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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 17 OF 1966.

REPORT ON THE RESULTS OBTAINED FROM WASHABILITY DETERMINATIONS CARRIED OUT ON TWO SAMPLES OF COAL FROM VRYHEID CORONATION COLLIERY.

Coal ex Vrede

See also T M 4/1966

(& T.M 9/1966 — Coal ex V.C. Section)

by

S.F. STREICHER.

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INTRODUCTION:

The Fuel Research Institute was requested by the Fuel Technologist of the Anglo American Corporation to determine the optimum top size to which coal from the Vrede Section of Vryheid Coronation Colliery should be crushed in order to obtain the maximum yield of coking coal at an ash content of approximately 12%.

A sample of this coal weighing about 650 lb. was taken by Colliery officials and was forwarded to the laboratories of the Fuel Research Institute in Pretoria. This sample, however, was considered too small for the accurate determination of the effect of crushing to different top sizes on the washability characteristics of the coal. This sample was therefore only broken to a top size of 2 inches, screened into different size fractions, and the washability characteristics of these size fractions were determined.

A second sample weighing about 3000 lb. was subsequently taken and forwarded to Pretoria, and on this sample the effect of crushing to different top sizes was determined.

ANALYSIS OF SAMPLES:

The first sample was screened at 2" and the few lumps remaining on the 2" screen were broken by hand to pass through the screen. The sample was then screened at 1", ½", ¼", ⅛", 1/16" and 0.5 mm. apertures. Results of this screen analysis are reported in Table 1.

Float and sink analyses were then carried out on all the +0.5mm. size fractions. Detailed float and sink analyses on a fractional basis were carried out in $ZnCl_2$ solutions at 0.05 intervals in the specific gravity range 1.35 to 1.70 on the +⅛" size fractions while the -⅛" size fractions were analysed in organic liquids at 0.04 intervals

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in the specific gravity range 1.34 to 1.70. Ash determinations were carried out on all specific gravity fractions and cumulative values were calculated. These results are reported in Tables 2 - 4. Washability curves were drawn as shown in Fig. 1 - 6.

The second sample contained no +2" materials. This sample was divided as accurately as possible to produce three identical sub samples, which were then analysed in the following manner:

1. The first sub sample was screened at 1", ½", ¼", ⅛", 1/16" and 0.5 mm. and washability determinations were carried out on the +0.5 mm. natural arisings in exactly the same way as described above for the first sample. Results of the screen analysis of this sample are reported in Table 5. Results of the float and sink analyses on the different size fractions are reported in Tables 6 - 8. Washability curves are shown in Fig. 7 - 12.

2. It was intended to crush the second sub sample to a top size of 1" and to repeat the washability determinations on all the different size fractions. However, the amount of +1" material in the sample was so small (less then 6%) that it was considered a waste of time to try to determine the effect of the crushing of the 2" x 1" size fraction to -1" on all the different size fractions of the natural arisings.

The sample was therefore screened at 1" and only the 2" x 1" size fractions was crushed in a jaw crusher to -1". This sample was then screened at 0.5 mm. (Table 9) and washability determinations were carried out on the 1" x 0.5 mm. material. These results are reported in Table 10. Washability curves were again drawn (Fig. 13).

3. The third sub sample was screened at ½" and the +½" size fraction was crushed to -½" in a jaw crusher and added to the original -½" size fraction. The sample was then screened at ¼", ⅛", 1/16" and 0.5 mm. Results of this screen analysis are reported in Table 11. Washability determinations were carried out on all the +0.5 mm. size fractions (Tables 12 - 13) and washability curves were drawn (Fig. 14 - 17.)

4. Swelling index determinations were carried out on all specific gravity fractions of the second sample having ash contents of less than 14%. These results are reported in Table 14.

5. Froth ...../

5. Froth Floatation tests were carried out on the -0.5 mm size fraction from the first sample received. These tests were done in a Denver No.8 open type froth flotation cell using paraffin and M.I.B.C. as reagents. Results of these tests are reported in Table 15.

6. From the washability characteristics and the screen analyses of the samples the total yield of +0.5 mm. coal at an ash content of 12% was calculated for:

(a) Natural arisings in both samples.
(b) Sample No.2 crushed to a top size of 1".
(c) Sample No.2 crushed to a top size of ½".

These results are reported in Table 16.

CONCLUSION:

From the calculated data in Table 16 it can be inferred that theoretically very little low ash coal can be liberated even by crushing this coal to a top size of ½".

In practice this very small gain can be converted into a loss through lower washing efficiencies on the smaller sizes and the increase of the ash content of the -0.5mm. material through crushing.

S.F. STREICHER.
Principal Research Officer.

PRETORIA,
23rd May, 1966.

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TABLE 1.

SCREEN ANALYSIS OF FIRST SAMPLE
NATURAL ARISINGS.

SIZE FRACTION	YIELD		
	FRACT. lb.	FRACT. %	CUM. %
2" x 1"	109.75	16.50	16.50
1" x ½"	157.75	23.71	40.21
½" x ¼"	113.75	17.10	57.31
¼" x ⅛"	102.0	15.33	72.64
⅛" x 1/16"	48.75	7.33	79.97
1/16" x 0.5mm.	73.5	11.05	91.02
-0.5mm.	59.75	8.98	
TOTAL	665.25	100.00	100.00

TABLE 2.

FLOAT AND SINK ANALYSIS OF 2" x 1" AND 1" x ½" SIZE FRACTIONS

FIRST SAMPLE. NATURAL ARISINGS.

S.G. INTERVAL	2" x 1" SIZE FRACTION						1" x ½" SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.35	6.65	7.1	6.65	7.1	93.35	26.73	13.89	6.7	13.89	6.7	86.11	26.30
1.35 - 1.40	18.13	10.8	24.78	9.81	75.22	30.57	18.53	10.8	32.42	9.04	67.58	30.55
1.40 - 1.45	23.16	14.1	47.94	11.88	52.06	37.90	19.79	14.5	52.21	11.11	47.79	37.19
1.45 - 1.50	15.81	19.5	63.75	13.77	36.25	45.93	14.04	19.2	66.25	12.82	33.75	44.67
1.50 - 1.55	5.59	24.4	69.34	14.63	30.66	49.86	6.74	24.8	72.99	13.93	27.01	49.63
1.55 - 1.60	5.54	29.4	74.88	15.72	25.12	54.37	5.26	29.5	78.25	14.98	21.75	54.50
1.60 - 1.65	5.14	33.0	80.02	16.83	19.98	59.87	3.86	34.3	82.11	15.89	17.89	58.86
1.65 - 1.70	3.58	39.1	83.60	17.78	16.40	64.4	4.21	39.9	86.32	17.06	13.68	64.70
>1.70	16.40	64.4					13.68	64.7				
Whole Coal	100.00	-	100.00	25.43	-	-	100.00	-	100.00	23.58	-	-

TABLE 3.

FLOAT AND SINK ANALYSIS OF ½" x ¼" AND ¼" x ⅛" SIZE FRACTIONS

FIRST SAMPLE. NATURAL ARISINGS.

