

R E P O R T
of the
ORE DRESSING AND METALLURGICAL LABORATORIES

Report No. 267

Experimental tests on ore from the Blue Quartz
Gold Mine, Painkiller Lake, Ont.
by J. S. Godard

Shipments: One shipment of ore, weight 475 lbs. was received Dec 15th. 1926 from the Blue Quartz Gold Mines Ltd. Toronto. The ore was from their mine at Painkiller Lake, near Matheson, Ont.

Characteristics of the ore: Gold is the valuable constituent of this ore. It occurs free and associated with the sulphides. The sulphides present are a white vein pyrites, arsenopyrite, and chalcopryrite. The gangue is mainly siliceous containing small stringers of calcite. It would appear that the limestone had been intruded by the siliceous material, the latter carrying the sulphides.

Analysis: The head sample contained -

Gold	0.38 oz/ton	Copper	0.08 %
Iron	15.29 %	Arsenic	0.97 %
Insol	56.54 %	CaO	7.43 %

Test No. 1 - Amalgamation at 100 mesh

Results - Screen test on amalgamation tailing

<u>Mesh</u>	<u>Weight %</u>	<u>Assay</u>	<u>% values</u>
+65	0.8	0.52	1.5
+100	8.9	0.22	7.1
+150	10.6	0.20	7.7
+200	9.2	0.22	7.3
-200	70.5	0.30	76.4
Average		0.28	
Head sample		0.38	% gold amalgamated 26.3

Test No. 2 - Amalgamation at 15% #200 mesh

+200	15.1	0.24	16.2
-200	84.9	0.22	83.8
Average		0.22	
Head sample		0.38	% gold amalgamated 42.1

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Test No. 3 - Flotation and tabling

Results:

<u>Product</u>	<u>Weight %</u>	<u>Assay</u>	<u>% values</u>	
Flot. concentrate	26.6	1.28	80.4	Ore ground 10% +100 mesh for flotation
Table "	4.4	0.42	4.4	
" tailing	44.8	0.10	10.6	
Slimes	24.2	0.08	4.6	
Heads from products		0.42		

Test No. 4 - Flotation and tabling

Flot. concentrate	33.6	0.94	84.6	Ore ground 10% +200 mesh for flotation. Flot.conc. contained Cu 0.26%, As 2.18%, the table conc. Cu 0.04% As 0.42 %
Table "	2.0	0.39	2.1	
" middling	7.8	0.14	2.9	
" tailing	23.8	0.08	5.1	
" slimes	32.8	0.06	5.3	
Heads from products		0.57		

Test No. 5 - Flotation and tabling

Flot. concentrate	24.3	1.38	79.1	Ore ground 10% +150 mesh Flot.conc. Cu 0.31% As 2.85% Table conc. Cu 0.04% As 0.54%
Table "	4.3	0.40	4.1	
" tailing	35.6	0.10	8.4	
" slimes	35.8	0.10	8.4	
Heads from products		0.42		

Tests Nos. 6,7,&8 - Flotation at 10% +200 mesh

<u>Test</u>	<u>Product</u>	<u>Weight %</u>	<u>Assay</u>	<u>% values</u>
6	Concentrate	23.8	1.55	82.9
	Tailing	76.2	0.10	17.1
	Head from products		0.45	
7	Concentrate	25.0	1.37	85.1
	Tailing	75.0	0.08	14.9
	Head from products		0.40	
8	Concentrate	25.2	1.69	90.4
	Tailing	74.8	0.06	9.6
	Head from products		0.47	

Test No. 9 - Screening -50+150, tabling the +150 material, regrinding table middling and tailing before flotation, tabling the flotation tailing. Flotation of the -150 mesh material and tabling flotation tailing.

-50+150 mesh

Table conc -50+150	19.5	0.96	47.9
Flot "	9.9	1.55	39.3
Table " from flot. tailing	1.9	0.43	2.1
Table tailing	48.1	0.07	8.6
" slimes	20.6	0.04	2.1

-150 mesh

Flot. concentrate	29.7	1.34	87.8
Table "	2.0	0.58	2.6
" tailing	37.1	0.09	7.4
" slimes	31.2	0.03	2.2

Summary Concentrates

Table -50+150	30.9	0.96	24.7
Flot. "	15.7	1.55	20.2
Table fm flot.	3.1	0.43	1.1
Flot. -150	47.1	1.34	52.5
Table -150	3.2	0.58	1.5
Average all concentrates		1.203	

