

Section 1 — Ore Dressing Investigations

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TR 12-152 157 R. 532

INDUSTRIAL & MINING INVESTIGATIONS— SAVAGE RIVER MAGNETITE TITANIUM REMOVAL BY DAVIS TUBE MAGNETIC SEPARATION

Sample

An adit sample from the northern area of the Savage River iron ore deposit was submitted by Mr T. D. Hughes on behalf of Industrial & Mining Investigations.

An analysis of the sample has been published previously under Registered Number 663609 and is:—

HCl soluble Fe	56.1 per cent
Ti	0.98 per cent
Ni	0.05 per cent

Investigation

Additional tests were required by the company to show the titanium and nickel levels in concentrates produced by magnetic separation of feeds ground to various degrees of fineness.

Procedure

A. Grinding—The grinding was carried out by two methods, stage wet grinding minus 18 mesh ore in a wedgewood mortar through limiting screens of 200 and 300 mesh B.S.S., and wet batch grinding for various times in a 'Seibtechnik' grinding mill of the pulverised assay sample. Grinding was generally in a pulp of 65% to 70% solids. Sizing of the grinds was determined by cyclosizing and appropriate screening.

B. Concentration—Davis Tube magnetic separations were performed on duplicate samples ground under precisely the same conditions as those used for the sizing determinations. Titanium, nickel and HCl soluble iron were determined on the magnetic concentrates only.

Summary

As was expected the titanium content of the magnetic concentrate decreased with finer grinding. With regard to the sample tested it does not seem feasible to expect reduction beyond 0.40% Ti as the concentrate showing this content was produced from material ground to 90% minus 7 microns.

The nickel content of the concentrates showed a slight increase with finer grinding, but the increase (maximum of 0.006% Ni) is of doubtful significance.

The results of HCl soluble iron determinations present an unexpected anomaly, iron content of the magnetics showing a small, but possibly significant decrease with finer grinding.

The attached graphs show the sizing curves under various conditions of grinding, and the titanium and nickel contents of the related magnetic concentrates.

Tabulated Test Results

Grinding for magnetic separation was performed under the following conditions:—

- Test No. 1—Wet hand grinding, Wedgewood mortar, to minus 200 mesh
- Test No. 2—Wet hand grinding, Wedgewood mortar, to minus 300 mesh
- Test No. 3—Dry pulverised assay sample
- Test No. 4—Wet Seibtechnik grinding—65%-70% solids
10 sec
- Test No. 5—Wet Seibtechnik grinding—65%-70% solids
20 sec
- Test No. 6—Wet Seibtechnik grinding—65%-70% solids
40 sec
- Test No. 7—Wet Seibtechnik grinding—65%-70% solids
80 sec
- Test No. 8—Wet Seibtechnik grinding—65%-70% solids
160 sec.

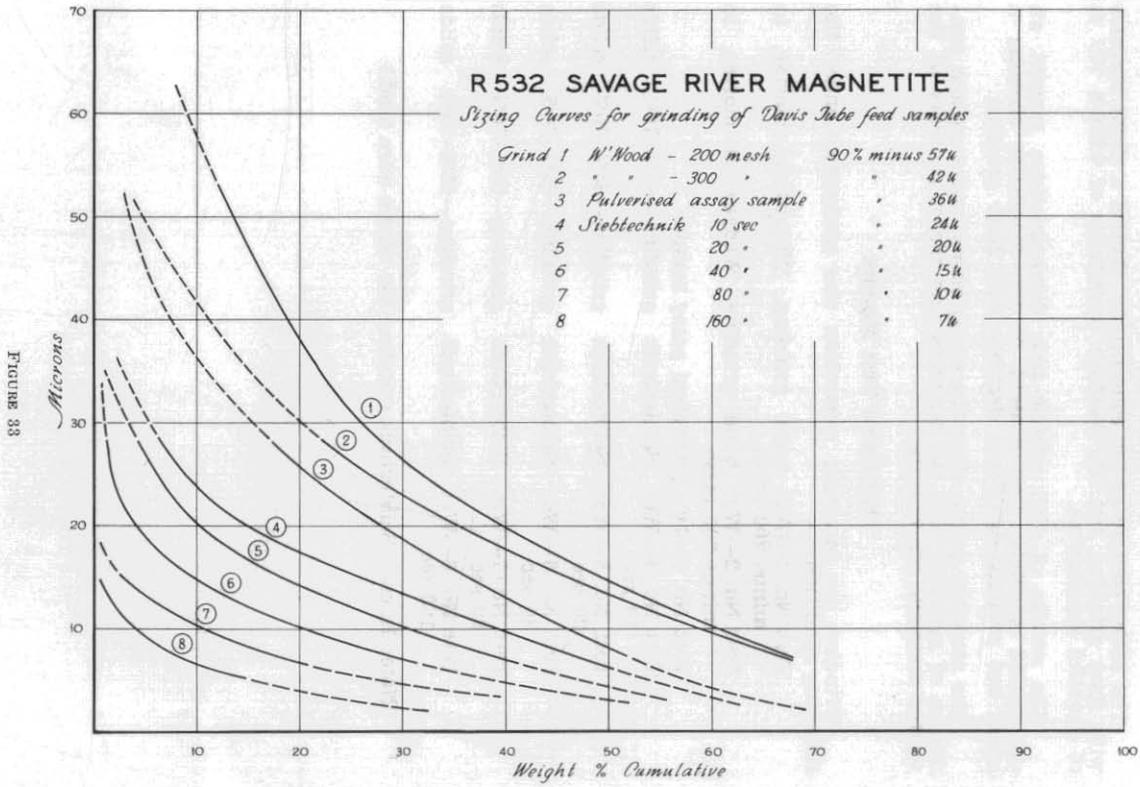
(Note: In each Seibtechnik grinding 10g. of ore were used.)

