OPEN-FILE

SUKUNKA 33 K

TITLE: SUKUNKA 1977 EXPLORATION REPORT

AUTHOR: A. R. Bowler DATE: March 31, 1978

NTS MAP REF: 92-P3/4/5, Lat.55° 11'
Long. 121° 31'

NAME OF OPERATOR: BP Exploration Canada

COAL LICENCE NOS. 3089-3129, 3014-3023, 3028, 3033, 3038, 3554-3557, 3559, 3025,3026

GEOLOGICAL BRANCH ASSESSMENT REPORT

0063



PR-SUKUNKA 77(1)

BP Exploration Canada Limited

335 Eighth Avenue S.W., Calgary, Alberta T2P 1C9 • Telephone (403) 266-7071

STATEMENT OF QUALIFICATIONS

A. R. Bowler graduated in 1969 with a London University

External BSC Special Geology Hons (Class 2) degree, obtained at Kingston

Polytechnic, Kingston-upon-Thames Surrey - England.

History of Employment

September 1969 - February 1976 - Coal Geologist with the National Coal Board (U.K.) Opencast Executive in Durham.

March 1976 - present

Sukunka Project Geologist with BP
Exploration Canada Ltd.

00663

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1. INTRODUCTION

Administrator of the British Columbia Department of Mines and Petroleum Resources, Victoria, and in compliance with the 'Regulations Under the Coal Act - 1974', it describes the exploration program carried out between June and October 1977 on BP Canada's Sukunka Coal Property. The report should be read in conjunction with BP's application for work credit, submitted on December 20, 1977, on the 'Application to Extend the Term of a Licence' form.

The work described in the Report is contained in 10 out of the 11 categories of 'acceptable work', mentioned in Part II of Section 8 of the Regulations under the Coal Act 1974.

At the time of publication of this report there is an ongoing review being carried out of, not only the 1977 BP data, but also the previous 7 years of exploration information obtained by the former owners of this property. It is possible that any additional information could be forwarded at a later date as an addendum to this report.

2. OBJECTIVES

The following objectives were established for the 1977 Exploration Program:

- 2.1 To determine the geological structure of the central and southern portions of the Sukunka coal property and to link such structures with that already established in the northern portion of the property. (Licence #3120, 3121, 3014, 3015, 3016, 3025, 3018, 3019, 3021).
- 2.2 To prove the thickness and quality of the coal seams of the Gates and Gething Series throughout the area described in 2.1 above.
- 2.3 To establish the extent of workable coal reserves within the Gates and Gething seams and accessible to a mine opening in the Saddle Creek area.
- 2.4 To establish raw coal quality and its variability in all workable seams in the Gates and Gething.
- 2.5 To establish theoretical washability characteristics of the workable seams in the Gates and Gething seams.
- 2.6 To provide information as to the nature of the roof and floor measures of seams likely to be worked in the area described in 2.1 above.
- 2.7 To establish the position of the outcrops of the Chamberlain and Bird Seams and any local geological structures around the head of Saddle Creek by geological mapping.

- 2.8 To select sites for adits to be driven into the Chamberlain and Bird Seams in the Saddle Creek area.
- 2.9.1 To obtain bulk samples from the existing mines in the Chamber-lain and Skeeter seams (Licence #3096, 3103, 3112) and from adits driven into the outcrops of the Bird and Chamberlain Seams in the Saddle Creek area, (3016, 3025).
- 2.9.2 To systematically record the geological features exposed in the existing underground workings.
- 3. LOCATION, TOPOGRAPHY, ACCESS (See Map 1 & 2 in pocket)

The Sukunka property occupies an area of some 165 km^2 and is located 60 km south of the township of Chetwynd in northeastern British Columbia. (See Map 1)

The following coal licences makeup BP Canada's new Sukunka Property. (See Map 2)

3089 - 3129 -Former Sukunka Property belonging to Brameda/Brascan.

-Now BP Canada $88\frac{1}{2}\%$, Brascan $12\frac{1}{2}\%$.

3554 - 3557 -Former Chamberlain property belong to 3559. Teck Corp.

-Now BP Canada 100%.

3014 - 3023 -Former Bullmoose Property belonging to 3025 - 3026 Teck Corp.
3028, 3033,
3038 -Now BP Canada's 100%, but minus the su

-Now BP Canada's 100%, but minus the surface rights to the Gates coals down to 500' in all licences except 3014-3016, 3025, 3026, and minus the rights to the Bird seam in licences 3022 (SE½), 3023, 3033, 3038.

The terrain at Sukunka is mountainous with deeply cut valleys and elevations mainly between 760 m and 2100 m above sea level. Dense coniferous forest cover nearly all areas below 1350 m.

Access to the property was via the Sukunka River Valley road to approximately mile 37. Alternate access from Chetwynd was via the Sukunka, Gwillam Lake and Bullmoose Valley road. The access within the site was on exploration roads, of which there are approximately 320 km.

4. BASE PLANS AND SURVEYING (Appendix H1, H2)

The existing plans of Sukunka were at 1:12,000 scale with a 50 foot interval. They were incomplete and inaccurate in respect to drillsites and road locations and so as to conform with Canadian practice of metrication, a new aerial survey was flown by Burnett Resource Surveys in order to produce new plans at 1:5,000 with 5 metre contour intervals. (See Appendix H1-H2.) The 16 sheets which makeup the new survey cover the coal leasing area of the property and are tied into the NTS and UTM grids.

The ground control work for the new survey, plus the locating and levelling of the 1977 boreholes, trenchés and adit sites were also carried out by Burnett Resource Surveys.

5. ROAD CONSTRUCTION-RECLAMATION (See Map 3)

Approximately 16,000 m of new exploration road was constructed for access to the 41 drill sites, 4 test sites and 2 adit locations. The existing exploration roads were also used as much as possible. The slashing and construction of roads and drill sites was contracted out, and the work done was in accordance with the "Guide-lines for Coal and Mineral Exploration".

The slashing was contracted to North Star Fabricators, and the heavy plant hire to Peter and Paul Demeulemeester both of Chetwynd.

The work started in the latter part of June with a team of 5 slashers. The heavy equipment which was on site for most of the program was used not only for road construction-restoration, but for drill rig moving, consisted of two D8 'cats', one D7 (part-time), one D6 'cat' and one backhoe. The latter was used for road ditching and coal trenching. The heavy reclamation of drill sites and roads was carried out by 'cats', and the seeding and scarifying by a lighter John Deere 'cat' and occasionally a bombadier track vehicle.

The 'light' reclamation work was contracted to North Star Fabricators, (see 1977 Reclamation Report in File Pocket).

6. DRILLING (See Before and After Forms 7-8 and Map 3 in File Pocket)

41 boreholes, totalling approximately 16,000 m of drilling were put down during the 1977 program. (Two of the forty-one boreholes were sunk in conjunction with Teck Corp.). All the holes were completely cored using wireline techniques, producing HQ size core, except for BP-37, which was PQ size. Triple tube barrels with split liners were used. The length of barrel used varied with strata; 10 and 15 foot for non-coal, 5 and 10 foot for coal.

Drilling mud was used throughout the program and was supplied by Thiessen Equipment Ltd.

The drilling contractor, the rigs they used, plus the boreholes and meterage drilled are described below:

	Meterage Drilled	Boreholes
Canadian Longyear Ltd.	6561.89 m	BP 6, 20, 37
DH3 skid mounted rig	1834.65 m	BP 4, 10, 18, 30, 40
V52 skid mounted rig	2819.87 m	BP 2, 11, 16, 33, 35
44 skid mounted rig	1907.34 m	
Tonto Drilling Co (Shepard Enterprises)	8388.59 m	•
CP50 skid mounted rig	2846.45 m	BP 5, 9, 15, 19, 29
44 skid mounted rig	2852.06 m	BP 1, 8, 14, 21, 34, 36, 38, 41
44 skid mounted rig	2692.08 m	BP 3, 12, 17, 22, 26

Connors	Drilling Ltd.	1128.17	m

BBS-25-A track mounted rig 308.34 m BP 7, BP 13

Super 38 - skid mounted 819.30 m BP 23-25, 27, 28, 31

On completion all boreholes were cement grouted from the base up to approximately 20 m above the Bird Seam.

The differences between the proposed and the actual program were as a result of continual reassessment as the program progressed.

- a) It was found that the line of deterioration in the Chamberlain Seam was further north than expected and therefore boreholes in the south were dropped.
- b) The additional holes around Saddle Creek resulted from trying to elucidate the more complicated structure than anticipated and substitution of drilling for the abortive field mapping program.
- c) 9 old Teck boreholes (NQ size) were cleaned out and geophysically logged to gain additional structural and lithological information (BP-8 was unsuccessful).
- d) Due to the additional cost in road maintenance brought about by the inclement weather conditions, some boreholes were dropped for budgetary reasons.

Due to poor coal core recoveries, BP-2, BP-3 and BP-6 were wedged and rebores completed with the result of creating boreholes BP-2a, BP-3a, and BP-6a. Due to drilling difficulties encountered on BP 14 and BP 25, completely new boreholes were started alongside, namely BP-14a and BP-25a respectively.

7. GEOPHYSICAL LOGGING (See Appendix B1 to B5)

All 41 boreholes were geophysically logged plus the 8 successful BP-T clean out boreholes. The suite of logs run, though not the same package on all boreholes was as follows:

General Logs at 1:200 Scale: Gamma, SLS Density, Caliper,

& Sonic.

Detal Logs at 1:20 Scale: Gamma, SLS Density, HRD Density

BRD Density, Sonic, Caliper.

The following boreholes were tested for verticality and direction using the Sperry-Sun equipment. (See Appendix A1 & A2 - page 1a), BP1, 2a, 3, 3a, 4 to 12, 15 to 21, 26, 29, 32a, 37.

The geophysical logging and the verticality testing were contracted to BPB Instruments (Canada) Ltd. who supplied one engineer, and mobile logging unit with tape accessory.

8. CORE HANDLING AND ANALYSES (See Appendix A1-A2 for Geologist's logs and Appendix C for Analytical data)

All core, was placed into 3 x .75 m core boxes, and was measured and sampled on site. Coal core measuring and sampling was restricted to 2 senior geologists for consistency, whereas the non-coal logging was carried out by a team of geologists and technicians. All measuring and subsectioning was carried out in one of the three heated, fluorescently lit, core sheds adjacent to the camp.

The coal samples were taken on the basis of lithological variations within the seam depicted on the geophysical logs and described by the geologists. Warnock Hersey Professional Services Ltd. were the laboratory used for coal sample testing and Cascade Coal Petrology Ltd. carried out the petrographic work.

In broad terms the following analytical procedure was carried out:

+90% Core Recovery Samples

Crushed to -32 mm.

Screened at 0.5 mm.

Raw coal ply analyses - Ash FSI and Sulphur.

Washed at $\pm 0.5 \times 32$ mm at SGS 1.20 to 1.90 in 0.05 increments.

The following tests were carried out on the clean coal composites, washed at 1.70~SG + -0.5~mm raw material. (Some tests were eliminated when there was insufficient sample available.)

- Specific Gravity
- Proximate Analyses
- Total Sulphur
- Carbon Dioxide
- Phosphorus
- Free Swelling Index
- Gieseler Fluidity
- Oudibert-Arnu Dilatometer

- Average Max. reflectance of vitrinite.
- Maceral analyses
- Calorific value
- Chlorine
- Ultimate Analyses
- Ash Fusability temperatures
- Ash Analyses
- Hardgrove grindability index

80 to 90% Core Recovery Samples

Individual ply analyses of Ash and F.S.I. followed by a raw coal composite with a proximate and sulphur analysis.

-80% Core Recovery Samples

Individual ply analyses of Ash and F.S.I.

The following is a list of core recoveries encountered in the Bird and Chamberlain seams.

Borehole No.	Bird Seam % Linear Rec.	Chamberlain Seam % Linear Rec.
BP 1	UP: 81.1 LP: 70.5	74.0
BP 2 BP 2A	DIVERSION: See 2A 85.1	94.6
BP 3	DIVERSION: See 3A 51.6	DIVERSION: See 3A 87.1
BP 4 BP 5	UP: 96.0 LP: 63.6 88.0	81.0 77.4
BP 6 BP 6A BP 7 BP 8 BP 9 BP 10 BP 11 BP 12 BP 13 BP 14A BP 15 BP 16 BP 17 BP 18 BP 19 BP 20 BP 21	DIVERSION: See 6A 76.0 32.2 100.0 49.0 44.2 68.7 78.9 54.6 87.0 51.6 99.1 UP:100.0 LP: 82.7 97.5 84.4 100.0 53.0	DIVERSION: See 6A 88.3 71.8 82.2 81.3 16.8 89.6 79.9 - 83.9 58.6 81.3 89.1 84.6 75.5 72.6 89.2

Core Recoveries - Cont'd

Воз	cehole	Bird Seam %		Chamb	erlain	Seam	%		
	No.	Linear Rec.		Linea	er Rec.	·			
BP	22	62.0			65.5				•
BP	23				-				
BP	24	_		-	96.0				
BP	25A	62.3			78.4				
BP	26	97.0			92.7				
BP	27				_				
BP	28	_		UP:	52.1	LP:	87.1		
BP	29	84.5		UP:	54.2	LP:	47.9		
BP	30	50.0	•		92.0				
BP	31				-				
BP	32	48.0			82.4				
BP	33	-			-				
\mathbf{BP}	34	-			72.4				
\mathbf{BP}	35	•••			69.6				
BP	36	85.0			53.8				
BP	37	86.0			93.6				
BP	38	_		UP:	53.6	LP:	83.1		
BP	39	-			56.1				
BP	40	-		UP:	78.3	MP:	42.3	LP:	80.9
BP	41	-			87.8				

Note

LP = Lower Plate
MP = Middle Plate

All core boxes for the 1977 program were supplied by E. C. Wally and Son, and were transported to the government core store at Charlie Lake at the end of the program. (See Appendix A1 + A2 for the geologists Logs and Appendix C for the analytical data.)

9. FIELD AND UNDERGROUND MAPPING (Appendix D)

As mentioned in the 1977 Objectives it was intended that field work be conducted in the Saddle Creek area (paragraph 2.7) but, owing to the presence of thick overburden, this was found to be impossible.

As mentioned in the drilling section, additional boreholes were added to the program in this vicinity to compensate for the lack of data, and aid in the siting of adits mentioned in the next section (10).

The underground mapping was contracted to G. R. Jordan

Consulting Services Ltd., whose report is enclosed in Appendix D.

This report deals with the exposed workings encountered in the No.

1 Mine and Sukunka Main Colliery (Window Mine).

10. BULK SAMPLES - Appendix C

10.1 Mine Samples

The bulk sample work was supervised by Intermin Consultants, who in turn sub-contracted the taking of the samples to Thyssen Mining Construction. Bulk samples for washability tests were taken from the Chamberlain Seam in the No. 1 Mine and Sukunka Main (Window Mine) and from the Skeeter Seam in the No. 1 Mine and were analysed by Birtley Engineering. The description of the methods employed, and the results is found in Appendix C.

10.2 Adit Samples

The adit work in Saddle Creek was contracted to the same contractors mentioned in 10.2. Bulk samples for washability tests were taken from the Bird Seam, but due to an untypical seam section encountered in the Chamberlain Seam adit, only a channel (not a bulk) sample was taken. The description of the methods employed, and the results is found in Appendix C.

11. SERVICING OF PROGRAM

Operations were conducted from a 70 man, 20 trailer, skid mounted, propane heated camp, situated in the centre of the exploration area, at the top end of Saddle Creek. The camp was supplied by Harp Oilfield Services and Territorial Leasing Ltd.

Catering was contracted to Westcamp Ltd. The following were typical of the numbers present at the camp:

Company	Numbers
ВР	<pre>12 - geologists, technicians summer students, drilling supervisor.</pre>
Robertson Research N.A. Ltd.	1 - contract geologist
BPB Instruments Ltd.	1 - geophysical logger
Westcamp	4 - caterers
P. & P. Deneulemeester	6 - cat drivers
North Star Fabrication	5 - slashers
Canadian Longyear Ltd.	16 - drillers & supervisors
Tonto Drilling Co.	16 - drillers & supervisors
Burnett Resource Surveyors	3 - surveyors (part of the time)
Transworld Safety	l - first-aid man
Thyssen Mining Construction	6 - miners (part of the time)

BP Transport was made up of 4 Ford 4 \times 4, 3/4 ton trucks and 2 Blazers. Nahanni and Highland Helicopters were used for surveying and geological duties as well as rig suppliers.

Two Bombardiers were required for crew and supply transportation due to the poor weather conditions which made some roads impassable for normal vehicles.

Texaco supplied the gasoline and diesel used on site by rigs and trucks.

12. GEOLOGICAL EVALUATION (Appendix E, F, & G)

As mentioned in the introduction there is an ongoing review of not only the 1977 Exploration data, but also the information obtained from the seven years of previous exploration. Some of the evaluation work completed is included in Appendix E, F. & G, in the form of Isopach Maps on the Skeeter, Chamberlain and Bird Seams, lithological cross-sections and Fence Diagrams on the above mentioned seams, plus structural base contours on the Chamberlain seam accompanied by structural cross-sections.

13. FINANCIAL STATEMENT

The main contractors used, and the expenditures incurred during the 1977 Sukunka Exploration Program are detailed on pages 2 and 3 of the "Application to Extend Term of Licence" form accompanying this report.

PRIOR TO PROGRAM



DEPARTMENT OF MINES AND PETROLEUM RESOURCES

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MINERAL RESOURCES BRANCH INSPECTION AND ENGINEERING DIVISION

NOTICE OF WORK ON A COAL LICENCE

Pursuant to section 7 of the Coal Mines Regulation Act this notice is to be completed by all companies or individuals carrying out exploration work prior to commencement of work, and within one month of cussation of work and one copy is to be sent to each of the following:

Senior Reclamation Inspector, Victoria District Inspector of Mines Regional Water Rights Engineer District Forester or Forest Ranger
Regional Fish and Wildlife Office

Do not film

PERMIT NO.

Coal Licence Numbers: 3014-3023, 3025, 3026, 3	<u> 1028, 3033, 3038, 3089-312</u>	29
3554 - 3557, 3559		
LOCATION: Mining Division 9 Princa Geor	ge, B.C. NTS Map Sheet (o.g., 8	32E/9E) <u>93-2/3,4,</u> &5
Lat.55 ° 11 Long. 121° 31 Locality and Access	Bullmoose-Saddle Crask	Nocelity
Access from Chetwynd via Sukunka R - Gwil	llim Laka - Bullmoose Val	loy - Saddle Creek
(EP C20L access road) roads. OWNER: Name BP Exploration Canada Limi	ted Free Miner's Cert. No. 16110)2
Address 335 - 8th Avenue S.W.		
OPERATOR: Name As Abova	Free Miner's Cert. No. AS A	lbova
Ganpany		
Address		
ESTIMATED DURATION OF WORK: FromJuly	•	
ACTUAL DATE WORK COMPLETED: Day	Month	
APPROXIMATE NUMBER OF MEN EMPLOYED: Up to 40	and the control of th	
EXPLORATION WORK: Proposed 🖾 Completed 🗍 (Use n	metric measure - 1 metre = 3,3 feet.)	
Linecutting (distance, width, method) (Requires approval of Forest Service, 'Licence to Cut' or 'Free Use Pa		
Drilling - No. of Sites38	02 500	
Drilling No. of Sites 30		
		square metres
Road Construction - Total Length 13,000 metr	res Approximate Width 4	(top) metres
Road Construction - Total Length 13,000 metrostruction - Total Length 13,000 metrostruction 1 naw addt - Saddle Cre	res Approximate Width 4 ton a bulk samples from	(top) matres existing u/g work
Hoad Construction - Total Length 13,000 metrostruction - Total Length 13,000 metrostruction 1 naw addt - Saddla Cro	res Approximate Width 4 to the Approximate Width	(nop) matres existing u/g wark matres
Hoad Construction - Total Length 13,000 metrostruction - Total Length 13,000 metrostruction 1 naw addt - Saddle Cre	res Approximate Width 4 to the Approximate Width	(nop) matres existing u/g wark matres
Hoad Construction - Total Length 13,000 metrostruction - Total Length 13,000 metrostruction 1 naw adde - Saddla Crassing - Number 10 Total Length 50 Test Pitting - Number 111 Total Disturbed Area Work by Self 123 OR Name of Contractor	res Approximate Width 4 Dak - 3 bulk samples from metres Width 11.60	(top) metres @RISTING U/G TONG (type) metres square metres
Hoad Construction — Total Length 13,000 metroscopic me	netros Width 4 metros Width 11.60	(top) metres @RISTING U/G TONG (type) metres square metres
Road Construction — Total Length	netros Width 4 metros Width 10.60 metros Width 10.60 mont regulations, see section 8, Cool Mines	(top) metres @RISTING U/G WON? (type) metres square metres
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Road Construction — Total Length	netros Width 4 metros Width 11.60 metros Width 11.60 mont regulations, see section 8, Coal Mines 11.20, 1977 Lorna ReQuagn	(top) metres @RISTING U/G WON? (type) metres square metres
Road Construction — Total Length	metres Width 4.60 metres Width 11.60 metres Width 11.60 metres Width 12.60 metres Width 12.60 metres Width 13.60 metres Width 13.60 metres Width 13.60	matres existing u/g work (type) motres square metres Regulation Act.)
Road Construction — Total Length	metres Width 4.60 metres Width 11.60 metres Width 11.60 metres Width 12.60 metres Width 12.60 metres Width 13.60 metres Width 13.60 metres Width 13.60	matres existing u/g toxk (type) motres motres square motres Regulation Act.)
Hoad Construction — Total Length	metres Width 4.60 metres Width 11.60 metres Width 11.60 metres Width 12.60 metres Width 12.60 metres Width 13.60 metres Width 13.60 metres Width 13.60	matres existing u/g toxic (type) motres square metres Regulation Act.)
Hoad Construction — Total Length	metres Width	metres existing u/g tone (type) metres metres square metres Regulation Act.)



DEPARTMENT OF MINES AND PETROLEUM RESOURCES

MINERAL RESOURCES BRANCH INSPECTION AND ENGINEERING DIVISION

RECLAMATION REPORT - COAL EXPLORATION

To be submitted in duplicate to Senior Reclamation Inspector, Victoria. See note at bottom of page.

	FOR CALENDAR YEAR 19 77	PERMIT NO. 48 Teck Corp.				
	COMPANY BP Exploration Canada Limited	NAME OF OFF	ICIAL J. Ken	nedy		
	ADDRESS 335 - Eighth Avenue S.W.	SIGNATURE _	- Y.X.	melly		
	Calgary, Alberta •	DATE SUBMIT	reb_January_	1978		
	DETAILS OF WORK DONE AND DESCRIPTION OF RECLAMAT Use metric measure (1 metre = 3.3 feet). Show method of reclamation topsoil, seed type, (ertilizer used and application, etc. Use back of shee Reference Maps).	n, for example, bac	kfill of excavated ear rence locations on 1:5	th and replacement of 0,000 map (Coal Titles		
	ROADS: Indicate lengths of individual roadways built and approximate and fill.	e width both cut	Area Disturbed	Area Reclaimed restored		
	New roads 16,000 m, in length X 4 m. top (approx. avg	.) m²	m ²		
	X 6 m. cut	11 11	96,000 m ²	$72,000 \text{ m}^2$		
	of which 53% was above the tree line		m²	m ²		
	4% was in scrub land		m²	m²		
	TEST PITS: 43% was below the tree line					
	CT#1: 25_mx_10_m.			250m²		
-	CT #2: 100m. × 94 m.		9400 m²	- <u>9400</u> m²		
	CT #7: 28 m. x 15 m.		420 m ²	420 m ²		
	CT#13: 25m. x 10 m.		250m ²	250 m ²		
	TRENCHES: Indicate lengths, widths, and ground slope.		٠			
	3 m. x 0.60 m. vertical		1.80 m ²	m ²		
			m²	m²		
			m²	m²		
			m²	m ²		
	ADITS: 25 m. x 20 m., 23° Total No. Two 40 m. x 30 m., 27°	,	1700 m²	1700 m²		
	DRILL SITES:					
	Total NoThirty-nine	,	15,600 m ²	15,600 m ²		
	OTHER:					
			m ²			
			m²	m²		
	Total Disturbed and Reclaimed Area (square metres)			_99620m ²		
	Total Disturbed and Reclaimed Area (hectares)		12.36 ha	9.96 *Resec		
	(1 hectare = 10 000 square metres) *Reseading due to the early snow will have to be seeded in the s GENERAL COMMENTS:			3/4 of this area		
	In addition to the 39 drill sites ment	ioned above	there were 2	drill sites		
_	constructed in conjunction with Teck Co					
	by Teck, and mentioned in their Reclama	ation Report	- -			

NOTE: Refer to original Application for a Reclamation Permit' and note work done on two copies of the 1:50,000 map. Specify where work done has varied from that which was proposed. Attach to this report. Belief to booklet entitled, Guidelines for Coal and Mineral Exploration, available at the office of the District Inspector of Mines, for reclamation advice, Attach photographs or other support data if desired to supplement this format.

() L EXPLORATION FORM 7-8

AFTER PROGRAM



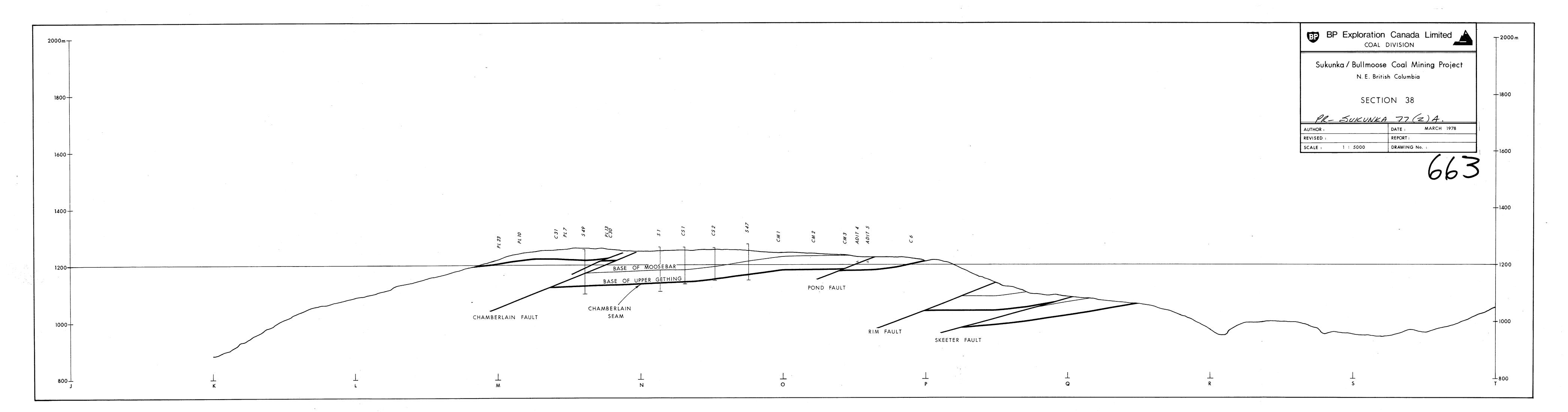
DEPARTMENT OF MINES AND PETROLEUM RESOURCES MINERAL RESOURCES BRANCH INSPECTION AND ENGINEERING DIVISION

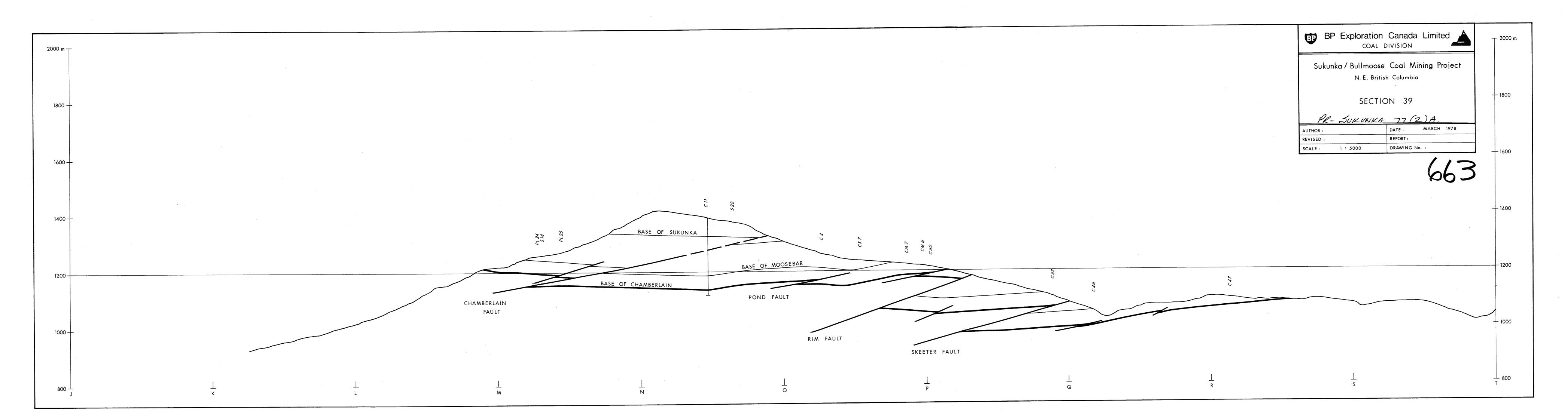
NOTICE OF WORK ON A COAL LICENCE

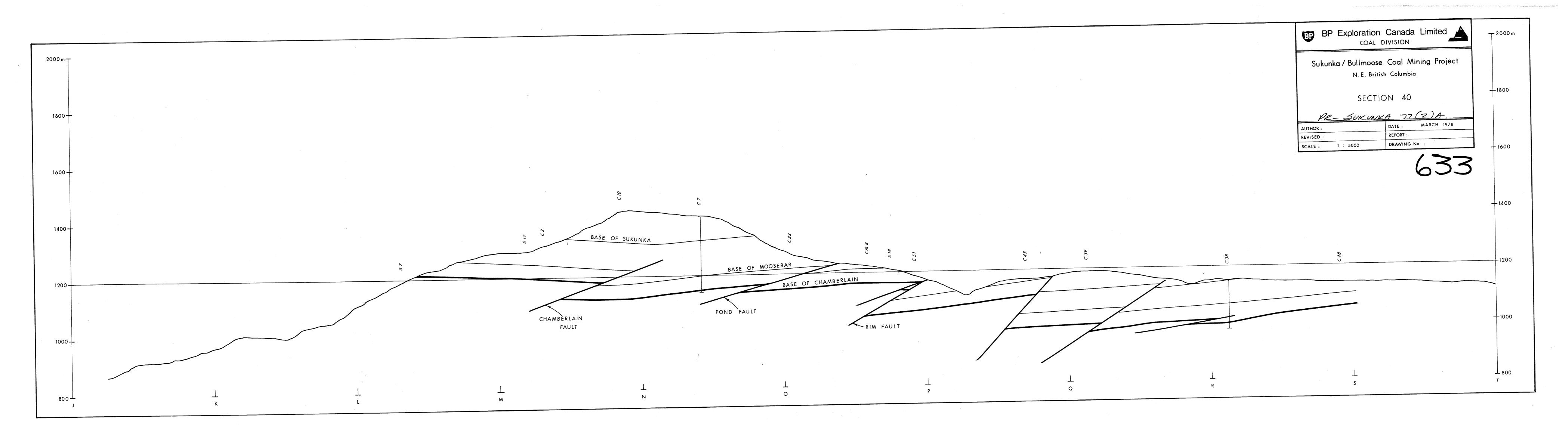
Pursuant to section 7 of the Coal Mines Regulation Act this notice is to be completed by all companies or individuals carrying out exploration work prior to commencement of work, and within one month of cessation of work and one copy is to be sent to each of the following:

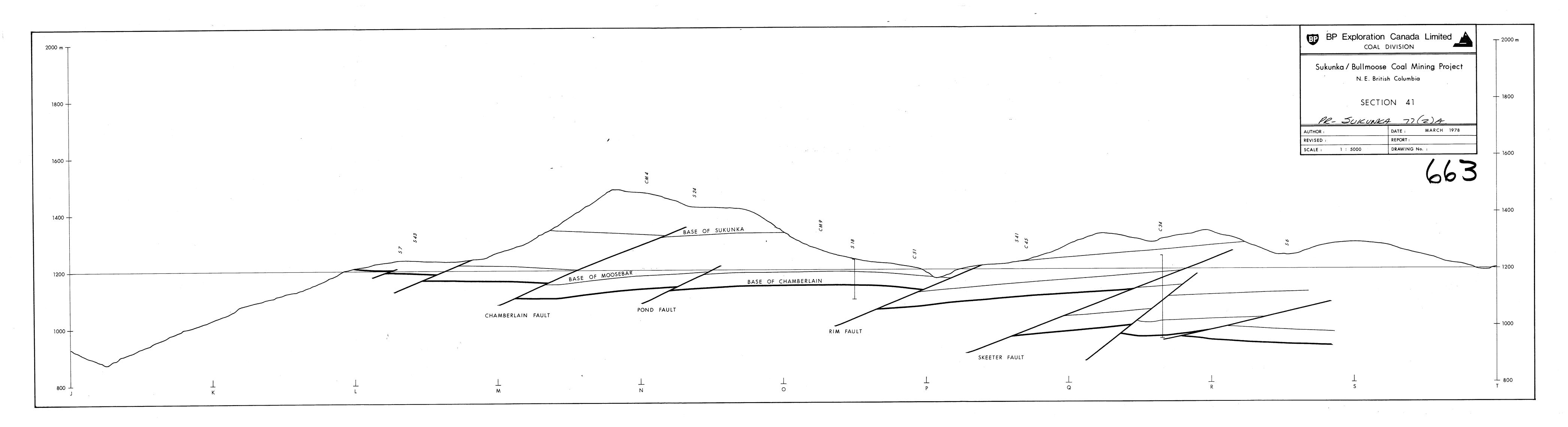
Senior Reclamation Inspector, Victoria District Inspector of Mines Regional Water Rights Engineer District Forester or Forest Ranger Regional Fish and Wildlife Office

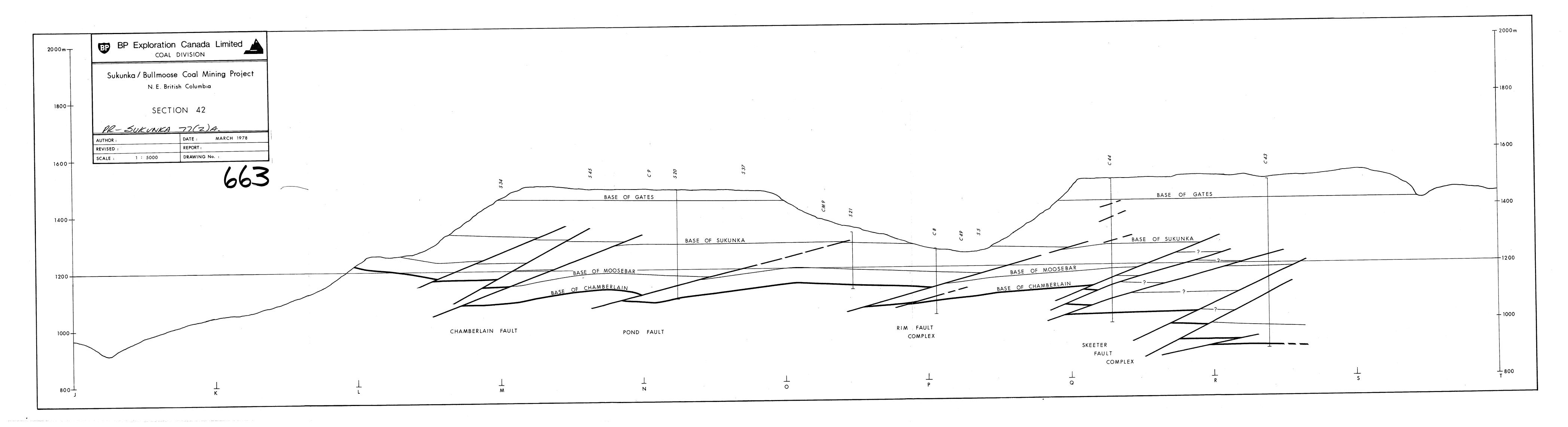
	PERMIT NO.
1.	NAME OF PROPERTY: Sukunka/Bullmoose
٠.	Coal Licence Numbers: 3089-3129, 3014-3023, 3025, 3026, 3028, 3033, 3038, 3554-3557, 3559
2.	LOCATION: Mining Division 9 Prince George B.C. NTS Map Sheet (e.g., 82E/9E) 93-P/3, 4, 5 Lat. 55 ° 11 Long. 121 ° 31 Locality and Access Bullmoose - Saddle Creek locality - access from Chetwynd via Sukunka valley Rd. and Coalition Exploration Road
3.	OWNER: Name BP Exploration Canada Limited Free Miner's Cert, No. 161102 Address 335-8th Avenue S.W. City Calgary Prov. Alberta
4.	OPERATOR: NameAs Above Free Miner's Cert, NoAs Above
	Company Telephone No. 266-7071 Address City Prov. ESTIMATED DURATION OF WORK: From July to October
5,	ACTUAL DATE WORK COMPLETED: Day 31 Month October 19.77
6.	APPROXIMATE NUMBER OF MEN EMPLOYED: 70
7.	EXPLORATION WORK: Proposed Completed (Use metric measure - 1 metre = 3.3 feet.)
8.	
	Linecutting (distance, width, method)
	Drilling - No. of Sites39 Total Area15,600square motres
	Road Construction - Total Length 16,000 metres Approximate Width 4 (top) metres
	Underground Exploration two new adits - Saddle Creek - three bulk samples from existing underground workings Trenching - Number 1 Total Length 3 metres Width 60 motres
	Tost Pitting - Number 4 Total Disturbed Area 12,000 square metres
9.	Work by Self OR Name of Contractor
	Name and Title of Forest Official Chief. Forest Ranger - Lorne McQueen
	# In addition to the 39 drill sites mentioned above there were two drill sites constructed in conjunction with Teck Corporation Ltd. These have been restored by Teck and mentioned in their Notice of Work.
NOT	E: Pursuant to section 8, subsection 2(a) of the Coal Mines Regulation Act, "where the employment of mechanical equipment is likely to disturb the surface of the land in clearing, stripping, trenching" the Application for a Reclamation Permit on the reverse side is also to be submitted.
SIGN	TITLE Senior Landman
	T NAME P. J. Kephedy DATE 7th December 1977

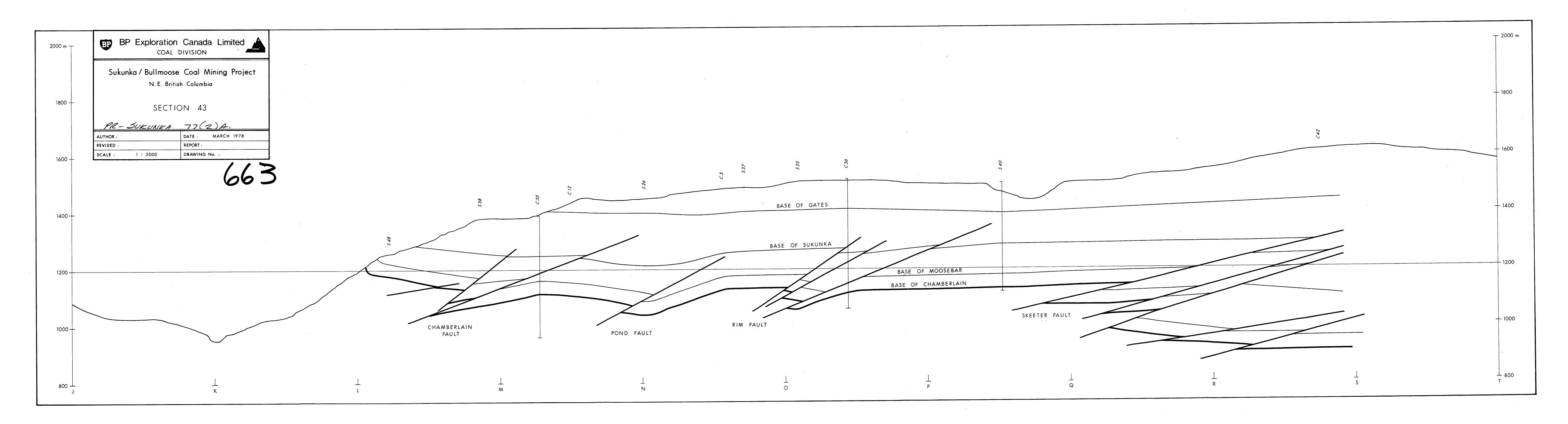


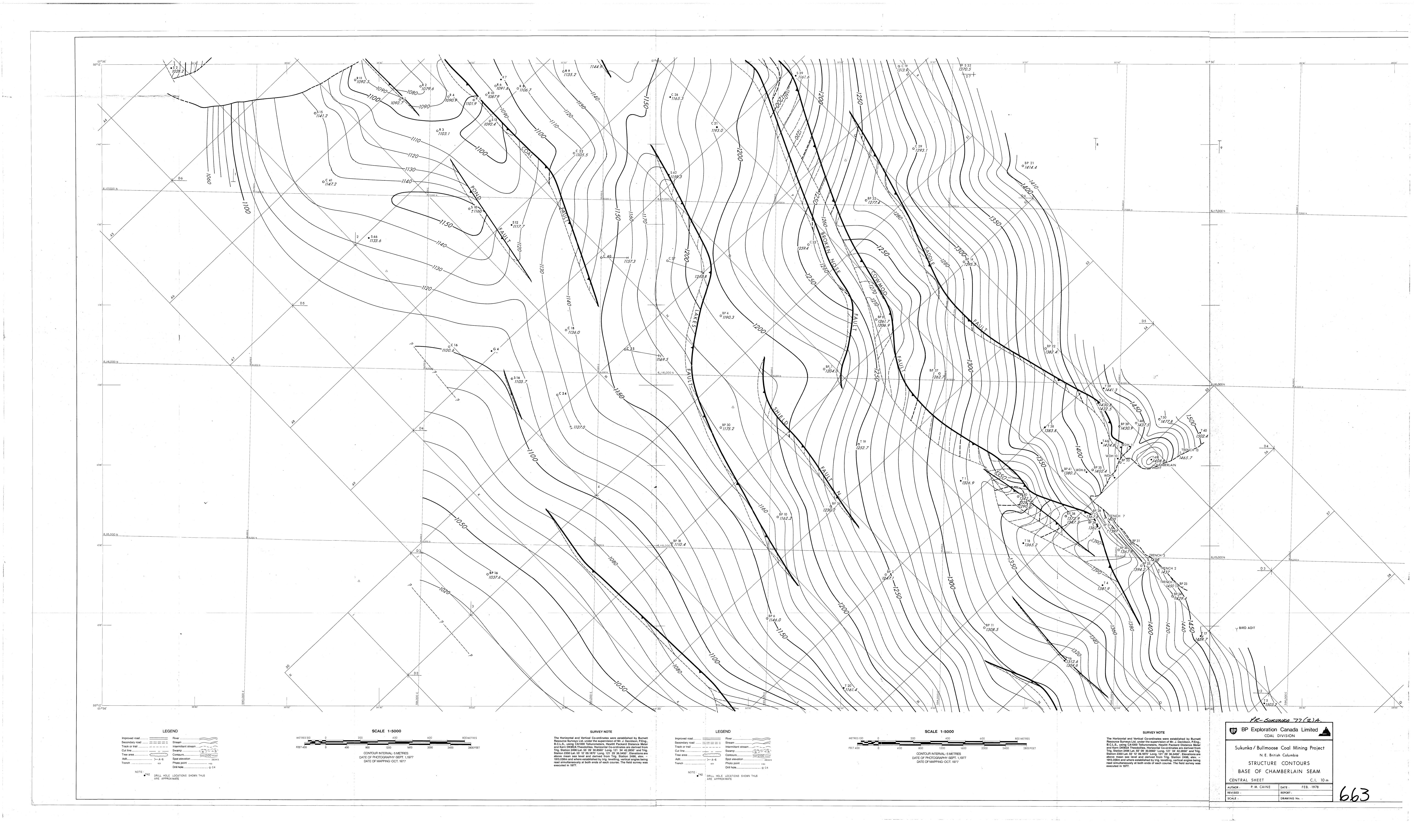


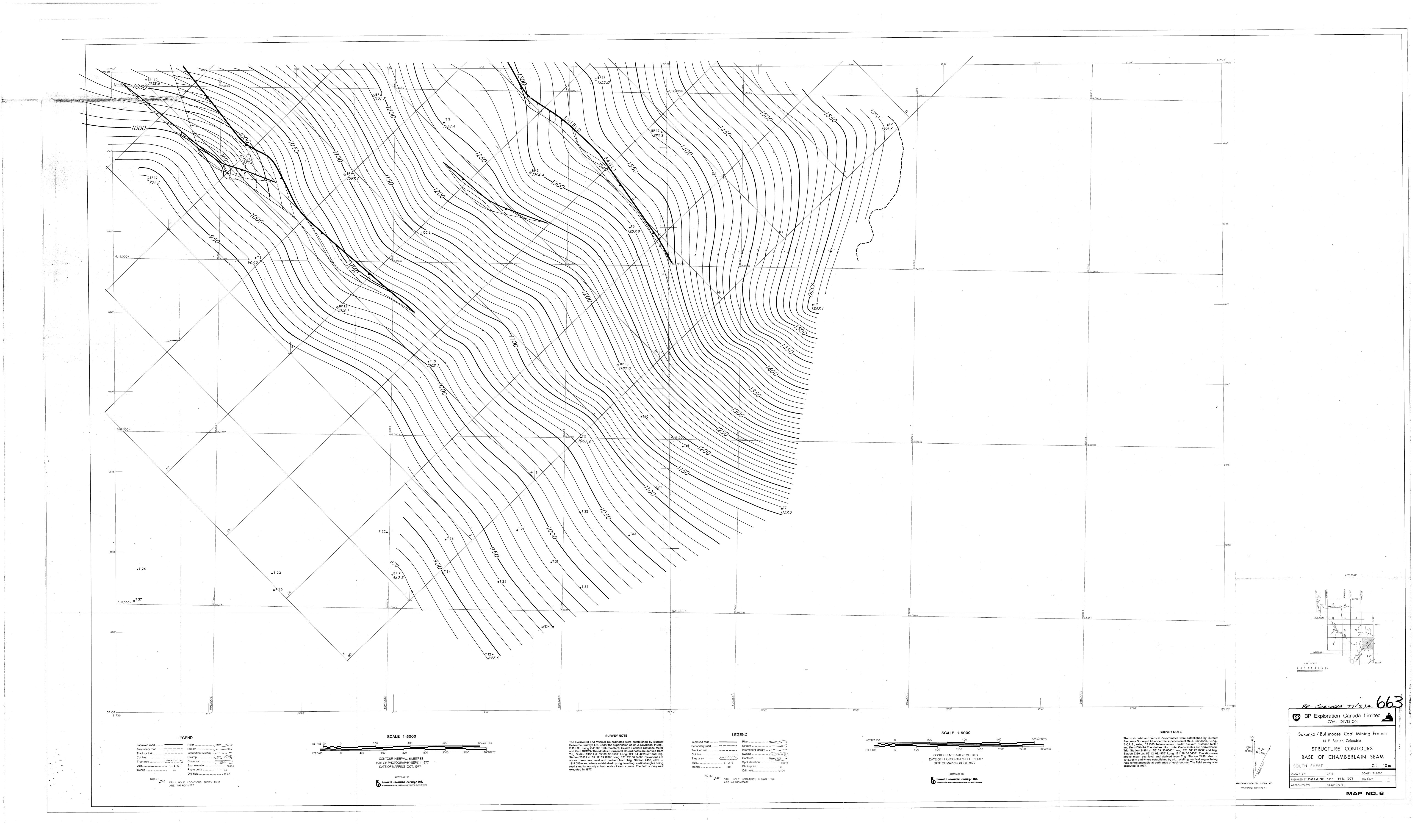


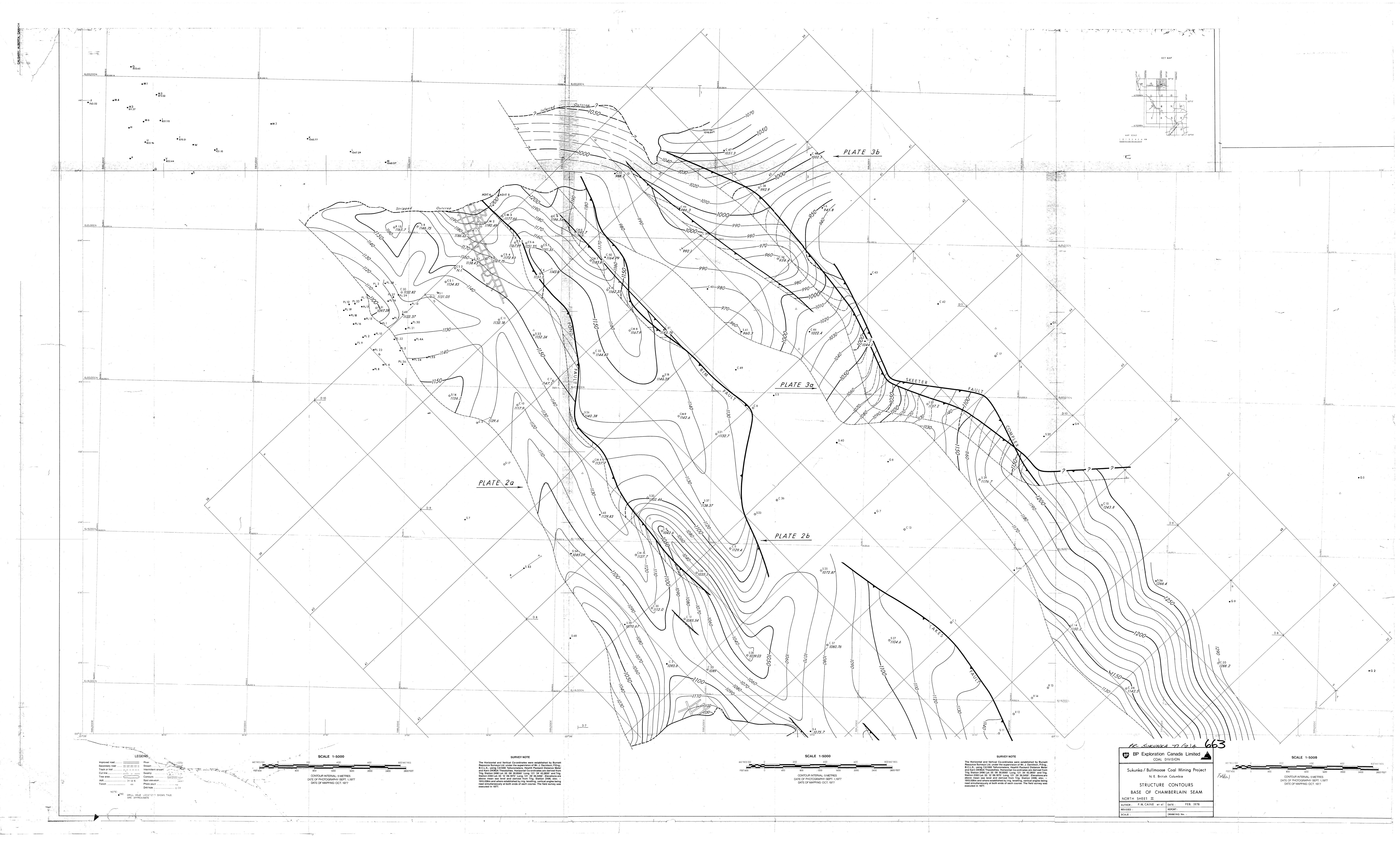


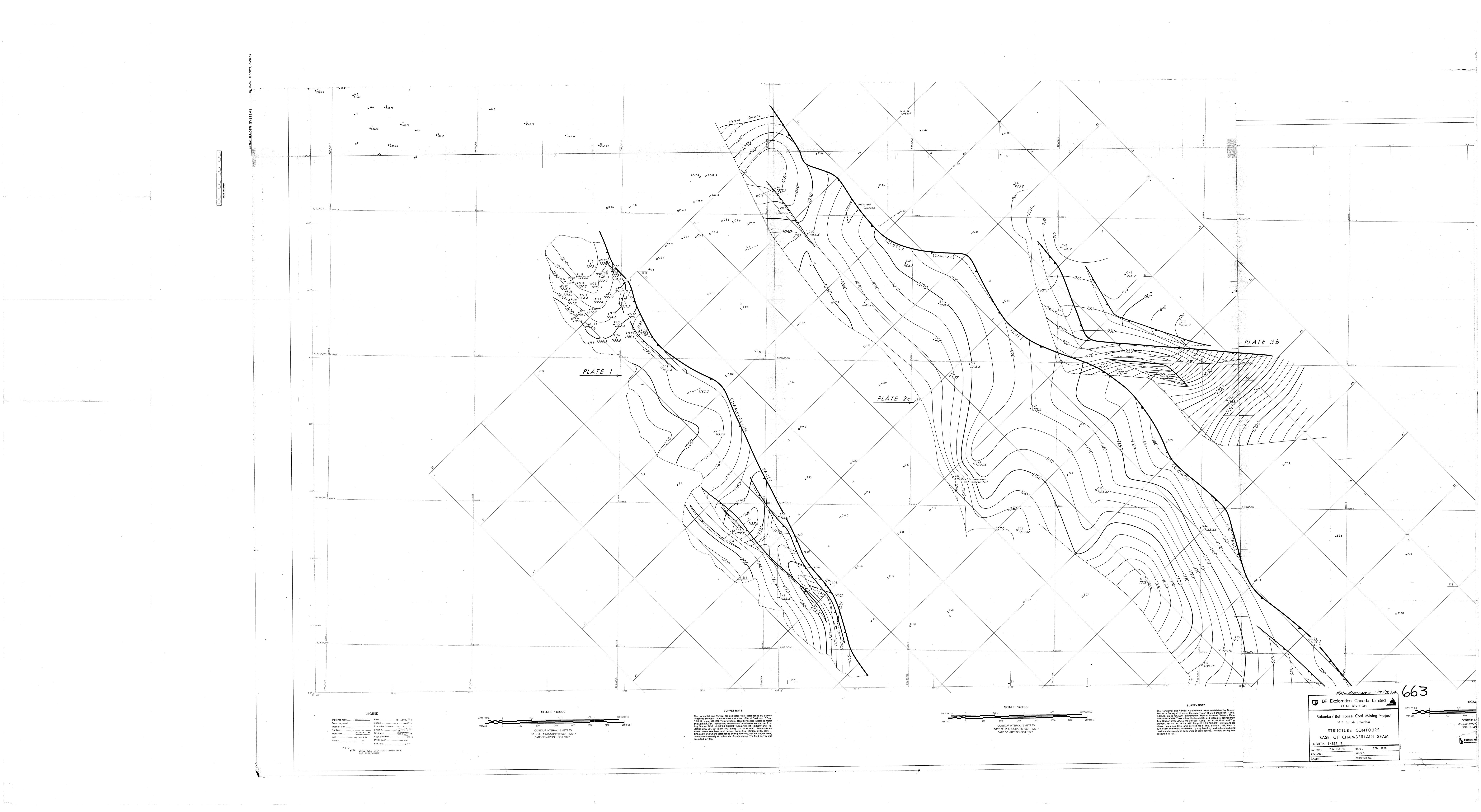


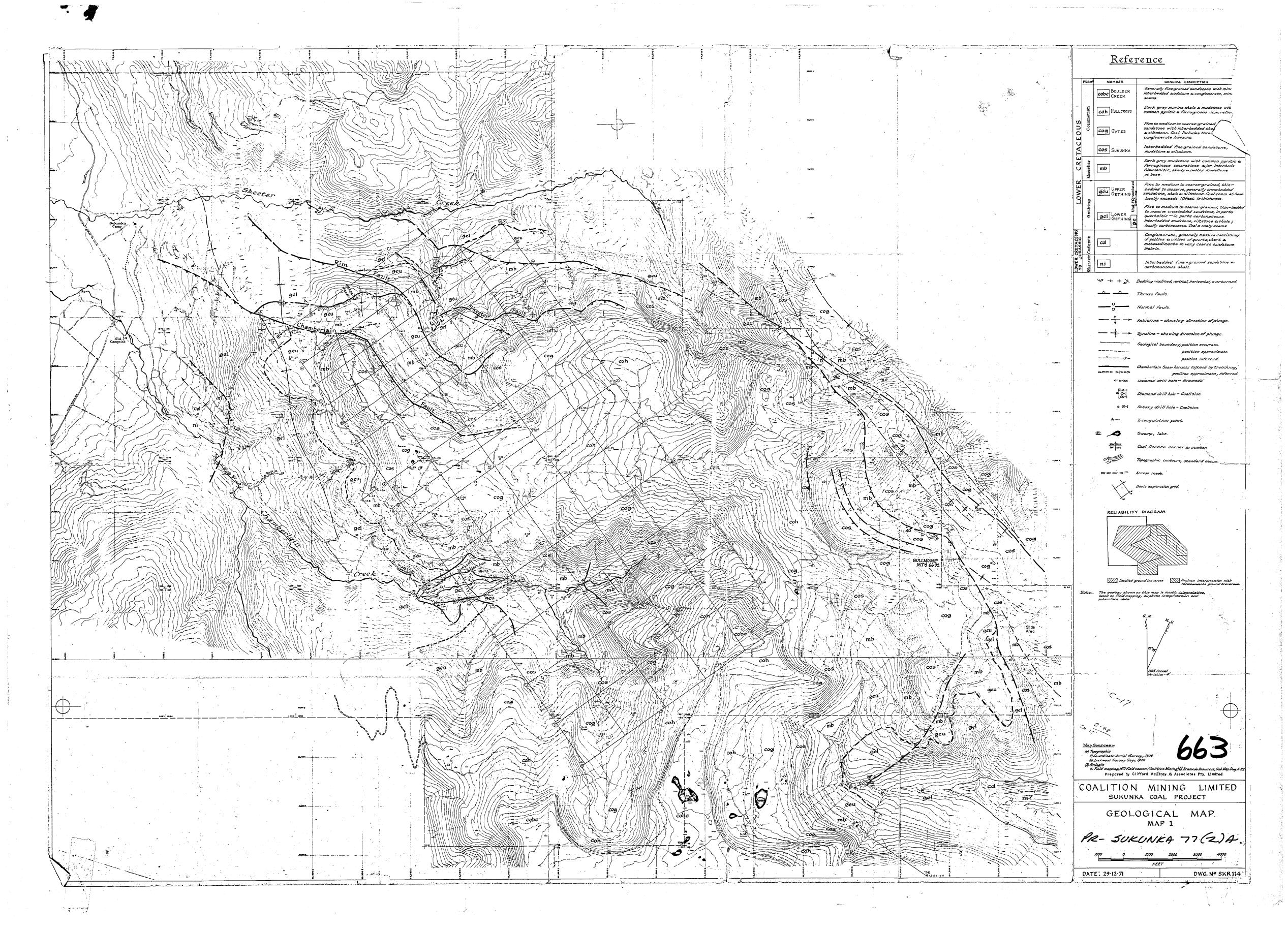


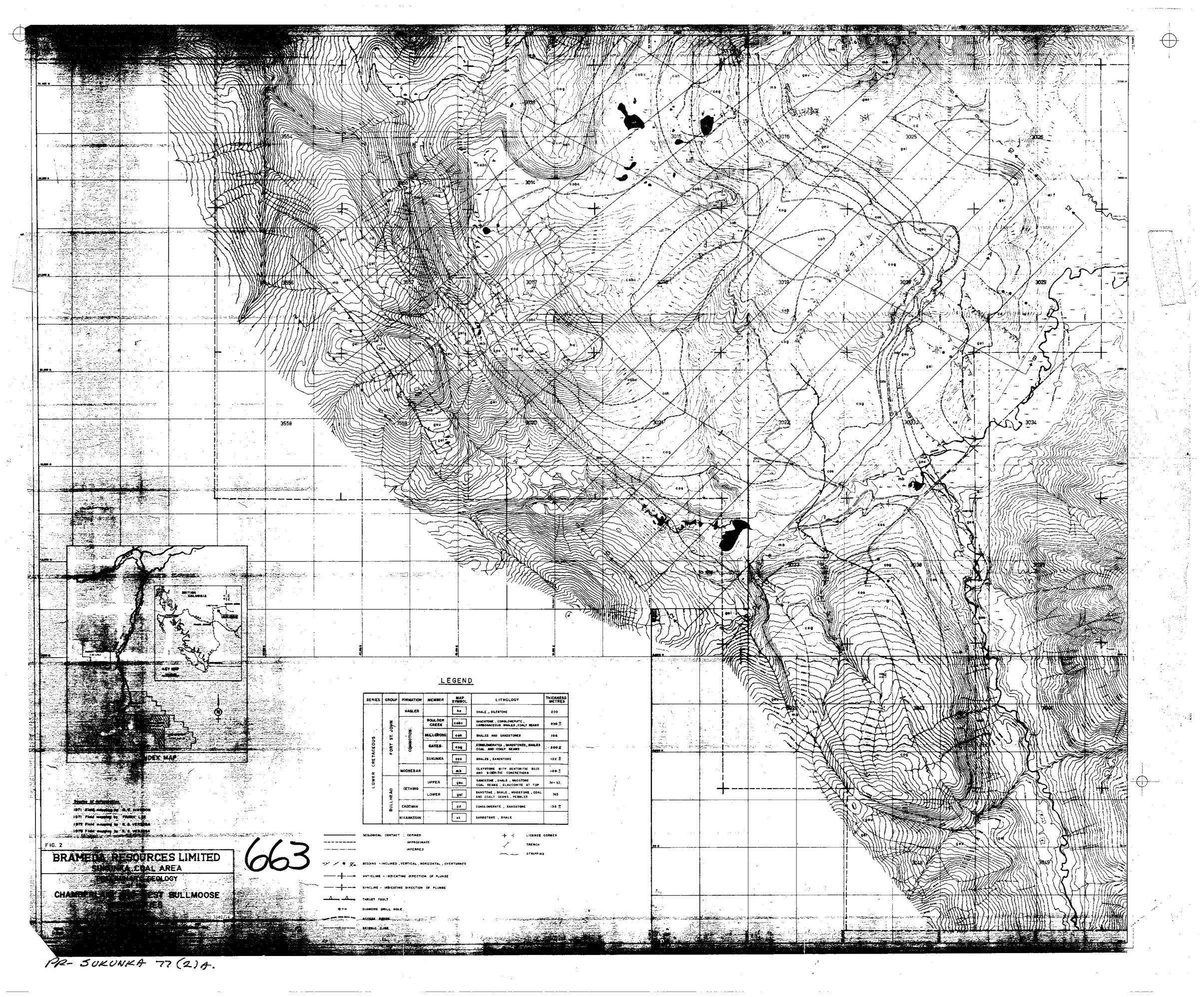


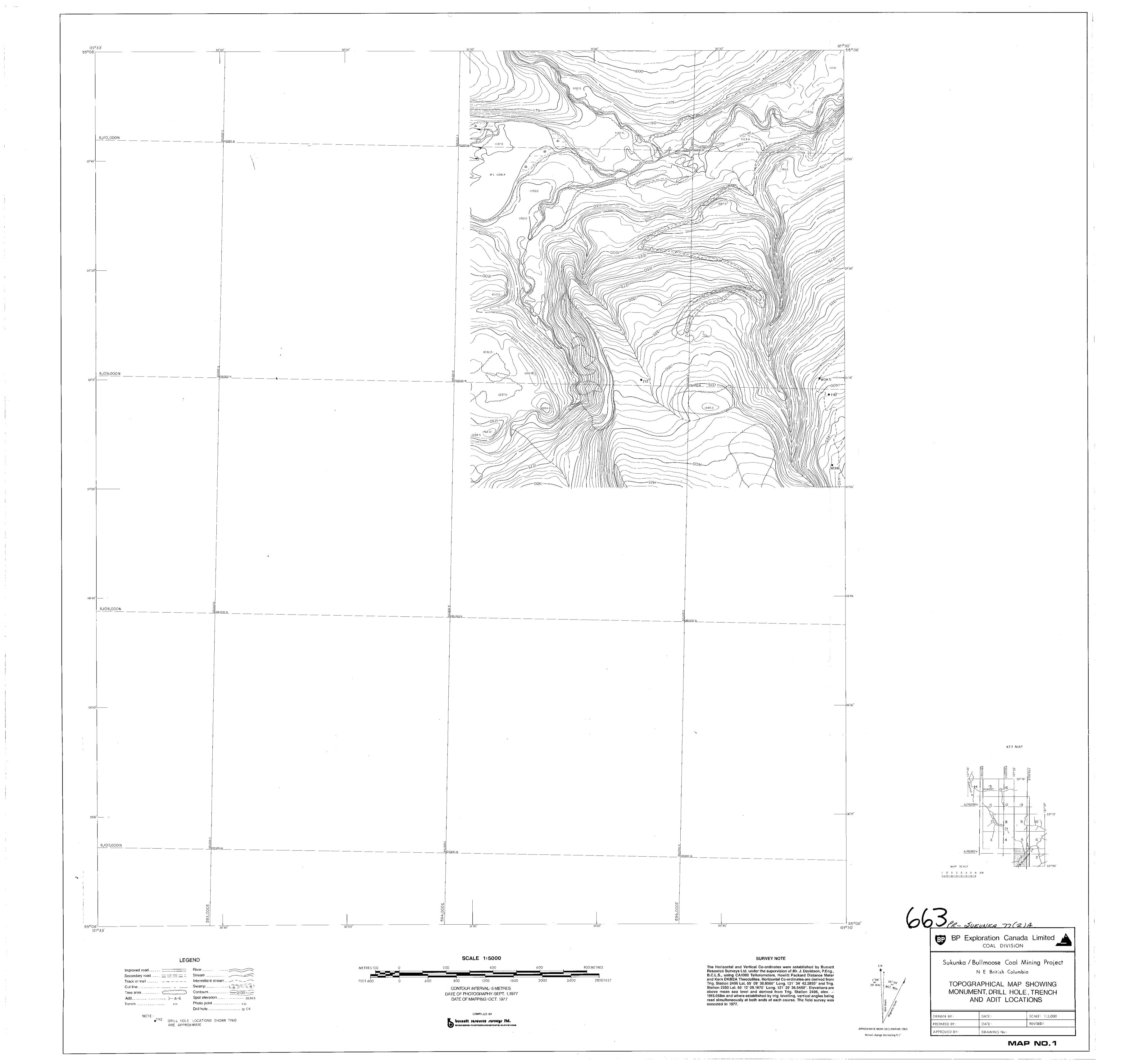


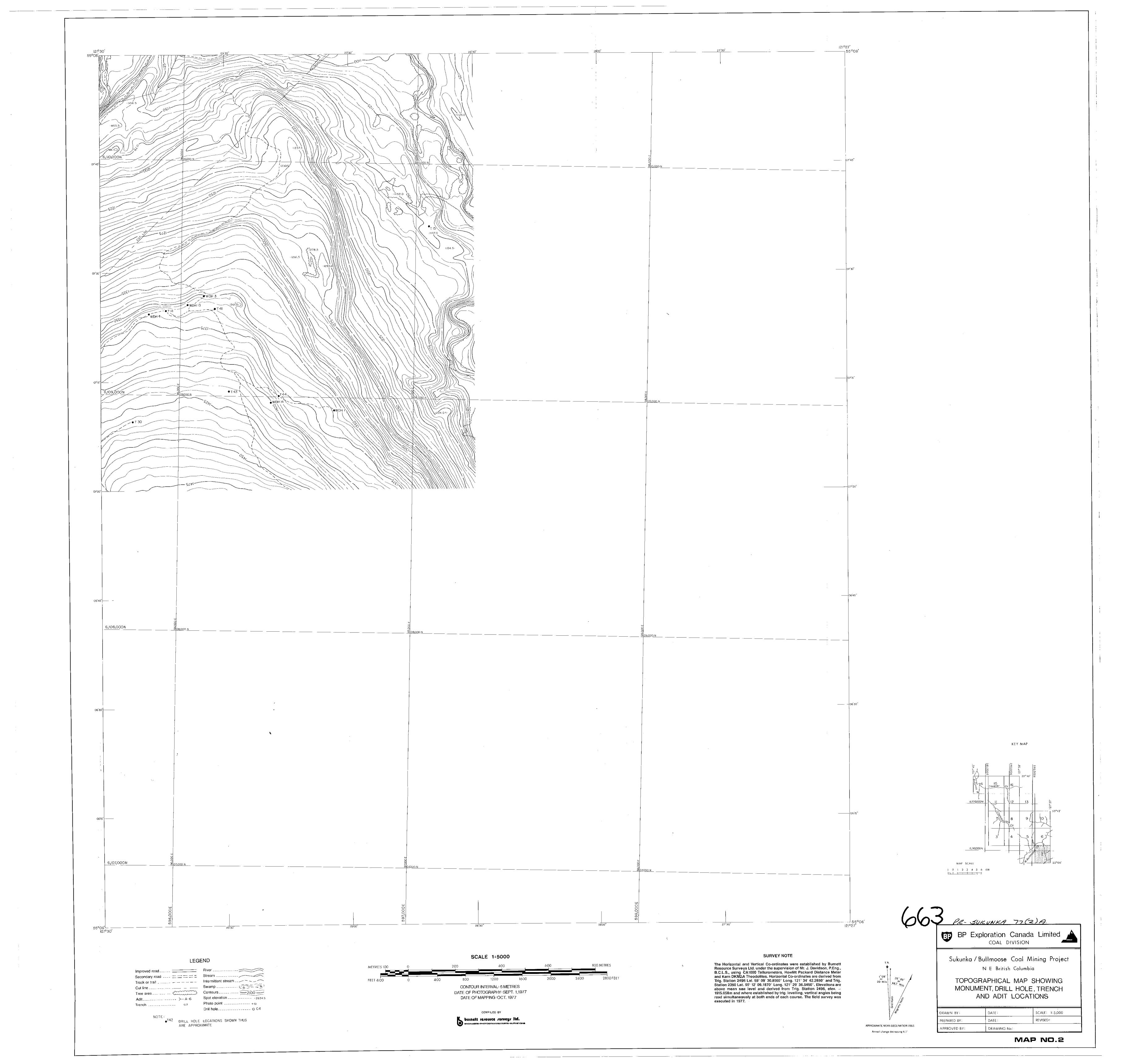


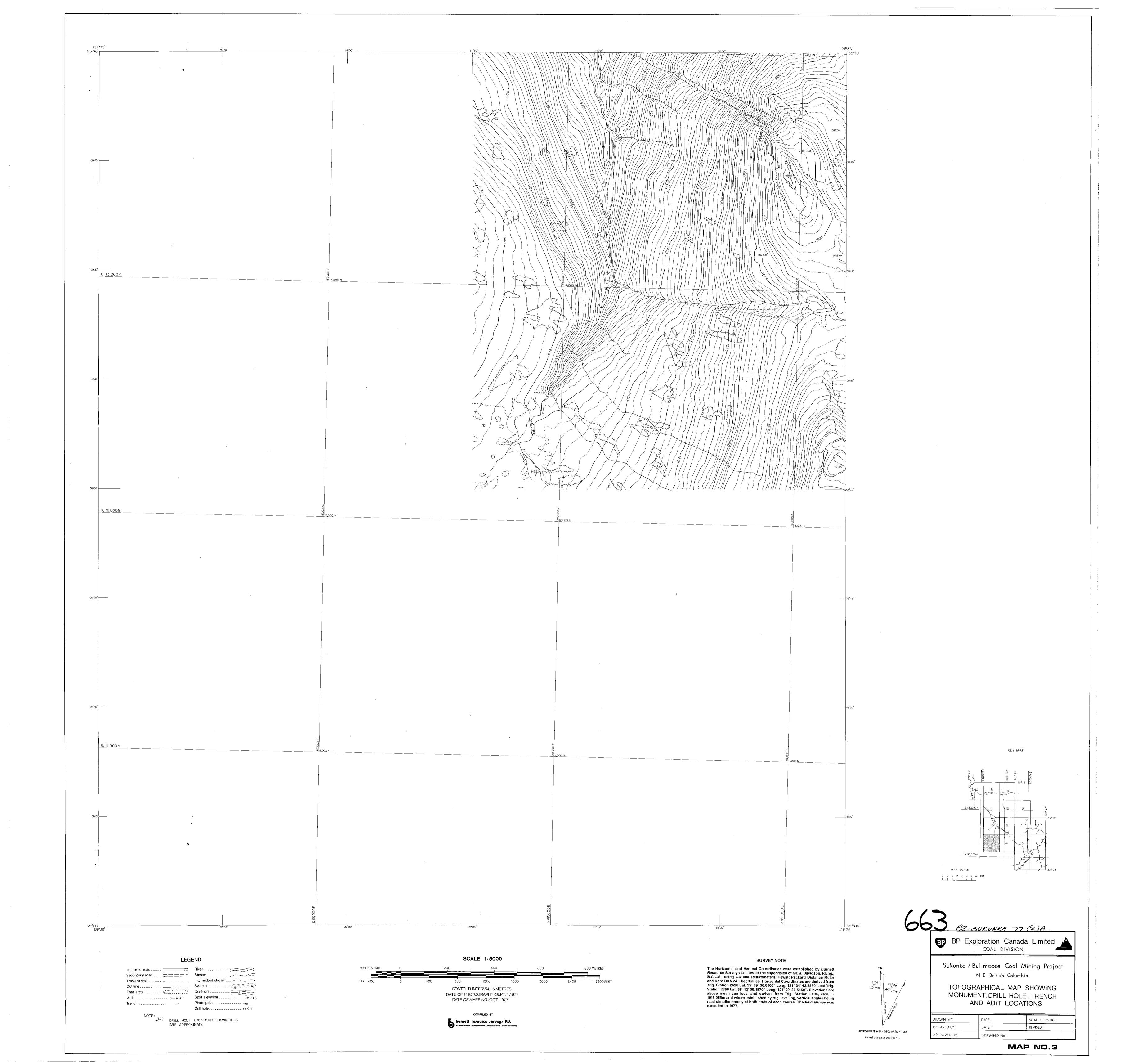


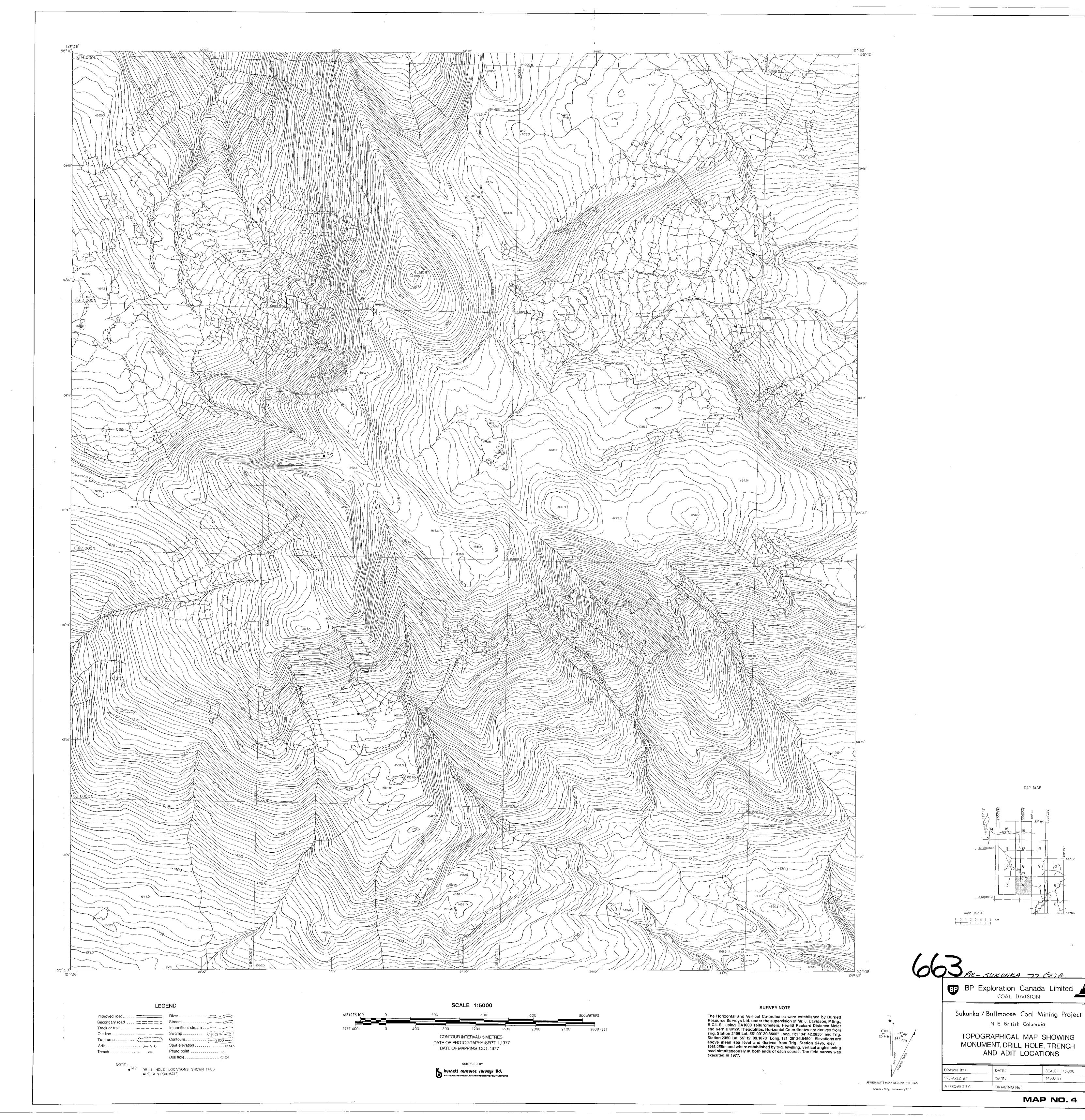


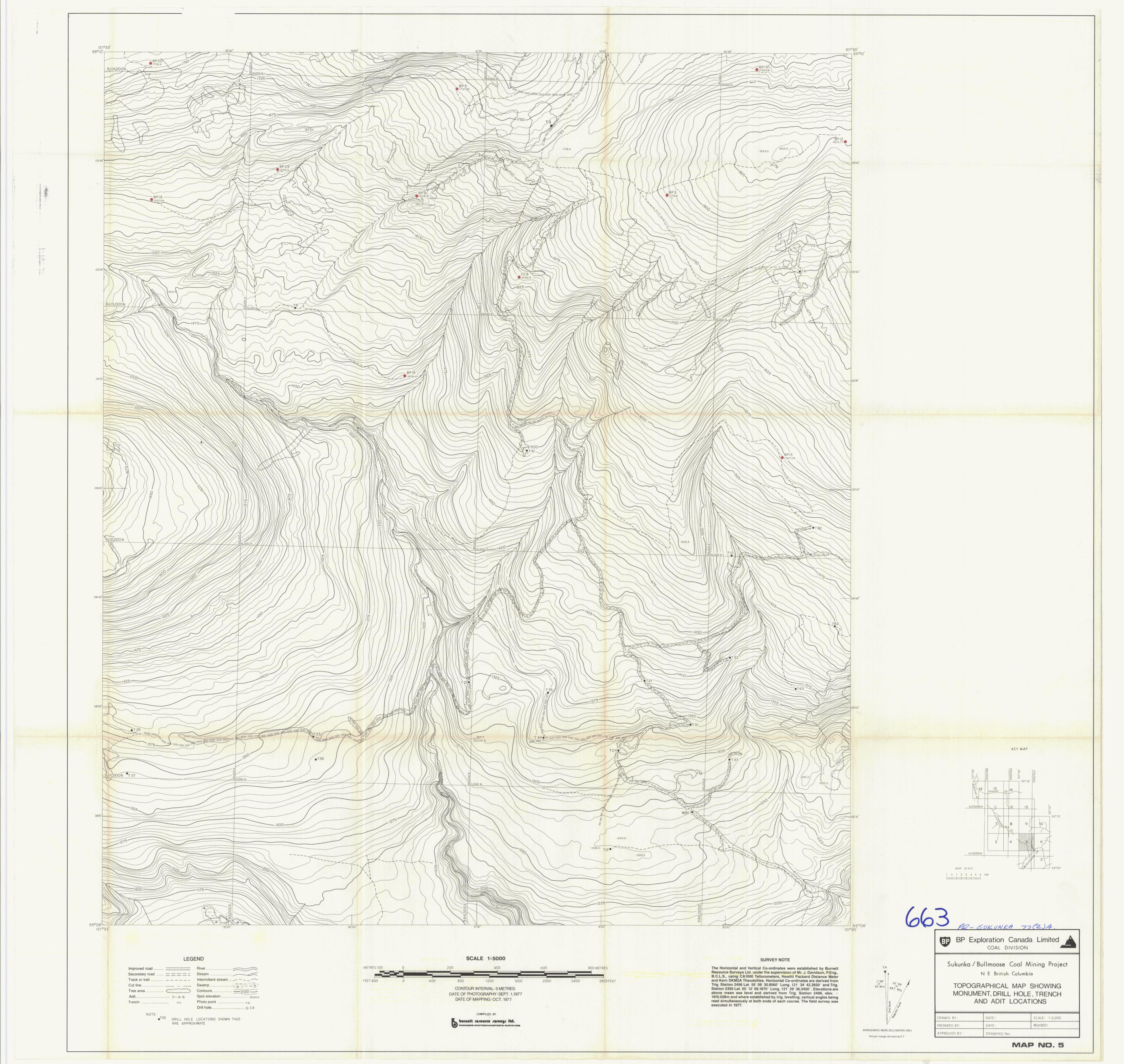


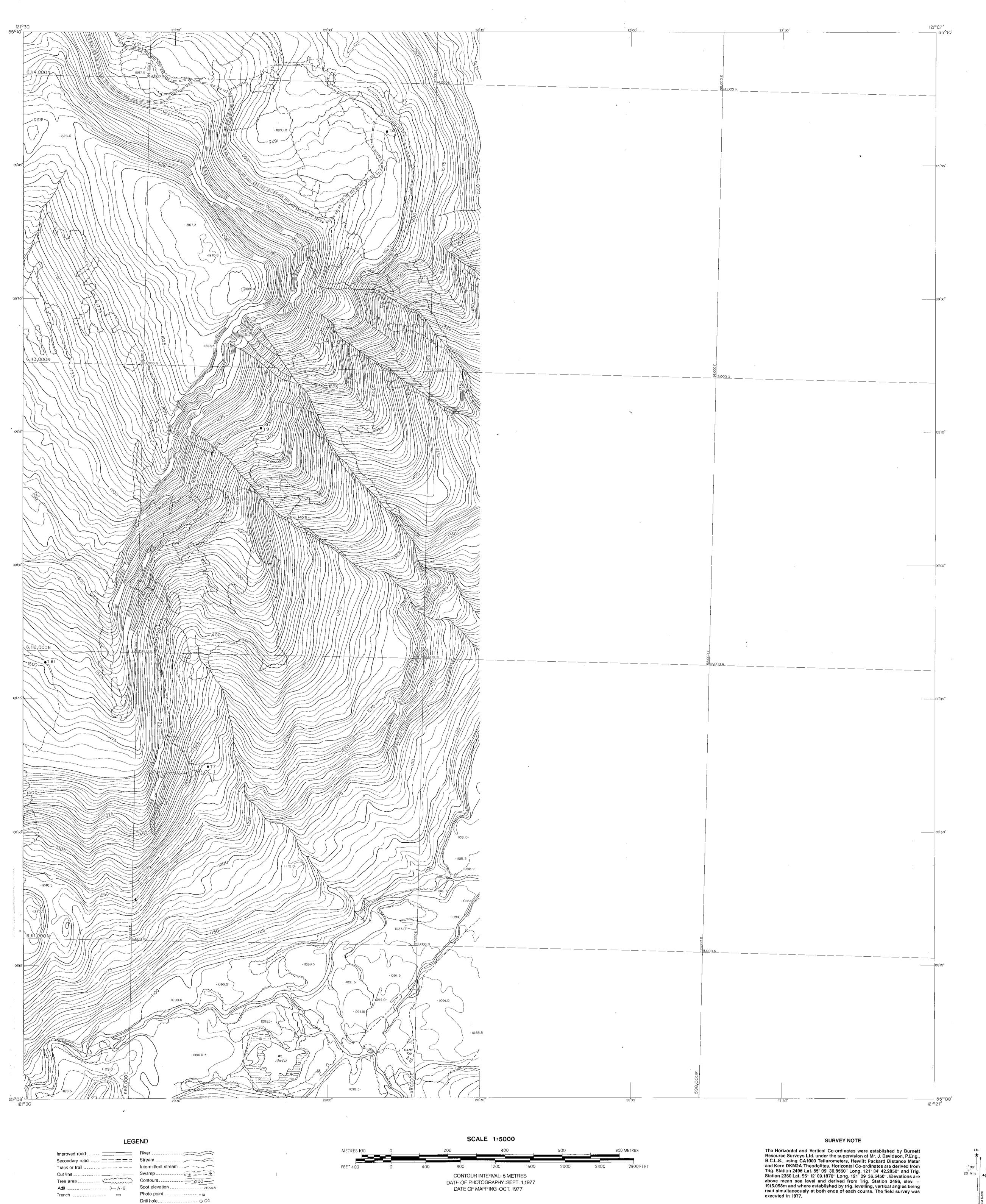


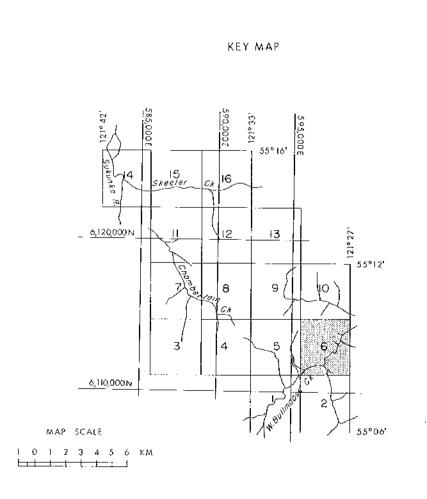












APPROXIMATE MEAN DECLINATION 1965

Annual change decreasing 4,1'

665
PR- SUKUNKA 77 (2)A.

BP Exploration Canada Limited COAL DIVISION

Sukunka/Bullmoose Coal Mining Project N E British Columbia

TOPOGRAPHICAL MAP SHOWING MONUMENT, DRILL HOLE, TRENCH AND ADIT LOCATIONS

DRAWN BY: SCALE: 1:5,000 PREPARED BY: REVISED:

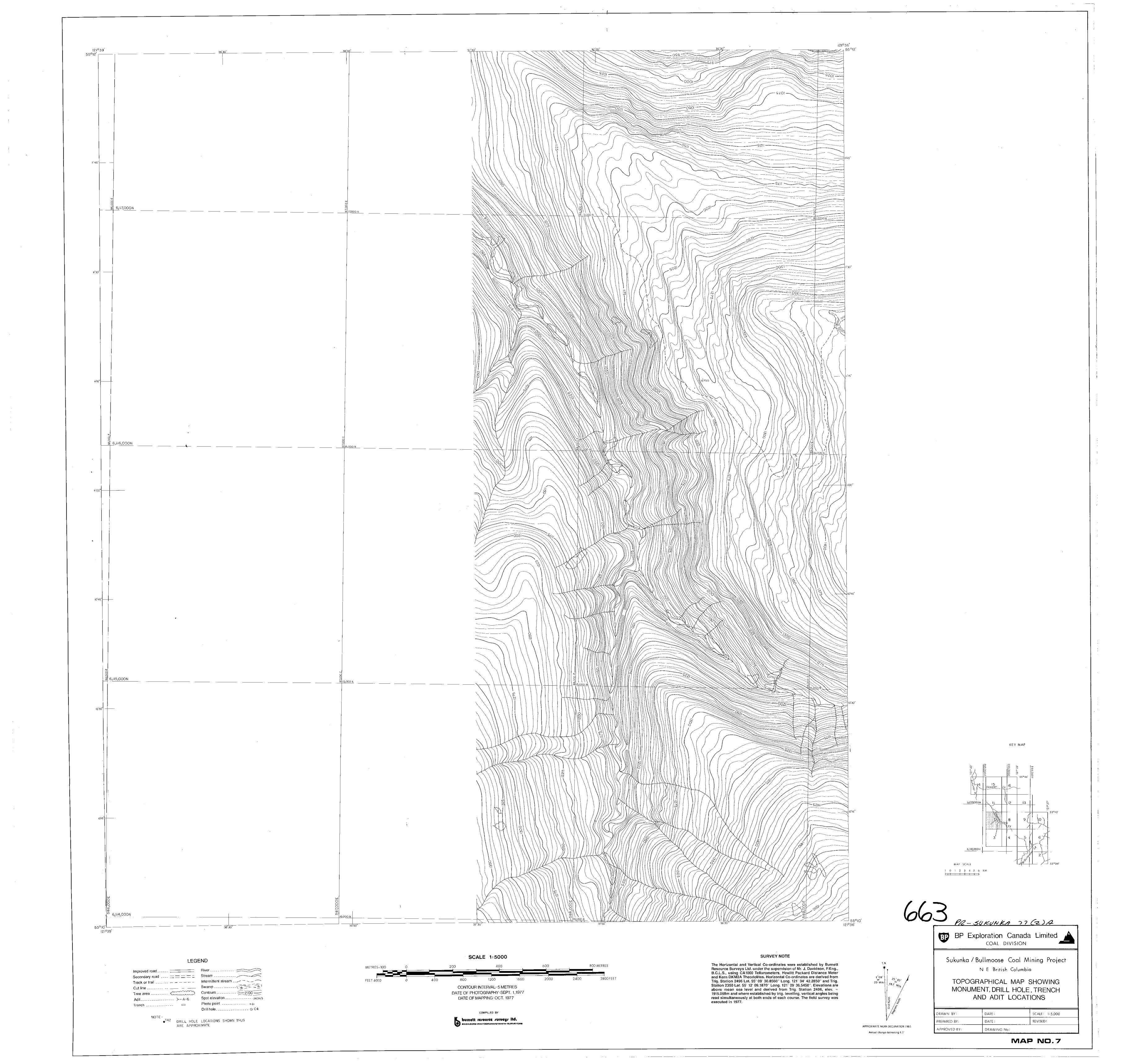
APPROVED BY: DRAWING No: MAP NO.6

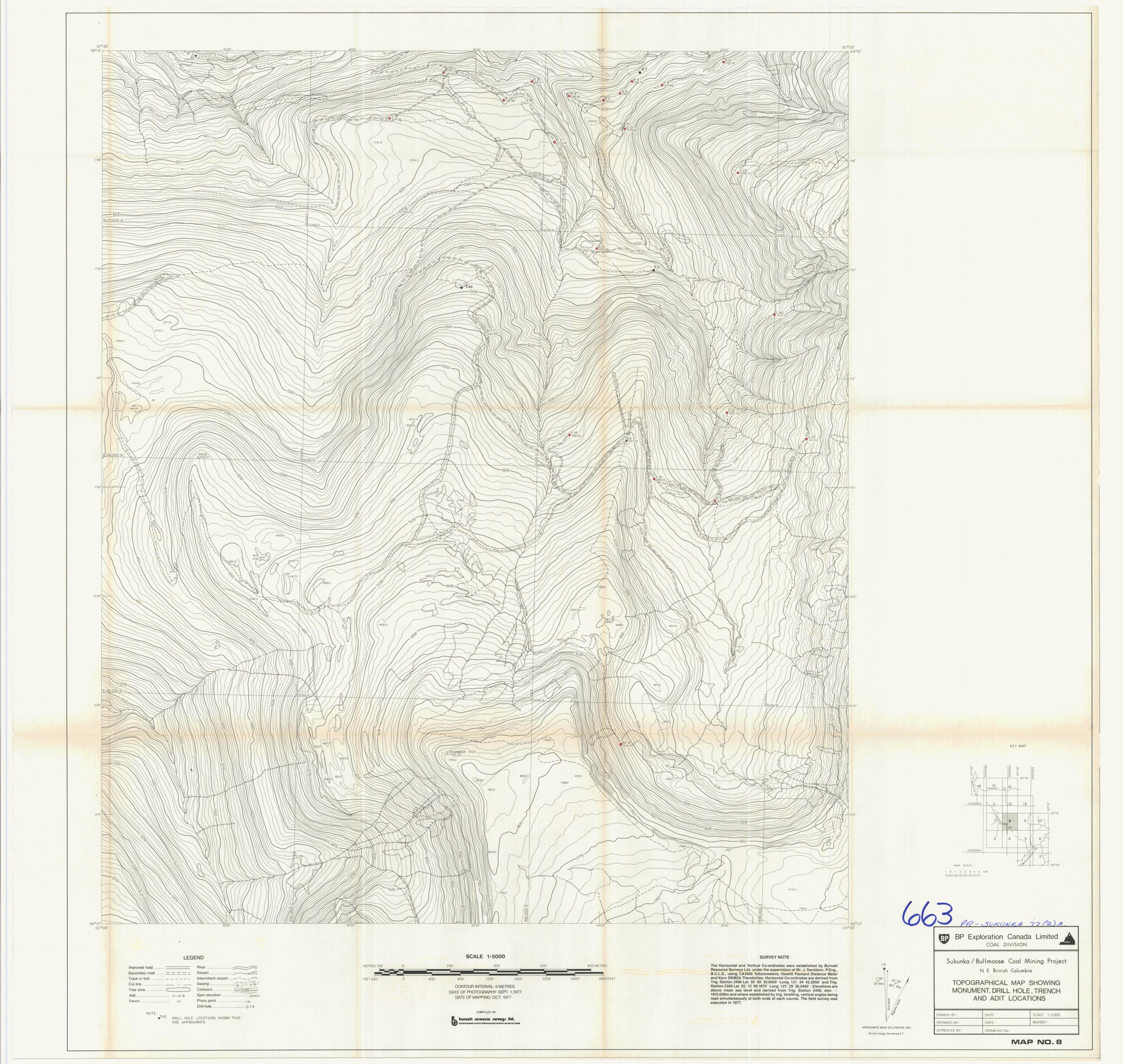
COMPILED BY burnett resource surveys Itd.

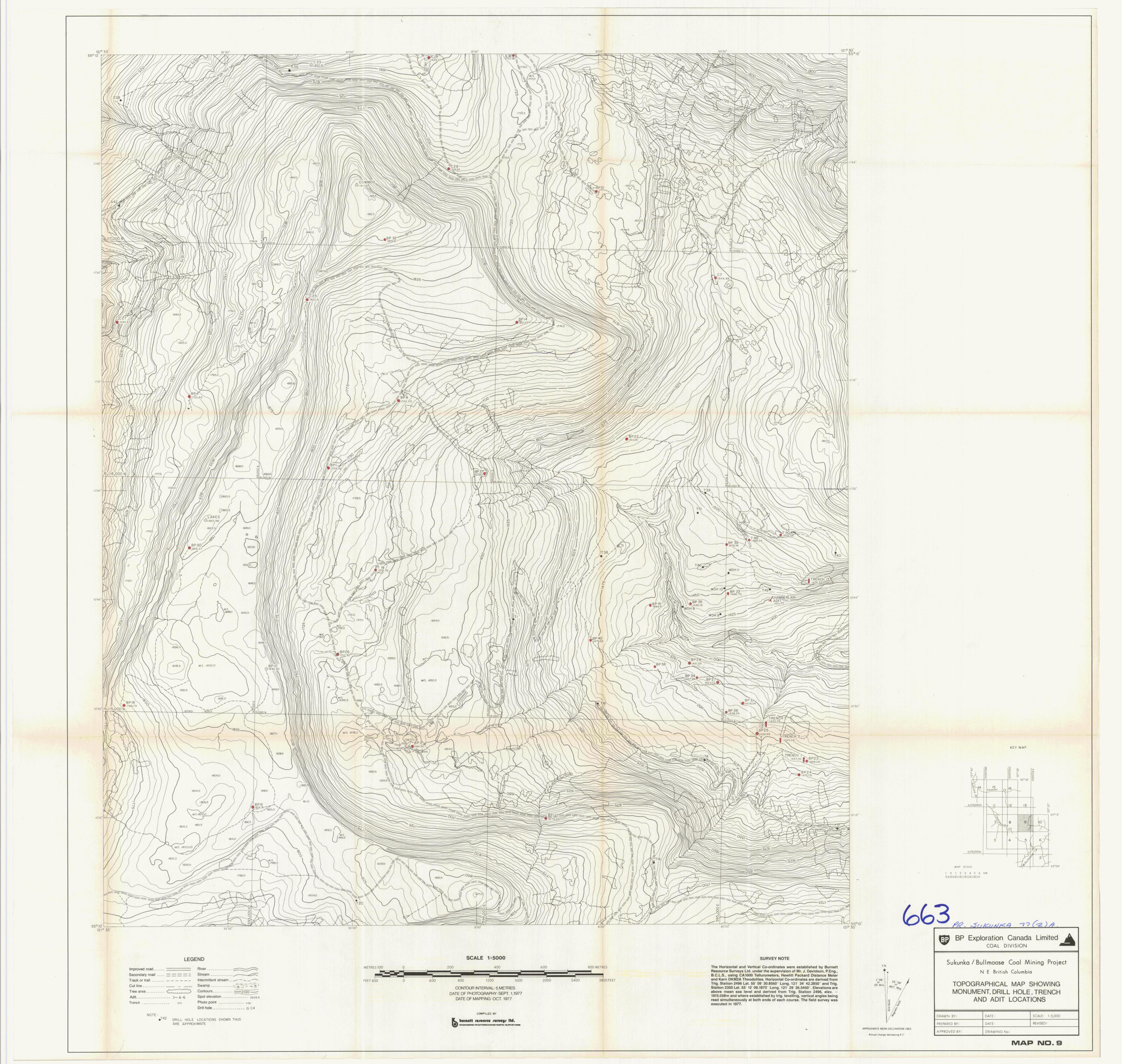
NOTE:

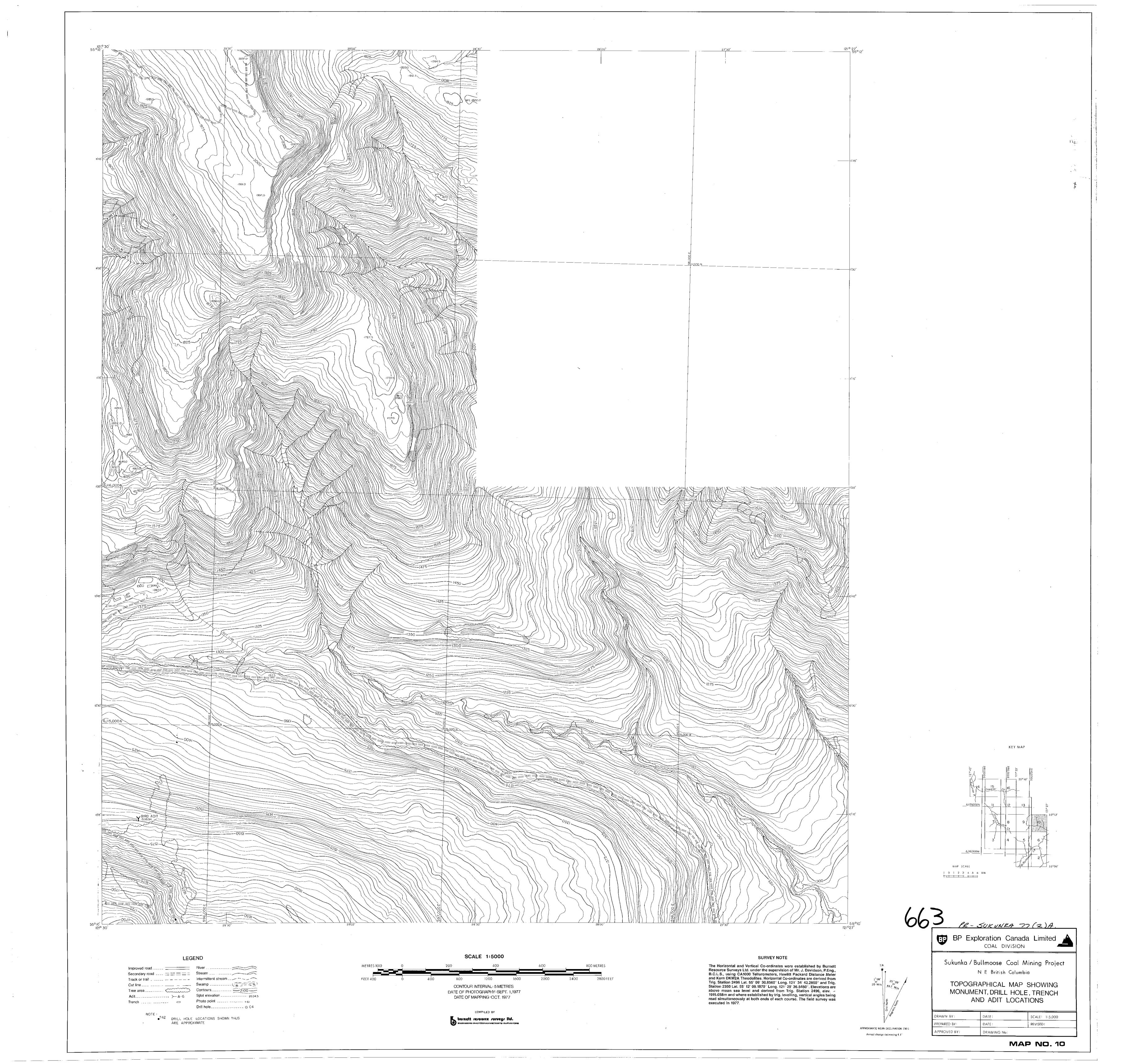
•T42 DRILL HOLE LOCATIONS SHOWN THUS

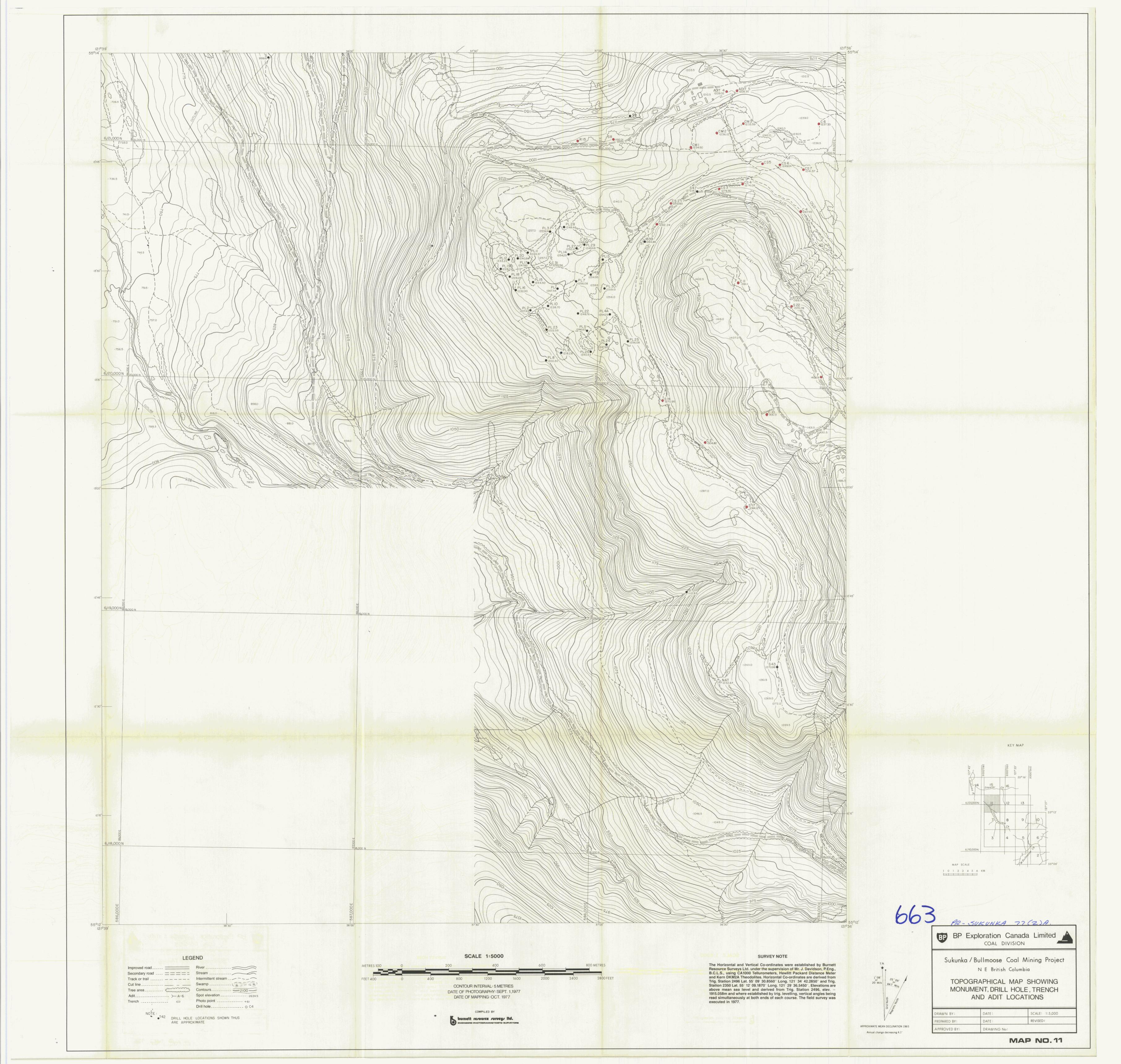
ARE APPROXIMATE

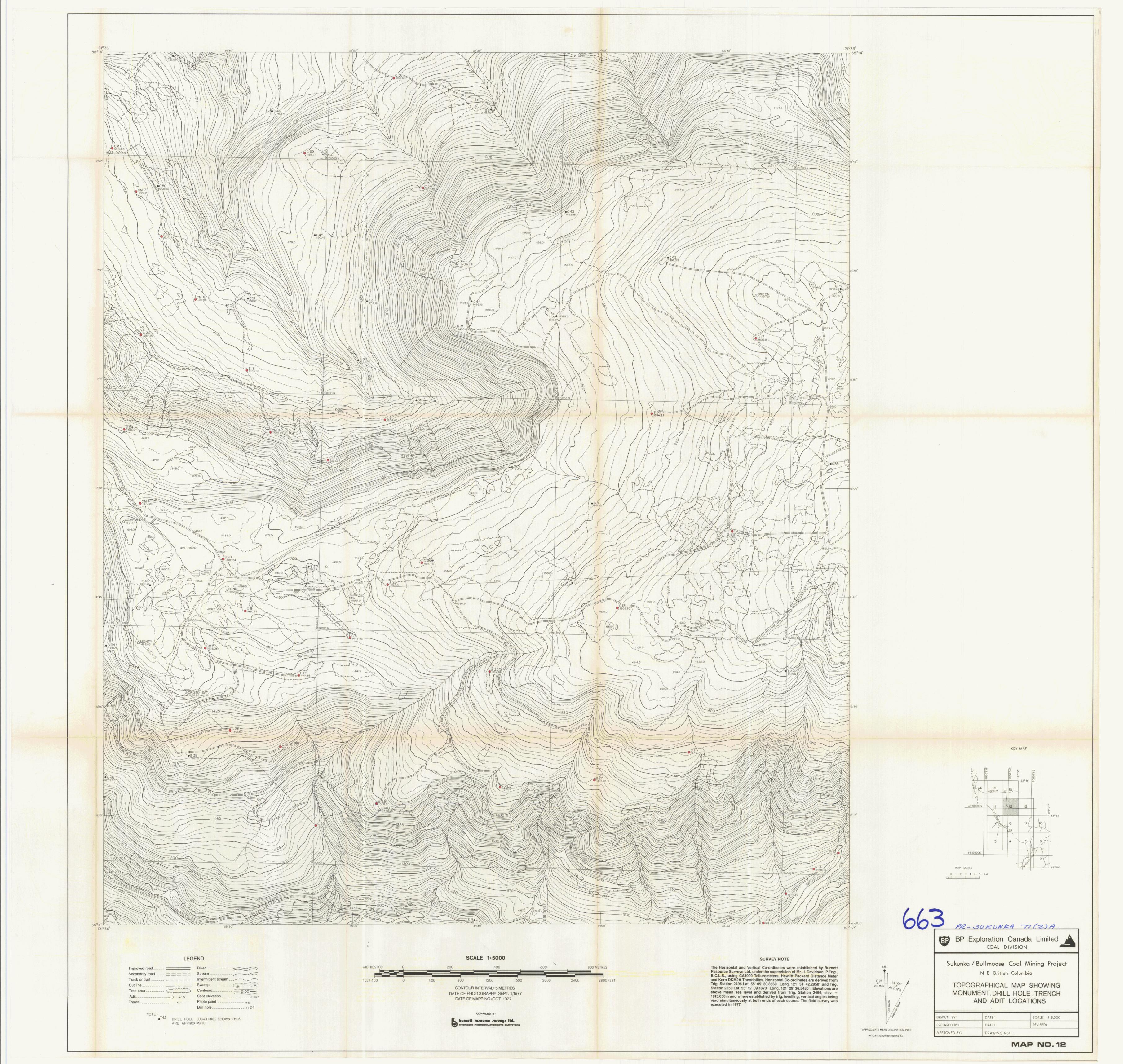


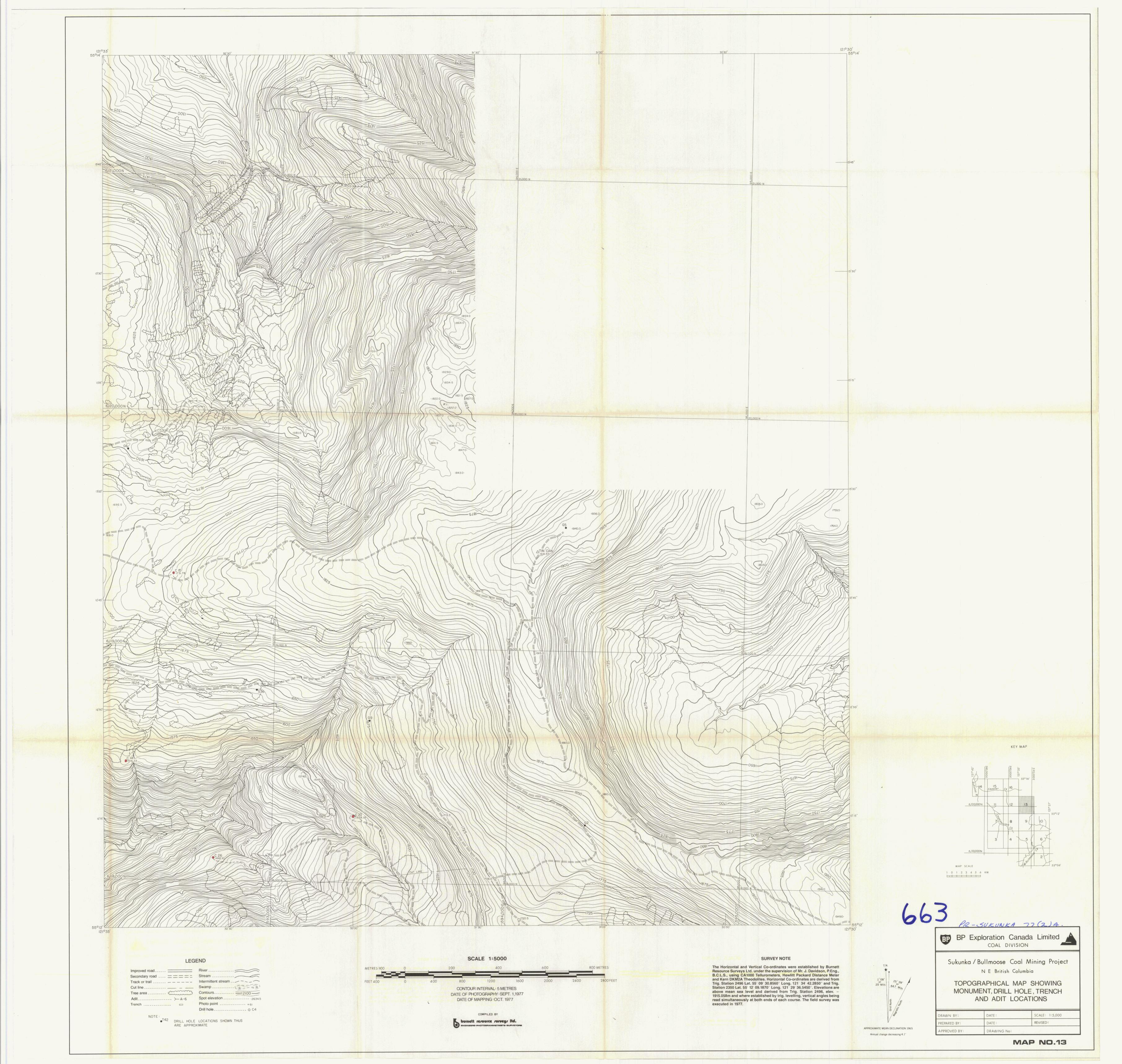


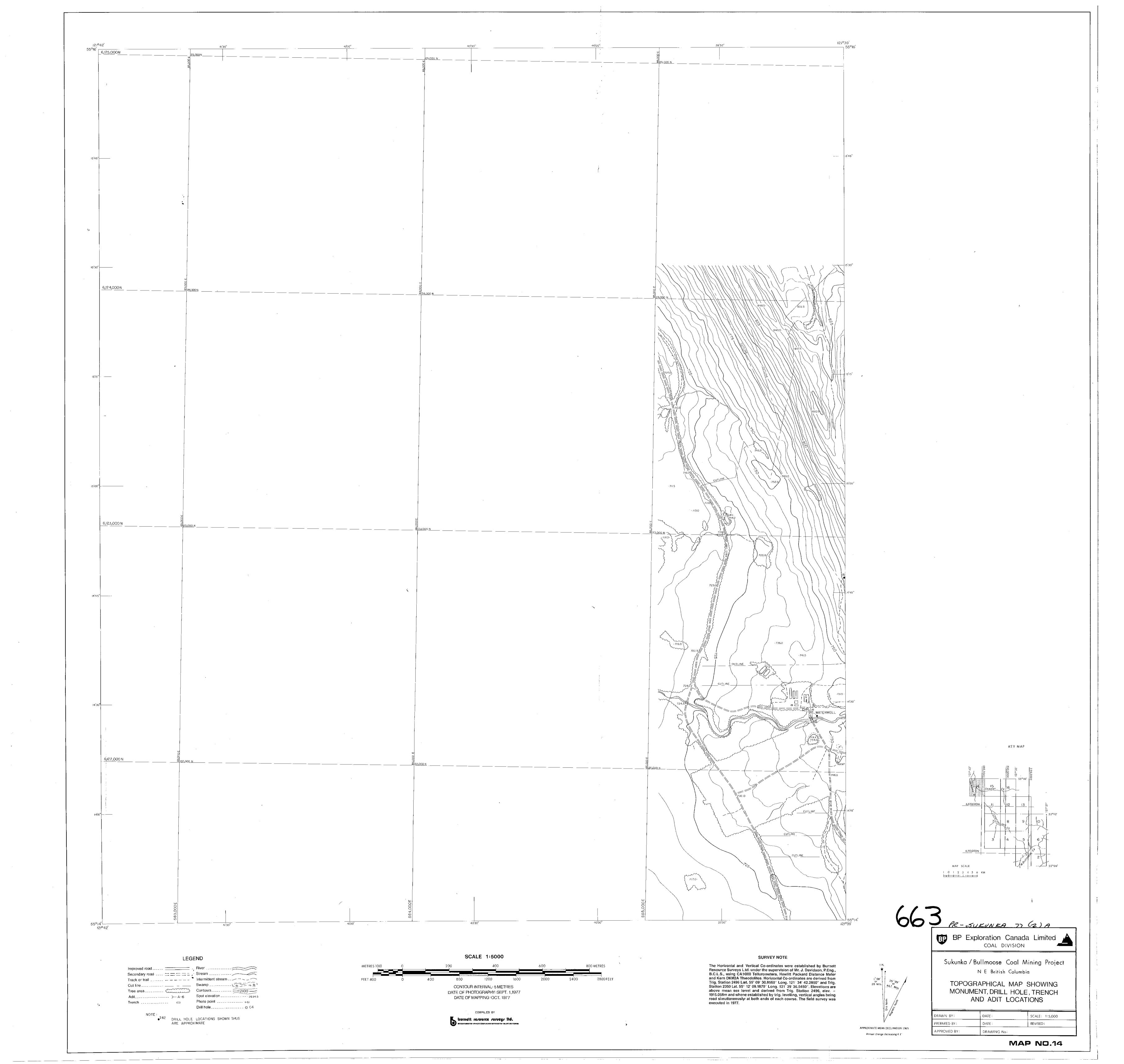


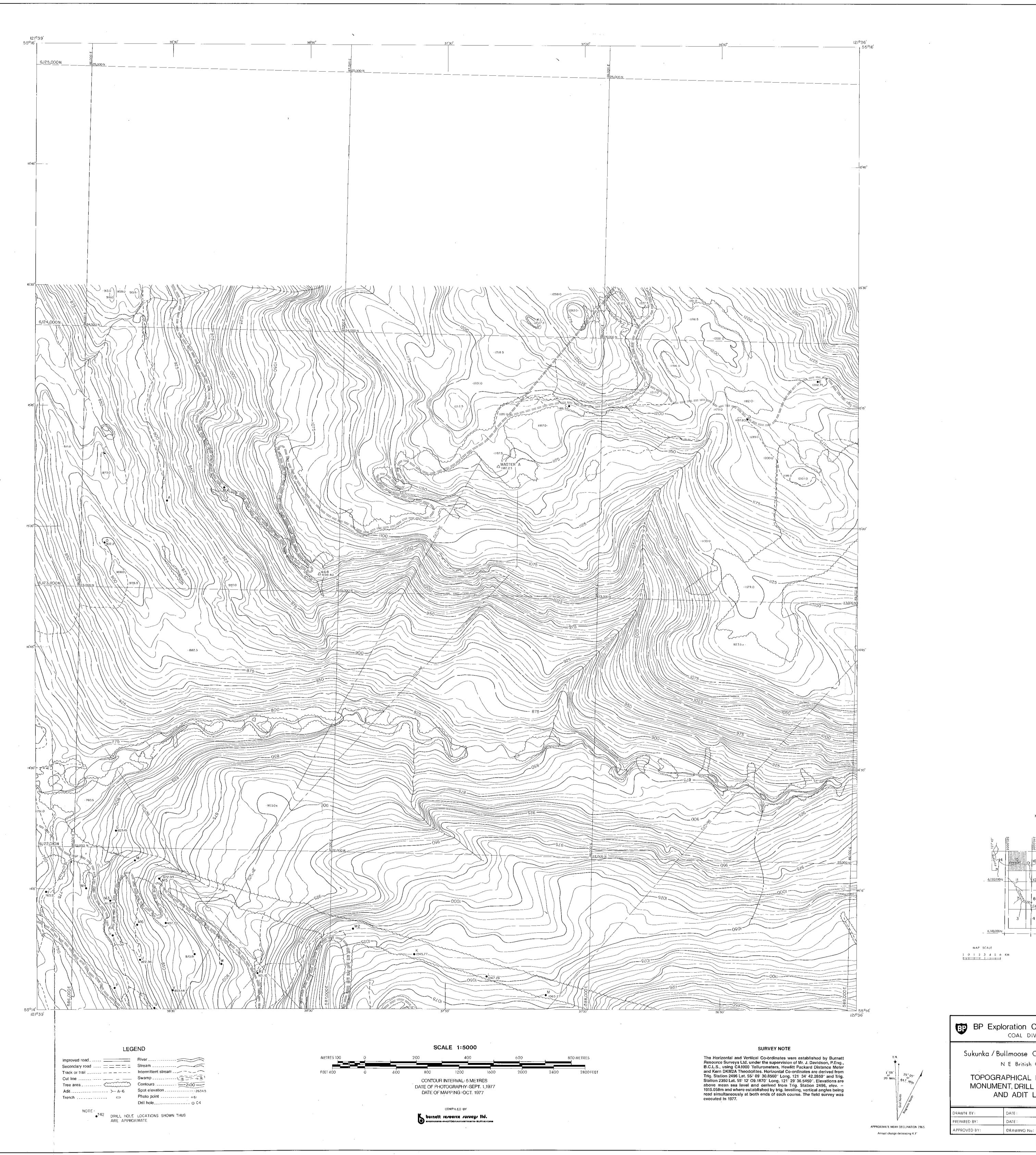


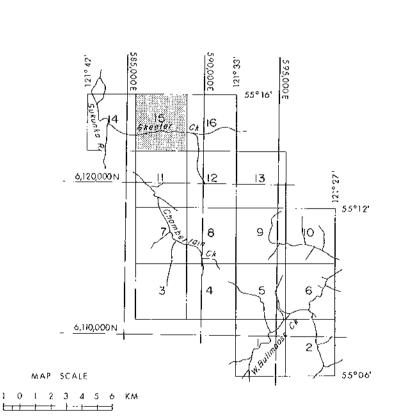












KEY MAP

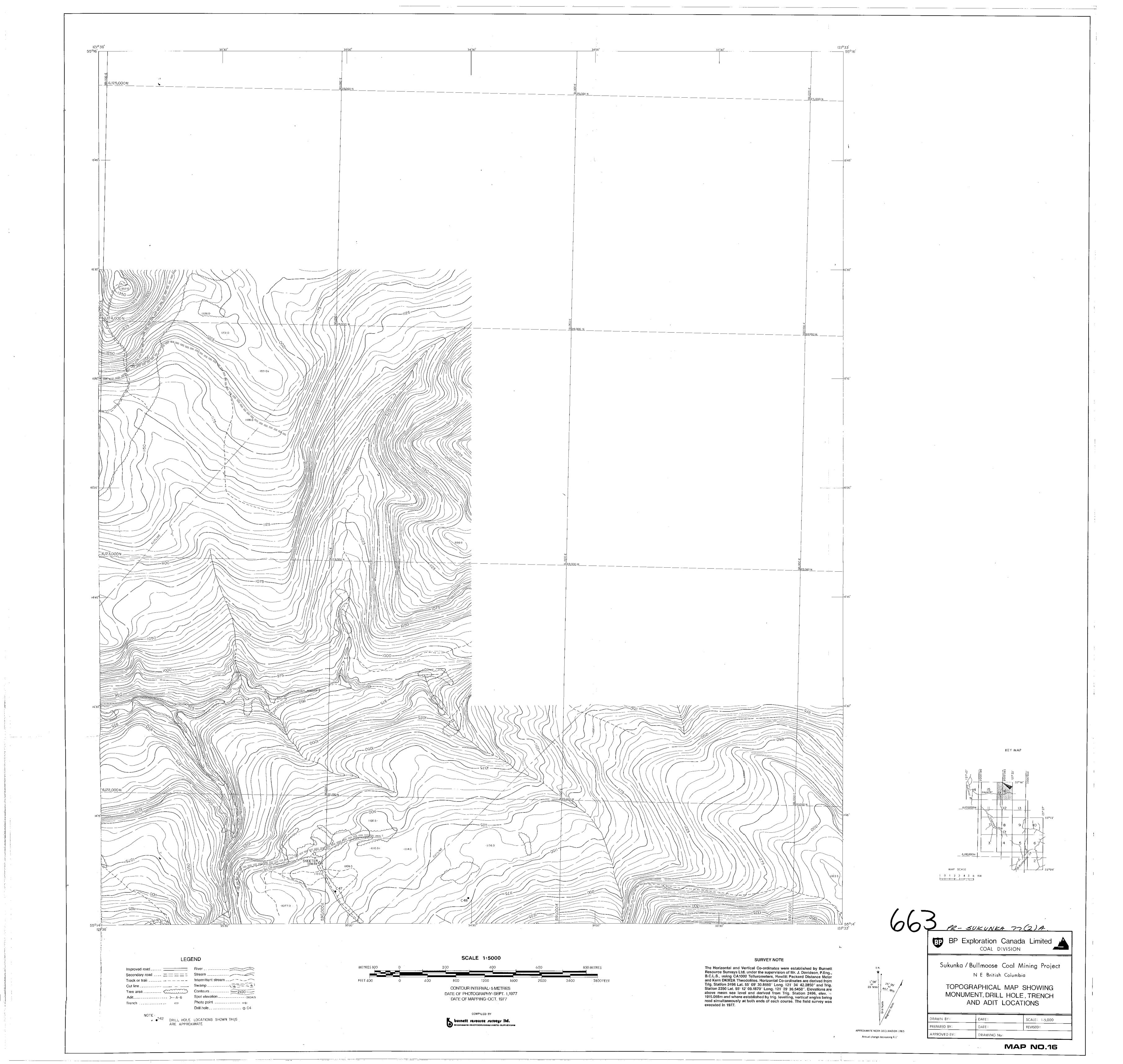
BP Exploration Canada Limited _____

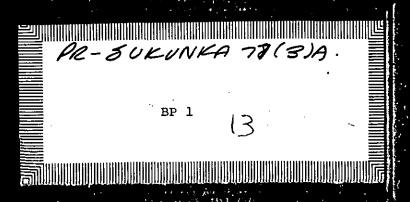
Sukunka/Bullmoose Coal Mining Project N E British Columbia

TOPOGRAPHICAL MAP SHOWING MONUMENT, DRILL HOLE, TRENCH AND ADIT LOCATIONS

SCALE: 1:5,000 REVISED:

MAP NO. 15 🗥





BP COAL CANADA

Fractures and Slickensides

N E

m

B. H. No. BP 1 AREA SUKUNKA Contractor: Tonto Co-ordinates: 6,116,048.85 Commenced: July 1, 1977 593.295.75 Completed: July 17, 1977 Surface Elevation: 1,760.68 Core Size: HQ Casing Left in Hole: Hole Angle: Geologist Depth See detail 12.20-124.81 Ali Chowdry Hole Azimuth: page la Logged by: 230.93-499.19 511.50-547.82 128.44-213.74 Andy Newson Final Depth: 561.71 500.08-509.01 Graham Wallis 550.18-561.71 FORMATION/MEMBER DEPTH THICKNESS ELEVATION Boulder Creek 1,701.78 Hulcross 58.90 58.90 1,507.68 Gates 194.10 253.00 1,377.68 Sukunka 130.00 383.00 1,260.60 Moosebar 500.08 117.08 56.63 1,203.97 U. Gething 556.71 561.71 Total Depth SEAMS DEPTH THICKNESS %RECOVERY ELEVATION 1,254.32 BIRD 506.36 50.1 1,203.97 CHAMBERLAIN 556.71 Shattered zone with slicks 430-432.5 F.PR. Fractured & Slickensided 455, 458 & 470 F.PO. 519.5-520.9 Badly Slickensided F.PO. Structurally disturbed 554 F.PO.

