CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

OTTAWA

MINES BRANCH INVESTIGATION REPORT IR 62-107

MINERALOGICAL EXAMINATION OF SAMPLES FROM RAGLAN NICKEL MINES LIMITED

by

W. PETRUK

MINERAL SCIENCES DIVISION

NOTE: THIS REPORT RELATES ESSENTIALLY TO THE SAMPLES AS RECEIVED. THE REPORT AND ANY CORRESPONDENCE CONNECTED THEREWITH SHALL NOT BE USED IN FULL OR IN PART AS PUBLICITY OR ADVERTISING MATTER.

COPY NO. 21

DECEMBER 10, 1962

Mines Branch Investigation Report IR 62-107

MINERALOGICAL EXAMINATION OF SAMPLES FROM RAGLAN NICKEL MINES LIMITED

by

W. Petruk*

- - -

SUMMARY OF RESULTS

A sample of nickel ore from the Cross Lake area in the Ungava nickel belt in Quebec was examined mineralogically. It was found that the minerals that may be of economic significance are pentlandite, violarite and chalcopyrite. These minerals are very finely intergrown with pyrrhotite and gangue, and complete liberation cannot be expected even at extremely fine grinds.

*Scientific Officer, Mineralogy Section, Mineral Sciences Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

INTRODUCTION

A sample of nickel ore from the Cross Lake area in the Ungava nickel belt in Quebec was received from G. Mathieu of the Mineral Processing Division, Mines Branch in October, 1962. Mr. Mathieu requested that the sample, originally submitted by Dr. A.T. Griffis of Watts, Griffis and McOuat Limited, Toronto, Ontario on behalf of Raglan Nickel Mines Limited, be examined mineralogically in order to aid his ore dressing investigation. A separate report on that phase of the work will be issued by the Mineral Processing Division. The sample received consisted of a number of hand specimens and a head sample ground to about -10 mesh.

METHOD OF EXAMINATION

Four polished sections were prepared from the hand specimens and the minerals identified by means of microscopical and X-ray diffraction studies.

RESULTS OF EXAMINATION

The sample consists of disseminated metallic minerals in a serpentine-chlorite rock. The metallic minerals are pyrrhotite (FeS), pentlandite ((Fe,Ni)S), chalcopyrite ($CuFeS_2$) and violarite ($(Ni,Fe)_3S_4$). The non-metallic minerals are serpentine, chlorite, amphibole, feldspar and spinel.

Pyrrhotite is the principal metallic mineral. It occurs as anhedral grains that range from below 1 micron to about 500 microns in diameter, and contains inclusions of pentlandite and spinel. Some of the pyrrhotite grains occur as minute angular fragments that appear to be parts of larger grains that have been intensely sheared, fractured and recemented by gangue minerals (see Figure 1).

The pentlandite occurs as (a) irregular grains intergrown with pyrrhotite and gangue (see Figure 2), and (b) elongated inclusions in pyrrhotite (see Figure 3). The inclusions range from below 1 micron to 20 microns in width and up to 50 microns in length. They were likely exsolved from pyrrhotite. The irregular grains of pentlandite range from about 1 to 250 microns in diameter, and the larger ones are partially altered to violarite (see Figure 4). The alteration proceeds into pentlandite from fractures and from pyrrhotite-pentlandite boundaries.

A small quantity of chalcopyrite occurs as irregular grains ranging from about 5 to 200 microns in diameter. It is commonly intergrown with pyrrhotite and gangue minerals.

A few grains of spinel are present in the ore. The variety could not be identified, but X-ray studies suggest that it is not magnetite but may be a magnesium-aluminum spinel.

CONCLUSIONS

The minerals that may be of economic significance are pentlandite, violarite and chalcopyrite. The present study indicates that in order to liberate these minerals from the gangue, very fine grinding would be required. It is almost certain that even at fine grinds complete liberation will not be achieved.

