OIL COMPANY
OF AUSTRALIA

BORAL ENERGY PETROLEUM PTY LTD

DRILLING PROGRAMME

PPL 1

NORTH PAARATTE 4

Boral Energy Petroleum Pty Ltd
A.C.N. 010 728 962
February, 1999

915493 003

PREFACE

The drilling of this well is to be managed by Oil Company of Australia Limited (A.C.N. 001 646 331), a Boral Limited company, on behalf of the permit operator Boral Energy Petroleum Pty Ltd (BEPL).

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1. GENERAL INFORMATION

WELL NAME:	NORTH PAARATTE 4
DRILLING MANAGER:	OIL COMPANY OF AUSTRALIA LIMITED A.C.N. 001 646 331 1st Floor, North Court, John Oxley Centre, 339 Coronation Drive, MILTON Qld 4064 Tel: (07) 3858 0600
PERMIT OPERATOR:	BORAL ENERGY PETROLEUM PTY LTD A.C.N. 010 728 926 60 Hindmarsh Square, ADELAIDE SA 5000 Tel: (08) 8235 3737
PERMIT:	PPL 1
BASIN:	OTWAY BASIN, VICTORIA
SURFACE LOCATION:	Latitude: 38° 33' 09.92" S Longitude: 142° 57' 13.70" E AMG Co-ordinates (AMG Zone 54): Northing: 5 731 028.38 Easting: 670 251.32
TARGET LOCATION:	Latitude: 38° 32' 58.87" S Longitude: 142° 57' 05.91" E AMG Co-ordinates (AMG Zone 54): Northing: 5 731 373 Easting: 670 070
SEISMIC LOCATION:	Inline: 8075 CDP: 2480
ELEVATION:	Ground Level: 92.9 m (approx.) Kelly Bushing: 98.4 m (approx.)
PROPOSED T.D.:	1590 m MD
DRILLING CONTRACTOR:	Century Drilling Limited, 172 Fullarton Road DULWICH S.A. 5065
DRILLING RIG:	Rig 1
PRIMARY OBJECTIVE:	Waarre Fm Unit 'C' Sandstone: 1411.4 m TVD KB
ESTIMATED COST:	$1,095,229 (Cased and Suspended)
ESTIMATED DURATION:	10.5 days
AFE CODE:	31-100-1000002-22xxx-12-2

OTWAY BASIN - WELL LOCATIONS

BORAL ENERGY

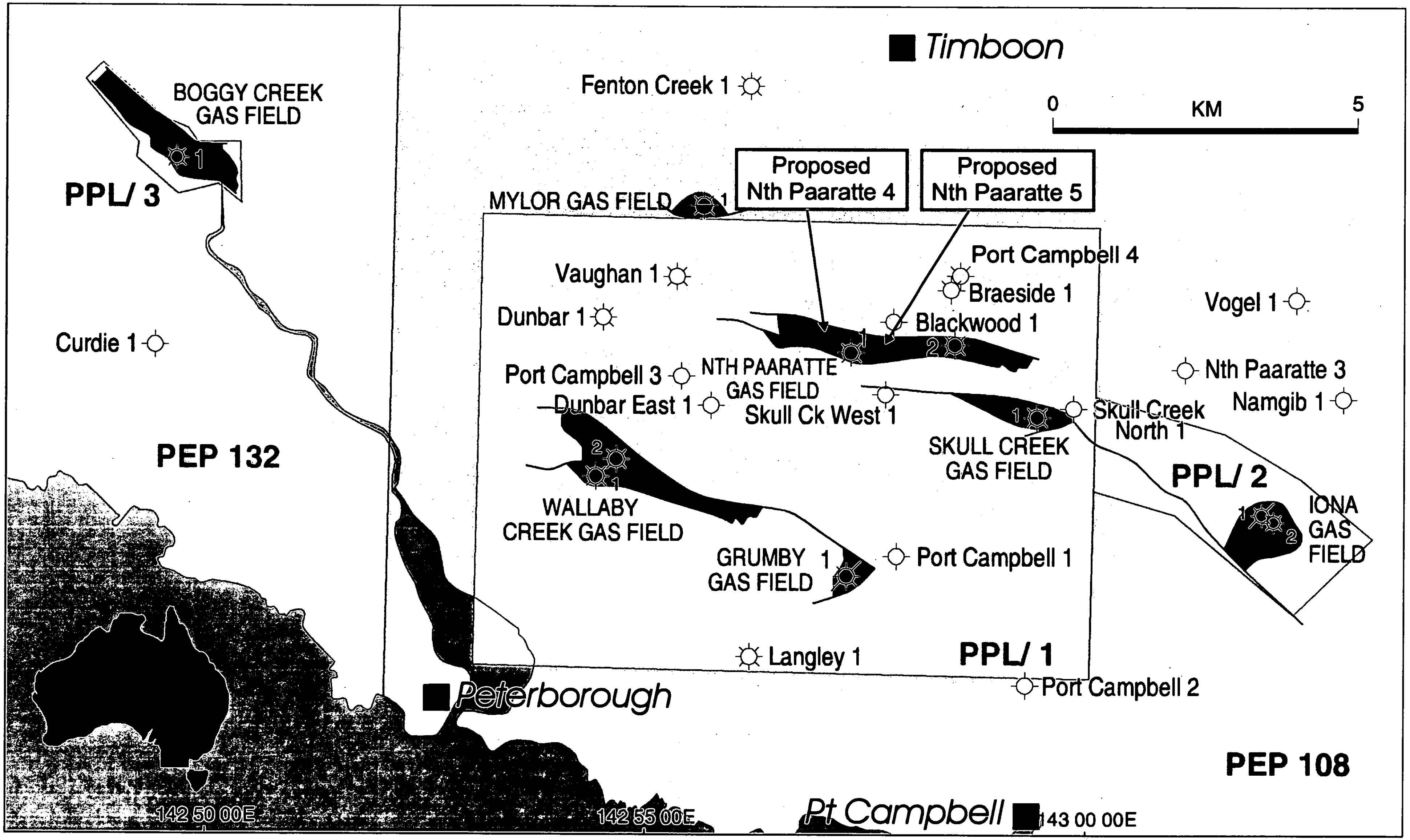

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Figure 1

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Co-ordinates of Plot Corners	LAND VICTORIA	AMG Zone 54	CADASTRAL MAP SYSTEM	Co-ordinates of Plot Corners
NW 660600, 5737700 SW 660600, 5725200	0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 Scale of Metres (1:50000)	Vicroads 100 F8	No guarantee or warranty is given as to the accuracy or completeness of the details shown on this map. Any dimensions measured from this map are only approximate. Refer to title register for further information. Source file [Rural] 6405728.324 Last updated 02/10/98 Printed 1:42pm 05/11/98	NE 680400, 5737700 SE 680400, 5725200

Figure 2

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Co-ordinates of Plot Corners NW 665500, 5734550 SW 665500, 5728300	**LAND VICTORIA** 0 250 500 750 1000 1250 1500 1750 2000 2250 2500 Scale of Metres (1:25000)	AMG Zone 54 Vicroads 100 F8	No guarantee or warranty is given as to the accuracy or completeness of the details shown on this map. Any dimensions measured from this map are only approximate. Refer to title register for further information.	**CADASTRAL MAP SYSTEM** Source file [Rural] 6405728.324 Last updated 02/10/98 Printed 1:41pm 05/11/98	Co-ordinates of Plot Corners NE 675400, 5734550 SE 675400, 5728300

Figure 3

2. GEOLOGY

2.1. Summary

North Paaratte 4 is proposed as a development well in the North Paaratte Field, PPL-1, onshore Otway Basin. Primary objective for the well is the upper Cretaceous Waarre Formation of the Sherbrook Group, and the reservoir will be used as a swing producer to meet peak gas demand.

The non-crestal North Paaratte 1 and 2 wells have shown high water cut, and strong water drive in the field demands that additional wells be located as high as possible on the structure. Depth structure mapping at the top Waarre 'C' unit shows two crestal locations and North Paaratte 4 will target the western high approximately 400 metres NNW of North Paaratte 1. The well will penetrate in excess of 40 m of gas-bearing sandstone above the original field GWC (1365mSS).

North Paaratte 4 will be drilled directionally from a surface location approximately 43 m south south-west of North Paaratte 1, using the existing gas field site. The proposed TD of –1399 m SS will allow sufficient rathole to perforate the reservoir and junk the perforating subs at the bottom of the hole.

2.2. Field History

The North Paaratte 1 discovery well was drilled in 1979 by Beach Petroleum NL. North Paaratte 1 was located on the southern flank of an elongate, east-west trending faulted anticline in the Port Campbell embayment of the Otway Basin and intersected gas in the Waarre Sandstone member of the Upper Cretaceous Sherbrook Group. Subsequent testing flowed GTS at rates up to 9.5 MMcfd and confirmed a new field discovery.

North Paaratte 2 was drilled in 1981 approximately 1.6 km to the east and intersected a similar high-deliverability reservoir in the Waarre Sandstone. North Paaratte 3 was located further to the east but intersected a separate fault block below the gas-water contact.

North Paaratte 4 is proposed as a development well approximately 400 metres north northwest of North Paaratte 1 to restore gas production from the field. The primary objective is the Waarre Formation Unit 'C' sand which is the sole reservoir in the field and North Paaratte 4 will be used to provide high deliverability gas during periods of peak demand in the Victorian gas system. High flow rates will lead to rapid reservoir depletion but such pressure loss will be offset in the long term by planned use of the Waarre sandstone as a gas storage reservoir.

The North Paaratte field was incorporated in a 1993 3-D seismic survey and the structure was reinterpreted. North Paaratte 1 was shown to be on the southern flank of an east-west trending anticlinal structure sealed by a down to the north normal fault. North Paaratte 2 is 8 metres structurally higher than North Paaratte 1 and drains the eastern region of the accumulation. Reservoir development is superior in the eastern region and production testing suggests a potential AOFP in North Paaratte 2 of 95 MMcfd.

Despite the structural elevation of both wells above the original GWC North Paaratte 2 has produced a significant water cut (up to 27 bbl/MMcf, March 1998) and elevation of the gas water contact due to strong water drive is likely to limit the ultimate recovery from both wells. RFT data indicates an original gas-water contact at –1365m SS, 12 metres below the top 'C' unit in North Paaratte 1, and up to 50 m closure remains up dip of the discovery well. In view of this fact North Paaratte 4 is proposed near the crest of a culmination which lies against the major east-west trending fault in the western region of the field and the top 'C' unit is prognosed at –1313 m SS.

Production to June 1998 totals 4.9 PJ. This volume of gas is interpreted as being sourced from the lower region of the North Paaratte structure due to strong water drive and concomitant rapid replacement of gas in the reservoir by influx of water. In view of such strong vertical movement of water within the closure attic gas is unlikely to be produced unless the respective culmination is penetrated by a well.

The original GWC is placed at -1365m SS based on RFT data and production is therefore likely to have raised the free water level to the elevation of North Paaratte 1 (-1353m SS). The GIP remaining in the structure is heavily dependent upon the ultimate rock volume above the current water level and North Paaratte 4 will be located to maximise gas recovery from the western crest of the structure.

2.3. Regional Geology

The Otway Basin is approximately 500 km long and extends both onshore and offshore west-northwest from the Victorian Mornington Peninsula in the east to Cape Jaffa, South Australia, in the west. The North Paaratte field, PPL 1, is located in the Victorian portion of the onshore Otway Basin approximately 50 km northwest of Cape Otway. The field lies in the Port Campbell embayment, which is bounded to the east by erosion along the emergent Otway Ranges and to the north and west by erosional thinning and pinch-out.

Formation of the Otway Basin commenced in the late Jurassic with the initiation of rifting between Australia and Antarctica. Depositional growth occurred as superimposed sedimentary sequences each laid down during different phases of the separation of the Antarctic continental landmass from Australia's southern margin.

The oldest strata comprise the Early Cretaceous Crayfish subgroup and overlying Eumeralla Formation, the latter comprising lithic-rich, volcanogenic sandstones with generally poor reservoir potential. Following deposition of the Eumeralla Formation widespread uplift and erosion occurred and this has been interpreted to be due to the onset of sea floor spreading.

The Sherbrook Group was deposited on the resulting unconformity as a condensed sandstone sequence onshore, whilst offshore it can be subdivided into formations representing the various facies of a delta system. The basal member, the Waarre Formation, comprises sands and shales with marine and shoreface facies, which have been subdivided into four units. Unit 'C' constitutes the objective gas reservoir in the gas fields in PPL 1 and 2.

The Waarre Formation is overlain by the Belfast Mudstone, a sequence of massive siltstones interpreted to represent offshore pro-deltaic facies, and the time equivalent Nullawarre Greensand. The Skull Creek Mudstone and Paaratte Formation, an interbedded sand and shale sequence, comprise the upper members of the Sherbrook Group.

Fault movements during deposition of the Sherbrook Group are apparent in seismic sections but fault throws diminish above the Belfast Mudstone: the eventual large reduction in the number of faults by the top of the Paaratte Formation indicates relative quiescence by the end of the Cretaceous.

The basal Tertiary section is defined by an unconformity with the Cretaceous and consists of sandstones and claystones of the Wangerrip Group probably deposited onshore in a fluvial-deltaic setting. The basal transgressive sandstone unit is the Pebble Point Formation which comprises conglomeratic and commonly ferruginous sands. Pro-delta muds and silts of the Pember Mudstone Member grade into the overlying sands and shales of the Dilwyn Formation which represent a series of stacked transgressive-regressive deltaic cycles.

