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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 7 OF 1964.

REPORT ON THE RESULTS OBTAINED FROM WASHABILITY
DETERMINATIONS CARRIED OUT ON A BULK SAMPLE
OF ANTHRACITE FROM BOSCHKRANZ,
PAULPIETERSBURG DISTRICT.



By:

S.F. STREICHER

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INTRODUCTION:

The Fuel Research Institute was requested to carry out washability determinations on a bulk sample of anthracite from the farm Boschkrantz in the Paulpietersburg district.

THE COAL:

Three truck loads (\pm 120 tons) of run-of-mine coal were sent to the Fuel Research Institute's pilot plant in Pretoria where a representative sample weighing about $3\frac{1}{2}$ tons was taken by officers of the Institute after crushing the run-of-mine product to -60 mm in a single roll crusher.

SAMPLING:

On arrival in Pretoria the coal was off-loaded into a track hopper from where it was fed to a single roll crusher set to crush the run-of-mine coal to -60 mm and conveyed to a storage bunker. Sampling was done during off-loading and crushing by stopping the conveyor belt to the storage bunker at regular intervals and by clearing a predetermined section of the belt each time. In this way 75 increments weighing about 100 lb. each were collected.

ANALYSIS .../

ANALYSIS OF SAMPLE:

After hammering a few lumps larger than 60 mm through a 60 mm screen, a screen analysis was carried out on the sample at the following apertures: 35mm, 20mm, 12mm, 6 mm, 3mm and 0.5mm. All screens used were of the woven wire type with square apertures.

Results of this screen analysis are reported in Table 1.

Representative sub-samples from all the different size fractions arising from the screen analysis were obtained by quartering. All these samples except the -0.5 mm size fraction were then subjected to detailed float and sink analyses on a fractional basis at 0.05 intervals in the specific gravity range 1.40 to 1.75.

Results of these analyses are reported in Table 2.

Ash determinations were then carried out on all specific gravity fractions and cumulative ash values were calculated. Washability curves were drawn for each size fraction (Figures 1 - 6).

On the -0.5 mm size fraction only a whole-coal ash determination was done.

Composite samples of the different size fractions were made up at specific gravities 1.45, 1.50, 1.55 and 1.60 and calorific value determinations were carried out on all these composite samples.

Moisture, volatile matter, total sulphur and ash fusion temperature determinations were also carried out on the composite samples of the 35 mm x 20 mm size fraction.

All these results are reported in Table 3.

(SIGNED) S. F. STREICHER.

SENIOR TECHNICAL OFFICER

PRETORIA.

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TABLE 1.
SCREEN ANALYSIS OF SAMPLE.

SIZE FRACTION	YIELD		
	FRACT. lb.	FRACT. %	CUM. %
60mm. x 35mm.	1421	18.93	18.93
35mm. x 20mm.	1374	18.30	37.23
20mm. x 12mm.	1034.25	13.77	51.00
12mm. x 6mm.	1159	15.44	66.44
6mm. x 3mm.	959.75	12.78	79.22
3mm. x 0.5mm.	1064.75	14.18	93.40
-0.5mm.	432	5.75	99.15
Loss	63.5	0.85	
Total	7508.25	100.00	100.00

TABLE 2.
FLOAT AND SINK ANALYSIS OF SIZE FRACTIONS.

