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O T T A W A November 25th, 1940.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 924.

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

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Shipment:

A sample of mill tailing, net weight 36 pounds, was received on October 28th, 1940, from the Stadacona Rouyn Mines Limited, Rouyn, Quebec. The sample was submitted by Horace C. Young, General Manager, Stadacona Rouyn Mines Limited.

Characteristics of the Ore:

Pyrite, comprising 1.5 per cent of the sample, is the only metallic sulphide present in significant quantity. The only other metallic mineral observed during superpanner tests is an unidentified magnetic mineral, presumably magnetite. The quantity of this mineral is estimated to be less than 0.1 per cent. No free gold was detected on the superpanner.

Purpose of the Investigation:

The purpose of the 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, as received, was quartered. One quarter, dried and riffled by the standard method, assayed as follows:

Gold	-	0.01 oz./ton.
Silver	-	Trace.
Iron (acid soluble)	-	5.04 per cent.
Copper	-	Nil.
Arsenic	-	0.02 per cent.
Sulphur (sulphate)	-	0.03 per cent
" (sulphide)	-	0.82 "
Total sulphur	-	0.85 "
Insoluble	-	63.56 per cent.

A 1,000-gram portion of the original sample was extracted with 6,000 millilitres of water, and the filtered

(Sampling and Analysis, cont'd) -

extract assayed for gold. The dissolved loss, less than 0.001 ounce gold per ton of ore, has been neglected in the experimental work.

The moisture content of the sample as received was 4.1 per cent water.

EXPERIMENTAL INVESTIGATION:

The experimental investigation consisted of cyanide tests to determine the completeness of present mill treatment, and the effect of finer grinding. A portion of the sample was sized by means of screens and the Haultain infrasizer, and pyrite concentrates were made on the Haultain superpanner from each sized fraction, to determine the association of gold with pyrite.

Tests Nos. 1 to 3.

Further cyanidation of the mill tailings, for periods up to 72 hours, at a dilution of 1.5:1, with a protective alkalinity of 0.2 to 0.6 pounds CaO per ton of solution, in a cyanide solution containing 1.0 pound NaCN per ton of solution, did not reduce the gold assay of the tailings. It is concluded, therefore, that present mill agitation time is sufficient to extract all values released by the present grinding.

Tests Nos. 4 to 6.

Three 1,000-gram portions of the mill tailings were ground in cyanide solution at 65 per cent solids, with additions of CaO to maintain protective alkalinity.

(Continued on next page)

(Tests Nos. 4 to 6, cont'd) -

The reground pulps were made up to a dilution of 1.5:1 and agitated in cyanide solution, strength 1.0 pound NaCN per ton of solution. After 24 hours' treatment, the pulps were filtered and the final tailings washed, dried, and assayed for gold. The results of these tests are given in Table 1:

Table 1.

Test No.	Grind, % -200 mesh	Assay of final tailing, Au, oz./ton	Reagents consumed, lb./ton ore		Final titration, lb./ton of solution	
			NaCN	CaO	NaCN	CaO
4	86.4	0.005	0.84	9.29	1.04	0.34
5	90.8	0.005	0.36	10.85	0.96	0.50
6	96.8	0.005	0.36	8.83	0.96	0.38

These results indicate that finer grinding, not exceeding 86 per cent minus 200 mesh, will be effective in improving extraction.

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Test No. 7.

The results of screening, infrasizing and superpanning operations are summarized in Tables 2 and 2A.

(See Tables 2 and 2A
on following pages)

Table 2.