561.71

F.PO.

Sperry-Sun Survey

Date: 16th July 1977

Borehole: BP 1 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: R. W. Wroot

Measured Depth	<u>Tilt</u>	Tilt Direction
550m	1° 30'	N 65° Е
500m	1° 30'	N 50° E
450m	200'	N 60° E
400m	10 30'	N 70 ^о Е
350m	1° 30'	N 60° E
300m	1° 30'	N 60° E
250m	1° 15'	. N 65° E
200m	0° 45'	N 35° E
150m	0° 45 "	N 20° E
100m	0° 30'	$N 1.0^{\circ} W$
50m	0° 15'	s 60° W

BH Nos. 1

BH No	5. I		
Dip o	DEPTH m	TH1CKNESS m	DESCRIPTION
	12.20	12.20	Overburden, no core
5°	58.66	46.46	SILTSTONE/MUDSTONE, medium grey, rapidly alternating layers and lenses of silts and muds and siltstones invariably have small scale cross-lamination and ripple-lamination, mutual boundaries usually erosional, sporadic burrowing, a calcite band at 18.11m fracture filling, very little silt between 23.04-25.41. Bentonitic band at 38.68-38.78 decayed, a vertical fracture at 37.22-37.98, calcite fracture 40.08-40.18, infilled with calcite band 42.34 (3cm) vertical fracture, 44.98-46.65, clean and unfilled, at 47.63-47.68, at 53.5-54.2, dark grey mudstone with occasional silty streaks at 33.21-36.11 also at 51-54, overall 80-85% mud, remainder laminated silts, partially bioturbated at 12.20-12.54, at 54.20-58.66, broadly banded appearance due to frequent sandy/silty lenses, sands very fine-grained, commonly erosional with muddy layers below, sharply defined lamination contact (below) with conglomerate, gradual increase and coarsening of sandy content, and finally changing to granulite and pebbly zone.
5°	58.90	0.24	CONGLOMERATE, granular to finely pebbly and set in medium-grain sandy, argillaceous matrix, ill sorted, clean contact, defining contact with Gates below. HULCROSS GATES
	60.75	1.85	SILTSTONE/MUDSTONE, medium grey, predominently (80%) silty, irregularly laminated, bottom 30cm muds with large blobs 3cm long and disseminated pyrite, calcareous and coaly
	61.70	0.95	COAL SEAM, dominantly durain, some very hard bands, abrupt and clean lower contact.
	62.95	1.25	SILTSTONE/MUDSTONE, medium grey, fine-irregular lamination vaguely banded, microgradations, bottom 10 cm carbonaceous
	63.28	0.33	COAL SEAM, predominantly durain, initial 3cm shaly with large pyrite blob, fractured
5°	66.98	3.70	SILTSTONE/MUDSTONE, medium grey, slight dominence of silts, intermingled, bottom 30 cm very finely sandy, very gradational, stylolite perpendicular to bedding.
6°	73.67	6.69	SANDSTONE, light grey to medium grey, initial 2.4m fine- grained with highly argillaceous layers, ripple-lamination, lamination partially obliterated by organisms, occasional

BH Nos. 1

			
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			thin shale clasts, rest clean medium-grained, cross-laminated and ripple drift laminated, slight medium to fine gradations also at 70.81-71.14 calcareous (good), vertical fracture 68.92-69.22, bottom 1.5m dark and boldly cross-bedded, abrupt below.
	73.92	0.25	COAL, dominantly durain, lower 4 cm friable, abrupt below
·4 ⁰	78.33	4.41	MUDSTONE/SANDSTONE, medium grey/dark grey, 85% silty muds 15% very fine-grained argillaceous sandstones, small gradational units with ripple-bedding, micro slumping and erosional fractures, 6 cm carbonaceous mud, calcareous abrupt
	78 . 63	0.30	SANDSTONE, light grey, medium-grained, fine carbonaceous fragments, weakly calcareous, abrupt and erosional
7°	86.83	8.20	MUDSTONE, medium grey, occasional thin silty lenticles sporadic rusty noduls (calcareous), otherwise homogenous and structureless, bottom 70 cm carbonaceous, and have 33 cm coal/mudstone, now badly broken
8 ⁰	88.01	1.18	SANDSTONE, light/medium grey, very fine-grained, finely interlaminated silts and muds imparting wavy to banded appearance, typical intertidal/mud flat zone, much bioturbation and micro erosional, certain zones akin to Sukunka, calcareous, very gradational, lenticular, ripple-lamination
	88.83	0.82	MUDSTONE, dark grey, upper 15 cm very finely sandy, rest with silty lenticles, locally calcareous, gradational
6°	92.70	3.87	SANDSTONE, light grey, medium-grained, clean and well- sorted, initial 1.42 massive, totally devoid of sedimentary lamination, rest has argillaceous wisps defining current lamination, 23 cm dark grey muddy laminated band, patchily calcareous, gradational
	93.87	1.17	MUDSTONE, dark grey, initial ½ black and carbonaceous, calcitic streaks, probably remains of highly fragmented shells, silty/very fine sand lenticles, partially calcareous, abrupt and erosional at base
	95.32	1.45	SANDSTONE, light grey, medium-grained, initial half homogenous and lacking current lamination, rest cross-bedded, very clean and well-sorted, strongly calcareous, abrupt and erosional
	95.87	0.55	SANDSTONE/SILTSTONE, 70:30, medium grey, sands very fine- grained, richly argillaceous, fine shaly angular clasts in lower fault, micro-erosional features, abrupt and erosional below
6°	98.64	2.77	SANDSTONE, light grey, medium-grained, extra clean and well-sorted, occasional greenish/grey layers emphasising lamination, mostly structureless, in patches strongly calcareous otherwise, gradational

BH Nos.1

	1	<u> </u>	
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	101.14	2.50	SANDSTONE, as above but coarse-grained, locally granular, few over 2.5cm across, dark muddy well-rounded pebbles. sporadic coal fragments, calacreous in patches, gradational
	101.68	0.54	SANDSTONE, light grey, medium-grained, richly calcareous, clean, well-sorted, vaguely cross-bedded, slightly coarsening bottomward, abrupt.
5°	103.53	1.85	SANDSTONE, medium to dark grey, very fine-grained, frequently interlayered with argillaceous content, with generally sharp contacts. lenticular to rippled-bedding, some gradation to fine sands, defined boundaries, occasional vertical burrows, very gradational below.
	104.16	0.63	SANDSTONE, light grey, fine/medium-grained, very clean and sorted, occasional lamination, burrowed fabrics, calcareous, gradational
	106.18	2.02	SANDSTONE, medium grey, dominantly fine-grained, argilla- ceous, thin muddy bands throughout, locally silty, bottom 0.40 silty/muddy, gradational.
5°	107.71	1.53	SILTSTONE, medium to dark grey, richly argillaceous, some
3°	115.90	8.19	muddy layers, bottom 25cm 50% fine sand, erosional SANDSTONE, light/medium grey, fine/medium-grained, frequently interlayered by silts and muds (20%), many clean and sorted zones, finely divided carbonaceous matter emphasizing lamination, local ripple-lamination, mud/sand boundaries erosional to gradational (through silts), bottom 0.66 with large rolled sand balls, slumped layers, sporadically calcareous (medium-grained), very gradational, certain zones homogenous.
	116.77	0.87	MUDSTONE/SILTSTONE, 60:40, lenses of very fine sands, (commonly erosional) some fine sands, rapidly alternating sequence of gradational.
	119.34	2.57	SANDSTONE, medium-grey, dominantly very fine-grained, 15-30cm silty/muddy layers showing extensive bioturbation, relics of primary laminations as chaotic muddy streaks in a sandy/silty matrix, homogenous, massive sands perhaps resulted from complete obliteration of sedimentary structures, some slumping, several rusty nodules and bands, 30cm sandstone, calcareous, gradational.
30	121.91	2.57	MUDSTONE, medium to dark grey, abundantly silty, as lenticles, irregularly laminated, small-scale slumping, bottom 30cm broadly banded, gradational, vertical fracture 30cm deep at 121.00
	124.81	2.90	SILTSTONE/MUDSTONE, 40:60, medium/dark grey, highly mottled and bioturbated silts and muds with lenticles of very fine sand, relics of muddy layers as discrete elongate structures floating in silty matrix, lithologically very similar to Sukunka type facies (normal sedmentary sequence) 20cm fine sandstone at 124.0, large burrows, chaotic fabrics, gradational

BH Nos. 1

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	128.44	3.63	SANDSTONE, fine/medium-grained, clean cross-laminated, gradational intervals from medium-fine, upper 1.4m 70% sand 30% mud, interlayered, large shale interclasts, 0.18 at base mudstone erosional below
	128.80	0.36	CONGLOMERATE, medium pebbles, dominantly cherty, erosional below
	136.00	7.20	MUDSTONE, dark grey, massive, pyritic, occasional coaly streaks, fractures at 131.71-132.29, bottom 1.5m very silty and slightly banded, calcareous, gradational below
8°	137.29	1.29	SILTSTONE, medium grey, highly argillaceous, laminae and layers micro erosional features, bottom 10cm very fine-grained, argillaceous sands strongly calcareous throughout, gradational below
	139.69	2.40	MUDSTONE, upper 2/3 medium grey, vaquely banded calcareou 2 steep fractures along coal intercalations, rest black mudstone carbonaceous with coaly intercalations
			COAL SEAM "E" ZONE
•	140.45	0.76	COAL, all broken up, durain, bottom 0.07m muddy
	145.39	4.94	MUDSTONE, black, 0.30m dirty hard coal at 142.76, rest sporadically carbonaceous and coaly
	148.18	2.79	COAL, 0.25 durain, some carbonaceous mudstone, 0.13 mudstone, carbonaceous, 0.18 durain, 0.25 mudstone, carbonaceous at top, to mudstone at bottom, 0.32 durain, 0.23 mudstone with thin coal layers, 0.40 durain, cleaner 0.57 mudstone, 0.21 durain
3 ⁰	153.75	5.57	MUDSTONE/SILTSTONE, 70:30, medium grey, interclasts of muds and argillaceous silts with small very fine-grained sands with occasional ripple-lamination, silty/sand layer very argillaceous, strongly calcareous, gradational
	154.53	0.78	COAL, durain, 0.07 coal fragmented and mudstone, 0.10 mudstone carbonaceous, 0.28 coal, durain, 0.10 mudstone carbonaceous, 0.23 coal, durain and clarain, fragmented
	155.20	0.67	MUDSTONE, medium grey, homogeneous, erosional below
	156.68	1.48	SANDSTONE, medium-dark grey, fine/medium-grained, very argillaceous, small-scale cross-lamination thin argill-aceous bands, erosional contact with sands, strongly calcareous erosional below
	157.96	1.28	SILTSTONE/MUDSTONE, 50:50, medium-dark grey, richly argillaceous silts with stringers of fine sand, calcareous and erosional
	158.98	1.02	SANDSTONES, medium grey, fine/medium-grained, very argillaceous, penecontemporaneous erosion of contiguous silty muddy beds as interclasts and mudlumps, small-scale

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			cross-lamination and vertical burrowing, strongly calcared erosional below
	159.79	0.81	SANDSTONES, very fine-grained, medium grey, muddy bands, calcareous, gradational below
	160.63	0.84	SANDSTONE, medium grey, medium-grained, upper 0.30m coarse with muddy bands, thin shale clasts small-scale cross-lamination, strongly calcareous, bottom 0.30m verticaly fractured and fragmented, abrupt below
	161.51	0.88	MUDSTONE, dark grey-black, initial 0.28 silty, rest homogeneously carbonaceous gradational
			COAL SEAM "D" ZONE
	162.13	0.62	COAL, 0.12 durain, 0.14 vitrain dominantly, some laminations, 0.28 durain, hard, 0.07 coal and shale, finel broken
	163.86	1:73	MUDSTONES, dark grey to black, carbonaceous, lower meter with numerous coaly bands
10 ⁰	166.27	2.41	SANDSTONE, medium grey, central 0.75m fine-grained, rest very fine-grained, argillaceous laminae and layers, irregular laminae and cross-laminations, gradational below
-	167.39	1.12	MUDSTONES, dark grey-black, carbonaceous, bottom 0.30m slightly ferruginous and silty, gradational below
	168.40	1.01	SILTSTONES/SANDSTONES, medium grey, very fine-grained, argillaceous sandstones with wavy/irregular laminations with numerous silty and muddy bands
	172.10	3.70	MUDSTONE, medium grey homogenous, structureless, gradual
	172.95	0.85	MUDSTONE, canneloid
	174.48	1.53	MUDSTONE, dark grey-black, some canneloid mudstone
			COAL SEAM "C"
	175.11	0.63	COAL, 0.07 coal, shaly, 0.50 durain, thin bands of clarain, 0.06 core loss-coal
	181.97	6.86	SANDSTONE, medium/light grey, dominantly coarse-grained, very clean well-sorted, well cross-bedded, initial 0.28m homogenised succeeding 2.2m with extensive small-scale burrows, tube diam less than 2mm forming a distinct zone, basal 1.5m with granular-conglomeratic bands from 2cm-1.15m in size, weakly calcareous, gradational below
6° 3°	198.48	16.51	SANDSTONES, light grey, medium-grained, very clean and very well-sorted, cross-bedding mostly obliterated, large burrowed zone at 182.82-183.82, conglomeratic granular band at 182.77-182.82 and at 186.64-186.76, non calcareous, passage by interbedding
	200.63	2.15	MUDSTONE/SANDSTONES, 70:30, interbedded sequence of black

<u> </u>	'5. 	1	
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			mudstones, carbonaceous, and fine-grained sands, sands mainly in upper half, very sharp erosional boundaries with muds, some shale clasts passage by interbedding
3°	201.63	1.00	SANDSTONE, light grey, fine-grained, clean, laminated, few muddy bands, passage abrupt below
	202.93	1.30	MUDSTONES/SANDSTONES, 80:20, rapidly alternating lenticular bedding of sands, black-dark grey mudstones mutual sharply defined boundaries, erosional below, conglomerate band at 203.60-203.69
	204.54	1.61	SANDSTONES, light grey, fine-grained, bottom 0.43 medium-grained with silty and sandy intraclasts, laminated and cross-laminated small-scale, generally clean, 0.11 at base conglomerate small pebbles, abrupt below
		·	COAL SEAM "B"
	204.98	0.44	COAL, clean contact below, core loss-coal 0.14m
	208.17	3.19	SILTSTONE/MUDSTONE, 50:50, interbedded and disseminated, medium grey, gradational below
6°	210.88	2.71	SANDSTONES, fine-very fine-grained, medium grey, small-scale cross lamination throughout, intercalated with silty muddy laminae, four muddy intervals each 0.18m equaly spaced within sequence, some slumping and burrowing in bottom 0.56m, muddy contact with coal below, non calcareous throughout.
			COAL SEAM "A"
	211.32	0.44	COAL, 0.07m coal, muddy, 0.14m mudstone carbonaceous, 0.04m coal shaly, 0.06 mudstone hard, carbonaceous, 0.03 coal, hard, durain, shaly, 0.10m durain, fragmented, abrupt below
·	213.74	2.42	CONGLOMERATE, chert and quartzite pebbles, small-medium set in abundance of meidum sand matrix, abrupt below
3°	230.93	17.19	SANDSTONE, light grey, fine to medium-grained, well-weathered, uniform look, well-sorted, massive to laminated low-angle to flat lamination, very calcareous up to 219.60, rest weakly to non calcareous, some intervals homogenous but no evidence of burrowing, very gradational below
	233.93	3.00	SANDSTONE, light grey, fine to very fine-grained, clean and sorted, thin (4-5cm) mud bands with coaly lenses, passage by interbedding
3°	237.93	4.00	SANDSTONE/MUDSTONE, 65:35, sands light grey, very fine- grained, laminated, muds dark grey to black with coaly streaks and lenses and invariably have erosional contacts with sands, calcareous, abrupt
	238.43	0.50	CONGLOMERATE, fine to medium pebbles set in fine sands, upper half about 70% sand 30% pebbles, lower dominantly

BH Nos. 1

Dip	DEPTH m	THICKNESS m	DESCRIPTION
			conglomerate, erosional
3-4°	240.93	2.50	SANDSTONE, light grey, fine to medium-grained, clean and well-sorted, cross-bedded, (some structureless) strongly calcareous, erosional
	245.63	4.70	SANDSTONE/MUDSTONE, 60:40, fine-to medium-grained sands clean interbedded with lenticles/layers of dark grey muds with erosional cross-bedded, boundaries, sporadic burrows, sands strongly calcareous, interbedding
3 [°]	246.93	1.30	SANDSTONE, light grey, fine/medium-grained, argillaceous laminae, parallel lamination, some cross stratified, abundant large muddy intraclasts, strongly calcareous, interbedded below
	249.53	2.60	MUDSTONE/SANDSTONE, 60:40, fine-grained sands, interbedde with dark grey muds, ripple/lenticular lamination, few large burrows, strongly calcareous, interbedding below
2 ⁰	253.00	3.47	SANDSTONE, light grey, fine/medium-grained, clean and well-sorted, strongly calcareous, massive to laminated, muddy layer (less than 5%), interbedding below
	- Principal Community Comm		GATES SUKUNKA
3°	269.11	16.11	SANDSTONE/MUDSTONE/SILTSTONE, Sukunka series consisting of rapidly alternating lenticular to bedded very finegrained, light grey sands with highly bioturbated silty muddy sand clean generally well-laminated and occasionaly calcareous
2 [°]	286.47	17.36	MUDSTONE, Sukunka, dark grey, mottled, highly bioturbated muds and silts with scattered wisps of very fine sand up to 5% and locally calcareous
	290.15	3.68	MUDSTONE/SANDSTONE, 15:85, dark grey muds with two distinct very fine sand intervals, calcareous
	292.39	2.24	SANDSTONE/MUDSTONE, light grey, very fine-grained sands, laminated and locally lamination obliterated by organic activity, calcareous, 80:20
3°	320.91	28.52	MUDSTONE/SILTSTONE, typical mottled and bioturbated lighology less than 5% differentiated, very fine sands
3 ⁰	326.33	5.42	SANDSTONE/MUDSTONE, sands light grey, fine-to very fine-grained, clean, well-laminated, strongly calcareous, intercalations of muds, silty, interval 318.38-319.13, small and large burrows (similar to Gates), 95:5
	333.41	7.08	MUDSTONE/SANDSTONE, rapidly interbedded sequence of very fine sands and silty muds, strongly calcareous 75:20

BH Wos. 1

RH NO	<u> </u>		Y
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
30	340.11	6.70	MUDSTONE/SANDSTOME, very fine sand interbedded with dark grey mudstone, strongly calcareous, 83:17
	356.81	16.70	MUDSTONE/ SILTSTONE, 35:15, wisps and thin layers of silts also mixed intimately with muds due to bioturbation, strongly calcareous, sticky? Bentonitic clay at 352.65-352.68
	383.00	26.19	MUDSTONE, dark grey with stringers and layers of very fine sand and coarse-silts jointly 5-7% scattered throughout, strongly calcareous, steep fractures at 358.00-359.15 and 362.38-363.91.
			SUKUNKA MOOSEBAR
	431.70	48.70	MUDSTONE, dark grey, very homogenous, totally lacking lamination and visible silty/sandy content, calcareous to 383.93, rest totally non-calcareous, no visible sedimentary structure, pyrite blobs and disseminated fractures 383.48, 391.28-391.56, 398.07-399.31, 403.73-404.27, a strongly fractured and shattered zone with well developed slickensided surfaces and some faulted calcite infillings at 430.37-432.51
	435.65	3.95	MUDSTONE, Moosebar interval off and on badly slickensided, broken up and calcite veining.
	499.19	63.54	MUDSTONE, as above, fractured and slickensided intervals, 454.34-455.22, 457.63-459.08, rusty bands 470.68-470.35, broken up at 470.05-471.15, rusty band 471.45-471.60 and 470.31-470.43, fractured 470.43-470.65 and 471.43-471.53, rusty band 471.53-471.61, fracture 482.06-482.32 with 0.07m rusty band in middle, pyritic specks, 473.53-475.05, rusty band 474.79-474.88, rusty band 480.34-480.44, this band fractured and calcite infilled, bentonitic band 481.64-401.72 and juxtaposed 0.05m rusty band, bentonitic bands 486.17-436.22, rusty band at 490.93-491.05 with an elongate muddy structure not impregnated with iron, fragmented at 491.0-492.0 and 492.50-492.86, bentonitic layers at 500.55-500.60, bentonitic band 501.64-501.74m
	500.08	0.89	SANDSTONE, fine-grained, dark grey, calcite on joint planes, minor slickensides on bedding planes, unit becoming glauconitic toward base, pyrite in basal 30mm, core fractures sub-parallel to core axis, calcareous filling in basal 0.20m
			MOOSEBAR UPPER GETHING

BH Nos. 1

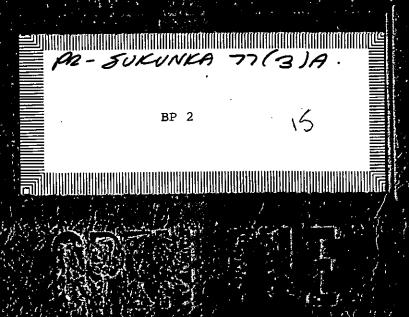
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	G.
	500.48	0.40	SILTSTONE, grading rapidly to mudstone, dark grey, becoming increasing carbonaceous, including plant remains (coaly), toward base of unit
	500.98	0.50	MUDSTONE, dark grey, carbonaceous, core broken
	501.36	0.38	MUDSTONE, dark grey to carbonaceous, slickensided, shear planes, calcite filled at 40° and 50° to core axis?
	501.49	0.13	ROOF OF UPPER PLATE - BIRD SEAM CORE LOSS-COAL
	501.93	0.49	COAL, dull ? and bright ?, possibly weathered, completely broken, possible listric surfaces present
	502.08	0.10	CORE LOSS-ROCK
	502.12	0.04	MUDSTONE, carbonaceous
	502.20	0.08	COAL, as above
	502.22	0.02	COAL, sheared
-	502.28	0.06	MUDSTONE, carbonaceous containing coaly wisps and lenses penetrated structure of mudstone into overlying coal, basal bedding plane slickensided
	502.32	0.04	CORE LOSS-ROCK
	502.74	0.42	COAL, apparently dull, hackly fracture, bedding 45° to core axis, slickensided throughout but as small-scale planes rather than continuous through core, basal 0.05m exhibits more intense shearing, zone from 501.42m to base seam possible fault zone
			FLOOR OF UPPER PLATE - BIRD SEAM
	504.80	2.06	MUDSTONE, dark grey, slightly carbonaceous, throughout with coaly blebs in basal 0.07m, silty zone grading up and down into mudstone in centre of unit, slickensided fracture plane at 30° to core axis, carbonaceous and dolomitic on joint face, 1.03 core loss at base - probabl fault zone
			ROOF OF LOWER PLATE - BIRD SEAM
	505.90	1.10	COAL, dull and bright, sheared throughout exhibiting listric surfaces, shear planes 40° and 50° to core axis, core varying from moderately broken to completely disintegrated
	506.36	0.46	CORE LOSS-COAL
		,	FLOOR OF LOWER PLATE - BIRD SEAM
	507.26	0.90	SANDSTONE, fine-to medium-grained, quartz/lithic, medium grey, carbonaceous, fracture plane at 30° to 40° to core axis, and irregular listric surfaces on carbonaceous partings, fracture planes recemented with dolomite

BH Nos. 1

		TILL 0.1115.00	
Dip O	DEPTH 	THICKNESS	DESCRIPTION
	m	u)	
	509.01	1.75	SANDSTONE, fine-to medium-grained, light grey, quartz- lithic, micaceous, massive, cross-bedded in part, well cemented, carbonaceous flecks on bedding planes.
	511.50	2.49	SANDSTONE, medium grey, dominantly cherty, siliceous, fine-to medium-grained, hard, cross-bedded, gradational below
	513.63	2.13	SANDSTONE, medium grey, medium-grained, siliceous, well-sorted, well-washed
	513.88	0.25	SANDSTONE, medium-grained, siliceous, brecciated and fragmented
	518.80	4.92	SANDSTONE, light/medium grey, medium-to coarse-grained, clean, well-sorted, cross-bedded, weakly calcareous, distinctive small burrows (similar to gates) at 514.45-515.42, several brittle fractures (and calcite lined)
	530.98	12.18	SANDSTONE, light/medium-grained, clean, well-sorted, cross-bedded, calcareous, large Gates type burrows at 519.09-520.19, badly slickensided at 519.52-519.75, almost entirely catcite filled fracture at 520.87-520.94, extensive calcite veined zone, 529.26-530.11 variously fractured and recemented, cross-bedding angle 25 slightly more calcareous.
	534.17	3.19	SANDSTONE, light grey, fine-grained, very clean and well- sorted, cross-bedded, strongly calcareous, abrupt below, vertical fracture in bottom 0.35m
35°	537.53	3.36	SANDSTONE, light grey, fine-grained, some argillaceous layers, mostly ripple-lamination, becoming progressively muddier downward, strongly calcareous
3°	539.71	2.18	MUDSTONE, dark grey, lenticles and ripples of silts, bottom 1.05m carbonaceous
	540.11	0.40	MUDSTONE, dark grey-to black, shell band-marker, fine silty ripples
	540.64	0.53	COAL/MUDSTONE, interval half carbonaceous mudstone, rest friable coal only 0.05m present
	546.64	6.00	MUDSTONE, medium to dark grey, very silty (30%) at 541.30-543.15 and sporadically calcareous, rest slightly carbonaceous and with numerous rusty bands.
	547.22	0.58	MUDSTONE, carbonaceous, fragmented with numerous coaly stringers
	547.82	0.60	SANDSTONE, initial 0.25m dark grey muds, rest very fine- grained, argillaceous sands, abundant slumping and disturbed lamination in upper half, strongly calcareous, gradational below
	550.18	2.36	SANDSTONE, fine-grained with mudstone lenses and bands, calcite on joint planes, calcite cement, increasing mud

BH Nos. 1

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			toward base of unit, grading to mudstone, with siltstone stringers and lenses
	551.72	1.54	MUDSTONE, mid grey, planar-bedding when split, polished surfaces due to stress on some bedding planes, and on fracture planes toward base of unit accompanied by calcite
	551.84	0.12	CORE LOSS-COAL ROOF OF CHAMBERLAIN SEAM
	552.27	0.43	COAL, dull with minor bright bands in part, core broken throughout, fractures angular, occasional zones of coal with listric surfaces
	552.38	0.11	COAL, dull with minor bright bands
	552.44	0.06	COAL, bright
	552.70	0.26	COAL, dull and bright
			FLOOR OF UPPER PLATE
	552.81	0.11	MUDSTONE, carbonaceous to dark grey
25 [°]	554.74	1.93	SILTSTONE, mid-grey with mudstone intercalations, carbonaceous in basal 0.25m, basal 1.40m structurally disturbed, fracture planes at 65° to core axis, calcitedolomite filled, intense deformation at top of disturbed zones, possible fault contact with coal, slickensided
			ROOF OF SEAM
	556.05	1.31	COAL, sheared throughout, listric surfaces common, angul fracture planes throughout unit
	556.71	0.66	CORE LOSS-COAL
			BASE OF SEAM
	561.71	5.00	SANDSTONE, fine-grained, dark to mid-grey with minor mudstone intercalations, fracture planes, slickensided, minor calcite/dolomite on planes, planes at 60-80° to core axis, core broken at contact with overlying seam floor, fracture toward base of unit contains coaly material, basal 1.90m broken
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AREA

SUKUNKA

B. H. No. BP* 2

Contractor:

Longyear

July 1, 1977

Commenced: Completed:

July 20, 1977

Co-ordinates: 6,114,870.28

N

Ε

593,674.49 Surface Elevation: 1,661.50

m

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

no

information

Ali Chowdry

Geologist

Depth 9.14-178.35

Hole Azimuth:

Logged by:

371.90-407.65 414.40-670.86

Andy Newson

185.10-371.40

Final Depth:

670.86

Graham Wallis

408.69-413.84

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	165.40	165.40	1,496.10
Sukunka	295.35	129.95	1,366.15
Moosebar	373.72	78.37	1,287.78
U. Gething Total Depth	414.40	40.68	1,247.10

SEAMS DEPTH THICKNESS %RECOVERY ELEVATION 1,284.90 BIRD 376.60 2.88 2.60 1,247.10 414.40 CHAMBERLAIN

BH Nos. 2

	75. 2	<u>T </u>	
Dip	DEPTH	THICKNESS	DESCRIPTION
0	nı	m	
	9.14	9.14	CASING IN OVERBURDEN
6°	12.73	3.59	SANDSTONE, light grey, fine/medium-grained, well-washed, well-sorted, strongly calcareous, cross-bedded, few weathered intervals
. 5 ⁰	20.73	8.00	SANDSTONE, light grey, medium-grained, generally clean and sorted, sporadic silty/muddy layers and mud clasts, cross-bedded, about 30% of interval intermittently weathered, calcareous, interbedded below
5 ⁰	21.61	0.88	SANDSTONE/MUDSTONE, medium grey, slight dominance of muds-very silty, sands fine-grained, argillaceous, large slump structures in basal 0.17m, patchily calcareous, gradational
	26.52	4.91	SILTSTONE, medium grey, richly argillaceous, occasional wisps of very fine sand, few rusty bands, highly decayed at 23.27-23.77, fractured at 24.17 & 24.87, devoid of lamination, gradational
,	29.53	3.01	SANDSTONE/SILTSTONE/MUDSTONE, medium/dark grey, extensively bioturbated sediments with large and small burrows, relict lamination, whorled fabrics, all lithologies intimately associated, brief intervals seem to have survived with primary lamination, erosional below
40	33.53	4.00 ·	SANDSTONE, light grey, fine-grained, cross-laminated (regularly), generally clean, discrete rusty bands up to 5cm, abrupt below
	34.02	0.49	CONGLOMERATE, multi-coloured granules (dominent) some fine to medium pebbles in lower 0.25m, muddy band 5cm in middle, erosional
	35.48	1.46	MUDSTONE, medium grey, massive, lower 0.70m with several coaly lenses, progressively siltier below, gradational
	36.58	1.10	SANDSTONE, medium grey, very fine-grained, ripple- lamination, highly argillaceous (thin bands and laminae), strongly calcareous, gradational
	37.43	0.85	MUDSTONE, medium to dark grey, richly silty-as thin bands, richly calcareous, carbonaceous intercalations in lower 0.40cm, gradational
	39.91	2.48	SILTSTONES, medium grey, highly argillaceous, thin ripples of very fine sands, richly calcareous, gradational
	40.41	0.50	MUDSTONE, black, upper half slightly silty, rest highly carbonaceous
	40.99	0.58	SANDSTONE, medium grey, very fine-grained, irregularly laminated, argillaceous, few rusty bands, strongly calcareous, gradational
5°	42.57	1.58	SILTSTONE, medium to dark grey, broadly banded, very argillaceous (20%), 1 or 2 coal lenses, weakly calcareous very gradational

BH Nos. 2

BH Nos	5. 2		
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	45.42	2.85	MUDSTONE, dark grey to black, broadly banded due to regular silty intercalations, highly irregular, rusty brown patches or nodules that are highly calcareous and regular throughout
	46.87	1.45	MUDSTONE, medium grey, little or no silt, lower 0.80m very carbonaceous, 0.19m silty muddy band with extensive calcite filled fractured at 45.62m, no significant movement involved here, very gradational to coal seam beneath
	l		COAL SEAM TOP OF E ZONE
	47.48	0.61	COAL, dominantly vitrian 0.22m COAL, dominantly durain 0.22m MUDSTONE, very hard band, carbonaceous 0.07m COAL, dominantly durain 0.10m
	51.48	4.00	MUDSTONE, black, 30% highly carbonaceous and bone coal zones, slickensides from 49.07 to 49.30, core loss of .56 between 49.07 and 49.99
	53.03	1.55	COAL, mostly bone coal, 25% hard durain
	55.82	2.79	SILTSTONE, medium grey, highly argillaceous, very fine- grained argillaceous sand band at 54.13 to 54.84, unit as a whole exhibits delicate slumping and hence chaotic lamination and banding irregular rusty patches, strongly calcareous, unit as a whole is weakly calcareous, highly sticky clay zone of .05m at base, dark grey
	57.10	1.28	SILTSTONE/SANDSTONE, 50:50, sandstone fine-grained, cross laminated, calcareous throughout, medium grey, gradational
5-6°	61.26	4.16	MUDSTONE/SILTSTONE & SANDSTONE, 60:40, broadly interbedded medium grey to dark grey, calcareous in sands and silts only, sand generally very fine-grained, passage by interbedding
	66.59	5:33	MUDSTONE, medium grey, numerous rusty bands, homogeneously silty, patchily calcareous, bottom 0.30 very carbonaceous, cannelised
			COAL SEAM D ZONE
	68.21	1.62	COAL, durain 0.55m, canneloid mudstone 0.23m, carbonaceous bone coal and carbonaceous mudstone 0.84m, gradational base
40	69.80	1.59	SILTSTONE, medium grey, richly argillaceous, lenses of very fine sands, weakly calcareous, erosional below
	74.33	4.53	SANDSTONE, medium grey, very fine-grained, argillaceous, muddy interval 0.70m thick, small-scale cross-lamination and ripple-bedding, sporadically calcareous, two vertical fractures, abrupt below
5°	77.33	3.00	MUDSTONE, medium/dark grey, sparingly silty, locally fractured, very fine-grained sands at 77.26-77.52, very argillaceous and highly calcareous, gradational

BH Nos. 2

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	U6-
	,		COAL SEAM C
	77.84	0.51	COAL & MUDSTONE 0.13, CORE LOSS-COAL 0.06, hard durain, erosional below 0.32
	87.30 K	9.46	SANDSTONE, light grey, medium to coarse-grained, gradational intervals, very clean and well-sorted, large-scale cross-stratification throughout, massive burrowed zone (2mm or less across) at 80.85-81.85, very coarse-grained at 84.60-85.10 (as gradational intervals), large burrows 85.84-86.84, small scattered pebbles in 87.02-87.30, non calcareous, gradational
4-5°	102.39	15.09	SANDSTONE, light grey, medium-grained, extremely clean and uniform, cross-bedded, many large intervals devoid of any current lamination, non calcareous throughout, 0.25m thick muddy band, clean vertical fracture at 100.19-101.69 very gradational below
	107.65	5.26	SANDSTONE, light grey, fine-grained, well-washed and sorted, microbanding and microstylolite, low angle to parallel lamination, large intervals structureless (predominant) dark grey muddy band with sand wisps and some pyrite at 103.25-103.47, and 107.46-107.67, gradational below, non calcareous throughout
2 [°]	108.65	1.00	SANDSTONE/MUDSTONE, 70:30, medium/dark grey, very fine- grained argillaceous sands, frequently interbedded with mud layers up to 15mm thick with very sharp and scoured boundaries, parallel lamination to ripple-lamination, abrupt below
	110.32	1.67	CONGLOMERATE, fine to medium pebbles, well packed with little sand matrix, fine-grained sandstone at 110.0-110.43, muddy/silty band at 110.83-111.08, abrupt below
	110 02	0.60	COAL SEAM B
	110.92	0.60	COAL, clean coal, mixture of durain and vitrain, core loss-coal 0.06 m
3°	114.48	3.56	SANDSTONE/SILTSTONE, 60:40, medium grey, very fine-grained sands interlayered (10-15mm) with argillaceous silts, ubiquitous small-scale cross-lamination, initial 0.70m dark grey muds with coaly intercalations, gradational below
			COAL ZONE A
	115.60	1.12	MUDSTONE, dark grey/black, middle very carbonaceous and with coaly layers, abrupt below
	126.87	11.27	CONGLOMERATE, well-packed coarse granules to small pebbles almost to exclusion of matrix, certain intervals fairly sorted and have sub-rounded pebbles, bottom 1.5 coarsely
	,	·	granular, abrupt below
	440	<u> </u>	

BH Nos. 2

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	140.24	13.37	SANDSTONE, light grey, fine to medium-grained, extremely clean and sorted, cross-bedded, non calcareous, bottom ward getting argillaceous, gradational
3 ⁰	142.75	2.51	SANDSTONE/MUDSTONE, light grey to dark grey, broadly interbedded fine sands and muds, two 10-15cm granular intervals
	144.04	1.29	CONGLOMERATE, well-packed granules to very small pebbles, locally well-sorted, abrupt below
3-4 ⁰	157.50	.13-46	SANDSTONE, light grey, fine/medium-grained, very ofean, uniform, sorted, ubiquitous cross-bedding, local concentration of finely divided carbonaceous matter (emphasizin lamination) between 152.30-154.75, strongly calcareous throughout, arbitrary cut-off
	162.47	4.97	SANDSTONE, same as above except fine-grained and with muddy bands (15%), interbedded below
	165.40	2.93	SANDSTONE/MUDSTONE, 50:50, basel of Gates characterized by fine lenticular sands and dark grey muds, sharp material boundaries, some burrowing, calcareous
			GATES SUKUNKA
	185.10	19.70	SHALE, silty with occasional bands of fine sand showing well developed bedding, shales disturbed by slumps and bioturbation, shales/silts:sand 87:13
8°	187.04	1.94	SHALE, silty, bioturbated with worm burrows (small), fine sands showing bedding, shales/silts:sand 90:10
	190.50	3.46	SHALE, silty with occasional bands of fine sand showing well developed bedding, shales fairly uniform (90:10 shale:sand)
	195.37	4.87	SHALE, silty, bioturbated with burrows (large and small), homogeneous
į	199.35	3.98	SILTSTONE/SANDSTONE, fine-grained sandstone, argillaceous well developed large and small burrows, poorly bedded, slumped and bioturbated
	212.72	13.37	SANDSTONE/SILTSTONE, very fine-grained sandstone, argill- aceous, bands of fine-grained sandstone with well developed bedding and cross-bedding, bulk of the unit bioturbated and distrubed, minor shaley bands, showing listric surfaces

BH Nos. 2

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
	228.83	16.11	SHALE, silty with minor fine sandstone bands, many small worm burrows with some large vertical burrows, some slump structures especially in the sands, shale/silty:sands 95:
	238.05	9.22	SANDSTONE, very fine-grained, medium grey, minor interbedded shaley layers, sands well-bedded and cross-bedded, some disturbence, bioturbation zone with large burrows 229.33m
6°	263.66	25.61	SHALE, silty, fine-grained sandstone bands showing well- developed bedding and cross-bedding, shale disturbed with load structures between shales and sands, shale/silt:sand 80:20
	295.35	31.69	SHALE, silty, with very minor fine sandstone bands, unifo gentle disturbed with minor bioturbation, small worm burrows common, shale/silty:sand 90:10
			:
	!		SUKUNKA MOOSEBAR
-	371.40	76.05	SHALE, silty, black, uniform, monotonous, no silty or sandy interbeds, fine pyrite infillings, vertical fracture at 304.10, iron cemented 345.23, 348.80, 254.87 (with calcite fractures and listric surfaces) 363.00, Bentonite hard at 358.24, bentonite soft at 362.02m, bentonite hard at 367.61
;	371.90	0.50	MUDSTONE, dark grey, upper half with two bentonite bands, each 1cm thick, rest 25-30% bentonitic, slightly rusty an heavier than normal, contact with rocks below is ground out
	373.72	1.82	SANDSTONE, black, fine-grained, extremely hard, siliceous to argillaceous, carbonized fragments, contact with coal ground out
-			COAL SEAM BIRD
	376.60	2.88	COAL, see coal sheet for detail, lower contact abrupt
	383.71	7.11	SANDSTONE, dark grey, medium-grained, very hard, siliceous, moderately-sorted, dominance of cherty component, cross-bedded, very gradational below, initial 0.60 with two muddy/coaly stringers
6°	395.02	11.31	SANDSTONE, medium/dark grey, fine/medium-grained, clean, cross-bedded, bottom 0.55 with argillaceous intercalation bottomwards becoming progressively calcareous, gradations
	395.19	0.17	MUDSTONE, dark grey, hard, silty, slightly carbonaceous, slightly calcareous, gradational

BH Nos. 2

Dip O	DEPTH m	THICKNESS	DESCRIPTION
		m	
	395.70	0.51	SANDSTONE, medium grey, fine/medium-grained, very fine sands and argillaceous in middle 0.08m, moderately calcar eous, gradational
1-5 ⁰	401.43	5.73	MUDSTONE/SANDSTONE, medium/dark grey, upper half dominant sandy, lower half dominantly muddy, sandstones very fine-grained, argillaceous, characterized by small-scale cross-lamination and micro-ripples, gradational to erosional contacts within units, laminae and layers sometimes laterally broken up, sporadic burrowing, finely comminuted carbonaceous matter, ubiquitous in sands, calcareous, small-scale sedimentary cycles repeated after few centimeters, some large slumps in upper sequence
	403.90	2.47	SANDSTONE, light/medium grey, fine to very fine-grained, small-scale cross-lamination, numerous burrows in upper 1.50m and partially homogenized, frequent thin argillaceo bands, bottom 0.45m muddy sands with abundant pelecypod shells, disarticulated to whole, abrupt contact with coal
	101.00	0.00	COAL SEAM, SHELLY, EQUIVALENT
	404.89	0.99	COAL, predominantly durain, bottom very muddy
:	407.65	2.76	SANDSTONE, medium grey, very fine-grained, argillaceous (25-30%), irregularly laminated, calcareous, very gradational lower contact
	408.69	1.04	MUDSTONE, mid to dark grey, containing siltstone inter- calations to 5mm, bedding planar and tending toward fissi
	409.20	0.51	MUDSTONE, dark grey, carbonaceous, contains carbonaceous partings, bedding planar, slightly fissile, increasingly carbonaceous toward base of unit, zone of listric surface carbonaceous at 0.33m above unit base
	409.40	0.20	MUDSTONE, dark grey, carbonaceous, calcareous
			ROOF OF CHAMBERLAIN SEAM
	409.57	0.17	COAL, bright, containing lenses of very bright coal to 2m thick and blebs of dull coal to 3mm thick, occasional lenses showing conchoidal fracture, cleat moderately well developed
	409.68	0.11	COAL, dull with minor bright bands, cleat moderately well developed, angular, fracture angular
	409.73	0.05	COAL, dull
	409.76	0.03	COAL, dull with minor bright bands
00	409.82	0.06	COAL, dull and bright
1	409.87	0.05	COAL, bright with minor dull bands
		it	•

BH Nos. 2

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	409.95	0.05	COAL, dull with minor bright bands, very minor lenses of sub lustrous coal
10 ⁰	410.15	0.20	COAL, bright, conchoidal, well developed cleat, highly lustrous, core broken
	410.19	0.04	COAL, dull with minor bright bands
	410.22	0.03	COAL, dull
-	410.30	0.08	COAL, dull and bright, contains two vertical joints fillowith stony coal in basal 0.05 thickness 2mm and 8mm
	410.42	0.12	COAL, dull with minor bright bands, cleat development better in central 30mm
	410.46	0.04	COAL, bright with minor dull bands
10 ⁰	410.54	0.08	COAL, dull with minor bright bands, minor evidence of slip on bedding plane, dull coal more lustrous than normal dull coal
	410.57	0.03	COAL, dull and bright in 2 15mm bands
	410.68	0.11	COAL, bright with minor dull bands and minor extremely bright lenses, contains one stone coaly lense to 1.5mm thick
5°	410.72	0.04	COAL, bright with minor dull bands
	410.74	0.02	COAL, dull with minor bright bands
	410.75	0.01	COAL, bright
	410.83	0.08	COAL, dull with minor bright bands, dull coal slightly lustrous
	410.92	0.09	COAL, dull
	410.95	0.03	COAL, bright with minor dull bands
	410.99	0.04	COAL, dull with minor bright bands both as discrete bands and very fine dispersions
	411.03	0.04	COAL, bright with minor dull bands
	411.32	0.29	COAL, dull and bright
	411.49	0.17	COAL, dull and bright indiscrete bands to 25mm thick
	411.58	0.09	COAL, dull with minor bright bands both as discrete bands to 2mm thick and as very fine dispersions and blebs, dul coal is lustrous
	411.66	0.08	COAL, dull with minor bright bands, dull coal tending to lustrous
-	411.71	0.05	COAL, bright with minor dull bands
	411.84	0.13	COAL, dull and bright, as above for 0.085m unit
-	411.92	0.08	COAL, dull and bright banded, bright to 10mm

BH Nos. 2

Dip	DEPTH	THICKNESS	DESCRIPTION
0	ιη	m	
	411.94	0.02	COAL, dull
	412.00	0.06	COAL, dull and bright, dull coal lustrous, bright coal bands to 5mm thick
	412.03	0.03	COAL, bright
	412.08	0.05	COAL, dull, 30mm with basal 20mm containing bright coal bands to 4mm
	412.18	0.10	COAL, bright with minor dull bands, predominance of brigh coal has a hackly fracture
	412.29	0.11	COAL, dull with minor bright bands, rare 'earthy' coal ba
	412.33	0.04	COAL, bright
	412.40	0.07	COAL, dull with minor bright bands
	412.44	0.04	COAL, dull with minor bright bands, dull coal lustrous, hackly fracture
	412.47	0.03	COAL, bright
15 ⁰	412.63	0.16	COAL, dull with minor bright bands, bright coal to 4mm thick, dull coal tending to lustrous, slickenside on bedding plane
	412.72	0.09	COAL, bright, well developed cleat, listric surfaces and possible variation in bedding plane
	413.00	0.28	COAL, dull and bright, listric surfaces common, unit sheared and completely broken
			FLOOR OF CHAMBERLAIN SEAM
	413.84	0.84	MUDSTONE, carbonaceous, core fractured, calcite on bedding plane below seam, coal and carbonaceous blebs accompanied in part with listric surfaces/slickensides 0.70m below unit top for 0.14m
	414.40	0.56	MUDSTONE, dark grey, mostly carbonaceous and hard, bottom 0.25m canneloid mudstone, contact with sands abrupt and slightly erosional
	417.88	3.48	SANDSTONE, light/medium grey, medium-grained, clean, sort siliceous, dominance of dark cherty components mostly devoid of lamination, gradational
5 ⁰	426.81	8.93	SANDSTONE, light grey, fine/medium-grained, very clean, uniform, well-sorted, cross-laminated, strongly calcar-eous, passage below by interbedding
4-5°	430.24	3.43	SANDSTONE/MUDSTONE, rapidly alternating zones of very fines sands and muds, gradational to erosional boundaries, lenticles of mud, sand filled burrows in muds (through silts), very intertidal looking, medium to coarse sands with muddy-sharp intraclasts at 429.21-429.97, strongly calcareous, coarsening below

BH Nos. 2

	'S . 2 Γ	T	
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	441.87	11.63	SANDSTONE, light grey, fine/medium-grained, very clean, sorted, cross-stratified, strongly calcareous, initial 0.16m has thin bands of granulite and very fine pebbles, few Gates type large but discrete burrows, large 0.025m rusty intraclast
	442.17	0.30	SANDSTONE, similar to above but thoroughly riddled with large Gates type burrows
Ц <mark>О</mark>	450.86	8.69	SANDSTONE, light grey, fine-grained, very clean, extremely well-sorted, strongly calcareous, cross-laminated, widely spaced muddy layers (5-7% in total), some shale intraclasts, occasional large burrows, interbedded below
4 ⁰	456.30	5.44	SANDSTONE/MUDSTONE, rapidly alternating very fine sands to coarse silts and mudstones, generally abrupt and erosional contacts, many burrows (the size of pelecypod shells), vertical tubes, very intertidal but more burrowing, very strongly calcareous 55:45
3-5°	473.63	17,33	MUDSTONE/SANDSTONE, dark grey, richly silty muds interbedded with very fine, laminated and rippled, extensively bioturbated, abundant finely comminuted carbonaceous matter throughout, some coaly stringers (evident on breaking), small pelecypods at 464.0m, strongly calcareous succession some ways akin to Sukunka but this one bioturbated to a lesser degree, 80:20
•	483.64	10.01	MUDSTONE, upper half medium grey, rest dark grey, homogeneous (no sédimentary lamination), much burrowing (with silty wisps 4-5%), Moosebar type, much finely divided plant debris (as revealed on freshly broken surfaces), some pelecypods, occasionally pyritized, also blobs and specks of pyrite throughout, small rusty band fragmented and calcite infilled at 475.79, strongly calcareous through out, bottom 0.25m very sandy
	485.27	1.63	SANDSTONE, medium grey, medium to coarse-grained, gritty at 484.64-484.77, bottom erosional and with muddy intraclasts, sands poorly-sorted, siliceous and show some fracturing
2-3°	487.45	2.18	SANDSTONE, light/medium grey, fine to very fine-grained, slightly argillaceous, laminated, some cross-lamination, strongly calcareous, gradational
3 [°]	498.65	11.20	SANDSTONE/MUDSTONE, dark grey, broadly interbedded sequence of very fine laminated sands, silts and muds imparting a banded look, sharp erosional boundaries, burrows, finely comminuted plant debris (carbonized), strongly calcareous throughout (muds and sands), gradual below, 40:60
	506.88	8.23	MUDSTONE, dark grey, silty wisps throughout, finely

BH Nos. 2

BH NO	S. Z	T	
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			broken plant debris, strongly calcareous, abrupt contact with coal
	507.13	0.25	COAL, broken up, listric surfaces
3°	513.07	5.94	SANDSTONE, light grey, fine-grained, initial 1.35m darker with coal streaks, rest clean, well-sorted, crossbedded, strongly calcareous, gradational
3-5 ^o	518.92	5.85	MUDSTONE/SILTSTONES, dark grey, silts lenticular and laminated, two 0.09cm each, very hard ferruginous bands, pyritized and one with abundant calcite infills, muds have abundant carbonized plant debris, uniformly disseminated, only silts calcareous, gradual, 85:15
	521.87	2.95	MUDSTONE, black, abundantly carbonaceous with coaly stringers
-	526.12	4.25	SANDSTONE, medium grey to dark grey, initial 1.5m muddy 35% very fine sands, rest fine-grained argillaceous, occasional burrowed, calcareous, gradational
	533.80	7.68	MUDSTONES, medium grey/dark grey, silty at 528.30-530.25, and calcareous, locally carbonaceous, gradual below
	534.90	1.10	MUDSTONE/SANDSTONE, 60:40, dark grey, very fine sands, disturbed layers,interbedded, strongly calcareous, gradual
	537.33	2.43	MUDSTONE, dark grey, upper 2/3 silty, lower 1/3 very carbonaceous with coaly stringers, calcareous, (upper sequence), abrupt below
	539.78	2.45	SANDSTONE, medium grey, fine to very fine-grained, 20% muds, some scoured contacts and tiny intraclasts, strongly calcareous
	544.05	4.27	MUDSTONE/SANDSTONE, intermingling sequence of dark grey silty, muds and very fine-grained argillaceous sands, calcareous, 70:30
4 ^O	548.10	4.05	SILTSTONE, medium grey, argillaceous 20%, coarse argillaceous locally laminated silts, calcareous, grada- tional, some very fine sands as stringers
	552.63	4.53	MUDSTONE/SANDSTONE, initial 1.5m carbonaceous and coaly muds, rest very fine sands and muds (interbedded), very argillaceous, calcareous
	560.34	7.71	MUDSTONE, black, carbonaceous, hard rusty band 0.15m, bottom 4.0m locally coaly, some bone band and durain but much of it badly broken up and ground out, much of core loss in coaly zone, sandy band (very fine-grained and argillaceous) 0.15m thick at around 556.0m gradual below
	561.04	0.70	MUDSTONE/SILTSTONE, dark grey hard, lower ½ dominantly silty, calcareous

BH Nos. 2

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	562.44	1.40	SANDSTONE, medium grey, very fine-grained, richly argillaceous, sporadically laminated, strongly calcareous gradational
	564.21	1.77	SILTSTONE, medium grey, coarse silts, very argillaceous, occasional wisps of very fine sands, strongly calcareous gradational
5 ⁰	565.00	0.79	SANDSTONE, medium grey, very fine-grained, with thin argillaceous bands, strongly calcareous, gradational
	566.51	1.51	SANDSTONE, light/medium grey, fine-grained, wavy, rippled bedding, carbonaceous matter (finely particulate) concentrated in certain laminae, thus emphasizing crossbedding, strongly calcareous, very gradational
	569.00	2.49	SANDSTONE, light grey, coarse-grained, infested with coal fragments, badly broken up-primarily because of yielding planes provided by coal lenses, poorly sorted, upper 0.45m calcareous, rest non calcareous, bottom sequent has some argillaceous admixture, abrupt & broken up below
	569.75	0.75	MUDSTONE, black, homogeneously silty, structureless, non calcareous, one slickensided surface, abrupt and listric contact with sand
	573.30	3.55	SANDSTONE, medium to light grey, coarse-grained, poorly- sorted, coaly lenses, cross-bedded, lower 1.08m granular and pebbly, bottomost 0.18m medium sand with large muddy clast, abrupt below, initial 0.70m strongly calcareous
	576.10	2.80	SANDSTONE, medium/dark grey, fine to very fine-grained, large muddy intervals, sands very argillaceous and have small-scale cross-lamination, strongly calcareous
	580.42	4.32	SANDSTONE/MUDSTONE, broadly alternating medium grey, fine grained, irregularly laminated argillaceous sands and dark grey silty mudstone, slightly carbonaceous in upper 1.40m sequence strongly calcareous, gradational below, some slump structures, fracture at 578.80, ratio 33:67
	581.16	0.74	MUDSTONE, dark grey, silty,strongly calcareous, gradation
	581.58	0.42	MUDSTONE, black, carbonaceous, fragmented, gradational
	585.41	3.83	COAL/MUDSTONE, mostly mixture of carbonaceous mudstone an very dirty coal, 0.35m bright coal with listric surfaces 0.40m hard bone coal at base
6°	587.46	2.05	SANDSTONE, dark grey, very fine-grained, very argillaceou muddy bands (15%), initial 0.65m with rootlets, rest sporadically laminated, gradational
	591.97	4.51	MUDSTONE, medium grey, locally silty and occasional root- lets, 0.13m very fine-grained sand, very gradational
	593.21	1.24	SILTSTONE/SANDSTONE, medium grey, initial ½ very argill-aceous siltstone, rest very fine-grained argillaceous

BH Nos. ²

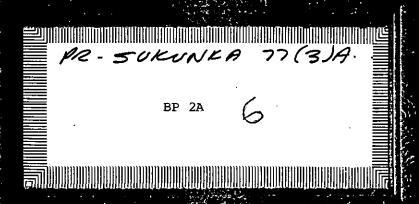
Dip o	DEPTH m	THICKNESS m	DESCRIPTION	
			sandstone, occasional lamination, one large burrow, siliceous, very gradational	
	596.59	3.38	SANDSTONE, light to medium grey, dominantly~fine-grained, abundant coaly fragments, cross-lamination, silty muddy intraclasts, bottom 0.65 medium-grained to coarse-grained some fractures, bottom 0.65 calcareous, erosional, bottom slickensided	
	599.18	2.59	MUDSTONE, initial 0.20m mudstone, 0.34m bone coal/mudstone, following 0.57 carbonaceous mudstone, broken, abundant listric surfaces, remainder to base, silty mudstone, occasional rootlets, very gradational	
	602.53	3.35	SANDSTONE, medium to dark grey, very fine-grained, highly argillaceous, mostly structureless, bottom 1.50m sporadically laminated, 15% argillaceous content, gradation below	
	605.06	2.53	MUDSTONES, black, homogeneously carbonaceous, listric surfaces, slickensided contact with sandstone below	
10 ⁰	607.22	2.16	SANDSTONE, medium grey, very fine-grained, highly argill ceous, muddy bands 20%, strongly calcareous throughout, very gradational	
20 [°]	610.10	2.88	SANDSTONE/MUDSTONE, dark grey to black, sands 20%, sand very fine-grained, argillaceous, laminated, some chaotic fabrics due to burrowing and/or slumping, highly calcareous rest is silty mudstones, vaquely laminated, slightly calcareous, gradational, one rusty band about 0.07m	
	611.65	1.55	MUDSTONE, black, carbonaceous, totally lacking silts, gradational	
	614.03	2.38	SANDSTONE, very fine-grained, very argillaceous (35% mud) lower 0.6 with small-scale cross-lamination, gradational below	
	614.48	0.45	COAL/MUDSTONE, carbonaceous, gradational	
20°	625.20	10.72	SANDSTONE, light to medium grey, dominantly very fine-grained, very argillaceous, characterised by ubiquitous small-scale cross-lamination, ripples, microerosional contacts, syndepositional slumping, some graded units, mudstone at 621.72-622.10, siltstone/mudstone at 622.50-623.02, bottom 2.10m fine-grained, light grey, very small scale cross-lamination, with abundant finely particulate carbonaceous matter, showing micro stylolites, siliceous throughout, passage below by diminution of sand and increas of carbonaceous matter, number of fractures over the interval, some slickensided surfaces	
	627.47	2.27	COAL, hard, dull, mudstone, 0.27m hard carbonaceous mud- stone with thin sandy layer, rest hard, dull coal, some muddy	

BH Nos. 2

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	628.19	0.72	MUDSTONE, black, carbonaceous, gradational
20 ⁰	637.17	8.98	MUDSTONE, dark grey to black, locally silty, coaly 633.52-633.61, carbonaceous to coaly 635.59-635.74, and at 635.72 636.82, highly calcareous from top to 634.29, with rusty bands, rest patchily calcareous, gradational
	637.57	0.40	SANDSTONE, fine-grained, argillaceous, small-scale, cross- lamination, some distrubed lamination, erosional, few burrows at base
	638.05	0.48	MUDSTONE, black, lower ½ canneloid
	638.67	0.62	COAL, initial ½ durain, all fragmented with listric surfactors that carbonaceous mudstone, gradational
22 ⁰	641.42	2.75	SILTSTONE/SANDSTONE, 80:20, medium grey, argillaceous siltstones interbedded with very fine-grained sandstone, ripples, strongly calcareous, gradational
ŕ	643.15	1.73	MUDSTONE, black/dark grey, locally carbonaceous, lower $\frac{1}{2}$ splitting along listric surfaces, gradual
	643.62	0.47	SILTSTONE, medium grey, little very fine-grained argillaceous sands, abundant rootlets, gradual below
	646.52	2.90	MUDSTONE, medium/dark grey, occasional silty/rusty bands, gradational
20 ⁰	658.50	11.98	MUDSTONE, dark grey to black, carbonaceous throughout, silty at 653.03-654.50, fracture at 653.50, much listric surfaces at 657.30, bottom 0.65 slightly coaly and with 10cm very fine-grained sand band, gradational
	660.57	2.07	SILTSTONE, medium grey, very argillaceous (15-20%), 0.45m fine-grained argillaceous sands and calcareous, gradation
	662.69	2.12	SANDSTONE, initial 0.52m fine to very fine-grained, dark grey argillaceous, laminated, siliceous with coal fragments, several listric surfaces, rest light grey, medium-grained, clean, cross-bedded, occasional coaly lamination, calcareous, 661.25-661.95, few pebbles at base
	663.47	0.78	SANDSTONE, light grey, medium-grained, abundant coal streaks, pebbles in middle 0.20m, slightly calcareous
	665.92	2.45	CONGLOMERATE, sub-angular to sub-rounded cherty, quartzit pebbles, generally around 5mm across (some 10mm) set in fine to medium-grained sand matrix, slightly calcareou. (mainly sands of the matrix), bottom 0.26m fine-graine argillaceous sands, erosional below
	666.74	0.82	MUDSTONE, dark grey, structureless, gradual below
22°	668.03	1.29	SANDSTONE, light/medium grey, fine-grained, remarkably uniform and parallel lamination, some wavy and rippled in bottom 0.40m, microbrecciated and calcite infilled 0.04m zone near base, sand argillaceous, laminae, strongl

BH Nos. 2

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			calcareous throughout, gradational
	669.16	1.13	MUDSTONE, medium grey, bottom 0.40m carbonaceous, gradatid
	670.40	1.24	COAL, initial 0.29m hard bone coal, rest dominantly durain at bottom some coal pulverized
	670.86	0.46	MUDSTONE, black, some coaly intervals
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BP COAL CANADA



Page 1

AREA

SUKUNKA

B. H. No. BP 2A

Contractor:

Longyear

Commenced:

July 1, 1977

Co-ordinates: 6,114,870.28

N E

Completed:

July 20, 1977

593.674.49 Surface Elevation: 1,661,50

m

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

See detail

Geologist

Depth

Hole Azimuth:

page la

Logged by: Geoff Jordan

347.05-382.51

Final Depth:

382.51

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates			
Sukunka			
Moosebar	374.36		1,287.14
V. Gething			

SEAMS

DEPTH

THICKNESS

%RECOVERY

ELEVATION

BIRD

377.18

1,284.32

CHAMBERLAIN

Sperry-Sun Survey

Date: 28th July 1977

Borehole: BP 2A Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
380m	4 ⁰ 15 '	n 53 ⁰ Е
370m	4° 15'	N 56° Е
360m	4° 15'	N 57° Е
340m	3° 00'	N 36° Е
330m	2° 45'	n 35° Е
300m	2° 45'	N 38° Е
260m	2° 15'	N 44° Е
200m	1° 45'	n 42° Е
1.50m	10 30'	N 45° E
1.00m	1 00'	N 41° E
50m	0° 45'	N 10° E

BH Nos. 2A

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	348.08	1.03	MUDSTONE, dark grey, green, Moosebar formation, low competency, breaks easily on irregular fractures, no bedding apparent.
	348.7	0.62	AS ABOVE
	349.19	0.49	AS ABOVE
	350.88	1.69	AS ABOVE
	351.19	0.31	AS ABOVE
	351.90	0.71	MUDSTONE, slickensided listric surfaces at base.
	353.30	1.40	AS ABOVE
ļ	353.56	0.26	AS ABOVE
	355.09	1.53	AS ABOVE
	355.35	0.26	AS ABOVE ·
	357.43	2.08	MUDSTONE, as above
	357.47	0.04	AS ABOVE
	357.63	0.16	CLAYSTONE, dark olive green, calcite filled fractures throughout, pyritic inclusions, concretion.
	358.16	0.53	MUDSTONE, as above
	358.63	0.47	AS ABOVE
	358.71	0.08	CLAYSTONE, light grey green, soft, dessicates when dry, dark coloured worm burrows.
	358.94	0.23	MUDSTONE, as above
	359.02	0.08	CONCRETION, light grey, green.
	359.54	0.52	MUDSTONE, as above
	359.68	0.14	AS ABOVE
	361.24	1.56	AS ABOVE
	361.38	0.14	CONCRETION, as above
	361.53	0.15	MUDSTONE, as above

BH Nos. 2A

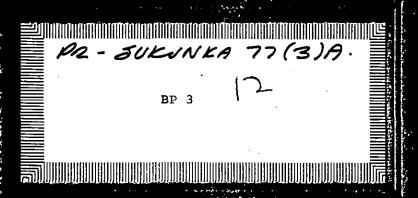
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	<u> </u>		
	362.40	0.87	AS ABOVE
	362.48	0.08	CLAYSTONE, as above, bentonitic, no worm burrows.
	362.83	0.35	MUDSTONE, as above
	363.05	0.82	AS ABOVE, pyritic worm burrows.
	363.86	0.81	MUDSTONE, as above
	365.08	1).22	AS ABOVE
	365.70	0.62	AS ABOVE
	366.49	0.79	AS ABOVE
	367.87	1.38	AS ABOVE
	368.50	0.63	AS ABOVE
	370.04	1.54	AS ABOVE
	370.13	0.09	MUDSTONE, dark grey, green, Moōsebar, massive, low competency, breaks easily along irregular fractures.
	371.75	1.62	AS ABOVE
	371.88	0.13	AS ABOVE
	373.12	1.24	AS ABOVE
	373.75	0.63	AS ABOVE
	373.84	0:09	CLAYSTONE, light brown, green, bentonitic, soft, gradational contact at top and sharp regular contact at base
	373.97	0.13	MUDSTONE, as above
	374.05	0.08	CLAYSTONE, as above
	374.36	0.31	SANDSTONE, very fine grained, grades to mudstone at top, green grey, glauconitic, pyrite filled worm burrows prominent at base, sharp basal contact to coal.
	374.38	0.02	COAL, dull, pyrite bands and inclusions.

BH Nos. 2A

RH NO	s. ZA		
Dip	DEPTH	THICKNESS	DESCRIPTION
О	m	m	
	271 15	0.07	2001 131 linewis suffered page abaned 5 broken
	374.45	0.07	COAL, dull, listric surfaces, core sheared & broken.
	374.50	0.05	COAL, dull banded, sheared, core broken
	374.58	0.08	COAL, dull, metallic lustre
	374.69	0.11	COAL, dull and bright, sheared.
	374.75	0.06	COAL, dull and bright
	374.82	0.07	COAL, dull, earthy
	374.88	0.06	COAL, dull and bright
	375.06	0.18	COAL, sheared, core heavily broken, dull and bright
	375.17	0.11	COAL, sheared, heavily broken, dull
	375.23	0.06	COAL, dull
	375.32	0.09	COAL, sheared, coal type not distinguishable
	375.40	0.08	COAL, sheared, dull and bright
	375.48	0.08	COAL, dull and bright
	375.55	0.07	COAL, dull, metallic lustre
	375.59	0.04	COAL, dull banded.
	375.68	0.09	COAL, dull, metallic lustre.
	375.73	0.05	COAL, bright banded.
	375.79	0.06	COAL, dull, metallic lustre
	375.84	0.05	COAL, bright
	375.90	0.06	COAL, dull banded
	375.95	0.05	COAL, dull and bright
	375.97	0.02	COAL, bright
	376.01	0.04	COAL, dull banded
	376.06	0.05	COAL, dull and bright
	376.17	0.11	COAL, dull banded
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BH Nos.

Dip o	DEPTH m	THICKNESS m	DESCRIPTION .
	376.24	0.07	COAL, dull banded
	376.29	0.05	COAL, bright
	376.40	0.11	COAL, dull and bright
	376.49	0.09	COAL, dull banded
	376.51	0.02	COAL, dull
	376.57	0.06	COAL, bright banded
	376.64	0.07	COAL, bright, core broken, fragments in box.
	376.74	0.10	COAL, dull and bright
	376.75	0.01	COAL, dull banded, pyrite inclusions at base.
	377.18	0.43	CORE LOSS - COAL.
	377.71	0.53	SANDSTONE, medium to coarse grained, light grey, large irregular coaly inclusions at top, bedding poorly developed, massive.
	378.06	0.35	AS ABOVE
	378.09	0.03	COAL, dull banded
	378.66	0.57	SANDSTONE, as above, mottling by worm burrows from 0.57 to 1.37 from top, competent.
	379.34	0.68	AS ABOVE
210	380.78	1.44	AS ABOVE
	380.90	0.12	AS ABOVE
	382.51	1.61	AS ABOVE
			La Agranda de Carlos de Ca



COAL



AREA

SUKUNKA

B. H. No.

BP 3

Contractor:

Tonto

Commenced:

July 1, 1977

Completed:

July 19, 1977

Co-ordinates: 6,113,527.28

594.782.90

Ν E

Surface Elevation: 1,779.66

m

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

Hole Azimut

See detail page la

Logged by:

Geologist

Depth

Ali Chowdry

15.85-119.70 123.69-267.60

Graham Wallis

110.95-122.42 471.40-486.18

Andy Newson

280.59-441.78

Final Depth:

486.18

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION	
Boulder Creek				
Hulcross	21.78	21.78	1,757.88	
Gates	229.78	208.00	1,549.88	
Sukunka	360.00	130.22	1,419.66	
Moosebar	444.97	84.97	1,334.69	
U. Gething	485.23	40.26	1,294.43	

SEAMS	DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD	451.34			1,328.32
CHAMBERLAIN	485.23 (3A)	split		1,294.43

Repeat of Bird seam 448.4 FE

*No record of upper Gething sequence Bird-Skeeter is available in BP 3

Sperry-Sun Survey

Date: 19th July 1977

Borehole: BP 3 Sukunka 77

Compass: 6° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
494m	4° 45'	n 37 ^о е
450m	4° 25 °	N 38 ⁰ Е
400ın	3° 20'	N 43° E
350m	2° 35'	n 54° е
300m	2° 30'	N 56° E
250m	2° 25'	N 57 ⁰ Е
200m	2° 20'	N 58° Е
150m	2° 20'	N 66° Е
100m	2° 20'	N 66° Е
50m	2° 35'	N 73° E

BH Nos. 3

·	5.)	Y	
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
2-30	15.85 21.78	15.58 5.93	OVERBURDEN SANDSTONE/MUDSTONE, rapidly alternating, very fine sands/muddy ripple bedded sequences, muds-generally eroded tops, gradations-fine sands to muds also exist, passage below abrupt
			HULCROSS GATES
	22.02	0.24	SANDSTONE/CONGLOMERATE, defines Hulcross/Gates contact, sands light grey, medium-grained, passing below to muddy sands with sparse and calcareous pebbles not exceeding 1cm across
	24.78	2.76	MUDSTONE, dark grey, initial 1.30m locally carbonaceous and fractured, rest with silty wisps, bottom 0.35 with rusty bands, gradual below
	25.51	0.73	COAL/MUDSTONE, initial 0.40m dominantly clarain, rest 0.33m carbonaceous mudstone and some coal, intercalations
3 [°]	30.14	4.63	SANDSTONE/MUDSTONE, light/medium grey, interbedded, very fine argillaceous sands and silty mudstones, change from sand to muds generally abrupt and erosional, wavy, irregular lamination laterally blurred, core fragmented, commonly along bedding in blocks of 3 to 4 cm at 28.46-29.79, strongly calcareous, gradational
	32.10	1.96	MUDSTONE, medium to dark grey, irregular rusty bands, slightly silty, bottom 0.35m carbonaceous, rest strongly calcareous
	33.22	1.12	COAL, upper 0.3m durain, rest 0.25m badly fragmented coal, some shale fragments
	35.05	1.83	MUDSTONE, medium/dark grey, lower half slightly silty, locally carbonaceous, mostly fractured interval
4 ⁰	35.97	0.92	SILTSTONE, light/medium grey, argillaceous, 0.10m very fine sandstone, calcareous, carbonized plant debris, gradational
	38.44	2.47	MUDSTONE, medium grey, silty 10%, 0.18m carbonaceous muds, strongly calcareous, fracture parallel to core axis 0.22m gradational
	41.45	3.01	SANDSTONE, light/medium grey, fine-grained, 0.40m medium-grained, some very argillaceous very fine sands, initial 0.80m with ripple-drift lamination, rest poorly to non laminated (due to organic activity) vertical burrows,

BH Nos. 3

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			fracture at 40.61-41.45, strongly calcareous, gradational
5°	46.50	5.05	MUDSTONE, medium grey, 15% silty at 41.45-44.50, dark and slightly carbonaceous at 44.50-46.56, coal 0.10 at 46.25, locally calcareous (silty zones), fractured at 45.41-45.75, abrupt below
	48.90	2.40	SANDSTONE, medium grey, fine to very fine-grained, very argillaceous, small-scale cross-lamination, few burrows, some gradation to silts and locally homogeneous, strongly calcareous, passage below by interbedding
5 [°]	50.60	1.70	SILTSTONE/MUDSTONE, rapid interbedding of silts and muds imperceptibly changing to each other, wavy, irregular lamination, strongly calcareous, gradational to mud, vert fracture 49.32-50.00
	51.81	1.21	MUDSTONE/SANDSTONE, fossil zone, dark grey to black muds and fine highly argillaceous sands, abundant pelecypod calcareous shells in sandy/muddy matrix, gradational
5°	61.45	9.64	SANDSTONE, light grey, medium-grained, well-washed and sorted, massive to cross-laminated, bottom 2.2m with shale clasts and 4cm shale band and with thin coarse sand intensely, strongly calcareous, some fracturing, passage below by interbedding
	63.96	2.51	SILTSTONE, medium grey, irregularly laminated, short very fine sands, gradational
5 [°]	71.93	7.97	SANDSTONE, light grey, fine/medium-grained, laminated and cross-laminated, brief silty bands, sands fairly clean, abundant burrows, interval characterized by widely spaced dark grey lamination and calcareous, gradational
5°	74.98	3.05	SANDSTONE/MUDSTONE, medium/dark grey, interbedded fine sands and silty muds, gradational to erosional boundaries small-scale cross-lamination and ripples, occasional burrows, sands fairly clean within intervals, gradational
	78.42	3.44	SANDSTONE/MUDSTONE, 50:50, otherwise similar to above except here more burrowing
1-5 ⁰	83.68	5.26	MUDSTONE/SILTSTONE, 80:20, dark grey, broadly banded muds and muddy silts,silts lenticular to bedded, vaquely discernible bioturbation, silty zones calcareous,normal contact
	86.87	3.19	MUDSTONE/SILTSTONE, medium grey, marker zone, thoroughly bioturbated zone with some intervals having relict lamination, 50:50
	91.35	4.48	SANDSTONE, medium grey, very fine to fine-grained, initia 0.58m very fine sands with muds (15%), and the bottom 1.8 regularly laminated, thin muddy layers, few vertical burrows, flaser structures, bottomost 0.12m fine pebble conglomerate marker

BH Nos. 3

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	·m	DESCRIPTION .
	93.49	2.14	SANDSTONE/MUDSTONE, 50:50, medium grey, very fine sands (argillaceous), interlayered with dark grey mudstone, calcareous, gradational
6°	98.49	5.00	MUDSTONE, initial 2.50m medium grey and very silty, locally laminated, strongly calcareous, rest black, and carbonaceous, bottomost 0.60m coaly layers, ironstone 0.12m with much calcite infilled ? fractures in contact with coal seam below
	98.76	0.27	COAL, broken up core and mixed up, some clean coal
	104.30	5.54	MUDSTONE, dark grey, carbonaceous, coaly at 99.36-99.70 fine-grained sandstone (0.30m) band 0.32m from top, homogeneous, fracturing in lower 1.30m silty downwards
6-7°	105.96	1.66	SILTSTONE/MUDSTONE, rapid succession of 2-3cm silts and dark muds with thin very fine sand intervals, much burrowing, highly irregular mutual boundaries, gradually passing to mud below
	109.92	3.96	MUDSTONE, dark grey, locally carbonaceous and 0.15m very fine argillaceous sand with plant debris in middle, gradual to coal, fresh rock competent but could fret on wetting and drying, splits generally parallel to bedding, contact with coal sharp
			COAL SEAM TOP OF E ZONE
ļ	110.95	1.03	CORE LOSS from Radiation Log
	111.21	0.26	COAL, sheared, core broken
	111.41	0.20	MUDSTONE, dark grey, carbonaceous
ĺ	111.49	0.08	COAL, sheared, core mushed
	111.58	0.09	COAL, dull with minor bright bands, minor shearing
	111.67	0.09	COAL, undifferentiated, moderate shearing but core intact, coal very competent
	111.82	0.15	COAL, dull with minor bright bands
	112.32	0.50	CORE LOSS from Radiation Logs
	112.60	0.28	MUDSTONE, carbonaceous, grading to mid grey color, to carbonaceous at base, internally sheared throughout
	112.83	0.23	COAL, dull, with minor bright bands
	112.87	0.04	SILTSTONE, mid grey
İ	112.93	0.06 .	COAL, dull with minor bright bands
-	113.03	0.10	COAL, dull, hackly fracture, core broken
1	113.16	0.13	COAL, dull with minor bright bands, sheared
	113.34	0.18	COAL, bright with minor dull bands

BH Nos. 3

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	·m	
	112 20	0.01:	COAL
	113.38	0.04	COAL, sheared
	113.42	0.04	COAL, dull and bright
	113.49	0.07	COAL, dull with minor bright bands
	113.62	0.13	COAL, bright with minor bright bands
	113.70	0.08	COAL, dull and bright
	113.72	0.02	COAL, dull
	113.77	0.05	COAL, dull with minor bright bands, sheared, core broken
	113.80	0.03	MUDSTONE, carbonaceous
	113.89	0.09	COAL, dull with minor bright bands, sheared at base of unit
	114.24	0.35	MUDSTONE, carbonaceous, slippage on bedding planes
	114.28	0.04	COAL, dull
	114.53	0.25	COAL, bright with minor dull bands, sheared in part
	114.58	0.05	COAL, bright
	114.66	0.08	COAL, bright with minor dull bands
	114.76	0.10	COAL, undifferentiated, sheared
	ļ		FLOOR OF SEAM
			MUDSTONE, carbonaceous, grading to siltstone in 0.15m
	115.26	0.50	SANDSTONE, medium-grey, very fine-grained, argillaceous, gradational
7°	115.71	0.45	MUDSTONE, medium grey, lower 2/3 very carbonaceous and 5cm coal at base
	116.66	0.95	SILTSTONE, medium grey, argillaceous, lenticular very fin sands, strongly calcareous, 0.30cm vertical fracture at 114.65
1-2 ⁰	118.99	2.33	MUDSTONE, dark grey, locally carbonaceous, one 0.10 coaly band, bottom 0.85 very silty (15%) and calcareous, gradational
	119.70	0.71	SANDSTONE, brownish grey, very fine-grained, argillaceous strongly calcareous, erosional below
	120.82	1.12	MUDSTONE/SILTY, dark grey to carbonaceous, fractured at 45 ^{°C} to core axis, grades abruptly into underlying unit
	121.32	0.50	SILTSTONE, grading to mudstone, carbonaceous at base of unit, exhibits similar tension fractures to unit above, possibly weak roof conditions
			COAL SEAM.D
	121,50	0.18	COAL, dull with minor bright bands
	121,50	V.IO	COAL, dult with minor oright bands

BH Nos. 3

BH NO	· · · · ·		
Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	121.65	0.15	COAL, dull, core broken throughout
	122.03	0.38	COAL, dull and bright
	122.12	0.09	MUDSTONE, carbonaceous, coaly flecks throughout
	122.42	0.30	COAL, dull and bright, sheared throughout
	123.69	1.27	SILTSTONE/SANDSTONE, medium grey, coarse silts to very fine sands, argillaceous, abundant plant debris (carbon-ized), ripple-lamination
	126.80	3.11	MUDSTONE, medium grey, initial 1.0m 50% silts and finely laminated and cross-laminated, rest homogeneous muds with coaly wisps, gradual below
5 ⁰	128.30	1.50	SANDSTONE, light/medium grey, very fine-grained, laminat- ed, argillaceous layers, intermittently calcareous (weakly) very gradational
	131.39	3.09	MUDSTONE, dark grey, homogeneous, few rusty bands (calcareous), gradational to coal below
	131.87	0.48	MUDSTONE, canneloid
	133.70	1.83	MUDSTONE, dark grey, fragmented at 132.58-133.15, carbon-aceous at base, gradual
		ĺ	COAL SEAM C
	134.00	0.30	COAL/MUDSTONE, upper 1/3 canneloid mudstone, rest clean coal
	151.71	17.71	CONGLOMERATE, well packed, commonly small to medium pebble range, interval 133.94~144.50 well-sorted in a given interval, little or no sandy matrix, rest with variable matrix of sands, bottom 3.20m have 20% clean media sands, small passage by sudden disappearance of pebbles.
2-3°	172.13	20.42	SANDSTONE, light grey, dominantly medium-grained, very clean, well-sorted, siliceous, marker large burrows at 152.68-154.43, smaller ones seem to have been washed out by conglomerates above, many intervals homogeneous and devoid of current structure, others have large-scale cross-stratified units, granular layer in 155.36-156.11, bottom 0.35m conglomerate, abrupt contact with coal below
			COAL SEAM B
	172.99	0.86	COAL, initial 0.25m bright coal, rest friable and mushy
	174.26	1.27	SANDSTONE, medium grey, fine/medium-grained, argillaceous mostly structureless, siliceous, gradational
	176.11	1.85	SILTSTONE/MUDSTONE; dark grey, upper half argillaceous silts, rest silty mudstone, vague lamination, gradual
			COAL SEAM A HORIZON
	177.00	0.89	MUDSTONE/COAL, mostly carbonaceous mudstone and some coal
	<u></u>	<u> </u>	dirty

DH NC)5. <u>3</u>	·	
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	190.80	13.80	CONGLOMERATE, pebbles of cherts, quartzite, schists, slates well-sorted intervals, much of conglomerate within 4-6mm range, pebbles up to 2.5cm across do occur, mainly in middle 3.5m, bottomost 0.80m very coarse-grained sandstone to granular, gradational
2°	197.30	6.50	GRANULES/SANDSTONE, initial 2.10m medium sands with granulite (50%), rest fine to medium sands with brief and scattered granular zones (less than 10%) sand, very clean siliceous
20	202.89	5.59	CONGLOMERATE/SANDSTONE, granule range clasts, sands fine-grained, interbedded sequence, some burrowing in sands, siliceous, mildly erosional below
	214.20	11.31	SANDSTONE, light grey, fine/medium-grained, very clean, some zones structureless but mostly cross-stratified, upper 2.50m weakly calcareous, rest strongly calcareous, vertical fracture in bottom 0.40m
2 ^O	227.38	13.18	SANDSTONE, light grey, fine/medium-grained, well-sorted and very clean, cross-laminated, calcareous, weak to strong, steep fracture 216.39-217.12, gradational below
·	229.78	2.40	SANDSTONE, medium grey, very fine-grained, 5cm muddy band, calcareous becoming argillaceous at base
			GATES SUKUNKA
	231.77	1.99	MUDSTONE/SANDSTONE, 90:10, medium grey muds with lenticles of very fine sands, laminated, erosional tops and bottoms (of muds), calcareous, steep fracture at 229.55-230.15 and 230.83-231.40
	232.30	0.53	SANDSTONE, light grey, very clean, fine/medium sands, cross-laminated, strongly calcareous, passage below by interbedding
	236.22	3.92	MUDSTONE/SANDSTONE, alternating layers of very fine sands and muds, muds/sands generally have erosional tops and bottom, calcareous, vertical fracture 232.73-233.53 and 234.23-234.98 and 234.60-235.28, 87:13
	239.77	3.55	SANDSTONE/MUDSTONE, interbedded, similar to above, vertical fracture 238.75-239.10, one sandstone band 0.20m thick with distinct large burrows, 55:45
2-3°	252.7 0	12.93	MUDSTONE/SANDSTONE, dominantly dark grey richly silty muds with thin and scattered very fine-grained, medium grey well-laminated sands, non calcareous throughout,

BH Nos. 3

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
		**************************************	Vertical fracture 244.46-244.76
1	260.00	7.30	MUDSTONE/SILTSTONE, 65:35, intimate association of dark muds and silts due to secondary mixing, occasional wisps of very fine sands
	266.30	6.30	SANDSTONE/SILTSTONE/MUDSTONE, 55:30:15, light grey very fine sands interbedded with silts and muds, gradational to erosional contacts, muddy/silty sequence, much bioturbation
	267.60	1.30	SILTSTONE/MUDSTONE, intermixed due to intensive bioturbation 70:30
5 [°]	276.51	8.91	SILTSTONE/SANDSTONE, 75:25, very fine, argillaceous partially laminated sands interbedded with silts and muds, all bioturbated
	280.59	4.08	SHALE/SILTSTONE, 70:30, poorly bedded, bioturbated, small worm burrows, patchily calcareous, gradational below
40	292.15	11.56	SHALE WITH INTERBEDDED SILTSTONES, 60:40, fine-grained sandstones, bedding poorly developed with disturbance and bioturbation, small worm burrows, coarser zones calcareou gradational below with two 2cm zones of coarser sandstone at boundary below
	298.00	5.85	SANDSTONE, medium/fine-grained, light grey, interbedded dark shales, sandstone well-bedded, calcareous, shale sandstone interface show erosional features, gradational below, large burrow bed 17cm thick at 293.13 coarse calcareous sand erosional 15cm thick at 293.53
3°	313.41	15.41	SILTSTONE AND SHALES INTERBEDDED, 60:40, bedding poorly developed, disturbed and bioturbated, load structures and erosional features, calcareous, gradational below, occasional zones of coarser-grained sandstones
	331.31	17.90	SHALE WITH MINOR SILTY INTERBEDS, 75:25, occasional zones of fine/medium-grained sandstone, bedding deteriorates towards base as bioturbation increases, small worm burrow erosional interfaces
6 <u>0</u>	360.00	28.69	SUKUNKA, shale 70:sands 30 to shale 90:sands 10 at base.
			SUKUNKA MOOSEBAR
	441.78	31.78	MUDSTONES, dark grey, almost totally lacking silty content, mostly structureless, ferrugineous bands, fractures and bentonite layers as follows:

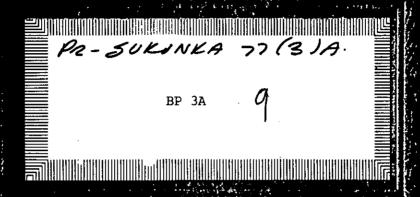
Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	DESCRIPTION
			Ferruginous
	471.40	28.62	SANDSTONE, fine-grained, light grey, calcareous, crossbedded, 45° shear plane 0.06m above base of unit, basal 0.04m mid grey very fine sandstone, sharp contacts with overlying fine sandstone and coal at base
			COAL SEAM, SHELLY EQUIVALENT
	471.56	0.16	COAL, dull with minor bright bands, slip planes evident in upper 0.03m and occasionally throughout unit
	471.57	0.01	MUDSTONE, dark grey
	471.75	0.18	COAL, dull with minor bright bands, occasional lustrous appearance to dull coal
	471.78	0.03	MUDSTONE, dark grey
	471.83	0.05	COAL, dull with minor bright bands
	471.89	0.06	COAL, dull and bright, occasional listric surfaces
	472.10	0.21	COAL, dull with minor bright bands, bright bands increasing in width to unit base
	472.16	0.06	COAL, dull and bright, core broken
	472.26	0.10	COAL, dull and bright, occasional listric surface, hackly fracture in dull coal which is commonly lustrous
	472.45	0.19	COAL, dull and bright, core broken
	472.86	0.41	COAL, dull with minor bright bands, core 60% broken, shear planes and hackly fracture common
	472.91	0.05	COAL, dull with minor bright bands, bright bands, 1mm thic except one band to 12mm, contact with floor uneven, possible slip—surface with calcite veining in floor
	473.83	0.92	SANDSTONE, very fine-grained, mid grey, containing lenses and intercalations of fine sandstone and siltstone, contacts between lithologies both gradational and sharp, wavy, sequence fining upward, containing more mudstone in upper 0.15m, quartz-lithic, occasionally micaceous

BH Nos. 3

Dip o	DEPTH	THICKNESS	DESCRIPTION
<u> </u>	m	m	
	477.21	3.38	SANDSTONE, medium-grained, contains mudstone wisps and intercalations, weakly calcareous in upper part of unit increasing toward base, unit massive overall
•	478.68	1.47	SILTSTONE, mid to dark grey, containing light grey fine sandstone interbeds to 25mm, commonly 10mm thick, beddin generally wavy throughout, contact with overlying sandstone sharp, carbonaceous partings on some bedding planes, fining toward base with occasional slip surface on bedding
	478.79	0.11	MUDSTONE, carbonaceous, sharp contact with underlying coal
·			ROOF OF CHAMBERLAIN SEAM - UPPER SPLIT
	478.99	0.20	COAL, dull with bright coal increasing in basal 20mm, slip surfaces at 30 to core axis throughout
	479.17	0.18	MUDSTONE, carbonaceous, containing coaly lenses and bleb
	479.32	0.15	COAL, dull with minor bright bands
	479.51	0.19	COAL, dull and bright, core broken
	479.57	0.06	COAL, bright with minor dull bands
	479.75	0.18	COAL, dull with minor bright bands, dull coal becoming lustrous with hackly fracture to base of unit, bright coal bands increasing in thickness to 10mm
-	479.89	0.14	SILTSTONE and COAL, bright, deformed, predominantly silt stone, apparently "thrust" into coal seam
	480.17	0.28	COAL, dull and bright, sheared, core borken, core loss
	480.24	0.07	COAL, dull with minor bright bands
	480.26	0.02	COAL, bright with minor dull bands
	480.41	0.15	COAL, dull with minor bright bands
	480.44	0.03	COAL, bright
;	480.57	0.13	MUDSTONE, dark grey
	480.88	0.31	COAL, dull with minor bright bands
			FLOOR OF UPPER SPLIT
	483.04	2.16	MUDSTONE, dark grey to carbonaceous, contains carbonaceo flecks, and partings and lenses increasing to base of unit, slip planes common in basal section of unit, associated with coaly partings, occasional sub vertical slip plane near base of unit, core broken, 0.40m carbonaceous mudstone at 481.76m
	İ		ROOF OF CHAMBERLAIN SEAM - LOWER SPLIT
	483.14	0.10	COAL, sheared throughout

BH Nos. 3

DEPTH	THICKNESS	DESCRIPTION
111	"	
483.74	0.60	COAL, dull with minor bright bands
483.91	0.17	MUDSTONE, carbonaceous, containing coaly lenses, core broken, slickensided
483.98	0.07	COAL, dull, lustrous with minor bright bands to 10mm
484.02	0.04	COAL, dull
484.04	0.02	COAL, bright
484.26	0.22	COAL, dull with minor bright bands
484.29	0.03	COAL, bright
484.33	0.04	COAL, bright with minor dull bands
·	0.21	COAL, dull and bright, sheared
		COAL, dull with minor bright bands to 10mm
_	Į	COAL, bright with minor dull bands
		FLOOR: OF LOWER SPLIT
485.01	0.05	SANDSTONE & COAL, wavy contact, minor shearing present, sandstone as below
486.18	1.17	SANDSTONE, fine-grained, light to mid grey, carbonaceous massive, occasional slickensided surface sub-parallel to carbonaceous partings on bedding, occasional sub-vertica dolomite filled joints
		·
•	,	
		·
	m 483.74 483.91 483.98 484.02 484.04 484.26 484.29 484.33 484.54 484.91 484.96	m m 483.74 0.60 483.91 0.17 483.98 0.07 484.02 0.04 484.04 0.02 484.26 0.22 484.29 0.03 484.33 0.04 484.54 0.21 484.91 0.37 484.96 0.05



BP COAL CANADA



Page 1

AREA

SUKUNKA

B. H. No. BP 3A

Contractor: Tonto

Commenced:

July 1, 1977

Completed:

July 19, 1977

Co-ordinates: 6,113,527.28

N

594,782.90

Ε

Surface Elevation: 1,779.66

Core Size:

НQ

Casing Left in Hole:

Hole Angle:

Hole Azimuth:

See detail

page la

Geologist

Depth

Geoff Jordan

428.60-489.60

Final Depth:

489.60

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates			
Sukunka			
Moosebar			
U. Gething			
68110	271116	0.5 - 6 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4	E. a

Logged by:

SEAMS

DEPTH

THICKNESS

%RECOVERY

ELEVATION

BIRD

CHAMBERLAIN

Sperry-Sun Survey

Date: 29th July 1977

Borshole: BP 3A (Diversion) Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
487m	3° 15'	N 54° Е
470m	3° 30'	n 59 ⁰ Е
460m	3 ⁰ 15'	n 62° Е
450m	3° 15'	n 64° E
438m	3° 15'	N 81° E
430m	3° 15'	(N 86° W)
400m	3° 30'	N 43° E
300m	2° 45'	N 52 ⁰ Е
200m	2° 30'	n 54° e
100m	2° 30'	n 62° Е

"BH Nos. 3A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	rn	
	428.60	1.18	MUDSTONE, dark grey/green, bedding not apparent, Moosebar formation
	429.56	0.96	MUDSTONE, as above
	430.01	0.45	MUDSTONE, as above
	430.18	0.17	CLAYSTONE, light grey/green, bentonitic, small dark grey worm burrows at base, calcite filled tension gashes at top
	431.40	1.22	MUDSTONE, as above
	431.57	0.17	MUDSTONE, as above
	432.74	1.17	MUDSTONE, as above
	432.83	0.09	MUDSTONE, as above
	432.92	0.09	CLAYSTONE, bentonitic, light grey/green as above
	433.63	0.71	MUDSTONE, as above, slickensides 0.37 to 0.49 from top
	434.43	0.80	MUDSTONE, as above
	435.76	1.33	MUDSTONE, as above
	436.34	0.58	MUDSTONE, as above
	436.37	0.03	CLAYSTONE, light grey brown, bentonitic, soft, dark worm burrows at top
	437.34	0.97	MUDSTONE, as above
	437.90	0.56	MUDSTONE, as above
•	439.47	1.57	MUDSTONE, pyrite filled worm burrows
	440.09	0.62 .	MUDSTONE, as above
	440.52	0.43	MUDSTONE, as above
	442.14	1.62	MUDSTONE, as above
	443.44	1.30	MUDSTONE, dark grey/green, no bedding apparent, low compe breaks, long irregular fractures, gradational contact at base
	443.46	0.02	CLAYSTONE, light green brown, bentonitic, soft, desicates on drying, sharp basal contact
	443.65	0.19	MUDSTONE, as above, gradational basal contact
	444.11	0.46	MUDSTONE, as above
	444.15	0.04	CLAYSTONE, as above, grades to unit below, bentonitic
	444.29	0.14	MUDSTONE, as above
	444.43	0.14	MUDSTONE, as above
	444.52	0.09	CLAYSTONE, as above, bentonitic; sharp basal contact
	444.97	0.45	SANDSTONE, fine-grained, dark grey/green, glauconitic, competent, pyrite filled worm burrows predominent at base, sharp-basal contact

Moosebar U. Gething

"BH Nos. 3A

Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m .	
	445.10	0.13	CLAYSTONE, carbonaceous, black, numerous bright coal band core broken
	445.20	0.10	CLAYSTONE, as above
			ROOF OF BIRD SEAM
*>	445.24	0.04	COAL, dull banded, sheared
	445.29	0.05	COAL, dull banded, core pulverized, fragments in box
	445.32	0.03	CLAYSTONE, black, carbonaceous, bright coal bands
	445.35	0.03	COAL, dull and bright
	445.39	0.04	COAL, dull metallic lustre
	445.59	0.20	CORE MISSING-ROCK
	445.81	0.22	CORE LOSS-COAL
	445.95	0.14	COAL, dull banded, heavily sheared, core badly broken
	446.06	0.11	COAL, sheared, coal type indistinguishable, fragments in box
	446.17	0.11	COAL, dull and bright, heavily sheared
	446.31	0.14	COAL, dull banded, very heavily sheared, fragments in box
	446.63	0.32	CORE MISSING-COAL
	446.67	0.04	COAL, dull banded
·	446.74	0.07	COAL, dull and bright, sheared, core badly broken
	446.78	0.04	COAL, dull banded
	446.82	0.04	COAL, as above
	446.98	0.16	COAL, sheared and pulverized, coal type indistinguishable
	447.00	0.02	COAL, duil metallic lustre
	447.07	0.07	COAL, sheared and pulverized, coal type indistinguishable
	447.13	0.06	COAL, dull banded
	447.18	0.05	COAL, sheared and pulverized
	447.48	0.30	CORE MISSING-COAL
	448.12	0.64	CORE MISSING-COAL
	448.26	0.14	CORE LOSS-COAL
	448.31	0.05	CORE LOSS-ROCK
	448.36	0.05	CLAYSTONE, carbonaceous, black, bright coal bands
	448.40	0.04	CORE MISSING-ROCK
	448.48	0.08	COAL, dull, sheared
	448.86	0.38	COAL, sheared and pulverized, slurry in box, no coal types distinguishable

BH Nos. 3A

D:	DEDTH	THICKNEE	DECODED TO THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OWNER OF THE OWNER
Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	449.07	0.21	CORE MISSING-COAL
	449.16	0.09	COAL, dull and bright, sheared
	449.24	0.08	COAL, dull
	449.59	0.35	COAL, sheared and pulverized, coal types indistinguishable
	450.00	0.41	CORE MISSING-COAL
	450.05	0.05	COAL, dull and bright
	450.10	0.05	COAL, sheared and pulverized
45°.	450.14	0.04	COAL, dull banded
	450.18	0.04	COAL, dull
	450.24	0.06	COAL, bright, banded
	450.28	0.04	COAL, bright, core pulverized
	450.32	0.04	COAL, dull banded
	450.38	0.06	COAL, dull and bright
	450.50	0.12	CORE MISSING-COAL
	450.54	0.04	COAL, bright, core pulverized
	450.58	0.04	COAL, bright banded
	450.61	0.03	COAL, dull, metallic lustre
	450.63	0.02	COAL, bright
	450.67	0.04	COAL, dull banded
	450.71	0.04	COAL, dull metallic lustre
	450.79	0.08	COAL, dull banded
	450.86	0.07	COAL, bright banded, core broken
	450.88	0.02	COAL, bright
	450.97	0.09	COAL, dull and bright
	451.08	0.11	CORE LOSS-COAL
	451.12	0.04	CORE LOSS-ROCK
	451.18	0.06	CLAYSTONE, carbonaceous, black, bright coal bands, core broken
	451.20	0.02	CORE MISSING-ROCK
	451.34	0.14	CORE LOSS-COAL Floor of Bird Seam
	452.66	1.32	SANDSTONE, coarse to medium-grained, bedding indistinct, massive, coaly inclusions at top, mottling by small worm burrows from 1.90m to 2.40m from top
	452.86	0.20	SANDSTONE, as above
	454.81	1.95	SANDSTONE, as above

BH No	s. 3A		
Dip	DEPTH m	THICKNESS	DESCRIPTION
 			CCOTION OVERWEACHNED
2 ⁰	454.67	-0.14	SECTION OVERMEASURED
2	455.89	1.22	SANDSTONE, as above
	456.13	0.24	SANDSTONE, as above
	456.76	0.63	SANDSTONE, medium-grained, light grey, bedding is apparent, gradational to unit above, occasional phases of fine-grained sandstone or siltstone
	458.22	1.46	SANDSTONE, as above
	458.93	0.71	SANDSTONE, as above
	459.02	0.09	SANDSTONE, as above
	461.02	2.00	SANDSTONE, large worm burrows in centre
	462.14	1.12	SANDSTONE, large worm burrows
	463.15	1.01	SANDSTONE, large worm burrows in top half
	465.19	2.04	SANDSTONE, as above
	467.36	2.17	SANDSTONE, as above
	468.23	0.87	SANDSTONE, as above
	469.48	1.25	SANDSTONE, as above
5 ⁰	471.22	1.74	SANDSTONE, as above
]	471.63	0.41	SANDSTONE, as above
	471.84	0.21	SANDSTONE, as above
	471.86	0.02	CLAYSTONE, carbonaceous, black, numerous bright coal bands
	471.91	0.05	COAL, dull banded
	471.93	0.02	COAL, bright
	472.03	0.10	COAL, dull metallic lustre
	472.10	0.07	COAL, dull banded
	472.17	0.07	COAL, dull and bright
	472.21	0.04	COAL, dull and bright, sheared
i I	472.27	0.06	COAL, bright
}	472.33	0.06	COAL, dull and bright
	472.39	0.06	COAL, dull, metallic lustre
	472.47	0.08	COAL, dull and bright
	472.53	0.06	COAL, dull, metallic lustre
	472.66	0.13	COAL, dull banded
	472.81	0.15	COAL, dull and bright
	472.85	0.04	COAL, bright
	472.99	0.14	COAL, bright banded

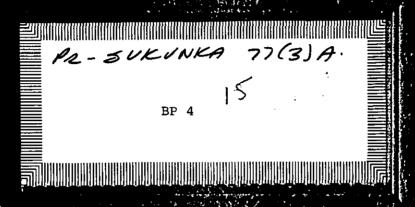
BH Nos. 3A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	rn.	m	:
	473.03	0.04	COAL, dull and bright
	473.10	0.07	COAL, bright .
	473.15	0.05	COAL, stony thin bands of carbonaceous claystone and
		_	bright coai
3 ⁰	473.29	0.14	SANDSTONE, grey, fine-grained, large coaly inclusions at top, grades to unit below, competent, a few thin interbeds of grey claystone throughout
	473.40	0.11	CLAYSTONE, dark grey, interbeds of grey sandstone
	473.62	0.22	SANDSTONE, medium-grained, light grey, massive, grades to units above and below, very competent
	473.80	0.18	SILTSTONE, grey, interbeds of fine-grained sandstone throughout, wavy bedding, sharp basal contact, competent
	474.20	0.40	SILTSTONE, as above
3 ⁰	475.96	1.76	SANDSTONE, light grey, medium-grained, coarse-grained phases, cross-bedded in places, fine coaly wisps throughout, sharp basal contact, large well rounded pebbles at base
	476.99	1.03	SANDSTONE, asabove
	477.20	0.21	SILTSTONE, grey, with frequent interbeds of grey clayston and phases of fine-grained light grey sandstone, cross- bedding at top, gradational basal contact
	477.64	0.4 <i>l</i> i	SILTSTONE, as above
-	478.07	0.43	CLAYSTONE, with interbeds of grey siltstone throughout, laminated grades to carbonaceous claystone at base, bedding very regular, polished bedding surfaces, fair to low competency, breaks easily on bedding planes
	478.34	0.27	CLAYSTONE, as above
	478.48	0.14	CORE MISSING-ROCK Roof of Chamberlain
	478.55	0.07	CORE MISSING-COAL
	478.63	0.08	COAL, bright, core broken
	478.67	0.04	COAL, bright banded
	478.98	0.31	CLAYSTONE, dark grey, carbonaceous at top and base, large coal inclusions at top and base
	479.16	0.18	CORE MISSING-COAL
	479.24	0.08	COAL, sheared, core broken, dull and bright
	479.27	0.03	COAL, dull and bright
}	479.29	0.02	COAL, dull banded
	479.42	0.13	COAL, dull banded
l			

BH Nos. 3A

BH No	os. 3A	1	
Dip	DEPTH m	THICKNESS m	DESCRIPTION
	479.52	0.10	COAL, dull and bright
	479.58	0.06	COAL, dull, metallic lustre
	479.70	0.12	COAL, dull and bright
	479.79	0.09	CLAYSTONE, dark grey, carbonaceous at top and base, brigh coal inclusion
	479.83	0.04	COAL, dull and bright
•	479.98	0.15	COAL, dull
	480.03	0.05	COAL, sheared
•	480.13	0.10	COAL, dull and bright
	480.21	0.08	COAL, bright banded
	480.27	0.06	CORE MISSING-COAL
	480.34	0.07	CLAYSTONE, carbonaceous, black, bright coal bands
	480.37	0.03	CORE MISSING-COAL
	480.44	0.07	COAL, dull, metallic lustre
	480.50	0.06	COAL, sheared, duil
	480.59	0.09	COAL, sheared and pulverized, fragments in box, dull and bright
	480.73	0.14	CORE MISSING-COAL
	480.83	0.10	CORE MISSING-ROCK
	481.49	0.66	CLAYSTONE, dark grey, carbonaceous phases at top and base
	481.68	0.19	CLAYSTONE, carbonaceous, black, phases of stony coal with bright coal bands, inclusions of bright coal throughout fair competency
	482.41	0.73	CLAYSTONE, as above
	482.45	0.04	COAL, dull and bright
	482.49	0.04	COAL, sheared, dull and bright
	482.60	0.11	CLAYSTONE, carbonaceous, as above
	482.75	0.15	CORE MISSING-ROCK
	482.77	0.02	COAL, dull, earthy lustre
	482.82	0.05	COAL, bright, core pulverized
	483.20	0.38	CLAYSTONE, carbonaceous, as above, fine calcite fracture filling throughout
	483.36	0.16	CLAYSTONE, as above
	483.44	0.08	COAL; dull banded
	483.54	0.10	COAL, sheared and pulverized, dull and bright

o O	DEPTH m	THICKNESS m	DESCRIPTION
	483.58	0.04	COAL, sheared and pulverized, bright fragments
	483.70	0.12	COAL, sheared and pulverized, dull fragments
	483.71	0.01	CLAYSTONE, carbonaceous, black, bright coal bands
	483.78	0.07	COAL, dull, earthy lustre, core pulverized
	483.87	0.09	COAL, bright banded
	483.92	0.05	COAL, dull and bright
	484.00	0.08	CORE LOSS-COAL
	484.07	0.07	COAL, dull, core broken, smutty earthy appearance
	484.14	0.07	COAL, dull banded
	484.21	0.07	COAL, dull
	484.29	0.08	COAL, dull banded
	484.32	0.03	COAL, dull
	484.37	0.05	COAL, dull banded
	484.48	0.11	COAL, dull
	484.58	0.10	COAL, dull and bright
	484.64	0.06	COAL, sheared and pulverized, bright banded
	484.68	0.04	COAL, sheared and pulverized, duīl
	484.73	0.05	COAL, sheared and pulverized, bright
	484.89	0.16	CORE MISSING-COAL
	484.96	0.07	CLAYSTONE, carbonaceous, black, bright coal bands, core broken
	485.03	0.07	COAL, dull banded
	485.07	0.04	COAL, stony
	485.11	0.04	COAL, dull banded
	485.13	0.02	COAL, stony
	485.17	0.04	CLAYSTONE, carbonaceous, black, bright coal bands
	485.23	0.06	COAL, sheared. core badly broken, dull and bright
			FLOOR OF CHAMBERLAIN SEAM
	486.60	1.37	SANDSTONE, medium to coarse-grained, light grey, large irregular coal inclusions at the top, bedding not apparent in top 2m
	486.91	0.31	SANDSTONE, as above
10 ⁰	488.96	2.05	SANDSTONE, as above
	489.60	0.64	SANDSTONE, as above



(06)

