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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 10 OF 1963.

A REPORT ON THE RESULTS OF WASHABILITY DE-  
TERMINATIONS CARRIED OUT ON TWO SAMPLES OF  
COAL FROM ALPHA ANTHRACITE COLLIERY.

BY:

S. F. STREICHER.

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INTRODUCTION:

The Fuel Research Institute was requested by Messrs. Alpha Anthracite Co. Ltd., to do washability determinations on two samples of run-of-mine coal.

THE COAL:

Two samples of run-of-mine coal were taken by colliery officials and forwarded to the Institute by rail. Each of the two samples consisted of 20 grain bags of coal blasted from the face, according to information received.

Sample No. 1, was received in bags numbered S1 - S20, while sample No. 2 was placed in bags numbered S21 - S40.

ANALYSIS OF SAMPLES.

As directed by the sponsor, the samples were analysed in the following manner:

- (1) The samples were reduced to a top size of 120 mm by hammering the +120 mm particles through a 120 mm screen.
- (2) Screen analyses were then carried out at the following apertures 90 mm, 60 mm, 40 mm, 20 mm, 12 mm and 5 mm.

Results of these screen analyses are reported in Table 1.

(3) .../

- (3) The various size fractions arising from the screen analyses, with the exception of the -5 mm size fractions were then subjected to detailed float and sink analyses on a fractional basis at 0.04 intervals in the specific gravity range 1.34 - 1.70.
- (4) Ash determinations were carried out on all specific gravity fractions and cumulative values were calculated. These results are reported in Tables 2 and 3.
- (5) Washability curves were then drawn for all size fractions analysed as shown in Figures 1 and 2.

DISCUSSION OF RESULTS.

As may be seen from the screen analysis (Table 1) the weights of the -120 mm +90 mm and -90 mm +60 mm size fractions arising from sample No. 1 were too small to be representative. This may be the cause of the scattering of points on the specific gravity yield curves obtained for the larger size fractions.

The peculiar shapes of the washability curves on the larger size fractions of sample No. 2 show that these are mixtures of ca. 40% of low ash coal and dirt with very little intermediate material.

This should present no washing problem at all, seeing that the ash content of the washed products on sample No. 2 is even better than that of the products on sample No. 1 at the same specific gravity.

By mixing the output of the section represented by sample No. 2 with that represented by sample No. 1, the ash content of the product should not be affected deleteriously, although the yield would be appreciably lower.

(SIGNED) S. F. STREICHER.

SENIOR TECHNICAL OFFICER.

PRETORIA  
17/4/63.

TABLE 1.  
SCREEN ANALYSIS OF SAMPLES.

SIZE FRACTION.	SAMPLE NO. 1.			SAMPLE NO. 2.		
	YIELD			YIELD		
	Fract. lb.	Fract. %	Cum. %	Fract. lb.	Fract. %	Cum. %
-120 mm +90 mm	326.25	7.87	7.87	634.5	13.79	13.79
- 90 mm +60 mm	370.0	8.93	16.80	854.25	18.56	32.35
- 60 mm +40 mm	377.5	9.11	25.91	588.25	12.78	45.13
- 40 mm +20 mm	559.5	13.50	39.41	608.0	13.21	58.34
- 20 mm +12 mm	506.75	12.22	51.63	441.5	9.59	67.93
- 12 mm + 5 mm	777.75	18.76	70.39	593.0	12.89	80.82
- 5 mm	1178.25	28.42	98.81	866.5	18.83	99.65
LOSS	49.25	1.19		15.75	0.35	
TOTAL	4145.25	100.00	100.00	4601.75	100.00	100.00



TABLE 2A.

SAMPLE NO. 1.

FLOAT AND SINK ANALYSIS OF SIZE FRACTIONS.

SPECIFIC GRAVITY	-120 mm +90 mm				-90 mm +60 mm				-60 mm +40 mm			
	YIELD		ASH		YIELD		ASH		YIELD		ASH	
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %
F. 1.34	-	-	-	-	-	-	-	-	0.50	0.50	4.3	4.30
1.34 - 1.38	21.23	21.23	5.9	5.90	29.93	29.93	6.4	6.40	29.15	29.65	5.6	5.58
1.38 - 1.42	48.38	69.61	8.7	7.85	37.93	67.86	8.8	7.74	27.66	57.31	9.0	7.23
1.42 - 1.46	7.87	77.48	13.0	8.37	6.95	74.81	13.9	8.31	8.07	65.38	14.3	8.10
1.46 - 1.50	5.43	82.91	17.8	8.99	9.43	84.24	17.2	9.31	12.63	78.01	17.3	9.59
1.50 - 1.54	7.68	90.59	21.3	10.03	2.04	86.28	21.1	9.59	2.54	80.55	21.7	9.97
1.54 - 1.58	3.12	93.71	25.1	10.53	4.99	91.27	27.1	10.55	7.29	87.84	28.8	11.53
1.58 - 1.62	4.81	98.52	28.9	11.43	6.43	97.70	30.4	11.86	6.45	94.29	30.6	12.83
1.62 - 1.66	0.39	98.91	32.5	11.51	1.54	99.24	31.6	12.17	3.78	98.07	33.7	13.63
1.66 - 1.70	-	98.91	-	-	0.04	99.28	40.2	12.18	0.48	98.55	38.7	13.75
S. 1.70	1.09	-	91.1	-	0.71	-	73.4	-	1.46	-	65.2	-
TOTAL:	100.00	100.00		12.38	99.99	99.99		12.61	100.01	100.01		14.5

TABLE 2B.

SAMPLE NO. 1.

