OTTAWA February 15th, 1943.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1356.

Magnetic Concentration of Iron Ore from the Bankfield Consolidated Mines Limited, Bankfield, Little Long Lac Area, Northwestern Ontario.

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Magnetic Concentration of Iron Ore from the Bankfield Consolidated Mines Limited, Bankfield, Little Long Lac Area, Northwestern Ontario.

Shipment:

A shipment of iron ore, weighing $26\frac{1}{4}$ pounds and designated Sample No. 57840, was received on January 7th, 1943. It was submitted by J. W. MacKenzie, Superintendent, Bankfield Consolidated Mines Limited, Bankfield, Ontario. - Page 2 -

Purpose of the Investigation:

The investigation was made to take out the gangue. The cleaned concentrate was to be returned to the company for further reduction tests to see whether the concentrates were suitable for the production of iron oxide.

Location of Property:

The property is located in Errington and Lindsley townships, Little Long Lac area, Thunder Bay mining division, northwestern Ontario, on Magnet Lake, 9 miles southwest of Geraldton.

Character of the Ore:

Selected specimens of the ore were subjected to microscopic examination of polished sections.

Gangue -

In the polished sections gangue consists of impure, glassy quartz which is slightly shattered and transected by narrow, sinuous fractures.

Metallic Minerals -

Magnetite is abundant as small granular masses and medium to very fine disseminated grains embedded in gangue. The finer grain sizes predominate and average probably not more than sixty microns (-200+280 Tyler mesh). The iron oxide is extensively impregnated with gangue which, in places, preponderates over metallic mineral. The greater percentage of the gangue inclusions is much too tiny to be economically eliminated.

Practically negligible amounts of pyrite, "limonite," and hematite are visible as rare small grains admixed with the magnetite. - Page 3 -

Sampling and Analysis:

The shipment was sampled by standard methods and was found to contain: Per cent

Iron (acid soluble) (Fe)	-	62.77
Insoluble	-	9.72
Titanium oxide (TiO2)	-	0.50

Investigative Procedure:

Samples of the ore were crushed minus 48, 65, 100 and 150 mesh.

The dry ore was fed to a Ball-Norton belt separator and given two passes, the first at maximum current and the second at minimum current. In this operation the ore is fed to and carried on a belt and the magnets are placed over the discharge end of the belt. The magnetic material is pulled out of the feed and is carried along by an overhead belt. The first pass produced a rough concentrate and a tailing. The second pass produced a cleaner concentrate and a cleaner tailing or a middling.

A portion of each cleaner concentrate was recleaned by means of the Davis tube magnetic separator.

A portion of the minus 150 mesh concentrate was crushed minus 200 mesh and reconcentrated in the Davis tube.

The results indicate that grinding to minus 200 mesh may be required for elimination of the gangue minerals.

DETAILS OF THE TESTS:

reaking sheet

TEST NO. 1.

Results of Dry Magnetic Separation:

		-48 M	esh Ore.		
	: Weight,:	Assays	, per cent	:Distribution:	Ratio of
Product	: per :	and the second second	:	: of Fe, :	concen-
	: cent :	Fe	: Insol.	: per cent :	tration
B	1 100 0	CO 01	•	100.0	
Feed	: 100.0 :	62.81		: 100.0	
Mag. conc.	86.9	68.67	: 3.30	95.0	1.15:1.
Middling	: 4.9 :	50,87		4.0	20.5:1.
Tailing	8.2 :	7.93	•	1.0	
			L		
		-65 M	esh Ore.	No.	
	1 100 0		:	:	
Feed	: 100.0 :	62.97		100.0	
Mag. conc.	: 87.8 :	69.01	2.81	90.5	1.14:1.
Middling	4.3 :	40.23	:	2.7	23.3:1.
Tailing	1.9	7.93	:	1.0	
			L		
		-100	Mark One		
		-100	Mesii Ore.		
Food	: 100 0	61 04		100 0	
Mag conc		67 69	. 3 39		1 15.1
Middling	5.0	51 61	. 0.00		20 0.1
Teiling		7 63		10	20.0.1.
Tarring		1.00		1.0	
			•	· · · · · · · · · · · · · · · · · · ·	
		-150	Mesh Ore.		
	: :		:		
Feed	: 100.0 :	62.80	:	: 100.0	
Mag. conc.	: 86.7 :	68.73	: 2.69	: 94.9	1.15:1.
Middling	: 5.8 :	45.60	:	4.2	17.33:1.
Tailing	: 7.5 :	7.53	:	: 0.9 :	
	1			1	
	Contraction of the local day of the loca	the second second second second second	and the second se	and the second	and the second s

· Calculated from the products.

The minus 48 mesh concentrate contained 0.69 per cent TiO2.

