

1. ENGINEERING DATA

1.1 Engineering Summary

Shortland 1, in EP18, Northern Territory, is located approximately 30 kilometres east southeast of Dunmarra, PetNTcw4965.

Prior to the rig moving onto location a 13 3/8" conductor was set and cemented 9 metres below ground level. Rockdril Rig 23 spudded **Shortland 1** at 1830 hours, 12 November 1992. A 12 1/4" hole was drilled to 59 metres, using spud mud for hole cleaning. A velocity survey was taken (held up at 38 metres). A checktrip was made and BPB Slimhole logged from 56.4 metres to surface. The 9 5/8" casing was run and cemented with the shoe at 59 metres, using 80 sacks of class 'A' cement at 15.6 ppg with cement returns to surface. After waiting on cement the diverter and blooie line were rigged up and air compressor and boosters installed.

The top plug and shoe were drilled out with a slick assembly, and then a pendulum assembly to drill the 8 1/2" section. Drilling commenced using air and water and at 90.5 metres circulation was lost with no returns. Drilling continued with air and no returns to 447.9 metres when the bit was pulled due to blown turbos on the boosters. An attempt to log the existing hole was made but the tool stood up at 110 metres.

Spare parts for the booster was flown in and installed and drilling continued to 487.3 metres when the bit was blocked. The bit was pulled and 20 metres of cuttings were removed from the bottom section of 6 1/4" drill collars. Drilling continued to 553.5 metres and it was decided to log. Bridges between 108 and 270 metres required continuous reaming, and BPB attempted to log the section through drill pipe, with the pipe at 126, 188, 283 and 330 metres, but each time the tool stood up 20 - 40 metres below the drillpipe depth.

The logging attempt was abandoned, and a velocity tool recorded data from 316 metres to the seismic reference point.

A check trip was made and the 7" casing was run with a cement basket at 36 metres. At 110 metres the casing stood up, the casing was worked down to 140 metres, and again from 390 metres down to 432.5 metres. The casing was set with the shoe at 532.2 metres. The casing was cemented with 78 sacks of Class 'A' cement at 15.6 ppg.

Three top cement jobs were attempted down to the cement basket without returns to surface. A steel plate was welded between the 9 5/8" and 7" annulus at surface.

After the BOP test a pendulum drilling assembly was used to drill out the cement and shoe using water and Hi Vis pills. A limited leak off test was conducted to an EMW of 12.7 ppg. The water was then lifted with air and drilling continued with air from 557 to 773 metres.

The well was then displaced to mud and several circulations made to condition the mud before drilling ahead. (The R.O.P. with mud in the hole dropped to approx. 7m /hr as compared to 15m /hr with air.)

At 836 metres a closed chamber drill stem test was conducted over the interval 817.87 - 836.0 metres.

Drilling continued to TD at 1020 metres without problem. Logs were run and abandonment Plug No.1 set from 960 - 840 metres.

After analysis of logs in Melbourne, Plug No.1 was drilled out and the velocity survey was re-run.

The well was then abandoned with Plug No. 1 set at 960 - 840 metres, and Plug No. 2 at 570 - 490 metres. After waiting on cement the Plug No. 2 was tagged with 5000 lb at 501 metres. A surface plug was set from 45 metres to surface.

A plate and well marker were welded on to the casing at surface and the rig released at 0800 hours on 3rd December, 1992.

1.2 General Data

Well Name:	Shortland-1
CRAE Drillhole No:	RD92MB24
Well Type:	Exploration well
Permit:	EP18
Operator:	Pacific Oil & Gas Pty. Limited
Title holders:	Pacific Oil & Gas Pty. Limited - 90% Pardi Pty. Limited - 10%
Location:	16° 40' 47.924" South 133° 41' 14.354" East AMG Zone 53, 360 077 E; 8 148 003.6 N SP 600, Line MA91-109 30km east southeast from Dunmarra
Elevation:	267.7 metres - Drilling floor, Datum 264.2 m - Ground level
Datum:	Unless stated all depths are loggers depths below Drilling Floor
Total Depth:	1020 metres - Driller 1018 metres - Schlumberger
Well Spudded:	13 November 1992 @ 1830 hours
At total depth:	30 November 1992 @ 2230 hours
Rig released:	3 December 1992 @ 0800 hours