## FLOAT AND SINK ANALYSIS OF SIZE FRACTIONS.

SPECIFIC GRAVITY	-40 mm +20 mm				-20 mm +12 mm				-12 mm +5 mm			
	YIELD		ASH		YIELD		ASH		YIELD		ASH	
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %
F. 1.34	1.03	1.03	3.1	3.10	3.15	3.15	3.1	3.10	8.71	8.71	2.7	2.70
1.34 - 1.38	35.30	36.33	5.8	5.72	41.17	44.32	5.6	5.42	40.26	48.97	5.3	4.84
1.38 - 1.42	21.79	58.12	9.7	7.21	17.79	62.11	10.1	6.76	16.26	65.23	9.9	6.10
1.42 - 1.46	8.46	66.58	14.5	8.14	8.44	70.55	14.2	7.65	7.55	72.78	14.3	6.95
1.46 - 1.50	10.66	77.24	17.9	9.49	8.64	79.19	17.9	8.77	7.36	80.14	18.5	8.01
1.50 - 1.54	3.20	80.44	22.2	10.00	4.17	83.36	23.1	9.49	4.65	84.79	22.7	8.82
1.54 - 1.58	8.64	89.08	28.5	11.79	6.61	89.97	28.1	10.86	5.81	90.60	27.0	9.99
1.58 - 1.62	4.19	93.27	30.5	12.63	3.66	93.63	30.6	11.63	3.25	93.85	30.7	10.71
1.62 - 1.66	3.49	96.76	33.2	13.37	2.64	96.27	34.4	12.25	2.21	96.06	33.7	11.24
1.66 - 1.70	1.21	97.97	37.6	13.67	1.50	97.77	37.9	12.64	1.10	97.16	39.2	11.56
S. 1.70	2.02		60.6		2.24		48.6		2.85		51.7	
TOTAL:	99.99	99.99		14.62	100.01	100.01		13.45	100.01	100.01		12.71

TABLE 3A.  
SAMPLE NO. 2.

FLOAT AND SINK ANALYSIS OF SIZE FRACTIONS.

SPECIFIC GRAVITY	-120 mm +90 mm				-90 mm +60 mm				-60 +40 mm			
	YIELD		ASH		YIELD		ASH		YIELD		ASH	
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %
F. 1.34	-	-	-	-	0.61	0.61	4.6	4.60	0.78	0.78	4.7	4.70
1.34 - 1.38	21.39	21.39	6.2	6.20	20.76	21.37	6.6	6.54	28.59	29.37	5.9	5.87
1.38 - 1.42	19.92	41.31	8.1	7.12	20.04	41.41	8.4	7.44	21.02	50.39	8.9	7.13
1.42 - 1.46	0.18	41.49	16.5	7.16	1.25	42.66	13.7	7.62	3.06	53.45	14.7	7.56
1.46 - 1.50	0.78	42.27	17.0	7.34	0.40	43.06	18.9	7.72	1.85	55.30	17.3	7.89
1.50 - 1.54	-	42.27	-	7.34	0.65	43.71	21.6	7.93	0.91	56.21	20.6	8.10
1.54 - 1.58	0.75	43.02	24.3	7.64	1.95	45.66	25.4	8.68	1.88	58.09	25.3	8.66
1.58 - 1.62	0.30	43.32	29.7	7.79	1.28	46.94	29.2	9.24	4.17	62.26	32.0	10.22
1.62 - 1.66	1.98	45.30	35.5	9.00	2.50	49.44	35.0	10.54	3.77	66.03	34.0	11.58
1.66 - 1.70	4.32	49.62	39.6	11.66	0.87	50.31	40.0	11.05	1.35	67.38	38.8	12.13
S. 1.70	50.40	100.02	56.0	34.01	49.70	100.01	57.2	33.99	32.62	100.00	58.2	27.16
TOTAL:	100.02	100.02		34.01	100.01	100.01		33.99	100.00	100.00		27.16



TABLE 3B.

SAMPLE NO. 2.

## FLOAT AND SINK ANALYSIS OF SIZE FRACTIONS.

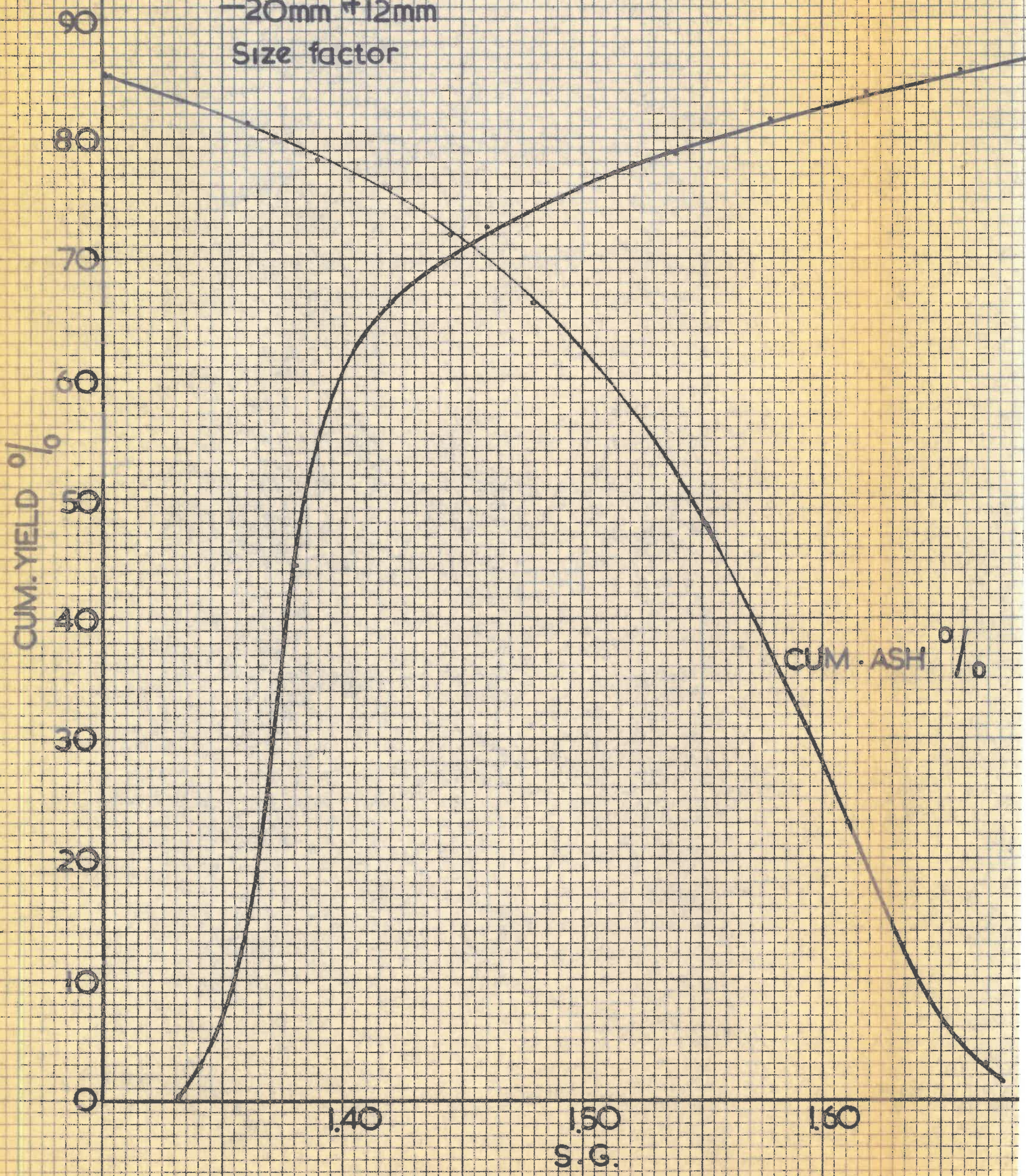
SPECIFIC GRAVITY	-40 mm +20 mm				-20 mm +12 mm				-12mm +5 mm			
	YIELD		ASH		YIELD		ASH		YIELD		ASH	
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %
F. 1.34	1.52	1.52	2.7	2.70	2.66	2.66	2.60	2.60	4.39	4.39	2.3	2.30
1.34 - 1.38	40.18	41.70	5.2	5.11	41.74	44.40	4.9	4.76	36.45	40.84	4.7	4.44
1.38 - 1.42	17.41	59.11	9.6	6.43	21.91	66.31	9.6	6.36	24.83	65.67	9.5	6.35
1.42 - 1.46	3.86	62.97	14.8	6.94	5.85	72.16	15.1	7.07	8.03	73.70	14.2	7.21
1.46 - 1.50	2.44	65.41	18.5	7.37	3.59	75.75	19.2	7.64	5.02	78.72	18.7	7.94
1.50 - 1.54	1.32	66.73	22.1	7.66	2.64	78.39	23.1	8.16	3.53	82.25	22.4	8.56
1.54 - 1.58	2.24	68.97	26.9	8.28	2.92	81.31	27.2	8.84	3.20	85.45	26.8	9.24
1.58 - 1.62	4.03	73.00	31.8	9.58	2.36	83.67	30.6	9.45	2.25	87.70	30.3	9.78
1.62 - 1.66	2.34	75.34	34.9	10.37	1.79	85.46	34.6	9.98	1.39	89.09	34.4	10.16
1.66 - 1.70	1.22	76.56	39.5	10.83	1.12	86.58	39.2	10.36	1.13	90.22	38.6	10.52
S. 1.70	23.43		59.4		13.41		59.2		9.76		59.5	
TOTAL;	99.99	99.99		22.21	99.99	99.99		16.91	99.99	99.99		15.30



