O T T A W A September 29th, 1941.

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of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1100.

Investigations on a Manganiferous Iron Ore from the Sault Ste. Marie District, Ontario.

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Shipment:

A 7-pound sample of ore, taken from a deposit near Sault Ste. Marie, Ontario, was received on September 6th, 1941. This sample was submitted by C. W. Greenland, 779 Bayview Avenue, Toronto, Ontario.

Characteristics of the Ore:

Selected specimens of the ore were taken and subjected to microscopic examination of polished sections for the purpose of determining the character of the ore.

Gangue -

Gangue material forms the greater portion of the polished sections and consists of a mixture of quartz and carbonate (calcite) as small masses and coarse to fine disseminated grains. The calcite exhibited a slight pinkish tinge.

Metallic Minerals -

Magnetite, the most abundant metallic mineral in the polished sections, is present largely as very fine-grained masses unevenly distributed throughout gangue. Hematite (specular), next in abundance, is often intimately associated with magnetite. On the whole the hematite is more coarsely crystalline than the magnetite and usually occurs in plates or needles which are sometimes grouped in sheaf-like forms. It contains numerous tiny inclusions of gangue and of magnetite.

A small quantity of pyrite is visible as occasional irregular grains, medium to small in size, scattered through gangue with the iron oxides. Many grains show attack and replacement by "limonite"; a few grains have been almost entirely replaced. A practically negligible quantity of chalcopyrite is also visible in the same mode of occurrence as pyrite. "Limonite" is not only present as replacement margins around grains of pyrite and chalcopyrite but, in some hand specimens, is quite prevalent as a thin layer of gossan, which indicates that the sample has been taken from the surface.

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(Characteristics of the Ore, cont'd) -

(Metallic Minerals, cont'd) -

As no manganese minerals were observed in the sections the microscopical examination did not disclose how this metal occurs.

A little of the gossan, collected from the surface of a hand specimen, gave a definite microchemical reaction for manganese.

Sampling and Analysis:

The sample was crushed, ground, and sampled by standard methods. Analysis showed the following:

Iron (Fe)	-	32.51 per cent
Manganese (Mn)	-	0.12 "
Calcium carbonate ($CaCO_3$)	-	26.30 "
Silica (SiO_2)	-	27.16 "

Investigative Test and Results:

An investigative test was conducted to determine with which mineral the manganese was associated. A sample of ore was ground to minus 100 mesh and screened for panning by means of a Haultain superpanner. The superpanner products were put through a Davis tube magnetic separator.

The magnetic portion of the superpanner concentrate gave the magnetite, and the non-magnetics the hematite. The non-magnetics from the superpanner tailing were the calcite-quartz product and the magnetics were the middling.

Results of Panning and Magnetic Separation:

Product	Weight, per cent	Analysis, per cent			
		Mn	CaCO3	Fe	Insol.
Feed	100.0	0.14	24.65	33.52	26.24
Magnetite	38.8	0.06	1.47	66.20	5.75
Hematite	3.4	0.10	8.39	49.80	13.10
Calcite-quartz	46.1	0.23	46.19	5.86	42.61
Middling	11.7	0.11	21.40	29.42	33.50

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(Investigation Test and Results, cont'd) -

A small amount of calcite was removed from the hand specimens by means of a knife. This product analysed 97.14 per cent $CaCO_3$ and 0.42 per cent manganese.

The above results indicate that calcite carries the largest portion of the manganese. It is possible that manganese replaces part of the calcium in the calcite to form manganocalcite and does not occur as individual crystals of rhodochrosite associated with calcite.

Conclusion:

The ore represented by this sample would be too low in manganese for commercial beneficiation of that metal.

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