The rate of sea floor spreading appears to have increased markedly during the upper Eocene resulting in a major marine transgression in the Otway Basin. The Tertiary sequence unconformably overlying the Dilwyn Formation is dominated by marine marls and limestones as a result of this inundation.

The tectonic framework of the Otway Basin is dominated by extensional processes that produced a series of normal fault blocks. Continued block faulting and subsidence during the lower Cretaceous led to the development of an extensive rift valley system throughout southeast Australia. Pull-apart tectonics continued until the late upper Cretaceous and faulting, recognised as 'down to the basin' movement, represented reactivation of the initial rift system faults. By the Late Eocene drifting rates increased and a period of out-building occurred; subsidence was slow and tectonic activity became relatively quiet, resulting in a relatively undeformed carbonate sequence.

During Late Cretaceous and possibly continuing to Early Tertiary times a right lateral couple was applied resulting in the formation of a series of northeast-trending anticlines (e.g. Port Campbell Anticline). The structural grain generated as a result of this couple produced the combination fault and three-way dip closures targeted by drilling in the Port Campbell Embayment.

2.4. Waarre Formation

The Waarre Formation is interpreted to be an open marine facies with sandstones deposited in the upper to middle shoreface. The sequence of interbedded sand and shale has led to an informal sub-division of the formation into the A (basal), B, C and D (top) units. The Unit 'A' sand and Unit 'B' shale units tend to be out of closure and therefore unprospective and exploration potential is highest in the unit 'C' sandstones.

Unit 'C' sandstones were deposited in the highest energy, shallow marine upper shoreface environment and comprise medium to coarse grainsize. Core 2, North Paaratte 2, recovered poorly consolidated sands from this interval with porosity and permeability ranging up to 26.5% and 1026 md respectively.

The typically porous and permeable sandstone in Unit 'C' is ubiquitous in PPL-1 and is regarded as a low risk play. The thickness of the sand, however, shows some variation and the thick section penetrated in North Paaratte 2 may not be repeated in the up-structure North Paaratte 4 well.

Palaeorelief has potential to influence shoreface sands but the marine shale facies of Unit 'B', which incorporates an interpreted maximum flooding surface, should offer an essentially flat substrate onto which the Unit 'C' sands prograded during a period of relative base level fall. In view of this interpretation variation in net sand caused by syn-depositional relief should not be significant.

2.5. Reserves

The North Paaratte field has produced 4.9 PJ/ ca 5.1 BCF from an accumulation with volumetric OGIP of 10.4 BCF. North Paaratte 1 (-1353m SS) and North Paaratte 2 (-1347m SS) have produced water at rates of 10+ bbl/MMcf. Free water appears close to the base of perforations (-1354.8m SS) in North Paaratte 2. North Paaratte 1 is only 1.8 m structurally higher with significantly lower water cut, consequently the overall field water level may be closer to -1357m SS. The field volumetrics have been based on an arbitrary cut-off of –1355 m SS. Between this depth and the original GWC calculated GIP is 9.3 BCF.

Assuming effective displacement of gas by water then this volume has sourced the cumulative field production (to end June, 1998) of 4.9 PJ / 5.1 BCF: a recovery factor of 55%. Above the suggested current free water is a volume of 9.3 BCF GIP. The two figures combined generate the volumetric OGIP of 18.6 BCF mapped in the total field and use of a 55% recovery factor indicates remaining reserves of 4.9 PJ to be accessed by North Paaratte 4.

2.6. Predicted Stratigraphy

North Paaratte 4 is expected to intersect the following stratigraphic section:

Table 1: Stratigraphic Prognosis

Formation	Depth (m MD KB)	Depth (m TVD KB)	Depth (m AMSL)	Thickness (m)
Port Campbell Limestone	5.5	5.5	+92.9	72.3
Gellibrand Marl	77.8	77.8	+20.6	245.0
Clifton Formation	322.8	322.8	-224.4	30.0
Narrawaturk Marl	352.8	352.8	-254.4	35.5
Mepunga Formation	388.3	388.3	-289.9	37.5
Dilwyn Formation	425.8	425.8	-327.4	233.5
Pember Mudstone	665.4	659.3	-560.9	79.5
Pebble Point Formation	753.2	738.8	-640.4	38.8
Paaratte Formation	796.0	777.6	-679.2	373.1
Skull Creek Member	1207.6	1150.7	-1052.3	95.0
Nullawarre Greensand	1312.5	1245.7	-1147.3	74.3
Belfast Formation	1394.5	1320.0	-1221.6	91.4
Waarre Formation (Unit 'C' sand)	1495.3	1411.4	-1313.0	85.9+
Total Depth	1590.0	1497.3	-1398.9	

Note: Depths derived from seismic are highlighted, all other depths are pro-rata from well control.

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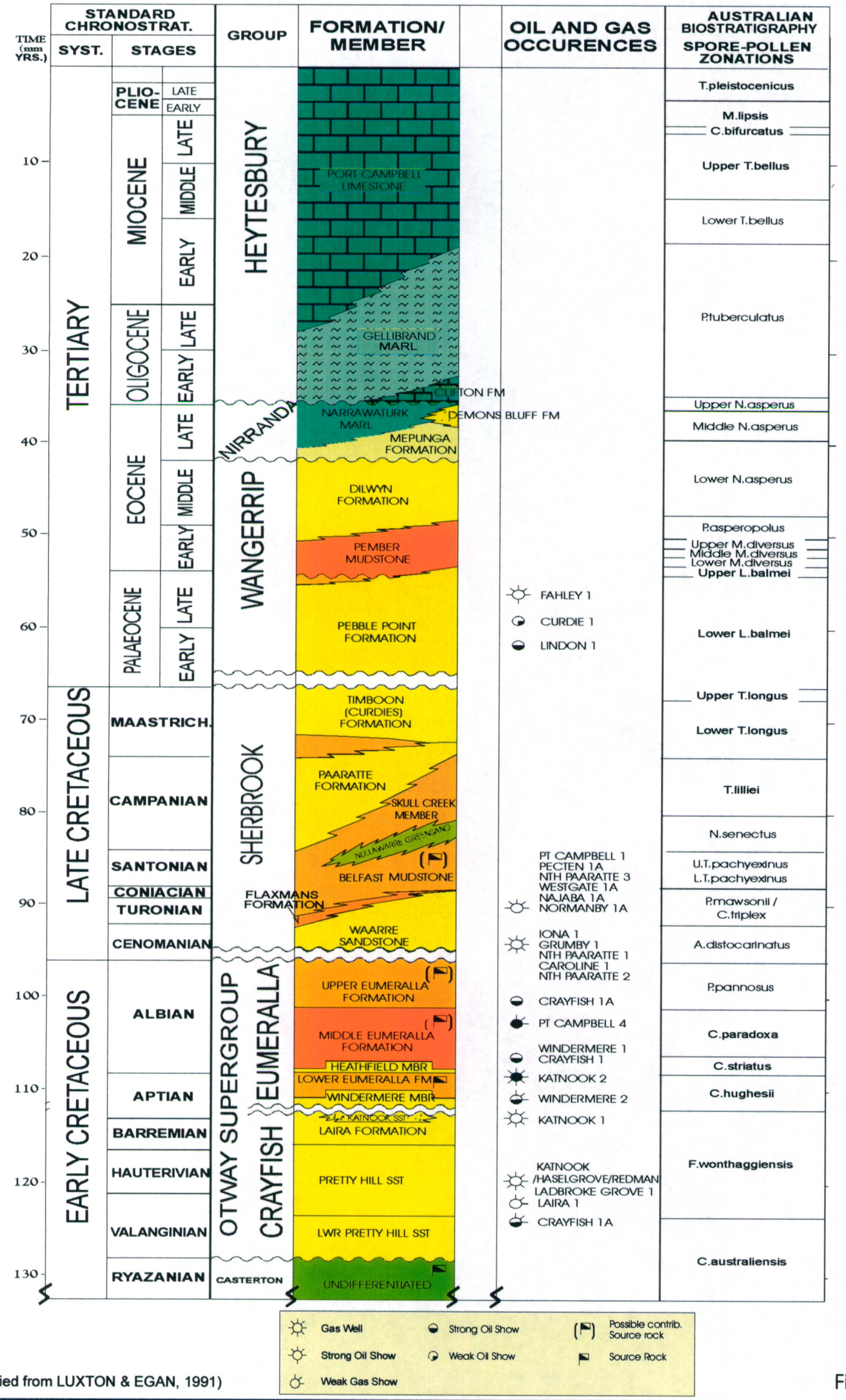
OTWAY BASIN - PPL/1

GENERAL STRATIGRAPHY



(Modified from LUXTON & EGAN, 1991)

Figure 4

3. FORMATION EVALUATION

3.1. Wellsite Geologist's Responsibilities

The Wellsite Geologist is responsible for geological supervision at the wellsite and for formation evaluation. He reports to the Drilling Supervisor at the wellsite and to the Operations Geologist in Brisbane. He will supervise the mud logging unit, mud loggers and wireline logging. He will prepare his own cuttings and core descriptions.

Additional samples may be collected at any time at his discretion. Significant drilling breaks will be penetrated by no more than 2 m then flow checked for fluid influx. If a sample of the new lithology is required for hydrocarbon show evaluation, then pull up at least 6 metres above and circulate out the break. If a PDC bit is in use, the drilling parameters (WOB etc) should be kept relatively constant as the primary objective is approached, and any significant change in drill rate (increase or decrease) investigated as above.

3.2. Ditch Cuttings

Table 2: Sample Requirements

Sets	Size	No	Type	In	For
A	500 g	1	Unwashed & air dried	Cloth bag	BORAL
B&C	250 g	2	Washed & air dried	Minigrip bag	VDME
D	100 g	1	Washed & air dried	Minigrip bag	BORAL
E		1	Washed	Samplex tray	BORAL

Table 3: Sampling Intervals

Interval	From	To
10 m	Surface	50 m above Waarre Sst
3 m	50 m above Waarre Sst	Total Depth

Additional samples will be taken to evaluate shows and at any time deemed necessary by the Wellsite Geologist.

3.3. Mud Logging

Mud logging services will be provided by Geoservices Overseas S.A. from surface casing shoe to total depth. The unit will provide continuous 24-hour surveillance of drilling operations including:

- Total gas detection
- Chromatographic gas analysis
- Measured depth
- Rate of penetration
- Pump stroke rate
- Mud pit levels

A comprehensive 1:200 scale mud log will be maintained at all times from surface to total depth. An up-to-date log is to be submitted daily to the Wellsite Geologist in time for the daily report along with a **Remcomms.trn** file for transmission to Brisbane.

All instrument charts are to be annotated with: depth (in metres), attenuation changes, dates, times and sample collection intervals. Charts are to be submitted to the Company Representative prior to release of the mud logging unit.

Gas detectors and chromatographs are to be calibrated with standard check gas blends each trip. Total gas detectors are to be calibrated so that 1% methane in air will produce a chart deflection of 50 units.

Calcium carbide lag checks will be run once per day or every 300 m, whichever occurs first (or at the discretion of the Wellsite Geologist). Total gas units and lag times (actual and calculated) are to be recorded on the mud log in minutes. No carbides are to be run whilst evaluating prospective hydrocarbon zones.

Formation Integrity Tests, pit losses/gains, tight-hole, bit data, mud information and survey data are to be recorded on the mud log. The mud loggers will be responsible for time lagging, collection and description of drill cutting from surface casing shoe to total depth. Routine microscopic and fluoroscopic examination of ditch cuttings for hydrocarbon shows will be undertaken.

Upon encountering a significant drilling break the interval is to be penetrated by no more than 2 m; drilling will be suspended and a flow check conducted. Bottoms up will be circulated if a sample of the new lithology is required for hydrocarbon show evaluation. Pull up at least 6 m above the top of the drilling break to minimise formation damage. If a PDC bit is in use, the drilling parameters (WOB etc) should be kept relatively constant as the primary objective is approached, and any significant change in drill rate (increase or decrease) investigated as above. If the Wellsite Geologist is not present, inform the Drilling Supervisor.

3.4. Coring

No cores are planned for this well.

3.5. Testing

The well is being drilled as a development well. Production testing will be conducted after the well is completed.

3.6. Measurement While Drilling

An MWD tool will be included in the bottom hole assembly for North Paaratte 4 below the kick-off point at 500 m TVD. The MWD tool will provide directional surveys to monitor hole deviation. An up-to-date listing of the survey data will be included in the daily reports. A 3½" diskette with the data in ASCII is required as soon as possible after the MWD tool is laid down.

3.7. Wireline Logging

216 mm (8½") Openhole:

Logs are to be displayed at 1:500 and 1:200 scales.

RUN 1:	PEX-BHC-AMS	Standard Platform Express, T.D. to casing shoe
	GR	T.D. to surface
RUN 2:	MDT-GR	20 pressure points to determine column height, contingent on unexpected results from wireline log evaluation
RUN 3:	Velocity Survey	T.D. to casing shoe, continued inside casing until signal deteriorates contingent on significant differences to prognosis

Notes: Horizontal log scales:

GR	0 - 200 API
SP	-50 - +50 MV
HALS, MCFL	0.2 - 2000 ohmm
BHC/AS	140 - 40 u/sec
RHOB	1.85 - 2.85 g/cc
NPHI	0.45 - -0.15 pu

3.8. Sidewall Coring

No sidewall coring is programmed for the well.

