DEPT. NAT. RES & ENV
PE902416

BARTON CORNER NO. 1 WELL COMPLETION REPORT

By: Beach Petroleum N.L.
B.L. Rayner

September, 1985

TEXT

Well Completion Report (Text)
Barton Corner
(W901)

BEACH PETROLEUM N.L.

(Incorporated in South Australia)

W901

11 SEP 1985

OIL and GAS DIVISION

BEACH PETROLEUM NO LIABILITY

BARTON CORNER NO. 1 PEP 104

WELL COMPLETION REPORT

MISSING VELOCITY SURVEY ?

BY:

B.L. RAYNER,

SEPTEMBER 1985.

CONTENTS

FIGURES

Page No.

TABLE

APPENDICES

ENCLOSURES

SUMMARY

Barton Corner No. 1 was drilled as a wildcat exploration well in PEP 104, central Otway Basin, Victoria, approximately 24 km east of Warrnambool.

The prospect was a seismically defined nose cut by transverse faults. The principle target horizon was the Waarre Formation sandstone. Secondary targets were the intra-Paaratte Formation sands and the Pebble Point Formation.

Participants in the well were Beach Petroleum N.L. (Operator), Gas and Fuel Exploration N.L. and Bridge Oil Ltd. (subject to farmin obligations).

Drilling commenced on the 5th April 1985 and reached a total depth of 2100 m (K.B.) on the 17th April 1985.

The primary objective proved to be tight and water saturated. The secondary objectives appear to have good porosity but were also water saturated.

Hydrocarbon shows were encountered within the Eumeralla Formation. DST #1 over the most promising zone recovered 120 m of drilling mud.

Prior to abandonment one wireline logging run comprising the DLL/MSFL, LDL/CNL, BHC and a WSS, was completed.

Barton Corner No. 1 was plugged and abandoned as a dry hole on the 20th April 1985.

1. INTRODUCTION

The Barton Corner prospect was identified by interpretation of the OB84A Mepunga Seismic Survey and confirmed by the OB85A Mepunga Detail Seismic Survey.

The structure is part of a prominent NE-SW trending nose with limited NE dip. Substantial closure is dependant on an E-W trending down-to-basin fault.

Geologically the prospect is sited on the Rowans Platform, the northwestern extension of the Port Campbell Embayment, which contains the Paaratte gas fields. Hydrocarbon was postulated to have migrated from deeper parts of the Eumeralla Formation up onto the platform via a number of prominent down-to-basin faults.

The nature of reservoir and seal rocks was largely based on Rowans No. 1, drilled 4 km to the SE by Shell Development Australia in 1972. Reference was also made to the various Victorian Department of Minerals and Energy water bores in the area, in particular Mepunga -12 drilled 5 km to the west.

Hence the well was designed as a test of the basal Upper Cretaceous Waarre Formation sandstone. Secondary targets were the Upper Cretaceous Nullawarre Greensand Member of the Paaratte Formation and the basal Teritary Pebble Point Formation.

2. WELL HISTORY

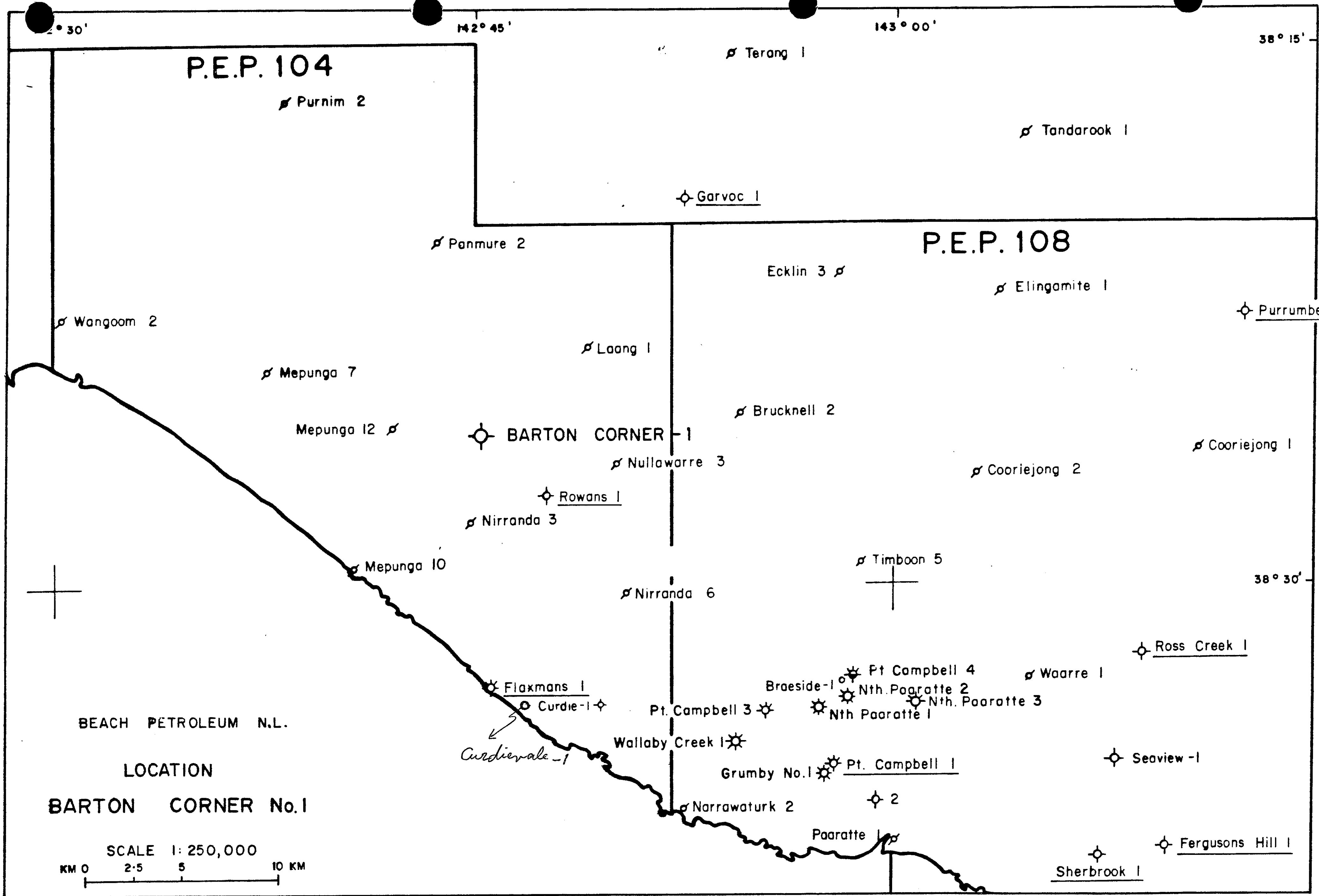
2.1 Location (See Figure 1)

Co-ordinates:	Latitude 38° 25' 52.357" S Longitude 142° 45' 18.351" E
Geophysical Control:	Line MD107 Shot Point 165 Beach Petroleum N.L. OB85A Mepunga Detail Seismic Survey.
Real Property Description:	Parish of Nullawarre Shire of Warrnambool County of Heytesbury
Property Owner:	A.J. Abrahams
District:	Mortlake Sheet 7421, 1:100,000 Scale.

2.2 General Data (See Figure 2)

Well Name & Number:	Barton Corner No. 1
Tenement:	P.E.P. 104
Operator:	Beach Petroleum N.L., 685 Burke Road, Camberwell, Vic., 3124.
Participants:	Beach Petroleum N.L. Gas and Fuel Exploration N.L., 171 Flinders Street, Melbourne, Vic., 3000. Bridge Oil Limited, 60 Margaret Street, Sydney, N.S.W., 2000.

Cont'd.



DRG No.: OT 3293

FIG 1. REGIONAL LOCATION MAP

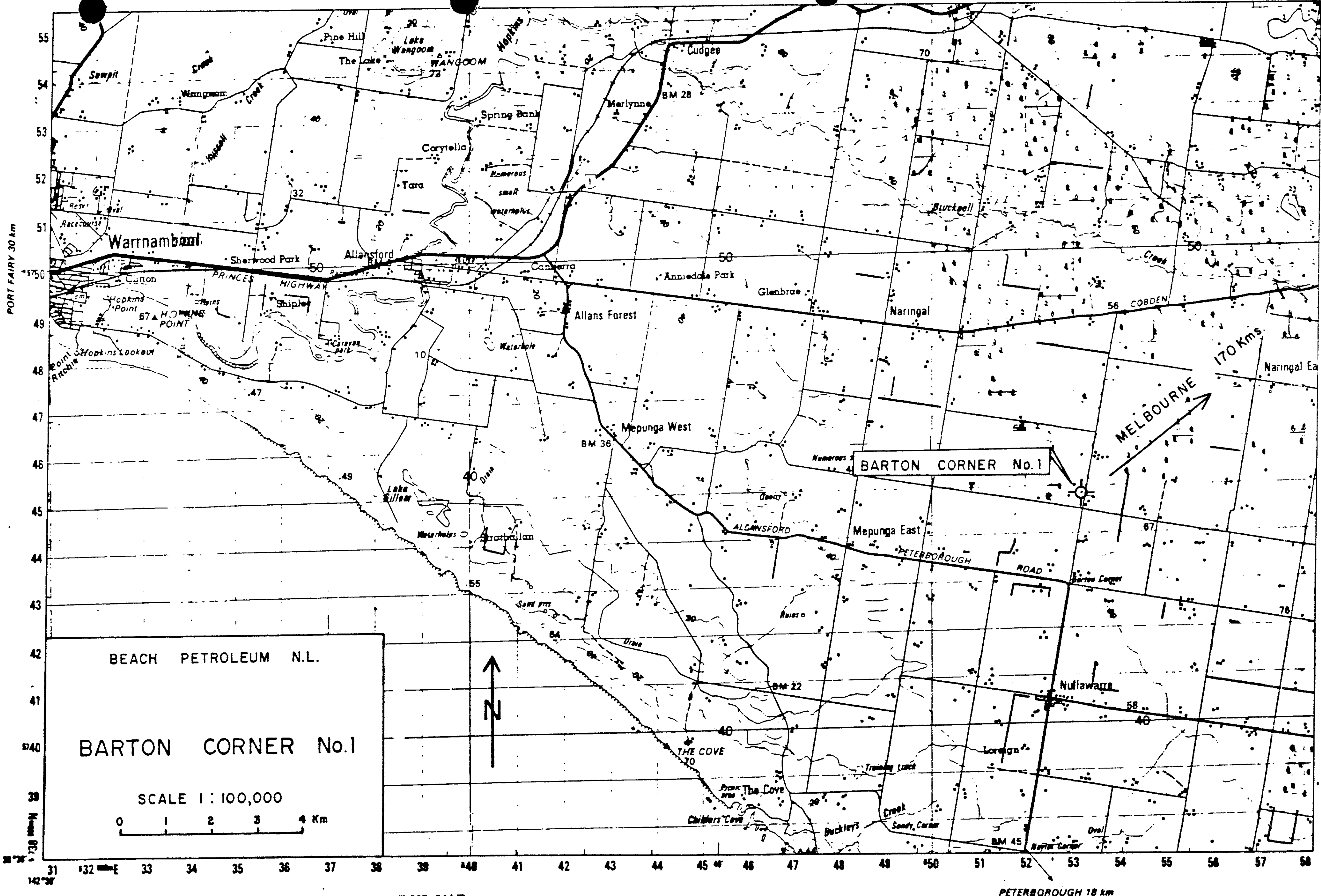


FIG 2. DETAILED LOCATION MAP

2.2 General Data (Cont'd.)

Elevation: Ground Level 57.68 m
Kelly Bushing 63.08 m
(Unless otherwise stated, all depths refer to K.B.)

Total Depth: Driller 2100.0 m
Wireline Logger 2094.4 m

Date Drilling Commenced: 5th April 1985 @ 08:15 hrs

Date Total Depth Reached: 17th April 1985 @ 15:00 hrs

Date Rig Released: 20th April 1985 @ 15:30 hrs

Drilling Time to Total Depth: 12 days

Status: Plugged and abandoned.

2.3 Drilling Data (See also Appendix 1 and 2)

2.3.1 Drilling Contractor

Petroleum Drilling Services (Australia) Pty. Ltd.,
5 Westcombe Street,
DARRA, QLD., 4076.

2.3.2 Drilling Rig

P.D.S.A. Rig 2 Superior 700E

2.3.3 Casing and Cementing Details

Conductor

A 20" conductor pipe was set at 11 m K.B.

Cont'd.

2.2.3 Casing and Cementing Details (Cont'd.)

Surface Casing

Size:	9 5/8"
Weight:	36 lb/ft
Grade:	J-55
Connection:	BTC
Centralizer:	At 275 m, 284 m, 293 m
Float Collar:	289.4 m
Shoe:	302.4 m
Cement:	320 sacks Class A Neat. 80 sacks Class A with 2% $CaCl_2$. 53 sacks Class A with 4% $CaCl_2$.
Cemented to:	Surface
Method:	Dual (Top & Bottom) plug displacement.
Equipment:	Dowell Schlumberger truck mounted unit.

Cement Plugs

. Plug No. 1

Interval: 1690 - 1620 m
Cement: 98 sacks Class A Neat.
Method: Balanced
Tested: No

. Plug No. 2

Interval: 1020 - 950 m
Cement: 100 sacks Class A Neat.
Method: Balanced
Tested: No

Cont'd.

2.3.3 Casing and Cementing Details (Cont'd.)

Cement Plugs (Cont'd.)

- Plug No. 3

  Interval: 310 - 230 m

  Cement: 125 sacks Class A plus 2% $CaCl_2$

  Method: Balanced

  Tested: Tagged at 230 m to 5000 kg weight.

2.3.4 Drilling Fluid (See Appendix 3 for details)

- 12¼" Hole, 5.4 m to 305 m

  The well was spudded using a fresh water/gel mud system, with a viscosity of 34 seconds.

- 8½" Hole, 305 m to 2100 m

  The 8½" hole section of the well was drilled using a KCL-Polymer mud system.

  Throughout the Gellibrand and Narrawaturk Marls, KCL was maintained in the 7 to 8% range and viscosity was held at approximately 30 seconds. Throughout most of the Wangerrip Group, fast rates of penetration necessitated raising the viscosity to approximately 34 to 36 seconds, so that the hole could be properly cleaned.

Cont'd.

2.3.4 Drilling Fluid (Cont'd.)

- 8½" Hole, 305 m to 2100m (Cont'd.)

  Once into the Sherbrook Group the mud properties were kept fairly constant at:

Weight:	9.5 - 9.7 p.p.g.
Viscosity:	36 - 38 sec/qt
Filtrate:	7.0 - 8.5 ml
KCL:	6 - 9%

  Tight hole conditions which required reaming were encountered while:

  - tripping in to 1006 m T.D. over the zone 905 to 917 m.
  - tripping in to 1302 m T.D. over the zone 1109 to 1137 m.
  - tripping in to 1697 m T.D. over the zone 1671 to 1697 m.

  Tight hole conditions below 1950 m also hampered the last few logging runs prior to abandonment.

2.3.5 Water Supply

Fresh water was obtained from a bore drilled by Beach Petroleum adjacent to the well.

Cont'd.

2.4 Formation Sampling and Testing

2.4.1 Cuttings

Cuttings samples were collected at 10 metre intervals to 300 metres and at 5 metre intervals from 300 metres to T.D. Each sample was washed, oven dried, divided into 5 splits and stored in labelled polythene bags. Four complete sample sets were distributed as follows; one each for Beach Petroleum N.L., Gas and Fuel Exploration N.L., Bridge Oil Ltd., and the Victorian Department of Minerals and Energy. One spare set was retained by Beach Petroleum N.L..

In addition, every 10 metres from 300 metres to T.D. an unwashed cuttings sample was collected, stored in a labelled calico bag and allowed to dry in the sun. This set of samples has been retained by Beach Petroleum for possible further analysis.

2.4.2 Cores

(i) No conventional coring operations were performed.

(ii) Twenty-five sidewall cores were attempted prior to plugging and abandoning the well. Twenty-four were recovered, one was left in the hole. Listed below are the depths and recovery of the sidewall cores. (See Appendix 4 for descriptions.)

Cont'd.