S.G. INTERVAL	½" x ¼" SIZE FRACTION						¼" x ⅛" SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
< 1.35	23.62	6.6	23.62	6.60	76.38	25.08	32.49	6.1	32.49	6.10	67.51	24.83
1.35 - 1.40	18.78	10.7	42.40	8.42	57.60	29.77	16.93	10.9	49.42	7.74	50.58	29.51
1.40 - 1.45	17.42	15.0	59.82	10.34	40.18	36.17	14.19	14.8	63.61	9.31	36.39	35.24
1.45 - 1.50	11.62	19.3	71.44	11.80	28.56	43.03	10.98	19.5	74.59	10.81	25.41	42.04
1.50 - 1.55	6.97	25.2	78.41	12.99	21.59	48.78	6.18	24.7	80.77	11.87	19.23	47.61
1.55 - 1.60	4.84	30.3	83.25	14.00	16.75	54.12	4.58	29.7	85.35	12.83	14.65	53.21
1.60 - 1.65	2.90	34.8	86.15	14.70	13.85	58.17	2.97	34.5	88.32	13.56	11.68	57.97
1.65 - 1.70	2.90	40.7	89.05	15.55	10.95	62.80	2.29	39.8	90.61	14.22	9.39	62.40
> 1.70	10.95	62.8					9.39	62.4				
WHOLE COAL	100.00	-	100.00	20.72	-	-	100.00	-	100.00	18.74	-	-

TABLE 4.

FLOAT AND SINK ANALYSIS OF $\frac{1}{8}$" x 1/16" AND 1/16" x 0.5mm. SIZE FRACTIONS

FIRST SAMPLE. NATURAL ARISINGS.

S.G. INTERVAL	$\frac{1}{8}$" x 1/16" SIZE FRACTION						1/16" x 0.5mm. SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
< 1.34	32.37	4.9	32.37	4.90	67.63	21.28	36.27	4.6	36.27	4.60	63.73	23.61
1.34 - 1.38	14.18	8.1	46.55	5.87	53.45	24.78	11.96	8.3	48.23	5.52	51.77	27.15
1.38 - 1.42	12.62	10.9	59.17	6.94	40.83	29.07	11.35	11.0	59.58	6.56	40.42	31.69
1.42 - 1.46	10.07	14.5	69.24	8.04	30.76	33.84	8.98	14.6	68.56	7.61	31.44	36.57
1.46 - 1.50	7.57	18.3	76.81	9.05	23.19	38.91	7.02	18.5	75.58	8.62	24.42	41.76
1.50 - 1.54	6.31	22.3	83.12	10.06	16.88	45.12	4.94	22.3	80.52	9.46	19.48	46.70
1.54 - 1.58	3.30	26.7	86.42	10.70	13.58	49.60	3.58	26.2	84.10	10.17	15.90	51.32
1.58 - 1.62	3.21	30.7	89.63	11.42	10.37	55.45	3.48	30.6	87.58	10.98	12.42	57.13
1.62 - 1.66	1.00	35.0	90.63	11.68	9.37	57.64	1.01	35.0	88.59	11.25	11.41	59.09
1.66 - 1.70	1.35	37.7	91.98	12.06	8.02	61.00	1.62	37.3	90.21	11.72	9.79	62.70
> 1.70	8.02	61.0					9.79	62.7				
WHOLE COAL	100.00	-	100.00	15.98	-	-	100.00	-	100.00	16.71	-	-

ASH CONTENT OF -0.5mm. MATERIAL 18.3%.

TABLE 5.

SCREEN ANALYSIS OF SECOND SAMPLE.

NATURAL ARISINGS.

SIZE FRACTION	YIELD		
	FRACT. lb.	FRACT. %	CUM. %
2" x 1"	61.25	5.75	5.75
1" x ½"	289.5	27.16	32.91
½" x ¼"	237.25	22.26	55.17
¼" x ⅛"	175.5	14.78	69.95
⅛" x 1/16"	88.5	8.30	78.25
1/16" x 0.5mm.	139.5	13.09	91.34
-0.5mm.	92.25	8.66	
TOTAL	1065.75	100.00	100.00

TABLE 6.

FLOAT AND SINK ANALYSIS OF 2" x 1" AND 1" x ½" SIZE FRACTIONS

SECOND SAMPLE. NATURAL ARISINGS.

S.G. INTERVAL	2" x 1" SIZE FRACTION						1" x ½" SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.35	3.97	7.0	3.97	7.00	96.03	38.14	11.76	6.8	11.76	6.80	88.24	25.39
1.35 - 1.40	14.59	10.2	18.56	9.52	81.44	43.15	19.86	10.5	31.62	9.12	68.38	29.72
1.40 - 1.45	17.03	14.5	35.59	11.90	64.41	50.73	20.78	14.5	52.40	11.25	47.60	36.36
1.45 - 1.50	12.70	19.0	48.29	13.77	51.71	58.52	14.82	19.5	67.22	13.07	32.78	43.98
1.50 - 1.55	5.50	24.1	53.79	14.83	46.21	62.62	7.18	24.8	74.40	14.20	25.60	49.36
1.55 - 1.60	4.41	29.3	58.20	15.93	41.80	66.14	6.19	30.0	80.59	15.41	19.41	55.54
1.60 - 1.65	4.86	33.7	63.06	17.30	36.94	70.41	3.97	34.3	84.56	16.30	15.44	61.00
1.65 - 1.70	2.52	39.2	65.58	18.14	34.42	72.70	2.45	39.8	87.01	16.96	12.99	65.00
>1.70	34.42	72.7					12.99	65.0				
WHOLE COAL	100.00	-	100.00	36.92	-	-	100.00	-	-	23.20	-	-

TABLE 7.

FLOAT AND SINK ANALYSIS OF ½" x ¼" AND ¼" x ⅛" SIZE FRACTIONS

SECOND SAMPLE. NATURAL ARISINGS.

S.G. INTERVAL	½" x ¼" SIZE FRACTION						¼" x ⅛" SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.35	20.88	6.3	20.88	6.30	79.12	23.26	29.82	6.1	29.82	6.10	70.18	23.29
1.35 - 1.40	19.66	10.5	40.54	8.34	59.46	27.48	17.61	10.2	47.43	7.62	52.57	27.67
1.40 - 1.45	19.19	14.4	59.73	10.29	40.27	33.71	16.10	14.3	63.53	9.31	36.47	33.57
1.45 - 1.50	13.17	19.3	72.90	11.92	27.10	40.71	11.57	19.1	75.10	10.82	24.90	40.29
1.50 - 1.55	7.81	24.7	80.71	13.16	19.29	47.19	6.92	24.3	82.02	11.96	17.98	46.44
1.55 - 1.60	4.52	29.5	85.23	14.03	14.77	52.61	4.40	29.7	86.42	12.86	13.58	51.87
1.60 - 1.65	3.01	34.7	88.24	14.75	11.76	57.20	2.77	34.1	89.19	13.52	10.81	56.42
1.65 - 1.70	2.26	40.0	90.50	15.38	9.50	61.30	2.26	39.1	91.45	14.15	8.55	61.00
>1.70	9.50	61.3					8.55	61.0				
WHOLE COAL	100.00	-	100.00	19.74	-	-	100.00	-	100.00	18.16	-	-

TABLE 8.

FLOAT AND SINK ANALYSIS OF $\frac{1}{8}$" x 1/16" AND 1/16" x 0.5mm. SIZE FRACTIONS

SECOND SAMPLE. NATURAL ARISINGS.