Tailings

Table -50+150	56.4	0.07	50.2
" -150	43.6	0.09	49.8
Average all tailings		0.079	

Slimes

Slimes -50+150	39.7	0.04	46.8
" -150	60.3	0.03	53.2
Average all slimes		0.034	

General

Product	Weight %	Assays	% values
Concentrates	31.5	1.203	90.0
Tailings	42.5	0.079	8.0
Slimes	26.0	0.034	2.0
Head from products		0.4215	

Test No. 10 - Tabling and flotation

A sample of 2100 grams of ore at -20 mesh was screened on 100 mesh. The -20+100 product was tabled, the middling and tailing reground and floated, and the flotation tailing tabled. The -100 mesh product from the screen was floated and the tailing tabled. Results:

Table conc +100	17.5	0.64	31.7
Flot "	9.2	1.86	48.3
Table conc fm flot			
tailing	4.4	0.46	5.7
Table tailing	46.4	0.09	11.8
Slime	22.5	0.04	2.5
Flot conc. -100	26.5	1.47	83.3
Table "	5.4	0.44	5.1
tailing	34.6	0.118	8.7
Slime	33.5	0.04	2.9

Summary - Concentrates

Table +100	37.3	0.64	22.0
Flot. +100	19.7	1.86	33.8
Table fm flot.	0.3	0.46	4.0
Flotation -100	28.0	1.47	37.9
Table -100	5.7	0.44	2.3
Average all concentrates		1.085	

Tailings

+100	73.1	0.09	67.5
-100	26.9	0.118	32.5
Average tailing		0.098	

Slimes

From +100	57.6	0.04	57.6
-100	42.4	0.04	42.4
Average slimes		0.04	

General

Concentrates	31.4	1.085	86.8
Tailings	42.5	0.09	10.6
Slimes	26.1	0.04	2.6
Head from products		0.393	

Test No. 11 - Cyanidation

Five small scale cyanidation tests were made in the following manner: For each test 750 grams of ore at -20 mesh was used. Each lot was ground in a 1:1 pulp, 0.05% KCN. The pulp was agitated for 48 hours in 1:2.5 pulp density. Cyanide strength was maintained at 0.075% KCN by additions of cyanide twice daily. Results:

Test	%+200 mesh	Head	Tailing			Extrtn %	Reagents lb/ton	
			+200	-200	Average		KCN	CaO
11A	15.5	0.43	0.11	0.09	0.093	78.3	1.70	5.15
11B	4.5	0.43	0.10	0.07	0.071	83.5	5.01	6.56
11C	1.4	0.43	0.10	0.06	0.061	85.7	2.09	6.16
11D	0.6	0.43	0.10	0.07	0.072	83.3	2.42	6.35
11E	0.3	0.43	1.87	0.04	0.046	89.2	8.41	7.04

Test No. 12 - Cyanidation.

Two small scale cyanidation tests were made in the following manner: 900 grams of the ore at -20 mesh was ground in 1:1 pulp in a pebble jar. The pulp was dewatered and cyanided in two Winchester bottles for 48 hours in 1:2.5 pulp 0.075% KCN. The solution from the dewatering was used for cyanidation Results:

12A	11.1	0.43	0.05	0.08	0.079	81.7	1.65	4.25
12B	11.4	0.43	0.11	0.07	0.072	83.3	1.65	4.25

Test No. 13 - Amalgamation, flotation and cyanidation of flotation concentrate

132 lbs. of ore at -48 mesh was ground in 1:1.25 pulp in a small rod mill in closed circuit with a classifier. The classifier overflow passed through an amalgamator and over a 12-ft. amalgamation plate. Some of the amalgamation tailing was floated in batch lots in a small Ruth machine. Rougher concentrates were made first, then two rougher concentrates were combined and cleaned. Three cleaner concentrates were made. These were sampled and reground in 1:1 pulp 0.025% KCN then agitated for 48 hours in 1:3 pulp 0.05% KCN. Head sample for test 0.43 oz/ton. Results:

A Amalgamation - Sampling of amalgamation plate tailings

Sample	Mesh	Weight %	Assay	% values
No.1	+200	2.7	0.17	2.9
	-200	97.3	0.16	97.1
	Average		0.16	
No.2	+200	3.7	0.19	2.9
	-200	96.3	0.24	97.1
	Average		0.238	

