	

© Calculated.

(Shipment No. 1, cont'd) -

Test No. 3. - Blanket Concentration.

In this test another portion of the tailing was passed through a 10-mesh screen and concentrated on a blanket table at a slope of 3:1.

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S	Ratio of concentration
Feed	100.00	0.235©	33.40©	6.07©	100.0	100.0	100.0	
Blanket conc.	6.78	1.28	38.09	4.52	36.8	7.7	5.0	14.7:1.
" tailing	93.22	0.16	33.07	6.19	63.2	92.3	95.0	

© Calculated.

The blanket concentrates consisted mostly of magnetite. The large amount of magnetite in the tailing tended to clog the blanket and prevent concentration of the gold. Also, as is shown later, a large part of the gold was in the fines.

SHIPMENT NO. 2.

Test No. 4.

A screen analysis of this shipment gave the following results:

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S
Over 35 mesh	4.7	0.14	17.93	7.19	2.7	2.6	5.8
35 to 48	6.4	0.13	23.70	6.62	3.1	4.7	7.3
48 to 65	10.6	0.14	28.47	5.65	5.8	9.3	10.3
65 to 100	15.1	0.14	32.11	5.32	8.1	14.9	13.8
100 to 150	16.3	0.14	34.24	6.72	8.9	17.1	18.9
150 to 200	16.5	0.23	36.37	4.87	14.8	18.4	13.3
Below 200	30.4	0.48	35.05	5.84	56.6	33.0	30.6
Totals	100.0	0.258	32.55	5.80	100.0	100.0	100.0

As can be seen from the above screen analysis, some 56 per cent of the gold is contained in the minus 200 mesh material.

(Shipment No. 2, cont'd) -

Test No. 5. - Superpanner Concentration.

Another portion of the No. 2 shipment was concentrated on a Haultain superpanner with the following results:

Product	Weight, per cent	Assays, Au, oz./ton	Distribution of gold, per cent
Feed	100.00	0.22[1]	100.0
1st sands	34.15	0.14	21.8
2nd sands	30.06	0.13	17.8
3rd sands	28.90	0.34	44.8
Slimes	6.86	0.50	15.6

[1] Calculated.

The 1st sands consisted of non-metallic gangue material, the 2nd sands were composed of about 50 per cent of non-metallic gangue and 50 per cent of magnetite, while the 3rd sands were nearly all magnetite. The slimes consisted of a red mud in which considerable fine pyrite and altered material were present. A microscopical examination of the tip of the concentrate from the 3rd sands disclosed the presence of four particles of free gold, each approximately 25 microns in diameter.

Test No. 6. - Sand Table Concentration.

A portion of the No. 2 shipment was taken and the plus 65 mesh material screened out. The minus 65 mesh was passed over a Wilfley sand table, with the following results:

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S	Ratio of concentration
Feed	100.00	0.285[1]	39.04[1]	3.78[1]	100.0	100.0	100.0	
Concentrate	23.16	0.50	56.40	0.65	40.5	33.4	4.0	4.3:1.
Middling	43.21	0.18	38.86	3.10	27.1	43.1	35.4	
Sands	19.47	0.20	22.89	9.63	13.6	11.4	49.5	
Slimes	14.16	0.38	33.45	2.95	18.8	12.1	11.1	

[1] Calculated.

The plus 100 mesh material assayed 0.18 ounce gold per ton.

(Shipment No. 2, cont'd) -

Test No. 7. - Slime Table Concentration.

A portion of the sample was taken and the plus 65 mesh material screened off. The minus 65 mesh was concentrated on a Wilfley slime table.

Results:

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S	Ratio of concentration
Feed	100.00	0.29*	39.30*	3.60*	100.0	100.0	100.0	
Table conc.	17.38	0.72	57.46	0.56	42.9	25.5	2.7	5.7:1.
" middling	35.80	0.14	46.07	1.27	17.3	41.9	12.5	
" sands	27.88	0.17	22.06	8.40	16.3	15.6	64.8	
" slimes	18.94	0.36	35.24	3.80	23.5	17.0	20.0	

* Calculated.

In these table concentration tests it was not possible to obtain a high-grade concentrate. The larger part of the magnetite reported in the concentrates, while the bulk of the sulphides were included in the sands product.

Test No. 8. - Flotation Concentration.

Another portion of the sand was screened to plus and minus 65 mesh. The plus 65 mesh material was pulped and transferred to a flotation machine. Seven pounds of lime and 0.12 pound of Barrett No. 4 oil per ton were added and the pulp conditioned for 20 minutes. 0.10 pound of pine oil and 0.10 pound of potassium amyl xanthate per ton were then added and a flotation concentrate obtained. This concentrate was cleaned in a smaller flotation machine.

(Continued on next page)

(Test No. 8, cont'd) -

Results of flotation:

Product	Weight, per cent	Assays Au, oz./ton	Assays per cent Fe	Assays per cent S	Distribution of gold, per cent	Ratio of concentration
Feed	100.00	0.27[◊]			100.0	
Flotation conc.	1.57	11.42	43.28	21.73	66.6	64:1.
" middling	1.84	1.22			8.3	
" tailing	96.59	0.07			25.1	

◊ Calculated.

Test No. 9. - Flotation Concentration.

In this test a portion of the shipment was concentrated by flotation. The coarser-sized material was not screened out as in the previous test, but was included in the flotation feed. Conditions otherwise were similar to Test No. 8.

Results:

Product	Weight, per cent	Assay, Au, oz./ton	Distribution of gold, per cent	Ratio of concentration
Feed	100.00	0.21[◊]	100.0	
Flotation conc.	1.14	9.34	50.7	88:1.
" middling	2.13	1.46	14.9	
" tailing	96.73	0.075	34.4	

◊ Calculated.

Summary and Conclusions:

By blanket concentration of this material, 36 per cent of the gold was recovered in a blanket concentrate assaying 1.3 ounces gold per ton. The ratio of concentration was 9.3:1. The bulk of the concentrate consisted of magnetite.

(Concluded on next page)

(Summary and Conclusions, cont'd) -

By slime table concentration, 42 per cent of the minus 65 mesh material was recovered in a concentrate assaying 0.72 ounce gold per ton. This table concentrate also consisted mainly of magnetite. The ratio of concentration was 5.7:1.

A screen analysis on the No. 2 shipment showed 88.4 per cent of the gold in the minus 65 mesh product, and 56.6 per cent of the gold in the minus 200 mesh product.

A test on the Haultain superpanner and microscopical examination showed some small free gold particles of approximately 25 microns diameter.

By flotation concentration, 62 per cent of the gold was recovered in a flotation concentrate assaying 11.42 ounces gold per ton, as shown in Test No. 8. In this test the plus 65 mesh material was screened out prior to flotation. In Test No. 9, where the minus 65 mesh material was included in the flotation feed, slightly lower results were obtained.

It is apparent from the test work on the shipments that blanket and table concentration methods are not suitable for treatment of this material. The major portion of the gold is either in the sulphides or in small particles of free gold and 56 per cent is contained in the minus 200 mesh material. Flotation concentration will recover over 60 per cent of the gold in a high-grade flotation concentrate and therefore is the only apparent method which offers reasonable hopes of successful operation.

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