

DEPARTMENT OF MINES AND RESOURCES

BUREAU OF MINES

CANADA

Ottawa, November 15, 1946.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2137.

Laboratory Tests on a Gold Ore Submitted by
Privateer Mine Limited, from a Group of Claims
on the West Coast of Vancouver Island, B.C.

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. 4.)

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Shipment:

On October 7, 1946, a shipment of five (5) bags of ore, total weight 387 pounds, was received under instructions from N. E. McConnell, Managing Director, Privateer Mine Limited, 602 Stock Exchange Building, Vancouver, British Columbia, for investigation purposes.

Location of Property:

In his letter of September 6, 1946, Mr. McConnell stated that the ore came from a group of claims consisting of a consolidation of the Gold Flake Mines Limited, Tofino Gold Mines Limited and the Pandora Gold Mining Company, Limited, situated some $3\frac{1}{2}$ miles up Tranquil River, on the west side, in the Alberni Mining Division on the west coast of Vancouver Island.

Sampling and Analysis:

The shipment, which consisted of a mixture of oxidized and unoxidized ore, was crushed to approximately 20 mesh and a head sample cut out on the Jones sampler for assay and analysis. The remainder of the ore was screened through a 20-mesh screen and the oversize crushed to pass this mesh and the product bagged for investigative purposes.

Before crushing, some representative samples of the ore were taken for microscopic examination for the purpose of determining the character of the ore.

The analysis made on the head sample gave the following results:

Gold	-	2.105 oz./ton
Silver	-	0.455 "
Arsenic	-	0.11 per cent
Sulphur	-	0.11 "
Iron	-	3.53 "
Zinc	-	Trace.
Lead	-	Trace.
Insoluble	-	84.00 per cent

A screen analysis on the ore showed the values, association and distribution of the gold in the various mesh sizes to be as follows:

Mesh:	Weight, per cent	A s s a y s			Distribution,		
		Oz./ton: Per Cent:			per cent		
		Au	Fe	S	Au	Fe	S
+28:	7.2	1.82	2.80	0.14	5.2	5.9	5.0
+35:	15.2	1.85	2.60	0.17	11.2	11.6	12.4
+48:	9.9	2.38	2.50	0.18	9.4	7.2	8.6
+65:	11.2	2.05	3.65	0.19	9.2	12.0	10.2
+100:	9.3	2.72	3.15	0.22	10.1	8.6	9.8
+150:	10.3	3.44	2.75	0.27	14.2	8.3	13.4
+200:	8.1	3.85	3.50	0.26	12.4	8.3	10.1
-200:	28.8	2.47	4.50	0.22	28.3	38.1	30.5
Total:	100.0	2.50	3.40	0.21	100.0	100.0	100.0

It is noteworthy that the assay values increase sharply at 100 mesh with 55 per cent of the gold occurring in the minus 100 mesh sizes.

(Continued on next page)

Microscopic Examination:

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

Gangue -

In the polished sections gangue consists essentially of medium fine-grained, milky quartz which contains a few small patches of soft, greenish-grey rock material and a little disseminated carbonate (calcite). The whole assemblage is crossed by a few narrow sinuous fractures and bears extensive reddish brown stains of iron oxides.

Metallic Minerals -

Megascopically the polished surfaces exhibit almost no metallic mineralization but under the microscope pyrite, pyrrhotite, arsenopyrite, chalcopyrite and native gold are seen to be present, as well as "limonite". All the sulphides occur in almost negligible amounts, as occasional to rare small grains disseminated sporadically through gangue. The largest grain seen is 420 microns (35 Tyler mesh) in its longest direction, but much finer sizes predominate and range down to only a micron or two in diameter. Besides the extensive stains in gangue, "limonite" is common as comparatively wide borders around grains of sulphides which, in some places, are completely replaced.

Native gold is relatively abundant as tiny scattered particles which are free in quartz. All are normal in colour and most are irregular in shape. Many occur along fractures or between grains of quartz but some are in apparently dense silica. Some eighty grains were observed and measured, and several places were noticed in the sections where subsurface gold is apparently present. The results

(Microscopic Examination, cont'd) -

of the measurements made are tabulated below:

Grain Size Analysis of Native Gold.

<u>Tyler Screen Sizes</u>		<u>Free in Gangue, per cent</u>
+200	-	27.3
-200 +280	-	5.9
-280 +400	-	20.9
-400 +560	-	9.6
-560 +800	-	10.5
-800+1100	-	16.1
-1100+1600	-	2.2
-1600+2300	-	5.4
-2300	-	<u>2.1</u>
Total		100.0

Conclusions:

Straight cyanidation of the ore gave such excellent results that there is little doubt that cyanidation is the process that should be adopted.

Perhaps the only question to be decided is one of the economics of grinding the ore and the method of cyanide treatment.

In Test No. 1B, as might be expected, the highest percentage of extraction of the gold was had at the finest grind of 91.4 per cent minus 200 mesh, but very excellent results were obtained at lesser grinds even as low as 28.8 per cent minus 200 mesh. (Test No. 4A)

The results of the cyanide tests indicate that the ore is extremely amenable to cyanidation.

Amalgamation as in Test No. 2 gave a higher than usual extraction of the gold at 81.7 per cent.

