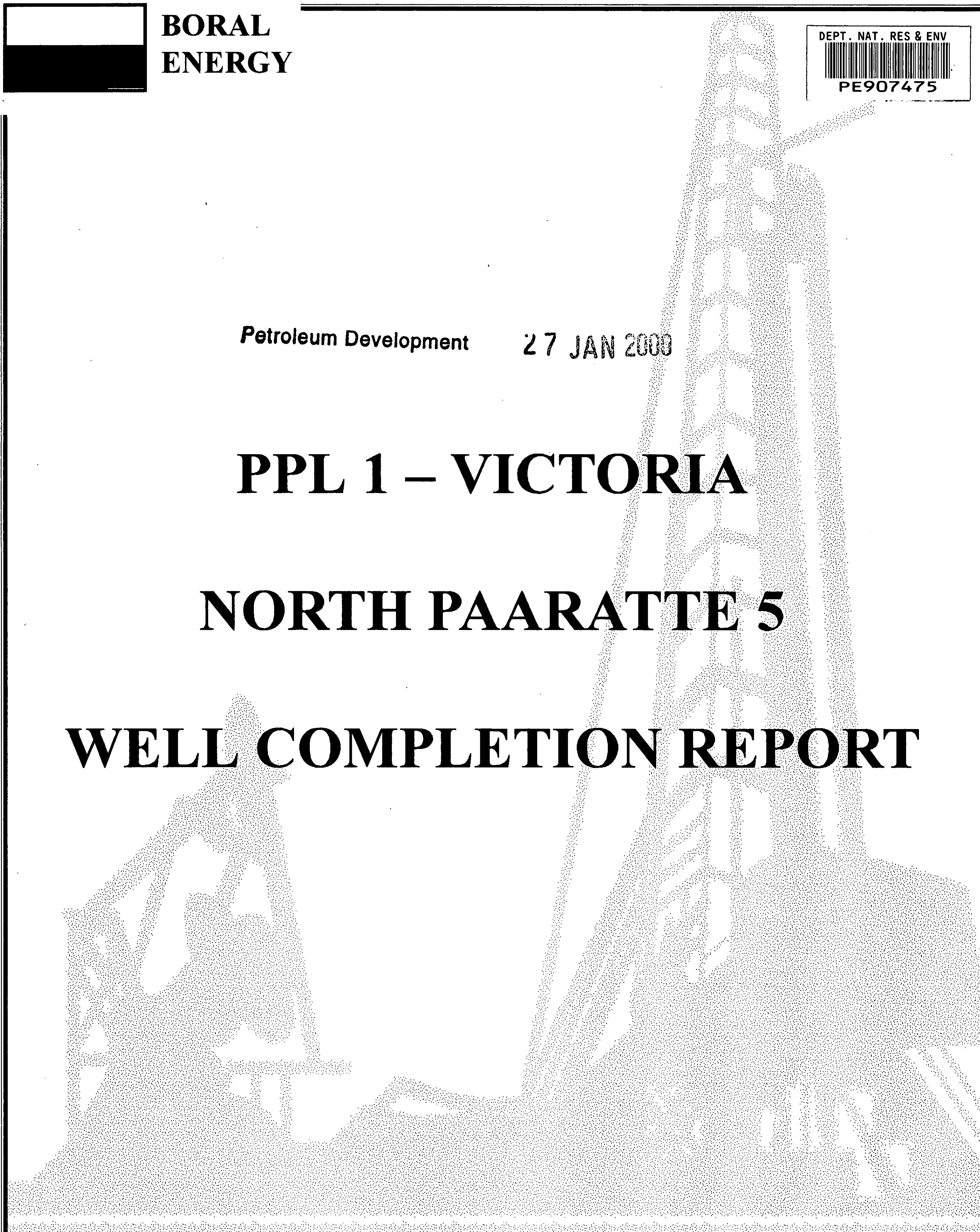
BORAL ENERGY



PPL 1 – VICTORIA

NORTH PAARATTE 5

WELL COMPLETION REPORT

BORAL ENERGY PETROLEUM PTY. LTD.

WELL COMPLETION REPORT

NORTH PAARATTE 5

PPL 1 - VICTORIA

OTWAY BASIN

Authors:

S F Simeone

D A Short

Boral Energy Petroluem Pty. Ltd.
1 King William Street
ADELAIDE SA 5000

December 1999

TABLE OF CONTENTS

			Page No.
WELL DATA CARD			
1.0	**SUMMARY**		1
2.0	**WELL HISTORY**		3
2.1	**General Data**		3
	2.1.1	Well Name & Number	3
	2.1.2	Location	3
	2.1.3	Elevations	3
	2.1.4	Petroleum Tenement	3
	2.1.5	Permit Operator	3
	2.1.6	Drilling Manager	3
	2.1.7	Date Drilling Commenced	3
	2.1.8	Date Drilling Completed	3
	2.1.9	Date Rig Released	3
	2.1.10	Drilling Time to TD	3
	2.1.11	Total Depth	3
	2.1.12	Status	3
2.2.	**Rig Data**		4
2.3	**Drilling Data**		10
	2.3.1	Drilling Data Summary	10
	2.3.2	Hole Sizes and Depths	12
	2.3.3	Casing and Cementing	12
	2.3.4	Deviation Surveys	12
	2.3.5	Drilling Fluid	13
	2.3.6	Physical Mud Properties	13
	2.3.7	Water Supply	14
	2.3.8	Perforation Record	14
	2.3.9	Plugging and Cementing	14
2.4	**Logging and Testing**		10
	2.4.1	Wellsite Geologist	10
	2.4.2	Mudlogging	10
	2.4.3	Ditch Cutting Samples	10
	2.4.4	Coring	10
	2.4.5	Sidewall Cores	10
	2.4.6	Testing	10
	2.4.7	Wireline Logs	10
	2.4.8	Temperature Surveys	11
	2.4.9	Velocity Survey	11

TABLE OF CONTENTS Contd.

		Page No.
3.0	GEOLOGY	17
3.1	**Reasons for Drilling**	17
3.2	**Stratigraphic Prognosis**	21
3.3	**Stratigraphy**	22
3.4	**Hydrocarbon Shows**	16
4.0	DISCUSSION AND CONCLUSIONS	27
5.0	COMPLETION	28
6.0	REFERENCES	28

TABLE OF ATTACHMENTS

LIST OF FIGURES

Figure 1	Locality Map for North Paaratte-5
Figure 2	Drilling Time/Depth Curve
Figure 3	Time Analysis
Figure 4	Otway Stratigraphic Table
Figure 5	Downhole Installation Diagram

LIST OF TABLES

Table 1	Stratigraphic Table for North Paaratte-5

LIST OF APPENDICES

Appendix 1	Cuttings Descriptions
Appendix 2	Wireline Log Analysis
Appendix 3	Bit Record
Appendix 4	Drilling Fluid Summary by M-I Pty. Ltd.
Appendix 5	Well Location Survey Plan
Appendix 6	MWD Survey Data by Sperry Sun

LIST OF ENCLOSURES (Pocket)

		SCALE
Enclosure 1	Composite Well Log	1:500
Enclosure 2	Composite Well Log	1:200
Enclosure 3	Geoservices Mudlog	1:200

907475 026

Location:	Latitude:	38°33'09.78S"
	Longitude:	142°57'14.32"E
	Station:	CDP 2525
	Line:	8325
Elevation:	GL:	92.9 metres
	KB:	98.4 metres
Map:	Colac	1 : 250000
Grid:	Easting:	670 265.59
	Northing:	5 731 032.49
Date Spudded:	22/03/1999	1730 hours
Reached TD	28/03/1999	1130 hours
Date rig release:	30/03/1999	1730 hours
Type Structure:	Anticline	

Status:	Gas Well	
Rig:	Century 2	
Total Depth:	Driller:	1603.0m.
	Logger:	1603.0m. (Extrap)
Plugs:	None	
Casing :	Size	Shoe
(a) Surface	244mm	401.8m
(b) Production	178mm	1596.0m

STRATIGRAPHIC UNITS PENETRATED

AGE	FORMATION	K.B. Depths	TVD Depths	MSL Depths	Thickness
E-L. Miocene	Port Campbell Ls.	5.5	5.5	92.9	73.5
Oligocene	Gellibrand Marl	79.0	79.0	19.4	245.0
E. Oligocene	Clifton Fm.	324.0	324.0	-225.6	29.0
L. Eocene	Narrawaturk Marl	353.0	353.0	-254.6	34.0
L. Eocene	Mepunga Fm.	387.0	387.0	-288.6	37.0
M. Eocene	Dilwyn Fm.	425.0	425.0	-326.6	244.6
E. Eocene	Pember Mudstone	676.0	669.6	-571.2	76.0
E–L. Palaeocene	Pebble Point Fm.	761.0	745.6	-647.2	56.2
L. Cretaceous	Paaratte Fm.	824.0	801.8	-703.4	323.4
L. Cretaceous	Skull Creek Mbr.	1184.0	1125.2	-1026.8	113.8
L. Cretaceous	Nullawarre Greensand	1310.0	1239.0	-1140.6	93.0
L. Cretaceous	Belfast Fm.	1414.0	1332.0	-1233.6	96.0
L. Cretaceous	Waarre Fm. (Unit C)	1521.5	1428.0	-1329.6	73.8
	T.D. (Logs)	1603.0	1501.8	-1403.4	

WIRELINE LOGS

Type Log	Run	Interval	BHT / Time
HLLS/HLLD – GR - SP - CAL	1	1591 – 400m	56°C after 8.0 hours
RXOZ	1	1589 – 400m	
BHCS – GR (GR to surface)	1	1578 – 400m	
RHOZ	1	1588 – 400m	
TNPHI	1	1592 – 400m	
(PEX – All logs recorded on 1 run)			

FORMATION TESTS

No	Interval / Formation (metres)	Periods (mins)	EMP IP/FP (psi)	EMP FSIP (psi)	Fluid to surface (mins)	Surface Press. (max) (psi)	TC. mm.	BC. mm.	Rev. Out	Result.
	None									

FULL HOLE CORES

No.	Interval	Formation	Cut (m)	Rec.(m)
	None			

PERFORATIONS

Interval	Formation	Shots / ft.
1521.5 – 27.0m.	Waarre Fm. Unit "C"	12

Interval	Formation	Shots / ft.

907475 028

LOG INTERPRETATION

Interval (MSL Depths)	Sand (m)	Net Pay (m)	Porosity (%)	Sw (%)
-1329.7 – -1339.8	10.1	10.0	0.245	0.141
-1339.8 - -1341.1	1.3	1.3	0.239	0.256
-1341.1 – -1354.0	12.9	12.9	0.237	0.156
-1354.0 – -1354.4	0.4	0.4	0.263	0.447
-1354.4 – -1355.9	1.5	1.5	0.224	0.727
-1355.9 – -1365.2	9.3	9.2	0.279	0.829
-1365.2 – -1372.2	7.0	6.9	0.209	1.348
-1372.2 – -1378.6	6.4	0.1	0.201	0.838
-1378.8 – -1380.5	1.7	1.4	0.262	0.829

SIDEWALL CORES

Depth (m)	Lithology	Depth (m)	Lithology
None			

SUMMARY

North Paaratte-5 was drilled as a development well in the North Paaratte Field, PPL-1, onshore Otway Basin. The primary objective for the well was the upper Cretaceous Waarre Formation of the Sherbrook Group where the reservoir, the Unit "C" sandstone, will be used as a swing producer to meet peak gas demand.

North Paaratte-5 was a deviated gas development well located approximately 8km north of the town of Port Campbell in PPL-1, Victoria, Relative to the closest well North Paaratte-1 (1979) the location was about 35 metres south at surface and about 420 metres east northeast at the top of the Waare Formation.

North Paaratte-2 (1981) is located approximately 1.6km. to the east, in the same field / fault block and is also a gas producer. North Paaratte-3 is located further to the east in a separate fault block but the reservoir sands are water saturated.

The primary objective for the well was the upper Cretaceous Waarre Formation of the Sherbrook Group where the reservoir, the Unit "C" sandstone, will be used as a swing producer to meet peak gas demand. The North Paaratte Field is currently shut-in due to high water cut and two wells are required to restore gas production

North Paaratte-5 intersected a normal Otway Basin (Port Campbell embayment) sequence and stratigraphic control was generally good with the top of the primary objective, the Waarre Unit "C" sandstone being 8 metres low to prognosis.

North Paaratte-5 spudded on the 22nd of March, 1999 and the surface hole (311mm) was drilled to 406m. Surface casing (244mm) was set at 401.8m. A 216mm hole (deviated below 500m.) was then drilled to a total depth of 1603.0m. (driller & logger). Total depth was reached on 28th March 1999.

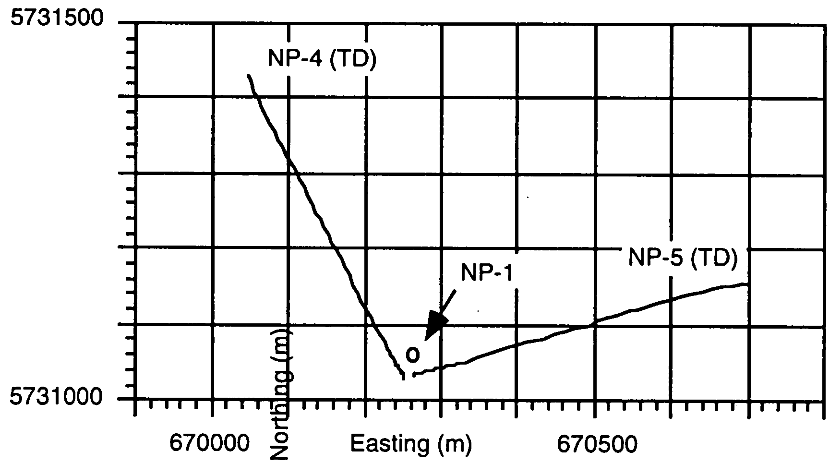
A strong gas show (308 units max.) was recorded in the Unit "C" sand of the Waarre Formatiion. No other significant gas shows or fluorescence were encountered while drilling.

After logging and evaluation the well was cased (178mm.) to 1596.0m. and the rig released to completion operations on the 30th of March 1999.

1.0 SUMMARY

North Paaratte-5 was drilled as a development well in the North Paaratte Field, PPL-1, onshore Otway Basin. The primary objective for the well was the upper Cretaceous Waarre Formation of the Sherbrook Group where the reservoir, the Unit "C" sandstone, will be used as a swing producer to meet peak gas demand.

North Paaratte-5 was a deviated gas development well located approximately 8km north of the town of Port Campbell in PPL-1, Victoria, Relative to the closest well North Paaratte-1 (1979) the location was about 35 metres south at surface and about 420 metres east northeast at the top of the Waare Formation.



North Paaratte-2 (1981) is located approximately 1.6km to the east, in the same field / fault block and is also a gas producer. North Paaratte-3 is located further to the east in a separate fault block but the reservoir sands are water saturated.

The primary objective for the well was the upper Cretaceous Waarre Formation of the Sherbrook Group where the reservoir, the Unit "C" sandstone, will be used as a swing producer to meet peak gas demand. The North Paaratte Field is currently shut-in due to high water cut and two wells are required to restore gas production

North Paaratte-5 intersected a normal Otway Basin (Port Campbell embayment) sequence and stratigraphic control was generally good with the top of the primary objective, the Waarre Unit "C" sandstone being 8 metres low to prognosis..

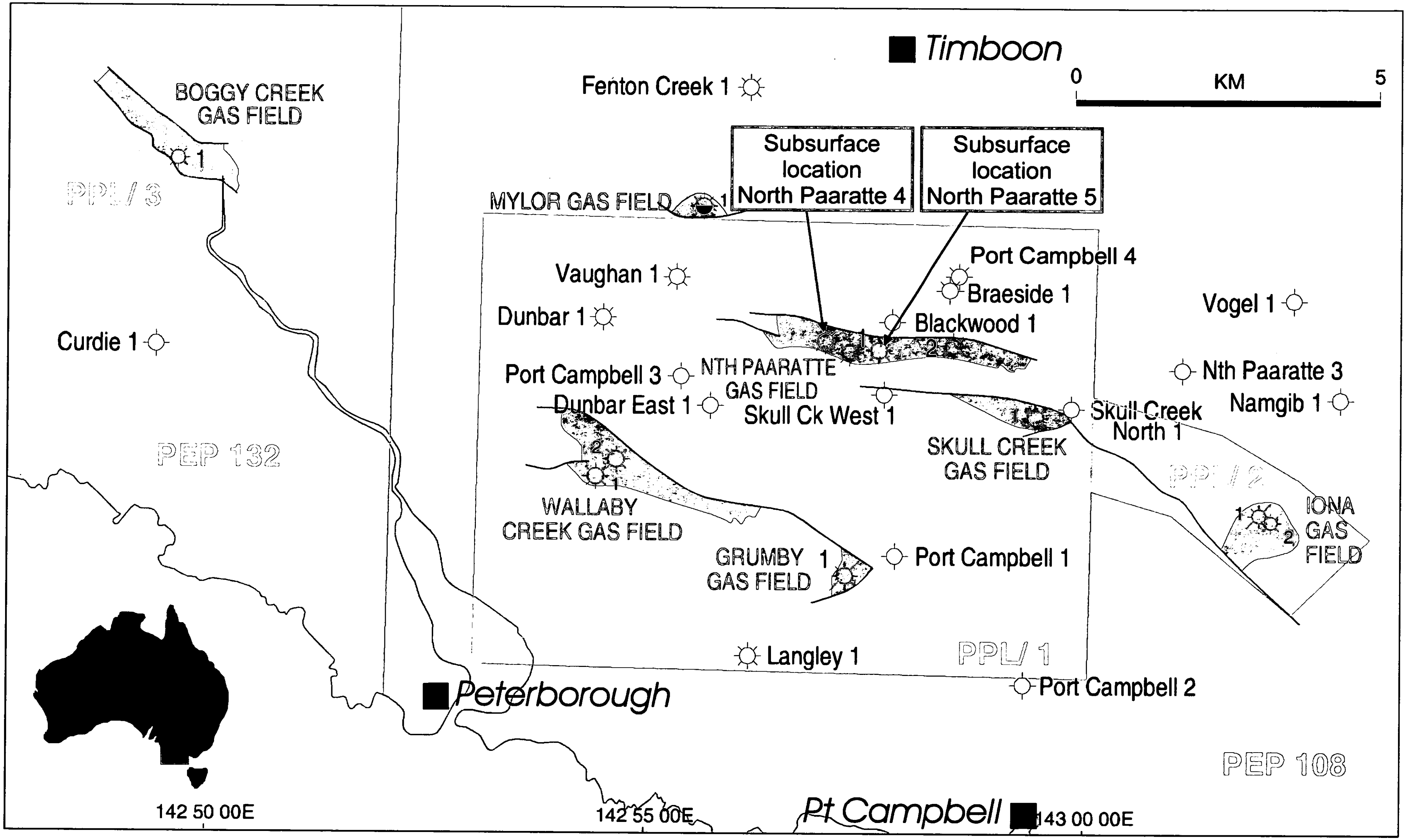
North Paaratte-5 spudded on the 22nd of March, 1999 and the surface hole (311mm) was drilled to 406m. Surface casing (244mm) was set at 401.8m. A 216mm hole (deviated below 500m) was then drilled to a total depth of 1603.0m (driller & logger). Total depth was reached on 28th March 1999.

A strong gas show (308 units max.) was recorded in the Unit "C" sand of the Waarre Formation. No other significant gas shows or fluorescence were encountered while drilling.

After logging and evaluation the well was cased (178mm) to 1596.0m and the rig released to completion operations on the 30th of March 1999.

BORAL ENERGY

OTWAY BASIN - WELL LOCATIONS



907475 032

Figure 1

2.0 WELL HISTORY

2.1 General Data

2.1.1	Well Name and Number	:	North Paaratte 5	
2.1.2	Location	:	Latitude :	38°33'09.78"S
			Longitude :	142°57'14.32"E
			Easting :	670 265.59
			Northing :	5 731 032.49
			Seismic :	Station CDP 2525
				Inline 8325
2.1.3	Elevations	:	G.L. :	92.9m A.S.L.
			K.B. :	98.4m A.S.L.
2.1.4	Petroleum Tenement	:	PPL 1	
2.1.5	Permit Operator	:	BORAL ENERGY PETROEUM PTY LTD A.C.N. 010 728 962 60 Hindmarsh Square, ADELAIDE SA 5000	
2.1.6	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	
2.1.7	Date Drilling Commenced	:	1730 hours 22nd March, 1999	
2.1.8	Date Drilling Completed	:	1130 hours 28th March, 1999	
2.1.9	Date Rig Released	:	1730 hours 30th March, 1999	
2.1.10	Drilling Time to T.D.	:	5.75 days total (3.1 days rotating)	
2.1.11	Total Depth	:	Driller :	1603.0m
			Logger :	1603.0m (Extrap)
2.1.12	Status	:	Completed Gas Well.	

2.2 Rig Data

Drilling Contractor:	Century Drilling Limited 172 Fullarton Road DULWICH SA 5065
Drawworks:	Ideco Hydrair H-44-CSC single drum drilling hoist mounted on an Ideco Model BIR-7585 carrier.
Substructure:	Ideco 260 ton telescoping substructure (capacity 320,000 pounds on rotary beams and 200,000 pounds on setback area, loaded concurrently). Height: 11ft for transport, telescopes to provide 16ft high substructure with 13'9" between ground and bottom of rotary beam.
Engines:	Two (2) Caterpillar 3408-DITA diesel engines with Allison model 5860 torquematic transmission.
Brake:	V80 Parmac hydromatic.
Mast:	Ideco KM-117-358AH kwik-lift telescoping. 117ft clear height from ground to underside of crown. Static hook capacity with 10 lines 358,000 pounds.
Catheads:	Hydraulic make up and break out unit, mounted in mast.
Travelling Block/Hook:	Ideco model UTB-265 capacity 265 tons with 5 x 42" sheaves grooved for 1.1/8" line.
Winches:	One hydraulic winch Braden model PD-12A. One hydraulic service winch PD-10.
Swivel:	Ideco TL-200 ton capacity.
Rig Lighting:	Electrical Power Systems, lighting system with fluorescent lights for mast, floor, pipe rack area, cellar, engine, pump and mud tank area. Explosion proof light.
Kelly Drive:	Varco 27 HDP pin drive with rollers to suit 5.1/4" and 3.1/2" hexagonal kellies.
Mud Pumps:	No.1 National 8-P-80 Triplex – 8.1/2" Stroke. Independently driven by Caterpillar D398TA diesel engine and complete with 1 only Warman 6" x 4" charging pump. No.2 National 8-P-80 Triplex – 8.1/2" Stroke. Independently driven by Caterpillar D398TA diesel engine and complete with 1 only Warman 6" x 4" charging pump.

Mixing Pump:	One (1) Harrisburg 6" x 8" Centrifugal Pump powered by a 60 H.P. 1800 R.P.M. electric motor.
Mud Agitators:	Three (3) Duck 5 H.P. (2 suction, 1 shaker).
Shale Shaker:	Two (2) DFE Linear Motion with 84 and 110 mesh screens
Degasser:	Drilco mud gas separator capable of handling a maximum of 700 G.P.M. of fluid.
Mud Cleaner:	Combination Mud Cleaner/Desilter powered by 5 H.P. electric motor charged with Harrisburg 6 x 8 Centrifugal Pump driven by 60 H.P. 1800 R.P.M. Electric Motor.
Desander:	Harrisburg DSN 1000 unit with 2 x 10" cones charged with a 6 x 8 Centrifugal Pump with a 10" impellor and a 60 H.P. 1800 R.P.M. Electric Motor.
Generators:	Two (2) Caterpillar 3406TA, 250 Kw prime, 300 Kw standby, 60 Hz 230/460 generating sets.
B.O.P's & Accumulators:	One (1) 13 5/8" x 5000 Shaffer LWS Ram type double studded hydraulic B.O.P. with 7", 5.1/2", 5",4.1/2", 3.1/2", 2.7/8", 2.3/8", and C.S.O. Rams. One (1) 13 5/8" x 5000 Hydril GK Spherical Annular B.O.P. studded top and flange bottom. One (1) Koomey Accumulator model 120 LS type 80 3000 psi 120 gallon capacity (10 bottles).
Kelly Cock(Upper):	Hydril 5000 psi upper kelly cock with 6.5/8" reg. LH connections.
Kelly Cock(Lower):	Hydril Kelly Guard 5000 psi lower kelly cock with 4.1/2" IF connections.
Drill Pipe Safety Valve:	1 x 4.1/2" IF Inside BOP (Gray) 1 x 4.1/2" IF Full Opening Stabbing Valve, 2 13/16" ID
Air Compressors & Receivers:	One (1) Gardner Denver 30 HP compressor, 100 cfm @ 125 psi. One (1) Worthington 20 HP compressor, 80 cfm @ 125 psi.
Power Tongs:	Weatherford Model 16 - 18 hydraulic unit complete with jaws to suit 13.3/8", 9.5/8", 7", 5.1/2" operated from rig hydraulic system.

