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MINERALOGICAL REPORT ON SIX ORE SAMPLES FROM PAMOUR PORCUPINE MINES LTD., PAMOUR, ONTARIO

by

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EXTRACTION METALLURGY DIVISION

6 p

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SUMMARY

Six ore samples from Pamour Porcupine Mines Ltd. are composed of medium grey to dark grey, fine grained, talc-carbonate-chlorite schist. Fine grained sulphides, of which pyrite is the most common, are sparsely disseminated throughout the ore samples but in two of the samples disseminated grains of magnetite are more abundant.

Two nickel minerals, gersdorffite and pentlandite, occur in the ore samples. Gersdorffite, a nickel sulphide-arsenide, occurs as disseminated crystals in the gangue and as irregular particles intergrown with sulphide minerals. Irregular particles of pentlandite, a nickel iron sulphide, are commonly intergrown with pyrite. Gersdorffite is more abundant than pentlandite. The grain size of the nickel minerals is usually less than 325 mesh although some of the disseminated crystals of gersdorffite are almost 28 mesh in size.

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INTRODUCTION

Six samples of minus five inch ore from Pamour Porcupine Mines Ltd. were submitted to the Mineralogy Section by Mr. W.A. Gow on February 3, 1964. They were reported to be from the Company's property at Pamour, Ontario, and were designated numbers 6288, 6289, 6290, 6291, 6292, and 6293. The samples were assigned Reference No. 2/64-1. The purpose of the investigation was to identify the nickel minerals which occur in the ore and to determine the nature of their occurrence.

MINERALOGY

A preliminary examination of the lump ore samples was made with a low-power stereoscopic microscope. Samples 6288, 6289, 6290, and 6291 consist of a fine grained, medium grey, schistose rock. Some of the rock is highly folded and fractures are numerous. On fracture surfaces the rock has a pearly or greasy lustre. White to smoky grey veins up to one half inch in thickness are present. Samples 6292 and 6293 also consist of fine grained rock but are darker grey in colour. The schistosity is less apparent and there is little of the folding and fracturing observed in the rock comprising samples 6288 to 6291. Also veins of white to smoky grey material are less common in samples 6292 and 6293. Fine grained metallic minerals are sparsely disseminated throughout the six ore samples.

Thin sections of the rock from each of the samples were studied with a petrographic microscope. Dolomite is the most abundant mineral in samples 6288, 6289, 6290, and 6291 and is intergrown with talc, chlorite, and minor amounts of quartz. Siderite was identified in samples 6288 and 6289. Dolomite and siderite show conspicuous rhombohedral cleavage. Talc occurs as very fine fibrous aggregates and is intimately associated with chlorite. Disseminated, anhedral grains of quartz are more common in samples 6288 and 6289 than in samples 6290 and 6291.

In samples 6292 and 6293 talc and chlorite are more abundant than dolomite and quartz is rare. Calcite is present in these samples in addition to dolomite.

Rutile is common to all six ore samples and occurs as fine anhedral grains sparsely disseminated in the rock. It is more abundant in samples 6288 to 6291 than in samples 6292 and 6293.

White to smoky grey veins of dolomite transect the rock in each sample. Minor amounts of quartz are present in some of the veins. The maximum observed thickness of the veins is one half inch but most of the veins are one quarter to one eight of an inch in thickness.

Microscopic examination of polished sections of the six ore samples showed that metallic minerals are scarce. They are fine grained and disseminated throughout the rock but are rarely found in the dolomite veins. Sulphides and a sulphide-arsenide comprise the metallic minerals in samples 6288, 6289, 6290, and 6291, but in samples 6292 and 6293 they are rare and magnetite is the most abundant metallic mineral. Magnetite occurs as subhedral crystals or fragments of crystals which, in many places in sample 6293, are elongated or lath-like.

The most common sulphide mineral in the ore samples is pyrite. It occurs as disseminated, irregularly shaped grains, the majority of which are between one quarter and one half of a millimeter in width. Pyrrhotite and chalcopyrite are present in the form of individual grains and as particles partly or completely enclosed in grains of pyrite. Fine inclusions of rutile occur occasionally in grains of pyrite.

