

000

D.S.

585001

D of M	A.O.	C.G.	E.O.	D.S.M.E.
Received				15 APR 1983
Answered				E & IL
DEPT. OF MINES				
REF. No. 2995/83				

SIX MONTHLY REPORT  
 ON  
 EXPLORATION LICENCE 6/79 (CATAMARAN)  
 FOR THE PERIOD 16.12.82 TO 15.5.83  
 VOLUME 1

83-1965

**MICROFILMED**

- TEXT
- APPENDIX I
- APPENDIX II
- APPENDIX III
- APPENDIX IV

**AUTHOR:** N.T. PERKINS  
**DATE:** MARCH, 1983  
**DISTRIBUTION:** DEPARTMENT OF MINES, TASMANIA  
 MARATHON, BRISBANE

**OPEN FILE**

001

585002

TABLE OF CONTENTS

	PAGE
1.0 INTRODUCTION	1
2.0 GEOLOGY OF EL 6/79 CATAMARAN	3
2.1 Stratigraphy	3
2.1.1 Ordovician Sediments	3
2.1.2 Permian Sediments	3
2.1.3 Triassic Sediments	3
2.1.4 Jurassic Dolerite	5
2.1.5 Tertiary Basalts	5
2.1.6 Unconsolidated Cainozoic Sediments	5
2.2 Structure	6
3.0 EXPLORATION	7
4.0 INTERPRETATION	9
5.0 FUTURE WORK	10
6.0 REFERENCES	11

Locality: SK55-8 Hobart Map Sheet

002

585003

LIST OF VOLUMES

Volume 1	Text Appendices
Volume 2	Plates

LIST OF FIGURES

<u>PLAN NO.</u>	<u>FIGURE NO.</u>	<u>TITLE</u>	<u>SCALE</u>
CIC 45	FIGURE 1	<i>transparency held</i> Location of EL 6/79 Catamaran	-
-	FIGURE 2	Summary of the Stratigraphy in the Catamaran - Mt. La Perouse Area, South Tasmania	-

LIST OF TABLES

TABLE 1	Drillhole Intersection Summary
---------	--------------------------------

LIST OF PLATES

*Transparencies held in vertiplan for all plates*

<u>PLAN NO.</u>	<u>PLATE NO.</u>	<u>TITLE</u>	<u>SCALE</u>
CM 032	PLATE 1	Drill Hole Location Map	1:25,000
CM 033	PLATE 2	Drill Hole Section CA 113	1:500

003

585004

LIST OF PLATES (Cont.)

<u>PLAN NO.</u>	<u>TITLE</u>	<u>SCALE</u>
CM 034	PLATE 3 Drill Hole Section CA 114	1:500
CM 035	PLATE 4 Drill Hole Section CA 115	1:500
CM 036	PLATE 5 Drill Hole Section CA 116	1:500
CM 037	PLATE 6 Drill Hole Section CA 117	1:500
CM 038	PLATE 7 Drill Hole Section CA 118	1:500
CIA3T5-11	PLATE 8 Drill Hole Section CA 119	1:500
CIA3T5-12	PLATE 9 Drill Hole Section CA 120	1:500
CM 040	PLATE 10 Landsat Thematic Classification Map	1:25,000
CM 046	PLATE 11 Landsat Interpretation Lineaments	1:25,000
	PLATE 12 Interpretation of Airborne Magnetic Data	1:25,000
	PLATE 13 Residual Magnetic Contours Sheet 8210-9	1:25,000
	PLATE 14 Residual Magnetic Contours Sheet 8210-13	1:25,000
	PLATE 15 Residual Magnetic Contours Sheet 8211-12	1:25,000
	PLATE 16 Residual Magnetic Contours Sheet 8211-16	1:25,000

Transparencies of Plates 1-16 in  
Vertiplan. Rm 120

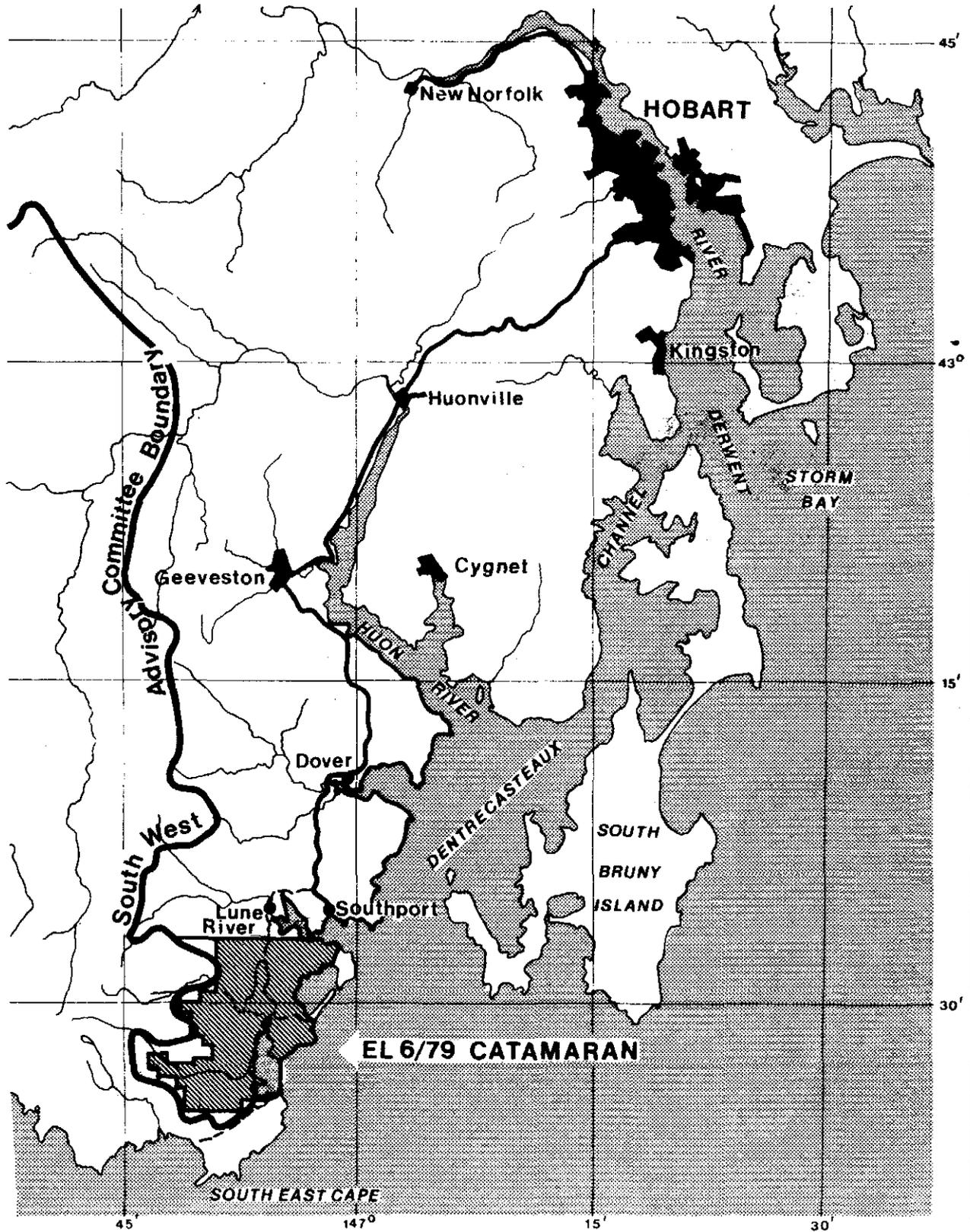
LIST OF APPENDICES

<u>Appendix No.</u>	<u>Title</u>
APPENDIX I	Lithological Hole Report
APPENDIX II	Landsat Interpretation of the Mt. Lloyd - Catamaran Area Southern Tasmania using Thematic Classification Techniques by M.J. Longman (M.J. Longman and Associates)
APPENDIX III	Interpretation of Airbourne Magnetic Data from E.L. 6/79, Catamaran, Tasmania by Geophysical Exploration Consultants.
APPENDIX IV	Petrological report by Dr. K. Martin

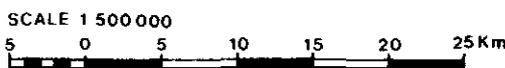
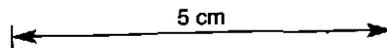
1.0 INTRODUCTION

Exploration Licence 6/79 (Catamaran) covers an area of 136 square kilometres in the vicinity of Recherche Bay, south-eastern Tasmania (Figure 1). It was granted to Marathon Petroleum Australia, Ltd. on May 16, 1980 for a period of six (6) months and renewed on November 16, 1980, and May 16, 1981 for further six (6) month periods. Due to a change in government policy the renewal period was extended to twelve (12) months and as such the licence was renewed on November 16, 1981. On November 16, 1982, the licence was only renewed for six months to alleviate the problem of calculating expenditure commitment and lease rentals on the licence area as it was six months out of phase.

This report presents a review of exploration undertaken on EL 6/79 (Catamaran) during the period November 16, 1982 to May 15, 1983.



LOCATION MAP



Report No. 1983/16

FIGURE 1

Marathon Petroleum Australia, Ltd.  
BRISBANE AUSTRALIA

LOCATION MAP FOR  
EL6/79 CATAMARAN

Mapped by Tas. Lands Date Aug 82  
Drawn by L.P.

Plan No. C1C45A

006

## 2.0 GEOLOGY OF EL 6/79 CATAMARAN

EL 6/79 is situated within the Tasmanian Basin which covers an area of approximately 20,000 square kilometres and contains over 1000m 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).

A summary of the stratigraphy of the area is given in Figure 2.

### 2.1 Stratigraphy

#### 2.1.1 Ordovician Sediments

The Ordovician age Junee Group outcrops on the upfaulted western side of the Lune River Fault. The Group consists of conglomerates and limestones outcropping at the base of steep ridges which extend from the western boundary of the area towards the west. The Gordon Limestone has been mined near Ida Bay for many years.

#### 2.1.2 Permian Sediments

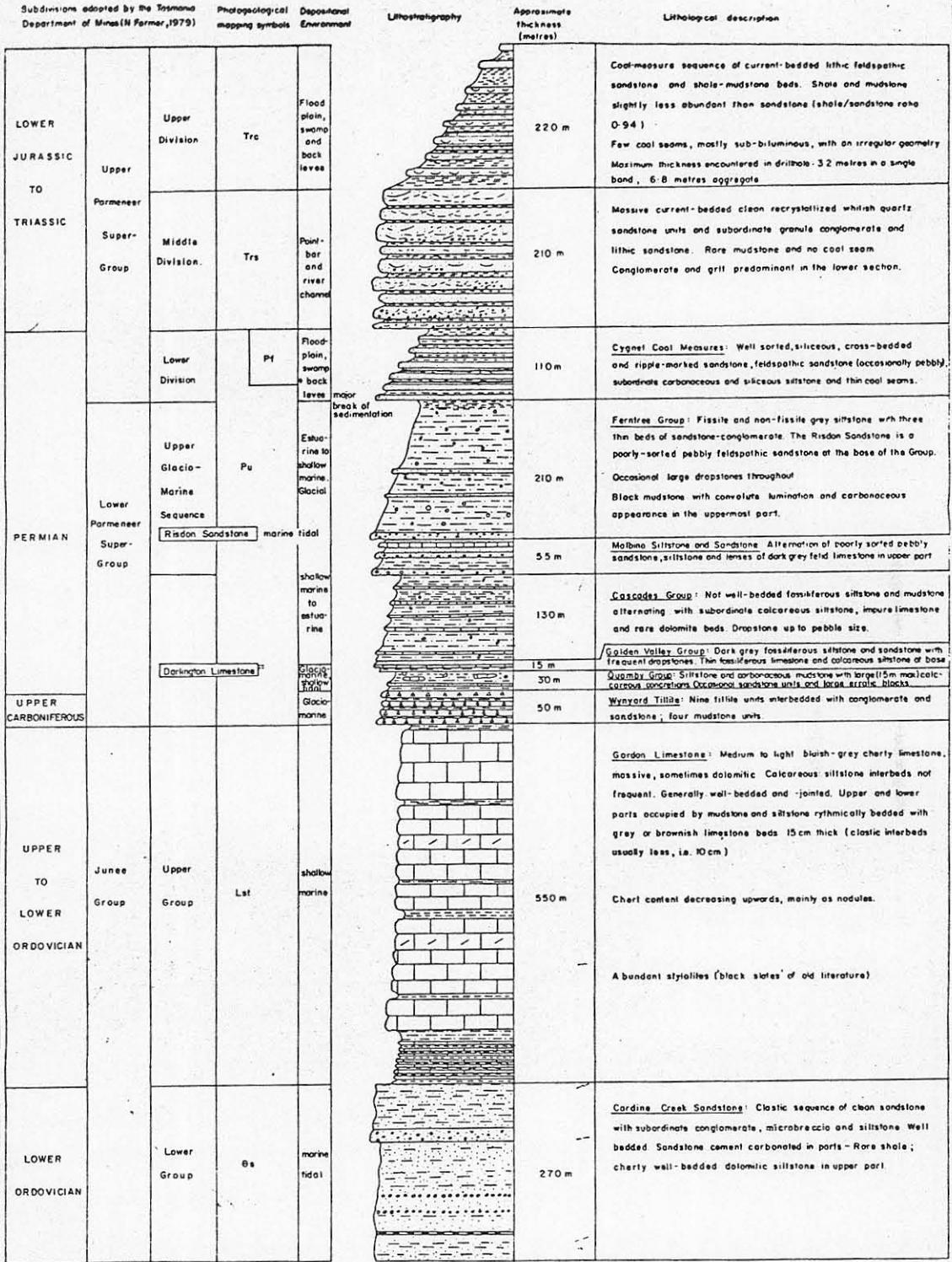
The Lower Parmeneer Supergroup of Permian age also outcrops to the west of the Lune River Fault. The sediments are predominantly glacio-marine and together with the basal Triassic (Upper Parmeneer<sup>ee</sup> Supergroup) sandstones form the resistant capping rocks of the steep ridges to the west of the Lune River Fault.

#### 2.1.3 Triassic Sediments

Triassic sediments of the Upper Parmeneer Supergroup occur in a downfaulted block to the east of the Lune River Fault.

FIGURE 2

Summary of the stratigraphy in the Catarman - Mount La Perouse Area, Southern Tasmania.



Underlain by approximately 1250 m of serpentinite and dolomite, conglomerate and breccia, sandstone and siltstone. Siltstone sometimes dominant in some intervals.

