

O T T A W A April 24th, 1943.

R E P O R T
of the
ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1391.

Concentration of Chromite Ore from
Embury Lake, Manitoba.

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Shipment:

A $1\frac{1}{4}$ -pound sample of chromite ore, obtained from the property of William Kelly, near Embury Lake, Manitoba, was received on March 17th, 1943, from Dr. G. Hanson, Acting Chief Geologist of the Geological Survey Division, Mines and Geology Branch, Department of Mines and Resources, Ottawa, for investigation by these Laboratories.

Location of Property:

The property from which the sample was obtained is located north of Embury lake, Manitoba, this location being shown on the G.S.C. Map 632A as a chromite occurrence. The sample was collected from a chromite-bearing band which ranges from 2 to 6 feet wide in serpentine rock. It was further observed that several chromite-bearing bands with individual lengths of several yards were found in outcrops discontinuously over a length of more than one mile.

Purpose of Investigation:

Request was made that sample be crushed to 80 mesh and for the following:

A. Analysis of a part of the crude sample for iron and chromium.

B. That:

(i) a concentrate of the heavy mineral be made (this presumably would contain, in material between minus 80 and plus 200 mesh, most of the chromite present);

(ii) by optical inspection with a microscope, determination be made of the approximate percentage of chromite (or metallic mineral) and serpentine (or non-metallic mineral) in the concentrate; and

(iii) the concentrate be analysed for iron and chromium.

(C). A magnetic concentration test was made in addition to the tests required.

The purpose of this investigation is to learn whether the material has the quality of a commercial ore of chromium.

Investigative Procedure:

The ore was crushed to pass an 80-mesh screen. A head sample was assayed for chromium and iron.

A portion of the ore was concentrated on a Haultain superpanner. A second portion was concentrated magnetically and the non-magnetic portion was treated by the gravity concentrating method.

A microscopic examination of the concentrate was made. Each product was assayed for chromium and iron.

Results of Assays:

A. Analysis of the Ore -

Cr₂O₃ - 23.72 per cent.
Fe - 17.60 "

Ratio of chromium to iron, 0.92:1.

B(iii). Analysis of the Superpanner Concentrate -

Cr₂O₃ - 49.32 per cent.
Fe - 27.22 "

Ratio of chromium to iron, 1.24:1.

C. Analysis of the Concentrate from the Non-Magnetic Portion of the Feed -

Cr₂O₃ - 53.64 per cent.
Fe - 23.46 "

Ratio of chromium to iron, 1.56:1.

DETAILS OF TESTS:

Test No. 1 (B-1). - Concentration of the Ore by Gravity.

This test was made by the concentration of 100 grams of the ore on a Haultain superpanner.

A portion of the concentrate recovered was used for the microscopic examination.

The paner products were assayed.

(Continued on next page)

(Test No. 1 (B-i), cont'd) -

Results:

Product	Weight,	Assays,		Distribution,		Ratio of concentration
	per	per cent		per cent		
	cent	Cr ₂ O ₃	Fe	Cr ₂ O ₃	Fe	
Feed	100.0	23.72	17.60	100.0	100.0	3.66:1.
Panner conc.	27.3	49.32	27.22	56.7	42.2	
" tailing	72.7	14.11	13.99	43.3	57.8	

Cr:Fe ratio in concentrate:

$$\text{Cr}_2\text{O}_3 \text{ to Cr, } 49.32 \times 0.6842 = 33.74,$$

$$\frac{33.74}{27.22} = 1.23,$$

$$\text{Cr:Fe} = 1.23:1.$$

Test No. 2 (C). - Magnetic Concentration Followed by Gravity Concentration of the Non-Magnetic Portion of the Feed.

This test was made to determine the Cr:Fe ratio after removing the magnetite from the ore.

A 100-gram sample of the ore was fed to a Davis tube magnetic concentrator which removed the magnetite from the feed. The magnetic concentrate was sampled and assayed.

The non-magnetic tailing was concentrated on a Haultain superpanner. The panner concentrate and tailing were assayed.

Results:

Product	Magnetic Concentration.					
	Weight,	Assays,		Distribution,		Ratio of
	per	per cent		per cent		
	cent	Cr ₂ O ₃	Fe	Cr ₂ O ₃	Fe	
Feed	100.0	23.40	17.47	100.0	100.0	3.5:1.
Mag. conc.	28.5	38.18	30.21	46.5	49.3	
Non-mag. tailing	71.5	17.51	12.39	53.5	50.7	

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(Test No. 2 (C), cont'd) -

Superpanner Concentration of Non-Magnetic Tailing.							
Product	Weight,		Assays,		Distribution,		Ratio of concentration
	per cent		per cent		per cent		
	In test	In orig. feed	Cr2O3	Fe	Cr2O3	Fe	
Feed	100.0	71.5	17.51	12.39	53.5	50.7	
Panner conc ^o	18.0	12.9	53.64	23.46	29.5	17.3	5.55:1.
" tailing	82.0	58.6	9.57	9.96	24.0	33.4	

* Panner concentrate = SiO₂, 1.76 per cent.

Cr:Fe ratio in panner concentrate:

$$53.64 \times 0.6842 = 36.70,$$

$$\frac{36.70}{23.46} = 1.56,$$

$$\text{Cr:Fe} = 1.56:1.$$

Test No. 3 (B-ii). - Microscopic Examination of the Chromite Concentrate.

A microscopic examination was made of a concentrate obtained from the ore, i.e., polished sections were made from selected portions of the concentrate and these were subjected to microscopic examination.

The polished surfaces are very largely composed of metallic minerals as uneven grains, ranging from about 265 microns down to 12 microns or less in size, embedded in the mounting medium (bakelite). Chromite preponderates, but occasional grains of pyrite and rare grains of pyrrhotite occur. In general, the sulphide grains are free but some are joined to chromite.

A small amount of magnetite is associated with chromite as narrow borders along grains and as tiny veinlets within them. These borders and veinlets do not average more than 5 or 6 microns in thickness. In the table which follows,

(Test No. 3 (B-1i), cont'd) -

they are included with the chromite.

As represented in the polished sections, the chromite concentrate is relatively clean as regards non-metallic material. The chromite contains no inclusions of gangue, and only infrequent small grains of the latter are visible in the bakelite. None of those observed is attached to chromite.

Using Rosewahl's method, an attempt was made to estimate the relative amounts of volume of the various mineral constituents in the polished sections. The results of this work are tabulated below. The percentage of the gangue content may be low, as the non-metallic grains are hard to distinguish from the mounting medium.

Approximate Percentages of the Mineral
Constituents by Volume.

<u>Mineral</u>		<u>Percentage</u>
Chromite	-	94.2
Sulphide	-	3.1
Gangue	-	<u>2.7</u>
		100.0

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The results of the investigation indicate that the concentrate has a low ratio of chromium:iron, which places it in the non-commercial class of chrome ores.

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