

O T T A W A

October 9th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1107.

Gold Ore from Loon Lake,
near Espanola, Ontario.

=====
=====

O T T A W A

October 9th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1107.

Gold Ore from Loon Lake,
near Espanola, Ontario.

=====

Shipment:

A shipment of 100 pounds of ore was received on August 8th, 1941, from the claims of Bert Elliot, at Loon Lake, near Espanola, Ontario. The sample was submitted by E. McElwain, P. O. Box 391, Kirkland Lake, Ontario.

Object of Investigation:

To investigate the possibility of treatment of a small tonnage of this ore by gravity concentration and amalgamation.

Sampling and Analysis:

The ore as received was crushed and sampled by standard methods to give a head sample with the following analysis:

Gold	-	0.53 oz./ton
Silver	-	0.10 "
Copper	-	0.08 per cent
Iron	-	13.36 "
Nickel	-	0.13 "
Sulphur	-	7.19 "
Arsenic	-	Trace.

Characteristics of the Ore:

Six polished sections were prepared and examined under the reflecting microscope for the purpose of determining the character of the ore.

Gangue -

Gangue forms the minor portion of the polished sections and is a mixture of milky white quartz and soft, light-grey rock. It bears deep reddish brown stains of iron oxides and carries rather abundant, finely disseminated carbonate which appears to be slightly dolomitic in character.

Metallic Minerals -

The metallic minerals present in the sections are: pyrite, pyrrhotite, unknown mineral "X", marcasite or arsenopyrite, chalcopyrite, "limonite", and native gold. Of these minerals pyrite and pyrrhotite are the only ones that are abundant.

Pyrite is disseminated in gangue as small masses, irregular grains, and subhedral crystals, coarse to fine in size. It contains inclusions of gangue and small grains of

(Characteristics of the Ore, cont'd) -

the other sulphides. Pyrrhotite has the same modes of occurrence as the pyrite but is not quite so abundant.

A small quantity of an unknown mineral "X" is present as tiny, hard, white, isotropic crystals scattered through pyrite, pyrrhotite, and gangue. These are negative to all standard etching reagents except 1:1 HNO₃; in some cases the latter stained the surface a light brown after long etching. The crystals are too small to be sure of obtaining pure material for microchemical tests. However, a little powder was gouged out with a needle and tested microchemically, with the following results:

Cobalt	-	strong.
Nickel	-	moderately strong to weak.
Iron	-	" " " "
Arsenic	-	nil (but residue from test material may have been all used up before arsenic was tried for).

A very small quantity of a mineral regarded as marcasite or arsenopyrite is visible in pyrite as tiny prismatic crystals too small to identify with certainty. Chalcopyrite and "limonite" are also visible in small amounts, the former as rare fine grains in pyrite, pyrrhotite and gangue, the latter as rusty brown stains and very rare tiny irregular grains in gangue.

Only one tiny particle of native gold was observed in the sections, even after careful examination under both low and high powers of magnification. This occurs alone in gangue and is about eight microns in size.

Results of Experimental Tests:

Gravity concentration tests, using jigs and blankets followed by amalgamation, were run on the ore

(Results of Experimental Tests, cont'd) -

and flotation tests to determine the occurrence of the gold were also run.

Recovery by amalgamation was low (56.6 per cent) but flotation alone or amalgamation followed by flotation gave high recoveries (85.1 per cent and 93.59 per cent).

Details of Test Work:

JIG-BLANKET CONCENTRATION.

Test No. 1.

Ore crushed to minus 14 mesh was passed over the Denver laboratory jig and rubberized blankets. The jig-blanket concentrates were barrel-amalgamated for $\frac{1}{2}$ hour.

Jig-Blanket.			
<u>Product</u>	: Weight, : : per : : cent :	Assay, : : Au : : oz./ton :	: Distribution : of gold, : per cent
Feed	: 100.0	0.45 [♦]	100.0
Jig-blanket conc.	: 13.7	1.26	38.6
Jig-blanket tailing	: 86.3	0.32	61.4

♦ Calculated.

Amalgamation.			
<u>Product</u>	: Assay, : : Au oz./ton :	: Recovery, : per cent	
Feed	: 1.26	100.0	
Amalgam	: 3.87 mg.	36.5	
Tailing	: 0.80	63.5	

Total recovery of gold = 14.08 per cent.

(Details of Test Work, cont'd) -

Tests Nos. 2 and 3.

Ore at minus 14 mesh was ground at 60 per cent solids to 70.9 per cent minus 200 mesh and 76.5 per cent minus 200 mesh for Tests Nos. 2 and 3 respectively. The ground pulp was passed over the Denver laboratory jig and rubberized blankets. The jig-blanket concentrates were barrel-amalgamated for $\frac{1}{2}$ hour.

Results of Test No. 2:

<u>Product</u>	<u>Jig-Blankets.</u>		
	: Weight,	: Assay,	: Distribution
	: per	: Au	: of gold,
	: cent	: oz./ton	: per cent
Feed	: 100.0	0.477 [⊕]	100.0
Jig-blanket conc.	: 15.6	1.76	57.4
Jig-blanket tailing	: 84.4	0.24	42.6

⊕ Calculated.

<u>Product</u>	<u>Amalgamation.</u>	
	: Assay,	: Recovery,
	: Au oz./ton	: per cent
Feed	: 1.76	100.0
Amalgam	: 5.45 mg.	52.9
Tailing	: 0.83	47.1

Total recovery of gold = 30.3 per cent.

..