A nickel sulphide-arsenide mineral, gersdorfitte (Ni, Fe, Co)AsS, occurs as disseminated subhedral to euhedral crystals (Figures 1 and 2) and as irregular particles intergrown in grains of pyrite (Figure 3) or pyrrhotite (Figure 4). The faces of most of the gersdorfitte crystals are corroded (Figures 1 and 2). Pyrrhotite is intergrown with gersdorffite (Figure 2) or occurs adjacent to particles of gersdorffite in grains of pyrite (Figure 3). A second nickel-bearing mineral, pentlandite $(Fe, Ni)_9S_8$, is present in this ore sample. It is intergrown with many of the pyrite grains (Figure 5). In places it occurs in grains composed of an intimate mixture of several sulphide minerals (Figure 6) or rarely it may occur as discrete grains in gangue.

The majority of the gersdorffite crystals are between 40 and 50 microns across their small dimension but crystals as large as 500 microns in width are present. The largest of the particles of gersdorffite occurring in grains of pyrite or pyrrhotite measures 30 by 40 microns. Particles of pentlandite intergrown with pyrite are commonly elongated with a width ranging between 5 and 20 microns.

PHOTOMICROGRAPHS

In the photomicrographs of polished sections the gangue minerals are indicated by the letter G.

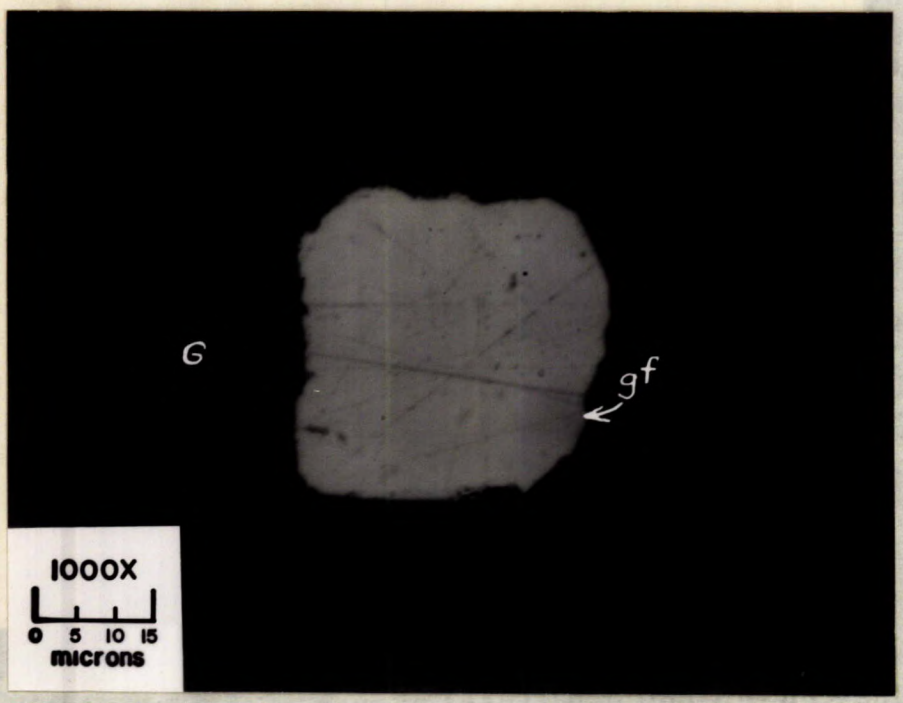

Figure 1. A subhedral crystal of gersdorffite (gf). The faces of the crystal are corroded. X1000.

