O T T A W A April 17, 1946.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2033.

Summary of Flotation and Cyanidation Tests on a Sample of Gold Ore from the Louvicourt Goldfield Corporation, Perron, Quebec.

Note:
This report relates essentially to the samples as received. It shall not, nor any correspondence connected therewith, be used in part or in full as publicity or advertising matter for the sale of shares in any promotion.

(Copy No. 8.)

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

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Shipment:

Fifty-five pounds of crushed diamond drill core was received on March 7, 1946, from the Louvicourt Goldfield Corporation, Perron, Quebec, per Mr. Gustave Maher, Manager.

Purpose of Tests:

In a letter dated March 1, 1946, Mr. Maher requested tests on the sample to determine the type of flow sheet required.

Location of Property:

The sample came from the Louvicourt Goldfield Corporation property, located in Louvicourt township, Abitibi, Quebec.

Sampling and Analysis:

The ore was crushed, sampled and assayed by standard methods. The sample assayed 0.18 ounce gold per ton, iron 9.07 per cent, and sulphur, 1.50 per cent.

Microscopic Examination:

Four polished sections were prepared at these laboratories and examined under a reflecting microscope to determine the character of the ore.

Gangue -

In the polished sections, gangue material is a mixture of translucent white quartz and hard light to dark greenish grey rock which probably represents a silicified greenstone. A test with acid showed it to carry abundant, fine, disseminated carbonate. One of the smaller fragments in the polished surfaces consists entirely of white calcite.

Metallic Minerals -

Metallic mineralization is moderately strong in the polished sections and is represented by pyrite, magnetite, ilmenite, chalcopyrite, and pyrrhotite.

Pyrite, the most abundant metallic mineral, is disseminated unevenly through the gangue as coarse to fine irregular grains and subhedral crystals with the coarser sizes predominating. It contains occasional small inclusions of gangue and of the other metallics.

Magnetite, the next most abundant metallic mineral, is present in gangue as scattered crystals which average about 75 microns (approximately 200 Tyler mesh) in size.

Ilmenite is common in gangue as small irregular grains whose average size is much smaller than that of the magnetite with which mineral it is often associated.

A small quantity of chalcopyrite is present as

(Microscopic Examination, cont'd) -

occasional small irregular grains in gangue, and pyrrhotite is visible in practically negligible amounts as very rare tiny inclusions in pyrite.

No gold was observed in the polished sections and nothing was learned as to its mode of occurrence. A sample of minus twenty mesh ore was panned in a gold pan and the concentrate examined under a binocular microscope. One piece of gold was observed attached to a piece of pyrite. The gold was approximately 160 microns by 80 microns in size, equivalent to 200 Tyler mesh. The gold was very clean and bright in appearance.

Conclusions from Test Work:

Approximately 55 per cent of the gold is freed at a grind of 74 per cent minus 200 mesh and can be recovered by amalgamation.

Approximately 89 per cent of the gold can be extracted by cyanide at a grind of 60 per cent minus 200 mesh. But to recover any of the remaining 11 per cent of the gold, very fine grinding will be necessary. This portion of the gold appears to be in very fine grains in the sulphides.

Cyanidation of the ore at a grind of 58 per cent minus 200 mesh resulted in an extraction of 80.6 per cent of the gold. Flotation of the cyanide residue, with grinding of the concentrates and re-cyanidation with lead oxide (PbO) resulted in the extraction of a further 13.3 per cent of the gold. This represents a total extraction of 93.9 per cent of the gold with a tailing assay of 0.011 oz. gold per ton.

Flotation followed by cyanidation of the reground concentrates and of the flotation tailings resulted in an extraction of 84.2 per cent of the gold.

(Continued on next page)

(Conclusions, cont'd) -

Cyanidation at a relatively coarse grind, followed by concentration of the sulphides and regrinding and cyanidation, would appear to give the highest gold extraction.

Two flowsheets are attached at the end of this report to illustrate suggested methods of selective grinding of the gold-bearing sulphides. (See Pages 11 and 12).

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EXPERIMENTAL TESTS

Amalgamation Followed by Cyanidation.

Test No. 1.

A charge of 1,000 grams of ore was ground in a pebble mill to pass 74 per cent minus 200 mesh. The pulp was amalgamated for one hour at a dilution of 1 to 1 with 7 c.c. of mercury.

Results of Amalgamation -

Feed	=	0.18	Au oz./ton
Tailing	=	0.08	" "
Extraction of gold	=	55.5	per cent

Five hundred grams of the amalgamated ore was cyanided for 48 hours at a 2 to 1 dilution and a solution strength of 1.0 pound NaCN per ton solution and 1.0 pound CaO per ton of solution.

