CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

OTTAWA

MINES BRANCH INVESTIGATION REPORT IR 72-15

PETROGRAPHY OF SAMPLES OF MAGNESITE ROCK FROM NORTHWEST GANDER RIVER, NEWFOUNDLAND

by

JAMES A. SOLES

MINERAL PROCESSING 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. 13

FEBRUARY, 1972

Mines Branch Investigation Report IR 72-15

PETROGRAPHY OF SAMPLES OF MAGNESITE ROCK FROM NORTHWEST GANDER RIVER, NEWFOUNDLAND

by

James A. Soles*

- - - -

ABSTRACT

The petrographic study showed that the rock is principally fine-grained magnesite, with abundant talc dispersed in the carbonate or concentrated in bands. Quartz is common locally, and chromite, magnetite and pyrite are minor accessory minerals. Iron is also present in the magnesite structure. Beneficiation of the magnesite to meet requirements for refractories may be difficult.

* Research Scientist, Ore Mineralogy Section, Mineral Processing Division, Mines Branch, Department of Energy, Mines and Resources, Ottawa, Canada.

MICROPROBE ANALYSIS DATA SHEET

ANALYSIS # EP 72-18

DATE 18-2-72

OPERATOR D. Owens

OPERATING KV 25

SPECIMEN CURRENT 0.0400 ma

SPECTROMETERS	#1	#2	#3
CRYSTAL	PET	KAP	LiF
ELEMENTS ANALYSED	Ca	Mg	Fe

STANDARDS: Mg from MgO; Fe from Fe_2O_3 ; Ca from Sphene.

ANALYSIS Two areas of the carbonate were analysed for Fe and also Mg, and Ca(although the latter two elements were not requested). The two areas selected were a white to yellowish white(see arrow)carbonate and the other a darker greyish carbonate (Circled). The Fe,Ca and Mg content of the greyish carbonate were more constant than those from the lighter coloured carbonate. The results obtained are listed below. It should be noted that these results were calculated without reference to standard corrections for absorption , fluorescence, atomic number etc.

Carbonate	Wt% Fe	Wt% Mg	Wt% Ca
Yellowish white	5.0 to 10.2	13.1 to 17.4	0.1 to 1.1
Medium grey	6.2 to 7.4	16.0 to 16.7	0.1 to 0.8

INTRODUCTION

A shipment of about 50 pounds of carbonate rock reported to be from the Great Bend area on the Northwest Gander River, Newfoundland, was received in November, 1971, from Mr. A. M. Frew, senior geologist of Newfoundland and Labrador Corporation. The geology of the region has been studied by Cooper[1] and others, who report that magnesite bodies are common within the serpentinized ultramafic mass which intrudes Silurian(?) clastic rocks in the Great Bend area.

The company is interested in developing the deposit as a possible source of magnesite for refractories, so a petrographic study was undertaken to assist the company in determining the suitability of the rock for this purpose.

PROCEDURES

Three specimens were selected from the supply to represent rock of different texture and color. Thin sections were cut from each for petrographic study, and X-ray powder diffraction patterns were obtained from slices and from individual particles to check their mineralogical compositions. A microprobe analysis* for iron in magnesite was made on one polished section to determine the approximate iron content.

RESULTS

The selected samples are mineralogically similar, differing only in the proportions of the principal minerals as shown in Table 1. The rock is a talcose magnesite containing variable amounts of chromite, magnetite and pyrite.

Magnesite in the samples is fine to coarse-grained (0.1 to 3.0 mm), occurring as relatively finely crystalline monomineralic masses, as small individual crystals scattered thickly in a talc matrix, and as larger cyrstals in talc seams. Talc is uniformly fine-grained (1 to 5 μm) in the matrix, but

---

*By Mr. D. Owen, Mineral Sciences Division.

it also occurs as scattered larger crystals in veinlets and areas of dark impure magnesite. Slickensiding of talc is common, indicating that the mineral has been the locus of stress relief of the rock. Quartz is present as large discrete monocrystals dispersed randomly through the rock, as masses of fine aggregated crystals, and in veinlets; it is rarely free of undulatory extinction, also suggesting that the rock has been deformed. Pyrite occurs mostly as euhedra in quartz-rich areas, and grains of chromite are

TABLE 1

Mineralogical Composition of Northwest Gander River Magnesite

Minerals	Proportions	Grain Sizes
Talc	50 to 10%	1.0 to 50 μm
Magnesite	45 " 80	0.1 " 3 mm
Quartz	25 " 5	0.1 " 1 "
Chromite	1 " 2	0.1 " 2 "
Pyrite	< 1	0.01 " 1 "
Magnetite	> 2	0.01 " 0.5 "

scattered throughout the rock, in euhedral form where shearing is minimal, or fractured to pulverized where movement has taken place. Chromite is magnetic and probably contains much iron. Rather large (1 to 5 mm) dark areas, scattered through all the specimens, consist principally of magnesite with minor talc, dusted with dispersed magnetite, pyrite, and unidentified materials. The various petrographic features are shown in Figures 1 and 2.

The results of the microprobe analysis are given in Appendix 1. The magnesium analyses are considerably low, as one would expect from uncorrected data.

DISCUSSION

The magnesite weathers to a buff tone, suggesting that it contains iron in moderate amounts. The X-ray pattern obtained fits that of pure (synthetic) magnesite, but gives a slightly smaller cell; however, no information was found in the literature[2] on the change in cell dimension of magnesite when iron substitutes for magnesium, so the iron

content cannot be estimated from diffraction data. The semi-quantitative microprobe analysis indicated that it may range from 5 to 10 per cent.