3.9. Velocity Survey

A velocity survey is programmed at the total depth of the well, contingent on significant differences to prognosis. The survey will be continued inside the casing until the signal deteriorates. Two or three shots if required, should be taken at levels corresponding to the following formation tops and at 150 m spacing within formations. Actual formation tops are to be picked from logs. See Appendix 3 for Velocity Survey procedures for the near well and flarepit shots.

This is the preferred order of shooting:

Shot No.	Formation / Level	Shot Locn	Prognosed Depth * m TVD	Shot No.	Formation / Level	Shot Locn	Prognosed Depth * m TVD
1	Datum	A	92.9	17	Belfast Fm	D	1320.0
2	Datum	A	92.9	19	Nullawarre Gr.	D	1245.7
3	Datum	B	92.9	20	Skull Creek Mbr	D	1150.7
4	Datum	B	92.9	21	Intra Paaratte Fm	D	1025.0
5	Datum	C	92.9	22	Intra Paaratte Fm	D	900.0
6	Datum	C	92.9	23	Paaratte Fm	D	777.6
7	Datum	D	92.9	24	Pebble Point Fm	D	738.8
8	Datum	D	92.9	25	Pember Mudstone	D	659.3
9	Dilwyn Fm	D	425.8	26	Dilwyn Fm	D	425.8
10	Nullawarre Gr.	D	1245.7				
11	Waarre Fm	D	1411.4		*Shots inside casing*		
12	Waarre Fm	E	1411.4	27	Mepunga Fm	D	388.3
13	Total Depth	D	1497.3	28	Narrawaturk Marl	D	352.8
14	Total Depth	F	1497.3	29	Clifton Fm	D	322.8
15	Waarre Fm	D	1411.4	30	Gellibrand Marl	D	77.8
16	Waarre Fm	E	1411.4				

NOTE:
1. The datum to be used in construction of the T.D. curve is Mean Sea Level.
2. If it is at all possible, run the velocity survey **during daylight hours**. This may require rearrangement of the logging programme.

4. DRILLING

4.1. Introduction

The following sections outline the recommended drilling programme. Minor modifications to the programme may be made at the discretion of the wellsite personnel in consultation with the Company Representative. Any substantial changes in the programme require approval from the Brisbane Office.

After the rig has been rigged up, a pre-spud safety meeting will be held to outline the well programme and to reinforce the need for all personnel to be aware of and to work in a safe manner. Particular attention is to be given to the "Work Permit System". The mousehole and rathole will be drilled and cased. The rig will be put in a safe and good housekeeping order prior to spudding the well.

Correct drilling procedures are to be adhered to at all times – Refer to Appendix 3.

4.2. Rig

K.B. height above ground:- 5.5 metres

4.3. Hole Size and Casing Programme Summary

	SURFACE HOLE	PRODUCTION HOLE
Hole Size	311 mm (12¼")	216 mm (8½")
Casing Size	245 mm (9⅝")	178 mm (7")
Setting Depth	405 m	1590 m MD

The 245 mm (9⅝") casing will be set approximately 20 m into the Mepunga Formation, which consists of claystone and sandy claystone, and is overlain by the Narrawaturk Marl. These lithologies are expected to provide a good casing seat, prior to drilling the sandstones of the Dilwyn Formation. North Paaratte 1 and 2 were drilled without hole problems after casing was set in the Mepunga Formation, which is 37 m and 62 m thick in these wells. An FIT test will be conducted after drilling out the shoe and no more than 5 m of new formation.

4.4. Summary of Drilling Programme

(i) Survey location; build access roads; rig and camp locations; dig and install cellar. Drill and cement conductor.

(ii) Move in rig and rig up, drill and case mousehole and rathole. Carry out Rig Safety and Environmental Audit Check. Hold pre-spud safety and environmental meeting.

(iii) Drill well as per the following programme:

Table 4: Drilling Programme and Estimated Activity Times

	Reference		Hrs	Cum	Depth
	Section	Table		days	MD
Rig to spud, drill rathole, mousehole			0	0.0	0
Drill 311 mm to 405 m (18 m/hr)			22	0.9	405
Wiper trip, Circ, pump hi-vis			6	1.2	405
Layout 204 mm drill collars			2	1.3	405
Run 245 mm casing	13.2.1	8	6	1.5	405
Circulate and condition			1	1.5	405
Cement	13.3.1	9	2	1.6	405
WOC			6	1.9	405
Slack off, install A section			6	2.1	405
Nipple up BOPs			16	2.8	405
Pressure test	13.4.1	10	4	3.0	405
RIH with 216 mm bit & BHA			4	3.1	405
Pressure test	13.4.1	10	2	3.2	405
Drill out and run FIT (1.5 SG MWE)	13.5		4	3.4	405
Drill 216 mm vertical section with a 4 -1-7 bit (16 m/hr) - rotary			6	3.6	500
POH, M/U directional BHA/MWD, RIH		5	8	4.0	500
Drill 216 mm deviated section with a 4 -1-7 bit (15 m/hr) - rotary		6	45	5.8	1200
Trip for BHA and/or bit			8	6.2	1200
Drill 216 mm tangent section with a 4 -3-7 bit (13 m/hr) - rotary			30	7.4	1590
Wiper trip, circ., POH			12	7.9	1590
Log well	3.7		24	8.9	1590
Trip, layout drill string			14	9.5	1590
Option A					
Run production casing - Refer OCA	13.2.2	8	14	10.1	1590
Cement	13.3.2	9	4	10.3	1590
Clean and dump tanks etc.			6	10.5	1590
Option B					
Run plugs	10	14	18	10.3	1590
Clean & dump tanks etc			6	10.5	1590

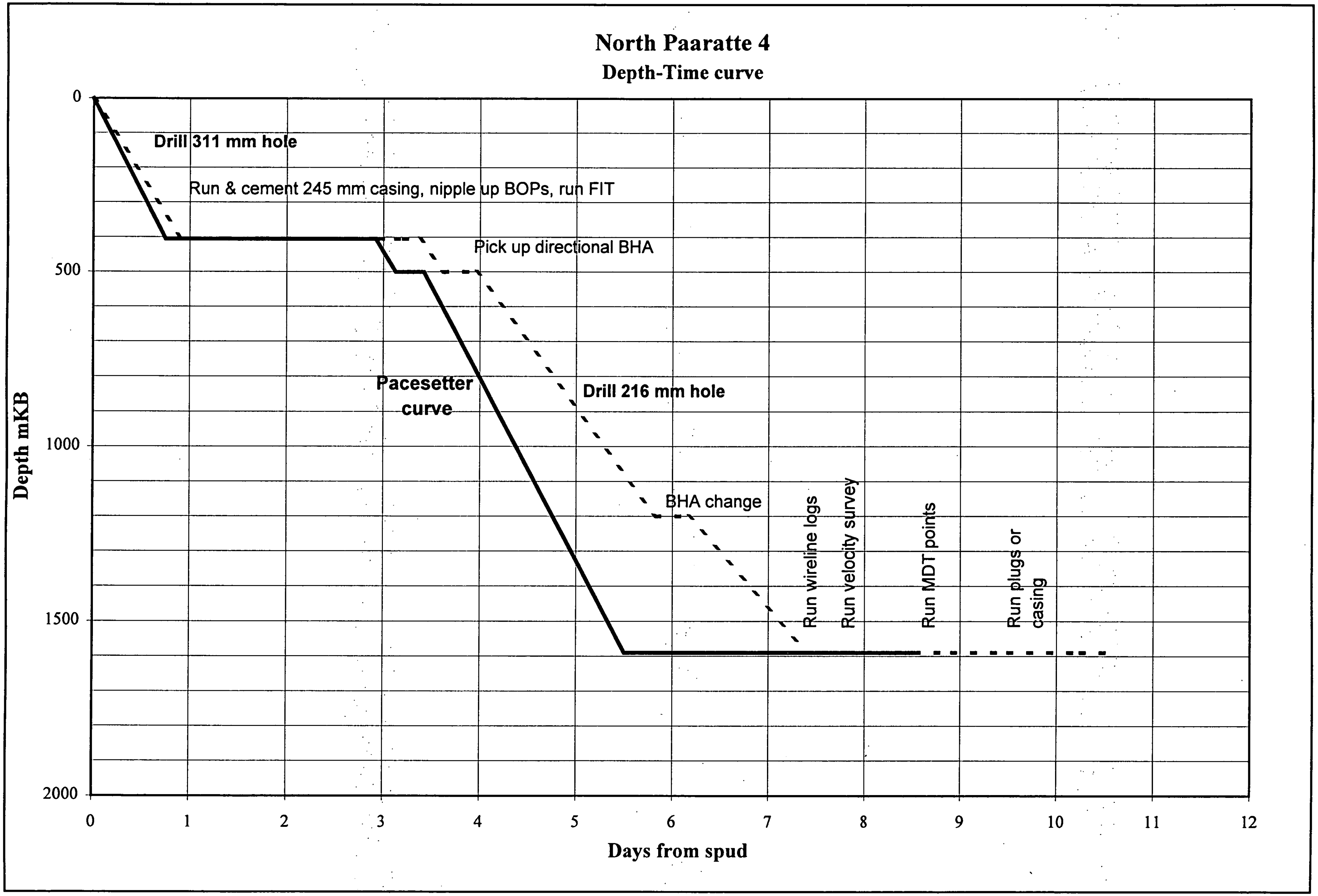

North Paaratte 4
Depth-Time curve
Drill 311 mm hole
Run & cement 245 mm casing, nipple up BOPs, run FIT
Pick up directional BHA
Pacesetter curve
Drill 216 mm hole
BHA change
Run wireline logs
Run velocity survey
Run MDT points
Run plugs or casing
Depth mKB
0
500
1000
1500
2000
0
1
2
3
4
5
6
7
8
9
10
11
12
Days from spud

Figure 5

4.5. Potential Hazards

The following potential hazards have been identified:

Potential Hazard	Potential Consequences	Actions Required/ Contingency Planning
Constricted surface site	Damage to existing North Paaratte 1 wellhead. Damage to North Paaratte 5 well head whilst drilling North Paaratte 4.	NP 1 wellhead to be protected by barrier fencing prior to rig arriving on location. NP5 wellhead to be protected by installation of a barrier fence prior to skidding rig to NP4. Both wells to be suspended with a blanking plug and BPV.
Single wire earth return (SWER) electricity line crosses site	Electric shock if equipment contacts SWER.	Rig to be sited to ensure that contact of equipment with SWER cannot occur. Maximum lift of fork lift is 4 metres with the power line at approx. 6 metres.
Intersection of North Paaratte 1 wellbore		Monitor well path with survey tools, maintain minimum separation of 15m. Well paths have been designed to maintain adequate separation (see Figures 6 and 7).
Drilling fluid loss due to unconsolidated sandstones	Differential Sticking Well Control	Maintain mud density as low as possible. Well bore sealing products and spotting fluid additives available on site. Fluid losses to be corrected prior to penetrating reservoir.
Lost circulation due to depleted reservoir	Differential Sticking	With a strong water drive existing in this field, a significantly depleted reservoir pressure is not expected. However the mud density will be maintained as low as possible. The BHA will utilize only HWDP to minimize wall contact area, no Drill Collars – apart from Monels - to be used. Drilling jars will be incorporated in the drill string.