S.G. INTERVAL	$\frac{1}{8}$" x 1/16" SIZE FRACTION						1/16" x 0.5mm. SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.34	33.20	5.3	33.20	5.30	66.80	22.88	34.13	4.5	34.13	4.50	65.87	22.55
1.34 - 1.38	13.58	9.2	46.78	6.43	53.22	26.37	11.68	8.3	45.81	5.47	54.19	25.62
1.38 - 1.42	8.41	12.0	55.19	7.28	44.81	29.07	10.87	10.5	56.68	6.44	43.32	29.42
1.42 - 1.46	11.25	14.6	66.44	8.52	33.56	33.92	10.87	13.7	67.55	7.61	32.45	34.69
1.46 - 1.50	8.26	18.4	74.70	9.61	25.30	38.99	7.68	17.8	75.23	8.65	24.77	39.93
1.50 - 1.54	5.68	22.5	80.38	10.52	19.62	43.77	5.71	21.8	80.94	9.58	19.06	45.36
1.54 - 1.58	4.06	26.0	84.44	11.26	15.56	48.41	3.69	25.6	84.63	10.28	15.37	50.11
1.58 - 1.62	2.53	29.8	86.97	11.80	13.03	52.03	2.48	29.2	87.11	10.82	12.89	54.13
1.62 - 1.66	2.48	33.5	89.45	12.40	10.55	56.39	2.07	32.8	89.18	11.33	10.82	58.21
1.66 - 1.70	1.72	37.9	91.17	12.88	8.83	60.00	1.77	37.8	90.95	11.85	9.05	62.20
>1.70	8.83	60.0					9.05	62.2				
WHOLE COAL	100.00	-	100.00	17.04	-	-	100.00	-	100.00	16.41	-	-

ASH CONTENT OF -0.5mm. MATERIAL 17.4%.

TABLE 9.

SCREEN ANALYSIS OF 2" x 1" SIZE FRACTION BROKEN TO -1".

SIZE FRACTION	YIELD	
	FRACT. %	CUM. %
1" x 0.5mm.	88.89	88.89
-0.5mm.	11.11	
TOTAL	100.00	100.00

TABLE 11.

SCREEN ANALYSIS OF SECOND SAMPLE ½" TOP SIZE.

SIZE FRACTION	YIELD	
	FRACT. %	CUM. %
½" x ¼"	40.78	40.78
¼" x ⅛"	21.54	62.32
⅛" x 1/16"	8.87	71.19
1/16" x 0.5mm.	17.15	88.34
-0.5mm.	11.66	
TOTAL	100.00	100.00

TABLE 10.

FLOAT AND SINK ANALYSIS OF 2" x 1" SIZE FRACTION BROKEN TO -1".

S.G. INTERVAL	1" x 0.5mm. SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.35	7.13	6.2	7.13	6.20	92.87	40.41
1.35 - 1.40	11.92	9.9	19.05	8.52	80.95	44.90
1.40 - 1.45	13.59	13.7	32.64	10.68	67.36	51.19
1.45 - 1.50	12.03	18.7	44.67	12.84	55.33	58.25
1.50 - 1.55	6.24	24.2	50.91	14.23	49.09	62.58
1.55 - 1.60	5.12	29.0	56.03	15.58	43.97	66.49
1.60 - 1.65	3.45	34.1	59.48	16.65	40.52	69.25
1.65 - 1.70	3.56	39.7	63.04	17.95	36.96	72.10
>1.70	36.96	72.1				
WHOLE COAL	100.00	-	100.00	37.96	-	-

ASH CONTENT OF -0.5mm. MATERIAL 33.8%.

TABLE 12.

FLOAT AND SINK ANALYSIS OF ½" x ¼" AND ¼" x ⅛" SIZE FRACTIONS

SECOND SAMPLE. TOP SIZE ½".

S.G. INTERVAL	½" x ¼" SIZE FRACTION						¼" x ⅛" SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.35	17.59	6.3	17.59	6.30	82.41	26.88	28.69	6.0	28.69	6.00	71.31	23.28
1.35 - 1.40	17.37	10.6	34.96	8.44	65.04	31.23	17.50	10.2	46.19	7.59	53.81	27.53
1.40 - 1.45	18.43	14.6	53.39	10.57	46.61	37.80	16.58	14.2	62.77	9.34	37.23	33.46
1.45 - 1.50	13.77	19.2	67.16	12.34	32.84	45.60	11.80	19.0	74.57	10.87	25.43	40.17
1.50 - 1.55	6.99	25.1	74.15	13.54	25.85	51.14	7.22	24.4	81.79	12.06	18.21	46.42
1.55 - 1.60	5.30	30.2	79.45	14.65	20.55	56.54	4.48	29.3	86.27	12.96	13.73	52.00
1.60 - 1.65	3.71	35.2	83.16	15.57	16.84	61.24	2.54	33.7	88.81	13.55	11.19	56.16
1.65 - 1.70	2.86	40.4	86.02	16.40	13.98	65.50	2.44	38.8	91.25	14.23	8.75	61.00
>1.70	13.98	65.5		23.26			8.75	61.0				
WHOLE COAL	100.00	-	100.00	23.26	-	-	100.00	-	100.00	18.32	-	-

TABLE 13.

FLOAT AND SINK ANALYSIS OF ⅛" x 1/16" AND 1/16" x 0.5mm. SIZE FRACTIONS

SECOND SAMPLE. TOP SIZE ½".

S.G. INTERVAL	⅛" x 1/16" SIZE FRACTION						1/16" x 0.5mm. SIZE FRACTION					
	FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS		FRACTIONAL		CUMULATIVE FLOATS		CUMULATIVE SINKS	
	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %	YIELD %	ASH %
<1.34	31.69	5.4	31.69	5.40	68.31	23.97	33.08	4.6	33.08	4.60	66.92	22.39
1.34 - 1.38	12.45	9.3	44.14	6.50	55.86	27.24	11.57	8.3	44.65	5.58	55.35	25.33
1.38 - 1.42	8.46	11.7	52.60	7.34	47.40	30.01	11.52	11.7	56.17	6.84	43.83	28.91
1.42 - 1.46	11.75	14.4	64.35	8.63	35.65	35.15	11.47	14.3	67.64	8.11	32.36	34.11
1.46 - 1.50	8.35	18.3	72.70	9.74	27.30	40.30	8.32	18.4	75.96	9.24	24.04	39.55
1.50 - 1.54	6.18	22.8	78.88	10.76	21.12	45.42	5.53	22.4	81.49	10.13	18.51	44.68
1.54 - 1.58	4.41	26.3	83.29	11.58	16.71	50.47	3.65	26.1	85.14	10.81	14.86	49.24
1.58 - 1.62	2.89	29.6	86.18	12.18	13.82	54.84	2.54	29.7	87.68	11.36	12.32	53.27
1.62 - 1.66	2.13	33.1	88.31	12.68	11.69	58.80	2.18	33.2	89.86	11.89	10.14	57.59
1.66 - 1.70	1.67	37.2	89.98	13.14	10.02	62.40	1.47	36.9	91.33	12.29	8.67	61.10
>1.70	10.02	62.4					8.67	61.1				
WHOLE COAL	100.00	-	100.00	18.08	-	-	100.00	-	100.00	16.52	-	-

ASH CONTENT OF -0.5mm. MATERIAL 18.5%.

TABLE 14.

SWELLING INDICES OF SPECIFIC GRAVITY FRACTIONS.