S.G. FRACTION	60mm. x 35mm.				35mm. x 20mm.				20mm. x 12mm.			
	YIELD		ASH		YIELD		ASH		YIELD		ASH	
	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %
F1.40	44.35	44.35	7.4	7.4	47.01	47.01	7.2	7.2	50.96	50.96	6.2	6.2
1.40-1.45	29.94	74.29	11.3	8.97	34.93	81.94	11.7	9.12	33.40	84.36	11.1	8.13
1.45-1.50	4.87	79.16	16.8	9.45	5.17	87.11	17.0	9.59	4.62	88.98	17.5	8.63
1.50-1.55	1.45	80.61	22.8	9.69	1.55	88.66	22.6	9.82	1.12	90.10	23.0	8.81
1.55-1.60	2.13	82.74	26.2	10.12	1.93	90.59	27.0	10.19	1.42	91.52	27.4	9.10
1.60-1.65	2.32	85.05	34.7	10.79	1.67	92.26	33.3	10.61	1.32	92.84	31.7	9.42
1.65-1.70	5.36	90.42	40.1	12.53	2.25	94.51	40.7	11.33	1.45	94.29	37.8	9.86
1.70-1.75	2.37	92.79	44.8	13.35	1.33	95.84	44.3	11.79	0.86	95.15	40.6	10.14
S1.75	7.21		54.4		4.17		52.3		4.85		52.8	
Whole coal	100.00	100.00		16.31	100.01	100.01		13.48	100.00	100.00		12.21

TABLE 2 (Continued).
FLOAT AND SINK ANALYSIS OF SIZE FRACTIONS.

S.G. FRACTION	12mm. x 6mm.				6mm. x 3mm.				3mm. x 0.5mm.				-0.5mm.
	YIELD		ASH		YIELD		ASH		YIELD		ASH		ASH %
	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	FRACT. %	CUM. %	
F1.40	51.94	51.94	6.0	6.0	60.12	60.12	5.9	5.9	50.18	50.18	4.9	4.9	
1.40-1.45	31.85	83.79	11.8	8.20	23.22	83.34	11.0	7.32	26.59	76.77	9.4	6.46	
1.45-1.50	5.53	89.32	17.4	8.77	5.47	88.81	16.6	7.89	8.00	84.77	14.3	7.20	
1.50-1.55	1.09	90.41	22.6	8.94	1.35	90.16	21.8	8.10	2.02	86.79	16.2	7.41	
1.55-1.60	1.32	91.73	26.5	9.19	2.17	92.33	26.5	8.53	2.40	89.19	18.1	7.70	
1.60-1.65	1.21	92.94	32.0	9.49	0.92	93.25	28.4	8.73	2.04	91.23	19.0	7.95	
1.65-1.70	1.14	94.08	37.0	9.82	1.07	94.32	34.7	9.02	1.56	92.79	25.2	8.24	
1.70-1.75	0.86	94.94	41.2	10.10	0.80	95.12	38.6	9.27	1.96	94.75	28.6	8.66	
S1.75	5.06		55.1		4.88		55.4		5.26		49.8		
Whole Coal	100.00	100.00		12.38	100.00	100.00		11.52	100.01	100.01		10.82	16.9

TABLE 3.
ANALYSIS OF COMPOSITE SAMPLES.

Size Fraction	S.G.	Cal.Val. lb/lb	Mois- ture %	Vola- tile Mat- ter %	Total Sul- phur %	Ash Fusion Temp. °C
60mm. x 35mm.	F1.40	14.31				
	1.45	14.04				
	1.50	13.94				
	1.55	13.96				
	1.60	13.87				
35mm. x 20mm.	F1.40	14.43	1.6	9.5	1.02	1300
	1.45	14.10	1.6	9.5	1.07	1310
	1.50	14.02	1.6	9.5	1.14	1320
	1.55	13.96	1.4	9.4	1.08	1310
	1.60	13.83	1.6	9.6	1.18	1310
20mm. x 12mm.	F1.40	14.56				
	1.45	14.20				
	1.50	14.11				
	1.55	14.10				
	1.60	14.04				
12mm. x 6mm.	F1.40	14.50				
	1.45	14.24				
	1.50	14.18				
	1.55	14.12				
	1.60	14.01				
6mm. x 3mm.	F1.40	14.68				
	1.45	14.43				
	1.50	14.42				
	1.55	14.29				
	1.60	14.21				
3mm. x 0.5mm.	F1.40	14.79				
	1.45	14.47				
	1.50	14.34				
	1.55	14.32				
	1.60	14.32				