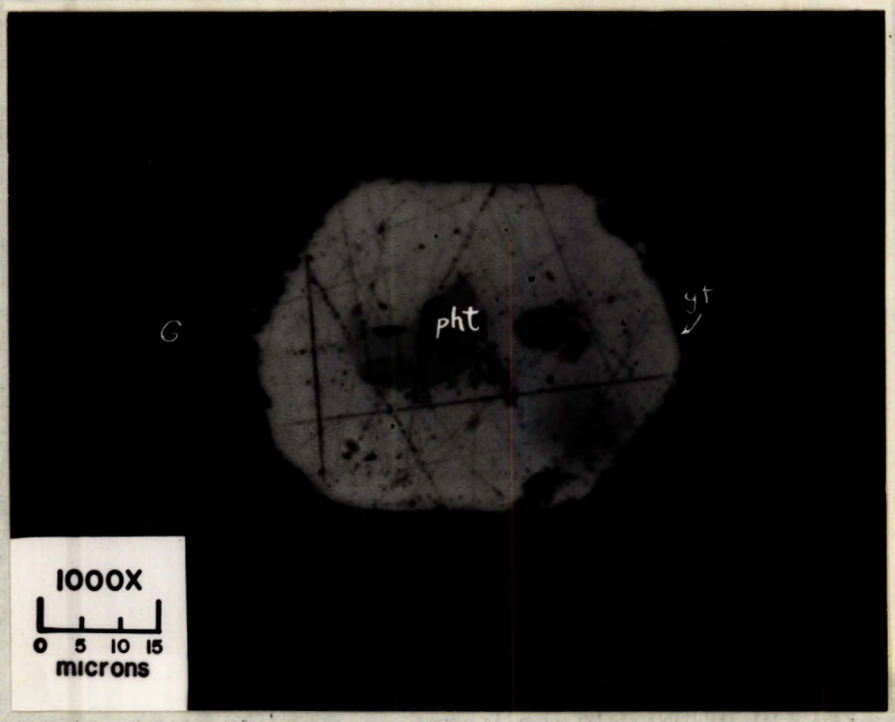

Figure 2. Small particles of pyrrhotite (pht) occur in a corroded euhedral crystal of gersdorffite (gf). X1000.

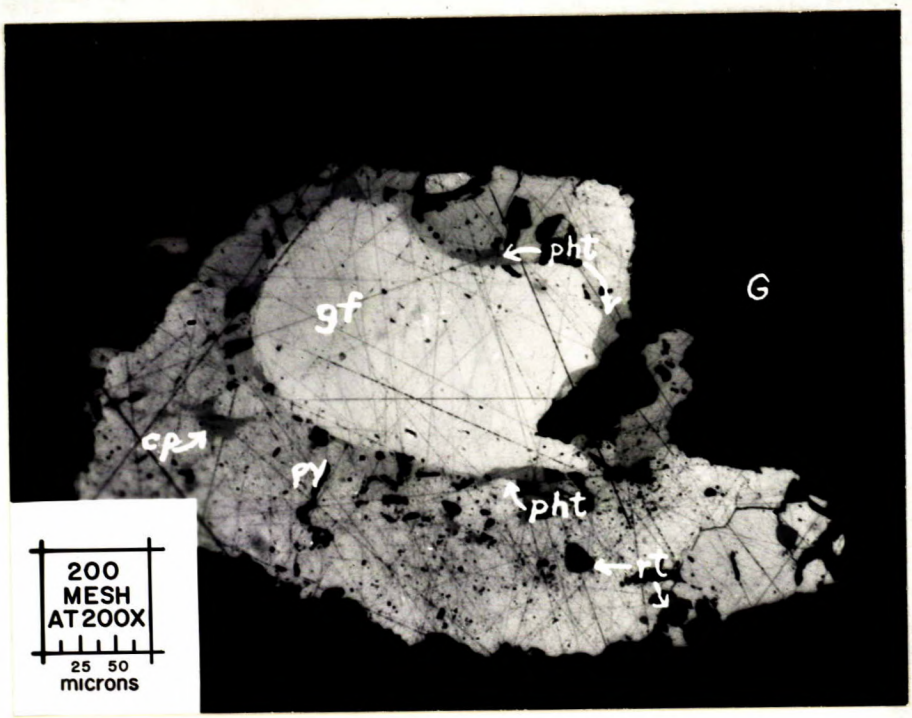

Figure 3. A grain of pyrite (py) contains a large particle of gersdorffite (gf) and much smaller particles of pyrrhotite (pht), chalcopyrite (cp) and rutile (rt). The black areas are pits. X200.