2.4.2 Cores (Cont'd.)

SWC No.	Depth (m)	Recovery (mm)
1 V	2050.0	23
2	1990.0	Nil
3 V	1924.5	37
4 V	1893.0	40
5 P	1890.0	15
6	1880.0	33
7 V A	1835.0	27
8	1780.5	20
9	1725.0	43
10 V A	1700.0	24
11 V	1683.0	10
12 PA	1674.0	50
13 VP	1633.5	50
14 V	1585.0	28
15 V	1562.5	40
16	1478.0	30
17	1426.5	30
18	1392.0	40
19	1389.0	48
20	1386.5	48
21	1173.0	40
22	1170.0	24
23	1006.0	50
24	1004.0	50
25	988.0	47

Note: V Vitrinite Reflectance Data Available, see Appendix 8

P Petrological Data Available, see Appendix 9

A Age Dating and Thermal Alteration Data Available, see Appendix 7.

Cont'd.

2.4.3 Tests

One drill stem test was performed.

Drill Stem Test No. 1

Interval Tested:	1875.6 m - 1900.5 m
Formation Tested:	Eumeralla
Packer Set At:	1875.6 m
Preflow:	15 minutes, no blow.
Initial Shut-in:	31 minutes.
Second Flow:	60 minutes, very weak air blow which could not be observed after 15 minutes.
Final Shut-in:	64 minutes.
Pressure: (Bottom guage at 1898.5 m)	Initial Hydrostatic 3296 psi. The MFE valve was plugged with mud and formation cuttings such that flowing and shut-in pressures could not be determined.
Recovery:	120 m drilling mud.
Assessment:	The Eumeralla Formation is water wet and has a low permeability.

2.5 Logging and Surveys (See Enclosure 1)

2.5.1 Mud Logging

A standard skid-mounted Exlog unit was used to provide penetration rate, continuous mud gas monitoring, intermittent mud and cuttings gas analysis, pump rate and mud volume data. The Masterlog is included as Enclosure 2.

Cont'd.

2.5.2 Wireline Logging

Wireline logging was performed by Schlumberger Seaco Inc. using a Cyber Service Unit. One run was performed and details are listed below. An analysis of these logs is included as Appendix 6.

Dual Laterolog (DLL/SP/Cal/GR)	302 - 2094 m
Micro-spherically focused log (MSFL)	995 - 2094 m
Sonic Log (LSS/GR)	302 - 2053 m
Natural Gamma Ray Spectroscopy Log (NGT)	775 - 2053 m
Litho-density/ Compensated Neutron Log (LDL/CNL/GR)	980 - 1720 m, 1855 - 2015 m

These logs are included as Enclosure 3.

2.5.3 Deviation Surveys

A Totco double recorder was used to measure hole deviation, the results of which are listed below:

Cont'd.

2.5.3 Deviation Surveys (Cont'd.)

Depth (m)	Deviation (°)	Depth (m)	Deviation (°)
38	½	1006	½
69	½	1197	½
107	½	1300	3/4
199	½	1471	3/4
303	½	1664	½
502	½	1899	1
671	2	2097	1¼
927	1		

2.5.4 Velocity Survey

A velocity survey was carried out by Schlumberger Seaco Inc., the result of which is included as Appendix 5.

3. RESULTS OF DRILLING

3.1 Stratigraphy

The following stratigraphic intervals have been delineated using penetration rate, cuttings analysis and wireline log interpretation. All formations were present as predicted, although some formation tops were marginally deeper than prognosed (see also Figure 3 and Figure 4).

Group	Formation	Depth (K.B.)	Depth (Subsea)	Thickness
Heytesbury	Port Campbell Limestone	Surface	+57.6	280.0
	Gellibrand Marl	280.0	-217.0	352.0
	Clifton	632.0	-569.0	25.0
Nirranda	Narrawuturk Marl	657.0	-594.0	54.0
	Mepunga	711.0	-648.0	66.0
Wangerrip	Dilwyn	777.0	-714.0	181.0
	Pember Member	958.0	-895.0	44.0
	Pebble Point	1002.0	-939.0	32.5
Sherbrook	Paaratte	1034.5	-971.5	247.5
	Skull Creek Member	1282.0	-1219.0	100.0
	Nullawarre Greensand Member	1382.0	-1319.0	175.5
	Belfast	1557.5	-1494.5	39.5
	Flaxmans	1597.0	-1534.0	75.0
	Waarre	1672.0	-1609.0	25.0
Otway	Eumeralla	1697.0	-1634.0	+403.0
	T.D.	2100.0	-2037.0	

Cont'd.

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BARTON CORNER No.1

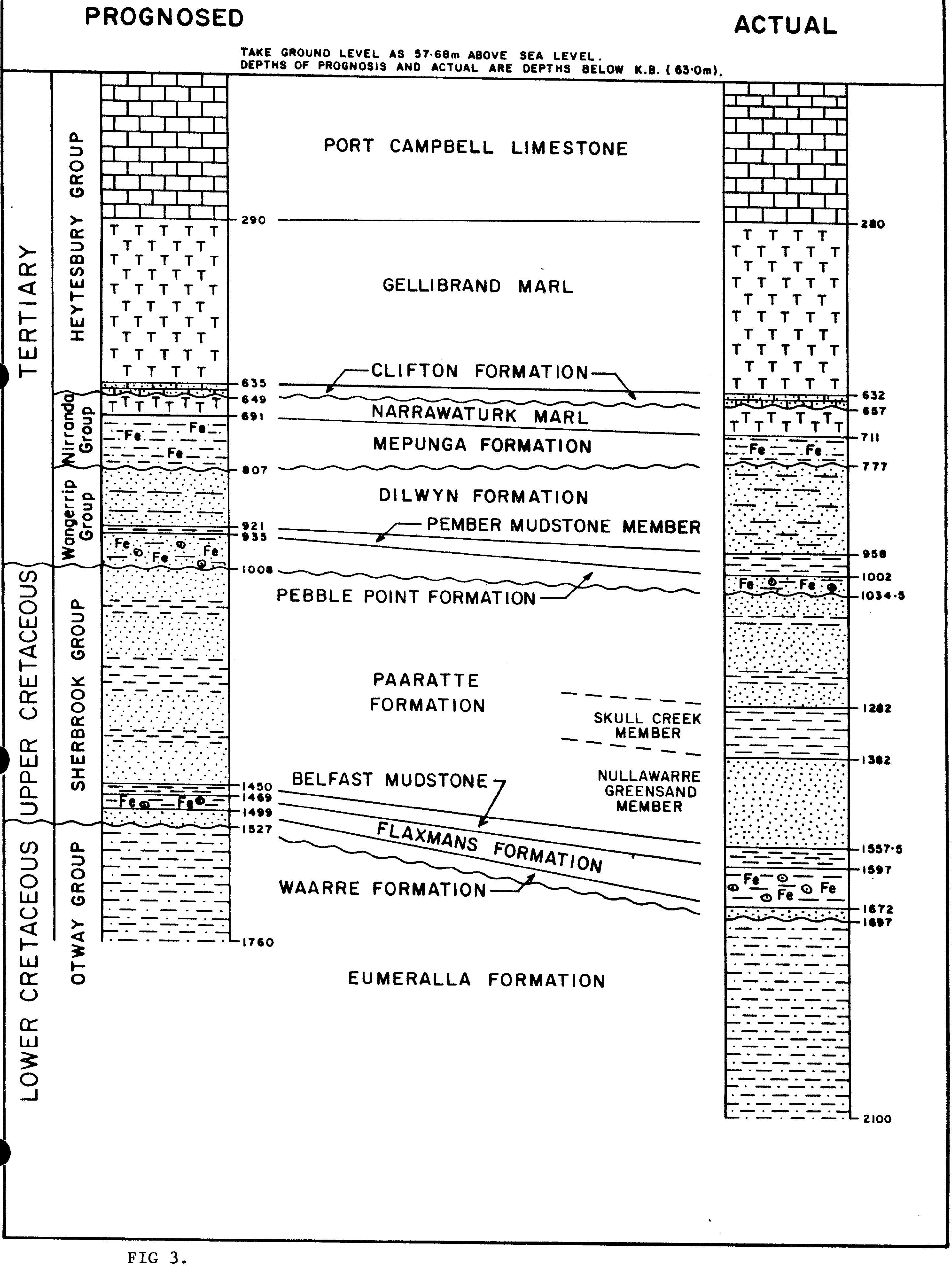


FIG 3.

BEACH PETROLEUM N.L.

OTWAY BASIN STRATIGRAPHIC TABLE

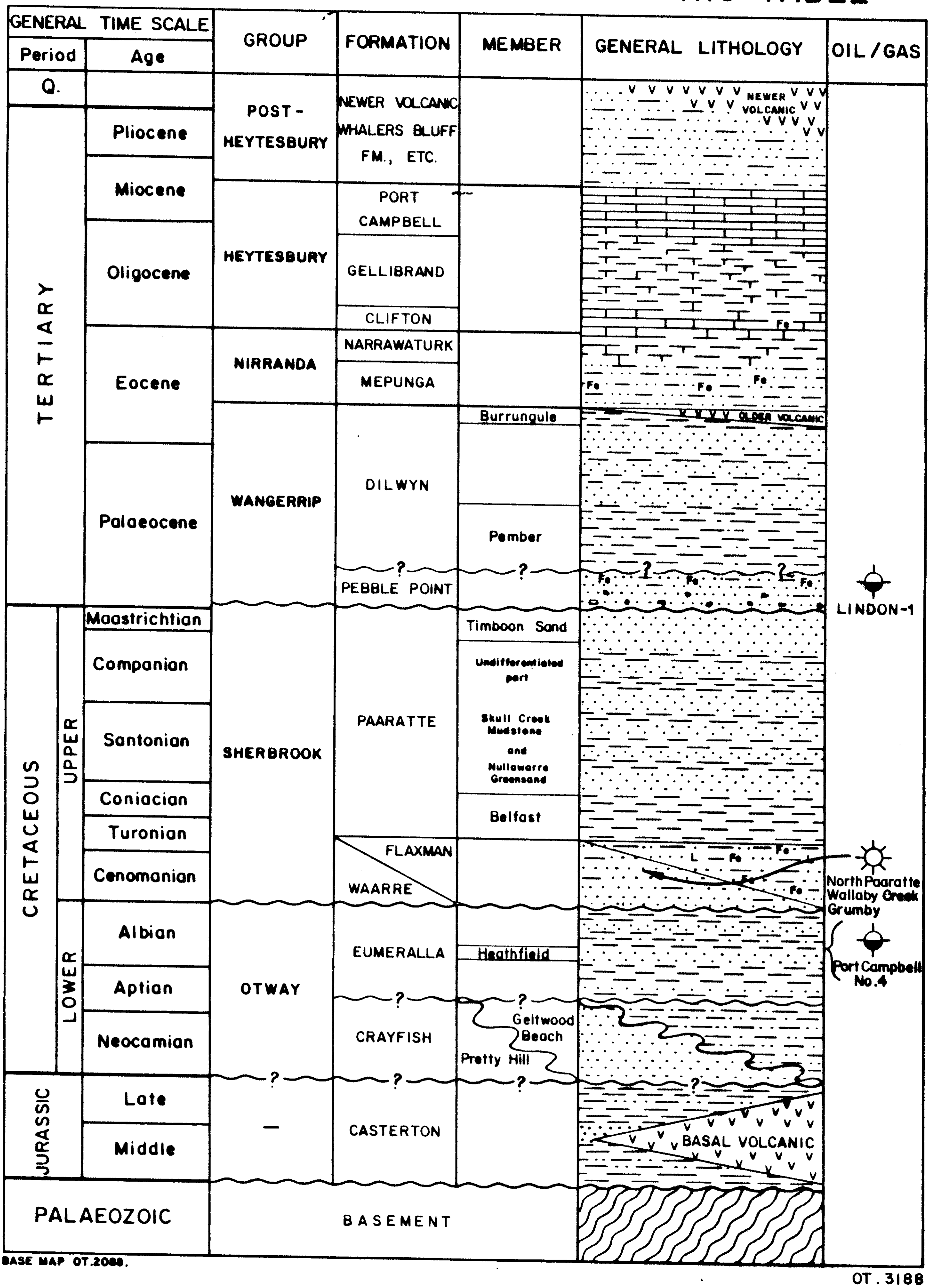


FIG 4.

3.2 Lithological Descriptions

HEYTESBURY GROUP (surface - 657 m)

Port Campbell Formation	Surface to 280 m CALCARENITE, light to medium grey, light grey - brown in part, dominantly firm, grading to hard at base, very fine to medium, grades to very fine to fine, common to abundant argillaceous matrix, occasionally iron oxide stained, very fossiliferous; bryozoa, echinoid spines, forams, shell fragments, rare clear, loose, medium grained, quartz, trace glauconite, trace black to dark brown lithics. Interbedded with minor MARL, medium grey, very soft, sticky, dispersive.
Gellibrand Marl	280 to 632 m MARL, light to medium grey, dominantly medium grey, occasionally light to medium green-grey, soft to very soft, sticky, dispersive, fossiliferous, common forams, shell fragments, echinoid spines, sponge spicules, trace coal detritus towards the base.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

HEYTESBURY GROUP (CONT'D.)

Clifton Formation	632 to 657 m CALCARENITE, light orange to medium - dark brown, friable to firm, medium to very coarse, dominantly coarse, common to abundant, iron oxide stained quartz, fine to very coarse, subangular to rounded, dominantly rounded, poorly sorted, iron carbonate matrix, common fossil fragments, occasionally iron oxide replaced, common ferrugenous pellets, very coarse, subrounded to rounded.

NIRRANDA GROUP (657 - 777 m)

Narrawaturk Marl	657 to 711 m MARL, light to medium grey green, dark brown in part, very soft to firm, sticky, fossiliferous, common forams, shell fragments, trace bryozoa, echinoid spines, trace pyrite, trace - rare black lithics, trace to rare, clear to translucent quartz, medium to coarse grained, subrounded to rounded, iron stained in part.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

NIRRANDA GROUP (CONT'D.)

Mepunga Formation

711 to 777 m

SANDSTONE, light to medium grey brown, clear to translucent in part, loose to friable, very fine to coarse, dominantly fine to medium grained, subangular to subrounded, dominantly subrounded, poorly sorted, abundant argillaceous matrix, medium to dark grey, silty in part, common iron oxide stain, poor visual porosity. Interbedded with CLAYSTONE, which becomes the dominant lithology at the base, medium to dark green grey, firm, blocky, dispersive in part, grades to silt, trace fine lithics, trace fine carbonaceous detritus, trace pyrite.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

WANGERRIP GROUP (777 - 1034.5 m)

Dilwyn Formation 777 to 958 m

From 777 to 848 m, SANDSTONE, clear to light brown, orange brown in part, loose, very fine to very coarse, dominantly medium to coarse, subangular to subrounded, poorly sorted, abundant light to medium grey argillaceous matrix, very dispersive, trace siliceous cement. Poor visual porosity. Interbedded with minor CLAYSTONE, light olive grey to medium dark brown, very soft, extremely dispersive, very finely micaceous, silty in part, trace fine lithics, trace pyrite, trace carbonaceous detritus.

From 848 to 958 m Interbedded SANDSTONE and CLAYSTONE. SANDSTONE, light grey, clear in part, friable to loose, very fine to coarse, dominantly fine grained, subangular to subrounded, poorly sorted, abundant light to medium grey argillaceous matrix, very dispersive, trace siliceous cement. Poor visual porosity.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

WANGERRIP GROUP (CONT'D.)

Dilwyn Formation (Cont'd.)	CLAYSTONE, medium to dark grey brown, very soft, dispersive, sticky, trace pyrite, trace mica, trace to common carbonaceous detritus.
Pember Mudstone Member	958 to 1002 m CLAYSTONE, medium to dark brown, grey brown in part medium green grey in part. Very soft to soft, dispersive, sticky, trace carbonaceous detritus, trace pyrite, common clear to light brown quartz grains, medium to coarse, dominantly medium grained, subrounded poor to moderate sorting.
Pebble Point Formation	1002 to 1034.5 m SANDSTONE, clear to light brown orange, loose, very fine to coarse, dominantly medium grained, subangular to subrounded, moderate sorting, common iron oxide staining, common to abundant argillaceous and silty matrix, light grey, soft dispersive, rare siliceous cement, trace pyrite.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

WANGERRIP GROUP (CONT'D.)

Pebble Point Formation (Cont'd.)	Grades to CLAYSTONE at base, light to medium grey, greenish grey in part, soft, dispersive in part, trace carbonaceous detritus.