\* Definitions within this group follow the nomenclature proposed by Pethig, Patter and Siever (1972)

- MUDSTONE
- COAL
- SILTSTONE
- SANDSTONE
- COARSE-GRAINED SANDSTONE
- CONGLOMERATE
- TILLITE
- DROPSTONE (erotics)
- LIMESTONE
- DOLOMITIC LIMESTONE
- CURRENT-BEDDING

008

The Triassic sedimentary sequence consists of a basal fluvial sandstone unit (Triassic Sandstones) some 210-300m in thickness which grades upwards into a mudstone dominated unit (Triassic Coal Measures), some 220m in thickness. The major coal seams are found within this upper mudstone unit.

MPAL has recognized seven coaly intervals within these coal measures, which have been designated in descending order A, B, C, D, E, F, G respectively. *and which do not correlate at all*

#### 2.1.4 Jurassic Dolerite

Theoleiitic Jurassic dolerite has intruded the Permo-Triassic sediments throughout most of the Tasmanian Basin. (Leaman and Naqvi, 1967; Sutherland, 1967). The dolerite has been intruded as sills and feeder dykes. Only minor thermal metamorphism seems to have occurred near most margins of the sills.

#### 2.1.5 Tertiary Basalts

Tertiary basalts outcrop on the tip of ridges in the north of the area.

#### 2.1.6 Unconsolidated Cainozoic Sediments

Unconsolidated sediments can be found blanketing most of the area. Dolerite scree covers most of the ridges, and clays and sands can be found on the flood plains and swampy areas near the coast.

010

2.2 Structure

The structure of EL 6/79 is dominated by fault bounded dolerite intruded blocks. The dolerite has intruded the Triassic sediments throughout the Tasmanian Basin. Geophysical and aeromagnetic interpretations imply numerous faults (Plate 12), which could be related to dilation effects from the intrusion of the dolerite (Leaman and Naqvi, 1967).

011

3.0 EXPLORATION

Work carried out during the period November 16, 1982 to May 15, 1983 included:-

- (a) A 1590m stratigraphic drilling programme comprising eight (8) rotary-percussion drillholes. The location of the drillholes are shown on Plate 1 and the stratigraphic intersections tabulated in Table 1. All holes were geophysically logged although not every hole had the complete suite of geophysical logs run in them. Lithological hole reports for these holes are in Appendix I. Graphic sections for all holes are shown in Plates 2-9.
  
- (b) A Landsat study undertaken by Longman and Associates using computer enhanced imagery (Appendix II and Plates 10 and 11).
  
- (c) An Aeromagnetic survey undertaken by Geoterrex Pty. Ltd. with interpretation of the data by Geophysical Exploration Consultants (Appendix III).
  
- (d) Petrological examinations of the rock samples from the north of the area were undertaken to identify basic criteria for field determination between basalts and fine grained dolerite (Appendix IV). *no locations for samples*

**TABLE 1**  
 EL 6/79 CATAMARAN - DRILL HOLE SUMMARY  
 For holes drilled between 16.11.82 to 15.02.83:-

<u>CA 113</u>	TD 321m	Coal Measures	0m - 100m	D Coal Interval	17.6-20.0m
				Dolerite Intrusives	30.0-38.0m
		Basal Sandstone	100m - TD		
<u>CA 114</u>	TD 235m	Coal Measures	0m - 100m	D Coal Interval	41.2-44.2m
		Basal Sandstone	100m - TD		
<u>CA 115</u>	TD 198m	Dolerite talus	0m - 20m		
		Dolerite Intrusives	20m - 38m		
		Coal Measures	38m - 196m	A Coal Interval	70.8-74.8m 76.2-76.5m 77.2-79.0m
		Dolerite Intrusives	196m - TD		
<u>CA 116</u>	TD 230m	Basalt Sandstone	0m - 230m	(few thin coal bands)	
<u>CA 117</u>	TD 195m	Basalt talus	0m - 67m		
		Basalt flow	67m - 101m		
		Coal Measures	101m - 166m	(no coal seams)	
				Dolerite Intrusives	120-144m 150-162m
		Major Dolerite Intrusives	166m - TD		
<u>CA 118</u>	TD 164m	Dolerite talus	0m - 50m		
		Coal Measures	50m - 164m	(few thin coal bands)	
				Dolerite Intrusives	51-66m
<u>CA 119</u>	TD 132m	Coal Measures	0m - 132.0m		
		Coal	0m - 2.0m		
		Coal	4.0m - 5.0m		
		Coal	25.8m - 26.3m		
		Coal	26.8m - 27.2m		
		Coal	62.0m - 65.0m		
		Coal	80.0m - 82.0m		
		Coal	85.0m - 86.0m		
		Dolerite Intrusives	88.8m - 96.8m		
		Dolerite Intrusives	113.4m - 115.6m		
		Dolerite Intrusives	120.5m - 121.6m		
<u>CA 120</u>	TD 115m	Basalt Talus	0m - 19.6m		
		Coal Measures	19.6m - 76.8m		
		Coal	58.88m - 57.81m		
		Coal	61.88m - 64.03m		
		Dolerite Intrusives	76.8m - 94.0m		
		Coal Measures	94.0m - 113.0m		
		Coal	98.8m - 99.1m		
		Coal	104.8m - 105.3m		
		Coal	106.6m - 107.6m		
		Dolerite Intrusives	113.0m - TD		

4.0 INTERPRETATION

Assessment of the results obtained from the stratigraphic drilling programme indicates that:-

- (a) The structure within the EL is more complex than at first thought, but the majority of the sediments are the target Triassic Coal Measures.
- (b) The A Coal Interval is not as extensive in the north of the area as was initially thought.
- (c) The thin dolerite sill between the D and E coal intervals which may have been useful as a marker horizon is not exclusively at this stratigraphic level.
- (d) The inferred coal reserve in the north of the area is much smaller but there is another area of inferred reserve to the east of the old Catamaran Coal Mine.

5.0 FUTURE WORK

Work proposed for the next year includes:-

- (a) Detailed evaluation of Aeromagnetic and Landsat data.
- (b) Field checking of Aeromagnetic and Landsat data and follow-up to fine tune the interpretation of this data.
- (c) Detailed mapping utilizing ground geophysics of the prospective areas.

6.0 REFERENCES

- Bacon, C.A., 1980: Sedimentology of the Freshwater Sequences, Upper Permian Supergroup on Fingal Tier. Tasmanian Department of Mines. Dep. 1980/21.
- Leaman, D.E. and Naqvi, I.H., 1967: Geology and Geophysics of the Cygnet District. Tasmanian Department of Mines Bull. 49
- Perkins, N.T., 1982: Fourth Six Monthly Report on Exploration Licence 6/79 (Catamaran). Unpublished Report.
- Perkins, N.T., 1982: Annual Report on Exploration Licence 6/79 (Catamaran) Unpublished Report.
- Spry, A.H. and Banks, M.R., 1982: The Geology of Tasmania. Journal Geological Society of Australia. Vol. 9 Part 2.
- Sutherland, F.L., 1967: Considerations on the Emplacement of Jurassic Dolerites Tasmania. Papers and Proc. Royal Society of Tasmania. 100.

**APPENDIX I**  
Lithological Hole Report



1 Apr 83

Page: 3

HOLE NUMBER : CA 113  
DATA SOURCE : Marathon Pet. Aust. Ltd  
LOGGER : N.T. Perkins  
Date commenced : 03 Nov 82  
Date completed : 08 Nov 82

LOCATION:

NORTHING : 5186431.00  
EASTING : 492228.00  
ELEVATION : 49.00m

DRILLING:

CONTRACTOR : Rockdril Contractors  
DRILL TYPE : Rotary-percussion  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH : 321.00m

GEOPHYSICAL:

CONTRACTOR : BPB Instruments  
PROBE DEPTH : 294.00m  
LOGS RUN : Natural Gamma  
Lens Spaced Density  
Caliper  
Resistivity

019

585020

12 Apr 83

Drillhole CA113

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

BLADES

0.00 - 1.00

SOIL, brown, fine grained, argillaceous.

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 coaly  
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 coaly  
fragments ferruginous.

18.00 - 21.00

80% COAL.  
20% MUDSTONE, grey.

21.00 - 31.00

MUDSTONE, grey, minor coaly 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.

47.00 - 48.00

25% COAL.  
25% CARBONACEOUS MUDSTONE, tan.  
50% MUDSTONE, tan.

020

585021

12 Apr 83

Drillhole CA113

Page: 3

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

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% atz, 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% atz, felds>rf.).

78.00 - 88.00 MUDSTONE, grey, some arenaceous phillite.

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% atz, felds>rf.).

BLADES

97.00 - 120.00 70% SANDSTONE, grey, fine to medium grained,  
feldspatho-lithic (<80% atz, felds>rf.).  
30% MUDSTONE, grey.

120.00 - 132.00 SANDSTONE, light grey, fine to medium grained,  
litho-feldspathic (<80% atz, rf>felds) minor coaly  
fragments.

132.00 - 133.00 SANDSTONE, light greyish-brown, fine to medium grained,  
litho-feldspathic (<80% atz, rf>felds).

021

585022

12 APR 83

Drillhole CA113

Page: 4

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

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% atz, rf>felds).
176.00 - 178.00	CARBONACEOUS MUDSTONE, dark brownish-black, some coaly fragments.
178.00 - 195.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% atz, felds)rf.).
195.00 - 196.00	MUDSTONE, dark brown, some coaly fragments.
196.00 - 251.00	SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% atz, 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% atz, felds)rf.).
303.00 - 321.00	SANDSTONE, light grey, fine grained, litho-feldspathic (<80% atz, rf>felds).
321.00	***** TOTAL DEPTH *****

022

585023

APR 83

Page: 1

HOLE NUMBER : CA 114  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 08 Nov 82  
Date completed : 11 Nov 82

LOCATION:

NORTHING : 5187124.00  
EASTING : 491807.00  
ELEVATION : 66.00m

DRILLING:

CONTRACTOR : Rockdril Contractors  
DRILL TYPE : Rotary-percussion  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH : 235.00m

GEOPHYSICAL:

CONTRACTOR : BFB Instruments  
PROBE DEPTH : 224.00m  
LOGS RUN : Natural Gamma  
Long Spaced Density  
Caliper  
Resistivity  
Bed Resolution Density  
High Resolution Density

023

12 Apr 83

Drillhole CA114

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

BLADES

0.00 - 6.00 SANDSTONE, yellowish-cream, argillaceous, moderately weathered.

\*\*\*\*\* BASE OF MODERATE WEATHERING \*\*\*\*\*

6.00 - 7.00 SANDSTONE, yellowish-brown, argillaceous with some coaly fragments, slightly weathered.

\*\*\*\*\* BASE OF WEATHERING \*\*\*\*\*

7.00 - 8.00 85% SANDSTONE, tannish-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 coaly fragments.

9.00 - 14.00 SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular argillaceous matrix.

14.00 - 22.00 50% SANDSTONE, grey, very fine grained, argillaceous. 50% MUDSTONE, grey.

HAMMER

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.) sub-angular argillaceous matrix.

38.00 - 40.00 95% SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular argillaceous matrix. 5% COAL.

40.00 - 42.00 SANDSTONE, light grey, fine to medium grained, feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular argillaceous matrix.

12 Apr 83

Drillhole CA114

Page: 3

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

- 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.) sub-angular  
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  
arsillaceous matrix.  
30% CARBONACEOUS MUDSTONE, blackish-brown, with some  
coaly fragments.
- 70.00 - 74.00 SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.)  
arsillaceous matrix.

025

585026

12 Apr 83

Drillhole CA114

Page: 4

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

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 coaly 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.

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.

026

585027

12 Apr 83

Drillhole CA114

Page: 5

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

171.00 - 180.00 SANDSTONE, light grey, fine to medium grained,  
 quartz lithic.

180.00 - 235.00 SANDSTONE, light grey, fine grained, quartz lithic  
 argillaceous sub-rounded.

235.00 \*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

Apr 83

Page: 1

HOLE NUMBER : CA 115  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 13 Nov 82  
Date completed : 15 Nov 82

LOCATION:

NORTHING : 5178213.00  
EASTING : 488924.00  
ELEVATION : 36.50m

DRILLING:

CONTRACTOR : Rockdril Contractors  
DRILL TYPE : Rotary-percussion  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH : 198.00m

GEOPHYSICAL:

CONTRACTOR : BPE Instruments  
PROBE DEPTH : 197.00m  
LOGS RUN : Natural Gamma  
Long Spaced Density  
Caliper  
Resistivity  
Bed Resolution Density  
High Resolution Density  
Neutron

028

585029

12 Apr 83

Drillhole CA115

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

BLADES

0.00 - 5.00 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.  
10% CLAYSTONE, white, moderately weathered.  
10% SAND, white, fine to medium grained,  
moderately weathered.

\*\*\*\*\* BASE OF MODERATE WEATHERING \*\*\*\*\*

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.) sub-angular  
argillaceous matrix, slightly weathered.

49.00 - 50.00 85% SANDSTONE, light greenish-grey,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular,  
slightly weathered.  
15% SILTSTONE, black, slightly carbonaceous.

50.00 - 51.00 SANDSTONE, light greenish-grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
with some coaly fragments, slightly weathered.

\*\*\*\*\* BASE OF WEATHERING \*\*\*\*\*

51.00 - 52.00 60% SANDSTONE, fine grained, ferruginous sub-angular  
argillaceous matrix, unweathered.  
40% MUDSTONE, light greenish-grey, with some coaly  
fragments.

52.00 - 56.00 SANDSTONE, light greenish-grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.

56.00 - 58.00 90% SANDSTONE, light greenish-grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
10% MUDSTONE, dark grey, some carbonaceous fragments.

023

585030

12 Apr 83

Drillhole CA115

Page: 3

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

58.00 - 66.00 SANDSTONE, light greenish-grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.

66.00 - 67.00 90% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
10% COAL.

BLADES

67.00 - 68.00 70% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
20% COAL.  
10% MUDSTONE, grey.

68.00 - 72.00 55% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
45% MUDSTONE, grey.

72.00 - 73.00 60% MUDSTONE, grey.  
40% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.

73.00 - 74.00 80% COAL.  
10% MUDSTONE, grey.  
10% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.

74.00 - 75.00 60% COAL.  
25% MUDSTONE, grey.  
15% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.

75.00 - 77.00 40% COAL.  
30% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
30% MUDSTONE, grey.

77.00 - 78.00 60% COAL.  
40% MUDSTONE, grey.

78.00 - 79.00 80% COAL.  
20% MUDSTONE, grey.

030

12 Apr 83

Drillhole CA115

Page: 4

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

79.00 - 80.00	80% MUDSTONE, grey. 20% COAL.
80.00 - 82.00	60% MUDSTONE. 40% SANDSTONE, light grey, fine grained, feldspatho-lithic (<80% qtz, felds>rf.) argillaceous matrix sub-angular.
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.) argillaceous matrix sub-angular.
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.) argillaceous matrix some thin mudstone bands throughout interval.
126.00 - 128.00	MUDSTONE, dark grey, slightly carbonaceous with some coaly 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 argillaceous matrix. 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.) sub-angular argillaceous 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.).

