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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 9 OF 1964.

PROGRESS REPORT ON THE INVESTIGATION OF EXCESSIVE MAGNETITE LOSSES IN CERTAIN COAL PREPARATION PLANTS.

BY:

E. L. GERICKE.

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1. INTRODUCTION:

This progress report must be read in conjunction with Technical Memoranda No. 24 and 34 of 1963.

Following the work that was done previously, it was decided to run a series of tests to determine what effect the specific gravity of the dilute medium suspension had on the magnetite losses in coal preparation plants. The average specific gravity of the dilute medium suspension in coal preparation plants at collieries is in the order of 1.10. In certain cases settling cones are used and the specific gravity of the dilute medium suspension fed to the magnetic separators can be as high as 1.25. The overflow from these settling cones is used as rinsing water.

2. THE TESTS:

For these tests four types of magnetite were used as follows:

A. Foskor magnetite wet milled in a ball mill at the Fuel Research Institute's pilot plant;

B. Foskor magnetite dry milled in a Raymond High Side roller mill;

C. Ermelo magnetite wet milled in a ball mill at the Fuel Research Institute's pilot plant and

D. Ermelo magnetite dry milled in a Raymond High Side roller mill;

E. This was a second delivery of Foskor magnetite dry milled in the Raymond High Side roller mill.

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The flowsheet used for these tests is shown in Figure 1, and is self explanatory. As can be seen the circuit used was a closed one.

Each type of magnetite was placed in the stock tank and on each type three tests were run with specific gravities of the dilute medium suspension adjusted at 1.10 1.20 and 1.30. The dilute medium suspension, made up to the desired specific gravity, was circulated through the plant (Figure 1), untill steady conditions prevailed and it had been ascertained that the specific gravity of the feed to the magnetic separator was constant at the required figure. The magnetite medium suspension was then circulated for another twenty minutes and during this period samples were taken of the feed to the magnetic separator, the over-dense medium suspension from the drum and the effluent. Sample increments were taken at one minute intervals. The rate of flow to the magnetic separator was kept constant at 237 gals./min. for all the tests. The rated capacity of the magnetic separator is 250 gals./min.

On each sample the percentage of magnetic material was determined and a screen analysis was done. In each case the magnetic material in the effluent was determined in grams/litre, but there was too little magnetite in the effluents to do a screen analysis.

Results of the screen analyses are shown in Table 1. The quantity of magnetite in the effluent at different specific gravities is shown in Table 2. The experiments were repeated at a later date and the results of the later experiments are given in Tables 3 and 4.

3. DISCUSSION OF RESULTS:

The results show that in each case the magnetite losses with Ermelo magnetite were higher than with Foskor magnetite, especially at higher specific gravities of feed to the magnetic separator. It will be noticed that with Foskor magnetite there is no appreciable difference in the magnetite losses as the specific gravity of the feed increases, whereas with Ermelo magnetite the difference is very marked.

(SIGNED) E. L. GERICKE.
TECHNICAL OFFICER.

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TABLE 1.

SCREEN ANALYSIS OF MAGNETITE.

1. As feed to the Magnetic Separator.

B.S.Mesh	Percentage of Material in Screen Fraction				% Magnetic Material
	+100	+200	+325	-325	
A	4.3	1.3	4.9	89.50	92.0
B	1.06	2.96	7.08	88.90	97.0
C	0.23	3.03	2.50	94.24	96.0
D	0.22	0.44	2.55	96.79	98.2
E	0.28	0.70	7.21	91.81	96.3
2. In the Over-dense Suspension from the Drum.					
A	1.25	1.21	8.24	89.30	97.7
B	0.58	4.33	10.35	84.74	99.4
C	0.20	0.90	3.10	95.80	99.0
D	0.16	0.42	2.28	97.14	98.9
E	0.28	0.65	7.94	91.13	99.0

TABLE 2.

Type of Magnetite	Test No.	S.G.of Feed	Magnetic Material in Effluent Gms/Litre.
A. Foskor (Wet Milled)	5	1.30	0.11
	6	1.20	0.09
	7	1.10	0.11
B. Foskor (Dry Milled)	8	1.30	0.06
	9	1.20	0.07
	10	1.10	0.05
C. Ermelo (Wet Milled)	11	1.30	7.02
	12	1.20	0.08
	13	1.10	0.10
D. Ermelo (Dry Milled)	14	1.30	11.32
	15	1.20	3.59
	16	1.10	0.05
E. Foskor (Dry Milled)	17	1.30	0.08
	18	1.20	0.07
	19	1.10	0.05

TABLE 3.

SCREEN ANALYSIS OF MAGNETITE.

1. In the Feed to the Separator.

B.S.Mesh	Percentage of material in Screen Fraction: +100	+200	+325	-325	% Magnetic Material
A	0.95	0.85	4.20	94.00	97.5
B	0.70	2.28	9.45	87.57	97.1
C	0.50	0.74	2.88	95.88	96.1
D	0.28	0.60	2.35	96.77	95.7
A (Repeat)	0.48	0.94	4.66	93.92	95.2
2. In the Overdense Suspension from the Drum.					
A	0.40	1.15	6.80	91.65	98.8
B	0.50	2.65	14.35	82.45	99.1
C	0.30	0.89	4.00	94.81	99.4
D	0.23	0.50	2.77	96.50	99.2
A (Repeat)	0.35	0.89	3.71	95.05	99.9

TABLE 4.