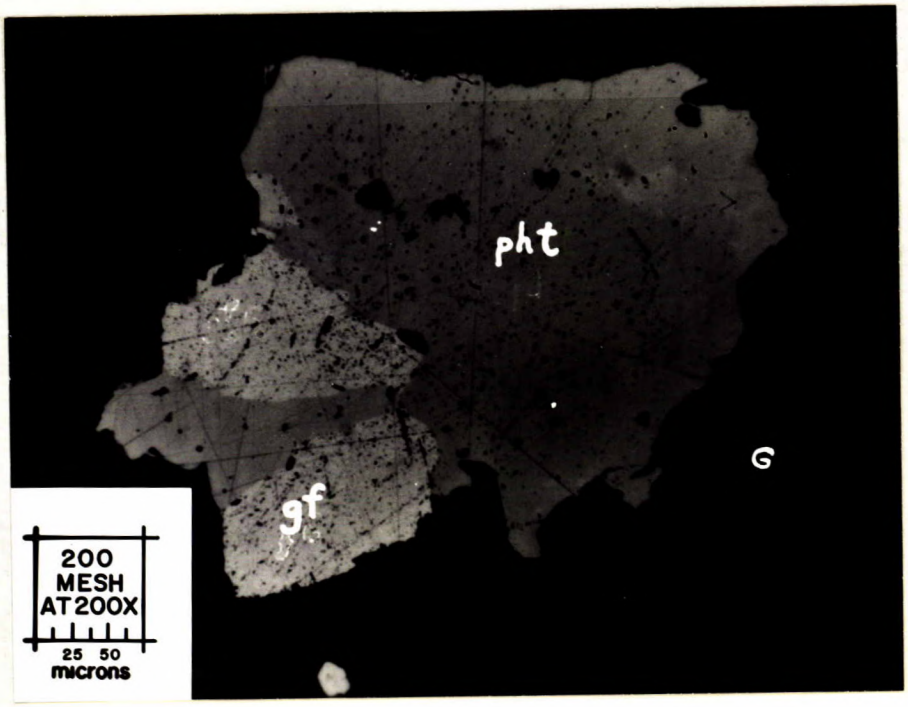

Figure 4. A grain of pyrrhotite (pht) contains particles of gersdorffite (gf). The black areas are pits. X200.

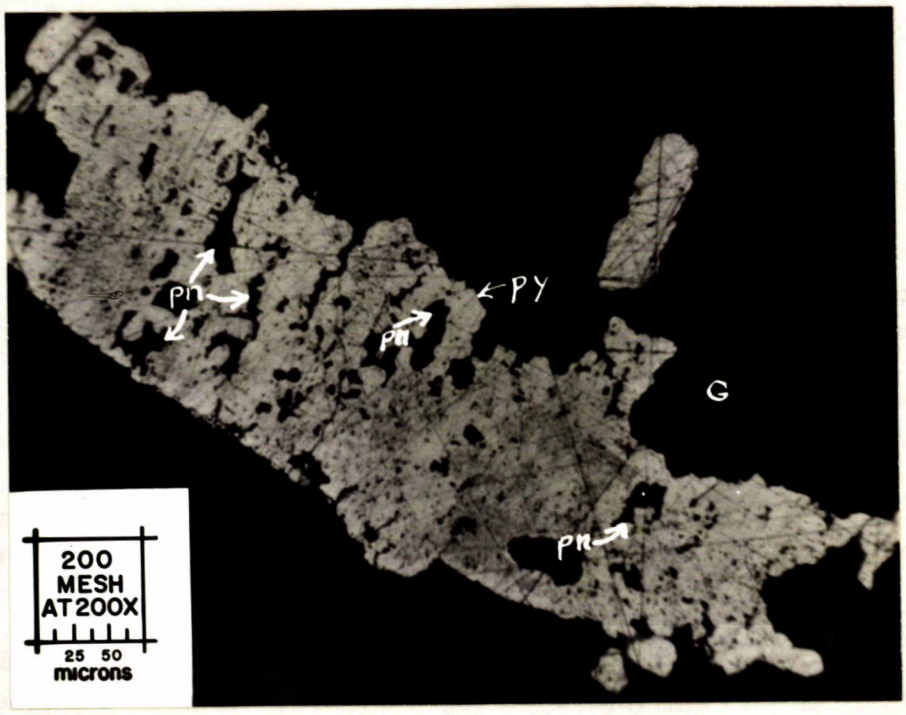

Figure 5. Inclusions of pentlandite (pn) in a grain of pyrite (py). X200.

