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GEOLOGICAL EVALUATION
OF
EL 6/79
CATAMARAN

VOLUME 1

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MICROFILMED

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DATE: MARCH, 1984

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(b) Mineralogical Report No. 3752 by Pontifex and Associates Pty. Ltd., July, 1982.

(c) Brief Petrological Report on Samples 1-7 for Marathon Petroleum Australia Limited by Dr. K.R. Martin, December, 1982.

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1.0 SUMMARY

E.L. 6/79 was granted to MPAL on May 16. 1980. Since granting, a photogeological study; ground magnetic, gravity and aeromagnetic surveys; landsat study; and two drilling programme have been carried out. Twenty holes totalling 2289 m of chip and 873 m of coring have been completed.

The tenement covers Triassic sediments intruded by Jurassic dolerite occurring in fault bounded blocks on the south western edge of the Tasmanian Basin. Within the area the coal target is the uppermost prospective part of the Triassic sequence (the Triassic Coal Measures). A prospective coal interval (Coal Interval A) has been intersected within these Coal Measures and intersections range in thickness from 1.8 m to 4.0 m.

An inferred open cut and shallow underground in situ coal resource has been outlined in Coal Interval A in the northern part of the area.

The coal within the Coal Interval A is a low sulphur, orthohydrous, high volatile bituminous steaming coal. Generally the coal type is dull and high in mineral matter which is typical of coals from the Tasmanian basin. Raw coal quality is air dried moisture 6.4%, ash 49%, specific energy 12.00 MJ/kg and total sulphur 0.38%. Washed coal quality from holes CA 106F and CA 111F is average yield 69.5%, ash 24.8%, specific energy 23.00 MJ/kg and total sulphur 0.32%.

Further work in E.L. 6/79 is designed to improve the confidence level of the resource for the northern area and to drill the other areas of the E.L. that remain untested. Drilling to date has indicated that only Coal Interval A is prospective, but further work should continue to test some of the lower coal intervals to determine whether there is any improvement in their quality.

2.0 INTRODUCTION

This report covers exploration carried out by Marathon Petroleum Australia, Ltd. (MPAL) on E.L. 6/79 Catamaran since May, 1980 when the licence was granted.

MPAL initially applied for an area of 520 km^2 on 15/2/79. However a government committee (South-West Advisory Committee, SWAC) was conducting a land use study over part of this area and the E.L. was not granted until 16/5/80 over a reduced area of 136 km^2 which excluded the SWAC study area.

Exploration work has been reported to the Tasmanian Government in ten quarterly, five six-monthly reports and one Annual report. These are detailed below:-

1st Quarterly Progress Report for the period 16/5/80 to 15/8/80 (Letter Report).

1st Six Monthly Progress Report for the period 16/5/80 to 15/11/80 (MPAL Report 1980/03)

2nd Quarterly Progress Report for the period 16/8/80 to 15/11/80 (Letter Report)

3rd Quarterly Progress Report for the period 16/11/80 to 15/2/81 (Letter Report)

2nd Six Monthly Progress Report for the period 16/11/80 to 15/5/81 (MPAL Report 1981/26)

4th Quarterly Progress Report for the period 6/5/81 to 15/5/81 (Letter Report)

5th Quarterly Progress Report for the period 16/5/81 to 15/8/81 (MPAL Report 1981/28)

3rd Six Monthly Progress Report for the period 16/5/81 to 15/11/81 (MPAL Report 1981/44)

7th Quarterly Progress Report for the period 16/11/81 to 15/2/82 (Letter Report)

4th Six Monthly Progress Report for the period 16/11/81 to 15/5/82 (MPAL Report 1982/06)

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8th Quarterly Progress Report for the period 16/2/82 to 15/5/82 (Letter Report)

9th Quarterly Progress Report for the period 16/5/82 to 15/8/82 (Letter Report).

Annual Progress Report for the period 16/11/81 to 15/11/82 (MPAL Report 1982/32).

11th Quarterly Progress Report for the period 15/11/82 to 15/2/83 (Letter Report).

6th Six Monthly Progress Report for the period 16/11/82 to 15/5/83 (MPAL Report 1983/16).

13th Quarterly Progress Report for the period 16/5/83 to 15/8/83 (Letter Report).

3.0 LOCATION AND ACCESS

E.L. 6/79 Catamaran is located at approximately 43° 30'S, 147°E and is 110 km by road south of Hobart on the southeast coast of Tasmania (Figure 3.1).

Access to the area from Hobart is by the sealed road which passes through Huonville, Geeveston and Dover, before terminating at Southport. An A grade, all weather access dirt road branches off the main road near Southport and passes into the area via Lune River and Ida Bay. Sections of this road are being upgraded by the government.

Access within the E.L. is by all weather forestry roads and roads dating from the beginning of the century. The area has been a base for a large sawmilling industry since the early 1890's.

Movement off these forestry roads is extremely difficult due to the steep slopes and dense vegetation on the hills or the soft swampy ground and thick grasses on the lowland.

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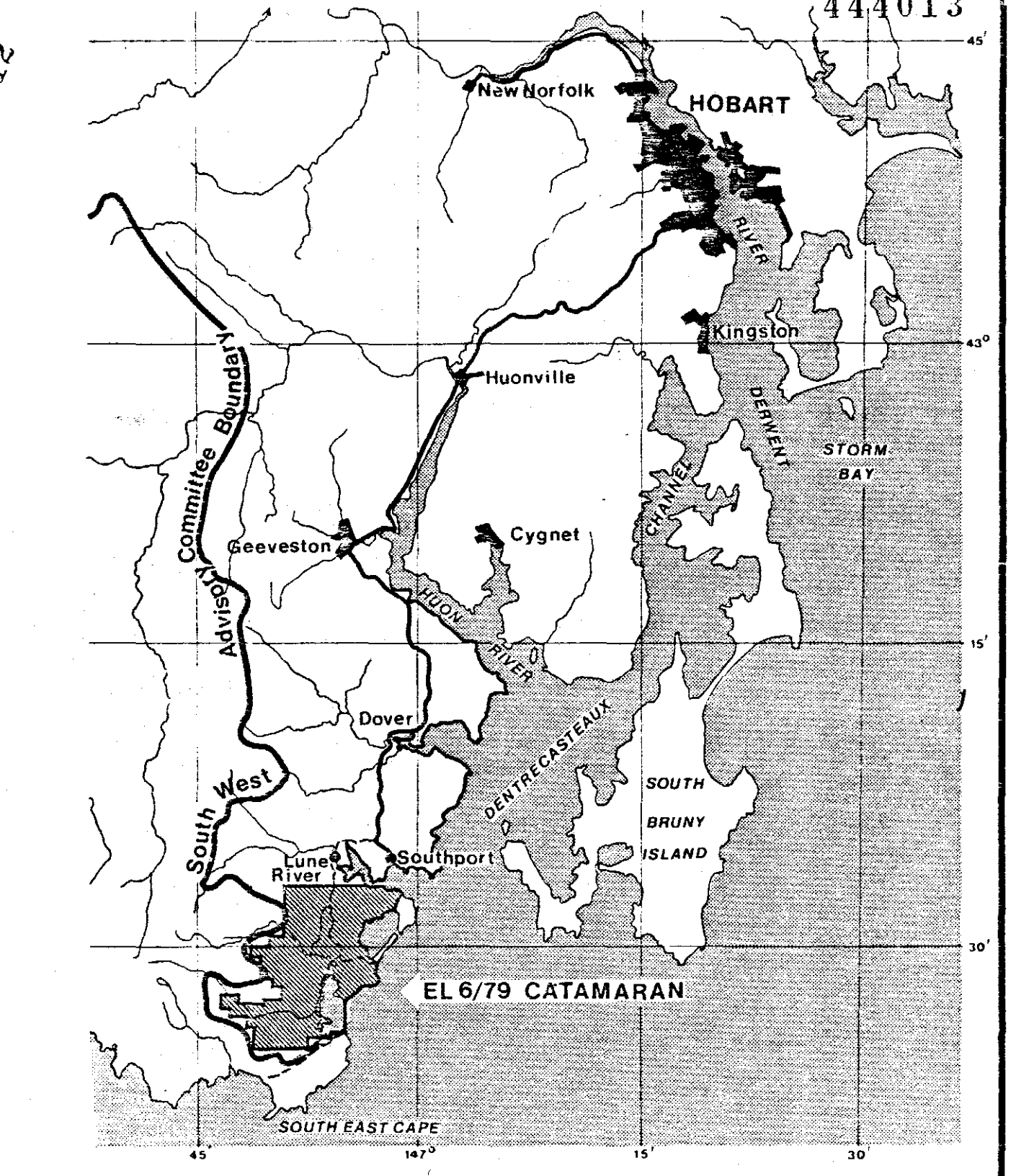

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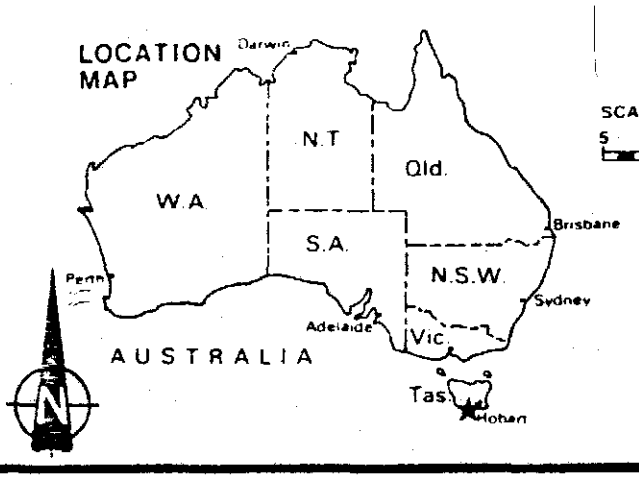

FIGURE 3-1

Marathon Petroleum Australia, Ltd.
BRISBANE AUSTRALIA

TASMANIA PROJECT

Mapped by Tas. Lands
Drawn by L.R. Date Aug'82

Plan No C1C45

4.0 PHYSICAL SETTING

4.1 Relief and Drainage

The regional topography rises from sea level up to 514 m on Lune, Sugarloaf and again further to the west to approximately 1000 m (Figure 4.1).

The western part of the area is a deeply dissected and densely timbered region of rugged topography with mountain peaks and numerous small streams.

The eastern part of the area forms low-lying swampy plains which are vegetated mostly with cutting-grass and button-grass. Isolated hills are densely timbered and exploited for forestry products.

Many watercourses drain the area - the two most important are the D'Entrecasteaux and Catamaran Rivers - these are both perennial eastward flowing rivers.

4.2 Land Usage

Most of the forests within the area have at one time or another undergone intensive sawmilling operations. These operations are continuing today with the Forestry Department revegetating areas to ensure further adequate timber supplies for the future use.

The only populated community within the area is at Catamaran, permanent population of less than 20, where holdiay homes and retirement houses are located along the coastline.

4.3 Vegetation

The vegetation of the area is typical of the coastal region of the Tasmania Basin, that is dry and wet Sclerophyll forest, temperate rain-forest and swampy grasslands (Figure 4.2). The different types of vegetation seem to correlate roughly with the lithological types. The forest type vegetation seems to be found associated with Jurassic dolerite and Tertiary basalts, while low swampy grassland is associated with Triassic sediments.

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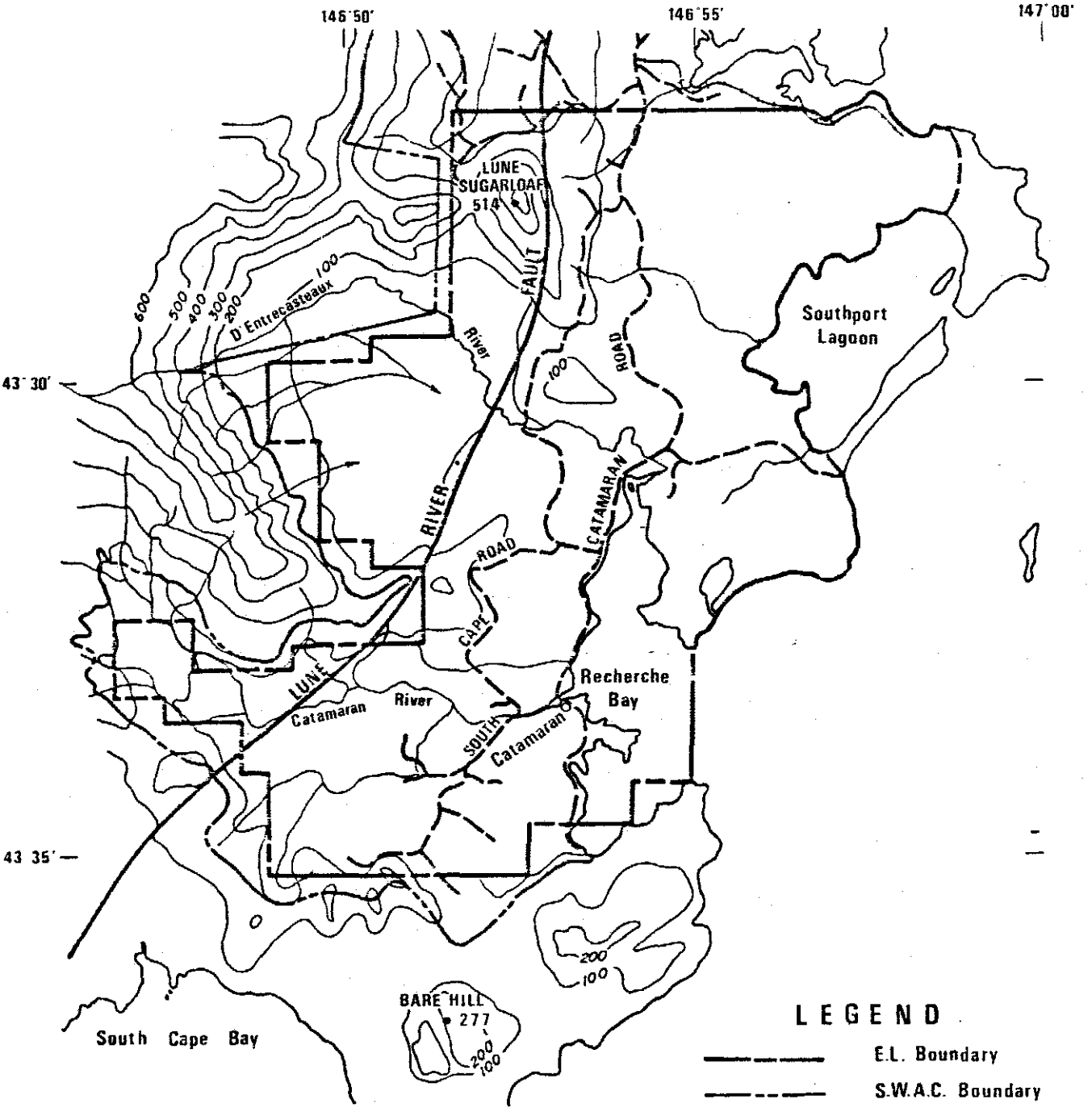

LEGEND

- E.L. Boundary
- S.W.A.C. Boundary
- Road
- Railway
- Drainage
- 200 Contours

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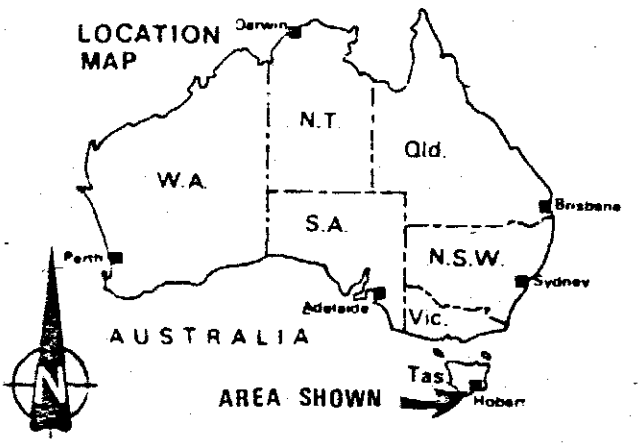

FIGURE 4-1

Marathon Petroleum Australia, Ltd.

BRISBANE AUSTRALIA

Hobart SK 55-8 Tasmania

EL 679 CATAMARAN

Plan Showing

TOPOGRAPHY AND DRAINAGE

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Drawn by J. Andrews Date Sept. '82

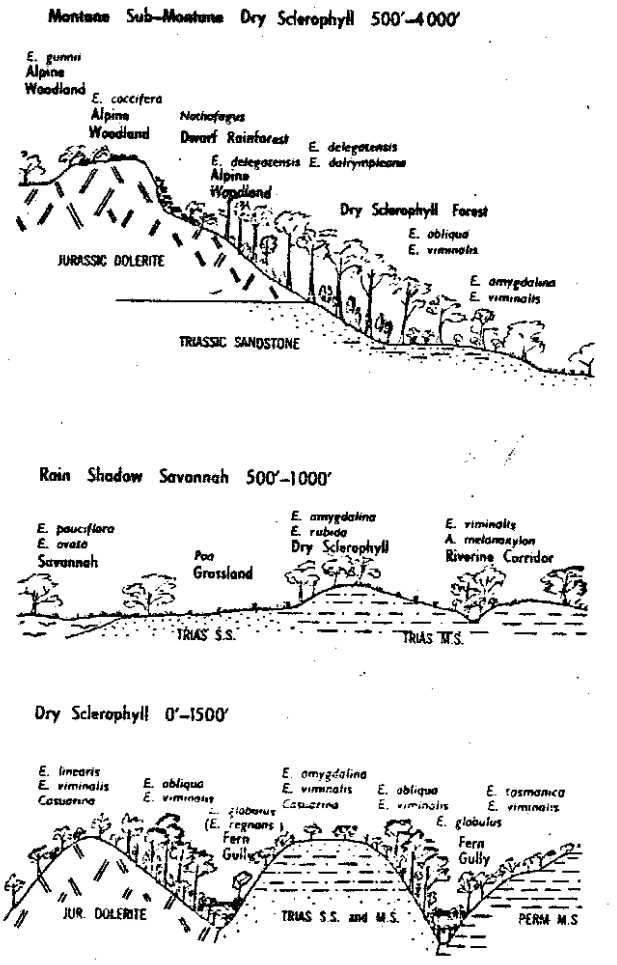

FIGURE 4.2 REPRESENTATIVE VEGETATION TYPES (from Jackson, 1956)

4.4 Climate

The climate of the area is typical of coastal Tasmania with an average daily temperature maxima of 18.9°C in summer and 11.7°C in winter. Average minimum night-time temperatures are 9.1°C in summer and 3.1°C in winter. Frosts often occur during the winter months and snow falls have been reported.

Annual rainfall in the region is 1420 mm with the majority of the rain received between May and September.

5.0 EXPLORATION HISTORY

5.1 Pre-MPAL Investigations

Coal in the E.L. 6/79 Catamaran area has been known since 1824, when it was reported in the cliff face overlooking the sea at South Cape Bay. Three areas were recognized by Hills et al (1922), two in the south of the E.L. at Catamaran and Moss Glen and one in the north at Ida Bay (Figure 5.1). The Catamaran mine seems to have been the most important of the three with a total production of 119,000 tons. Production was first reported in 1904 and continued spasmodically until around 1939. Coal from the Catamaran mine was used for household heating and fuel for ships bunkers.

The area was taken up in 1975 by the Australian Paper Manufacturers Ltd. (A.P.M.) to explore for a coal resource that could possibly be used as a substitute for fuel oil in the Port Huon Pulp Mill.

A.P.M. commissioned Earth Resources Australia Pty. Ltd. to do the work within the E.L. Two areas were investigated:-

(a) Near the old Catamaran mine (Figure 5.1);
This work involved the drilling of seven shallow holes to investigate the length of exposure of coal measure outcrop. Costeans were also dug along the outcrop in an effort to test the coal. (Rasmus, 1975).

(b) near the old Ida Bay mine (Figure 5.1);
Two lines of shallow (less than 30 m deep) holes were drilled across the flat swampy plains to the south of the mine (Bunny, 1978).

From the investigations it was decided that there was no resources of open cut coal within the area and as a consequence the areas were dropped.

5.2 MPAL Exploration History

After a study carried out by MPAL (Stuart, 1979) the area near Catamaran was selected as the most prospective area then available within the basin for the discovery of a coal resource.

Due to poor access within E.L. 6/79, MPAL commissioned a photo-geological study of the area. This was undertaken by Hunting Geology and Geophysics in early 1980 on behalf of MPAL (Appendix I). The photo-geological map generated is presented as Plate 1.

From this study two important facts emerged:-

(a) The area west of the Lune River Fault contained no Triassic coal measures, as the barren lowermost Triassic sandstone unit formed the highest topographic units.

(b) Of the initial 520 km^2 of the licence area only a narrow down-faulted block, of 35 km^2 to the east of Lune River Fault contained possible prospective Triassic coal measures.

Within this block two subareas with potential to contain coal deposits were delineated:-

(a) between the Catamaran and D'Entrecasteaux Rivers.

(b) area to the south of Ida Bay.

Another area further to the north near Strathblane was also considered prospective (MPAL has since been granted this area, E.L. 40/83, Strathblane).

After consultation with Dr. D. Leaman (formally Government Geophysicist), a ground gravity and magnetic survey was carried out over the area to:-

(a) Map the distribution of dolerite, dolerite scree, basalt and sediments.

(b) To synthesise an integrated geophysical/geological model of the area by comparing the geophysics with existing geological data and photogeological interpretation (Appendices I and II, Plates 1, 2, 3 and 4).

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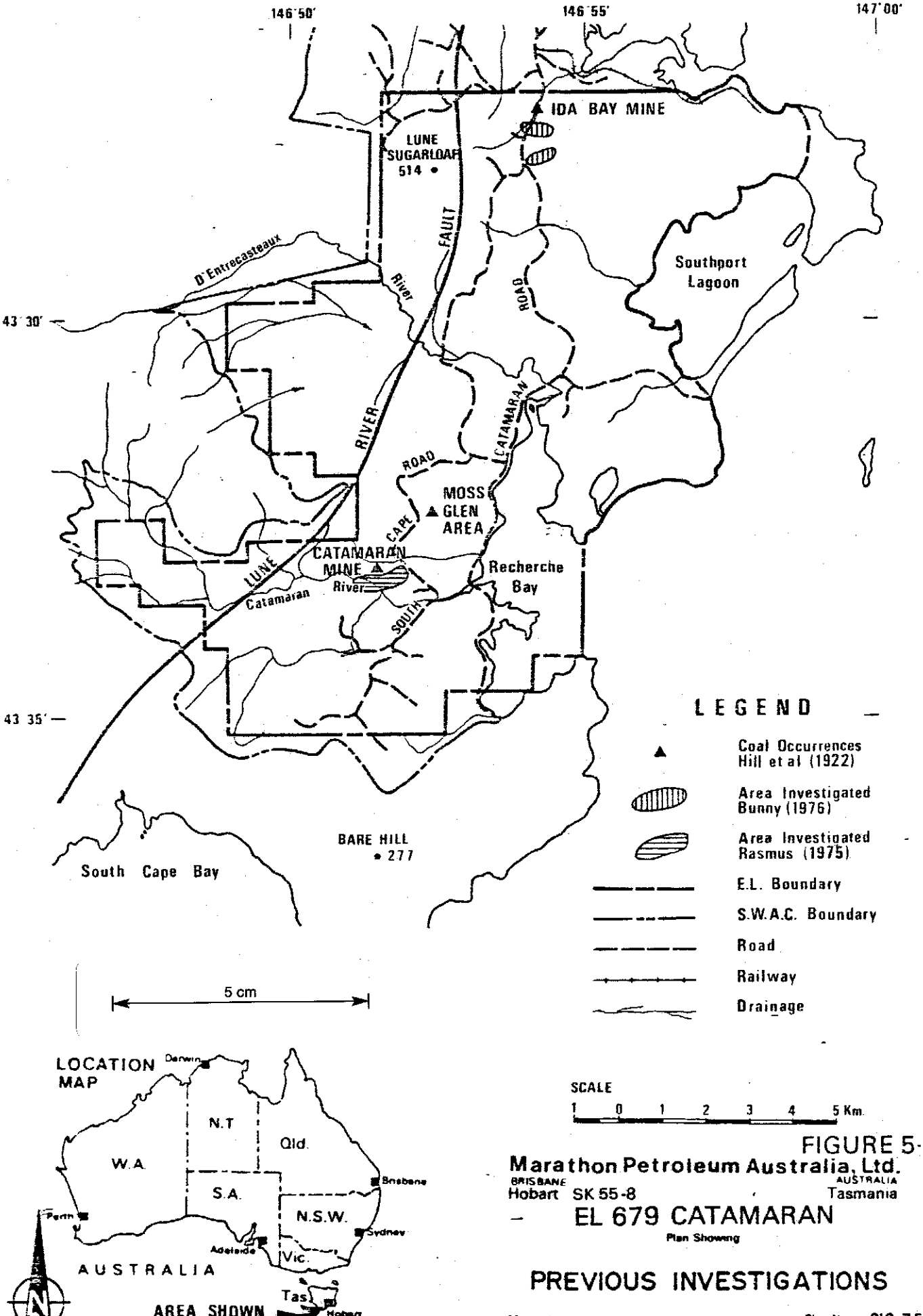

FIGURE 5-1

Marathon Petroleum Australia, Ltd.

BRISBANE AUSTRALIA

Hobart SK 55-8 Tasmania

EL 679 CATAMARAN

Plan Showing

PREVIOUS INVESTIGATIONS

Mapped by

Drawn by J. Andrews Date Sept. '82

Plan No CIC 75

From this information, a stratigraphic drilling programme was planned to test the stratigraphic section within each of the major fault blocks. Twelve holes were drilled (refer Plate 5 for locations), of these seven reached their target depths while the other five were stopped short due to drilling problems. This programme was followed up with a fill-in drilling programme of eight drillholes to test:-

(a) any good intersections from the earlier drilling

(b) any further prospective areas.

(Refer to Table 5.1 for drilling details). Major coal seams were sampled and laboratory tested (Sections 12.5 and 12.7 respectively). Stratigraphic intercepts of the drillholes are given in Appendix III.

TABLE 5.1

DRILLHOLE SUMMARY

Hole	Metres Chip	Metres Core	Total Depth	Status of Hole
CA 101	42.18	-	42.18	Abandoned in Basalt
CA 102F	41.40	128.69	170.00	Completed
CA 103	28.50	-	28.50	Abandoned in Scree
CA 104	39.00	-	39.00	Abandoned in Scree
CA 105F	48.25	30.61	78.86	Completed (Not geophysically logged.
CA 106F	32.17	201.99	234.16	Completed (Redrill of CA 101)
CA 107	27.00	30.46	57.46	Abandoned in Scree
CA 108	7.17	32.36	39.43	Abandoned in Scree
CA 109F	11.63	288.73	300.36	Completed (Redrill of CA 103)
CA 110	279.30	19.70	299.00	Completed
CA 111F	18.00	153.50	171.50	Completed
CA 112	99.80	8.70	108.50	Completed (Redrill of CA 104 & CA 107)
Sub Total	674.40	894.55	1568.95	

TABLE 5.1 (cont.)

DRILLHOLE SUMMARY

Hole	Metres Chip	Metres Core	Total Depth	Status of Hole
CA 113	321.00	0.00	321.00	Completed
CA 114	235.00	0.00	235.00	Completed
CA 115	198.00	0.00	198.00	Completed
CA 116	230.00	0.00	230.00	Completed
CA 117	195.00	0.00	195.00	Completed
CA 118	164.00	0.00	164.00	Completed
CA 119	130.00	0.00	130.00	Completed
CA 120	115.00	0.00	115.0	Completed
Sub Total	1588.00	0.00	1588.00	
Total	2262.40	894.55	3156.95	

6.0 REGIONAL GEOLOGICAL SETTING

E.L. 6/79 Catamaran is situated within the Tasmanian Basin which covers an area of approximately 20,000 square kilometres and contains over 1000 m of Permo-Triassic intruded and faulted clastic continental and paralic sediments. These sediments overly Ordovician marine sediments of the Junee Group and have been intruded by sills of Jurassic dolerite (Spry and Banks, 1962). The regional geology of the relevant portion of the Tasmanian Basin is shown in Figure 6.1. A representative stratigraphic column is shown in Figure 6.2.

6.1 Regional Stratigraphy

6.1.1 Ordovician Sediments

The Ordovician age Junee Group is believed to form the basement to the Tasmanian Basin and is known from a number of widely scattered localities along the western margin of the basin including a few isolated inliers near Hastings and Ida Bay.

The Group consists of limestone and sandstone with subordinate conglomerates which are believed to have been deposited in a shallow marine or tidal environment.

This Group underwent deformation during the Middle Devonian Taberabberan Orogeny and is unconformably overlain by rocks from the Parmeneer Supergroup.

6.1.2 Permian Sediments

The Lower Parmeneer Supergroup of Permian age outcrops over a large part of the Tasmanian Basin. These sediments consist of a variety of sediment types eg., tillite, mudstone, sandstone and conglomerate. The environment of deposition ranges from glacio marine during the Upper Carboniferous and Lower Permian through shallow marine, esturine and minor glacial conditions in the Middle Permian and fluvial in the Upper Permian.

6.1.3 Triassic Sediments

The upper Parmeneer Supergroup of Triassic Age is not as areally extensive as the Lower Parmeneer Supergroup.

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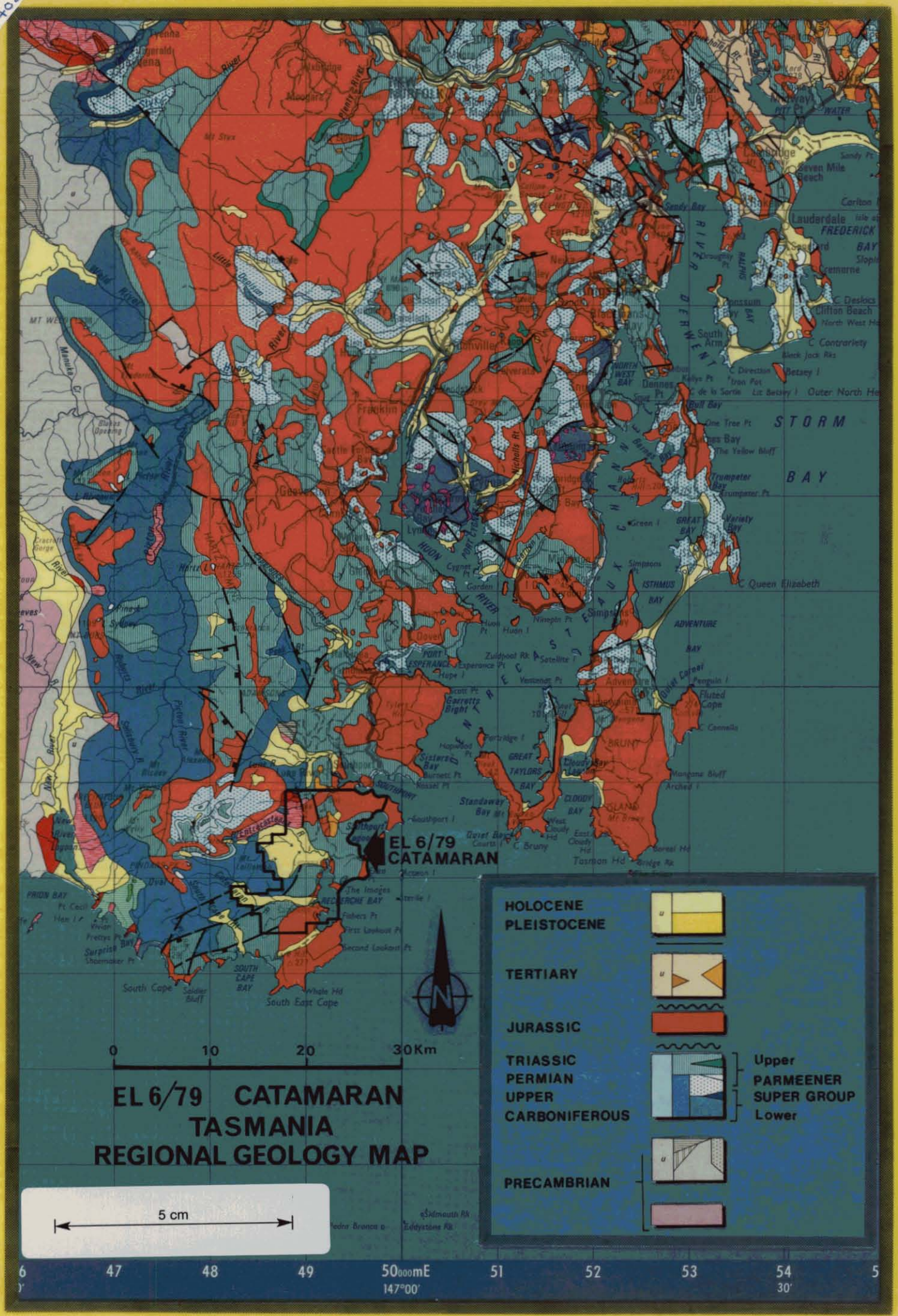

EL 6/79 CATAMARAN TASMANIA REGIONAL GEOLOGY MAP

FIGURE 6.2

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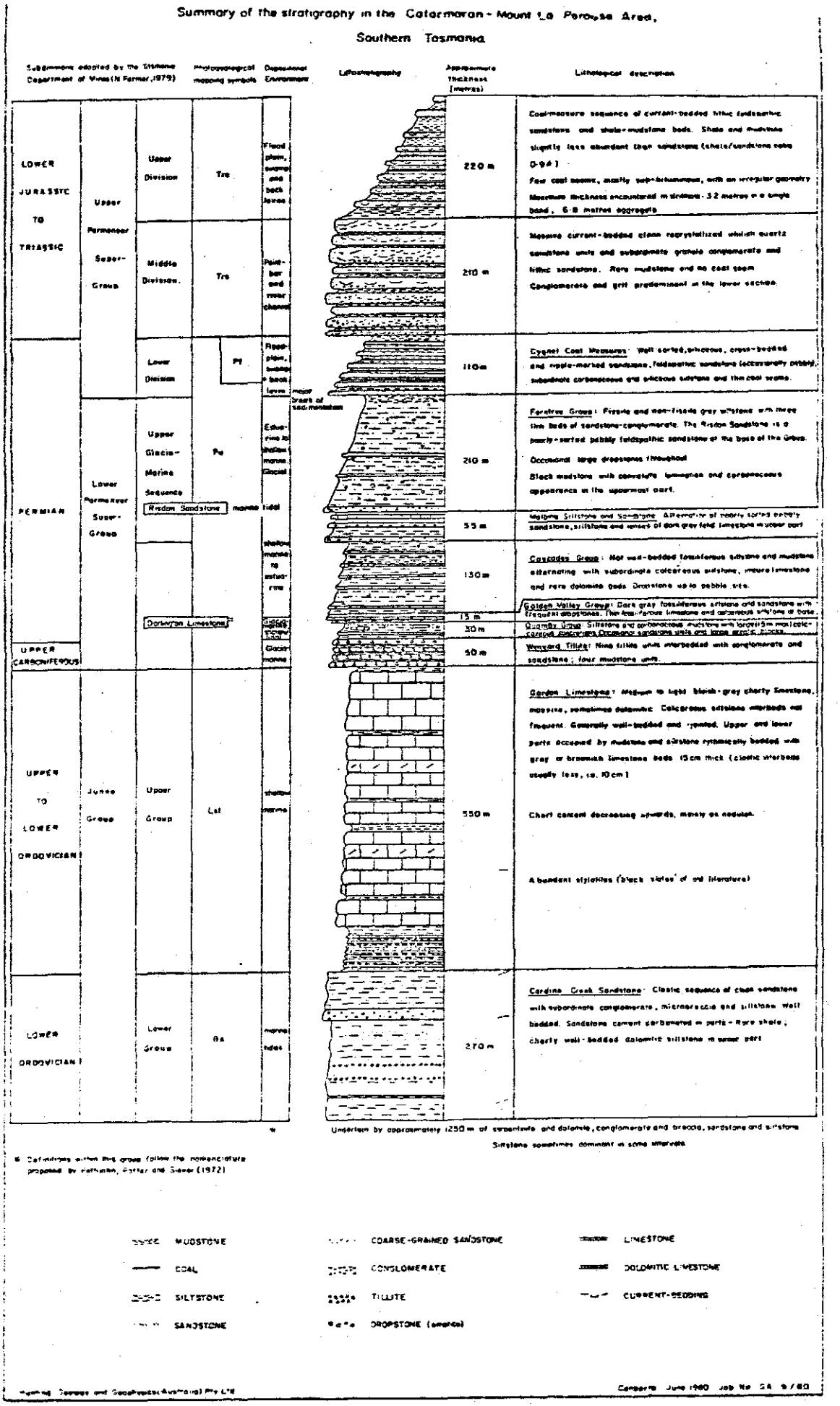

These sediments contain the prospective coal measures which occur towards the top of the Triassic Sequence. Attempts have been made to break up the Upper Parmeneer Supergroup into units, but due to lack of continuous marker horizons only a limited subdivision into a basal quartzose sandstone with minor mudstone and upper prospective coal measures has been possible. The sequence within the basin is between 60 and 400 m in thickness.

6.1.4 Jurassic Dolerite

During the Jurassic, large bodies of dolerite were intruded into both Permian and Triassic sediments. These intrusives take the form of large transgressive sheet like bodies with minor dykes. These sheets form resitant capping on topographic highs throughout the Tasmanian Basin.

6.1.5 Cainozoic

Tertiary basalts are widespread in the Tasmanian Basin. These basalts are believed to be the remains of incised valley fills.

Soil horizons, unconsolidated alluvial sediments, dolerite scree and glacial debris can be recognised over the basin and these have been attributed to both the Tertiary and Quaternary.

6.2 Tectonic History

The Tasmanian Basin has undergone at least two major tectonic events. The first occurred during the Jurassic when large bodies of dolerite were intruded into the Permian and Triassic sediments. The magma rose up through the basement until it reached the Permo-Triassic sediments, where it spread out laterally, lifting or floating the roof of sediments.

The second major tectonic event occurred during the Tertiary when horst and graben structures of major dimensions were developed. Basaltic volcanism was a feature of this event.

7.0 GEOLOGY OF E.L. 6/79

The rocks outcropping in E.L. 6/79 Catamaran range in age from Ordovician to Recent. They are predominantly sedimentary rocks of fluvitile origin with some marine units (Ordovician). Dolerite and basalts from the Jurassic and Tertiary are also present.

The following observations were predominantly made from drill core and chips with some field observations from road cuttings. An interpretative geology map is shown as Plate 6.

7.1 Stratigraphy

7.1.1 Ordovician

Limestones, sandstones and conglomerates of Ordovician age outcrop to the west of the Lune River Fault.

The limestone is presently being extracted for use in the zinc works at Hobart.

7.1.2 Permian

Within E.L. 6/79 glacial-marine rocks of Permian age outcrop to the west of the Lune River Fault and on the coast in the vicinity of Southport (Plate 6). At Southport thinnly bedded cross-bedded siltstones and sandstones interbedded with ripple marked dark shales outcrop on the beach. These rocks are believed to belong to the Permian Ferntree group (Figure 6.2). They are either the basal section of the Triassic Sandstone or an equivalent of the Permian Cygnet Coal Measures. West of the Lune River Fault conglomerate rocks of Permian age outcrop.

7.1.3 Triassic

Triassic rocks underlie the majority of E.L. 6/79. They can be broadly subdivided into two units based on lithological and chronological criteria.

Triassic Basal Sandstone

The lower unit or Triassic Basal Sandstone is predominantly arenitic (up to 90% quartz) and is greater than 238m thick within the E.L. (CA113).

The sandstones are predominantly well sorted; fine to medium grained arenites and are typically bedded (0.3m) and massive fining upward sequences with some cross bedding. Composition is generally either quartz lithic or quartz feldspathic, although some beds are made up of volcanic lithic quartz fragments. Colour is light grey to grey, although some beds have either a greenish or reddish coloration due to the presence of either epidote or hematite.

Other lithotypes present are mudstone, siltstone and clay pellet conglomerate. Minor amounts of carbonaceous material and coal were also observed. The matrix in the sediment appears to be argillaceous with traces of calcite and zeolite cement (Appendix IV).

Triassic Coal Measures

The upper unit or Triassic Coal Measures lies conformably on top of the Triassic Basal Sandstone and is greater than 140m (CA106F) thick within the E.L.

The sequence comprises a sequence of sandstone, siltstone, mudstone, carbonaceous mudstone and coal seams. The coal seams are banded, dull, and typically have a high inherent ash.

Based on lithologic description of chip and core samples and interpretation of geophysical logs, rocks of the Triassic Coal Measures can be divided up into a number of upward fining clastic sequences. These sequences are similar to the Basal Triassic Sandstones but contain a higher proportion of fine grained sediments (up to 50%) and also a thicker development of coal seams.

Sandstone from the Triassic Coal Measures found within E.L. 6/79 are generally light to dark grey; occasionally brown or greenish grey; very fine to fine grained; occasionally medium grained; and generally quartz lithic although lithic and feldspar lithic varieties are common.

Depositional Environment

The depositional environment of the sandstone and coal during the Triassic is believed to have been fluviatile (Figure 7.1). Uplift to the west of the present data basin boundaries providing the source. During the early Triassic (during deposition of the Basal Sandstones) streams of low sinousity (possibly braided) flowed from this uplifted area towards the south-east. Banks and Clarke, 1973 have suggested a drier, possibly monsoonal type environment. Hale, 1962 suggests that the depositional area sank rapidly but the shores remained low allowing good sorting of the immature sediments resulting in the deposition of the Basal Sandstone. Later in the Triassic, evidence suggests that the climate became more humid and the sinousity of the streams increased resulting from a decrease in relief of the source area. This quieter sedimentary environment and climate led to the deposition of a greater proportion of finer grained sediments and formation of coal in back swamp areas.

7.1.4 Jurassic Dolerite

Dolerite intrudes the Triassic sediment within the E.L. The dolerite belongs to the tholeiitic quartz dolerite association (McDougall, 1958). The dolerite appears to have been emplaced in the form of sills which is consistant with other observations around the basin. Contact effects upon the sediments appears to be limited. In CA111, dolerite is in contact with a coal seam and analysis of that seam shows that no upgrading of the coal has occurred. This may not always be the case as the presence of anthracite coal has been reported from the Catamaran Coal field. The dolerite appears to have caused localised faulting and although it appears to be in the form of sills it cannot be used to aid the correlation of the coal seams.

Dolerite scree covers a large proportion of the Triassic sediments. The scree blocks range in size up to several tens of metres causing considerable problems with field mapping and drilling. Leaman (1982) suggests that there is two generations of scree. The older deposits are usually reddish in colour and the more recent has little matrix.

7.1.5 Tertiary Basalt

As noted (Chapter 6), basalt occurs as minor flows generally less than a few kilometres long. The basalt is hand specimen is generally very difficult to distinguish from fine grained dolerite except if vesicles or amygdales are present. Basalt has only been recognized in the north of the area.

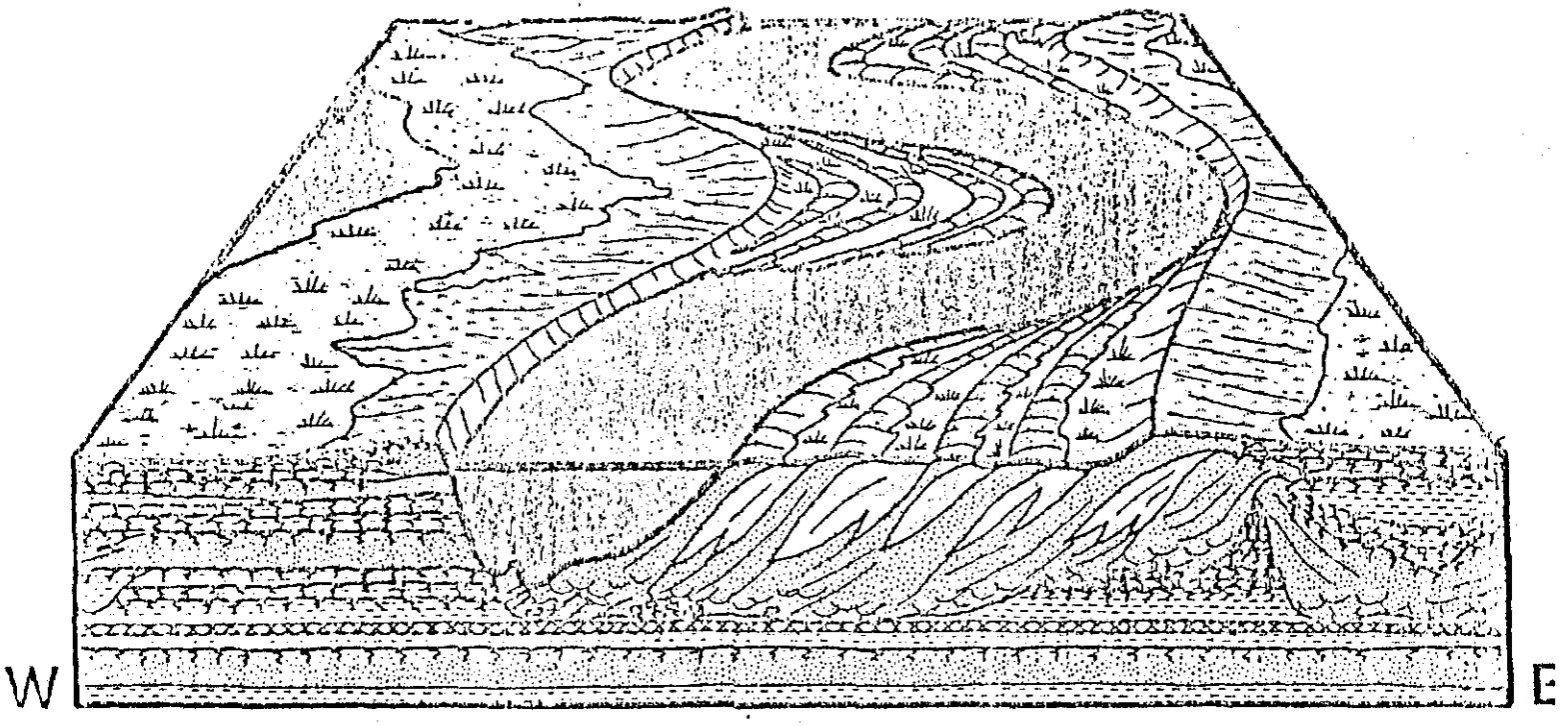

FIGURE 7.1

DEPOSITIONAL MODEL OF IDEALISED FLUVIAL SYSTEM
(After Horne and Ferm, 1976)

7.1.6 Cainozoic Sediments

Minor amounts of clays and sands occur in the low swampy areas and along the major water course. These deposits are relatively unconsolidated and difficult to recognize.

8.0 COAL SEAMS

EL 6/79 Catamaran contains coal seams of low sulphur steaming coal. The coal is bituminous and the major lithotype is dull. Complex seam splitting is characteristic.

Marathon defines a coal seam by the following parameters:

(a) consists of a coal ply greater than 0.30 m in thickness,

(b) there is a greater than 40% coal in the bench, i.e. a coal ply may contain a number of stone partings; however, the parting must not exceed 30 cm in thickness.

Six coal intervals designated A to F have been recognized throughout the area. Minor coal seams have also been recognized but due to the wide spacing of the holes accurate correlation has not been possible.

8.1 Correlation Methods

Downhole geophysical logs are the principal tool used in establishing correlations, and given the complex nature of the seam splitting and coalescence which occurs, downhole geophysical logs are indispensable for correlation purposes.

Details of the suite of downhole geophysical logs run at Catamaran are given in Section 12.6 of this report. The Coal Lithology Log (Scale 1:200) is most frequently used for seam correlation purposes.

No geophysical markers are evident in the area, and no coal seams possess an apparent unique geophysical "fingerpoint".

Coal seam Lithological Log-Petrophysical correlation plots for the five partially cored drill holes are presented in Plates 8, 9, 10, 11 and 12.

Additional aids to coal seam correlations are:

(a) Stratigraphic position of coal seams - the F interval is generally the first seam above the Triassic Coal Measures - Sandstone boundary.

(b) Stratigraphic position of the dolerite sills - the dolerite sills appear to preferentially intrude between the D and E coal intervals but care must be taken as this may not apply where holes are widely spaced.

8.2 Seam Characteristics

Detailed wireline log correlation shows that considerable variation occurs in thickness and quality of individual coal seams which deteriorate along strike by splitting, thinning and/or deterioration of individual component plies within in seams.

The most common method of seam deterioration or thinning is:

(a) Increasing number of thin argillaceous partings within the seam

(b) The increase in the thickness of one or more argillaceous partings that splits the coal interval into two or more discrete coal seams.

8.3 Seam Oxidation

No specific limit of oxidation drilling was carried within the E.L. but indications are that the base of coal weathering throughout the area is variable.

9.0 COAL QUALITY

Coal Interval A has been shown to be the only coal interval of potential economic significance. The other coal intervals are too high in ash and produce unacceptable yields upon washing and will not be discussed further.

Average raw coal quality of Coal Interval A is air dried moisture 7%, ash 49%, specific energy 12.0 MJ/kg and total sulphur 0.27%. The raw coal ash content is too high for use as a domestic power station fuel and requires washing.

Floats R.D. 1.80 composites of the A interval meet the possible marketable coal specification (Table 9.1) set by MPAL. The average yield is 69.5%, air dried moisture 6.2%, ash 24.9%, volatile matter 23.0%, specific energy 23.12 MJ/kg, total sulphur 0.32% and ash fusion temperatures (deformation) 1250°C-1360°C.

The coal from Coal Interval A is high volatile bituminous A or B (ASTM) and 700(6) or 611(6) (Australian Classification).

Samples from five core holes and one chip hole, as summarised in Table 9.2, were laboratory tested using the procedure discussed in Section 2.7. The results of the analyses are included as Appendix V.

TABLE 9.1

POSSIBLE MARKETABLE COAL SPECIFICATION

Yield %	>55
Air Dried Moisture %	<8
Ash %	20-30
Specific Energy MJ/kg	21-25
Total Sulphur	<0.5
Ash Fusibility °C (Deformation, Reducing Atmosphere)	>1200

TABLE 9.2

CORE SAMPLE SUMMARY

DRILLHOLE	COAL INTERVAL	PLY NUMBER	TOP	BOTTOM	THICKNESS
CA 102F		1	14.85	15.47	0.62
		2	51.84	52.28	0.44
		3	59.24	59.59	0.35
		4	74.10	74.78	0.68
		5	87.64	87.90	0.26
CA 105F		1	60.87	61.31	0.44
		2	61.31	61.53	0.22
		3	61.53	61.77	0.24
		4	61.77	62.21	0.44
		5	62.21	62.94	0.73
		6	62.94	63.42	0.48
CA 106F		1	131.67	132.71	1.04
		2	132.71	132.82	0.11
		3	132.82	133.43	0.61
		4	133.43	134.00	0.57
		5	134.00	135.03	1.03
CA 109F		1	256.96	257.90	0.94
		2	284.86	286.60	1.74
		3	286.60	287.10	0.50
CA 111F		1	149.89	150.29	0.40
		2	150.29	150.35	0.06
		3	150.35	150.82	0.47
		4	153.10	154.86	1.76
		5	154.86	156.04	1.18
		6	78.62	79.30	0.68
		7	79.30	79.52	0.22
		8	79.52	80.62	0.90

9.1 Raw Coal Quality

Macroscopically the coal seams present in the E.L. consist of dull coal. Classified according to the standard coal lithotype system (AS K183-1970) the following lithotypes are present in Coal Interval A (Table 9.3).

TABLE 9.3

COAL MACROLITHOTYPES, COAL INTERVAL A

	Mean %	Range %
D (<1% bright bands)	35	30-56
Dm (1-10% bright bands)	35	15-50
Db (10-40% bright bands)	20	10-50
Stone Bands	10	5-20

An indication of the lithotypes present in Coal Interval A are given in the coal quality and graphics summaries of boreholes CA 106F, CA 111F (Tables 9.4 and 9.5).

Average raw coal quality for Coal Interval A for boreholes CA 106F, CA 111F is shown in Table 9.6.

TABLE 9.6

AVERAGE RAW COAL QUALITY, COAL INTERVAL A

Air Dried Moisture %	7
Ash%	49
Specific Energy Moisture MJ/kg	12.00
Total Sulphur %	0.27

These analyses clearly show that the raw coal is too poor for a power station feedstock and that a washed coal product is necessary. A product coal of less than 30% ash is acceptable for a domestic power station feedstock.

CORE ANALYTICAL SUMMARY SHEET

444038 037

TENEMENT: EL 6/79 CATAMARAN HOLE NO. CA 106F COAL INTERVAL: A SEAM

Graphic Log	% Core Recov.	Raw Coal Analysis								Washed Coal Analysis (adb) Float R.D 1.80															
		Moist %	Ash %	V.M. %	S.E. MJ/Kg a.d.b.	S.E. MJ/Kg d.a.f.	Total Sulphur %	C.S.N.	R.D.	Yield %	Moist %	Ash %	V.M. %	S.E. MJ/Kg a.d.b.	S.E. MJ/Kg d.a.f.	Total Sulphur %	P %	Cl %	Ash Fusion Temps °C (Red. Atmos.) Def.	Soft.	Hemi.	Flow.	H.G.I.	C.S.N.	Grey King	R.D.
131·67																									
PLY 1 (1·04)	100	5.9	55.5		11.0		0.16			62.2	5.6	41.8		16.82		0.17									
PLY 2 (0·11)																									
132·71																									
132·82	100	4.4	77.9						2.4																
PLY 3 (0·61)	100	5.6	41.2		16.56		0.25			71.1	5.9	32.7		19.87		0.21									
133·43																									
PLY 4 (0·57)	100	6.2	53.6		10.41		.11			42.2	7.1	27.9		21.47		0.21									
134·00																									
PLY 5 (1·03)	100	7.3	22.1		23.16		0.67			93.0	7.5	18.6		24.51		0.24									
135·03																									
Composite Plys 3, 4, & 5									1.70	69.6	6.4	25.3	23.1	22.20		0.22	0.001		1360	1590	1600	>1600	49	½	A	1.56

Table No. 9.4

Hole No. CA 106

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CORE ANALYTICAL SUMMARY SHEET

444039 033

TENEMENT: EL 6/79 CATAMARAN HOLE NO. CA 111 COAL INTERVAL: A SEAM

Graphic Log	Core Recov. %	Raw Coal Analysis								Washed Coal Analysis (adb) Float R.D. 1.80															
		Moist %	Ash %	V.M. %	S.E. Mj/Kg a.d.b.	S.E. Mj/Kg d.a.f.	Total Sulphur %	C.S.N.	R.D.	Yield %	Moist %	Ash %	V.M. %	S.E. Mj/Kg a.d.b.	S.E. Mj/Kg d.a.f.	Total Sulphur %	P %	Cl %	Ash Fusion Temps °C (Red. Atmos.) Def.	Soft.	Hemi.	Flow.	H.G.I.	C.S.N.	Grey King	R.D.
78·62																									
PLY 6 (0·68)	100	7.3	47.5		14.91		0.44			56.4	5.6	29.4		22.63		0.49									
79·30																									
PLY 7	100	7.3	46.4		14.36		0.69		1.72	58.2	6.3	30.8		21.58		0.45									
79·52																									
PLY 8 (1·10)	100	6.8	31.6		21.22		0.34			79.7	5.8	21.3		25.72		0.40									
80·62																									
Composite Ply 6, 7 & 8									1.64	69.39	5.9	24.4	22.8	24.04		0.42	.003		1250	1440	1490	1540	73	1	B	1.51
Composite																									

Table No. 9.5 Hole No. CA 111

Comments

Marathon Petroleum Australia, Ltd.

9.2 Washed Coal Quality

Float sink testwork shows that only Coal Interval A yields an acceptable product. The floats R.D. 1.80 fraction composites from Coal Interval A meet the required coal specification (Table 9.1) and give an acceptable average yield of 69.5%. Details of the composite analyses for Coal Interval A in CA 106F and CA 111F are given in Table 9.7.

Coal Interval A may be classified as high volatile bituminous A (ASTM) or 700(6) (Australian Classification) in the case of CA 106F and high volatile bituminous B and 611(6) in the case of CA 111F. When plotted on Seylers Coal Chart (Figure 9.1) the coal is shown to be orthohydrous.

Sedgman and Associates (1982) examined the coal analyses data and determined the following specific energy/ash relationship for Catamaran coal.

SE (MJ/kg) air dried = 33.21 - 0.420 Air Dried Ash (%)
(Correlation co-efficient = 0.84)

The composite analyses (Table 9.7) show an increase in CSN, Gray King Coke Type and Hardgrove Grindability Index in CA 111F relative to CA 106 due to the higher vitrinite content of CA 111F. Ash fusion temperatures in CA 111F are lower than CA 106F due to the higher base/acid ratio (higher Fe_2O_3, CaO, MgO) in CA 111F.

Petrographic analyses of the washed coal composites of Coal Interval A from CA 106F and CA 111F were carried out. Mean maximum vitrinite reflectance in CA 106F was 0.63% and 0.87% in CA 111F, both in the high volatile bituminous range of reflectance values. Such a variation in reflectance is strongly suggestive that intrusion of the Jurassic dolerites has caused an upgrading of coal rank in some areas. Maceral analyses confirm the dull nature and high mineral matter content of the coal, with inertinite contents of 38% - 44% and mineral matter contents of 28% - 32%.

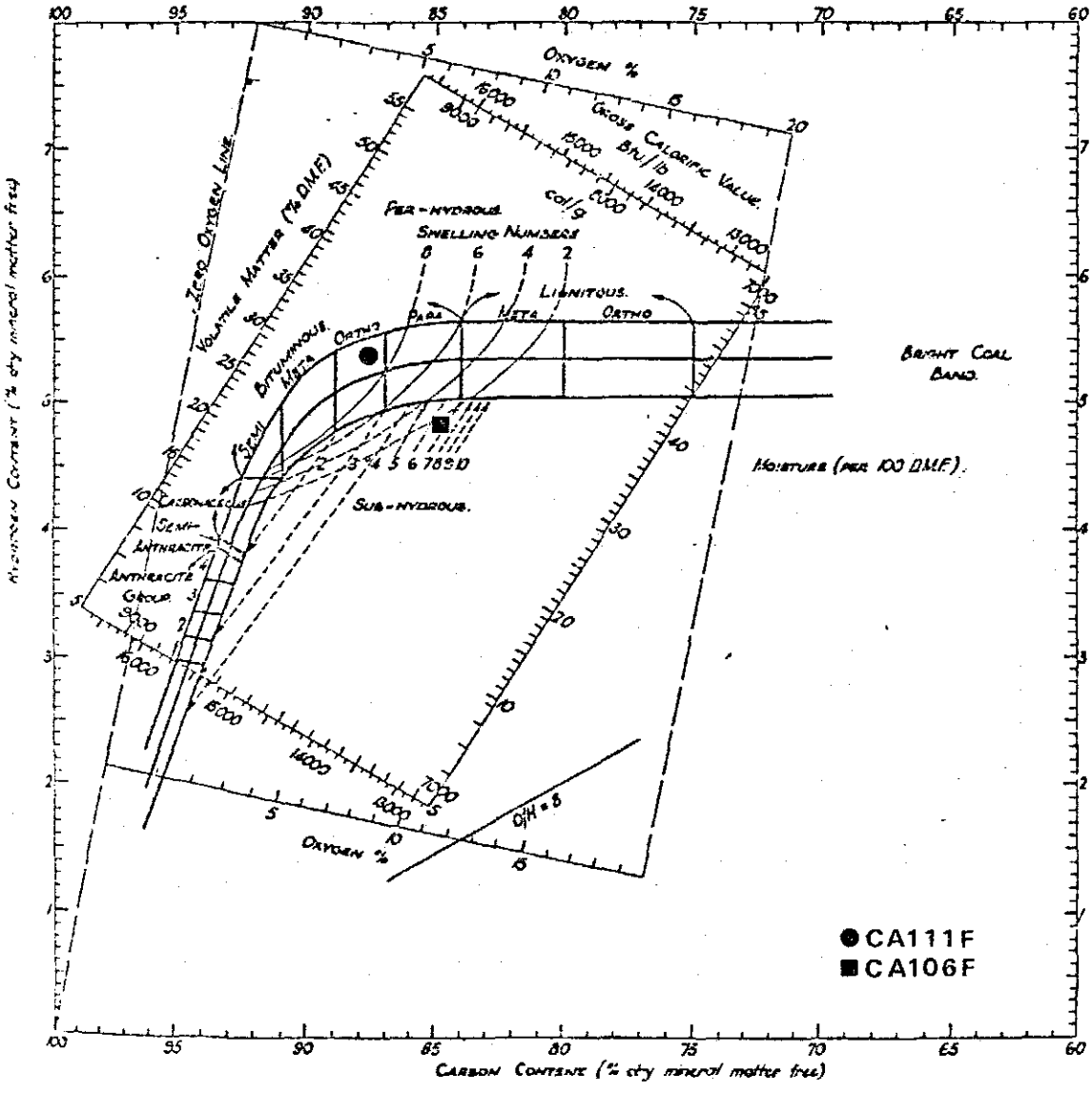


FIGURE 9.1 SEYLERS COAL CHART

TABLE 9.7

ANALYTICAL RESULTS OF COAL INTERVAL A WASHED COAL COMPOSITES FROM CA 106F & CA 111F

Sample Details	Hole No. CA 106F Composite (Plies 3+4+5) Floats 1.80 (Ida Bay)	Hole No. CA 111F Composite (Plies 6+7+8) Floats 1.80 (catamaran)
As Analysed Basis		
Moisture %	6.4	5.9
Ash%	25.3	24.4
Volatile Matter %	23.1	22.8
Fixed Carbon %	45.2	46.9
Sulphur %	0.22	0.42
Chlorine %		
Phosphorous %	0.001	0.003
Specific Energy MJ/kg (Calorific Value)	22.20	24.04
Crucible Swelling No.	1/2	1
Gray King Coke Type	A	B
Hardgrove Grindability Index	49	73
Relative Density	1.56	1.51

TABLE 9.7 (cont.)

ANALYTICAL RESULTS OF COAL INTERVAL A WASHED COAL COMPOSITES FROM CA 106F & CA 111F

Sample Details	Hole No. CA 106F Composite (Plies 3+4+5) Floats 1.80	Hole No. CA 111F Composite (Plies 6+7+8) Floats 1.80
Ultimate Analysis (daf basis)		
Carbon %	81.90	84.90
Hydrogen %	4.71	5.17
Nitrogen %	1.64	1.43
Sulphur %	0.32	0.60
Oxygen %	11.43	7.90
Carbonates (CO_2) %	0.31	0.20
Forms of Sulphur		
Pyritic %	0.08	0.17
Sulphate %	<0.01	<0.01
Organic %	0.13	0.24
Ash Fusibility Temperatures	Reducing	Reducing
Deformation °C	1360	1250
Spherical °C	1590	1440
Hemispheric °C	1600	1490
Flow °C	>1600	1540

TABLE 9.7 (cont.)

ANALYTICAL RESULTS OF COAL INTERVAL A WASHED COAL COMPOSITES FROM CA 106F & CA 111F

Sample Details	Hole No. CA 106F Composite (Plies 3+4+5) Floats 1.80	Hole No. CA 111F Composite (Plies 6+7+8) Floats 1.80
Ash Analysis		
Silicon as SiO_2 %	71.5	59.8
Aluminium as Al_2O_3 %	22.0	26.2
Iron as Fe_2O_3 %	3.84	8.16
Calcium as CaO %	1.40	2.88
Magnesium as MgO %	0.20	1.19
Titanium as TiO_2 %	1.15	0.88
Sodium as Na_2O %	0.01	0.08
Potassium as K_2O %	0.10	0.74
Phosphorous as P_2O_5 %	0.01	0.03
Manganese as Mn_3O_4 %	0.09	0.38
Sulphur as SO_3 %	0.27	0.20
Maceral Analysis		
Vitrinite Vol%	21	28
Resinite Vol%	trace	trace
Sporinite Vol%	6	1
Culimite %	1	1
Fusinite Vol%	4	5
Semi Fusinite Vol%	29	20

TABLE 9.7 (cont.)

ANALYTICAL RESULTS OF COAL INTERVAL A WASHED COAL COMPOSITES FROM CA 106F & CA 111F

Sample Details	Hole No. CA 106F Composite (Plies 3+4+5) Floats 1.80	Hole No. CA 111F Composite (Plies 6+7+8) Floats 1.80
Maceral Analysis (cont.)		
Macrinite Vol%	1	1
Sclerotinite Vol%	-	trace
Micrinite Vol%	2	2
Inerodetrinitie Vol%	8	10
Mineral Matter Vol%	28	32
Trace Element		
Mercury as Hg (ug/g)	0.02	0.02
Vandium as V (ug/g)	19.2	32.6
Cadmium as Cd (ug/g)	0.12	0.08
Lead as Pb (ug/g)	16.1	13.8

10.0 COAL RESOURCE POTENTIAL

The resource potential of E.L. 6/79 Catamaran is shown in Table 10.1. An insitu resource of 5.5 million tonnes of opencutable coal at the Inferred level of confidence may be present in area 20 and further 11.5 million tonnes of shallow underground coal at the Inferred level of confidence may be present in area 6 (see Plate 6). This gives a total of 17.0 million tonnes of coal. Areas with some potential but as yet untested are areas 12, 13 and sections of area 6.

The Tasmanian Hydro-Electric Commission has indicated that a thermla fired power station is likely to be of 2 x 200 MW size. Based on typical Tasmanian coal quality characteristics, approximately 34 million tonnes (1.13 Mtpa) of saleable coal would be required over the usual 30 year power station life span.

- Underground mineable target 112 Mt in situ (assumption of 50% mining recovery and 60% preparation plant yield), i.e. assuming a single workable 2m thick seam, a total areal requirement of 35 sq. km.

- Opencut mineable target 64 Mt in situ (assumption of 90% mining recovery and 60% preparation plant yield), i.e. assuming a single workable 2m thick seam, a total areal requirement of 20 0 sq. km.

Table 10.1
Coal Resource Potential, E.L. 6/79 Catamaran

AREA	RESERVE POTENTIAL		COMMENT
AREA 20	Open Cut (60m overburden) (10:1 overburden:coal)	5.5mT	- Coal Interval A intersected in 2 holes (CA106F, CA110). - Average thickness of 2.7m, R.D. 1.60.
AREA 6	Potential shallow underground resource	11.5mT	- Near old mine. - two holes (CA111F, CA115) intersected Coal Interval A. - Thickness 4.0m CA115, 1.8m CA111F. - Needs more drilling
AREAS 12, 13 & rest of 6	Potential open cut	5.0mT each	- Needs no drill holes.
AREA 21	No potential		- only one drill hole (CA102) within area. - Coal Interval A is not present in CA102. - Remaining area too small for a resource.
AREA 19	No potential		- CA116 intersected no coal resource. - Sandstone outcrops in south of area.
AREA 1	No potential		- CA001 and 002 intersected very little coal measures.

11.0 FUTURE WORK

Proposed work for 1984 would involve follow up drilling of the inferred reserve areas. Holes would be stepped out from CA110 and CA115. Partial core holes would also be required to check coal quality in these reserve areas. Nine chip holes and two partial core holes would be required initially in these two areas. Two folow up drillholes in some adjacent untested areas is also advised if the inferred reserve areas are still considered prospective after the initial step out drillholes. Proposed total depths for these holes are shown in Table 11.1 and locations for the holes are shown in Figure 11.1 Refer to Plate 6 for location of areas mentioned below.

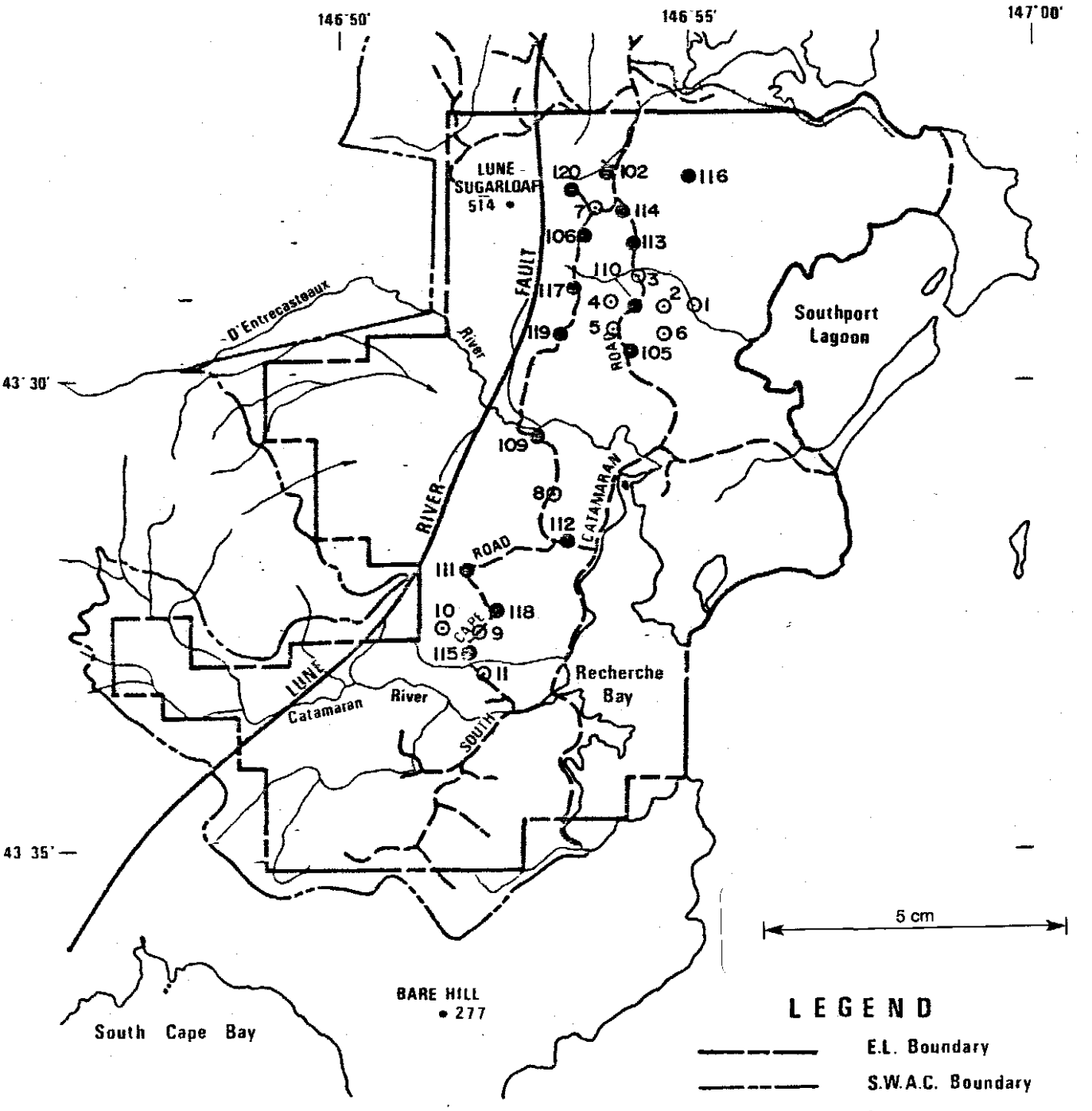
TABLE 11.1

PROPOSED DRILLHOLE DEPTHS

AREA NO.	REASON	DEPTH	
1	Step out reserve in Area 20	20	
2	" " " " " " "	"	
3	" " " " " " "	"	
4	" " " " " " "	"	
5	" " " " " " "	"	
6	" " " " " " "	"	
7	" " " " " Area 6	140	
8	" " " " " " "	"	
9	" " " " " " "	120	
10	Adjacent untested areas.	200	
11	" " " " " " "	120	
		1440	
12	Partial core hole Area 20	35	6
13	" " " " " "	70	10
		105m	16
		1545m	16m

048

444049



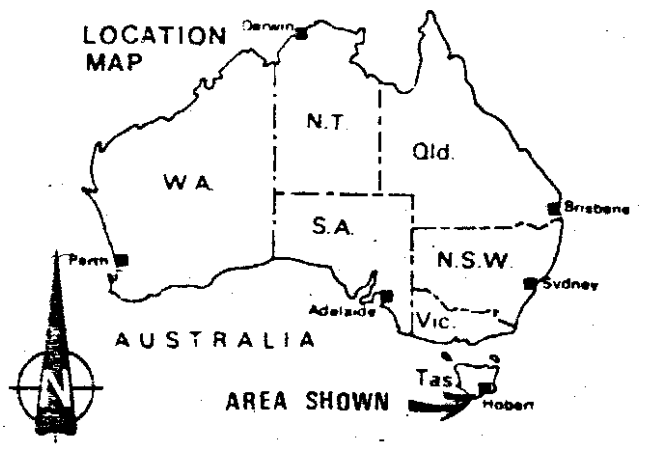


FIGURE 11·1

Marathon Petroleum Australia, Ltd.

BRISBANE AUSTRALIA

Hobart SK 55-8 Tasmania

EL 679 CATAMARAN

Plan Showing

PROPOSED DRILL HOLES

Mapped by

Drawn by J. Andrews Date Sept. '82

Plan No CIC 93

12.0 ASSESSMENT METHODS

12.1 Mapping Methods

Map coverage of E.L. 6/79 Catamaran is available from the Tasmanian Government at 1:100,000 for topographic maps and 1:250,000 for geological maps.

Black and white aerial photographs on the area were last flown in 1979 at a height of 7260 m above ground level. This work was undertaken by the Lands Department.

A base map at 1:25,000 scale has been used for the geological work on the area. The geophysics and photogeological interpretation made by the consultants are depicted on 1:50,000 scale maps.

No ground survey of drill holes has been undertaken. The drill holes were located visually on aerial photographs, transferred to a 1:50,000 map and digitized into the computer using a Mincom Pty. Ltd. survey program.

12.2 Photogeological Methods

Hunting Geology and Geophysics (Australia) Pty. Ltd. was contracted by MPAL to undertake a photogeologic study of E.L. 6/79 Catamaran (Appendix I).

A 1:50,000 scale photogeological map (Plate 1) was generated from a literature review, air photo interpretation of 1:50,000 scale aerial photographs and limited field verification. Work was performed from April to June, 1980.

The most important conclusions from the report are set out below:-

1. The area to the west of the Lune River Fault was unprospective for Triassic Coal Measures.

2. Only a narrow "corridor" of sedimentary rocks, constitutes the actual prospective target - are east of Lune River Fault.

3. Detailed field mapping of the two prospective areas within the E.L. should be undertaken.

12.3 Geophysical Surveys

a) Gravity

Gravity stations were established in the field at approximately 250 metre intervals alongside the roads in the area. Later in this survey, a helicopter was used on air photographs and transferred to a 1:25,000 topographic map. All stations on the roads were optically levelled and those in the more accessible areas were levelled by barometer loops.

Two gravity meters were used:-

(a) a La Coste and Romberg D-46 series gravity meter. This meter was used for stations 1 to 425 by Layton International, Appendix II.

(b) Worden Gravity meter. This meter was used for the remainder of the stations by MPAL staff.

All data was reduced using a density of 2.67. A terrain correction was applied to remove the effect of the La Perouse Massif. A regional correction was also made to reduce the effect of the basement. The residual bouger anomalies were plotted and contoured (Plate 2).

(b) Ground Magnetics

Magnetometer traverses were undertaken at the same time as the gravity using a Scintrex MF 2 fluxgate magnetometer. The traverses were conducted along the access tracks used by the gravity traverses. Measurements were taken every ten paces between stations and tied into the gravity grid. A magnetic interpretation map (Plate 3) was prepared from the data.

The gravity and magnetic data was integrated to produce an interpreted geophysical map (Plate 4).

12.4 Drilling Programmes

MPAL has completed two drilling programmes within E.L. 6/79 Catamaran. Details of these programmes are summarised in Table 12.1 and drill hole locations are shown in Plate 5. Details of individual drillholes have been previously given in Table 5.1, and stratigraphic intersections in Appendix III. The drill holes were sited using photogeological and geophysical data.

Three drilling rigs were used:-

(a) B40 Foxmobile mounted on a 4 x 4 Bedford

(b) B80 Foxmobile mounted on a 6 x 4 Tandem drive Mack

(c) T685H Schram Rotodrill mounted on a 8 x 4 Tandem drive Leader.

Twenty holes were drilled. Of these five holes (CA 101, CA 103, CA 104, CA 107 and CA 108) were abandoned in scree or basalt and redrilled. Of the remaining fifteen holes, ten were chip holes (CA 110, CA 112, CA 113, CA 114, CA 115, CA 116, CA 117, CA 118, CA 119 and CA 120) and the other five were core holes (CA 102F, CA 105F, CA 106F, CA 109F and CA 111F). Samples for coal quality testing were obtained from these core holes. Samples of the chips from the chip section in all holes were collected. Most coring was HQ, this was reduced to NQ where drilling problems occurred.

Several drilling problems were experienced in drilling the scree material. This may only be solved by extensive use of steel casing.

12.5 Wellsite Lithological Logging and Sampling

Most of the lithological logging involves describing chip samples, which are generally sampled in one metre intervals, and encoding the data directly onto a computer input sheet termed the C1 sheet. The computer data base is discussed in Section 12.8. The geologist also observes strata changes whilst drilling is in progress to further refine sample description and depth estimates, and to note drill penetration rates.

Core samples were logged in detail at the wellsite, coal and non coal bands of 0.01 m or greater are described. Coal lithotypes were described using the Australian Standard K 183 - 1970.

Attention is also paid to geotechnical descriptions of the core. Parameters noted include rock and soil strengths, discontinuities, apparent bedding dips and weathering. Core descriptions were also directly encoded onto the C1 input sheets. All cores were colour photographed in the core barrel splits on site.

The core samples were stored pending geophysical logging of the drillholes. A graphic seam section is prepared at 1:20 scale and compared with the geophysical detail logs also at 1:20 scale. The graphic logs are then adjusted for core loss and spreading to conform with the geophysical logs. The geophysical logs are also used to aid selection of sampling plies since the density logs in particular are responsive to ash variations.

Lithologic reports of chip and core sample descriptions and hole reports summarizing the coal and overburden in each drill hole are contained in Appendix VI.

12.6 Geophysical Logging

Exploration policy has been to geophysically log all bore holes where possible. The geophysical logging of bore holes is regarded as absolutely essential for achieving reliable seam correlations. All drill holes were geophysically logged unless downhole conditions prevented the running of the sondes. Drill holes were logged by BPB Instruments (Aust.) Pty. Ltd. The suite of geophysical logs run on all open drill holes is listed in Table 12.1.

The geophysical logs were used in conjunction with wellsite lithological logs for locating and correlating coal seams, and in a semi-quantitative sense for assessing coal quality. Depth and thickness of coal seams intersected were interpreted from geophysical logs almost exclusively. Depths were read to 0.1 m from the 1:200 scale general logs and 0.01 m from the 1:20 detail logs. The geophysical logs were also used to control core loss spreading, and to select sample intervals of cores for analyses.

An understanding of the sedimentology of fluvial depositional environments is required for confident seam correlations. The geophysical logs are an invaluable non-subjective record of the strata intersected and the various depositional sub-environments of fluvial systems give characteristic log responses as shown in Figure 12.1.

053

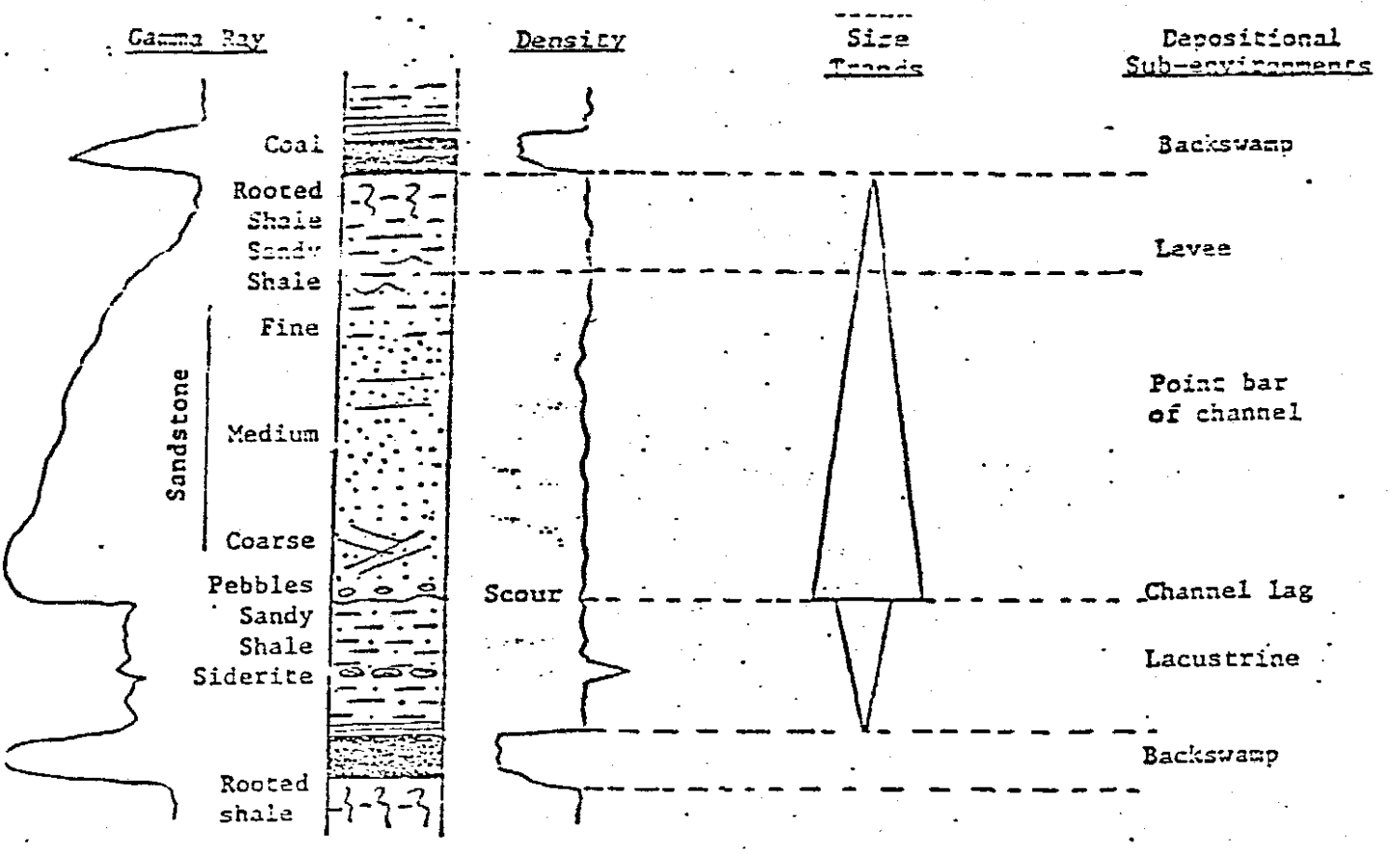


FIGURE 12.1 GEOPHYSICAL LOG RESPONSE
FLUVIAL SEQUENCE

(Clark and Cooper, 1982)

12.7 Coal Analytical Methods

Coal analyses undertaken on bore cores from E.L. 6/79 Catamaran, follow a scheme appropriate for the assessment of a steaming coal resource.

Bore core was sampled in the field, with reference to wireline geophysical logs, following the guidelines discussed in Section 12.5 of this report. The coal core samples depths are listed in Table 12.2.

The coal analyses were undertaken by the Australian Coal Industry Research Laboratory (ACIRL) mostly at their Ipswich Laboratory, to the relevant Australian Standards.

TABLE 12.1

DRILLING PROGRAMME SUMMARY

Commencement Completion	Drilling Contractor Drilling Rig & Number of Rigs	No. Open Holes No. Cored Holes	Open Holed Metreage Cored Metreage	Geophysical Contractor & Logs Run	Drillhole Spacing
CA 101-CA105					
November 14, 1981	H.J. Stackpole	3	219.26	BHB Australia P/L 1:200 Scale Gamma Ray Long Spaced Density Caliper Resistivity.	Stratigraphic exploratory holes throughout the property.
December 14, 1981	(a), 1	2	139.23	1:20 Scale Gamma Ray Long Spaced Denisty Bed Resolution Density Caliper.	
CA 106-CA 112					
February 4, 1982	H.J. Stackpole	2	481.91	"	"
May 12, 1982	(a), (b), 2	5	733.40	"	"
CA 113-CA 120					
November 3, 1982	Rockdril Contractors	8	1588.00	"	"
December 2, 1982	(c), 1	0	0.00	"	"
Total Open Holes		13	2289.17		
Core Holes		7	872.68		

The analytical scheme followed on the bore cores and the analytical results included in the Appendices to this report are tabulated below (Table 12.2).

TABLE 12.2

E.L. 6/79 CATAMARAN ANALYTICAL TESTWORK

CA 102F	HQ	"Ply by Ply" float/sink Appendix V	
CA 105F	HQ	" " " " "	
CA 106F	HQ	" " " " "	Detailed washed coal composite analysis. CA 106F and CA 111F only Appendix V.
CA 109F	HQ	" " " " " " " " "	
CA 111F	HQ	" " " " " " " " "	
CA 110	Chip Samples	" " " " " " " " "	

Slim core ply samples for "ply by ply" float/sink testwork were analysed in the following manner:-

Coal Plys

Stage 1

1. Weigh

2. Crush to -11.2 mm, retain a reserve of all sample in excess of that required for step 3.

3. Float/sink at 1.40, 1.60 and 1.80 relative densities*

4. Analyse each R.D. fraction for mass, ash, moisture, specific energy and total sulphur.

5. Determine relative density of the S1.80 fraction.

* These poor R.D.'s were used in holes CA 102 and CA 105 but due to poor yields, 1.40 was dropped and 2.00 was added for the other three holes.

Stage 2 (performed on CA 106F and CA 111F only)

Proximate Analysis
Specific Energy
Forms of Sulphur
Phosphorous
Ash Analysis - major
- trace
Ultimate Analysis
Relative Density
Ash Fusion Properties
Hardgrove Grindability Index
CSN
Vitrinite Reflectance
Maceral Analysis
Gray-King Coke Type

Stone Plys

1. Weigh
2. Prepare - retaining a reserve sample - 3.18 mm
3. Analyse for ash, moisture and relative density.

Choice of ply composites for detailed Stage II analyses was made following assessment of the Stage I analytical results.

12.8 Computer Data Base

Given the rather large amount of data generated in an exploration programme, the storage and manipulation of this data using a computer data base is an obvious step. All EL 6/79 Catamaran drilling data and coal quality analyses are stored on computer files.

MPAL utilizes a coal computing system developed by Marathon in conjunction with Mincom Pty. Ltd. The system requires additional development in terms of input, validation and editing and output to improve its operational effectiveness.

Data is input using a series of coding sheets termed G1, C1-C6 and the data stored on a series of files listed below. Additional input can be made normally, in the editing phase or data such as property boundaries, seam subcrops and unsurveyed borehole co-ordinates can be digitized from maps.

G1 Drill Hole Information File

This file contains survey, drilling and geophysical logging data and is input on the G1 drill hole information sheet.

C1 Coal Lithological File

Contains details of strata intersected in the drill hole and is input on the C1 coal lithological sheet encoded at the drill site.

C2 Coal Seam Thickness File

The C2 file includes summary roof and floor details of coal seams, stratigraphic boundaries, weathering details and total depth for the drill hole. Coal seam details are derived principally from the geophysical logs. The data is input on the C2 and seam information sheet.

C3 Coal Sample Information File

Contains details of coal, non-coal and marginal plies sampled for analysis and is input on the C3 coal sample information sheet.

C4 Coal Physical Properties and Washability File

This file includes data generated by the laboratory float/sink testwork programme and is input on the C4 coal physical properties and washability sheet.

C5 Coal Sample Analyses File

The C5 file contains detailed analyses including proximate analyses, specific energy, sulphur, phosphorous, ash analyses, ash fusion temperatures, ultimate analyses, hardgrove grindability and coal petrology and is input on the C5 coal sample sheet.

With E.L. 6/79 Catamaran, a base map at 1:25,000 scale showing bore hole positions was generated. The computer was used to produce lithological reports, hole reports (Appendix VI) and coal quality reports (Appendix V).

12.9 Aeromagnetic Survey

During December, 1982 MPAL contracted Geophysical Exploration Consultants Pty. Ltd. (G.E.C.) to undertake the supervision of an aeromagnetic survey over E.L. 6/79 Catamaran.

Full details of the survey are included in the report supplied by G.E.C. in Appendix VII.

12.10 Landsat Study

During December, 1982 MPAL contracted M.J. Longman and Associates to conduct a study over E.L. 6/79 Catamaran using data collected from the Landsat satellite utilizing a computer program designed to enhance various fractures of that data that relate to geologic information.

Full details of the study are included in the report supplied by M.J. Longman and Associates in Appendix VIII.

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GEOLOGICAL EVALUATION OF EL 6/79 CATAMARAN

VOLUME 2 (PART 1)
APPENDICES I - VII

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FICHE No. 013536-45

AUTHORS: N.T. PERKINS
D.L.J. DUNN

DATE: MARCH, 1984

OPEN FILE

REPORT NO. 1983/03

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(b) Interpretation of Geophysical Surveys, Catamaran Area (E.L. 6/79) by Leaman Geophysics, September, 1981.

(c) Review of Geophysical Interpretation by Leaman Geophysics, July, 1982.

(d) Review of Geophysical Interpretation by Leaman Geophysics, December, 1982.

APPENDIX III — Drill Hole Intersection Summary

APPENDIX IV — Petrological Reports

(a) Mineralogical Report No. 3599 by Pontifex and Associates Pty. Ltd., February, 1982.

(b) Mineralogical Report No. 3752 by Pontifex and Associates Pty. Ltd., July, 1982.

(c) Brief Petrological Report on Samples 1-7 for Marathon Petroleum Australia Limited by Dr. K.R. Martin, December, 1982.

APPENDIX V — Coal Analytical Report (ACIRL Reports)

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APPENDIX I

Photogeological Study, Catamaran Project Area

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Hunting Geology and Geophysics (Australia) Pty. Limited

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Our Ref. MMC/bg/391/80

Your Ref.

24th June, 1980

Mr. J. Mclean-Hodgson
Marathon Petroleum Australia, Ltd.
G.P.O. Box 687
BRISBANE QLD 4001

Dear John,

LETTER REPORT : PHOTOGEOLOGICAL STUDY, CATAMARAN PROJECT AREA, SOUTHERN TASMANIA (Our Job No. GA.8/80)

1. Introduction

A photogeological study of the Catamaran coal project-area in Southern Tasmania, using black and white panchromatic vertical aerial photographs at the approximate scale of 1:48 500, was carried out during the period April - June, 1980, by Hunting Geology and Geophysics (Australia) Pty. Limited on behalf of Marathon Petroleum Australia, Ltd. This letter report presents the findings of the photogeological interpretation and offers some recommendations for future coal exploration in this area.

The Catamaran project-area covers approximately 520km^2 of densely vegetated country (see Figure 1) which forms two distinct physiographic regions, as follows:

- The western half of the area is a deeply dissected and densely timbered region of rugged topography with mountain peaks and elevations frequently in excess of 1,000 metres. Alpine vegetation replaces gradually the wet sclerophyll forest above an approximate altitude of 800m.

- The eastern half of the area forms low-lying swampy plains which are vegetated mostly with cutting-grass and button-grass. Isolated hills are densely timbered and exploited for forestry products. Apart from a few roads in the eastern part which link the various timber exploitation fields and isolated settlements, access to the area is extremely restricted, and almost impossible in the central part of the area, even by means of helicopter.

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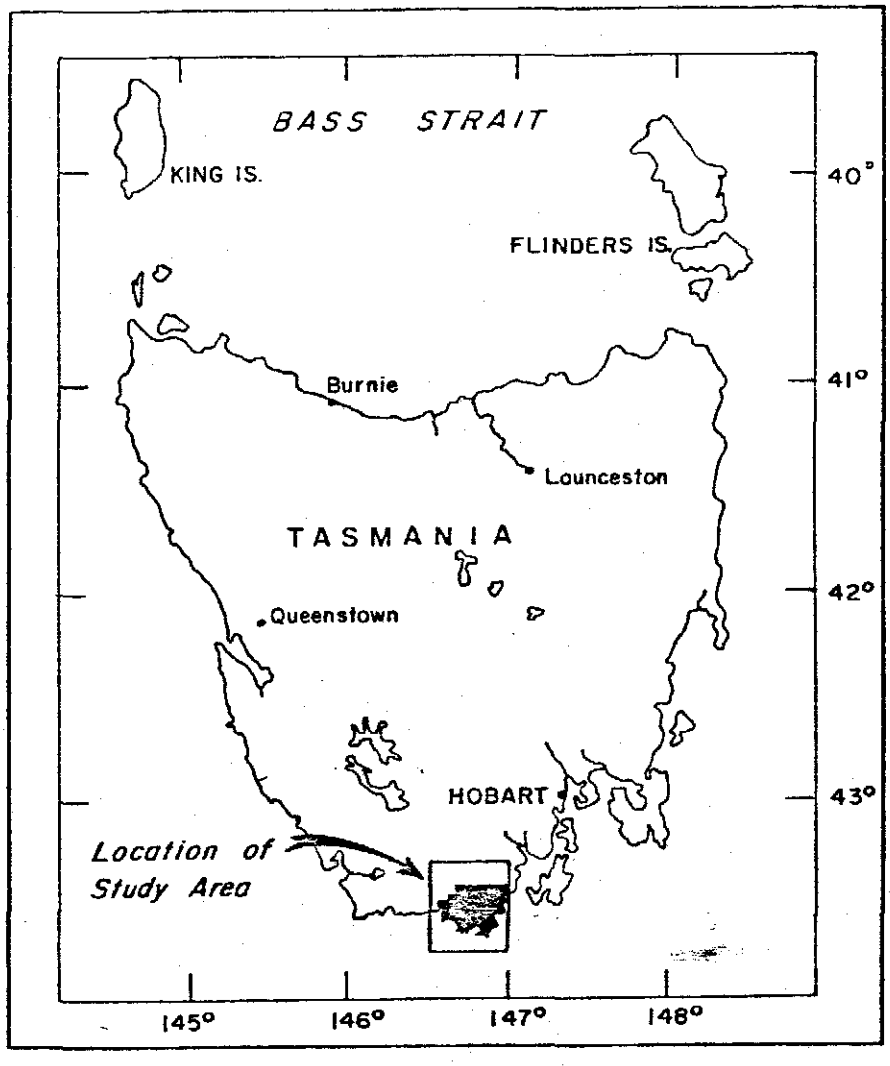


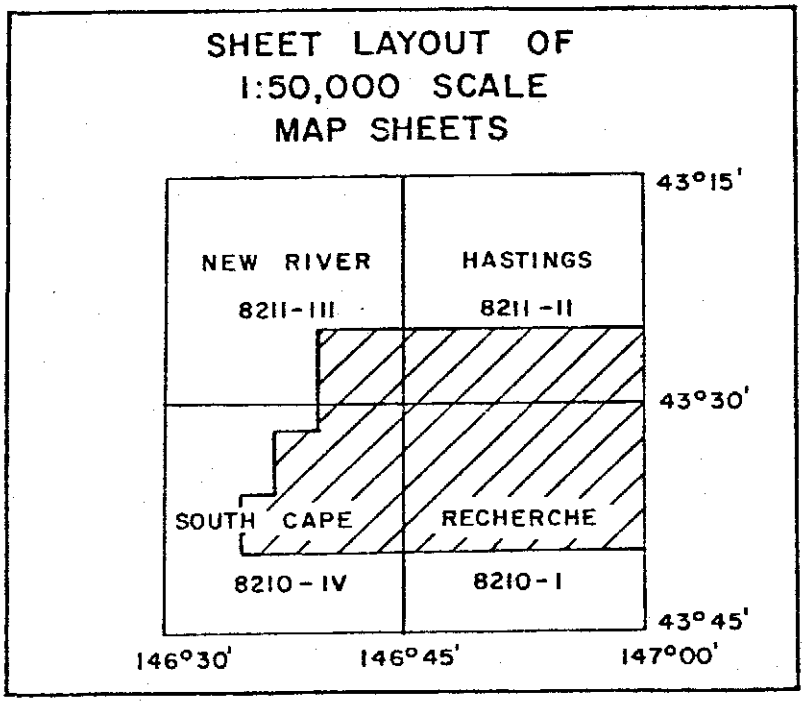


Figure 1. LOCATION DIAGRAM

The area has been previously mapped by geologists of the Geological Survey of Tasmania, at a scale of 1:250 000 (Hobart sheet SK-55/8). Geological reconnaissance and numerous investigations of the coal outcrops have been carried out since their discovery in 1824, and are reported in detail by Twelvetrees (1915a and b).

Comprehensive reconnaissance studies of the geology and the stratigraphy of the area are found in Farmer (1979), Banks (1962a, b and c), Hale (1962), Spry (1962) and Twelvetrees (1915a and b). Reports on coal occurrences and preliminary assessment have been made by Twelvetrees (1915a) and Rasmus (1975).

