FUEL RESEARCH INSTITUTE OF SOUTH AFRICA

TECHNICAL MEMORANDUM NO. 45 OF 1965

REPORT ON THE RESULTS OF WASHABILITY TESTS CARRIED OUT ON A BULK SAMPLE OF NO. 5 SEAM RUN-OF-MINE COAL FROM THE WITBANK AREA

by

S.F. STREICHER

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INTRODUCTION:

The Fuel Research Institute was requested by the Consulting Engineer, Coal Division, Anglo American Corporation, to carry out washability tests on a 5-ton sample of No. 5 Seam run-of-mine coal from the farm Zondagsfontein in the Witbank area.

TREATMENT OF SAMPLE:

The sample was taken by colliery officials and was transported by road to the laboratories of the Fuel Research Institute in Pretoria, where it was analysed in the following manner:-

A. SCREEN ANALYSIS:

The sample was screened at 4" and the +4" material was broken to -4" by hand and mixed with the -4" natural arisings. The sample was then screened at 1.25", 0.5" and 0.5 mm. Results of this screen analysis are reported in Table 1.

B. FLOAT-AND-SINK ANALYSIS:

Representative sub-samples of all the size fractions arising from the screen analysis, except the -0.5 mm. size fraction, were then subjected to float-and-sink analyses on a fractional basis at the following specific gravities: 1.30, 1.35, 1.40, 1.50, 1.60 and 1.70.

Separate samples of the floats at specific gravity 1.50 of the 4" x 1.25" and 1.25" x 0.5" size fractions were prepared for despatch to Western Germany.

C./...

C. ANALYSIS OF SPECIFIC GRAVITY FRACTIONS:

Proximate analyses and swelling index determinations were carried out on the specific gravity fractions of all the different size fractions. Calorific value determinations were also carried out on all the float fractions of the 4" x 1.25" and 0.5" x 0.5 mm. size fractions. An ash determination only was carried out on the -0.5 mm. size fraction. All these results are reported in Table 2.

Proximate analyses, calorific values, swelling indices and total sulphur determinations were carried out on the F 1.50 fractions from the 4" x 1.25" and 1.25" x 0.5" size fractions. These results are reported in Table 3.

D. WASHABILITY DATA:

From the respective yields at the different specific gravity intervals and the ash contents of the fractions, the washability data for the different size fractions were calculated. These results are reported in Table 4. Washability curves were then drawn for the different size fractions (Figures 1 to 3).

REMARK:

The percentage of Torbanite associated with this sample appears to be much higher than is normal for the No. 5 Seam in this area.

(Sgd.) S.F. STREICHER
Principal Technical Officer.

PRETORIA,
2nd November, 1965.

/OvR.

TABLE 1

SCREEN ANALYSIS

Size Fraction	Yield		
	Weight lb.	Fract. %	Cum. %
4" x 1.25"	2,289.25	34.53	34.53
1.25" x 0.5"	1,993.0	30.06	64.59
0.5" x 0.5 mm.	1,914.5	28.88	93.47
-0.5 mm.	404.75	6.11	99.58
Loss	28.0	0.42	
Total	6,629.5	100.00	100.00

TABLE 3

ANALYSIS OF F 1.50 SAMPLES SENT TO GERMANY

	4" x 1.25" Size Fraction	1.25" x 0.5" Size Fraction
Cal. Value (lb/lb)	11.99	12.15
Moisture (%)	5.9	4.9
Ash (%)	12.5	12.0
Vol. Matter (%)	34.7	34.5
Fixed C (%)	46.9	48.6
Swelling No.	0	0
Total S (%)	1.10	0.76