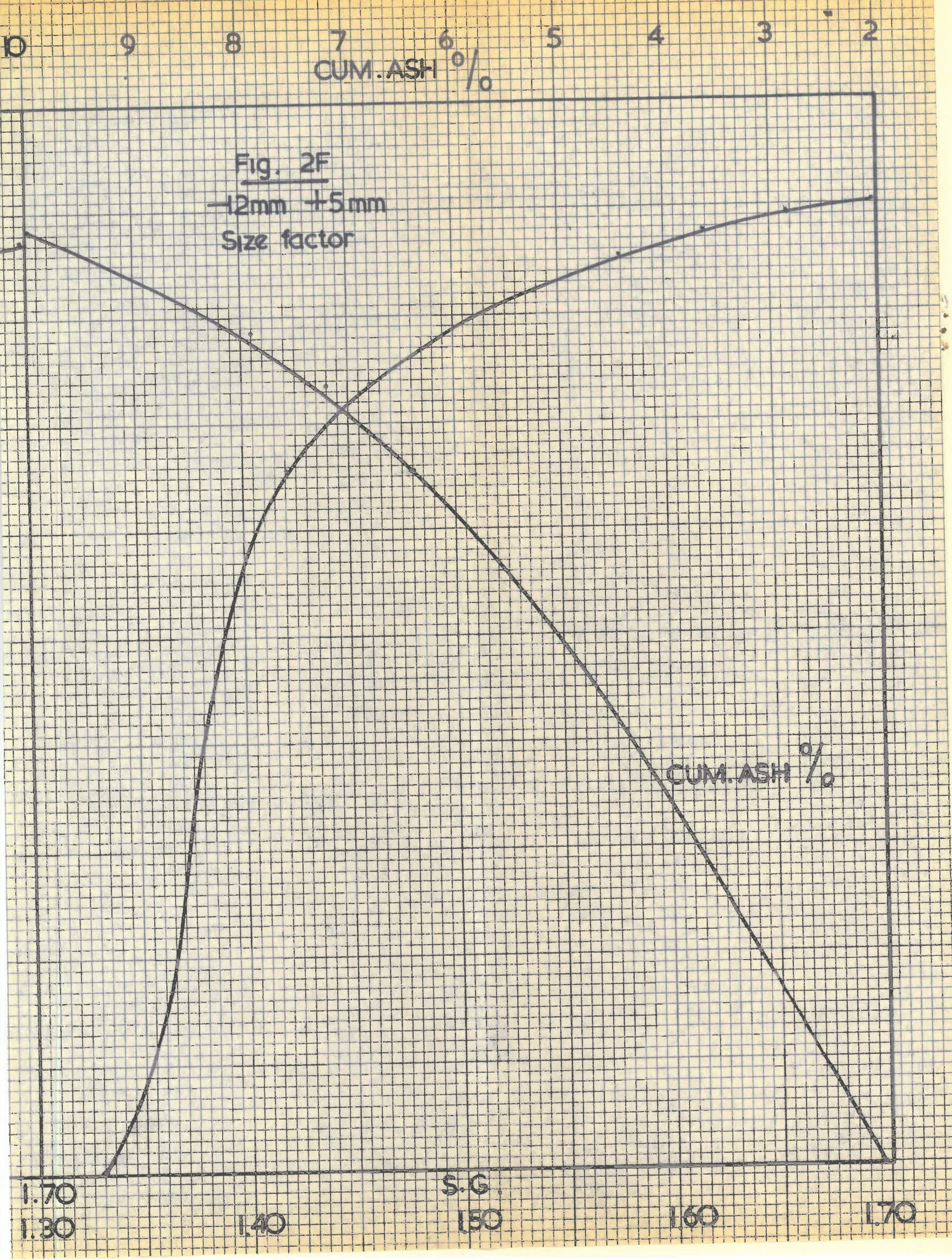
CUM. ASH %

0 9 8 7 6 5 4 3

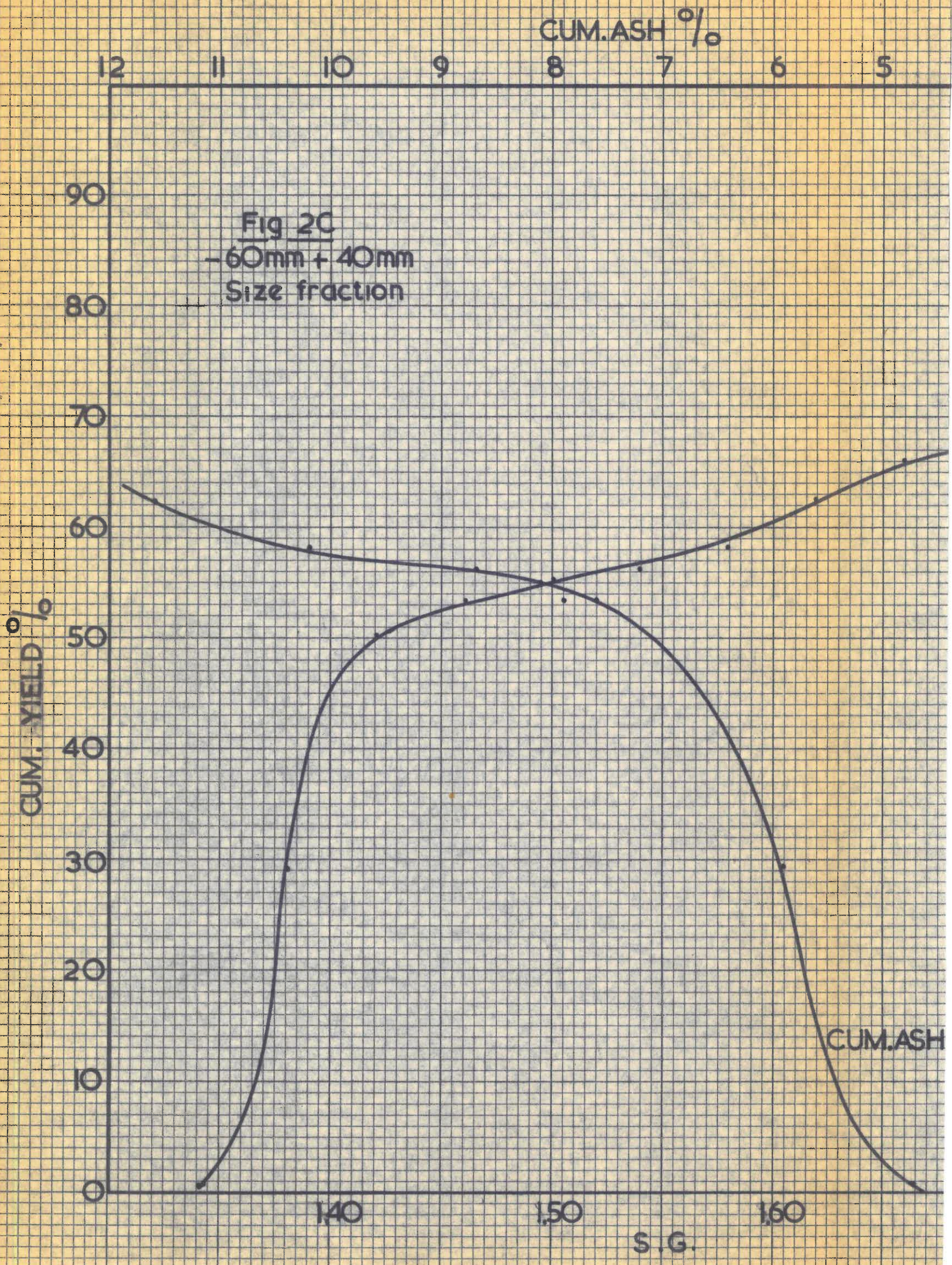
Fig. 2E  
-20mm +12mm  
