O T T A W A January 25th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 949.

Gold Ore from the Siscoe Gold Mines, Limited,
Siscoe, Quebec.

O T T A W A January 25th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 949.

Gold Ore from the Siscoe Gold Mines, Limited,
Siscoe, Quebec.

==========

Shipment:

Two boxes of ore, total weight 116 pounds, were received on November 21st, 1940, from L. E. Djingheuzian, Mill Superintendent, Siscoe Gold Mines, Limited, Siscoe, Quebec. Sample A, weighing 56 pounds, consisted of one box

of mill feed ore, representing 13,286 tons; Sample B, weighing 60 pounds, was a sample of sulphide ore, representing 3,567 tons from the No. 26 zone ore and the "Hope" vein.

Sampling and Analysis:

After cutting, crushing, and grinding by standard methods, a sample of each lot of ore was obtained which assayed as follows:

	Sample A	Sample B
Gold, oz./ton	0.24	0.46
Silver, oz./ton	0.08	0.13
Sulphur, per cent	0.40	1.45
Iron, "	5.79	7.04
Magnesia, "	4.84	2.52
Alumina, "	7.37	6.60
Lime, "	4.90	3.60
Acid insoluble, per cent	67.49	70.78

Characteristics of the Ore:

A number of the larger pieces, from the ore samples, were selected from which six polished sections, three for each sample, were prepared and examined microscopically for the purpose of determining the character of the ore. Metallic mineralization is sparse but is heavier in Sample B than in Sample A.

Sample A.

The gangue in the majority of the pieces comprising the sections appears to be siliceous, dark-grey rock, which contains rather abundant white carbonate. In several pieces, however, the gangue consists of translucent white to colourless quartz, and in two or three fragments it is composed of very soft, light greenish grey material

(Continued on next page)

(Characteristics of the Ore, cont'd)

of mill feed ore, representing 17,206 tons; Sample B, which is talcose in character, is of sulphide ore, representing 3,567 tons. The metallic minerals, in their approximate order of abundance, are: pyrite, magnetite, and chalcopyrite. Pyrite is sparingly disseminated as irregular grains and subhedral crystals, medium to fine in size. It contains occasional small inclusions of gangue and rare tiny grains of chalcopyrite. Magnetite, with probably some admixed hematite and ilmenite, is visible as occasional disseminated grains. A very small quantity of chalcopyrite is present as rare tiny particles in gangue and in pyrite.

Sampling and Analysis:

After crushing, sampling, and grinding by standard methods, a sample of each lot of ore was obtained which was assayed as follows:

	Sample A	Sample B
Gold, oz./ton	0.24	0.46
Iron, "	5.70	7.04
[illegible], "	[illegible]	0.50
Alumina, "	7.07	0.80
Lime, "	[illegible]	3.60
Acid Insol., "	[illegible]	18.70

The gangue is much the same as that in Sample A but is more siliceous. Patches of quartz are more prevalent and the soft talcose material is lacking in the polished sections, [illegible] three [illegible]. The metallic mineralization is also much the same as in Sample A but, as already noted, is somewhat heavier. Pyrite preponderates as coarse to fine grains which are [illegible] unevenly distributed through gangue. Chalcopyrite is much more abundantly disseminated and in coarser sizes than in the previous sample. Magnetite and ilmenite are present in small quantity as associated grains disseminated in gangue. [illegible] several [illegible]. One grain of native gold, free in gangue, is visible in the sections. It occurs along a fracture in quartz and is 108 microns (+150 Tyler mesh) in size.

(Continued on next page)

(Experimental Tests:

The test work was conducted on both samples A and B and consisted of gravity concentration and amalgamation, followed by cyanidation. Each test on Sample B was paralleled by a test, under approximately identical conditions, on Sample A.

In an effort to segregate the sulphides from the remainder of the ore, some flotation tests were run.

CONCENTRATION, AMALGAMATION, AND CYANIDATION.-

Tests Nos. 1 (A and B) to 4 (A and B).

In these tests the ore at minus 14 mesh was ground in a ball mill. In each of these tests the ground pulp was passed through a hydraulic classifier or trap and blanket, and the concentrates amalgamated to remove the free gold. The trap tailings were combined with the amalgam residue and were cyanided in a pulp at 2 to 1 dilution with a cyanide strength of 1 pound per ton. Five pounds of lime per ton of ore were added to maintain protective alkalinity. The cyanidation tailings were assayed for gold.

Screen tests showed the grinding to be as follows:

Mesh	Weight, per cent							
	Test No. 1-A	Test No. 1-B	Test No. 2-A	Test No. 2-B	Test No. 3-A	Test No. 3-B	Test No. 4-A	Test No. 4-B
+200	38.8	38.2	24.6	25.2	16.6	11.2	12.4	7.4
-200	61.2	61.8	75.4	74.8	83.4	88.8	87.6	92.6

(Continued on next page)

(Tests Nos. 1 to 4, cont'd) -

Cyanidation.