TABLE 4

FLOAT-AND-SINK ANALYSIS OF SIZE FRACTIONS

S.G. Interval	4" x 1.25" Size Fraction				1.25" x 0.5" Size Fraction				0.5" x 0.5 mm. Size Fraction			
	Yield		Ash		Yield		Ash		Yield		Ash	
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %
F 1.30	0.27	0.27	4.0	4.0	3.61	3.61	3.8	3.8	21.07	21.07	3.3	3.3
1.30 - 1.35	21.81	22.08	7.5	7.46	33.33	36.94	7.2	6.87	29.26	50.33	7.7	5.86
1.35 - 1.40	26.63	48.71	12.9	10.43	21.07	58.01	13.2	9.17	12.75	63.08	13.4	7.38
1.40 - 1.50	20.51	69.22	18.0	12.67	13.90	71.91	19.2	11.11	7.92	71.00	19.8	8.77
1.50 - 1.60	11.60	80.82	28.7	14.98	6.35	78.26	30.1	12.65	6.31	77.31	30.0	10.50
1.60 - 1.70	7.24	80.06	36.6	16.75	4.43	82.69	37.9	14.00	3.89	81.20	38.4	11.84
S 1.70	11.94		57.4		17.31		55.6		18.80		64.8	
Whole Coal	100.00	100.00		21.61	100.00	100.00		21.20	100.00	100.00		21.79

ANALYSIS OF S

S.G. Interval	4" x 1.25" Size Fraction						
	Cal. Val. lb/lb	H_2O %	Ash %	Vol. Mat. %	Fix. C %	Sw. No.	H_2O %
F 1.30	13.13	6.4	4.0	37.8	51.8	0	5.8
1.30 - 1.35	12.60	6.4	7.5	35.7	50.4	0	5.8
1.35 - 1.40	11.93	5.9	12.9	34.5	46.7	0	5.1
1.40 - 1.50	11.22	5.5	18.0	32.2	44.3	0	4.6
1.50 - 1.60	9.46	5.2	28.7	26.2	39.9	0	4.3
1.60 - 1.70	8.25	4.6	36.6	26.3	32.5	0	3.8
S 1.70	-	3.6	57.4	17.5	21.5	-	3.0