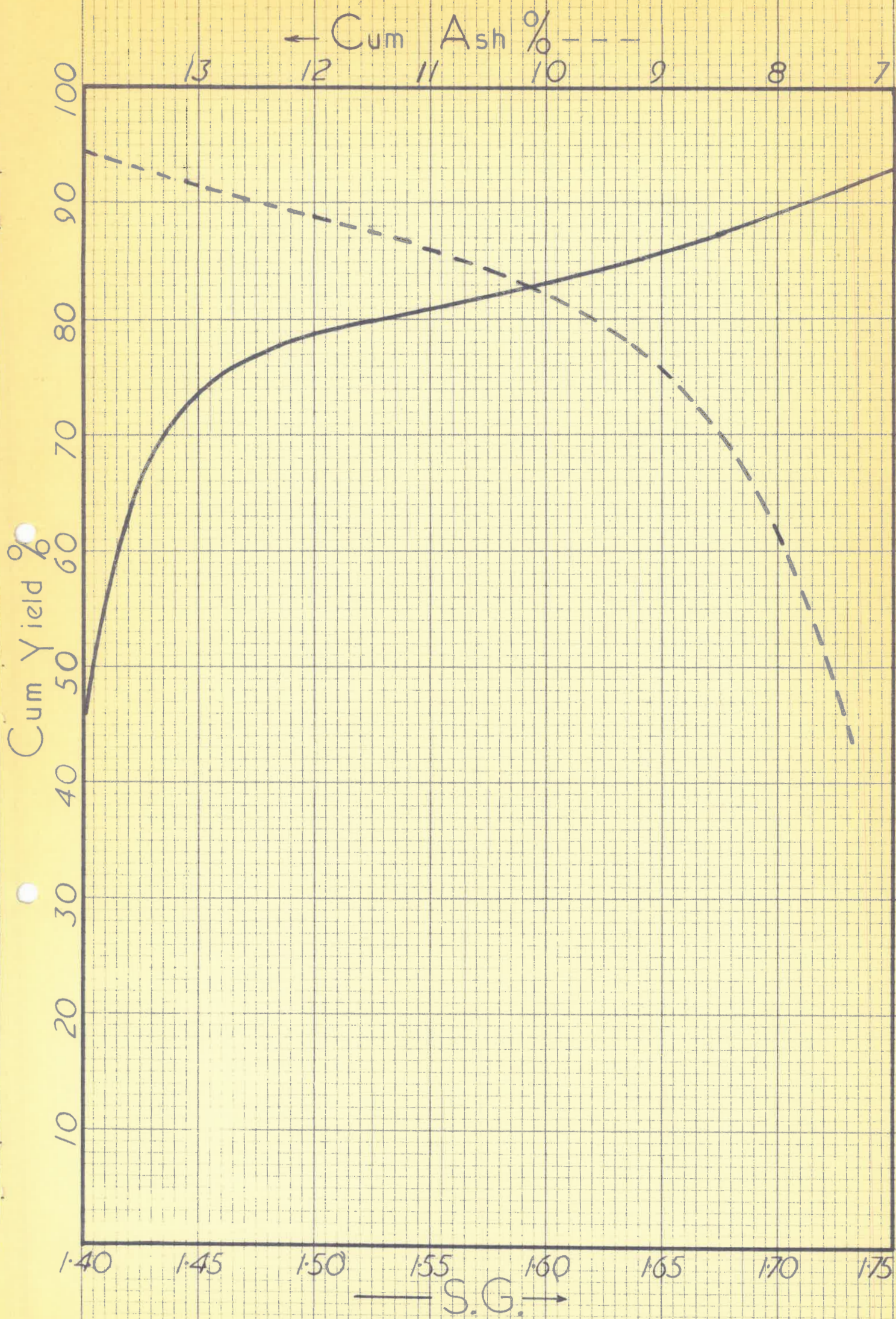
