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RAPPORT No.....

REPORT No. 7

VAN.....

OF 1937

BRANDSTOF-NAVORSINGS-INSTITUUT

VAN SUID-AFRIKA.

FUEL RESEARCH INSTITUTE

OF SOUTH AFRICA.

ONDERWERP:
SUBJECT: PRELIMINARY REPORT ON SAMPLES OF NO. 4 SEAM FROM BOREHOLE CORES PUT DOWN ON KLIPPLAAT 47, TWEEFONTEIN 69 AND WATER-PAN 68 BY TWEEFONTEIN UNITED COLLIERIES LIMITED.

Coal Survey Report No. 24

AFDELING:
DIVISION: CHEMISTRY

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PRELIMINARY REPORT ON SAMPLES OF NO. 4 SEAM FROM BOREHOLE CORES PUT DOWN ON KLIPPLAAT 47, TWEEFONTEIN 69 AND WATERPAN 68 BY TWEEFONTEIN UNITED COLLIERIES LIMITED.

By J.C. Vogel.

Samples of No. 4 seam were obtained from seven boreholes. The cores were, in part, broken and incomplete, those from boreholes 1 and 4 (see Table I) were intact and could be divided into sections, the remainder were broken up and no attempt was made to divide these. Table I records details of the cores and the sections into which they were divided for analysis. The sections are recorded from the top to the bottom of the seam.

The No.4 seam encountered in these boreholes is about 8 feet in thickness and consists mainly of dull coal together with some bright bands. A number of stoney and shaley bands occur in the upper portion of the seam. In the case of borehole I, the major stone bands were eliminated when the core was sectioned, the cores from the other holes were analysed without any preliminary sorting.

The samples recorded in table I were broken to cobble size and separated into portions of specific gravity less than 1.6 and greater than 1.6. By this means the major stoney and shaley bands were separated from the coal. The proportions of coal of specific gravity less than 1.6 (Float at 1.6) and of waste of specific gravity greater than 1.6 (Sink at 1.6) which were obtained from each cobble size sample are recorded in Table II. This table also records the proximate analysis and calorific value of each of the coal samples and the ash contents of the waste samples. In the case of borehole 4 (sample E 86) the waste from all sections were combined for analysis.

In order to investigate the distribution of the ash in the coal samples, these were crushed to -20 mesh and the proportions of coal of specific gravity less than 1.45 and less than 1.6 determined. The ash contents of these fractions were determined as also the Woodall-Duckham swelling numbers of the fractions

of specific gravity less than 1.45. This swelling number indicates the presence of coking coal which, if present, is concentrated in the lighter fractions of the coal.

The samples of waste were similarly crushed and separated into fractions of specific gravity greater than 1.6 and less than 1.6. The ash contents of the former fractions were determined.

The results of these tests are recorded in Table II.

The data in Table II indicates that, when broken to cobble size, the No. 4 seam can be separated into 80% to 85% of coal of an ash content of 14% to 17% and 15% to 20% of waste containing about 30% of ash. This is the extent to which the coal could be cleaned at cobble size by effecient washing to a specific gravity of 1.6. (In this estimate the stone bands in borehole I are taken into consideration and borehole 2, being incomplete, is ignored.) The cobble coal from boreholes 1 and 33 appears to have a somewhat lower ash content than that from the remaining holes.

Samples E 6 and E 86 indicate that the volatile matter content is higher in the upper portions of the seam than in the lower, in which respect this seam differs from the No.1 and No.2 seams of the Witbank district in which the higher volatile coal is found at the bottom of the seam.

The analyses of the floats at S.G.1.45 and 1.6 on the finely ground coal indicate that the coal in this seam contains 40 to 50% of coal of an ash content of 6% and over 80% of coal of an ash content of about 10% and that the high ash content of the cobble size coal is due to the presence of about 20% of shaley matter containing over 40% ash which is present in thin bands which are not separated by crushing to cobble size. Similarly the analyses of the cobble size sinks at S.G. 1.6 indicate that, at this size, the waste with an ash content of 30% consists of roughly equal parts of shale of 45% ash content and of coal. Owing to this intimate mixture of the low ash coal and the shaley impurities it would not be possible to recover from the seam a high grade coal by washing

unless the coal were crushed very finely.

The difficulty of separating the low ash coal from this seam is shown by the data in Table III in which is recorded the proportion of cobble size coal having a specific gravity of less than 1.45 together with the ash content and calorific value of this fraction for boreholes 1, 2 and 5 (samples E 6, E 7 and E 47)

TABLE NO III

Sample No.	Cobble Size Float at 1.45.		
	Float at 1.45. %	Ash on Float at 1.45. %	Cal.Val.on Float at L45 lbs./lbs.
E 6A	76.3	9.5	
B	12.2	7.4	
C	67.0	13.3	
D	47.4	11.5	
E	64.2	11.2	
F	1.5	14.3	
G	0	-	
H	49.2	8.6	
E 6 A to H.	44.6	11.0	12.6
E 47	27.5	12.3	12.4
E 7	64.4	10.1	12.8

The difference between the ash content of the Float at 1.45 on the cobble size coal (Table III) and on the -20 mesh coal (Table II) indicates the extent to which high ash coal is present in the cobble size pieces.

