T/18P Part 7

176001

BASS STRAIT OIL & GAS N.L.
17-23 QUEENSBRIDGE STREET,
SOUTH MELBOURNE .. VIC. .. 3205.

ANNUAL REPORT, YEAR 2, T18P

BASS BASIN, TASMANIA

FOR

THE BASS STRAIT OIL & GAS

CONSORTIUM.

AUGUST, 1982.

CONTENTS

LIST OF PLATES

INTRODUCTION

This report relates to work carried out by Bass Strait Oil & Gas (Holdings) N.L. as operator for the Consortium which holds title to T18P for the period 23rd July, 1981 to 22nd July, 1982. This is the final quarterly report for the second permit year.

During the period the geological and geochemical data has been reassessed in order to define the prospective regions within the permit. The marine seismic survey, BBS81 totalling 730.9 km has been interpreted and several leads defined. A further 144.7 km of 48 fold seismic data was shot over these leads but processing was incomplete at the end of the report period.

The Consortium is presently attempting to farm-out the permit.

GEOLOGICAL PROGRAMMES

The available well data in the Bass Basin has been studied in order to gain a perspective of the broad sedimentation and geochemical patterns prevailing in the basin during the Paleocene-Eocene. Isopachs and net sand/gross section maps were prepared for three periods of time during the Paleocene-Eocene and were incorporated in interpreting the present day heat flow distribution. Regional cross-sections encompassing the wells in the basin have been combined with vitrinite reflectance and total organic carbon measurements in order to define the prospective regions within the basin and in T18P in particular.

L. balmei Isopach and Net Sand/Gross Section (Plate I)

Partridge (1976) defined two spore pollen assemblage zones which almost entirely span the Paleocene. These zones were the Upper and Lower *Lygistepollenites balmei* zones. The zones were combined in this study in order to establish a net sand/gross section map (plate I). Net Sand was considered to be any sandy interval with sonic log or conductivity response indicating porosity greater than about 10%.

Even though the L. balmei section was not reached in Bass -1, Cormorant -1 and Toolka -1 and over 480 metres was penetrated in Pelican -3 to the southwest, there is sufficient evidence to postulate a major south-westerly trending depositional trough in the eastern part of the basin.

Interpretation of the BCS81 seismic survey suggests there could be greater than 3000 metres of L.balmei age sediments near Dondu -1 which is near this depocentre.

Net sand/gross section data are also sparse but sufficient to indicate a large sand source from the southeast near Durroon -1 with less prominent basin flank sources from the east and west. Essentially no sand reached the present basin axial position, nor does there appear to be any evidence of a sand source from the north. Indeed, the shaling of the unit to the north seems well established and one would anticipate that the unit would be almost entirely shale, albeit geochemically mature (as with the overlying unit at Cormorant -1) over the large northern portion of the basin. The 10% value at Nangkero -1 located between two lower values at Dondu -1 and Poonboon -1 suggest the relatively simple depositional pattern described above may have been influenced by uplift providing local sources of sand. However, this appears to be a minor influence with Nangkero -1 type sands not providing particularly good reservoir potential.

Lower M. diversus Isopach and Net Sand/Gross Section (Plate II)

Partridge (1976) indicated the Lower Malvacipollis diversus spore-pollen zone to be of Late Paleocene-Early Eocene age and the Upper Malvacipollis diversus zone to be of Early Eocene age. Several of the wells in Bass Basin have a zone identified as Middle M.diversus. For convenience the latter zone was combined with the Lower M.diversus zone to form Plate II.

It must be recognised that the isopach of the Lower plus middle M. Diversus will be a little misleading as one of the major unconformities within the Eastern View Group occurred during Middle M.diversus time.

The isopach of Plate II is considered accurate enough to indicate that the depositional axis changed from that of L.balmei time to one located in a more central north-south position. In fact, the absence of the unit at Pelican -3 and Bass -3 suggests there was quite a rift valley in the Pelican -1 and 2 and Narimba -1 area. Aroo -1 may have constituted a major horst within the rift which turned north between Bass -3 and Tarook -1 to the Cormorant -1/Toolka -1 region.

Despite the absence of sand at Durroon -1 due to erosion, the sand source distribution is rather similar to the previous L.balmei unit. However, relatively greater proportions of sand were entering the basin suggesting increased uplift of the margins and particularly of northern Tasmania.

Upper Eastern View (Upper M.diversus to Upper N. asperus) Isopach and Net Sand/Gross Section (Plate III)

Partridge (1976) assigned the Upper M.diversus to Upper N.asperus zones to the Early Eocene through Early Oligocene. The BBS and BCS81 seismic data exhibit onlap of the base of the unit onto the often truncated Middle M.diversus unit.

The isopach of Plate III indicates a return to the general form of that of the Paleocene L. balmei. However, there is no seismic expression of a deep trough to the east near Dondu; rather the depocentre may have been in the Pelican-Narimba region.