SHERBROOK GROUP (1034.5 to 1697 m)

Paaratte Formation	1034.5 to 1282 m SANDSTONE, clear, loose, very fine to very coarse, dominantly medium to coarse grained, angular to subrounded, dominantly subangular, poor to moderate sorted, common argillaceous matrix, trace siliceous cement, trace calcareous cement, trace pyrite, trace medium to dark grey lithics, trace angular medium grey cherty lithics, rare to good trace carbonaceous detritus, rare dolomite. Fair to good visual porosity. Interbedded with CLAYSTONE, medium grey to medium brown grey, very soft to firm, dominantly soft, dispersive in part, sticky, trace to common carbonaceous detritus, trace pyrite, occasionally silty.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

SHERBROOK GROUP (CONT'D.)

Skull Creek Member	1282 to 1382 m CLAYSTONE, light to medium grey green, medium to dark grey in part, firm, soft in part, dispersive in part, occasionally very silty, common pyrite, trace dolomite, trace carbonaceous detritus, rare to common quartz grains, very fine to fine grained. Interbedded with minor SANDSTONE, clear to light grey, loose, very fine to fine grained, subangular to subrounded, dominantly subangular, moderate sorting, trace to common argillaceous matrix, siliceous cement in part, calcareous cement in part, trace black lithics, trace pyrite. Poor to fair visual porosity.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

SHERBROOK GROUP (CONT'D.)

Nullawarre Greensand Member	1382 to 1557.5 m	SANDSTONE, light to medium grey green, occasionally light yellow green, rare pale blue, loose to friable, very fine to very coarse, dominantly medium grained, subangular to subrounded, dominantly subrounded, moderate to well sorted, abundant argillaceous matrix, dolomitic in part, glauconitic in part, abundant to common glauconite, trade cherty lithics, trace pyrite. Fair to good visual porosity. Interbedded with very minor CLAYSTONE, light to medium grey, soft, dispersive, calcareous in part.
Belfast Member	1557.5 to 1597 m	CLAYSTONE, medium to dark greenish grey - brown, dark greenish grey in part, soft to firm, very dispersive, carbonaceous, slightly calcareous in part, common glauconite, trace to common quartz lithics, trace micromicaceous.

Cont'd.

3.2 Lithological Description (Cont'd.)

SHERBROOK GROUP (CONT'D.)

Flaxmans Formation	1597 to 1672 m

From 1597 to 1638 SANDY CLAYSTONE, dark green to black, dark greenish brown in part, soft, subfissile in part, very dispersive, micromicaceous in part, common to abundant, light yellow brown, clear, milky, green, medium to very coarse grained quartz grains, rounded, poorly sorted, common iron oxide pellets, trace to common iron oxide staining, common glauconite, moderately carbonaceous.

From 1638 to 1672 m CLAYSTONE, medium to dark greenish brown, medium to dark greenish grey in part, soft, subfissile in part, very dispersive, micromicaceous in part, carbonaceous. Grading to SILTSTONE at base, medium to light grey, mottled in part, firm, soft in part, common multicoloured lithics, common loose quartz and glauconite, common pyrite, good trace carbonaceous detritus.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

SHERBROOK GROUP (CONT'D.)

Waarre Formation

1672 to 1697 m

From 1672 to 1682 SANDSTONE, clear to light grey, light brown in part, soft to friable, very fine to fine, dominantly fine grained, angular to subrounded, dominantly subrounded, moderate sorting, argillaceous light grey matrix, dispersive, slightly calcareous, common carbonaceous laminations, trace mica. Poor visual porosity.

From 1682 to 1697 SANDSTONE clear to light grey, soft to friable, fine to very coarse, dominantly coarse grained, angular to subrounded, dominantly subangular, poorly sorted, good calcite cement, siliceous in part, kaolinitic in part, common black and green lithics, trace pyrite. Poor to fair visual porosity. Grading to CLAYSTONE at base, light orange - light brown, hard, subfissile, common carbonaceous detritus common white lithics, trace pyrite, trace to common vein quartz.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

OTWAY GROUP (1697 to 2100 m)

Eumeralla Formation	From 1697 to 1878 m Interbedded SANDSTONE, SILTSTONE and CLAYSTONE. SANDSTONE, clear to light greenish grey, friable to hard, very fine to fine grained, subangular to subrounded, dominantly subangular, moderate sorting, common to abundant argillaceous matrix, dispersive in part, trace to common calcite cement, siliceous in part, common multicoloured lithics, common feldspar lithics, common carbonaceous detritus. Very poor to fair visual porosity, dominantly poor visual porosity. SILTSTONE, medium to dark greenish grey, medium bluish green in part, soft to firm, blocky in part, dispersive in part, subfissile in part, very finely carbonaceous, occasional carbonaceous streaks, slightly calcareous, common multicoloured lithics.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

OTWAY GROUP (CONT'D.)

Eumeralla Formation (Cont'd.) CLAYSTONE, light to medium greenish grey, dark brownish grey in part, firm to soft, subfissile in part, slightly calcareous, trace carbonaceous detritus, trace carbonaceous streaks, trace pyrite.

From 1878 to 1894 m. SANDSTONE, medium to dark greenish grey, friable to firm, very fine to fine, dominantly fine grained, angular to subangular, dominantly subangular, moderate sorting, argillaceous matrix, very dispersive, siliceous in part, calcareous in part, common feldspar lithics, trace to common carbonaceous detritus. Poor to fair visual porosity. Interbedded with minor CLAYSTONE, light to medium grey, medium greenish grey in part, soft to firm, dispersive in part, subfissile in part, slightly calcareous, trace carbonaceous detritus, trace pyrite.

Cont'd.

3.2 Lithological Descriptions (Cont'd.)

OTWAY GROUP (CONT'D.)

Eumeralla Formation (Cont'd.) From 1894 - 2100 m Interbedded CLAYSTONE, SILTSTONE and SANDSTONE.

CLAYSTONE, light to medium grey, light to medium grey brown in part, soft to firm, subfissile, traces to common carbonaceous detritus, micromicaceous in part, occasionally silty.

SILTSTONE, light to medium greenish grey, dark grey in part, firm to soft, blocky in part, dispersive in part, ocasionally very finely carbonaceous.

SANDSTONE, light to medium grey, light brown grey in part, soft to friable, firm in part, very fine to medium, dominantly fine grained, angular to subangular, moderate sorting, abundant to common argillaceous matrix, calcite cement in part, siliceous in part, trace feldspar lithics, trace carbonaceous detritus, trace COAL, trace pyrite. Poor visual porosity.

Cont'd.

3.3 Hydrocarbons

3.3.1 Mud Gas Readings

A background gas of nil to 20 ppm C_1 was relatively stable throughout the well until Belfast Mudstone was penetrated at 1557.5 m. From the top of Belfast Mudstone through to the top of the Flaxmans Formation at 1597 m the background gas steadily rose to approximately 200 ppm C_1 with traces of C_2 and C_3. This level of background gas was stable throughout the Flaxmans Formation. The top of the Waarre Formation was penetrated at 1672 m, at which point gas levels rose to a maximum for the well of approximately 1400 ppm C_1, 180 ppm C_2 and 45 ppm C_3 over the interval 1683 m to 1696 m. The top of the Eumeralla Formation was penetrated at 1697 m and, except for some minor sandy units near the top of this formation, the background gas levels steadily dropped to, and stabilised at, 100 ppm C_1, trace C_2, trace C_3 for the remainder of the section penetrated.

Very little coal was penetrated by the bit at Barton Corner No. 1. The only significant example of coal gas was from the Eumeralla Formation at 1707 m, where a thin coal unit gave approximately 200 ppm C_1 above the background level.

3.3.2 Sample Fluorescence

Oil fluorescence was observed in a number of sandstone units within the Eumeralla Formation.

Cont'd.

3.3.2 Sample Fluorescence (Cont'd.)

Cuttings samples from the interval 1878.5 to 1893.5 had between 10% and 70% patchy to even, very dull medium yellowish milky white cut fluorescence. A drill stem test (DST #1, 1873.6 to 1900.5 m) recovered 120 metres of drilling mud (see Section 2.4.3). Three sidewall core samples were taken over this interval, one of which (SWC 5 @ 1890 m) showed some fluorescence (see Appendix 4).

From 1900.5 to 2100 m the Eumeralla Formation sandstones had approximately 10% patchy natural fluorescence, of the same type as noted above.

Oil staining and odour was not associated with these zones of fluorescence, nor any other portion of the well.

There were no significant gas level changes over the zone of fluorescence.

4. GEOLOGY

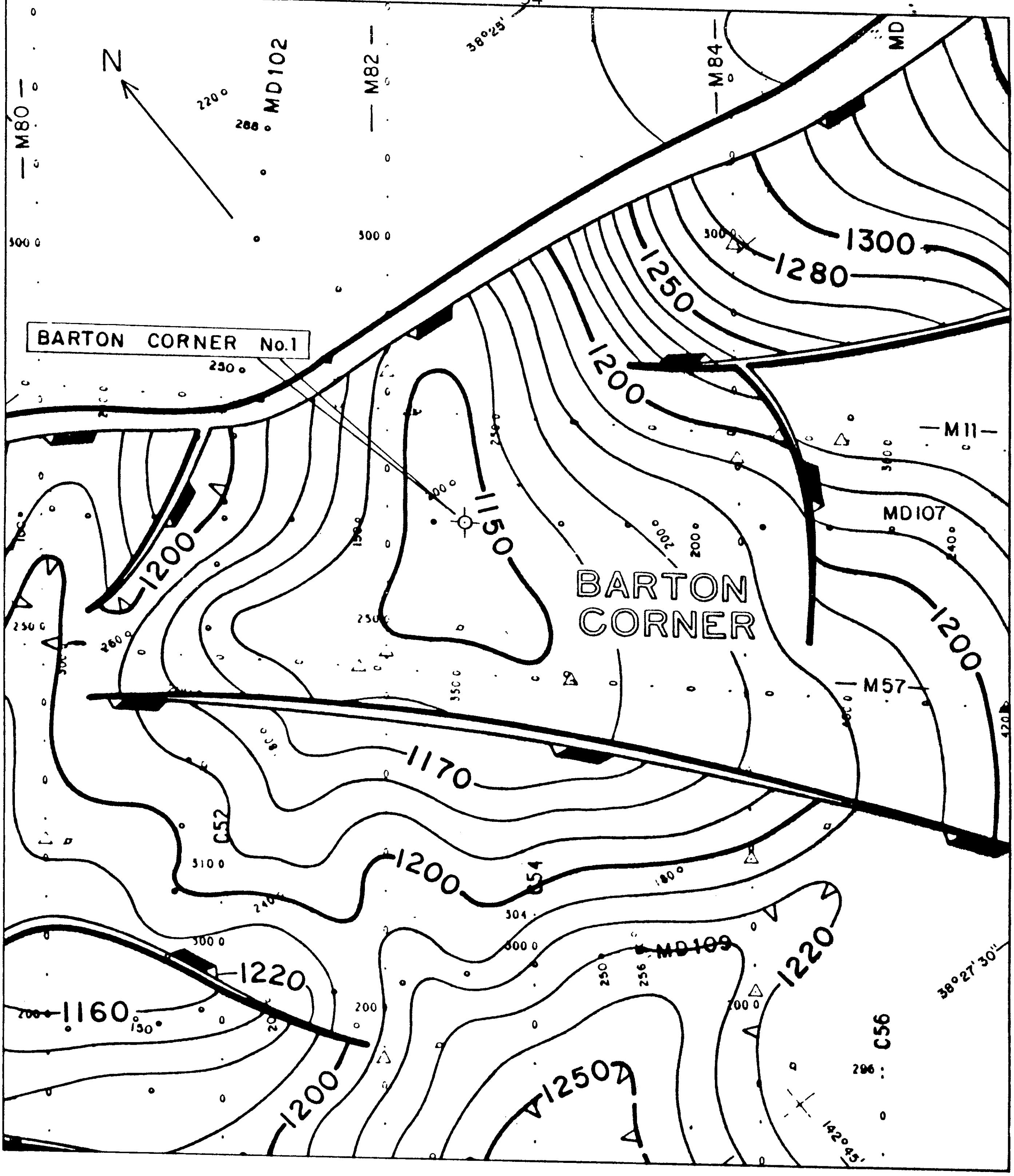
4.1 Barton Corner Structure

The Barton Corner structure was delineated after the OB84A Mepunga Seismic Survey and subsequently refined after the OB85A Mepunga Detail Seismic Survey.

Barton Corner No. 1 was designed as a Waarre Formation test, at which level the structure is part of a prominent SW plunging nose with limited NE dip. The area of closure is 6.03 km^2 with approximately 15 m of turnover and up to 60 m of fault dependant vertical closure. (Figure 5.) At progressively younger levels the structural nose is less prominent but symmetrical such that the high points of the Waarre Formation, the intra-Paaratte and the Pebble Point Formation are coincident. Barton Corner No. 1 was drilled at SP 165, Line MD107 to test the highest points of these formations. (Figure 6.)

Despite the fair to good seismic data quality and the close proximity of Rowans No. 1 to Barton Corner No. 1 there was some discrepancy between the predicted and actual formation tops in this well (Table 1 and Figure 3). At Barton Corner No. 1 the seismic character of the "Top Pebble Point" is unusually weak, and the interpreted "Near Top Pebble Point" horizon was in fact an intra-Dilwyn horizon, some 64 msec or 87 m shallower than the Pebble Point Formation. This means that the Pebble Point Formation had been down faulted against Paaratte Formation sands thereby greatly decreasing the probability of lateral seal to hydrocarbon migration. At Waarre Formation level the top was 115 msec or 177 m deeper than prognosed. The effect of this would be to increase the area of closure and the relief of the structure.

Cont'd.



BEACH PETROLEUM N.L.

NEAR BASE UPPER CRETACEOUS

TIME STRUCTURE MAP

contour interval - 10 msec

SCALE 1 : 25,000

0 1 2 Kms

FIG 5.

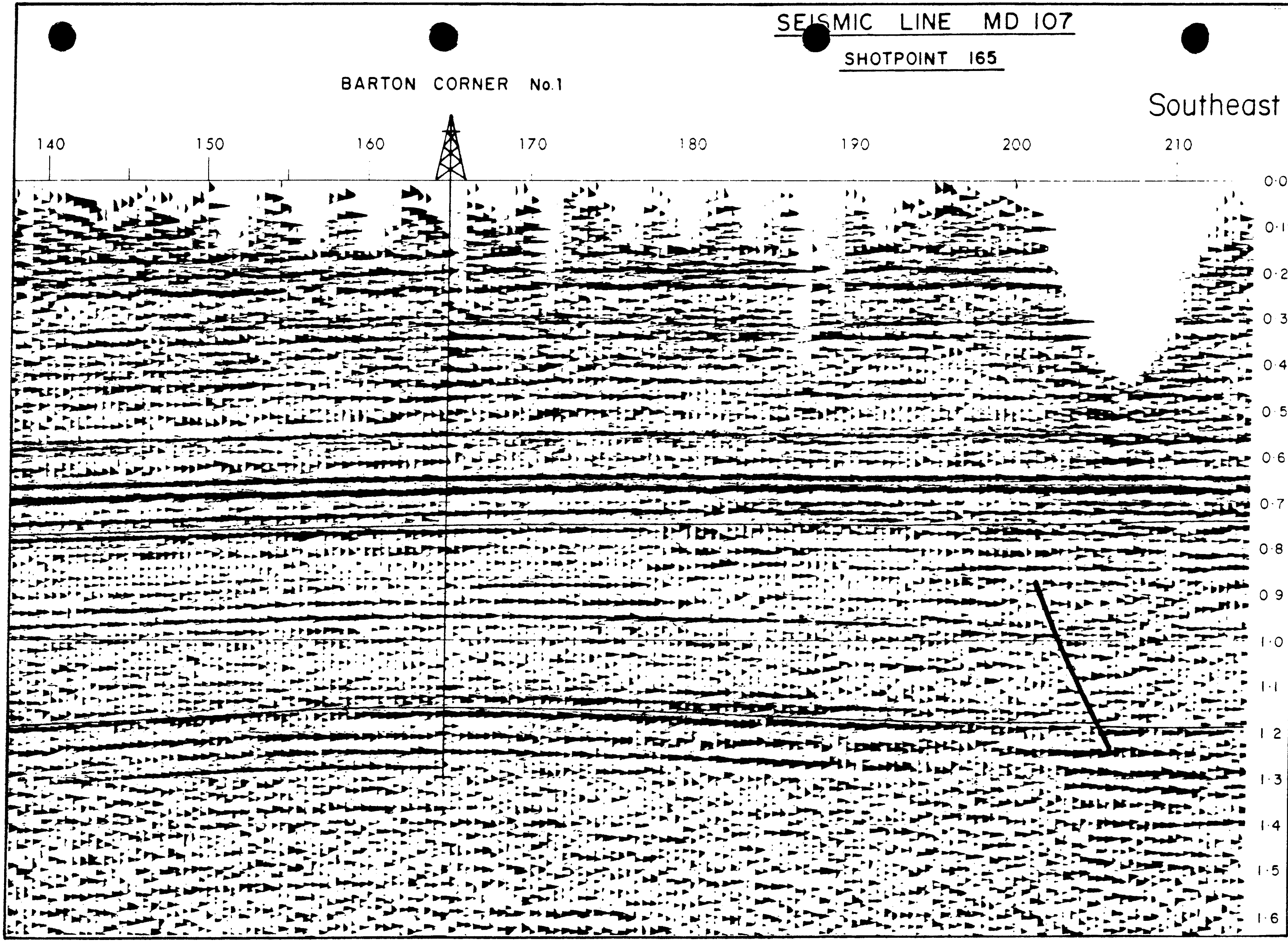

SEISMIC LINE MD 107
SHOTPOINT 165
BARTON CORNER No.1
Southeast
140
150
160
170
180
190
200
210
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1.6

FIG 6.