Spools:	One (1) DSAF 13-5/8" - 5000 psi x 13-5/8" - 3000 psi. One (1) DSAF 13-5/8" - 5000 psi x 11" 5000 psi One (1) DSAF 13-5/8" - 5000 psi x 11" 3000 psi One (1) DSAF 13-5/8" - 5000 psi x 7-1/16" 5000 psi One (1) DSAF 13-5/8" - 5000 psi x 7-1/16" 3000 psi One (1) flanged spool 13-5/8" - 5000 psi x 13-5/8" – 5000 psi with 2 1/16" - 5000 psi x 3 1/8" - 5000 psi outlets (23" high) One (1) flanged spacer spool 13.5/8" - 5000 psi (23" high).	
Mud Tanks (3) :	Dimension L x W x H	Capacity
Shaker Tank:	39' x 10' x 6'	414 bbls
Sand Trap		81 bbls
Desander		47 bbls
Desilter		55 bbls
Reserve		231 bbls
Suction Tank:	40' x 10' x 6'	400 bbls
Suction		360 bbls
Pill		40 bbls
Trip Tank:	One 25 bbls capacity with 2" & 1.1/2" electric pumps	
Kill Line Valve:	2 x 2" - 5000 psi gate valve manual CIW	
Choke Line Valves:	1 x 3" - 5000 psi gate valve manual CIW 1 x 3" - 5000 psi hydraulic gate valve CIW	
Choke Manifold:	1 x 3" 5000psi. unit with 2 x 3" adjustable chokes - CIW	
Drill Pipe:	8,500' 16.6 lb/ft. Grade E 4.1/2" OD 18 degree taper with 6.3/8" OD tool joints and 4" IF connections.	
Pup Joints:	1 x 10' – 4.1/2" OD with 4" IF connections 1 x 5' – 4.1/2" OD with 4" IF connections	
Hevi-Wate Drill Pipe:	22 only 4.1/2" OD with 4" IF connections	
Drill Collars:	4 only 150 lb/ft 8" OD (2.813" ID) Drill Collars with 6.5/8" Reg. connections. 30 only 92 lb/ft 6.1/4" (2.813" ID) OD Drill Collars slip recessed and hardbanded with 4" IF connections. 1 only 92 lb/ft 6.1/4" (2.813" ID) OD pony Drill Collars	
Kellies:	1 only 5.1/4" Hexagonal 38' working space (40' overall) with 6.5/8" reg. LH box x 4" IF Pin.	

Roller Reamers & Stabilisers:	1 only 12.1/4" OD Gearhart Ezy-Change Stabiliser with 6-5/8" Reg connections 1 only 8.1/2" OD Gearhart Modular stabiliser- 4" IF box x 4.1/2" Reg box 3 only 8.1/2" OD Gearhart Modular stabiliser- 4" IF connections 1 only 8.1/2" OD Gearhart NB "Redback" roller reamer- 4" IF box x 4.1/2" Reg box connections
Fishing Tools:	1 only Bowen 6.1/4" OD type Z Hydraulic Jar 1 only Bowen 9.5/8" series 150 FS Overshot 1 only Bowen 8.1/8" series 150 FS Overshot 1 only 7.7/8" Reverse Circulating Junk Basket 1 only Junk Sub - 8.1/2" hole 1 only flat bottom mill for 8.1/2" hole 1 only Magnet for 8.1/2" hole
Wireline Survey Unit:	1-Bronco Model BS-15-RH Remote Hydraulic Powered Unit complete with 12,000' 0.092" diameter line.
Subs:	3 only 4" IF saver subs. 2 only 6-5/8" Reg lifting subs 12 only 4" IF lifting nubbins. 2 only 6-5/8" Reg double box bit sub (5F-6R float recess). 2 only 4" IF box x 4.1/2" Reg. box bit sub (4R float recess). 1 only 4.1/2" Reg pin x 4.1/2" FH pin 4" long 2 only 6-5/8" Reg pin x 4" IF box. 2 only 4.1/2" IF box x 4" IF pin. 1 only 4" IF pin x 2" LP pin (circulating) 12" long. 1 only 3.1/2" IF pin x 2" LP pin (circulating) 12" long.
Handling Tools:	1 set AAX tongs complete with hangers Range 2.7/8" - 13.3/8" 1 set forged elevator links 108" x 2.3/4" capacity 250 tons 1 set 13.3/8" H150 Casing Elevators 1 set 13.3/8" Single Joint Elevators 1 set 13.3/8" CMSXL Casing Slips 1 set 9.5/8" H150 Casing Elevators 1 set 9.5/8" Single Joint Elevators 1 set 9.5/8" CMSXL Casing Slips 1 set 7" H150 Casing Elevators 1 set 7" Single Joint Elevators 1 set 7" CMSXL Casing Slips 1 set 5.1/2" H150 Casing Elevators 1 set 5.1/2" Single Joint Elevators

	1 set 5.1/2" SDL-M Casing Slips 2 sets 4.1/2" T200 Drill Pipe Elevators 2 sets 4.1/2" SDL-M Drill Pipe Slips 1 set 6.3/4" - 8.1/4" DSC-L Drill Collar Slips 1 set 5.1/2" - 7" DSC-L Drill Collar Slips 1 Safety Clamp 6.3/4" - 8.1/4" type MP-R 1 Quick Lift Drill Collar System - 100 ton capacity, with 42" links 1 only 6.1/2" HD-100 Drill Collar Elevator 1 only 8" HD-100 Drill Collar Elevator
Casing/Tubing Drifts:	1 – 9.5/8" - 36.0 ppf 1 – 7" - 26.0 ppf 1 – 7" - 23.0 ppf 1 – 5.1/2" - 15.5 ppf 1 – 5.1/2" - 17.0 ppf
Thread Protectors:	3 x 9.5/8" Klampon Style 3 x 7" Klampon Style 3 x 5.1/2" Klampon Style
Kelly Spinner:	Foster Model 77 Hydraulic Kelly Spinner operated by rig hydraulic system
Pipe Spinner:	Weatherford Lamb model 13000-J-29 spinner- hawk
Welding Equipment:	1 - Lincoln 400AS Diesel powered Welder 1 - Oxy-Acetylene Welder and cutting set
Doghouse:	1 steel unit 7' x 12' x 7' 6" high
Generator House:	1 steel unit to accommodate the generators, switch gear and workshop (45' L x 10' W)
Utility House:	1 steel unit to accommodate accumulators and storeroom
Catwalks:	1 set incorporating junk rack 48' L x 5' W x 42" H
Pipe Racks:	1 set of 6 tumble type each 28' x 42" high
Day Fuel Tank:	1 tank 10' x 8' 6" x 2' (4870 litres capacity)
Water/Fuel Tank:	1 unit 23' L x 9' 6" W x 8' H (300 bbls) with fuel storage tank (capacity 5600 gallons)
Oil Storage:	1 skid mounted oil storage unit.
Drilling Rate Recorder:	Totco 6 pen record-o-graph (penetration, weight, pump pressure, rotary torque and rotary RPM)
Deviation Recorder:	1 only Totco Double Recorder 0 - 8 degree

Instruments & Indicators:	Martin Decker F.S. Weight Indicator National F.S. deadline anchor complete with E160 load cell Totco DCT-25 tong torque indicator Totco Rotary Torque Unit (Relative Indicator) Totco Stroke rate meter complete with limit switches for No. 1 and No.2 pump accumulated strokes Totco RPM tachometer system Totco Mud Flow Unit model F Totco Pitometer model L2 Totco Trip Tank Monitor Totco "Drill Master" automatic driller BOP Pressure Recorder and Chart, 0-5000 psi
Communications:	Westinghouse Model S100 Satellite telephone and Sharp F0355 fax m/c
Mud Testing:	1 only Baroid Mud Field Test Kit
Rathole Driller:	Wichita Engineering rat hole driller for 5.1/4" kelly
Mud Saver:	Harrisburg Unit with 4.1/2" sealing rubbers
Cellar Pump:	1 only Pacific diaphragm unit 3" with 3 H.P. explosion proof electric motor
Water Pump:	1 only Flex-Tool fully submersible Model 212, driven by 3 phase electric motor. Capacity 61,000 ltrs/hour.
Sump Pump:	1 only 3" Regent Centrifugal sump pump driven by diesel motor complete with hoses, foot valve etc.
Fire Extinguishers:	1 set as required by State Mining Regulations for rig and camp.
Pipe Bins:	4 only 36' L x 10' W x 42" H.
Cup Tester:	Cameron Type 'F' cup tester mandrel with 4" IF connections.

North Paaratte No.5
Time Analysis

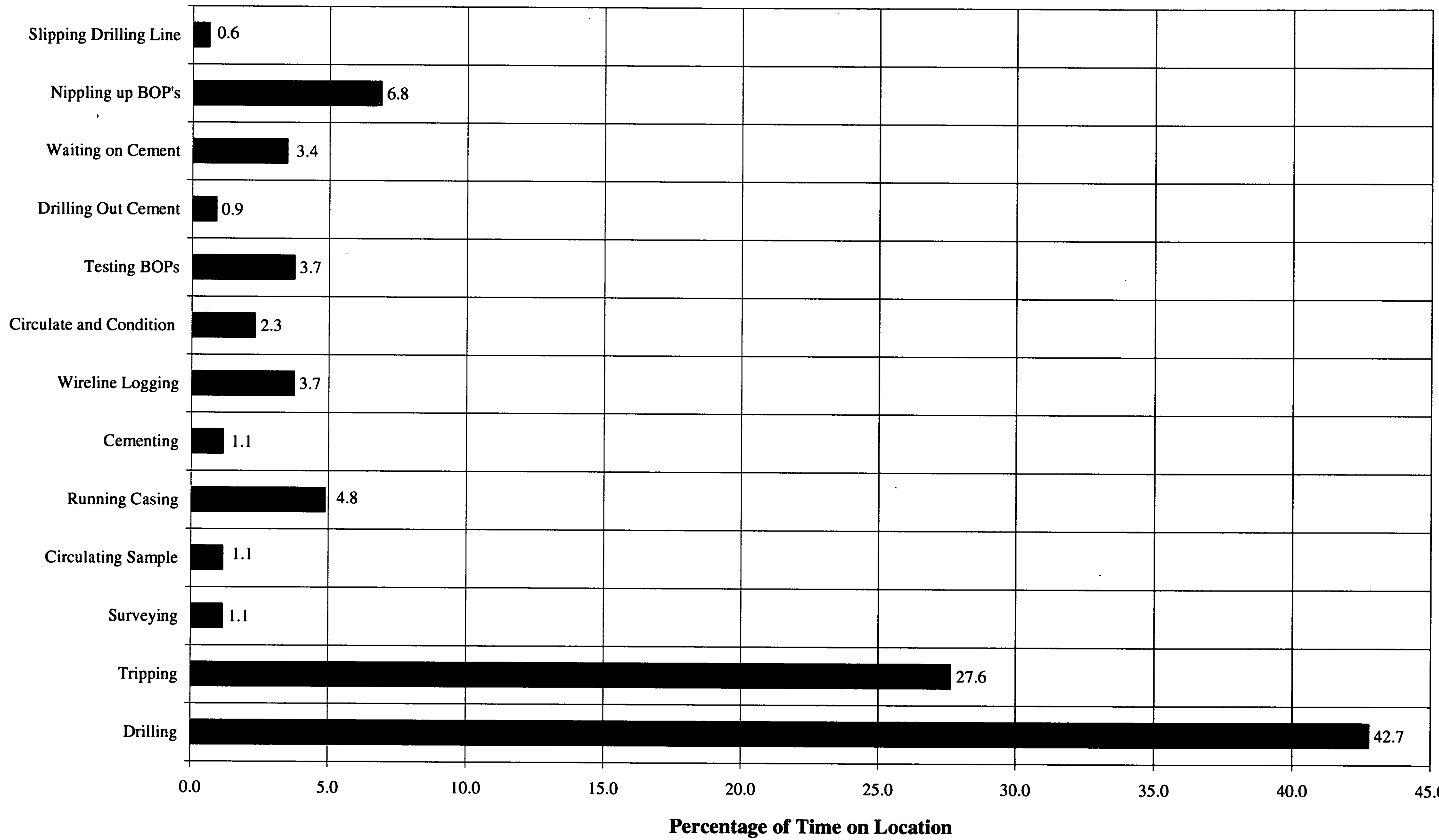


Figure 3

907475 040

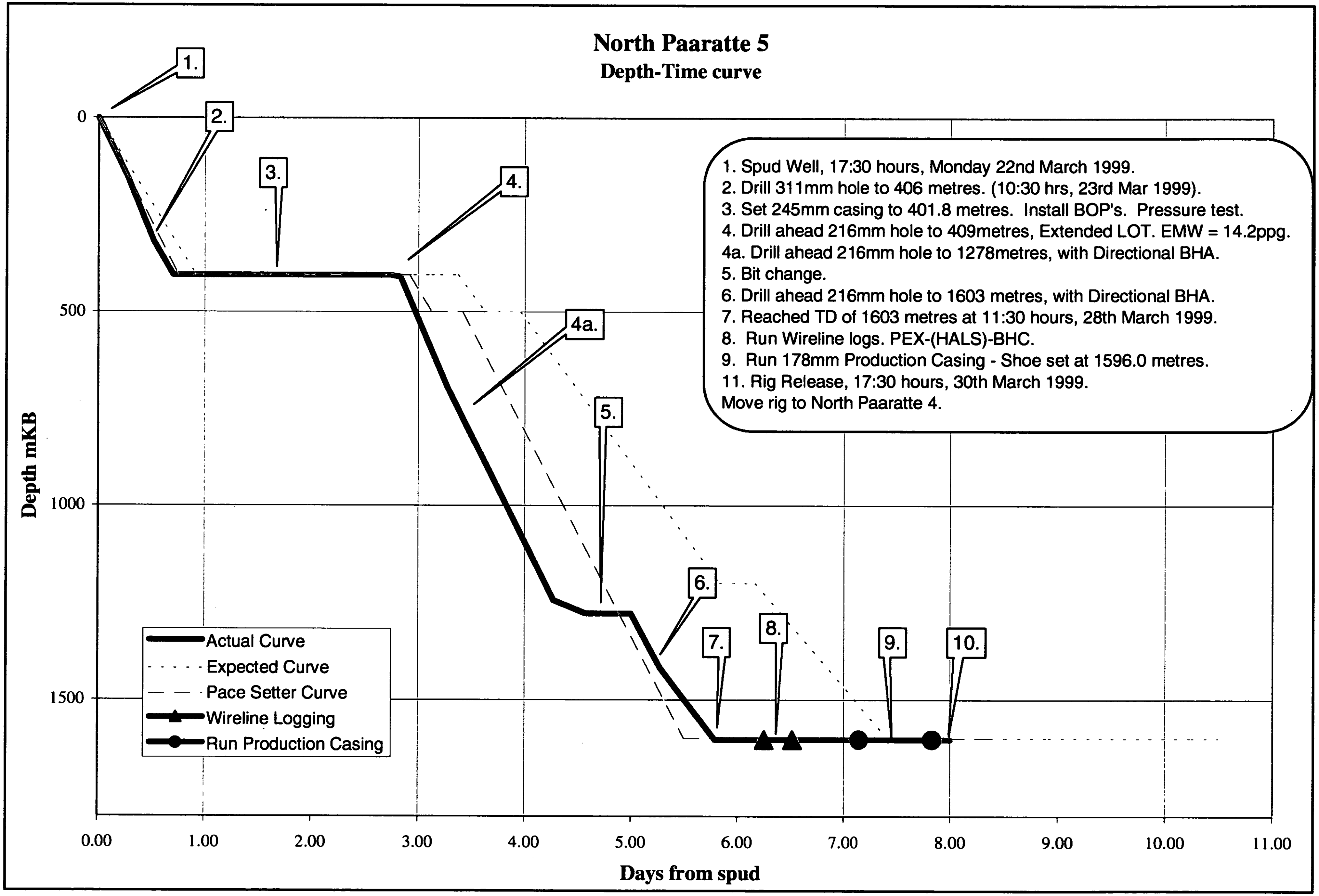

North Paaratte 5
Depth-Time curve
1. Spud Well, 17:30 hours, Monday 22nd March 1999.
2. Drill 311mm hole to 406 metres. (10:30 hrs, 23rd Mar 1999).
3. Set 245mm casing to 401.8 metres. Install BOP's. Pressure test.
4. Drill ahead 216mm hole to 409metres, Extended LOT. EMW = 14.2ppg.
4a. Drill ahead 216mm hole to 1278metres, with Directional BHA.
5. Bit change.
6. Drill ahead 216mm hole to 1603 metres, with Directional BHA.
7. Reached TD of 1603 metres at 11:30 hours, 28th March 1999.
8. Run Wireline logs. PEX-(HALS)-BHC.
9. Run 178mm Production Casing - Shoe set at 1596.0 metres.
11. Rig Release, 17:30 hours, 30th March 1999.
Move rig to North Paaratte 4.
Actual Curve
Expected Curve
Pace Setter Curve
Wireline Logging
Run Production Casing
Depth mKB
0
500
1000
1500
Days from spud
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
1.
2.
3.
4.
4a.
5.
6.
7.
8.
9.
10.

Figure 2

2.3 Drilling Data

2.3.1 The following is the daily operations summary for North Paaratte-5 compiled from the tour sheets and daily drilling reports. Onsite drilling supervision for Oil Company of Australia Limited was by B. Beetson. Further details are provided in the time/depth curve (Figure 2) and the time analysis chart. (Figure 3).

The depths in the following summary are those reached at 2400 hours on each day with the operations given for the previous 24 hour period.

Date	Depth	Operation
22.03.99	153.0m	Rig up, drill rat hole and mouse hole - Pre spud safety check - Spud North Paaratte-5 - Drill to 61m. - Circulate and WLS at 49m. - Drill to 117m. - Circulate and WLS at 105m. - Drill to 153m.
23.03.99	406.0m	Drill 311mm. hole, 153 – 216m. - Circulate and WLS at 204m. - Drill to 317m. - Circulate and WLS at 305m. - Drill to 362m. - Work mud ring in annulus, lost mud to formation as hole packed off - Circulate hole clean - Drill to 406m. - Circulate hole clean - Wiper trip to surface (strap out) - Clean stab and bit. - No tight hole or fill - Circulate hole clean - Drop survey and POH - Lay out stabilizer and 203mm. drill collars - Rig for and run 244mm. casing
24.03.99	406.0m	Finish running 244mm. casing - Install cement head and lines - Pre job safety meeting, circulate and reciprocate casing - Pressure test cement lines - Cement casing with "G" cement + gel lead and neat "G" cement tail - Good returns, bumped plug at 02.45 hours, hold pressure 10 minutes, bleed back 1 barrel, float holding - WOC. - Clean cellar of gumbo, raise riser, cut conductor - Slack off, lay out circulating head, landing joint and riser - Continue to clean out cellar - Install "A" section - Install and nipple up BOPs - Pressure test casing, blind rams, choke manifold, HCRs and kill line valves to 250 / 2000psi. – all OK

25.03.99	655.0m	RIH with 165mm. drill collars – Lay out all collars – Pick up Motor, Monels and MWD subs - Modify bit breaker to fit MX-03 bit - Make up directional BHA and test same - RIH with BHA, MWD survey at 231m. - tag cement at 383m. - Pressure test pipe rams, annular, kelly cocks, stabbing valves as per BOP test program - Drill cement and shoe track, displace to KCl / PHPA and drill to 409m. - Run FIT to 14.2 ppg MWE – no leak off - Drill 216mm. hole to 695m. (begin to slide to build angle from 500m. and adjust azimuth) - Target 26.35 degree inclination at 73 degree azimuth.
26.03.99	1244.0m	Directionally drill 695 – 1244m. Survey with MWD.
27.03.99	1418.0m	Directionally drill 1244 – 1278m. - Clear balled-up bit – High torque - Circulate clean - POH. Change bit - adjust motor to 1.15 deg. - RIH to shoe - Slip 16m drill line – Continue to RIH to 1260m. (break circulation at 700m.), wash and ream 1260 - 1278m. - Directionally drill 1278 – 1418m.
28.03.99	1603.0m	Directionally drill 1418 – 1603m. (includes 1hr extra for daylight saving) - Circulate hole clean - POH to 1250m., work through tight hole 1402 - 1345m. - Break circulation to clear BHA and RIH - Circulate and condition mud - Pump barite slug, POH, hole good - Service break and lay out directional tools and equipment - Rig up wireline loggers
29.03.99	1603.0m	Pre job safety meeting. Log with Schlumberger- - Run # 1, PEX, BHC - Make up bit and BHA and RIH - Slip 8m drill line - Continue RIH to 1589m. - Wash 14m. to bottom with 3m. of fill - Circulate hole clean - POH, lay out drill pipe - Service break kelly and swivel - Continue POH, lay out HWDP and jars - Rig up to run 178mm. casing - Try to change to 178mm. pipe rams, work on bonnet bolts

30.03.99	1603.0m	Change to 178mm. pipe rams - Make up shoe joint and float collar, hold pre-job safety meeting. - Run 135 joints of 178mm. casing - Head up Halliburton, circulate casing, hold pre job safety meeting. - Pump SAPP pre-flush - Pressure test lines. - Cement casing with 550 sacks neat Class "G" and displace with 2% KCl brine - Bump plug, hold pressure for 15 minutes, bleed off, floats holding - Install 178mm. casing slips and set with 75000lbs. - Nipple down DSA - Lift BOPs. rough cut casing. - Release rig to completion operations.

2.3.2 Hole Sizes and Depths :

311mm to 406.0m
216mm to 1603.0m (TD.)

2.3.3 Casing and Cementing :

Surface

Size -	9 5/8" / 244mm
Weight -	36 lb/ft, 53.6 kg/m
Grade -	K55 (33 Joints)
Shoe Setting Depth -	401.8m
Cement (lead) -	308 sacks 'G' + 2.3 % gel & 0.2% CFR3
Cement (tail) -	283 sacks 'G'

Production

Size -	7" / 178 mm
Weight -	26 lb/ft, 38.77 kg/m
Grade -	K55 (135 joints)
Shoe Setting Depth -	1596.0m
Quantity of Cement -	550 sacks "G" + 1% HALAD 322
Interval Cemented -	TD to 600m

2.3.4 Deviation Surveys :

Depth (metres)	Deviation (degrees)	Depth (metres)	Deviation (degrees)	Depth (metres)	Deviation (degrees)
49	0.50	105	0.25	204	0.25
305	0.25	399	0.25		

Directional surveys are listed in Appendix 6.

2.3.5 Drilling Fluid :

(a) Spud - 406m Fluid - Fresh water - Gel
Additives - M-I Gel, C-121 Viscosifier, Lime, Caustic Soda, Trugel, Soda Ash, SAPP.

(b) 406 - TD Fluid - KCl - PHPA
Additives - M-I Bar, Duovis, C-122 Fluid Loss, C-122 Viscosifier, Caustic Soda, Sodium Suplhite, KCl, Polyplus, Soda Ash, Glute 25.

2.3.6 Physical Mud Properties :

Date	Depth	SG	Vis.	WL	pH	FC	Sand	Solid	K+	Cl-
22/03	153	1.06	38	-	9.5	-	-	-	-	-
23/03	406	1.09	40	-	9.5	-	-	-	-	-
24/03	406	1.03	45	-	-	-	-	-	-	-
25/03	689	1.07	41	9.0	9.5	1	-	-	4.0	-
26/03	1244	1.12	45	5.2	10.0	1	0.25	8.0	5.0	29500
27/03	1418	1.13	47	5.2	9.2	1	0.25	8.0	5.0	27000
28/03	1603	1.14	56	5.8	9.2	1	0.25	8.5	4.0	22000
29/03	1603	1.15	52	-	-	-	-	-	-	-
30/12	1603	1.15	52	-	-	-	-	-	-	-

Chemicals Used :

Product	Units		Amount	
C-121 Viscosifier	11	Sack	275	kg
C-122 Fluid Loss	4	Sack	100	kg
Caustic Soda	3	Sack	75	kg
Duovis	10	Sack	250	kg
Glute 25	3	Drum	75	kg
KCl	490	Sack	12250	kg
Lime	2	Sack	50	kg
M-I Bar	90	Drum	2250	li
M-I Gel	12	Sack	300	kg
Poly Plus	49	Sack	1225	kg
SAPP	2	Sack	50	kg
Soda Ash	14	Sack	350	kg
Sodium Suplhite	8	Sack	200	kg
Trugel	70	Sack	1750	kg

2.3.7 Water Supply :

Water was trucked from a mains supply 2 km from the lease.

2.3.8 Perforation Record :

1521.5 - 1527.0m. 114mm. (4.5") 12 spf Ø=45° 21.3gm.

2.3.9 Plugging and Cementing :

Nil

2.4 Logging and Testing

2.4.1 Wellsite Geologist :

D. A. Short

2.4.2 Mudlogging :

Mudlogging services were provided by Geoservices Overseas SA. Cuttings gas was monitored from surface casing shoe to total depth using a hot-wire gas detector and a FID gas chromatograph. A mudlog recording lithology, penetration rate, mud gas and other data was prepared and is an enclosure to this report.

2.4.3 Ditch Cutting Samples :

Cuttings were collected at 10m intervals from the surface to 1470m, then at 3m intervals to T.D. The cutting samples and sets were:

Sample Type	No. Sets
Unwashed (BORAL)	1
Washed (VDME(2) / BORAL(1))	3
Samplex Trays (BORAL)	1

2.4.4 Coring :

None.

2.4.5 Sidewall Cores :

None.

2.4.6 Testing :

None

2.4.7 Wireline Logs :

One suite of logs (PEX) was run by Schlumberger

Type Log	Interval (base) m.	Interval (top) m.
RXOZ / HLLS-HLLD	1589 / 1591	400 / 400
DT / GR	1578 / 1591	400 / 15
RHOZ / TNPH	1588 / 1592	400 / 400

2.4.8 Temperature Surveys :

Wireline logging recorded the following bottom hole temperature:-
1. 56°C / 8.0 hours after circulation ceased.

2.4.9 Velocity Survey :

None.