1,190.25

BP COAL CANADA

Page 1

AREA SUKUN	IKA	B. H. No.	BP 4	
Contractor: Longyear				
Commenced: July 10, 1	977	Co-ordinat	tes: 6,116,344.45 592,696.33	N
Completed: July 26, 1	977	Surface El	levation: 1,733.83	E m
Core Size: HQ		Casing Let	ft in Hole:	m
Hole Angle: See det		Geologist Andy Newson	Depth 50.89-275.00	
Hole Azimuth: page 1a	Logged	•	484.48 519.38-522.90	
Final Depth: 549.60		Ali Chowdry Geoff Jordan	278.89-438.70 485.48-499.11 523.01-549.60	
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION	
Boulder Creek				
Hulcross	90.20	90.20	1,643.63	
Gates	288.04	197.84	1,445.79	
Sukunka	414.40	126.36	1,319.43	
Moosebar	488.91	74.51	1,244.92	

SEAMS		DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD	UP LP	491.65 496.75			1,242.18 1,237.08
C HAMBERLA	ATN	543.58			1,190.25
מי כו		494 66		Small Breccia	

543.58

U. Gething

54.67

Sperry-Sun Survey

Date: 26th July 1977

Borehole: BP 4 Sukunka 77

Compass: 20° Maximum to Magnetic North

DPB Operator: P. J. Waters

Measured Depth	Tilt	Tilt Direction
545m	5° 30'	N 38° E
530m	5° 45'	N 37° E
510m	5° 45'	N 36° E
490m	5° 45'	N 36° E
480m	6° 45'	(N 22° E)
450m	4° 45'	(S 9° E)
350m	5° 30'	(N 42° W)
250m	4 ⁰ 45'	(S 9° W)
150m	4° 45'	(N 29° W)
50m	4° 00°	(S 29° W)
(Top hole hanging in	rods at base of sonde)	
Om	1° 30'	(S 64° W)

BH Nos. 4

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	50.89	50.89	CASING
	68.28	17.39	SHALE, silty, regular fine laminations, light grey-dark
3°			grey, relatively undisturbed, very fractured with iron staining on surfaces, 57.15-56.39 and 59.84-62.48 with fractures parallel with core axis
	68.73	0.45	BENTONITE CLAY, light olive grey, hard, will weather soft, calcite infilling of fracture joints
	70.32	1.59	SHALE, silty, fine-bedding, poorly defined, minor very fine sandstone bands showing cross-bedding
	70.38	0.06	BENTONITE CLAY, hard, calcareous, light grey
i	90.20	19.82	SHALE/SILTY with minor fine-grained sandstone layers, 90:10 grading down to fine grained sandstone with shale/silty layers 60:40, bedding and cross-bedding well defined some disturbance and minor bioturbation, aburpt below
			HULCROSS GATES
•			
	90.40	0.20	CONGLOMERATE, dark grey-black, well rounded pebbles, abrupt below
2 ⁰	94.91	4.51	SANDSTONE, argillaceous, medium/fine-grained, medium light grey, carbonaceous, dark shale interbeds calcareous, small burrows and large burrows, some load structures, 50% undisturbed well sorted 50% disturbed, gradational below
·	95.35	0.44	COAL, duro-clarain, pyritic, abrupt below
5°	96.41	1.06	SHALE, silty, pyritic, fine sandstone zone 96.31-95.91 showing bedding and load structure carbonaceous material throughout, dark grey-black
	97.09	0.68	COAL, durain/carbonaceous layers, gradational below
	98.00	0.91	SHALE, carbonaceous, coaly stringers, listric surfaces dark grey-black, pyritic, gradational below
20	100.52	2.52	SANDSTONE, fine-grained, interbedded siltstones argillac eous, minor coaly stringers, bedding and cross bedding in sandstones but poorly developed and disturbed in siltstones, patchily bioturbated
	101.13	0.61 .	SHALE, silty carbonaceous, dark grey to black, pyritic. homogeneous
	101.80	0.67	COAL, duro-clarain becoming very shaley at base, gradational below
	102.33	0.53	SHALE, silty, dark grey-black, minor coaly stringers, listric surfaces, pyritic, shows some disturbance, abrunt below

BH Nos. 4

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	150.58	4.39	SHALE/SANDY, poorly defined bedding showing erosional features, bioturbation with small worm burrows, shale 70 sand 30
	153.12	2.54	SANDSTONE, argillaceous, shaley interbeds, very bioturbated and disturbed, small and large burrows, iron cemented bands abrupt below (Sukunkoid type marker)
4°	156.70	3.58	SANDSTONE WITH CARBONACEOUS SHALE INTERBEDDED, disturbed with minor bioturbation and small scale erosional features and intraclasts, 3x1cm layers of grit size sandsto at base, abrupt below
	159.19	2.49	SHALE, carbonaceous, coal (156.97-157.17 durain and dirty) homogeneous, pyritic, listric surfaces
	160.52	1.33	SHALE/SILTSTONE, very fine-grained, carbonaceous, poorly developed bedding, some small scale erosional features, listric surfaces, abrupt below
	161.12	0.60	COAL, durain, becoming dirty below, listric surfaces, gradational below
	161.44	0.32	SHALE, carbonaceous, coaly stringers, no bedding, shows some small scale erosional features
	162.52	1.08	SILTSTONE, fine-grained, medium-dark grey, carbonaceous, gradational below
	166.42	3.90	SHALE, carbonaceous, dark grey-black, silty, well preserved plant fragments, occasionaly iron cemented, one coaly string at 0.08m thick at 163.88, becomes very coaly towards the base
	166.77	0.35	COAL, bright, listric surfaces, 0.02m of carbonaceous shale at 166.47m
	167.30	0.53	SHALE, carbonaceous, listric surfaces, planty material, silty at 167.55 very soft shale, carbonaceous
	167.80	0.50	COAL, dull, becomes shaley at base
	168.70	0.90	SHALE, carbonaceous, silty, dark grey-black
	169.00	0.30	COAL, dull, gradational below
	169.60	0.60	SHALE, carbonaceous, silty, abrupt below
3°	175.06	5.46	SANDSTONE AND INTERBEDDED SHALES, dark grey-black, carbonaceous, minor disturbances and load structures, sandy units cross-bedded, eroded below
	182.29	7.23	SHALE, carbonaceous, silty, dark grey, occasional bands iron cemented, listric surfaces, coaly stringers, gradational below, coaly interval at 179.19
			COAL SEAM D
	183.01	0.72	COAL, top 1cm and basal 1.5cm very shaley and dirty, dull coal, abrupt below, core-loss coal 0.14m

BH Nos. 4

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	185.00	1.99	SHALE, carbonaceous, silty-fine-grained sandstones layers, dark grey, transitional below
5 ⁰	197.25	12.25	SANDSTONE, medium-grained, interbedded shales, medium to dark grey, disturbed in shales and sandstone shale interfaces shale:Sand 50:50
	205.79	8.54	SHALE, silty, black, carbonaceous, sandy layer, medium- grained, very disturbed and dirty, small burrows at 200.8 201.79
		[COAL SEAM C
	206.30	0.51	COAL, dirty, carbonaceous
	206.52	0.22	COAL, dull, very dirty at base, pyritic
9°	214.98	8.46	SANDSTONE, medium/coarse-grained, pebble with occasional intraclasts, dirty, coarsly-bedded and cross-bedded
	229.00	14.02	SANDSTONE, light grey, medium-grained, well-sorted, clean, weakly calcareous, basal 0.5m with coaly whisps, two small pebble bands 215.78 and 216.88
	233.16	4.16	SANDSTONE AND SHALES INTERBEDDED, medium/fine-grained, light grey well-bedded, sandstone and black shales 50:50 interfaces show small scale erosional features, coal wisps and minor stringers, abrupt below
	234.40	1.24	CONGLOMERATE, well-rounded 2cm-0.5cm in size, dark grey
	234.70	0.30	SHALE, silty, carbonaceous, coaly stringers, with minor fine sandstone bands, disturbed
			COAL SEAM B
	235.00	0.30	COAL, bright and dull 50:50, abrupt below
	242.34	7.34	SANDSTONE, medium-grained, with shaley interbeds, patchil calcareous, bedding poorly defined, 50:50 sandstone:shale increasing disturbance towards the base coaly stringers, gradational below
	244.25	1.91	SHALE, black, silty, pyritic, homogeneous, with minor coaly stringers, carbonaceous
	244.80	0.55	SHALE, carbonaceous, very coaly, listric surfaces, coal seam 0.03m at base, abrupt below (this coal represer A horizon)
	246.00	1.20	CONGLOMERATE, well rounded 1cm-0.5cm in size, light grey abrupt below
	246.44	0.44	SANDSTONE, dirty, medium grey, medium-grained, occasiona pebbles, abrupt below
	246.84	0.40	CONGLOMERATE, sandy matrix with well-rounded pebbles, 1cm-0.5cm
3°	265.35	18.51	SANDSTONE, clean, bedded, medium/fine-grained, medium grey, minor cross-bedding, abrupt below

BH Nos. 4

Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	265.57	0.22	SHALE, dark grey-black, with sandstone, medium-grained, erosional above and below, disturbed
	268.45	2.38	SANDSTONE, clean, medium grey, medium-grained, minor shaley intercalations, pyritic, minor disturbances and erosion features, abrupt below
	272.25	3.80	SANDSTONE/SHALE, 50:50, coarsly interbedded, disturbed, eroded between beds, minor bioturbation, abrupt below
	272.50	0.25	CONGLOMERATE, light grey, well-rounded, sub-angular coarse sand size - 1.5cm, abrupt below
	275.00	2.50	SANDSTONE, clean, medium grey, medium-grained, clean, well-sorted
3°	278.89	3.89	SANDSTONE, light grey, fine/medium-grained, mostly lamin- ated, silty muds 276.11-276.36 with burrowed top, clean, well-sorted, calcareous throughout, interbedded below
3°	288.04	9.15	SANDSTONE/MUDSTONE, interbedded fine to medium sand and muds interval 282.14-283.44, 90% mud and 10% fine sands, as lenticles, also at 283.66-284.56, 80% mud, 20% sand, bioturbated zones, rest of sequence on either side 60% sands and 40% silty muds, some zones well-laminated, sand/shale boundaries commonly scoured, sporadic thin shale clasts, vertical fracture, 280.65-281.15; 282.14-282.71, calcareous throughout, gradational
	-		GATES . SUKUNKA
2 ^O	303.80	15.76	MUDSTONE/SANDSTONE/SILTSTONE, interbedded very-fine-to fine-sands, silty muds and silts, much bioturbated, many sandy zones laminated, interbedded below, vertical frac- ture 293.79-295.05 and 302.91-303.28, 25:35:40
3°	311.95	8.15	SANDSTONE/SILTSTONE/MUDSTONE, 15:40:45, interbedded, in sedimentary features similar to above
	318.00	6.05	SILTSTONE/MUDSTONE, 40:55, intimate association of silts and muds, predominantly bioturbated, very-fine-grained sand 5%, fractured vertically, 311.62-312.90 and 314.68-315.51, bentonite 0.5cm at 312.95
	333.00	15.00	SANDSTONE/SILTSTONE/MUDSTONE, 35-40:50:10, most sands fine-to very fine, laminated, rest with whorled fabrics and chaotic association of silts and muds with some sands
	350.50	17.50	SAND/SILTS/MUDS, homogenized sequence with occasional sandy remnants, very difficult to assess the individual components due to thorough 'churning', possibly muds 35%, silts 40%, sands 20-25%

BH Nos. 4

1)11 IAC	5. 4		
Dip O	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	102.61	0.28	SANDSTONE, very fine-grained, dark grey, few shaley interbeds, coaly stringers disturbed
	103.27	0.66	SHALE, carbonaceous, pyritic, coal band at middle, pyritic, listric surfaces, silty, abrupt below
	104.91	1.64	SANDSTONE, fine-to medium-grained, generally shows bedding and cross-bedding, some zones show disturbance with intraction clasts and bioturbation, small burrows, occasional coally carbonaceous zones, gradational below
	111.67	6.76	SHALE, black carbonaceous, occasional bands of iron cemented, very poorly defined bedding, some evidence of reworking, listric surfaces, gradational below
	115.80	4.13	SANDSTONE, fine-grained, argillaceous, medium to dark grey, patchily calcareous, disturbed and bioturbated, large vertical burrow at 113.7, abrupt below
	118.25	2.45	SANDSTONE, fine-grained, shales finely interbedded, smal scale cross-bedding, disturbed with load structures and intraclasts, gradational below (118.05 Shell Band Marker
	121.52	3.27	SANDSTONE, light grey, clean, well-sorted, poorly defined bedding and cross-bedding, increasing number of coaly wisps toward the base, gradational below
-	124.14	2.62	SHALE WITH SANDY ZONES, bedding poorly developed with zones of extensive disturbance, listric surfaces, gradational below
4 ⁰	129.71	5.57	SANDSTONE, fine/medium-grained, light grey, argillaceous layers giving bedding, with large fragments of carbon-aceous material, becoming cleaner and calcareous at the base, abrupt below
	133.29	3.58	SANDSTONE, medium-grained, medium grey, argillaceous, distinct well defined bedding with some minor bioturbati gradational below, patchily calcareous
9 ⁰	135.44	2.15	SHALE, silty with fine-grained sandstone intercalations, poorly defined bedding, disturbed, gradational below
	138.01	2.57	SANDSTONE, medium-grained, medium grey, poorly defined bedding and cross-bedding, minor shaley layers, erosiona below
	140.33	2.32	SHALE/SILTSTONE, interbedded, some fine-grained sandston layers, bedding poorly developed, bioturbated with some small-scale erosional features, gradational below
	142.93	2.60	SANDSTONE, medium-grained, shaley layers with abrupt boundaries, zones of bioturbation and erosional features but generally well-sorted, gradational below
6 ⁰	146.19	3.26	SANDSTONE/SHALES, interbedded, argillaceous and carbon- aceous, bedding well defined but showing some disturbanc with intraclasts and small-scale erosional features, gradational below

BH Nos. 4

5.	050711	THEOLOGICS	DECODIDATION
Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	358.50	8.00	SANDSTONE, light grey, fine-grained, clean, interbedded with silty muds, very reminiscent of intertidal sequence, initial 0.65m with large burrows and bioturbated, strongly calcareous throughout
	368.02	9.52	SANDSTONE/MUDSTONE/SILTS, 40:60, interbedded sequence of very fine sand and muddy silts, strongly calcareous
	375.10	7.08	MUDSTONE/SILTS/SANDS, 80:20, with all the attendent features
	396.53	21.43	SILTSTONE/MUDSTONE/SANDSTONE, very fine-grained, vertical fracture, 374.10-374.90, sandstone, fine-grained clean, calcareous at 387.18-387.63, vertical fracture 388.32-389.00
	414.40	17.87	MUDSTONE, marking base of Sukunka, dark grey, interbedded with wisps and lenticles of very fine-grained, finely laminated sands, in upper half, sands 10%, lower half 2-3% mainly as wisps, calcareous, there is a marked reduction in organic activity, some pyritic nodules around 411.0, vertical fracture, 411.10-411.78 and 412.51-413.21
			SUKUNKA
	·		MOOSEBAR
-	438.70	24.30	MUDSTONE, dark grey, homogenous mudstone devoid of bedding and totally lacking discernible silty/sandy laminae, vertical fracture 413.21-415.05 and 422.48-423.98, listric surfaces and abundantly split along bedding at 415.29-415.60
	484.48	45.78	MUDSTONE, dark grey, pyritic clusters, occasional layers iron cemented, occasional bentonites, some fracture zones with calcite infilling
			Iron Cemented Bentonites Fracture Zones 452.99m 472.74 455.95m 467.25 476.51 464.30 472.00 472.00 472.74 476.01 476.01 Fracture zones with calcite infilling often associated with either iron cementing or bentonites
	485.48	1.00 .	MUDSTONE, dark grey-brown, Moosebar, low competency, weathers quickly, breaks readily on fractures not controlled by structure
	487.90	2.42	CLAYSTONE, light green-brown to white, dessicated, soft, bentonitic
	488.04	0.14	MUDSTONE, as above

BH Nos. 4

BH No	s. 4	·	
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	488.19	0.15	CLAYSTONE, as above
	488.54	0.35	SANDSTONE, fine-grained, dark green, glauconitic, massiv very competent, irregular, abrupt basal contact
	488.72	0.18	SANDSTONE, as above
	488.91	0.19	SANDSTONE, as above
			MOOSEBAR GETHING
		·	COAL SEAM - BIRD
	488.97	0.06	CORE MISSING-COAL
	489.04	0.07	COAL, dull and bright, core broken, pyrite band at top
	489.10	0.06	COAL, dull banded
	489.11	0.01	CLAYSTONE, carbonaceous
	489.14	. 0.03	COAL, stoney
•	489.17	0.03	COAL, dull banded
	489.21	0.04	COAL, dull and bright
	489.26	0.05	COAL, bright banded
	489.36	0.10	COAL, dull and bright
	489.41	0.05	COAL, dull banded
	489.50	0.09	COAL, dull and bright
	489.60	0.10	COAL, dull, fusain
	489.64	0.04	COAL, bright banded
	489.74	0.10	COAL, dull banded
	489.83	0.09	COAL, dull and bright
	489.88	0.05	CORE LOSS-ROCK
5 ⁰	490.97	1.09	CLAYSTONE, dark grey, occasional large pyritic worm casts, a few light grey claystone interbeds, moderately competent
110	491.22	0.25	CLAYSTONE, as above
	491.33	0.11	COAL, dull banded
	491.44	0.11	COAL, dull
10°	491.50	0.06	COAL, dull and bright
	491.65	0.15	COAL, duli
٠	493.00	1.35	SANDSTONE, medium-grained, light grey, massive, very competent coaly matrix and inclusions at top, numerous

BH Nos. 4

	····	1 	
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			fractures where calcite has been leached in centre
	494.66	1.66	SANDSTONE, mottling by small worm burrows from 1.65m to 2.0m from top, small tectonic breccia at base
	494.81	0.15	SANDSTONE, probable fault plane at base
	495.13	0.32	CORE MISSING-ROCK
	495.14	0.01	CLAYSTONE, carbonaceous, fragments in box, highly sheared and listric surfaces
	496.32	1.18	CLAYSTONE, dark grey, carbonaceous towards base, one sandy phase near top, plant fossils, pyritic worm burrows moderately competent, slickensided on fractures at 50° to core axis towards base
9°	496.59	0.27	COAL, dull banded, core completely broken during drilling fragments usually unsheared, scam is probably unsheared or unfaulted
	496.75	0.16	CORE MISSING-COAL
	497.00	0.25	SANDSTONE, medium-grained, light grey, massive, very competent coaly matrix and inclusions at top, mottling by small worm burrows 1.60 to 1.95
	497.88	0.88	SANDSTONE, as above
9° .	499.11	1.23	SANDSTONE, as above
	519.38	20.27	SANDSTONE, medium-grained, medium grey, poorly-bedded, with zones of bioturbation and large worm burrows, calcareous burrows from 501.60 to 505.60 and 509.33-510.23, becoming finer grained towards the base
	522.90	3.52	SANDSTONE/SHALES,coarsley interbedded, sandstones fine- grained, medium grey, poorly-bedded, shales dark grey, transitional above and below
	523.01	0.11	SILTSTONE, dark grey, coaly plant fragments on bedding planes, bedding indistinct, numerous very fine calcite filled veins throughout, one calcite filled fracture parallel to bedding in centre, grades rapidly to unit below
	52 <u>3</u> .41	0.40	SANDSTONE, light grey, medium-grained, becomes coarser- grained at base, large light coloured worm burrows immediately above base, basal contact sharp but irregular sedimentary breccia of underlying lithology for 0.03m above contact, bedding weakly developed, very competent rock unit
	523.68	0.27	CLAYSTONE, dark grey, few fine light grey siltstone interbeds towards the top, sharp basal contact, rock unit competent
	524.15	0.47	SANDSTONE, mid grey, fine-grained, several thin grey irregular interbeds in top half, bioturbation towards based competent, grades to lower unit

BH Nos. 4

RH NO	5. 4		
Dip O	DEPTH m	TH1CKNESS m	DESCRIPTION
	524.27	0.12	SILTSTONE, mid grey, irregular fine-grained sandstone phases, grades to lower unit, very competent
	524.62	0.35	SANDSTONE, fine to medium-grained, coarser at base, cross-bedded in top half, argillaceous clasts and coaly laminae towards base, sharp basal contact, competent
5 ⁰	524.97	0.35	SILTSTONE, mid grey, numerous laminations of dark grey claystone throughout, bioturbation with fine light coloure worm burrows in top 1/3, grades to lower unit,competent
	525.12	0.15	CLAYSTONE, dark grey, frequent very fine grey siltstone interbeds throughout, lithology appears moderately compete sharp contact to unit below
	526.34	1.22	CLAYSTONE, as above
	527.30	0.96	SANDSTONE, medium-grained, grey, numerous irregular carbonaceous claystone interbeds becoming more frequent at base, phases of very fine worm burrows towards the base (light coloured), competent, rapid gradational basal contact
	527.96	0.66	SANDSTONE, as above
ц ^O	528.22	0.26	SANDSTONE, grey, medium-grained, bedding highly disturbed by bioturbation at top but includes a few coaly inclusions then gradually grades to frequent coaly wisps and inclusion and finally to frequent carbonaceous claystone interbeds and coaly inclusions, sharp basal contact, fair competency
	529.26	1.04	SANDSTONE, mid grey, medium-grained, sharp irregular basal contact, bioturbation and medium sized worm burrows towards top, bedding completely disturbed at top but only highly distrubed towards base, competent
	529.41	0.15	CLAYSTONE, carbonaceous, black with frequent interbeds of grey claystone, grades to lower unit, fair competency
	529.80	0.39	CLAYSTONE AND SILTSTONE INTERBEDDED, carbonaceous, black claystone with irregular grey siltstone interbeds, shelly fossils and fossil fragments present in centre sharp contact at base, fair competency, may break at lithologida contacts
	529.85	0.05	COAL, dull and bright, dull coal is sub lustrous, pyrite band at base
4 ^O	529.93	0.08	COAL, dull, metallic luster
	529.96	0.03	COAL, dull and bright, irregular coal bands at top, metallic dull luster
	530.00	0.04	COAL, bright banded
	530.20	0.20	CORE MISSING-COAL
	530.87	0.67	CORE MISSING-ROCK
	•	•	, , , , , , , , , , , , , , , , , , ,

BH Nos. 4

Dip	DEPTH	THICKNESS	DESCRIPTION
0	រា	m	
	530.97	0.10	CLAYSTONE, carbonaceous, black, core broken, plant fragments and numerous bright coal bands, some fragments show slickensided and listric surfaces, tectonic dis- turbance present but minon, rapidly grades to lower unit
	531.75	0.78	SANDSTONE, fine-grained, becoming medium-grained towards base, claystone slump structure towards base, bedding indistinct, slump contact sharp at top, gradational at bas bioturbation in top half, competent, sharp basal contact
	532.10	0.35	SILTSTONE, mid grey, bedding irregular and indistinct grading to grey claystone at top and fine-grained, light grey sandstone, competent, sharp basal contact
	532.68	0.58	SILTSTONE, as above
5 ⁰	533.96	1.28	SILTSTONE, grey with frequent interbeds of dark grey to carbonaceous claystone and frequent phases of fine- grained light grey
	534.00	0.04	SANDSTONE, one small (0.03m) slump in centre, worm burrows and bioturbation in lower ½, moderate to low competency, sharp irregular basal contact, rock unit may part along bedding surfaces
	534.19	0.19	CLAYSTONE, dark grey, with frequent very fine grey silt- stone interbeds at top disappearing to base, claystone grades to carbonaceous claystone at base, listric surfaces and slickensided at intervals to 0.05m on bedding, fair to low competency, gradational contact to lower unit
	535.88	1.69	CLAYSTONE, as above
	536.28	0.40	CLAYSTONE, carbonaceous, black, sub fissile phases, plant fragments, coal at base, low competency
	536.34	0.06	CLAYSTONE, as above
	536.68	0.34	CLAYSTONE, as above
<u>.</u> .	536.72	0.04	COAL, dull and bright, metallic juster of dull coal
60	536.83	0.11 -	COAL, dull, metallic luster of dull coal
	537.01	0.18	COAL, dull banded, core broken, metallic luster of dull coal
	537.16	0.15	CORE MISSING-COAL
	537.33	0.17	COAL, dull, metallic luster of dull coal
	537.36	0.03	COAL, dull, core broken, metallic luster of dull coal
	537.86	0.50	CORE MISSING-COAL
	537.93	0.07	CORE MISSING-ROCK
8°	538.68	0.75	SANDSTONE, medium-grained, light grey, carbonaceous siltstone at top, very competent
	538.74	0.06	SANDSTONE, as above, contains calcite filled fractures predominantly on bedding but some irregular fine fractures

BH Nos . 4

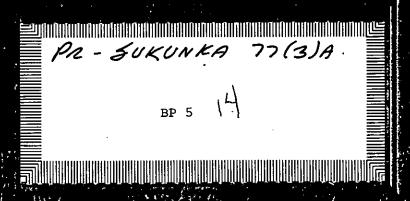
o m m cutting across bedding 539.06 0.32 SANDSTONE, unfractured, as above 539.17 0.11 SILTSTONE & CLAYSTONE INTERBEDDED, grey siltstone and dark grey claystone forming thin graded units, bedding contacts often irregular and occasionally cross-bedd core often breaks to 5cm units, moderate to low competency, grades to unit below 539.65 0.48 SILTSTONE & CLAYSTONE INTERBEDDED, as above CLAYSTONE, dark grey, grades to carbonaceous at base listric surfaces common on bedding planes, low competence core easily breaks to 0.01m lengths, one large calcit filled fracture 0.46m from top and at 60° to core ax 1940.46 0.20 CLAYSTONE, as above, calcite filled large irregular fractures for 0.05m at top and base defining sigmoid laminite zone 540.52 0.06 CLAYSTONE, carbonaceous, black 540.54 0.02 COAL, dull and bright 540.63 0.06 COAL, dull banded 540.68 0.05 COAL, dull and bright 540.72 0.04 COAL, dull and bright 540.79 0.07 COAL, dull and bright 540.85 0.06 COAL, dull and bright 540.90 0.05 COAL, dull and bright 540.90 0.05 COAL, dull and bright 541.01 0.11 COAL, dull banded 541.09 0.08 COAL, dull banded	ng ed,
539.06 539.17 0.11 SILTSTONE & CLAYSTONE INTERBEDDED, grey siltstone and dark grey claystone forming thin graded units, beddit contacts often irregular and occasionally cross-beddit core often breaks to 5cm units, moderate to low competency, grades to unit below 539.65 0.48 SILTSTONE & CLAYSTONE INTERBEDDED, as above CLAYSTONE, dark grey, grades to carbonaceous at base listric surfaces common on bedding planes, low competence of easily breaks to 0.01m lengths, one large calcit filled fracture 0.46m from top and at 60° to core axily breaks to 0.05m at top and base defining sigmoid laminite zone 540.52 0.06 CLAYSTONE, as above, calcite filled large irregular fractures for 0.05m at top and base defining sigmoid laminite zone 540.54 0.02 CLAYSTONE, carbonaceous, black 540.57 0.03 CORE MISSING-COAL 540.63 0.06 COAL, dull and bright 540.72 0.04 COAL, dull and bright 540.79 0.07 COAL, dull and bright 540.85 0.06 COAL, dull and bright 540.90 0.05 COAL, dull and bright 541.01 0.11 COAL, dull banded 541.09 0.08 COAL, dull and bright	ng ed,
539.17 O.11 SILTSTONE & CLAYSTONE INTERBEDDED, grey siltstone and dark grey claystone forming thin graded units, beddicontacts often irregular and occasionally cross-beddicore often breaks to 5cm units, moderate to low competency, grades to unit below S39.65 O.48 SILTSTONE & CLAYSTONE INTERBEDDED, as above CLAYSTONE, dark grey, grades to carbonaceous at base listric surfaces common on bedding planes, low competence easily breaks to 0.01m lengths, one large calcit filled fracture 0.46m from top and at 60° to core ax listric surfaces for 0.05m at top and base defining sigmoid laminite zone CLAYSTONE, as above, calcite filled large irregular fractures for 0.05m at top and base defining sigmoid laminite zone CLAYSTONE, carbonaceous, black COAL, dull and bright COAL, dull banded S40.63 O.06 COAL, dull banded S40.72 O.04 COAL, dull and bright COAL, dull and bright S40.85 O.06 COAL, dull and bright S40.90 O.05 COAL, dull and bright S40.90 O.05 COAL, dull and bright ng ed,	
dark grey claystone forming thin graded units, beddicontacts often irregular and occasionally cross-bedd core often breaks to 5cm units, moderate to low competency, grades to unit below 539.65 0.48 SILTSTONE & CLAYSTONE INTERBEDDED, as above 540.26 0.61 CLAYSTONE, dark grey, grades to carbonaceous at base listric surfaces common on bedding planes, low competency breaks to 0.01m lengths, one large calcit filled fracture 0.46m from top and at 60° to core ax 540.46 0.20 CLAYSTONE, as above, calcite filled large irregular fractures for 0.05m at top and base defining sigmoid laminite zone 540.52 0.06 CLAYSTONE, carbonaceous, black 540.54 0.02 COAL, dull and bright 540.57 0.03 CORE MISSING-COAL 540.63 0.06 COAL, dull banded 540.68 0.05 COAL, dull and bright 540.72 0.04 COAL, bright banded 540.79 0.07 COAL, dull and bright 540.85 0.06 COAL, dull and bright 540.90 0.05 COAL, dull and bright 541.01 0.11 COAL, dull banded 541.09 0.08 COAL, dull and bright	ng ed,
CLAYSTONE, dark grey, grades to carbonaceous at base listric surfaces common on bedding planes, low compete core easily breaks to 0.01m lengths, one large calcit filled fracture 0.46m from top and at 60° to core ax CLAYSTONE, as above, calcite filled large irregular fractures for 0.05m at top and base defining sigmoid laminite zone 540.52	ency
listric surfaces common on bedding planes, low competed core easily breaks to 0.01m lengths, one large calcit filled fracture 0.46m from top and at 60° to core ax 540.46 0.20 CLAYSTONE, as above, calcite filled large irregular fractures for 0.05m at top and base defining sigmoid laminite zone 540.52 0.06 CLAYSTONE, carbonaceous, black COAL, dull and bright CORE MISSING-COAL COAL, dull banded 540.63 0.06 COAL, dull and bright 540.72 0.04 COAL, bright banded 540.79 0.07 COAL, dull and bright 540.85 0.06 COAL, dull and bright 540.90 0.05 COAL, dull and bright 541.01 0.11 COAL, dull banded 541.09 0.08 COAL, dull banded COAL, dull banded COAL, dull and bright	ency
fractures for 0.05m at top and base defining sigmoid laminite zone 540.52	s
540.54 0.02 COAL, dull and bright 540.57 0.03 CORE MISSING-COAL 540.63 0.06 COAL, dull banded 540.68 0.05 COAL, dull and bright 540.72 0.04 COAL, bright banded 540.79 0.07 COAL, dull and bright 540.85 0.06 COAL, dull 540.90 0.05 COAL, dull 541.01 0.11 COAL, dull banded 541.09 0.08 COAL, dull and bright	à [
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540.90 0.05 COAL, dull and bright 541.01 0.11 COAL, dull banded 541.09 0.08 COAL, dull and bright	
541.01	
541.09 0.08 COAL, dull and bright	
State of COM Lainte handed	
541.13 0.04 COAL, bright banded	
541.15 0.02 COAL, boney, earthy luster and high ash with several bright coal bands	
541.19 0.04 COAL, bright banded	
541.22 0.03 COAL, dull banded	
541.28 0.06 COAL, as above	
541.33 0.05 COAL, dull and bright	•
541.44 0.11 COAL, dull banded	
541.55 0.11 COAL, dull and bright	
541.60 0.05 COAL, bright	
541.65 0.05 COAL, bright banded	
7° 541.72 0.07 COAL, dull banded	

BH Nos. 4

BH NO			
Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m .	
	541.78	0.06	COAL, bright banded
	541.83	0.05	COAL, dull and bright
	541.87	0.04	COAL, bright
	541.91	0.04	COAL, dull and bright
	541.97	0.06	COAL, bright banded
	542.00	0.03	COAL, dull and bright
	542.04	0.04	COAL, dull banded
	542.08	0.04	COAL, dull and bright
	542.10	0.02	COAL, dull, fusain (woody)
	542.23	0.13	COAL, dull and bright
	542.27	0.04	COAL, dull banded
	542:34	0.07	COAL, dull and bright
	542.39	0.05	COAL, bright banded
	-542.48	0.09	COAL, dull and bright
	542.52	0.04	COAL, bright banded
	542.55	0.03	COAL, bright
	542.64	0.09	COAL, dull and bright
	542.66	0.02	COAL, dull, earthy
	542.74	0.08	COAL, dull and bright
	542.77	0.03	COAL, bright
	542.86	0.09	COAL, dull and bright
	542.91	0.05	COAL, dull banded
	543.00	0.09	COAL, dull and bright
	543.05	0.05	COAL, dull banded
	543.17	0.12	COAL, dull and bright
	543.26	0.09	COAL, dull, glossy luster
	543.31	0.05	COAL, dull banded
	543.38	0.07	COAL, dull and bright
	543.42	0.04	COAL, bright banded
	543.45	0.03	COAL, dull and bright
•	543.58	0.13	CORE MISSING-COAL
6°	544.31	0.73	SANDSTONE, medium to coarse-grained, light grey, carbonaceous at top, bedding indistinct
	545.06	0.75	SANDSTONE, as above
	545.79	0.73	SANDSTONE, as above

BH Nos. 4

ip o	DEPTH m	THICKNESS m	DESCRIPTION
	546.56	0.77	SANDSTONE, as above .
;	547.20	0.64	SANDSTONE, as above
	547.92	0.72	SANDSTONE, as above
	549.60	1.68	SANDSTONE, as above
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AREA

SUKUNKA

B. H. No. BP 5

Contractor:

Tonto

Commenced:

July 9, 1977

Completed:

July 21, 1977

Co-ordinates: 6,113,959.54

N

593,876.52

E

Surface Elevation: 1,737.85

m

Core Size:

ΗQ

Casing Left in Hole:

m

Hole Angle:

Hole Azimuth:

See detail

page la

Geologist

Andy Newson

Depth 9.14-501.43 501.54-510.05

Geoff Jordan Logged by: Mike DeMestre

512.44-526.91

Graham Wallis

527.41-550.16

Final Depth:

550.16

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross	69.93	69.93	1,667.92
Gates	282.00	212.07	1,455.85
Sukunka	415.20	133.20	1,322.65
Moosebar	504.93	89.73	1,232.92
U. Gething	546.11	41.18	1,191.74

SEAMS	DEPTH	-	THICKNESS	%RECOVERY	ELEVATION.
BIRD	507.35				1,230.5
CHAMBERLAIN	546.11				1,191.74

512.63 F.PO. F.PO. 545.41 Slickensides & Fracturing Intense fracturing

Spercy-Sun Survey

Date: 21st July 1977

Borehole: BP 5 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
545m	6° 00'	N 22° E
500m	.6° 00'	N 22° Е
450m	4° 15'	n 27° Е
400m	3° 15'	N 39° Е
350m	2° 30'	n 32° E
300m	2° 15'	N 30° E
250m	1° 45'	N 31° E
200m	2° 00'	N 28° Е
150m	10.45	n 27° Е
100m	1° 45'	n 23° Е
50m	1° 45'	N 12° E

BH Nos. 5

	s. >		
Dip o	DEPTH	THICKNESS	DESCRIPTION
·	m	m	
	9.14	9.14	CASING
5° 2°	25.65	16.51	SHALE & FINE SILTSTONE INTERBEDDED, light to dark grey, fine laminations and minor cross-bedding, occasional zones of distrubed sediments with load structures in a generally even finely bedded sequence, minor small lenses of siltstone in shale, steep fractures 80° at 21.8, abrupt below.
6°	26.78	1.13	SHALE WITH FINE SILTSTONE, medium to dark grey, poorly defined bedding, bioturbated, lenses of lighter fine silt stone frequent, abrupt below
•	28.66	1.88	SHALE WITH FINE SILTSTONE, medium to dark grey, poorly bedded, faintly laminated and cross laminated, minor load structures, abrupt below
	28.86	0.20	SHALE WITH FINE SILTSTONE, light to dark grey, disturbed and bioturbated, calcareous infilling of "herring bone" structure, on minor fault surface, eroded below
5°	29.76	0.90	SHALE WITH FINE SILTSTONE, light to dark grey, bedding poorly developed because of bioturbation, minor load structures, siltstone gradational above with shales and eroded below, with shales burrows (small) zone 1cm thick at 31.10
	69.93	40.17	SHALE WITH INTERBEDDED FINE SILTSTONE, fine laminations, well developed throughout, light to dark grey, siltstone layers show small scale cross laminations also often show abrupt below to shales and gradational above to shales, occasional zones of more strongly disturbed sediments showing rolling and slump structures, occasional bands of 0.1-0.3m thickness of siltstones with very little shale, these layers often aligntly disturbed by
			little shale, these layers often slightly disturbed by load structures, 0.47bentonite clay at 50.29, light olive grey homogenous, soft, slightly micaseous and silty calcite infillings on movement surface, unit abrupt below
			HULCROSS GATES
	70.08	0.15	CONGLOMERATE, well rounded, pebbles 0.5cm-1.0cm, calcar- eous matrix, gradational below
	71.18	1.10	SHALE WITH FINE SANDSTONE, medium to dark grey, calcareou fine but poorly developed bedding, bands of fine sandy material, gradational below.
	73.02	1.8½	SHALE, black, minor listric surfaces, replaced carbonaceo material giving areas of lighter color, uniform, poorly

0	DEPTH	THICKNESS	DESCRIPTION
	m	m	
			developed to no bedding, abrupt below
	73.79	0.77	COAL, durain, massive
	73.89	0.10	SHALE, carbonaceous, massive, hard
	74.49	0.60	SHALE, dark grey/black, bedding poorly defined, some siltstones and bioturbation at base
	79.87	5.38	SILTSTONE/SANDSTONE, fine-grained sandstone, finely laminated, with well developed bedding and cross bedding gradually coarsening towards the base, calcareous, some disturbed zones showing bioturbated shales at base, gradational below
	81.57	1.70	SHALE/SILTY, poorly developed bedding, dark grey, listric surfaces, coaly stringers at base
	82.32	0.75	COAL, durain, massive, minor vitrain stringers, 0.1m carbonaceous shale at top
	83.22	0.90	SHALE, carbonaceous, dark grey/black, poorly developed bedding, massive, coaly stringers and listric surfaces, well developed at base, gradational below
	84.02	0.80	COAL, durain with infrequent vitrain layers, massive
5°	85.09	1.07	SILTSTONE, light grey, shaley at top, well defined bedding with minor disturbed layers, abrupt below
	85.29	0.20	SILTSTONE AND INTERBEDDED COAL, carbonaceous, listric surfaces
	89.86	4.57	SILTSTONE/SANDSTONE & INTERBEDDED SHALES, fine sandstone poorly developed bedding and cross-bedding, bioturbated
	95.41	5.55	SHALE, silty with sandy layers, black/light grey, poorly developed bedding, bioturbated
	95.65	0.24	COAL, durain, with carbonaceous shales interbedded, very broken
-	97.94	2.29	SHALE & FINE SILTSTONES, medium/dark grey, bioturbated, lighter material forming lenses in darker matrix; calcareous
9 ⁰	102.63	4.69	SHALE WITH MINOR SILTSTONE, dark grey, bedding poorly developed at top improving at the base, bioturbated, non calcareous, shell bed marker at 98.96m, gradational belo
	107.44	4.81	SANDSTONE, medium-grained, light grey, poorly developed bedding and cross bedding, minor bands of shale material intraclasts of shale material angular up to 4cm x2cm in size, coarsening towards the base, gradational below
	107.72	0.28	SAMDSTONE, coarse-grained, light grey, minor coaly stringers, intraclasts of shale at base well-rounded 2cm x lcm, calcareous.

BH Nos. 5

BH NO	, , , , , , , , , , , , , , , , , , ,		
Dip	DEPTH m.	THICKNESS m	DESCRIPTION
90	109.27	1.55	SILTSTONE AND INTERBEDDED SHALE, finely bedded and cross- bedded, well developed, slight disturbance with some load structures, abrupt below.
7°	117.99	8.72	SANDSTONE, medium/coarse-grained, clean, well-sorted, bedding poorly developed, occasional intraclasts of shale, light grey, patchily calcareous, gradational below.
	126.22	8.23	SANDSTONE, medium/fine-grained, finely bedded, with minor shale layers, light grey, slightly calcareous, becoming more shaly towards the base, shaly layers showing abrupt contacts above and below.
	128.91	2.69	SANDSTONE, medium-grained with interbedded shales, abrupt boundaries, minor cross in sandstones with shales showing some erosional features, at top 70% sand 30% shale, at base 100% shale, transitional below.
	130.06	1.15	SHALE WITH MINOR INTERBEDDED FINE SILTS, bedding well defined and regular with some disturbance, medium/dark grey, very small worm burrows common, patchily calcareous, abrupt below.
	135.60	5.54	SILTSTONE, fine-grained and shale, very bioturbated, horizontal small burrows and vertical large burrows, minor layers of relatively undisturbed siltstones showing cross-bedding, abrupt below with minor listric surfaces.
50	138.17	2.57	SANDSTONE, medium-grained, faint but regular bedding, medium/light grey, small-scale cross-bedding.
	140.42	2.25	SANDSTONE, medium/fine-grained, with interbedded shales showing bioturbation, load structures common on the shales, occasional layers of near grit size sandstone, basal 0.6m consists of mainly sandstone, argillaceous, wit large worm burrows, bedding and cross-bedding well-defined in sandstones, gradational below.
	140.62	0.20	CONGLOMERATE, large to grit size pebbles, well-rounded, abrupt below.
6°	144.10	3.48	SILTSTONE WITH INTERBEDDED SHALES, faint bedding with bioturbation generally minor, well developed worm burrows and disturbance in middle, shales show load structures and often highly carbonaceous, basal 1.2m fairly clean siltstone, before grading into shales below.
	147.23	3.13	SHALE AND SILTSTONE INTERBEDDED, poorly developed bedding in shales but better developed bedding and cross-bedding in siltstones, some minor bioturbation, medium-dark grey, plant fragments, abrupt below.
	148.33	1.10	SHALE, carbonaceous, black, well developed, plant frag- ments, coaly stringers, gradational below.
			COAL SEAM E TOP HORIZON
	148.80	0.47	COAL, claro-durain, massive, basal O.lm,carbonaceous.

BH Nos.

BH No	5. 5	~~····································	
o id	DEPTH m	THICKNESS	DESCRIPTION
40	152.59	3.79	SHALE, carbonaceous, with two layers of siltstone showing bedding and cross-bedding, bedding generally poorly developed, minor coaly stringers, well preserved woody material, gradational below.
	155.12	2.53	SHALE, very carbonaceous, poorly bedded, dark grey/black, coaly stringers, two coals 152.60-152.80 clarain; and at 153.98-154.10, durain and very dirty, minor silty bands, gradational below.
. !	155.75	0.63	COAL, claro-durain, massive, basal 0.22m carbonaceous shale, gradational below.
7°	157.80	2.05	SILTSTONE, argillaceous, light/dark grey, bedding poorly developed, bioturbated in places, abrupt below.
	158.54	0.74	COAL, durain, massive, minor listric surfaces, gradationa below.
	168.26	9.72	SHALE, light/medium grey, bedding poorly developed, minor silty layers, carbonaceous with coaly stringers, minor slump structures, gradational below.
6 ⁰	171.36	3.10	'SANDSTONE, fine/medium-grained, light grey, distinct bedding and cross-bedding showing slight disturbance, intraclasts of dark grey shales, abrupt below.
	172.36	1.00	SHALE, carbonaceous, black, bedding slightly developed at top 0.lm and showing disturbance.
			COAL SEAM D
	173.48	1.12	COAL, claro-durain, massive-platy, becoming shaly towards the base, carbonaceous shale stringer at 173.20, grada- tional below.
	174.09	0.61	SANDSTONE, very fine-grained, bedded and cross-bedded, slightly disturbed, light/medium grey, coarsening to base gradational below.
	175.39	1.30	GRANULITE, well sorted, clean, abrupt below, light grey
	177.14	1.75	SHALE, carbonaceous dark grey/black, poorly developed bedding showing disturbance, coaly stringers, dirty coal 177.11-177.36, abrupt below.
	178.74	1.60	SILTSTONE/SANDSTONE, fine-grained sandstone, light grey, well developed bedding and cross-bedding, in places showing bioturbation, calcareous, abrupt below.
	184.70	5.96	SHALE, carbonaceous, black, massive, homogeneous, abrupt below.
			COAL SEAM C
	185.00	0.30	COAL, durain with very dirty layers, minor listric sur- faces.
	203.29	18.29	CONGLOMERATE, dark/light grey, well-rounded pebbles, size range 2-3mm to 2.5cm, patchily calcareous.

BH Nos. 5

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Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	·
	204.72	1.43	CONGLOMERATE, well-rounded pebbles, size 2cm-3mm carbon- aceous shale band with coaly stringers at 204.42, grada- tional below.
10°	209.25	4.53	SANDSTONE, medium-grained, medium grey, clean, well-sorted, conglomerate bands throughout 205.1-24cm thick, well-rounded, up to 5mm, 205.40-38cm thick, well-rounded, up to 5mm scattered through sandy matrix, 206.20-15cm thick, sub-angular to well-rounded up to 1.5cm, 206.43 staurolite structures, 206.72-30cm thick, well-rounded, up to 1cm in size, 207.55-15cm thick, well-rounded to sub-angular, up to 1cm in size, 209.14-2cm thick, sub-angular, 0.5-1.0cm in size.
	223.91	14.66	SANDSTONE, medium-grained, medium grey, poorly discernible bedding, well-sorted, clean, occasional chert pebbles (sub-angular), patchily calcareous, gradational below.
	226.16	2.2 5	CONGLOMERATE, grades from sandstone at top with large pebbles to conglomerate at base, well-rounded up to 0.5cm in size, minor carbonaceous shale wisps, abrupt below, bottom 2cm carbonaceous sandstone.
			COAL SEAM B
	227.18	1.02	COAL, 0.18 durain, clusters of pyrite, 0.81 clarain.
·	230.25	3.07	SHALE AND SILTSTONE, coarse by interbedded, carbonaceous, beds 0.30m thick on average, 60% siltstone/fine-grained sandstone, 40% shale.
!			COAL SEAM A HORIZON
	233.20	2.95	SHALE, carbonaceous with very coaly intervals at 230.62, 231.07 and 233.0, numerous well preserved carbonaceous fragments with coaly stringers throughout, abrupt below. Note: out of this 2.95m interval, only about 0.30 coal indicated (geophysical log) toward its base.
	237. 85	4.65	CONGLOMERATE, rounded, sub-angular, heterogeneous in size, sandstone size to greater than 5cm, basal 0.80m granulite (ie; coarse sandstone size) transitional below
	248.61	10.76	SANDSTONE, light grey, clean well-sorted, medium-grained, transitional below.
3 ⁰	251.20	2.59	SANDSTONE WITH FINE CONGLOMERATE LAYERS, argillaceous and carbonaceous, coaly wisps, abrupt below, intraclasts, bedding poorly defined
	253.26	2.06	CONGLOMERATE, round to sub-angular, coarse sandstone size to 1.5cm, abrupt below
	254.00	0.74	SANDSTONE, medium-grained, medium grey, poorly bedded, disturbed, large worm burrows at 253.4, gradational below
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BH Nos.

Dit NO			
Dip	DEPTH m	THICKNESS m	DESCRIPTION '
3°	255.51	1.51	SANDSTONE WITH CONGLOMERATE INTERBEDDED, argillaceous, poorly bedded, some disturbance
3°	265.50	9.99	SANDSTONE, medium/fine-grained, clean well-sorted, occa- sional intraclasts of dark shale, bedding poorly defined
i	276.70	11.20	SANDSTONE, medium-grained, clean, well-sorted, light grey bedding poorly developed, abrupt below
	282.00	5.30	SANDSTONES AND INTERBEDDED SHALES, argillaceous and carbonaceous, bioturbated and disturbed, large worm burrows throughout sandy units, sand:shales, 50:50
			GATES SUKUNKA
	296.13	_14.13	SHALE WITH INTERBEDDED SANDSTONES, fine-grained sandstone shows bedding and cross-bedding, shales disturbed and bioturbated large and small worm burrows throughout, shale 70% sands 30%, transitional below
	308.77	12.64	SHALE WITH MINOR SILTSTONE INTERBEDS, disturbed and biotu bated, large and small worm burrows, grades down to 100% shale for bottom half, calcite infilling of cracks at 300.33m, pyritic shales
2 ⁰	315.47	6.70	SHALE & SAND INTERBEDDED, 50:50, poorly bedded sandstone with zones of shale disturbed by bioturbation and slump structures, patchily calcareous, gradational below
3 ^o	343.50	28.03	SHALE, sandy, generally disturbed and bioturbated, large and small worm burrows, minor sandy interbeds usually abrupt above and below, abrupt below, shale/sand 70:30, basal 2cm coarse sand
	354.07	10.57	SANDSTONE, fine/medium-grained, well-bedded and cross- bedded, burrow zone 343.5-343.8-large burrows in sand, interbedded dark shales, showing erosional features, calcareous, gradational below
	373.08	19.01	SHALE WITH SANDSTONE INTERBEDS, shale bioturbated and disturbed with small burrows, sands calcareous and well-bedded, shale:sand 70:30, shale to sand ratio increase to base, gradational below
	415.20	42.12	SHALE SILTY WITH MINOR SANDSTONES BEDS, disturbed, pyriti small burrows with minor bioturbation, and some load structures, shale dark grey/black, sandstone light-grey, shale:sandstone 90:10

BH Nos. 5

Dip o	DEPTH m	THICKNESS m	DESCRIPTION	
		·		
		·	SUKUNKA MOOSEBAR	
	450.31	35.11	MUDSTONE, black, pyritic, silty, homogeneous, occasional bands of iron cemented shale harder and light brown in color	
	501.43	51.12	MUDSTONE, dark grey to black, devoid of sedimentary lamination, total paucity of discernible coarse ferrigenous detritus, much pyritic specks and uniformly disseminated	
	501.54	0.11	MUDSTONE, dark grey brown, massive, low competency, core breaks easily on irregular planes, moosebar formation	
	503.53	1.99	MUDSTONE, as above	
13 ⁰	504.03	0.50	MUDSTONE, as above (
	504.08	0.05	CLAYSTONE, greenish/brown, bentonitic, low competency, sharp junctions with units above and below	
	504.21	0.13	MUDSTONE, as above, sharp contact with unit below .	
	504.28	0.07	CLAYSTONE, bentonitic as above, sharp contact with unit below	
	504.66	0.38	SANDSTONE, fine-grained, grey/green, bedding irregular, occasional pebbles towards base, glauconitic, competent, sharp basal contact	
	504.93	0.27	SANDSTONE, as above	
			MOOSEBAR GETHING	
	·		QE I III NO	
			COAL SEAM - BIRD	
<u> </u>	504.98	0.05	COAL, dull and bright	
.	505.11	0.13	COAL, dull banded, pyritic inclusions at top	
	505.19	0.08	COAL, dull, earthy lustre	
	505.24	0.05	COAL, dull banded	
	505.33	0.09	COAL, bright banded	
	505.41	0.08	COAL, dull and bright	

BH Nos. 5

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	505.45	0.04	COAL,dull, silky lustre
	505.52	0.07	COAL, dull and bright
	505.58	0.06	COAL, dull banded
	505.64	0.06	COAL, dull and bright
	505.71	0.07	COAL, bright banded
	505.77	0.06	COAL, dull and bright
	506.06	0.29	CORE MISSING-COAL
	506.16	0.10	COAL, dull, metallic lustre, sheared, listric surfaces
	506.23	0.07	COAL, dull banded
	506.27	0.04	COAL, dull, metallic lustre
	506.69	0.42	COAL, dull, metallic lustre
	506.79	0.10	COAL, dull, earthy lustre, low ash, core broken
•	507.04	0.25	COAL, dull, metallic lustre
	507.13	0.09	COAL, dull banded, sheared
	507.29	0.16	COAL, dull and bright, core badly broken
	507.35	0.06	COAL, dull banded, core broken
	507.63	0.28	SANDSTONE, medium to coarse-grained, light grey, carbon- aceous at top and coaly inclusions, bedding is very poorly developed at top, mottling by small worm burrows from 1.51m to 1.96m from top, very competent
•	507.89	0.26	SANDSTONE, as above
	510.05	2.16	SANDSTONE, as above
	512.44	2.39	SANDSTONE, well-sorted, massive, medium-grained, light grey, slickenside surface and calcite filling small fractures
	512.63	0.19	SANDSTONE, as above
	513.41	0.78	SANDSTONE, massive, fine-grained, light grey, grades into medium-grained light grey sandstone, with occasional lenses of dark mudstone and coarse-grained mudstone, slickensided surface
17 ⁰	515.09	1.68	SANDSTONE, banded, light grey/medium grey, medium-grained to fine-grained, massive to cross-bedded, thin carbonaceous partings and scattered large burrows
	516.43	1.34	SANDSTONE, fine-grained, medium grey, massive, with occasional thin carbonaceous and pyritic bands (½cm thick) over a.16m interval
	516.73	0.30	SANDSTONE, as above

BH Nos. 5

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Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	516.93	0.20	SANDSTONE, large burrows more numerous
	519.74	2.81	SANDSTONE, as above
	522.73	2.99	SANDSTONE, fine-grained, light grey, massive, strongly calcareous
	523.76	1.03	SANDSTONE, as above, occasional large burrows
	525.78	2.02	SANDSTONE, as above
	526.25	0.47	SANDSTONE, as above, sharp contact with black mudstone
	526.89	0.64	MUDSTONE, black, interbedded with thin layers of very fine-grained, light grey, calcareous sandstone, cross-bedded
	526.91	0.02	SANDSTONE, medium grey, medium-grained, salt and pepper sandstone
	527.41	0.50	MUDSTONE, dark grey to carbonaceous, containing coaly wisps and lenses, siltstone lenses in basal part of unit, associated with both wavy and planar bedding, contact with underlying unit sharp
	527.75	0.34	SANDSTONE, fine-grained, medium grey, massive with mudstone partings at base of unit
	529.10	1.35	SANDSTONE/MUDSTONE INTERBEDS, 70:30 at top of unit, 30:70 in centre, and 70:30 at base, bedding commonly planar wit units fining upwards, wavy and convolute bedding present, commonly associated with carbonaceous material, zones of possible sedimentary slump structures
			SKEETER SEAM
	529.62	0.52	COAL, dull with minor bright bands, dull coal fracture hackly and lustrous in part, bedding (?) at 25°, minor evidence of slippage
	529.79	0.17	COAL, dull, shear planes evident
	530.14	0.35	COAL, sheared throughout
	530.50	0.36	COAL, sheared throughout
			FLOOR OF SEAM
	530.78	0.28	MUDSTONE, dark grey, coaly lenses in upper 0.02m of unit grading downwards into;
	531.49	0.71	SANDSTONE, fine/medium-grained, light/medium grey, finely cross-bedded, calcareous, containing mudstone phases and partings, gradational boundaries, one calcite fracture plane at 25° to core axis at top of unit, stress zone or (?) fault zone, sharp boundary with underlying unit, crosional
	534.74	3.25	MUDSTONE/SILTSTONE INTERBEDS, containing minor fine sand-
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BH Nos. 5

Dip	DEPTH	THICKNESS	DESCRIPTION
-	m	m	
			stone units to 0.5m max, cross-bedded, which exhibit ero- sional contact at base and gradational at top, fining upwards, interbeds variable in thickness but commonly .02 calcareous, uneven and wavy bedding planes and slump structures evident, basal boundary gradational with under lying sandstone unit
	536.09	1.35	SANDSTONE, quartz-lithic, fine-grained, calcareous, containing flecks and partings of mudstone and occasional carbonaceous material, fracture planes at 25° to core axis, calcite filled
	538.35	2.26	LAMINITE, dominantly mudstone with siltstone content increasing toward base of unit, mica on some bedding planes, grades downward into
	538.80	0.45	MUDSTONE, carbonaceous, dark grey, slickensided at seam contact
	530.05	0.05	MUDSTONE & COAL, intermixed, slickensided
			CHAMBERLAIN SEAM
	53 8 -92	0.07	COAL, bright in part, intensely sheared
	530.9/: (0.02	COAL, dull with minor bright bands
	539.01	0.07	CORE LOSS-COAL
	539.10	0.09	MUDSTONE, dark grey with carbonaceous partings, sheared on bearing planes
	539.15	0.05	COAL, undifferentiated, sheared
	539.21	0.06	CORE LOSS-ROCK
	539.25	0.04	MUDSTONE, as above
	539.31	0.06	COAL, undifferentiated, sheared (core unbroken)
	539.36	0.05	COAL, bright
	539.46	0.10	COAL, dull with minor bright bands, sheared 🦸
	539.49	0.03	COAL, dull, sheared
	539.53	0.04	COAL, undifferentiated, sheared
	539.57	0.04	COAL, dull with minor bright bands
	539.62	0.05	COAL, bright with minor dull bands
	539.75	0.13	COAL, undifferentiated, sheared
	539.78	0.03	COAL, dull and bright, sheared
	539.96	0.18	CORE LOSS-COAL
	540.00	0.04	COAL, undifferentiated, sheared
	540.03	0.03	COAL, dull with minor bright bands, minor listric surface

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	ELO 00	0.00	MUDCTONE
	540.08	0.05	MUDSTONE, mid grey, listric surfaces on bedding plane
	540.14	0.06	CORE LOSS-ROCK
	540.39	0.25	COAL, dull and bright but intensely sheared and core broken
	540.48	0.09	CORE LOSS-COAL
	540.58	0.10	COAL, undifferentiated, intensely sheared, sub parallel to
	540.62	0.04	CORE LOSS-COAL
	540.85	0.23	COAL, dull and bright, sheared, sub parallel to core axis
	541.03	0.18	COAL, undifferentiated, internally sheared
	541.10	0.07	COAL, dull and bright, minor shearing
	541.14	0.04	COAL, bright, cleat well developed, minor shearing
	541.17	0.03	COAL, undifferentiated, minor shearing
	541.22	0.05	COAL, dull, minor shearing
	541.25	0.03	COAL, dull with minor bright bands, minor shearing
	541.31	0.06	COAL, dull, listric surfaces parallel to core axis
	541.34	0.03	COAL, bright
	541.39	0.05	COAL, dull and bright, listric surfaces present
	541.53	0.14	COAL, bright with minor dull bands, listric surfaces present but not uniform throughout unit
	541.55	0.02	COAL, undifferentiated
	541.57	0.02	COAL, dull with minor bright bands
	541.61	0.04	COAL, dull and bright
	541.64	0.03	COAL, bright
	541.76	0.12	COAL, undifferentiated, sheared sub parallel to core axis
	541.98	0.22	CORE LOSS-COAL
			FLOOR OF CHAMBERLAIN SEAM
			Possible fault in split above
	543.13	1.15	MUDSTONE, mid grey, containing coaly remains, listric surface on bedding plane, basal 0.50m exhibits shear planes at 25 ⁰ to core axis, slickensided, minor calcite veining
	543.23	0.10	COAL, undifferentiated, intensely sheared and core broken
	543.28	0.05	MUDSTONE, dark grey, slickensided

BH Nos. 5

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	543.33	0.05	MUDSTONE, coaly, sheared bedding planes
	543.51	0.18	MUDSTONE, as far 543.28 to 543.23m
	543.57	0.06	COAL, undifferentiated
	543.68	0.11	MUDSTONE, dark grey to carbonaceous, grading into unit below
	. 544.30	0.62	SILTSTONE, grading to fine sandstone, mid grey, carbon- aceous remains, core fractured for 0.15m - 0.20m above unit base, contains one calcite filled tension joint 0.10m above unit base at 50° to core axis, basal part of unit grading to mudstone
	544.34	0.04	MUDSTONE, carbonaceous and coaly, sheared
	544.52	0.18	SILTSTONE, grading to mudstone, dark grey and carbonaceouslicks on bedding planar
	544.75	0.23	MUDSTONE, carbonaceous, containing bright coal flecks and blebs
	544.85	0,10	COAL & MUDSTONE, carbonaceous, intensely sheared, listric surfaces, core broken
	545.41	0.56	MUDSTONE, carbonaceous and coaly, grading and alternating in approximately 0.10m units with siltstone, intensely fractured, calcite filled tension (?) and slickensided shear joints common at approximately 50° to core axis
	546.11	0.70	COAL, dull with minor bright bands, sheared
	550.16	4.05	SANDSTONE, quartz-lithic, strongly carbonaceous in upper 0.30m, carbonaceous, silty and mud partings throughout, fracture cracks, calcite filled throughout upper 3.5m, remainder essentially massive, bedding averaging 100
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PR-SURUNKA 77(3)A. BP 6 2

663

CANADA



Page 1

AREA

SUKUNKA

B. H. No. BP 6

Contractor:

Longyear

Commenced:

July 16, 1977

Completed:

July 21, 1977

Co-ordinates: 6,114,600.59

592,998.05

Surface Elevation: 1,815.82

Ε m

Ν

Core Size:

ΗQ

Casing Left in Hole:

m

Hole Angle:

Hole Azimuth:

See detail

page la

Geologist

Depth 77.37-284.58

Ali Chowdry

297.20-303.23

305.63-404.80

Geoff Jordan

284.64-291.15

297.33-305.02 610.86-674.43

Final Depth: 674.43

Andy Newson

417.75-614.95

يسبب ويزسمنها والمراوع ووجروه والمحاد وبرساء والمناكاة الكاكا فيهود وسيهر وسنات القواكة فليجوه فسيسه والفروف		VIII A TURNOOTI	7
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek	106.22	106.22	1,709.60
Hulcross	207.52	101.30	1,608.30
Gates	404.80	197.28	1,411.02
Sukunka	531.33	126.53	1,284.49
Moosebar	623.04	91.71	1,192.78
U. Gething	669.80	46.76	1,146.02

Logged by:

<u>SEAMS</u>	DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD	625.69			1,190.13
CHAMBERLAIN	669.80			1,146.02

F.PO. F.PO.

470-472 551, 609 Slickensided Slickensided

Sperry-Sun Survey

Date: 13th August 1977

Borehole: BP #6 Sukunka 77

Compass: 20° maximum tilt to magnetic North

BPB Operator: P. J. Waters

Measured Depth	Tilt	Tilt Direction
670m	3° 15'	n 23° e
650m	3° 15 '	N 24° E
600m	3° 30°	N 17° E
550m	2° 45†	N 13° E
500m	2° 45*	N 25° E
450m	2° 30'	N 20° E
400m	2°	N 21° E
350m	1° 45'	и 18° Е
300m	1° 30'	N 15° E
250m	I ^O 45†	N 19 [°] Е
200m	1° 30'	N 19° E
150m	I o -	N 12° E
100m	45 °	N O E
50m	30 [†]	N OO E

Borehole 6A (wedge) 665m 3° 45' N 48° E

Other results lost in film jam. 21st August 1977

BH Nos. 6

Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	17.37	17.37	CASING
6°	19.73	2.36	SANDSTONE, light grey, dominantly medium-grained, brief intervals very coarse-grained to granular, bottom 1.05m conglomeratic (grains averaging 3mm across), sands clean, calcareous except initial 0.65m that is locally weathered, conglomerate also calcareous, abrupt below, topmost 0.12cm with 60° suggesting its boulder origin
	21.85	2.12	SANDSTONE/SILTSTONE, initial 0.72m light/medium grey, fine-to very fine-grained, slightly argillaceous sands with small-scale cross-lamination, rest dark grey, argillaceous, coarse siltstone, with sporadic lamination and lenticles of very fine sands, strongly calcareous (whole unit), gradational silts/sand contact slightly weathered
	22.59	0.74	SANDSTONE, light grey, very fine-grained, small-scale cross-lamination, bottom 0.28m argillaceous with eroded and redeposited silty lenticles, erosional below (contact with sands below defined by 2cm of intraformational clasts), strongly calcareous
-	23.16	0.57	SANDSTONE, light grey, fine/medium-grained, very clean, sorted, no lamination, 55mm thick eroded silty/very fine sand unit with large amount of wispy intraclasts, strongly calcareous, abrupt below
	23. 93	0.77	SILTSTONE/SANDSTONE, medium grey, finely laminated and cross-laminated argillaceous siltstones frequently intercalated with small ripples and wisps of very fine sands, somesyndepositional disturbance, bottom 0.25m, fine to very fine-grained argillaceous sands with some erosional features, calcareous throughout, gradation
3 [°]	28.71	4.78	SANDSTONE, light grey, medium-grained, very clean and well-sorted, initial 0.33m fine/medium-grained, and with disturbed ripple-drift cross-lamination, unit of sands as a whole characterized by abundant silty intraclasts (most with original sedimentary lamination though variously deformed) some up to 10cm long, strongly calcareous, some clasts rusty and others completely deformed and overturned structures
_ :	29.01	0.30	MUDSTONE, medium grey, silty, structureless, gradational
6-7 ⁰	29.21	0.20	SANDSTONE, medium grey, very fine-grained, argillaceous, small cross-lamination, few isolated burrows at base, erosional below
	31.54	2.33	MUDSTONE/SILTSTONE, medium grey, initial half structure- less, silty muds, rest argillaceous siltstone, some rootlets, devoid of sedimentary lamination, weathered zone 30.81-30.89, also 30.26-30.60, non calcareous, gradational below

BH Nos. 6

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	32.00	0.46	SANDSTONE, medium grey, very fine-grained, richly argillaceous, fine muddy clasts at base, irregularly laminated, erosional
6-7°	35.71	3.71	SANDSTONE, medium grey/light grey, dominantly fine- grained, small-scale ripply lamination, brief, slightly coarser sands with scoured bases, occasional coaly streaks weakly calcareous, at 34.49-34.54 very coarse sand with abrupt lower contact, bottom 0.55m exhibiting gradual coarsening (medium-grained sands), transitional to conglomerates below
	47.55	11.84	CONGLOMERATE, granules and pebbles, frequently changing in grain size and amount of matrix, certain zones very coarse-grained, well-sorted sands, common grain size 4mm across, mostly ill-sorted conglomerates with occasional coal fragments some clasts of soft sediments, erosional below
8°	50.60	3.05	SANDSTONE, initial 0.40m fine/medium-grained sands with wispy intraclasts of silts, followed by 0.99m of very fine-grained argillaceous sands and silts, with silty clasts at top and base, underlain by 0.87m of fine/medium-grained, clean sands, laminated with silty clasts toward base, rest at base medium/coarse sands, very clean cross-bedded with occasional pebbly layers and whole zone calcareous, passage below by gradual increase of pebbles in sands matrix
٠.	52.98.	2.38	CONGLOMERATE, quartz-chert pebbles, some 8-10mm across, ill-sorted, some granular zones, abrupt below
	54.43	1.45	MUDSTONE, dark grey, silty at top and toward base, gradational
,]	55.41	0.98	SANDSTONE, light grey, fine-grained, ripply cross-lamin- ation, locally concentrated, finely broken carbonaceous matter (within laminae) strongly calcareous, erosional below
	56.46	1.05	MUDSTONE, dark grey, silty in bottom 0.26m and carbonaced and coaly (0.08m) at base, calcareous (patchy), gradation
	57 .7 9	1.33	SILTSTONE, initial 0.30m very argillaceous, medium grey with rootlets, gradational
	58.14	0.35	MUDSTONE, medium grey, homogeneously silty, locally decayed, gradual
	61.03	2.89	SILTSTONE, medium grey, locally argillaceous, much plant debris, and rootlets, bottom 0.18m clean with large worm burrows, very gradational
7°	67.50	6.47	SANDSTONE, initial 1.80m fine-grained, locally silty, rest light/medium grey, medium-grained (locally 3-4cm coarse-grained zones), very clean and sorted, ubiquitous

BH Nos. 6

Dip	DEPTH m	THICKNESS	DESCRIPTION
,,			cross-bedded, conglomerate, 62.85-62.93, coal fragments and silty clasts abound in 62.0-63.68, strongly calcareous throughout, erosional below
	69.20	1.70	SILTSTONE, medium grey to dark grey, mottled (blobs of lighter and darker sediments in close chaotic association) this either due to extensive re-working by organism or slumping at an unlithified stage, argillaceous, gradational
	72.92	3.72	SANDSTONE, light grey to medium grey, dominantly fine- grained, sequence characterized by frequently changing sedimentary structures, slumping, scouring, compaction and load casting, much (fine) silty/muddy intraclasts, gradations from fine sands through silts and muds locally occur, erosional at base, few coaly inclusions towards base
	73.52	0.60	SILTSTONE, medium grey, vaguely laminated, some very fine sand at top, very argillaceous at base
·	78.78	5.26	MUDSTONE, initial muds (up to 76.0m) dark grey, with few rusty bands, 68-77.72, medium grey silty, softer and locall clay, rest black and slightly carbonaceous
	79.71	0.93	MUDSTONE/COAL, black, strongly carbonaceous, intervals of muddy hard coal, gradational below
	83.12	3.41	SILTSTONE, medium grey, argillaceous, initial 1.50m with abundant rootlets (no bedding), silts becoming coarser bottomward, irregularly laminated, grading to sand below
•	84.82	1.70	SANDSTONE, medium grey, fine-grained, characterized by ubiquity of fine floating silty clasts, invariably angular, gradational
·	86.07	1.25	SANDSTONE, initial 1/3 very fine argillaceous sands, laminated, middle 1/3 fine-grained, light grey, infested with coal inclusions, bottom 1/3 very fine sands and silts with 20% muds, abrupt below
	92.60	⊕ 6.53	SANDSTONE/CONGLOMERATE, from 92.60-89.55 sands, light grey to white, medium-grained, locally coarse-grained in 89.55-90.55, very clean, strongly cross-bedded, concentration of dark grey mineral in laminae, siliceous, quartzose, conglomerate 89.43-90.55, pebbles 3-4mm, rest medium quartzose sands with occasional pebbles, erosional below
	93.96	1.36	SANDSTONE, medium grey. fine-grained, clean, sorted, laminated, conglomeratic at base 0.18m and at 92.84-92.90 top 0.25 highly silty dark grey mudstone, abrupt below, a large rusty clast
6°	106.22	12.26	SANDSTONE, medium grey/brownish, very clean, and sorted, fine-grained, ubiquitous cross-bedding, scattered rusty clasts, bottom 1.5m very fine sands with silty/muddy intercalations, with few burrows and some listric surfaces

BH Nos. 6

D11 110	ŗ 	1	
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			BOULDER CREEK HULCROSS
	207.52	101.30	HULCROSS MARKER: MUDSTONE/SILTSTONE/SANDSTONE, medium to dark grey, frequently interbedded silts, sands (very fine-grained) and muds, small-scale cross-lamination, ubiquitous layer boundaries usually erosional sporadic burrowing, but locally thoroughly bioturbated zones, bioturbated zone 111.60-115.65 also 118.15-120.75, bentonitic 181.10-181.15 herringbone structure in 13mm calcareous band at 136.97, vertical fracture 111.72-112.40 bentonitic band, 139.69-139.93 most of it intermixed with mudstone, bentonite 142.04-142.10, vertical fracture 144.91-146.01, calcite band 145.08-145.12, sheared calcite band 159.78-159.86, 166.92-167 and 167.71-167.80 (the last two bands are associated with fractured intervals at top, these are thought to be very local fractures involving little or no movement), calcite band 127.50-127.58 bentonitic band 187.75-188.18, fractured 188.18-189.28 dominantly very fine sands interbedded with silty mud at 199.75-207.52, abrupt basal contact
			HULCROSS GATES
	207.64	0.12	CONGLOMERATE, predominently dark colored pebbles, 1cm across (maximum) in very coarse sandstone, granular matrix, erosional basal contact, this unit defines the top of Gates
	211.02	3.38	MUDSTONE, dark grey, top 0.75 with sandy intercalations (very fine-grained),locally coaly layers 209.0-209.09 and 209.97-210.07, abrupt lower contact with coal
	211.42	0.40	COAL SEAM, predominantly soft coal with metallic lustre
1	216.14	4.72	SILTSTONE/SANDSTONE/MUDSTONE, 40-45:30:25-30, broadly alternating lithologies of muds (very fine) silts and dark grey muds, locally carbonaceous, sands irregularly laminated and argillaceous, calcareous, gradual change below
	216.69	0.55	COAL SEAM, mostly soft and sub-metallic lustre, gradual
	218.14	1.45	MUDSTONE, dark grey, silty 25%, carbonaceous and coaly in middle, gradual
	·	<u> </u>	

BH Nos. 6

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Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	218.74	0.60	SANDSTONE/SILTSTONE, upper half very fine argillaceous sands with coaly streaks, rest coarse argillaceous silts, bottom 10cm black mudstone
	219.29	0.55	COAL SEAM, mixture of durain and coal with sub-metallic lustre
	221.14	1.85	SILTSTONE, medium grey, very argillaceous, occasional vague rootlet type structures, mon calcareous, bottom 1.0m has syndepositional disturbed bedding, abrupt below
5 ⁰	222.38	1.24	SANDSTONE, light grey, fine-grained, crinkly lamination, ubiquitous coalified plant matter (also particulate), strongly calcareous, erosional below
_	222.76	0.38 -	MUDSTONE, black, carbonaceous, silty at base, gradational
6°	224.74	1.98 -	SANDSTONE/SILTSTONE, medium/dark grey, upper 0.40m very fine laminated, argillaceous sands, rest argillaceous silts with lenticles of very fine sands, many burrows, some slumping, strongly calcareous, gradual below
	225.26	0.52	MUDSTONE, dark grey, with little or no silts, abundant pelecypod shell (not discernible unless core broken - these are dark grey to black and non calcareous), gradational below, note this shell band is 10m above the previous pelecypod shells (calcareous)
	227.31	2.05	SANDSTONE, medium to dark grey, very fine-grained, argillaceous, interbedded with coarse silts 20%, wavy, ripple lamination, some slumping, sporadic burrows, canneloid base
	228.78	1.47	MUDSTONE, dark grey, upper 2/3 with little silts, rest slightly silty, structureless, gradational
	229.70	0.92	SANDSTONE, upper 0.20m silts, rest fine-grained, light grey, clean sands, middle of the unit with large (12- 13cm) slump of dark grey mudstone 'floating' in sandstone sands strongly calcareous, erosional below
	232.38	2.68	MUDSTONE, dark grey, few rusty bands, coaly in bottom 0.15m, erosional
	233.48	1.10	SANDSTONE, upper 0.30m very fine-grained, argillaceous, 30%, rest light grey, fine-grained, ubiquitous, small-scale cross-lamination, strongly calcareous, abundant carbonized plant debris, bottom 0.15m have some burrows, interbedded below
	237.58	4.10	MUDSTONE/SILTSTONE/SANDSTONE, dark grey sequence of silty muds and muddy silts and sands (very fine-grained), locally laminated, some bioturbation, pelecypod shell band, marker 234.68-235.08, ferruginous bottom 0.35m, abrupt basal contact
	238.37	0.79	SANDSTONE, light grey, fine/medium-grained, 10cm zone

BH Nos. 6

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			in middle with concentration of silty brownish litholo- gical grains, strongly calcareous throughout, fining downward
	239.79	1.42	SANDSTONE, light grey, fine-grained, several muddy bands, erosional to gradational contacts, small burrows in muds, small-scale cross-lamination characterized by concentration of finely broken carbonaceous matter in foresets, non calcareous, passage by interbedding
	245.39	5.60	SANDSTONE, light, dominantly medium-grained, sorted, sporadic cross-lamination (some have concentration of finely particulate carbonaceous matter), middle 2.75m with abundant sand sized silty clasts, some of these 3-4mm long, generally clean look, 0.30m zone (in top 1.40m) of very fine sands interbedded with silts and muds with delicate ripples and tiny burrows perpendicular to bedding, bottom 1.15m infested with large and small silty/muddy clasts, much coal fragments, strongly calcareous at 241.06-241.78, rest weakly calcareous, abrupt below
7 [°]	247.44	2.05	SANDSTONE, medium grey, fine-grained, wavy to parallel lamination, some small ripples, brief fine sand to very fine sand, gradational zones, occasional worm burrows (normal to bedding), some zones appear banded due to intervention of finer lithologies, abrupt, clean, at intervals black laminae due to carbonaceous matter
	250.32	2.88	SILTSTONE, medium/dark grey, massive to laminated, large-scale slumping, some muds at base and middle (totalling 0.35m), also very fine sandstone at 248.35-248.55 (clean and abrupt contacts with silts below and with muds at top), abrupt lower contact
	251.00	0.68	SANDSTONE, light grey, medium-grained, devoid of lamina- tion, few silty clasts, calcareous, abrupt below
5 [°]	254.33	3 . 33	SANDSTONE, light/medium grey, fine-grained, bottom 0.65 fine/medium-grained, and strongly calcareous, locally fine sands grading to very fine sands and delicately laminated, generally clean, widely spaced burrowed zones, abrupt below
5 [°]	261.31 -	6.98	SANDSTONE/MUDSTONE, 80:20, rapidly alternating sands and muds, basal 1.70m dominantly silty with some muddy intercalations, this zone characterized by rapid interbedding of very fine sands and dark grey silts with some silty mudstones, invariably micro contacts erosional to sharp, abundance of pin head burrows (mud infills in sands) and some larger burrows, from the top of above unit to 257.25 dominantly fine/medium sands with brief silty/muddy intercalations, some large Gates burrows, in

BH Nos. 6

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	,		to the top composed of sands frequently intergrading from fine sands to very fine sands, punctuated by silty laminae and layers, sand sized silty clasts through the interval, frequent concentration of carbonaceous matter within laminae, certain levels weakly calcareous, abrupt below
	264.86	3.55	MUDSTONE/SILTSTONE, dark grey, lower half has widely spaced thin silty layers, upper half homogenous silty, pin prick burrows at 263.00-263.12, 263.46-263.55, otherwise no other evidence of burrowing, some rusty banding 3cm singly
	267.52	2.66	SANDSTONE/SILTSTONE/MUDSTONE, 50:30:20, thoroughly bioturbated zone, Sukunkoid, basal 0.65m dominantly very fine sands with relics of primary lamination, several 2-3cm rusty bands, non calcareous throughout, abrupt below
5 ⁰	272.30	4.78	SANDSTONE, basal 0.14m granular conglomerate, one chert pebble 5cm long (part of small cobble ?), conglomerate overlain by 1.06m rapidly interbedded, very fine-grained, laminated sands and silty mudstones many with pin prick burrows, erosional micro boundaries, rest to the top sandstones, light grey, fine-grained, clean and sorted and ubiquitously laminated and cross-lamination, non calcareous, basal contact of unit abrupt, *two 15mm each granular bands within 0.20m of base of unit
8 ⁰	284.58	12.28	MUDSTONE, dark grey, hard rusty band, 275.70-276.01, siltstone, 276.15-276.65, siltstone, very muddy and sporadically laminated at 282.24-284.03, rusty nodules, 284.14-284.54, vertical fracture 276.65-277.30,278.07-278.65, carbonaceous 280.44-281.41, bottom 0.60m black with numerous listric surfaces
		,	TOP OF COAL SEAM HORIZON E
	284.64	0.06	COAL, dull and bright, stick
	284.73	0.09	COAL, dull banded, stick
	284.75	0.02	COAL & CLAYSTONE, black, carbonaceous claystone with thick bright coal bands
	284.83	0.08	CORE LOSS-COAL
	284.87	0.04	COAL, bright banded, stick
	284.91	0.04	COAL, dull and bright, small pieces
	284.94	0.03	COAL, dull banded, stick
	284.96	0.02	COAL, dull, stick
	285.05	0.09	COAL, stoney, stick
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BH Nos. 6

DEPTH m	THICKNESS m	DESCRIPTION
28E 08	0.03	COAL, bright, stick
		COAL, dull and bright, stick
	•	COAL, dull banded, stick
		MUDSTONE, dark grey to black, carbonaceous; occasional
207.10	1,09	rusty bands, slightly calcareous, gradual at base
287.12	0.02	COAL, stoney, stick
287.63	0.51	CLAYSTONE, carbonaceous, black, bright coal bands, sheare towards base
287.73	0.10	COAL, stoney, stick
287.77	0.04	COAL, stoney, stick
287.80	0.03	COAL, dull banded, stick
287.86	0.06	COAL, dull and bright, stick
287.88	0.02	COAL, bright banded
288.72	0.84	MUDSTONE, dark grey to black, carbonaceous phases at top
288.81	0.09	COAL, stoney, stick
289.16	0.35	MUDSTONE, dark grey, carbonaceous at base
289.21	0.05';	COAL, stoney, stick
289.24	0.03	COAL, bright banded, stick
289.25	0.01	COAL, dull, stick
289.29	0.04	COAL, dull banded, stick
289.32	0.03	COAL, dull and bright
289.35	0.03	CLAYSTONE, carbonaceous, bright coal bands
289.39	0.04	COAL, dull, stick
289.43	0.04	CLAYSTONE, carbonaceous, bright coal bands .
289.46	0.03	COAL, dull and bright, stick
289.48	0.02	COAL, dull banded, stick
289.57	0.09	COAL, dull, stick
289.58	0.01	COAL, dull banded, stick
289.75	0.17	CLAYSTONE, carbonaceous, bright coal bands
289.78	0.03	COAL, dull and bright, stick
290.06	. 0.28	CLAYSTONE, carbonaceous, black, bright coal bands
290.14	0.08	CORE LOSS-COAL
290.18	0.04	COAL, dull and bright, hard, stick
290.23	0.05	COAL, dull banded, stick
	285.08 285.15 285.21 287.10 287.12 287.63 287.73 287.77 287.80 287.86 287.88 287.88 289.21 289.21 289.21 289.21 289.25 289.29 289.25 289.32 289.35 289.35 289.35 289.35 289.35 289.35 289.35 289.35 289.35 289.35 289.35 289.36 289.37 289.48 289.57 289.58 289.75 289.78 290.06 290.14 290.18	m m 285.08

BH Nos. 6

Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	290.24	0.01	COAL, stoney, stick
	290.29	0.05	COAL, dull and bright, stick
<u> </u>	290.33	0.04	COAL, dull banded, stick
	290.37	0.04	COAL, bright, stick
	290.40	0.03	COAL, dull banded, stick
	290.44	0.04	COAL, dull, stick
	290.49	0.05	COAL, dull and bright, stick
	290.55	0.06	COAL, stoney, stick
	290.59	0.04	COAL, dull and bright, stick
	290.62	0.03	COAL, stoney, stick
	290.66	0.04	COAL, dull and bright, stick
	290.71	0.05	COAL, dull banded, stick
	290.77	0.06	CLAYSTÓNE, carbonaceous, black, bright coal bands
	290.80	0.03	COAL, bright banded, large pieces
	290.82	0.02	COAL, dull banded, large pieces
	290.86	0.04	CORE LOSS-COAL
	291.15	0.29	MUDSTONE, dark grey to black, carbonaceous at top
11 ⁰	297.20	6.05	SILTSTONE, medium grey, coarse silts, locally very argillaceous, much plant debris, laminated throughout, locally grading to very fine sands, coal 292.12-292.17, strongly calcareous, bedding plane fractures calcite incrusted at 297.38-297.58, abrupt below, some slumping
	297.33	0.13	COAL, dull, stick
	297.38	0.05	COAL, dull and bright, stick
	297.41	0.03	COAL, bright banded, stick
	297.46	0.05	COAL, dull banded, stick
	297.50	0.04	COAL, dull and bright, stick
	297.53	0.03	COAL, bright, stick
- }	297.61	.08 0	COAL, dull and bright, stick
	297.67	0.06	COAL, dull banded, stick
	297.73	0.06	COAL, dull, stick
	297.77	0.04	COAL, bright, large pieces
. 1	297.84	0.07	COAL, dull and bright, large pieces
	297.86	0.02	CLAYSTONE, brown, coaly inclusions
	298.00	0.14	CORE LOSS-ROCK

BH Nos. 6

Dip	DEPTH	THICKNESS	DECCD LDELON
0			DESCRIPTION :
	m	m	
	298.02	0.02	COAL, dull, large pieces
	298.05	0.03	COAL, bright banded, large pieces
	298.08	0.03	COAL, dull, large pieces
	298.12	0.04	COAL, dull and bright, large pieces
	298.16	0.04	CORE LOSS-COAL
	298.76	0.60	SANDSTONE, medium grey, very fine-grained, laminated, argillaceous, calcareous, locally carbonaceous and coaly intervals, gradational
	300.20	1.44	MUDSTONE, medium grey, silty, much plant debris, vaguely laminated and patchily calcareous, gradational at base
	300.86	0.66	SANDSTONE, medium grey, fine-grained, locally very fine- grained and with muddy intercalations, laminated, cal- careous, gradational
	303.23	2.37	MUDSTONE, medium/dark grey, homogeneously silty, lcm coal toward top, vertical fracture in basal 0.60m, some rusty nodules, broken to coal below
	304.17	0.94	SANDSTONE, medium-grained, light grey, very clean
	304.24	0.07	CONGLOMERATE, pebble, light grey, grains of grey white and black chert and argillite, coaly bands at base
		,	COAL SEAM D
	304.26	0.02	COAL, dull and bright, large pieces
	304.29	0.03	COAL, dull, stick
٠.	304.31	0.02	COAL, dùll and bright, large pieces
	304.36	0.05	COAL, dull banded, large pieces
	304.40	0.04	COAL, dull and bright, large pieces
	304.42	0.02	COAL, bright banded, large pieces
	304.46	0.04	COAL, dull banded, large pieces
	304.53	0.07	COAL, dull and bright, large pieces
	304.57	0.04	COAL, dull banded. large pieces
	304.65	0.08	COAL, dull and bright, large pieces
	304.71	0.06	COAL, dull and bright, core pulverized
;	305.02	0.31	CORE LOSS-COAL
	305.63	0.61	SILTSTONE, medium to dark grey, lower half infested with carbonized plant debris, vertical fracture traversing the whole unit, gradual below
	307.31	1.68	MUDSTONE, black, locally carbonaceous and coaly bands (commonly high ash and hard), abrupt below, some listric surfaces within the interval

BH Nos. 6

Dip	DEPTH	THICKNESS	DESCRIPTION DESCRIPTION
0	m	m	
5 ⁰	309.90	2.59	SILTSTONE/SANDSTONE, upper 1.28m predominently medium grey siltstone, very argillaceous with thin very fine sand layers, broadly laminated, rest very fine-grained argillaceous sands with small-scale cross-lamination, gradational to mudstone below
,	310.66	0.76	MUDSTONE, black, carbonaceous with coaly stringers, very gradational
	310.88	0.22	SILTSTONE, medium grey, structureless, non calcareous, transitional below
4-5 ⁰	311.51	0.63	SANDSTONE, light/medium grey, fine to very fine-grained, abundant silty lamination, slightly wavy, calcareous, a rusty nodule, transitional basal contact
	312.40	0.89	SILTSTONE, medium grey, wisps and thin layers of very fine sands, discontinuous lamination, slight suggestion of burrowing, feebly calcareous, some rusty banding, gradual below
3-40	317.40	5.00	MUDSTONE, predominently black, many rusty bands, locally carbonaceous, ferruginous band with calcite hair lines 315.60-315.77, coarse, well laminated siltstone 316.07-316.32, canneloid mudstone with abundant pyrite specks 315.0-315.73, also at 317.70-318.08, gradual below
	į	1	COAL SEAM C
	317.84	0.44	COAL SEAM, mostly mixture of dull and bright banded, clean coal, lower contact abrupt
	322.99	5.15	SANDSTONE, light grey, coarse-grained, cross-stratified, very clean and well-sorted, small burrows (marker) at 319.12-321.0, bottom 0.45m with scattered pebbles
	328.51	5.52	CONGLOMERATE, lower 3.0m essentially granules with large intervals of coarse-grained clean sands, rest finely pebbly, large burrows (marker) 325.06-325.18 this is the only coarse sand lithology in an otherwise conglomerate facies at this level, sands and granular intervals exhibit cross-lamination, non calcareous throughout
	346.50	17.99	SANDSTONE, light grey, fine-grained, remarkably clean and well-sorted, general abscence of primary current structures is remarkable, muddy layers (25%) within 337.63-338.64 and laminated, two brief pebbly levels 329.98-330.03 and 330.33-330.39, non calcareous throughout, some ghosting of lamination, discernible at certain levels, there is no apparent reason for this homogenization
3°	348.94	2.44	SANDSTONE, light grey, fine-grained, clean, well-sorted, slightly weathered at places, bottom 0.45m dark grey with several thin (3-4mm) medium-grained layers, lower part sporadically broken and ground, bottom contact broken

BH Nos. 6

Dip	DEPTH m	THICKNESS m	DESCRIPTION
	349.04	0.10	CONGLOMERATE, dark grey, predominently dark cherty pebbles, granular, some very finely pebbly, broken below
	350.04	1.00	SANDSTONE, light grey, fine-grained, clean and well- sorted, cross-laminated, bottom 0.31m have streaks of medium sands, basal 0.09m conglomerate with abundant sandy matrix, listric surfaces in bottomost 0.09m with listric surfaces
			COAL SEAM B
İ	350.52	0.48	COAL SEAM, mostly fragmented bright bands and dull
	352.66	2.14	SANDSTONE, medium/dark grey, very fine-grained, well- laminated, argillaceous, locally grading to brief silty zones, 3cm granular zone 0.30m from top, gradational below
	353.76	1.10	SANDSTONE, medium grey, fine-grained, 0.25m very fine sandstone/mudstone band in lower half, some rusty clasts plus coaly inclusions bottomward, erosional
12 ⁰	355.76	2.00	SANDSTONE, medium grey, very fine-grained, ubiquitous small-scale cross-lamination, compactional features, sporadic burrowing, silty/muddy at top and base, erosional below
	356.51	0.75	SANDSTONE, dark grey, initial (top) half fine-grained, argillaceous, rest fine/medium-grained, small-scale cross-lamination, deep burrows, passage below by interbedding
	357.04	0.53	MUDSTONE, dark grey, silty at top, slightly carbonaceous at base, gradual to coal
			COAL SEAM A
	357.60	0.56	COAL SEAM, predominently muddy coal, about 25% of coal dull, abrupt contact with conglomerate below
	367.07	9.47	CONGLOMERATE, polymict, finely pebbly, bottom 1.33m inter- bedded fine/medium sands and granular/gritty lithology, abrupt basal contact
2-3°,	378.73	11.66	SANDSTONE, light grey, fine/medium-grained, very clean, uniform, well-sorted, mostly cross-bedded, erosional below one large stylolite in upper zone
	379.80	1.07	SANDSTONE/MUDSTONE, 50:50, broadly interbedded dark grey to black mudstone with fine/medium-grained sands, mutual boundaries being invariably erosional, brief intraclastic zones with abundant coal fragments, erosional basal contact
	381.09	1.29	SANDSTONE, light grey, medium/fine-grained, locally bioturbated and also discrete large burrows, bottom 0.10m very muddy, 7cm granular band, 12cm from top, abrupt at base

BH Nos. 6

DI NO			
Dip	DEPTH m	THICKNESS m	DESCRIPTION
	383.55	2.46	CONGLOMERATE, predominently granular, some just under 1cm across, bottom 0.40m 80% fine sands, abrupt below
	3 99.06	15.51	SANDSTONE, light grey, fine/medium-grained, very clean, sorted throughout, calcareous, ubiquitous cross-stratification throughout, shaly intraclasts 395.60-395.75, core grounded by drilling 392.08-392.68, bottom 3.048m strong ly calcareous, interbedded below
	404.80	5.74	SANDSTONE/MUDSTONE, transitional zone between Gates and Sukunka between 402.03-404.16 rapidly changing fine clean sands and mudstones with highly erosional boundaries, locally burrowed, at 404.16-405.47 clean, finegrained, strongly calcareous, well-laminated sandstones, from 405.47-406.50 predominently dark grey mudstones, and interbedded sands, abundant burrows, rest to base 75% fine sands and 25% scattered muddy zones, this is the lasignificant sandy zone
			GATES / SUKUNKA
00	417.75	12.95	SANDSTONE WITH INTERBEDDED MUDSTONE, 60:40, bioturbated large and small burrows, disturbed with rolling and slump structures, sandst me calcareous, fine to very fine-grained, cross-beauth
	427.42	9.67	MUDSTONE/SANDY, 80:20, les disturbed and bioturbated sands patchily calcareou, and cross-bedded
	434.96	7.54	MUDSTONE/SILTY, 95:5, bioturbated, small burrows, occasional sandy layers, well bedded with abrupt boundaries, gradational below, argillaceous
0 [°]	467.31	32.35	SANDSTONE, bioturbated large and small burrows, disturbed occasional fine-grained sands well bedded, well defined boundaries, erosional below with 0.34m of glauconitic grit at boundary
	484.34	17.03	SANDSTONE, argillaceous, sandstone calcareous, well- bedded, large burrows, disturbed boundaries, shales disturbed bioturbated, large and small burrows, abrupt below, slicks with calcite filled cracks, 470.99-471.57, 472.13,472.85
	502.12	17.78	MUDSTONE SILTY WITH SANDSTONE INTERBEDS, 80:20, sands well bedded with disturbed boundaries, mudstones disturbed and bioturbated, small burrows, calcite filled fractures 487.12-487.62 at 60° COM B.C.A.

BH Nos. 6

DIT NO	,	_	
Dip o	DEPTH m	THICKNESS m	DESCRIPTION -
	531.33	29.21	MUDSTONE/SANDY, 90:10, minor sandy stringers, bioturbated small burrows, disturbed boundaries to sandstone, gradational below, pyritic
			SUKUNKA MOOSE BAR
1	614.95	83.62	MUDSTONE, Moosebar, black, pyritic, silty, homogeneous, 550. 551.05 slicks with calcite fractures FRACTURES IRONSTONE ZONES BENTONITIC ZONES CALCITE FILLED 581.69 (3cm) 603.88 with 582.79 (1cm) 582.19 (4cm) small worm burrows slicks 587.45 (7cm) (11cm) 598.98 (4cm) with thick pyrite 608.48 (6cm) 599.24 (3cm) filled cracks 601.00 (6cm) 591.49 (4cm) 603.50 (3cm) 597.28 (.33m) 603.60 (7cm) 601.00 (6cm) 606.53 (16cm) 603.50 (6cm) 609.54 (45cm) 603.60 (7cm) 608.63 (3cm) 609.53 (29cm) 610.65 (10cm) 614.17 (9cm) 611.17 (8cm)
	616.86	1.91	MUDSTONE, dark grey, occasional pyrite filled worm burrows, low competency, core breaks easily on irregular fractures
	616.89	0.03	CLAYSTONE, grey/white, soft, bentonitic, dark colored worm burrows
	617.08	0.19	MUDSTONE, dark grey, as above
	619.22	2.14	MUDSTONE, as above
	620.16	0.94	MUDSTONE, as above
	621.37	1.21	MUDSTONE, as above.
	622.25	0.88	MUDSTONE, as above
	622.30	0.05	CLAYSTONE, grey/white, as above
	622.47	0.17	MUDSTONE, dark grey, as above
	622.58	0.11	CLAYSTONE, grey/white, hard, bentonitic
	623.04	0.46	SANDSTONE, dark grey/green, fine-grained, glauconitic, pyrite filled worm burrows, large pyrite inclusions at base, bedding completely obliterated by bioturbation, competent

BH Nos. 6

Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
			40007000
			MOOSEBAR GETHING
		·	
			BIRD COAL SEAM
	623.13	0.09	COAL, dull and bright, large pieces
	623.23	0.10	COAL, dull banded, large pieces
	625.12	1.89	CORE LOSS-COAL/ROCK
	625.15	0.03	COAL, dull, large pieces
	625.17	0.02	COAL, dull and bright, large pieces
	625.20	0.03	COAL, dull, large pieces
	625.25	0.05	COAL, dull banded
	625.29	0.04	COAL, dull and bright, stick
<u> </u>	625.31	0.02	COAL, bright, stick
	625.35	0.04	COAL, bright banded, stick
	625.41	0.06	COAL, dull and bright, stick
	625.45	0.04	COAL, bright banded, stick
	625.51	0.06	COAL, dull and bright, stick
	625.54	0.03	COAL, stoney, stick
	625.59	0.05	COAL, bright, stick
	625.65	0.06	COAL, bright banded, large pieces
	625.69	0.04	COAL, dull banded, large pieces
	626.20	0.51	SANDSTONE, light grey, medium-grained, coarse-grained at base, small mottled worm burrows from 1.08 to 1.52m from top, carbonaceous inclusions at top, bedding obliterated usually by worm burrows
	627.29	1.09	SANDSTONE, as above
	629.19	1.90	SANDSTONE, as above
	629.43	0.24	SANDSTONE, as above
	629.94	0.51	SANDSTONE, as above
3°	631.58	1.64	SANDSTONE, light grey medium-grained becoming fine at base, occasional phases of dark grey carbonaceous mudstone
	632.37	0.79	SAND\$TONE, as above ·
	633.74	1.37	SANDSTONE, as above

BH Nos. 6

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	-
. ,	635.46	1.72	SANDSTONE, as above
	635.81	0.35	SANDSTONE, as above
	637.95	2.14	SANDSTONE, as above
	638.54	0.59	SANDSTONE, as above
	640.12	1.58	SANDSTONE, as above
	641.55	1.43	SANDSTONE, as above
	641.84	0.29	MUDSTONE, dark grey, carbonaceous, frequent small pyritic worm burrows, sharp basal contact, thin calcite filled fractures on bedding at centre
	642.27	0.43	SANDSTONE, medium-grained, light grey, cross-bedded, bedding and cross-bedding defined by fine carbonaceous partings
	643.17	0.90	SANDSTONE, as above
	643.31	0.14	MUDSTONE, carbonaceous interbedded with fine-grained light grey sandstone, ripple marks characteristic
	643.96	0.65	SILTSTONE, dark grey, plant fragments throughout, bedding completely disturbed by bioturbation
	644.19	0.23	SANDSTONE, fine-grained, mid grey with very frequent interbeds of dark grey carbonaceous mudstone
	644.50	0.31	SANDSTONE, medium-grained, light grey, coaly inclusions at base, gradational basal contact, siltstone interbeds at base
•	645.10	0.60	SANDSTONE/MUDSTONE INTERBEDDED, light grey, fine-grained sandstone with thin interbeds of carbonaceous mudstone, small light coloured worm burrows at top
	645.22	0.12	MUDSTONE, dark grey, sandy, abundant shelly fossils
5 ⁰	645.43	0.21	SANDSTONE, mid grey, fine-grained, very thin mudstone interbeds
	646.08	0.65	CLAYSTONE, carbonaceous, black, bright coal bands, prominent at base
	646.15	0.07	CLAYSTONE, carbonaceous, as above, abundant shelly fossils
	646.30	0.15	CLAYSTONE, carbonaceous, black, bright coal bands at top
	647.17	0.87	CLAYSTONE, as above
	648.39	1.22	MUDSTONE, dark grey to black, carbonaceous, numerous bright coal bands, dark grey siltstone phases at base, gradational basal contact
	650.26	1.87	SILTSTONE, grey, with frequent phases of dark grey mud- stone, some phases of medium-grained, light grey sandston

BH Nos. 6

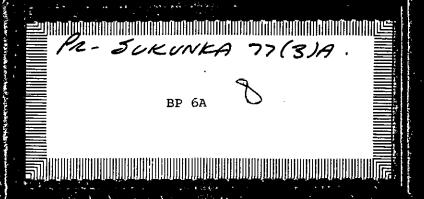
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
·····			
	Ì	,	bedding indistinct, bioturbation throughout
	650.49	0.23	SILTSTONE, as above
	652.63	2.14	SILTSTONE, as above
	653.31	0.68	SILTSTONE, as above
	654.82	1.51	SILTSTONE, as above
	655.09	0.27	SILTSTONE, as above
	656.30	1.21	SANDSTONE, medium-grained with frequent phases and interbeds of dark grey siltstone, intense bioturbation throughout, coarse-grained towards the base, large coaly inclusions throughout becoming prominent at base
	656.99	0.69	SANDSTONE, as above
	658.62	1.63	SANDSTONE, as above
	659.23	0.61	SANDSTONE, fine-to medium-grained, becoming coarse-graine at base, light grey, characterized by small-scale cross- bedding defined by very thin partings of carbonaceous material
	659.48	0.25	SANDSTONE, as above
	660.37	0.89	MUDSTONE, dark grey with occasional thin interbeds of grey siltstone, listric surfaces on bedding plane fractur
	661.32	0.95	MUDSTONE, as above
	661.89	0.57	MUDSTONE, as above
	662.40	0.51	CORE LOSS-ROCK
	663.06	0.66	LAMINITE, thin interbeds of grey siltstone and dark grey mudstone forming graded units
	663.45	0.39	LAMINITE, as above
	663.92	0.47	MUDSTONE, dark grey, black, carbonaceous at base
3°	665.36	1.44	MUDSTONE, as above, low competency
	665.46	0.10	COAL, dull and bright, stick
	665.50	0.04	COAL, dull banded, stick
	665.58	0.08	COAL, dull, stick
	665.60	0.02	COAL, bright banded, large pieces
	665.71	0.11	COAL, sheared, core pulverized (?bright banded)
	665.82	0.11	COAL, sheared, core pulverized ? dull and bright ?
	665.92	0.10	CORE LOSS-COAL
	666.06	0.14	CORE LOSS-ROCK
	666.16	0.10	CORE LOSS-COAL
	1]	,

BH Nos.6

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
1	m 666.21 666.31 666.32 666.35 666.38 666.41 666.43 666.45 666.49 666.57 666.63 666.69 666.79 666.86 666.91 666.98 667.00 667.06 667.06 667.09 667.13 667.22 667.31 667.38	m 0.05 0.10 0.01 0.03 0.03 0.03 0.02 0.02 0.04 0.08 0.06 0.06 0.10 0.07 0.05 0.07 0.05 0.07 0.02 0.06 0.03 0.04 0.09 0.09 0.09	COAL & CLAYSTONE, fragments, heavily sheared CORE LOSS-COAL COAL, sheared, small fragments, coal types indistinguishable CLAYSTONE, dark brown, carbonaceous COAL, bright, very heavily sheared, stick COAL, dull banded, very heavily sheared, stick COAL, dull and bright, very heavily sheared, stick CLAYSTONE, carbonaceous, dark brown COAL, bright, very heavily sheared, stick COAL, dull banded, sheared, stick COAL, dull banded, stick COAL, dull and bright, stick COAL, dull, stick COAL, dull, stick COAL, dull and bright, stick COAL, dull and bright, stick COAL, dull, stick
	667.09 667.13 667.22 667.31	0.03 0.04 0.09 0.09	COAL, dull, stick COAL, dull banded, stick COAL, dull and bright, stick COAL, dull, stick

BH Nos. 6

BH No	5.0		
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
,	668.10	0.05	COAL, dull and bright, large pieces
	668.13	0.03	COAL, bright, small pieces, sheared
	668.16	0.03	COAL, dull banded, small pieces, sheared
	668.60	0.44	CORE LOSS-COAL
	668.62	0.02	COAL, stoney, sheared
5 ⁰	669.10	0.48	SILTSTONE, dark grey, phases of light grey, sandstone interbeds towards base, bright coal bands and inclusions bedding disturbed by bioturbation
	669.66	0.56	SILTSTONE, as above
	669.80	0.14	CLAYSTONE, carbonaceous, black, numerous bright coal ban
	671.29	1.49	SANDSTONE, coarse-grained at top becoming medium-grained carbonaceous at top, large worm burrows at base, occasion dark grey siltstone interbeds in lower half
	671.39	0.10	SANDSTONE, as above
	673.46	2.07	SANDSTONE, as above
	674.43	0.97	SANDSTONE, as above





Page 1

AREA

SUKUNKA

B. H. No. BP 6A

Contractor:

Longyear

Commenced:

July 16, 1977

Completed:

Core Size:

July 21, 1977

Co-ordinates: 6,114,600.59

N

592.998.05 Surface Elevation: 1,815.82 Ε m

ΗQ

Casing Left in Hole:

m

Hole Angle:

page la

See detail

Geologist Geoff Jordan

Depth 596.29-671.76

Hole Azimuth:

Logged by:

Final Depth:

671.76

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			<u> </u>
Hulcross			
Gates			######################################
Sukunka			7-18-18-18-18-18-18-18-18-18-18-18-18-18-
Moosebar	623.47		
U. Gething	670.82		

SEAMS

DEPTH

THICKNESS

%RECOVERY

ELEVATION

BIRD

625.97

CHAMBERLAIN

670.82

BH Nos. 6A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	596.29	1.47	MUDSTONE, dark grey, occasional pyritic worm burrows, bedding obscured, Moosebar formation
	596.95	0.66	MUDSTONE, as above
	597.41	0.46	MUDSTONE, as above
	600.57	3.16	MUDSTONE, as above
ļ	600.65	0.08	MUDSTONE, as above
	600.75	0.10	CONCRETION, light grey, calcite filled fractures
	601.55	0.80	MUDSTONE, as above
,	601.59	0.04	CONCRETION, as above
	602.60	1.01	MUDSTONE, as above
	602.64	0.04	MUDSTONE, as above
	602.77	0.13	CONCRETION, as above
	602.96	0.19	MUDSTONE, as above
	603.05	0.09	CONCRETION, as above
	603.20	0.15	MUDSTONE, as above
	603.61	0.41	MUDSTONE, as above
	603.64	0.03	MUDSTONE, as above
	603.73	.0.09	CLAYSTONE, light grey/green, characterized by small dark coloured worm burrows
	603.90	0.17	MUDSTONE, as above
	604.00	0.10	CONCRETION, as above
	605.21-	1.21	MUDSTONE, dark grey, as above
	605.53	0.32	MUDSTONE, as above
	605.60	0.07	CONCRETION, as above
	606.66	1.06	MUDSTONE, as above
	607.42	0.76	MUDSTONE, as above
	608.07	0.65	MUDSTONE, as above
	608.14	0.07	CLAYSTONE, as above
	608.55	0.41	MUDSTONE, as above
	608.67	0.12	CONCRETION, as above
	609.60	0.93	MUDSTONE, as above
	609.70	0.10	MUDSTONE, as above
	609.84	0.14	CONCRETION, as above
	611.00	1.16	MUDSTONE, as above

511.14 511.24 512.65 514.17 515.90 517.22 518.74 519.35 520.88 520.89 521.22 521.44 521.45 521.79 522.73 522.90 523.02 523.43	0.14 0.10 1.41 1.52 1.73 1.32 1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	CONCRETION, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above CLAYSTONE, as above CLAYSTONE, as above
511.24 512.65 514.17 515.90 517.22 518.74 519.35 520.88 520.89 521.22 521.44 521.45 521.79 522.73 522.90 523.02	0.10 1.41 1.52 1.73 1.32 1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above
512.65 514.17 515.90 517.22 518.74 519.35 520.88 520.89 521.22 521.44 521.45 521.79 522.73 522.90 523.02	1.41 1.52 1.73 1.32 1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17	MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above
514.17 515.90 517.22 518.74 519.35 520.88 520.89 521.22 521.44 521.45 521.79 522.73 522.90 523.02	1.52 1.73 1.32 1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above
615.90 617.22 618.74 619.35 620.88 620.89 621.22 621.44 621.45 621.79 622.73 622.90 623.02	1.73 1.32 1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above
617.22 618.74 619.35 620.88 620.89 621.22 621.44 621.45 621.79 622.73 622.90 623.02	1.32 1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above
618.74 619.35 620.88 620.89 621.22 621.44 621.45 621.79 622.73 622.90 623.02	1.52 0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above
619.35 620.88 620.89 621.22 621.44 621.45 621.79 622.73 622.90 623.02	0.61 1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17	MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above
20.88 20.89 21.22 21.44 21.45 21.79 22.73 22.90 23.02	1.53 0.01 0.33 0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above
520.89 521.22 521.44 521.45 521.79 522.73 522.90 523.02	0.01 0.33 0.22 0.01 0.34 0.94 0.17	CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above CLAYSTONE, as above MUDSTONE, as above MUDSTONE, as above
621.22 621.44 621.45 621.79 622.73 622.90 623.02	0.33 0.22 0.01 0.34 0.94 0.17	MUDSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above
21.44 21.45 21.79 22.73 22.90	0.22 0.01 0.34 0.94 0.17 0.12	MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above
21.45 21.79 22.73 22.90 23.02	0.01 0.34 0.94 0.17 0.12	CLAYSTONE, as above MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above
21.79 22.73 22.90 23.02	0.34 0.94 0.17 0.12	MUDSTONE, as above CLAYSTONE, as above MUDSTONE, as above
522.73 522.90 523.02	0.94 0.17 0.12	CLAYSTONE, as above MUDSTONE, as above
22.90	0.17 0.12	MUDSTONE, as above
23.02	0.12	
		CLAVSTONE as above
23.43		CEATSTONE, as above
	0.41	SANDSTONE, dark grey/green, glauconitic, pyritic worm burrows increasing to base, bedding completely obliterated, competent
23.47	0.04	PYRITE, large band at top of Bird seam, includes coaly material
23.49	0.02	COAL, dull and bright, small pieces
23.53	0.04	COAL, dull, small pieces
23.62	0.09	COAL, dull, stick
23.69	0.07	COAL, dull banded, small pieces
23.71	0.02	COAL, bright, small pieces
23.75	0.04	COAL, dull, small pieces
23.85	0.10	COAL, dull and bright, small pieces
23.91	0.06	COAL, dull banded, small pieces
23.99	0.08	CORE LOSS-COAL
24.07	0.08	COAL, dull and bright, small pieces
31. 11	0.04	COAL, bright banded, small pieces
544.II	0.02	COAL, bright, small pieces
	23.75 23.85 23.91 23.99	23.75 0.04 23.85 0.10 23.91 0.06 23.99 0.08 24.07 0.08 24.11 0.04

BH Nos. 6A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	•
	624.19	0.06	COAL, dull and bright, small pieces
	624.24	0.05	COAL, bright banded, small pieces
	624.26	0.02	COAL, bright, small pieces
	624.33	0.07	COAL, bright banded, small pieces
	624.38	0.05	COAL, bright, small pieces
,	624.42	0.04	COAL, dull and bright, small pieces
	624.46	0.04	COAL, dull banded, small pieces
	624.49	0.03	COAL, dull and bright, small pieces
	624.56	0.07	COAL, dull and bright, stick
,,,	624.59	0.03	COAL, bright, stick
	624.68	0.09	COAL, dull banded, stick
	624.79	0.11	COAL, dull, stick
	624.91	0.12	COAL, dull and bright, stick
	624.95	0.04	COAL, dull banded, stick
	625.01	0.06	COAL, dull and bright, stick
	625.10	0.09	COAL, dull, stick
	625.15	0.05	CORE LOSS-COAL
	625.19	0.04	COAL, bright banded, stick
	625.25	0.06	COAL, bright, small pieces
	625.29	0.04	COAL, dull and bright, stick
	625.33	0.04	COAL, dull banded, stick,
	625.35	0.02	COAL, dull and bright, small pieces
	625.38	0.03	COAL, bright banded, stick
	625.43	0.05	COAL, dull and bright, stick
	625.48	0.05	COAL, bright, stick
	625.50	0.02	COAL, dull and bright, stick
	625.97	0.47	CORE LOSS-COAL
	627.17	1.20	SANDSTONE, medium-grained, light grey, carbonaceous at top, small worm burrows from 3.0 to 3.20m from top, very clean, bedding obscured by bioturbation
	627.67	0.50	SANDSTONE, as above
	629.11	1, 44	SANDSTONE, as above
	629.56	0.45	SANDSTONE, as above
7°	630.63	1.07	SANDSTONE, medium-grained, light grey, scattered inter- beds of dark grey mudstone, defined bedding

BH Nos. 6A

Dip	DEPTH	THICKNESS	DESCRIPTION
О	m	m	
	(01 07		
	631.07	0.44	SANDSTONE, as above
	632.31	1.24	SANDSTONE, fine-grained, light grey, very clean, bedding barely seen
	633.98	1.67	SANDSTONE, as above
	635.51	1.53	SANDSTONE, as above
	637.03	1.52	SANDSTONE, as above
	638.56	1.53	SANDSTONE, as above
	640.08	1.52	SANDSTONE, as above
	641.60	1.52	SANDSTONE, as above
	641.77	0.17	MUDSTONE, dark grey, interbeds of light grey siltstone
	641.82	0.05	MUDSTONE, as above
2 ^O	643.09	1.27	SANDSTONE, medium-grained, light grey, characterized by small scale cross-bedding and fine carbonaceous partings on bedding
	643.22	0.13	SILTSTONE, dark grey, massive, interbedded sandstone at base
	643.97	0.75	SILTSTONE, as above
	644.42	0.45	SILTSTONE, as above
	644.65	0.23	SANDSTONE, fine-grained, light grey, shelly fossils at to
2 ⁰	645.16	0.51	SILTSTONE, grey with very frequent interbeds of dark grey mudstone
	645.30	0.14	SILTSTONE, as above, abundant shelly fossils at top
	645.72	0.42	MUDSTONE, dark grey, carbonaceous phases and bright coal bands, siltstone phases towards base
	646.18	0.46	MUDSTONE, as above
	647.70	1.52	MUDSTONE, as above
	649.22	1.52	MUDSTONE, as above
	650.44	1.22	MUDSTONE, as above
	651.97	1.53	MUDSTONE, as above
	653.49	1.52	MUDSTONE, as above
2 ⁰	655.02	1.53	SANDSTONE, medium-grained, light grey, with very frequent regular interbeds of carbonaceous mudstone, bioturbation by worm burrowing at base
	656.54	1.52	SANDSTONE, as above
	656.84 ,	0.30	SANDSTONE, medium-grained, grey, abundant large irregular coaly inclusions and bright coal bands, phases of carbonaceous mudstone

BH Nos. 6A

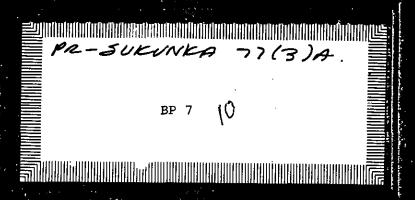
Dip	DEPTH m	THICKNESS	DESCRIPTION '
	658.37	1.53	SANDSTONE, as above
	659.40	1.03	SANDSTONE, as above
	659.89	0.49	SANDSTONE, medium-grained, light grey, very clean
	660.64	0.75	SANDSTONE, as above
	660.78	0.14	SANDSTONE, as above
	661.91	1.13	LAMINITE, thin regular bedded interbeds of dark grey mudstone and grey siltstones
	663.20	1.29	LAMINITE, as above
	663.67	0.47	LAMINITE, as above
	663.83	0.16	LAMINITE, as above
	664.84	1.01	MUDSTONE, dark grey, carbonaceous at top, occasional light grey siltstone interbeds
	665.05	0.21	MUDSTONE, ás above, calcite fractures at 40° to core axis, listric surfaces, sigmoidal laminite type structure
	665.18	0.13	MUDSTONE, undisturbed as above
	665.42	0.24	MUDSTONE, as above
	665.78	0.36	MUDSTONE, dark grey, carbonaceous
	665.92	0.14	COAL, dull,heavily sheared, stick
	665.96	0.04	COAL, dull banded, sheared, stick
	`665.99	0.03	COAL, dull and bright, sheared, stick
	666.09	0.10	CLAYSTONE, carbonaceous, black, heavily sheared
	666.14	0.05	COAL, dull and bright, heavily sheared, stick
·	666.17	0.03	COAL, dull banded, heavily sheared, stick
	666.21	0.04	COAL, dull and bright, heavily sheared, stick
,	666.28	0.07	COAL, dull, heavily sheared, stick
	666.33	0.05	COAL, dull and bright, heavily sheared, stick
	666.38	0.05	COAL, bright, heavily sheared, stick
	666.41	0.03	COAL, bright banded, heavily sheared, stick
	666.43	0.02	CLAYSTONE, carbonaceous, black, sheared
	666.46	0.03	COAL, bright, heavily sheared, small fragments
	666.58	0.12	COAL, dull and bright, heavily sheared, stick
	666.62	0.04	COAL, dull, heavily sheared, stick
	666.65	0.03	COAL, bright, heavily sheared, stick
	666.68	0.03	COAL, dull banded, heavily sheared, stick
	666.70	0.02	COAL, dull and bright, heavily sheared, stick

BH Nos. 6A

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	(((7)	. 0.01	CLAVCTORE
	666.74	0.04	CLAYSTONE, carbonaceous, black
	666.75	0.01	COAL, dull and bright, heavily sheared, stick
	666.82	0.07	COAL, dull banded, heavily sheared, stick
	666.94	0.12	COAL, dull, heavily sheared, stick
	667.06	0.12	COAL, dull banded, heavily sheared, stick
	667.13	0.07	COAL, dull, heavily sheared, stick
	667.29	0.16	COAL, dull, stick
	667.41	0.12	COAL, dull and bright, stick
	667.47	0.06	COAL, dull banded, stick
	667.52	0.05	COAL, dull and bright, stick
	667.61	0.09	COAL, bright, stick
•	667.67	0.06	COAL, dull, stick
	668.06	0.39	CORE LOSS-COAL
	668.08	0.02	COAL, bright banded, stick
	668.16	0.08	COAL, dull banded, stick
	668.22	0.06	COAL, dull, stick
	668.27	0.05	COAL, dull and bright, stick
	668.31	0.04	COAL, dull, stick
	668.40	0.09	COAL, dull banded, stick
	668.50	0.10	COAL, dull, stick
	668.54	0.04	COAL, dull, heavily sheared, stick
	668.58	0.04	COAL, dull and bright, heavily sheared, stick
	668.63	0.05	COAL, bright, heavily sheared, stick
	668.70	0.07	COAL, dull and bright, heavily sheared, stick
	668.76	0.06	COAL, dull banded, heavily sheared, stick
	668.80	0.04	COAL, dull and bright, heavily sheared, stick
	668.88	0.08	COAL, dull, heavily sheared, stick
	668.95	0.07	COAL, dull banded, heavily sheared, stick
	669.02	0.07	COAL, dull and bright, heavily sheared, stick
	669.07	0.05	COAL, bright banded, heavily sheared, stick
	669.10	0.03	COAL, dull banded, heavily sheared, stick
	669.19	0.09	SILTSTONE, dark grey, carbonaceous
	670.19	1.00	MUDSTONE, carbonaceous, sandy, coaly bands and inclusions

BH Nos. 6A

ip o	DEPTH m	THICKNESS m	DESCRIPTION
·	670.63	0.44	MUDSTONE, carbonaceous, sheared, frequent bright coal bands
	670.72	0.09	SANDSTONE, medium-grained, dark grey, carbonaceous, pyrite inclusions, bright coal bands
	670.78	0.06	COAL, dull and bright
	670.82	0.04	MUDSTONE, carbonaceous
	671.55	0.73	SANDSTONE, medium-grained, light grey, carbonaceous at top, massive
	671.76	0.21	SANDSTONE, as above
		!	



