August 19th, 1941.

OTTAWA

## REPORT

of the

## ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1064.

Coarse Cobbing Concentration of Magnetite from the Bessemer Mine,
Hastings County, Ontario.

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Coarse Cobbing Concentration of Magnetite from the Bessemer Mine,
Hastings County, Ontario.

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## Shipment:

A sample of magnetite ore having a net weight of 3,953 pounds was received at the Metallic Minerals Division of the Bureau of Mines, 552 Booth Street, Ottawa, Ontario, on July 8th, 1941.

#### Characteristics of the Ore:

三島 电插机相轴径

There appeared to be two distinctive types of ore physically:

- 1. A type in which the ore consisted of massive, fine-grained magnetite with no visible contaminants.
- 2. A coarse-grained type in which gangue material appeared fairly well disseminated.

Pyrite was visible both as massive pyrite, which was coarsely crystalline, and as fine-grained pyrite in veinlets through the ore.

Calcite crystals were also readily observable to the eye.

## Results of Investigation:

A satisfactory concentrate can be made by crushing to minus  $l_{2}^{\frac{1}{2}}$  inches. The concentrate gave a recovery of 86.0 per cent of the iron, at a ratio of concentration of 1.35:1.

The tailings assayed 24.37 per cent iron and could be stock-piled for future beneficiation. (See Ore Dressing Investigation No. 1045, Bureau of Mines, Ottawa, Ontario, July, 1941).

Table No. 1. - Analysis of Final Concentrate.

<u>Determination</u>	Per cent
Iron (Sol.)	<del>-</del> 52,66
Sulphur	
Pnospnorus	÷ 0,016
Manganese	Trace
Titanium	- 0.04
S10 <sub>2</sub>	- 11.10
Algo <sub>3</sub>	- 2,86
୍ Caପ ୍	<b>-</b> 7.16
MgO	- 2.00

(Results of Investigation, cont'd) -

Table No. 2. - Screen Analysis of Final Concentrate.

Screen Size	Weight,: per cent :	Fe, per cent	Distribution into firon, and reper cent
1ne-graines Magnetita	35.8	51.37	34.7
$-\frac{1}{2} + \frac{1}{2} + 1$	10.9	52.24 52.96	ich 33.2 meteris
ppear=3+6 mesh well d	3.0 7	52.67	6.2 3.0
-8 " Pyrita waa y	10.4	52.97	12.0

veinless through the ore.

# Calcite crystals were also readily observable to

per cont of the in

The entire shipment of ore was crushed to minus

4 inch size and separated into two lots for separate treatment.

The first test was made to determine the optimum size for crushing and the second test was made by crushing to this size.

Table No. 3. - Feed Samples.

ings assayed of DI per cent from and could

Por cont

ba stock-piled for	Weight,					
Product :	pounds	: Fe : S.	P. :	Insol.		
Lot No. 1	2,183.5	46.17:0.18	0.17	26.04		
Lot No. 2	1,767.5	:45.52:0.20	0.17:	25.74		
Combined	3,951.0	45.88:0.19	0.17	25.91		
	-1.7		1			

## Test No. 1.

Determination

Lot No. 1 was screened at various mesh sizes and these were separated magnetically. As no machine was available that would handle the coarse sizes, two strong hand magnets of different intensity were used to make the separation. The material down to -1 inch  $+\frac{1}{2}$  inch was treated in the above manner. The material -1 inch  $+\frac{1}{2}$  inch to  $-\frac{1}{2}$  inch +3 mesh in size was treated on the Stearns separator and the remainder was treated on the Ball-Norton

(Test No. 1, cont'd) - on cont'd) separator.

In the case of the -l inch + inch material the field strength of the magnet on the Stearns was not sufficient to hold the larger pieces of magnetite; consequently the tailing from this fraction was somewhat high.

Table No. 4. - Details of Test No. 1.

: Weight		: Fe (Soluble)		: S,	: S, : P, :	
and the second second	The second second	The second secon	THE RESERVE TO SERVE THE PROPERTY OF THE PERSON NAMED IN COLUMN TWO IN C	PORT OF THE REAL PROPERTY AND ADDRESS OF THE PARTY AND ADDRESS OF THE P	The state of the s	per cent
2,183,50	100.0	:46.17:	100.0	0.18	:0.017:	23,38
:1,218.75:	55.8	:54.50:	65.9	The same of the sa		The second secon
: 686.00:	31.4	:39.51:	26.9			
: 278.75:	12.8	:26,13:	7.2	:0.34	:0.023:	44.23
HENTAL PROOF	KOURE:	: :			: :	
1,904.75	87.2	49.10	ore 98.8 ca	0.16	0.016	23.38
	Pounds 2,183,50 1,218,75 686,00 278,75	Per Pounds cent  2,183.50 100.0  1,218.75 55.8  686.00 31.4  278.75 12.8	Per Per :D cent:  2,183.50 100.0 46.17: 1,218.75 55.8 54.50: 686.00 31.4 39.51: 278.75 12.8 26.13:	Per Per Distribution cent: Pounds cent cent: Per cent  2,183.50: 100.0: 46.17: 100.0: 1,218.75: 55.8: 54.50: 65.9: 686.00: 31.4: 39.51: 26.9: 278.75: 12.8: 26.13: 7.2	Per Per Distribution, per Pounds cent cent per cent cent cent cent cent cent cent cent	Per Per Distribution, per per Pounds cent cent per cent cent cent cent cent cent cent cent