Type of Magnetite	Test No.	S.G.of Feed	Magnetic Material in Effluent Gms/Litre.
A. Foskor (Wet Milled)	26	1.30	0.06
	27	1.20	0.04
	28	1.10	0.04
B. Foskor (Dry Milled)	32	1.30	0.02
	33	1.20	0.02
	34	1.10	0.01
C. Ermelo (Wet Milled)	20	1.30	1.86
	21	1.20	0.26
	22	1.10	0.22
D. Ermelo (Dry Milled)	23	1.30	14.75
	24	1.20	0.43
	25	1.10	0.40
A. Foskor (Wet Milled) (Repeat of A.)	29	1.30	0.03
	30	1.20	0.01
	31	1.10	0.01

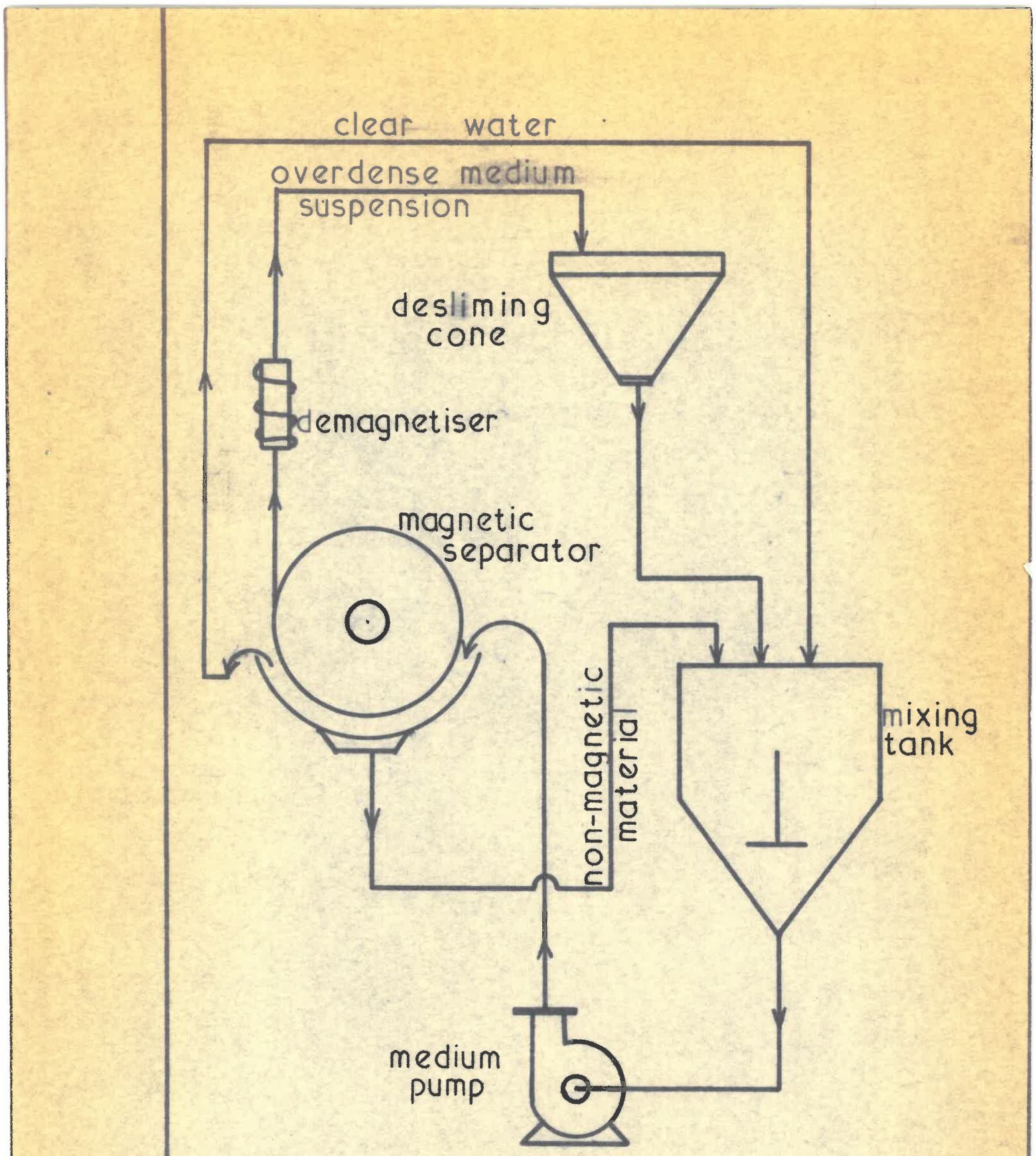

figure no. 1

flowsheet showing the circuit used for magnetite tests