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CENTRAL TECHNICAL

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GEOLOGICAL FILES

MINES BRANCH INVESTIGATION REPORT IR 62-60

**REMOVAL OF SILICA FROM A SAMPLE OF SPECULAR HEMATITE CONCENTRATE SUBMITTED BY NORTHERN PIGMENT COMPANY LIMITED, NEW TORONTO, ONTARIO**

by

P. D. R. MALTBY

MINERAL PROCESSING DIVISION

*38*

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REMOVAL OF SILICA FROM A SAMPLE OF SPECULAR HEMATITE  
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SUMMARY OF RESULTS

Tests were conducted on a specular hematite concentrate from Northern Pigment Company Limited, which was all coarser than 28 m and contained about 5.6% SiO<sub>2</sub>. After preliminary tests using the Jones High Intensity Wet Magnetic Separator, a final test was conducted on an 11 lb sample. The sample was pulverized to 100% minus 100m, and 5.4% of the weight removed as magnetite at 0 amp containing 3.7% SiO<sub>2</sub>. The 0 amp middling and tailing products were combined and repassed at 10 amp. The 10 amp concentrate contained 0.20% SiO<sub>2</sub> with a weight recovery of 71.0% of the original feed.

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## INTRODUCTION

### Purpose of the Investigation

It was desired to lower the silica content of the specular hematite concentrate to under 0.25% so that on fine grinding it would be suitable for making pigment. At present, pigment of this quality can only be made synthetically by chemical precipitation from iron solutions.

### Shipment

A shipment of 35 lb of specular hematite concentrate was received at the Mines Branch on February 12, 1962. The sample was submitted by Mr. P. A. Cauterman, then Director, Research and Development, Northern Pigment Company Limited, P.O. Box 1, New Toronto, Ontario.

### Analysis

The chemical analyses shown in this investigation were made by the Analytical Chemistry Sub-Division, Mineral Sciences Division, Mines Branch.

## RESULTS

In a preliminary test, a 15 lb sample of concentrate was pulverized to minus 48 m and passed over the Jones separator at 0, 5, and 10 amp to give the results shown in Table 1.

TABLE 1

### Results of Treatment at Minus 48 m

Product	Weight %	Analysis % <sup>xxx</sup> SiO <sub>2</sub>	Distn % SiO <sub>2</sub>
0 amp conc <sup>xxx</sup>	5.4	3.76	3.6
5 amp conc	36.3	0.48	3.0
10 amp conc	39.1	0.68	4.8
10 amp midd	11.3	16.20	32.7
10 amp tail	7.9	39.68	55.9
Feed <sup>*</sup>	100.0	5.6	100.0

\* calculated

xxx mainly magnetite

xxx Internal Report MS-AC-62-457, Analyst F. W. Brethour.

The feed at 5 amp was the combined 0 amp middling and tailing products, and at 10 amp, the 5 amp middling and tailing products.

The 5 and 10 amp concentrates were combined, ground slightly, and rerun at 10 amp with the results shown in Table 2.

TABLE 2  
Results of Retreatment of 5 and 10 amp Concentrates

Product	Weight % of original feed	Analysis % <sup>***</sup> SiO <sub>2</sub>	Distn % of SiO <sub>2</sub> in orig feed
10 amp regrind conc	52.9	0.28	2.3
10 amp regrind midd	16.0	0.96	2.3
10 amp regrind tail	6.5	3.16	3.2
Feed <sup>*</sup>	75.4	0.68	7.8

\* calculated

\*\*\* Internal Report MS-AC-62-457, Analyst F. W. Brethour

From the results shown in Tables 1 and 2, it was decided to pulverize the remainder of the head sample to minus 100 m, and treat at 10 amp. As previously, the magnetics were removed first at 0 amp. The results of this test are shown in Table 3.

TABLE 3  
Results of Treatment at Minus 100 m

Product	Weight %	Analysis % <sup>**</sup> SiO <sub>2</sub>	Distn % SiO <sub>2</sub>
0 amp conc	5.4	3.70	3.8
10 amp conc	71.0	0.20	2.6
10 amp midd	12.5	15.88	37.3
10 amp tail	11.1	27.00	56.3
Feed <sup>*</sup>	100.0	5.4	100.0

\* calculated

\*\* Internal Report MS-AC-62-659, Analyst J. C. Hole

The SiO<sub>2</sub> content of the 10 amp concentrate was considered to be satisfactory.

A screen test was conducted on the 10 amp concentrate and the results are shown in Table 4.

TABLE 4

Results of Screen Test on 10 amp Concentrate

Mesh	Weight %
+100	0.6
-100 +150	28.7
-150 +200	23.6
-200 +325	23.5
-325	23.6
Total	100.0

CONCLUSIONS

The SiO<sub>2</sub> content of a sample of specular hematite concentrate was lowered to 0.20% by using a Jones separator after pulverizing the sample to minus 100 m. Weight recovery was 71% of the original sample.

The concentrate produced, when ground below micron size, would make extremely good material for high grade pigment. As a ton of specular hematite concentrate would cost about \$15 F.O.B. the mine, the relatively cheap process involved in lowering the SiO<sub>2</sub> content to 0.20% followed by the fine grinding, would make the resulting concentrate very competitive with the synthetic iron oxides presently used for pigments.