2. Aims of the Study

The aims of the photogeological mapping were twofold:

- To provide a detailed account of the stratigraphy and structure of the area to assist coal exploration;
- To formulate recommendations and guidelines for the next stage of coal exploration.

3. Procedure

The photogeological mapping involved a total of 22 aerial photographs (three runs) at the approximate scale of 1:48 500. Annotation of photogeological detail was done under a Zeiss N2 mirror stereoscope fitted with a 6x magnification binocular, onto two acetate drainage bases obtained from the photographic enlargements of 1:50 000 scale provisional toposheets (New River, Hastings, South Cape and Recherche).

Field checking of the photogeological mapping took two days at the end of the annotation phase, using a helicopter. Seventeen (17) localities were inspected in detail and are indicated on the photogeological map.

Extensive re-annotation, literature compilation and construction of geological cross-sections took place after the field checking phase; further re-annotation was done during the final stages of the integrated interpretation of the area. The results of the mapping are presented as a single photogeological map-sheet at the approximate scale of 1:48 500, a coloured version of which accompanies this report. A stratigraphic column and four (4) geological cross-sections are also presented to supplement the map-sheet.

4. Results

The regional geology consists of a thick (3,100 metres +) gently dipping sedimentary pile, ranging from Cambrian to Triassic in age, which has been intruded by Jurassic dolerite. A summary of the local strati-

.../...

graphy compiled from the literature, the field checking and observations made during the photogeological mapping is outlined in Figure 2.

The photogeological mapping has resulted in the empirical differentiation of 12 discrete units, however it has been severely hampered by the thick vegetal cover and the abundance of glacial deposits. The degree of reliability of the interpretation is considered to be good in the highest parts of the area and along the coast, where vegetation is least developed. Elsewhere it is considered to be fair, but cannot obviously be subdivided to the extent shown in Figure 2.

Significant stratigraphic features noted during the photogeological mapping are as follows:

- The Gordon Limestone (Lst) is difficult to recognise, because it does not readily form sinkholes, a corollary to its cherty nature. A similar vegetation cover to the other units is associated with the limestone, except near the top of the Lune Sugarloaf hill.

- The lowermost Triassic sandstone unit (Trs) is whitish on the air photographs and has been used as a "marker" horizon.

- The uppermost Triassic coal-measures sequence (Trc) forms extremely poor outcrops, owing to its lithological nature and is often found in low-lying swampy plains occupied by cutting-grass.

- The Jurassic dolerite produces rounded or conical hills which are (or have been, following the intensive present timber exploitation in the eastern parts of the area) densely forested at moderate altitudes. Higher-up, the dolerite is usually well-exposed and column-jointed; the presence of lichens or tea-trees associated with the dolerite imparts a characteristic mottling on the air photographs. The density of linear features is often a reliable indicator of the presence of dolerite, even in areas of poor outcrops.

The dominant structural features noted during the photogeological mapping are illustrated by the geological cross-sections (see plate 2) and are briefly as follows:

- The dominant feature in the area is the arcuate Lune River Fault, broadly oriented N-S and with an E block-down movement. Various interpretations as to its type can be envisaged, however for reasons of brevity, suffice it to say that it is a scissor-fault with a throw increasing northwards; a horsetail nature of the fault near the south coast suggests it terminates there or indicates the hinge zone.

- On a regional basis, the Lune River Fault appears to be the physical continuity of a large (50km+) N-S lineament, whose trace dictates the course of the Mountain River (west of Hobart), Huon River and Wobbly Creek. A hot spring north of

.../...

the Lune River appears to be conveniently located at the intersection of this lineament and a NW-trending fracture.

Other predominant fracture directions are E-W and NW-SE.

The Jurassic dolerite has extensively intruded the sedimentary sequence, far more in fact than shown on the 1:250 000 scale Hobart Geological Sheet. Two dolerite sheets are indicated by the geological cross-sections (plate 2), and this indication agrees well with the geophysical conclusions of Leaman and Naqvi (1967) in the Cygnet District and Leaman (1972) in the Hobart area.

The geometry of the dolerite is often flat-lying sheet- or trough-like, although considerable distortions, including bulging and/or coalescing of sheets, can suddenly be produced (see plate 2, east of Lune Sugarloaf). Figure 3 illustrates some of the forms of a dolerite body.

5. Conclusions and Recommendations

The following conclusions and recommendations for coal exploration in the Catamaran project-area are discussed in point form below:

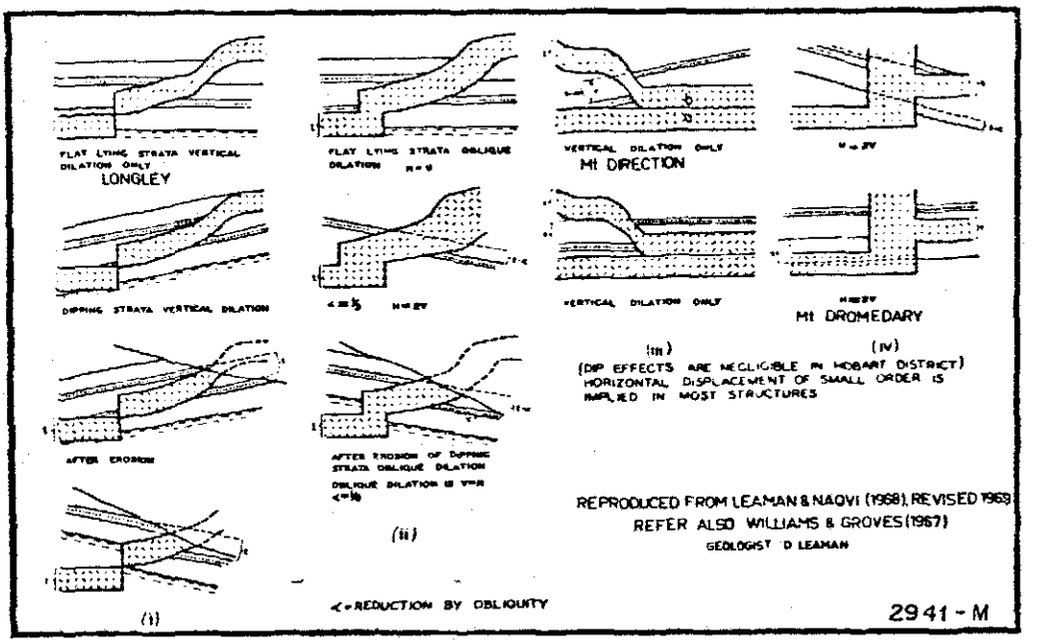
(i) The most important conclusion of the photogeological mapping is the discovery of a sandstone unit (Trs) south of the Catamaran River. This implies that the thin coal seams outcropping in the cliffs of South Cape Bay are probably part of the Permian Cygnet Coal Measures and not Triassic. The poor quality of coal reported by Twelvetrees (1915 b, p.6), the thinness of individual bands and the ratio coal:band (which was estimated to be in the order of 1:15 during the field checking) all appear to agree with a Permian age, traditionally considered to yield only inferior coal.

Further work along the South Cape Bay could define more precisely the quality and thickness of the coal, but should not be regarded as a high priority target.

(ii) The second major conclusion concerns the area west of the Lune River Fault. No Triassic coal-measures sequence (Trc) can outcrop in this area, because the lowermost Triassic sandstone (Trs) unit forms the highest topographic areas, at or above 1,000 metres altitude, namely the Moonlight Ridge and Mount La Perouse.

The area located west of the Lune River Fault which coincidentally is one of almost impossible access, does not therefore warrant further coal exploration.

(iii) The photogeological evidence indicates that from the initial 520km^2 of prospective country, a narrow "corridor" of sedimentary rocks (Trc), approximately 14km by 2.5km, constitutes the actual prospective target-area east of the Lune River Fault. Access problems are not quite as acute as



Reproduced from Gravity Survey of the
Hobart District
(Geol. Surv. Bull. 52, page 13)

Figure 3. FORM OF DILATION ASSOCIATED WITH DOLERITE BODIES

further west, however could still severely hamper exploration efforts. Detailed field checking of this "corridor" should be done to improve the photogeological mapping, especially west of Leprena, where coal outcrops have been reported in the literature. Three sub-areas should be considered in order decreasing priority:

- A small basin-like structure 4 x 3km, is located between the Catamaran and D'Entrecasteaux Rivers and contains the best Triassic coal intersections made to date with a maximum aggregate thickness of 6.8 metres. The nature of the basin, whether sedimentary or tectonic, is still a matter of speculation, owing to the paucity of observed dips or sedimentary features.

  This area has so far been well prospected with shallow diggings and scout drillholes in the immediate vicinity of known coal outcrops, yet away from the coal outcrops, no prospecting activity has taken place to test the down-dip continuity and/or improvement or deterioration of the seams.

  Further work in this sub-area is therefore warranted, and could include some geological field mapping with particular emphasis towards sedimentary structures for basin analysis. The field mapping should be assisted by shallow auger holes in areas of thicker overburden. Drillholes away from the coal outcrops should be located upon the results of the field mapping integrated with the photogeology and the previous drilling results. Other methods such as ground magnetics and particularly gravity could be readily incorporated with the field mapping stage and aid in delineating the subsurface extent of dolerite above and below the coal measures. Depending on the results of these ground geophysical surveys, aeromagnetic surveying may be employed to aid in outlining subsurface dolerite, particularly in areas of poor outcrop.

- The area located south of Ida Bay has also some coal potential and has been partly tested with two drillhole profiles. The results of this drilling are however unknown to the writer. Further untested coal potential could still exist south of the above drillhole profiles.

- Further coal potential appears to exist outside the area mapped photogeologically. Two areas indicated by "C's" on the 1:250 000 geological map of Hobart are located 5km NW and 8km N of Lune River respectively and could be briefly investigated for possible correlation with the known coal at Catamaran during a short field mapping program.

Yours sincerely,

M.M. Coupard

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LIST OF FIGURES AND PLATES

Figure 1: Location map.

Figure 2: Summary of the stratigraphy. Fig 6-2 main body of report.

Figure 3: Form of dilation associated with dolerite bodies.

Plate 1: Photogeological worksheet. plan CM013a of main body of report

Plate 2: Geological cross-sections (four). } not included here

Plate 3: Individual photoscale field checking overlays. } not included here

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APPENDIX I

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CATAMARAN AREA - LIST OF AERIAL PHOTOGRAPHS

Scale of Photography: Approximately 1:48 500

Camera: 152.95mm

Source: Department of Lands, Tasmania

Type: Black and white contact prints, 24x24cm format, double weight glossy finish.

Forward Overlap: 60%

Side Overlap: 25%

Topo sheets: (1:100 000) South Cape 8210 and Huon 8211. (Provisional 1:50 000) New River 8211-III; Hastings 8211-II; South Cape 8210-IV; Recherche 8210-I.

Job Name	Job No.	Date	Run No.	Print No.	No. of Photos	Quality
South West	F.617	12.12.79	28	180-187	8	Good
South West	F.617	12.12.79	29	145-152	8	Good
South West	F.617	12.12.79	30	136-141	6	Good
				Total	22	

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APPENDIX II

Geophysical Reports

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MARATHON PETROLEUM AUSTRALIA LTD.

GRAVITY SURVEY - LUNE RIVER DISTRICT, SOUTHERN TASMANIA

DECEMBER 1980.

LAYTON GEOPHYSICAL INTERNATIONAL

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1. INTRODUCTION

Layton Geophysical International was asked by Marathon Petroleum Australia Ltd., to conduct a gravity survey in the Lune River District of S.E. Tasmania, south of Dover. The survey was designed to delineate dolerite sills with the aid of known geology and ground magnetics obtained by Marathon. Once delineated, it was hoped that gravity would prove useful in estimating the probable thickness of these sills.

The survey consisted of:

1. Tying gravity into the B.M.R. isogal station 6491.0260 at Elizabeth Street Pier, Hobart.

2. Conducting a gravity survey along roads and forest tracks in the designated area with station intervals of 250 metres. In the later stages of the survey a helicopter, supplied by Marathon, was used in terrain inaccessible to four-wheel drive vehicles, to cover the area with a 250 - 500 metre grid.

3. Optically levelling the gravity stations to determine elevations. Where terrain made optically levelling impossible, aneroid barometers were used to determine the elevations.

Gravity field work was carried out by Mr. M. Heuson and supervised by Mr. B. Simons. Computation was carried out by Mr. N. Hart in the Canberra office.

The gravity meter used was a La Coste and Romberg D series, No. D-46, which was calibrated before and after the survey over the B.M.R. calibration range in Canberra.

The levelling survey was carried out by Mr. B. McCauley of the Layton Group and Mr. B. Wilson of L.G.I.

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2. SURVEY PROCEDURE

Gravity

The gravity values for the survey were tied to B.M.R. gravity isogal station No. 6491.0260 situated on the Elizabeth Street Pier, Hobart. The value used for this station was 980,450.52 mgals.

Two separate loops were run from this Hobart isogal station to a temporary base station at the Dover Hotel, Dover. The Dover base station was read at the beginning and end of each day's field work, and provided a control for stations read in the field.

Stations were read every 250 metres using the following procedure:

(i) Read the first base.

(ii) Read all the stations from the first base to the second base.

(iii) Read the second base.

(iv) Read the first base.

(v) Read the second base.

(vi) Read all the stations from the second base to the third base.

(vii) Read the third base.

(viii) Read the second base.

(ix) Read the third base,
and so on.

No more than three hours elapsed for the closure of each loop, with most loops completed in under two hours.

The La Coste and Romberg D-46, D series gravity meter used was calibrated before and after the survey over the B.M.R. calibration range in Canberra, and was found to agree with the calibration table supplied with the meter. A value of 55.982 mgals was used for the range.

Slight differences in gravity values for each base station, due

using a least squares adjustment program. The maximum adjustment accepted was 0.2 mgals.

Elevation

Station elevations were obtained by optically levelling where terrain permitted and by the use of barometers elsewhere. The surveying was done by Mr. B. McCauley and Mr. B. Wilson.

No elevation values were available in the area and therefore the survey was tied to Mean High Water Mark at Research Bay. This datum was also used for the roads that have been surveyed in the area by the Department of Main Roads. Should these roads be brought onto A.H.D. some time in the future, the same adjustment can be made to this survey to bring it onto A.H.D.

Optically levelled loops were closed back to the initial station or to a previously levelled station. The maximum misclosure accepted was 0.5 metres.

The barometer loops were run in the same manner, and at the same time as the gravity loops. Control was supplied by a base barometer being read at the base station at regular intervals of not more than 10 minutes.

Positioning

Initially stations were established in the field at approx. 250 metre intervals alongside the roads in the area. Later in the survey a helicopter was used to set up stations in inaccessible areas in an attempt to set up a grid of approx. 250 metre station spacing.

Stations were marked with a dumpy peg and a number. Whilst in the field these stations were marked on air photographs and later transferred to a 1:25,000 topographic map. This map was then digitised to provide longitude and latitude values for each station. This map has also been taken as the base map for the survey.

3. RESULTS

The results have been plotted at 1:25,000 (see Figure 1) with one milligal contour interval. All stations have been numbered and also have the bouguer anomaly value for a density of 2.35 gms / cc.

It should be noted that the data has had no functional conversion undertaken on it for the effects of the topography (terrain corrections). After consulting with a number of gravity specialists in the Bureau of Mineral Resources, and with our Chief Geophysicist it is our view that the terrain effects will be most marked within a quarter kilometre radius from the station. Any terrain outside that radius will have less than 0.25 milligals effect on the data (unless it is a very sharp increase in elevation) and any anomaly present would be real however its shape and size might change slightly. There appears to be only one anomaly in this survey area that will be effected by the topography and that is the anomaly around station number 294.

It should also be noted that the density used is 2.35 gms/cc which is the density of the coal in the area. Any positive anomalies will be related to a thinning of the coal or a thickening of the dolerite and one or two of the positive anomalies could be associated with a dyke of dolerite.

The following is a run down of the individual anomalies with comments regarding each:

Anomaly at St. No. 422 Negative anomaly based on one point, appears not related to topography and is of approx 1 milligal in size.

Anomaly at St. No. 255 Positive anomaly, banana shaped, appears not to be related to topography, based on a number of stations, approx. 3 milligals in size and is possible associated with a dolerite dyke.

Anomaly at St. No. 16 Negative anomaly, covers a generally large area, but only approx. 1 milligal in size, could have some effect from topography, pear shaped pointing north, the anomaly is based on a large number of points.

Anomaly at St. No. 294 Positive anomaly, appears to have some effect from the topography, ie the hill to the west of the anomaly (1685 feet in height). The anomaly is 3 milligals in size, pear shaped and is based on at least five points.

Anomaly at St. No. 37 Negative anomaly, based on a number of points, 2 mgals in size, possibly no closure to the south, appears to have little effect from the topography, however, station 206 might have some topographic effect.

Anomaly at St. No. 347 Negative anomaly, based on a single station, not effected by topography, could possibly need further investigation to determine size and shape, at present 1 mgal in size.

Anomaly at St. No. 335 Negative anomaly, based on a single station, not effected by topography, could possibly need further investigation to determine size and shape, at present 2 mgals in size.

Anomaly at St. No. 241 Positive anomaly, with no effect from topography, based on a large number of stations, 3 mgals in size, oval in shape with steeper gradients on the southern margin than on the northern side, warrants further investigation on the north/east and south western sides.

CONCLUSIONS AND RECOMMENDATIONS

The gravity survey was able to delineate a number of gravity anomalies. A number of these anomalies are of interest, especially anomaly at station number 255 and at station number 241.

It is recommended therefore that some further field work be undertaken on these two anomalies to determine the exact extent and size. It is also recommended that the terrain effects be taken from the gravity values for the anomaly on station number 294 to see the extent and size of the anomaly.

It should be noted that the survey is tied to isogal datums for gravity, however for elevation, it is tied to the Mean High Water Mark at Research Bay.

The survey had a number of problems including vehicle shipment and equipment breakdown. The progress was generally slow with an average of 25 gravity stations being read per day, this figure also includes ties to the isogal station in Hobart.

It is recommended that in any further work undertaken in this area, grid lines be cut before the survey starts and therefore there would be no delay in reading gravity.

Respectfully submitted,

T.D.J. Pippett B. App. Sc., ASEG,
Managing Geophysicist.

5. APPENDIX - SURVEY STATISTICS

Personnel

Managing Geophysicist	-	T.D.J. Pippett
Supervising Geophysicist	-	B. Simons
Observer	-	M. Heuson
Surveyors	-	B. McCauley
	-	B. Wilson
Computer	-	N. Hart

Daily Account of Activities

1 December	Mobilise Canberra to Dover		
	Gravity	Surveying	
2 "	Loops 1 to 18	Stations 1 to 13	
	" 18 to 25		
3 "	Tie to isogal network	" 14 to 24	
4 "		" 25 to 47	
5 "		" 48 to 92	
6 "	Loops 25 to 47	" 93 to 118	
7 "	" 47 to 105	" 119 to 127	
	" 105 to 118		
	" 118 to 127		
	" 48 to 56		
8 "	" 48 to 92	" 128 to 162	
9 "	" 66 to 75		
	" 75 to 92	" 163 to 175	
10 "	" 128 to 153	" 176 to 191	
	" 154 to 162		
	" 163 to 175		
11 "	" 176 to 217	" 192 to 199	
12 "	" 217 to 229	" 200 to 239	
	" 230 to 244		
	" 245 to 247		
13 "	" 248 to 265	" 240 to 247	
	" 266 to 275		
14 "	" 276 to 289	" 290 to 300	
15 "	" 290 to 300	" 267 to 275	

	Gravity	Surveying
16 December		Stations 248 to 265
17 "	Loops 301 to 308	" 301 to 308
		" 277 to 289
18 "	" 309 to 321	" 309 to 325
	" 322 to 325	
19 "	" 326 to 346	" 326 to 394
	" 347 to 361	
	" 362 to 379	
	" 380 to 394	
20 "	" 395 to 409	" 395 to 425
	" 410 to 425	
21 "	Tie to isogal	
22 "	Demobilise Dover to Canberra.	

Total number of new gravity stations surveyed - 425.

Stations from 248 to 425 were surveyed using barometers.

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8012 TASGRAV 15/01/8 1981/02/02

8012.001 15/01/8 DATUM = =DH MO 1981/02/02

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	*	LAST DATE STATION UPDATED
6491.0260	*********	*********	*********	980450.52	*********	********					1981/01/15
8012.0001	43.4478	145.9040	34.81	980489.86	34.81	********	11.25	7.82			1981/02/02
8012.0002	43.4500	145.9042	19.69	980491.90	19.69	********	8.42	6.49			..
8012.0003	43.4518	145.9048	21.93	980491.45	21.93	********	8.51	6.35			..
8012.0004	43.4540	145.9045	26.89	980490.32	26.89	********	8.71	6.07			..
8012.0005	43.4560	145.9035	32.41	980488.90	32.41	********	8.82	5.63			..
8012.0006	43.4580	145.9023	38.68	980486.85	38.68	********	8.52	4.71			..
8012.0007	43.4598	145.9008	45.57	980484.87	45.57	********	8.50	4.01			..
8012.0008	43.4620	145.8993	49.65	980483.63	49.65	********	8.32	3.43			..
8012.0009	43.4642	145.8987	48.55	980483.20	48.55	********	7.36	2.58			..
8012.0010	43.4665	145.8987	47.36	980483.43	47.36	********	7.01	2.35			..
8012.0011	43.4687	145.8988	52.45	980482.29	52.45	********	7.25	2.08			..
8012.0012	43.4698	145.8973	68.56	980478.87	68.56	********	8.70	1.95			..
8012.0013	43.4700	145.8938	82.71	980476.26	82.71	********	10.43	2.29			..
8012.0014	43.4715	145.8918	93.84	980473.98	93.84	********	11.46	2.22			..
8012.0015	43.4733	145.8908	101.00	980472.75	101.00	********	12.27	2.33			..
8012.0016	43.4765	145.8907	90.01	980475.32	90.01	********	11.16	2.30			..
8012.0017	43.4788	145.8900	85.85	980476.58	85.85	********	10.92	2.47			..
8012.0018	43.4803	145.8892	81.42	980477.81	81.42	********	10.66	2.64			..
8012.0019	43.4813	145.8890	75.63	980478.89	75.63	********	9.86	2.42			..
8012.0020	43.4842	145.8902	76.26	980479.10	76.26	********	10.01	2.50			..
8012.0021	43.4868	145.8895	80.42	980478.65	80.42	********	10.60	2.68			..
8012.0022	43.4890	145.8893	88.61	980477.91	88.61	********	12.20	3.47			..
8012.0023	43.4907	145.8882	94.16	980477.42	94.16	********	13.26	3.99			..
8012.0024	43.4922	145.8867	87.48	980479.24	87.48	********	12.89	4.27			..
8012.0025	43.4938	145.8855	79.47	980481.82	79.47	********	12.84	5.02			..
8012.0026	43.4952	145.8840	73.86	980483.93	73.86	********	13.10	5.83			..
8012.0027	43.4943	145.8818	68.07	980486.67	68.07	********	14.14	7.43			..
8012.0028	43.4955	145.8802	61.93	980488.12	61.93	********	13.59	7.49			..
8012.0029	43.4973	145.8787	54.27	980490.17	54.27	********	13.10	7.76			..
8012.0030	43.4993	145.8783	49.06	980491.29	49.06	********	12.43	7.60			..
8012.0031	43.5010	145.8780	46.40	980492.31	46.40	********	12.48	7.91			..
8012.0032	43.5030	145.8763	40.80	980493.96	40.80	********	12.22	8.21			..
8012.0033	43.5043	145.8748	32.36	980496.23	32.36	********	11.77	8.58			..
8012.0034	43.5068	145.8745	22.93	980498.64	22.93	********	11.05	8.79			..
8012.0035	43.5092	145.8735	19.97	980500.27	19.97	********	11.55	9.59			..
8012.0036	43.5095	145.8757	19.15	980498.96	19.15	********	9.96	8.07			..
8012.0037	43.5097	145.8787	19.67	980498.51	19.67	********	9.65	7.71			..
8012.0038	43.5105	145.8817	25.05	980497.73	25.05	********	10.46	7.99			..
8012.0039	43.5120	145.8832	27.55	980498.00	27.55	********	11.37	8.66			..
8012.0040	43.5140	145.8833	31.42	980498.18	31.42	********	12.56	9.46			..
8012.0041	43.5163	145.8832	35.29	980497.98	35.29	********	13.34	9.87			..
8012.0042	43.5183	145.8823	28.85	980499.76	28.85	********	12.95	10.11			..
8012.0043	43.5202	145.8807	28.37	980500.32	28.37	********	13.20	10.41			..
8012.0044	43.5218	145.8790	32.09	980500.12	32.09	********	14.00	10.84			..
8012.0045	43.5237	145.8787	36.62	980499.72	36.62	********	14.84	11.23			..
8012.0046	43.5258	145.8798	37.79	980501.19	37.79	********	16.47	12.75			..
8012.0047	43.5282	145.8827	51.48	980498.89	51.48	********	18.18	13.11			..
8012.0048	43.5285	145.8792	55.63	980499.02	55.63	********	19.57	14.09			..
8012.0049	43.5287	145.8760	66.20	980496.38	66.20	********	20.17	13.65			..

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8012.001 15/01/8 DATUM = =DM MO 1981/02/02

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	* LAST DATE STATION UPDATED *
8012.0050	43.5295	145.8737	63.87	980496.72	63.87	********	19.72	13.43		1981/02/02
8012.0051	43.5305	145.8715	60.65	980496.98	60.65	********	18.89	12.92		..
8012.0052	43.5315	145.8688	52.26	980498.19	52.26	********	17.43	12.28		..
8012.0053	43.5322	145.8655	51.90	980498.15	51.90	********	17.21	12.10		..
8012.0054	43.5327	145.8620	56.55	980496.64	56.55	********	17.10	11.53		..
8012.0055	43.5350	145.8625	61.47	980495.75	61.47	********	17.51	11.45		..
8012.0056	43.5362	145.8647	69.81	980494.77	69.81	********	19.00	12.13		..
8012.0057	43.5383	145.8653	59.09	980498.34	59.09	********	19.07	13.25		..
8012.0058	43.5392	145.8672	54.44	980500.48	54.44	********	19.70	14.34		..
8012.0059	43.5408	145.8677	48.36	980502.64	48.36	********	19.83	15.07		..
8012.0060	43.5427	145.8660	50.65	980502.25	50.65	********	19.98	15.00		..
8012.0061	43.5442	145.8642	43.62	980504.07	43.62	********	19.49	15.20		..
8012.0062	43.5460	145.8620	35.50	980506.11	35.50	********	18.66	15.37		..
8012.0063	43.5488	145.8600	27.28	980509.01	27.28	********	18.97	16.29		..
8012.0064	43.5503	145.8615	22.12	980510.55	22.12	********	18.78	16.61		..
8012.0065	43.5517	145.8637	20.39	980512.05	20.39	********	19.63	17.62		..
8012.0066	43.5527	145.8665	20.55	980513.47	20.55	********	21.01	18.99		..
8012.0067	43.5540	145.8685	21.31	980514.58	21.31	********	22.24	20.14		..
8012.0068	43.5553	145.8705	16.01	980516.16	16.01	********	22.06	20.49		..
8012.0069	43.5570	145.8727	8.61	980517.66	8.61	********	21.12	20.28		..
8012.0070	43.5590	145.8715	7.72	980518.70	7.72	********	21.71	20.95		..
8012.0071	43.5602	145.8700	12.08	980518.02	12.08	********	22.27	21.08		..
8012.0072	43.5617	145.8678	21.37	980516.56	21.37	********	23.54	21.44		..
8012.0073	43.5633	145.8663	21.39	980516.90	21.39	********	23.74	21.64		..
8012.0074	43.5650	145.8643	19.82	980517.29	19.82	********	23.49	21.54		..
8012.0075	43.5667	145.8622	25.04	980516.72	25.04	********	24.39	21.92		..
8012.0076	43.5687	145.8607	30.80	980516.04	30.80	********	25.31	22.27		..
8012.0077	43.5698	145.8600	36.35	980514.60	36.35	********	25.47	21.90		..
8012.0078	43.5713	145.8590	39.29	980514.05	39.29	********	25.69	21.82		..
8012.0079	43.5722	145.8568	46.43	980515.19	46.43	********	28.96	24.39		..
8012.0080	43.5735	145.8548	40.19	980515.03	40.19	********	26.76	22.80		..
8012.0081	43.5757	145.8548	32.08	980517.64	32.08	********	26.67	23.51		..
8012.0082	43.5780	145.8537	25.47	980519.13	25.47	********	25.91	23.40		..
8012.0083	43.5805	145.8523	39.37	980517.29	39.37	********	28.13	24.26		..
8012.0084	43.5822	145.8502	37.95	980517.33	37.95	********	27.59	23.85		..
8012.0085	43.5835	145.8477	40.74	980515.18	40.74	********	26.17	22.16		..
8012.0086	43.5832	145.8445	45.56	980514.00	45.56	********	26.51	22.02		..
8012.0087	43.5832	145.8415	56.92	980512.23	56.92	********	28.24	22.64		..
8012.0088	43.5843	145.8392	56.78	980511.83	56.78	********	27.70	22.10		..
8012.0089	43.5857	145.8370	56.26	980512.75	56.26	********	28.34	22.80		..
8012.0090	43.5852	145.8348	48.25	980514.79	48.25	********	27.95	23.20		..
8012.0091	43.5848	145.8330	51.49	980513.41	51.49	********	27.60	22.53		..
8012.0092	43.5843	145.8313	55.90	980512.34	55.90	********	27.94	22.43		..
8012.0093	43.5287	145.8853	34.58	980503.40	34.58	********	17.43	14.03		..
8012.0094	43.5292	145.8890	29.47	980505.01	29.47	********	17.43	14.53		..
8012.0095	43.5293	145.8920	17.73	980508.04	17.73	********	16.81	15.06		..
8012.0096	43.5303	145.8935	9.56	980510.37	9.56	********	16.53	15.59		..
8012.0098	43.5320	145.8927	2.61	980510.20	2.61	********	14.07	13.81		..
8012.0099	43.5342	145.8898	2.01	980510.80	2.01	********	14.29	14.09		..
8012.0100	43.5363	145.8878	2.03	980511.25	2.03	********	14.55	14.35		..

4414090

8012 TASGRAV 15/01/8 1981/02/02

8012.001 15/01/8 DATUM = =DM MO 1981/02/02

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	* LAST DATE STATION UPDATED
8012.0101	43.5383	145.8892	4.71	980511.04	4.71	********	14.99	14.52		1981/02/02
8012.0102	43.5402	145.8897	6.43	980512.35	6.43	********	16.66	16.02		..
8012.0103	43.5422	145.8902	8.12	980514.54	8.12	********	19.19	18.39		..
8012.0104	43.5442	145.8890	2.57	980516.51	2.57	********	19.27	19.01		..
8012.0105	43.5460	145.8875	4.20	980517.26	4.20	********	20.35	19.94		..
8012.0106	43.5477	145.8867	3.49	980517.99	3.49	********	20.71	20.37		..
8012.0107	43.5500	145.8853	2.86	980518.23	2.86	********	20.56	20.28		..
8012.0108	43.5518	145.8838	11.13	980516.56	11.13	********	21.27	20.18		..
8012.0109	43.5533	145.8828	9.14	980517.18	9.14	********	21.14	20.24		..
8012.0110	43.5555	145.8822	8.61	980517.62	8.61	********	21.22	20.37		..
8012.0111	43.5565	145.8842	8.19	980518.32	8.19	********	21.70	20.90		..
8012.0112	43.5575	145.8873	12.08	980517.72	12.08	********	22.21	21.02		..
8012.0113	43.5595	145.8885	6.38	980519.00	6.38	********	21.56	20.93		..
8012.0114	43.5613	145.8895	8.27	980519.26	8.27	********	22.23	21.42		..
8012.0115	43.5635	145.8895	7.46	980519.95	7.46	********	22.47	21.74		..
8012.0116	43.5648	145.8882	5.92	980520.65	5.92	********	22.58	22.00		..
8012.0117	43.5663	145.8868	5.49	980521.41	5.49	********	23.08	22.54		..
8012.0118	43.5672	145.8847	4.88	980520.93	4.88	********	22.33	21.85		..
8012.0119	43.5692	145.8858	7.56	980520.81	7.56	********	22.86	22.11		..
8012.0120	43.5710	145.8872	9.29	980521.39	9.29	********	23.80	22.89		..
8012.0121	43.5727	145.8888	12.16	980520.13	12.16	********	23.28	22.09		..
8012.0122	43.5752	145.8890	12.79	980520.30	12.79	********	23.42	22.16		..
8012.0123	43.5773	145.8878	6.26	980522.66	6.26	********	23.56	22.95		..
8012.0124	43.5788	145.8850	.70	980523.81	.70	********	22.87	22.80		..
8012.0125	43.5813	145.8862	1.67	980523.85	1.67	********	22.99	22.82		..
8012.0126	43.5828	145.8885	1.04	980524.04	1.04	********	22.84	22.74		..
8012.0127	43.5837	145.8910	2.50	980524.89	2.50	********	24.06	23.82		..
8012.0128	43.5273	145.8940	3.40	980511.36	3.40	********	15.89	15.56		..
8012.0129	43.5258	145.8953	3.45	980511.26	3.45	********	15.94	15.60		..
8012.0130	43.5238	145.8960	5.85	980510.23	5.85	********	15.83	15.26		..
8012.0131	43.5222	145.8965	3.63	980509.99	3.63	********	15.05	14.70		..
8012.0132	43.5195	145.8973	6.44	980508.82	6.44	********	14.99	14.36		..
8012.0133	43.5172	145.8978	8.53	980507.60	8.53	********	14.63	13.79		..
8012.0134	43.5155	145.9005	9.10	980507.45	9.10	********	14.81	13.91		..
8012.0135	43.5145	145.9027	5.40	980508.75	5.40	********	15.06	14.53		..
8012.0136	43.5135	145.9048	1.80	980509.10	1.80	********	14.39	14.21		..
8012.0137	43.5125	145.9077	.65	980508.92	.65	********	13.94	13.88		..
8012.0138	43.5113	145.9095	3.97	980506.77	3.97	********	12.92	12.53		..
8012.0139	43.5092	145.9108	9.11	980505.08	9.11	********	13.01	12.12		..
8012.0140	43.5075	145.9118	19.18	980502.35	19.18	********	13.54	11.65		..
8012.0141	43.5055	145.9123	23.79	980500.74	23.79	********	13.53	11.19		..
8012.0142	43.5035	145.9117	28.59	980499.37	28.59	********	13.83	11.01		..
8012.0143	43.5018	145.9095	38.96	980496.45	38.96	********	14.25	10.42		..
8012.0144	43.5010	145.9070	51.34	980493.37	51.34	********	15.07	10.02		..
8012.0145	43.5002	145.9037	54.04	980492.24	54.04	********	14.85	9.52		..
8012.0146	43.4992	145.9032	50.84	980492.35	50.84	********	14.06	9.06		..
8012.0147	43.4972	145.9022	46.37	980492.09	46.37	********	12.61	8.04		..
8012.0148	43.4953	145.9018	37.01	980492.91	37.01	********	10.70	7.06		..
8012.0149	43.4930	145.9005	32.04	980493.00	32.04	********	9.47	6.31		..
8012.0150	43.4912	145.9002	38.19	980490.90	38.19	********	9.43	5.67		..

030

44409

8012.001 15/01/8 DATUM = =DM MD 1981/02/02

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	* LAST DATE STATION UPDATED
8012.0151	43.4887	145.9012	33.76	980491.32	33.76	********	8.70	5.38		1981/02/02
8012.0152	43.4870	145.9033	34.94	980491.05	34.94	********	8.95	5.51		..
8012.0153	43.4853	145.9057	30.13	980491.42	30.13	********	7.99	5.02		..
8012.0154	43.4828	145.9058	28.91	980491.55	28.91	********	7.97	5.12		..
8012.0155	43.4812	145.9042	31.88	980490.35	31.88	********	7.83	4.69		..
8012.0156	43.4790	145.9037	33.77	980489.48	33.77	********	7.74	4.41		..
8012.0157	43.4772	145.9042	36.63	980488.65	36.63	********	7.96	4.35		..
8012.0158	43.4748	145.9038	34.30	980489.06	34.30	********	7.86	4.49		..
8012.0159	43.4728	145.9032	33.76	980488.80	33.76	********	7.61	4.29		..
8012.0160	43.4710	145.9020	38.47	980487.39	38.47	********	7.82	4.03		..
8012.0161	43.4697	145.9013	42.91	980485.86	42.91	********	7.78	3.55		..
8012.0162	43.4685	145.9002	49.08	980484.37	49.08	********	8.30	3.47		..
8012.0163	43.4485	145.9018	44.20	980488.78	44.20	********	13.01	8.66		..
8012.0164	43.4498	145.8995	46.51	980487.27	46.51	********	12.10	7.52		..
8012.0165	43.4512	145.8973	52.81	980485.56	52.81	********	12.21	7.01		..
8012.0166	43.4523	145.8945	60.26	980483.49	60.26	********	12.33	6.40		..
8012.0167	43.4527	145.8917	61.16	980482.70	61.16	********	11.79	5.77		..
8012.0168	43.4523	145.8883	58.57	980482.68	58.57	********	11.00	5.23		..
8012.0169	43.4503	145.8867	60.45	980481.98	60.45	********	11.06	5.11		..
8012.0170	43.4512	145.8842	69.81	980479.22	69.81	********	11.11	4.23		..
8012.0171	43.4528	145.8830	71.95	980478.68	71.95	********	11.08	3.99		..
8012.0172	43.4545	145.8815	72.48	980478.67	72.48	********	11.08	3.95		..
8012.0173	43.4547	145.8795	71.62	980479.37	71.62	********	11.50	4.45		..
8012.0174	43.4560	145.8772	73.58	980479.98	73.58	********	12.60	5.36		..
8012.0175	43.4560	145.8742	69.79	980481.29	69.79	********	12.74	5.87		..
8012.0176	43.4467	145.9067	11.69	980495.15	11.69	********	9.51	8.36		..
8012.0177	43.4475	145.9103	4.00	980496.89	4.00	********	8.80	8.41		..
8012.0178	43.4483	145.9132	1.14	980498.66	1.14	********	9.62	9.50		..
8012.0179	43.4502	145.9152	.20	980498.73	.20	********	9.23	9.21		..
8012.0180	43.4503	145.9188	9.19	980497.52	9.19	********	10.78	9.88		..
8012.0181	43.4497	145.9213	18.70	980498.25	18.70	********	14.50	12.66		..
8012.0182	43.4485	145.9237	13.07	*********	13.07	********				..
8012.0183	43.4487	145.9265	13.63	980499.25	13.63	********	14.03	12.68		..
8012.0184	43.4493	145.9288	9.04	980500.25	9.04	********	13.55	12.66		..
8012.0185	43.4502	145.9313	8.64	980501.04	8.64	********	14.14	13.29		..
8012.0186	43.4513	145.9355	8.67	980501.40	8.67	********	14.41	13.55		..
8012.0187	43.4515	145.9390	5.02	980502.45	5.02	********	14.31	13.82		..
8012.0188	43.4525	145.9418	3.94	*********	3.94	********				..
8012.0189	43.4533	145.9450	2.07	980503.00	2.07	********	13.79	13.58		..
8012.0190	43.4537	145.9467	1.73	980503.52	1.73	********	14.18	14.00		..
8012.0191	43.4547	145.9478	1.00	980503.59	1.00	********	13.93	13.83		..
8012.0192	43.4547	145.9460	30.39	980498.07	30.39	********	17.49	14.49		..
8012.0193	43.4550	145.9440	23.14	980499.29	23.14	********	16.43	14.15		..
8012.0194	43.4553	145.9417	24.20	980498.92	24.20	********	16.36	13.98		..
8012.0195	43.4552	145.9392	26.42	980498.44	26.42	********	16.58	13.98		..
8012.0196	43.4547	145.9368	19.34	980499.69	19.34	********	15.69	13.79		..
8012.0197	43.4518	145.9322	19.23	980499.47	19.23	********	15.69	13.79		..
8012.0198	43.4530	145.9328	14.07	980499.75	14.07	********	14.27	12.89		1981/01/29
8012.0199	43.4518	145.9322	8.47	980501.02	8.47	********	13.93	13.09		..
8012.0200	43.4623	145.8968	61.11	980481.65	61.11	********	9.85	3.84		1981/02/02

4440092

8012.001 15/01/8 DATUM = =DM MO 1981/02/02

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	* LAST DATE STATION UPDATED
8012.0201	43.4622	145.8947	69.02	980479.62	69.02	********	10.27	3.48		1981/02/02
8012.0202	43.4653	145.8908	125.19	980469.64	125.19	********	17.35	5.02		..
8012.0203	43.4670	145.8905	113.67	980472.00	113.67	********	16.00	4.81		..
8012.0204	43.4683	145.8918	98.18	980475.33	98.18	********	14.43	4.76		..
8012.0205	43.5058	145.8788	22.10	980500.27	22.10	********	12.51	10.33		..
8012.0206	43.5058	145.8813	20.81	980499.02	20.81	********	10.86	8.81		..
8012.0207	43.5058	145.8835	25.61	980498.53	25.61	********	11.85	9.33		..
8012.0208	43.5055	145.8868	25.79	980498.82	25.79	********	12.23	9.69		..
8012.0209	43.5055	145.8893	27.87	980499.44	27.87	********	13.49	10.75		..
8012.0210	43.5055	145.8932	33.14	980498.98	33.14	********	14.66	11.39		..
8012.0211	43.5128	145.8853	21.06	980501.76	21.06	********	13.05	10.98		..
8012.0212	43.5132	145.8882	12.84	980504.53	12.84	********	13.26	11.99		..
8012.0213	43.5135	145.8912	9.95	980505.77	9.95	********	13.57	12.59		..
8012.0214	43.5132	145.8932	12.15	980505.64	12.15	********	14.15	12.95		..
8012.0215	43.5315	145.8633	71.65	*********	71.65	********				..
8012.0216	43.5573	145.8680	8.58	*********	8.58	********				..
8012.0217	43.5697	145.8582	29.73	980517.20	29.73	********	26.04	23.11		..
8012.0218	43.5703	145.8552	29.83	980516.77	29.83	********	25.58	22.64		..
8012.0219	43.5705	145.8522	32.32	980516.06	32.32	********	25.62	22.44		..
8012.0220	43.5693	145.8497	29.68	980516.64	29.68	********	25.50	22.58		..
8012.0221	43.5670	145.8482	28.92	980516.28	28.92	********	25.12	22.27		..
8012.0222	43.5673	145.8457	38.51	980514.93	38.51	********	26.69	22.90		..
8012.0223	43.5653	145.8458	47.68	980511.92	47.68	********	26.69	22.00		..
8012.0224	43.5633	145.8443	43.40	980512.97	43.40	********	26.61	22.33		..
8012.0225	43.5700	145.8478	35.96	980516.37	35.96	********	27.11	23.57		..
8012.0226	43.5710	145.8460	37.68	980515.86	37.68	********	27.04	23.33		..
8012.0227	43.5703	145.8623	34.12	980516.78	34.12	********	26.92	23.56		..
8012.0228	43.5713	145.8653	33.89	980516.58	33.89	********	26.56	23.22		..
8012.0229	43.5710	145.8690	32.50	980516.55	32.50	********	26.13	22.93		..
8012.0230	43.5753	145.8565	38.59	980517.00	38.59	********	28.06	24.26		..
8012.0231	43.5757	145.8590	42.42	980516.27	42.42	********	28.49	24.31		..
8012.0232	43.5772	145.8612	41.94	980517.07	41.94	********	29.00	24.87		..
8012.0233	43.5787	145.8655	35.39	980518.67	35.39	********	28.45	24.96		..
8012.0234	43.5780	145.8680	44.75	980516.34	44.75	********	29.07	24.66		..
8012.0235	43.5767	145.8703	55.89	980513.38	55.89	********	29.66	24.16		..
8012.0236	43.5843	145.8517	42.72	980517.53	42.72	********	29.05	24.85		..
8012.0237	43.5853	145.8538	40.27	980519.05	40.27	********	29.73	25.77		..
8012.0238	43.5873	145.8545	19.55	980522.53	19.55	********	26.64	24.72		..
8012.0239	43.5883	145.8572	19.90	980523.74	19.90	********	27.86	25.90		..
8012.0240	43.5652	145.8848	8.51	980522.63	8.51	********	25.33	24.49		..
8012.0241	43.5637	145.8825	9.51	980522.20	9.51	********	25.34	24.41		..
8012.0242	43.5620	145.8800	11.98	980521.23	11.98	********	25.29	24.11		..
8012.0243	43.5607	145.8778	11.65	980520.38	11.65	********	24.45	23.31		..
8012.0244	43.5588	145.8752	8.54	980520.80	8.54	********	24.08	23.24		..
8012.0245	43.5565	145.8805	2.78	980521.18	2.78	********	22.89	22.62		..
8012.0246	43.5573	145.8785	1.85	980521.22	1.85	********	22.57	22.39		..
8012.0247	43.5582	145.8763	2.21	980521.34	2.21	********	22.73	22.51		..
8012.0248	43.4623	145.9010	43.60	980486.66	43.60	********	9.45	5.16		..
8012.0249	43.4623	145.9040	49.30	980487.15	49.30	********	11.70	6.85		..
8012.0250	43.4625	145.9075	92.40	980480.15	92.40	********	17.99	8.89		..

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4440093

8012.001 15/01/8 DATUM = EDM MO 1981/02/02

093

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	*	LAST DATE STATION UPDATED
8012.0251	43.4625	145.9107	83.60	980483.67	83.60	********	18.79	10.56			1981/02/02
8012.0252	43.4622	145.9135	73.00	980485.90	73.00	********	17.78	10.59			..
8012.0253	43.4623	145.9162	74.50	*********	74.50	********					..
8012.0254	43.4628	145.9187	64.90	980489.63	64.90	********	18.95	12.56			..
8012.0255	43.4630	145.9217	72.70	980488.75	72.70	********	20.47	13.31			..
8012.0256	43.4653	145.9225	54.00	980490.18	54.00	********	15.91	10.60			..
8012.0257	43.4653	145.9202	74.40	980484.95	74.40	********	16.99	9.66			..
8012.0258	43.4655	145.9170	55.10	980488.27	55.10	********	14.33	8.90			..
8012.0259	43.4655	145.9143	32.80	980490.78	32.80	********	9.96	6.73			..
8012.0260	43.4655	145.9115	49.50	980486.99	49.50	********	11.33	6.45			..
8012.0261	43.4655	145.9085	36.30	980488.16	36.30	********	8.42	4.84			..
8012.0262	43.4655	145.9057	32.90	980487.88	32.90	********	7.09	3.85			..
8012.0263	43.4652	145.9030	40.20	*********	40.20	********					..
8012.0265	43.4647	145.9000	46.30	980486.60	46.30	********	10.02	5.46			..
8012.0266	43.4620	145.8947	69.02	980479.97	*********	********	10.64				..
8012.0267	43.4625	145.8910	95.20	980474.29	95.20	********	12.99	3.62			..
8012.0268	43.4620	145.8883	130.00	980467.67	130.00	********	17.16	4.36			..
8012.0269	43.4615	145.8850	150.10	980463.33	150.10	********	19.06	4.28			..
8012.0270	43.4615	145.8818	145.20	980464.49	145.20	********	18.72	4.42			..
8012.0271	43.4638	145.8822	187.90	980457.60	187.90	********	24.79	6.29			..
8012.0272	43.4645	145.8857	154.40	980463.09	154.40	********	19.89	4.68			..
8012.0273	43.4645	145.8885	116.00	980471.61	116.00	********	16.55	5.13			..
8012.0274	43.4645	145.8908	98.30	980475.60	98.30	********	15.08	5.40			..
8012.0275	43.4640	145.8927	93.40	980476.68	93.40	********	14.69	5.49			..
8012.0277	43.4678	145.9043	39.20	980487.47	39.20	********	8.41	4.55			..
8012.0278	43.4678	145.9075	34.40	980488.85	34.40	********	8.31	4.92			..
8012.0279	43.4682	145.9110	37.50	980489.93	37.50	********	10.31	6.62			..
8012.0280	43.4680	145.9142	38.70	980490.95	38.70	********	11.72	7.91			..
8012.0281	43.4682	145.9163	53.40	980488.98	53.40	********	14.27	9.01			..
8012.0282	43.4680	145.9180	41.70	980491.63	41.70	********	13.33	9.23			..
8012.0283	43.4683	145.9207	77.60	980485.39	77.60	********	18.14	10.49			..
8012.0284	43.4703	145.9200	83.70	980483.70	83.70	********	18.15	9.91			..
8012.0285	43.4708	145.9170	41.60	980492.06	41.60	********	13.47	9.37			..
8012.0286	43.4715	145.9140	37.20	980491.82	37.20	********	11.82	8.15			..
8012.0287	43.4717	145.9112	37.70	980490.67	37.70	********	10.80	7.09			..
8012.0288	43.4710	145.9083	34.10	980489.86	34.10	********	8.94	5.59			..
8012.0289	43.4710	145.9052	32.80	980489.31	32.80	********	7.99	4.76			..
8012.0290	43.4733	145.8887	141.90	980465.55	141.90	********	17.69	3.72			..
8012.0291	43.4745	145.8853	171.20	980460.85	*********	********	21.93				..
8012.0292	43.4745	145.8827	222.70	980451.88	222.70	********	28.85	6.93			..
8012.0293	43.4727	145.8828	218.10	980454.54	218.10	********	30.26	8.78			..
8012.0294	43.4703	145.8828	213.80	980454.84	213.80	********	29.44	8.39			..
8012.0295	43.4687	145.8825	198.40	980458.74	198.40	********	28.74	9.21			..
8012.0296	43.4668	145.8828	182.90	980461.01	182.90	********	26.39	8.38			..
8012.0297	43.4672	145.8858	165.30	980463.58	165.30	********	23.50	7.22			..
8012.0298	43.4688	145.8857	161.80	980465.04	161.80	********	23.73	7.80			..
8012.0299	43.4707	145.8865	157.70	980466.51	157.70	********	23.77	8.24			..
8012.0300	43.4712	145.8893	126.40	980471.64	126.40	********	19.20	6.75			..
8012.0301	43.4913	145.8912	90.40	980478.78	90.40	********	13.40	4.50			..
8012.0302	43.4922	145.8933	83.10	980480.92	83.10	********	13.21	5.03			..

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8012.001 15/01/8 DATUM = =DM MO 1981/02/02

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	* LAST DATE STATION UPDATED
8012.0303	43.4925	145.8958	70.20	980485.34	70.20	********	13.62	6.71		1981/02/02
8012.0304	43.4927	145.8983	58.40	980487.06	58.40	********	11.69	5.94		..
8012.0305	43.4807	145.9010	37.10	980487.21	37.10	********	6.35	2.69		..
8012.0306	43.4808	145.8975	61.20	980482.25	61.20	********	8.81	2.78		..
8012.0307	43.4810	145.8952	54.80	980484.36	54.80	********	8.93	3.53		..
8012.0308	43.4805	145.8922	64.30	980481.58	64.30	********	9.13	2.80		..
8012.0309	43.5132	145.9112	5.10	980507.59	5.10	********	13.92	13.42		..
8012.0310	43.5143	145.9138	14.80	980506.74	14.80	********	15.97	14.51		..
8012.0311	43.5142	145.9167	17.00	980505.99	17.00	********	15.91	14.23		..
8012.0312	43.5133	145.9208	22.60	980505.14	22.60	********	16.86	14.64		..
8012.0313	43.5128	145.9238	28.70	980504.92	28.70	********	18.57	15.74		..
8012.0314	43.5122	145.9262	27.50	980504.91	27.50	********	18.25	15.54		..
8012.0315	43.5113	145.9293	29.70	980504.22	29.70	********	18.31	15.39		..
8012.0316	43.5108	145.9323	13.90	980506.17	13.90	********	15.43	14.06		..
8012.0317	43.5112	145.9347	6.40	980507.52	6.40	********	14.44	13.81		..
8012.0318	43.5117	145.9373	6.10	980508.97	6.10	********	15.74	15.14		..
8012.0319	43.5130	145.9395	1.20	980510.90	1.20	********	16.04	15.92		..
8012.0320	43.5133	145.9420	2.10	980511.62	2.10	********	17.01	16.81		..
8012.0321	43.5130	145.9458	0.00	980512.93	0.00	********	17.71	17.71		..
8012.0322	*********	*********	26.40	980512.49	26.40	********				1981/01/15
8012.0323	*********	*********	29.20	980511.93	29.20	********				..
8012.0324	*********	*********	36.60	980510.41	36.60	********				..
8012.0325	*********	*********	37.80	980509.97	37.80	********				..
8012.0326	43.5297	145.9538	2.20	980516.18	2.20	********	20.14	19.92		1981/02/02
8012.0327	43.5252	145.9483	11.60	980511.14	11.60	********	18.40	17.25		..
8012.0328	43.5257	145.9420	24.90	980509.99	24.90	********	21.31	18.85		..
8012.0329	43.5258	145.9343	9.60	980511.19	9.60	********	17.77	16.82		..
8012.0330	43.5263	145.9283	30.70	980505.85	30.70	********	18.90	15.88		..
8012.0331	43.5258	145.9225	28.00	980506.25	28.00	********	18.51	15.75		..
8012.0332	43.5248	145.9182	29.70	980506.41	29.70	********	19.28	16.35		..
8012.0333	43.5237	145.9095	19.60	980508.22	19.60	********	18.09	16.16		..
8012.0334	43.5227	145.9065	.10	980512.62	.10	********	16.56	16.55		..
8012.0335	43.5212	145.9143	19.20	980506.81	19.20	********	16.78	14.89		..
8012.0336	43.5225	145.9243	23.00	980506.69	23.00	********	17.71	15.44		..
8012.0337	43.5225	145.9298	1.10	980510.92	1.10	********	15.18	15.07		..
8012.0338	43.5225	145.9353	16.40	980510.26	16.40	********	19.24	17.63		..
8012.0339	43.5223	145.9400	11.60	980511.21	11.60	********	18.72	17.58		..
8012.0340	43.5223	145.9460	11.20	980512.29	11.20	********	19.68	18.58		..
8012.0341	43.5223	145.9522	2.60	980515.67	2.60	********	20.40	20.15		..
8012.0342	43.5275	145.9542	.80	980516.97	.80	********	20.69	20.61		..
8012.0343	43.5175	145.9510	0.00	980514.89	0.00	********	19.26	19.26		..
8012.0344	43.5175	145.9478	5.90	980512.31	5.90	********	18.50	17.92		..
8012.0345	43.5180	145.9428	7.00	980511.44	7.00	********	17.93	17.24		..
8012.0346	43.5182	145.9375	1.40	980510.63	1.40	********	15.37	15.23		..
8012.0347	43.5190	145.9312	1.50	980509.45	1.50	********	14.14	14.00		..
8012.0348	43.5190	145.9237	25.00	980505.98	25.00	********	17.93	15.46		..
8012.0349	43.5187	145.9168	48.90	980501.87	48.90	********	21.22	16.41		..
8012.0350	43.5187	145.9113	24.10	980507.05	24.10	********	18.75	16.37		..
8012.0351	43.5193	145.9057	13.70	980509.82	13.70	********	18.25	16.90		..
8012.0352	43.5203	145.9020	3.10	980513.49	3.10	********	18.56	18.25		..

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8012.001 15/01/8 DATUM = =DM MO 1981/02/02

095

STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	*	LAST DATE STATION UPDATED
8012.0353	43.5147	145.9082	2.70	980510.82	2.70	********	16.28	16.01			1981/02/02
8012.0354	43.5140	145.9280	16.70	980507.74	16.70	********	17.57	15.93			..
8012.0355	43.5137	145.9352	4.90	980510.82	4.90	********	17.04	16.56			..
8012.0356	43.5143	145.9445	.20	980513.44	.20	********	18.16	18.14			..
8012.0357	43.5142	145.9523	.30	980512.60	.30	********	17.36	17.33			..
8012.0358	43.5070	145.9392	.40	980510.77	.40	********	16.21	16.17			..
8012.0359	43.5077	145.9332	8.00	980507.20	8.00	********	14.92	14.13			..
8012.0360	43.5080	145.9277	30.80	980502.83	30.80	********	17.56	14.53			..
8012.0361	43.5077	145.9220	14.20	980505.04	14.20	********	14.67	13.28			..
8012.0362	43.5078	145.9153	18.90	980503.31	18.90	********	14.39	12.53			..
8012.0363	43.5113	145.9145	13.40	980506.06	13.40	********	15.12	13.80			..
8012.0364	43.5112	145.9208	16.10	980505.43	16.10	********	15.34	13.76			..
8012.0365	43.5025	145.9172	20.30	980501.71	20.30	********	13.70	11.70			..
8012.0366	43.5020	145.9237	12.20	980504.26	12.20	********	13.79	12.59			..
8012.0367	43.5020	145.9290	19.90	980504.07	19.90	********	15.98	14.02			..
8012.0368	43.5020	145.9337	0.00	980509.17	0.00	********	14.93	14.93			..
8012.0369	43.5018	145.9413	.20	980510.70	.20	********	16.54	16.52			..
8012.0370	43.4983	145.9250	22.00	980500.85	22.00	********	13.74	11.57			..
8012.0371	43.4975	145.9190	34.40	980497.53	34.40	********	14.32	10.93			..
8012.0372	43.4973	145.9135	38.50	980495.09	38.50	********	13.16	9.37			..
8012.0373	43.4977	145.9053	44.00	980493.77	44.00	********	13.50	9.17			..
8012.0374	43.4930	145.9032	32.20	980494.33	*********	********	10.85				..
8012.0375	43.4927	145.9115	29.80	980495.13	29.80	********	10.93	7.99			..
8012.0376	43.4933	145.9200	22.30	980496.30	22.30	********	9.73	7.53			..
8012.0377	43.4933	145.9235	22.30	980498.82	22.30	********	12.24	10.05			..
8012.0378	43.4930	145.9273	1.10	980503.35	1.10	********	10.26	10.15			..
8012.0379	43.4930	145.9318	0.00	980507.10	0.00	********	13.68	13.68			..
8012.0380	43.4877	145.9348	13.80	980500.20	13.80	********	11.52	10.16			..
8012.0381	43.4870	145.9260	16.50	980498.58	16.50	********	10.79	9.16			..
8012.0382	43.4885	145.9208	16.20	980497.93	16.20	********	9.92	8.32			..
8012.0383	43.4887	145.9157	17.70	980496.84	17.70	********	9.27	7.53			..
8012.0384	43.4878	145.9077	18.20	980495.23	18.20	********	7.89	6.09			..
8012.0385	43.4835	145.9087	18.50	980494.15	18.50	********	7.29	5.47			..
8012.0386	43.4828	145.9143	15.20	980496.29	15.20	********	8.47	6.97			..
8012.0387	43.4830	145.9200	22.20	980496.92	22.20	********	11.25	9.07			..
8012.0388	43.4832	145.9262	21.50	980498.17	21.50	********	12.27	10.15			..
8012.0389	43.4840	145.9322	24.90	980499.60	24.90	********	14.67	12.22			..
8012.0390	43.4838	145.9383	0.00	980506.64	0.00	********	14.04	14.04			..
8012.0391	43.4792	145.9540	0.00	980507.33	0.00	********	15.15	15.15			..
8012.0392	43.4798	145.9468	0.00	980507.12	0.00	********	14.89	14.89			..
8012.0393	43.4802	145.9410	0.00	980506.84	0.00	********	14.57	14.57			..
8012.0394	43.4797	145.9357	21.70	980499.13	21.70	********	13.61	11.47			..
8012.0395	43.4797	145.9305	15.20	980499.67	15.20	********	12.14	10.65			..
8012.0396	43.4802	145.9242	30.10	980496.28	30.10	********	13.30	10.34			..
8012.0397	43.4807	145.9183	22.00	980496.36	22.00	********	10.84	8.67			..
8012.0398	43.4798	145.9125	18.20	980494.55	18.20	********	7.93	6.14			..
8012.0399	43.4748	145.9073	19.60	980492.22	19.60	********	6.48	4.55			..
8012.0400	43.4745	145.9158	24.30	980493.40	24.30	********	9.14	6.75			..
8012.0401	43.4748	145.9213	38.70	980491.59	38.70	********	11.75	7.94			..
8012.0402	43.4752	145.9262	30.90	980494.53	30.90	********	12.25	9.21			..

4440996

8012.001 15/01/8 DATUM = =DM HO 1981/02/02

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STATION NUMBER.	LATITUDE SOUTH. (DEGREES)	LONGITUDE EAST. (DEGREES)	METER ELEVATION (METRES)	OBSERVED GRAVITY. (MGAL)	GROUND ELEVATION (METRES)	TERRAIN CORRECTION FOR 2.35	FREE AIR ANOMALY. (MGAL)	BOUGUER ANOMALY. FOR 2.35	INFORMAL STATION NAME, NUMBER,BENCHMARK,ETC.	*	LAST DATE STATION UPDATED
8012.0403	43.4730	145.9342	31.60	980495.11	31.60	********	13.24	10.13			1981/02/02
8012.0404	43.4752	145.9412	19.60	980501.06	19.60	********	15.29	13.36			..
8012.0405	43.4750	145.9487	12.90	980502.74	12.90	********	14.92	13.65			..
8012.0406	43.4697	145.9468	20.90	980501.06	20.90	********	16.19	14.13			..
8012.0407	43.4692	145.9395	19.50	980500.35	19.50	********	15.09	13.17			..
8012.0408	43.4693	145.9327	33.10	980494.30	33.10	********	13.22	9.96			..
8012.0409	43.4693	145.9248	*********	*********	*********	********					..
8012.0410	43.4642	145.9313	32.20	980493.15	32.20	********	12.27	9.09			..
8012.0411	43.4642	145.9373	13.90	980498.44	13.90	********	11.90	10.53			..
8012.0412	43.4650	145.9438	19.40	980500.21	19.40	********	15.30	13.39			..
8012.0413	43.4652	145.9487	13.10	980502.47	13.10	********	15.60	14.31			..
8012.0414	43.4612	145.9438	48.20	980495.30	48.20	********	19.62	14.87			..
8012.0415	43.4607	145.9400	29.30	980498.21	29.30	********	16.74	13.86			..
8012.0416	43.4590	145.9340	44.30	980494.05	44.30	********	17.36	13.00			..
8012.0417	43.4617	145.9238	23.00	980495.93	23.00	********	12.43	10.16			..
8012.0418	43.4590	145.9145	57.50	*********	57.50	********					..
8012.0419	43.4585	145.9228	53.00	980489.54	53.00	********	15.58	10.36			..
8012.0420	43.4563	145.9290	11.60	980499.35	11.60	********	12.82	11.67			..
8012.0421	43.4563	145.9333	16.40	980498.71	16.40	********	13.66	12.04			..
8012.0422	43.4590	145.9423	19.50	980498.95	19.50	********	14.61	12.69			..
8012.0423	43.4530	145.9297	5.90	980500.63	5.90	********	12.63	12.05			..
8012.0424	43.4533	145.9177	5.90	980496.79	5.90	********	8.76	8.18			..
8012.0425	43.4527	145.9115	14.80	980494.76	14.80	********	9.54	8.08			..

* END-FILE *

* END-FILE *

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INTERPRETATION OF GEOPHYSICAL SURVEYS

CATAMARAN AREA (E.L. 6/79)

by

LEAMAN GEOPHYSICS

for

MARATHON PETROLEUM (AUST.) LTD.

September, 1981

098

444099

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SUMMARY:

Results from a detailed gravity survey and magnetometer traverses across the Catamaran Coal field in Southern Tasmania have been interpreted. The surveys were undertaken to provide definition of the extent of Triassic coal measures and the significance of Jurassic dolerite intrusions.

Although the surveys have demonstrated that many mapped dolerite bodies are largely illusory - being dolerite talus - several dolerite feeders have been identified and dolerite is present at variable depth in all sections of the area east of the Lune River Fault. The gravity data do, however, suggest substantial sections of coal-bearing rocks immediately east of the Lune River Fault from Ida Bay to Catamaran River. The greatest depth to dolerite is of the order of 400m. but it is generally no deeper than 70 - 120m. on the eastern side of the coalfield. Unfortunately, extensive faulting is also implied.

The Lune River Fault possesses a clear magnetic signature and the gravity survey has also located a sizeable granitic stock in the pre-Permian basement.

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INTRODUCTION:

The Catamaran area is located south of Dover in Southern Tasmania. It is variably, but often thickly, vegetated and of moderate relief. Access is often poor. Coal has long been known in the area and it has been worked in several small operations. The coal-bearing potential of the region is currently under examination by Marathon Petroleum Australia Ltd. (exploration licence EL 6/79).

Prior to commencement of an extensive drilling programme it was thought advisable to attempt an improved definition of the extent of coal measures and the distribution of dolerite bodies including an indication of faulting. Dolerite or dolerite talus appears to conceal parts of the coal-bearing units but surface mapping cannot reliably indicate the structural form or nature of the material. Continuity of deposit and possible reserve are vitally affected by intrusion form.

The magnetometer traverses were intended to complement the geological map and resolve dolerite outcrop or dolerite talus and differentiate between those areas where talus overlies dolerite or coal measures. The gravity survey was undertaken to define the overall structure of the area, the form of intrusions and the overall extent of the Triassic coal measures.

This report provides an interpretation of the magnetic and gravity data within the constraint of available photo interpreted geological control.

GEOLOGY AND ROCK PROPERTIES:

The geology of the area is summarised in Figure 1, which is a reproduction of part of the photogeology interpretation provided Marathon by Hunting Geology and Geophysics (Aust.) Pty. Ltd. Several rock units are indicated which are relevant to the interpretation:

1. Ordovician limestone, with minor siltstone (Olmst); sandstone (Os).

2. Permian undifferentiated. Permian rocks are exposed west of the Lune River Fault and are, with the exception of an upper coal sequence (Cygnet Coal Measures), marine sandstones, siltstones. The section is up to 600m. thick.

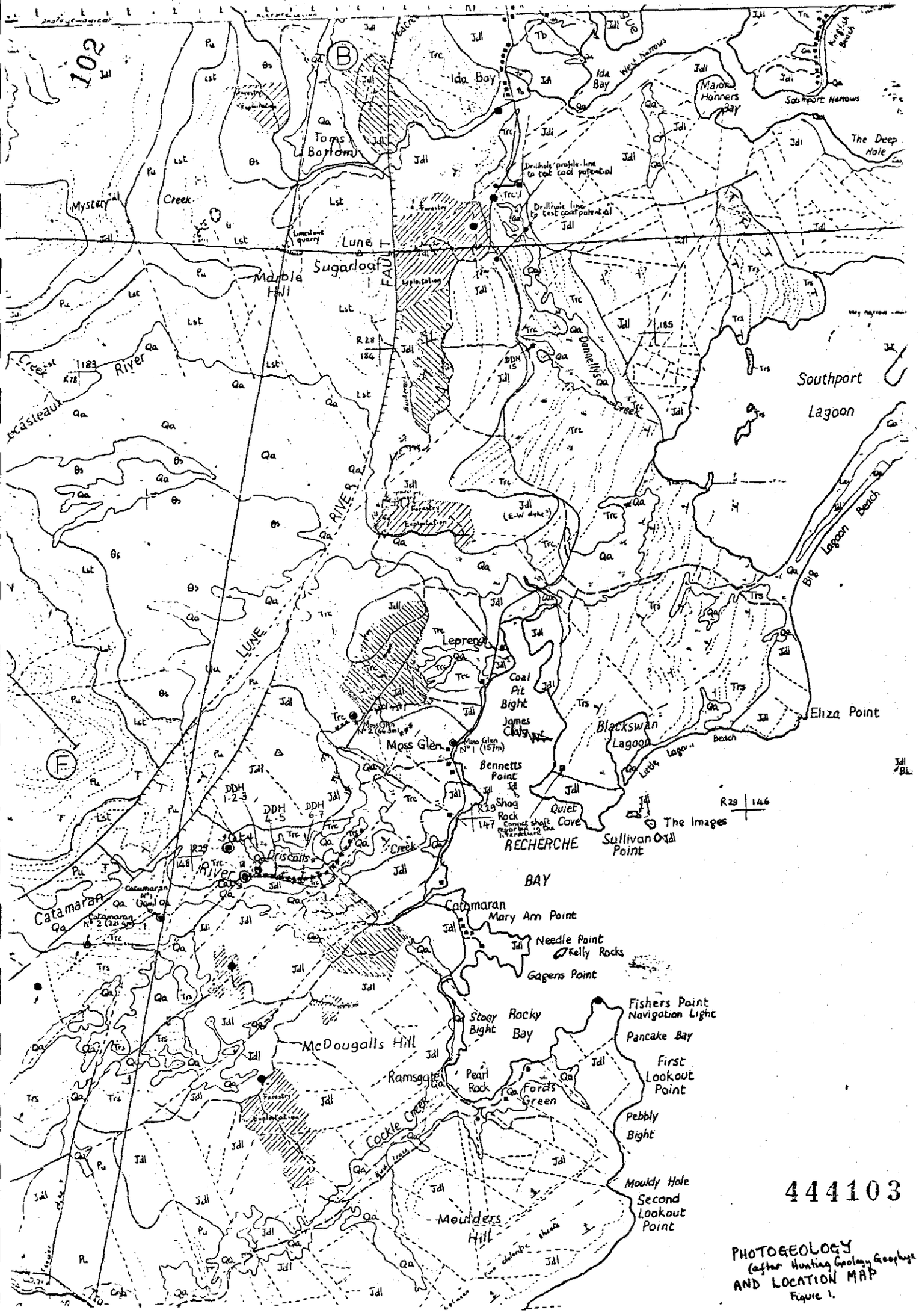
3. Triassic rocks provide the bulk of the sedimentary exposures between the Lune River Fault and the D'Entrecasteaux Channel and have been divided into two units. The lower unit (Trs) is a quartz sandstone/mudstone succession with little or no coal. The upper unit (Trc) is the coal bearing feldspathic sequence. The thickness of each unit is unknown but drilling and dip deductions suggest that each unit is at least 200-250m. thick.

4. Jurassic dolerite (Jdl). The ubiquitous Tasmanian dolerite dominates much of the relative lowland east of the Lune River Fault where it intrudes both Triassic units. There is no evidence of intrusion into pre-Triassic rocks west of the Fault except at Lune Sugarloaf. The scale of the intrusions cannot be gauged from surface mapping but they are more than 100-150m. thick.

5. Tertiary basalt (Tb) overlies Triassic rocks south of Lune River and east of Lune Sugarloaf. The geological map (Figure 1) incorrectly suggests 'structured' dolerite. The photo texture reflects the bases of the various flows. Some lacustrine sediments and tuffs are interbedded.

6. Quaternary talus (Qt). No talus deposits are indicated in Figure 1, although nearly half of each dolerite 'mass' could be represented as such. Not all deposits can be identified by surface inspection. Block size varies from a few centimetres to several metres and the matrix content of red-brown clay, soil or grey clay may range from nil to more than half the volume. Similar deposits are common in the northern basalt areas although the block size is generally smaller. The thickness of either talus type is extremely variable.

Both igneous rocks and their derived products are strongly and often variably magnetic. Typical susceptibility values lie in the range 5-20 x 10-3 S.I. although some coarse grained dolerites exceed 50 x 10-3 S.I. No data is available on the natural remanence of either rock type in this area but typical magnetisation values for Huon/Channel dolerites are 0.2 to 10 Amp/m; average 2 A/m. The Koenigsberger ratio ranges from 0.5 to 10(ratio of remanent/induced magnetisation).



PHOTOGEOLOGY (after Hunting Geology Geophys) AND LOCATION MAP

Figure 1.

Unfortunately timing of the project, supply of data for interpretation and need for early provision of interpretation has precluded specific sampling for rock density or magnetic property determinations. The table below summarises available density data which has been extracted from observations for the materials in adjacent areas. It may not be wholly reliable as a result:

	Range: t/m^3	@ Av. t/m^3	*Contrast t/m^3	Attraction/ 100m.mgal
Ordovician limestone:	2.72-2.76	2.75	+0.08	+0.33
Permian undiff:	2.35-2.60	2.48	-0.19	-0.80
Triassic undiff:	2.32-2.40	2.36	-0.31	-1.30
Jurassic dolerite:	2.80-3.20	2.90	+0.23	+0.96
Tertiary basalt:	2.80-3.20	2.95	+0.28	+1.17
Quaternary talus:	1.90-2.50	2.20	-0.47	-1.97

@ average: assumption based on allowance for varied composition.

* contrast: vs 2.67 t/m^3

MAGNETIC SURVEY:

A number of magnetometer traverses have been observed by Marathon staff using a fluxgate magnetometer. Proton magnetometers are not recommended in dolerite terrain since high gradients and potential non reproducibility of results can cause problems for observers. The added precision is not required in any event.

The location of the traverses and interpretation of the profiles is summarised in Figure 2.

Several magnetic field - rock property signatures have been used to provide the qualitative interpretation and boundary location.

a) Rocks west of the Lune River Fault have a very flat, slightly stepped magnetic character. This is typical of non magnetic siliceous or calcareous materials such as the Permian formations or the Ordovician limestone. The fault is clearly identified on most lines, though it may be disguised by adjacent dolerite bodies (e.g. GS54 to 679 or line 2 from GS28).

b) Massive dolerite, or basalt, is recognised by high frequency high amplitude anomalies. Deep weathering or thick talus cover sometimes obscures this character but the presence of dolerite is usually indicated by muted responses.

c) Talus deposits may also be identified by high frequency anomalies but of low amplitude. The character is most easily recognised where the deposits overlie sedimentary rocks. Only where the deposit is thick and on dolerite is there any doubt. Dolerite is identified.

d) Coal measures may be recognised by low frequency, low amplitude variations (less than 50nT).

On site verification of many facets of the interpretation shows the method to be a reliable mapping aide. The interpretation may be contrasted with the 'geological'map (Figure 1). So many differences were evident that on site inspection became essential. The magnetic guide was found to be the more reliable. No great credence should be attached to many parts of the photo interpretation (Fig.1). This is unfortunate since the detailed interpretation discussed below is dependent on the quality of the geological input.

The traverses show that :

i) the position of the Lune River Fault is reasonably located.
ii) the basalts in the north of the area (not shown in Fig. 1) are patchy and not especially significant structurally or magnetically.
iii) dolerite is limited in exposure north of the Catamaran River. Talus is common. Elsewhere, deep weathering is frequently observed.
iv) <u>in-situ</u> dolerite forms only a small part of the area between the Catamaran and D'Entrecasteaux Rivers (much less than implied by photo interpretation).
v) dolerite underlies significant sections of the coal field.

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444106

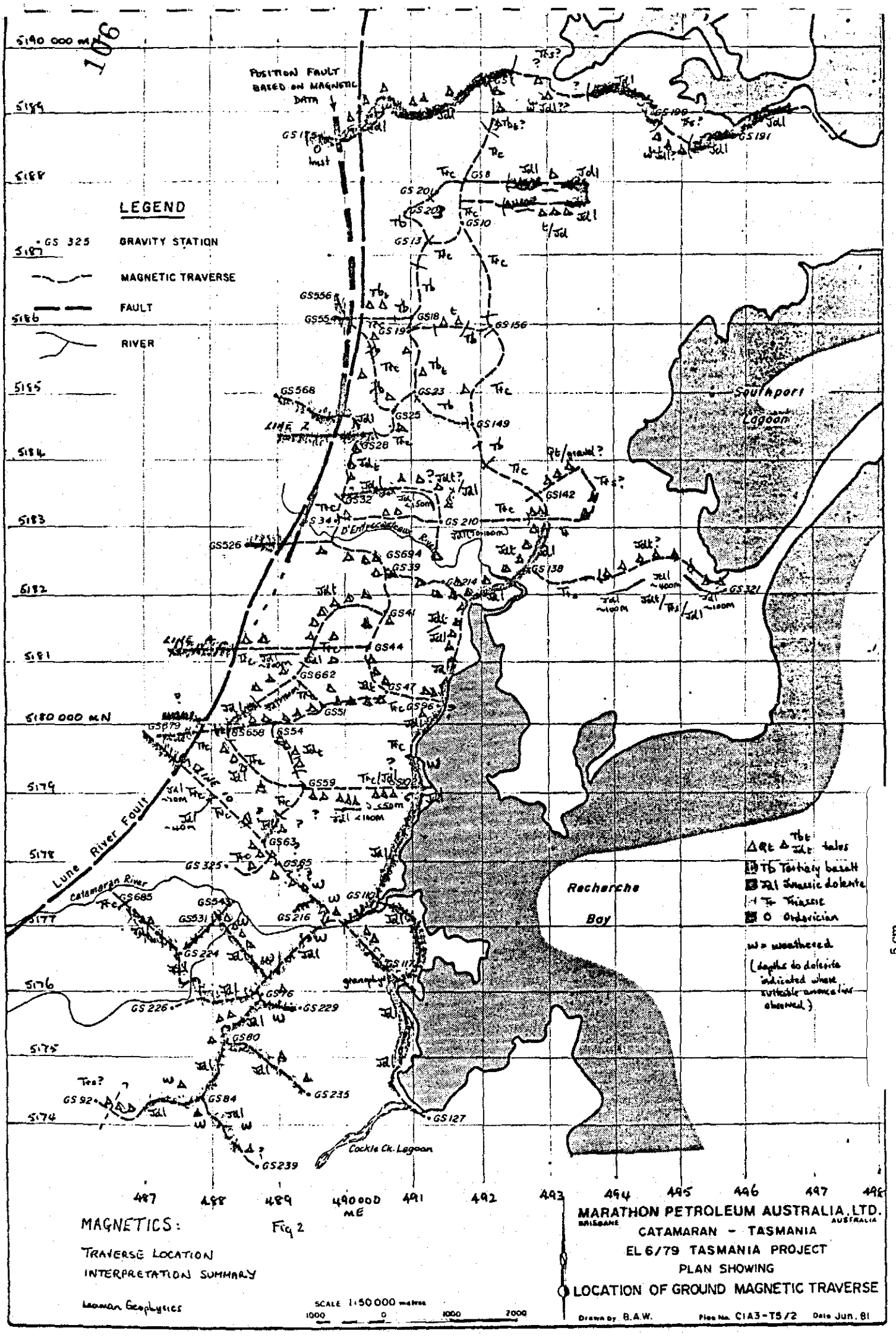
Several traverses across exposed Triassic rocks indicate dolerite at some relatively shallow depth. Subdued, smoothed anomalies with amplitudes of several hundred nano Teslas can be separated from the data. The table below provides maximum depth estimates of the depth to dolerite in typical cases.

1.	500m E of GS210:	491900/5183100,	70-100m
2.	1100m NW of GS63:	488000/5179000,	ca.40m
3.	1400m NW of GS63:	487700/5179200,	ca.70m
4.	400m NW of GS210:	491200/5183500,	<150m (under talus)
5.	SW of GS662:	489000/5180500,	>100m
6.	1000m E of GS138:	494000/5182200,	ca.100m
7.	2000m E of GS138:	494800/5182500,	ca.400m
8.	adj.GS321:	495500/5182000,	ca.100m
9.	600m E of GS59:	490000/5179000,	70-100m
10.	1000m E of GS59:	490400/5179000,	50-100m
11.	800m W of GS44:	489500/5181150,	ca.300m

The above estimates may be placed in perspective by evaluation of an anomaly near Moss Glen where the interpreted depth was a maximum of 220m. The actual depth is 139m. The discrepancy suggests anomaly definition deficiencies, invalid property assessments, or a more complex structure (see Figure 7). Other estimates could be in error but it will be noted that dolerite occurs within 100m of the surface in most of the areas sampled.

The traverses have pinpointed some basalt dykes which yield characteristic anomaly forms (e.g. near GS142, 148, 156) and some small fault anomalies (e.g. near GS102).

Much more might have been made of the magnetic data if smoothed, corrected for diurnal variations and storm activity, and contoured. It has not been possible for the writer to do this since only unrelated profile plots were provided for interpretation. However, given the extent of the gravity coverage and the desire to use the magnetic method as a mapping aide such work is probably not justified.


106
5190 000 mN
5189
5188
5187
5186
5185
5184
5183
5182
5181
5180 000 mN
5179
5178
5177
5176
5175
5174
LEGEND
GS 325 GRAVITY STATION
MAGNETIC TRAVERSE
FAULT
RIVER
Position Fault based on magnetic data
Lune River Fault
Catamaran River
Cockle Ck. Lagoon
Recherche Bay
Southport Lagoon
D'Entrecasteaux Road
LINE 1
LINE 2
LINE 10
Tbt tuffs
Tb Tertiary basalt
Jdl Jurassic dolerite
Trs Triassic
O Ordovician
w = weathered
(depths to dolerite indicated where suitable anomalies observed)
5 cm
487
488
489
490000 mE
491
492
493
494
495
496
497
498
SCALE 1:50 000 metres
1000 0 1000 2000
MAGNETICS:
TRAVERSE LOCATION
INTERPRETATION SUMMARY
Fig 2
Leaman Geophysics
MARATHON PETROLEUM AUSTRALIA LTD.
BRISBANE AUSTRALIA
CATAMARAN - TASMANIA
EL 6/79 TASMANIA PROJECT
PLAN SHOWING
LOCATION OF GROUND MAGNETIC TRAVERSE
Drawn by B.A.W.
Plan No. C1A3-T5/2
Date Jun. 81

GRAVITY SURVEY:

The gravity field compilation shown in Figure 3 has been derived from three sources; Marathon commissioned survey by Layton Geophysical International, Bureau of Mineral Resources gravity file data, Marathon undertaken in-fill survey. All surveys have been tied to the national Isogal network in Hobart. The local base station at the Dover Hotel has a gravity value of 980489.20 mgal.

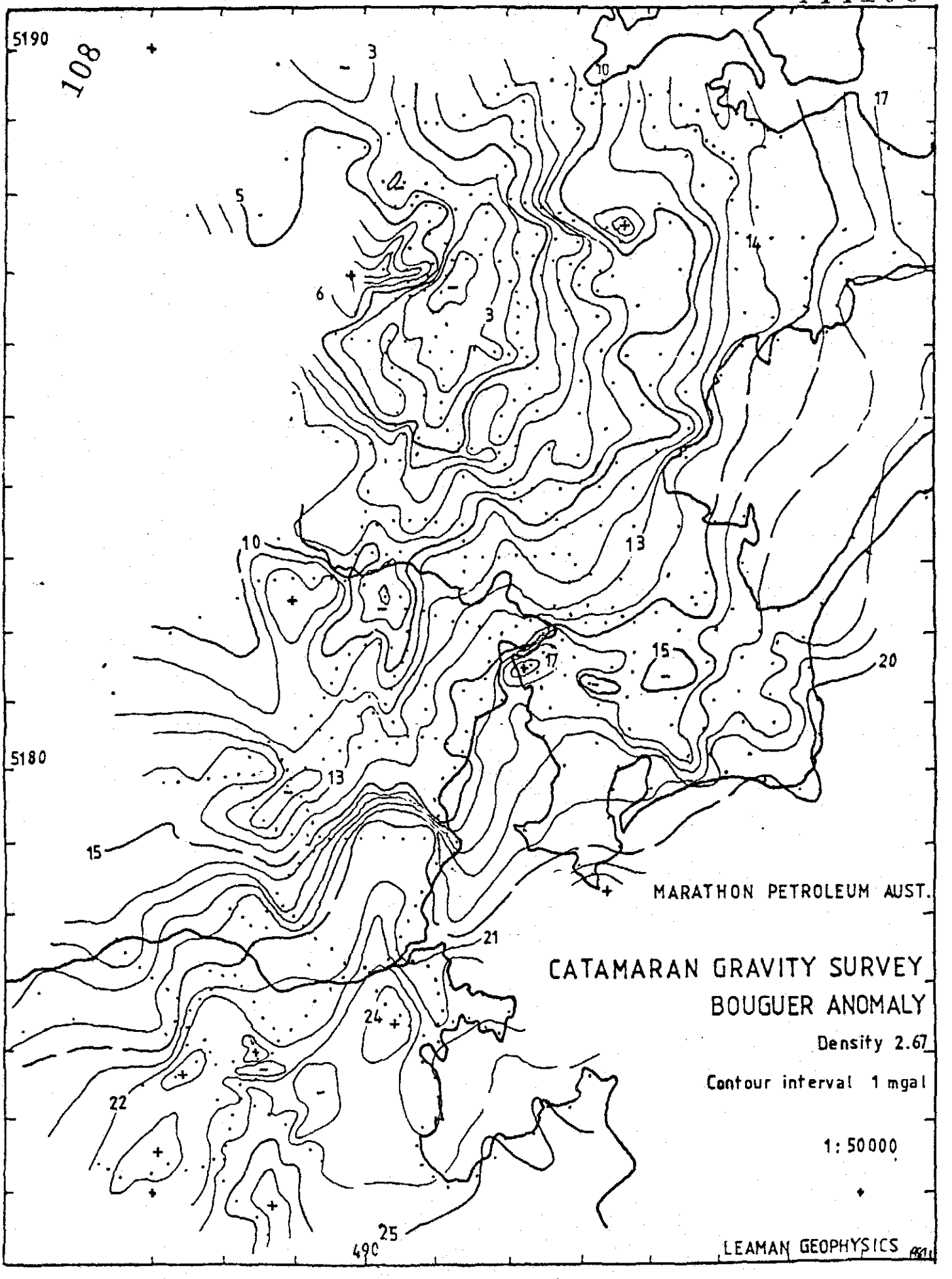
All three sources have been normalised, corrected and reduced using a density of 2.67 t/m^3. BMR stations have been used to provide an indication of regional trends beyond the region of detailed coverage. All stations have been terrain corrected to a radius of 21 km. in order to remove the effect of the La Perouse massif across the area. Overall precision of the reductions is estimated at 0.25 - 0.30 mgal. Most of the errors are related to barometric elevation determinations. Many stations, most belonging to the Layton set, have a precision of about 0.05 - 0.10 mgal.

Some problems were encountered with the in-house reduction of the in-fill survey data and the reduction sequence was transferred to Leaman Geophysics. Reduction details for this data are included in the Appendix.

The Bouguer anomalies (Figure 3) increase coastward from a value of about 3.5 mgal to 26 mgal. Inspection of the anomalies reveals a range of wavelengths - only some of which are relevant to the shallow structural objectives of the survey in this area. Regional-residual separations have been effected using sinc x filter methods and grid apertures of 1, 2 and 4 km. The regional field for the 2 and 4 km. apertures is shown in Figures 4 and 5. Both versions of the regional field reveal gross trend changes and the regional BMR data suggest closure of the negative anomalous feature centred on Lune Sugarloaf. A sizeable granite stock is implied at shallow depth in the basement and this conclusion may have important ramifications for mineralisation of susceptible Ordovician limestones. The 1 and 2 km filters retain several shallow source features and cannot be used to provide a residual containing all short wavelength anomalies. All target structures lie within about a kilometre of the surface and the spectral content of the 4 km filter reflects sources at greater depth. Thus the residual derived from this filter contains all the desired information (Figure 6).

Review of the density-attraction table (page 5) permits an immediate review and qualitative assessment of the anomalies. For the purposes of qualitative interpretation we may assume, since the materials nowhere outcrop east of the Lune River Fault, that the basement is homogeneous and the Permian sequence is uniform in thickness and content. Most of the anomalies observed are directly related to the distribution and form of Triassic rocks and dolerite. These materials may interplay to yield a range of residual anomalies:

444109


5190
108
3
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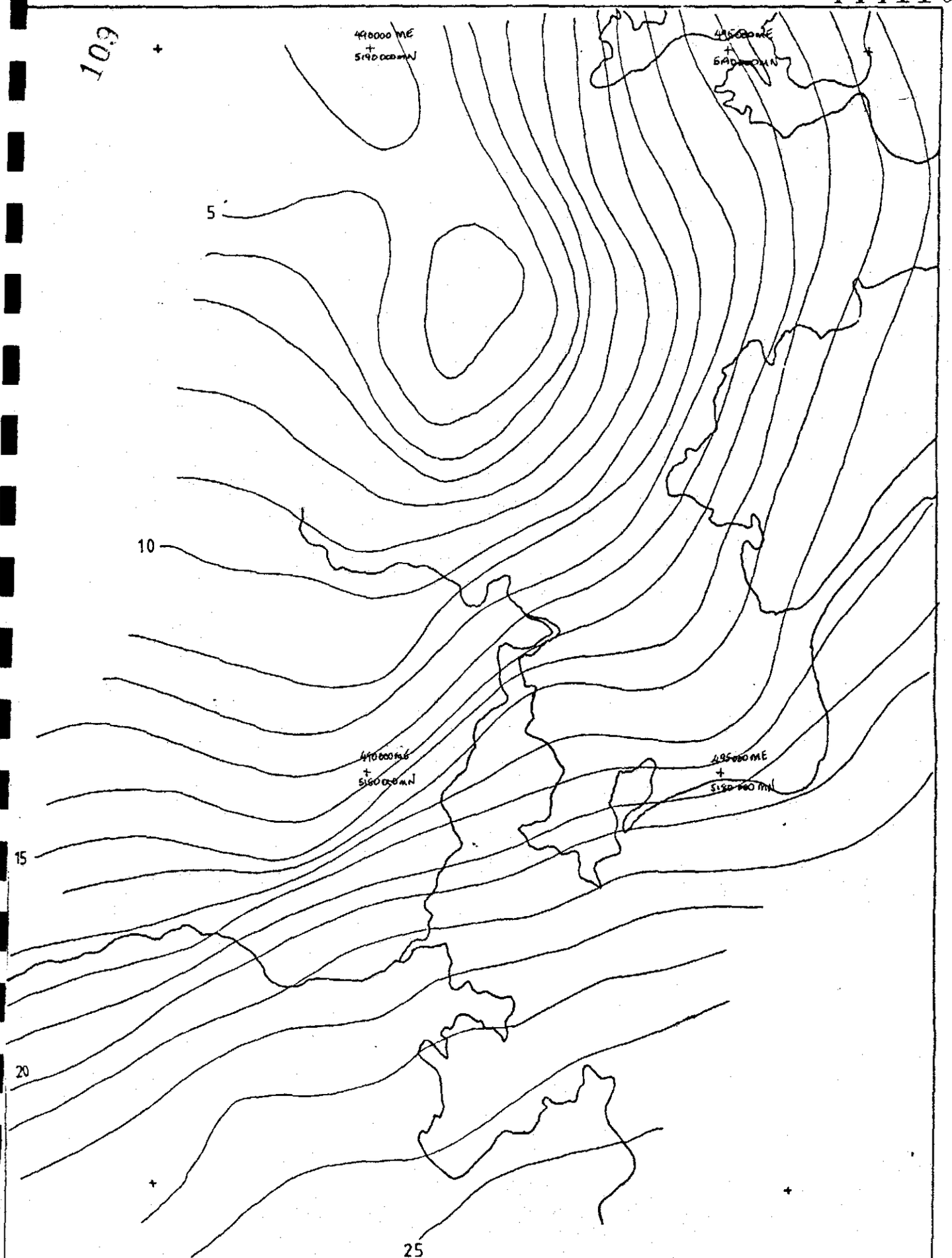
5180
13
15
21
24
22
25
490
MARATHON PETROLEUM AUST.
CATAMARAN GRAVITY SURVEY
BOUGUER ANOMALY
Density 2.67
Contour interval 1 mgal
1:50000
LEAMAN GEOPHYSICS

5 cm

444110

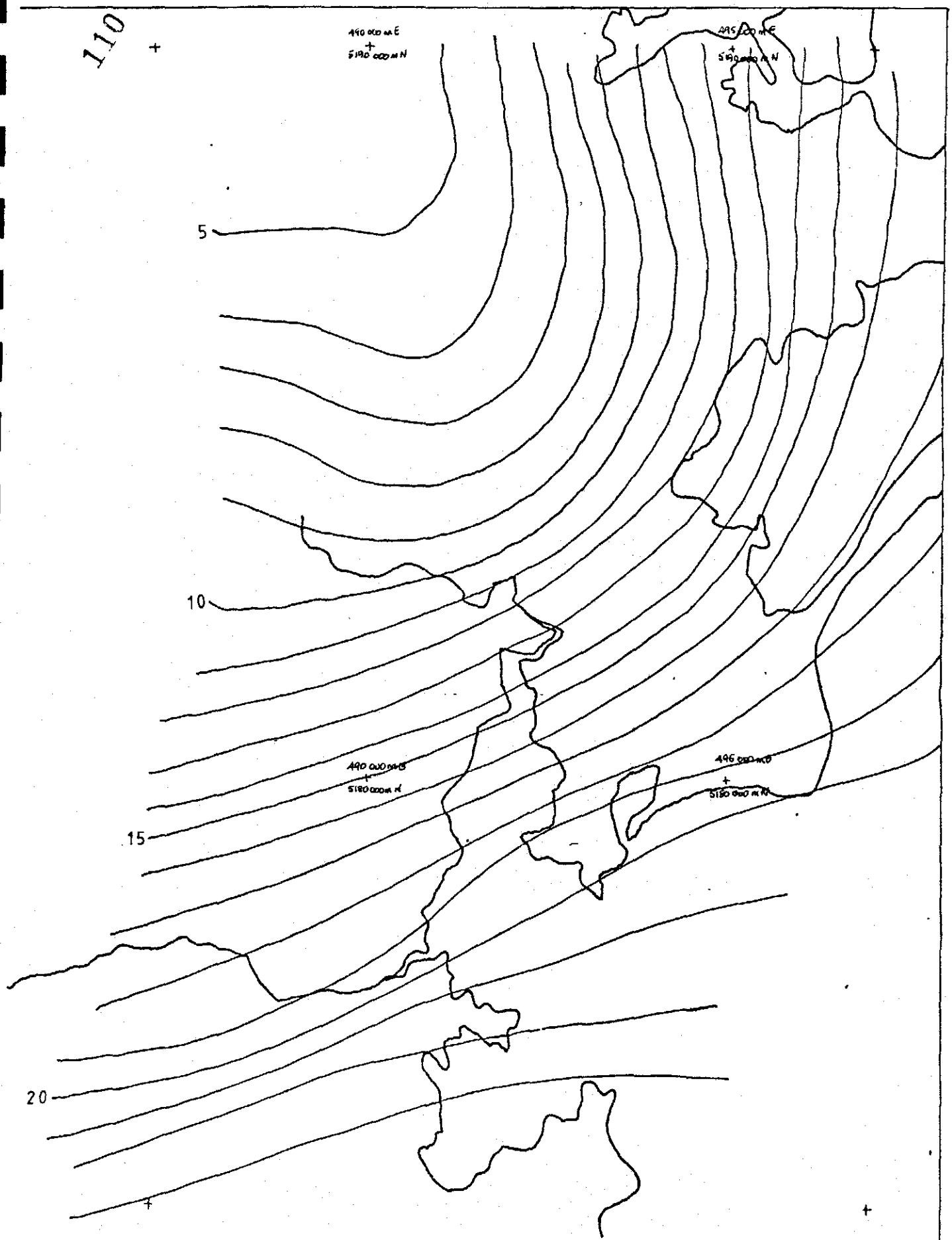


CATAMARAN GRAVITY SURVEY : REGIONAL BOUGUER ANOMALY

DENSITY : 2.67 FILTER : 2 km

1 : 50000

5 cm



CATAMARAN GRAVITY SURVEY : REGIONAL BOUGUER ANOMALY

DENSITY: 2.67 FILTER: 4 km

1:50000

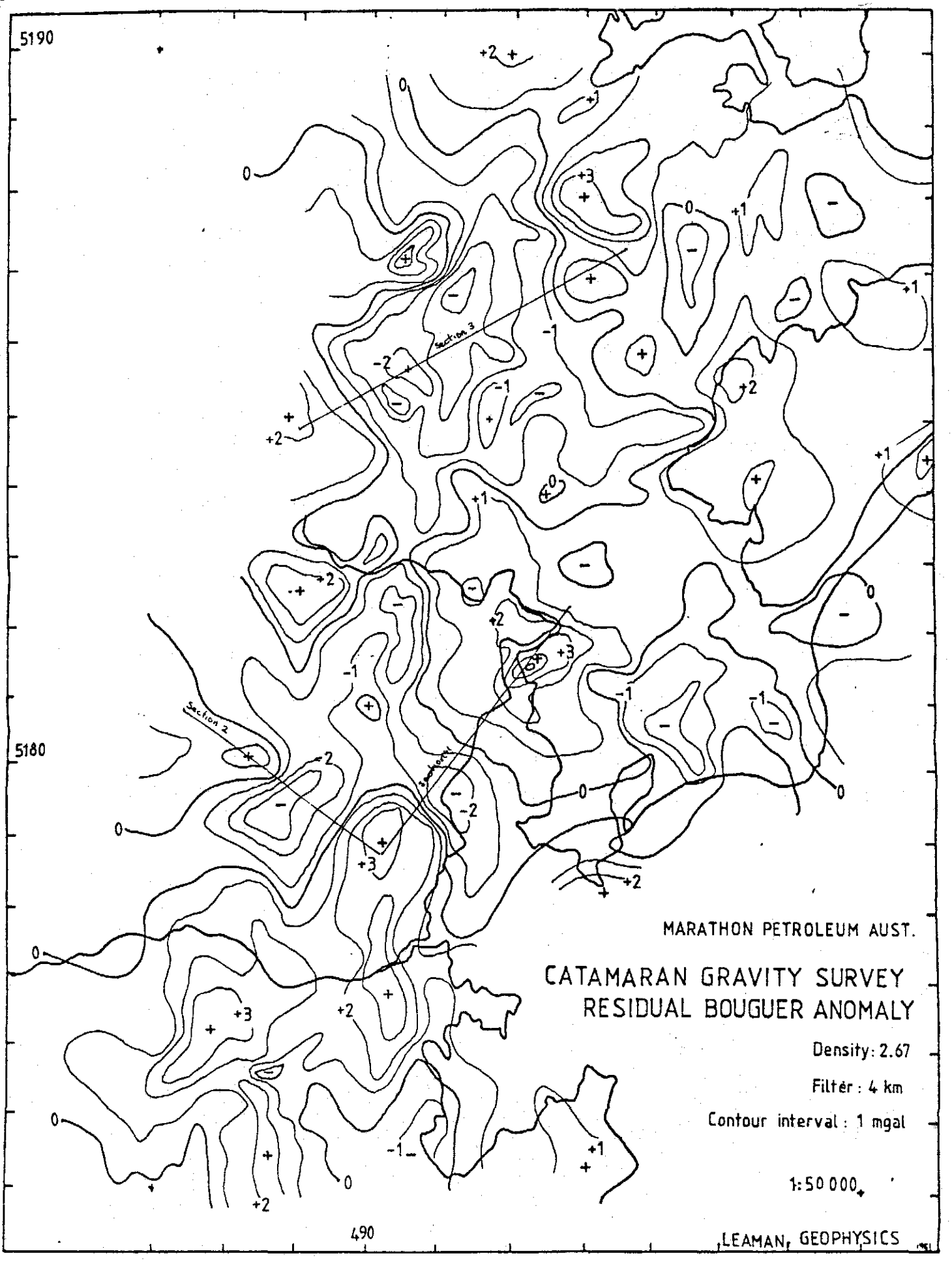
MARATHON PETROLEUM AUST. LTD

5 cm

111

444112

5 cm



0m Jdl: 0.00	100m Jdl: 0.96	200m Jdl: 1.92
400m Tr: -5.20	300m Tr: -3.90	200m Tr: -2.60
-5.20	-2.94	-0.68
300m Jdl: 2.88	300m Jdl: 2.88	300m Jdl: 2.88
100m Tr: -1.30	200m Tr: -2.60	300m Tr: -3.90
1.58	0.28	-1.02
300m Jdl: 2.88	0m Jdl: 0.00	300m Jdl: 2.88
400m Tr: -5.20	200m Tr: 2.60	0m Tr: 0.00
-2.32	-2.60	2.88

While the values obtained need not be directly comparable with the residual values (Figure 6), two things are certain. Firstly, if the residual value is positive and in excess of 2 mgal, dolerite must dominate the section. This conclusion remains true whether the sedimentary content is absent or substantial. What cannot be determined qualitatively is the depthwise distribution of the rock types. If dolerite is exposed then surface inspection may aid deduction of the sheet proportion remaining hidden in the section. Secondly, if the residual value is strongly negative then sedimentary rocks dominate the section. If a negative anomaly is associated with outcropping dolerite then either the dolerite is a thin capping sheet or the sedimentary section is substantial. Alternatively, where the negative anomaly is associated with exposed sedimentary rocks a thick section is again implied. But in this case no indication of the position of included dolerites may be possible.