BP COAL

Page 1

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AREA

SUKUNKA

B. H. No. BP 7

Contractor: Connors

Commenced:

Completed:

Core Size:

HQ

SEAMS

F.PO.

Hole Angle: See detail page la Hole Azimuth

Co-ordinates: 6,111,191.72 594,015.77

Surface Elevation: 1,291.82

Casing Left in Hole:

Geologist Ali Chowdry

%RECOVERY

Logged by: Andy Newson

Geoff Jordan

343.58

367.59-412.67

347.51-358.09 414.31-429.51

ELEVATION:

Final Depth: 429.51

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION	
Boulder Creek		·		
Hulcross				
Gates	78.65	78.65	1,213.17	
Sukunka	193.00	114.35	1,098.82	
Moosebar	347.48	154.48	944.34	
U. Gething	+ 429.51	82.03	862.31	

	*	
BIRD	351.66	940.16
CHAMBERLAIN	*429.51 *	862.31
F.PO.	297–298	Badly Sheared

THICKNESS

*hole stopped with Chamberlain seam horizon

DEPTH

254-256

Sperry-Sun Survey

Date: 22nd July 1977

Borehole: BP 7 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
428m	3° 15°	N 18 ⁰ E
400m	3° 15†	N 18° Е
350m		
300m	2° 00'	N 19 [°] Е
250m	,	
200m	1° 00'	n 55° Е
150m	1° 30'	n 68° Е
100m	1° 00'	N 49 [°] Е
50m	1° 00'	N 35° E

Mechanical jam in Camera stopped two results

BH Nos. 7

Dip	DEPTH	THICKNESS	DESCRIPTION
Ů	m	m	·
	46.61	46.61	SANDSTONE: medium-grey, medium-grained, predominance of darker components, siliceous, generally clean with sporadiargillaceous/silty laminae, massive to cross-bedded, gradational.
	47.45	0.84	SANDSTONE: medium-grey, fine-to medium-grained, clean, well-sorted, gradational.
	49.47	2.02	SANDSTONE: light/medium-grey, succession of fine-to med- ium-grained and medium grained, well-sorted, clean sands, gradational.
2°-3°	69.88	20.41	SANDSTONE: light-grey, fine-to medium-grained, very clean uniform well-sorted, calcareous, cross-bedding seldom discernible, apparently parallel lamination. In fact, it could be very low-angle large-scale cross-stratification. Bottom 4.75m have shaly/silty interbeds, less than 5-7%, interbedded below.
2 ⁰ -3 ⁰	78.65	8.77	MUDSTONE (40%)/SANDSTONE (60%): rapidly alternating bands of dark-grey silty mudstone (burrowed) with fine-grained, light-grey laminated and cross-laminated (small-scale) sands. Mutual micro-boundaries invariably erosional.
			GATES SUKUNKA
· 2 ^O	96.32	17.67	MUDSTONE (80%)/SANDSTONE (20%): dark-grey, highly bioturb- ated muds and sands, some sandy zone, fine-to very fine- grained with small-scale cross-lamination, weakly calcar- eous, interbedded muds have high percentage of silts intermixed.
	109.51	13.19	SANDSTONE (80%)/MUDSTONE (20%): light/medium-grey, fine-grained sands, with large and small burrows, very weakly calcareous, interbedded,gouged carbonaceous shale/mud, 3cm thick at 98.09. Predominently silty/muddy at 105.46-108.20.
2 [°]	126.14	16.63	SANDSTONE (30%)/MUDSTONE, SILTY (70%): intimate association of sands, silt and mudstone, due to intensive bioturbation, frequent sandy zone, fine-to very fine-grained with intact lamination.
	139.50	13.36	SANDSTONE: light-grey, fine-grained, dominantly very clear and well-sorted, initial 2.75m very bioturbated with many large burrows, rest finely laminated and cross-laminated. Bottom 3.25m have 15% mud and silty zones. Many micro-erosional features, some fine shale clasts. Whole interval strongly calcareous, interbedded below.

BH No	s. ₇		
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
·2°-3°	149.73	10.23	SANDSTONE (60%)/MUDSTONE/SILTSTONE (40%): interval with frequent alternating lithologies, much of sandstone light grey, very fine-grained, mud/silts with highly erosional boundaries. Interval as a whole less modified due to relative inactivity of organisms. Strongly calcareous; interbedded below.
2°-3°	193.00	43.27	MUDSTONE/SANDSTONE(80-85%)/SANDSTONE (15-20%): rapidly alternating lithologies of silts, muds and sands (very fine-grained and laminated). The proportion of these 3 constituents remains fairly constant in any given interval Mutual boundaries, though erosional, yet less scoured the whole aspect one of quieting environment downward. Whole sequence strongly calcareous. SUKUNKA MOOSEBAR
	302.87	109.87	MUDSTONE: dark-grey, homogeneous, lacking totally silty/sandy lamination. Calcite fracture - 231.74 (parallel to bedding, less than 5mm thick). Core badly fragmented, slickensided: 253.90 - 256.03, 0.10m calcareous band at 279.63-279.73. Top and bottom of the unit (of carbonate) normal though there is some suggestion of movement during late stage of diagenesis. A good deal of pyrite in it. A number of 8 to 10cm rusty bands 289.00-294.44 and several listric surfaces. Badly sheared and locally finely broken up at 297.0-298.00 and fine calcite infillings.
	·		Whole of Moosebar sequence non-calcareous, very difficult to assess bedding angle in the absence of silty/sandy intercalations.
	343.58	40.71	MOOSEBAR SHALE: black, silty, pyritic clusters, very homogeneous. Towards the base get ferruginous layers and bentonites, often associated with calcite infilling of fractures.
			Ferruginous layers: 321.40 (5cm), 327.82 (10cm), 329.37 (5cm)
			Bentonites: 321.37 (10cm), 326.77 (15cm), 344.20 (7cm) Fractures Calcite Filled: 314.18 (5cm), 316.73 (4cm) 321.40 (5cm),327.82 (10cm)
	345.97	2.39	MUDSTONE: dark-grey/green, monotonous, breaks along irregular planes, low competency
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Dip o	DEPTH	THICKNESS	DESCRIPTION
	m 346.09	0.12	CLAYSTONE: light-brown/green, bentonitic, soft
		٠	
	346.44	0.35	MUDSTONE: as above
	346.47	0.03	CLAYSTONE: as above, core broken
	346.62	0.15	CLAYSTONE: as above
	347.48	0.86	SANDSTONE: fine-grained, green-grey, glauconitic, pyrite filled worm burrows, bedding reworked, grades to mudston at top, competent, sharp irregular basal contact.
			MOOSEBAR GETHING
	347.51	0.03	COAL: dull, pyritic, inclusions of carbonaceous claystone
	347.85	0.34	CLAYSTONE: carbonaceous, black, numerous large bright Coal bands, some listric surfaces on bedding planes, no major tectonic disturbance, incompetent.
	348.69	0.84	SILTSTONE: grey with frequent interbeds of dark-grey clay stone, minor bioturbation, a few pyrite filled worm burrows prominent at top, lamination of bedding to lcm., carbonaceous at top, occasional Coaly inclusions on bed- ding, moderate competency, gradational basal contact.
 	348.96	0.27	SILTSTONE: as above
	349.23	0.27	CLAYSTONE: carbonaceous, black, numerous bright Coal band to 0.005m irregular fractures on Coal inclusions, listric surfaces on Coal partings.
	349.26	0.03	CLAYSTONE: as above
	349.29	0.03	COAL: bright
	349.45	0.16	CLAYSTONE: carbonaceous, as above, core broken to 0.01m pieces on listric surfaces.
25 ⁰	349.80	0.35	CLAYSTONE: carbonaceous, unbroken as above, moderate to low competency, pyrite bands at base.
<u> </u>			BIRD COAL SEAM.
	350.20	0.40	CORE MISSING-COAL
	350.32	0.12	CORE MISSING-ROCK

BH Nos. 7

Dip o	DEPTH m	THICKNESS	DESCRIPTION .
	350.38	0.06	COAL: bright banded
	350.48	0.10	,
			COAL: dull, metallic lustre
	350.54	0.06	COAL: dull and bright
	350.64	0.10	COAL: dull, metallic lustre
	350.71	0.07	COAL: dull banded
	350.78	0.07	COAL: bright banded
	350.85	0.07	COAL: dull and bright
	350.92	0.07	COAL: dull, metallic lustre
	351.28	0.36	CORE MISSING-COAL
	351.42	0.14	CORE MISSING-ROCK
ĺ	351.66	0.24	CORE MISSING-COAL
	-		FLOOR OF BIRD SEAM
£	352.63	0.97	CLAYSTONE: Carbonaceous, black, numerous bright Coal bands pyrite filled worm burrows in top half, Coaly inclusions prominent at base, sharp basal contact.
	353.60	0.97	SANDSTONE: medium-grained, light-grey, large irregular Coaly inclusions in top 1.0m, regular fine Coal partings on bedding towards base, massive at top, competent.
	354.77	1.17	SANDSTONE: as above
25°	355.64	0,87	SANDSTONE: as above
11°	356.84	1.20	SANDSTONE: medium-grey, medium-grained, argillaceous, carbonaceous stringers, patchily calcareous, listric surfaces, abrupt below.
22 ⁰	358.09	1.25	SILTSTONE: sandy, carbonaceous, Coaly stringers, listric surfaces, locally slickensided.
20 ⁰	367.59	9.50	SANDSTONE: medium/coarse-grained, argillaceous with carbonaceous stringers, bedding and cross-bedding well-developed, patchily calcareous, gradational below, large worm burrows: 366.74-365.34.
	373.68	6.09	SANDSTONE: medium/fine-grained, poorly-developed bedding, clean, well-sorted, calcareous, abrupt below.

BH Nos. 7

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	382.35	8.67	SHALE: silty with sandy zones, black homogeneous shale, pyritic with minor sandy/silty zones, disturbed, carbon-aceous, sandy at base, gradational below.
	385.21	2.86	SANDSTONE: coarse/medium-grained, argillaceous, Coaly stringers, gradational below, vaguely calcareous.
30°	389.10	3.89	SANDSTONE: medium-grained, argillaceous, well-bedded and cross-bedded, abrupt below, occasional worm burrows, large, with minor disturbence.
	395.16	6.06	SANDSTONE: fine-grained, medium-grey, poorly bedded, slightly argillaceous, calcareous, gradational below.
	395.60	0.44	SHALE: silty, 50:50, dark-grey, poorly bedded, slightly distrubed, gradational below.
	398.96	3.36	SHALE: carbonaceous, Coaly stringers, listric surfaces, silty, gradational below.
	401.24	2.28	SHALE: silty becoming sandy at base, poorly bedded, disturbed, calcareous where sandy, gradational below.
27 [°]	404.75	3.51	SANDSTONE: medium-grained, very argillaceous, disturbed, Coaly stringers, intraclasts, abrupt below, calcareous.
	406.23	1.48	SHALE: with interbedded argillaceous sands, medium-to fine-grained, some disturbence, sands calcareous, shale: sands 50:50. Coaly stringers, abrupt below.
	408.12	1.89	SHALE: black, carbonaceous, occasional bright Coal strin- gers, abrupt below.
	410.86	2.74	SILTSTONE: shaly , bedding poor, disturbed, calcareous, gradational below.
25 [°]	412.67	1.81	SANDSTONE: with shale interbeds 50:50, well-bedded, slightly disturbed, calcareous.
19 ⁰	414.31	1.64	SILTSTONE: grey with frequent interbeds of dark-grey clay stone, minor slumping and large light coloured worm burr- ows at top, interbeds form graded units, abrupt break to Coal at base, unit moderately competent.
			SKEETER SEAM
	414.35	0.04	COAL: dull and bright
	414.45	0.10	COAL: dull banded
	414.54	0.09	COAL: dull and bright, core broken, calcite parting at base.

BH Nos. 7

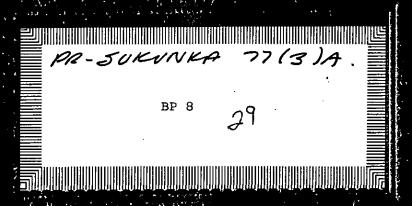
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	414.64	0.10	COAL: dull and bright
	414.71	0.07	COAL: dull banded, core broken
	414.75	0.04	CORE MISSING-COAL
	415.37	0.62	SANDSTONE: mid-grey, fine-to medium-grained frequent interbeds of grey siltstone, bedding is wavy and reworked medium sized worm burrows toward top, sharp contact at base, competent.
	415.73	0.36	SILTSTONE: grey, interbeds of dark-grey claystone, unit grades to carbonaceous claystone at base, moderate competency, gradational irregular contact at base.
	415.83	0.10	SANDSTONE: medium-grained, light-grey, cross-bedded, Coaly wisps throughout.
	415.92	0.09	CLAYSTONE: dark-grey, thin veins of calcite, grades to unit below, moderate to low competency.
	416.10	0.18	SANDSTONE: medium-grained, light-grey, grades to unit below, bedding reworked.
	416.54	0.44	CLAYSTONE/SILTSTONE: interbedded, dark-grey claystone and grey siltstone, laminated, bedding is very even, listric surfaces on bedding planes, breaks readily on bedding, low competency.
	416.78	0.24	CLAYSTONE: carbonaceous, black with numerous bright Coal bands.
	417.64	0.86	SANDSTONE: fine-grained, mid-grey, irregular bedded inter beds of siltstone and claystone, worm burrows, competent.
	417.73	0.09	CLAYSTONE: carbonaceous, black, bright Coal bands at base, low competency.
:			CHAMBERLAIN COAL SEAM
:	417.81	0.08	COAL: dull and bright
	417.94	0.13	CLAYSTONE: carbonaceous, black, bright Coal bands
	418.00	0.06	COAL: dull and bright
	418.11	0.11	COAL: dull banded
	418.21	0.10	COAL: dull and bright, sheared, core broken
	418.23	0.02	COAL: bright

BH Nos. 7

Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m ·	
	418.30	0.07	COAL: dull, core broken
	418.58	0.28	CLAYSTONE: dark-grey, carbonaceous at top and base, Coal bands at top and base.
	418.63	0.05	COAL: bright
	418.70	0.07	COAL: bright banded
	418.72	0.02	CLAYSTONE: carbonaceous, black, bright Coal Bands
	418.85	0.13	COAL: dull banded
	418.90	0.05	COAL/CLAYSTONE: interbedded, dark, carbonaceous claystone with numerous bright Coal bands.
	418.95	0.05	CORE MISSING-COAL
	418.98	0.03	COAL: bright banded
	419.32	0.34	CLAYSTONE: carbonaceous, fissile at top, bright Coal bands throughout.
	420.13	0.81	CLAYSTONE: as above, numerous Coal bands, listric surface on bedding, very poor competency.
	420.18	0.05	COAL: sheared, fragments in box
	420.39	0.21	CORE MISSING-ROCK
	421.14	0.75	CLAYSTONE: carbonaceous as above
	422.13	0.99	CLAYSTONE: as above
	422.22	0.09	SILTSTONE: dark-grey, phases of carbonaceous claystone, large Coaly inclusions, competent, grades to units at top and base.
	422.67	0.45	SILTSTONE: as above
	422.78	0.11	SHALE: black, carbonaceous, Coal bands, fissile (tectonic
	423.16	0.38	CLAYSTONE: carbonaceous, black, plant fragments, grades to units above and below.
	423.23	0.07	CLAYSTONE: dark-grey with phases of carbonaceous claystor as above.
	424.74	1.51	BRECCIA: sedimentary breccia of grey siltstone near the base.

BH Nos. 7

7	<u> </u>	T	
Dip O	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	424.87	0.13	COAL: dull and bright
	424.90	0.03	COAL: dull banded
	424.95	0.05	COAL: sheared, fragments in box
	425.03	0.08	CLAYSTONE: carbonaceous, black, bright Coal bands, sheared core broken on listric surfaces
	425.17	0.14	CLAYSTONE: as above
	425.23	0.06	CLAYSTONE: carbonaceous, as above, very heavily sheared
	425.47	0.24	CORE MISSING-ROCK
	425.57	0.10	COAL: dull and bright
	425.68	0.11	COAL: dull banded
	425.72	0.04	CORE MISSING-COAL
	425.81	0.09	CLAYSTONE: carbonaceous, black, sheared, numerous bright Coal bands
	426.27	0.46	CLAYSTONE: carbonaceous, as above, unsheared, frequent Coal bands to 0.01m.
	426.36	0.09	COAL: bright banded
	426.99	0.63	CLAYSTONE: carbonaceous, as above.
	427.07	0.08	CLAYSTONE: carbonaceous, as above
;	427.13	0.06	COAL: dull and bright
	427.40	0.27	CLAYSTONE: carbonaceous, as above.
	427.54	0.14	SANDSTONE: light-grey, salt and pepper, phases and interbeds of carbonaceous claystone, Coaly inclusions throughout, bedding is contorted, competent, sharp basal contact.
, !	428.23	0.69	SANDSTONE: as above.
	428.48	0.25	COALY/CLAYSTONE: interbedded, bright Coal bands interbedde with bony and stony Coal, high ash.
	428.88	0.40	CLAYSTONE: carbonaceous, black, numerous bright Coal bands
18°	429.51 ,	0.63	CLAYSTONE: carbonaceous, as above with interbeds of grey sandstone.
			* * * *



CANADA

Page 1

AREA

SUKUNKA

B. H. No.BP 8

Contractor:

Tonto

Commenced:

July 18, 1977

Completed:

Aug 4, 1977

549.08

Co-ordinates: 6,116,342.70

593,589.58

Surface Elevation: 1,750.30

Core Size:

HQ

Casing Left in Hole:

m

N

E

m

Hole Angle:

Final Depth:

See detail

page la

Geologist Ali Chowdry

Depth 9.24-105.56

Hole Azimuth:

Logged by:

107.87 115.24-124.17

Geoff Jordan

95.94-97.44

109.25-114.05 114.27-549.08

		Andy Newson	124.17-412.99
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	218.13	218.13	1,532.17
Sukunka	336.50	118.37	1,413.80
Moosebar	416.95	80.45	1,333.35
U. Gething	488.57 543.36	71.62	1,261.73 1,206.94

SEAMS DEP	<u>TH</u>	THICKNESS	%RECOVERY	ELEVATION
BIRD 419	.54			1,330.76
UP 488 CHAMBERLAINLP 543				1,261.73 1,206.94
F.PR. F.E.	460.42 498.99		Breccia Breccia	·.
F.E.	503 506 507 456–507	• '	Breccia Beds overturned,	breccias

Sperry-Sun Survey

Date: 3rd August 1977

Borehole: BP #8 Sukunka 77

Compass: 20° maximum to Magnetic north

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
500m	3° 30'	n 55° e
490m	3° 30'	n 56° е
480m	2° 30'	n 54° е
450m	2° 45*	(N 13° E)
400m	3° 30'	(N 9° E)
350m	3° 00'	(N 18° E)
300m	2° 45'	(N 78° E)
250m	3° 001	(N 8° W)
200m	2° 15'	(N 22° E)
150m	1° 00'	(N 55° W)
100m	0° 30'	(S 55° W)
50m	1° 15'	(N 82° W)

P.S. Rods were pulled 100' from td.

Sperry-Sun Survey

Date: 4th August 1977

Borehole: BP #8 Sukunka 77

BPB Operator: P. J. Waters

Compass: 20° Maximum to Magnetic North

Measured Depth	<u>Tilt</u>	Tilt Direction
545m	3° 30'	N 53° E
525m	3° 15'	N 55° E
466m	3° 00'	N 49° E
450m	2° 30'	N 27° E
400m	3° 30'	N 54° E
350m	3° 15'	N 48° Е
300m	3° 00'	N 49° E
250m	2° 45'	n 49° Е
200m	2° 15'	. N 49° E
150m	1° 15'	N 25° E
100m	1° 15'	N 76° W
50m	1° 15'	n 65° w

P.S. Second run

BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION	
0	m	m		
	7.06	7.06	Overburden	
16°	9.24	2.18	SILTSTONE, medium grey, coarse-grained, laminated, interspersed with lenticles and ripples of very fine sands, richly argillaceous, strongly calcareous, initial 1.45 m. mostly weathered, top of unit finely broken up and carbonaceous.	
7°	9.32	0.08	COAL, hard with carbonaceous mudstone at base, contact of coal with rocks below ground out and remnant rocks weathered.	
120	17.06	7.74	SANDSTONE, light medium grey, from 9.32 - 10.80 very fine argillaceous sands (top & bottom badly weathered) intensely burrowed fine sands 10.80-11.40 from 11.40 to 13.71 fine to medium sands, lenticular to ripple bedded, eroded and disrupted laminae and layers (silty very finely sandy and dense), much angular silty/sandy clasts (some evidently resulted from complete disruption of thin layers), 5-7 mm. coal lens; silty/muddy 13.71 - 14.03., medium to coarse, clean sands (14.03-17.06) cross-bedded with occasional coal streaks (badly broken and weathered 16.66-17.06) and intraclasts. Whole sequence strong to moderately calcareous. Bottom contact ground out, some broken up sediments in sticky clayey matrix.	والمرازعة والمرازع والمرازع والمرازعة والمرازعة والمرازعة والمرازعة والمرازعة والمرازعة والمرازعة والمرازعة
100	19.52	2.46	MUDSTONE, medium grey, 0.52 m. silts in middle, most have silty wisps, small carbonaceous intervals toward top and base; sporatically fragmented and weathered, patchily calcareous, erosional below.	
	21.09	1.57	SANDSTONE, light grey, fine grained, crinkly lamination, lower half with ripple drifts; 0.32 m. silty band in upper half, strongly calcareous, abrupt below.	
120	29.00	7.91	MUDSTONE, medium grey, dominantly silty in upper 1.0 m. Rest silty mudstone, thin, scattered pelecypod shells (Marker zone) from 23.16-24.69, siltstone: 23.16-23.91. Interval sporatically broken up and variously weathered (few with listric surfaces). Bottom 0.50 m. carbonaceous muds. Contact with sands below broken up.	والمارات والمراورة والتراوي والمراوية والمراوية والمراوية والمراوية والمراوية والمراوية والمراوية والمراوية

BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
10°	30.34	1.34	SANDSTONE, light/medium grey, very fine-grained, wavy ripply bedding, argillaceous; strongly calcareous; weathered, 29.30-29.70, gradational below, some vertical burrows.
	31.14	0.80	SILTSTONE, medium grey, muddy (20%), discontinuous lamination, calcareous, gradational below. A decayed and weathered zone (0.07 m.) thick, 0.14 m. from base.
8 ⁰	34.73	3.59	SANDSTONE, light grey, fine-medium grained easily breakable, occasional specks and streaks of carbonaceous matter, mostly devoid of lamination, initial 0.35 m. dark grey, argillaceous, non-calcareous and partially weathered, rest calcareous, passage below by interbedding
	39.14	4.41	SILTSTONE/MODSTONE, dark grey, muddy content disseminated throughout, disturbed and eroded layers, much largescale slumping; abundant plant debris, carbonaceous streaks, numerous small fine sandstone units in lower 1.50 m.(erosional sand silt contact). Vertical fracture and weathered at 38.30-38.50. Highly scarred lower contact.
	40.49	1.35	SANDSTONE, medium to light grey, very fine-grained, entire unit slumped structure, erosional below, (originally with small-scale coarse lamination).
90	42.58	2.09	SANDSTONE, light grey, medium-grained, very clean and well sorted, cross-bedded, carbonized plant fragments. 41.76 - 41.96; strongly calcareous; number of 50° to 60° fractures (and weathered along fracture plane), abrupt below. Bottom 14 cm. has coaly fragments.
10 ⁰	45.10	2.52	SANDSTONE, medium grey, fine-grained, characterized by dark grey laminated sequences (concentration of finely particulate matter along laminae), some wavy and small scale cross-lamination, calcareous; local gradation to very fine sands and silts; possage transitional. Tendency to split along bedding where concentration of finely broken up carbonaceous matter.
	47.50	2.40	SILTSTONE/MUDSTONE, medium grey, initial half silty mudstone with stringers of very fine sands, lower half richly argillaceous siltstones grading into fine sands.

BH No	s. 8		•
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
5 ⁰	52.50	5.00	SANDSTONE, light grey, medium grained. (some fine-grained at top). Initial 2.00m. with several 8-10 cm. muddy bands associated with muddy clasts, two levers, I thin band of weathered sands. Much of sands clean, laminated and with occasional burrows, weakly calcareous interbedded below.
6 ⁰	57.96	5.46	SANDSTONE/MUDSTONE, rapidly alternating sequence of medium grey, richly silty sands and light grey, fine to medium grained laminated sands. Mutual boundaries predominantly erosional. Slump structure within 55.55-56.62, zone 57.00-57.69 slickensided and calcite encrusted at number of places. Calcareous, erosional below
11°	61.93	3.97	70 SANDSTONE/SILTSTONE, dark grey very fine-grained sands (argillaceous) and silts. Although several horizons have well-defined laminations, most intervals structureless and with abundant finely broken carbonaceous matter. Many large burrows, two zones intensely churned through. At 59.34 - 59.82 much fine muddy streaks (identical to pin pricks). Initial 1.25 m. with thin bands of fine-grained sand with greenish greymineral, also some slumping in the interval, strongly calcareous, gradational below.
8°	64.79	2.86	MUDSTONE, dark grey, very silty (calcareous streaks), gradational.
	67.14	2.35	SILTSTONE/SANDSTONE, Sukunkoid zone, occasional remnants of very fine laminated sands, otherwise thoroughly homogenized.
	72.03	4.89	SANDSTONE, initial half light grey, fine grained, some clean intervals, muddy bands, laminated with occasional vertical burrows., broken up to 69.19, Bottom 2.10 m. fine sands intermixed with silty/muddy fractions due to bioturbation. Contact with conglomerate below is listric
	72.16	0.13	CONGLOMERATE, granular to finely pebbly, maximum diameter 0.06 m., quartzite pebble at base.
	73.75	1.59	MUDSTONE, initial 1.00 m. very hard, silty, highly ferruginous mudstone with much pyrite, rest dark grey, highly carbonaceous, from 73.76-73.86 extremely hard nodular/ferruginous mudstone.
	'		Control of the contro

BH Nos. 8

Dip o	DEPTH ·	THICKNESS m	DESCRIPTION
·	71, 00	,	MUDSTONE dark grow to black some coals shale at base
	74.00	0.25	MUDSTONE, dark grey to black, some coaly shale at base
	76.20	2.20	SILTSTONE, medium grey, rootlets, locally muddy, grada- tional
	80.20	4.00	MUDSTONE, medium grey, locally carbonaceous and ferruginous.
120	82.14	1.94	SANDSTONE, light/medium grey, fine/medium grained in initial 1.0 m., medium/coarse grained remainder, some argillaceous layers and coal fragments, characterized by abundance of brownish mineral in coarser zone, siliceous; number of listric surfaces and fractured, easily split along coal fragments, contact below fractured.
	84.24	2.10	MUDSTONE, dark grey, lower half homogenously silty, devoid of lamination, very gradational below.
10 [°]	87.47	3.23	SANDSTONE, initial 1.03 m. fine to very fine argillaceous sand, rest fine/medium grained, small-scale cross laminated (much dark lamination due to concentration of fine carbonaceous matter, mostly siliceous, yielding along carbonaceous laminae, abrupt below.
	95.88	8.41	SANDSTONE, upper 0.98 m. very fine grained, dark grey, richly argillaceous laminated sands, grading below into light grey, dominantly medium-grained, quartzone, cross-bedded sands with abundant limonitic specks, abundant coaly fragments, totally impoverished in argillaceous matter. Core frequently split and with listric surfaces. Some slickensiding.
			Re-constructed - Boxes 44 & 45 - coal only.
	95.94	0.06	CLAYSTONE, carbonaceous, brown, bright coal bands.
			COAL SEAM E
	95.95	0.01	COAL, bright stick
	95.99	0.04	COAL, stony.
	96.04	0.05	COAL, dull
	96.14	0.10	COAL, stony.
\$	1	1	

BH Nos. 8

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	96.18	0.04	COAL, dull banded,stick
	96.20	0.02	COAL, bright banded
	96.22	0.02	COAL, dull
	96.26	0.04	COAL, dull and bright
	96.31	0.05	Core Loss
	96.37	0.06	COAL, dull banded, large pieces.
	96.41	0.04	as above
	96.46	0.05	Core Loss
:	96.55	0.09	COAL, dull and bright, stick
: 	96.62	0.07	COAL, dull banded.
	96.70	0.08	COAL, dull and dull banded, pieces mixed in box.
	96.80	0.10	COAL, dull and bright stick.
	96.85	0.05	Core Loss - Coal
	96.89	0.04	COAL, dull banded, pieces.
	96.92	0.03	COAL, stony.
	97.44	0.52	SILTSTONE, dark grey with few fine sandstone interbeds at base of coal.
	97.68	0.24	COAL, muddy, all broken up coal core.
6°	98.97	1.29	SANDSTONE, medium grey, fine-grained, cross-bedded, calcareous, erosional below.
	99.21	0.24	MUDSTONE, medium grey, ripples of silts, non-calcareous, gradual.
	103.21	4.00	SANDSTONE, dark grey, very fine grained, very argillaceou mottling fabrics, feebly calcareous, gradational below.

BH Nos. 8

Dip	DEPTH m	THICKNESS m	DESCRIPTION

	103.50	0.29	MUDSTONE, upper half very silty, strongly calcareous rest with coaly wisps, gradational.
	103.960	0.46	COAL, from top to bottom, mostly dull and muddy bands, dominantly bright, some dull.
	105.56	1.60	MUDSTONE, medium grey, slightly silty, some fracturing in middle (in carbonaceous band), gradational below.
	107.87	2.31	SANDSTONE, MUDSTONE, 60/40, medium grey, sands fine to very fine grained, small-scale cross lamination, strongly calcareous, interbedded with silty mudstones, local vertical fracturing, gradational.
	109.25	1.38	MUDSTONE, medium grey, uniformly silty, carbonaceous at base.
	109.91	0.66	CLAYSTONE, dark grey, few bright coal bands, low competency, core breaks easily on irregular fractures or coal partings.
	110.63	0.72	AS ABOVE.
	110.74	0.11	CLAYSTONE, carbonaceous, black, bright coal inclusions, core broken,
	110.87	0.13	STONE, coaly
	110.90	0.03	COAL, and claystone interbedded - carbonaceous claystone and dull coal, high ash.
	110.99	0.09	COAL, dull and bright.
	111.10	Ö.11	CLAYSTONE, carbonaceous, brown to black with very frequent bright coal bands, listric surfaces on fractures
	111.18	0.08	COAL, dull metallic lustre.
	111.24	0.06	COAL, bright banded.
	111.32	0.08	COAL, dull metallic lustre.
	111.37	0.05	COAL, dull banded.
	111.46	0.09	COAL, dull and bright
	111.53	0.07	COAL, dull - earthy

BH Nos. 8

	s. 8		
Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			·
	111.62	0.09	COAL, dull and bright.
	111.69	0.07	COAL, bright banded
	111.77	0.08	COAL, dull and bright
	111.80	0.03	COAL, duli banded
	111.89	0.09	CLAYSTONE, carbonaceous, phases with frequent bright coal bands, grades to siltstone at base, low competency.
	113.37	1.48	AS ABOVE.
20	113.66	0.29	SILTSTONE, grey, fine irregular coaly inclusions
-	114.05 115.24	0.39 1.19	throughout AS ABOVE SILTSTONE/SANDSTONE, medium grey initial 0.50 m.very argillaceous silts grading to very fine sands and some fine grained sands,laminated light grey, slightly calcareous, abrupt below.
	116.57	1.33	MUDSTONE, medium grey, very silty, gradual below.
	116.87	0.30	MUDSTONE, black, much coaly intercalations.
	117.87	1.00	SILTSTONE, medium grey, very argiliaceous, particles of very fine grained sandstone (calcareous), some disturbed lamination in silts, few rusty nodules toward base, very gradational.
50	123.39	5.52	MUDSTONE, initial 2.0 m. medium grey silty sand with some ferruginous banding, remainder dark grey, much of it akin to canneloid mud (very smooth surface with distinctive texture, very silty & medium grey at 123.25-123.95. Bottom 0.17 m. fine grained, highly argillaceous, dark grey sandstone, listric surface at base.
			Coal Seam "C"
	124.17	0.78	COAL, dominantly bright, lower ½ calcitic (powdery), two distinct fracture planes and cleated: 0.25 m. Coal, high ash 0.10m Coal, dominantly dull 1.10m, Mudstone, carbonaceaus 0.05m
	124.27	0.10	MUDSTONE, abrupt below

BH Nos. 8

·	S. 9		
Dip O	DEPTH m	THICKNÉSS m	DESCRIPTION
	132.48	8.21	SANDSTONE, medium to coarse grained, light grey, poorly sorted, bedding poorly developed, 1 m. of bioturbated with small worm burrows at 126.90. calcareous, occasional isolated pebbles, gradational below.
	132.93	0.45	SANDSTONE, medium-fine grained, medium - light grey, bioturbated with large burrows, minor pebbles and shaly stringers, abrupt below, vaguely calcareous.
	148.58	15.65	SANDSTONE, medium grained, clean, well sorted, minor pebble bands at 137.35, 1 cm. thick and at 138.29 lo cm. thick patchily calcareous, bedding poorly developed - non existant, abrupt below.
	154.51	5.93 0.85	SHALE, with interbedded sandstones 60:40, shales with abrupt contacts with sands, bioturbated and disturbed, sandstones poorly developed, bedding patchily, calcareous abrupt below. Conglomerate, pebbles 1-2 cm. in size well
			rounded, erosional below. Coal Seam "B"
	156 01		
	156.01	1.50	COAL, dull, very broken with minor shaly layers.
	159.98	3.97	SHALE, silty and interbedded sandstone, 60:40, often disturbed, with poorly developed bedding, coaly stringers, apparent penecontemporaneous injection of carbonaceous shales into vertical dyke, abrupt below
	161.19	1.21	SHALE, silty, dark grey-black, carbonaceous, coaly, fairly homogenous, abrupt below.
	164.19	3.00	CONGLOMERATE, uniformly sized pebbles ½ cm., subrounded in medium grained sandy matrix, gradational below.
	169.77	5.58	SANDSTONE, medium-coarse grained, occasional pebble band at 165.14, at 165.37, & at 169.77, minor coaly stringers in top 0.5 m. bedding distinct with some cross bedding, some disturbance, abrupt below.
	184.82	15.05	SANDSTONE, fine grained, light grey, poorly developed bedding, clean, well sorted, patchily calcareous, abrupt below, one carbonaceous shale interbed at 179.82.
	189.35	4.53	SANDSTONE, with shale interbeds 60:40, fine grained sands calcareous, poorly bedded with minor disturbance, worm burrows, shale black, usually disturbed with rolling, load structures and intraclasts, abrupt below, pebble layer at 189.15m.

BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCRIPTION .
	189.83	0.48	CONGLOMERATE, heterogenous in size from coarse sands to 1 cm. pebbles, medium sand matrix, sub-rounded - sub-angular, abrupt below.
	192.26	2.43	SANDSTONE, medium - fine grained, clean well sorted, calcareous abrupt below.
	200.03	7.77	SANDSTONE, medium - fine grained, shaly interbeds, 70:30, sand calcareous, poorly developed bedding, minor bioturbation, shales black, silty, disturbed, calcite veins at base 20° com. BCA., gradational below.
	203.14	3.11	SANDSTONE, shale, interbedded, both very disturbed, rolling intraclasts and load structures, gradational below.
3°	206.24	3.10	SANDSTONE, medium grained, fairly well-bedded, clean with argillaceous layers becoming more disturbed and shaly towards the base, gradational below.
	218.13	11.89	MUDSTONE, sandy interbeds, 60:40, bedding poorly developed, disturbed, with rolling intraclasts, erosional boundaries. Bioturbated small worm burrows abrupt below.
			GATES // SUKUNKA
	236.70	18.57	MUDSTONE, with minor sandy layers 90:10, bioturbated, small worm burrows, abrupt below.
ц ^О	267.31	30.61	MUDSTONE, silty with medium grained sandy layers, 60:40, sands well bedded, vaguely calcareous, shales disturbed, rolled, with bioturbation and intraclasts, erosional surfaces between layers.
3°	278.0	10.69	SANDSTONE, fine grained shaley, 70:30, well bedded and calcareous in sandy units, some disturbance with bioturbation, small and large burrows, transitional below.

BH Nos. 8

Dip	DEPTH m	THICKNESS m.	DESCRIPTION
		,	
	282.50	4.50	MUDSTONE, silty, with fine sands,60:40, Sukunka type.
	284.55	2.05	SANDSTONE, fine grained, shaley, 70:30, well bedded and sandy in calcareous units, some disturbance with bioturbation, small and large burrows, transitional below.
	316.00	31.45	MUDSTONE, silty with minor sands 90:10, bioturbated, and disturbed, small burrows, Sukunkoid type.
	336.50	20.50	MUDSTONE/SANDSTONE, predominantly dark grey mudstone with subordinate amounts of very fine-grained sands. SUKUNKA MOOSEBAR
	412.99	76.49	MUDSTONE, dark grey, lacking sedimentary lamination. ferruginous zones, bentonite, Fractures Calcite. 389.98 (5 cm.) 395.20 (5 cm.) 385.48 (3 cm.) 400.67 (10 cm.) 395.00 (3 cm.) 401.42 (5 cm.) 395.20 (4 cm.). (slicks) 403.27 (20 cm.) 403.27 (5 cm.) 409.70 (2.5 cm.)
	414.27	1.28	MUDSTONE, dark grey green, no bedding is apparent, low competency, breaks readily on irregular fractures, Moosebar formation, grades to lower unit.
	414.31	0.04	CLAYSTONE, light grey, green, bentonitic, dark coloured, worm burrows, & inclusions, hard sharp basal contact.
	414.85	0.54	MUDSTONE, as above.
	415.12	0.27	AS ABOVE.
	415.82	0.70	AS ABOVE.
	415.99	0.17	CLAYSTONE, light grey green, abundant small dark coloure worm burrows, numerous quartz fractures at 45° to core axis, soft and bentonitic at base.

BH Nos. 8

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	416.19	0.20	MUDSTONE, as above.
	416.23	0.04	AS ABOVE
	416.36	0.13	CLAYSTONE, grey, white, soft, bentonitic, dessicates when dry.
	416.95	0.59	SANDSTONE, dark grey, green, fine grained, glauconitic, pyritic, worm burrows throughout and large pyrite inclusions at base, bedding is obliterated by bioturbation, competent.
			MOOSEBAR TGETHING
	·		BIRD COAL SEAM
,	417.01	0.06	COAL, dull and bright
	417.08	0.07	COAL, dull banded.
	417.12	0.04	COAL, dull, metallic lustre.
٠	417.14	0.02	
			CLAYSTONE, carbonaceous, black, bright coal bands.
	417.22	0.08	COΛL, dull & bright.
	417.26	0.04	COAL, bright
	417.36	0.10	COAL, dull and bright.
	417.43	0.07	COAL, dull, metallic lustre
	417.52	0.09	COAL, dull banded, sheared.
	417.57	0.05	COAL, dull, metallic lustre.
	417.67	0.10	COAL, dull, sheared,
	417.68	0.01	COAL, banded, sheared, core broken
	417.70	0.02	COAL, dull banded

BH Nos. 8

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	417.71	0.01	CLAYSTONE, carbonaceous, dark brown to black, coaly inclusions at top pyritic worm burrows, grades to silt-stone at base, competent.
	417.81	0.10	SILTSTONE, dark grey, occasional pyrite filled worm burrows, calcite filled fractures at 85° to C.A 0.93 cm. from top, 60° to CA - 1.08 cm. from top, 70° to C.A 1.27 cm. from top, competent.
	419.20	1.39	AS ABOVE.
	419.27	0.07	COAL, bright banded.
	419.31	0.04	. COAL, bright
	419.36	0.05	COAL, dull - metallic lustre.
	419.39	0.03	COAL, bright
	419.42	0.03	COAL, dull, fusain
	419.46	0.04	COAL, dull, metallic lustre.
	419.52	0.06	COAL, dull, sheared.
	419.54	0.02	COAL, dull banded.
			FLOOR OF BIRD SEAM
	421.13	1.59	SANDSTONE, medium grained, light grey, vertical joint drilled in top 2 m. coaly material on joint plane for first ½ m., mottling by small worm burrows for 1.79 to 2.42 m. from top, massive and very competent, grades to lower unit.
	422.12	0.99	AS ABOVE.
	422.96	0.84	AS ABOVE, one joint at 10° to C.A. at base.
5°	423.28	0.32	SANDSTONE, as above, occasional fine coaly partings define bedding and a few thin phases with carbonaceous claystone.
	425.11	1.83	AS ABOVE.
	425.45	0.34	AS ABOVE

BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION
0	rn	m	
	427.06	1.61	AS ABOVE
	427.11	0.05	CONGLOMERATE, granule, light grey, grains of grey, black, and white chert, matrix 10%,dense packed and competent.
	427.65	0.54	SANDSTONE, as above.
3 ⁰	428.28	0.63	AS ABOVE.
	429.71	1.43	AS ABOVE.
	431.14	1.43	AS ABOVE.
	431.83	0.69	AS ABOVE, phases of cross-bedding.
5 ⁰	432.50	0.67	AS ABOVE.
	433.94	1.44	AS ABOVE.
	436.08	2.14	AS ABOVE.
	436.96	0.88	AS ABOVE.
	438.14	1.18	AS ABOVE.
	440.26	2.12	AS ABOVE.
	442.08	1.82	AS ABOVE.
	442.24	0.16	AS ABOVE.
	442.28	0.04	AS ABOVE.
20	442.75	0.47	SANDSTONE, fine-grained, light grey, frequent interbeds of grey claystone and siltstone, cross-bedded, compact,
			minor bioturbation, pyritic worm burrows at base, com- petent, grades to unit below.
	442.80	0.05	SILTSTONE, dark grey, bedding greatly disturbed by bio- turbation, frequent pyritic worm burrows, grades to clay- stone at base, abrupt basal contact.
	443.71	0.91	SANDSTONE, fine-grained, light grey, a few fine siltstone interbeds at the base, very competent.
	443.78	0.07	AS_ABOVE.
	444.04	0.26	SANDSTONE, as above, calcite filled fractures, 45° to core axis at top, 60° to core axis at base.
	444.62	0.58	SANDSTONE, medium-grained, as above, grades to siltstone at base.

BH Nos. 8

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	445.72	1.10	SANDSTONE & siltstone, interbedded fine grained sandstone with very frequent thin, grey siltstone interbeds throughout, one small slump structure in the lower half and one phase of dark grey claystone in the centre.
7°	447.41	1.69	SANDSTONE, grades to a laminite of siltstone and claystone in the lower half.
	447.43	0.02	SANDSTONE, fine grained, light grey, abundant pelecy- pods.
	447.86	0.43	L'AMINITE, grey, fine grained sandstone with black clay- stone.
	448.57	0.71	LAMINITE, as above with frequent horizons containing abundant shelly fossils.
<u> </u>	448.64	0.07	AS ABOVE
	448.73	0.09	AS ABOVE
5 ⁰	448.85	0.12	SANDSTONE, fine grained, grey, cross bedded, with interbeds of siltstone & claystone towards base, rootlet punctures at top, gradational basal contact.
	449.02	0.17	CLAYSTONE, dark grey with frequent irregular lenses of light grey sandstone, grades to carbonaceous clay-stone at base.
	449.63	0.61	CLAYSTONE, carbonaceous, black with frequent bright coal bands.
	450.00	0.37	CLAYSTONE, black with occasional indistinct phases of grey siltstone and a few coaly inclusions - carbonaceous phases, low competency.
	451.79	1.79	AS ABOVE
	452.03	0.24	AS ABOVE
10°	454.21	2.18	AS ABOVE
	454.74	0.53	AS ABOVE .
	456.27	1.53	AS ABOVE, one calcite filled fracture with slickensides 1.07 from marker.
	456.99	0.72	AS ABOVE, calcite fracture as above 40° to CA 0.53 m. from top of box.

BH Nos. 8

	m 457.17	m	
	457.17	1	,
35°		0.18	CLAYSTONE, siltstone phases, core broken, calcite & slickensides on fracture surfaces.
i	458.37	1.20	CLAYSTONE, siltstone phases unbroken as above, calcite filled fractures parallel to bedding.
	459.10	0.73	AS ABOVE
	459.47	0.37	CLAYSTONE/SILTSTONE, as above, numerous calcite filled irregular fractures, slickensided.
_	459.92 460.33	0.45 0.41	AS ABOVE . CLAYSTONE/SILTSTONE, as above, slickensided fractures spaced 10 cm.
	460.42	0.09	BRECCIA, CLAYSTONE/SILTSTONE, as above sheared and slickensided, fault zone.
	460.56	0.14	CLAYSTONE/SILTSTONE, as above, core broken
	461.24	0.68	CORE LOSS - ROCK
	461.40	0.16	AS ABOVE
85°	461.87	0.47	AS ABOVE, frequent fractures on bedding and one set at 60° to CA (approx. 1 to bedding).
90°	463.32	1.45	AS ABOVE
	463.99	0.67	AS ABOVE.
	465.07	1.08	AS ABOVE, principal slickensiding & disturbance ceases at the base of this unit.
90°	465.33	0.26	CLAYSTONE AND SILTSTONE, interbedded as above with occasional phases of fine grained sandstone, interbeds of increasing to base.
	467.38	2.05	AS ABOVE
	467.94	0.56	AS ABOVE
	469.42	1.48	AS ABOVE
85°	471.13	1.71	AS ABOVE
	471.58	0.45	AS ABOVE

BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCRIPTION .
	472.96	1.38	AS ABOVE, bioturbation prominent at base.
60 ⁰	473.48	0.52	SANDSTONE, fine-to medium-grained, grey with dark grey siltstone, prominent bioturbation.
	474.19	0.71	AS ABOVE.
	475.15	0.96	AS ABOVE.
	475.63	.0.48	SANDSTONE, grey, medium-grained, with frequent thin partings of carbonaceous material.
	476.14	0.51	AS ABOVE.
	477.11	0.97	SANDSTONE/CLAYSTONE, interbedded, grey, fine-grained sandstone and grading to dark grey claystone, bedding disturbed by bioturbation, frequent phases with dark coloured, small worm burrows throughout, irregular sharp basal contact.
	477.27	0.16	LAMINITE, thin graded units of grey siltstone and dark grey claystone, bedding very regular, frequent listric surfaces on bedding planes, moderate to low competency, breaks easily on bedding surfaces.
60°	477.61	0.34	AS ABOVE.
	478.47	0.86	AS ABOVE.
	479.53	1.06	AS ABOVE, one calcite filled fracture with listric sur- faces at base, 20° to core axis in direction of bedding.
	480.19	0.66	AS ABOVE, listric surfaces and calcite filled fractures at base.
50°	480.82	0.63	AS ABOVE.
	481.27	0.45	CORE LOSS - COAL
	481.37	0.10	COAL, sheared, dull banded
	481.57	0.20	COAL, sheared, dull
	481.74	0.17	COAL, sheared, dull and bright
	481.90	0.16	COAL, dull
	482.04	0.14	COAL, dull and bright, sheared

BH Nos.8

Dip o	DEPTH	THICKNESS	DESCRIPTION
-	m	m	
	482.11	0.07	COAL, sheared & dull
}	482.26	0.15	COAL, sheared, bright banded.
	482.43	0.17	COAL, sheared, bright, core pulverized.
	482.58	0.15	CORE LOSS - COAL
	482.62	0.04	COAL, dull banded
	482.66	0.04	COAL, bony, bright coal bands.
	482.70	0.04	COAL, dull and bright, sheared
	482.75	0.05	COAL, dull banded
	482.85	0.10	COAL, sheared, dull and bright
	482.91	0.06	COAL, dull and bright
	483.02	0.11	COAL, dull
	483.31	0.29	CORE LOSS - COAL
	483.52	0.21	COAL, sheared and pulverized, most fragments dull banded.
	483.60	0.08	COAL, dull
	483.65	0.05	COAL, bright banded, core broken
	483.70	0.05	COAL, dull
	483.73	0.03	COAL, bright
	483.79	0.06	COAL, dull and bright
	483.85	0.06	COAL, dull banded
	483.96	0.11	COAL, dull
	484.05	0.09	COAL, dull banded
	484.16	0.11	COAL, dull and bright, sheared.
	484.25	0.09	COAL, dull banded, sheared
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BH Nos. 8

Dip	DEPTH m	THICKNESS m	DESCRIPTION
	484.31	0.06	COAL, dull
	484.39	0.08	COAL, sheared, dull and bright
	484.50	0.11	COAL, dull banded
	484.56	0.06	COAL, sheared, dull - bright.
	484.64	0.08	COAL, dull
	485.34	0.70	CORE LOSS - COAL.
	485.46	0.12	COAL, dull banded.
	485.54	0.08	COAL, bright banded, sheared.
	485.63	0.09	COAL, dull
	485.74	0.11	COAL, dull banded
,	485.80	0.06	COAL, dull & bright
	485.85	0.05	COAL, dull banded
	485.96	0.11	COAL, dull
	486.65	0.69	CORE LOSS - COAL.
	486.79	0.14	COAL, dull, sheared
	486.83	0.04	COAL, dull banded
	486.90	0.07	COAL, dull and bright
	486.95	0.05	COAL, bright banded
	487.01	0.06	COAL, dull and bright
	487.03	0.02	COAL, bright
	487.10	0.07	COAL, dull and bright
	487.21	0.11	COAL, bright banded
	487.31	0.10	COAL, dull banded
	487.59	0.28	CORE LOSS - COAL .
	487.67	0.08	COAL, dull

BH Nos. 8

Dip	DEPTH m	THICKNESS m	DESCRIPTION
	487.69	0.02	COAL, dull and bright
	487.73	0.04	COAL, dull and bright
	487.79	0.06	COAL, bright, sheared.
,	487.93	0.14	COAL, dull and bright, sheared.
	488.01	0.08	COAL, dull banded, sheared
	488.03	0.02	COAL, dull, sheared
	438.11	. 0.08	COAL, sheared
	488.57	0.46	CORE LOSS - COAL
75 [°]	490.05	1.48	SANDSTONE, medium-grained, light grey, frequent fine coaly partings and cross-bedding throughout, frequent calcite filled fractures at 45° to core axis (+1 to bedding) grades to unit at base.
	490.15	0.10	AS ABOVE.
	490.51	0.36	AS ABOVE.
	491.29	0.78	SAUDSTONE, medium-grained, light grey, interbeds of grey siltstone, lenticular and bioturbated.
75 ⁰	491.67	0.38	AS ABOVE.
90°	491.99	0.32	SILTSTONE, dark grey
85 ⁰	492.17	0.18	SANDSTONE, as above.
	492.31	0,.14	AS ABOVE.
	494.12	1.81	AS ABOVE.
	494.21	0.09	AS ABOVE, core badly broken, frequent slickensides and calcite veins and breccia, faulted zone.
	495.09	0.88	AS ABOVE
	495.19	0.10	AS ABOVE
,	495.95	0.76	SILTSTONE, dark grey, sandy with phases of claystone and fine-grained sandstone, see marker 471.43
	497.00	1.05	SILTSTONE, as above with frequent irregular calcite filled fractures.

BH Nos.

D:	DE DELL	THICKNESS	DECCENTED TO A
Dip	DEPTH m	THICKNESS m	DESCRIPTION
	`		AC ADOME
	497.53	0.53	AS ABOVE
70°	497.78	0.25	SANDSTONE, grey, medium-grained, fine, dark grey siltstone laminations, slickensides and calcite fractures as above.
	498.87	1.09	SILTSTONE, as above.
	498.99	0.12	BRECCIA, tectonic, angular and irregular fragments of sandstone with fine coaly inclusions and laminations with dark siltstone fragments.
	500.29	1.30	AS ABOVE, frequent irregular calcite filled fractures
	500.98	0.69	SANDSTONE, grey, fine-grained with frequent phases of grey siltstone, bedding disturbed by bioturbation
65°	502.15	1.17	AS ABOVE, calcite filled fractures and slickensides becoming prominent towards base.
	502.93	0.78	AS ABOVE
	503.05	0.12	BRECCIA, angular and sheared fragments of sandstone, as above, in a matrix of calcite, fault plane.
	504.84	1.79	SANDSTONE, as above, breccia at base (fault plane), frequent small zones of disturbance throughout, bedding very irregular.
. !	505.09	0.25	AS ABOVE, disturbed tectonically.
58 ⁰	505.15	0.06	SANDSTONE, light grey, medium-grained, cross-bedded, frequent thin coaly partings and laminations through-out (see marker 488.59 and 474.57), bedding overturned.
	505.79	0.64	AS ABOVE
	505.91	0.12	BRECCIA, sandstone as above, ?fault plane
	506.03	0.12	BRECCIA, coal, carbonaceous claystone, very intensely sheared.
	506.17	0.14	LAMINITE, thin bedded fine sandstone and claystone, core broken, listric surfaces on bedding.
	506.38	0.21	. LAMINITE, as above, with fine pelecypod fauna (see marker 447.14)
	507.22	0.84	BRECCIA, sandstone and siltstone fragments in calcite matrix, fault zone.
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BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	507.28	0.06	AS ABOVE.
	508.21	0.93	CORE LOSS - ROCK ·
20	509.39	1.18	SANDSTONE, medium grained, light grey, occasional interbeds of siltstone or fine sandstone in top half, a few small worm burrows.
·	510.22	0.83	SANDSTONE, in top 0.05 m., coarse worm burrows from 0.64 m. to 0.94 m. from top, competent, minor cross bedding, bedding is upright.
	511.34	1.12	AS ABOVE
3°	511.44	0.10	AS ABOVE
	513.38	1.94	AS ABOVE
	514.43	1.05	AS ABOVE
	515.34	0.91	AS ABOVE
	517.42	2.08	AS ABOVE
	517.49	0.07	AS ABOVE
	519.64	2.15	AS ABOVE
5 ⁰	520.37	0.73	AS ABOVE
3 ⁰	520.65	0.28	SILTSTONE, dark grey with numerous thin claystone interbeds, grades to claystone at base, rapid gradational contact at base, bedding undisturbed.
	521.03	0.38	SANDSTONE, fine grained, light grey with frequent phases of grey siltstone, gradational contact at base.
	521.84	0.81	SILTSTONE, as above
	522.27	0.43	AS ABOVE
	522.64	0.37	CLAYSTONE, dark grey, carbonaceous at base, gradational basal contact.
	523.0/3	0.39	SANDSTONE, dark grey, thin interbeds of dark grey silt- stone, bedding slumped near top, one siltstone phase in centre, gradational basal contact.

BH Nos. 8

Dip	DEPTH m	THICKNESS m	DESCRIPTION	
				
	523.22	0.19	SILTSTONE, dark grey, carbonaceous, occasional medium grained sandstone interbeds, abundant shelly fossils.	
	523.58	0.36	AS ABOVE	
	523.69	0.11	COAL, dull banded	
	523.79	0.10	CLAYSTONE, carbonaceous, black, bright coal bands.	
	524.00	0.21	SANDSTONE, fine grained with frequent irregular interbeds of black carbonaceous claystone, bright coal bands and inclusions.	
	524.41	0.41	AS ABOVE.	
	526.16	1.75	SILTSTONE, dark grey, occasional phases of medium grained, light grey sandstone, gradational basal contact, plant rootlets prominent towards top, bedding usually obscured.	
	526.49	0.33	AS ABOVE	
	527.07	0.58	AS ABOVE	
	527.44	0.37	SANDSTONE, light grey, medium grained, siltstone phase at top, fine interbeds towards base, slumping in centre, sharp, irregular basal contact.	
	528.38	0.94	SILTSTONE, as above, one phase of sandstone near base.	
	529.19	0.81	AS ABOVE	
	530.53	1.34	SANDSTONE, light grey, coarse grained, some medium grained phases, frequent irregular coaly and carbon-aceous claystone inclusions throughout, bioturbation prominent at base, sharp basal contact.	
	531.11	0.58	AS ABOVE	
	532.56	1.45	MUDSTONE, dark grey, plant fragments, bedding obliterate by bioturbation, a few fine sandstone phases are appar- ent, occasional coal inclusions, low competency, core breaks on irregular fractures.	
	532.64	0.08	AS ABOVE	

BH Nos. 8

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m·	
			·
	533.86	1.22	AS ABOVE
	534.69	0.83	AS ABOVE
	534.79	0.10	AS ABOVE
·	535.18	0.39	SANDSTONE, medium grained, light grey, frequent interbeds and partings of black carbonaceous claystone, bedding disturbed, sharp irregular basal contact.
	535.95	0.77	MUDSTONE, dark grey, with interbeds of fine grained light grey sandstone in the centre, sharp basal contact.
	536.04	0.09	AS ABOVE
	537.87	1.83	SANDSTONE, medium grained, mid grey with carbonaceous partings throughout, plant rootlets and coaly inclusions at the top.
	538.16	0.29	LAMINITE: dark grey interbeds of claystone inter-layered with a lighter grey siltstone, bedding very regular, low competency, breaks easily on bedding surfaces, listric surfaces on bedding planes.
	538.70	0.54	AS ABOVE
	539.02	0.32	LAMINITE: as above, bedding disturbed, calcite filled fractures at top and base, sigmoidal laminite type structure.
	539.32	0.30	LAMINITE: undisturbed, as above.
			CHAMBERLAIN SEAM
	539.46	0.14	CORE LOSS - COAL
	539.52	0.06	COAL, dull, large fragments.
	539.57	0.05	COAL, dull and bright, large fragments
	539.64	0.07	COAL, dull, large fragments.
	539.70	0.06	COAL, dull banded
	539.75	0.05	COAL, dull sheared, small fragments
	539.81	0.06	COAL, dull metallic lustre,stick
	539.85	0.04	COAL, dull banded, stick

BH Nos. 8

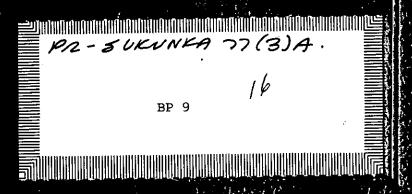
Dip o	DEPTH m	THICKNESS m	DESCRIPTION
		.,,	
	539.91	0.06	COAL, dull, metallic lustre, stick
	539.94	0.03	COAL, bright, stick
	539.99	0.05	COAL, dull, metallic lustre, stick
	540.04	0.05	COAL, dull and bright fragments.
	540.07	0.03	COAL, dull banded, fragments
	540.17	0.10	COAL, dull and bright, fragments
	540.21	0 .0 4	COAL, dull, fragments
	540.27	0.06	COAL, dull, banded, large fragments
	540.39	0.12	COAL, bright, core pulverized.
	540.43	0.04	COAL, dull, metallic lustre, large fragments.
	540.53	0.10	COAL, dull and bright, small fragments
	540.57	0.04	COAL, dull, metallic lustre, stick
	540.61	0.04	COAL, dull and bright, stick
	540.62	0.01	COAL, dull, metallic lustre, stick
	540.75	0.13	COAL, dull banded, stick
	540.78	0.03	COAL, dull and bright, stick
	540.83	0.05	COAL, bright banded, stick
	540.86	0.03	COAL, dull banded, stick
	540.92	0.06	COAL, duil and bright, stick
	540.95	0.03	COAL, dull banded, stick
	540.98	0.03	COAL, bright, stick
	- 541.02	0.04	COAL, bright, stick
	541.10	0.08	COAL, dull and bright, stick
	541.12	0.02	COAL, dull, stick

BH Nos. 8

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	541.23	0.11	COAL, bright, stick
	541.28	0.05	COAL, dull and bright, stick
	541.32	0.05	COAL, dull, banded, large fragments
	541.37	0.04	COAL, dull and bright, large fragments.
	541.45	0.08	COAL, dull, metallic lustre, stick
	541.50	0.05	COAL, dull banded, stick
	541.54	0.04	COAL, dull and bright
	541.57	0.03	COAL, dull banded, Stick
	541.68	0.11	COAL, dull and bright
	541.74	0.06	COAL, bright, banded large fragments
	541.78	0.04	COAL, dull, metallic lustre, stick
	541.83	0.05	COAL, dull,banded, stick
	541.86	0.03	COAL, dull, metallic lustre, stick
	541.89	0.03	COAL, dull and bright, stick
	541.91	0.02	COAL, bright, stick
	541.99	0.08	COAL, dull and bright, stick
	542.19	0.20	CORE LOSS - COAL
	542.25	0.06	COAL, dull, banded, stick
	542.29	0.04	COAL, dull, stick
	542.38	0.09	COAL, dull and bright, large fragments
	542.43	0.05	COAL, bright, banded, stick
	542.47	0.04	COAL, dull and bright, stick
	542.56	0.09	COAL, dull, banded, stick
	542.66	0.10	COAL, dull and bright, large fragments.

BH Nos. 8

D:s	DEPTH	THICKNESS	DESCRIPTION
Dip O	m brate	m	DESCRIPTION
	542.73	0.07	COAL, bright banded, large fragments
	542.76	0.03	COAL, dull and bright, sheared, large fragments
	542.79	0.03	COAL, dull and bright, large fragments.
	542.87	0.08	COAL, dull, stick
	542.91	0.04	COAL, dull, banded, stick
	543.00	0.09	COAL, bright, stick
	543.07	0.07	COAL, dull and bright, stick
	543.10	0.03	COAL, dull and bright, large fragments
	543.13	0.03	COAL, dull and bright, sheared, large fragments.
	543.16	0.03	COAL, bright banded, small fragments.
	543.36	. 0.20	CORE LOSS - COAL
			FLOOR OF CHAMBERLAIN SEAM
	544.83	1.47	SANDSTONE, coarse grained, light grey, massive, carbonaceous at top, large coaly inclusions, very competent.
	545.98	1.15	AS ABOVE
	546.55	0.57	AS ABOVE
	546.93	0.38	SANDSTONE, medium grained, light grey, a few fine partings of dark grey siltstone, large worm burrows over the last metre.
40	549.00	2.07	AS ABOVE
	549.08	0.08	AS ABOVE
	,		



Bessel

CANADA



Page 1

AREA

SUKUNKA

B. H. No. BP 9

Contractor:

Tonto

Commenced:

July 23, 1977

Completed:

Aug 5, 1977

Co-ordinates: 6,113,500.31

593.716.05 Surface Elevation: 1,628.90 N E m

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

Hole Azimuth

See detail

page la

Geologist

Depth 18.34-138.29

Ali Chowdry

143.52-189.15

Logged by:

192.69-252.84

Geoff Jordan

138.39-142.02

189.45-191.31 176.80-535.95

535.95 Final Depth:

	-	Andy Newson	262.11-476.06
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross	35.83	35.83	1,593.07
Gates	252.84	217.01	1,376.06
Sukunka	378.00	125.16	1,250.90
Moosebar	478,93	100.93	1,149.97
U. Gething	529.46	50.53	1,099.44

SEAMS	DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD	481.26			1,147.64
CHAMBERLAIN	529.46			1,099.44

F.PR.

428-471.

Zones of slickensiding and fracturing

Sperry-Sun Survey

Date: 5th August 1977

Borehole: BP #9 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
535m	4° 30'	N 36° E
500m	4° 00'	N 43° E
450m	4° 15'	N 43° E
400m	4° 15'	N 41° E
350m	3° 45'	N 43° E
300m	3° 30'	N 50 [°] Е
250m	2° 45'	N 48° E
200m	2° 30'	N 45 ⁰ Е
150m	2° 30'	N 39 ⁰ Е
100m	20 001	N 47 ^о Е
50m	0° 45'	N 53° E

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCITE LINE
	18.34	18.34	OVERBURDEN, weathered mudstone and clays
9°	35.83	17.49	HULCROSS MEMBER, medium grey/browny grey, frequent small scale (commonly 2-3cm) alternations of coarsegrained, laminated and cross-laminated siltstones and
10°			medium grey mudstones. Much lenticular bedding, ubiquitous microerosional fractions occasional overturning of laminated units. Tendancy of rock to split along silty laminae locally burrowed, bentonitic band 21.36-21.3 bottom 0.61m with much fine-grained, siliceous sands (at time medium-grained), some reworking of sediments with more pronounced erosional feature, well developed parallel to low angle cross-lamination at 34.36-35.05, contact with conglomerate below very gradual, continuation of lamination units with gradual downward increase in grain size-eventually pebbly lithology
			HULCROSS GATES
	35.88	0.05	CONGLOMERATE, dominantly chert pebbles, about 1cm across (maximum) in fine sand matrix, this defines Gates/Hulcross contact
	36.55	0.67	MUDSTONE, dark grey, silty (homogenously), bottom 0.03m very carbonaceous, gradational to coal below
	36.90	0.35	COAL SEAM, dominently dull coal, contact with rocks below obscure
	39.43	2.53	SILTSTONE/SANDSTONE, initial 1.40m highly argillaceous, irregularly laminated, medium grev siltstones with some compactional features, (crinkly laminations), numerous burrows, rest very fine-grained sands with, muddy bands, also with burrows, strongly calcareous throughout, bottom 0.20m richly silty and carbonaceous black mudstone contact with coal below is sheared
	40.03	0.60	COAL SEAM; badly sheared with extensive listric surfaces, bright coal, contact with rocks below broken up
	42.28	2.25	SANDSTONE/MUDSTONE (initial 0.28m broken up), very fine- grained sands, muddy layers, compactionally deformed slightly laminated layers, bottom 1.13m very silty mudstones, strongly calcareous throughout, erosional coaly fragments, few burrows
	44.93	2.65	SANDSTONE, light grey, fine-grained, small cross-lamina- tion, strongly calcareous, abrupt below
8°	46.75	1.82	SANDSTONE, light grey, medium-grained, very clean, sorted few clasts, cross-stratified, strongly calcareous, abrupt below

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION	
O	m	m		
	48.11	1.36	MUDSTONE, medium grey to black, initial half fragmented, lower half black, abundant carbonized plant remains, much pyrite, bottom 0.20m very carbonaceous, gradational	
	48.43	0.32	COAL SEAM: mixture of durain and claro-durain (dull and bright), but durain predominates	
	49.60	1.17	MUDSTONE, dark grey, mostly silty, structureless, grada- tional below some fracturning and listric surfaces	
	50.35	0.75	COAL SEAM, clean coal, solid core, gradational below	
	51.67	1.32	SANDSTONE, medium grey, fine-to very-fine-grained, argillaceous, plant debris, some rootlets in upper 0.28m (non calcareous) rest strongly calcareous, very gradation	
10 ⁰	52.12	0.45	MUDSTONE, dark grey, dominantly silty and calcareous, bottom 0.25m fragmented and coaly intercalations, gradational below	
	53.34	1.22	SANDSTONE, medium grey, very fine-grained, argillaceous (20%), wavy, ripply lamination, strongly calcareous, gradational, few burrows	
	54.04	0.70	MUDSTONE, dark grey, coaly zone in upper part, sporadic calcareous, gradational	
	54.61	0.57	SANDSTONE, upper half light grey, fine/medium-grained, rest very fine-grained, silty/muddy layers, laminated, strongly calcareous, gradational	
	57.93	3.32	MUDSTONE, medium grey, silty, some laminations,bottom 0.65m admixture of very fine-grained sands, rusty band, erosional below, weathered zone at 56.51	
	59.34	1.41	SANDSTONE, light grey, fine/medium-grained, silty/muddy bands (15-20%) strongly calcareous, abrupt below	
	61.88	2.54	MUDSTONE, medium grey, carbonaceous, few rusty bands (one strongly calcareous), bottom 0.60m have 0.20m coal, erosional	
5-6°	64.78	2.90	SANDSTONE/MUDSTONE, initial 0.60m fine-grain, light grey sands, followed by rest of sequence of very fine-grained, argillaceous, (30-35%) sands with ripples and lenticles of silts, all irregularly laminated, some organic activity bottom 0.10m fine sands-clean, scoured bottom contact, strongly calcareous throughout, some listric-surfaces	
	65.53	0.75	MUDSTONE, dark grey, slightly silty, abundant pelecypod, Fossil Marker, gradual	
	67.73	2.20	SANDSTONE, medium grey, very fine-to fine-grained, small cross-lamination, some silty layers, some plastic deformation, gradational	
	72.74	5.01	SANDSTONE, light grey, fine/medium-grained, occasional lamination, very clean and sorted, bottom 1.50m strongly calcareous, erosional below	

BH Nos. 9

	DEPTH m	THICKNESS m	DESCRIPTION
)	75.53	2.79	SANDSTONE, medium grey, fine-grained, argillaceous, several silty bands through bottom 0.65m laminated, rest distinctively slumped and at places rolled, non calcareous, gradual below
	86.90	11.37	SANDSTONE, light grey, medium-grained, generally very clean, much of sands devoid of lamination (might be due to intensive homogenization but no tangible manifestatio upper most 0.40m with muddy layers, some of these with pin prick burrows, very characteristic of the interval is the ubiquitous dissemination of brownish, grey grains of soft lithology, strongly calcareous, abrupt below
	88.13	1.23	SANDSTONE, fine-grained with thin layers of silts, laminated, gradual
	90.45	2.32	SANDSTONE, light/medium grey, medium-grained, abundant coalified leaf debris in basal 0.40m, bottom 1.20m strongly calcareous, much of sand devoid of lamination, gradual below
	94.12	3.67	SANDSTONE, light/medium grey, interbedded sequence of ve fine and fine/medium sands, often with erosional contact some silty muddy layers, much brownish grey grains (soft lithology) in coarser zones, discrete burrows, sporadic lamination, non calcareous, passage below by interbeddin
	100.72	6.60	MUDSTONE/SANDSTONE, medium grey, from top to 98.19 interbedded (frequently) muds 70% and siltstone 30%, generally gradational sequences with local bioturbation, from 98.19-100.72, thoroughly bioturbated zone (Sukunkoi dominantly fine-grained sands intermixed with silts and listric contact below
	105.84	5.12	SANDSTONE, light grey, fine-grained, mostly laminated, bottom 2.65m with regular silty/muddy layers (4-5mm), mu burrowing (several deep ones across bedding), non calcareous, gradual below
	106.22	0.38	CONGLOMERATE, upper half granular with fair amount of fi sand matrix, lower $\frac{1}{2}$ pebbly (one bluish chert 7cm across abrupt below, some muddy layers within conglomerate
	108.60	2.38	MUDSTONE, medium grey, some rusty calcareous sand, grada tional
	110.36	1.76	SILTSTONE, medium grey, highly argillaceous, strongly calcareous, gradual
	110.95	0.59	MUDSTONE, medium grey, slightly silty, pyrite nodules, gradual
			COAL SEAM E HORIZON
	111.75	0.80	COAL/MUDSTONE, upper half carbonaceous mudstone with coaly intercalations, rest clean coal, soft to break, silky lustre

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	ı,
	113.30	1.55	MUDSTONE, dark grey, carbonaceous in some parts, 20cm siltstone, pyrite nodules, gradational
12 ⁰	114.60	1.30	SANDSTONE/MUDSTONE, sands light grey, very fine-drained and calcareous, interlaminations of dark grey mudstone wit some silts; many burrows in sandstone, mud/sand boundaries erosional, 62:38
	118.55	3.95	MUDSTONE, dark grey, locally very carbonaceous and coaly, gradual
10 ⁰	119.50	0.95	COAL, from top to bottom, dull high ash coal 0.16m, mudstone, carbonaceous 0.23m, mixture of dull and bright (with a dirt band 0.56 m)
	120.04	0.54	MUDSTONE, dark grey, with few coaly intercalations, gradual, bottom 0.15m homogeneously carbonaceous
	121.45	1.41	COAL, dominantly dull 0.10m, bony and carbonaceous mudstone 0.22m, dull 0.25m,dull, 10%bright 0.25m, coal and mudstone interbedded 0.48m
	123.09	1.64	SILTSTONES, upper 0.25m dark grey mudstones, rest coarse silts, very argillaceous with disturbed lamination, lower half muddy, gradual below
	123.46	0.37	COAL, dull and lower half with metallic lustre, clean coal
•		·	FLOOR OF "E" SEAM
	130.64	7.18	MUDSTONE, medium grey, upper 1.55m with little or no sill rest locally very silty and occasionally vaguely discernible lamination, non calcareous, gradual below
	137.13	6.49	MUDSTONE/SILTSTONE, medium grey, broadly interbedded, silty muds and argillaceous siltstone, passage from one to the other imperceptible, generally devoid of lamination, strongly calcareous throughout, vertical fracture 133.21-133.63, gradual below
	138.29	1.16	MUDSTONE, medium grey, somewhat silty, calcareous, few carbonized plant fragments
	138.39	0.10	SANDSTONE, medium-grained, light grey, irregular dark grey claystone interbeds
	138.44	0.05	CLAYSTONE, dark grey, grades to siltstone at base, competent, sharp basal contact
!	138.68	0.24	CLAYSTONE, as above
16 ⁰	139.02	0.34	SANDSTONE, medium-grained, light-grained, fine coaly inclusions and cross-bedding at top, sharp convoluted basal contact
	139.79	0.77	CLAYSTONE, dark grey, plant fragments, sub fissile phases low competency,gradational basal contact
	140.06	0.27	SHALE, carbonaceous, black, coaly inclusions, fissile, low competency

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	វារ	m `	
			COAL SEAM D
	140.11	0.05	COAL, dull banded
	140.16	0.05	COAL, dull and bright
	140.33	0.17	COAL, dull, metallic lustre
	140.41	0.08	COAL, dull banded
	140.72	0.31	COAL, dull
	140.78	0.06	COAL, dull and bright
	140.82	0.04	COAL, bright banded
	140.86	0.04	COAL, bright
	140.91	0.05	COAL, dull and bright
	141.01	0.10	CLAYSTONE, carbonaceous, black, numerous bright coal bands
	141.06	0.05	COAL, dull and bright
	141.12	0.06	COAL, dull, fusain
	141.16	0.04	COAL, bright banded
1	141.19	0.03	CLAYSTONE, carbonaceous, black, numerous bright coal bands
	141.21	0.02	COAL, stony , black, numerous bright coal bands
	141.26	0.05	COAL, dull and bright .
	141.34	0.08	CLAYSTONE, carbonaceous, black, numerous bright coal bands
	141.52	0.18	CLAYSTONE, as above
1,8 ⁰	142.02	0.50	SANDSTONE, medium-grained, light grey, grey siltstone interbeds, near top competent
	143.52	1.50	SANDSTONE, upper half medium grey, broadly laminated siltstones with 0.10m granular layer at top, rest sandstone very fine-grained, argillaceous, cross-lamination, gradual at base
12 ⁰	144.34	0.82	MUDSTONE, dark grey, silty, gradual below
	145.92	1.58	SANDSTONE, upper 0.35m sands, grey, fine-grained, rest very fine-grained, highly argillaceous, laminated, gradational to mudstone at base
	152.15	6.23	MUDSTONE, upper 2.10m medium grey mudstone, rest alternating beds of silty mudstone and canneloid mudstone (0.80m canneloid mudstone in total)
			COAL SEAM C
	152.42	0.27 .	COAL, abrupt contact below
	170.56	18.14	CONGLOMERATE, chert/quartz pebble predominant, generally coarse-granular and locally well-sorted, though mostly some sandy matrix, some entirely grain-supported, coarsest interval 160.65-163.65 where pebbles up to 4cm (largest diam) occur, about below

- BH Nos. 9

	,	·	
Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m ·	
	189.15	18.59	SANDSTONE, light grey, fine-to medium-grained, very clean and well-sorted throughout, mostly devoid of current lamination, non calcareous throughout, conglomematic band 173.69-173.98, muddy layer 181.00-181.15, locally pebbly and some coarse-grained sand within 181.99-182.74
2 [°]	189.45	0.30	SANDSTONE, light grey, fine-grained, few thin siltstone interbeds, very competent
	189.49	0.04	CONGLOMERATE, light grey, granule, grains of grey, white an black chert and argillite, 30% matrix COAL SEAM B
	189.60	0.11	COAL, dull banded, core broken
•	189.73	0.13	CORE LOSS-COAL/CLAYSTONE
	189.78	0.05	COAL, dull, smutty-earthy, core broken
	189.86	0.08	CORE LOSS-COAL
	189.93	0.07	COAL, dull and bright
	189.99	0.06	COAL, dull banded
	190.05	0.06	COAL, stony , bright bands
	190.12	0.07	COAL, dull and bright
•	190.19	0.07	COAL, bright banded
	190.21	0.02	COAL, dull
7 ⁰	190.30	0.09	COAL, dull and bright
	190.36	0.06	COAL, dull
	190.44	0.08	COAL, dull banded
	190.47	0.03	COAL, dull
	190.62	0.15	COAL, dull
13 ⁰	191.31	0.69	SANDSTONE, medium-grained, light grey, few fine coaly inclusions, plant remains, siltstone at top, competent
	192.69	1.38	SANDSTONE, medium grey, fine-grained, argillaceous, much carbonized plant debris, gradual below
	193.02	0.33	MUDSTONE, medium grey, very silty, gradational basal contact
	193.85	0.83	SANDSTONE, medium grey, very fine-grained, very argillace small-scale cross-lamination, specks of finely broken pla matter, transitional below
	194.02	0.17	MUDSTONE, dark grey, slightly carbonaceous, gradational
	194.60	0.58	SANDSTONE, medium grey, very fine-grained, richly argillaceous, calcareous, gradational
	195.80	1.20	MUDSTONE/SANDSTONE, medium grey, sands very fine-grained, argillaceous, calcareous, broken at base, 50:50

BH Nos 9

Dip o	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			COAL SEAM HORIZON A .
	196.40	0.60	COAL/MUDSTONE, badly fragmented, much listric surfaces, abrupt basal contact
	207.49	11.09	CONGLOMERATE, essentially granular from top to 202.29 and fairly well-sorted with little or no sands in matrix medium pebbles between 202.29-205.74 though abundant smaller sized also occur
	209.33	1.84	SANDSTONE, mixture of medium-to very coarse sands and granular fraction, locally cross-stratified, gradual below
	211.20	1.87	CONGLOMERATE, many pebbles 4cm in largest diameter, ill- sorted, no sands in matrix, fining downward
	223.82	12.62	SANDSTONE/GRANULAR, alternating beds of fine/medium clean sands and granular conglomerates (though small-pebbles occur within 217.93-221.15) sands occasionally laminated, non calcareous
10 ⁰	245.92	22.10	SANDSTONE, light grey, fine/medium-grained, very well-sorte and well-washed, mostly cross-stratified, strongly calcareous throughout, bottom 0.30m have sporadic burrows
	250.63	4.71	SANDSTONE/MUDSTONE, upper half 90% fine-grained sand with muddy intercalations, lower half dominantly muddy calcareous
•	252.84	2.21	SANDSTONE, upper half medium grey, homogeneously argill- aceous, rest light grey, sands fine-grained, strongly calcareous, abrupt below
			GATES SUKUNKA
	262.11	9.27	MUDSTONE SILTY WITH INTERBEDDED SANDSTONE, fine-grained units, bioturbated and disturbed, Sukunka, 60:40 mudstone sand (patchily calcareous)
	279.99	17.88	MUDSTONE SILTY, MINOR SANDSTONE UNITS, Sukunka, 90:10 mudstone/sand (non calcareous)
	295.64	15.65	MUDSTONE, SANDY WITH INTERBEDDED SANDSTONE, bioturbated and disturbed 50:50, mudstone/sand, Sukunka (non calcareous)
	313.05	17.41	MUDSTONE, SILTY WITH SANDSTONE INTERBEDS, fine-grained, disturbed, bioturbated, Sukunka 90:10 mudstone/sand (calcareous)
-	326.73	13.68	SANDSTONE WITH INTERBEDDED MUDSTONES, fine-grained sand- stone, 90:10 sand/mudstone, ukunka, slightly disturbed and bioturbated, calcareous

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	378.00	51.27	MUDSTONE WITH OCCASIONAL SANDY INTERBEDS, disturbed and bioturbated, abrupt below, 90:10 mudstone/sand calcareous
			SUKUNKA
•			MOOSEBAR
		· ·	
	476.06	98.06	MUDSTONE, Moosebar, black, silty, pyritic, FERRUGINOUS ZONES BENTONITIC ZONES FRACTURE ZONES 458.02 (4cm) 458.02 (20cm) 428.18-429.56 460.27 (7cm) (with worm burrows (listric surfaces at top 5cm) slicks & broken) 462.52 (5cm) 446.53 (slicks) 448.80 (fracture calcite filled) 454.71 (fracture
			calcite filled, listric & slicks) 455.83 (slicks & calcite fractures 458.02 (2cm) 459.02 (4cm) (calcite fractures with listric sur-
			faces) 460.27 (5cm) 460.27 (5cm) calcite fractures 465.72 (5cm)slich calcite fractures 468.37-471.46 (broken zone-3m
			tures calcite filled.)
	476.80	0.74	MUDSTONE, dark grey green, no bedding is apparent, low competency, breaks easily on irregular fractures, sharp basal contact
	476.87	0.07	CLAYSTONE, light grey green, few small dark worm burrows, inter layered with mudstone, bentonitic
	477.05	0.18	MUDSTONE, as above, gradational basal contact
	477.90	0.85	MUDSTONE, as above
	478.00	0.10	CLAYSTONE, as above, bentonitic, hard
	478.08	0.08	MUDSTONE, as above, sharp irregular basal contact
	478.14	0.06	MUDSTONE, as above
	478.20	0.06	CLAYSTONE, light grey green, soft, bentonitic, sharp basa

"BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m ,	
			contact
	478.91	0.71	SANDSTONE, medium-grained, dark grey green, glauconitic, intensely bioturbated, bedding completely obliterated, pyritic worm burrows, increasing to base, large pyrite inclusions at base, competent
	478.93	0.02	CLAYSTONE, carbonaceous, black, coal bands, pyritic
	•		MOOSEBAR GETHING
	479.07	0.14	CORE LOSS-COAL
	479.09	0.02	COAL, dull and bright
	479.13	0.04	CLAYSTONE, carbonaceous, black, coal bands, pyritic
	479.20	0.07	COAL, dull,sheared, core fragmented
	479.24	0.04	CORE LOSS-COAL
	479.28	0.04	COAL, dull banded, sheared, stick ~
	479.30	0.02	COAL, dull, pulverized
	479.33	0.03	CLAYSTONE, carbonaceous, bright coal bands
	479.53	0.20	COAL, dull and bright, core pulverized, sheared
·	479.64	0.11	CORE LOSS-COAL
	479.68	0.04	COAL, dull and bright, large fragments
	479.72	0.04	COAL, dull and bright, large fragments
	479.77	0.05	COAL, dull banded, large fragments
	479.81 +	0.04	COAL, dull banded, stick
	479.84	0.03	COAL, dull and bright, stick
İ	479.90	0.06	COAL, bright banded, stick
	479.97	0.07	COAL, dull and bright, stick
}	480.00	0.03	COAL, dull, sheared, stick
	480.02	0.02	COAL, dull and bright, core pulverized
	480.11	0.09	COAL, dull banded, stick
	480.15	0.04	COAL, dull and bright, small fragments
}	480.26	0.11	COAL, dull, earthy lustre, stick
	480.32	0.06	COAL, dull and bright, stick
	480.40	0.08	COAL, dull, earthy lustre, sheared, small fragments
	481.18	0.78	CORE LOSS-COAL

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	481.26	0.08	COAL, sheared, large pieces
			FLOOR OF BIRD SEAM
	481.34	0.08	CLAYSTONE, carbonaceous, numerous bright coal bands competent, hard
	482.01	0.67	MUDSTONE, carbonaceous, black, plant fragments and bright coal bands, phases of dark grey siltstone, pyritic worm burrows, inter-bedded basal contact, moderate competency
	482.99	0.98	MUDSTONE, as above
	483.97	0.98	MUDSTONE, as above
11°	485.16	1.19	SANDSTONE, coarse-grained, grading to medium-grained at base, occasional fine carbonaceous partings, bedding usually obscured, a few small worm burrows causing mottli in the lower half meter
	485.61	0.45	SANDSTONE, as above
	486.04	0.43	SANDSTONE, medium-grained, phases of thin carbonaceous laminations, large worm burrows from 0.43m to 1.66m from top
	487.23	1.19	SANDSTONE, as above
	489.28	2.05	SANDSTONE, as above
	489.99	0.71	SANDSTONE, as above
	491.48	1.49	SANDSTONE, as above
	492.84	1.36	SANDSTONE, as above
	493.46	0.62	SANDSTONE, as above
	495.20	1.74	SANDSTONE, as above
•	495.66	0.46	SANDSTONE, as above
	495.98	0.32	SANDSTONE, as above
	496.57	0.59	SANDSTONE, fine-grained, medium grey, cross-bedded with frequent carbonaceous partings on bedding, calcite-filled fractures on bedding and at 45° to core axis, carbonaceous laminations at the base, plant rootlets near base
	496.74	0.17	CLAYSTONE, carbonaceous, black, bright coal bands, core broken, listric surfaces on core breaks
	497.43	0.69	CORE LOSS-ROCK
	498.02	0.59	CLAYSTONE, core badly broken
	498.39	0.37	SANDSTONE, fine-grained, dark grey with frequent phases of dark grey mudstone and light grey sandstone, bedding is usually obscured, plant penetrations and worm burrow bioturbation in sandstone phases
	498.58	0.19	SANDSTONE, as above

BH Nos. 9

RH NO	·	1	
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
<u>.</u>	500.53	1.95	SANDSTONE, grades to unit at base
	500.82	0.29	SANDSTONE, as above
	501.71	0.89	SILTSTONE, dark grey, with occasional phases of dark grey mudstone and phases of fine-grained light grey sandstone showing worm burrow bioturbation, plant fragments
	502.62	0.91	SILTSTONE, as above
	504.63	2.01	SILTSTONE, as above
	504.70	0.07	SILTSTONE, as above
	506.84	2.14	SILTSTONE, as above
	506.86	0.02	MUDSTONE, black to dark grey, bedding completely obscured
	507.66	0.80	MUDSTONE, sharp basal contact
	508.34	0.68	MUDSTONE, as above
	508.70	0.36	SANDSTONE, coarse-grained, light grey, frequent irregular inclusions of dark grey mudstone, sedimentary breccia at base, irregular, sharp basal contact
	508.87	0.17	SILTSTONE, grey with phases of fine-grained sandstone
	508.90	0.03	SILTSTONE, as above
	509.83	0.93	SANDSTONE, fine-to medium-grained, grey, cross-bedded, occasional phases of fine interbeds throughout
	510.29	0.46	CLAYSTONE, dark grey with interbeds of grey siltstone and fine-grained sandstone forming thin graded units, occasional large worm burrows, gradational basal contact
	510.79	0.50	SANDSTONE, grey, fine-grained, with interbeds of siltstone, grades to siltstone at base, slump structures in the top half
	510.91	0.12	SANDSTONE, as above
	511.18	0.27	SANDSTONE, as above
	511.98	0.80	SANDSTONE, medium-grained, light grey, abundant fine cross- bedding throughout, sharp basal contact
	512.16	0.18	SILTSTONE, grey with thin interbeds of fine grained, light grey sandstone
	513.11	0.95	SANDSTONE, as above
18 ⁰	513.13	0.02	SILTSTONE, grey with thin irregular interbeds of fine- grained,light grey sandstone, some phases of medium-grained cross-bedded sandstone, competent
	513.95	0.82	SILTSTONE, as above
	515.17	1.22	SILTSTONE, as above
	515.91	0.74	SILTSTONE, as above
	516.51	0.60	SANDSTONE, fine-grained, light grey, cross-bedded, sharp

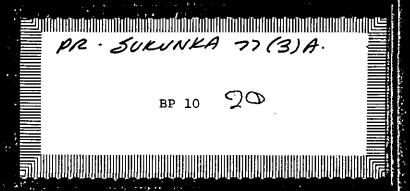
Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	fis .	,
	1		basal contact, competent
	516.83	0.32	SILTSTONE, dark grey interbedded with fine-grained, light grey sandstone, lamination is prominent bioturbation at top completely disturbing bedding, interbedded basal contact, competent
	517.07	0.24	SANDSTONE, fine-grained, light grey, siltstone interbeds in centre, slumping at top and base, sharp irregular basal contact, competent
	517.27	0.20	SANDSTONE, as above
	517.41	.0.14	SANDSTONE, as above
20°	519.38	1.97	LAMINITE, thin-bedded, grey siltstone interbedded with degrey claystone forming thin graded units, occasional fine interbeds of fine-grained sandstone, bedding is very regular, listric surfaces on bedding plane fracture moderate to low competency, core breaks easily on bedding planes
	519.62	0.24	LAMINITE, as above
	520.01	0.39	CLAYSTONE, carbonaceous, black, bright coal bands, low competency
	520.11	0.10	CLAYSTONE, as above
			ROOF OF CHAMBERLAIN SEAM
	520.35	0.24	CLAYSTONE, carbonaceous as above, core broken at top, calcite filled fractures at top and base, probable equivalent of sigmoidal laminite structure
	520.59	0.24	CLAYSTONE, undisturbed, as above
	520.62	0.03	COAL, dull and bright, large fragments
	520.66	0.04	COAL, dull, sheared, large fragments
	520.81	0.15	COAL, dull, metallic lustre, stick
	520.86	0.05	COAL, bright, stick
	520.92	0.06	COAL, bright banded, stick
	520.99	0.07	COAL, dull and bright, stick
	521.02	0.03	COAL, bright banded, sheared, stick
	521.12	0.10	COAL, dull and bright fragments in box, core pulverized
	521.20	0.08	COAL, dull and bright, large fragments
	521.25	0.05	COAL, dull banded, large fragments
	521.28	0.03	COAL, dull banded, sheared, core pulverized
į	521.43	0.15	CORE LOSS-COAL
	521.55	0.12	SILTSTONE, dark grey, carbonaceous, bright coal bands an inclusions

- BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	
	521.58	0.03	COAL, dull, core pulverized
	521.64	0.06	COAL, dull and bright, core pulverized
	521.70	0.06	CORE LOSS-COAL
	521.80	0.10	COAL, dull and bright, sheared, small pieces
	521.85	0.05	COAL, bright, large pieces
	521.91	0.06	COAL, dull, large pieces
	522.02	0.11	COAL, dull and bright, large pieces
	522.06	0.04	COAL, dull, fusain, large pieces
	522.11	0.05	COAL, dull and bright, large pieces, sheared
	522.13	0.02	COAL, bright, large pieces
	522.19	0.06	COAL, dull banded, large pieces, sheared
	522.30	0.11	COAL, dull, metallic lustre, large pieces
	522.33	0.03	COAL, dull and bright, stick
	522.35	0.02	COAL, dull, metallic lustre, large pieces
	522.40	0.05	COAL, dull and bright, large pieces
•	522.45	0.05	COAL, dull and bright, small pieces
	522.48	0.03	COAL, bright, stick
	522.53	0.05	COAL, dull and bright, stick
	522.60	0.07	COAL, bright, stick
	522.64	0.04	COAL, dull and bright, sheared
	522.86	0.22	CORE LOSS-COAL
	522.89	0.03	COAL, stony , bright coal bands
			FLOOR OF CHAMBERLAIN SEAM
	523.09	0.20	CLAYSTONE, carbonaceous, black, core pulverized, very heavily sheared
1	523.18	0.09	CLAYSTONE, carbonaceous, black, bright coal bands
	523.65	0.47	SILTSTONE, dark grey, carbonaceous, few very fine laminations of fine-grained sandstone in the centre, coaly inclusions at top-base, sharp basal contact, competent
	524.26	0.61	SILTSTONE, as above
	524.83	0.57	CLAYSTONE, carbonaceous, black, frequent plant fragments and rootlets throughout, moderate to low competency
	525.79	0.96	CLAYSTONE, as above
	525.88	0.09	CLAYSTONE, as above, very heavily sheared, core pulverized
1	525.91	0.03	CLAYSTONE, unsheared, as above
	525.98	0.07	CLAYSTONE, sheared, as above

BH Nos. 9

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	526.29	0.31	CLAYSTONE, unsheared, as above
	526.44	0.15	CLAYSTONE, as above
	526.59	0.15	CLAYSTONE, sheared, as above, some bright coal fragments
	527.64	1.05	CLAYSTONE, unsheared, as above
	527.91	0.27	SANDSTONE, dark grey, fine-grained, phases of dark grey siltstone, bedding obliterated by bioturbation
	528.10	0.19	SANDSTONE, as above
	528.37	0.27	SANDSTONE, light grey, medium-grained, frequent interbeds of dark grey mudstone, dark small worm burrows
	528.84	0.47	MUDSTONE, dark grey to black, bright coal bands and inclusions
	529.46	0.62	MUDSTONE, as above
	529.91	0.45	SANDSTONE, medium-grained, light grey, small scale cross- bedding frequent phases and interbeds of dark grey carbon- aceous mudstone throughout, coarse bioturbation by large worm burrows thoughout
	531.84	1.93	SANDSTONE, as above
	532.08	0.24	SANDSTONE, as above
	532.50	0.42	SANDSTONE, as above
	533.06	0.56	SANDSTONE, light grey, coarse-grained, carbonaceous and coaly inclusions at top
	533.91	0.85	SANDSTONE, as above
	535.18	1.27	SANDSTONE, as above
22 ⁰	535.95	0.77	SANDSTONE, as above
' 			
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BP COAL

CANADA

Page 1

AREA

SUKUNKA

B. H. No. BP 10

Contractor:

Longyear

Commenced:

July 29, 1977

Completed:

Aug 14, 1977

Co-ordinates: 6,115,188.74

593.046.62

Ν E

Surface Elevation: 1,842.83

m

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

See detail

page la

Geologist Ali Chowdry

Depth 9.47-98.50

Hole Azimuth:

Logged by:

203.63-312.01

Andy Newson

158.42-201.60 321.58-608.47

Final Depth:

687.34

Geoff Jordan

608.51-687.34

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek	98.50	98.50	1,744.33
Hulcross	201.60	103.10	1,641.23
Gates	397.66	196.06	1,445.17
Sukunka	525.68	128.02	1,317.15
Moosebar	613.39	87.71	1,229.44
U. Gething	680.66	67.27	1,162.17

<u>SEAMS</u>	DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD	616.60			1,226.23
CHAMBERLAIN	680.66			1,162.17

595.88-597.68 F.PO., F.E. 631.82

F.PO. 646 Slicks & Fractures Breccia Bedding disturbed

Sperry-Sun Survey

Date: 14th August 1977

Borehole: BP #10 Sukunka 77

Compass: 20° Maximum Tilt to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
680m	·3° -	N 12° E
650m	3° 15'	N 9° E
600m	· 3° -	n 7° E
550m	20 -	
500m	1° 45'	
400m	1° 30'	
300m	1° 15'	
200m	45 '	
100m	15'	

P.S. Rods in Borehole to 580m

Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	9.47	9.47	OVERBURDEN.
	10.72	1.25	CONGLOMERATE: upper half finely pebbly to granular with abundant sandy matrix and large silty/muddy intraclasts, rest fine-to medium sands with sprinkling of gritty fractions, abrupt below.
	11.52	0.80	SILTSTONE: medium-grey, locally broken up and some rusty weathering, structureless, calcareous, abrupt below (though actual contact fragmented).
	17.96	6.44	SANDSTONE/GRITS: light/medium-grey, distinct salt and pepper appearance, strongly cross-stratified, coarse-to very coarse-grained, bottom 1.85m granular, good sorting within a given interval, well washed; erosional at base.
	19.13	1.17	SILTSTONE: medium-grey, coarse-grained, root lets, mostly structureless, gradational at base.
	21.28	2.15	MUDSTONE: dark-grey, highly silty (25%), structureless, bottom 0.20cm very carbonaceous, fragmented and pulverized at base.
	24.36	3.08	SILTSTONE: medium-grey, argillaceous, structureless in most part, locally mottled, some suggestion of root lets, sporadic lamination, non-calcarcous, erosional at base. Core sporadically fractured in top half and with rusty/orange weathering on broken surfaces.
	25.91	1.55	SANDSTONE: light/medium-grey, fine-to very fine-grained, irregular small-scale cross-lamination, scattered silty intraclasts in lower one-third of sequence; bottom 12cm medium-grainéd sands, gradual below.
	34.63	8.72	SANDSTONE/GRITSTONE: medium-grey, sandstone range from medium-to very coarse-grained, clean and locally sorted. In general these are series of gradational sequences beginning with granular fractions and fining upwards (occasionally approaching fine sands). Apparent crossstratification. Widely dispersed small Coaly inclusions.
	39.07	4.44	CONGLOMERATE: granular to finely pebbly, some sandy matrix, abrupt sandstone, light-grey, medium-to coarse-grained, very clean, well washed, sorted, cherty, quart-zose, strongly cross-bedded, some intervals structureless fine sand 20cm at 42:15 core locally with large vertical fractures, surface slightly weathered, abrupt, clean basal contact.
	45.94	6.87	SANDSTONE: medium-grey, fine-to medium-grained; character- ized by concentration of carbonaceous matter (manifested as dark laminae), calcareous, abrupt at base.

BH Nos. 10

Dip o	DEPTH m	TH1CKNESS m	DESCRIPTION
	49.44	3.50	CONGLOMERATE: mostly fine pebble conglomerate; medium-to coarse, clean sands 0.63m (interbedded), abrupt below.
	59.22	9.78	SILTSTONE/MUDSTONE: generally dark-grey, interbedded sequence of silty mudstone and argillaceous siltstone, sporadically laminated to banded, locally siltstone with abundant root-lets; bottom 1.27m with frequent sandy intervals and calcareous, rest sporadically.
	61.83	2.61	SANDSTONE: medium-grey, very coarse-grained, locally gritty, Coaly inclusions, quartzose, cherty, abrupt below.
	64.12	2.29	MUDSTONE: dark-grey, sporadically silty, carbonaceous and Coaly bands at 62.33-62.48, structureless, very gradational at base.
	65.18	1.06	SILTSTONE: medium-grey, coarse-grained, argillaceous at top and base, devoid of lamination, gradual at base.
	66.35	1.17	MUDSTONE: black, carbonaceous (homogeneously) throughout, intervals 0.15m muddy/bony Coal, abrupt below.
	67.12	0.77	SILTSTONE: medium-grey, abundant root lets, structureless, gradual.
	70.77	3.65	SANDSTONE: medium-grey, very fine-grained, locally highly argillaceous and silty, bottom 0.85m with wavy and disturbed lamination, micro-channelling, locally fractured, fragmented at base.
	71.63	0.86	MUDSTONE: black, richly carbonaceous, abundantly sandy (uniformly disseminated), 8cm black sands (fine-grained) toward base, structureless, gradual at base.
	72.13	0.50	SANDSTONE: light/medium-grey, very fine-grained, argilla- ceous layers, laminated, few burrows, increasing muddy content bottomward.
	72.85	0.72	SILTSTONE: medium-grey, very argillaceous, root lets, upper half sandy.
	75.72	2.87	MUDSTONE: dark-grey to black (predominantly), locally very carbonaceous, and some muddy/bony Coal. Bottom 0.70m broken and pulverized. Progressively becoming sandy at base; gradational.
	78.27	2.55	SANDSTONE: light-grey, predominantly quartzose (98%), devoid of argillaceous matter, 'rooty', medium-grained, vaguely cross-bedded, fractured toward base.
1 1 1 1	84.22	5.95	CONGLOMERATE: a mixture of gritstone, very coarse-grain-

BH Nos. 10

Dip	DEPTH m	THICKNESS m	DESCRIPTION
			ed sandstone, and fine pebble conglomerate; larger pebble toward base, erosional at base.
	84.87	0.65	SANDSTONE: medium-grey, fine-to very fine-grained, pebbly intraclasts zone (8cm), laminated at base; abrupt.
	86.14	1.27	SANDSTONE: light-grey to whitish, siliceous, medium-to coarse-grained, dark cross-bedded laminae (concentration of chert grains), erosional at base, clean, sorted.
	86.60	0.46	MUDSTONE/SANDSTONE: interbedded fine/medium sands, erosional micro-contacts; abrupt basal contact.
	87.54	0.94	SANDSTONE: light-grey (whitish), quartzose, cherty, small intraclasts of silts in top 0.10m, cross-laminated, fine/medium-grained, erosional at base.
	94.29	6.75	SANDSTONE: medium-grey, fine/medium-grained, very uniform clean, ubiquitously cross-bedded, two levels with rusty weathering silty clasts, non-calcareous, clean contact at base.
	98.50		SANDSTONE/MUDSTONE: interbedded very fine sand, well lam- inated and silty mudstone. A 4cm hard ferruginous band at 98.13, some burrowing; this unit represents transition- al zone between Boulder Creek and the Hulcross.
			BOULDER CREEK
			HULCROSS
	158.42	59.92	MUDSTONE: sandy 70:30, sands calcareous, fine bedding, regular, discrete layers. Mudstones, silty showing distu-rbance and mixing with sands at margins. Generally a banded appearance. Less disturbed than Sukunka. Bentonite layer 131.51-0.23m with fine interbedded mudstones. Bioturbated with large and small burrows. Transitional below.
	174.61	16.19	MUDSTONE: sandy, 50:50, regular discrete layers of interbedded sands (fine-grained) well defined. Some disturbence with minor bioturbation. Occasional zones of more intensively bioturbated material.
	182.42	7.81	MUDSTONE: sandy, 90:10, widely spaced bands of sandy material. Well defined and bedded. Bentonites at 174.61 (3cm) and 180.04 (40cm) with calcite infillings of fractures.
	189.60		MUDSTONE: sandy, 60:40, regular discrete layers of inter- bedded sands (fine-grained) well defined. Some disturbance transitional below.

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	201.60	,	MUDSTONE: sandy, 50:50, sands well defined and bedded. Picasional forming units O.lm-O.2m thick(often about 23cm) Some minor disturbence and occasional bioturbation.
			HULCROSS GATES
·	203.63		MUDSTONE: dark-grey (black), locally silty and carbonaceou highly pyritic 201.82-202.38, sporadically calcareous in top half.
	204.18	0.55	COAL SEAM: predominantly dull Coal, 2-3cm dull banded in middle.
	208.00	3.82	SANDSTONE: light/medium-grey, fine-grained, ubiquitous small-scale cross-lamination, abundance of finely broken carbonaceous matter as manifested by dark laminae, few Coaly inclusions, strongly calcareous, few isolated burrows, erosional at base.
	208.96	0.96	SANDSTONE: medium-grey, very fine-grained, highly argill- aceous some silty intervals (as thin layers), calcareous, gradual below.
	209.56	0.60	MUDSTONE: dark-grey, richly silty, lower half carbonaceous gradual.
	210.31	0.75	COAL SEAM: solid, basal contact gradual.
			Coal, bony, muddy - 0.06 Coal, dull, light - 0.14 Mudstone - 0.07 Coal, dull, low ash - 0.19 Coal with submetallic lustre - 0.04 Coal, dull - 0.02
	211.74	1.43	MUDSTONE: black, locally silty and carbonaceous, abrupt below.
	213.02	1.28	SANDSTONE: medium-grey, fine-to very fine-grained, small- scale, cross-lamination, slumping and syndepositional disturbance, micro-erosional contacts, argillaceous, silty laminae, occasional burrows, strongly calcareous, abrupt below.
	213.65		COAL: Judging from tags and grounded Coal, Coal loss probable:
	,		Coal, dull and bright - 0.05 Coal, dull metallic lustre - 0.05

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			Coal, dull, banded - 0.12 Coal, dull and few bright streaks of fussain - 0.11
	216.42	2.77	SANDSTONE: medium-grey, fine-grained, ubiquitous small-scale cross-lamination, rare abundance of fine Coaly fragments, compactional and slump structures, occasional burrows. Brief gradation of fine to very fine sands and silts, strongly calcareous, abundant carbonized plant debris, abrupt below.
	217.51	1.09	MUDSTONE: dark-grey, silty at top and base (35%), a large slump encompassing basal 0.20m, locally slightly carbonaceous, silty zones calcareous, erosional at base.
	218.99	1.48	SANDSTONE: medium-grey, fine-grained, small cross-lamina- tion, much large scale slumping and complete distortion of laminae. Concentration of cherty grains within certain iron laminae, locally tiny clasts and some finer litholog- ies, strongly calcareous throughout, erosional at base.
	227.49	8.50	MUDSTONE: dark-grey to black, top 1.20m with silty stringers, one rusty zone and silty levels strongly calcareous, Pelecypod shells; though shells dispersed throughout, these are especially concentrated within 226.72-227.35 and constitute Coquina. Many vertical fractures. Basal 0.15m carbonaceous, mudstone almost canneloid. Basal contact gradual.
	228.57	1.08	SANDSTONE: top 0.40m fine-grained with abundant carbonized plant debris, rest light/medium-grey, very fine-grained, small cross-laminations and ripples, argillaceous laminae, few burrows, compactional features, strongly calcareous, passage by interbedding.
	229.25	0.68	SILTSTONE/MUDSTONE: top half dominantly silty (as fine ripples) rest dominantly muddy, dark-grey, all calcareous, gradual.
	231.80	2.55	SANDSTONE: dark-grey, fine-grained, abundantly argillaceous bottom 0.40m laminated and small cross-lamination; much of zone throughly bioturbated, many scattered Pelecypod shells (in top half), lower contact gradual.
	232.47	0.67	MUDSTONE: dark-grey/black, abundant plant debris, very silty interbedded at base.
	242.32	9.85	SANDSTONE: top 0.53m interbedded mudstone/sandstone (highly scoured micro-boundaries); Basal 2.60m medium-grey, fine-grained and regularly laminated and most parallel and wavy, some small-scale cross-lamination, this zone characterized by abundant vertical burrows (some of these

BH Nos. 10

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			0.20cm deep), small-graded intervals, some levels with concentrations of finely particulate carbonaceous matter emphasising laminae. Rest of sequence medium/light-grey, medium-grained, well-sorted, mostly massive with isolated laminated units; 0.12cm muddy band in middle, and weakly calcareous, gradual at base. Some silty intraclasts 238.37-238.77 and within zone also sand-sized silty grains
	243.76	1.44	SANDSTONE: medium-grey, fine-grained, some disturbed laminae, otherwise structureless, non-calcareous, abrupt below; abundant finely broken plant matter.
	244.40	0.64	SANDSTONE: light/medium-grey, fine-grained, very strongly calcareous, abrupt.
	245.05	0.65	SANDSTONE: medium-grey, fine-grained, mostly devoid of lamination, abundant finely broken plant debris (carbon-ized), interbedded below.
	255.96	10.91	SANDSTONE: light/medium-grey, top 2.80m fine-grained, rest fine to medium-grained; upper half frequently in@r calated with silty/muddy layers, laminated, muddy band 248.41 - 248.75, few worm burrows, some ripples. Lower half contains lesser silty/muddy content, large-scale slumping, erosional features, strongly calcareous 253.22-255.41, rest non-calcareous, interbedded below.
	262.27	6.31	MUDSTONE/SILTSTONE: dark-grey, predominantly muddy, top 2.10m with regular ripples of silts and with 'Pin Prick' burrows, rest of sequence highly bioturbated. Sukunkoid marker. Bottom 1.25m highly bioturbated very fine-grained argillaceous sandstones. Passage to basal sand, through gradual diminution of organic activity.
	267.10	4.83	SANDSTONE: basal 15cm conglomerate (fine pebbly), and also at 266.18-266.28. Rest light/medium-grey, fine-grained sands, lower 2.70m predominantly organically disturbed with thin muddy layers, (erosional micro-contachigher beds well-laminated, clean, some parallel Pamination (dark due to entombment of carbonaceous matter), few rusty, silty cherts, non-calcareous. Abrupt at base.
	279.05	11.95	MUDSTONE: dark-grey to Black, few rusty bands and some zones with carbonized plant debris, essentially devoid of lamination and non-calcareous, interval 275.08 - 275.48 very fine-grained, light/medium sand with small-scale cross-lamination and strongly calcareous. Interval 275.48 276.48 medium/grey, richly silty muds and strongly calcareous, these grade to black mudstone at base.
	279.49	U.44	MUDSTONE: black, middle very carbonaceous, listric cont- act at base.

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			TOP OF COAL ZONE 'E'
	280.14	0.65	COAL: top half dominantly bright, rest dull Coal.
	280.56	0.42	MUDSTONE: dark-grey to Black, non-calcareous, gradational at base.
	281.16	0.60	MUDSTONE: black, carbonaceous, gradual to Coal below.
	282.36	1.20	COAL SEAM: predominantly muddy Coal, and mudstone, carbon-aceous.
	282.97	0.61	MUDSTONE: black, carbonaceous, gradual at base.
	283.13	0.16	COAL: top 4cm dull and muddy, rest dominantly bright Coal
	283.65	0.52	MUDSTONE: dark-grey at top, black at base and richly carbonaceous.
	284.79	1.14	COAL: mostly hard and very competent, gradual at base:
			Hard Coaly Mudstone 0.07 CORE-LESS -COAL 0.08 Coal, dull with minor bright streaks 0.16 Coal, bone 0.31 Mudstone, Coaly 0.10 Coal, dull and bright 0.05 Coal, bright banded 0.16 Coal, dull 0.04 Coal, bright banded 0.11 Coal, high ash, dull 0.06
			BASE OF COAL ZONE 'E'
	285.83	1.04	MUDSTONE: medium-grey, richly silty (25%), 4cm Coal 20cm from base, very transitional below.
	286.29	0.46	SILTSTONE: medium-grey, argillaceous, discontinues lamin- ation, calcareous.
	286.88	0,59	MUDSTONE: medium-grey, very silty, vaguely laminated, gradational.
	289.75	2.87	SANDSTONE: medium-grey, very fine-grained, argillaceous, local burrowing, slumped laminated sequences, basal 0.40m sporadically laminated (wavy/parallel), strongly calcar- eous throughout, erosional at base.
,	291.26	1.51	SANDSTONE: light/medium-grey, interbedded sequence of fine-grained sands and very fine sands, some silty layers much micro-erosional contacts, laminated throughout, some

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			slumping in upper half, very strongly calcareous, erosional at base.
	292.00	0.74	MUDSTONE: basal locm clean, light-grey fine sands, lamin- ated, overlain by 17cm of dark-grey mudstone with frequ- ent silty layers, syndepositionally disturbed, calcareous followed by 24cm of carbonaceous mudstone. Rest at top (23cm) silty laminated, calcareous mudstone.
	:		COAL SEAM 'D'
,	293.05	1.05	COAL/MUDSTONE: dominantly highly Coaly mudstone and some dull Coal.
	294.99	1.94	SILTSTONE/MUDSTONE: medium/dark-grey, upper half dominant ly silty, locally with delicate lamination, and calcareou rest slightly carbonaceous, gradational at base.
	295.86	0.87	SANDSTONE: medium-grey, very fine-grained, ubiquitous small-scale, cross-lamination, very argillaceous, calcareous, gradual at base.
	298.12	2.26	MUDSTONE: dark-grey, slightly carbonaceous, structureless broken at base.
			COAL SEAM 'D' (lower leaf).
	298.42	0.30	COAL: dull and bright, fragmented, lower contact broken.
	299.12	0.70	SANDSTONE: dark-grey, very fine-grained, local lamination abrupt, argillaceous/carbonaceous (finely macerated) matter in matrix, slightly calcareous, abrupt at base.
	299.29	0.17	COAL: dominantly dull and hard, fragmented.
	300.32	1.03	MUDSTONE: medium-grey, localy Coaly stringers, many list- ric surfaces.
	300.96	0.64	COAL/MUDSTONE (CARBONACEOUS): predominantly black carbon- aceous, some very high ash Coal at top, gradual at base.
	301.56	0.60	MUDSTONE: medium-grey, fragmented, slightly silty, grad- ual at base.
	303.32	1.76	SANDSTONE: medium-grey, very fine-grained, regular small- scale cross-lamination, argillaceous, weakly calcareous, very gradational at base.
	304.13	0.81	MUDSTONE: medium-grey, slightly silty, gradual basal con- tact.
1	}		

BH Nos. 10

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	305.47	1.34	SILTSTONE: medium-grey, very argillaceous, scattered lam- ination, gradual.
	306.66	1.19	SANDSTONE: light/medium-grey, fine-grained, laminated, argillaceous at top, weakly calcareous, erosional at base
	309.64	2.98	MUDSTONE: dark-grey, sparingly silty, locally ferruginous homogeneously carbonaceous at base, very gradual change to Mudstone below.
<u> </u>	310.29	0.65	MUDSTONE: black, distinctly canneloid, broken contacts
	311.09	0.80	at base. MUDSTONE/SILTSTONE: upper half black mudstone with conchoidal fracture, rest siltstone, laminated with carbonaceous content, whole interval strongly calcareous.
	311.56	0.47	MUDSTONE: black, much of interval canneloid mudstone.
			COAL SEAM 'C'
	312.01	0.45	COAL: dull, mostly canneloid Coal.
	321.58	9.57	SANDSTONE: dark-grey, argillaceous, bioturbated (large and small burrows) and disturbed, bedding moderately well developed. Transitional below. Small burrow zone - 313.86-316.50 Large burrow zone - 319.27-321.58 Conglomerate, 1-2cm pebbles - 317.68-317.63 Carbonaceous near top, Coaly stringer at - 312.65.
	342.02	20.44	SANDSTONE: light-grey, clean with occasional interbeds of dark mudstone with sandy intraclasts. Transitional below Mudstone layers - 332.83 (13cm) - 333.61 (7cm) - 343.25 (12cm) - 343.55 (4cm)
	343.19	1.17	MUDSTONE: with interbedded sandstone, 50:50, sands medium grained, clean. Shales with intraclasts and erosional boundaries. Abrupt below with 2cm of conglomerate at boundary.
			COAL SEAM 'B'
	343.65	0.46	COAL: 0.03 bright with dull bands 0.03 Pyritic layer discontinuous 0.05 dull with bright bands 0.09 as above 0.02 bright 0.03 dull with metallic lustre 0.02 sheared dull 0.19 CORE LOSS-COAL.