Even greater proportions of sand entered the basin at this time and were derived from essentially the total basin perimeter. Despite the uplift of the northern part of the basin, the lower sand percentages were still located in the north-central area.

Synthesis

The NE-SW cross section (plate 1V) through the Bass Basin indicates the two major half graben trough systems of the L. balmei and lower M. diversus ages which contrasts with the broad, more uniform simple depression unfil sedimentation of the Upper Eastern View sediments.

Heat Flow (Plate V)

The heat flow distribution was determined by calculating the thermal conductivity from the average bed porosity for intervals over which the temperature gradient can be measured from well-log data.

The heat flow distribution is characterised by two northwesterly trending highs near the basin margins separated by a relatively low heat flow trend about the central basin axis. The heat flow high trends overlie the L. balmei and Lower M. diversus depositional axes. This is highly significant as the areas of highest sand percentage and highest heat flow are essentially coincident which indicates that these areas can develop maturation more shallow where porosity is preserved.

Regional Crosssections and Geochemistry (Plates V1, VII)

Regional cross-sections in the NW-SE and SW-NE directions have been constructed for the Paleocene-Eocene periods by datuming the well logs on the Top Eastern View event. The palaeontological information have been included and the N. asperus, P. asperopolus, M.diversus, L. balmei, T. longus and T. lilliei zones are defined. The known hydrocarbon occurrences have been indicated and can be summarised as follows:-

In Pelican 1 and 2 condensate was recovered during formation interval testing (F.I.T.) of thin sandstones at various levels within the early Eocene sections. In Pelican -1, a maximum recovery of 3.9m^3 of gas and 600 cm^3 of condensate was made from an F.I.T. at 2661m, and in Pelican 2 an F.I.T. at 2880m recorded a maximum recovery of 1.05m^3 of gas and 750 cm^3 of condensate; while in Pelican 3, minor gas, but no condensate was detected in sandstones of Paleocene age below 2800m. Abnormal pressures were encountered below this depth in the Pelican area.

In Bass 3, 0.82m^3 of gas and 800 cm^3 of condensate were recovered during an F.I.T. at a depth of 2055m. The reservoir was a 15m thick sandstone in the Paleocene (L. balmei zone) section.

In Cormorant 1, an F.I.T. at a depth of 1550m recovered 22 litres of oil from a thin sandstone in the Upper Eastern View Coal Measures. Hydrocarbon shows also occurred in four thin sands between 1828m and 2347m.

In Aroo 1 hydrocarbon indications occúr in the L. balmei zone, while indications in Dondu 1, Pelican 3 and Poonboon 1 were found in thin, tight sands below 2740m.

Three geochemical parameters have been included on the two plates. These data have been taken from the BMR study by Nicholas et al and it should be noted that this information has significantly upgraded the potential basin. Firstly vitrinite reflectance values indicate maturation levels at which oil and gas may be generated occur below M. diversus level everywhere except in the far eastern portion of the basin.

The second parameter is the quantity of organic matter. If minimum total organic carbon (TOC) content of 0.5 percent is necessary for a clastic rock to have hydrocarbon source potential, all of the samples for the Eastern View Coal Measures have reached or exceeded this value, the majority of the samples exceeded 1.5 percent. The highest value, 20.1 percent, is from a shale Paleocene age (L. balmei zone) from Bass 3 and a value of 10.1 percent was obtained from an Eocene shale from Cormorant 1. Other potentially rich samples in excess of 2 percent are common.

The third parameter, the hydrogen/oxygen ratio, related to amounts of generated residual hydrocarbon and reflect the elemental composition of the source rock kerogen and hence source type - gas or oil.

The data suggests a predominatly gas condensate prone source but the Upper Cretaceous has a marked preponderance of oil prone samples. This might be considered highly significant as Dr. Saxby from the C.S.I.R.O. has shown this unit to be the Gippsland oil source.

Synthesis

The deeper wells in the basin centre and the wells on the south-west flank in the vicinity of the Pelican field appear to have terminated just above the zone of initial hydrocarbon generation so that the best potential is in the Lower Eastern View coal measures or Late Cretaceous sediments. The vitrinite reflectance data indicate immature or barely mature source rocks at depths of 3000m in the deep basin and 2000m on the flanks. Thus the best potential for hydrocarbon accumulation is most likely to be along the basin flanks where the geothermal gradients have been shown to be higher, the maturation is greater at shallower depths and where the Paleocene and Late Cretaceous are more sand prone and occur at shallower depths. In the basin deep where depths to maturation are greatest and sand percentages small the best hydrocarbon potential will be restricted to these areas where vertical migration along growth faults into the sands of the upper Eastern View Coal Measures can occur.

Since the majority of faults penetrate no further than the M.diversus unconformity this represents a restricted play. These conclusions indicate that exploration needs to be concentrated nearer the basin margins where very little exploration has taken place.

