



Section of:

MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

Purpose:

COAL EXPLORATION

Exact Site:

NATIONAL GRID CO-ORDINATES

(Nat. Grid, Sheet & Qtr.) B/H REGD. NO.

SK 46 NE

55a (No.16)  
55b (No.17)

E445744 ) Both holes  
N368403 )

Level at which bore commenced relative to  
O.D. : 376.1 m  
(Zero: floor of Clay Cross Soft)

Date of Boring: 1980-81

Borer: NATIONAL COAL BOARD  
Cores examined by D.J. Green, N.C.B. Geologist

SK 46 NE / 44 +  
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GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
	Top of borehole at			146	54
Siltstone	coarse, vaguely greenish; occasional siltstone medium layers; poorly laminated; rare roots throughout	0	84+	145	70
Siltstone	medium with occasional siltstone coarse layers (strong); common ironstone bands; poorly laminated	0	90	144	80
Siltstone	fine, poorly laminated; common plant debris	0	54	144	26
Siltstone	coarse, unlaminated; rare plant debris	0	61	143	65
Siltstone	medium with occasional siltstone fine and muddy layers, poorly laminated; occasional ironstone bands; rare plant debris	1	50	142	15
Siltstone	fine, poorly laminated; common ironstone nodules; occasional plant debris	0	75	141	40



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SK 146 / NE / 44+  
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-- JUN 1982

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	silty, laminated; occasional ironstone bands. passage	0	28	141	12
Siltstone	medium, laminated; occasional plant debris	0	61	140	51
Mudstone	silty, laminated; rare ironstone bands; common plant remains including <u>Calamites</u>	0	91	139	60
Mudstone	silty, poorly laminated; common listric surfaces; common plant debris; common roots; occasional <u>Pinnularia</u> Sharp	0	37	139	23
Sandstone	fine and siltstone fine; locally common load and pouch structures; occasional dune sets; common ripples and minor erosion surfaces; common micaceous planty planes	1	81	137	42
Sandstone	medium; common micaceous planty planes above 134.50; common ripples above 134.80	5	14	132	28
Siltstone	medium and sandstone fine; locally vaguely rippled; sub-vertical, calcite-mineralized joint throughout	0	12	132	16
Siltstone	medium, poorly laminated; sub-vertical, unmineralised joint throughout passage	0	10	132	06
Siltstone	fine, poorly laminated; common ironstone bands passage	0	72	131	34
Mudstone	silty, poorly laminated; common thin ironstone bands passage	1	94	129	40
Mudstone	dark, laminated; common ironstone bands; common worm tracks on some bedding planes	0	34	129	06



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CORE ANALYSED 129.06 to 126.08

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SK/46/NE / 44 +  
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Mudstone	silty, ironstone bands; non-marine lamellibranchs	0	25	128	81
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Mudstone	shaly, carbonaceous; non-marine lamellibranch impressions detached	0	13	128	68
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SECOND WATERLOO

	(Coal, bright	15)	
<u>Upper</u>	(Coal, banded	24)	fragments
<u>Leaf</u>	(Coal, mostly bright	38)	
Mudstone, laminated, rootlets 32 cylinders			
<u>Middle</u>	(Cannel	7)	
<u>Leaf</u>	(Coal and dirty coal	18)	
		)	fragments
Seatearth; mudstone, grey		20)	
<u>Lower</u>		)	
<u>Leaf</u>	(Coal mostly bright	48)	
		202	cm

Dip less than 2°, recovery 75%	2	02	126	66
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Seatearth Mudstone	silty, grey, listric	0	18	126	48
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Siltstone	fine, grey, with fine sandstone laminae, commoner in basal 0.14; ironstone root-nodules and common roots	0	40	126	08
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Sandstone	fine with common siltstone medium laminae (60:40); local slump structures between 125.98 and 126.04; abundant roots	0	30	125	78
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Siltstone	fine to medium; poorly laminated; common roots	0	54	125	24
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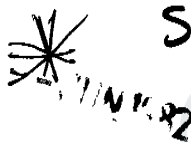
Siltstone	fine to medium, occasional muddy layers, unlaminated; sporadic roots throughout passage	1	39	123	85
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Sandstone	medium to fine, (strong), with occasional siltstone laminae; common poorly developed ripples; occasional micaceous planty planes	0	47	123	38
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Siltstone	coarse, poorly laminated; common slurried layers; common plant debris including <u>Neuropteris</u>	1	04	122	34
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with occasional sandstone fine laminae and thin layers (80:20) towards base; common load casts in basal 0.05; occasional plant debris including <u>Calamites</u> and <u>Neuropteris</u>	1	16	121	18
Mudstone	locally slightly silty; poorly laminated; rare ironstone bands; common non-marine lamellibranchs in basal 0.10; very rare plant debris	2	89	118	29
Mudstone	carbonaceous, shaly	0	09	118	20
<u>COAL</u>	bright (cylinder)	0	02	118	18
Seatearth Mudstone	silty, unlaminated, brownish; abundant listric surfaces; abundant roots passage	1	28	116	90
Mudstone	silty, unlaminated, greenish; abundant irregular listric surfaces; occasional ironstone nodules; abundant roots	2	97	113	93
Siltstone	medium, unlaminated, greenish; common roots, becoming less common to base	1	15	112	78
Sandstone	fine to medium, locally vaguely greenish; rare discontinuous micaceous planty planes; rare comminuted plant debris	1	48	111	30
Siltstone	fine and sandstone fine, interlaminated; locally well developed ripples passage	0	20	111	10
Siltstone	fine to medium, poorly laminated	0	50	110	60
Siltstone	medium with common thin sandstone fine laminae (70:30); locally vaguely ripple bedded; occasional comminuted plant debris	0	30	110	30

COMMERCIAL AND RESEARCH 5

*Handwritten sketch of a star-like symbol*

*Handwritten: SK/46/NE/44+50*

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	medium, poorly laminated; common slurried layers	0	54	109	76
Siltstone	fine, poorly laminated; common plant debris	2	20	107	56
Siltstone	fine and sandstone fine; occasional micaceous planty planes; rare ripples and minor erosion surfaces	0	86	106	70
Sandstone	medium, generally massive; rare discontinuous micaceous carbonaceous planes	0	62	106	08
Siltstone	fine with common thin sandstone fine laminae (60:40); occasional ripples; rare plant debris	0	23	105	85
Siltstone	fine, poorly laminated, with rare wispy thin sandstone fine laminae near the base; rare plant debris	0	30	105	55
Sandstone	medium, occasional micaceous carbonaceous planes; rare poorly developed ripples; rare plant remains erosional	3	27	102	28
Mudstone	silty, poorly laminated; rare plant debris	0	80	101	48
<u>COAL</u>	bright (fragments)	<u>0</u>	<u>24</u>	<u>101</u>	<u>24</u>
Seatearth Mudstone	silty, unlaminated; abundant irregular listric surfaces; abundant roots	0	48	100	76
Sandstone	fine to medium; occasional micaceous planty planes; occasional poorly developed ripples; occasional roots including <u>Stigmaria</u>	0	81	99	95

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MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

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Section of:

GEOLOGICAL  
CLASSIFICATION

NATURE OF STRATA

THICKNESS  
m cm

DEPTH  
m cm

Seatearth  
Mudstone

silty, unlaminated, greenish; occasional  
fine siltstone passages; common roots

1 31

98 64

Siltstone

fine, unlaminated, greenish; common  
ironstone nodules; abundant roots

0 88

97 76

Siltstone

medium, unlaminated, grey; common ironstone  
nodules; coalified Stigmaria, abundant  
roots

0 40

97 36

Mudstone

silty, unlaminated, greenish; occasional  
irregular listric surfaces; common roots

0 32

97 04

Siltstone

fine to medium, unlaminated, greenish;  
ironstone nodules; common roots

1 04

96 00

Siltstone

coarse, unlaminated, greenish,  
abundant roots

0 74

95 26

Siltstone

fine to medium, unlaminated; common  
roots, occasional root nodules near  
the base