Feed assays: Sample A, 0.24 Au oz./ton
" B, 0.46 " "

Test No.	Product	Agitation, hours	Assay, Au oz./ton	Extraction, per cent	Reagents consumed, lb./ton KCN	CaO
1-A	Amalgam-blanket tailing		0.035	85.40		
	Cyanide tailing	42	0.01	95.83	0.92	4.6
1-B	Amalgam-blanket tailing		0.045	90.22		
	Cyanide tailing	42	0.01	97.83	0.92	4.6
2-A	Amalgam-blanket tailing		0.04	83.33		
	Cyanide tailing	42	0.01	95.83	0.92	4.6
2-B	Amalgam-blanket tailing		0.045	90.22		
	Cyanide tailing	42	0.005	98.91	1.20	4.6
3-A	Amalgam-blanket tailing		0.03	87.50		
	Cyanide tailing	42	0.005	97.92	1.26	4.6
3-B	Amalgam-blanket tailing		0.04	91.30		
	Cyanide tailing	42	0.005	98.91	1.44	4.6
4-A	Amalgam-blanket tailing		0.03	87.50		
	Cyanide tailing	42	0.005	97.92	1.54	4.6
4-B	Amalgam-blanket tailing		0.035	92.39		
	Cyanide tailing	42	0.005	98.91	1.54	4.6

These tests were run to ascertain if there were any marked differences between ore "A" and ore "B". From these results it may be assumed that no difficulties may be expected in the cyanidation of ore "B".

Test No. 5 (A and B).

In these tests the ore at minus 14 mesh was ground at 70 per cent solids in a ball mill. The pulp was at 1 pound per ton strength of cyanide and 5 pounds of lime per ton of ore. The ground sample was passed through the hydraulic trap and blankets and the free gold removed by

(Continued on next page)

(Test No. 5, cont'd) -

amalgamation. The combined blanket tailing and amalgam residue were cyanided for 42 hours with a solution strength of 1 pound per ton of cyanide and 5 pounds of lime per ton of ore. Settling tests were conducted on the cyanide tailing from Test No. 5-B. At a solid:solution ratio of 2 to 1, this rate was 1.22 feet per hour.

To complete this test the cyanide tailings from both samples were passed over blanket tables.

Grinding was to 60.6 per cent minus 200 mesh for Sample A and 58.4 per cent for Sample B.

Cyanidation:

Feed: Sample A, Gold, 0.24 oz./ton.
" B, " , 0.46 "

Test No.	Product	Agitation, hours	Assay, Au oz./ton	Extraction of gold, per cent	Reagents consumed, lb./ton KCN	Reagents consumed, lb./ton CaO
5-A.	Blanket-amalgam tailing		0.04	83.33		
	Cyanide tailing	42	0.005	97.92	1.02	4.8
5-B.	Blanket-amalgam tailing		0.04	86.95		
	Cyanide tailing	42	0.01	97.83	1.18	4.8

Blanket Concentration:

Test No.	Product	Weight, per cent	Assay, Au oz./ton	Distribution of gold, per cent
5-A.	Blanket conc.	26.06	0.02	58.49
	Blanket tailing	73.94	0.005	41.51
	Totals	100.00	0.0089⊕	100.00
5-B.	Blanket conc.	33.47	0.02	61.10
	Blanket tailing	66.53	0.005	38.90
	Totals	100.00	0.011⊕	100.00

⊕ Calculated.

(Continued on next page)

(Test No. 5, cont'd) -

These tests were run to show that a high extraction may be expected at a grind that may be considered very coarse. The blanket concentration tests showed that some concentration of values by this method may be expected. A fairly high pulp velocity would increase the ratio of concentration considerably and it may be assumed that the low tailings shown could be maintained.

Grinding was to 60.6 per cent minus 200 mesh for both Tests Nos. 6 (A and B) and 7 (A and B).

In Test No. 6 (A and B) the tailings from Test No. 1 were put over the Haultain superpanner and the sulphides removed. These relatively pure sulphides contain some residual values.

In Test No. 7 (A and B) the ore at minus 14 mesh was ground to 60 per cent minus 200 mesh and the ground pulp passed over a laboratory concentrating table. A clean concentrate was taken in each case. The table middlings were combined with the tailings for assay.

Concentration:

Test No.	Product	Weight, per cent	Assay, Au oz./ton	Distribution of gold, per cent
6-A.	Panner conc.	0.61	0.24	22.74
	Panner tailing	99.39	0.005	77.26
	Totals	100.00	0.0064⊕	100.00
6-B.	Panner conc.	2.16	0.135	54.38
	Panner tailing	97.89	0.0025	45.62
	Totals	100.00	0.0054⊕	100.00
7-A.	Table conc.	0.52	9.576	35.75
	Table tailing	99.48	0.09	64.25
	Totals	100.00	0.139⊕	100.00
7-B.	Table conc.	1.67	12.44	63.79
	Table tailing	98.33	0.12	36.21
	Totals	100.00	0.326⊕	100.00

⊕ Calculated.

(Continued on next page)

(Test No. 8, cont'd) -

Tests Nos. 8 (A and B) and 9 (A and B).