GEOPHYSICAL PROGRAMMES

During the report period Petrecon integrated earlier seismic survey data with the interpreted BBS81 data and defined several leads. Detailed prospect shooting of 122 line km (144.7km with tails) of 48 fold seismic data was completed on 22nd April 1982. Processing of these data by GSI at their Sydney computing centre was not complete at the end of the permit year.

AQUISITION PARAMETERS AND SPECIFICATIONS

T18P BB82 survey

Cable: 3200 metres, 96 trace, 48 fold

Cable depth: 13 metre average

Energy source: 4075 cu in airgun array operating at 2000 psi

Shot: 33.3 metres, 1 pop per shotpoint

Sample rate: 2 milli-seconds

Record length: 5 seconds

Filters:	High filter and slope	128 hz	72db/OCT
	Low filter and slope	8 hz	18db/OCT

Navigation System: Maxiran

PROCESSING PARAMETERS

Resample

Static corrections

True amplitude recovery

Pre deconvolution

Designature

Velocity analysis

Normal moveout correction

First break suppression

Common depth point stack

Deconvolution

Time varient filtering

Time varient scaling

Lead 1 (Plates VIII and IX)

At the Base Tertiary horizon the structure is a tilted normal block on the southwest margin of the basin (plate VIII). The Top Eastern View, M.diversus Unconformity and the Base Tertiary markers are shown on Plate IX. Rollover of the "top porosity" Top Eastern View may provide a trap but experience has shown that at these depths, maturity does not take place until below the M.diversus Unconformity. Basinward, the pre M.diversus Unconformity is shaley. This is probably the case with Lead 1, as there is a seismic anomaly at the interpreted Base Tertiary Unconformity. No shows have been encountered below the Palaeocene in the basin so this feature is representative of a totally new play.

A pre Tertiary source for the Gippsland oil and gas fields has been established and it is possible that given a similar heat flow the pre Tertiary truncated section of Lead 1 could produce hydrocarbons. These hydrocarbons might explain the amplitude drop on the top of the fault block.

FARMOUT

A farmout package was prepared for distribution to over 30 leading companies throughout the world. At the end of the permit year four companies had shown interest in the farmout and had requested further technical reviews and data. In view of the present economic climate, and Petrecon's past experience in farmouts, this interest is very encouraging.

SECOND PERMIT YEAR EXPENDITURE AND WORK PROGRAMME.

Expenditure Requirements - T18P.

	Expenditure	Work Programme
First Year	$205,000	Preliminary investigation reappraisal and preliminary seismic
Second Year	$410,000	Seismic plus commencement of drilling first well
Third Year	$2,000,000	Completion of first well, reappraisal.

Actual Expenditure - T18P

First Year	$678,450	Preliminary investigation 731 kms seismic data
Second Year	$250,716	144.7kms seismic, geological and burial history study
	$929,166	

The Second Year expenditure has been calculated to June 30th, 1982. Processing accounts related to the 1982 seismic survey had not been received at the end of the permit year.

VARIATION IN AGREEMENT - T18P

On March 26th, 1982 a letter was sent to the Designated Authority requesting for a variation of the terms on permit T18P.