0 38

94 88

Mudstone

silty, poorly laminated; common irregular  
listric surfaces; occasional iron-filled  
roots near base, occasional carbonaceous  
roots near top; occasional coalified plant  
remains, common well preserved Neuropteris  
leaves near top

1 18

93 70

Siltstone

fine to medium, poorly laminated; rare  
sandstone fine laminae in basal 0.50;  
occasional iron-rich patches; occasional  
sub-vertical unmineralised joints;  
occasional comminuted plant debris;  
occasional plant remains including  
Calamites and Pinnularia above 90.80  
passage

5 00

88 70

Siltstone

fine to medium with occasional sandstone  
fine laminae and lenses (80:20); locally  
vaguely rippled; 45 degree fracture at  
88.43

0 65

88 05

Section of:

MARKHAM NOS. 16 (UP) AND  
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JUN 1982

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine, locally muddy, laminated passage	0	50	87	55
Mudstone	silty with rare sandy laminae near the base; occasional iron-rich layers; occasional thin wormy ironstone bands; rare small non-marine lamellibranchs; rare plant remains	3	32	84	23
Siltstone	fine with occasional wispy thin sandstone fine laminae (95:5); occasional plant remains including <u>Neuropteris</u> towards the top	0	39	83	84
Siltstone	fine, locally muddy, poorly laminated; rare vague sandy laminae; occasional iron-rich patches	1	04	82	80
Mudstone	silty, poorly laminated	0	95	81	85
Siltstone	fine, unlaminated; common iron-rich patches. short passage	0	85	81	00
Mudstone	slightly silty, laminated passage	1	54	79	46
Mudstone	silty, slightly carbonaceous, laminated, shaly; becoming less carbonaceous towards top; occasional shelly ironstone bands up to 0.05 thick passage	0	74	78	72
Mudstone	highly carbonaceous, shaly, occasional ostracods; common non-marine lamellibranchs in basal 0.05, rare above	0	15	78	57
<u>COAL</u>	and dirt (fragments)	0	30	78	27
Seatearth Mudstone	locally silty, laminated; common listric surfaces, core completely fragmented; locally slightly carbonaceous; occasional rootlets sharp	2	13	76	14



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Section of: MARKHAM NOS. 16 (UP) AND  
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GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with common thin sandstone fine laminae (70:30); common micaceous carbonaceous planes	0	75	75	39
Sandstone	fine with rare siltstone fine laminae; vaguely ripple bedded; micaceous carbonaceous planes; occasional comminuted plant debris	1	92	73	47
Sandstone	fine and siltstone fine; common lenticular ripples; common micaceous planes; rare sand-filled burrows	1	52	71	95
Siltstone	fine to medium with common thin sandstone fine laminae (70:30); common plant debris	1	37	70	58
Siltstone	muddy, poorly laminated passage	0	58	70	00
Mudstone	silty, laminated, dark; common non-marine lamellibranchs in basal 0.10; scattered non-marine lamellibranch fragments throughout	2	66	67	34
<u>Ironstone</u>	shelly	0	06	67	28
Siltstone	fine, unlaminated; common <u>roots</u> in top 0.10, rare below	1	58	65	70
Siltstone	fine with common sandstone fine laminae and layers (60:40); slump structures at 63.70, 65.40; common <u>rootlets</u> 64.20 to 64.60; common plant fragments including <u>Neuropteris</u> 64.60 to 64.75	3	70	62	00
Siltstone	muddy, laminated passage	0	30	61	70
Mudstone	silty, laminated; abundant non-marine lamellibranchs including <u>Naiadites</u> and <u>Anthracosia</u>	0	90	60	80

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

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SK/46/N E/44  
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GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	carbonaceous, shaly; detached <u>Spirorbis</u> at 60.05; common non-marine lamellibranch fragments including <u>Naiadites</u> <u>CORE ANALYSED 59.79 TO 58.27</u>	1	01	59	79
Mudstone	silty; a few ironstone nodules	0	53	59	26
<u>SECOND</u> <u>ELL</u>	Coal, bright 80) fragments Coal, inferior bright 14) 94 cm  Dip less than 2°. <u>Recovery</u> 60% (based on borehole recorder)	0	94		
Seatearth Siltstone	medium, with a few bright coal laminae	0	05	58	32
Siltstone	muddy, poorly laminated, dark; common plant fragments including <u>Lepidodendron</u>	0	07	58	27
<u>Seatearth</u> <u>Siltstone</u>	muddy, unlaminated, abundant rootlets	0	20	58	00
Siltstone	fine, poorly laminated, thin irregular sandstone fine laminae in top 0.30, rootlets above 57.25	1	25	56	75
Siltstone	fine with common thin sandstone fine laminae (70:30); burrows up to 0.08 deep; comminuted plant debris	0	45	56	30
Siltstone	fine, poorly laminated; common faultlets in basal 0.50 passage	0	57	55	73
Siltstone	muddy with irregular thin sandstone fine laminae 55.43 to 55.53	1	92	53	81
Siltstone	fine with sandstone fine (70:30) slurried in parts	0	25	53	56
Siltstone	muddy, laminated, dark; isolated non-marine lamellibranch fragment at 53.40	0	18	53	38

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17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
				53	38
<u>Seatearth</u> Siltstone	muddy, unlaminated, cheesy texture, ironstone nodules in top 0.10; abundant rootlets	0	73	52	65
Siltstone	fine with common sandstone fine laminae in basal 0.30; rare rootlets	0	37	52	28
Sandstone	fine with thin siltstone laminae; slurried in parts, common load casts throughout; contact inclined at 20 degrees	4	91	47	37
Siltstone	muddy to fine with common thin sandstone fine laminae in top 0.15 passage	0	47	46	90
Mudstone	silty laminated; common shelly ironstone to 43.02 passage	5	75	41	15
Siltstone	muddy, laminated, dark; common non-marine lamellibranchs passage	1	50	39	65
<u>CLAY CROSS</u> <u>MARINE BAND</u>	mudstone, silty, completely fragmented; cone-in-cone, canky ironstone 36.14 to 36.36; <u>Lingula</u> and <u>Dunbarella</u> fragments towards base; isolated <u>Lingula</u> at 37.46 (core from 34.65 to 36.14 broken, part lost)	5	00	34	65
Siltstone	muddy, cheesy texture	0	10	34	55
Siltstone	muddy to fine with common thin sandstone fine laminae, 33.65 to 34.05	1	10	33	45
Mudstone	silty, laminated; wormy	1	91	31	54
Mudstone	silty, dark; common non-marine lamellibranch fragments; common <u>Geisina</u> in basal 0.02	0	25	31	29
Siltstone	muddy to fine; thin sandstone laminae 29.90 to 30.08; poorly laminated; ironstone nodules in top 0.30; plant remains in top 0.30	2	19	29	10

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SK/46/NE 14x+50

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	silty, laminated	0	75	28	35
Siltstone	muddy, becoming siltstone fine upwards with rare sandstone fine laminae passage	0	65	27	70
Mudstone	silty, laminated, dark; shelly ironstone 27.00 to 27.12; abundant <u>Geisina</u> in basal 0.01	0	77	26	93
<u>Seatearth</u> Mudstone	silty, dark, unlaminated, listric; abundant rootlets	0	02	26	91
Siltstone	fine with irregular thin sandstone fine laminae; cheesy texture; abundant rootlets	0	46	26	45
Siltstone	fine with common thin sandstone fine laminae; sandstone layer 24.58 to 24.83; common rootlets above 26.25	3	30	23	15
Siltstone	muddy, poorly laminated passage	1	05	22	10
Mudstone	silty, laminated, wormy passage	0	80	21	30
Mudstone	silty, dark, abundant thick shelled non-marine lamellibranchs including <u>Carbonicola</u> ; abundant <u>Geisina</u>	0	75	20	55
<u>COAL</u>	(cylinder)	0	02	20	53
<u>Seatearth</u> Siltstone	fine, poorly laminated; common ironstone nodules; common rootlets	0	73	19	80
Siltstone	fine with common thin sandstone fine laminae; sporadic rootlets above 18.50	3	32	16	48
Mudstone	silty, laminated	1	18	15	30



