



MINES BRANCH

REPORT  
of the  
ORE DRESSING AND METALLURGICAL LABORATORIES

Report No. 196

Experimental tests on gold ore from Wright  
Hargreaves Mines, Ltd., Kirkland Lake, Ont.

R. K. Carnochan

-----

Shipment: A box of ore, gross weight 146 lbs. was received  
at the Ore Dressing and Metallurgical Laboratories,  
February 1, 1923, from the Wright Hargreaves Mines, Ltd.,  
Kirkland Lake, Ont.

Purpose of Tests were desired on the sample  
Experimental tests: submitted to determine what results  
the different methods of milling would  
give, and to see if the molybdenite present in the ore  
interfered with the cyanide process.

Characteristics The ore consists of red porphyry and dark  
of the ore: quartz intimately mixed together. A small  
amount of sulphides is present. These  
sulphides are mostly chalcopyrite and molybdenite. The  
molybdenite occurs in a thin film on slickensided faces.

Sampling and analysis: After the selection of suitable  
specimens, the balance of the ship-  
ment was crushed to  $\frac{1}{4}$ ". A portion was cut by means of a  
Jones riffle from the  $\frac{1}{4}$ " material and crushed to pass 20  
mesh. A sample was cut from the -20 mesh material and ground  
to -100 mesh for analysis. This sample was found to contain  
the following:

Gold	..	5.62 oz/ton	Tellurium	.	0.04 %
Silver	..	0.54 "	Alumina	..	7.49
Molybdenite		0.32 %	Lime and		
Iron	..	2.86	magnesia	..	2.34
Silica	..	81.10	Carbon	..	trace
Sulphur	..	1.16	Loss on ignn		1.80

Experimental Tests

Cyaniding: A series of cyaniding tests were made on the  
ore ground to -100, -150 and -200 mesh. A  
solution, made up to titrate 0.25% KCN, and 0.10% CaO by  
using sodium cyanide and soda ash, was used in all the tests.  
Different periods of agitation were used. Unless otherwise  
stated in the 'remarks' column, agitation was secured by the

196



use of rubber stoppered bottles.

Time hours	-100 tailg		-150 tailg.		-200 tailg.		Remarks
	Au oz	Ag oz	Au oz	Ag oz	Au oz	Ag oz	
8	0.68	-	0.38	-	0.40		
16	0.41	0.20	0.34	0.19	0.33	-	
24	0.45	0.34	0.40	0.29	0.37	0.28	
32	0.45	0.21	0.39	0.17	0.33	0.13	
40	0.48	0.21	0.40	0.20	0.35	0.15	
48	0.41	0.18	0.33	0.16	0.29	0.12	
48					0.28	-	open
48					0.41	-	Agitation by revolving/bottle
72					0.23		1 lb/ton sodium peroxide used
96					0.21		

The table shows:

1. The ore can be readily cyanided to 0.68 oz. gold per ton. This gives a recovery of 87.9%
2. Fine grinding increases the extraction.
3. Longer agitation increases the extraction.
4. The ore ground to -200 mesh and cyanided for 96 hours gives a tailing of 0.21 oz. gold per ton. This means a recovery of 96.3%. This is a very fair recovery, but the tailings are too high to be thrown away.
5. Agitation by means of the open bottle gives the same results as agitation by means of the stoppered bottle.
6. Sodium peroxide does not seem to improve the extraction.

#### Floating and Cyaniding

A number of tests were made using flotation as an aid to cyanidation. The flotation was done in a small Ruth laboratory flotation machine. The cyaniding was carried out in a manner similar to that in the straight cyaniding tests.

Procedure	Concentrate		Tailing	
	.Au oz.	Ag oz.	Au oz.	Ag oz.
Floating at -200 mesh with coal oil and pine oil then cyaniding the flotation tailing for 48 hrs	20.50	2.22	tr.	tr.
Floating at -200 mesh with TT mixture then cyaniding flotation tailing for 48 hours.	83.68	3.91	0.16	0.12
Floating at -200 mesh with heavy hardwood creosote coal tar, and coal tar creosote, then cyaniding flotation tailing for 48 hours	63.72	4.78	0.18	0.08
Cyaniding at -200 mesh for 48 hours and then floating the cyanide tailing with heavy hardwood creosote, coal tar, and coal tar creosote	2.43	1.03	0.20	0.15
Cyaniding at -200 mesh for 48 hours then floating the cyanide tailing with TT mixutre	1.30	1.11	0.24	0.2

The above table shows:

1. There is difficulty in either getting a representative sample of the ore or in assaying, as it is hardly possible that the tailing in the first test would run only a trace in gold when two other tests using reagents usually found better for ore similar to the ore being treated give tailings of 0.16 and 0.18 oz. gold per ton.
2. Floating either before or after cyanidation improves the extraction a little, but leaves a tailing still too high in gold.



Cyaniding & tabling:

A test was made to see what tabling would do as an aid to cyaniding:

Procedure	Concentrate		Tailing	
	Au oz	Ag oz	Au oz	Ag oz
Cyaniding at -200 mesh for 48 hours, then tabling the cyanide tailing	1.30	1.11	0.24	0.20

This test shows that tabling improves the extraction somewhat but does not give a sufficiently low tailing.

Summary of Experimental Tests:

1. Cyaniding alone on the ore submitted gives a good recovery, but leaves a tailing too high to discard.
2. Flotation used as an aid to cyaniding improves the extraction and gives a lower tailing, but the tailing is still too high.
3. Tabling used as an aid to cyaniding improves the extraction and gives a lower tailing, but the tailing is still too high

CONCLUSIONS: It is regrettable that the ore submitted did not run about the same as the ore being milled by the Wright Hargreaves Mines Ltd. The sample tested assayed 5.62 oz. gold per ton. This is equivalent to \$116.17 per ton and is much higher than the ore that is being milled at present.

On lower grade ore it would be easier to secure a lower tailing and it is probable that on ore similar to that now being milled at the mine, straight cyaniding would work well.

The molybdenite present in the ore seems to have no deleterious effect on the cyanide process.