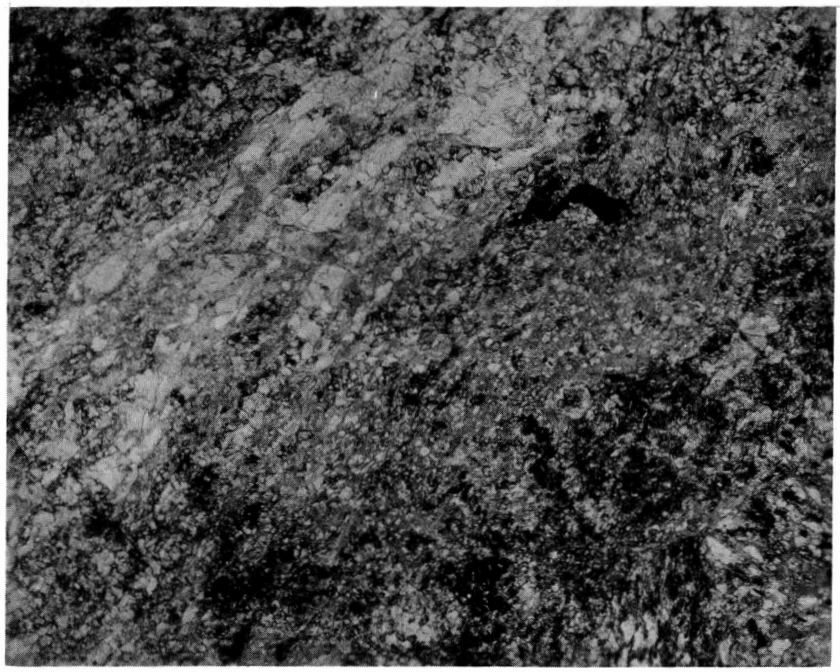

Figure 1. Photomicrograph of Northwest Gander River magnesite rock, showing fine-grained magnesite (light, high relief) with intergranular talc (grey); banded, coarser-grained magnesite imbedded in schistose talc; two black chromite grains, one deformed by shearing; and dark areas, predominantly magnesite, containing minor pyrite, oxides(?) and unidentified material. Magnification 10X.

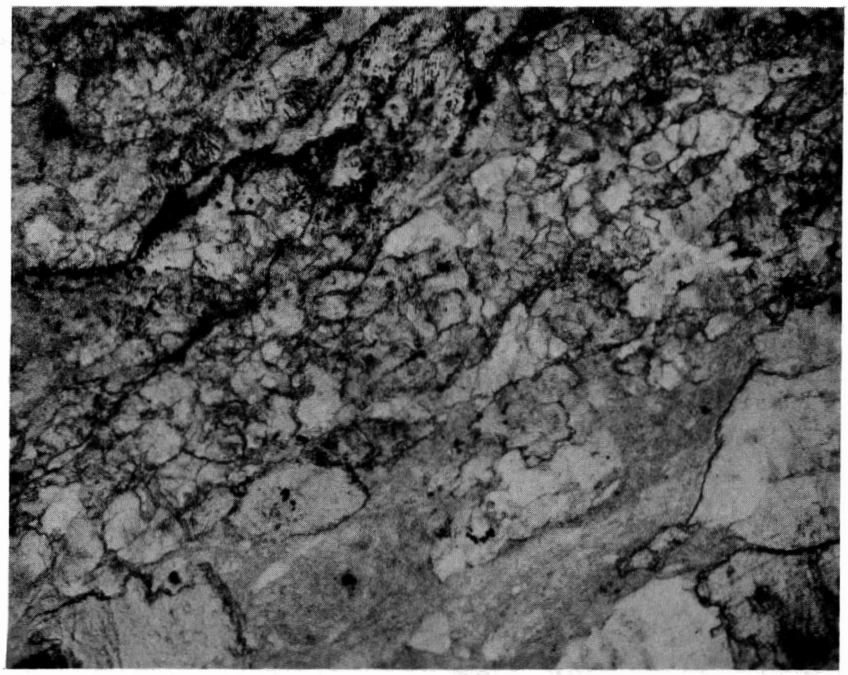

Figure 2. Enlargement of area near to Fig. 1; magnification 50X.
Top: finely granular mass of magnesite with streaks of intergranular talc and smeared chromite
Bottom: coarser magnesite in seam of talc (grey, low relief).

Processing of this rock to obtain a refractory magnesite concentrate would be difficult. Fine grinding would be necessary to release dispersed talc from magnesite, thereby reducing the effectiveness of a gravity separation technique. A flotation technique may be more effective in reducing the talc content, and magnetic separation could be used to remove the discrete magnetic iron minerals, but iron in the magnesite structure would remain in the concentrate. Chemical analyses of beneficiated samples, treated elsewhere[3], appear to support these conclusions.

REFERENCES

1. G.E. Cooper "Magnesite Occurrences in Central Newfoundland". In: The Geology of Canadian Industrial Mineral Deposits, Sixth Commonwealth M. & M. Congress, 166-174 (1957).
2. D.L. Graf "Crystallographic Tables for the Rhombohedral Carbonates", American Mineralogist, 46 (11), 1283-1316 (1961).
3. Personal communication, Newfoundland and Labrador Corporation.

JAS/ec

CONCLUSIONS

Tantalite and wodginite are the principal Ta-bearing minerals. Cassiterite and wodginite are the Sn-bearing phases. All the minerals are well liberated. The concentrate would be upgraded towards the desired Ta_2O_5 content by floating the sulphides out of it. Tin is significant in the ore and it ought to be determined in all the product analyses.

Figure 1. Photomicrograph of the coarse tantalum cleaner concentrate to illustrate the content of sulphides (white) and degree of liberation.