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**DEPARTMENT OF MINES AND TECHNICAL SURVEYS**  
**OTTAWA**

**MINES BRANCH INVESTIGATION REPORT IR 61-74**

**MINERALOGICAL REPORT ON A GOLD ORE  
FROM PAMOUR PORCUPINE MINES LTD.,  
PAMOUR, ONTARIO**

by

**M. R. HUGHSON & S. KAIMAN**

**EXTRACTION METALLURGY DIVISION**

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MINERALOGICAL REPORT ON A GOLD ORE FROM  
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M. R. Hughson\* and S. Kaiman\*\*

SUMMARY

An ore sample from Pamour Porcupine Mines Ltd. contains native gold enclosed generally in grains of pyrite and rarely in other sulphides. The particles of native gold are usually about 5 to 10 microns in diameter.

Pyrite comprises approximately 95 per cent of the sulphide mineralization in the ore. Arsenopyrite, pyrrhotite, sphalerite, chalcopyrite and cobaltite make up the remainder.

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## INTRODUCTION

A request for test work on Pamour Porcupine Mines Ltd. ore was made by Mr. R.H. Duval, mill superintendent, during a visit by Mines Branch officers to the mine at Pamour, Ontario, in April, 1961. A 150 lb sample of minus 1/2 inch ore (our Reference No. 5/61-4) was subsequently received on May 11, 1961. A small representative sample of the original ore sample and also a sulphide flotation concentrate produced from the ore sample were submitted to the Mineralogical Section for investigation of the nature of occurrence of the gold and the identification of the sulphide minerals present.

Chemical analyses and assays of a head sample showed that the original ore contained 0.08 oz Au/ton, 0.03 oz Ag/ton, < 0.004% Cu, 0.027% Ni, < 0.01% Co, 0.056% As, 0.76% S and 8.36% CO<sub>2</sub>(evol).

## MINERALOGY

The mineralogical investigation of this ore included a microscopic examination of polished sections of 34 chip specimens of ore as well as polished sections of a sized fraction of a sulphide flotation concentrate. In addition, in order to determine the sulphide mineral composition of the flotation concentrate, a numerical count was made of the sulphide minerals in the latter polished sections,

using a Swift automatic point counter. The identification of minerals was confirmed by X-ray diffraction methods.

In the polished sections of the chip specimens four particles of native gold included in grains of pyrite were observed (Figures 1, 2 and 3). In the polished sections of the sulphide flotation concentrate 16 particles of native gold were observed, partly or completely enclosed in grains of pyrite. The gold particles range in size from 5 to 10 microns. Small inclusions of non-opaque minerals, and of pyrrhotite or chalcopyrite, occur in pyrite adjacent to or partly surrounding the particles of native gold (Figures 1, 2 and 3).

One exception to the native gold-pyrite association was observed. Two of a small cluster of cobaltite grains contained very fine particles of native gold ranging in size from 4 microns to < 1 micron (Figure 4).

Pyrite is the most abundant sulphide mineral present in the ore and comprises about 95 per cent of the metallic mineral content. The sulphide mineral composition of the flotation concentrate is shown in Table 1.

TABLE 1

Sulphide Mineral Composition of Flotation Concentrate  
(Minus 100 Plus 150 Mesh)

Mineral	Weight per cent
Pyrite	95.4
Arsenopyrite	3.5
Pyrrhotite	0.7
Sphalerite	0.4
Chalcopyrite	
Cobaltite	
Total	100.0

In addition to the sulphide minerals trace amounts of rutile and anatase are also present.

The non-opaque minerals include quartz, dolomite, muscovite, plagioclase feldspar, and talc.

*~ 30% non-opaque in flat conc.  
- 100 + 150*

## PHOTOMICROGRAPHS

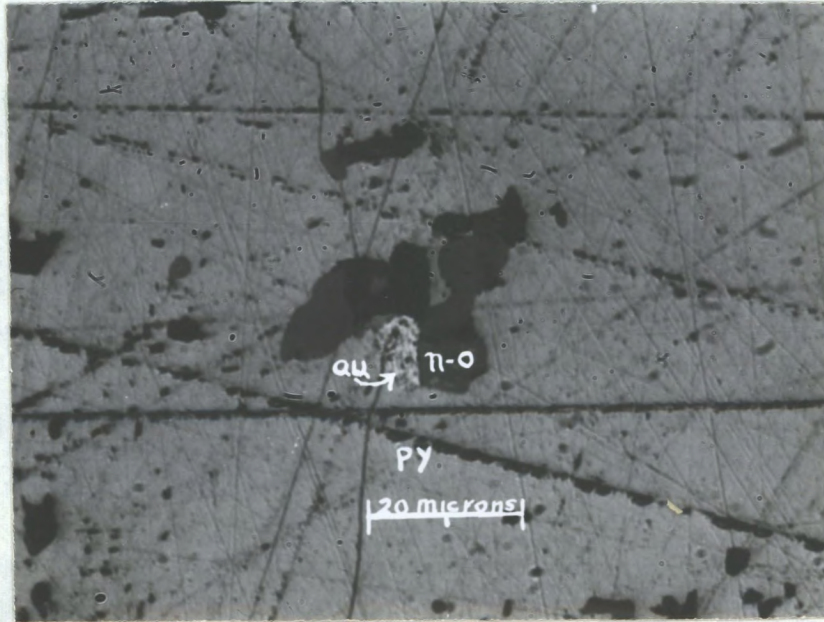


Figure 1. Native gold (au) adjacent to a non-opaque mineral (n-o) in pyrite (py). X1000.