BH Nos. 10

Dip o	DEPTH m	THICKNESS	DESCRIPTION
	343.74	0.09	SHALE: carbonaceous, Coaly massive.
	347.52	3.78	SANDSTONE: argillaceous, carbonaceous, bedding moderately well developed, slightly disturbed. Abrupt below. Mediumgrained, minor bioturbation with large vertical burrows.
	348.52	1.00	MUDSTONE: carbonaceous becoming very Coaly at base with numerous small Coals and stringers.
			COAL SEAM 'A' ZONE.
-	348.60	0.08	COAL SEAM: very muddy, dull coal.
	353.41	4.81	CONGLOMERATE: grey, moderately homogeneous, up to 0.5cm in size.
	357.81	4.40	CONGLOMERATE: as above, ground mass up to 0.5cm in size with large number of pebbles 2-3cm in size.
	361.39	3.58	CONGLOMERATE: with interbedded very coarse sands,50:50, dark/light-grey, clean with only very occasional mudstone layers, less than 0.5cm pebble size.Transitional below.
	375.23	13.84	SANDSTONE: medium/fine-grained, clean, well-sorted, becoming more argillaceous in thin layers towards base. Abrupt below.
,	378.44	3.21	MUDSTONE: sandy 50:50, dark mudstone showing disturbance and minor bicturbation, sands occasionally well bedded wit some disturbence. Becoming coarse sands, grit at base.
	383.99	5.55	_CONGLOMERATE: from 2-3mm at top to 1.25-1.50cm at base, abrupt below.
	386.17	2.18	SANDSTONE: clean well-sorted, abrupt below, faintly bed- ded, medium/fine-grained.
	397.66	11.49	SANDSTONE: with mudstone interbeds 60:40. Sands as above Mudstone disturbed and bioturbated with minor sandy layer within. Transitional below.
	·		GATES SUKUNKA
	417.90	20.24	MUDSTONE: sandy, 50:50, some discrete sandy layers well- bedded, disturbed at contact, other layers of mixed sands and mudstone bioturbated and disturbed, sands patchily calcareous.

Dip	· •		DESCRIPTION	
0	m	m		
	428.24	10.34	MUDSTONE: sandy, 70:30, sandy layers discrete and well defined. Patchily calcareous. Mudstone silty with minor disturbences.	
	452.97	24.73	SANDSTONE: argillaceous, 80:20, disturbed and bioturbated large and small burrows, patchily calcareous. Gradational below, medium-grained.	
	459.47	6.50	SANDSTONE: argillaceous 80:20 as above, development of discrete well-bedded sandy layers. Abrupt below.	
	461.20	1.73	MUDSTONE: sandy and Glauconitic, bioturbated and disturbed.	
	477.01	15.81	SANDSTONE: argillaceous, 60:40. Sandy layers discrete. Well-defined, disturbed and bioturbated at margins with argillaceous layers, calcareous, large and small burrows, medium-grained.	
	499.66	22.65	MUDSTONE: sandy 60:40, as above.	
	525.68	26.02	MUDSTONE: sandy 80:20, sands form thin discrete layers, often disturbed and bioturbated (calcareous), large and small burrows, abrupt below.	
·			SUKUNKA MOOSEBAR	
	608.47	82.79	MUDSTONE: silty, pyritic, dark-grey/black, homogeneous, except: Bentonitic Zones: 589.58 (0.15m) worm burrows 593.68 (20cm).	
			Ferruginous Zones:578.78 (5cm) + fract. calcite fill and fracture zones579.24 (6cm) 582.09(7cm) + fract. calcite fill- ed + slicks.	
			586.40 (5cm)+ fract. calcite fille 587.94 (10cm)+ fract.calcite fille +pyritic	
			Fracture Zone : 595.88-597.68 (slicks and fract. rock).	
	608.51	0.04	MUDSTONE: dark-grey, occasional pyritic worm burrows, low competency, Moosebar formation.	
	610.93	2.42	MUDSTONE: as above.	
	610.99	0.06	CLAYSTONE: grey-white, hard, bentonitic characterized by small dark-coloured worm burrows.	

"BH Nos. 10

Dip	DEPTH	THICKNESS	DESCRIPTION	
0	m	m		
	612.15.	1.16	MUDSTONE: dark-grey, as above.	
	612.25	0.10	CLAYSTONE: grey-white, as above.	
	612.43	0.18	MUDSTONE: dark-grey, as above.	
	612.52	0.09	CLAYSTONE: grey/white, as above.	
	612.74	0.22	SANDSTONE: fine-grained, dark-grey/green, pyritic worm burrows predominant at base, large pyrite inclusions at base, bedding completely obliterated by bioturbation, competent.	
	613.39	0.65	SANDSTONE: as above	
			MOOSEBAR	
			GETHING	
		·	GETRING	
	613.50	0.11	BIRD COAL SEAM.	
	614.04	0.54	CORE LOSS - COAL/ROCK	
	614.10	0.06	COAL: dull and bright, large pieces MD	
	614.15	0.05	COAL: dull, large pieces, LD	
	614.42	0.27	CORE LOSS-COAL	
	614.46	0.04	COAL: dull, banded, large pieces, MD	
	614.52	0.06	COAL: dull, large pieces, MD	
	614.54	0.02	COAL: dull and bright, large pieces, LD	
	614.81	0.27	CORE LOSS-COAL.	
	614.97	0.16	MUDSTONE: dark-grey, large Coaly inclusions	
	615.02	0.05	COAL: dull and bright, pyritic inclusions VHD	
	615.06	0.04	COAL: dull banded, large pieces	
	615.08	0.02	COAL: bright, large pieces, LD	
	615.11	0.03	COAL: dull and bright, large pieces, pyrite inclusions, VHD	
	615.17	0.06	COAL: dull and bright, large pieces, MD	

BH Nos. 10

Dip	DEPTH	THICKNESS	DESCRIPTION	
0	m	m		
	615.82	0.65	CORE LOSS-COAL	
	615.90	0.08	COAL: dull, sheared, stick HD	
ļ ļ	615.99	0.09	COAL: dull and bright, sheared, stick LD	
	616.07	0.08	COAL: dull banded, stick, MD	
	616.13	0.06	COAL: dull, stick, MD	
	616.15	0.02	COAL: bright, large pieces, LD	
1	616.17	0.02	COAL: dull, large pieces, LD	
	616.21	0.04	COAL: bright banded, large pieces, LD	
	616.31	0.10	COAL: dull and bright, large pieces, MD	
i i	616.34	0.03	COAL: bright banded, large pieces, LD	
	616.37	0.03	COAL: bright, fragments in box	
	616.39	0.02	CLAYSTONE: dark-brown, carbonaceous.	
	616.41	0.02	COAL: bright, stick	
	616.53	0.12	COAL: dull banded, stick, MD	
	616.58	0.05	COAL: bright, fragments in box	
	616.60	0.02	COAL: dull banded, fragments in box	
	617.77	1.17	SANDSTONE: medium-to coarse-grained, light-grey, large Coaly inclusions at top, mottling by small worm burrows for 1.98 to 2.50m, from top, bedding poorly developed.	
	619.92	2.15	SANDSTONE: as above	
	620.84	0.92	SANDSTONE: as above	
	621.25	0.41	SANDSTONE: as above	
	621.84	0.59	SANDSTONE: medium-grained, becoming fine at base, light-grey, large worm burrows from 0.97 to 1.64m from top, calcite filled fractures at 60° to core axis for top 0.50m.	
	623.57	1.73	SANDSTONE: as above	
	623.84	0.27	SANDSTONE: as above	
	626.05	2.21	SANDSTONE: as above	

BH Nos. 10

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	626.67	0.62	SANDSTONE: as above
	628.08	1.41	SANDSTONE: as above
	629.86	1.78	SANDSTONE: as above
	630.10	0.24	SANDSTONE: as above
	630.80	0.70	SANDSTONE: as above
	631.65	0.85	SANDSTONE: as above with calcite filled fractures at 50° to core axis spaced 0.10m.
	631.82	0.17	BRECCIA: sandstone fragments as above, disoriented in calcite matrix.
	631.87	0.05	SANDSTONE: with fractures as above.
	632.14	0.27	SANDSTONE: as above
	633.67	1.53	SANDSTONE: as above
	633.81	0.14	SANDSTONE: undisturbed as above.
1	640.99	7.18	SANDSTONE: as above
	642.02	1.03	SILTSTONE: grey, with phases of fine-grained, light-grey, sandstone and interbeds of dark-grey mudstone forming thin-graded units, pyritic worm burrows, slumping near the top, bioturbation at centre, sharp basal contact.
	642.43	0.41	SANDSTONE: fine-grained, light-grey, characterized by small-scale cross-bedding defined by fine carbonaceous partings on bedding.
	642.53	0.10	SANDSTONE: grey, fine-grained with very frequent interbeds of dark-grey siltstone, bioturbation at top.
	643.61	1.08	SANDSTONE: as above
	643.73	0.12	MUDSTONE: dark-grey with occasional very thin, fine- grained sandstone interbeds, grades to carbonaceous clay- stone at base , small zone of sedimentary breccia above base.
	644.33	0.60	MUDSTONE: as above
	644.56	0.23	SANDSTONE: medium-grained with occasional interbeds of dark-grey mudstone, bedding disturbed by bioturbation.
	644.63	0.07	SANDSTONE: grey, fine-grained with very frequent inter- beds of dark-grey mudstone.

BH Nos. 10

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Dip O	DEPTH m	THICKNESS	DESCRIPTION
	645.03	0.40	SANDSTONE: as above.
	645.36	0.33	MUDSTONE: dark-grey, with fine interbeds of fine-grained sandstone, large shelly fossil band from 0.09 to 0.14m, from top, small shelly fossil band from 0.26 to 0.27m from top.
	645.42	0.06	CLAYSTONE: carbonaceous, black with numerous large bright Coal bands.
	645.58	0.16	COAL: stony, stick, VHD
	645.64	0.06	CLAYSTONE: carbonaceous, black with bright Coal bands.
	645.90	0.26	SILTSTONE: dark-grey with abundant plant fragments
	646.05	0.15	MUDSTONE: dark-grey, probable fault plane at base.
	646.26	0.21	SANDSTONE: grey, fine-grained with very frequent interabeds of dark-grey mudstone, bedding increases from 60° upright to vertical and 45° inverted at base, appears as same unit as above shelly fossils, slickensided surfaces at top and base, probable fault plane at base.
	646.38	0.12	MUDSTONE: dark-grey with fine interbeds of fine-grained sandstone.
	646.50	0.12	SANDSTONE: medium-grained, interbeds of dark-grey mudstone bedding disturbed by bioturbation at top.
	646.60	0.10	SANDSTONE: as above
	647.40	0.80	SANDSTONE: fine-grained with very frequent interbeds of dark-grey mudstone.
	647.96	0.56	MUDSTONE: dark-grey with interbeds of grey siltstone, large shelly fossil zone from 0.02 to 0.09m from top, plane of small fault at 0.31m from top, base of large shelly fossil zone at 0.32m from top, small shelly fossil zone from 0.43 to 0.44m from top.
	648.00	0.04	CLAYSTONE: carbonaceous with numerous very large Coal bands.
	648.11	0.11	COAL: stony, stick VHD
	648.23	0.12	COAL: stony, core broken
	648.44	0.21	CLAYSTONE: carbonaceous, bright Coal bands.
	648.60	0.16	SILTSTONE: grey with numerous plant fragments.

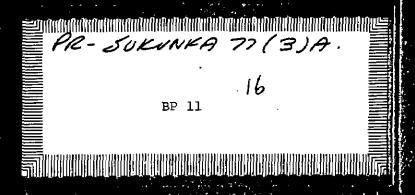
Dip	DEPTH	THICKNESS	DESCRIPTION	
0	m	. m		
	648.65	0.05	SILTSTONE: grey with phases of dark-grey and carbonaceous mudstone, a few small phases of fine-grained sandstone.	
	651.90	3.25	SILTSTONE: as above	
	652.41	0.51	SILTSTONE: grey, a few phases of fine-grained sandstone, abundant plant fragments.	
Ì	652.95	0.54	MUDSTONE: dark-grey, as above	
	655.68	2.73	MUDSTONE: dark-grey, as above, bright Coal bands becoming prominant at base, gradational base.	
	656.19	0.51	SANDSTONE: medium-grained, characterized by small-scale cross-bedding defined by fine carbonaceous partings	
	658.94	2.75	SANDSTONE: as above.	
	659.89	0.95	SANDSTONE: as above	
	660.32	0.43	SANDSTONE: as above, frequent, irregular calcite filled fractures and slickensided surfaces.	
	661.91	1.59	SANDSTONE: undisturbed, as above.	
	662.01	0.10	SILTSTONE: dark-grey, sharp upper and lower contacts.	
	662.21	0.20	SANDSTONE: as above, sedimentary breccia at base, sharp basal contact	
	662.68	0.47	SANDSTONE: fine-grained with phases of grey siltstone, cross-bedding very prominent.	
	665.71	3.03	SANDSTONE: as above.	
	665.78	0.07	SILTSTONE: dark-grey, bedding very indistinct at base, bioturbation, thin interbeds of dark-grey mudstone at top.	
	666.36	0.58	SILTSTONE: as above	
	667.28	0,92	LAMINITE: thin interbeds of grey siltstone and dark-grey mudstone forming thin graded units, slickensided surfaces and calcite veins at base, probable fault plane at base.	
Í	668.30	1.02	SILTSTONE: bedding very indistinct, bioturbation.	
	668.77	0.47	LAMINITE: as above, slickensided surfaces and calcite filled bedding planes.	
	669.41	0.64	LAMINITE: undisturbed as above.	

BH Nos. 10

Dip o	DEPTH m	THICKNESS m	DESCRIPTION	
	672.31	2.90	LAMINITE: undisturbed as above.	
	672.95	0.64	LAMINITE: fine interbeds of siltstone and mudstone, bedding very regular, listric surfaces on bedding, core broken at base.	
	673.30	0.35	MUDSTONE: dark-grey, carbonaceous at base.	
	675.26	1.96	CORE MISSING - COAL	
	675.29	0.03	COAL: dull and bright, stick	
	675.38	0.09	COAL: dull, large pieces	
	675.44	0.06	COAL: dull, small pieces.	
	675.52	0.08	CLAYSTONE: dark-grey, numerous bright Coal bands.	
	675.56	0.04	COAL: pulverized, type indistinguishable.	
	675.58	0.02	COAL: bright banded, heavily sheared	
	675.60	0.02	COAL: dull banded, heavily sheared.	
	675.65	0.05	COAL: dull and bright, heavily sheared	
	675.76	0.11	COAL: dull, heavily sheared	
	675.83	0.07	COAL: dull banded, heavily sheared	
	675.86	0.03	COAL: dull and bright, heavily sheared	
	675.88	0.02	COAL: dull banded, heavily sheared	
	675.95	0.07	COAL: pulverized, types indistinguishable	
	676.08	0.13	COAL: dull, heavily sheared.	
	676.14	0.06	COAL: sheared	
	·676.16	0.02	COAL: pulverized, bright fragments	
	676.19	0.03	COAL: dull banded, sheared.	
	676.26	0.07	COAL: sheared, bright banded.	
	676.32	0.06	COAL: sheared, dull and bright	
	676.37	0.05	COAL: dull, core badly broken	
	679.88	3.51	CORE LOSS-COAL	

BH Nos. 10

Dip	DEPTH m	THICKNESS	DESCRIPTION	
			FLOOR OF CHAMBERLAIN SEAM.	
		CLAYSTONE: carbonaceous, interbeds of light-grey sandstone		
	680.66	0.48		
		·	SILTSTONE: dark-grey, Coaly inclusions at base.	
	681.77	1.11	SANDSTONE: light-grey, medium-grained, calcite filled fractures throughout, spaced 0.20m at 45° to core axis and normal to bedding. Coaly inclusions at top, large worm burrows over last meter.	
	687.34	5.57	SANDSTONE: as above.	
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CANADA

Page 1

AREA

SUKUNKA

B. H. No. BP 11

Contractor:

Longyear

Commenced:

July 30, 1977

Completed:

Aug 5, 1977

Co-ordinates: 6,114,574.84

594,248.59

Ν E

Surface Elevation: 1,679.25

m

Core Size:

ΗQ

Casing Left in Hole:

m

Hole Angle:

SEAMS

page la

DEPTH

See detail

Geologist Ali Chowdry

Hole Azimuth:

Logged by:

Geoff Jordan

58.17-59.63

%RECOVERY

254.81-375.10

ELEVATION

375.10 Final Depth:

Bill Nyland

233.48-252.32

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	115.98	115.98	1,563.27
Sukunka	243.91	127.93	1,435.34
Moosebar	331.30	87.39	1,347.95
U. Gething	370.71	39.41	1,308.54

-			
BIRD	334.24		1,345.01
CHAMBERLAIN	370.71		1,308.54
F.PO.	324.28	Fracturing	

THICKNESS

Sperry-Sun Survey

Date: 5th August 1977

Borehole: BP #11 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
374m	4° 15†	N 18° E
350m	4° 15'	N 16° E
300m	3° 30'	N 18° E
250m	3° 30'	N 14° E
200m	3° 15'	N 15° Е
150m	2° 45 '	$N 12^{O} E$
100m	2° 30'	N 3° E
50m	2° 15'	n 7° e

BH Nos. 11

Dip	DEPTH m	THICKNESS	DESCRIPTION
	20.56	20.56	OVERBURDEN.
5°	21.21	0.65	SANDSTONE: light-grey, fine-grained, some gradations to very fine sand, laminated, top 0.07m weathered; gradat-ional at base.
	21.68	0.47	SILTSTONE: medium/dark-grey, very argillaceous, ripples of very fine sands, mostly fragmented, calcareous lower half.
	22.70	1.02	MUDSTONE: dark-grey/black, abundant carbonized plant debris, rusty nodules, coaly stringers towards base.
	23.06	0.36	SANDSTONE: medium-grey, very fine-grained, silty and argillaceous lower half, calcareous, gradational below.
	25.65	2.59	MUDSTONE: dark-grey to black, locally carbonaceous, broken up at 25.50-25.91, gradational below.
	26.35	0.70	MUDSTONE: middle 0.22m dark-grey, silty strongly calcareeous mudstone, rest canneloid mudstone.
	27.80	1.45	MUDSTONE: dark-grey, canneloid, breaks easily on concoid- al and irregular fractures, incompetent. COAL SEAM 'C'
	27.85	0.05	COAL: dull banded, pieces
	27.94	0.09	COAL: dull and bright, pieces
	27.96	0.02	CLAYSTONE: dark-grey,
	27.99	0.03	COAL: dull and bright, pieces
	28.08	0.09	COAL: undifferentiated, core very badly pulverized
	28.21	0.13	CORE LOSS-COAL
	28.28	0.07	COAL: dull and bright
	28.47	0.19	SANDSTONE: grey, medium-grained, large bright coal inclusions at top, carbonaceous.
6°	33.76	5.29	SANDSTONE: light-grey, medium-grained, mostly cross-bedd- ed, clean and well-sorted, small diagnostic burrows (Marker), 29.14-31.09, non-calcareous, gradational below.
	37.70	3.94	SANDSTONE/CONGLOMERATE: 50:50, interbedded sequence of sandstone, generally fine/medium-grained and clean, and granular to finely pebbly conglomerates, abrupt basal contact. Large marker burrows: 36.15-36.28.

BH Nos. 11

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	47.24	9.54	SANDSTONE: light-grey, fine-to medium-grained, very clean and extremely well-sorted, vaguely discernible cross-bedding, non-calcareous; few vertical fractures.
	48.15	0.91	SANDSTONE (80%)/MUDSTONE (20%): rapidly interlayered sand and mudstone with erosional micro-boundaries, sand fine-grained, clean; erosional below.
	51.02	2.87	SANDSTONE: light-grey, very clean and uniform, totally lacking lamination (except basal 0.30m), erosional below.
70	51.47	0.45	MUDSTONE: black, some silty ripples at top and 0.08m of fine sand toward base; erosional below, some sticky mud at top.
	55.62	4.15	SANDSTONE:light-grey, fine/medium-grained, clean, devoid of lamination.
	56.62	1.00	SANDSTONE (70%)/MUDSTONE (30%): initial 0.23m sands with sticky black clays. Rest interbedded, sandstone, fine-grained, clean and dark-grey silty mudstone. Rock readily yielding along contact of muddy lithology, listric surfaces.
90	58.17	1.55	SANDSTONE: light-grey, fine-grained, bright coaly bands and fine coaly partings in lower 0.30m, sharp basal contact, very competent.
	58.46	0.29	CONGLOMERATE: pebbly, light-grey, grains of grey/white-black argelite and chert, very competent.
			COAL SEAM 'B'
	58.48	0.02	COAL: dull and bright, stick
	58.53	0.05	COAL: dull banded, stick
	58.57	0.04	COAL: dull and bright, stick
	58.61	0.04	COAL: dull banded, stick
	58.68	0.07	COAL: bright banded, stick
	58.71	0.03	COAL: dull, stick
	58.73	0.02	COAL: dull and bright, stick
	58.76	0.03	COAL: dull, stick
	58.78	0.02	COAL: dull banded, stick

BH Nos. 11

Dip	DEPTH m	THICKNESS	DESCRIPTION
		m	
	58.82	0.04	COAL: bright banded, stick
	58.85	0.03	COAL: dull, stick
	58.89	0.04	COAL: bright, stick
	58.95	0.06	COAL: dull, stick
	59.00	0.05	COAL: dull and bright, stick
	59.05	0.05	COAL: dull, stick
	59.12	0.07	COAL: dull and bright, stick
	59.21	0.09	MUDSTONE: carbonaceous, bright coal inclusions, dark-grey soft, weathered brown.
	59.63	0.42	SILTSTONE: dark-grey, plant fragments, sharp irregular basal contact, competent.
	61.67	2.04	SANDSTONE: medium-grey, very fine-grained, argillaceous 20%, laminated, few goal inclusions, gradual below.
	62.95	1.28	MUDSTONE: predominantly dark-grey to black, coaly and carbonaceous, lower half badly broken and pulverized. Coal Seam 'A' level lower contact abrupt.
	77.41	14.46	CONGLOMERATE: upper 4.0m essentially within 4-5mm (across) Rest finely pebbly quartz, cherts; bottom 0.90m fine sand granular interval, base defined by coaly fragment.
6°	90.28	12.87	SANDSTONE: light-grey, well-washed, well-sorted, massive to cross-laminated, non-calcareous, fine-to medium-grained vertical fracturing within 85.35-88.22, Bottom 1.0m fine grained, some burrowing and silty clastic laminae (due to biochurning), very coarse-grained sandstone layer: 89.32-89.36; erosional basal contact.
	91.64	1.36	SANDSTONE: fine-grained, light-grey, few very coarse-grained sand and granular layers; bottom 0.60m with argillaceous intercalations (15%), erosional at base.
	.93.57	1.93	CONGLOMERATE: predominantly granular; bottom 0.35m fine pebbles, erosional below.
7 ⁰	94.17	0.60	SANDSTONE: light-grey, very fine-grained, small-scale cross-lamination, muddy lenticles (erosional boundaries), erosional below.
	94.35	0.18	CONGLOMERATE: finely pebbly, with fine sand matrix, abrupt below.

BH Nos.11

	DED	THICKNESS	
Dip	DEPTH m	THICKNESS m	DESCRIPTION
6°	112.16	17.81	SANDSTONE: light-grey, medium-grained, very clean and well-sorted, prominently cross-stratified, slump structures 102.96-104.17, strongly calcareous throughout; listric surfaces within 104.46-105.46, bottom 3.0m with several thin muddy layers, interbedded below.
	114.50	2.34	MUDSTONE (40%)/SANDSTONE (60%): rapid interlaying of fine- grained sands and dark-grey mudstone; many micro-erosional features, extensive burrowing, core broken up in basal l.Om,strongly calcareous, abrupt below.
6°	115.98	1.48	SANDSTONE: light-grey, fine-grained, mostly clean, sand at base intimately associated with muds due to modification by burrows, 0.12m muddy layer 0.40m from base. Some large burrows, and much original lamination still preserved, calcareous, interbedded below.
			GATES SUKUNKA
6°	129.03	13.05	SANDSTONE (50%)/MUDSTONE (30%)/SILTSTONE (20%): rapid alternations of sands, very fine-grained, some gradations, abundant micro-erosional features, extensive bioturbation.
			SANDSTONE (20%)/SILTSTONE (50%)/MUDSTONE (30%):similar in features to above, but more intensive bioturbation.
	145.48	16.45	MUDSTONE (30%)/SANDSTONE (15%)/SILTSTONE (55%): much of sequence well-homogenized so the intermingling of lithologies, some fracturing: 137.46-138.76; some rusty nodules.
5 ⁰	159.45	13.97	SANDSTONE (75%)/SILTSTONE (15%)/MUDSTONE (10%): sandstone fine-to very fine-grained, laminated and some small-scale cross-lamination, large burrows at 3 widely spaced levels, silts and muds intimately associated with sandy units.
	167.00	7.55	SILTSTONE (55%)/MUDSTONE (20%)/SANDSTONE (25%): intensive bioturbation; some sandy zones still with some sedimentary lamination, vertical fracture 162.25-163.0, strongly calcareous throughout.
,	179.61	12.61	SANDSTONE (35-40%)/SILTSTONE (40-45%)/MUDSTONE (25-30%): sand fine-to very fine-grained, have differentiated intervals with much small-scale cross-lamination; Basal 2.80m with lenticles and ripples of sands, with erosional tops. Bottom 0.15m with vertical fracture.3cm very coarse-grain sand with scattered granular fraction of cherts, quartz and some sand pebble lithology (nothing exceeding 2-3mm across), this small unit has erosional and scoured

BH Nos. 11

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	•		base with mudstone (10cm) below, some glauconitic sand- stone in basal 2.10m, strongly calcareous throughout.
30-40	198.80	19.19	SANDSTONE (60%)/SILTSTONE (25%)/ MUDSTONE (15%): regularly alternating sequences of silts, sands and muds, better defined and preserved sedimentary structures (due to lesser degree of bioturbation), strongly calcareous throughout.
	232.29	33.49	SILTSTONE (50%)/MUDSTONE (35%)/SANDSTONE (15%): sands very fine-grained, here mainly as lenticles and ripples, some micro and cross-lamination, siltstones dark grey, coarse and imtimately mixed with sands, considerably decreased bioturbation, there is gradual tendency for increase of mud and elimination of sandy, silty fraction, strongly calcareous throughout.
	233.48	1.19	SANDSTONE/SILTSTONE: interbedded, sandstone very fine- grain and siltstone dark grey to black, sandstone biotur- bated and minor slump structures apparent 30/70,calcareous
	235.61	2.13	SANDSTONE/SILTSTONE: as above 30/70.
	240.49	4.88	SANDSTONE/SILTSTONE: as above 20/80.
	242.31	1.32	SANDSTONE/SILTSTONE: as above 30/70.
	243.91	1.60	MUDSTONE: silty, black.
			SUKUNKA
			MOOSEBAR
	248.79	4.88	MUDSTONE: silty, fractured, minor small worm burrows apparent.
	252.32	3.53	MUDSTONE: black, uniform.
	254.81	2.49	MUDSTONE: dark grey with occasional phases of dark grey siltstone, occasional worm burrows throughout, concretions low competency, cores break easily, irregular fractures.
	309.68	54.87	MUDSTONE: as above.
	314.25	4.57	MUDSTONE: as above, occasional slickensided fractures at 45° to core axis for 0.20m above depth marker 309.68.
	315.96	1,71	CLAYSTONE: white to grey/green, hard, bentonitic, charac- terised by small,dark grey worm burrows predominant at the base, sharp upper and lower contact.

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	316.12	0.16	CONCRETION: mid-grey with irregular carbonate filled fractures.
	317.14	1.02	MUDSTONE: dark-grey as above.
	317.30	0.16	CONCRETION: as above
	318.41	1.11	MUDSTONE: dark-grey as above.
	318.47	0.06	CLAYSTONE: white to grey, soft bentonitic.
	323.29	4.82	MUDSTONE: dark-grey as above.
	324.28	0.99	CORE: below marker block 323.29 shows distinct fracture. Pattern which may represent stressing of the Moosebar formation by tectonics for 3.73m below marker.
	324.30	0.02	CLAYSTONE: grey-white as above.
	325.59	1.29	MUDSTONE: as above
	326.27	0.68	MUDSTONE: as above
<u> </u>	326.31	0.04	CLAYSTONE: grey-white, hard, as above.
	327.73	1.42	MUDSTONE: dark grey as above.
	328.04	0.31	MUDSTONE: dark-grey, pyritic worm burrows throughout, core breaks easily on irregular fractures, low competency gradational basal contact.
	329.55	1.51	MUDSTONE: as above.
	329.64	0.09	CLAYSTONE: grey-white, hard bentonitic, characterized by dark coloured worm burrows, prominent at base, sharp basal contact.
	329.87	0.23	MUDSTONE: dark-grey, as above.
	330.65	0.78	MUDSTONE: as above.
	330.75	0.10	CLAYSTONE: grey-white, hard as above, sharp basal contact
-	330.87	0.12	MUDSTONE: dark-grey, as above, gradational contact.
	330.98	0.11	CLAYSTONE: grey-white, as above.
	331.30	.0.32	SANDSTONE: dark-grey/green, glauconite & pyrite filled worm burrows, prominent towards base large pyrite inclusions, bedding completely obliterated by bioturbation.

BH Nos.11

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			MOOSEBAR
			GETHING
			BIRD COAL SEAM
	331.76	0.46	CORE LOSS-COAL
	331.78	0.02	COAL: sheared, dull banded, core badly broken
	331,82	0.04	COAL: dull, metallic lustre, large fragments
	331.85	0.03	COAL: sheared, types indistinguishable.
	331.87	0.02	CLAYSTONE: carbonaceous, black
	331.90	0.03	CLAYSTONE: as above
	331.92	0.02	COAL: dull banded
	331.93	0.01	CLAYSTONE: as above
	331.94	0.01	COAL: dull, large sheared pieces
	332.01	0.07	COAL/CLAYSTONE: small sheared fragments of dull Coal and carbonaceous claystone mixed in box.
	332.47	0.46	CORE LOSS-COAL
	332.49	0.02	COAL: stoney, bright bands, stick
	332.53	0.04	COAL: dull banded, stick
	332.55	0.02	COAL: dull, fusain bands, stick
	332.62	0.07	COAL: dull banded, stick
	332.65	0.03	COAL: dull, stick
	332.69	0.04	COAL: dull and bright, sheared, stick
	332.76	0.07	COAL: dull, stick .
	332.79	0.03	COAL: bright banded, stick
	332.86	0.07	COAL: dull, large pieces,
	332.90	0.04	COAL: dull and bright, large pieces
	332.97	0.07	COAL: dull banded, large picces.

BH Nos. 11

Dip	DEPTH	THICKNESS m	DESCRIPTION
	m		
	333.00	0.03	COAL: dull and bright, stick
	333.12	0.12	COAL: dull banded, stick
	333.14	0.02	COAL: bright, stick.
	333.16	0.02	COAL: dull banded, stick
	333.22	0.06	COAL: dull and bright, stick
	333.28	0.06	COAL: dull banded, stick
	333.33	0.05	COAL: bright banded, stick
	333.37	0.04	COAL: dull banded, stick
	333.42	0.05	COAL: bright, stick
	333.47	0.05	COAL: dull and bright, stick
	333.55 ·	0.08	COAL: dull, metallic lustre, stick
	333.64	0.09	COAL: dull and bright, stick
	333.72	0.08	COAL: dull banded, stick
	333.75	0.03	COAL: dull and bright, stick
	333.79	0.04	COAL: bright, stick
	333.84	0.05	COAL: dull banded, stick
	333.88	0.04	COAL: bright, large pieces.
	333.93	0.05	COAL: dull and bright, small pieces
	333.97	0.04	COAL: bright banded, small pieces
	334.00	0.03	COAL: bright, stick
	334.02	0.02	COAL: bright banded, large pieces
	334.06	0.04	COAL: dull banded, stick
	334.11	0.05	COAL: dull and bright, large pieces
	334.19	0.08	COAL: bright banded, stick
	334.21	0.02	COAL: dull and bright, stick
	334.24	0.03	COAL: bright, small pieces.

BH Nos. 11

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	334.45	0.21	SANDSTONE: medium-grained, light-grey, coaly inclusions, near the top, characterized by small worm burrows giving mottled appearance from 2.13m - 3.5m from top. Bedding completely obliterated by bioturbation.
	340.33	5.88	SANDSTONE: as above
50	340.81	0.48	SANDSTONE: fine/medium-grained, light-grey, characterized by large worm burrows, from 1.25m-1.50m from top. Bedding is apparent and defined by fine carbonaceous partings, a few interbeds of dark-grey siltstone towards the top.
	346.05	5.24	SANDSTONE: as above
	346.34	0.29	SANDSTONE: as above, numerous calcite filled fractures and inclusions, irregular orientations.
	347.23	0.89	SANDSTONE: undisturbed as above.
	354.14	6.91	SANDSTONE: as above
	354.37	0.23	MUDSTONE: dark-grey, pyritic worm burrows prominent towards base, sharp irregular basal contact.
	355.14	0.77	SILTSTONE: mid-grey, phases of fine-grained sandstone interbedded at base, plant fragments, bedding partially obliterated by bioturbation.
	355-79	0.65	SANDSTONE: grey, frequent cross-bedding, phases of dark- grey siltstone interbeds.
	355.99	0.20	SILTSTONE: grading to mudstone at base, dark-grey, slump- ing at basal contact.
	356.75	0.76	SILTSTONE: as above
	356.95	0.20	SANDSTONE: medium-grained, light-grey, coaly partings and inclusions at base, pyrite at base.
	357.25	0.30	MUDSTONE: dark-grey with coaly inclusions near top and fine grained sandstone interbeds at the base.
	358.18	0.93	SANDSTONE: light-grey, medium-grained, frequent interbeds of dark-grey siltstone in the lower half. Base of unit marked by light coloured large worm burrows.
	358.32	0.14	SANDSTONE: as above
	360.17	1.85	CORE MISSING - ROCK
	360.26	0.09	SILTSTONE: dark-grey, grades to unit at base.

BH Nos. 11

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	360.28	0.02	SANDSTONE: dark-grey with abundant coaly partings and plant fragments.
	360.34	0.06	COAL: dull banded, pyrite inclusions.
	360.55	0.21	CLAYSTONE: carbonaceous, abundant plant fragments, numerous bright coal inclusions at top and base.
	360.57	0.02	COAL: dull banded, stick
	360.68	0.11	COAL: dull, stick
	360.71	0.03	.COAL: dull and bright, stick
	360.75	0.04	COAL: dull banded, stick
	360.82	0.07	COAL: dull, stick
	360.89	0.07	COAL: dull and bright, stick
	360.95	0.06	COAL: dull, stick
	360.98	0.03	COAL: bright banded, stick
	361.02	0.04	COAL: dull banded, stick
	361.08	0.06	COAL: dull and bright, stick
	361.10	0.02	COAL: bright banded, stick
	361.13	0.03	COAL: bright, stick
	361.16	0.03	COAL: bright, stick
	361.20	0.04	COAL: bright banded, stick
	361.23	0.03	COAL: bright, stick
	361.28	0.05	CLAYSTONE: carbonaceous, bright coal bands and inclusions at top.
	362.84	1.56	SANDSTONE: medium-grained, light-grey, with frequent phases of dark-grey siltstone. Plant penetrations and cross-bedded phases.
	362.94	0.10 .	SANDSTONE: fine-grained, light-grey, characterized by abundant cross-bedding, plant penetration in centre, interbeds of dark-grey siltstone at base.
	363.61	0.67	SANDSTONE: as above

BH Nos. []

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
5°	365.13	1.52	LAMINITE: thin regular interbeds of fine-grained, light- grey sandstone, with dark-grey mudstone, moderate to low competency, core breaks easily on bedding planes, grada- tional bedding contacts.
	366.08	0.95	CORE MISSING - ROCK
	366.16	0.08	CLAYSTONE: carbonaceous
	366.22	0.06	CORE LOSS-ROCK
	366.25	0.03	COAL: bone
	366.28	0.03	COAL: dull banded
	366.32	0.04	COAL: dull and bright
	366.35	0.03	COAL: dull banded
	366.57	0.22	CORE LOSS-COAL
	366.69	0.12	CORE LOSS-ROCK
	366.73	0.04	CLAYSTONE: carbonaceous, slickensides on fracture surfaces.
	366.75	0.02	COAL: dull and bright, stick
	366.78	0.03	COAL: dull, stick
	366.82	0.04	COAL: dull and bright, stick
	366.84	0.02	COAL: bright banded, stick
	366.86	0.02	COAL: boney, stick
	366.93	0.07	COAL: dull, stick
	366.98	0.05	COAL: dull and bright, stick
	367.04	0.06	COAL: dull banded, stick
	367.11	0.07	COAL: dull, stick
	367.15	0.04	COAL: dull banded, stick
	367.17	0.02	COAL: boney, stick
	367.25	0.08	COAL: dull, stick
	367.28	0.03	COAL: dull and bright, stick

BH Nos.11

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	367.39	0.11	COAL: dull, stick
	367.46	0.07	COAL: dull and bright, stick
	367.47	0.01	COAL: boney, stick
	367.55	0.08	COAL: dull and bright, stick
	367.62	0.07	COAL: dull banded, stick
	367.68	0.06	COAL: dull banded, stick
	367.74	0.06	COAL: dull and bright, large pieces sheared.
	367.77	0.03	COAL: dull banded, large pieces sheared
	367.81	0.04	COAL: dull and bright, stick, sheared
	367.84	0.03	COAL: bright, stick
	367.92	0.08	COAL: dull, stick
	368.00	0.08	COAL: dull banded, stick
	368.11	0.11	COAL: dull, stick
	368.14	0.03	COAL: dull and bright, stick
	368.18	0.04	COAL: dull banded, stick
	368.20	0.02	COAL: dull and bright, stick
	368.25	0.05	COAL: dull, stick
	368.27	0.02	COAL: dull banded, stick
	368.34	0.07	COAL: dull, stick
	368.39	0.05	COAL: dull and bright, stick
	368.42	0.03	COAL: boney, stick
	368.44	0.02	COAL: bright, stick
	368.47	0.03	COAL: bright banded, stick
	368.49	0.02	COAL: dull, stick
	368.53	0.04	COAL: bright banded, stick
	368.58	0.05	COAL: bright, stick

- BH Nos. 11

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	368.61	0.03	COAL: dull and bright, stick
	368.64	0.03	COAL: dull, stick
	368.66	0.02	COAL: dull banded, stick
	368.70	0.04	COAL: dull, stick
	368.72	0.02	COAL: bright, stick
	368.75	0.03	COAL: dull, stick
	368.82	0.07	COAL: bright, stick
	368.87	0.05	COAL: dull and bright, stick
	368.90	0.03	COAL: dull banded, stick
	368.93	0.03	COAL: dull, stick
	368.98	0.05	COAL: dull banded, stick
	369.06	0.08	COAL: dull and bright, stick
	369.08	0.02	COAL: bright banded, stick
	369.10	0.02	COAL: dull, stick
	369.13	0.03	COAL: dull and bright, stick
	369.17	0.04	COAL: bright banded, stick
	369.25	0.08	COAL: dull and bright, stick
	369.30	0.05	COAL: bright, stick
	369.34	0.04	COAL: dull and bright, stick
	369.39	0.05	COAL: bright banded, stick
	369.43	0.04	COAL: dull and bright, stick
	369.46	0.03	COAL: dull, stick
-	369.53	0.07	COAL: dull banded, stick
	369.62	0.09	COAL: dull, stick
	369.65	0.03	COAL: bright banded, stick
	369.67	0.02	COAL: dull banded, stick

BH Nos. 11

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	369.70	0.03	COAL: dull, stick
	369.71	0.01	COAL: bright, stick
	369.73	0.02	COAL: dull, stick
	369.76	0.03	COAL: dull and bright, stick
	369.79	0.03	COAL: bright, stick
	369.81	0.02	COAL: dull and bright, stick
	369.82	0.01	CLAYSTONE: white, coaly inclusions, 0.01
	369.89	0.07	COAL: bright banded
	369.93	0.04	COAL: dull
	369.96	0.03	COAL: dull and bright
	370.00	0.04	COAL: dull banded
ļ	370.07	0.07	COAL: bright
	370.12	0.05	COAL: dull and bright
	370.15	0.03	COAL: dull banded
	370.19	0.04	COAL: dull and bright
	370.27	0.08	CORE LOSS-COAL
6°	370.71	0.44	MUDSTONE: dark-grey, carbonaceous, bright coal bands and inclusions.
	371.97	1.26	SANDSTONE: medium-coarse-grained, light-grey, carbonaceou inclusions at top, bedding distinguished by thin coaly laminae, few dark-grey claystone interbeds.
	375.10	3.13	SANDSTONE: as above.
			* * * * *
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BP - SUKUNKA 77 (3)A. BP 12

663

BP COAL CANADA



AREA

SUKUNKA

B. H. No. BP 12

Contractor: Tonto

Commenced:

July 31, 1977

Completed:

Aug 12, 1977

Co-ordinates: 6,113,773.63

595.536.76

Surface Elevation: 1,824.78

Ε m

Ν

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

Hole Azimuth:

Final Depth: 473.35

See detail

page la

Geologist

Ali Chowdry

46.58-110.90

Logged by:

113.10-169.00 42.57-45.16

Geoff Jordan

110.94-111.76 393.17-473.35

		Andy Newson ·	186.63-392.89
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	169.00	169.00	1,655.78
Sukunka	299.40	130.40	1,525.38
Moosebar	394.11	94.71	1,430.67
U. Gething	427.53	33.42	1,397.25

SEAMS	DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD	397.28			1,427.50

CHAMBERLAIN 427.53 1,397.25

F.PR. F.PO. 20.7 409.01 Brecciated Slickensides

Sperry-Sun Survey

Date: 12th August 1977

Borehole: BP # 12 Sukunka 77

Compass: 20° Maximum tilt to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	Tilt	<u>Tilt Direction</u>
473m	3° -	N 43° E
450m	2° 30°	N 43° Е
400m	2° -	N 41° E
350m	2° 30'	N 39° Е
300m	2° 15'	n 36° Е
250m	1° 30'	N 31° E
200m	1° 30'	N 7° E
150m	1° -	N 12° E
100m	1° -	n 16° w
50m	1° -	n 38° w

BH Nos. 12

Dip	DEPTH	THICKNESS	DESCRIPTION
О	m	m	
	42.78	0.08	CLAYSTONE, carbonaceous, with bright coal bands, fragment in box
	42.98	0.20	CLAYSTONE, carbonaceous
	43.03	0.05	COAL, stony
	43.12	0.09	CLAYSTONE, carbonaceous
	43.15	0.03	COAL, dull, large pieces
	43.20	0.05	COAL, dull, stick
	43.28	0.08	COAL, dull, core broken
	43.34	0.06	CLAYSTONE, with bright coal bands
	43.40	0.06	COAL, dull and bright, large pieces
	43.47	0.07	COAL, dull banded, stick
	43.53	0.06	COAL, dull, large pieces
	43.61	0.08	COAL, dull and bright small pieces
	43.63	0.02	CLAYSTONE, carbonaceous
	43.69 43.71	0.06	COAL, dull banded, small pieces dull and bright, stick
	43.74	0.03	COAL, dull, stick
	43.80	0.06	COAL, dull and bright, sheared stick
	43.81	0.01	CLAYSTONE, carbonaceous
	43.87.	0.06	COAL, dull, stick
	43.92	0.05	COAL, dull banded, stick
	43.97	0.05	COAL, dull and bright, stick
	43.99	0.02	COAL, dull, stick
	44.06	0.07	COAL, bright banded, stick
	44.14	, 0.08	COAL, dull banded, stick
	44.20	0.06	COAL, dull and bright, stick
	44.29	0.09	COAL, dull, large pieces
	44.33	0.04	COAL, dull and bright
	44.38	0.05	COAL, dull banded, large pieces
<u> </u>	44.45	0.07	COAL, sheared, dull
	44.47	0.02	CLAYSTONE, carbonaceous
	44.53	0.06	COAL, sheared, small pieces
	45.16	0.63	CORE LOSS-?ROCK/COAL
	46.58	1.42	MUDSTONE, medium grey, richly silty, vertical fractures throughout, gradational at base

BH Nos. 12

Dip	DEPTH	THICKNESS	DESCRIPTION
0	· m	m	
	47.21	0.63	SILTSTONE, medium grey, coarse-grained, very little argillaceous content, devoid of lamination, bottom 0.25m muddy, gradual base, rock locally weathered along fracture plane, some calcite infilling at base
	48.65	1.44	MUDSTONE, medium grey, slightly carbonaceous (locally), fragmented, and sporadically weathered, non calcareous, fragmented base
18 ⁰	52.41	3.76	SILTSTONE/MUDSTONE, medium grey, local discontinuous lamination, strongly calcareous throughout, locally fractured vertically, gradual at base, basal 0.30m with very fine sand intercalations, 40:60
	53.04	0.63	SANDSTONE, light grey but in most part badly weathered to orange/yellow color and sand can be crushed in hand, fine-grained, unweathered part strongly calcareous, fragmented at base (no suggestion of any gradation), small scale cross-lamination
	55.96	2.92	MUDSTONE, dark grey, two carbonaceous/coaly levels aggregating 0.30m, top 1.20m with rusty nodules, a large vertical fracture, bottom 0.45m pure mudstone and crumbly, clean contact with coal below
	}		COAL SEAM "D"
	56.90	0.94	COAL, dull and bony 0.12 MUDSTONE, canneloid 0.21 COAL, dull 0.19 MUDSTONE, coaly 0.13 COAL, metallic luster 0.07 MUDSTONE, 0.09 COAL, fragmented, dull 0.06 COAL, bony 0.07
	57.32	0.42	SANDSTONE, medium grey, fine-grained, laminated, calcar- eous, gradual below bottom 0.12m very fine-grained sandstp
	57.75	0.43	MUDSTONE, medium grey, very silty at top, few coal streaks abrupt below
	58.26	0.51	SANDSTONE, medium grey, fine-grained, small-scale cross- lamination, some plant debris, calcareous, broken at base
	60.64	2.38	SILTSTONE/MUDSTONE, medium grey, top 2/3 very silty with numerous small bands of very fine grained sands, irregularly laminated, rest predominantly muddy, strongly calcareous throughout, gradual at base.
	61.34	0.70	MUDSTONE, upper half carbonaceous with thin coaly layers, rest dark mudstone
	62.74	1.40	SANDSTONE, medium grey, very fine-grained, argillaceous, 0.32m muddy band / silty band, calcareous, gradational.
	66.40	3.66	MUDSTONE, dark grey, locally carbonaceous, top 0.60m silt

BH Nos. 12

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCRIPTION
	66.85	0.45	MUDSTONE, black to dark grey, canneloid, gradual below
	67.41	0.56	MUDSTONE, brown/grey, strongly calcareous, (limy), erosional below
}	68.80	1.39	MUDSTONE, black, canneloid mostly fragmented, gradual
	00.00	1.,,,	COAL SEAM "C"
	69.18	0.38	COAL SEAM: dull, dull and bright with 0.09m mudstone, abrupt contact with conglomerate below
	86.37	17.19	CONGLOMERATE, top 5.50m predominantly granular, rest finely pebbly, multi-colored pebbles of cherts, quartzite, metamorphics, some sand in matrix, interval 83.88-86.10 frequently broken with yellow/orange weathering on broken surfaces, fining bottomward
20°	90.28	3.91	SANDSTONE/GRITS , , 60:40, essentially fine/medium-graine sands with gritty intervals, sands occasionally laminated with few coal fragments, otherwise clean, abrupt below
150	110.90	20.62	SANDSTONE, light grey, fine/medium-grained, very clean and extremely well-sorted and uniform, non calcareous, top 2.10m with scattered granules and 0.20m zone (toward base) embodying large burrows and fine pebbles, crossbedding from barely discernible to absent, a large vertical fracture around 101.20, one stylolite 104.25, bottom 1.15 fine-grained sandstone, well-laminated and interbedded with dark grey mudstones, bottom of this unit defined by 3cm conglomerate
			COAL SEAM "B"
	110.94	0.04	COAL, duil and bright, pyritic, high density stick
	110.98	0.04	COAL, dull, stick
	111.04	0.06	COAL, dull banded, stick
	111.08	0.04	COAL, dull, stick
	111.11	0.03	COAL, dull banded, stick
	111.15	0.04	COAL, dull, small pieces
	111.20	0.05	COAL, dull, small pieces
	111.27	0.07	COAL, dull and bright, large pieces
	111.36	0.09	COAL, dull, large pieces
	111.39	0.03	COAL, sheared, dull and bright fragments
	111.41	0.02	COAL, dull, small pieces
	111.46	0.05	COAL, powdered, coal types indistinguishable
	111.52	0.06	COAL, dull, sheared, small pieces
	111.66	0.14	COAL, dull, large pieces
	111.71	0.05	COAL, dull banded, large pieces

BH Nos. 12 '

Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	
	111.73	0.02	COAL, dull and bright, small pieces
	111.76	0.03	CORE LOSS-COAL
	113.10	1.34	SANDSTONE, medium grey, fine-grained, dark matrix, sporadic lamination, fragmented at top, erosional below
	114.34	1.24	SILTSTONE/MUDSTONE, dark grey, argillaceous silts, laminated locally, gradual
			COAL SEAM A HORIZON
	116.00	1.66	MUDSTONE, black, sporadically carbonaceous, 0.15m dirty coal at base, abrupt basal contact
-	130.55	14.55	CONGLOMERATE, from 116.42 to 122.38, predominantly granular also basal 1.50m, rest fine pebbles, some very large pebbles (32-50mm) bottom 0.35m with abundant sands,
	141.00	10.45	abrupt below SANDSTONE, light grey, medium-grained very clean, fairly well-sorted, cross-stratification? planes, some medium/ coarse-grained sand (very thin layers), between 132.20- 135.50, vertical fractures and fragmented core, 133.54- 134.84, gradual below, large burrows 138.44-138.60
	141.77	0.77	CONGLOMERATE, predominantly granular, fragmented and some weathering residue on fragmented surfaces
18 ⁰	143.68	1.91	SANDSTONE, light grey, medium-grained, clean occasional lamination, passage below by interbedding, (frequent appearance of granules)
	145.34	1.66	CONGLOMERATE, essentially granular and predominantly chert in sandy matrix
19 ⁰	146.25	0.91	SANDSTONE, fine/medium-grained, light grey, granular intervals (10%)
	147.47	1.22	CONGLOMERATE, 80% gritty, rest fine-grained, medium grey, well-laminated sandstones with abrupt micro-contacts with grits, abrupt below, calcareous,
	150.47	3.00	SANDSTONE, light/medium grey, fine-grained, laminated, two 9cm (each) granular intervals in upper 1.20m, 5cm muddy layer, bottom 1.0m with vertical fracture, base gradational
	152.32	1.85	SANDSTONE, badly broken (by drilling), and pulverized zone, fragments reveal the fine sandstone, light/medium grey, strongly calcareous, some of fragments seem to have been cooked in-situ and appear clinkerish
15 ⁰	166.74	14.42	SANDSTONE, clean, light grey, fine/medium-grained on to 159.10, rest fine-grained, strongly calcareous, cross-bedded, interbedded below
	169.00	2.26	SANDSTONE/MUDSTONE, sands fine-grained, argillaceous, interbedded with silty mudstone, strongly calcareous, interbedded below, 80:20

3H Nos.	12
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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			GATESSUKUNKA
	186.63	17.63	MUDSTONE WITH INTERBEDDED SANDSTONES, 60:40, mudstones distorted and bioturbated, sandstones calcareous, clean, well-bedded, bioturbated in places (large burrows) often disturbed at margins, erosional below.
	204.14	17.51	MUDSTONE, silty, minor sandy layers, vaguely calcareous, abrupt below.
-	237.66	33.52	MUDSTONE/SAND, 60:40, poorly defined layers, sand and mudstone well mixed and bioturbated, large and small burrows, disturbed, abrupt below, 215.59-0.20 of slicks and calcite filled fractures, 6cm coarse grit at 236.0m
	253.06	15.40	SANDSTONE, fine grained, argillaceous, zones of darker argillaceous material disturbed and bioturbated, gradational below, calcareous, sand: argillaceous material 80:20
	299.40	46 34	SANDSTONE, light grey, fine-grained, interbedded with silty/sandy mudstone, calcareous, interbedded at base.
			SUKUNKA MOOSEBAR
	320.23	20.83	MUDSTONE/SANDSTONE, interbedded, laminated, fine-grained, disturbed and bioturbated, sandy layers become infrequent near base, transitional below.
	392.89	72.66	MOOSEBAR BENTONITIC ZONE FERRUGINOUS ZONES SLICKED ZONES 377.73 (6cm) 384.44 (4cm) 383.03 (6cm) 383.03 (5cm) 366.49 (5cm) 366.49 (5cm)
	393.17	0.28	MUDSTONE, dark grey, pyritic worm burrows, phases of siltstone, gradational basal contact.
	393.24	0.07	CLAYSTONE, grey white, bentonitic, hard, sharp basal contact.
	393.40	0.16	MUDSTONE, dark grey, as above.
	393.46	0.06	CLAYSTONE, grey white, as above
	394.11	0.65	SANDSTONE, fine-grained, dark grey/green, pyritic worm burrows prominent at base, large pyrite inclusions at base, bedding completely obliterated by bioturbation, competent

BH Nos. 12

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			MOOSEBAR
	-		GETHING
		·	BIRD COAL SEAM
	394.12	0.01	COAL AND CLAYSTONE, bright coal bands and carbonaceous claystone interbedded,
	394.17	0.05	COAL, dull and bright, pyritic, large pieces, sheared
	394.23	0.06	COAL, dull banded, stick, sheared
	394.28	0.05	COAL, dull and bright, stick, sheared
	394.32	0.04	COAL, dull and bright, stick
	394.35	0.03	COAL, dull, stick
	394.40	0.05	COAL, dull, small pieces, sheared
	394.44	0.04	COAL, dull banded, small pieces, sheared
•	394.50	0.06	COAL, dull banded, stick
	394.54	0.04	COAL, bright banded, stick
	394.61	0.07	COAL, dull and bright, stick, sheared
•	395.07	0.46	CORE LOSS-COAL/ROCK
	395.15	0.08	COAL, sheared, small fragments, coal types indistinguishap
	395.19	0.04	COAL, dull and bright, sheared, small pieces
	395.25	0.06	COAL, dull, sheared, small pieces
	395.29	0.04	COAL, bright banded, sheared, small pieces
	395.32	0.03	COAL, bright, sheared, small pieces
	395.37	0.05	COAL, dull, sheared, small pieces
	395.42	0.05	COAL, dull and bright, sheared, small pieces
	395.47	0.05	COAL, dull banded, sheared, small pieces
	395.50	0.03	COAL, bright banded, sheared, small pieces
	395.55	0.05	COAL, dull and bright, sheared, small pieces
	395.58	0.03	COAL, dull, sheared, small pieces
	395.65	0.07	COAL, sheared, core pulverized, coal types indistin- guishable
	395.69	0.04	COAL, dull and bright, small fragments, crushed core
	395.71	0.02	COAL, dull, small fragments, crushed core
	395.74	0.03	COAL, sheared and powdered, coal types indistinguishable, fusain fragments

BH Nos. 12

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	395.77	0.03	COAL, dull, stick, sheared
	395.81	0.04	COAL, dull banded, stick, sheared
	395.87	0.06	COAL, dull banded, pieces sheared
	395.91	0.04	COAL, dull and bright, pieces sheared
	395.94	0.03	COAL, dull, pieces sheared
	396.01	0.67	COAL, dull, pieces sheared
	396.05	0.04	COAL, dull banded, pieces sheared
	396.18	0.13	COAL, dull, pieces sheared
	396.21	0.03	COAL, dull, pieces sheared
	396.25	0.04	COAL, dull banded, pieces sheared
	396.31	0.06	COAL, dull and bright, pieces sheared
	396.45	0.14	COAL, dull, stick
	396.48	0.03	COAL, dull, stick
	396.56	0.08	COAL, dull and bright, stick
ļ	396.62	0.06	COAL, dull banded, stick
	396.69	0.07	COAL, dull, large pieces, sheared
	396.71	0.02	PYRITE
	396.73	0.02	COAL, dull
	396.77	0.04	CLAYSTONE, carbonaceous, black, sheared
	397.00	0.23	CLAYSTONE, carbonaceous, black, bright coal bands
	397.10	0.10	CORE LOSS-COAL
	397.14	0.04	COAL, dull and bright, stick
	397.24	0.10	CORE LOSS-COAL
	397.28	0.04	SANDSTONE, medium-grained, light grey, carbonaceous at top, bedding completely obscured by worm burrowing, mottling by small worm burrows from 1.60 to 2.44 meters from top, leached calcite fractures and broken core from 1.33 to 3.00 meters from top
	398.68	1.40	SANDSTONE, as above
	399.34	0.66	SANDSTONE, as above
	400.39	1.05	SANDSTONE, as above
	401.33	0.94	SANDSTONE, as above
	401.78	0.45	SANDSTONE, as above
_	402.64	0.86	SANDSTONE, as above
20	403.02	0.38	SANDSTONE, fine-to medium-grained, light grey, coarse worm burrows in top 4meters, bedding defined by fine carbonaceous partings

BH Nos. 12

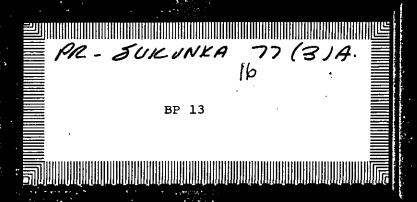
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	403.33	0.31	SANDSTONE, as above
	405.47	2.14	SANDSTONE, as above
}	407.58	2.11	SANDSTONE, as above
	409.01	1.43	SANDSTONE, calcite filled, slickensided planes at base at 27° to core axis
	409.23	0.22	SANDSTONE, as above, core badly broken and slickensided
	409.39	0.16	CORE LOSS-ROCK
	409.74	0.35	SANDSTONE, undisturbed, as above
	411.17	1.43	SANDSTONE, as above
	411.73	0.56	SANDSTONE, as above
	413.86	2.13	SANDSTONE, as above
	414.71	0.85	SANDSTONE, as above
	415.93	1.22	SANDSTONE, as above
	417.28	1.35	SANDSTONE, as above
	417.55	0.27	SANDSTONE, as above
	419.67	2.12	SANDSTONE, as above
12°	419.77	0.10	SANDSTONE, light grey, fine-grained with numerous fine coal partings on bedding
	419.87	0.10	COAL, pulverized and powdered, coal types indistinguishable
	419.96	0.09	CORE LOSS-COAL
	420.06	0.10	CORE LOSS-ROCK
	420.17	0.11	SANDSTONE, dark grey, fine-grained with numerous thick bright coal bands
	420.24	0.07	CORE LOSS-ROCK
	420.27	0.03	COAL, bright banded, core badly broken
	420.52	0.25	CORE LOSS-COAL
	420.81	0.29	SANDSTONE, fine-grained, light grey
	420.84	0.03	COAL, dull and bright, stick
	420.95	0.11	COAL, bright banded, stick
	421.04	0.09	COAL, dull and bright, stick
}	421.07	0.03	COAL, dull banded, stick
	421.22	0.15	COAL, dull, stick
	421.37	0.15	CORE LOSS-COAL
	421.48	0.11	SILTSTONE, grey with fine interbeds of carbonaceous claystone and bright coal
	421.78	0.30	CLAYSTONE, carbonaceous, black, bright coal bands

BH Nos.

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	421.88	0.10	CORE LOSS-ROCK
1	421.98	0.10	CORE LOSS-COAL
	422.05	0.07	COAL, dull banded, stick, sheared
	422.12	0.07	COAL, dull, stick, sheared
	422.18	0.06	COAL, dull and bright, stick, sheared
	422.24	0.06	COAL, dull banded
	422.36	0.12	COAL, dull, stick, sheared
	422.41	0.05	COAL, dull and bright, stick, sheared
	422.43	0.02	COAL, boney, stick, sheared
	422.50	0.07	COAL, dull banded, stick, sheared
	422.65	0.15	COAL, stoney, sheared, large pieces
	422.77	0.12	COAL, dull and bright, sheared, large pieces
	422.81	0.04	CLAYSTONE, carbonaceous, bright coal bands
	422.83	0.02	COAL, bright
	422.86	0.03	CLAYSTONE, as above
	422.89	0.03	COAL, bright banded, sheared, stick
	422.93	0.04	COAL, dull and bright, sheared, stick
	422.98	0.05	CLAYSTONE, carbonaceous, as above
	423.02	0.04	COAL, bright banded, stick sheared
	423.05	0.03	CLAYSTONE, carbonaceous, as above
	423.12	0.07	COAL, dull and bright
	423.30	0.18	CLAYSTONE, carbonaceous, as above
	423.71	0.41	CORE LOSS-ROCK
	423.78	0.07	COAL ε CLAYSTONE, fragments mixed in box
	\$24.50	0.72	CLAYSTONE, carbonaceous, as above
	425.36	0.86	CLAYSTONE, as above
	425.43	0.07	COAL, bright, core broken
	425.91	0.48	CLAYSTONE, carbonaceous, as above
	426.01	0.10	SANDSTONE, fine-grained, light grey, coaly incusions at top and base
	426.11	0.10	COAL, dull and bright, sheared
	426.13	0.02	COAL, stoney
	426.19	0.06	COAL, bright banded, sheared
	426.24	0.05	COAL, dull banded, sheared
	426.28	0.04	COAL, dull and bright, sheared

BH Nos. 12

Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	·m	
-	443.47	0.04	SANDSTONE, as above, containing scattelea chert pebbles
	443.78	0.31	SANDSTONE, as above, medium to coarse-grained, cross- bedded
	445.80	2.02	SANDSTONE, as above
	446.06	0.26	SANDSTONE, as above
	447.22	1.16	SANDSTONE, as above, core broken, calcite filled slickensided irregular fractures, minor tectonic disturbance
	447.84	0.62	SANDSTONE, undisturbed, as above
	448.63	0.79	SANDSTONE, as above
•	448.71	0.08	CONGLOMERATE, pebble, 30% matrix, black, white and grey chert
	449.98	1.27	SANDSTONE, as above, medium-grained
	450.32	0.34	SANDSTONE, as above
	451.13	0.81	SANDSTONE, as above
	451.18	0.05	CONGLOMERATE, pebble, as above
	452.10	0.92	SANDSTONE, as above
	453.50	1.40	SANDSTONE, as above
	454.25	0.75	SANDSTONE, as above
	454.62	0.37	SANDSTONE, as above
	455.99	1.37	SANDSTONE, as above
	456.42	0.43	SANDSTONE, as above
	456.58	0.16	SANDSTONE, as above
	458.50	1.92	SANDSTONE, as above
,	459.59	1.09	SANDSTONE, as above
٠	460.52	. 0.93	SANDSTONE, as above
	462.61	2.09	SANDSTONE, as above
	463.91	1.30	SANDSTONE, as above
	464.83	0.92	SANDSTONE, as above
	465.68	0.85	SANDSTONE, as above
	466.28	0.60	SANDSTONE, as above
	466.48	0.20	SANDSTONE, as above
	466.51	0.03	SEDIMENTARY BRECCIA, siltstone in sandstone
	467.00	0.49	SANDSTONE, as above
	467.27	0.27	SANDSTONE, as above
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AREA

SUKUNKA

B. H. No. BP -13

Contractor:

Connors

Commenced:

Completed:

Hole Angle:

SEAMS

Core Size:

HQ

DEPTH

Hole Azimuth

See detail

page la

Logged by:

Bill Nyland

Geoff Jordan

%RECOVERY

Casing Left in Hole:

Depth 49.07-68.99 Geologist Mike DeMestre

Co-ordinates: 6,112,423.63

Surface Elevation: 1,567.10

84.95-318.85

595,299.91

71.93-82.00 319.07-390.32

ELEVATION

390.32 Final Depth:

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	82.00	82.00	1,485.10
Sukunka	232.00	150.00	1,335.10
Moosebar	321.02	89.02	1,246.08
U. Gething	369.18	48.16	1,197.92

THICKNESS

BIRD	325.29	1,241.81
CHAMBERLAIN	369.18	1,197.92
F. PR F. PR. F. PO. F. PO. F. PR. F. PR.	86.58 108-119 140.93 239.57 288 336.89 379	Brecciated and Slickensided Fractured & slickensided Fractured Fractured & slickensided Fractured & slickensided Breccia Highly distrubed bedding

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION
0	111	m	
	49.07	49.07	TRICORED - no core
	50.44	1.37	SANDSTONE, medium grey, medium-grained sandstone, moderately well-sorted, usually massive but sometimes cross-bedded (large highangle) black mudstone partings occur locally (zone sandstone/mud .0205m thick)
	51.22	0.78	SANDSTONE, dark, varicolor, coarse-grained sandstone, moderately well-sorted, fining upward
90	51.51	0.29	SANDSTONE, banded, dark, varicolored, coarse-grained sandstor and medium grey, fine-to medium-grained sandstone, both moderately well-sorted, commonly cross-bedded (high angle, large scale) with occasional thin black muddy partings
	53.75	2.24	SANDSTONE, as above
	56.69	2.94	SANDSTONE, light grey, fine-grained sandstone, well- sorted, massive to cross-bedded with occasional black muddy inclusions scattered
	59.74	3.05	SANDSTONE, as above
	62.78	3.04	SANDSTONE, as above
	65.83	3.05	SANDSTONE, as above
	68.99	3.16	SANDSTONE, as above
15 ⁰	71.93	2.94	SANDSTONE, fine-grained, light grey, faintly laminated, moderately calcareous
	72.40	0.47	SANDSTONE, as above
	72.52	0.12	SANDSTONE, very fine-grained with thinly laminated siltstone
20°	72.77	0.25	SANDSTONE, fine-grained, light grey, family laminated
	72.90	0.13	SILTSTONE, dark grey to black, sandy
	73.84	0.94	SANDSTONE, fine-grained, light grey, faintly-bedded
	74.37	0.53	SANDSTONE, fine-to very fine-grained grey to argillaceous with laminations
	74.46	0.09	SILTSTONE, dark grey to black, slumped and small burrows
	74.98	0.52	SANDSTONE, fine-grained, grey laminated, slumped and bioturbated, strongly calcareous
	75.26	0.28	SANDSTONE, as above
25°	76.00	0.74	SANDSTONE, as above but laminated
	76.63	0.63	SILTSTONE, dark grey to black, slumped and bioturbated in part with laminated sandstone, grey to argillaceous, very fine-graimed, calcareous
	77.34	0.71	SANDSTONE, fine-graimed, light grey, faintly laminated, calcareous strongly

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	78.53	1.19	SANDSTONE, fine-grained, light grey, strongly calcareous, slumped and bioturbated in part, interbedded thickly with small bands of siltstone, dark grey to black
	81.58	3.05	SANDSTONE, light grey, fine-grained with large slump structures and minor laminations, strongly calcareous
	81.67	0.09	SANDSTONE, as above
	82.00	0.33	SANDSTONE, grey, fine-grained, laminated with siltstone, dark grey to black
			·
			GATES SUKUNKA
			SANDSTONE/MUDSTONE, light grey, very fine-grained-to fine-grained sandstone, slightly calcareous, finely laminated, few low-angle small-scale cross-beds, black massive mudstone often burrowed (mostly small size burrows), usually slightly silty, the two lithologies are also found intimately mixed together, often heavily bioturbated, burrowed and slumped, the contacts of the finely-laminated sandstone with the mudstone units are usually sharp
	84.95	2.95	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, 40:40:20, silty mudstone
	85.38	0.43	SAME AS ABOVE
	86.58	1.20	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, as above, zone of faulting, core is heavily sheared and fragmented with numerous listric and slickensided features, also calcite common in brecciated zones
	89.30	2.72	SANDSTONE/MUDSTONE, 65:35
	92.35	3.05	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, 70:25:5, zone of broken up core and listric surface
	95.40	3.05	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, 25:25:50
	98.45	3.05	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, 15:40:45, gradational, silty mudstone
	101.80	3.35	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE,15:55:30, silty mudstone
	104.85	3.05	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, 15:70:15, silty mudstone, two slickensided surfaces
	105.41	0.56	SANDSTONE/MUDSTONE, 25:75, silty, very few burrows, core broken up, but no listric or slickensided features
	107.89	2.48	SANDSTONE/MUDSTONE, as above

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION
o	m	m	
	108.39	0.50	SANDSTONE/MUDSTONE, silty, few scattered burrows, small ones, zone of sheared and completely shattered core 15:85
	108.47	0.08	SANDSTONE/MUDSTONE, as above
	110.94	2.47	SANDSTONE/MUDSTONE, as above
	113.99	3.05	SANDSTONE/MUDSTONE, 20:80, silty, occasionally mixed with thin sandy wisps, core is locally extensively broken up and has numerous slickensided and listric features with associated calcite mineralization (spaced every .0212m)
	116.43	2.44	SANDSTONE/MUDSTONE, silty, 50:50, some fault features as above, but core broken up more extensively
	119.48	3.05	SANDSTONE/MUDSTONE, silty, 80:20, core still shows fault features but more infrequently and the core is slight broken up
	122.52	3.04	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE,60:20:20, heavily burrowed, sandstone bed 0.90m thick
	123.98	1.46	SANDSTONE/MUDSTONE/MIXED SANDSTONE-MUDSTONE, 20:20:60, as above, core broken up with few slickensides, silty
	124.58	0.60	AS ABOVE
	125.88	1.30	AS ABOVE
	128.93	3.05	SANDSTONE/MUDSTONE/MIXED SANDSTONE MUDSTONE, 35:10:55, silty, gets sandier towards bottom
	129.96	1.03	SANDSTONE/MIXED SANDSTONE-MUDSTONE, 60:40, gradational
	131.97	2.01	SANDSTONE/MIXED SANDSTONE-MUDSTONE, 30:70, gradational
	135.33	3.36	SANDSTONE/MUDSTONE/MIXED SANDSTONE MUDSTONE, 15:40:45, silty mudstone, heavily burrowed, gradational
	138.37	3.04	MUDSTONE/MIXED SANDSTONE-MUDSTONE, 70:30, silty mudstone, gradational
			SANDSTONE/MUDSTONE SANDSTONE MIXTURE, silty, light grey, very-fine-to fine-grained sandstone, poorly-sorted, non-calcareous, bioturbated, slumped, burrowed, occurs as irregularly shaped lenses and wisps, medium grey, silty, mudstone often burrowed, it also occurs mixed intimately with sand, this genetic unit is heavily bioturbated, small size mostly
	140.93	2.56	SANDSTONE/MUDSTONE, SAND MIXTURE, 65:35, fine-grained sandstone, silty mudstone, zone of broken up core with fault features, calcite and slickensided surfaces closely spaced 0.05-0.10m apart
	141.42	0.49	SANDSTONE/MUDSTONE, SAND MIXTURE, as above, gradational below
	143.25	1.83	SANDSTONE/MUDSTONE, SAND MIXTURE, 15:85, silty mudstone, same fault features as above

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	nι	
	145.08	1.83	SANDSTONE/MUDSTONE, SAND MIXTURE, 10:90, silty mudstone, core not as badly broken up, listric and slickensided surfaces more widely spaced (0.20m-0.30m)
	145.44	0.36	SANDSTONE/MUDSTONE, SANDSTONE MIXED, 5:95, silty mudstone, heavily burrowed, core broken up parallel to its axis
	148.13	2.69	SAME AS ABOVE
	151.18	3.05	MUDSTONE/SANDSTONE MIXTURE, silty mudstone, greater sand content than above, 5 slickensided and listric surfaces spaced 0.05-0.20m apart
	151.24	0.06	MUDSTONE/SANDSTONE, silty, burrowed
	152.24	1.00	MUDSTONE/SANDSTONE, as above, 9 slickensided and listric surfaces (0.08 to 0.16m apart)
	153.37	1.13	MUDSTONE/SANDSTONE, as above, sandstone interbeds as described above, 0.02-0.15m thick
	154.22	0.85	SANDSTONE/MUDSTONE, silty, 35:65
	156.66	2.44	SANDSTONE/MUDSTONE, SANDSTONE MIXTURE, 40:60, silty mudstone
	157.51	0.85	SANDSTONE/MUDSTONE, SANDSTONE MIXTURE, 25:75, silty
	159.71	2.20	SANDSTONE/MUDSTONE, as above, sandstone gets coarser- grained
	161.45	1.74	SANDSTONE/MUDSTONE, silty, medium-grained sandstone becomes more abundant and gets segregated in thin beds, culminates at bottom in 1 unit 0.15m thick, 20:80
	161.84	0.39	SANDSTONE/MUDSTONE, light grey, very-fine-grained to fine-grained, calcareous, well-sorted, horizontal lamination with few low-angle small-scale cross-beds, locally heavily burrowed (large size), interbedded with thin black mudstone bands, often silty also occasional very thin intraclastic (black mudstone) beds within the sandstone
	164.29	2.45	SANDSTONE/MUDSTONE, 90:10, as above, 2 slickensided surfaces 0.02m apart, heavily bioturbated (0.47-0.93m)
	164.89	0.60	SANDSTONE/MUDSTONE, 90:10
12 ⁰	167.94 170.99	3.05 3.05	SANDSTONE/MUDSTONE, 90:10 SANDSTONE/MUDSTONE, 85:15
	174.24	3.25	SANDSTONE/MUDSTONE, 85:15
14 ⁰	177.39	3.15	SANDSTONE/MUDSTONE, 90:10
	180.44	3.05	SANDSTONE/MUDSTONE, 80:20
	183.48	3.04	SANDSTONE/MUDSTONE, 80:20, going to sand/mud, 50:50
	187.75	4.27	SANDSTONE/MUDSTONE, 50:50
	190.80	3.05	sandstone/mudstone, 40:60
	193.85	3.05	SANDSTONE, lithologically same as above, but from now on it is present as mostly thin (.00505m) wisps and

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m.	
			irregular lenses also occasionally as laminated interbeds the mudstone is usually slightly silty and sometimes burrowed
	196.90	3.05	SANDSTONE/MUDSTONE, 30:70, silty
	199.94	3.04	SANDSTONE/MUDSTONE, 25:75, silty, locally heavily burrowe (.1015mthick)
	200.86	0.92	SANDSTONE/MUDSTONE, 25:75, silty
•	200.98	0.12	SANDSTONE/MUDSTONE, 25:75, heavily burrowed
	202.99	2.01	SANDSTONE/MUDSTONE, 25:75
	206.04	3.05	SANDSTONE/MUDSTONE, 20:80
	209.09	3.05	SANDSTONE/MUDSTONE, 20:80, silty
	212.14	3.05	SANDSTONE/MUDSTONE, 15:85, silty
	215.18	3.04	SANDSTONE/MUDSTONE, 10:90, silty, heavily burrowed (small first appearance of pyrite nodules
	218.23	3.05	SANDSTONE/SILTY MUDSTONE to sandstone/mud 10 90 25 75
	221.28	3.05	SANDSTONE/MUDSTONE, 25:75, silty mudstone
	221.43	0.15	SANDSTONE/MUDSTONE, 25:75, broken up core, gradational below
	224.33	2.90	SANDSTONE/MUDSTONE, 10:90, silty
	227.38	3.05	SANDSTONE/MUDSTONE, 5:95, silty, gradational
	230.42	3.04	SANDSTONE/MUDSTONE, 15:85, silty
	232.00	1.58	SANDSTONE/MUDSTONE, 5:95, silty
			SUKUNKA MOOSEBAR
	233.06	1.06	MUDSTONE, black, massive with occasional pyrite bands, nodules and ferruginous bands
	236.52	3.46	MUDSTONE, black
	238.17	1.65	MUDSTONE, black
	239.57	1.40	MUDSTONE, zone of extensively broken up core, fault breccia with associated calcite and listric and slickensides (.0515m apart)
	242.62	3.05	MUDSTONE, . black
	245.66	3.04	MUDSTONE, black
	248.71	3.05	MUDSTONE, black

Dip	DEPTH	THICKNESS	DESCRIPTION
o	m	m	
	251.76	3.05	MUDSTONE, black
	254.81	3.05	MUDSTONE, black
	257.86	3.05	MUDSTONE, black
	258.71	0.85	MUDSTONE, black
	259.68	0.97	MUDSTONE, core broken up in sticks .0510m long
	261.51	1.83	MUDSTONE, black
	264.56	3.05	MUDSTONE, black
	267.61	3.05	MUDSTONE, black
	273.71	6.10	MUDSTONE, black
	276.45	2.74	MUDSTONE, black
	279.50	3.05	MUDSTONE, black with occasional pyrite and ferruginous inclusions
	282.54	3.04	MUDSTONE, black
	285.59	3.05	MUDSTONE, black
	288.64	3.05	MUDSTONE, black, zone of slickensided and listric surface 25 off vertica(.05m apart at .40m), stick, shattered core (.08m) and listric features
	289.83	1.19	MUDSTONE, 4 listric surfaces 27 ⁰ off vertical, core broken up in sticks .0410m long
	291.69	1.86	MUDSTONE, black
	293.28	1.59	MUDSTONE, black
	294.28	1.00	MUDSTONE, two listric surfaces and calcite mineralization
	295.35	1.07	MUDSTONE, black
	296.35	1.00	MUDSTONE, black, two slickensided surfaces .06m apart
	296.85	0.50	MUDSTONE, black
	297.18	0.33	MUDSTONE, zone of slickensided surfaces 6 surfaces .03 to .08m apart
	298.55	1.37	MUDSTONE, core broken up parallel to its axis and fractured, occasional listric surfaces
	298.91	0.36	MUDSTONE, black
	298.99	0.08	MUDSTONE, two listric surfaces .06m apart
	300.22	1.23	MUDSTONE, black, locally broken up
	302.15	1.93	MUDSTONE, no listric or slickensided
	302.24	0.09	MUDSTONE, core shattered, numerous listric and slicken- sides and calcite mineralization
	302.27	0.03	BENTONITE bed, burrowed
	303.25	0.98	MUDSTONE, black

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	
	251.76	3.05	MUDSTONE, black
	254.81	3.05	MUDSTONE, black
	257.86	3.05	MUDSTONE, black
	258.71	0.85	MUDSTONE, black
	259.68	0.97	MUDSTONE, core broken up in sticks .05~.10m long
	261.51	1.83	MUDSTONE, black
	264.56	3.05	MUDSTONE, black
	267.61	3.05	MUDSTONE, black
	273.71	6.10	MUDSTONE, black
	276.45	2.74	MUDSTONE, black
	279.50	3.05	MUDSTONE, black with occasional pyrite and ferruginous inclusions
	282.54	3.04	MUDSTONE, black
	285.59	3.05	MUDSTONE, black
	288.64	3.05	MUDSTONE, black, zone of slickensided and listric surface 25° off vertica(.05m apart at .40m) stick, shattered core (.08m) and listric features
	289.83	1.19	MUDSTONE, 4 listric surfaces 27 ⁰ off vertical, core broken up in sticks .0410m long
	291.69	1.86	MUDSTONE, black
	293.28	1.59	MUDSTONE, black
	294.28	1.00	MUDSTONE, two listric surfaces and calcite mineralization
	295.35	1.07	MUDSTONE, black
	296.35	1.00	MUDSTONE, black, two slickensided surfaces .06m apart
	296.85	0.50	MUDSTONE, black
	297.18	0.33	MUDSTONE, zone of slickensided surfaces 6 surfaces .03 to .08m apart
	298.55	1.37	MUDSTONE, core broken up parallel to its axis and fractured, occasional listric surfaces
	298.91	0.36	MUDSTONE, black
	298.99	0.08	MUDSTONE, two listric surfaces .06m apart
	300.22	1.23	MUDSTONE, black, locally broken up
	302.15	1.93	MUDSTONE, no listric or slickensided
	302.24	0.09	MUDSTONE, core shattered, numerous listric and slicken- sides and calcite mineralization
	302.27	0.03	BENTONITE bed, burrowed
	303.25	0.98	MUDSTONE, black

Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	304.32	1.07	MUDSTONE, black
	304.58	0.26	MUDSTONE, core shattered, two slickensides 40° to horizont
	304.88	0.30	BENTONITE, burrowed at top of unit, one slickenside 38 ^o to horizontal, one zone shattered 0.02m
	306.32	1.44	MUDSTONE, black
	306.73	0.41	MUDSTONE, black
	307.33	0.60	MUDSTONE, core broken up, parallel to axis and trans- verse to it
	308.99	1.66	MUDSTONE, black
	309.37	0.38	MUDSTONE, one fracture parallel to its axis
	311.83	2.46	MUDSTONE, black with occasional ferruginous bands
	312.42	0.59	MUDSTONE, core broken and few listric and slickensided surfaces
	315.56	3.14	MUDSTONE, black
	318.85	3.29	MUDSTONE, black
	319.07	0.22	MUDSTONE, dark grey, occasional pyritic worm burrows
	319.09	0.02	CLAYSTONE, light grey/green, hard, bentonitic
	319.46	0.37	MUDSTONE, dark grey, as above
	319.49	0.03	CLAYSTONE, light grey/green, as above
	319.84	0.35	MUDSTONE, as above
	319.87	0.03	CLAYSTONE, as above
	320.30	0.43	MUDSTONE, as above
	320.35	0.05	CLAYSTONE, as above
	320.53	0.18	MUDSTONE, as above
	320.55	0.02	CLAYSTONE, as above
	320.83	0.28	SANDSTONE, dark grey/green, glauconitic, pyritic worm burrows prominent atabase, bedding completly obscured by bioturbation, competent
	321.02	0.19	SANDSTONE, as above
	321.08	0.06	CLAYSTONE, carbonaceous, black, bright coal bands
			ROOF OF BIRD SEAM
	321.12	0.04	COAL, bright banded
	321.28	0.16	CORE LOSS-COAL
	321.29	0.01	PYRITE, band
	321.45	0.16	CORE LOSS-COAL
	321.50	0.05	COAL, dull, sheared, stick

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BH No	5.13		
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	304.32	1.07	MUDSTONE, black
	304.58	0.26	MUDSTONE, core shattered, two slickensides 40° to horizontal
	304.88	0.30	BENTONITE, burrowed at top of unit, one slickenside 38° to horizontal, one zone shattered 0.02m
	306.32	1.44	MUDSTONE, black
	306.73	0.41	MUDSTONE, black
	307.33	0.60	MUDSTONE, core broken up, parallel to axis and trans- verse to it
	308.99	1.66	MUDSTONE, black
	309.37	0.38	MUDSTONE, one fracture parallel to its axis
	311.83	2.46	MUDSTONE, black with occasional ferruginous bands
	312.42	0.59	MUDSTONE, core broken and few listric and slickensided surfaces
}	315.56	3.14	MUDSTONE, black
	318.85	3.29	MUDSTONE, black
	319.07	0.22	MUDSTONE, dark grey, occasional pyritic worm burrows
	319.09	0.02	CLAYSTONE, light grey/green, hard, bentonitic
1	319.46	0.37	MUDSTONE, dark grey, as above
	319:49	0.03	CLAYSTONE, light grey/green, as above
1	319.84	0.35	MUDSTONE, as above
	319.87	0.03	CLAYSTONE, as above
	320.30	0.43	MUDSTONE, as above
	320.35	0.05	CLAYSTONE, as above
-	320.53	0.18	MUDSTONE, as above
	320.55	0.02	CLAYSTONE, as above
	320.83	0.28	SANDSTONE, dark grey/green, glauconitic, pyritic worm burrows prominent at base, bedding completly obscured by bioturbation, competent
	321.02	0.19	SANDSTONE, as above
	321.08	0.06	CLAYSTONE, carbonaceous, black, bright coal bands
1	i !		ROOF OF BIRD SEAM
	321.12	0.04	COAL, bright banded
1	321.28	0.16	CORE LOSS-COAL
1	321.29	0.01	PYRITE, band
	321.45	0.16	CORE LOSS-COAL
	321.50	0.05	COAL, dull, sheared, stick

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	ពា	
	321.55	0.05	COAL, dull and bright, stick
	321.58	0.03	COAL, dull banded, stick
	321.63	0.05	COAL, dull, small pieces
	321.96	0.33	MUDSTONE, dark grey, carbonaceous and coaly inclusions at top and base
	321.98	0.02	MUDSTONE, as above
	322.40	0.42	CORE LOSS-COAL
	322.44	0.04	COAL, dull, sheared, large pieces
	322.49	0.05	COAL, bright banded, large pieces, heavily sheared
	322.54	0.05	COAL, dull and bright, large pieces, heavily sheared
	322.58	0.04	COAL, dull, stick
	322.60	0.02	COAL, dull, banded, stick
	322.64	0.04	COAL, dull, stick
	322.70	0.06	COAL, dull and bright, small pieces
	322.73	0.03	PYRITE, band
	322.78	0.05	COAL, dull banded, small pieces
	322.89	0.11	COAL, dull, stick
	322.91	0.02	COAL, bright, stick
	322.97	0.06	COAL, duľl, stick
	323.01	0.04	COAL, dull banded, stick
	323.10	0.09	COAL, dull, stick
	323.14	0.04	COAL, dull and bright, stick
	323.24	0.10	COAL, dull, stick
	323.29	0.05	COAL, dull, small pieces
	323.33	,0.04	COAL, dull banded, small pieces
	323.36	0.03	COAL, dull, small pieces
	323.42	0.06	COAL, dull and bright, small pieces
	324.30	0.88	CORE LOSS-COAL
	324.40	0.10	COAL, dull and bright, small pieces
	324.44	0.04	COAL, dull, small pieces
	324.51	0.07	COAL, dull banded, small pieces
	324.63	0.12	COAL, dull, small pieces
	324.69	0.06	COAL, dull and bright, small pieces
	324.77	0.08	COAL, dull banded, large pieces
	324.95	0.18	CLAYSTONE, carbonaceous, black, heavily sheared

BH Nos. 13

Dip	DEPTH	THICKNESS	DESCRIPTION	
0	m	៣		
	321.55	0.05	COAL, dull and bright, stick	
	321.58	0.03	€OAL, dull banded, stick	
	321.63	0.05	COAL, dull, small pieces	
	321.96	0.33	MUDSTONE, dark grey, carbonaceous and coaly inclusions at top and base	
	321.98	0.02	MUDSTONE, as above	
	322.40	0.42	CORE LOSS-COAL	
	322.44	0.04	COAL, dull, sheared, large pieces	
	322.49	0.05	COAL, bright banded, large pieces, heavily sheared	
	322.54	0.05	COAL, dull and bright, large pieces, heavily sheared	
	322.58	0.04	COAL, dull, stick	
	322.60	0.02	COAL, dull, banded, stick	
	322.64	0.04	COAL, dull, stick	
	322.70	0.06	COAL, dull and bright, small pieces	
	322.73	0.03	PYRITE, band	
	322.78	0.05	COAL, dull banded, small pieces	
	322.89	0.11	COAL, dull, stick	
	322.91	0.02	COAL, bright, stick	
	322.97	0.06	COAL, dull, stick	
	323.01	0.04	COAL, dull banded, stick	
	323.10	0.09	COAL, dull, stick	
	323.14	0.04	COAL, dull and bright, stick	
	323.24	0.10	COAL, dull, stick	
	323.29	0.05	COAL, dull, small pieces	
	323.33	0.04	COAL, dull banded, small pieces	
	323.36	0.03	COAL, dull, small pieces	
	323.42	0.06	COAL, dull and bright, small pieces	
	324.30	0.88	CORE LOSS-COAL	
	324.40	0.10	COAL, dull and bright, small pieces	
	324.44	0.04	COAL, dull, small pieces	
}	324.51	0.07	COAL, dull banded, small pieces	
	324.63	0.12	COAL, dull, small pieces	
	324.69	0.06	COAL, dull and bright, small pieces	
	324.77	0.08	COAL; dull banded, large pieces	
	324.95	0.18	CLAYSTONE, carbonaceous, black, heavily sheared	

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Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	324.97	0.02	COAL & CLAYSTONE, carbonaceous, very heavily sheared, small fragments
	325.29	0.32	CORE LOSS-COAL
			FLOOR OF BIRD SEAM - SEAM RECOVERY
	326.27	0.98	SANDSTONE, medium-grained, light grey, small worm burrows near centre, very clean, bedding rarely seen, carbonaceou at top
	326.54	0.27	SANDSTONE, as above
	328.71	2.17	SANDSTONE, as above
	330.06	1.35	SANDSTONE, as above
10 [°]	330.77	0.71	SANDSTONE, light grey, medium-grained, bedding defined by scattered fine interbeds of carbonaceous material, large worm tubes in phases
	332.53	1.76	SANDSTONE, as above
	332.83	0.30	SANDSTONE, as above
	335.09	2.26	SANDSTONE, as above
	335.67	0.58	SANDSTONE, as above
	336.32	0.65	SANDSTONE, as above
	336.76	0.44	SANDSTONE, as above, frequent calcite filled fractures at 50° to core axis
	336.89	0.13	BRECCIA, rotated fragments of sandstone as above in calcite matrix, fault zone
40 ⁰	343.14	6.25	SANDSTONE, as above, frequent calcite filled fractures and large worm burrows
	343.44	0.30	BRECCIA, sandstone as above, blocks rotated, fault zone
	343.45	0.01	COAL, dull, base of Bird seam
	347.98	4.53	SANDSTONE, light grey, medium-grained, carbonaceous at top, bedding usually obscured, small worm burrows from 0.90 to 1.07 meters from top
18 ⁰	352.50	4.52	SANDSTONE, medium-grained, light grey, bedding defined by scattered partings of carbonaceous material, phases of large worm burrows
	359.00	6.50	SANDSTONE, light grey, fine-grained, very clean, bedding usually not apparent
			SKEETER SEAM
	359.38	0.38	CORE MISSING-COAL
	359.39	0.01	COAL, bright banded, large pieces
	359.42	0.03	COAL, bright banded, stick
	359.47	0.05	COAL, dull, stick

BH Nos. 13

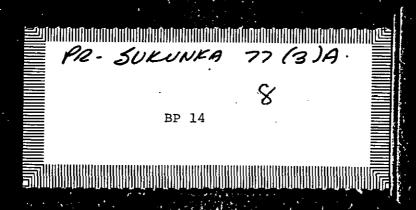
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	359.51	0.04	COAL, dull banded, stick
	359.57	0.06	COAL, dull, stick
	359.66	0.09	COAL, dull banded, stick
	359.75	0.09	COAL, dull and bright, stick
	359.77	0.02	COAL, bright, stick
	359.79	0.02	COAL, bright, stick
	359.81	0.02	COAL, dull banded, stick
	359.89	0.08	COAL, dull and bright, stick
	359.93	0.04	COAL, dull banded, stick
	360.04	0.11	COAL, dull and bright, stick
	360.07	0.03	COAL, bright, stick
	360.11	0.04	COAL, dull and bright, stick
	360.17	0.06	COAL, bright banded, stick
	360.20	0.03	COAL, dull banded, stick
			SKEETER SEAM FLOOR
	360.73	0.53	SILTSTONE, dark grey, with phases of medium-grained, ligh grey sandstone
15 ⁰	362.05	1.32	SILTSTONE & MUDSTONE INTERBEDDED, dark grey mudstone interbedded with grey siltstone forming thin graded units
2,10	363.25	1.20	SANDSTONE, light grey, fine-grained, characterized by small scale cross-bedding, large coaly inclusions towards base, fine carbonaceous partings on bedding
	364.85	1.60	LAMINITE, thin interbeds of grey siltstone to dark grey mudstone
	364.90	0.05	MUDSTONE, dark grey, becoming carbonaceous at base
	365.40	0.50	MUDSTONE, as above
		,	CHAMBERLAIN SEAM ROOF
	367.11	1.71	CORE MISSING-COAL
	367.16	0.05	COAL, stoney, stick
30°	367.17	0.01	CLAYSTONE, carbonaceous, black
	367.21	0.04	COAL, dull and bright, stick
	367.27	0.06	COAL, dull, stick
	367.31	0.04	COAL, dull and bright, stick
	367.38	0.07	COAL, boney, stick
}	367.41	0.03	COAL, dull, stick
	367.48	0.07	COAL, dull banded, stick

BH Nos. 13

m 367.53 367.59 367.64 367.67 367.69 367.74 367.79	m 0.05 0.06 0.05 0.03 0.02 0.05	COAL, bright banded, stick COAL, dull banded, stick COAL, dull and bright, stick COAL, bright banded, stick
367.59 367.64 367.67 367.69 367.74 367.79	0.06 0.05 0.03 0.02	COAL, dull banded, stick COAL, dull and bright, stick COAL, bright banded, stick
367.64 367.67 367.69 367.74 367.79	0.05 0.03 0.02	COAL, dull and bright, stick COAL, bright banded, stick
367.67 367.69 367.74 367.79	0.03	COAL, bright banded, stick
367.69 367.74 367.79	0.02	
367.74 367.79		COAL bright stick
367.79	0.05	COAL, bright, stick
	1	COAL, dull and bright, stick
2/7 05	0.05	CLAYSTONE, carbonaceous, black, numerous bright coal band
367.85	0.06	COAL, dull and bright
367.96	0.11	CLAYSTONE, carbonaceous
368.00	0.04	COAL, dull banded
368.08	0.08	CLAYSTONE, carbonaceous
368.20	0.12	COAL, dull banded, stick, high density
		CHAMBERLAIN SEAM FLOOR
369.18	0.98	MUDSTONE, dark grey, phases of siltstone interbeds, carbonaceous phases
373.20	4.02	SANDSTONE, grey, fine-grained, siltstone at top, very frequent fine interbeds of dark grey siltstone, frequent irregular calcite filled fractures
374.10	0.90	SANDSTONE, fine-grained, light grey, characterized by small scale cross-bedding and fine carbonaceous partings on bedding, probably faulted at base, possibly faulted at top
375.00	0.90	LAMINITE, thin bedded, dark grey mudstone interbedded wit grey siltstone
376.20	1.20	CORE MISSING-COAL
376.74	0.54	LAMINITE, as above, core broken, calcite veins, slicken- sided, probable fault
377.40	0.66	SILTSTONE, dark grey, rootlets and bioturbation of bedding at top
3 7 9.22	1.82	MUDSTONE, dark grey with frequent interbeds of grey siltstone forming thin graded units.
385.54	6.32	MUDSTONE, as above, bright coal bands, calcite filled fractures throughout
388.04	2.50	MUDSTONE, interbeds of fine-grained sandstone becoming prominent
390.03	1.99	MUDSTONE, dark grey with frequent irregular interbeds of medium-grained sandstones, prominent bioturbation and da coloured worm burrows, calcite filled fractures, slickensided on bedding surfaces
	376.74 377.40 379.22 385.54 388.04	376.74 0.54 377.40 0.66 379.22 1.82 385.54 6.32 388.04 2.50

_BH Nos. 13

Dip .	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	390.32	0.29	SANDSTONE, medium-grained, light grey, carbonaceous, frequent large irregular coaly inclusions
	<u>.</u>		
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Page 1

B. H. No. BP 44 AREA SUKUNKA Centractor: Tonto Aug 5, 1977 Commenced: Co-ordinates: 6,116,685.68 Ν 594,087.76 E Aug 25, 1977 Completed: Surface Elevation: 1,801.52 Core Size: HQ Casing Left in Hole: m Geologist Hole Angle: Depth See detail page la 11.02-80.60 Hole Azimuth: Logged by: Ali Chowdry 87.48-142.34 80.92-86.25 Graham Wallis 142.34 Final Depth:

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates			
Sukunka			
Moosebar			
U. Gething			

SEAMS DEPTH THICKNESS RECOVERY ELEVATION

BIRD

CHAMBERLAIN

Stopped in Gates

BH Nos. 14

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	11.02	11.02	TRICONED, no core
	11.27	0.25	SANDSTONE/SILTSTONE, light-medium-grey, sands very fine- grained, interbedded with siltstones and some muddy layers, calcareous, weathered
	12.88	1.61	SILTSTONE, medium grey, locally brief intervals of very fine sands, some slumping, argillaceous, strongly calcar- eous, a 0.26m fracture parallel to core axis, broken core and locally superficially weathered
	13.41	0.53	SANDSTONE, medium grey, very fine-grained, many vertical burrows and much slumping, strongly calcareous, core broken
	14.32	0.91	SANDSTONE, as above, middle 0.20m badly fragmented and weathered
9°	19.50	5.18	SANDSTONE, top 0.18m medium grey, silty, argillaceous siltstones with muddy intraclasts, rest light-medium grey, very fine sands with ubiquitous, small-scale crosslamination, carbonaceous laminae, scattered burrowing, strongly calcareous, basal 0.13m muddy siltstone, core frequently broken, core loss-triconad
	20.30	0.80	SANDSTONE, as above, cross-bedding 5 to 10mm thick units and abundant finely comminuted carbonaceous matter, broker core
	20.72	0.42	MUDSTONE/SANDSTONE, top 16cm dark grey silty muds, rest light/medium grey, very fine-grained sands and silts, intensively bioturbated with chaotic fabrics, calcareous, core broken
	21.09	0.37	SANDSTONE, initial half very fine-grained, well-laminated and cross-laminated with silty layers, rest wavy, irregular laminated, very fine sands with numerous burrows, calcared core broken, interbedded below
	22.33	1.24	SILTSTONE/MUDSTONE, top 0.70m dominantly siltstones with abundant very fine sand laminae, well-laminated, rest dark grey mudstone with pelecypod shell marker zone, gradual at base, core broken
10 ⁰	22.76	0.43	SANDSTONE, light grey, fine-grained, top 0.18m very muddy and with modified lamination due to bioturbation, erosional at base
	22.90	0.14	MUDSTONE, same as pelecypod zone above erosional at base
	23.47	0.57	SANDSTONE, light grey, medium-grained, clean, well-sorted cross-bedded, occasionally emphasized by dark matter
	26.17	2.70	SANDSTONE, as above, carbonized plant debris emphasizing isolated laminae, strongly calcareous, gradational at base
	26.51	0.34	SANDSTONE, dark grey, very fine-grained, argillaceous, locally bioturbated, weathering along vertical fracture

RH MC)5. 14	·	
Dip	DEPTH	THICKNESS	DESCRIPTION
	26.79	0.28	MUDSTONE, medium grey, very silty, listric surfaces, erosional at base
10 ⁰	29.56	2.77	SANDSTONE, light grey, fine/medium-grained, top 0.60m fin grained with frequent silty/muddy intercalations, some wavy/disturbed lamination, rest clean, well-sorted, stron calcareous
8°	32.61	3.05	SANDSTONE, similar to above, top 2/3 medium-grained, rest dominantly fine-grained with ubiquitous small-scale cross-lamination, silty laminae, calcareous
6°	35.66	3.05	SANDSTONE, as above regularly laminated (?parallel), fine carbonaceous matter frequently emphasizing laminatio locally strongly calcareous
	37.15	1.49	SANDSTONE, as above, locally weathered, vertical fracture in lower half
10 ⁰	38.70	1.55	SANDSTONE, medium grey, very fine-grained, silty (20%), small-scale cross-bedding in lower half, few burrows, micro-erosional boundaries
	39.20	0.50	SANDSTONE, as above, very gradational at base
	40.84	1.64	SANDSTONE, light medium grey, medium-grained, argillaceou locally fine intraclasts of muddy siltstones, laminated, some very fine-grained sandstone zones (argillaceous) and these burrowed, strongly calcareous, one fracture
	41.76	0.92	SANDSTONE, as above but generally medium-grained
	42.97	1.21	SANDSTONE, as above, basal 0.20 with small-scale cross- lamination
10 ⁰	43.27	0.30	SANDSTONE, same as last 0.20m
	44.80	1.53	SANDSTONE, light grey, fine/medium-grained, top half with widely spaced argillaceous/silty laminae, rest clean,calcareous
5 ⁰	47.85	3.05	SANDSTONE, light/medium grey, fine/medium-grained, silty/argillaceous layers and laminae, laminated, 0.18m zone with burrows, medium sands, strongly calcareous, rest non-calcareous
5°	50.90	3.05	SANDSTONE, medium/light grey, fine/medium-grained, top 0.51m medium-grained with abundant burrows at top, strong calcareous, carbonaceous laminae at base, followed by 0.71 well-laminated (?parallel) sands, abundant carbonaceous laminae, rest largely massive (appear homogenized due to bioactivity), very strongly calcareous, bottom 0.4 with abundant slumped structures
	51.80	0.90	SANDSTONE, light grey, fine/medium-grained, silty laminade few vertical burrows, gradational at base
	52.84	1.0 ^{<i>l</i>} i	SILTSTONE, medium grey, very argillaceous, small intercal ations of very fine sands, broadly laminated, basal 0.32m

BH Nos. 14

Dip	DEPTH	THICKNESS	DESCRIPTION	
	m	រោ	very fine-grained sands with slumping, local weathering,	
:			erosional below	
	53.52	0.68	SANDSTONE, light grey, fine/medium-grained, specks of fine carbonaceous matter, strongly calcareous, erosional at base	
	53.95	0.43	SILTSTONE, medium grey, coarse silts, argillaceous	
	56.10	2.15	SILTSTONE, as above, locally richly argillaceous, lamin- ated, change at base by interbedding, local burrowing	
	57.00	0.90	MUDSTONE, dark/medium grey, fine layers of very fine sands and siltstones, much pin prick burrowing	
6°	60.04	3.04	MUDSTONE, as above, basal 0.60m badly fragmented, some grinding of core evident, some 0.30 silts in lower half	
	61.73	1.69	StLTSTONE/MUDSTONE, medium grey, predominantly siltstone, thoroughly mottled and bioturbated, Sukunkoid marker	
	63.09	1.36	SANDSTONE, top 0.56m intensively bioturbated, very fine sands with 'kernels' of muddy lithology (remnants of once continuous layers), rest light grey, clean, well-laminated, fine-grained sands with few thin muddy	
	65.38	2.29	layers, sporadic burrowing SANDSTONE, as above, local mottling, burrowing, large interval with broken core, vertical fracture	
	66.14	0.76	SANDSTONE, light medium grey, well-laminated, two medium- grained sandy bands totalling 8cm	
	66.35	0.21	SANDSTONE, same as above, bioturbated with muddy relics	
	66.70 67.39	0.35	MUDSTONE/SANDSTONE, top half dark grey highly silty muds with some grits, rest very fine-grained sands, laminated with 0.04m gritty zone, erosional at base CONGLOMERATE, essentially granular, cherty/quartzic, larger pebbles of sands and siltstones, strongly calcareous matrix (cement), abrupt at base	
	67.56	0.17	SANDSTONE, light/medium grey, very fine-grained, strongly calcareous, gradual	
	69.18	1.62	SILTSTONE, medium grey, richly argillaceous, vague broad banding, strongly calcareous, fragmented at top	
	69.78	0.60	SANDSTONE, medium grey, very fine-grained, highly argillaceous, original lamination highly modified by bioturbation, strongly calcareous, gradational at base	
;	72.23	2.45	SILTSTONE/MUDSTONE, medium grey sequence of richly argill- aceous siltstone and silty mudstones, occasional lamina- tion, calcareous	
	74.33	2.10	MUDSTONE/SILTSTONE, same as above, better lamination and some local burrowing, calcareous, gradational at base core fragmented with vertical fractures	
	74.98	0.65	MUDSTONE, dark grey/black, highly carbonaceous, somewhat coaly	

BH Nos. 14

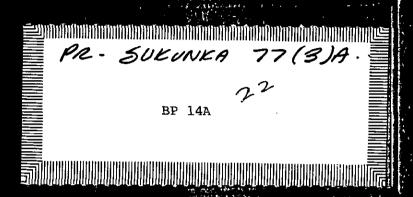
Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	
	75.13	0.15	MUDSTONE, dark grey, badly fragmented
	75.53	0.40	COAL, middle 7cm dull, high ash, rest bright banded
	75.79	0.26	MUDSTONE, dark grey, carbonaceous, core broken
	76.30	0.51	MUDSTONE, dark grey, carbonaceous, core broken
	76.44	0.14	COAL, dirty, finely broken
	77.46	1.02	MUDSTONE, black, carbonaceous, stringers of coal, gradual to coal
	77.71	0.25	COAL, predominently muddy, core broken
	78.33	0.62	MUDSTONE, dark grey/black, bottomward very carbonaceous
	78.50	0.17	MUDSTONE, ferruginous band, highly calcareous, hard
	78.80	0.30	MUDSTONE, dark grey, slightly carbonaceous, gradational at base
	79.78	0.98	MUDSTONE, black, richly carbonaceous, coaly, few silty wisps
	80.60	0.82	MUDSTONE, dark grey, middle 0.26m highly silty incorpora- ting many rootlets, rest slightly carbonaceous, gradual
	80.77	0.17	COAL/MUDSTONE, core badly fragmented, coal generally muddy
	80.92	0.15	MUDSTONE, dark grey, carbonaceous, stick
	81.04	0.12	COAL, stony, containing minor bright coal 'veinlets' thin unit, mudstone pebble present
	81.07	0.03	COAL, dull banded
	81.12	0.05	COAL, stony, containing minor bright coal veinlets, grade into unit below
	81.18	0.06	MUDSTONE, mid grey, carbonaceous
	81.42	0.24	COAL, stony, as above, broken stick
	81.44	0.02	COAL, as above
	81.48	0.04	COAL, dull banded, stick
	81.50	0.02	COAL, dull banded, stick
	81.53	0.03	COAL, bright
	81.55	0.02	COAL, dull and bright
	81.63	0.08	COAL, bright banded
	81.65	0.02	COAL, dull banded
	81.70	0.05	COAL, bright banded
	81.73	0.03	COAL, bright banded
	81.76	0.03	COAL, dull and bright
	81.78	0.02	COAL, bright, stick

Dip O	DEPTH	THICKNESS	DESCRIPTION
···	81.85	0.07	COAL, dull banded, stick
	81.86	0.01	COAL, dull, stick
	81.88	0.02	COAL, dull and bright, stick
	81.92	0.04	COAL, dull banded, stick
	81.97	0.05	COAL, dull banded, stick
	81.99	0.02	COAL, dull and bright, stick
	82.03	0.04	COAL, bright, stick
	82.04	0.01	COAL, dull, stick
	82.06	0.02	COAL, bright, stick
	82.08	0.02	COAL, dull, stick
	82.11	0.03	COAL, bright, stick
	82.18	0.07	COAL, bright banded, stick
	82.22	0.04	COAL, dull banded, stick
	82.28	0.06	COAL, bright banded, broken, small pieces
	82.31	0.03	COAL, dull banded, broken, small pieces
	82.51	0.20	MUDSTONE, mid grey, carbonaceous in part, and containing coaly bands
	82.56	0.05	COAL, bright
	82.63	0.07	COAL, dull and bright
			FLOOR OF SPLIT
	83.24	0.61	MUDSTONE, dark grey, carbonaceous
	83.32	0.08	COAL, dull and bright
	83.67	0.35	MUDSTONE, dark grey, coarser toward base
	83.92	0.25	SILTSTONE, light grey, mudstone and coaly partings commor slickensided plane at 87.70m, sequence finings downwards
	84.32	0.40	SILTSTONE, as above
	85.04	0.72	SILTSTONE, as above
	85.52	0.48	MUDSTONE, dark grey, carbonaceous in part, sub vertical fracture, coal filled, basal 10cm sheared and fractured
	85.62	0.10	COAL, dull, intensely sheared and broken
	85.64	0.02	COAL, dull banded, stick
	85.66	0.02	COAL, dull, stick
	85.70	0.04	COAL, dull banded, stick
	85.79	0.09	COAL, dull to stony, stick
	85.81	0.02	COAL, dull banded, stick
	85.85	0.04	COAL, dull banded, stick

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	85.88	0.03	COAL, dull, stick
	85.92	0.04	COAL, dull banded, stick
	86.25	0.33	SILTSTONE, muddy and carbonaceous phases
	87.48	1.23	BASE OF SÉAM D MUDSTONE, dark grey, homogeneously silty, gradational base
	90.24	2.76	SANDSTONE, medium grey, top 0.19m siltstones, rest very fine-grained sands, locally very argillaceous, disturbed lamination, brief silty intervals, calcareous
20 ⁰	93.29	3.05	SANDSTONE, as above, strongly calcareous, scattered fine, muddy clasts number of vertical fractures, broken at base
	96.34	3.05	MUDSTONE, black, homogeneously carbonaceous, listric surfaces in bottom 0.35m and very carbonaceous
	96.84	0.50	COAL SEAM, top 0.15m dull and bright, rest predominently bright, abrupt below
	99.41	2.57	CONGLOMERATE, finely pebbly, abundant sandy matrix, middl 0.40m with vertical fracture
	102.00	2, 59	CONGLOMERATE, larger pebbles than above, basal 0.18m pebbly sandstone, abrupt below
	102.38	0.38	COAL, mostly dull, high ash, lower half sheared
	102.88	0.50	COAL, mostly dull coal, layers of dirt bands, carbonaceou
	104.11	1.23	SILTSTONE, medium grey, top 0.35 very argillaceous, some very fine-grained sand intercalations, occasionally laminated
	106.09	1.98	MUDSTONE, medium grey, richly silty, carbonized plant debris
6°	106.83	0.74	SANDSTONE, medium grey, very fine-grained, wavy/parallel lamination, silty/muddy laminae/layers (some with micro-erosional boundaries, slightly calcareous, gradual at base, abundant carbonized plant debris
	107.53	0.70	MUDSTONE, top 1/3 siltstones, rest silty mudstones, core broken, one large vertical fracture
	109.78	2.25	MUDSTONE, dark grey, slightly silty, bottom 0.70m with vertical fractures and fragmented core
	110.84	1.06	MUDSTONE, top 0.30m thoroughly weathered (soft mud - gouged zone), rest black mudstone with clean fracture
	111.54	0.70	MUDSTONE, dark grey/black, locally carbonaceous, coaly, fragmented
	112.26	0.72	SILTSTONE, medium grey, argillaceous, strongly calcareous locally fractured
	112.38	0.12	MUDSTONE, black, canneloid, fragmented

_BH Nos. 14

	l .	
DEPTH	THICKNESS	DESCRIPTION
m	m	
112.53	0.15	MUDSTONE, black, similar to above
		COAL SEAM ''C'' - abrupt basal contact
112.73	0.20	COAL, metallic lustre 0.20
112.79	0.06	COAL, dull banded 0.06
113.00	0.21	CORE LOSS
113.20	0.20	COAL, pulverized 0.20
113.23	0.03	COAL, bright and dull 0.03
113.26	0.03	MUDSTONE, carbonaceous 0.03
116.13	2.87	SANDSTONE, light/medium grey, medium-grained, very clean well-sorted, cherty quartzose, small burrows (marker) calcareous, some cross-bedding
119.18	3.05	SANDSTONE, as above, no small burrows, large-scale cross- stratification throughout, few silty clasts
122.22	3.04	SANDSTONE; light/medium grey, medium/coarse-grained, few scattered fine pebbles (quartz and chert), strongly cross-bedded, very clean and sorted, calcareous
125.27	3.05	SANDSTONE, light grey, fine/medium-grained, well-washed and sorted, barely discernible cross-lamination, fine scattered quartz/chert pebbles, calcareous, some slickensiding
128.32	3.05	SANDSTONE, identical to above, top 0.12m fine-grained, argillaceous with abundant carbonized plant debris
131.37	3.05	SANDSTONE, similar to above, minus pebbles, fine-grained
134.72	3.35	SANDSTONE, identical to above
137.46	2.74	SANDSTONE, similar to above, devoid of sedimentary lamination
139.02	1.56	SANDSTONE, similar to above, slightly darker, homogenized some lamination in bottom 0.15m,interbedded below
139.29	0.27	SANDSTONE/MUDSTONE, sand very fine-grained, erosional contacts with muddy layers, laminated, 60:40
142.34	3.05	SANDSTONE/MUDSTONES, interbedded sequence of very fine- grained clean sandstones, cross-laminated, and dark grey silty mudstones, highly erosional muddy/sandy boundaries, small burrows, in one instance pin pricks, sporadically calcareous, listric surfaces in bottom 0.15m
	,	Hole abandoned due to loss of circulation and drilling difficulties
	m 112.53 112.79 113.00 113.20 113.23 113.26 116.13 119.18 122.22 125.27 128.32 131.37 134.72 137.46 139.02 139.29	m m 112.53 0.15 112.73 0.20 112.79 0.06 113.00 0.21 113.20 0.20 113.23 0.03 113.26 0.03 116.13 2.87 119.18 3.05 122.22 3.04 125.27 3.05 128.32 3.05 131.37 3.05 134.72 3.35 137.46 2.74 139.02 1.56 139.29 0.27



(06)3

BP COAL CANADA

Page 1

AREA

SUKUNKA

B. H. No. BP 14A

Contractor:

Tonto

Commenced:

Aug 5, 1977

Completed:

Aug 25, 1977

Co-ordinates: 6,116,685.68

594,087.76

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Surface Elevation: 1,801.52

m

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

No Information

Geologist Ali Chowdry

Hole Azimuth:

Logged by:

Mike DeMestre Geoff Jordan

184.71-437.66 437.77-512.49

Final Depth:

512.49

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	181.94	181.94	1,619.58
Sukunka	336.00	154.06	1,465.52
Moosebar	438.46	102.46	1,363.06
V. Gething	505.99	67.53	1,295.53

SEAMS	DEPIH	THICKNESS	%RECOVERY	ELEVATION
BIRD	441.19			1,360.33
CHAMBERLAIN	505.99			1,295.53
F.PO. F.PO. F.PO.	202.07 282 355.39 365.8 385.84		highly sheared ar highly sheared ar highly sheared ar broken core and lessed and breco	nd brecciated and brecciated brecciation
F.PR.	466.77	6	Breccia	•

BH Nos. 14A

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	137.28	137.28	SECTION triconed to 137.28.
	137.98	0.70	SANDSTONE: light-grey, fine-grained, very well-washed, sorte quartzose, barely discernible cross-lamination.
4 ⁰ -5 ⁰	138.99	1.01	SANDSTONE: as above, Q30m middle zone with frequent interbedding of siltstone and mudstone (erosional boundaries).
4°	142.04	3.05	MUDSTONE (85%)/SANDSTONE (15%): mudstone dark-grey, frequently interlayered with very fine-grained sand, and some silts. Sand/Mud contacts predominantly erosional (sometimes scoured). Sandstone generally lenticular and some small-scale ripples, sporadic burrowing. Two Coal lenses (1cm each).
	143.58	1.54	MUDSTONE/SANDSTONE: as above. One 6cm sandstone with scattered granules.
	144.28	0.70	MUDSTONE: dark-grey, with very little sand, bottom O.lim carbonaceous. COAL SEAM 'B'
	144.84	0.56	COAL: predominantly bright banded, contact of Coal with base fragmented.
	145.24	0.40	MUDSTONE: black, abundant carbonized plant debris, gradual.
	145.94	0.70	SILTSTONE/MUDSTONE: dark-grey, top half silty, rest muddy, plant debris, structureless, broken at base.
6°	147.52	1.58	SANDSTONE: medium-grey, top 2/3 very fine-grained with silty/muddy intervals, well-laminated, rest fine-grained.
	148.05	0.53	SANDSTONE: as above, abrupt basal contact
	148.91	0.86	MUDSTONE: black, locally highly carbonaceous, Coaly,core fragmented, abrupt basal contact.
			COAL SEAM 'A' HORIZON.
	149.06	0.15	COAL: dull, fragmented.
	150.57	1.51	SANDSTONE: light/medium-grey, medium-grained, well- washed and sorted, tiny Coal streaks, cross-stratified, broken and surfacial orangy weathering in basal 0.50m, weakly calcareous, abundance of chert grains.
40	152.41	1.84	SAND\$TONE: as above, locally moderately calcareous, gradual.

