O T T A W A January 8, 1946.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1984.

Analysis, Examination and Cyanide Tests on
Gold Ore from the Upper Canada Mines
Limited, Dobie, Ontario.

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
-
Physical Metallurgy
Research Laboratories

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
Mines and Geology Branch

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Shipment:

Five small bags of ore were received on November 26, 1945, from the Upper Canada Mines Limited, Dobie, Ontario, per D. M. Briden, Mill Superintendent. The shipment had a total weight of 25¾ pounds.

A covering letter from Mr. Briden, dated November 23, was received asking for an assay for gold values and a complete analysis of a composite sample of the five bags of ore.

It was stated that this new ore was causing some trouble in the mill and it was suggested that pyrrhotite might be present.

Location of Property:

The property of the Upper Canada Mines Limited from which the samples were sent is at Dobie, Ontario.

Sampling and Analysis:

After taking a well mineralized piece of rock from each of the five bags for the preparation of polished sections, the contents of each bag were crushed separately to minus 14 mesh and a sample was taken by standard methods for assay.

The rejects from each sample were combined to form a composite sample, and a sample from this was prepared for complete analysis.

The remainder was bagged.

Characteristics of the Ore:

Since the five polished surfaces are essentially similar in character, they will not be described separately in this report.

Gangue -

In the polished sections gangue is composed of fine-grained, grey to greenish grey rock with abundant coarse to fine disseminated carbonate. A microchemical test for iron was applied to the latter and gave a fairly strong reaction. In general the gangue material is hard and probably represents a silicified and carbonated greenstone.

Metallic Minerals -

Metallic mineralization in the five polished surfaces is represented preponderantly by pyrite. This mineral occurs as irregular grains and subhedral crystals unevenly disseminated through gangue. The largest grain in the sections measures about 1300 microns (-10 +14 Tyler mesh) and the others range from that size down to only a few microns, with the moderately fine sizes predominating. The iron sulphide contains occasional to rare small inclusions of gangue and grains

(Characteristics of the Ore, cont'd) -

of other metallics.

In the section prepared from Sample No. 3, small ragged particles of sphalerite and grey copper (tetrahedrite-tennantite) are common in gangue but the total amount of both minerals is small. Practically negligible amounts of chalcopyrite and magnetite are visible as rare tiny grains in gangue and pyrite.

Nine small particles of native gold, ranging from 36 microns (approximately 400 mesh) down to 6 microns (2300 mesh) in size, were observed and measured in Sample No. 3. All of them occur alone (free) in gangue except one, the largest, which is associated with sphalerite. See Figure 1.

Conclusion from Microscopic Examination -

The microscopic examination did not reveal the presence of pyrrhotite or other cyanicides in appreciable amount in these ore samples, but it should be borne in mind that these conclusions are based on observations from the examination of only five polished sections.

(Figure 1 follows,)
(on Page 4.)