031

585032

12 Apr 83

Drillhole CA115

Page: 5

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

196.00 - 198.00

DOLERITE, dark green, fine grained, hard.  
Porphyritic and aphanitic

198.00

\*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

1 Apr 83

Page: 1

HOLE NUMBER : CA 116  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 15 Nov 82  
Date completed : 17 Nov 82

LOCATION:

NORTHING : 5187484.00  
EASTING : 492511.00  
ELEVATION : 42.50m

DRILLING:

CONTRACTOR : Rockdril Contractors  
DRILL TYPE : Rotary-percussion  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH : 230.00m

GEOPHYSICAL:

CONTRACTOR : BFB Instruments  
PROBE DEPTH : 230.00m  
LOGS RUN : Natural Gamma  
Long Spaced Density  
Caliper  
Resistivity  
Sonic  
Neutron

033

585034

12 Apr 83

Drillhole CA114

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

BLADES

0.00 - 3.00

SOIL, tan, argillaceous 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  
argillaceous matrix with rare coaly wisps and coaly  
laminae, slightly weathered, occasional  
heavy mineral(not identified).  
Rock fragments are subangular and  
Quartz grains are subrounded

\*\*\*\*\* BASE OF WEATHERING \*\*\*\*\*

17.00 - 30.00

SANDSTONE, light grey, fine to medium grained,  
quartzose (>90% quartz)  
litho-feldspathic (<80% qtz, rf>felds)  
argillaceous matrix with some thin mudstone bands  
and rare coaly laminae.

30.00 - 33.00

75% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
litho-feldspathic (<80% qtz, rf>felds)  
argillaceous matrix, slight brown iron oxide  
stainings.  
20% MUDSTONE, light grey.  
5% SANDSTONE, dark green, moderate chlorite stainings.

30.00 - 61.00

SANDSTONE, light grey, fine to medium grained,  
quartzose (>90% quartz)  
litho-feldspathic (<80% qtz, rf>felds)  
argillaceous matrix with thin mudstone bands and  
rare coaly wisps and coaly 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 coaly  
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.

12 Apr 83

Drillhole CA114

Page: 5

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

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 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 coaly 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	35% 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.).
196.00 - 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.

035

12 Apr 83

Drillhole CA116

Page: 4

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

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)  
 litho-feldspathic (<80% qtz, rf)felds)  
 argillaceous matrix.

230.00 \*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

036

585037

1 Apr 83

Page: 1

HOLE NUMBER : CA 117  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 22 Nov 82  
Date completed : 25 Nov 82

LOCATION:

NORTHING : 5185576.00  
EASTING : 490977.00  
ELEVATION :

DRILLING:

CONTRACTOR : Rockdrill Contractors  
DRILL TYPE : Rotary-percussion  
HOLE SIZE : /  
CORE SIZE :  
TOTAL DEPTH : 195.00m

GEOPHYSICAL:

CONTRACTOR : BPB Instruments  
PROBE DEPTH : 100.00m  
LOGS RUN : Natural Gamms  
Long Spaced Density  
Caliper  
Resistivity  
Neutron

037

12 Apr 83

Drillhole CA117

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

HAMMER

0.00 - 1.00	SOIL, tan, highly weathered.
1.00 - 6.00	SANDSTONE, white, very fine grained, argillaceous, 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) argillaceous, moderately weathered, moderate yellow iron oxide staining, interbedded with: 40% CLAY, greyish-brown, moderately weathered.
27.00 - 50.00	SANDSTONE, yellow, fine grained, quartzose (>90% quartz) argillaceous, moderately weathered, moderate yellow iron oxide staining.
50.00 - 67.00	DOLERITE, greenish-black, fine grained, hard, moderately weathered, intense brown iron oxide staining.
***** BASE OF MODERATE WEATHERING *****	
67.00 - 101.00	DOLERITE, greenish-black, fine grained, hard, slightly weathered, slight brown iron oxide staining.
***** 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.
150.00 - 158.00	MUDSTONE, hard arenaceous.

038

585039

12 Apr 83

Drillhole CA117

Page: 3

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

158.00 - 162.00 DOLERITE, greenish-black, fine grained, hard, slight  
 brown iron oxide stainings.

162.00 - 184.00 MUDSTONE, black, hard arenaceous.

184.00 - 187.00 MUDSTONE, grey, with some doleritic fragments.

187.00 - 193.00 MUDSTONE, black, hard arenaceous.

193.00 - 195.00 DOLERITE, greenish-black, fine grained, hard.  
 Could not cut dolerite with Hammer

196.00 \*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

039

585040

1 APR 83

Page: 1

HOLE NUMBER : CA 118  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 'er o a  
Date completed : 'er o a

LOCATION:

NORTHING : 5179031.00  
EASTING : 489463.00  
ELEVATION :

DRILLING:

CONTRACTOR :  
DRILL TYPE :  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH :

GEOPHYSICAL:

CONTRACTOR :  
PROBE DEPTH :  
LOGS RUN :

12 Apr 83

Drillhole CA118

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

HAMMER

- 0.00 - 20.00 NO SAMPLE RETURN. Dolerite scree, no sample return  
Due to difficult drillings and Problems with casings
- 20.00 - 50.00 Dolerite scree  
70% DOLERITE, dark green, hard, slightly weathered.  
10% CLAY, tan, highly weathered, intense brown iron oxide staining.  
10% CLAY, pale green, highly weathered, intense clay staining.  
10% SANDSTONE, brownish-yellow, medium grained, quartzose (>90% quartz) feldspathic (predom. feldspar fragments) hard, moderately weathered, intense brown iron oxide staining.
- 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, slight brown iron oxide staining, common calcite disseminated, common zeolite.
- 52.00 - 66.00 DOLERITE, dark green, fine grained.  
Sill, porphyritic and granitic
- 66.00 - 67.00 -hard, slight brown iron oxide staining.  
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, light grey.  
60% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% Qtz, felds)rf.) sub-rounded moderately sorted.
- 70.00 - 73.00 SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% Qtz, felds)rf.) argillaceous matrix, fining upwards to:
- 73.00 - 74.00 50% MUDSTONE.  
50% SANDSTONE, light grey, fine grained, quartzose (>90% quartz) feldspatho-lithic (<80% Qtz, felds)rf.) argillaceous matrix.

041

12 Apr 83

Drillhole CA118

Page: 3

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

- 74.00 - 80.00 20% SANDSTONE, light greenish-grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous matrix; slight clay stainings.  
80% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous 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.)  
argillaceous matrix.
- 82.00 - 83.00 60% MUDSTONE, grey.  
40% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous matrix.
- 83.00 - 84.00 SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous 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.)  
argillaceous matrix.
- 88.00 - 90.00 70% MUDSTONE, grey.  
30% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous matrix; slight clay stainings.
- 90.00 - 91.00 50% MUDSTONE, grey.  
50% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous matrix.
- 91.00 - 100.00 SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% qtz, felds>rf.)  
argillaceous matrix.

042

585043

12 Apr 83

Drillhole CA118

Page: 4

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

- 100.00 - 101.00 80% SANDSTONE, light grey, fine grained, carbonaceous.  
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% atz, felds>rf.).
- 114.00 - 116.00 70% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% atz, 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 coaly fragments.
- 119.00 - 122.00 40% SANDSTONE, light grey, fine grained,  
quartzose (>90% quartz)  
feldspatho-lithic (<80% atz, felds>rf.) sub-angular.  
30% SILTSTONE, light grey.  
30% MUDSTONE, grey.
- 122.00 - 129.00 SANDSTONE, light grey, fine to medium grained,  
quartzose (>90% quartz)  
litho-feldspathic (<80% atz, rf>felds) sub-angular  
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 sub-angular, slight

12 Apr 83

Drillhole CA118

Page: 5

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

134.00 - 135.00	70% SANDSTONE. 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 - 189.00	SANDSTONE, black, fine grained, carbonaceous.
189.00 - 162.00	SANDSTONE, light grey, fine grained, argillaceous.

044

585045

12 Apr 83

Drillhole CA118

Page: 6

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

162.00 - 164.00 NO SAMPLE RETURN. Lost air circulation. couldn't set  
 Blades through dolerite scree which  
 Caved in whenever rods were pulled.

164.00 \*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

045

585046

1 Apr 83

Page: 1

HOLE NUMBER : CA 119  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 1er 0 9  
Date completed : 1er 0 9

LOCATION:

NORTHING : 5184609.00  
EASTING : 490772.00  
ELEVATION :

DRILLING:

CONTRACTOR :  
DRILL TYPE :  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH :

GEOPHYSICAL:

CONTRACTOR :  
PROBE DEPTH :  
LOGS RUN :

12 Apr 83

Drillhole CA119

Page: 2

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

## \*\*\*\*\* CHIP 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 *****	
31.00 - 32.00	SANDSTONE, grey, very fine grained, argillaceous, slightly weathered.

047

12 Apr 83

Drillhole CA119

Page: 3

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

- 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.)  
argillaceous matrix, unweathered.
- 59.00 - 61.00 50% SANDSTONE, light grey, fine grained.  
50% MUDSTONE, grey, slightly carbonaceous with rare  
coaly fragments.
- 61.00 - 62.00 SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.
- 62.00 - 63.00 85% SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
15% COAL, <10% BRIGHT.
- 63.00 - 64.00 20% SANDSTONE, light grey, very fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.  
10% MUDSTONE, grey.  
35% COAL, <10% BRIGHT.  
35% COAL, UP TO 1% BRIGHT.
- 64.00 - 65.00 60% COAL, <10% BRIGHT.  
40% SANDSTONE, light grey,  
feldspatho-lithic (<80% Qtz, felds>rf.) sub-angular  
argillaceous matrix.
- 65.00 - 67.00 SANDSTONE, light grey, fine grained,  
feldspatho-lithic (<80% Qtz, felds>rf.)  
argillaceous 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 (<80% Qtz, felds>rf.)  
argillaceous matrix.

12 Apr 83

Drillhole CA119

Page: 4

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

73.00 - 74.00 80% SANDSTONE, light grey, fine grained,  
 feldspatho-lithic (<80% Qtz, felds>rf.)  
 argillaceous matrix.  
 20% MUDSTONE, grey.

74.00 - 78.00 SANDSTONE, light grey, fine grained,  
 feldspatho-lithic (<80% Qtz, felds>rf.)  
 argillaceous matrix.

78.00 - 79.00 20% SANDSTONE, light grey, fine grained,  
 feldspatho-lithic (<80% Qtz, felds>rf.)  
 argillaceous 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.)  
 argillaceous matrix.  
 25% COAL, <10% BRIGHT.  
 25% MUDSTONE, grey.

82.00 - 83.00 85% SANDSTONE, light grey, fine grained,  
 feldspatho-lithic (<80% Qtz, felds>rf.)  
 argillaceous matrix.  
 25% MUDSTONE, grey.

83.00 - 85.00 SANDSTONE, light grey, fine grained,  
 feldspatho-lithic (<80% Qtz, felds>rf.)  
 argillaceous matrix.

85.00 - 86.00 50% SANDSTONE, light grey, fine grained,  
 feldspatho-lithic (<80% Qtz, felds>rf.)  
 argillaceous 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.

049

585050

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

92.00 - 99.00 DOLERITE, hard. Porphyrific

\*\*\*\*\* DESCRIPTION \*\*\*\*\*

0.00 - 0.00 , -abundant calcite disseminated, abundant zeolite.  
25% SANDSTONE, light grey, very fine grained, hard.  
15% MUDSTONE, dark grey, carbonaceous.

\*\*\*\*\* CHIP DESCRIPTION \*\*\*\*\*

HAMMER  
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 cavins caused sampleContamination.

130.00 \*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

050

585051

1 Apr 83

Page: 1

HOLE NUMBER : CA 120  
DATA SOURCE : Marathon Pet. Aust, Ltd  
LOGGER : Sharon Carr  
Date commenced : 7er 0 9  
Date completed : 7er 0 9

LOCATION:

NORTHING : 5187496.00  
EASTING : 490939.00  
ELEVATION :

DRILLING:

CONTRACTOR :  
DRILL TYPE :  
HOLE SIZE :  
CORE SIZE :  
TOTAL DEPTH :

GEOPHYSICAL:

CONTRACTOR :  
PROBE DEPTH :  
LOGS RUN :

051

12 Apr 83

Drillhole CA120

Page: 2

\*\*\*\*\*  
FROM TO LITHOLOGY  
\*\*\*\*\*

\*\*\*\*\* CHIP 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  
stainings. Glassy with small asates

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  
stainings. 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  
stainings, stainings. Glassy with asates

\*\*\*\*\* BASE OF WEATHERING \*\*\*\*\*

12.00 - 19.00

BASALT, greenish-grey, very fine grained, hard,  
unweathered. Glassy with asates throughout

19.00 - 20.00

40% MUDSTONE, grey.  
30% SILTSTONE, reddish-brown.  
30% SANDSTONE, cream, very fine grained, argillaceous.

BLADES

20.00 - 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 coaly fragments.

40.00 - 43.00

MUDSTONE, dark grey.

052

585053

12 Apr 83

Drillhole CA120

Page: 3

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

43.00 - 46.00	70% MUDSTONE, brownish-red. 30% MUDSTONE, pale green.
46.00 - 48.00	60% MUDSTONE, grey, with some coaly 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 coaly 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 coaly 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. 30% SILTSTONE, brownish-grey.
62.00 - 63.00	50% COAL. 20% CARBONACEOUS MUDSTONE, greyish-black. 30% SILTSTONE, brownish-grey.

053

585054

12 Apr 83

Drillhole CA120

Page: 4

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

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 in veins. 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  
 coaly 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 sub-angular 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.  
 50% SILTSTONE, brown.

107.00 - 108.00 50% CARBONACEOUS MUDSTONE, greyish-black.  
 50% COAL, brownish-black.

054

585055

12 Apr 83

Drillhole CA120

Page: 5

\*\*\*\*\*  
 FROM TO LITHOLOGY  
 \*\*\*\*\*

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.)  
 argillaceous matrix.

113.00 - 115.00 DOOLERITE, dark green, fine grained, hard.  
 Blades couldn't cut dolerite.

115.00 \*\*\*\*\* TOTAL DEPTH \*\*\*\*\*

**APPENDIX II**

**Landsat Interpretation of the Mt. Lloyd - Catamaran Area  
Southern Tasmania using Thematic Classification Techniques  
by M.J. Longman (M.J. Longman and Associates)**

056

585057

# M. J. LONGMAN & ASSOCIATES

LANDSAT PROCESSORS AND INTERPRETERS

POSTAL ADDRESS:  
P.O. BOX 434, WEST PERTH 6005  
73 OUTRAM STREET, WEST PERTH  
WESTERN AUSTRALIA 6005  
PHONE (09) 322 2739  
AFTER HOURS (09) 385 9469

LANDSAT INTERPRETATION

OF THE

MT LLOYD - CATAMARAN AREA

SOUTHERN TASMANIA

USING

THEMATIC

CLASSIFICATION

TECHNIQUES

by

M.J. Longman

January, 1983

Perth, W.A.