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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

JUN 1982

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	silty, laminated, dark; shelly ironstone band 15.25 to 15.30; abundant thick shelled non-marine lamellibranchs	0	61	14	69
<u>COAL</u>	and dirt (completely fragmented)	0	10	14	59
Seatearth Mudstone	silty, dark, unlaminated, cheesy texture; abundant rootlets (core fragmented)	0	39	14	20
Mudstone	silty, poorly laminated, common rootlets	0	33	13	87
Siltstone	muddy, laminated; common rootlets above 13.20 passage	1	27	12	60
Mudstone	silty, laminated passage	0	65	11	95
Mudstone	carbonaceous, shaly; <u>Geisina</u> at 11.65; common <u>Naiadites</u> fragments at 11.68 passage	0	40	11	55
Mudstone	silty, laminated; abundant non-marine lamellibranchs 10.50 to 10.70	1	50	10.	05
Markham No. 16 (upbore)	<u>Start of coring in upbore: 10.05 m</u>				
<u>ORIGIN</u>	<u>Base of Clay Cross Soft Seam</u>			0	00
Markham No. 17 (downbore)	<u>Start of coring in downbore; 4.00 m</u>				
				4.	00
Siltstone	fine with common thin sandstone fine laminae 70:30; common ripple sets, occasional minor erosion surfaces; rare comminuted plant debris	0	44	4	44
Siltstone	fine and sandstone fine; interlaminated and interlayered. Ripple bedded throughout, minor erosion surfaces	0	19	4	63



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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

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GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Sandstone	fine to medium with rare siltstone fine laminae; common micaceous planty planes. Local vague ripples	1	25	5	88
Siltstone	fine with common sandstone fine laminae, 70:30; becoming 60:40 towards base. Poorly developed ripples throughout Passage	0	31	6	19
Sandstone	fine with common siltstone fine laminae, 70:30. Common ripple sets; occasional ripple drift, common micaceous planes	0	51	6	70
Siltstone	fine and sandstone fine, complexly interlaminated and interlayered; ripple bedded throughout, occasional minor erosion surfaces. Locally developed minor load structures. Common micaceous planty planes. Rare iron-rich patches Sharp	1	08	7	78
Sandstone	fine to medium; core broken into 1 cm pieces though no sign of bedding sharp, erosional	0	20	7	98
Mudstone	silty, laminated. Common ironstone bands; rare worm tracks; rare plant debris	1	12	9	10
	Detached				
<u>DEEP SOFT</u> <u>(part)</u>	Coal (fragments) Detached		0.19		
	Seatearth, silty mudstone, coal laminae (fragments) Detached		0.16		
	Coal and dirt (fragments)		0.08		
	Detached		0.43		
		0	43	9	53
Seatearth Mudstone	silty, occasional coaly laminae. Abundant roots	0	56	10	09
<u>COAL</u>	and dirt (fragments and broken cylinders)	0	43	10	52

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GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Seatearth Mudstone	silty, occasional coaly laminae; common roots	1	22	11	74
Siltstone	fine to medium, unlaminated, granular texture. Occasional roots	0	79	12	53
Ironstone		0	12	12	65
Siltstone	fine to medium, poorly laminated, becoming muddy towards base. Occasional iron-rich patches; 0.11 ironstone band at base. Rare plant debris	0	83	13	48
Mudstone	silty, poorly laminated. Rare plant debris	0	13	13	61
Siltstone	medium, locally siltstone fine. Slurried texture near top. Poorly laminated; occasional faultlets. Occasional plant remains	0	54	14	15
Siltstone	fine, unlaminated with occasional siltstone medium passages. Slurried texture in basal 0.20. Common faultlets. Common plant remains including <u>Neuropteris</u> ; common comminuted plant debris	0	43	14	58
Mudstone	laminated	0	06	14	64
Siltstone	fine, locally muddy, unlaminated; abundant faultlets. Common ironstone bands. Single <u>Naiadites</u> at 15.97. Occasional plant debris	2	29	16	93
Siltstone	medium with common sandstone fine laminae, 70:30. Occasional ironstone patches. Occasional faultlets. Sub-vertical unmineralised joint in basal 0.20 Occasional plant debris	0	40	17	33

COMMERCIAL REFERENCE 15

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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine, locally muddy, unlaminated	0	72	18	05
Siltstone	coarse, poorly laminated	0	48	18	53
CORE LOST		0	47	19	00
Mudstone	laminated, becoming slightly carbonaceous in basal 0.10. Core completely fragmented. Occasional ironstone bands; rare non-marine lamellibranch fragments. Rare guillemites. Common worm tracks on some bedding planes	3	96	22	96
COAL	(fragments)	0	15	23	11
Seatearth Mudstone	core completely fragmented	0	29	23	40
Siltstone	coarse, unlaminated; abundant roots	0	25	23	65
Sandstone	fine with rare wispy thin siltstone fine laminae, becoming more common towards base. Common micaceous carbonaceous planes. Common sand-filled roots passage	0	35	24	00
Siltstone	fine to medium with rare sandstone fine laminae. Occasional iron-rich patches. Common comminuted plant debris	0	40	24	40
Mudstone	silty, poorly laminated; common ironstone bands. Occasional roots	0	25	24	65
Siltstone	fine with occasional wispy sandstone fine microlenses, 90:10; occasional ironstone bands. Common comminuted plant debris. Rare roots in top 0.10 Passage	0	60	25	25



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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine, laminated; occasional thin ironstone bands. Occasional plant fragments passage	0	35	25	60
Mudstone	silty, laminated sharp	0	29	25	89
Sandstone	fine with rare siltstone fine laminae; vaguely ripple bedded. Common micaceous planty planes. Common comminuted plant debris	0	09	25	98
Mudstone	silty, laminated, core fragmented. Occasional ironstone bands. Occasional worm tracks; abundant burrows in top 0.05 Detached	1	64	27	62
<u>DEEP HARD</u> <u>(Upper Leaf)</u>	Coal (fragments) Detached	0	27	27	89
Seatearth Siltstone	fine to muddy, grey; common ironstone nodules; common roots	0	51	28	40
Siltstone	fine to medium, unlaminated; common ironstone bands and nodules, becoming rare below 29.20; common roots	1	30	29	70
Siltstone	medium with occasional sandstone fine laminae. Occasional iron-rich patches. Rare roots, rare plant debris	0	20	29	90
Siltstone	fine with common thin sandstone fine laminae and layers, variously inclined. Common plant debris	2	20	32	10
Mudstone	silty, laminated. Common worm tracks on some bedding planes	0	90	33	00
Siltstone	fine, locally muddy, laminated; iron-rich layers in basal 0.10	0	37	33	37

SK/46/NE/44+  
50

Section of:

MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	laminated. Occasional plant debris	0	09	33	46
Siltstone	fine, poorly laminated, occasional medium siltstone passages. Occasional iron-rich layers. Rare plant debris	0	44	33	90
Mudstone	silty, laminated, fining downwards. Occasional ironstone bands. Common worm tracks. passage	1	10	35	00
Mudstone	laminated; core fragmented. Rare plant remains	0	48	35	48
Siltstone	fine, poorly laminated. Occasional iron-rich layers. Rare plant remains including <u>Lepidostrobos</u> . Vague worm tracks, locally common small burrows	0	94	36	42
<u>CORE ANALYSED, 36.42 to 38.04</u>					
Mudstone	silty, light grey	0	31	36	73
<u>DEEP HARD (Main Leaf)</u>	Coal, mostly bright Coal, inferior bright, pyritic Coal, bright Coal, inferior bright, pyritic Coal, mostly bright	40) 19)cyl- 32)inders 3) 21) <u>115 cm</u>			
	<u>Dip less than 2° Recovery 100%</u>	1	15	37	88
Seatearth Mudstone	light grey	0	16	38	04
Mudstone	silty, grey, common roots	0	26	38	30
Siltstone	coarse, unlaminated. Common roots	0	15	38	45