It will be evident, however, that anomalies in the range -1.5 to +1 mgal could be associated with a range of rock combinations. The calculations suggested in the above table have made certain assumptions concerning the thicknesses of dolerite or Triassic rocks to be found. A typical dolerite sheet is of the order of 300m thick but some are known (elsewhere) to exceed 400m. No reliable information is available on the thickness of the Triassic rocks and the figures yield the relative effect of section changes. It will be clear that density assumption errors will also affect the conclusions but in a relatively minor way since the values used for the two materials are unlikely to be in error by more than about 0.03 t/m^3.

A more important source of ambiguity lies in the assessment of the actual intruded horizon. If an area has been faulted prior to intrusion, as is general in Tasmania, dislocated again at the time of intrusion and again in late Tertiary times then it may not be easy to reconstruct the form of the intrusions without the presence of some geological markers and a scale for the rock section. This geological history means that the site of intrusion may vary from fault block to fault block and thus the relative proportions of each rock remaining in each block may differ markedly. Since the gravity data can give a relative assessment of the proportions, input of surface geological control can often lead to an accurate estimate of intrusion level and section status, so revealing any faults. This is not guaranteed in this area since the geological markers required are absent or, at least, not mapped. Even so, the gravity data can be used to infer the location of the faults if not to reliably estimate the displacements.

The anomalies shown in Figure 6 range from -4 to +5 mgal, or 9 mgal. This is not markedly different from the range suggested in the section calculations and suggests a possible Triassic/dolerite normal balance of 450/350m or an extreme of at least 320/550m. However, the normal variation is from -1.5 to +1 mgal, a range of 2.5 mgal, which is consistent - excluding the effect of depth changes - with section changes involving a little over 100m of material:

e.g. 300m Jdl: 2.88 400m Jdl: 3.84
200m Tr: $\frac{-2.60}{0.28}$ to 100m Tr: $\frac{-1.30}{2.54}$

a change of +2.26 mgal.

This type of calculation presumes that the overall section, including intrusions, remains of the same order and it is then representative of fault-dilation or intrusion horizon changes. It also shows that if dolerite is locally exposed and also implied within the adjacent rock block (by residual values near zero) then the amount of sedimentary overburden will rarely exceed 100m.

The above discussion was intended to stress the importance of sound geological background data. In the writer's experience surface mapping of an area is essential to high quality structural interpretations since it provides reliable control for the geophysical evaluation of structural options in the third dimension. In this case the magnetic observations have improved the situation in respect of igneous boundaries but detail on faulting and markers within the sedimentary sequence is lacking. Consequently both qualitative and quantitative methods of interpretation carry excessive ambiguities. This point may be emphasized by considering the restricted drilling data available (see Figure 1).

Hole	Cat.1	Cat.2	Cat.3	Cat.4	Moss Glen 1
Dolerite at (m)	66	210	19	111	138
Residual field(mgal)	-0.5	*0	+1.0	-0.5	-2.2

*not well defined value

If absolute value considerations are ignored the relative components of the field at each site can be assessed. Assume a 300m thick dolerite sheet in each case.

Tr (m)	66	210	19	111	138
Jdl (m)	300	300	300	300	300
Tr (m)	ca. 200	0	125	ca.150	ca.250
Attraction(mgal)	- 0.6	+0.2	+1.0	-0.5	-2.2

The above tabulation confirms two features of the interpretation; the sedimentary section is either extensively faulted or very erratically intruded and that interpretation must relate adjacent blocks and not attempt bulk area assessments.

The Lune River Fault is not well defined gravimetrically, probably because the station density is very patchy west of it. Some anomaly correlation is suggested north of 5187000mN and south of 5180000mN where coverage is improved. A number of other trends are evident - some coincident with photo interpreted features. Many are shown in Figure 10. The presumed eastern limit of the coal bearing sequence is also shown.

Dolerite is clearly dominant south and west of Catamaran. The mass is irregular in form but the +1 to +2 residual values imply much dolerite and/or little secimentary section. Exposures west of McDougalls Hill suggest intrusion near the base of the Triassic sequence and the residual values suggest more than 200m of dolerite. Peak anomalies in excess of +3.5 mgal are associated with coarse grained dolerite and granophyre near 490500mE, 5176000mN and a feeder is implied. Other feeders are suggested nearby, the centre south of Moss Glen is concealed by a thin cover of Triassic rocks.

Other dolerite feeders are located at 492200mE, 5185000mN, 493000mE, 5188000mN and probably 489000mE, 5182600mN. The feature at 490400mE, 5187250mN on the eastern flank of Lune Sugarloaf may represent either a dolerite or basalt source although the intrusion of dolerite in Lower Permian rocks west of the fault suggests a dolerite feeder adjacent to the fault zone. Definite basalt sources were identified by the magnetic survey (see page 7) but these are narrow (ca.20-25m) dykes.

Dolerite from the feeder (? see page 17, section 1) at the head of Coal Pit Bight underlies the outcropping coal measures along the valley of the D'Entrecasteaux River. Dolerite forms a major portion of the section near Sullivan Point and on the western side of Southport Lagoon.

Regional dips are to the west and given a situation in which faulting is systematic - the Lune River Fault and any parallel ghost faulting may be the western side of a graben structure - and that dolerite intrusion has largely followed a hydrostatic level, it could be expected that the thickest succession or at least thickest cover on dolerite would occur adjacent to the Lune River Fault. In fact, the larger negative anomalies are to be found over the blocks adjacent to the fault although cross faulting has slightly complicated the structure. Since the bulk of the known coals also occur in parts of this block the association of negative anomalies suggest a significant volume of coal-bearing rocks. Areas with anomaly values more negative than -2mgal are clearly prime target zones. Unfortunately, few blocks appear to have escaped faulting and none may be free of dolerite. It will be recalled that the large negative values may reflect major sequences which could still contain dolerite. The anomaly gradients associated with the western blocks, however, suggest several hundred metres of sedimentary rock from the surface.

Some possible plug-like projections are suggested within the main prospective axis (490000mE, 5181000mN; 490200mE, 5183200mN; 488200mE, 5180200mN).

Some quantitative interpretation has also been attempted in order to verify the scale of some structures inferred in the fore-going treatment. Extended treatment is not warranted unless particular propositions are available for test and the geological source data is not adequate to provide them at this stage. The processing has been designed to assess dolerite depth and intrusion form.

Most modelling has used limited strike two dimensional methods although three dimensional methods have been used to test anomaly closures.

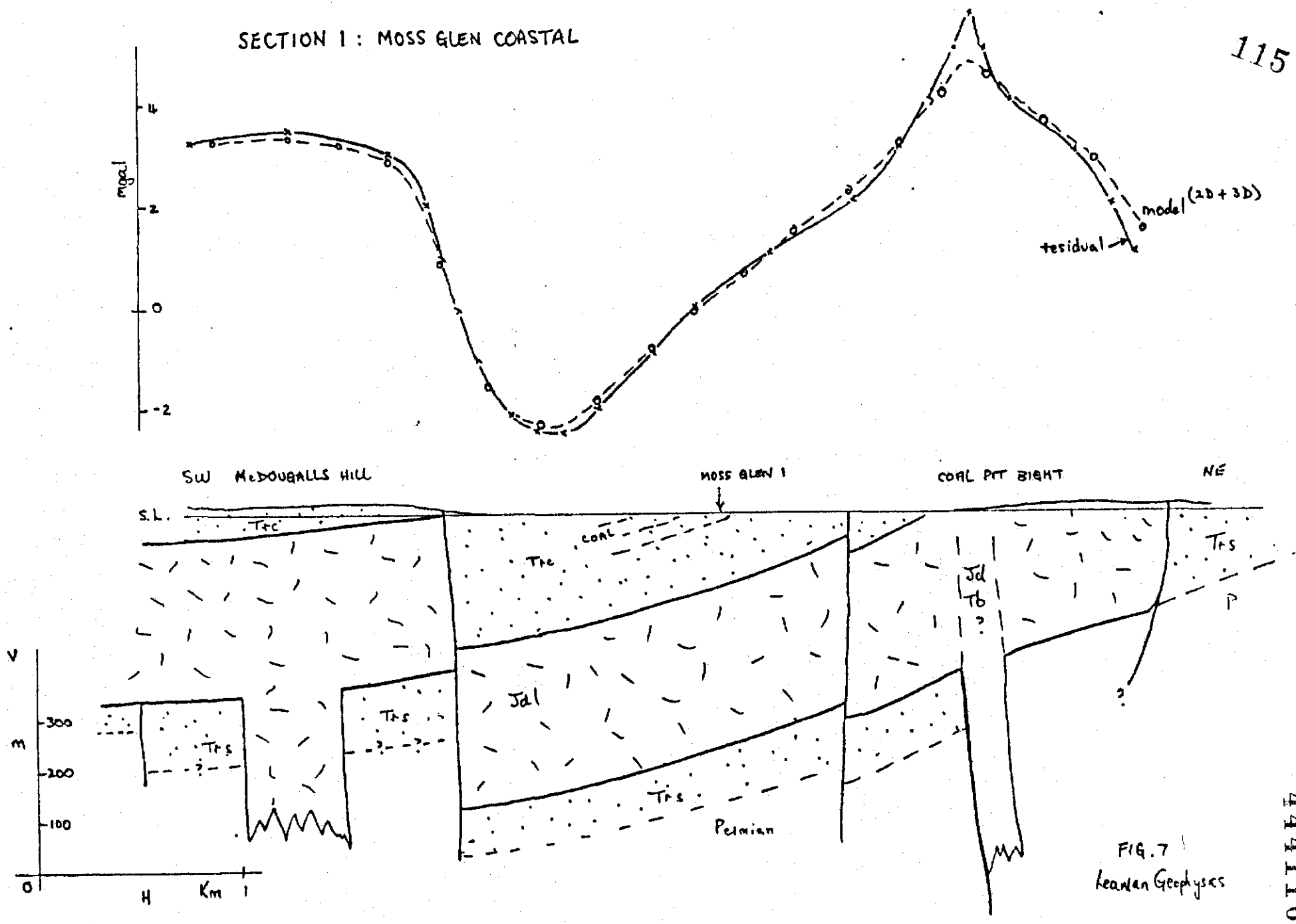


FIG. 7
Leaman Geophysics

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Section 1: NE-SW: Moss Glen coastal.

Calculations along this profile have verified that the residual Bouguer values are indeed reflective only of Triassic rocks and dolerite for all practical purposes. No arbitrary matching shift was required at any stage. The final model is shown in Figure 7. Modelling has also confirmed the feeders inferred qualitatively. The small eastern feeder produces an abrupt anomaly suggesting a moderate contrast close to the surface. A second stage intrusion or basalt pipe is a possible solution. The dimensions shown are minima. 3D analysis suggests a pipe over 650m in diameter for the western feeder (450m, 2D). Similar dimensional underestimates have been noted for the thickness of the Moss Glen sedimentary wedge. The maximum thickness is likely to be in excess of 300m but the model suggests only about 270m. The model indicates a total Triassic content of about 400m which compares favourably with the qualitative estimate (388m, p15) but shows how the placement of the dolerite varies. The rock distribution suggests that the source of dolerite is the pipe system beneath McDougalls Hill and that the sheet transgresses upward to the east across the section. A major fault is confirmed near Bennetts Point.

Section 2: NW-SE: Moss Glen inland.

Modelling (Figure 8) of the large negative anomaly 2 km west of Moss Glen has demonstrated that up to 400m of Triassic rocks may overlie the local dolerite sheet. The steep western gradient to the anomaly is crucial to this interpretation. Two large faults are indicated in the section but the orientation and extension of the larger western structure is uncertain as it is cross cut by the fault revealed in Section 1. The extension of the sedimentary wedge, shown in Section 2, south west toward Catamaran River is uncertain due to lack of data. The uneven drilling results at holes Catamaran 3, 4 are consistent with the type of shelved, shallow and variable structure interpreted for the eastern side of the anomaly.

Section 3: ENE-WSW: Lune Sugarloaf south.

Section 3 transects the large area of consistent negative anomaly in the north of the area. The general character of the anomaly is asymmetric suggesting a similar wedge-shaped form. The irregularities in the centre of the section (Figure 9) may be related to basalt features or dolerite variations. The section can be modelled in two ways. If dolerite is excluded from the section the wedge of Triassic rocks required cannot exceed 100m thickness in the east and 250m thickness in the west. Some faulting is also required to avoid exposure of Permian rocks. In this case the small anomalies in the centre and west of the structure must be related to substantial local piles of basalt. Up to 80m of volcanics is required. This picture cannot be supported by the available geological information. Since the lower Triassic rocks are at least 200m thick, they should be exposed near Donnellys Creek. However, only coal measures (Upper Triassic) materials are exposed in this entire region and regional dips, with or without fault assistance, suggest a considerably thicker sequence. It may be concluded therefore that much more Triassic material is present and that it must include a dolerite sheet. The model shown in Figure 9 presents this option.

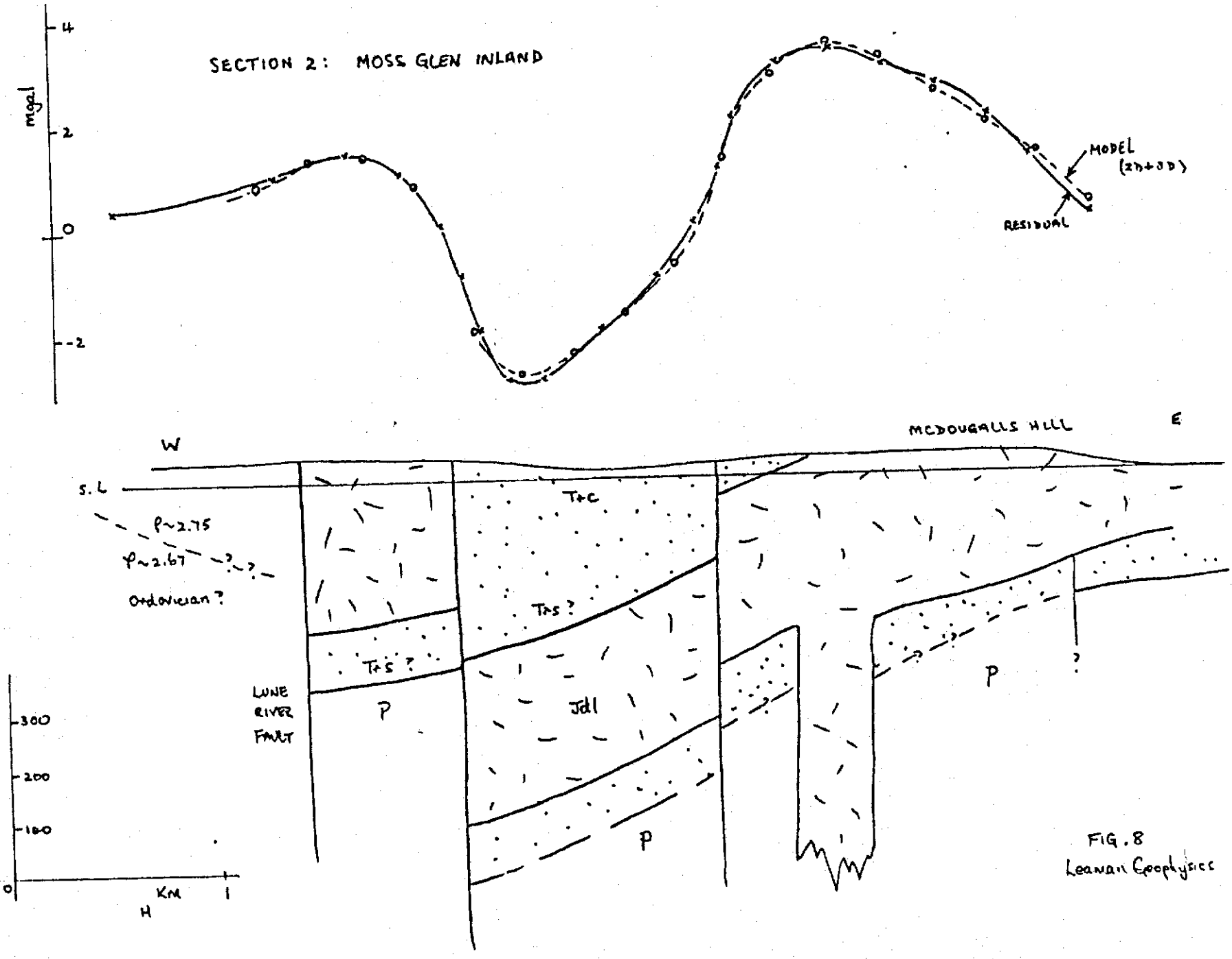


FIG. 8
Leonard Geophysics

441118

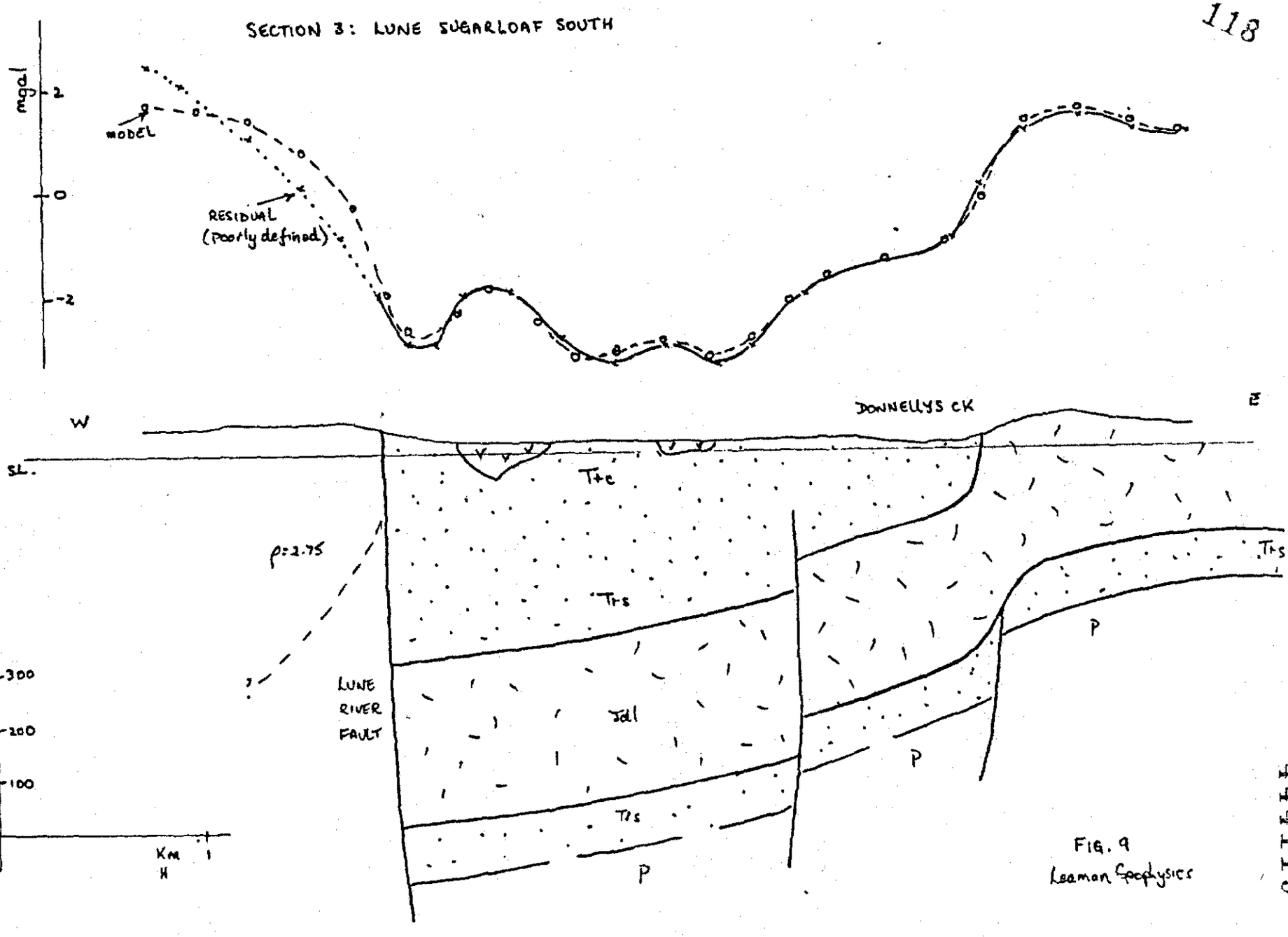


FIG. 9
Leaman Geophysics

444119

The structure west of the Lune River Fault is uncertain and control of the observed profile is quite poor in any event. The irregularities noted in the section have been largely ascribed to variations in Tertiary materials near surface. It is possible that valley systems filled with sediments and volcanics may be concealed beneath the patchy basalt and talus cover in this region. Such structures are common elsewhere in southern Tasmania.

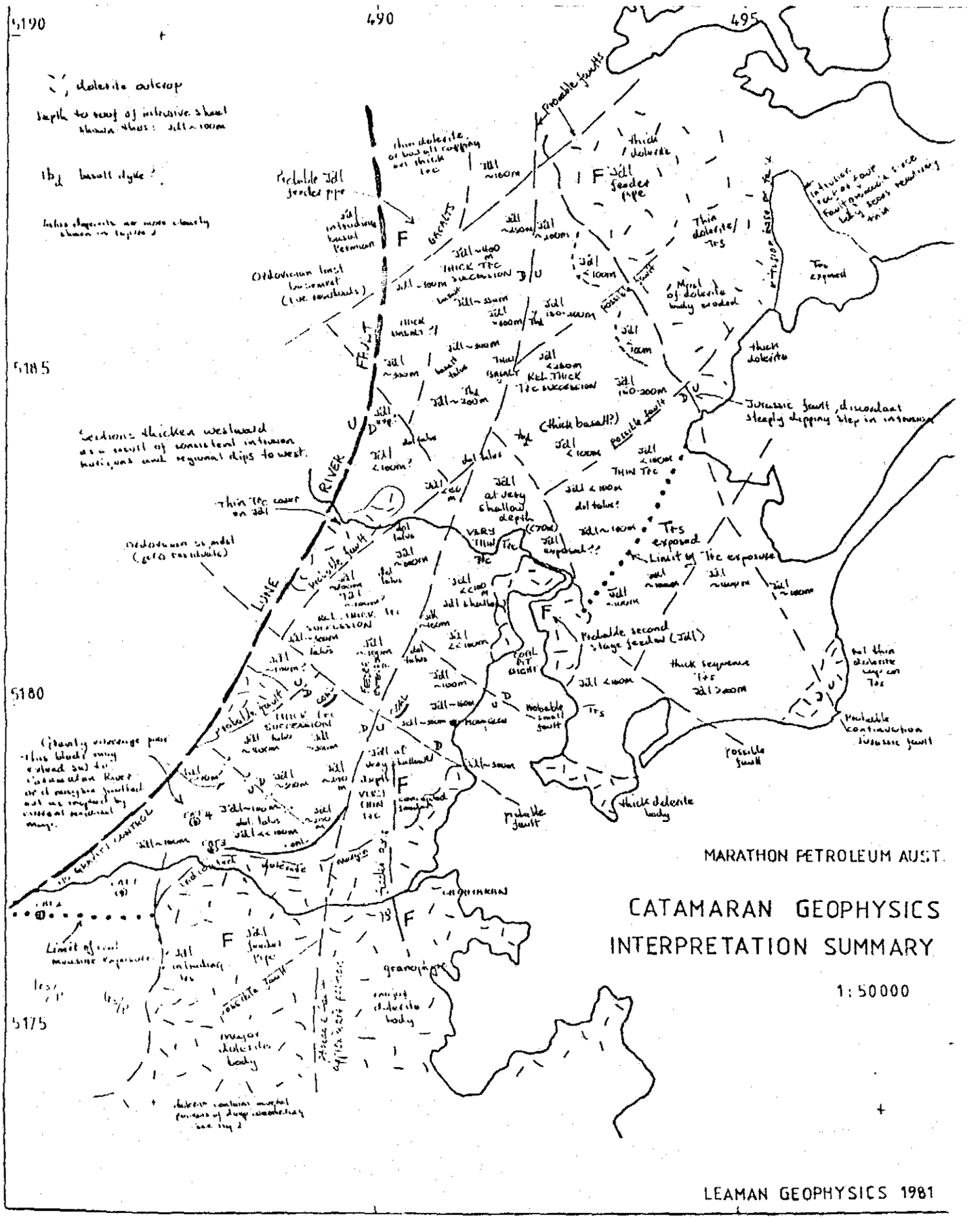
The model also implies contemporaneous (eastern) and post intrusion (centre) faulting in the area. Dolerite exposed at the eastern end of the section shelves upward to the surface near Southport Lagoon, partly as a result of transgression and partly due to the regional dip. The exposed base of the intrusion is intrusive into Lower Triassic rocks.

Deficiencies in the rock property values used for the interpretation could lead to minor modification. The Triassic rocks are unlikely to be denser than 2.40t/m^3 overall and the dolerite is unlikely to be less than 2.85t/m^3. The values actually used are close to the lower and upper limits respectively for the Triassic sequence and dolerite. Consequently the contrast used is a virtual maximum and the depths suggested are minima. Where talus overlies the section some reduction in thickness estimate is possible since a - 0.16 t/m^3 contrast is likely between talus and coal measures. However, as no reliable thickness data is extant this factor has not been included in the calculations.

The interpretation presumes relatively simple large scale intrusion. The possibility of smaller multiple intrusions cannot be excluded with present information. In Upper Triassic rocks small stringer intrusions and plugs should be anticipated above major injections. While these cannot be resolved by the methods used the interpretation does indicate the <u>total</u> amount of dolerite as a section proportion and the likely depth to a reasonably thick intrusion - which may not be the only one in the section. Thus a modelled 300 metres of dolerite may be made up by two 150 m. intrusions and perhaps a few stringers with the bulk of the mass at a depth equivalent or deeper than that modelled.

120

444121


5190
490
495
5185
5180
5175
dolerite outcrop
basalt dyke?
Probable Jdl feeder pipe
Ordovician inlier (Tec exposed)
Ordovician structural (Tec exposed)
Limit of Tec exposure
Limit of Tes exposure
Probable second stage feeder (Jdl)
Thick dolerite body
Jurassic fault, downthrown steeply dipping step in intrusive
possible fault
probable fault
thick dolerite
thin dolerite/Tes
Tes exposed
Tes
Jdl
F
U
D
MARATHON PETROLEUM AUST.
CATAMARAN GEOPHYSICS
INTERPRETATION SUMMARY
1:50000
LEAMAN GEOPHYSICS 1981
5 cm

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CONCLUSIONS:

Magnetic methods have been shown to provide a cheap, effective means of upgrading and checking geological base maps, especially where uncertainty exists about the exact nature of the materials. In this area the resolution of dolerite and dolerite talus is of paramount importance since it allows assessment of probable continuity of sedimentary sequences and aids structural integration of dolerite structures. It can fairly be said that dolerite dominates the geology of this area.

Several magnetics profiles have implied dolerite at relatively shallow depth beneath a cover of talus or coal measures. Although depth estimates based on these profiles are maxima they have been found concordant with gravity estimates. Even the 220m estimate at Moss Glen is consistent with the average depth estimate from the gravity data even though hole Moss Glen 1 proved only 138m. The gravity data suggest a wedge-shaped structure which is consistent with both drilling and magnetic results.

While a few magnetics profiles have implied dolerite at depth in some coal-bearing sedimentary sections, the gravity survey indicates that dolerite has intruded a low-middle horizon within the Triassic rocks and is present in every block of exposed coal measures. The intrusive sheet is of the order of 300m thick and was fed from up to six feeder sources within the area. The cover of coal-bearing rocks varies in thickness from zero, where the sheet roof is exposed, to about 400m.

As the dolerite appears to have been intruded within a consistent 100-150m band of the Triassic succession and Tertiary epeirogeny has produced a regional westerly dip and graben faulting a series of wedges havebeen produced in which the thickness of Triassic rock above dolerite varies systematically. The thickest wedges occur adjacent to the Lune River Fault although cross faulting has introduced some variation (e.g. to Moss Glen). A number of faults have also been suggested in the interpretation and it is likely that the average block size is about 2km x 2km.

An overall summation of the interpretation is provided in Figure 10 which is internally consistent to the precision afforded by existing drilling and geological control. Points of ambiguity remain (areas of non descript residual anomaly) and any drilling programme should proceed from the major anomalies/ structures/ sections toward these features since the first requirement must be to establish presence of useful coal, then extent of coal. The overall resolution and accuracy of the present interpretation is estimated at 50m.

Submitted on behalf of
Leaman Geophysics
by

D. Leaman

Dr. D.E. Leaman, B.Sc. Ph.D.

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444123

REVIEW OF GEOPHYSICAL INTERPRETATION

GEOPHYSICAL SURVEYS

CATAMARAN AREA, TASMANIA - EL 6/79

for

MARATHON PETROLEUM AUSTRALIA LTD.

by

LEAMAN GEOPHYSICS

July, 1982

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444124

INTRODUCTION:

Gravity and magnetic data acquired by Marathon Petroleum Australia Ltd. in exploration licence area EL 6/79 at Catamaran, Southern Tasmania, were interpreted by Leaman (1981). The magnetic data were used to support and upgrade a relatively low standard geological basemap. In this area dolerite and dolerite products are important and not readily assessed rock materials. The gravity data were interpreted to provide a general structural guide. Information on faulting and dolerite intrusion was particularly important to an assessment of coal reserves. Proper evaluation of potential reserve areas and, the possible mining problems or methods, is intimately related to definition of fault blocks and any intrusions within them.

The initial drilling programme was begun in late 1981 and completed in mid 1982. This report summarises the drilling results, discusses the reliability of the interpretation and outlines revisions where necessary.

DRILLING RESULTS:

The table summarises results from the recent drilling programme. Older drilling results were discussed in the original interpretation report (Leaman, 1981) where they were used to provide a patchy, basic control.

Of the nine holes which yielded an effective result three were in complete agreement with the interpreted prediction (105, 109, 112) and three others were within the stated error envelope (102, 107, 110) although two (102, 110) did not terminate in dolerite within the stated depth range (inconclusive). Results were poor in holes 106, 111 and especially 108.

Examination of materials within each hole is also revealing. Sandstone dominates the coal measures section in holes 105, 109, 112 whereas the proportion of sandstone-shale is 70:30 (approx.) in 102, 110 and about 50:50 in 106.

The original interpretation summary is reproduced in Figure 1. Hole positions are indicated.

DISCUSSION:

No discussion is necessary in respect of holes 101, 103, 104, 105, 109, 112. The results suggest that the density contrast used (about 0.50 t/m^3; dolerite-coal measures) is about the right order of magnitude for sandstone-dominated successions. Where the shale content is significant the contrast is clearly reduced which accounts for the understatement noted for holes 102 and 110. The minimum contrast is probably about 0.35 t/m^3. The overstatement noted in 107 can be related to the presence of scree rather than coal measures.

Hole	Approx Coords (N, E)	Depth to dolerite(m) Predicted	Observed	Total Depth	Materials
101	864,911	~400	-	42	basalt
102	879,914	~150	38-51	170	0-38 coal m,-51 do -170 coal m.
103	826,904	~300	-	28	scree
104	904,905	~100	-	39	scree
105	844,918	<100	71-	79	coal m, dolerite
106	864,911	~400	225-	234	0-72 basalt, -225 coal m, dol.
107	804,905	~100	40-	57	0-40 talus,dolerite
108	800,890	~300	21-	39	0-21 coal m,dolerit
109	827,903	~300	296-	300	0-296 coal m, dolerite
110	855,924	<250	100-115	304	0-100,115-304 coal
111	797,889	~300	36-47 157-	171	coal measures, dolerite
112	804,908	~100	11,31,63, 106	108	coal measures,minor dolerite intrusions

Holes 108, 111 are located together in a region with exposed coal measures and an associated sizeable negative gravity anomaly. Although substantial positive gradients have been observed to the immediate west there is no obvious reason for the discrepancy. It is possible that the dolerite encountered is part of relatively thin sills. However, in each case more dolerite has been proven than observed in other thin sills (holes 102, 111, 112). The magnetic data from traverses 51-59, 54-679 has been re-examined. Station 54 is centrally located between holes 108 and 111. The regional anomaly across the gravimetric low is relatively low amplitude (500nT), smooth and long wavelength (~1800m). It is quite consistent with a major intrusion at moderate depth although it is possible that lateral effects could produce a similar illusion. Line 54-679 is perpendicular to 51-59 and indicates dolerite at shallow depth west of 54 (exposed about 400m west of 54). Although the observations are not readily compiled into profiles for modelling, line segments 54-679, 654-658, 59-539, 59-654 have been grouped to provide a working profile (Figure 2). These segments roughly correspond to Section 2 (Figure 8 of Leaman, 1981) and the gravity model has been reviewed magnetically. All general forms can be reproduced easily; the high frequency effects can be shown to be related to local variations in magnetisation and overburden. The gravity section is supported at the predicted order of magnitude. Indeed the section of modelled profile over the graben has precisely the form and amplitude of the field observed between 51-59 (approx perpendicular to Section 2).

Given these results, and assuming exclusion of thin intrusions, the position of the western fault (marked probable in Figure 1) may either be further east than indicated or a multiple structure. Neither possibility would radically alter the gravity-magnetic model for Section 2. A further interesting point relates to the difference in depth to dolerite at these closely related sites (108, 111). It is possible that 108 was stopped in a slightly thicker version of the upper body found in 111.

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The gross overestimate noted for hole 106, a region with substantial negative anomalies, implies that the hole may have been drilled west of an inferred N-S trending fault. It is also possible that Tertiary sediments may be present beneath part of the thick basalt flows in the north of the region (contrast against dolerite - 0.90 t/m^3) and the large negative effects observed may be related to Tertiary, not Triassic materials. It is noteworthy that the negative axis correlates easily with basalt-covered areas and an erratic Tertiary-sediment valley fill beneath basalt is typical Tasmanian experience. At the possible contrast, 25m of sediment could contribute about one mgal (equivalent to 75-100m of coal measures). The above discussion presumes, of course, that the dolerite encountered at 225m is not a thin sill.

As noted above, thin dolerite bodies have been observed in three holes (102, 111, 112). In view of the separation of these holes and general observation of the Tasmanian Jurassic dolerites, it is most unlikely that the occurrences represent a 'marker' horizon. It must also be observed that several other holes completed in dolerite may not have encountered the main sheet.

The large north-south fault inferred across the centre of the area appears to be supported by the results although its exact position remains unconfirmed. Minor modification of the probable position of two other faults has been noted above (near 106 and 108/111) (see Figure 1).

Examination of the geophysical logs provided for each hole indicates that the best seams, in terms of thickness and quality (low density, high resistivity etc.) occur at shallow depth (<30m) near holes 110 and 102. Results seem disappointing in the region of the southern coal exposures (holes 108, 111; 104, 107, 112) - perhaps these sites were below the coal-bearing horizon.

CONCLUSIONS:

The original interpretation, though based largely on potentially ambiguous gravity data, has proven reasonably reliable. Indeed the initial drilling programme has suggested very few refinements. This is partly due to the location of the drill sites (access problems), the areas drilled (best data coverage) and the absence of dolerite (basement) in some deep holes. The latter is particularly important since several holes have not definitely established the level of the main dolerite sheet (e.g. 102, 106, 110, 112). Any future drilling should prove at least 25m of dolerite before termination since most thin sills are 8 to 15m thick. Textural characteristics at 25m from the roof are commonly distinctiv and allow separation of large and small intrusions.

Some minor deviations in the interpretation can be related to the density contrasts employed. The value used seems adequate for predominantly sandstone successions only.

Other refinements relate to the exact placement of some faults. Many of the larger faults have been proven but the position of these structures is still not known to better than 100 to 200m.

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Further drilling can be planned on the base provided and should perhaps be directed at the shallow seams in the region of holes 105, 110. Only thin dolerite and/or basalt bodies should interfere in any way in this region at depths less than 70 to 100m. It may be found after more dense, detailed drilling that small dolerite bodies and faults may be of some account. Detailed magnetic survey may then be warranted in specific, very small areas.

REFERENCES:

Leaman, D.E., 1981. Interpretation of Geophysical Surveys, Catamaran Area, Tasmania. EL 6/79. Confidential report.

Report submitted on behalf of
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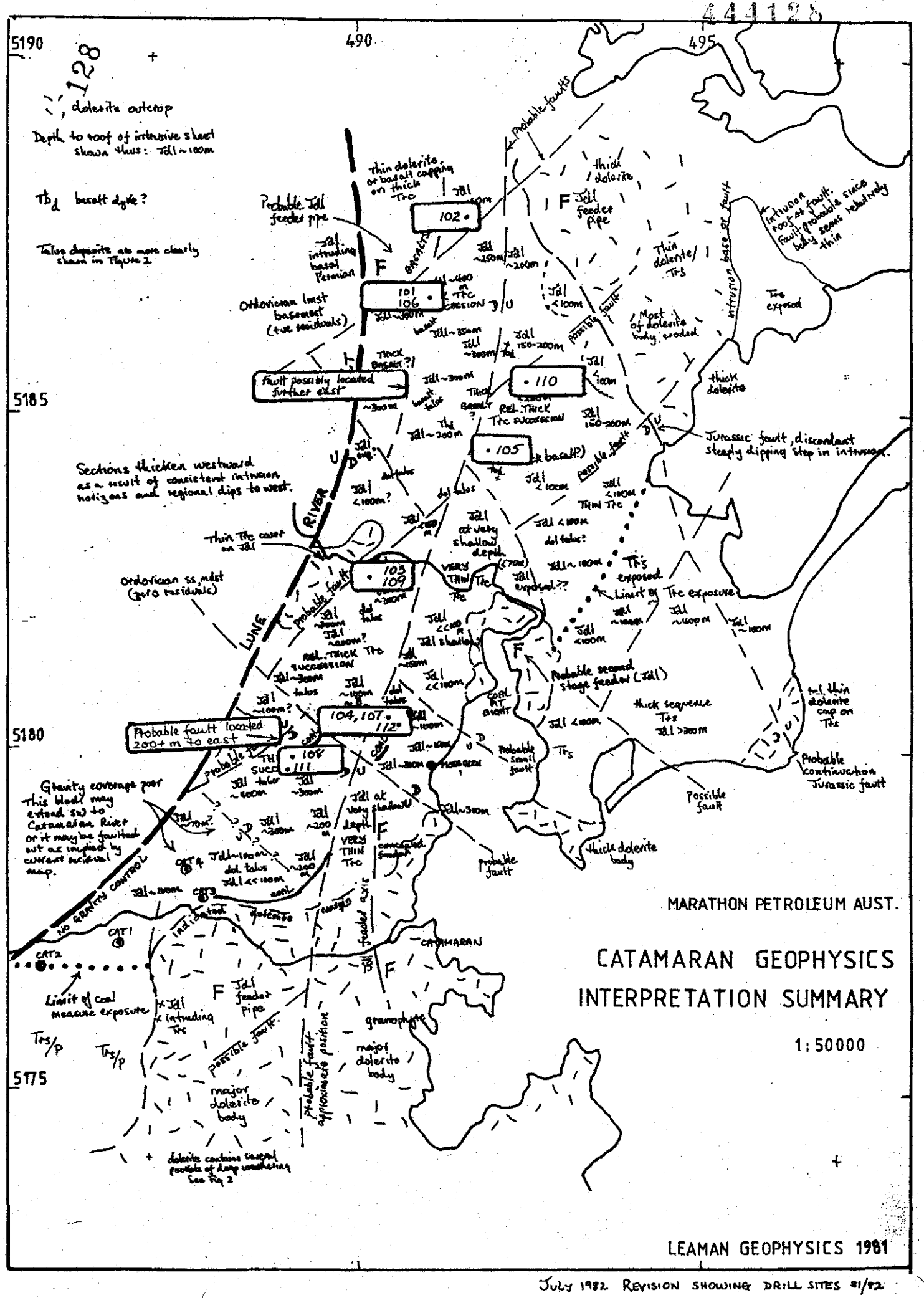
5190
490
495
5185
5180
5175
128
dolerite outcrop
Depth to roof of intrusive sheet shown thus: Jdl ~100m
Tbd basalt dyke?
Talus deposits are more clearly shown in Figure 2.
Probable faults
thin dolerite or basalt capping on thick Trc
Probable Jdl feeder pipe
Jdl intruding basal Permian
Ordovician limst basement (+ve residuals)
102
101
106
110
105
103
109
104, 107
112
108
111
Fault possibly located further east
Probable fault located 200+ m to east
Sections thicken westward as a result of consistent intrusion horizons and regional dips to west.
RIVER
LUNE
Thin Trc coast on Jdl
Ordovician ss, most (zero residuals)
Gravity coverage poor this body may extend SW to Catamaran River or it may be faulted out as implied by current residual map.
NO GRAVITY CONTROL
CAT1
CAT2
CAT3
CAT4
CAT5
Limit of coal measure exposure
Jdl intruding Trc
Trs/p
Jdl feeder pipe
major dolerite body
dolerite contains several foothills of deep weathering See Fig 2
Jdl feeder pipe
Thin dolerite/ Trs
Intrusion base or fault
Most of dolerite body eroded
Trc exposed
thick dolerite
Jurassic fault, discordant steeply dipping step in intrusion.
Trs exposed
Limit of Trc exposure
Probable second stage feeder (Jdl)
thick sequence Trs
Jdl >300m
thin dolerite cap on Trc
Probable continuation Jurassic fault
Possible fault
Thick dolerite body
Probable small fault
Probable fault
CATAMARAN
granophyre
major dolerite body
Probable fault approximate position
MARATHON PETROLEUM AUST.
CATAMARAN GEOPHYSICS
INTERPRETATION SUMMARY
1:50000
LEAMAN GEOPHYSICS 1981
JULY 1982 REVISION SHOWING DRILL SITES 81/82
5 cm

Fig 1

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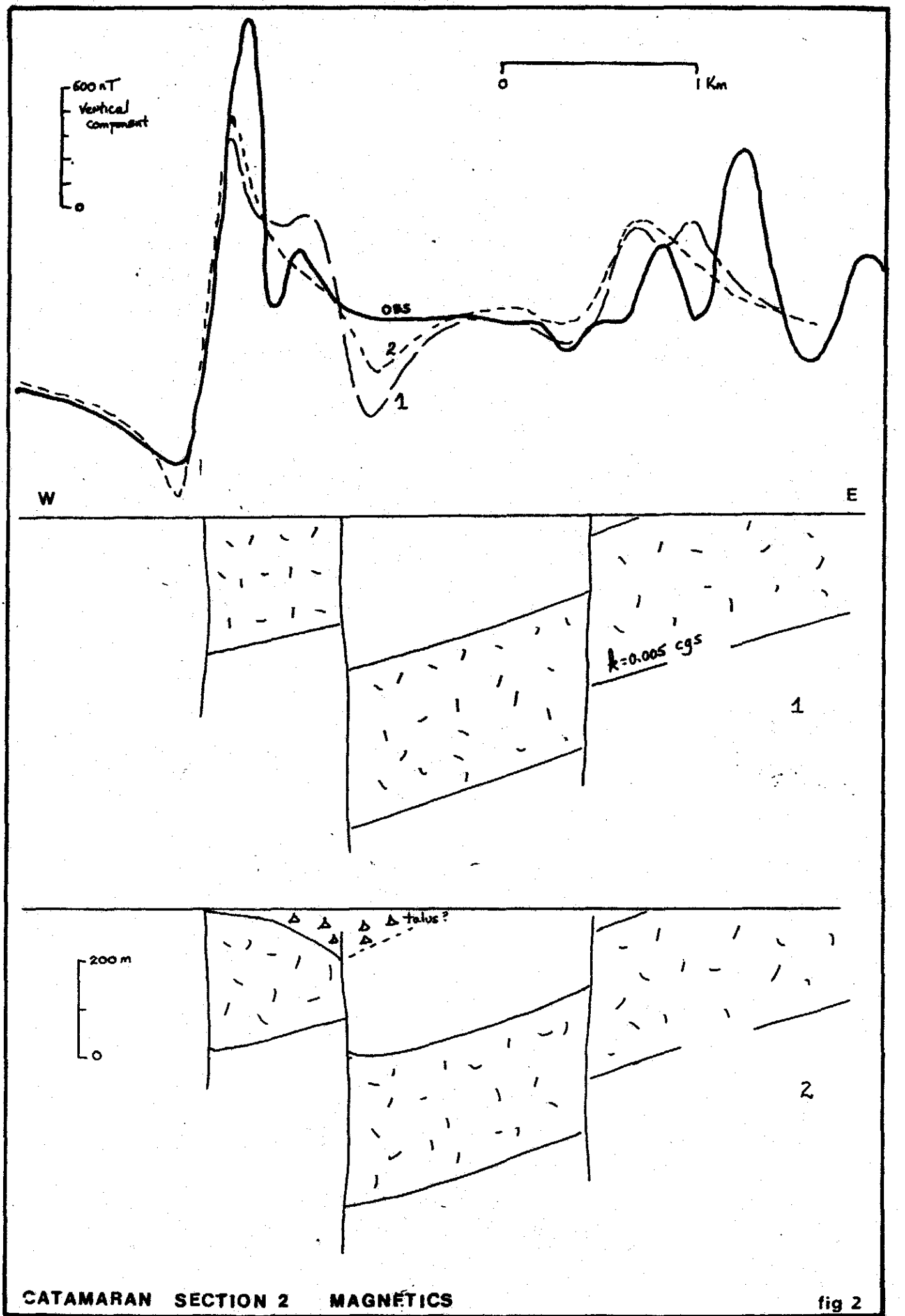

CATAMARAN SECTION 2 MAGNETICS

fig 2

5 cm

129

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LEAMAN GEOPHYSICS
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REVIEW OF GEOPHYSICAL INTERPRETATION

GEOPHYSICAL SURVEYS
CATAMARAN AREA, TASMANIA - EL 6/79

for
MARATHON PETROLEUM AUSTRALIA LTD

by
D. E. LEAMAN

December 1982

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INTRODUCTION:

Gravity and magnetic data acquired by Marathon Petroleum Australia Ltd. in exploration licence area EL 6/79 at Catamaran, Southern Tasmania have been used to support and upgrade a relatively low standard photo-interpreted geological basemap. Magnetic data have been used to define boundaries and identify talus areas while the gravity data were interpreted to provide a general structural guide with particular reference to dolerite intrusion forms and faulting. Proper evaluation of potential coal reserves or reserve areas is dependent on location of intrusions and/or faults. The original interpretation of all geophysical data was provided by Leaman (1981).

A first stage drilling programme of 12 holes was completed in the first half of 1982. The results and their interpretive implications were described by Leaman (1982) but no holes were critically located and the interpretation stood with very minor modification or discussion. A hint of potential problems was suggested at hole 106 where the main dolerite sheet was presumed encountered at 175 metres less than the predicted depth. The original interpretation, as annotated in July 1982, is reprocuced in Figure 1.

A second stage drilling programme was completed this month. Several of the additional holes support the interpretation outright but those south-east of Lune Sugarloaf (compare 106) apparently do not. This report reviews all drilling results and suggests a structural pattern consistent with all available geophysical data.

DRILLING RESULTS:

The results of both drilling programmes have been tabulated. Only three holes failed to provide a potentially significant result (101, 103, 104). Of the others, holes 105, 109, 112, 115 were in complete agreement with the original interpretation while 102, 107, 110, 114, 116, 118, 119 and 120 are inconclusive but concur within the stated depth range error envelope. Several results appear in clear contradiction: 106, 108, 111, 113 and 117 but some are difficult to evaluate due to absence of a reference horizon or dolerite. Possible, consistent solutions are outlined and discussed below.

TABLE 1: CATAMARAN DRILLING RESULTS, MARATHON AUSTRALIA

Hole(CA)	Approx coords (N,E)	Depth to dolerite (m) Predicted	Observed	Total Depth	Materials
101	869,920	~400	-	42	Basalt
102	879,960	~150	38-51	170	0-38 coal m, -51 dol, -170 coal m
103	825,905	~300	-	28	Scree
104	804,905	~100	-	39	Scree
105	845,919	~100	71-	79	0-71 coal m, dol
106	864,911	~400	225-	234	0-72 basalt, -225 coal m, dol
107	804,906	~100	40-	57	0-40 talus, dol
108	800,891	~300	21-	39	0-21 coal m, dol
109	826,904	~300	296-	300	0-296 coal m, dol
110	852,924	< 250	110-115	304	0-100 coal m,-115 dol, -180 coal m, -304 basal ss?
111	798,889	~300	36-47,157-	171	coal m, dol
112	804,908	~100	11,31,63,106	108	coal m, minor intrusions
113	861,922	150/200	30-38	321	0-30, 38-100 coal m, -321 basal ss
114	870,918	~250	-	235	0-100 coal m, -235 basal ss
115	783,889	~200	20-38,196-	198	0-20 talus, -38 dol, -196 coal m, dol
116	878,922	~200	-	230	0-230 basal ss
117	857,910	~300	51-96 158-162,193-195		0-19 basalt talus, -51 Tertiary sed?, -96 dol, -193 (Tr/P??), dol
118	791,894	~200	50-66	164	0-50 talus, -66 dol, -164 coal m
119	847,908	~200	89-97 113-116,120-122		0-132 coal m, dol sills
120	875,909	-	77-94 113-	115	0-9 talus, -19 basalt, -115 coal m, dol sills

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DISCUSSION:

The region south of holes 103, 109 is considered first. The implications of holes 108, 111 were discussed in the previous review (Leaman, 1982) where it was concluded that small sills must have been encountered, rather than dolerite 'basement' or main sheet. Recent drilling, e.g. holes 115, 117 has certainly established the existence of small intrusions of the required scale and holes 115 and 118 in the same fault block (as 108, 111) encountered small intrusions at shallow depth. The results at 115 and 118 do not indicate problems with the interpretation and the writer believes that the previous argument about 108, 111 can be sustained.

Of the nine holes in the southern region (103, 104, 107, 108, 109, 111, 112, 115, 118) only 107 appears abnormal or inconsistent with the interpretation. Dolerite has been logged from 40 to 57 metres. It has now been established that small intrusions may exceed 20 metres in thickness and, as adjacent hole 112 included at least two minor bodies at the required absolute elevation, it may be concluded that the interpretation of the fault block including holes 104, 107, 112 and Moss Glen 1 is basically sound; any understatement in dolerite depth can be related mainly to the presence of thick screes and talus (high negative contrast).

The interpretation north of holes 103, 109 appeared suspect after the first programme when hole 106 encountered dolerite at 224 rather than 400 metres. Two possible explanations were suggested in the July 1982 review (Leaman, 1982); the dolerite was a thin minor body (only 9m drilled) or that Tertiary sediments were biassing the Bouguer anomalies. Hole 117 of the new programme indicates that such sediments are present in the area. The writer believes that the soft, 'weathered', clayey material recovered represents Tertiary sediments, rather than weathered basal sandstones. The colouration, sorting and texture is consistent with this view. Although only 30 metres have been proven the material could yield at least -0.8 mgal locally and account for some extreme gradients. As noted in earlier reports coupling of such sediments and basalts is ubiquitous in Tasmania. Local and substantial basalt thicknesses are also substantiated (101, 106) which would enhance gradients but complicate resultant anomaly amplitudes.

Sedimentary materials in hole 117 below 96 metres have been tentatively identified by C. Bacon (Mines Department) as possibly Upper Permian. The writer has not seen this material but the conclusion is hard to sustain. Holes 106, 119 to north and south have proven sections of coal measures to depths in excess of 200 m. Thus insertion of a shallow Permian block would imply a local fault block with uplift equivalent to the entire basal sandstone section and the demonstrated coal measures at least. Section 3 (Leaman, 1981) passes close to 117. It is possible to remodel this section but special pleading is required for the anomaly match. The fault block cannot be

extensive - either in width or strike length, and the long wavelength anomalies produced must be counteracted by substantial accumulations of Tertiary materials to restore the sharp observed gradients. The result is not really credible, but the gravity field alone cannot resolve the problem.

No prediction was made for the depth of dolerite within the fault block containing hole 120. The residual anomaly of +1 mgal implies a partly terminated section, or nearness to a feeder, but this has not been established since only two metres of dolerite were drilled.

Further possible implications of the main graben block and dolerite bodies in holes 106, 117 and 120 are discussed below.

In the eastern section of the area, with the exception of hole 105, depth to dolerite is generally in excess of the roughly marked predictions by at least 20-30% (110, 113, 114 not established, 116). The 250 m sedimentary thickness estimate near site 110 is based on average residual anomaly values of -1 to -1.5 mgal (see section 3 and page 14, Leaman 1981 for comparison of implied depth/gravity values). Inadequate figure labelling was included to allow for the observed and local -2.2 mgal anomaly at 110. This value is minimised by the fault and upraised block to the north. The discrepancy could allow a further 60 to 100 m of section, i.e. 310 to 350 m, at the density contrast used and restricted extent assumptions. Hole 110 is thus probably consistent with the observed data and the overall interpretation. Certainly, the possible fault implied has been established by holes 110 and 113.

The problem posed by the results from holes 113 and 116 is apparently more significant. The residual values at 113, 114 and 116 are -1.6, -2.5, 0 mgal respectively. Leaman (1981, p. 14) suggested a series of guide values for the Triassic-dolerite part of the section. While these must be modified by local effects (weathering, screes, basalt, etc.) or by three dimensionality and nearness of the Permain basement or main dolerite sheet drilling has shown that the values can be used literally. Comparison of the value table and sections 1 to 3 (Leaman, 1981) will show the scale of an interpretation modifications possible. Thus, although ambiguities are possible - for values between +1 and -3 mgal - a value of -1.6, as at hole 113, is quite consistent with a section containing a 330 m dolerite sheet and about 350 m of Triassic rocks (> 321 m in hole 113). More than 200 metres of basal sandstone were recorded indicating that the main sheet has intruded near the base of the Triassic sequence or lies within the mid-Permian rocks (typical intrusion horizons). The former positition is supported by the many dolerite - Lower Triassic contacts south of Southport and Southport Lagoon.

Similarly, the anomaly at 114 can be translated into a section over 400 m thick. The hole shows that the sheet is low in the section. In the region of 114 three dimensional interactions are important and 400 m can be considered an overestimate. Although the results from hole 114 are not definitive there is a stratigraphic discrepancy between holes 113 and 114. The base of the coal measures has been displaced (up in hole 114). The implied movement could be

provided by a small SW-NE trending fault only if the main N-S fault is located a few hundred metres west of the original interpreted position. Review of the data, and section 3, indicates that this is possible, but is certainly unresolved, north of 860N. South of 860N gradients and field distortions suggest that such a shift in position is justified.

Hole 116, located on the 0 mgal contour adjacent to a strong positive anomaly, is not easily assessed. The recovery of basal Triassic rocks is consistent with a section dominated by dolerite (e.g. 300 m Jdl, 200 m Trs). The original interpretation did not clearly present a section thickness for this area but typical values were suggested as 150 to 200 metres. The hole, however, has demonstrated two things;

1: the probable NE-SW fault exists, northside up, and
2: the dolertie boundary adjacent to the feeder system is very steep and has a descent in excess of 230 m, not 130 m as modelled.

Interpretive revisions are indicated in Figure 2. Although generally minor and restricted to the northern parts of the area, drilling control has removed a few ambiguities and confirmed many fault posions. Several faults are now more accurately located and throw estimates are possible (approximate, since regional dips are not reliably measured). The section is intruded by many dolerite bodies. Ambiguities remain in the region south of Lune Sugarloaf.

Three possible structures can be proposed to explain the observed drilling data (see also sketches, Figure 2).

i) a pre-intrusion graben where dolerite has crossed the bounding faults into a downward displaced horizon, or has upstepped along the faults.
ii) a normal post-intrusion graben where an upper sheet has been encountered at shallow depth.
iii) a pre/post intrusion graben with a main sheet in depth and small upper section sheets.

Clearly (i) and (ii) give full weight to the terminal sheet intersections in holes 106, 117, 120 etc, whereas (iii) does not. Rejuvenations may further complicate deduction of original forms. Examples of all three classes are readily found in other parts of Tasmania. Gravimetrically the alternatives yield anomaly contrasts of the order of -2.5, -0.25, -2.5 mgal. Thus only (i) or (iii) are realistic, but the implication is far reaching since only one large sheet in Triassic rocks can be sustained. Thus every substantial occurrence of dolerite in contact with Triassic rocks found at Catamaran probably represents fragments of the same intrusive mass fed from several sources. Given this deduction and the demonstration by drilling that the favoured horizon is basal Triassic section much of the ambiguity can be removed from simple anomaly calculations and modelling (refer discussion page 14; Leaman, 1981). The proposed interpretation is thus generally valid since it was based on such first order assumptions using the principles of occam's razor (simplest initial proposition). This discussion neglects the possible complication of a narrow upthrown fault block (refer notes, hole 117, page 3).

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CONCLUSIONS:

The interpretive principles described in the original interpretation report have been completely supported by Marathon's two phase drilling programme. Apparent deviations between drilling results and interpretation, with only minor exception, can be related directly to the spot comment form of presentation (Figure 1). This type of presentation provides order of megnitude guide data while clearly indicating structures and block dimensions. Inevitably, depth estimates will conflict unless all details of the 3D model conception are transferred. Since only parts of the area were originally modelled comprehensively (due to time constraints) this was not possible and some interpolations were required. Most "deficiencies" disappear when actual anomaly magnitudes (maxima/minima e.g. as at 110) are matched against the rock unit/contrast coupling tables, rather than eatimate interpolations from Figure 1.

Many of the interpreted faults have been confirmed by the drilling programmes with throw sense, and sometimes magnitude, deducible. Slight modifications of position are indicated for three structures, the most important relating to the main eastern graben fault which trends N-S across the area. This fault is probably about 250m west of the original predicted position in the far north of EL 6/79.

Evaluation of the area immediately south of Lune Sugarloaf remains uncertain. The interpreted graben structure is supported by the drill results. All data (geophysical, geological and drilling from southern and eastern parts of the Catamaran area indicate that the main dolerite sheet is generally placed near the Permo-Triassic boundary. Although the coal measures sequence is intruded by many minor bodies, which is potentially misleading, there is no conclusive data to show that the dolerite drilled at the base of holes 106, 117 etc. represents a large sheet; gravity data alone cannot resolve the structure. It is likely, however, that the graben section contains only one major sheet (300m) and it is possible but not probable that this intrusion has been encountered.

The interpretation remains a sound structural guide to the area. The density assumptions used have proven acceptable and the conversion of residual values to section thickness is adequate. The regional assumptions used to derive the residual anomalies also appear to be satisfactory. However, future depth estimates should be made from the residual anomaly map using the density-section transform discussed in the original report and should not rely on the interpretive notes (as on Figure 1). This comment must be tempered with a caution: unless estimates are 3D modelled some allowance must be made for end effects and lateral source interference.

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Leaman, D.E.: 1982. Review of Geophysical Interpretation, Geophysical Surveys, Catamaran Area. Confidential report for Marathon Petroleum Aust. Ltd.

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M.Aus.I.M.M., M.M.I.C.A.

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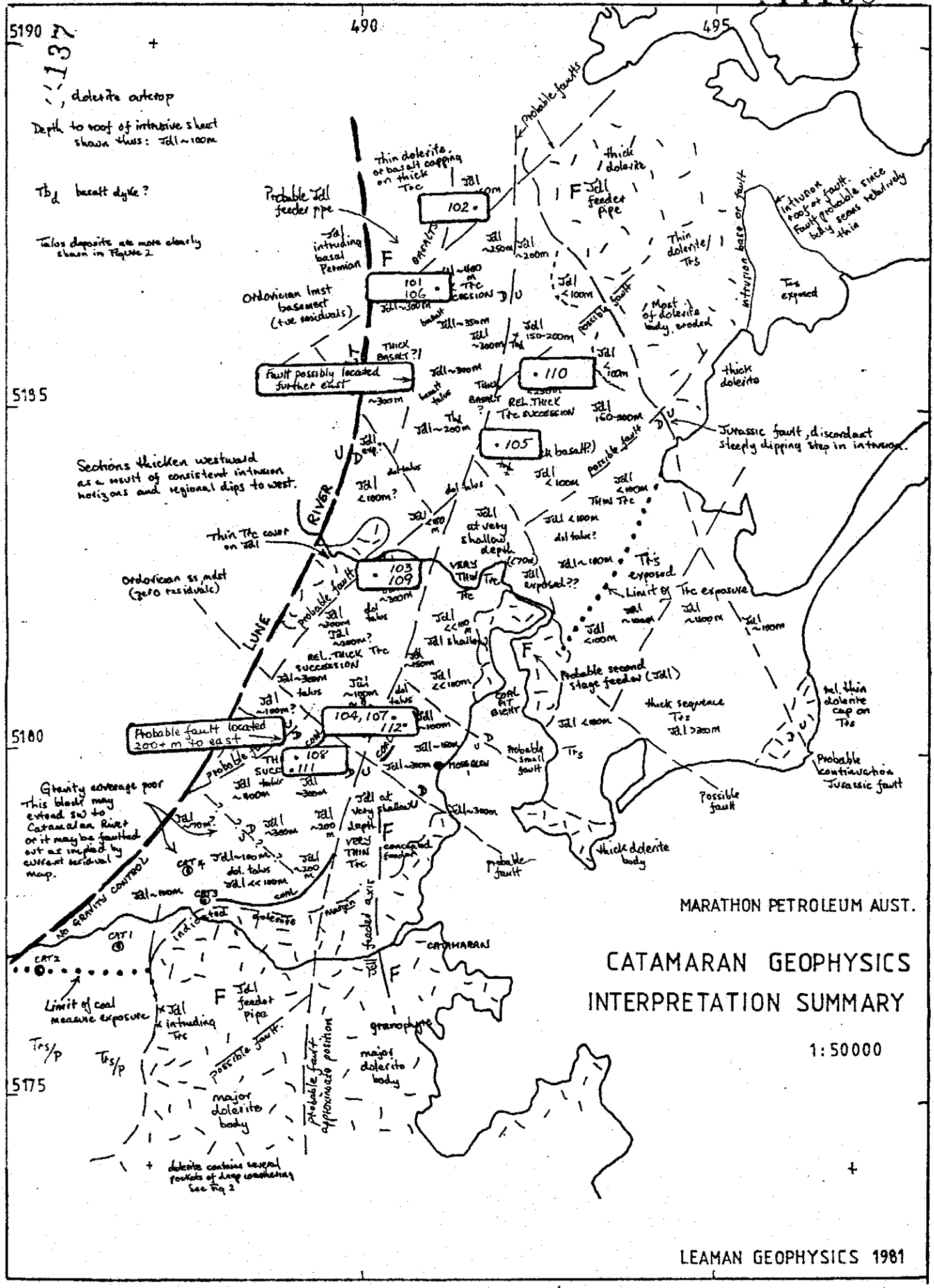

JULY 1982 REVISION SHOWING DRILL SITES 81/82

Fig 1

5 cm

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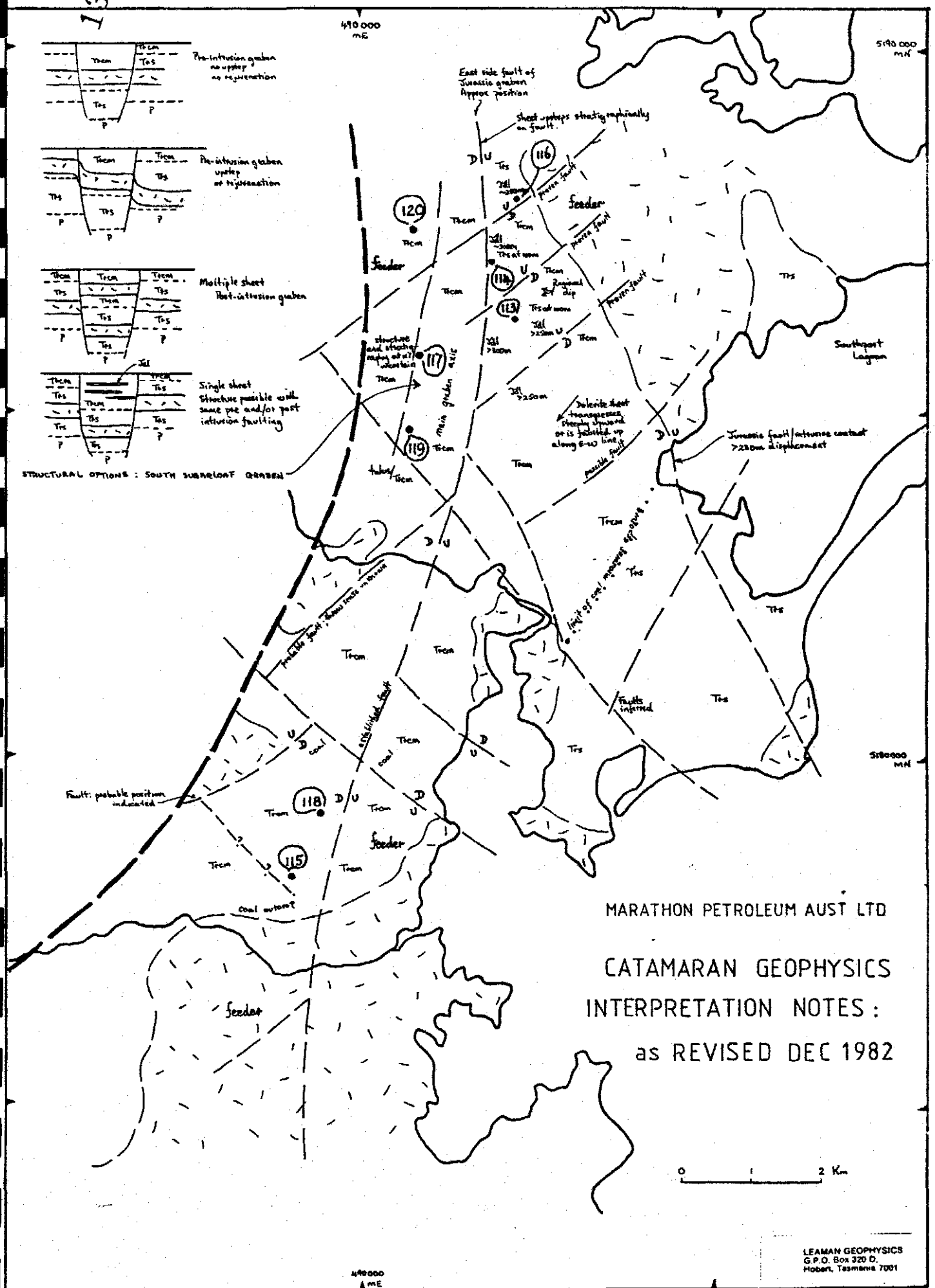

Figure 2

5 cm

APPENDIX III

Drill Hole Intersection Summary

APPENDIX III

DRILLHOLE INTERSECTION SUMMARY

Drillhole	Total Depth m (Status)	Intersection		Thickness	Comment
CA 101	42.00 (abandoned)	0.00 -	42.00		Tertiary Basalt
		0.00 -	170.00		Triassic Sediments
CA 102F	170.00 (completed)	14.85 -	15.47	0.62	Coal C Interval
		36.00 -	36.50	0.50	Coal D "
		38.50 -	51.27		Dolerite
		51.84 -	52.28	0.44	Coal E "
		59.24 -	59.59	0.35	Coal
		67.52 -	67.68	0.16	Coal F "
		67.96 -	68.27	0.31	Coal F "
		74.10 -	74.78	0.68	Coal F "
		75.87 -	76.00	0.09	Coal F "
		87.64 -	87.90	0.26	Coal G "
		92.81 -	93.01	0.20	Coal G "
CA 103	29.00 (abandoned)	0.00 -	29.00		Dolerite scree
CA 104	39.00 (abandoned)	0.00 -	39.00		Dolerite scree
CA 105F	79.00 (completed)	0.00 -	70.55		Triassic Sediments
		60.87 -	61.31	0.44	Coal D Interval
		61.53 -	61.77	0.24	Coal D "
		62.21 -	63.42	1.21	Coal D "
		70.55 -	79.00		Dolerite

DRILLHOLE INTERSECTION SUMMARY

Drillhole	Total Depth m (Status)	Intersection	Thickness	Comment
CA 106F	234.16 (completed)	0.00 - 72.00		Tertiary Basalt
		72.00 - 224.00		Triassic Sediments
		131.67 - 132.71	1.04	Coal A Interval
		133.82 - 135.03	1.21	Coal A "
		150.93 - 151.44	0.51	Coal B "
		181.34 - 182.02	0.68	Coal C "
		187.20 - 187.34	0.63	Coal C "
		188.72 - 189.25	0.53	Coal C "
		189.29 - 189.49	0.20	Coal C "
		189.62 - 190.61	0.99	Coal C "
		208.21 - 208.39	0.18	Coal D "
		209.08 - 210.52	1.44	Coal D "
		210.94 - 211.37	0.43	Coal D "
		211.61 - 212.41	0.80	Coal D "
		225.00 - 234.16		Dolerite
CA 107	57.46 (abandoned)	0.00 - 57.46		Dolerite scree
CA 108	39.43 (abandoned)	0.00 - 39.43		Dolerite scree
CA 109F	300.36 (completed)	0.00 - 295.36		Triassic Sediments
		183.92 - 184.35	0.43	Coal A Interval
		256.93 - 257.90	0.94	Coal C "
		284.86 - 287.10	2.24	Coal D "
		295.36 - 300.36		Dolerite

DRILLHOLE INTERSECTION SUMMARY

Drillhole	Total Depth m (Status)	Intersection	Thickness	Comment
CA 110	304.00 (completed)	0.00 - 304.00		Triassic Sediments
		27.71 - 30.28	2.57	Coal A Interval
		72.72 - 72.97	0.25	Coal C Interval
		74.19 - 74.74	0.55	Coal C "
		75.26 - 75.96	0.70	Coal C "
		89.78 - 90.69	0.91	Coal D "
		92.39 - 93.49	1.10	Coal D "
		100.00 - 117.99		Dolerite
		119.00 - 119.40	0.40	Coal E Interval
		143.90 - 145.00	1.10	Coal F "
		147.50 - 148.00	0.50	Coal F "
		169.90 - 170.40	0.50	Coal G "
CA 111F	171.50 (completed)	0.00 - 48.35		Dolerite scree
		48.35 - 156.00		Triassic Sediment
		65.19 - 65.35	0.16	Coal A Interval
		67.93 - 68.73	0.80	Coal A "
		74.03 - 74.33	0.30	Coal A "
		75.29 - 75.50	0.21	Coal A "
		79.52 - 80.62	1.10	Coal D "
		149.89 - 150.29	0.40	Coal D "
		150.67 - 150.82	0.15	Coal D "
		153.10 - 153.30	0.20	Coal D "
		153.75 - 156.04	2.29	Coal D "
		156.62 - 171.50		Dolerite

DRILLHOLE INTERSECTION SUMMARY

Drillhole	Total Depth m (Status)	Intersection	Thickness	Comment
CA 112	108.40 (completed)	0.00 - 37.00		Dolerite scree
		37.00 - 105.00		Triassic sediment
		105.00 - 108.90		Dolerite
CA 113	321.00 (completed)	0.00 - 231.00		Triassic sediments
		17.60 - 18.70		Coal C Interval
		19.20 - 19.80		Coal C "
		20.00 - 38.00		Dolerite
		46.50 - 47.10		Coal D Interval
		58.10 - 58.80		Coal E "
		79.80 - 80.80		Coal F "
CA 114	235.00 (completed)	0.00 - 235.00		Triassic sediments
		20.40 - 21.50		Coal C Interval
		22.00 - 22.60		Coal C "
		41.60 - 44.50		Coal D "
		52.60 - 53.2		Coal
		59.60 - 60.60		Coal E "
		73.90 - 74.80		Coal F "
		159.90 - 160.40		Coal
CA 115	198.00 (completed)	0.00 - 18.00		Dolerite scree
		18.00 - 38.00		Dolerite
		38.00 - 196.00		Triassic sediments
		70.77 - 74.80		Coal
		76.20 - 76.50		Coal
		77.20 - 79.00		Coal
		196.00 - 198.00		Dolerite

DRILLHOLE INTERSECTION SUMMARY

Drillhole	Total Depth m (Status)	Intersection	Thickness	Comment
CA 116	230.00 (completed)	0.00 - 230.00		Triassic
		60.00 - 60.60		Coal
		195.70 - 196.40		Coal
CA 117	195.00 (completed)	0.00 - 19.00		Basalt scree
		19.00 - 193.00		Triassic sediments
		51.20 - 98.60		Dolerite
		158.00 - 162.00		Dolerite
		193.00 - 195.00		Dolerite
CA 118	164.00 (completed)	0.00 - 50.00		Scree
		50.00 - 66.00		Dolerite
		66.00 - 164.00		Triassic sediments
		116.00 - 118.00		Coal Interval
		156.00 - 158.00		Coal Interval
CA 119	132.00 (completed)	0.00 - 132.00		Triassic sediments
		0.00 - 2.00		Coal Interval
		4.00 - 5.00		Coal Interval
		25.80 - 26.30		Coal
		26.80 - 27.20		Coal
		62.00 - 65.00		Coal Interval
		80.00 - 82.00		Coal Interval
		85.00 - 86.00		Coal Interval
		88.80 - 96.80		Dolerite
		113.40 - 115.60		Dolerite
		120.15 - 121.60		Dolerite

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DRILLHOLE INTERSECTION SUMMARY

Drillhole	Total Depth m (Status)	Intersection	Thickness	Comment
CA 120	115.0 (completed)	0.00 - 9.00		Basalt scree
		9.00 - 19.60		Basalt
		19.60 - 113.00		Triassic sediments
		56.88 - 57.81		Coal
		61.81 - 64.03		Coal
		76.80 - 94.00		Dolerite
		98.80 - 99.10		Coal
		104.80 - 105.30		Coal
		106.60 - 107.60		Coal
		113.00 - 115.00		Dolerite

APPENDIX 1.

444147

January 11, 1982

CATAMARAN EL 6/79 DRILLHOLE INTERSECTION SUMMARY

CA 101	T.D. 42.9m	0 - 3.0	grey clay
		- 42.0	basalt
CA 102	T.D. 170.0	0 - 3.0	grey clay
		- T.D.	Coal Measures (dolerite sheet 38.50 - 51.27)
CA 103	T.D. 29.0	0 - 5.0	clay
		- T.D.	dolerite talus
CA 104	T.D. 39.9	0 - 4.5	soil derived from dolerite
		- T.D.	dolerite talus
CA 105	T.D. 79.0	0 - 5.0	clay
		- 70.55	Coal Measures
		- T.D.	dolerite sheet
CA 106	T.D. 234.16	0 - 5.0	clay
		- 72.0	basalt
		- 224.0	Coal Measures
		- T.D.	dolerite sheet
CA 107	T.D. 57.46	0 - 1.0	clay
		- 27.0	sandstone talus
		- T.D.	dolerite talus
CA 108	T.D. 39.43	0 - 20.21	weathered sediments
		- T.D.	dolerite sheet
CA 109	T.D. 300.36	0 - 295.36	Coal Measures
		- T.D.	dolerite sheet
CA 110	T.D. 304.00	0 - 1.0	sandy soil
		- T.D.	Coal Measures (dolerite sheet 100.00 - 117.99)
CA 111	T.D. 171.50	0 - 2.0	clay
		- 35.27	sandstone talus
		- 48.35	dolerite talus
		- 156.62	Coal Measures
		- T.D.	dolerite sheet
CA 112	T.D. 108.40	0 - 7.0	clay
		- 37.0	dolerite sheet
		- 105.0	basal sandstone
		- T.D.	dolerite sheet
CA 113	T.D. 321.0	0 - 1.0	clay
		- 100.0	Coal Measures (dolerite sheet 30.0 - 38.0)
		- T.D.	basal sandstones

CA 114 T.D. 235.0m	0 - 100.0	Coal Measures
	- T.D.	basal sandstones
CA 115 T.D. 198.0	0 - 50.0	road fill
	- 20.0	dolerite talus
	- 38.0	dolerite sheet
	- T.D.	Coal Measures
CA 116 T.D. 230.0	0 - 3.0	clay
	- T.D.	basal sandstone
CA 117 T.D. 195.0	0 - 1.0	clay
	- 67.0	basalt talus
	- 101.0	basalt flow
	- 166.0	Coal Measures (dolerite sheets 120.0-144.0) 150.0-162.0)
	- T.D.	dolerite sheet
CA 118 T.D. 164.0	0 - 51.0	dolerite talus
	- 66.0	dolerite sheet
	- T.D.	Coal Measures
CA 119 T.D. 130.0	0 - 1.0	clay
	- 89.0	Coal Measures
	- 101.0	dolerite sheet
	- 113.0	Coal Measures
	- T.D.	dolerite sheet
CA 120 T.D. 115.0	0 - 1.0	sandy soil
	- 7.0	basalt talus
	- 19.0	basalt flow
	- 77.0	Coal Measures
	- 94.0	dolerite sheet
	- 113.0	Coal Measures
	- T.D.	dolerite sheet

APPENDIX IV

Petrological Reports

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Pontifex & Associates Pty. Ltd.

444150

TEL. 332 6744
A.H. 31 3816

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 3599

12th February, 1982

TO:	Mr. W. Barbour, Marathon Petroleum Pty. Ltd., P.O. Box 687, BRISBANE, QLD. 4001
YOUR REFERENCE:	Your letter dated 18/12/81
MATERIAL:	Drill core samples
IDENTIFICATION:	CA2 57.50; 67.20 CA2 75.10; 87.40
WORK REQUESTED:	Thin section and petrographic description
SAMPLES & SECTIONS:	Returned to you with this report

PONTIFEX & ASSOCIATES PTY. LTD.

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COMMENTS

Each sample is described petrographically. At the normal thickness of the thin sections (30 microns) coal is essentially opaque, thus allowing negligible information to be gained from normal petrographic observations. Thinner sections can be prepared with difficulty but the information thus gained is also limited, and did not appear to be warranted for this investigation.

Comments on the suitability of these samples for marker horizons (questioned in your covering letter) are as follows -

The three samples -

CA2 57.20 - coal layers within arkosic silty to fine sandy claystone
CA2 67.20 - massive coal (durain?)
CA2 87.40 - laminated carbonaceous claystone

objectively do not appear to have petrographic characteristics which would be specifically diagnostic enough, to render them as likely marker horizons. This assumption however would need to be confirmed by consideration of the petrology with the spatial representation of the samples within the sedimentary sequence of interest, also how different or similar these samples may be to this sequence as a whole.

Sample CA2 75.20 is an altered, thin bedded, airfall tuff, composed mainly of compact ash, largely glass shards, i.e. it is vitroclastic. It seems highly likely that this could be sufficiently distinctive to be used as a marker horizon.

This facies is petrologically similar to the Reid's Mistake Formation, Swansea Head, N.S.W., described in Journal Geol.Soc. Aust. Vol 25, Pt8, pp 473-481.

**

CA2 57.50 : disrupted irregular coal beds intercalated within an unsorted, lithic, coaly, arkosic fine-sandy claystone, with lenses and laminations of carbonaceous claystone

This core consists of light grey, incorporating irregular, bifurcating thin beds of coal to 10 mm thick. The sediment is dominated by a clay matrix crowded with angular sedimentary detritus of silt to rare medium sand size and composed of the following, listed in approximate decreasing order of abundance :-

.. carbonaceous (coaly) fragments, including cellular plant fragments
.. fragments of silty claystone
.. fragments of altered K-spar (highlighted stained yellow on the section offcut)
.. fragments of quartz and 'chert'
.. fragments of plagioclase
.. detrital micas, mainly biotite

Some cellular plant fragments are quite sinuous and continuous along the bedding. Minor irregular laminations and lenses of carbonaceous claystone ± coal fragments are intercalated within this grey sediment, also within the coal bands.

The coal bands are commonly disrupted, and the sediment locally intrudes the areas of dislocation with micro-bedding in these intrusions quite disconformable to the prevailing macro-bedding. These areas of disruption thus appear to have developed by soft sediment deformation.

Irregular, partly crenulated stringers of diagenetic carbonate, also of adularia and/or zeolite (?laumontite) cut the coal and the sediment. Accessory pyrite occurs along some dislocation structures.

The coal, seen in normal petrographic thin sections (of 30 microns thick) is totally opaque, thus they do not display any diagnostic characteristics.

CA2 67.20 : massive coal (?durain variety),
minor thin layers of ?vitrain;
minor stringers of carbonate ± adularia
and/or zeolite; sparse silt and clays

Macroscopically this piece of core consists of homogeneous massive coal, essentially dull, without lustre and with negligible stratification. It is apparently a durain variety of black coal. A single layer, 5 mm thick is somewhat more vitreous, with concoidal fracture, and may be considered as vitrain.

Microscopic examination of the normal petrographic thickness reveals an opaque mass, with rare fragments of plant debris (macerals) very poorly discernible.

Very sparse quartz silt, and thin tongues of carbonaceous clay can be seen along the bedding, but these have no specific diagnostic characteristics.

Several white stringers of extremely fine carbonate ± adularia and/or zeolite cut the rock, as in the coal in 57.50.

CA2 75.10 : thin bedded airfall tuff, composed mainly of compact ash, largely glass shards (i.e. vitroclastic); completely altered to clay/sericite; minor thin interbeds of detrital clays and carbonaceous mudstone laminations

This rock consists almost entirely of devitrification and other alteration products which completely replace a thin bedded, very compact vitroclastic mass of tuffaceous ash, predominantly of glass shards. These products include clay-sericite, possible palagonite, and ultrafine apparently secondary K-spar.

The primary texture of the compacted, but bedded, glass shards is well preserved within these alteration products; there is no evidence of fhlow however, thus indicating an airfall tuff not an ignimbrite. Rare very small (tuff) crystals of felspar and quartz are scattered.

Minor shredded and streaky foliae of carbonaceous (plant) material $\pm$ admixed clays are intercalated at irregular intervals. Thin beds of apparently detrital clays incorporating a lower concentration of tuffaceous ash and single shards are intercalated.

A weakly developed axial plane cleavage is oblique to the primary layering.

CA2 87.40 : laminated carbonaceous claystone, minor microfaults

This is essentially a laminated carbonaceous claystone (or mudstone). Individual laminations are differentiated on the basis of different concentrations and slightly different grain size of fine carbonaceous material variably 1% to 60%, within a matrix of detrital clays, extremely fine detrital sericite (unoriented) and rare silt.

The darker beds (obviously with most carbonaceous material) occur at irregular intervals within the sequence. Rare very small lenses of arkosic siltstone are locally intercalated.

The sequence is cut by hairline fractures which extend over 30 mm, and these cause dislocation of the beds of up to 2 mm.

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Pontifex & Associates Pty. Ltd. 444156

TEL. 332 6744
A.H. 31 3816

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 3752

8th July, 1982

TO: Mr. N. Perkins,
Project Geologist
Marathon Petroleum Australia Ltd.,
Dover Hotel,
DOVER, TASMANIA 7116

COPY TO: The Chief Geologist,
Marathon Petroleum Australia Ltd.,
G.P.O. Box 687
BRISBANE, QLD. 4001

YOUR REFERENCE: Order No. P00076
Your letter dated 22/6"82

MATERIAL: Rock samples (3)

IDENTIFICATION: CA109 : 255.65
292.5
296.0

WORK REQUESTED: Thin section preparation and identification of red & green minerals

SAMPLES & SECTIONS: Retuurned to you with this report

A.C. Purvis, PhD
PONTIFEX & ASSOCIATES PTY. LTD.

C A109 : 255.65 : volcanogenic sandstone with a sparse laumontite cement; scattered hematitised grains (red mineral); rare poikilitic calcite grains

Field note : identity of red mineral ?

This is a volcanic sandstone with rounded detrital grains 0.2 to 0.5 mm across, of quartz, plagioclase, alkali felspar, altered textureless to weakly amygdaloidal volcanic rock fragments, very minor grains of granophyre and rare altered mica flakes. The volcanic rock fragments contain secondary clays; some contain hematite (the red mineral referred to in the field note) and some contain granular epidote. There is a sparse cement of laumontite grains to 0.5 mm. Rare large poikilitic calcite grains to 10 mm diameter occur instead of laumontite as a cement in parts of the rock.

The thin section has been cut parallel to the bedding.

CA109 : 292.5 m : massive mudstone or claystone with a strong bedding foliation

This is a fine grained sediment composed of well oriented clouded clay (?illite) with disseminated cryptocrystalline ?leucoxene. There are small irregular lenses with the clay flakes at right angles to the main orientation direction.

There are also narrow crosscutting veins of clear unclouded clay, and fractures at a low angle to the bedding.

CA109 : 296.0 m : weakly brecciated pigeonite-bearing basalt with pervasive clay alteration and veins of stilbite

Field note : identification of green mineral ?

This rock is an altered basalt whose overall pale greenish-grey colour is due to pervasive clay alteration. It is weakly brecciated and cut by veins filled with stilbite and, locally, minor calcite.

The phenocrysts in the basalt are of clinopyroxene, with both pigeonite (uniaxial) and augite (definitely biaxial) present, mostly as anhedral to subhedral grains to 1 mm long, locally fragmented (there are rare euhedral prisms to 2 mm long).

The groundmass consists of felted plagioclase laths with granular pyroxene and interstitial clays; the felspars are altered to fine grained colourless clay and/or to stilbite. Limonite stains are common and there are rare vesicles with limonite rims and cores of calcite. The groundmass is commonly brecciated.

The rock is cut by stilbite veins to 3 mm wide, locally with minor calcite.

BRIEF PETROLOGICAL REPORT ON SAMPLES 1 - 7 FOR MARATHON PETROLEUM AUSTRALIA LIMITED (Order No. P00103).

SAMPLE 1. Basalt

Macroscopic: Hard, dark grey igneous rock with with a fine-grained crystalline groundmass and rare phenocrysts.

Microscopic: Porphyritic basalt containing rare phenocrysts up to 1.5mm long which in order of abundance are clinopyroxene, plagioclase (labradorite-bytownite), olivine, and occasionally quartz. The phenocrysts are set in an intergranular to intersertal textured groundmass of euhedral-subhedral plagioclase (labradorite) laths averaging 0.2mm long, anhedral (granular) to subdedral clinopyroxene and olivine and with irregular patches of turbid dark brown glass and yellow brown palagonite partly altered to chlorite.

SAMPLE 2. Dolerite

Macroscopic: Hard, dark grey - brown, fine-medium, even grained non-porphyritic crystalline igneous rock.

Microscopic: The texture is predominantly subophitic grading to hyaloophitic in places. The rock consists mainly of plagioclase and clinopyroxene in approximately equal proportions. Plagioclase (labradorite) crystals average 0.2mm in length and vary from a short prismatic habit to elongated laths up to 0.6mm long. Clinpyroxene is anhedral to subhedral and averages 0.25mm in crystal length but ranges up to 0.7mm. Lesser amounts of anhedral olivine are also present. Irregular patches of glass occur throughout the rock. These appear to have partly altered to a mixture of fine crystallites (possibly feldspar) and granular opaques.

SAMPLE 3. Basalt

Macroscopic: Hard, dark grey fine-grained crystalline igneous rock containing rare, small phenocrysts.

Microscopic: This basalt contains phenocrysts up to 1.5mm long.

They are mainly clinopyroxene (augite and pigeonite) and rarely plagioclase. They are set in an intersertal to intergranular groundmass composed of laths of plagioclase (andesine-labradorite) averaging 0.2mm long, granular to subhedral clinopyroxene (av. 0.15mm) and rare olivine. Turbid brown glass containing a fine dust of opaques is present throughout much of the groundmass and irregular patches of yellow-green palagonite are also visible. The palagonite shows some alteration to chlorite.

SAMPLE 4. Basalt

Macroscopic: Hard, dark grey, fine, even grained igneous rock apparently lacking phenocrysts.

Microscopic: The rock is even grained and lacks phenocrysts. It has an intergranular to intersertal texture consisting of laths of plagioclase (av. 0.25mm) and anhedral clinopyroxene and olivine (av. 0.10mm). Turbid brown glass containing fine-grained opaques is interstitial between the feldspars and ferromagnesians. Calcite is present as a common alteration product of ferromagnesian minerals.

SAMPLE 5. Dolerite

Macroscopic: Hard, dark grey fine-grained igneous rock which appears slightly altered in hand specimen.

Microscopic: The texture varies from ophitic to subophitic and hyaloophitic with the rock consisting mainly of plagioclase, clinopyroxene and olivine. The plagioclase (labradorite-bytownite) is euhedral to subhedral and average crystal length is 0.3mm. Crystals vary from a short, prismatic habit to elongate laths up to 1mm. Clinopyroxene and olivine are anhedral to subhedral and average 0.25mm but with a few larger crystals up to 2mm long. Patches of brown, iron-rich glass are widespread and these contain fine-grained opaques. Several patches of yellow-green palagonite were also noted, and a vein of chalcedony cuts the section.

SAMPLE 6. Quartzose sandstone

Macroscopic: Grey-buff coloured, friable, medium-coarse grained moderately sorted sandstone containing a white clay matrix.

Microscopic: The rock is a moderately sorted medium-coarse sandstone (av. grain size 0.5mm) consisting mainly of quartz (60-70%) with 5-10% altered potash feldspar (microcline, orthoclase) and 4-8% rock fragments (siltstone tuff and chert). Small amounts of altered mica are also present and some clay matrix is visible. The rock is relatively porous with approximately 10% visible porosity. Quartz grains have well-developed quartz overgrowth rims which have partly filled the primary pores. Feldspars are in various stages of alteration to clay and dissolution to form secondary pores. Provenance from an acid plutonic source with a lesser contribution from sedimentary/volcanic sources is indicated.

SAMPLE 7. Lithic sandstone

Macroscopic: Brown, weathered, friable, well sorted, medium grained lithic sandstone.

Microscopic: The rock is a medium grained (av. 0.30mm), well sorted sandstone, containing subangular to rounded grains. It is composed mainly of lithic fragments (60-70%) including acid-intermediate tuffs and flows, very fine sandstone, siltstone and chert. Some feldspar (8-12%) is also present (altered potash feldspar and oligoclase) and quartz makes up only a small proportion of the framework grains (5-8%). A small amount of mica, mostly biotite (2-3%) is also present. Clay matrix (10-15%) consists of chlorite and possibly smectite and the rock has little or no visible porosity. Volcanic and sedimentary sources have contributed most of the sediment.

DISCUSSION. Petrological criteria for separating dolerites and basalts are not clearcut and some difficulty was experienced with the samples in making this distinction. Sample 3, although

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identified as a basalt, did nevertheless have some similarities to samples 2 and 5. Likewise, Sample 4 although identified as a basalt, was lacking in phenocrysts and had a relatively coarse grained groundmass. In the two dolerite samples a considerable proportion of the feldspar was in the form of short prismatic crystals with a tendency towards an ophitic texture, whereas in the basalts the groundmass plagioclase is typically in the form of elongated laths.

K.R. MARTIN

13th December, 1982

APPENDIX V

Coal Analytical Report (ACIRL Reports)

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/5254
Date 13th October, 1982

Authorisation: Letter, N. Perkins, 11.10.82
Origin: MARATHON PETROLEUM AUSTRALIA LTD
Report to: Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,
11th Floor, AMP Place, 10 Eagle Street,
BRISBANE. Q. 4000

Copy to Mr. N. Perkins

Sample	Relative Density
Hole No. CA106 Plies 3 - 5 Raw Coal	1.70
Hole No. CA111 Plies 6 - 8 Raw Coal	1.64

Relative Density by ACIRL method

Date 13th October, 1982

THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
IPSWICH LABORATORY

444165

COAL ANALYSIS

Report No. 05/5064 (FINAL)

Date 1st October, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.
2113

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal
11th Floor, AMP Place, 10 Eagle Street,
BRISBANE. Q. 4000

Copy to Mr. N. Perkins

Sample Details	Hole No. CA106 Plies 3 - 5 Floats 1.80	Hole No. CA111 Plies 6 - 8 Floats 1.80		
As Received Basis Total Moisture %				
As Analysed Basis				
Moisture %				
Ash %				
Volatile Matter %				
Fixed Carbon %				
Sulphur %				
Chlorine %				
Phosphorus %	0.001	0.003		
Specific Energy MJ/kg. (Calorific Value)				
Crucible Swelling No.				
Gray King Coke Type				

Copies have been sent to

Determinations carried out in Duplicate
Analysed in accordance with AS 1038

Sampled by Received

THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

IPSWICH LABORATORY

444166

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FORM 7

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

COAL ASH AND MINERAL ANALYSIS REPORT

Report No. 05/5064

Date 1st October, 1982

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Sample Details		Hole No. CA106 Plies 3 - 5 Floats 1.80	Hole No. CA111 Plies 6 - 8 Floats 1.80		
Silicon as SiO_2	%	71.5	59.8		
Aluminium as Al_2O_3	%	22.0	26.2		
Iron as Fe_2O_3	%	3.84	8.16		
Calcium as CaO	%	1.40	2.88		
Magnesium as MgO	%	0.20	1.19		
Titanium as TiO_2	%	1.15	0.88		
Sodium as Na_2O	%	0.01	0.08		
Potassium as K_2O	%	0.10	0.74		
Phosphorus as P_2O_5	%	0.01	0.03		
Manganese as Mn_3O_4	%	0.09	0.38		
Sulphur as SO_3	%	0.27	0.20		

Copies have been sent to

Determination carried out in Duplicate ~~Analysed in accordance with~~ by XRF

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

444167

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PETROGRAPHIC ANALYSIS OF COAL

Report No. 05/5064

Date 1st October, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83
North Ryde, N.S.W.
2113

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Client MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

SAMPLE DETAILS: Hole No. CA106 Plies 3 - 5 Floats 1.80

MEAN MAXIMUM REFLECTANCE OF VITRINITE % 0.63

REFLECTANCE MEASUREMENTS AT 546 n m LIGHT WAVELENGTH

OIL REFRACTIVE INDEX: 1.518

NEW MACERAL CLASSIFICATION

MACERAL	VOLUME %	MACERAL	VOLUME %	MACERAL GROUP	VOLUME %
Vitrinite	21	Vitrinite	21	Vitrinite	21
Resinite	Trace	Resinite	Trace	Exinite	7
Sporinite	6	Sporinite	6		
Cutinite	1	Cutinite	1		
Fusinite	4	Fusinite	4	Inertinite	44
Semi fusinite	30	Semi fusinte	29		
		Macrinite	1		
		Sclerotinite	-		
		Micrinite	2		
Micrinite	10	Inertodetrinite	8		
Mineral Matter	28	Mineral Matter	28	Mineral Matter	28

In line with current practices of the International Committee for Coal Petrology, A.C.I.R.L. is now applying a new standard maceral classification for coal petrography.