Size factor













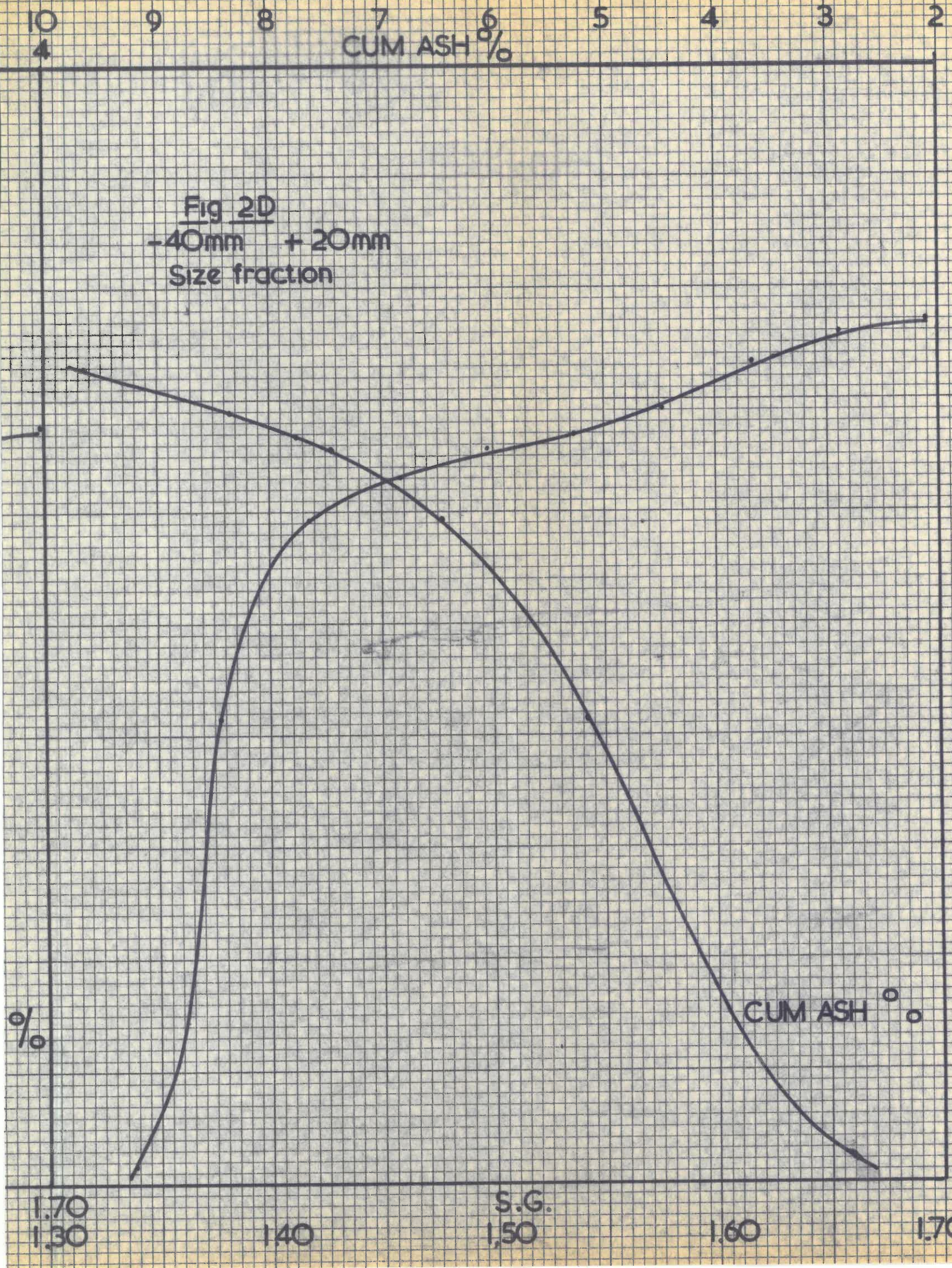


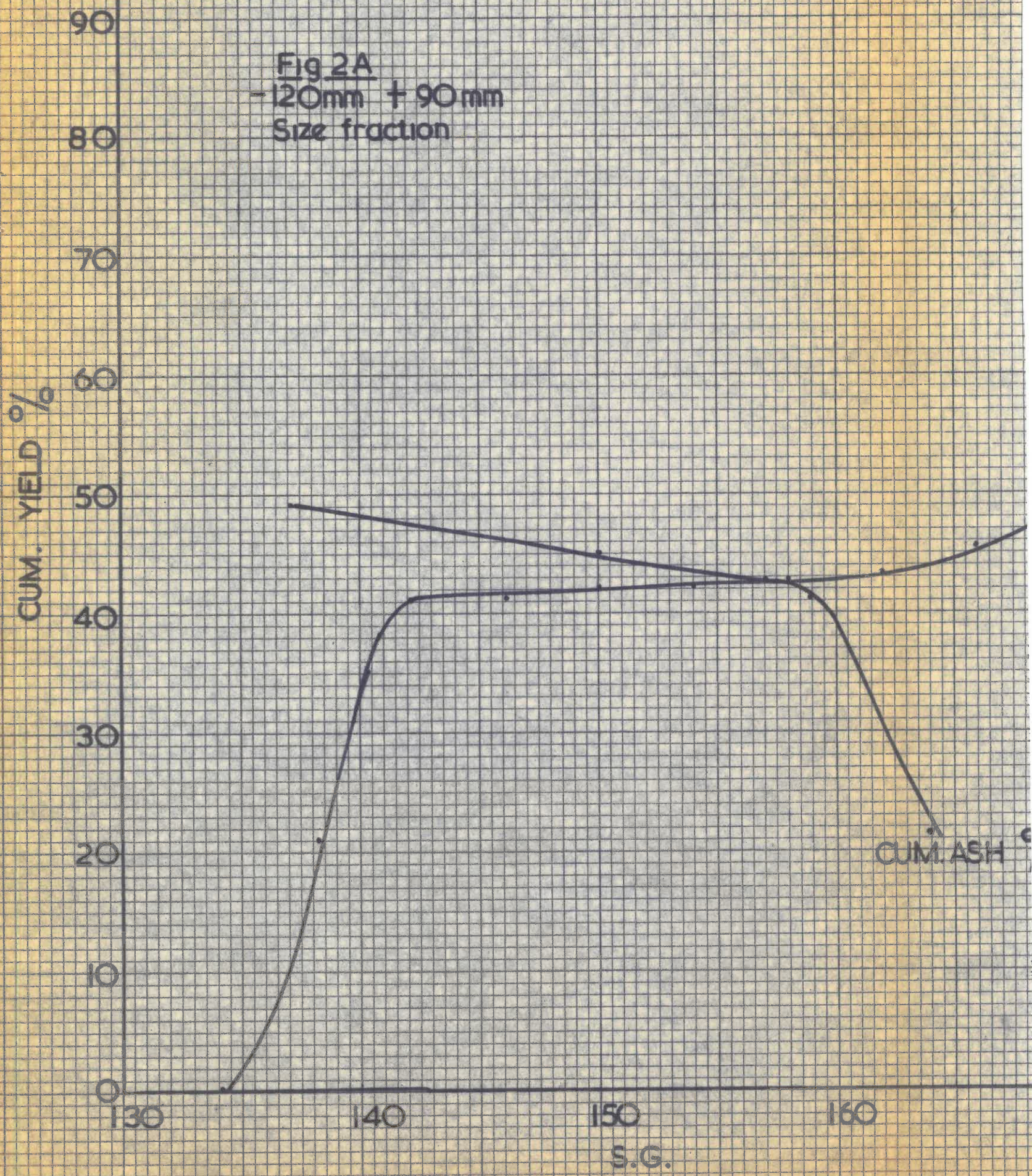
Fig 2D  
 -40mm + 20mm  