~~CONFIDENTIAL~~

18

SK/46/NE/44+50 + 

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with common thin sandstone fine laminae, 70:30. Common roots	0	57	39	02
<u>Seatearth</u>					
Sandstone	fine with occasional root-disturbed siltstone fine laminae. Common micaceous planty planes. Common iron-rich patches. Occasional roots	0	78	39	80
Siltstone	fine with common thin sandstone fine laminae, 70:30. Common small load and pouch structures. Occasional roots	0	15	39	95
Siltstone	fine with rare sandstone fine laminae and lenses. Occasional roots. Occasional plant remains	0	10	40	05
Siltstone	fine, poorly laminated. Occasional roots passage	0	35	40	40
Mudstone	laminated; occasional ironstone bands	0	20	40	60
Siltstone	fine with common, variously inclined sandstone fine laminae and layers, 60:40. Ripple-bedded throughout. Common micaceous planty planes. Common sand-filled burrows	0	60	41	20
Siltstone	fine with occasional muddy passages; 0.18 slurried layer at 41.47. Common plant debris. Occasional small burrows. passage	2	30	43	50
Mudstone	silty, poorly laminated passage	0	30	43	80
Siltstone	fine, poorly laminated. Occasional iron-rich layers. Common worm tracks	0	67	44	47
Mudstone	laminated; common ironstone bands Detached	1	43	45	90

COMMERCIAL IN CONFIDENCE

19

SK/46/NE/44+  
50 \*

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

-- JUN 1982

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
<u>1ST PIPER</u> <u>(Part)</u>	Coal, dirty (fragments) Detached	0	29	46	19
Seatearth Mudstone	Core fragmented	0	91	47	10
Siltstone	fine, grey; common ironstone nodules Common roots	0	44	47	54
Mudstone	Core fragmented	0	57	48	11
Siltstone	fine with occasional muddy layers. Occasional ironstone nodules. Occasional roots. Common <u>Neuropteris</u> leaves below 48.50	0	59	48	70
Siltstone	fine, poorly laminated; rare ironstone nodules. Abundant plant remains including <u>Mariopteris</u> ; <u>Calamites</u> ; <u>Neuropteris</u> and <u>Pinnularia</u>	2	66	51	36
Siltstone	medium, poorly laminated. Abundant burrows in top 0.10; rare plant debris passage	0	84	52	20
Siltstone	medium with common thin sandstone fine laminae, 70:30; occasional ripples and minor erosion surfaces, common micaceous planty planes passage	1	55	53	75
Sandstone	fine with common siltstone fine laminae, 70:30. Common ripples and minor erosion surfaces. Common micaceous planty planes	1	37	55	12
Siltstone	fine with common thin sandstone fine laminae, 60:40. Common ripples. Common micaceous planty planes	0	28	55	40



COMMERCIAL IN CONFIDENCE

20

SK /46 /NE /44+  
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-- JUN 1982

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Sandstone	fine with common siltstone fine laminae. Vaguely ripple bedded. Common micaceous planty planes	0	50	55	90
Sandstone	medium, generally massive, rare discontinuous micaceous planty planes showing vague dune bedding; conglomerate between 61.75 and 61.82. Occasional thin fine siltstone layers. Common sub-vertical mineralised joints sharp	6	87	62	77
Siltstone	fine and sandstone fine, interlayered. Common ripples and minor erosion surfaces	0	81	63	58
Sandstone	medium, massive. Common sub-vertical unmineralised joints	1	05	64	63
Siltstone	fine and sandstone fine; interlayered; common mineralised joints. Common ripples, common micaceous planty planes passage	1	57	66	20
Siltstone	fine, poorly laminated, common listric surfaces. Common sub-vertical joints. Rare horizons with thin sandstone fine laminae. Rare plant debris. passage	2	90	69	10
Siltstone	medium, poorly laminated	1	10	70	20
Sandstone	fine with common siltstone fine laminae, 70:30. Occasional ripples. Detached	0	86	71	06
<u>COAL</u>	and dirt (broken cylinders)	0	34	71	40
Seatearth Mudstone	unlaminated; grey; rare coal streaks Detached	0	13	71	53

COMMERCIAL REFERENCE

21

SK/46/NE 44 + 50 \*  
2-JUN-2027

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
<u>COAL AND DIRT</u>	Coal, bright 0.05 (cylinder) Coal and dirt 0.14 (broken cylinders 0.19 and fragments)				
	Detached	0	19	71	72
Seatearth Mudstone	unlaminated, grey; abundant listric surfaces; abundant roots	0	29	72	01
Siltstone	fine, poorly laminated; abundant roots	0	57	72	58
Siltstone	fine, poorly laminated; rare ironstone nodules; rare roots; common plant debris	0	42	73	00
Mudstone	silty, poorly laminated, common listric surfaces; common roots	0	82	73	82
<u>Seatearth Mudstone</u>	grey, common coal streaks, abundant roots	0	17	73	99
Siltstone	medium, grey; occasional ironstone nodules, common roots	0	45	74	44
Sandstone	fine with common siltstone fine laminae, 60:40. Occasional ironstone nodules. Common roots in top 0.05; rare below. passage	0	21	74	65
Siltstone	fine, unlaminated; rare plant remains	1	06	75	71
Siltstone	fine with common sandstone fine laminae, 70:30. Common vague ripples. Common micaceous planty planes Sharp	0	35	76	06
Mudstone	silty, laminated; rare non-marine lamellibranchs	0	14	76	20

COMMERCIAL REFERENCE

22

SK/46/NE/44+  
50

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine, poorly laminated; rare plant debris passage	0	60	76	80
Mudstone	silty, poorly laminated; rare plant debris	0	19	76	99
Siltstone	fine, poorly laminated; occasional muddy passages; common small burrows	1	99	78	98
Mudstone	very weak, core completely fragmented; occasional ironstone bands	3	65	82	63
Mudstone	carbonaceous, shaly. Common ostracods. Rare plant remains including <u>Lepidodendron</u> and <u>Neuropteris</u> Attached	0	26	82	89
<u>COAL</u>	and dirt (cylinder) Attached	0	04	82	93
Mudstone	carbonaceous, shaly. Locally common ostracods. Locally common fish scales. Detached	0	06	82	99
Mudstone	and <u>Coal</u> . Abundant plant fragments (cylinder) Detached	0	12	83	11
Seatearth Mudstone	silty, unlaminated, grey, occasional irregular listric surfaces, abundant roots	0	31	83	42
Siltstone	fine, muddy, unlaminated, grey; occasional ironstone bands; common roots	0	36	83	78
Mudstone	silty with local muddy siltstone passages; core completely fragmented; common roots, becoming rare towards base sharp	1	34	85	12
Sandstone	medium; common micaceous planty planes; rare roots	0	31	85	43



COMMERCIAL IN CONFIDENCE

23

SK46 NE / 44 +  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	laminated, fissile, core locally completely fragmented; occasional ironstone bands up to 0.04 thick; locally common worm tracks sharp	0	77	86	20
Mudstone	highly carbonaceous, shaly; core completely fragmented in top 0.22; common ostracods including <u>Geisina</u>	0	40	86	60
<u>CORE LOST</u>		0	60	87	20
Mudstone	carbonaceous, poorly laminated in top 0.30, becoming shaly below; locally very weak. Locally common non-marine lamellibranchs, some with mineralised shells. Locally common ostracods including <u>Geisina</u> ; occasional ironstone bands up to 0.04 thick passage	2	91	90	11
Mudstone	laminated, very weak, occasional ironstone bands; occasional non-marine lamellibranchs near top	0	96	91	07
	<u>CORE ANALYSED 91.07 TO 93.07</u>				
Mudstone	shaly with non-marine lamellibranch fragments	0	11	91	18
<u>TUPTON</u>	Coal, inferior bright 11 part fragmented Coal, mostly bright 28) Mudstone, grey 3) Coal, bright 10) cylinders Mudstone, dark grey 3) Coal, bright 96) Coal, bright 3 fragments Core lost, assumed coal 22 <u>176</u> cm				
	Pull-out at 92.68. Dip less than 20 Recovery 85% (Based on borehole recorder)	1	76	92	94
Seatearth Mudstone	silty, light grey; ironstone nodules	0	13	93	07