BH Nos. 14A

Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	153.92	1.51	SANDSTONE: light-grey, fine/medium-grained, well-sorted and washed, well-laminated, local brief, very fine sand
	·	•	zones, some slumping, local burrows (obliterating lamin- ation), strongly calcareous.
3°	156.36	2.44	SANDSTONE: as above, one steep fracture and slightly weathered along fracture plane.
4 ⁰	159.41	3.05	SANDSTONE: same as above, large vertical fractures and core slightly weathered along the fracture plane.
	160.32	0.91	SANDSTONE: light-grey, fine/medium-grained, extrenely clean and uniform. Bedding barely perceptible, numerous rusty weathering muddy nodules (clasts).
	163.37	3.05	SANDSTONE: as above minus clasts, non-calcareous.
	165.20	1.83	SANDSTONE: as above, fractures in basal 1.09m and very slightly weathered.
	165.81	0.61	SANDSTONE: as above, vertical fractures and weathered.
	166.42	0.61	SANDSTONE: as above, some fracturing.
	167.03	0.61	SANDSTONE: as above.
	168.86	1.83	SANDSTONE: light-grey, fine-grained, very clean and extremely well-sorted, vaguely cross-laminated; Basal 0.16m muddy and slightly carbonaceous
	169.47	0.61	SANDSTONE: as above, core unbroken.
20-30	171.39	1.92	SANDSTONE: light-grey, fine-to very fine-grained, gener-
			ally clean, tiny muddy clasts (widely scattered); 4cm mudstone; well-laminated, basal 0.27m sparingly burrowed, erosional at base.
	172.51	1.12	SANDSTONE (40%)/MUDSTONE (60%): sandy very fine-grained, laminated, frequently alternating with bioturbated mud-stone.
	174.11	1.60	MUDSTONE (65%)/SANDSTONE (35%): dark-grey mud and sand as above.
3°	175.21	1.10	SANDSTONE: light-grey, fine-to very fine-grained, clean, 0.18m zone with muddy layers and fragmented, erosional at base.
	175.56	0.35	MUDSTONE: dark-grey, with lenticles of very fine sand.
	176.12	0.56	MUDSTONE: as above, bottomwards scattered layers of gran- ules, erosional basal contact.

	14/4	7	
Dip	DEPTH	THICKNESS	DESCRIPTION
	176.53	0.41	CONGLOMERATE: well packed, very finely pebbley to gran- ular, little or no sand in matrix, sparry calcite patches; abrupt below.
	177.49	0.96	SANDSTONE: light-grey, fine-grained, top half well- laminated, clean, well-sorted, strongly calcareous, abrupt.
	178.64	1.15	SANDSTONE (85%)/MUDSTONE (15%): sand and mud broadly interbedded.
40	180.38	1.74	SANDSTONE (90%)/MUDSTONE (10): sand fine-grained, characterized by ubiquitous parallel and wavy lamination, erosional sand/mudstone contacts, sand generally very clean and sorted, strongly calcareous.
	181.94	1.56	MUDSTONE/SANDSTONE: predominantly sandy mudstone.
			GATES SUKUNKA
	184.71	2.77	MUDSTONE: dark grey-black, silty, calcareous, massive to bioturbated and burrowed (small size burrows), with frequent interbeds and lenses of grey, very fine-to fine-grained sandstone, calcareous, finely laminated, some small-scale low-angle cross-beds, and occasionally slumped. Both lithologies also occur churned together, bioturbated and slumped.
	187.12	2,41	MUDSTONE, SILTY (55%)/SANDSTONE (45%): same as above.
	187.75	0.63	SANDSTONE (80%)/SILTSTONE (20%): light-grey, very fine- to fine-grained sandstone, calcareous, finely laminated with occasional small-scale, low-angle cross-beds, very few burrows, one thin black muddy intraclastic bed (.02m thick) with few interbeds of black siltstone, calcareous, often burrowed.
	189.50	1.75	SANDSTONE (80%)/SILTSTONE (20%): same as above.
	190,18	0.68	MUDSTONE, SILTY (50%)/SANDSTONE (50%): mudstone dark- grey-black, silty, calcareous, massive to bioturbated and burrowed (small-size burrows) with interbeds and lenses of grey, very fine-to fine-grained sandstone, calcareous, massive, sometimes finely laminated and low- angle cross-bedded. Both lithologies are occasionaly churned and slumped together with biorturbation. One slickensided surface with calcite mineralization.
	190.80	0.62	MUDSTONE, SILTY (50%)/SANDSTONE (50%): as above

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Dip	DEPTH.	THICKNESS	DESCRIPTION
0	m	m	·
	192.70	1.90	MUDSTONE, SILTY (50%)/SANDSTONE (50%): as above.
	193.54	0.84	SANDSTONE (65%)/MUDSTONE, SILTY (35%): as above, two slickensided surfaces .06m apart.
	193.85	0.31	SANDSTONE (65%)/MUDSTONE, SILTY (35%): as above
	195.34	1.49	SANDSTONE (65%)/MUDSTONE, SILTY (35%): as above except the silty mudstone loses its calcareous character, large scale burrows and fossil fragments occasionally appear in the sandstone units
·	195.58	0.24	SANDSTONE (65%)/MUDSTONE, SILTY (35%): as above, zone of slickensided surfaces, three surfaces over .24m, .08m apart, bottom one broken up and calcite mineralization.
	196.16	0.58	SANDSTONE (50%)/MUDSTONE, SILTY (50%).
	196.31	0.15	SANDSTONE (50%)/MUDSTONE: silty (50%): as above, zone of slickensided surfaces, four surfaces over .15m, .0305m apart.
	196.90	0.59	MUDSTONE, SILTY (65%)/SANDSTONE (35%): the sandstone loses its calcareous character, only slightly calcareous.
	197.72	0.82	MUDSTONE, SILTY (60%)/SANDSTONE (40%): the silty mudstone becomes increasingly silty and locally heavily bioturbated (small-scale burrows), no fossils in the sandstone over this interval.
	198.44	0.72	MUDSTONE, SILTY (60%)/SANDSTONE (40%): as above, long crack, with weathered surfaces parallel to core axis.
	199.97	1.53	MUDSTONE, SILTY (55%)/SANDSTONE (45%).
	200.15	0.18	SANDSTONE (70%)/MUDSTONE, SILTY (30%): very light-grey to grey, fine-to medium-grained sandstone, slightly calcareous, well-sorted, finely laminated and cross-bedded (low-angle, small-scale) and massive, bioturbated (surrows small-scale), occasionally slumped. Occasional black muddy partings with interbedded dark-grey/black mudstone and silty mudstone often heavily bioturbated (small-burrows), occasionally both lithologies (sandstone/siltstonare churned together, core broken up (.05cm), and two slickensided surfaces .13m apart.
	200.65	0.50	SANDSTONE (70%)/MUDSTONE, SILTY (30%): as above.
	200.99	0.34	SANDSTONE (70%)/MUDSTONE, SILTY (30%): as above, zone of broken up core and four slickensided surfaces

BH Nos. 14A

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
			plus calcite .0416 m apart
	201.78	0.79	SANDSTONE (70%)/MUDSTONE, SILTY (30%): as above.
 	202.07	0.29	SANDSTONE (70%)/MUDSTONE, SILTY (30%): as above, exten-
	·	,	sive zone of faulting, 17 surfaces with listric and slickensided features, plus highly sheared zone, plus calcite mineralization with brecciation.
	202.99	0.92	SANDSTONE (70%)/MUDSTONE, SILTY (30%): as above.
	204.19	1.20	SANDSTONE (60%)/MUDSTONE, SILTY (40%): as above, but sandstone decreases in grain size to very fine-to fine-grained, nine surfaces with slickensided features.0519m apart, but core not badly broken up.
	206.04	1.85	MUDSTONE, SILTY (60%) SANDSTONE (40%): as above.
	208.78	2.74	MUDSTONE, SILTY (80%)/SANDSTONE (20%): sandstone is very fine-grained and occurs mostly as lenses, silty mudstone is dark-grey, increasingly silty, slickenside features numerous (sometimes along with thin highly sheared zones or broken up zones) and occur every .1015m.
	211.84	3.06	MUDSTONE, SILTY (65%)/SANDSTONE (35%): same as above, (.0509) thin layers of fine-grained finely laminated cross-bedded sandstone becoming more frequent. Slickensided and listric features (no sheared up zones) occur every .15-35m.
	213.64	1.30	MUDSTONE, SILTY (65%)/SANDSTONE (35%): same as above, same frequency of faulting as interval directly above.
	213.97	0.33	MUDSTONE, SILTY (65%)/SANDSTONE (35%): same as above, core highly broken up in all directions, few slicken-sided and listric surfaces, also a few weathered surfaces.
	215.79	1.82	MUDSTONE, SILTY (65%)/SANDSTONE (35%): same as above, core badly broken up in all directions, weathered surfaces but no slickensided or listric surfaces.
	216,13	0.34	MUDSTONE, SILTY (65%)/SANDSTONE (35%): same as above, core badly broken up.
	218.28	2.15	MUDSTONE, SILTY (80%)/SANDSTONE (20%).
	218.63	0.35	MUDSTONE, SILTY (95%)/SANDSTONE (5%): same as above, core shattered, one stick with one slickensided surface at base.
	221.28	2.65	MUDSTONE, SILTY (95%)/SANDSTONE (5%).

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Dip o	DEPTH	THICKNESS m	DESCRIPTION
	222.65	1.37	MUDSTONE, SILTY (95%)/SANDSTONE (5%).
	223.88	1.23	SANDSTONE (90%)/MUDSTONE (10%).
	224.33	0.45	SANDSTONE/MUDSTONE: medium-grey, very fine-grained, massive poorly-sorted, highly burrowed (small size mostly) slumped with numerous lenses and thin interbeds of light-grey, fine-grained sandstone well-sorted, burrowed and slumped. Both lithologies are often churned intimately. Also thin intervals of silty mudstone, dark-grey and burrowed, becoming more common downsection until it predominates over the sandstone, plus two listric surfaces .20m apart.
	225.00	0.67	SANDSTONE (80%)/MUDSTONE (20%): as above, decreasing to half sandstone, half mudstone, one listric surface.
	226.00	1.00	MUDSTONE (60%)/SANDSTONE (40%).
	228.65	2.65	SANDSTONE: medium-grey, very fine-grained, massive, small burrows, becoming muddy. 150mm fine-grained sandstone at 228.20.
	230.42	1.77	SANDSTONE: light-grey, fine-grained, laminated, inter- bedded with bioturbated sandstone/mudstone.
	231.61	1.19	MUDSTONE: silty, bioturbated, light-grey.
	247.77	16.16	MUDSTONE: dark-grey, silty, interbedded with fine-grained sandstone, often churned, slumped and burrowed, sandstone content decreasing downwards.
	248.28	0.51	MUDSTONE: as above, plus thin intervals of dark mudstone (.05m thick), one listric surface.
	248.71	0.43	SANDSTONE (70%)/MUDSTONE, SILTY (30%).
	250.15	1.44	SANDSTONE (50%)/MUDSTONE, SILTY (50%).
	250.30	0.15	SANDSTONE (50%)/MUDSTONE, SILTY (50%): core broken up, one possible weathered surface.
	251.00	0.70	SANDSTONE (50%)/MUDSTONE, SILTY (50%).
	251.10	0.10 '	SANDSTONE: light-grey, fine-grained, horizontal lamination
	251.70	0.60	SANDSTONE (20%)/MUDSTONE, SILTY (80%).
	253.32	1.62	SANDSTONE (20%)/MUDSTONE, SILTY (80%).
	254.04	0.72	SANDSTONE: salt and pepper, fine-to medium-grained, mass- ive sandstone, few large burrows.

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<u> </u>		1	
Dip	DEPTH m	THICKNESS m	DESCRIPTION
	254.81	0.77	SANDSTONE: medium-grey, fine-grained, massive sandstone, slightly carbonaceous, locally heavily burrowed (large) occasional thin black mudstone parting becoming predominantly thicker to base.
	257.40	2.59	SANDSTONE: same as above
	260.90	3.50	SANDSTONE: same as above, but laminated and not burrowed, mudstone interbeds becoming more frequent.
	263.17	2.27	SANDSTONE (80%)/MUDSTONE (20%): sandstone as above, laminated, mudstone intervals black, heavily burrowed.
	263.96	0.79	SANDSTONE (60%)/MUDSTONE (40%): the two lithologies are frequently intimately mixed together.
	267.00	3.04	SANDSTONE (55%)/MUDSTONE (45%): same as above
	268.00	1.00	SANDSTONE (55%)/MUDSTONE (45%): same as above
	268.35	0.35	SANDSTONE (55%)/MUDSTONE (45%): same as above, interval of three listric surfaces 0.10m apart.
	269.78	1.43	SANDSTONE (55%)/MUDSTONE (45%).
	272.29	2.51	SANDSTONE (50%)/MUDSTONE (50%).
	273.10	0.81	SANDSTONE (50%)/MUDSTONE (50%): same as above, four zones of listric surfaces separated from each other by 0.10-0.12m of unbroken core.
	273.61	0.51	SANDSTONE (45%)/MUDSTONE (55%): as above, 3 zones of listric and slickensided surfaces over 0.47m.
	274.37	0.76	SANDSTONE (40%)/MUDSTONE (60%).
	276.15	1.78	MUDSTONE (80%)/SANDSTONE (20%).
	277.50	1.35	MUDSTONE (80%)/SANDSTONE (20%).
	279.30	1.80	MUDSTONE (80%)/SANDSTONE (20%): as above, 7 zones of slickers sided and listric surfaces separated by even intervals of unbroken core.
	282.00	2.70	MUDSTONE: small lenses of sandstone, broken up core with numerous evidence of movement, listric and slickensided surfaces plus calcite mineralization, extensive zone of highly sheared, brecciated core with associated calcite mineralization.
	282.24	0.24	MUDSTONE: as above.

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Dip	DEPTH m	THICKNESS m	DESCRIPTION
	282.84	0.60	MUDSTONE: as above, highly sheared zone continued.
	284.71	1.87	SANDSTONE (60%)/MUDSTONE (40%): as above, few zones of slickensided surfaces.
	285.29	0.58	SANDSTONE (50%)/MUDSTONE (50%).
واز بياني - براوارد متعدده	285.40	0.11	SANDSTONE (50%)/MUDSTONE (50%): as above, one small zone of highly sheared core.
	286.53	1.13	SANDSTONE (40%)/MUDSTONE (60%): occasional pyrite nodules
	288.34	1.81	SANDSTONE/MUDSTONE: as above, one listric marked surface.
	291.30	2.96	SANDSTONE/MUDSTONE: slightly silty, calcareous.
	294.43	3.13	SANDSTONE (40%)/MUDSTONE (60%).
	297.48	3.05	SANDSTONE (30%)/MUDSTONE (70%).
	300.53	3.05	SANDSTONE (25%)/MUDSTONE (75%).
	303.58	3.05	SANDSTONE (25%)/MUDSTONE (75%).
	306.62	3.04	SANDSTONE (20%)/MUDSTONE (80%): sandstone as small lenses and wisps.
·	308.07	1.45	SANDSTONE (20%)/MUDSTONE (80%).
	308.16	0.09	SANDSTONE/MUDSTONE as above, core badly broken up.
	308.34	0.18	SANDSTONE/MUDSTONE: as above.
	308.59	0.25	SANDSTONE/MUDSTONE: as above.
	313.06	4.47	SANDSTONE (10%)/MUDSTONE (90%).
	316.10	3.04	SANDSTONE/MUDSTONE.
	318.82	2.72	SANDSTONE/MUDSTONE: as above
and the second s	319.44	0.62	MUDSTONE/SILTSTONE/SANDSTONE: dark grey-black, silty mudstone, strongly calcareous often burrowed (small size burrows most common), bioturbated, with intercalated light-grey siltstone and very fine-grained sandstone beds (.OlmlOm thick), strongly calcareous, massive bioturbated and burrowed to finely laminated, pyrite nodules scattered throughout section. I listric surface.
	321.48	2.04	MUDSTONE/SILTSTONE/SANDSTONE: same as above

BH Nos. 14A

Dip	DEPTH	THICKNESS m	DESCRIPTION
	321.86	0.38	MUDSTONE (75%)/SILTSTONE (25%): as above, core badly shattered.
	324.91	3.05	MUDSTONE (80%)/SILTSTONE (20%): as above, some sandstone.
	327.96	3.05	MUDSTONE (80%)/SILTSTONE (20%): as above.
	330.62	2.66	MUDSTONE (80%)/SILTSTONE (20%): as above.
	333.68	3.06	MUDSTONE (80%)/SILTSTONE (20%): as above.
	336.00	2.32	MUDSTONE (90%)/SILTSTONE (10%): as above.
			SUKUNKA MOOSEBAR
	336.72	0.72	MUDSTONE (98%)/SILTSTONE (2%): mudstone, black, slightly silty, non-calcareous, massive, often burrowed (small size), with very occasional light grey silty calcareous parting.
	339.77	3.05	MUDSTONE (98%)/SILTSTONE (2%): as above.
	340.45	0.68	MUDSTONE (98%)/SILTSTONE (2%): as above.
	342.82	2.37	MUDSTONE: black, homogeneous, occasional pyrite nodules and shear zones.
	344.56	1.74	MUDSTONE: as above.
	344.96	0.40	MUDSTONE: as above, broken up zone (no listric or slick- ensided surfaces).
	346.25	1.29	MUDSTONE: as above.
	347.07	0.82	MUDSTONE: as above.
	347.90	0.83	MUDSTONE: as above, zone of listric surfaces and one grounded section on broken core, 4 over .73m
	348.74	0.84	MUDSTONE: as above.
	349.30	0.56	MUDSTONE: as above, zone of highly shattered core, with several pieces showing listric surfaces.
	351.09	1.79	MUDSTONE: four major zones .25m thick separated by up to .25cm of unbroken zone plus isolated single fractures with listric surfaces.

BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	-
	352.34	1.25	MUDSTONE: as above
	352.76	0.42	MUDSTONE: as above
	353.05	0.29	MUDSTONE: as above, core broken up in three pieces each .09lm thick, two listric surfaces.
	355.26	2.21	MUDSTONE: as above
	355.39	0.13	MUDSTONE: as above, zone of highly sheared up mudstone, with listric surfaces.
	358.44	3.05	MUDSTONE: as above
	359.14	0.70	MUDSTONE: as above, one gastropod shell
	359.33	0.19	MUDSTONE: as above, one listric surface
	361.49	2.16	MUDSTONE: as above
	362.40	0.91	MUDSTONE: as above, one listric surface at bottom
<u> </u>	364.02	1.62	MUDSTONE: as above
	364.50	0.48	MUDSTONE: as above, broken up core
	365.80	1.30	MUDSTONE: as above, zone of broken up core with numerous slickensided and listric surfaces, brecciated mudstone with calcite infilling.
	367.20	1.40	MUDSTONE: as above
	370.63	3.43	MUDSTONE: as above, one listric surface .48m from base.
	373.68	3.05	MUDSTONE: as above.
	376.10	2.42	MUDSTONE: as above, one listric surface at top .
	379.17	3.07	MUDSTONE: as above.
	381.19	2.02	MUDSTONE: as above
	382.52	1.33	MUDSTONE: as above, one listric surface at bottom.
	382.82	0.30	MUDSTONE: as above, core badly broken up.
	383.31	0.49	MUDSTONE: as above, unbroken 0.35, zone of slickensided and listric surfaces 1.04m, four zones separated from each other by 0.2035m of unbroken core, bottom one the most important, 0.15m of broken up core with listric surfaces.

BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	385.84	2.53	MUDSTONE: as above, continuation of the preceeding zone of faulting, parallel intervals of slickensided and listric surfaces mostly as single surfaces (one has broken up core over .10m). These zones of faulting are from 0.06m to 0.30m apart.
	388.92	3.08	MUDSTONE: as above, zone of slickensided and listric surfaces 0.35-0.40m apart.
	390.90	1.98	MUDSTONE: as above
	391.97	1.07	MUDSTONE: as above, zone of slickensided and listric surfaces.
	395.02	3.05	MUDSTONE: as above, occasional slickensided and listric surface where the core is broken every .5070m.
<u> </u> -	397.07	2.05	MUDSTONE: as above, occasional listric surfaces
	401.12	4.05	MUDSTONE
	404.16	3.04	MUDSTONE
	406.14	1.98	MUDSTONE
	406.58	0.44	MUDSTONE: as above, one highly broken up section.
	407.21	0.63	MUDSTONE .
	408.21	1.00	MUDSTONE: as above with one listric surfaces
	410.26	2.05	MUDSTONE
	412.46	2.20	MUDSTONE: small set of slickensided and listric surfaces with broken up cores.
	412.99	0.53	MUDSTONE: as above.
	413.31	0.32	MUDSTONE
	416.36	3.05	MUDSTONE: occasional iron nodules possibly burrows and two listric surfaces.
	419.40	3.04	MUDSTONE: with occasional pyritic nodules.
	422.45	3.05	MUDSTONE
	423.70	1.25	MUDSTONE
	423.85	0.15	BENTONITE: layer with scattered small size burrows at base.

- BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	425.50	1.65	MUDSTONE: with slickensided surface at base.
	427.20	1.70	MUDSTONE
	427.25	0.05	MUDSTONE: thin bentonitic layer.
	428.55	1.30	MUDSTONE
<u>.</u>	431.60	3.05	MUDSTONE
	432.02	0.42	MUDSTONE .
<u> </u>	432.04	0.02	MUDSTONE: thin bentonitic layer
	433.09	1.05	MUDSTONE
	433.59	0.50	MUDSTONE: core broken up but no trace of slickensided or listric surfaces.
	437.66	4.07	MUDSTONE: as above.
	437.77	0.11	MUDSTONE: dark-grey, pyritic worm burrows, no bedding observed, low comptency
	437.87	0.10	CLAYSTONE: light grey-white, bentonitic, soft.
	438.02	0.15	MUDSTONE: dark-grey as above.
 	438.13	0.11	CLAYSTONE: light grey-white, as above.
	438.46	0.33	SANDSTONE: fine-grained, dark grey-green, glauconitic, pyritic worm burrows, prominent to base, pyrite band at base, bedding completely obliterated, competent.
			ROOF OF BIRD SEAM.
	438.47	0.01	COAL: dull, abundant, pyrite, stick.
	438.51	0.04	COAL: dull and bright, stick.
	438.56	0.05	COAL: dull banded, stick
	438.63	0.07	COAL: bright banded, stick
	438.66	0.03	COAL: dull and bright, stick.
	438.70	0.04	COAL: dull banded, stick.
	438.75	0.05	COAL: dull and bright, stick
	438.78	0.03	COAL: bright, stick

BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION .
		m	
	438.80	0.02	COAL: dull, stick.
	438.87	0.07	COAL: dull and bright, stick
	438.90	0.03	COAL: bright banded, stick
	438.93	0.03	COAL: dull and bright, stick
	438.96	0.03	COAL: dull banded, stick
	439.08	0.12	CORE LOSS-COAL
	440.72	1.64	MUDSTONE: dark-grey, carbonaceous atop, plant root lets in top 0.5m.
	440.76	0.04	CORE LOSS-ROCK
	440.78	0.02	CORE LOSS-COAL
	440.84	0.06	COAL: dull banded, small pieces
<u> </u>	440.87	0.03	COAL: bright banded, sheared, pieces
	440.96	0.09	COAL: dull, pieces
	441.02	0.06	COAL: dull banded, pieces
	414.07	0.05	COAL: dull and bright, pieces
	441.13	0.06	COAL: bright banded, pieces.
	441.19	0.06	COAL: dull
		<u>.</u>	FLOOR OF BIRD SEAM.
	441.35	0.16	SANDSTONE: light-grey, carbonaceous at top, medium-grain- ed, large Coaly inclusions at top. Small worm burrows from 1.36 to 2.00m from top, very clean, bedding not observed.
	443.53	2.18	SANDSTONE: as above.
	443:64	0.11	SANDSTONE: as above .
50	444.42	0.78	SANDSTONE: light-grey, medium-grained, scattered inter-beds of dark-grey, carbonaceous mudstone, large worm burrows from 3.26-3.36m from top.
	445.77	1.35	SANDSTONE: as above
	447.51	1.74	SANDSTONE: as above

BH No)5. 14A		
Dip	DEPTH m	THICKNESS	DESCRIPTION
	447.91	0.40	SANDSTONE: as above
	450.09	2.18	SANDSTONE: light-grey, fine-grained, very clean, small worm burrows in lower half. <u>NOTE</u> : no fault is present.
	450.62	0.53	SANDSTONE: as above
	451.09	0.47	SANDSTONE: as above
	452.22	1.13	SANDSTONE: medium-grained, light-grey, large worm burrows from 2.75-3.51m from top, scattered interbeds of carbon-aceous mudstone.
10°	453.64	1.42	SANDSTONE: as above
	454.36	0.72	SANDSTONE: as above
	454.81	0.45	SANDSTONE: as above
	456.57	1.76	SANDSTONE: fine-grained, light-grey, very clean.
	456.74	0.17	SANDSTONE: as above.
	458.65	1.91	SANDSTONE: as above
	459.75	1.10	SANDSTONE: as above
	460.76	1.01	SANDSTONE: as above
	462.58	1.82	SANDSTONE: as above, frequent irregular calcite filled and leached fractures.
	464.70	2.12	SANDSTONE: as above
	465.01	0.31	SANDSTONE: as above
	465.17	0.16	COAL: fragments in box, dull and bright, probably Coaly material dragged on fault plane, fault established.
	466.77	1.60	BRECCIA: sandstone fragments as above rotated in calcite matrix, fault breccia.
	466.84	0.07	SANDSTONE: light-grey, medium-grained, scattered interbeds of carbonaceous mudstone, large worm burrows from 0.83-1.60m from top, repeat of lower large worm burrows above fault.
	468.38	1.54	SANDSTONE: as above.
	468.70	0.32	SANDSTONE: fine-grained, light-grey, very clean.
	468 98	0.28	SANDSTONE: as above

BH Nos. 14A

Dip	DEPTH m	THICKNESS m	DESCRIPTION
<u></u>	471.19	2.21	SANDSTONE: as above.
	471.93	0.74	SANDSTONE: as above
	473.31	1.38	SANDSTONE: às above
	475.51	2.20	SANDSTONE: as above
	477.70	2.19	SANDSTONE: as above
	477.80	0.10	SANDSTONE: as above
<u> </u>	479.00	1.20	SANDSTONE: as above
 	479.14	0.14	MUDSTONE: dark-grey, frequent pyrite filled worm burrows.
	479.57	0.43	SANDSTONE: light-grey, medium-grained with interbeds of grey siltstone at base.
	479.65	0.08	MUDSTONE: dark-grey
	479.79	0.14	SILTSTONE: grey, fine-grained, sandstone interbeds
	479.91	0.12	SANDSTONE: fine-grained, light-grey, characterized by small scale cross-bedding.
	480.17	0.26	SANDSTONE: as above.
	480.42	0.25	SANDSTONE: medium-to coarse-grained, light grey, salt and pepper.
	480.73	0.31	MUDSTONE: dark-grey with frequent thin interbeds of grey siltstone, phases of bioturbation, slumping at base.
	481.97	1.24	MUDSTONE: as above
	482.08	0.11	SANDSTONE: light-grey, fine-grained, characterized by small scale cross-bedding.
	482.38	0.30	SANDSTONE: as above.
	482.80	0.42	SANDSTONE: coarse grained, light-grey, few fine carbon- aceous interbeds.
	483.75	0.95	SANDSTONE: medium-grained with frequent interbeds and phases of dark-grey mudstone and grey siltstone.
	484.17	0.42	SANDSTONE: as above
	484.39	0.22	SANDSTONE: as above

BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	485.12	0.73	SANDSTONE: light-grey, medium-grained, small-scale cross- bedding, carbonaceous partings on bedding, mudstone breccia at base.
	485.77	0.65	SILTSTONE/MUDSTONE: interbedded, grey siltstone and dark grey mudstone.
	485.91	0.14	SILTSTONE/MUDSTONE: interbedded as above, calcite fracture: and slickensided, possible sigmoidal laminate type structure.
	486.41	0.50	SILTSTONE: grey, plant rootlets at top, worm burrows near base.
	486.88	0.47	SILTSTONE: as above.
	487.04	0.16	SILTSTONE: as above.
	487.92	0.88	SANDSTONE: fine-grained, grey, with frequent interbeds of grey siltstone, slumping near base, gradational basal contact, calcite filled irregular features.
	488.51	0.59	SANDSTONE: light-grey, medium-grained, very clean, large calcite filled fractures parallel to bedding.
	488.58	0.07	CALCITE
	488.60	0.02	CALCITE
	488.94	0.34	SANDSTONE: as above.
	490.77	1.83	SILTSTONE: grey, with frequent phases of fine-grained, light grey sandstone and dark grey mudstone interbeds. large irregular calcite filled fractures at top, bio- turbation at top.
	491.26	0.49	SILTSTONE: as above.
10 ⁰	492.15	0.89	SILTSTONE/MUDSTONE: interbedded, dark grey mudstone interbedded with grey siltstone, mudstone increasing to base.
	492.91	0.76	SILTSTONE/MUDSTONE: as above.
	494.61	1.70	SILTSTONE/MUDSTONE: as above.
	494.82	0.21	SILTSTONE/MUDSTONE: interbedded as above, shelly fossils.
	494.85	0.03	COAL: dull and bright, stick
	494.86	0.01	COAL: bright, stick
<u> </u>	494.89	0.03	COAL: dull banded, stick

BH Nos. - 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	494.92	0.03	COAL: dull, stick.
	494.95	0.03	COAL: dull banded, stick.
	494.99	0.04	COAL: dull and bright, stick.
	495.08	0.09	COAL: stoney, stick.
	495.80	0.72	SANDSTONE: fine-grained, light grey, with frequent irregular bedded carbonaceous mudstone interbeds, small light coloured worm burrows at base.
	495.87	0.07	SILTSTONE: black, carbonaceous.
	496.10	0.23	MUDSTONE: black, carbonaceous with frequent fine, light- grey sandstone interbeds, bioturbation.
	496.14	0.04	COAL: dull and bright, stick.
	496.19	0.05	COAL: dull banded, stick.
	496.23	0.04	COAL: boney, stick.
	496.29	0.06	COAL: dull and bright, stick.
	496.32	0.03	CLAYSTONE: carbonaceous, black, numerous bright coal bands.
	496.35	0.03	COAL: bright banded, pieces.
	496.37	0.02	COAL: duil, stick
100	497.32	0.95	SANDSTONE: fine-grained, light grey, phases of grey siltstone.
	497.38	0.06	SANDSTONE: as above.
	498.85	1.47	SILTSTONE: grey with frequent phases and interbeds of dark grey mudstone and frequent phases of fine-grained sandstone.
	498.95	0.10	SILTSTONE: as above
	499.64	0.69	LAMINITE: dark grey siltstone-mudstone forming thin graded units.
	500.59	0.95	LAMINITE: as above.
	501.44	0.85	MUDSTONE: dark grey, carbonaceous at base.
	501.46	0.02	MUDSTONE: as above.

BH Nos. 14A

Dip o	DEPTH	THICKNESS m	DESCRIPTION
	<u> </u>		ROOF OF CHAMBERLAIN SEAM
	501.49	0.03	COAL, dull, stick
	501.53	0.04	COAL, dull banded, stick
	501.61	0.08	CORE LOSS-COAL
	501.63	0.02	COAL, dull banded, large pieces
	501.66	0.03	COAL, dull banded, stick
	501.71	0.05	COAL, dull and bright, stick
	501.75	0.04	COAL, dull banded, stick
	501.88	0.13	COAL, dull, stick
	501.91	0.03	COAL, dull banded, stick
	501.96	0.05	COAL, dull and bright, stick
	501.98	0.02	COAL, dull, stick
	502.00	0.02	COAL, bright, stick
	502.06	0.06	COAL, dull banded, stick
,	502.11	0.05	COAL, dull and bright, stick
	502.13	0.02	COAL, dull, stick
	502.15	0.02	COAL, bright banded, stick
	502.19	0.04	COAL, dull, stick
	502.22	0.03	COAL, dull banded, stick
	502.28	0.06	COAL, dull banded, stick
	502.39	0.11	COAL, dull and bright, stick
	502.43	0.04	COAL, bright, stick
	502.48	0.05	COAL, dull and bright, stick
	502.52	0.04	COAL, dull, stick
	502.53	0.01	COAL, bright, stick
	502.56	0.03	COAL, dull, stick, sheared
	502.60	0.04	COAL, dull banded, stick, sheared

BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	502.70	0.10	CORE LOSS-COAL
	502.78	0.08	COAL, dull and bright, small fragments
	502.82	0.04	COAL, dull, stick
<u> </u>	502.89	0.07	COAL, dull banded, stick
	502.96	0.07	COAL, dull, stick
	503.12	0.16	CORE LOSS-COAL
	503.14	0.02	COAL, dull, small fragments
	503.22	0.08	CORE LOSS-COAL
	503.26	0.04	COAL, dull, large pieces, sheared
	503.29	0.03	COAL, dull and bright, stick
	503.33	0.04	COAL, baney, stick
	503.35	0.02	COAL, dull and bright, stick
} 	503.43	0.08	CORE LOSS-COAL
	503.46	0.03	COAL, bright, large pieces
	503.50	0.04	COAL, dull and bright, stick
	503.58	0.08	COAL, bright, stick
	503.63	0.05	COAL, dull and bright, stick
	503.71	0.08	COAL, dull, stick
	503.75	0.04	COAL, dull banded, stick
	503.85	0.10	COAL, dull banded, stick
	503.93	0.08	COAL, dull and bright, stick
	503.98	0.05	COAL, dull banded, stick
	504.04	0.06	COAL, dull and bright, stick
	504.10	0.06	COAL, dull banded, stick .
	504.22	0.12	COAL, dull and bright, stick
	504.25	0.03	COAL, dull banded, stick

BH Nos. 14A

Dip	DEPTH	THICKNESS	DESCRIPTION
o	m	m	
	504.27	0.02	COAL: bright, stick
	504.31	0.04	COAL: bright banded, stick
	504.35	0.04	COAL: dull banded
}	504.38	0.03	COAL: bright, stick
	504.43	0.05	COAL: dull, stick
	504.51	0.08	CORE LOSS-COAL
	504.59	0.08	COAL: dull banded, large pieces, sheared
	504.63	0.04	COAL: dull, stick
	504.72	0.09	COAL: dull banded, stick
	504.79	0.07	COAL: dull and bright, stick
	504.82	0.03	COAL: dull banded, stick
1	504.92	0.10	COAL: dull, stick
	504.96	0.04	COAL: dull banded, stick
	504.99	0.03	COAL: bright, stick
	505.07	0.08	COAL: bright banded, stick
	505.11	0.04	COAL: dull and bright, stick
	505.12	0.01	COAL: dull, stick
	505.15	0.03	COAL: bright, stick
	505.25	0.10	COAL: dull and bright, stick
	505.28	0.03	COAL: dull banded, stick
	505.37	0.09	COAL: bright banded, stick
	505.49	0.12	COAL: dull, stick, sheared
	505.52	0.03	COAL: dull and bright, stick, sheared
	505.56	0.04	COAL: dull, stick, sheared
	505.68	0.12	COAL: dull and bright, stick, sheared
	505.72	0.04	COAL: bright, stick, sheared
L	505.75	10.03	L_COAL: dull and bright, stick, sheared

BH Nos. 14A

Dip o	DEPTH	THICKNESS	DESCRIPTION
 -	505.78	0.03	COAL, bright, sheared
	505.80	0.02	COAL, dull and bright, stick, sheared
	505.89	0.09	CORE LOSS .
	505.99	0.10	COAL, dull and bright, large pieces
			FLOOR OF CHAMBERLAIN SEAM
	506.54	0.55	SANDSTONE, light grey, medium-grained, carbonaceous at top, very clean, bedding usually unobserved
	508.64	2.10	SANDSTONE, as above
	508.87	0.23	SANDSTONE, as above with large worm burrows
	511.76	2.89	SANDSTONE, as above
	512.49	0.73	SANDSTONE, as above
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Page 1

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SUKUNKA

B. H. No. BP 15

Contractor: Tonto

Commenced:

Aug 6, 1977

Completed:

Aug 16, 1977

Co-ordinates: 6,112,736.10

593.683.81

Surface Elevation: 1,458.40

E

N

Core Size:

Hole Azimuth:

Final Depth:

SEAMS

В

C

НQ

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449.49

DEPTH

Casing Left in Hole:

m

Geologist

Ali Chowdry

Depth 8.25-71.63

79.87-96.01

99.20-147.13

150.88-194.20

ELEVATION

Peter Raymond

%RECOVERY

71.90-77.72

147.53-150.32 (SEE OVER)

		(0000	, v Dit)
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek		-	
Hulcross		,	
Gates	194.20	194.20	1,264.20
Sukunka	318.47	124.27	1,139.93
Moosebar	401,23	82.76	1,057.17
U. Gething	444.29	43.06	1,014.11

Logged by:

SIRD .	404.08		1,054.32
CHAMBERLAIN	444.29		1,014.11
F.PO. F.PO. F.PO.	95.29 351.12 387.78	Slickensided, sto core highly broke slickensided	

THICKNESS

Geologist	<u>Depth</u>
Andy Newson	214.35-231.62
Mike DeMestre	233.17-399.81
Geoff Torden	399 81-649 49

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Sperry-Sun Survey

Date: 16th August 1977

Borehole: BP #15 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth		<u>Tilt</u>	Tilt Direction
446m	1.	3° -	N 28° Е
400m		2° 45'	N 34° Е
350m		2° 30'	и 40° Е
300m		2° -	N 41° E
250m		2° -	N 41° E
200m		1° 45'	n 46° Е
150m		1° 15'	и 60° Е
100m		1° 30'	N 41° E
50m		10 -	n 26° Е

"BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	8.25	8.25	TRICONED
8 ⁰	8.94	0.69	SANDSTONE, light grey, fine/medium-grained, scattered small-scale cross-lamination and tiny muddy clasts, 0.17m dark grey mudstone in middle (crosional top and base) and fragmented, calcareous, crosional at base, cross-laminae enhanced due to fine carbonaceous matter
	10.06	1.12	MUDSTONE, dark grey, locally ferruginous and calcareous, bottom 0.20m with carbonized plant debris, core badly fragmented throughout
4 ⁰	13.26	3.20	SANDSTONE, medium grey, very fine-grained, locally grading to siltstones, abundantly laminated and cross-laminated (small-scale), some tiny ripples, slumping toward base and occasional burrows, strongly calcareous, base fragmented
	14.56	1.30	SANDSTONE, light grey, fine-to medium-grained, locally grading to fine sands, some argillaceous laminae, top 0.20m broken and weathered, small cross-lamination throughout, strongly calcareous
,	15.96	1.40	SANDSTONE, light/medium grey, fine-grained, ubiquitous, small-scale cross-lamination, some ripple-drifts, abundance of carbonaceous matter (interlaminae), thin silty layers, some intervals with wavy lamination, strongly calcareous, gradational at base
	16.30	0.34	MUDSTONE, dark grey, silty, calcareous, pelecypod shells, fragmented core, basal contact broken
·	16.46	0.16	SANDSTONE, medium grey, medium-grained, very clean, well- sorted, scattered small-scale cross-sets
5 ⁰	19.51	3.05	SANDSTONE, as above, some near vertical fractures
	20.96	1.45	SANDSTONE, light grey, medium-grained, extremely clean, calcareous, bottom 0.70m well laminated and strongly calcareous, with local interlaminae carbonaceous matter, gradual
	22.71	1.75	SANDSTONE, light grey, fine/medium-grained, ubiquitous, low angle, cross-lamination and interlaminae finely comminuted carbonaceous matter, feebly calcareous
	24.27	1.56	SANDSTONE, identical to above
	24.59	0.32	SANDSTONE, light grey, fine-grained, very clean, structureless, strongly calcareous, gradual
	25.75	1.16	SANDSTONE, medium grey, very fine-grained, argillaceous, laminated, slumping
5 ⁰	26.74	0.99	SANDSTONE/SILTSTONE, 30:70, medium grey, rapidly interbedded, very fine sands and silts (argillaceous) laminated with microerosional boundaries, 0.16m at top and 0.15m toward base water saturated and considerably softened, interbedded at base

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	IM .	
	28.96	2.22	SANDSTONE, light grey, medium-grained, extremely clean and well-sorted, predominently structureless, 0.16 zone fine-grained with abundant interlaminae, carbonaceous matter, moderately calcareous, high chert percentage
	32.00	3.04	SANDSTONE, as above
	32.65	0.65	SANDSTONE, similar to above, gradual at base
	33.32	0.67	SANDSTONE, light grey, fine-grained, abundance of interlaminae, carbonaceous matter (some coaly streaks), abrupt below
	35.05	1.73	SANDSTONE, light grey, medium-grained, very clean and well-sorted, very brief fine-grained sands intervals with carbonaceous laminae, otherwise mainly structureless few scattered dark grey silty clasts, locally strongly calcareous
	38.10	3.05	SANDSTONE, same as above
	40.92	2.82	SANDSTONE, light grey, medium-grained, very clean, well-sorted, almost completely devoid of lamination, calcareous bottom 0.70m fine/medium-grained with 8cm silty zone and strongly calcareous (sands), abrupt
	41.15	0.23	SANDSTONE/SILTSTONE, 50:50, medium grey, sands fine/medium-grained, erosional boundary with silts
	44.20	3.05	SANDSTONE, light grey, fine/medium-grained, widely-spaced silty layers, some interlaminae carbonaceous matter, bottomwards predominently fine-grained to very fine sands
	47.24	3.04	SANDSTONE/SILTSTONE, 90:10, light/medium grey, sands fine-grained, clean and well-sorted, widely-spaced thin silty layers with abrupt and erosional boundaries, some carbonaceous laminae, bottomwards strongly calcareous with increasing silty/muddy component
10 [°]	50.29	3.05	MUDSTONES, dark grey, frequently with lenticles and ripples of very fine sands and silts, much mecroerosional features, many pin prick burrowing zones, locally feebly calcareous
	51.05	0.76	MUDSTONE/SANDSTONE, very fine-grained, laminated and rippled sands interlayered with dark grey mudstones, some rusty layers, erosional features, bioturbated in basal 0.10m
5 ⁰	53.34	2.29	SANDSTONE, medium grey, fine-to very fine-grained, highly bioturbated and whorled fabrics, some silty/muddy admixture, many zones of sands with well-preserved parallel lamination, some rusty weathering nodules, much carbonized plant debris, sukunkoid zone
5°	56.39	3.05	SANDSTONE, light grey, fine-grained, generally very clean, sorted, ubiquitous large-scale cross-bedding, few ferruginous nodules, within muddy band, slickensided surfac

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	, m	m	
			top 0.15m with dark laminae
·	59.43	3.04	SANDSTONE, as above, slightly darker, 10cm black mudstone, bottom 0.80m with many large burrows, top 0.70 feebly calcareous, basal 5cm interbedded sands and mudstone, some vertical fractures in middle core
	59.65	0.22	SAND/MUDSTONE, dark grey muds with very fine-grained cross- laminated sands with quartz/chert granules, sharp contact, gradual at base
	61.62	1.97	MUDSTONE, dark grey to black, top 1.02m locally very silty, rest at base abundantly carbonaceous, gradual basal contact
	62.48	0.86	MUDSTONE/SILTSTONE, 70:30, medium grey, interlayered sequer of argillaceous silts and muds, very transitional toward base
5 ⁰	62.93	0.45	SILTSTONES, medium grey, very argillaceous, locally stringers of very fine sands, irregularly laminated, patchily calcareous, gradual at base
	63.55	0.62	MUDSTONE, black, carbonaceous (richly), some admixture of silts in matrix, coaly toward base, broken
	64.21	0.66	COAL SEAM, basal contact fragmented butappears normal Coal, bony 0.05 Mudstone, carbonaceous 0.03
i			Coal, dull and bright 0.06 Coal, bright banded 0.08 Coal, dull with metallic lustre 0.07 Coal, bright banded 0.05 Coal, bony 0.08 Coal, bright banded 0.06 Coal, dull and bright 0.02 Coal, dominantly dull, badly broken 0.16
	65.53	1.32	MUDSTONE, top half black, locally carbonaceous, rest dark grey, sporadically silty, gradual at base
	65.71	0.18	SANDSTONE, light/medium grey, very fine-grained, argilla- ceous, calcareous, very gradational at base
	68.58	2.87	MUDSTONE, dark grey/black, carbonaceous, 4cm coal in top 1/3 of sequence, non calcareous
8°	69.94	1.36	MUDSTONE/SANDSTONE, 35:65, dark grey, sands very fine- grained, argillaceous, small-scale cross-lamination, erosional sand/mud boundaries, erosional at base
	71.63	1.69	MUDSTONE, top 1.15m medium grey, silty with 10cm very fine-grained sandy unit, and calcareous (muds), rest at base black, carbonaceous, gradual to base
,	{ }		GATES E SEAM
	71.90	0.27	COAL, mostly dull with some bright bands, fragmented and

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	tm	m	
	72.79	0.89	MUDSTONE, grey-brown, silty, carbonaceous, particularly towards top, plant remains, some coal bands, broken stick
	73.07	0.28	MUDSTONE, coaly, interbedded with thin coal bands, friable stick
	73.18	0.11	MUDSTONE, grey-brown, silty, carbonaceous, stick
	73.21	0.03	COAL, dull, dense, with thin bright bands, stick
	73.31	0.10	MUDSTONE, as above, stick
	73.38	0.07	COAL, dull with thin bright bands, friable, stick
	73.56	0.18	MUDSTONE, grey-brown, carbonaceous, with coal bands, 0.01-0.02 thick, stick
	73.60	0.04	COAL, bright banded, ankerite, stick
	73.61	0.01	MUDSTONE, silty, carbonaceous, polished surface top and base, stick
	73.73	0.12	COAL, dull and bright, dull dense bands with bands of bright coal, ankerite, bright coal, stick
	73.76	0.03	MUDSTONE, very carbonaceous, thin coal bands, stick
	74.05	0.29	MUDSTONE, grey-brown, slightly silty, abundant plant remains, slightly carbonaceous, highly listricated, soft to top, 45° striated plane passing through core 0.27 from top, broken stick
	74.39	0.34	MUDSTONE, dark grey, very carbonaceous, almost coal in places, thin bright coal bands, top 0.06 has several striated planes passing through core, broken stick
	74.48	0.09	COAL, dull and bright, ankerite, broken stick
	74.67	0.19	MUDSTONE, grey-brown, very carbonaceous, thin coal bands, stick
	74.79	0.12	COAL, dull lustrous with thin bright bands, broken stick
	74.82	. 0.03	COAL, bright banded, ankerite, stick
	74.84	0.02	COAL, powdered
	74.90	0.06	COAL, dull, dense, hard, broken stick
	75.11	0.21	FRAGMENTS, mudstone and coal
	75.43	0.32	MUDSTONE, carbonaceous, 0.02 coal band in middle, thin coal bands, broken stick
	75.47	0.04	MUDSTONE, as above, stick
	75.53	0.06	COAL, bright banded, ankerite, stick
•	77.29	1.76	MUDSTONE, grey, silty, plant remains, listricated in places, broken stick
	77.40	0.11	COAL, dull and bright, some ankerite, friable, broken stic
***	77.72	0.32	COAL, mostly dull, lustrous with bright bands, ankerite in bright coal, sheared and crumpled at base, broken stick

BH Nos. 15

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Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
100	79.87	2.15	MUDSTONE, dark grey/black, top half with silty laminae, rest with little or no silts, locally very carbonaceous, gradual
	80.77	0.90	SILTSTONE, medium grey, very muddy, structureless
	83.82	3.05	SILTSTONE/MUDSTONE, 50:50, medium/dark grey, broadly interbedded sequence of argillaceous silts and silty mud- stones, irregularly laminated, silts/muds gradational boundaries, patchily calcareous, very gradational at base
6 ⁰	86.87	3.05	SILTSTONES, medium grey, richly argillaceous, brief intervals of very fine-grained sands, sporadic lamination core broken at numerous sections and some calcite infilled patchily calcareous
	89.91	3.04	SILTSTONES, as above, sequence in general impoverished in muddy fractures, numerous fractures along bedding, calcite encrusted, bottom 0.98 very finely sandy and strongly calcareous, slickensided surfaces
10°	92.96	3.05	SANDSTONE, medium grey, very fine-grained, argillaceous and silty, irregularly laminated, changes in lithologies generally concomitant with erosion, minor slump structure bottom 0.60m with large scale slumping, slickensided surfaces, strongly calcareous
	93.41	0.45	SILTSTONES, dark grey, highly argillaceous, slump structures, strongly calcareous, erosional at base, vertical fracture at base
	94.97	1.56	MUDSTONE, dark grey, abundant carbonized plant debris, listric surfaces 10-12cm apart, slickensiding, strongly calcareous, bottom 12cm fragmented
50°	95.79	0.82	SILTSTONE, medium grey, richly argillaceous, number of steeply dipping slickensided surfaces, strongly calcareous, erosional basal contact, calcite infilled
	96.01	0.22	MUDSTONE, 'dark grey/black, slightly carbonaceous, lower 1/3 broken up and with numerous polished surfaces
	96.36	0.35	MUDSTONE, grey, silty, carbonaceous, slickensides parallel to core axis, broken
	96.56	0.20	MUDSTONE, as above, broken
	96.77	0.21	COAL, fragments of dull lustrous and dull banded, very broken
	96.91	0.14	COAL, dull lustrous with thin bright bands, broken
1	97.09	0.18	COAL, as above, broken stick
	97.27	0.18	COAL, bright, cleated, ankerite, broken stick
	97.35	0.08	COAL, dull, dense, occasional bright bands, some ankerite granular texture, broken stick

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	ľη	
**************************************	97.48	0.13	MUDSTONE, grey, silty, carbonaceous, listricated, broken stick
	97.55	0.07	COAL, small fragments, dull, sheared
	97.82	0.27	MUDSTONE, grey, silty carbonaceous, coal bands, listricate striated planes passing through core, very broken stick.
	97.86	0.04	COAL, mostly bright, cleated, ankerite, broken stick
	97.92	0.06	COAL, dull, dense, hard, occasional bright bands, broken stick
	98.01	0.09	MUDSTONE, very coaly, thin coal bands, listricated, broken stick
	98.06	0.05	COAL, fragments of dull lustrous banded, very broken
	98.14	0.08	MUDSTONE, grey carbonaceous, coal bands, silty, listricate broken stick
	98.50	0.36	FRAGMENTS, Mudstone, grey, coaly, silty, listricated, and Coal, dull lustrous banded
	98.54	0.04	COAL, dull, dense, bands of bright coal, broken stick
	98.68	0.14	FRAGMENTS, coal as above
	98.75	0.07	MUDSTONE, grey, carbonaceous, silty, listricated, broken stick
	98.86	0.11	COAL, dull, dense, banded with bright coal, 30% bright, broken stick
	98.90	0.04	MUDSTONE, grey, carbonaceous, silty, thin coal bands, broken stick
	99.03	0.13	FRAGMENTS, mudstone as above and dull coal
	99.20	0.17	MUDSTONE, dark grey/black, very carbonaceous at top, gradational
	100.01	0.81	SANDSTONES, top 0.13m dark grey, highly silty mudstones, grading below to very fine-grianed, medium grey sandstone finely cross-laminated, with finely broken carbonaceous matter, abrupt
	101.13	1.12	SILTSTONE, medium/dark grey, very argillaceous, laminated stringers of very fine-grained sands, basal 0.25m with slump* structures, coaly wedge (across bedding) (*although slumping also common within the unit)
	101.28	0.15	MUDSTONE, dark grey, slightly carbonaceous
	101.77	0.49	MUDSTONE, dark grey, highly silty, sporadic lamination
	102.12	0.35	MUDSTONE, black, carbonaceous, coaly stringers, broken up
10 ⁰	104.21	2.09	SANDSTONE, medium grey, very fine-grained, some silty intervals, laminated and cross-laminated, load casting, minor burrowing, basal 0.43m with numerous slickensiding

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
· · · · · · · · · · · · · · · · · · ·	m	m	
			and calcite infilled, tip in this zone steepness 40°
	104.39	0.18	SILTSTONE, medium grey, laminated, non calcareous
	104.59	0.20	SILTSTONE, as above, some fracturing at base
30°	105.80	1.21	MUDSTONE, dark grey, somewhat silty, most of interval broken up and some near vertical fracturing, slicken-siding
	108.20	2.40	MUDSTONE, dark grey/black, locally ferruginous banding, (especially bottom 0.40m that are badly fragmented) and with listric surfaces, non calcareous throughout
	110.05	1.85	MUDSTONE, dark grey, large ferruginous interval in top 0.5 bottom 0.85m canneloid mudstone with 0.20m slightly calcareous, gradational to basal 0.10m canneloid mudstone
	110.75	0.70	SILTSTONE, brownish grey, ubiquitous small scale cross- laminated, over steeping and slumping of lamination toward base, very strongly calcareous (abrupt limestone), base defined by calcite fracture filling (along bedding)
,	111.25	0.50	MUDSTONE, dark grey/black, carbonaceous (homogeneously) somewhat canneloid at top
	113.01	1.76	MUDSTONE, dark grey/black, carbonaceous, 7 1/3 of interval canneloid mudstone, core broken, base of unit defined by 15mm gritstone (abrupt with coal below)
			COAL SEAM, Coal, core broken, evidence of grinding at base
	113.07	0.06	GATES C COAL, dull with sub metallic lustre
	113.12	0.05	COAL, bright banded
	113.16	0.04	COAL, dull banded
	113.19	0.03	COAL, bright banded
	113.22	0.03	COAL, bright (vitrain), small quartz pebbles?
	113.25	0.03	COAL, dull banded
	113.28	0.03	COAL, dull and bright
	113,30	0.02	COAL, bright banded
	113.34	0.04	COAL, dull banded
	113.39	0.05	COAL, bright banded
1	113.42	0.03	COAL, dull, finely sheared ? weathered
	113.44	0.02	COAL, bony
	114.10	0.66	MUDSTONE, dark grey, rich in carbonized plant debris, abrupt but not erosional below
í	114.30	0.20	CONGLOMERATE, cherty/quartzite pebbles, mostly under 15mm across (one 6cm longest dimension)
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BH Nos. 15

Di-	DEDTIL	TULCUUSCO	
Dip o	DEPTH	THICKNESS	DESCRIPTION
<u></u>	m	m	
	117.35	3.05	CONGLOMERATE, as above, pebbles predominantly under 5mm
	120.40	3.05	CONGLOMERATE, as above, bottom 1.60 essentially granular
	121.95	1.55	CONGLOMERATE, predominantly granular, gritty
12 ⁰	123.45	1.50	SANDSTONE, light grey, medium~grained, sprinklings of coarse sand grains within cross-stratified intervals, siliceous
	126.50	3.05	SANDSTONE, top 1.56m identical to above with 5cm pebble band, rest medium-grained, clean sands, cross-bedded, siliceous
	129.55	3.05	SANDSTONE, light grey, medium~grained sands, bottom 0.94m with granular intervals, some coal inclusions in bottom 0.15m
	131.55	2.00	SANDSTONE, as above, 0.02m muddy, weathered seam 0.28m from the base
	132.59	1.04	CONGLOMERATE, predominently granular/gritty, basal 0.20 with pebbles
] - 	135.63	3.04	CONGLOMERATE, predominently finely pebbly, locally fairly sorted
	138.68	3.05	CONGLOMERATE, predominently, granular, gritty with 0.18m medium/coarse-grained sandstones
	141.73	3.05	CONGLOMERATE, very similar to above, a good deal of very coarse-grained sandstone, basal 0.29m dominantly fine sands with tiny coaly inclusions
10°	144.78	3.05	SANDSTONE/GRITSTONE, alternating sequence of fine to very fine-grained clean sands, laminated, and granular/gritty lithologies with occasional fine pebbles, change from one to the other achieved either by interbedding or abruptly, few coaly inclusions, a 0.15m silty band 0.40m from base, 0.12cm stylolite perpendicular to bedding, non calcareous throughout
	147.13	2.35	SANDSTONE/GRITSTONE, sands essentially fine/medium-graine clean, vaquely laminated, although coarse-sandstone grain scattered throughout, basal 0.43m distinctly gritty and basal 0.18m very pebbly, abrupt with coal at basc
	147.53	0.40	COAL, dull lustrous with approx 20% bright bands ranging from 0.001 to 0.005 thick, relatively hard stick
	147.56	0.03	COAL, bright, well cleated, high per cent ankerite on cleat, stick
	147.81	0.25	COAL, dull lustrous with bright bands as before, stick
	147.87	0.06	COAL, bright banded with dull, dense, coal, stick
	148.13	0.26	COAL, dull lustrous with approx. 15% bright bands, broken stick
	148.23	0.10	COAL, dull with bright bands, sheared, broken

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	· m	
	148.33	0.10	COAL, dull lustrous with thin bright bands, approx 10% broken stick
	148.45	0.12	COAL, powdered and fragmented
	148.52	0.07	COAL, soft, powdered
	148.67	0.15	MUDSTONE, grey, carbonaceous, silty, coal traces at top, (striated, broken at top, rest broken stick)
	149.29	0.62	SANDSTONE, grey, fine-grained, plant remains, coal traces, some 30° striated planes passing through core, broken stick
	150.32	1.03	MUDSTONE, brown-grey, silty, carbonaceous, abundant plant remains, larger ones carbonized, listric surfaces, progressively more silty to base, broken at top, rest broken stick
	150.88	0.56	SILTSTONE, top half very argillaceous, silts irregularly laminated, some stringers of very fine-grained sands
	151.27	0.39	SANDSTONES, medium/light grey, very fine-grained, lamina- ted and rippled, streaks of coal toward base, gradual
	151.49	0.22	MUDSTONE, black, carbonaceous with coaly layers, gradual
10 ⁰	153.11	1.62	SANDSTONE/SILTSTONE, top 0.32m very fine sands, laminated and gradually fining bottomward, rest dominantly argillaceous siltstone with some very fine sands (erosional contacts), sporadically laminated and calcareous, gradual at base, 0.05m carbonaceous mudstone in sequence
•	153.91	0.80	MUDSTONE, top 0.18m dark grey and silty, rest black, carbonaceous, and some bony coal, core fragment with list surfaces in some intervals
	155.05	1.14	MUDSTONE, black, higher proportion of bony coal than above, bottom 0.30m canneloid coal and canneloid mudstone, (sandstones underneath core directly in contact with canneloid coal)
	157.05	2.00	CONGLOMERATE, top 0.10m fine-to very fine-grained, dark grey sands with rare abundance of coaly inclusions, (wavy and underlating due to Compaction), this is followed by 0.80m gritstones, rest finely pebbly comglomerate
	160.10	3.05	CONGLOMERATE, as above, basal 0.03m highly carbonaceous conglomerate
			COAL SEAM, top half broken up, rest at base, stick, erosional base
	160.14	0.04	COAL, dull banded
	160.20	0.06	COAL, dull and bright
	160.25	0.05	COAL, dull banded
	160.60	0.35	COAL, bright, banded

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION ·
0	EI	· m	
	160.64	0.04	COAL, dull and bright, disseminated sand
	163.07	2.43	SANDSTONE, medium grey, medium-grained, extremely clean well-sorted, mottled due to intensive bioturbation, many small burrows (type usually seen in floor sends of 'C' seam), most sedimentary lamination obliteration
į	165.93	2.86	SANDSTONE, medium grey, medium-grained (locally fine-grai clean, cross-bedded, 0.10m coarse-grained zone 0.45m abov base, two levels have fine coaly inclusions
15 ⁰	167.01	1.08	SANDSTONE, medium grey, dominantly fine-grained with occasional 2 to 3 cm medium/coarse-grained sand zones, laminated, some interlaminae carbonaceous, mottled
	168.24	1.23	GRITSTONE, top 0.76m very coarse-grained sands with 0.05m muddy layer, rest granular to very finely pebbly
	169.01	0.77	SANDSTONE, light grey, fine/medium-grained, siliceous, streaks of silty clasts, obscure cross-lamination
	172.06	3.05	SANDSTONE, light grey, fine/medium-grained, extremely cle and well-sorted, ubiquitous cross-lamination, calcareous
	175.20	3.14	SANDSTONE, as above, very few scattered small pebbles in basal 0.95m
15 ⁰	178.30	3.10	SANDSTONE, as above, few tiny silty clasts, moderately to strongly calcareous
	181.36	3.06	SANDSTONE, as above
	184.40	3.04	SANDSTONE, as above
	188.01	3.61	SANDSTONE, strongly calcareous, (appears to have very high component of detrital carbonates), very obscure to devoid of current lamination
10 ⁰	188.56	0.55	SANDSTONE, light/medium grey, fine/medium-grained, some cross-lamination, strongly calcareous
	191.06	2.50	SANDSTONE/MUDSTONE, 90:10, sand fine-grained, with widely spaced muddy intervals, generally with erosional boundaries, strongly calcareous throughout, few muddy intraclasts
į	191.86	0.80	MUDSTONE/SANDSTONE, rest sedimentary features as above 80:20
	194.10	2.24	SANDSTONE, light grey, fine-grained, obscurely cross- laminated, strongly calcareous
	194.20	0.10	SANDSTONE, similar to above, this defines gates/sukunka content
			GATES SUKUNKA

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	214.35	20.15	MUDSTONE/SANDY, 50:50, sands light grey, medium/fine- grained, clean boundaries with mudstone sharp or disturbe often disturbed and bioturbated, large burrows, transitio al below
	221.48	7.13	MUDSTONE/SANDY, 80:20, sands form minor indistinct zones disturbed and bioturbated, small and large burrows
	231.62	10.14	SANDSTONE/MUDDY, 80:20, minor zones undisturbed but mostly disturbed and bioturbated with large and small burrows, vaguely calcareous
	233.17	1.55	MUDSTONE/SANDSTONE, silty, dark grey mudstone, massive burrowed (mostly small size and few large size) with light grey very fine-grained sandstone, slightly calcareous, occasionaly burrowed and slumped, as thin interbeds and wisps, pyritic nodules occur occasionaly
	236.22	3.05	MUDSTONE/SANDSTONE, as above, 70:30
	239.23	3.01	MUDSTONE/SANDSTONE, 80:20, as above
	242.32	3.09	MUDSTONE/SANDSTONE, silty mudstone, 75:25
	245.36	3.04	MUDSTONE/SANDSTONE, 60:40, silty mudstone
	248.41	3.05	MUDSTONE/SANDSTONE, silty mudstone, 60:40
	251.46	3.05	MUDSTONE/SANDSTONE, 60:40, silty mudstone
	254.50	3.04	SANDSTONE/SILTSTONE, 90:10, light to medium grey, very fine-to medium-grained sandstone, slightly calcareous, massive, often bioturbated and slumped coarsening downward to a thin very coarse-grained sandstone (almost conglomerate) at the base of the unit, with occasional thin interbeds of dark grey to black siltstone and silty mudstone
			SANDSTONE/MUDSTONE, light grey, very fine-grained to fine-grained sandstone, calcareous, horizontal laminated, low angle small scale cross-beds very rarely bioturbated or slumped with thin black mudstone interbeds, massive to heavily burrowed, bioturbated, occasionaly the two lithologies are mixed together intimately
	256.00	1,50	SANDSTONE/MUDSTONE, 80:20
	257.30	1.30	SANDSTONE
	257.56	0.26	SANDSTONE/MUDSTONE, 90:10
5°	258.79	1.23	SANDSTONE
	260.60	1.81	SANDSTONE/MUDSTONE, mudstone intervals becoming more frequent toward bottom of section, contact sandstone/mudstone very sharp
	263.56	3.05	SANDSTONE/MUDSTONE, 80:20, mudstone occasionaly as thin intraclastic beds
	266.70	3.05	SANDSTONE/MUDSTONE, 70:30, sandstone interbeds decreasing

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			in size and frequency, mudstone becomes increasingly silt and muddy ie) intimately mixed sand/mud, burrowed and slumped
	269.74	3.04	MUDSTONE/SANDSTONE, 60:40, silty sandy mudstone
	272.80	3.06	MUDSTONE/SANDSTONE, 50:50, silty, sandy mudstone
	275.84	3.04	MUDSTONE/SANDSTONE, 70:30, silty, sandy mudstone
	276.50	0.66	MUDSTONE/SANDSTONE, 75:25, silty, sandy mudstone
	277.00	0.50	SANDSTONE
	278.90	1.90	MUDSTONE/SANDSTONE, 70:30, silty, sandy mudstone
	281.94	3.04	MUDSTONE/SAŅDSTONE, 75:25, silty mudstone
	284.98	3.04	MUDSTONE/SANDSTONE, silty mudstone, 80:20
	285.81	0.83	MUDSTONE/SANDSTONE, 85:15, silty mudstone
	286.11	0.30	MUDSTONE/SANDSTONE, 85:15, silty mudstone, broken up section and weathered surface
	288.03	1.92	MUDSTONE/SANDSTONE, 90:10, silty mudstone
	291.07	3.04	MUDSTONE/SANDSTONE, 90:10, silty mudstone
	294.13	3.06	MUDSTONE/SANDSTONE, 85:15, silty mudstone
	297.18	3.05	MUDSTONE/SANDSTONE, 90:10, silty mudstone
	302.27	5.09	MUDSTONE/SANDSTONE, 80:20, silty mudstone
	306.32	4.05	MUDSTONE/SANDSTONE, 85:15, silty mudstone
	309.37	3.05	MUDSTONE/SANDSTONE, 85:15, silty mudstone, occasional pyritic nodules
	312.42	3.05	MUDSTONE/SANDSTONE, silty mudstone, 90:10, sandstone intervals are as thin wisps
	315.47	3.05	MUDSTONE/SANDSTONE, 95:5, silty mudstone, bottom of section is broken up
	318.47	3.00	MUDSTONE/SANDSTONE, silty mudstone, 98:2, 0.06m from the bottom transition from silty mudstone, very calcareous to a less silty mudstone, non calcareous
			SUKUNKA MOOSEBAR
	321.56	3.09	MUDSTONE, black, massive, non-calcareous
	324.61	3.05	MUDSTONE, black, massive, non calcareous, core broken up and slight calcite in along hairline fractures

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	TOTAL TOTAL
	327.66	3.05	MUDSTONE, black, massive
	330.70	3.04	MUDSTONE, black, massive
	333.74	3.04	MUDSTONE, black, massive
	336.78	3.04	MUDSTONE, as above
	339.85	3.07	MUDSTONE, as above
	342.90	3.05	MUDSTONE, as above
	345.94	3.04	MUDSTONE, as above
	348.99	3.05	MUDSTONE, as above
	351.12	2.13	MUDSTONE, as above, core highly broken up
	354.17	3.05	MUDSTONE, black, massive
	357.53	3.36	MUDSTONE, as above
	360.57	3.04	MUDSTONE, as above
	363.62	3.05	MUDSTONE, as above
	366.06	2.44	MUDSTONE, as above
	367.28	1.22	MUDSTONE, as above
	370.33	3.05	MUDSTONE, as above
	373.38	3.05	MUDSTONE, as above
	376.42	3.04	MUDSTONE, as above
	379.41	2.99	MUDSTONE, as above, calcite veining
	381.07	1.66	MUDSTONE, as above
	381.12	0.05	BENTONITE bed, heavily burrowed
	382.52	1.40	MUDSTONE, black, massive
	384.32	1.80	MUDSTONE, as above
	385.06	0.74	MUDSTONE, as above, thin bentonite bed
	385.57	0.51	MUDSTONE, as above
	387:74	2.17	MUDSTONE, as above
	387.78	0.04	MUDSTONE, black, massive, zone of slickenside and associated calcite mineralization
	388.62	0.84	MUDSTONE, black, massive
	391.66	3.04	MUDSTONE, black, massive, and thin bentonite layer at the core of the section
	394.71	3.05	MUDSTONE, black, massive, with occasional minor slicken- side (two zones) and appearance of ferrugineous banding
	397.76	3.05	MUDSTONE, black, massive and slickensided surface at 1.0
	399.81	2.05	MUDSTONE, black, massive

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	399.87	0.06	MUDSTONE, dark grey, occasional pyritic worm burrows
	399.88	0.01	CLAYSTONE, grey white, bentonitic
	399.94	0.06	MUDSTONE, dark grey, as above
	400.05	0.11	CLAYSTONE, grey white, bentonitic, characterized by small dark colored worm burrows
	400.18	0.13	MUDSTONE, dark grey, as above
	400.21-	0.03	CLAYSTONE, grey white, bentonitic, hard, brittle
	401.23	1.02	SANDSTONE, dark grey green, glauconitic, frequent pyritic worm burrows becoming prominent at base, pyritic inclusions at base, bedding completely distrubed by bioturbation competent
			ROOF OF BIRD SEAM
	401.47	0.24	CORE LOSS-COAL
	401.50	0.03	COAL, dull banded, small fragments in box
	401.75	0.25	CORE LOSS-ROCK
	401.91	0.16	MUDSTONE, dark grey, with interbeds of fine-grained, light grey sandstone
	401.99	0.08	CORE LOSS-COAL
	402.02	0.03	COAL, bright banded, smail fragments
	402.05	0.03	COAL, dull and bright, stick
	402.15	0.10	COAL, dull banded, stick
	402.17	0.02	COAL, dull, stick
	402.21	0.04	COAL, dull and bright, stick
	402.26	0.05	COAL, bright banded, stick
	402.32	0.06	COAL, dull and bright, stick
	402.35	0.03	COAL, bright, stick
	402.43	0.08	COAL, dull and bright, stick
	402.54	0.11	COAL, dull and bright, stick
	402.61	0.07	COAL, dull, stick
	402.66	0.05	COAL, dull banded, small fragments (probably intact core)
	402.70	0.04	COAL, dull banded, stick
	402.98	0.28	CORE LOSS-COAL
	403.03	0.05	COAL, dull banded, small pieces (possible core loss)
	403.07	0.04	COAL, dull and bright, small pieces
	403.11	0.04	COAL, dull and bright, stick
	403.14	0.03	COAL, dull and bright, small pieces, (possible core loss)
	403,41	0.27	CORE LOSS-COAL

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	403.45	0.04	COAL, dull, stick
	403.49	0.04	COAL, dull and bright, large pieces
	403.51	0.02	COAL, bright banded, small pieces
	403.58	0.07	COAL, dull and bright, stick
	403.63	0.05	COAL, dull banded, stick
	403.65	0.02	COAL, dull banded, stick
	403.71	0.06	COAL, dull, stick
	403.83	0.12	CORE LOSS-COAL
	403.84	0.01	COAL, dull banded, small pieces (possible core loss)
	403.85	0.01	COAL, bright, small pieces, (possible core loss)
	403.90	0.05	COAL, dull and bright, small pieces, (possible core loss)
	403.94	0.04	COAL, dull and bright, stick
	403.95	0.01	COAL, dull, small pieces (possible core loss)
	404.08	0.13	CORE LOSS-COAL
٤			FLOOR OF BIRD SEAM
	404.76	0.68	SANDSTONE, medium-grained, light grey, mottling by small worm burrows from 1.39 to 2.60m from top, very clean, massive, extensive bioturbation
2°	404.87	0.11	SANDSTONE, as above
	406.87	2.00	SANDSTONE, as above
	407.45	0.58	SANDSTONE, as above
	408.97	1.52	SANDSTUNE, as above
	409.76	0.79	SANDSTONE, as above
	411.26	1.50	SANDSTONE, as above, frequent thin interbeds of dark grey siltstone, large worm burrows from 1.25 to 3.00m from top
	411.85	0.59	SANDSTONE, as above
ļ	414.05	2.20	SANDSTONE, as above
	414.28	0.23	SANDSTONE, as above
	416.12	1.84	SANDSTONE, large worm burrows from 0.34 to 2.50m below
	416.69	0.57	SANDSTONE, as above
	417.38	0.69	SANDSTONE, fine-grained, light grey, very clean, massive
}	418.32	0.94	SANDSTONE, as above
ŧ	420.45	2.13	SANDSTONE, as above
	422.65	2.20	SANDSTONE, as above
	423.45	0.80	SANDSTONE, as above

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	424.83	1.38	SANDSTONE, as above
	425.09	0.26	SANDSTONE, as above
	425.16	0.07	MUDSTONE, grey, carbonaceous at base
	425.40	0.24	COAL AND CLAYSTONE, pulverized fragments in box (possible core loss)
	425.46	0.06	MUDSTONE, dark grey, slickensided and listric surfaces at oblique angles to core axis, probable sigmoidal laminite structure
	425.49	0.03	CLAYSTONE, carbonaceous, numerous bright coal bands
	425.86	0.37	COAL & CLAYSTONE, pulverized and mixed fragments in box
	426.99	1.13	SHALE, carbonaceous, black, fissile, frequent bright coal bands
	428.20	1.21	COAL & CLAYSTONE, pulverized fragments in box
	428.36	0.16	CLAYSTONE, carbonaceous, numerous bright coal bands, heavily sheared
	428.43	0.07	COAL, dull, sheared, small fragments
<u> </u>	428.50	0.07	COAL, dull and bright, sheared, small fragments
	428.53	0.03	COAL, bright, sheared, small fragments
	428.59	0.06	COAL, dull and bright, sheared, small fragments
	428.65	0.06	COAL, dull banded, sheared, small fragments
	428.74	0.09	COAL, dull, sheared, small fragments
	428.79	0.05	COAL, dull banded, sheared, small fragments
	428.86	0.07	COAL, dull banded, large pieces, sheared
	428.93	0.07	COAL, dull and bright, large pieces, sheared
	428.96	0.03	COAL, dull banded,
	429.78	0.82	MUDSTONE, dark grey, carbonaceous phases, frequent bright coal bands
	430.75	0.97	MUDSTONE, as above
E	430.96	0.21	MUDSTONE, as above
	432.08	1.12	MUDSTONE, as above
	432.43	0.35	SANDSTONE, fine-grained, light grey, characterized by small scale cross bedding
	432.45	0.02	SANDSTONE, as above
	432.77	0.32	MUDSTONE, dark grey, as above
	433.09	0.32	MUDSTONE, as above
15 ⁰	434.10	1.01	SANDSTONE, light grey, fine-grained, with frequent interbeds of grey siltstone, bedding disturbed by worm burrow bioturbation at base

BH Nos. 15

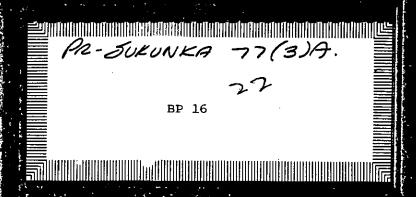
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	-
	434.45	0.35	SANDSTONE, medium to coarse-grained with occasional phases of dark grey siltstone
	434.93	0.48	SANDSTONE, as above
	434.95	0.02	SANDSTONE, as above
	435.88	0.93	MUDSTONE, dark grey, carbonaceous at base
	435.93	0.05	CORE LOSS-COAL
	435.98	0.05	COAL, large pieces, bright banded
	436.01	0.03	COAL, dull and bright
	436.05	0.04	COAL, duil, large pieces
	436.43	0.38	SILTSTONE, dark grey, plant fragments, bedding oblitera- ted by bioturbation
	436.86	0.43	MUDSTONE, dark grey, coal bands and carbonaceous phases
	436.90	0.04	CORE LOSS-ROCK
	436.99	0.09	COAL, dull, sheared, small fragments
	437.03	0.04	COAL, dull and bright, small fragments
j	437.18	0.15	COAL, dull, sheared, small fragments
	437.25	0.07	COAL, dull banded, sheared, small fragments
	437.28	0.03	COAL, dull, sheared, stick
	437.32	0.04	COAL, dull and bright, sheared, stick
	437.84	0.52	CORE LOSS-COAL
	437.93	0.09	CLAYSTONE, carbonaceous, black, numerous bright coal band
	438.02	0.09	CORE LOSS-COAL
	438.06	0.04	COAL, bright, sheared, small fragments in box
	438.10	0.04	COAL, dull and bright, sheared, small fragments in box
	438.15	0.05	COAL, dull and bright, stick
	438.27	0.12	COAL, dull and bright, large fragments
	438.36	0.09	COAL, dull banded, stick
	438.42	0.06	COAL, dull and bright, large pieces
	438.60	0.18	CORE LOSS-ROCK
	438.68	0.08	CLAYSTONE, carbonaceous, black, small fragments
	438.74	0.06	SILTSTONE, grey, plant fragments
	439.00	0.26	CORE LOSS-COAL
	439.05	0.05	COAL, dull, stick
	439.10	0.05	COAL, dull banded, stick
	439.13	0.03	COAL, dull banded, large pieces

BH Nos. 15

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
<u> </u>	439.23	0.10	CORE LOSS-ROCK
	439.33	0.10	MUDSTONE, dark grey, carbonaceous, numerous bright coal bands
	439.39	0.06	MUDSTONE, as above
	439.48	0.09	CORE LOSS-COAL
	439.57	0.09	COAL, dull banded, small fragments
	439.69	0.12	CORE LOSS-ROCK
}	439.95	0.26	MUDSTONE, as above
	440.65	0.70	CORE LOSS-COAL
	440.70	0.05	COAL, dull banded, core pulverized
	440.74	0.04	COAL, dull, stick
	440.82	0.08	COAL, dull banded, large pieces
	440.87	0.05	COAL, dull, large pieces
	440.94	0.07	COAL, dull banded, small pieces
	440.98	0.04	COAL, dull and bright, large pieces
<u> </u>	441.00	0.02	COAL, dull, small pieces
	441.08	0.08	CORE LOSS-ROCK
	441.28	0.20	MUDSTONE, dark grey
	441.60	0.32	CORE LOSS-COAL
	441.63	0.03	COAL, bright, small-pieces
	441.66	0.03	COAL, dull, stick
	441.72	0.06	COAL, dull and bright
	441.74	0.02	COAL, dull banded, stick
	441.76	0.02	COAL, dull and bright, small fragments
	441.81	-0.05	COAL, dull banded, sheared, small fragments
	441.83	0.02	COAL, bright banded, sheared, small fragments
	441.85	0.02	CORE LOSS-ROCK
	441.99	0.14	CLAYSTONE, carbonaceous, sheared
	442.01	0.02	CORE LOSS-COAL
	442.05	0.04	COAL, dull banded, stick
	442.12	0.07	COAL, dull and bright, stick
	442.16	0.04 /	COAL, duli banded, stick
	442.20	0.04	COAL, dull, stick
	443.41	1.21	MUDSTONE, dark grey, frequent phases of carbonaceous claystone with bright coal bands

BH Nos. 15

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BP COAL CANADA

Page 1

AREA

SUKUNKA

B. H. No. BP 16

Contractor: Longyear

Commenced:

Aug 7, 1977

Completed:

Aug 30, 1977

Co-ordinates: 6,114,825.07

N

591.384.29 Surface Elevation: 1,645.72

E

Core Size:

HQ

Casing Left in Hole:

m

Hole Angle:

See detail

Geologist Ali Chowdry

%RECOVERY

highly listricated and broken

Hole Azimuth:

Final Depth:

SEAMS

F.PR.

page la

611.02

DEPTH

516.94-532.18

Logged by:

Depth 39.62-156.79 174.86-184.54

189.29-198.89

Geoff Jordan

156.98-166.32 184.60-188.89

232.82-233.50

ELEVATION

			(SEE OVER)
FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross	84.00	84.00	1,561.72
Gates	287.60	203.60	1,358.12
Sukunka	413.00	125.40 ,	1,232.72
Moosebar	558.68	145.68	1,087.04
U. Gething	608.12	49.44	1,037.60

BIRD	560,88	•	1,084.84
CHAMBERLAIN	608.12		1,037.60
F.PR. F.PR.	418.03-460.55 494.69	highly sheared and Brecciated	slickensided

THICKNESS

Geologist	<u>Depth</u> ·
Andy Newson	204.10-232.68
	237.62-372.80
Bill Nyland	373.38-556.77
	577.90-585.52
Graham Wallis	557.51-577.62
	586.26-611.02

•

Sperry-Sun Survey

Borehole: BP 16 Sukunka 77 Date: 31st August 1977 BPB Operator: P. J. Waters

BPB Operator: P. J. Waters Compass: 20° Maximum to Magnetic North

Measured Depth	<u>Tilt</u>	Tilt Direction
605 m	3° 15'	N 19 ⁰ Е
550 m	2° 30'	N 17° E
500 m	1° 15'	и 33° Е
450 m	0° 30'	n 54° e
400 m	0°. 45°	S 51°E
350 m	1° -	S 55° E
300 m	1° 15'	S 45° E
250 m	1° 45°	s 37° E
200 m	2° -	S 31° E
150 m	2° 30'	s 37° E
100 m	2° 15'	S 40°E
50 m	2° 30'	S 36' E

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	, m	
	39.62	39.62	CASING
٠	44.45	4.83	SILTSTONE/SANDSTONE, hullcross sequence badly broken and locally weathered, predominently siltstone, with abundant argillaceous layers, ripples of very fine-graine sands
10 ⁰	53.33	8.88	SILTSTONE/MUDSTONE, silty mudstone and argillaceous siltstones, gradual transition from one to the other, majority of sequence fragmented and locally weathered
	58.40	5.07	SILTSTONE/SANDSTONE, 40:60, brownish grey, sands very fin grained and occurs as lenticles and ripples interbedded with argillaceous siltstones, occasional burrows, core locally weathered
	63.40	5.00	SILTSTONE/SANDSTONE, 80:20, medium grey in predominently silty lithology with lenticles and ripples of very finegrained sands
	84.00	20.60	SILTSTONE/MUDSTONE, medium grey, well-laminated siltstone dominant, sharply defined, mutual contacts, non calcareou bentonitic band, 64.22 %4.52, bottom 0.50m very sandy, abrupt basal contact, calcite band at 66.26 (3cm) with abrupt top and bottom
	**		HULCROSS GATES
	84.89	0.89	CONGLOMERATE, quartz chert pebbles (up to 4cm largest diam.) in lower part, rest at top granular with abundant fine sand matrix, abrupt below
	85.49	0.60	COAL SEAM, predominently dull, pyrite streaks, the coal i abundantly coated with white powdery matter, ?calcite
	86.85	1.36	SILTSTONE, medium grey, coarse silts, laminated, 0.15m sands very fine-grain in middle, gradational at base
	87.93	1.08	SANDSTONE, medium grey, very fine-grained, thin silty layers, calcareous, gradual at base.
	88.72	0.79	SANDSTONE, medium grey, fine-grained, isolated, laminated units, bottom 15cm with abundant silty/muddy clasts, erosional at base
6°	95.60	6.88	SANDSTONE, medium grey, dominantly very fine-grained, laminated and cross-laminated (small-scale), locally silty intervals and argillaceous, large fracture (vertica

BH Nos. 16

		-5141 0 5 0 0	
Dip	DEPTH	THICKNESS	DESCRIPTION
	m 96.65	. m 1.05	MUDSTONE, dark grey, lower half black and slightly carbonaceous
	97.63	0.98	COAL ZONE, upper 0.30m dull and bright banded coal, rest dominantly carbonaceous mudstone, with some coaly layers
	102.99	5.36	MUDSTONE/SILTSTONE, dark grey, top 0.75m carbonaceous, 100.15-100.40 also carbonaceous with coal at top, rest predominently siltstones, irregularly laminated, argillaceous, strongly calcareous, sand fine-grained, 100.00-100.15
	105.16	2.17	SILTSTONE/SANDSTONE, medium gray, interbedded sequence of argillaceous siltstones and very fine-grained sands, strongly calcareous, gradual
	107.40	2.24	MUDSTONE, dark grey, locally rusty bands, pelecypod shell 7cm Coquina in middle, many shells pyritized, silty below
	109.31	1.91	SANDSTONE, medium grey, fine-grained, generally clean, some cross-laminae emphasised by fine particulate carbonaceous matter, strongly calcareous, transitional at base
	113.90	4.59	MUDSTONE, top 0.75m muddy siltstones, rest dark black mudstones, locally with pelecypod shells, bottom 2.10m locally coaly and predominently carbonaceous (some shelly
70	114.97	1.07	even in black mudstones), very gradual at base SANDSTONE, medium grey, fine-grained, small-scale cross- lamination, isolated ripples, compactual features, some silty laminae, strongly calcareous, gradational at base
	116.00	1.03	MUDSTONE/SILTSTONE, interbedded (frequently), ripples and laminae of silts, slight dominance of mudstones, calcareous, gradational
	117.44	1.44	SANDSTONE, top half light grey, slightly argillaceous, strongly calcareous, rest dark grey, highly argillaceous, whole sequence fine-grained, with very large pelecypod shells, local burrows, gradational
	119.34	1.90	MUDSTONE, dark grey, structureless, basal 0.33m richly silty, passage below by interbedding, 0.15m carbonaceous mudstone in middle
5°	136.21	16.87	SANDSTONE, light /medium grey, medium-grained, generally clean, well-sorted, laminated, occasional carbonaceous laminae, few rusty clasts, mostly strongly calcareous, bottom 2.10m fine-grained, gradual
6°	138.99	2.78	SILTSTONE, dark grey, structureless (lower half), upper half locally laminated with frequent layers of very fine sands, large slump at top, interbedded at base
	143.16	4.17	MUDSTONE, dark grey, homogeneously silty, structureless, interbedded at base

BH Nos. 16

	1	1	
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
5 ⁰	148.13	4.97	MUDSTONE/SANDSTONE, mudstones dark grey, frequently interbedded with fine/medium sandstones with erosional contacts, locally fine sands, interbedded below
	149.30	1.17	SILTSTONE, medium grey, very argillaceous, occasional burrows
	152.70	3.40	SANDSTONE, medium grey, very fine-grained sandstones, locally silty, intensively bioturbated (sukunkoid zone) much of lamination obliterated, richly argillaceous, botto 0.70m with local small-scale cross-lamination, gradual at base
	156.51	3.81	SANDSTONE, light/medium grey, fine-grained, top 0.80m very argillaceous, locally burrowed, (large and small), rest laminated, some burrowing (much recurrence of silty clasts), these are probably circumscribed silty layers
	156.79	0.28	GRITSTONE/MUDSTONE, medium/dark grey, silty/muddy layers, with two distinct granular/gritty bands, this zone appears to be equivalent to the conglomerate found elsewhere below sukunkoid zone and associated lithologies, abrupt below
	156.98	0.19	SANDSTONE, light grey, medium-grained with frequent interbeds of dark grey mudstone, bedding disturbed by worm burrow bioturbation
	157.47	0.49	SANDSTONE, as above
	157.58	0.11	CONGLOMERATE, light grey, granule, grains of grey/white and black chert and argillite
	157.70	0.12	SILTSTONE, dark grey with light grey sandstone interbeds
	157.73	0.03	CONGLOMERATE, as above
	158.19	0.46	MUDSTONE, dark grey, carbonaceous, bright coal bands
	158.21	0.02	CLAYSTONE, black, carbonaceous
	158.24	.0.03	COAL, dull and bright, stick
	158.26	0.02	COAL, bright banded, stick
	158.28	0.02	COAL, dull banded, stick
	158.31	0.03	COAL, bright, stick
	158.36	0.05	COAL, bright banded, stick
	158.38	0.02	COAL, dull and bright, stick
	158.43	0.05	COAL, bright, stick
	158.48	0.05	COAL, dull and bright, stick
	158.57	0.09	COAL, stony, stick
	158.62	0.05	COAL; dull, stick
	158.78	0.16	SILTSTONE, grey, with phases and interbeds of light grey

qiQ	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	158.96	0.18	SILTSTONE, as above
	159.11	0.15	SILTSTONE, as above
	161.09	1.98	MUDSTONE, black, carbonaceous, phases of bright coal penny bands
	161.34	0.25	MUDSTONE, as above
	161.92	0.58	SANDSTONE, fine-grained, light grey, plant rootlets, frequent interbeds of dark grey siltstone
	161.97	0.05	MUDSTONE, as above
	162.73	0.76	MUDSTONE, as above
	162.75	0.02	COAL, dull and bright, stick
	162.78	0.03	COAL, bright, stick
	162.82	0.04	COAL, dull and bright, stick
	162.84	0.02	CLAYSTONE, black, carbonaceous
	162.86	0.02	COAL
	163.82	0.96	CORE LOSS
	164.20	0.38	SILTSTONE, dark grey, phases of carbonaceous mudstone
	165.80	1.60	SILTSTONE, as above
	165.83	0.03	COAL, dull, stick
	165.88	0.05	COAL, dull and bright, stick
	165.95	0.07	COAL, dull, stick
	166.01	0.06	COAL, dull banded, stick
	166.09	0.08	COAL, dull, stick
	166.16	0.07	COAL, dull and bright, stick
	166.32	0.16	MUDSTONE, dark grey, carbonaceous at top
· ·	174.86	8.54	SILTSTONE, medium grey, coarse-grained, locally argillaceout layers, mostly laminated, strongly calcareous throughout, vertical fracture in top 1.80m, very gradational at base
5 ⁰	178.00	3.14	SANDSTONE, medium grey, very fine-grained, regular argillaceous/silty layers, laminated, cross-laminated, strongly calcareous
	184.54	6.54	MUDSTONE, medium grey, abundantly silty, locally laminated fine and very fine sandstones, 184.44-181.34, dominantly calcareous
	184.60	0.06	SANDSTONE, fine-grained, grey with interbeds of dark grey siltstone, coaly bands, competent
	184.72	0.12	CORE LOSS-COAL
	184.75	0.03	COAL, dull banded, large pieces

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
	in	m	
	1 84.81	0.06	COAL, dull and bright, stick
	184.84	0.03	COAL, dull banded, stick
	184.88	0.04	COAL, bright, stick
	184.96	0.08	COAL, dull and bright, stick
	185.00	0.04	COAL, dull banded, stick
	185.05	0.05	COAL, bright banded, stick
	185.10	0.05	COAL, dull, stick
	185.16	0.06	COAL, dull banded, stick
	185.25	0.09	COAL, dull, stick
	185.28	0.03	COAL, bright banded, stick
	185.32	0.04	COAL, dull, stick
	185.39	0.07	CORE LOSS-MUDSTONE
	185.45	0.06	MUDSTONE, dark grey, coaly inclusions
<u> </u>	185.53	0.08	COAL, dull, stick
	185.56	0.03	COAL, duli banded, stick, sheared
	185.61	0.05	COAL, dull, stick
	185,66	0.05	COAL, bright banded, stick
	185.72	0.06	COAL, dull and bright, stick
	185.74	0.02	COAL, dull, stick
	185.76	0.02	COAL, bright, stick
	185.80	0.04	COAL, dull banded, stick
	185.87	0.07	COAL, dull, stick
	185.91	0.04	COAL, stony, stick
	185.94	0.03	COAL, dull and bright, carbonate filled clete
	186.06	0.12	COAL, dull, stick
}	186.10	0.04	COAL, dull banded, stick
	186.15	0.05	COAL, dull, stick
	186.19	0.04	COAL, dull, small pieces
	186.25	0.06	COAL, dull and bright, stick
	186.30	0.05	COAL, bright, stick
	186.33	0.03	COAL, dull and bright, stick
	186.37	0.04	COAL, bright, stick
	186.45	0,08	COAL, dull and bright, stick
	186.49	0.04	COAL, dull, stick

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	186.55	0.06	COAL, dull and bright, small fragments in box
	186.93	0.38	SILTSTONE, dark grey, plant rootlets throughout, frequent bright coal bands
	187.01	0.08	CORE LOSS-COAL
	187.10	0.09	COAL & CLAYSTONE, interbedded, black, carbonaceous, claystone with frequent interbeds and penny bands of bright coal
	187.13	0.03	SILTSTONE, as above
	187.27	0.14	COAL & CLAYSTONE INTERBEDDED, as above
	187.29	0.02	CLAYSTONE, black, carbonaceous
	187.32	0.03	CLAYSTONE, as above
	187.38	0.06	COAL, bright, large pieces
	187.49	0.11	CORE LOSS-COAL
	187.60	0.11	COAL & CLAYSTONE, as above
	187.76	0.16	CORE LOSS-COAL & CLAYSTONE
	188.89	1.13	MUDSTONE, dark grey, carbonaceous phases with bright coail bands
	189.29	0.40	MUDSTONE, dark grey, structureless, locally carbonaceous, silty bottomward
	190.67	1.38	SILTSTONE, medium grey, highly argillaceous, irregularly laminated, thin layers of very fine-grained sands, feebly calcareous, gradual
	192.33	1.66	SANDSTONE, medium grey, very fine-grained, highly argill-aceous, smail-scale cross-lamination, strongly calcareous, very gradual at base
	193.05	0.72	SILTSTONE, dark grey, richly argillaceous (30%), streaks of very fine sands (calcareous), very gradational at base
	195.68	2.63	MUDSTONE, dark grey, homogeneously carbonaceous (slightly) with little or no silts, structureless, locally breaking with conchoidal fracture, gradual
	198.89	3.21	MUDSTONE/COAL, this sequence is predominently canneloid mudstones (almost limestone) siltstone at 196.36-197.02, this siltstone unit has some canneloid mudstones in its upper half, but siltstone proper strongly calcareous and almost limy, basal 0.25m essentially hard, dull coal sudden contact with floor sandstones mottled, bioturbated sands with small burrows
	204.10	5.21	SANDSTOME, argillaceous, carbonaceous, with coaly stringer in places, medium-grained, medium light grey, abrupt below
	212.97	8.87	SANDSTONE, coarse with conglomerates up to 0.5cm in size, sandstone conglomerate 50:50, occasional muddy layer

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
			with carbonaceous inclusions becoming sandier at base, transitional below
	229.54	16.57	SANDSTONE, medium-grained, medium grey, homogenous, clean, well-sorted, abrupt below
00	232.68	3.14	SANDSTONE, as above, with interbedded shales 60:40, shales often disturbed with sandstone intraclasts, minor coals, minor slicked surfaces, basal 0.12 conglomeritic, abrupt below
	232.82	0.14	CORE LOSS-COAL
	232.87	0.05	COAL, dull and bright, small pieces
	232.90	0.03	COAL, dull banded, stick
	232.93	0.03	COAL, dull and bright, stick
	232.97	0.04	COAL, dull, stick
	233.01	0.04	COAL, dull and bright, stick
	233.05	0.04	COAL, dull banded, stick
ł ł	233.08	0.03	COAL, dull and bright, stick
	233.14	0.06	COAL, dull banded, stick
	233.22	0.08	COAL, dull and bright, stick
	233.29	0.07	COAL, dull, stick
	233.34	0.05	COAL, dull banded, stick
	233.38	0.04	COAL, dull and bright, stick
	233.43	0.05	COAL, dull banded, stick
	233.50	0.07	CORE LOSS-COAL
	237.62	4.12	SANDSTONE, fine-grained, argillaceous and carbonaceous, minor coaly stringers, transitional below
	239.57	.1.95	MUDSTONE, carbonaceous, minor listric surfaces and coaly towards the base, abrupt below
	243.11	3.54	CONGLOMERATE, heterogenous in size form 0.25cm-4cm transitional below
	247.48	4.37	CONGLOMERATE, fairly homogenous in size, coarse grit, 0.5cm with occasional pebbles 1.5cm
	259.94	12.46	SANDSTONE, no bedding very homogenous, clean well-sorted
20°	261.95	2.01	SANDSTONE WITH INTERBEDDED MUDSTONE, 60:40, mudstone coming in towards base with

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
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			SHEETS MISSING
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BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	317.47	55.52	MUDSTONE, silty, bioturbated small burrows, minor sandy layers, aburpt below
	351.00	33.53	MUDSTONE/SANDY, 50:50, bioturbated, disturbed, small burrows, well mixed and disturbed, occasional large vertical burrows, abrupt below with small (2cm thick) conglomerate
	372.80	21.80	SANDSTONE WITH INTERBEDDED MUDSTONE, 70:30, bioturbated and disturbed mudstones, sands argillaceous but fairly well-bedded
	373.38	0.58	SANDSTONE, very fine-grained, siltstone interbedded, bioturbated and small worm burrows, minor cross-bedding apparent in finely laminated zones
	375.10	1.72	SANDSTONE/SILTSTONE, as above
	378.28	3.18	SANDSTONE/SILTSTONE, as above
	379.26	0.98	SANDSTONE, fine-to very fine-grained, 3.18m93m argillaceous, slightly bedded
	379.78	0.52	SANDSTONE, very fine-grained, and siltstone interbedded, worm burrows (small), slight bioturbation
	381.91	2.13	SANDSTONE/SILTSTONE, as above, calcareous, fracture at 379.78m @20° from axis
	386.79	4.88	SANDSTONE/SILTSTONE, as above, 60:40, fracture @ 382m @ 10 ⁰ from axis, calcareous
	391.06	4.27	SANDSTONE/SILTSTONE, as above, 70:30, cross-bedding @388m
	395.94	4.88	SANDSTONE/SILTSTONE, as above 80:20, fracture @393.88 @ 15° from axis, calcareous
	399.59	3.65	SILTSTONE, light to dark grey and sandstone, very fine- grained 80:20, bioturbated and small worm burrow zones, no larger than 10cm
	404.16	4.57	SILTSTONE, light to dark grey, minor very fine-grained sandstone, interbedded, calcareous
	408.74	4.58	SILTSTONE, minor sandstone, as above, listric surface @ 405.66m @ 13 from axis
	410.87	2.13	SILTSTONE/SANDSTONE, as above, pyritic disseminations in sandstone beds, numerous high angle fractures from 12° to 14° from axis from 408.74m to 410.87
	411.02	0.15	MUDSTONE, black, silty
	413.00	1.98	MUDSTONE, as above, carbonaceous, minor sandstone band upper-lower moose bar contact @ 411.88m
~			SUKUNKA MOOSEBAR

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCRIPTION
~	416.05	3.05	MUDSTONE, black, minor sideritic inclusions and pyrite disseminations along bedding planes, fossil shells @413.09m
	418.03	1.98	MUDSTONE, black, as above, fractured and broken zone from 416.03 to 418.03, angles at approx. 13°
	419.56	1.53	MUDSTONE, as above, broken zone
	423.37	3.81	MUDSTONE, black, as above, calcite filled fracture @419.86 @16 from axis, @421.16 @ 20 from axis, @422.76 @ 12 from axis, fractured and broken zone from 422.76 to 423.37 angles at 10 from axis
	425.50	2.13	MUDSTONE, black, numerous calcite filled fractures @ approx. 25° and 10°
	427.33	1.83	MUDSTONE, black, faintly bedded fractures @ approx. 7 ^o from axis
	429.00	1.67	MUDSTONE, black, numerous bedding cleats
	434.02	5.02	MUDSTONE, black, faintly bedded, minor pyrite on bedding plane, fracture zone - calcite coated, from 430.63 to 431.84 near vertical, from 433.30 to 434.02 angle from vertical to approx 10
	436.78	2.76	MUDSTONE, black, fractured zone from 435.68 to 438.30 angle from 6 to 12
	441.84	5.06	MUDSTONE, black, fractured zone as above from 441.21 to 441.52
	445.31	3.47	MUDSTONE, black, minor near vertical angles
	449.58	4.27	MUDSTONE, black, fault zone, listric surfaces, gauge faulted from 448 to 451.8 gauge from 449.18 to 449.78 numerous calcite veinlets
	452.32	2.74	MUDSTONE, black, fault zone as above, siderite on fracture @ 449.78
	456.29	3.97	MUDSTONE, black, faulted zone from 453.08 to 456.29 numerous listric surfaces @ 60° to 70° from axis, large vertical fracture approx 1.5m long
	460.55	4.26	MUDSTONE, black, faulted zone, listric surfaces from 457.39 to 460.77 @ 40° to 50°
	465.43	4.88	MUDSTONE, black, 8cm clay band calicified @ 461.3
	469.50	4.07	MUDSTONE, black, large vertical fractures 2m
	474.27	4.77	MUDSTONE, black, minor listric surfaces, minor vertical fractures
	478.84	4.57	MUDSTONE, black, ferrigenous bands from 6cm to 10cm thick small fault zone approx 15cm numerous calcite veinlets and listric surfaces
	481.58	2.74	MUDSTONE, black, as above
-	486.77	5.19	MUDSTONE, black, as above minor pyritic blebs, minor list surfaces associated with calcite veinters bedding fractur

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	491.03	4.26	MUDSTONE, black, as above, minor listric surfaces and ferrugenous bands
	491.34	0.31	MUDSTONE, black, as above
	493.01	1.67	MUDSTONE, as above, vertical fractures, clay band worm burrowed, sheared, slightly calcareous, @491.97 to 492.12 listric surfaces calcite infilled
	494.69	1.68	MUDSTONE, black, breccia band infilled with calcareous sandstone @ 493.63m, fault listric surfaces @494.19m
	496.21	1.52	MUDSTONE, black, vertical fractures, minor listric surface
	497.74	1.53	MUDSTONE, black, gouge zone, numerous listric surfaces and calcite veinlets from 496.77 to 497.94
	498.96	1.22	MUDSTONE, black, high angle fractures
	500.18	1.22	MUDSTONE, black, minor listric surfaces, high angle frac- tures
	501.70	1.52	MUDSTONE, black, minor listric surfaces calcite filled with pyritic streaks
	503.25	1.55	MUDSTONE, black
	504.75	1.50	MUDSTONE, black, listric surface with numerous sub paralle fractures
	506.27	1.52	MUDSTONE, black, minor calcite veinlets
	507.80	1.53	MUDSTONE, black, listric surfaces with numerous subparalle fractures, calcite infilling and listric surfaces, minor pyrite disseminations
	509.32	1.52	MUDSTONE, black, minor listric surfaces
	510.85	1.53	MUDSTONE, black
	512.37	1.52	MUDSTONE, black
	513.89	1.52	MUDSTONE, black, minor listric surfaces
	515-42	1.53	MUDSTONE, black, minor calcite veinlets
	516.94	1.52	MUDSTONE, black, fault zone, numerous listric surface calcite filled at random orientation from 516.15 to 517.52
	518.46	1.52	MUDSTONE, black, fault zone as above
	519.99	1.53	MUDSTONE, black, minor listric surfaces infilled with calcite
ļ	520.29	0.30	MUDSTONE, black
	521.50	1.21	MUDSTONE, black, listric surfaces, ferrigenous bands, clay band fissile from 520.95 to 521.11, mottled
	523.04	1.54	MUDSTONE, black, numerous listric surfaces

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	
	524.56	1.52	MUDSTONE, black, fault zone numerous calcified listric surfaces from 523.15 to 524.56
	526.00	1.44	MUDSTONE, black, fault zone from 525.06 to 527.16, numerous listric surfaces and calcite veinlets
	527.61	1.61	MUDSTONE, black, fault zone, as above, clay band at 427.87
	529.13	1.52	MUDSTONE, black, fault zone, large listric surfaces, calcite infilled at 528.93m
	530.66	1.53	MUDSTONE, black, minor listric surfaces fractured
	532.18	1.52	MUDSTONE, black, faulted and broken zone, gouge infilled numerous calcite veinlets and listric surfaces at 531.66
	533.71	1.53	MUDSTONE, black, fractured ferruginous bands
	535.23	1.52	MUDSTONE, black, as above
	536.75	1.52	MUDSTURE, black, minor listric surfaces fractured
	538.28	1.53	MUDSTONE, black, listric surfaces, fractures, pyrite blebs and bands
	539.00	0.72	MUDSTONE, black, as above, clay band at 538.48
	541.33	2.33	MUDSTONE, black, as above, minor calcite veinlets
	542.85	1.52	MUDSTONE, black, as above, clay band at 542.10, fault zone from 542.65 to 544.17, some gouge
	544.37	1.52	MUDSTONE, black, as above, fault as above.
	545.90	1.53	MUDSTONE, black, ferruginous bands, fractured, pyritic bands
	547.42	1.52	MUDSTONE, black, as above
	548.95	1.53	MUDSTONE, black, as above
	550.47	1.52	MUDSTONE, black, as above, clay band at 549.27m
	551.99	1.52	MUDSTONE, black, as above, clay band at 551.89m
	553.52	1.53	MUDSTONE, black, as above
	555.04	1.52	MUDSTONE, black, as above
	556.57	1.53	MUDSTONE, black, as above, clay bands at 556.02m,
	556.77	.20	MUDSTONE, black, minor clay bands at 556.59 and at 556.65, minor pyritic bands
	557.51	0.74	MUDSTONE, medium grey, grading to siltstone at base of unit, contains 0.15m bentonite zone, 0.14m above unit base, thin band 0.12m above main zone
	558.68	1.17	SANDSTONE, mid grey to greenish, coarsening downward, glauconitic, 0.15m bentonite at top of unit
			BIRD SEAM ROOF
	558.71	0.03	COAL, dull, broken

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	ıŋ	m	
	558.77	0.06	COAL, dull, stick, sheared
	558.79	0.02	COAL, dull, broken, sheared
	558.83	0.04	COAL, dull, stick, sheared
1	558.86	0.03	COAL, dull banded, sheared, stick
	558.92	0.06	COAL, dull, broken, sheared
	558.96	0.04	COAL, dull, stick, sheared
	558.99	0.03	COAL, dull, broken, sheared
	559.13	0.14	COAL, dull, stick
	559.18	0.05	COAL, dull, broken, sheared
	559.20	0.02	PYRITE vein; coal dull
	559.37	0.17	COAL, dull banded, broken
	559.42	0.05	COAL, dull, stick
	559.44	0.02	COAL, dull banded, broken pieces
	559.46	0.02	COAL, dull, stick
	559.52	0.06	COAL, dull banded, stick
	559.55	0.03	COAL, dull, stick, internally sheared
	559.69	0.14	COAŁ, dull banded, stick
	559.73	0.04	COAL, dull banded, stick
	559.77	0.04	COAL, stony, stick
	559.80	0.03	COAL, dull, stick
	559.82	0.02	COAL, dull banded, stick
	559.89	0.07	COAL, dull banded, sheared, broken
	559.92	0.03	COAL, dull, sheared, broken
	559.97	0.05	COAL, dull banded, stick
	560.04	0.07	COAL, dull banded
	560.09	0.05	COAL, dull and bright, stick
	560.22	0.13	COAL, dull banded, stick
	560.31	0.09	COAL, dull and bright, stick
	560.33	0.02	COAL, bright, stick
	560.38	0.05	COAL, dull banded, stick
	560.42	0.04	COAL, dull, stick
	560.46	0.04	COAL, dull banded, stick
	560.48	0.02	COAL, bright banded, stick
	560.55	0.07	COAL, dull and bright, stick
L			

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	560.60	0.05	COAL, bright, sheared, broken
•	560.68	0.08	COAL, bright banded, sheared, broken
	560.81	0.13	COAL, dull and bright, sheared
	560.86	0.05	COAL, dull, sheared
	560.88	0.02	CORE LOSS-COAL
			FLOOR OF BIRD SEAM
	560.91	0.03	SANDSTONE, fine-grained, carbonaceous partings in upper 0.5m, core fractured toward base with rare calcite, not faulted
20 ⁰	563.88	2.97	SANDSTONE, fine-grained, massive, mid/light grey, small worm burrows for 2m from unit top, cross-bedding developing in base of unit
	565.70	1.82	SANDSTONE, as above
	567.23	1.53	SANDSTONE, fine-grained, mid grey, cross-bedded, large worm burrows present
	568.75	1.52	SANDSTONE, fine-grained, mid grey, massive, cross-bedding, sporadically developed
	570.28	1.53	SANDSTONE, as above
	571.80	1.52	SANDSTONE, as above
	573.32	1.52	SANDSTONE, as above
	574.85	1.53	SANDSTONE, as above
,	576.37	1.52	SANDSTONE, as above
	577.62	1.25	SANDSTONE, as above
	577.90	0.28	SANDSTONE, cross-bedded, fine-grain, finely bedded, near vertical slump structures
	578.97	1.07	SANDSTONE, as above
-	579.43	0.46	SANDSTONE, fine to medium-grain, thinly bedded minor carbonaceous partings, calcareous
	580.95	1.52	SANDSTONE, as above
	582.47	1.52	SANDSTONE, as above, carbonaceous bands with associated fine-grained sandstone, @581.63-3cm thick, @581.82-8cm thick, @582.15-2.5cm thick
	584.00	1.53	SANDSTONE, medium-grain , faintly bedded, calcareous, well-sorted, thin carbonaceous beds with associated fine-grain sandstone at 583.19m-21cm thick, minor calcite veinlets, fracture fills
	585.52	1.52	SANDSTONE, as above
22 ⁰	586.26	0.74	SANDSTONE, fine-grained, quartz-lithic, massive, mudstone partings and blebs throughout but interspersed, basal 0.13m contains mudstone clasts and fragments very fine-gr

BH Nos. 16

Dip D	DEPTH m	THICKNESS m	DESCRIPTION
581	6.86	0.60	SANDSTONE, as above
586	6.96	0.10	SANDSTONE, very fine-grained, containing numerous mudstone, partings on bedding plane, boundary with unit above sharp, gradational below
58	7.57	0.61	SILTSTONE, grading to Mudstone, with silty stringers, and lenses, bedding uneven (wavy) at base, shelly fossils and carbonaceous in basal 0.15m of unit
58	7.77	0.20	COAL, dull and bright
58 ⁻	7.85	0.08	COAL, bright banded, contains numerous pyrite bands, stic
58	7.89	0.04	COAL, duil banded, stick
58	7.92	0.03	COAL, dull and bright, stick
58 ⁻	7.97	0.05	MUDSTONE & COAL, broken
58	8.01	0.04	COAL, dull banded
588	8.10	0.09	MUDSTONE, carbonaceous
58	8.16	0.06	COAL, dull banded, (Skeeter Seam Equivalent)
588	8.46	0.30	MUDSTONE, dark grey, carbonaceous, containing silty stringers
589	9.67	1.21	MUDSTONE, as above
58	9.92	0.25	MUDSTONE, as above
. 590	0.12	0.20	SANDSTONE, very-fine to fine-grained, light grey, contain muddy partings and stringers, silty phase and increasing mudstone content around 590m, disturbed bedding and slump structures common above 590m.
591	0.34	0.22	SANDSTONE, as above
20° 59	1.09	0.75	SANDSTONE, as above
59:	2.58	1.49	SANDSTONE, as above
59:	2.65	0.07	SANDSTONE, as above
59	3.14	0.49	LAMINITE, siltstone-mudstone interlaminations
59.	3.97	0.83	SANDSTONE, fine-grained, light grey, mudstone partings and laminae common to 0.05m thick, boundary sharply gradational with unit below
20 ⁰ 59	5.68	1.71	MUDSTONE, dark grey, carbonaceous in basal 1m, silty stringers toward top of unit
590	6.02	0.34 .	CORE LOSS-COAL
59	6.16	0.14	COAL, dull and bright, broken fragments
590	6.33	0.17	SANDSTONE, fine-grained, mid grey, muddy stringers
597	7.31	0.98	SILTSTONE, muddy for most part and containing discrete muddy stringers and carbonaceous flecks
597	7.31	0.98	· · · · · · · · · · · · · · · · · · ·

BH Nos. 16

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	597.37	0.06	COAL, dull and bright, broken
	597.81	0.44	CORE LOSS
	597.94	0.13	MUDSTONE, carbonaceous
	599.44	1.50	SILTSTONE, muddy throughout, containing mudstone partings and lenses, basal 0.20m carbonaceous
	599.64	0.20	COAL, dull and bright, core broken
	599.88	0.24	COAL, as above
	600.38	0.50	CORE LOSS-COAL
ļ	600.42	0.04	MUDSTONE, carbonaceous
	603.08	2.66	SILTSTONE, containing muddy lenses and stringers, and carbonaceous flecks occasionally listric surface
13°	603.68	0.60	LAMINITE, containing erosional and sedimentary slump feature in upper part of unit
	604.38	0.70	LAMINITE, as above
<u> </u>	604.49	0.11	LAMINITE, as above
	604.53	0.04	MUDSTONE, dark grey to carbonaceous
<u> </u>			ROOF OF CHAMBERLAIN SEAM
	604.67	0.14	CORE LOSS-COAL
	604.71	$0.0l_{1}$	COAL, dull banded, small pieces, sheared
	604.73	0.02	COAL, as above
	604.75	0.02	COAL, as above
	604.77	0.02	COAL, dull and bright, small pieces, sheared
}	604.80	0.03	COAL, dull banded, small pieces
	604.83	0.03	COAL, banded, small pieces
]	604.88	0.05	COAL, dull banded, stick
}	604.89	.0.01	COAL, bright,
	604.92	0.03	COAL, dull and bright, broken pieces
	604.94	0.02	COAL, dull, broken pieces
<u> </u> 	604.96	0.02	COAL, dull, sheared
	604.99	0.03	COAL, dull banded, stick
	605.02	0.03	COAL, dull banded, large pieces
	605.05	0.03 ,	COAL, dull and bright, large pieces
	605.08	0.03	COAL, dull banded, stick
	605.09	0.01	COAL, bright, broken
	605.13	0.04	.COAL, dull banded, stick
	605.15	0.02	COAL, dull, stick

BH Nos. 16

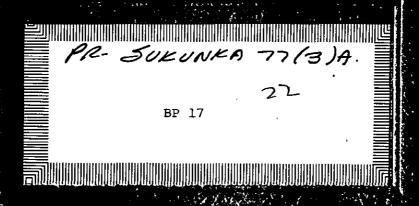
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m ·	m	
	605.16	0.01	COAL, bright, stick
	605.21	0.05	COAL, dull banded
	605.30	0.09	COAL, dull banded, sheared, broken core
	605.32	0.02	COAL, dull, stick
	605.34	0.02	COAL, bright, broken
	605.39	0.05	COAL, dull and bright, broken pieces
	605.40	0.01	COAL, bright, stick
	605.42	0.02	COAL, dull, stick
÷,	605.43	0.01	COAL, bright, broken pieces
	605.48	0.05	COAL, bright banded
	605.51	0.03	COAL, dull banded, pieces
	605.53	0.02	COAL, bright, stick
	605.56	0.03	COAL, dull banded, stick
	605.59	0.03	COAL, dull banded, stick
 	605.74	0.15	COAL, dull and bright, small pieces throughout
ļ 1	605.81	0.07	COAL, dull banded, stick
	605.82	0.01	COAL, bright, stick
	605.83	0.01	COAL, bright, stick
	605.84	0.01	COAL, dull banded, stick
	605.87	0.03	COAL, bright banded, stick
	605.89	0.02	COAL, dull and bright, stick
	605.91	0.02	COAL, bright, stick
	605.92	0.01	COAL, dull and bright, stick
	605.93	0.01	COAL, bright, stick
	605.94	0.01	COAL, dull banded, stick
,	605.95	0.01	COAL, as above
	605.97	0.02	COAL, dull, stick
	605.99	0.02	COAL, dulì banded, stick
	606.00	0.01	COAL, bright, stick
	606.05	0.05	COAL, dull banded, sheared, broken
	606.07	0.02	COAL, bright banded, sheared, broken
-	606.14	0.07	COAL, dull and bright, sheared, broken
	606.18	0.04	COAL, bright, sheared, broken
	606.22	0.04	COAL, dull and bright, sheared, broken
	{		

BH Nos. 16

Dip	DEPTH .	THICKNESS	DESCRIPTION '
0	m	m	
	606.24	0.02	COAL, bright, sheared, broken
	606.27	0.03	COAL, bright banded, sheared, broken
	606.31	0.04	COAL, dull banded, sheared, broken
	606.36	0.05	CCAL, dull, sheared, broken
	606.40	0.04	COAL, bright banded, stick
	606.44	0.04	COAL, dull banded, sheared. stick
	606.45	0.01	COAL, bright, sheared, stick
	606.50	0.05	COAL, dull banded, stick
	606.53	0.03	COAL, dull, stick
	606.55	0.02	COAL, dull and bright, stick
	606.57	0.02	COAL, bright, sheared, broken
	606.61	0.04	COAL, dull and bright, sheared, broken
	606.64	0.03	COAL, dull banded, stick
	606.70	0.06	COAL, dull banded, sheared, broken
	606.72	0.02	COAL, bright banded
	606.77	0.05	COAL, dull banded
	606.82	0.05	COAL, bright banded, sheared, broken
	606.85	0.03	COAL, dull banded, stick
	606.87	0.02	CDAL, bright banded, stick
	606.96	0.09	COAL, dull, stick
	607.00	0.04	COAL, dull banded, stick
	607.03	0.03	COAL, bright banded, stick
	607.05	0.02	COAL, dull and bright, stick
	607.07	0.02	COAL, bright banded, sheared, broken
	607.11	0.04	COAL, dull banded, sheared, broken
	607.16	0.05	COAL, dull and bright, sheared, broken
	607.22	0.06	COAL, dull and bright, stick
	607.28	0.06	COAL, dull banded, broken pieces, small (?)
	607.60	0.32	CORE LOSS-COAL *
	607.73	0.13	MUDSTONE, carbonaceous with coaly partings, broken throughout
ļ	607.80	0.07	CORE LOSS-COAL
	607.83	0.03	COAL, duli banded, broken
	607.84	0.01	COAL, as above
	607.86	0.02	COAL, bright banded, stick