Results of Cyanidation -

Feed	=	0.08	Au oz./ton
Tailing	=	0.03	" "
Extraction	=	62.5	per cent of the gold in the cyanide feed
NaCN consumed	=	0.30	lb./ton ore
CaO		3.36	" "

Combined recovery = 83.3 per cent

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Grinding Tests

A series of tests was carried out to determine the per cent extraction of the gold at different grinds. Cyanidation periods were 48 hours (except one at 72 hours), dilution of 2 to 1 and solution strength of 1.0 pound per ton for both NaCN and CaO.

(Experimental Tests, cont'd) -

Results

Test No.	Grind, -200 Mesh	Agitation, hours	Assay, Au, oz./ton Feed	Assay, Au, oz./ton Tailing	Recovery, per cent	Consumption, lb./ton Ore NaCN	Consumption, lb./ton Ore CaO
14	58	48	0.18	0.035	80.6	0.48	4.08
4	59	48	0.18	0.02	88.9	1.12	4.56
5	68	48	0.18	0.02	88.9	1.00	4.72
6	82	48	0.18	0.175	90.3	0.68	5.36
9	83	72	0.18	0.02	88.9	0.40	5.76

Flotation Followed by Cyanidation of Products.

A series of tests were carried out to determine the effect of floating a concentrate, regrinding this concentrate, and cyaniding both the concentrate and flotation tailings.

Test No. 8.

A 2,000-gram charge of ore was ground in a ball mill to give 78.0 per cent minus 200 mesh.

Reagents Added -

To Grind	Lb./ton Ore
Aerofloat No. 208 -	0.10
Reagent No. 301 -	0.10
Aerofloat No. 25 -	0.005

Flotation

Aerofloat No. 25 -	0.01

Concentrate collected 8 minutes.
Grind, 78 per cent minus 200 mesh.
pH, 9.3.

Results

Product	Weight, per cent	Assay, Au, oz./ton	Distribution of gold, per cent
Feed	100.0	0.16⊕	100.0
Conc.	9.3	1.57	91.5
Tailing	90.7	0.015	8.5

⊕ Calculated.

(Experimental Tests, cont'd) -

The concentrates were reground to 60 per cent minus 325 mesh and cyanided for 48 hours. The tailings were also cyanided for 48 hours. Solutions were kept at 2.0 lb./ton NaCN and CaO for the concentrate and 1.0 lb./ton for the tailings.

Result

Product	Weight, per cent	Assay, Au, oz./ton		Extraction of Gold, per cent		Reagent Consumption, lb./ton ore	
		Heads	Tailing	Cyanide Feed	Flot. Feed	NaCN	CaO
Conc.	9.3	1.57	0.30	81.5	74.1	6.00	12.84
Tailing	90.7	0.015	0.005	66.7	5.6	0.32	3.96
Combined	100.0	0.16	0.033		79.7	0.85	4.79

Test No. 10.

The above test was repeated with a coarser original grind but a finer grind of the flotation concentrates.

2,000 grams of ore was ground in a ball mill to give a grind of 64.8 per cent minus 200 mesh.

Reagents Added -

To Grinding	Lb./ton Ore
Reagent No. 404 -	0.20
Aerofloat No. 208 -	0.20
Aerofloat No. 31 -	0.01

To Flotation

Aerofloat No. 31 -	0.01

Concentrate collected 10 minutes.
pH, 9.1.

Results

Product	Weight, per cent	Assay, Au, oz./ton	Distribution of gold, per cent
Feed	100.0	0.196⊕	100.0
Conc.	14.4	1.18	86.9
Tailing	85.6	0.03	13.1

⊕ Calculated.

(Experimental Tests, cont'd) -

The concentrate was ground to 98 per cent minus 325 mesh and cyanided for 48 hours with solution strength of 2.0 lb./ton NaCN and 1.0 lb./ton for CaO. The tailings were cyanided for 48 hours with a solution strength of 1.0 lb/ton NaCN and CaO.

Results

Product	Weight, per cent	Assay, Au, oz./ton		Extraction of Gold, per cent		Reagent Consumption, lb./ton ore	
		Heads	Tailing	Cyan. Feed	Flot. Feed	NaCN	CaO
Conc.	14.4	1.18	0.185	84.3	73.3	5.20	16.24
Tailing	85.6	0.03	0.005	83.3	10.9	0.08	3.64
Combined	100.0	0.16	0.031		84.2	0.81	5.45

This test gave 4.5 per cent more extraction of the gold than the previous test but the extraction of the gold in the concentrate is still unsatisfactory.