For convenience, reports will be prepared using both the old and new nomenclatures for a period so that continuity can apply to past and future results.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
IPSWICH LABORATORY

444168

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PETROGRAPHIC ANALYSIS OF COAL

Report No. 05/5064

Date 1st October, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83
North Ryde, N.S.W.
2113

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Client MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor, Coal

SAMPLE DETAILS: Hole No. CA111 Plies 6 - 8 Floats 1.80

MEAN MAXIMUM REFLECTANCE OF VITRINITE % 0.87

REFLECTANCE MEASUREMENTS AT 546 n m LIGHT WAVELENGTH

OIL REFRACTIVE INDEX: 1.518

NEW MACERAL CLASSIFICATION

MACERAL	VOLUME %	MACERAL	VOLUME %	MACERAL GROUP	VOLUME %
Vitrinite	28	Vitrinite	28	Vitrinite	28
Resinite	Trace	Resinite	Trace	Exinite	2
Sporinite	1	Sporinite	1		
Cutinite	1	Cutinite	1		
Fusinite	5	Fusinite	5	Inertinite	38
Semi fusinite	21	Semi fusinte	20		
		Macrinite	1		
		Sclerotinite	Trace		
		Micrinite	2		
Micrinite	12	Inertodetrinite	10		
Mineral Matter	32	Mineral Matter	32	Mineral Matter	32

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/5064
Date 1st October, 1982

Authorisation Letters, J. McLean-Hodgson, N. Perkins
Origin MARATHON PETROLEUM AUSTRALIA, LTD
Report to Mr. J. McLean-Hodgson, Exploration Supervisor, Coal

TRACE ELEMENTS ANALYSIS OF COAL

	Hole No. CA 106 Plies 3 - 5 Floats 1.80	Hole No. CA 111 Plies 6 - 8 Floats 1.80
Mercury as Hg (ug/g)	0.02	0.02
Vanadium as V (ug/g)	19.2	34.6
Cadmium as Cd (ug/g)	0.12	0.08
Lead a Pb (ug/g)	16.1	13.8

Date 1st October, 1982

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
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COAL ANALYSIS

Report No. 05/5064 (FINAL)

Date 1st October, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.
2113

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal
11th Floor, AMP Place, 10 Eagle Street,
BRISBANE. Q. 4000

Copy to Mr. N. Perkins

Sample Details	Hole No. CA106 Plies 3 - 5 Floats 1.80	Hole No. CA111 Plies 6 - 8 Floats 1.80		
As Received Basis Total Moisture %				
As Analysed Basis				
Moisture %				
Ash %				
Volatile Matter %				
Fixed Carbon %				
Sulphur %				
Chlorine %				
Phosphorus %	0.001	0.003		
Specific Energy MJ/kg. (Calorific Value)				
Crucible Swelling No.				
Gray King Coke Type				

Copies have been sent to

Determinations carried out in Duplicate
Analysed in accordance with AS 1038

Sampled by Received

NATA
THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

IPSWICH LABORATORY

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FORM 7

COAL ASH AND MINERAL ANALYSIS REPORT

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Report No. 05/5064

Date 1st October, 1982

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Sample Details		Hole No. CA106 Plies 3 - 5 Floats 1.80	Hole No. CA111 Plies 6 - 8 Floats 1.80		
Silicon as SiO_2	%	71.5	59.8		
Aluminium as Al_2O_3	%	22.0	26.2		
Iron as Fe_2O_3	%	3.84	8.16		
Calcium as CaO	%	1.40	2.88		
Magnesium as MgO	%	0.20	1.19		
Titanium as TiO_2	%	1.15	0.88		
Sodium as Na_2O	%	0.01	0.08		
Potassium as K_2O	%	0.10	0.74		
Phosphorus as P_2O_5	%	0.01	0.03		
Manganese as Mn_3O_4	%	0.09	0.38		
Sulphur as SO_3	%	0.27	0.20		

Copies have been sent to

Determination carried out in Duplicate
~~Analysed in accordance with~~ by XRF

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

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PETROGRAPHIC ANALYSIS OF COAL

Report No. 05/5064

Date 1st October, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83
North Ryde, N.S.W.
2113

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Client MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

SAMPLE DETAILS: Hole No. CA106 Plies 3 - 5 Floats 1.80

MEAN MAXIMUM REFLECTANCE OF VITRINITE % 0.63

REFLECTANCE MEASUREMENTS AT 546 n m LIGHT WAVELENGTH

OIL REFRACTIVE INDEX: 1.518

NEW MACERAL CLASSIFICATION

MACERAL	VOLUME %	MACERAL	VOLUME %	MACERAL GROUP	VOLUME %
Vitrinite	21	Vitrinite	21	Vitrinite	21
Resinite	Trace	Resinite	Trace	Exinite	7
Sporinite	6	Sporinite	6		
Cutinite	1	Cutinite	1		
Fusinite	4	Fusinite	4	Inertinite	44
Semi fusinite	30	Semi fusinte	29		
		Macrinite	1		
		Sclerotinite	-		
Micrinite	10	Micrinite	2		
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Mineral Matter	28	Mineral Matter	28	Mineral Matter	28

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
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PETROGRAPHIC ANALYSIS OF COAL

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83
North Ryde, N.S.W.
2113

Report No. 05/5064

Date 1st October, 1982

Authorisation Letters, J. McLean-Hodgson, N. Perkins

Client MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor, Coal

SAMPLE DETAILS: Hole No. CA111 Plies 6 - 8 Floats 1.80

MEAN MAXIMUM REFLECTANCE OF VITRINITE % 0.87

REFLECTANCE MEASUREMENTS AT 546 n m LIGHT WAVELENGTH

OIL REFRACTIVE INDEX: 1.518

NEW MACERAL CLASSIFICATION

MACERAL	VOLUME %	MACERAL	VOLUME %	MACERAL GROUP	VOLUME %
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Fusinite	5	Fusinite	5	Inertinite	38
Semi fusinite	21	Semi fusinite	20		
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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
IPSWICH LABORATORY

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ANALYSIS AND TESTING REPORT

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Report No. 05/5064
1st October, 1982
Date

Authorisation Letters, J. McLean-Hodgson, N. Perkins
Origin MARATHON PETROLEUM AUSTRALIA, LTD
Report to Mr. J. McLean-Hodgson, Exploration Supervisor, Coal

TRACE ELEMENTS ANALYSIS OF COAL

	Hole No. CA 106 Plies 3 - 5 Floats 1.80	Hole No. CA 111 Plies 6 - 8 Floats 1.80
Mercury as Hg (ug/g)	0.02	0.02
Vanadium as V (ug/g)	19.2	34.6
Cadmium as Cd (ug/g)	0.12	0.08
Lead a Pb (ug/g)	16.1	13.8

Date 1st October, 1982

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
IPSWICH LABORATORY

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ANALYSIS AND TESTING REPORT

Report No. 05/4623

Date 25th May, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,
11th Floor, AMP Place, 10 Eagle Street,
BRISBANE. Q. 4000

Copy to Mr. R. Kempnich

SAMPLES

The following slim core intersections from Hole No. CA102 are analysed in this report.

Sample	Interval	Description	Mass (g)
1	0.62	Marginal	2323
2	0.44	Coal	2632
3	0.35	Coal	1783
4	0.77	Coal	2647
5	0.31	Coal	1875

METHOD OF TEST

The samples were analysed according to instructions received by letter, J. McLean-Hodgson, 23.4.82.

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4623

Date 25th May, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA102 Sample No. 1

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	3.2	6.8	29.1	0.54	21.090
1.60 - 1.80	31.7	6.9	42.6	0.30	15.350
S1.80	65.1	6.1	65.9	0.17	6.160

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	3.2	6.8	29.1	0.54	21.090
F1.60	34.9	6.9	41.4	0.32	15.880
Raw Coal	100.0	6.4	57.3	0.22	9.550

Relative Density of S1.80 = 2.10

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
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ANALYSIS AND TESTING REPORT

Report No. 05/4623

Date 25th May, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA102 Sample No. 2

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	4.8	5.7	26.1	0.46	22.680
1.60 - 1.80	5.6	7.0	43.3	0.38	15.340
S1.80	89.6	8.9	71.2	0.12	3.590

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	4.8	5.7	26.1	0.46	22.680
F1.80	10.4	6.4	35.4	0.20	18.730
Raw Coal	100.0	8.6	67.5	0.15	5.160

Relative Density of S1.80 = 2.13

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ANALYSIS AND TESTING REPORT

Report No. 05/4623

Date 25th May, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA102 Sample No. 3

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	3.4	4.2	13.8	0.61	27.780
1.40 - 1.60	11.9	5.6	24.2	0.57	22.860
1.60 - 1.80	16.0	5.3	38.0	0.41	15.970
S1.80	68.7	7.5	75.7	0.10	3.750

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	3.4	4.2	13.8	0.61	27.780
F1.60	15.3	5.3	21.9	0.58	23.950
F1.80	31.3	5.3	30.1	0.49	19.870
Raw Coal	100.0	6.8	61.4	0.22	8.800

Relative Density of S1.80 = 2.23

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
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ANALYSIS AND TESTING REPORT

Report No. 05/4623

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Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA102 Sample No. 4

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	3.4	4.0	15.8	0.61	27.700
1.40 - 1.60	16.5	3.4	26.7	0.49	23.950
1.60 - 1.80	43.7	5.0	44.5	0.27	16.880
S1.80	36.4	5.5	67.4	0.14	7.840

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	3.4	4.0	15.8	0.61	27.700
F1.60	19.9	3.5	24.8	0.51	24.590
F1.80	63.6	4.5	38.3	0.35	19.290
Raw Coal	100.0	4.9	48.9	0.27	15.120

Relative Density of S1.80 = 2.06

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ANALYSIS AND TESTING REPORT

Report No. 05/4623

Date 25th May, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA102 Sample No. 5

Relative Density Fractional

Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	3.4	4.4	19.3	0.62	26.520
1.60 - 1.80	5.3	8.0	45.6	0.29	15.260
S1.80	91.3	9.4	72.5	0.08	3.270

Relative Density Cumulative Floats

Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	3.4	4.4	19.3	0.62	26.520
F1.80	8.7	6.6	35.3	0.42	19.660
Raw Coal	100.0	9.2	69.3	0.11	4.700

Relative Density of S1.80 = 2.16

Date 25th May, 1982

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
IPSWICH LABORATORY

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ANALYSIS AND TESTING REPORT

Report No. 05/4624

Date 26th May, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,
11th Floor, AMP Place, 10 Eagle Street,
BRISBANE. Q. 4000

Copy to Mr. R. Kempnich

SAMPLES

The following slim core intersections from Hole No. CA105 are analysed in this report.

Sample	Interval	Description	Mass (g)
1	0.44	Coal	2144
2	0.22	Non-Coal	743
3	0.24	Coal	1006
4	0.44	Non-Coal	2146
5	0.73	Coal	2943
6	0.48	Coal	1770

METHOD OF TEST

The samples were analysed according to instructions received by letter, J. McLean-Hodgson, 23.4.82.

RECEIVED
27 MAY 1982
Ans'd.....

444182

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4624

Date 26th May, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA105 Sample No. 1

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	5.8	8.5	13.6	0.47	26.350
1.40 - 1.60	18.1	7.3	26.7	0.40	21.770
1.60 - 1.80	31.9	7.1	43.6	0.27	15.620
S1.80	44.2	7.0	63.9	0.24	7.650

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	5.8	8.5	13.6	0.47	26.350
F1.60	23.9	7.6	23.5	0.42	22.880
F1.80	55.8	7.3	35.0	0.33	18.730
Raw Coal	100.0	7.2	47.8	0.29	13.830

Relative Density of S1.80 = 2.05

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ANALYSIS AND TESTING REPORT

Report No. 05/4624

Date 26th May, 1982

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2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA105 Sample No. 3

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	13.0	6.5	27.1	0.41	22.150
1.60 - 1.80	22.5	7.0	44.7	0.25	15.230
S1.80	64.5	8.6	65.8	0.10	6.240

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	13.0	6.5	27.1	0.41	22.150
F1.80	35.5	6.8	38.3	0.31	17.760
Raw Coal	100.0	8.0	56.0	0.17	10.330

Relative Density of S1.80 = 2.07

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
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2113

ANALYSIS AND TESTING REPORT

Report No. 05/4624

Date 26th May, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA105 Sample No. 5

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	8.9	8.0	16.7	0.49	25.160
1.40 - 1.60	11.0	7.1	27.8	0.47	21.210
1.60 - 1.80	8.7	9.0	44.4	0.47	14.390
S1.80	71.4	7.0	74.5	0.11	3.790

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	8.9	8.0	16.7	0.49	25.160
F1.60	19.9	7.5	22.8	0.48	22.980
F1.80	28.6	8.0	29.4	0.48	20.360
Raw Coal	100.0	7.3	61.6	0.21	8.530

Relative Density of S1.80 = 2.24

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4624

Date 26th May, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA105 Sample No. 6

Relative Density Fraction	Mass %	Fractional Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	17.2	7.2	13.9	0.55	26.190
1.40 - 1.60	51.8	9.0	25.8	0.45	21.190
1.60 - 1.80	13.1	8.6	42.8	0.36	14.840
S1.80	17.9	7.9	66.7	0.27	6.420

Relative Density Fraction	Mass %	Cumulative Floats Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.40	17.2	7.2	13.9	0.55	26.190
F1.60	69.0	8.6	22.8	0.47	22.440
F1.80	82.1	8.6	26.0	0.46	21.220
Raw Coal	100.0	8.4	33.3	0.42	18.570

Relative Density of S1.80 = 2.07

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ANALYSIS AND TESTING REPORT

Report No. 05/4624

Date 26th May, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA105 Stone Plies

Sample	Air-dried Moisture %	Ash %	Relative Density
2	8.7	75.6	2.23
4	14.0	78.9	2.22

Date 26th May, 1982

THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

IPSWICH LABORATORY

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ANALYSIS AND TESTING REPORT

Report No. 05/4683

Date 17th June, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,
G.P.O. Box 687,
BRISBANE Q. 4001

Copy to: Mr R. Kempnich

SAMPLES

The following slim core intersections from Hole No. CA109 are analysed in this report.

Ply No.	Interval (m)	Description	Mass (g)
1	0.96	Coal	4250
2	0.70	Coal	3640
3	0.25	Coal	877

METHOD OF TEST

The samples were analysed according to instructions received by letters, J. McLean-Hodgson, 23.4.82 and 21.5.82.

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4683

Date 17th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA109 Ply 1

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	45.6	4.8	23.3	0.38	24.570
1.60 - 1.80	28.5	5.1	37.4	0.29	19.030
1.80 - 2.00	8.0	5.7	52.6	0.17	12.940
S2.00	17.9	6.2	77.3	0.06	2.150

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	45.6	4.8	23.3	0.38	24.570
F1.80	74.1	4.9	28.7	0.35	22.440
F2.00	82.1	5.0	31.0	0.33	21.510
Raw Coal	100.0	5.2	39.3	0.28	18.050

Relative Density of S2.00 = 2.33

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ANALYSIS AND TESTING REPORT

Report No. 05/4683

Date 17th June, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson.

Hole No. CA109 Ply 2

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.3	6.6	14.2	1.34	26.240
1.60 - 1.80	5.9	7.9	27.6	0.90	20.510
1.80 - 2.00	5.9	8.1	41.6	0.29	15.090
S2.00	85.9	5.4	86.2	0.03	1.360

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.3	6.6	14.2	1.34	26.240
F1.80	8.2	7.5	23.8	1.02	22.120
F2.00	14.1	7.8	31.3	0.72	19.180
Raw Coal	100.0	5.7	78.5	0.13	3.870

Relative Density of S2.00 = 2.51

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ANALYSIS AND TESTING REPORT

Report No. 05/4683

Date 17th June, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA109 Ply 3

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.4	5.7	11.9	0.28	27.610
1.60 - 1.80	7.5	7.3	25.3	0.86	21.280
1.80 - 1.90	16.7	9.1	40.2	0.59	15.420
S2.00	73.4	8.8	66.4	0.05	5.560

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.4	5.7	11.9	0.28	27.610
F1.80	9.9	6.9	22.1	0.72	22.820
F2.00	26.6	8.3	33.4	0.64	18.170
Raw Coal	100.0	8.7	57.6	0.21	8.920

Relative Density of S2.00 = 2.25

Date 17th June, 1982

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

IPSWICH LABORATORY

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal
AMP Place, 10 Eagle Street,
BRISBANE. Q. 4000

Copy to Mr. R. Kempnich

SAMPLES

The following chip samples from Hole No. CA110 are analysed in this report.

Ply No.	Interval (m)	Description	Mass (g)
1	2	Coal	340
2	1	Coal	1595
3	1	Coal	2137
4	1	Coal	1735
5	1	Coal	917
6	1	Coal	960
7	1	Coal	481
8	1	Coal	370
9	1	Coal	1330
10	1	Coal	1128
11	1	Coal	398
12	1	Coal	363

METHOD OF TEST

The chip samples received were analysed according to instructions received by letters, J. McLean-Hodgson, 23.4.82, 13.5.82 and 21.5.82.

RECEIVED

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 1

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	48.8	6.9	17.2	0.31	25.130
1.60 - 1.80	19.1	4.5	38.6	0.17	17.430
1.80 - 2.00	5.2	3.9	54.0	*	11.420
52.00	26.9	3.7	78.9	0.51	2.100

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	48.8	6.9	17.2	0.31	25.130
F1.80	67.9	6.2	23.2	0.27	22.960
F2.00	73.1	6.1	25.4	-	22.140
Raw Coal	100.0	5.4	39.8	-	16.750

Relative Density of 52.00 = 2.37

* Insufficient sample

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
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ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal

Hole No. CA110 Ply 2

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	16.9	6.7	21.0	0.55	23.930
1.60 - 1.80	44.1	5.3	40.1	0.28	17.210
1.80 - 2.00	16.5	4.8	53.5	0.27	12.320
S2.00	22.5	2.7	79.2	4.50	2.800

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	16.9	6.7	21.0	0.55	23.930
F1.80	61.0	5.7	34.8	0.36	19.070
F2.00	77.5	5.5	38.8	0.34	17.630
Raw Coal	100.0	4.9	47.9	1.27	14.300

Relative Density of S2.00 = 2.50

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
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ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal

Hole No. CA110 Ply 3

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	57.5	9.4	17.1	0.48	24.430
1.60 - 1.80	10.7	6.9	38.8	0.41	17.270
1.80 - 2.00	2.5	4.1	54.8	0.55	11.060
S2.00	29.3	4.4	84.4	0.93	0.620

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	57.5	9.4	17.1	0.48	24.430
F1.80	68.2	9.0	20.5	0.47	23.310
F2.00	70.7	8.8	21.7	0.47	22.870
Raw Coal	100.0	7.5	40.1	0.61	16.350

Relative Density of S2.00 = 2.50

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
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ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor Coal,

Hole No. CA110 Ply 4

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	40.0	8.1	18.0	0.45	24.470
1.60 - 1.80	14.8	7.2	37.5	0.32	17.530
1.80 - 2.00	4.7	5.4	53.3	0.42	12.060
S2.00	40.5	4.4	84.3	0.51	0.810

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	40.0	8.1	18.0	0.45	24.470
F1.80	54.8	7.9	23.3	0.42	22.600
F2.00	59.5	7.7	25.6	0.42	21.760
Raw Coal	100.0	6.3	49.4	0.45	13.280

Relative Density of S2.00 = 2.52

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 5

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	11.6	7.4	18.8	0.48	24.850
1.60 - 1.80	8.0	6.6	44.5	0.29	16.010
1.80 - 2.00	15.9	8.1	60.1	0.17	9.080
S2.00	64.5	7.9	83.0	0.16	1.360

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	11.6	7.4	18.8	0.48	24.850
F1.80	19.6	7.1	29.3	0.40	21.240
F2.00	35.5	7.5	43.1	0.30	15.800
Raw Coal	100.0	7.8	68.8	0.21	6.480

Relative Density of S2.00 = 2.29

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 6

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.5	6.1	23.1	0.35	23.160
1.60 - 1.80	4.0	5.0	43.3	0.34	16.060
1.80 - 2.00	14.8	8.6	64.3	0.19	7.160
S2.00	78.7	8.3	80.4	0.15	1.970

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.5	6.1	23.1	0.35	23.160
F1.80	6.5	5.4	35.5	0.34	18.790
F2.00	21.3	7.6	55.5	0.24	10.710
Raw Coal	100.0	8.2	75.1	0.17	3.830

Relative Density of S2.00 = 2.25

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
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2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal

Hole No. CA110 Ply 7

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	8.3	6.0	25.1	0.29	22.650
1.60 - 1.80	18.5	5.8	39.9	0.24	17.130
1.80 - 2.00	20.2	6.1	58.1	0.14	9.670
S2.00	53.0	6.8	78.8	0.22	2.340

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	8.3	6.0	25.1	0.29	22.650
F1.80	26.8	5.9	35.3	0.26	18.840
F2.00	47.0	6.0	45.1	0.21	14.900
Raw Coal	100.0	6.4	63.0	0.21	8.240

Relative Density of S2.00 = 2.25

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply B

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	8.6	7.1	23.5	0.32	23.270
1.60 - 1.80	12.2	5.7	41.3	0.18	16.560
1.80 - 2.00	14.6	6.9	57.2	0.13	8.070
S2.00	64.6	6.9	81.1	0.25	0.570

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	8.6	7.1	23.5	0.32	23.270
F1.80	20.8	6.3	33.9	0.24	19.330
F2.00	35.4	6.5	43.5	0.19	14.690
Raw Coal	100.0	6.8	67.8	0.23	5.570

Relative Density of S2.00 = 2.30

444200

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 10th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 9

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	1.1	7.2	24.2	*	22.090
1.60 - 1.80	5.5	6.6	42.7	0.23	15.880
1.80 - 2.00	16.2	6.2	55.6	0.15	10.320
S2.00	77.2	5.5	80.9	0.04	1.400

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	1.1	7.2	24.2	-	22.090
F1.80	6.6	6.7	39.6	-	16.920
F2.00	22.8	6.3	51.0	-	12.230
Raw Coal	100.0	5.7	74.1	-	3.870

Relative Density of S2.00 = 2.33

* Insufficient sample for analysis

444201

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 10th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 10

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	15.9	8.0	23.7	0.38	22.870
1.60 - 1.80	12.0	6.8	39.9	0.31	16.800
1.80 - 2.00	22.6	6.7	56.4	0.23	10.070
S2.00	49.5	6.2	81.5	0.15	1.330

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	15.9	8.0	23.7	0.38	22.870
F1.80	27.9	7.5	30.7	0.35	20.260
F2.00	50.5	7.1	42.2	0.30	15.700
Raw Coal	100.0	6.7	61.6	0.22	8.590

Relative Density of S2.00 = 2.33

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 10th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 11

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.80	2.0	5.3	34.8	*	*
1.80 - 2.00	5.3	5.4	59.1	*	8.610
S2.00	92.7	5.2	79.9	0.10	1.600

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %
F1.80	2.0	5.3	34.8
F2.00	7.3	5.4	52.4
Raw Coal	100.0	5.2	77.9

Relative Density of S2.00 = 2.34

* Insufficient sample for analysis

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4626

Date 9th June, 1982

Authorisation Letter, J. McLean-Hodgson, 13.5.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr. J. McLean-Hodgson, Exploration Supervisor - Coal,

Hole No. CA110 Ply 12

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	25.9	6.8	16.4	0.62	25.550
1.60 - 1.80	8.8	4.8	44.1	0.34	15.640
1.80 - 2.00	18.2	5.7	56.5	0.22	9.860
S2.00	47.1	5.1	76.6	0.20	3.000

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	25.9	6.8	16.4	0.62	25.550
F1.80	34.7	6.3	23.4	0.55	23.040
F2.00	52.9	6.1	34.8	0.44	18.500
Raw Coal	100.0	5.6	54.5	0.33	11.200

Relative Density of S2.00 = 2.28

Date 9th June, 1982

THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
IPSWICH LABORATORY

444204

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ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,
G.P.O. Box 687,
BRISBANE Q. 4001

Copy to: Mr R. Kempnich

SAMPLES

The following slim core intersections from Hole No. CA111 are analysed in this report.

Ply No.	Interval (m)	Description	Mass (g)
1	0.24	Coal	406
2	0.06	Non-Coal	161
3	0.15	Coal	353
4	1.30	Coal	3,080
5	1.09	Coal	2,960
6	0.50	Coal	2,880
7	0.22	Non-Coal	1,049
8	1.06	Coal	4,770

METHOD OF TEST

The samples were analysed according to instructions received by letters, J. McLean-Hodgson, 23.4.82 and 21.5.82.

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA 111 Ply 1

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	85.6	2.4	7.3	0.50	32.450
1.60 - 2.00	5.9	8.1	54.5	0.20	11.740
S2.00	8.5	11.6	74.5	0.12	3.150

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	85.6	2.4	7.3	0.50	32.450
F2.00	91.5	2.8	10.3	0.48	21.120
Raw Coal	100.0	3.5	15.8	0.45	28.740

Relative Density of S2.00 = 2.15

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA 111 Ply 3

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	57.7	3.6	19.3	0.45	26.640
1.60 - 1.80	22.2	5.2	36.8	0.22	17.460
1.80 - 2.00	5.4	7.6	56.1	0.21	*
S2.00	14.7	9.2	68.4	0.06	3.830

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	57.7	3.6	19.3	0.45	26.640
F1.80	79.9	4.0	24.2	0.39	24.090
F2.00	85.3	4.3	26.2	0.38	-
Raw Coal	100.0	5.0	32.4	0.33	-

Relative Density of S2.00 = 2.15

* Insufficient sample for analysis

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA 111 Ply 4

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	1.9	5.2	21.1	0.39	25.500
1.60 - 1.80	16.6	7.2	35.0	0.14	18.950
1.80 - 2.00	31.8	10.4	56.0	0.06	9.060
S2.00	49.7	11.6	73.8	0.05	2.900

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	1.9	5.2	21.1	0.39	25.500
F1.80	18.5	7.0	33.6	0.17	19.620
F2.00	50.3	9.1	47.8	0.10	12.940
Raw Coal	100.0	10.4	60.7	0.08	7.950

Relative Density of S2.00 = 2.21

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA 111 Ply 5

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.5	9.1	23.3	0.19	22.890
1.60 - 1.80	8.8	7.7	30.3	0.15	20.670
1.80 - 2.00	22.3	8.8	49.1	0.09	12.220
S2.00	66.4	10.5	72.9	0.03	4.550

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	2.5	9.1	23.3	0.19	22.890
F1.80	11.3	8.0	28.8	0.16	21.160
F2.00	33.6	8.5	42.3	0.11	15.230
Raw Coal	100.0	9.8	62.6	0.06	8.140

Relative Density of S2.00 = 2.24

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA 111 Ply 6

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	34.2	4.5	19.1	0.57	27.030
1.60 - 1.80	22.2	7.3	45.3	0.37	15.860
1.80 - 2.00	16.6	8.8	60.4	0.36	8.700
S2.00	27.0	10.1	77.5	0.37	2.590

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	34.2	4.5	19.1	0.57	27.030
F1.80	56.4	5.6	29.4	0.49	22.630
F2.00	73.0	6.3	36.5	0.46	19.470
Raw Coal	100.0	7.3	47.5	0.44	14.910

Relative Density of S2.00 = 2.21

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA 111 Ply 8

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	66.8	5.4	16.9	0.44	27.630
1.60 - 1.80	12.9	8.1	44.3	0.21	15.850
1.80 - 2.00	5.6	10.1	59.7	0.15	8.530
S2.00	14.7	11.1	76.6	0.07	1.640

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	66.8	5.4	16.9	0.44	27.630
F1.80	79.7	5.8	21.3	0.40	25.720
F2.00	85.3	6.1	23.9	0.39	24.600
Raw Coal	100.0	6.8	31.6	0.34	21.220

Relative Density of S2.00 = 2.16

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4684

Date 24th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA, LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA111 Stone Plies

Ply No.	Air-dried Moisture %	Ash %	Relative Density
2	6.1	72.8	2.15
7	8.4	46.4	1.72

Date 24th June, 1982

THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

IPSWICH LABORATORY

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4625

Date 7th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA PTY LTD

Report to Mr J. McLean-Hodgson,
11th Floor, AMP Place, 10 Eagle Street,
BRISBANE Q. 4000

Copy to: Mr R. Kempnich

SAMPLES

The following slim core intersections from Hole No. CA106 are analysed in this report.

Ply No.	Interval (m)	Description	Mass (g)
1	1.06	Coal	4690
2	0.11	Non-Coal	829
3	0.68	Coal	3380
4	0.53	Marginal	3090
5	1.05	Coal	3410

METHOD OF TEST

The samples were analysed according to instructions received by letters, J. McLean-Hodgson, 23.4.82 and 21.5.82.

444213

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4625

Date 7th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA PTY LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA106 Ply 1

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	13.7	7.1	27.4	0.23	21.960
1.60 - 1.80	30.5	5.3	41.1	0.17	17.160
1.80 - 2.00	18.0	4.8	54.0	0.13	12.340
S2.00	37.8	6.4	78.0	0.14	1.430

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	13.7	7.1	27.4	0.23	21.960
F1.80	44.2	5.9	36.9	0.19	18.650
F2.00	62.2	5.6	41.8	0.17	16.820
Raw Coal	100.0	5.9	55.5	0.16	11.000

Relative Density of S2.00 = 2.30

444214

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4625

Date 7th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA PTY LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA106 Ply 3

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	35.4	6.6	25.0	0.23	22.630
1.60 - 1.80	35.7	5.3	40.3	0.19	17.130
1.80 - 2.00	17.7	4.9	55.9	0.18	10.830
S2.00	11.2	4.4	72.1	0.61	4.570

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	35.4	6.6	25.0	0.23	22.630
F1.80	71.1	5.9	32.7	0.21	19.870
F2.00	88.8	5.7	37.3	0.20	18.070
Raw Coal	100.0	5.6	41.2	0.25	16.560

Relative Density of S2.00 = 2.23

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AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4625

Date 7th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA PTY LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA106 Ply 4

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	31.9	7.7	22.9	0.22	23.290
1.60 - 1.80	10.3	5.3	43.5	0.17	15.830
1.80 - 2.00	9.0	6.6	56.9	0.13	9.900
S2.00	48.8	5.4	75.1	0.03	0.950

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	31.9	7.7	22.9	0.22	23.290
F1.80	42.2	7.1	27.9	0.21	21.470
F2.00	51.2	7.0	33.0	0.19	19.440
Raw Coal	100.0	6.2	53.6	0.11	10.410

Relative Density of S2.00 = 2.38

444216

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

ANALYSIS AND TESTING REPORT

Report No. 05/4625

Date 7th June, 1982

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA PTY LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA106 Ply 5

Fractional

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	87.3	7.6	17.4	0.24	24.920
1.60 - 1.80	5.7	6.1	36.9	0.22	18.180
1.80 - 2.00	1.4	6.4	54.2	0.71	10.310
S2.00	5.6	4.1	71.9	7.80	3.930

Cumulative Floats

Relative Density Fraction	Mass %	Air-dried Moisture %	Ash %	Total Sulphur %	Specific Energy MJ/kg
F1.60	87.3	7.6	17.4	0.24	24.920
F1.80	93.0	7.5	18.6	0.24	24.510
F2.00	94.4	7.5	19.1	0.25	24.300
Raw Coal	100.0	7.3	22.1	0.67	23.160

Relative Density of S2.00 = 2.48

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ANALYSIS AND TESTING REPORT

Report No. 05/4625

Date 7th June, 1982

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.
P.O. Box 83,
North Ryde, N.S.W.,
2113

Authorisation Letter, J. McLean-Hodgson, 23.4.82

Origin MARATHON PETROLEUM AUSTRALIA PTY LTD

Report to Mr J. McLean-Hodgson,

Hole No. CA106 Stone Ply

Ply No.	Air-dried Moisture %	Ash %	Relative Density
2	4.4	77.9	2.40

Date 7th June, 1982

THIS LABORATORY IS REGISTERED BY THE NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA. THE TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH ITS TERMS OF REGISTRATION.

AUSTRALIAN COAL INDUSTRY RESEARCH LABORATORIES LTD.

IPSWICH LABORATORY

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Dir. of M. | A.O. | C.G. | E.O. | D.
Registrar
Received 13 APR 1984
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R & IL
DEPT. OF MINES
REF. No. 3749/84

GEOLOGICAL EVALUATION
OF
EL 6/79
CATAMARAN

VOLUME 2 (PART 2)
APPENDICES VI - VIII

AUTHORS: N.T. PERKINS
D.L.J. DUNN

DATE: MARCH, 1984

OPEN FILE

REPORT NO. 1983/03

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VOLUME 2 (PART 2)

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APPENDIX VIII	Landsat Interpretation of the Mt. Lloyd - Catamaran Area, Southern Tasmania using Thematic Classification Techniques by M.J. Longman and Associates, January, 1983.

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APPENDIX VI

Lithological and Hole Report (MPAL computer output)

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LITHOLOGICAL LOG REPORT
for hole CA 0101

Eastings: 491170.00 Hole Size: 120mm

Northings: 5186710.00

Elevation: 99.00m

Total Depth: 42.18m

Probe Depth: 36.81m

Logged By: Brain T.J.

Rig Type:

Drilling Commenced: 14/11/81

Drilling Completed: 17/11/81

Data Source: Marathon Pet. Aust/ Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor: BPB Instruments

Logs Available: Resistivity
Caliper
Gamma -Natural
Density -Long Spaced

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EPORT : MCSS COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

Hole Number : CA0101

Lithology Description Report

From	To	Lithology Description
0.00 -	3.00	CLAY, grey, very sticky.
3.00 -	5.50	BASALT, brown, moderately weathered.
5.50 -	15.00	BASALT, dark bluish-grey, fine grained, slightly weathered.
		Base of WEATHERING
15.00 -	42.18	BASALT, light greenish-grey, fine grained, some siliceous nodules, unweathered. Abandoned in basalt due to drilling problems.

****
Total Depth = 42.18
****

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444224

LITHOLOGICAL LOG REPORT
for hole CA 0102R

Easting: 491589.00 Hole Size: 120mm

Northing: 5187908.00 Core Size: 64mm

Elevation: 73.00m

Total Depth: 170.00m

Probe Depth: 168.41m

Logged By: Brain T.J.

Rig Type:

Drilling Commenced: 17/11/81

Drilling Completed: 01/12/81

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor: BPB Instruments

Logs Available: Resistivity
Caliper
Gamma -Natural
Density -Long Spaced

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444225

ole Number : CA01029

Lithology Description Report

From	To	Lithology Description
LADES		
0.00 -	3.00	CLAY, grey, very sticky.
3.00 -	5.00	SANDSTONE, light to medium grey, argillaceous matrix some carbonaceous fragments sticky.
5.00 -	7.00	MUDSTONE, dark grey, carbonaceous mudstone near top of unit, very sticky.
7.00 -	8.00	CLAYSTONE, light brownish-grey, sticky.
8.00 -	10.00	CLAYSTONE, light grey, very sticky.
10.00 -	14.85	MUDSTONE, dark grey, some thin coal bands throughout interval slightly carbonaceous.
14.85 -	14.90	COAL.
DIAMOND CORING		
14.90 -	14.94	CLAYSTONE, light to medium brown, coal laminae near top of unit coal wisps throughout interval, weak rock, solid core, thinnly bedded, abrupt basal contact of bedding 5 deg. to horizontal.
14.94 -	14.95	COAL, <10% BRIGHT, broken core, very thinnly bedded, abrupt basal contact of bedding 5 deg. to horizontal.
14.95 -	14.96	CLAYSTONE, light to medium brown, arenaceous weak rock, solid core, thinnly bedded, abrupt basal contact of bedding 5 deg. to horizontal.
14.96 -	15.16	COAL, <10% BRIGHT, solid core, transitional basal contact of bedding 0 deg. to horizontal.
15.16 -	15.17	COAL, HEAVY (INFERIOR COAL), black, weak rock, solid core, transitional basal contact of bedding 0 deg. to horizontal.
15.17 -	15.42	COAL, <10% BRIGHT, rare claystone rods near base of unit solid core, abrupt basal contact of bedding 0 deg. to horizontal.
15.42 -	15.45	CARBONACEOUS MUDSTONE, very weak rock, very broken core.
15.45 -	15.47	COAL, HEAVY (INFERIOR COAL), broken core.
15.47 -	15.58	CARBONACEOUS MUDSTONE, dark grey, very weak rock, broken

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444226

ole Number : CA0102R

Lithology Description Report

From	To	Lithology Description

IAMOND CORING

core.

15.58 - 16.02 NO SAMPLE RETURN.

16.02 - 16.41 MUDSTONE, medium to dark grey, very weak rock, broken core, laminated, transitional basal contact of beddins 0 des. to horizontal.

16.41 - 17.14 SANDSTONE, light to medium grey, very fine grained, rare calcareous traces, weak rock, broken core, laminated, transitional basal contact of beddins 10 des. to horizontal.

17.14 - 17.38 SANDSTONE, light to medium grey, fine grained, some thin slightly carbonaceous laminae throughout interval weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.

17.38 - 17.39 SANDSTONE, dark brownish-black, very fine grained, carbonaceous very weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.

17.39 - 17.41 SANDSTONE, light to medium grey, fine grained, weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.

17.41 - 17.43 SANDSTONE, dark brownish-black, very fine grained, carbonaceous very weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.

17.43 - 17.45 SANDSTONE, light to medium grey, fine grained, weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.

17.45 - 17.46 SANDSTONE, dark brownish-black, very fine grained, carbonaceous very weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.

17.46 - 17.63 SANDSTONE, light to medium grey, fine grained, carbonaceous laminae near top of unit, weak rock, solid core, laminated, transitional basal contact of bedding 10 des. to horizontal.

17.63 - 17.90 SANDSTONE, light grey, fine grained, weak rock, solid core, occasional calcite on joint surfaces, occasional calcite bedding surfaces.

LADES

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444227

ole Number : CA0102R

Lithology Description Report

From	To	Lithology Description
LADES		
17.90 -	21.00	NO SAMPLE RETURN.
21.00 -	26.00	SANDSTONE, light grey, fine to medium grained, some carbonaceous frasments some thin coal bands near middle of unit friable, common quartz frasments. Common clear yellow crystalline grain towards top of unit.
26.00 -	27.00	SANDSTONE, light to medium grey, fine to medium grained, friable.
27.00 -	29.00	SANDSTONE, light grey, fine to medium grained, some carbonaceous frasments thin coal bands throughout interval friable.
29.00 -	31.00	SANDSTONE, light grey, fine to medium grained, some carbonaceous frasments arsillaceous matrix mudstone bands near base of unit friable.
31.00 -	32.00	SANDSTONE, light grey, arsillaceous matrix friable.
32.00 -	33.40	MUDSTONE, medium to dark grey, hard rare pyritic mudstone granular.
33.40 -	33.57	COAL.
IAMOND CORING		
33.57 -	35.00	NO SAMPLE RETURN.
LADES		
35.00 -	36.00	MUDSTONE, medium to dark grey, carbonaceous in part.
36.00 -	36.50	COAL, HEAVY (INFERIOR COAL).
36.50 -	37.00	MUDSTONE, medium to dark grey.
37.00 -	38.50	CLAYSTONE, light greenish-grey, arenaceous in part.
38.50 -	40.00	DOLERITE, light grey, fine grained, hard.
40.00 -	42.00	DOLERITE, dark bluish-grey, fine grained.
42.00 -	44.40	DOLERITE, light to medium greenish-grey, fine grained.
IAMOND CORING		

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Lithology Description Report

From	To	Lithology Description

IAMOND CORING

44.40 - 44.45 DOLERITE, light brownish-grey, very fine grained, very strong rock, solid core.

44.45 - 45.27 DOLERITE, light brownish-grey, fine grained, siliceous bands near top of unit, very strong rock, solid core, occasional pyrite disseminated. Grain size setting slightly coarser with depth.

45.27 - 48.17 DOLERITE, light brownish-grey, very strong rock, solid core. Some siliceous veins.

48.17 - 51.07 DOLERITE, light greenish-grey, fine grained, very strong rock, broken core, joints, common zeolite on joint surfaces, occasional pyrite on joint surfaces.

51.07 - 51.27 DOLERITE, light to medium grey, very fine grained, very strong rock, broken core, deformed basal contact.

51.27 - 51.58 SANDSTONE, grey, fine grained, quartz lithic moderately strong rock, broken core, transitional basal contact of beddins 5 des. to horizontal.

51.58 - 51.64 SANDSTONE, light to medium grey, fine grained, quartz lithic numerous carbonaceous laminae moderately strong rock, broken core, transitional basal contact of bedding 5 des. to horizontal.

51.64 - 51.84 SANDSTONE, grey, fine grained, quartz lithic moderately strong rock, solid core, abrupt basal contact of beddins 5 deg. to horizontal. Quartz veins.

51.84 - 51.86 COAL, <10% BRIGHT, very weak rock, broken core, transitional basal contact of bedding 5 deg. to horizontal, occasional pyrite on cleats.

51.86 - 52.21 COAL, HEAVY (INFERIOR COAL), very weak rock, solid core, transitional basal contact of beddins 5 des. to horizontal.

52.21 - 52.25 CLAYSTONE, numerous carbonaceous wisps, very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.

52.25 - 52.28 COAL, HEAVY (INFERIOR COAL), erosional basal contact.

52.28 - 52.31 CLAYSTONE, medium to dark grey, carbonaceous near base of

Hole Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		unit very stiff, solid core, transitional basal contact.
52.31 -	52.53	CLAYSTONE, light to medium brown, very stiff, very broken core.
52.53 -	54.07	MUDSTONE, light grey, very weak rock, very broken core.
54.07 -	54.11	MUDSTONE, light grey, very weak rock, very broken core, transitional basal contact.
54.11 -	54.49	MUDSTONE, grey, arenaceous fragments very stiff, broken core, transitional basal contact faults. Brecciated.
54.49 -	55.38	SANDSTONE, grey, fine grained, mudstone phases near top of unit pyritic phases near base of unit, very weak rock, solid core, transitional basal contact of bedding 10 des. to horizontal, occasional pyrite beddins surfaces, fining upwards to:
55.38 -	56.03	SANDSTONE, light grey, fine grained, calcareous cement very weak rock, transitional basal contact of beddins 10 des. to horizontal.
56.03 -	56.18	SANDSTONE, light to medium grey, fine grained, numerous mudstone phases, veryweak rock, solid core.
56.18 -	56.29	SANDSTONE, light grey, fine grained, very weak rock, solid core, transitional basal contact common calcite lenses, common calcite infilled vesicles.
56.29 -	56.40	SANDSTONE, grey, fine to medium grained, very weak rock, solid core.
56.40 -	57.24	NO SAMPLE RETURN.
57.24 -	57.39	SANDSTONE, grey, fine to medium grained, very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.
57.39 -	57.40	MUDSTONE, dark brown, very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.
57.40 -	57.43	SANDSTONE, grey, fine to medium grained, thin mudstone lenses near base of unit very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.
57.43 -	57.46	MUDSTONE, dark brown, very weak rock, solid core, erosional

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		basal contact occasional pyrite beddings surfaces.
57.46 -	57.49	SANDSTONE, grey, fine to medium grained, thin calcareous bands near top of unit very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal.
57.49 -	57.75	SANDSTONE, grey, fine to medium grained, very weak rock, solid core, occasional pyrite infilled vesicles, common calcite infilled vesicles. Brecciated zone within.
57.75 -	58.16	SANDSTONE, grey, fine to medium grained, rare mudstone phases rare siliceous bands, very weak rock, solid core, occasional calcite infilled vesicles.
58.16 -	59.24	SANDSTONE, grey, fine to medium grained, carbonaceous bands near base of unit, very weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.
59.24 -	59.30	COAL, HEAVY (INFERIOR COAL), transitional basal contact.
59.30 -	59.37	CARBONACEOUS MUDSTONE, dark brownish-black, very stiff, broken core, transitional basal contact.
59.37 -	59.45	COAL, 10 - 40% BRIGHT, broken core.
59.45 -	59.49	COAL, <10% BRIGHT, solid core.
59.49 -	59.59	COAL, HEAVY (INFERIOR COAL), erosional basal contact.
59.59 -	59.75	SILTSTONE, light to medium grey, very weak rock, solid core, transitional basal contact.
59.75 -	60.07	SANDSTONE, grey, fine grained, very weak rock, solid core.
60.07 -	60.81	SANDSTONE, light grey, fine grained, thin coal lenses near top of unit fining upwards very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal.
60.81 -	62.42	SANDSTONE, grey, fine to medium grained, some carbonaceous fragments rare pyritic phases, very weak rock, broken core.
62.42 -	63.07	NO SAMPLE RETURN.
63.07 -	64.57	SANDSTONE, grey, fine grained, thin carbonaceous laminae near top of unit very weak rock, broken core.
64.57 -	65.15	SANDSTONE, grey, fine to medium grained, some calcareous

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444231

Hole Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		lenses quartzose ()90% quartz) very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal.
65.15 -	65.99	SANDSTONE, grey, fine to medium grained, rare thin carbonaceous laminae throughout interval pyritic bands near top of unit quartzose ()90% quartz), very weak rock, solid core.
65.99 -	66.35	NO SAMPLE RETURN.
66.35 -	67.38	SANDSTONE, grey, fine to medium grained, quartzose ()90% quartz) weak rock, solid core, abrupt basal contact of bedding 10 des. to horizontal, occasional mica disseminated. With wisps and lenses and flame stru of a hard dark brown sediment, very fine grained,possibly a shale.
67.38 -	67.52	CLAYSTONE, light greyish-cream, arenaceous in part very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal, occasional mica bedding surfaces.
67.52 -	67.59	COAL, <10% BRIGHT, solid core, abrupt basal contact of bedding 10 des. to horizontal.
67.59 -	67.68	COAL, HEAVY (INFERIOR COAL), solid core. Bright coal lenses towards top of unit.
67.68 -	67.78	NO SAMPLE RETURN.
67.78 -	67.96	MUDSTONE, light brownish-grey, carbonaceous bands near base of unit, very stiff, broken core, transitional basal contact of bedding 10 des. to horizontal. Brecciated.
67.96 -	68.06	COAL, <10% BRIGHT, solid core, abrupt basal contact of bedding 60 des. to horizontal.
68.06 -	68.14	CLAYSTONE, light greyish-cream, very stiff, solid core.
68.14 -	68.27	COAL, <10% BRIGHT, carbonaceous shaly bands, broken core.
68.27 -	68.28	CLAYSTONE, light greyish-cream, very stiff, solid core.
68.28 -	69.01	MUDSTONE, light to medium grey, arenaceous phases very weak rock, solid core. Brecciated.
69.01 -	69.23	NO SAMPLE RETURN.

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444232

EPORT : MC55 COAL SYSTEM Page : 9
Date : WED, 21 MAR 1984

ole Number : CA0102R

Lithology Description Report

From	To	Lithology Description

IAMOND CORING

69.23 - 71.20 MUDSTONE, light to medium grey, arenaceous phases near top of unit, very weak rock, solid core. Slightly brecciated,very thinly bedd ed towards base of unit.

71.20 - 71.97 SANDSTONE, light grey, very fine grained, very weak rock, solid core, very thinnly bedded.

71.97 - 72.07 NO SAMPLE RETURN.

72.07 - 73.07 MUDSTONE, light to medium grey, silty in part very weak rock, solid core, transitional basal contact of bedding 5 des. to horizontal. Brecciated in part.

73.07 - 74.03 SILTSTONE, light to medium grey, thin mudstone bands thin arenaceous bands near base of unit very weak rock, broken core, abrupt basal contact of bedding 0 des. to horizontal.

74.03 - 74.10 SANDSTONE, light grey, very fine grained, very weak rock, solid core, abrupt basal contact of bedding 0 des. to horizontal.

74.10 - 74.37 COAL, <10% BRIGHT, broken core.

74.37 - 74.42 NO SAMPLE RETURN.

74.42 - 74.54 COAL, <10% BRIGHT, broken core.

74.54 - 74.55 CLAYSTONE, light brownish-cream, very stiff, solid core.

74.55 - 74.78 COAL, <10% BRIGHT, broken core.

74.78 - 74.94 CLAYSTONE, light greyish-cream, carbonaceous wisps very stiff, solid core.

74.94 - 75.07 NO SAMPLE RETURN.

75.07 - 75.24 TUFF, light creamy-grey, very weak rock, abrupt basal contact of bedding 2 des. to horizontal. Glass shards altered to sericite,clay.

75.24 - 75.43 SANDSTONE, medium to dark grey, fine grained, thin mudstone laminae near top of unit very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal.

75.43 - 75.52 COAL, <10% BRIGHT, broken core, abrupt basal contact of

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444233

Hole Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		beddins 5 des. to horizontal.
75.52 -	75.87	CLAYSTONE, light brownish-grey, carbonaceous wisps and lenses very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.
75.87 -	75.95	COAL, <10% BRIGHT, very broken core.
75.95 -	76.00	COAL, HEAVY (INFERIOR COAL), arenaceous mudstone near top of unit, solid core, abrupt basal contact of beddins 5 des. to horizontal.
76.00 -	76.20	MUDSTONE, dark grey, very weak rock, broken core, transitional basal contact.
76.20 -	77.10	NO SAMPLE RETURN.
77.10 -	77.93	SILTSTONE, light to medium grey, slightly carbonaceous and arenaceous laminae throughout interval very weak rock, solid core, laminated, abrupt basal contact.
77.93 -	77.98	MUDSTONE, dark grey, very stiff, solid core, abrupt basal contact of beddins 0 des. to horizontal.
77.98 -	78.07	SILTSTONE, light to medium grey, slightly carbonaceous and arenaceous laminae throughout interval very weak rock, solid core, with cross lamination laminated.
78.07 -	79.64	SILTSTONE, slightly carbonaceous and arenaceous laminae throughout interval very weak rock, solid core, laminated.
79.64 -	80.47	NO SAMPLE RETURN.
80.47 -	80.95	SILTSTONE, dark grey, slightly carbonaceous some arenaceous laminae near middle of unit very weak rock, solid core, laminated.
80.95 -	81.07	NO SAMPLE RETURN.
81.07 -	82.04	SILTSTONE, dark greyish-black, carbonaceous arenaceous bands near base of unit thin coal bands near base of unit very weak rock, solid core.
82.04 -	82.10	NO SAMPLE RETURN.
82.10 -	82.41	SANDSTONE, light to medium grey, very fine grained,

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444234

ple Number : CA0102R

Lithology Description Report

From	To	LithologyDescription
IAMOND CORING		
		carbonaceous and arenaceous bands throughout interval very weak rock, solid core, laminated, abrupt basal contact of bedding 5 des. to horizontal.
82.41 -	84.07	SANDSTONE, light grey, fine grained, some carbonaceous wisps some calcareous bands and lenses very weak rock, solid core.
84.07 -	87.06	SANDSTONE, light grey, fine grained, some carbonaceous laminae throughout interval near top of unit and near base of unit calcareous bands near base of unit very weak rock, solid core.
87.06 -	87.07	NO SAMPLE RETURN.
87.07 -	87.28	SANDSTONE, light grey, fine grained, very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal.
87.28 -	87.51	CARBONACEOUS MUDSTONE, dark blackish-grey, very weak rock, solid core, laminated, transitional basal contact of bedding 2 des. to horizontal.
87.51 -	87.64	CARBONACEOUS MUDSTONE, dark blackish-grey, very weak rock, solid core, abrupt basal contact of bedding 5 des. to horizontal.
87.64 -	87.67	COAL, HEAVY (INFERIOR COAL), solid core, abrupt basal contact of bedding 0 des. to horizontal.
87.67 -	87.71	COAL, <10% BRIGHT, broken core, abrupt basal contact of bedding 5 des. to horizontal.
87.71 -	87.74	CLAYSTONE, light greyish-brown, very stiff, solid core, abrupt basal contact of bedding 5 des. to horizontal.
87.74 -	87.82	COAL, <10% BRIGHT, broken core, abrupt basal contact of bedding 0 des. to horizontal.
87.82 -	87.85	CLAYSTONE, light creamy-grey, very stiff, solid core, abrupt basal contact of bedding 0 des. to horizontal.
87.85 -	87.90	COAL, 10 - 40% BRIGHT, broken core, abrupt basal contact of bedding 5 des. to horizontal.
87.90 -	89.76	SILTSTONE, light to medium grey, some arenaceous bands slightly carbonaceous near top of unit carbonaceous

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444235

EPORT : MCS5 COAL SYSTEM Page : 12
Date : WED, 21 MAR 1984

ole Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		laminae near base of unit very weak rock, solid core, very thinnly bedded.
89.76 -	90.07	NO SAMPLE RETURN.
90.07 -	90.40	SILTSTONE, light to medium grey, arenaceous near base of unit very weak rock, solid core, transitional basal contact.
90.40 -	92.81	MUDSTONE, medium to dark grey, slightly carbonaceous hard carbonaceous bands near middle of unit and near base of unit very weak rock, solid core, transitional basal contact.
92.81 -	92.94	COAL, <10% BRIGHT, solid core, abrupt basal contact of bedding 5 des. to horizontal.
92.94 -	92.95	COAL, 10 - 40% BRIGHT, very broken core, abrupt basal contact of bedding 5 des. to horizontal.
92.95 -	92.96	COAL, HEAVY (INFERIOR COAL), solid core, abrupt basal contact of bedding 5 des. to horizontal.
92.96 -	92.98	COAL, 10 - 40% BRIGHT, broken core, abrupt basal contact of bedding 5 des. to horizontal.
92.98 -	93.01	COAL, HEAVY (INFERIOR COAL), solid core.
93.01 -	93.04	NO SAMPLE RETURN.
93.04 -	95.40	SILTSTONE, medium to dark grey, slightly carbonaceous near base of unit very weak rock, solid core, very thinnly bedded, transitional basal contact.
95.40 -	96.00	SANDSTONE, grey, fine grained, silty bands throughout nterval, very weak rock, solid core.
96.00 -	96.02	NO SAMPLE RETURN.
96.02 -	96.12	SANDSTONE, grey, fine grained, very weak rock, solid core, abrupt basal contact of bedding 3 des. to horizontal.
96.12 -	98.19	MUDSTONE, medium to dark grey, thin carbonaceous bands carbonaceous wisps near top of unit silty bands near middle of unit calcareous phases silty, very weak rock, solid core, erosional basal contact of bedding 3 des. to horizontal.

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444236

ole Number : CA0102R

Lithology Description Report

From	To	Lithology Description

IAMOND CORING

98.19 - 98.37 SILTSTONE, light to medium grey, carbonaceous laminae near base of unit, very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.

98.37 - 98.75 SANDSTONE, light grey, fine grained, slightly carbonaceous bands near middle of unit fining upwards very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.

98.75 - 98.86 SILTSTONE, light to medium grey, slightly carbonaceous near base of unit very weak rock, solid core, laminated, transitional basal contact of beddins 5 des. to horizontal.

98.86 - 98.90 SANDSTONE, light grey, fine grained, very weak rock, solid core, transitional basal contact fining upwards to:

98.90 - 99.04 SILTSTONE, light to medium grey, laminae near top of unit slightly carbonaceous near base of unit very weak rock, solid core.

99.04 - 99.14 SILTSTONE, medium to dark grey, slightly carbonaceous throughout interval very weak rock, solid core, with cross lamination laminated, transitional basal contact of beddins 5 des. to horizontal.

99.14 - 101.50 SANDSTONE, light grey, fine grained, bands with carbonaceous wisps near top of unit fining upwards, very weak rock, solid core, abrupt basal contact of beddins 3 des. to horizontal.

101.50 - 101.69 SANDSTONE, grey, very fine grained, very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.

101.69 - 102.03 SANDSTONE, light grey, fine grained, very weak rock, solid core. Finer sand towards middle of unit.

102.03 - 105.07 SANDSTONE, light grey, fine grained, very weak rock, solid core.

105.07 - 107.65 SANDSTONE, light grey, fine grained, carbonaceous laminae near top of unit carbonaceous wisps near top of unit and near middle of unit very weak rock, solid core, transitional basal contact of beddins 5 des. to horizontal.

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ple Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
107.65	107.93	SANDSTONE, light grey, fine to medium grained, very weak rock, solid core, transitional basal contact of bedding 5 deg. to horizontal.
107.93	108.07	SANDSTONE, light grey, fine grained, very weak rock, solid core.
108.07	111.04	SANDSTONE, light grey, fine grained, very weak rock, solid core. Fining upwards from middle of unit.
111.04	111.07	NO SAMPLE RETURN.
111.07	113.37	SANDSTONE, light grey, fine grained, very weak rock, solid core. Thin silty bands at 111.77m and 112. 57m.
113.37	113.51	SANDSTONE, light grey, fine grained, argillaceous matrix near top of unit very weak rock, solid core, transitional basal contact of bedding 0 deg. to horizontal.
113.51	113.55	CARBONACEOUS SHALE, black, very stiff, solid core, transitional basal contact of bedding 5 deg. to horizontal.
113.55	113.61	COAL, HEAVY (INFERIOR COAL), solid core, abrupt basal contact of bedding 10 deg. to horizontal.
113.61	114.05	SANDSTONE, light grey, fine grained, carbonaceous wisps near top of unit carbonaceous phases near base of unit, very weak rock, solid core. Band 3cm thick of mudstone fragments ,subrounded, in an arenaceous matrix at 113.70m.
114.05	115.42	SANDSTONE, light grey, fine grained, coal lenses near base of unit, very weak rock, solid core, transitional basal contact of bedding 0 deg. to horizontal.
115.42	116.06	SANDSTONE, light grey, fine grained, near top of unit coal lenses near top of unit numerous thin coal lenses throughout interval mudstone phases near top of unit and near base of unit very weak rock, solid core, transitional basal contact.
116.06	116.55	SANDSTONE, light grey, fine grained, very weak rock, solid core, transitional basal contact.
116.55	117.07	SANDSTONE, light grey, fine to medium grained, thin coal

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444238

ple Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		lenses throughout interval carbonaceous mudstone near base of unit fining upwards very weak rock, solid core.
117.07	117.18	SANDSTONE, light grey, fine to medium grained, very weak rock, solid core, abrupt basal contact of beddins 3 des. to horizontal.
117.18	119.54	SANDSTONE, light grey, fine grained, carbonaceous wisps near top of unit numerous carbonaceous and coal lenses and wisps near base of unit very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.
119.54	119.62	SANDSTONE, light to medium grey, very fine grained, very weak rock, solid core, transitional basal contact of beddins 5 des. to horizontal.
119.62	120.06	SANDSTONE, light grey, fine grained, thick coal lenses near top of unit numerous carbonaceous wisps throughout interval very weak rock, solid core, fining upwards to:
120.06	120.07	NO SAMPLE RETURN.
120.07	121.40	SANDSTONE, light grey, fine grained, mudstone phases near top of unit carbonaceous bands near base of unit, very weak rock, solid core, erosional basal contact of beddins 10 des. to horizontal.
121.40	121.46	SILTSTONE, dark greyish-black, carbonaceous very weak rock, broken core, abrupt basal contact of beddins 10 des. to horizontal.
121.46	121.61	SANDSTONE, light grey, fine grained, very weak rock, solid core, transitional basal contact of beddins 5 des. to horizontal.
121.61	121.99	SILTSTONE, light to medium grey, carbonaceous wisps throughout interval, very weak rock, solid core, transitional basal contact of bedding 0 des. to horizontal.
121.99	123.07	SANDSTONE, light grey, fine grained, very weak rock, solid core, fining upwards to:
123.07	124.16	SANDSTONE, light grey, fine grained, some carbonaceous wisps throughout interval very weak rock, solid core, abrupt basal contact of beddins 5 des. to horizontal.
124.16	126.05	DOLERITE, light greyish-green, very fine grained,

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444239

ple Number : CA0102R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		moderately weak rock, solid core.
126.05	126.11	DOLERITE, light greyish-green, very fine grained, moderately weak rock, solid core, deformed basal contact of bedding 15 deg. to horizontal.
126.11	126.47	SANDSTONE, light grey, fine grained, hard weak rock, solid core, transitional basal contact of bedding 5 deg. to horizontal.
126.47	126.49	SILTSTONE, dark greyish-black, carbonaceous very weak rock, broken core, abrupt basal contact of bedding 5 deg. to horizontal.
126.49	129.07	SANDSTONE, light grey, fine grained, hard weak rock, solid core.
129.07	129.08	NO SAMPLE RETURN.
129.08	132.06	SANDSTONE, light grey, fine grained, weak rock, solid core, occasional mica bedding surfaces.
132.06	135.03	SANDSTONE, light to medium grey, fine grained, carbonaceous wisps and fragments near middle of unit very weak rock, solid core.
135.03	138.07	SANDSTONE, light to medium grey, fine grained, very weak rock, solid core, rare calcite infilled vesicles.
138.07	141.04	SANDSTONE, light grey, fine grained, very weak rock, solid core.
141.04	144.07	SANDSTONE, light grey, fine grained, very weak rock, solid core, rare calcite infilled vesicles.
144.07	150.07	SANDSTONE, light grey, fine grained, very weak rock, solid core, occasional calcite infilled vesicles.
ROLLER BIT		
150.07	161.50	SANDSTONE, light cream, fine grained, quartz feldspathic slightly carbonaceous well sorted. Almost no sample return.
161.50	170.00	SANDSTONE, light cream, fine grained, quartz feldspathic slightly carbonaceous well sorted. Almost no sample return hole abandoned due to poor sample and slow

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444240

ole Number : CA0102R

Lithology Description Report

From	To	Lithology Description

OLLER BIT

drilling rate.

****
Total Depth = 170.00
****

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444241

LITHOLOGICAL LOG REPORT
For hole CA 0103

Easting: 490379.00 Hole Size: 120mm

Northing: 5182539.00

Elevation: 28.00m

Total Depth: 28.50m

Logged By: Bacon R.J.

Rig Type:

Drilling Commenced: 04/12/81

Drilling Completed: 09/12/81

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor:

Logs Available:

241

444242

Hole Number : CA0103

Lithology Description Report

From	To	Lithology Description
0.00 -	5.00	SOIL, creamy-brown, arsillaceous moderately weathered.
5.00 -	28.50	SANDSTONE, brownish-grey, fine to medium grained, arsillaceous matrix some claystone clasts limonitic weak rock, intermixed with: DOLERITE SCREE, greenish-grey, very strong rock. Hole abandoned in scree due to water flow and caving.

****
Total Depth = 28.50
****

242

444243

LITHOLOGICAL LOG REPORT
for hole CA 0104

Easting: 490601.00 Hole Size: 120mm

Northing: 5180431.00

Elevation: 63.00m

Total Depth: 39.00m

Logged By: Bacon R.J.

Rig Type:

Drilling Commenced: 09/12/81

Drilling Completed: 11/12/81

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor:

Logs Available:

243

444244

EPORT : MC55 COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

ole Number : CA0104

Lithology Description Report

From	To	Lithology Description

AMMER

0.00 - 4.50 SOIL, reddish-brown, fine to medium grained, arsillaceous matrix moderately weathered. Weathered lithic sandstone.

4.50 - 6.50 DOLERITE SCREE, very strong rock.

6.50 - 8.00 SANDSTONE, reddish-brown, fine to medium grained, arsillaceous matrix moderately sorted weak rock.

8.00 - 12.80 CLAY, creamy-red, soft.

12.80 - 39.00 DOLERITE SCREE, very strong rock, intermixed with:
SANDSTONE, grey, medium to coarse grained, arsillaceous matrix lithic (predominately rock fragments) weak rock, intermixed with:
CLAY, creamy-grey, soft. Dolerite scree in sandstone and clay matrix hole abandoned in dolerite scree, due to drilling problems.

****
Total Depth = 39.00
****

244

444245

LITHOLOGICAL LOG REPORT
for hole CA 0105R

Eastings: 491907.00

Northing: 5184545.00

Elevation: 47.00m

Total Depth: 78.86m

Hole Size: 120mm

Core Size: 64mm

Logged By: Bacon R.J.

Rig Type:

Drilling Commenced: 11/12/81

Drilling Completed: 14/12/81

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor:

Logs Available:

245

444246

ple Number : CA0105R

Lithology Description Report

From	To	Lithology Description
0.00 -	5.00	SOIL, fine to medium grained, arsillaceous matrix.
5.00 -	6.00	SANDSTONE, light to medium grey, fine to medium grained, quartz lithic angular well sorted.
6.00 -	9.00	SANDSTONE, medium to dark grey, fine grained, quartz lithic well sorted.
9.00 -	10.00	SANDSTONE, medium to dark grey, fine to medium grained, quartz lithic angular well sorted.
10.00 -	13.00	SANDSTONE, medium to dark grey, fine grained, with arsillaceous cement.
13.00 -	18.00	SANDSTONE, medium to dark grey, fine grained, quartz lithic angular well sorted.
18.00 -	20.00	SANDSTONE, medium to dark grey, fine to medium grained, quartz lithic angular well sorted.
20.00 -	24.00	SANDSTONE, medium to dark grey, fine to medium grained, quartz lithic angular well sorted.
24.00 -	25.00	SANDSTONE, dark grey, fine to medium grained, quartz lithic angular well sorted.
25.00 -	30.00	SANDSTONE, light to medium grey, fine grained, with arsillaceous cement.
30.00 -	32.00	SANDSTONE, light to medium grey, fine grained, with arsillaceous cement.
32.00 -	39.00	SANDSTONE, medium to dark grey, fine to medium grained, quartz lithic angular well sorted.
39.00 -	40.00	SANDSTONE, dark grey, fine to medium grained, quartz lithic angular well sorted.
40.00 -	41.00	SILTSTONE, medium to dark grey, fine grained, carbonaceous.
41.00 -	44.00	SILTSTONE, dark grey, fine grained, carbonaceous.
44.00 -	48.25	SANDSTONE, dark grey, fine to medium grained, interbedded coal. Probable contamination of chip samples ,no trace of coal in first run.
48.25 -	58.87	SANDSTONE, light to medium grey, medium grained, quartz

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444247

EPORT : MCS5 COAL SYSTEM Page : 3
Date : WED, 21 MAR 1984

ple Number : CA010SR

Lithology Description Report

From	To	Lithology Description
		lithic moderately weak rock, of beddins 15 deg. to horizontal. Common weathered biotite frasments decreasins downwards, lithic pebble at 57.6m.
58.87 -	59.00	SANDSTONE, light to medium grey, fine to medium grained, quartz lithic moderately weak rock, abrupt basal contact of beddins 15 deg. to horizontal.
59.00 -	59.68	SANDSTONE, light to medium grey, medium to coarse grained, rare coal wisps, moderately weak rock, erosional basal contact of beddins 15 deg. to horizontal, common brown iron oxide frasments.
59.68 -	60.76	SILTSTONE, light to medium grey, sporadic carbonaceous partinss weak rock. Calcite veins towards base of unit.
60.76 -	60.87	SANDSTONE, grey, medium grained, arsillaceous matrix weak rock, abrupt basal contact of beddins 10 deg. to horizontal, common calcite veining.
60.87 -	61.31	COAL, HEAVY (INFERIOR COAL), sporadic dull coal lenses, common calcite veining. Calcite veins towards top of unit,no apparent cleat patterns.
61.31 -	61.36	CARBONACEOUS SHALE, dark brownish-grey, medium grained, sporadic coal lenses, weak rock, transitional basal contact.
61.36 -	61.43	CARBONACEOUS SHALE, dark brownish-grey, medium grained, rare coal lenses, weak rock, transitional basal contact.
61.43 -	61.53	SILTSTONE, creamy-brown, fine to medium grained, slightly carbonaceous sporadic coal wisps weak rock, erosional basal contact.
61.53 -	61.68	COAL, 10 - 40% BRIGHT, sporadic shaly lenses, transitional basal contact.
61.68 -	61.77	COAL, HEAVY (INFERIOR COAL), transitional basal contact.
61.77 -	61.86	SHALE, creamy-brown, fine grained, slightly carbonaceous sporadic coal wisps weak rock, transitional basal contact.
61.86 -	61.95	MUDSTONE, greyish-green, very fine grained, calcareous very weak rock, transitional basal contact. Softening towards base.
61.95 -	62.04	CLAY, rare coal firm, transitional basal contact of beddins

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444248

Hole Number : CA0105R

Lithology Description Report

From	To	Lithology Description
		30 des. to horizontal.
62.04 -	62.21	CLAYSTONE, rare coal very weak rock, abrupt basal contact of beddins 10 des. to horizontal.
62.21 -	62.94	COAL, HEAVY (INFERIOR COAL), rare pyritic traces, transitional basal contact common calcite on joint surfaces. Sporadic shaley and clayey lenses.
62.94 -	63.36	COAL, 10 - 40% BRIGHT, some pyritic traces, common calcite on joint surfaces. With common coal bands.
63.36 -	63.42	COAL, HEAVY (INFERIOR COAL), transitional basal contact common calcite on joint surfaces. Gradins downward to carbonaceous shale.
63.42 -	63.69	CARBONACEOUS SHALE, srey, fine srained, arsillaceous matrix fining upwards weak rock, transitional basal contact.
63.69 -	64.71	30% SILTSTONE, brownish-srey, quartz lithic moderately weak rock, interbedded with: 70% SHALE, brownish-srey, moderately weak rock.
64.71 -	65.99	SANDSTONE, bluish-srey, medium srained, quartz lithic moderately weak rock, transitional basal contact occasional brown iron oxide frasments.
65.99 -	67.01	SANDSTONE, srey, coarse srained, quartz lithic fining upwards common brown iron oxide frasments.
67.01 -	67.24	80% SILTSTONE, srey, fine to medium srained, arenaceous moderately weak rock, transitional basal contact interbedded with: 20% SANDSTONE, srey, medium srained, arenaceous moderately weak rock, transitional basal contact.
67.24 -	67.73	SANDSTONE, bluish-srey, coarse srained, quartz lithic moderately weak rock, abrupt basal contact.
67.73 -	67.93	SANDSTONE, light to medium srey, medium srained, arsillaceous matrix moderately weak rock, abrupt basal contact. Common coal lenses and frasments.
67.93 -	68.41	SANDSTONE, srey, coarse srained, rare carbonaceous partings quartz lithic moderately weak rock.
68.41 -	68.70	SANDSTONE, coarse srained, numerous coal frasments

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444249

Hole Number : CA0105R

Lithology Description Report

From	To	Lithology Description
		arsillaceous matrix lithic (predominately rock frasments) moderately weak rock, abrupt basal contact.
68.70 -	69.40	SANDSTONE, medium to coarse grained, some carbonaceous partings rare coal frasments, moderately weak rock, transitional basal contact.
69.40 -	70.00	SANDSTONE, coarse grained, numerous carbonaceous partings some coal frasments, transitional basal contact.
70.00 -	70.55	SANDSTONE, medium to coarse grained, calcareous throughout interval abrupt basal contact common brown iron oxide frasments. Pyrite on contact with dolerite.
70.55 -	71.06	DOLERITE, light greenish-grey, calcareous throughout interval abrupt basal contact common calcite veinings. Metasomatised calcified dolerite.
71.06 -	78.86	DOLERITE, dark greenish-grey, common calcite veinings. Hole abandoned at 78.86m due to cavein around rods and loss of 14 rods down hole.

****
Total Depth = 78.86
****

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444250

LITHOLOGICAL LOG REPORT
for hole CA 0106R

Eastins: 491125.00 Hole Size: 120mm

Northins: 5186491.00 Core Size: 64mm

Elevation: 117.00m

Total Depth: 234.16m

Probe Depth: 233.20m

Logged By: Bacon R.J.

Rig Type:

Drilling Commenced: 04/02/82

Drilling Completed: 26/02/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Bed Resolution

250

444251

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description

AMMER

0.00 -	1.00	SOIL, light creamy-brown, fine to medium grained, arsillaceous matrix firm, highly weathered.
1.00 -	4.00	SOIL, light orangy-brown, fine to medium grained, arsillaceous matrix firm, highly weathered.
4.00 -	5.00	SOIL, light brown, medium grained, arsillaceous matrix stiff, moderately weathered.
5.00 -	22.00	BASALT, greenish-grey, fine to medium grained, slightly weathered.
22.00 -	23.00	BASALT, greenish-grey, fine grained, strong rock, slightly weathered.

Base of WEATHERING

23.00 -	32.71	BASALT, greenish-grey, fine grained, strong rock.

DIAMOND CORING

32.71 -	33.21	BASALT, grey, fine grained, very strong rock, common calcite lenses, common quartz infilled vesicles.
33.21 -	33.30	BASALT, dark greenish-grey, fine to medium grained, very strong rock. Medium grained pyroxene rich xenoliths in very fine grained basalt vein.
33.30 -	33.95	BASALT, some calcareous lenses, common quartz infilled vesicles.
33.95 -	34.03	INTRUSIVE ROCK, dark greenish-grey, moderately strong rock. Fine to coarse grain basic intrusive alteration to surrounding basalt.
34.03 -	34.40	BASALT, grey, fine grained, some calcareous lenses, occasional quartz infilled vesicles.
34.40 -	36.22	INTRUSIVE ROCK, dark greenish-grey, fine grained, strong rock, common quartz infilled vesicles. Fine grained basic intrusive with co arse grained altered basalt xenolith.
36.22 -	39.41	BASALT, grey, fine grained, some calcareous lenses, very strong rock, common quartz infilled vesicles. Altered

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444252

ole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		band 38.38-38.43 metres.
39.41 -	39.83	BASALT, brown, fine to medium grained, soft. Severely altered rock,some feldspar altered to clay.
39.83 -	44.26	BASALT, grey, fine grained, some calcareous lenses, very strong rock, common quartz infilled vesicles.
44.26 -	45.58	INTRUSIVE ROCK, dark greenish-grey, very fine grained, numerous calcareous lenses, strong rock, abundant quartz infilled vesicles. Fine to coarse basic intrusive with altered basalt xenoliths.
45.58 -	45.94	BASALT, light grey, some calcareous lenses, very strong rock. Slightly altered by intrusives.
45.94 -	45.99	INTRUSIVE ROCK, dark greenish-grey, very fine grained, numerous calcareous lenses, strong rock.
45.99 -	46.41	BASALT, grey, fine grained, some calcareous lenses, very strong rock, abundant quartz infilled vesicles. Alteration of basalt at contacts with intrusives.
46.41 -	46.93	INTRUSIVE ROCK, dark greenish-grey, fine grained, numerous calcareous lenses, strong rock, abundant quartz infilled vesicles, common calcite infilled vesicles. Basic intrusive with altered basalt xenoliths.
46.93 -	47.48	BASALT, light grey, some calcareous lenses. Slightly altered.
47.48 -	48.21	INTRUSIVE ROCK, dark greenish-grey, some calcareous lenses. Basic intrusive with few basalt xenoliths.
48.21 -	51.69	BASALT, grey, fine to medium grained, some calcareous lenses. Occassional basic intrusive veins.
51.69 -	52.03	BRECCIA. Basalt frasments(90%) in basic intrusive(10%).
52.03 -	72.13	BASALT, greenish-grey, fine grained, very strong rock, rare quartz infilled vesicles, occasional calcite lenses. Occassional basic intrusive veins. vesicles and grain size fining downwards.
72.13 -	72.35	50% BASALT, greenish-grey, fine grained, weak rock. 50% SANDSTONE, grey, very fine grained, weak rock. Lower contact zone of basalt with sand stone,sandstone is

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444253

ole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		brecciated set in a basalt matrix,lithological description as follows.
72.35 -	72.68	SANDSTONE, grey, fine grained, quartz lithic mudstone near base of unit, weak rock, transitional basal contact. Recrystallised.
72.68 -	72.73	MUDSTONE, grey, weak rock, abrupt basal contact of bedding 30 des. to horizontal.
72.73 -	72.82	COAL, HEAVY (INFERIOR COAL), black, carbonaceous mudstone in part, very weak rock, abrupt basal contact of bedding 30 des. to horizontal.
72.82 -	75.20	MUDSTONE, medium to dark grey, some siltyphases, very weak rock, broken core, of bedding 30 des. to horizontal.
75.20 -	76.86	MUDSTONE, medium to dark greenish-grey, broken core, very weak rock. Some purple orsanic stainins.
76.86 -	77.01	NO SAMPLE RETURN.
77.01 -	77.38	MUDSTONE, grey, very weak rock, broken core, transitional basal contact.
77.38 -	77.57	MUDSTONE, green, very weak rock, very broken core. Some purple orsanic stainins.
77.57 -	78.86	MUDSTONE, greenish-grey, very weak rock, broken core. Minor orsanic staining (purple).
78.86 -	79.76	MUDSTONE, light greenish-grey, very weak rock, transitional basal contact. Common light to medium clastic lenses.
79.76 -	80.48	MUDSTONE, greenish-grey, arsillaceous matrix weak rock, transitional basal contact of bedding 30 des. to horizontal. Common brown and green bands and lense.
80.48 -	80.89	SILTSTONE, grey, numerous mudstone clasts arsillaceous matrix weak rock, broken core, transitional basal contact of bedding 30 des. to horizontal.
80.89 -	81.79	SANDSTONE, medium grained, arsillaceous matrix some coal wisps transitional basal contact. Medium to verycoarse mudstone clasts.
81.79 -	81.89	SILTSTONE, grey, arsillaceous matrix moderately weak rock,

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444254

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		abrupt basal contact.
81.89 -	81.90	COAL, HEAVY (INFERIOR COAL), abrupt basal contact. Coal lense with pyrite infillins.
81.90 -	83.45	SILTSTONE, pale pinkish-grey, fine grained, arsillaceous matrix some coal, moderately weak rock.
83.45 -	83.57	COAL, HEAVY (INFERIOR COAL), some mudstone clasts, deformed basal contact of beddins 30 des. to horizontal, faults.
83.57 -	84.01	SILTSTONE, grey, arsillaceous matrix moderately weak rock.
84.01 -	84.15	MUDSTONE, grey, very fine grained, arsillaceous matrix deformed basal contact of beddins 30 des. to horizontal.
84.15 -	84.88	SILTSTONE, greenish-grey, some slishtly carbonaceous bands, moderately weak rock, transitional basal contact.
84.88 -	85.32	SILTSTONE, brownish-grey, numerous slishtly carbonaceous bands arsillaceous matrix moderately weak rock, transitional basal contact.
85.32 -	88.18	MUDSTONE, greenish-grey, very fine grained, arsillaceous matrix some carbonaceous wisps weak rock, broken core, transitional basal contact.
88.18 -	88.28	SANDSTONE, grey, fine grained, arsillaceous matrix weak rock, transitional basal contact.
88.28 -	88.38	SILTSTONE, grey, arsillaceous matrix weak rock, transitional basal contact of beddins 30 des. to horizontal.
88.38 -	88.52	SANDSTONE, grey, fine grained, arsillaceous matrix weak rock, transitional basal contact of beddins 30 deg. to horizontal.
88.52 -	88.63	SILTSTONE, grey, arsillaceous matrix weak rock, transitional basal contact.
88.63 -	88.66	SANDSTONE, grey, fine grained, weak rock, transitional basal contact rare calcite lenses.
88.66 -	90.06	MUDSTONE, greenish-grey, very fine grained, arsillaceous matrix moderately weak rock, transitional basal contact.
90.06 -	90.65	SILTSTONE, grey, fine grained, arsillaceous matrix fining

ple Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		upwards weak rock, transitional basal contact of bedding 30 des. to horizontal.
90.65 -	92.02	SANDSTONE, grey, fine grained, argillaceous matrix fining upwards moderately weak rock, abrupt basal contact rare calcite lenses.
92.02 -	93.74	SANDSTONE, grey, fine to medium grained, fining upwards calcareous cement, moderately weak rock, abrupt basal contact occasional calcite lenses.
93.74 -	93.76	30% SANDSTONE, grey, fine to medium grained, abrupt basal contact intermixed with: 70% COAL, bands abrupt basal contact rare calcite lenses.
93.76 -	95.50	SANDSTONE, grey, medium grained, fining upwards arenaceous well sorted, moderately weak rock, erosional basal contact.
95.50 -	96.24	PEBBLE CONGLOMERATE, grey, pebble, fining upwards well-rounded poorly sorted calcareous cement deformed basal contact with pebbles of: SANDSTONE, grey, medium grained.
96.24 -	96.27	COAL, HEAVY (INFERIOR COAL), deformed basal contact abundant calcite lenses.
96.27 -	96.55	PEBBLE CONGLOMERATE, grey, pebble, fining upwards well-rounded poorly sorted calcareous cement arenaceous matrix transitional basal contact with pebbles of: SANDSTONE, grey.
96.55 -	96.84	PEBBLE CONGLOMERATE, grey, pebble, well-rounded poorly sorted calcareous cement transitional basal contact rare pyrite on joint surfaces. No matrix present.
96.84 -	97.00	50% PEBBLE CONGLOMERATE, grey, pebble, well-rounded poorly sorted arenaceous matrix calcareous cement, erosional basal contact with pebbles of: 25% SANDSTONE, grey, lithic (predominately rock fragments). 25% CARBONACEOUS MUDSTONE, fine grained. Orange red crystals between some pebbles. in joints between surrounding pebbles.
97.00 -	97.27	NO SAMPLE RETURN.
97.27 -	97.32	COAL, HEAVY (INFERIOR COAL).

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444256

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
97.32 -	97.36	MUDSTONE, light to medium grey, arenaceous in part very weak rock, very broken core.
97.36 -	97.38	MUDSTONE, brownish-black, carbonaceous in part coal laminae very weak rock, solid core, abrupt basal contact.
97.38 -	97.64	85% CARBONACEOUS MUDSTONE, black, with numerous coal fragments very weak rock, very broken core, interbedded with: 15% COAL, HEAVY (INFERIOR COAL), phases and laminae, abrupt basal contact of beddins 20 des. to horizontal.
97.64 -	97.89	MUDSTONE, brownish-black, carbonaceous coal frasments throughout interval very weak rock, very broken core, transitional basal contact of beddins 20 des. to horizontal.
97.89 -	98.12	CARBONACEOUS MUDSTONE, black, coal thin bands throughout interval solid core, very weak rock, of beddins 20 des. to horizontal.
98.12 -	98.17	50% CARBONACEOUS MUDSTONE, black, very weak rock, interbedded with: 50% CONGLOMERATE, bands mudstone in part, weak rock, solid core.
98.17 -	98.44	NO SAMPLE RETURN.
98.44 -	98.45	CLAYSTONE, light brownish-cream, stiff, fragmented, abrupt basal contact of beddins 20 des. to horizontal.
98.45 -	98.46	COAL, HEAVY (INFERIOR COAL), broken core, moderately weak rock, abrupt basal contact of bedding 20 des. to horizontal.
98.46 -	98.52	SILTSTONE, light to medium grey, very weak rock, solid core, abrupt basal contact of bedding 20 des. to horizontal.
98.52 -	98.58	CARBONACEOUS MUDSTONE, medium to dark black, numerous coal bands and laminae weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
98.58 -	98.60	COAL, HEAVY (INFERIOR COAL), thin mudstone bands, weak rock, very broken core, cleats.
98.60 -	98.91	NO SAMPLE RETURN.

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444257

EPORT : MCSS COAL SYSTEM Page : 8
Date : WED, 21 MAR 1984

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description

IAMOND CORING

98.91 - 98.92 CARBONACEOUS MUDSTONE, black, numerous thin coal bands and arsillaceous matrix throughout interval coal in part, weak rock, very broken core.

98.92 - 98.93 SANDSTONE, light greenish-grey, very fine grained, arsillaceous matrix very stiff, solid core, abrupt basal contact of beddins 20 deg. to horizontal.

98.93 - 99.20 CARBONACEOUS MUDSTONE, black, thin mudstone bands near top of unit mudstone lenses near top of unit coal frasments laminae and bands throughout interval mudstone bands near base of unit solid core, very weak rock.

99.20 - 99.35 90% SANDSTONE, greyish-black, fine grained, carbonaceous calcareous cement, very broken core, very weak rock, intermixed with:
10% COAL, HEAVY (INFERIOR COAL), frasments.

99.35 - 99.54 CARBONACEOUS MUDSTONE, brownish-black, some coal laminae, very broken core, weak rock, common calcite on joint surfaces.

99.54 - 99.55 MUDSTONE, creamy-brown, slightly carbonaceous rare coal frasments weak rock, broken core.

99.55 - 99.67 90% CARBONACEOUS MUDSTONE, brownish-black, some coal laminae, weak rock, transitional basal contact of beddins 20 deg. to horizontal, intermixed with:
10% COAL, brown, frasments very broken core.

99.67 - 99.85 50% CARBONACEOUS MUDSTONE, dark brownish-black, weak rock, abrupt basal contact of beddins 20 deg. to horizontal, occasional calcite on joint surfaces, intermixed with:
50% COAL, frasments very broken core.

99.85 - 100.21 MUDSTONE, light brownish-grey, slightly carbonaceous some coal frasments some carbonaceous laminae near top of unit moderately weak rock, broken core, transitional basal contact of beddins 20 deg. to horizontal.

100.21 - 100.23 CARBONACEOUS MUDSTONE, brownish-black, coal frasments near top of unit, weak rock.

100.23 - 100.37 MUDSTONE, brownish-grey, slightly carbonaceous coal frasments near top of unit broken core, moderately weak rock.

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444258

ple Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
100.37	100.40	COAL, HEAVY (INFERIOR COAL), brownish-black.
100.40	100.45	CARBONACEOUS MUDSTONE, brownish-black, moderately weak rock.
100.45	100.52	COAL, HEAVY (INFERIOR COAL), black, abrupt basal contact.
100.52	100.57	CLAYSTONE, creamy-brown, numerous coal frasments, firm, abrupt basal contact.
100.57	100.61	COAL, HEAVY (INFERIOR COAL), dark brownish-black, hard.
100.61	100.66	MUDSTONE, creamy-brown, slightly carbonaceous coal bands near middle of unit weak rock, broken core.
100.66	100.71	COAL, HEAVY (INFERIOR COAL), brownish-black, transitional basal contact occasional calcite on cleats.
100.71	100.78	CARBONACEOUS MUDSTONE, brownish-black, numerous coal frasments near middle of unit moderately weak rock, broken core, abrupt basal contact common calcite infillins fault discontinuities.
100.78	100.80	SILTSTONE, creamy-brown, calcareous cement coal frasments near top of unit very weak rock, broken core, abrupt basal contact.
100.80	100.85	MUDSTONE, greyish-brown, rare carbonaceous frasments calcareous cement moderately weak rock, broken core, transitional basal contact.
100.85	100.96	MUDSTONE, light brownish-black, carbonaceous some coal frasments weak rock, very broken core, transitional basal contact of bedding 20 deg. to horizontal, occasional calcite on joint surfaces, rare pyrite on joint surfaces.
100.96	100.98	CARBONACEOUS MUDSTONE, dark brownish-black, very weak rock, transitional basal contact of beddins 20 deg. to horizontal.
100.98	101.04	COAL, HEAVY (INFERIOR COAL), dark brownish-black, transitional basal contact.
101.04	101.06	CARBONACEOUS MUDSTONE, dark brownish-black, moderately weak rock.
101.06	101.08	MUDSTONE, brownish-black, carbonaceous some coal frasments

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444259

ole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		stiff, very broken core, abrupt basal contact.
101.08	101.09	MUDSTONE, light brownish-grey, slightly carbonaceous weak rock, abrupt basal contact of bedding 30 des. to horizontal.
101.09	101.12	COAL, HEAVY (INFERIOR COAL), brownish-black, transitional basal contact.
101.12	101.26	MUDSTONE, brownish-black, slightly carbonaceous some coal frasments moderately weak rock, broken core.
101.26	101.68	SILTSTONE, brownish-grey, carbonaceous some coal frasments moderately weak rock, broken core, abrupt basal contact.
101.68	101.75	CARBONACEOUS MUDSTONE, dark brownish-black, rare coal laminae, moderately weak rock, broken core, abrupt basal contact.
101.75	102.66	SILTSTONE, brownish-grey, carbonaceous in part some coal frasments numerous near base of unit moderately weak rock, solid core, weak rock, transitional basal contact of bedding 30 des. to horizontal.
102.66	104.50	SILTSTONE, dark grey, slightly carbonaceous calcareous cement near top of unit argillaceous matrix weak rock, broken core, transitional basal contact. Fractures and breaks concoidally.
104.50	104.85	SANDSTONE, grey, fine grained, lithic (predominately rock frasments) argillaceous matrix weak rock, transitional basal contact.
104.85	105.65	SILTSTONE, grey, argillaceous matrix some carbonaceous frasments near base of unit slightly carbonaceous near base of unit moderately weak rock.
105.65	106.08	MUDSTONE, medium to dark greyish-black, slightly carbonaceous in part with some carbonaceous traces, weak rock, very broken core, transitional basal contact joints. Has a conchoidal fracture.
106.08	106.38	MUDSTONE, medium to dark blackish-grey, slightly carbonaceous near top of unit and near base of unit seam phases near middle of unit weak rock, solid core, transitional basal contact.
106.38	106.40	CARBONACEOUS MUDSTONE, black, weak rock, solid core, abrupt

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444260

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		basal contact.
106.40	107.40	MUDSTONE, medium to dark grey, carbonaceous laminae near top of unit, weak rock, broken core, transitional basal contact.
107.40	107.60	NO SAMPLE RETURN.
107.60	107.63	SANDSTONE, brownish-grey, fine grained, mudstone matrix weak rock, solid core, transitional basal contact.
107.63	114.30	MUDSTONE, medium to dark brownish-grey, slightly carbonaceous near top of unit numerous carbonaceous mudstone fragments throughout interval arenaceous in part some carbonaceous mudstone pellets throughout interval very weak rock, broken core. Some bands of swelling clay some purple organic stainins.
114.30	114.42	NO SAMPLE RETURN.
114.42	114.58	MUDSTONE, dark grey, mudstone pellets near top of unit, very weak rock, broken core, transitional basal contact. Common reddish brown stainins.
114.58	115.08	MUDSTONE, dark grey, very stiff, very broken core, transitional basal contact. Probably a shear zone,mudstone is brecciated,soft and has slickensides.
115.08	115.46	SILTSTONE, medium to dark brownish-grey, calcareous bands near base of unit, very weak rock, solid core, transitional basal contact.
115.46	115.87	MUDSTONE, dark purplish-grey, very weak rock, solid core, transitional basal contact. Abundant reddish stainins.
115.87	116.95	MUDSTONE, medium to dark grey, mudstone pellets phases near middle of unit broken core, very weak rock, of beddins 20 deg. to horizontal.
116.95	117.09	MUDSTONE, dark grey, some carbonaceous mudstone pellets weak rock, solid core, transitional basal contact of beddins 10 deg. to horizontal.
117.09	117.30	80% MUDSTONE, dark grey, some carbonaceous mudstone pellets weak rock, very broken core, of beddins 20 deg. to horizontal, interbedded with: 20% SANDSTONE, dark grey, fine grained, with numerous

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444261

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		mudstone frasments seam matrix, weak rock, of beddins 20 des. to horizontal.
117.30	118.72	SILTSTONE, medium to dark srey, mudstone near top of unit broken core, weak rock, abrupt basal contact.
118.72	119.16	SANDSTONE, srey, fine to medium srained, fining upwards numerous silty and mudstone laminae and bands throughout interval some mudstone pellets near middle of unit calcareous bands near middle of unit lithic (predominately rock frasments) weak rock, broken core, abrupt basal contact of beddins 5 des. to horizontal.
119.16	119.21	MUDSTONE, brown, very stiff, frasmented, abrupt basal contact.
119.21	119.42	SANDSTONE, sreenish-srey, fine to medium srained, calcareous bands near top of unit quartz lithic weak rock, broken core, abrupt basal contact of bedding 45 des. to horizontal.
119.42	119.65	MUDSTONE, brownish-srey, calcareous bands near base of unit, very weak rock, broken core.
119.65	120.30	SANDSTONE, sreenish-srey, fine to medium srained, quartz lithic weak rock, very broken core.
120.30	122.48	SANDSTONE, sreenish-srey, fine to medium srained, lithic (predominately rock frasments) calcareous cement carbonaceous bands near middle of unit and near base of unit mudstone matrix near base of unit weak rock, solid core, transitional basal contact of bedding 10 des. to horizontal.
122.48	122.69	MUDSTONE, medium to dark blackish-brown, carbonaceous near top of unit arenaceous in part veryweak rock, solid core, transitional basal contact of bedding 10 des. to horizontal.
122.69	122.81	SANDSTONE, light brown, fine to medium srained, mudstone matrix calcareous, broken core, transitional basal contact of beddins 3 des. to horizontal.
122.81	123.22	CARBONACEOUS MUDSTONE, dark brownish-black, some thin coal bands and laminae, weak rock, broken core, abrupt basal contact of beddins 10 des. to horizontal.
123.22	124.61	MUDSTONE, brownish-srey, silty laminae bands near base of

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		unit and near middle of unit, weak rock, solid core, abrupt basal contact of beddins 10 des. to horizontal.
124.61	125.30	MUDSTONE, dark brownish-black, carbonaceous slightly carbonaceous in part thin coal bands near middle of unit and near base of unit, weak rock, broken core, abrupt basal contact of beddins 15 des. to horizontal.
125.30	126.30	MUDSTONE, medium to dark grey, silty phases near middle of unit, weak rock, solid core.
126.30	127.86	50% SANDSTONE, light to medium grey, very fine grained, weak rock, abrupt basal contact of beddins 15 des. to horizontal, interbedded with: 50% SILTSTONE, medium to dark grey, laminae and bands, weak rock, abrupt basal contact of beddins 15 des. to horizontal.
127.86	128.00	SANDSTONE, light to medium grey, fine grained, weak rock, broken core, transitional basal contact of beddins 15 des. to horizontal.
128.00	129.09	SILTSTONE, dark grey, with numerous arenaceous bands and laminae, weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.
129.09	129.19	SANDSTONE, light to medium grey, fine to medium grained, with siltstone bands throughout interval weak rock, solid core, abrupt basal contact of beddins 15 des. to horizontal.
129.19	129.30	SILTSTONE, dark grey, weak rock, solid core, of beddins 15 des. to horizontal.
129.30	129.45	SILTSTONE, dark grey, arenaceous bands and laminae throughout interval weak rock, solid core, abrupt basal contact of beddins 15 des. to horizontal.
129.45	129.55	SANDSTONE, light to medium grey, fine grained, weak rock, solid core, abrupt basal contact of beddins 15 des. to horizontal.
129.55	129.59	MUDSTONE, dark blackish-grey, silty slightly carbonaceous weak rock, solid core, abrupt basal contact of beddins 15 des. to horizontal.
129.59	129.72	SANDSTONE, light to medium grey, fine grained, argillaceous

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		matrix near base of unit some carbonaceous traces broken core, weak rock, transitional basal contact of bedding 15 des. to horizontal.
129.72	129.77	50% SANDSTONE, light to medium grey, very fine grained. 50% MUDSTONE, dark blackish-grey, laminae slightly carbonaceous weak rock, transitional basal contact of bedding 15 des. to horizontal.
129.77	129.88	MUDSTONE, dark grey, silty arenaceous laminae near base of unit weak rock, solid core, transitional basal contact of bedding 15 des. to horizontal.
129.88	130.13	SANDSTONE. Interbedded sequence of fine sandstone and silty mudstones,units are 1 to 5 cm thick,sandstones display deformed erosional bases,they often show reworked mudstone pellets, mudstone finely laminated with silt and sand.
130.13	130.38	SANDSTONE, light to medium grey, fine to medium grained, some thin mudstone bands and laminae, weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal.
130.38	130.41	MUDSTONE, dark blackish-grey, slightly carbonaceous numerous arenaceous laminae near top of unit, weak rock, solid core, abrupt basal contact of bedding 10 des. to horizontal.
130.41	130.51	MUDSTONE, dark blackish-grey, arenaceous laminae near top of unit arenaceous bands near base of unit minor coal laminae near base of unit weak rock, solid core, abrupt basal contact of bedding 10 des. to horizontal.
130.51	130.55	SANDSTONE, light to medium grey, very fine grained, thin carbonaceous laminae throughout interval weak rock, solid core, abrupt basal contact of bedding 10 des. to horizontal.
130.55	131.18	MUDSTONE, dark blackish-grey, slightly carbonaceous very weak rock, solid core, abrupt basal contact of bedding 15 des. to horizontal. Thin bright coal band base unit.
131.18	131.63	SANDSTONE, fine grained, slightly carbonaceous mudstone bands throughout interval fining upwards calcareous cement carbonaceous wisps, weak rock, deformed basal contact.

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Lithology Description Report

From	To	Lithology Description

IAMOND CORING

131.63 - 131.64 COAL, >90% BRIGHT, solid core, deformed basal contact.

131.64 - 131.66 SANDSTONE, light to medium grey, fine to medium grained, lithic (predominately rock fragments) weak rock, broken core, deformed basal contact.

131.66 - 131.67 MUDSTONE, brown, numerous carbonaceous pellets, very weak rock, very broken core, abrupt basal contact.

131.67 - 132.01 COAL, HEAVY (INFERIOR COAL), carbonaceous mudstone in part slightly fissile weak rock, fragmented.