The ash contents of the floats at 1.45 of the finely ground coal indicate that the lower ash contents of the coal from boreholes 1 and 33 are not due to differences in the nature of the coal but only to the presence in these cores of less of the finely disseminated shaley matter.

The Woodall-Duckham swelling numbers indicate that the No.4 seam coal has no coking properties, the major portion of the seam yielding a friable residue on carbonisation (as indicated by the swelling number 1f) and the remainder caking without swelling (swelling number 1).

29th May,1937

J Vogel

DIRECTOR

TABLE NO. I

Sample No.	Bore Hole No.	Farm.	Depth to floor of Seam.	Thickness of sample	Description of sample	Remarks
	1	Klipplaat	64' 8"		Sandstone roof	
				5"	Shale & shaley coal not sampled.	
E 6A				7"	Very bright banded coal.	
B				4"	Dull shaley coal.	
C				6½"	Bright banded coal.	
-				3½"	Stone Band, not sampled.	
D				8"	Very bright banded coal.	
E				43½"	Mixed, mainly dull coal.	
-				1"	Shale, not sampled.	
F				20"	Dull splinty coal.	
-				1"	Stone, not sampled.	
G				7½"	Dull coal.	
H				12"	Bright banded coal.	
-					Shale and sandstone floor.	

TABLE NO.I CONTINUED.

Sample No.	Bore hole No.	Farm	Depth to floor of Seam.	Thickness of Sample.	Description of sample.	Remarks.
E 7	2	Klipplaat	78' 3½"	?	Whole Seam.	Core badly broken and incomplete.
E 86A	4	Klipplaat	46' 1"	24"	Mainly dull coal.	Core incomplete, 19" missing.
B				25"	Alternating bright & dull coal.	
C				22"	Mainly dull coal.	
D				18"	Mainly dull coal with some bright bands.	
E 47	5	Klipplaat	63' 3"	101"	Whole Seam alternating dull & bright coal bands.	Core broken and mixed
E 87	33	Tweefontein	29' 5"	98"	Whole Seam alternating dull and bright coal bands.	Core broken and mixed
E 88	36	Waterpan	139' 7"	141"	Whole Seam alternating dull and bright coal bands	
E 35	39	Tweefontein	150' 9"	24"	Alternating dull and bright coal bands.	Bottom 2' of seam only represented in this sample.

T A

Sample No.	Cobble Size Samples.		Cobble Si			
	Float at 1.6 %	Sink at 1.6 %	Cal.Val. lbs/lb.	Moisture. %	Ash %	V
E6A	86.4	13.6	12.7	2.4	10.6	
B	12.2	87.8	13.4	2.1	8.1	
C	100.0	-	12.0	2.2	15.2	
D	80.8	19.2	12.4	2.1	13.4	
E	93.6	6.4	12.2	2.3	13.3	
F	92.3	7.7	11.3	2.3	17.9	
G	100.0	-	11.6	2.0	16.9	
H	100.0	-	12.1	2.4	13.8	
Average E6A to H	90.8	9.2	12.1		13.6	
E 7	94.2	5.8	12.4		11.9	
E86A	68.0	32.0	11.9	2.2	16.3	
B	100.0	-	12.1	2.3	13.3	
C	82.5	17.5	11.6	2.5	15.9	
D	100.0	-	11.8	2.6	16.0	
Average E86A to D	87.0	13.0	11.9		15.3	
E47	81.0	19.0	11.5	2.3	16.7	
E87	81.0	19.0	11.9	2.8	14.3	
E88	78.5	21.5	11.4	2.7	17.5	
E85	100.0		11.6	2.9	16.8	

B L E II.

ze Float at 1.6							Cobble Size Sink at 1.6		
Vol.Mat. %	Fixed C %	Float at 1.45 %	Ash on Fl. at 1.45 %	W-D Swel No. on Fl at 1.45	Fl.at 1.6 %	Ash on Fl. at 1.6 %	Ash. %	Sink at 1.6 %	Ash on Sink at 1.6 %
31.9	55.1	81.3	4.8	1	88.4	5.9	29.2		
31.1	58.7	89.2	5.4	1	94.2	5.9	39.5		
30.2	52.4	69.7	6.3	1	82.9	8.4	-		
29.8	54.7	73.4	4.9	1f	83.5	6.8	34.0		
27.5	56.9	63.4	6.3	1f	87.3	9.1	29.5		
21.0	58.8	24.5	6.1	1f	77.2	12.0	31.1		
21.0	60.1	31.2	6.5	1f	80.5	12.2	-		
24.7	59.1	62.1	6.6	1f	88.7	10.2	-		
							33.8	-	-
							27.2	-	-
28.5	53.0	54.9	6.4	1	82.4	10.2			
27.7	56.7	58.3	6.4	1f	89.2	9.4			
25.9	55.7	42.3	6.2	1	79.6	10.4			
23.7	57.7	33.5	6.8	1f	86.7	10.7			
							30.4	57.8	42.9
25.1	55.9	72.5	6.9	1f	81.9	10.8	30.7	52.4	45.5
23.9	59.0	45.8	6.0	1f	84.2	9.9	33.0	66.3	41.8
24.9	54.9	36.8	6.2	1f	79.1	11.2	32.0	57.3	48.4
24.2	56.1	37.1	7.8	1f	82.5	13.1	-	-	-