SECTION 2 - GEOLOGICAL DATA

2.1 Geological Summary

Scarborough-1 was spudded in the Kyalla Member of the McMinn Formation of the late Proterozoic Upper Roper Group. Cuttings samples were taken at 2 metre intervals from the top of the hole to a depth of 8m from where the hole was fully cored.

The well penetrated a typical Upper Roper Group section and essentially followed the prognosed section given the discrepancy in the thickness of Bessie Creek Sandstone anticipated and that intersected. Table 3 summarises the actual versus prognosed formation tops. The section intersected is almost identical to that drilled in Alexander-1.

Numerous fluorescence and a few very minor oil shows were encountered during the drilling of Scarborough-1. The fluorescence/shows are detailed in Enclosure 1. The main occurrences of interest are as follows:-

1. Moroak member - bitumen blebs in vugs and in part entirely infilling porosity, oil and bitumen staining throughout.

2. Velkerri Formation - occasional kerosene odour through interval.
   - minor oil bleeds mainly associated with small carbonate veinlets.
   - all colours of fluorescence throughout interval from 270-470m.

3. Bessie Creek Sandstone - Pore-filling bitumen throughout.
   - Rare yellow/green fluorescence in places.
   - Relict oil/water contact at 642.7m

The well was terminated in the Corcoran Formation, the unit directly underlying the primary reservoir target - the Bessie Creek Sandstone (Figure 3 shows porosity/permeability results).

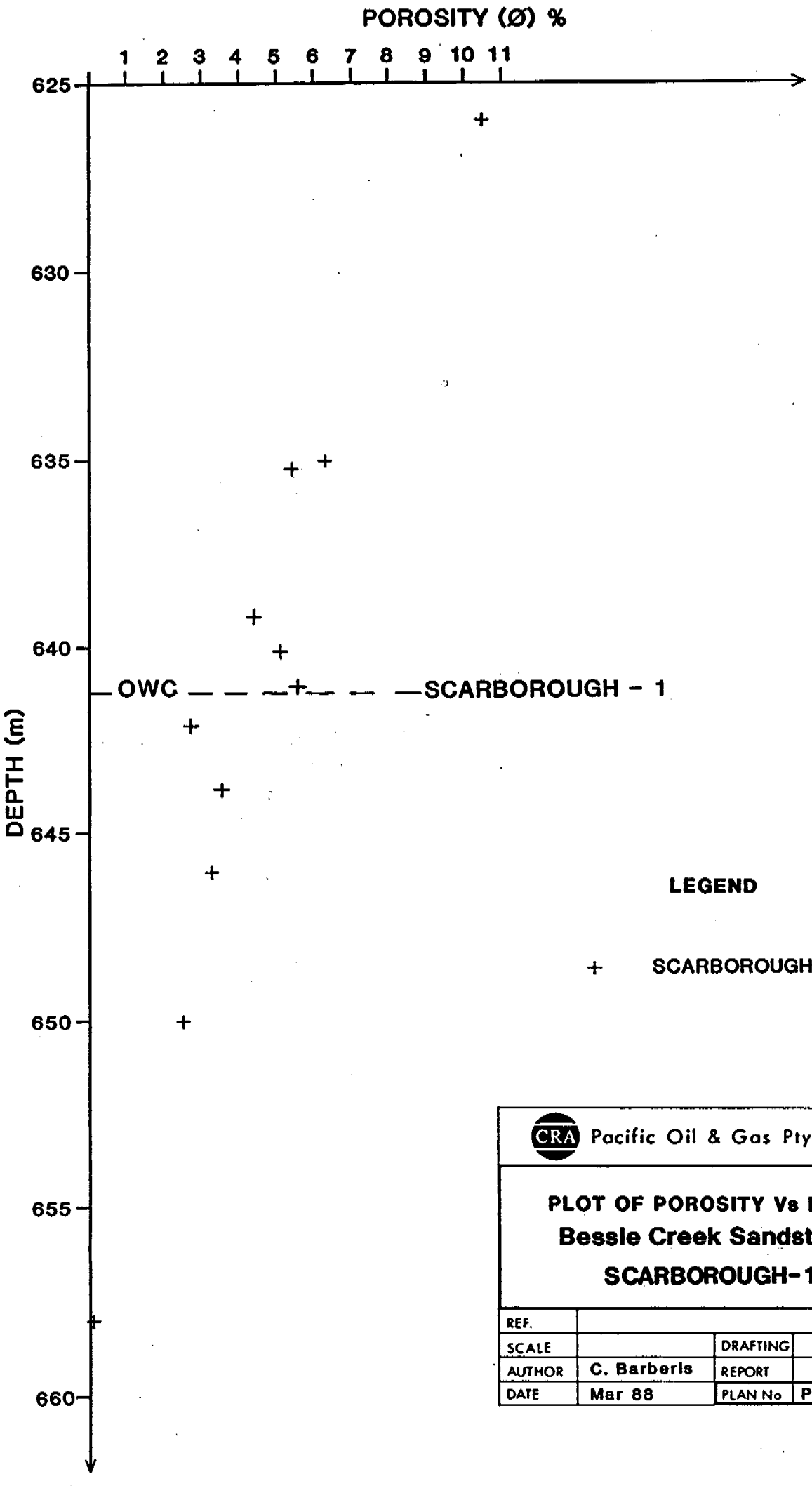
An on-site evaluation of the wireline logs indicated no zones that warranted testing. The well was then plugged and abandoned in the approved manner.