Map Sheet SK 55-8

057

Table of Contents

	Page
1.0 SUMMARY . . . . .	1-1
2.0 CONCLUSION. . . . .	2-1
3.0 INTRODUCTION. . . . .	3-1
3.1 Location. . . . .	3-1
3.2 Physiography. . . . .	3-1
3.3 Vegetation. . . . .	3-1
3.4 Climate . . . . .	3-2
4.0 GEOLOGY . . . . .	4-1
4.1 Regional Geology. . . . .	4-1
4.2 Detailed Geology. . . . .	4-1
4.2.1 Ordovician. . . . .	4-1
4.2.2 Upper Carboniferous-Permian. . . . .	4-1
4.2.3 Triassic . . . . .	4-2
4.2.4 Jurassic . . . . .	4-2
4.2.5 Cainozoic. . . . .	4-2
5.0 LANDSAT INVESTIGATIONS. . . . .	5-1
5.1 Landsat Data. . . . .	5-1
5.2 Analysis Method . . . . .	5-1
5.3 Geographical Control. . . . .	5-1
6.0 CONTROL FOR THEMATIC CLASSIFICATION . . . . .	6-1
6.1 Final Map Production. . . . .	6-2
7.0 DISCUSSION OF RESULTS . . . . .	7-1
8.0 REFERENCES. . . . .	8-1

## Table of Contents ( continued )

## PLATES

(at 1:25,000 scale)

## Mt. Lloyd Area

## Landsat - Thematic Classification Maps

- Plate 1 - North west corner row 400, column 1550
- Plate 2 - North west corner row 400, column 1800
- Plate 3 - North west corner row 650, column 1550
- Plate 4 - North west corner row 650, column 1800

## Landsat - Lineament Interpretation

- Plate 5 - Northern area
- Plate 6 - Southern area

## Geeveston - Catamaran Area

## Landsat - Thematic Classification Maps

- Plate 1 - North west corner row 1027, column 1800
- Plate 2 - North west corner row 1027, column 2050
- Plate 3 - North west corner row 1277, column 1762
- Plate 4 - North west corner row 1277, column 2008
- Plate 5 - North west corner row 1526, column 1758

## Landsat - Lineament Interpretation

- Plate 7 - Northern area
- Plate 8 - Central area
- Plate 9 - Southern area

059

585060

## 1.0 SUMMARY

In the Mt. Lloyd, Catamaran and Geeveston areas of Southern Tasmania, computer processing of digital Landsat data and thematic classification techniques has been used in an attempt to distinguish between outcropping Tertiary basalt, Jurassic dolerite and Triassic coal measures, transported scree, talus and rocks of doleritic origin, and alluvial areas underlain by Permian and Triassic sediments.

A cloud free digital Landsat image No 2255-023085 acquired on 15th January 1982 by the Landsat 2 satellite was used in the computer processing. Geological ground control in the Catamaran district was provided by drill hole information and a geological map at 1:25,000 scale.

*(with abundant errors)*

Fifteen signature classes totalling thirty three separate signatures, arranged in three reliability groups were developed in the control area containing the geological information. These signatures were then used to produce nine thematic maps at 1:25,000 scale outlining the distribution of these signatures in the Mt. Lloyd, Geeveston and Catamaran districts.

Ground checking of these areas are required to verify the distribution, as the thematic mapping technique assumes that the response of the vegetation cover directly correlates with the underlying rock type.

To accompany the digital classification maps, visual interpretation of the linear features shown on the Landsat image has been undertaken. This interpretation has been produced on five separate map sheets at 1:25,000 scale.

## 2.0 CONCLUSION

A thematic classification technique based on computer processing of digital landsat image No 2255-023085 in the Catamaran district of Southern Tasmania has shown that in the control area, where drill hole and geological information is available, dolerite, basalt, dolerite scree, and talus can be identified and distinguished from the <sup>Permian</sup> Triassic Coal Measures and other <sup>Permian</sup> Triassic rocks.

Nine thematic maps at 1:25,000 scale have been produced showing the distribution of these signatures in the Mt. Lloyd and the Catamaran - Geeveston district.

To accompany the thematic maps, a visual lineament interpretation of the same Landsat digital data has been produced.

### 3.0 INTRODUCTION

#### 3.1 Location

The area mapped, approximately 2,100 sq kilometres, is located in two areas in southern Tasmania. The larger area, 1700 sq kilometers in size, is located between Geeveston and Catamaran and the smaller area, 400 sq kilometres in size, is located at Mt Lloyd, south-west of New Norfolk. It is covered by the Landsat image, Hobart No 2255-023085 and is included by the southern portion of the 1:250,000 map sheet Hobart (SK 55-8) The permanent settlements in the area are Geeveston, Strathblane, Hastings, Lune River and Catamaran.

#### 3.2 Physiography

The area studied is mountainous with a relief of up to 1500 metres. In the western areas where the pre-Permian rocks form residuals, the ranges tend to be ridge-like, while areas in the east tend to be covered by flat lying Jurassic dolerite. These ranges tend to be plateau-like with deeply dissected valleys and sharp scarps where the underlying Triassic and Permian rocks are exposed. Adjacent to the coastline, narrow coastal plains occur, but these are of limited extent.

#### 3.3 Vegetation

The areas are occupied by two major forest types, a typical rainforest in the north and west, and a dry sclerophyll forest in the Southport area.

Due to the dissected and hilly topography which covers most of the study area, and the rapid changes in rock type and parent rock material, the vegetation appears to form local environments within the broader forest types.

In the dry sclerophyll forest, well defined species definition occurs on the western and eastern slopes of the hills and classification techniques must develop signatures for the environments.

Typically on Jurassic dolerite soils the western slopes are composed of a *Eucalyptus linearis*, *E. viminalis* cover while the eastern slopes are covered with *E. obliqua* and *E. viminalis*.

In Triassic Sandstone areas, the western slopes have an *E. globulus* cover, the hill crests an *E. amygdalina*, *E. viminalis* cover and the eastern slopes an *E. obliqua*, *E. viminalis* cover while in Permian areas *E. tasmanica* and *E. viminalis* are the dominant species.

In the wetter rainforest areas, the distinction between the parent rock types becomes less distinct with *Notofagus* sp. tending to dominate in the moister areas.

The natural patterns have been modified by forestry and agriculture activities and frequent fire burns. In these areas classification techniques reflect surface changes rather than the underlying rock type.

### 3.4 Climate

The area of interest is between latitude 42° 45'S and 43° 45'S. The climate is temperate marine dominated by westerly winds. Thus on a broad basis the climate is predictable with similar patterns from year to year. This regular pattern influences the vegetation which under natural conditions tends to be stable showing only seasonal variations.

In the study area the annual rainfall varies from 100 - 200 mms. spread throughout the year, but with the main period between April and November.

The mean temperature range varies from 17°C in January to 7°C in July, with peak temperature in January reaching 40°C and minimum temperature in July falling to minus 12°C.

## 4.0 GEOLOGY

### 4.1 Regional Geology

In the area of interest Jurassic dolerite, intruded as flat lying sills into both the Permian and Triassic rocks is the dominant rock unit.

The oldest rocks exposed on the western margin of the area are limestones of Ordovician age unconformably overlain by Permian rocks of glacial origin. Overlying the Permian rocks with a major disconformity is the lacustrine Triassic succession.

During a period of block faulting in the Late Cretaceous and Early Tertiary, basalts has been intruded along major fault zones.

### 4.2 Detailed Geology

#### 4.2.1 Ordovician

Exposed in the west of the area, these rocks are composed dominantly of well bedded limestone with minor chert horizons.

#### 4.2.2 Upper Carboniferous-Permian

These rocks are composed of glacial marine sequence of interbedded basal pebbly tillite overlain by siltstone and mudstone, with rare limestone horizons. This unit is overlain disconformably by an erratically developed fresh water sequence, locally carbonaceous, which in turn again is overlain by a monotonous sequence of siltstone and mudstone.

#### 4.2.3 Triassic

The Triassic rocks are composed of lacustrine and fluviatile deposits of quartzite, lithic arenites, minor conglomerate and coal beds. Sandstone dominates in the lower part of the succession being quartzose in the basal units with increasing feldspathic content in the higher portion of the succession.

In the upper coal bearing portion of the succession, feldspathic sandstone dominates, and lutites become more common forming up to half the succession in selected areas. Coal is restricted to the upper portion of the succession closely related to the feldspathic sandstone units.

#### 4.2.4 Jurassic

During the middle Jurassic widespread intrusion of tholeiitic magma took place forming dyke like bodies in the pre-Permian rocks and sills parallel to bedding in the Permian and Triassic rocks.

These sills, up to 500 metres thick, dominate in the area. Multiple sills have been observed in the one stratigraphic succession and interpretation suggests that two sills are present south of Catamaran.

The contact with the adjacent sediments are sharp and only a narrow chilled margin is present. No large scale assimilation of the country rock has been observed. One local variant of the tholeiitic suite is a granophytic differentiate which tends to occur above feeder dykes.

#### 4.2.5 Cainozoic

During the late Mesozoic and Early Tertiary, widespread normal faulting produced the graben or step fault structures throughout the area. In these depressions under lacustrine conditions clays and silts were deposited. At major fault intersections, olivine basalt lavas were extruded together with the associated tuffaceous sediments.

Widespread lateritisation occurred during the late Tertiary followed by a period of glaciation in the Pleistocene.

dominate H x

065

585066

## 5.0 LANDSAT INVESTIGATIONS

### 5.1 Landsat Data

Digital data from the Landsat 2 Satellite has been used to process the area covered by the Hobart Landsat image. This image was sensed on the 15th January 1982. It is cloud free and the sun elevation was at a maximum.

### 5.2 Analysis Method

The digital Landsat data was analysed using programmes developed by our organization to operate on our PDP11-44 computing system.

Two main programmes are used, the first an interactive programme which allows the digital data to be processed in small blocks up to a maximum of 6000 acres, 50 x 120 pixels, and individually display the response of each pixel on each band.

The second programme which takes these selected responses and produces and plots maps at any selected scale and projection.

In addition to the two main programmes, subsidiary programmes read the data from the Landsat data tapes, perform various statistical smoothing operations to remove noise and sensor imbalance. Other programmes automatically classify the data and produce classifications which are statistically valid.

Subsidiary programmes are used to establish geographical control and adjust the data to match the required map projection.

### 5.3 Geographical Control

One of the greatest problems associated with the interpretation of Landsat data is to obtain accurate ground control and relate the Landsat digital image to the existing data bases.

Although actual Latitude and Longitude are provided with the Landsat data, these have been calculated from the theoretical orbit of the satellite and as such have little reference to the actual area sensed on the ground.

To provide accurate ground control, to within 200 metres or better, data points which are visible on the digital data and can be accurately located on the ground must be used. These points are determined using the pixel grid for reference in the Landsat data and Latitude and Longitude from the ground control maps.

By statistical analysis of this data, making due allowance for variations in the mirror scan rate, pitch and height variations in the satellite itself and corrections for the earth's rotation, an accuracy of 150-200 metres could be expected in an individual area on the final maps.

Variation in the control points used to correct the digital data to the Transverse Mercator Base map, the residual error after the above corrections had been applied varied between 8 and 112 metres.

## 6.0 CONTROL FOR THEMATIC CLASSIFICATION

As the ground or vegetation response for the various rock types could not be determined by either ground radiometer traverses or aircraft scans, the sensor responses had to be calibrated by accurately locating known geological features on the digital image data and determining the actual responses of each sensor in that area.

To provide the most accurate ground data, the location of each of the drill holes in the area, Holes No CA 101 to 120 inclusive were plotted on the satellite pixel grid and the sensor response of the surrounding 4 pixels was determined. As this accuracy is at the limit of reasonable ground control using 1:25,000 scale base maps, the values of the response of the pixels corresponding to a 5 x 5 pixel block (25 acres) were also determined to augment the signatures existing in the smaller area.

To provide correlation throughout the mapped region, these twenty areas were analysed using an automatic classification technique and the responses graded as to reliability, on a pixel by pixel basis, of characterising each rock type. The response range of each pixel was then increased in unit values on a band by band basis until a compromise was reached between an increased coverage of the control areas with increased false responses from rock units unassociated with the control unit.

Even in the relatively small area occupied by the control drill holes, each rock type could not be characterised by one signature without considerable false responses, so in all cases multiple signatures were used to characterise each unit, in an attempt to minimise false responses.

To provide ground control in areas away from the drill hole locations, the geological maps, one at 25,000 scale provided by Marathon and one at 1:250,000 scale produced by the Geological Survey of Tasmania were used.

Again as with the drill hole information, areas were selected which were composed of the one rock type and an automatic classification technique was used to extract those responses which could be used to characterise that area.

Where these signatures corresponded to those derived from the drill hole data, greater reliability could be placed on these signatures than those which had no direct correlation.

During this phase of the development, it was noted that certain responses were widespread and appeared to be independent of rock type. These areas could not be classified using this technique and appear as blank areas on the final maps.

In all, in excess of 2,000 classification signatures were tested and finally 33 signatures were selected which appeared to have specific responses, particularly within the control areas. These 33 signatures were combined into groups and presented on the final maps as fifteen groups in three reliability categories.

The first priority signatures were eight in number, composed of four dolerite, one basalt and three sandstone signatures. These signatures had minimal false responses in the control areas, but due to the restricted range of responses in each band, tended to be restricted in coverage.

The second priority signatures were twelve in number, and composed of two dolerite, four dolerite talus and scree, two basalt talus and three sandstone signatures. These signatures were less reliable in the control area, but again had restricted responses and ground coverage.

The third category signatures were twelve in number and were composed of two dolerite signatures, four dolerite talus signatures and six signatures which appeared to correspond to soils overlying sandstone in the control area. These signatures as a group are less reliable, tend to have wider responses and more widespread coverage.

A water signature, corresponding to clear water was determined to provide in addition to the geographic grid, details for location in the southern areas.

### 6.1 Final Map Production

Sixteen maps at 1:25000 scale have been produced. Eight maps cover the Catamaran Geeveston area, five digital classification maps and three lineament maps, while in the Mt Lloyd area four digital classification and two lineament maps were plotted.

In all cases, due to the oblique path of the satellite more area was processed than was actually contained within the Exploration Areas to assure that the area was adequately covered. This was particularly true in the case of the lineament maps where many of the lineaments were major trends extending throughout the southern portion of the State.

## 7.0 DISCUSSION OF RESULTS

The thematic classification mapping technique relies on the fact that an identical response from each of the Landsat sensors represents a unique situation and it is assumed that all areas with that identical response will also be identical.