3.0 GEOLOGY

3.1 Reasons for Drilling

Introduction

North Paaratte-5 was proposed as a development well in the North Paaratte Field, PPL-1, onshore Otway Basin. Primary objective for the well was 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 & 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-5 will be drilled on the central high approximately 0.4 km ENE of North Paaratte-1. North Paaratte-5 is prognosed to intersect the top Waarre sands at -1321.7 m SS, approximately 31.3 m above the current HKW.

North Paaratte-5 was drilled directionally from a surface location approximately 37 m south of North Paaratte-1, using the existing gas field site. The proposed TD of –1398.3m SS will allow sufficient rathole to perforate the reservoir and junk the perforating subs at the bottom of the hole.

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.

The North Paaratte Field is presently shut-in due to high water cut and two wells are required to restore gas production. North Paaratte-4 was proposed to be drilled approximately 0.4 km north northwest of North Paaratte-1. North Paaratte-5 is proposed as a development well approximately 0.4 km east northeast of North Paaratte-1.

The primary objective is the Waarre Formation Unit 'C' sand which is the sole reservoir in the field and North Paaratte-4 & 5 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 excellent 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 43 m closure remains up dip of the discovery well. In view of this fact North Paaratte-5 is proposed near the crest of a culmination which lies against the major east-west trending fault in the central region of the field and the top 'C' unit is prognosed at –1321.7m 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-5 will be located to maximise gas recovery from the western crest of the structure.

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 & 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.

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.

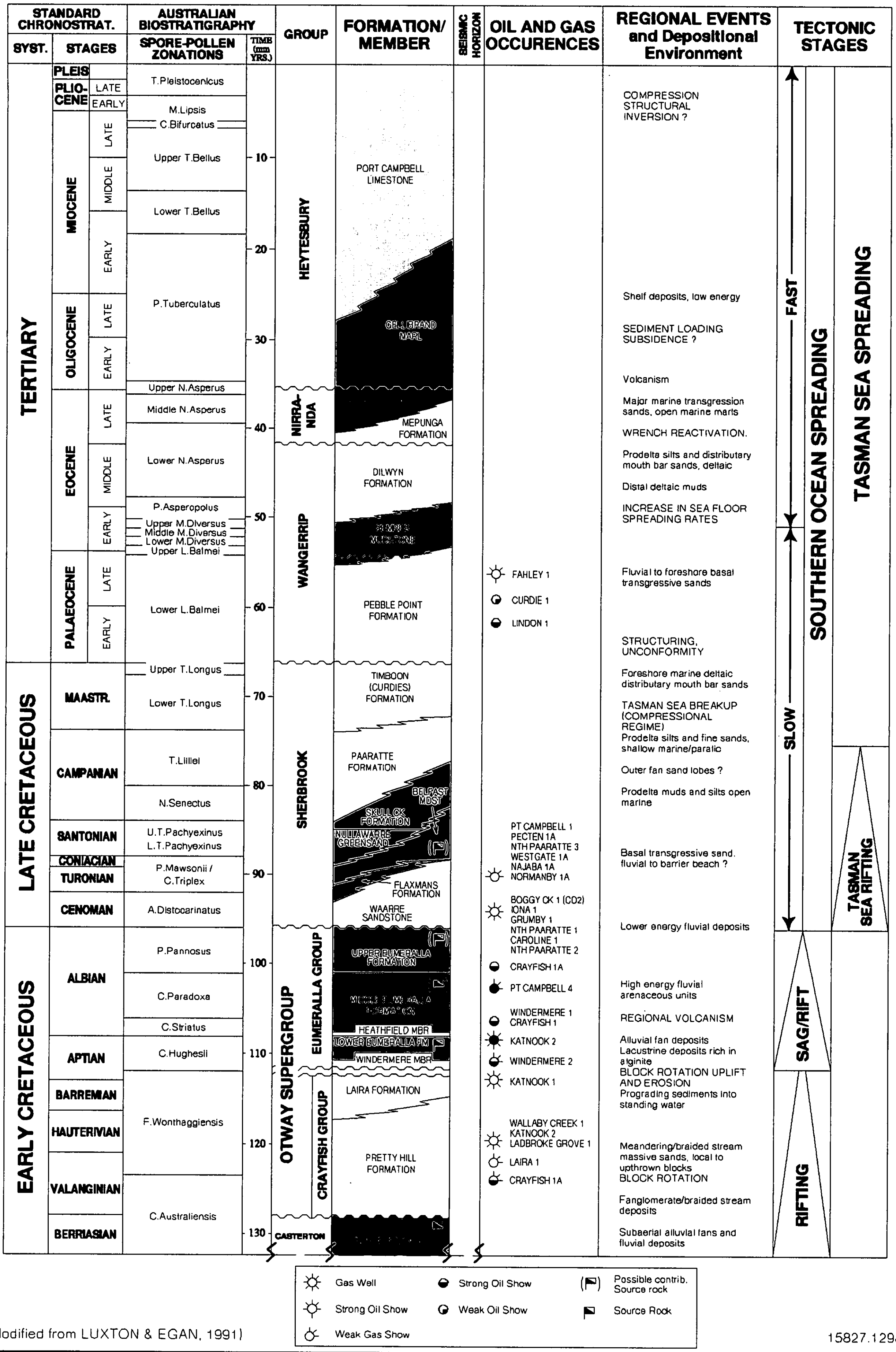
Unit 'C' sandstones were deposited in the highest energy, shallow marine upper shoreface environment and comprise medium to coarse grainsize. Core 2, North Paaratte-2, recovered poorly consolidated sands from this interval with porosity and permeability ranging up to 26.5% and 1026 md respectively. The 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-5 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 over the short inter-well spacing.

BORAL ENERGY

PEP 111 - OTWAY BASIN

STRATIGRAPHIC COLUMN



(Modified from LUXTON & EGAN, 1991)

15827.1298

Figure 4

3.2 Stratigraphic Prognosis

The stratigraphic prognosis was made utilising the results of nearby wells and the available seismic coverage.
A comparison between prognosed and actual formation tops is given below.

Formation	Predicted TVD (m KB)	Actual TVD (m KB)	Difference (m)
Port Campbell Ls.	5.5	5.5	0
Gellibrand Marl	77.8	79.0	-1.2
Clifton Fm.	322.8	324.0	-1.2
Narrawaturk Marl	352.8	353.0	-0.2
Mepunga Fm.	388.3	387.0	1.3
Dilwyn Fm.	425.8	425.0	0.8
Pember Mudstone	659.3	669.6	-10.3
Pebble Point Fm.	738.8	745.6	-6.8
Paaratte Fm.	777.6	801.8	-24.2
Skull Creek Mbr.	1130.8	1125.2	5.6
Nullawarre Greensand	1242.7	1239.0	3.7
Belfast Fm.	1336.8	1332.0	4.8
Waarre Fm. (Unit C)	1420.1	1428.0	-7.9
T.D. (Logs)	1496.7	1501.8	-5.1

3.3 Stratigraphy

The following stratigraphic summary describes the formations drilled at North Paaratte-5. the depths in brackets are true vertical depths (TVD) and thicknesses are true vertical thickness.

PORT CAMPBELL LIMESTONE

5.5 - 79.0 metres (5.5 – 79.0m. TVD) Thickness : 73.5 metres

5.5 - 79.0m (5.5 - 79.0)	CALCARENITE, light to medium grey, (some white to pale yellow at top – weathered and iron stained), very fine to fine, sub-angular to sub-rounded, moderate to well sorted quartz grains, minor fossil fragments, trace dark yellowish green to black spherical glauconite pellets, trace pyrite, argillaceous matrix, calcite cement, friable to moderately hard, poor to occasional fair porosity.

GELLIBRAND MARL

79.0 - 324.0 metres (79.0 – 324.0m. TVD) Thickness : 245.0 metres

79.0 - 324.0m (79.0 - 324.0m)	MARL, light to moderate grey, becoming darker bluish grey with depth, soft, dispersive with abundant white to pinkish brown fossil fragments (predominantly forams & bryozoa) and grades to coquina in part, occasional medium to dark green glauconite, rare pyrite and very fine to fine sub-rounded loose, quartz grains.

CLIFTON FORMATION

324.0 - 353.0 metres (324.0 – 353.0m. TVD) Thickness : 29.0 metres

324.0 - 353.0m (324.0 - 353.0m)	SANDSTONE, clear to translucent white, translucent yellow-brown, dark lustrous brown-black, very fine to medium, occasionally coarse, sub-rounded to well rounded quartz and ironstone grains, abundant green to black glauconite pellets, moderate sorted, loose, minor pyrite nodules, good porosity.

NARRAWATURK MARL

353.0 - 387.0 metres (353.0 – 387.0m. TVD) Thickness : 34.0 metres

353.0 - 387.0m (353.0 - 387.0m)	MARL, moderate to dark grey to grey-brown, soft, dispersive silty and argillaceous, abundant pinkish white fossil fragments, minor quartz, ironstone and glauconite grains, abundant pyrite in places.

MEPUNGA FORMATION

387.0 - 425.0 metres (387.0 – 425.0m. TVD) Thickness : 37.0 metres

387.0 - 425.0m CLAYSTONE with interbedded SANDSTONE.

(387.0 - 425.0m) CLAYSTONE, medium to dark grey-brown, occasional light to medium bluish grey, soft, dispersive, silty and grading to very fie sandstone in part, common white to pink-white fossil fragments, abundant pyrite and dark green to black glauconite.
SANDSTONE, dark green, fine to coarse, sub-rounded to rounded, moderate sorted, loose glauconite pellets.

DILWYN FORMATION

425.0 - 676.0 metres (425.0 – 669.6m. TVD) Thickness : 244.6 metres

425.0 - 676.0m SANDSTONE with interspersed and interbedded SILTSTONE.

(425.0 - 669.6m) SANDSTONE, clear to translucent white, some pale translucent yellow-brown, fine to very coarse, polished, sub-angular to well rounded, poor to moderate sorted loose quartz grains, brown, dispersive silty clay matrix in part, fair to predominantly good porosity.
SILTSTONE, moderate to dark brown, soft, dispersive, sandy in part, very argillaceous and grades to claystone.

PEMBER MUDSTONE

676.0 - 761.0 metres (669.6 – 745.6m. TVD) Thickness : 76.0 metres

676.0 - 761.0m CLAYSTONE with minor SANDSTONE.

(669.6 – 745.6m) CLAYSTONE, moderate to dark grey-brown, occasionally grey-green, soft, dispersive, minor glauconite, trace pyrite, silty in part.
SANDSTONE, white, very fine to fine, sub-rounded, moderate to well sorted loose quartz grains, probably dispersed within the claystone.

PEBBLE POINT FORMATION

761.0 - 824.0 metres (745.6 – 801.8m. TVD) Thickness : 56.2 metres

761.0 - 824.0m SANDSTONE with minor CLAYSTONE.

(745.6 – 801.8m) SANDSTONE, white to pale grey, translucent brown, fine to coarse, sub-angular to sub-rounded, moderate to well sorted loose quartz grains, good porosity.
CLAYSTONE, dark grey to grey-brown, soft, dispersive.

PAARATTE FORMATION

824.0 - 1184.0 metres (801.8 – 1125.2m. TVD) Thickness : 323.4 metres

824.0 - 1184.0m SANDSTONE with minor SILTSTONE and rare COAL.
(801.8 – 1125.2) SANDSTONE, clear to translucent white, fine to very coarse, predominantly medium to coarse, sub-rounded to sub-rounded, poor to moderate sorted, loose quartz grains, trace lithic / quartzite grains, trace to occasionally abundant pyrite, rare carbonaceous material, occasional glauconite, trace dispersive silty clay matrix and weak silica cement (becoming more common with depth), occasional quartz overgrowths / crystal faceted grains, fair to predominantly good porosity.

SILTSTONE, moderate to dark grey to grey-brown, soft, argillaceous, dispersive, trace coal / carbonaceous material.

COAL, (1070m.), black, dull, lignitic.

SKULL CREEK MEMBER

1184.0 - 1310.0 metres (1125.2 – 1239.0m. TVD) Thickness : 113.8 metres

1184.0 - 1310.0m SILTSTONE with trace SANDSTONE.
(1125.2 – 1239.0m) SILTSTONE, moderate to dark grey and grey-brown, soft to firm, sub-fissile to non-fissile, very argillaceous, occasionally grades to / interlaminated with light grey very fine argillaceous sandstone, slightly calcareous in part, rare pyrite, trace glauconite in part.

SANDSTONE, white to very pale bluish grey, very fine, sub-rounded, moderate to well sorted, trace lithics, abundant argillaceous matrix, calcareous in part, friable to moderately hard, poor porosity.

NULLARWARRE GREENSAND

1310.0 - 1414.0 metres (1239.0 – 1332.0m. TVD) Thickness : 93.0 metres

1310.0 -1414.0m SANDSTONE with minor SILTSTONE.
(1239.0 – 1332.0m) SANDSTONE, clear to translucent greenish white, pale yellow, fine to coarse, sub-angular to sub-rounded, loose, common to abundant moderate to dark green glauconite, greenish white dispersive glauconitic silty clay matrix, good porosity.

SILTSTONE, white to greenish grey, green, soft to firm, sandy, very glauconitic in part, argillaceous, dispersive, grades to claystone.

BELFAST FORMATION

1414.0 - 1521.5 metres (1332.0 – 1428.0m. TVD) Thickness : 96.0 metres

1414.0 -1521.5m (1332.0 – 1428.0m)	SILTSTONE with trace SANDSTONE. SILTSTONE, moderate to dark grey to grey-brown, moderate to dark greyish blue-green, soft to firm, sub-fissile to non-fissile, glauconitic in part, very argillaceous and grades to claystone. SANDSTONE, clear to translucent, pale yellow, fine to medium, occasionally coarse, sub-angular to sub-rounded, moderate to well sorted loose quartz grains.

WAARRE FORMATION (Unit 'C' sand)

1521.5 - 1603.0 metres (1428.0 – 1501.8m. TVD) Thickness : 73.8 metres

1521.5 – 1568.5m. (1428.0 – 1470.4m)	SANDSTONE, clear to translucent white, fine to coarse, occasionally very coarse, sub-angular to sub-rounded, poor to moderate sorted, loose, trace pyrite, occasional silty interbeds / laminae, trace dispersive silty clay matrix, good to very good porosity.
1568.5 - 1603.0m. (1470.4 – 1501.8m)	SILTSTONE with minor SANDSTONE interbeds. SILTSTONE, moderate grey to grey-brown, moderate brown, soft, dispersive, argillaceous, trace carbonaceous material, trace pyrite. SANDSTONE, white, fine to medium, sub-angular to sub-rounded, moderate sorted, dispersive white clay matrix, friable, fair porosity.

TOTAL DEPTH

Driller:	1603.0 metres	(1501.8m. TVD)
Logger:	1603.0 metres (Extrapolated)	(1501.8m. TVD)

Table 1 : NORTH PAARATTE 5 - STRATIGRAPHIC TABLE

AGE	FORMATION	K.B. Depths	TVD Depths	MSL Depths	Thickness
E-L. Miocene	Port Campbell Ls.	5.5	5.5	92.9	73.5
Oligocene	Gellibrand Marl	79.0	79.0	19.4	245.0
E. Oligocene	Clifton Fm.	324.0	324.0	-225.6	29.0
L. Eocene	Narrawaturk Marl	353.0	353.0	-254.6	34.0
L. Eocene	Mepunga Fm.	387.0	387.0	-288.6	37.0
M. Eocene	Dilwyn Fm.	425.0	425.0	-326.6	244.6
E. Eocene	Pember Mudstone	676.0	669.6	-571.2	76.0
E–L. Palaeocene	Pebble Point Fm.	761.0	745.6	-647.2	56.2
L. Cretaceous	Paaratte Fm.	824.0	801.8	-703.4	323.4
L. Cretaceous	Skull Creek Mbr.	1184.0	1125.2	-1026.8	113.8
L. Cretaceous	Nullawarre Greensand	1310.0	1239.0	-1140.6	93.0
L. Cretaceous	Belfast Fm.	1414.0	1332.0	-1233.6	96.0
L. Cretaceous	Waarre Fm. (Unit C)	1521.5	1428.0	-1329.6	73.8
	T.D. (Logs)	1603.0	1501.8	-1403.4	

3.4 Hydrocarbon Shows

The only significant gas shows encountered were from the Unit "C" sand of the Waarre Formation where 308 units (99/1/Tr) were recorded at 1527m.

Log evaluation of the Unit "C" sand indicates it to be gas saturated over the interval 1521.5 – 48.7m (1428.0 – 52.5m TVD). The actual gas water contact is between 1548.6 and 1550.9m (1452.4 and 1454.5m TVD).

Gas readings remained high (180-200 units) immediately below the gas water contact, dropping back to 60 units by 1562m and to a base level of 20 units at 1569m.

The higher than expected gas readings over the interval 1550.9 – 1562.0m are probably due to residual gas in this interval. Gas production has raised the gas water contact from an original depth of –1365m sub-sea (= 1560.7m MD / 1463.4m TVD in NP-5) to a current depth of about –1354m sub-sea (= 1548.6m MD / 1452.4m TVD in NP-5).

4.0 DISCUSSION AND CONCLUSIONS

North Paaratte-5 achieved its objective of establishing gas reserves in the Waarre "C" sandstone and confirmed the excellent reservoir character of the sandstone.

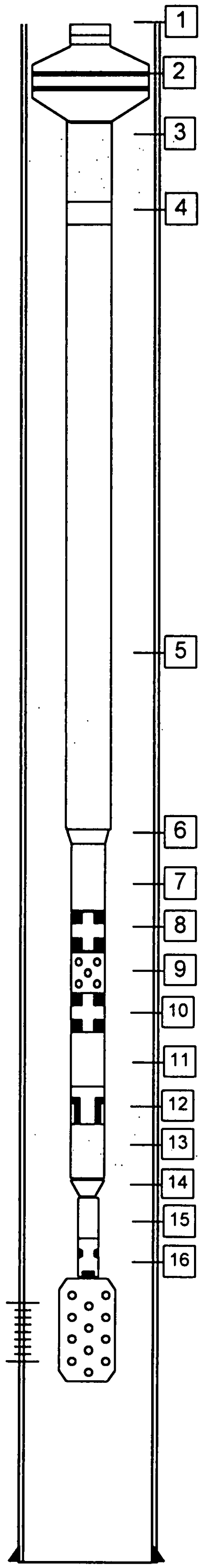
These results indicate that the North Paaratte structure should be suitable for gas production and re-injection and as a swing producer to meet peak gas demand.

No significant problems were encountered while drilling and the well was drilled in approximately 8.0 days compared to a budgeted time of 10.5 days.

BEPL

Downhole Installation Diagram

Well: North Paaratte #5



PBTD: 1580 mKB

Ite No.	Description	Length (m)	Depth (m KB)	Min ID (in)
1	KB to top of tubinghead spool	4.50		
2	Hanger, 6" x 4-1/2" EUE box x box	0.39	4.50	4.000
3	one jt 4-1/2" EUE, 12.75 ppf, J55, R2 tbg	9.11	4.89	3.958
4	4' x 4-1/2" pup joints	1.2	14.00	
5	approx 157 jts, 4-1/2" EUE, 12.75 ppf, J55,	1476.37	15.20	
6	Crossover, 4-1/2" EUE x 3-1/2" EUE	0.39	1491.57	
7	Pup joint, 10' x 3-1/2"	3.08	1491.96	
8	X nipple, 3-1/2" EUE, (2.750 X)	0.28	1495.04	2.750
9	Pup joint, 10' x 3-1/2" perforated	3.02	1495.32	
10	XN nipple, 3-1/2" EUE, (2.750 X, 2.635 NoG	0.29	1498.34	2.635
11	Pup joint, 10' x 3-1/2"	3.08	1498.63	
12	3-1/2" EUE Gun Release sub	0.66	1501.71	2.965
13	Pup joint, 10' x 3-1/2"	3.02	1502.37	
14	Crossover, 3-1/2" EUE x 2-3/8" EUE	0.15	1505.39	
15	One joint x 2-3/8" EUE, 4.7 ppf, J55, R2 tbg	9.52	1505.54	
16	2-3/8" EUE open firing Head	1.51	1515.06	
17	4-1/2" TCP Guns (Safety spacer)	5.13	1516.57	
	Top Shot		1521.70	

PERFORATIONS		Gun		Charges			
Formation	**Interval (m KB)**	**Size**	**Typ**	**SPF**	**Typ**	**Ph**	**gm**
Waarre Formation	1521.5 - 1527.0	4.5"	TCP 34JL	12	HM	45	21.3

Surface Casing	9-5/8", 36ppf, K55, BTC @ 401.8 mKB
Production Casing	7", 26 ppf K55 BTC @ 1596.0 mKB
Cementing Details	550 sacks class G + 1% Halad 322
Remarks	
String Weight Calculated	**Actual**

Wellsite Supervisor	Barry Beetson			Not to Scale	
Date of Installation	1/04/99			Proposed	
Drafted by	RAN	Date:	07/04/99	Re-Completion	
Checked by	RAN	Date:	07/04/99	Completion	X

Figure 5

5.0 COMPLETION

The completion of North Paaratte-5 was carried out between 30th March 1999 and 2nd April 1999. Wellsite supervision was provided by Barry Beetson.

After the well had been cased and cemented, the well was immediately completed using the drilling rig (Century Rig 2).

The well was perforated with approximately 1000 psi underbalance using 4-1/2" TCP guns suspended on 4-1/2" EUE tubing. A packer was not used in this completion and a bit and scraper trip was consequently not carried out.

A 4-1/16" 3,000 psi wellhead was installed on the well.

Immediately post perforation and clean up flow, a PX plug and prong was set in the tailpipe to allow the tubing to be bled to zero - as a safety precaution for skidding the rig and immediately drilling North Paaratte 4.

6.0 REFERENCES

Oil Company of Australia Limited;	Drilling Program : PPL-1 : North Paaratte-5, Unpublished report prepared for Boral Energy Petroleum Limited, February 1999.
Fawcett W.R.;	Proposal to Drill North Paaratte 5, PPL 1, Otway Basin Victoria, Unpublished report prepared for Boral Energy Resources Limited, February 1999.