Due to the oxidized condition of the ore, flotation would not appear applicable from a standpoint of high gold extraction, as the flotation tailings remain too valuable to be discarded as waste. However, under certain

(Conclusions, cont'd) -

conditions of plant expenditure and operation, a concentrate of over 68 ounces in gold per ton (\$2400 at \$35 per ounce) might be utilized for shipment to a smelter.

Cyanide consumption in the tests was higher than normal.

Filtering of the test products from cyanidation was slow, denoting that high filtering capacity might be required in this operation and in all probability high settling capacity also.

The results of the tests and the conclusions drawn are based entirely on the ore as represented by the sample received. Any change in the grade or the characteristics of the ore might alter partially or entirely the method of treatment.

DETAILS OF INVESTIGATIVE TESTS:

Test No. 1.

Two lots of ore of 1,000 grams each were ground to 69.8 per cent minus 200 mesh (1A) and to 91.4 per cent minus 200 mesh (1B) and cyanided at 2 to 1 dilution for 48 hours.

Filtered, washed, and samples sent for assay.

Results:

	Test No. 1A	Test No. 1B
Reducing power (combined solutions)	-	22 cc. N KMnO ₄ /L. 10
NaCNS (combined solutions), per cent	-	Trace.
NaCN consumed, lb./ton ore	- 0.32	0.76
CaO " " "	- 8.92	8.96
Cyanide heads, Au oz./ton	- 2.105	2.105
Cyanide residue, " "	- 0.0175	0.015
Extraction of gold, per cent	- 99.17	99.29

(Details of Investigative Tests, cont'd) -

Test No. 2.

One thousand grams of ore ground to 65 per cent minus 200 mesh and amalgamated with 1,000 c.c. water, 7 c.c. mercury, 0.5 gram CaO, and 6 small pebbles. Mercury recovered and pulp filtered and sent for assay.

Heads, Au oz./ton	-	2.105
Amalgamated tailings, Au oz./ton	-	0.385
Extraction of gold, per cent.	-	81.7

Test No. 3.

Two thousand grams of ore ground to 90.8 per cent minus 200 mesh and transferred to a flotation cell.

Reagents Added:

<u>To Grinding -</u>	<u>Lb./ton</u>
Soda ash	- 0.5
Reagent No. 301	- 0.1
Reagent No. 203	- 0.1
Pot. amyl xanthate	- 0.1

To Conditioning -

Pot. amyl xanthate	-	0.1	3 mins.
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To Flotation -

Pine oil	-	0.05	7 mins. pH, 8.9.
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Products	Weight, per cent	A s s a y s			Distribution, per cent		
		Oz./ton Au	Per Cent Fe	Per Cent S	Au	Fe	S
Flot. conc.	2.9	68.68	10.40	3.16	87.6	8.8	50.9
Flot. tailings	97.1	0.29	3.20	0.09	12.4	91.2	49.2
Total	100.0	2.27	3.41	0.18	100.0	100.0	100.0

* Gold at \$35.00 per ounce.

Test No. 4.

One thousand grams of ore as crushed through 20 mesh (28.8 per cent minus 200 mesh) (4A), and 1,000 grams of

(Details of Investigative Tests, cont'd) -

ore ground to 58.0 per cent minus 200 mesh (4B), were cyanided at 2 to 1 dilution for 48 hours.

Filtered, washed, and assayed.

Results -

	Test No. 4A	Test No. 4B
NaCN consumed, lb./ton -	0.56	0.36
CaO " " -	7.80	7.84
Cyanide heads, Au oz./ton -	2.105	2.105
Cyanide residue, " " -	0.04	0.0175
Extraction of gold, per cent	98.1	99.17

Test No. 5.

Two thousand grams of ore ground to 88.2 per cent minus 200 mesh and transferred to a flotation cell.

Reagents Added:

<u>To Grinding -</u>	<u>Lb./ton</u>
Soda ash -	0.5
Reagent No. 301 -	0.1
Reagent No. 208 -	0.2
Pot. amyl xanthate -	0.1
Aerofloat No. 25 -	0.035

To Conditioning -

Pot. amyl xanthate - 0.05 3 mins.

To Flotation -

Pine oil - 0.025 10 mins.
pH, 8.6.

Results:

Products	Weight, : per : cent	A s s a y s				Distribution,		
		: Oz./ton	: Per Cent	:	:	: Au	: Fe	: S
		: Au	: Fe	: S	:	: Au	: Fe	: S
		: 1655.85 ^o	:	:	:	:	:	:
Flot. conc.	: 4.32	: 47.31	: 7.64	: 2.14	:	: 94.7	: 9.7	: 65.9
Flot. tailings	: 95.68	: 0.12	: 3.22	: 0.05	:	: 5.3	: 90.3	: 34.1
Total	: 100.00	: 2.157	: 3.41	: 0.14	:	: 100.0	: 100.0	: 100.0

^o Gold at \$35.00 per ounce.

(Continued on next page)

(Details of Investigative Tests, cont'd) -

Test No. 6.

Five hundred c.c. of solution from Tests Nos. 4A and 4B (combined) was deoxidized in a laboratory precipitation apparatus for 30 minutes after the addition of 0.2 gram PbNO_3 .

Solution precipitated under vacuum with 0.3 gram zinc dust for 5 minutes and precipitate filtered off and barren solution sent for assay.

Results -

Pregnant solution, Au oz./ton	-	1.144
Barren solution, " "	-	0.007

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