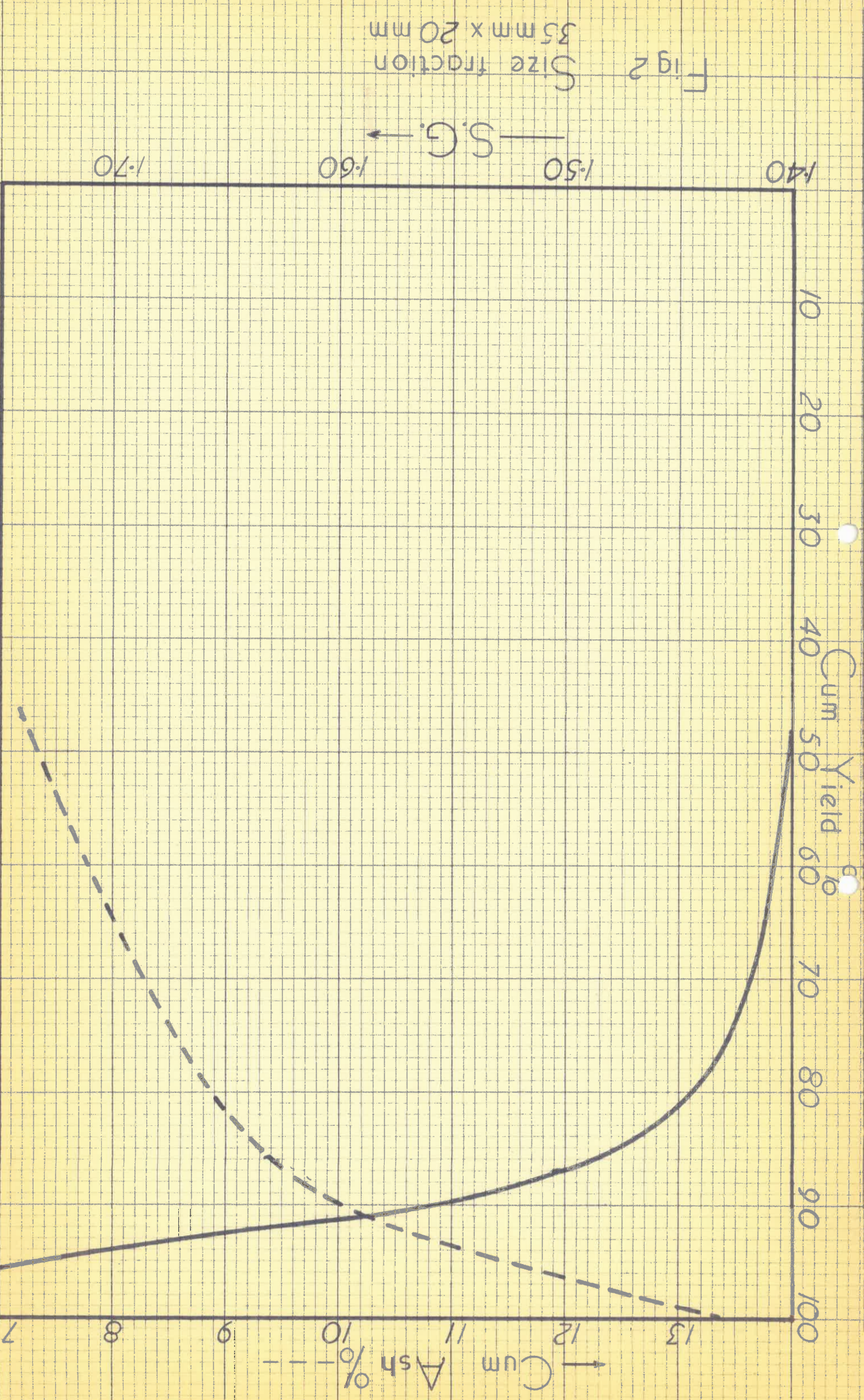


