

DEPARTMENT OF MINES

CANADA

OTTAWA

December 31st, 1935.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Report No.....

Experimental Tests on a Gold Ore from the
Elizabeth Gold Syndicate, Rainy River District,
Ontario.

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Experimental Tests on a Gold Ore from the
Elizabeth Gold Syndicate, Rainy River District,
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Shipment:

A shipment of ore, weighing approximately 200 pounds, was received on November 7th, 1935, from claims F.M.171 and F.M.172 of the Elizabeth Gold Syndicate, Rainy River District, Ontario. The shipment was submitted by Mr. H.C. Martin, 9 Adelaide St. East, Toronto, Ontario.

Character of the Ore:

The gangue is chiefly translucent to glassy fine-textured quartz which is locally stained brown by iron oxides. Some specimens contain fine-textured dark siliceous rock.

The metallic minerals in their order of abundance in the sections studied are chalcopyrite, "limonite", pyrite, arsenopyrite and covellite. Chalcopyrite is moderately abundant as irregular patches, stringers and grains in quartz. "Limonite" in considerable quantity occurs as partial to complete replacement of pyrite grains, and as stains in quartz. A small amount of pyrite is present as coarse grains which commonly show a large amount of replacement by "limonite". A very small amount of arsenopyrite occurs as small grains associated with pyrite. Rare tiny patches of covellite occur with chalcopyrite and "limonite".

No native gold was visible in the polished sections examined.

The microscopic examination of the sample indicates the presence of relatively large amounts of chalcopyrite and "limonite." The "limonite" and covellite show that the sample has been subjected to surface alteration, and is thus not representative of the material which

may be expected below the zone of surface oxidation.

Sampling and Assaying.

The shipment of ore was crushed and sampled by standard methods and the head sample assayed as follows:-

Gold	-	1.014 oz. per ton.
Silver	-	0.55
Copper	-	0.49%
Arsenic	-	trace.

Experimental Tests.

Test work comprised barrel amalgamation, flotation, blanket concentration and a combination of hydraulic classification and flotation.

Test No.1:

A sample of ore was ground to a fineness of 50 per cent minus 200 mesh and then barrel amalgamated with mercury for 1 hour.

The results are as follows:-

Gold in feed -	1.014 oz./ton.
Gold in tailing-	0.13 oz/ton.
Recovery -	87.18%

The results indicate the free-milling gold in the ore at the grinding indicated.

Test No.2:

A sample of ore was ground wet in a Abbe grinding jar with soda ash, 3 pounds per ton, and aerofloat No.31, 0.07 pound per ton. The pulp was conditioned with potassium amyl xanthate, 0.30 pound per ton. Pine oil, 0.05 pound per ton was used as frother.

Results of Test:

Product	Weight, Per cent	A S S A Y S		Distribution Per cent		Ratio. of Concentration
		Au oz.ton	Cu %	Au	Cu	
Feed	100.00	0.78	0.49	100.00	100.00	
Conc.	3.28	20.04	13.36	83.94	89.43	30.49 to 1
Tailing	96.72	0.13	0.05	16.06	10.57	

Screen Test on Tailing.

(3)

MESH	Weight Per cent
+ 65	0.1
-65 +100	5.3
-100 +150	16.4
-150 +200	28.0
-200	50.0
	100.0

The lower gold in the feed than that of the head assay is probably due to free gold remaining in the cell.

Test No.3:

In this test the ore sample was ground to a fineness of 69.3 per cent minus 200 mesh. The flotation reagents were the same as in Test No.2.

Results of Test:

Product	Weight Per cent	A S S A Y S		Distribution Per Cent		Ratio of Concentration
		Au oz/ton	Cu %	Au	Cu	
Feed	100.00	0.90	0.49	100.00	100.00	
Cons.	2.94	25.92	15.32	84.87	91.92	34.01 to 1
Tailing	97.06	0.14	0.04	15.13	8.08	

Test No.4:

This was a blanket concentration test. The ore was ground in water to a fineness of 50 per cent minus 200 mesh and the pulp then fed to a corduroy blanket.