APPENDIX 1

CUTTINGS DESCRIPTIONS

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
20 (0.1)	100	CALCARENITE, white to pale yellow (weathered), light grey, angular to sub-angular shell and calcareous grains with a calcite matrix, some fine to medium, sub-rounded quartz grains, ferruginized and iron stained in part, friable, fair porosity.	
30 (0.1)	100	CALCARENITE, light to moderate grey, very fine to fine, sub-angular to sub-rounded, moderate to well sorted quartz and calcareous grains, trace shell fragments, minor argillaceous matrix, calcite cement, friable, poor to fair porosity.	0.0 (0:0:0:0:0)
40 (0.4)	100	CALCARENITE, a.a. – light to moderate grey, silty and argillaceous in part, minor shell and bryozoan fragments, friable to moderately hard, poor porosity.	0.0 (0:0:0:0:0)
50 (0.2)	100	CALCARENITE, a.a.	0.0 (0:0:0:0:0)
60 (0.5)	100	CALCARENITE, a.a. – white to light grey, trace dark yellowish green glauconite.	0.0 (0:0:0:0:0)
70 (0.2)	100	CALCARENITE, a.a.	0.0 (0:0:0:0:0)
80 (0.7)	90 10	CALCARENITE, a.a. – argillaceous in part, fossiliferous, trace glauconite. CLAYSTONE, moderate to dark grey, firm.	0.0 (0:0:0:0:0)
90 (0.7)	90 10	CALCARENITE, moderate grey, very fine to fine, occasional medium, sub-angular to sub-rounded, moderate sorted, very argillaceous and grades to marl in part, abundant fossil fragments (shell, bryozoan, foram) and quartz grains, trace pyrite and glauconite, calcite cement, moderately hard, poor porosity. CLAYSTONE, a.a. – calcareous in part and grades to marl.	0.0 (0:0:0:0:0)
100 (0.9)	100	MARL, moderate grey, soft, argillaceous, dispersive with abundant white to pinkish brown fossil fragments (forams & bryozoan), minor medium to dark green glauconite nodules.	0.0 (0:0:0:0:0)
110 (0.5)	100	MARL, a.a.	0.0 (0:0:0:0:0)
120 (0.6)	100	MARL, a.a. – grades to argillaceous coquina.	0.0 (0:0:0:0:0)
130 (0.4)	100	MARL, a.a.	0.0 (0:0:0:0:0)
140 (0.4)	100	MARL, a.a.	0.0 (0:0:0:0:0)
150 (0.6)	100	MARL, a.a. – trace pyrite.	0.0 (0:0:0:0:0)
160 (0.8)	100	MARL, a.a. – moderate to dark grey to bluish grey, abundant fossil shell fragments and grades to coquina in part.	0.0 (0:0:0:0:0)
170 (0.5)	100	MARL, a.a.	0.0 (0:0:0:0:0)
180 (0.6)	100	MARL, a.a.	0.0 (0:0:0:0:0)
190 (0.6)	100	MARL, a.a.	0.0 (0:0:0:0:0)
200 (0.6)	100	MARL, a.a.	0.0 (0:0:0:0:0)
210 (0.7)	100	MARL, a.a.	0.0 (0:0:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
220 (1.0)	100	MARL, moderate to dark grey to bluish grey, soft to firm, argillaceous, dispersive with abundant fossil fragments, grades to coquina in part.	0.0 (0:0:0:0:0)
230 (1.1)	100	MARL, a.a.	0.0 (0:0:0:0:0)
240 (0.8)	100	MARL, a.a.	0.0 (0:0:0:0:0)
250 (0.7)	100	MARL, a.a.	0.0 (0:0:0:0:0)
260 (0.7)	100	MARL, a.a. – trace very fine sub-rounded quartz grains.	0.0 (0:0:0:0:0)
270 (0.9)	100	MARL, a.a.	0.0 (0:0:0:0:0)
280 (0.9)	100	MARL, a.a.	0.0 (0:0:0:0:0)
290 (0.8)	100	MARL, a.a.	0.0 (0:0:0:0:0)
300 (1.1)	100	MARL, a.a.	0.0 (0:0:0:0:0)
310 (0.8)	100	MARL, a.a.	0.0 (0:0:0:0:0)
320 (1.0)	100	MARL, a.a.	0.0 (0:0:0:0:0)
330 (1.2)	100	MARL, a.a.	0.0 (0:0:0:0:0)
340 (1.8)	100	SANDSTONE, clear to white, very fine to fine, sub-rounded, moderate to well sorted quartz grains with very dark green to black fine to medium, rounded, well sorted ironstone and glauconite grains / pellets, minor fossil fragments, no matrix or cement, good inferred porosity.	0.0 (0:0:0:0:0)
350 (0.9)	100	SANDSTONE, a.a.	0.0 (0:0:0:0:0)
360 (1.1)	100	MARL, dark grey to grey-brown, soft, dispersive with abundant fossil fragments, minor ironstone, glauconite and quartz grains.	0.0 (0:0:0:0:0)
370 (1.4)	100	MARL, a.a. - minor ironstone, glauconite, pyrite and quartz grains.	0.0 (0:0:0:0:0)
380 (1.5)	100	MARL, a.a.	0.0 (0:0:0:0:0)
390 (1.4)	100	CLAYSTONE, moderate to dark grey-brown, soft, dispersive, common white to pinkish white fossil fragments and dark green to black glauconite.	0.0 (0:0:0:0:0)
400 (1.1)	100	CLAYSTONE, a.a. – abundant fossil fragments, also light to medium bluish grey, soft to firm.	0.0 (0:0:0:0:0)
410 (1.3)	100 Tr	CEMENT CLAYSTONE, a.a. – common glauconite pellets.	0.0 (0:0:0:0:0)
420 (1.1)	100 Tr	CEMENT CLAYSTONE, a.a.	0.0 (0:0:0:0:0)
430 (1.1)	100	SANDSTONE, clear to translucent brown, fine to coarse, rounded to well rounded, poor to moderate sorted quartz grains, common glauconite, dispersive yellow-brown clay matrix, fair inferred porosity.	0.0 (0:0:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
440 (0.6)	100	SANDSTONE, a.a. – predominantly fine but some medium to very coarse, sub-rounded to well rounded, poorly sorted, dispersive clay matrix washing out, predominantly loose, good inferred porosity.	0.0 (0:0:0:0:0)
450 (1.0)	80 20	SANDSTONE, a.a. – fine to coarse, dispersive clay matrix, fair to good inferred porosity. SILTSTONE, moderate grey-brown, soft, very argillaceous and grades to claystone.	0.0 (0:0:0:0:0)
460 (0.7)	50 50	SANDSTONE< a.a. – trace greenish grey and pale green lithic / quartzite grains, trace glauconite, dispersive clay matrix, fair to good porosity. SILTSTONE, moderate to dark brown, soft, dispersive, sandy in part, very argillaceous and grades to claystone.	0.0 (0:0:0:0:0)
470 (0.5)	70 30	SANDSTONE, a.a. – rare pyrite. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
480 (1.0)		NO SAMPLE – cleaning off shakers.	0.0 (0:0:0:0:0)
490 (0.5)	80 20	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
500 (0.5)	100	SANDSTONE, clear to translucent white to pale yellow, predominantly coarse to very coarse, some fine to medium, well rounded, moderate sorted, polished quartz grains, loose, good inferred porosity.	0.0 (0:0:0:0:0)
510 (1.1)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
520 (0.8)	100	SANDSTONE, clear to translucent white, medium to very coarse, moderate to well sorted, rounded, loose quartz grains, trace iron stain, good porosity.	0.0 (0:0:0:0:0)
530 (1.0)	60 40	SANDSTONE, a.a. – fine to coarse, fair inferred porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
540 (1.1)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
550 (1.3)	100 Tr	SANDSTONE, a.a. – medium to very coarse, rounded, polished, loose quartz grains, good porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
560 (0.9)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
570 (0.7)	80 20	SANDSTONE, a.a. – rare pyrite grains. SILTSTONE, moderate to dark brown, soft, dispersive, sandy, very argillaceous and grades to claystone.	0.0 (0:0:0:0:0)
580 (0.6)	100	SANDSTONE, a.a. – clear to translucent, fine to very coarse, sub-angular to rounded, poor to moderate sorted, good inferred porosity.	0.0 (0:0:0:0:0)
590 (0.8)	40 60	SANDSTONE, a.a. – very fine to fine. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
600 (1.4)	50 50	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
610 (0.8)	60 40	SANDSTONE, a.a. – very fine to medium. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
620 (2.0)	90 10	SANDSTONE, a.a. – clear to translucent white, medium to very coarse, loose quartz grains, good porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
630 (0.8)	90 10	SANDSTONE, a.a. – very fine to coarse, rare pyrite. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
640 (0.8)	90 10	SANDSTONE, a.a. – fine to very coarse. SILTSTONE, a.a.	0.0 (0:0:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
650 (1.5)	60 40	SANDSTONE, a.a. – very fine to coarse. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
660 (0.8)	80 20	SANDSTONE, clear to translucent white, rare pale green, fine to very coarse, polished, sub-rounded to well rounded, poor to moderate sorted loose quartz grains, dispersive clay matrix, good porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
670 (0.7)	90 10	SANDSTONE, a.a. – trace mica. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
680 (1.1)	50 50	SANDSTONE, a.a. – very fine to coarse, trace pyrite, fair to good inferred porosity. SILTSTONE, moderate to dark brown, soft, dispersive, sandy in part, trace carbonaceous fragments, very argillaceous and grades to claystone.	0.0 (0:0:0:0:0)
690 (2.0)	70 30	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
700 (1.9)	30 70	SANDSTONE, a.a. CLAYSTONE, moderate to dark grey-brown, occasional greenish grey, soft, dispersive, minor glauconite, trace pyrite.	0.0 (0:0:0:0:0)
710 (1.3)	20 80	SANDSTONE, a.a. – very fine. CLAYSTONE, a.a. – soft, dispersive.	0.0 (0:0:0:0:0)
720 (1.4)	10 90	SANDSTONE, a.a. CLAYSTONE, a.a. – silty in part.	0.0 (0:0:0:0:0)
730 (1.9)	10 90	SANDSTONE, a.a. CLAYSTONE, a.a.	0.0 (0:0:0:0:0)
740 (1.7)	10 90	SANDSTONE, a.a. CLAYSTONE, a.a.	0.1 (0:0:0:0:0)
750 (0.9)	20 80	SANDSTONE, a.a. – fine to coarse. CLAYSTONE, moderate grey-green, dark grey-brown, soft, dispersive, silty in part, minor dark green glauconite.	0.0 (0:0:0:0:0)
760 (1.0)	30 70	SANDSTONE, clear to translucent white, medium to coarse, loose, sub-rounded, moderate sorted quartz grains, good inferred porosity. CLAYSTONE, a.a.	0.0 (0:0:0:0:0)
770 (0.6)	100	SANDSTONE, white to pale grey, pale translucent brown, medium to very coarse, sub-angular to sub-rounded, moderate sorted, loose quartz grains, good porosity.	0.0 (0:0:0:0:0)
780 (0.8)	80 20	SANDSTONE, a.a. CLAYSTONE, dark grey to grey-brown, soft, dispersive.	0.0 (0:0:0:0:0)
790 (0.8)	90 10	SANDSTONE, white to translucent brown, fine to coarse, sub-angular to sub-rounded, moderate to well sorted, loose quartz grains, good porosity. CLAYSTONE, a.a.	0.0 (0:0:0:0:0)
800 (1.0)	30 70	SANDSTONE, a.a. CLAYSTONE, a.a.	0.0 (0:0:0:0:0)
810 (1.1)	40 60	SANDSTONE, a.a. – fine to very coarse. CLAYSTONE, a.a.	0.0 (0:0:0:0:0)
820 (1.0)	40 60	SANDSTONE, a.a. CLAYSTONE, a.a.	Tr (100:0:0:0:0)
830 (0.8)	100	SANDSTONE, clear to translucent white, medium to very coarse, sub-angular to rounded, poor to moderate sorted, loose quartz grains, good porosity.	0.0 (0:0:0:0:0)
840 (0.8)	100	SANDSTONE, a.a. – medium to very coarse, trace quartz overgrowths, good porosity.	0.0 (0:0:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
850 (0.7)	100	SANDSTONE, a.a. – sub-rounded to rounded, nil quartz overgrowths or crystal facets, trace pyrite, loose, good porosity.	0.0 (0:0:0:0:0)
860 (1.0)	100	SANDSTONE, a.a.	0.0 (0:0:0:0:0)
870 (0.7)	100	SANDSTONE, clear to translucent white, fine to very coarse, sub-rounded to rounded, poor to moderate sorted, loose quartz grains, good porosity.	0.0 (0:0:0:0:0)
880 (0.6)	100	SANDSTONE, a.a.	0.0 (0:0:0:0:0)
890 (0.7)	100	SANDSTONE, clear to translucent white, medium to very coarse, sub-angular to sub-rounded, moderate sorted, loose quartz grains, trace lithic / quartzite grains, pyrite and carbonaceous material, fair to good porosity.	0.0 (0:0:0:0:0)
900 (0.6)	100	SANDSTONE, a.a.	0.0 (0:0:0:0:0)
910 (0.7)	10 90	SANDSTONE, a.a. CLAYSTONE, a.a. – grey, dispersive.	0.0 (0:0:0:0:0)
920 (0.8)	10 90	SANDSTONE, a.a. CLAYSTONE, a.a.	1.2 (100:0:0:0:0)
930 (0.7)	100 Tr	SANDSTONE, a.a. – mostly coarse to very coarse, good porosity. CLAYSTONE, moderate to dark grey to grey-brown, soft, dispersive, silty.	1.1 (97:3:0:0:0)
940 (0.7)	100 Tr	SANDSTONE, a.a. CLAYSTONE, a.a.	1.0 (100:0:0:0:0)
950 (1.0)	40 60	SANDSTONE, a.a. – minor very fine, silty. SILTSTONE, moderate grey, soft, dispersive, very argillaceous and grades to claystone, trace quartz and lithic grains, trace carbonaceous material.	0.7 (100:0:0:0:0)
960 (0.9)	100 Tr	SANDSTONE, clear to translucent white, fine to coarse, sub-angular to sub-rounded, moderate sorted loose quartz grains, trace silty argillaceous matrix, tr pyrite and carbonaceous fragments, good porosity. SILTSTONE, a.a.	0.3 (100:0:0:0:0)
970 (1.1)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	0.1 (100:0:0:0:0)
980 (1.0)	40 60	SANDSTONE, a.a. – also minor white to pale grey, very fine to fine, sub-angular to sub-rounded, moderate sorted, silty, argillaceous, poor porosity. SILTSTONE, moderate grey, soft, argillaceous, dispersive, sandy in part, occasional carbonaceous fragments.	0.1 (100:0:0:0:0)
990 (0.8)	50 50	SANDSTONE, clear to greyish white, predominantly very fine to fine, some medium to coarse, sub-angular to sub-rounded, poor to moderate sorted, silty argillaceous matrix, trace carbonaceous fragments and pyrite, fair porosity. SILTSTONE, a.a.	0.2 (100:0:0:0:0)
1000 (1.1)	80 20	SANDSTONE, a.a. – fine to coarse, loose, fair to good porosity. SILTSTONE, a.a.	0.1 (100:0:0:0:0)
1010 (0.8)	100	SANDSTONE, a.a. – fine to coarse, loose, sub-angular, trace pyrite and carbonaceous material, good porosity.	0.0 (0:0:0:0:0)
1020 (0.8)	100	SANDSTONE, a.a. – predominantly medium to coarse, good porosity.	0.0 (0:0:0:0:0)
1030 (0.7)	100	SANDSTONE, a.a. – trace pyrite, good porosity.	0.0 (0:0:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
1040 (0.7)	100	SANDSTONE, a.a. – sub-rounded, good porosity.	0.0 (0:0:0:0:0)
1050 (0.8)	100	SANDSTONE, clear to translucent, fine to coarse, mostly medium to coarse, sub-rounded, moderate sorted, loose, common dark green glauconite pellets, trace pyrite, good porosity.	0.0 (0:0:0:0:0)
1060 (1.6)	100	SANDSTONE, a.a. – abundant pyrite, common glauconitic pellets, good porosity.	0.0 (0:0:0:0:0)
1070 (1.3)	20 80 Tr	SANDSTONE, clear to white, very fine to fine, sub-angular to sub-rounded, moderate to well sorted, loose, fair inferred porosity. SILTSTONE, moderate to dark grey to grey-brown, moderate brown, soft, argillaceous, dispersive. COAL, dull black, lignitic.	0.0 (0:0:0:0:0)
1080 (1.5)	100 Tr	SANDSTONE, clear to translucent white, medium to very coarse, sub-angular to rounded, moderate sorted, loose quartz grains, trace pyrite, good porosity. COAL, a.a.	0.0 (0:0:0:0:0)
1090 (1.0)	100	SANDSTONE, a.a. – medium to coarse, sub-angular, trace pyrite, good porosity.	0.0 (0:0:0:0:0)
1100 (1.0)	70 30	SANDSTONE, a.a. – fine to coarse, sub-angular to sub-rounded, common to abundant pyrite, dispersive silty clay matrix in part, good porosity. SILTSTONE, moderate grey to grey-brown, soft, dispersive, argillaceous, trace carbonaceous / coal fragments.	0.0 (0:0:0:0:0)
1110 (1.1)	90 10	SANDSTONE, a.a. – trace pyrite and lithic / quartzite grains, loose, good porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
1120 (1.3)	80 20	SANDSTONE, a.a. – predominantly medium to coarse, good porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
1130 (1.8)	90 10	SANDSTONE, a.a. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
1140 (2.1)	90 10	SANDSTONE, clear to translucent, fine to coarse, sub-angular, poor to moderate sorted, minor pyrite, loose, trace dispersive clay matrix, good porosity. SILTSTONE, light to moderate grey, soft, sub-fissile to non-fissile, sandy in part, minor carbonaceous / coal fragments / laminae.	0.0 (0:0:0:0:0)
1150 (1.2)	90 10	SANDSTONE, a.a. – very fine to coarse, minor clay matrix with very fine to fine aggregates, friable to loose, good porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
1160 (2.0)	90 10	SANDSTONE, a.a. – predominantly very fine to fine, minor clay matrix, weak silica cement, fair porosity. SILTSTONE, a.a.	0.0 (0:0:0:0:0)
1170 (1.8)	90 10	SANDSTONE, a.a. – predominantly medium to coarse, loose quartz grains, good porosity. SILTSTONE, a.a.	0.2 (100:0:0:0:0)
1180 (2.9)	70 30	SANDSTONE, white to pale grey, mostly very fine to fine, some medium to coarse, sub-angular to sub-rounded, moderate sorted, trace pyrite, rare greenish grey lithic / quartzite grains, minor silty clay matrix, slightly calcareous, weak silica cement, friable, fair porosity. SILTSTONE, moderate to dark grey, soft to firm, sub-fissile to non-fissile, sandy in part, argillaceous; also dark brown, carbonaceous.	0.1 (100:0:0:0:0)
1190 (4.9)	20 80	SANDSTONE, a.a. – very fine, pyritic, fair porosity. SILTSTONE, a.a. – rare brown, carbonaceous.	0.2 (100:0:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
1200 (3.4)	10	SANDSTONE, a.a.	0.6 (100:0:0:0:0)
	90	SILTSTONE, a.a. – moderate grey, pyritic in part, common dark green glauconite nodules, argillaceous.	
1210 (2.8)	30	SANDSTONE, white to pale bluish grey, very fine, sub-angular to sub-rounded, moderate to well sorted, moderate dispersive clay matrix, common pyrite nodules and cement in part, weak silica cement in part, friable, poor to fair porosity.	0.8 (100:0:0:0:0)
	70	SILTSTONE, moderate grey, grey-brown, soft to firm, sandy in part, very argillaceous and grades to silty claystone.	
1220 (2.0)	30	SANDSTONE< a.a. – slightly calcareous, common glauconite nodules, poor to fair porosity.	0.8 (100:0:0:0:0)
	70	SILTSTONE, a.a.	
1230 (2.9)	100	SILTSTONE, moderate to dark grey and grey-brown, soft to firm, sub-fissile to non-fissile, very argillaceous, occasionally grades to / interlaminated with light grey, very fine argillaceous sandstone, slightly calcareous, rare pyrite.	1.0 (100:0:0:0:0)
1240 (5.4)	Tr	SANDSTONE, white to very pale bluish grey, very fine, sub-rounded, moderate to well sorted, trace lithics, abundant argillaceous matrix, calcareous in part, friable to moderately hard, poor porosity.	0.5 (100:0:0:0:0)
	100	SILTSTONE, a.a.	
1250 (5.6)	Tr	SANDSTONE, a.a.	0.7 (100:0:0:0:0)
	100	SILTSTONE, a.a. – minor dark green glauconite.	
1260 (4.3)	Tr	SANDSTONE, a.a.	0.9 (100:0:0:0:0)
	100	SILTSTONE, a.a.	
1270 (6.3)	100	SILTSTONE, dark grey to grey-brown, argillaceous, trace glauconite.	0.8 (100:0:0:0:0)
1280 (17.1)	100	SILTSTONE, a.a.	1.5 (100:0:0:0:0)
1290 (1.8)	60	SANDSTONE, caving? – clear to translucent white and yellow-brown, iron stained, fine to coarse, sub-angular to rounded, poor to moderate sorted, minor lithic / quartzite grains, predominantly loose, minor clay matrix with fine grained aggregates, fair to good inferred porosity.	3.0 (100:0:0:0:0)
	40	SILTSTONE, a.a.	
1300 (3.0)	40	SANDSTONE, clear, very fine to medium, sub-angular to sub-rounded, moderate to well sorted quartz grains, abundant dark green glauconite nodules / pellets, loose, good inferred porosity.	2.3 (100:0:0:0:0)
	60	SILTSTONE, moderate bluish grey, soft, very argillaceous and grades to claystone.	
1310 (2.9)	80	SANDSTONE, clear to translucent white, pale yellow, occasionally pale green, loose quartz grains, fine to medium, occasionally coarse, sub-angular to sub-rounded, moderate to well sorted, common light to dark green glauconite, pale greenish white dispersive clay matrix, good porosity.	3.5 (100:0:0:0:0)
	20	SILTSTONE, a.a.	
1320 (0.8)	80	SANDSTONE, white to green, fine to coarse, sub-angular to sub-rounded, moderate sorted, predominantly loose quartz grains, abundant green fine glauconite grains and greenish white glauconitic silty clay matrix, good porosity.	8.3 (100:0:0:0:0)
	20	SILTSTONE, white to greenish grey, green, soft to firm, sandy, very glauconite, argillaceous and dispersive.	
1330 (2.0)	80	SANDSTONE, a.a.	3.4 (100:0:0:0:0)
	20	SILTSTONE, a.a.	

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
1340 (3.4)	90 10	SANDSTONE, a.a. – fine to coarse, occasionally very coarse, loose quartz grains, abundant dark green glauconite nodules / pellets, good porosity. SILTSTONE, a.a. – dispersive, argillaceous.	4.7 (100:0:0:0:0)
1350 (1.7)	70 30	SANDSTONE, a.a. – moderate greenish glauconitic clay matrix. SILTSTONE, a.a. – very argillaceous, dispersive.	9.1 (100:0:0:0:0)
1360 (0.9)	90 10	SANDSTONE, clear, occasionally pale yellow, fine to medium, some coarse, sub-rounded, moderate to well sorted, loose quartz grains, common dark green glauconite pellets, greenish white silty clay matrix, good porosity. SILTSTONE, a.a.	10.1 (100:0:0:0:0)
1370 (0.9)	50 50	SANDSTONE, a.a. – predominantly fine to medium, abundant green glauconite, cm, fair porosity. SILTSTONE, a.a. – argillaceous, dispersive, glauconite, sandy in part.	9.1 (100:0:0:0:0)
1380 (0.7)	100 Tr	SANDSTONE, a.a. – predominantly medium to coarse, sub-angular to sub-rounded, moderate to well sorted, loose quartz grains, minor glauconite, good porosity. SILTSTONE, a.a.	10.1 (100:0:0:0:0)
1390 (1.0)	90 10	SANDSTONE, a.a. – fine to coarse, sub-rounded, good porosity. SILTSTONE, a.a.	8.6 (100:0:0:0:0)
1400 (1.3)	80 20	SANDSTONE, a.a. SILTSTONE, a.a. – very argillaceous and grades to claystone.	6.3 (100:0:0:0:0)
1410 (2.1)	70 30	SANDSTONE, a.a. SILTSTONE, pale to moderate greyish blue-green, soft, dispersive, very argillaceous and grades to claystone.	4.6 (100:0:0:0:0)
1420 (3.5)	30 70	SANDSTONE, a.a. – medium to coarse. SILTSTONE, a.a.	3.0 (100:0:0:0:0)
1430 (5.4)	30 70	SANDSTONE, a.a. SILTSTONE, a.a.	1.7 (100:0:0:0:0)
1440 (3.7)	30 70	SANDSTONE, a.a. SILTSTONE, a.a.	2.1 (100:0:0:0:0)
1450 (2.8)	10 90	SANDSTONE, a.a. SILTSTONE, a.a. – abundant dark green glauconite grains.	4.1 (100:0:0:0:0)
1460 (2.7)	30 70	SANDSTONE, clear to translucent, fine to medium, occasionally coarse, sub-angular to sub-rounded, moderate to well sorted loose quartz grains, good porosity. SILTSTONE, a.a.	4.4 (100:0:0:0:0)
1470 (2.3)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	5.6 (99:1:0:0:0)
1473 (2.6)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	8.7 (97:3:0:0:0)
1476 (2.4)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	7.1 (98:2:0:0:0)
1479 (2.6)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	7.9 (98:2:0:0:0)
1482 (2.8)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	10.8 (97:3:0:0:0)
1485 (2.9)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	8.1 (98:2:0:0:0)
1488 (2.8)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	7.8 (98:2:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
1491 (2.2)	100	SILTSTONE, moderate to dark grey to greyish blue-green, soft, very argillaceous and grades to claystone, glauconitic.	9.4 (97:3:0:0:0)
1494 (2.1)	100	SILTSTONE, a.a.	10.5 (97:3:0:0:0)
1497 (3.0)	100	SILTSTONE, a.a.	11.8 (97:3:0:0:0)
1500 (4.4)	100	SILTSTONE, a.a.	8.5 (98:2:0:0:0)
1503 (4.1)	100	SILTSTONE, a.a. – very argillaceous and grades to claystone.	5.2 (99:1:0:0:0)
1506 (4.4)	100	SILTSTONE, moderate to dark grey to grey-brown, soft, argillaceous, dispersive, grades to claystone.	5.8 (99:1:0:0:0)
1509 (4.4)	100	SILTSTONE, a.a.	6.3 (99:1:0:0:0)
1512 (3.9)	100	SILTSTONE, a.a. – minor glauconite and trace carbonaceous fragments.	5.0 (100:0:0:0:0)
1515 (4.6)	100	SILTSTONE, a.a. – trace carbonaceous fragments and pyrite, minor white very fine, sandy argillaceous laminae.	6.1 (100:0:0:0:0)
1518 (4.5)	100	SILTSTONE, a.a. – trace carbonaceous fragments and pyrite.	6.0 (100:0:0:0:0)
1521 (2.7)	20 80	SANDSTONE, clear, fine to coarse, loose quartz grains. SILTSTONE, a.a.	33.9 (99:1:0:0:0)
1524 (1.7)	100	SANDSTONE, clear to translucent white, fine to medium, sub-angular to sub-rounded, moderate to well sorted, loose quartz grains, trace grey silty argillaceous matrix, trace pyrite, good porosity.	208.2 (99:1:0:0:0)
1527 (1.0)	100 Tr	SANDSTONE, a.a. – good porosity. SILTSTONE, moderate grey, soft, dispersive, very argillaceous and grades to claystone.	270.7 (99:1:0:0:0)
1530 (1.0)	100	SANDSTONE, a.a. – fine to coarse, good porosity.	301.0 (99:1:0:0:0)
1533 (1.3)	100 Tr	SANDSTONE, a.a. – fine to coarse, occasionally very coarse, poor to moderate sorted, loose, trace dispersive, silty clay matrix, good porosity. SILTSTONE, a.a. – trace pyrite and carbonaceous fragments.	257.7 (99:1:0:0:0)
1536 (1.2)	100 Tr	SANDSTONE, a.a. – fine to very coarse, good porosity. SILTSTONE, a.a.	244.9 (99:1:0:0:0)
1539 (1.5)	100 Tr	SANDSTONE, a.a. – fine to very coarse, predominantly medium, good porosity. SILTSTONE, a.a.	137.8 (99:1:0:0:0)
1542 (1.6)	100 Tr	SANDSTONE, a.a. – fine to very coarse, mostly medium to coarse, good porosity. SILTSTONE, a.a.	129.2 (99:1:0:0:0)
1545 (1.5)	100 Tr	SANDSTONE, a.a. – fine to very coarse, trace pyrite, loose, good porosity. SILTSTONE, a.a.	88.5 (99:1:0:0:0)
1548 (1.5)	90 10	SANDSTONE, a.a. – fine to very coarse, predominantly medium to coarse, loose, trace dispersive clay matrix, good porosity. SILTSTONE, moderate grey to grey, brown, soft, argillaceous, dispersive, trace carbonaceous fragments.	89.6 (99:1:0:0:0)
1551 (1.6)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	179.0 (99:1:0:0:0)