Fig / Size fraction
 60mm x 35mm

Fig 2
Size fraction
35 mm x 20 mm



1.70

1.60

1.50

140

10

20

30

40

Cum

Yield

%

70

80

90

100

S.G.



Cum
Ash
%

7
8
9

10

11

12

13

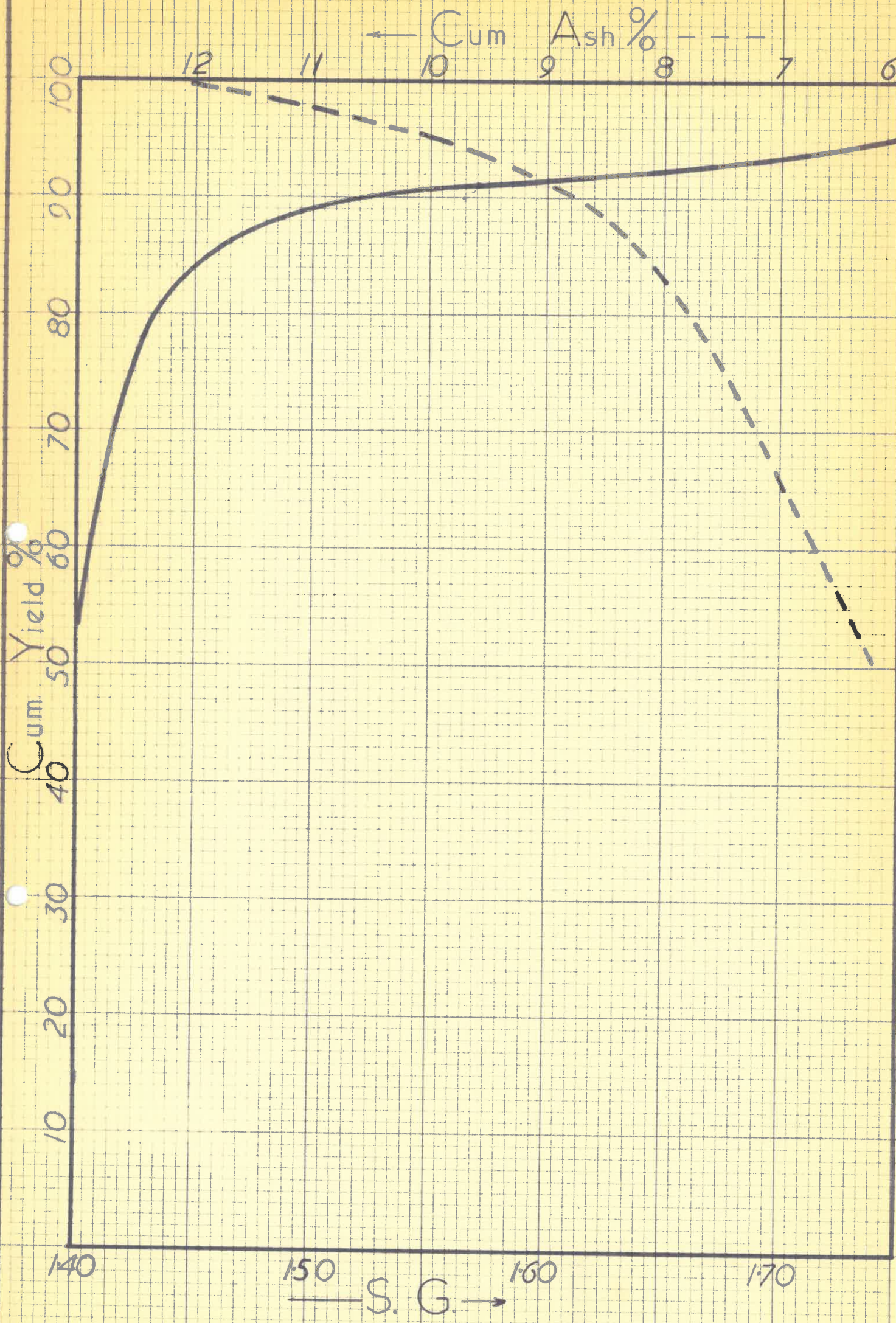


Fig 3 Size fraction