BARTON CORNER NO. 1 WSS SUMMARY

Seismic TWT (msec)	Prognosed Formation/ Depth(m)	Actual Formation/ Depth(m)
652	Dilwyn/807	Dilwyn/777
752	Pebble Point/935	Intra-Dilwyn/915
816	-	Pebble Point/1002
907	Intra-Paaratte/1150	Intra-Paaratte/1127
1153	Waarre/1499	Intra-Nullawarre/1495
1195	-	Belfast/1557
1268	-	Waarre/1672
1283	-	Eumeralla/1697

TABLE 1: Seismic Events and Formation Tops

4.2 Porosity and Water Saturation

Wireline log evaluation was carried out by a Schlumberger log analysis at the wellsite. Porosity estimates are based on the sonic, density and neutron logs (see Appendix 6).

Pebble Point Formation

The Pebble Point Formation is a relatively argillaceous lithic unit with a minimum clay volume of around 37% at 1004 m. The maximum porosity estimate is between 17 and 20% over the interval 1003.5 to 1005.5 m. The formation is water saturated with salinities in the range 4500 to 6500 ppm. Na Cl equivalent.

Paaratte Formation

The Paaratte Formation consists of interbedded sandstones and shales. The sandstones are relatively clean, generally less than 10% clay volume, and give maximum porosity estimates in the 25 to 30+% range. The formation is water saturated with salinities in the range of 2900 to 3700 ppm. Na Cl equivalent.

Nullawarre Greensand Member

The Nullawarre Greensand Member is dominantly sandstone with only minor clay interbeds. The sands appear to be relatively clean, generally less than 10% clay volume, but lithological analysis indicates the presence of kaolinitic clay. Bearing this in mind, log derived porosity estimates of 25 to 30+% may be too high. There are a number of resistivity anomalies within this member but all appear to be associated with dolomitic cementation. The formation is water saturated with salinities in the range of 2500 to 3500 ppm. Na Cl equivalent.

Cont'd.

4.2 Porosity and Water Saturation (Cont'd.)

Waarre Formation

The Waarre Formation consists of thin sandstone units interbedded with claystone. The sandstones are relatively argillaceous with a clay volume of around 25%. The highest porosity estimate for the Waarre Formation was between 23% and 24%, developed over the interval 1681 m to 1684 m. Elsewhere the porosities were in the 10% to 14% range. The formation is water saturated, with salinities in the 16,000 ppm. Na Cl equivalent range.

Eumeralla Formation

The Eumeralla Formation is a sequence of interbedded sandstones and shales. Fluorescence in cuttings was noted over the interval 1878 m to 1894 m. However no oil saturation could be identified by the wireline logs. The sandstones are generally argillaceous with a clay volume of around 30%. Some units appear to be relatively cleaner, with an estimated 14% clay volume, although such clean sandstones were not seen in the cuttings. Porosities are in the 12 to 22% range at best. Wireline log analysis suggests that the formation is water saturated, with salinities in the range of 10,000 ppm Na Cl equivalent.

4.3 Maturation and Source Rock Analysis

Vitrinite reflectance estimates ($\overline{Rv}$ max) and total organic carb analysis (T.O.C.) were carried out on nine sidewall cores from Barton Corner No. 1. Four of these samples are from the basal Sherbrook Group and the remainder are from the Otway Group (see Figure 7 and Appendix 8).

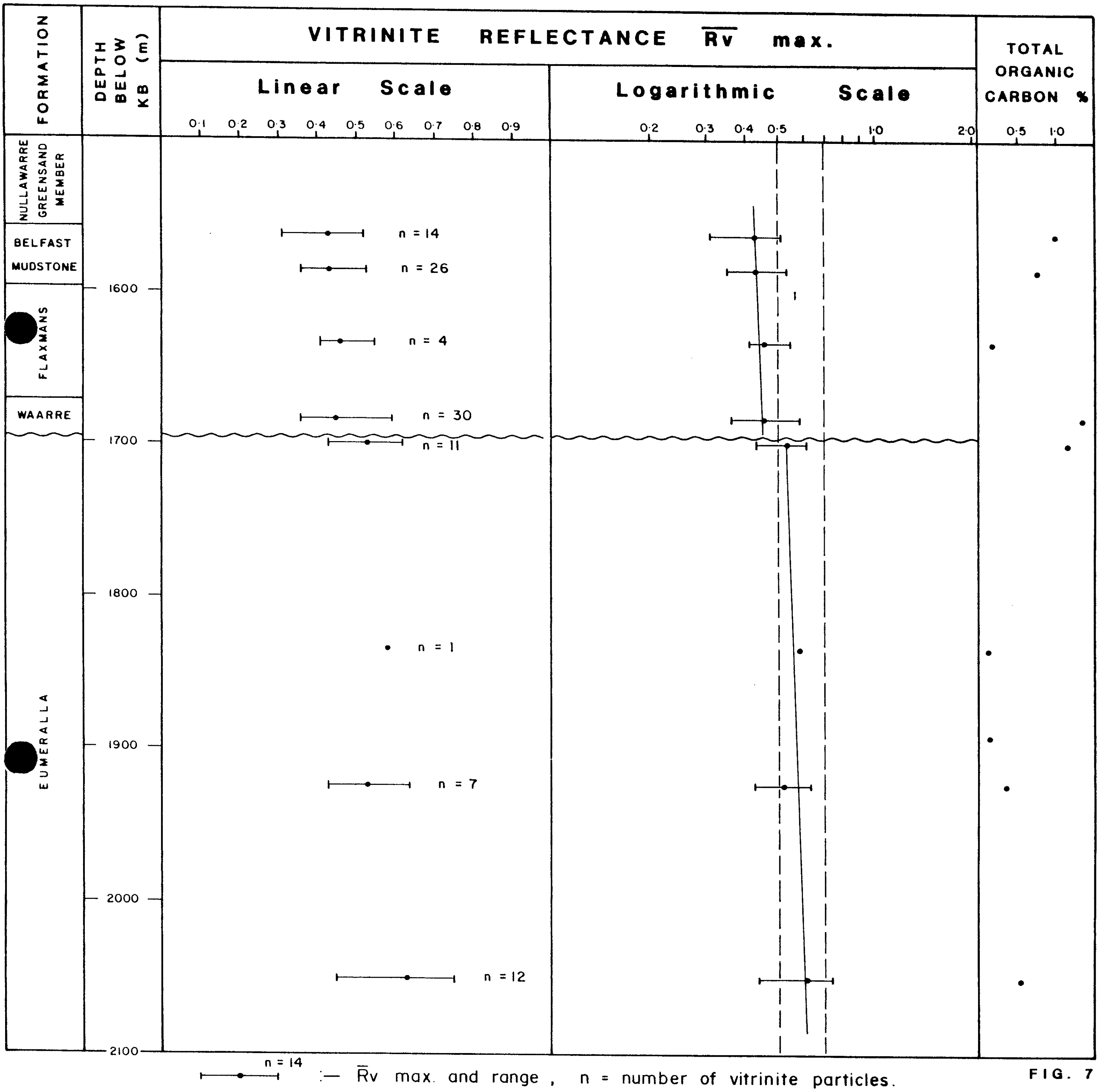
Basal Sherbrook Group

The $\overline{Rv}$ max of the Upper Cretaceous group of samples are between 0.43% and 0.46%, with sample counts generally greater than ten. This suggests that the basal Sherbrook Group at Barton Corner No. 1 is immature and could not be expected to have generated much hydrocarbon.

Cont'd.

BARTON CORNER No1

VITRINITE REFLECTANCE AND TOTAL ORGANIC CARBON PROFILE



n = 14 :— $\overline{R}v$ max. and range , n = number of vitrinite particles.

Samples were all sidewall cores.

FIG. 7

OT 3287

4.3 Maturation and Source Rock Analysis (Cont'd.)

Basal Sherbrook Group (Cont'd.)

The T.O.C. values are in the range 0.2% to 1.33% (0.82% average) which suggests moderate source potential. However all samples showed inertinite as common to abundant with only secondary exinite and vitrinite. Hence at Barton Corner No. 1 the basal Sherbrook Group appears to have poor generative potential.

Otway Group

The $\overline{Rv}$ max of the Eumeralla Formation are between 0.53% to 0.63%. This suggests that the entire sequence of the Eumeralla Formation penetrated by the bit at Barton Corner No. 1 lies within the threshold of peak hydrocarbon generation. The log-normal plot of $\overline{Rv}$ max vs depth (Figure 7) shows that all the Barton Corner No. 1 samples fall on a slope of approximately 0.1% per 400 m, but the curve has been offset to the right at the Waarre/Eumeralla unconformity. Given that the Otway Group portion of the curve is based on four samples with low counts, the plots have been interpreted to suggest that some 400 m of erosion, or a period of non-deposition, has occurred at the top of the Eumeralla Formation. The consistency of the slope suggests that this portion of the Eumeralla Formation has not suffered any thermal event that did not also effect the Sherbrook Group.

The T.O.C. values are in the range 0.12% to 1.17% (0.47% average) which suggests that the Eumeralla Formation at Barton Corner No. 1 is a poor source rock. Exinite is the dominant maceral in these samples, especially towards the base, but overall the maceral count is low. If the proportion of exinite in the organic material is maintained in a zone of higher TOCs, the Eumeralla could be a good oil source.

Cont'd.

4.3 Maturation and Source Rock Analysis (Cont'd.)

Hence at Barton Corner No. 1 the Eumeralla Formation is mature for oil generation and could be classified as a poor source rock. However the poor source potential of the Eumeralla Formation may be offset by the large volume of this rock unit.

4.4 Relevance to Occurrance of Hydrocarbons

Barton Corner No. 1 was plugged and abandoned as a dry hole. Both the primary and secondary targets were water saturated, although some fluorescence was noted towards the base of the section penetrated. Listed below are some considerations for future oil exploration in the area.

1. The Pebble Point is not as good a seismic marker in this portion of the Otway Basin as it is elsewhere. Over the Barton Corner structure a strong intra-Dilwyn seismic event was mistaken for the Pebble Point seismic event. This now makes the Pebble Point horizon much more affected by faulting than previously thought. In addition the time-depth profile generated at Barton Corner No. 1 is at odds with, and throws doubt on, the accuracy of the Rowans No. 1 time-depth profile, which has in the past been used to correlate well bores to seismic sections in this region. As a consequence some refinement of existing plays in the permit is required.

Cont'd.

4.4 <u>Relevance to Occurrance of Hydrocarbons</u> (Cont'd.)

2. The Belfast-Flaxmans Formation at Barton Corner No. 1 represent some 115 m of seal rock. The effectiveness of this seal is difficult to quantify. It is significant that gas levels in Barton Corner No. 1 were very low above the Belfast-Flaxmans seal and that maxmimum gas levels for the well were found in the Waarre Formation. In addition the Waarre Formation water salinity is significantly higher than any other formation in the well, confirming that the Belfast-Flaxmans seal has isolated the Waarre Formation from the effect of ground water flushing.

   Similarly the Pember Mudstone, which was 44 metres thick, may have protected the Pebble Point Formation from ground water flushing, resulting in marginally higher salinities in the Pebble Point Formation than in the Paaratte Formation.

3. The maturation profile obtained from Barton Corner No. 1 suggests that the Eumeralla Formation is thermally mature for oil generation. While organic matter content is overall sparse in the Eumeralla Formation, it is dominated by oil prone exinite. This fact, coupled with the widespread extent of the Eumeralla Formation, combine to make this formation an attractive oil source rock.

   The basal Sherbrook Group is thermally immature. Although the basal Sherbrook Group at Barton Corner No. 1 has a relatively high organic content, it is dominated by inertinite and must be regarded as a poor source rock. This does not completely downgrade the basal Sherbrook Group as a source rock, since in different parts of the basin the organic input may change.

Cont'd.

4.4 Relevance to Occurrance of Hydrocarbons (Cont'd.)

4. The reservoir potential of the Waarre Formation has been severely downgraded as the unit did not show the good sandstone development that is exhibited in wells in the Port Campbell area.

Petrological analysis suggests that the rock had been deposited in a moderate but fluctuating energy regime and that the provenance was varied. The result is a fine grained, poorly sorted lithic sandstone with a significant proportion of clay matrix and shale laminae. While the primary porosity of the rock is good, the permeability of the unit is probably very low due to the fine grainsize and the shale laminae.

Exactly why the Waarre Formation at Barton Corner No. 1 is so different to that of the Port Campbell area is not clear. Overall the expectation would be to have higher depositional energy regimes towards the basin margin than towards the middle of the basin. The diverse lithic component at Barton Corner No. 1 suggests that the depositional site was relatively close to the source rock region but the fine grainsize and clay content does not reflect high energy regimes.

The answer is certainly related to the provenance type in this part of the embayment but may in part be related to depositional subenvironments peculiar to the downthrown side of a large down-to-basin fault, as is the case at Barton Corner No. 1.

If this is so then the spacial relationship of prospects to large scale faulting may be an important consideration in predicting reservoir quality.

Cont'd.

4.4 Relevance to Occurrence of Hydrocarbons (Cont'd)

In conclusion Barton Corner No. 1:

(a) was drilled on a valid fault dependent structure, much the same as originally mapped,

(b) intersected 25 m of a Waarre Formation reservoir which had a low porosity and suspected low permeability,

(c) proved to have approximately 115 m of Flaxmans/Belfast Formation seal, and

(d) penetrated in excess of 400 m of Eumeralla Formation which was in the generally accepted limits of oil generation onset.

What is not clear is why the well was dry. It may be that fault dependant structures are not reliable in the Otway Basin. Another consideration is the oil migration pathway. In this part of the Otway Basin oil was postulated to have migrated up to the basin margins from the deeper parts of the Eumeralla Formation via the Boggy Creek Fault. Experience has shown that live oil is not expelled from the Eumeralla Formation in significant quantities until vitrinite reflectance values of around 0.7% are reached. For example, at Lindon No. 1, moderate to bright fluorescence with a fast cut was noted in the cuttings at a level of around 0.76% vitrinite reflectance. Prior to this depth only dull to moderate fluorescence with a slow cut was noted. This type of dull fluorescence has been seen at very low vitrinite reflectance values, eg. around 0.4% at Green Banks No. 1. Hence despite the fact that the Eumeralla Formation was within the "oil window" at Barton Corner No. 1, an extrapolation of the vitrinite reflectance profile suggests that prolific zone of 0.7% lies at a depth of around 2400 m KB, ie. vertical migration of some 700 m is required from the main generating zone to the Waarre Formation.

Cont'd.

4.4 Relevance to Occurrence of Hydrocarbons (Cont'd.)

Given the low permeability of the Eumeralla Formation, direct interface charging of the Waarre Formation from the Eumeralla Formation is probably insignificant compared to oil migration along a fault and subsequent lateral migration into the reservoir.