DEPTH (ROP)		NORTH PAARATTE-5 LITHOLOGICAL DESCRIPTIONS	GAS (%)
1554 (1.2)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	192.7 (99:1:0:0:0)
1557 (0.8)	100 Tr	SANDSTONE, a.a. – clear to translucent white, fine to coarse, sub-angular to sub-rounded, poor to moderate sorted, trace pyrite, trace silty dispersive clay matrix, loose, good porosity. SILTSTONE, a.a.	148.3 (99:1:0:0:0)
1560 (1.2)	100 Tr	SANDSTONE, a.a. SILTSTONE, a.a.	117.1 (99:1:0:0:0)
1563 (1.3)	100	SANDSTONE, a.a. fine to very coarse, good porosity.	60.9 (99:1:0:0:0)
1566 (1.2)	100	SANDSTONE, a.a.	35.1 (99:1:0:0:0)
1569 (2.0)	90 10	SANDSTONE, a.a. SILTSTONE, a.a.	24.8 (93:7:0:0:0)
1572 (3.8)	80 20	SANDSTONE, a.a. SILTSTONE, a.a.	19.6 (91:9:0:0:0)
1575 (3.9)	50 50	SANDSTONE, clear to translucent white, pale grey, fine to coarse, mostly fine to medium, sub-angular to sub-rounded, moderate sorted, trace pyrite, trace silty dispersive clay matrix, loose, good porosity. SILTSTONE, moderate grey to grey-brown, moderate brown, soft, dispersive, argillaceous, trace carbonaceous material, trace pyrite.	21.9 (99:1:0:0:0)
1578 (2.8)	50 50	SANDSTONE, a.a. SILTSTONE, a.a.	27.1 (99:1:0:0:0)
1581 (4.1)	40 60	SANDSTONE, a.a. SILTSTONE, a.a.	17.7 (99:1:0:0:0)
1584 (4.1)	30 70	SANDSTONE, a.a. SILTSTONE, a.a.	12.8 (98:2:0:0:0)
1587 (3.9)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a. – trace white, fine grained, argillaceous sandy lenses.	17.2 (98:2:0:0:0)
1590 (3.5)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	22.3 (97:3:0:0:0)
1593 (3.4)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	15.8 (98:2:0:0:0)
1596 (2.0)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	46.8 (99:1:0:0:0)
1599 (1.3)	Tr 100	SANDSTONE, white, fine to medium, sub-angular to sub-rounded, moderate sorted, dispersive white clay matrix, friable, fair porosity. SILTSTONE, a.a.	46.2 (99:1:0:0:0)
1602 (0.9)	Tr 100	SANDSTONE, a.a. SILTSTONE, a.a.	35.3 (99:1:0:0:0)
		TD = 1603m. @ 11.30 hours28/03/1999	

907475 075

APPENDIX 2

WIRELINE LOG ANALYSIS

907475 076

BORAL ENERGY
RESOURCES LIMITED

PETROPHYSICS REPORT

NORTH PAARATTE 4
&
NORTH PAARATTE 5

PPL 1

OTWAY BASIN

VICTORIA

Author:
J A Donley
Dr M Deakin

Boral Energy Resources Limited
60 Hindmarsh Square
ADELAIDE SA 5000

November 1999

TABLE OF CONTENTS

			Pg
SUMMARY			**1**
1.0	**INTRODUCTION**		**2**
2.0	**EXPLORATION HISTORY OF PPL1 & THE PT CAMBPBELL EMBAYMENT**		**3**
3.0	**LOG DATASET**		**4**
4.0	**TVD**		**5**
5.0	**DEPTH MATCHING**		**6**
6.0	**ENVIRONMENTAL CORRECTIONS**		**7**
	6.1	Resistivity Logs	7
	6.2	Gamma Ray Logs	7
7.0	**NORMALISATION**		**8**
8.0	**VOLUME OF SHALE**		**10**
	8.1	Gamma Ray Cut-Offs	10
	8.2	Vsh Calculation	11
		8.2.1 Linear Vsh	11
		8.2.2 Non-Linear Vsh	12
		8.2.3 Final Vsh	12
9.0	**POROSITY**		**14**
	9.1	Overburden Porosity Factor	14
	9.2	DENSITY POROSITY	17
		9.2.1 Mean Grain Density	17
		9.2.2 Fluid Density	18
	9.3	SHALE CORRECTED NEUTRON POROSITY	21
		9.3.1 Matrix Correction	21
		9.3.2 Shale Correction	21
	9.4	NEUTRON POROSITY CORE CALIBRATION	23
	9.5	NEUTRON POROSITY SUMMARY	25
	9.6	DENSITY-NEUTRON POROSITY - SHALE CORRECTED	25
	9.7	DENSITY-NEUTRON POROSITY - CORE CALIBRATED	25
	9.8	SONIC (Δt) POROSITY	29
	9.9	V-SHALE POROSITY	30
	9.10	FINAL POROSITY	31
10.0	**WATER SATURATION (Sw)**		**33**
	10.1	ARCHIE APPARENT WATER RESISTIVITY (Rwa)	33
		10.1.1 Pickett Plots	33
	10.2	FORMATION WATER RESISTIVITY	35
	10.3	SATURATION EXPONENT "n"	37
	10.4	Sw100 PLOTS	39
	10.5	FLUID ZONE CLASIFICATION	41
11.0	**PERMEABILITY**		**43**
	11.1	Poro-Permeability (K-Φ)	43
	11.2	Water Saturation Permeability (K-Sw)	45
	11.3	Vsh-Permeability (K-Vsh)	46
	11.4	FINAL PERMEABILITY	46
	11.5	OVERBURDEN PERMEABILITY CORRECTION	47
12.0	**NET PAY**		**49**
	12.1	NET PAY CUTOFFS	49
		12.1.1 Evidence of Fluid Movement – Mudcake	49
		12.1.2 Evidence of Fluid Movement – Invasion	50
	12.2	FINAL CUTOFFS	51
	12.3	NET PAY	52
	12.4	SENSITIVITY STUDY	53
		12.4.2 Cutoff Sensitivity	53
		12.4.1 Water Saturation Equation - Input Parameter Sensitivity	53

907475 078

LIST OF TABLES

		Pg
Table 1	Well Dataset	2
Table 2	PPL1 Wireline Logging Program	4
Table 3	GR Cutoffs for Vsh	10
Table 4	Overburden Porosity	14
Table 5	Mean Grain Density	17
Table 6	RHOf Summary Table	19
Table 7	Mylor 1 NPMX From Petrology	23
Table 8	DN to Sonic Porosity Calibration	29
Table 9	Gas Shows In PPL1 - Sw 100 Zones	33
Table 10	Waarre Reservoir Temperature	33
Table 11	Waarre Formation Water Analysis	36
Table 12	SCAL Saturation Exponent "n"	37
Table 13	Sw Equation Parameters	39
Table 14	PPL1 Fluid Zone Table	41
Table 15	Summary of Fluid Contacts	42
Table 16	Fluid Zone Classification	42
Table 17	Permeability Equation Correlation Coefficients	46
Table 18	Net-Pay Cutoffs	51
Table 19	Net Pay & Pay Statistics	52

LIST OF FIGURES

		Pg
Figure 1	North Paaratte 4, Well Path & TVD Correction	5
Figure 2	North Paaratte 5, Well Path & TVD Correction	5
Figure 3	GR Correction, Nth Paaratte 2	7
Figure 4a	Normalisation Crossplot RHOB vs DT	8
Figure 4b	Normalisation Crossplot RHOB vs DT	8
Figure 4c	Normalisation Crossplot, RHOB vs LLD	9
Figure 5a	North Paaratte 4, GR Histogram	10
Figure 5b	North Paaratte 5, GR Histogram	11
Figure 6a	North Paaratte 4, Linear and Non-Linear Vsh Functions	12
Figure 6b	North Paaratte 5, Linear and Non-Linear Vsh Functions	13
Figure 7	Skull Creek West 1. Overburden Porosity at EQHS vs Ambient Porosity.	15
Figure 8	Braeside 1. Overburden Porosity at EQHS vs Ambient Porosity.	15
Figure 9	Wallaby Creek 2 Overburden Porosity at EQHS vs Ambient Porosity.	16
Figure 10	Interpolated Porosity Factor	16
Figure 11	Mylor 1 Grain Density Histogram	17
Figure 12	Mylor 1 RHOf Crossplot (Water Zone)	18
Figure 13	Mylor 1 RHOf Crossplot (Gas Zone)	19
Figure 14	Mylor 1 Density Porosity	20
Figure 15a	North Paaratte 4, Shale Density Porosity	21
Figure 15b	North Paaratte 5, Shale Density Porosity	21
Figure 16a	North Paaratte 4, Shale Neutron Porosity (Matrix Corrected)	22
Figure 16b	North Paaratte 5, Shale Neutron Porosity (Matrix Corrected)	22
Figure 17a	Nth Paaratte 4, Neutron Porosity (Shale Corrected) Dens Porosity Calibration	24
Figure 17b	Nth Paaratte 5, Neutron Porosity (Shale Corrected) Dens Porosity Calibration	24
Figure 18a	Multiwell X-plot, Dens-Neutron Porosity vs Core O/burden Porosity (Gas Zone)	26
Figure 18b	Multiwell X-plot, Density-Neutron Porosity vs Core Overburden Porosity (Water Zone)	26
Figure 19a	Mylor1 – Density-Neutron Core Calibrated Porosity	27
Figure 19b	North Paaratte 4 - Density-Neutron Core Calibrated Porosity	28
Figure 19c	North Paaratte 5 - Density-Neutron Core Calibrated Porosity	28
Figure 20	Sonic vs Density-Neutron Porosity (Core Calibrated)	29
Figure 21	North Paaratte 5, Sonic Porosity	30
Figure 22a	North Paaratte 4, Final Composite Porosity	31
Figure 22b	North Paaratte 5, Final Composite Porosity	32
Figure 23a	Mylor 1 Pickett Plot	34
Figure 23b	North Paaratte 4 Pickett Plot	34
Figure 23c	North Paaratte 5 Pickett Plot	34
Figure 24	Waarre Formation Water Analysis	35
Figure 25	Saturation Exponent	38
Figure 26	Archie Water Saturation in Sw100 Zones at North Paaratte 4	39
Figure 27a	Archie Water Saturation, North Paaratte 4	40
Figure 27b	Archie Water Saturation, North Paaratte 5	40
Figure 28a	Poroperm Crossplot	43
Figure 28b	Poroperm Crossplot	43
Figure 29	Sw-Permeability Crossplot	45
Figure 30	Vsh-Permeability Crossplot	46
Figure 31	Ambient Permeability vs Overburden Permeability	47
Figure 32	North Paaratte 4, Permeability	48
Figure 33	North Paaratte 5, Permeability	48
Figure 34	Crossplot of Mudcake vs Permeability (Waarre Formation Interval)	49
Figure 35	Permeability vs INVSN, Wallaby Creek 2 (Gas zones only)	50
Figure 36	Cutoff Sensitivity Histograms	55
Figure 37	Hydrocarbon Thickness Sensitivity to Archie Equation Input Parameters	53

APPENDICES

1 North Paaratte 4 Net Pay Listing
2 North Paaratte 5 Net Pay Listing

ENCLOSURES

1 North Paaratte 4 Petrophysical Composite Plot
2 North Paaratte 5 Petrophysical Composite Plot

SUMMARY

The petrophysical evaluation of the North Paaratte 4 &5 was conducted by Boral Energy Resources Ltd as part of a PPL1 reserves determination study. The evaluation used the methodologies of Dr Mark Deakin who was closely involved in the study and provided endorsement of the final results.

Volume of shale was calculated using the Clavier equation. Density Porosity and Shale Corrected Neutron Porosity were calculated and combined to produce Density-Neutron Porosity. Density-Neutron Porosity was calibrated to overburden corrected core porosity. Sonic Porosity and Vsh Porosity provided Badhole Porosity. Water Saturation was calculated using the Archie Equation. Core Permeability was crossplotted against Porosity, Water Saturation and Vsh. Permeability was predicted from a weighted average of these individual permeability relationships, with the weighting dependent upon the strength of each correlation.

Pay was determined within identified gas zones using a permeability cutoff of 0.3mD. A backup Vsh cutoff of 50% was added to ensure reservoir quality.

A summary of pay and pay statistics for the North Paaratte 4 and 5 wells is shown below;

BORAL ENERGY - NORTH PAARATTE 4 & 5 PETROPHYSICS							
WELL	INTERVAL	PAY	Ave Vsh	Ave Sw	Ave Por	AveK	HC THK
NORTH PAARATTE 4	C3-B	18.09	0.10	0.45	0.22	324.21	2.21
NORTH PAARATTE 5	C1-TWE	24.33	0.06	0.16	0.24	444.12	4.95

1.0 INTRODUCTION

This report documents the petrophysical evaluation of North Paaratte 4 and North Paaratte 5. The evaluation was part of a wider PPL1 reserves determination study for the North Paaratte, Wallaby Creek and Grumby gasfields.

The study applied the methodologies of Mark Deakin using Terrastation petrophysical software. Dr Deakin provided input on a Daily basis during the course of the study.

The North Paaratte, Wallaby Creek and Grumby gas fields were the focus of the study. However, the dataset was expanded to incorporate a number of other wells and fields within the vicinity of PPL1 for calibration purposes. Table 1 lists all wells which formed the dataset for the study.

Table 1 – Well Dataset

FIELD	WELLS	WELLS	WELLS	WELLS
North Paaratte Wallaby Creek Grumby Mylor Skull Creek	North Paaratte 1 Wallaby Creek 1 Grumby 1 Mylor 1 Skull Creek West 1 Braeside 1	North Paaratte 2 Wallaby Creek 2	North Paaratte 4	North Paaratte 5

2.0 EXPLORATION HISTORY OF PPL1 and THE PORT CAMBPBELL EMBAYMENT

The first hydrocarbon discovery in the Port Campbell embayment was made in 1959 when Frome-Broken Hill drilled the Port Campbell 1 exploration well. The well flowed gas from the Late Cretaceous Waarre Formation at an initial rate of 1.5 MMCFD. However, the rate declined rapidly and the discovery was deemed non-commercial.

The first commercial hydrocarbon discovery was made in 1979 when the North Paaratte 1 well was drilled by Beach Petroleum NL. The well was located on the southern flank of an elongate, east-west trending faulted anticline and intersected gas in the Waarre Formation. Subsequent testing flowed gas at rates of 9.5 MMCFD and confirmed a new field discovery. North Paaratte 2 was drilled in 1981 approximately 1.6km to the east and intersected a similar high deliverability reservoir in the Waarre Formation. North Paaratte 3 was located on separate structure to the east and failed to encounter a gas column.

Following the North Paaratte gas discovery, the Wallaby Creek and Grumby gas fields were discovered by Beach in 1981. Subsequent exploration led to the discovery of the Iona gas field in 1988 (Beach Petroleum NL) and the Boggy Creek CO_2 field in 1991 (GFE Resources).

In 1994, Bridge Petroleum and GFE discovered the Mylor 1 gas field immediately north of the North Paaratte gasfield. In the same year, GFE drilled the Langley-1 well which flowed CO_2 rich gas from the Waarre Formation. After acquiring the assets of GFE Resources, Basin Oil discovered the Skull Creek field in 1996. However, subsequent drilling at Skull Creek West 1 and Skull Creek North-1 proved the field to be much smaller than anticipated. In 1997, Santos and Basin drilled the Fenton Creek-1 well and flowed gas and condensate from the Waarre Formation.

After acquiring Basin's interest in PPL1, Boral Energy drilled the North Paaratte 4 and 5 wells updip of North Paaratte 1 and 2 in 1999. Both wells confirmed the continuity of the gas accumulation in the Waarre Formation at North Paaratte.

3.0 LOG DATASET

North Paaratte 4 and 5 was logged by Schlumberger using Platform Express (PEX). Table 2 provides details of the logging program in each well.

TABLE 2 - PPL 1 WIRELINE LOGGING PROGRAMS						
WELL	COMMENT	LOGS RECORDED	SUITE	RUN	LOGGED INTERVAL	
					TOP	BOTTOM
NTH PAARATTE 4	Schlumberger	PEX(HALS)-BHC-RHOZ-TNPHI	1	1	25	1648.7
NTH PAARATTE 5	Schlumberger	PEX(HALS)-BHC-RHOZ-TNPHI	1	1	400	1591.71

4.0 TVD

North Paaratte 4 and 5 were drilled from a single drill pad and deviated 450m to the northwest and northeast respectively. Sperry Sun was contracted to provide directional drilling equipment and control during the drilling of these wells. Borehole dip and azimuth data provided by Sperry Sun was input into Terrastation and TVD calculated using a Minimum Radius of Curvature method.

Figure 1 - North Paaratte 4, Well Path & TVD Calculation

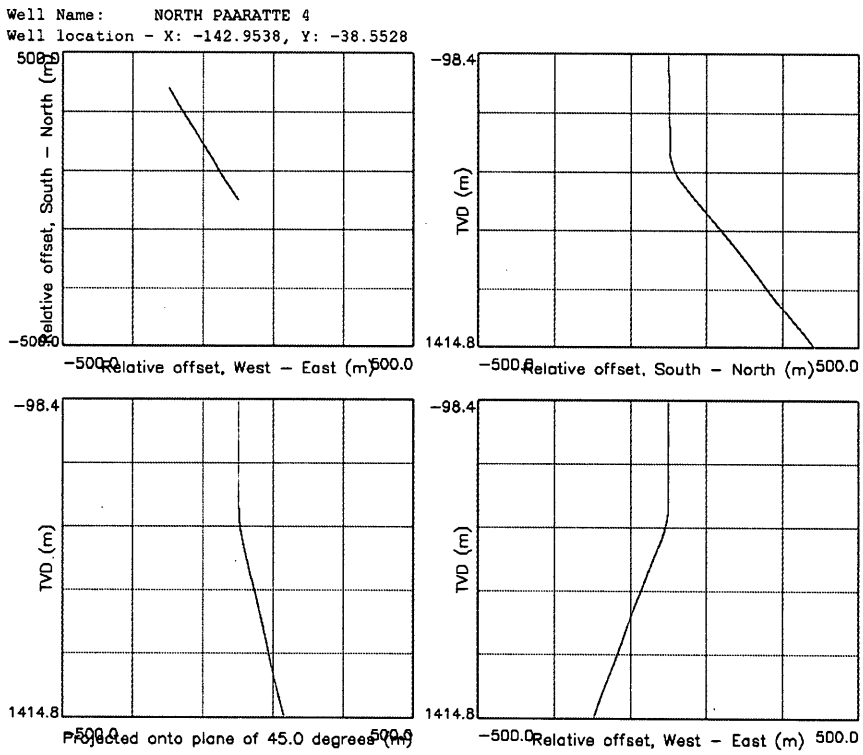
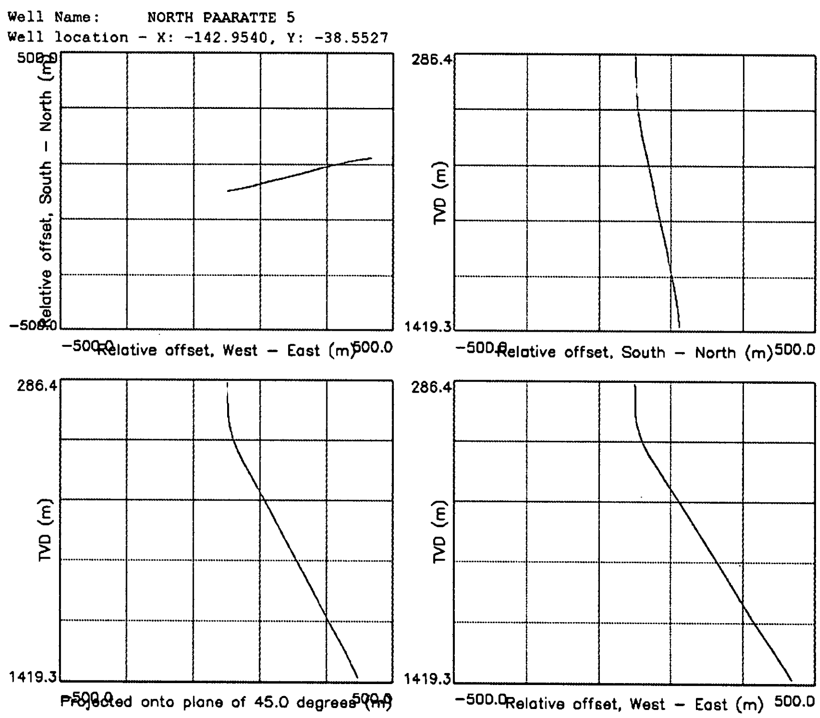


Figure 2 - North Paaratte 5, Well Path & TVD Calculation



5.0 DEPTH MATCHING

Schlumberger's Platform Express (PEX) was used to acquire wireline log data in North Paaratte 4 and North Paaratte 5. The PEX allows all conventional wireline instruments to be run during one pass, thus eliminating depth error.

6.0 ENVIRONMENTAL CORRECTIONS

6.1 Resistivity Logs

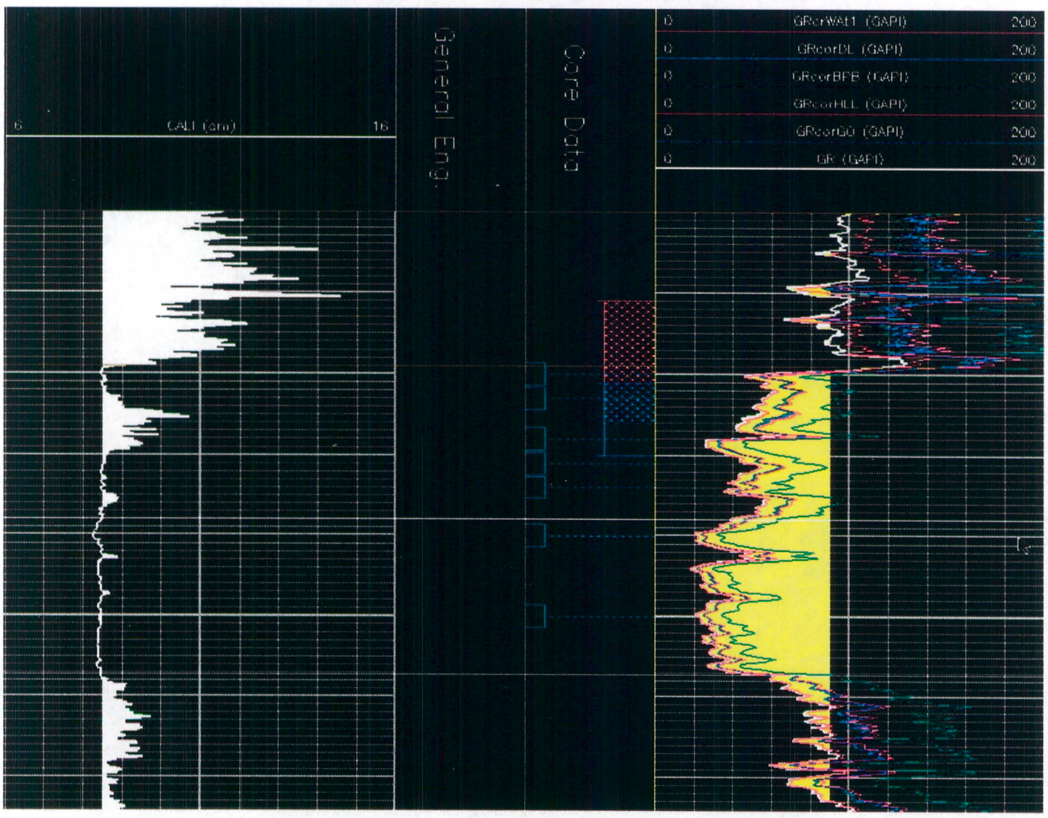
The Laterolog Resistivity Tools were environmentally corrected using standard correction algorithms taken from the Schlumberger chartbook. The MSFL was corrected using chart Rxo-3 whilst the LLS and LLD were corrected using chart Rcor-2.

In order to determine True Formation Resistivity (Rt), Invaded Zone Resistivity (Rxo) and Invasion Diameter (DI), Tornado Chart Rint-9a was applied. However, it was observed that the MSFL log performed erratically in Mylor 1, Grumby 1, Wallaby Creek 1&2, and North Paaratte 2, often recording resistivities greater than the deeper reading tools and occasionally showing "spiky" nature. For this reason it was decided to discard the Tornado chart calculated value of Rt and use Environmentally corrected LLD during subsequent Water Saturation calculations (Chapter 10).

6.2 Gamma Ray Logs

Environmental Correction of the GR curve could not be done using the Schlumberger correction algorithm within Terrastation. Several GR environmental correction algorithms were tested on North Paaratte 2. Figure 3 shows the relative magnitude of corrections provided by the different Service Company algorithms. The BPB Correction (dark green) provides a small correction in the sands and is not as severe as all other corrections in the shales. The BPB correction was considered the most believable and was used to correct the GR in all wells, including North Paaratte 4 and 5.

