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VAN ..... OF 1961

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BRANDSTOFNAVORSINGSINSTITUUT
VAN SUID-AFRIKA

FUEL RESEARCH INSTITUTE
OF SOUTH AFRICA

SURVEY REPORT NO. 286.

ONDERWERP:
SUBJECT: REPORT ON 4 BOREHOLES DRILLED ON THE FARM SCHUILPLAATS 4267 IN THE DUNDEE DISTRICT OF NATAL.

AFDELING:
DIVISION: SURVEY.

NAAM VAN AMPTENAAR:
NAME OF OFFICER: H.P. BOSHOFF.

W.P.—39162—5/10/60.

FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

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REPORT ON 4 BOREHOLES DRILLED ON THE FARM SCHUILPLAATS 4267 IN THE DUNDEE DISTRICT OF NATAL.

INTRODUCTION:

During the year 1957 Messrs. Impati Anthracite Ltd. drilled 4 boreholes on the farm Schuilplaats 4267 situated approximately 5 miles to the north-west of Dundee, Natal. The boreholes were numbered 57/1/A and 57/1 to 57/3.

Coal cores were sampled by an officer of the Institute at the colliery or at the borehole site. All the samples were crushed to pass a 2" screen and subjected to float and sink tests at a specific gravity of 1.58.

PRESENTATION OF RESULTS:

The data on which this report is based are contained in tables and figures at the end of the report. Table 1 contains the borehole records, Table 2 the details of sampling and Table 3 the analysis of the samples taken as well as average analyses for the Bottom seam. Table 4 gives the constitution of composite samples for further analysis. The remaining tables give the analysis of the composite samples containing data on ultimate analyses in Table 5 and forms of sulphur and ash fusion temperature in Table 6. Figure 1 is a plan showing the positions of the boreholes except borehole 57/3 of which the position is not known. Figure 2 gives borehole sections - corrected for collar elevations - showing coal seams and dolerite intrusions. The collar elevation of borehole 57/3 was not supplied so that the position of the section of this borehole is not necessarily correct. In the appendix is given a brief description of the analytical methods used and their significance.

GENERAL CONSIDERATIONS:

No coal was found in borehole 57/1/A, which was stopped after penetrating 56' 4" of dolerite. Dolerite with thicknesses of 5' 8" and 1' 0" was present in borehole 57/2. A 20' 6" dolerite sill was present near the surface in borehole 57/3 and 5' 4" of dolerite was

encountered/....

encountered just below the Top seam and 3" of dolerite just above the Bottom seam. Although no dolerite was present in borehole 57/1, the coal from this borehole had lower volatile matter contents than in borehole 57/3 where the dolerite was in contact with the seams. This appearance was probably caused by a nearby dyke. (The Morgenstond fault runs through this farm but the exact position is not known.)

Some differences occurred in the depth and thicknesses of the coal seams as given in the borehole records and those supplied when sampling the cores. In the discussion that follows the measurements supplied during sampling the cores will be taken as correct.

THE COAL SEAMS:

The Leader seam.

This seam was present in boreholes 57/1 to 57/3 with thicknesses between 2" and 7". In borehole 57/2 it was present in two sections of 3" and 7". The seam is too thin to be of any importance and was nowhere sampled.

Another thin coal seam was encountered just above the Top seam in boreholes 57/2 (3") and 57/3 (7") but was also not sampled.

The Top seam was present in boreholes 57/1 to 57/3 at an average distance of 60' below the Leader seam. Thicknesses range from 1'4"* to 2' 10".

The coal was rather inferior in borehole 57/3 at 22.9% ash over 20" sampled. Float yield obtained at 1.58 s.g. was only 5.9% with 12.8 lb./lb. calorific value, 17.3% ash, and 11.8% volatile matter on the floats.

In boreholes 57/1 and 57/2 the seam consists of anthracite with raw coal ash contents of 9.6% and 14.2% over thicknesses of 21" and 30" respectively. Float yields obtained at 1.58 s.g. were 93.2% and 88.0% with calorific values 13.9 lb./lb. and ash contents 9.5% and 11.0% on the floats in boreholes 57/1 and 57/2 respectively. Average analyses for the seam in these two boreholes are as follows:

Thickness:/....