WORK PROGRAMME FOR PERMIT YEAR 3

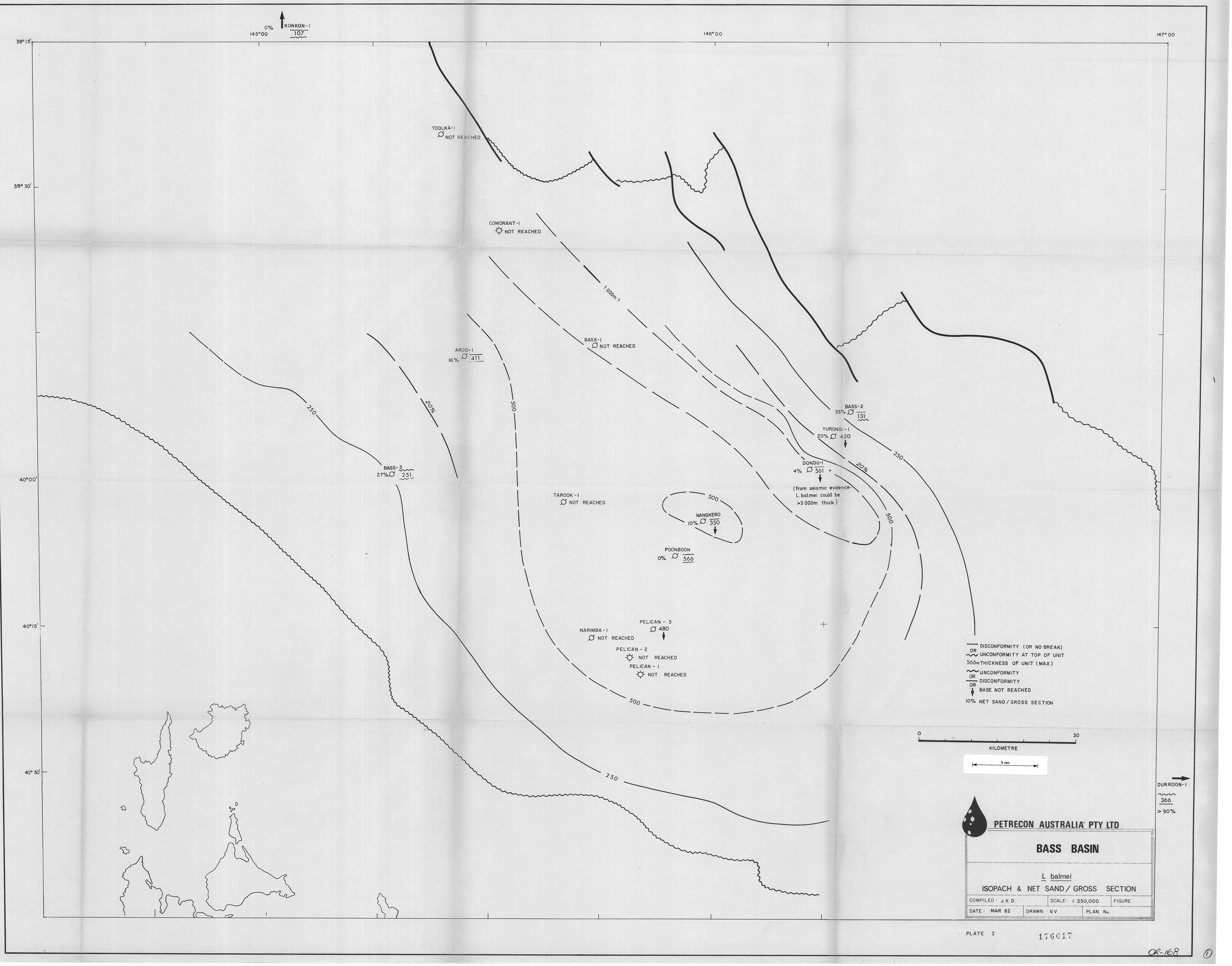
It is anticipated that farmout arrangements should be completed by the end of the calendar year and that the farminee will drill a well during the permit year.

