

O T T A W A May 21st, 1942.

R E P O R T
of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1228.

Mill Tailing from the Stadacona Rouyn
Mines Limited, Rouyn, Quebec.

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BUREAU OF MINES
DIVISION OF METALLIC MINERALS
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ORE DRESSING AND
METALLURGICAL LABORATORIES

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Shipment:

A sample of mill tailing, net weight 43 pounds, was received on March 24th, 1942, from the Stadacona Rouyn Mines Limited, Rouyn, Quebec. The sample was submitted by Horace C. Young, General Manager, Stadacona Rouyn Mines Limited, Rouyn, Quebec.

The sample was a composite of the mill tailing covering a period of one week.

Characteristics of the Ore:

The most abundant metallic mineral in the sample of mill tailing was pyrite. Small amounts of chalcopyrite, pyrrhotite, and magnetite were also present. No gold was detected in the polished sections prepared from sized products.

Purpose of Investigation:

The purpose of investigation was to determine the association of gold in the tailings and to determine whether finer grinding would improve extraction by cyanidation.

Sampling and Analysis:

The moist sample was quartered and one quarter was thoroughly washed to remove any cyanide solution therein. It was then dried and riffled by the standard method. The analyses were as follows:

Gold	-	0.009 [‡] oz./ton.
Silver	-	0.01 "
Iron	-	4.53 per cent.
Lime (CaO)	-	9.10 "
Magnesia (MgO)	-	4.17 "
Silica (SiO ₂)	-	54.34 "
Sulphur	-	0.74 "
Arsenic	-	Nil

[‡] Duplicate assays on 5 assay tons.

The remainder of the sample was dried, riffled by the standard method, and assayed for gold. The gold content was 0.009 ounce per ton (duplicate assays, 5 A.T.).

Experimental Investigation:

The experimental investigation consisted of cyanidation tests to determine the effect of finer grinding; also microscopic observations on sized products and flotation products to determine the association of the gold in the

(Experimental Investigation, cont'd) -

mill tailing.

The results of cyanidation tests showed that finer grind did not increase gold extraction (Test No. 1).

Gold assays on sized products showed that the gold values are higher in the coarser products (Test No. 2). Microscopic observations of polished sections of sized products revealed no information that would indicate how the gold is tied up in the tailings.

A pyrite concentrate obtained by flotation assayed 0.15 ounce gold per ton and contained 36.7 per cent of the gold in the mill tailing. The flotation tailing assayed 0.005 ounce gold per ton, 0.17 per cent sulphur, and contained 52.1 per cent of the gold. The middling assayed 0.015 ounce gold per ton and contained 11.2 per cent of the gold (Test No. 3). The results of flotation tests show that an appreciable amount of gold is associated with the sulphide minerals. No gold was observed in the polished sections of the flotation products.

While the microscopic examination of the polished sections of the flotation products and the sized products revealed no information that would indicate how the gold is tied up in the tailings, a previous microscopic examination on the ore from this mine (Ore Dressing and Metallurgical Investigation No. 655, 1935) showed that the grain size of the gold is exceedingly small, and that a small percentage of it is enclosed in dense pyrite. It would seem reasonable to suspect that the fineness of the gold is, at least in part, the cause of the tailing loss.

Details of Tests:

Test No. 1.

Two samples of mill tailing, one ground to 85.7 per cent minus 200 mesh and the other without any further grinding (as received, it was already ground 70.1 per cent minus 200 mesh), were agitated with cyanide and lime for three hours at 2.0 to 1 dilution.

Results of Cyanidation.

Test No.	Grind, % -200 mesh	Gold, oz./ton		Extraction, per cent	Solution titration, lb./ton		Reagents consumed, lb./ton of solids	
		Feed	Tailing		NaCN	CaO	NaCN	Lime
1-A	70.1	0.009	0.008 [⊕]	11.1	0.84	0.05	0.40	0.35
1-B	85.7	0.009	0.008 [⊕]	11.1	0.74	0.02	0.52	0.38

[⊕] Assays made on 5 assay tons.

Finer grind did not increase gold extraction; the lowering of the tailing from 0.009 ounce to 0.008 ounce of gold was due to a longer period of cyanidation.

Test No. 2.

A sample of mill tailing was screened and assayed. The screen analysis was as follows:

Mesh	Weight, per cent	Assays		Distribution, per cent	
		Au, oz./ton	S, per cent	Au	S
+100	6.58	0.01	0.22	7.9	2.0
-100+150	12.07	0.0125	0.35	19.4	5.8
-150+200	11.20	0.01	0.80	13.5	12.3
-200	70.15	0.007	0.83	59.2	79.9
Total	100.00	0.0085 [⊕]	0.73 [⊕]	100.0	100.0

[⊕] Calculated value.

No gold was visible in the polished sections of sized products.

(Details of Tests, cont'd) -

Test No. 3.

To determine with what minerals the gold is associated, in this test a sulphide concentrate was made by flotation and the polished sections of flotation products were observed under a microscope.

A sample of mill tailing was conditioned for 10 minutes with 1.0 pound of soda ash, 0.20 pound of potassium butyl xanthate, and 1.0 pound of copper sulphate per ton. Then 0.096 pound of cresylic acid per ton was added and the froth was removed.

The rougher concentrate was cleaned by refloating. No reagents were used in the cleaning operation.

Results of Flotation:

Product	Weight, per cent	Assays		Distribution, per cent	
		Au, oz./ton	S per cent	Au	S
Feed	100.00	0.0038 [Ⓢ]	0.73 [Ⓢ]	100.0	100.0
Concentrate	2.14	0.15	21.66	36.7	63.8
Middling	6.56	0.015	1.64	11.2	14.8
Tailing	91.30	0.005	0.17	52.1	21.4

[Ⓢ] Calculated value.

The above results show that an appreciable amount of the gold is locked up with the sulphide minerals.

No gold was visible in the polished sections of the flotation products.

Conclusions:

The results of the tests showed that increasing the fineness of grind from 70 to 85 per cent minus 200 mesh will not decrease the gold values in the mill tailings to less than 0.009 ounce per ton.

An appreciable amount of the gold in the mill tailings is associated with the sulphide minerals. While no gold was visible in the polished sections of the flotation products nor in the sized products, even under high power of magnification, it may be assumed that the grain size of the gold is exceedingly small. It would seem reasonable to suspect that the fineness of gold is, at least in part, the cause of the tailing loss.

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