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Tabling Followed by Cyanidation

Two tests were carried out to determine the effect of concentrating the sulphides by a tabling operation followed by cyaniding both products.

Test No. 13.

2,000 grams of ore was ground for 15 minutes in a cyanide solution at a strength of 1.0 lb./ton NaCN and CaO. This grind gave 69.0 per cent minus 200 mesh.

Results

Heads = 0.18 Au oz./ton
Tailing = 0.15 " "
Extraction of gold = 16.7 per cent

The pulp from the cyanide leach was wet-screened on a 150-mesh screen into plus 150 and minus 150 mesh fractions. These two products were tabled separately on a laboratory-size Wilfley table.

Results

Product	Weight, per cent	Assay, Au, oz./ton	Distribution of Gold, per cent	
			Table Feed	Original Sample
Table conc.	14.6	0.56*	54.5	45.4
Table tailing	85.4	0.08	45.5	37.9
Table feed	100.0	0.15	100.0	83.3

* Calculated.

(Experimental Tests, cont'd) -

The table concentrate was ground to 98 per cent minus 325 mesh and cyanided for 48 hours at a solution strength of 2.0 lb./ton NaCN and CaO. The table tailing was cyanided for 48 hours at a cyanide solution strength of 1.0 lb./ton NaCN and CaO.

Results

Product	Weight, per cent	Assay, Au, oz./ton		Extraction of Gold, per cent			Reagent Consumption, lb/ton ore	
		Heads	Tailing	Cyan. Feed	Table Feed	Ore	NaCN	CaO
Table conc.	14.6	0.56⊕	0.075	86.6	47.2	39.3	4.70	11.60
Table tailing	85.4	0.08	0.015	81.3	37.0	30.8	0.25	4.10
Table feed	100.0	0.15	0.024		84.2	70.1	0.90	5.20

⊕ Calculated.

Overall extraction of gold = 70.1 + 16.7 = 86.8 per cent.

Test No. 15.

This test is similar to Test No. 13, with the exception that the original grinding was not done in cyanide solution and the pulp was not classified before tabling.

2,000 grams of ore was ground in a ball mill to produce 72 per cent minus 200 mesh. The pulp was passed over a Wilfley table to give a concentrate and tailing.

Results

Product	Weight, per cent	Assay, Au, oz./ton	Distribution of Gold, per cent
Table conc.	26.2	0.392⊕	56.9
Table tailing	73.8	0.105	43.1
Table feed	100.0	0.180	100.0

⊕ Calculated.

The concentrate was ground to 87.6 per cent minus 325 mesh and cyanided at 2 to 1 dilution for 48 hours with a solution strength of 2.0 lb./ton of both NaCN and CaO. The tail-

(Experimental Tests, cont'd) -

ings were cyanided for 48 hours at 2 to 1 dilution with a solution strength of 1.0 lb./ton of both NaCN and CaO.

Results

Product	Weight, per cent	Assay, Au, oz./ton		Extraction of Gold, per cent		Reagent Consumption, lb./ton ore	
		Heads	Tailing	Cyanide Feed	Ore	NaCN	CaO
Conc.	26.2	0.392	0.025	93.6	53.3	1.60	10.80
Tailing	73.8	0.105	0.015	35.7	36.9	0.90	8.10
Ore	100.0	0.180	0.017		90.2	1.08	8.80

This test shows a better extraction of the gold but this was obtained by regrinding a much greater weight of table concentrates.

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Cyanidation and Flotation.

The following test shows the extraction obtained by cyanidation at a coarse grind followed by flotation and treatment of the flotation concentrates.

Test No. 14.

1,000 grams of ore was ground in a pebble mill to give 58.4 per cent minus 200 mesh. The ore was cyanided for 48 hours at a 2 to 1 dilution with a solution strength of 1.0 lb./ton NaCN and CaO.

Head assay		0.18 Au oz./ton
Tailing assay	=	0.035 " "
Extraction	=	80.6 per cent
Reagent consumption:		
NaCN	=	0.48 lb./ton ore
CaO	=	4.08 " "

The cyanide residue was repulped in a flotation cell and a concentrate removed.

Reagents Added	Lb./ton
Aerofloat No. 208	- 0.04
Reagent No. 404	- 0.04

Conditioned 5 minutes.

(Continued on next page)

(Experimental Tests, cont'd) -

Flotation

Aerofloat No. 31 = 0.005 lb./ton
pH, 9.5.