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*The recovered core actually measured 20".

Thickness: ..... 26"
Raw coal ash: 12.3%
Floats of -2" coal at 1.58 s.g.:-
Yield: 90.1%
Cal.val.: ..... 13.9 lb./lb.
Moisture: 1.4%
Ash: 10.3%
Vol.mat.: 8.5%
Fix.carb.: 79.8%

The Bottom seam: This seam was encountered at distances of 4' 0" to 7' 3" below the Top seam. The Bottom seam is a little thicker than the Top seam with thicknesses of 3' 2" to 5' 10", averaging 4' 10". With the exclusion of inferior coal and/or carbonaceous shale bands at the top of the seam in boreholes 57/1 and 57/3, the better section consists of reasonably good quality anthracite with raw coal ash contents varying between 10.3% and 12.3% over thicknesses of 34" to 56½" (+4" excluded). Calorific values and ash contents on the floats range from 13.9 lb/lb. to 14.0 lb./lb. and 9.6% to 11.2% respectively. Float yields obtained at 1.58 s.g. ranged from 87.0% to 95.5%. Average analyses for this section are as follows:-

Coal thickness: ..... 43"
Exclusions: ..... 1"
Raw coal ash: 11.5%
Floats of -2" coal at 1.58 s.g.:-
Yield: 92.7%
Cal.val.: ..... 13.9 lb./lb.
Moisture: 1.3%
Ash: 10.6%
Volmat.: 8.8%
Fix.carb.: 79.3%

ULTIMATES:

Two composite samples representing the Top and Bottom seam, were made up for further analyses. These samples were made up from the float fractions.

Dry ash-free carbon, hydrogen and nitrogen contents for the Bottom seam were 89.9%, 3.7% and 2.5% respectively.

Total sulphur contents are rather high, being 1.79% and 1.95% for the Bottom and Top seams respectively.

Ash fustion/.....

Ash fusion temperatures were +1400°C.

SUMMARY:

Four boreholes were drilled on the farm Schuilplaats 4267, situated approximately 5 miles to the north-west of Dundee, Natal.

Dolerite was present in borehole 57/1/A, 57/2 and 57/3. Borehole 57/1/A was stopped after penetrating 56' 4" of dolerite and no coal. In borehole 57/3 the dolerite sills were present between the Top and Bottom seams. The coal was affected in all the boreholes and the seams consist of reasonably good quality anthracite.

The Leader, Top and Bottom seams of the Klip River coalfield were encountered.

The Leader seam was thin, with thicknesses between 2" and 7", and was nowhere sampled.

The Top seam was inferior in borehole 57/3 at 22.9% ash over 20" sampled. Average data for the Top seam in the other two boreholes and for the Bottom seam in three boreholes are given below:-

	Top seam	Bottom seam.
Boreholes:	57/1, 57/2	57/1, 57/2, 57/3.
Coal thickness (in.):	26	43
Exclusions (in.):	-	1
Raw coal ash (%):	12.3	11.5
Floats of -2" coal at 1.58 s.g.:-		
Yield (%):	90.1	92.7
Cal.val. (lb./lb.)	13.9	13.9
Moisture (%):	1.4	1.3
Ash (%) :	10.3	10.6
Vol.mat. (%):	8.5	8.8
Fix.carb. (%):	79.8	79.3
Total S. (%):	1.95	1.79
A.F.T. (°C):	+1400	+1400
On a dry ash-free basis:		
Carbon (%):	-	89.9
Hydrogen (%):	-	3.7
Nitrogen (%):	-	2.5

PRETORIA.

11th December, 1961.

H.P. BOSHOFF

Assistant Technical Officer.

TABLE 1.

BOREHOLE RECORDS.