132.01 - 132.03 MUDSTONE, dark brownish-grey, slightly carbonaceous weak rock, very broken core, abrupt basal contact.

132.03 - 132.17 COAL, HEAVY (INFERIOR COAL), mudstone in part weak rock, very broken core, abrupt basal contact.

132.17 - 132.20 MUDSTONE, dark brown, arenaceous in part weak rock, solid core, abrupt basal contact of bedding 10 deg. to horizontal.

132.20 - 132.71 COAL, <10% BRIGHT, broken core, moderately weak rock.

132.71 - 132.76 MUDSTONE, light greyish-brown, coal lenses near top of unit slightly silty weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.

132.76 - 132.80 SANDSTONE, light brownish-cream, fine grained, calcareous cement moderately weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.

132.80 - 132.82 MUDSTONE, light brownish-cream, silty coal lenses near middle of unit coal wisps near base of unit weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.

132.82 - 133.00 COAL, <10% BRIGHT, weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal, cleats.

133.00 - 133.02 MUDSTONE, brown, numerous coal lenses, weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.

133.02 - 133.43 COAL, <10% BRIGHT, mottled purplish-thin argillaceous bands, broken core, moderately weak rock, transitional basal

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		contact of beddins 20 des. to horizontal, cleats.
133.43	133.48	CARBONACEOUS MUDSTONE, dark brownish-black, numerous thin coal lenses and bands throughout interval weak rock, broken core, abrupt basal contact of beddins 20 des. to horizontal.
133.48	133.62	COAL, <10% BRIGHT, broken core, moderately weak rock, abrupt basal contact of beddins 20 des. to horizontal.
133.62	133.72	MUDSTONE, light brownish-grey, some coal wisps, weak rock, broken core, deformed basal contact. Flame structure intrusion of underlying coal is 3 cm. Wide and extends to top of unit.
133.72	133.89	COAL, <10% BRIGHT, with mudstone pellets, moderately weak rock, broken core, abrupt basal contact of beddins 20 des. to horizontal.
133.89	134.00	MUDSTONE, light greyish-brown, numerous argillaceous pellets coal wisps weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
134.00	134.25	COAL, <10% BRIGHT, broken core, cleats.
134.25	135.03	COAL, <10% BRIGHT, fragmented, abrupt basal contact.
135.03	135.82	MUDSTONE, medium to dark grey, slightly carbonaceous weak rock, broken core, abrupt basal contact of beddins 20 des. to horizontal, slight plantlet remains beddins surfaces.
135.82	135.90	CARBONACEOUS SHALE, dark brownish-black, coal lenses weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
135.90	136.48	SILTSTONE, grey, weak rock, solid core, transitional basal contact.
136.48	137.04	MUDSTONE, medium to dark grey, slightly carbonaceous near base of unit weak rock, solid core, abrupt basal contact of beddins 45 des. to horizontal.
137.04	137.13	COAL, <10% BRIGHT. Unit contains a cobble of very hard black material,very fine grained may be a basic volcanic bomb as it appears to have a chilled edge and possibly small vesicles.

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

137.13 - 137.58 SILTSTONE, grey, mudstone near top of unit weak rock, solid core, abrupt basal contact of beddings 10 deg. to horizontal.

137.58 - 138.21 SANDSTONE, light grey, fine grained, quartz feldspathic calcareous cement, weak rock, broken core, transitional basal contact of beddings 10 deg. to horizontal.

138.21 - 138.58 SILTSTONE, grey, with mudstone bands and laminae weak rock, solid core, abrupt basal contact of beddings 10 deg. to horizontal.

138.58 - 139.62 SANDSTONE, light to medium grey, some carbonaceous laminae, weak rock, broken core, abrupt basal contact of beddins 20 deg. to horizontal.

139.62 - 139.68 SILTSTONE, medium to dark grey, weak rock, solid core, abrupt basal contact of beddins 20 deg. to horizontal.

139.68 - 140.58 SANDSTONE, light grey, fine to medium grained, numerous carbonaceous laminae lithic (predominately rock fragments) weak rock, solid core, abrupt basal contact of beddins 20 deg. to horizontal.

140.58 - 140.68 SILTSTONE, dark grey, arenaceous laminae near base of unit, weak rock, solid core, transitional basal contact of bedding 20 deg. to horizontal.

140.68 - 140.77 SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) weak rock, solid core, abrupt basal contact of beddins 20 deg. to horizontal.

140.77 - 141.30 MUDSTONE, medium to dark grey, weak rock, very broken core.

141.30 - 141.80 CARBONACEOUS MUDSTONE, black, shaly in part some coal bands near base of unit, weak rock, fragmented, transitional basal contact. Some of mudstone is almost a stoney coal.

141.80 - 142.06 CLAYSTONE, light to medium grey, stiff, solid core, abrupt basal contact of beddins 20 deg. to horizontal.

142.06 - 142.18 CARBONACEOUS SHALE, black, coal weak rock, fragmented, transitional basal contact.

142.18 - 142.26 COAL, HEAVY (INFERIOR COAL), carbonaceous mudstone near base of unit, moderately weak rock, broken core,

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		transitional basal contact.
142.26	142.38	CARBONACEOUS MUDSTONE, black, slightly carbonaceous near base of unit weak rock, solid core, transitional basal contact.
142.38	142.49	CLAYSTONE, brown, weak rock, solid core, abrupt basal contact of bedding 10 deg. to horizontal.
142.49	142.67	CARBONACEOUS MUDSTONE, black, coal in part very broken core, weak rock, abrupt basal contact. Close to a stoney coal in parts.
142.67	144.30	MUDSTONE, medium to dark brownish-grey, weak rock, broken core. End of hq core,start of nq core.
144.30	144.78	MUDSTONE, medium to dark grey, silty near base of unit weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
144.78	144.93	SANDSTONE, grey, very fine grained, weak rock, solid core, transitional basal contact of bedding 30 deg. to horizontal.
144.93	145.68	70% MUDSTONE, medium to dark grey, silty in part weak rock, interbedded with: 30% SANDSTONE, very fine grained, phases and laminae, solid core, abrupt basal contact of bedding 25 deg. to horizontal.
145.68	146.50	SANDSTONE, light grey, fine grained, some carbonaceous laminae mudstone phases and laminae near base of unit broken core, moderately weak rock, abrupt basal contact of bedding 15 deg. to horizontal.
146.50	146.53	MUDSTONE, blackish-grey, moderately weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
146.53	146.71	SANDSTONE, greyish-green, fine grained, mudstone thin bands near base of unit moderately weak rock, solid core.
146.71	146.74	MUDSTONE, dark grey, silty laminae throughout interval, weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
146.74	147.40	NO SAMPLE RETURN.
147.40	147.42	MUDSTONE, dark grey, weak rock, frasmented.

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
147.42	147.60	SANDSTONE, light greenish-grey, fine grained, coal lenses near base of unit quartz feldspathic mudstone pellets near base of unit mudstone laminae, weak rock, broken core, erosional basal contact of beddins 15 des. to horizontal.
147.60	147.90	MUDSTONE, dark grey, weak rock, broken core, transitional basal contact.
147.90	148.78	SILTSTONE, light to medium grey, weak rock, broken core, transitional basal contact.
148.78	150.37	SANDSTONE, light greenish-grey, very fine grained, fining upwards mudstone phases near top of unit mudstone laminae and bands throughout interval, weak rock, broken core.
150.37	150.73	MUDSTONE, grey, silty laminae slightly carbonaceous bands near middle of unit broken core, weak rock, abrupt basal contact of beddins 5 des. to horizontal.
150.73	150.93	CARBONACEOUS MUDSTONE, medium to dark brownish-black, carbonaceous pellets near middle of unit coal near top of unit very weak rock, solid core, abrupt basal contact of beddins 15 des. to horizontal.
150.93	151.09	COAL, HEAVY (INFERIOR COAL), carbonaceous mudstone near base of unit, broken core, moderately weak rock, transitional basal contact of beddins 30 des. to horizontal.
151.09	151.16	MUDSTONE, blackish-brown, coal lenses near base of unit arsillaceous pellets near base of unit, weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
151.16	151.24	COAL, <10% BRIGHT, weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
151.24	151.28	MUDSTONE, light brown, coal bands near top of unit and near middle of unit weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
151.28	151.44	COAL, <10% BRIGHT, mudstone near base of unit weak rock, solid core, transitional basal contact.
151.44	151.46	CARBONACEOUS MUDSTONE, black, coal weak rock, solid core,

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		abrupt basal contact of beddins 15 des. to horizontal.
151.46	151.50	SANDSTONE, light greyish-brown, very fine grained, mudstone matrix weak rock, broken core, abrupt basal contact of beddins 20 des. to horizontal.
151.50	151.80	CARBONACEOUS MUDSTONE, brownish-black, weak rock, solid core.
151.80	153.10	MUDSTONE, brownish-grey, silty in part very broken core.
153.10	153.35	NO SAMPLE RETURN.
153.35	153.51	MUDSTONE, brownish-grey, silty near base of unit weak rock, solid core, transitional basal contact.
153.51	154.48	SILTSTONE, grey, arenaceous in part weak rock, solid core, transitional basal contact.
154.48	161.16	SANDSTONE, fine grained, fining upwards argillaceous matrix quartzose (>90% quartz), very weak rock, solid core, transitional basal contact of beddins 30 des. to horizontal. 1% black brown platy mineral.
161.16	161.29	50% MUDSTONE, medium to dark grey, pellets weak rock, intermixed with: 50% SANDSTONE, light grey, fine grained, matrix argillaceous matrix very weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
161.29	161.45	SANDSTONE, light grey, fine grained, argillaceous matrix some mudstone pellets quartzose (>90% quartz) very weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
161.45	161.50	80% MUDSTONE, medium to dark grey, pellets weak rock, erosional basal contact intermixed with: 20% SANDSTONE, light grey, fine grained, matrix argillaceous matrix coal lenses near base of unit, very weak rock, solid core.
161.50	161.64	SANDSTONE, light grey, fine grained, argillaceous matrix quartzose (>90% quartz) coal laminae near middle of unit, very weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
161.64	161.80	90% MUDSTONE, medium to dark grey, pellets weak rock,

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Lithology Description Report

From	To	Lithology Description
IAMOND CORING		
		intermixed with: 10% SANDSTONE, light grey, fine grained, matrix abrupt basal contact of beddings 30 deg. to horizontal.
161.80	163.45	SANDSTONE, light grey, fine grained, argillaceous matrix numerous mudstone laminae near middle of unit and near base of unit weak rock, abrupt basal contact of beddings 20 deg. to horizontal.
163.45	163.49	SILTSTONE, medium to dark brownish-grey, weak rock, solid core, abrupt basal contact of beddings 20 deg. to horizontal.
163.49	163.91	SANDSTONE, light brownish-grey, numerous mudstone laminae near top of unit and near base of unit, weak rock, solid core, abrupt basal contact of beddings 30 deg. to horizontal.
163.91	165.28	SANDSTONE, light grey, fine to medium grained, quartz feldspathic fining upwards weak rock, solid core, transitional basal contact of beddings 25 deg. to horizontal. 1% brown platy mineral.
165.28	166.34	SANDSTONE, light whitish-grey, medium grained, feldspathic (predom. feldspar frasments) fining upwards weak rock, solid core, transitional basal contact. 1% brown platy mineral.
166.34	167.41	SANDSTONE, light whitish-grey, medium to coarse grained, feldspathic (predom. feldspar frasments) some quartz feldspathic moderately sorted seam weak rock, solid core, transitional basal contact.
167.41	168.89	SANDSTONE, light whitish-grey, medium grained, feldspathic (predom. feldspar frasments) quartz feldspathic in part seam poorly sorted some carbonaceous wisps and laminae weak rock, solid core, transitional basal contact of beddings 25 deg. to horizontal.
168.89	169.37	SANDSTONE, light light whitish-grey, grey, fine to medium grained, mudstone pebbles near top of unit numerous coal wisps and laminae throughout interval feldspathic (predom. feldspar frasments) weak rock, solid core, transitional basal contact.
169.37	172.38	SANDSTONE, light whitish-grey, fine to medium grained, coal lenses near base of unit quartz feldspathic poorly sorted

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		angular, weak rock, solid core, transitional basal contact.
172.38	172.46	70% SANDSTONE, light whitish-grey, fine to medium grained, some coal lenses, weak rock, transitional basal contact intermixed with: 30% SILTSTONE, medium to dark grey, fragments weak rock.
172.46	172.92	SANDSTONE, light whitish-grey, fine grained, numerous mudstone fragments near top of unit feldspathic (predom. feldspar fragments) coal lenses near middle of unit weak rock, solid core, abrupt basal contact.
172.92	173.11	80% SILTSTONE, medium to dark grey, pebbles weak rock, intermixed with: 20% SANDSTONE, light whitish-grey, medium grained, matrix fining upwards feldspathic (predom. feldspar fragments), weak rock, abrupt basal contact.
173.11	173.37	SANDSTONE, light whitish-grey, fine grained, fining upwards feldspathic (predom. feldspar fragments) weak rock, solid core, abrupt basal contact.
173.37	173.48	SILTSTONE, medium to dark grey, arenaceous lenses near base of unit arenaceous bands near top of unit, weak rock, solid core, abrupt basal contact.
173.48	173.56	SANDSTONE, light whitish-grey, fine grained, quartz feldspathic weak rock, solid core, erosional basal contact.
173.56	173.73	50% SILTSTONE, brown, arenaceous in part weak rock, intermixed with: 50% SANDSTONE, light whitish-grey, medium grained, matrix feldspathic (predom. feldspar fragments) weak rock, with mud pellets transitional basal contact. Unit consists of partially reworked siltstone and fine sandstone beds set in a sandstone matrix.
173.73	175.30	SANDSTONE, light whitish-grey, medium to coarse grained, mudstone pellets near base of unit coal bands near base of unit feldspathic (predom. feldspar fragments) poorly sorted angular, weak rock, solid core, erosional basal contact. Reworked siltstone pebbles from underying unit at base ,2 to 4 cm.
175.30	175.45	SILTSTONE, dark grey, mudstone near top of unit arenaceous

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		lenses near middle of unit, abrupt basal contact.
175.45	175.86	70% SANDSTONE, light whitish-grey, medium grained, feldspathic (predom. feldspar fragments) poorly sorted angular, weak rock, transitional basal contact intermixed with: 30% SILTSTONE, dark grey, fragments weak rock, solid core. Siltstone fragments .5 to 4 cm.
175.86	178.98	SANDSTONE, light whitish-grey, medium to coarse grained, feldspathic (predom. feldspar fragments) poorly sorted angular some mudstone pellets throughout interval some carbonaceous traces very broken core, of bedding 20 deg. to horizontal.
178.98	179.43	NO SAMPLE RETURN.
179.43	179.52	SANDSTONE, light greenish-white, very fine grained, quartzose ()90% quartz) numerous tuffaceous fragments moderately strong rock, solid core, abrupt basal contact. Tuffaceous fragments 0.1 to 1 cm in size , consist of plagioclase (1 mm) set in a green-black groundmass, heavily altered, possibly andesitic tuff. The sandstone appears to have been silicified.
179.52	179.55	COAL, (10% BRIGHT, broken core, weak rock, abrupt basal contact.
179.55	180.16	CLAYSTONE, light green, slightly carbonaceous near base of unit stiff, broken core, abrupt basal contact of bedding 20 deg. to horizontal.
180.16	181.30	CARBONACEOUS MUDSTONE, black, coal in part weak rock, broken core, abrupt basal contact of bedding 15 deg. to horizontal.
181.30	181.31	CLAYSTONE, light green, stiff, solid core, abrupt basal contact of bedding 15 deg. to horizontal.
181.31	181.34	CARBONACEOUS MUDSTONE, dark brownish-black, very weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.
181.34	181.36	COAL, HEAVY (INFERIOR COAL), weak rock, solid core, abrupt basal contact of bedding 25 deg. to horizontal.
181.36	181.45	MUDSTONE, brown, carbonaceous near base of unit very stiff,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		broken core.
181.45	181.59	COAL, HEAVY (INFERIOR COAL), mudstone in part moderately weak rock, solid core, abrupt basal contact of beddins 30 deg. to horizontal.
181.59	181.64	MUDSTONE, blackish-brown, slishtly carbonaceous coal phases near middle of unit weak rock, solid core, abrupt basal contact of beddins 20 deg. to horizontal.
181.64	181.78	COAL, HEAVY (INFERIOR COAL), black, solid core, moderately weak rock, transitional basal contact.
181.78	181.81	CARBONACEOUS MUDSTONE, dark brownish-black, coal in part moderately weak rock, solid core, transitional basal contact.
181.81	182.02	COAL, <10% BRIGHT, solid core, moderately strons rock, abrupt basal contact of beddins 30 deg. to horizontal.
182.02	182.49	CARBONACEOUS MUDSTONE, black, coal near base of unit very weak rock, solid core, transitional basal contact.
182.49	182.52	COAL, HEAVY (INFERIOR COAL), solid core, abrupt basal contact of beddins 30 deg. to horizontal.
182.52	182.56	CLAYSTONE, lisht sreen, stiff, broken core, abrupt basal contact of beddins 30 deg. to horizontal.
182.56	182.70	CARBONACEOUS MUDSTONE, dark brownish-black, weak rock, solid core, abrupt basal contact of beddins 30 deg. to horizontal.
182.70	182.81	CLAYSTONE, lisht sreen, solid core, very stiff, abrupt basal contact of beddins 20 deg. to horizontal.
182.81	183.25	MUDSTONE, dark srey, coal near middle of unit frasmented, weak rock.
183.25	183.28	NO SAMPLE RETURN.
183.28	183.45	CARBONACEOUS MUDSTONE, black, very stiff, frasmented.
183.45	183.60	CLAYSTONE, lisht sreen, very stiff, non sticky, abrupt basal contact of beddins 20 deg. to horizontal.
183.60	184.23	CARBONACEOUS MUDSTONE, black, coal in part coal near base

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Lithology Description Report

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DIAMOND CORING

of unit moderately weak rock, fragmented, transitional basal contact.

184.23 - 184.28 COAL, 40 - 60% BRIGHT, broken core, abrupt basal contact of bedding 20 deg. to horizontal.

184.28 - 184.55 MUDSTONE, arenaceous in part very broken core, weak rock, abrupt basal contact of bedding 30 deg. to horizontal.

184.55 - 184.65 SANDSTONE, light grey, very fine grained, mudstone phases near middle of unit, weak rock, solid core, abrupt basal contact of bedding 35 deg. to horizontal.

184.65 - 187.00 MUDSTONE, blackish-brown, slightly carbonaceous near base of unit weak rock, solid core, transitional basal contact of bedding 30 deg. to horizontal.

187.00 - 187.18 CARBONACEOUS MUDSTONE, dark brownish-black, weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.

187.18 - 187.20 CLAYSTONE, light green, calcareous bands near middle of unit, very weak rock, solid core, abrupt basal contact of bedding 35 deg. to horizontal.

187.20 - 187.25 COAL, <10% BRIGHT, solid core, abrupt basal contact of bedding 10 deg. to horizontal.

187.25 - 187.30 CLAYSTONE, blackish-brown, coal lenses near top of unit, broken core, very weak rock, abrupt basal contact of bedding 15 deg. to horizontal.

187.30 - 187.46 COAL, 10 - 40% BRIGHT, solid core, transitional basal contact of bedding 25 deg. to horizontal.

187.46 - 187.83 COAL, <10% BRIGHT, blackish-brown, coal laminae and bands moderately weak rock, solid core, transitional basal contact of bedding 20 deg. to horizontal.

187.83 - 188.48 SILTSTONE, medium to dark grey, mudstone near top of unit arenaceous near base of unit weak rock.

188.48 - 188.67 CARBONACEOUS MUDSTONE, dark brownish-black, weak rock, very broken core, abrupt basal contact.

188.67 - 188.72 SANDSTONE, light grey, fine grained, weak rock, very broken core, transitional basal contact of bedding 25 deg. to

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		horizontal.
188.72	189.25	COAL, HEAVY (INFERIOR COAL), solid core, moderately weak rock, abrupt basal contact of bedding 5 deg. to horizontal.
189.25	189.29	CLAYSTONE, light greenish-grey, very weak rock, very broken core, abrupt basal contact.
189.29	189.49	COAL, <10% BRIGHT, very broken core, moderately weak rock, deformed basal contact.
189.49	189.62	CARBONACEOUS MUDSTONE, medium to dark blackish-brown, slightly carbonaceous in part coal bands near middle of unit weak rock, solid core, transitional basal contact of bedding 25 deg. to horizontal.
189.62	189.64	COAL, HEAVY (INFERIOR COAL), solid core, abrupt basal contact.
189.64	189.67	MUDSTONE, light to medium blackish-grey, solid core, weak rock, abrupt basal contact of bedding 25 deg. to horizontal.
189.67	189.75	COAL, HEAVY (INFERIOR COAL), black, weak rock, very broken core, abrupt basal contact of bedding 30 deg. to horizontal.
189.75	189.78	MUDSTONE, medium to dark blackish-brown, slightly carbonaceous slightly arenaceous, weak rock, very broken core, abrupt basal contact of bedding 30 deg. to horizontal.
189.78	190.12	COAL, <10% BRIGHT, very broken core, weak rock, transitional basal contact.
190.12	190.26	COAL, 10 - 40% BRIGHT, weak rock, solid core.
190.26	190.31	MUDSTONE, grey, slightly carbonaceous near top of unit weak rock, solid core, with mud pellets abrupt basal contact of bedding 30 deg. to horizontal.
190.31	190.41	COAL, <10% BRIGHT, very broken core, weak rock, abrupt basal contact.
190.41	190.51	CLAYSTONE, brown, carbonaceous near base of unit and coal near base of unit weak rock, very broken core, with mud

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		pellers abrupt basal contact of beddins 30 des. to horizontal.
190.51	190.54	COAL, HEAVY (INFERIOR COAL), numerous arsillaceous pellets throughout interval weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
190.54	190.55	MUDSTONE, blackish-grey, slightly carbonaceous coal wisps, weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
190.55	190.61	COAL, <10% BRIGHT, thin mudstone bands near middle of unit weak rock, broken core, abrupt basal contact of beddins 15 des. to horizontal.
190.61	191.22	MUDSTONE, medium to dark brown, slightly carbonaceous carbonaceous near top of unit, weak rock, very broken core, transitional basal contact.
191.22	193.09	SILTSTONE, grey, weak rock, broken core.
193.09	195.28	SILTSTONE, grey, some arenaceous phases near base of unit very broken core, weak rock.
195.28	196.03	50% SANDSTONE, light to medium grey, very fine grained, weak rock. 50% SILTSTONE, grey, weak rock, broken core, transitional basal contact of beddins 5 des. to horizontal.
196.03	197.53	SANDSTONE, light to medium grey, very fine grained, silty near top of unit slightly silty near middle of unit weak rock, broken core, transitional basal contact.
197.53	198.07	SANDSTONE, light grey, fine grained, fining upwards quartzose (>90% quartz) weak rock, broken core, abrupt basal contact of beddins 30 des. to horizontal.
198.07	198.27	SANDSTONE, light to medium grey, very fine grained, fining upwards weak rock, solid core, transitional basal contact.
198.27	204.35	SANDSTONE, light grey, fine to medium grained, fining upwards quartz lithic coal traces near base of unit solid core, weak rock, of beddins 35 des. to horizontal.
204.35	204.36	COAL, <10% BRIGHT, lenses solid core, weak rock, abrupt basal contact of beddins 3 des. to horizontal.
204.36	205.11	SANDSTONE, light grey, fine to medium grained, quartz lithic

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444277

REPORT : MC55 COAL SYSTEM Page : 28
Date : WED, 21 MAR 1984

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		weak rock, solid core, abrupt basal contact of beddins 35 deg. to horizontal.
205.11	205.12	MUDSTONE, brownish-grey, weak rock, solid core, abrupt basal contact of beddins 30 deg. to horizontal.
205.12	207.65	SANDSTONE, light greenish-grey, fine grained, weak rock, solid core, transitional basal contact.
207.65	208.04	SANDSTONE, light green, fine grained, numerous coal lenses throughout interval weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.
208.04	208.10	CARBONACEOUS SHALE, blackish-brown, coal bands throughout interval, weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal. Stoney coal lamina show a disturbed beddins, in core section it looks like colliform bandins in agates.
208.10	208.21	SANDSTONE, light green, fine grained, coal lenses near top of unit, moderately weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.
208.21	208.39	COAL, HEAVY (INFERIOR COAL), broken core, abrupt basal contact of bedding 30 deg. to horizontal.
208.39	208.55	CLAYSTONE, light brown, carbonaceous near top of unit stiff, very broken core, of bedding 30 deg. to horizontal.
208.55	209.08	NO SAMPLE RETURN.
209.08	209.57	COAL, <10% BRIGHT, fragmented.
209.57	209.61	CLAYSTONE, light brown, very stiff, very broken core, abrupt basal contact of bedding 30 deg. to horizontal.
209.61	210.19	COAL, <10% BRIGHT, thin mudstone bands near top of unit and near middle of unit, broken core, abrupt basal contact of bedding 20 deg. to horizontal.
210.19	210.26	CLAYSTONE, light brown, coal bands near middle of unit, solid core, very stiff.
210.26	210.30	CLAYSTONE, light brown, fragmented, very soft.
210.30	210.39	COAL, <10% BRIGHT, very broken core.
210.39	210.41	CLAYSTONE, light brownish-cream, coal lenses throughout

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444278

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		interval, very stiff, very broken core.
210.41	210.52	COAL, HEAVY (INFERIOR COAL), broken core.
210.52	210.94	CLAYSTONE, light greenish-grey, slightly carbonaceous near base of unit numerous calcareous bands, very stiff, very broken core, abrupt basal contact of beddins 20 des. to horizontal.
210.94	211.37	COAL, <10% BRIGHT, frasmented.
211.37	211.58	NO SAMPLE RETURN.
211.58	211.61	CARBONACEOUS MUDSTONE, dark brownish-black, argillaceous pellets very weak rock, very broken core.
211.61	212.41	COAL, <10% BRIGHT, frasmented, abrupt basal contact of beddins 10 des. to horizontal.
212.41	213.22	MUDSTONE, medium to dark brownish-grey, slightly carbonaceous near top of unit frasmented, weak rock.
213.22	213.62	MUDSTONE, brownish-grey, weak rock, very broken core.
213.62	213.91	CLAYSTONE, light green, very stiff, broken core, abrupt basal contact of beddins 25 des. to horizontal.
213.91	213.98	MUDSTONE, medium to dark blackish-brown, slightly carbonaceous arenaceous near base of unit, weak rock, solid core, transitional basal contact of beddins 30 des. to horizontal.
213.98	214.70	SANDSTONE, light grey, fine to medium grained, quartz lithic weak rock, broken core, abrupt basal contact.
214.70	214.85	MUDSTONE, medium to dark brownish-grey, silty near top of unit arenaceous phases near middle of unit weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
214.85	219.32	SANDSTONE, light grey, fine to medium grained, quartz lithic fining upwards weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal. Brown platey mineral on beddins planes.
219.32	219.76	SANDSTONE, light to medium grey, very fine grained, weak rock, solid core.

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444279

Hole Number : CA0106R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
219.76	223.36	SANDSTONE, light grey, fine to medium grained, quartz lithic silty near base of unit, weak rock, solid core. Brown platey mineral on bedding planes.
223.36	223.38	COAL, <10% BRIGHT, broken core, transitional basal contact.
223.38	223.43	COAL, HEAVY (INFERIOR COAL), solid core, transitional basal contact.
223.43	223.73	MUDSTONE, greyish-black, slightly carbonaceous moderately weak rock, solid core, abrupt basal contact of beddins 10 des. to horizontal.
223.73	223.75	COAL, <10% BRIGHT, very broken core, abrupt basal contact.
223.75	224.10	CARBONACEOUS MUDSTONE, black, very weak rock, solid core.
224.10	224.77	CARBONACEOUS MUDSTONE, black, very weak rock, broken core, deformed basal contact.
224.77	225.28	DOLERITE, light green, very fine grained, moderately weak rock, transitional basal contact. Calcite veins intrudins sediments with some reddish brown minerization possibly cinnebar.
225.28	226.72	DOLERITE, dark grey, fine grained. Extensivly veined,brecciated in parts.
226.72	230.60	DOLERITE, dark grey, fine grained. Extensivly fractured and jointed to 5 cm. Spacins ,some calcareous veins.
230.60	231.28	DOLERITE, dark grey, fine grained, fining upwards.
231.28	234.16	DOLERITE, dark grey, fine to medium grained.

****
Total Depth = 234.16
****

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444280

LITHOLOGICAL LOG REPORT
for hole CA 0107

Eastins: 490601.00 Hole Size: 120mm

Northins: 5180431.00 Core Size: 64mm

Elevation: 63.00m

Total Depth: 57.46m

Logged By: Thornley W.J.

Rig Type:

Drilling Commenced: 06/03/82

Drilling Completed: 10/03/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor:

Logs Available:

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444281

REPORT : MCSS COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

Hole Number : CA0107

Lithology Description Report

From	To	Lithology Description
HAMMER		
0.00 -	1.00	SOIL, brown.
1.00 -	11.00	95% CLAY, yellowish-brown, highly weathered, intermixed with: 5% SAND, light to dark grey, fine grained, lithic (predominately rock fragments) moderately weathered.
11.00 -	19.00	50% CLAY, yellowish-brown, moderately weathered, intermixed with: 50% SANDSTONE, white, fine grained, fragments slightly weathered.
19.00 -	23.00	80% SANDSTONE, yellow, fragments slightly weathered, intermixed with: 20% CLAY, yellowish-brown, moderately weathered.
23.00 -	27.00	NO SAMPLE RETURN. Hammer unable to return wet weathered sample ,roller bit could not cut hard dolerite ,change to diamond core.
DIAMOND CORING		
27.00 -	27.10	DOLERITE SCREE, dark blackish-grey, medium grained, very strong rock, unweathered, solid core.
27.10 -	27.23	50% DOLERITE SCREE, greyish-black, medium grained, very strong rock, unweathered, intermixed with: 50% DOLERITE SCREE, light yellowish-brown, weak rock, highly weathered.
27.23 -	27.46	NO SAMPLE RETURN. Serpentine matrix/dolerite dyke breccia which washed away as it weathered.
27.46 -	28.06	DOLERITE SCREE, yellowish-brown, strong rock, moderately weathered, fragmented.
28.06 -	29.99	MUDSTONE. Probably from washing away of weather- ed serpentine and country rock matrix.
29.99 -	30.46	DOLERITE SCREE. Dyke breccia composed of, 80 % metamorphosed mudstone matrix yellowish brown,with 20 % dolerite fragments 0.5cm to 5cm in size, light grey, highly weathered angular very stiff.
30.46 -	30.63	DOLERITE SCREE, blackish-grey, medium grained, very strong rock, unweathered, solid core.

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444282

REPORT : MC55 COAL SYSTEM Page : 3
Date : WED, 21 MAR 1984

Hole Number : CA0107

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

30.63 - 30.76 MUDSTONE, light green. Mudstone,contact metamorphism, ,some dolerite fragments base of unit, very small (71mm.) throughout and slightly weathered.

30.76 - 30.83 DOLERITE SCREE, light to dark greenish-grey, medium grained, strong rock, slightly weathered, solid core.

30.83 - 31.25 MUDSTONE, light green. ,slightly weathered, dolerite fragments of varying grain size throughout. 1mm to 5 cm, fragments slightly to moderatly weathered, some yellow iron oxide stains, good state of core.

31.25 - 31.32 DOLERITE SCREE, light to dark grey, fine to medium grained, very strong rock, slightly weathered, solid core.

31.32 - 31.76 DOLERITE SCREE, light to dark greenish-grey. 80% serpentine matrix, slightly weathered. 20% dolerite fragments, fine to medium grained, slightly weathered, size of fragments ,5 cm to less than 1mm, matrix may have intermixed country rock sediment.

31.76 - 31.91 DOLERITE SCREE, blackish-grey, fine grained, very strong rock, unweathered, broken core.

31.91 - 32.23 60% DOLERITE SCREE, light to dark blackish-grey, fine to medium grained, fragments slightly weathered, intermixed with:
40% MUDSTONE. Matrix light green slightly weathered,matrix intermixed mudstone and serpentine.

32.23 - 32.33 DOLERITE SCREE, medium to dark blackish-grey, fine grained, very strong rock, unweathered, solid core.

32.33 - 32.45 DOLERITE SCREE, light to medium greenish-grey. 70 % serpentine slightly weathered 6 cm. Dolerite fragment, and some lith ic fragments 6cm: to less than 1mm, these lithic fragments are xenoliths of country rock ,some appear to be carbonaceous mudstones and others a green mudstone all are altered and thermally metamorphosed.

32.45 - 33.10 DOLERITE SCREE. 80 % matrix ,light green,slightly weathered,20 % dolerite fragments,fine to medium grained,matrix probably con sists of serpentine and mudstones.

33.10 - 33.46 NO SAMPLE RETURN.

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444283

Hole Number : CA0107

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

33.46 - 33.86 MUDSTONE. Mudstone ,light green,gritty,some green mudstone clasts and some dolerite fragments all less than 4 cm, thermally metamorphosed.

33.86 - 33.93 SANDSTONE, light to medium grey, very fine grained, micaceous fragments quartzose ()90% quartz), weak rock, solid core, abrupt basal contact. Muscovite flakes 1% thermally metamorphosed.

33.93 - 34.09 DOLERITE SCREE. 40 % serpentine,20% dolerite fragments fine grained,40 % mudstone fragments.

34.09 - 34.22 DOLERITE SCREE, blackish-grey, fine grained, very strong rock, solid core.

34.22 - 36.46 DOLERITE SCREE. 70% serpentine slightly weathered,20% green mudstone fragments,many show signs of rounding ,10 % dolerite fragm ents, fine grained.

36.46 - 37.45 MUDSTONE, greenish-brown. Gritty fragments throughout,slightly weathered,thermally metamorphosed.

37.45 - 37.55 DOLERITE SCREE, blackish-grey, fine grained, very strong rock, unweathered, solid core.

37.55 - 38.76 DOLERITE SCREE. 80 % serpentine blackish green, 20% dolerite ments , some mudstone fr fragments ,some signs of slight weathering. serpentine matrix may contain intermixed altered mudstones.

Base of WEATHERING

38.76 - 39.46 NO SAMPLE RETURN.

39.46 - 39.87 DOLERITE SCREE, blackish-grey, fine grained, very strong rock, unweathered, broken core.

39.87 - 39.99 DOLERITE SCREE, fragmented. 60 % serpentine, 20 % dolerite fragments fine grained ,20 % lithic fragments, black ,very stiff.

39.99 - 40.84 DOLERITE SCREE. 80 % dolerite,fine grained ,blackish grey, 20% serpentine matrix, green.

40.84 - 41.21 NO SAMPLE RETURN.

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444284

REPORT : MC55 COAL SYSTEM Page : 5
Date : WED, 21 MAR 1984

Hole Number : CA0107

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
41.21 -	42.16	DOLERITE SCREE, fragmented. 60 % dolerite fragments,fine grained blackish grey,set in a matrix of green serpentine.
42.16 -	42.60	DOLERITE SCREE, blackish-grey, fine grained, very broken core. 10 % green serpentine matrix.
42.60 -	44.10	DOLERITE SCREE. 50 % dolerite fragments,fine grained, blackish grey,50% green serpentine mat rix.
44.10 -	44.38	DOLERITE SCREE, blackish-grey, fine to medium grained, very strong rock, solid core.
44.38 -	45.51	DOLERITE SCREE, fragmented. 50 % dolerite fragments blackish grey 50 % serpentine matrix light green some black lithic fragments.
45.51 -	45.97	DOLERITE SCREE, blackish-grey, fine grained, broken core, very strong rock.
45.97 -	46.17	DOLERITE SCREE, fragmented. 70 % dolerite,green grey fragments, 30 % serpentine matrix ,some black country rock fragments.
46.17 -	46.74	DOLERITE SCREE, blackish-grey, fine to medium grained, broken core, very strong rock, slight calcite on joint surfaces.
46.74 -	47.16	DOLERITE SCREE, fragmented. 80 % dolerite,green grey fragments fine grained ,20% serpentine matrix, green.
47.16 -	47.66	DOLERITE SCREE, blackish-grey, fine grained, very strong rock, solid core. Brecciated vein top and middle of unit.
47.66 -	48.76	DOLERITE SCREE, fragmented. 50 % serpentine matrix brown,50% dolerite fragments, grey black,fine grained.
48.76 -	48.91	DOLERITE SCREE, blackish-grey, fine grained, very strong rock, solid core.
48.91 -	49.12	DOLERITE SCREE, fragmented. 70 % serpentine matrix greenish brown 30 % dolerite fragments,blackish grey fine grained.
49.12 -	50.00	DOLERITE SCREE, blackish-grey, fine grained, broken core. Brecciated 2 cm. Vein at 49.39 m.
50.00 -	50.07	DOLERITE SCREE, fragmented. 80 % dolerite fragments

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444285

REPORT : MC55 COAL SYSTEM Page : 6
Date : WED, 21 MAR 1984

Hole Number : CA0107

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		,black,very fine grained. 20% serpentine matrix , green.
50.07 -	50.11	NO SAMPLE RETURN.
50.11 -	50.41	DOLERITE SCREE, fragmented. 60 % dolerite fragments ,fine grained, grey ,40% serpentine matrix brown calcereous near base of unit.
50.41 -	50.66	DOLERITE SCREE, blackish-grey, solid core, very strong rock.
50.66 -	51.60	DOLERITE SCREE, fragmented. 65 % dolerite fragments,greenish grey fine to very fine grained ,35% serpent ine matrix brownish green ;dolerite fragments ranse size from 1 mm to 4cm.
51.60 -	52.53	DOLERITE SCREE, blackish-grey, fine to medium grained, solid core, very strong rock, massive.
52.53 -	54.38	DOLERITE SCREE, fragmented. 65 % dolerite fragments ,fine grained green to grey in colour ,fragments up to 10 cm. In size ,small fragments often have an altered outer rim; 35% serpentine green to brown matrix some of the fragments may be extensively altered sandstones.
54.38 -	54.46	NO SAMPLE RETURN.
54.46 -	55.71	DOLERITE SCREE, fragmented. 50 % dolerite fragments ,fine grained green grey ,50 % serpentine matrix green brown.
55.71 -	56.14	DOLERITE SCREE, blackish-grey, fine grained, very strong rock, solid core.
56.14 -	57.24	BRECCIA. 75 % dolerite fragments grey to green fine to very fine grained,fragments up to 10 cm. In size small fragments show alteration rims 25% serpentine matrix greenish brown some of the fragments extensivly altered sandstones.
57.24 -	57.46	NO SAMPLE RETURN. Abandoned,poor drilling.

****
Total Depth = 57.46
****

fragmented.

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444286

LITHOLOGICAL LOG REPORT
for hole CA 0108

Eastings: 489189.00 Hole Size: 120mm

Northings: 5179999.00 Core Size: 64mm

Elevation: 68.00m

Total Depth: 39.43m

Probe Depth: 19.00m

Logged By: Thornley W.J.

Rig Type:

Rig Number: 1

Drilling Commenced: 11/03/82

Drilling Completed: 18/03/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Bed Resolution

286

444287

REPORT : MOSS COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

Hole Number : CA0108

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00 -	1.00	SANDSTONE, light yellowish-green, fine grained, argillaceous matrix soft, slightly weathered.
1.00 -	2.00	SANDSTONE, fine grained, argillaceous matrix very soft, slightly weathered. 1 to 2 cm coal band at 1.5 m. Moderate ly weathered.
		Base of COAL WEATHERING
2.00 -	3.00	SANDSTONE, light yellowish-green, fine grained, argillaceous matrix very soft, slightly weathered.
3.00 -	3.60	MUDSTONE, medium to dark grey, very stiff, slightly weathered.
DIAMOND CORING		
3.60 -	5.49	MUDSTONE, medium to dark grey, silty weak rock, slightly weathered, frasmented.
5.49 -	5.92	NO SAMPLE RETURN. Sandstone washed away,very soft.
5.92 -	6.32	SANDSTONE, light green, fine grained, poorly sorted seam feldspathic (predom. feldspar frasments), very weak rock, slightly weathered, occasional yellow iron oxide staining. 55 % quartz,30%,feldspar,15% lithics.
6.32 -	6.36	SANDSTONE, light green, fine grained, poorly sorted seam feldspathic (predom. feldspar frasments), frasmented, slightly weathered, very weak rock. 55 % quartz,30%,feldspar,15% lithics.
6.36 -	6.38	MUDSTONE, medium to dark grey, weak rock, slightly weathered, very broken core.
6.38 -	7.06	SANDSTONE, light green, fine to medium grained, quartz feldspathic moderately sorted seam fining upwards frasmented, slightly weathered, very weak rock. 81 % quartz ,14% feldspar,5% lithics.
7.06 -	9.43	NO SAMPLE RETURN.
9.43 -	9.80	SANDSTONE, light green, very weak rock, slightly weathered, very broken core, abrupt basal contact faults, occasional

Hole Number : CA0108

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		yellow iron oxide stainins.
9.80 -	9.88	CARBONACEOUS MUDSTONE, dark greyish-black, thin coal bands near top of unit firm, slightly weathered, solid core, transitional basal contact.
9.88 -	9.98	MUDSTONE, light to dark grey, slightly carbonaceous near top of unit siliceous mudstone pebbles near middle of unit, stiff, slightly weathered, solid core, abrupt basal contact.
9.98 -	10.24	SANDSTONE, green, very fine grained, arsillaceous matrix well sorted sub-rounded quartzose (>90% quartz) solid core, slightly weathered, very weak rock, abrupt basal contact of beddins 0 des. to horizontal.
10.24 -	10.45	SANDSTONE, light to medium greenish-grey, medium grained, poorly sorted seam quartz feldspathic, very weak rock, slightly weathered, solid core. 85 % quartz , 10 % feldspar 5% lithics.
10.45 -	12.43	NO SAMPLE RETURN.
ROLLER BIT		
12.43 -	14.43	SANDSTONE, green, fine grained, quartzose (>90% quartz) poorly sorted sub-rounded, loose, slightly weathered. 90 % quartz , 5% feldspar, 5% lithics.
14.43 -	15.43	SANDSTONE, light blackish-green, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) poorly sorted sub-rounded, loose, slightly weathered, occasional yellow iron oxide staining. 75 % quartz ,15 lithics (mixed provenance). 10% feldspars ,lithic content decreasing upwards.
		Base of WEATHERING
15.43 -	16.00	90% MUDSTONE, grey, carbonaceous in part shaly in part very weak rock, intermixed with: 10% CARBONACEOUS MUDSTONE, fragments.
DIAMOND CORING		
16.00 -	16.08	MUDSTONE, dark grey, weak rock, solid core, abrupt basal

Hole Number : CA0108

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

contact faults.

16.08 - 16.15 SILTSTONE, yellowish-grey, lenses very weak rock, solid core, erosional basal contact. Interformational slump.

16.15 - 16.32 SILTSTONE, yellowish-grey, carbonaceous laminae near top of unit and near base of unit erosional basal contact. Brecciated slump material set in a very fine grained sandstone matrix.

16.32 - 16.60 MUDSTONE, dark grey, silty near middle of unit weak rock, solid core, transitional basal contact. Thin carbonaceous band at 16.42 m.

16.60 - 16.70 MUDSTONE, medium to dark grey, fragmented.

16.70 - 16.82 MUDSTONE, grey, silty laminae near top of unit and near base of unit weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.

16.82 - 16.84 SANDSTONE, light to medium grey, very fine grained, silty solid core, weak rock. Fine dyklets intruding overlying unit.

16.84 - 17.08 MUDSTONE, medium to dark grey, silty laminae throughout interval, weak rock, solid core, of bedding 25 deg. to horizontal. Faulted basal contact at 45 degrees.

17.08 - 17.20 SILTSTONE, grey, numerous carbonaceous laminae, very weak rock, solid core, abrupt basal contact of bedding 25 deg. to horizontal. Numerous compaction faults in random directions showing throws of up to 1cm ,spacings 1 to 3 cm.

17.20 - 17.23 MUDSTONE, dark grey, silty laminae throughout interval, very weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal. Laminations are planar cross beds at 15 degrees to the bedding surfaces.

17.23 - 17.67 SILTSTONE, grey, some laminae very broken core, weak rock, transitional basal contact of bedding 20 deg. to horizontal.

17.67 - 17.78 MUDSTONE, dark grey, very weak rock, broken core, transitional basal contact.

17.78 - 18.30 MUDSTONE, medium to dark grey, silty laminae near base of

Hole Number : CA010B

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

unit, weak rock, broken core.

18.30 - 18.43 NO SAMPLE RETURN.

18.43 - 18.48 MUDSTONE, dark grey, very weak rock, broken core, with disturbed bedding. Vertically dipping mudstone fragment possibly slump material.

18.48 - 18.59 MUDSTONE, dark grey, laminae throughout interval weak rock, broken core, abrupt basal contact of bedding 30 deg. to horizontal.

18.59 - 18.70 MUDSTONE, dark grey, very weak rock, broken core, with disturbed bedding abrupt basal contact. Brecciated.

18.70 - 18.92 MUDSTONE, moderately weak rock, fragmented, abrupt basal contact.

18.92 - 18.99 SANDSTONE, very fine grained, silty carbonaceous laminae, solid core, moderately weak rock, abrupt basal contact of bedding 45 deg. to horizontal.

18.99 - 19.21 70% MUDSTONE, light yellow, matrix very stiff, with disturbed bedding abrupt basal contact intermixed with: 30% SILTSTONE, yellowish-brown, hard fragments moderately weak rock. Mudstone /siltstone breccia.

19.21 - 19.27 CLAYSTONE, light greenish-white, carbonaceous laminae near middle of unit bentonitic firm, solid core, abrupt basal contact.

19.27 - 19.28 CARBONACEOUS MUDSTONE, black, thin coal laminae throughout interval solid core, firm.

19.28 - 19.39 MUDSTONE, grey, very weak rock, solid core, abrupt basal contact slight yellow iron oxide stainins.

19.39 - 19.42 CARBONACEOUS MUDSTONE, black, coal laminae solid core, stiff, abrupt basal contact.

19.42 - 19.45 CARBONACEOUS SHALE, dark brownish-black, moderately weak rock, solid core, abrupt basal contact.

19.45 - 19.48 CARBONACEOUS MUDSTONE, black, coal laminae solid core, firm, abrupt basal contact.

19.48 - 19.53 CLAYSTONE, light green, firm, solid core, abrupt basal

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Hole Number : CA0108

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		contact occasional yellow iron oxide stainins.
19.53 -	19.57	CLAYSTONE, light whitish-grey, slightly carbonaceous in part firm, solid core, abrupt basal contact.
19.57 -	19.71	MUDSTONE, light grey, very stiff, broken core.
19.71 -	20.21	NO SAMPLE RETURN.
20.21 -	20.82	DOLERITE, medium to dark grey, very fine grained, very broken core, very strong rock.
20.82 -	21.27	DOLERITE, medium to dark blackish-grey, fine grained, very strong rock, solid core.
21.27 -	21.43	NO SAMPLE RETURN.
21.43 -	22.53	DOLERITE, dark blackish-grey, very fine grained, broken core, very strong rock.
22.53 -	22.62	DOLERITE, dark blackish-grey, very fine grained, very broken core, very strong rock.
22.62 -	23.00	DOLERITE, dark greenish-grey, very fine grained, very broken core, very strong rock. Calcite on joint surfaces,joint spacin g 3 to 6 cm.
23.00 -	23.84	DOLERITE, dark grey, fine grained, very strong rock, broken core, joints.
23.84 -	23.91	NO SAMPLE RETURN.
23.91 -	24.11	DOLERITE, dark greenish-grey, fine grained, broken core, very strong rock, joints, common calcite on joint surfaces.
24.11 -	24.21	DOLERITE, dark greenish-grey, fine grained, very broken core, very strong rock, joints, abundant calcite on joint surfaces.
24.21 -	24.36	DOLERITE, dark greenish-grey, fine grained, very strong rock, broken core.
24.36 -	26.09	DOLERITE, dark greenish-grey, fine grained, very broken core, very strong rock, joints, occasional calcite on joint surfaces.
26.09 -	26.39	DOLERITE, medium to dark greenish-grey, fine grained, very

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Date : WED, 21 MAR 1984

Hole Number : CA0108

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		strong rock, frasmented, slisht calcite on joint surfaces. Brecciated in parts,some sreen serpent ine present.
26.39 -	26.72	DOLERITE, medium to dark sreenish-srey, fine srained, broken core, very strons rock, joints, occasional calcite on joint surfaces.
26.72 -	27.12	DOLERITE, medium to dark sreenish-srey, fine srained, very broken core, very strons rock.
27.12 -	27.33	DOLERITE, medium to dark sreenish-srey, fine srained, broken core, very strons rock.
27.33 -	27.43	NO SAMPLE RETURN.
27.43 -	27.70	DOLERITE, medium to dark sreenish-srey, fine srained, frasmented, very strons rock.
27.70 -	28.07	NO SAMPLE RETURN.
28.07 -	28.35	DOLERITE, medium to dark sreenish-srey, fine srained, very strons rock, frasmented.
28.35 -	28.38	DOLERITE, medium to dark srey, very strons rock, frasmented, abrupt basal contact.
28.38 -	29.25	DOLERITE, frasmented. 60% serpentine ,sreen , 40% dolerite frasments ,fine srained.
29.25 -	29.32	DOLERITE, frasmented. Serpentine,lisht brown,some 6cm frasments of dolerite.
29.32 -	29.54	DOLERITE, dark sreenish-srey, fine srained, very strons rock, frasmented.
29.54 -	29.68	NO SAMPLE RETURN.
29.68 -	31.08	DOLERITE, medium to dark sreenish-srey, fine srained, very strons rock, solid core, abrupt basal contact. Brecciated,with a calcareous matrix.
31.08 -	31.41	DOLERITE, dark blackish-srey, fine to medium srained, very strons rock, solid core, joints, occasional calcite on joint surfaces.
31.41 -	32.29	DOLERITE, broken core. 60% serpentine matrix,brown,soft,

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REPORT : MC55 COAL SYSTEM Page : 8
Date : WED, 21 MAR 1984

Hole Number : CA0108

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		intermixed with,40% dolerite fragments,up to 6 cm. In size,enis fine grained, greenish grey.
32.29 -	32.42	DOLERITE, dark blackish-grey, fine to medium grained, very strong rock, solid core, abrupt basal contact.
32.42 -	33.21	DOLERITE, medium to dark greenish-grey, fine grained, very strong rock, solid core. Brecciated,calcareous matrix.
33.21 -	33.46	NO SAMPLE RETURN.
33.46 -	33.97	DOLERITE, medium to dark greenish-grey, fine to medium grained, calcareous bands near top of unit, very strong rock, solid core.
33.97 -	35.21	DOLERITE, medium to dark greenish-grey, fine grained, solid core, very strong rock. Brecciated,fragments up to 10 cm,brown serpentine and calcite matrix.
35.21 -	35.27	DOLERITE, solid core. 75 % brown serpentine matrix,with 25 % dolerite frasments ,fine grained.
35.27 -	39.43	DOLERITE, medium to dark greenish-grey, fine to medium grained, very strong rock, solid core. Brecciated in parts,brown serpentine and calcite occuring as matrix and bands. hole abandoned due to poor drilling conditions in scree.

****
Total Depth = 39.43
****

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REPORT : MC55 COAL SYSTEM Page : 1
Date : WED, 21 MAR 1984

LITHOLOGICAL LOG REPORT
For hole CA 0109R

Eastins: 490242.00
Northins: 5182597.00
Elevation: 28.00m
Total Depth: 300.36m
Probe Depth: 290.00m

Hole Size: 120mm
Core Size: 64mm

Logged By: Thornley W.J.
Rig Type:
Rig Number: 1

Drilling Commenced: 19/03/82
Drilling Completed: 09/04/82

Data Source: Marathon Pet. Aust, Ltd
Drilling Contractor: Stackpoole Drilling
Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Bed Resolution

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Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
HAMMER		
0.00 -	1.00	SOIL, medium to dark blackish-brown, arenaceous very soft.
1.00 -	2.00	SANDSTONE, light greenish-grey, fine grained, arsillaceous matrix soft, moderately weathered.
2.00 -	3.00	SANDSTONE, light yellowish-green, fine to medium grained, arsillaceous matrix firm, moderately weathered, common yellow iron oxide stainings.
		Base of MODERATE WEATHERING
3.00 -	4.00	SANDSTONE, light grey, fine to medium grained, quartz lithic moderately sorted seam, friable, slightly weathered.
4.00 -	5.00	SANDSTONE, light grey, fine to medium grained, quartz lithic moderately sorted seam, loose, slightly weathered.
5.00 -	6.00	SANDSTONE, light grey, fine to medium grained, quartz feldspathic very stiff, slightly weathered, occasional yellow iron oxide stainins.
6.00 -	7.00	80% SANDSTONE, light grey, fine to medium grained, quartz feldspathic very weak rock, slightly weathered, interbedded with:
		Base of WEATHERING
		20% MUDSTONE, dark grey, slightly siliceous moderately weak rock, unweathered.
7.00 -	8.00	SANDSTONE, light grey, fine to medium grained, moderately sorted seam weak rock, unweathered.
8.00 -	9.00	80% SANDSTONE, light grey, fine to medium grained, quartz feldspathic moderately sorted seam, weak rock, unweathered, interbedded with: 10% SILTSTONE, medium to dark grey, bands weak rock, interbedded with: 10% CARBONACEOUS SHALE, dark brownish-black, weak rock.
9.00 -	10.00	95% SANDSTONE, light grey, fine to medium grained, quartz feldspathic poorly sorted seam, weak rock, interbedded with:

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Lithology Description Report

From	To	Lithology Description
HAMMER		5% CARBONACEOUS SHALE, dark brownish-black, bands very weak rock.
10.00 -	11.63	NO SAMPLE RETURN.
DIAMOND CORING		
11.63 -	12.04	SANDSTONE, grey, very fine grained, hard moderately strong rock, fragmented. Recrystallised.
12.04 -	12.43	NO SAMPLE RETURN.
12.43 -	12.46	SANDSTONE, white, coarse grained, quartzose ()90% quartz) moderately strong rock, fragmented. Recrystallised.
12.46 -	12.48	SANDSTONE, light greyish-white, very fine grained, moderately strong rock, fragmented. Recrystallised.
12.48 -	12.52	SANDSTONE, light greenish-grey, fine grained, seam moderately sorted quartz lithic, broken core, fragmented.
12.52 -	12.57	MUDSTONE, dark blackish-grey, moderately strong rock, fragmented.
12.57 -	12.72	SANDSTONE, light greenish-grey, fine grained, weak rock, solid core.
12.72 -	12.76	MUDSTONE, dark grey, very broken core, abrupt basal contact.
12.76 -	12.85	SANDSTONE, light whitish-green, fine to medium grained, quartz feldspathic poorly sorted seam thin coal bands, solid core, weak rock, with mud pellets abrupt basal contact. Large mudstone clast 6 cm. Size.
12.85 -	13.11	MUDSTONE, dark grey, slightly carbonaceous in part very broken core, erosional basal contact.
13.11 -	20.84	SANDSTONE, light grey, fine to medium grained, sub-rounded moderately sorted lithic (predominately rock fragments) near top of unit feldspatho-lithic (<80% qtz, felds)rf.) near base of unit coal laminae and wisps near base of unit solid core, weak rock, massive abrupt basal contact of bedding 10 deg. to horizontal.
20.84 --	20.86	COAL, 10 - 40% BRIGHT, solid core, abrupt basal contact.
20.86 -	21.28	SANDSTONE, light grey, fine grained, coal lenses near

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

middle of unit, broken core, with mud pellers. Coal lense has a woody textur.

21.28 - 21.53 NO SAMPLE RETURN.

21.53 - 27.43 SANDSTONE, light grey, fine grained, moderately sorted seam quartzose (>90% quartz) near top of unit quartz feldspathic near base of unit, broken core, weak rock, massive transitional basal contact.

27.43 - 27.53 NO SAMPLE RETURN.

27.53 - 29.40 SANDSTONE, light grey, fine grained, quartzose (>90% quartz) moderately sorted seam, solid core.

29.40 - 29.61 SANDSTONE, light grey, fine grained, seam well sorted quartz feldspathic numerous coal lenses and wisps solid core, weak rock, massive transitional basal contact of bedding 10 deg. to horizontal.

29.61 - 30.57 SANDSTONE, light grey, fine grained, some coal wisps feldspathic (predom. feldspar frasments) sub-rounded moderately sorted, solid core, weak rock, massive transitional basal contact of bedding 10 deg. to horizontal.

30.57 - 31.70 SANDSTONE, light grey, fine grained, rare coal wisps feldspathic (predom. feldspar frasments) seam poorly sorted, solid core, weak rock, massive with mud pellers abrupt basal contact.

31.70 - 31.71 COAL, HEAVY (INFERIOR COAL), lenses solid core, abrupt basal contact.

31.71 - 34.34 SANDSTONE, light greenish-grey, fine grained, slightly chloritic in part some mudstone laminae feldspathic (predom. feldspar frasments) seam moderately sorted, weak rock, solid core, with mud pellers erosional basal contact of bedding 10 deg. to horizontal.

34.34 - 34.35 MUDSTONE, medium to dark grey, silty broken core, erosional basal contact of bedding 10 deg. to horizontal.

34.35 - 41.11 SANDSTONE, light grey, fine grained, quartz feldspathic near top of unit feldspathic (predom. feldspar frasments) near base of unit moderately sorted seam, solid core, weak rock, massive transitional basal contact slight red

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		iron oxide beddins surfaces.
41.11 -	41.61	SANDSTONE, lisht srey, medium srained, numerous coal traces and thin bands, broken core, with mud pellers transitional basal contact of beddins 15 des. to horizontal.
41.61 -	44.05	SANDSTONE, lisht srey, fine to medium srained, feldspathic (predom. feldspar frasments) moderately sorted sub-rounded some carbonaceous traces, solid core, massive transitional basal contact of beddins 10 des. to horizontal.
44.05 -	44.45	SANDSTONE, lisht sreenish-srey, fine to medium srained, slishtly chloritic broken core, with disturbed beddins abrupt basal contact faults.
44.45 -	45.53	SANDSTONE, lisht srey, fine to medium srained, moderately sorted seam solid core, weak rock, transitional basal contact faults. Quartz 70 %,feldspar 25%,lithics 5%.
45.53 -	46.31	SANDSTONE, lisht to medium blackish-srey, carbonaceous wisps and coal lenses throughout interval quartzose (>90% quartz) poorly sorted seam, solid core, very weak rock, with mud pellers with disturbed bedding transitional basal contact faults. Probable slump material ,faulted and slishtly brecciated.
46.31 -	47.29	SANDSTONE, lisht srey, fine to medium srained, fining upwards rare carbonaceous traces moderately sorted sub-rounded quartzose (>90% quartz) solid core, very weak rock, transitional basal contact of beddins 25 des. to horizontal. 93 % quartz ,5 % feldspar ,2% lithics.
47.29 -	47.40	SANDSTONE, lisht srey, very fine srained, fining upwards coal lenses and laminae throughout interval quartzose (>90% quartz) solid core, very weak rock, transitional basal contact of beddins 20 des. to horizontal.
47.40 -	47.56	SANDSTONE, lisht whitish-srey, medium srained, fining upwards rare coal traces moderately sorted seam, solid core, weak rock, abrupt basal contact of beddins 30 des. to horizontal. 88 % quartz,10 % feldspar 2% lithics.
47.56 -	48.53	SANDSTONE, lisht srey, fine srained, seam moderately sorted quartzose (>90% quartz), solid core, massive

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		transitional basal contact. 90 % quartz, 9 % feldspar 1% lithics.
46.53 -	51.53	SANDSTONE, light grey, fine to medium grained, fining upwards moderately sorted seam quartzose (>90% quartz) near top of unit quartz feldspathic near base of unit slightly chloritic in part solid core, weak rock, massive.
51.53 -	54.50	SANDSTONE, light grey, medium grained, some carbonaceous traces near top of unit quartzose (>90% quartz) sub-rounded moderately sorted solid core, massive transitional basal contact. Quartz 90 %,feldspars 5%,lithics 5%.
54.50 -	54.53	NO SAMPLE RETURN.
54.53 -	57.11	SANDSTONE, light greenish-grey, fine to medium grained, slightly chloritic in part quartzose (>90% quartz) seam well sorted, solid core, weak rock, abrupt basal contact of bedding 20 deg. to horizontal. 93 % quartz,5 % feldspars ,2% lithics.
57.11 -	57.23	CARBONACEOUS SHALE, medium to dark blackish-brown, coal partings weak rock, very broken core, deformed basal contact.
57.23 -	61.52	SANDSTONE, light greenish-grey, fine to medium grained, slightly chloritic quartz feldspathic moderately sorted seam solid core, moderately weak rock, abrupt basal contact. 83 % quartz ,15% feldspar ,2% lithics.
61.52 -	61.53	50% SILTSTONE, brown, laminae solid core, interbedded with: 50% SANDSTONE, light grey, very fine grained, laminae transitional basal contact of bedding 25 deg. to horizontal.
61.53 -	61.95	SANDSTONE, light greenish-grey, fine grained, chloritic near base of unit quartzose (>90% quartz) sub-rounded moderately sorted solid core, moderately weak rock, with mud pellets transitional basal contact. Quartz 95 %,feldspar 4% ,lithics 1%.
61.95 -	62.26	SANDSTONE, whitish-green, sub-rounded moderately sorted chloritic quartzose (>90% quartz) moderately weak rock, very broken core, with disturbed bedding transitional basal contact. Quartz 90 % ,feldspar 10%,slumped.
62.26 -	62.54	SANDSTONE, light greenish-grey, fine to medium grained,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		fining upwards slightly chloritic seam poorly sorted quartz feldspathic, solid core, moderately weak rock, with mud pellets deformed basal contact. 15 % feldspar, 1 % lithic,84 % quartz.
62.54 -	63.14	80% MUDSTONE, greenish-grey, chloritic weak rock, with disturbed beddins deformed basal contact faults. 20% SANDSTONE, light greenish-grey, fine grained, quartz feldspathic seam poorly sorted, solid core. Sandstone occurs as a completely detached flame structure.
63.14 -	63.39	SANDSTONE, light to medium greenish-grey, fine grained, numerous mudstone pellets quartz feldspathic seam poorly sorted, very broken core, erosional basal contact.
63.39 -	63.45	MUDSTONE, greenish-grey, slightly chloritic solid core, deformed basal contact.
63.45 -	63.53	SANDSTONE, light greenish-grey, fine grained, numerous mudstone pellets, very broken core, erosional basal contact.
63.53 -	63.58	MUDSTONE, medium to dark grey, very weak rock, deformed basal contact.
63.58 -	63.72	SANDSTONE, light greenish-grey, fine grained, numerous mudstone pellets slightly chloritic quartz feldspathic, solid core, weak rock, deformed basal contact.
63.72 -	63.87	SILTSTONE, arenaceous laminae near top of unit, solid core, abrupt basal contact of beddins 45 des. to horizontal.
63.87 -	66.53	SANDSTONE, light grey, fine grained, sub-rounded moderately sorted quartzose (>90% quartz) some coal traces and lenses near top of unit, solid core, massive transitional basal contact of beddins 15 des. to horizontal. 90 % quartz,4% feldspar,4 % lithic.
66.53 -	70.57	SANDSTONE, light greenish-grey, fine to medium grained, numerous coal laminae and lenses near middle of unit slightly chloritic in part mudstone near base of unit quartz feldspathic near top of unit feldspathic (predom. feldspar fragments) near middle of unit quartzose (>90% quartz) near base of unit solid core, moderately weak rock, massive transitional basal contact of beddins 20 des. to horizontal.
70.57 -	70.61	80% SANDSTONE, green, very fine grained, chloritic solid

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444301

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		core, abrupt basal contact intermixed with: 20% CARBONACEOUS MUDSTONE, dark brownish-black, fragments. Slump breccia.
70.61 -	70.63	CARBONACEOUS MUDSTONE, dark brownish-black, fragmented.
70.63 -	70.71	SANDSTONE, blackish-green, very fine grained, chloritic mudstone matrix, very broken core, transitional basal contact.
70.71 -	71.01	SANDSTONE, light greenish-grey, fine to medium grained, fining upwards slightly chloritic quartz feldspathic seam well sorted, solid core, weak rock, with mud pellets abrupt basal contact of bedding 10 deg. to horizontal. 84% quartz , 12 % feldspar, 4 % lithic.
71.01 -	71.16	50% SANDSTONE, grey, very fine grained, numerous carbonaceous laminae, solid core, abrupt basal contact of bedding 15 deg. to horizontal, intermixed with: 50% SILTSTONE, phases carbonaceous laminae, weak rock.
71.16 -	71.62	SANDSTONE, light to medium grey, fine grained, numerous coal and shaly laminae and thin lenses solid core, weak rock, abrupt basal contact of bedding 15 deg. to horizontal.
71.62 -	72.53	SANDSTONE, light greenish-grey, fine grained, quartzose (>90% quartz) slightly chloritic seam well sorted solid core, weak rock, massive abrupt basal contact. 90 % quartz , 6 % feldspar ,4 % lithic.
72.53 -	72.60	MUDSTONE, medium to dark grey, very stiff, very broken core, abrupt basal contact.
72.60 -	72.88	CARBONACEOUS MUDSTONE, black, hard moderately weak rock, very broken core, abrupt basal contact of bedding 20 deg. to horizontal.
72.88 -	73.94	SANDSTONE, light grey, fine grained, mudstone pellets bands near base of unit quartz feldspathic seam, solid core, moderately weak rock, abrupt basal contact of bedding 20 deg. to horizontal. Quartz 78 % ,feldspar 16% ,lithics 6 %.
73.94 -	74.00	CARBONACEOUS SHALE, medium to dark blackish-brown, coal partings solid core, abrupt basal contact of bedding 25 deg. to horizontal.
74.00 -	74.04	SANDSTONE, light grey, fine grained, quartz feldspathic

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Date : WED, 21 MAR 1984

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		solid core, abrupt basal contact of beddins 25 des. to horizontal.
74.04 -	74.07	COAL, HEAVY (INFERIOR COAL), black, lenses solid core, deformed basal contact.
74.07 -	74.28	SANDSTONE, light grey, fine grained, numerous coal and shaly laminae and thin bands near middle of unit feldspathic (predom. feldspar fragments) seam moderately sorted, solid core, weak rock, abrupt basal contact of beddins 30 des. to horizontal.
74.28 -	74.32	CARBONACEOUS SHALE, medium to dark blackish-brown, solid core, very weak rock, abrupt basal contact of beddins 25 des. to horizontal.
74.32 -	74.52	SANDSTONE, light grey, fine grained, thick shaly lenses near middle of unit some shaly traces throughout interval feldspathic (predom. feldspar fragments), solid core, weak rock, abrupt basal contact of beddins 30 des. to horizontal.
74.52 -	74.65	CARBONACEOUS SHALE, medium to dark blackish-brown, slightly coal near middle of unit, solid core, abrupt basal contact of beddins 45 des. to horizontal.
74.65 -	75.53	SANDSTONE, light grey, fine grained, quartzose ()90% quartz) sub-rounded well sorted, moderately weak rock, solid core, with mud pellers transitional basal contact of beddins 20 des. to horizontal. 94 % quartz , 3 % feldspar ,3 % lithic.
75.53 -	78.53	SANDSTONE, light whitish-grey, fine grained, quartzose ()90% quartz) well sorted sub-rounded, solid core, moderately weak rock, transitional basal contact of beddins 30 des. to horizontal. 97 % quartz , 2 % lithics 1 % feldspar.
78.53 -	82.21	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) near top of unit moderately sorted sub-rounded quartz feldspathic near middle of unit and near base of unit fining upwards, solid core, moderately weak rock, massive of bedding 1 des. to horizontal. 80 % quartz ,14 % feldspars ,6% lithic.
82.21 -	83.23	SANDSTONE, light grey, medium grained, quartz feldspathic sub-rounded moderately sorted, weak rock, solid core,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		massive transitional basal contact. Quartz 75 %,feldspar 20 %,lithics 5 %.
83.23 -	83.56	SANDSTONE, light grey, fine to medium grained, mudstone pellets throughout interval coal lenses and traces throughout interval moderately sorted seam quartz feldspathic moderately weak rock, solid core, transitional basal contact of bedding 25 deg. to horizontal. Quartz 82 %,feldspar 13 %,lithics 5 %.
83.56 -	84.21	SANDSTONE, light grey, fine grained, coal lenses near middle of unit silty laminae throughout interval, weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
84.21 -	84.23	CARBONACEOUS MUDSTONE, black, lenses solid core, abrupt basal contact.
84.23 -	84.53	SANDSTONE, light greenish-grey, fine to medium grained, slightly chloritic near middle of unit and near base of unit carbonaceous mudstone fragments near top of unit, solid core, weak rock, transitional basal contact.
84.53 -	85.24	SANDSTONE, light grey, fine grained, feldspathic (predom. feldspar fragments) some mudstone bands near base of unit seam moderately sorted weak rock, broken core, abrupt basal contact of bedding 25 deg. to horizontal. 70 % quartz ,25 % feldspar,5 % lithics.
85.24 -	85.31	MUDSTONE, medium to dark grey, arenaceous laminae near middle of unit, solid core, abrupt basal contact.
85.31 -	85.81	SANDSTONE, light grey, fine to medium grained, mudstone laminae near middle of unit shaly lenses near base of unit, solid core, weak rock, abrupt basal contact of bedding 15 deg. to horizontal.
85.81 -	86.14	SILTSTONE, medium to dark grey, arenaceous laminae near middle of unit, solid core, abrupt basal contact.
86.14 -	87.98	SANDSTONE, light whitish-grey, fine to medium grained, quartz feldspathic seam moderately sorted fining upwards solid core, abrupt basal contact. 82 % quartz,10 % feldspar ,8 % lithics.
87.98 -	89.63	SANDSTONE, light whitish-grey, fine to medium grained, fining upwards some slightly carbonaceous laminae angular

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		moderately sorted, solid core, transitional basal contact.
89.63 -	92.09	SANDSTONE, light grey, medium grained, mudstone near base of unit some carbonaceous mudstone lenses, solid core, weak rock, transitional basal contact of bedding 20 des. to horizontal.
92.09 -	94.01	SANDSTONE, light grey, fine to medium grained, fining upwards rare carbonaceous laminae weak rock, solid core, massive abrupt basal contact of bedding 10 des. to horizontal.
94.01 -	94.02	COAL, >90% BRIGHT, thin bands solid core, abrupt basal contact of bedding 15 des. to horizontal.
94.02 -	94.61	SANDSTONE, light grey, fine to medium grained, mudstone fragments near base of unit, very weak rock, weak rock, massive transitional basal contact.
94.61 -	94.95	SANDSTONE, light grey, fine to medium grained, numerous coal thin bands near top of unit mudstone fragments near base of unit weak rock, solid core, transitional basal contact of bedding 45 des. to horizontal.
94.95 -	97.80	SANDSTONE, light grey, medium grained, quartz lithic moderately sorted seam, solid core, weak rock, massive abrupt basal contact.
97.80 -	97.90	CARBONACEOUS MUDSTONE, dark brownish-black, very weak rock, solid core, deformed basal contact.
97.90 -	97.99	SANDSTONE, light grey, fine to medium grained, lenses carbonaceous mudstone fragments near top of unit weak rock, solid core, abrupt basal contact.
97.99 -	98.13	CARBONACEOUS MUDSTONE, dark brownish-black, very weak rock, solid core, abrupt basal contact.
98.13 -	98.17	SANDSTONE, light grey, fine to medium grained, carbonaceous mudstone lenses near middle of unit quartz lithic solid core, weak rock, abrupt basal contact of bedding 35 des. to horizontal.
98.17 -	98.18	CLAYSTONE, blackish-brown, carbonaceous very stiff, solid core, abrupt basal contact of bedding 35 des. to horizontal.
98.18 -	98.19	SANDSTONE, light grey, fine grained, carbonaceous mudstone

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		fragments near middle of unit weak rock, solid core, massive deformed basal contact.
98.19 -	98.20	CARBONACEOUS MUDSTONE, black, very weak rock, solid core, deformed basal contact.
98.20 -	98.32	SANDSTONE, light grey, fine grained, numerous mudstone fragments and coal traces, weak rock, solid core, transitional basal contact.
98.32 -	100.12	SANDSTONE, light grey, fine to medium grained, rare carbonaceous traces, solid core, massive abrupt basal contact.
100.12 -	100.45	SANDSTONE, light to medium grey, very fine grained, carbonaceous laminae throughout interval, solid core, abrupt basal contact of beddins 25 deg. to horizontal, slight yellow iron oxide on joint surfaces.
100.45 -	102.17	SANDSTONE, light grey, medium grained, solid core, massive transitional basal contact.
102.17 -	105.58	SANDSTONE, light greenish-grey, medium to coarse grained, carbonaceous mudstone fragments near base of unit quartz lithic solid core, weak rock, massive abrupt basal contact.
105.58 -	106.98	SANDSTONE, light to medium grey, fine to medium grained, fining upwards carbonaceous laminae near middle of unit and near base of unit, solid core, weak rock, transitional basal contact of beddins 20 deg. to horizontal.
106.98 -	107.70	SANDSTONE, light greenish-grey, fine to medium grained, numerous carbonaceous mudstone fragments and laminae throughout interval broken core, weak rock, abrupt basal contact.
107.70 -	107.71	CARBONACEOUS MUDSTONE, dark brownish-black, very weak rock, broken core, abrupt basal contact.
107.71 -	107.78	SANDSTONE, light reddish-grey, fine grained, feldspathic (predom. feldspar fragments) mudstone bands and traces throughout interval, broken core, abrupt basal contact. Some red iron mineral occuring as stainins,which transgresses bedding planes.
107.78 -	108.14	COAL, HEAVY (INFERIOR COAL), black, coal in part very weak

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		rock, solid core, abrupt basal contact.
108.14	108.20	SANDSTONE, grey, very fine grained, some calcareous traces, weak rock, solid core.
108.20	108.63	MUDSTONE, medium to dark grey, silty in part arenaceous near base of unit very weak rock, solid core, transitional basal contact.
108.63	108.99	SILTSTONE, grey, numerous arenaceous laminae and phases veryweak rock, solid core, abrupt basal contact.
108.99	109.00	COAL, HEAVY (INFERIOR COAL), lenses solid core, abrupt basal contact.
109.00	109.31	SANDSTONE, light to medium grey, fine grained, some mudstone pellets and coal traces, solid core, weak rock, abrupt basal contact.
109.31	109.32	COAL, (10% BRIGHT, bands solid core, abrupt basal contact of beddins 30 des. to horizontal.
109.32	109.37	SANDSTONE, light to medium whitish-grey, fine grained, numerous carbonaceous traces throughout interval weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
109.37	109.62	MUDSTONE, brown, very weak rock, very broken core, abrupt basal contact.
109.62	109.78	SANDSTONE, light to medium grey, fine grained, mudstone pellets throughout interval coal traces near middle of unit, solid core, weak rock, abrupt basal contact.
109.78	110.36	SANDSTONE, light greenish-grey, fine to medium grained, fining upwards weak rock, solid core, massive transitional basal contact occasional calcite on joint surfaces.
110.36	110.76	SANDSTONE, light greenish-grey, medium grained, fining upwards weak rock, solid core, massive abrupt basal contact occasional calcite on joint surfaces.
110.76	114.53	SANDSTONE, light greenish-grey, fine to medium grained, some silty laminae, solid core, weak rock, transitional basal contact of beddins 30 des. to horizontal, rare calcite on joint surfaces.

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444307

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
114.53	116.10	SANDSTONE, light greenish-grey, medium grained, quartzose ()90% quartz) moderately sorted angular, solid core, weak rock, massive transitional basal contact.
116.10	117.22	SANDSTONE, light whitish-grey, fine to medium grained, quartzose ()90% quartz) moderately sorted seam coal lenses near middle of unit, solid core, weak rock, massive abrupt basal contact. Quartz 90 % ,feldspar 10%.
117.22	117.24	COAL, 10 - 40% BRIGHT, solid core, abrupt basal contact of beddins 25 des. to horizontal.
117.24	118.13	SANDSTONE, light grey, fine to medium grained, coal bands near top of unit and near base of unit solid core, weak rock, massive deformed basal contact.
118.13	118.18	COAL, HEAVY (INFERIOR COAL), lenses solid core, abrupt basal contact.
118.18	118.21	SANDSTONE, light grey, fine grained, feldspathic (predom. feldspar frasments) solid core, weak rock, abrupt basal contact. Some red iron stainins.
118.21	118.26	CARBONACEOUS MUDSTONE, black, very weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
118.26	118.33	80% MUDSTONE, medium to dark brownish-grey, frasments rare solid core, transitional basal contact intermixed with: 20% SANDSTONE, light to medium grey, very fine grained, matrix.
118.33	121.44	SANDSTONE, light grey, fine to medium grained, fining upwards some silty laminae throughout interval quartz feldspathic seam moderately sorted solid core, weak rock, abrupt basal contact of beddins 30 des. to horizontal.
121.44	122.69	50% SILTSTONE, medium to dark blackish-grey, numerous calcareous laminae, solid core, transitional basal contact of beddins 30 des. to horizontal, interbedded with: 50% SANDSTONE, light grey, very fine grained, bands and laminae.
122.69	123.46	SILTSTONE, medium to dark grey, numerous thin arenaceous laminae throughout interval solid core, weak rock, transitional basal contact of bedding 30 des. to

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444308

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		horizontal.
123.46	123.53	NO SAMPLE RETURN.
123.53	124.66	70% SANDSTONE, light whitish-grey, very fine grained, solid core, transitional basal contact of beddins 30 des. to horizontal, interbedded with: 30% SILTSTONE, grey, laminae and phases numerous carbonaceous laminae, weak rock.
124.66	125.41	SANDSTONE, light to medium grey, fine grained, numerous silty and carbonaceous laminae throughout interval, solid core, weak rock, transitional basal contact of bedding 30 des. to horizontal.
125.41	126.48	SANDSTONE, light grey, fine to medium grained, some silty laminae near top of unit fining upwards solid core, weak rock, massive.
126.48	126.53	NO SAMPLE RETURN.
126.53	129.52	SANDSTONE, light grey, fine to medium grained, sub-rounded moderately sorted quartzose (>90% quartz), moderately weak rock, solid core, massive.
129.52	129.53	NO SAMPLE RETURN.
129.53	130.74	SANDSTONE, grey, fine to medium grained, moderately sorted seam quartz lithic, solid core, massive transitional basal contact. 82 % quartz ,6 % feldspar,12% lithics.
130.74	130.81	SANDSTONE, light greenish-grey, fine to medium grained, moderately sorted sub-rounded quartz lithic, frasmented, massive transitional basal contact. 82 % quartz ,6 % feldspar,12% lithics.
130.81	131.01	SANDSTONE, light greenish-grey, medium grained, moderately sorted sub-rounded quartz lithic, broken core, weak rock, massive transitional basal contact. Quartz 89 % ,feldspar 7%,lithics 4%.
131.01	131.08	SANDSTONE, light reddish-grey, medium grained, feldspathic (predom. feldspar frasments) sub-rounded well sorted, solid core, weak rock, massive transitional basal contact. 63 % quartz ,32% feldspar ,5% lithics some red iron staining.
131.08	132.82	SANDSTONE, light grey, fine to medium grained, quartz

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		feldspathic some mudstone frasments near middle of unit mudstone lenses near base of unit solid core, weak rock, massive abrupt basal contact.
132.82	132.86	SILTSTONE, blackish-brown, slishtly carbonaceous weak rock, abrupt basal contact.
132.86	132.94	SANDSTONE, lisht sreenish-srey, medium srained, quartz feldspathic seam moderately sorted, weak rock, solid core, massive abrupt basal contact.
132.94	133.02	MUDSTONE, blackish-srey, silty slishtly carbonaceous solid core, abrupt basal contact.
133.02	133.03	SANDSTONE, lisht reddish-sreen, medium srained, litho-feldspathic (<80% qtz, rf)felds) sub-rounded moderately sorted, broken core, massive abrupt basal contact occasional calcite on joint surfaces. Quartz 65 %,feldspar 15 %,lithics 20 % some red iron stainins.
133.03	133.07	MUDSTONE, blackish-srey, slishtly carbonaceous very weak rock, broken core, abrupt basal contact of beddins 30 des. to horizontal.
133.07	133.66	SANDSTONE, lisht sreenish-srey, medium srained, rare laminae lithic (predominately rock frasments) seam moderately sorted broken core, weak rock, abrupt basal contact of beddins 20 des. to horizontal. Abundent red iron stainins in parts.
133.66	133.69	SILTSTONE, srey, broken core.
133.69	141.63	SANDSTONE, lisht srey, medium srained, litho-feldspathic (<80% qtz, rf)felds) ansular moderately sorted, solid core, massive rare calcite on joint surfaces. 5 to 15 % feldspar,15 % lithics, some phases of red iron stainins.
141.63	144.72	SANDSTONE, lisht srey, medium to coarse srained, some mudstone pellets near base of unit seam moderately sorted quartzose (>90% quartz) and quartz lithic, solid core, moderately weak rock, massive abrupt basal contact occasional calcite on joint surfaces. Red iron stainins middle of unit quartz 80 to 90 % ,feldspar 5 to 2%, lithics 15 to 5 %.
144.72	146.50	SANDSTONE, lisht reddish-srey, medium srained, seam moderately sorted quartz feldspathic quartzose (>90%

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		quartz) near base of unit weak rock, solid core, massive transitional basal contact joints, occasional calcite on joint surfaces. Quartz 80 to 92 % ,feldspars 5 to 20% lithics 5 to 2 % ,common red iron stainins middle unit.
146.50	147.69	SANDSTONE, light grey, medium to coarse grained, some mudstone pellets bands near middle of unit and near base of unit quartz feldspathic near middle of unit quartzose ()90% quartz) near top of unit and near base of unit seam moderately sorted, weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal. Quartz 94 % feldspars 3 % lithics 3 % some red iron staining middle of unit.
147.69	147.92	MUDSTONE, medium to dark blackish-grey, pellets bands arenaceous matrix weak rock, broken core, abrupt basal contact of bedding 20 deg. to horizontal.
147.92	148.13	SANDSTONE, light reddish-green, medium grained, with some mudstone pellets litho-feldspathic (<80% qtz, rf>felds) seam, weak rock, broken core, transitional basal contact of bedding 10 deg. to horizontal. Red iron stainins ,10% white feldspar 18 % lithics , 72 % quartz.
148.13	164.03	SANDSTONE, light grey, medium grained, seam and seam moderately sorted quartzose ()90% quartz) rare quartz feldspathic phases weak rock, solid core, massive transitional basal contact. Most of unit above 90 % quartz,about 4 % lithics with white feldspar the remainins portion.
164.03	164.34	SANDSTONE, reddish-green, medium grained, quartz lithic some quartzose ()90% quartz), weak rock, solid core, massive abrupt basal contact. Common red iron stains in parts.
164.34	164.35	MUDSTONE, medium to dark blackish-grey, slightly carbonaceous in part lenses, very weak rock, broken core, abrupt basal contact.
164.35	165.36	SANDSTONE, light greenish-grey, medium grained, numerous thin mudstone frasments and laminae near middle of unit seam moderately sorted litho-feldspathic (<80% qtz, rf>felds) weak rock, broken core, massive abrupt basal contact. 80 % quartz ,10 % white feldspar,10% lithics.
165.36	165.52	SANDSTONE, greenish-red, medium grained, some mudstone pellets and frasments solid core, weak rock, massive

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		erosional basal contact. Common red iron staining.
165.52	165.78	65% SANDSTONE, greenish-grey, fine to medium grained, matrix weak rock, erosional basal contact intermixed with: 35% MUDSTONE, dark grey, fragments rare moderately weak rock, solid core.
165.78	166.10	SANDSTONE, green, fine to medium grained, chloritic weak rock, broken core, abrupt basal contact.
166.10	167.16	SANDSTONE, light reddish-grey, medium grained, quartz feldspathic sub-rounded moderately sorted, weak rock, solid core, massive transitional basal contact. Feldspar 15 %,lithics 2 %,some red iron staining.
167.16	171.46	SANDSTONE, light greenish-grey, fine to medium grained, moderately sorted seam quartz feldspathic, weak rock, solid core, massive transitional basal contact. Rare red iron stains.
171.46	171.53	NO SAMPLE RETURN.
171.53	172.05	SANDSTONE, light grey, medium grained, quartz feldspathic moderately sorted angular, weak rock, solid core, massive deformed basal contact.
172.05	172.22	MUDSTONE, dark grey, very weak rock, broken core, deformed basal contact.
172.22	174.88	SANDSTONE, light greenish-grey, medium grained, some thin chloritic mudstone laminae and lenses near base of unit quartz feldspathic, weak rock, solid core, massive transitional basal contact.
174.88	175.75	SANDSTONE, light reddish-grey, medium grained, some thin mudstone pellets bands near base of unit angular moderately sorted weak rock, solid core, massive transitional basal contact. Common red iron staining in parts.
175.75	179.06	SANDSTONE, light grey, medium grained, feldspatho-lithic (<80% qtz, felds>rf.) seam well sorted mudstone fragments near middle of unit, weak rock, solid core, massive transitional basal contact. 75 % quartz ,15% feldspar,10% lithics.
179.06	179.50	SANDSTONE, green, fine grained, litho-feldspathic (<80%

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444312

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		qtz, rf)felds) moderately sorted seam, very weak rock, solid core, massive common calcite on joint surfaces. Minor red iron stainins.
179.50	180.39	SANDSTONE, light greenish-grey, fine to medium grained, numerous silty laminae near middle of unit and near base of unit litho-feldspathic ((80% qtz, rf)felds) moderately sorted seam, weak rock, solid core, with mud pellets abrupt basal contact of beddins 25 des. to horizontal. 80% quartz, 10% feldspar, 10 % lithics ,rare flakes of mica, colourless and brown.
180.39	183.92	SANDSTONE, light grey, fine to medium grained, feldspathic (predom. feldspar frasments) seam moderately sorted, weak rock, solid core, massive abrupt basal contact. 65 % quartz,25 % feldspar,10 % lithics minor red iron stainins in parts.
183.92	183.97	COAL, HEAVY (INFERIOR COAL), dark brownish-black, coal in part with coal frasments throughout interval, very weak rock, solid core, transitional basal contact.
183.97	184.04	COAL, <10% BRIGHT, solid core, transitional basal contact.
184.04	184.35	COAL, 60 - 90% BRIGHT, broken core, abrupt basal contact.
184.35	184.78	MUDSTONE, medium to dark grey, solid core, very weak rock, with disturbed beddins abrupt basal contact. Probably a slump breccia.
184.78	184.79	COAL, 10 - 40% BRIGHT, frasmented, abrupt basal contact.
184.79	185.13	MUDSTONE, medium to dark grey, very weak rock, solid core, with disturbed beddins abrupt basal contact.
185.13	185.17	MUDSTONE, medium to dark blackish-grey, slightly carbonaceous very stiff, solid core, abrupt basal contact of beddins 20 des. to horizontal.
185.17	185.51	MUDSTONE, medium to dark grey, slightly silty near base of unit, very stiff, solid core, transitional basal contact.
185.51	186.61	SILTSTONE, brownish-grey, arenaceous bands and laminae near middle of unit very weak rock, solid core, abrupt basal contact of beddins 25 des. to horizontal.
186.61	187.30	SANDSTONE, light grey, fine grained, numerous thin mudstone

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444313

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		laminae near middle of unit and near base of unit quartzose ()90% quartz) well sorted, weak rock, broken core, transitional basal contact.
187.30	190.84	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) well sorted seam rare micaceous fragments, solid core, weak rock, massive abrupt basal contact. Quartz 98 % ,feldspars 1 %,lithics 1 % rare brown mica fragments ,possibly muscovite.
190.84	196.34	SANDSTONE, light grey, medium grained, quartzose ()90% quartz) near top of unit quartz feldspathic near base of unit weak rock, solid core, massive transitional basal contact. Quartz 85 to 98 %,feldspar 2 to 15 %, lithics 1 to 5 % ,more quartzose top of unit.
196.34	199.80	SANDSTONE, light greenish-grey, fine to medium grained, quartzose ()90% quartz) and quartz feldspathic phases throughout interval seam moderately sorted some carbonaceous laminae near middle of unit broken core, weak rock, transitional basal contact of beddins 15 des. to horizontal.
199.80	200.06	SANDSTONE, reddish-green, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) moderately sorted seam, solid core, weak rock, massive transitional basal contact. 80 % quartz,10 % feldspar,10 % lithics some red iron stains.
200.06	204.53	SANDSTONE, medium grained, moderately sorted seam quartzose ()90% quartz) some quartz feldspathic some mudstone pellets near middle of unit, solid core, weak rock, massive abrupt basal contact. Quartz generally above 90 % ,feldspars less than 10 %,lithics up to 5 %.
204.53	204.55	MUDSTONE, dark grey, silty very weak rock, solid core, abrupt basal contact.
204.55	204.89	81% SANDSTONE, light greenish-grey, medium grained, seam quartzose ()90% quartz) moderately sorted, weak rock, massive erosional basal contact intermixed with: 19% SILTSTONE, rare fragments ansular lenses some slightly carbonaceous, weak rock, solid core.
204.89	208.45	SANDSTONE, light grey, medium grained, quartzose ()90% quartz) ansular moderately sorted, solid core, weak rock, massive abrupt basal contact. Quartz 93 %,lithics 5

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444314

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		%,feldspars 2 %.
208.45	209.36	SANDSTONE, greenish-red, medium grained, quartz lithic seam moderately sorted, weak rock, solid core, massive transitional basal contact. Quartz 81 %,14 % lithics, 5 % feldspar common red iron staining.
209.36	211.27	SANDSTONE, light greenish-grey, medium grained, quartzose ()90% quartz), seam moderately sorted, weak rock, broken core, transitional basal contact. Quartz 92 %,lithics 5 %,feldspars 3 %.
211.27	215.28	SANDSTONE, light reddish-green, medium grained, quartz lithic weak rock, solid core, massive transitional basal contact.
215.28	220.52	SANDSTONE, light grey, medium grained, quartzose ()90% quartz) and quartz feldspathic phases weak rock, solid core, massive transitional basal contact.
220.52	220.61	MUDSTONE, dark grey, very weak rock, solid core, abrupt basal contact of beddins 15 deg. to horizontal.
220.61	221.37	SANDSTONE, light greenish-grey, medium grained, quartz feldspathic seam moderately sorted, weak rock, solid core, transitional basal contact.
221.37	221.97	SANDSTONE, light greenish-grey, medium grained, numerous mudstone frasments, broken core, weak rock, transitional basal contact.
221.97	222.20	60% MUDSTONE, greyish-red, rare frasments very weak rock, erosional basal contact intermixed with: 40% SANDSTONE, reddish-green, medium grained, matrix weak rock, solid core.
222.20	222.98	SANDSTONE, greenish-grey, medium to coarse grained, weak rock, solid core, massive abrupt basal contact slisht calcite on joint surfaces.
222.98	223.17	SANDSTONE, light grey, fine to medium grained, some thin carbonaceous laminae throughout interval quartzose ()90% quartz), weak rock, solid core, abrupt basal contact of beddins 25 deg. to horizontal.
223.17	224.43	SANDSTONE, light reddish-grey, medium grained, seam moderately sorted feldspatho-lithic ((80% qtz,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		feldS)rf.), weak rock, solid core, massive abrupt basal contact joints. 75 % quartz,15 % feldspar 10% lithics common red iron mineral stainins twinned yellow gypsum in open joints.
224.43	225.00	SANDSTONE, green, fine to medium grained, quartzose ()90% quartz) angular and seam moderately sorted very weak rock, broken core, massive transitional basal contact joints. 93 % quartz,5 % feldspar,2 % lithics abundant green stainins.
225.00	225.22	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) weak rock, solid core, massive abrupt basal contact.
225.22	225.31	SANDSTONE, green, fine grained, quartzose ()90% quartz) very weak rock, solid core, abrupt basal contact.
225.31	225.48	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) weak rock, solid core, massive.
225.48	225.53	NO SAMPLE RETURN.
225.53	225.76	SANDSTONE, light grey, fine grained, quartzose ()90% quartz) seam moderately sorted, weak rock, solid core, massive abrupt basal contact. Quartz 93 % ,lithics 5 %,feldspars 2 %.
225.76	230.05	SANDSTONE, light grey, medium grained, angular moderately sorted litho-feldspathic (<80% qtz, rf)felds), weak rock, solid core, massive deformed basal contact. Quartz 80 %,feldspar 10%,lithics 10 % green and red alteration zone around calcareous veinins,veins dip 75 degrees,alteration zones extend 10 to 20 cm. From the veins,vein spacing 30cm to 1.5m.
230.05	230.11	MUDSTONE, light to dark grey, frasments with arenaceous matrix near top of unit and near base of unit mudstone bands near middle of unit very weak rock, solid core, deformed basal contact.
230.11	230.31	SANDSTONE, light to medium grey, fine grained, thin carbonaceous wisps throughout interval solid core, weak rock, transitional basal contact of beddins 15 des. to horizontal.
230.31	232.00	SANDSTONE, light grey, fine to medium grained, finins

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444316

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		upwards mudstone near base of unit quartzose ()90% quartz) seam moderately sorted, solid core, weak rock, massive abrupt basal contact. Quartz 90 %,feldspars 2 %,lithics 8 %.
232.00	232.12	SANDSTONE, light to medium grey, very fine grained, coal bands near middle of unit mudstone fragments lenses near base of unit quartzose ()90% quartz) weak rock, solid core, abrupt basal contact of bedding 25 deg. to horizontal.
232.12	232.55	SANDSTONE, light grey, fine grained, fining upwards quartzose ()90% quartz) some thin carbonaceous laminae near middle of unit some thin mudstone pellets bands near base of unit weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
232.55	232.60	SANDSTONE, light to medium grey, fine to medium grained, some rare mudstone fragments near base of unit quartzose ()90% quartz), weak rock, solid core, massive abrupt basal contact.
232.60	232.83	MUDSTONE, light to medium grey, silty laminae and phases throughout interval some thin slightly carbonaceous laminae throughout interval weak rock, solid core, of bedding 30 deg. to horizontal. Faulted basal contact at 45 degrees.
232.83	233.28	MUDSTONE, black, very weak rock, solid core, massive abrupt basal contact.
233.28	233.30	BRECCIA, black, mudstone very weak rock, solid core, with disturbed bedding abrupt basal contact.
233.30	233.45	MUDSTONE, black, silty near base of unit very weak rock, solid core, massive transitional basal contact.
233.45	233.96	SANDSTONE, medium to dark blackish-grey, very fine grained, mudstone matrix very weak rock, solid core, massive abrupt basal contact.
233.96	234.22	SANDSTONE, light to medium blackish-grey, fine grained, some mudstone matrix in part weak rock, solid core, transitional basal contact.
234.22	234.70	SANDSTONE, light blackish-grey, fine grained, numerous thin mudstone laminae throughout interval weak rock, solid

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		core, abrupt basal contact of beddins 20 des. to horizontal.
234.70	236.87	SANDSTONE, light grey, fine to medium grained, finins upwards numerous thin mudstone laminae throughout interval quartzose ()90% quartz) well sorted angular, weak rock, solid core, abrupt basal contact of beddins 25 des. to horizontal. Quartz 96 %,feldspar 2 %,lithics 2 %.
236.87	238.27	SANDSTONE, light whitish-grey, medium to coarse grained, some mudstone laminae quartz lithic moderately sorted angular, weak rock, solid core, abrupt basal contact of bedding 30 des. to horizontal. Quartz 88 %,lithics 10 %,feldspar 2 %.
238.27	238.63	SILTSTONE, grey, rare arenaceous laminae, weak rock, solid core, abrupt basal contact of bedding 30 des. to horizontal.
238.63	238.68	COAL, HEAVY (INFERIOR COAL), black, shaly very weak rock, fragmented, transitional basal contact.
238.68	238.73	CARBONACEOUS MUDSTONE, black, slightly coal near top of unit, very weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
238.73	238.76	COAL, (10% BRIGHT, black, fissile weak rock, solid core, abrupt basal contact.
238.76	238.86	CARBONACEOUS MUDSTONE, black, coal in part very weak rock, very broken core, abrupt basal contact of bedding 20 des. to horizontal.
238.86	238.94	MUDSTONE, medium to dark grey, silty near base of unit weak rock, solid core, abrupt basal contact.
238.94	239.10	SILTSTONE, light to medium grey, arenaceous near base of unit very weak rock, solid core, abrupt basal contact of beddins 20 des. to horizontal.
239.10	240.09	75% SILTSTONE, grey, weak rock, abrupt basal contact of beddins 25 des. to horizontal, interbedded with: 20% MUDSTONE, medium to dark grey, laminae thin weak rock, interbedded with: 5% SANDSTONE, light to medium grey, very fine grained, phases weak rock, solid core.