COMMERCIAL IN CONFIDENCE

24

SK/46/NE/44 +  
50 \*  
-- JUN 1982

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	medium, unlaminated, grey; abundant roots becoming common below 94.50; occasional root nodules below 94.70	1	83	94	90
Siltstone	medium with occasional root-disturbed sandstone fine laminae 80:20, becoming 70:30 below 95.40; common root nodules; common roots sharp	1	14	96	04
Siltstone	medium, slurried texture	0	30	96	34
Siltstone	medium with rare sandstone fine wisps and micro-lenses; strong; rare root nodules; locally abundant small burrows towards base; rare plant debris passage	2	01	98	35
Siltstone	fine to medium with common sandstone fine laminae and lenses, 70:30; occasional micaceous planty planes; occasional minor erosion surfaces; occasional small load casts; common comminuted plant debris sharp	0	87	99	22
Mudstone	laminated, fissile, weak; occasional ironstone nodules; locally common worm tracks	0	52	99	74
Siltstone	fine with common sandstone fine laminae, 80:20 sharp	0	08	99	82
Mudstone	laminated, shaly, weak; occasional ironstone bands; locally common worm tracks	0	42	100	24
<u>CORE ANALYSED 100.24 to 101.40</u>					
Mudstone	light grey	0	28	100	52
<u>THREEQUARTER</u>	Coal, bright 72 cylinders Coal, bright 4 fragments <u>76 cm</u>				
	Dip less than 2°, Recovery (based on borehole recorder) 99%.	0	76	101	28



COMMERCIAL IN CONFIDENCE  
Section of: MARKHAM NOS. 16 (DOWN)  
17 (DOWN) UNDERGROUND BOREHOLES

25

SK/46/NE/44+  
50  
JUN '82

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Seatearth Mudstone	silty, grey	0	10	101	38
Siltstone	fine, grey	0	02	101	40
Siltstone	fine with common root-disturbed sandstone fine laminae, 60:40; abundant roots	0	14	101	54
Sandstone	fine with occasional discontinuous micaceous planty planes; common roots	0	28	101	82
Siltstone	medium with common sandstone fine laminae and layers, 70:30; common roots	0	33	102	15
Mudstone	with occasional ironstone bands. Core completely fragmented; occasional roots	0	60	102	75
Siltstone	fine, un laminated; common roots sharp	0	41	103	16
Sandstone	fine to medium with rare siltstone fine laminae; locally vaguely ripple bedded, well developed ripple sets in basal 0.20; common micaceous planty planes; occasional iron-rich patches; rare roots in top 0.50 sharp	1	68	104	84
Siltstone	fine to medium with rare wispy thin sandstone fine laminae in top 0.30; common worm tracks and small burrows; single non- marine lamellibranch at 105.63	1	04	105	88
Siltstone	fine and sandstone fine; variously interlayered and inter laminated; occasional ripples; rare minor erosion surfaces; common micaceous planty planes	0	36	106	24

COMMERCIAL IN CONFIDENCE

26

SK/46/NE/44 +  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Sandstone	fine with rare siltstone fine laminae; occasional iron-rich patches; occasional large load-and-pouch structures	0	86	107	10
Siltstone	medium with occasional sandstone fine laminae, 90:10; common minor load structures and isolated sandstone pouches in top 0.50	1	40	108	50
Sandstone	fine and siltstone fine, interlayered and interlaminated; locally developed ripples with ripple sets, occasional minor erosion surfaces; common micaceous planty planes; occasional large load-and-pouch structures	1	70	110	20
Sandstone	fine with rare siltstone fine laminae; occasional discontinuous micaceous planty planes; vague ripple bedding throughout; occasional sand-filled burrows passage	2	60	112	80
Siltstone	fine with common sandstone fine laminae; 60:40, becoming 80:20 below 113.10; locally ripple-bedded; occasional sand-filled burrows; common micaceous planes passage	0	40	113	20
Siltstone	fine with rare sandstone fine laminae and isolated lenses; occasional sandstone dominant layers up to 0.03 thick; occasional sand-filled burrows; common comminuted plant debris in sand-dominant layers; single non- marine lamellibranch at 113.25. passage	0	80	114	00
Siltstone	fine to medium, poorly laminated; occasional plant debris; abundant burrows throughout. passage	0	80	114	80
Siltstone	fine, muddy, laminated; occasional thin ironstone bands, rare plant debris, common burrows	0	26	115	06

COMMERCIAL IN CONFIDENCE

27

SK/46/NE / 44+  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

- JUN 1982



GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with rare sandstone fine laminae and isolated lenses; occasional iron-rich patches; common sand-filled burrows sharp	0	26	115	32
Mudstone	silty, laminated; core completely fragmented below 117.00; occasional thin ironstone bands; common worm tracks on some bedding planes; locally common small burrows sharp	2	23	117	55
Siltstone	medium and sandstone fine, interlaminated and interlayered; strong; common micaceous planty planes; rare <u>roots</u>	0	45	118	00
Siltstone	fine, poorly laminated with rare sandstone fine wisps near the base; rare root nodules; rare <u>roots</u>	0	67	118	67
Sandstone	fine with rare siltstone fine laminae; common iron-rich layers; common micaceous planes; locally poorly developed ripples; common sand-filled burrows towards the base short passage	0	68	119	35
Siltstone	fine with common sandstone fine laminae and ripple marked lenses, 80:20; occasional iron-rich patches sharp	0	27	119	62
Sandstone	fine with occasional siltstone fine laminae and layers, 90:10; occasional small load structures; sub-vertical mineralised joint throughout	0	45	120	07
Siltstone	medium to fine, laminated; common burrows in top 0.05	0	83	120	90

COMMERCIAL IN CONFIDENCE

28

SK/46/NE/44+  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

10/10/82

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Sandstone	fine with occasional siltstone fine laminae and layers 90:10; occasional discontinuous micaceous planty planes. Inclined, erosional contact	0	52	121	42
Siltstone	medium to coarse with occasional sandstone fine pouches and layers 90:10; strong. sharp	0	54	121	96
Mudstone	silty, laminated; occasional thin ironstone bands, rare comminuted plant debris; locally common small burrows; single non-marine lamellibranch at 122.08 passage	0	34	122	30
Siltstone	fine, poorly laminated; occasional iron-rich patches; occasional small burrows near the base	1	35	123	65
Siltstone	medium with rare sandstone fine laminae and lenses; common burrows	0	22	123	87
Siltstone	coarse with occasional irregular sandstone fine laminae, strong	0	25	124	12
Siltstone	fine, locally muddy, poorly laminated; occasional ironstone bands; 45 degree polished break at 125.43; rare plant remains including <u>Calamites</u>	2	26	126	38
Mudstone	silty, laminated, occasional ironstone bands; locally common worm tracks	1	54	127	92
Mudstone	laminated, weak, core completely fragmented in parts	0	53	128	45
Mudstone	dark, slightly carbonaceous, shaly; rare fish remains including scales	0	11	128	56

COMMERCIAL BORING LOG 29

SK/46/NE / 44+  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	laminated, core completely fragmented	0	19	128	75
Mudstone	carbonaceous, shaly	0	04	128	79
Mudstone	laminated, dark; occasional thin ironstone bands	1	34	130	13
<u>CORE ANALYSED 130.13 TO 131.91</u>					
Mudstone	grey	0	10	130	23
<u>YARD</u>	Coal, inferior bright 5 cylinders Mudstone, grey, listric 14 fragments Mudstone, dark grey 5) Coal, inferior bright and dull 14) cylinders Coal, bright 51) Core lost, assumed coal 29) <u>118 cm</u>				
	Dip less than 2°. Recovery (based on borehole recorder) 75%. Pull-out at 130.68	1	18	131	41
Seatearth Siltstone	fine, light grey; a few ironstone lenses	0	50	131	91
Siltstone	fine, unlaminated, grey; occasional ironstone nodules; abundant roots	0	29	132	20
Siltstone	medium, unlaminated; common roots becoming rare to base; occasional root nodules. passage	0	50	132	70
Siltstone	fine, poorly laminated; common comminuted plant debris; rare roots passage	0	40	133	10
Siltstone	fine, muddy, laminated; rare roots and root nodules in top 0.10; 0.04 ironstone at base	1	18	134	28