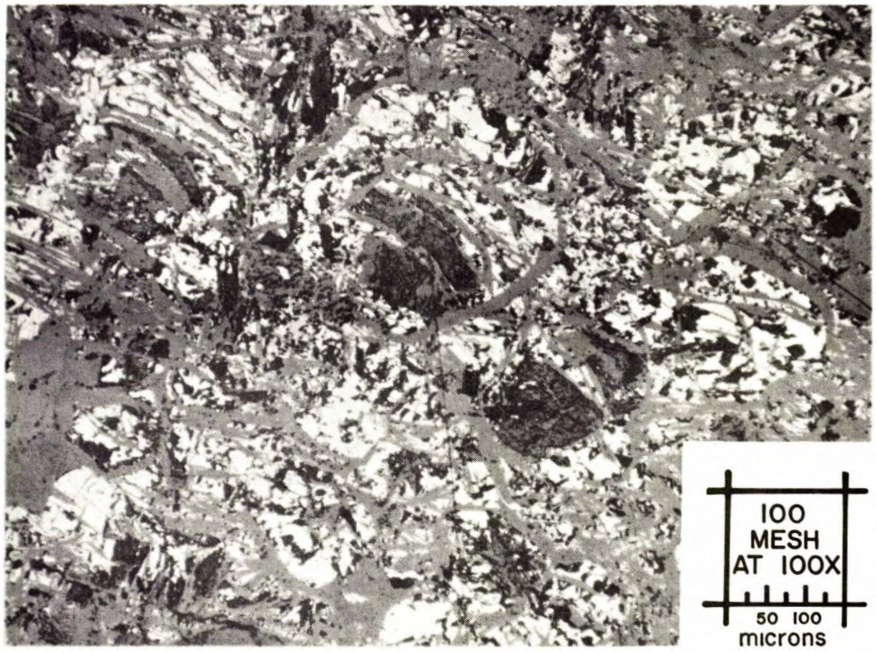

Figure 1. Photomicrograph of a polished section showing pyrrhotite (white) that appears to have been fractured and recemented by gangue minerals (grey).

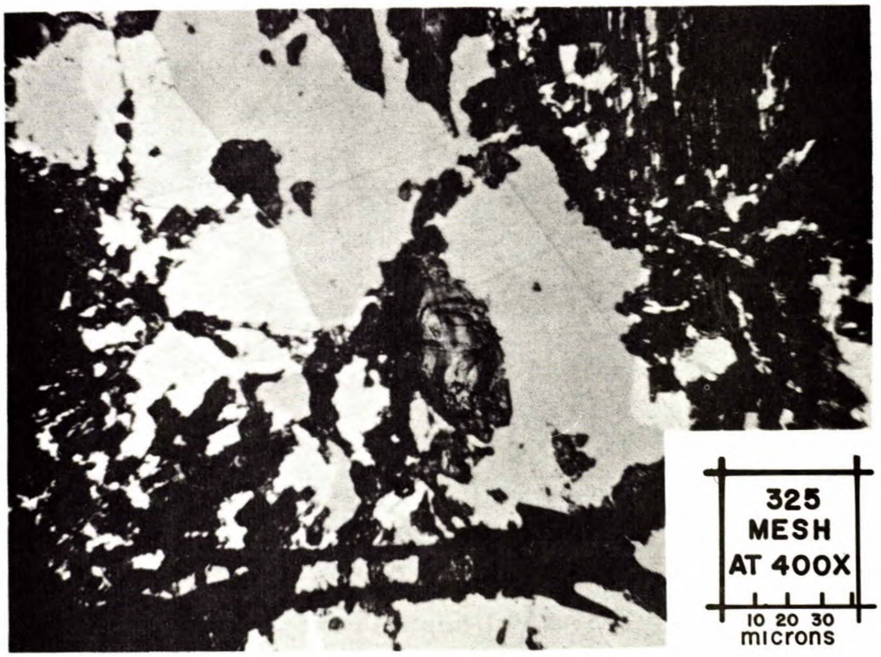

Figure 2. Photomicrograph of a polished section showing pentlandite (white) intergrown with pyrrhotite (grey). The black areas represent gangue.

