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MAGNETIC CONCENTRATION OF IRON ORE FROM A PROPERTY
OF THE VALENTINE SYNDICATE, MONTREAL, P.Q. IN THE
MAGUSE LAKE AREA OF THE NORTHWEST TERRITORIES

by

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MINERAL PROCESSING DIVISION

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W. S. Jenkins*

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SUMMARY OF RESULTS

Each of the 12 samples was analysed for soluble iron. The highest iron 26.8% was in sample 32 and the remainder varied from 24.38% (sample 29) to 12.6% in sample 35.

Group 1 ore, samples 25 - 29, ground to 99% 200 mesh and magnetically concentrated by the Jeffrey-Steffenson separator, produced concentrate which assayed iron 64.1%, insol. 9.76%. Recovery was 51.5% of the iron in the feed, ratio of concentration was 6.1:1. The middling and tailing assayed iron 48.9% and 6.6% respectively. Combined concentrate and middling assayed iron 58.3% with recovery of 76% of the iron.

The group 2 ore produced a concentrate which assayed iron 53.3% insol. 23.5%, Recovery was 27.9%, ratio of concentration was 11:1.

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INTRODUCTION

Shipment

On September 1, 1959 a shipment of 12 small samples of ore was received at the Mines Branch laboratories, Ottawa, from Mr. Nelson Hogg, Chief Geologist of Hunting Technical and Exploration Services, Limited, 1450 O'Connor Drive, Toronto 16, Ontario.

In a letter dated September 2, 1959, Mr. Hogg requested analysis of the 12 samples submitted and magnetic concentration followed by analysis of the products of the tests. Mr. Hogg stated that Hunting Technical and Exploration Services Limited had been engaged to carry out the field investigation.

Location of the Property

The iron deposit is said to be located in the Maguse Lake area of the N.W.T. The property is controlled by the Valentine Syndicate, 701 Dominion Square Building, Montreal. Mr. W.W. Davis, 17 Bedford Crescent, Ottawa 2, is consulting engineer for the Syndicate.

Purpose of the Investigation

Mr. Hogg stated, in part, that outcropping in the area is very scarce but a large number of iron formation boulders were seen. The geological field work found four small outcrops of iron formation. Having detailed ground magnetic profiles over two of these outcrops, and samples of the material, it is possible to place a more useful interpretation on other ground magnetic profiles. The

Syndicate also wants to know at this stage whether the composition and physical properties of the iron formation are sufficiently attractive to proceed further with the investigation.

Sampling and Analysis of the Shipment

The samples were numbered from 25 to 36 and were divided into two groups, :- Group 1, samples 25 to 29, and Group 2, samples 30 to 36.

Each of the samples was crushed and a portion was made to pass a 200 mesh screen.

TABLE 1

Chemical Analysis of Each Sample

Group 1		Group 2	
<u>Sample</u>	<u>Sol. Fe</u>	<u>Sample</u>	<u>Sol. Fe</u>
25	21.95 %	30	17.48 %
26	20.12 %	31	13.21 %
27	20.12 %	32	26.82 %
28	19.71 %	33	18.29 %
29	24.38 %	34	18.49 %
		35	12.60 %
		36	14.02 %

A composite sample was made from each group and was analysed for the following elements.

TABLE 2

Group 1		Group 2	
Total iron	21.6 %	17.84 %	
Sol. iron	21.3 %	17.5 %	
Silica	52.56 %	53.72 %	
Manganese	0.08 %	0.08 %	
Titanium dioxide	0.08 %	0.23 %	
Phosphorus	0.132 %	0.119 %	
Sulphur	0.014 %	0.082 %	

MINERALOGICAL EXAMINATION

At the request of Mr. W. W. Davis samples of the material were submitted to the Mineral Sciences Division for mineralogical examination. The results will be reported in a separate investigation report.

DETAILS OF THE TESTS

Magnetic concentration tests by Davis Tube were made on the ore of each sample which was crushed - 200 mesh. The concentrates were analysed for soluble iron, and the analysis of the tailing was calculated.

A sample from each group was concentrated by a Jeffrey-Steffensen 3 - drum separator.

Test No. 1 -

Magnetic Concentration by Davis Tube of Ore Crushed - 200 Mesh

TABLE 3

Group 1

Product	Weight %	Analysis % Sol. Fe	Distribution % Sol. Fe	Ratio of Concentration
<u>Sample 25</u>				
Feed	100	21.95	100.0	
Conc.	46	42.94	90.0	2.2:1
Tailing*	54	4.07	10.0	
<u>Sample 26</u>				
Feed	100	20.12	100.0	
Conc.	42	41.92	87.5	2.4:1
Tailing*	58	4.33	12.5	
<u>Sample 27</u>				
Feed	100	20.12	100.0	
Conc.	32	52.6	83.7	3.1:1
Tailing*	68	4.83	16.3	
<u>Sample 28</u>				
Feed	100	19.71	100.1	
Conc.	38	45.4	87.5	2.6:1
Tailing*	62	3.96	12.5	
<u>Sample 29</u>				
Feed	100	24.38	100.0	
Conc.	51.6	42.84	90.7	1.9:1
Tailing*	48.4	4.70	9.3	