However, there are many exceptions to this assumption and the interpretation of thematic maps must in many areas be treated with caution.

The commonest cause of false responses is the averaging effect of between two extreme responses, e.g. a sandy beach and water where intermediate responses composed of all variations between the responses for sand and water can be obtained. This effect is generally restricted to small areas of a few pixels in size and can be visually isolated.

The other false response which is more difficult to identify is when the vegetation cover does not reflect the underlying rock type. This response can be due to many causes. Seasonal conditions tend to have an overriding effect on vegetation cover. The most obvious cases can be seen after heavy rainfall where variations in the response tends to be minimised, while at the other extreme, in drought conditions almost no variation can be detected.

Another feature that affects the reliability of the classification is the distance from the control area, particularly where climatic patterns undergo rapid change. In these situations, signatures developed in one area have almost no possibility of being applied on a regional basis.

The following comments can be applied to the signatures developed in the Catamaran area.

### 1. Signature A - Dolerite Outcrop

This is a composite signature composed of four sub-divisions and is the broadest signature response plotted. The composite theme has a variation of 2% in brightness on band 4, 2% on band 5, 5% on band 6 and 6% on band 7.

Because of the wide response on bands 6 and 7 the signature could be expected to have wide coverage, but would tend to have false responses associated with its distribution. Reducing the responses on bands 6 and 7 resulted in restricted area coverage without significantly reducing the false responses.

2. Signature B - Basalt Outcrop

This signature developed in the vicinity of drill hole No CA106 is a single signature with a reflective range of 3% on each band. This signature would be expected to have minimal false responses, but from its distribution there appears to be an overlapping response with that of fine grained dolerite.

No combination of signatures were able to eliminate this dual response, so association of signatures would be needed to verify the distribution. Small areas closely associated with dolerite and sandstone signatures would probably represent fine grained contact zones, while isolated larger areas would represent basalt.

3. Signature C - Triassic Coal Measures

This is a composite signature of two sub-signatures developed in the Catamaran area from drill hole locations and known outcrops. The range of response is 1% on band 4, 3% on band 5, 3% on band 6 and 2% on band 7.

With such restricted tolerances the signature would be expected to be very specific and could be interpreted with reasonable reliability. Other rock units composed of sandstone and shale sequences could be expected to provide false responses.

4. Signature D - Dolerite Sub-outcrop

This is a composite signature composed of three sub-signatures. The range of responses are 3% on band 4, 3% on band 5, 7% on band 6 and 2% on band 7. With the wide range of response on band 6, false identifications could be expected. When this range was reduced, very scattered coverage was obtained in the type area.

5. Signature E - Dolerite Scree

This signature was developed from the drill hole data in the Catamaran area and is composed of two sub-signatures. It is quite a specific signature with response ranges of 2% on band 4, 2% on band 5, 3% on band 6 and 2% on band 7. With this response range, false identifications should be minimal.

6. Signature T - Dolerite Talus and Soil

This is a composite signature composed of two sub-signatures developed in the Catamaran area. The signature has a response range of 2% on band 4, 2% on band 5, 4% on band 6 and 3% on band 7. Due to the relatively wide range on bands 6 and 7 some false identification could be expected, however when the response range was restricted scattered areas were obtained.

071.

7. Signature G - Basalt Talus and Soil

This is a composite signature developed near drill hole No CA106 and has a response range of 3% on all bands. It is always closely associated with Signature B and could be associated with soils derived from chilled dolerite margins as well as basalt outcrop.

8. Signature H - Triassic Coal Measures

This is a composite signature composed of three sub-signatures, developed from the drill hole data in the Catamaran area. The signature should be quite specific as the response ranges were 2% on all bands.

As the signatures were developed over an alternating sandstone and shale succession, other sandstone and shale sequences could provide a similar response.

9. Signature I - Dolerite Weathered insitu

This signature has been developed in areas of known dolerite outcrop with a heavy forest cover. It is a composite signature composed of two sub-signatures. The signature ranges are 1% on band 4, 2% on band 5, 3% on band 6 and 2% on band 7.

This limited response range suggests that the signature should be quite specific, but as it has been developed in heavy forest cover, this may dominate in the classification rather than the underlying rock type.

10. Signature X - Dolerite Talus and Soil

This is a composite theme composed of the sub-signatures with an overall response range of 1% on band 4, 2% on band 5, 1% on band 6 and 2% on band 7. With this response range it is anticipated that the signature should be quite specific and false responses would be minimal.

11. Signatures K, L, N, and P - Triassic Rocks - Soil covered

These signatures have been developed in areas mapped as Triassic sandstone or Triassic coal measures on the geological map and modified to provide minimal false responses. This group of signatures have the widest responses, and as such would tend to be the least reliable of the signatures developed.

Interpretation of the areas covered by these signatures must be treated with caution. Six sub-signatures have been used to produce the range of responses with signature L with a response range of 3% on all bands, being typical of the developed signatures.

12. Signature W - Water

This signature has been developed to assist in location of the areas of interest. The response has been restricted to areas of deeper water and tidal areas, mud flats, swamps, etc. have not been covered by the classification. This signature shows a normal response range for thematic classification techniques of 14% on band 4, 12% on band 5, 12% on band 6 and 10% on band 7.

### 13. Unclassified Areas

These areas have been plotted as areas without distinguishing symbols. They are outside the range of the classification used or are composed of areas which have no diagnostic features. In general they correspond to ground that has been altered by agriculture or forestry activities, road construction or recent fire burns.

## 8.0 REFERENCES

FARMER N, 1979, Geological Atlas, 1:250,000 Series,  
Sheet SK 55-8 Hobart, Explanatory Report, Geological  
Survey, Tasmania.

LEAMAN D, 1981, Interpretation of Geophysical Surveys,  
Catamaran Area [EL 6/79] Unpublished.

**APPENDIX III**

Interpretation of Airbourne Magnetic Data  
from E.L. 6/79, Catamaran, Tasmania  
by Geophysical Exploration Consultants.

585076



**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.

CONTENTS

1. Introduction and General Geology
2. Specifications of the Airborne Magnetic Survey
3. Interpretation
4. Conclusion

PLANS

1. Total Magnetic Intensity Plans: 1:25,000 (4)
2. Stocked profiles of Total Magnetic Intensity
3. Interpretation of Airborne Magnetic Data

APPENDIX

1. Summary of drill hole data to 11 January 1982.

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, spikeg 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

078  
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 cost.

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.

080

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.

*in lower Lounsean marine beds?*

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.

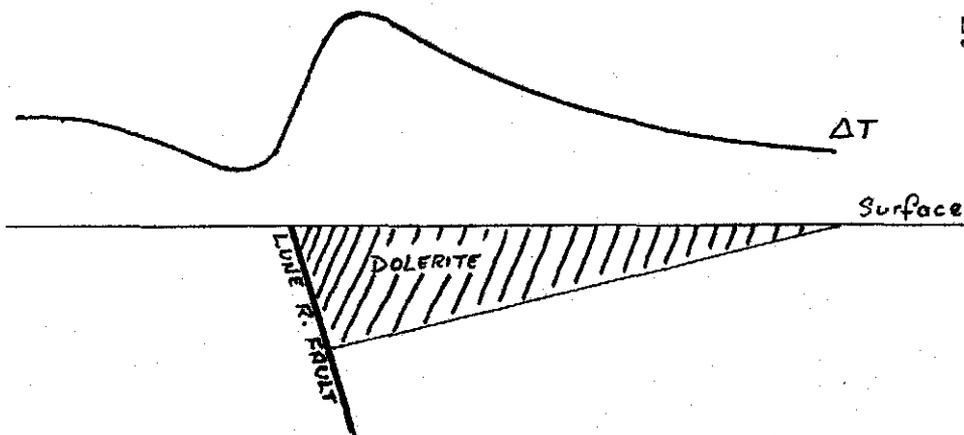
|| 7

081

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 <sup>mines</sup> ~~shafts~~ appear to be well within the outcrop of surface dolerite suggesting that the subsurface geology was thought to be understood before the shafts/<sup>adits</sup> were sunk; the three <sup>adits</sup> ~~shafts~~ are named Anthracite, McKenzie, and Hoods. *and all produced coal after striking in little bit of coal.*

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:



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.

083

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.

084

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.

085

585086

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.

- large dyke N of "pigsty" bridge on D'Entrecasteaux Is. in area of "thin dolerites".

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 RUTTER  
CONSULTANT GEOPHYSICIST.

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

087

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- <del>162.0</del> )
			- 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 report by Dr. K. Martin

089  
location from which samples gathered not given.

BRIEF PETROLOGICAL REPORT ON SAMPLES 1 - 7 FOR MARATHON

PETROLEUM AUSTRALIA LIMITED (Order No. P00103).

585090

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 subhedral 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. Clinopyroxene 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

092

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

D1256

585094

D of M	A.O.	C.G.	E.O.	D.S.M.E
				Registrar
Received Answered		15 APR 1983		E & IL
DEPT. OF MINES				
REF. No. 2995/83				

SIX MONTHLY REPORT  
 ON  
 EXPLORATION LICENCE 6/79 (CATAMARAN)  
 FOR THE PERIOD 16.12.82 TO 15.5.83  
 VOLUME 2

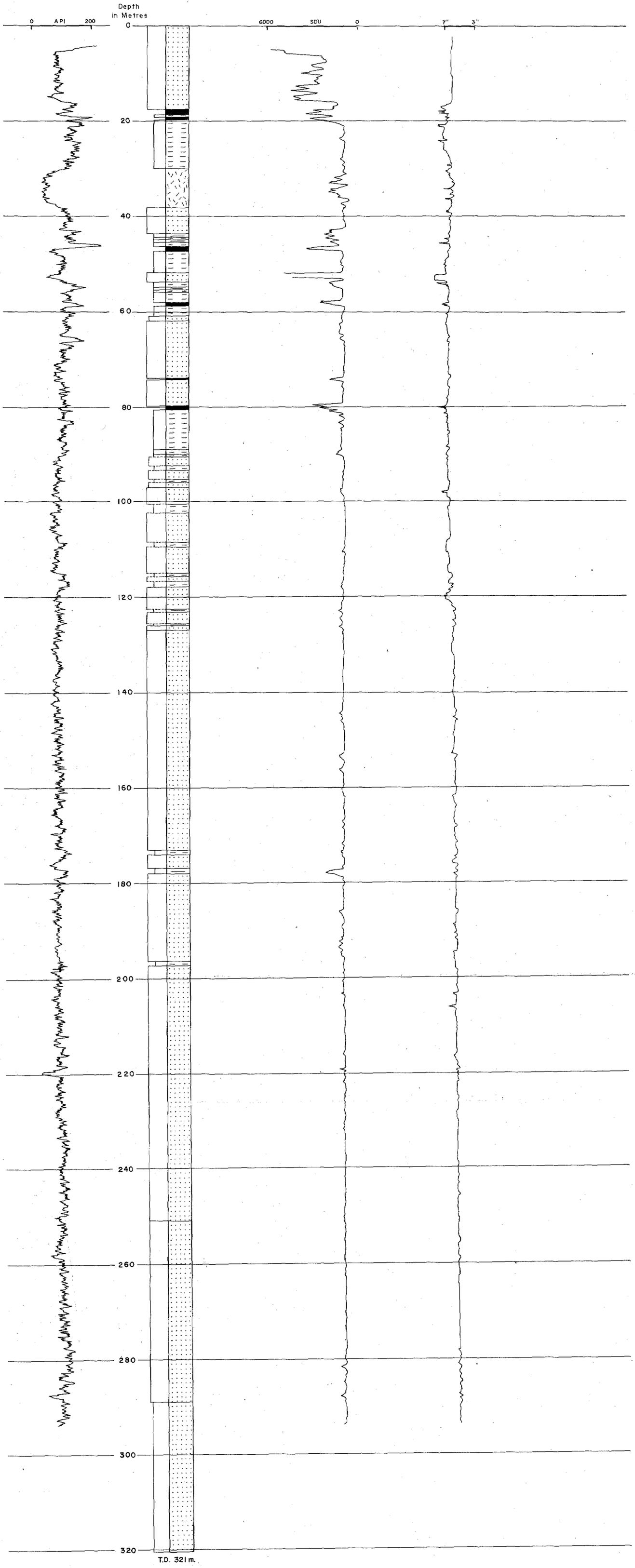
**MICROFILMED**

PLATES

**AUTHOR:** N.T. PERKINS  
**DATE:** MARCH, 1983  
**DISTRIBUTION:** DEPARTMENT OF MINES, TASMANIA  
 MARATHON, BRISBANE

**OPEN FILE**





GAMMA RAY

SEAM LOG

L.S. DENSITY

CALIPER

T.D. 321 m.