 20mm x 12mm

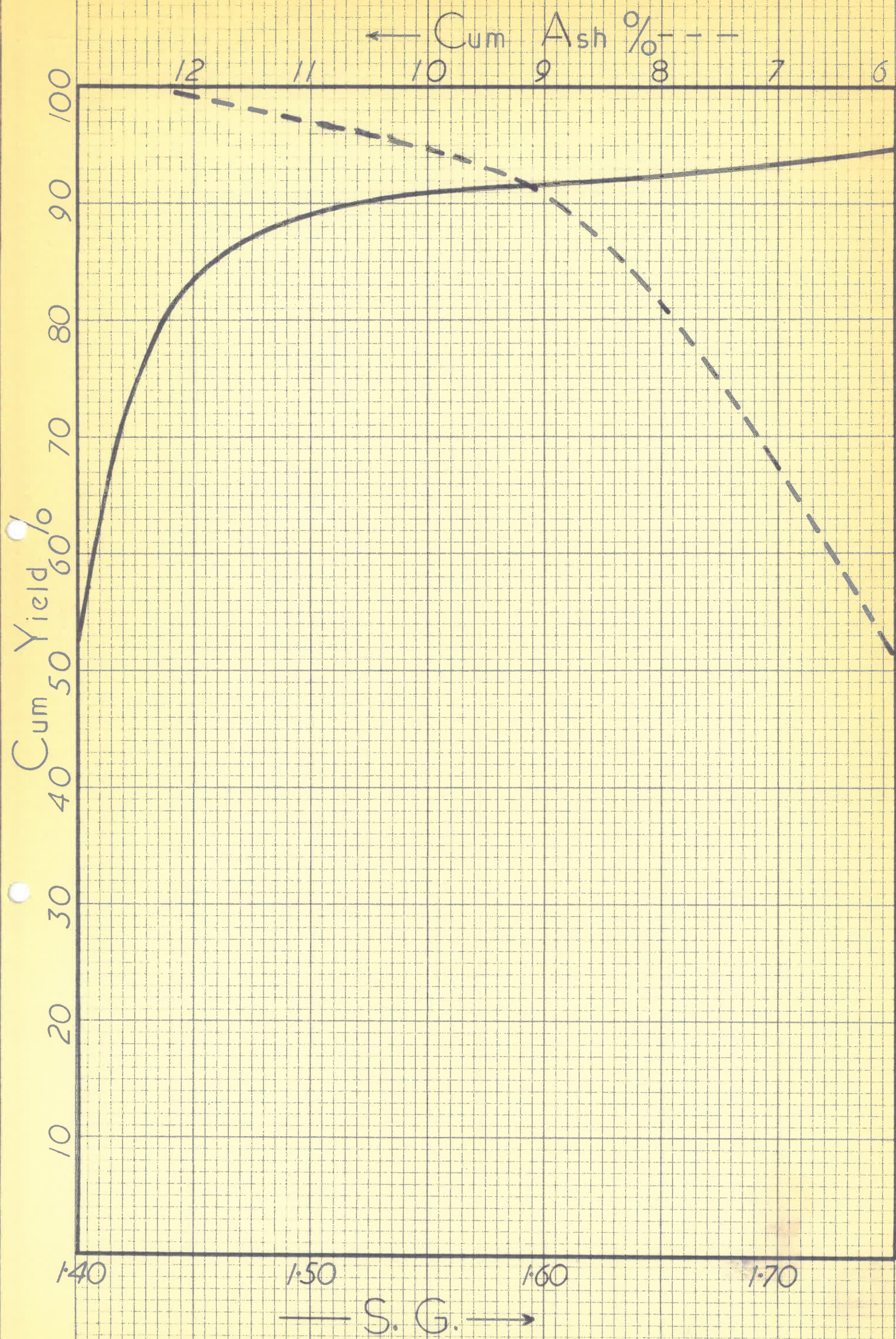


Fig 4 Size fraction
 12mm x 6mm

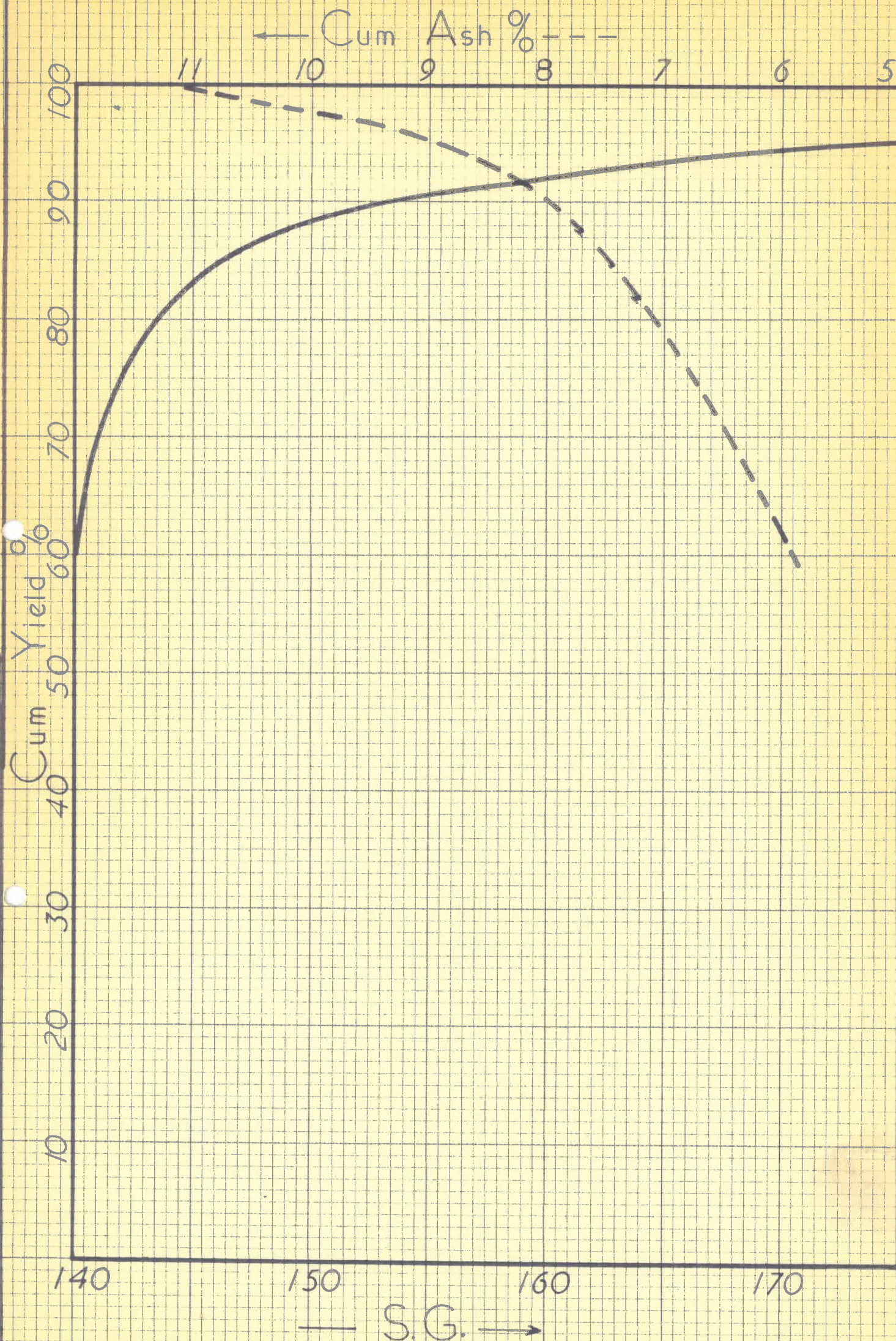


