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FUEL RESEARCH INSTITUTE

OF SOUTH AFRICA

TEGNIESE MEMORANDUM
TECHNICAL

NO. 45 OF 1968

INVESTIGATION OF THE EFFECT ON THE CUT POINT CAUSED BY PRE-WET SCREENING THE FEED TO THE D.S.M. CYCLONE BEFORE WASHING

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From observations made during previous investigations with the D.S.M. cyclone there was reason to believe that the cut point with a given feed was liable to change depending on whether the feed was wet or dry-screened immediately before washing. It was, therefore, decided to carry out an investigation to determine the effect of the two methods of screening on the cut point.

THE COAL

In virtually all the tests Sprinkbok No. 2 Seam raw coal was used. The only exception was test No. 354 (Table 2) in which a larger amount of sinks was deliberately added. The densimetric characteristics of the Springbok coal can be judged by the curve shown in Diagram 1, and by the data in Table 1.

THE TESTS

The coal selected was first passed over a ½-mm vibrating screen, with the water sprays on or off, depending on the type of test. The coal was then washed in the cyclone where a certain cut point was aimed at.

Samples of the coal leaving the pre-wet screen were taken and analysed for moisture content. Samples of the floats and sinks were also taken and the normal analysis performed so that the distribution curve could be drawn and the cut point determined. Occasionally a sample of the medium was also taken and the sp.gr. determined. The float and sink products were weighed, drained, and fed back into the bunker in preparation for the next test.

This procedure was repeated but the sp.gr., as well as the amount of coal fed into the cyclone, was varied within the possible limits in order to find out whether the effect (if any) was consistent.

/The results ....

The results of all the tests carried out are given in Table 2.

CONCLUSIONS

From the results it can be concluded that an increase in feed rate of coal to the cyclone while the water sprays are on has the following effect:

More water is carried into the medium thus diluting it and lowering its sp.gr. The intended cut point of the test is thus also lowered.

In tests done with a high medium sp.gr. (ca 1.70) the effect of the water which is carried over with the coal is larger than in tests done with a low medium sp.gr. (ca 1.30). Thus the higher the sp.gr. of the medium, the larger is the effect on the cut point.

Tests done with a dry feed to the cyclone show virtually none of the above-mentioned effects.

Thus it can be said that pre-wet screening of the feed coal to the D.S.M. cyclone has the effect of lowering the cut point and that predetermined steps should normally be taken to counteract this.

The following suggestions are made:

1) The cyclone could be fed with dry coal but this suggestion is not very practical because of the dust nuisance and hazard associated with dry coal handling.

2) The separation should be carried out with the medium at a slightly higher sp.gr. than the cut point required.

An exact mathematical estimate of the difference required could unfortunately not be deduced from the data obtained, and the operator will have to rely to a large extent on previous experience when making a specific gravity adjustment.