The weakest link in this chain is the interconnected nature of the Waarre Formation sandstone units. Its quite probable that towards the basin margin, sand body development was more discrete than the sheet sand developed towards the trough.

The implication is that wells drilled on the basin flanks, too far from the "feeder" faults may not benefit from lateral oil migration at the Waarre Formation Level. In addition the quality of this Waarre Formation reservoir may well be adversely effected by proximity to the downthrown side of fault blocks.

APPENDIX 1

DETAILS OF DRILLING PLANT

(a) RIG AND EQUIPMENT

Contractor's Rig No.	P.D.S.A. Rig 2
Drawworks:	Superior 700E
Compound:	S.C.R.
Engines:	4 Cat. 3412 PCTA
Rotary Table:	Oilwell 20½"
Substructure:	Dreco designed one piece, height 14', width 13'6".
Rig Lighting:	Explosion proof, flood and fluorescent fittings.
Mast:	Dreco model No. M12713-510, Height 127', Base Width 13'6" Gross Nominal Capacity 510,000 lbs
Crown Block:	1-36" Fast Line Sheave 5-36" Crown Sheaves.
Travelling Block:	Crosby McKissick 250 Ton Block WE Wilson 250 ton Hydro-hook
Swivel:	Oilwell PC300
Mud Pumps:	2 Gardner Denver PZ-8-750.
Mixing Pump:	5-50 HP 6" x 5" Mission Magnum
Mud Agitator:	6 - Pioneer 40 TD. 15 HP Pitbull.
Mud Tanks:	1-300 bbls. 1-360 bbls. 1-141 bbls.
Shale Shakers:	1 Brandt Dual Tandem
Desander:	1 Pioneer T8-6 Sandmaster
Desilter:	1 Pioneer T12-4 Siltmaster
Degasser:	1 Drilco Atmospheric
Generators:	S.C.R.
BOP's & Accumulator:	Annular Hydril GK 13 5/8" 3,000 PSI Ram type Hydril double 13 5/8" 5,000 PSI.
Kelly Cock:	Griffith
Drill Pipe Safety Valve:	Griffith
Air Compressors & Receivers:	2-LE ROI Model 660A, 2-120 Gallon receiver
Spools:	Refer inventory
Rathole Driller:	Yes

(a) RIG AND EQUIPMENT (CONT'D.)

Choke Manifold:	McEvoy 5,000 PSI, 2 chokes, SWACO Hydraulic 10,000 PSI super choke.
Drill Pipe:	10,000' - 4½" Grade E
Drill Collars:	30 - 6½", 6 - 8"
Shock Subs:	Refer inventory.
Kelly:	4¼" Square Kelly, 42' long.
Stabilizers:	Nil
Fishing Tools:	Refer inventory.
Handling Tools:	Refer inventory.
Instruments & Indicators:	Geosource 2 Pen Mud Sentry
Drilling Rate Recorder:	Geosource 6 Pen Recorder
Deviation Instrument:	Totco 0-8 degrees
Tool House:	Yes
Dog House:	Yes
Generator House:	Yes
Welding Equipment:	Yes
Pipe Racks:	Yes
Catwalks:	Yes
Water Tank:	Yes 1 - 400 bbls
Fuel Tank:	Yes 1 - 600 gals
Substitutes:	See inventory
Mud Testing:	Baroid
Junk Box:	Yes
Rathole Driller:	Yes
Mud Saver:	Yes
Cellar Pump:	Yes
Matting:	Yes
Pipe Straightener:	No
Hydraulic Pump:	Yes
Water Pumps:	Yes
Fire Extinguishers:	Yes

(b) TRANSPORT EQUIPMENT AND MOTOR VEHICLES

1 Heavy Duty Forklift

1 Toyota Pick Up Truck

1 Toyota 10 Man Troop Carrier

(c) CAMP AND EQUIPMENT

Fully Airconditioned Toolpusher/Company Rep Shack complete with cooking, refrigeration and ablution facilities independently powered by a Lister 25 KVA 50 Hz Generator Set.

SUMMARY OF DRILLING OPERATIONS

The Barton Corner No. 1 drilling site was prepared by the earthmoving contractor Gordon Rudolph, Curdievale Road, Timboon.

Prior to the rig arriving a 20" conductor pipe had been installed to 11.0 m K.B.

The P.D.S.A. Rig 2 was rigged up and Barton Corner No. 1 was spudded at 0815 hrs on the 5th April 1985.

A 12¼" hole was drilled to 305 m and 9 5/8" casing was run and cemented.

The BOP's were installed and all functions were tested to 1000 psi.

Drilling resumed with 8½" hole to 310 m and a leak-off test established a formation integrity of 14.7 ppg. The 8½" hole was continued to 1900.5 m with bit changes at 1006 m, 1303 m and 1697 m.

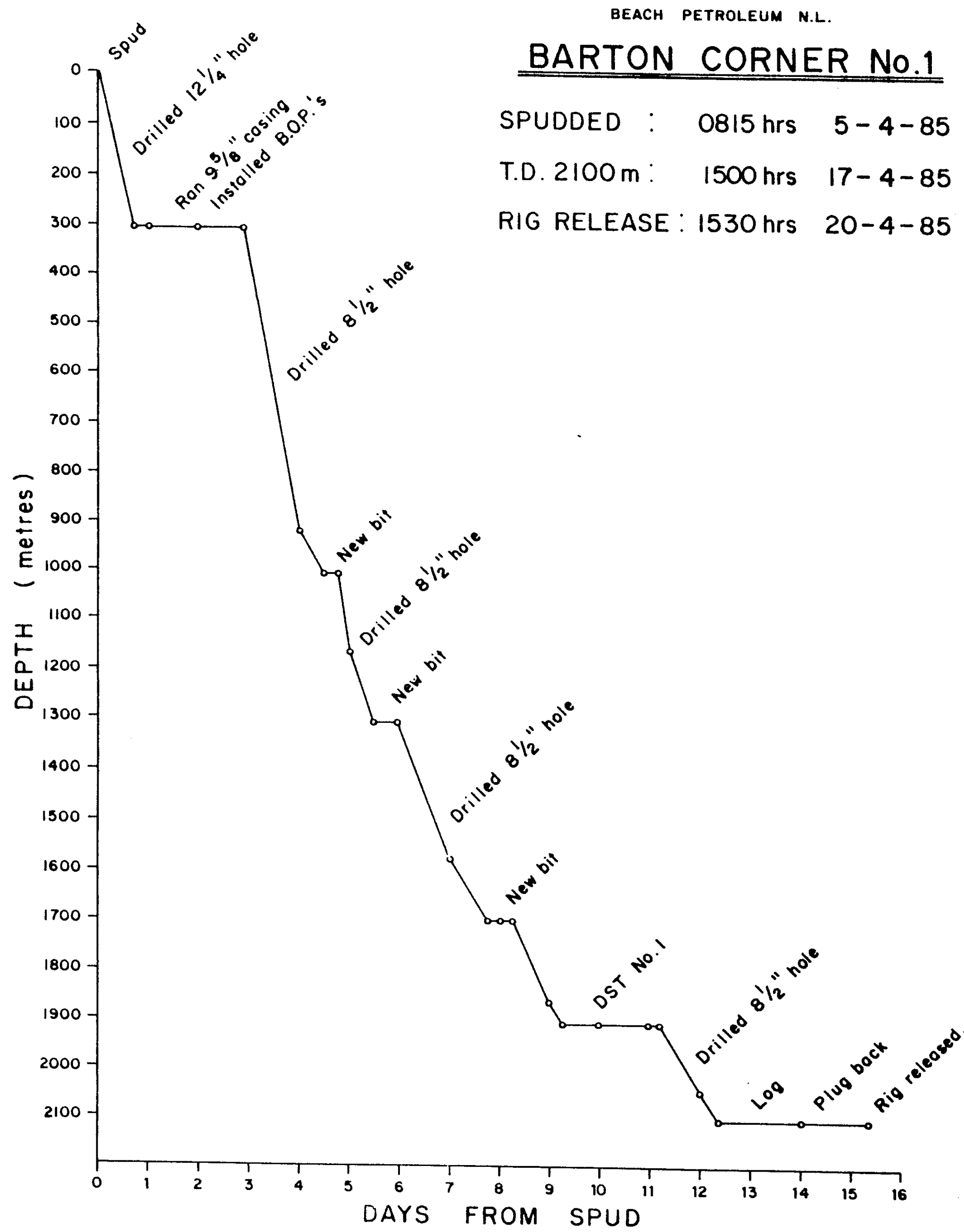
DST No. 1 was then performed over the interval 1875.6 m to 1900.5 m and 120 m of mud was recovered.

The 8½" hole was then continued to a total depth of 2100 m, which was reached at 1500 hrs on the 17th April 1985.

The following wireline logs were run prior to abandonment; DLL/MSFL, BHC/NGT, LDL/CNL, CST and a WST.

Cement plugs were then set over the intervals 1690 - 1620 m, 1020 - 950 m and 310 - 230 m, after which a wellhead cap was installed.

The rig was released at 1530 hrs on the 20th April 1985.



ACTUAL PENETRATION PROFILE

DRG. No.: OT 3291

BEACH PETROLEUM N.L.

DRILLING FLUID RECAP

BARTON CORNER NO. 1

Prepared by : Manfred Olejniczak

Dated : May 1985

TABLE OF CONTENTS

WELL SUMMARY

Operator	:	Beach Petroleum N.L.
Well Number	:	Barton Corner No. 1
Location	:	PEP 104, Otway Basin, Nullawarre, Victoria
Contractor	:	P.D.S.A.
Rig	:	Rig No. 2
Total Depth	:	2100 m
KB Elevation	:	5.4 m
Arrived on Location	:	3 April 1985
Spud Date	:	5 April 1985
* Date Reached T.D.	:	19 April 1985
* Total Days Drilling	:	15
Date off Location	:	20 April 1985
Total Days on Well	:	18
* Total Cost of Mud Materials	:	$30,454.05
* Mud Costs/m	:	$14.54
* Mud Costs/day	:	$2,030.27
Engineer Service : 17 days	:	No Charge
Total Cost Materials and Engineer Service	:	$20,454.05
Mud Materials not Charged to Drilling	:	None
Engineer Service Not Charged to Drilling	:	None
Casing Program	:	$9^5/8$" @ 302 m

* Calculated as from actual spud to P and A.

DISCUSSION BY INTERVAL

$12^{1}/4$" HOLE 5.4 m (RKB) to 305 m - 2 days

The well was spudded in at 08:15 hrs on 5 April 1985 with a fresh water-AQUAGEL spud mud. Initial viscosity was very low at 28 seconds while the nature of the cuttings was observed. After drilling through surface soil into loose limestone, began adding Caustic Soda and Lime to flocculate the system and improve the carrying capacity.

The viscosity was then maintained at about 34 seconds by further Caustic Soda and Lime additions, while adding water to maintain volume. The initial 60 sacks of AQUAGEL mixed was sufficient to complete the section despite the use of approximately 800 bbls of water. The carrying capacity of this low viscosity fluid with a yield point range of 10 - 12 lb/100 ft^2 was quite sufficient for adequate removal of the low density limestone cuttings.

Continued drilling through limestone until the Gellibrand Marl was reached at 290 m, then circulated the hole clean on reaching casing depth at 305 m. This 15 m penetration into the Marl was insufficient to cause any significant impact on the mud.

A wiper trip was then run to surface with no hole problems. The hole was again circulated prior to pulling out to run casing.

The $9^{5}/8$" casing was then run and cemented to 302 m, with only partial returns during the cementing. There were no cement returns to surface so a top job with a stinger was then done.

$8^{1}/2$" HOLE 305 m to 2100 m T.D. - 13 days

While nippling up the B.O.P., the mud tanks were dumped, cleaned out and filled with water in preparation for the change-over to a KCl-Polymer mud system.

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

The cement, $9^5/8$" casing shoe and 5 m of new hole were drilled with water so that the leak-off test could be run using water. Returns of the Gellibrand Marl at the shakers were very mushy with the fresh water.

During the leak-off test, premixed KCl-Polymer mud was added to the water in the tanks. As drilling continued through the Gellibrand Marl, additions of KCl premix continued till a concentration of 7 - 8% KCl was obtained. Additions of Polymer were minimised in order to maintain a low viscosity to help break up any potentially sticky marl. The resultant viscosity of only about 30 seconds proved sufficient to clean the hole.

The most noticeable result of drilling the Gellibrand Marl with KCl was the complete change in nature of cuttings to solid discrete pieces, instead of the dispersive mush usually seen when using fresh water. This dramatic response to KCl indicates that in future wells which anticipate drilling a sizeable section of Gellibrand Marl, it would be beneficial to add up to 5 - 6% KCl while drilling the Marl, even if a fresh water-Gel mud system is being used. Additions could then be stopped after drilling through the Marl since the borehole usually remains stable, even when drilled with fresh water.

An indirect result of drilling the Marl with KCl was a much lower dilution rate, as solids dispersion was greatly reduced. As the sump on Barton Corner No. 1 was very small, this may have saved having the sump extended, which was being considered at the time.

From about 710 m, began drilling dirty sands of the Mepunga and later the Dillwyn Formations. These sands are of very variable grain size and the shaker screens required frequent wire brushing to minimise losses due to sand blinding of the screens. The mud viscosity was increased to 34 - 36 seconds with additional Polymer to improve hole cleaning. The very fast drill rates and the amount of sand returns at the shakers meant that the mud viscosity could not practically be raised further without causing unacceptable mud losses at the shakers. The shakers on P.D.S.A. Rig 2 proved quite reliable and satisfactory in general, although they had a slow vibration speed which made it difficult to handle higher mud viscosities, and also meant that the screens blinded with sand easily.

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

S40 over S60 screens were initially run on the shakers, and with constant attention, mud losses were bearable. During this early period of the well, the drill crews were generally short handed, particularly on the night tour, so that most of the wire brushing and mud mixing was done by the mud engineer with help from the Beach geologist and the Gas and Fuel Corporation observer.

At around 900 m, sand blinding of the screens continued to worsen, with 100 bbl of mud lost over the shakers in the early hours of the morning of the 9th April. I then decided that, as it had proved impossible to maintain adequate rig crew maintenance of the shaker screens, to let most of the sand go through, and be processed by the desander and desilter. The bottom S60 screens were removed and the shakers were run with only top S40 mesh screens.

This problem with screen blinding persisted through most of the well, due mostly to the high drill rates and variable grain size sands. The bottom S60 mesh screens were later replaced as the drill rate slowed, but the shaker always had to be watched and occasionally brushed to minimise losses.

Drilling continued through a predominantly dirty sand sequence containing highly dispersive clays. Polymer consumption throughout the $8^1/2$" hole was higher than anticipated due to Polymer loss to these clays and as a result, mud viscosity values tended to steadily drop until new premixed polymer was added.

During trips, minor tight spots were encountered on running back in. Had to ream from 905 to 917 m on a trip at 1006 m, then from 1109 to 1137 m on a trip at 1302 m. On a trip at 1697 m, pulled tight at 1542 m which required reaming, then also reamed from 1671 m to bottom on running back in. These erratic tight spots together with a higher than theoretical lag suggested that parts of the hole were washed out and had ledges. This was later confirmed by the Schlumberger caliper log.

INTERVAL DISCUSSION

$8^1/2$" HOLE (Cont'd)

The mud properties throughout the section were kept quite consistent as follows :-

Weight	9.5 - 9.7 ppg
Viscosity	36 - 38 sec/qt
Filtrate	7.0 - 8.5 ml
KCl	6 - 9 %

This was largely due to the high dilution rates caused by the rapid drilling and not allowing the very fine solids content to build up.

At 1900.5 m it was decided to test a show in a drill break within the Eumarella Formation. However the test tool failed, and on retrieval was found to be plugged with cuttings. When a bit was run back in, it ran in till it became held up at 1884 m, and then washed to bottom with the kelly with no solid fill being encountered. Perhaps the test tool hit a ledge when being run in the hole and so became clogged with cuttings.

Continued drilling to 2100 m where T.D. was declared. The hole was circulated clean for $1^3/4$ hours, no wiper trip was run, and P.O.H. to run logs.

While logging, the hole continually took fluid at the rate of $1^1/2$ to 1 bbl/hr, indicating seepage losses to the very long exposed sand section.

The resistivity log went to bottom, but subsequent logs encountered tight spots, with the sonic tool only going down to 1950 m and the others to 2040 m.