(Continued on next page)

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(Test No. 1, cont'd) -

Results of Wet Separation in Davis Tube:

	the second set of the second	and the second se	-10 110	211 1	o oncento.	l'aut.		
-		Weight	,: Assay	ys,	per cer	nt :	Distributio	on:Ratio of
Pro	oduct :	per	:	:	:	1 1	of Fe,	:concen-
		cent	: Fe	:Ti	02:Inso	1:Si02:	per cent	:tration
Food		96 0	. 60 67		:		100.0	
Doria	tube come	03.0	.00.07	: _	-1 05		00.3	. 1 04.1
Davis	ube conc.:	2.0	.70.00	-	.1.95	: - :	90.0	. 1.04:1.
	" talling:	0.9	:20.02	•			1.7	•
		and the second s		-	<u>.</u>			
			-65 Me	sh	Concent	rate.		-
	:			:	:	: :		:
Feed	:	87.8	:69.01	:	:	: :	100.0	:
Davis	tube conc.:	84.3	:70,40	: -	:1.35	1 - 1	97.9	: 1.04:1.
11	" tailing:	3.5	:35.60:	: -	: -	1 - 1	2.1	:
			1	:	1	1 1		
		1	-100 Mes	sh	Concenti	rate.		
	:		:	:	:	: :		:
Feed		86.9	:67.62:	:		: :	100.0	:
Davis	tube conc.:	83.4	:69.85		:1.13	:0.78:	99.2	: 1.04:1.
=	" tailing:	3.5	:14.17				0.8	
								<u>i</u>
			-150 Mes	sh (Concenti	rate.		
	:		:	:	1	: :		1
Feed	:	86.7	:68.73:		:	: :	100.0	:
Davis	tube conc.:	84.1	:69.65	:0.	50:0.91	:0.67:	98.3	: 1.03:1.
11	" tailing:	2.6	:38.96				1.7	
					:			
			-200 Mes	sh (Concenti	rate.		
	:		:	:	:	1 1		:
Feed		86.7	:68.73				100.0	:
Davis	tube conc.	82.8	:70.54	:0.	46:0.79	:0.47:	98.0	: 1.04:1.
=	" tailing:	3.9	:30,49				2.0	
					and an address of the local diversion of the			

Reconcentration of Magnetic Concentrates in the Davis Tube Magnetic Separator:

Product	: A S S : Feed to : :Davis tube:	A Y S, Concer Fe :	, per ntrate fr Insol.:	cent com Davis SiO2 :	tube TiO2
- 48 mesh cond - 65 " " -100 " " -150 " " -200 " "	68.67 69.01 67.62 68.73 68.73	70.65 70.40 69.85 69.65 70.54	1.95 : 1.35 : 1.13 : 0.91 : 0.79 :	0.78 0.67 0.47	0.50 0.46

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(Details of Tests, cont'd) -

TEST NO. 2.

Concentration of Minus 200 Mesh Ore.

The remaining ore and the magnetic concentrates from the previous tests were reground minus 200 mesh.

This material was concentrated magnetically on the Ball-Norton dry separator.

The magnetic concentrate was recleaned by concentrating it on a Wilfley table to remove fine gangue adhering to the magnetic particles.

Results:

ALLES AN

Magnetic Concentration at Minus 200 Mesh. :Weight,: Assays, :Distribution: Ratio of of Fe, Product : per per cent : concen-1 2 per cent :cent : Si02 tration Fe :100.0 64.50 Feed 100.00 : : 99.45 0.12 1.04:1. Concentrate: 96.2 66.68 : 3.96 : : : Middling 200:1. 0.5 15.81 : : : . : Tailing 8.29 0.43 3.3 : : . : .

Wilfley Table Concentration.

Product	: <u>Weight,</u>	per cen	t: Assays,	Distribution	on:Ratio of
	: In :	In	:per cent	of Fe,	: concen-
	: test :c	prig.fee	d: Fe :SiO ₂	per cent	: tration
Feed Cleaner conc. Middling Tailing	100.00 83.56 12.93 3.51	96.2 80.4 12.4 3.4	66.68: 70.24:1.04 67.50:3.17 23.69:	100.0 86.0 12.8 1.2	1.2:1. 7.7:1.

The cleaner concentrate weighed 80.4 per cent of the original feed and assayed 70.2 per cent Fe and 1.04 per cent Si0₂.

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SUMMARY AND CONCLUSIONS:

The microscopic examination discloses that the finer grain sizes predominate, averaging about 60 microns, equivalent to -200+280 Tyler mesh. Some magnetite grains contain tiny particles of gangue.

The results of the investigation indicate that grinding minus 200 mesh will be required to free the magnetite particles. At this grind, it was observed that considerable middling product was drawn into the magnetic concentrate by the small particles of magnetite included. Some of this product was eliminated by **re**concentrating the magnetic concentrate on a Wilfley table. The silica content of this cleaner concentrate was 1.04 per cent.

Small-scale tests using the Davis tube magnetic separator showed that when minus 200 mesh concentrate was reconcentrated in it, the silica content of the cleaned concentrate was approximately 0.5 per cent.

The results indicate that the dry magnetic concentration on a belt-type machine does not give as clean a concentrate as is obtained with a wet pulp.

This shipment was too small for a test using the wet method on the large-scale Roche machine and no comparative test was possible.

It was concluded that there would be difficulty in recovering a magnetite concentrate with the elimination of silica, owing to the fine grain size of the magnetite and also to the tiny inclusions of silica in the magnetite.

The results of this investigation can apply only to the type of ore submitted in this shipment.

WSJ: GHB.