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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO.15 OF 1966.

REPORT ON THE RESULTS OBTAINED FROM WASHABILITY DETERMINATIONS CARRIED OUT ON A SAMPLE OF COAL FROM N'KANDABWE, ZAMBIA.

BY:
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INTRODUCTION:

A sample of N'Kandabwe coal was submitted by the Chief Geologist, Chartered Exploration Limited, Lusaka, Zambia, on behalf of the Metallurgical Manager, Contracts Division, Fraser & Chalmers (S.A.) Pty. Ltd, for washability determinations.

THE SAMPLE:

The sample which weighed approximately 850 lb. was forwarded by passenger train in three drums, and consisted mainly of large coal (cobbles and rounds).

ANALYSIS OF SAMPLE:

As requested the sample was analysed in the following manner:

The +3" coal was broken by hand to -3" and the sample was then screened at 1", ¼" and 0.5 mm. Results of this screen analysis are reported in Table 1. The 3" x 1" size fraction was then split into two samples ($^2/_3$ and $^1/_3$) The sample consisting of one third of the 3" x 1" size fraction was then crushed to -1" in a jaw crusher screened at ¼" and -½ mm was added to the original -1" size fractions.

All the different size fractions except the -0.5mm size fraction were then subjected to detailed float and sink analyses on a fractional basis at 0.05 intervals in the sp.gr range 1.45 to 1.70. Ash determinations were carried out on all sp.gr fractions and washability data were calculated. These results are reported in Tables 2 and 3.

Washability .../

Washability curves were drawn and are shown in Figures 1 - 3.

Composite samples were made up of the floats at sp.gr 1.45 and 1.70 of the different size fractions and calorific value determinations and proximate analyses were carried out on these composite samples. These results are reported in Table 4.

Froth flotation tests were carried out on the -0.5 mm size fraction in a Denver No.8 open type froth flotation cell. These results are reported in Table 5.

(SIGNED) S. F. STREICHER.

Principal Research Officer.

PRETORIA.
22/4/66.

TABLE 1.

SCREEN ANALYSIS AFTER BREAKING TO -3"

SIZE FRACTION	FRACT. YIELD		CUM. YIELD
	lb.	%	%
3" x 1"	731.75	84.55	84.55
1" x ¼"	87.50	10.11	94.66
¼" x 0.5mm	35.50	4.10	98.75
-0.5 mm	10.75	1.24	
TOTAL	865.50	100.00	100.00

TABLE 2.

FLOAT AND SINK ANALYSIS OF 3"x1" AND 1"x¼" SIZE FRACTIONS.

S. G. INTERVAL	3" x 1" SIZE FRACTION						1" x ¼" SIZE FRACTION					
	FRACTIONAL		CUM. FLOATS		CUM. SINKS		FRACTIONAL		CUM. FLOATS		CUM. SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.45	21.79	13.8	21.79	13.8	78.21	34.97	21.66	12.6	21.66	12.6	78.34	31.78
1.45 - 1.50	15.80	19.3	37.59	16.11	62.41	38.94	17.12	17.6	38.78	14.81	61.22	35.74
1.50 - 1.55	13.84	23.1	51.43	18.00	48.57	43.45	18.03	21.1	56.81	16.81	43.19	41.85
1.55 - 1.60	10.52	27.6	61.95	19.63	38.05	47.83	10.77	26.4	67.58	18.34	32.42	46.98
1.60 - 1.65	8.48	31.5	70.43	21.06	29.57	52.51	6.87	31.3	74.45	19.54	25.55	51.20
1.65 - 1.70	6.76	37.7	77.19	22.52	22.81	56.9	6.10	36.2	80.55	20.80	19.45	55.9
>1.70	22.81	56.9					19.45	55.9				
WHOLE COAL	100.00	-	100.00	30.36			100.00	-	100.00	27.63	-	-

TABLE 3.

FLOAT AND SINK ANALYSIS OF ¼"x0.5mm SIZE FRACTION.

S. G. INTERVAL.	¼" x 0.5 mm SIZE FRACTION					
	FRACTIONAL		CUM. FLOATS		CUM. SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.45	19.45	9.9	19.45	9.9	80.55	31.39
1.45 - 1.50	16.38	17.5	35.83	13.37	64.17	34.93
1.50 - 1.55	15.02	20.7	50.85	15.54	49.15	39.28
1.55 - 1.60	12.97	23.9	63.82	17.24	36.18	44.79
1.60 - 1.65	9.22	28.9	73.04	18.71	26.96	50.23
1.65 - 1.70	6.83	34.1	79.87	20.03	20.13	55.7
>1.70	20.13	55.7				
WHOLE COAL	100.00	-	100.00	27.21	-	-

TABLE 4.

ANALYSIS OF COMPOSITE SAMPLES.