The final caliper log showed the hole to be slightly ledged although not badly washed out except in the Gellibrand Marl. From 750 m to T.D., the hole averaged between $8^1/2$ and $10^1/2$ inches, which is not excessive. In the Gellibrand Marl the hole size varied from 14 to 17 inches. The washouts can probably be related to low mud viscosities and turbulent flow conditions. As the Gellibrand had never previously been drilled with KCl mud, the viscosity was deliberately kept low to break up any potentially sticky clay. Results showed that it could have been drilled with a higher mud viscosity for the remainder of the section, although the high drill rates and low vibration speed of the shakers made it impractical to raise the viscosity without serious mud losses.

CONCLUSION AND RECOMMENDATIONS

Mud costs for Barton Corner No. 1 were originally estimated to cost approximately $25,500 for an 1800 m well. The final mud cost of $30,454.05 to a T.D. of 2100 m is actually very close to the programmed cost considering the extra depth of KCl-Polymer drilled hole.

From a mud point of view, with no significant mud problems and stable mud properties, this was a quite successfully drilled well.

Not everything went smoothly though. The high drill rates through loose sands in the $8^{1}/2$" hole caused severe shaker screen blinding problems, resulting in higher than expected mud losses and a low mud viscosity. It also meant constant observation and brushing of shaker screens, done mostly by Baroid, Beach, Exlog and Gas and Fuel personnel rather than the drill crews which were often short handed.

These losses were partially offset by using mostly reclaimed sump water for mud make-up from 1000 m to T.D. The sump water had a high KCl % due to mud losses into it (up to 5%), and also the small size of the sump meant that it had to be pumped out to avoid overflowing. This recycling enabled us to get by without enlarging the sump and we also regained some KCl.

KCl was used instead of Barite for slugs. This worked well initially, but as the mud weight and KCl concentration increased, KCl slugs became unsatisfactory and trips were generally wet, resulting in mud losses and rig crew dissatisfaction. From a base mud with 8 - 9% KCl, saturating with KCl for extra weight only gives an additional 0.7 - 1.0 ppg increase. Also, to suspend the KCl, a high viscosity is required which tends to slow down the action of the slug. I recommend reverting to Barite slugs, as the small additional cost is easily covered by reduced mud loss, faster trips and more satisfied crews which work better.

BEACH PETROLEUM N.L.
BARTON CORNER NO. 1

FLUID RECOVERY ANALYSIS : DST NO. 1

DST NO. 1 Interval : 1873.6 - 1900.5 metres 15 April 1985

Three samples were taken from the 120 metre column of fluid recovered; one sample at the top of the column (Sample 1), one from the middle (Sample 2) and one from the very bottom of the column (Sample 3).

Mud properties at the time of the test were:

Cl^-	-	48,000 ppm
Ca	-	250 ppm
KCl	-	9.5%

Sample 1 :	Cl^-	- 56,000 ppm	Ca -	280 ppm	KCl - 10.9%
Sample 2 :	Cl^-	- 36,500 ppm	Ca -	1120 ppm	KCl - 7.0%
Sample 3 :	Cl^-	- 33,000 ppm	Ca -	1600 ppm	KCl - 5.5%

Note:

1. High calcium content in samples 2 and 3 indicates water contamination, supported by reduction in KCl content.

2. Sample 1 has practicaly the same calcium as the mud but higher Cl^- and KCl %. However KCl and chloride are still in the same proportion indicating a more concentrated solution. This is probably due to the dissolving of dried out KCl left in the pipe from tripping.

3. Calculating formation water dilution on Samples 2 and 3 gives :

   Sample 2 : Has 35% volume increase based on KCl%. Calculations then give formation water as : 4,500 ppm Cl^-, 3540 ppm Ca.

   Sample 3 : Has 73% volume increase based on KCl%. Calculations then give formation water as : 12,450 ppm Cl^-, 3,450 ppm Ca.

BEACH PETROLEUM N.L.
BARTON CORNER NO. 1

FLUID RECOVERY ANALYSIS (Cont'd)

NOTE: Calcium values are reasonably consistent, indicating this would be closer to a true formation value. Chloride values differ markedly, but if we assume some contamination by dried out KCl from inside the drill pipe, this would explain the lower value of Sample 2. Assuming Sample 3 has little contamination, this would give a formation water salinity of 12,450 ppm or slightly higher.

MATERIAL RECONCILIATION

MATERIAL	UNIT	STOCK DELIVERED TO WELL SITE ST 102548	ST 10357	ST 10358	ST 103060	ST 103062	ST 103064	ST 103072	TOTAL DELIVERED	STOCK REMAINING AT END OF WELL	MATERIAL CONSUMPTION FOR WELL
AQUAGEL	100 lb	210							210	150	60
CAUSTIC SODA	40 kg	20							20	7	13
SODA ASH	40 kg	20							20	8	12
LIME	25 kg	40							40	30	10
CELPOL	25 kg	160							160	51	109
XC-POLYMER	25 kg	40							40	13	27
CMC-EHV	25 kg	10							10	10	6
POTASSIUM CHLORIDE	50 kg		340		440		20	200	1000	210	790
CALCIUM CHLORIDE	25 kg		43						43	37	6
CONDET	200 lt		4						4	4	-
SURFLO W300	20 lt			2					2	2	-
EZ-SPOT	200 lt				4				4	4	-
FORMAL-DEHYDE	20 lt					10			10	5	5

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL RECAP

COMPANY BEACH PETROLEUM
WELL BARTON CORNER #1
LOCATION NULLAWARRE, VIC.
COST/DAY -
COST/M -
COST/M³ -
RECAPPED BY M. OLEJNICZAK
DATE 19th APRIL 1985.

MUD TYPES MATERIAL NOT USED FOR DRILLING.

CONTRACTOR P.D.S.A.
DRILLING DAYS/PHASE
ROTATING HRS/PHASE

HOLE SIZE
INTERVAL TO
FROM
MTRS DRILLED

MUD CONSUMPTION FACTOR m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
CALCIUM CHLORIDE	25kg	19.45			6			116.70

CHEMICAL VOLUME
FRESH WATER
SEA WATER
TOTAL MUD MADE
COST LESS BARYTES $116.70
COST WITH BARYTES $116.70
COMMENTS:

Calcium Chloride used for cementing.

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL RECAP

COMPANY BEACH PETROLEUM
WELL BARTON CORNER 1.
LOCATION NULLAWARRE, VIC.
COST/DAY $459.14
COST/M $3.07
COST/M³ $7.17
RECAPPED BY M. OLEJNICZAK
DATE 6th APRIL 1985

MUD TYPES LIME - FLOCCULATED GEL

CONTRACTOR P.D.S.A.
DRILLING DAYS/PHASE 2
ROTATING HRS/PHASE 12¼

HOLE SIZE 12¼"
INTERVAL TO 305m
FROM 5.4m
MTRS DRILLED 299.6m

MUD CONSUMPTION FACTOR 0.43 m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
AQUAGEL	100lb	13.50			60			810.00
CAUSTIC SODA	40kg	31.24			2			62.48
LIME	25kg	4.58			10			45.80

CHEMICAL VOLUME M³	1	
FRESH WATER M³	127	
SEA WATER		
TOTAL MUD MADE M³	128	
COST LESS BARYTES		$918.28
COST WITH BARYTES		$918.28

COMMENTS:

Two sacks calcium chloride used for tail slurry of 9⁵/₈" cementation.
Caustic Soda and Lime used to flocculate Gel for high viscosity.

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL RECAP

COMPANY BEACH PETROLEUM
WELL BARTON CORNER #1
LOCATION NULLAWAREE, VIC.
COST/DAY 2263.01
COST/M 16.39
COST/M³ 75.24
RECAPPED BY M. OLEJNICZAK
DATE 19th APRIL 1985

MUD TYPES KCL - POLYMER

CONTRACTOR P.D.S.A. RIG 2.
DRILLING DAYS/PHASE 13
ROTATING HRS/PHASE 121 3/4

HOLE SIZE 8½"
INTERVAL TO 2100m
FROM 305m
MTRS DRILLED 1795m
MUD CONSUMPTION FACTOR 0.22 m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
CELPOL	25kg	95.16			109			10,372.44
XC-POLYMER	25kg	279.86			27			7,556.22
CAUSTIC SODA	40kg	31.24			11			343.64
SODA ASH	40kg	13.16			12			157.92
POTASSIUM CHLORIDE	50kg	13.70			790			10,823.00
FORMALDEHYDE	20ltr	33.17			5			165.85

RECLAIMED SUMP WATER	M³		
CHEMICAL VOLUME	M³	143	
FRESH WATER	M³	14	
SEA WATER		234	
TOTAL MUD MADE	M³		
COST LESS BARYTES		391	
COST WITH BARYTES			$29,419.07
COMMENTS:			$29,419.07

Four sacks of Calcium Chloride used for final cement plug on 19th April during abandonment prodecure.

NL Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL SUMMARY

COMPANY BEACH PETROLEUM
WELL BARTON CORNER #1
LOCATION NULLAWARRE, VIC.
COST/DAY $2030.27
COST/M $ 14.54
COST/M³ $ 58.68
RECAPPED BY M. OLEJNICZAK
DATE 19th APRIL 1985

MUD TYPE LIME FLOCCULATED GEL & KCL POLYMER

HOLE SIZE	METRES DRILLED	DRILLING DAYS
12¼"	299.6	2
8½"	1795	13

TOTAL ROTATING HRS 134
TOTAL DAYS ON HOLE 15
TOTAL DEPTH 2100m
TOTAL 2094.6m
MUD CONSUMPTION : WELL AVERAGE .25m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
AQUAGEL	100lb	13.50			60			810.00
CAUSTIC SODA	40kg	31.24			13			406.12
SODA ASH	40kg	13.16			12			157.92
LIME	25kg	4.58			10			45.80
CELPOL	25kg	95.16			109			10,372.44
XC-POLYMER	25kg	279.86			27			7,556.22
POTASSIUM CHLORIDE	50kg	13.70			790			10,823.00
FORMALDEHYDE	20Lt	33.17			5			165.85
CALCIUM CHLORIDE	25kg	19.45			6			116.70

RECLAIMED SUMP WATER	M³	143	
CHEMICAL VOLUME	M³	15	
FRESH WATER	M³	361	
SEA WATER			
TOTAL MUD MADE	M³	519	
COST LESS BARYTES			$30,454.05
COST WITH BARYTES			$30,454.05

COMMENTS:

Calcium Chloride included as materials not used for drilling.
No material losses due to breakage.

Baroid Australia PTY. LTD./NL INDUSTRIES INC

DRILLING FLUID PROPERTY RECAP

COMPANY BEACH PETROLEUM WELL BARTON CORNER # 1.

DATE 1985	DEPTH m	HOLE SIZE	TEMP °C	WEIGHT SG	VIS SEC	PV	YP	GELS 10 sec	GELS 10 min	WATER LOSS API	CAKE mm	pH	Pf	Mf	Cl mg/l	Ca mg/l	SAND %	SOLIDS %	WATER %	OIL %	MBC kg/m³	REMARKS TREATMENT	FORMATION
APRIL 5	303	12¼	-	1.07	34	7	18	8	12	N.C.	-	11.5	.8	.9	1,200	140	¼	3	97	-	-	LIME FLOCCULATED GEL	L/S, MARL.
6	305			MUD PITS DUMPED AND CLEANED FOR KCl-POLYMER MUD.																		RAN & CEMENTED $9^5/8$" CASING.	-
7	305							"														NIPPLED UP, PRESSURE TEST.	-
8	832	8½	-	1.10	36	13	10	1	3	14	1	9.0	.02	.05	36,000	240	¼	3	97	-	-	MIXED KCL MUD.	MARL, SAND.
9	1006	8½	-	1.13	36	12	13	1	3	8.5	1	9.0	.05	.1	26,000	260	¼	5	95	-	-	DRILLING.	SAND, CLAY.
10	1302	8½	-	1.14	38	11	14	1	3	8.5	1	9.0	.1	.15	41,500	260	Tr	4½	95½	-	-	DRILLING.	SAND, CLAY.
11	1482	8½	-	1.15	38	14	14	2	5	8.5	1	9.0	.05	.1	44,000	400	0.1	5	95	-	-	DRILLING.	SANDS.
12	1683	8½	-	1.15	37	11	12	2	4	8.5	1	9.0	.05	.1	43,000	160	Tr	5	95	-	12	DRILLING.	CLAYSTONE.
13	1797	8½	-	1.16	36	11	13	2	6	8.4	1	9.0	.05	.1	44,500	280	Tr	5	95	-	-	DRILLING.	SAND, CLAY.
14	1900.5	8½	-	1.16	37	13	13	3	8	7.4	1	9.0	.05	.1	46,000	280	Tr	5	95	-	10	DRILL, WIPER TRIP.	SAND, CLAY.
15	1900.5	8½	-	1.16	36	12	12	2	6	7.8	1	9.0	.05	.1	48,000	250	Tr	5	95	-	10	TEST	-
16	1995	8½	-	1.16	38	16	16	3	8	7.8	1	9.0	.05	.1	43,000	400	Tr	5	95	-	-	TEST FAILED, DRILL ON.	SAND, CLAY.
17	2100	8½	-	1.15	38	15	16	3	8	7.8	1	9.0	.05	.1	43,500	240	Tr	5	95	-	8	REACHED T.D.,WIPER TRIP.	SAND, CLAY.
18	2100	8½	-	1.15	38	15.	16	3	8	7.8	1	9.0	.05	.1	43,500	240	Tr	5	95	-	8	LOGGING.	
19						RIH AND PLUG AND ABANDON WELL AFTER COMPLETING LOGS.																	

Baroid Australia PTY LTD /NL INDUSTRIES INC

BIT RECORD

COMPANY BEACH PETROLEUM WELL BARTON CORNER #1 CONTRACTOR/RIG P.D.S.A. Rig #2

LOCATION PEP 104 NULLAWARRE, VIC. SPUD DATE 5th APRIL 1985 DATE REACHED T.D.

COMPANY SUPERVISORS J. OZOLINS. U. SANTO STEFANO. TOOLPUSHERS B. FOWLER, L. BROWN.

PUMPS: MAKE, TYPE G.D. P28 LINERS USED 6" x 8" DRILL COLLARS 8" / 6¼" DRILL PIPE 4½"

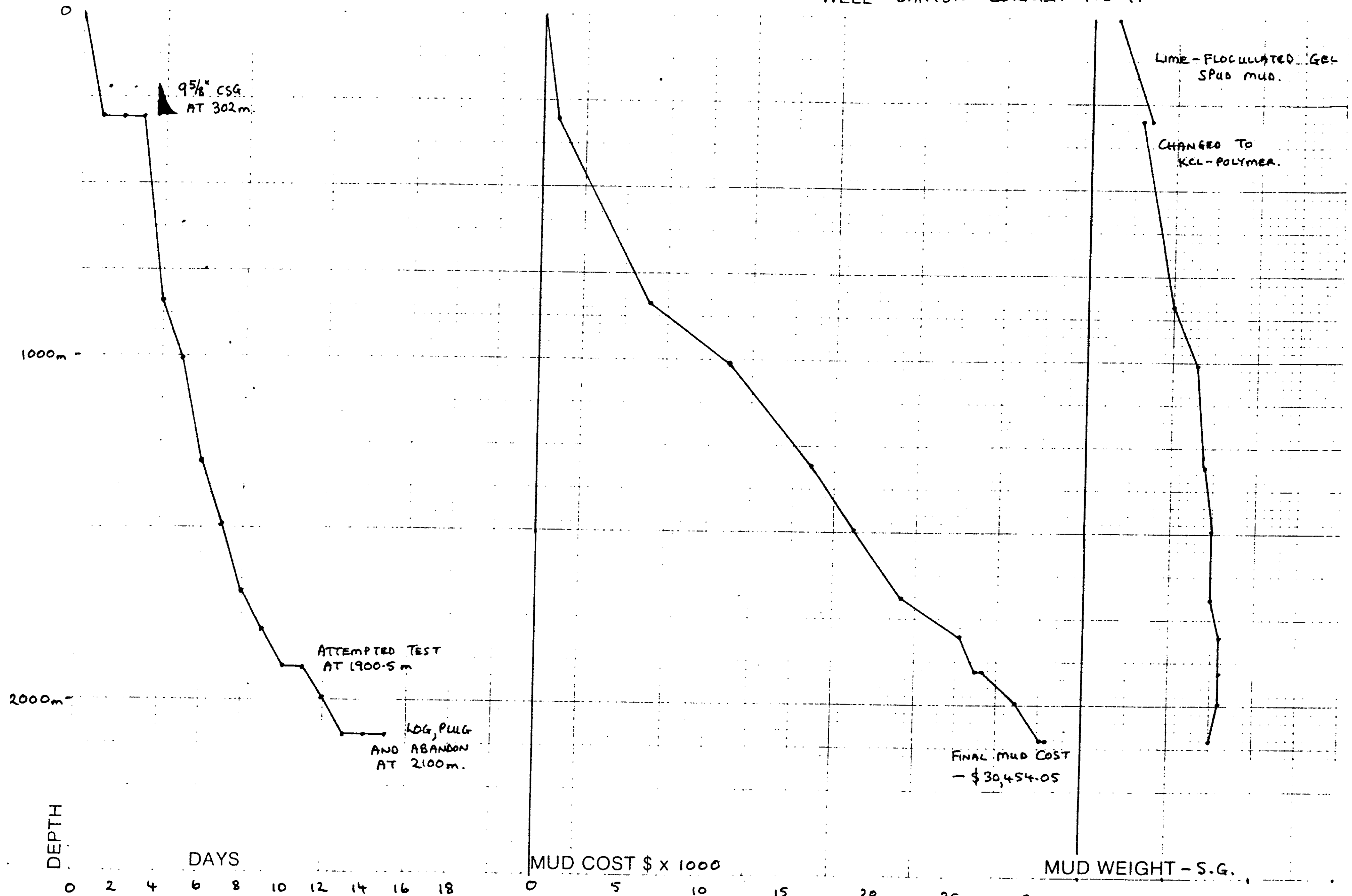
MUD SYSTEMS, DEPTHS LIME-FLOCCULATED GEL to 305m, KCL-POLYMER to T.D.