Thickness Ft.	in.	Description of Strata.	Depth Ft.	in.
		FARM: SCHUILPLAATS 4267.		
BOREHOLE NO. 57/1/A			**COLLAR ELEVATION: 4385'**	
4	0	Surface soil and clay	4	0
17	0	Soft Sandstone.	21	0
24	8	Sandstone with shale bands.	45	8
56	4	Dolerite.	102	0
BOREHOLE NO. 57/1.			**COLLAR ELEVATION: 4405'**	
23	0	Clay	23	0
21	0	Shale.	44	0
6	0	Sandstone.	50	0
13	0	Sandstone.	63	0
8	0	Sandy shale.	71	0
3	8	Shale.	74	8
	5	Coal. Leader seam.	75	1
25	0	Sandstone.	100	1
2	0	Shale.	102	1
15	0	Sandstone	117	1
9	0	Shale	126	1
1	9	Coal. Top seam.	127	10
4	0	Sandy shale.	131	10
3	2	Coal. Bottom seam.	135	0
3	0	Sandstone.	138	0
BOREHOLE NO. 57/2			**COLLAR ELEVATION: 4419'**	
12	0	Surface soil and clay.	12	0
9	5	Decomposed sandstone.	21	5
1	5	Black shale.	22	10
67	11	Sandstone with shale bands.	90	9
1	0	Dolerite	91	9
10	3	Sandstone with shale bands.	102	0
24	8	White sandstone.	126	8
	3	Coal. Leader seam.	126	11
10	7	Shale with sandstone bands.	137	6
	7	Coal with shale band.	138	1
6	2	Shaly sandstone.	144	3
4	3	White sandstone.	148	6
9	4	Shaly sandstone.	157	10
5	8	Dolerite	163	6
15	10	Sandstone with shale bands.	179	4
	3	Coal.	179	7
2	8	Sandstone with shale bands.	182	3
2	10	Coal. Top seam.	185	1
4	9	White sandstone.	189	10
5	5	Coal. Bottom seam.	195	3
11	7	Shaly sandstone.	206	10
8	2	Coarse white sandstone.	215	0

BOREHOLE NO. 57/3/.....

TABLE 1 (Cont.)

Thickness Ft.	in.	Description of Strata.	Depth Ft.	in.
BOREHOLE NO. 57/3			COLLAR ELEVATION: ?	
5	0	Surface soil and decomposed sandstone	5	0
20	6	Dolerite boulders	25	6
45	0	White sandstone.	70	6
83	6	Shaly sandstone.	154	0
22	9	White sandstone.	176	9
	2	Coal. Leader seam.	176	11
	6	Black shale.	177	5
4	11	Shaly sandstone.	182	4
9	8	Shale.	192	0
30	0	White sandstone with shale bands.	222	0
16	9	Shale and sandstone bands.	238	9
	7	Coal.	239	4
1	6	Shaly sandstone.	240	10
1	4	Coal. Top seam.	242	2
5	4	Dolerite.	247	6
1	8	Shale.	249	2
	3	Dolerite	249	5
5	10	Coal. Bottom seam.	255	3
1	9	Shaly sandstone.	257	0

TABLE 2/.....

TABLE 2.

DESCRIPTION OF SAMPLES.

B.H. No.	Sample No.	Thickness in.	Depth Ft.	in.	Description
Top seam.					
57/1			126	1	ROOF: Shale.
	57/528 A	21			Mixed coal, calcitic.
			127	10	FLOOR: Sandstone and shale.
57/2			184	7	ROOF: Sandstone with shale bands.
		1			Coal. } Not sampled.
		3			Coal and sandstone. }
	57/530 A	30			Mixed mainly bright coal.
			187	5	FLOOR: White sandstone.
57/3			240	10	ROOF: Shaly sandstone.
	57/560 A	20			Dull coal.
			242	2	FLOOR: Dolerite.
					NOTE: 4" excess core.
Bottom seam.					
57/1			131	10	ROOF: Sandstone and shale.
		4			Carbonaceous shale. Not sampled.
		6			Mixed coal.
	57/529 B	½			Carbonaceous shale.
		13			Mixed coal.
		½			Carbonaceous shale.
	A	14			Mixed mainly bright coal.
			135	0	FLOOR: Sandstone.
					NOTE: Coal calcitic.
57/2			191	9	ROOF: White sandstone.
		12			Mixed mainly bright coal.
		4			Carbonaceous shale. Excluded.
	57/531 B	10			Mixed coal.
		5			Dull coal.
		8			Mixed coal.
		1			Carbonaceous shale.
		9			Mixed coal.
	A	½			Carbonaceous shale.
		11			Mixed mainly bright coal.
			197	3	FLOOR: Shaly sandstone.
					NOTE: 5½" of core lost.
57/3			249	5	ROOF: Dolerite.
	57/561 C	10			Mixed coal.
		7			Carbonaceous shale. Not sampled.
	B	20			Mixed mainly bright coal.
	A	19			Bright finely banded coal.
			255	3	FLOOR: Shaly sandstone.
					NOTE: 14" of core lost.