Ratio of Concentration: to determine the optimum size for

Concentrate, 1.79:1.

(1) Concentrate, 1.79:1.

Crushing and the second (2) Concentrate and middling, 1.12:1.

Table No. 5. - Screen Analysis of Concentrate.

Product	i kate	Weight, per cent	: per :	Distribution of iron, per cent
+2 in. +2 +1 in. +1 +2 in. +2 in +3 mesh -3+8 mesh	% 2,183 1,187 2,151	19.0 56.7 6.5 5.4 5.5	54,52 53,96 55,40 55,55 50,94	19.0 04 56.1 74 6.6 5.5 91 5.2
-8+20 mesh -20 mesh	ADE TO COMPANY OF THE PARTY OF	2.0	55.40 61.88	2.0 5.6
Total		100.0	54,50	100.0

In the above test a satisfactory furnace product was made, but there is also a considerable portion of the iron tied up in the middling product which would require further treatment. Also, the grade of the tailings was still somewhat high.

Let We I was sereened at various tech sizes

separator and the regulator was theated on the Ball-Norton

to - I inch 43 mech in plus men tout fed the Steamers

(Test No. 1, contid) -

Product

## Test No. 2.

separater. From the information received in Test No. 1 it was decided to crush this lot through la inches and make only a finished product and a tailing, eliminating the middling product. rection was comowhat high.

In treating this ore all the material  $+\frac{1}{2}$  inch was passed under a large stationary magnet and a constant field

strength was used. The remainder was treated on the Stearns Sol. Produc separator. The finer material could have been treated on

the stationary magnet but due to the time it would have? 23.33 Middlirequired it was decided to use the Stearns. 10.20 10.020: 31.41 Tailing

The test was quite satisfactory and a concentrate was obtained that assayed 52.97 per cent iron with a recovery

of 86 per cent of the iron at a ratio of concentration of 1.35:1. While the tailing is somewhat high, this material could be stock-piled for future treatment and middling, 1,12:1.

Details of the test are given in the following tables and in Tables No. 1 and No. 2.

Table No. 6. - Details of Test No. 2.

: Weigh						S, . P, :	
			Distribution, : per cent :		per : per : cent:		
Food -9+90 mg	1,767.5	100.0	45 50	100.0	0.00	0 017	OE 74
Concentrate	1,307.0	: 74.0:	52.97:		: 0,20:		
Tailing Total	460.5	: 26.0:	24.38:	14.0	: 0,35:	0.025:	42.96

Ratio of Concentration = 1.35:1. tery furines product

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was made, but there is also a considerable por ion of the iron tied up in the middling product which would require further breatment. Also, the grade of the tallings was still somewhat high.

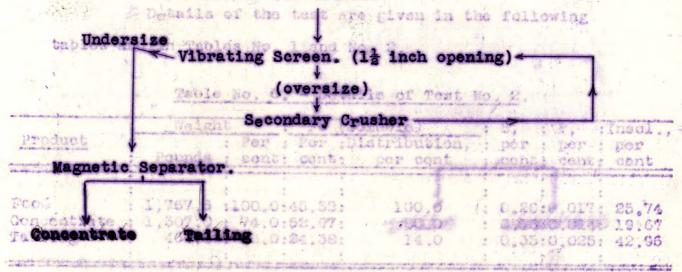
#### Conclusions:

1. A concentrate assaying 52.66 per cent iron and having a recovery of 86.0 per cent of the iron at a ratio of concentration of 1.35:1 can readily be made by crushing to minus  $1\frac{1}{2}$  inches.

2. It is not possible to make a low-grade tailing without grinding to minus 14 mesh. (See Investigation No. 1045).

strongth 3. The ore is extremely hard and produces very as little fines on crushing. The could have been treated on the state 4. It is possible, by hand sorting, to remove the massive magnetite at a sufficiently high grade for shipping.

Recovery in this case would be low, however, a concentrate was obtain 5. The flow-sheet suggested is as follows: scovery of 86 per cent of the iron at a ratio of concentration of 1.35:1. While the tail Mine Ore that high, this material could be atock-siled for Jaw Crusher



Ratio of Commentication = 1.35:1

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KNS:GB.