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444318

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
240.09	240.18	COAL, 10 - 40% BRIGHT, solid core, abrupt basal contact.
240.18	240.55	MUDSTONE, light to medium grey, silty bands near middle of unit, solid core, abrupt basal contact.
240.55	240.57	MUDSTONE, black, slightly carbonaceous very stiff, solid core, abrupt basal contact.
240.57	240.78	MUDSTONE, grey, slightly carbonaceous lenses near middle of unit and near base of unit very weak rock, broken core, transitional basal contact.
240.78	240.96	MUDSTONE, grey, silty near base of unit weak rock, broken core, transitional basal contact.
240.96	241.42	80% SANDSTONE, light to medium grey, very fine grained, weak rock, transitional basal contact of bedding 20 des. to horizontal. 20% MUDSTONE, dark grey, laminae and bands, weak rock, solid core.
241.42	241.60	SILTSTONE, medium to dark grey, mudstone laminae and phases weak rock, solid core, transitional basal contact of bedding 20 des. to horizontal.
241.60	242.57	SANDSTONE, very fine grained, silty and mudstone laminae throughout interval weak rock, solid core, abrupt basal contact of bedding 20 des. to horizontal.
242.57	244.44	MUDSTONE, black, slightly carbonaceous silty near base of unit thick arenaceous bands near base of unit weak rock, broken core, massive abrupt basal contact.
244.44	244.46	COAL, <10% BRIGHT, solid core, abrupt basal contact cleats, abundant calcite on cleats.
244.46	245.35	MUDSTONE, medium to dark grey, slightly silty in part, solid core, weak rock, abrupt basal contact of bedding 30 des. to horizontal.
245.35	245.41	SILTSTONE, grey, solid core, weak rock, abrupt basal contact of bedding 30 des. to horizontal.
245.41	246.01	MUDSTONE, medium to dark grey, solid core, weak rock, massive.
246.01	246.23	NO SAMPLE RETURN.

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

246.23	247.08	SILTSTONE, dark grey, numerous arenaceous laminae throughout interval broken core, very weak rock, abrupt basal contact of bedding 30 deg. to horizontal.
247.08	247.32	SANDSTONE, light greenish-grey, fine grained, lithic (predominately rock fragments) fining upwards weak rock, solid core, erosional basal contact.
247.32	247.52	MUDSTONE, dark grey, silty solid core, massive abrupt basal contact of bedding 20 deg. to horizontal.
247.52	248.97	SANDSTONE, light greenish-grey, fine to medium grained, lithic (predominately rock fragments) some carbonaceous mudstone laminae throughout interval, solid core, weak rock, abrupt basal contact of bedding 25 deg. to horizontal.
248.97	249.15	SANDSTONE, grey, very fine grained, numerous thin carbonaceous laminae throughout interval weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
249.15	249.23	SILTSTONE, grey, very weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
249.23	249.30	SANDSTONE, light greenish-grey, fine grained, lithic (predominately rock fragments) some thin carbonaceous laminae near base of unit, very weak rock, solid core, abrupt basal contact of bedding 25 deg. to horizontal.
249.30	249.33	SILTSTONE, arenaceous near top of unit some mudstone laminae near base of unit, weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal.
249.33	249.86	SANDSTONE, light greenish-grey, lithic (predominately rock fragments) numerous carbonaceous laminae throughout interval weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
249.86	249.91	SILTSTONE, medium to dark grey, weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
249.91	251.29	SANDSTONE, light grey, medium grained, rare carbonaceous traces lithic (predominately rock fragments) weak rock, solid core, transitional basal contact.
251.29	253.23	SANDSTONE, light reddish-grey, medium grained, thin coal

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444320

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		bands near middle of unit lithic (predominately rock fragments) broken core, weak rock, massive transitional basal contact common red iron oxide stainins.
253.23	254.76	SANDSTONE, light grey, medium grained, some thin carbonaceous laminae near middle of unit broken core, weak rock, transitional basal contact.
254.76	255.81	SANDSTONE, light reddish-green, medium grained, lithic (predominately rock fragments) some laminae, very broken core, weak rock, transitional basal contact of beddins 30 deg. to horizontal, common red iron oxide stainins.
255.81	256.18	SANDSTONE, light grey, medium grained, some carbonaceous laminae lithic (predominately rock fragments) weak rock, solid core, abrupt basal contact of beddins 30 deg. to horizontal.
256.18	256.71	SANDSTONE, light greyish-green, medium grained, lithic (predominately rock fragments) weak rock, solid core, abrupt basal contact of beddins 30 deg. to horizontal, common calcite on joint surfaces.
256.71	256.95	CARBONACEOUS MUDSTONE, black, some coal fragments near middle of unit very stiff, broken core, abrupt basal contact of beddins 20 deg. to horizontal.
256.95	256.96	SILTSTONE, light brown, very stiff, solid core, abrupt basal contact of beddins 10 deg. to horizontal.
256.96	257.65	COAL, <10% BRIGHT, slightly fissile some thin mudstone partinss, very weak rock, broken core, abrupt basal contact.
257.65	257.90	MUDSTONE, medium to dark grey, weak rock, very broken core, transitional basal contact.
257.90	260.12	SILTSTONE, brownish-grey, some mudstone phases near middle of unit and near base of unit, weak rock, very broken core, abrupt basal contact.
260.12	260.29	SILTSTONE, light to medium greenish-grey, arenaceous and mudstone fragments throughout interval very stiff, solid core, with disturbed beddins abrupt basal contact. Faulted basal contact at 45 degrees.
260.29	260.38	SILTSTONE, medium to dark grey, very weak rock, fragmented.

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444321

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

260.38 - 261.19 SANDSTONE, light grey, fine grained, some carbonaceous laminae near base of unit broken core, transitional basal contact of beddins 5 des. to horizontal.

261.19 - 261.38 SANDSTONE, light reddish-green, fine grained, silty fragments throughout interval, fragmented.

261.38 - 261.53 NO SAMPLE RETURN.

261.53 - 261.69 SANDSTONE, green, fine grained, silty fragments throughout interval, solid core, abrupt basal contact.

261.69 - 261.78 SILTSTONE, red, weak rock, solid core, abrupt basal contact. Faulted basal contact at 45 degrees,co mmon red iron staining.

261.78 - 264.53 SANDSTONE, light reddish-green, medium grained, lithic (predominately rock fragments) weak rock, broken core, transitional basal contact. Common red iron staining throughout.

264.53 - 265.90 SANDSTONE, light grey, medium to coarse grained, fining upwards lithic (predominately rock fragments) weak rock, solid core, transitional basal contact.

265.90 - 271.16 SANDSTONE, greenish-red, medium grained, weak rock, solid core, transitional basal contact. Unit heavily altered,abundant red iron staining and chloritic alteration, extenive calcite veining on joint surfaces, 10 to 50 cm.spacing, dipping at 80 degrees to core axis.

271.16 - 272.06 SANDSTONE, light grey, medium grained, some carbonaceous laminae near top of unit lithic (predominately rock fragments) ansular, weak rock, broken core, transitional basal contact.

272.06 - 272.29 SANDSTONE, reddish-green, medium grained, lithic (predominately rock fragments) moderately sorted seam, weak rock, solid core, transitional basal contact.

272.29 - 272.75 SANDSTONE, light grey, medium grained, lithic (predominately rock fragments) moderately sorted seam, broken core, very weak rock, transitional basal contact.

272.75 - 273.34 SANDSTONE, reddish-green, fine to medium grained, numerous carbonaceous mudstone fragments throughout interval

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		lithic (predominately rock fragments), very weak rock, solid core, transitional basal contact. Abundant red iron stainins.
273.34	274.16	SANDSTONE, light grey, medium grained, lithic (predominately rock fragments) angular moderately sorted some carbonaceous laminae and mudstone fragments, broken core, weak rock, abrupt basal contact.
274.16	274.21	COAL, HEAVY (INFERIOR COAL), weak rock, solid core, abrupt basal contact.
274.21	274.30	MUDSTONE, dark grey, slightly carbonaceous near top of unit solid core, weak rock, abundant pyrite on joint surfaces.
274.30	274.66	MUDSTONE, dark grey, very broken core, abrupt basal contact. Faulted basal contact at 80 degrees.
274.66	275.62	MUDSTONE, medium to dark grey, very weak rock, solid core, with disturbed beddins transitional basal contact. Severly brecciated,ansular mudstone fragments upto 10 cm. Size,in a mudstone matrix.
275.62	276.53	MUDSTONE, medium to dark grey, some silty laminae, very weak rock, solid core, abrupt basal contact faults.
276.53	276.70	COAL, HEAVY (INFERIOR COAL), carbonaceous mudstone phases near top of unit very weak rock, broken core, abrupt basal contact.
276.70	276.85	MUDSTONE, dark blackish-grey, silty near base of unit weak rock, broken core, abrupt basal contact.
276.85	276.90	COAL, HEAVY (INFERIOR COAL), shaly solid core, weak rock, abrupt basal contact.
276.90	277.15	COAL, <10% BRIGHT, broken core, abrupt basal contact.
277.15	277.17	COAL, HEAVY (INFERIOR COAL), shaly solid core, abrupt basal contact.
277.17	277.21	SANDSTONE, black, very fine grained, coal matrix solid core, weak rock, abrupt basal contact.
277.21	277.28	SILTSTONE, black, carbonaceous weak rock, solid core, transitional basal contact.
277.28	278.39	SILTSTONE, light to dark grey, arenaceous and mudstone

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444323

REPORT : MC55 COAL SYSTEM Page : 30
Date : WED, 21 MAR 1984

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		laminae throughout interval weak rock, solid core, abrupt basal contact of beddins 35 des. to horizontal.
278.39	279.82	SANDSTONE, light grey, fine grained, lithic (predominately rock fragments) some carbonaceous laminae throughout interval weak rock, solid core, abrupt basal contact.
279.82	279.95	SILTSTONE, medium to dark grey, arenaceous lenses near base of unit, weak rock, solid core, abrupt basal contact.
279.95	280.00	SANDSTONE, light grey, fine grained, solid core, abrupt basal contact of bedding 20 des. to horizontal.
280.00	280.14	MUDSTONE, dark grey, silty in part solid core, abrupt basal contact.
280.14	280.24	SANDSTONE, light grey, fine grained, thick mudstone bands near middle of unit solid core, abrupt basal contact of beddins 20 des. to horizontal.
280.24	280.74	SILTSTONE, dark grey, weak rock, solid core, abrupt basal contact. Basal contact step faulted with two faults at 75 degrees.
280.74	282.70	SANDSTONE, light greyish-red, fine to medium grained, carbonaceous bands near middle of unit lithic (predominately rock fragments) weak rock, broken core. Common red iron staining middle unit and base unit.
282.70	283.09	NO SAMPLE RETURN.
283.09	283.19	50% SANDSTONE, light to medium grey, weak rock, intermixed with: 50% MUDSTONE, dark grey, fragments weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
283.19	283.38	SILTSTONE, dark grey, some arenaceous phases, weak rock, solid core, abrupt basal contact of bedding 30 des. to horizontal.
283.38	283.44	SANDSTONE, grey, very fine grained, silty near top of unit fining upwards some carbonaceous laminae, weak rock, solid core, abrupt basal contact of beddins 30 des. to horizontal.
283.44	283.72	60% SANDSTONE, grey, very fine grained, weak rock, interbedded with:

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444324

REPORT : MC55 COAL SYSTEM Page : 31
Date : WED, 21 MAR 1984

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		40% SILTSTONE, bands and laminae, weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
283.72	283.81	MUDSTONE, light to dark grey, silty laminae weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal, joints, common calcite on joint surfaces.
283.81	284.34	MUDSTONE, greyish-black, broken core, weak rock, abrupt basal contact joints.
284.34	284.35	SANDSTONE, grey, very fine grained, weak rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
284.35	284.79	60% MUDSTONE, medium to dark blackish-grey, weak rock, abrupt basal contact of bedding 30 deg. to horizontal, interbedded with: 40% SANDSTONE, light to medium grey, very fine grained, laminae and bands, weak rock, solid core.
284.79	284.86	CARBONACEOUS MUDSTONE, black, some coal frasments, stiff, very broken core, abrupt basal contact of bedding 30 deg. to horizontal.
284.86	284.88	COAL, <10% BRIGHT, solid core, abrupt basal contact.
284.88	285.12	MUDSTONE, black, carbonaceous in part weak rock, abrupt basal contact joints.
285.12	285.22	NO SAMPLE RETURN.
285.22	285.26	COAL, <10% BRIGHT, solid core, abrupt basal contact of bedding 30 deg. to horizontal, occassional zeolite traces. Clinonoctilite, a zeolite from heat alteration effects of dolerite sill.
285.26	285.29	CARBONACEOUS MUDSTONE, black, solid core, weak rock, abrupt basal contact of bedding 30 deg. to horizontal.
285.29	285.35	COAL, <10% BRIGHT, black, broken core, transitional basal contact.
285.35	285.42	COAL, HEAVY (INFERIOR COAL), black, very broken core, abrupt basal contact.
285.42	285.45	CARBONACEOUS MUDSTONE, black, firm, abrupt basal contact.
285.45	285.52	COAL, HEAVY (INFERIOR COAL), with carbonaceous mudstone

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		phases throughout interval fragmented.
285.52	286.28	NO SAMPLE RETURN.
286.28	286.60	COAL, HEAVY (INFERIOR COAL), black, fragments firm, fragmented.
286.60	286.85	NO SAMPLE RETURN.
286.85	287.10	COAL, HEAVY (INFERIOR COAL), some carbonaceous mudstone bands fragmented.
287.10	287.57	MUDSTONE, greyish-black, carbonaceous near top of unit and slightly carbonaceous near base of unit and near middle of unit very broken core, abrupt basal contact common gypsum on joint surfaces.
287.57	287.61	SANDSTONE, black, very fine grained, mudstone matrix abrupt basal contact of bedding 20 deg. to horizontal.
287.61	287.76	MUDSTONE, blackish-grey, slightly carbonaceous weak rock, broken core, abrupt basal contact of beddins 20 deg. to horizontal, joints, common gypsum on joint surfaces.
287.76	287.90	SANDSTONE, blackish-grey, very fine grained, slightly carbonaceous weak rock, solid core, abrupt basal contact of beddins 20 deg. to horizontal.
287.90	288.03	SILTSTONE, greyish-black, slightly carbonaceous fragmented.
288.03	288.53	NO SAMPLE RETURN. Core loss end of hq core and start of nq.
288.53	289.94	MUDSTONE, medium to dark grey, slightly carbonaceous near top of unit very broken core, weak rock, abrupt basal contact joints, abundant calcite on joint surfaces.
289.94	290.39	SANDSTONE, light greenish-grey, very fine grained, solid core, weak rock, transitional basal contact abundant calcite on joint surfaces. 1 cm. Calcite vein middle unit,at 80 degrees to core axis.
290.39	290.51	SILTSTONE, blackish-grey, slightly arenaceous weak rock, solid core, transitional basal contact.
290.51	290.61	SANDSTONE, medium to dark brownish-grey, very fine grained, some carbonaceous laminae, weak rock, solid core, abrupt basal contact of bedding 20 deg. to horizontal, joints,

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		calcite on joint surfaces.
290.61	290.88	SANDSTONE, light reddish-green, fine grained, weak rock, very broken core, abrupt basal contact joints, common zeolite calcite on joint surfaces. Some thermal metamorphism.
290.88	291.06	DOLERITE, greenish-grey, very fine grained, very strong rock, solid core, joints, calcite on joint surfaces.
291.06	291.36	NO SAMPLE RETURN.
291.36	291.46	DOLERITE, blackish-grey, very strong rock, solid core, massive abrupt basal contact.
291.46	291.78	SILTSTONE, reddish-green, some arenaceous phases, broken core, weak rock. Some thermal metamorphism.
291.78	292.08	SILTSTONE, light to medium grey, weak rock, solid core, transitional basal contact.
292.08	292.40	SILTSTONE, black, slightly carbonaceous weak rock, solid core, transitional basal contact. Traces of yellow iron mineral top of unit,slightly thermally metamorphosed.
292.40	293.24	MUDSTONE, greenish-red, weak rock, solid core, transitional basal contact joints, occasional calcite on joint surfaces. Common red iron mineral,slightly therm ally metamorphosed.
293.24	293.95	SILTSTONE, light to medium greenish-grey, slightly arenaceous some laminae throughout interval weak rock, broken core, of beddins 10 des. to horizontal. Green staining,possibly chloritic, laminations altered to green mineral slightly thermally metamorphosed.
293.95	294.08	NO SAMPLE RETURN.
294.08	294.25	SILTSTONE, light grey, some laminae near base of unit, very broken core, weak rock, transitional basal contact of beddins 20 des. to horizontal. Slightly thermally metamorphosed.
294.25	294.32	SILTSTONE, greenish-red, arenaceous laminae throughout interval, weak rock, solid core. Slightly thermally metamorphosed.
294.32	294.36	NO SAMPLE RETURN.

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444327

Hole Number : CA0109R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
294.36	294.57	SANDSTONE, light to medium brownish-green, very fine grained, numerous mudstone laminae, broken core, weak rock, abrupt basal contact of bedding 15 deg. to horizontal, joints. Talc on joint surfaces,slightly metamorphosed.
294.57	294.87	MUDSTONE, light to medium brownish-green, very broken core, very weak rock, abrupt basal contact of bedding 20 deg. to horizontal. Slightly brecciated,with talc on joints.
294.87	294.96	MUDSTONE, dark green, very weak rock, broken core, transitional basal contact common calcite nodules.
294.96	295.40	SILTSTONE, mottled brownish-green, arenaceous near base of unit weak rock, broken core, transitional basal contact joints, abundant calcite on joint surfaces.
295.40	295.91	DOLERITE, dark grey, fine grained, very strong rock, solid core, transitional basal contact.
295.91	297.33	DOLERITE, dark green, fine grained, with arenaceous clasts, strong rock, broken core, abundant calcite on joint surfaces. Brecciated,.
297.33	297.36	NO SAMPLE RETURN.
297.36	297.67	DOLERITE, dark greenish-grey, fine grained, very strong rock, solid core, transitional basal contact abundant calcite on joint surfaces. Brecciated.
297.67	298.26	DOLERITE, greenish-grey, fine grained, very strong rock, broken core, transitional basal contact. Veins with calcite and talc.
298.26	300.36	DOLERITE, greenish-grey, fine grained, very strong rock, broken core, joints.

****
Total Depth = 300.36
****

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444328

LITHOLOGICAL LOG REPORT
for hole CA 0110

Eastings: 492228.00 Hole Size: 120mm

Northings: 5185274.00

Elevation: 42.00m

Total Depth: 304.00m

Probe Depth: 299.00m

Logged By: Thornley W.J.

Rig Type:

Drilling Commenced: 18/03/82

Drilling Completed: 20/04/82

Data Source: Marathon Pet. Aust. Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor: BPB Instruments

Logs Available: Gamma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Med Resolution

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444329

REPORT : MCSS COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
HAMMER		
0.00 -	1.00	SOIL, light brown, arenaceous soft.
		Base of ALLUVIUM
1.00 -	4.00	MUDSTONE, medium to dark brown, rare coal fragments, firm, slightly weathered, occasional yellow iron oxide stainins.
		Base of WEATHERING
4.00 -	12.00	MUDSTONE, medium to dark grey, rare coal fragments rare slightly carbonaceous wisps, firm, unweathered.
12.00 -	14.00	90% MUDSTONE, medium to dark grey, firm, interbedded with: 10% SILTSTONE, grey, bands throughout interval very weak rock.
14.00 -	16.00	90% CARBONACEOUS SHALE, moderately weak rock, interbedded with: 5% CARBONACEOUS MUDSTONE, black, verysoft. 5% MUDSTONE, light greyish-brown, some carbonaceous wisps, very weak rock.
16.00 -	18.00	50% CARBONACEOUS MUDSTONE, black, very soft, interbedded with: 35% COAL, interbedded with: 15% MUDSTONE, medium to dark grey, very weak rock.
18.00 -	20.00	NO SAMPLE RETURN.
20.00 -	24.00	60% SANDSTONE, light grey, fine grained, loose, interbedded with: 40% MUDSTONE, medium to dark grey, bands very weak rock.
24.00 -	28.00	SANDSTONE, light to medium grey, fine to medium grained, coal bands near base of unit, loose.
28.00 -	29.00	COAL.
29.00 -	30.00	85% COAL, carbonaceous shaly in part. 15% MUDSTONE, light brownish-grey.
30.00 -	31.00	95% COAL, carbonaceous shaly in part.

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444330

REPORT : MC55 COAL SYSTEM Page : 3
Date : WED, 21 MAR 1984

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
HAMMER		
		5% MUDSTONE, light brownish-grey.
31.00 -	34.00	SANDSTONE, light to medium grey, fine grained, silty phases.
34.00 -	36.00	95% SANDSTONE, light grey, fine grained, quartz lithic. 5% COAL, HEAVY (INFERIOR COAL).
BLADES		
36.00 -	38.00	70% SANDSTONE, light to medium grey, fine grained. 30% MUDSTONE, medium to dark grey.
38.00 -	45.00	MUDSTONE, medium to dark grey, silty near base of unit some arenaceous phases near base of unit.
45.00 -	46.00	90% MUDSTONE, medium to dark grey, interbedded with: 10% CARBONACEOUS SHALE, dark brownish-black, bands.
46.00 -	49.00	70% MUDSTONE, grey, interbedded with: 30% SANDSTONE, light to medium grey, very fine grained, arsillaceous matrix.
49.00 -	51.00	70% SANDSTONE, light to medium grey, very fine grained, arsillaceous matrix. 30% MUDSTONE, medium to dark grey.
51.00 -	55.00	60% MUDSTONE, medium to dark grey, interbedded with: 40% SANDSTONE, light grey, fine grained.
55.00 -	59.00	SANDSTONE, light grey, fine to medium grained, quartz lithic poorly sorted seam.
59.00 -	61.00	MUDSTONE, brownish-grey.
61.00 -	65.00	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) moderately sorted seam. 90 % quartz , 6% lithics, 4 % feldspar.
65.00 -	66.00	70% MUDSTONE, brown, interbedded with: 30% SANDSTONE, light whitish-grey, medium grained, quartzose ()90% quartz) moderately sorted seam.
66.00 -	70.00	60% SANDSTONE, light whitish-grey, fine to medium grained, quartzose ()90% quartz) moderately sorted seam, interbedded with: 40% SILTSTONE, medium to dark grey.
70.00 -	71.00	SANDSTONE, light grey, fine to medium grained, quartz lithic.

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444331

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
BLADES		
71.00 -	73.00	60% SANDSTONE, light grey, fine to medium grained, quartz lithic interbedded with: 40% SHALE, dark blackish-grey, carbonaceous in part.
73.00 -	74.00	90% CARBONACEOUS SHALE, medium to dark brownish-black, interbedded with: 5% COAL, HEAVY (INFERIOR COAL). 5% CLAYSTONE, light greyish-brown.
74.00 -	75.00	95% CARBONACEOUS SHALE, dark brownish-black, rare coal fragments, interbedded with: 5% CLAYSTONE, light greyish-white.
75.00 -	76.00	80% CARBONACEOUS SHALE, medium to dark black, interbedded with: 15% COAL, HEAVY (INFERIOR COAL). 5% CLAYSTONE, light brownish-cream.
76.00 -	77.00	75% CARBONACEOUS SHALE, dark brownish-black, coal in part interbedded with: 20% COAL, <10% BRIGHT. 5% CLAYSTONE, light brownish-cream.
77.00 -	78.00	80% CARBONACEOUS SHALE, dark brownish-black, coal in part interbedded with: 20% COAL, HEAVY (INFERIOR COAL).
78.00 -	79.00	80% MUDSTONE, medium to dark brown, slightly carbonaceous. 20% SANDSTONE, light grey, fine grained, quartz lithic arsillaceous matrix.
79.00 -	81.00	70% MUDSTONE, medium to dark greyish-brown. 30% SANDSTONE, light grey, fine grained, arsillaceous matrix.
81.00 -	88.00	SANDSTONE, light grey, medium grained, quartz feldspathic seam moderately sorted.
88.00 -	89.00	95% MUDSTONE, medium to dark brownish-grey. 5% COAL, bands.
89.00 -	90.00	MUDSTONE, dark grey.
90.00 -	91.00	85% MUDSTONE, dark grey. 15% COAL, bands.
91.00 -	92.00	60% CARBONACEOUS SHALE, black, coal slightly fissile.

444332

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REPORT : MOSS COAL SYSTEM Page : 5
Date : WED, 21 MAR 1984

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
BLADES		35% COAL, HEAVY (INFERIOR COAL). 5% MUDSTONE, brownish.
92.00 -	93.00	60% COAL, HEAVY (INFERIOR COAL). 40% CARBONACEOUS SHALE, black, coal.
93.00 -	94.00	75% COAL, HEAVY (INFERIOR COAL). 20% CARBONACEOUS SHALE, black, coal. 5% CLAYSTONE, Light to dark brownish-cream.
94.00 -	96.00	MUDSTONE, brownish-grey, arenaceous phases near base of unit.
96.00 -	100.00	SANDSTONE, light grey, fine grained, some mudstone fragments quartz feldspathic sub-rounded moderately sorted.
100.00 -	101.40	DOLERITE, very fine grained, moderately strong rock.
DIAMOND CORING		
101.40 -	102.06	DOLERITE, black, very fine grained, very strong rock, solid core. Some veining present.
102.06 -	102.36	DOLERITE, mottled greyish-black, very fine grained, very strong rock, solid core, joints.
102.36 -	102.60	DOLERITE, medium to dark greenish-black, very fine grained, solid core, very strong rock, joints.
102.60 -	103.10	NO SAMPLE RETURN.
103.10 -	106.10	DOLERITE, mottled black, very fine grained, very strong rock, solid core, transitional basal contact joints.
106.10 -	108.18	DOLERITE, mottled black, fine to medium grained, fining upwards solid core, very strong rock, massive transitional basal contact.
108.18 -	109.16	DOLERITE, mottled black, medium grained, solid core, very strong rock, massive transitional basal contact.
109.16 -	112.10	DOLERITE, mottled black, fine grained, very strong rock, solid core, joints.
112.10 -	115.44	DOLERITE, black, very fine grained, very strong rock, solid core, abrupt basal contact joints.
115.44 -	115.78	SANDSTONE, blackish-grey, very fine grained, mudstone

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		laminae and thin bands throughout interval, solid core, strong rock, abrupt basal contact of bedding 45 deg. to horizontal.
115.78	116.11	SANDSTONE, light to medium grey, fine grained, moderately strong rock, solid core, abrupt basal contact of bedding 30 deg. to horizontal.
116.11	116.25	DOLERITE, light green, very fine grained, strong rock, solid core.
116.25	117.85	SANDSTONE, light whitish-grey, fine grained, silty laminae near base of unit, solid core, weak rock, massive abrupt basal contact of bedding 30 deg. to horizontal. Recrystallized top of unit.
117.85	117.99	DOLERITE, light green, very fine grained, lithic (predominately rock fragments) fragments throughout interval, very broken core, moderately strong rock, abrupt basal contact. Fragments of sandstone and mudstone.
117.99	118.10	MUDSTONE, brown, moderately strong rock, very broken core.
118.10	118.26	70% SANDSTONE, light to medium brown, very fine grained, matrix solid core, intermixed with: 20% MUDSTONE, light to medium green, fragments chloritic intermixed with: 10% SANDSTONE, light whitish-grey, very fine grained.
118.26	119.60	SANDSTONE, light grey, fine to medium grained, solid core, very weak rock, abrupt basal contact of bedding 10 deg. to horizontal.
119.60	119.97	MUDSTONE, medium to dark blackish-brown, carbonaceous in part coal fragments near top of unit solid core.
119.97	120.23	CARBONACEOUS MUDSTONE, black, solid core, abrupt basal contact faults.
120.23	120.28	MUDSTONE, light to medium brown, broken core, abrupt basal contact.
120.28	120.35	COAL, HEAVY (INFERIOR COAL), black, solid core, transitional basal contact.
120.35	120.79	MUDSTONE, brown, solid core, abrupt basal contact.

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
120.79	121.10	SILTSTONE, grey, solid core.
ROLLER BIT		
121.10	122.00	80% MUDSTONE, grey. 20% COAL.
122.00	124.00	SANDSTONE, light grey, medium grained, quartzose (>90% quartz) seam well sorted.
124.00	126.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) seam moderately sorted. 90 % quartz ,7 % feldspar ,3 % lithics.
126.00	127.00	SANDSTONE, light grey, medium grained, quartz feldspathic seam moderately sorted.
127.00	128.00	60% SANDSTONE, light grey, medium grained, quartz lithic seam moderately sorted. 40% MUDSTONE, medium to dark brownish-grey.
128.00	130.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) sub-rounded moderately sorted.
130.00	134.00	SANDSTONE, light grey, fine to medium grained, quartz lithic sub-rounded moderately sorted. 88 % quartz ,10 % lithics ,2% feldspar becomming more quartzose to base of unit.
134.00	138.00	SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) sub-rounded moderately sorted some mudstone bands throughout interval.
138.00	144.00	SANDSTONE, light grey, fine to medium grained, quartz lithic seam moderately sorted quartzose (>90% quartz) near base of unit.
144.00	145.00	60% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) intermixed with: 40% SILTSTONE, dark grey.
145.00	146.00	SILTSTONE, medium to dark blackish-grey, carbonaceous in part arenaceous in part.
146.00	147.00	95% MUDSTONE, dark blackish-grey, carbonaceous and shaly in part. 5% COAL.

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Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
147.00	149.00	70% SILTSTONE, grey, intermixed with: 30% SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments).
149.00	150.00	80% SILTSTONE, grey. 20% COAL.
150.00	151.00	60% SHALE, light to dark greyish-black, coal in part intermixed with: 40% SANDSTONE, light whitish-grey, very fine grained.
151.00	153.00	95% MUDSTONE, medium to dark grey. 5% COAL.
153.00	155.00	90% MUDSTONE, dark brownish-grey, interbedded with: 10% COAL.
155.00	156.00	MUDSTONE, brown.
156.00	159.00	MUDSTONE, grey, some arenaceous phases.
159.00	160.00	95% SANDSTONE, light to medium grey, very fine grained, interbedded with: 5% COAL.
160.00	162.00	65% SANDSTONE, light to medium grey, medium grained, quartz lithic. 30% SILTSTONE, greyish-brown. 5% CARBONACEOUS SHALE.
162.00	164.00	90% SANDSTONE, light to medium grey, fine grained, quartz feldspathic seam well sorted. 10% SILTSTONE, brownish-grey.
164.00	165.00	SANDSTONE, light grey, fine to medium grained, seam quartz feldspathic moderately sorted.
165.00	166.00	SANDSTONE, light grey, fine grained, angular quartzose (>90% quartz) well sorted thin mudstone bands. 95 % quartz,3 % feldspar,2 % lithics.
166.00	167.00	85% SANDSTONE, light whitish-grey, fine grained, quartz feldspathic angular. 15% SILTSTONE, dark grey.
167.00	168.00	50% SILTSTONE, medium to dark grey, intermixed with:

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
		50% SANDSTONE, medium to dark grey, very fine grained.
168.00	169.00	90% SANDSTONE, light grey, fine grained, quartzose (>90% quartz). 10% SILTSTONE, medium to dark grey.
169.00	170.00	SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) seam moderately sorted.
170.00	183.00	SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) seam moderately sorted. 91 % quartz ,8 % feldspar,1 % lithics slightly more feldspathic middle of unit.
183.00	185.00	SANDSTONE, grey, fine to medium grained, quartz lithic some thin coal bands.
185.00	194.00	SANDSTONE, light to medium grey, fine to medium grained, quartz lithic.
194.00	196.00	90% SANDSTONE, light to medium grey, fine to medium grained, interbedded with: 10% MUDSTONE, dark grey.
196.00	208.00	SANDSTONE, grey, medium grained, quartzose (>90% quartz) and moderately sorted. Quartz 90 %,lithics 5 %,feldspar 5%.
208.00	215.00	SANDSTONE, light to medium grey, fine grained, quartz lithic with quartzose (>90% quartz) near base of unit.
215.00	223.00	95% SANDSTONE, light to medium grey, fine to medium grained, quartzose (>90% quartz) seam moderately sorted, rare pyrite fragments, interbedded with: 5% MUDSTONE, dark grey.
223.00	230.00	SANDSTONE, light to medium greenish-grey, medium grained, quartz feldspathic with rare pyritic mudstone seam moderately sorted.
230.00	231.00	SANDSTONE, light to medium greenish-grey, fine grained, quartz feldspathic seam moderately sorted with minor mudstone bands and rare coal.
231.00	233.00	65% MUDSTONE, dark blackish-grey, shaly in part interbedded with: 35% SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz feldspathic seam well sorted and

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
		minor coal lenses near base of unit.
233.00	242.00	95% SANDSTONE, light to medium bluish-grey, fine to medium grained, quartz feldspathic well sorted seam, with bands of: 5% MUDSTONE, dark blackish-grey, with some rare sporadic coal fragments near top of unit.
242.00	244.00	90% SANDSTONE, light to medium grey, fine grained, quartzose (>90% quartz) sub-rounded well sorted, with bands of: 10% MUDSTONE, dark grey, minor pyritic fragments.
244.00	246.00	55% SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) well sorted seam, intermixed with: 35% MUDSTONE, dark blackish-grey, shaly in part with minor coal bands. 10% DOLERITE, dark blackish-grey, fine grained, sill.
246.00	254.00	95% SANDSTONE, light to medium grey, fine to medium grained, quartz lithic moderately sorted seam, with bands of: 5% MUDSTONE, dark blackish-grey.
254.00	257.00	90% MUDSTONE, dark blackish-grey, with minor arsillaceous bands irregularly interbedded with: 10% SANDSTONE, light to medium greenish-grey, fine grained, near base of unit quartz feldspathic.
257.00	261.00	90% SANDSTONE, light to medium greenish-grey, fine grained, quartz lithic well sorted seam, irregularly interbedded with: 10% MUDSTONE, dark blackish-grey, near top of unit slightly shaly.
261.00	263.00	55% SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz lithic well sorted seam, interbedded with: 45% MUDSTONE, dark blackish-grey.
263.00	265.00	SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz lithic moderately sorted seam with minor mudstone bands.
265.00	266.00	SANDSTONE, light to medium greenish-grey, fine grained, quartz lithic well sorted sub-rounded.
266.00	267.00	95% SANDSTONE, light to medium greenish-grey, fine to

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444338

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
		medium grained, quartz lithic moderately sorted seam, with bands of: 5% MUDSTONE, dark blackish-grey.
267.00	268.00	90% SANDSTONE, light to medium greenish-grey, fine grained, quartz lithic well sorted sub-rounded, with bands of: 10% DOLERITE, dark blackish-grey, fine grained, sill hard.
268.00	269.00	SANDSTONE, light to medium greenish-grey, fine grained, quartzose (>90% quartz) well sorted seam.
269.00	272.00	80% SANDSTONE, light to medium greenish-grey, fine grained, quartzose (>90% quartz) moderately sorted seam. 20% MUDSTONE, dark greyish-black, hard granular quartzose (>90% quartz).
272.00	275.00	SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz feldspathic moderately sorted seam with some lithic (predominately rock fragments) fragments and minor mudstone bands rare mica fragments.
275.00	276.00	SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz lithic moderately sorted seam.
276.00	277.00	85% MUDSTONE, light to medium whitish-grey, interbedded with: 15% SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz lithic poorly sorted seam.
277.00	279.00	80% SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz feldspathic moderately sorted seam, irregularly interbedded with: 20% MUDSTONE, light to medium whitish-grey, hard.
279.00	282.00	60% SANDSTONE, light to medium greenish-grey, fine grained, quartz lithic moderately sorted seam. 40% MUDSTONE, medium to dark grey.
282.00	285.00	90% SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz lithic moderately sorted seam, irregularly interbedded with: 10% MUDSTONE, light to dark grey, silty in part.
285.00	292.00	95% SANDSTONE, light to medium greenish-grey, fine to medium grained, quartz lithic moderately sorted seam, rare pyrite nodules, with bands of: 5% MUDSTONE, dark blackish-grey.

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444339

Hole Number : CA0110

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
292.00	293.00	80% SANDSTONE, light to medium greenish-grey, medium to coarse grained, lithic (predominately rock fragments) moderately sorted seam, interbedded with: 20% CLAY, white, slightly ferruginous sticky.
293.00	295.00	SANDSTONE, medium to dark grey, fine to medium grained, lithic (predominately rock fragments) moderately sorted seam with sporadic argillaceous and mudstone bands.
295.00	302.00	SANDSTONE, light to medium grey, fine to medium grained, quartz lithic well sorted seam.
302.00	304.00	SANDSTONE, light to medium greenish-grey, medium grained, lithic (predominately rock fragments) moderately sorted seam.

****
Total Depth = 304.00
****

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444340

LITHOLOGICAL LOG REPORT
For hole CA 0111R

Eastings: 489000.00
Northings: 5179691.00
Elevation: 75.00m
Total Depth: 171.50m
Probe Depth: 168.00m

Hole Size: 120mm
Core Size: 64mm

Logged By: MacConnachie Ross
Rig Type:

Drilling Commenced: 16/04/82
Drilling Completed: 12/05/82

Data Source: Marathon Pet. Aust, Ltd
Drilling Contractor: Stackpoole Drilling
Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Bed Resolution

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444341

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
0.00 -	2.00	CLAY, light to dark yellowish-brown, arenaceous in part and gravelly in part.
AMMER		
2.00 -	5.00	85% CLAY, medium to dark yellowish-brown, arenaceous highly weathered, with clasts of: 15% DOLERITE, green, pebble, highly weathered.
5.00 -	8.00	95% SANDSTONE, medium to dark brownish-green, fine to medium grained, lithic (predominately rock fragments) moderately sorted angular, highly weathered, with clasts of: 5% CLAY, light to medium reddish-orange, argillaceous matrix near top of unit highly weathered, grading into:
OLLER BIT		
8.00 -	12.00	SAND, light to medium green, fine to medium grained, lithic (predominately rock fragments) poorly sorted angular, moderately weathered, grading into:
12.00 -	17.00	SAND, light to medium greenish-brown, fine grained, litho-feldspathic (<60% qtz, rf)felds) moderately sorted seam, moderately weathered, grading into:
17.00 -	18.00	SAND, light to medium brown, fine to medium grained, quartz lithic moderatelysorted seam, slightly weathered.
IAMOND CORING		
18.00 -	18.14	NO SAMPLE RETURN. Core loss.
18.14 -	18.25	GRAVEL, mottled grey, pebble, basaltic and arenaceous very broken core.
18.25 -	18.65	SANDSTONE, light to medium yellowish-brown, fine grained, quartzose (>90% quartz) moderately weak rock, slightly weathered, very broken core, with mud pellets.
18.65 -	19.70	SANDSTONE, light to medium yellowish-brown, fine to medium grained, quartzose (>90% quartz) moderately weak rock, slightly weathered, very broken core, joints.
19.70 -	19.74	CLAYSTONE, white, sticky, firm.
19.74 -	20.30	SANDSTONE, light to medium orangy-brown, medium grained,

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444342

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		quartz feldspathic broken core, slightly weathered, moderately weak rock, joints.
20.30 -	21.55	NO SAMPLE RETURN. Core loss.
21.55 -	22.01	SANDSTONE, medium to dark greenish-blue, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) very broken core, slightly weathered, weak rock, joints, occasional yellow iron oxide staining.
22.01 -	22.35	SANDSTONE, medium to dark bluish-green, fine grained, litho-feldspathic (<80% qtz, rf)felds) moderately weak rock, slightly weathered, broken core, occasional yellow iron oxide staining.
22.35 -	22.48	60% SANDSTONE, medium to dark bluish-green, fine grained, litho-feldspathic (<80% qtz, rf)felds) very broken core, slightly weathered, intermixed with: 40% MUDSTONE, medium to dark yellowish-brown, very broken core, slightly weathered.
22.48 -	23.95	NO SAMPLE RETURN. Core loss.
23.95 -	24.03	45% SANDSTONE, medium to dark greenish-blue, medium grained, feldspatho-lithic (<80% qtz, felds)rf.) weak rock, slightly weathered. 55% SANDSTONE, light to medium greenish-brown, fine to medium grained, lithic (predominately rock fragments) moderately weak rock, slightly weathered, very broken core.
24.03 -	24.23	SANDSTONE, light to medium greenish-blue, medium grained, feldspatho-lithic (<80% qtz, felds)rf.) moderatelyweak rock, slightly weathered, broken core, joints.
24.23 -	24.65	NO SAMPLE RETURN. Core loss.
24.65 -	24.99	SANDSTONE, light to medium brownish-blue, medium grained, litho-feldspathic (<80% qtz, rf)felds) poorly sorted and granular near top of unit, very broken core, slightly weathered, moderately weak rock.
24.99 -	25.10	SANDSTONE, light to medium brownish-green, very fine grained, lithic (predominately rock fragments) arsillaceous matrix and pebbly angular in part, very stiff, slightly weathered, broken core, erosional basal contact of bedding 50 deg. to horizontal.

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444343

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

25.10 - 25.50 SANDSTONE, light to medium bluish-green, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) moderately weak rock, broken core, abrupt basal contact of bedding 0 deg. to horizontal.

25.50 - 25.70 MUDSTONE, green, arenaceous and pebbly near middle of unit firm, broken core, abrupt basal contact of beddins 50 deg. to horizontal, joints, rare red iron oxide on joint surfaces.

25.70 - 25.92 MUDSTONE, variated blackish-green, carbonaceous in part stiff, broken core, abrupt basal contact of beddins 0 deg. to horizontal.

25.92 - 26.80 SANDSTONE, medium to dark greenish-brown, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) firm, moderately weathered, very broken core, abrupt basal contact of beddins 0 deg. to horizontal.

26.80 - 26.90 CARBONACEOUS MUDSTONE, dark greyish-black, soft, fragmented.

26.90 - 27.65 NO SAMPLE RETURN. Core loss.

27.65 - 27.91 80% CARBONACEOUS MUDSTONE, dark bluish-black, arsillaceous with numerous, stiff, unweathered, joints, intermixed with:
20% SANDSTONE, pale bluish-grey, very fine grained, clasts and lenses quartz lithic stiff, broken core, with disturbed beddins.

27.91 - 27.95 CLAYSTONE, dark orangy-brown, slightly carbonaceous very stiff, broken core, massive slisht brown iron oxide stainins.

27.95 - 27.98 CLAYSTONE, light to medium whitish-green, fragmented, very stiff, deformed basal contact of bedding 45 deg. to horizontal.

27.98 - 28.04 80% SANDSTONE, pale brownish-grey, medium grained, litho-feldspathic (<80% qtz, rf)felds) well sorted moderately weak rock, broken core, joints, with clasts of:
20% CLAYSTONE, light to medium whitish-green, very stiff, transitional basal contact of beddins 0 deg. to horizontal.

28.04 - 28.43 SANDSTONE, pale brownish-grey, medium grained,

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		litho-feldspathic (<80% qtz, rf>felds) well sorted moderately weak rock, broken core, abrupt basal contact of beddins 45 des. to horizontal.
28.43 -	28.47	MUDSTONE, light brownish-tan, silty with arenaceous frasments weak rock, broken core, of beddins 0 des. to horizontal.
28.47 -	28.55	SANDSTONE, light to medium bluish-green, fine to medium grained, lithic (predominately rock frasments) weak rock, broken core, deformed basal contact of beddins 70 des. to horizontal, joints.
28.55 -	28.65	SANDSTONE, pale brownish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) weak rock, broken core, massive deformed basal contact of beddins 60 des. to horizontal.
28.65 -	28.89	BRECCIA, mottled greenish-oranse, medium to coarse grained, arenaceous matrix fining upwards hard near base of unit poorly sorted pebbly angular mudstone, very stiff, slishtly weathered, broken core, transitional basal contact of beddins 0 des. to horizontal, joints.
28.89 -	29.00	BRECCIA, dark reddish-brown, pebble, numerous mudstone frasments, very broken core, slishtly weathered, deformed basal contact of beddins 65 des. to horizontal.
29.00 -	29.13	SANDSTONE, light whitish-brown, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) with numerous mudstone frasments moderately weak rock, slishtly weathered, broken core, deformed basal contact of beddins 65 des. to horizontal, joints.
29.13 -	29.18	BRECCIA, medium to dark oransy-brown, pebble, mudstone with arenaceous frasments stiff, very broken core, abrupt basal contact of beddins 65 des. to horizontal.
29.18 -	29.49	SANDSTONE, pale brownish-white, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) moderately weak rock, broken core.
29.49 -	30.65	NO SAMPLE RETURN.
30.65 -	30.77	SANDSTONE, pale greenish-brown, fine to medium grained, quartz lithic with sub-rounded, moderately weak rock, very broken core. Dolerite pebbles.

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
30.77 -	30.93	SANDSTONE, varisated sreenish-brown, fine to medium srained, quartz lithic poorly sorted with mudstone clasts broken core, weak rock.
30.93 -	31.10	BRECCIA, varisated blackish-tan, pebble, seam arenaceous with minor arenaceous matrix, loose, very broken core, transitional basal contact. Dolerite pebbles.
31.10 -	31.14	BRECCIA, varisated sreenish-brown, arenaceous litho-feldspathic ((80% qtz, rf)felds) clasts and matrix fragmented, slightly weathered, soft.
31.14 -	33.65	NO SAMPLE RETURN.
33.65 -	33.69	SANDSTONE, light to medium sreenish-brown, fine srained, litho-feldspathic ((80% qtz, rf)felds) very broken core, unweathered, weak rock.
33.69 -	33.96	50% SANDSTONE, light to medium oransy-brown, fine srained, litho-feldspathic ((80% qtz, rf)felds) broken core, with clasts of: 50% SANDSTONE, pale brownish-tan, fine srained, litho-feldspathic ((80% qtz, rf)felds) sub-rounded pebbles, weak rock. Incomplete alteration sives "clasts".
33.96 -	34.13	SANDSTONE, varisated yellowish-sreen, litho-feldspathic ((80% qtz, rf)felds) weak rock, very broken core, transitional basal contact of bedding 45 deg. to horizontal.
34.13 -	34.80	SANDSTONE, mottled bluish-srey, medium srained, litho-feldspathic ((80% qtz, rf)felds) broken core, unweathered, moderately weak rock, massive transitional basal contact of bedding 45 deg. to horizontal, joints, rare yellow iron oxide stainins.
34.80 -	35.27	SANDSTONE, mottled brownish-srey, medium srained, litho-feldspathic ((80% qtz, rf)felds) very broken core, moderately weak rock, massive abrupt basal contact of bedding 45 deg. to horizontal, moderate yellow iron oxide stainins.
35.27 -	36.50	65% METAMORPHIC ROCK, sreen, arsillaceous very stiff, broken core, common calcite disseminated, with clasts of: 35% DOLERITE, dark srey, fine srained, poorly sorted ansular in part and sub-rounded in part, strons rock. Granule to

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444346

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		9cm size ranse with some calcite veins.
36.50 -	36.65	NO SAMPLE RETURN.
36.65 -	37.40	60% MUDSTONE, sreen, arsillaceous slishtly sranular, very stiff, transitional basal contact common calcite disseminated, with cobbles of: 40% DOLERITE, dark srey, fine srained, poorly sorted ansular strons rock, broken core.
37.40 -	39.62	50% MUDSTONE, sreen, arsillaceous slishtly sranular, very weak rock, common calcite disseminated. 50% DOLERITE, dark srey, fine srained, ansular strons rock. Fractured around rim of dolerite.
39.62 -	39.65	NO SAMPLE RETURN.
39.65 -	40.70	50% BRECCIA, sreen, matrix arenaceous in part, weak rock, occasional calcite disseminated, with cobbles of: 50% DOLERITE, dark srey, fine srained, ansular strons rock, broken core, transitional basal contact of bedding 45 des. to horizontal.
40.70 -	40.80	60% BRECCIA, pale brownish-sreen, arsillaceous matrix weak rock, abundant red iron oxide stainins. 40% DOLERITE, dark srey, fine srained, seam broken core, abrupt basal contact of bedding 60 des. to horizontal.
40.80 -	41.29	70% BRECCIA, medium to dark sreenish-srey, arsillaceous arenaceous matrix, loose, with cobbles of: 30% DOLERITE, dark srey, ansular moderately strons rock.
41.29 -	42.65	DOLERITE, very broken core, slishtly weathered. Brecciated in parts with hard sreen sandy matrix and minor brown clayey matrix. Gypsum? (sample taken to determine-ca111-42.0) on cobble face.
42.65 -	44.74	70% DOLERITE, dark sreyish-srey, fine srained, cobbles moderately strons rock, slishtly weathered, transitional basal contact of bedding 45 des. to horizontal, joints, rare brown iron oxide stainins, intermixed with: 30% CLAYSTONE, medium to dark yellowish-srey, matrix slishtly fibrous with mudstone clasts, very weak rock, broken core. And dolerite cobbles.
44.74 -	45.10	DOLERITE, medium to dark sreenish-brown, fine srained, very broken core, slishtly weathered, abrupt basal contact of

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444347

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		beddins 45 des. to horizontal. Brecciated with pebbles in silty 'matrix'.
45.10 -	45.60	DOLERITE, dark srey, medium srained, boulder strons rock, unweathered, solid core, abrupt basal contact of beddins 50 des. to horizontal.
45.60 -	45.65	BRECCIA, medium to dark sreenish-srey, frasmented.
45.65 -	47.68	65% BRECCIA, mottled sreyish-brown, pebbly with mudstone cobbles silty matrix, weak rock, broken core, with cobbles of: 35% DOLERITE, dark sreenish-srey, fine to medium srained, moderately weak rock, abrupt basal contact of beddins 45 des. to horizontal.
47.68 -	47.97	DOLERITE, dark srey, fine srained, solid core, strons rock, abrupt basal contact of beddins 50 des. to horizontal. Large boulder in breccia?.
47.97 -	48.35	BRECCIA, mottled sreyish-brown, pebble, with arenaceous and doleritic clasts and cobbles seam in part, moderately strons rock, broken core, very weak rock, abrupt basal contact of beddins 60 des. to horizontal.
48.35 -	48.58	SANDSTONE, pale brownish-srey, fine srained, feldspatho-lithic (<80% qtz, felds>rf.) poorly sorted seam, moderately strons rock, solid core, slisht yellow iron oxide stainins. Boulder in breccia?.
48.58 -	48.65	NO SAMPLE RETURN. Core loss.
48.65 -	48.93	SANDSTONE, pale brownish-srey, fine srained, feldspatho-lithic (<80% qtz, felds>rf.) moderately strons rock, solid core, abrupt basal contact of beddins 60 des. to horizontal.
48.93 -	50.22	BRECCIA, dark sreenish-srey, pebble, minor matrix with, weak rock, broken core, transitional basal contact slisht yellow iron oxide stainins. Dolerite clasts to cobble size.
50.22 -	51.00	CLAYSTONE, pale sreyish-brown, arenaceous in part with rare arenaceous frasments, weak rock, broken core, transitional basal contact of beddins 45 des. to horizontal, moderate yellow iron oxide stainins. Dolerite frasments.

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
51.00 -	51.07	SANDSTONE, light to medium bluish-green, fine grained, litho-feldspathic (<80% qtz, rf>felds) broken core, weak rock, slisht yellow iron oxide stainins. Fragmented with massive milky matrix.
51.07 -	51.16	SANDSTONE, light to medium bluish-green, fine grained, litho-feldspathic (<80% qtz, rf>felds) solid core, weak rock, abrupt basal contact of beddins 40 deg. to horizontal.
51.16 -	51.25	SANDSTONE, light to medium oransy-brown, fine grained, litho-feldspathic (<80% qtz, rf>felds) broken core, very stiff, transitional basal contact of beddins 40 deg. to horizontal, joints, moderate brown iron oxide stainins.
51.25 -	52.14	SANDSTONE, mottled bluish-brown, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) very weak rock, broken core, abrupt basal contact of beddins 50 deg. to horizontal, joints, slisht brown iron oxide stainins.
52.14 -	53.15	DOLERITE, varisated sreenish-srey, fine grained, pebbles and some cobbles very stiff, broken core, common calcite disseminated. Serpentinitic matrix with some indistinct dolerite boundaries.
53.15 -	53.28	BRECCIA, dark sreenish-srey, pebbly very stiff, very broken core, slisht red iron oxide stainins. Dolerite with serpentinitic matrix base of scree.
53.28 -	54.54	BRECCIA, pale sreyish-brown, pebble, mudstone clasts poorly sorted with arsillaceous matrix solid core, very weak rock, deformed basal contact of beddins 80 deg. to horizontal. Bleached appearance with some pale blue coloured resions, possible old soil.
54.54 -	54.65	MUDSTONE, dark blackish-srey, with numerous hard arenaceous and some mudstone pebbles slightly carbonaceous, broken core, weak rock, with bioturbidation with load casts.
54.65 -	55.10	MUDSTONE, medium to dark bluish-black, slightly carbonaceous with hard slightly carbonaceous mudstone and ansular arenaceous clasts, weak rock, solid core, erosional basal contact of beddins 30 deg. to horizontal.
55.10 -	56.34	SANDSTONE, light bluish-srey, fine grained, quartzose (>90% quartz) finins upwards numerous hard arenaceous clasts

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

with slightly carbonaceous arenaceous and mudstone lenses and slightly carbonaceous clasts near top of unit and near middle of unit, very stiff, solid core, with disturbed beddins of cross bedding 70 des. to horizontal, transitional basal contact.

56.34 - 56.77 MUDSTONE, medium to dark blackish-srey, slightly carbonaceous arenaceous with mudstone and rare arenaceous pebbles stiff, broken core, transitional basal contact of bedding 20 des. to horizontal.

56.77 - 57.65 SANDSTONE, pale bluish-srey, fine srained, quartz feldspathic slightly carbonaceous in part pebbly with mudstone clasts and mudstone pebbly bands and sporadic carbonaceous lenses near base of unit and near top of unit, stiff, thinnly bedded, of bedding 20 des. to horizontal.

57.65 - 57.83 MUDSTONE, dark bluish-srey, slightly carbonaceous in part with pebbles and sranular mudstone clasts weak rock, broken core, abrupt basal contact of beddins 20 des. to horizontal, joints.

57.83 - 57.85 MUDSTONE, dark blackish-srey, carbonaceous with numerous peaty clasts weak rock, broken core, abrupt basal contact of bedding 20 des. to horizontal.

57.85 - 57.88 COAL, HEAVY (INFERIOR COAL), black, broken core, abrupt basal contact of bedding 70 des. to horizontal.

57.88 - 58.13 MUDSTONE, dark bluish-srey, some carbonaceous lenses near top of unit and numerous mudstone clasts weak rock, solid core, transitional basal contact joints.

58.13 - 58.30 MUDSTONE, medium to dark srey, arenaceous with minor sranular mudstone clasts, very stiff, frasmented, joints.

58.30 - 58.37 CLAYSTONE, medium to dark bluish-srey, minor mudstone lenses near base of unit stiff, broken core, massive.

58.37 - 58.76 MUDSTONE, slightly arenaceous with rare lithic (predominately rock frasments) frasments and numerous mudstone pellets very stiff, very broken core, abrupt basal contact of beddins 70 des. to horizontal.

58.76 - 58.84 SANDSTONE, dark sreyish-black, very fine srained, carbonaceous poorly sorted very stiff, broken core,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		transitional basal contact of beddins 5 des. to horizontal.
58.84 -	58.85	CLAYSTONE, light greyish-green, broken core, stiff, transitional basal contact of beddins 6 des. to horizontal.
58.85 -	59.05	MUDSTONE, mottled grey, carbonaceous in part and with mudstone pebbles throughout interval weak rock, broken core, abrupt basal contact of beddins 75 des. to horizontal.
59.05 -	59.40	80% SANDSTONE, medium to dark bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) argillaceous matrix weak rock, joints, intermixed with: 20% SANDSTONE, medium to dark blackish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) moderately sorted moderately strong rock, solid core.
59.40 -	59.49	SANDSTONE, medium to dark bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) argillaceous matrix fragmented, firm.
59.49 -	59.87	NO SAMPLE RETURN. Core loss.
59.87 -	59.89	SILTSTONE, medium to dark greenish-grey, fragmented, weak rock, massive.
59.89 -	60.11	SANDSTONE, medium to dark grey, medium grained, lithic (predominately rock fragments) poorly sorted weak rock, broken core, transitional basal contact of beddins 40 des. to horizontal, joints.
60.11 -	60.31	SANDSTONE, medium to dark grey, fine grained, lithic (predominately rock fragments) with well sorted lenses and lenses with well-rounded slightly carbonaceous mudstone clasts weak rock, broken core, medium bedded, abrupt basal contact of beddins 45 des. to horizontal, of beddins 45 des. to horizontal, joints.
60.31 -	60.34	MUDSTONE, dark blackish-grey, carbonaceous very broken core, very stiff, transitional basal contact of beddins 45 des. to horizontal.
60.34 -	60.77	SANDSTONE, medium to dark grey, fine to medium grained, lithic (predominately rock fragments) mudstone matrix with rare mudstone clasts near top of unit and some well

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

sorted phases carbonaceous partings near base of unit, very stiff, solid core, abrupt basal contact of beddins 45 deg. to horizontal.

60.77 - 61.19 SANDSTONE, light to dark grey, fine to medium grained, lithic (predominately rock fragments) fining upwards moderately sorted, moderately weak rock, broken core, abrupt basal contact of beddins 45 deg. to horizontal.

61.19 - 61.21 MUDSTONE, dark blackish-grey, slightly carbonaceous weak rock, broken core, abrupt basal contact of bedding 45 deg. to horizontal.

61.21 - 61.37 SANDSTONE, medium to dark grey, fine to medium grained, lithic (predominately rock fragments) well sorted bands minor mudstone lenses, moderately weak rock, solid core, with scour and fill structures of cross bedding 40 deg. to horizontal, abrupt basal contact of bedding 45 deg. to horizontal.

61.37 - 61.38 CARBONACEOUS MUDSTONE, black, solid core, weak rock, abrupt basal contact of bedding 45 deg. to horizontal.

61.38 - 61.62 70% SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) weak rock, interbedded with:
30% SANDSTONE, medium to dark grey, medium to coarse grained, near middle of unit lithic (predominately rock fragments) weak rock, solid core, with mud pellets abrupt basal contact of bedding 40 deg. to horizontal.

61.62 - 61.82 SANDSTONE, medium to dark bluish-grey, very fine grained, lithic (predominately rock fragments) weak rock, broken core, abrupt basal contact of bedding 40 deg. to horizontal, joints.

61.82 - 61.97 SANDSTONE, medium to dark bluish-grey, medium grained, lithic (predominately rock fragments) some carbonaceous lenses near base of unit weak rock, broken core, with planar bedding of cross bedding 15 deg. to horizontal, abrupt basal contact of bedding 20 deg. to horizontal.

61.97 - 62.03 50% SANDSTONE, medium to dark bluish-grey, fine grained, lithic (predominately rock fragments) arsillaceous matrix very weak rock, transitional basal contact of bedding 20 deg. to horizontal, intermixed with:
50% MUDSTONE, dark blackish-grey, carbonaceous very stiff,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		broken core, abrupt basal contact of bedding 70 deg. to horizontal.
62.03 -	62.06	MUDSTONE, dark blackish-grey, carbonaceous in part with slightly arenaceous lenses, with planar bedding of cross bedding 10 deg. to horizontal, abrupt basal contact of bedding 20 deg. to horizontal.
62.06 -	62.07	CLAYSTONE, light to medium purplish-grey, stiff, broken core, abrupt basal contact of bedding 20 deg. to horizontal.
62.07 -	62.54	CLAYSTONE, light to medium bluish-grey, some coal frasments, very stiff, very broken core, joints.
62.54 -	62.72	NO SAMPLE RETURN. Core loss.
62.72 -	62.74	NO SAMPLE RETURN, dark grey, mudstone clasts and arenaceous frasments frasmented, loose. Approx 60cm of loose material.
62.74 -	62.76	CLAYSTONE, pale bluish-grey, weak rock, very broken core, massive.
62.76 -	62.82	SANDSTONE, medium to dark green, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) moderately weak rock, very broken core.
62.82 -	63.07	MUDSTONE, mottled grey, carbonaceous lenses very stiff, very broken core.
63.07 -	63.22	SANDSTONE, dark grey, fine grained, lithic (predominately rock fragments) slightly carbonaceous arsillaceous matrix, very broken core, weak rock, massive.
63.22 -	63.29	SANDSTONE, mottled greenish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) frasmented, moderately weak rock.
63.29 -	63.41	SANDSTONE, medium to dark grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) some carbonaceous laminae broken core, moderately weak rock, with cross lamination of cross bedding 30 deg. to horizontal, transitional basal contact of bedding 30 deg. to horizontal, joints.
63.41 -	63.58	MUDSTONE, medium to dark blackish-grey, slightly arenaceous

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From	To	Lithology Description
DIAMOND CORING		
		in part and slishtly carbonaceous very weak rock, broken core, abrupt basal contact of beddins 30 des. to horizontal, joints.
63.58 -	63.64	CLAYSTONE, medium to dark brownish-srey, some arenaceous frasments, very stiff, broken core, abrupt basal contact of beddins 30 des. to horizontal.
63.64 -	64.03	MUDSTONE, lisht to dark brown, slishtly carbonaceous in part arsillaceous, stiff, very broken core.
64.03 -	64.12	CARBONACEOUS MUDSTONE, dark brownish-black, some arsillaceous lenses, stiff, broken core, abrupt basal contact of beddins 15 des. to horizontal.
64.12 -	64.26	MUDSTONE, dark bluish-srey, arsillaceous with minor arenaceous frasments pebbles and carbonaceous near base of unit, very stiff, broken core, abrupt basal contact of beddins 20 des. to horizontal.
64.26 -	64.28	CARBONACEOUS MUDSTONE, brownish-black, pebbly very broken core, weak rock, abrupt basal contact of beddins 20 des. to horizontal.
64.28 -	64.34	CLAYSTONE, pale oransy-brown, stiff, solid core, abrupt basal contact of beddins 10 des. to horizontal.
64.34 -	64.38	CARBONACEOUS MUDSTONE, dark blackish-brown, with minor arsillaceous bands very stiff, broken core, abrupt basal contact of bedding 25 des. to horizontal.
64.38 -	64.40	CLAYSTONE, pale pinkish-brown, broken core, stiff, transitional basal contact of beddins 15 des. to horizontal.
64.40 -	64.43	CARBONACEOUS MUDSTONE, black, broken core, stiff, transitional basal contact of beddins 25 des. to horizontal.
64.43 -	64.62	CLAYSTONE, pale pinkish-brown, with some carbonaceous lenses broken core, stiff, abrupt basal contact of bedding 10 des. to horizontal.
64.62 -	64.63	CARBONACEOUS MUDSTONE, black, slishtly coal very broken core, abrupt basal contact of beddins 15 des. to horizontal.
64.63 -	64.66	CARBONACEOUS MUDSTONE, brownish-black, broken core, very

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		stiff, abrupt basal contact of bedding 35 deg. to horizontal.
64.66 -	64.68	COAL, HEAVY (INFERIOR COAL), black, very broken core, abrupt basal contact of bedding 0 deg. to horizontal.
64.68 -	64.87	MUDSTONE, brownish-black, carbonaceous near top of unit and near base of unit with sporadic thin coal bands throughout interval weak rock, very broken core, abrupt basal contact of bedding 10 deg. to horizontal, joints.
64.87 -	64.92	CLAYSTONE, pale grey, very stiff, broken core, abrupt basal contact of bedding 5 deg. to horizontal.
64.92 -	65.08	MUDSTONE, medium to dark grey, carbonaceous with thin coal bands near base of unit, weak rock, very broken core, abrupt basal contact.
65.08 -	65.10	COAL, <10% BRIGHT, black, very broken core, abrupt basal contact.
65.10 -	65.19	MUDSTONE, medium to dark blackish-grey, carbonaceous abrupt basal contact joints.
65.19 -	65.22	COAL, <10% BRIGHT, black, frasmented.
65.22 -	65.30	COAL, <10% BRIGHT, black, very broken core.
65.30 -	65.39	COAL, HEAVY (INFERIOR COAL), black, broken core.
65.39 -	65.40	CLAYSTONE, grey, very broken core.
65.40 -	66.42	NO SAMPLE RETURN. Wash: mudstone loose with some sand grains and clay bands.
66.42 -	66.93	MUDSTONE, dark blackish-grey, with some arsillaceous frasments and mudstone clasts carbonaceous in part, loose, frasmented.
66.93 -	66.97	COAL, HEAVY (INFERIOR COAL), black, very broken core.
66.97 -	67.00	COAL, <10% BRIGHT, black, very broken core.
67.00 -	67.08	COAL, HEAVY (INFERIOR COAL), black, solid core, cleats.
67.08 -	67.09	CLAYSTONE, dark reddish-brown, slightly carbonaceous frasmented, very stiff, abrupt basal contact of bedding

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From	To	Lithology Description
DIAMOND CORING		
		5 des. to horizontal.
67.09 -	67.14	CLAYSTONE, dark reddish-brown, slightly carbonaceous solid core, very stiff, abrupt basal contact of bedding 5 des. to horizontal.
67.14 -	67.18	MUDSTONE, dark blackish-grey, slightly carbonaceous and silty, moderately weak rock, broken core, abrupt basal contact of bedding 0 des. to horizontal.
67.18 -	67.19	COAL, <10% BRIGHT, black, broken core, transitional basal contact of bedding 5 des. to horizontal.
67.19 -	67.20	70% CLAYSTONE, pale pinkish-brown, very stiff, interbedded with: 30% COAL, <10% BRIGHT, black, broken core.
67.20 -	67.24	40% COAL, HEAVY (INFERIOR COAL), black, very broken core, intermixed with: 60% MUDSTONE, greyish-black, very broken core.
67.24 -	67.32	MUDSTONE, blackish-grey, carbonaceous broken core, joints.
67.32 -	67.46	MUDSTONE, blackish-grey, carbonaceous frasmented, weak rock.
67.46 -	67.48	CARBONACEOUS MUDSTONE, very broken core, weak rock.
67.48 -	67.49	CLAYSTONE, greyish-white, firm, abrupt basal contact of bedding 6 des. to horizontal.
67.49 -	67.52	CARBONACEOUS MUDSTONE, black, firm, very broken core.
67.52 -	67.63	COAL, <10% BRIGHT, black, broken core, transitional basal contact of bedding 0 des. to horizontal.
67.63 -	67.67	COAL, HEAVY (INFERIOR COAL), brownish-black, broken core, transitional basal contact of bedding 20 des. to horizontal.
67.67 -	67.68	COAL, <10% BRIGHT, broken core, abrupt basal contact of bedding 20 des. to horizontal.
67.68 -	67.69	CARBONACEOUS MUDSTONE, brownish-black, broken core, abrupt basal contact of bedding 20 des. to horizontal.
67.69 -	67.73	70% COAL, <10% BRIGHT, black, broken core, abrupt basal contact of bedding 5 des. to horizontal, with bands of:

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		30% CARBONACEOUS MUDSTONE, brownish-black, thin bands very stiff, broken core.
67.73 -	68.02	SILTSTONE, mottled grey, slightly carbonaceous near top of unit with some arenaceous bands, weak rock, broken core, transitional basal contact of bedding 5 des. to horizontal, joints.
68.02 -	68.41	SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) with minor silty bands near top of unit some carbonaceous partings near base of unit broken core, moderately weak rock, with planar bedding of cross bedding 5 des. to horizontal, abrupt basal contact.
68.41 -	68.58	MUDSTONE, medium to dark grey, some pebbly clasts, very stiff, very broken core, abrupt basal contact of bedding 30 des. to horizontal.
68.58 -	68.74	SILTSTONE, medium to dark grey, minor arenaceous bands, moderately weak rock, broken core, transitional basal contact joints.
68.74 -	68.76	MUDSTONE, medium to dark brownish-grey, very broken core, stiff.
68.76 -	68.99	SILTSTONE, light to medium grey, with sporadic arenaceous lenses slightly carbonaceous partings, moderately weak rock, broken core, with cross lamination of cross bedding 5 des. to horizontal, transitional basal contact of bedding 5 des. to horizontal, joints.
68.99 -	69.22	SANDSTONE, light grey, very fine grained, litho-feldspathic (<60% qtz, rf)felds) with numerous slightly carbonaceous siltstone laminae near top of unit moderately weak rock, broken core, joints.
69.22 -	70.11	MUDSTONE, varisated blackish-grey, silty with numerous slightly carbonaceous partings solid core, moderately weak rock, with planar bedding very thinnly bedded, transitional basal contact of bedding 5 des. to horizontal, of bedding 5 des. to horizontal.
70.11 -	70.24	MUDSTONE, blackish-grey, silty with slightly carbonaceous partings solid core, moderately weak rock, with planar bedding very thinnly bedded, transitional basal contact of bedding 5 des. to horizontal, of bedding 5 des.

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

to horizontal, joints.

70.24 - 71.63 MUDSTONE, blackish-grey, slightly carbonaceous with silty laminae throughout interval solid core, weak rock, with planar beddings of beddings 0 des. to horizontal.

71.63 - 71.90 MUDSTONE, blackish-grey, slightly carbonaceous silty moderately weak rock, solid core, massive erosional basal contact of beddings 5 des. to horizontal.

71.90 - 72.13 MUDSTONE, brownish-black, slightly carbonaceous carbonaceous in part, very broken core, weak rock, transitional basal contact.

72.13 - 72.56 MUDSTONE, black, slightly carbonaceous slightly slightly silty bands near base of unit, solid core, weak rock, transitional basal contact.

72.56 - 72.88 MUDSTONE, mottled greyish-black, slightly carbonaceous and with slightly carbonaceous thin silty laminae solid core, weak rock, abrupt basal contact of bedding 5 des. to horizontal.

72.88 - 72.99 MUDSTONE, variated pinkish-black, carbonaceous with numerous claystone clasts solid core, weak rock, transitional basal contact.

72.99 - 73.15 MUDSTONE, brownish-black, carbonaceous with minor thin argillaceous laminae, very broken core, weak rock, transitional basal contact of bedding 5 des. to horizontal.

73.15 - 73.20 MUDSTONE, light to dark blackish-brown, argillaceous and carbonaceous, weak rock, broken core, abrupt basal contact of bedding 0 des. to horizontal.

73.20 - 73.46 MUDSTONE, black, carbonaceous very broken core, weak rock.

73.46 - 73.48 CLAYSTONE, pale pinkish-white, weak rock, broken core, transitional basal contact of bedding 5 des. to horizontal.

73.48 - 73.57 CARBONACEOUS MUDSTONE, dark brownish-black, with thin coal lenses near base of unit broken core, weak rock.

73.57 - 73.72 NO SAMPLE RETURN. Core loss.

73.72 - 73.80 CARBONACEOUS MUDSTONE, dark brownish-black, with minor thin

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		coal lenses throughout interval, moderately weak rock, solid core, transitional basal contact of beddings 5 deg. to horizontal.
73.80 -	73.88	CLAYSTONE, with numerous thin coal and carbonaceous lenses throughout interval solid core, weak rock.
73.88 -	73.90	CLAYSTONE, pale brownish-grey, fragmented, very stiff, abrupt basal contact of beddings 15 deg. to horizontal.
73.90 -	73.97	COAL, HEAVY (INFERIOR COAL), black, some claystone lenses near base of unit solid core, transitional basal contact of beddings 0 deg. to horizontal.
73.97 -	74.03	CARBONACEOUS MUDSTONE, black, with some carbonaceous argillaceous lenses solid core, abrupt basal contact of beddings 5 deg. to horizontal.
74.03 -	74.05	COAL, HEAVY (INFERIOR COAL), black, solid core, abrupt basal contact of beddings 5 deg. to horizontal.
74.05 -	74.06	CLAYSTONE, pale pinkish-grey, numerous coal lenses, solid core, transitional basal contact of beddings 5 deg. to horizontal.
74.06 -	74.21	COAL, <10% BRIGHT, black, solid core.
74.21 -	74.33	COAL, <10% BRIGHT, black, very broken core.
74.33 -	74.47	MUDSTONE, grey, carbonaceous lenses near top of unit and near base of unit solid core, abrupt basal contact of bedding 5 deg. to horizontal.
74.47 -	74.73	CLAYSTONE, pale brownish-grey, some carbonaceous wisps, broken core, weak rock, abrupt basal contact of beddings 5 deg. to horizontal, cleats.
74.73 -	74.83	COAL, <10% BRIGHT, black, very broken core, transitional basal contact of beddings 5 deg. to horizontal.
74.83 -	74.95	CLAYSTONE, medium to dark pinkish-brown, numerous coal wisps, solid core, transitional basal contact of beddings 5 deg. to horizontal.
74.95 -	74.96	COAL, <10% BRIGHT, solid core, transitional basal contact of beddings 5 deg. to horizontal.
74.96 -	74.98	MUDSTONE, medium to dark brownish-grey, some carbonaceous

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		wisps, broken core, moderately weak rock, transitional basal contact of beddins 0 des. to horizontal, joints.
74.98 -	75.00	CARBONACEOUS MUDSTONE, dark brownish-black, carbonaceous near base of unit solid core, moderately weak rock, transitional basal contact of beddins 0 des. to horizontal.
75.00 -	75.03	COAL, HEAVY (INFERIOR COAL), black, solid core, transitional basal contact of beddins 0 des. to horizontal.
75.03 -	75.12	COAL, <10% BRIGHT, broken core, cleats.
75.12 -	75.18	70% SANDSTONE, light bluish-grey, very fine grained, quartz lithic moderately weak rock, interbedded with: 30% CLAY, light bluish-grey, arenaceous in part stiff, frasmented.
75.18 -	75.19	CLAY, light bluish-grey, stiff, of cross beddins 0 des. to horizontal.
75.19 -	75.25	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with some arsillaceous lenses arsillaceous matrix coal clasts near base of unit, stiff, broken core.
75.25 -	75.29	CLAYSTONE, medium to dark brown, thin carbonaceous lenses near top of unit and rare coal lenses near middle of unit carbonaceous near base of unit very stiff, broken core, erosional basal contact of beddins 0 des. to horizontal.
75.29 -	75.31	COAL, <10% BRIGHT, black, thick carbonaceous claystone bands near base of unit broken core, transitional basal contact of beddins 5 des. to horizontal.
75.31 -	75.42	COAL, <10% BRIGHT, black, transitional basal contact of beddins 0 des. to horizontal.
75.42 -	75.45	90% CLAY, dark pinkish-brown, weak rock, abrupt basal contact of beddins 10 des. to horizontal, with lenses of: 10% COAL, <10% BRIGHT, near top of unit and near middle of unit, broken core.
75.45 -	75.50	COAL, <10% BRIGHT, black, broken core.

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

75.50 - 75.56 CARBONACEOUS MUDSTONE, black, conchoidal frasments very broken core, massive.

75.56 - 75.59 CARBONACEOUS MUDSTONE, black, frasmented, weak rock.

75.59 - 75.63 CARBONACEOUS MUDSTONE, black, broken core, weak rock, with lenses of:

75.63 - 75.73 60% CARBONACEOUS MUDSTONE, black, broken core, deformed basal contact of beddins 5 des. to horizontal, joints, intermixed with:
40% CLAY, dark reddish-brown, lenses with rare coal laminae and coal lenses near base of unit, weak rock.

75.73 - 75.81 MUDSTONE, dark blackish-grey, carbonaceous broken core, weak rock, transitional basal contact of beddins 5 des. to horizontal.

75.81 - 75.98 CARBONACEOUS MUDSTONE, black, weak rock, very broken core, transitional basal contact of bedding 5 des. to horizontal.

75.98 - 76.07 CLAYSTONE, dark greyish-brown, carbonaceous in part with carbonaceous wisps near middle of unit, very broken core, weak rock.

76.07 - 76.35 CLAYSTONE, light to dark greyish-brown, slightly carbonaceous in part weak rock, very broken core, transitional basal contact.

76.35 - 76.56 CLAYSTONE, light to medium brownish-grey, thin carbonaceous partings near base of unit very stiff, solid core, abrupt basal contact of beddins 5 des. to horizontal.

76.56 - 76.60 SILTSTONE, light to medium bluish-grey, arsillaceous near base of unit very stiff, broken core, transitional basal contact of beddins 0 des. to horizontal, joints.

76.60 - 76.62 CLAYSTONE, light to dark bluish-grey, siltstone near top of unit very stiff, broken core.

76.62 - 76.65 MUDSTONE, dark blackish-brown, claystone near top of unit and carbonaceous near base of unit very stiff, broken core, transitional basal contact of beddins 8 des. to horizontal.

76.65 - 76.74 CLAYSTONE, light to medium brownish-grey, slightly

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		carbonaceous near top of unit with, very stiff, broken core.
76.74 -	76.77	CLAYSTONE, light grey, very stiff, very broken core.
76.77 -	76.78	CLAYSTONE, light to medium reddish-brown, weak rock, very broken core, erosional basal contact of bedding 0 des. to horizontal.
76.78 -	76.90	COAL, HEAVY (INFERIOR COAL), black, minor calcareous lenses, broken core, deformed basal contact of bedding 20 des. to horizontal.
76.90 -	77.06	MUDSTONE, light to dark brownish-grey, rare carbonaceous wisps, solid core, weak rock, transitional basal contact of bedding 0 des. to horizontal.
77.06 -	77.08	CARBONACEOUS MUDSTONE, dark greyish-brown, carbonaceous laminae solid core, weak rock, transitional basal contact.
77.08 -	77.10	MUDSTONE, light to dark brownish-grey, carbonaceous wisps solid core, transitional basal contact.
77.10 -	77.25	55% CARBONACEOUS MUDSTONE, dark brownish-black, thin coal laminae, solid core, intermixed with: 45% CLAYSTONE, light to medium brownish-grey, weak rock.
77.25 -	77.36	NO SAMPLE RETURN. Core loss.
77.36 -	77.52	CARBONACEOUS MUDSTONE, black, very broken core, very stiff, transitional basal contact of bedding 5 des. to horizontal.
77.52 -	77.61	65% CLAYSTONE, light to dark pinkish-brown, broken core, transitional basal contact of bedding 0 des. to horizontal, with lenses of: 35% CARBONACEOUS MUDSTONE, black, weak rock.
77.61 -	77.95	COAL, HEAVY (INFERIOR COAL), black, with some minor thin arsillaceous laminae near top of unit and near middle of unit, broken core, abrupt basal contact of bedding 5 des. to horizontal.
77.95 -	78.00	SANDSTONE, light to medium pinkish-brown, very fine grained, arsillaceous very broken core, weak rock, transitional basal contact.
78.00 -	78.15	CLAYSTONE, pale pinkish-brown, rare slightly carbonaceous

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		wisps, solid core, moderately weak rock.
78.15 -	78.50	CLAYSTONE, light brownish-grey, solid core, moderately weak rock, transitional basal contact.
78.50 -	78.62	CLAYSTONE, light to medium pinkish-brown, slightly arenaceous fragmented, weak rock, abrupt basal contact of bedding 0 deg. to horizontal.
78.62 -	78.69	COAL, HEAVY (INFERIOR COAL), black, thin arenaceous argillaceous bands near top of unit solid core.
78.69 -	78.74	COAL, HEAVY (INFERIOR COAL), black, very broken core.
78.74 -	78.83	COAL, <10% BRIGHT, black, very broken core.
78.83 -	78.89	CARBONACEOUS MUDSTONE, black, moderately weak rock, solid core.
78.89 -	78.94	COAL, <10% BRIGHT, black, very broken core.
78.94 -	78.97	75% CLAYSTONE, dark brown, carbonaceous very broken core, abrupt basal contact of bedding 8 deg. to horizontal, with lenses of: 25% COAL, <10% BRIGHT, black, near top of unit weak rock.
78.97 -	79.00	COAL, HEAVY (INFERIOR COAL), black, solid core, transitional basal contact of bedding 8 deg. to horizontal.
79.00 -	79.06	COAL, <10% BRIGHT, black, solid core.
79.06 -	79.12	CARBONACEOUS MUDSTONE, dark brownish-black, broken core, transitional basal contact.
79.12 -	79.17	CLAYSTONE, dark pinkish-brown, slightly carbonaceous near top of unit very broken core, abrupt basal contact.
79.17 -	79.30	COAL, HEAVY (INFERIOR COAL), black, argillaceous wisps near top of unit, solid core, transitional basal contact of bedding 5 deg. to horizontal.
79.30 -	79.31	CLAYSTONE, light to dark pinkish-brown, solid core, transitional basal contact of bedding 5 deg. to horizontal.
79.31 -	79.43	CARBONACEOUS MUDSTONE, black, thin coal bands, solid core,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		deformed basal contact.
79.43 -	79.45	COAL, 60 - 90% BRIGHT, black, solid core, deformed basal contact.
79.45 -	79.52	CARBONACEOUS MUDSTONE, black, broken core, transitional basal contact joints.
79.52 -	79.56	70% COAL, HEAVY (INFERIOR COAL), black, solid core, transitional basal contact. 30% COAL, 10 - 40% BRIGHT, black, thin near base of unit solid core.
79.56 -	79.70	COAL, HEAVY (INFERIOR COAL), black, some thin dull coal bands near base of unit broken core, transitional basal contact.
79.70 -	79.73	COAL, <10% BRIGHT, black, broken core, abrupt basal contact.
79.73 -	79.81	COAL, HEAVY (INFERIOR COAL), black, very broken core.
79.81 -	79.83	CLAYSTONE, dark brown, carbonaceous solid core, abrupt basal contact of beddins 0 des. to horizontal.
79.83 -	79.91	COAL, HEAVY (INFERIOR COAL), black, solid core, joints.
79.91 -	79.95	COAL, <10% BRIGHT, black, very broken core, abrupt basal contact of beddins 45 des. to horizontal.
79.95 -	79.99	CLAYSTONE, medium to dark reddish-brown, frasmented.
79.99 -	80.02	COAL, <10% BRIGHT, frasmented.
80.02 -	80.18	COAL, <10% BRIGHT, solid core, transitional basal contact of beddins 5 des. to horizontal.
80.18 -	80.30	COAL, 10 - 40% BRIGHT, black, with minor claystone bands near middle of unit solid core, transitional basal contact of beddins 2 des. to horizontal.
80.30 -	80.33	CLAYSTONE, dark blackish-brown, carbonaceous solid core, abrupt basal contact of beddins 5 des. to horizontal.
80.33 -	80.48	90% COAL, HEAVY (INFERIOR COAL), black, solid core, abrupt basal contact of bedding 10 des. to horizontal, with bands of: 10% COAL, 10 - 40% BRIGHT, black, near middle of unit.

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
80.48 -	80.53	COAL, <10% BRIGHT, solid core, transitional basal contact.
80.53 -	80.60	COAL, HEAVY (INFERIOR COAL), broken core.
80.60 -	80.61	COAL, 40 - 60% BRIGHT, broken core, abrupt basal contact of bedding 5 des. to horizontal.
80.61 -	80.62	COAL, <10% BRIGHT, solid core, abrupt basal contact of bedding 5 des. to horizontal.
80.62 -	81.68	CLAY, dark blackish-brown, carbonaceous solid core, transitional basal contact of bedding 5 des. to horizontal, irresularly interbedded with:
81.68 -	81.75	CLAYSTONE, carbonaceous in part very broken core, moderateiy weak rock, abrupt basal contact of bedding 5 des. to horizontal.
81.75 -	81.88	CLAYSTONE, light to medium pinkish-grey, slightly carbonaceous near top of unit very broken core, very stiff, abrupt basal contact of bedding 5 des. to horizontal.
81.88 -	81.90	CLAYSTONE, light to medium grey, slightly carbonaceous with carbonaceous mudstone lenses erosional basal contact of bedding 5 des. to horizontal.
81.90 -	81.99	CARBONACEOUS MUDSTONE, medium to dark black, minor coal lenses near base of unit solid core, weak rock.
81.99 -	82.20	MUDSTONE, medium to dark brownish-grey, with rare carbonaceous lenses near top of unit weak rock, solid core, transitional basal contact of bedding 0 des. to horizontal.
82.20 -	82.38	MUDSTONE, dark grey, slightly carbonaceous near base of unit weak rock. SI.
82.38 -	83.00	SANDSTONE, medium to dark grey, very fine grained, litho-feldspathic (<80% qtz, rf)felds) with rare sporadic coal fragments and lenses near top of unit and sporadic carbonaceous lenses rare near base of unit, solid core, moderately weak rock, transitional basal contact of bedding 0 des. to horizontal.
83.00 -	83.13	SILTSTONE, medium to dark brownish-grey, solid core,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		moderately weak rock, transitional basal contact of bedding 0 des. to horizontal.
83.13 -	83.40	MUDSTONE, medium to dark pinkish-grey, slightly silty solid core, moderately weak rock.
83.40 -	83.67	SILTSTONE, light to medium pinkish-grey, with some slightly carbonaceous argillaceous laminae moderately weak rock, broken core, transitional basal contact of bedding 0 des. to horizontal.
83.67 -	84.05	SILTSTONE, light to medium grey, with numerous slightly arenaceous laminae fining upwards in part solid core, moderately weak rock, with planar beddins of cross bedding 5 des. to horizontal, very thinnly bedded, transitional basal contact of bedding 5 des. to horizontal.
84.05 -	84.14	SILTSTONE, slightly arenaceous with some slightly carbonaceous laminae, solid core, moderately weak rock, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact of beddins 0 des. to horizontal.
84.14 -	84.19	SANDSTONE, light to medium grey, very fine grained, lithic (predominately rock fragments) well sorted broken core, moderately weak rock, with cross lamination abrupt basal contact of beddins 10 des. to horizontal.
84.19 -	84.45	SANDSTONE, light to medium bluish-grey, fine grained, lithic (predominately rock fragments) solid core, moderately strons rock, with cross lamination of cross beddins 7 des. to horizontal, transitional basal contact.
84.45 -	84.46	SANDSTONE, light to medium grey, fine to medium grained, lithic (predominately rock fragments) moderately sorted very broken core, moderately strons rock, massive abrupt basal contact of beddins 5 des. to horizontal.
84.46 -	84.57	SANDSTONE, medium to dark grey, fine grained, lithic (predominately rock fragments) with some mudstone matrix lenses solid core, moderately weak rock, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal.
84.57 -	84.82	SANDSTONE, light bluish-grey, fine grained, lithic

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		(predominately rock fragments) well sorted broken core, moderately strong rock, massive.
84.82 -	85.00	SANDSTONE, light bluish-grey, fine grained, lithic (predominately rock fragments) well sorted solid core, moderately strong rock, massive.
85.00 -	85.25	SANDSTONE, light to medium grey, very fine grained, lithic (predominately rock fragments) with minor slightly carbonaceous laminae and some thin mudstone bands broken core, moderately strong rock, with cross lamination of cross bedding 5 des. to horizontal, abrupt basal contact of bedding 10 des. to horizontal.
85.25 -	85.31	SANDSTONE, pale bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) well sorted argillaceous matrix seam with rare thin slightly carbonaceous partings near base of unit solid core, moderately strong rock, massive transitional basal contact of bedding 5 des. to horizontal.
85.31 -	85.44	SANDSTONE, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) well sorted solid core, moderately strong rock, massive transitional basal contact of bedding 5 des. to horizontal.
85.44 -	86.00	SANDSTONE, pale bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) rare thin mudstone partings and wisps near top of unit and slightly fining upwards solid core, moderately strong rock. Massive apart from sparse lamination at about 5 degrees.
86.00 -	86.44	SANDSTONE, pale bluish-grey, medium grained, litho-feldspathic (<80% qtz, rf)felds) solid core, moderately strong rock, transitional basal contact of bedding 5 des. to horizontal. Slight, sparce x-lamination.
86.44 -	86.51	SANDSTONE, light to medium bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with sporadic carbonaceous fragments and laminae solid core, moderately strong rock, transitional basal contact of bedding 0 deg. to horizontal.
86.51 -	86.58	SANDSTONE, pale bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with thin coal lenses solid core, weak rock, with disturbed bedding of

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

cross beddins 5 des. to horizontal, with mud pellers transitional basal contact of beddins 7 des. to horizontal.

86.58 - 86.78 SANDSTONE, light to medium bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) well sorted minor rare thin mudstone laminae broken core, moderately strong rock, of beddins 10 des. to horizontal.

86.78 - 87.19 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) moderately sorted sporadic mudstone laminae with rare coal fragments, broken core, moderately strong rock, with cross lamination of cross beddins 10 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal.

87.19 - 87.73 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) well sorted solid core, moderately strong rock, joints, calcite on joint surfaces.

87.73 - 87.99 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) with lenses with sporadic carbonaceous fragments solid core, moderately strong rock, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal.

87.99 - 88.12 SANDSTONE, light bluish-grey, medium grained, litho-feldspathic (<80% qtz, rf>felds) with minor carbonaceous lenses and some laminae and rare mudstone fragments, solid core, moderately strong rock, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal.

88.12 - 88.85 SANDSTONE, light bluish-grey, medium grained, litho-feldspathic (<80% qtz, rf>felds) rare sporadic mudstone laminae solid core, moderately strong rock, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal.

88.85 - 89.77 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) well sorted

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

broken core, moderately strong rock, massive of cross bedding 5 deg. to horizontal.

89.77 - 90.49 SANDSTONE, light to medium bluish-grey, medium grained, lithic (predominately rock fragments) solid core, moderately strong rock, massive transitional basal contact of bedding 0 deg. to horizontal.

90.49 - 90.64 SANDSTONE, light to medium bluish-grey, fine to medium grained, lithic (predominately rock fragments) rare thin carbonaceous partings solid core, moderately strong rock, with cross lamination of cross bedding 8 deg. to horizontal, transitional basal contact of bedding 8 deg. to horizontal.

90.64 - 91.13 SANDSTONE, light to medium bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) solid core, moderately strong rock, with trough cross bedding of cross bedding 8 deg. to horizontal, transitional basal contact of bedding 5 deg. to horizontal.

91.13 - 92.75 SANDSTONE, light to medium bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) solid core, moderately strong rock, with cross lamination of cross bedding 5 deg. to horizontal.

92.75 - 93.70 SANDSTONE, pale grey, fine grained, lithic (predominately rock fragments) solid core, strong rock. Slight lamination at about 5 deg to horizontal.

93.70 - 94.08 SANDSTONE, pale grey, fine grained, lithic (predominately rock fragments) strong rock, broken core, massive transitional basal contact of bedding 2 deg. to horizontal.

94.08 - 94.66 SANDSTONE, pale grey, fine grained, lithic (predominately rock fragments) with rare sporadic thin mudstone matrix laminae and, broken core, strong rock, with cross lamination of cross bedding 5 deg. to horizontal, transitional basal contact of bedding 2 deg. to horizontal. A single carbonaceous lense at 94.30 meters (2mm thick).

94.66 - 95.69 SANDSTONE, pale grey, fine grained, lithic (predominately rock fragments) strong rock, broken core, massive. Single carbonaceous lense and a few mudstone clasts at 95.67 metres.

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

95.69 - 95.75 SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) with thin carbonaceous partings near top of unit sporadic coal fragments and mudstone pebbles, broken core, strong rock, transitional basal contact of bedding 0 deg. to horizontal.

95.75 - 96.10 SANDSTONE, light grey, fine to medium grained, lithic (predominately rock fragments) rare sporadic mudstone fragments solid core, strong rock, transitional basal contact of bedding 0 deg. to horizontal.

96.10 - 96.16 20% SANDSTONE, pale whitish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) strong rock, transitional basal contact of bedding 0 deg. to horizontal, with clasts of:
80% MUDSTONE, light to medium grey, angular poorly sorted moderately weak rock, solid core.

96.16 - 96.20 85% SANDSTONE, light grey, fine to medium grained, lithic (predominately rock fragments) strong rock, transitional basal contact of bedding 0 deg. to horizontal, with clasts of:
15% MUDSTONE, light grey, seam with thin carbonaceous lenses near top of unit, moderately weak rock.

96.20 - 96.28 25% SANDSTONE, pale whitish-grey, fine to medium grained, lithic (predominately rock fragments) strong rock, transitional basal contact with clasts of:
75% MUDSTONE, light to medium grey, granule, cobble, poorly sorted weak rock.

96.28 - 96.65 70% SANDSTONE, pale whitish-grey, fine to medium grained, lithic (predominately rock fragments) strong rock, transitional basal contact of bedding 2 deg. to horizontal, interbedded with:
17% MUDSTONE, light to medium grey, poorly sorted weak rock, with lenses of:
13% COAL, black, solid core, with disturbed bedding of cross bedding 10 deg. to horizontal.

96.65 - 96.81 85% SANDSTONE, pale whitish-grey, fine to medium grained, lithic (predominately rock fragments) fining upwards strong rock, transitional basal contact of bedding 5 deg. to horizontal, with clasts of:
15% MUDSTONE, light to medium grey, pebble, near middle of

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Lithology Description Report

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DIAMOND CORING

unit in part and near base of unit weak rock, solid core.

96.81 - 97.29 SANDSTONE, pale grey, fine grained, lithic (predominately rock fragments) with minor mudstone clasts near middle of unit and rare sporadic clasts throughout interval solid core, strong rock, massive of cross beddins 5 deg. to horizontal, erosional basal contact of bedding 0 deg. to horizontal.

97.29 - 97.35 CARBONACEOUS MUDSTONE, dark brownish-black, with thin coal laminae near top of unit broken core, weak rock, abrupt basal contact of beddins 5 deg. to horizontal, occasional calcite infilled vesicles.

97.35 - 97.41 MUDSTONE, dark blackish-grey, carbonaceous broken core, moderately weak rock, abrupt basal contact of beddins 45 deg. to horizontal, joints.

97.41 - 97.45 CLAYSTONE, brownish-grey, with thin carbonaceous mudstone lenses broken core, moderately weak rock.

97.45 - 97.49 CARBONACEOUS MUDSTONE, black, solid core, transitional basal contact of bedding 0 deg. to horizontal.

97.49 - 97.50 CARBONACEOUS MUDSTONE, black, weak rock.

97.50 - 97.53 COAL, HEAVY (INFERIOR COAL), black, frasmented, transitional basal contact of bedding 0 deg. to horizontal.

97.53 - 97.57 COAL, HEAVY (INFERIOR COAL), broken core, abrupt basal contact of bedding 5 deg. to horizontal.

97.57 - 97.58 CLAYSTONE, medium to dark pinkish-brown, slightly carbonaceous near base of unit solid core, moderately weak rock, abrupt basal contact of bedding 10 deg. to horizontal.

97.58 - 97.62 COAL, HEAVY (INFERIOR COAL), solid core.

97.62 - 97.68 COAL, (10% BRIGHT, black, very broken core, abrupt basal contact of bedding 0 deg. to horizontal.

97.68 - 97.76 CARBONACEOUS MUDSTONE, black, broken core, moderately weak rock, abrupt basal contact of bedding 10 deg. to horizontal, occasional calcite infilled vesicles.

97.76 - 98.09 MUDSTONE, medium to dark brownish-grey, slightly

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		carbonaceous in part weak rock, broken core, abrupt basal contact of bedding 15 deg. to horizontal.
98.09 -	98.10	COAL, MID LUSTROUS TO BRIGHT, black, frasmented, abrupt basal contact of bedding 15 deg. to horizontal.
98.10 -	98.17	MUDSTONE, dark blackish-srey, slishtly carbonaceous very broken core, weak rock.
98.17 -	98.18	COAL, MID LUSTROUS TO BRIGHT, black, frasmented.
98.18 -	98.59	MUDSTONE, dark blackish-srey, carbonaceous frasmented, weak rock, joints.
98.59 -	98.64	90% MUDSTONE, dark blackish-srey, carbonaceous moderately weak rock, with bands of: 10% COAL, MID LUSTROUS TO BRIGHT, black, thin bands very broken core.
98.64 -	98.84	MUDSTONE, dark blackish-srey, carbonaceous with sporadic thin coal bands, moderately weak rock, broken core.
98.84 -	98.98	80% CARBONACEOUS MUDSTONE, dark sreyish-black, with sporadic thin coal lenses near top of unit, frasmented, abrupt basal contact of bedding 5 deg. to horizontal, intermixed with: 20% CLAYSTONE, pale pinkish-brown, near base of unit.
98.98 -	99.01	65% CARBONACEOUS MUDSTONE, dark brownish-black, weak rock, deformed basal contact of bedding 20 deg. to horizontal, with lenses of: 35% COAL, MID LUSTROUS TO BRIGHT, broken core.
99.01 -	99.12	MUDSTONE, light to medium srey, carbonaceous near top of unit with coal wisps sporadic throughout interval moderately strong rock, solid core, transitional basal contact of bedding 0 deg. to horizontal.
99.12 -	99.40	MUDSTONE, light to medium srey, silty lenses and rare coal wisps near top of unit solid core, strong rock, transitional basal contact of bedding 0 deg. to horizontal.
99.40 -	99.89	SILTSTONE, light to medium srey, with some thin mudstone bands near top of unit and slightly arenaceous bands near base of unit fining upwards, solid core, strong rock, transitional basal contact of bedding 3 deg. to

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

horizontal.

99.89 - 100.24 SILTSTONE, mottled grey, some silty mudstone bands and some arenaceous bands near base of unit, solid core, strong rock, with cross lamination of cross beddins 3 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal, joints.

100.24 - 101.94 SANDSTONE, light bluish-grey, very fine grained, lithic (predominately rock fragments) with thin slightly silty bands, solid core, strong rock, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact of beddins 5 des. to horizontal, joints, abundant calcite on joint surfaces.

101.94 - 102.11 SANDSTONE, pale pinkish-green, very fine grained, lithic (predominately rock fragments) with minor mudstone pellets solid core, strong rock, with trough cross beddins of cross beddins 10 des. to horizontal, abrupt basal contact of beddins 0 des. to horizontal.