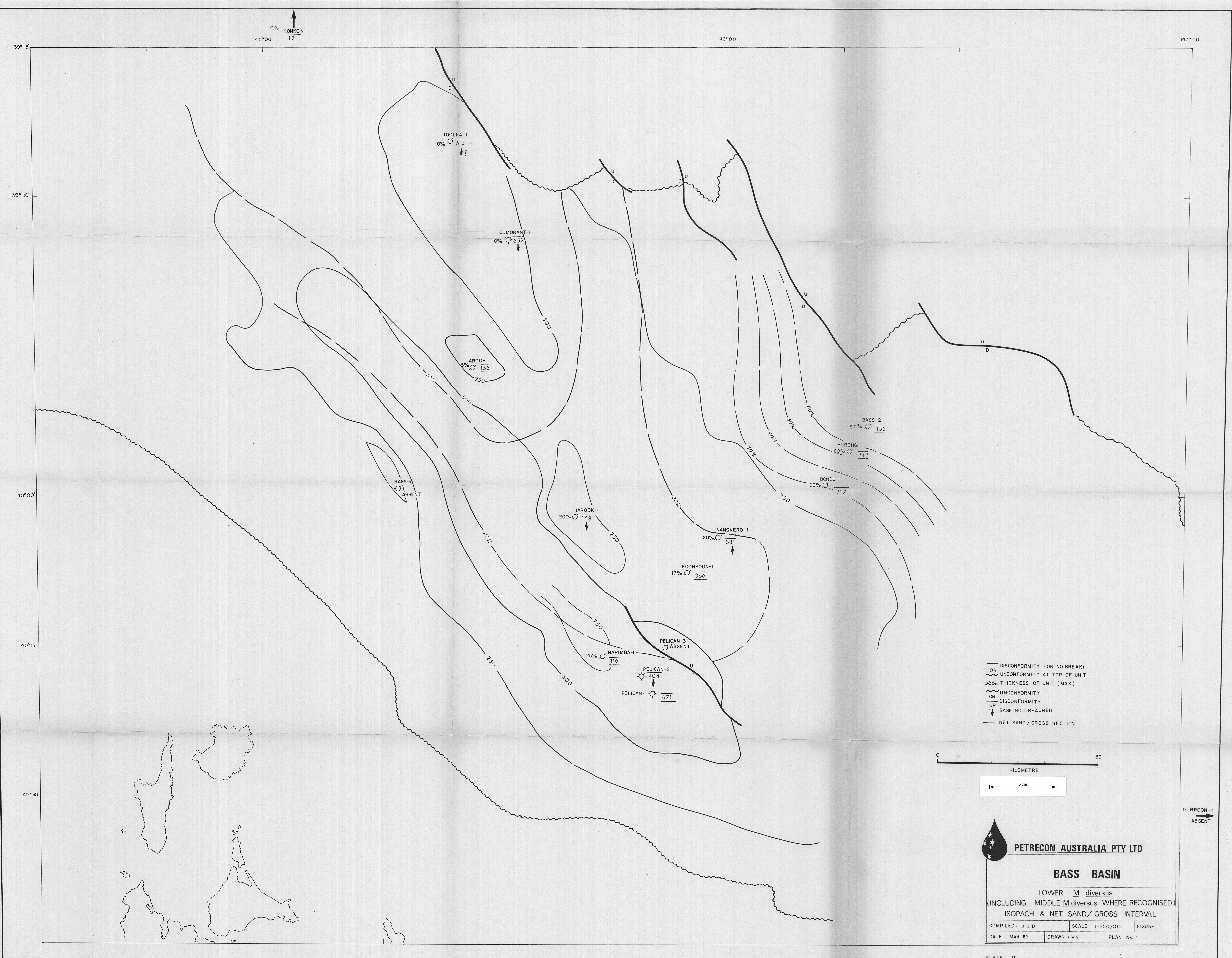
REPORTS SUBMITTED DURING PERMIT YEAR 2

First Quarter Report, Year 2, T18P.

Second Quarter Report, Year 2, T18P.

Third Quarter Report, Year 2, T18P.


PETRECON AUSTRALIA PTY LTD
BASS BASIN
L balmei
ISOPACH & NET SAND / GROSS SECTION
COMPILED: J.K.D
SCALE: 1: 250,000
FIGURE:
DATE: MAR 82
DRAWN: V.V
PLAN No.
PLATE I
176017
OR-168
145°00
146°00
147°00
39°15'
39°30'
40°00'
40°15'
40°30'
0%
KONKON-1
107
TOOLKA-1
NOT REACHED
COMORANT-1
NOT REACHED
BASS-1
NOT REACHED
AROO-1
16%
411
BASS-3
27%
251
TAROOK-1
NOT REACHED
NANGKERO
10%
350
POONBOON
0%
566
BASS-2
33%
131
YURONGI-1
20%
420
DONDU-1
4%
561
(from seismic evidence-
L. balmei could be
>3 000m thick.)
PELICAN-3
480
NARIMBA-1
NOT REACHED
PELICAN-2
NOT REACHED
PELICAN-1
NOT REACHED
1 000m ?
250
500
20%
DISCONFORMITY (OR NO BREAK)
OR
UNCONFORMITY AT TOP OF UNIT
566m THICKNESS OF UNIT (MAX.)
UNCONFORMITY
OR
DISCONFORMITY
OR
BASE NOT REACHED
10% NET SAND / GROSS SECTION
0
30
KILOMETRE
5 cm
DURROON-1
366
> 90%