NORTH PAARATTE - 1,4 and 5 - RELATIVE WELL PATHS

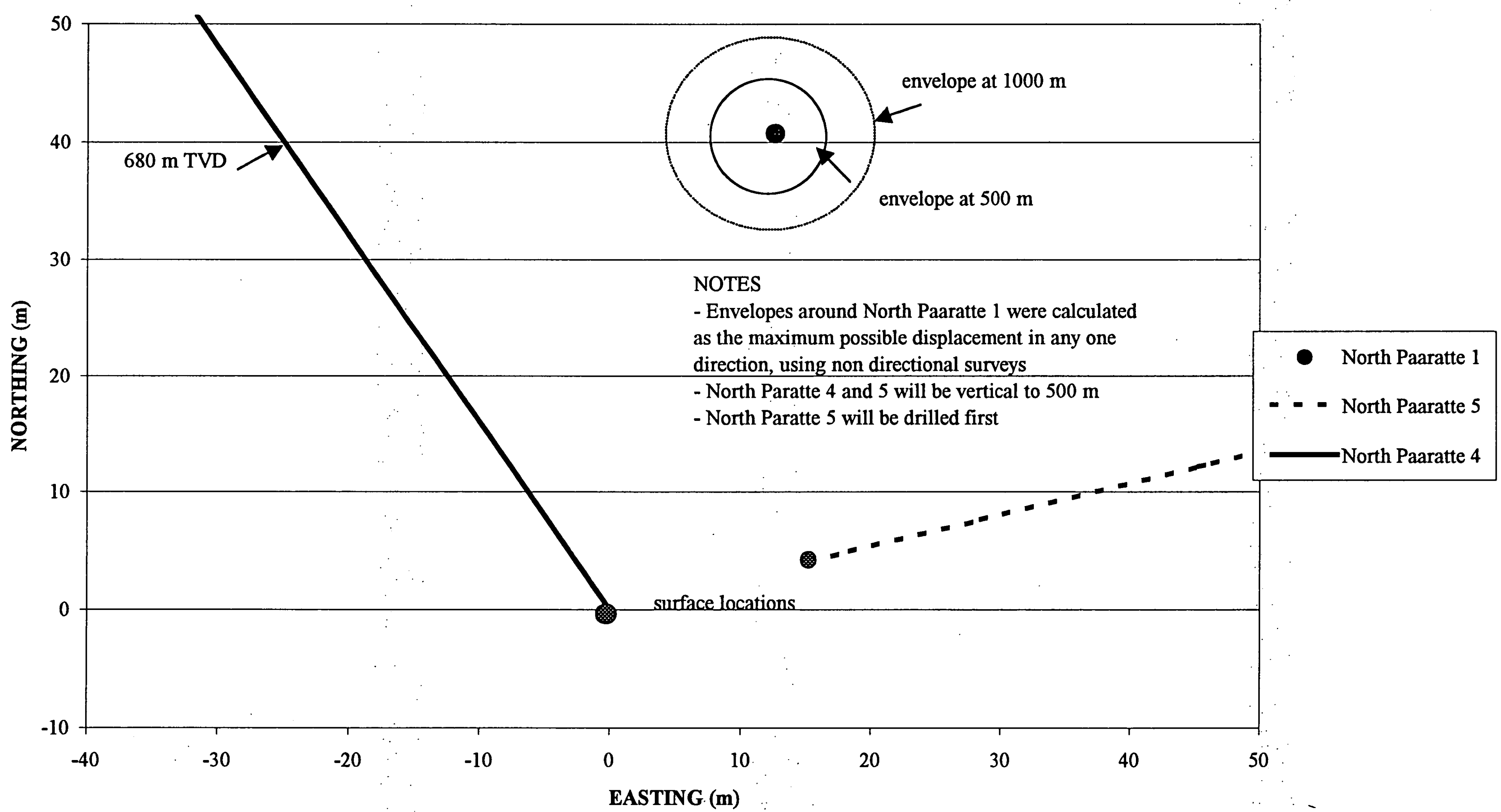


FIGURE 6

915493 027

NORTH PAARATTE 1 WELL PATH

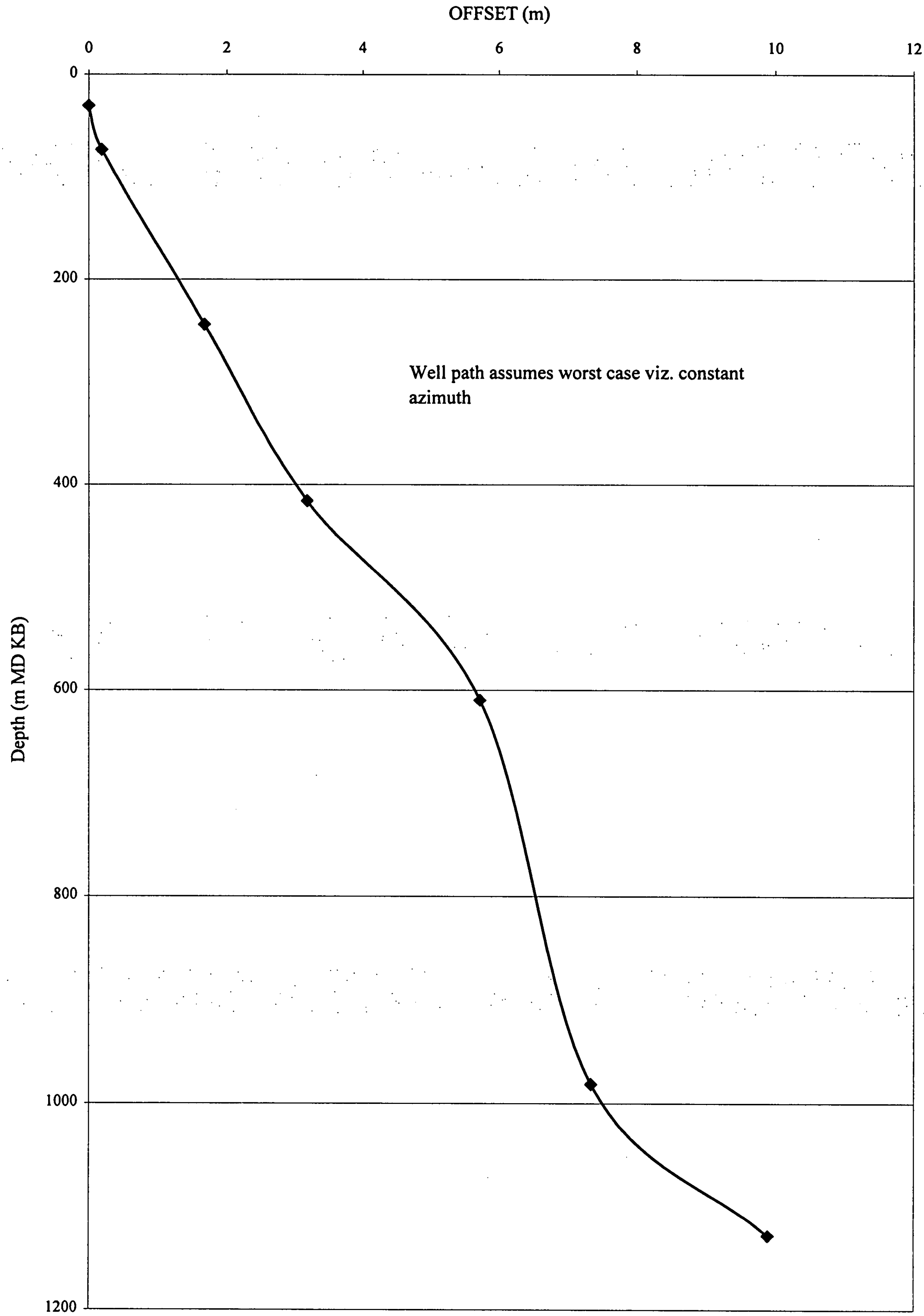


FIGURE 7

5. BITS, HYDRAULICS AND BHA

5.1. 311mm (12¼") Hole

Use a Varel L116 or L117 with BHA No. 1. The weight on bit will be maintained in the 4,500 - 14,000 kg (10,000 lb - 30,000 lb) range. The rotary speed is to be in the range of 100 - 140 rpm.

5.2. 216mm (8½") Hole

Drill out with Bit 2 and BHA 2, and drill the vertical section to kick-off point at 500 m K.B. Use Bit 2, and Bit 3 if required, with BHA 3 to drill the build and tangent sections to TD. A steerable motor and MWD tool will be used to monitor survey data as angle is built and maintained (refer Section 6). These bits are detailed below:

BIT NO.	MAKE	TYPE	IADC	NOZZLES	PUMP GPM	WOB x1000 kg	RPM
2	Hughes	GT-03	417	15,15,15	550	6.8 – 9.1	120 - 140
2RR	Hughes	GT-03	417	15,15,15	500	6.8 – 13.6	Motor + 50 - 60
3	Varel	ETD437M	437	15,15,15	450	11.3 – 15.9	80 - 100

The hydraulics are designed to maximise motor efficiency and bit HSI.

PUMP	No. 1	No. 2
Type	National 8-P-80	National 8-P-80
Stroke	216 mm (8½″)	216 mm (8½″)
Max. Speed Permitted	160 spm	160 spm
Liners Available	152 mm (6″)	152 mm (6")
Max. Pressure Permitted	17000 kPa (2470 psi)	17000 kPa (2470 psi)
Pump Output (95% efficiency)	11.24 l/stk (2.97 gps)	11.24 l/stk (2.97 gps)

5.3. Bottom Hole Assemblies

North Paaratte 4 will be drilled as a vertical well to 500 m K.B. using BHA #1 in 311 mm hole and BHA #2 in 216 mm hole. Below 500 m K.B. the well will be directionally drilled using BHA #3 in 216mm hole (refer section 6). The bottom hole assemblies are listed below:

Table 5: Bottom Hole Assemblies

BHA No. 1	
No.	**Tool**
1	311 mm Bit and bit sub
2	204 mm (8") Drill Collar
1	311 mm (12¼") Stabiliser
6	166 mm (6½") Drill Collars
30	127 mm (5") Hevi-wate Drill Pipe
	127 mm (5") Grade "E" Drill Pipe (as required)

BHA No. 2: Rotary Drilling Assembly	
No.	**Tool**
1	216 mm Bit
1	166 mm (6½") Bit Sub
1	166 mm (6½") Shock Sub
2	166 mm (6½") Drill Collar
1	216 mm (8½") String Stabiliser
4	166 mm (6½") Drill Collars
30	127 mm (5") Hevi-wate Drill Pipe
	127 mm (5") Grade "E" Drill Pipe (as required)

BHA No. 3: Directional Motor / Building Assembly	
1	216 mm bit
1	172 mm (6¾") SperryDrill Adjustable PD Motor w/- 210 mm (8¼") Screw On Stabiliser
1	197 mm (7¾") Integral Blade Stabiliser
1	172 mm (6¾") Pony Flexed Non-Magnetic Drill Collar
1	172 mm (6¾") MWD Hang off
1	172 mm (6¾") Flexed Non-Magnetic Drill Collar
30	127 mm (5") Hevi-wate Drill Pipe – include Hydraulic Drilling Jars 127 mm (5") Grade "E" Drill Pipe (as required)

6. DEVIATION REQUIREMENTS

Spud – 405 m	Survey at 30, 60, 100, then every 100 metres up to and including casing point. Deviation should not exceed 1° at casing point.
405 m - 500 m	Survey at 500 m. The maximum deviation should not exceed 5°, and the rate of change should not exceed 1° per 30 m and 3° per 150 m. Acquire additional surveys with MWD equipment while running in to kick-off, as directed by Drilling Supervisor.
500 m – 1590 m	Survey at least once per stand of drill pipe using MWD equipment. The well path will be monitored by Sperry-Sun Drilling Services and alterations in angle and direction will be made as required, after consultation with the Drilling Supervisor (refer to Table 6). Location tolerance at the Waarre Sandstone is 25 m radius of target.

Table 6: Proposed Well Path

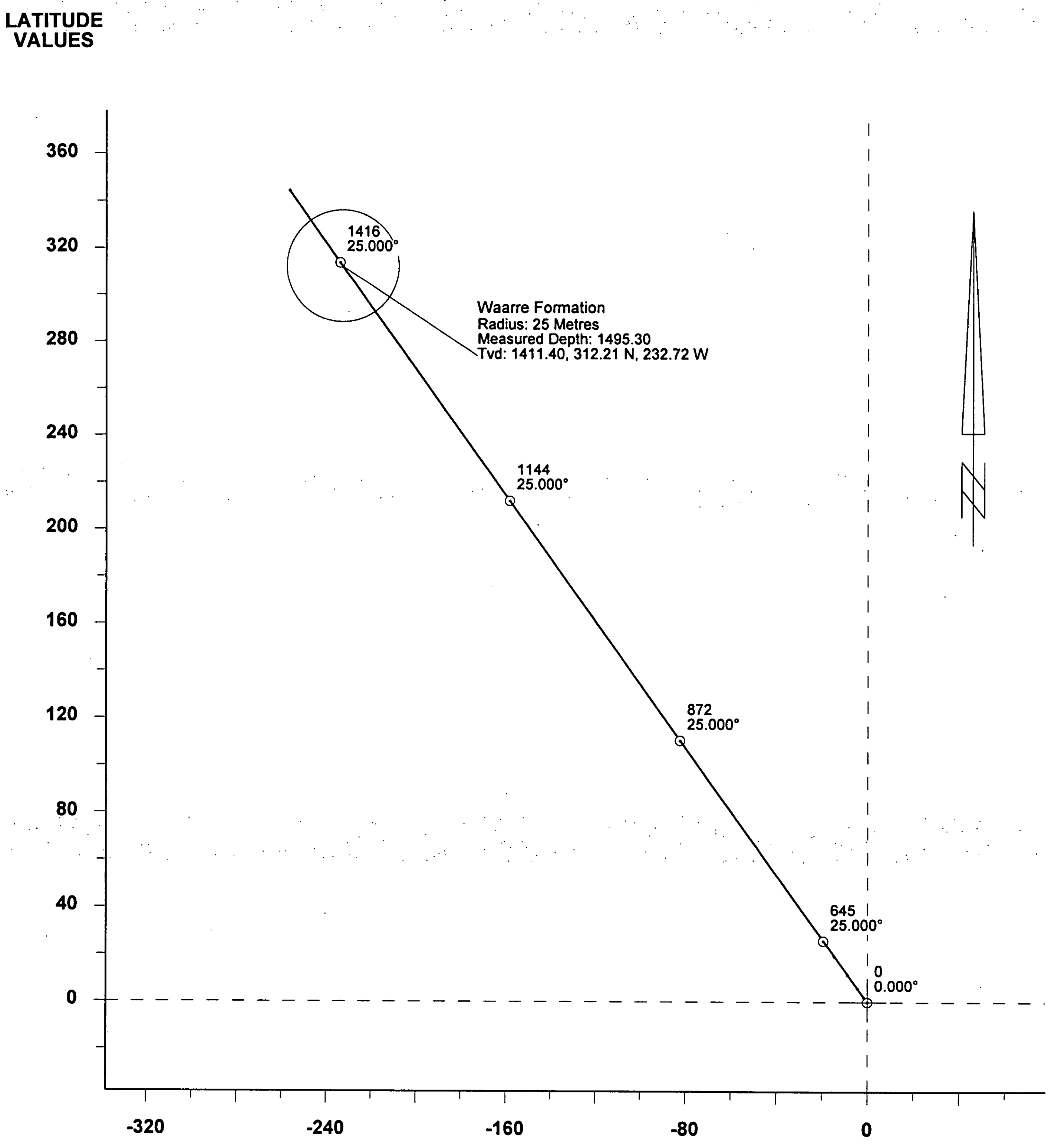
Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)		Eastings (m)		Vertical Section (m)	Dogleg rate (°/30m)
0.00	0.00	0.00	0.00	0.00	N	0.00	W	0.00	0.00
300.00	0.00	0.00	300.00	0.00	N	0.00	W	0.00	0.00
500.00	0.00	0.00	500.00	0.00	N	0.00	W	0.00	0.00
500.11	0.00	0.00	500.11	0.00	N	0.00	W	0.00	0.00
510.00	1.648	323.299	510.00	0.11	N	0.08	W	0.14	5.00
540.00	6.648	323.299	539.91	1.85	N	1.38	W	2.31	5.00
570.00	11.648	323.299	569.52	5.68	N	4.23	W	7.08	5.00
600.00	16.648	323.299	598.60	11.55	N	8.61	W	14.41	5.00
630.00	21.648	323.299	626.93	19.44	N	14.49	W	24.25	5.00
650.11	25.000	323.299	645.40	25.82	N	19.25	W	32.21	5.00
900.00	25.000	323.299	871.87	110.50	N	82.36	W	137.82	0.00
1200.00	25.000	323.299	1143.77	212.15	N	158.14	W	264.60	0.00
1495.30	**25.000**	**323.299**	**1411.40**	**312.21**	N	**232.72**	W	**389.40**	**0.00**
1500.00	25.000	323.299	1415.66	313.80	N	233.91	W	391.39	0.00
1590.08	25.000	323.299	1497.30	344.33	N	256.66	W	429.46	0.00