Ash Content of -0.5 mm. Size F

TABLE 2

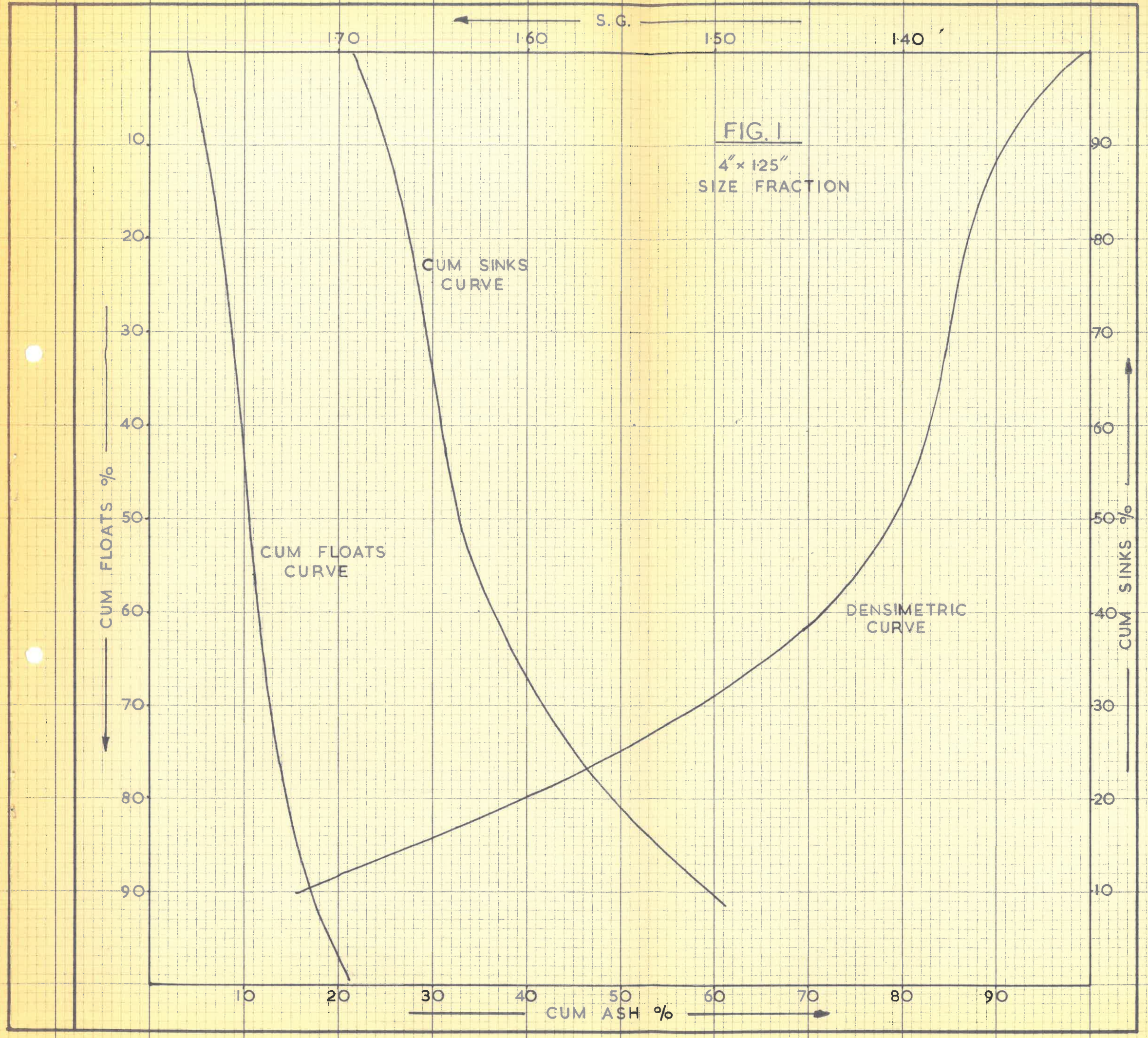
PECIFIC GRAVITY FRACTION

1.25" x 0.5" Size Fraction				0.5" x 0.5 mm. Size Fraction					
Ash %	Vol. Mat. %	Fix. C %	Sw. No.	Cal. Val. lb/lb	H_2O %	Ash %	Vol. Mat. %	Fix. C %	Sw. No.
3.8	37.3	53.1	0	13.26	5.3	3.3	37.2	54.2	0
7.2	36.2	50.8	0	12.77	4.8	7.7	35.5	52.0	0
13.2	33.8	47.9	0	12.05	4.1	13.4	33.7	48.8	0
19.2	30.7	45.5	0	11.06	3.6	19.8	30.1	46.5	0
30.1	26.1	39.5	0	9.50	3.3	30.0	26.1	40.6	0
37.9	24.4	33.9	0	7.95	2.8	38.4	23.5	35.3	0
55.6	19.0	22.4	0	-	2.1	64.8	16.1	17.0	-