585096

Report No. 1983/16  
**Marathon Petroleum Australia, Ltd.**  
 BRISBANE AUSTRALIA

Plate 2

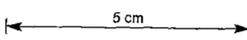
E.L. 679 CATAMARAN  
 Plan Showing

DRILL HOLE SECTION

HOLE No. CA 113

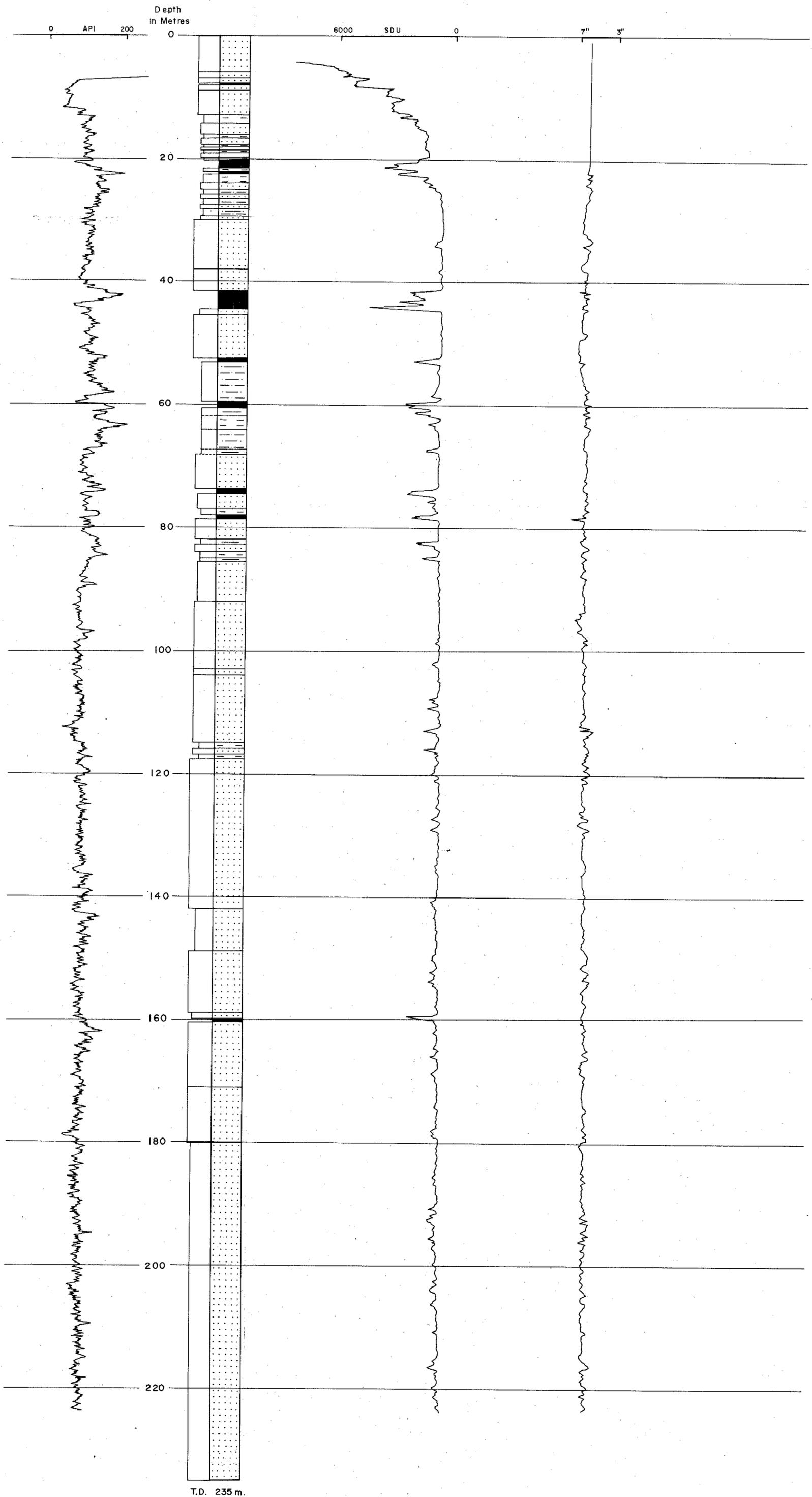
Maped by S. CARR  
 Drawn by J. ANDREWS Date JAN 1983 Plan No. CM 033

1588 SCALE 1:500



HOLE No. CA 113

83-1965 2/2



T.D. 235 m.

GAMMA RAY

SEAM LOG

L. S. DENSITY

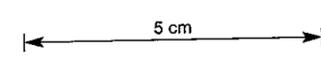
CALIPER

585097

Report No. 1983/16  
**Marathon Petroleum Australia, Ltd.**  
 BRISBANE AUSTRALIA

**E.L. 679 CATAMARAN**  
 Plan Showing

**DRILL HOLE SECTION**  
**HOLE No. CA 114**



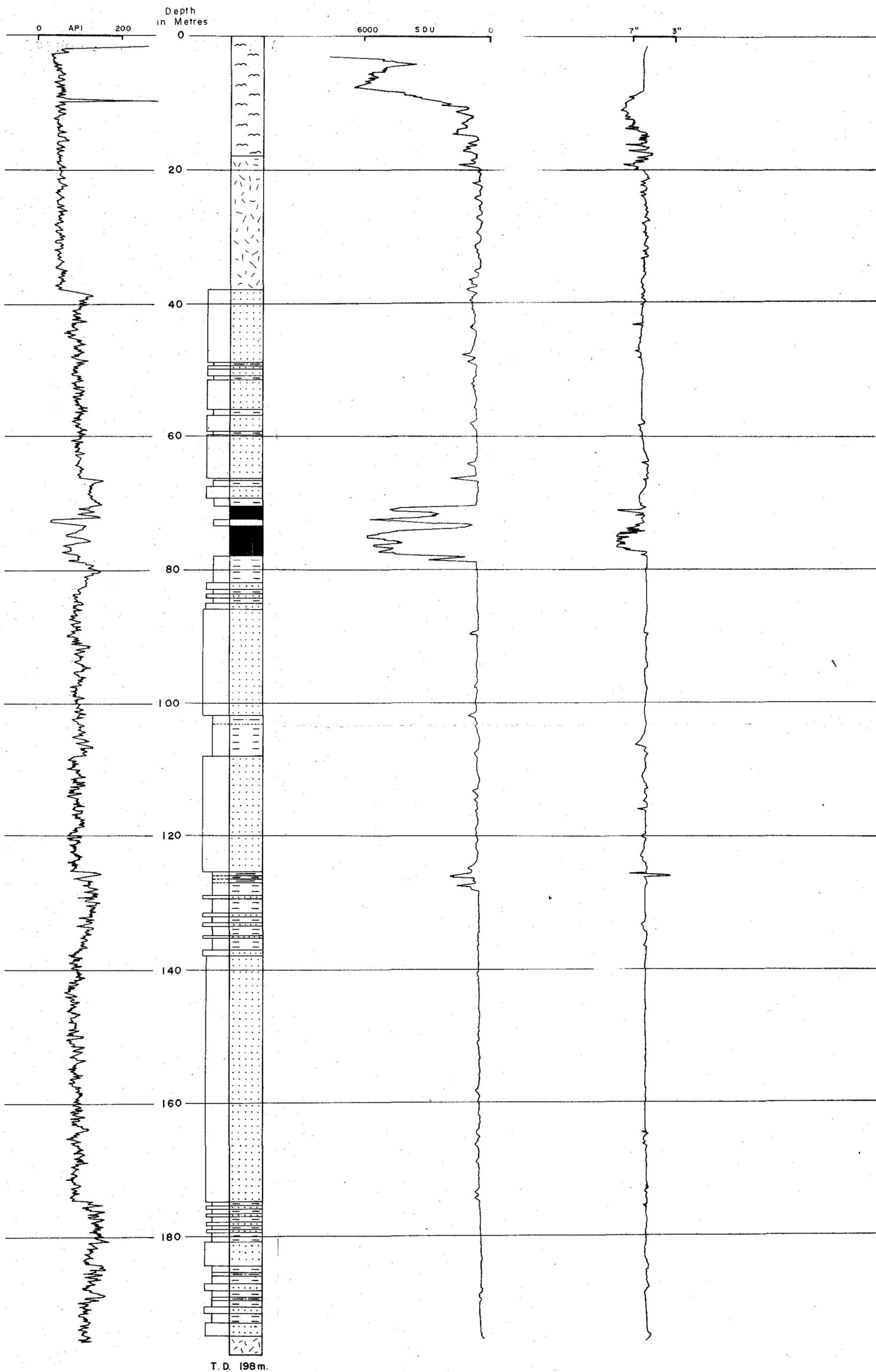
SCALE 1:500

Mapped by S. CARR  
 Drawn by J. ANDREWS Date JAN. 1983 Plan No. CM 034

1589

83-1965 2/2

HOLE No. CA 114



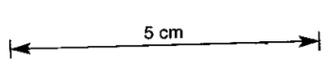
GAMMA RAY      SEAM LOG      L.S. DENSITY      CALIPER

585098

Report No. 1983/16      Plate 4  
**Marathon Petroleum Australia, Ltd.**  
 BRISBANE      AUSTRALIA

**E.L. 679 CATAMARAN**  
 Plan Showing  
**DRILL HOLE SECTION**  
**HOLE No. CA 115**

Mapped by S.CARR      Plan No. CM.035  
 Drawn by J.ANDREWS      Date JAN. 1983

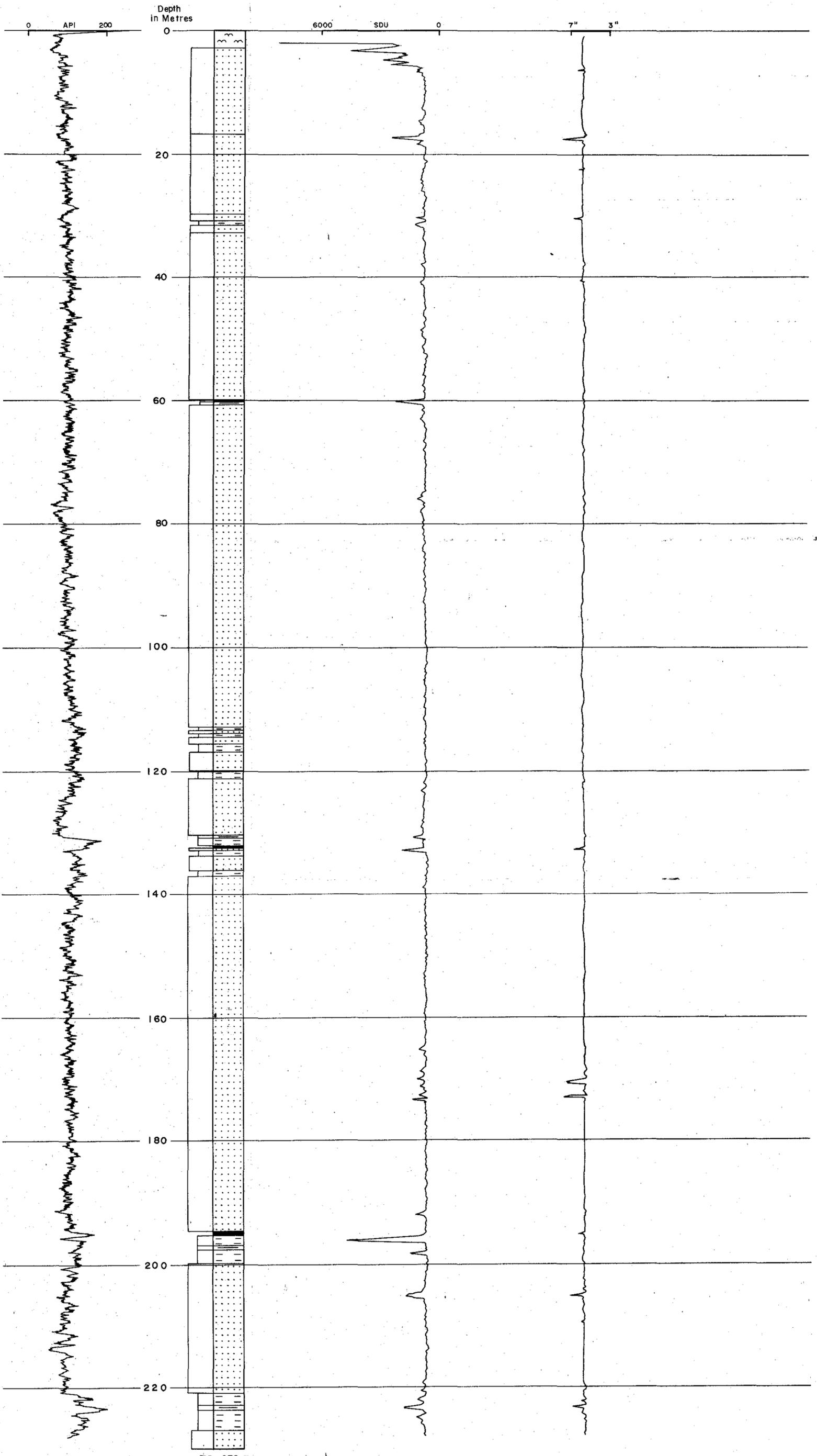


1590

SCALE 1:500

83-1965 2/2

HOLE No. CA 115



GAMMA RAY

SEAM LOG

L.S. DENSITY

CALIPER

T.D. 230 m.

585099

5 cm

Report No. 1983/16 Plate 5  
**Marathon Petroleum Australia, Ltd.**  
 BRISBANE AUSTRALIA

1591

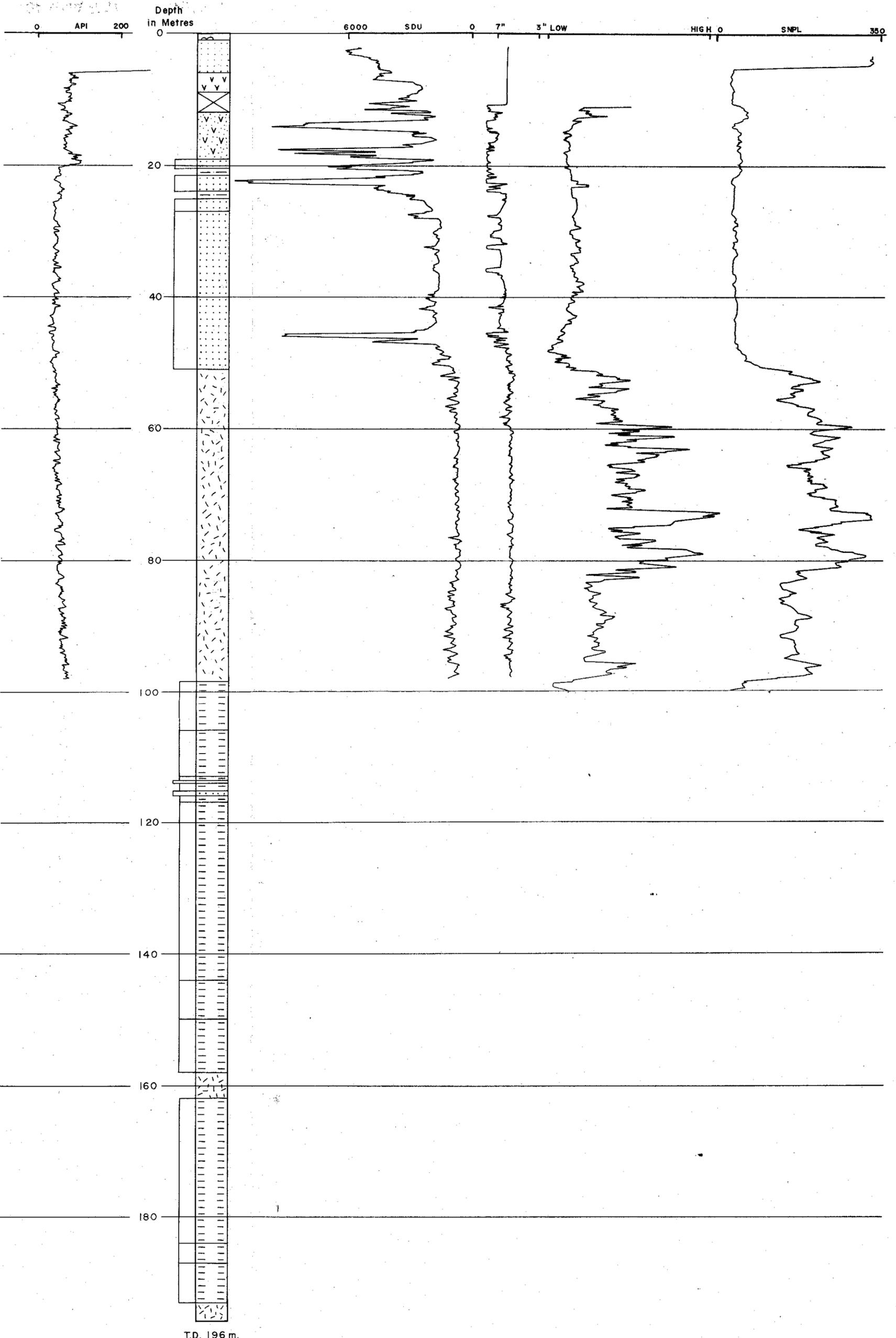
SCALE 1:500

**E.L. 679 CATAMARAN**  
 Plan Showing  
**DRILL HOLE SECTION**  
**HOLE No. CA 116**

Mapped by S. CARR Plan No. CM 036  
 Drawn by J. ANDREWS Date JAN. 1983.