COMMERCIAL IN CONFIDENCE

30

SK/46/NE/447

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Section of: MARKHAM NOS. 16 (UP)  
17 (DOWN) UNDERGROUND BOREHOLES

JUN 1982

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Mudstone	dark, laminated; common worm tracks	0	18	134	46
Mudstone	carbonaceous, poorly laminated; occasional fish remains including spines and scales. detached, fitting	0	04	134	50
<u>BLACKSHALE 4TH LEAF</u>	Coal, dirty 5 cylinder Coal, bright 9 cylinder <u>14</u> detached, inclined	0	14	134	64
Seatearth Mudstone	silty, unlaminated; common inclined listric surfaces; common roots	0	05	134	69
Siltstone	fine, iron-rich; abundant roots	0	20	134	89
<u>CORE LOST</u>		0	35	135	24
Mudstone	laminated, very weak; occasional ironstone bands; common worm tracks sharp	0	65	135	89
Siltstone	fine, locally muddy, poorly laminated; occasional ironstone bands; rare roots in top 0.20; locally vaguely wormy. passage	1	11	137	00
Siltstone	medium, unlaminated, barren	0	60	137	60
Siltstone	fine, locally muddy, poorly laminated; barren	1	50	139	10
Siltstone	medium, poorly laminated; occasional slurried layers; barren passage	1	20	140	30
Siltstone	fine, poorly laminated with occasional siltstone medium passages, very rare comminuted plant debris	2	60	142	90

SK/46/NE/44+  
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COMMERCIAL IN CONFIDENCE

31

Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

-- JUN 1982

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with common thin sandstone fine laminae, 80:20 becoming 90:10 towards the base; occasional iron-rich layers; rare minor erosion surfaces; 0.04 ironstone band at base; common small sand-filled burrows	0	76	143	66
Mudstone	silty, laminated, very weak	0	11	143	77
Siltstone	fine, muddy, laminated; occasional ironstone bands up to 0.08 thick sharp	1	18	144	95
Mudstone	laminated, very weak; common worm tracks	0	17	145	12
<u>CORE ANALYSED 145.12 TO 146.67</u>					
Mudstone	shaly	0	08	145	20
<u>BLACKSHALE</u> <u>LEAVES 1 to 3</u>	Coal, bright 39 cylinders Coal, bright 7 fragments Coal, bright 14 cylinders Coal, bright 9 fragments Coal, bright; with 50° dip ) slickensided breaks ) 46 cylinders 115 cms				
	Dip less than 2°. Recovery (based on borehole recorder) 90%. Pull-out at 145.88	1	15	146	35
Seatearth Mudstone	dark grey	0	01	146	36
Siltstone	fine, light grey	0	31	146	67
Mudstone	silty, very weak, unlaminated, grey; abundant roots	0	07	146	74
Siltstone	medium to coarse, strong; unlaminated, grey; abundant roots	0	22	146	96
Siltstone	fine to medium, unlaminated, grey; abundant roots including <u>Stigmara</u> becoming common towards base; occasional root nodules below 147.25	0	54	147	50



COMMERCIAL IN CONFIDENCE

32

SK/46/NE/44+  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

22/11/92

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	medium, unlaminated, with rare, diffuse siltstone coarse layers, strong; occasional roots in top 0.25; 0.04 septarian ironstone at base	1	04	148	54
Siltstone	fine with occasional siltstone medium passages, unlaminated; rare plant remains including <u>Neuropteris</u> sharp	1	17	149	71
Sandstone	fine with occasional irregular siltstone fine laminae, 90:10. Common large load-and-pouch structures	0	42	150	13
Siltstone	medium, unlaminated; barren	0	19	150	32
Sandstone	fine with common discontinuous micaceous planty planes; ripple bedded throughout with well developed ripple sets; occasional minor erosion surfaces inclined	0	25	150	57
Siltstone	fine with rare sandstone fine laminae and disconnected lenses	0	38	150	95
Sandstone	fine with rare highly disturbed siltstone fine laminae; complex load-and-pouch structures throughout	0	46	151	41
Siltstone	medium with occasional complex, isolated siltstone and sandstone pouches	0	28	151	69
Sandstone	fine with rare siltstone fine laminae; highly contorted bedding; common large load structures	0	12	151	81
Siltstone	fine to medium, laminated; common micaceous bedding planes	0	73	152	54

COMMITTEE REFERENCE

33

SK/46/NE/441  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with common sandstone fine laminae and layers 70:30 becoming 60:40 towards base; locally well developed ripples; locally common ripple lenses below 156.00; common small scale load-and-pouch structures; common micaceous planty planes; rare minor erosion surfaces; mineralised joint between 155.34 and 155.58 Inclined, sharp	5	56	158	10
Sandstone	medium, generally massive; occasional siltstone fine laminae in top 0.50; occasional iron-rich layers showing vague dune bedding; sub-vertical mineralised joint in top 0.70; rare burrows towards base sharp	11	64	169	74
Siltstone	and sandstone interlaminated and inter-layered; common vague ripples; abundant plant debris; occasional sand-filled burrows sharp	0	50	170	24
Mudstone	slightly silty, poorly laminated ; dark; slightly carbonaceous, occasional plant debris	0	33	170	57
Mudstone	carbonaceous, shaly, cleated; locally abundant coalified plant debris	0	26	170	83
<u>COAL</u>	and dirt	0	04	170	87
Mudstone	dark, slightly carbonaceous, poorly laminated; common irregular listric surfaces; abundant plant debris in top 0.04	0	36	171	23
Mudstone	carbonaceous, laminated; common guilielmites in top 0.10; rare <u>Naiadites</u> fragments; rare coalified plant fragments sharp; inclined	0	27	171.50	
Sandstone	fine with rare siltstone fine laminae, vague ripple bedding	0	05	171	55

COMMERCIAL

34

SK/46 / NE / 44+  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine and sandstone fine; ripple bedded throughout with well developed ripple sets; occasional minor erosion surfaces; common micaceous planty planes.	0	21	171	76
Siltstone	fine with occasional siltstone - with - sandstone layers; load structures within sandy layers	0	20	171	96
Siltstone	fine and sandstone fine, interlaminated and interlayered; common ripples throughout; common small sand-filled burrows.	0	39	172	35
Siltstone	fine with rare sandstone fine micro-lenses; occasional ironstone patches; sub-vertical mineralised joint below 172.80 rare plant debris	1	12	173	47
Sandstone	medium with common micaceous planty planes; vague ripple bedding.	0	13	173	60
Siltstone	fine with occasional sandstone fine laminae and lenses 90:10; occasional iron-rich patches	0	70	174	30
Siltstone	fine, laminated; occasional ironstone bands	0	55	174	85
Mudstone	laminated, common worm tracks	0	55	175	40
Mudstone	highly carbonaceous, shaly; barren	0	68	176	08
<u>Seatearth</u>					
Siltstone	medium with occasional highly disturbed sandstone fine laminae, 80:20, abundant roots	0	57	176	65
Siltstone	fine to medium, poorly laminated; common roots becoming rare to base; occasional root nodules; 0.05 "oolitic" ironstone band at base	1	26	177	91