102.11 - 102.35 SANDSTONE, light to medium greyish-blue, very fine grained, lenses broken core, strong rock, massive.

102.35 - 103.10 SANDSTONE, light greyish-blue, very fine grained, lithic (predominately rock fragments) solid core, moderately strong rock, massive transitional basal contact of beddins 5 des. to horizontal.

103.10 - 103.70 SANDSTONE, light to medium greyish-blue, very fine grained, lithic (predominately rock fragments) minor carbonaceous partings near base of unit and rare slightly carbonaceous partings near top of unit broken core, moderately strong rock, with cross lamination of cross beddins 5 des. to horizontal, abrupt basal contact of beddins 5 des. to horizontal.

103.70 - 103.88 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) moderately strong rock, solid core, massive transitional basal contact of beddins 2 des. to horizontal.

103.88 - 103.97 SANDSTONE, light to medium bluish-grey, very fine grained, litho-feldspathic (<80% qtz, rf)felds) silty with some carbonaceous partings, moderately strong rock, broken core, abrupt basal contact of beddins 2 des. to horizontal.

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Lithology Description Report

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DIAMOND CORING

103.97 - 104.29 SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) moderately strong rock, solid core, transitional basal contact of bedding 5 des. to horizontal.

104.29 - 104.71 SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) sporadic carbonaceous laminae coal fragments, moderately strong rock, solid core, with cross lamination of cross beddins 5 des. to horizontal, transitional basal contact.

104.71 - 105.26 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) rare mudstone partings moderately strong rock, broken core, with cross lamination of cross beddins 3 des. to horizontal, joints.

105.26 - 106.03 SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) solid core, strong rock, massive transitional basal contact of beddins 3 des. to horizontal.

106.03 - 106.48 SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) rare sporadic carbonaceous laminae broken core, strong rock, transitional basal contact of bedding 5 des. to horizontal.

106.48 - 106.60 80% SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) moderately strong rock, with lenses of:
20% CARBONACEOUS MUDSTONE, dark reddish-brown, with coal laminae, weak rock, solid core, transitional basal contact of bedding 5 des. to horizontal.

106.60 - 107.97 SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) broken core, transitional basal contact of bedding 5 des. to horizontal, joints. Rare carbonaceous partings at 107.22 and 108.29 to 108.40m.

107.97 - 108.27 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) strong rock, very broken core, joints, common calcite on joint surfaces.

108.27 - 108.42 SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) minor coal

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

fragments partings broken core, moderately strong rock, with planar beddings of cross beddings 30 des. to horizontal, transitional basal contact of bedding 10 des. to horizontal, grading into:

108.42 - 108.79 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) minor argillaceous laminae solid core, moderately strong rock, with planar beddings of cross beddings 10 des. to horizontal, transitional basal contact of bedding 0 des. to horizontal.

108.79 - 109.39 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) broken core, moderately strong rock, massive transitional basal contact of bedding 2 des. to horizontal.

109.39 - 110.25 SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) with sporadic mudstone pebbles throughout interval, broken core, moderately strong rock, transitional basal contact of bedding 5 des. to horizontal, grading into:

110.25 - 110.68 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with rare minor slightly moderately sorted matrix lenses throughout interval, solid core, moderately strong rock, with planar bedding of cross bedding 2 des. to horizontal, transitional basal contact of bedding 2 des. to horizontal.

110.68 - 111.17 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) slightly fining upwards, solid core, moderately strong rock, massive with mud pellets. End of hq core, start of nq.

111.17 - 112.12 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) very broken core, moderately strong rock, transitional basal contact of bedding 3 des. to horizontal.

112.12 - 112.35 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) carbonaceous partings, very broken core, moderately strong rock, with planar bedding of cross bedding 3 des. to horizontal, transitional basal contact of bedding 0 des. to horizontal.

112.35 - 113.24 SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) solid core,

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strong rock.

113.26 - 114.02 SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) solid core, strong rock, transitional basal contact of bedding 0 deg. to horizontal.

114.02 - 114.65 SANDSTONE, light to medium grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) sporadic carbonaceous partings solid core, strong rock.

114.65 - 115.19 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) fining upwards slightly, solid core, strong rock, massive transitional basal contact.

115.19 - 116.24 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) minor carbonaceous partings near base of unit solid core, strong rock, with planar bedding of cross bedding 10 deg. to horizontal.

116.24 - 116.89 SANDSTONE, light grey, very fine grained, litho-feldspathic (<80% qtz, rf)felds) minor slightly carbonaceous partings near top of unit solid core, strong rock, with planar bedding of cross bedding 5 deg. to horizontal, transitional basal contact of bedding 5 deg. to horizontal, joints, rare calcite on joint surfaces.

116.89 - 118.39 SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) fining upwards solid core, strong rock, massive erosional basal contact of bedding 5 deg. to horizontal.

118.39 - 118.41 80% CARBONACEOUS MUDSTONE, dark brownish-black, moderately weak rock, abrupt basal contact of bedding 5 deg. to horizontal, with bands of:
20% COAL, MID LUSTROUS TO BRIGHT, black, very broken core.

118.41 - 118.48 SANDSTONE, light to medium grey, very fine grained, lithic (predominately rock fragments) carbonaceous partings, very broken core, strong rock, with cross lamination of cross bedding 5 deg. to horizontal, abrupt basal contact of bedding 0 deg. to horizontal.

118.48 - 118.51 30% SANDSTONE, light whitish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) strong rock, with clasts of:
70% MUDSTONE, medium to dark grey, moderately strong rock,

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		fragmented, transitional basal contact of bedding 0 deg. to horizontal.
118.51	119.14	SANDSTONE, light whitish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) very broken core, strong rock.
119.14	120.45	SANDSTONE, light whitish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) sporadic carbonaceous partings broken core, strong rock, with cross lamination of cross bedding 5 deg. to horizontal, transitional basal contact.
120.45	121.11	SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) some bands with carbonaceous partings, solid core, strong rock, transitional basal contact.
121.11	121.22	SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) with mudstone fragments solid core, strong rock, transitional basal contact.
121.22	121.58	SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) with sporadic carbonaceous wisps solid core, strong rock, transitional basal contact grading into:
121.58	121.66	SANDSTONE, light to medium blackish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) numerous slightly carbonaceous partings fining upwards solid core, strong rock, transitional basal contact of bedding 5 deg. to horizontal.
121.66	122.28	SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) well sorted rare mudstone fragments broken core, strong rock.
122.28	123.30	SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with rare carbonaceous laminae broken core, strong rock, transitional basal contact.
123.30	123.35	SANDSTONE, medium to dark blackish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with numerous carbonaceous laminae broken core, strong rock, transitional basal contact of bedding 5 deg. to horizontal, common calcite disseminated.

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From	To	Lithology Description
DIAMOND CORING		
123.35	123.54	SANDSTONE, light to medium grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with carbonaceous laminae and thin coal bands near top of unit, very broken core, strong rock, transitional basal contact of bedding 5 deg. to horizontal.
123.54	123.66	SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) with numerous slightly carbonaceous mudstone fragments, solid core, moderately strong rock, transitional basal contact of bedding 5 deg. to horizontal, common calcite disseminated.
123.66	123.73	SANDSTONE, medium to dark grey, very fine grained, lithic (predominately rock fragments) solid core, strong rock, transitional basal contact.
123.73	123.98	SANDSTONE, medium to dark grey, lithic (predominately rock fragments) numerous slightly carbonaceous mudstone pebbles and slightly carbonaceous lenses very broken core, strong rock, transitional basal contact common calcite disseminated.
123.98	124.12	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) with some mudstone fragments fining upwards, very broken core, strong rock, erosional basal contact of bedding 0 deg. to horizontal, joints, abundant calcite on joint surfaces.
124.12	124.13	MUDSTONE, light greyish-brown, arsillaceous solid core, moderately strong rock, transitional basal contact of bedding 25 deg. to horizontal, grading into:
124.13	124.17	CARBONACEOUS MUDSTONE, black, very broken core, moderately strong rock.
124.17	124.29	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) with coal bands near middle of unit fragmented, moderately weak rock.
124.29	124.36	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) with numerous slightly carbonaceous well-rounded mudstone pebbles solid core, moderately weak rock, abrupt basal contact.
124.36	124.64	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) with some

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DIAMOND CORING		
		carbonaceous laminae near base of unit, fragmented, moderately weak rock, joints.
124.64	124.76	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) very broken core, moderately strong rock, erosional basal contact joints.
124.76	124.83	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) with numerous thin coal lenses, broken core, moderately strong rock, erosional basal contact.
124.83	124.88	40% SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) moderately strong rock, with disturbed beddins erosional basal contact with lenses of: 60% COAL, 10 - 40% BRIGHT, black, fragmented.
124.88	125.07	SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) with minor mudstone laminae very broken core, moderately strong rock, of cross bedding 45 deg. to horizontal.
125.07	125.16	SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) with carbonaceous wisps very broken core, moderately strong rock, transitional basal contact.
125.16	125.96	SANDSTONE, light grey, fine to medium grained, lithic (predominately rock fragments) with rare mudstone laminae slightly carbonaceous in part solid core, strong rock, with planar beddins of cross beddins 5 deg. to horizontal, grading into:
125.96	126.45	SANDSTONE, light grey, fine to medium grained, lithic (predominately rock fragments) with sporadic carbonaceous laminae solid core, strong rock, abrupt basal contact of beddins 5 deg. to horizontal.
126.45	126.46	CARBONACEOUS MUDSTONE, dark blackish-grey, broken core, moderately strong rock.
126.46	126.51	80% SANDSTONE, medium to dark greenish-grey, fine grained, lithic (predominately rock fragments) moderately strong rock, with disturbed beddins of cross beddins 8 deg. to horizontal, transitional basal contact of beddins 8 deg. to horizontal, with lenses of:

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From	To	Lithology Description
DIAMOND CORING		
		20% COAL, HEAVY (INFERIOR COAL), black, and carbonaceous lenses, fragmented.
126.51	126.86	SANDSTONE, light to medium grey, fine to medium grained, lithic (predominately rock fragments) with sporadic carbonaceous wisps very broken core, strong rock, with mud pellets transitional basal contact grading into:
126.86	127.42	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) well sorted fining upwards, solid core, strong rock, massive.
127.42	128.28	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with mudstone pebbles near middle of unit and slightly carbonaceous partings near base of unit, solid core, strong rock, with planar bedding of cross bedding 5 deg. to horizontal, transitional basal contact of bedding 0 deg. to horizontal.
128.28	128.69	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) strong rock, solid core, massive transitional basal contact of bedding 0 deg. to horizontal.
128.69	129.15	80% SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) strong rock, transitional basal contact of bedding 0 deg. to horizontal, with clasts of: 20% MUDSTONE, medium to dark grey, solid core.
129.15	130.06	SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) minor carbonaceous partings near base of unit solid core, strong rock, massive transitional basal contact of bedding 0 deg. to horizontal, joints, abundant calcite on joint surfaces.
130.06	130.56	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) minor carbonaceous partings solid core, strong rock, with planar bedding transitional basal contact of bedding 0 deg. to horizontal.
130.56	± 130.74	SANDSTONE, light to medium grey, very fine grained, lithic (predominately rock fragments) with numerous carbonaceous partings solid core, strong rock, with planar bedding

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From	To	Lithology Description
DIAMOND CORING		
		transitional basal contact of bedding 0 deg. to horizontal.
130.74	130.94	SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) solid core, strong rock, massive.
130.94	131.14	SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) minor carbonaceous partings throughout interval broken core, strong rock, with planar beddings of cross bedding 8 deg. to horizontal, transitional basal contact of bedding 5 deg. to horizontal.
131.14	131.41	SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) rare carbonaceous partings very broken core, strong rock, with planar beddings of cross bedding 5 deg. to horizontal, transitional basal contact of bedding 5 deg. to horizontal, joints, rare pyrite on joint surfaces.
131.41	131.83	SANDSTONE, light to medium grey, fine grained, lithic (predominately rock fragments) rare carbonaceous partings and minor carbonaceous partings near base of unit, solid core, strong rock, with planar beddings of cross bedding 5 deg. to horizontal, transitional basal contact of bedding 5 deg. to horizontal.
131.83	131.87	SANDSTONE, dark green, fine grained, lithic (predominately rock fragments) with carbonaceous clasts solid core, strong rock, erosional basal contact of bedding 30 deg. to horizontal.
131.87	131.90	CARBONACEOUS MUDSTONE, black, very broken core, moderately weak rock, erosional basal contact of bedding 45 deg. to horizontal.
131.90	131.98	SANDSTONE, dark green, fine grained, lithic (predominately rock fragments) with carbonaceous laminae throughout interval fragmented, strong rock.
131.98	132.83	SANDSTONE, light to medium pinkish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) broken core, strong rock, transitional basal contact of bedding 0 deg. to horizontal, joints.
132.83	133.64	SANDSTONE, light to medium pinkish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) well

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DIAMOND CORING		
		sorted arsillaceous matrix, solid core, strong rock.
133.64	133.86	SANDSTONE, light to medium grey, fine grained, thin mudstone laminae litho-feldspathic (<80% qtz, rf)felds) broken core, strong rock, abrupt basal contact of bedding 20 deg. to horizontal.
133.86	133.88	CARBONACEOUS MUDSTONE, black, arenaceous in part very broken core, strong rock.
133.88	134.04	SANDSTONE, light to medium grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with some coal laminae near top of unit and mudstone clasts near base of unit broken core, strong rock, transitional basal contact of bedding 0 deg. to horizontal, joints.
134.04	134.36	SANDSTONE, light to medium grey, litho-feldspathic (<80% qtz, rf)felds) with sporadic carbonaceous partings solid core, strong rock, with planar bedding abrupt basal contact of bedding 10 deg. to horizontal.
134.36	134.40	50% SANDSTONE, litho-feldspathic (<80% qtz, rf)felds) strong rock, erosional basal contact of bedding 90 deg. to horizontal. 50% CARBONACEOUS MUDSTONE, arenaceous in part strong rock, solid core.
134.40	134.42	CARBONACEOUS MUDSTONE, arenaceous in part strong rock, fragmented, abrupt basal contact of bedding 45 deg. to horizontal.
134.42	134.45	SANDSTONE, light to medium blackish-grey, fine grained, numerous carbonaceous wisps, broken core, strong rock, abrupt basal contact of bedding 30 deg. to horizontal.
134.45	134.54	SANDSTONE, light to medium grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) sporadic carbonaceous laminae broken core, strong rock, erosional basal contact of bedding 5 deg. to horizontal.
134.54	134.55	CARBONACEOUS MUDSTONE, broken core, erosional basal contact of bedding 0 deg. to horizontal.
134.55	134.83	SANDSTONE, brownish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with sporadic carbonaceous laminae and some mudstone pebbles, broken core, strong rock, of bedding 5 deg. to horizontal.

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING.

134.83 - 134.95 SANDSTONE, medium to dark blackish-grey, fine grained, numerous carbonaceous laminae, broken core.

134.95 - 134.97 CARBONACEOUS MUDSTONE, black, moderately weak rock, fragmented.

134.97 - 135.70 SANDSTONE, medium to dark grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with carbonaceous laminae and mudstone clasts very broken core, strong rock, with planar bedding occasional calcite disseminated.

135.70 - 135.77 SANDSTONE, light to medium purplish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) argillaceous matrix fragmented, moderately strong rock, massive joints.

135.77 - 135.92 SANDSTONE, litho-feldspathic (<80% qtz, rf)felds) sporadic carbonaceous laminae broken core, strong rock, transitional basal contact occasional calcite disseminated.

135.92 - 136.16 SANDSTONE, medium to dark grey, litho-feldspathic (<80% qtz, rf)felds) very broken core, strong rock.

136.16 - 136.32 SANDSTONE, medium to dark whitish-grey, fine grained, lithic (predominately rock fragments) with sporadic coal laminae broken core, strong rock, abrupt basal contact of bedding 10 des. to horizontal.

136.32 - 136.33 CARBONACEOUS MUDSTONE, black, strong rock, very broken core, abrupt basal contact of bedding 10 des. to horizontal.

136.33 - 136.53 SANDSTONE, medium to dark grey, fine grained, lithic (predominately rock fragments) with sporadic carbonaceous laminae strong rock, fragmented, strong rock.

136.53 - 136.69 SANDSTONE, lithic (predominately rock fragments) with some carbonaceous laminae broken core, strong rock, abrupt basal contact.

136.69 - 136.87 CARBONACEOUS MUDSTONE, black, hard very broken core, strong rock.

136.87 - 137.05 MUDSTONE, medium to dark grey, very broken core, moderately strong rock, transitional basal contact of bedding 0

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From	To	Lithology Description
DIAMOND CORING		
		des. to horizontal, grading into:
137.05	137.65	SILTSTONE, light to dark grey, with numerous mudstone laminae and some arenaceous bands near base of unit, broken core, moderately strong rock, with planar beddins of cross beddins 0 des. to horizontal, transitional basal contact of bedding 0 des. to horizontal, joints, common calcite on joint surfaces.
137.65	137.76	SANDSTONE, light to medium grey, very fine grained, lithic (predominately rock fragments) solid core, strong rock, transitional basal contact of beddins 0 des. to horizontal.
137.76	138.37	70% MUDSTONE, medium to dark grey, moderately strong rock, irregularly interbedded with: 30% SILTSTONE, light to dark grey, moderately strong rock, fragmented.
138.37	138.39	COAL, (10% BRIGHT) black, very broken core, with planar beddins of cross bedding 15 des. to horizontal, abrupt basal contact of beddins 15 des. to horizontal.
138.39	138.48	CARBONACEOUS MUDSTONE, black, with thin coal seam throughout interval broken core, strong rock, joints, abundant calcite on joint surfaces.
138.48	138.69	CARBONACEOUS MUDSTONE, black, minor coal bands, fragmented, moderately strong rock.
138.69	138.75	MUDSTONE, light to medium bluish-grey, very broken core, moderately weak rock, abrupt basal contact of beddins 10 des. to horizontal, joints.
138.75	138.79	MUDSTONE, greyish-black, fragmented, strong rock, abrupt basal contact.
138.79	138.90	MUDSTONE, medium to dark grey, granule, very broken core.
138.90	139.53	50% COAL, HEAVY (INFERIOR COAL), light grey, fragmented, transitional basal contact of beddins 0 des. to horizontal, joints, intermixed with: 50% MUDSTONE, light to medium grey, slightly silty near base of unit, fragmented, moderately weak rock.
139.53	139.68	SANDSTONE, light to medium grey, very fine grained, lithic (predominately rock fragments) solid core, strong rock,

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Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		transitional basal contact of beddins 0 des. to horizontal.
139.68	139.83	MUDSTONE, light to dark grey, solid core, strong rock.
139.83	139.90	CLAYSTONE, medium to dark grey, weak rock, very broken core.
139.90	140.02	SILTSTONE, light to medium grey, lithic (predominately rock fragments) with numerous mudstone laminae fragmented, strong rock.
140.02	140.11	SILTSTONE, light to medium grey, rare mudstone laminae, broken core, strong rock, transitional basal contact of beddins 0 des. to horizontal.
140.11	140.17	MUDSTONE, with silty laminae and minor arenaceous laminae solid core, strong rock, abrupt basal contact of beddins 0 des. to horizontal.
140.17	140.23	70% MUDSTONE, medium to dark grey, near base of unit with silty laminae fragmented, solid core, with trough cross beddins of cross beddins 10 des. to horizontal, abrupt basal contact of beddins 5 des. to horizontal, grading into: 30% SANDSTONE, light to medium grey, very fine grained, near top of unit strong rock.
140.23	140.24	SANDSTONE, fine grained, litho-feldspathic (<80% qtz, rf)felds) strong rock, solid core, with load casts erosional basal contact of beddins 5 des. to horizontal.
140.24	140.50	52% SANDSTONE, light to medium grey, very fine grained, litho-feldspathic (<80% qtz, rf)felds) solid core, erosional basal contact of beddins 10 des. to horizontal, interbedded with: 29% MUDSTONE, medium to dark grey, strong rock, with laminae of: 19% SILTSTONE, light to medium grey.
140.50	140.57	MUDSTONE, grey, with silty laminae, solid core, strong rock, abrupt basal contact of beddins 5 des. to horizontal.
140.57	140.81	SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) fining upwards with mudstone bands near middle of unit, solid core, strong rock.
140.81	141.04	MUDSTONE, medium to dark grey, with silty laminae and lenses

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DIAMOND CORING		
		throughout interval carbonaceous partings near base of unit, solid core, strong rock, with cross lamination of cross bedding 5 des. to horizontal, abrupt basal contact of bedding 0 des. to horizontal.
141.04	141.67	SANDSTONE, pale greenish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) fining upwards slightly, solid core, strong rock, massive occasional pyrite disseminated.
141.67	142.03	SANDSTONE, light greenish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with minor carbonaceous bands near middle of unit, broken core, strong rock, abrupt basal contact of bedding 0 des. to horizontal.
142.03	142.30	SANDSTONE, light bluish-grey, fine grained, with numerous thin carbonaceous and coal laminae broken core, strong rock, with cross lamination of cross bedding 5 des. to horizontal, transitional basal contact of bedding 0 des. to horizontal.
142.30	145.10	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with rare carbonaceous partings sporadic throughout interval solid core, strong rock, joints, abundant calcite on joint surfaces.
145.10	145.35	SANDSTONE, light bluish-grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) bands with numerous carbonaceous partings near base of unit broken core, strong rock, with cross lamination of cross bedding 5 des. to horizontal, transitional basal contact of bedding 0 des. to horizontal.
145.35	146.27	SANDSTONE, light bluish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf)felds) fining upwards slightly, solid core, strong rock, massive transitional basal contact of bedding 0 des. to horizontal.
146.27	146.37	SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf)felds) with numerous carbonaceous partings broken core, strong rock, with trough cross bedding of cross bedding 5 des. to horizontal, transitional basal contact of bedding 0 des. to horizontal.
146.37	146.48	SANDSTONE, light whitish-grey, fine to medium grained,

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From	To	Lithology Description
DIAMOND CORING		
		litho-feldspathic (<80% qtz, rf)felds) finins upwards with thin bands with numerous coal lenses, solid core, strong rock, with disturbed beddins of cross beddins 10 des. to horizontal, transitional basal contact of beddins 0 des. to horizontal, sradins into:
146.48	146.63	SANDSTONE, light bluish-srey, fine srained, litho-feldspathic (<80% qtz, rf)felds) well sorted minor carbonaceous phases near top of unit, solid core, strons rock, erosional basal contact of beddins 5 des. to horizontal.
146.63	146.69	CARBONACEOUS MUDSTONE, black, weak rock, frasmented.
146.69	146.95	CLAYSTONE, mottled rinkish-brown, slishtly carbonaceous in part very broken core, moderately weak rock.
146.95	149.57	NO SAMPLE RETURN.
149.57	149.89	CLAYSTONE, light bluish-srey, slishtly arenaceous in part, very broken core, very stiff, abrupt basal contact of beddins 45 des. to horizontal.
149.89	149.98	COAL, 10 - 40% BRIGHT, black, frasmented.
149.98	150.08	NO SAMPLE RETURN. Core loss.
150.08	150.20	COAL, <10% BRIGHT, black, very broken core. Broken base at 45 desrees.
150.20	150.26	NO SAMPLE RETURN. Core loss.
150.26	150.29	COAL, 10 - 40% BRIGHT, black, frasmented.
150.29	150.35	CARBONACEOUS MUDSTONE, brownish-black, very broken core, abrupt basal contact of bedding 40 des. to horizontal.
150.35	150.67	NO SAMPLE RETURN. Core loss.
150.67	150.71	COAL, 10 - 40% BRIGHT, black, very broken core.
150.71	150.74	COAL, 10 - 40% BRIGHT, frasmented.
150.74	150.80	COAL, 10 - 40% BRIGHT, broken core, abrupt basal contact of bedding 15 des. to horizontal, common calcite infilled vesicles.
150.80	150.82	COAL, <10% BRIGHT, black, frasmented.

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Lithology Description Report

From	To	Lithology Description

DIAMOND CORING

150.82 - 151.00 MUDSTONE, medium to dark grey, arsillaceous near top of unit broken core, weak rock, joints, abundant clay on joint surfaces.

151.00 - 151.17 SILTSTONE, light to medium grey, with numerous mudstone laminae broken core, moderately weak rock, with trough cross beddins of cross beddins 20 deg. to horizontal.

151.17 - 151.23 MUDSTONE, medium to dark grey, with rare siltstone laminae near top of unit broken core, moderately weak rock, with trough cross beddins of cross beddins 25 deg. to horizontal, joints, abundant clay on joint surfaces.

151.23 - 151.31 NO SAMPLE RETURN. Core loss.

151.31 - 151.34 MUDSTONE, medium to dark grey, silty in part with rare coal lenses, fragmented, moderately weak rock, joints, abundant clay on joint surfaces.

151.34 - 151.44 MUDSTONE, dark grey, slightly carbonaceous very broken core, very stiff.

151.44 - 151.62 92% MUDSTONE, dark grey, slightly carbonaceous fragmented, intermixed with:
8% CARBONACEOUS MUDSTONE, dark greyish-black, fragmented.

151.62 - 151.76 CLAYSTONE, light to medium pinkish-grey, stiff, fragmented.

151.76 - 151.80 MUDSTONE, light to dark grey, silty in part very broken core, joints.

151.80 - 152.02 NO SAMPLE RETURN. Core loss.

152.02 - 152.07 MUDSTONE, light to dark grey, silty in part fragmented, moderately weak rock, abrupt basal contact of bedding 45 deg. to horizontal.

152.07 - 152.10 MUDSTONE, light to dark grey, broken core, weak rock, abrupt basal contact of bedding 30 deg. to horizontal, joints, abundant clay on joint surfaces.

152.10 - 152.27 MUDSTONE, light to dark grey, some silty bands, broken core, transitional basal contact of bedding 0 deg. to horizontal, joints.

152.27 - 152.52 MUDSTONE, light to medium grey, slightly carbonaceous silty

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444388

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		near base of unit, fragmented, moderately weak rock, abrupt basal contact of beddings 10 des. to horizontal.
152.52	152.92	SILTSTONE, light to medium purplish-grey, with numerous mudstone and slightly carbonaceous partings and arenaceous in part, very broken core, strong rock, with trough cross beddings of cross beddings 25 des. to horizontal, abrupt basal contact of beddings 10 des. to horizontal.
152.92	152.93	MUDSTONE, black, carbonaceous with arenaceous laminae broken core, strong rock.
152.93	153.05	NO SAMPLE RETURN. Core loss.
153.05	153.06	SANDSTONE, medium to dark grey, very fine grained, lithic (predominately rock fragments) with numerous carbonaceous partings broken core, strong rock, with trough cross bedding of cross beddings 10 des. to horizontal, abrupt basal contact of bedding 5 des. to horizontal.
153.06	153.10	MUDSTONE, black, carbonaceous fragmented.
153.10	153.18	COAL, HEAVY (INFERIOR COAL), fragmented.
153.18	153.24	NO SAMPLE RETURN.
153.24	153.26	COAL, 10 - 40% BRIGHT, black, fragmented.
153.26	153.30	COAL, <10% BRIGHT, black, very broken core, abundant calcite disseminated.
153.30	153.65	NO SAMPLE RETURN.
153.65	153.68	CARBONACEOUS MUDSTONE, black, fragmented, weak rock.
153.68	153.70	CARBONACEOUS MUDSTONE, black, claystone very broken core, stiff.
153.70	153.75	NO SAMPLE RETURN. Core loss.
153.75	153.81	COAL, HEAVY (INFERIOR COAL), black, fragmented.
153.81	153.82	CARBONACEOUS MUDSTONE, black, fragmented, very stiff, abrupt basal contact of beddings 6 des. to horizontal.
153.82	153.88	COAL, HEAVY (INFERIOR COAL), black, very broken core.

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444389

REPORT : MCS5 COAL SYSTEM Page : 50
Date : WED, 21 MAR 1984

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
153.88	154.01	COAL, HEAVY (INFERIOR COAL), very broken core.
154.01	154.07	COAL, HEAVY (INFERIOR COAL), frasmented.
154.07	154.25	COAL, HEAVY (INFERIOR COAL), very broken core.
154.25	154.27	COAL, HEAVY (INFERIOR COAL), black, frasmented, moderately weak rock.
154.27	154.30	COAL, <10% BRIGHT, very broken core, cleats, abundant calcite on cleats.
154.30	154.41	COAL, <10% BRIGHT, broken core, cleats, common calcite on cleats.
154.41	154.65	COAL, HEAVY (INFERIOR COAL), broken core, transitional basal contact occasional pyrite disseminated.
154.65	154.78	COAL, <10% BRIGHT, broken core, cleats, abundant calcite disseminated.
154.78	154.82	COAL, <10% BRIGHT, frasmented.
154.82	154.86	COAL, HEAVY (INFERIOR COAL), very broken core.
154.86	155.17	COAL, <10% BRIGHT, black, very broken core.
155.17	155.20	COAL, <10% BRIGHT, very broken core.
155.20	155.22	COAL, <10% BRIGHT, frasmented.
155.22	155.31	COAL, <10% BRIGHT, broken core.
155.31	155.40	COAL, <10% BRIGHT, very broken core, cleats.
155.40	155.45	NO SAMPLE RETURN. Core loss.
155.45	155.63	COAL, <10% BRIGHT, broken core, cleats.
155.63	155.78	COAL, <10% BRIGHT, broken core, occasional calcite disseminated.
155.78	155.84	NO SAMPLE RETURN.
155.84	155.92	COAL, <10% BRIGHT, broken core, occasional calcite disseminated.

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444390

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
155.92	156.04	COAL, <10% BRIGHT, solid core, erosional basal contact of beddings 40 deg. to horizontal, abundant calcite infilled vesicles.
156.04	156.62	NO SAMPLE RETURN. Core loss coal adjusted to bpb log-depth.
156.62	156.83	METAMORPHIC ROCK, light to medium greyish-green, mudstone moderately strong rock, transitional basal contact of beddings 0 deg. to horizontal. Many thin calcite veins - altered.
156.83	157.00	DOLERITE, medium to dark greenish-grey, very fine grained, strong rock, solid core, transitional basal contact occasional calcite disseminated.
157.00	159.50	DOLERITE, medium to dark grey, fine grained, fining upwards broken core, very strong rock, joints, abundant calcite on joint surfaces.
159.50	160.80	DOLERITE, medium to dark greenish-grey, fine grained, fining upwards very strong rock, solid core, transitional basal contact of beddings 0 deg. to horizontal, joints, common calcite on joint surfaces.
160.80	161.20	DOLERITE, medium to dark greenish-grey, fine grained, fining upwards very strong rock, solid core, transitional basal contact of beddings 0 deg. to horizontal, joints.
161.20	161.60	DOLERITE, medium to dark greenish-grey, fine grained, thin calcareous laminae, moderately strong rock, solid core, joints, calcite on joint surfaces.
161.60	162.56	DOLERITE, medium to dark greenish-grey, fine to medium grained, strong rock, broken core, massive transitional basal contact.
162.56	163.40	DOLERITE, medium to dark greenish-grey, fine to medium grained, strong rock, solid core, transitional basal contact.
163.40	164.75	DOLERITE, fine grained, strong rock, solid core, massive erosional basal contact of beddings 10 deg. to horizontal.
164.75	164.95	DOLERITE, fine to medium grained, strong rock, erosional

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444391

Hole Number : CA0111R

Lithology Description Report

From	To	Lithology Description
		DIAMOND CORING
		basal contact of beddins 10 des. to horizontal. Flowbandins.
164.95	165.50	DOLERITE, medium to dark sreenish-srey, fine to medium srained, solid core, strons rock, with planar beddins of cross beddins 8 des. to horizontal, thinnly bedded, thinnly bedded.
165.50	166.30	DOLERITE, medium to dark srey, fine srained, solid core, very strons rock, transitional basal contact joints, abundant calcite on joint surfaces.
166.30	167.80	DOLERITE, medium to dark srey, fine srained, with sporadic throughout interval, very strons rock. Clusters of medium calcite srains.
167.80	168.50	DOLERITE, medium to dark srey, fine to medium srained, very strons rock, solid core, transitional basal contact.
168.50	169.40	DOLERITE, medium to dark srey, fine to medium srained, solid core, very strons rock.
169.40	170.60	DOLERITE, medium to dark srey, fine to medium srained, solid core, very strons rock, joints.
170.60	171.50	DOLERITE, medium to dark srey, fine to medium srained, solid core, very strons rock.

****
Total Depth = 171.50
****

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444392

LITHOLOGICAL LOG REPORT
For hole CA 0112

Eastins: 490699.00 Hole Size: 120mm

Northins: 5180477.00

Elevation: 52.00m

Total Depth: 108.40m

Probe Depth: 105.00m

Logged By: MacConnachie Ross

Rig Type:

Drilling Commenced: 24/04/82

Drilling Completed: 01/05/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Stackpoole Drilling

Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Density -Med Resolution

392

444393

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
0.00 -	3.50	CLAY, light to medium orangy-brown, arenaceous with some hard argillaceous bands near base of unit highly weathered.
HAMMER		
3.50 -	7.00	CLAY, variegated orangy-red, slightly arenaceous in part, highly weathered, common red iron oxide staining.
7.00 -	12.00	70% CLAY, mottled whitish-brown, arenaceous highly weathered, with cobbles of: 30% DOLERITE, dark grey, fine grained, unweathered. Sandstone texture in parts.
12.00 -	17.00	50% CLAY, medium to dark orangy-brown, arenaceous in part highly weathered, intermixed with: 50% SAND, light to medium brown, argillaceous in part and pebbly in part.
17.00 -	20.00	85% CLAY, medium to dark orangy-brown, slightly arenaceous fragments: 10% SANDSTONE, variegated whitish-red, fine grained, highly weathered, occasional red iron oxide staining, with clasts of: 5% DOLERITE, variegated whitish-yellow, fine grained, highly weathered.
20.00 -	31.50	NO SAMPLE RETURN, medium to dark orangy-brown, Hammer in water, throwing mud -but nothing solid.
		Base of ALLUVIUM
ROLLER BIT		
31.50 -	31.70	DOLERITE, dark grey, very fine grained, unweathered.
DIAMOND CORING		
31.70 -	31.85	DOLERITE, dark grey, fine grained, moderately strong rock, solid core, joints. Appears solid but material on joint surface suggests a large fragment.
31.85 -	32.00	40% DOLERITE, dark grey, very fine grained, moderately strong rock, broken core, slight brown iron oxide

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		stainins. Alteration around perimeters. 60% METAMORPHIC ROCK, sreen, frasmented, very stiff.
32.00 -	32.25	25% METAMORPHIC ROCK, medium to dark sreen, matrix very stiff, interbedded with: 75% DOLERITE, dark srey, sub-rounded frasments moderately strons rock, broken core, slisht brown iron oxide stainins.
32.25 -	32.90	DOLERITE, dark sreenish-srey, ansular frasments moderately strons rock. In searce dark sreen matrix and srowths on cracks around dolerite frasments -some quartz srowths.
32.90 -	33.10	NO SAMPLE RETURN. Core loss.
33.10 -	34.25	DOLERITE, dark sreenish-srey, frasments very broken core, transitional basal contact. Brecciated with srowths on cracks.
34.25 -	35.12	DOLERITE, dark sreenish-srey, frasments broken core, joints, occasional calcite on joint surfaces. Brecciated with srowths.
35.12 -	36.10	DOLERITE, dark sreenish-srey, frasments frasmented.
36.10 -	36.26	DOLERITE, dark sreen, frasments weak rock, frasmented.
36.26 -	36.45	MUDSTONE, mottled brownish-srey, arsillaceous frasmented, weak rock, occasional yellow iron oxide stainins. Altered.
36.45 -	36.48	CLAYSTONE, varisated reddish-white, with numerous carbonaceous mudstone clasts very stiff, broken core, sbrupt basal contact of beddins 10 des. to horizontal, common red iron oxide stainins.
36.48 -	36.51	CARBONACEOUS MUDSTONE, black, slishtly lenses very stiff, solid core, sbrupt basal contact of beddins 10 des. to horizontal.
36.51 -	36.56	MUDSTONE, blackish-srey, slishtly carbonaceous very stiff, solid core, sbrupt basal contact of beddins 2 des. to horizontal.
36.56 -	36.60	CARBONACEOUS MUDSTONE, black, broken core, very stiff.
36.60 -	36.78	MUDSTONE, medium to dark bluish-srey, arsillaceous

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
DIAMOND CORING		
		arenaceous in part, very stiff, transitional basal contact of bedding 45 deg. to horizontal, joints. Glassy appearance.
36.78 -	36.90	BRECCIA, dark bluish-grey, mudstone fragments angular and mudstone matrix slightly carbonaceous broken core, very stiff, abrupt basal contact of bedding 45 deg. to horizontal.
36.90 -	36.91	CARBONACEOUS MUDSTONE, medium to dark reddish-brown, soft, broken core, abrupt basal contact of bedding 45 deg. to horizontal.
36.91 -	37.16	95% MUDSTONE, dark bluish-grey, with mudstone fragments, stiff, joints, with lenses of: 5% CARBONACEOUS MUDSTONE, medium to dark reddish-brown, sporadic throughout interval very broken core.
37.16 -	37.20	MUDSTONE, dark bluish-grey, argillaceous and slightly carbonaceous, fragmented, stiff, transitional basal contact of bedding 40 deg. to horizontal.
37.20 -	37.25	80% CARBONACEOUS MUDSTONE, black, claystone stiff, with disturbed bedding transitional basal contact of bedding 5 deg. to horizontal, with lenses of: 20% MUDSTONE, light bluish-grey, slightly silty claystone, broken core.
37.25 -	37.37	CLAYSTONE, light bluish-grey, silty in part with some carbonaceous laminae, stiff, very broken core, with disturbed bedding abrupt basal contact of bedding 15 deg. to horizontal.
37.37 -	37.46	CARBONACEOUS MUDSTONE, black, hard lenses near base of unit, very stiff, solid core, transitional basal contact of bedding 0 deg. to horizontal, joints.
37.46 -	37.47	CLAYSTONE, light grey, broken core, weak rock, deformed basal contact of bedding 5 deg. to horizontal.
37.47 -	37.65	MUDSTONE, green, argillaceous some lithic (predominately rock fragments) fragments fragmented, weak rock.
37.65 -	39.00	NO SAMPLE RETURN. Core loss.
ROLLER BIT		
39.00 -	40.00	90% MUDSTONE, mottled green, argillaceous in part

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444396

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
		intermixed with: 5% MUDSTONE, light pinkish-grey, interbedded with: 5% COAL, black.
40.00 -	41.00	20% MUDSTONE, green, fragments: 15% DOLERITE, dark grey, hard intermixed with: 20% MUDSTONE, light bluish-grey, interbedded with: 40% CARBONACEOUS MUDSTONE, black, interbedded with: 5% COAL, black.
BLADES		
41.00 -	42.00	15% MUDSTONE, dark green, fragments: 5% DOLERITE, dark grey, fine grained, intermixed with: 55% MUDSTONE, variegated yellowish-grey, interbedded with: 15% CARBONACEOUS MUDSTONE, greyish-black. 10% COAL, black.
42.00 -	43.00	60% CARBONACEOUS MUDSTONE, black, shaly in part interbedded with: 5% COAL, black. 30% MUDSTONE, light argillaceous interbedded with: 5% METAMORPHIC ROCK, green.
43.00 -	44.00	55% SANDSTONE, pale greyish-white, fine grained, quartz lithic seam well sorted cement interbedded with: 45% CARBONACEOUS MUDSTONE, black, shaly in part.
44.00 -	45.00	CARBONACEOUS MUDSTONE, black, shaly in part with near middle of unit coal bands.
45.00 -	46.00	SANDSTONE, light greenish-grey, fine to medium grained, lithic (predominately rock fragments) sub-rounded moderately sorted with some carbonaceous mudstone bands.
46.00 -	47.00	60% SANDSTONE, variegated yellowish-green, fine grained, lithic (predominately rock fragments) quartz lithic in part moderately sorted sub-rounded interbedded with: 35% MUDSTONE, black, carbonaceous and shaly, with bands of: 5% COAL, black.
47.00 -	48.00	60% SANDSTONE, greyish-white, fine to medium grained, litho-feldspathic (<80% qtz, rf>flds) angular moderately sorted, with bands of: 35% CLAYSTONE, variegated yellowish-orange, interbedded with: 5% CARBONACEOUS MUDSTONE, black. Base of scree.
ROLLER BIT		

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
48.00 -	50.00	60% SANDSTONE, white, fine to medium grained, lithic (predominately rock fragments) seam with bands of: 20% DOLERITE, dark greyish-green, fine grained, fragments: 20% MUDSTONE, mottled grey, carbonaceous in part.
50.00 -	51.00	85% SANDSTONE, light greenish-white, fine grained, lithic (predominately rock fragments) interbedded with: 10% MUDSTONE, mottled grey, carbonaceous coal in part, irregularly interbedded with: 5% DOLERITE, black, near top of unit.
51.00 -	55.00	SANDSTONE, pale fine grained, fining upwards poorly sorted. Much of sample is contaminated by carb.mudstone and soft multi- coloured clays and rare coal fragments.
55.00 -	56.00	50% SANDSTONE, light very fine grained, poorly sorted fining upwards seam, interbedded with: 45% MUDSTONE, black, intermixed with: 5% COAL, black.
BLADES		
56.00 -	57.00	40% CARBONACEOUS SHALE, black, fissile some mudstone, interbedded with: 30% COAL, black. 30% SANDSTONE, light very fine grained, fining upwards.
57.00 -	59.00	90% SANDSTONE, light greyish-green, fine grained, litho-feldspathic (<60% qtz, rf>felds) cement seam moderately sorted interbedded with: 5% COAL, black. 5% CARBONACEOUS SHALE, black, and carbonaceous mudstone.
59.00 -	62.00	SANDSTONE, light greyish-green, fine to medium grained, quartz lithic seam moderately sorted. Quartz:80%, lithics:18%, feldspar:about 2%.
ROLLER BIT		
62.00 -	63.00	SANDSTONE, light greenish-grey, fine to medium grained, lithic (predominately rock fragments) seam moderately sorted with minor carbonaceous mudstone and coal bands.
63.00 -	64.00	80% SANDSTONE, pale whitish-green, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam moderately sorted argillaceous matrix interbedded with:

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
		5% MUDSTONE, carbonaceous in part with some coal bands, with bands of: 10% DOLERITE, dark greenish-grey, fine grained. 5% CLAYSTONE, pale brownish-green, granular in part.
64.00 -	65.00	50% DOLERITE, dark grey, fine grained, hard intermixed with: 25% DOLERITE, dark green, fine grained, with bands of: 15% CLAYSTONE, light brownish-green, slightly fissile granular, interbedded with: 10% SANDSTONE, light greenish-white, feldspatho-lithic (<80% qtz, felds>rf.) argillaceous matrix.
65.00 -	66.00	75% DOLERITE, dark green, fine grained, intermixed with: 25% DOLERITE, dark grey, fine grained.
66.00 -	67.00	50% METAMORPHIC ROCK, dark green, argillaceous and fibrous, intermixed with: 45% DOLERITE, dark grey, fine grained, minor haematitic fragments. 5% SANDSTONE, fine grained, lithic (predominately rock fragments) seam with some minor carbonaceous mudstone bands.
67.00 -	68.00	70% SANDSTONE, light greenish-fine grained, litho-feldspathic (<80% qtz, rf>felds) poorly sorted angular. 15% METAMORPHIC ROCK, dark green. 10% DOLERITE, dark grey, fine grained. 5% MUDSTONE, medium to dark grey.
68.00 -	69.00	90% SANDSTONE, light whitish-green, fine to medium grained, quartz feldspathic poorly sorted seam, with bands of: 3% COAL, black. 7% MUDSTONE, medium to dark cream, slightly carbonaceous in part.
69.00 -	71.00	SANDSTONE, white, fine to medium grained, quartzose (>90% quartz) quartz feldspathic in part poorly sorted seam with some coal and mudstone bands.
71.00 -	73.00	SANDSTONE, pale whitish-grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) moderately sorted seam, grading into: Quartz:70%, lithics:21%, felds 9%.
73.00 -	78.00	SANDSTONE, pale greenish-white, fine to medium grained, quartz lithic poorly sorted angular cement quartzose (>90% quartz) near base of unit, grading into:

398

444399

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
78.00 -	79.00	SANDSTONE, pale greenish-white, fine grained, quartz lithic poorly sorted seam.
79.00 -	81.00	SANDSTONE, light yellowish-green, fine grained, quartzose ()90% quartz) moderately sorted seam with arsillaceous matrix in part. Yellow stained quartz 94% felds 9% more lithics toward base.
81.00 -	83.00	60% SANDSTONE, light to medium green, fine to medium grained, quartzose ()90% quartz) slightly quartz lithic poorly sorted seam irregularly interbedded with: 25% SILTSTONE, varigated brownish-green, slightly arenaceous hard. 15% MUDSTONE, medium to dark brownish-grey, and.
83.00 -	85.00	85% SANDSTONE, pale greenish-white, fine grained, quartzose ()90% quartz) seam moderately sorted, interbedded with: 5% DOLERITE, dark grey, fine grained, hard intermixed with: 5% METAMORPHIC ROCK, dark green, fibrous with bands of: 5% SANDSTONE, light to medium yellowish-green, very fine grained, quartzose ()90% quartz) arsillaceous matrix well sorted.
85.00 -	92.00	SANDSTONE, light greyish-green, fine to medium grained, quartzose ()90% quartz) seam poorly sorted rare granular calcareous.
92.00 -	97.00	SANDSTONE, light greyish-green, fine grained, quartzose ()90% quartz) seam poorly sorted.
97.00 -	98.00	SANDSTONE, light greyish-green, fine grained, quartz feldspathic seam poorly sorted. Quartz:85%,lithics:5%,feldspar.
98.00 -	104.00	98% SANDSTONE, light greyish-green, fine grained, quartzose ()90% quartz) seam poorly sorted quartz lithic in part. 1% SANDSTONE, light greenish-grey, medium grained, quartzose ()90% quartz) moderately sorted seam arsillaceous matrix with minor rare sporadic haematitic, moderately strong rock, very broken core. 1% SANDSTONE, light greenish-grey, fine to medium grained, quartzose ()90% quartz) poorly sorted seam arsillaceous matrix lithic (predominately rock fragments) in part, moderately strong rock, fragmented. Hole losing water from 100m. Two blocks of sandstone from core- (evidently fallen in) -jointing inferred.

399

444400

Hole Number : CA0112

Lithology Description Report

From	To	Lithology Description
ROLLER BIT		
104.00	105.00	SANDSTONE, variegated greyish-white, fine to medium grained, quartz lithic poorly sorted seam argillaceous matrix interbedded with:
105.00	106.00	75% SANDSTONE, pale greenish-white, fine to medium grained, quartz feldspathic poorly sorted seam, interbedded with: 10% SILTSTONE, pale whitish-grey, claystone in part with bands of: 10% DOLERITE, dark grey, fine grained, fining upwards hard fining upwards to: 5% DOLERITE, dark grey. Glassey.
106.00	107.00	40% METAMORPHIC ROCK, variegated whitish-grey, medium grained, arenaceous quartzose (>90% quartz) micaceous in part with some granular haematitic interbedded with: 60% DOLERITE, dark greenish-grey, fine grained, hard claystone.
DIAMOND CORING		
107.00	108.40	DOLERITE, grey, fine grained, strong rock, solid core, joints, occasional calcite on joint surfaces.

****
Total Depth = 108.40
****

400

444401

REPORT : MC55 COAL SYSTEM Page : 1
Date : WED, 21 MAR 1984

LITHOLOGICAL LOG REPORT
For hole CA 0113

Eastins: 492228.00 Hole Size: 120mm

Northins: 5186431.00

Elevation: 49.00m

Total Depth: 321.00m

Probe Depth: 294.00m

Logged By: Perkins N.T.

Rig Type:

Drilling Commenced: 03/11/82

Drilling Completed: 08/11/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity

401

444402

REPORT : MC55 COAL SYSTEM Page : 3
Date : WED, 21 MAR 1984

Hole Number : CA0113

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00 -	1.00	SOIL, brown, fine grained, arsillaceous.
1.00 -	4.00	SANDSTONE, fine to medium grained, feldspathic (predom. feldspar fragments) moderately weathered.
		Base of MODERATE WEATHERING
4.00 -	6.00	SANDSTONE, yellowish-brown, fine to medium grained, feldspatho-lithic ((80% qtz, felds)rf.) slightly weathered.
		Base of WEATHERING
6.00 -	12.00	SANDSTONE, light grey, fine to medium grained, feldspathic (predom. feldspar fragments) some coal bands unweathered.
12.00 -	17.00	SANDSTONE, light to medium grey, fine to medium grained, feldspatho-lithic ((80% qtz, felds)rf.).
HAMMER		
17.00 -	18.00	SANDSTONE, grey, fine to medium grained, feldspatho-lithic ((80% qtz, felds)rf.) some coal fragments ferruginous.
18.00 -	21.00	80% COAL. 20% MUDSTONE, grey.
21.00 -	31.00	MUDSTONE, grey, minor coal bands near top of unit.
31.00 -	39.00	DOLERITE, green, chloritic some siliceous lenses strong rock, occasional pyrite disseminated.
39.00 -	43.00	SANDSTONE, grey, fine to medium grained, feldspathic (predom. feldspar fragments).
43.00 -	45.00	80% COAL. 20% MUDSTONE, grey.
45.00 -	46.00	CLAYSTONE.
46.00 -	47.00	50% COAL. 50% CARBONACEOUS MUDSTONE, tan.

Hole Number : CA0113

Lithology Description Report

From	To	Lithology Description
HAMMER		
47.00 -	48.00	25% COAL. 25% CARBONACEOUS MUDSTONE, tan. 50% MUDSTONE, tan.
48.00 -	51.00	MUDSTONE, tan.
51.00 -	54.00	SANDSTONE, light grey, fine to medium grained, quartz feldspathic.
54.00 -	55.00	CLAYSTONE, cream.
55.00 -	56.00	50% MUDSTONE, tan. 30% CARBONACEOUS MUDSTONE, light to medium brown. 20% COAL.
56.00 -	58.00	MUDSTONE, grey.
58.00 -	59.00	70% MUDSTONE, grey. 30% COAL.
59.00 -	61.00	MUDSTONE, grey.
61.00 -	62.00	SANDSTONE, grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.).
62.00 -	73.00	SANDSTONE, light grey, fine to medium grained, feldspathic (predom. feldspar fragments).
73.00 -	74.00	50% SANDSTONE, light grey, fine to medium grained, feldspathic (predom. feldspar fragments). 50% COAL.
74.00 -	78.00	SANDSTONE, grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.).
78.00 -	88.00	MUDSTONE, grey, some arenaceous phases.
88.00 -	90.00	MUDSTONE, dark grey.
90.00 -	97.00	50% MUDSTONE, grey, some claystone bands. 50% SANDSTONE, grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.).
BLADES		
97.00 -	120.00	70% SANDSTONE, grey, fine to medium grained,

Hole Number : CA0113

Lithology Description Report

From	To	Lithology Description
BLADES		
		feldspatho-lithic (<80% qtz, felds>rf.). 30% MUDSTONE, grey.
120.00	132.00	SANDSTONE, light grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) minor coal fragments.
132.00	133.00	SANDSTONE, light greyish-brown, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds).
133.00	173.00	SANDSTONE, light grey, fine to medium grained, lithic (predominately rock fragments).
173.00	174.00	MUDSTONE, grey.
174.00	176.00	SANDSTONE, grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds).
176.00	178.00	CARBONACEOUS MUDSTONE, dark brownish-black, some coal fragments.
178.00	195.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.).
195.00	196.00	MUDSTONE, dark brown, some coal fragments.
196.00	251.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) occasional brown iron oxide fragments.
251.00	289.00	SANDSTONE, light grey, fine to medium grained, quartz feldspathic.
289.00	303.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.).
303.00	321.00	SANDSTONE, light grey, fine grained, litho-feldspathic (<80% qtz, rf>felds).

****
Total Depth = 321.00
****

404

444405

REPORT : MC55 COAL SYSTEM Page : 1
Date : WED, 21 MAR 1984

LITHOLOGICAL LOG REPORT
for hole CA 0114

Eastings: 491807.00 Hole Size: 120mm

Northings: 5187124.00

Elevation: 66.00m

Total Depth: 235.00m

Probe Depth: 224.00m

Logged By: SDC

Rig Type:

Drilling Commenced: 08/11/82

Drilling Completed: 11/11/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Bed Resolution
Density -High Resolution

405

444406

REPORT : MC55 COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

Hole Number : CA0114

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00 -	6.00	SANDSTONE, yellowish-cream, arsillaceous moderately weathered.
		Base of MODERATE WEATHERING
6.00 -	7.00	SANDSTONE, yellowish-brown, arsillaceous with some coal fragments slightly weathered.
7.00 -	8.00	85% SANDSTONE, brown, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) unweathered. 15% COAL, unweathered.
8.00 -	9.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) with some coal fragments.
9.00 -	14.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
14.00 -	22.00	50% SANDSTONE, grey, very fine grained, arsillaceous. 50% MUDSTONE, grey.
AMMER		
22.00 -	23.00	COAL.
23.00 -	24.00	50% COAL. 50% MUDSTONE, grey.
24.00 -	25.00	50% MUDSTONE, grey. 45% SILTSTONE, grey. 5% COAL.
25.00 -	30.00	50% SANDSTONE, light grey, very fine grained. 50% SILTSTONE, grey.
30.00 -	38.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
38.00 -	40.00	95% SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 5% COAL.
40.00 -	42.00	SANDSTONE, light grey, fine to medium grained,

406

444407

Hole Number : CA0114

Lithology Description Report

From	To	Lithology Description
HAMMER		feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
42.00 -	45.00	COAL.
45.00 -	46.00	SANDSTONE, brown, very fine grained, silty arsillaceous matrix.
46.00 -	49.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
BLADES		
49.00 -	54.00	SANDSTONE, light greenish-grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix sub-rounded.
54.00 -	55.00	60% COAL. 40% SANDSTONE, light greenish-grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix sub-rounded.
55.00 -	57.00	SILTSTONE, greenish-grey, arenaceous with arsillaceous matrix some carbonaceous fragments.
57.00 -	60.00	SILTSTONE, greyish-green, arsillaceous matrix.
60.00 -	61.00	50% CLAYSTONE, greyish-green. 45% SILTSTONE, dark grey. 5% COAL.
61.00 -	62.00	70% COAL. 30% CLAYSTONE, greyish-green.
62.00 -	63.00	COAL.
63.00 -	64.00	40% COAL. 40% CLAYSTONE, tan. 20% MUDSTONE, dark grey, silty and carbonaceous.
64.00 -	65.00	75% MUDSTONE, brown, arenaceous. 25% COAL.
65.00 -	69.00	SILTSTONE, grey.
69.00 -	70.00	70% SANDSTONE, brown, very fine grained, fragments

Hole Number : CA0114

Lithology Description Report

From	To	Lithology Description
BLADES		
		arsillaceous matrix. 30% CARBONACEOUS MUDSTONE, blackish-brown, with some coal fragments.
70.00 -	74.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
74.00 -	76.00	75% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix. 25% MUDSTONE, greyish-brown.
76.00 -	77.00	45% SANDSTONE, grey, very fine grained, arsillaceous. 55% MUDSTONE, brown, carbonaceous.
77.00 -	78.00	60% MUDSTONE, grey. 30% CARBONACEOUS MUDSTONE, blackish-brown. 10% COAL.
78.00 -	84.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous.
84.00 -	85.00	55% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous. 40% MUDSTONE, with some arsillaceous matrix. 5% COAL.
85.00 -	92.00	SANDSTONE, dark grey, very fine grained.
92.00 -	103.00	SANDSTONE, light grey, fine grained, quartz feldspathic arsillaceous matrix.
103.00 -	104.00	SANDSTONE, light grey, fine grained, quartz feldspathic arsillaceous matrix with some coal fragments.
104.00 -	114.00	SANDSTONE, light grey, fine grained, quartz feldspathic.
114.00 -	116.00	50% SANDSTONE, pale grey, very fine grained, quartz feldspathic arsillaceous. 50% MUDSTONE, grey.
116.00 -	142.00	SANDSTONE, light grey, fine to medium grained, quartz feldspathic arsillaceous.
142.00 -	149.00	SANDSTONE, dark grey, very fine grained, arsillaceous.
149.00 -	159.00	SANDSTONE, light grey, fine to medium grained, quartz feldspathic arsillaceous.

Hole Number : CA0114

Lithology Description Report

From	To	Lithology Description
BLADES		
159.00	162.00	SANDSTONE, light grey, fine grained, quartzose ()90% quartz).
162.00	163.00	COAL.
163.00	171.00	SANDSTONE, light grey, fine to medium grained, quartz lithic arsillaceous.
171.00	180.00	SANDSTONE, light grey, fine to medium grained, quartz lithic.
180.00	235.00	SANDSTONE, light grey, fine grained, quartz lithic arsillaceous sub-rounded.

****
Total Depth = 235.00
****

409

444410

LITHOLOGICAL LOG REPORT
for hole CA 0115

Eastings: 488924.00 Hole Size: 120mm

Northings: 5170213.00

Elevation: 36.50m

Total Depth: 198.00m

Probe Depth: 197.00m

Logged By: SDC

Rig Type:

Drilling Commenced: 13/11/82

Drilling Completed: 15/11/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gammma -Natural
Density -Long Spaced
Caliper
Resistivity
Density -Bed Resolution
Density -High Resolution
Neutron

410

444411

Hole Number : CA0115

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00 -	5.00	GRAVEL. Road fill.
5.00 -	9.00	70% DOLERITE SCREE, pale green, highly weathered. Scree. 15% CLAYSTONE, greenish-white, highly weathered. 15% SAND, white, fine to medium grained, highly weathered.
9.00 -	18.00	80% DOLERITE SCREE, green, moderately weathered.
		Base of MODERATE WEATHERING
		10% CLAYSTONE, white, moderately weathered. 10% SAND, white, fine to medium grained, moderately weathered.
HAMMER		
18.00 -	38.00	DOLERITE, dark green, fine grained, very strong rock, slightly weathered. Porphyritic and aphanitic with phenocrysts of pyroxene,feldspar hypohyaline texture.
38.00 -	49.00	SANDSTONE, light greenish-grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix, slightly weathered.
49.00 -	50.00	85% SANDSTONE, light greenish-grey, feldspatho-lithic (<80% qtz, felds>rf.) seam slightly weathered. 15% SILTSTONE, black, slightly carbonaceous.
50.00 -	51.00	SANDSTONE, light greenish-grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam with some coal fragments, slightly weathered.
51.00 -	52.00	60% SANDSTONE, fine grained, ferruginous seam arsillaceous matrix, unweathered. 40% MUDSTONE, light greenish-grey, with some coal fragments.
52.00 -	56.00	SANDSTONE, light greenish-grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
56.00 -	59.00	90% SANDSTONE, light greenish-grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 10% MUDSTONE, dark grey, some carbonaceous fragments.
59.00 -	66.00	SANDSTONE, light greenish-grey, fine grained,

411

444412

REPORT : MC55 COAL SYSTEM Page : 3
Date : WED, 21 MAR 1984

Hole Number : CA0115

Lithology Description Report

From	To	Lithology Description
HAMMER		feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
66.00 -	67.00	90% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 10% COAL.
LADES		
67.00 -	68.00	70% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 20% COAL. 10% MUDSTONE, grey.
68.00 -	72.00	55% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 45% MUDSTONE, grey.
72.00 -	73.00	60% MUDSTONE, grey. 40% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
73.00 -	74.00	80% COAL. 10% MUDSTONE, grey. 10% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
74.00 -	75.00	60% COAL. 25% MUDSTONE, grey. 15% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
75.00 -	77.00	40% COAL. 30% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 30% MUDSTONE, grey.
77.00 -	78.00	60% COAL. 40% MUDSTONE, grey.
78.00 -	79.00	80% COAL. 20% MUDSTONE, grey.
79.00 -	80.00	80% MUDSTONE, grey. 20% COAL.
80.00 -	82.00	60% MUDSTONE.

412

444413

Hole Number : CA0115

Lithology Description Report

From	To	Lithology Description
BLADES		
		40% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix seam.
82.00 -	86.00	60% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.). 40% MUDSTONE.
86.00 -	102.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix seam.
102.00 -	109.00	MUDSTONE, grey, silty with arenaceous bands throughout interval.
109.00 -	126.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix some thin mudstone bands throughout interval.
126.00 -	128.00	MUDSTONE, dark grey, slightly carbonaceous with some coal traces.
128.00 -	130.00	MUDSTONE, grey.
130.00 -	139.00	55% MUDSTONE. 45% SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% qtz, felds>rf.).
139.00 -	175.00	90% SANDSTONE, light brownish-grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) with arsillaceous matrix with bands of: 10% MUDSTONE, grey.
175.00 -	181.00	60% MUDSTONE, silty. 40% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
181.00 -	190.00	40% MUDSTONE, grey. 30% SILTSTONE, grey. 30% SANDSTONE, light grey, fine grained.
190.00 -	196.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.).
196.00 -	198.00	DOLERITE, dark green, fine grained, hard. Porphyritic and aphanitic.

****
Total Depth = 198.00
****

413

444414

LITHOLOGICAL LOG REPORT
For hole CA 0116

Eastins: 492511.00 Hole Size: 120mm

Northins: 5167484.00

Elevation: 42.50m

Total Depth: 230.00m

Probe Depth: 230.00m

Logged By: SDC

Rig Type:

Drilling Commenced: 15/11/82

Drilling Completed: 17/11/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gamma -Natural
Density -Long Spaced
Caliper
Resistivity
Sonic
Neutron

Hole Number : CA0116

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00	3.00	SOIL, tan, arsillaceous and arenaceous, highly weathered.
HAMMER		
3.00	17.00	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) litho-feldspathic ((80% qtz, rf)felds) minor arsillaceous matrix with rare coal wisps and coal laminae slightly weathered. Rock frasments are subangular and quartz grains are subrounded.
17.00	30.00	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) litho-feldspathic ((80% qtz, rf)felds) arsillaceous matrix with some thin mudstone bands and rare coal laminae.
30.00	33.00	75% SANDSTONE, light grey, fine grained, quartzose ()90% quartz) litho-feldspathic ((80% qtz, rf)felds) arsillaceous matrix, slight brown iron oxide staining. 20% MUDSTONE, light grey. 5% SANDSTONE, dark green, moderate chlorite staining.
33.00	61.00	SANDSTONE, light grey, fine to medium grained, quartzose ()90% quartz) litho-feldspathic ((80% qtz, rf)felds) arsillaceous matrix with thin mudstone bands and rare coal wisps and coal laminae throughout interval.
61.00	62.00	30% COAL. 30% CARBONACEOUS MUDSTONE, blackish-grey. 40% SANDSTONE, light grey, fine to medium grained.
62.00	110.00	SANDSTONE, with some thin mudstone bands and rare coal laminae.
110.00	111.00	70% SANDSTONE, light grey, fine grained. 30% MUDSTONE, dark blackish-grey, slightly carbonaceous.
111.00	113.00	70% SANDSTONE, light grey, fine to medium grained. 30% MUDSTONE.
113.00	122.00	SANDSTONE, light grey, fine to medium grained, with some thin mudstone bands throughout interval.
122.00	124.00	60% SANDSTONE, light grey, fine to medium grained. 40% MUDSTONE, light grey.
124.00	129.00	SANDSTONE, with some thin mudstone bands throughout

415

444416

Hole Number : CA0116

Lithology Description Report

From	To	Lithology Description
HAMMER		interval.
129.00	130.00	85% SANDSTONE, light grey, fine to medium grained, abundant pyrite fragments. 10% MUDSTONE, light grey. 5% COAL.
130.00	131.00	SANDSTONE, light grey, fine to medium grained, with some coal fragments.
131.00	132.00	50% MUDSTONE, light grey. 30% SANDSTONE, light grey. 20% COAL, brownish-black.
132.00	133.00	60% SANDSTONE. 40% MUDSTONE, light grey.
133.00	134.00	40% SANDSTONE, brownish-grey, slightly carbonaceous argillaceous. 40% MUDSTONE, brownish-grey. 15% CARBONACEOUS MUDSTONE, blackish-brown. 5% COAL.
134.00	135.00	60% SANDSTONE, light grey, fine grained. 40% MUDSTONE, grey.
135.00	194.00	SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) litho-feldspathic (<80% qtz, rf>felds) argillaceous matrix with some thin mudstone bands.
194.00	196.00	65% SANDSTONE, light grey, fine to medium grained. 35% MUDSTONE, grey, slightly carbonaceous.
196.00	197.00	55% COAL. 45% MUDSTONE, grey, feldspatho-lithic (<80% qtz, felds>rf.).
197.00	200.00	MUDSTONE, grey, silty.
200.00	220.00	SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) litho-feldspathic (<80% qtz, rf>felds) argillaceous matrix with some thin mudstone bands.
220.00	223.00	90% MUDSTONE, dark grey. 10% MUDSTONE, greyish-black, slightly carbonaceous.
223.00	227.00	MUDSTONE, grey.
227.00	230.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz)

Hole Number : CA0116

Lithology Description Report

From	To	Lithology Description
HAMMER		litho-feldspathic (<80% qtz, rf)felds) arsillaceous matrix.

****
Total Depth = 230.00
****

417

444418

REPORT : MC55 COAL SYSTEM Page : 1
Date : WED, 21 MAR 1984

LITHOLOGICAL LOG REPORT
for hole CA 0117

Easting: 490977.00 Hole Size: 120mm

Northing: 5185576.00

Total Depth: 196.00m

Probe Depth: 100.00m

Logged By: SDC

Rig Type:

Drilling Commenced: 22/11/82

Drilling Completed: 25/11/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gamma -Natural
Density -Long Spaced
Caliper
Resistivity
Neutron

418

444419

REPORT : MC55 COAL SYSTEM Page : 1
Date : WED, 21 MAR 1984

Hole Number : CA0117

Lithology Description Report

From	To	Lithology Description
HAMMER		
0.00 -	1.00	SOIL, tan, highly weathered.
1.00 -	6.00	SANDSTONE, white, very fine grained, arsillaceous highly weathered.
6.00 -	9.00	BASALT, pale green, highly weathered.
9.00 -	12.00	NO SAMPLE RETURN.
12.00 -	19.00	50% BASALT, pale green, highly weathered. 50% CLAY, highly weathered.
19.00 -	27.00	60% SANDSTONE, yellow, fine grained, quartzose (>90% quartz) arsillaceous moderately weathered, moderate yellow iron oxide stainins, interbedded with: 40% CLAY, greyish-brown, moderately weathered.
27.00 -	50.00	SANDSTONE, yellow, fine grained, quartzose (>90% quartz) arsillaceous moderately weathered, moderate yellow iron oxide stainins.
50.00 -	67.00	DOLERITE, greenish-black, fine grained, hard moderately weathered, intense brown iron oxide stainins.
		Base of MODERATE WEATHERING
67.00 -	101.00	DOLERITE, greenish-black, fine grained, hard slightly weathered, slight brown iron oxide stainins.
		Base of WEATHERING
101.00 -	106.00	MUDSTONE, black.
106.00 -	113.00	MUDSTONE, grey.
113.00 -	117.00	90% MUDSTONE, interbedded with: 10% SANDSTONE, grey, fine grained, quartzose (>90% quartz).
117.00 -	144.00	MUDSTONE, black, hard arenaceous. Could be slightly metamorphosed.
144.00 -	150.00	MUDSTONE, grey.

420

444420

REPORT : MC55 COAL SYSTEM Page : 3
Date : WED, 21 MAR 1984

Hole Number : CA0117

Lithology Description Report

From	To	Lithology Description
HAMMER		
150.00	158.00	MUDSTONE, hard arenaceous.
158.00	162.00	DOLERITE, greenish-black, fine grained, hard slisht brown iron oxide stainins.
162.00	184.00	MUDSTONE, black, hard arenaceous.
184.00	187.00	MUDSTONE, grey, with some doleritic frasments.
187.00	193.00	MUDSTONE, black, hard arenaceous.
193.00	195.00	DOLERITE, greenish-black, fine grained, hard. Could not cut dolerite with hammer.
195.00	196.00	NO SAMPLE RETURN.

****
Total Depth = 196.00
****

419

444421

LITHOLOGICAL LOG REPORT
for hole CA 0118

Eastins: 489463.00 Hole Size: 120mm

Northins: 5179031.00

Total Depth: 164.00m

Probe Depth: 156.00m

Logged By: SDC

Rig Type:

Drillins Commenced: 26/11/82

Drillins Completed: 26/11/82

Data Source: Marathon Pet. Aust, Ltd

Drillins Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Neutron

421

444422

REPORT : MOSS COAL SYSTEM Page : 2

Date : WED, 21 MAR 1984

Hole Number : CA0119

Lithology Description Report

From	To	Lithology Description
HAMMER		
0.00 -	20.00	NO SAMPLE RETURN. Dolerite scree, no sample return due to difficult drilling and problems with casing.
20.00 -	50.00	DOLERITE SCREE. 70% DOLERITE, dark green, hard slightly weathered. 10% CLAY, tan, highly weathered, intense brown iron oxide stainins. 10% CLAY, pale green, highly weathered, intense clay stainins. 10% SANDSTONE, brownish-yellow, medium grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments) hard, moderately weathered, intense brown iron oxide stainins.
		Base of WEATHERING
50.00 -	51.00	70% COAL, (10% BRIGHT, unweathered. 20% CARBONACEOUS MUDSTONE, black, unweathered. 10% SANDSTONE, grey, and mudstone unweathered.
51.00 -	52.00	5% COAL, (10% BRIGHT, unweathered. 95% DOLERITE, dark green, hard unweathered, slisht brown iron oxide stainins, common calcite disseminated, common zeolite.
52.00 -	66.00	DOLERITE, dark green, fine grained, hard slisht brown iron oxide stainins. Sill, porphyritic and granitic.
66.00 -	67.00	50% MUDSTONE, lisht grey. 45% MUDSTONE, dark blackish-grey, carbonaceous. 5% COAL, (10% BRIGHT.
67.00 -	68.00	SILTSTONE, blackish-grey, slightly carbonaceous.
68.00 -	70.00	40% MUDSTONE, lisht grey. 60% SANDSTONE, lisht grey, fine grained, quartzose ()90% quartz) feldspatho-lithic ((80% qtz, felds)rf.) sub-rounded moderately sorted.
70.00 -	73.00	SANDSTONE, lisht grey, fine grained, quartzose ()90% quartz) feldspatho-lithic ((80% qtz, felds)rf.) argillaceous matrix, fining upwards to:
73.00 -	74.00	50% MUDSTONE.

Hole Number : CA0118

Lithology Description Report

From	To	Lithology Description
HAMMER		50% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
74.00 -	80.00	20% SANDSTONE, light greenish-grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix, slight clay stainins. 80% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
80.00 -	81.00	SANDSTONE, mottled grey, carbonaceous.
81.00 -	82.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
82.00 -	83.00	60% MUDSTONE, grey. 40% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
83.00 -	84.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
84.00 -	85.00	SANDSTONE, light grey, fine grained, carbonaceous.
85.00 -	88.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
88.00 -	90.00	70% MUDSTONE, grey. 30% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix, slight clay stainins.
90.00 -	91.00	50% MUDSTONE, grey. 50% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
91.00 -	100.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
100.00 -	101.00	80% SANDSTONE, light grey, fine grained, carbonaceous.

423

444424

REPORT : MCSS COAL SYSTEM Page : 4
Date : WED, 21 MAR 1984

Hole Number : CA0118

Lithology Description Report

From	To	Lithology Description
HAMMER		20% MUDSTONE, grey.
101.00	110.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspathic (predom. feldspar fragments) sub-rounded moderately sorted argillaceous matrix.
110.00	111.00	60% SANDSTONE, light grey, very fine grained, quartzose (>90% quartz) feldspathic (predom. feldspar fragments). 40% SILTSTONE.
111.00	113.00	DOLERITE, pyrite.
113.00	114.00	40% DOLERITE. 60% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.).
114.00	116.00	70% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.). 30% MUDSTONE.
116.00	117.00	50% SANDSTONE, grey, very fine grained, argillaceous. 20% MUDSTONE, grey, carbonaceous. 30% COAL, <10% BRIGHT.
117.00	118.00	50% MUDSTONE, grey. 30% SILTSTONE, grey. 20% COAL.
118.00	119.00	MUDSTONE, dark grey, with some coal fragments.
119.00	122.00	40% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) seam. 30% SILTSTONE, light grey. 30% MUDSTONE, grey.
122.00	129.00	SANDSTONE, light grey, fine to medium grained, quartzose (>90% quartz) litho-feldspathic (<80% qtz, rf>felds) seam moderately sorted.
129.00	130.00	70% SANDSTONE, light grey, medium grained. 30% MUDSTONE, dark grey.
130.00	134.00	SANDSTONE, light grey, medium grained, quartzose (>90% quartz) feldspathic (predom. feldspar fragments) argillaceous moderately sorted seam slight clay staining.
134.00	135.00	70% SANDSTONE.

424

444425

REPORT : MCBS COAL SYSTEM Page : 5
Date : WED, 21 MAR 1984

Hole Number : CA0118

Lithology Description Report

From	To	Lithology Description
HAMMER		
		30% MUDSTONE.
135.00	137.00	SANDSTONE, light grey, medium grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments).
137.00	138.00	85% SANDSTONE, light grey, medium grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments). 15% MUDSTONE, dark grey, medium grained, slightly carbonaceous.
138.00	140.00	SANDSTONE, light grey, medium grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments).
140.00	142.00	85% SANDSTONE, light grey, medium grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments). 15% MUDSTONE, grey.
142.00	144.00	80% SANDSTONE, light grey, fine grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments). 20% MUDSTONE, black, slightly carbonaceous.
144.00	151.00	SANDSTONE, light grey, fine to medium grained, fining upwards.
151.00	152.00	90% SANDSTONE, light grey, fine to medium grained, slightly carbonaceous. 10% MUDSTONE, grey.
152.00	156.00	SANDSTONE, light grey, fine grained, quartzose ()90% quartz) feldspathic (predom. feldspar fragments).
156.00	157.00	50% SANDSTONE, quartzose ()90% quartz) feldspathic (predom. feldspar fragments). 25% SANDSTONE, brownish-black, carbonaceous. 25% COAL, 10 - 40% BRIGHT.
157.00	158.00	50% CARBONACEOUS MUDSTONE, black. 30% COAL, 10 - 40% BRIGHT. 20% MUDSTONE, grey.
158.00	159.00	SANDSTONE, black, fine grained, carbonaceous.
159.00	162.00	SANDSTONE, light grey, fine grained, argillaceous.
162.00	164.00	NO SAMPLE RETURN. Lost air circulation. Couldn't get blades through dolerite scree which caved in whenever rods were pulled.

****
Total Depth = 164.00
****

425

444426

LITHOLOGICAL LOG REPORT
For hole CA 0119

Eastins: 490772.00 Hole Size: 120mm

Northins: 5184609.00

Total Depth: 130.00m

Probe Depth: 123.60m

Logged By: SDC

Rig Type:

Drilling Commenced: 28/11/82

Drilling Completed: 29/11/82

Data Source: Marathon Pet. Aust, Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gamma -Natural
Density -Long Spaced
Caliper
Resistivity
Neutron

426

444427

Hole Number : CA0119

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00 -	1.00	CLAY, yellowish-tan, highly weathered.
1.00 -	2.00	50% CLAY, yellowish-tan, highly weathered. 35% MUDSTONE, dark blackish-grey, carbonaceous highly weathered. 15% COAL, sooty highly weathered.
2.00 -	3.00	40% MUDSTONE, blackish-grey, highly weathered. 30% CLAY, brownish-grey, highly weathered. 30% COAL, sooty highly weathered.
3.00 -	4.00	60% CARBONACEOUS MUDSTONE, blackish-grey, moderately weathered. 40% CLAY, white, highly weathered.
4.00 -	5.00	50% CARBONACEOUS MUDSTONE, dark blackish-grey, moderately weathered. 30% COAL, sooty highly weathered. 20% CLAY, brownish-grey, highly weathered.
5.00 -	6.00	50% MUDSTONE, light grey, slightly weathered. 50% SILTSTONE, light grey, slightly weathered.
6.00 -	24.00	MUDSTONE, grey, slightly weathered.
24.00 -	25.00	80% MUDSTONE, grey, slightly weathered. 20% CARBONACEOUS MUDSTONE, dark blackish-grey, moderately weathered.
25.00 -	26.00	50% CARBONACEOUS MUDSTONE, dark blackish-grey, moderately weathered. 50% COAL, highly weathered.
26.00 -	27.00	40% CLAY, brownish-grey, highly weathered. 40% COAL, highly weathered. 20% CARBONACEOUS MUDSTONE, dark blackish-grey, moderately weathered.
27.00 -	28.00	60% COAL, moderately weathered. 40% CARBONACEOUS MUDSTONE, dark blackish-grey, moderately weathered.
28.00 -	31.00	MUDSTONE, grey.

Base of MODERATE WEATHERING

427

444428

Hole Number : CA0119

Lithology Description Report

From	To	Lithology Description
BLADES		
31.00 -	32.00	SANDSTONE, grey, very fine grained, arsillaceous slightly weathered.
32.00 -	35.00	MUDSTONE, grey, slightly weathered.
35.00 -	38.00	SILTSTONE, grey, slightly weathered.
38.00 -	43.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) fining upwards slightly weathered.
		Base of WEATHERING
43.00 -	59.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix unweathered.
59.00 -	61.00	50% SANDSTONE, light grey, fine grained. 50% MUDSTONE, grey, slightly carbonaceous with rare coal frasments.
61.00 -	62.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
62.00 -	63.00	85% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 15% COAL, <10% BRIGHT.
63.00 -	64.00	20% SANDSTONE, light grey, very fine grained, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix. 10% MUDSTONE, grey. 35% COAL, <10% BRIGHT. 35% COAL, HEAVY (INFERIOR COAL).
64.00 -	65.00	60% COAL, <10% BRIGHT. 40% SANDSTONE, light grey, feldspatho-lithic (<80% qtz, felds>rf.) seam arsillaceous matrix.
65.00 -	67.00	SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
67.00 -	69.00	MUDSTONE, dark grey, slightly carbonaceous.
69.00 -	71.00	MUDSTONE, grey.
71.00 -	73.00	SANDSTONE, light grey, fine grained, feldspatho-lithic

428

444429

REPORT : MC55 COAL SYSTEM Page : 4
Date : WED, 21 MAR 1984

Hole Number : CA0119

Lithology Description Report

From	To	Lithology Description
BLADES		
		((80% qtz, felds)rf.) arsillaceous matrix.
73.00 -	74.00	80% SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix. 20% MUDSTONE, grey.
74.00 -	78.00	SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix.
78.00 -	79.00	20% SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix. 40% CARBONACEOUS MUDSTONE, blackish-grey. 40% MUDSTONE, brownish-grey.
79.00 -	80.00	50% MUDSTONE, grey. 50% SILTSTONE, grey.
80.00 -	81.00	65% COAL, <10% BRIGHT. 35% MUDSTONE, grey.
81.00 -	82.00	50% SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix. 25% COAL, <10% BRIGHT. 25% MUDSTONE, grey.
82.00 -	83.00	85% SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix. 15% MUDSTONE, grey.
83.00 -	85.00	SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix.
85.00 -	86.00	50% SANDSTONE, light grey, fine grained, feldspatho-lithic ((80% qtz, felds)rf.) arsillaceous matrix. 35% MUDSTONE, grey. 15% COAL, <10% BRIGHT.
86.00 -	89.00	SANDSTONE.
89.00 -	90.00	DOLERITE, dark grey, fine grained, hard.
HAMMER		
90.00 -	92.00	40% MUDSTONE, dark grey, carbonaceous. 30% MUDSTONE, grey. 30% SANDSTONE, grey, very fine grained.
92.00 -	99.00	DOLERITE, hard abundant calcite disseminated, abundant

Hole Number : CA0119

Lithology Description Report

From	To	Lithology Description
		zeolite. Porphyritic.
99.00	101.00	60% DOLERITE, abundant pyrite disseminated. 25% SANDSTONE, light grey, very fine grained, hard. 15% MUDSTONE, dark grey, carbonaceous.
101.00	104.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspathic (predom. feldspar fragments) hard.
104.00	107.00	60% SANDSTONE. 40% MUDSTONE, dark grey, carbonaceous hard.
107.00	110.00	50% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspathic (predom. feldspar fragments) argillaceous matrix. 30% SILTSTONE, grey. 20% MUDSTONE, grey.
110.00	113.00	70% SANDSTONE, light grey. 30% MUDSTONE, grey.
113.00	117.00	DOLERITE, dark greenish-black, very fine grained, hard. Aphanitic and holohyaline.
117.00	120.00	50% MUDSTONE, grey. 20% CARBONACEOUS MUDSTONE, dark grey. 30% SANDSTONE, light grey, very fine grained.
120.00	122.00	40% SANDSTONE, light grey, fine grained. 40% DOLERITE, green. 20% MUDSTONE, grey.
BLADES		
122.00	130.00	NO SAMPLE RETURN. Extremely hard rock, probably dolerite. Bad caving caused sample contamination.

****
Total Depth = 130.00
****

430

444431

REPORT : MC55 COAL SYSTEM Page : 1
Date : WED, 21 MAR 1984

LITHOLOGICAL LOG REPORT
for hole CA 0120

Eastings: 490939.00 Hole Size: 120mm

Northings: 5187496.00

Total Depth: 115.00m

Probe Depth: 112.00m

Logged By: SBC

Rig Type:

Drilling Commenced: 02/12/82

Drilling Completed: 02/12/82

Data Source: Marathon Pet. Aust. Ltd

Drilling Contractor: Rockdrill Contractors

Geophysical Contractor: BPB Instruments

Logs Available: Gamma -Natural
Density -Long Spaced
Caliper
Resistivity
Neutron

431

444432

REPORT : MC55 COAL SYSTEM Page : 2
Date : WED, 21 MAR 1984

Hole Number : CA0120

Lithology Description Report

From	To	Lithology Description
BLADES		
0.00 -	1.00	SOIL, orangy-tan.
1.00 -	5.00	BASALT. Scree. 70% CLAY, orangy-tan, highly weathered. 30% BASALT, dark greenish-black, very fine grained, moderately weathered, intense brown iron oxide stainins. Glassy with small agates.
5.00 -	6.00	DOLERITE. Scree. 50% DOLERITE, green, medium grained, moderately weathered. Porphyritic. 50% CLAY, orangy-tan, highly weathered.
HAMMER		
6.00 -	7.00	BASALT, moderately weathered, intense brown iron oxide stainins. Scree.
7.00 -	9.00	CLAY, yellowish-brown, highly weathered.
		Base of MODERATE WEATHERING
9.00 -	12.00	BASALT, greenish-grey, very fine grained, hard slightly weathered, intense brown iron oxide stainins, stainins. Glassy with agates.
12.00 -	19.00	BASALT, greenish-grey, very fine grained, hard unweathered. Glassy with agates throughout.
19.00 -	20.00	40% MUDSTONE, grey. 30% SILTSTONE, reddish-brown. 30% SANDSTONE, cream, very fine grained, argillaceous.
BLADES		
30.00 -	31.00	50% MUDSTONE, grey, interbedded with: 50% SANDSTONE, grey, very fine grained, feldspatho-lithic (<80% qtz, felds>rf.) argillaceous.
31.00 -	35.00	SANDSTONE, grey, fine to medium grained, litho-feldspathic (<80% qtz, rf>felds) argillaceous matrix.
35.00 -	38.00	MUDSTONE, dark grey.
38.00 -	40.00	MUDSTONE, dark grey, with some coal fragments.

Hole Number : CA0120

Lithology Description Report

From	To	Lithology Description
BLADES		
40.00 -	43.00	MUDSTONE, dark grey.
43.00 -	46.00	70% MUDSTONE, brownish-red. 30% MUDSTONE, pale green.
46.00 -	48.00	60% MUDSTONE, grey, with some coal fragments. 20% MUDSTONE, reddish-brown. 20% MUDSTONE, pale green.
48.00 -	49.00	50% MUDSTONE, grey. 50% MUDSTONE, dark grey, carbonaceous.
49.00 -	51.00	MUDSTONE, grey.
51.00 -	53.00	MUDSTONE, grey, with some coal fragments.
53.00 -	54.00	70% MUDSTONE, grey. 30% SANDSTONE, greyish-brown, very fine grained, argillaceous.
54.00 -	55.00	50% MUDSTONE, grey. 45% CARBONACEOUS MUDSTONE, blackish-grey. 5% COAL.
55.00 -	57.00	50% MUDSTONE, grey. 40% CARBONACEOUS MUDSTONE, blackish-grey. 10% SILTSTONE, brownish-grey.
57.00 -	58.00	50% MUDSTONE. 50% CARBONACEOUS MUDSTONE, blackish-grey, with some coal fragments.
58.00 -	59.00	50% CARBONACEOUS MUDSTONE, greyish-black. 20% COAL. 30% MUDSTONE, grey.
59.00 -	60.00	50% SILTSTONE, brownish-grey. 40% MUDSTONE, grey. 10% COAL.
60.00 -	61.00	50% SANDSTONE, dark grey, very fine grained, carbonaceous. 50% MUDSTONE, grey.
61.00 -	62.00	40% COAL. 30% CARBONACEOUS MUDSTONE, creamy-black, occasional pyrite disseminated.

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444434

REPORT : MCSS COAL SYSTEM Page : 4
Date : WED, 21 MAR 1984

Hole Number : CA0120

Lithology Description Report

From	To	Lithology Description
BLADES		
		30% SILTSTONE, brownish-grey.
62.00 -	63.00	50% COAL. 20% CARBONACEOUS MUDSTONE, greyish-black. 30% SILTSTONE, brownish-grey.
63.00 -	64.00	50% COAL, occasional pyrite disseminated. 40% CARBONACEOUS MUDSTONE, greyish-black. 10% SILTSTONE, brownish-grey.
64.00 -	77.00	70% MUDSTONE. 15% SANDSTONE, grey, very fine grained, feldspatho-lithic (<80% qtz, felds>rf.) argillaceous interbedded with: 15% SILTSTONE, brownish-grey, interbedded with:
77.00 -	94.00	DOLERITE, dark green, fine grained, hard occasional calcite veining. Porphyritic.
94.00 -	96.00	SANDSTONE, grey, fine grained, litho-feldspathic (<80% qtz, rf>felds) argillaceous matrix.
96.00 -	97.00	60% CARBONACEOUS MUDSTONE, blackish-grey. 20% COAL. 20% SANDSTONE, grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) argillaceous.
97.00 -	98.00	30% COAL. 40% CARBONACEOUS MUDSTONE, greyish-black. 30% SILTSTONE, brown.
98.00 -	100.00	40% MUDSTONE. 40% CARBONACEOUS MUDSTONE, blackish-grey, with some coal fragments. 20% SILTSTONE, brown.
100.00 -	101.00	40% CARBONACEOUS MUDSTONE. 60% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.).
101.00 -	105.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) argillaceous matrix seam poorly sorted.
105.00 -	106.00	60% COAL. 40% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.).
106.00 -	107.00	50% COAL, brownish-black.

434

444435

REPORT : MC55 COAL SYSTEM Page : 5
Date : WED, 21 MAR 1984

Hole Number : CA0120

Lithology Description Report

From	To	Lithology Description
BLADES		
		50% SILTSTONE, brown.
107.00	108.00	50% CARBONACEOUS MUDSTONE, greyish-black. 50% COAL, brownish-black.
108.00	109.00	75% SILTSTONE, brown. 25% CARBONACEOUS MUDSTONE, greyish-black.
109.00	113.00	SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% qtz, felds>rf.) arsillaceous matrix.
113.00	115.00	DOLERITE, dark green, fine grained, hard. Blades couldn't cut dolerite.

****
Total Depth = 115.00
****

---------- END OF REPORT ----------

444436

APPENDIX VII

Interpretation of Airborne Magnetic Data from E.L. 6/79, Catamaran, Tasmania.

444437

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GEC

GEOPHYSICAL EXPLORATION CONSULTANTS PTY. LTD.

Suite 106, 104 Mount Street, Heidelberg, Victoria 3084 Telephone (03) 459 0533

INTERPRETATION OF AIRBORNE MAGNETIC DATA

FROM THE E.L 679, CATAMARAN, TASMANIA

FOR MARATHON PETROLEUM AUSTRALIA LTD

BY GEOPHYSICAL EXPLORATION CONSULTANTS PTY LTD.

HUGH RUTTER

FEBRUARY 1983.

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3. Interpretation of Airborne Magnetic Data

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1. Summary of drill hole data to 11 January 1982.

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444439

1. INTRODUCTION AND GENERAL GEOLOGY

The EL 679, Catamaran is along the coast of S.E. Tasmania extending from Southport almost to the southern coast; Hobart is approximately 75 km to the north east.

The 1:250,000 scale geology shows Holocene alluvium along the valleys of the main rivers, ie Catamaran and D'Entrecasteaux Rivers. Outcrops of Tertiary basalts are indicated south of Ida Bay. The Jurassic dolerites which are the problem rocks as far as exploration is concerned are mapped over much of the area; but there is also a significant proportion of Permo-Triassic rocks shown which contain known coal seams. The Lune River Fault marks the apparent western limit of prospective coal bearing strata. To the west of this fault upper Carboniferous rocks outcrop which are, at this stage, considered to be devoid of coal seams. This geology is very general and must now be considered in the light of photogeological studies (Huntings) and previous geophysical work, predominantly gravity (Leaman). Both studies indicate a somewhat greater, and more patchwork, distribution of dolerite but are unable to determine the actual boundaries. The main problem is the abundance of dolerite talus at the edges of the main dolerite sheets; which make it difficult, if not impossible to locate the edge of the sill. Leaman noted that the edge of the solid rock could be distinguished from the talus using a magnetometer on the ground. The solid dolerite has a more uniform magnetic signature, where as the talus has an erratic, spiked appearance on the magnetic profile. This is presumably caused by the more uniform nature of magnetisation in the solid sill contrasting with the irregular assemblage of dolerite blocks in the talus.

The airborne magnetic survey was designed to take advantage of

these facts.

The dolerite (and the basalt in the north) are extremely magnetic compared to other rocks in the area. Therefore the distribution of dolerite is expected to be evident from the airborne magnetic data. The short wave length anomalies from the talus would not be recognised to any extreme extent, by measurements collected 90m in the air. Faults, and dips in some instances, should be readily in evidence; the depth to the major sill, and to some of the thinner sills, can be estimated.

The airborne magnetic survey was designed to solve these problems while remaining within the bounds of reasonable cast.

2. SPECIFICATIONS OF THE AIRBORNE MAGNETIC SURVEY.

The flight lines are in an east-west direction with a spacing of 500m; the tie lines are north south with a nominal separation of 2500m. The mean terrain clearance of the magnetic sensor was 90m whenever possible; most of the survey is within this limit except where topographic features necessitated a higher altitude. A cesium vapour magnetometer was used for the survey, giving a sensitivity of 0.04 nT with a reading being taken every 0.2seconds; this corresponds to a reading interval of 15m at an aircraft speed of 270 kph. Navigation and subsequent flight path recovery was completed using 1:25000 scale photography. No positioning errors were reported due to the quality of the photographs; overall the quality was good.

The final data is presented as contour maps of total magnetic intensity with a contour interval of 5 nT. Stocked profiles are also available at a horizontal scale of 1:25000; they are presented in the form of a stretched layout to enable easier usage.

Full details are included in the logistics report supplied by the contractor, Geoterrex Pty. Ltd.

3. INTERPRETATION.

The contours of total magnetic intensity fall on four maps at 1:25000 scale for the Catamaran E.L. One copy is coloured to clarify the relative amplitudes of the magnetic anomalies. The result is a map showing a complex picture of very variable magnetic character.

The Lune River Fault appears to be clearly defined along much of its length. To the west of the fault there is virtually no magnetic activity. Exceptions are at Lune Sugar Loaf, a hill about 450m above the back ground elevation; and possible in the south west where the Lune River Fault appears to split. Magnetic dolerites occur much further west therefore it seems reasonable to assume that the magnetic anomalies west of the Lune River Fault are due to down faulted blocks containing thin dolerites. Perhaps it is also worthwhile to consider the presence of coal bearing strata west of the fault, particularly in the region south west of the D'Entrecasteaux River where a topographic plain coincides with magnetic inactivity: the geology is covered by Recent alluvium.

The magnetic properties of the dolerites are discussed in the Mt Lloyd report and it is sufficient to summarise here that the magnetic susceptibility is variable depending on the part of the sill from which the sample originates. However, the end result is that the rocks contain sufficient magnetite to give significant airborne magnetic anomalies.

It is stated by Leaman, and by other geological workers, that there is only one major dolerite sill with other minor sills throughout the sequence.

The major sill is quite apparent in the Catamaran E.L. by its strong magnetic signature; anomaly amplitudes are as high as 800 nT. It is extremely faulted and rarely has the appearance of a sheet. The nearest approach to an unfaulted "horizontal" sheet is 2.5km west of Moss Glen. The drill hole CH 108 was collared in dolerite and finished at 39m still in dolerite. The total thickness of the sill in this locality is likely to be in the order of 200 m.

Southwards towards Driscolls Creek the sill narrows towards a south-west, north-east fault and then south of the fault broadens again. Driscolls Creek is an old coal mining area with a number of shafts shown on the map. If these shafts are still accessible they should provide useful information on the dolerite and the underlying coal seams. Three of the shafts appear to be well adits within the outcrop of surface dolerite suggesting that the subsurface geology was thought to be understood before the shafts were sunk; the three shafts are named Anthracite, McKenzie, and Hoods. all driven from coal outcrops !!!

The dip of the two large dolerite blocks near Moss Glen and Driscolls Creek is variable and probably the result of a number of periods of faulting subsequent to intrusion. The apparently low angle of dip makes the algorithms used to model the anomaly rather unreliable. The probable wedge shape of the dolerite section produces a profile which implies an easterly dip in some instances; the following schematic section illustrates this point:

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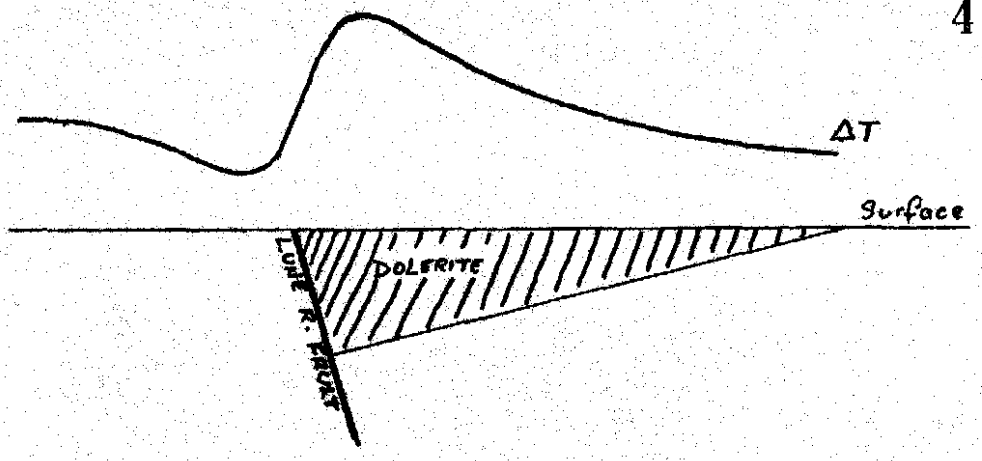

Most of the distinctive parameters of a magnetic anomaly are caused by the edges of the body and lateral thinning as shown above does not produce a magnetic effect from which the boundary can be easily defined.

Dips have been estimated from various anomalies throughout Catamaran and the overall conclusion is that the dip is predominantly westerly with local variations in actual direction and degrees. There are numerous thinner sills which underly the main dolerite unit. The low angle of dip may produce an extensive outcrop with the secondary result of abundant talus. The thickness of the smaller sills varies from 10m to 50m and does not appear to be consistent along the strike outcrop of any individual sill. The thin sills may not be detrimental to coal extraction as long as their presence is known.

Faulting appears to be intense, but with the exception of the Lune River Fault the throw of the faults is not great. The direction of faulting is variable as can be seen from the interpretation plan and there may be other faults which are not clearly discernible from the magnetic data.

The drill holes in Catamaran intersected rock types which correlate very well with the airborne-magnetic data; in fact it would be rather alarming if this was not the case.

CA 101 intersected basalt from 0-43m; there is a coincident 230 nT magnetic anomaly.

CA 102 intersected predominantly coal measures but there is a dolerite sill, 12m thick at 38m. The magnetic response consists of a weak 20 nT anomaly, nearby; otherwise there is no recognizable individual response. This thin dolerite is interpreted as being quite extensive and probably underlies the whole area of the broad magnetic low.

CA 103 and CA 104 both recorded dolerite talus. The former probably represents talus upon non magnetic sediments; and the latter, talus upon a dolerite sill.