Fig 5 Size fraction
6mm x 3mm

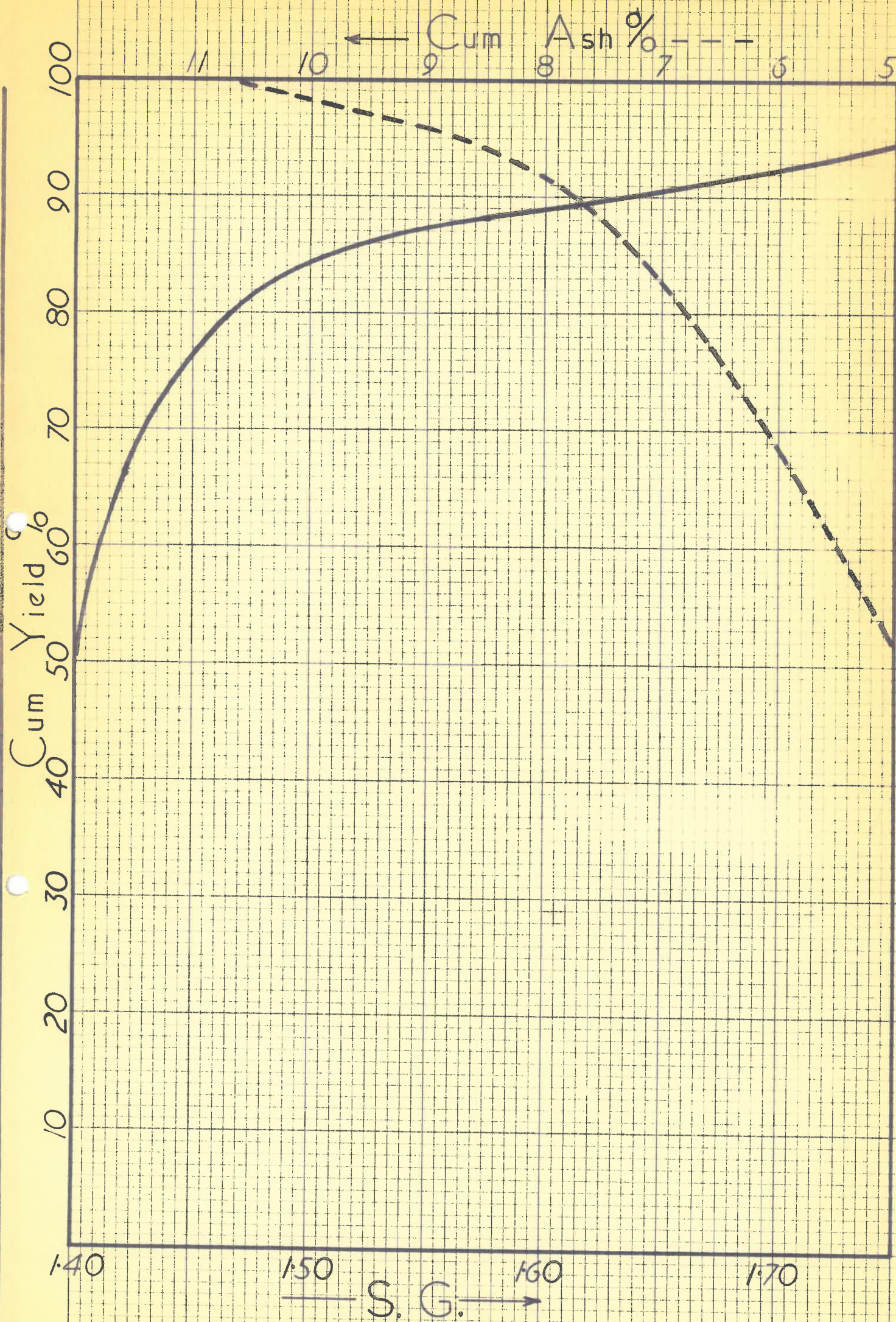


Fig 6 Size fraction
3mm x 0.5mm