(SIGNED) A. HIBBERT

Pretoria
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/TW

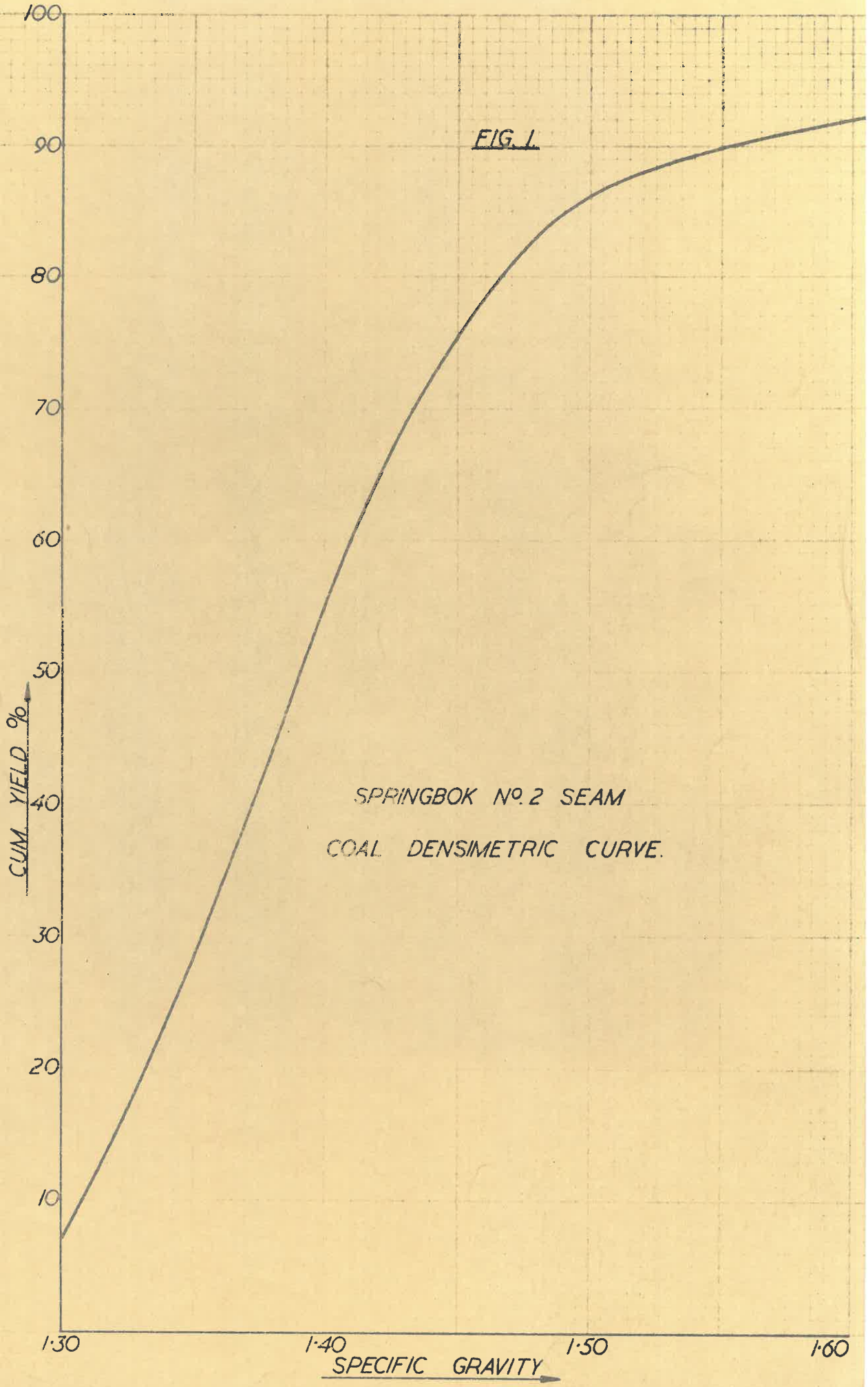
TABLE 1 - FLOAT AND SINK CHARACTERISTICS OF SPRINGBOK (NO. 2 SEAM) COAL

Specific gravity interval	Yield, %	
	Fract.	Cum.
F 1.30	6.98	6.98
1.30 - 1.34	15.41	23.39
1.34 - 1.38	20.35	42.74
1.38 - 1.42	22.09	64.83
1.42 - 1.46	13.95	78.78
1.46 - 1.50	7.37	86.15
1.50 - 1.54	3.29	89.44
1.54 - 1.58	1.84	91.28
1.58 - 1.62	1.45	92.73
1.62 - 1.66	1.07	93.90
1.66 - 1.70	0.97	94.77
S 1.70	5.23	-
TOTAL	100.00	100.00

TABLE 2 - RESULTS PERTAINING TO WASHING TESTS IN THE D.S.M. CYCLONE

Test No.	Feed, dry wt., tons/hr.	Cut point	EP	Yield, %	Moisture of feed, %	Medium SG
347	5.18	1.3900	0.017	46.88	21.50	-
346	11.02	1.3800	0.010	43.51	24.90	-
345	17.84	1.3725	0.014	39.54	29.43	-
350	5.49	1.3987	0.013	49.66	2.75	-
351	14.64	1.3932	0.016	42.64	2.42	-
352	26.60	1.3987	0.017	45.71	2.31	-
353	20.04	1.3845	0.015	69.62	26.15	-
354	18.01	1.3825	0.016	15.16	22.56	-
359	21.78	1.6300	0.019	87.10	20.99	-
358	17.04	1.6540	0.030	89.35	3.61	-
364	27.03	1.6190	0.027	84.58	21.10	1.619
363	13.29	1.6530	0.023	80.39	2.88	1.613
373	21.68	1.6740	0.025	86.82	5.78	1.627
374	19.65	1.6560	0.024	86.03	20.43	1.628
384	14.20	1.4450	0.017	51.08	5.81	1.442
385	16.85	1.3913	0.013	45.23	23.62	1.440
396	7.01	1.5226	0.015	80.03	19.51	1.541
397	9.62	1.5144	0.016	75.22	20.30	1.548
398	16.91	1.4931	0.018	79.61	21.61	1.463

FIG. 1.



SPRINGBOK No. 2 SEAM

COAL DENSIMETRIC CURVE.