BH Nos. 16

Dip	DEPTH m	THICKNESS	DESCRIPTION
	607.88	0.02	COAL, bright, stick
	608.00	0.12	CORE LOSS-COAL
		•	FLOOR OF CHAMBERLAIN SEAM
	608.12	0.12	MUDSTONE, carbonaceous, as above
	608.58	0.46	SANDSTONE, fine-grained, muddy partings
	609.91	1.33	SANDSTONE, as above, calcite filled joints
	610.75	0.84	SANDSTONE, as above
	611.02	. 0.27	SANDSTONE, as above
			·
		,	
•			
	<u> </u>		





AREA

SUKUNKA

B. H. No.

BP 17

Contractor:

Tonto

Commenced:

Aug 13, 1977

Co-ordinates: 6,114,071.44 595,152.81 Ν E

Completed:

Aug 26, 1977

Surface Elevation: 1,759.06

m

Core Size:

ΗQ

Casing Left in Hole:

m

Hole Angle:

See detail

page la

Logged by:

Geologist Ali Chowdry

Depth 15.21-174.71 178.61-282.07

Mike DeMestre

Bill Nyland Graham Wallis 282.25-350.92

355.08-411.78

Final Depth:

Hole Azimuth:

411.78

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek			
Hulcross			
Gates	. 135.35	135.35	1,623.71
Sukunka	274.90	139.55	1,484.16
Moosebar	355.67 371.65	80.77 15.98	1,403.39 1,387.41
U. Gething	406.05	34.4	1,353.01

SEAMS	DEPTH	THICKNESS	%RECOVERY	ELEVATION
BIRD UP LP	358.24 374.54			1,400.82 1,384.52
CHAMBERLAIN	406.05			1,353.01
F.PO. F.PR.	284.99-297. 362.16	18	 Fractured and I Fractured 	Listricated

Sperry-Sun Survey

Date: 26th August 1977

Borehole: BP 17 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
400m	2° 45'	N 30° E
350m	2° 30'	N 10°E
300m	2° -	N 11°E
250m	2° -	и 03° Е
200m	1° 30'	- N -
150m	1° 45'	N 12° W
100m	1° 30'	N 19° W
50m	1° 30'	N 28° W

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	15.21	15.21	TRICONED
	15.76	0.55	MUDSTONE, black, abundant plant debris (carbonized), pyritic core fragmented, and locally weathered, much of mudstones carbonaceous with thin dirty coal intervals
	15.98	0.22	MUDSTONE, black, stringers of silts, carbonaceous at base
	16.17	0.19	MUDSTONE/SANDSTONE, predominantly black mudstone with coal layers, sandstone very fine-grained, interlayered, slightl weathered
-	16.29	0.12	MUDSTONE, black, richly carbonaceous, weathered, core broken
	16.91	0.62	COAL SEAM, the coal core badly fragmented throughout, evidence of grinding at base, Coal, dull 0.05, Coal, dull and bright 0.05, Coal, dull banded 0.04, Coal dull banded 0.05, Coal, dull with sub-metallic lustre 0.04, Coal, dull 0.04, Coal, boney 0.02, Siltstone 0.06, Coal, boney 0.02, Coal, dull banded 0.15, Coal, dull with metallic lustre, two sets of cleats 0.10
	17.07	0.16	MUDSTONE, dark grey, abundant carbonized plant remains, homogeneously silty, somewhat weathered
	18.09	1.02	SILTSTONE, medium grey, argillaceous at top and base, small-scale cross-lamination throughout, top 0.10m broken and weathered
	18.58	0.49	MUDSTONE, medium grey, richly silty, badly fragmented and weathered
	19.03	0.45	SANDSTONE, light/medium grey, fine-grained, ubiquitous small-scale cross-lamination, strongly calcareous, core badly weathered and fragmented
8°	19.38	0.35	SILTSTONE/MUDSTONE, badly broken and weathered zone of silts and muds with some pulverized carbonaceous zone in middle
	20.11	0.73	SILTSTONE, medium grey, very argillaceous, broadly banded, strongly calcareous, bottom 0.20m fragmented and badly weathered mudstones
	21.33	1.22	MUDSTONE, dark grey, locally carbonaceous, core badly fragmented and weathered, some siltstone intervals, fragment at base
	22.13	0.80	MUDSTONE, dark grey, silty (homogeneously) some rusty patches, strongly calcareous, mildly erosional at base
	22.56	0.43	SILTSTONE, dark grey, richly argillaceous, devoid of lamination, slumping bottomwards, strongly calcareous
	23.16	0.60	SANDSTONE/SILTSTONE, top half light grey, very fine- grained sands with silty/muddy clasts, coaly inclusions an severe slumping, rest muddy siltstones, strongly calcared throughout, interval with near vertical fracture and weath

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	ln	
	23.70	0.54	SANDSTONE, medium/dark grey, broad interbedding of very f grained sands, laminated and cross-laminated, and argill- aceous siltstones, finely broken carbonaceous matter within laminae, strongly calcareous, fractured
	24.38	0.68	MUDSTONE, dark grey/black, much of it with conchoidal fracture, core broken throughout
	25.60	1.22	MUDSTONE, same as above, some calcareous zones within bottom 0.55m and slightly ferruginous, core fragmented at base and somewhat carbonaceous
	26.06	0.46	MUDSTONE, same as above, badly fragmented, non calcareous
	35.66	9.60	INTERVAL TRICONED
	36.41	0.75	SANDSTONE, light/medium grey, top half fine-grained, rest very fine-grained, argillaceous, very gradational at base
	38.40	1.99	MUDSTONE, dark grey, top 0.20m muddy siltstone with rippl of very fine sands, rest mudstones, slightly silty, locally ferruginous
	39.95	1.55	MUDSTONE, predominently black, locally carbonaceous, listric surfaces, core badly broken
	40.77	0.82	SILTSTONE, brownish grey, somewhat ferruginous, strongly calcareous (substantial amount of carbonate content), vear vertical fractures and fragmented
	40.91	0.14	MUDSTONE, black, carbonaceous, some of it canneloid
	41.50	0.59	MUDSTONE, dark grey/black, locally canneloid, core broken
•			COAL SEAM "C" - top and bottom of seam not defined due to fractures
	41.60	0.10	COAL, dull, all badly fragmented
;	41.65	0.05	COAL, dull and bright
	41.69	0.04	COAL, dull banded
	41.72	0.03	COAL, bright banded with few pebbles
	41.76	0.04	COAL, dull and bright
	41.86	0.10	COAL, bright banded
	44.05	- 2.19	CONGLOMERATE, well packed pebbles of cherts and quartzose generally very fine pebbly
	47.25	3.20	CONGLOMERATE, as above, mixture of finely pebbly to pebbly
	49.69	2.44	CONGLOMERATE, predominently gritty and finely pebbly
	50.53	0.84	SANDSTONE, light grey, medium-grained, scattered granules and odd pebble
	51.45	0.92	CONGLOMERATE, finely pebbly, some fractures, abrupt at

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Dip	DEPTH	THICKNESS	DESCRIPTION
٥	m	m	
	52.10	0.65	SANDSTONE, light grey, medium-grained, few granules and pebbles
	53.64	1.54	CONGLOMERATE, mixture of gritstones, coarse-to very coarse-grained sandstones and conglomerates with fine pebbles
	56.38	2.74	CONGLOMERATE, as above, predominently gritty
	56.69	0.31	SANDSTONE, light grey, fine/medium-grained, clean with scattered granules
	57.74	1.05	SANDSTONE, light grey, fine/medium-grained, extremely clean, 0.40m gritstones (or aggregate) within sequence and 4cm pebbly zone, vaguely cross-stratified, siliceous
	62.79	5.05	SANDSTONE, as above, with 2cm gritty zone and few pebbles almost devoid of sedimentary lamination, 0.60cm vertical fracture splitting core into two
	65.83	3.04	SANDSTONE, light grey, fine-grained, very clean and extremely well-sorted, lacking lamination, siliceous, very uniform 0.07 zone, slightly weathered
	68.88	3.05	SANDSTONE, identical to above
	71.93	3.05	SANDSTONE, as above, some suggestion of local lamination, some fracturing and weathering
	74.98	3.05	SANDSTONE, as above, middle 0.35m section slickensided
	77.82	2.84	SANDSTONE, light grey, fine-to very fine-grained, 0.20m silty/muddy zone in middle, bottom 0.42m very fine sands silts and mudstones, with 0.04m decayed mudstone, core broken
	78.22	0.40	SANDSTONE/MUDSTONE, very fine-grained sands rapidly intercalating with mudstones with erosional boundaries, 12-14mm across tube of burrowed sediments with a granule in it, core very fragmented, slickensided, evidence of grinding at base
	78.70	0.48	SANDSTONE, top 0.08m conglomerate, ill-sorted with some muddy matrix, rest regularly cross-laminated fine-grained sands, contact with core below broken, listric
	79.40	0.70	COAL SEAM, top half dull banded, rest bright banded core broken up and at base pulverized, abrupt
5 ⁰	79.81	0.41	SILTSTONE, medium grey, laminated, coarse-grained with thin layers of very fine-grained sands, abundant carbonized plant debris, somewhat banded, passage below b interbedding
	80.13	0.32	SANDSTONE, medium grey, fine-grained, carbonaceous admixture in matrix, gradational to base
	80.87	0.74	MUDSTONE, dark grey, silty at top and base, laminated (sporadically)

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Dip	DEPTH	THICKNESS	DESCRIPTION
O	m,	m	
the Wagner company and the larger com <u>a</u> n	82.31	1.44	MUDSTONES, medium/dark grey, sporadically silty layers and these zones with well-defined small-scale cross-
	82.70	0.39	MUDSTONE, black, abundant listric surfaces, fragmented GATES "A" HORIZON
	83.74	1.04	MUDSTONE, black very fragmented, abundantly carbonaceous, and coaly intercalations at base, abrupt with conglomerate
	84.12	0.38	CONGLOMERATE, gritty to finely pebbly, sorted, no sandy matrix
	87.17	3.05	CONGLOMERATE, predominently gritty, locally fairly sorted
	90.22	3.05	CONGLOMERATE, slightly coarser than above, basal 0.52m with fine/medium pebbles
	92.66	2.44	CONGLOMERATE, fine/medium pebbles, fragmented in basal 0.50
ŗ	95.97	3.31	CONGLOMERATE, coarse grits and finely pebbly, basal 0.24m mixture of very coarse-grained sands and grits, some fine/medium-grained sands
	96.10	0.13	GRITSTONES, with abundance of fine sands in matrix, clean contact
,	96.42	0.32	SANDSTONE, light grey, very fine-grained, very clean vaguely laminated, two small pebbles
-	98.75	2.33	SANDSTONE, light, fine-grained, clean, extremely uniform vaguely cross-laminated, non calcareous
	101.80	3.05	SANDSTONE, identical to above, 1cm pebbly zone
	104.91	3.11	SANDSTONE, fine/medium-grained, stylolite, similar to above, light grey
	107.49	2.58	SANDSTONE, as above, slightly darker, siliceous
	107.70	0.21	MUDSTONE, black, homogenously carbonaceous, silty, abrupt
	108.05	-0.35	SANDSTONE, light grey, fine/medium-grained, 0.08m very finely pebbly conglomerate at top, core mostly broken and a large near vertical fracture
	109.83	1.78	SANDSTONE, as above with few gritty intervals
	110.64	0.81	GR!TSTONE, fairly uniform and sorted, broken up core
	111.12	0.48	GRITSTONE/CONGLOMERATE, as above
	111.56	0.44	SANDSTONE, light grey, fine-to very fine-grained, devoid of sedimentary lamination, siliceous
	111.84	0.28	CONGLOMERATE, very finely pebbly, 0.14m dark grey, very fine-grained carbonaceous sands at top
	112.17	0.33	SANDSTONE, light grey, fine/medium-grained, 0.10 gritstone at base

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	112.33	0.16	GRITSTONE/CONGLOMERATE, 5cm of very fine sands at top
	112.76	0.43	SANDSTONE, light grey, fine/medium-grained, abrupt at base
	113.05	0.29	MUDSTONE/SANDSTONE, very fine-grained sands interbedded with dark grey mudstone, erosional mutual boundaries, basal 15mm gritstone
	114.60	1.55	SANDSTONE, light grey, fine/medium-grained, very clean, well-sorted, cross-stratified, strongly calcareous
	117.65	3.05	SANDSTONE, light grey, medium-grained, prominently cross-bedded, well-washed and well-sorted, strongly calcareous
	120.70	3.05	SANDSTONE, identical to above
	123.75	3.05	SANDSTONE, light grey, fine/medium-grained, generally obscurely cross-stratified, few calcite filled fractures (along bedding), strongly calcareous
	126.80	3.05	SANDSTONE, identical to above, two moderately steep fractures, one with thick calcite encrustation
	129.84	3.04	SANDSTONE, light/medium grey, fine-grained, mostly laminated, strongly calcareous
:	131.01	1.17	SANDSTONE, identical to above, very strongly calcareous, erosional at base
	131.81	0.80	MUDSTONE/SANDSTONE, sands very fine-grained, well-laminate dark grey mud interlayered with sands, invariably with scoured surfaces, tiny muddy intraclasts bottomward, calcareous throughout, sharp contact at base
	132.30	0.49	SANDSTONE, light grey, fine-to very fine-grained, well cross-stratified, strongly calcareous, basal 0.08m silty mudstone
	132.47	0.17	MUDSTONE/SANDSTONE, very fine sands and dark grey muds and some argillaceous siltstone laminated, calcareous
3-4°	134.75	2.28	SANDSTONE, light grey, fine-to very fine-grained, generally well cross-laminated, 4cm mudstone, bottom 0.48m burrowed with partial obliteration of lamination, strongly calcareous, abrupt
	135.35	0.60	MUDSTONE/SANDSTONE, 60:40, very fine-grained sand in intra clastic association with mudstone due to bioturbation, weakly calcareous. GATES SUKUNKA
	135.94	0.59	SANDSTONE, light grey, very fine-grained, well-laminated, stringers of silty mudstones toward base, calcareous

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	138.19	2.25	SANDSTONE/MUDSTONE, 45:55, interbedded sequence, core broken at base
	141.27	3.08	MUDSTONE/SANDSTONE, interbedded units of very fine sands and muds with variable thickness, burrowed zones
5 ⁰	144.47	3.20	MUDSTONE/SANDSTONE, 55:45, as above
5 ⁰	147.67	3.20	SANDSTONE/MUDSTONE, 65:35, similar sedimentary features as above
	150.88	3.21	MUDSTONE/SANDSTONE, 75:25, similar as above in sedimentary features
	154.04	3.16	MUDSTONE/SILTSTONES, dark grey silts and silty mudstone with infrequent very fine-grained, light/medium grey laminated sands, abundant bioturbation
	157.12	3.08	SILTSTONE/MUDSTONE, very similar to above, 15:85
	160.17	3.05	SILTSTONE/MUDSTONE, 10:90, very similar to above, core broken at base
5°	163.31	3.14	MUDSTONE/SILTSTONE, dark grey, disseminated silts and thin zones of well-laminated very fine-grained sands, much burrowing 0.15m fragmented mudstone with clayey lith- ology, 0.89m from base of the unit
	165.18	1,87	MUDSTONE, dark grey, very little differentiated silts or sands, pin prick burrows and layer ones, primary sedimenta lamination almost completely erased, non calcareous, appearance of sands bottomwards
	166.42	1.24	SILTSTONES/MUDSTONE, thoroughly homogenized sequence of silts and sands, some very fine sands (dispersed), 60:40
4-5 ⁰	169.47	3.05	SANDSTONE/SILTSTONE/MUDSTONE, top 2/3 thoroughly intermixed coarse-grained silts and mudstones, rest predominently light grey, very fine-grained sands, lamin-ated/cross-laminated to bioturbated with small silty/mudd/intervals, non calcareous throughout
	172.52	3.05	SANDSTONE/SILTSTONE, similar to above, predominently very fine sands
5 ⁰	174.71	2.19	SAND/SILTSTONES, slightly higher proporation of silts, many large burrows, non calcareous,
			SANDSTONE/MUDSTONE, light grey, very fine-grained to fine-grained sandstone, slightly calcareous, moderately well-sorted, laminated sometimes cross-bedded (low angle, small scale) occasionally slumped and burrowed, sharp contacts with other lithologies, black mudstone can be silty, present as thin interbeds, most common lithology is an intimately mixed sandstone (as described above) and silty mudstone, characteristically heavily bioturbate slumped and burrowed

Dip , o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	178.61	3.90	SANDSTONE/MIXED SANDSTONE, MUDSTONE/SILTY MUDSTONE, 20:20:0 mudstone moderately burrowed
	181.66	3.05	SANDSTONE/MIXED SANDSTONE, MUDSTONE/MUDSTONE, 25:20:55, silty
	183.84	2.18	SANDSTONE/MIXED SANDSTONE, MUDSTONE/MUDSTONE, zone of highly broken up, sheared core with slickensided and listric features and abundant calcite
	184.70	0.86	SANDSTONE/MIXED SANDSTONE,MUDSTONE/MUDSTONE, silty, zone of moderately broken up corewithoccasional listric feature
	185.79	1.09	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, 10:45:45
	186.07	0.28	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, two listric surfaces 0.05m apart, core slightly broken
	187.75	1.68	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, 5:70:25
	190.18	2.43	SANDSTONE/MIXED SANDSTONE& MUDSTONE/MUDSTONE, silty, 0:75:25, occasional small shell fragments scattered throughout
	190.80	0.62	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, core broken at high angle to horizontal(55°)
	193.85	3.05	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, 25:70:5
	194.39	0.54	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty
	194.86	0.47	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, two listric surfaces 0.27m apart
	196.90	2.04	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty
	198.55	1.65	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, 30:60:10, mudstone changes to black
	199.41	0.86	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, silty, 20:50:30
	199.94	0.53	SANDSTONE, light grey, medium-grained, appears scattered as single grains and small isolated clusters, core broken parallel to its axis and broken up in small piece with calcite and slickensided
	200.08	0.14	SANDSTONE/MIXED SANDSTONE/MUDSTONE, fine-grained and medium-grained bands of sandstone, silty mudstone
	200.56	0.48	SANDSTONE/MIXED SANDSTONE & MUDSTONE/MUDSTONE, core broken up, silty, fine-grained and medium-grained bands of sandstone
	200.99	0.43	SANDSTONE/MIXED SANDSTONE &MUDSTONE/MUDSTONE, silty mudstone, fine-grained and medium-grained bands of sandstone

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	202.74	1.75	MIXED SANDSTONE & MUDSTONE, silty, heavily burrowed, small-scale.
	202.99	0.25	SANDSTONE/MIXED SANDSTONE/MUDSTONE, fine-grained sandstone few large burrows, 40:30:30
			SANDSTONE/MUDSTONE, medium grey, very fine-grained to fine-grained sandstone, moderately calcareous, finely laminated to sometimes cross-bedded, (low angle small scale), locally heavily burrowed (large ones), with occasional black muddy inclusions and black muddy intraclastic beds, black mudstone interbeds, usually burrowed (small and large burrows) which become more frequent downsection
	204.31	1.32	SANDSTONE, heavily burrowed, core broken parallel to its axis
l	205.03	0.72	SANDSTONE/MUDSTONE, 90:10
5°	205.43	0.40	SANDSTONE/MUDSTONE, 90:10, core broken up
	205.61	0.18	SANDSTONE/MUDSTONE, 90:10, core broken up
	206.76	1.15	SANDSTONE/MUDSTONE, 85:15
	208.66	1.90	SANDSTONE/MUDSTONE, 85:15, core badly broken up and calcite and slickensided
6°	208.99	0.33	SANDSTONE/MUDSTONE, 90:10
	209.09	0.10	SANDSTONE/MUDSTONE, 90:10, core slightly broken up
	211.56	2.47	SANDSTONE/MUDSTONE, 85:15
	212.14	0.58	SANDSTONE/MUDSTONE, 85:15, two listric surfaces 0.03m apart
	213.58	1.44	SANDSTONE/MUDSTONE, 80:20
	214.40	0.82	SANDSTONE/MUDSTONE, core broken up in all directions with few slickensided and weathered surfaces
	215.18	0.78	SANDSTONE/MUDSTONE, 75:25
	218.23	3.05	SANDSTONE/MUDSTONE, 75:25, slightly burrowed, small-scale
	221,28	3.05	SANDSTONE/MUDSTONE, silty, 65:35
	221.81	0.53	SANDSTONE/MUDSTONE, silty, core broken parallel to its axis
	222.06	0.25	SANDSTONE/MUDSTONE, heavily burrowed section
	222.27	0.21	SANDSTONE/MUDSTONE, core broken up, three listric surfaces 0.03-0.05m apart
	222.99	0.72	SANDSTONE/MUDSTONE, silty, 50:50
	223.09	0.10	SANDSTONE/MUDSTONE, silty, core broken, shattered and listric features
	224.33	1.24	SANDSTONE/MUDSTONE, silty

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
	225.79	1.46	SANDSTONE/MUDSTONE, silty, 40:60
	226.76	0.97	SANDSTONE/MUDSTONE, silty, 40:60, core broken parallel to its axis
,	227.38	0.62	SANDSTONE/MUDSTONE, silty, 40:60
10 ^O	228.03	0.65	SANDSTONE/MUDSTONE, silty, 40:60
	228.89	0.86	SANDSTONE/MUDSTONE, silty, 40:60, core slightly broken up
	230.12	1.23	SANDSTONE/MUDSTONE, silty, 30:70
	230.42	0.30	SANDSTONE/MUDSTONE, silty, core broken up
6°	233.47	3.05	SANDSTONE/MUDSTONE, silty, 30/70
	236.13	2.66	SANDSTONE/MUDSTONE, silty, 20:80
	236.52	0.39	SANDSTONE/MUDSTONE, silty, 20:80, broken up core with listric and slickensided features
	236.81	0.29	SANDSTONE/MUDSTONE, as above
	239.56	2., 75	SANDSTONE/MUDSTONE, silty, 20:80, locally .05-0.15m zones, heavily burrowed (small ones)
	241.09	1.53	SANDSTONE/MUDSTONE, 15:85, silty
	244.14	3.05	SANDSTONE, mostly as thin irregular shaped stringers for the rest of the section
	245.68	1.54	SANDSTONE/MUDSTONE, 15:85
	248.71	3.03	SANDSTONE/MUDSTONE, silty, 12:88
	251.76	3.05	SANDSTONE/MUDSTONE, silty, 10:90
	252.57	0.81	SANDSTONE/MUDSTONE, silty, 10:90
	253.00	0.43	SANDSTONE/MUDSTONE, silty, 10:90, core broken parallel to its axis
	254.81	1.81	SANDSTONE/MUDSTONE, silty, 15:85
	257.86	3.05	SANDSTONE/MUDSTONE, silty, 10:90
	260.91	3.05	SANDSTONE/MUDSTONE, silty, 15:85, four slickensides .0102m apart
	263.95	3.04	SANDSTONE/MUDSTONE, silty, 10:90, appearance at this level of occasional pyrite nodules, scattered distribution
	265.15	1.20	SANDSTONE/MUDSTONE, silty, 3:97
	267.00	1.85	SANDSTONE/MUDSTONE, silty, 3:97, core broken parallel to its axis
	270.05	3.05	SANDSTONE/MUDSTONE, silty, 5:95, sandstone as wisps and lenses
	270.54	0.49	SANDSTONE/MUDSTONE, as above
	270.74	0.20	SANDSTONE

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Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m	
	273.06	2.32	SANDSTONE/MUDSTONE, silty, 5:95
	273.09	0.03	SANDSTONE/MUDSTONE, silty, 5:95, core broken up
	273.59	0.50	SANDSTONE/MUDSTONE, silty 2:98
	274.29	0.70	SANDSTONE/MUDSTONE, silty, 2:98, core moderately broken up
	274.40	0.11	SANDSTONE/MUDSTONE, silty, 2:98
	274.90	0.50	SANDSTONE/MUDSTONE, silty, 2:98
			SUKUNKA MOOSEBAR
			MOUSEBAN
	279.19	4.29	MUDSTONE, black with occasional pyrite and ferruginous bands
	282.07	2.88	MUDSTONE, black
	282.25	0.18	MUDSTONE, black, minor sandy-silty lenses
	284.99	2.7 ^l i	MUDSTONE, black, faulted, listric surfaces, minor calcite veinlets from 282.25 to 282.70
	288.04	3.05	MUDSTONE, black, faulted, listric surfaces, fractured from 284.99 to 286.34
	291.08	3.04	MUDSTONE, black, fractured, minor listric surfaces
,	294.13	3.05	MUDSTONE, black, faulted, listric surfaces fractured, calcite veinlets from 291.22 to 292.18
	297.18	3.05	MUDSTONE, black, fractured
	299.47	2.29	MUDSTONE, black, as above
	302.67	3.20	MUDSTONE, as above
	303.58	0.91	MUDSTONE, as above
	306.63	3.05	MUDSTONE, as above
	309.68	3.05	MUDSTONE, as above
	312.73	3.05	MUDSTONE, as above
	315.77	3.04	MUDSTONE, as above
	318.82	3.05	MUDSTONE, black, minor ferruginous bands, fractures, minor pyritic blebs
	321.87	3.05	MUDSTONE, as above
	324.00	2.13	MUDSTONE, as above
	325.22	1.22	MUDSTONE, as above
	327.97	2.75	MUDSTONE, as above
	331.01	3.04	MUDSTONE, as above

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Dip	DEPTH	THICKNESS	DESCRIPTION
. 0	m	m	
	334.06	3.05	MUDSTONE, as above
	337.11	3.05	MUDSTONE, as above
	338.33	1.22	MUDSTONE, as above
	338.42	0.09	CLAY BAND, beige, mottled, worm burrows?
	340.10	1.68	MUDSTONE, black
	350.92	10.82	MUDSTONE, black, as above, (core missing)
	355.08	4.16	MUDSTONE, dark grey to mid grey, pyrite blebs throughout, occasional silty phases in basal l metre
	355.67	0.59	SANDSTONE, fine-grained, greenish grey, glauconitic, pebbly, calcite slip plane at top and base of unit
	-		ROOF OF BIRD SEAM - Upper Plate
	355.74	0.07	COAL, dull, minor bright bands, broken, listric surfaces
	355.77	0.03	COAL, dull and bright, broken
	355.82	0.05	COAL, dull banded, broken, listric surfaces
	355.88	0.06	COAL, bright banded, stick
	355.89	0.01	COAL, bright
	355.92	0.03	COAL, bright banded
	355.93	0.01	COAL, bright
	355.95	0.02	COAL, bright banded
	355.96	0.01	COAL, dull banded
	355.97	0.01	COAL, bright
	356.01	0.04	COAL, dull and bright, stick
i	356.03	0.02	COAL, bright banded, stick
	356.09	0.06	COAL, dull and bright
	356.12	0.03	COAL, dull banded, stick
	356.14	0.02	COAL, bright
	356.16	0.02	COAL, bright banded
	356.20	0.04	COAL, dull banded
	356.21	0.01	COAL, bright
	356.23	0.02	COAL, dull banded
	356.24	10.0	COAL, bright
	356.30	0.06	COAL, dull banded, listric surface at base of unit, stick
	356.33	0.03	PYRITE
	356.34	0.01	COAL, dull and bright, core broken, listric surfaces next 0.2m

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	356.39	0.05	COAL, duli banded
	356.42	0.03	COAL, dull and bright
	356.47	0.05	COAL, dull banded
	356.49	0.02	COAL, bright
	356.60	11.0	COAL, dull banded, broken
	356.64	0.04	COAL, dull and bright, broken
	356.69	0.05	MUDSTONE, carbonaceous
	356.75	0.06	COAL, dull, broken
	356.78	0.03	COAL, dull banded
	356.80	0.02	COAL, bright
	356.83	0.03	COAL, dull banded, sheared
	356.85	0.02	COAL, bright
	356.91	0.06	COAL, dull and bright, stick
	357.08	0.17	COAL, dull banded, stick 0.06, dull banded,broken 0.07, dull banded, stick 0.04
	357.19	0.11	COAL, bright and dull, broken, listric surfaces 0.02, bright and dull, broken, listric surfaces 0.01, bright and dull, stick, listric surfaces 0.06, bright and dull, broken, listric surfaces 0.02
	357.20	0.01	COAL, bright, broken, listric surfaces
	357.27	0.07	COAL, dull and bright bands, broken, listric surfaces
	357.28	0.01	COAL, bright, broken, listric surfaces
	357.33	0.05	COAL, bright banded, broken
	357.45	0.12	COAE, dull banded, stick
	357.52	0.07	COAL, bright banded, sheared, broken
	357.56	0.04	COAL, dull banded, stick
	357.61	0.05	COAL, dull and bright
	357.66	0.05	COAL, dull
	357.69	0.03	COAL, dull and bright
	357.73	0.04	COAL, dull
	357.75	0.02	COAL, dull banded
	357.85	0.10	COAL, dull banded, stick, listric surfaces internally
	357.88	0.03	COAL, dull, broken
	357.99	0.11	COAL, dull banded, broken, listric surfaces
	358.09	0.10	COAL, dull and bright, stick listric surfaces internally
	358.14	0.05	COAL, dull and bright

BH Nos. 17

θiρ	DEPTH	THICKNESS	DESCRIPTION
0	m	£n	
	358.16	0.02	COAL, dull
	358.22	0.06	COAL, dull banded
	358.24	0.02	COAL, dull, broken, listric surfaces
	 		FLOOR OF BIRD SEAM -Upper Plate
	358.42	0.18	MUDSTONE, dark grey, carbonaceous, contains penny band of slickensided coal 0.06m from unit top, below 0.025m silty phase
	358.45	0.03	MUDSTONE, carbonaceous to coaly
1	358.60	0.15	MUDSTONE, dark grey, as above, core broken, slickensided
-	358.62	0.02	COAL, dull and bright(?), slickensided
	358.65	.0.03	MUDSTONE, dark grey, as above
	358.75	0.10	MUDSTONE, coaly, core broken, slickensided
	358.85	0.10	MUDSTONE, coaly, bright and dull coal, flecks throughout, core broken, pieces rounded
	358.95	0.10	COAL, dull banded (?), highly sheared, broken throughout
	359.20	0.25	MUDSTONE, mid grey, containing coaly blobs throughout, sheared, slickensided surface, core broken, fracture planes and joints calcite filled
	359.94	0.74	MUDSTONE, tending toward
	360.63	0.69	SILTSTONE, grading into sandstone at unit base, slickensing fracture planes throughout at 80° to 45° to core axis, joints/fractures calcite filled throughout unit, junction with underlying unit, sharp, parallel to core axis, fault definite
	362.16	1.53	SANDSTONE, fine-grained, light grey, fractured as above, probable fault plane localized in or near this unit
	363.88	1.72	SILTSTONE, mid grey to dark grey, calcite filled fracture zones in top 0.3m of unit, also containing fine sandstone inclusions, remainder of unit undisturbed
	368.16	4.28	SILTSTONE, unit contains fine sandstone occasionally (max 0.04m thick,) grades downwards into mudstone and contains mudstone phases, gradational throughout, pyritic in basal 0.50m
	370.32	2.16	MUDSTONE, mid to dark grey, gradational with unit above pyritic throughout, small shelly fossils present but not common
ĺ	371.13	0.81	MUDSTONE, occasional zones of siltstone 0.03-0.07m thick, gradational upper contact, sharp basal
	371.65	0.52	SANDSTONE, fine-grained, glauconitic, pyritic ROOF OF BIRD SEAM -LOWER PLATE

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	រា	
	371.66	0.01	PYRITE vein at base of unit
	371.69	0.03	COAL, dull and bright, sheared
	371.72	0.03	STONE, coaly
	371.82	0.10	CORE LOSS-COAL
	371.88	0.06	COAL, dull, sheared, broken
	371.90	0.02	COAL, dull banded, broken
	371.96	0.06	COAL, dull and bright, broken
	372.02	0.06	COAL, bright banded, broken
	372.04	0.02	COAL, bright, sheared, broken (to seamtop) (bedding in seam 20 ⁰)
	372.07	0.03	COAL, dull and bright
	372.09	0.02	COAL, bright banded, stick, internally sheared for next 0.24m
1	372.14	0.05	COAL, dull banded
	372.19	0.05	COAL, dull
	372.22	0.03	COAL, bright banded
	372.25	0.03	COAL, dull and bright
	372.29	0.04	COAL, dull
	372.32	0.03	COAL, dull and bright
	372.34	0.02	COAL, bright
	372.37	0.03	COAL, dull banded
	372.40	0.03	COAL, dull, stick, but internally sheared for next 0.70m
	372.43	0.03	COAL, dull banded
	372.46	0.03	COAL, dull
	372.51	.0.05	COAL, dull banded
	372.52	0.01	COAL, dull
	372.57	0.05	COAL, dull banded
	372.91	0.34	COAL, dull and bright, highly sheared
	372.95	0.04	COAL, dull banded, stick, less sheared
	372.97	0.02	COAL, dull, less sheared
	373.00	0.03	COAL, dull and bright
	373.05	0.05	COAL, bright, sheared
	373.08	0.03	COAL, dull,
	373.11	0.03	COAL, dull banded
	373.16	0.05	COAL, dull

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	373.38	0.23	COAL, dull banded, core broken, sheared
 	373.41	0.03	COAL, dull banded, stick
	373.49	0.08	COAL, dull and bright, stick
	373.52	0.03	COAL, dull banded
	373.57	0.05	COAL, dull and bright
	373.65	0.08	COAL, dull banded, broken, highly, sheared
	373.72	0.07	COAL, dull banded, stick, less sheared than above for next 0.37m
	373.92	0.20	CORE LOSS-COAL
	374.13	0.21	CORE LOSS-ROCK MUDSTONE
	374.23	0.10	MUDSTONE, carbonaceous
<u> </u>	374.26	0.03	COAL, dull banded, broken, sheared
	374.28	0.02	COAL, bright
	374.36	0.08	COAL, dull and bright
	374.38	0.02	COAL, dull banded
	374.41	0.03	COAL, bright banded
	374.49	0.08	COAL, dull and bright
	374.51	0.02	COAL, dull banded
	374.54	0.03	COAL, dull
		1	FLOOR OF BIRD SEAM - Lower Plate
	375.94	1.40	SANDSTONE, medium-grained, massive light grey, white flecks carbonaceous material in upper0.05m
	376.68	0.74	SANDSTONE, as above
	378.56	1.88	SANDSTONE, fracture plane, calcite filled @ 378m
	378.89	0.33	SANDSTONE, as above, fining downwards
	382.82	3.93	SANDSTONE, fine-grained, light grey, weakly cross-bedded, mudstone wisps and partings, occasional lense to 0.01m large worm burrows
	383.42	0.60	SANDSTONE, as above
	385.87	2.45	SANDSTONE, as above, absence of worm burrows and mud partings finer and less common
	388.02	2.15	SANDSTONE, as above
	388.92	0.90	SANDSTONE, as above, fractured but no evidence of stress at 388.60m
	391.97	3.05	SANDSTONE, as above
	395.02	3.05	SANDSTONE, as above

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
o	ım	រោ	
	398.06	3.04	SANDSTONE, as above
]	399.33	1.27	SANDSTONE, as above, mudstone partings developing
5 ⁰	399.42	0.09	LAMINITE, sandstone, fine-grained, laminae to 0.01m max.
	}	0.05	mudstone laminae 0.003m sandstone/mudstone 60:40, top 50
			ROOF OF CHAMBERLAIN SEAM
	399.47	0.05	COAL, stony (bone)
	399.52	0.05	COAL, dull banded
	399.58	0.06	SILTSTONE/MUDSTONE, carbonaceous
	399.61	0.03	COAL, dull banded, stick
	398.63	0.02	COAL, dull and bright, stick
	399.67	0.04	COAL, dull banded, stick
	399.68	0.01	COAL, bright, stick
	399.71	0.03	COAL, dull banded, stick
	399.73	0.02	COAL, bright banded, stick
	399.81	0.08	COAL, dull and bright, stick, some internal shearing
	399.83	0.02	COAL, bright banded, stick
	399.86	0.03	COAL, bright, stick
	399.89	0.03	COAL, bright banded, stick
	399.91	0.02 .	COAL, bright, stick
	399.93	0.02	COAL, bright banded
	399.96	0.03	COAL, bright
	399.98	0.02	MUDSTONE, carbonaceous
	400.02	0.04	COAL, bright
	400.09	0.07	MUDSTONE, carbonaceous
	400.10	0.01	COAL, bright
	400.14	0.04	COAL, dull banded
	400.19	0.05	COAL, bright banded
	400.22	0.03	COAL, dull and bright
	400.24	0.02	COAL, bright
1	400.34	0.10	PYRITE "vein" containing coal
	400.40	0.06	CORE LOSS-COAL
	400.46	0.06	COAL, dull and bright
	400.47	0.01	COAL, stony
	400.49	0.02	CORE LOSS - MUDSTONE
	400.56	0.07	MUDSTONE, carbonaceous

Dip	DEPTH	THICKNESS	DESCRIPTION
o	តា	m	
	400.63	0.07	COAL, dull and bright
	400.67	0.04	COAL, bright banded
-	400.69	0.02	COAL, dull banded
	400.73	0.04	COAL, dull and bright, stick
	400.74	0.01	AS ABOVE
	400.76	0.02	AS ABOVE
	400.78	0.02	COAL, bright, sheared, broken
	400.83	0.05	COAL, bright banded
	400.90	0.07	COAL, dull banded
	400.92	0.02	COAL, bright banded, stick
	400.94	0.02	COAL, bright, stick
	400.96	0.02	COAL, bright banded, stick
	400.97	0.01	COAL, bright, stick
	400.98	0.01	AS ABOVE
	401.07	0.09	COAL, bright banded, stick
	401.11	0.04	AS ABOVE
	401.14	0.03	COAL, dull and bright, stick
	401.19	0.05	COAL, bright banded, broken
}	401.27	0.08	MUDSTONE, carbonaceous
	401.32	0.05	CORE LOSS -MUDSTONE
	401.33	0.01	COAL, bright
	401.36	0.03	COAL, bright and dull
	401.39	0.03	CORE LOSS-COAL
وردين وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان وروان و	401.75	0.36	MUDSTONE, dark grey, carbonaceous in part, coaly flecks of bedding planes
	401.80	0.05	COAL, bright, sheared
}	401.86	0.06	COAL, dull and bright, sheared
	401.94	0.08	COAL, dull banded
	401.96	0.02	COAL, dull
	401.98	0.02	COAL, dull banded, stick
	402.01	0.03	COAL, dull
	402.07	0.06	COAL, as above
	402.11	0.04	COAL, dull banded
	402.16	0.05	AS ABOVE
	402.17	0.01	COAL, bright

BH Nos. 17

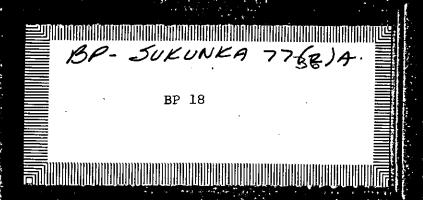
Dip	DEPTH	THICKNESS	DESCRIPTION
0	តា	m	
	402.22	0.05	COAL, dull banded
	402.25	0.03	AS ABOVE
	402.26	0.01	COAL, bright
	402.30	0.04	COAL, dull and bright
	402.35	0.05	AS ABOVE
•	402.39	0.04	COAL, dull banded
	402.40	0.01	COAL, bright
	402.42	0.02	COAL, dull banded
	402.45	0.03	COAL, bright banded
	402.50	0.05	COAL, dull banded, stick
	402.55	0.05	COAL, bright banded
	402.57	0.02	COAL, dull
	402.63	0.06	COAL, duli banded, stick
	402.67	0.04	COAL, dull and bright, broken
	402.70	0.03	COAL, dull banded, core broken, sheared,
	402.72	0.02	COAL, bright, core broken, sheared
	402.78	0.06	COAL, dull banded, core broken, sheared
	402.97	0.19	COAL, sheared, dominantly dull banded
	403.06	0.09	COAL, sheared, dominantly dull and bright
	403.17	0.11	COAL, sheared, dominantly bright banded
	403.19	0.02	MUDSTONE, carbonaceous
	403.20	0.01	COAL, bright
	403.21	0.01	MUDSTONE, carbonaceous
	403.29	0.08	CORE LOSS-COAL
	403.37	0.08	COAL, sheared, dominantly bright banded
	403.44	0.07	COAL, soot ?, weathered
	403.49	0.05	COAL, bright, sheared
	403.51	0.02	COAL, dull banded sheared
	403.54	0.03	COAL, bright banded, sheared
	403.61	0.07	COAL, bright banded, sheared
	403.68	0.07	MUDSTONE, dark grey, containing coaly penny bands
	403.72	0.04	COAL, highly sheared, indeterminate
	403.82	0.10	CORE LOSS-COAL
	403.91	0.09	COAL, dull banded, highly sheared

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	กา	
<u></u>	403.97	0.06	CORE LOSS-COAL
	404.02	0.05	COAL, soot, (weathered?)
	404.10	0.08	CORE LOSS-COAL
	404.19	0.09	COAL, dominantly dull banded
	404.27	0.08	CORE LOSS-MUDSTONE
	404.32	0.05	MUDSTONE, carbonaceous
	404.48	0.16	CORE LOSS-COAL
	404.52	0.04	COAL, intensely sheared, dull banded
	404.59	0.07	COAL, intensely sheared, dull
	404.68	0.09	COAL, stony
	404.69	0.01	COAL, bright
	404.71	0.02	COAL, dull banded
	404.74	0.03	COAL, bright, sheared
	404.76	0.02	COAL, bright banded, sheared
	404.81	0.05	COAL, dull banded, sheared
ļ	404.82	0.01	MUDSTONE, brown/grey
	404.87	0.05	COAL, stony
	404.89	0.02	AS ABOVE
	404.90	0.01	COAL, dull banded
	404.92	0.02	COAL, bright banded
	404.94	0.02	COAL, bright and dull
	404.97	0.03	AS ABOVE
	405.00	0.03	COAL, bright banded
	405.02	0.02	COAL, bright banded
	405.03	0.01	COAL, bright, stick
	405.09	0.06	COAL, dull banded, stick
	405.10	0.01	AS ABOVE
	405.11	0.01	COAL, bright
	405.15	0.04	COAL, dull and bright
	405.17	0.02	AS ABOVE
	405.19	0.02	COAL, bright
	405.21	0.02	COAL, bright banded
	405.32	0.11	COAL, dull banded, stick
	405.36	0.04	COAL, bright, stick

BH Nos. 17

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
<u> </u>	405.38	0.02	COAL, dull banded, stick
	405.41	0.03	COAL, bright, stick
	405.43	0.02	COAL, bright banded
	405.47	0.04	COAL, bright
	405.50	0.03	COAL, bright banded
	405.53	0.03	COAL, bright
	405.55	0.02	COAL, bright banded
	405.56	0.01	COAL, dull banded
	405.57	0.01	COAL, bright
	405.58	0.01	COAL, bright and dull
	405.60	0.02	COAL, dull banded
	405.63	0.03	COAL, dull and bright stick
	405.70	0.07	COAL, dull banded, stick
	405.72	0.02	AS ABOVE
	405.74	0.02	COAL, bright banded, stick
	405.76	0.02	COAL, dull banded, stick
	405.78	0.02	COAL, AS ABOVE, broken
	405.80	0.02	COAL, bright, stick
	405.82	0.02	COAL, dull banded, stick
	405.86	0.04	COAL, bright banded, stick
	405.90	0.04	COAL, bright, stick
	405.98	0.08	COAL, bright, broken
	406.05	0.07	COAL, dull and bright, broken
			FLOOR OF CHAMBERLAIN SEAM
	411.78	·5.73	SANDSTONE, medium-grained, medium to light grey, carbona- ceous flecks and partings in upper 0.3m mudstone partings in basal 2m, tending to finer grained
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m

m

B. H. No. BP 18 AREA SUKUNKA Contractor: Longyear Co-ordinates: 6,115,024.48 Commenced: Aug 17, 1977 592,441.40 Surface Elevation: 1,786.80 Completed: Sept 4, 1977 Core Size: HQ Casing Left in Hole: Hole Angle: Geologist Depth 9.41-89.58 See detail Ali Chowdry page la Hole Azimuth: 191.26-391.91 Logged by: 89.91-190.50 Mike DeMestre 394.71-534.61 572.37-630.39 Final Depth: 681.77 Bill Nyland 537.70-571.50 630.43-681.77 <u>Geoff Jordan</u> FORMATION/MEMBER DEPTH THICKNESS ELEVATION 1,697.24 89.56 89.56 Boulder Creek 100.94 1,596.30 190.50 Hulcross 1,382.94 403.86 213.36 Gates 1,265.60 117.34 Sukunka 521.20 110.56 1,155.04 Moosebar 631.76 44.68 1,110.36 676,44 U. Gething SEAMS DEPTH THICKNESS %RECOVERY ELEVATION 1,152.66 BIRD 634.14 1,110.36 CHAMBERLAIN 676.44 Broken and slickensided 144.78 F.PO. small gouge zones 537.7-541.00 F.PO. Fractured F.PO. 556

highly sheared slickensided

575-577.6

613.86-620.01

Sperry-Sun Survey

Borehole: BP 18

Date: 5th September 1977

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
680m	4° 30'	N 10°Е
650m	4° 30°	n 9°е
600m	3° 45'	n 6° Е
550m	3° 15'	N 6 [°] E
500m	3° -	n 3° E
480m	3° -	N 3° E
450m	2° 15'	-
400m	2° -	
350m	2° 30'	_
300m	2° 30'	
250m	1° 30'	-
200m	1° 30'	- -
150m	0° 45'	-
100m	1° -	ana.
50m	1° 15'	

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
-	9.41	9.41	TRICONED.
	10.67	1.26	SANDSTONE: light-grey, medium-grained, well-sorted and well-washed ubiquitous cross-bedding, quartzose, chertz, non-calcareous, core broken and sporadically weathered (slightly).
	13.71	3.04	SANDSTONE: light/medium-grey, medium-grained, brief intervals of fine/medium sands with abundance of inter- laminae carbonaceous matter. Core locally broken, bottom 0.10m weathered (slightly).
	16.76	3.05	SANDSTONE: light/medium-grey, medium-grained, top half cross-bedded, rest homogeneous and devoid of sedimentary structures; an 0.08m slightly weathered zone.
	19.81	3.05	SANDSTONE: same as above, uniformly clean, well-sorted, medium-grained, substantial amount of cherts.
	21.17	1.36	SANDSTONE: same as above, 0.06m mudstone, rusty weather- ing, silty intraclasts, one 7 to 8 cm highly weathering nodule of silty/siliceous lithology; lower 0.70m with vertical fracture and somewhat weathered along it
	22.02	0.85	SANDSTONE/CONGLOMERATE: top half very coarse-grained sands, rest at Gritstone, granular, with abundant Coaly inclusions, erosional.
	22.86	0.84	SANDSTONE: light-grey, medium-grained (some zones fine/ medium-grained), strongly cross-bedded, carbonaceous matter inter-laminae.
	25.91	3.05	GRITSTONE/CONGLOMERATE: top 1.06m mixture of medium/coars grained sandstone and gritstone with abundant Coaly inclusions toward base, bottom 0.98 also similar, rest finely pebbly conglomerate. Core at one place slightly weathered.
	27.91	2.00	-GRITSTONE/CONGLOMERATE: as above, Core broken along large Coal inclusions, some rusty clasts of siltstone.
	28.51	0.60	SANDSTONE: light-grey, medium-grained, well-sorted, clean, vaguely discernible cross-bedding, gradual at base.
	28.95.	0.44	CONGLOMERATE: very finely pebbly.
	29.90	0.95	CONGLOMERATE: coarse-grits and very finely pebbly.
	30.38	0.48	SANDSTONE: light-grey, fine/medium-grained, 2cm gritty layer toward base, cross-bedded, pebbly calcareous,

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	30.83	0.45	SILTSTONE/MUDSTONE: medium-grey, sequence of silty in- clasts with abundant fine sandy matrix, bottom half essentially muddy clasts in silty mudstone matrix, middle 5-6cm weathered, erosional at base.
	31.45	0.62	SANDSTONE: light/medium-grey, alternating bands of fine and medium-grained, small-scale cross-bedding. Top of core with abundant silty clasts. Zones of carbonaceous laminae, abrupt basal contact.
	32.00	0.55	CONGLOMERATE: essentially gritstones with very coarsegrained matrix, fine pebbles.
	32.12	0.12	SILTSTONE: medium-grey, some very fine sands, abundant Coaly inclusions.
	35.05	2.93	CONGLOMERATE: finely pebbly and sandy zones. Bottom 0.48m dominantly fine-grained sands, brief conglomerate intervals, erosional at base.
	35.53	0.48	SILTSTONE: medium/dark-grey, top half with rusty patches, erosional.
	38.10	2.57	SANDSTONE/CONGLOMERATE: very coarse-grained sand, grit- stone, and fine pebble conglomerate; sands locally well- sorted.
	40.37	2.27	CONGLOMERATE: top 0.55m very coarse-sand and granuler, rest fine pebble conglomerate, erosional at base.
	41.15	0.78	MUDSTONE: dark-grey, homogenously silty, rusty patches bottomward, non-calcareous.
50	42.40	1.25	SILTSTONE: top 0.30m black mudstone with rusty nodules, rest medium-grey, very argillaceous siltstone with very fine-grained sandy layers, occasional lamination, gradual at base. Bottom 6cm richly carbonaceous mudstone. Bright banded, abrupt at base.
	42.46	0.06	COAL: bright banded, abrupt at base.
	44.20	1.74	SILTSTONE: medium-grey, muddy, abundance of root-lets, devoid of lamination, top 7cm carbonaceous.
	46.56	2.36	SILTSTONE: medium-grey, top 0.40m very similar to above, rest coarse silts, structureless, bottom 0.30m almost approaching very fine sand grade and with a fracture at top.
	47.24	0.68	SANDSTONE: light/medium-grey, fine-to very fine-grained, top half with small-scale cross-lamination, rest abundantily slumped and with erosional features, strongly calcardous

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	48.13	0.89	SANDSTONE: medium-grey, fine-grained, micro-erosional features, small-scale cross-lamination, lOcm siltstone band with clasts, erosional at base, calcareous.
	49.68	1.55	SANDSTONE: light-grey, fine/medium-grained, ubiquitous cross-lamination, few tiny clasts of silt, clean, well-sorted, calcareous.
	52.73	3.05	SANDSTONE/CONGLOMERATE: Top 0.23m medium-grained sand with all encompassing slump structure, bottom 0.36m finely conglomerate, rest coarse-to very coarse-grained sands, vaguely cross-bedded.
	53.91	1.18	CONGLOMERATE: finely pebbly with coarse sands, erosional at base.
	54.21	0.30	MUDSTONE: black, silty at base, structureless, gradational.
	55.15	0.94	SANDSTONE: light/medium-grey, fine-grained, ubiquitous small-scale cross-lamination; lower half with many parallel laminations with abundant Coaly inclusions and numerous muddy layers, calcareous, erosional.
	55.79	0.64	MUDSTONE: dark-grey, bottom 0.25m very silty and sporadically laminated, gradual.
	56.54 ·	0.75	SILTSTONE/MUDSTONE: medium-grey, top half very silty, lower half argillaceous siltstone, sporadically lamin- ated, bottom 4cm with rich deposit of pyrite and Coaly lens at base.
	57.91	1.37	MUDSTONE: dark-grey/black, bottom 0.28m carbonaceous.
	59.43	1.52	SILTSTONE: medium-grey, very muddy, 7cm very fine-grained sandstone, finely broken plant debris and some root-lets, bottom 0.23m very carbonaceous mudstone, black. 0.25m fractured zone, 0.35m from base.
	62.48	3.05	MUDSTONE: black, locally carbonaceous, root-lets, bottom 0.14m ferruginous zone.
	65.53	3.05	MUDSTONE: top 0.95m medium-grey muds locally with listric surfaces, followed by 0.52m carbonaceous sands (thin unit embodies 15cm of intraclastic mudstone intraclasts of black carbonaceous mudstone). Bottom 1.21 medium- grey root-let seaming.
	66.59	1.06	MUDSTONE: as above, slightly silty, somewhat less 'rooty
	67.63	1.04	SILTSTONE: medium-grey, slightly argillaceous, structure less, abrupt below.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCRIPTION .
	68.58	0.95	MUDSTONE: dark-grey, top half silty with a silty dyke.
	68.88	0.30	MUDSTONE: dark-grey, as above, gradational below.
	71.62	2.74	SANDSTONE: light/medium-grey, fine-to very fine-grained, much small-scale cross-lamination, ubiquitously slumped structures, some silty bands; local levels of tiny silty clasts, non-calcareous.
	72.02	0.40	SANDSTONE: identical to above, gradational at base.
	73.80	1.78	SANDSTONE: light-grey, medium-grained, very clean, stro- ngly cross-bedded, gradation from coarse-to medium-grain- ed sands, siliceous, gradational (coarsening) below.
·	74.68	0.88	CONGLOMERATE: dominantly quartzite, cherty grain and fine pebbles.
	77.72	3.04	CONGLOMERATE: top 1.53 dominantly medium-to fine-grained, clean sands with intermittant conglomerate zones, rest dominantly conglomerate, finely pebbly, Coaly inclusions.
	78.17	0.45	CONGLOMERATE: finely pebbly with abundant sandstone matrix.
	78.98	0.81	SANDSTONE: light-grey, fine/medium-grained, cross-laminate finely comminuted carbonaceous matrix, siliceous, eros-ional basal contact.
	79.56	0.58	SANDSTONE: medium-grey, top 9cm with pebbles, rest fine-grained, 5cm silty mudstone.
	79.95	0.39	SANDSTONE: medium-grey, very fine-grained, middle 0.09m silty, structureless, abrupt below.
	80.27	0.32	CONGLOMERATE: finely pebbly, dominantly dark pebbles, abrupt.
	80.77	0.50	SANDSTONE: light-grey, fine-grained, well-laminated, rusty clasts in top 0.12m.
5°	83.82	3.05	SANDSTONE (95%)/MUDSTONE (5%): light/medium-grey, top 0.55m fine/medium-grained, rest fine-grained sands, with layers of silty mudstone, erosional sand/mud boundaries.
	86.86	3.04	SAKDSTONE: light-grey, fine-grained, very uniform, clean well-laminated, cross-laminated, non-calcareous.
	88.06	1.20	SANDSTONE: identical to above.
	89.56	1.50	SANDSTONE: medium-grey, very fine-grained, 10cm silty/muddy zone, and 12cm muddy zone, abrupt below.

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Dip	DEPTH m	THICKNESS	DESCRIPTION
,		·	BOULDER CREEK HULLCROSS
	89.91	0.35	SANDSTONE (50%)/MUDSTONE (50%): light-grey, very fine- grained, well sorted finely laminated to low-angle cross- bed sandstone, often with sharply defined base and fining upward to mudstone. Black mudstone massive to burrowed. Also the two lithologies are occasionally intimately mixed.
	90.42	0.51	SANDSTONE (50%)/MUDSTONE (50%): weathered surface with iron staining.
	91.14	0.72	SANDSTONE (80%)/MUDSTONE (20%): fractured parallel to axis, weathered.
	91.91	0.77	MUDSTONE, SILTY/SANDSTONE: light-grey, very fine-grained sandstone intimately mixed with a medium/dark-grey silty mudstone usually heavily burrowed, occasionally the sandstone occurs as thin beds strongly defined at base but gradational at top, and are massive structure-less to cross-bedded (low-angle, small-size).
	92.96	1.05	MUDSTONE, SILTY/MIXED SANDSTONE: zone of highly broken up core often parallel to axis with weathered surfaces.
	96.01	3.05	MUDSTONE, SILTY/MIXED SANDSTONE: as above
	99.36	3.35	MUDSTONE: silty mixed with sandstone and zone of broken up core with weathered surfaces.
	100.18	0.82	MUDSTONE: silty mixed with sandstone, core broken up parallel to axis, weathered surface.
	100.74	0.56	MUDSTONE: as above
	102.10	1.36	SANDSTONE/MIXED SANDSTONE/MUDSTONE: light-grey, very fine-grained sandstone, thin bed cross-bedded (rippled) with sharp base grading up into mudstone. Intimately mixed sandstone (same lithology as above), and dark silty mudstone, heavily burrowed and bioturbated. Also black mudstone, sometimes slightly silty with occasional large size burrows, pyrite nodules occasionally seen.
	102.56	0.46	MIXED SANDSTONE/MUDSTONE (75%)/SANDSTONE (25%): one weathered surface
	103.08	0.52	MIXED SANDSTONE/MUD (85%)/SANDSTONE (15%): two weathered surfaces.

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Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	105.16	2.08	MIXED SANDSTONE/MUD (85%)/SANDSTONE (15%): gradational.
	106.83	1.67	MIXED SANDSTONE/MUDSTONE, BLACK (65%)/SANDSTONE (35%).
	108.20	1.37	MIXED SANDSTONE/MUDSTONE, BLACK (65%)/SANDSTONE (35%).
	108.73	0.53	MUDSTONE, BLACK (75%)/SANDSTONE (25%).
	109.22	0.49	MUDSTONE,BLACK (70%)/SANDSTONE (30%): fractured parallel to axis with weathered surface.
	111.25	2.03	MUDSTONE, BLACK (70%)/SANDSTONE (30%): same as above.
1	112.55	1.30	MUDSTONE, BLACK (75%)/SANDSTONE (25%).
	114.30	1.75	MIXED MUDSTONE/SANDSTONE (90%)/SANDSTONE (10%).
	115.10	0.80	MIXED MUDSTONE/SANDSTONE (85%)/SANDSTONE (15%).
	116.10	1.00	MUDSTONE, BLACK (70%)/SANDSTONE (30%): well defined beds at base.
	116.71	0.61	MUDSTONE, BLACK (70%)/SANDSTONE (30%): as above, core split parallel to axis and weathered.
	117.35	0.64	MUDSTONE, BLACK (60%)/SANDSTONE (40%).
	119.72	2.37	MUDSTONE, BLACK (65%)/SANDSTONE (35%): one listric surface.
	120.40	0.68	MUDSTONE, BLACK (60%)/SANDSTONE (40%).
	122.08	1.68	MUDSTONE, BLACK (40%)/SANDSTONE (60%).
	123.44	1.36	MUDSTONE/SANDSTONE: mixed, gradational
	123.93	0.49	MUDSTONE, BLACK MIXED/SANDSTONE
	124.13	0.20	BENTONITE.
	126.49	2.36	MUDSTONE, BLACK (85%)/SANDSTONE (15%): sandstone contact increases down section.
	129.54	3.05	MUDSTONE, BLACK (60%)/SANDSTONE (40%).
The state of the s	132.58	3.04	MUDSTONE, BLACK (60%)/SANDSTONE (40%): sandstone also present as thin wisps.
	135.63	3.05	MUDSTONE, BLACK (65%)/SANDSTONE (35%).
	137.05	1.42	MUDSTONE, BLACK (60%)/SANDSTONE (40%): core badly broken up and carbonaceous, Coaly inclusions.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	137.15	0.10	MUDSTONE, BLACK (60%)/SANDSTONE (40%): same as above.
	138.0	0.85	MUDSTONE (60%)/SANDSTONE (40%).
	138.03	0.03	BENTONITE.
	138.68	0.65	MUDSTONE (60%)/SANDSTONE (40%).
	141.73	3.05	MUDSTONE (60%)/SANDSTONE (40%): becoming mixed with sand intimately near bottom (1.50m), gradational below.
	143.58	1.85	MUDSTONE (60%)/SANDSTONE (40%).
	144.78	1.20	MUDSTONE (60%)/SANDSTONE (40%): as above with zone of highly broken up core with calcite veining and slickensided surface.
	146.35	1.57	SANDSTONE/MUDSTONE: mixed.
<u> </u> 	147.83	1.48	MIXED SANDSTONE/MUD (70%)/SANDSTONE (30%).
	150.88	3.05	MUDSTONE (60%)/SANDSTONE (40%).
	153.92	3.04	MUDSTONE (40%)/SANDSTONE (60%): with occasional mixed sandstone/mud bed.
	156.97	3.05	MUDSTONE (40%)/SANDSTONE (60%): increasing mudstone near base of unit, sand occurs as thin wisps, poorly defined.
	160.02	3.05	MUDSTONE (50%)/SANDSTONE (50%).
	163.07	3.05	MUDSTONE (45%)/SANDSTONE (55%).
	166.11	3.0 ⁴	MUDSTONE (30%)/SANDSTONE (70%): grading to 50% each, sandstone interbeds well defined.
	169.16	3.05	MUDSTONE (70%)/SANDSTONE (30%).
	171.29	2.13	MUDSTONE (80%)/SANDSTONE (20%).
	171.71	0.42	CLAY: band, broken up near top.
	172.21	0.50	MUDSTONE (85%)/SANDSTONE (15%).
	173.55	1.34	MUDSTONE (85%)/SANDSTONE (15%). core broken up.
	173.61	0.06	MUDSTONE (85%)/SANDSTONE (15%): as above, brecciated zone with calcite.
	175.26	1.65	MUDSTONE (85%)/SANDSTONE (15%).

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
o ·	m	m .	
,	178.30	3.04	MUDSTONE (80%)/SANDSTONE (20%).
	181.36	3.06	MUDSTONE (80%)/SANDSTONE (20%): gradational to sandstone
	183.22	1.86	MUDSTONE (40%)/SANDSTONE (60%).
	183.28	0.06	ZONE of thin COALY layers, 5mm thick.
	184.40	1.12	MUDSTONE (35%)/SANDSTONE (65%).
	187.45	3.05	SANDSTONE: predominantly in rest of section, usually finely laminated often low-angle, small-size cross-beds up to .08m thick but also small ripples separated from each other by muddy intervals.
	190.50	3.05	SANDSTONE (75%)/MUDSTONE (25%): with large size burrows.
			HULLCROSS
			GATES
	191.26	0.76	SANDSTONE/SILTSTONE/MUDSTONE: interbedded sequence of very fine-grained sands, well-laminated and cross-laminated (small-scale) siltstone and dark mudstone, erosional boundaries.
	191.45	0.19	CONGLOMERATE: predominance of chert pebbles, commonly between 15-25mm across, gritty/granular material in matrix, rare abundance of sparry calcite as cement, abrupt.
	193.21	1.76	SANDSTONE: medium-grey, fine-to very fine-grained, silty, muddy layers, disturbed lamination, some burrowing, highly scoured at base.
	193.50	0.29	MUDSTONE: black, abundant rusty pyrite patches (calcareous
	195.65	2.15	MUDSTONE: dark-grey/black, somewhat silty, abundant pyrite: as finely disseminated and as blobs on layers, non-calcareous, carbonaceous at base.
	196.18	0.53	COAL SEAM: mostly dull with sub-metallic lustre appears low ash, fragmented at basal contact.
	196.60	0.42	MUDSTONE: Black, carbonaceous, fragmented.
	197.00	0.40	MUDSTONE: medium-grey, very silty, abrupt below.
	197.25	0.25	SANDSTONE: light-grey, very fine-grained, ubiquitous small-scale, cross-lamination, calcareous, scoured at base

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
o o	m	រា	
-	198.07	0.82	MUDSTONE: dark-grey, very silty top half, bottom 0.15m carbonaceous, gradational to Coal below.
	198.42	0.35	COAL SEAM: fragmented, almost entirely dull Coal.
	198.87	0.45	MUDSTONE: dark-grey, silty, structureless, very gradual at base.
	199.34	0.47	SILTSTONE: medium-grey, locally very argillaceous with stringers of very fine sands, delicate ripples, calcarecous, erosional at base.
	199.41	0.07	COAL: dull, top and bottom not defined (broken).
	202.69	3.28	MUDSTONE/SILTSTONE: dominantly dark-grey, top half essentially silty mudstone, rest siltstone, argillaceous and somewhat sandy, locally laminated, silty zones, calcareous, abupt.
	202.96	0.27	SANDSTONE: light-grey, fine-grained, small-scale cross- lamination inter-laminae carbonaceous matter, sporadic burrowing, calcareous, abrupt below.
	205.66	2.70	SANDSTONE: light-grey, medium-grained, ubiquitous small- scale cross-lamination, tiny Coal inclusions, locally grading to fine/medium sands, feebly calcareous, very abrupt below.
	205.74	0.08	COAL SEAM: top 0.05m dull with metallic lustre, rest dull and bright.
	205.82	0.08	COAL: dull banded and some bright.
	205.88	0.06	COAL: dull banded
	205.96	0.08	COAL: dull and bright
	206.02	0.06	COAL: dull banded
	206.04	0.02	COAL: dominantly dull
	207.26	1.22	MUDSTONE: top 0.72m dark-grey, very silty (bottom 0.14m of these with tiny scattered shells), rest broken up mudstone with thin sandy bands toward base, calcareous patchily.
100	208.03	0.77	SANDSTONE: medium-grey, very fine-grained, compactional features, middle 0.30m muddy siltstone, laminated, calcareous, gradual at base.
	209.30	1.27	MUDSTONE (60%)/SILTSTONE (40%): medium-to dark-grey, broken up interval, some vertical fracturing, locally

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
О	m	m	
			calcareous, gradual.
	210.31	1.01	SANDSTONE: medium-grey, top 0.42m richly calcareous silts locally burrowed, rest fine-grain highly calcareous sands with silty/muddy interbeds.
	210.39	0.08	SANDSTONE: as above, erosional at base.
	211.84	1.45	MUDSTONE: dark-grey, structureless, non-calcareous.
	212.80	0.96	SILTSTONE: medium-grey, very argillaceous, some very fine sands, very gradational at base.
	213.17	0.37	SANDSTONE: medium-grey, fine-grained, well laminated, very argillaceous in bottom 0.15m, erosional.
	214.53	1.36	SANDSTONE: light-grey, dominantly fine/medium-grained, some silty/muddy intervals in lower half, few silty clasts, strongly calcareous, erosional at base.
	214.88	0.35	MUDSTONE/SANDSTONE: medium-grey, middle 0.15m very fine- grained sand, rest silty mudstone.
	216.97	2.09	MUDSTONE: dark grey, slightly silty and carbonaceous, gradual.
	217.93	0.96	SILTSTONE: medium-grey, argillaceous, large-scale slump- ing, es pécially toward base (sandy).
10°	218.13	0.20	SANDSTONE: medium-grey, very fine-grained, silty and argillaceous layers, slumping, very gradational.
	218.63	0.50	MUDSTONE: dark-grey, slightly silty (homogeneously), gradual.
	220.03	1.40	SANDSTONE: light/medium-grey, very fine-grained, ubiquit- ous small-scale cross-lamination (now in certain zones partially modified and obliterated due to organic activi- ty),(frequent/muddy in bottom 0.35m with lenticular bedding, very gradational, strongly calcareous.
	220.98	0.95	MUDSTONE (70%)/SILTSTONE (30%): dark-grey, essentially mud with layers and lenticles of silty and very-fine sands (now partially bioturbated) rusty nodules (bottom end), increasingly sandy at base.
	222.91	1.93	SANDSTONE: medium/dark-grey, very argillaceous, fine- grain to very fine-grained, seems to have been deposited with small-scale cross-lamination but now not modified due to Bioturbation; sporadic large shells; bottom 0.03m Coquina (thick shells), matrix.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	223.16	0.25	MUDSTONE: dark-grey/black, top half very carbonaceous, shelly at base.
	224.03	0.87	SANDSTONE: medium-grey, very fine-grained, silty/muddy at top, somewhat disturbed lamination within, calcareous
	227.08	3.05	SANDSTONE: light-grey, fine/medium-grained, very clean and well-sorted, two thin silty bands, obscurely cross-bedded, calcareous.
	229.67	2.59	SANDSTONE: identical to above.
60.	231.77	2.10	SANDSTONE: light-grey, fine/medium-grained, locally interlaminated, carbonaceous matter (emphasing laminae), 4cm zone tiny silty intraclasts, cross-lamination, abrupbelow.
	232.56	0.79	SANDSTONE: medium-grey, fine-grained, laminated, some inter-laminae carbonaceous matter, few burrows.
Tabliki B	235.30	2.74	SANDSTONE: as above, many large vertical burrows, some of these by worms, others with 2cm wide cores centre structure; bottomward very fine sand, feebly calcareous.
	235.61	0.31	SILTSTONE: medium-grey, laminated, scoured at base.
50	237.96	2.35	SILTSTONE/MUDSTONE: medium to dark-grey, interbedded mudstone with some very fine-grained laminated sands (Sand/Mud boundaries erosional), abrupt below.
	238.66	0.70	SANDSTONE: light-grey, fine/medium-grained, top 0.23m well-laminated, rest sporadically laminated, 0.03m muddy intraclastic zone.
	240.53	1.87	SANDSTONE: similar to above, a good deal of burrowing locally.
	241.71	1.18	SANDSTONE: light-grey, fine-grained, local burrows, generally clean, strongly calcareous bottomward.
	243.06	1.35	SANDSTONE: light-grey, fine/medium-grained, sporadically laminated, very strongly calcareous (a very high percentage of detrital carbonates).
	245.06	2.00	SANDSTONE: light/medium-grey, fine-grained, character- ized by ubiquitous occurrence of large burrows (Gates type), and very disrupted lamination, some silty/muddy fracture intimately associated, very mildly calcareous
	248.41	3.35	SANDSTONE/MUDSTONE: top 1.20m similar to above, rest fine-grained sandstone with muddy interlaying (sharp erosional boundaries) well-laminated sequence with little or no burrowing.

- BH Nos. 18

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Dip	DEPTH	THICKNESS	DESCRIPTION
	m	i m	
	251.01	2.60	SANDSTONE (60%)/MUDSTONE (40%): rapidly interbedding, very fine-to fine-grained sandstone, well-laminated with mudstone. Sand/mud boundaries highly erosional, sporadic tiny muddy intraclasts, whole sequence reminiscent of intertidal sediments, local discrete burrowing, mostly non-calcareous.
	251.26	0.25	SANDSTONE: light/medium-grey, fine-grained, clean, muddy layers, calcareous, erosional at base.
	251.44	0.18	MUDSTONE/SILTSTONE: slight dominance of mudstone, lamin- ated.
	254.51	3.07	MUDSTONE (90%)/SILTSTONE (10%): dark-grey, widely-spaced silty intervals, pin prick burrows, non-calcareous.
	257.56	3.05	SANDSTONE/SILTSTONE: dominantly fine sandy, bioturbated lithology sukunkoid marker, 3cm ferruginous band, patchy calcareous.
	258.72	1.16	SANDSTONE/SILTSTONE: similar to above, bottom 0.15m slightly bioturbated.
	260.60	1.88	SANDSTONE: light-grey, fine-grained, very clean, lamin- ated, 0.18m mudstone, few burrows, non-calcareous, a large rusty nodule.
	262.49	1.89	SANDSTONE: light/medium-grey, fine-to very fine-grained, mottling due to bioturbation, some well-laminated intervals, non-calcareous.
	263.06	. 0.57	SANDSTONE/MUDSTONE: sand similar to above, interbedded with mud.4cm finely pebbly intraclastic zone in middle, abrupt below.
	263.30	0.24	CONGLOMERATE: middle part gritty, rest finely pebbly, abrupt.
	263.38	0.08	SANDSTONE: light-grey, very fine-grained, somewhat muddy abrupt.
	263.80	0.42	MUDSTONE: black, carbonaceous, thin Coaly layers.
			GATES 'E' COAL SEAMS
	264.47	0.67	MUDSTONE: dark-grey/black, carbonaceous, gradual to Coal below.
٠.	264.77	0.30	COAL SEAM: mixture of dull banded and dull and bright.
	266,65	1.83	MUDSTONE: black, slightly carbonaceous, structureless, gradational.

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Dip	DEPTH	THICKNESS	DESCRIPTION
C/	ın	m	
-	267.08	0.43	COAL: dominantly dull with a network of calcite veins.
	267. 53	0.45	MUDSTONE: dark-grey, without any structures, listric surfaces.
	267.98	0.45	MUDSTONE: black, highly carbonaceous with dirty Coaly intervals.
	268.44	0.46	MUDSTONE:/COAL: black, carbonaceous mud interbedded with Bony Coal.
	268.98	0.54	MUDSTONE: black, carbonaceous/COALY
	269.26	0.28	COAL: middle 0.13 carbonaceous Mudstone, rest bright banded and dull Coal.
	269.44	0.18	MUDSTONE: black, carbonaceous, gradual at base.
	270.04	0.60	COAL: top 2/3 dull Coal, rest Bony Coal at base.
	270.27	0.23	MUDSTONE: dark-grey, somewhat carbonaceous, gradual
	270.69	0.42	MUDSTONE: Top 0.32m black richly carbonaceous, and with partings of Bony Coal, rest somewhat silty mudstone at base, gradual to sandstone below.
	271.32	0.63	SANDSTONE: medium-grey, very fine-grained, laminated and small-scale cross-lamination, tiny Coal inclusions, argillaceous bottomward grading to silty mudstone, non-calcareous.
	271.75	0.43	MUDSTONE: dark-grey, very silty especially toward the base, abrupt.
	272.80	1.05	SANDSTONE: medium-grey, dominantly very fine-grained wit some fine sand intracalations, wavy irregular lamination microerosional features, few small burrows, calcareous.
	272.88	0.08	SANDSTONE: as above,very strongly calcareous, gradual to base.
	273.38	0.50	SILTSTONE: medium-grey, highly argillaceous, abundant slumped, lamination, strongly calcareous, very gradat-ional below.
	273.89	0.51	MUDSTONE: medium/dark-grey, somewhat banded, slumping features, silty laminae, Coal inclusion, patchy calcareous.
	274.46	0.57	SILTSTONE: medium-grey, sandy at top, interlaminae, carbonaceous matter, abundant slumped laminae, strongly calcareous.

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Dip	DEPTH	THICKNESS	DESCRIPTION
-	274.90	0.44	MUDSTONE: dark-grey, carbonaceous in top 0.06m, very
			silty towards base, sporadic lamination, gradual at base
	275.84	0.94	SANDSTONE (50%)/SILTSTONE (50%): medium-grey, very fine- grained sandstone, abundant slumping, argillaceous at base.
	276.36	0.52	SANDSTONE: medium-grey, very fine-grained, ripple lamin- ation, silty and argillaceous, strongly calcareous, gradual at base.
	278.89	2.53	MUDSTONE: black, homogeneously carbonaceous, structure- less, listric surfaces in basal 10cm.
	278.99	0.10	MUDSTONE: same as above, frequently with listric surfaces
	280.53	1.54	MUDSTONE: dark-grey, rusty patches, structureless, non- calcareous.
	281.18	0.65	SILTSTONE: medium-grey, ferruginous, ripples of coarse silts sporadically laminated, strongly calcareous, vertical fracture traversing length of unit.
<u>.</u> <u>.</u>	281.94	0.76	MUDSTONE: dark-grey, slightly silty, non-calcareous.
	282.80	0.86	MUDSTONE: identical to above.
			GATES 'D' COAL SEAM
	283.48	0.68	COAL SEAM: almost entire Coal interval uniformly dull Coal.
	283.98	0.50	SILTSTONE: dark-grey, very argillaceous, carbonized plant matter, non-calcareous, very gradational at base.
	284.59	0.61	SANDSTONE: medium-grey, very fine-grained, laminated, cross-taminated, some argillaceous laminae, erosional.
	284.99	0.40	MUDSTONE: dark-grey, silty, structureless.
	285.39	0.40	MUDSTONE: as above, increasingly silty bottom end, grad- ational.
	287.33	1.94	SANDSTONE/MUDSTONE: broadly interbedded, very fine-grained medium grey argillaceous sandstone and silty mudstone, usually abrupt, mutual boundaries, non-calcareous, very transitional.
	288.04	0.71	SANDSTONE: light/medium-grey, fine-grained, small-scale cross-lamination, abundant finely macerated carbonaceous matter(along laminae), some flowage of lamination, a Coaly inclusion, non-calcareous.

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	-
8 ⁰	288.83	0.79	SANDSTONE: top 0.33m very fine-grained to fine-grained dark-grey, banded sequence, passing below to light-grey, fine-grained sands with Coaly inclusions and locally tiny silty clasts, non-calcareous.
	289.01	0.18	CONGLOMERATE: finely pebbly, large muddy clasts and abundant fine/medium sandy matrix, erosional at base.
	289.99	0.98	S!LTSTONE: medium-grey, very argillaceous, very fine sand intervals.
	290.84	0.85	SANDSTONE: medium-grey, very fine-grained, argillaceous, clasts of silts, local small cross-lamination, non-calcareous.
	291.08	0.24	SANDSTONE: light-grey, fine-grained, clean, abundant silty clasts.
	294.13	3.05	CONGLOMERATE: Top 0.24m light-grey, fine-grained sands, rest finely pebbly chert/ quartzile conglomerate with abundant sandy matrix.
	297.18	3.05	CONGLOMERATE: coarser than above with little sandy matrix.
	300.05	2.87	CONGLOMERATE: identical to above, scoured at base.
	300.23	0.18	MUDSTONE: black, slightly carbonaceous, structureless.
	300.95	0.72	MUDSTONE: black, locally richly carbonaceous, depositionally disturbed Basal contact and characterized by occurrence of large quartz patches.
60	302.07	1.12	SANDSTONE: light/medium-grey, fine-grained with subord- inate amounts of very fine sand/silty intercalatous wavy-lamination, tiny carbonaceous inclusions, fully calcareous, very gradational at base.
	303.28	1.21	MUDSTONE: dark-grey, silty in top 0.35m with wisps of sand, rest with rusty patches.
	305.08	1.80	MUDSTONE: top 0.59m medium-grey, slightly silty, rest dark-grey, totally structureless mudstone, very gradual at base.
	305.71	0.63	MUDSTONE: black, predominantly canneloid muds, gradual.
	306.32	0.61	SILTSTONE: rusty looking, ubiquitous small-scale cross- lamination, very strongly calcareous (almost limestone), abrupt below
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BH Nos.18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	307.70	1.38	MUDSTONE: dark-grey/black, much of it canneloid, abrupt below.
	308.0	0.30	GATES 'C' COAL SEAM.
	309.22	1.22	SANDSTONE: light/medium-grey, medium-grained, mostly mottled and free of argillaceous matter, non-calcareous.
	312.42	3.20	SANDSTONE: as above, top 1.34m riddled with small burrow rest clean, well-sorted and cross-stratified sands.
	315.47	3.05	SANDSTONE: as above, local gradation into fine/medium-sand, 0.16m rusty, ferruginous sandstone (erosional bothends), bottom 0.89m with sporadic large burrows and two small pebbles.
	318.51	3.04	SANDSTONE: light-grey, medium-grained, very clean and well-sorted, top 0.55m with vague cross-lamination, rest dominantly devoid of it. Sandstone dominantly quartzose, non-calcareous.
	321.56	3.05	SANDSTONE: identical to above, devoid of lamination, a few small pebbly zones.
	324.61	3.05	SANDSTONE: as above, fine/medium-grained.
	327.66	3.05	SANDSTONE: identical to above, very clean well-sorted and uniform, essentially quartzose, bottom 0.50m with silty clasts, fine/medium-grained, abrupt below.
	327.81	0.15	MUDSTONE: dark-grey/black, conchoidal fracture, tubes of pyrite, few lenses of sandstone (very fine-grained) abrupt.
6°	328.67	0.86	SANDSTONE: light-grey, fine/medium-grained, clean, well- sorted, 0.07m of dark-grey mudstone with fine sand lenses cross-stratified, non-calcareous.
	328.84	0.17	MUDSTONE: rusty looking, highly ferruginous and heavy/ band, 0.05m sand lenticle, abrupt below.
	330.71	1.87	SANDSTONE: light-grey, fine/medium-grained, well-washed and sorted, feebly calcareous, generally devoid of bedding, brief intervals (2) of Coaly laminae.
	333.14	2.43	SANDSTONE: identical to above, lower half obscurely cross-laminated, abrupt basal contact.
	333.43	0.29	MUDSTONE: Black, richly pyritic (patches and lenticles) lenses of very fine sands exhibiting flowage, erosional at base.

BH Nos. 18

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Dip	DEPTH m	THICKNESS	DESCRIPTION
5°	333.76	0.33	SANDSTONE: top 0.13cm very fine-grained sands, with rare abundance of tiny Coaly inclusions, a large mudstone clast at base; rest fine-grained, well-laminated sands with interlaminae carbonaceous matter.
	334.72	0.96	SANDSTONE: Top 0.12m with abundant Coaly laminae (wavy parallel), rest clean, well-sorted sands, erosional below.
	335.69	0.97	SANDSTONE: light-grey, fine-to very fine-grained, wavy/ripple lamination, 0.13m dark mudstone, tiny muddy clasts abrupt basal contact.
	335.78	0.09	CONGLOMERATE: fine/medium pebbly conglomerate with gran- ular matrix, very clean abrupt contact.
	336.22	0.44	COAL: mixture of bright banded and dull and bright.
	337.42	1.20	SANDSTONE: top 0.20m argillaceous/carbonaceous siltstone, followed by 0.65m of very fine-grained sandstone, wavy/crinkley lamination and some root-lets (basal 0.12m muddy silty) rest fine-grained, well laminated sandstone gradational.
	338.27	0.85	MUDSTONE: dark-grey, irregular sandy layers (very fine sands) somewhat disturbed (syndepositional), abrupt.
	339.42	1.15	SANDSTONE: top 0.45m fine-grained, rest very fine-grain argillaceous/silty layers, somewhat disturbed, weakly calcareous.
	341.16	1.74	SILTSTONE: medium-grey, locally coarse-grained, many muddy layers imparting broad banded appearance, large types of very fine sandstone/coarse siltstone; passage below by interbedding.
	342.29	1.13	SANDSTONE: light/medium-grey, dominantly fine-grained, ubiquitous small-scale cross-lamination, some zones with wavy irregular lamination, some silty layers, feebly calcareous, gradual at base.
	344.38	2.09	SANDSTONE: light-grey, fine-grained, very clean, sorted, ubiquitous ripple-drift, cross-lamination, stresses of finely comminuted carbonaceous matter, feebly calcareous abrupt.
	344.48	0.10	SANDSTONE: dark-grey, very fine-grained or coarse silts, rich in fine carbonaceous admixture, highly erosional.
	345.11	0.63	SANDSTONE: as above, abundant silty elongate intraclasts 5cm channeled zone of gritstone (in sands), passage below by gradual appearance of grits and fine pebbles.

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DEPTH	THICKNESS	DESCRIPTION
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345.34	0.23	CONGLOMERATE: gritstone, finely pebbly conglomerates.
348.69	3.35	CONGLOMERATE: predominantly gritty, granular, odd pebbles.
349.76	1.07	CONGLOMERATE: as above, bottom 0.26m pebbly.
352.04	2.28	CONGLOMERATE: polymict pebbles of cherts, quartzite, metamorphies and pyroclastic rocks, one pebble little over 0.06m across, some granular matrix.
355.09	3.05	CONGLOMERATE: Top 1.07 mixture of very fine pebbles and gritty/granular lithologies, rest a mixture of very coarse-grained sandstone and gritstone, 0.20 sandstone medium-grained.
358.14	3.05	SANDSTONE: Top 0.41m and bottom 0.24m medium sands with abundant gritty zones, rest fine-grained very clean sand with sprinkling of coarse-grained sands, laminated and cross-laminated, occasional tiny pebbles, quartzose.
361.18	3.04	SANDSTONE: light-grey, fine-grained, very clean and extremely well-sorted, barely discernible cross-stratification; quartzose siliceous; top 0.19m with grains of coarse sands.
364.23	3.05	SANDSTONE: similar to above, two tiny rusty cherts; some burrows within bottom 0.40m.
367.28	3.05	SANDSTONE: as above, bottom 10 cm well-laminated.
369.48	2.20	SANDSTONE: light-grey, fine-grained, clean, sorted, one quartz nodule, a zone of elongate muddy clasts, 0.15m bioturbated zone; most of sequence devoid of lamination, abrupt below
369.78	0.30	MUDSTONE (50%)/SANDSTONE (50%): dark-grey mudstone inter- bedded with very fine-grained sands, laminated, passage below by interbedding.
370.33	0.55	GRITSTONE: well-sorted; O.13m very fine-grain sand.
370.53	0.20	GRITSTONE: as above; 25mm rusty band, contact defined Coaly inclusions.
372.57	2.04	SANDSTONE: light-grey, fine-grained, generally very clean and well-sorted; 0.38m partially bioturbated, vaguely cross-laminated, very tiny dense clasts within above bioturbated zone; a 0.05m muddy band 0.13m above base. Erosional contact.
	m 345.34 348.69 349.76 352.04 355.09 358.14 361.18 364.23 367.28 369.48 369.78	m m 345.34 0.23 348.69 3.35 349.76 1.07 352.04 2.28 355.09 3.05 361.18 3.04 364.23 3.05 367.28 3.05 369.48 2.20 369.78 0.30 370.33 0.55 370.53 0.20

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	DESCRIPTION
5°	373.38	0.81	MUDSTONE/SANDSTONE: top 0.40m predominantly dark-grey mudstone with lenses of very fine sands, followed by 0.17m of very fine sands with few muddy layers and locally burrowed. Rest at base mudstone and gritstone (erosional top and bottom Mud/granular).
	374.25	0.87	CONGLOMERATE: Top 0.35m essentially gritty, rest fine pebbles, conglomerate, clean and abrupt basal contact.
	376.42	2.17	SANDSTONE: light-grey, fine/medium-grained, regularly laminated (low-angle cross-lamination), very clean, well-sorted, strongly calcareous.
	379.47	3.05	SANDSTONE: similar to above.
	382.52	3.05	SANDSTONE: identical to above, bottom end lamination less well-defined, seems to incorporate low-angle cross-lamination.
	383.42	0.90	SANDSTONE: as above; middle 0.14m with muddy layers and burrowed, some erosional features, erosional.
5 ⁰	384.12	0.70	SANDSTONE (40%)/MUDSTONE (60%): broadly interbedded sequence of dark-grey mudstone and fine clean, laminated sandstone, erosional features; few burrows.
	385.09	0.97	SANDSTONE: light-grey, fine/medium-grained, strongly calcareous, bottom 0.32m bioturbated, erosional at base.
	385.57	0.48	MUDSTONE: dark-grey, sequence characterized by abundance of fine sandy lenses (erosional and scoured contacts), sporadic burrows, and somewhat slumped structures, larger sandy lenticles toward base.
	385.87	0.30	SANDSTONE/MUDSTONE: Top half with very large vertical burrows, bottom black mudstone with sand lenticles, gradual at base.
	388.62	2.75	SANDSTONE: light-grey, fine/medium-grain, regularly laminated, strongly calcareous; 0.13 muddy zone with tiny clasts.
3°	391.67	3.05	SANDSTONE: light-grey, fine-to medium-grained, regularly cross-bedded (low-angle), generally very clean and well-sorted. Bottom 0.36m with numerous mudstone layers (somewhat silty), some parallel lamination bottom end. Few intraclasts, calcareous throughout.
	391.91	0.24	SANDSTONE: similar to above, calcareous.
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BH Nos. 18

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			Contact of Gates/Sukunka up 0.98m above marker 394.71. SANDSTONE/MUDSTONE, sandstone light grey, very fine-to fine-grained, slightly calcareous, finely laminated, occasionally low-angle, small-scale cross-beds of massive burrowed (small-size with occasional large ones), bioturbated and slumped at black mudstone, massive to bioturbated (small-size) burrows, both lithologies are sometimes churned and intimately mixed together.
	394.71	2.80	SANDSTONE (65%)/MUDSTONE (35%).
	397.76	3.05	SANDSTONE (60%)/MUDSTONE (40%).
	401.47	3.71	SANDSTONE (65%)/MUDSTONE (35%).
	402.81	1.34	SANDSTONE (65%)/MUDSTONE (35%): as above, five zones of slickensided and listric surfaces spaced widely apart (up to 0.30m).
	403.86	1.05	SANDSTONE (70%)/MUDSTONE (30%): with occasional pyrite nodules.
			GATES
	404.07	0.21	SANDSTONE/MUDSTONE, SILTY: mudstone becoming slightly silty and dark grey.
	409.95	5.88	SANDSTONE (65%)/ MUDSTONE, SILTY (35%): bottom 2m have sandstone (40%)/mudstone (60%), one slickensided surface.
	410.57	0.62	MUDSTONE, SILTY (60%)/SANDSTONE (40%).
	410.84	0.27	MUDSTONE, SILTY (60%)/ SANDSTONE (40%): as above, core broken up with many listric surfaces.
	412.99	2.15	MUDSTONE, SILTY (50%)/SANDSTONE (50%).
	416.05	3.06	MUDSTONE, SILTY (45%)/SANDSTONE (55%).
	420.92	4.87	MUDSTONE, SILTY (50%)/SANDSTONE (50%): core occasionally broken up but no slickensided or listric surfaces. Sand content gradually decreases to silty mudstone (80%)/ sandstone (20%).

BH Nos. 18

Dip o	DEPTH	THICKNESS	DESCRIPTION
	111	tii	
	421.52	0.60	MUDSTONE, SILTY (05%)/SANDSTONE (15%): sandstone present as thin irregularly shaped wisps.
	421.54	0.02	CLAY: dark grey, non-consolidated.
<u> </u> - -	422.59	1.05	MUDSTONE, SILTY (90%)/SANDSTONE (10%)
	422.89	0.30	MUDSTONE, SILTY (95%)/SANDSTONE (5%): gradational increase in sand content.
	425.19	2.30	MUDSTONE, SILTY (60%)/SANDSTONE (40%): heavily burrowed and bioturbated.
			SANDSTONE/MUDSTONE, SILTY: light/medium grey, very fine- to fine-grained sandstone, slightly calcareous, mostly massive bioturbated, burrowed (small size), slumped to finely laminated and occasional cross-bedded with inter- beds usually of thin dark silty mudstone, often burrowed, boundaries between the laminated sands and the rest of the unit usually very sharp.
	428.24	3.05	SANDSTONE (90%)/ MUDSTONE, SILTY (10%).
	429.53	1.29	SANDSTONE (90%)/MUDSTONE, SILTY (10%).
	430.52	0.99	SANDSTONE (90%)/MUDSTONE, SILTY (10%): zone of slicken- sided and listric surfaces with calcite mineralization - four surfaces, .06 to .60m apart.
ļ	431.29	0.77	SANDSTONE (90%)/MUDSTONE, SILTY (10%).
	434,34	3.05	SANDSTONE (80%)/MUDSTONE, SILTY (20%): sandstone is mostly very fine-grained and massive bioturbated, burrowed.
	437.38	3.0 <i>4</i>	SANDSTONE (90%)/MUDSTONE, SILTY (10%).
	443.98	6.60	SANDSTONE (90%)/MUDSTONE, SILTY (10%): gradational.
			SANDSTONE/MUDSTONE, SILTY: very fine-grained sandstone and siltstone, silty mudstone becoming increasingly intimately muxed together and heavily bioturbated with occasional interbeds (sharp contacts) of laminated sandstone.
	445.49	1.51	SANDSTONE/MUDSTONE: silty, mixed, one slickenside surface
	446.23	0.74	SANDSTONE/MUDSTONE: silty, mixed.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	449.58	3.35	SANDSTONE/MUDSTONE: silty, mixed.
	452.62	3.04	SANDSTONE/MUDSTONE: silty, mixed.
	455.67	3.05	SANDSTONE/MUDSTONE: silty, mixed.
-	456.89	1.22	SANDSTONE/MUDSTONE: silty, mixed, medium-grained sand- stone increases downward, appears as isolated grains scattered, culminates in a thin bed at the base of this unit (medium-grained, light grey, sandstone).
			SANDSTONE/MUDSTONE: slightly silty mudstone. Light grey, very fine-to fine-grained sandstone, finely laminated with some low-angle cross-beds, occasionally burrowed (large-scale) and slumped with sharply contrasted black mudstone beds, sometimes silty, often burrowed (small-scale, occasionally both lithologies sandstone/mud are intimately mixed together.
	458.72	1.83	SANDSTONE (50%)/MUDSTONE (50%).
	461.46	2.74	SANDSTONE (85%)/MUDSTONE (15%).
	464.51	3.05	SANDSTONE (85%)/MUDSTONE (15%).
·	467.86	3 . 35	SANDSTONE (90%)/MUDSTONE (10%).
	470.91	3.05	SANDSTONE (80%)/MUDSTONE (20%): with occasional pyrite nodules.
	473.96	3.05	SANDSTONE (75%)/MUDSTONE (25%).
	476.40	2.44	SANDSTONE (60%)/MUDSTONE (40%).
	479.45	3.05	SANDSTONE (50%)/MUDSTONE (50%).
20	482.80	3.35	SANDSTONE (45%)/MUDSTONE (55%).
	485.58	2.78	MUDSTONE (65%)/SANDSTONE (35%).
	488.89	3.31	MUDSTONE (70%)/SANDSTONE (30%).
	489.57	0.68	MUDSOTNE (70%)/SANDSTONE (30%).
	489.75	0.13	MUDSTONE (70%)/SANDSTONE (30%): broken up core parallel to axis, traces of weathering.
	492.25	2.50	MUDSTONE (75%)/SANDSTONE (25%).
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Dip	DEPTH	THICKNESS	DESCRIPTION
	ın	m	
	493.20	0.95	MUDSTONE (70%)/SANDSTONE (25%).
	493.25	0.05	MUDSTONE (75%)/SANDSTONE (25%): two listric surfaces .05m apart.
	495.30	2.05	MUDSTONE (70%)/SANDSTONE (30%).
	497.68	2.38	MUDSTONE (80%)/SANDSTONE (20%): one slickensided surface.
	498.34	0.66	MUDSTONE (80%)/SANDSTONE (20%).
	501.40	3.06	MUDSTONE (95%)/SANDSTONE (5%): with occasional pyrite nodules.
	503.30	1.90	MUDSTONE (80%)/SANDSTONE (20%): one listric surface.
	504.44	1.14	MUDSTONE (80%)/SANDSTONE (20%).
	507.49	3.05	MUDSTONE (90%)/SANDSTONE (10%): number of burrows gradually decreasing.
	510.54	3.05	MUDSTONE (95%)/SANDSTONE (5%).
	513.58	3.04	MUDSTONE (95%)/SANDSTONE (5%).
	516.63	3.05	MUDSTONE (95%)/SANDSTONE (5%).
te:	519.68	3.05	MUDSTONE (96%)/SANDSTONE (4%).
	521.20	1.52	MUDSTONE (98%)/SANDSTONE (2%): calcareous silt within mudstone.
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			MOOSEBAR
	524.25	3.05	MUDSTONE: black, with occasional pyrite and ferruginous nodule, four listric surfaces near bottom of section, .05m15m apart.
	525.78	1.53	MUDSTONE: black, zone of badly broken up core and listric slickensided surfaces (9).
	526.31	0.53	MUDSTONE: five listric surfaces a few cm apart, core not shattered.
	527.30	0.99	MUDSTONE: black
	529.25	1.95	MUDSTONE: black, nine surfaces with listric features, two zones (small) slightly broken up.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	531.87	2.62	MUDSTONE: Black
	533.87	2.00	MUDSTONE: black, 1 thin highly sheared up zone (.01m)
	534.61	0.74	MUDSTONE: black as above
	537.70	3.09	MUDSTONE: Black, small gouge zone at 535.36 - 15°.
	538.90	1.20	MUDSTONE: Black as above, small gouge zone at 538.70 - 20°.
	541.00	2.10	MUDSTONE: Black, as above, shearer zone from 538.90 to 539.80 listric surfaces angles 5° to 20°.
	544.07	3.07	MUDSTONE: Black as above, gastropod at 541.48 calcited.
	547.12	3.05	MUDSTONE: Black as above, bedding plane fracture at 544.17 - 60° to axis, listric surface at 544.20 - 30° to axis.
	550.16	3.04	MUDSTONE: Black as above.
	553.21	3.05	MUDSTONE: Black as above, gouge at 550.56 and listric surfaces.
	556.26	3.05	MUDSTONE: Black as above, calcified fracture at 553.21 - 80° to axis; calcified fracture at 554.7 - 80° to axis; calcified fracture at 556.26 - 80° to axis with broken zone.
	559.30	3.04	MUDSTONE: black, faintly banded possible ferruginous infilling along bedding planes.
	562.36	3.06	MUDSTONE: Black larger ferruginous bands.
	568.45	6.09	MUDSTONE: Black as above, minor ferruginous bands, calcareous fractures from 566.1 to 566.9 at 20° to axis.
	571.50	3.05	MUDSTONE: Black, vertical fracture from 568.8 to 569.7m listric surface at 569.8m - 20°; numerous bedding fractures at 70°; listric surface at 570.66m - 15°; gouge zone from 570.9 to 571.74, numerous calcite vein-lets, fractures at 572.1 to 572.8 - 40°.
	572.37	0.87	MUDSTONE: Black.
	575.20	2.83	MUDSTONE: Black, zone of slickensided and listric surfaces (18), .05m to .25m apart with associated calcite mineraliz
	575.30	0.10	MUDSTONE: Black, highly sheared and broken up zone, brecciated with calcite mineralization and listric surfaces.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	576.50	1.20	MUDSTONE: Black.
	577.60	1.10	MUDSTONE: Black, zone of slickensided and listric surfaces (6), 0.10 to .35m apart.
	580.64	3.04	MUDSTONE: Black, with occasional listric surfaces (3).
	583.69	3.05	MUDSTONE: Black, with one listric surface at 1.33m from top.
	586.74	3.05	MUDSTONE: Black, zone of broken up core with five listric surfaces with calcite mineralization.
	589.79	3.05	MUDSTONE: Black, with occasional ferruginous connections, 7 individual listric and slickensided surfaces .08m to .35m apart.
	592.84	3.05	MUDSTONE: Black, 9 individual listric surfaces 0.05 to 0.09m apart.
	593.73	0.89	MUDSTONE: Black
	594.95	1.22	MUDSTONE: Black, 3 slickensided surfaces.
	595.88	0.93	MUDSTONE: black.
	596.57	0.69	MUDSTONE: Black
	598.95	2.38	MUDSTONE: Black with 8 listric surfaces and calcite'm, 0.10 to 0.45m apart.
	600.08	1.13	MUDSTONE: Black.
	600.22	0.14	BENTONITE: Layer, burrowed.
	600.70	. 0.48	MUDSTONE: Black, 3 listric surfaces +.05m of section, highly sheared up.
	600.78	0.08	BENTONITE: layer.
	601.98	1.20	MUDSTONE: Black.
	603.50	1.52	MUDSTONE: Black, with two listric surfaces
	605.30	1.80 ,	MUDSTONE: Black.
	605.73	0.43	MUDSTONE: Black
	605.82	0.09	BENTONITE: layer, highly broken up
	606.55	0.73	MUDSTONE: Black.

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Dip	DEPTH m	THICKNESS	DESCRIPTION .
	608.08	1.53	MUDSTONE: Black.
	609.80	1.72	MUDSTONE: Black with 3 individual listric surfaces.
	611.18	1.38	MUDSTONE: Black, with zone of slickensided and listric surfaces - 0.09m apart.
	612.34	1.16	MUDSTONE: Black, with zone of slickensided and listric surfaces (6) .04 to .10m apart.
	612.39	0.05	MUDSTONE: Black
	612.41	0.02	BENTONITE: layer.
	612.76	0.35	MUDSTONE: Black.
	613.86	1.10	MUDSTONE: Black, highly sheared up zone with many listric and slickensided surfaces with calcite mineralization.
	615.39	1.53	MUDSTONE: Black, broken up zone with many listric and slickensided surfaces with calcite mineralization, .02 to .15m apart.
	617.22	1.83	MUDSTONE: Black, core broken up, zone of slickensided surfaces, 6 individual ones 0.10 to 0.20m apart.
	618.17	0.95	MUDSTONE: Black; with listric and slickensided surfaces 0.20 - 0.30m apart, calcite veining.
	618.26	0.09	MUDSTONE: Black, zone of highly broken up core with listric and slickensided surfaces.
	618.74	0.43	MUDSTONE: Black, with 2 listric surfaces.
	619.76	1.02	MUDSTONE: Black, with occasional listric surfaces (2).
	620.01	0.25	MUDSTONE: Black, core broken up with listric and slicken- sided surfaces.
	620.26	0.25	MUDSTONE: Black.
}	620.92	0.66	MUDSTONE: Black and ferruginous.
	621.17	0.25	MUDSTONE: Black, with two slickensided surfaces.
	621.79	0.62	MUDSTONE: Black.
	622.58	0.79	MUDSTONE: Black.
	622.61	0.03	BENTONITE: layer
	623.31	0.70	MUDSTONE: Black

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	624.84	1.53.	MUDSTONE: Black
	625.80	0.96	MUDSTONE: Black
	630.39	4.59	MISSING: probably not logged.
	630.43	0.04	CLAYSTONE: light-grey, white, bentonitic.
	630.94	0.51	MUDSTONE: dark-grey, pyritic worm burrows, bedding not observed, Moosebar formation.
	631.02	0.08	CLAYSTONE: as above
	631.76	0.74	SANDSTONE: dark-grey/green, glauconitic, pyritic worm burrows throughout, extensive bioturbation, pyrite inclusions at base. TOP OF BIRD SEAM.
1	631.79	0.03	CORE LOSS-COAL.
	631.83	0.04	COAL: dull banded, stick
	631.86	0.03	COAL: bright, stick
	631.88	0.02	COAL: bright banded, stick
	631.92	0.04	COAL: dull and bright, stick
	631.98	0.06	COAL: dull banded, stick
	632.10	0.12	COAL: dull, stick
	632.12	0.02	COAL: bright, stick.
	632.19	0.07	COAL: dull and bright, stick
	632.25	0.06	COAL: dull banded, stick
	632.26	0.01	COAL: bright, stick
	632.29	0.03	COAL: dull and bright, stick
	632.32	0.03	COAL: bright, stick
	632.37	ر0.0	COAL: dull banded, stick
	632.43	0.06	COAL: bright, stick
	632.47	0.04	COAL: bright banded, stick
	632.54	0.07	COAL: dull and bright, stick
	632.57	0.03	COAL: dull banded, stick

BH Nos. 18 .

Dip	DEPTH	THICKNESS	DESCRIPTION
0	· m	, 111	
	632.64	0.07	COAL: dull, stick, sheared.
	632.70	0.06	COAL: dull and bright, stick
	632.78	0.08	COAL: dull banded, sheared, large pieces.
	632.88	0.10	CLAYSTONE: carbonaceous.
	632.97	0.09	COAL: dull and bright, sheared fragmented.
	633.01	0.04	COAL: dull, sheared, fragmented.
	633.09	0.08	COAL: dull and bright, stick
	633.12	0.03	COAL: dull banded, stick
	633.14	0.02	COAL: dull, stick
	633.17	0.03	COAL: dull, stick
	633.21	0.04	COAL: dull banded, stick
	633.29	0.08	COAL: dull, stick
	633.30	0.01	COAL: bright, stick
	633.33	0.03	COAL: dull banded.
	633.37	0.04	COAL: dull and bright, stick
	633.41	0.04	COAL: bright banded, stick
	633.51	0.10	COAL: dull and bright, stick
	633.57	0.06	COAL: dull banded, stick
	633.59	0.02	COAL: bright, stick
	633.68	0.09	COAL: dull and bright, stick
	633.69	0.01	COAL: bright, stick
	633.71	0.02	COAL: dull and bright, stick
	633.73	0.02	COAL: bright, stick
	633.87	0.14	COAL: dull and bright, stick
	633.92	0.05	COAL: dull banded, stick
	633.95	0.03	COAL: dull and bright, stick

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
О	ta	m	
	634.04	0.09	COAL: dull banded, stick
	634.06	0.02	COAL: bright, stick
	634.07	0.01	COAL: bright, stick
	634.10	0.03	COAL: dull banded, stick
	634.14	0.04	CORE LOSS-COAL: BASE OF BIRD SEAM
	634.34	0.20	SANDSTONE: light-grey, medium-grained, mottled, worm burrows.
	634.52	0.18	SANDSTONE: light-grey, medium-grained, mottled, burrows.
	635.45	0.93	BEDDING obliterated by burrowing. Mottled from 1.50m to 3.50m from top.
	638.56	3.11	BEDDING as above
	639.90	1.34	SANDSTONE: medium-grained, light-grey, phases of scatter- ed fine carbonaceous mudstone interbeds, large light coloured worm burrows.
	640.08	0.18	SANDSTONE: fine-grained, light-grey, very clean.
	648.92	8.84	SANDSTONE: as above
	649.22	0.30	SANDSTONE: medium-grained, light-grey, abundant large Coaly inclusions and phases of carbonaceous claystone interbeds, extensive bioturbation.
	650.18	0.96	SANDSTONE: as above, small-scale cross-bedding towards top.
	650.24	0.06	MUDSTONE: Black, carbonaceous, plant remains, bright Coal bands.
	650.55	0.31	MUDSTONE: as above
	650.75	0.20	SILTSTONE: grey with fragment phases of fine-grained, light-grey sandstone, phases of root-lets.
	652.27	1.52	SILTSTONE: as above, bioturbation, bedding poorly devel- oped.
	653.80	1.53	SILTSTONE: as above.
	653.87	0.07	SILTSTONE: as above
	654.19	0.32	SANDSTONE: light-grey, fine-grained, small-scale cross- bedding and Coaly partings on bedding.

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	654.24	0.05	SILTSTONE: grey with frequent interbeds of dark-grey mudstone, bioturbation at base.
	655.25	1.01	SILTSTONE: as above.
	655.32	0.07	SANDSTONE: light-grey, fine-grained, small-scale cross- bedding phases of carbonaceous mudstone interbeds.
	656.19	0.87	SANDSTONE: as above
	656.34	0.15	SILTSTONE: dark-grey, sandstone interbeds at base.
	656.84	0.50	SILTSTONE: as above
	657.31	0.47	SILTSTONE: as above
	657.62	0.31	CLAYSTONE: dark-grey, carbonaceous at base.
	658.37	0.75	SANDSTONE: light-grey, medium-grained interbedded with irregular bedded carbonaceous mudstone.
	658.56	0.19	SANDSTONE: as above
	658.72	0.16	MUDSTONE: carbonaceous, black, with interbeds of grey siltstone and abundant shelly fossils.
	659.21	0.49	CORE LOSS-COAL.
	659.28	0.07	COAL: dull, stick
	659.43	0.15	COAL: dull and bright, stick
	659.46	0.03	COAL: dull, stick
	659.55	0.09	CORE LOS:-COAL .
	660.32	0.77	CLAYSTONE: carbonaceous, black frequent bright Coal bands
	660.37	0.05	CLAYSTONE: as above.
	660.48	0.11	SANDSTONE: fine-grained, light-grey, small-scale, cross bedding.
	660.97	0.49	SANDSTONE: as above.
	661.42	0.45	STLTSTONE: grey with frequent interbeds of dark-grey mudstone.
	662.54	1.12	SILTSTONE: as above
	662.94	0.40	SILTSTONE: as above

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	រា	
	663.04	0.10	SILTSTONE: as above
	663.54	0.50	SANDSTONE: medium-grained, light-grey, small-scale cross-bedding.
	664.46	0.92	LAMINITE: thin bedded, regular bedded, dark-grey clay- stone and grey siltstone, sandstone interbedded at top.
	664.79	0.33	LAMINITE: as above
	665.85	1.06	LAMINITE: as above
·	665.99	0.14	MUDSTONE: dark-grey, carbonaceous at base.
	666.80	0.81	MUDSTONE: as above
	666.90	0.10	MUDSTONE: as above
	666.97	0.07	COAL: dull banded, stick
	667.01	0.04	COAL: dull, stick
	667.07	0.06	COAL: dull and bright, stick
	667.11	0.04	COAL: dull banded, stick
	667.20	0.09	COAL: dull and bright, stick
	667.29	0.09	COAL: dull, stick
	667.30	0.01	COAL: dull banded, stick
	667.34	0.04	CLAYSTONE: carbonaceous.
	667.51	0.17	SILTSTONE: grey, mudstone phases irregular bedding.
	668.01	0.50	SILTSTONE: as above
0°	668.42	0.41	SILTSTONE/MUDSTONE: interbedded.
	668.45	0.03	COAL: dull and bright, stick
	668.73	0.28	SILTSTONE/MUDSTONE: interbedded, calcite filled fractures on bedding.
	668.80	0.07	COAL: dull banded, sheared, fragmented.
	668.85	0.05	COAL: dull, sheared, fragmented.
	668.88	0.03	COAL: dull, large pieces.
	668.99	0.11	COAL: dull, large pieces.

BH Nos. 18

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
	669.06	0.07	COAL: dull, sheared, pieces
	670.09	1.03	CORE LOSS-COAL
	670.23	0.14	MUDSTONE: carbonaceous Coal bands.
	672.87	2.64	SANDSTONE: fine-grained, light-grey with frequent interbeds, phases of dark-grey mudstone, minor slumping.
	672.98	0.11	CORE LOSS-COAL.
	673.04	0.06	COAL: dull banded, stick
	673.09	0.05	COAL: bright banded, stick
	673.16	0.07	COAL: dull banded, stick
	673.26	0.10	COAL: dull and bright, stick
	673.31	υ.05	COAL: dull banded, stick
	673.37	0.06	COAL: dull, stick
	673.43	0.06	COAL: dull and bright, stick
	673.47	0.04	COAL: dull, stick
	673.53	0.06	COAL: dull banded, stick
	673.54	0.01	COAL: bright, stick
	673.59	0.05	COAL: dull, stick
	673.63	0.04	COAL: dull and bright, stick
	673.74	0.11	COAL: dull stick
	673.86	0.12	COAL: dull and bright, stick
	673.91	© 0.05	CONL: dull and bright, stick
	674.00	0.09	COAL: dull, stick
	674.04	0.04	COAL: dull and bright, stick
	674.07	0.03 /	COAL: bright, stick
	674.13	0.06	COAL: dull and bright, stick
	674.22	U.09	COAL: dull, stick
	674.32	0.10	COAL: dull banded, stick

BH Nos. 18

Dip O	DEPTH m	THICKNESS	DESCRIPTION
	674.39	0.07	COAL: dull, stick
	674.41	0.02	COAL: dull and bright, stick
	674.44	0.03	COAL: dull banded, large pieces
	674.50	0.06	CORE LOSS-COAL
	674.56	0.06	COAL: dull and bright, stick
	674.58	0.02	COAL: bright, stick
	674.66	0.08	COAL: dull, stick
	674.70	0.04	COAL: dull banded, stick
	674.75	0.05	COAL: dull, stick
	674.78	0.03	COAL: bright banded, stick
	674.83	0.05	COAL: dull and bright, stick
	674.84	0.01	COAL: bright, stick
	674.87	0.03	COAL: dull and bright, stick
	674.90	0.03	COAL: bright, stick
	674.95	0.05	COAL: dull and bright, stick
	675.02	0.07	COAL: dull, stick
	675.09	0.07	COAL: dull banded, stick
	675.13	0.04	COAL: dull and bright, stick
	675.16	0.03	COAL: dull, stick
	675.21	0.05	COAL: dull and bright, stick
	675.24	0.03	COAL: dull banded, stick
	675.33	0.09	COAL: dull and bright, stick
	675.39	0.06	COAL: dull, stick
	675.45	0.06	COAL: dull banded, fragmented.
	675.52	0.07	CORE LOSS-COAL
	675.56	0.04	COAL: bright, stick

BH No	s. 18		Page 35
Dip o	DEPTH m	THICKNESS m	
·	675.59	0.03	COAL: dull banded, stick
i	675.62	0.03	COAL: bright, stick
	675.65	0.03	COAL: bright banded, stick
	675.66	0.01	COAL: bony, stick
	675.72	0.06	COAL: dull and bright, stick
	675.78	0.06	COAL: dull, stick
	675.84	0.06	COAL: dull and bright, stick
	675.90	0.06	.COAL: duil, stick
	675.93	0.03	COAL: bright, stick
•	675.96	0.03	COAL: bright, stick
	676.02	0.06	COAL: bright banded, stick
	676.05	0.03	COAL: dull and bright, stick
	676.13	0.08	COAL: dull, sheared, stick
	676.44	0.31	CORE LOSS-COAL
2 [°]	677.20	0.76	SANDSTONE: medium-grained, light-grey, large worm burrows in lower 1 metre, carbonaceous at top, very competent.
	678.72	1.52	SANDSTONE: as above
	680.24	1.52	SANDSTONE: as above
	681.77	1.53	SANDSTONE: as above.
	·		* * * * *

PR- SUKUNKA 77(3)A

BP]9



Page 1

N

m

AREA

SUKUNKA

B. H. No. BP 19

Contractor: Tonto

Commenced:

Aug 17, 1977

Completed:

Sept 3, 1977

Co-ordinates: 6,113,456.61

592,586.80

Ε Surface Elevation: 1,597.66 m

Core Size:

Hole Angle:

HQ

See detail page la

Hole Azimuth:

Logged by:

Casing Left in Hole:

Depth

Geologist Mike DeMestre

22.60 161.51 372.40-607.71

Ali Chowdry Geoff Jordan

%RECOVERY

164.07-372.21 608.75-667.97

ELEVATION

Final Depth:

SEAMS

667.97

DEPTH

FORMATION/MEMBER	DEPTH	THICKNESS	ELEVATION
Boulder Creek	63.60	63.60	1,534.06
Hulcross	165.20	101.60	1,432.46
Gates	372.40	207.20	1,225.26
Sukunka	499.60	127.20	1,098.06
Moosebar	612.66	113.06	985.00
U. Gething	660.38	47.72	937.28

				
BIRD	616.88			980.78
CHAMBERLAIN	660.38	•		937.28
F.PR. F.PR. F.PR. F.PR	561.44 580.64 589.78–598.93		Slickensided Slickensided sheared broken Breccia (steep	dip)

THICKNESS

Sperry-Sun Survey

Date: 4th September 1977

Borehole: BP 19

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	<u>Tilt</u>	Tilt Direction
655m	5 ⁰ 15'	- N -
600m	5° -	N 3° W
550m	5° -	n 3° w
500m	5° -	- N -
450m	4 ⁰ 45'	- N =
400m	4° 45'	n 2° w
350m	4° 45'	n 2° w
300m	4° 30'	n 5° w
250m	4° 30'	n 5° w
200m	4° 15'	N 3° W
150m	3° 45'	n 5° w
100m	3° -	n 6° w
50m	2° 30'	N 8° W

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	22.69	22.69	TRICONED-NO CORE
	22.70	0.01	CONGLOMERATE, fragments of a pebble conglomerate
	22.86	0.16	MUDSTONE, dark grey, massive
			MUDSTONE, dark grey mudstone, massive with numerous inclusions of irregularly shaped bands and pods of brown mudstone sometimes silty and calcareous with occasional interbeds of light grey very fine-grained sandstone, calcareous, massive
	23.19	0.33	MUDSTONE
	23.79	0.60	MUDSTONE, silty, gradational
	24.35	0.56	MUDSTONE, silty with thin (0.01-0.05) siltstone and very fine-grained sand intervals
	24.43	0.08	SANDSTONE, salt and pepper fine-grained to medium-grained calcareous, poorly-sorted
	25.29	0.86	MUDSTONE, siltyriting
	25.90	0.61	MUDSTONE, black and brown
	28.93	3.03	MUDSTONE, black, core broken up, thin coaly layer
	29.07	0.14.	MUDSTONE, dark grey, highly broken up
	29.97	0.90	MUDSTONE, as above
	29.99	0.02	MUDSTONE, dark grey, sheared zone
	30.55	0.56	MUDSTONE, dark grey, occasionally broken up
	32.04	1.49	MUDSTONE, dark grey, numerous rootlets, becoming less abundant in the lower 0.30m
	32.65	0.61	MUDSTONE, dark grey, black with occasional thin coaly bands
	33.04.	0.39	SANDSTONE, light grey, very fine-grained, massive, poorly sorted with thin carbonaceous partings
	34.13.	1.09	MUDSTONE/SANDSTONE, 70:30, dark green mudstone with light grey sandstone intervals, gradational contacts
	35.05	0.92	MUDSTONE, dark grey, unconsolidated, very friable, broker
	35.66	0.61	MUDSTONE, dark grey, (bottom 0.15m broken up)
	38.10	2.44	MUDSTONE, dark grey/dark green, occasional carbonaceous inclusions
	39.54	1.44	MUDSTONE, dark grey/medium grey with numerous rootlets, core occasionally broken up.
	41.14	. 1.60	MUDSTONE, as above, no rootlets
	41.33	0.19	MUDSTONE, dark grey
	41.93	0.60	MUDSTONE, dark grey, silty, gradational
	42.46	0.53	SANDSTONE, light grey, very fine-grained, massive, poorly

BH No	05. 19	Y	T
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
 			sorted, with scattered carbonaceous inclusions and few thin coaly layers
	43.01	0.55	SANDSTONE, zone of slickensided and broken up core with weathered surfaces
	43.18	0.17	SANDSTONE, as above, no coals, gradational
	43.70	0.52	SANDSTONE, very light grey, fine-grained, moderatelý well- sorted, gradational:
	44.19	0.49	MUDSTONE, light grey with thin black muddy interbeds
	45.11	0.92	MUDSTONE, light/dark,grey, massive, core broken up top 0.19
	46.41	1.30	MUDSTONE, as above
	47.24	0.83	MUDSTONE, as above, core broken up with occasional slickens
	47.82	0.58	MUDSTONE, as above, top 0.05m broken up
	47.97	0.15	CONGLOMERATE, sub-angular to rounded pebbles, fining up, moderately well-sorted.
	48.52	0.55	MUDSTONE, dark grey with occasional sprinkling of fine- coarse grained sandstone, core broken panallel to its axis, weathered
	49.01	0.49	SANDSTONE, light grey, fine-grained, well-sorted with carbonaceous partings
	49.21	0.20	CONGLOMERATE, pebbly, sub-angular to rounded, moderately well-sorted
	49.65	0.44	SANDSTONE, as above, thin coaly layer
	49.90	0.25	SANDSTONE, medium grey, medium-grained to coarse-grained, slickenside with floating pebbles and coaly inclusions
	49.98	0.08	MUDSTONE, black
	50.17	0.19	CONGLOMERATE, pebbly with light grey, coarse-grained sand- stone matrix
	50.29	0.12	CONGLOMERATE/SANDSTONE, as above but bigger pebbles
	50.69	0.40	SANDSTONE, floating pebbles, very light grey, coarse- grained, poorly sorted with pebbles floating, grades down into a conglomerate, coarse pebbles, 5-10mm sub-angular to rounded, moderately well-sorted, sharp basal contact
* *	50.89	0.20	MUDSTONE, dark, core broken up extensively, few weathered surfaces
	51.69	0.80	CONGLOMERATE, very coarse pebbles, 5-14mm, sub-angular to rounded, poorly sorted
	51.94	0.25	SANDSTONE, light grey, very fine-to-fine-grained , fining upward; moderately well-sorted, massive with occasional thin pebble beds (.01m thick)
	52.29	0.35	SANDSTONE, core brokentparallel to axis, weathered

BH Nos.