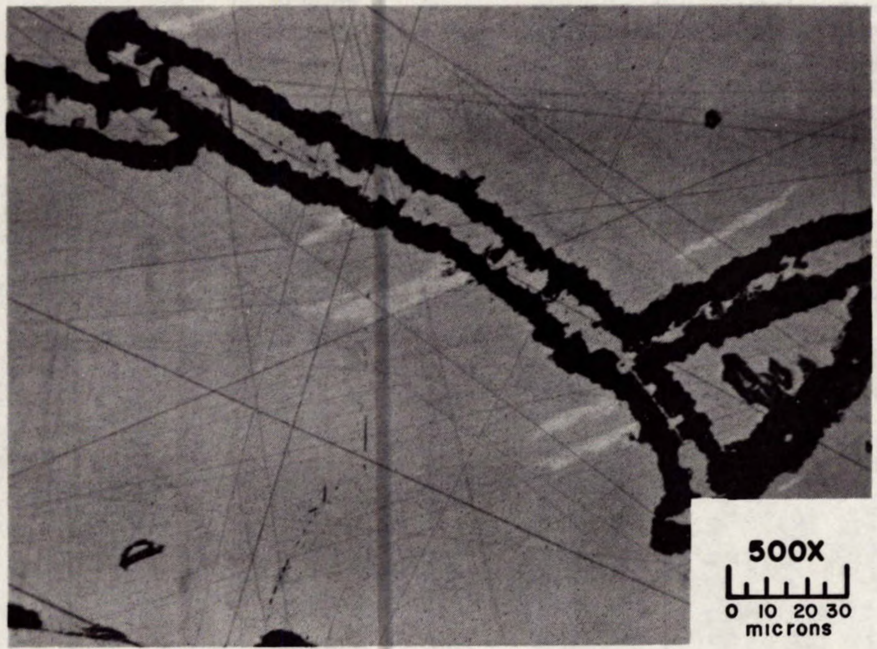

Figure 3. Photomicrograph of a polished section showing minute elongated inclusions of pentlandite (white) in pyrrhotite (grey). The black areas are pits on the polished surface.

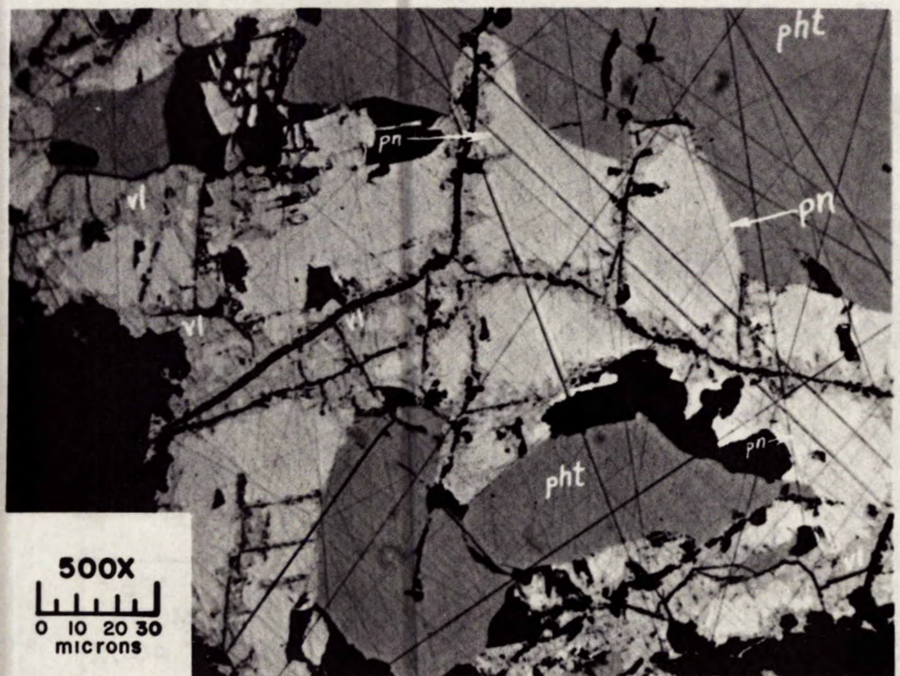

Figure 4. Photomicrograph of a polished section showing pentlandite (pn) partially altered to violarite (vl). The areas marked (pht) are pyrrhotite and the black areas are pits on the polished surface. The straight lines are scratches on the polished surface and the curved ones are fractures in the minerals.

- - - -

WP:DV