Collection 10 minutes.

Results

Product	Weight, per cent	Assay, Au, oz./ton	Distribution of gold, per cent: Flot. Feed	Ore
Conc.	14.8	0.208	87.8	17.1
Tailing	85.2	0.005	12.2	2.3
Feed	100.0	0.035	100.0	19.4

The concentrate was ground to 98 per cent minus 325 mesh and cyanided for 24 hours with a solution strength of 2.0 lb./ton NaCN and 1.0 lb./ton CaO.

Results

Head = 0.208 Au oz./ton
Tailing = 0.120 " "
Extraction of gold = 42.3 per cent

The residue after washing and sampling was cyanided for 24 hours with a solution strength of 2.0 lb./ton NaCN, 1.0 lb./ton CaO and 2.0 lb./ton PbO.

Results

Head = 0.120 Au oz./ton
Tailing = 0.045 " "
Extraction of gold = 62.5 per cent

Combined tailings = 0.011 Au oz./ton
Combined extraction = 93.9 per cent

Total consumption, lb./ton ore:
NaCN = 0.98
CaO = 5.26

This test shows that the addition of PbO helps the extraction of the gold. This extraction is the highest obtained in any of the tests and was obtained with a relatively coarse original grind.

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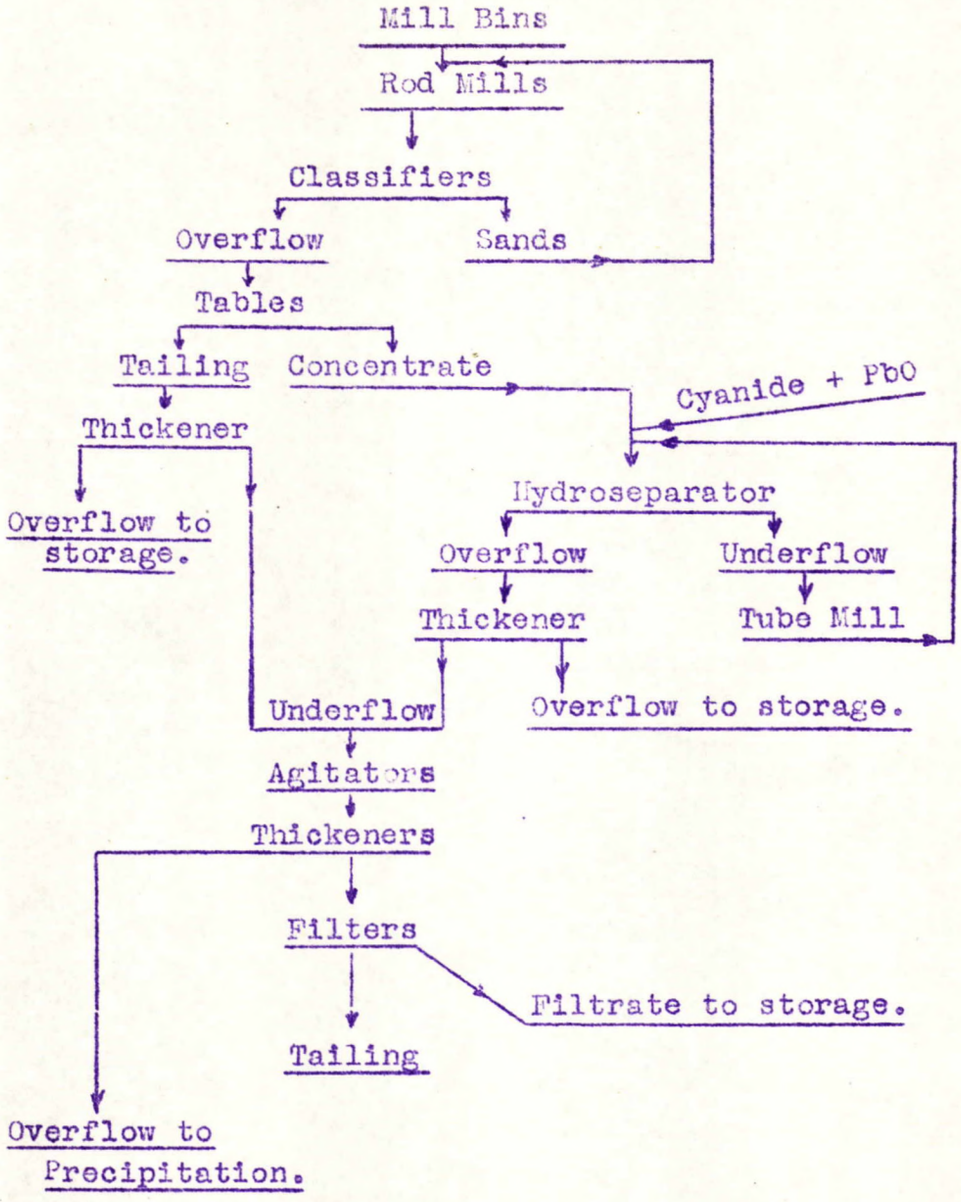
WAW:LB.