B Flotation of amalgamation tailing

Concentrate	21.8	1.07	83.7
Middling	10.9	0.145	5.8
Tailing	67.3	0.043	10.5
Amalg.tailing from products		0.274	

A grab sample of 1020 grams of amalgamation tailing was floated in a small Ruth machine -

Concentrate	25.4	0.76	86.2
Tailing	74.6	0.041	13.8

The tailing was screened on 200 mesh

+200	2.7	0.09	5.8
-200	97.3	0.04	94.2
Average		0.041	
Amalg.tailing from products		0.22	

Head sample 0.43 oz/ton Average Amalg tailing 0.213 oz/ton
Per cent gold amalgamated 50.4

C Cyanidation of flotation concentrate. Results:

No.	Head	Tailing	Extractn %	Reagents lb/ton		Reagents lb/ton of original ore	
				KCN	CaO	KCN	CaO
1	1.08	0.22	79.5	5.0	13.1	1.09	2.86
2	1.04	0.22	78.8	5.82	15.1	1.27	3.29
3	1.04	0.19	81.7	6.44	16.6	1.40	3.62
1 -	Concentrates ground 15 minutes before agitation						
2 -	"	"	30	"	"	"	"
3 -	"	"	60	"	"	"	"

Test No. 14 - Amalgamation and cyanidation

135 pounds of ore at -48 mesh was ground and amalgamated as in test

13. Lime equivalent to 1 lb/ton was added during grinding. The amalgamation tailing was dewatered to about 60% solids and cyanided in a pachuca tank for 48 hours. The strength was maintained at 0.05% KCN. The pulp dilution was about 1:3. Results:

Sampling of amalgamation tailing -

Sample	Product	Weight %	Assay	% values
No.1	+200	3.8	0.27	5.1
	-200	96.2	0.20	94.9
	Average		0.20	
No.2	+200	3.4	0.24	3.6
	-200	96.6	0.23	96.4
	Average		0.23	
No.3	+200	3.8	0.15	2.5
	-200	96.2	0.23	97.5
	Average		0.227	
Average tailing 3 samples			0.22	
Head sample			0.43	% gold amalgamated 48.8

Sampling cyanide tailing

No.1	+200	1.5	0.07	1.8
	-200	98.5	0.06	98.2
	Average		0.06	
No.2	+200	5.2	0.07	5.95
	-200	94.8	0.06	94.05
	Average		0.0605	
Head sample			0.43	Recovery 86 %

Test No. 15 - Cyanidation

113.5 pounds ore at -35 mesh ground in a small rod mill in closed circuit with a classifier. The grinding was done in 1:1 pulp 0.024% KCN. Lime equivalent to 3 lb/ton of ore was fed to the rod mill. The ground ore was emptied into a pachmca tank and agitated 24 hours in 1:3 pulp maintaining the cyanide strength at 0.02% KCN. Cyanide strength was then raised to 0.046% and agitation continued for 24 hours. Tailings were filtered, washed, and repulped before sampling. Results:

No.1	+200	6.8	0.09	8.6
	-200	93.2	0.07	91.4
	Average		0.0713	
No.2	+200	9.3	0.09	11.7
	-200	90.7	0.07	88.3
	Average tailing		0.0719	
No.3	+200	7.6	0.08	8.6
	-200	92.4	0.07	91.4
	Average		0.0708	
Average three samples			0.0713	
Head sample			0.42	Extraction 85.1 %

Conclusions: Amalgamation - 26 per cent of the gold was recovered by amalgamation at 10% +100 mesh, and 42 per cent at 15% +200 mesh. The amount of gold recovered by amalgamation increased with finer grinding. Concentration - Thirty per cent of the gold was the maximum recovery by concentration. This was obtained in test no. 8 by flotation only and in test no. 9 by tabling and flotation. The ratio of concentration was low, 1:4, and the grade of concentrate unsatisfactory, 1.69 oz/ton being the best. As in amalgamation the recovery increases with finer grinding. The tailings obtained by flotation compared favourably with those by cyanidation, but the cyanidation of the concentrate from

from flotation more than offset this. The concentrate has no constituent other than gold that would make a desirable smelter product, the copper being too low in grade and the presence of arsenic would probably incur a penalty.

Cyanidation - Cyanidation tests showed that about 85 to 90 per cent of the gold may be recovered by this method provided the grinding is sufficiently fine. About two pounds KCN and six pounds lime per ton of ore would be required. Where amalgamation preceded cyanidation a small increase in recovery is noted, but in large scale operations this would probably be negligible.