The Dogleg Severity is in Degrees per 30 m. The vertical section was calculated along an azimuth of 323° (grid). Based upon minimum curvature type calculations. At a measured depth of 1590.08 m, the bottom hole displacement is 429.46 m, in the direction of 323.299° (grid).

SPERRY-SUN DRILLING SERVICES
HORIZONTAL SECTION

915493 032

Boral Energy Petroleum Pty Ltd
North Paaratte 4



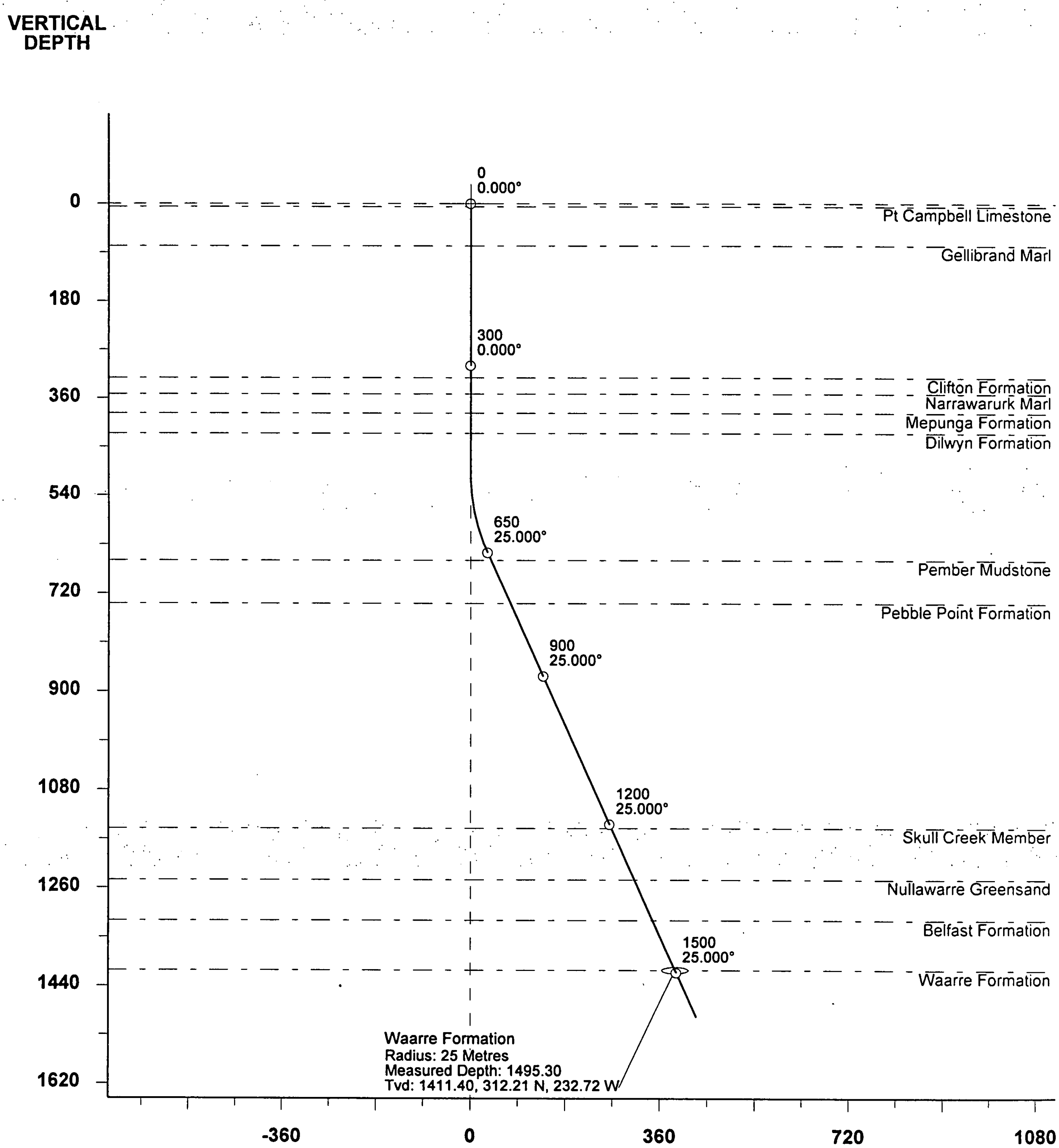
Depths shown on plot are Vertical Depths.
All measurements are in Metres.

Figure 8

915493 033

SPERRY-SUN DRILLING SERVICES
VERTICAL SECTION

Boral Energy Petroleum Pty Ltd
North Paaratte 4



VERTICAL SECTION - Direction: 323.299° (Grid)
Depths shown on plot are Measured Depths.
All measurements are in Metres.

Figure 9

7. MUD PROGRAMME

7.1. 311mm (12¼") Hole

Drill out with a Gel spud mud. If the local ground water is high in hardness salts, it should be pretreated with Soda Ash prior to Gel additions. Maintain viscosity with native clays supplemented with Gel additions. If the native clays do not yield significant viscosity, a small addition of PAC may be beneficial. Loss circulation is possible in this area. Initial losses may be treated with LCM, either direct to the mud system or spotted as a pill. LCM pills can be formulated using 30 - 40 ppb Gel with a minimum of 20 ppb of LCM. Mica and Kwik Seal, in combination, are the recommended LCMs. The pump strainers may need to be removed. If losses are severe a cement pill may be considered. LCM may also be added to the cement slurries.

While drilling this section, the density should be kept to a minimum by running the finest possible shaker screens and running all the solids control equipment. The ability to limit drill solids may be diminished if there is a need for significant quantities of LCM in the system. The pH should be maintained at 9.5 with Caustic Soda or Soda Ash. The hole should be circulated clean and a wiper trip made to surface prior to running the casing.

7.2. 216 mm (8½") Hole

Drill out the cement and shoe with water, using only the pill tank for surface volume. After drilling through the shoe, displace the hole to KCl - PHPA fluid, dumping the cement contaminated water to the sump. Run a FIT to an equivalent mud density of 1.50 S.G. (12.5 ppg). The initial mud composition will incude approximately 3 - 4% KCl, with a minimum of 1.5 ppb PHPA powder. The PAC level will be approximately 0.5 ppb and will be gradually increased to reduce the filtrate loss. The filtrate loss will be initially high but will reduce as mud solids increase. The filtration rate target will be less than 7 ccs / 30 min. As the initial mud begins to shear, the PHPA level can be raised to a minimum of 1.75 ppb on a dry powder basis. This will be achieved by adding at least 2 ppb PHPA into the premix additions. All volume additions to the system should be as pre-mixed KCl - PHPA fluid. The pH should be maintained at 9.0 - 9.5 with Soda Ash or Caustic Soda, the Sulphite level at 100 ppm to minimise corrosion and any excess Hardness may be treated out with Soda Ash or Sodium Bicarbonate. Biocide should be added as required, to preserve the system against bacterial degradation.

The mud rheology will be monitored closely to ensure good hole cleaning, as the possibility of fast ROPs could lead to a heavy cuttings loading in the annulus. XCD Polymer may be used to give initial rheology control. In the vertical section, a Yield Point of around 12-15 lbs / 100sq ft should give good hole cleaning, provided the annular velocities are adequate. Once the KOP is reached the rheology should be monitored to ensure the low end rheology is adequate for good hole cleaning in the deviated section. A 6 rpm rheometer reading of 4 – 8 is recommended. When using significant quantities of XCD Polymer, PAC LV may be substituted for filtration control so that the mud viscosity does not become excessive.

Solids control will be of prime importance in this section to keep drill solids to a minimum. This will entail running the finest possible shaker screens, dumping solids from the sand trap and running the desander and the desilter, providing fluid loss is not excessive. It is aimed to keep the MBT level below 15 ppb equivalent clay. The mud density will most likely be in the 1.06 - 1.10 SG range. The density may have to be raised, depending on the suspected formation pore pressures.

When running production casing, the mud left in the casing/open hole annulus should be treated with biocide to reduce bacteria and the pH should be increased to at least 10 to minimise corrosion. An oxygen scavenger or proprietary corrosion control additive may also be considered. The production casing may be displaced with brine and, if so, a corrosion inhibitor should be added.

Table 7: **Mud Type by Interval**

Interval (Hole Size)	Weight (SG)	Viscosity	Api Fluid Loss (cc)	Mud Type
0 - 405 m 311 mm (12.25")	Minimum	40 - 50 or as needed Raise to 50+ prior to casing	N/C	Spud with Gel spud mud. Use hivis, LCM pills as required if loss of returns is encountered. Spot cement plugs if necessary to achieve circulation. Maintain a pH of 9.5 with Caustic Soda. Run all solids control equipment to minimize drill solids and mud density.
405 m - TD 216mm (8½")	1.06 - 1.10 - or as required to control formation pressure	35 - 50	Initially high reducing down to 10 cc by 500 m and <7 cc by 1200 m.	Drill out with water. Displace to 3-4% KCl - PHPA fluid with adequate PHPA to provide good solids encapsulation (min. of 1.75ppb). PAC can be added to gradually reduce the filtrate loss. Initial viscosity and low end rheology may be supplemented with XCD Polymer. Run all solids control equipment to minimize density and drill solids build up. Control the pH at 9.0 - 9.5 with Caustic Soda or Soda Ash. Add oxygen scavenger and Biocide as required.

NB: Additions of any diesel or hydrocarbon based chemicals MUST be first discussed with the wellsite geologist. Subsequently, such additions must be fully documented.