 Size fraction



CUM. ASH. %

12 11 10 9 8 7 6

Fig 2A  
-120mm + 90mm  
Size fraction

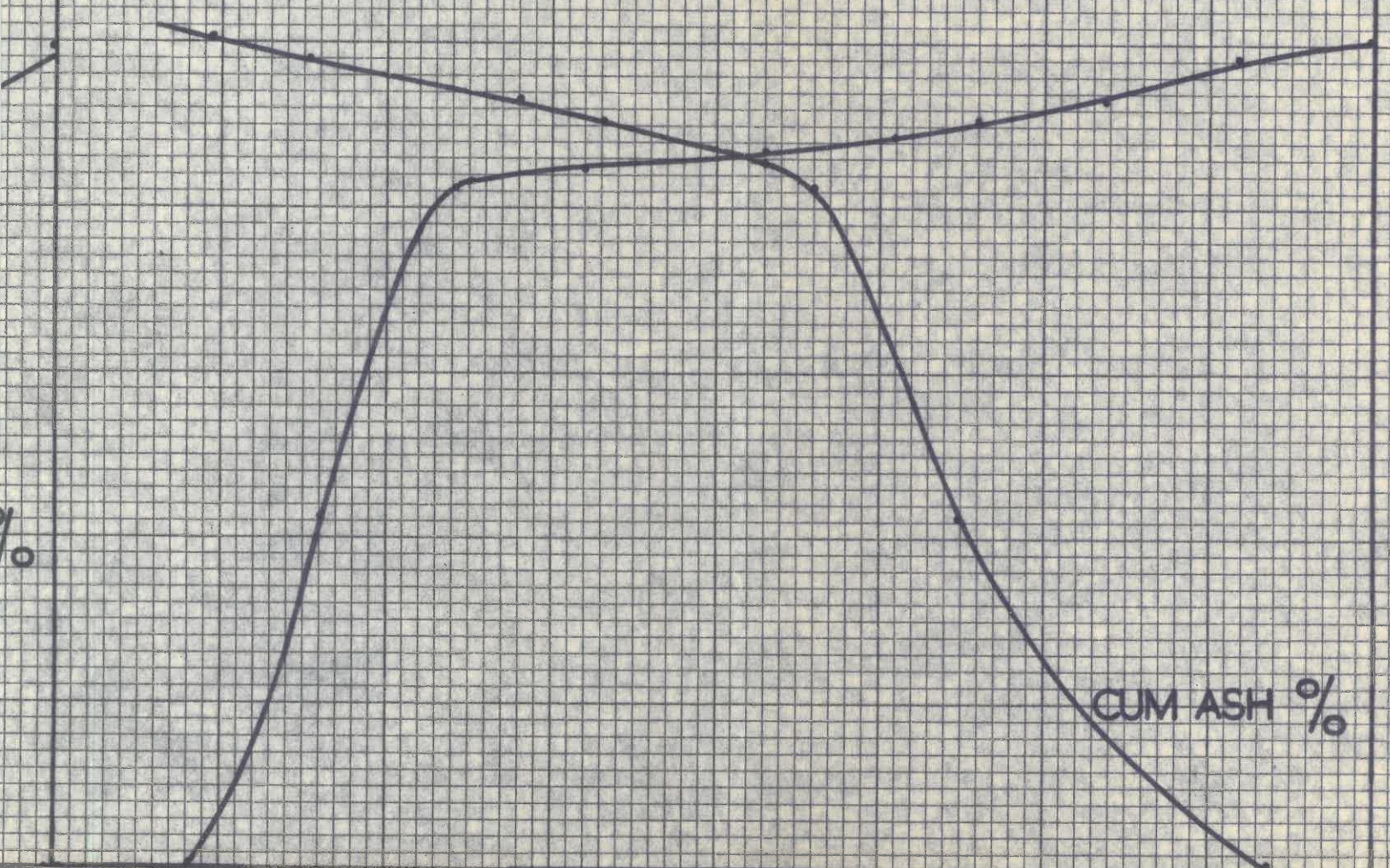