	19		
Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	53.31	1.02	SANDSTONE, as above
	53.34	0.03	SANDSTONE, lithologically similar to above but getting horizontal lamination
	54.30	0.96	SANDSTONE, as above, last pebbly band
:	56.38	2.08	SANDSTONE, as above
	58.88	2.50	SANDSTONE, as above
	58.93	0.05	SANDSTONE, as above, thin zone, broken up and minor listric features
	59.43	0.50	SANDSTONE, as above
	61.91	2.48	SANDSTONE, as above, pyriternodules
	62.48	0.57	SANDSTONE, as above, gradational but rapid change
	63.18	0.70	SANDSTONE, is becoming increasingly muddier downsection (ie:more mudstone (black) partings), two listric surfaces 0.05m apart
	63.60	0.42	SANDSTONE/MUDSTONE, 70:40, silty, black, mudstone, massiv with light grey, very fine-grained to fine-grained sandstone, laminated when thick but usually as interbedde stringers and lenses
			BOULDER CREEKHULCROSS
	63.90	0.30	MUDSTONE/SANDSTONE, silty, 60:40
	63.93	0.03	MUDSTONE/SANDSTONE, two slickensides0.03m apart
	64.43	0.50	MUDSTONE/SANDSTONE, as above
	64.65	0.22	SANDSTONE, laminated
	65.45	0.80	SANDSTONE & MUDSTONE, lithologically same as above but intimately mixed and heavily disturbed, slumped, burrowed (large size), and occasionaly pyrite nodules scattered throughout,
	66.15	0.70	MUDSTONE, silty, occasional burrows, gradational
İ	67.45	1.30	MUDSTONE, silty
	69.05	1.60	MUDSTONE/SANDSTONE, silty, dark grey mudstone, locally bioturbated, burrowed with thin interbeds of light grey very fine-grained sandstone usually massive, often slumped and locally burrowed (medium size), to finely laminated, 60:40
1	69.45	0.40	MUDSTONE/SANDSTONE, silty, 65:35
	69.55	0.10	MUDSTONE/SANDSTONE, 65:35, silty, core shattered

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m _.	
	70.85	1.30	MUDSTONE/SANDSTONE, 55:45, silty, increasingly the sandston and silty mudstone become intimately mixed and locally burrowed heavily
	71.91	1.06	MUDSTONE/SANDSTONE, silty, 75:25
	73.24	1.33	MUDSTONE/SANDSTONE, silty, interbedded sequence described as above
	73.85	0.61	MUDSTONE/SANDSTONE MIX, numerous burrows
	75.55	1.70	MUDSTONE/SANDSTONE/MUDSTONE & SANDSTONE MIX, 20:20:60
	76.85	1.30	AS ABOVE
		7.5	MUDSTONE/SANDSTONE/MUDSTONE, SANDSTONE MIXED, dark grey silty mudstone with moderate burrowing (mostly small size interbedded with light grey very fine-grained sandstone, laminated and cross-laminated, also massive, the sandstone interbeds are characteristically thin, usually in the order of .0104m and occasionaly up to .08m, their boundaries with the mudstone are usually sharp, the two lithologies (sandstone and silty mudstone) also occur mixed intimately together and are characteristically heavily burrowed and slumped
	79.36	2.51	MUDSTONE/SANDSTONE/MIXED, silty, 15:15:70
	80.46	1.10	MUDSTONE/SANDSTONE/MIXED, silty, 10:20:70
	82.60	2.14	MUDSTONE/SANDSTONE/MIXED, silty, 30:25:50, gradational
•	83.51	0.91	MUDSTONE/SANDSTONE/MIXED, silty, 40:30:30, two listric surfaces 0.05m apart at top of section
	86.09	2.58	MUDSTONE/SANDSTONE/MIXED, 50:40:10, silty
	86.74	0.65	SANDSTONE/MUDSTONE, mixed, burrowed
	86.86	0.12	SANDSTONE/MUDSTONE, mixed
	89.14	2.28	MUDSTONE/SANDSTONE, mixed, silty, 45:50:5 to 60:40:0
•	89.27	0.13	CLAY BAND
	89.79	0.52	MUDSTONE/SANDSTONE/MIXED, 60:40:0, the mudstone is losing its silty character to black mudstone
	91.66	1.87	MUDSTONE/SANDSTONE, 65:35
	92.90	1.24	MUDSTONE/SANDSTONE, 65:35, core broken parallel to its a axis
	93.10	0.20	MUDSTONE/SANDSTONE, 55:45, core highly broken up, with listric and slickensided features
1	94.99	1.89	MUDSTONE/SANDSTONE, as above
ļ	95.49	0.50	MUDSTONE/SANDSTONE, core broken up (no fault)
	.95.95	0.46	MUDSTONE/SANDSTONE, gouge
	96.80	0.85	MUDSTONE, slightly silty, SANDSTONE, 65:45

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
٥	m	m	
20	97.22	0.42	MUDSTONE/SANDSTONE, as above
	97.69	0.47	MUDSTONE/SANDSTONE, slightly silty mudstone, 70:30
	97.84	0.15	CLAY BAND
	99.06	1.22	CLAY BAND
	100.13	1.07	MUDSTONE/SANDSTONE, silty mudstone, 75:25
	100.33	0.20	CLAY BAND
	101.60	1.27	MUDSTONE/SANDSTONE, as above
	102.10	0.50	MUDSTONE/SANDSTONE, minor zone of slickensided and listri surfaces (0.0515m apart)
	105.15	3.05	MUDSTONE/SANDSTONE, 65:35, silty mudstone
3°	108.20	3.05	MUDSTONE/SANDSTONE, 65:35, silty mudstone
	110.34	2.14	MUDSTONE/SANDSTONE, 70:30, silty mudstone
,	110.67	0.33	MUDSTONE/SANDSTONE, 70:30, silty mudstone, minor zone wit listric surfaces about 5 every .0508m;
,	111.25	0.58	MUDSTONE/SANDSTONE, as above
	112.70	1.45	MUDSTONE/SANDSTONE, silty mudstone, 70:30
	112.75	0.05	MUDSTONE/SANDSTONE, silty mudstone, 70:30, breccia with calcite cement
	114.30	1.55	SANDSTONE/MUDSTOŅE, as above
	117.34	3.04	MUDSTONE/SANDSTONE, silty mudstone, 75:25
	120.39	3.05	MUDSTONE/SANDSTONE, silty mudstone, 75:25
	123.44	3.05	MUDSTONE/SANDSTONE, 65:35, silty mudstone
	125.07	1.63	MUDSTONE/SANDSTONE, 65:35, silty mudstone
	125, 12	0.05	MUDSTONE/SANDSTONE, as above, two listric surfaces .05m apart, calcite coat on core
	126.49	1.36	MUDSTONE/SANDSTONE, as above
	128.39	1.90	MUDSTONE/SANDSTONE, silty mudstone gradually changes to a black mudstone, massive with very occasional small size burrows, sandstone stays the same, 60:40
	129.54	1.15	MUDSTONE/SANDSTONE, 70:30
	132.58	3.04	MUDSTONE/SANDSTONE, 70:30
	132.84	0.26	MUDSTONE/SANDSTONE, 75:25
	132.92	0.08	MUDSTONE/SANDSTONE, 75:25, core highly broken up with slickensided markings, gradational
	134.43	1.51	MUDSTONE/SANDSTONE, 35:65
	135.63	1.20	MUDSTONE/SANDSTONE, 50:50

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	-
3°	138.68	3.05	MUDSTONE/SANDSTONE, 45:55, the sandstone remains the same lithologically but it is now present in thicker interbeds (.0109m) and characteristically cross-bedded, low angle, small scale slumping and soft sediment deformation (ie: flame structure occurs occasionaly), gradational change from above units to the interbedded mudstone/
	11.1 72		sandstone described above MUDSTONE/SANDSTONE, 45:55 to mudstone/sandstone, 75:25
	141.73 144.48	3.05 2.75	MUDSTONE/SANDSTONE, 45:35 to industone/sandstone, 75:25
	144.78	0.30	CLAY, layers, highly broken up
	144.91	0.30	CLAY, broken
	146.75	1.84	MUDSTONE/SANDSTONE, 80:20
	146.78	0.03	MUDSTONE/SANDSTONE, 80:20, breccia? and calcite mineralization
	147.82	1.04	mudstone/sandstone, 80:20
}	150.87	3.05	MUDSTONE/SANDSTONE, 80:20
	151.97	1.10	MUDSTONE/SANDSTONE, 88:12
	152.07	0.10	MUDSTONE/SANDSTONE, 88:12, minor slickensided or broken core
	153.43	1.36	MUDSTONE/SANDSTONE, 88:12, two slickensided surfaces
	153.92	0.49	MUDSTONE/SANDSTONE, 88:12, broken up core with minor slickenside
<u> </u>	156.97	3.05	MUDSTONE/SANDSTONE, 80:20 to mud/sand 50:50
	160.02	3.05	SANDSTONE/MUDSTONE, sandstone lithologically similar to above but is laminated to cross-bedded (low angle, small scale) and sharp contacts between mudstone and sandstone
	161.15	1.13	MUD/SAND, 25:75
	161.30	0.15	MUD/SAND, 25:75
4°	161.51	0.21	SANDSTONE
			·

Dip	DEPTH m	THICKNESS	DESCRIPTION
5 ⁰	164.07	2.56	SANDSTONE/SILTSTONE/SHALE, Hulcross sequence of well- laminated and cross-laminated very fine-grained sands, silts and dark grey mudstones, brief gradations from sands to muds
	165.20	1.13	SANDSTONE/SILTSTONE/SHALE, identical to above, bottom 0.15m essentially fine-grained, well-laminated sandstones
			HULCROSS GATES
	165.57	0.17	SANDSTONE/conglomerate, fine to medium-grained sands with 0.06m muddy interval, basal 6cm conglomerate with large pebbles
4 ⁰	166.12	0.75	SILTSTONE/MUDSTONE, dark grey, somewhat banded, abundant disseminated pyrite (some blobs), calcareous, interbedded
	167.04	0.92	SANDSTONE/SILTSTONE, medium grey, dominantly very fine- grained sands imperceptibly passing to argillaceous siltstones, small scale cross-lamination, some of it slumped, strongly calcareous
	169.55	2.51	SANDSTONE, initial 0.74m very fine-grained, argillaceous, and silty local microerosional features, bottom 0.37m fine-grained, medium sands with abundant coaly inclusions rest fine-grained, light grey, clean sands with ripple lamination, strongly calcareous throughout, very abrupt below
	169.91	0.36	COAL SEAM, predominently dull, middle 0.08m dull banded, abrupt below
	170.03	0.12	SILTSTONE, medium grey, coarse-grained, highly argilla- ceous, tiny rootlets, crinkly laminated, listric surface at base, non calcareous
	170.11	0.08	SILTSTONE, identical to above, erosional below
	170.45	0.34	SILTSTONE/MUDSTONE, dark grey, interbedded, gradual below
	170.85	0.40	SANDSTONE, medium grey, very fine-grained, strongly calcareous
	171.15	0.30	MUDSTONE, dark grey, richly silty, calcareous, erosional at base
	172.94	1.79	SILTSTONE/SANDSTONE, medium grey, broadly interlayered very fine sands and silts, much slumping throughout, calcareous
	173.21	0.27	MUDSTONE/SILTSTONE, medium grey, dominantly muddy, calcars

Dip	DEPTH	THICKNESS	DESCRIPTION
0	· m	m	- -
	175.86	2.65	MUDSTONE, medium/dark grey, 0.21m very fine sandstone with ripple lamination, bottom 10cm carbonaceous muds, strongly calcareous throughout
	176.18	0.32	COAL SEAM, mostly broken up Coal, dull banded, some fusain streaks Coal, with sub metallic lustre, dull Coal, bright banded Coal, dull banded Coal, mostly dull Coal, dull banded
	176.38	0.20	MUDSTONE, black, very carbonaceous, locally coaly layers
	177.35	0.97	MUDSTONE, dark grey, locally richly silty, calcareous
:	178.69	1.34	MUDSTONE, initial 0.30m dark grey, rest richly calcareous
-	180.31	1.62	MUDSTONE, dark grey, local rusty patches, 0.12m weathered zones and slightly carbonaceous
	180.89	0.58	COAL SEAM, mostly fragmented Coal, shaly Coal, dull with metallic lustre Coal, dull banded, badly fragmented Coal, dull banded Coal, pulverized
	181.55	0.66	SILTSTONE, medium grey, very muddy, weakly calcareous
	182.57	1.02	SANDSTONE, light/medium grey, very fine-grained, vague small scale cross-lamination, locally argillaceous, strongly calcareous
	182.79	0.22	MUDSTONE, dark grey, slightly carbonaceous, gradational
	183.47	0.68	SANDSTONE, light grey, very fine-grained, ubiquitous small-scale cross-lamination, locally silty, calcareous, erosional
	184.48	1.01	MUDSTONE, dark grey, locally silty laminae, 0.12m very fine-grained, argillaceous sands and wavy irregular lamination, calcareous
	185.21	0.73	MUDSTONE, dark grey, top 2/3 strongly calcareous, very silty
	187.45	2.24	MUDSTONE, dark grey, shelly horizon, pelecypod, 2cm coquina zone
	187.69	0.24	SILTSTONE, dark grey, very argillaceous, erosional
	188.63	0.94	SANDSTONE, medium grey, very fine-grained, small cross- lamination, 0.20m argillaceous mudstone, tiny silty intraclastic zone, calcareous, some slumping
	190.50	1.87	MUDSTONE, dark grey, shelly in top 0.30m locally rusty, carbonaceous at base
	190.84	0.34	MUDSTONE, dark grey, richly silty, strongly calcareous, gradational

Dip	DEPTH	THICKNESS	DESCRIPTION
4-5 ⁰	192.69	1.85	SANDSTONE, light/medium grey, very fine-grained, intervals with delicate ripples and ripple drift cross-lamination, bottom 0.07m have fine parallel lamination, 0.30m in silty/muddy zone in middle, strongly calcareous passage below by interbedding
	193.32	0.63	SILTSTONE/MUDSTONE, medium grey, broadly interbedded dominantly muddy lower half, locally sandy and calcareous gradual at base
	193.54	0.22	SANDSTONE, medium grey, very fine-grained, argillaceous, tiny coaly inclusions, calcareous, laminated
	194.25	0.71	SANDSTONE, similar to above, few burrows, argillaceous layers, calcareous, interbedded below
	195.52	1.27	SILTSTONE/MUDSTONE, dark grey, frequently interlayered very fine-grained sands, well-laminated and argillaceous siltstone, locally rusty layers, the whole sequence characterized by churning (biological), non calcareous
	196.60	1.08	MUDSTONE, medium/dark grey, middle 0.20m very silty and calcareous, bottom half with coaly stringers, sporadic shells
`	196.85	0.25	MUDSTONE, dark grey, slightly silty, erosional at base
5°	198.63	1.78	SANDSTONE, top 0.94m fine to very fine-grained with argillaceous laminae, small-scale cross-lamination and 0.12 intraclastic zone at very top, rest very fine-grained sands and siltstones, interlayered, non calcareous, erosional at base
	199.64	1.01	SANDSTONE, light grey, fine/medium-grained, 0.15m sand zone with abundant carbonized plant debris, rest clean and sorted, local obscure lamination, calcareous
	201.02	1.38	SANDSTONE, similar to above, tiny coal inclusions in 0.12m zone, strongly calcareous, bottom 0.06m with muddy lenses and fine-grained, one fracture
	201.96	0.94	SANDSTONE, light grey, medium-grained, clean, cross- bedded, locally carbonized plant debris, calcareous, brownish lenses of claystone
	202.69	0.73	SANDSTONE, light/medium grey, fine-grained, characterized by ripple lamination with frequent inter-laminae, finely comminuted carbonaceous matter
	204.27	1.58	SANDSTONE, similar to above, 0.29m very strongly calcareous sand
	205.74	1.47	SANDSTONE, medium grey, very fine-grained, argillaceous, 0.28m fine-grained with many burrows and calcareous
	207.97	2.23	SANDSTONE, medium grey, very fine-grained, locally silty, large-scale slumping, ubiquitous finely comminated plant debris (carbonaceous), abrupt below

BH Nos. 19

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Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	208.79	0.82	SANDSTONE, light grey, top half broadly layered zones of very fine to fine sands, rest fine/medium-grained, strongly calcareous
	209.05	0.26	SANDSTONE, light grey, medium-grained, fine-grains of brown claystone, strongly calcareous, abrupt at base
	211.83	2.78	SANDSTONE, light/medium grey, predominantly fine-grained, 0.45m in aggregate, fine/medium-grained, sporadic lamination, but locally bioturbated, feebly calcareous
	212.10	0.27	SANDSTONE, bioturbated, very similar to above, (note this is not the zone to be equated with normal Sukunkoid zone)
	214.27	2.17	SANDSTONE, light grey, fine-grained, top 0.45m with four discrete burrowed zones (about 4cm each), rest very clean, sorted sands and regularly cross-laminated, feebly calcareous
	214.88	0.61	SANDSTONE, light/medium grey, rapidly interbedded sequence of very fine sand and fine sands, layers of dark muds, micro erosional features, some delicate rippling
5°	217.93	3.05	SANDSTONE, similar to above, locally burrowed (small), flame structures, few rusty patches, many muddy, silty intercalations, erosional boundaries, bottom 0.17m fine-grained, light grey sands and strongly calcareous
	220.24	2.31	SANDSTONE, interbedded sequence of fine sands and silty mudstone, with all the attendant features of above, locally strongly calcareous, erosional
	220.98	0.74	MUDSTONE, dark grey with regular silty/sandy lenses, bottom 0.17m with little or no silts, non calcareous
	222.78	1.80	MUDSTONE, dark grey with silty ripples, locally ferrugin- ous, many zones with pin prick burrows, very silty bottom end, gradual at base
	224.02	1.24	SILTSTONE/MUDSTONE, medium grey sequence of highly bioturbated silts and mudstones with locally layers of very fine-grained laminated sands, non calcareous, typical Sukunkoid horizon
	225.24	1.22	SANDSTONE, medium grey, silty/muddy, mostly bioturbated siltstone, 0.12m dark mudstone with pin prick burrows
	225.70	0.46	SANDSTONE, light grey, very fine-grained, very low angle cross-lamination to parallel lamination, large vertical burrows, non calcareous, erosional
	225.88	0.18	MUDSTONE, dark grey, rusty, locally silty, gradual at base
4 ^O	227.07	1.19	SAND\$TONE, very fine-grained, two 6cm muddy bands
	227.60	0.53	SANDSTONE, as above, 0.14m zone with muddy layers and sporadic burrows, feebly calcareous, erosional

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
O	m	m .	
<u> </u>	228.37	0.77	SANDSTONE/MUDSTONE, frequently interbedded very fine sands and dark grey mudstones with erosional mutual boundaries, some rippling,erosional
	228.82	0.45	SANDSTONE, light grey, fine-grained, generally very clean, bottom 0.13m with two gritty zones (less than 2cm together), gradual at base
5 ⁰	229.59	0.77	SANDSTONE, medium grey, very fine-grained, top 0.34m with thin silty/muddy layers, wavy, lenticular bedding, bottom 0.16m also similar with numerous pin prick burrows rest in middle, highly bioturbated sands with total obliteration of lamination, many large vertical burrows
	229.67	0.08	MUDSTONE, very hard ferruginous band, top and bottom not defined
	230.12	0.45	SILTSTONES, medium grey, very argillaceous, top half with a vertical burrow traversing entire length, tube 12mm across and half (top) filled with granules, rest fine sands and entirely impregnated with pyrite, lower half of unit also with large burrowing tubes
	233.17	3.05	MUDSTONES, medium/dark grey, much of sequence very silty, sporadic burrowing tubes and pyrite impregnated, non calcareous, structureless
	235.22	2.05	MUDSTONE, mostly dark grey, slightly carbonaceous in upper half, 0.06m very fine-grained, siliceous sandstone, slightly silty bottomward
	236.22	1.00	SILTSTONE/SANDSTONE, medium grey, argillaceous, irregular laminated, 0.15m sands, very fine-grained with flow structures locally burrowed and calcareous
	237.16	0.94	SILTSTONE/MUDSTONE, 30:70, medium grey, rusty nodules, gradual
	237.90	0.74	MUDSTONE, dark grey, sporadically carbonaceous, listric surface
	238.25	0.35	COAL, top half bone coal, rest dull banded coal
	239.27	1.02	MUDSTONE, dark grey, locally very carbonaceous
	240.37	1.10	SANDSTONE, medium grey, very fine-grained, large interval of argillaceous siltstones, ubiquitous small-scale cross-lamination, much burrowing, calcareous, gradational at base, top 5cm mudstone
	240.97	0.60	MUDSTONE, medium grey, locally very ferruginous, gradual at base
	241.73	0.76	SANDSTONE, medium grey, very fine-grained, laminated, silty/argillaceous, feebly calcareous, gradual at base
	242.32	0.59	SANDSTONE, light/medium grey, fine-grained, ripple and small-scale cross-lamination, lower half calcareous
	242.38	0.06	SANDSTONE, as above

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
٥	m	m	
	243.04	0.66	MUDSTONE, medium/dark grey, silty, calcareous, gradual
7°	243.26	0.22	SANDSTONE, medium grey, very fine-grained, laminated and cross-laminated, silty lower end, strongly calcareous, very gradational at base
	245.36	2.10	MUDSTONE, dark grey, few thin rusty bands, carbonaceous at base
	245.46	0.10	MUDSTONE, black, richly carbonaceous, gradational to coal
			COAL SEAM ZONE E
	245.98	0.52	COAL SEAM, broken up Coal, finely broken Coal, dull, slightly banded Coal, dull, very hard, high ash Coal, pulverized Mudstone, highly carbonaceous Coal, high ash, dull Mudstone/Coal, bone coal, carbonaceous Mudstone, black, carbonaceous
	246.18	0.20	MUDSTONE, black, carbonaceous, fragmented
	246.25	0.07	MUDSTONE, as above
	246.43	0.18	COAL, badly fragmented and pulverized
	246.73	0.30	MUDSTONE, black, carbonaceous, some thin layers of coal
	247.03	0.30	COAL, dominantly dull, abundant hair line calcite, 2cm mudstone
	247.63	0.60	MUDSTONE, black, locally richly carbonaceous
	247.80	0.17	COAL, dull, very high ash coal and bony coal
	248.23	0.43	MUDSTONE, black, very hard, very carbonaceous
	248.41	0.18	COAL, predominantly dull coal
	248.73	0.32	MUDSTONE/COAL, dominantly carbonaceous mudstone, some coal
	248.96	0.23	MUDSTONE, dark grey, slightly carbonaceous
	249.41	0.45	SILTSTONE, medium grey, locally argillaceous, abundant plant impressions, sporadic lamination, gradual
1	249.66	0.25	MUDSTONE/COAL, top half dark mudstones, rest friable coal
			BASE OF ZONE E
	250.85	1.19	MUDSTONE, dark grey, very silty (homogeneously), slightly calcareous, structureless
}	251.60	0.75	MUDSTONE, as above
	252.01	0.41	SILTSTONE, medium grey, argillaceous, locally laminated, strongly calcareous, very transitional at base
	252./39	0.38	SILTSTONE/MUDSTONE, similar to above

BH Nos. 19

<u> </u>		,	
Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	252.70	0.31	SILTSTONE, medium grey, sporadic lamination, calcareous
	254.08	1.38	MUDSTONES, top 0.24m medium grey, calcareous and silty, rest black, locally carbonaceous, sporadically calcareous
	254.38	0.30	MUDSTONE/COAL, lower half thoroughly pulverized coal and carbonaceous mudstone
	257.19	2.81	MUDSTONE, dark grey, very silty, structureless, non calcareous
	260.30	3.11	MUDSTONE, similar to above, locally slightly carbonaceous
,	262.95	2.65	MUDSTONE, medium grey, locally ferruginດັ່ນຮຸ້ມ and calcareous, bottom 0.12m carbonaceous
			COAL SEAM D
	263.25	0.30	COAL SEAM, top 0.12 carbonaceous mudstone, rest mostly dull coal, fragmented, basal contact broken
	263.72	0.47	COAL, fragmented, mostly dull banded, Core loss-Coal 0.27
	264.73	1.01	SILTSTONES, top 0.35m dark grey, coaly inclusions and small slumping, rest medium grey, richly argillaceous, gradual below
5 [°]	265.53	0.80	SANDSTONE, light/medium grey, very fine-grained, locally grading to fine silts and muddy layers, much burrowing ubiquitous small-scale delicate lamination and cross-lamination, calcareous
	266.48	0.95	MUDSTONE, dark grey/black, locally ferruginous, non calcareous
	268.06	1.58	MUDSTONE, top 0.47m black, locally carbonaceous, rest dark grey, locally silty, gradual at base
	268.68	0.62	SILTSTONE, medium grey, richly argillaceous, laminated, lenticles of very fine sands, transitional
	269.39	0.71	MUDSTONE, black, sparingly carbonaceous
	269.60	0.21	SILTSTONE, medium grey, argillaceous at top
	270.44	0.84	SILTSTONE, dark grey, very argillaceous, carbonized plant debris, locally slightly ferruginous, few burrows, mostly structureless, non calcareous
	271.27	0.83	MUDSTONE, black, locally carbonaceous, pyrite nodule, core fragmented toward base
	272.02	0.75	MUDSTONE, dark grey, ferruginous particles, gradual
:	272.80	0.78	SILTSTONE, medium grey, locally layers of very fine sands, muddy, patchŷ lamination, calcareous
3-4 ⁰	273.18	0.38	SANDSTONE/SILTSTONE, light/medium grey, very frequently interlayered very fine sands and silts, delicate lamination and ripples, some parallel lamination, calcareous, very gradual at base
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BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	275.54	2.36	MUDSTONE, medium/dark grey, locally ferruginous and sporadically calcareous (ferruginous layers)
	276.39	0.85	MUDSTONE, similar to above
	277.21	0.82	MUDSTONE/COAL, the interval finely broken and pulverized kernels of cannel mudstone
	277.95	0.74	MUDSTONE, dark grey, bottom 0.23m siltstone, strongly calcareous (almost lime), silts laminated, gradual
<u> </u>	278.15	0.20	MUDSTONE, black, hard and carbonaceous
<u> </u>	278.89	0.74	MUDSTONE, dark grey, slightly ferruginous, structureless
	279.66	0.77	MUDSTONE, dark grey, somewhat carbonaceous, coaly at contact with conglomerate below
			COAL SEAM C HORIZON
	281.94	2.28	CONGLOMERATE, finely pebbly, cherty/quartzose
	284.99	3.05	CONGLOMERATE, very similar to above, 0.13 zone with medium pebbles
	288.03	3.04	CONGLOMERATE, well packed, medium sized pebbles
	291.08	3.05	CONGLOMERATE, identical to above
	293.19	2.11	CONGLOMERATE, similar to above
	294.13	0.94	CONGLOMERATE, dominantly fine pebbles
	294.74	0.61	CONGLOMERATE, very similar to above
	297.18	2.44	CONGLOMERATE, dominantly fine pebbles
	297.68	0.50	CONGLOMERATE, dominantly granular with abundant sandstone matrix
	298.08	0.40	SANDSTONE, light grey, fine-grained, 4cm granular zone
	298.85	0.77	GRITSTONE, mixture of very coarse/coarse and medium- grained sand
	299.10	0.30	GRITSTONE/SANDSTONE, sands fine/medium-grained, abrupt below
	300.18	1.08	SANDSTONE, top half light grey, fine-grained, obscurely laminated with only a few laminae of coarse grains, rest cross-laminated with abundant intercalations of coarse sands
	303.28	3.05	SANDSTONE, light grey, fine/medium-grained, very clean and well-sorted, cross-stratified, non calcareous
	306.32	3.04	SANDSTONE, as above, bottom 1.15m have sprinkling of coarse sands and few fine pebbles toward base
	309.37	3.05	SANDSTONE, same as above, 0.22m zone with top half conglomerate and rest dark grey mudstone, some coarse sand grains
	312.43	3.06	SANDSTONE, light grey, similar to above, many granular

BH Nos. 19

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Dip	DEPTH m	THICKNESS m	DESCRIPTION
			zones 4cm pebbly zone toward top, few places coaly in- clusions
	315.36	2.93	SANDSTONE, similar to above, two 7-8cm pebbly zones, locally granular, abrupt with coal below
}			COAL SEAM B
	315.48	0.12	MUDSTONE/COAL, mostly fragmented, carbonaceous/sandy mudstones
	315.63	0.15	CONGLOMERATE, granular lithology with carbonaceous intercalations
	316.53	0.90	COAL SEAM, fragmented coal, top contact broken Coal, dull banded 0.06 Coal, dull and bright 0.03 Coal, bright banded 0.04 Coal, bright 0.03 Coal, bright 0.03 Coal, dull banded, small fragments 0.06 Coal, dull and bright 0.07 Coal, dull banded 0.03 Coal, dull banded 0.03 Coal, dull and bright 0.06 Core Loss-Coal 0.34 Coal, pulverized 0.12
]			FLOOR OF SEAM B
	317.15	0.62	SILTSTONE, dark grey, coarse-grained, argillaceous, rootilets, distrubed lamination, carbonized plant debris, local channels infilled with fine-grained sands, non calcareous, passage below by interbedding
5 [°]	318.52	1.37	SANDSTONE/SILTSTONE, 65:35, medium grey, frequently interlayered, very fine-grained sands and richly argillaceous siltstones broadly banded, parallel lamination, micro-erosional contacts, non calcareous
	319.26	0.74	SANDSTONE/SILTSTONE, similar to above, abrupt below
	321.56	2.30	SANDSTONE, light/medium grey, fine/very fine-grained, well-laminated, non calcareous, bottom 0.33m/siltstones
	323.42	1.86	SANDSTONE, light/medium grey, dominantly very fine- grained, laminated and cross-laminated, abrupt below
	324.61	1.19	SANDSTONE, dark grey, dominantly cherty, medium-grained, top 0.12m with abundant coaly inclusions
	327.66	3.05	SANDSTONE, dark grey, medium-grained, dominantly cherty siliceous, well-sorted and worked, cross-stratified, sensible coarsening bottomward
	328.82	1.16	SANDSTONE, medium grey, medium-grained, very clean, some silty intraclasts, bottom 0.38m with abundant fine pebbles, top 0.80m with mottled look, seem to be due to small burrows (note: the preceeding/2.20m sands are similarly mottled)

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	330.43	1.61	CONGLOMERATE, predominantly finely pebbly with abundant sandy matrix, some cherts/quartzite pebble 5cm (maximum apparent length), bottom 0.20m coarse pebbles
	333.18	2.75	CONGLOMERATE, top 0.98m medium pebbles, rest dominantly granular, 2cm silty layers toward base
	333.98	0.80	CONGLOMERATE, well-packed fine pebbles, few pebbles 4cm long
	335.28	1.30	GRITSTONE/SANDSTONE, sands range from medium to very a coarse-grained, large gritty/fine pebbly intervals, gradational sequences, cross-bedded
	335.99°	0.71	SANDSTONE, light grey, fine/medium-grained, well washed laminated, top half with granular layers
	336.80	0.81	GRITSTONE, granular with abundant coarse-grained sands
	337.99	1.19	GRITSTONE, as above, one stylolite parallel to bedding
	338.46	0.47	SANDSTONE, medium grey, bimodal fine and medium sands, poorly-sorted, laminated, coarsening below
	339.85	1.39	GRITSTONE, as above, some sandstone
u	342.90	3.05	GRITSTONE, as above, large interval of fine-grained sand
	343.02	0.12	GRITSTONE, as above, abrupt basal contact
	343.33	0.31	SANDSTONE, light grey, fine-grained, quartzose, laminated few gritty layers, abrupt below
	345.01	1.68	CONGLOMERATE, predominantly gritty, sandy matrix, bottom 0.30m with medium pebbles
	345.95	0.94	SANDSTONE, light grey, fine-grained, clean, irregularly laminated, some burrowing, non calcareous
3 ⁰	346.89	0.94	SANDSTONE, light, fine-grained, cross-laminated, clean, well-sorted, some distinct burrows(some of these with muddy outlines), bottom 0.12m with <code>sprinkling</code> of mediumgrained sands, abrupt below
-	346.99	0.10	CONGLOMERATE, finely pebbly in granular/sandstone matrix
	347.36	0.37	SANDSTONE, light grey, fine-grained, laminated, some medium-grained sands (dispersed grains), abrupt below
	347.40	0.04	GRITSTONE, fairly well-sorted, erosional at base
	347.68	0.28	SANDSTONE, light grey, fine-grained, clean, uniform lithology, low angle cross-lamination, abrupt below
	347.83	0.15	GRITSTONE, middle zone dominantly fine/medium sands, abrupt
	348.99	1.16	SANDSTONE, light/medium grey, top 0.44m fine/medium- grained, rest medium-grained with sporadic fine pebbles/ grits, 0.04m sandy/carbonaceous lithology, laminated
	349.49	0.50	SANDSTONE, identical to above, abrupt below

BH Nos. 19

Dip Di	EPTH	THICKNESS	
<u> </u>	m [m	DESCRIPTION
34	9.74	0.25	CONGLOMERATE/GRITSTONE, fine pebbles to coarse grits, erosional
35	0.35	0.61	SANDSTONE, medium grey, medium to coarse-grained, locally gritty, top 8cm sandstone/mudstone, laminated, erosional
35	0.50	0.25	below SILTSTONE, dark grey, homogeneously carbonaceous, richly argillaceous, finely micaceous, erosional at base
35	0.88	0.28	SANDSTONE/GRITSTONE, top 1/3 medium-grained sands, rest gritstone
35	2.04	1.16	SANDSTONE, light grey, fine/medium-grained, very clean and sorted, regularly cross-bedded, calcareous
35.	5.09	3.05	SANDSTONE, identical to above, strongly calcareous
	58.14	3.05	SANDSTONE, light grey, fine/medium-grained, very clean and sorted, cross-stratified, strongly calcareous
4 ^o 36	1.19	3.05	SANDSTONE, light grey, fine/medium-grained, cross-bedded, calcareous, very clean and sorted
36	4.24	3.05	SANDSTONE, similar to above
36	7.28	3.04	SANDSTONE, as above
37	0.33	3.05	SANDSTONE, similar to above, strongly calcareous
37	2.21	1.88	SANDSTONE, light grey, fine to medium-grained, very well washed, well-sorted, strongly calcareous, well-cross-stratified and mostly low angle cross-laminated
37	2.40	0.19	SANDSTONE/MUDSTONE, light grey, fine-grained, inter- bedded with mudstone
			GATES
			SUKUNKA
			·
			SANDSTONE/MUDSTONE, light grey, very fine-grained to fine-grained sandstone, slightly calcareous, finely laminated with occasional low angle cross beds and massively burrowed (large scale mostly) bioturbated, slumped, very occasionaly thin black muddy interclastic beds in the sand, black mudstone usually bioturbated can also be mixed intimately with sand (occasionaly), sandstone/mudstone contacts are sharp
37.	3.60	1.20	SANDSTONE, laminated
374	4.51	0.91	SANDSTONE/MUDSTONE, 50:50
374	4.97	0.46	SANDSTONE, laminated ·
375	5.35	0.38	MUDSTONE/SANDSTONE, 50:50, massive sandstone interbeds

BH Nos. 19

D: 5	NEDTH.	THICKNESS	DECCDIDITON
Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	375.74	0.39	SANDSTONE, laminated
	377.26	1.52	SANDSTONE/MUDSTONE, 40:60
	377.43	0.17	SANDSTONE/MUDSTONE, sheared zones
,	380.19	2.76	SANDSTONE/MUDSTONE interbeds, one listric surface, 70:30
	382.52	2.33	SANDSTONE/MUDSTONE interbeds, 70:30
	385.57	3.05	SANDSTONE/MUDSTONE, 80:20, silty mudstone, interbeds
	388.02	2.45	SAND/MUD, 80:20 grading to sand/silty mudstone, the mudstone is becoming increasingly silty
	391.66	3.64	SANDSTONE/MUDSTONE, silty, heavily bioturbated and slumpe churned, 35:65
	394.71	3.05	SANDSTONE/MUDSTONE, silty, numerous burrows (medium size) 30:70
	397.76	3.05	SANDSTONE/MUDSTONE, silty, 30:70
	399.26	1.50	SANDSTONE/MUDSTONE, silty, mudstone heavily burrowed 20:80
	399.28	0.02	CLAY BAND
	400.16	0.88	MUDSTONE, silty, heavily burrowed
	400.81	0.65	MUDSTONE, zone of slickenside and listric surfaces and calcite (9.02-1.12m apart)
	403.86	3.05	MUDSTONE/SANDSTONE, silty, very heavily burrowed (small-medium sized) dark grey mudstone with occasional thin band and wisps of light grey sandstone, two listric surfaces 0.80m apart
	404.36	0.50	MUDSTONE/SANDSTONE, as above but getting increasingly more sandy, light grey very fine-grained to fine-grained sandstone, slightly calcareous, laminated and medium grey, intimately mixed sandstone/silty mudstone, heavily burrowed and slumped.
	405.54	1.18	SANDSTONE/MUDSTONE, mixed 70:30
	406.90	1.36	SANDSTONE/MUDSTONE, mixed, 70:30, zone of slickensided ar listric surfaces(ten .02m to .40m apart)
	409.09	2.19	MUDSTONE/SANDSTONE, mixed, sand, 60:40
	409.65	0.56	MUDSTONE/SANDSTONE, three slickensided surfaces .0824m apart
	409.95	0.30	MUD/SANDSTONE, 20:80, mixed, sand
,	410.60	0.65	SANDSTONE, few large scale burrows grades into silty mudstone
	412.36	1.76	MUDSTONE/SAND, mixed, sand, 80:20
	413.00	0.64	SANDSTONE, laminated, carbonaceous partings

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	" m	m	
	414.49	1.49	SANDSTONE/SAND,MUDSTONE MIXED, 20:80, zone of slickenside and listric surfaces(five .0740m apart).
	416.05	1.56	SANDSTONE/SAND,MUDSTONE MIXED, as above
	419.10	3.05	SANDSTONE/SAND, MUDSTONE MIXED, 20:80
	422.14	3.04	SANDSTONE/MUDSTONE, mixed, 90:10
	425.19°	3.05	SANDSTONE/MUDSTONE, mixed, 95:5
	428.24	3.05	SANDSTONE/MUDSTONE, mixed, 85:15
	431.29	3.05	SANDSTONE/MUDSTONE, mixed, 80:20, sandstone (laminated), more abundant near bottom of unit
	434.34	3.05	SANDSTONE/MUDSTONE MIXED/MUDSTONE, black, 60:25:15, a lithologies as above, mudstone interbeds becoming common, (.0308m thick)
	435.39	1.05	SANDSTONE/MUDSTONE MIXED/MUDSTONE, black, 60:25:15.
	436.20	0.81	SANDSTONE, salt and pepper, medium-grained, appears at this level as a sprinkling of grains and becomes more abundant down section where it culminates in a thin bed .03m thick
	437.39	1.19	SANDSTONE, fine-grained, laminated
	440.43	3.04	SANDSTONE/MUDSTONE, 90:10, light grey, fine-grained lamin ated sandstone, calcareous with thin interbeds of black mudstone and occasional black mudstone intraclastic beds
	443.48	3.05	SANDSTONE/MUDSTONE, 80:20
	446.53	3.05	SANDSTONE/MUDSTONE, mudstone is locally burrowed and slumped, churned
	448.84	2.31	SANDSTONE/MUDSTONE, 60:40, from now on the sandstone intervals become thinner and are the same size or smaller than the mudstone interbeds
	449.58	0.74	SANDSTONE/MUDSTONE, 50:50, from now on most mudstone intervals are bioturbated and the mixed sandstone, silty mudstone lithologies appears again
	452.62	3.04	SANDSTONE/MUDSTONE/SANDSTONE, MUDSTONE MIXED, 30:40:30
	455.67	3.05	SANDSTONE/MUDSTONE/SANDSTONE, MUDSTONE MIXED, 20:50:30, mudstone becoming silty
	458.72	3.05	SANDSTONE/MUDSTONE, SILTY, sandstone interbeds are replaced more and more by thin irregularly shaped beds and wisps of sand, (poorly defined) the mixed lithology and the silty mudstone become one, often burrowed, 20:80
	461.77	3.05	SANDSTONE/MUDSTONE, silty, 30:70
	463.90	2.13	SANDSTONE/MUDSTONE, silty, 20:80
	464.82	0.92	SANDSTONE/MUDSTONE, silty, 15:85

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
	467.86	3.04	SANDSTONE/MUDSTONE, silty 15:85
	470.91	3.05	SANDSTONE/MUDSTONE, silty, 20:80
	473.96	3.05	SANDSTONE/MUDSTONE, silty, 10:90
	477.01	3.05	SANDSTONE/MUDSTONE, silty, 20:80
	480.06	3.05	SANDSTONE/MUDSTONE, silty, 20:80, occasional pyrite nodule
,	483.11	3.05	SANDSTONE/MUDSTONE, silty, 25:75, few burrows
,	486.15	3.04	SANDSTONE/MUDSTONE, silty, 25:75, few burrows
	489.20	3.05	SANDSTONE/MUDSTONE, silty, 20:80
	492.25	3.05	SANDSTONE/MUDSTONE, silty, 15:85
	495.30	3.05	SANDSTONE/MUDSTONE, 5:95, silty, occasional pyrite nodules
	498.34	3.04	SANDSTONE/MUDSTONE, silty, 5:95,
	499.60	1.26	SANDSTONE/MUDSTONE, silty, 2:98
			SUKUNKA MOOSEBAR
	501.39	1.79	MUDSTONE, black, occasional pyrite nodules and ferruginous bands
	504.44	3.05	MUDSTONE, black, core highly broken up, no slickenside
	507.49	3.05	MUDSTONE, black
	510.54	3.05	MUDSTONE, black
	513.58	3.04	MUDSTONE, black
	516.63	3.05	MUDSTONE, black
	519.68	3.05	MUDSTONE, black
	522.73	3.05	MUDSTONE, black
	525.78	3.05	MUDSTONE, black
	528.82	3.04	MUDSTONE, black, last 0.15m highly broken up
	531.87	3.05	MUDSTONE, black
	534.92	3.05	MUDSTONE, black
	537.97	3.05	MUDSTONE, black
•	541.02	3.05	MUDSTONE, black, zone of slickensided and listric surfaces (4)

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	544.07	3.05	MUDSTONE, black, one slickenside
	547.11	3.04	MUDSTONE, black
	550.16	3.05	MUDSTONE, black, bottom 0.05m broken up, no slickenside or listric features
	553.21	3.05	MUDSTONE, black
	555.65	2.44	MUDSTONE, black
	558.70	3.05	MUDSTONE, black, minor slickenside surface
	561.44	2.74	MUDSTONE, black, zone of slickensides(6) 48 ⁰ off vertica heavy calcite mineralization and bottom .10m heavily sheared
	564.48	3.04	MUDSTONE, black, four slickenside surfaces
	567.53	3.05	MUDSTONE, black
	568.45	0.92	MUDSTONE, black
	571.50	3.05	MUDSTONE, black
	574.54	3.04	MUDSTONE, black
	577.59	3.05	MUDSTONE, black
	580.64	3.05	MUDSTONE, black, zone of slickenside along fracture parallel to axis of the core
	583.69	3.05	MUDSTONE, black
	586.74	3.05	MUDSTONE, black
	589.78	3.04	MUDSTONE, black, three listric surfaces
	592.83	3.05	MUDSTONE, black, zone of sheared core and listric and slickensided surfaces, bentonite layer, burrowed
	595.88	3.05	MUDSTONE, black, three slickensided surfaces .0815m apart, bentonite layer
	598.93	3.05	MUDSTONE, black, three slickensides (0.05-0.10m apart), zone of highly sheared up, broken core with numerous listric surfaces
	602.44	3.51	MUDSTONE, black
	605.95	3.51	MUDSTONE, black
	607.71	1.76	MUDSTONE, black
	608.75	1.04	MUDSTONE, dark grey, phases of pyritic worm burrows, no bedding observed
1	609.77	1.02	MUDSTONE, as above
	611.60	1.83	MUDSTONE, as above
	611.73	0.13	CLAYSTONE, light grey, white, bentonitic

BH Nos. 19

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
<u> </u>	611.87	0.14	MUDSTONE, as above
	611.90	0.03	MUDSTONE, as above
	612.66	0.76	SANDSTONE, fine-grained, dark grey/green, pyritic worm
	012.00	0.76	burrows throughout, bioturbation, glauconitic
	Í		
}			
}			MOOSEBAR
	}		GETHING
	612.68	0.02	PYRITE, band
	012.00	0.02	BIRD COAL SEAM
	612.74	0.06	COAL, dull and bright, stick
	612.76	0.02	COAL, dull banded, small pieces
}	612.80	0.04	COAL, dull banded, stick
	612.90	0.10	COAL, dull, stick
	612.96	0.06	COAL, bright, stick
	612.99	0.03	COAL, bright, core pulverized
ļ	613.03	0:04	COAL, dull and bright, stick
	613.11	0.08	COAL, dull, large pieces
	613.14	0.03	COAL, bright, stick
	613.18	0.04	COAL, dull and bright, stick
	613.25	0.07	COAL, bright banded, stick
	613.31	0.06	COAL, dull, stick
	613.36	0.05	COAL, dull and bright, stick
	613.38	0.02	COAL, bright, stick
	613.40	0.02	COAL, dull banded, stick
	613.45	0.05	COAL, dull, sheared, large pieces
	613.50	0.05	COAL, dull banded, stick
	613.55	0.05	COAL, dull, stick
	613.59	0.04	COAL, dull banded, stick
	613.68	0.09	COAL, dull and bright, stick
1	613.74	0.06	COAL, dull and bright, stick
	613.75	0.01	PYRITE, band, stick
	613.77	0.02	COAL, dull and bright, stick

BH Nos. 19

Dip	DEPTH	THICKNES\$	DESCRIPTION
0	m	m	
	613.84	0.07	COAL, dull, stick
	613.87	0.03	COAL, dull banded, stick
	613.96	0.09	COAL, dull, stick
,	614.20	0.06	COAL, dull banded, core pulverized
	614.12	0.10	COAL, dull banded, core pulverized
	614.15	0.03	COAL, dull, core pulverized
	614.17	0.02	COAL, bright, core pulverized
	614.21	0.04	COAL, dull banded, core pulverized
	614.30	0.09	COAL, dull, core pulverized
1	614.37	0.07	COAL, bright banded, core pulverized
	614.52	0.15	COAL, dull, stick
	614.61	0.09	COAL, dull and bright, stick
	614.64	0.03	COAL, bright banded, stick
	614.71	0.07	COAL, bright, stick
	614.76	0.05	COAL, dull, stick
	614.83	0.07	COAL, dull and bright, stick
	614.90	0.07	COAL, dull, stick
	614.96	0.06	COAL, bright, stick
	614.99	0.03	COAL, dull and bright, stick
	615.04	0.05	COAL, bright, stick
	615.07	0.03	COAL, dull and bright, stick
	615.11	0.04	COAL, dull, stick
	615.16	0.05	COAL, dull banded, stick
	615.27	0.11	COAL, dull, stick
	615.34	0.07	COAL, dull banded, large pieces
	615.37	0.03	COAL, dull, stick
	615.49	0.12	COAL, dull banded, large pieces
	615.63	0.14	CORE LOSS-COAL
ļ	615.67	0.04	COAL, bright banded, large pieces
	615.72	0.06	COAL, dull, large pieces
	615.82	0.10	COAL, dull and bright, stick
	615.88	0.06	COAL, dull banded, large pieces
	615.97	0.09	COAL, dull and bright, stick

BH Nos. 19

Dip	P DEPTH THICKNESS DESCRIPTION		DESCRIPTION
0	m	m	- -
	616.01	0.04	COAL, dull banded, stick
	616.05	0.04	COAL, bright, stick
	616.07	0.02	PYRITE, band
	616.13	0.06	COAL, dull, stick
	616.17	0.04	COAL, dull and bright, stick
	616.19	0.02	COAL, bright, stick
	616.25	0.06	COAL, dull, stick
	616.36	0.11	COAL, dull, small pieces
	616.88	0.52	CORE LOSS-COAL
	618.63	1.95	MUDSTONE, dark grey, carbonaceous phases with bright coal bands
35 ⁰	624.25	5.42	SANDSTONE, medium-grained, light grey, scattered interbed of carbonaceous mudstone, carbonaceous matrix at top, frequent irregular and bedding plane calcite filled fractures
	624.83	0.58	BRECCIA, sandstone as above forming rotated blocks in calcite matrix, partially leached, fault zone
	628.44	3.61	SANDSTONE, undistrubed as above
34 ⁰	631.49	3.05	SANDSTONE, light grey, medium-grained, phases of carbon- aceous mudstone parting and large light colored worm burrows
	639.23	7.74	SANDSTONE, fine-grained, light grey, very clean
	639.92	0.69	MUDSTONE, carbonaceous, dark grey, plant fragments
	640.41	0.49	SANDSTONE, light grey, fine-grained with frequent phases of grey siltstone
	641.62	1.21	SILTSTONE, grey with phases of fine-grained, light grey sandstone, bedding distrubed by bioturbation
	643.22	1.60	SANDSTONE, fine-grained, light grey with frequent inter- beds of dark grey mudstone
	643.75	0.53	SILTSTONE/MUDSTONE INTERBEDDED, dark mudstone with light grey siltstone
	644.08	0.33	SANDSTONE, medium-grained, light grey, very clean
	644.88	0.80	SANDSTONE/MUDSTONE INTERBEDDED, light grey sandstone and carbonaceous mudstone
	645.56	0.68 0.05 0.02 0.03 0.02 0.03	COAL SEAM Coal, dull, stick dull banded, stick dull and bright, stick dull and bright, stick bright, stick

BH Nos. 19

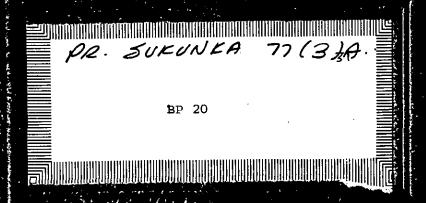
Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	4 7.	0.11 0.05 0.03 0.10 0.03 0.17 0.02	dull and bright, stick dull, stick bright banded, stick dull and bright, stick bright, stick CORE LOSS-COAL CLAYSTONE, carbonaceous, black, frequent bright coal bands
}		0.02	Coal, dull banded, small pieces
	646.32	0.76	MUDSTONE, black, carbonaceous with bright coal bands throughout
	647.65	1.33	SILTSTONE, grey, bedding indistinct with phases of dark grey mudstone and a few phases of fine-grained light grey sandstone
	648.91	1.26	SANDSTONE, fine-grained, light grey with phases of grey mudstone
	649.83	0.92	SANDSTONE, medium-grained, light grey, characterized by small scale cross bedding and carbonaceous partings on bedding surfaces
	652.21	2.38	LAMINITE, dark grey mudstone interbedded with grey siltstone, some fine-grained light grey sandstone interbeds at top very regularly bedded
1	653.44	1.23	MUDSTONE, dark grey, carbonaceous at base
	653.84	0.40 0.09 0.03 0.04 0.04 0.05 0.15	COAL SEAM . Coal, dull, large pieces dull banded, stick dull banded, fragmented dull and bright, fragmented dull and bright, large pièces core loss-coal
	656.21	2.37	SILTSTONE, grey with phases of fine-grained light grey sandstone at top
19 ⁰	657.19	0.98	SILTSTONE & MUDSTONE INTERBEDDED, dark grey mudstone and grey siltstone forming graded units
	660.38	3.19 0.05 0.05 0.04 0.02 0.12 0.07 0.03 0.06 0.13 0.07	CHAMBERLAIN SEAM - 75.5% Rec'd Core loss Coal, sheared Coal, dull Mudstone, dark grey Coal, dull sheared Coal, dull banded sheared Coal, dull and bright, sheared Core loss, siltstone Coal, dull, broken Coal, dull banded, large pieces

BH Nos. 19

Dip	DEPTH m	THICKNESS	DESCRIPTION
25 [°]	662.15	0.06 0.05 0.04 0.03 0.07 0.08 0.02 0.04 0.07 0.06 0.08 0.05 0.03 0.05 0.04 0.05 0.03 0.04 0.06 0.03 0.04 0.03 0.04 0.03 0.04 0.03 0.04 0.03 0.04 0.03 0.04 0.05 0.04 0.05 0.04 0.05 0.04 0.05 0.06 0.07 0.06 0.07 0.06 0.07 0.06 0.07 0.06 0.07 0.06 0.07 0.06 0.07 0.06 0.07 0.06 0.07 0.07	Coal, dull stick Coal, dull banded Coal, dull Siltstone, dark grey, plant remains Core ioss-siltstone Core Loss Coal, dull banded, stick Coal, dull banded, stick Coal, dull, stick Coal, dull, stick Coal, dull, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull, stick Coal, dull, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull banded, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, bright banded, stick Coal, bright, stick Coal, dull, stick Coal, dull, stick Coal, dull, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, stick Coal, dull and bright, sheared, stick Coal, dull and bright, sheared, stick Coal, dull and bright, sheared, stick Coal, dull and bright, sheared, stick Coal, dull and bright, sheared, stick Coal, dull and bright, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull banded, sheared, stick Coal, dull sheded, sheared, stick Coal, dull sheded, sheared, stick Coal, dull sheded, sheared, stick Coal, bright, small fragments Coal, dull, stick
	-		with plant rootlets at top, interbeds of dark grey siltstone

BH Nos. 19_

Dip	DEPTH m	THICKNESS	DESCRIPTION
0			
13 ⁰	662.75	0.60	SILTSTONE, dark grey, very argillaceous, well-laminated, slightly calcareous, fragmented at base
	664.16	1.41	MUDSTONE, dark grey, slightly carbonaceous, listric surfaces
	664.38	0.22	MUDSTONE, black, carbonaceous, plant debris, fragmented base
	666.31	1.93	SILTSTONE/MUDSTONE, medium grey, silts/mud mixture about equal (homogenized), total lack of sedimentary lamination, non calcareous
	667.51	1.20	MUDSTONE, black, richly carbonaceous (homogeneously)
	667.97	0.46	MUDSTONE, dark grey, richly silty, mostly structureless, non calcareous, listric surfaces in basal 10cm
			· .
			·
 			. ·



BP COAL



Page 1

AREA	

SUKUNKA

B. H. No. BP 20

Contractor: Longyear

Commenced:

Aug 24, 1977

Completed:

Sept 19, 1977

Co-ordinates: 6,114,036.40

Ν E

592 **5**68.94

Surface Elevation: 1,756:47

Core Size:

HQ

Casing Left in Hole:

m

m

Hole Angle:

Hole Azimuth;

see detail

page la

Geologist Mike DeMestre

Depth 86.11-238.58

Logged by:

449.58-625.66

Ali Chowdry

239,40-272.79

657.45-691.19 699.05-701.95

Andy Newson

275,19~445.70

701.95 Final Depth:

649 57 (SEE OVER) FORMATION/MEMBER DEFTH ELEVATION THICKNESS 1,617.32 Boulder Creek 139.15 139.15 1,517.07 100.25 Hulcross 239.40 206.30 1,310.77 445.70

Gates 1,178.67 132.10. Sukunka 577.80 1,105.34 73.33 Moosebar 651.13 1,058.79 46.55 697.68 U. Gething

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DEPTH

THICKNESS

%RECOVERY

ELEVATION

BIRD

653.60

1,102.87

CHAMBERLAIN

697.68

1,058.79

F.PO.

177.7

F.PO.

544-547.11

. Fractured & listircated Brecciated & Slickensided Geologist

Depth

Peter Caine

649.98-655.73 691.35-698.30

Sperry-Sun Survey

Date: 19th September 1977

Borehole: BP 20 Sukunka 77

Compass: 20° Maximum to Magnetic North

BPB Operator: P. J. Waters

Measured Depth	Tilt	Tilt Direction
700m	4° 45'	N 18° W
650m	4° 30°	N 24° W
600m	2° 30'	
550m	3°	-
500m	2° 45'	
450m -	. 2° 45'	-
400m	3° 15'	
330m	3° 30'	-
300m	2° 15'	-
250m	2° 45'	-
200m	2°'-	. –
150m	3° 45'	-
100m	3° 30'	
50m	2° 15'	-

Readings above 600 m were made in rods - hence no figures for Tilt Direction.

Dip	DEPTH m	-THICKNESS	DESCRIPTION
	36.11	86.11	BOULDER CREEK CASING.
	87.41	1.30	PEBBLE CONGLOMERATE: varicolored coarsening down conglom- erate (.2cm-1 cm average Ø of pebbles) sub-angular to sub-rounded with matrix and lenses of salt and pepper medium-grained to coarse-grained sandstone.
	88.20	0.79	SANDSTONE/CONGLOMERATE: (coarsening down cycle), siltstone very fine-grained sandstone, dark-grey, massive, intermixed with siltstone predominant at top.
	89.46	1.26	SANDSTONE: salt and pepper, very coarse-grained, pebbly, poorly-sorted, massive with occasional muddy inclusions.
·	90.34	0.88	PEBBLE CONGLOMERATE: varicoloradçoarsening down, well- sorted, (pebbles at Ø 2mm-9mm), sub-angular to sub-rounded
	90.58	0.24	CLAY; yellow band, unconsolidated. (core badly broken).
	91.86	1.28	PEBBLE CONGLOMERATE: (a coarsening down cycle), varicolor coarsens down (average Ø 3mm-15mm), moderately well-sorted, sub-angular to rounded, core broken up (locally).
	92.81	0.95	PEBBLE CONGLOMERATE: same as above cyclé, no sharp contacts between the two, gradational.
	92.96	0.15	CLAY: band, yellow, unconsolidated.
	93.82	0.86	SILTSTONE: top 0.05m dark-grey clay band, dark-grey massive siltstone with sandy inclusions near its base, gradational.
	94.58	0.76	SANDSTONE: medium-grey, medium-grained sandstone, massive to cross-bedded (trough cross-beds, small scale).
	95.68	1.10	SILTSTONE: medium-grey, massive with few wispy inclusions of above sandstone.
	97.64	1.96	SANDSTONE: light-grey, very fine-grained to fine-grained, cross-bedded and convolute bedding, occasional slumping.
	97.69	0.05	MUDSTONE: black,
	98.68	0.99	SANDSTONE: light-grey, fine-grained to medium-grained, poorly-sorted, churned, sometimes cross-bedded and with large mudstone inclusions.
	99.06	0.38	MUDSTONE: dark-grey, bottom 0.25m broken up.
	99.46	0.40	MUDSTONE: same as above.
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Dip	DEPTH	.THICKNESS	DESCRIPTION
0	m	m	
	100.78	1.32	SANDSTONE: medium-grained, fine-to medium-grained, calcar- eous, poorly-sorted, massive, churned at the top, massive with numerous carbonaceous partings near the bottom.
	100.88	0.10	MUDSTONE: black to grey.op 0.03m, black, becomes clay.
	102.11	1.23	CLAY, greyish, gradational below.
	102.52	0.41	MUDSTONE: black, core broken up .
	104.54	2.02	MUDSTONE: greyish, core highly broken up and fractured.
	104.69	0.15	MUDSTONE: greyish, silty.
	105.41	0.72	MUDSTONE: grey, silty.
	105.97	0.56	MUDSTONE: black, very clayey, broken up.
	107.63	1.66	MUDSTONE: grey, silty.
	108.20	0.57	MUDSTONE: black, clayey , gradational below.
	108.52	0.32	MUDSTONE: dark grey.
	109.04	0.52	MUDSTONE: dark grey, core highly broken up (in small fragments).
	109.15	0.11	MUDSTONE: becomes carbonaceous.
	109.30	0.15	COAL: dull with carbonaceous mudstone.
	109.48	0.18	MUDSTONE: carbonaceous, gradational below.
	111.25	1.77	MUDSTONE: silty and greyish, core broken up, shows listric surfaces.
	111.48	0.23	MUDSTONE: black, slightly silty, numerous rootlets present.
	113.09	1.61	MUDSTONE: silty, medium-grey , core highly broken up, numerous rootlets present but not as common.
	114.30	1.21	MUDSTONE; silty, medium-grey, gradually becomes slightly sandy
	116.68	2.38	MUDSTONE; medium-grey, silty, with evidence of numerous rootlets and also occasional carbonaceous inclusions, the rootlets frequency decreases downsection until none are present.
	117.34	0.66	MUDSTONE; light-grey, sandy, sand is very fine-grained, light-grey and occurs disseminated and as thin wisps,

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Dip O	DEPTH m	-THICKNESS m	DESCRIPTION
			also occasional black calcareous inclusions found scattered.
	118.73	1.39	MUDSTONE: sandy, gradational below.
	120.39	1.66	MUDSTONE: dark-grey then black.
	122.48	2.09	MUDSTONE: black, slightly silty with few carbonaceous inclusions and rootlets present, core badly broken up plus sprinkling of coarse-grained sand between carbonaceous bands.
,	123.44	0.96	MUDSTONE: black, slightly silty.
	123.71	0.27	MUDSTONE: black with sharp lower contact.
	126.28	2.57	PEBBLE CONGLOMERATE: varicolored, poorly-sorted, sub-angular to sub-rounded (average Ø 2-4mm), certain pebble sizes are segregated in irregular bands, occasional mudstone interbeds (.0102m), two slickensided surfaces, conglomerater has sharp lower contact
	126.49	0.21	MUDSTONE: dark-grey.
	128.16	1.67	MUDSTONE: grey, silty with few thin wisps of light-grey, very fine-to fine-grained sandstone (0.01m), 0.62-0.87m below marker.
	128.19	0.03	PEBBLY: thin band.
	128.33	0.14	MUDSTONE: as above.
	129.54	1.21	CONGLOMERATE: varicologed , dark, poorly to moderately well sorted with segregated bands of pebbles of the same size (average Ø 4mm - 6mm up to 2cm), sub-angular to sub-rounded
	131.03	1.49	CONGLOMERATE: (same as above), core broken mostly parallel to its axis.
	131.62	0.59	CONGLOMERATE: (as above) but coarser average Ø 9mm-13mm.
	132.58	0.96	CONGLOMERATE: bottom 0.15m is a very coarse-grained to almost conglomeratic sandstone, varicolored, well-sorted.
	133.32	0.74	CONGLOMERATE: (same as above) plus few interbeds of vari- colored very coarse-grained sandstone, poorly-moderately well-sorted (0.03-0.05m thick).
	134.05	0.73	CONGLOMERATE: five listric surfaces, (0.10 - 0.18m apart), core not badly broken up.

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	·
	135.24	1.19	CONGLOMERATE: gradually becomes smaller grained (average 3mm-4mm), very sharp basal contact with a thin (0.01m)
	135.60	0.36	mudstone band at the base (3 slickensides over 0.30m) SANDSTONE: light-grey, very fine-grained, well-sorted, finely laminated to cross-bedded (low angle) with occas-
	135.63 135.83	0.03 0.20	ional mudstone intraclasts and interbeds burrowed. MUDSTONE: 0.03m interbed. SANDSTONE: same as above.
•	136.44	0.61	SANDSTONE
!	136.59	0.15	MUDSTONE
	136.95	0.36	SANDSTONE
	137.01	0.06	MUDSTONE
:	138.20	1.19	SANDSTONE (90%)/MUDSTONE (10%)
1	138.25	0.05	ZONE of large scale burrows
	139.15	0.90	SANDSTONE (85%) / MUDSTONE (15%)
		·	BOULDER CREE, HULLCROSS
	139.50	0.35	SANDSTONE/MUDSTONE: silty, mixed sand and mud, medium-grey, very fine-grained to fine-grained sandstone, well-sorted, finely laminated to massive, occasionally crossbedded (low angles, small scale), occurs as thin interbeds with sharp basal contact and usually grading up into mudstone. Also occurs as thin irregularly shaped pods and wisps. Mudstone is black, massive, often burrowed. Mixed sandstone, mudstone is intimately mixed, slumped, burrowed. Occasional pyrite nodules found scattered throughout.
	139.70	0.20	SANDSTONE (15%)/SILTY MUDSTONE (5%)/MIXED SAND/MUD·(80%): two slickensided surfaced 0.03m apart.
	140.64	0.94	SANDSTONE/MUDSTONE: same as above.
	140.79	0.15	SANDSTONE/MUDSTONE: same as above, three slickensided surfaces 0.05m apart.
	141.98	1.19	SANDSTONE/MUDSTONE: same as above.

Dip O	DEPTH m	-THICKNESS m	DESCRIPTION
	144.88	2.90	SANDSTONE (20%)/SILTY MUDSTONE(40%)/MIXED SAND-MUD (40%)
	147.82	2.94	SANDSTONE (20%)/SILTY MUDSTONE (50%)/MIXED SAND-MUD (30%)
	150.87	3.05	SANDSTONE (20%)/SILTY MUDSTONE (50%)/MIXED SAND-MUD (30%)
	153.30	2.43	SANDSTONE (15%)/SILTY MUDSTONE (40%)/MIXED SAND-MUD (45%): broken parallel to its axis.
•	153.92	0.62	SANDSTONE (10%)/SILTY MUDSTONE (40%)/MIXED SAND-MUD (50%)
	156.03	2.11	SANDSTONE (20%)/SILTY MUDSTONE (10%)/MIXED SAND-MUD (70%): tional.
	156.97	0.94	SANDSTONE (25%)/MUDSTONE (65%)/MIXED. SAND-MUD (10%)
٠	157.42	0.45	SANDSTONE (30%)/MUDSTONE (70%): broken up core parallel to its axis.
	160.02	2.60	SANDSTONE (40%)/MUDSTONE (60%): mixed.
	163.06	3.0 ⁴	SANDSTONE (35%)/MUDSTONE (55%)/MIXED SAND-MUD (10%)
·	163.67	0.61	SANDSTONE (40%)/MUDSTONE (60%): core broken up in thin slices, no listric or slickensided surfaces.
	166.11	2.44	SANDSTONE (45%)/MUDSTONE (55%)
	169.16	3.05	SANDSTONE (55%)/MUDSTONE (45%)
	172.21	3.05	SANDSTONE (50%)/MUDSTONE (50%)
	172.67	0.46	CLAY BAND: with one thin mudstone interbed.
	175.25	2.58	SANDSTONE (35%)/MUDSTONE (65%)
	177.71	2.46	SANDSTONE (35%)/MUDSTONE (65%): nine minor listric surfaces 0.4-0.37m apart, core broken parallel to its axis. Light-grey, medium-grained sandstone band 0.03m thick, followed by intense calcite veining, 0.03m carbonaceous inclusions.
	178.30	0.59	SANDSTONE (35%)/MUDSTONE (65%)
	181.35	3.05	SANDSTONE (25%/MUDSTONE (75%)
	184.40	3.05	'SANDSTONE (20%)/MUDSTONE (80%)
•	187.45	3.05	SANDSTONE (20%)/MUDSTONE (80%)
	190.50	3.05	SANDSTONE (15%)/MUDSTONE (85%): core split lengthwise.

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Dip o	DEPTH m	-THICKNESS	DESCRIPTION
	193.54	3.04	SANDSTONE (15%)/MUDSTONE (85%)
	196.59	3.05	SANDSTONE (15%)/MUDSTONE (85%)
	199.55	2.96	SANDSTONE (22%)/MUDSTONE (78%): core broken lengthwise, last 0.10m brecciated plus heavy calcite infilling.
	199.64	0.09	SANDSTONE (25%)/MUDSTONE (75%)
	200.16	0.52	SANDSTONE (25%)/MUDSTONE (75%)
	200.72	0.56	SANDSTONE/MUDSTONE: zone mixed, medium-grey, heavily bioturbated, slumped, burrowed, mudstone becomes slightly silty.
	202.69	1.97	SANDSTONE (40%)/MUDSTONE (60%)
	205.74	3.05	SANDSTONE (35%)/MUDSTONE (65%)
	208.68	2.94	SANDSTONE (40%)/MUDSTONE (60%)
	211.63	2.95	SANDSTONE (45%)/MUDSTONE (55%)
	214.58	2.95	SANDSTONE (40%)/MUDSTONE (60%)
	217.53	2.95	SANDSTONE (40%)/MUDSTONE (60%)
	217.98	0.45	SANDSTONE (30%)/MUDSTONE (70%)
	218.40	0.42	CLAY BAND
	220.98	2.58	SANDSTONE (30%)/MUDSTONE (70%)
	224.02	3.04	SANDSTONE (30%)/MUDSTONE (70%)
	227.07	3.05	SANDSTONE (25%)/MUDSTONE (75%); calcite veining.
	228.66	. 1.59	SANDSTONE (35%)/MUDSTONE (65%): gradational.
	230.12	1.46	SANDSTONE (60%)/MUDSTONE (40%)
	233.17	3.05	SANDSTONE (55%)/MUDSTONE (45%)
	235.62	2.45	SANDSTONE (60%)/MUDSTONE (40%)
	236.52	0.90	SANDSTONE (60%)/MUDSTONE (40%): core broken lengthwise.
	238.58	2.06	SANDSTONE (75%)/MUDSTONE (25%)
	239.40	0.82	SANDSTONE (30%)/SILTSTONE (70%): medium-grey, very small scale cross-bedding and lenticular units of very fine-

Dip	DEPTH m	THICKNESS m	DESCRIPTION
			grained sandstone and siltstone with interbedding of some silty dark-grey mudstone . Sandstones have erosional boundaries, sporadic burrowing; sandier bottomward.
			HULL CROSS GATES
	239.58	0.18	SANDSTONE/CONGLOMERATE: top 0.10m medium-grey, very fine- grained sands, laminated, rest at base mixture of medium- to coarse-grained sands intermingled with fine-to medium- chert pebbles. Erosional below.
	239.62	0.04	SILTSTONE: medium-grey, strongly calcareous.
	239.71	0.09	SILTSTONE: as above, richly impregnated by pyrite, eros-ional.
	240.16	0.45	SANDSTONE: medium-grey, very fine-grained, some silty layers, broadly banded, top half with slightly disturbed lamination, strongly calcareous, gradational at base.
	240.26	0.10	SILTSTONE: dark-grey, argillaceous, disturbed lamination, calcareous, erosional.
	240.56	0.30	MUDSTONE: dark-grey, silty at top, large patches of pyr- ite, (also finely disseminated), some burrows, gradationa
	241.41	0.85	SILTSTONE: dark-grey, coarse-grained, local argillaceous layers, thin layers of very fine-grained sand, strongly calcareous.
	242.26	0.85	SANDSTONE: medium-grey, very fine-grained, much of lamin- ation obliterated or modified due to extensive bioturba- tion, argillaceous, strongly calcareous, gradational.
	242.51	0.25	SANDSTONE: light-grey, fine-grained, carbonaceous streakş small scale cross-lamination, very strongly calcareous.
	243.45	0.94	SANDSTONE: identical to above; 0.19m layer toward base, has medium sand lenticles; abrupt below.
	243.62	0.17	COAL: dull, abrupt basal contact.
	243.74	0.12	MUDSTONE: black, very silty, abundant carbonized plant debris, structureless, gradational at base.
	244.44	0.70	SILTSTONE: dark-grey, abundantly argillaceous, finely broken carbonaceous matter, root lets, disturbed bedding, brief zones of very fine-grained sands, gradational.

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Dip o	DEPTH m	THICKNESS m	DESCRIPTION		
	693.41	0.04	COAL: bright banded, listricated.		
	693.46	0.05	COAL: dull with bright bands, listric surfaces at 60°.		
	693.51	0.05	COAL: dull, lustrous with bright bands, intensely cleated.		
	693.54	0.03	COAL: dull with occasional bright bands.		
	693.57	0.03	COAL: dull, bright, thinly banded, core broken to roof.		
	693.60	0.03	MUDSTONE: dark-grey, carbonaceous with coal streaks and listric surfaces, light-brown streaks.		
	693.67	0.07	MUDSTONE: dark-grey as above, becoming coaly to base.		
.	693.74	0.07	CORE LOSS-ROCK		
	693.97	0.23	CORE LOSS-COAL		
	694.02	0.05	FRAGMENTS OF MUDSTONE: coaly,coal, dull,		
	694.05	0.03	COAL: dull, broken		
	694.10	0.05	COAL: Tustrous, badTy broken		
,	694.21	0.11	MUDSTONE: dark-grey, carbonaceous, coal streaks, listric surfaces.		
	694.37	0.16	COAL: dull and bright, predominantly bright 0.08m from base sheared, listric surfaces throughout, broken stick B.S.)		
	694.49	0.12	COAL: dull, bright, thin bedded, B.S.		
	694.55	0.06	COAL: bright, thinly banded, granular, B.S., structure to base, listric surfaces.		
	694.61	0.06	COAL: dull with bright bands, large sub-horizontal listric surfaces through core.		
	694.65	0.04	COAL: lustrous, 30° listric surface.		
	694.69	0.04	COAL: dull, bright, thinly banded from bright band at top, $2 \mathrm{nm}$ cleats at 80° .		
	694.73	0.04	COAL: lustrous, listricated.		
	694.79	0.06	COAL: dull, lustrous, with occasional bright bands. 2 intersecting listric surfaces at top of core at 30°, partly cleated.		

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DEPTH m	THICKNESS m	DESCRIPTION
254.51	1.19	MUDSTONE: dark-grey to black, sporadically carbonaceous, 7cm silty zone, non-calcareous.
255.57	1.06	MUDSTONE/SILTSTONE: top 0.27m and bottom 0.37m silty, dark- grey mudstones, rest richly argillaceous siltstones with numerous burrows, patchy laminations, listric contact with Coal below. Mudstones 0.15m at the very base riddled with carbonized plant debris. COAL SEAM: large chunks, basal contact clean and abrupt.
255.82	0.25	COAL: dull with silty lustre
255.86	0.04	COAL: dull with fusain streaks.
255.95	0.09	COAL: dull banded
257.55	1.60	MUDSTONE: dark-grey, highly silty, bottom 0.30m carbon-aceous and fragmented coaly partings.
257.87	0.32	MUDSTONE: medium dark-grey, middle 6cm highly silty, transitional.
259.88	2.01	SILTSTONE/SANDSTONE: medium-grey, top 1.13m dominantly argillaceous siltstone, lenticular sandstone, wavy irregular lamination; rest very fine-grained sandstone, silty, argillaceous, tiny clasts, coaly inclusions, calcareous, erosional at base.
260.11	0.23	SILTSTONE: medium-grey, laminated, tiny lenses and wisps of very fine-grained sandstone, strongly calcareous, erosional.
260.40	0.29	MUDSTONE: medium-grey, slightly silty, upper half calcar- eous, erosional.
260.60	0.20	SANDSTONE: light-grey, fine-grained, ubiquitous small- scale cross-lamination, abundant coaly inclusions, some thin cross-bedded units of very fine-grained sands, strongly calcareous, erosional at base.
262.92	2.32	MUDSTONE: dark-grey, bottom 0.45m slightly ferruginous, 0.27m zone richly shelly in middle (Pelecypod), irregular basal contact.
263.65	0.73	SANDSTONE/SILTSTONE: top 0.25m fine to very fine-grained sandstone, passing below into argillaceous siltstone (few sandy zones),calcareous.
263.84	0.19	SILTSTONE: medium-grey, argillaceous, ferruginous, calcar- eous, highly crosional base.
	254.51 255.57 255.82 255.86 255.95 257.55 257.87 259.88 260.11 260.40 260.60 262.92	m m 254.51 1.19 255.57 1.06 255.82 0.25 255.86 0.04 255.95 0.09 257.55 1.60 257.87 0.32 259.88 2.01 260.11 0.23 260.40 0.29 260.60 0.20 262.92 2.32 263.65 0.73

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Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	264.03	0.19	SANDSTONE: light-grey, fine-grained, very clean and uniform, calcite fracture along bedding, calcareous, scoured base,
	266.10	2.07	MUDSTONE: dark-grey, locally ferruginous, 2cm shelly band, occasional silty streaks; bottom 0.14m very silty, eros-ional at base.
	266.40	0.30	SANDSTONE/SILTSTONE: top half very fine-grained, with laminated sandstone, rest siltstone; erosional at base, carbonized root lets), calcareous throughout.
	266.70	0.30	SANDSTONE: top 0.14m light-grey, fine-grained with ubiquitous small-scale cross-lamination, many burrows; rest at base very fine-grained, medium-grey sandstone all calcareous.
	267.19	0.49	SANDSTONE: light/medium-grey, fine-to very fine-grained, much small-scale cross-lamination, burrows, locally silty, calcareous, erosional at base.
	268.78	1.59	MUDSTONE: dark-grey, locally very silty, ferruginous nodules, vaguely laminated, calcareous, abrupt.
	269.75	0.97	SANDSTONE: light-grey, very fine-grained, small-scale cross-lamination throughout, some microdisturbed bedding, rame abundance of carbonized plant leaves and other debris abundantly burrowed (some 2cm wide and 8-10cm deep), brief silty laminae and thin layers, strongly calcareous.
	270.16	0.41	SANDSTONE: similar to above, but with higher silty content and more extensive burrowing (major disruption of laminae) strongly calcareous throughout.
	270.68	0.52	MUDSTONE/SANDSTONE: dark-grey, silty/muddy lithology incorporating ripples and lenticles of very fine-grained sand, some burrowing; bottom half dominantly muddy with silty/sandy wisps; patchy calcareous, gradational.
	271.49	0.81	MUDSTONE: dark-grey, wisps of silt , some burrowing, few Pelecypod shells at base; bottom 0.10m very silty/sandy and much bioturbation very gradational.
	272.45	0.96	MUDSTONE: dark-grey, locally silty; 0.12m Pelecypod shell band; middle 0.45m with fracture parallel to core axis, fragmented; basal 0.26m carbonaceous, silty (homogeneous ly) with many pyrite blobs, transitional.
	272.79	0.34	SILTSTONE: medium-grey, sequence characterized by exten- sive slumping; basal 0.07m with very fine-grained sands and distorted laminae (thin unit of sand calcareous).

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Dip o	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	275.19	2.40	MUDSTONE: sandy 60:40, shows well developed bedding and cross-bedding, occasional mudstone units with sharp boundaries, sands becoming coarser below, transitional.
	276.64	1.45	SANDSTONE: coarse-grained, interbedded argillaceous layers bedding poorly developed, coarser sands calcareous, occasional carbonaceous fragments and stringers; one zone of very disturbed material - mud lumps and rolls at 275.53m, abrupt below with conglomerate mudstone pebbles; slickensides at base.
	279.69	- 3.05	SANDSTONE: medium-grained, numerous carbonaceous stringers giving bedding and cross-bedding, patchily strongly calcareous, abrupt below.
	280.69	1.00	MUDSTONE: silty, carbonaceous, minor sandy zones showing disturbance slumping, transitional below.
	285.44	4.75	SANDSTONE: very argillaceous, 60:40, carbonaceous, minor disturbance, some bioturbation, large burrows, poorly bedded, towards base get some mudstones interbedded with sharp contacts, often showing loading or slumping, abrupt below.
	292.11	6.67	SANDSTONE: medium-grained, carbonaceous giving bedding, occasional large worm burrows, patchily calcareous, esomecially in relatively clean sands, becoming dirtier toward base, increase in disturbance, some bioturbation and slumping with occasional intraclasts, transitional below.
	298.48	6.37	SANDSTONE: interbedded mudstones, 60:40, amount of interbedding increases towards base, boundaries relatively sharp with some disturbance, sandstone generally calcareous and carbonaceous, transitional below, minor listric surfaces at 298m.
	302.7	4.30	MUDSTONE: sandy 70:30, interbedding disturbed and indistinct, numerous small burrows at top becoming heavily bioturbated by large and small at base, large intraclasts at base with glauconite patches in sands, transitional below. (Sukunkoid).
	306.36	3.58	SANDSTOJE: with mudstone interbeds, 60:40, interbedding irregular, but increasing to base, sands carbonaceous, poorly developed bedding showing well developed bioturbation with large and small burrows, muds sharp boundaries, some bioturbation, occasional pyritic clusters sometimes forming intraclasts in sands. Abrupt below, small well developed conglomerate, towards base slickensides at. 303.89m.

)ip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	309.94	3,58	MUDSTONE: relatively homogeneous, pyritic, coaly stringers becomes very coaly then, silty, carbonaceous throughout slickensides, broken, abrupt below.
			COAL SEAM 'E' ZONE
	311.43	1.49	CORE LOSS (actual depth unknown)
	311.61	81.0	COAL: dull, sheared 0.03m.
	311.66	0.05	COAL: bright
	311.68	0.02	COAL: dull
	311.73	0.05	COAL: bright, clear deformed.
	311.87	0.14	MUDSTONE: carbonaceous - 0.06m.
	312.03	0.16	COAL: bright and dull -0.07m.
	312.12	0.09	COAL: bright with dull bands.
	313.49	1.37	MUDSTONE: carbonaceous, planty gragments, numerous listric surfaces at base, transitional below, minor sandy zones showing disturbance.
	320.32	6,83	MUDSTONE: with interbedded sands 50:40, sandy units 1.0-1.25m thick, calcareous, carbonaceous, wiel developed and cross-bedding, some disturbance, slumping, rolling and bioturbation, intraclasts often with erosional contact muds, ferruginous bands, carbonaceous, minor sands, pyritic clusters, transitional below.
	321.22	0.90	MUDSTONE: very carbonaceous, numerous coaly stringers, occasional listric surfaces.
	321.40	0.18	COAL: dull with bright bands.
	321.50	0.10	SANDSTONE: medium-grained, carbonaceous.
	321.56	0.06	COAL: dull, metallic lustre.
	321.71	0.15	MUDSTONE: very coaly and carbonaceous.
	321.99	0.28	MUDSTONE: carbonaceous, planty fragments, minor listric surfaces.
	322.03	0.04	COAL:dull- bony.
	322.05 322.13	0.02	COAL: dull and bright. MUDSTONE: carbonaceous, very coaly.

BH Nos. 20

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Dip	DEPTH	THICKNESS	DESCRIPTION		
0	m	m			
	322.23	0.10	COAL: dull with bright bands less than 1mm thick.		
	322.33	0.10	MUDSTONE: carbonaceous, planty fragments.		
	322.42	0.09	COAL: bright, some slickensides.		
	323.13	0.71	MUDSTONE: carbonaceous, planty fragments, numerous listric surfaces.		
	323.23	0.10	COAL: bright with dull bands		
	323.63	0.40	MUDSTONE: carbonaceous, coaly stringers.		
	323.86	0.23	COAL: dull- 0.05m		
			dull with bright bands - 0.07m dull- 0.06m		
			bright and dull banded - 0.05m		
	324.31	0.45	MUDSTONE: carbonaceous, planty material, listric surfaces, broken.		
	329.61	5.30	MUDSTONE: sandy 50:50, bedding fairly well developed, junctions sharp but often disturbed and irregular, abrupt below, occasional pyritic clusters.		
	329.81	0.20	MUDSTONE: carbonaceous, coal stringers, with numerous listric surfaces.		
	330.17	0.36	COAL: dull metallic, sub-metallic lustre.		
	331.11	0.94	MUDSTONE: planty fragments,ccoaly stringers, broken with listric surfaces.		
	334.94	3.83	MUDSTONE: carbonaceous with planty fragments, occasional coaly stringers, abrupt below.		
	335.09	0.15	COAL 'D' SEAM: dull with bright layers (lmm.), metallic lustre - 0.10m		
:	335.39	0.30	COAL: dull,metallic lustre-0.25m.		
	335.69	0.30	COAL: dull sub-metallic lustre, cleat disturbed(0.25m).		
	346.14	10.45	MUDSTONE: with interbedded sands 60:40, sands-fine-medium grained, carbonaceous, poorly bedded, minor planty material, Coaly stringers in units of 0.70-0.80m, mudstones, carbonaceous, numerous planty fragments, occasional ferruginous bands, transitional below.		
	349.95	3.81	MUDSTONE: relatively homogeneous, ferruginous bands, minor silty zones, slickensides with minor broken zones.		

BH Nos.20

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Dip O	DEPTH	THICKNESS	DESCRIPTION
	m 253 70 :	10)	MIDCTONE 1
	351.70	1.75	MUDSTONE: homogeneous planty fragments, abrupt below.
	351.79	0.09	COAL SEAM 'C': metallic lustre.
	351.92	0.13	COAL: bright, broken.
	352.0	0.08	COAL: with conglomerate pebbles.
	374.22	22.22	CONGLOMERATE: well rounded, size from 0.5-3 cm, stick; transitional below. 0.30m of sand near base with pebbles, carbonaceous.
	386.66	12.44	SANDSTONE: medium-grained, fairly clean and homogeneous, numerous pebbles in layers through top 1.5m, decreasing downwards, bedding poorly developed in frequent mudstone layers.
	387.66	1.00	SANDSTONE: coaly stringers and partings, medium-fine-grained.
	387.78	0.12	CONGLOMERATE: heterogeneous in size, abrupt below, sub- angular pebbles.
	387.87	0.09	COAL SEAM 'B': bright
	387.96	0.09	COAL: dull metallic lustre.
	388.06	0.10	COAL: dull and bright banded.
ı	388.20	0.14	SANDSTONE: medium-grained, very carbonaceous, coaly, disturbed, slumping.
	388.66	0.46	COAL: dull metallic lustre, broken.
	389.16	0.50	SANDSTONE: medium-grained, carbonaceous, abrupt below.
	389.26	0.10	COAL: bright, broken
	399.86	10.60	SANDSTONE: medium-grained, dark-grey, occasional carbon-aceous stringers—giving bedding minor cross-bedding, occasional coaly stringers near top. Dip on cross-bedding ing 45(?)becoming carbonaceous towards the base with minor coaly stringers.
	408.33	8.47	CONGLOMERATE: well-rounded, size varies from 0.5cm - 2-3 cm, abrupt below, becomes a very coarse sandstone at base.
:	418.69	10.36	SANDSTONE: medium-grained, clean, very poorly developed bedding, carbonaceous, occasional pebbles and intraclasts.

BH Nos. 20

qid	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	425.20	6.51	SANDSTONE: with interbedded conglomerate($\sqrt{0}:30$) forming 0.5-1.5m units, sands medium-grained, becoming more disturbed and bioturbated towards the base, boundaries sharply clean. abrupt below with a conglomerate at base.
	445.70	20.50	SANDSTONE: medium-grained, vaguely calcareous, poorly bedded, stick, fairly homogeneous and clean.
			GATES SUKUNKA
		•	l l
			SANDSTONE/MUDSTONE: light-grey, very fine-grained to fine-grained sandstone, slightly calcareous, well-sorted, finely laminated with occasional low-angle small-scale crossbeds, lower contact always sharp (erosional), upper contact sometimes sharp, mostly gradational into black mudstone, also occurs as massive irregularly shaped beds, lenses often developed, burrowed, contacts usually diffuse and gradational with black mudstone, burrowed (small-scale mostly) bioturbated. sometimes the two lithologies are intimately mixed together.
	449.58	3.88	SANDSTONE (35%)/MUDSTONE (55%)/MIXED (10%): finely laminated sandstone.
	451.18	1.60	SANDSTONE (40%)/MUDSTONE (50%)/MIXED (10%): three slick- ensided surfaces 0.02m apart.
	452.62	1.44	SANDSTONE (30%)/MUDSTONE (40%)/MIXED (30%)
	455.67	3.05	SANDSTONE (40%)/MUDSTONE (50%)/MIXED (10%)
	458.72	3 . 05	SANDSTONE (40%)/MUDSTONE (40%)/MIXED (20%): one slicken- sided surface at +1.47m, zone of heavy burrowing between 1.82-1.98m, large scale burrows, two slickensided surface between 1.99-2.05m and two slickensided surfaces between 3.00-3.05m.
:	461.72	3.00	SANDSTONE (40%)/MUDSTONE (30%)/MIXED (30%): three slick-ensided surfaces between 0.95-1.30m 0.10-0.05m apart, one slickensided surface at 1.51m (high).
	464.82	3.10	SANDSTONE (30%)/MUDSTONE (55%)/MIXED (15%): mudstone is becoming silty (more silty than before), it is heavily burrowed (small-scale), gradational but rapid change.
	467.86	3.04	SANDSTONE (30%)/SILTY MUDSTONE (60%)/MIXED (10%): one slickensided surface at 2.51m.

BH Nos. 20

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
	470.91	3.05	SANDSTONE (30%)/SILTY MUDSTONE (65%)/MIXED (5%): five slickensided and listric surfaces between 2.17-2.61m, 0.10-0.05m apart. Sandstone of this unit is lithologically similar to that of the preceeding unit, but occurs only as thin wisps. The mudstone is black silty and locally heavily bioturbated (small-size).
	473.96	3.05	SANDSTONE (30%)/MUDSTONE (70%): mudstone increasing to 95%.
	477.01	3.05	SANDSTONE (10%)/MUDSTONE (90%): core slightly broken between 2.21-3.03m.
	478.01	1.00	SANDSTONE (15%)/MUDSTONE (85%): light-grey, very fine-to fine-grained sandstone, finely laminated, well-sorted, sharp lower contact, often upper contact sharp as well, massive, poorly to moderately well-sorted, burrowed, slumped, sandstone often intimately mixed with silty mudstone, heavily burrowed, slumped, bioturbated black mudstone, silty, burrowed plus small shell fragments scattered throughout.
	480.06	2.05	SANDSTONE (30%)/MUDSTONE (5%)/MIXED (65%): two slicken-sided surfaces between 1.24-1.30m.
	483.10	3.04	SANDSTONE (20%)/MIXED (75%)/MUDSTONE (5%):slickensided
	486.15 489.20	3.05 3.05	surfaces at 0.33, 0.79 and 2.51m. SANDSTONE (20%)/MIXED (75%)/MUDSTONE (5%) slickensided at SANDSTONE (20%)/MIXED (30%)/MUDSTONE (50%): one slicken- sided surface at 0.68m
	492.25	3.05	SANDSTONE (40%)/MIXED (50%)/MUDSTONE (10%)
	495.30	3.05	SANDSTONE (30%)/MIXED (70%)
	498.35	3.05	SANDSTONE (30%)/MIXED (70%)
	501.40	3.05	SANDSTONE (30%)/MIXED (70%)
	504.44	3.04	SANDSTONE (35%)/MIXED (60%)/MUDSTONE (5%): eight slicken- sided surfaces between 0.96-3.04m, 0.18-0.40m apart.
	507.49	3.05	SANDSTONE (25%)/MIXED (70%)/MUDSTONE (5%)
	510.54	3.05	SANDSTONE (40%)/MIXED (55%)/MUDSTONE (5%): salt and peppe medium-grained-coarse-grained sandstone appears as thin bands and sprinkling of individual grain throughout core. Small coaly inclusion at 0.10m from the bottom.

BH Nos. 20

Dip o	DEPTH m	THICKNESS m	DESCRIPTION
			SANDSTONE/MUDSTONE: medium-grey, fine-to medium-grained sandstone, slightly calcareous, well-sorted in segregated bands of equal grain size, finely-laminated to low-angle cross-beds, occasionally slumped with black mudstone inter beds as partings, sometimes burrowed (small-scale). Both lithologies occasionally mixed intimately together, also occasional thin black muddy intraclastic beds in the sandstone.
	513.58	3.04	SANDSTONE (75%)/MUDSTONE (23%)/MIXED (2%): developed listric surfaces.
	516.63	3.05	SANDSTONE (80%)/MUDSTONE (20%): mixed, slickensided surfaces at 0.53, 0.77, 0.94, 1.86 and 2.06m.
	519.68	3.05	SANDSTONE (65%)/MUDSTONE (15%)/MIXED (20%): one slicken- sided surface at 0.65m.
	522.73	3.05	SANDSTONE (60%)/MUDSTONE (20%)/MIXED (20%): around this level the sandstone interbeds become much thinner and decreasingly mixed, mudstone intervals are also heavily burrowed, gradational.
	525.78	3.05	SANDSTONE (40%)/MUDSTONE (50%)/MIXED (10%): sandstone more and more often appears as thin wisps of sands.
	528.82	3.04	SANDSTONE (35%)/MUDSTONE (45%)/MIXED (20%)
·	531.87.	3.05	SANDSTONE (35%)/MUDSTONE (50%)/MIXED (15%)
	534.92	3.05	SANDSTONE (30%)/MUDSTONE (70%): sandstone mostly as thin irregular bands,often massive and sometimes burrowed and slumped.
į	537.97	3.05	SANDSTONE (30%)/MUDSTONE (70%): laminated sandstone bet- ween 0.58-1.09m.
	541.02	3.05	SANDSTONE (30%)/MUDSTONE (70%): bottom 0.37m core slightly broken.
	544.06	3.04	SANDSTONE (25%)/MUDSTONE (75%): one high angle slicken- sided surface with calcite— at top of section, numerous medium size burrows scattered throughout,2.50-3.02m core broken up lengthwise.
	547.11	3.05	SANDSTONE (20%)/MUDSTONE (80%): one high-angle slicken-sided surface at 0.42m; brecciated cores with calcite at 1.15-1.20m; core shattered at 1.78-1.85m; core broken lengthwise (locally) between 2.05 to 3.00m.

BH Nos. 20

Dip	DEPTH	THICKNESS	DESCRIPTION
0	in	m	
	549.24	2.13	SANDSTONE (20%)/MUDSTONE (80%): at 0-1.65m,core broken lengthwise in section up to 0.70m, core shattered between 1.94-2.05m.
	552.29	3.05	SANDSTONE (25%)/MUDSTONE (75%)
	555.34	3.05	SANDSTONE (25%)/MUDSTONE (75%)
	558.39	3.05	SANDSTONE (25%)/MUDSTONE (75%)
	559.30	0.91	SANDSTONE (20%)/MUDSTONE (80%)
	562.35	3.05	SANDSTONE (20%)/MUDSTONE (80%)
	565.40	3.05	SANDSTONE (15%)/MUDSTONE (85%): between 1.59-1.78m core broken lengthwise plus one slickensided surface.
	568.45	3.05	SANDSTONE (15%)/MUDSTONE (85%)
	570.79	2.34	SANDSTONE (15%)/MUDSTONE (85%)
	577.80	7.01	SANDSTONE (10%)/MUDSTONE (90%): between 1.50-3.01 core broken in thin slices at high-angle but only occasional slickensides; between 0-1.31m core broken in thin slices but only occasional slickensides; between 1.82-3.00m core broken up in small pieces but only occasional slickensides
			SUKUNKA
			MOOSEBAR
	579.73	1.93	MUDSTONE: black, massive mudstone with occasional pyrite and ferruginous bands.
	582.78	3.05	MUDSTONE: black, massive.
	585.83	3.05	MUDSTONE: black, massive, between 1.90-3.05m core badly broken up but no associated slickensided or listric surfaces.
	588.87	3.04	MUDSTONE: black, massive, between 1.42-2.02m core broken up lengthwise.
	591.00	2.13	MUDSTONE: black, between 0.84-1.52m core badly broken up but no slickensided surfaces.
1	592.53	1.53	MUDSTONE: black, core broken lengthwise.
	593.44	0.91	MUDSTONE: black, core broken lengthwise, shattered over thin intervals.

BH Nos. 20

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	549.24	2.13	SANDSTONE (20%)/MUDSTONE (80%): at 0-1.65m,core broken lengthwise in section up to 0.70m, core shattered between 1.94-2.05m,
	552.29	3.05	SANDSTONE (25%)/MUDSTONE (75%)
	555.34	3.05	SANDSTONE (25%)/MUDSTONE (75%)
	558.39	3.05	SANDSTONE (25%)/MUDSTONE (75%)
	559.30	0.91	SANDSTONE (20%)/MUDSTONE (80%)
-	562.35	3.05	SANDSTONE (20%)/MUDSTONE (80%)
	565.40	3.05	SANDSTONE (15%)/MUDSTONE (85%): between 1.59-1.78m core broken lengthwise plus one slickensided surface.
	568.45	3.05	SANDSTONE (15%)/MUDSTONE (85%)
	570.79	2.34	SANDSTONE (15%)/MUDSTONE (85%)
	577.80	7.01	SANDSTONE (10%)/MUDSTONE (90%): between 1.50-3.01 core broken in thin slices at high-angle but only occasional slickensides; between 0-1.31m core broken in thin slices but only occasional slickensides; between 1.82-3.00m core broken up in small pieces but only occasional slickensides
			SUKUNKA MOOSEBAR
	579.73	1.93	MUDSTONE: black, massive mudstone with occasional pyrite and ferruginous bands.
	582.78	3.05	MUDSTONE: black, massive.
	585.83	3.05	MUDSTONE: black, massive, between 1.90-3.05m core badly broken up but no associated slickensided or listric surfaces.
	588.87	3.04	MUDSTONE: black, massive, between 1.42-2.02m core broken up lengthwise.
	591.00	2.13	MUDSTONE: black, between 0.84-1.52m core badly broken up but no slickensided surfaces.
	592.53	1.53	MUDSTONE: black, core broken lengthwise.
	593.44	0.91	MUDSTONE: black, core broken lengthwise, shattered over thin intervals.

BH Nos. 20

Dip	DEPTH	THICKNESS	DESCRIPTION
0	aı	m	
	596.79	3.35	MUDSTONE: black, core broken, lengthwise especially but no slickensided or listric surfaces.
	598.93	2.14	MUDSTONE: black, between 1.44-2.10m core shattered, no slickensided or listric surfaces.
	600.76	1.83	MUDSTONE: black, between .97-1.50m core shattered.
	602.58	1.82	MUDSTONE: black, between 0.50-1.55m core broken lengthwise
	603.50	0.92	MUDSTONE: black, core broken lengthwise.
·	604.72	1.22	MUDSTONE: black, core broken lengthwise.
	607.77	3.05	MUDSTONE: black, core broken up in small slices between 0.10-0.20m and 0.0-1.51m.
	609. 29	1.52	MUDSTONE: black.
	612.34	3.05	MUDSTONE: black.
	614.78	2.44	MUDSTONE: black, core broken in small pieces between 0.0-0.27m.
	625.66	10.88	MUDSTONE: black,
	649.57	23.91	MUDSTONE: generally homogeneous, black, silty in places, byritic clusters common. Ferruginous band with calcite illed fracturesat 632.15. Bentonite band 0.05m thick at 633.98. Ferruginous band with calcite filled fractures at 637.64, broken stick. Bentonite band with worm burrows, 0.01m thick at 638.25. Ferruginous band at 641.29 and 642.51.
·	649.98	0.41	MUDSTONE: dark-grey, silty, pyrite specks throughout, occasional plant remains, broken stick.
	650.05	0.07	MUDSTONE: medium-grey, reworked bentonite layers and burrows (pin), broken stick.
	650.17	0.12	MUDSTONE: dark-grey, silty, pyritized worm burrows, occasional bentonite.
	650.24	0.07	MUDSTONE: light-grey-green, soapy texture(probably bent-onitic) broken stick.
	650.95	0.71	SANDSTONE: grey-green, medium-grained, intensely bioturb- ated, glauconitic, argillaceous, carbonized plant debris, stick.
	650.99	0.04	MUDSTONE: dark-grey, silty, slightly carbonaceous, very broken.

BH Nos. 20

Dip	DEPTH	THICKNESS	DESCRIPTION
	m	m	
	651.13	0.14	SANDSTONE: grey-green, medium-grained, bioturbated, base irregular.
	651.14	0.01	PYRITE: nodules, coal stringers, coaly mudstone with listric surfaces, base irregular.
			MOOSEBAR
		•	GETHING
			BIRD SEAM
	651.19	0.05	COAL: dull with pyrite nodule, listricated.
	651.23	0.04	COAL: dull banded.
	651.26	0.03	COAL: dull lustrous,
	651.34	0.08	COAL: dull/bright
	651.45	0.11	COAL: dull lustrous
	651.50	0.05	COAL: dull/bright
	651.51	0.01	COAL: bright, lmm cleated parallel to core axis.
	651.67	0.16	COAL: dull banded
	651.68	0.01	COAL: bright, 2mm cleats
	651.70	0.02	COAL: dull banded.
	651.75	0.05	COAL: dull and bright
	651.85	0.10	COAL: bright with occasional dull bands plus Imm cleats.
	651.91	0.06	COAL: dull/bright, with pyrite band
	651.93	0.02	COAL: dull
	652.0	0.07	COAL: dull/bright becoming brighter to base,indistinct cleats.
	652.01	0.01	COAL: dull
	652.05	0.04	COAL: dull/bright, 45° slip plane.
[652.21	0.16	COAL: dull with listric surfaces.
	652.25	0.04	COAL: bright banded.

BH Nos. 20

Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	652.32	0.07	COAL: sheared.
	652.35	0.03	COAL: dull (?), core loss.
	652.40	0.05	COAL: dull lustrous, broken.
	652.48	0.08	COAL: dull, broken stick.
	652.53	0.05	COAL: dull lustrous.
	652.60	0.07	COAL: dull with listric surfaces.
	652.64	0.04	COAL: dull sheared.
	652.84	0.20	COAL: lustrous with bright bands.
	652.87	0.03	COAL: bright/dull 50/50, sub-mi croscopic banding
	652.90	0.03	COAL: lustrous, dull with occasional bright bands, intensel
	652.92	0.02	COAL: dull/bright, listricated at 30°.
	652.96	0.04	COAL: dull/lustrous.
	653.00	0.04	COAL: dull/bright.
	653.03	0.03	PYRITE: with coaly stringers.
	653.16	0.13	COAL: dull with occasional bright bands listricated to sheared.
	653.36	0.20	COAL: dull to slightly lustrous, stick.
	653.58	0.22	COAL: dull, friable, with occasionalbright bands with listric surfaces throughout coal less friable in basal 13cm.
	653.60	0.02	COAL: fragments, dull/bright with duff.
	654.01	0.41	SANDSTONE: medium-grey, medium-grained, distinct mottled appearances, intense bioturbation, carbonaceous at top, irregular listricated contact with coal, broken stick, with fractures 0.09m from base, core badly broken with listric surfaces 11°, fractured at base with calcite filling.
	655.73	1.72	SANDSTONE: as above, with occasional remnants of primary laminations, calcite fracture 43cm from base at 70°.

BH Nos. 20

Dip	DEPTH m	THICKNESS m	DESCRIPTION
	657.45	1.72	SANDSTONE: dark-grey, medium-grained (maybe medium/coarse-grained), distinctly mottled appearance; occasional silty clasts, few coaly inclusions, well-sorted, siliceous, non-calcareous.
	659.18	1.73	SANDSTONE: identical to above; locally some cross-strati- fication.
	660.90	1.72	SANDSTONE: medium-grey, medium-grained, locally fine/med- ium-grained intervals, well cross-bedded, weakly calcare- ous.
	662.62	1.72	SANDSTONE: medium to light-grey, fine/medium-grained, generally clean and well-sorted, cross-bedded, fairly calcareous.
	664.27	1.65	SANDSTONE: as above, more calcareous than above.
	665.95	1.68	SANDSTONE: light-grey, fine/medium-grained, very uniform locally, poor cross-lamination, strongly calcareous.
	667.47	1.52	SANDSTONE: identical to above, very strongly calcareous.
	669.05	1.58	SANDSTONE: identical to above, very strongly calcareous.
	670.56	1.51	SANDSTONE: as above, fairly calcareous.
erriber im falle for de falle falle de falle falle de falle falle falle de falle fal	672.08	1.52	SANDSTONE: light/medium-grey, dominantly very fine-grained, sporadically laminated; 0.14m muddy bands, sands very argillaceous, basal 0.30m zone fine-grained with occasion al silty laminae, top 0.25m yielding along laminae, calcareous.
	673.61	1.53	SANDSTONE: similar to the above interval, strongly calcareous.
	674.93	1.32	SANDSTONE/SILTSTONE: dark-grey, rapidly alternating bands of very fine-grained laminated sands and siltstones, some argillaceous layers, abundant finely broken and carbon-ized plant debris.
	675.23	0.30	SANDSTONE/SILTSTONE: identical to above, strongly calcareous.
	675.33	0.10	MUDSTONE/SANDSTONE: slight dominance of sand, interlayered carbonaceous, bottom 0.06m Shell Band.
	675.78	0.45	SMEETER SEAM COAL SEAM: Skeater Horizons, top 0.32 dull lustrous and dull banded coal; rest at basec oaly mudstone and some dense, high ash coal.

BH Nos. 20

Dip O	DEPTH m	THICKNESS m	DESCRIPTION
	675.88	0.10	MUDSTONE: black, carbonaceous, listricated, transitional at base
	675.98	0.10	SILTSTONE: medium-grey, abundant plant remains, structure less, slightly argillaceous.
	676.07	1.09	SILTSTONE/SANDSTONE: silty, identical to above, sandstone very fine-grained.
	676.37	0.30	SILTSTONE: medium-grey, plant remains, structureless.
	676.82	0.45	SANDSTONE: light/medium-grey, fine/medium-grained, medium-scale cross-lamination, strongly calcareous, passage below by interbedding.
	677.02	0.20	SILTSTONE/MUDSTONE: medium/dark-grey, dominance of mud, sporadically laminated, weakly calcareous, gradational.
,	677.50	0.48	SANDSTONE: light-grey, medium-grained, generally well-sorted and clean, bottom 0.20m with minor silty intercalactions; strongly calcareous; 70° fracture to core axis (calcite infilled).
	678.25	0.75	SANDSTONE: top 0.09m identical to above, followed by locm of very fine-grained sand; rest fine/medium-grained sand, massive to frequently cross-stratified, strongly calcareous; very clean basal contact and listricated.
	678.45	0.20	SILTSTONE: medium-grey, richly argillaceous, ferruginous, sporadic laminations, calcareous.
	679.30	0.85	SANDSTONE: dark-grey, highly silty, ferruginous nodules, vaguely laminated (widely spaced), very strongly calcareous
	680.03	0.73	SILTSTONE/MUDSTONE: medium to dark-grey, laminated, locally somewhat banded; sequence characterized by highly brecciated zones, which are recemented pieces of banded or of other mudstone (some ferruginous), much brittle fracturing, calcareous.
	682.03	2.00	MUDSTONE: top half dark-grey, highly fractured and frag- mented mudstone; lower half essentially a fault breccia as described above; patchily calcareous.
	682.50	.0.47	SANDSTONE: dark grey, widely spaced, thin silty layers many listricated surfaces, patchily calcareous
	683.15	0.65	MUDSTONE: dark-grey, locally carbonaceous, slightly silty and ferruginous, listricated
	683.25	0.10	MUDSTONE: similar to above, abrupt with coal below. COAL: highly pulverized and powdered, type unknown.

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Dip	DEPTH	THICKNESS	DESCRIPTION
0	m	m	
	683.57	0.07	MUDSTONE: dark-grey, richly carbonaceous, silty, gradation
	684.02	0.45	SILTSTONE: medium-to dark-grey, argillaceous, lower part sandy strongly calcareous throughout, some slumping, abun- dant carbonized plant debris.
	685.49	1.47	SANDSTONE/SILTSTONE: medium-to dark-grey, top half dominantly very fine-grained sandstone, argillaceous with small-scale cross-lamination, much slumping; rest argillaceous siltstone, irregularly laminated, much carbonized plant debris, very strongly calcareous.
	687.06	1.57	SANDSTONE: medium-grey, very fine-grained, many silty intervals, irregular to wavy parallel lamination, some slumping, micro-graded units, finely macerated, carbon-aceous matter incorporated in matrix; very strongly calcareous throughout.
	689.57	2.51	SANDSTONE: very similar to above minus slumping, strongly calcareous, passage below by interbedding.
	689.88	0.31	SANDSTONE: light/medium-grey, fine-grained, some silty intercalations, micro-erosional features, strongly calcareous.
	690.35	0.47	SANDSTONE: light/medium-grey, fine-to very fine-grained, ubiquitious small-scale cross-lamination, few burrows, very strongly calcareous; gradational.
	691.19	0.84	SANDSTONE/SILTSTONE: medium-grey, interbedded sequence of very fine-grained argillaceous sandstone and argillaceous coarse-grained siltstone, ubiquitous lamination, some very small-scale cross-laminated units, syndepositional disturbance (small-scale), finely broken carbonaceous matter in matrix, micro-grading, strongly calcareous.
	691.35	0.16	MUDSTONE: dark-grey, silty to siltstone thinly bedded.
	692.88	1.53	SILTSTONE: dark-grey, interbedded with grey mudstone, becoming laminated, increasingly argillaceous to base.
	693.19	0.31	MUDSTONE: dark-grey, silty, thinly bedded.
	693.27	0.08	MUDSTONE: dark-grey, silty becoming slightly carbonaceous to base, listric surfaces at base.
			CHAMBERLAIN SEAM
	693.34	0.07、	COAL: bright, intensely cleated at 80°, major listric surface at base 65°.
	693.37	0.03	COAL: dull/lustrous foliated listrications.

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DII 7.05. 2-				
Dip o	DEPTH m	THICKNESS m	DESCRIPTION	
	693.41	0.04	COAL: bright banded, listricated.	
	693.46	0.05	COAL: dull with bright bands, listric surfaces at 60°.	
	693.51	0.05	COAL: dull, lustrous with bright bands, intensely cleated.	
	693.54	0.03	COAL: dull with occasional bright bands.	
	693.57	0.03	COAL: dull, bright, thinly banded, core broken to roof.	
	693.60	0.03	MUDSTONE: dark-grey, carbonaceous with coal streaks and listric surfaces, light-brown streaks.	
	693.67	0.07	MUDSTONE: dark-grey as above, becoming coaly to base.	
	693.74	0.07	CORE LOSS-ROCK	
	693.97	0.23	CORE LOSS-COAL	
	694.02	0.05	FRAGMENTS OF MUDSTONE: coaly,coal, dull.	
	694.05	0.03	COAL: dull, broken	
	694.10	0.05	COAL: lustrous, badly broken	
<i>;</i>	694.21	0.11	MUDSTONE: dark-grey, carbonaceous, coal streaks, listric surfaces.	
	694.37	0.16	COAL: dull and bright, predominantly bright 9.08m from base sheared, listric surfaces throughout, broken stick B.S.)	
}	694.49	0.12	COAL: dull, bright, thin bedded, B.S.	
	694.55	0.06	COAL: bright, thinly banded, granular, B.S., structure to base, listric surfaces.	
	694.61	0.06	COAL: dull with bright bands, large sub-horizontal listric surfaces through core.	
	694.65	0.04	COAL: lustrous, 30° listric surface.	
A CONTRACTOR OF THE CONTRACTOR	694.69	0.04	COAL: dull, bright, thinly banded from bright band at top, $2 \mathrm{nm}$ cleats at 80° .	
	694.73	0.04	COAL: lustrous, listricated.	
	694.79	0.06	COAL: dull, lustrous, with occasional bright bands, 2 intersecting listric surfaces at top of core at 30°, partly cleated.	

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Dip	DEPTH	THICKNESS	DESCRIPTION .
0	m	m m	
	694.88	0.09	FRAGMENTS: large, mixed, dull bright, lustrous.
	694.96	0.08	CORE LOSS-COAL
	695.11	0.15	COAL: dull lustrous with occasional bright bands, ,B.S.,
	695.31	0.20	COAL: lustrous with thin, bright bands sheared at base, becoming brighter to base.
	695.43	0.12	COAL: dull bright, with listric surfaces, (B.S.)
	695.52	0.09	COAL: dull lustrous and bright, core broken into large fragments.
	695.57	0.05	CORE LOSS-COAL
	695.69	0.12	COAL: predominantly bright, highly S., listricated , VBS.
	695.77	0.08	COAL: dull, bright, listricated B.S.
	695.84	U.07	COAL: Tustrous with bright bands, core broken, friable.
	695.93	0.09	COAL: bright with dull bands, highly slickensided ,8.S.,
	696.00	0.07	CORE LOSS-ROCK
	696.08	0.08	FRAGMENTS OF MUDSTONE: coaly, with coal streaks, highly listricated.
	696.45	0.37	CORE LOSS-COAL
;	696.57	0.12	MUDSTONE: dark-grey, carbonaceous at top, listric surfaces throughout, slickensided.
	696.68	0.11	MUDSTONE: as above, with fewer sticks.
	696.75	0.07	MUDSTONE: as above, B.S.
:	697.68	0.93	MUDSTONE: as above becoming less carbonaceous to base, lmm Coal band at base, irregular basal contact.
	698.30	0.62	SANDSTONE: grey, medium-grained, distinctly mottled, carbonaceous at top, occasional thin mudstone laminae with coal traces.
The second secon	699.05	0.75	SANDSTONE: dark-grey, medium-grained, dominantly cherty, occasional semblance of sedimentary lamination, otherwise distinctly mottled, non-calcareous, well-sorted.
	699.78	0.73	SANDSTONE: very similar to above, slightly finer-grained.

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Dip o	DEPTH m	THICKNESS	DESCRIPTION
	700.43	0.65	SANDSTONE: as above, cross-laminated,fine-to medium- grained, very weakly calcareous.
	701.95	1.52	SANDSTONE: medium-grey, medium-grained, regularly cross-stratified; few intercalations of fine sand, also some silty, muddy intervals (0.04m), micaceous, some suggestion of burrowing as evidenced by disturbance of lamination, calcareous.
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