Figure 3 – GR Correction, Nth Paaratte 2



7.0 NORMALISATION

Logging tools were crossplotted over the Waarre Formation interval to investigate the presence of anomalous logs. Three crossplots were made, RHOB vs DT, GR vs TNPHI and RHOB vs LLD (Figure 4a, 4b, 4c). The Neutron log in North Paaratte 1 appears to be reading low relative to other wells. The evaluation proceeded without Normalisation but the TNPHI of North Paaratte 1 was monitored closely at each stage.

Figure 4a – Normalisation Crossplot RHOB vs DT

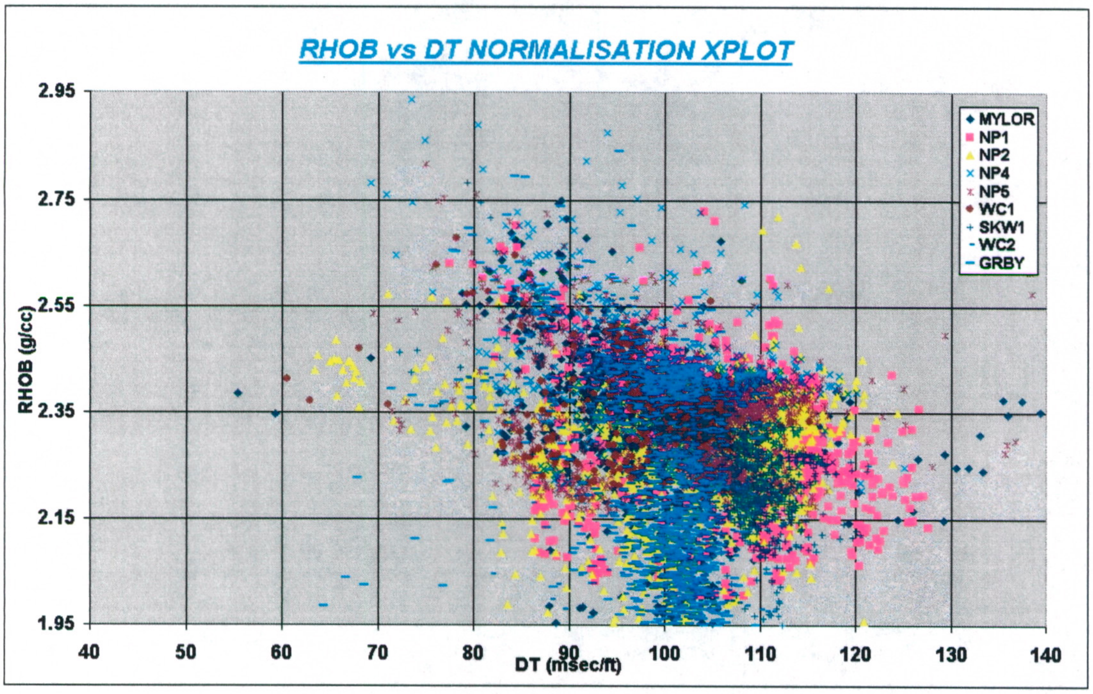


Figure 4b – Normalisation Crossplot GR vs TNPH

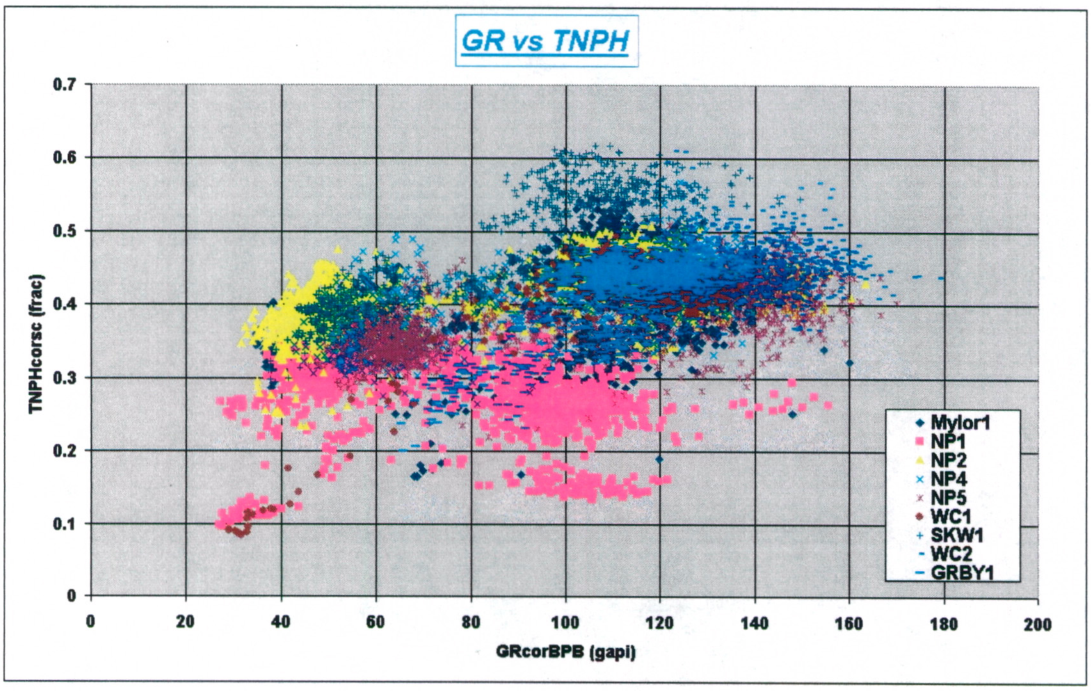
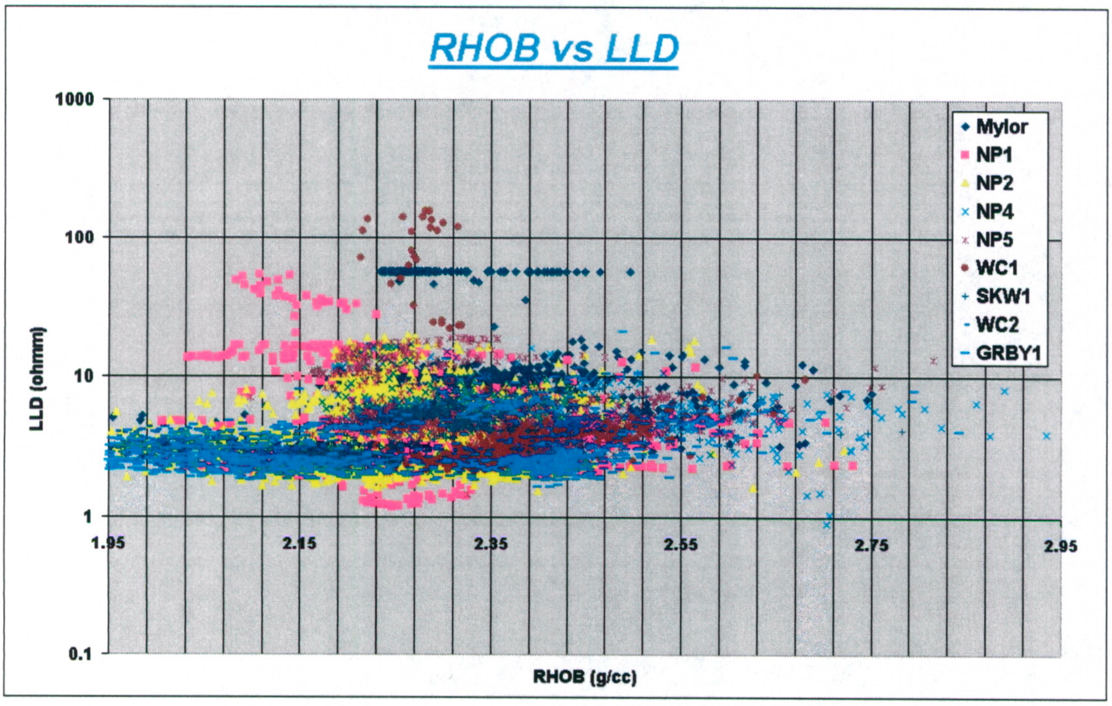


Figure 4c – Normalisation Crossplot, RHOB vs LLD



8.0 VOLUME OF SHALE

8.1 Gamma Ray Cut-Offs

Volume of Shale (Vsh) was determined using the Gamma Ray log. GR clean and GR shale cutoffs were determined for each well by picking the 5% and 95% values from histograms of environmentally corrected Gamma Ray (Figures 5a & 5b). Each individual well histogram was plotted over the same stratigraphic interval, namely the Waarre Formation (Units A to D). Table 4 shows the cutoffs which were determined for North Paaratte 4 and 5;

Table 3 – GR Cutoffs for Vsh

WELL	GR clean GAPI	GR shale GAPI
North Paaratte 4	45	150
North Paaratte 5	45	150

Figure 5a – North Paaratte 4 GR Histogram

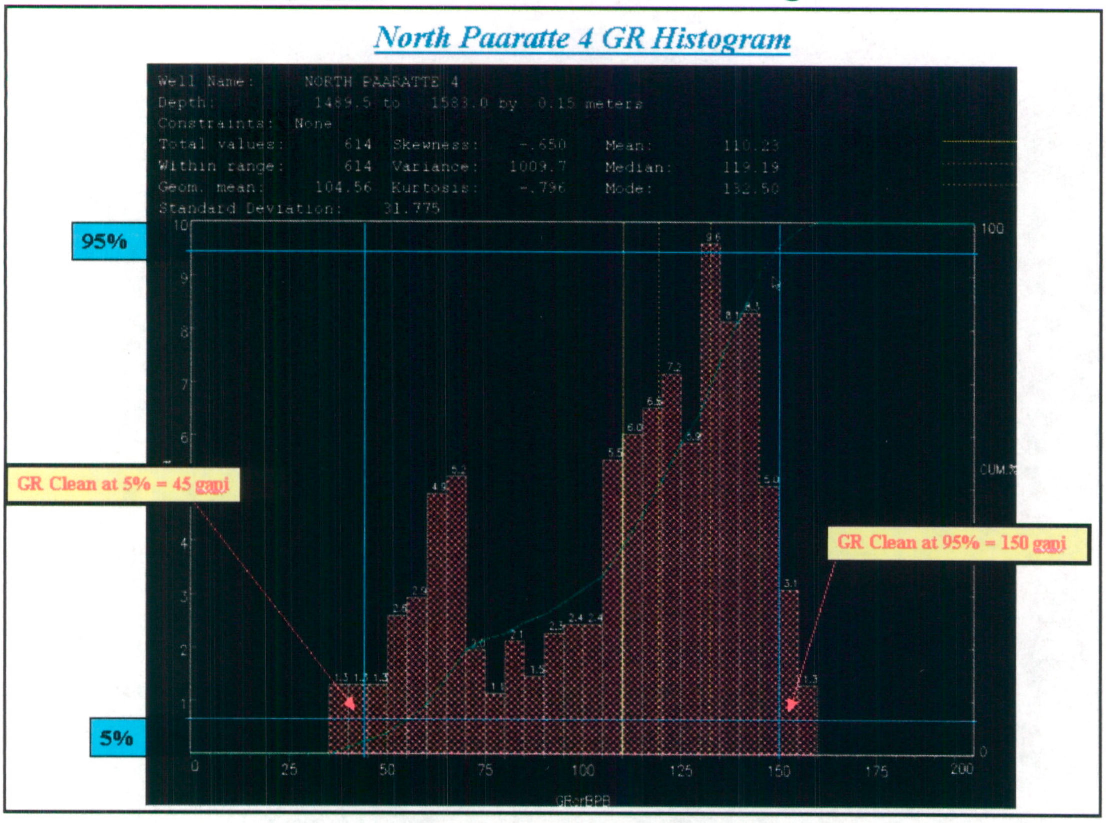
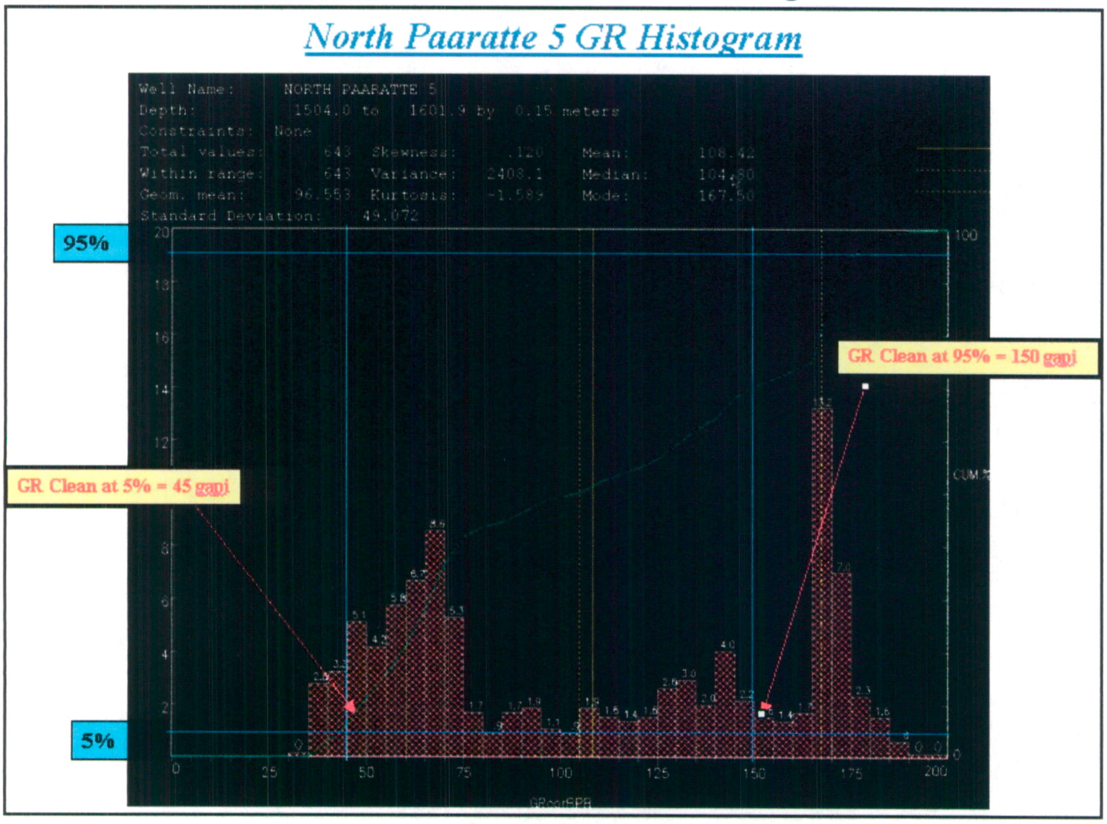


Figure 5b - North Paaratte 5 GR Histogram



8.2 Vsh Calculation

Six methods of Vsh Calculation were tested, three linear and three non-linear calculations.

8.2.1 Linear Vsh

Three Linear Vsh Functions were evaluated, the standard Linear function, the Clavier function and the Steiber function. These Functions are listed below;

LINEAR

$$Vsh_{LINEAR} = \frac{(GR_{LOG} - GR_{CLEAN})}{(GR_{SHALE} - GR_{CLEAN})}$$ **Equation 1**

CLAVIER

$$Vsh_{CLAVIER} = 1.7 - \left[3.38 - \{[Vsh_{LINEAR}] + 0.7\}^2\right]^{0.5}$$ **Equation 2**

STEIBER

$$Vsh_{STEIBER} = \left\{\frac{0.5 * [Vsh_{LINEAR}]}{1.5 - [Vsh_{LINEAR}]}\right\}$$ **Equation 3**

Where;

Where;	GR_{LOG}	=	Environmentally Corrected Gamma Ray Log Value
	GR_{CLEAN}	=	Gamma Ray Clean Sand Value
	GR_{SHALE}	=	Gamma Ray Shale Value

8.2.2 Non-Linear Vsh

Linear Vsh is often viewed as pessimistic. A non-linear Vsh is more optimistic and provides for improved evaluation (Dewan 1983). If thin section data is available, non-linear Vsh can be tested by cross-plotting linear Vsh against Vcltx. A quadratic function applied to the data will give a customised non-linear Vsh function. Whilst thin section data was available for this evaluation, time constraints did not permit implementation of a customised non-linear Vsh function. However, Deakin (1999) suggests the use of the following non-linear function;

$$Vsh_{NONLINEAR} = 0.6 * Vsh_{LINEAR} + 0.4 * Vsh_{LINEAR}^2 \qquad \textbf{Equation 4}$$

This non-linear function was applied to the Linear, Steiber, and Clavier linear Vsh functions.

8.2.3 Final Vsh

The six Vsh techniques were applied to each well. Figure 6a shows the results of this process on the North Paaratte 4 well.

The results of the linear Vsh calculations were analysed and comparisons made against core and mudlog descriptions and core photographs. Following this analysis, it was decided to use a conservative linear Vsh function. The Clavier (red) Vsh Function was chosen to represent Volume of Shale for this evaluation.

Figure 6a - North Paaratte 4

Linear and Non-Linear Vsh Functions

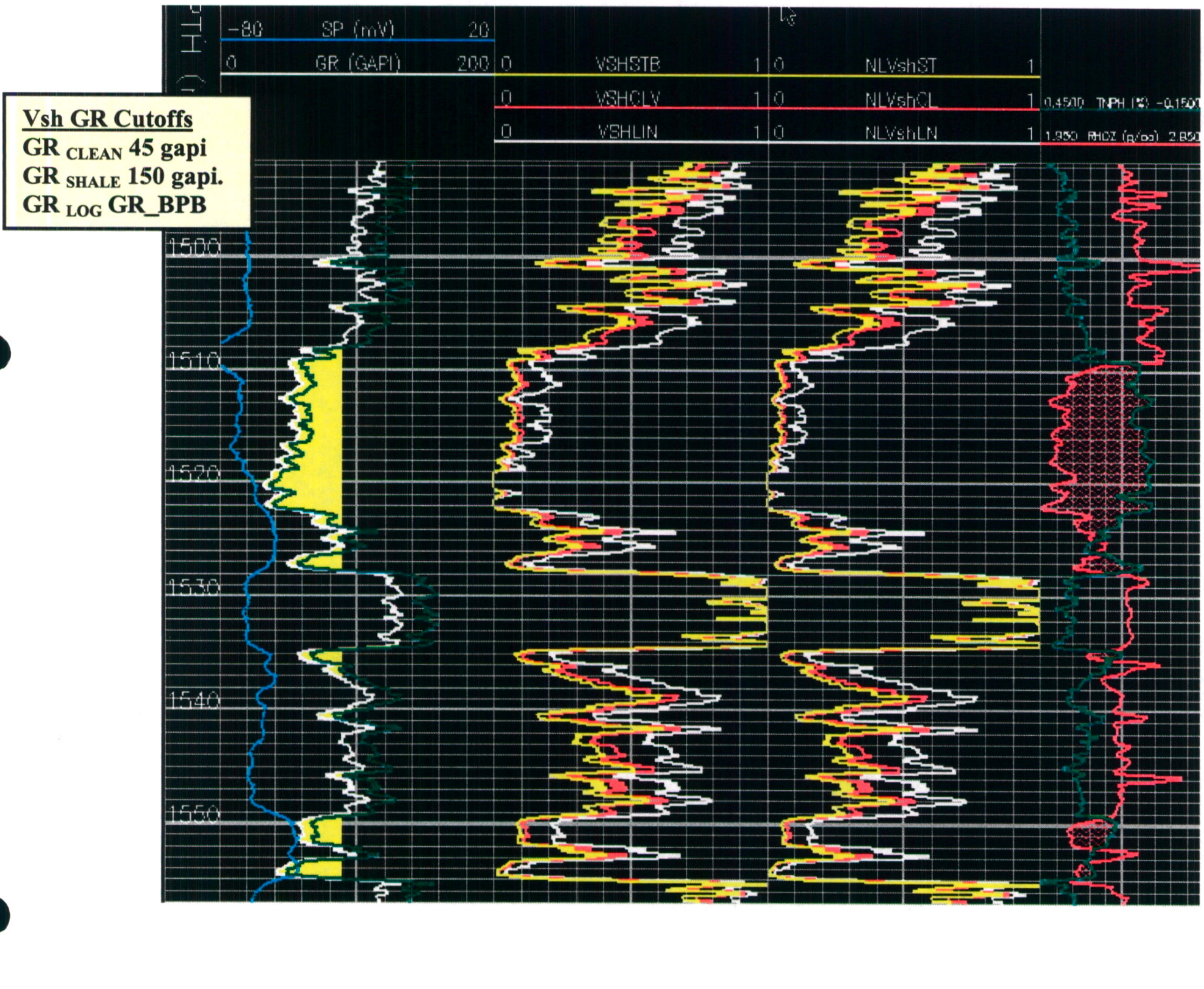
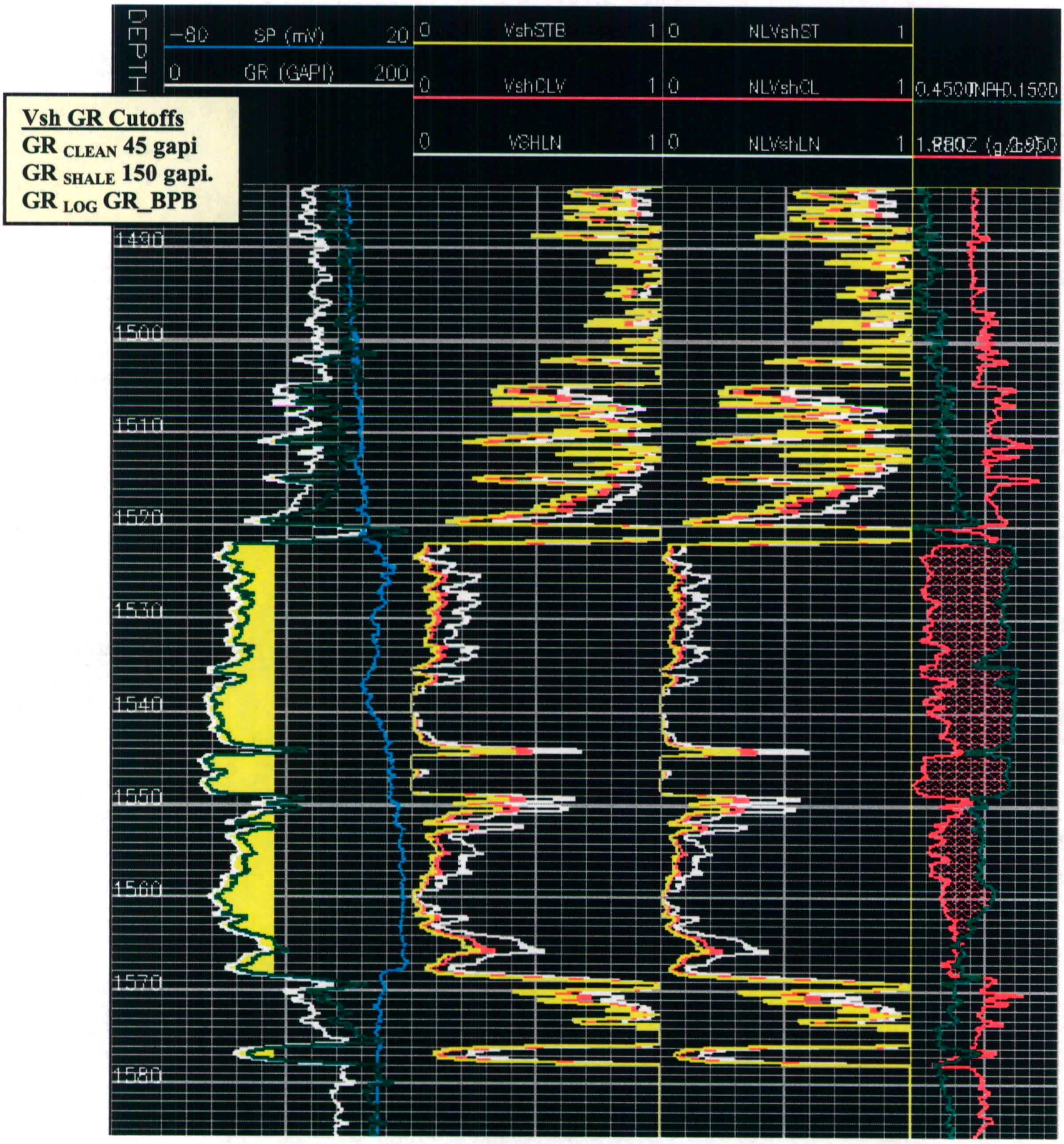


Figure 6b - North Paaratte 5

Linear and Non-Linear Vsh Functions



9.0 POROSITY

9.1 Overburden Porosity Factor

Core Porosity, adjusted for overburden uniaxial stress, is most representative of reservoir conditions. Core compaction data is acquired under triaxial loading which requires less stress than uniaxially applied stress to achieve the same porosity reduction. 62% of the laboratory hydrostatic stress is assumed to be equivalent to reservoir uniaxial stress.