8. CASING AND CEMENTING DETAILS AND DESIGN

Table 8: Casing Details and Design

STRING DETAILS	CONDUCTOR	SURFACE CASING	PRODUCTION CASING
Hole Size	445 mm (17½")	311 mm (12¼")	216 mm (8½")
Casing Size	406 mm (16")	245 mm (9⅝")	178 mm (7")
Setting Depth	24 m MD	405 m MD	1590 m MD
Grade	Schedule 40	K 55	K55
Weight		53.57 kg/m (36 lb/ft)	38.77 kg/m (26 lb/ft)
Strength • **Burst psi** • **Collapse psi** • **Tension lbs**	conductor pipe only	3520 2020 564,000	4980 4320 415,000
Safety Factor • **Required** • **Actual Load** • **Design**	conductor pipe only	1.25/1.125/1.8 2000/447/136,376 1.76/4.521/4.14	1.25/1.125/1.8 2500/1024/228,384 1.99/4.218/1.82
Design Assumptions • **Burst** • **Collapse** • **Tension**	conductor pipe only	Pressure test @ 2.0M Displace cement w/ 1.0 SG fluid Bump plug 1.5M psi w/ buoyed string	GTS Displace cement w/ 1.0 SG fluid Bump plug 2.28M psi w/ buoyed string
Connection		BTC	BTC
Optium Torque	-	4890	-
Float Equipment	-	Guide shoe, float collar one joint off bottom	Float shoe on bottom, float collar one joint off bottom
Wiper Plugs	-	Top	Top and bottom
Centralising	-	At mid first joint and on 3rd and 5th joints above shoe	At mid first joint and on 3rd and 5th joints, every joint from 30 m above and below pay zones
Accessories	-	245 mm (9⅝") casing head	178 mm (7") slip and seal assembly.
Threadlock	-	Shoe through to 1 st Connection above float collar	Shoe through to 1 st connection above float collar
BOP Test Pressure	-	14000 kPa (2000 psi)	17500 kPa (2500 psi)

Table 9: Cementing Details

	SURFACE CASING	PRODUCTION CASING
Hole/Casing Size	311 mm / 245 mm (12¼" / 9⅝")	216 mm / 178 mm (8½" / 7")
Setting Depth	405 m	1590 m MD
Cement Type	Class G with 2.5% P/H Gel Class G	Class G
Cement Top	Class G / Gel to Surface Neat G to 150 m above TD	Neat Class G to 50 m above base of Dilwyn Form. – to approx 600m
Excess	100% in O.H.	10% in O.H. (based on caliper)
Estimated Sacks **Basis of Calculation**	280 Class G / Gel 270 Class G Gauge + 100%	420 Class G Gauge + 15%
Slurry Density	13.2 ppg Lead 15.8 ppg Tail	15.8 ppg
Mix Water	Fresh	Fresh
Additives	Lead – 8% Gel (2.5% pre-hydrated), 0.2% CFR3	1.2% Halad 322 in neat cement Final composition may alter with lab testing of m/u water
Bump Plug Pressure	7000 kPa (1000 psi) above final pumping pressure	7000 kPa (1000 psi) above final pumping pressure

9. PRESSURE TESTING AND KICK TOLERANCES

Table 10: Pressure Testing Requirements for BOPs

EQUIPMENT	PRESSURE (psi)	TIME (minutes)	PRESSURE (psi)	TIME (minutes)
SURFACE CASING				
Casing, Blind Rams, HCR	250	15	2000	15
Choke Manifold				
- Rear Valves	250	5	2000	5
- Mid Valves	250	5	2000	5
- Front Valves	250	5	2000	5
Pipe Rams	250	15	2000	15
Annular Preventer	250	5	1500	5
Kelly Cocks	250	5	1500	5
Kill Line Valves	250	5	2000	5
INTERMEDIATE CASING – WHERE APPLICABLE				
Casing, Blind Rams, HCR	250	15	2500	15
Choke Manifold				
- All Valves	250		2500	5
Pipe Rams	250	15	2500	15
Annular Preventer	250	5	1000	5
Kelly Cocks	250	5	2500	5

A BOP Pressure Test Checklist should be completed and submitted to Brisbane office together with any relevant pressure recording charts.

Table 11: Kick Tolerance Calculations - Shoe

KICK TOLERANCE CALCULATION — Weak Point @ shoe

WELL		
	NAME	North Paaratte 4
	DEPTH	1590
	HOLE SIZE	8.5
SURFACE CASING		
	DEPTH (m)	405
	ID	8.92
	BURST	3520
LEAK OFF		
	EMW (ppg)	12.5
	LOP (psi)	235
	FG shoe	0.65
WEAK POINT		
	DEPTH (m)	405
	FPwp	864
	FGwp	0.65
MUD		
	OMW	9.1
	PGm	0.473
	KMW	
INFLUX		
	PGi	0.06
	Pbh	2243
HWDP		
	OD	5.0
	ID	3.06
	LENGTH (m)	300
DRILL PIPE		
	OD	5.0
	ID	4.276
	LENGTH (m)	1290

	D	d	CAP	L	V
DP	5	4.276	0.0583	1290	75.2
HW	5	3.06	0.0299	300	9.0
			PIPE	1590	84.2
HW-OH	8.5	5	0.1506	300	45.2
DP-OH	8.5	5	0.1506	885	133.3
DP-CSG	8.92	5	0.1740	405	70.5
			ANN	1590	249.0
			TOTAL		333.2

Max Safe Casing Pressure (MSCP)

A **MSCP = LOP - Ann Friction - op error**

Ann frict (psi/100m) 10
Operator error 20

MSCP = 174 psi

Maximum bottomhole pressure (BHPm)

B **BHPm = 2468 psi**

HSPdp 2468
FP 2243

Length of influx which can be handled (Li)

C Li = (MSCP + HSPdp - BHPm)/(PGm - PGi)

Li = 422 ft
129 m

Volume bottomhole & weakpoint

D Vbh = CAPbh x Li, Vwp = CAPwp x Li

Vbh = 19.4 bbls
Vwp = 19.4 bbls

Convert to bottomhole volume

E Vbh1 = (Pwp x Vwp) / Pbh, assuming Pi = FP wp)

Vwp(bh1) = 7.5 bbls

Select minimum of two volumes, Vbh or Vbh1

Kick tolerance = 7.5 bbls

Table 12: Kick Tolerance Calculations – Dilwyn Fm.

KICK TOLERANCE CALCULATION Weak Point @ Dilwyn

WELL		
	NAME	North Paaratte 4
	DEPTH	1590
	HOLE SIZE	8.5
SURFACE CASING		
	DEPTH (m)	405
	ID	8.92
	BURST	3520
LEAK OFF		
	EMW (ppg)	12.5
	LOP (psi)	235
	FG shoe	0.65
WEAK POINT		
	DEPTH (m)	425
	FPwp	767
	FGwp	0.55
MUD		
	OMW	9.1
	PGm	0.473
	KMW	
INFLUX		
	PGi	0.06
	Pbh	2243
HWDP		
	OD	5.0
	ID	3.06
	LENGTH (m)	300
DRILL PIPE		
	OD	5.0
	ID	4.276
	LENGTH (m)	1290

	D	d	CAP	L	V
DP	5	4.276	0.0583	1290	75.2
HW	5	3.06	0.0299	300	9.0
			PIPE	1590	84.2
HW-OH	8.5	5	0.1506	300	45.2
DP-OH	8.5	5	0.1506	885	133.3
DP-CSG	8.92	5	0.1740	405	70.5
			ANN	1590	249.0
			TOTAL		333.2

Max Safe Casing Pressure (MSCP)

A **MSCP = LOP - Ann Friction - op error**

Ann frict (psi/100m) 10
Operator error 20

MSCP = 174 psi

Maximum bottomhole pressure (BHPm)

B **BHPm = 2468 psi**

HSPdp 2468
FP 2243

Length of influx which can be handled(Li)

C Li = (MSCP + HSPdp - BHPm)/(PGm - PGi)

Li = 422 ft
129 m

Volume bottomhole & weakpoint

D Vbh = CAPbh x Li, Vwp = CAPwp x Li

Vbh = 19.4 bbls
Vwp = 19.4 bbls

Convert to bottomhole volume

E Vbh1 = (Pwp x Vwp) / Pbh, assuming Pi = FP wp)

Vwp(bh) = 6.6 bbls

Select minimum of two volumes, Vbh or Vbh1

Kick tolerance = 6.6 bbls

10. ABANDONMENT

(i) Should there be no significant hydrocarbon indications, the well will be abandoned by setting cement plugs in the open hole and at the surface, as required by The Petroleum Regulations.

Table 13: Abandonment Programme

Plug No.	Formation	Depth	Sacks of Cement
6	Surface	Surface to 10 m	15
5	Surface Casing Shoe ** test for position	380 to 440 m	75
4	Pember Mudstone	640 to 690 m	60
3	Top Paaratte Formation	770 to 820 m	60
2	Top Nullawarre Greensand	1290 to 1340 m	60
1	Waarre Sandstone	1460 to 1520 m	75

The final plugging programme will be advised after wireline logs have been run and evaluated.

ABANDONMENT WILL NOT COMMENCE WITHOUT
APPROVAL FROM THE BRISBANE OFFICE

(ii) Should there be significant indications of hydrocarbons on wireline logs and it is decided to complete the well as a producer, the Production Department will issue an appropriate completion programme.

11. APPENDIX 1 - EXTRACTS FROM 'PETROLEUM REGULATIONS 1992'

723. Fluid Samples

1. The titleholder must ensure that all formation fluid recovered from tests or non-routine production tests are sampled in accordance with good oilfield practice.
2. The titleholder must ensure that the samples are labelled and analysed, and liquid samples preserved.
3. The titleholder must ensure that results obtained from the analysis of samples are provided to the Minister as soon as practicable but within 30 days of the date on which they are obtained.

725. Formation and water shut-off tests

1. A titleholder must take all reasonable steps to notify the Minister of a water shut-off test.
2. If a test results in the discovery of a new pool of petroleum, the titleholder must notify the Minister as soon as practicable after the discovery is made.
3. In addition to the requirements of subregulations (1) and (2), a titleholder must provide the Minister with -
   (a) a copy of the relevant operational report; and
   (b) a legible copy of the pressure recorder chart for each drill stem or other test taken at the well; and
   (c) an interpretation of those tests.

727. Production or drill stem tests on exploration or production wells

1. The titleholder must not, in a title area, conduct a production or drill stem test in an exploration well or development well not yet producing, except with and in accordance with the approval of the Minister.
2. An application by the titleholder to the Minister for approval to conduct a production test in an exploration well or production well not yet producing in a title area must be accompanied by particulars of –
   (a) The equipment proposed to be used for the test; and
   (b) The proposed testing program; and
   (c) The intervals in the well proposed to be tested; and
   (d) The proposed duration of the test; and
   (e) The maximum quantity of petroleum or water proposed to be produced; and
   (f) The proposed method of disposal of the petroleum or water produced.
3. An approved test must not be conducted unless at least 24 hours notice of intention to conduct the test has been given to an inspector.

731. Disposal of produced oil and gas

The titleholder must ensure that any oil or gas that is circulated out of or produced from a well during a drilling, testing or repair operation, and that is not flowed through the well's flowline to a gathering facility, must be disposed of in accordance with good oilfield practice.

732. Disposal of waste fluids

The titleholder must ensure that all waste materials from work on a well or produced from a well as it cleans up (whether or not contaminated with oil) are disposed of in accordance with good oilfield practice.

12. APPENDIX 2 - SAFETY PRECAUTIONS

12.1. Safety

(1) Whenever drilling breaks are encountered, drill 2 metres into the break then conduct a flow check. The Wellsite Geologist will check the samples when circulated up for hydrocarbon indications and lithology.

(2) Subsequent to encountering a drilling break or the evidence of "trip" or "connection" gas, all "trips" will include a short wiper trip of ten stands out, circulating bottoms-up to check for any hydrocarbon influx before proceeding with the trip.

(3) A reduced hoisting and lowering speed technique, whereby speed is reduced to half normal rate is to be introduced when tripping the drill collars and bit over the interval of any successful DST.

(4) The kick control techniques in the Operations Manual and Emergency Response Manual are to be followed in the event of any kick being encountered when drilling, tripping or during any other operations.

(5) At all times, adherence to the OCA Operations and Safety Manual is mandatory.

12.2. Environmental

(1) At all times, adherence to the OCA Drilling Environmental Compliance Manual is mandatory.

(2) All solid waste (non-metallic) will be deposited in refuse skips and transported to a designated disposal area by a licensed refuse removal contractor.

(3) All metal waste material will be kept in a waste metal basket and removed to a recycling plant at the completion of the program.

(4) All reusable pallets will be stored and transported back to the suppliers.

(5) The Drilling Contractor will remove any worn tyres.

(6) All waste hydrocarbons, oils and greases, will be collected in designated waste drums and removed for recycling by the Drilling Contractor.

(7) Any soil contaminated by hydrocarbons will be collected and disposed off at a designated disposal area.

(8) Any camp refuse will be collected in a garbage skip and removed to a designated refuse site by a licensed refuse removal contractor.

ACCIDENT / INCIDENT REPORTING
All accidents, including environmental incidents, no matter the severity are to be reported to the Brisbane Offices immediately regardless of the time or day using the OCA Health Safety & Environmental Alert Form. An OCA Incident / Accident Form is to completed and sent by facsimile or modem to the Brisbane Offices at the earliest opportunity along with the relevant Contractor Reports.

13. APPENDIX 3 – OCA DRILLING PROCEDURES

13.1. Correct Drilling Procedures

(1) Daily safety meetings are to be held prior to the start of each tour and are to be recorded on the Tour Report.

(2) BOP's are to be operated daily or whenever out of hole and are to be recorded in the Tour Report.

(3) Each day, all drill pipe on location will be noted in the Tour Report as to being in hole, on rack, etc.

(4) Slow Pump Rate tests are to be carried out once per tour and are to be recorded in the Tour Report.

(5) A pump efficiency test should be conducted where possible.

(6) Emergency engine shut down equipment is to be tested and operated prior to drill out and then weekly on all engines, or more frequently if required, and noted on TOUR report. Safety Drills will be held weekly, or more frequently at the discretion of the Drilling Supervisor.

13.2. Casing

13.2.1. Surface casing - 311 mm (12¼") hole - 245 mm (9⅝") casing

(1) On reaching casing point, circulate hole clean, P.O.O.H. Any tight spots, ream out and clean to bottom.

(2) Install guide shoe on bottom joint of 245 mm (9⅝") casing. Insert float collar between first and second joints and threadlock these joints together with the second and third joints.

(3) Install bow type centralisers at approximately mid first joint, secured with lock ring, and around third and fifth couplings.

(4) Run casing, tag bottom, install cement head and circulate at least the total volume of casing whilst slowly reciprocating through a 7 m stroke. Chain casing down prior to mixing and pumping cement. Cement as per SECTION 13.3.1.

NOTE: Casing collar is to be spaced and landed such that the installation of the BOP stack, bell nipple and flow line do not need modification.

13.2.2. Production Casing - 216 mm (8½") hole - 178 mm (7.0") casing

Where a well is proved to be productive a 178 mm (7.0") casing string will be run and cemented.