TABLE 3

ACTUAL VERSUS PROGNOSED FORMATION TOPS

WELL: Scarborough-1
PERMIT: EP4, Northern Territory

A G E	FORMATION	DEPTH TO FORMATION TOP		
		ACTUAL DEPTH	PROGNOSED DEPTH	DIFFERENCE
Late Proterozoic	Kyalla Member	Surface	Surface	
	Moroak Sandstone Member	52	16	+ 36
	Velkerri Fm.	122	143	- 21
	Bessie Ck Sst	621	593	+ 28
	Corcoran Fm.	667	700	- 33
	TD	691.3	730	- 38.7

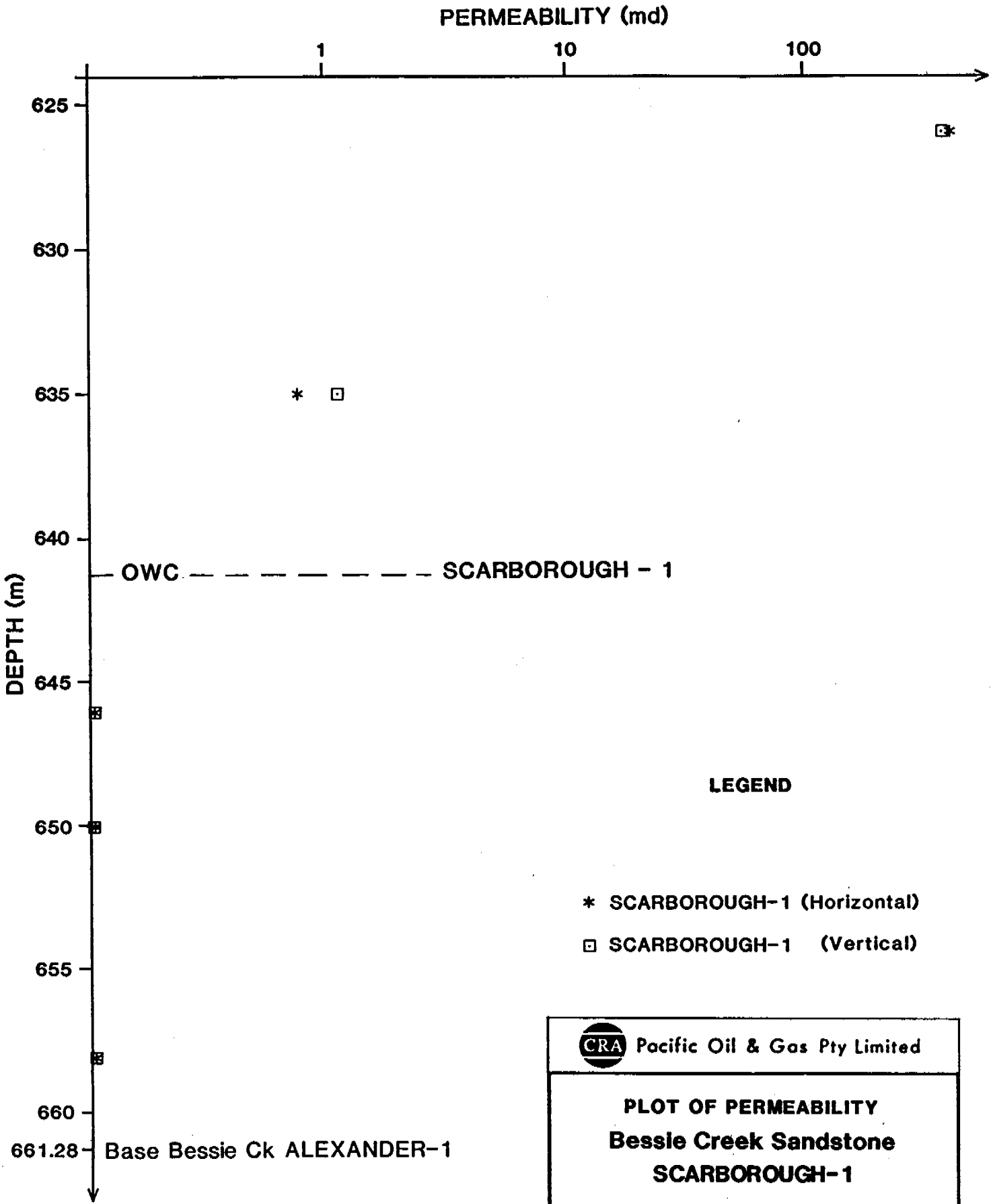


CRA Pacific Oil & Gas Pty Limited

PLOT OF POROSITY Vs DEPTH
Bessie Creek Sandstone
SCARBOROUGH-1

REF.			
SCALE		DRAFTING	
AUTHOR	C. Barberis	REPORT	
DATE	Mar 88	PLAN No	PetNTcw 652

Figure 3A



CRA Pacific Oil & Gas Pty Limited

PLOT OF PERMEABILITY
Bessie Creek Sandstone
SCARBOROUGH-1

REF.			
SCALE		DRAFTING	
AUTHOR	C. Barberis	REPORT	
DATE	Mar 88	PLAN No	PetNTcw 654

Figure 3B

2.2 Well Objectives

A. To obtain a full stratigraphic and lithological section of the Upper Roper Group, McArthur Basin.

B. To obtain a full source rock quality profile through the whole stratigraphic sequence, including oil and gas generative potential.

C. To provide preliminary data on reservoir horizons.

D. To provide well control for the seismic data obtained by Amoco in 1983.

E. To test a seismically defined structure exhibiting four way dip closure.

2.3 Performance vs. Objectives

The performance versus objectives are discussed below using the same subsections as section 2.2 above.

A. A full stratigraphic and lithological section of the McArthur Basin Upper Roper Group was intersected by Scarborough-1 from the Kyalla Member to the Corcoran Formation.

B. A full source rock profile was obtained over the entire stratigraphic sequence in Scarborough-1. Samples were taken at five metre intervals through all potential source horizons (Moroak member/Velkerri Formation/Corcoran Formation). Alternate samples were analysed for TOC, and those samples with a TOC > 0.4% were analysed by the Rock-Eval pyrolysis technique. Results are located in Appendix III.