The reservoirs Net Overburden Stress (NOS) which acts uniaxially is approximated by;

$$NOS = \left(ft_{\_TVDSS} * 1.00 \frac{psi}{ft} \right) - RFT_{FM\_PRESSURE(PSI)}$$ **Equation 5**

Where;

NOS	=	Net Overburden Stress
$RFT_{FM\_PRESSURE}$	=	Formation Pressure recorded by the RFT Tool
ft_TVDSS	=	Vertical Subsea Depth of Reservoir in Feet.
1.00 psi/ft	=	Formation Overburden is assumed at 1.00 psi/ft

$$EQHS = 0.61 * NOS$$ **Equation 6**

Where; EQHS = Equivalent Hydrostatic Stress

TABLE 4 - O/B POROSITY	Depth mSS				Net Ovb Stress	Fm Pressure	EQV Lab Stress	Por Factor	Int Por Factor
	top	base	ave	ftSS	PSI	PSI	PSI	frac	frac
Wallaby Creek 1	1472	1484	1478	4849.067	4849.06674	2164	1637.890711		0.928
Wallaby Creek 2	1426	1461	1443.5	4735.878	4735.878105	2152	1576.165644	0.9702	0.935
North Paaratte 2	1350	1364	1357	4452.086	4452.08631	1973	1512.242649		0.942
Grumby 1	1575	1595	1585	5200.116	5200.11555	2291	1774.560486		0.913
Skull Creek West 1	1187	1195	1191	3907.469	3907.46853	1758	1311.175803	0.9642	0.964
Mylor 1	1566	1599	1582.5	5191.913	5191.913475	2344	1737.22722		0.917
Braeside 1	1358.3	1391.7	1375	4511.141	4511.14125	2018.793129	1520.332354	0.941	0.941

[1]

Core overburden porosity was measured at Wallaby Creek 2, Braeside 1, and Skull Creek West 1. However, porosity at EQHS needed to be interpolated because laboratory overburden porosity was measured at pressures in excess of 2000psi.

In order to calculate the Overburden Porosity Factor, Ambient Porosity was crossplotted against interpolated EQHS Porosity (Figures 7, 8, 9).

[1] No Formation Pressures were available for Braeside 1. Formation pressure at Braeside was interpolated from a Formation Pressure vs Depth Plot.

Figure 7 – Skull Creek West 1. Overburden Porosity at EQHS vs Ambient Porosity.

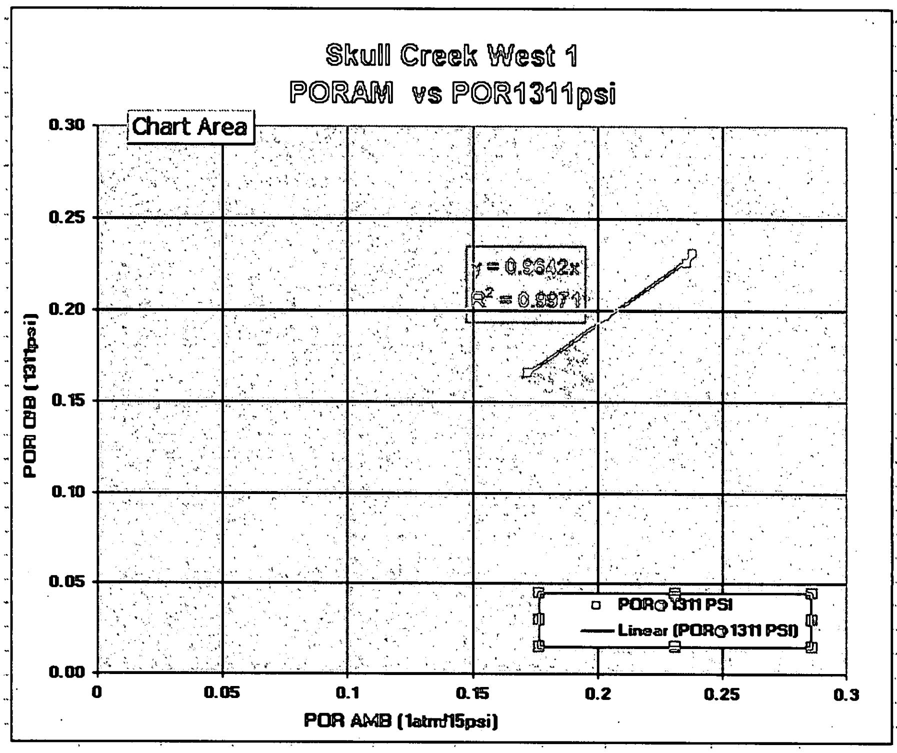


Figure 8 – Braeside 1. Overburden Porosity at EQHS vs Ambient Porosity.

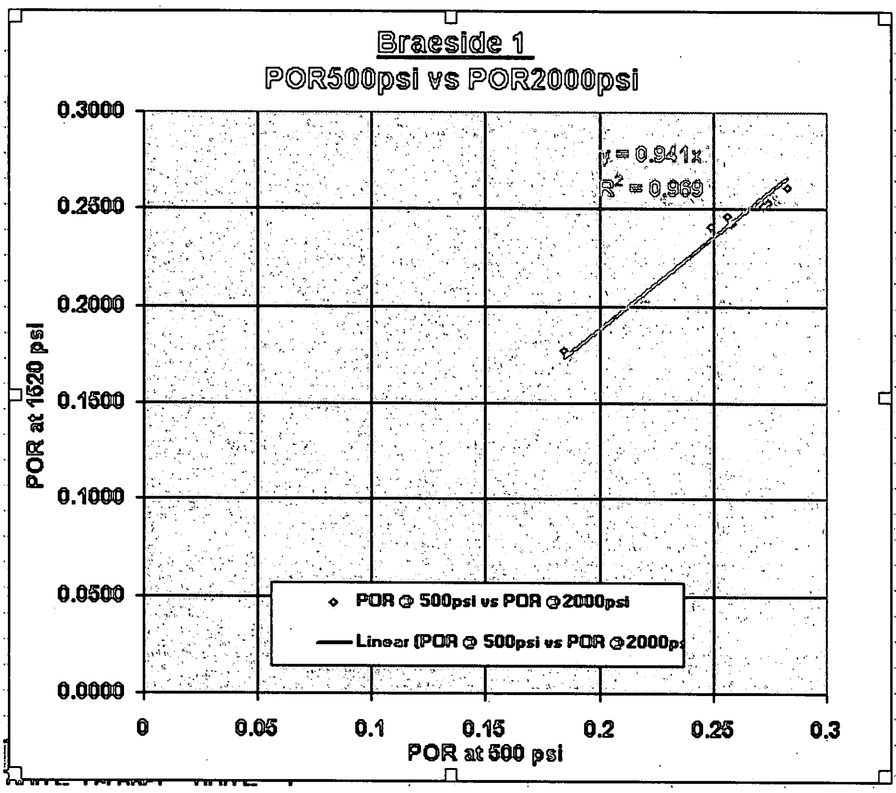
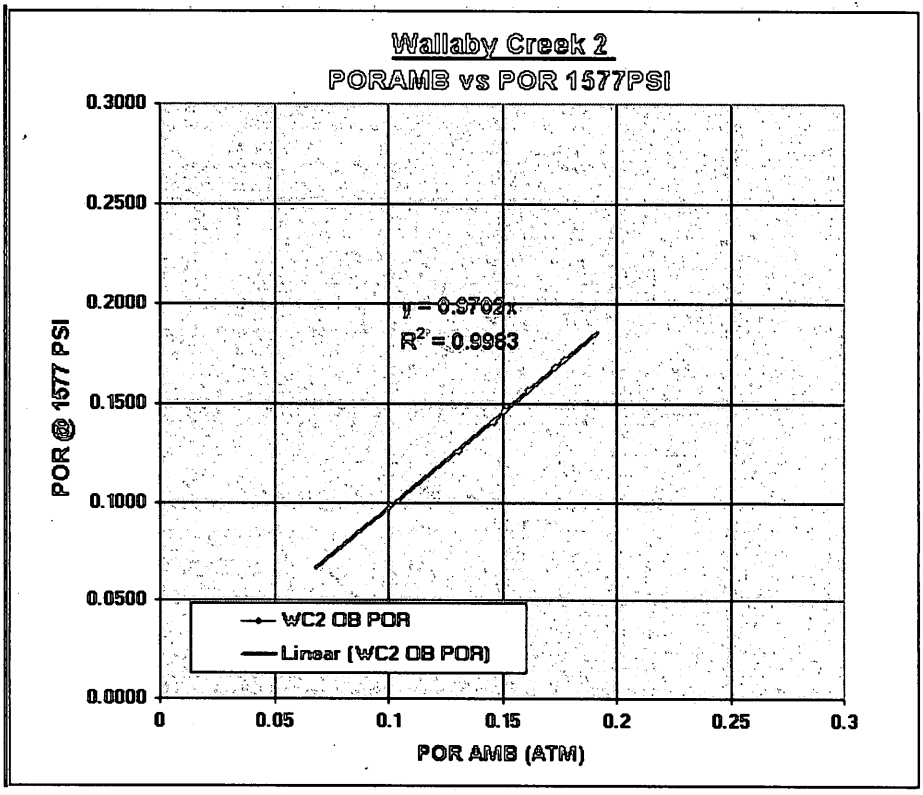
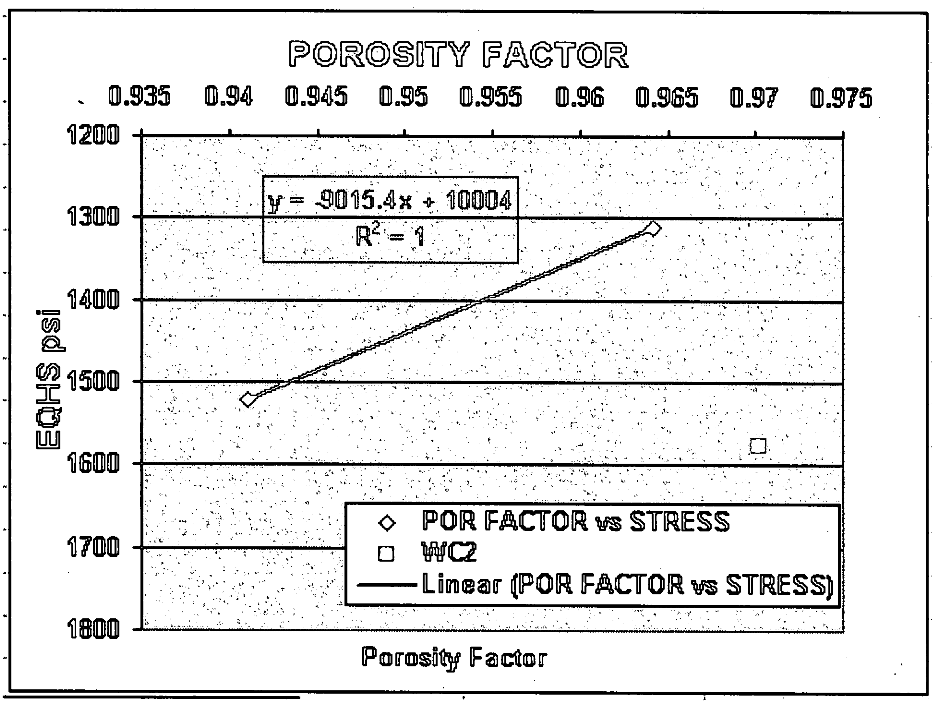


Figure 9 – Wallaby Creek 2 Overburden Porosity at EQHS vs Ambient Porosity.



For those cored wells without overburden porosity measurements, a Porosity Factor was interpolated by plotting Porosity Factor against EQHS. A trend was defined by Braeside 1 and Skull Creek West 1. However, Wallaby Creek 2 was excluded because it did not fit a realistic trend (Figure 10).

Figure 10 – Interpolated Porosity Factor



9.2 DENSITY POROSITY

9.2.1 Mean Grain Density

Mean grain densities (RHOg) were determined from histograms of core grain densities. Figure 11 shows a grain density histogram from the core of Mylor 1. The mean grain density was determined to be 2.65gm/cm³.

Figure 11 – Mylor 1 Grain Density Histogram

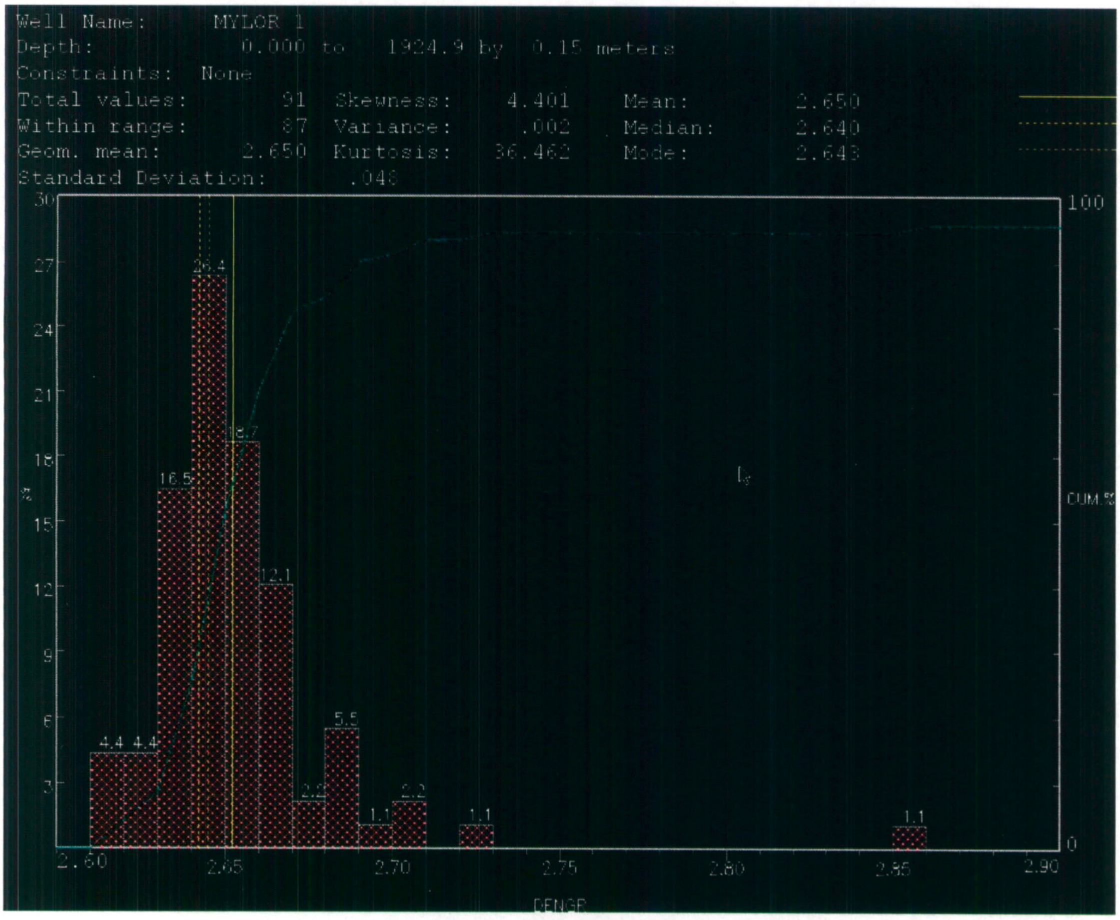


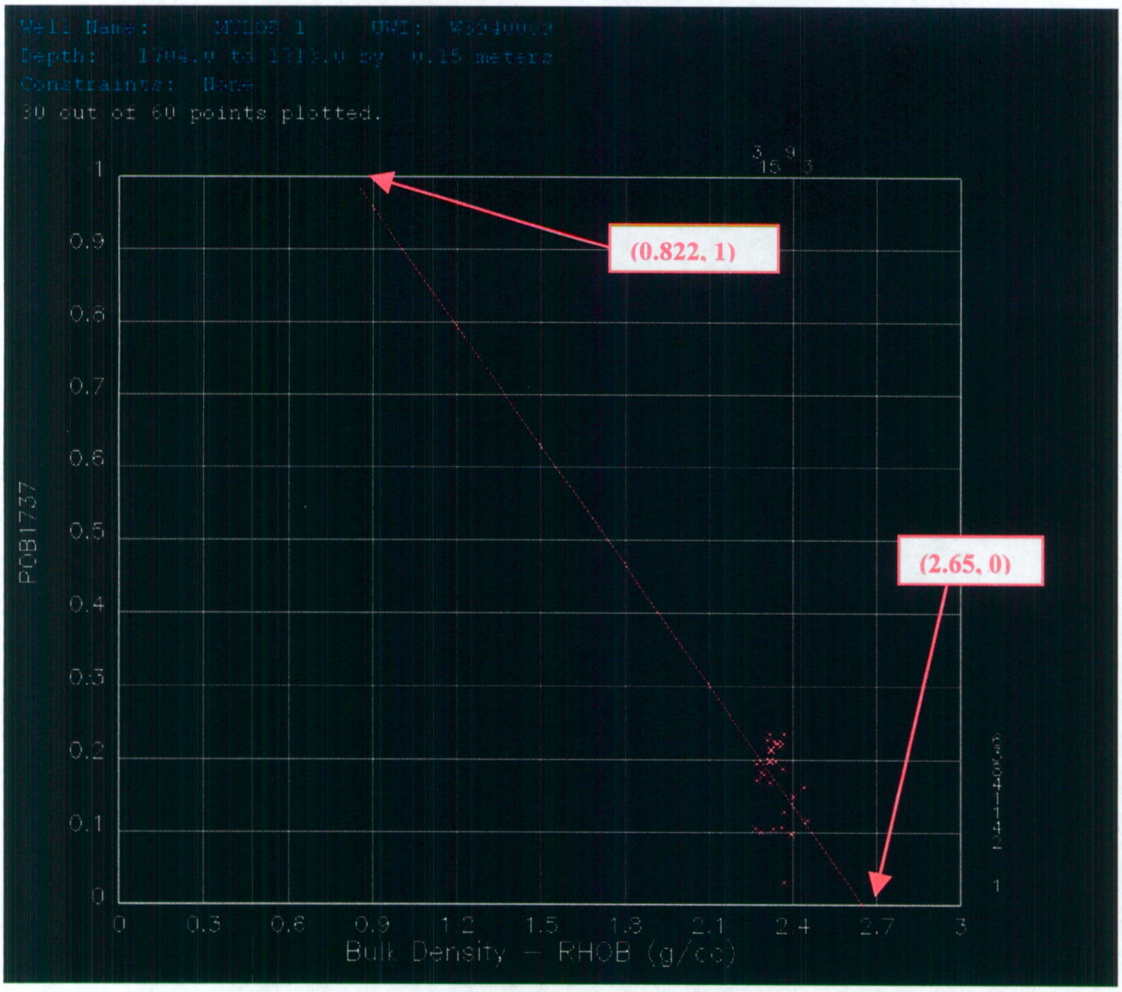
TABLE 5 - MEAN GRAIN DENSITY	
	MEAN GRAIN DENSITY
NTH PAARATTE 2	2.68
MYLOR 1	2.65
SKULL CREEK WEST 1	2.67
BRAESIDE 1	2.68
WALLABY CREEK 2	2.70
AVERAGE	2.67

Table 6 lists mean grain densities derived from core grain density histograms. All of the above wells except Wallaby Creek 2 contain core within the Waarre "C" Sand. Wallaby Creek 2 cored the lower "A" Sand and top Eumeralla Formation. The average grain density for the Waarre "C" Sand excluded grain densities from Wallaby Creek 2. A grain density of 2.67 gm/cm3 was used in subsequent Density Porosity calculations.

9.2.2 Fluid Density

Fluid Density (RHOf) was determined by a fixed point regression of bulk density (RHOB) versus overburden core porosity (POB) for water and hydrocarbon zones. Figure 12 shows the Water Zone RHOf crossplot for Mylor 1;

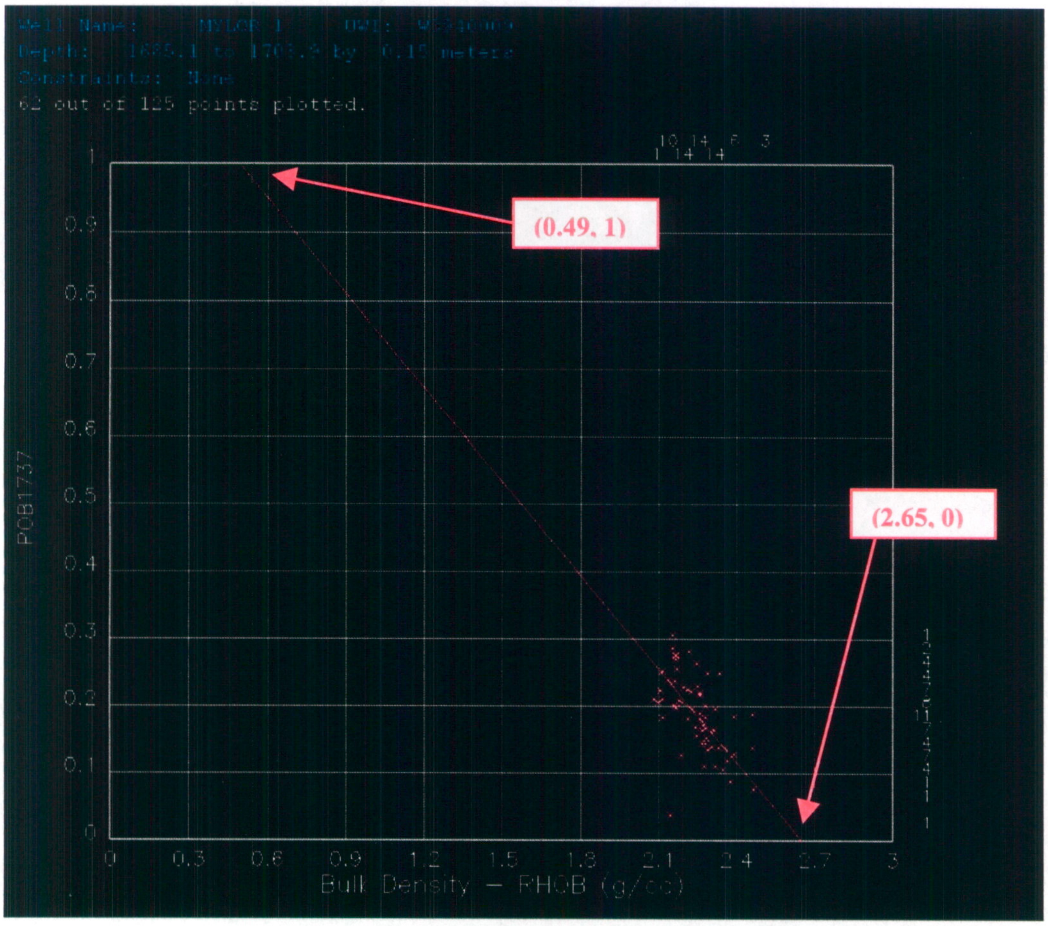
<u>Figure 12 – Mylor 1 RHOf Crossplot (Water Zone)</u>



Overburden Porosity at EQHS Pressure of 1737psi was crossplotted against RHOB (Bulk Density). At zero porosity, RHOB is equal to a RHOg of 2.65g/cc (determined previously from RHOg Histogram). This point provides a fixed point for the regression (2.65,0). If the regression line is extrapolated to a porosity of 1, this point represents the fluid density of the zone. In this case, the fluid density of the water zone is 0.822 g/cm^3.

A similar process was repeated for the gas zone at Mylor 1;

Figure 13 – Mylor 1 RHOf Crossplot (Gas Zone)



If this case, the Fluid Density of the gas zone was found to be 0.49 gm/cm^3.

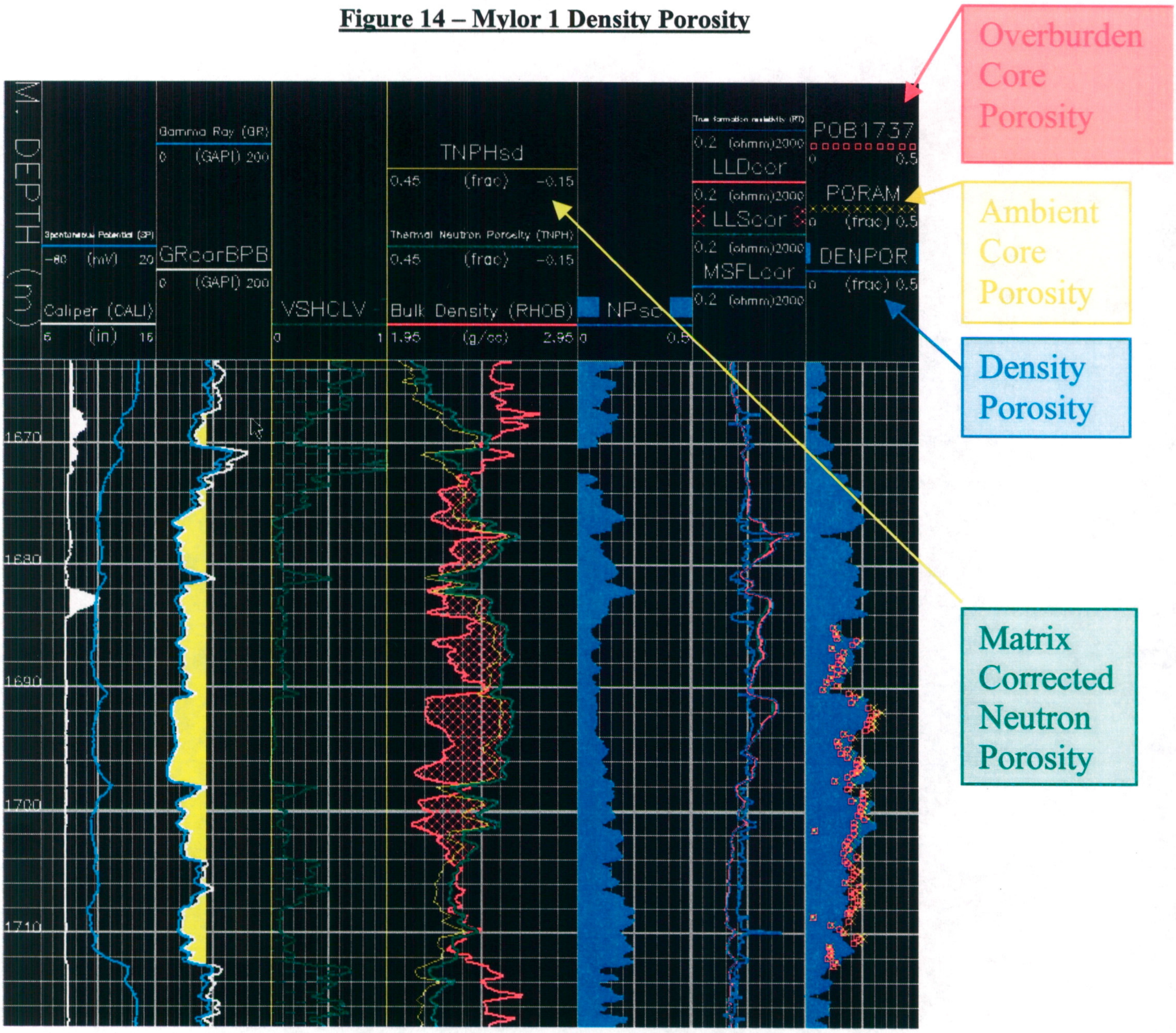
Table 7 provides a Summary of all Fluid Density plots;

TABLE 6 - RHOf SUMMARY TABLE		
	RHOf water	RHOf gas
NTH PAARATTE 2	na	0.198
MYLOR 1	0.822	0.49
SKULL CREEK WEST 1	0.872	na
BRAESIDE 1	1.132	na
AVERAGE	0.942	

Table 7 shows a range in calculated Fluid Density. Given this variability, it was decided to use a constant RHOf of 1.0gm/cm^3 in Density Porosity calculations.