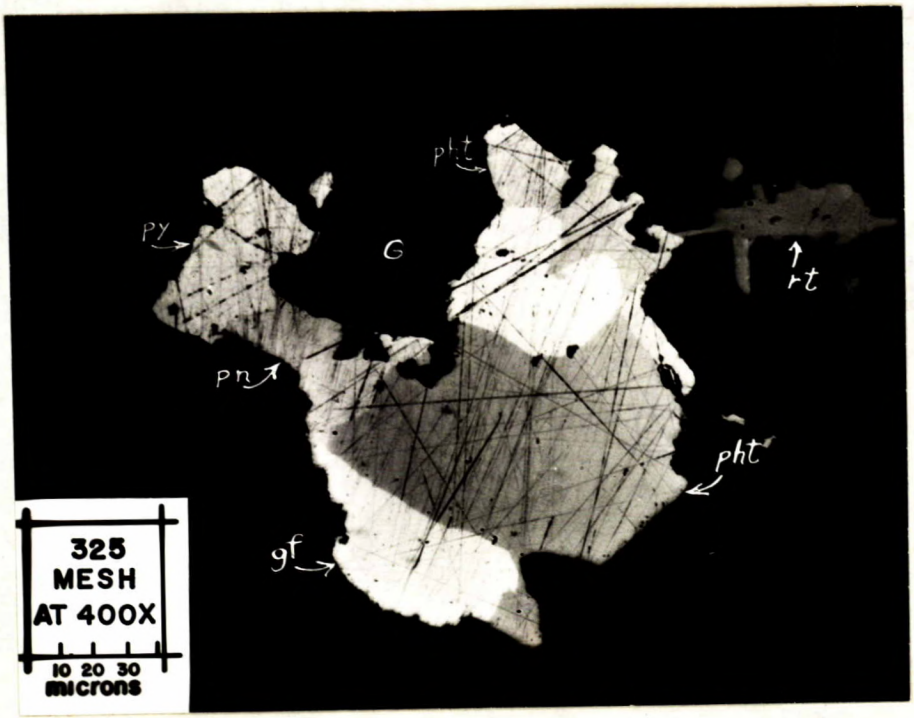

Figure 6. A grain composed of pyrrhotite (pht), gersdorffite (gf), pentlandite (pn), and pyrite (py). A particle of rutile (rt) is adjacent to the grain. X400.

DISCUSSION AND CONCLUSIONS

Four of the six ore samples received from Pamour Porcupine Mines Ltd., namely, samples 6288, 6289, 6290, and 6291, consist of a medium grey, fine grained, schistose rock. The other two samples, 6292 and 6293, are darker grey and the schistose appearance is less apparent. Dolomite, talc, and chlorite are the major rock-forming constituents. Dolomite is more abundant in the lighter coloured samples and talc and chlorite are more abundant in the darker grey samples. Minor amounts of quartz, siderite, calcite and rutile are present.

Fine grained sulphide minerals are sparsely disseminated in all of the samples. They are scarce in samples 6292 and 6293 in which magnetite is present. Pyrite is the predominant sulphide mineral.

Two nickel-bearing minerals are present, gersdorffite, a nickel sulphide-arsenide and pentlandite, a nickel-iron sulphide. Gersdorffite is more abundant than pentlandite. Both occur as fine, irregular particles partly or completely enclosed in pyrite and to a lesser extent in other sulphide minerals. Gersdorffite also occurs as subhedral to euhedral crystals disseminated in the non-metallic gangue. The corroded appearance of the gersdorffite crystals indicates they have undergone replacement since their formation in the rock. The width of the nickel mineral grains rarely exceeds 50 microns or 325 mesh. However, coarser crystals of gersdorffite, up to almost 28 mesh in size, are present in the gangue.

Selective flotation of the nickel minerals may be possible since both gersdorffite and pentlandite occur, at least in part, as free grains in gangue and much of the remainder could probably be exposed by fine grinding of the ore.