SK/46 NE/ 44+  
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Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine to muddy, laminated; occasional ironstone patches; occasional plant debris including <u>Calamites</u>	0	47	178	38
Mudstone	laminated; core completely fragmented; 0.08 ironstone at base sharp	0	52	178	90
Mudstone	silty, laminated; core completely fragmented	0	60	179	50
Mudstone	dark, laminated; core completely fragmented	0	78	180	28
<u>CANNEL</u>		0	36	180	64
Mudstone	laminated; occasional ironstone bands; core completely fragmented	0	76	181	40
Siltstone	fine, laminated; common ironstone bands	0	50	181	90
Siltstone	fine with common sandstone fine laminae and lenses, 80:20 becoming 70:30 in basal 0.20; local ripple bedding; rare minor erosion surfaces; rare sand-filled burrows; rare plant debris	0	88	182	78
Siltstone	fine with rare wispy thin sandstone fine laminae and disconnected lenses passage	2	02	184	80
Mudstone	silty laminated;	0	32	185	12
Siltstone	fine laminated; occasional ironstone bands	0	61	185	73
Mudstone	dark, laminated	0	26	185	99
Mudstone	highly carbonaceous, sub-canneloid; rare fish scales	0	14	186	13



COMMERCIAL IN CONFIDENCE

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-- JUN 1982



Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
COAL	bright (fusain in top 0.01)	0	05	186	18
Seatearth Mudstone	core completely fragmented	0	02	186	20
Sandstone	fine with rare highly disturbed siltstone fine laminae; abundant roots; occasional root nodules	1	09	187	29
Siltstone	fine to medium, poorly laminated; common roots and occasional root nodules sharp	0	35	187	64
Sandstone	fine with rare, locally highly disturbed siltstone fine laminae and thin layers; common micaceous planty planes; occasional large load-and-pouch structures; vague ripples below 88.40; rare roots in top 0.10 Sharp, slightly erosional	2	80	190	44
Siltstone	fine to medium with occasional sandstone fine laminae, 80:20; occasional small load structures; locally common small burrows passage	0	36	190	80
Siltstone	medium, poorly laminated	1	02	191	82
Mudstone	laminated	0	16	191	98
COAL AND DIRT	Coal, bright 3 Mudstone 1 Coal 4 Coal and dirt 2	0	10	192	08
Seatearth Mudstone	core completely fragmented	0	12	192	20



CONFIDENTIAL

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SK/46/NE 1997  
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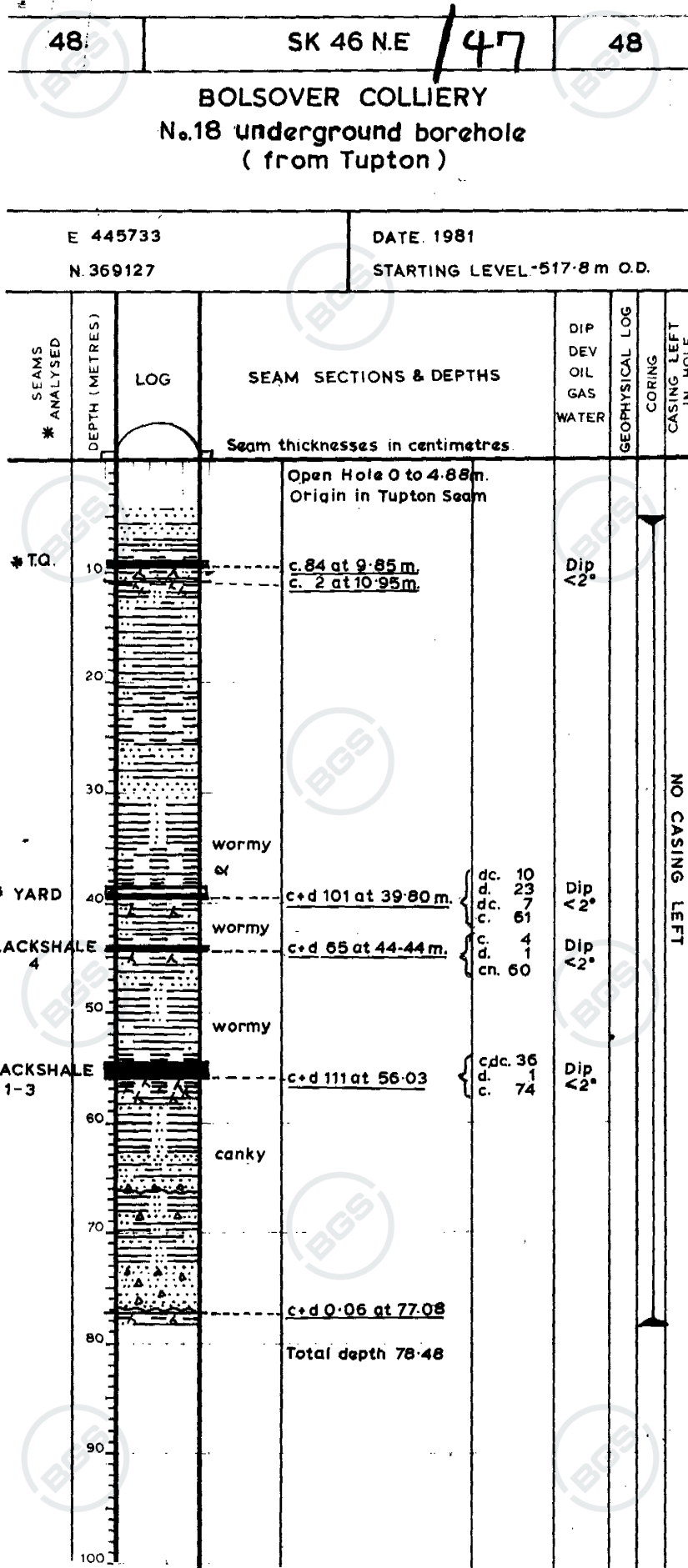
22 JUL 1997



Section of: MARKHAM NOS. 16 (UP) AND  
17 (DOWN) UNDERGROUND BOREHOLES

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Siltstone	fine with common highly disturbed sandstone fine laminae 70:30; common roots	0	25	192	45
Sandstone	fine with rare siltstone fine laminae; bedding highly disturbed by large load structures and occasional roots	0	38	192	83
Siltstone	fine with occasional sandstone fine laminae; 90:10 becoming 80:20 below 193.30; vague ripple bedding, rare minor erosion surfaces; common diffuse ironstone bands; rare roots; common comminuted plant debris in basal 0.30	1	22	194	05
Siltstone	medium, poorly laminated, occasional diffuse ironstone bands; rare thin sandstone fine layers below 195.00 showing minor load and pouch structures; occasional faultlets; rare worm tracks and burrows	3	51+	197	56

Base of borehole at 197.56





Section of: Bolsover Colliery No. 18  
Underground Borehole

Purpose: Coal Exploration

SK46NE/47

Nat. Grid, Sheet & Qtr. B/H REGD. NO.

Exact Site: National Grid Co-ordinates  
E. 445 733  
N. 369 127

SK46NE

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Level at which bore commenced relative to O.D.:  
517.82 m below O.D.  
(in Tupton seam workings)

Date of Boring: August 1981

Borer: National Coal Board  
Cores examined by P.K. Boam, N.C.B. Geologist

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS		DEPTH	
		m	cm	m	cm
Cores not seen	<u>Open hole to 4.57</u>	0	31	4	57
				4	88
Sandstone	medium; siltstone fine laminae sharp	0	30+	5	18
Siltstone	medium, rare thin sandy laminae sharp	0	05	5	23
Sandstone	medium, well cemented; micaceous planty planes sharp	0	87	6	10
Siltstone	fine to medium, sandy laminae and lenticular ripples; plant debris on bedding planes, rare sand-filled burrows sharp	1	50	7	60
Siltstone	fine, muddy, locally iron-rich; vaguely wormy	1	19	8	79
	<u>CORE ANALYSED, 8.79 TO 10.29</u>				
Mudstone	grey, laminated	0	22	9	01
<u>THREEQUARTER</u>	Coal, bright clean (part core and fragments) Recovery (based on borehole recorder) 90% Dip less than 2°.	0	84	9	85