raction = 63.2%

FIG. 1

4″ × 1·25″
SIZE FRACTION



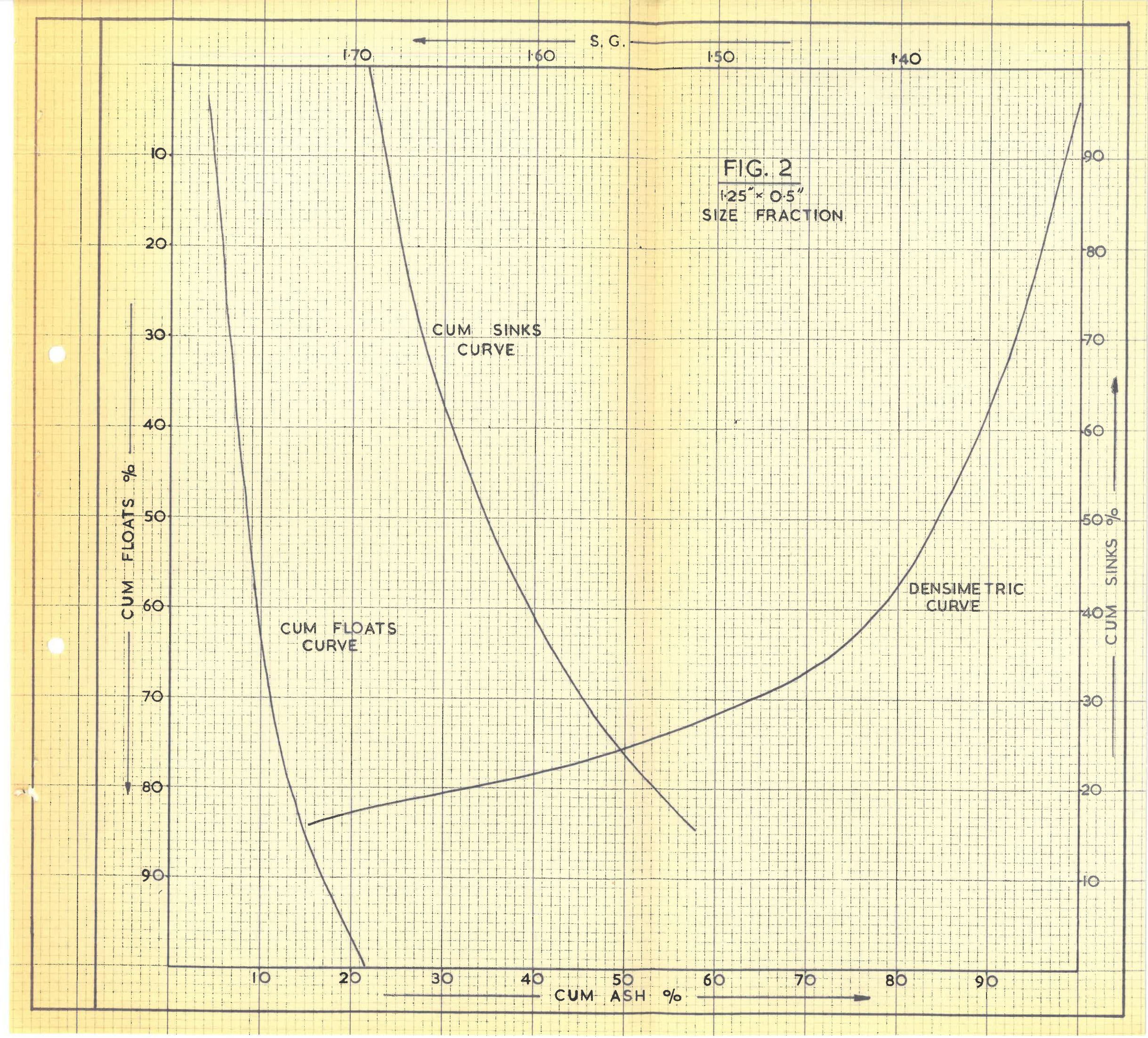

S. G.
1·70
1·60
1·50
1·40
FIG. 2
1·25" × 0·5"
SIZE FRACTION
CUM SINKS
CURVE
CUM FLOATS
CURVE
DENSIMETRIC
CURVE
CUM FLOATS %
CUM SINKS %
CUM ASH %
10
20
30
40
50
60
70
80
90

FIG. 3

0·5" × 0·5 mm
SIZE FRACTION

S.G.

1·70 1·60 1·50 1·40

CUM SINKS CURVE

CUM FLOATS CURVE

DENSIMETRIC CURVE

CUM FLOATS %

CUM SINKS %

10 20 30 40 50 60 70 80 90

CUM ASH %