SIZE FRACTION	S.G. FRACTION	CAL.VAL. BTU/lb.	MOIS-TURE %	ASH %	VOL. Mat. %	FIX. CARB. %
3" x 1"	F.1.45	12,010	2.8	13.9	25.3	58.0
	F.1.70	10,510	3.2	22.7	19.6	54.5
1" x ¼"	F.1.45	12,080	3.2	12.7	25.3	58.8
	F.1.70	10.560	3.5	21.0	19.7	55.8
¼" x 0.5mm	F.1.45	12,520	3.0	9.9	26.9	60.2
	F.1.70	10,530	3.3	20.1	20.3	56.3

TABLE 5.

FROTH FLOTATION TESTS ON -05mm. MATERIAL.

Test No.	FEED	F.FLOT.PROD.		TAILINGS		REAGENT CONSUMPTION	
	Ash %	Yield %	Ash %	Yield %	Ash %	Paraffin lb/ton	M.I.B.C. lb/ton
1	32.0	59.3	24.9	40.7	40.9	6.2	0.3
2.	32.0	61.6	25.2	38.4	41.8	9.3	0.3

S. G.

1·70 1·60 1·50 1·40

FIG. 1

3" x 1"
SIZE FRACTION

DENSIMETRIC

CUM. FLOATS

CUM. SINKS

CUM. FLOATS %

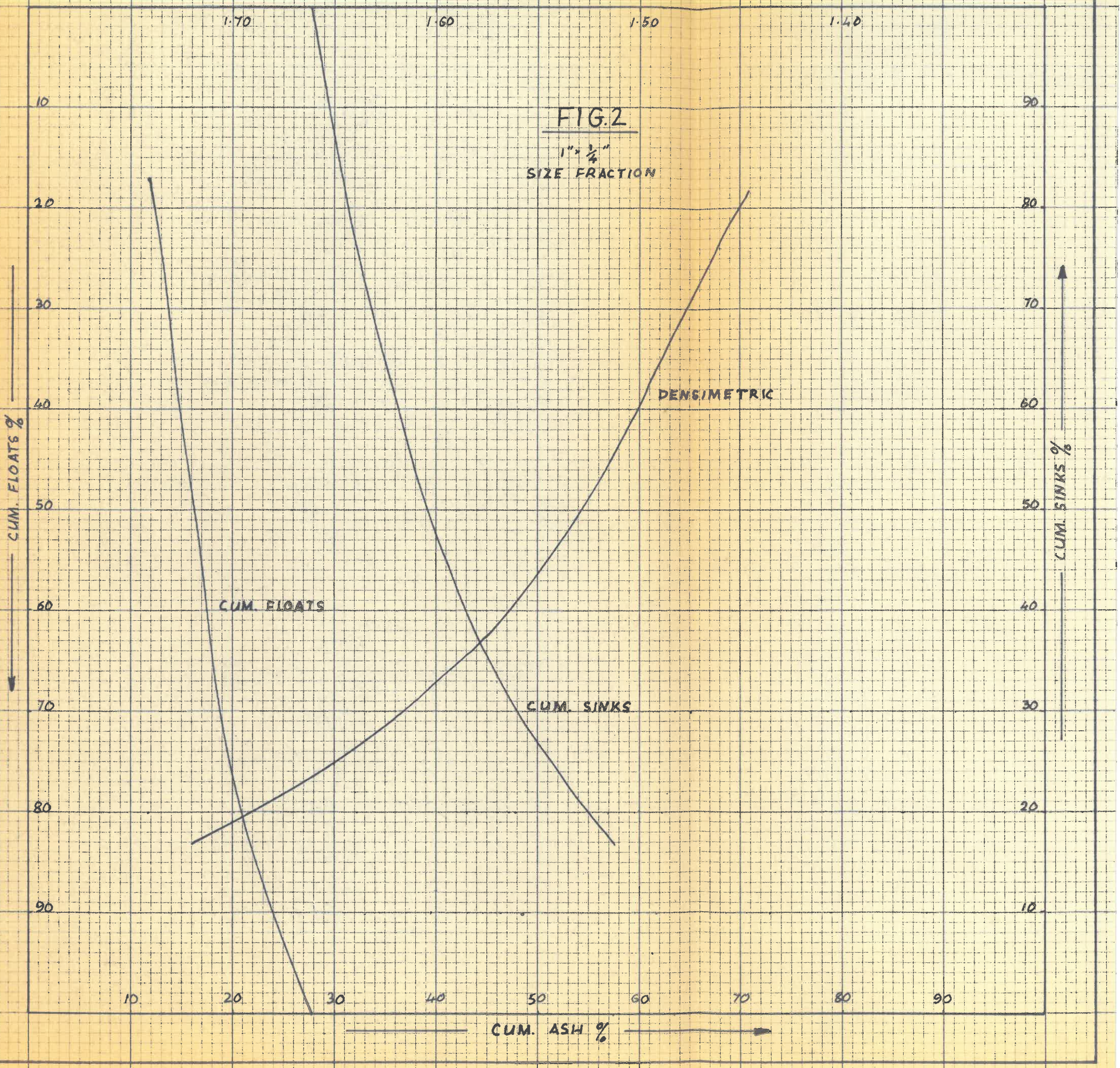
CUM. SINKS %

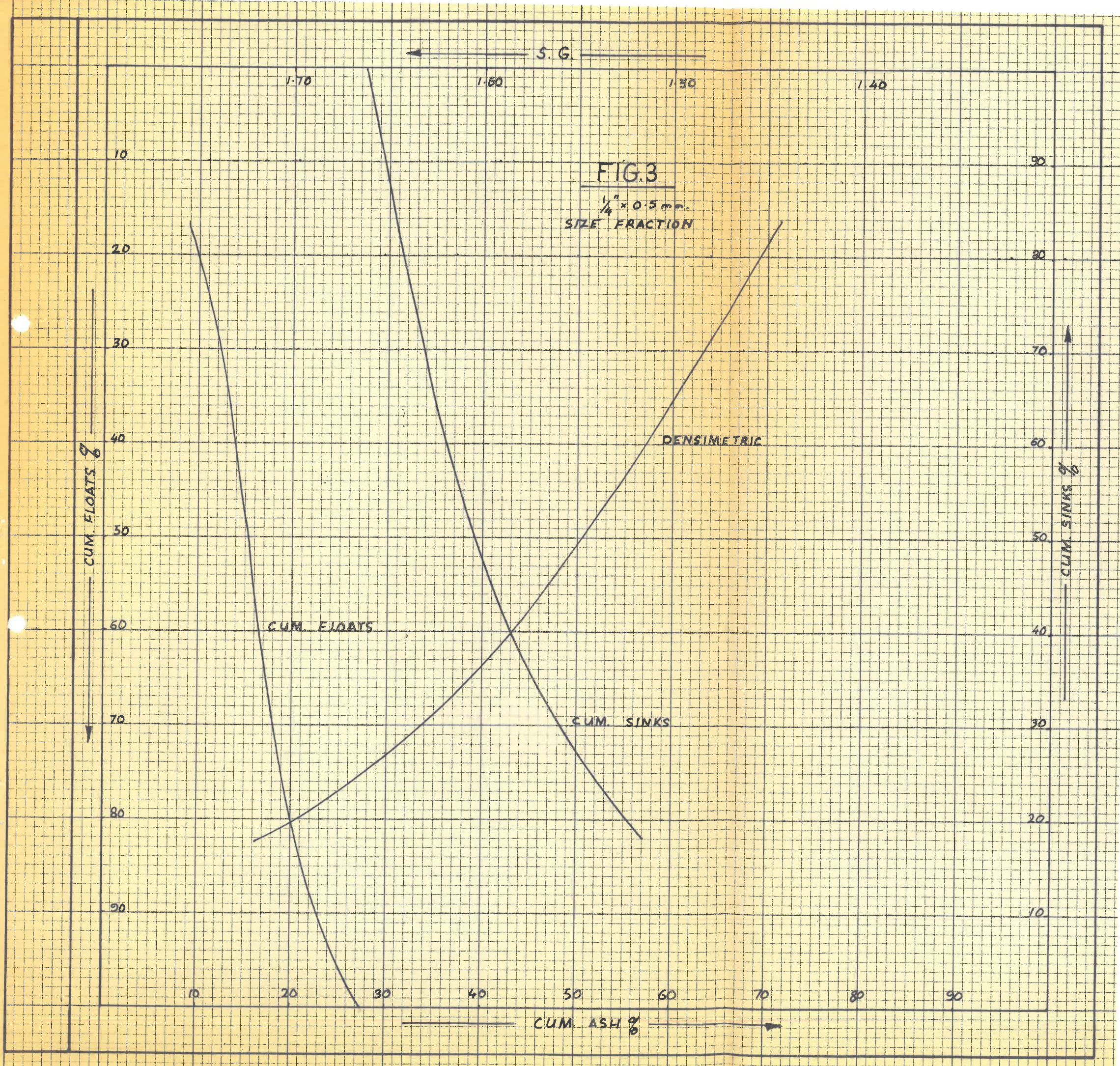
10 20 30 40 50 60 70 80 90

CUM. ASH %

FIG.2

1" × ¼"
SIZE FRACTION




S. G.
1·70
1·60
1·50
1·40
FIG.3
1/4" x 0·5 mm.
SIZE FRACTION
DENSIMETRIC
CUM. FLOATS
CUM. SINKS
CUM. ASH %
CUM. FLOATS %
CUM. SINKS %
10
20
30
40
50
60
70
80
90