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SK46NE/47

Seatearth Siltstone	medium, grey, with fine sandstone laminae. Total Quartz 54%	0	25	10	10
Sandstone	fine, with medium siltstone laminae. Total Quartz 62%	0	19	10	29
Siltstone	sandy, roots sharp	0	03	10	32
Mudstone	dark, slightly silty; rare non-marine lamellibranchs, occasional roots passage	0	40	10	72
Mudstone	dark, fissile; non-marine lamellibranchs, rare fish debris	0	21	10	93
<u>COAL</u>	bright	<u>0</u>	<u>02</u>	<u>10</u>	<u>95</u>
Seatearth Mudstone	silty; roots passage	0	04	10	99
Siltstone	medium; abundant roots, iron-rich patches passage	0	79	11	78
Siltstone	sandy; roots, iron-rich patches	0	31	12	09
Sandstone	medium to fine, rare discontinuous siltstone laminae, rare roots passage	0	55	12	64
Siltstone	fine, sandy lenses and laminae; rare comminuted plant debris on bedding planes passage	2	87	15	51
Siltstone	fine laminated; vaguely wormy passage	4	87	20	38
Siltstone	fine, locally muddy, rare thin wispy sandy laminae passage	2	18	22	56
Mudstone	silty, laminatd; wormy, iron-rich patches sharp	3	02	25	58
Siltstone	fine with disconnected sandy lenticular ripples	0	09	25	67

SK46NE/47

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Sandstone	fine with discontinuous siltstone strings; micaceous planty planes; locally crumpled bedding sharp	1	31	26	98
Siltstone	fine with thin disconnected sandy lenticular ripples, locally iron-rich sharp	1	64	28	62
Sandstone	fine to medium, well cemented, vague ripple marks; micaceous planty planes passage	1	54	30	16
Siltstone	medium, poorly laminated; iron-rich patches; barren	4	38	34	54
Mudstone	silty, dark laminae; iron-rich patches, wormy with tracks passage	1	37	35	91
Mudstone	dark, laminated; wormy passage	1	17	37	08
Mudstone	dark, fissile; ironstone bands; wormy, fish fragments	1	47	38	55
<u>CORE ANALYSED, 38.55 TO 40.05</u>					
Mudstone	grey, fissile; fish remains	0	24	38	79
<u>YARD</u>	Coal, bright dirty seatearth; siltstone, muddy grey Coal, mostly bright; clean Coal, bright clean 10 fragments 23) solid 58) core 10 part fragments <u>101</u> Recovery (based on borehole recorder) 97% Dip less than 2°	1	01	39	80
Seatearth Mudstone	silty, light grey	0	25	40	05
Siltstone	fine, grey; roots and ironstone nodules passage	1	52	41	57
Siltstone	fine with wispy sandstone laminae passage	1	82	43	39
Mudstone	dark, laminated; wormy	0	31	43	70
<u>CORE ANALYSED, 43.70 TO 44.50</u>					

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SKULONE/47

Mudstone	grey with a few dark grey patches	0	09	43	79
<u>BLACKSHALE</u>					
<u>4TH LEAF</u>					
	Coal, bright, clean		4) solid		
	Siltstone, fine, light grey		1) core		
	Coal bright, cannelloid, clean		6 part fragments		
	Cannel, clean		5 solid core		
	Cannel, clean		20) fragments		
	Cannel, dirty		29)		
			65		
	Recovery (based on borehole recorder) 80%				
	Dip less than 2°	0	65	44	44
Mudstone	dark grey	0	03	44	47
<u>Seatearth</u>					
<u>Mudstone</u>					
	light grey	0	03	44	50
Mudstone	dark, laminated, wormy sharp	0	71	45	21
Siltstone	fine, laminated; iron-rich patches; barren passage	1	21	46	42
Sandstone	fine and siltstone fine (70:30) variously inclined laminae and layers; minor erosion surfaces; micaceous planty planes, comminuted plant debris on beddings passage	1	44	47	86
Siltstone	medium, laminated wispy sandy laminae; locally iron-rich; rare plant fragments passage	2	76	50	62
Siltstone	fine, laminated; iron-rich patches; rare plant debris on bedding planes passage	3	28	53	90
Mudstone	silty laminated; vaguely wormy	0	88	54	78
<u>CORE ANALYSED, 54.78 TO 56.24</u>					
Mudstone	light grey	0	14	54	92

SK46NE/47

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BLACKSHALE  
(1 TO 3 LEAVES)

Coal bright, clean 31 solid core  
Coal, bright, dirty 5 fragments  
Mudstone, carbonaceous 1 solid core  
Coal, bright, clean 74 part core and fragments

111

Recovery (based on borehole recorder) 94%  
Dip 2°

1 11

56 03

Seatearth  
Mudstone

dark grey with a few bright coal streaks

0 08

56 11

Mudstone

light grey

0 13

56 24

Mudstone

brown, highly listric; roots, ironstone  
nodules  
passage

0 22

56 46

Mudstone

silty, grey; listric; roots  
passage

0 30

56 76

Siltstone

fine; roots, ironstone nodules  
passage

1 42

58 18

Sandstone

fine with siltstone fine; highly root  
disturbed, iron-rich patches  
passage

0 72

58 90

Siltstone

medium, laminated; thin sandy laminae with  
small load casts 59.60 to 59.80; iron-rich  
patches  
passage

3 87

62 77

Sandstone

fine, canky; sporadic near-vertical  
mineralised breaks  
passage

1 05

63 82

Siltstone

medium with thin disconnected lenticular  
ripples  
sharp

0 11

63 93

Sandstone

fine with discontinuous siltstone strings  
passage

1 41

65 34

Siltstone

fine with variously inclined sandy laminae  
and layers  
sharp

0 20

65 54

Sandstone

fine  
sharp

0 08

65 62

Sandstone

fine; angular and rounded siltstone and  
ironstone clasts  
erosional

0 27

65 89

SKUBONE/47

		6			
Siltstone	medium; coaly planes sharp	2	22	68	11
Sandstone	fine; siltstone and ironstone clasts and micro-breccia sharp	0	40	68	51
Siltstone	fine to medium with thin even wispy sandy laminae	1	63	70	14
Sandstone	fine with discontinuous siltstone strings; micaceous planty planes sharp	0	64	70	78
Siltstone	medium laminated, rare thin even sandy laminae	1	62	72	40
Sandstone	medium; abundant micro-breccia and soft sediment pellets; plant debris	3	70	76	10
Sandstone	medium; angular and rounded siltstone and ironstone clasts erosional	0	92	77	02
<u>COAL</u>	bright, with dirt partings (cylinder) attached	<u>0</u>	<u>06</u>	<u>77</u>	<u>08</u>
Seatearth Mudstone	roots, listric	0	42	77	50
Siltstone	fine; roots, ironstone nodules	0	98+	78	48
	Base of Borehole at 78.48 m				



NORTH DERBYSHIRE AREA

NATIONAL COAL BOARD

SK46NE/47

SURVEY DEPARTMENT

BOREHOLE DATA AND HISTORY

BOREHOLE NAME: BOLSOVER N°18 UNDERGROUND BOREHOLE  
Approximate Location: 2,000 METRES SOUTH 5° WEST BOLSOVER SHAFTS.  
National Grid Reference: E 445 733.03 N. 369 127  
6 inch sheet: SK 46 NE.  
Level of Origin: 517.82 METRES BELOW C.D.  
Date of Drilling: Commenced 24.7.81.  
Finished 25.8.81.  
Contractor's Name: N. C. B.  
Name of Boremaster: DRILLER IN CHARGE J. MOTTREAW.

Depth <sup>m</sup> (ft)	Diameter of Core <sup>mm</sup> (in)	Diameter of Hole <sup>mm</sup> (in)
0 To 4.57	OPEN HOLE.	76 mm.
4.57m To 78.45	NQ CORE 47.6 mm	75.8 mm

Drilling Difficulties: NONE.

Method of Sealing Off Borehole: INJECTED 467 Kilograms SHALLOW OIL WELL CEMENT API CLASS B MIXED WITH 250 litres FIRE MAIN WATER THROUGH THE DRILL ROBS. CHECKED BOREHOLE NEXT DAY, CEMENT SOLID TO FLOOR OF ROADWAY.

Purpose fulfilled by Borehole: OBTAINED CORES OF 3/4, YMCB, BLACK SHALE & ASH GATE SEAMS

Official Responsible for above Report:

AFB BOWNER

LB