SIZE FRACTION	SP. GR. FRACTION	SWELLING INDICES	
		NATURAL ARISINGS	TOP SIZE ½"
2" x 1"	F 1.35	4½	-
	1.35 - 1.40	1	-
1" x ½"	F 1.35	5	-
	1.35 - 1.40	1	-
½" x ¼"	F 1.35	6	5½
	1.35 - 1.40	1	1
¼" x ⅛"	F 1.35	7	7
	1.35 - 1.40	1	1
⅛" x 1/16"	F 1.34	8½	8½
	1.34 - 1.38	2	2
	1.38 - 1.42	1	1
1/16" x 0.5mm.	F 1.34	8½	8½
	1.34 - 1.38	3½	3
	1.38 - 1.42	1	1
2" x 1" CRUSHED TO -1"	F 1.35	4½	
	1.35 - 1.40	1	
	1.40 - 1.45	1	

TABLE 15.

FROTH FLOTATION TESTS ON -0.5mm. MATERIAL FROM FIRST SAMPLE.

TEST NO.	FEED ASH %	FROTH FLOTATION PRODUCT			TAILINGS		REAGENT CONSUMPTION	
		YIELD %	ASH %	SW. NO.	YIELD %	ASH %	PARAFFIN lb/ton	M.I.B.C. lb/ton
1	18.3	83.8	13.2	4	16.2	44.1	3.2	0.20
2	18.3	75.7	12.4	4	24.3	35.0	1.6	0.15
3	18.3	63.6	11.1	5	36.4	31.5	1.6	0.10
4	18.3	17.4	10.2	5	82.6	19.8	0.53	0.02

TABLE 16.

THEORETICAL YIELD OF 12% ASH COAL.

SIZE FRACTION	FIRST SAMPLE NATURAL ARISINGS			SECOND SAMPLE NATURAL ARISINGS			SECOND SAMPLE TOP SIZE ½"		
	% OF FRACTION	% OF ORIGINAL		% OF FRACTION	% OF ORIGINAL		% OF FRACTION	% OF ORIGINAL	
		FRACT.	CUM.		FRACT.	CUM.		FRACT.	CUM.
2" x 1"	47	7.76	7.76	37	2.13	2.13	-	-	-
1" x ½"	60	14.23	21.99	59	16.02	18.15	-	-	-
½" x ¼"	72	12.23	34.22	74	16.47	34.62	64	26.10	26.10
¼" x ⅛"	81	12.42	46.64	83	12.27	46.89	83	17.88	43.98
⅛" x 1/16"	91	6.67	53.31	88	7.30	54.19	86	7.63	51.61
1/16" x 0.5mm.	91	10.06		91	11.91		91	15.61	
TOTAL		63.37	63.37		66.10	66.10		67.22	67.22

FROM CRUSHING SAMPLE NO. 2 TO A TOP SIZE OF 1" AN EXTRA 0.23 % OF 12% ASH COAL CAN BE LIBERATED.

FIG. 1

1st Sample

2" x 1"
SIZE FRACTION

S.G.

1.70 1.60 1.50 1.40

CUM. SINKS Vs Ash

S.G. Vs. Cumul. Floats

DENSIMETRIC

CHARACTERISTIC
ASH

Inst. Ash Vs Yield ?

CUM. FLOATS Vs ash.

CUM. FLOATS %

CUM. SINKS %

CUM. ASH %

10 20 30 40 50 60 70 80 90

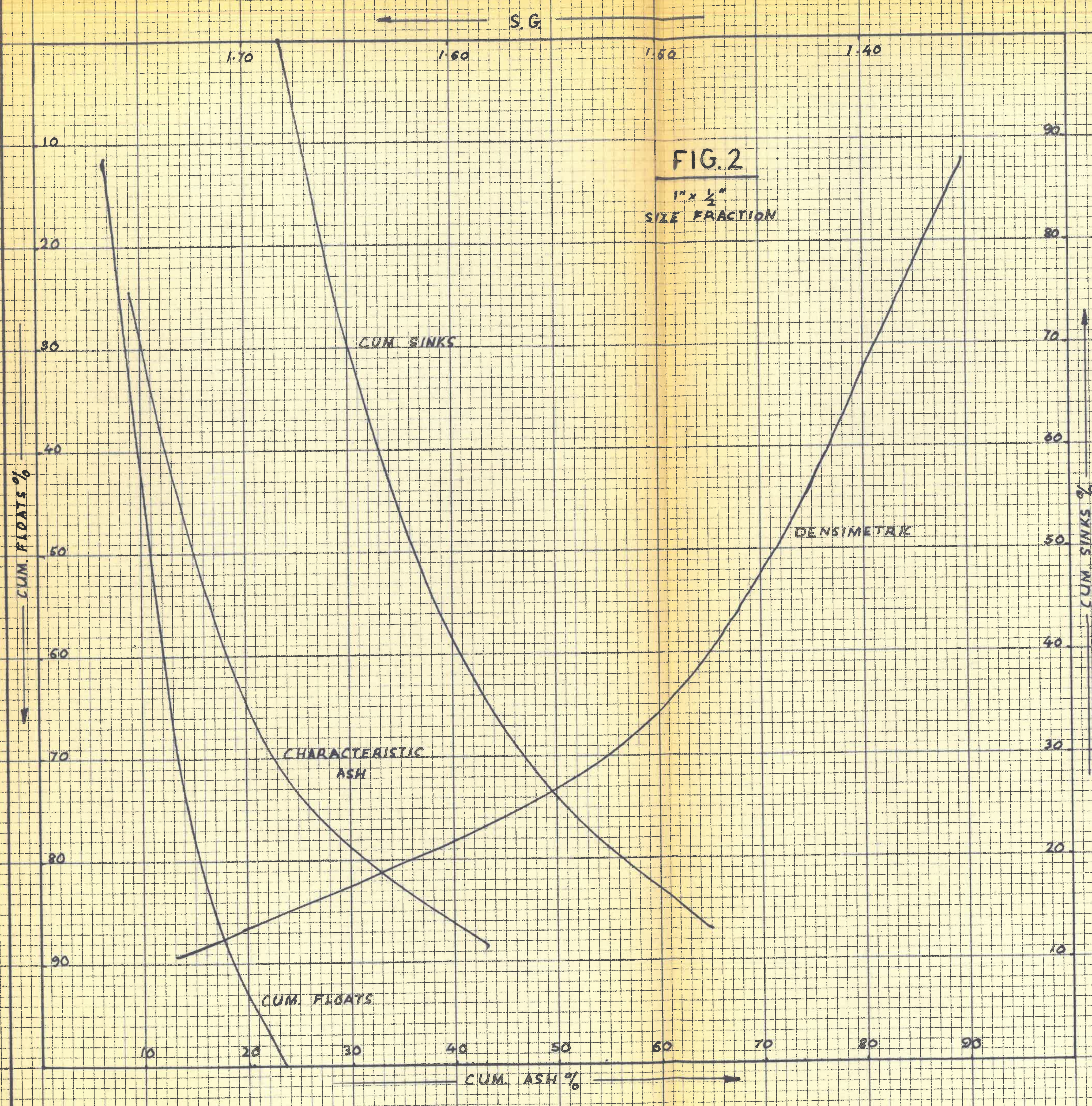
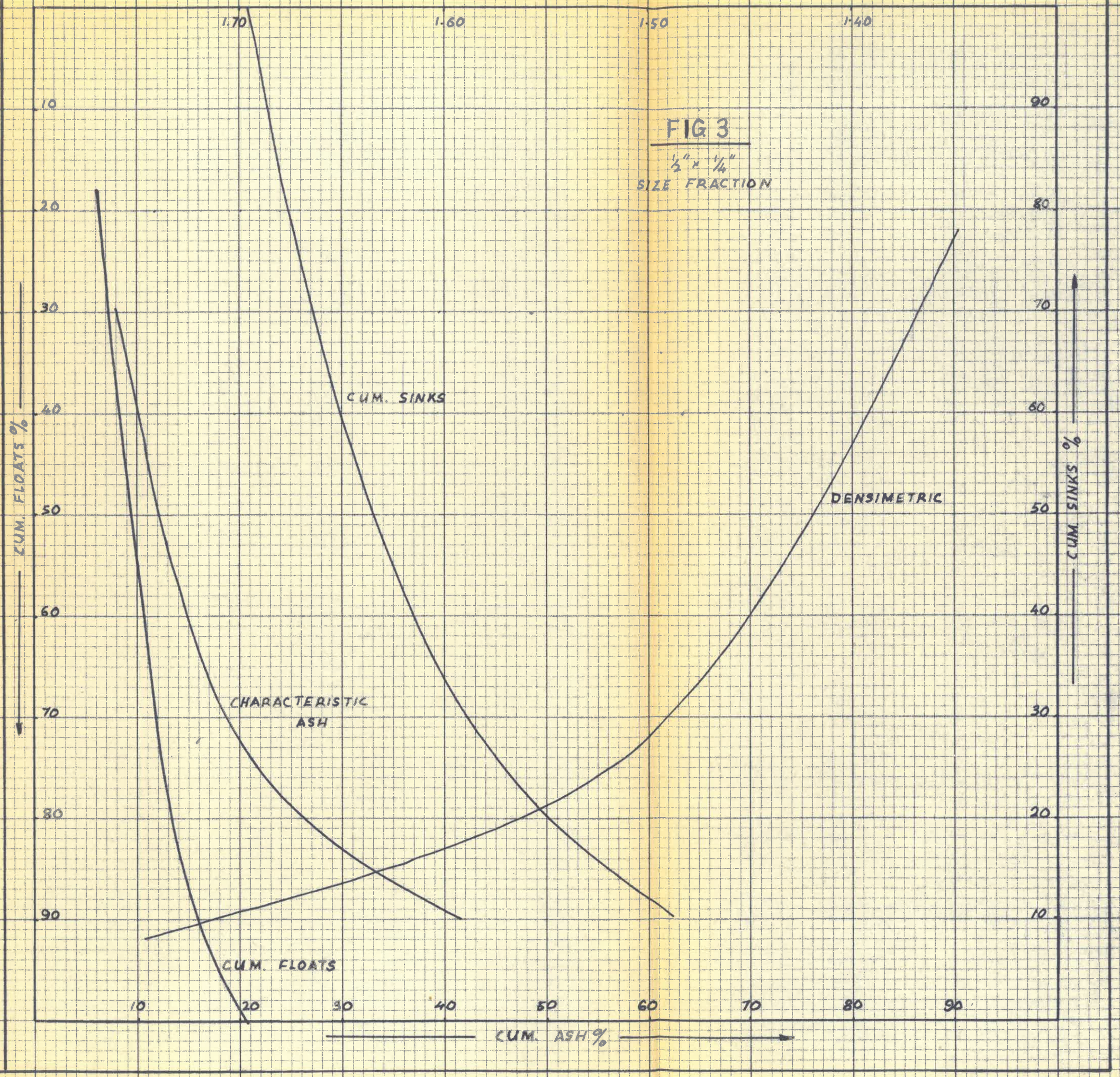