In these tests the ore at minus 14 mesh was ground 64 per cent minus 200 mesh with standard flotation reagents. The ground pulp was floated to remove a sulphide concentrate which was amalgamated. All the products were sampled and assayed and the combined residues cyanided for 42 hours in accordance with previous tests run on this ore. For Test No. 9 (A and B) the cyanide tailings were filtered and washed, conditioned with standard flotation reagents, and floated to produce a sulphide concentrate. In this test it was assumed that the concentrate would contain no free gold.

Results:

Test No. 8 (A and B).

Test No.	Product	Weight, per cent	Assays Au, oz./ton	Assays S, per cent	Distribution, per cent Au	Distribution, per cent S
8-A	Concentrate	2.22	1.12	10.61	32.29	52.30
	Middling	6.28	0.32	2.11	26.10	29.42
	Tailing	91.50	0.035	0.09	41.61	18.28
	Amalgam		6.01 Mg.			
	Totals	100.00	0.25•	0.45	100.00	100.00
8-B	Concentrate	3.40	2.28	46.45	66.64	92.36
	Middling	2.25	0.68	3.19	13.16	4.20
	Tailing	94.35	0.025	0.062	20.20	3.44
	Amalgam		12.65 Mg.			
	Totals	100.00	0.485•	1.71	100.00	100.00

• Calculated.

(Continued on next page)

(Tests Nos. 8 and 9, Results, cont'd) -

Test No. 9 (A and B).

Test No.	Product	Weight, per cent	Assays Au, oz./ton	Assays S, per cent	Distribution, per cent Au	Distribution, per cent S
9-A	Concentrate	5.34	0.08	4.69	46.79	73.98
	Tailing	94.66	0.005	0.093	53.21	26.02
	Totals	100.00	0.009•	0.34•	100.00	100.00
9-B	Concentrate	2.44	1.18	18.82	42.46	29.59
	Tailing	97.56	0.04	1.12	57.54	70.41
	Totals	100.00	0.068•	1.55•	100.00	100.00

• Calculated.

—

Test No. 10 (A and B).

The ore at minus 14 mesh was ground in a ball mill to pass 63 per cent minus 200 mesh. The ground pulp was tabled and a sulphide concentrate taken. The concentrates from both Samples A and B were amalgamated and then cyanided for 42 hours at a dilution of 3 to 1, with a solution strength of 2 pounds of cyanide per ton of solution and 5 pounds of lime per ton of concentrates.

The residue from the table was sampled and cyanided at 2 to 1 dilution, with a solution strength of 1 pound of cyanide per ton of solution and 5 pounds of lime per ton of ore.

(Continued on next page)

(Test No. 10, cont'd) -

Results of Tests Nos. 10-A and 10-B:

Gravity Concentration and Cyanidation of Products.

Test No. 10-A.

Product	Weight, per cent	Assays, Au, oz./ton	Assays, S, per cent	Extraction, Au: per cent	Reagents consumed, lb./ton KCN	Reagents consumed, lb./ton CaO
Amalgam tailing of table concentrate	2.35	0.44	10.18			
Cyanide tailing of amalgam tailing of table concentrate		0.09		79.55	0.9	5.96
Table tailing	97.65	0.07	0.18			
Cyanide tailing of table tailing		0.005		92.86	1.1	4.75
Average tailing (cal.)	100.00	0.007		97.08		

~~Concentrates - 0.1 per cent S = 0.00432 oz. Au.~~
~~Tailings - 0.1 per cent S = 0.00388 oz. Au.~~

Test No. 10-B.

Product	Weight, per cent	Assays, Au, oz./ton	Assays, S, per cent	Extraction, Au: per cent	Reagents consumed, lb./ton KCN	Reagents consumed, lb./ton CaO
Amalgam tailing of table concentrate	5.81	0.63	16.11			
Cyanide tailing of amalgam tailing of table concentrate		0.08		87.30	0.3	6.16
Table Tailing	94.19	0.06	0.52			
Tailing tailing of table tailing		0.01		83.33	1.1	4.75
Average tailing (cal.)	100.00	0.014		96.96		

~~Concentrates - 0.1 per cent S = 0.00301 oz. Au.~~
~~Tailings - 0.1 per cent S = 0.00115 oz. Au.~~

The results of these tests on ores A and B indicate that the gold content of both the sulphide and the non-sulphide portions of these samples is quite amenable to cyanidation and that a high extraction may be expected when treating either the whole ore or the separate constituents.

Summary and Conclusions:

From the various tests on the two types of ore that have been submitted it appears that no difficulty should be experienced in their cyanidation. Ore "B", which differs somewhat from the present mill feed, as represented by ore "A", in having a higher sulphur content, reacts well to all types of treatment. The good settling characteristics of this ore should be of benefit in its treatment.

The proposed method of passing the mill tailings over blankets to recover and re-treat the sulphides present may be of benefit to the total extraction. It will be necessary to maintain a high ratio of concentration in this step.

OS:PES.