Results of Test:

Product	Weight Per cent	A S S A Y S		Distribution Per Cent		Ratio of Concentration.
		Au oz/ton	Cu %	Au	Cu	
Feed	100.00	0.86		100.00		
Cons.	0.32	232.07		86.63		312.5 to 1
Tailing	99.68	0.115		13.37		

Test No.5:

In this test a sample of ore was ground in a water pulp to a fineness of 50 per cent minus 200 mesh and then fed to a hydraulic classifier. The oversize was peened to remove excess gangue and the overflow was dewatered and repulped in a flotation cell with soda ash, 3 pounds per ton, potassium amyl xanthate 0.4 pound per ton and pine oil 0.05 pound per ton.

Results of Test:HYDRAULIC CLASSIFICATION.

Product	Weight Per cent	ASSAYS Au. oz/ton	Distribution Per cent	Ratio of Concentration.
Feed	100.00	-	100.00	
Oversize	0.06	1004.62	67.15	1666 to 1
Overflow	99.94	0.295	32.85	

FLotation OF CLASSIFIER OVERFLOW.

Product	Weight Per cent	ASSAYS Au. oz/ton	Cu %	Distribution per cent Au : Cu	Ratio of Concentration.
Feed	100.00	0.295	0.50	100.00 : 100.00	
Conc.	2.58	9.56	16.48	83.50 : 84.51	38.76 to 1
Tailing	97.42	0.05	0.08	16.50 : 15.49	

Overall gold recovery - 67.15% ± (84.51% of 32.85%)

= 94.91 per cent.

Test No.6:

In this test the ore was ground to a fineness of 50 per cent minus 200 mesh and the pulp then fed to a corduroy blanket. The blanket concentrate was panned to remove excess gangue and the tailings floated. The following reagents were used:-

Soda ash - 3 lbs. per ton
Potassium amyl
xanthate - 0.4 lbs. per ton
Pine oil - 0.05 " " "

BLANKET CONCENTRATION.

Product	Weight Per Cent	ASSAYS Au. oz/ton	Distribution Per cent	Ratio of Concentration.
Feed	100.00	-	100.00	
Concentrate	0.05	808.80	49.67	2000 to 1
Tailing	99.95	0.41	50.33	

FLotation OF BLANKET TAILING.

Product	Weight Per cent	ASSAYS Au. oz/ton	Cu %	Distribution per cent Au : Cu	Ratio of Concentration
Feed	100.00	0.41	0.51	100.00 : 100.00	
Concentrate	2.44	12.16	17.88	72.56 : 84.83	40.98 to 1
Tailing	97.56	0.115	0.08	27.44 : 15.17	

Overall recovery of gold - 49.67% ± (72.56% of 50.33%)

= 36.19 per cent.

Test No.7:

This was a blanket test followed by flotation of the blanket tailing. The grinding was to a fineness of 62.8 per cent minus 200 mesh.

The reagents added were the same as in Test No.6.

The results follows:-

BLANKET CONCENTRATION.

Product	Weight:		ASSAYS	Distribution:		Ratio of Concentration
	Per	cent		Per	cent	
	cent	Am oz/ ton				
Feed	100.00	0.92		100.00		
Concentrate	0.12	568.00		73.58		833.3 to 1
Tailing	99.88	0.245		26.42		

FLOTATION OF BLANKET TAILING.

Product	Weight :		A S S A Y S		Distribution		Ratio of Concentration.
	Per	cent	Am oz/ ton	Cu%	Per	cent	
	cent				Am	Cu	
Feed	100.00	0.245		0.50	100.00	100.00	
Concentrate	2.39	6.80		17.78	66.20	84.48	41.84 to 1
Tailing	97.61	0.085		0.08	33.80	15.52	

Overall recovery of gold - 73.58% ± (66.20% of 26.42%)

= 91.07 per cent.

CONCLUSIONS:

The results of the tests indicate that the gold is largely free-milling. At a fineness of grinding of 50 per cent minus 200 mesh a barrel amalgamation test indicated that 87 per cent of the gold was free-milling.

Removal of the free gold by jigs or blankets and flotation of the resulting tailing indicates from the tests carried out a recovery of over 90 per cent of the gold.

Very fine grinding was not necessary in order to obtain the above mentioned recoveries.

WR. McC/AJR.