(1) After running wireline logs or testing, run a wiper trip to T.D., circulate hole clean, pull out of hole laying down pipe - strap out, change rams to suit the selected casing size.

(2) Install float shoe on bottom with float collar on top of 1st joint. Bakerlok these joints together as well as the second and third joints.

(3) Centralisers: mid 1st joint and on 3rd and 5th couplings, and over each joint from 30 m below to 30 m above each potential pay zone. Ensure that a lock ring is used to locate the shoe joint centraliser.

(4) Where programmed, install three scratchers every joint, located securely with lock nails, from 20 m below the OWC to 20 m above, through each potential pay zone.

(5) Run casing, tag bottom, install cement head and circulate at least the total volume of the casing whilst slowly reciprocating through a 7 m stroke. Pressure test all lines and cement as per SECTION 13.3.2.

NOTE: Casing is to be reciprocated continuously until the cement has been pumped.

13.3. Cementing Procedure

13.3.1. Surface Casing - 311 mm (12¼") hole - 245 mm (9⅝") casing

(1) Pressure test all lines to 14,000 kPa (2000 psi) for 5 minutes.

(2) Mix required sacks of Class A and pump to hole at between 4.0 - 4.5 BPM, release top plug. Note: if gel cement is programmed and pre-blended gel cement is not available, it will be necessary to pre-hydrate the gel in the cement mix water. 8% pre-blended gel cement by weight of cement is equivalent to approximately 2.5% pre-hydrated gel by weight of water.

(3) Displace with water and bump plug with 10500 kPa (1500 psi) or a minimum 7000 kPa (1000 psi) above the final pumping pressure. After 15 minutes, release pressure.

(4) W.O.C. a minimum of 6 hours.

(5) Install B.O.P. stack, bell nipple and flow.

(6) If an FIT is programmed, drill 5 metres of new hole and run F.I.T. to required EMW.

13.3.2. Production Casing - 216 mm (8½") hole - 178 mm (7.0") casing

(1) Pressure test all lines to 28,000 kPa (4000 psi) for 5 minutes.

(2) Mix sufficient preflush brine with 6 kg SAPP/bbl to fill 450 m annulus, calculated from DLL caliper, when displacing. The density of the brine must be at least equal to the mud weight equivalent of the permeable zones. Pump preflush, release bottom plug.

(3) Mix and pump cement slurry reciprocating slowly through a 6 m stroke.

(4) Release top plug and displace with water or brine.

(5) Bump plug with 7000 kPa (1000 psi) over final displacing pressure. Hold for 15 minutes. If float does not hold, rebump plug and hold 3500 kPa (500 psi) on casing for 6 hours.

(6) Lift BOP's, drop and set slips, land casing with 100,000# set down, cut and bevel casing stub, install tubing spool.

13.4. BOP Pressure Testing

All the requirements of the BOP Test Procedures (Section 2) of the Operations and Safety Manual will be adhered to.

13.4.1. Casing Tests

The Contractor will test the BOPs following the setting of surface casing and / or intermediate casing and prior to drilling out. Use the cement pumping unit. All tests are to be conducted using water. The Cup Tester to be used as required. Test pressures are tabulated in the Drilling Program.

13.4.2. Below Casing Tests

Every seven days after drilling below the last casing shoe, a pressure check of the BOP and manifold equipment will be made using a suitable Cup tester as indicated below:

(1) Below surface casing test to a low pressure of 1750 kPa (250 psi) for 15 minutes, then to 14000 kPa (2000 psi) for 15 minutes.

(2) Below intermediate casing test to a low pressure of 1750 kPa (250 psi) for 15 minutes, then to 17500 kPa (2500 psi) for 15 minutes.

(3) Pipe Rams and Annular Preventer are to be operated on a daily basis with Blind Rams being operated on each trip out of the hole. Manual closing controls are to be checked on a daily basis.

(4) Emergency engine shut down equipment is to be tested and operated prior to drill out and then weekly on all engines, or more frequently if required, and noted on TOUR report. Safety Drills will be held weekly, or more frequently at the discretion of the Drilling Supervisor.

IT IS A GOVERNMENT REGULATION THAT BOPs ARE OPERATIONAL AT ALL TIMES AFTER DRILL OUT OF ANY CASING STRING

13.5. Formation Leak-Off and Formation Integrity Tests

A formation Leak-Off Test (LOT) or Formation Integrity Test (FIT) is conducted to determine the strength of the open hole formation and to confirm the competency of the casing cement job. The leak-off value obtained is used to establish the maximum allowable casing pressure (MACP) for well control procedures and to calculate Kick Tolerance to be used as a guide for determining the maximum depth to be drilled prior to setting the next string of casing.

A LOT is defined as a test in which the pressure is taken to leak-off and the formation is fractured. A LOT should not be taken to a pressure higher than the calculated overburden pressure of 2.31 SG below seabed plus a seawater hydrostatic gradient. A FIT is defined as a test in which pumping is to be stopped at a predetermined maximum based on requirements for the hole section, or known fracture pressures for exposed formations.

LOT data is plotted on a volume pumped versus applied surface pressure plot to determine the leak-off pressure. As illustrated in Figure 10, the leak-off pressure is the pressure at which deviation from a straight line occurs. Pumping should stop when this deviation is clearly defined on the plot. The formation fracture pressure for a given depth is calculated as the sum of the mud hydrostatic pressure and the surface applied leak-off pressure.

Formation leak-off tests should be conducted at the following times:

(1) After drilling out every casing shoe once the BOP stack is run

(2) Prior to penetrating a suspected or known overpressure zone

(3) After drilling a suspected weak formation

(4) After any significant increase in mud weight

13.5.1. Procedure (Land Operations)

(1) Prepare a graph of pressure vs volume pumped. The estimated surface applied leak-off pressure (for LOT) and maximum applied surface pressure (for FIT) should be pre-plotted on the graph.

(2) Drill out casing shoe and drill 3-5 m of new hole below the original overhole.

(3) Circulate to ensure mud column is balanced and cuttings are circulated out.

(4) Pull bit inside casing shoe. If a slug has been pumped, as in the case when pulling back where a long open hole section has been drilled, ensure the slug is circulated out of the well prior to performing the leak-off test.

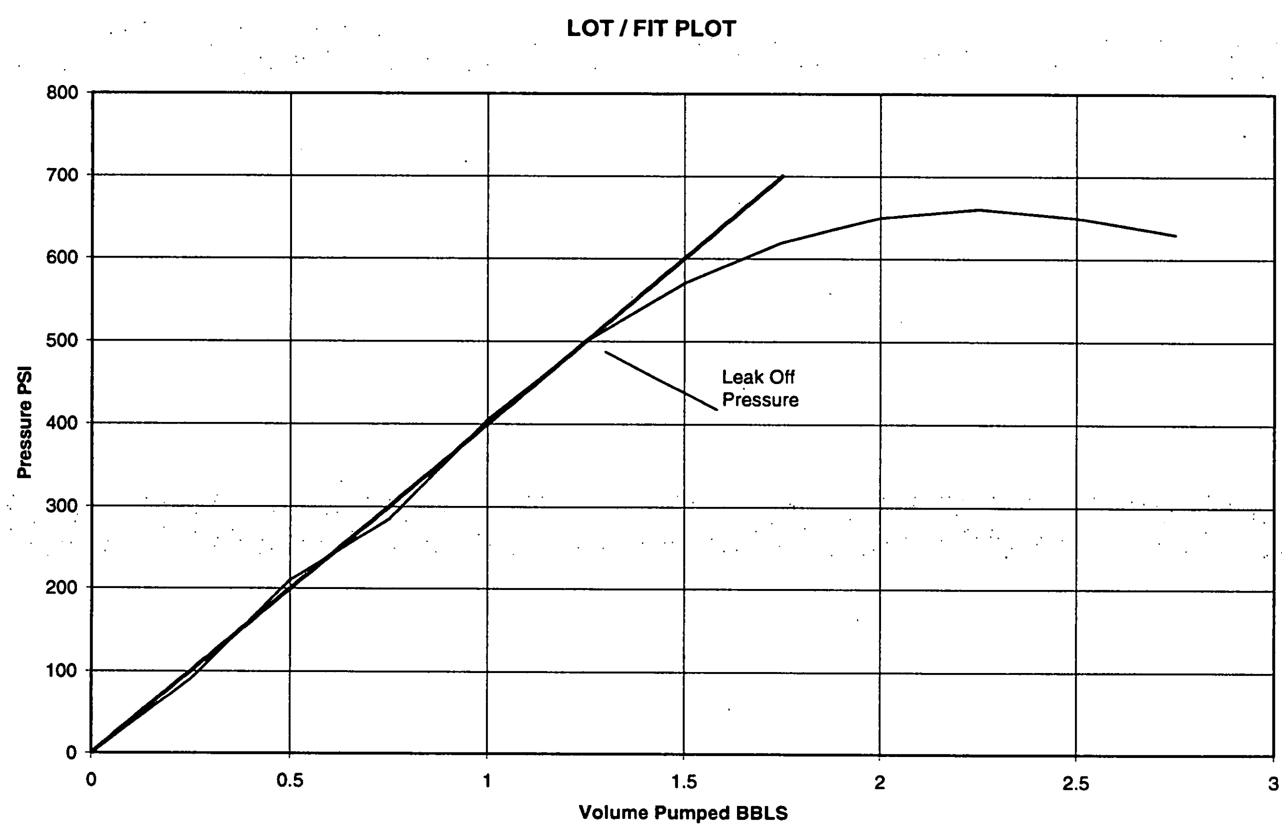
(5) Shut the well in using the designated pipe rams.

(6) Pump down the drillpipe and/or annulus at a constant rate with the cement unit or high pressure pumping unit. Suggested pump rate should be 0.25 bpm. For tests conducted with permeable formations exposed in the open hole, pump rates of 1 to 1.5 bpm may be required. Record and plot the applied pressure at increments of ¼ bbl (1 minute intervals).

(7) The point of departure of the data points from the straight line relationship is the leak-off pressure. For a LOT, stop pumping when the departure from the straight line is clearly defined. For a FIT, stop pumping when the present maximum required surface pressure is reached, or the formation leak-off is reached, whichever occurs first. Record and plot the pressures in one minute intervals after shutting down the pump until the pressure stabilises.

(8) Bleed off the pressure and record the volume of fluid recovered. Any difference between the volume bled back and the volume pumped is volume that has been lost to the hole.

FIGURE 10



13.5.2. Calculation and Interpretation

The leak-off pressure gradient is calculated as follows:

$$LOT = \frac{PS}{1.421\,D} + MW$$

Where:

LOT = leak-off pressure gradient (SG)

PS=applied surface pressure at leak-off (psi)

D =depth of suspected leak-off (m)

MW = mud weight (SG)

The depth used in this calculation should either be the casing shoe depth, drilled depth at which an open hole leak-off test is done, or the depth of the suspected weakest formation in the open hole section.

13.6. Testing Procedure

13.6.1. Drill Stem Testing Procedure

If a drill stem test is warranted, the following procedure will be adopted:

(1) Circulate until hole is clean.

(2) Pull out of hole.

(3) Make up testing assembly:

(4) Final test string configuration will be confirmed with testing contractor prior to test. Tools must include as a minimum, four (4) recorders (mechanical – inside, outside and recovery, electronic – inside) plus two independent reversing / pump-out subs, safety joint and jars. If possible, fax proposed tool string to the Brisbane office before make up.

(5) Check measurements with the testing operator to ensure that the desired interval is in fact tested. Write all measurements on the back of the Drill Stem Test Report Form.

(6) Check that the flare line is clear and all valves on this line downstream from the choke are open. Ensure that separator valves and dumps are in the operating position and that the entry and exit valves are closed.

(7) Ensure water sprays to all exhausts are in operation and that all sources of ignition have been suppressed.

(8) Set packers.

(9) Open valve - observe annulus to ascertain if the packers are holding.

(10) After a 5 minute initial flow, close tool.

IF THERE IS ONLY A SLIGHT AIR BLOW

(11) After 60 minutes shut-in, re-open the tool.

(12) Open for a further 60 minutes then shut-in tool

(13) After 120 minutes second shut-in, pull free and P.O.O.H.

IF THERE IS A STRONG AIR BLOW OR IF THERE IS GAS TO SURFACE DURING THE INITIAL FLOW PERIOD

(14) After 60 minutes shut-in, open tool.

(15) Flow gas until all mud has been cleared (the gas should be vented through the flare line and flared.

(16) Flow gas for at least 45 minutes or until pressures have stabilised. Observe pressures and temperatures every 5 minutes if recorders are not available. Two samples of gas will be collected from the floor manifold.

(17) If the gas flow during the clean-up is moderate and decreasing and if the flare has a smoky reddish colour, there is probably oil in the pipe. In this case, the flow period should be prolonged until oil reaches the surface.

(18) If there is no gas to surface but there is a continuing air blow, prolong flow period until either water reaches the surface or the air blow dies.

COLLECT FLUID SAMPLES AS PER SECTION 13.7

(19) Shut-in tools for at least 2 hours, then pull the packer free. Observe the mud level in the hole for any returns.

(20) If the contents of the drill pipe have not been reversed out, take samples of the fluid in the drill pipe and it is most important to take a sample from above the test valve.

(21) When pulling out of hole it is most important that the hole is kept full.

(22) Keep a full and accurate record of all operations during the test on the Drill Stem Test Report Form.