176018

OR-168

2

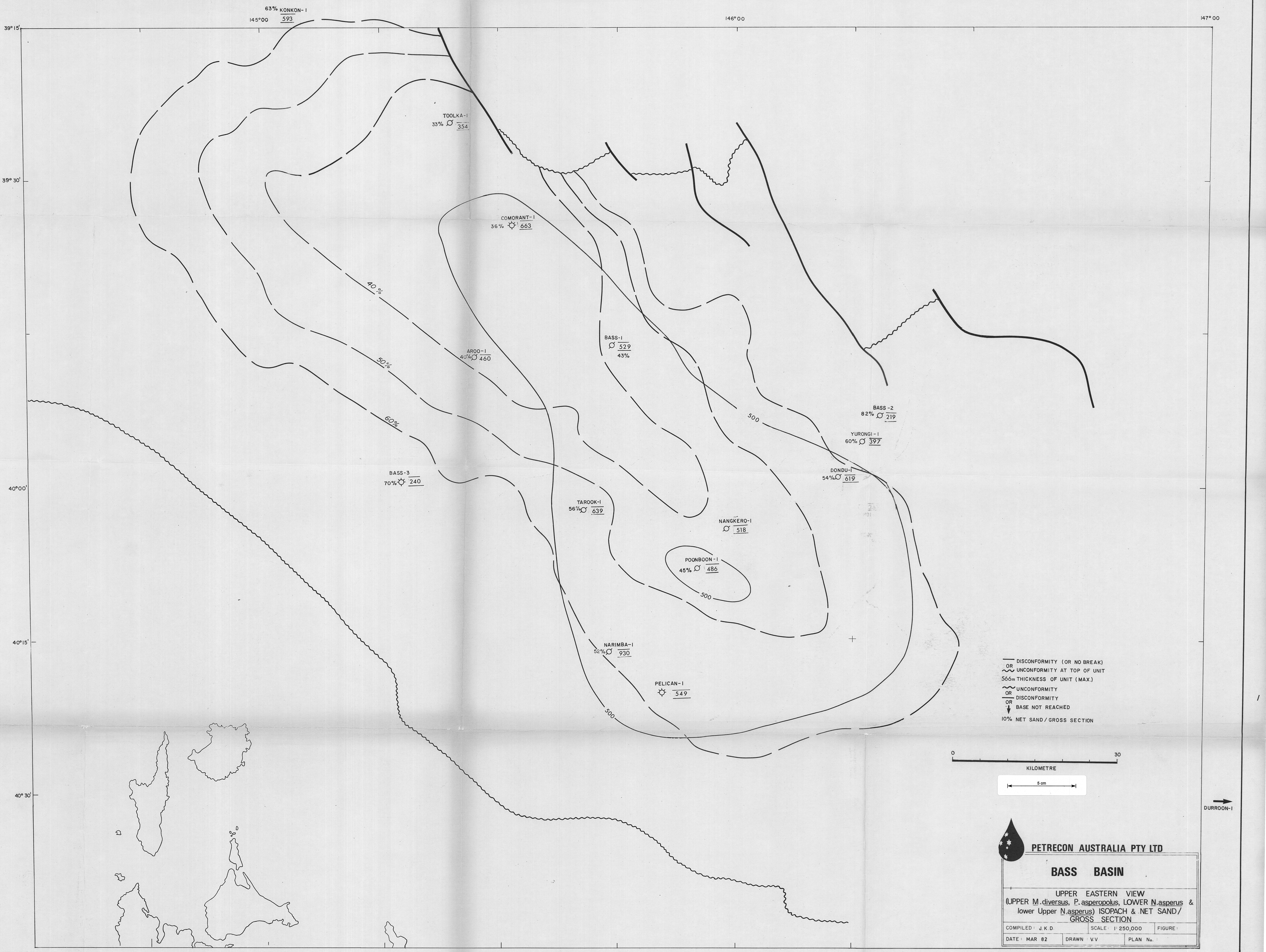


PLATE III

176019

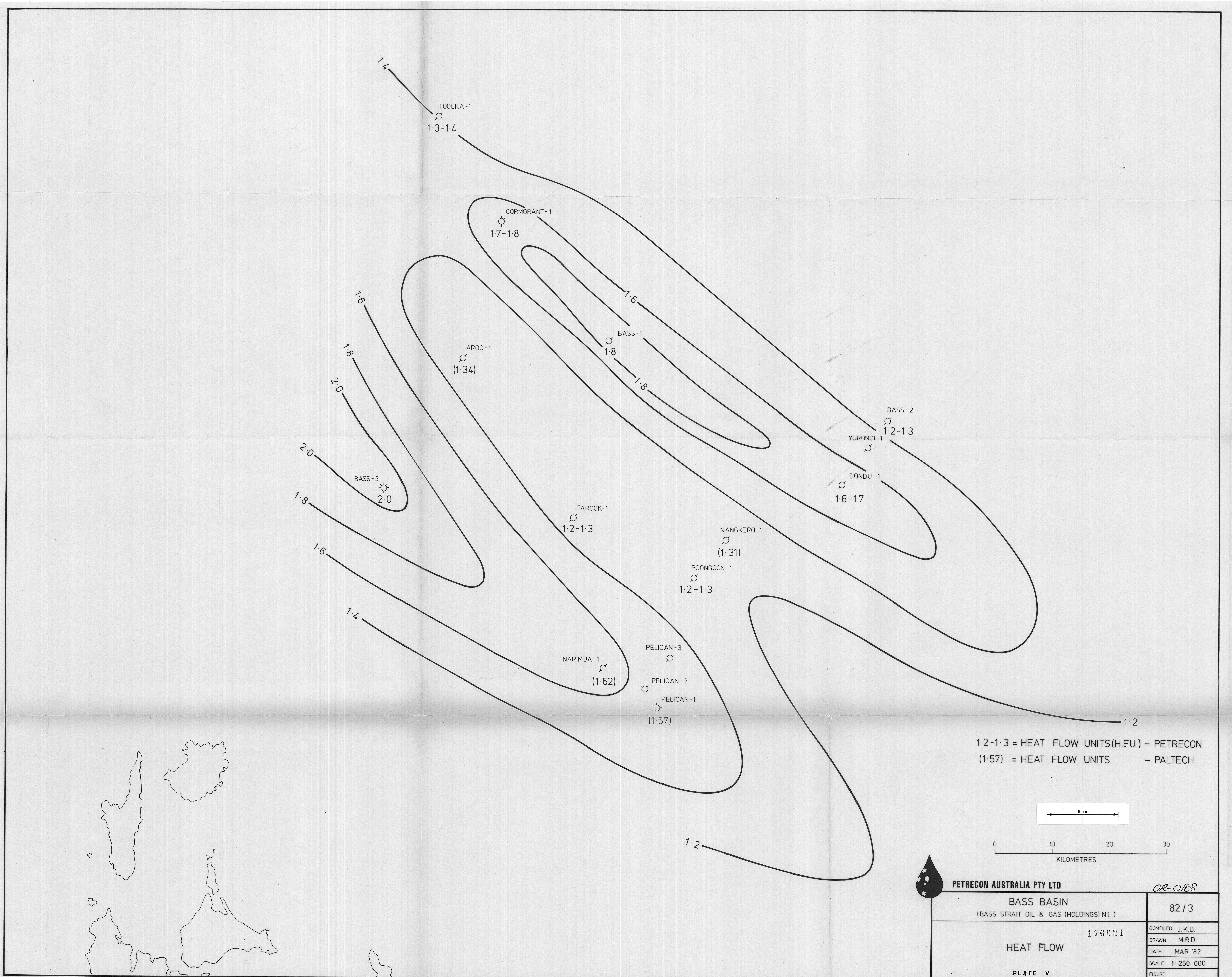
OR-0168

3

PLATE IV

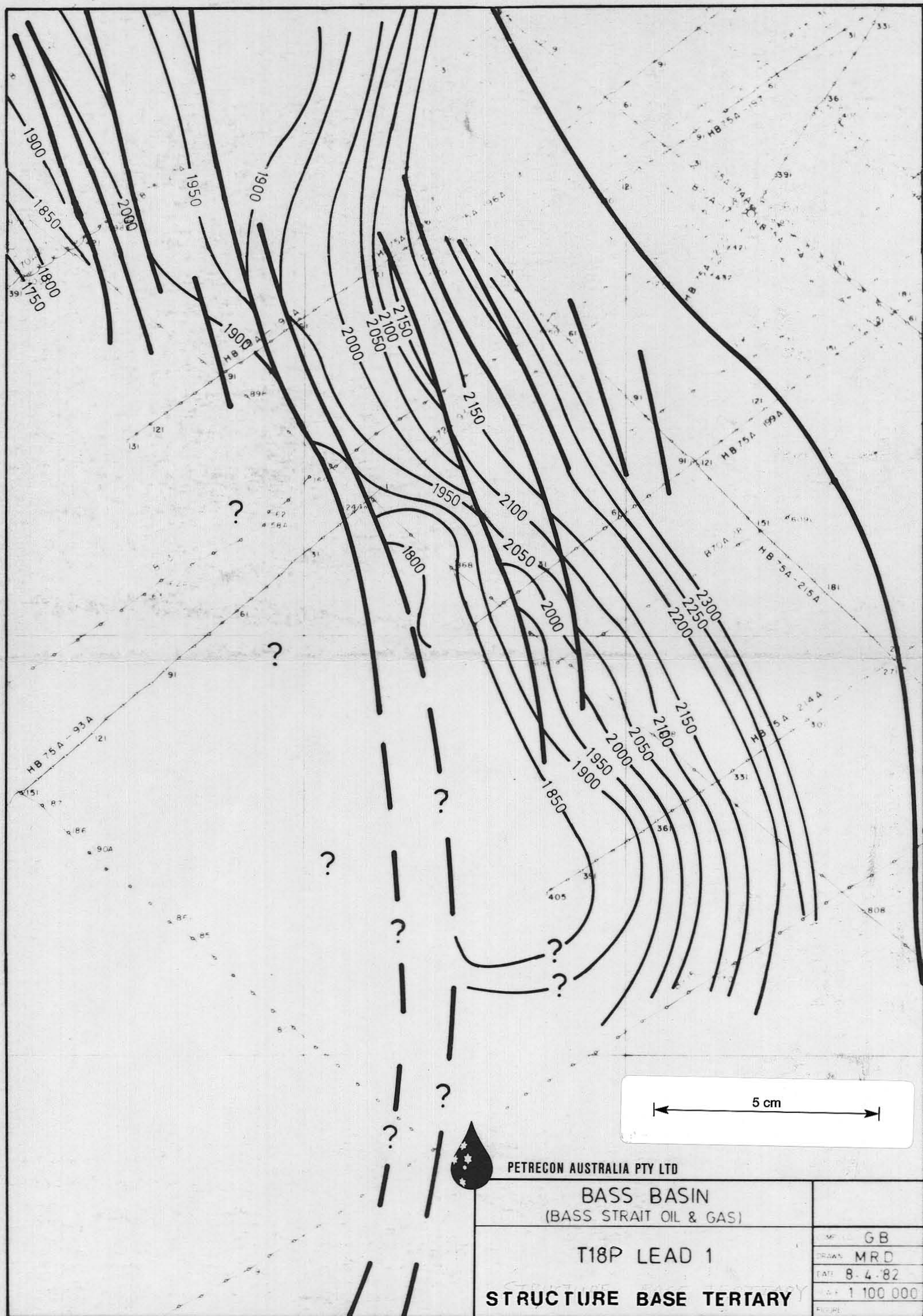
OR-0168

4


TOOLKA-1
1·3-1·4
CORMORANT-1
1·7-1·8
BASS-1
1·8
AROO-1
(1·34)
BASS-2
1·2-1·3
YURONGI-1
DONDU-1
1·6-1·7
BASS-3
2·0
TAROOK-1
1·2-1·3
NANGKERO-1
(1·31)
POONBOON-1
1·2-1·3
PELICAN-3
NARIMBA-1
(1·62)
PELICAN-2
PELICAN-1
(1·57)
1·4
1·6
1·8
2·0
1·2
1·2-1·3 = HEAT FLOW UNITS (H.F.U.) - PETRECON
(1·57) = HEAT FLOW UNITS - PALTECH
5 cm
0 10 20 30
KILOMETRES
PETRECON AUSTRALIA PTY LTD
OR-0168
BASS BASIN
(BASS STRAIT OIL & GAS (HOLDINGS) N.L.)
82/3
176021
HEAT FLOW
PLATE V
COMPILED J.K.D.
DRAWN M.R.D.
DATE MAR '82
SCALE 1: 250 000
FIGURE