CUM ASH %

Fig 2B

-90mm +60mm  
Size fraction



12  
5

11

10

9

8

7

6

5

4

1.70  
1.30

1.40

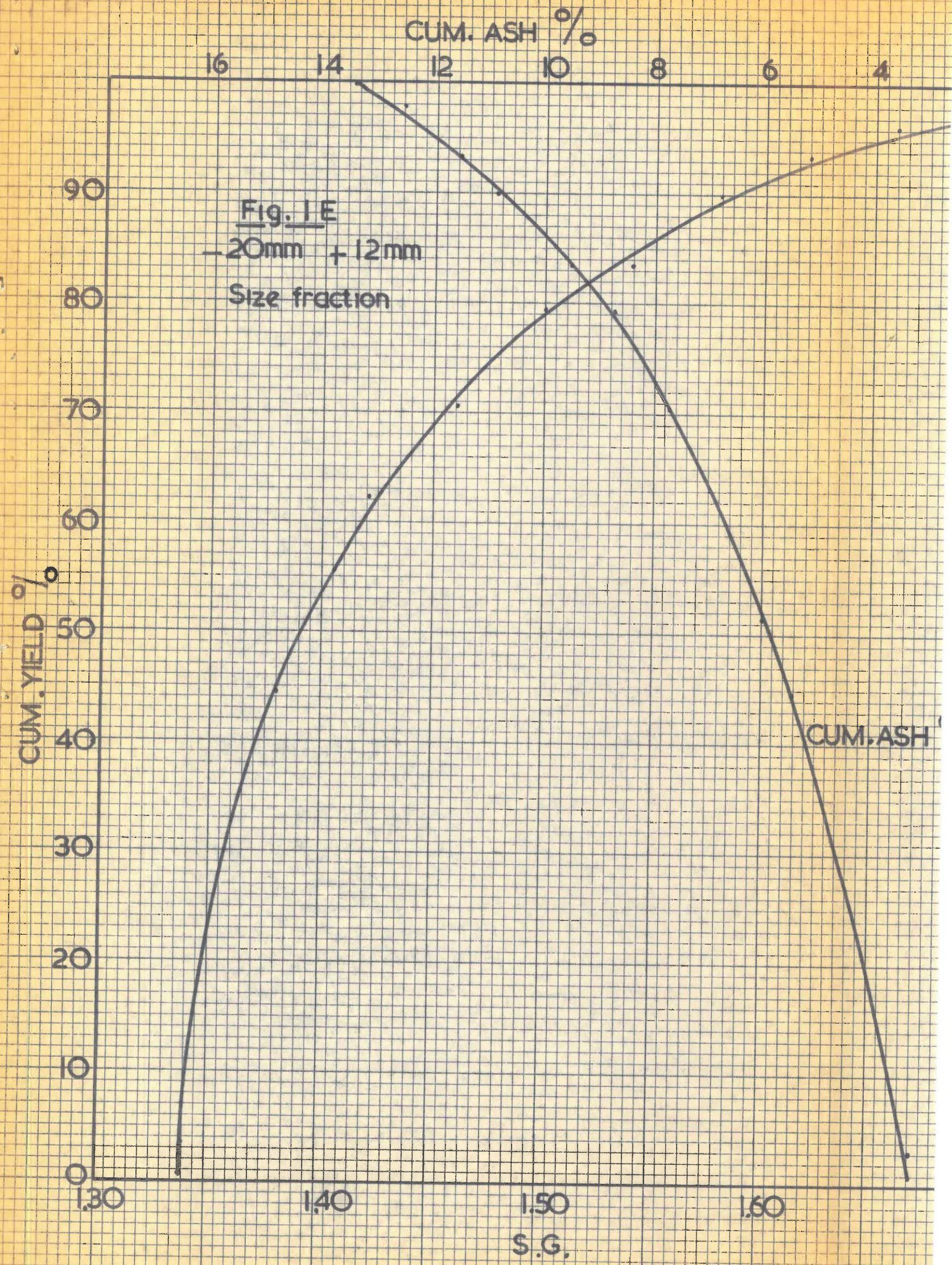