Status:	Dry hole, plugged and abandoned	
Drilling rig:	Walker-Neer Apache Model 228-38-4 Rockdril Rig 23	
Hole Size:	17½ inch to 9 metres (Driller) 12¼ inch to 59 metres (Driller) 8½ inch to 553.5 metres (Driller) 6 inch to 1020 metres (Driller)	
Casing:	13 3/8 inch at 9 metres (Driller) 9 5/8 inch at 59 metres (Driller) 7 inch at 532 metres (Driller)	
Wireline Logs:	<u>BPB</u> RR2 12.7 - 59.0 metres <u>Schlumberger</u> DLL-GR-BHC-MSFL-SP 50.0-1515.5 metres LDL-CNL-NGS 532.0-1017.0 metres DIL 532.0-1016.0 metres	
Velocity Survey:	Velocity Data Pty Ltd,	12.0-38.0 metres 16 event weight drop survey 38.0-316.0 metres 11 shot well shoot
	Schlumberger Seaco,	67.7-1010.0 metres 20 shot well shoot

1.3 Drilling Rig

Rockdril Contractors Rig 23, a Walker-Neer, was used to drill **Shortland 1**. Specifications for this rig and associated plant are given in Appendix 1.

1.4 Service Companies

The following service companies were employed:

Milpark:	Mud supply, mud engineering
Halliburton SDL:	Mud logging
Schlumberger Seaco/BPB:	Electric logging, Velocity surveys
Dowell Schlumberger/Australian DST:	Testing
Velocity Data:	Velocity surveys

1.5 Hole Sizes

17½ inch to 9 metres (Driller):
Pre-drilled by Gorey and Cole, drilling contractors.

12¼ inch to 59 metres (Driller):
Conventionally drilled to 59 metres (Driller).

8½ inch to 553.5 metres (Driller):
Drilled with air and without returns to surface.

6 inch to 1020 metres (Driller):
Drilled with air 557 - 773 metres. Mud from 773 metres - 1020 T.D.

1.6 Drilling Problems

The Tindall Limestone was drilled with air and it had been anticipated that water (and cuttings) would be lifted to surface from this major aquifer. However in the event, although air was used (saving the drilling of water bores to supply water for blind drilling) there were no returns to surface until the Tindall Limestone was cased off.

Problems were experienced in this section while attempting to log (as in previous wells). The hole appeared to bridge off preventing logs to T.D. (accumulated cuttings on ledges?).

No other major problems were encountered.

1.7 Casing

13 3/8 inch at 9 metres (Driller)

Type	Conductor pipe
Range	3
No. of joints	1
Remarks	Set by Gorey and Cole drilling contractors. The pipe was cemented to the cellar floor.

9 5/8 inch at 59 metres (Driller)

Grade	K55
Weight	36 lb
Thread	LT+C
Range	3
No. of joints	5
Accessories	Float shoe, cement basket Centralisers at 56 metres and 35 metres.
Cement used	80 sacks, Class 'A'
Cementation	Pumped 10 bbl, water pre-flush; released bottom plug; mixed and pumped cement at 15.6 ppg; released top plug; displaced with 14.9 bbl water; bumped plug with 600 psi; float held.
Top of cement	Surface
Leak-off test	Not performed

7 inch at 532.20 metres (Driller)

Grade	N80
Weight	29 lb
Thread	BTC
Range	3
No. of joints	44
Accessories	Float shoe. Float collar between joints 1 and 2. Cement retainer at 36 metres (Driller).

	5.	
Cement used	(i)	75 sacks, Class 'A'
	(ii)	60 sacks, Class 'A'
Cementation	(i)	Pumped 10 bbl water pre-flush; released bottom plug; mixed and pumped cement at 15.6 ppg; released top plug; displaced with 81.6 bbl water - no returns; bumped plug with 1000 psi; floats held.
	(ii)	Mixed and pumped cement at 15.6 ppg to the 9 5/8 x 7 inch annulus.
Leak-off test		Limited leak-off test to 400 psi EMW 12.7 ppg
Remarks		The casing had to be worked through a number of tight sections but was landed at the planned depth.

1.8 Drilling Fluids

A 12¼" hole was drilled with spud mud to 59 metres. The 8½" section through the Tindall Limestone was drilled with air using the Rockdril air package. This package was less than optimal, but was the only equipment available at short notice and consisted of 2 x 900 CFM compressors, 2 x 700 psi boosters, and a diverter fabricated to an Oiltools design.

Drilling progressed although the anticipated water and cuttings from the aquifer did not eventuate and the section was drilled blind, with slugs of water and foam injected to help clear cuttings from around the BHA.

The 6" hole section was drilled with air from 557 metres to 773 metres. ROP was 15 metres/hour. The hole was displaced to PhPa mud at 773 metres prior to penetrating the target zones and drilling to T.D. The ROP decreased to 7 metres/hour with mud in the hole. Some problems were experienced shearing the new mud prior to drilling ahead, in part due to the limited mud handling capability of the Rockdril rig. A full mud report from Milpark Drilling Fluids is included as Appendix 2.