SW
NE
Bass - 3
Narimba - 1
Pelican - 1
Pelican - 3
Poonboon - 1
Donau - 1
Yurongi - 1
Bass - 2
Ro = 0·44
1 800·5
0·38 1·05 0·4
2 055m
REC. 820 lit. GAS
3·8 lit. COND.
(G.O.R. 1272 or
23 500 bbls./10⁶ cu.ft.)
2 104·6m
0·63 20·1 23
Ro = 0·64
2 265·6m
0·56 2·4 18
2 432m
0·6 0·1
T.D. 2432
T.D. 3354
2 468m
2 551m
REC. 3 900 lit. GAS
0·6 lit. COND.
(783 bbls./10⁶ cu.ft.)
2 833m
0·67 7·1 24
2 912·3m
0·62 0·85 0·3
2 972·3m
0·56 1·85 0·6
Ro = 0·6
Ro = 0·7
Ro = 1·1
T.D. 3178
Ro = 0·48
PRESSURE INCREASE
3 185m
REC. 14 cu.ft. GAS
T.D. 3266
3 034m
0·7 1·75 0·6
3 258m
0·66 1·20 0·6
T.D. 2926
Ro = 0·9
T.D. 2438
1 260·9m
0·36 3·55 11
Ro = 0·55
1 679m
T.D. 1801
0·35 2·40 14
GEOCHEMICAL DATA
Ro T.O.C. H/O
<0·5 0-1% <2·5 GAS PRONE
1-2%
>0·5 2-3% >5 OIL PRONE
>3%
(after Nicholas et al 1981)
>40
30 - 40
20 - 30
10 - 20
<10
% NET SAND / GROSS INTERVAL
Ro = 1·1 (after Kantsler et al 1978)
0
200
400
Vertical Scale in metres
Palynological Zones
N. asperus
P. asperopolus
M. diversus
L. balmei
T. longus
PETRECON AUSTRALIA PTY LTD
BASS BASIN
(BASS STRAIT OIL & GAS)
82/1
SW - NE CROSS SECTION
PLATE VI
COMPILED J.K.D.
DRAWN M.R.D.
DATE 26-2-82
176022
OR-0168


NW
SE
Konkon - 1
Cormorant - 1
Poonboon - 1
Durroon - 1
Ro = 0·345
Ro = 0·4
1 500m
REC. 22lit. OIL
1 509·1m
0·4
10·1
0·6
2 007m
REC.1lit. COND.
Ro = 0·58
2 345m
REC. 45lit. COND.
Ro = 1·05
T.D.2998
Ro = 0·48
PRESSURE INCREASE
3 034m
0·7
1·75
0·6
3 185m
REC. 14cu.ft. GAS
3 258m
0·66
1·20
0·6
T.D.3266
Ro = 0·38
T.D. 3024
(2620m)Ro = 0·53
GEOCHEMICAL DATA
Ro
T.O.C.
H/O
<0·5
0-1%
<2·5 GAS PRONE
1-2%
>0·5
2-3%
>3%
>5 OIL PRONE
(after Nicholas et al 1981)
>40
30-40
20-30
10-20
< 10
% NET SAND / GROSS INTERVAL
Ro = 1·1 (after Kantsler et al 1978)
Vertical Scale Metres
0
200
400
Palynological Zones
N. asperus
P. asperopolus
M. diversus
L. balmei
T. longus
T. lilliei
PETRECON AUSTRALIA PTY LTD
176023
BASS BASIN
(BASS STRAIT OIL & GAS)
82/2
NW - SE CROSS SECTION
PLATE VII



PETRECON AUSTRALIA PTY LTD

BASS BASIN
(BASS STRAIT OIL & GAS)

T18P LEAD 1

STRUCTURE BASE TERTARY

GB	
DRAWN	MRD
DATE	8-4-82
SCALE	1 100 000

PLATE VIII OR-0168

176024

PLATE VIII

8

PETRECON AUSTRALIA PTY LTD

BASS BASIN (BASS STRAIT OIL & GAS)	82/8
T18P LEAD 1	COMPILED K.M.
	DRAWN M.R.D.
	DATE 10-3-'82
LINE BBS 81-12	SCALE 1:12 500
	FIGURE

176025

PLATE IX

OR-0168

PLATE IX

9