Size	Weight, per cent		PYRITE CONCENTRATE: Weight, per cent	Au, oz./ton	S, per cent	GANGUE PRODUCT: Weight, per cent	Au, oz./ton	S, per cent
+ 48 mesh	0.13							
- 48 + 65 mesh	0.83	5.50	0.012			5.49	0.01	0.14
- 65 +100 mesh	4.54							
-100 +150 mesh	9.81	9.81	0.073	0.358	39.74	9.74	0.01	0.34
-150 +200 mesh	10.14	10.14	0.177			9.96	0.01	0.12
-200 mesh								
+56 microns	4.09	4.09	0.456			3.63	0.01	0.45
-56+40 microns	11.74	21.64	0.716			20.92	0.005	0.21
-40+28 microns	9.90							
-28+20 microns	9.49			0.137	34.38			
-20+14 microns	8.76	18.25	0.232			18.02	0.005	0.29
-14+10 microns	8.00	8.00						
-10 microns	22.57	22.57						
TOTALS - (Calculated)	100.00	100.00						
(Assayed)								

(Note: This table is continued as Table 2A on the next page.)

(Test No. 7, cont'd)

Table 2A.

Size	Weight, per cent		PYRITE (Gangue-Free) Weight, per cent	Au, oz./ ton	Au Dist'bn, per cent	GANGUE (Pyrite-Free) Weight, per cent	Au, oz./ ton	Au Dist'bn, per cent	PYRITE AND GANGUE Au, oz./ton	Au distribution, - per cent
+ 48 mesh	0.13)									
- 48 + 65 mesh	0.83)	5.50	0.023)		1.16	5.48	0.0088	5.09	0.011	6.25
- 65 +100 mesh	4.54)		)							
-100 +150 mesh	9.81	9.81	0.116)	0.479	5.88	9.69	0.0070	7.17	0.013	13.05
-150 +200 mesh	10.14	10.14	0.154)		7.80	9.99	0.0089	9.46	0.016	17.26
-200 mesh			)							
+56 microns	4.09	4.09	0.370)		18.72	3.72	0.0060	2.37	0.049	21.09
-56+40 microns	11.74)	21.64	0.543)		12.06	21.10	0.0042	9.35	0.0094	21.41
-40+28 microns	9.90)		)	0.210						
-28+20 microns	9.49)	18.25	0.246)		5.47	18.00	0.0039	7.38	0.0067	12.85
-20+14 microns	8.76)		)							
-14+10 microns	8.00	8.00	0.078			7.92			0.0025⊕	2.12
-10 microns	22.57	22.57	0.207			22.36			0.0025⊕	5.97
TOTALS - (Calculated)	100.00	100.00	1.737			98.26			0.0095	100.00
(Assayed)			1.53			98.47			0.010	100.00

⊕ Assayed values.

(Test No. 7, cont'd) -

Notes regarding Tables 2 and 2A:

The assayed values of the +56 micron and -56+14 micron pyrite concentrates were used as average assays to calculate the assays of pure pyrite and gangue in the various sizes included in these two ranges. A more exact analysis, involving assays of each sized pyrite concentrate, would probably show a gradation in pyrite assays through the various sizes, and would indicate a slightly greater distribution of gold in the coarser mesh sizes than is represented in the tabulations 2 and 2A.

The -14 micron material was not panned. The split of this material is based on the sulphur assays.

The above analysis indicates that, of the total gold in the tailings, 33.56 per cent is associated with pyrite and 24.09 per cent with the gangue, in the sizes coarser than 56 microns, which represent 29.54 per cent of the total weight.

Conclusions:

Tests made on the sample submitted, presumed to be representative of current mill tailings, indicate that no loss is occurring, either as dissolved loss, free values, or due to insufficient agitation time, in the present mill circuit. Finer grinding, followed by proper treatment, will improve present extraction. Considering the low assay of

(Conclusions, cont'd) -

the present tailing, however, it is doubtful that much finer grinding could be economic. Approximately 50 per cent of the total gold content of the tailing is associated with pyrite, largely in the sizes coarser than 56 microns (nominal infrasizer size, correct for quartz). In any approach to finer grinding, it will be necessary to so adjust grinding and classification that this coarse pyrite is broken down and its associated gold made amenable to solution by cyanide.

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