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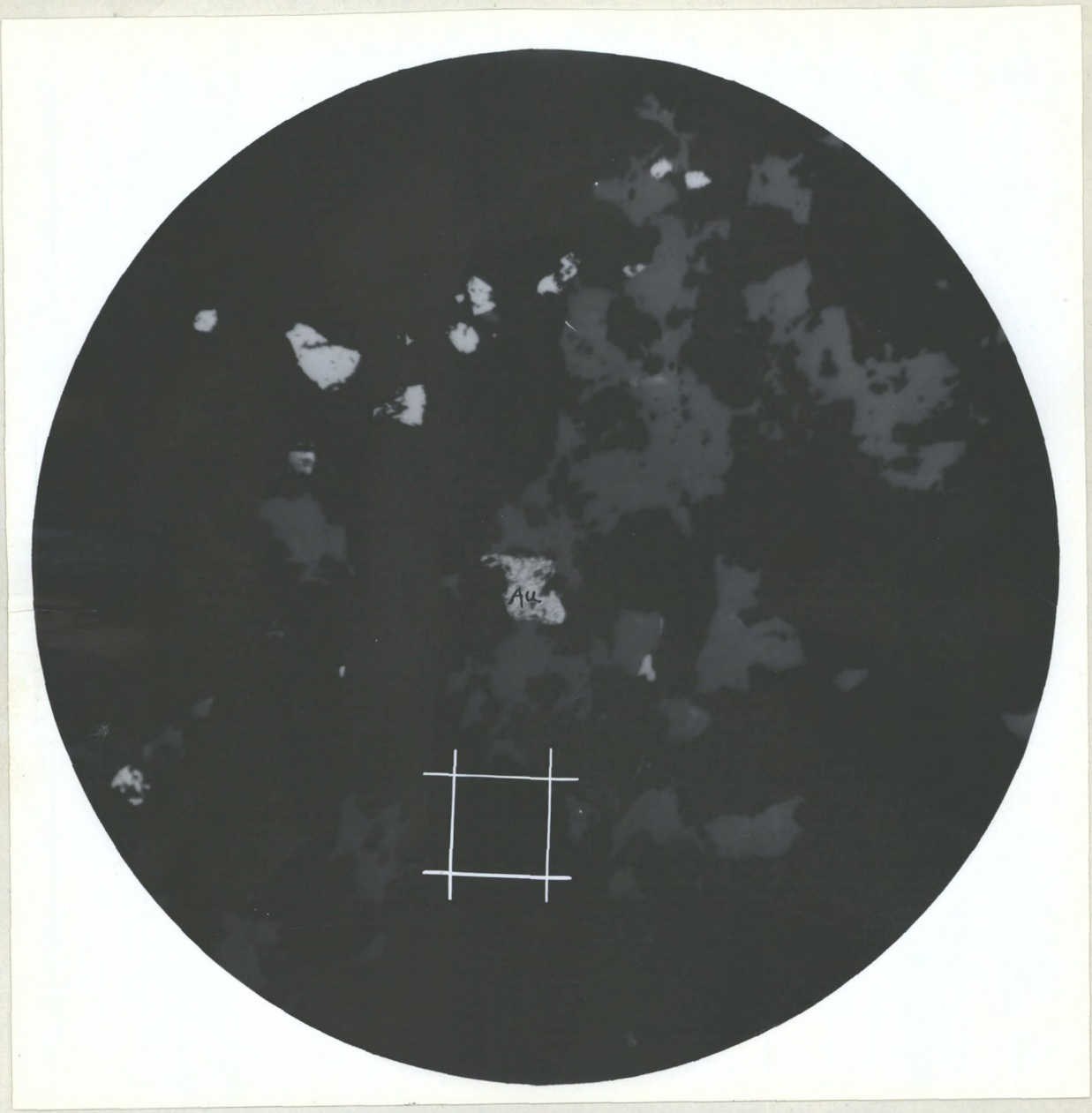
Figure 1.



PHOTOMICROGRAPH OF POLISHED SURFACE, SHOWING A GRAIN OF GOLD ASSOCIATED WITH SPHALERITE IN SAMPLE NO. 3. A 200-MESH TYLER SCREEN OPENING IS OUTLINED IN WHITE.

Gold (Au) - white, rough surface.
Pyrite - white, smooth surface.
Sphalerite - dark bluish grey.
Gangue - black.

Magnification - X200.

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RESULTS AND DETAILS OF INVESTIGATIVE WORK:

The results of the assay of the individual samples were as follows:

Sample		Weight, pounds	Gold oz./ton
1	-	6	0.230
2	-	5⅛	8.395
3	-	4½	0.435
4	-	6	0.260
5	-	4	1.110

The average value in gold, according to the weights of the individual samples, was 2.15 ounces per ton.

The gold value of the combined rejects was 2.10 ounces per ton.

The complete analysis on the combined rejects sample was as follows:

Copper		0.02 per cent
Lead		Nil.
Zinc		Trace.
Nickel		Nil.
Iron		5.21 per cent
Sulphur		3.94 "
Arsenic		Nil.
Antimony	-	Nil.
SiO_2		52.88 per cent
Al_2O_3		11.71 "
CaO		6.37 "
MgO		4.00 "
CO_3		Present

While the above information covers that asked for by the Company, some further tests were made in view of the fact that it was stated that the ore was causing some trouble in the mill.