S.G.  
1.50

1.60

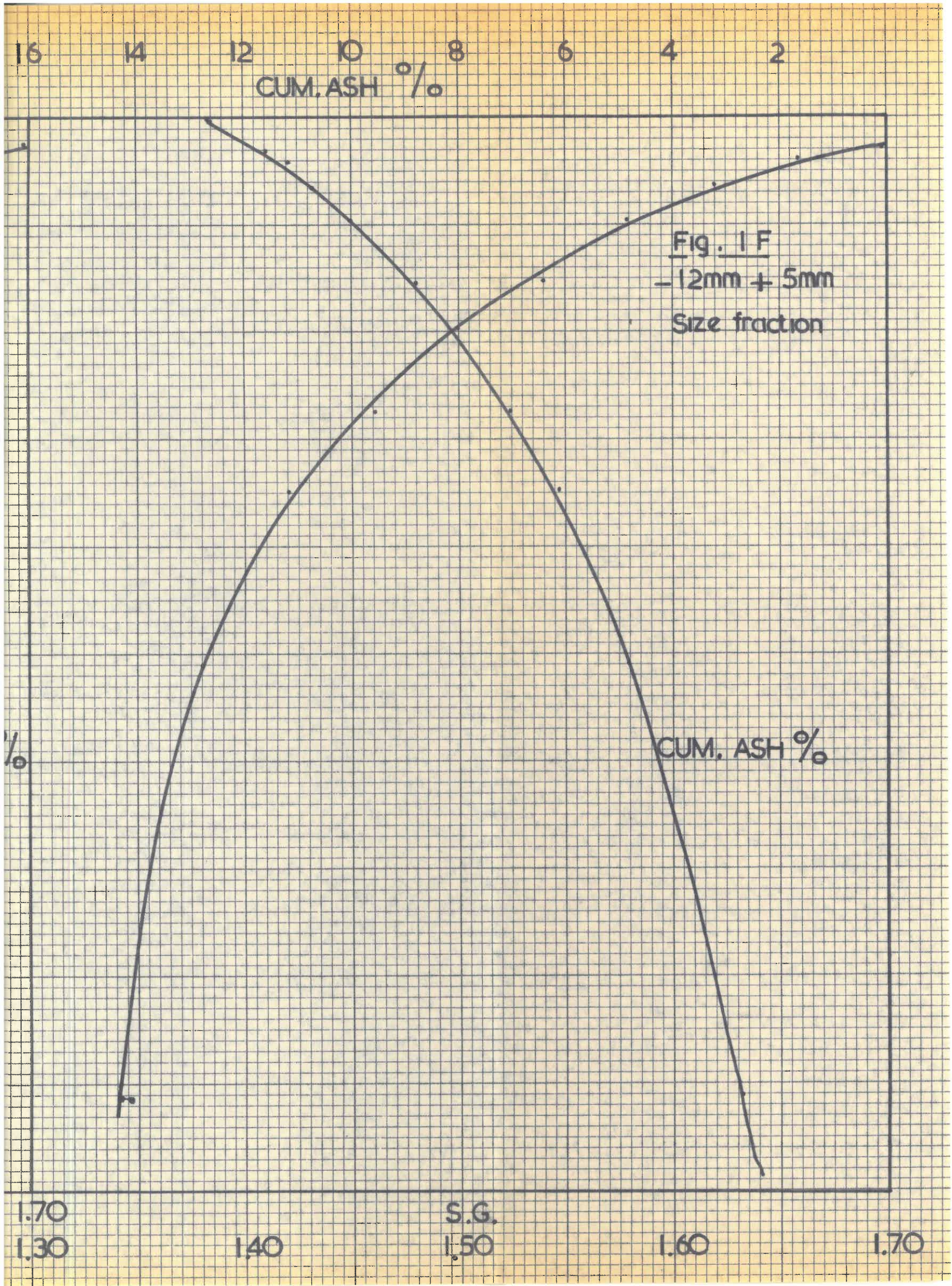
1.70

CUM ASH %

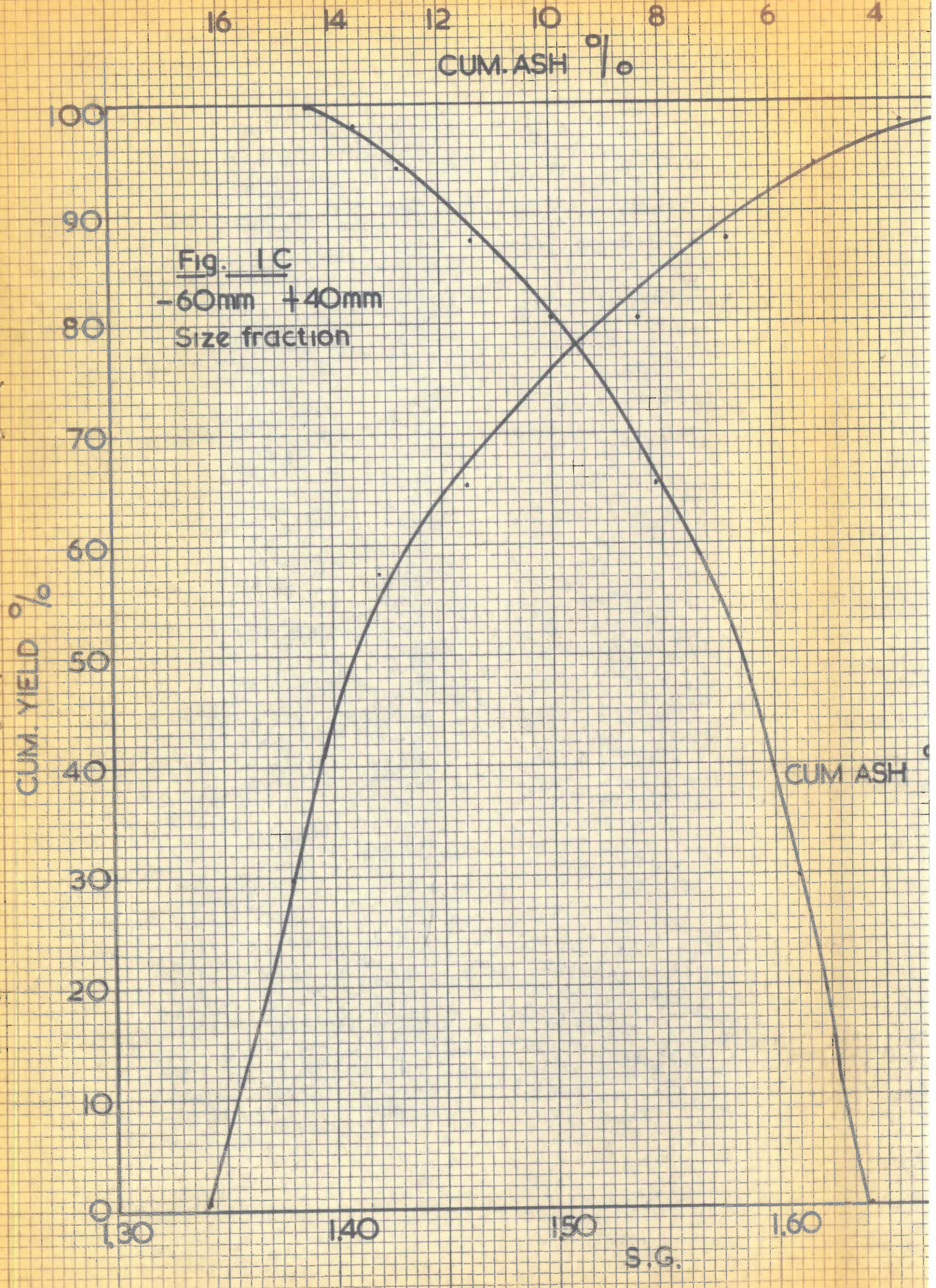