* Calculated

Test No. 2 -

Magnetic Concentration by Davis Tube of Ore Crushed - 200 MeshTABLE 4Group 2

Product	Weight %	Analysis % Sol. Fe	Distribution % Sol. Fe	Ratio of Concentration
<u>Sample 30</u>				
Feed	100.0	17.48	100.0	
Conc.	36.4	39.44	82.1	2.7:1
Tailing*	63.6	4.91	17.9	
<u>Sample 31</u>				
Feed	100.0	13.21	100.0	
Conc.	23.2	41.50	72.9	4.3:1
Tailing*	76.8	4.66	27.1	
<u>Sample 32</u>				
Feed	100.0	26.82	100.0	
Conc.	58.2	41.90	90.9	1.7:1
Tailing*	41.8	5.82	9.1	
<u>Sample 33</u>				
Feed	100.0	18.29	100.0	
Conc.	47.4	37.20	86.2	2.4:1
Tailing*	57.6	4.37	13.8	
<u>Sample 34</u>				
Feed	100.0	18.49	100.0	
Conc.	39.6	38.4	82.2	2.5:1
Tailing*	60.4	5.44	17.8	

* Calculated

<u>Sample 35</u>				
Feed	100.0	12.6	100.0	
Conc.	24.4	40.2	77.9	4.1:1
Tailing*	75.6	3.69	22.1	
<u>Sample 36</u>				
Feed	100.0	14.02	100.0	
Conc.	26.0	44.0	81.6	3.8:1
Tailing*	74.0	3.49	18.4	

* Calculated

The feed analysis was taken from Table 1. Each concentrate was analysed for soluble iron. The tailing analysis was calculated.

Test No. 3 -

Magnetic Concentration of the Mixed Ore of Group 1 by the Jeffrey-Steffenson Separator.

Portions of the rejects of the samples of Group 1 were mixed and crushed to - 20 mesh. A 500 g sample of the mixed ore was ground in a ball mill. The ground ore was concentrated by the Jeffrey-Steffenson Separator which produced a concentrate, a middling and a tailing. The concentrate was analysed for soluble iron and insoluble, the middling and tailing for soluble iron.

The grade produced by mixing the concentration and middling was calculated.

Test No. 3 -

Results of Magnetic Concentrate

TABLE 5

Group 1

Product	Weight %	Analysis %		Distribution % Sol. Fe	Ratio of Concentration
		Sol. Fe	Insol.		
Feed*	100.0	20.3		100.0	
Conc.	16.3	64.12	9.76	51.5	6.1:1
Midds	10.2	48.9	--	24.5	
Tailing	73.5	6.6	--	24.0	
Mixed Conc and Midds	26.5	58.3	--	76.0	3.8:1

* Calculated SiO₂ - 8.84% Phosphorus - 0.11%
 Sulphur - 0.024% TiO₂ - 0.08%

Test No. 4 -

Magnetic Concentration of the mixed Ore of Group 2 by the Jeffrey-Steffenson Separator

Portions of the rejects of the samples of Group 2 were mixed and crushed to - 20 mesh. A 500 g sample of the mixed ore was ground in a ball mill and concentrated by the Jeffrey-Steffenson separator as in Test No. 3.

Test No. 4 -

Results of Magnetic Concentration

TABLE 6

Group 2

Product	Weight %	Analysis %		Distribution % Sol. Fe	Ratio of Concentration
		Sol. Fe	Insol.		
Feed*	100.0	17.3		100.0	
Conc.	9.0	53.3	23.52	27.9	11:1
Midds	15.5	42.6		38.1	
Tailing	75.5	7.8		34.0	
Mixed Conc and Midds*	24.5	46.6		66.0	4:1

*Calculated
Silica and Mang. conc., 20.48%

TABLE 7

Screen Tests on Grinds

	<u>Test No. 3</u> <u>Group 1</u>	<u>Test No. 4</u> <u>Group 2</u>
+ 150	0.2	0.3
+ 200	0.3	0.8
- 200	<u>99.5</u>	<u>98.9</u>
	100.0	100.0

CONCLUSIONS

The results of the tests show that a satisfactory commercial grade of concentrate could not be obtained from ore represented by the shipment.

The samples were taken from two small out crops of the iron formation on the property and the information received does not disclose that this sample is considered to be representative of the ore body.

It therefore does not seem possible to answer the question posed by the Syndicate as to whether the composition and physical properties of the iron formation warrant further investigation.

After the tests described above not enough ore remained from any individual sample for Jeffrey-Steffenson tests. It is possible that a better grade of concentrate could be made on one or more of the samples which made up composite group No. 1 (e. g. No. 27) if treated separately. The practical value of this information can only be judged by the consultants since the relative tonnages represented by the samples are not known by the writer.

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