DATE 1985	No	SIZE	MAKE	TYPE	JETS 32nd"	DEPTH OUT m	Mtrs DRILLED	HOURS	Mtrs HR	ACCUM DRLG HOURS	BIT WEIGHT tonnes	RPM	VERT DEV'N	PUMP PRESSURE p.s.i	PUMP RATE spm	WT SG	MUD VIS sec	CONDITION T	B	G	FORMATION	REMARKS
APRIL 5.	1	12¼	HTC	OSC 3J	3x18	305	305	12¼	25	12¼	4-9	135		1300	190	1.07	34	1	1	I	Limestone, Marl.	
9.	2	8½	HTC	X3A	3x10	1006	701	28½	24.6	40¾	5-14	120		1500	100	1.13	36	8	5	¼	Marl, Sands.	
11.	3	8½	HTC	XDG	9,10,10	1303	297	16¾	17.7	57½	10-16	90		1700	100	1.15	38	7	5	1/16	Sands, Clay.	
13.	4	8½	HTC	J11	9,10,10	1697	394	32¾	12.0	90¼	11-14	85		1800	100	1.16	37	7	4	¼	Sand, Clay.	Junk Damage.
15.	5	8½	HTC	XDG	9,10,10	1900.5	203.5	20¾	9.8	111	11-14	85		1800	100	1.16	36	3	3	I	Sand, Clay.	
17.	6	8½	HTC	XDG	9,10,10	2100	199.5	23	8.7	134	11-14	85		1800	105	1.15	38	5	4	1/16	Sand, Clay.	

Baroid Australia PTY LTD /NL INDUSTRIES INC

GRAPH SUMMARY

OPERATOR BEACH PETROLEUM N.L. WELL BARTON CORNER No 1.



BARTON CORNER -1

SIDEWALL CORE DESCRIPTIONS

SWC	Depth(m)	Rec(mm)	Description
1	2050	23	Claystone, medium grey, firm subfissile, common multicoloured lithics, common carbonaceous detritus, trace micromicaceous. No fluorescence.
2	1990	Nil	Lost bullet.
3	1924.5	37	Claystone, light to medium grey, laminated, firm, common multicoloured lithics, common carbonaceous detritus trace micromicaceous. No fluorescence.
4	1893	40	Sandstone, quartz, medium greenish grey, very fine to fine grained dominantly very fine grained, friable to blocky, angular to subrounded, dominantly subangular, moderate sorting, argillaceous matrix, dispersive, trace carbonate cement, abundant feldspar and dark brown to black lithics, common carbonaceous detritus and biotite flakes. Poor to fair visual porosity. No fluorescence.
5	1890	15	Sandstone, quartz, medium greenish grey, very fine to fine grained, dominantly fine grained, friable to blocky, angular to subangular, dominantly subangular, moderate sorting, argillaceous matrix, dispersive, good carbonate cement, abundant feldspar and multicoloured lithics, common carbonaceous detritus and biotite flakes. Poor visual porosity. 50% even, very dull medium yellow-orange fluorescence, with a very weak pale yellowish milky white slow streaming cut.
6	1880	33	Sandstone, quartz, medium to dark greenish grey, very fine to fine grained, dominantly fine grained, friable to firm, blocky in part, angular to subangular, dominantly subangular, moderate sorting, argillaceous matrix, minor carbonate cement, common feldspar, biotite, carbonaceous detritus and multicoloured lithics. Poor visual porosity. No fluorescence.

Cont'd.

SWC	Depth(m)	Rec(mm)	Description
7	1835	27	Siltstone, medium to dark greenish grey, firm, dispersive in part, blocky in part, good calcite cement in part. Common carbonaceous detritus, multicoloured lithics, trace biotite. No fluorescence.
8	1780.5	20	Sandstone, quartz, light to medium grey, very fine grained, friable to blocky, angular to subangular, dominantly subangular, moderate sorting, very argillaceous matrix, good calcite cement, abundant multicoloured lithics, biotite and feldspar, common carbonaceous detritus. Poor visual porosity. No fluorescence.
9	1725	43	Sandstone, quartz, medium greenish grey, very fine to fine grained, dominantly fine grained, firm to blocky, subangular to subrounded, dominantly subangular, moderate sorting argillaceous matrix, dispersive, calcite cement in part, common carbonaceous detritus, biotite, feldspar and multicoloured lithics. Poor to fair visual porosity, no fluorescence.
10	1700	24	Claystone, dark brownish grey, firm to soft, common carbonaceous detritus, trace micromicaceous. No fluorescence.
11	1683	10	Sandstone, quartz, light grey to white, fine grained to very coarse grained, dominantly coarse grained, friable, angular to subrounded, dominantly subangular, poorly sorted, good calcite cement, siliceous in part, kaolinitic in part. Fair visual porosity. No fluorescence.
12	1674	50	Sandstone, quartz, light to medium grey, very fine to fine grained, dominantly very fine grained, soft to friable, angular to subrounded, dominantly subangular, moderate sorting, argillaceous matrix, dispersive, slight carbonate cement in part, common carbonaceous detritus, trace mica, common carbonaceous shale laminations. Poor visual porosity. No fluorescence.

Cont'd.

SWC	Depth(m)	Rec(mm)	Description
13	1633.5	50	Sandy Claystone, dark green to black, soft, very dispersive, friable in part, micromicaceous in part, glauconitic(?), carbonaceous(?), calcareous in part with abundant quartz lithics, light yellow brown, clear, milky, green, medium to very coarse grained, dominantly coarse grained, rounded, poorly sorted, common ferrugenous ooids, dark green to black, metallic lustre, medium grained. Very poor visual porosity. No fluorescence.
14	1585	28	Claystone, dark greenish grey - brown, soft, very dispersive, very slightly calcareous, common glauconite, common quartz lithics, multicoloured, fine grained, subangular, moderate sorting, common carbonaceous detritus, trace micromicaceous. No fluorescence.
15	1562.5	40	Claystone, medium to dark greenish grey, soft, very dispersive, carbonaceous, trace micromicaceous, rare quartz lithics. No fluorescence.
16	1478	30	Sandstone, sublithic, dark greenish black, fine to medium grained, friable subangular to subrounded, dominantly subrounded, moderate to well sorted abundant carbonaceous(?) matrix, dispersive, trace cherty lithics. Poor visual porosity, no fluorescence.
17	1426.5	30	Sandstone, sublithic, dark greenish grey - brown, fine to medium grained, friable to blocky, subangular to rounded, dominantly subrounded, moderate sorting, abundant carbonaceous matrix grading to silt, calcareous in part, common glauconite, trace cherty lithics. Poor to fair visual porosity. No fluorescence.
18	1392	40	Sandstone, quartz, medium greenish grey, medium to coarse grained, friable subrounded, moderate sorting, abundant argillaceous matrix, good calcite cement, common glauconite, trace carbonaceous detritus, trace mica. Fair visual porosity. No fluorescence.

Cont'd.

SWC	Depth(m)	Rec(mm)	Description
19	1389	48	Sandstone, sublithic, medium grained, firm to friable, subrounded to rounded, moderate sorting, argillaceous matrix, slight calcite cement, trace glauconite, trace cherty lithics, fair visual porosity, no fluorescence.
20	1386.5	48	Sandstone, quartz, medium to dark greyish green, medium to very coarse grained, dominantly medium grained, friable to firm, subrounded, poor to moderately sorted, argillaeous matrix, dispersive, rare glauconite, rare cherty lithics, fair visual porosity. No fluorescence.
21	1173	40	Conglomeratic Sandstone, quartz, light to medium grey, very friable to loose, angular to rounded, poorly sorted, minor argillaceous matrix, common carbonaceous detritus. Fair to good visual porosity. No fluorescence.
22	1170	24	Sandstone, quartz, medium grey, medium to very coarse grained, dominantly very coarse grained, friable to loose, angular to subrounded, poorly sorted, abundant argillaceous matrix, fair visual porosity. No fluorescence.
23	1006	50	Sandstone, quartz, medium to dark grey - brown, fine to medium grained, firm to friable, subrounded, well sorted, abundant silty matrix, very dispersive, carbonaceous, slight calcareous cement, trace mica. Fair visual porosity. No fluorescence.
24	1004	50	Sandstone, A/A.
25	988	47	Claystone, dark brown to black, soft, very dispersive, slightly calcareous, common mica, carbonaceous, common quartz lithics, very fine grained, subrounded. No fluorescence.

BARTON CORNER NO. 1

LOG INTERPRETATION

Wireline log interpretation was completed at the wellsite by a Schlumberger Analyist. The attached Cyberlook log is based on the Dual-Water method. As a check, Sw was hand calculated using the Archie equation and the following parmeters.

Shale

Vclay	Level	Limits
NGT	1 - 4	GRSS = 40° API; GRSH = 110° API
	5 - 31	GRSS = 20° API; GRSH = 110° API
N-DX	1 - 6	NPHI(SH) = 36%; RMOB(SH) = 2.46 g/cc
	7 - 31	NPHI(SH) = 45%; RMOB(SH) = 2.40 g/cc

Water Saturation

1. Sw calculated from:

$$Sw = \sqrt{\frac{F\ Rw}{Rt}} \quad \text{where } F = 1/\phi^2$$

(Archie Equation)

2. Rw estimated from the Archie Equation in clean water bearing sands:

Level	Rw @ 24°C
1 - 4	0.61 ohm. m.
5 - 6	0.39 " "
6 - 29	2.05 " "
30 - 31	1.10 " "

Cont'd.

Group	Formation	Depth (K.B.)	Depth (Subsea)	Thickness
Heytesbury	Port Campbell Limestone	Surface	+57.6	280.0
	Gellibrand Marl	280.0	-217.0	352.0
	Clifton	632.0	-569.0	25.0
Nirranda	Narrawuturk Marl	657.0	-594.0	54.0
	Mepunga	711.0	-648.0	66.0
Wangerrip	Dilwyn	777.0	-714.0	181.0
	Pember Member	958.0	-895.0	44.0
	Pebble Point	1002.0	-939.0	32.5
Sherbrook	Paaratte	1034.5	-971.5	247.5
	Skull Creek Member	1282.0	-1219.0	100.0
	Nullawarre Greensand Member	1382.0	-1319.0	175.5
	Belfast	1557.5	-1494.5	39.5
	Flaxmans	1597.0	-1534.0	75.0
	Waarre	1672.0	-1609.0	25.0
Otway	Eumeralla	1697.0	-1634.0	+403.0
	T.D.	2100.0	-2037.0	

Cont'd.

Level	Depth (metres)	MSFL (ohm.m)	LLS (ohm.m)	LLD (ohm.m)	RT (ohm.m)	NPHI (Is.por.)	RHOB (g/cc)	DT (us/f)
1	1893.0	0.8	4.0	4.3	4.77	28.0	2.28	89
2	1890.0	41.0	18.0	18.0	18.0	10.0	2.62	66
3	1880.5	2.5	6.6	6.8	7.48	19.5	2.42	65
4	1879.5	0.5	4.0	4.2	4.62	21.0	2.33	75
5	1683.5	0.55	1.5	2.2	2.86	25.0	2.28	96
6	1681.7	0.78	2.0	2.5	3.08	25.0	2.29	96
7	1540.5	0.90	5.3	9.0	11.61	30.5	2.22	111
8	1540.0	0.75	5.1	8.5	10.8	31.0	2.24	106
9	1538.5	1.20	6.0	10.0	13.1	31.5	2.25	102
10	1442.5	0.49	6.7	10.5	12.8	32.0	2.18	95
11	1442.0	0.50	7.0	11.0	13.4	32.5	2.19	112
12	1440.0	0.75	7.0	10.5	12.9	31.0	2.18	111
13	1391.5	0.54	10.5	15.0	18.1	28.5	2.19	106
14	1390.0	0.76	10.5	15.0	18.2	30.0	2.26	104
15	1388.0	0.67	10.0	15.0	18.2	33.5	2.23	105
16	1386.5	0.66	9.5	14.0	16.9	31.5	2.23	110
17	1385.5	0.60	10.0	14.0	17.1	31.0	2.22	112
18	1284.8	2.0	10.0	15.0	19.1	25.5	2.21	102
19	1274.0	1.0	8.0	14.5	18.6	24.0	2.20	106
20	1273.0	1.2	10.5	21.0	26.9	21.0	2.25	104
21	1245.8	1.5	8.0	14.0	18.2	31.5	2.13	105
22	1245.0	1.4	10.5	18.0	23.0	23.0	2.20	107
23	1244.0	3.2	10.0	20.0	26.6	25.5	2.22	106
24	1166.0	1.2	7.0	14.0	18.3	24.5	2.24	105
25	1159.5	1.05	8.0	11.0	13.4	28.0	2.23	100
26	1067.0	0.55	5.0	8.7	11.0	28.5	2.15	120
27	1065.0	0.60	4.0	7.0	9.0	29.0	2.15	114
28	1063.5	0.5	9.0	12.0	8.4	30.0	2.13	112
29	1005.0	0.85	9.0	14.5	18.0	29.5	2.25	97
30	1004.0	0.86	8.0	11.5	14.1	32.0	2.25	98
31	1002.0	1.0	8.2	10.5	12.6	36.0	2.52	98

RT determined from Chart Rint - 9

Cont'd.

Level	Depth (metres)	Vclay (NGT)	Vclay (N-D.X)	POR (n-DX)	POR (Dt)	Sw %
1	1893.0	0.29	0.28	22.0	26.2	110
2	1890.0	0.29	0.35	Nil	10.0	39
3	1880.5	0.36	0.27	12.5	9.0	150
4	1879.5	0.46	0.14	20.0	12.5	120
5	1683.5	0.40	0.17	24.0	29.3	110
6	1681.7	0.50	0.20	23.0	29.3	110
7	1540.5	0.25	0.18	27.0	34.8	100
8	1540.0	0.26	0.24	24.0	33.0	120
9	1538.5	0.26	0.28	23.0	31.8	110
10	1442.5	0.27	0.16	24.0	29.0	110
11	1442.0	0.27	0.20	27.0	35.0	96
12	1440.0	0.28	0.12	29.5	34.8	90
13	1391.5	0.27	0.07	30.0	33.0	85
14	1390.0	0.27	0.25	22.0	32.3	116
15	1388.0	0.27	0.30	23.0	32.7	111
16	1386.5	0.25	0.23	24.5	34.3	108
17	1385.5	0.24	0.20	26.0	35.0	101
18	1284.8	0.26	0.01	29.0	31.8	86
19	1274.0	0.37	0.00	31.0	33.0	82
20	1273.0	0.37	0.00	27.0	32.3	78
21	1245.8	0.39	0.05	34.5	32.7	74
22	1245.0	0.36	0.00	31.0	33.5	76
23	1244.0	0.36	0.02	29.0	33.0	76
24	1166.0	0.44	0.02	27.0	32.7	98
25	1159.5	0.44	0.12	26.0	31.0	119
26	1067.0	0.33	0.00	33.0	37.2	104
27	1065.0	0.30	0.00	33.0	35.7	115
28	1063.5	0.22	0.00	35.0	35.0	112
29	1005.0	0.49	0.21	23.5	30.0	85
30	1004.0	0.44	0.30	22.0	30.2	101
31	1002.0	0.24	0.90	6.60	30.2	79

APPENDIX 7

PALYNOLOGICAL REPORT ON THE BARTON CORNER NO 1 WELL - FOR BEACH PETROLEUM N/L

BY

V ARCHER

GEOLOGICAL SURVEY OF VICTORIA REPORT 1985

CONTENTS

INTRODUCTION

Three side wall core samples from the Beach Petroleum Barton Corner No.1 well were examined for palynological dating purposes. The well is located near Dartmoor in south-western Victoria.