FIG. 2
1" x ½"
SIZE FRACTION

FIG 3

1½" × ¼"
SIZE FRACTION



S.G

1·70 1·60 1·50 1·40

FIG. 4

¼" × ⅛"
SIZE FRACTION

CUM. FLOATS %

CUM. SINKS

CHARACTERISTIC ASH

DENSIMETRIC

CUM. SINKS %

CUM. FLOATS

CUM. ASH %

10 20 30 40 50 60 70 80 90

S. G.

1.70 1.60 1.50 1.40

FIG. 5

1/8" × 1/16"

SIZE FRACTION

CUM. FLOATS %

CUM. SINKS %

CUM. SINKS

CHARACTERISTIC ASH

DENSIMETRIC

CUM. FLOATS

CUM. ASH %

10 20 30 40 50 60 70 80 90

FIG. 6

$\frac{1}{16}$" × 0.5 mm.

SIZE FRACTION

S.G.

1·70 1·60 1·50 1·40

CUM. SINKS.

CHARACTERISTIC ASH

DENSIMETRIC

CUM. FLOATS

CUM. FLOATS %

CUM. SINKS %

CUM. ASH %

10 20 30 40 50 60 70 80 90

2nd Sample

FIG. 7

2" × 1"
NATURAL ARISING

S. G.

1·70 1·60 1·50 1·40

CUM. FLOATS %

10 20 30 40 50 60 70 80 90

CUM. SINKS %

90 80 70 60 50 40 30 20 10

CUM. ASH %

10 20 30 40 50 60 70 80 90

DENSIMETRIC

CHARACTERISTIC ASH

CUM. SINKS

CUM. FLOATS

FIG. 8

1" x ½"

NATURAL ARISING

S.G.

