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DEPARTMENT OF MINES AND TECHNICAL SURVEYS

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MINES BRANCH INVESTIGATION REPORT IR 58-70

INVESTIGATION OF GOLD ORE FROM NORTHWIND EXPLORATIONS LIMITED, STURGEON RIVER AREA, ONTARIO

by

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MINERAL DRESSING AND PROCESS METALLURGY DIVISION

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SUMMARY OF RESULTS

Test No.	Procedures	Recovery % Au
1	24 hr cyanidation of ore, ground to 67.3% -200 mesh	96.8
2	2 hr amalgamation of ore, ground to 95.7% -200 mesh	81.1
3	Blanket concentration of ore, ground to 67.3% -200 mesh	87.6

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INTRODUCTION

Location of Property

The ore was taken from a vein designated as No. 1-A, located on the old Amoranda property, which is approximately 3 miles north of the Leitch Gold Mines Limited, in the Sturgeon River area of northern Ontario.

Shipment

On March 17, 1958, a sample of the above mentioned ore, weighing approximately 5 lb, was received at the Mines Branch in Ottawa, from Northwind Explorations Limited.

Nature of Investigation

In a covering letter, Mr. B. C. Lamble, P. Eng., asked that an inspection of the sample be made, and that tests be done to determine whether the gold could be extracted satisfactorily. He also asked that the results of the tests be sent to Mr. G. G. Elliott, President, Northwind Explorations Limited, Suite 1204, 302 Bay Street, Toronto, Ontario.

Sampling and Analysis

Two representative pieces of ore were selected for a mineralogical examination.

The remainder of the sample was crushed to approximately 10 mesh, and a head sample was riffled out. A small portion of the head sample was sent to the Spectrographic Laboratory for analysis.

The result of the semi-quantitative spectrographic analysis was as follows, with the elements listed in the decreasing order of their concentration:

1 - Si, Fe

2 - Al, Zn

3 - Cu, Ca, As, Pb, Mg, Ni

4 - Mn, Ti

5 - Cr, B

A chemical analysis of the head sample gave the following results:

Au	-	11.99	oz/ton
Ag	-	3.52	"
Fe(total)	-	17.3	%
S(total)	-	18.9	"
Cu	-	0.28	"
Pb	-	0.09	"
Zn	-	0.70	"
SiO_2	-	57.70	"
Insol	-	60.40	"

MINERALOGICAL EXAMINATION *

Two polished sections prepared from the sample were examined microscopically in order to study the characteristics of the ore.

Gangue

In the polished sections gangue is composed of clear glassy to milky white to smoky grey quartz, with a very small quantity of chlorite as tiny disseminated particles. The quartz is transected by a few narrow sinuous fractures, and bears local reddish brown stains of iron oxides.

*From Mineralogical Laboratory Report M-1581-E, by W. E. White, April 15, 1958.