A screen analysis of the head sample was made with the following results:

(Continued on next page)

(Results and Details, cont'd) -

Mesh	Weight, per cent	Oz./ton Au	Per cent Fe	Per cent S	Distribution, per cent Au	Distribution, per cent Fe	Distribution, per cent S
+20	10.2	1.52	4.42	3.36	7.4	8.92	8.70
+35	30.0	1.67	4.32	3.15	24.1	25.65	24.05
+65	19.3	1.71	4.32	3.20	16.0	16.50	15.73
+100	7.4	1.95	5.37	4.46	7.0	7.86	8.40
+150	6.1	2.12	6.32	5.90	6.2	7.62	9.20
+200	4.4	2.38	7.60	7.21	5.0	6.61	8.10
-200	22.6	3.17	6.00	4.53	34.3	26.84	25.82
	500.0	2.08	5.05	3.93	100.0	100.0	100.0

From this it may be seen that the gold content follows remarkably close to the varying amounts of iron and sulphur in the different sizes of the sample and it might be inferred that the gold was attached to the pyrite and might require fine grinding to liberate it for effective cyanidation.

Some agitation tests were made for the purpose of determining the resistance of the ore to cyanidation.

Test No. 1.

1,000 grams ore ground 30 minutes to 85.6 per cent minus 200 mesh.

Agitated at 2 to 1 dilution for 48 hours with cyanide and lime.

Residue filtered and washed.

Results -

NaCN consumed, lb./ton ore = 0.72

CaO " " " = 4.20

Solution: NaCNS = 0.003 per cent

Reducing Power = 52 c.c. $\frac{N}{10}$ $KMnO_4$ per 1000 c.c. of solution.

Residue, oz./ton gold = 0.105

Extraction, per cent = 95.0

Test No. 2.

1,000 grams of ore ground 60 minutes to 98.2 per

(Results and Details, cont'd) -

cent minus 200 mesh and 90.8 per cent minus 325 mesh.

Agitated at 2 to 1 dilution for 48 hours with cyanide and lime.

Residue filtered and washed.

Results -

NaCN consumed, lb./ton ore = 1.24

CaO " " " = 5.12

Solution NaCNS = 0.0003 per cent

Reducing Power = 60 c.c. $\frac{N}{10}$ $KMnO_4$ per 1000 c.c. of solution.

Residue, oz./ton gold = 0.07

Extraction, per cent = 96.7

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In Mr. Briden's letter it was not intimated in what manner the ore was causing trouble in the mill and while, from the analysis, there would not seem to be any elements which would interfere with precipitation, a test was made to check this feature.

Test No. 3.

750 c.c. of solution from Cyanidation Test No. 1 were taken and 0.2 gram NaCN and 0.2 gram $PbNO_3$ were added. The solution was agitated and de-aerated under 27¾ inches of vacuum for 30 minutes.

Precipitation was effected by adding 0.2 gram of zinc dust and the solution agitated, still under vacuum, for 5 minutes, after which it was filtered through filter paper and filter cel in a Buckner funnel.

Results -

Assay precipitation head, oz./ton gold = 0.927

Assay precipitation tailing, oz./ton gold = 0.008

This compares favourably with laboratory experiments

(Results and Details, cont'd) -

on precipitation of solutions from other ores.

CONCLUSIONS:

From the analysis and from the results of the tests which were made on the ore and solution, it would appear that no trouble should be encountered in the cyanidation of this ore.

Naturally, if much of the ore of this value is included in the mill feed, the tailing will be higher, but with nearly 97 per cent extraction obtained from test work on the ore it cannot be said to be causing much trouble from an extraction standpoint. It would be anticipated that with the concentration action in a bowl classifier, returning the high-grade pyrite sands for regrinding, the test results might be bettered in plant practice. Consumption of cyanide will probably be above normal.

The results would seem to depend on the degree of fine grinding which can be obtained in the plant or the degree of fine grinding which is dictated by the economics of the operation.

As will be seen from the analysis, the ore contains no metals which in cyaniding might result in fouling or in precipitation troubles. The precipitation test confirms this.

With reference to pyrrhotite, this mineral was not found microscopically in any of the sections.

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