1·70 1·60 1·50 1·40

2nd Sample

DENSIMETRIC

CHARACTERISTIC ASH

CUM. FLOATS

CUM. SINKS

CUM. FLOATS %

CUM. SINKS %

CUM. AS %

10 20 30 40 50 60 70 80 90

FIG. 9

½" × ¼"
NATURAL ARISING

2nd Sample

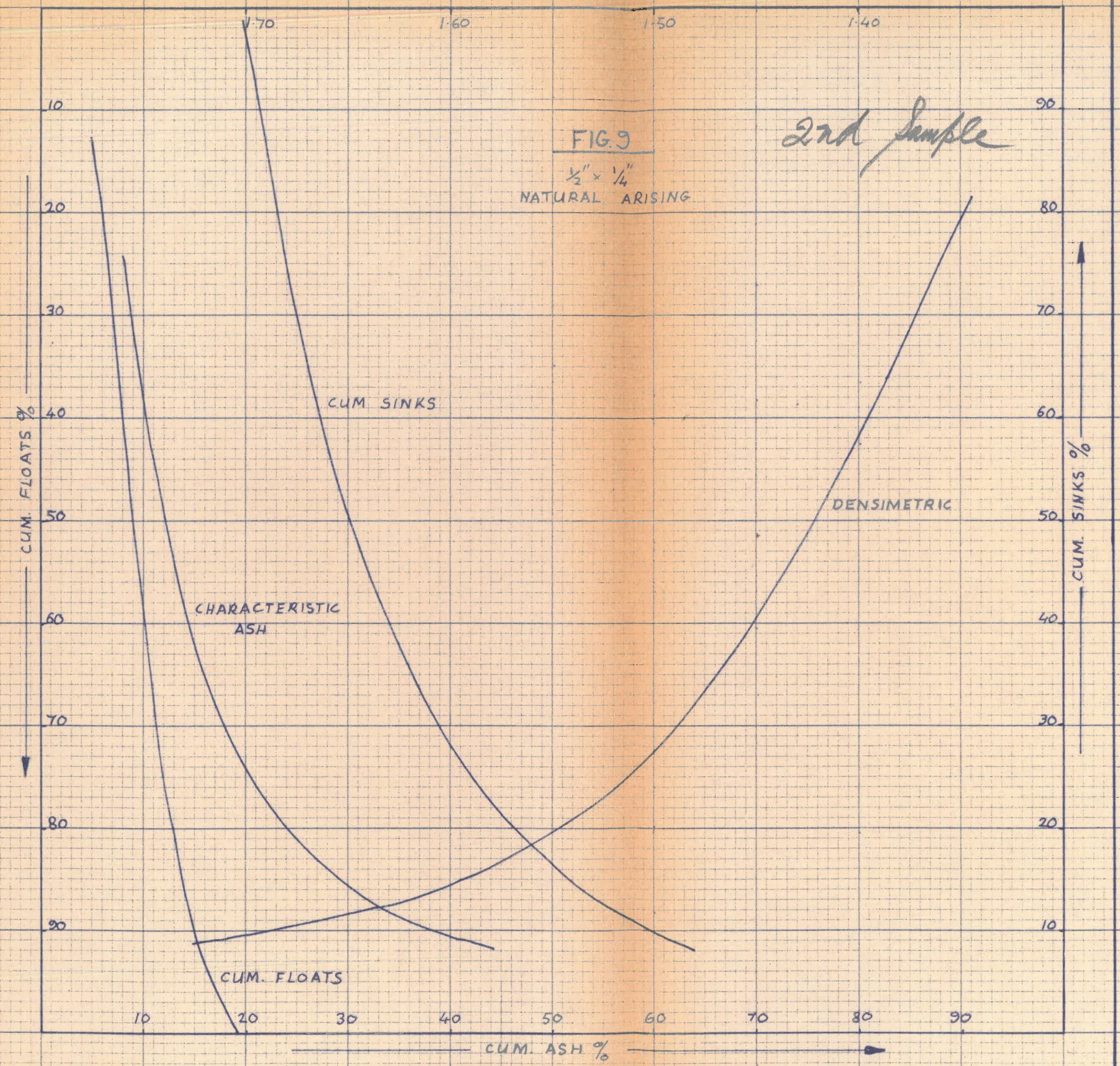


FIG. 10

$\frac{1}{4}'' \times \frac{1}{8}''$

NATURAL ARISING

2nd Sample

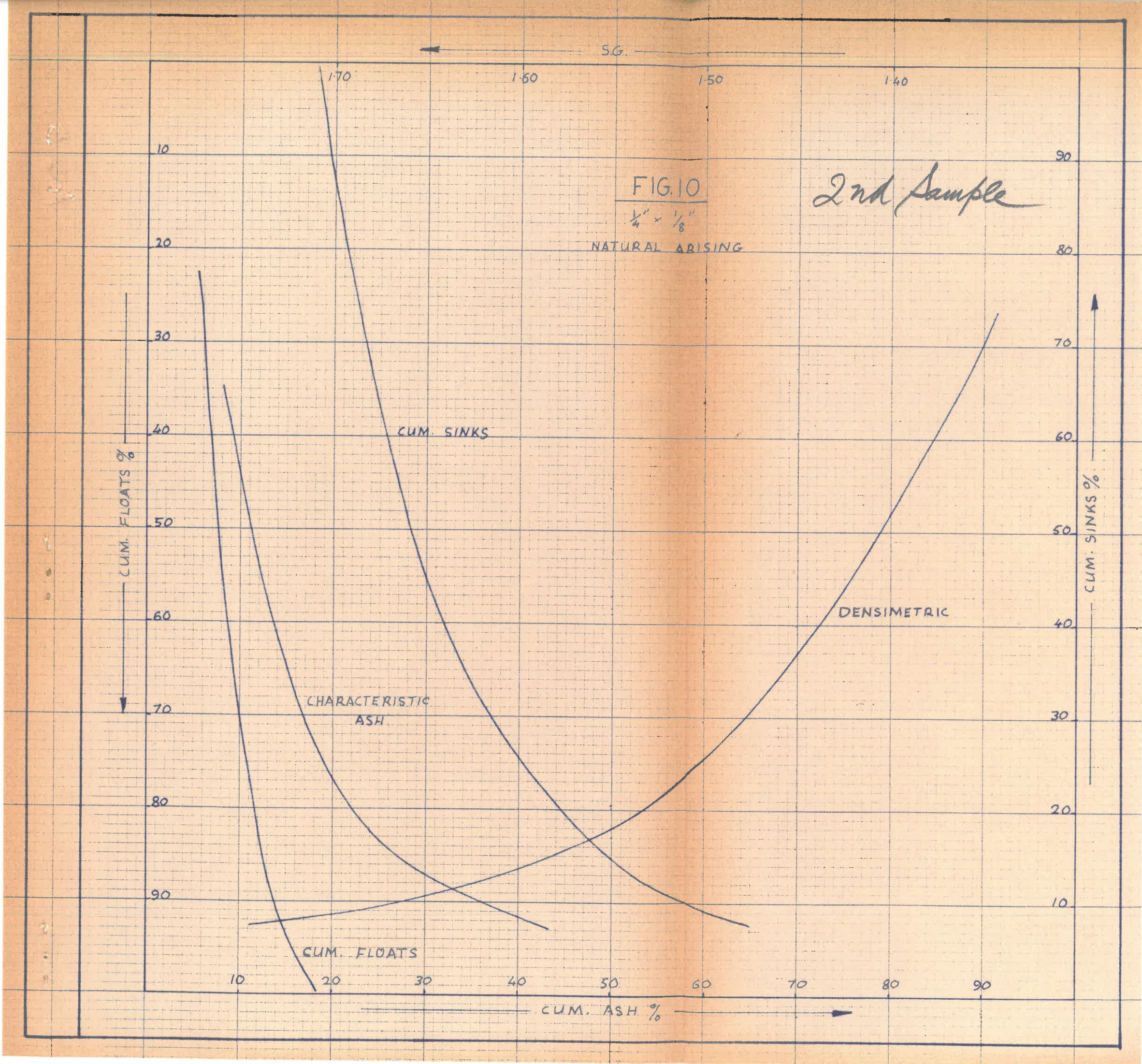