HOLE No. CA 116

83-1965 2/2



T.D. 196 m.

GAMMA RAY

SEAM LOG

L.S. DENSITY

CALIPER

RESISTIVITY

NEUTRON

585100

Report No. 1983/16  
Marathon Petroleum Australia, Ltd.  
BRISBANE

Plate 6  
AUSTRALIA

E.L. 679 CATAMARAN  
Plan Showing

DRILL HOLE SECTION  
HOLE No. CA 117

Mapped by S. CARR  
Drawn by J. ANDREWS Date JAN. 1963

Plan No. CM037

1592

SCALE 1:500

5 cm

HOLE No. CA117

83-1965 2/2

Depth  
in Metres

0

20

40

60

80

100

120

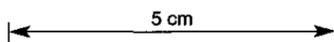
140

160

T.D. 164 m.

NEUTRON

585101



Report No. 1983/16  
Marathon Petroleum Australia, Ltd.  
BRISBANE AUSTRALIA

Plate 7

1593

E.L. 679 CATAMARAN  
Plan Showing

SCALE 1:500

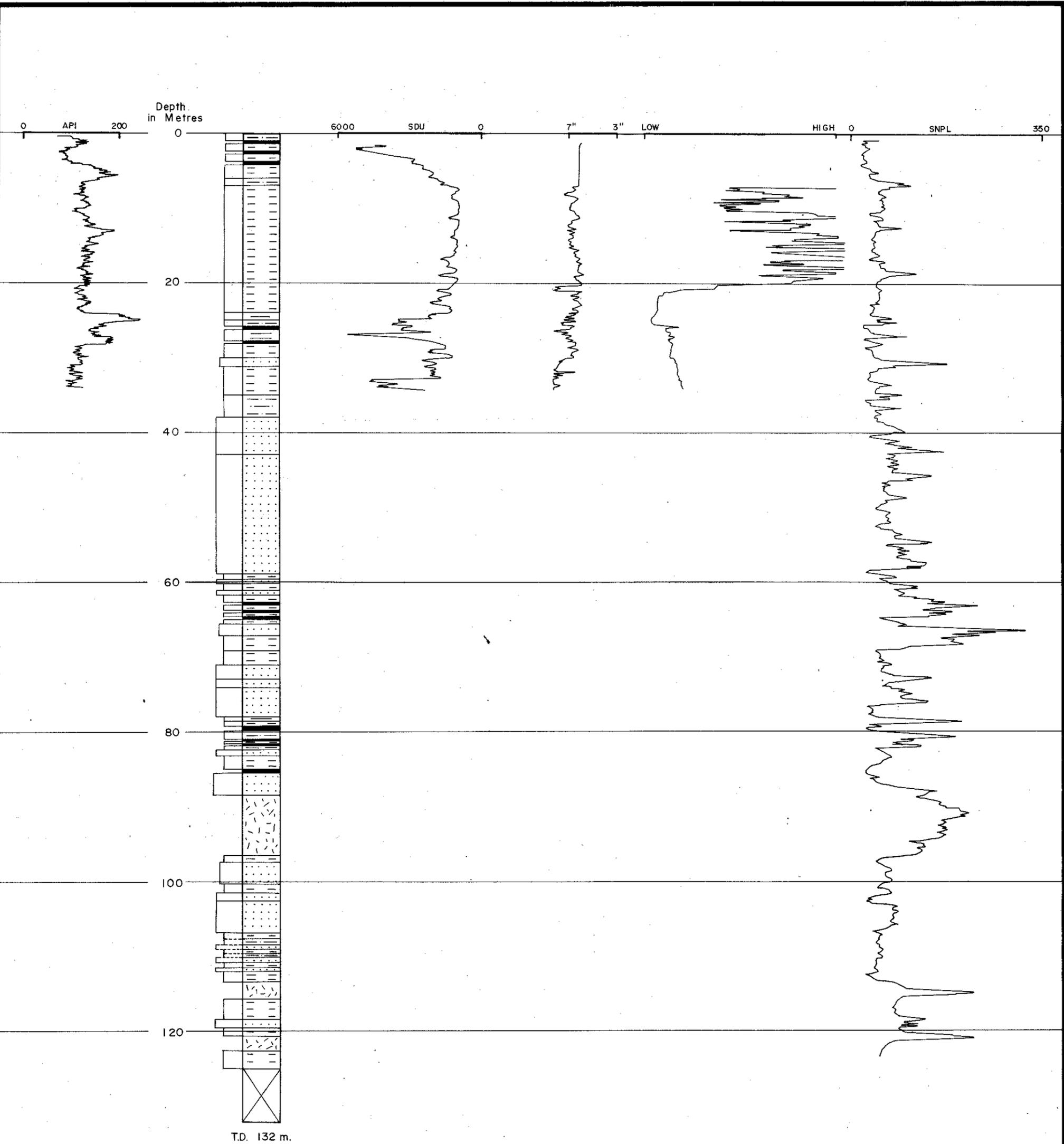
DRILL HOLE SECTION  
HOLE No. CA 118

NOTE: Neutron sonde logged through casing.  
: 0-20m No sample return in Scree

Mapped by S. CARR  
Drawn by J. ANDREWS Date JAN. 1983 Plan No. CM 038

HOLE No. CA118

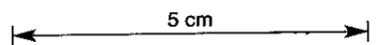
83-1965 2/2



T.D. 132 m.

GAMMA RAY      SEAM LOG      L.S. DENSITY      CALIPER      RESISTIVITY      NEUTRON

NOTE: Sample contamination between 122 m. and 132 m. due to bad caving, extremely slow drilling rate suggests that the lithology is dolerite.



1594  
SCALE 1:500

585102

Report No. 1983/16  
**Marathon Petroleum Australia, Ltd.**  
BRISBANE AUSTRALIA

Plate 8

**E.L. 679 CATAMARAN**  
Plan Showing

**DRILL HOLE SECTION**  
**HOLE No. CA 119**

Mapped by S. CARR  
Drawn by J. ANDREWS Date JAN. 1983 Plan No. CIA3T5-II

HOLE No. CA119

83-1965 2/2

Depth  
in Metres

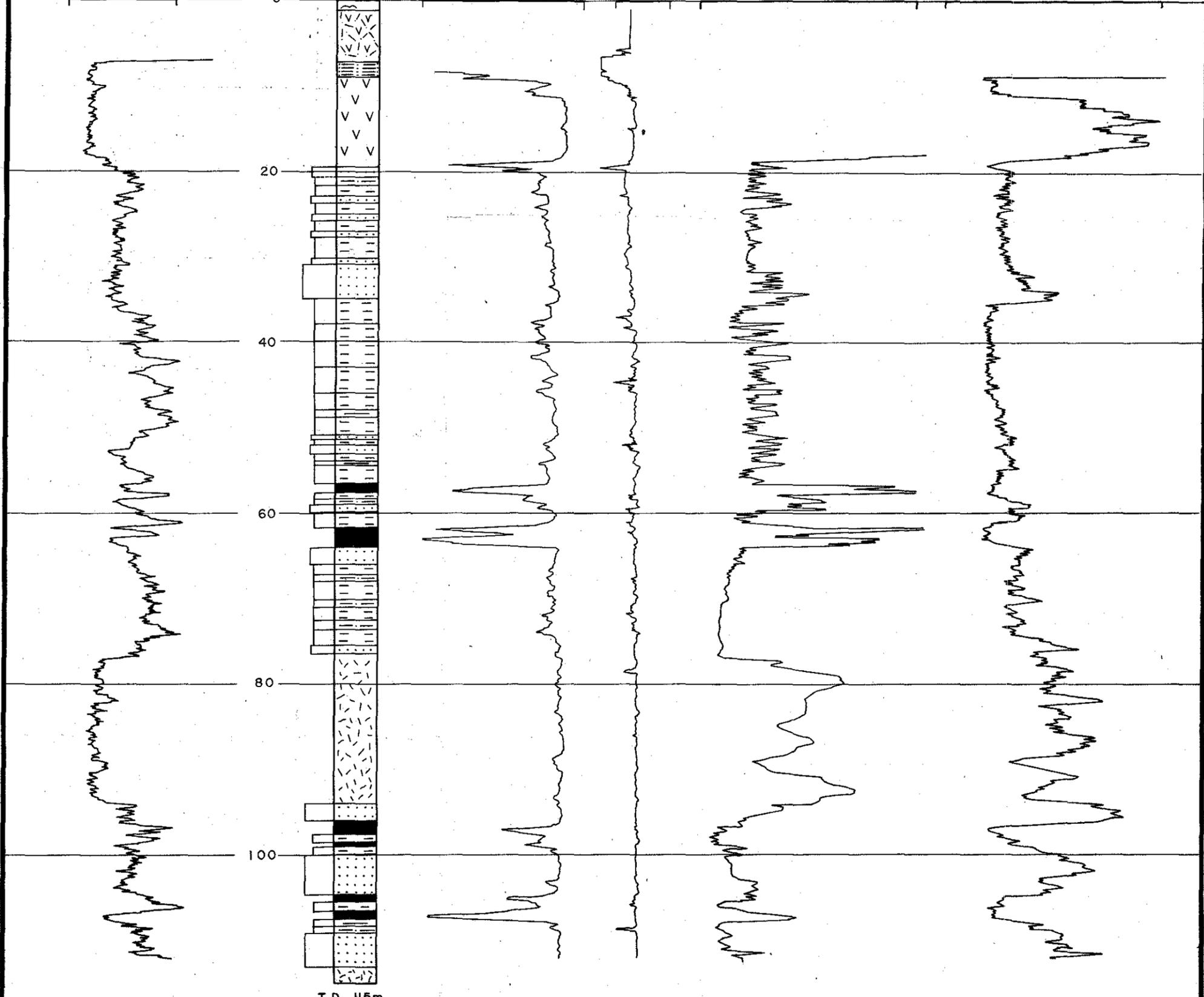
0 API 200

6000 SDU

0 7" 3" LOW

HIGH 0

SNPL 350



T.D. 115m.

GAMMA RAY

SEAM LOG

L.S. DENSITY

CALIPER

RESISTIVITY

NEUTRON

585103

Report No. 1983/16  
**Marathon Petroleum Australia, Ltd.**  
BRISBANE AUSTRALIA

**E.L. 679 CATAMARAN**  
Plan Showing

**DRILL HOLE SECTION**  
HOLE No. CA 120

Mapped by S. CARR Plan No. CIA3T5-12  
Drawn by J. ANDREWS Date JAN. 1983

5 cm

1595  
SCALE 1:500

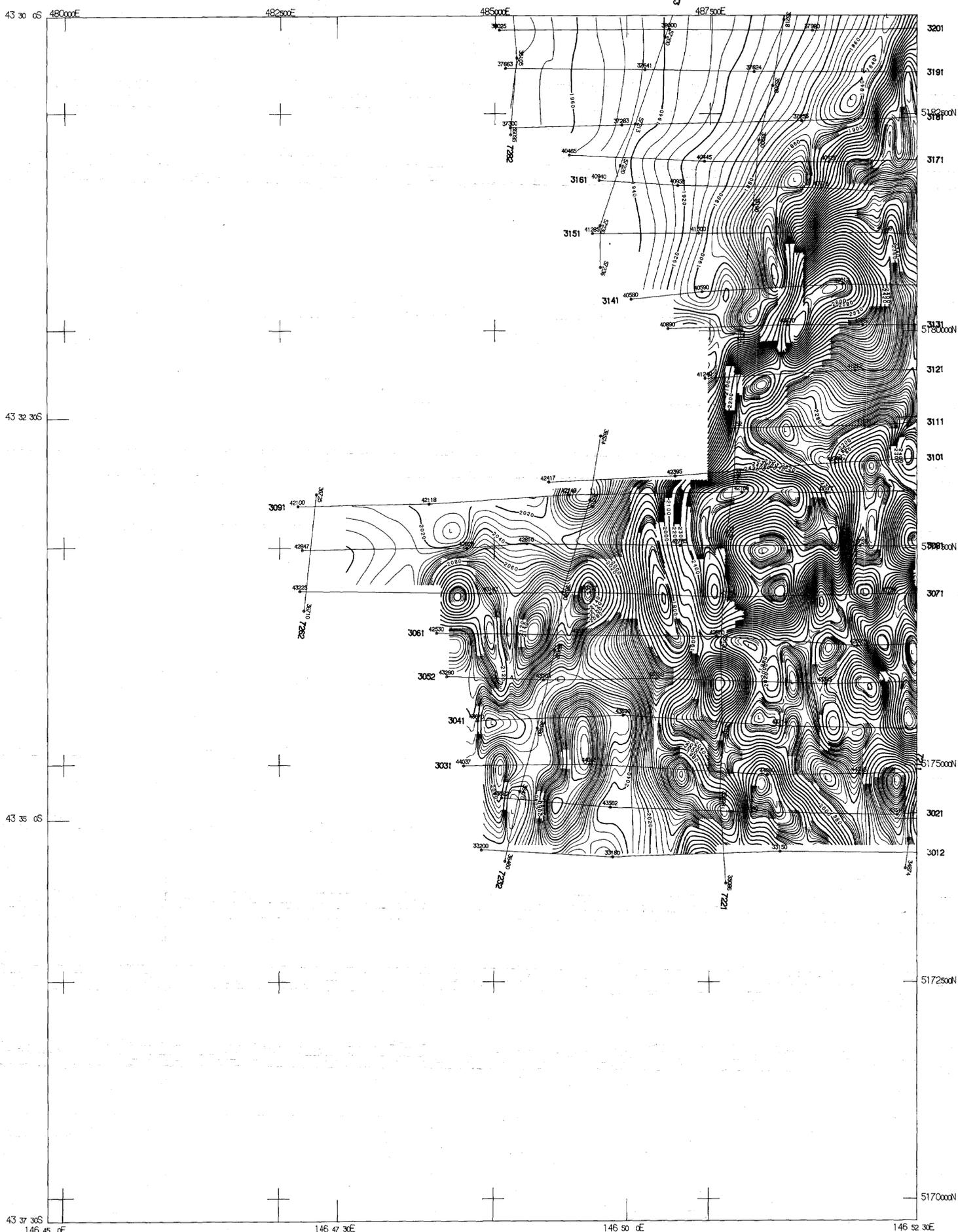
HOLE No. CA120

83-1965 2/2







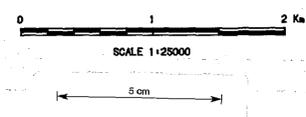


AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER : Caesium 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 : Geotrex 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 : Geocom-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  
 Digitized from 1:25000 controlled photographs.  
 Magnetic : \*Tie Line Levelled.  
 Diurnal : \*Removed.  
 IGRF : \*Removed, Datum 2000nT added.  
 Contour Interval : 5, 20, 100, 500, 1000 and  
 2000 nanoteslas.