CA 105 is close to a fault interpreted from the magnetics and terminated in dolerite at 71m. The magnetic data indicates a lack of surface dolerite. Of the remaining holes in this "dolerite free" area CA 110 and CA 113 intersected thin dolerites at depths ranging from 30m to 100m (thickness of 8m and 18m respectively); both are related to weak magnetic anomalies of a few nanoteslas. CA 114 and CA 116 both drilled to 230m without intersecting dolerite.

The 6 drill holes (CA, 102, 105, 110, 113, 114, 116) are all within an area of magnetic inactivity. Some are free of dolerite and some have intersected thin sills. The lack of continuation indicates either faulting within the area or thinning and termination of the sills.

CA 109 intersected 5m of dolerite at 295m, for which there is no strong magnetic evidence at the surface.

A comparison of CA 107 which intersected dolerite talus at 27m and CA 112, only 100m away, which intersected dolerite sheet at 37m suggest a difficulty of identifying sheet dolerite from the drill samples. The magnetic data indicates dolerite sheet at both locations.

CA 111 is south of a dolerite outcrop and intersected dolerite at 156m. 200m to the north CA 108 collared in dolerite. Either there is a local dip of about 40° to the south or there is a fault between the two holes which has downthrown the major sill. A fault is the most likely interpretation.

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4. CONCLUSION

The areas free of significant dolerite, and therefore are prospective for coal exploration are recognizable from their low magnetic amplitude and lack of any weak magnetic anomalies. The most extensive area approaching these conditions extends from drill hole CA 102 in the north, south and south-east towards Pigsty bridge, then eastwards to Southport Lagoon and southwards almost to Eliza Point. However, thin dolerites are indicated throughout the area, some quite close to the surface.

Other smaller areas with similar characteristics are marked on the interpretation plan as having thin dolerites at depth.

It is concluded that the magnetic survey has been successful in delineating lithology and structure and serves as an excellent guide to future exploration potential.

Hugh M Rutter

HUGH RUTTER
CONSULTANT GEOPHYSICIST.

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APPENDIX 1.

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January 11, 1982

CATAMARAN EL 6/79 DRILLHOLE INTERSECTION SUMMARY

CA 101	T.D. 42.9m	0 - 3.0	grey clay
		- 42.0	basalt
CA 102	T.D. 170.0	0 - 3.0	grey clay
		- T.D.	Coal Measures (dolerite sheet 38.50 - 51.27)
CA 103	T.D. 29.0	0 - 5.0	clay
		- T.D.	dolerite talus
CA 104	T.D. 39.9	0 - 4.5	soil derived from dolerite
		- T.D.	dolerite talus
CA 105	T.D. 79.0	0 - 5.0	clay
		- 70.55	Coal Measures
		- T.D.	dolerite sheet
CA 106	T.D. 234.16	0 - 5.0	clay
		- 72.0	basalt
		- 224.0	Coal Measures
		- T.D.	dolerite sheet
CA 107	T.D. 57.46	0 - 1.0	clay
		- 27.0	sandstone talus
		- T.D.	dolerite talus
CA 108	T.D. 39.43	0 - 20.21	weathered sediments
		- T.D.	dolerite sheet
CA 109	T.D. 300.36	0 - 295.36	Coal Measures
		- T.D.	dolerite sheet
CA 110	T.D. 304.00	0 - 1.0	sandy soil
		- T.D.	Coal Measures (dolerite sheet 100.00 - 117.99)
CA 111	T.D. 171.50	0 - 2.0	clay
		- 35.27	sandstone talus
		- 48.35	dolerite talus
		- 156.62	Coal Measures
		- T.D.	dolerite sheet
CA 112	T.D. 108.40	0 - 7.0	clay
		- 37.0	dolerite sheet
		- 105.0	basal sandstone
		- T.D.	dolerite sheet
CA 113	T.D. 321.0	0 - 1.0	clay
		- 100.0	Coal Measures (dolerite sheet 30.0 - 38.0)
		- T.D.	basal sandstones

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CA 114 T.D. 235.0m

0 - 100.0	Coal Measures	
- T.D.	basal sandstones	

CA 115 T.D. 198.0

0 - 50.0	road fill	
- 20.0	dolerite talus	
- 38.0	dolerite sheet	
- T.D.	Coal Measures	

CA 116 T.D. 230.0

0 - 3.0	clay	
- T.D.	basal sandstone	

CA 117 T.D. 195.0

0 - 1.0	clay	
- 67.0	basalt talus	
- 101.0	basalt flow	
- 166.0	Coal Measures	
	(dolerite sheets	120.0-144.0)
		150.0-162.0)
- T.D.	dolerite sheet	

CA 118 T.D. 164.0

0 - 51.0	dolerite talus	
- 66.0	dolerite sheet	
- T.D.	Coal Measures	

CA 119 T.D. 130.0

0 - 1.0	clay	
- 89.0	Coal Measures	
- 101.0	dolerite sheet	
- 113.0	Coal Measures	
- T.D.	dolerite sheet	

CA 120 T.D. 115.0

0 - 1.0	sandy soil	
- 7.0	basalt talus	
- 19.0	basalt flow	
- 77.0	Coal Measures	
- 94.0	dolerite sheet	
- 113.0	Coal Measures	
- T.D.	dolerite sheet	

BRIEF PETROLOGICAL REPORT ON SAMPLES 1 - 7 FOR MARATHON PETROLEUM AUSTRALIA LIMITED (Order No. P00103).

SAMPLE 1. Basalt

Macroscopic: Hard, dark grey igneous rock with with a fine-grained crystalline groundmass and rare phenocrysts.

Microscopic: Porphyritic basalt containing rare phenocrysts up to 1.5mm long which in order of abundance are clinopyroxene, plagioclase (labradorite-bytownite), olivine, and occasionally quartz. The phenocrysts are set in an intergranular to intersertal textured groundmass of euhedral-subhedral plagioclase (labradorite) laths averaging 0.2mm long, anhedral (granular) to subdedral clinopyroxene and olivine and with irregular patches of turbid dark brown glass and yellow brown palagonite partly altered to chlorite.

SAMPLE 2. Dolerite

Macroscopic: Hard, dark grey - brown, fine-medium, even grained non-porphyritic crystalline igneous rock.

Microscopic: The texture is predominantly subophitic grading to hyaloophitic in places. The rock consists mainly of plagioclase and clinopyroxene in approximately equal proportions. Plagioclase (labradorite) crystals average 0.2mm in length and vary from a short prismatic habit to elongated laths up to 0.6mm long. Clinpyroxene is anhedral to subhedral and averages 0.25mm in crystal length but ranges up to 0.7mm. Lesser amounts of anhedral olivine are also present. Irregular patches of glass occur throughout the rock. These appear to have partly altered to a mixture of fine crystallites (possibly feldspar) and granular opaques.

SAMPLE 3. Basalt

Macroscopic: Hard, dark grey fine-grained crystalline igneous rock containing rare, small phenocrysts.

Microscopic: This basalt contains phenocrysts up to 1.5mm long.

They are mainly clinopyroxene (augite and pigeonite) and rarely plagioclase. They are set in an intersertal to intergranular groundmass composed of laths of plagioclase (andesine-labradorite) averaging 0.2mm long, granular to subhedral clinopyroxene (av. 0.15mm) and rare olivine. Turbid brown glass containing a fine dust of opaques is present throughout much of the groundmass and irregular patches of yellow-green palagonite are also visible. The palagonite shows some alteration to chlorite.

SAMPLE 4. Basalt

Macroscopic: Hard, dark grey, fine, even grained igneous rock apparently lacking phenocrysts.

Microscopic: The rock is even grained and lacks phenocrysts. It has an intergranular to intersertal texture consisting of laths of plagioclase (av. 0.25mm) and anhedral clinopyroxene and olivine (av. 0.10mm). Turbid brown glass containing fine-grained opaques is interstitial between the feldspars and ferromagnesians. Calcite is present as a common alteration product of ferromagnesian minerals.

SAMPLE 5. Dolerite

Macroscopic: Hard, dark grey fine-grained igneous rock which appears slightly altered in hand specimen.

Microscopic: The texture varies from ophitic to subophitic and hyaloophitic with the rock consisting mainly of plagioclase, clinopyroxene and olivine. The plagioclase (labradorite-bytownite) is euhedral to subhedral and average crystal length is 0.3mm. Crystals vary from a short, prismatic habit to elongate laths up to 1mm. Clinopyroxene and olivine are anhedral to subhedral and average 0.25mm but with a few larger crystals up to 2mm long. Patches of brown, iron-rich glass are widespread and these contain fine-grained opaques. Several patches of yellow-green palagonite were also noted, and a vein of chalcedony cuts the section.

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SAMPLE 6. Quartzose sandstone

Macroscopic: Grey-buff coloured, friable, medium-coarse grained moderately sorted sandstone containing a white clay matrix.

Microscopic: The rock is a moderately sorted medium-coarse sandstone (av. grain size 0.5mm) consisting mainly of quartz (60-70%) with 5-10% altered potash feldspar (microcline, orthoclase) and 4-8% rock fragments (siltstone tuff and chert). Small amounts of altered mica are also present and some clay matrix is visible. The rock is relatively porous with approximately 10% visible porosity. Quartz grains have well-developed quartz overgrowth rims which have partly filled the primary pores. Feldspars are in various stages of alteration to clay and dissolution to form secondary pores. Provenance from an acid plutonic source with a lesser contribution from sedimentary/volcanic sources is indicated.

SAMPLE 7. Lithic sandstone

Macroscopic: Brown, weathered, friable, well sorted, medium grained lithic sandstone.

Microscopic: The rock is a medium grained (av. 0.30mm), well sorted sandstone, containing subangular to rounded grains. It is composed mainly of lithic fragments (60-70%) including acid-intermediate tuffs and flows, very fine sandstone, siltstone and chert. Some feldspar (8-12%) is also present (altered potash feldspar and oligoclase) and quartz makes up only a small proportion of the framework grains (5-8%). A small amount of mica, mostly biotite (2-3%) is also present. Clay matrix (10-15%) consists of chlorite and possibly smectite and the rock has little or no visible porosity. Volcanic and sedimentary sources have contributed most of the sediment.

DISCUSSION. Petrological criteria for separating dolerites and basalts are not clearcut and some difficulty was experienced with the samples in making this distinction. Sample 3, although

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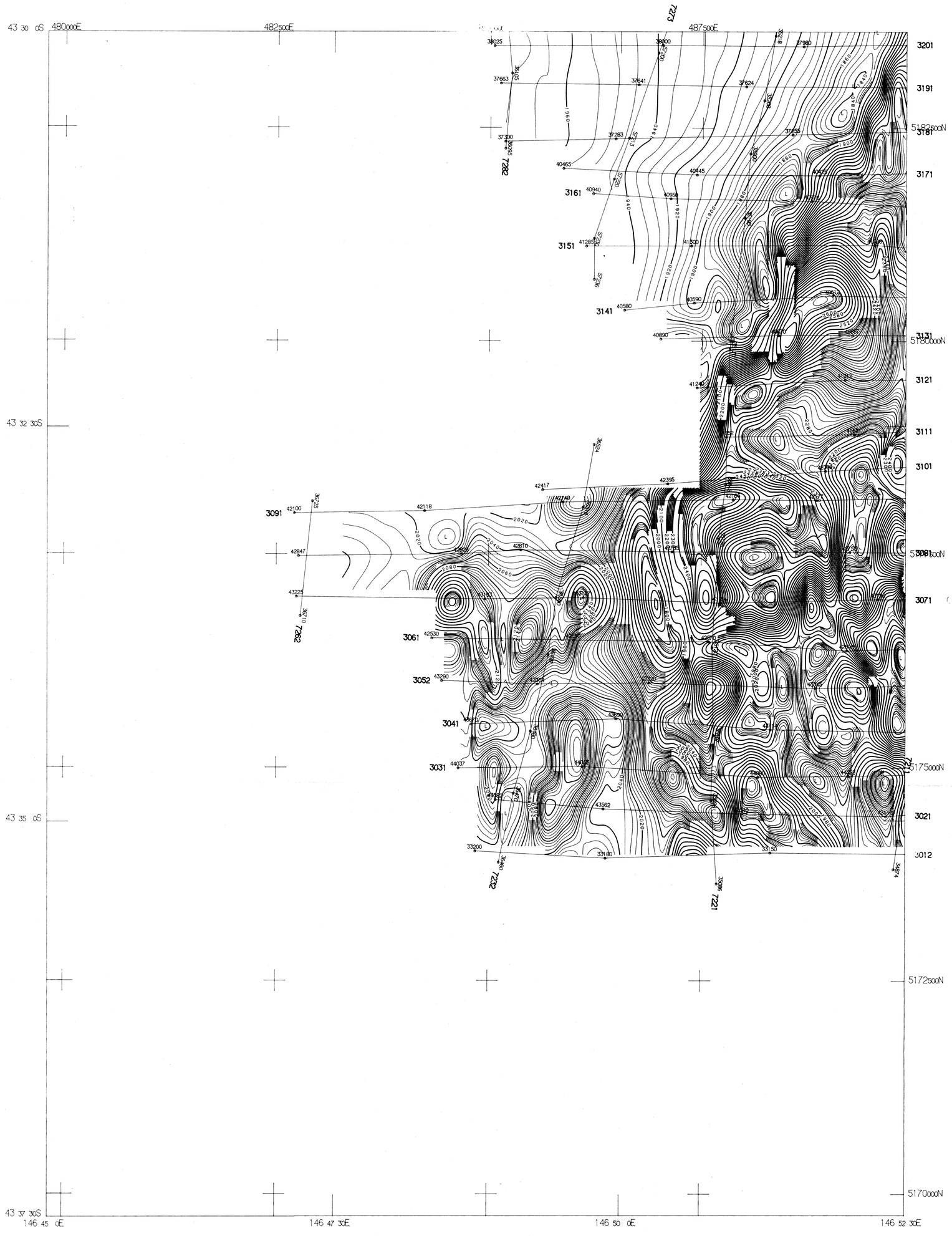
identified as a basalt, did nevertheless have some similarities to samples 2 and 5. Likewise, Sample 4 although identified as a basalt, was lacking in phenocrysts and had a relatively coarse grained groundmass. In the two dolerite samples a considerable proportion of the feldspar was in the form of short prismatic crystals with a tendency towards an ophitic texture, whereas in the basalts the groundmass plagioclase is typically in the form of elongated laths.

K.R. MARTIN

13th December, 1982



AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER :	Cesium Vapour optical absorption. Sensitivity : 0.04 nT
RECORDING INTERVAL :	0.2 sec (approx 13m sampling) at mean ground speed of 220 km/hour.
DATA RECORDING :	Geoterrex MADACS acquisition system. Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE :	Detector in aircraft at 90 m.
NOMINAL LINE SPACING :	Traverse lines 500 metres. Tie lines 3.0 km.
FLIGHT PATH RECORD :	Geocam 35mm continuous tracking camera.
FLIGHT LINE RECOVERY :	Visually to 1:25,000 enlargements of Tas Lands Dept. black & white photography.

RESIDUAL MAGNETIC CONTOURS

SHEET 8210-9

Grid Notation Refers to Australian Map Grid

Digitised from 1:25000 controlled photographs.

Magnetics	:Tie Line Levelled.
Diurnal	:Removed.
IGRF	:Removed.Datum 2000nT added.
Contour Interval	:5,20,100,500,1000 and 2000 nanoteslas.

8211-10	8211-14	8311-2
8211-11	8211-15	8311-3
8211-12	8211-16	8311-4
8210-9	8210-13	

TRANSPARENCIES HELD

0 1 2 Km

SCALE 1:25000

5 cm

444454

JOB NO : 87-259

Flown by GEOTERREX PTY LTD : DECEMBER 1982

Compiled by Geoterrex Pty Ltd.,Sydney, NSW.

Processed by Engineering Computer Services , Bowral, NSW.

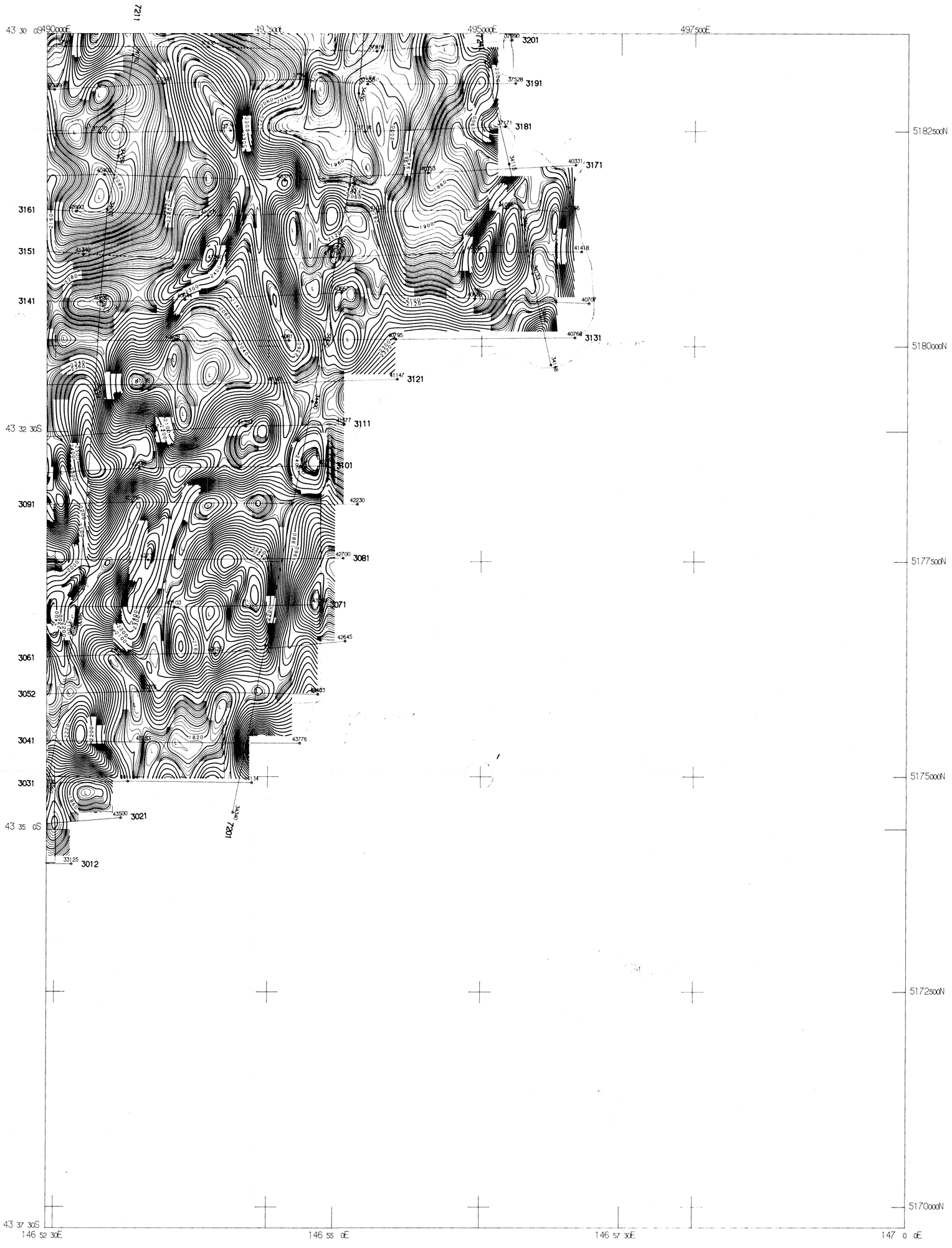
MARATHON PETROLEUM AUSTRALIA, LTD.

EL 6/79 CATAMARAN TAS. RESIDUAL MAGNETIC CONTOURS SHEET 8210-9

PROJ NO.	DATE:	24-DEC-82

8H-2110 2.2 of 3.

3218



AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER :	Cesium Vapour optical absorption. Sensitivity : 0.04 nT
RECORDING INTERVAL :	0.2 sec (approx 13m sampling) at mean ground speed of 220 km/hour.
DATA RECORDING :	Geoterrex MADACS acquisition system. Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE :	Detector in aircraft at 90 m.
NOMINAL LINE SPACING :	Traverse lines 500 metres. Tie lines 3.0 km.
FLIGHT PATH RECORD :	Geocam 35mm continuous tracking camera.
FLIGHT LINE RECOVERY :	Visually to 1:25,000 enlargements of Tas Lands Dept. black & white photography.

RESIDUAL MAGNETIC CONTOURS

SHEET 8210-13
Grid Notation Refers to Australian Map Grid
Digitised from 1:25000 controlled photographs.
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IGRF :Removed.Datum 2000nT added.
Contour Interval:5,20,100,500,1000 and 2000 nanoteslas.

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8211-11	8211-15	8311-3
8211-12	8211-16	8311-4
8210-9	8210-13	

0 1 2 Km
SCALE 1:25000

5 cm

444455

JOB NO : 87-259
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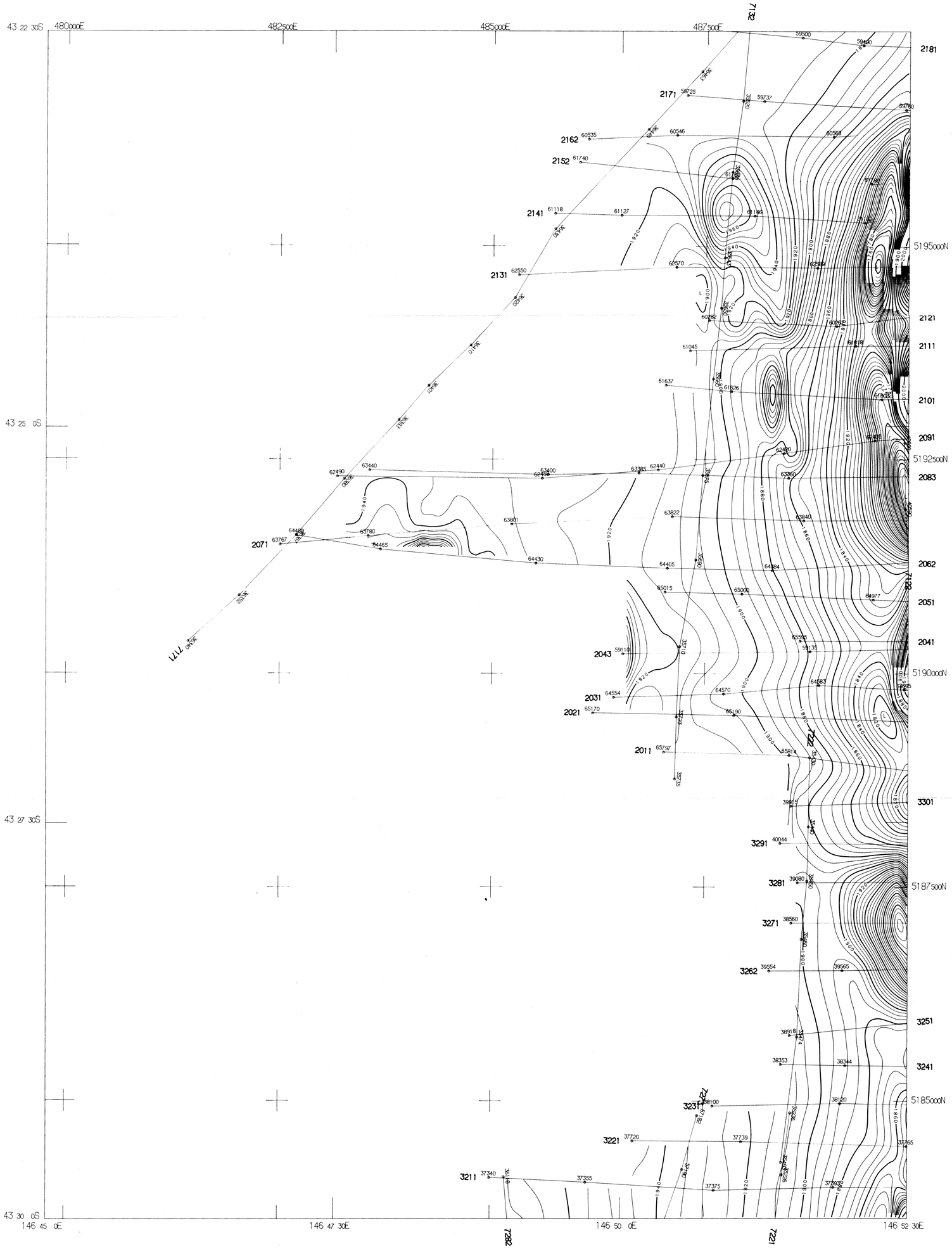
AUSTRALIA, LTD.

EL 6/79 CATAMARAN TAS.
RESIDUAL MAGNETIC CONTOURS
SHEET 8210-13

PROJ NO.	DATE: 24-DEC-82

84-211D 2.2 of 3

3219



AIRBORNE SURVEY SPECIFICATIONS

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DATA RECORDING :	Geoterrex MADACS acquisition system, Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE :	Detector in aircraft at 90 m.
NOMINAL LINE SPACING :	Traverse lines 500 metres. Tie lines 3.0 km.
FLIGHT PATH RECORD :	Geocam 35mm continuous tracking camera.
FLIGHT LINE RECOVERY :	Visually to 1:25,000 enlargements of Tas Lands Dept. black & white photography.

RESIDUAL MAGNETIC CONTOURS
SHEET 8211-12
Grid Notation Refers to Australian Map Grid
Digitised from 1:25000 controlled photographs.
Magnetics :Tie Line Levelled.
Diurnal :Removed.
IGRF :Removed.Datum 2000nT added.
Contour Interval:5,20,100,500,1000 and 2000 nanoteslas.

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8211-11	8211-15	8311-3
8211-12	8211-16	8311-4
8210-9	8210-13	

N

0 1 2 Km
SCALE 1:25000

5 cm

444456

JOB NO : 87-259
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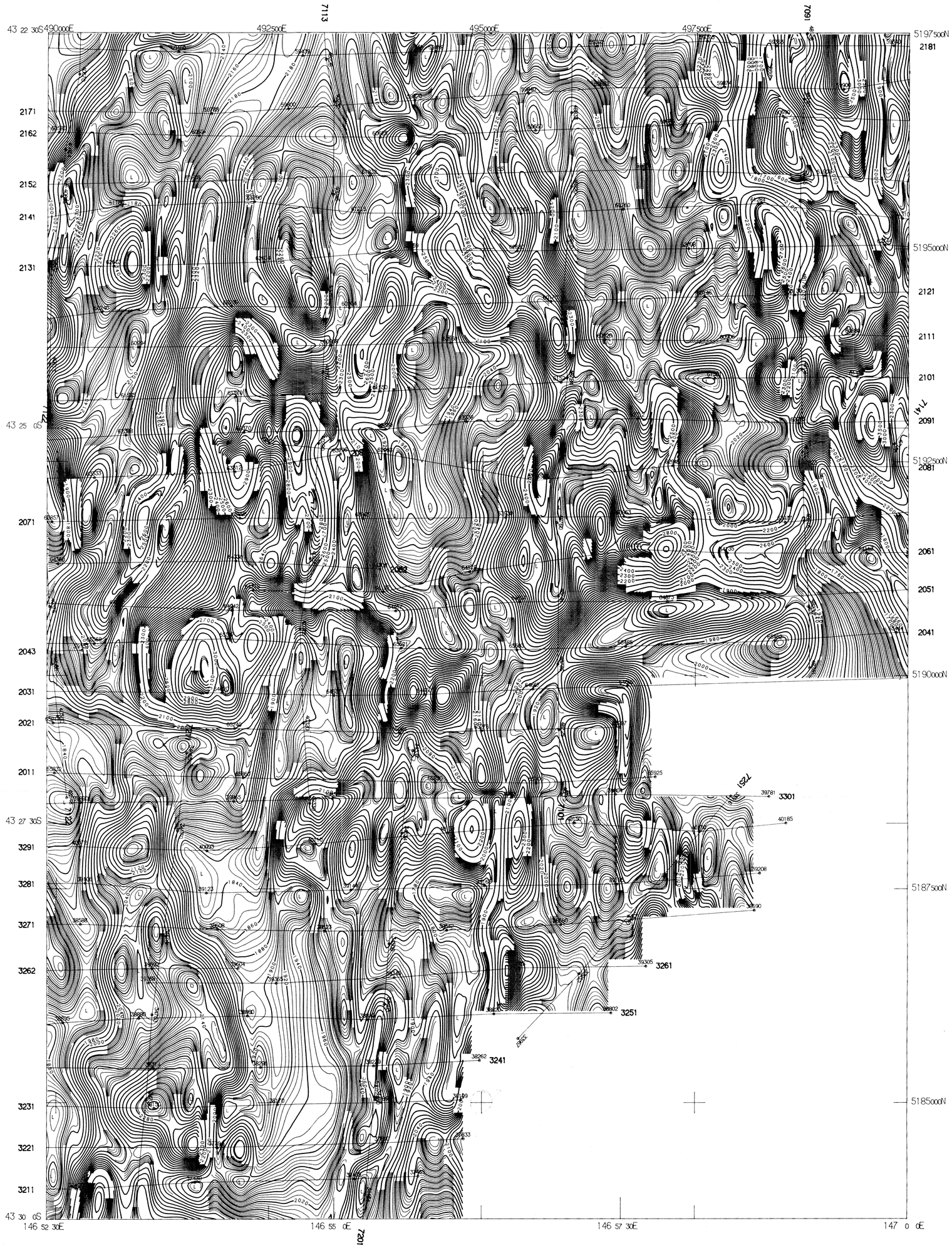
EL 28/82, EL 6/79 TAS.
RESIDUAL MAGNETIC CONTOURS
SHEET 8211-12

PROJ NO.	DATE: 24-DEC-82

84-2110 2.2 of 3.

3250



AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER :	Cesium Vapour optical absorption. Sensitivity : 0.04 nT
RECORDING INTERVAL :	0.2 sec (approx 13m sampling) at mean ground speed of 220 km/hour.
DATA RECORDING :	Geoterrex MADACS acquisition system. Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE :	Detector in aircraft at 90 m.
NOMINAL LINE SPACING :	Traverse lines 500 metres. Tie lines 3.0 km.
FLIGHT PATH RECORD :	Geocam 35mm continuous tracking camera.
FLIGHT LINE RECOVERY :	Visually to 1:25,000 enlargements of Tas Lands Dept. black & white photography.

RESIDUAL MAGNETIC CONTOURS

SHEET 8211-16
Grid Notation Refers to Australian Map Grid
Digitised from 1:25000 controlled photographs.
Magnetics :Tie Line Levelled.
Diurnal :Removed.
IGRF :Removed.Datum 2000nT added.
Contour Interval:5,20,100,500,1000 and 2000 nanoteslas.

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8211-11	8211-15	8311-3
8211-12	8211-16	8311-4
8210-9	8210-13	

0 1 2 Km
SCALE 1:25000

5 cm

444457

JOB NO : 87-259
Flown by GEOTERREX PTY LTD : DECEMBER 1982
Compiled by Geoterrex Pty Ltd.,Sydney, NSW.
Processed by Engineering Computer Services , Bowral, NSW.

MARATHON PETROLEUM AUSTRALIA, LTD.

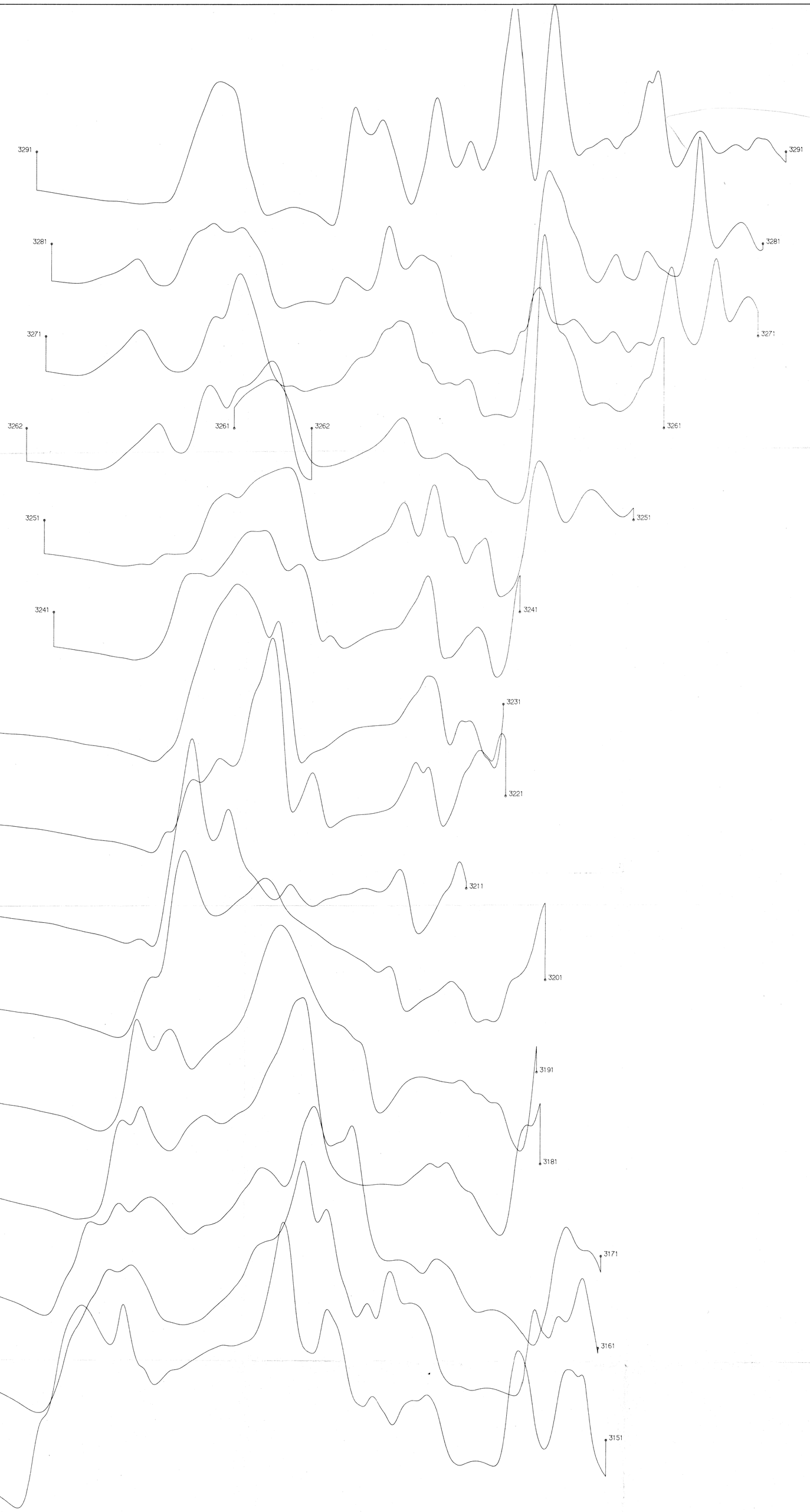
EL 28/82, EL 6/79 TAS. RESIDUAL MAGNETIC CONTOURS SHEET 8211-16

PROJ NO.	DATE: 24-DEC-82

84-2110 2.2 of 3.

3221

3222



AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER :	Cesium Vapour optical absorption. Sensitivity : 0.04 nT
RECORDING INTERVAL :	0.2 sec (approx 13m sampling) at mean ground speed of 220 km/hour.
DATA RECORDING :	Geoterrex MADACS acquisition system. Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE :	Detector in aircraft at 90 m.
NOMINAL LINE SPACING :	Traverse lines 500 metres. Tie lines 3.0 km.
FLIGHT PATH RECORD :	Geocam 35mm continuous tracking camera.
FLIGHT LINE RECOVERY :	Visually to 1:25.000 enlargements of Tas Lands Dept. black & white photography.

SEPARATED MAGNETIC PROFILES
SHEET 1

Digitised from 1:25000 controlled photographs.	
Magnetics	:Tie Line Levelled.
Diurnal	:Removed.
IGRF	:Removed.Datum 2000nT added.
Base Value	:2000 nT
Vertical Scale	:50 nT/CM

1
2
146 47E 147 00E

5 cm

0 1 Km
SCALE 1:25000

44445S

JOB NO : 87-259
Flown by GEOTERREX PTY LTD : DECEMBER 1982
Compiled by Geoterrex Pty Ltd..Sydney. NSW.
Processed by Engineering Computer Services . Bowral. NSW.

MARATHON PETROLEUM
AUSTRALIA. LTD.

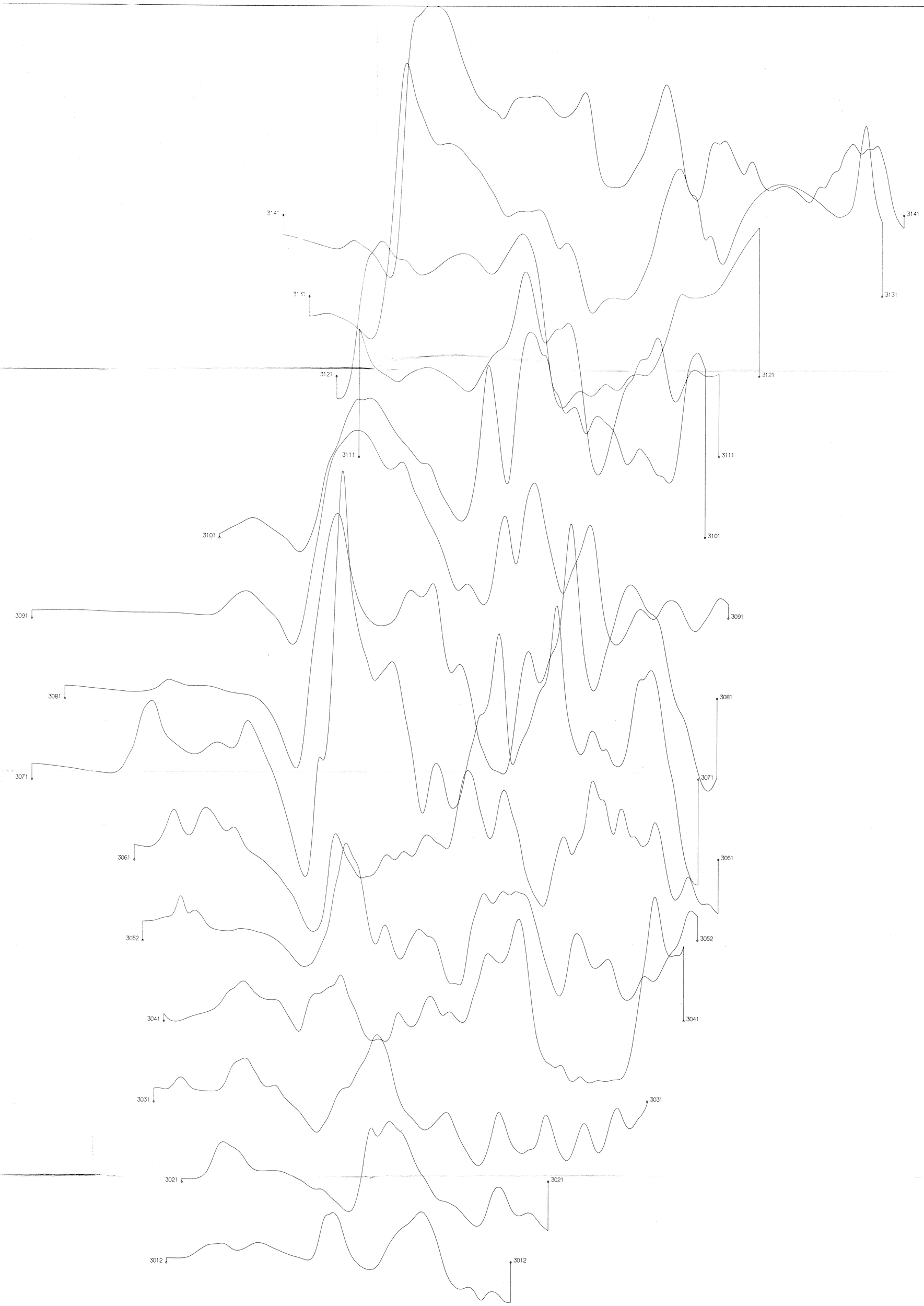
EL 6/79 CATAMARAN TAS.
SEPARATED MAGNETIC PROFILES
SHEET 1

PROJ NO.	DATE:	5-JAN-83

84-2110 2.2 of 3

3222

3223



444459

5 cm

AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER :	Cesium Vapour optical absorption. Sensitivity : 0.04 nT
RECORDING INTERVAL :	0.2 sec (approx 13m sampling) at mean ground speed of 220 km/hour.
DATA RECORDING :	Geoterrex MADACS acquisition system. Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE :	Detector in aircraft at 90 m.
NOMINAL LINE SPACING :	Traverse lines 500 metres. Tie lines 3.0 km.
FLIGHT PATH RECORD :	Geocam 35mm continuous tracking camera.
FLIGHT LINE RECOVERY :	Visually to 1:25.000 enlargements of Tas Lands Dept. black & white photography.

SEPARATED MAGNETIC PROFILES
SHEET 2

Digitised from 1:25000 controlled photographs.

Magnetics	:Tie Line Levelled.
Diurnal	:Removed.
IGRF	:Removed.Datum 2000nT added.
Base Value	:2000 nT
Vertical Scale	:50 nT/CM

1
2

146 47E 147 00E

0 1 Km
SCALE 1:25000

JOB NO : 87-259
Flown by GEOTERREX PTY LTD : DECEMBER 1982
Compiled by Geoterrex Pty Ltd..Sydney, NSW.
Processed by Engineering Computer Services , Bowral, NSW.

MARATHON PETROLEUM
AUSTRALIA, LTD.

EL 6/79 CATAMARAN TAS.
SEPARATED MAGNETIC PROFILES
SHEET 2

PROJ NO.	DATE: 5-JAN-83

84-2110 22 of 3

3223

4850 E
4900 E
4950 E
5000 E
5190 N
5185 N
5180 N
5175 N

Dolerite
Th Dol
Dol
Basalt and Dolerite
Thin dolerite at depth
Dolerite (Bas?)
The Deep Hole
CA102
CA120
CA116
CA114
CA121
CA106
CA113
CA117
CA110
CA119
CA105 Thin Dolerite
Lune Sugarloaf
Dolerite at Depth ?
Basalt
Thin Dolerites at depth
Thin dolerite layers at depth
Southport Bluff
Southport Lagoon
Eliza Point
General absence of magnetic rocks within range of exploration
CA109
CA103
Th. Dol.
Piggy Bridge
Thin dolerites at depth.
Sequence of thin dolerites
Dolerites at depth.
Leprena
Thin dol at depth
CA101
CA102
CA112
Moss Glen
Thin dol. at depth.
CA111
CA108
CA118
CA115
Shafts
Sullivan Point
Catamaran
No evidence of magnetic dolerite
Thin layer of subsurface dolerite
Rocky Bay
Dolerite ?
Fishers Point
McDougalls Hill
Ramsgate
RIVER FAULT ZONE
LUNE

444460

5 cm

N

1:25,000 Scale

1·0 0 0·5 1·0 1·5 2·0 2·5 Km

MARATHON PETROLEUM AUSTRALIA, LTD

Hobart SK 55-8

EL. 679 CATAMARAN — TASMANIA PROJECT

INTERPRETATION OF AIRBORNE MAGNETIC DATA

LOCATION

3224

Sept. 78 Date-Hg

5218N

5215N

5210N

5205N

5202N

3559E

3564E

3569E

3574E

3579E

3584E

Waterloo Bay

White Bluff

Flowerpot Hill

Swearing Bobs Plain

Tri-Tree Hill

Storm Hill

Huon Point

Pine Lodge

Raminea

Port Esperance

d
Dolerite at depth.

4825E

4830E

4835E

4840E

4845E

Rock boundary :
Fault :
Thick dolerite : D
Thin dolerite : d
Underscore indicates likelyhood of non-outcrop : d

GA CEY

N

1:25,000

1 .5 0 1 2 Km

MARATHON PETROLEUM AUSTRALIA LIMITED.

HOBART SK 55-8

ELA 28/82 STRATHBLANE

INTERPRETATION OF TOTAL MAGNETIC INTENSITY DATA

NORTHERN SHEET

PLAN No. CM 110

5202N
5200N
5195N
5190N
5187N
4284E
3584
3064
3564
3065
3565
3565E

Strathblane
Hawker Point
Scott Point
Lonas Hill
Lippies Point
Tylers Hill
Tower Bay
Browns Point
Burnett Point
Coal Hill
Shingles Hill
Hays Hill
Dolerites at depth (50m-100m)
Thin dolerites at depth
Dolerite at depth
Thin dolerites at depth.
Thin dolerites at depth
Thin dolerites at Depth
Predominantly free of dolerite
LUNE RIVER FAULT
Lune River
Southport
Southport Lagoon

Rock boundary :
Fault :
Thick dolerite : D
Thin dolerite : d
Underscore indicates likelyhood of non-outcrop : d

1:25,000
1 .5 0 1 2Km

N

MARATHON PETROLEUM AUSTRALIA LIMITED

HOBART SK 55-8
ELA 28/82 STRATHBLANE

INTERPRETATION OF TOTAL MAGNETIC INTENSITY DATA

SOUTHERN SHEET

PLAN No. CM 111

444461

MICROFILMED

Dept of Mines | A.O. | O.G. | E.O. | D.G.
Registered
Received 13 APR 1984
Answered
DEPT. OF MINES
REF. NO. 3749/84

GEOLOGICAL EVALUATION
OF
EL 6/79
CATAMARAN

VOLUME 3
PLATES

MICROFILMED
FICHE No.013536-45

AEROMAG DATA HELD

AUTHORS: N.T. PERKINS
D.L.J. DUNN

DATE: MARCH, 1984

OPEN FILE

REPORT NO. 1983/03

485 146°50' 490 146°55' 495 147°00' 500

51 90 51 85 43°30' 51 80 51 75 43°35' 51 70

Lune Sugarloaf 514

Lune River South

Lune River

Catamaran Lune River South

Bare Hill

South Cape Bay

Recherche Bay

Southport Lagoon

D'Entrecasteaux Channel Road

South Cape Road

Cockle Creek

Railway

182 R28 183 R28 184 R28 185 R28 186 R28

149 R29 148 R29 147 R29 146 R29 145 R29

277 R30E 140 139 R30E 141 R30E

REFERENCE

QUATERNARY		Alluvium
TERTIARY		Basalt
JURASSIC		Dolerite
JURASSIC TO TRIASSIC		Coal Measures
		Sandstone
PERMIAN TO CARBONIFEROUS		Cygnet Coal Measures
		Undifferentiated Glacio-Marine
ORDOVICIAN		Limestone
		Conglomerate

TOPOGRAPHIC LEGEND

- Sealed Road
- Unsealed Road
- E.L. Boundary
- S.W.A.C. Boundary
- 145 / R29 — Photo Centre 444462

5 cm

SCALE 1: 50 000

1000 0 1000 2000 3000 4000 5000

Metres

Marathon Petroleum Australia, Ltd
Brisbane Australia

South East Cape (Sh. 8210) Tasmania

E.L. 6/79 Catamaran — Tasmania Project

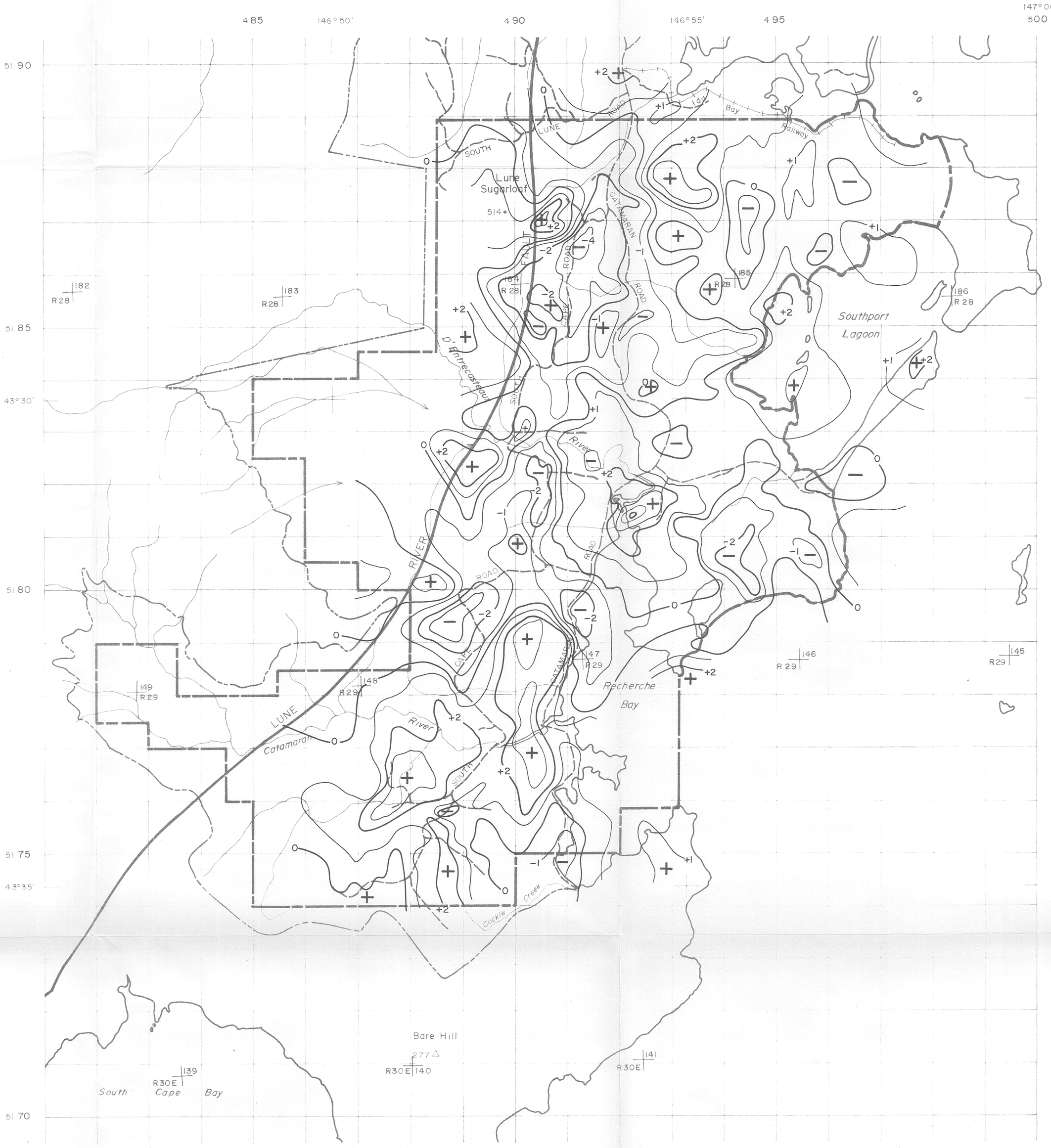
Plan Showing

PHOTOGEOLOGY

DRAWN BY J. Andrews	DATE Aug. '81	MAP No C.M. 013a (FILE / ORDER)	PLATE 8
ORIGINAL DATA Hunting Geology & Geophysics	DATE Jun. '80	REVISED BY	DATE

84-2110 (3/3

3225



REFERENCE

Density : 2·67

Filter: 4 Km.

Contour Interval : 1 mgal

TOPOGRAPHIC LEGEND

- Sealed Road
- Unsealed Road
- E.L. Boundary
- S.W.A.C. Boundary
- 146 / R29 — Photo Centre 444463

5 cm

SCALE 1 : 50 000

1000 0 1000 2000 3000 4000 5000

Metres

Marathon Petroleum Australia, Ltd
Brisbane Australia

South East Cape (Sh. 8210) Tasmania

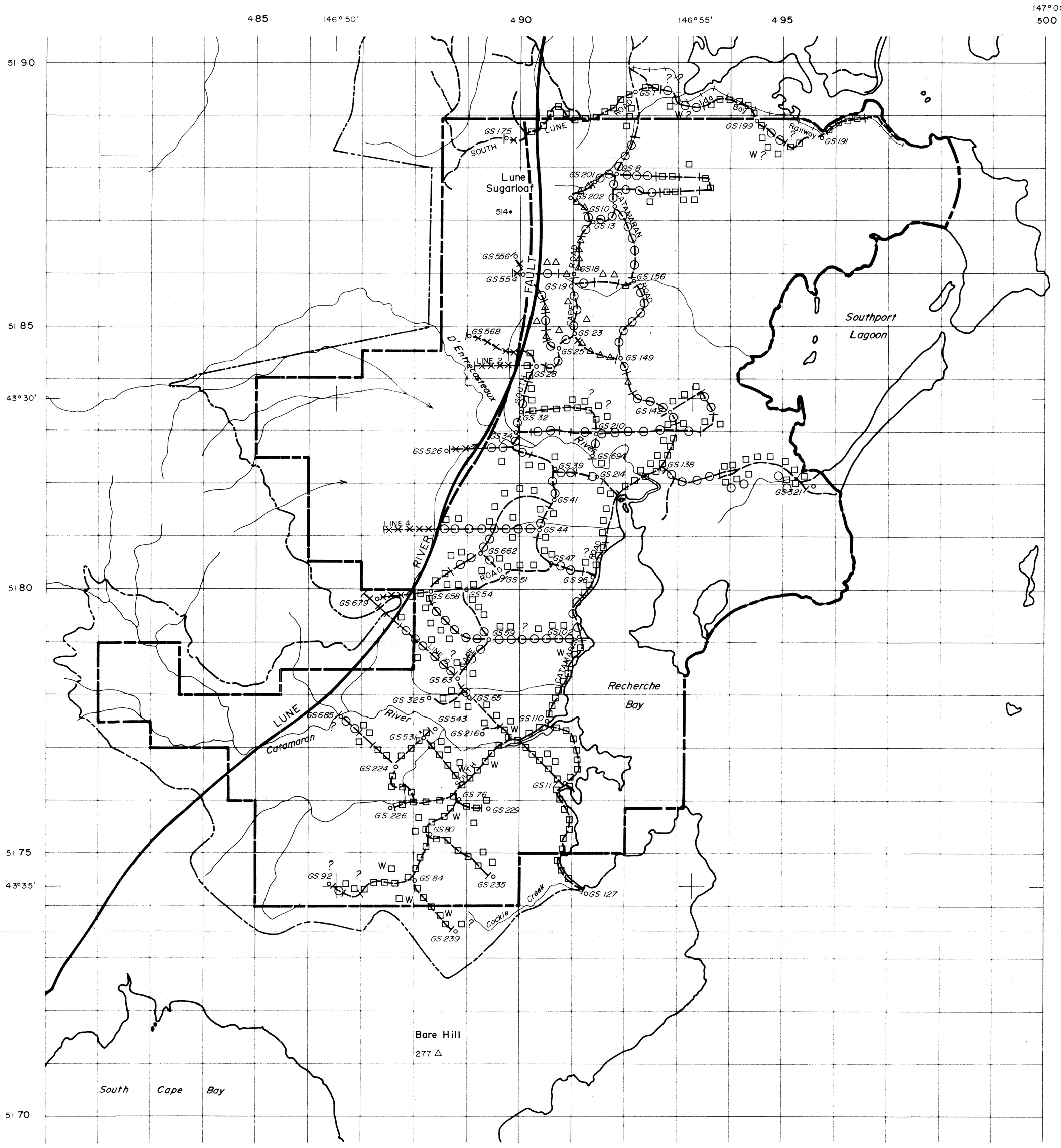
E.L. 6/79 Catamaran — Tasmania Project

Plan Showing

GRAVITY SURVEY
RESIDUAL BOUGUER ANOMALY

DRAWN BY J. Andrews	DATE Aug. '81	MAP No C.M. 013 e (FILE ORDER)	PLATE 2
ORIGINAL DATA Leaman Geophysics	DATE	REVISED BY	DATE

3226



REFERENCE

- o GS 92 — Gravity Station
- Magnetic Traverse
- Basalt / Tallus
- Dolerite/Tallus
- × Permian Sediments
- ○ Triassic Sediments
- W Weathered
- ? Uncertain
- Fault
- Fault (changed position)

TOPOGRAPHIC LEGEND

- Sealed Road
- Unsealed Road
- E.L. Boundary
- S.W.A.C. Boundary

444464

5 cm

SCALE 1: 50 000

1000 0 1000 2000 3000 4000 5000

Metres

Marathon Petroleum Australia, Ltd
Brisbane Australia

South East Cape (Sh. 8210) Tasmania

E.L. 6/79 Catamaran — Tasmania Project

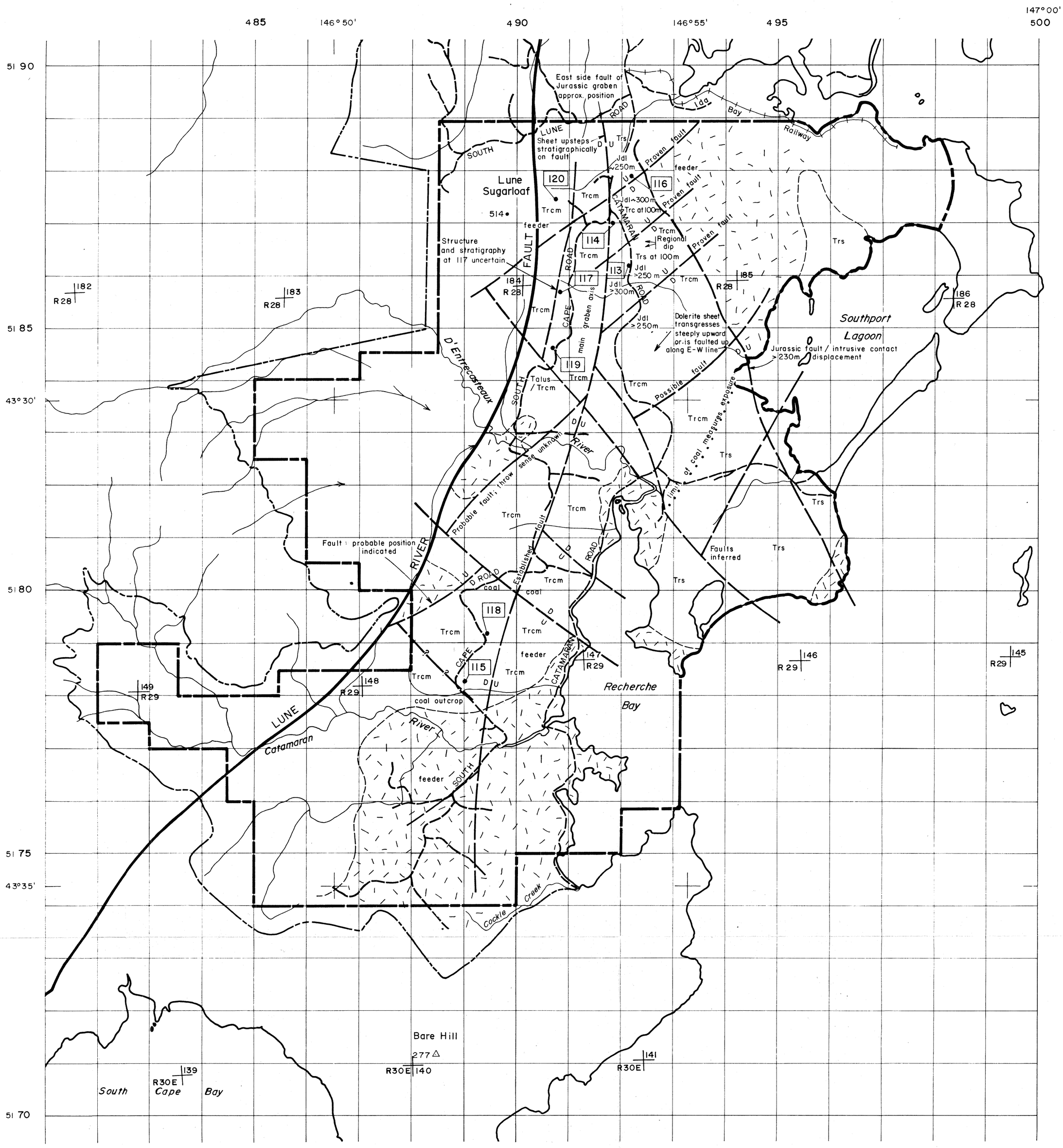
Plan Showing

MAGNETIC INTERPRETATION

DRAWN BY J. Andrews	DATE Aug. '81	MAP No C.M. 0.1.3.c. FILE ORDER	PLATE 3
ORIGINAL DATA Leaman Geophysics	DATE	REVISED BY	DATE

84-2110 3/3

3227



GEOLOGICAL LEGEND

	Dolerite Outcrop
Jdl ~ 100m	Depth to roof of intrusive sheet
Trs	Triassic Sandstone
Trcm	Triassic Coal Measures

TOPOGRAPHIC LEGEND

- Sealed Road
- Unsealed Road
- E.L. Boundary
- S.W.A.C. Boundary
- 146 / R29 — Photo Centre 444465

5 cm

SCALE 1 : 50 000

1000 0 1000 2000 3000 4000 5000

Metres

Marathon Petroleum Australia, Ltd
Brisbane Australia

South East Cape (Sh. 8210) Tasmania

E.L. 6/79 Catamaran — Tasmania Project

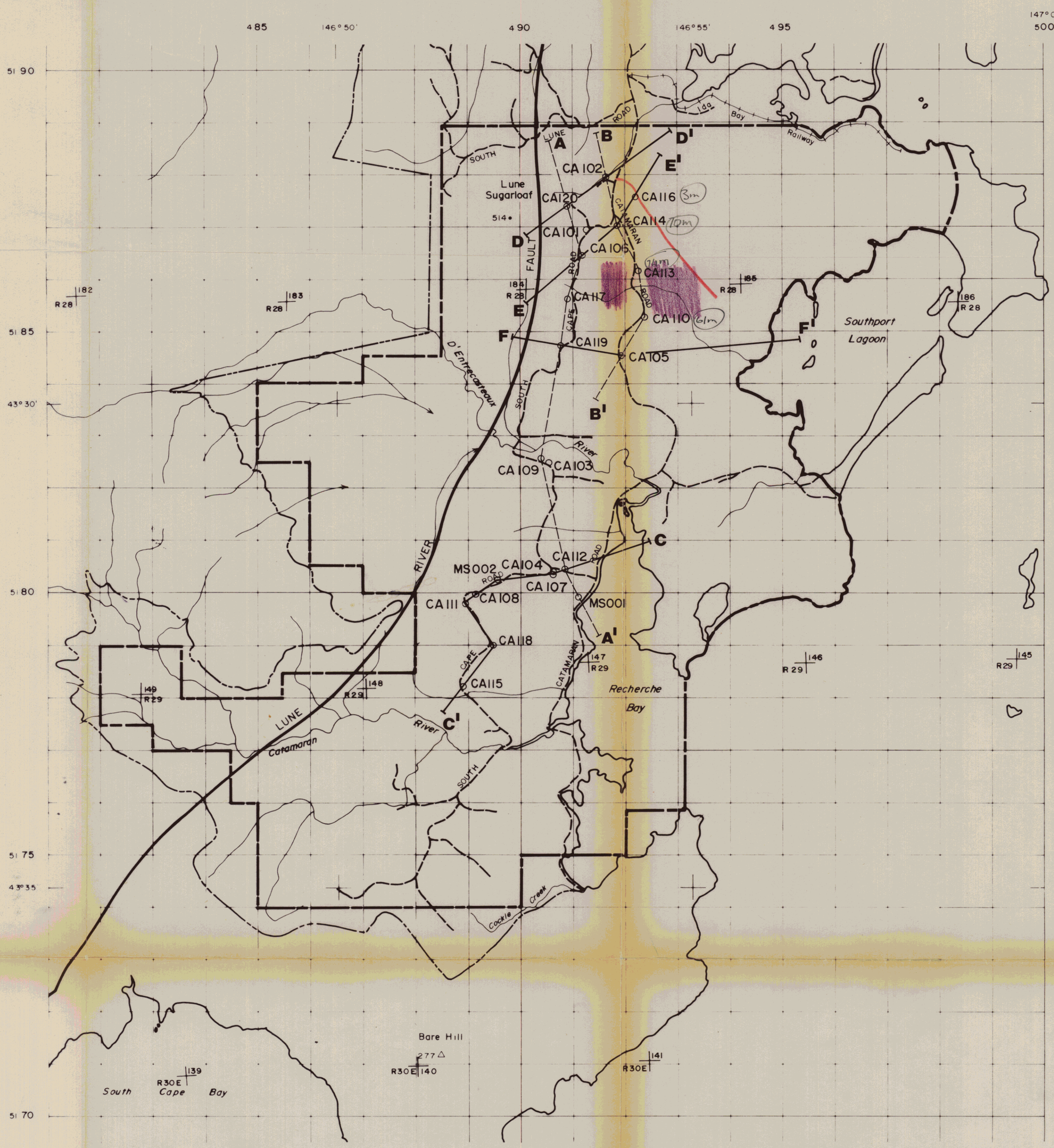
Plan Showing

GEOPHYSICS INTERPRETATION SUMMARY

DRAWN BY MPAL	DATE Feb. '84	MAP No C.M. 063. (FILE / ORDER)	PLATE 4
ORIGINAL DATA Leaman Geophysics	DATE Sept. '81	REVISED BY	DATE

84-2110 3/3

3228



LEGEND

A ——— A'	Cross Section
———	Sealed Road
– – – –	Unsealed Road
———	E.L. Boundary
———	S.W.A.C. Boundary
R29 146	Photo Centre
○ CM 112	Drillhole location & number

5 cm

SCALE 1 50 000

444466

1000 0 1000 2000 3000 4000 5000

Metres

Marathon Petroleum Australia, Ltd
Brisbane Australia

South East Cape (Sh. 8210) Tasmania

E.L. 6/79 Catamaran — Tasmania Project

Plan Showing

DRILLHOLE AND CROSS SECTION LOCATIONS

DRAWN BY J. Andrews	DATE Jun. '82	MAP No C.M. 030. FILE ORDER	PLATE 5
ORIGINAL DATA	DATE May '82	REVISED BY	DATE

84-2110 3/3.

3229

5 190 000 N

5 185 000 N

5 180 000 N

5 175 000 N

485000 E

490000 E

495000 E

500000 E

Lune River

Creek

Summers Creek

Teatree Creek

Ida Bay

IDA BAY ROAD

LUNE ROAD

Gauge 2'0"

Hastings Bay

Southport

Major Honners Bay

Southport Narrows

The Deep Hole

SOUTH

Ida Bay Cave

Lune Sugarloaf

514

CATAMARAN

Donnellys

D'Entrecasteaux

Southport Creek

Southport Lagoon

ROAD

River

Pigsty Bridge

MOUNT LEILLATEAH

Leprena

Coal Pit Bight

Eliza Point

Moss Glen

Bennetts Point

Sullivan Point

Recherche Bay

Driscolls Creek

Abandoned

Catamaran River

Catamaran

Rocky Bay

Fishers Point

McDougalls Hill

Ramsgate

Cockle Creek

Valley

Moulders Hill

Blowhole

REFERENCE

1. Predominately sediments, some minor dykes or sills. (Trs)
2. Predominately dolerite, either thicker or shallower towards the west. (Jdl)
3. Possibly basalt flow or dolerite sill capping ridge. (Jdl?)
4. Either thin sill near surface or thicker sill at depth (probably former). (Jdl)
5. Dolerite outcropping along coast, possibly thin sill. (Jdl)
6. Predominately sediments with minor sills and dykes, a large proportion is covered by scree. (Trc)
7. Predominately dolerite, possibly a sill capping the hill. (Jdl)
8. Predominately dolerite, probably a sill. (Jdl)
9. Mainly sediments probably covered by scree. (Trc)
10. Minor sill, outcropping at coast. (Jdl)
11. Sill, outcrops on the road, possibly dips towards the east. (Jld)
12. Mainly sediments, some scree cover, sediments thick 250m. (Trc)
13. Basalt flows (great variation in thickness) Cover on Coal Measures. (Tb)
14. Mostly dolerite outcrop, could be continuous with Area 11. (Jdl)
15. Dolerite body outcropping on hill, possibly larger as there is a large number of scree ridges to the south. (Jdl)
16. 17. 18. All dolerite bodies, probably outropping. (Jdl)
19. Area of thick sediment boundary on west is approximate Coal Measure Sandstone boundary. (Trs)
20. 21. Areas of thick sediments. (Trc)
22. Thin dolerite sill outcrop. (Jdl)
23. Area of Pre-Triassic Sediments is Permian and Ordovician Sediments.

LEGEND

- Geological Boundary
- Fault
- (16) Area number
- Coal Outcrop
- Abandoned Coal Mine
- Tb Tertiary Basalt
- Jdl Jurrassic Dolerite
- Trc Triassic Coal Measures
- Trs Triassic Sandstone
- E.L.Boundary
- S.W.A.C Boundary
- Main Road Sealed
- Main Road Unsealed
- Secondary Road Unsealed
- Track (Dry weather)
- Railway

SCALE 1:25 000 (Kilometres)
1·0 0 0·5 1·0 1·5 2·0 2·5

5 cm

LOCATION MAP
AREA SHOWN

444467

Marathon Petroleum Australia, Ltd.
Brisbane Australia

Hobart SK 55-8 Tasmania

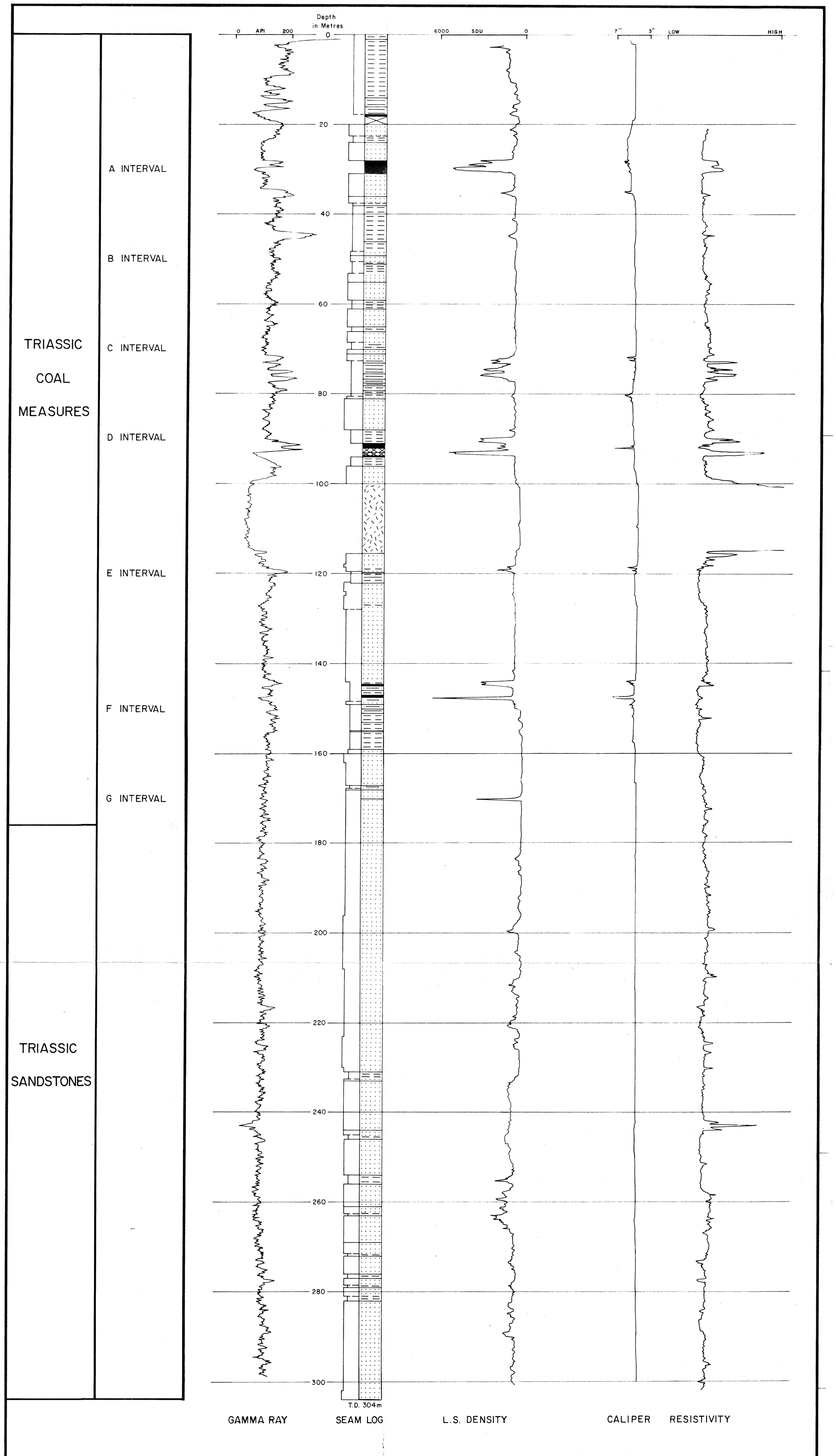
EL.679 CATAMARAN — TASMANIA PROJECT

Plan Showing

INTERPRETATIVE GEOLOGY

Drawn by B. A.W.	Date JAN.'84	Plan No. File CM-062	Order	PLATE 6
Mapped by NTP	Date MAY 83	Amended by	Date	

84-2110 3|3 3230



444468

PLATE 7

Marathon Petroleum Australia, Ltd.

E.L. 679 CATAMARAN

Plan Showing

DRILL HOLE SECTION

HOLE No. CA 110

5 cm

SCALE 1:500

Mapped by

Drawn by B.A.W Date AUG. 1982

Plan No. CM 026

84-2110 3/3.

3231

444469

TCR 84-2110

✳

GEOLOGICAL EVALUATION EL 6/79

✳

CATAMARAN

✳

AEROMAG DATA

AEROMAG DATA HELD

84-2110.

444470

LOGISTICS REPORT

FOR AN

AIRBORNE MAGNETIC SURVEY

NEAR

SOUTHPORT

IN

TASMANIA

ON BEHALF OF

MARATHON PETROLEUM AUSTRALIA LIMITED

CONDUCTED BY

GEOTERREX PTY. LIMITED

PROJECT NO. 87-259

Sydney, Australia
December, 1982

EL 6/79

R. Hobbs
Compilation Manager

AEROMAG DATA HELD

Loaded data held

444471

TABLE OF CONTENTS

		Page
I.	SURVEY DETAILS	1.
II.	AIRCRAFT AND EQUIPMENT	2.
III.	PERSONNEL	3.
IV.	DATA ACQUISITION	4 & 5.
V.	DATA REDUCTION AND PRESENTATION	6.
VI.	PARALLAX	7.
VII.	COMPENSATION	8.

FIGURE 1: Location of Survey.

APPENDICES

A. Geoterrex Madacs Airborne Magnetometer/Spectrometer System.

B. Description of Field Tape Format.

C. Located Data Tape Format.

ACCOMPANYING THIS REPORT

1. Field Analogue Records; Magnetic and Diurnal.

2. Magnetic Contour Maps at 1:25,000 scale.

3. Seperated Magnetic Profiles at 1:25,000 scale.

4. Located Data Tape with format.

5. Diurnal Tape.

6. 1:25,000 Scale Flight Path Photography.

7. Flight Logs and Mileage Lists.

I. SURVEY DETAILS

Geoterrex Pty. Limited conducted an airborne magnetic survey in the vicinity of Southport, Tasmania, during December, 1982, from a base at Hobart, Tasmania. The location of the survey areas are shown in Figure 1.

The total flying distance was 2315.2 kilometres for the three areas as follows:-

Strathblane	1260.5
Mt. Lloyd	735.0
Catamaran	319.7

Flight lines were numbered as follows:-

	Flight Lines	Tie Lines
Strathblane	201 - 258	707 - 719
Mt. Lloyd	101 - 141	701 - 706
Catamaran	301 - 330	720 - 728

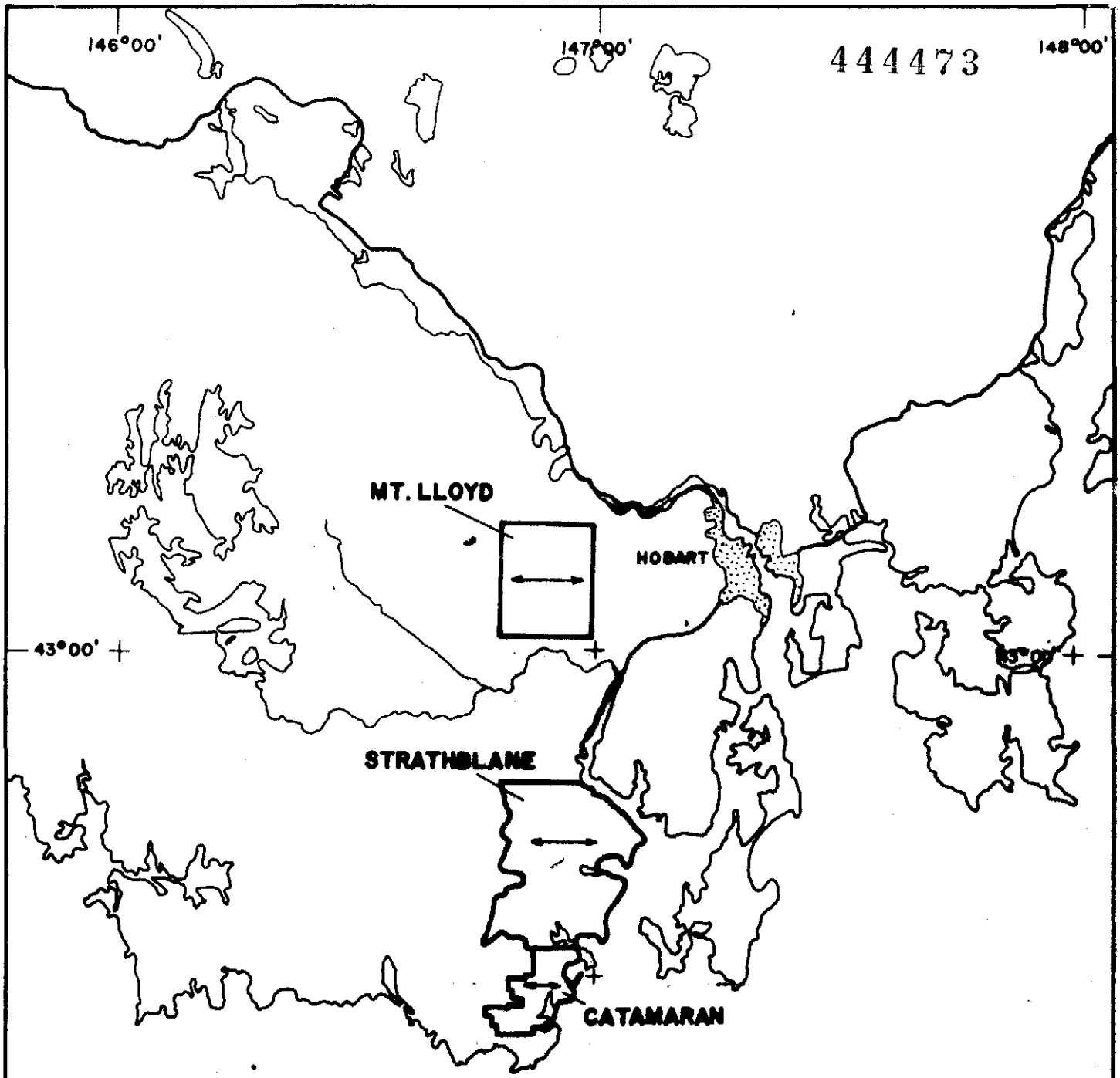
For all areas the following criteria were observed in data acquisition.

Specifications

Line Direction	-	East - West
Line Spacing	-	500 metres
Tie Line Spacing	-	Not greater than 3 kilometres
Mean Terrain Clearance	-	Ninety (90) metres

Navigation was performed visually using 1:25,000 enlargements of state photographic material. Path recovery was performed on a daily basis as flying progressed on a second set of enlargements. Reflights for navigation and diurnal activity were performed as necessary.

444473



SURVEY AREA LOCATION MAP

SCALE 1:1000000

FIGURE 1.

II. AIRCRAFT AND EQUIPMENT

The aircraft used for flying the survey was a Rockwell Shrike Commander, registered VH-PWO.

The Shrike Commander is equipped with an optically pumped cesium vapour magnetometer, a Geoterrex Madacs acquisition system incorporating digidata 9-track recorder with a read-after-write facility, a Chessell 10 centimetre recorder, a Geocam 35mm tracking camera, a Sperry AA-200 radio altimeter and a GSM-8B proton magnetometer base station.

III. PERSONNEL

The following Geoterrex personnel comprised the field team for the survey:-

D. BOWEN	PILOT/NAVIGATOR
B. WOOLFREY	ELECTRONICS TECHNICIAN
M. CURTIS	DATA COMPILER

The survey was supervised by G. Butt in consultation with H. Rutter, of Geophysical Exploration Consultants Pty. Ltd. representing Marathon Petroleum Australia Limited. The airborne data was processed by Engineering Computer Services Pty. Limited, of Bowral, New South Wales.

IV. DATA ACQUISITION

The Madacs acquisition system is controlled by a precision clock which allows data to be collected at multiples of 0.1 seconds. The event signal synchronizes the magnetometer and spectrometer record with the tracking camera. For this survey the sample interval is 0.2 seconds, with fiducials generated every 50 sample intervals. The event signal corresponds to the 24 hour time clock as expressed in tenths of seconds after midnight.

The sensitivity of the cesium vapour magnetometer is 0.04nT and the cycle interval of 0.2 seconds corresponds to a sample every 15 metres approximately.

The acquisition system is described in more detail in Appendix A, "Geoterrex Madacs Airborne Magnetometer/Spectrometer System".

Digital Data

The digital field data is recorded as signed binary integers, 9-track, 800 b.p.i. density. The tapes are written in IBM compatible format with full parity. A description of the tape format is contained in Appendix B.

The read-after-write facility of the Madacs acquisition system ensures an inspection of the digital record.

The radio altimeter describes the terrain clearance of the aircraft. Fiducials are signalled every 50 samples, which represents a distance of approximately 750 metres or 15 metres per sample.

On the Chessell 10 centimetre recorder the fine and coarse magnetic traces represent scales of 50nT and 500nT respectively. The terrain clearance of the aircraft was recorded on the third trace with a full scale deflection of 150 metres; this is linear. Refer to figure 2 for a sample record.

Total magnetic readings were recorded at a sensitivity of 0.04nT with acceptable data having a noise envelope normally no greater than 0.2nT peak to peak. Reflights for magnetometer data were performed where the noise envelope exceeded 0.5nT. Diurnal activity rarely exceeded 5nT in 5 minutes as defined by a straight line chord; reflights for diurnal were restricted to flight three (3).

444478

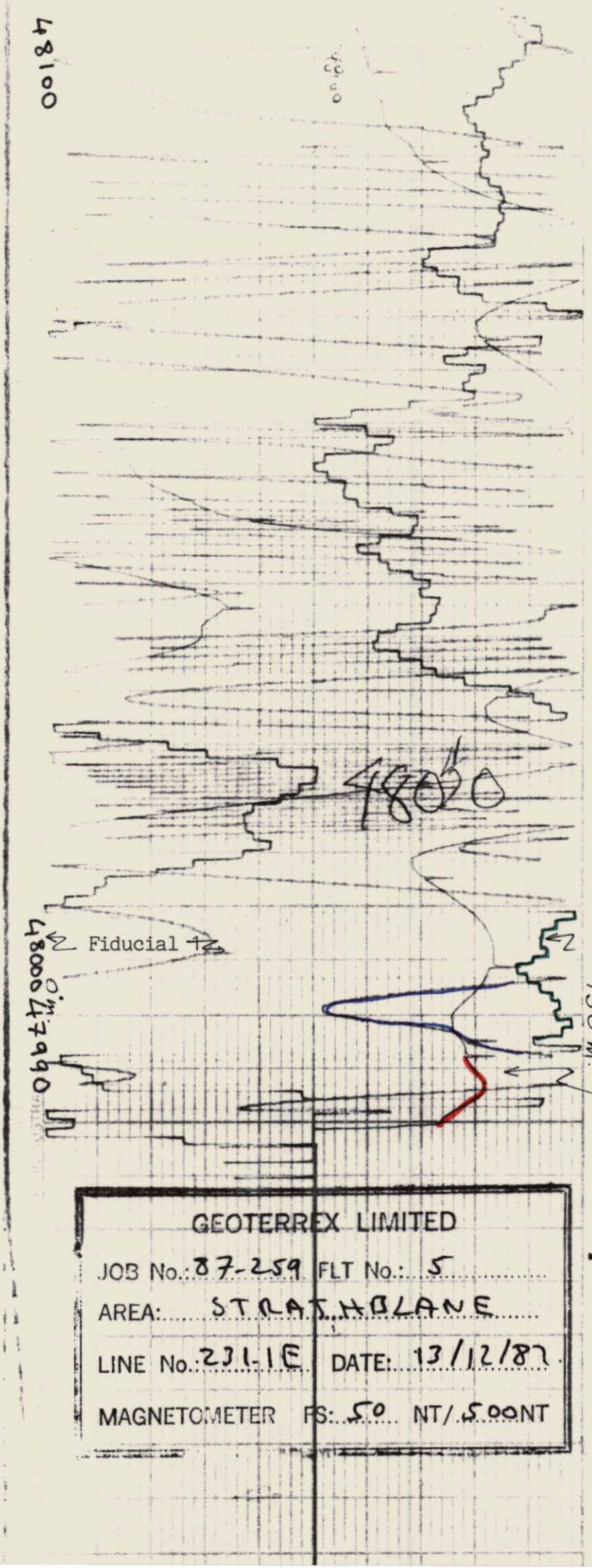


Figure 2

V. DATA REDUCTION AND PRESENTATION

During the survey flight path was recovered as flying proceeded on a second set of enlargements each with 9 control points per photograph. Subsequent to the survey, flight path, flight logs and recovered line lists were checked for consistency. Digitising of flight path and all major corrections were completed within 4 days of receipt of data from the field; this involved digitising each photograph and using the nine control points to remove photographic distortion. Merging of individual photographs resulted in a single speed report for each of the three areas. This report compared the speed along line between adjacent recovered fiducial points with the average speed along line. These values were then compared with the photograph and excessive speed changes related to terrain or errors requiring corrections.

Preliminary flight path plots were generated at final scale to check for coding and digitising errors before preliminary contour maps at 1:25,000 scale were produced. Final contours at 5nT are generated as 7.5 x 7.5 minute sheets. Following levelling and I.G.R.F. removal a figure of 2000nT was added to the datum before contouring; flight path is included with the contours.

Due to the separation of the stacked profiles a revised sheet layout was required for presentation of the magnetic data in this form.

Magnetic and diurnal analogue data is presented in a folder accompanied by tracking film (11 rolls), flight logs, mileage lists and path recovery photographs.

VI. PARALLAX

There is no lag between the recorded data position and the film fiducial marks; a dot between the first and second digits of the film fiducial number recorded every 10 seconds indicates the true position and is periodically checked for accuracy.

VII. COMPENSATION

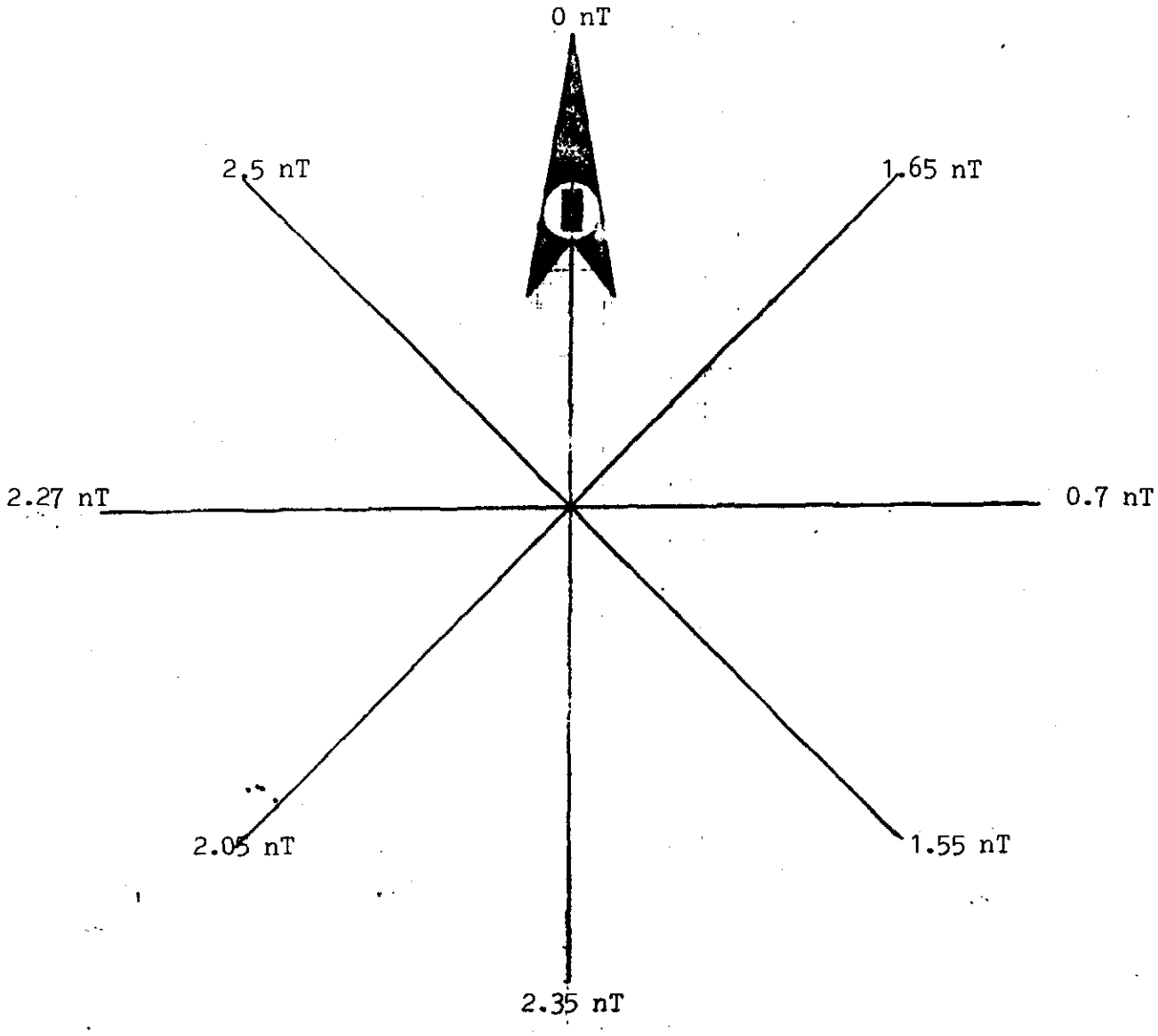
Cloverleaf (Heading Test)

Due to the high magnetic gradients it was not possible to accurately perform this exercise on site. Immediately following this survey a second test was performed in the vicinity of Leigh Creek, South Australia, the results of which are included at Figure 3 overleaf.

HEADING TEST

444482

AIRCRAFT :- VH-PWC
DATE :- 19/12/82
AREA :- Gunsight, South Australia
MAGNETOMETER :- Optically pumped cesium vapour magnetometer
SENSITIVITY :- 0·04nT
SAMPLING INTERVAL :- 0·2 seconds



Max Variation:- 2.5 nT
Mean Variation per 10° Sector:- 0.21 nT
Max Variation per 10° Sector:- 0.55 nT
Standard Deviation of 45° Variations:- 0.82 nT

Figure 3.

(MAGNETIC HEADINGS HAVE BEEN CORRECTED FOR DIURNAL VARIATION)

GEOTERREX MADACS AIRBORNE MAGNETOMETER/SPECTROMETER SYSTEM

This system is installed in a Rockwell Shrike Commander 500S twin engined aircraft and has operated with the MADACS data acquisition system since December, 1979.

MAGNETOMETER

Single cell optically pumped alkali vapour (cesium) magnetometer sensor, mounted in a stinger. The sensor signal is operated and processed by a Geoterrex MADACS geophysical system. The magnetometer sensitivity is normally set to 0.04nT for a cycle rate of 0.2 seconds.

SPECTROMETER

A multi-channel analyser is used and it records 256 channels of 4 pi gamma spectrum data. The MCA can handle information from two 8-bit (256) channel nuclear analogue to digital converters, and so could be used with an upward looking (2 pi) crystal array as well as the normal (4 pi) array.

Crystal Detectors

Two assemblies each including four 4" x 4" x 16" rectangular Harshaw NaI (Tl) crystals, photo multipliers and preamplifiers.
Total volume = 2048 cubic inch (33.8 litres).
Temperature stabilized to $\pm$ 1^{o}C.

DIGITAL RECORDING (MADACS Acquisition System)

Data Recorded each sample interval is listed below:-

Fiducial number.

Sample number.

Time (in tenth second units).

Magnetic field (five values)

Radar altitude.

Doppler co-ordinates (if applicable).

Thorium window counts (2.42 to 2.82 MeV).

Uranium window counts (1.66 to 1.85 MeV).

Aux Uranium window counts (1.04 to 1.21 MeV).

Potassium 40 window counts (1.36 to 1.56 MeV).

Integral live time (in milliseconds).

Ch 0 : Cosmic gamma radiation.

Ch 1 - 255 : 0 - 3 MeV. Usually several early channels are set to zero to reduce system dead time. Dead time is usually 8 milliseconds during a 1 second sample interval accumulating data from .32 - 3 MeV + cosmic (from 1000 cubic inches).

Data recorded in addition every tenth sample:-

Record number

Flight number.

Precision Clock

The system is controlled by a precision clock which allows data to be collected at any multiple of 0.1 seconds.

Computer

The system is based on an Interdata 6/16 mini-computer with 32K core memory with the following interfaces:-

Digital Input/Output Port

The bus is capable of recording from, writing to, testing and controlling 16 external digital devices.

A 12 Bit Analogue Input Module

This will handle 8 balanced analogue inputs. Expandable to 16.

Analogue Ouput Module having 8 outputs with 12 bit resolution.

Magnetic Tape

This interface/controller is capable of handling four 9-track, NRZ1 tape transports. Tapes are written in IBM compatible format with full parity, cyclic redundancy and longitudinal check characters. Recording density is 800 bpi.

Read-after-write checking ensures data is correctly recorded.

Magnetometer Interface.

Camera Controllers.

Operators Console

This is a standard teletype type keyboard and T.V. alpha numeric display via which the operator communicates with the system. While on line during survey, all measured parameters are continuously displayed on the monitor unless the system senses an abnormal condition in which case a diagnostic message and the time sensed are displayed. This message remains until acknowledged by the operator.

The survey program operates on a request-response basis, with the system pre-empting the operator and rejecting all illegal responses.

The MADACS system has software routines to allow calibration and stability control when flying radiometric surveys.

1. Window Setting Check Routines

   Using Cesium and Thorium sources.
   With the appropriate source within detector proximity the system begins to accumulate data and continually updates calculations of the centre of the centroid of the curve relating to the relevant photo peak. This position is comparable with the expected peak channel-location.

   By checking high and low MeV peaks, linear spread of the 256 channels is insured.

   This routine enables an overall channel drift check to an accuracy of 1/100th of a channel window width.

2. Source Calibration Check Routine

   This routine requires Uranium and Thorium sources and a background measurement.

   The results are automatically calculated and displayed on the VDU monitor. The values are recorded on the flight log.

   These figures are plotted daily and 1 and 4 remain within +/- 10% variation.

APPENDIX B

DESCRIPTION OF FIELD TAPE FORMAT

Geoterrex 9-track field tapes are recorded in binary code at 800 bpi.

For each one second record:-

Header Format:

Physical record number	2 bytes	(I*2)	
Flight number	2 "	(I*2)	

'Scan' Format:

Data sample number	4 bytes	(I*4)	
Fiducial number	2 "	(I*2)	
Scan time	4 "	(I*4)	(time in tenth of seconds (after midnight.
Magnetometer 0	4 "	(I*4)	(for readings
Magnetometer 2	4 "	(I*4)	(incremented
Magnetometer 4	4 "	(I*4)	(every
Magnetometer 6	4 "	(I*4)	(0.2
Magnetometer 8	4 "	(I*4)	(seconds.
Radar altimeter	2 "	(I*2)	- feet.
Heading	2 "	(I*2)	
Doppler along distance	2 "	(I*2)	
Doppler across distance	2 "	(I*2)	
Thorium channel	2 "	(I*2)	- counts.
Uranium channel	2 "	(I*2)	- counts.
Aux. Uranium channel	2 "	(I*2)	- counts.
Potassium channel	2 "	(I*2)	- counts.
Total count	2 "	(I*2)	- counts.
Live time	2 "	(I*2)	- milliseconds.
Spectrometer) 0 - 59 inc.	2 " ea.	(I*2)	- counts.
channel) 60 - 255 inc.	1 byte ea.	(I*I)	- counts.

APPENDIX C.

LOCATED DATA TAPE FORMAT.

RECORD LENGTH = 68 CHARACTERS.

RECORD DESCRIPTION.

COL	1 - 6	DATE (DDMMYY)
	7	BLANK
	8 -10	FLIGHT
	11-16	TIME (SECONDS)
	17	BLANK
	18-23	LINE NO.
	24-29	FIDUCIAL
	30	* IF RECOVERED
	31	BLANK
	32-37	AMG EASTING
	38	BLANK
	39-45	AMG NORTHING
	46	BLANK
	47-53	MAG VALUE (nT)
	54-60	RAW MAG VALUE (nT)
	61-65	ALTIMETER (METRES)
	66-68	BLANKS