FIG. II

$\frac{1}{8}'' \times \frac{1}{16}''$

NATURAL ARISING

2nd Sample

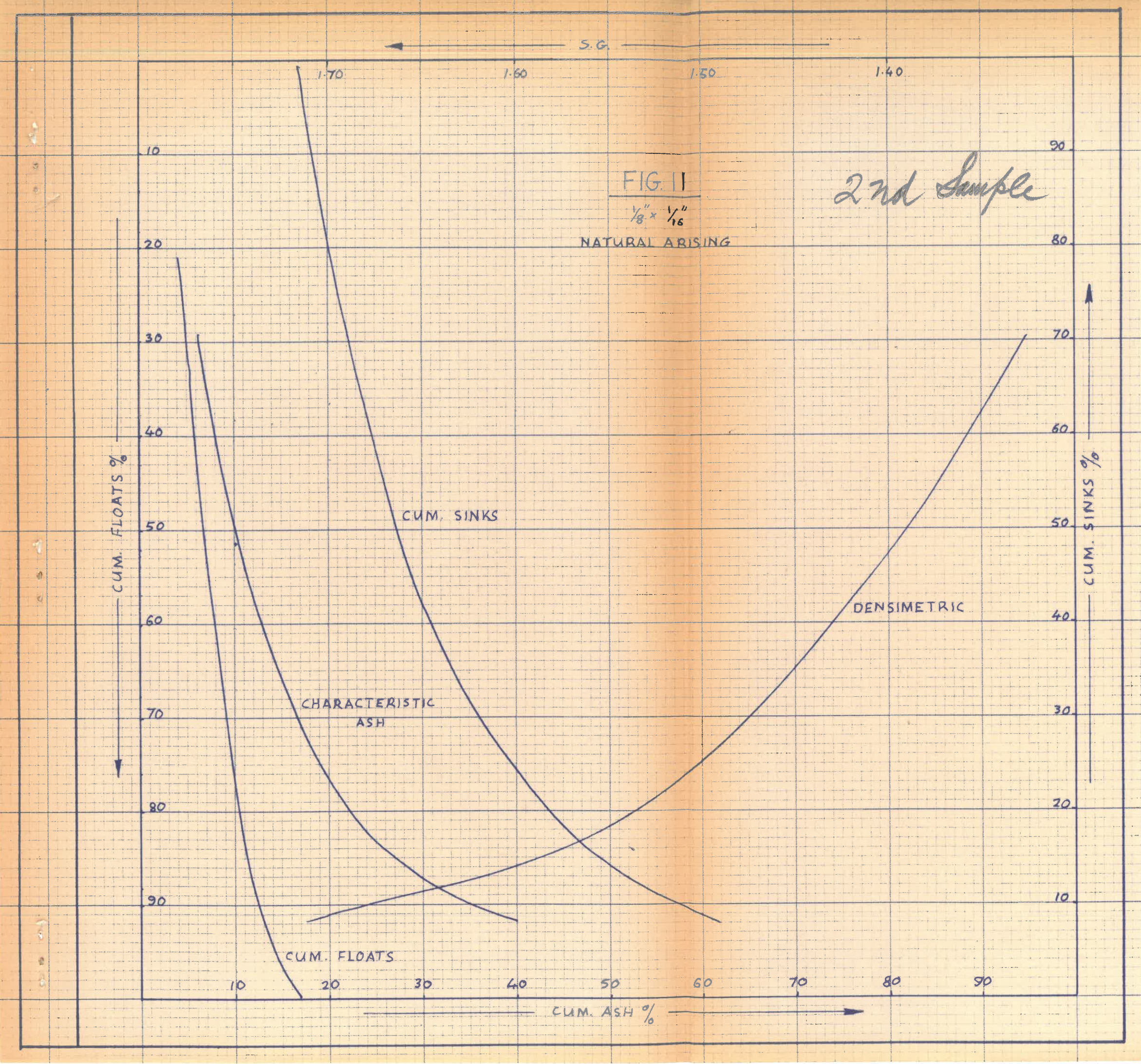


FIG. 12

1/16" × 0.5 mm

NATURAL ARISING

2nd Sample

S.G.

1·70 1·60 1·50 1·40

CUM. FLOATS %

CUM. SINKS %

CUM. SINKS

DENSIMETRIC

CHARACTERISTIC ASH

CUM. FLOATS

CUM. ASH %

FIG.13

2nd Sample

2"×1" BROKEN TO −1"

S.G.