1.9 Water Supply

It was anticipated that water would be produced from the Tindall Limestone whilst drilling with air and stored in a sump for rig and camp use.

No bores were drilled.

In the event no water was produced from the Tindall Limestone and water for rig and camp use was trucked from the Hayfield Station bore approx 24 kilometres from site. However water requirements were minimal due to drilling with air from 59 metres to 773 metres, and the minimal mud volume in the 6" hole section from that point to T.D.

1.10 Drilling Bits and Bottom Hole Assemblies

12¼ inch	To 59 metres (Driller)
	1 Type 1-1-6 (steel tooth) bit (Re-run)
	Slick BHA
	Average penetration 5.1 metres/hour
	Bit graded 5-5-1 and not reusable.

8½ inch	6. To 447.5 metres (Driller) 1 Type 4-3-7 (insert) bit Simple pendulum BHA Average penetration: 6.5 metres/hour Bit graded 2-5-1 but with 1 broken insert, discarded.
8½ inch	To 553.5 metres (Driller) 1 Type 5-1-7 (insert) bit Simple pendulum BHA Average penetration: 3.3 metres/hour Bit graded 2-3-1 and discarded.
6 inch	To 1120 metres (Driller) 1 Type 5-1-7 (insert) bit Simple pendulum BHA Average penetration: 7.2 metres/hour Bit graded 3-4-1 and discarded

1.11 Deviation Records

Deviation surveys were carried out with an Eastman downhole camera. Results are presented in Table 1.

TABLE 1

DEVIATION SURVEYS - SHORTLAND-1

Depth (metres)	Deviation
58	1°
132	½°
299	1°
401	½°
912	0°
1018	1°

1.12 Fishing Operations

Fishing operations were not necessary.

1.13 Cores

No cores were cut.

1.14 Downhole Geophysical Logs

BPB Slimline Services were contracted to survey the upper part of the well above the 6" casing shoe. Due to poor ground conditions only the Resistivity tool RR2, was run from 12.7 to 59.0 metres.

Schlumberger Seaco were contracted to complete the logging of the remainder of the well with the following suites of tools.

DLL-GR-BHC-MSFL-SP	50.0-1515.5 metres
LDL-CNL-NGS	532.0-1017.0 metres
DIL	532.0-1016.0 metres

1.15 Formation Tests

One bottom hole drill stem test was conducted with the packer set in the open hole. The closed chamber technique was used in this test.

In summary, the results were:

DST 1

Interval	817.87 to 836.0 metres (Driller)
Unit	"Hayfield Mudstone"
1st Flow	6 minutes
1st Shut-in	121 minutes
2nd Flow	237 minutes
2nd Shut-in	660 minutes
Flow	Nil (Closed Chambered)
Recovery	3.5 metres of water cut mud. Gas in hydraulic tool

Full details of the testing operations is included in this report as Appendix 4.

1.16 Abandonment

The well was plugged and abandoned with cement plugs as follows:-

- (i) Plug No. 1 was set from 960 to 840 metres with 65 sacks of Class "A" cement.
- (ii) Plug No. 2 was set from 570 to 490 metres with 54 sacks of Class "A" cement. The top of hard cement was located at 501 metres.
- (iii) Plug No. 3 was set from 45 metres to surface.
- (iv) The bradenhead was removed and a plate and monument welded to the top of the 7" casing stub.

1.17 Time Distribution

A full break-down of drilling operations can be found in Appendix 5. Drilling operations commenced at 18:30 hours 12th November and ceased at 08:00 hours 3rd December, 1992, a period of 20 days 13.5 hours. An analysis of the time spent is presented on PetNTcw4889.

1.18 Well Costs

A summary of costs for the drilling of **Shortland 1** is given in Table 2.

TABLE 2

DRILLING COST SUMMARY - SHORTLAND 1

ITEMS	COSTS
Site Preparation/Rehabilitation	30,834
Water Supply	7,923
Mobilisation/Demobilisation	60,000
Drilling	245,149
Casing	41,722
Cementing Services	6,650
Mud Supplies & Services	8,123
Geophysical logging	55,939
Camp	35,965
Mudlogging Services	19,896
Drill Stem Testing	36,762
Communications	9,404
Freight	8,228
Travel & Accommodation	21,342
Vehicle Costs	2,704
Lab Analysis	1,005
Payroll & Benefit	17,473
CRA Overheads	15,372
Consultants	27,737
Office Supplies	440
Insurance	6,253
TOTAL	658,421