(23) If oil has been produced, reverse circulate out.

PULLING DRILLPIPE CONTAINING HYDROCARBONS
MUST NOT BE ATTEMPTED

13.6.2. Reverse Circulating Procedures

If it is considered that there could be significant liquid hydrocarbons in the string, it should be reverse circulated out prior to pulling the string.

The following procedure should be followed when reversing out:

(1) Closing the choke manifold when shearing the knock out sub or opening the DCIP valve will buffer the sudden drop of annular fluid. This reduces the commingling of produced fluids, and by manipulation of the choke, a controlled recovery can be made.

(2) Calculate the drill string capacity above the pump out sub or DCIP (which ever is used), and convert the volume to pump strokes at 95% efficiency.

(3) Zero the pump stroke counter or have two people on the pumps counting strokes. Line the pump to the kill line - DO NOT close the BOP's.

(4) Close the choke manifold. Drop the knock out bar or rotate the DCIP valve to the circulating position.

(5) Fill the hole as the annulus drops. Watch the annulus at all times, adjusting the pump rate to keep the annulus full, but not overflowing.

(6) Open the choke and commence recovery. Control the recovery rate using the choke and collect samples from the bubble hose.

(7) As the flow slows down due to hydrostatic balancing, shut-in the annular preventer and pump out the remaining recovery. Ensure the pump pressure, 1400 - 2100 kPa max (200 - 300 psi), does not exceed formation breakdown pressure. When the calculated capacity has been pumped, drilling mud returns should act as a final check to full recovery.

(8) Continue circulating for approximately 15 minutes to ensure a balanced system. Return fluids will normally be diverted into a holding tank where volumetric recovery is confirmed, and after a settling period, various fluid recoveries can be accurately determined.

(9) Pull out with test string.

13.7. Formation Fluid Samples

13.7.1. Crude Oil Samples

If crude oil is recovered, two 5 litre can samples will be taken for analysis. Preliminary analysis of the API gravity and pour point of the oil will be made at the wellsite. The samples will be labelled with: Well Name, Date, DST Number, DST Interval, Formation, Sample origin and Temperature.

13.7.2. Gas Samples

Gas samples of 500 - 1000 ml are required for analysis. A minimum of two samples per test will be collected under pressure in an evacuated steel cylinder (minimum 1500 psi). The cylinder will be labelled with:- Well Name, Date, DST Number, DST Interval, Formation, pressure, sample origin, time sample was taken and the reservoir and surface temperatures.

Use the Drill Stem Test Report form to record all information about the samples collected. A sample of any gas to surface will be analysed at the wellsite using the chromatography in the mud logging unit. Avoid saturating the detector by diluting with air.

13.7.3. Water Samples

The following procedures for sampling drill stem test fluid for hydrogeochemical evaluation are recommended.

Collect the following types of samples for evaluation:-

(i)	Drilling mud sample	-	1 litre plastic bottle
(ii)	Make-up water	-	1 litre plastic bottle
(iii)	DST samples	-	1 sample from the top
		-	1 sample from the middle
		-	1 sample from the bottom
(iv)	Mud filtrate	-	20 ml sample

Collect each DST sample in a 1 litre plastic bottle. If an organic extraction of possible petroleum components from the water is required, then two, 1 litre GLASS bottles should be collected.

13.7.4. Sample Collection Methods

Rinse all containers thoroughly with the fluid to be sampled before collecting the actual sample.

If possible, obtain the Ph and resistivity of each sample immediately after collection. Measure and record chlorides by titration.

Fill all plastic containers to the brim with sample. Screw cap down and at the same time squeeze some of the liquid out then tighten the cap. Wrap the cap tightly with tape. This procedure will provide a good seal and reduce bacterial putrefaction and oxidation.

Fill bottles ¾ full, tap cork evenly into position, invert and store with bottom end upwards. This will trap gases against the bottom of the bottle. Check for leakage around the cork.

Label all containers clearly.

STORE SAMPLES IN A COOL PLACE AND SHIP
AS SOON AS POSSIBLE FOR ANALYSIS.

Water samples quickly change composition upon sitting, especially if they have been contaminated with mud. Thus for best results, samples should be sent for analysis immediately after collection.

13.8. Well Velocity Survey Procedures

Attachment A shows the geometry of the offset and flarepit locations. The offset shots (A = 5 m, B = 25 m and C = 50 m from the well head) are to estimate the well datum static and can be compared with the seismic datum static to determine if a static mistie exists. The flarepit is used for the deeper check shots for improved coupling and safety when larger charges are required.

In order to more accurately determine respective datum statics relative to offset and flarepit shot locations greater duplication of shot data is required. The following field acquisition procedures are proposed and the geometry is shown on Attachment A:

13.8.1. Offset Shots

(i) Offset shots to be not more than 0.5 metres in depth (as safety permits). This will minimise any error upon correcting to vertical travel paths.

(ii) All offset shots should be acquired at the same shot depth to enable direct comparison between successive shots.

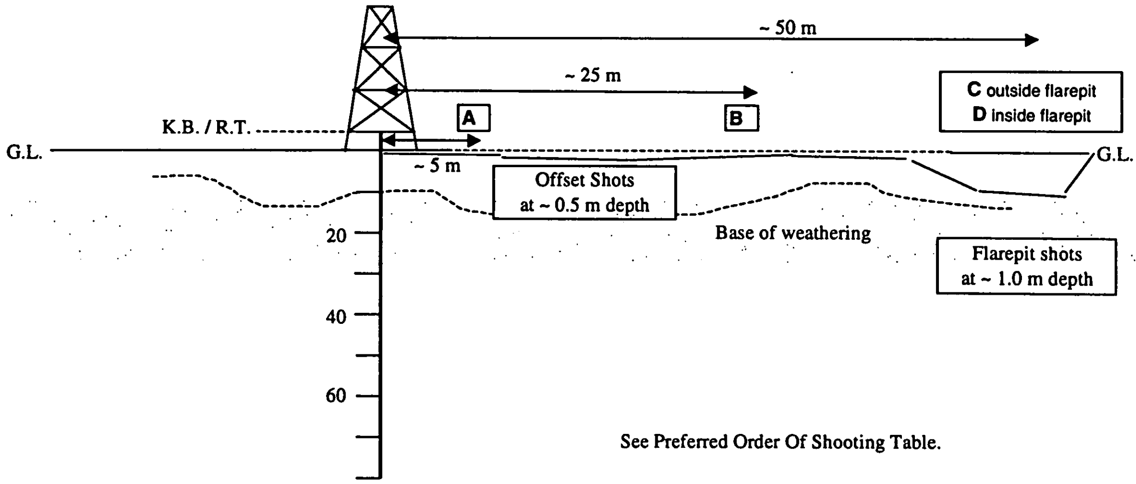
(iii) Datum shots should be acquired at a geophone depth equal to mean sea level.

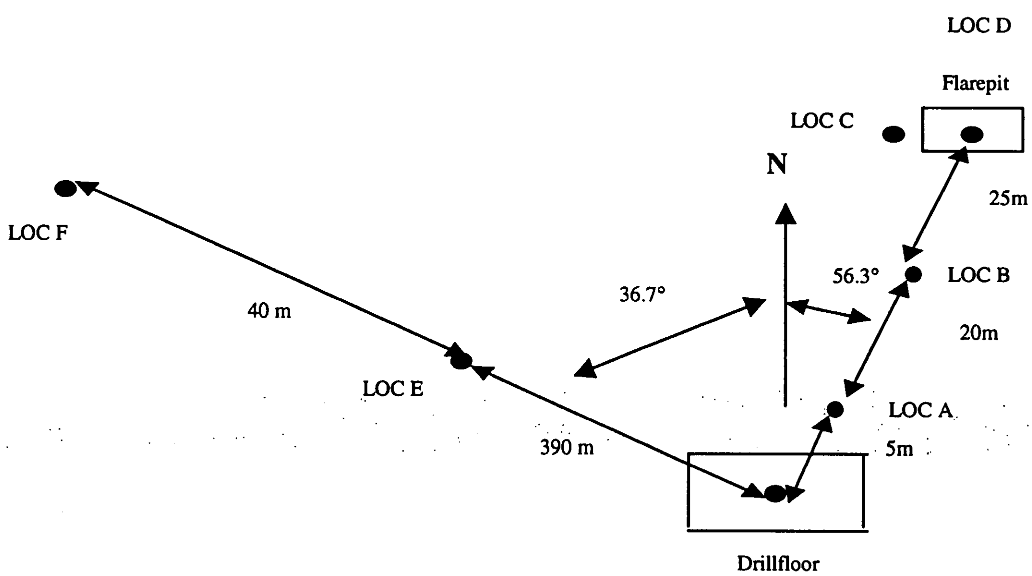
13.8.2. Flarepit Shots

(i) all flarepit shots should be acquired at the same offset position and same shot depth to enable direct comparison between successive shots at different geophone depths.

(ii) at least three of the offset geophone depths (MSL) should be duplicated by shots from the flarepit so that a "flarepit datum static" can be determined and used to datum correct all subsequent flarepit shots at deeper horizons of interest.

ATTACHMENT A





NORTH PAARATTE 4
SHOT POINT LOCATION SKETCH
NOT TO SCALE

14. APPENDIX 4 - COMMUNICATIONS

14.1. BERL Phone Numbers

Office Telephone:	(08) 8235 3803
Office Facsimile:	(08) 8223 2263
Drilling Operations Mobile:	(04) 1773 1889
Geology Operations Mobile :	(04) 1964 8885

14.2. Daily Reports

Daily reports covering 0000 - 2400 hours, transmitted by 0730 hours Eastern Standard Time, to the Brisbane Office.

14.3. OCA After Hours Contact Telephone Numbers

Ross NAUMANN:	(07) 3848 8618	(04) 1358 4661
Shane ROBBIE:	(07) 3285 6416	(04) 1773 1889
Bill FAWCETT:	(08) 8373 1004	(04) 1964 8885
Glen WINGATE:	(04) 1884 2051 (Wk Mob)	(08) 8553 7171(H) - Weekend

14.4. Emergency Contact Numbers

Port Campbell

Ambulance:	000
Fire:	000
CFA - Colac	(03) 5232 1923
Hospital: Warnambool Base Hospital (Ryot St)	(03) 5563 1666
Police:	(03) 5598 6310 (Lord St) – if unattended, call will divert to Warnambool Police
State Emergency Service:	(03) 5598 6363
Corangamite Shire Council	(03) 5593 7100
(Camperdown) Peter Johnston	(03) 5593 2695 Fax

14.5. Contractors' Contact Numbers

Baker Hughes INTEQ (Coring) Suite 4-5, Stoneham Road Belmont, WA 6104	(Ken Johns)	 Fax:	(08) 8478 0500 (08) 9478 6155
Baker Oil Tools (Australia) (Drill Stem Testing) 23 Pambula Street Regency Park, SA 5010	(Ewan McDonald)	 Fax:	(08) 8345 4778 (08) 8345 4778
Century Drilling Limited (Drilling Rig) 172 Fullarton Road Dulwich, SA 5065	(Mike Newport)	 Fax:	(08) 8333 0366 (08) 8333 0442
Dowell Drilling Fluids (Drilling Fluids) 24 Bannick Court Canning Vale, WA 6155	(Timi Aladetimi)	 Fax: Mob.	(08) 9420 4876 (08) 9455 1728 (04) 1109 2057
Expertest Pty Ltd 138 Richmond Road Marleston, SA 5033	(Dave Hawkes)	 Fax: A/H:	(08) 8354 0488 (08) 8443 7408 (08) 8381 3467
Geoservices Overseas SA (Mudlogging) Unit 8, 14-22 Farrell Road Midvale, WA 6056	(David Angus)	 Fax:	(08) 9250 2010 (08) 9250 2715
Halliburton Australia Pty Ltd (Cementing) Level 12, 60 Edward St Brisbane, QLD 4000	(David Guglielmo)	 Fax:	(07) 3211 3950 (07) 3211 3952
Roma Base	(Paul Larkins)		(07) 4622 4588
Nelsons Transport Service (Cobden)	(Ian Kerr)	 Fax: Mob:	(03) 5595 1320 (03) 5595 1883 (0409) 797 223
Schlumberger Oilfield Australia Pty Ltd (Wireline Logging) 59 Kremzow Road Brendale, QLD 4500	(Lee Swager)	 Fax:	(07) 3231 0513 (07) 3229 1180
Sperry-Sun Drilling Services 19 Drake Street Osborne Park, WA 6017	(Mike Cunnington)	 Fax: Mob:	(08) 9242 4533 (08) 9242 2486 (04) 1891 3267
Velocity Data Pty Ltd	(John Larsen)	 Fax:	(07) 5495 3077 (07) 5495 7314

14.6. Government Contact Numbers

Communication with the Government will be through the Brisbane office only.

BORAL ENERGY PETROLEUM PTY LTD
60 Hindmarsh Square
ADELAIDE SA 5000

Tel:	(08) 8235 3737	Bill Fawcett	(08) 8373 1004 (H)
Fax:	(07) 8223 1851	(Mob)	(04) 1964 8885

DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT
8th Floor
250 Victoria Parade
FITZROY VIC 3065

Tel:	(03) 9412 5089	Ahmed Nadji	(03) 9848 8905 (H) Fax
Fax:	(03) 9412 5152	(Mob)	(04) 1211 0997