TABLE 3/.....

TABLE 3.

PROXIMATE ANALYSIS AND CALORIFIC VALUES. (AIR-DRY BASIS).

Borehole No.	Sample No.	Thickness In.			Analysis of Floats (-2" coal at 1.58 s.g.)						Sink
		Excluded	Sampled	Raw coal Ash %	Float Yield %	Cal.Val. lb./lb.	H_2O %	Ash %	Vol.Mat. %	Fix.Carb. %	Ash %
Top seam.											
57/1	57/528 A		21	9.6	93.2	13.9	1.6	9.5	7.5	81.4	10.4
57/2	57/530 A		30	14.2	88.0	13.9	1.2	11.0	9.2	78.6	37.7
57/3	57/560 A		20	22.9	5.9	12.8	1.0	17.3	11.8	69.9	23.2
Bottom seam.											
57/1	57/529 B		19½	10.0	87.8	13.9	1.6	9.8	7.1	81.5	11.3
	A		14½	10.6	86.0	14.0	1.7	9.3	7.1	81.9	18.3
Average	AB		34	10.3	87.0	13.9*	1.6*	9.6*	7.1*	81.7*	-
57/2	57/531 B	4	35	10.9	96.4	13.9	1.2	10.9	8.8	79.1	-
	A		21½	14.6	88.3	13.8	1.3	11.6	9.0	78.1	37.0
Average	AB	4	56½	12.3	95.5	13.9	1.2	11.2	8.9	78.7	-
57/3	57/561 C	7	10	40.7	37.6	14.1	1.1	9.3	10.5	79.1	59.6
	B		20	10.6	93.2	14.1	1.2	9.5	10.6	78.7	25.1
	A		19	12.5	93.8	13.8	1.2	11.5	9.6	77.7	27.3
Average	AB		39	11.5	93.5	14.0	1.2	10.5	10.1	78.2	-

*Raw coal analysis.

TABLE 4.

COMPOSITION OF SAMPLES FOR FURTHER ANALYSIS.

Sample No.	Components	Parts	Description
Top seam.			
58/352	57/528 A_1	196	Floats of -2" coal at 1.58 s.g.
	57/530 A_1	264	Mixed coal over the seam in boreholes 57/1 and 57/2. Average thickness: 25½" Average float yield: 90.1%
Bottom seam.			
58/353	57/529 B_1	171	Floats of -2" coal at 1.58 s.g.
	A_1	125	Mixed to bright coal over the
	57/531 B_1	350	whole seam excluding inferior
	A_1	190	bands in boreholes 57/1, 57/2
	57/561 B_1	186	and 57/3.
	A_1	178	Average thickness: 43" Average float yield: 92.7%

TABLE 5.

DRY ASH-FREE ULTIMATE ANALYSIS.

Sample No.	Seam.	C %	H %	N %	Org. S %	O and Errors %
58/353	Bottom	89.9	3.7	2.5	1.6	2.3

TABLE 6.

FORMS OF SULPHUR AND ASH FUSION TEMPERATURES.

Sample No.	Seam.	Total S. %	Organic S. %	Mineral S. %	A.F.T. °C
58/352	Top	1.95	-	-	+1400
58/353	Bottom	1.79	1.42	0.37	+1400

FIGURE 1.
MAP SHOWING BOREHOLE POSITIONS.

SCALE: 1: 7,500.