5 cm

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Sizing Curves for grinding of Davis Tube feed samples

Grind 1	W' Wood - 200 mesh	90% minus 57u
2	" " - 300 "	" 42u
3	Pulverised assay sample	" 36u
4	Stebtechnik 10 sec	" 24u
5	20 "	" 20u
6	40 "	" 15u
7	80 "	" 10u
8	160 "	" 7u



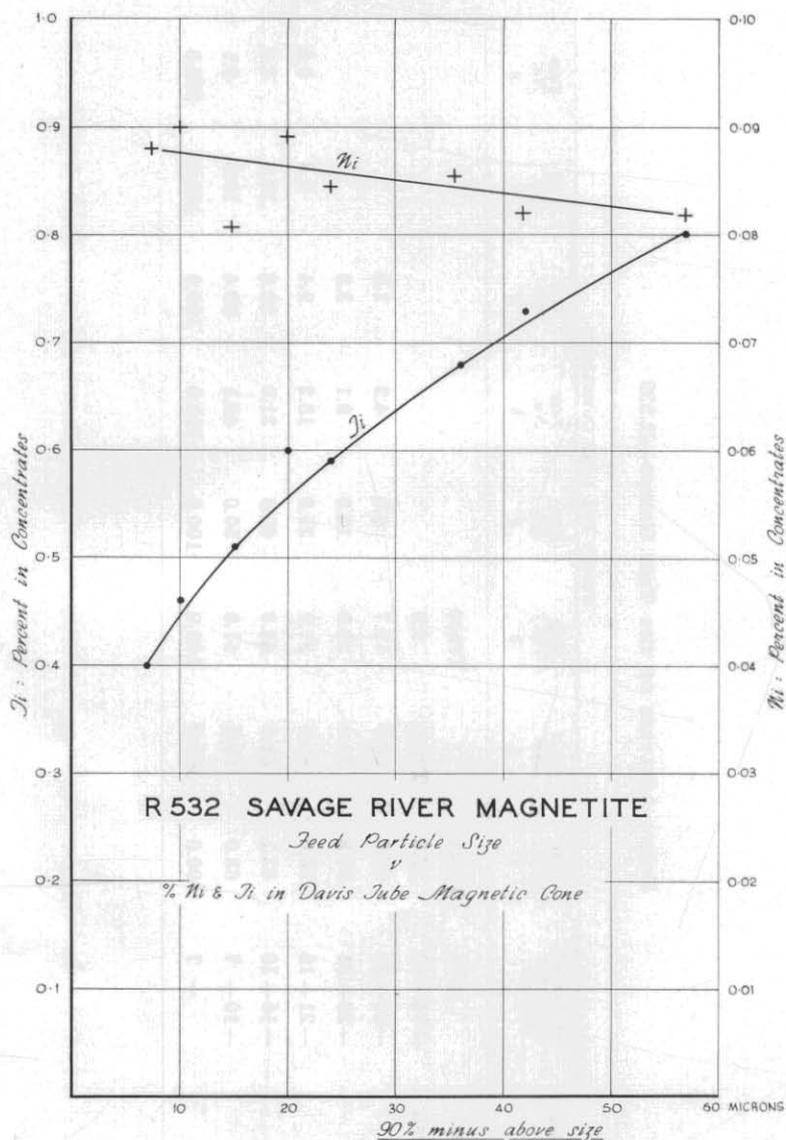
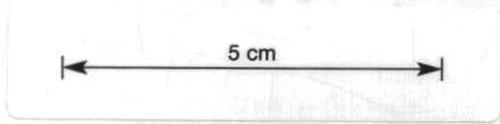


FIGURE 34



RESULTS OF DAVIS TUBE SEPARATIONS

<i>Test No.</i>	<i>Sizing 90% Minus</i>	CONCENTRATE PER CENT			
		<i>Weight</i>	<i>Fe</i>	<i>Ti</i>	<i>Ni</i>
1	57 microns	76.9	69.7	0.80	0.082
2	42 microns	75.9	70.3	0.73	0.082
3	36 microns	77.2	69.3	0.68	0.085
4	24 microns	76.5	69.2	0.59	0.084
5	20 microns	77.2	69.2	0.60	0.089
6	15 microns	77.2	68.8	0.51	0.081
7	10 microns	76.0	68.7	0.46	0.090
8	7 microns	73.0	68.7	0.40	0.088