8211-10	8211-14	8211-2
8211-11	8211-15	8211-3
8211-12	8211-16	8211-4
8210-9	8210-13	



185107

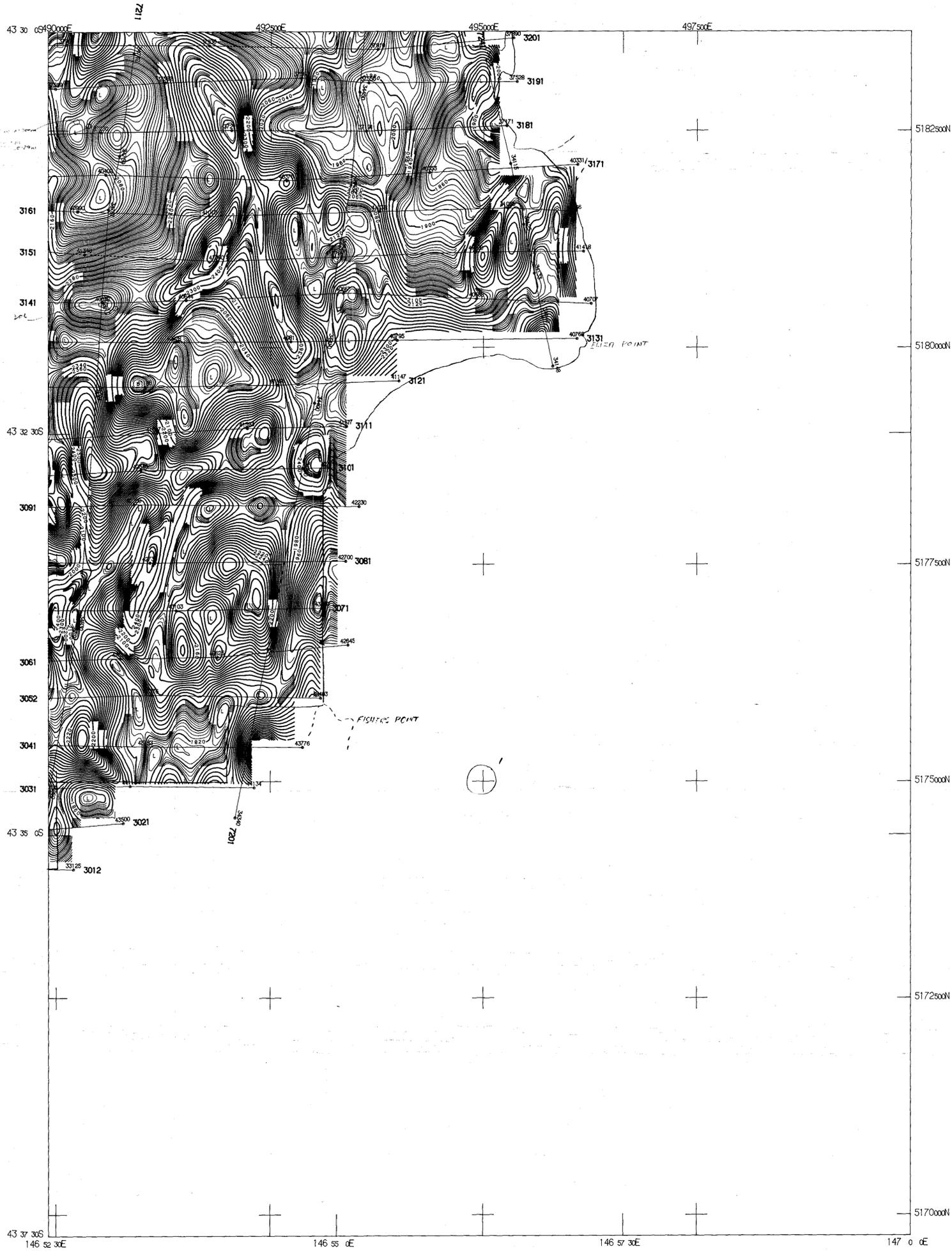
Plate 13

1599



JOB NO : 87-259  
 Flown by GEOTREX PTY LTD : DECEMBER 1982  
 Compiled by Geotrex 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

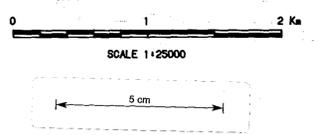


**AIRBORNE SURVEY SPECIFICATIONS**

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 : Geotrex 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  
 Tee Lands Dept. black & white photography.

**RESIDUAL MAGNETIC CONTOURS**  
 SHEET 8210-13  
 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	



585108

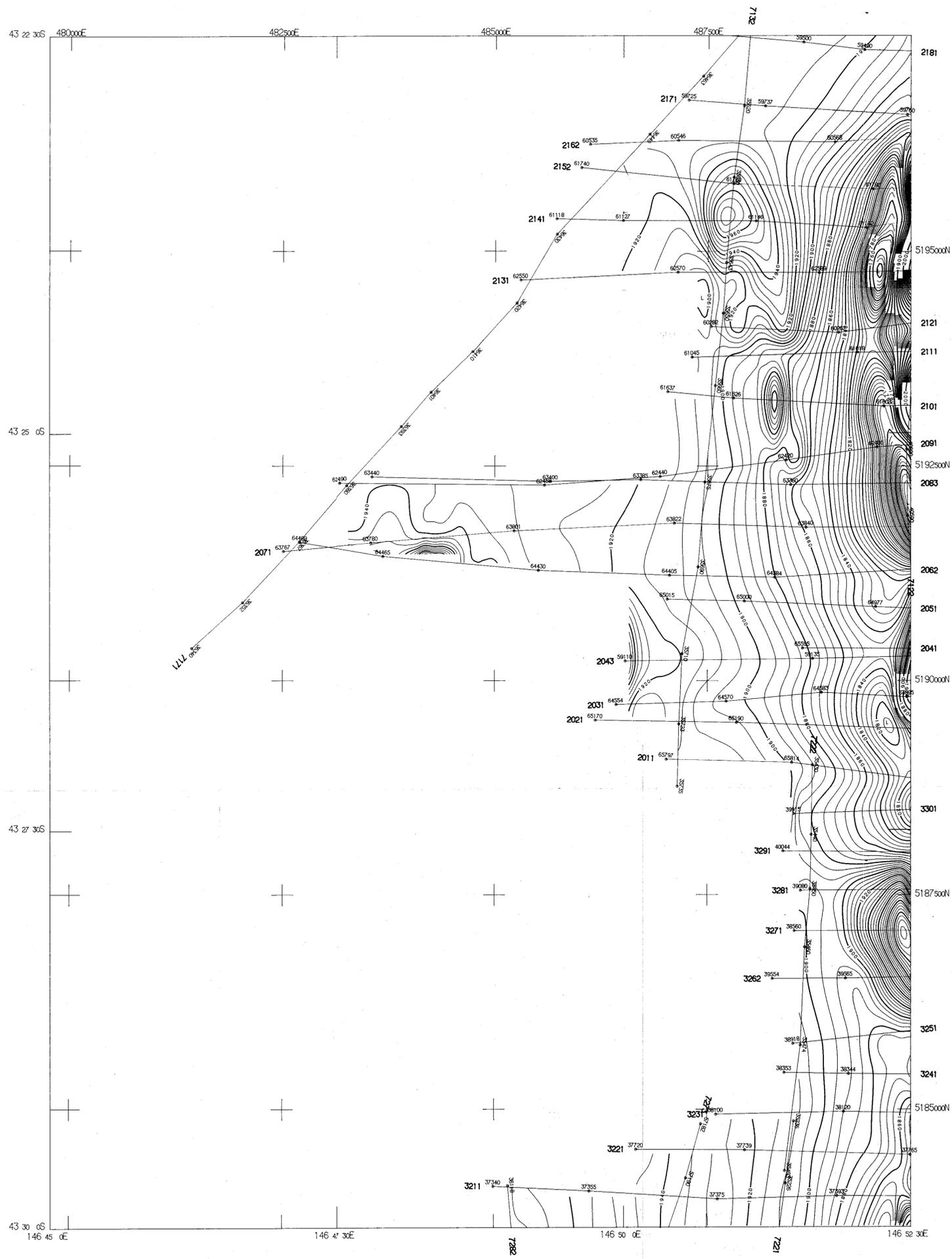
Plate 14  
 1600

JOB NO : 87-259  
 Flown by GEOTERREX PTY LTD : DECEMBER 1982  
 Compiled by Geotrex Pty Ltd., Sydney, NSW.  
 Processed by Engineering Computer Services, Bowral, NSW.

**MARATHON PETROLEUM AUSTRALIA, LTD.**

**EL 6/79 CATAMARAN TAS.  
 RESIDUAL MAGNETIC CONTOURS  
 SHEET 8210-13**

PROJ NO. 83-1965 2/2 DATE: 24-DEC-82



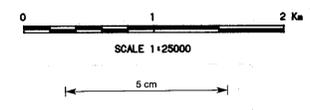
**AIRBORNE SURVEY SPECIFICATIONS**

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 : Geotrex 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 : Geocem 35mm continuous tracking camera.  
 FLIGHT LINE RECOVERY : Visually to 1:25,000 enlargements of  
 Teo 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.

8211-10	8211-14	8211-2
8211-11	8211-15	8211-3
8211-12	8211-16	8211-4
8210-9	8210-13	



585109

Plate 15

160i

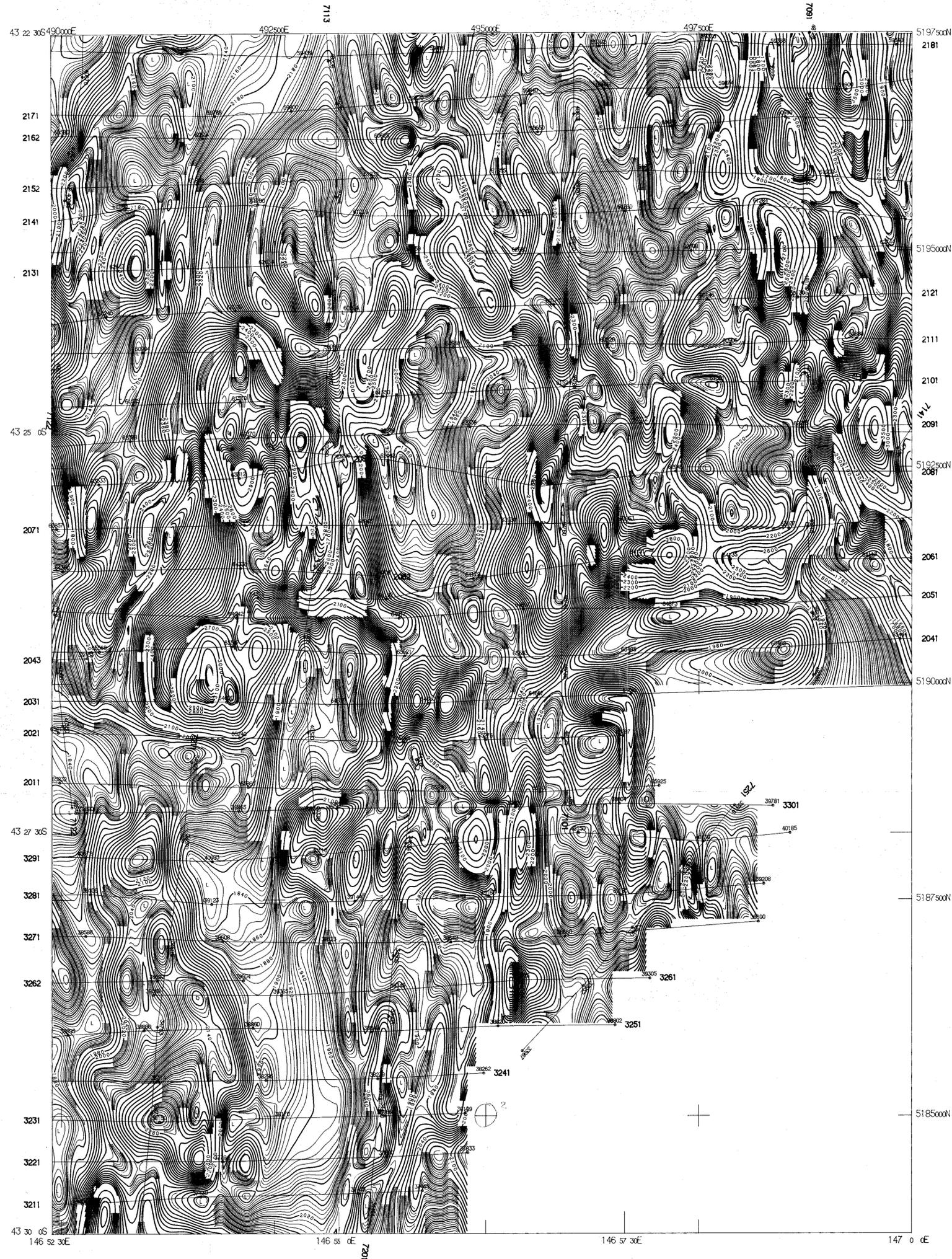
JOB NO : 87-259  
 Flown by GEOTREX PTY LTD : DECEMBER 1982  
 Compiled by Geotrex Pty Ltd., Sydney, NSW.  
 Processed by Engineering Computer Services, Bowral, NSW.

**MARATHON PETROLEUM  
 AUSTRALIA, LTD.**

EL 28/82, EL 6/79 TAS.  
 RESIDUAL MAGNETIC CONTOURS  
 SHEET 8211-12

PROJ NO. DATE: 24-DEC-82

83-1965 2/2



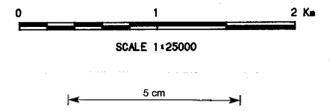
AIRBORNE SURVEY SPECIFICATIONS

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 : Geotrex 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.

8211-10	8211-14	8211-2
8211-11	8211-15	8211-3
8211-12	8211-16	8211-4
8210-9	8210-13	



585110 Plate 16 1602

JOB NO : 87-259  
Flown by GEOTERREX PTY LTD : DECEMBER 1982  
Compiled by Geotrex 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

83-1965 2/2