Results of Test No. 3:

<u>Product</u>	<u>Jig-Blankets.</u>		
	: Weight,	: Assay,	: Distribution
	: per	: Au	: of gold,
	: cent	: oz./ton	: per cent
Feed	: 100.0	0.442 [⊕]	100.0
Jig-blanket conc.	: 9.9	2.00	44.9
Jig-blanket tailing	: 90.1	0.27	55.1

⊕ Calculated.

(Continued on next page)

(Details of Test Work, cont'd) -

Results of Test No. 3, cont'd:

Amalgamation.			
Product	Assay, Au oz./ton		Recovery, per cent
Feed	2.00		100.0
Amalgam		4.7 mg.	61.5
Tailing	0.77		38.5

Total recovery of gold = 27.6 per cent.

Test No. 4.

Ore at minus 14 mesh was ground at 60 per cent solids to 96.6 per cent minus 200 mesh. The ground pulp was passed over the Denver laboratory jig and rubberized blankets. The jig-blanket concentrates were barrel-amalgamated for $\frac{1}{2}$ hour.

Jig-Blanket.			
Product	Weight, per cent	Assay, Au oz./ton	Distribution of gold, per cent
Feed	100.0	0.53 [⊕]	100.0
Jig-blanket conc.	31.0	1.28	75.0
Jig-blanket tailing	69.0	0.19	25.0

[⊕] Calculated.

Amalgamation.			
Product	Assay, Au oz./ton		Recovery, per cent
Feed	1.28		100.0
Amalgam		9.44 mg.	75.0
Tailing	0.32		25.0

Total recovery of gold = 56.2 per cent.

(Details of Test Work, cont'd) -

These various tests showed a very low recovery of gold by amalgamation. This appears to be due to the fact that the amount of gold that is sufficiently liberated for amalgamation at normal grinds is relatively small. As a result of this it was deemed advisable to conduct flotation tests.

FLOTATION.

Two flotation tests were conducted on the ore. The first was straight flotation of the ore and the second was flotation of the jig-blanket-amalgamation tailings. The recoveries shown in both tests were relatively high.

Test No. 5.

Ore at minus 14 mesh was ground at 60 per cent solids to 84.4 per cent minus 200 mesh. The ground pulp was transferred to a 1,000-gram-size laboratory flotation cell and floated to produce a concentrate and tailing. The reagents used were as follows:

<u>To ball mill:</u>	<u>Lb./ton</u>
Soda ash	- 0.4
Butyl xanthate	- 0.15
Cresylic acid	- 0.176

<u>To flotation cell:</u>	
Butyl xanthate	- 0.10
Pine oil	- 0.10

Flotation.

<u>Product</u>	<u>Weight,</u>		<u>Assay,</u>		<u>Distribution,</u>	
	<u>per</u>	<u>per</u>	<u>Au,</u>	<u>S,</u>	<u>per cent</u>	
	<u>cent</u>	<u>cent</u>	<u>oz./ton</u>	<u>per cent</u>	<u>Au</u>	<u>S</u>
Flotation conc.	: 16.81 [⊙]	: 2.26	: 24.47	: 85.10	: 69.11	
Flotation tailing	: 83.19	: 0.08	: 2.21	: 14.90	: 30.89	
Feed (cal.)	: 100.00	: 0.45	: 5.95	: 100.00	: 100.00	

[⊙] Ratio of concentration = 5.9:1.

(Details of Test Work, cont'd) -

Test No. 6.

Ore at minus 14 mesh was ground at 60 per cent solids to 84.4 per cent minus 200 mesh. The ground pulp was passed over the Denver laboratory jig and rubberized blanket. The jig and blanket concentrates were ground for $\frac{1}{2}$ hour and barrel-amalgamated for $\frac{1}{2}$ hour. The amalgamation tailing and the jig-blanket tailings were recombined and transferred to a 1,000-gram-size laboratory flotation cell and floated to produce a concentrate and tailing. The reagents used were as follows:

<u>To flotation cell:</u>	<u>Lb./ton</u>
Soda ash	- 0.4
Cresylic acid	- 0.176
Butyl xanthate	- 0.30
Pine oil	- 0.05

<u>Amalgamation.</u>		
<u>Product</u>	: Assay, : Au : oz./ton	: Distribution : of gold, : per cent
Feed	: 0.53	100.0
Jig-amalgamation tailing	: 0.23	56.6

<u>Flotation. (Feed, 0.23 oz./ton)</u>					
<u>Product</u>	: Weight, : per : cent	: Au, : oz./ton	: Assay, : S, : per cent	: Distribution, : per cent : Au : S	
Flotation conc.	: 22.01	0.92	24.30	85.23	90.02
Flotation tailing	: 77.99	0.045	0.76	14.77	9.98
Feed (cal.)	: 100.00	0.237	5.94	100.00	100.00

Ratio of concentration = 4.55:1.

	<u>Per cent</u>
Recovery of total gold by amalgamation	- 56.6
" " " " " flotation	- 36.99
Recovery by amalgamation and flotation	- 93.59

Summary and Conclusions:

The ore as represented by the sample submitted does not appear to be completely free-milling, as the recovery by amalgamation did not exceed 56.6 per cent. However, the results of the flotation tests indicate that a high recovery may be made by combining jig and flotation concentration methods. It is therefore to be recommended that if this ore is at first treated by gravity concentration and amalgamation, the tailing be carefully impounded in order that it could be retreated at some future date.

oooooooooooo
oooooo
oo

OS:GB.