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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 3 OF 1960.

A REPORT ON THE EXAMINATION OF
FOSKOR MAGNETITE.

BY

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A REPORT ON THE EXAMINATION OF
FOSKOR MAGNETITE.

INTRODUCTION:

A sample of magnetite received from Foskor was examined in order to establish its suitability as a medium for use in Heavy Medium Coal washing installations.

TEST PROCEDURE:

1) Size Analysis.

A representative portion of the sample was screened at 10, 30, 60, 120, 240 and 300 mesh B.S.S. and the yields of each size fraction are reported in Table I.

2) Chemical Analysis.

A representative portion of the sample was subjected to the following chemical analysis:-

- (a) Silica
- (b) Total iron
- (c) Ferrous oxide
- (d) Ferric oxide
- (e) Metallic iron
- (f) Titanium oxide.

The results appear in Table II.

3) Physical Analysis.

A representative portion of the sample was ground to minus 200 mesh B.S.S. and the specific gravity of the solids was found to be 4.65.

4) Magnetic Properties.

The magnetic content of the sample as received amounted to 93.5%.

A representative sample was wet ground in a laboratory ball mill for 3 hours and yielded a product with a screen analysis as reported in Table III.

Settling rates were carried out at specific gravities 1.1 and 1.5 by 2 different methods and the following results obtained:

1. Clear line method:-

- (a) When Demagnetised at s.g. 1.5 the settling rate was found to be 1.2 cm/minute.
- (b) When magnetised at s.g. 1.1, the settling rate was found to be greater than 40 cm./minute.

2. F.R.I. Method:-

- (a) Demagnetised at s.g. 1.40, the initial settling rate (So) was found to be 0.056 cm./sec.
- (b) Demagnetised at s.g. 1.45 So was found to be 0.039 cm./sec.

DISCUSSION OF RESULTS:

1). Size Analysis:

The size analysis indicates that this material can be charged directly to the washery ball mill without preliminary grinding.

2). The Chemical Analysis indicate very low Silica and free iron content.

3). The Physical/.....

- 3). The Physical Analysis shows that the specific gravity and magnetic content of the raw material are both high.
- 4). The Magnetic Properties:
Results indicate that this magnetite can be magnetised and demagnetised readily.

CONCLUSIONS:

Foskor Magnetite is at present being used as medium at a number of washing installations. The results are very satisfactory as can be expected from the results of the experiments described in this report.

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TABLE I.

SCREEN ANALYSIS OF SAMPLE AS RECEIVED.

<u>Size.</u>			<u>% by Weight.</u>	
+ 10 mesh B.S.S.			0	
-10 + 30	"	"	9.6	0.15 m
-30 + 60	"	"	35.3	44.9 0.15
-60 +100	"	"	20.7	65.6 0.15
-100+200	"	"	18.9	84.5 0.076
-200	"	"	15.5	

TABLE II.

<u>Constituent.</u>	<u>% by Weight.</u>
SiO ₂	0.4
Total Fe	63.9
FeO	25.9
Fe ₂ O ₃	62.6
Free Fe	∠ 0.1
TiO ₂	4.9

TABLE III.

<u>Size.</u>			<u>% by Weight.</u>
+200 mesh B.S.S.			1.8
-200 +300	"	"	8.2
-300	"	"	90.0