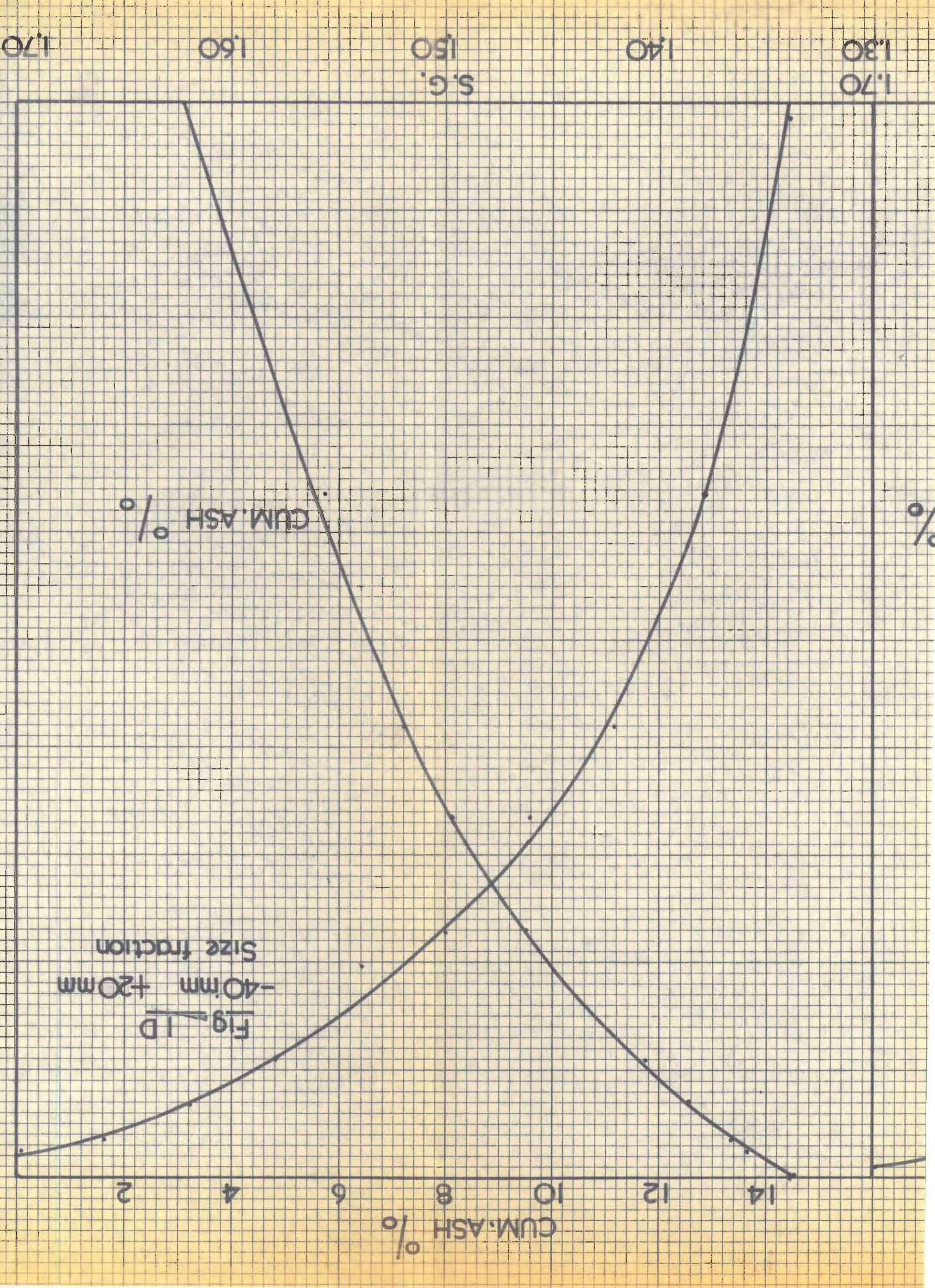


Fig. 1D  
-40mm +20mm  
Size fraction

CUM. ASH %

CUM. ASH %

S.G.

%