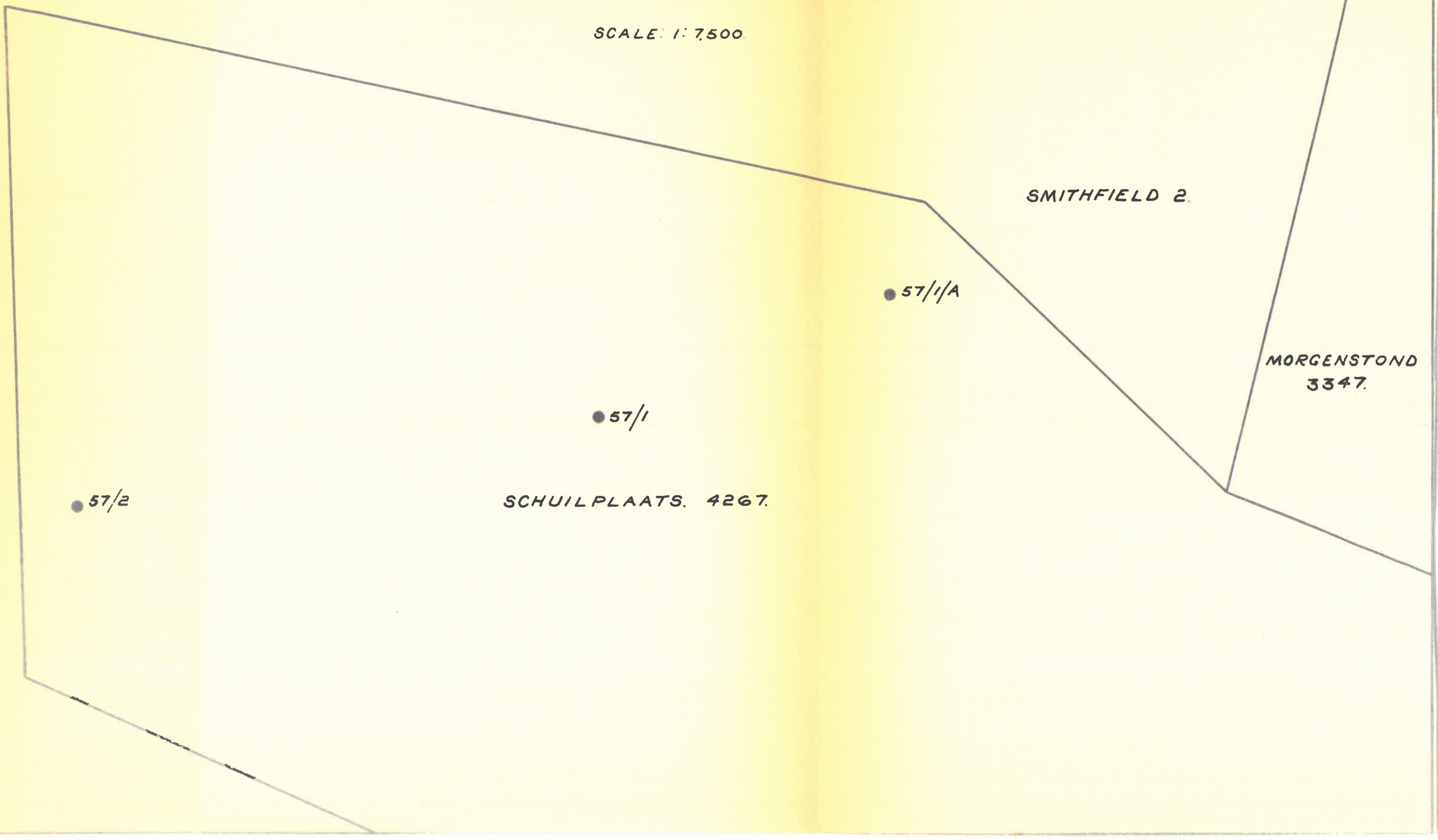

FIGURE 2.
BOREHOLE SECTIONS.

SCALE: 1MM: 1FT.

COAL

DOLERITE.

L: LEADER SEAM.
T: TOP SEAM.
B: BOTTOM SEAM.