Based on the results of the geochemical analyses, it was possible to identify organic-rich oil-prone source horizons. The middle part of the Velkerri Formation appeared to be the best source horizon.

C. The reservoir horizon intersected (namely the Bessie Creek Sandstone) was tested for porosity/permeability.

Figure 3 shows a graphical representation of the results. These results can be found in Appendix IV.

D&E. The validity of the test is uncertain. The quality of seismic data available is very poor and a reprocessing/reinterpretation excercise is currently underway to identify the structure more clearly.

2.4 Stratigraphy

The nomenclature used in the following discussion and stratigraphic table (Table 4) is based on a compilation of all available data concerning the stratigraphy of the McArthur Basin.

PROTEROZOIC

Kyalla Member
Surface to 52 metres. (thickness 16 metres plus).
Sandstone/siltstone/mudstone
0 - 52m
Interbedded siltstone, mudstone and fine to medium grained sandstone, micaceous, finely laminated to massive, red brown and yellow orange colouring changing below 8m to greyish black and olive black with light grey to medium grey fine to medium grained 1-5m laminated sandstone. Scours of up to 10cm are present. The siltstone and mudstone is finely laminated to structureless. Vertical fractures appear to cause the sandstone to "boudinage" probably as a dewatering phenomenon. Organic matter lathes, soft sediment deformation and compactional features are common.

Moroak sandstone Member
52m to 122m (thickness 70 metres)
Sandstone/siltstone/mudstone.
Massive medium grained sandstone, light olive grey with mottled brown and yellowish grey staining, occasional very thin mudstone beds and interbedded fine sandstone, siltstone. Large scale scours (10cm) are present. Some areas appear to have enhanced visible porosity.

Velkerri Formation
122m to 621m (thickness 499 metres)
very fine sandstone/siltstone/mudstone.
The Velkerri Formation can be divided into three sections as follows:-

1. Upper Velkerri - 122-295m (thickness 173m.)

122-169m
Thinly interbedded very fine grained sandstone, siltstone and mudstone, yellowish grey to light olive grey, greenish black to olive black in colour.
Thinly interbedded organic matter rich mudstone and siltstone, brownish black in colour.

169-295m
Thinly interbedded dominantly mudstone with siltstone and rare very fine grained sandstone. Light bluish grey to medium bluish grey in colour. Mudstones and siltstones are finely laminated, with sandstone varying from 2mm to 5cm thick.
When kerosene odour starts (180m) the colours change from brown to black to olive black and sediments exhibit a varve like appearance. Sandstone intervals disappear after approximately 220m.

2. Middle Velkerri 295-457m (thickness 162m)

Finely laminated to massive mudstone characterised by thin (1mm to 1cm) carbonate lenses with associated pyrite at centre. Fractures infilled with carbonate are common, as are vughs. The colouring is brown black to black. Often a debris flow texture is apparent.

3. Lower Velkerri 457-621m (thickness 164m)

Massive or extremely finely laminated mudstone. Colours are medium bluish grey to dark green grey. Minor smirly organic matter is apparent as are blebs. Slumping and soft sediment deformation are common.

Bessie Creek Sandstone 621-667m (thickness 46m)

Sandstone
Massive fine to medium and coarse grained silicified sandstone, medium dark grey to brown grey colouring. Stylolites are common as are vertical fractures. A relict oil/water contact is interpreted at 642.65m below which the colours change to pinkish grey to very light grey with thin organic rich layers and intraclasts of mudstone.

Corcoran Formation 667-691.3m (thickness 24.3m plus)

Sandstone/siltstone
Thinly interbedded fine to very fine sandstone and siltstone. Numerous soft sediment deformation features are present and provide a diagnostic character for the interval.