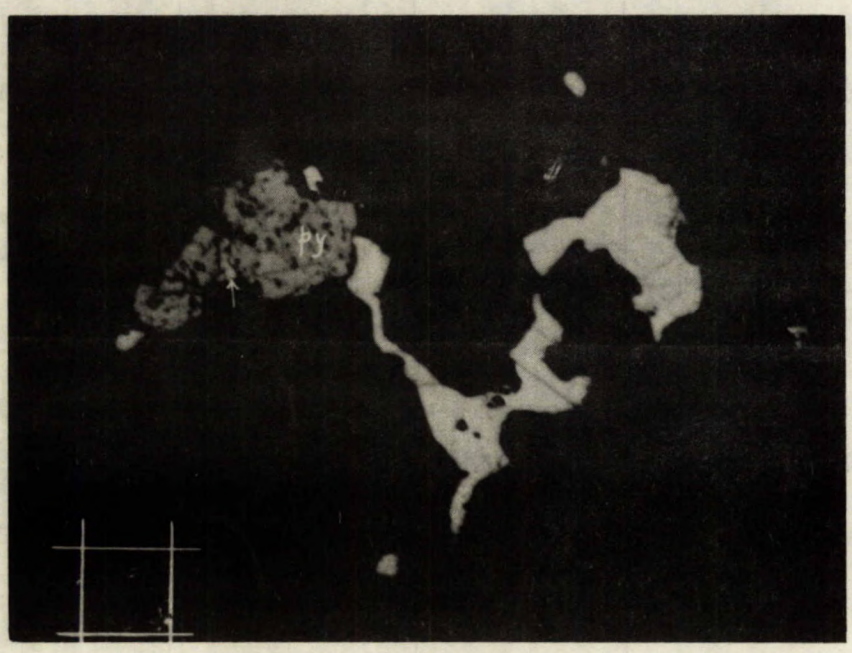
Metallic Minerals

In the two polished sections, metallic mineralization is slightly more abundant than gangue by volume and, to unaided eyes, appears to be represented almost entirely by coarse granular pyrite. Under a microscope this observation proves to be substantially true but small amounts of sphalerite, chalcopyrite, galena and gold are seen to be present also.

Pyrite is by far the most abundant metallic mineral in the two polished sections and is distributed unevenly through gangue as coarse to fine anhedral grains with the coarser sizes predominant. The polished surfaces of pyrite particles are, in general, dense and homogeneous in appearance but they do contain some small inclusions of gangue and metallics.

Sphalerite, the next most abundant metallic mineral in the polished sections, occurs largely in gangue, rarely in pyrite. One small elongated mass in quartz measures almost 6 mm in length and encloses tiny inclusions of pyrite but, on the whole, sphalerite is present in comparatively meagre quantity as small scattered particles. Minor amounts of chalcopyrite and galena are also visible in the two polished sections of ore, as occasional small disseminated particles in gangue and in pyrite.

Coarse to fine irregular grains of native gold are present in gangue and in pyrite. Although the greater amount of this metal occurs in quartz, a considerable proportion is in pyrite. Besides the one indicated, several more tiny particles of gold are in the grain of pyrite shown in the photomicrograph (Figure 1) but failed to register on the photographic film.



X150.

Figure 1. Photomicrograph of polished section showing typical occurrences of native gold, white, in quartz, black, and in pyrite (Py), grey; although several tiny particles of gold occur in this grain of pyrite, only one is differentiated by the photographic film and is indicated by arrow; polishing pits and scratches are black; white square is a 200-mesh Tyler screen opening.

DETAILS OF INVESTIGATION

The sample received was not large enough to permit more than three tests. These included a straight cyanidation of the ground ore, an amalgamation test, and a gravity concentration test using blankets.

Test No. 1

One thousand grams of ore was crushed to 67.3% -200 mesh

and cyanided for 48 hr at a pulp dilution of 2:1. Cyanide and lime were maintained at 1.0 lb/ton soln during cyanidation. The results of Test No. 1 were as follows:

Head	-	11.99 oz Au/ton		
Tailing	-	0.38 " "		
Recovery	-	11.61 " "	=	96.8%

Reagent consumption - NaCN - 3.50 lb/ton ore
- CaO - 2.48 " "

Reducing power of soln - 216 ml $^{N}/_{10}$ $KMnO_4$/litre

Test No. 2

Five hundred grams of ore was ground to 95.7% -200 mesh and amalgamated for 2 hr with 4.0 lb CaO/ton and 15 ml of Hg.

The result of Test No. 2 was as follows:

Amalgam	-	9.37 oz Au/ton		
Residue	-	2.18 " "		
Head	-	11.55 " "		
Recovery	-	9.37 " "	=	81.1%

Test No. 3

Approximately 500 grams of ore was ground to 67.3% -200 mesh and allowed to flow over a set of corduroy blankets.

The results of this test were as follows:

Product	Weight, %	Assay, oz/ton		Distribution, %	
		Au	Ag	Au	Ag
Concentrate	57.7	18.425	5.10	87.6	84.2
Tailing	42.3	3.55	1.31	12.4	15.8
Feed (calc.)	100.0	12.13	3.50	100.0	100.0

CONCLUSIONS

The sample submitted for test work was too small to permit a very exhaustive examination.

The results obtained in Test No. 3 indicate that the ore is amenable to gravity concentration. A possible flow sheet should include jigging, followed by tabling of the jig tailing and blanket concentration of the table tailing. Although it was not possible to do any flotation tests, this method of concentration would probably not be too efficient, due to the evident amount of coarse gold in the sample.

The high percentage of sulphur which would be present in any concentrate produced, may make the refining process difficult, but this could be overcome by roasting.

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