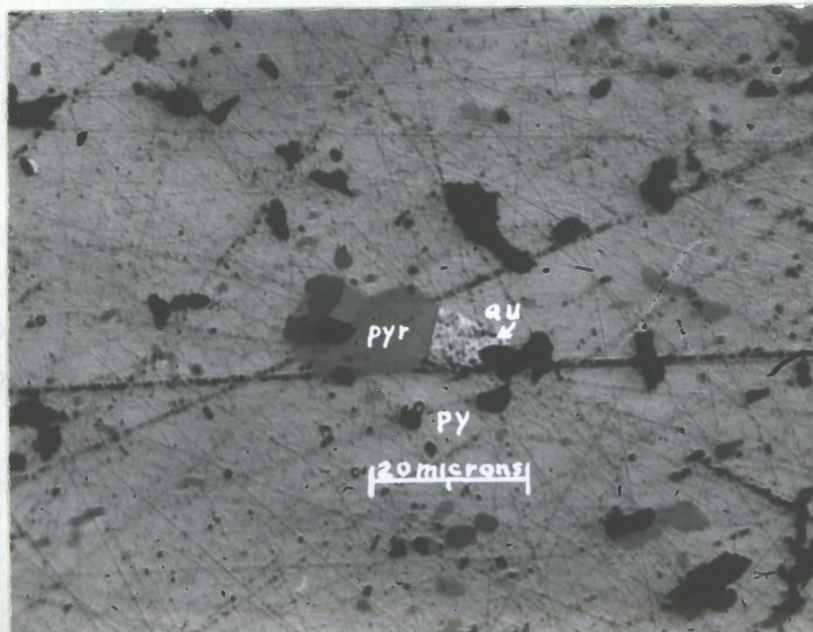


Figure 2. Native gold (au) adjacent to pyrrhotite (pyr) in pyrite (py). X1000.

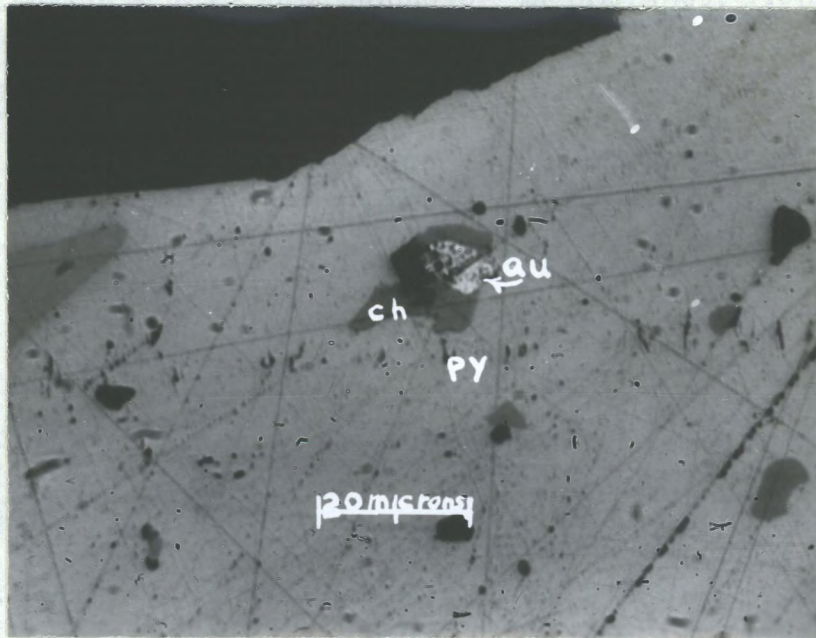


Figure 3. Native gold (au) almost surrounded by chalcopyrite (ch) in pyrite (py). X1000.

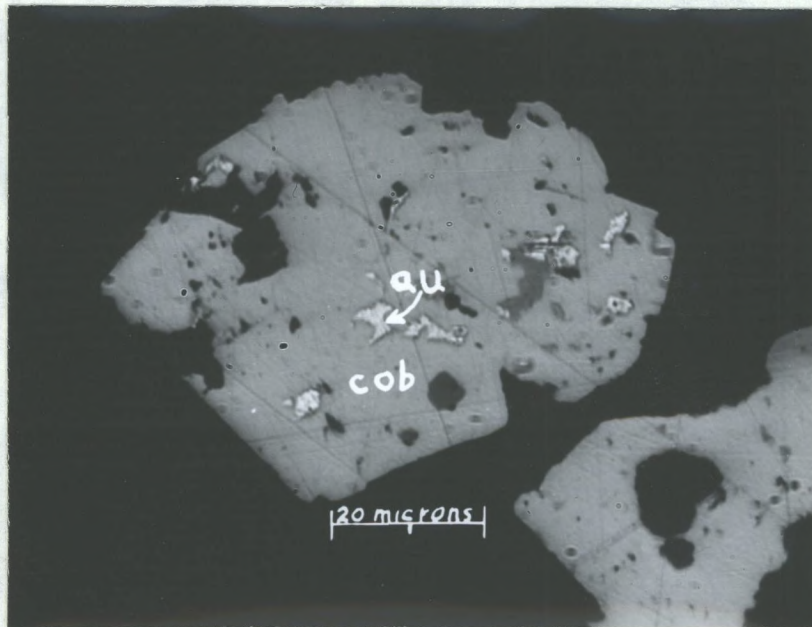


Figure 4. Particles of native gold (au) in cobaltite (cob). X1000.

## CONCLUSIONS

In the ore from Pamour Porcupine Mines Ltd. gold occurs as the native element and is usually present as fine inclusions in pyrite, the major sulphide mineral present. Only one occurrence of gold in cobaltite was observed.

## ACKNOWLEDGEMENTS

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