STRATIGRAPHY - ROPER GROUP

<table>
<tr><td colspan="2">CHAMBERS RIVER FORMATION</td><td rowspan="2">COBANBIRINI FORMATION</td></tr>
<tr><td>McMINN FORMATION</td><td>KYALLA MEMBER
SHERWIN IRONSTONE
MOROAK SANDSTONE MEMBER</td></tr>
<tr><td colspan="2">VELKERRI FORMATION</td><td>LANSEN CREEK SHALE</td></tr>
<tr><td colspan="3">BESSIE CREEK SANDSTONE</td></tr>
<tr><td colspan="3">CORCORAN FORMATION</td></tr>
<tr><td rowspan="3">ABNER SANDSTONE</td><td colspan="2">HODGSON/MUNYI SANDSTONE MBR.</td></tr>
<tr><td colspan="2">JALBOI MEMBER</td></tr>
<tr><td colspan="2">ARNOLD SANDSTONE MEMBER</td></tr>
<tr><td colspan="3">CRAWFORD FORMATION</td></tr>
<tr><td colspan="3">MAINORU FORMATION</td></tr>
<tr><td colspan="3">LIMMEN SANDSTONE</td></tr>
</table>

2.5 Mud Logging

No mud logging services were contracted for Scarborough-1.

2.6 Electrical Logging and Other Surveys

At total depth, the following logs were run by BPB Instruments (Australia) Pty Limited.

L O G	R U N	INTERVAL (m)	D A T E
Gamma, density, caliper and porosity	3, 4	2 - 690	28/09/87
Self potential, dual spaced focussed	1, 2	87 - 690	
Gamma, caliper, sonic	3, 5	2 - 690	

Copies of all well logs are included as Enclosure 2.

2.7 Bottom Hole Temperature

Bottom hole temperature recorded at 693.4m (logger) was 58°C.

2.8 Formation Sampling

2.8.1 Ditch Cuttings

Ditch cuttings were collected at two metre intervals down the hole from 0 metres to 8 metres. A washed sample from each interval was described by the company geologist in detail and a portion of the sample submitted to the mines branch.

2.8.2 Conventional Cores

Scarborough-1 was a fully cored hole from 8.1m to 691.3m (T.D.). Core is stored at the CRA Exploration Pty Limited core shed in Darwin.

2.9 Reservoir Potential

Details are contained in Appendix IV and Figure 3 for the thirteen samples submitted for reservoir analysis to AMDEL from Scarborough-1.

2.10 Hydrocarbon Shows

Numerous occurrences of fluorescence and a few very minor oil shows were encountered during the drilling of Scarborough-1. Results are detailed in Enclosure 1.

2.11 Geochemistry

2.11.1 Analyses

A total of 51 core samples from Scarborough-1 were sent to AMDEL in Adelaide for geochemical analyses. Samples were selected from the section 140 to 690m. at approximately five metre intervals. Every second sample was analysed for Total Organic Carbon (TOC), if this was ≥0.4 then the sample was analysed by the Rock-Eval pyrolysis technique.

The analyses provided by AMDEL were internally consistent.

The analytical results from AMDEL are included as Appendix III.

2.12 Geophysics

2.12.1 Core Gamma Ray

Core gamma ray measurements were taken over the entire interval from 0 - 691.3m in Scarborough-1. Results can be found as Enclosure 4.

2.12.2 Magnetic Susceptibility

The entire core from Scarborough-1 was measured for magnetic susceptibility. Results are included as Enclosure 5.

2.13 Contributions to Geological Concepts

Prior to the drilling of Scarborough-1 there was a paucity of hard data available in the McArthur Basin.

Scarborough-1 provided a full stratigraphic sequence through Upper Roper Group of the McArthur Basin, evaluation of its hydrocarbon potential is now possible.

Scarborough-1 demonstrated that fair to reasonable quality reservoirs exist in the Upper Roper Group, and that excellent quality source rocks are present in the Velkerri Formation and are laterally continuous over areas of at least tens of kilometres.