1·70 1·60 1·50 1·40

CUM. FLOATS %

CUM. SINKS %

DENSIMETRIC

CUM. SINKS

CHARACTERISTIC ASH

CUM. FLOATS

CUM. ASH %

10 20 30 40 50 60 70 80 90

FIG. 14

½" x ¼"
CRUSHED COAL

2nd Sample

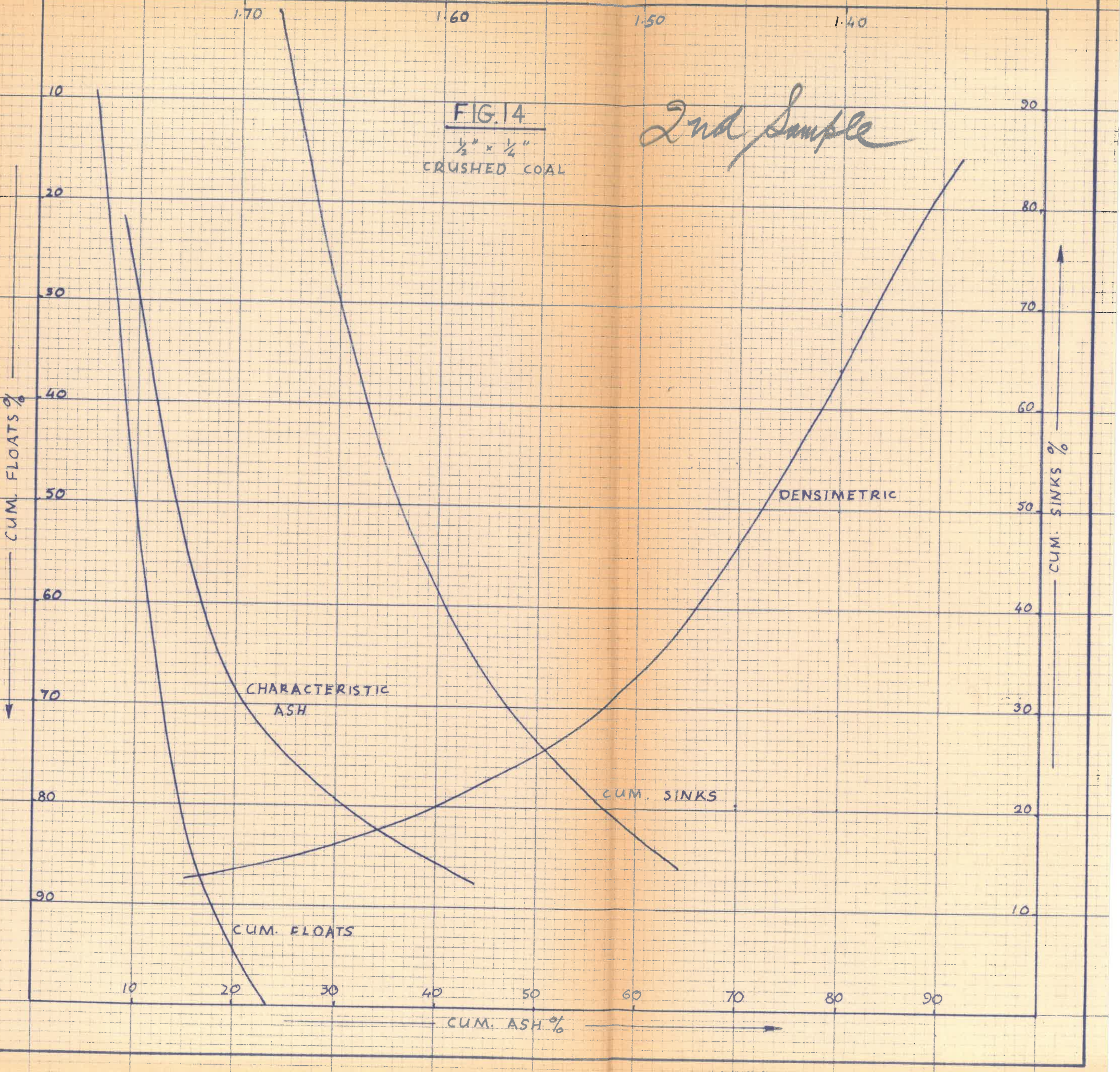


FIG. 15

$\frac{1}{4}" \times \frac{1}{8}"$

CRUSHED COAL

2nd Sample

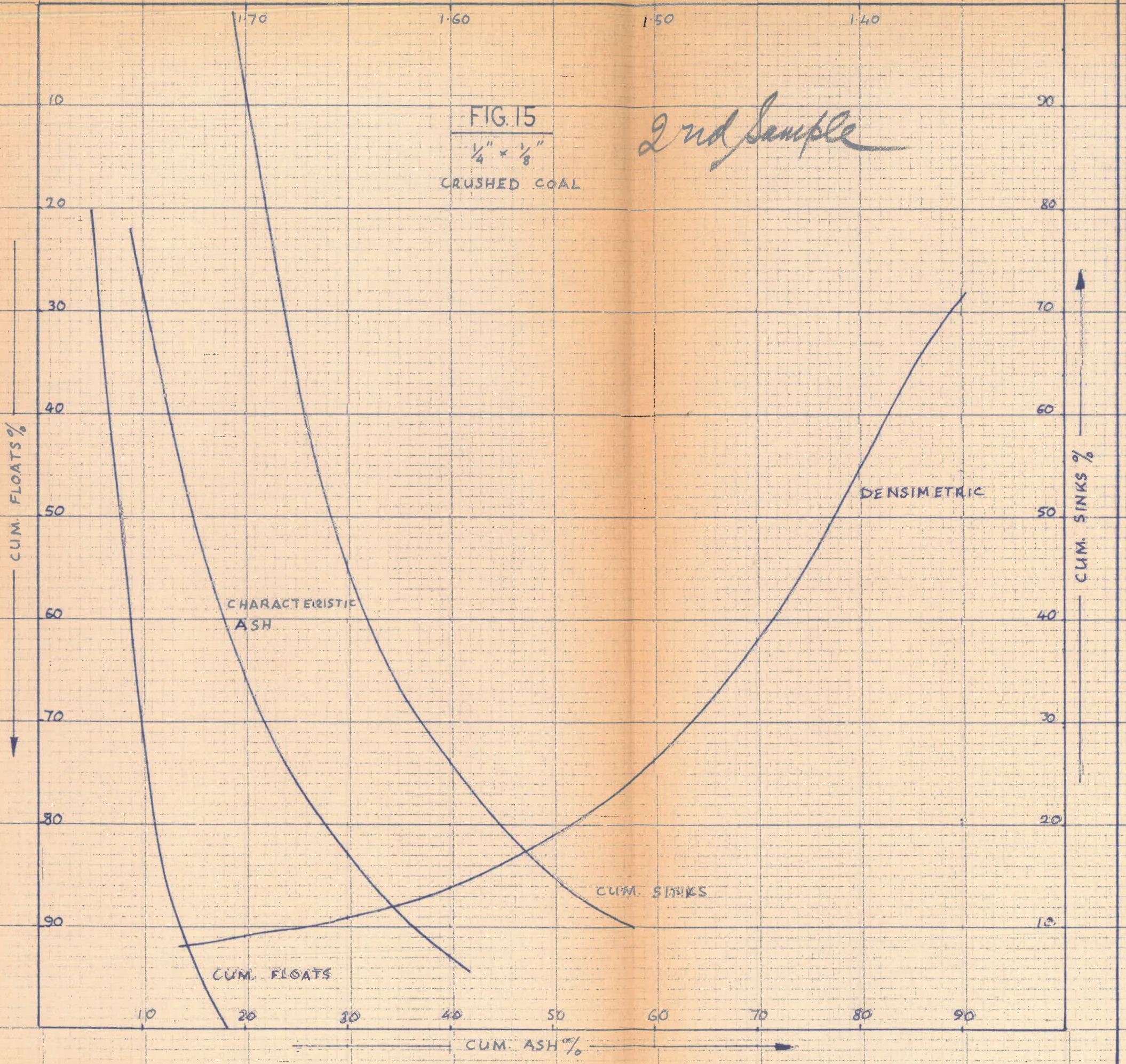


FIG. 16

1/8" × 1/16"

CRUSHED COAL

2nd Sample

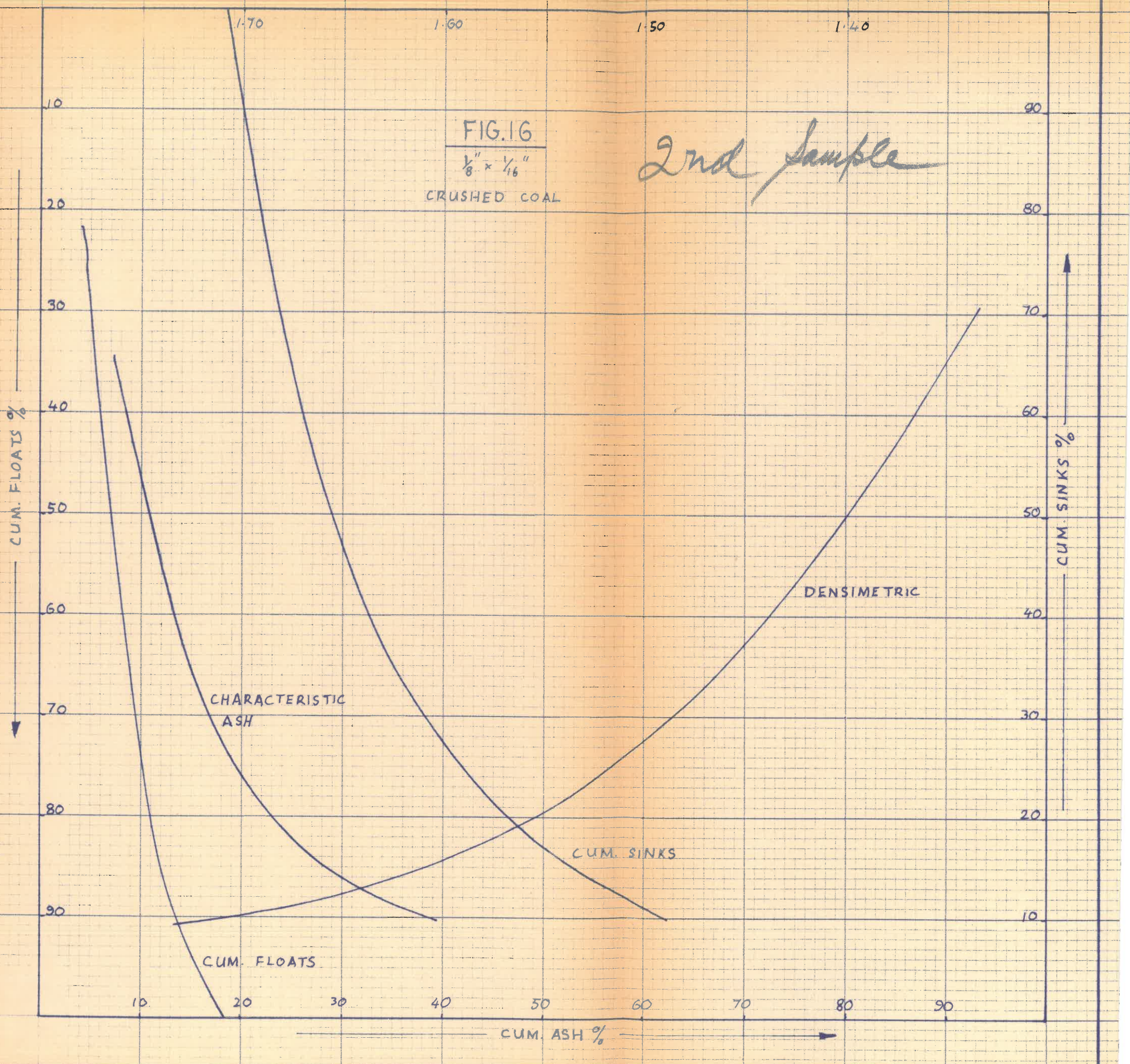


FIG. 17

1/16" × 0·5 m.m
CRUSHED COAL

2nd Sample