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DEPARTMENT OF MINES AND TECHNICAL SURVEYS

OTTAWA

MINES BRANCH INVESTIGATION REPORT IR 63-82

**MINERALOGICAL REPORT ON A COPPER  
ORE SAMPLE FROM GASPÉ COPPER  
MINES LTD., MURDOCHVILLE, QUEBEC**

by

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

**EXTRACTION METALLURGY DIVISION**

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**COPY NO. 19**

**SEPTEMBER 3, 1963**

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Mines Branch Investigation Report IR 63-82

MINERALOGICAL REPORT ON A COPPER ORE SAMPLE  
FROM GASPÉ COPPER MINES LTD., MURDOCHVILLE, QUEBEC

by

M. R. Hughson\* and S. Kaiman\*\*

SUMMARY

Malachite, the most abundant copper-bearing mineral, occurs in fractures and is disseminated in a weathered, light coloured, fine-grained, siliceous rock sample from Gaspé Copper Mines Ltd. Other copper-bearing minerals present are chalcopyrite and bornite which are sparsely disseminated and digenite ( $\text{Cu}_{2-x}\text{S}$ ) which occurs as rims around some grains of chalcopyrite.

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## INTRODUCTION

Four samples of 3/4 inch material, one from the surface and the other three from greater depth, were received by the Extraction Metallurgy Division from Gaspé Copper Mines Ltd. on March 15, 1963. They were given our Reference No. 3/63-4. The three subsurface samples were combined for test work and a small sample of this material was taken for mineralogical study. The purpose of the mineralogical investigation was to identify the copper minerals and determine the nature of their occurrence.

Chemical analyses of a head sample performed by the Chemical Analysis Section gave the following results: Cu=0.81 per cent, Fe=6.17 per cent, S=0.22 per cent, CaO=9.18 per cent, and SiO<sub>2</sub>=64.3 per cent.

## METHOD OF INVESTIGATION

A preliminary examination of the rock chips as received was made with a low-power stereoscopic microscope. Polished sections were prepared of selected chips for the study of the metallic minerals and thin sections for the study of the rock-forming minerals.

In order to determine the mineral composition and to make a further search for copper-bearing metallic minerals a representative head sample was screened and the minus 65 plus 150 mesh size was treated on the Haultain Superpanner to concentrate the heavy minerals. A numerical count was made of the mineral constituents by traversing one polished section of the tip and two of the tailing, using a Swift automatic point counter.

## RESULTS OF INVESTIGATION

The sample consists of a weathered, fine-grained, light greyish-green, siliceous rock composed mainly of quartz. Brownish to black iron oxides occur on exposed surfaces, in fractures and are disseminated in the rock. Minor non-metallic minerals are amphibole, pyroxene, garnet, anatase and rutile. The nature of occurrence of bright green malachite is similar to that of the iron oxides but malachite is much less abundant. Metallic minerals are sparse: the most abundant are pyrite and chalcopyrite. Also present are magnetite, digenite, bornite and pyrrhotite.

The results of a screen analysis of a representative head sample of the ore are shown in the following table.

TABLE 1  
Screen Analysis

Size	Weight in Grams	Weight Per Cent
+ 65 mesh	258.8	62.6
- 65+150 "	42.4	10.2
-150+200 "	17.0	4.1
-200+270 "	9.3	2.2
-270+325 "	9.6	2.3
-325 "	77.0	18.6
Totals	414.1	100.0

The mineralogical composition of the minus 65 plus 150 mesh fraction as determined from a point count analysis is shown in Table 2. Malachite could not be distinguished from the non-metallic minerals in the polished sections and is included with them in the table.

TABLE 2  
Mineral Composition of the Minus 65 Plus 150 Mesh Size

Mineral	Weight Per Cent
Non-metallics including malachite	97.1
Iron oxides (secondary)	1.9
Pyrite	0.8
Chalcopyrite	0.2
Magnetite	trace
Digenite	"
Bornite	"
Pyrrhotite	"

The major metallic minerals, pyrite and chalcopyrite, commonly occur as sparsely disseminated grains in the rock and in fractures in the rock. Many of the pyrite grains are rimmed by iron oxides and chalcopyrite grains by digenite. The less common metallic minerals, magnetite, bornite, and pyrrhotite were observed only in the Superpanner tip, and they occur mainly as free grains. A unique occurrence in the Superpanner tip was observed where several grains of pyrite were partly surrounded by digenite.

The copper-bearing metallic minerals are chalcopyrite, digenite, and bornite. The total copper content of these minerals calculated from the point count analysis of the minus 65 plus 150 mesh fraction is approximately 0.08 per cent or 10 per cent of the copper contained in the sample. Since malachite is the only other copper-bearing mineral identified it contains 90 per cent of the copper in the sample.

#### CONCLUSIONS

Malachite, the major copper-bearing mineral in a sample from Gaspé Copper Mines Ltd. contains approximately 90 per cent of the copper present. Most of the remainder is contained in chalcopyrite and small amounts are present in digenite and bornite. Malachite is believed to be an alteration product of the metallic copper-bearing minerals although it shows no direct relationship to them. It occurs as disseminations and fracture-fillings in the fine-grained quartz rock.