The two shallower samples at 1674m and 1700m yielded assemblages of spores and pollen and microplankton, while the deepest sample at 1835m was virtually barren.

A kerogen and maturation analysis was made for the three samples.

Results : Palynological Examination of Barton-Corner -1

Depth (m) of SWC's	Confidence Rating	Spore-Pollen Zone	Age
1674.0	1	A.distocarinatus Zone	Cenomanian - early Turonian
1700.0	1	P.pannosus Zone - early A.distocoirinatus Zone	Late Albian - early Cenomanian
1835.0		Indeterminate	

CONFIDENCE RATINGS - DEFINITIONS

0 : SWC or CORE, EXCELLENT CONFIDENCE, assemblage with zone species of spores, pollen and microplankton.

1 : SWC or CORE, GOOD CONFIDENCE, assemblage with zone species of spores and pollen or microplankton.

2 : SWC or CORE, POOR CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.

3-4 : Apply to cuttings only.

SPECIES LIST - BARTON CORNER-1

SPORES-POLLEN	1674m	1700m
Alisporites grandis		x
Amosopollis cruciformis	x	x
Appendicisporites distocarinatus	x	x
Arcellites reticulatus		x
Baculatisporites comaumensis	x	
Balmeisporites tridictyus		x
Ceratosporites equatis		x
Cicatricosisporites australiensis	x	x
C.cuneiformis	x	x
C.hughesi	x	
C.ludbrooki	RW	RW
C.pseudotripartitus	x	x
Classopollis cf. C chateaunovi		x
C.classoides	x	x
Coptospora paradoxa	RW	
Cyathidites australis		x
C.minor	x	x
Dictyotosporites filosus	RW	
D.speciosus		RW
Foraminisporis asymmetricus	RW	
F.dailyi		x
Foveosporites canalis		x
Gingkocycadophytus nitidus	x	
Gleicheniidites circinidites	x	
Klukisporites scaberis	x	x
Kraeuselisporites jubatus	x	
K.linearis	cf.	x
K.majus		x
Laevigatisporites major	x	x
L.ovatus	x	
aff. Lunatisporites noviaulensis	RW	RW
Microcachyridites antarcticus	x	x
Osmundacidites wellmanii	x	x
Parasaccites gondwanensis		RW
Podocarpidites ellipticus	x	
Stereisporites antiquasporites	x	x
Triporoletes radiatus		x
T.reticulatus	x	x

(continued):

MICROPLANKTON	1674m	1700m
Callaiosphaeridium asymmetricum		x
Cleistosphaeridium cf. C.granutatum		x
Coronifera oceanica		x
Cribroperidinium edwardsii	x	x
Cyclonephelium compactum		x
C.distinctum	x	x
C.eisenackii		x
Exochosphaeridium cf. E.phragmites?		x
Fromea amphora	x	
aff. Litosphaeridium arundum		x
Muderongia cf. M. staurota		x
Odontochitina operculata	x	x
Oligosphaeridium pulcherrimum		x
Spinidinium sp.		x
Spiniferites ramosus	x	x

cf. - compare

RW - Reworked

KEROGEN ANALYSIS :- BARTON CORNER NO.1

Depth(m)	TAI	Spores-Pollen (%)	Micro-plankton (%)	Structural Terrestial (%)	Biode-graded Terrest-rial (%)	Amorphous Sapropelic (%)	Inert Opaque fusain
1674	4	+	–	5.5	14.5	6.0	74.0
1700	4	1.5	4.5	-	22.5	2.0	70.0
1835	-	+	-	-	7.0	6.0	81.5

To nearest 0.5%

DISCUSSION AND CONCLUSIONS

a) The Biostratigraphic Zones

1674m. The palynomorph assemblage contains the species A.distocarinatus, L.major, C.pseudotripartitus, C.cuneiformis and K.jubatus which suggest an A.distocarinatus Zone assemblage.

1700. The assemblage is richer in microplankton than the sample above. The spore-pollen species A.distocarinatus, C.cuneiformis, L.major, K.majus in the assemblage restrict the vertical distribution to the T.pannosus - early A.distocarinatus Zones. The dinoflagellate species present lend support to an Albian - Cenomanian age.

Both samples contain reworked Permian and Early Cretaceous species.

1835m. The sample proved to be virtually barren of microflora, and yielded insufficient information for dating purposes. The sparse palynomorphs present were poorly preserved and although not able to be dated, a kerogen analysis was made on the organic matter present.

b) Kerogen Analysis

The Thermal Alteration Index (TAI) is based on a subjective observation of an unornamented spore(s) to determine the colour as it relates to a TAI scale (Batten 1981).

A TAI of 4 indicates a light to medium brown colour which falls within the dry and wet hydrocarbon generation regime.

The Barton Corner No.1 samples are high in inert (opaque) fusian (>70%). Of the remaining organic matter, biodegraded terrestial material is the most common, then amorphous material and structured terrestial.

The percentages of amorphous material are generally higher in these samples than the Fahley-1 samples. The Barton Corner No.1 results, being from side wall core material, must be regarded as being truer representations of the organic constituents than the cutting analysis, but nevertheless, the two wells yielded similar trends.

As with the Fahley-1 samples, the proportion of opaque material is the highest, followed by biodegraded terrestial, then amorphous and structured material.

From Staplin 1969, this mixture of amorphous and recognizable terrestial plant matter tends to have wet hydrocarbon potential.

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BARTON CORNER NO. 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
					Belfast Mudstone 1557.5 m
x2280	1562.5 SWC 15	0.43	0.31-0.52	14	Sparse sporinite and phytoplankton, yellow to orange. (Siltstone>claystone. Dom abundant, I>E>V. Inertinite abundant, exinite and vitrinite sparse. Major ?glauconite and pyrite.)
	$\bar{R}_I$	1.16	0.70-1.88	25	
x2281	1585 SWC 14	0.43	0.36-0.53	26	Sparse sporinite, yellow to orange, sparse phytoplankton, yellow. (Siltstone>claystone. Dom abundant, I>V>E. Inertinite abundant, vitrinite common, exinite sparse. Major ?glauconite and pyrite.)
					Flaxmans Formation 1597 m
x2282	1633.5 SWC 13	0.46	0.41-0.55	4	Rare phytoplankton, yellow. (Siltstone>sandstone. Dom common, I>V>or=E. Inertinite common, vitrinite and exinite rare. Major ?glauconite, carbonate and pyrite.)
	$\bar{R}_I$	1.30	0.92-1.80	25	
					Warree Formation 1672 m
x2283	1683 SWC 11	0.45	0.36-0.59	30	Rare liptodetrinite, yellow to orange, rare ?sporinite, yellow orange. (Sandstone>carbonate>siltstone>coal. Coal abundant, I>V. Fusinite>vitrite. Coal typically pyritized, fusite extensively pyritized. Dom sparse, I>V>E. Inertinite sparse, vitrinite and exinite rare. Inorganic mud additive present. Pyrite abundant.)
	$\bar{R}_I$	1.21	0.78-2.93	7	
					Eumeralla Formation 1697.0 m
x2284	1700 SWC 10	0.53	0.43-0.62	11	Sparse sporinite and liptodetrinite, yellow to orange. (Claystone>sandstone. Dom common, I>E>V, Inertinite common, exinite sparse to common, vitrinite rare. Pyrite common.)
	$\bar{R}_I$	1.48	0.86-3.21	15	
x2285	1835 SWC 7	0.58	-	1	Rare liptodetrinite, yellow. (Sandstone>>claystone> carbonate. Dom rare, I>V>E. All three maceral groups rare. Diffuse humic matter present. Pyrite rare.)
	$\bar{R}_I$	1.37	0.88-1.68	8	
x2286	1893 SWC 4	-	-	-	No fluorescing exinite. (Sandstone>>carbonate. Dom rare, I only. ?Marcasite rare.)
	$\bar{R}_I$	2.06	0.98-4.47	4	
x2287	1924.5 SWC 3	0.53	0.43-0.64	7	Sparse sporinite, yellow to dull orange, sparse liptodetrinite, greenish yellow to dull orange, rare cutinite, yellow. (Sandstone>claystone. Dom common, E>I>V. Exinite common, inertinite sparse, vitrinite rare. ?Oil droplets present. Pyrite rare.)
	$\bar{R}_I$	1.52	0.96-2.77	15	
x2288	2050 SWC 1	0.63	0.45-0.75	12	Sparse sporinite, yellow to orange, rare cutinite, orange, rare liptodetrinite, yellow to orange. (Sandstone> claystone. Dom sparse, E>I>V. Exinite and inertinite sparse, vitrinite rare. Pyrite rare.)
	$\bar{R}_I$	1.37	0.98-1.91	15	

BARTON CORNER NO. 1

K.K. No.	Beach Pet. No.	TOC
X2280	SWC 15	1.00
X2281	SWC 14	0.76
X2282	SWC 13	0.20
X2283	SWC 11	1.33
X2284	SWC 10	1.17
X2285	SWC 7	0.13
X2286	SWC 4	0.12
X2287	SWC 3	0.37
X2288	SWC 1	0.56

PHILIP E. BOCK
GEOLOGICAL CONSULTANT

PETROLOGY
BIOSTRATIGRAPHY
PETROLEUM GEOLOGY
HYDROGEOLOGY

32 SWAYFIELD ROAD
MT. WAVERLEY
VICTORIA, 3149

TELEPHONE 288 4491

21st August 1985

PETROLOGICAL REPORT FOR BEACH PETROLEUM LTD

Sidewall Cores from Barton Corner

Core 13: 1633 m.

Name: Chloritic coarse quartzose greensand

Megascopic properties: Soft, dark green, very poorly sorted.

Microscopic properties: About 50% 'chlorite' matrix
About 25% 'greensand' grains: includes structureless 'glauconite', oolitic 'chamosite' and partially oxidised glauconite.
About 25% terrigenous grains: mainly quartz, with minor biotite schist, phyllite, microcline, and volcanic rocks (andesite or dacite)

Fabric: Homogeneous, no visible grain orientation or bedding.
Grainsize: Sand-size grains range from medium to very coarse.
Grains are generally rounded to well-rounded; some grains are angular. Sphericity of grains is moderate.
The grains of 'glauconite' and 'chamosite' oolites indicate a marine environment with slow rates of deposition and reasonably high energy conditions. The great variety of types of terrigenous grains suggests that an area of complex geology was being eroded relatively rapidly, since grains of volcanic rocks and felspars are relatively fresh, and soft metamorphic rocks (phyllite) have not been destroyed by abrasion. The supply of these grains would require transport by a significant river or river system. However, the grains are contained in a matrix which is interpreted as depositional, of green phyllosilicate ('chlorite'). This material may have formed from the degradation of the greensand grains, but is probably not derived from breakdown of felspars or rock fragments. However, the grains of greensand in the rock show no signs of post-depositional breakdown, so it is probable that the matrix is a true depositional matrix. The fabric is borderline between a grain-supported ('packstone') fabric and a mud-supported fabric ('wackestone' in carbonate rock terminology). There is little evidence of post-depositional compaction. Minute grains of

--2

Microscopic properties: about 40% of terrigenous sand grains.
remainder is calcitic cement, with minor chlorite.

--3

limonite-coated carbonate (dolomite?) are present in the matrix.
Interpretation: The final depositional environment for this sediment was low-energy, such as a lagoonal or shallow, quiet-marine environment. However, this was close to sources of high energy material, including terrigenous grains and the glauconite/chamosite grains. Primary porosity would have been very low.

Core 12: 1674 m.

Name: Fine lithic sandstone ; with shale interbeds.

Megascopic properties: friable, grey, well-sorted sand with shale laminae.

Microscopic properties: 100% terrigenous material
Fabric: the rock is inhomogeneous: a discrete layer of shale, with a thickness of about 3 mm, is present. The remainder of the rock consists of fine sandstone, which appears to be slightly finer near the junction with the shale layer, and contains clay matrix in variable quantities in different parts of the section observed. The primary porosity of the rock would appear to be reasonably high, although it would have had a low permeability due to the fine grainsize. The clay matrix present in some layers appears to have been formed by the breakdown of labile grains in the sandstone.

Grainsize: Mean grain diameter is in the range 0.1-0.2 mm. Sorting is poor, rounding also is poor. Textural maturity is either submature (assuming 'matrix' has been deposited after deposition of the framework), or immature (if their was more than 5% of depositional matrix).

Quartz: about 20% of rock, mainly single-crystal grains.
Rock fragments: about 40% of rock. These are of varied composition, but appear to mainly consist of felsic volcanics, with minor chert and fine-grained metamorphic rocks. Felspar: about 10% of rock, mainly plagioclase.
Clay matrix: This is not distributed evenly through the rock. Some areas appear to lack significant amounts of matrix, but particular patches or layers contain a considerable amount of fine matrix.

Comments: The grainsize distribution and structures suggest a moderate and variable energy regime, such as might be present in fluvial sediments or tidal flat conditions. The inhomogeneity of the rock implies that porosity and permeability on a micro-scale would also be highly variable, but the clay layers and the presence of areas richer in clay matrix will result in low permeability measures ove large distances.

Core 5: 1890 m

Name: Calcitic lithic sandstone.

Megascopic properties: Friable, light grey, moderately well sorted. Bedding present as a fissile fracture, with rare thin laminae of muddy material.

Microscopic properties: about 40% of terrigenous sand grains.
remainder is calcitic cement, with minor chlorite.

Fabric: generally homogeneous, but with small areas rich in 'chlorite' cement. Grainsize: Sand grains about 0.5 to 1.5 mm. Sand is poorly sorted, angular, with low to moderate sphericity. The proportion of cement is unusually high: it is possible that grain growth of the cementing material has 'forced apart' the framework grains, so that a large number are apparently 'floating' with no mutual contacts with other framework grains. (The alternative explanation is that the cement is recrystallised primary calcite matrix, but this would be inconsistent with what is presently known of the Otway Group sediments).

Quartz: About 10% of rock volume. Grains are angular, and poorly sorted.
Rock fragments: About 25% of rock. Includes fine volcanic rocks, chert, and mudstone fragments. Some grains appear fresh, others are weathered.

Felspar: A few grains of plagioclase, some with significant weathering.
Matrix/Cement: This mainly consists of sparry calcite or 'microspar', with the crystal size down to about .005 mm. A patch of 'chlorite' cement is also present.

Comments: It is believed that this rock initially had high porosity and permeability, and was formed in a high energy environment of rapid deposition. The subsequent deposition of calcite cement has reduced the porosity to a very low value. The source of the calcite cannot be established, but it was probably related to the groundwater regime at some stage. It should be emphasised that this is only a small sample, and the core may not be representative of the properties of the remainder of the unit. It is possible, for example, that calcite deposition only took place in a small concretion, or in a single bed. A layer cemented like this in an otherwise permeable formation could, of course, form a barrier to petroleum migration.

It is therefore believed that this unit could be further examined for relatively uncemented sections which may have retained a high porosity.

However, an alternative explanation is that carbonate cementation preceded the events which, elsewhere in the Otway Group, resulted in breakdown of labile grains and the deposition of chloritic cement. In this case, the layers without carbonate may prove to be equally impermeable. Further study would be necessary before a detailed relationship between deposition, cementation, and oil generation and migration could be worked out.

(Philip E. Bock)