(Flowsheet Nos. 1 and 2 follow, on Pages 11 and 12.)

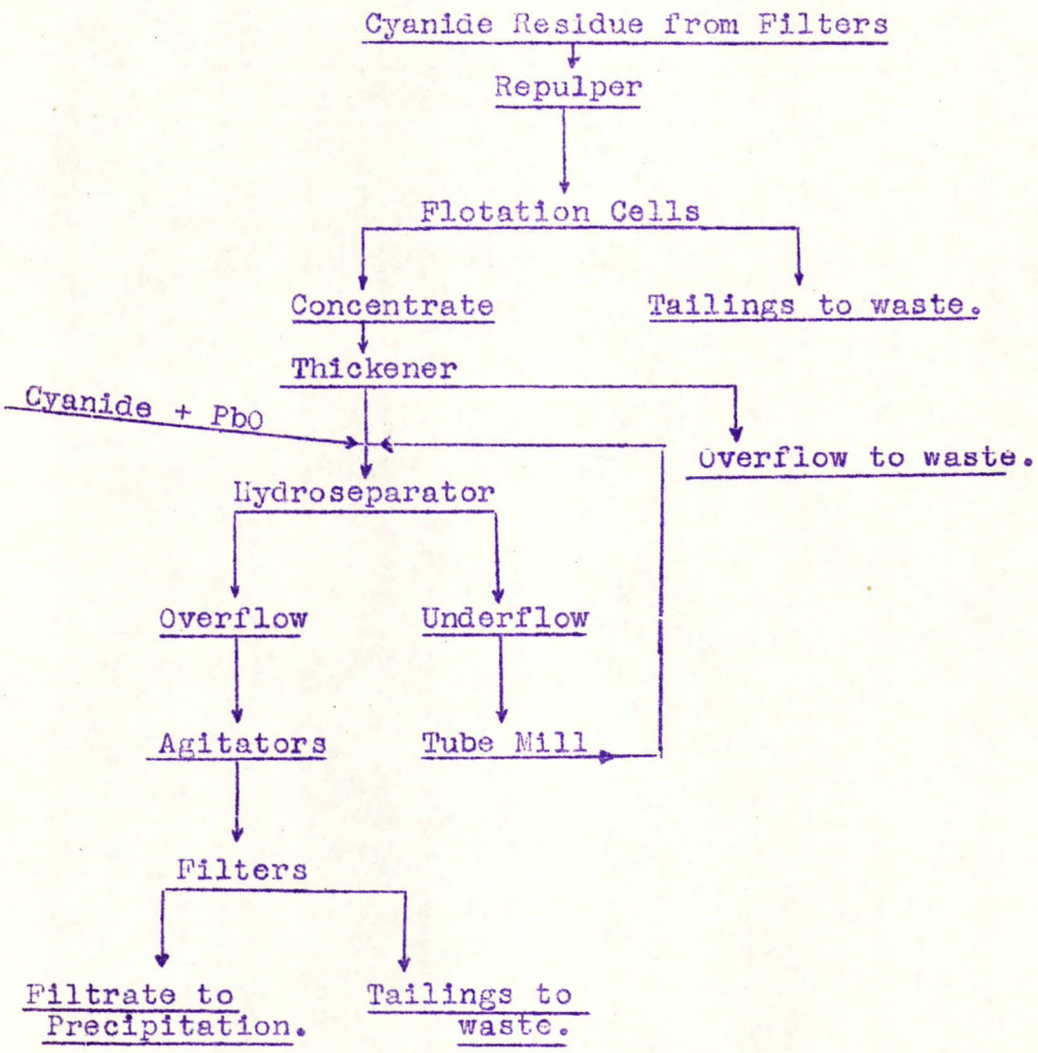
FLOWSHEET NO. I.

(SHOWING TABLES IN MAIN CIRCUIT.)



FLOWSHEET NO. 2

(SHOWING TREATMENT OF CYANIDE TAILINGS BY FLOTATION.)



Ottawa, Ont.
April 17, 1946.
WAW:LB.