Figure 14 shows the results of the Density Porosity calculation. Mylor 1 is shown for comparison with overburden porosity core data.

Figure 14 – Mylor 1 Density Porosity



9.3 SHALE CORRECTED NEUTRON POROSITY

9.3.1 Matrix Correction

TNPHI was corrected to sandstone units using the Schlumberger Por13a algorithm within Terrastation. The results of this correction can be seen above in Figure 14.

9.3.2 Shale Correction

The objective of the neutron shale correction is to provide a neutron porosity curve which tracks density porosity over varying degrees of shaliness. Density Porosity in shales is assumed to be a reasonable approximation to actual shale total porosity.

Density Porosity of shale and Neutron Porosity of shale was determined by crossplotting Density Porosity vs Vsh (Figure 15a,15b) and Neutron Porosity vs Vsh (Figure 16a, 16b).

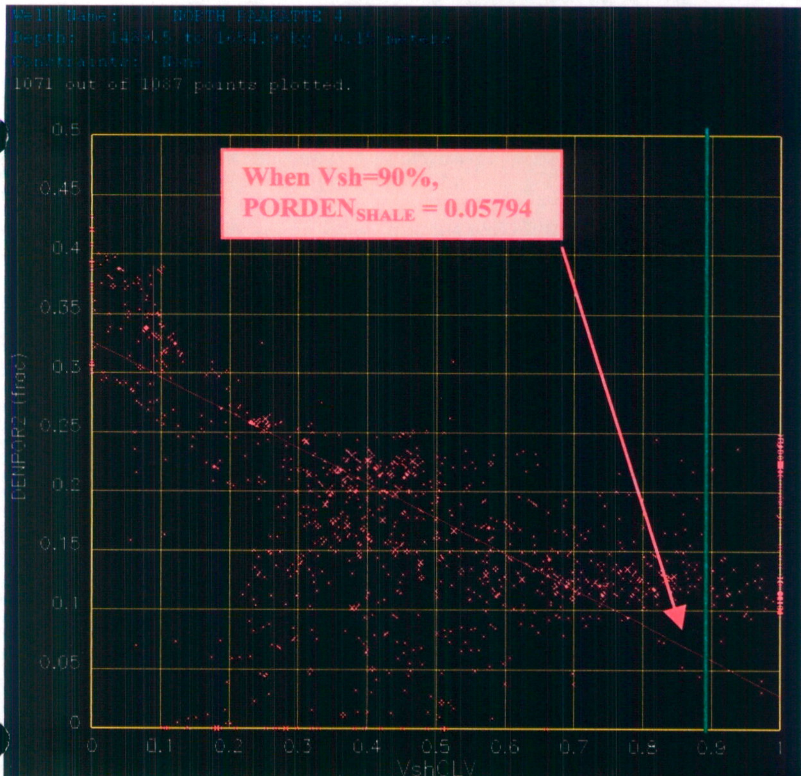


Figure 15a
North Paaratte 4 – Shale Density Porosity

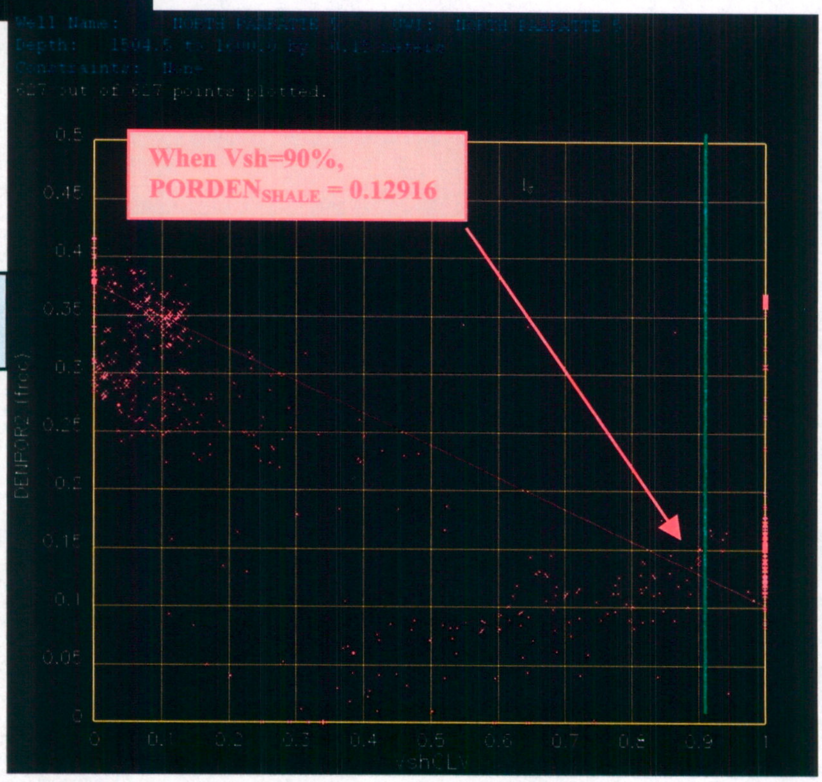


Figure 15b
North Paaratte 5 – Shale Density Porosity

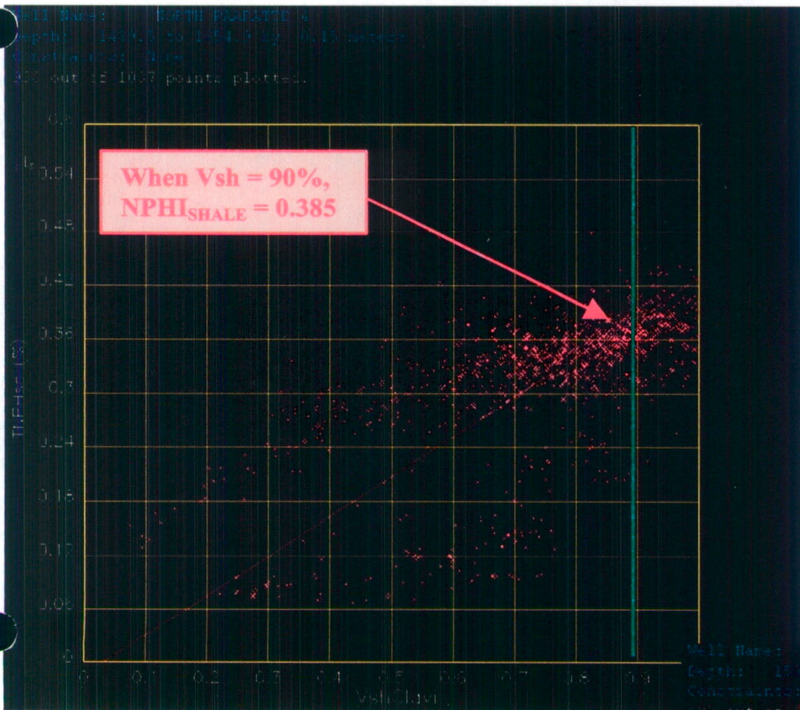


Figure 16a - North Paaratte 4
Shale Neutron Porosity (Matrix Corrected)

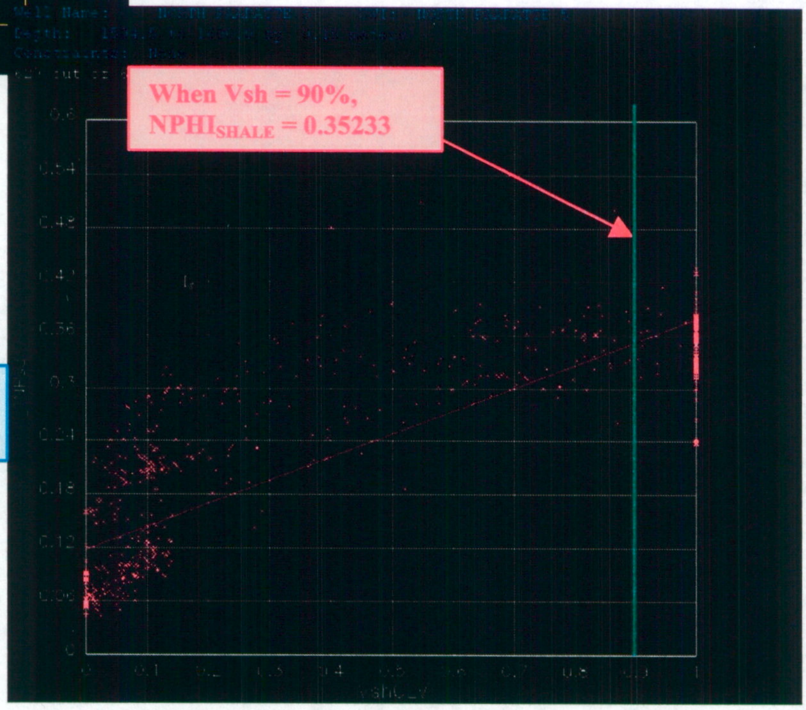


Figure 16b - North Paaratte 5
Shale Neutron Porosity (Matrix Corrected)

The difference between the higher neutron porosity and density porosity in shales provides the correction for neutron porosity to track density porosity as shale increases. Therefore in the case of North Paaratte 4, the equation for shale corrected Neutron Porosity is;

$$NPSC = NPHI - Vsh(NPHI_{SHALE} - DENPOR_{SHALE})$$
$$NPSC_{NP4} = NPHI - Vsh(0.385 - 0.05794)$$

Equation 7

Where;

NPSC	-	Neutron Porosity Shale Corrected
NPHI	-	Neutron Porosity (Matrix Corrected)
Vsh	-	Volume of Shale (Clavier)
$NPHI_{SHALE}$	-	Neutron Porosity at 90% Shale
$DENPOR_{SHALE}$	-	Density Porosity at 90% Shale

9.4 NEUTRON POROSITY CORE CALIBRATION

The final adjustment to Neutron Porosity was to calibrate it with core. However, many of the wells (including North Paaratte 4 & 5) did not contain core or did not contain enough core porosity data points to produce a meaningful correlation. Therefore, instead of calibrating NPSC with core, it was calibrated with Density Porosity. The crossplots (Figure 17a, 17b) show a fixed point regression of shale corrected neutron porosity with density porosity at North Paaratte 4 and 5.

The fixed point is NPSC = NPMX (Neutron response to zero porosity clay free matrix) when Density Porosity is equal to zero. In order to find NPMX, the petrological analysis of core in Mylor 1 and Skull Creek West 1 was examined. For each sample analysed by the petrographer, the percentage of each component identified was multiplied by its Neutron response as quoted in the Schlumberger chartbook. These component responses were summed and averaged to get a final NPMX. Table 9 shows this procedure;

TABLE 7 - MYLOR 1 NPMX from PETROLOGY

Sample DEPTH	COMPONENT FRACTION	Fqz fr	Ffld fr	Flth fr	Fmica fr	Fglc fr	Facc fr	Mcly fr	Mmud fr	Mopq fr	Mqz fr	Mpyr fr	Mkao fr	Mcrb fr	SUM COM-PONENTS	SUM NEUTRON RESPONSE
	CNL pu	-0.04	-0.03	-0.02	0.12	0.13		0.36		0.40	-0.04	-0.03	0.36	-0.01		
1681.5	COMPONENT (fr)	0.78	0.12	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0		-0.03
1686.2	COMPONENT (fr)	0.81	0.09	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0		-0.01
1688.6	COMPONENT (fr)	0.81	0.06	0.01	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.06	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0		-0.01
1690.4	COMPONENT (fr)	0.81	0.10	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0		-0.01
1692.2	COMPONENT (fr)	0.91	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0	1	
	NEUT RESPONSE	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0		-0.04
1696.1	COMPONENT (fr)	0.83	0.06	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.06	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0		0.00
1698.2	COMPONENT (fr)	0.70	0.06	0.02	0.00	0.00	0.00	0.06	0.00	0.02	0.01	0.06	0.06	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.02	0		0.02
1700.3	COMPONENT (fr)	0.82	0.06	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.02	0.04	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0		-0.01
1701.2	COMPONENT (fr)	0.82	0.07	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.06	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0		-0.01
1702.4	COMPONENT (fr)	0.73	0.07	0.11	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.03	0	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0		-0.01
1705.4	COMPONENT (fr)	0.76	0.06	0.07	0.00	0.00	0.00	0.04	0.00	0.01	0.01	0.01	0.04	0.00117	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	-1E-05		0.00
1708.4	COMPONENT (fr)	0.75	0.13	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12563	1	
	NEUT RESPONSE	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	-0.0013		-0.01
AVERAGE																-0.01

**AVERAGE NPMX
=>FIXED POINT is (-0.01,0)**

Figure 17a – North Paaratte 4

Neutron Porosity (Shale Corrected) Density Porosity Calibration

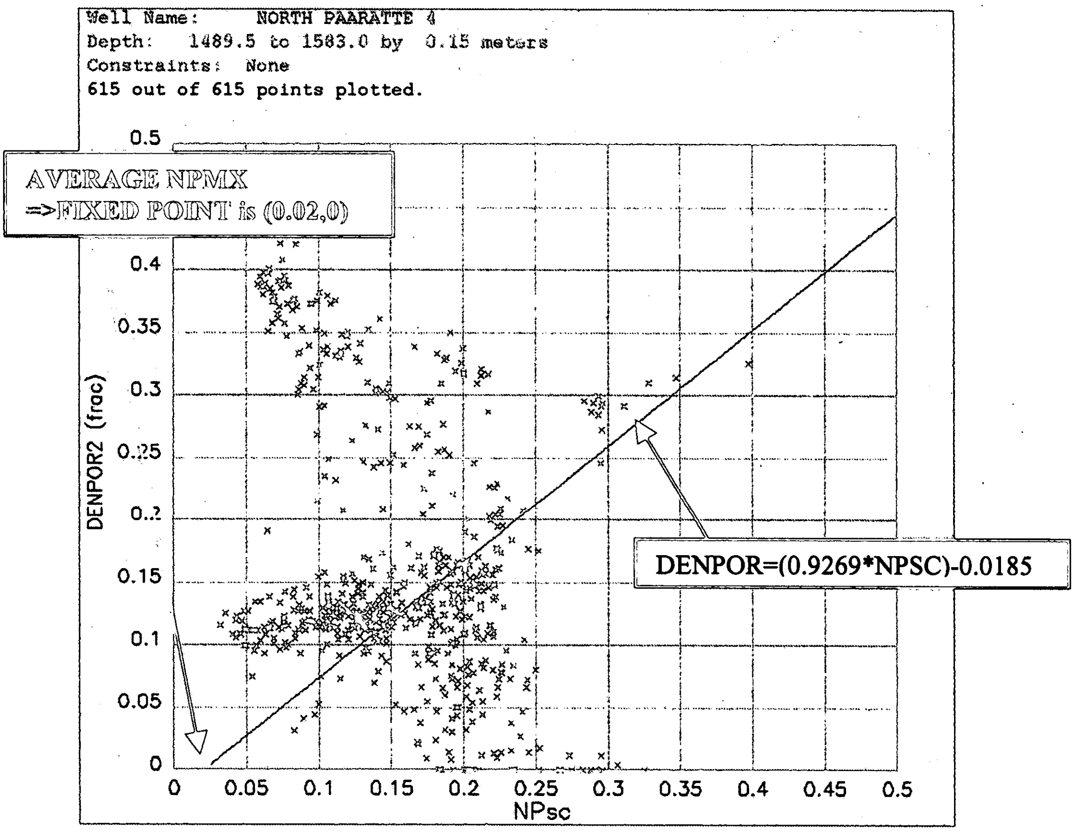
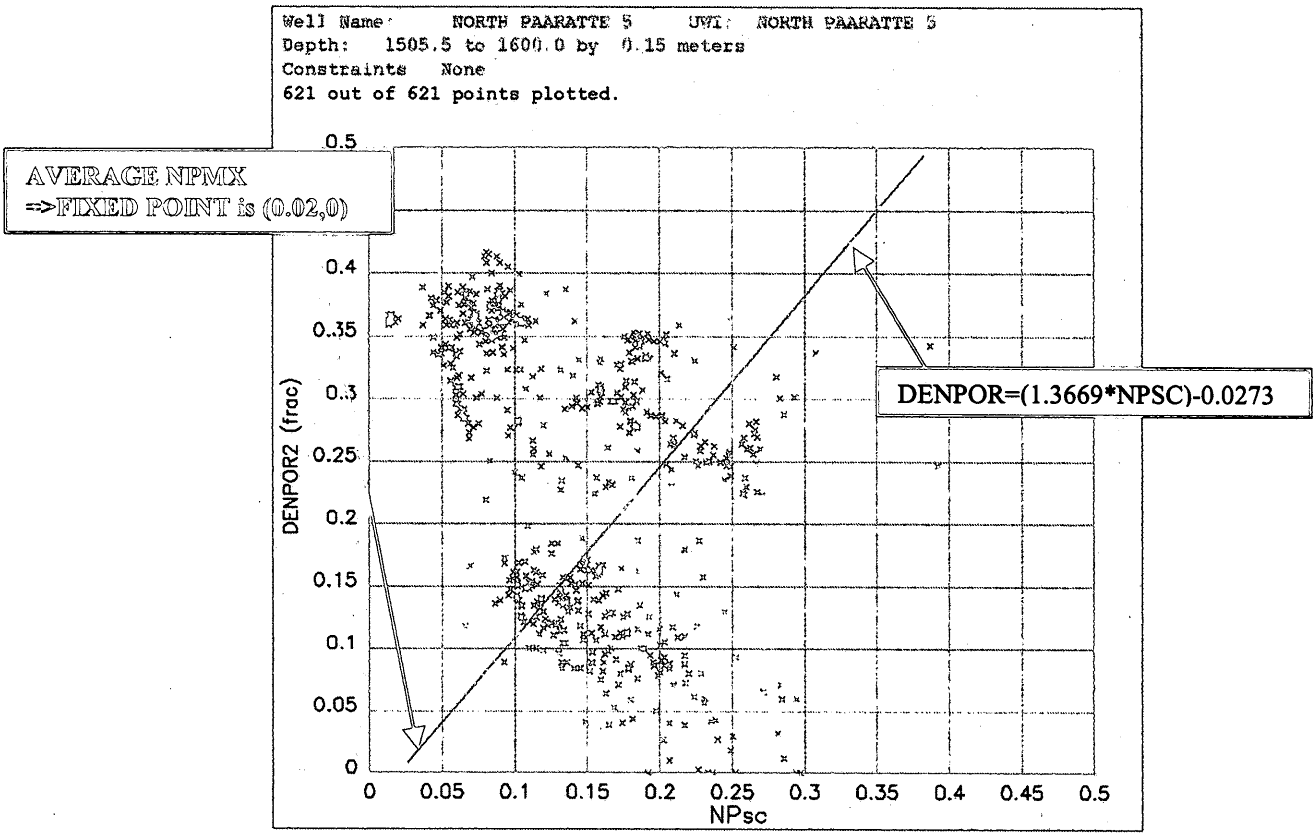


Figure 17b – North Paaratte 5

Neutron Porosity (Shale Corrected) Density Porosity Calibration



9.5 NEUTRON POROSITY SUMMARY

The above procedure provides a matrix and shale corrected neutron porosity which mimics density porosity but which deviates in the opposite sense when either fluids or matrix properties impair density porosity (Figures 19a, 19b, 19c).

9.6 DENSITY-NEUTRON POROSITY - SHALE CORRECTED

The density tool responds primarily to matrix and requires constant matrix densities to indicate pore fluids. The neutron tool responds primarily to fluids. Fortunately, most minerals and fluids which cause density porosity to under calculate, cause shale corrected neutron porosity to over calculate. Density-Neutron porosity reduces grain density error to less than half because dense minerals tend to have positive hydrogen indices, partially cancelling the error.

Gas zones can be most effectively evaluated by utilising the opposing effect which gas has on the density and neutron tools ("gas effect"). To calculate Density-Neutron porosity the following equation was used;

$$\Phi DN = \sqrt{\frac{\Phi D^2 + \Phi N^2}{2}} \qquad \textbf{Equation 8}$$

Where;

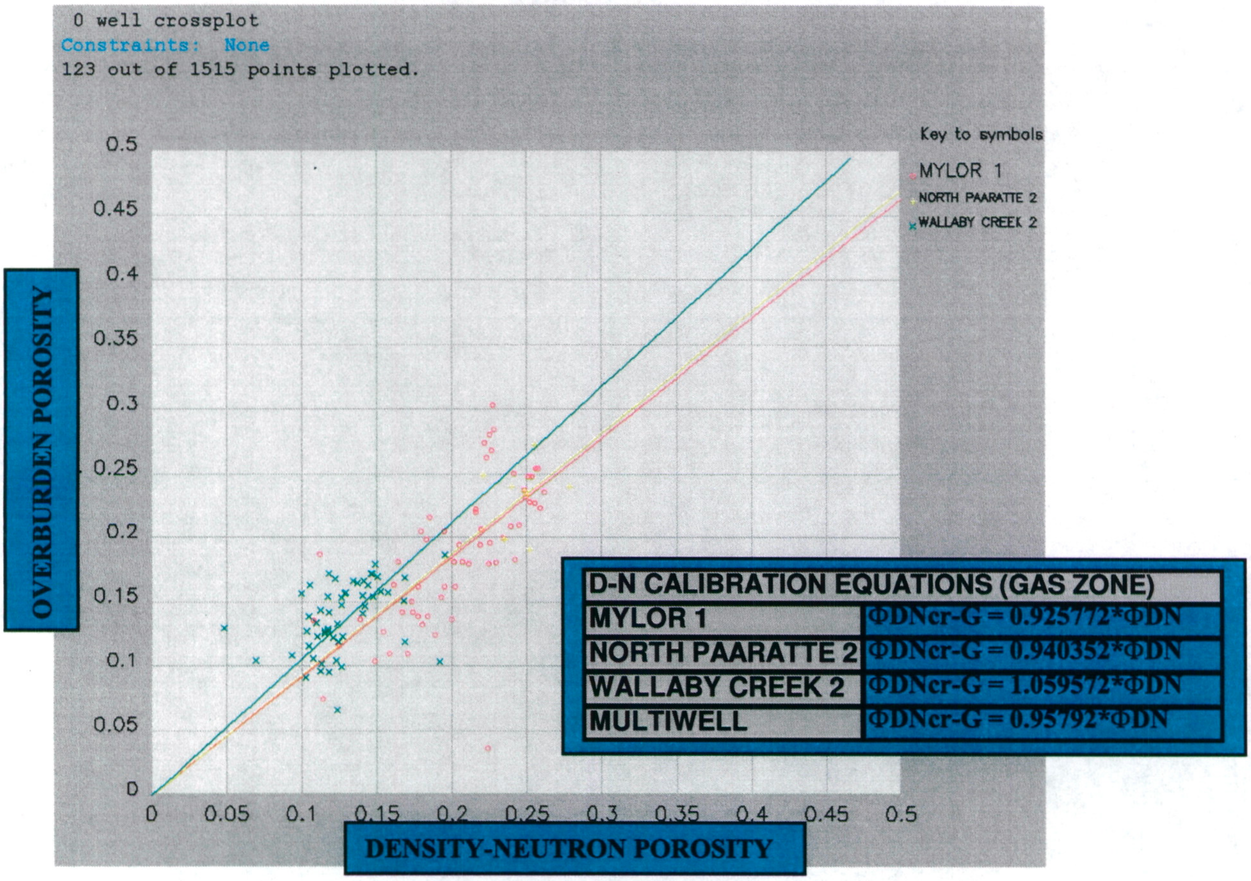
ΦDN	=	Density-Neutron Porosity
ΦD	=	Density Porosity
ΦN	=	Shale Corrected, Core Calibrated Neutron Porosity

9.7 DENSITY-NEUTRON POROSITY - CORE CALIBRATED

To calibrate Density-Neutron porosity to overburden core porosity, two multiwell crossplots of Overburden Porosity vs Density-Neutron Porosity were made (Figures 18a and 18b). The first plotted these two parameters over the identified gas zones only whilst the second was restricted to the water zones.

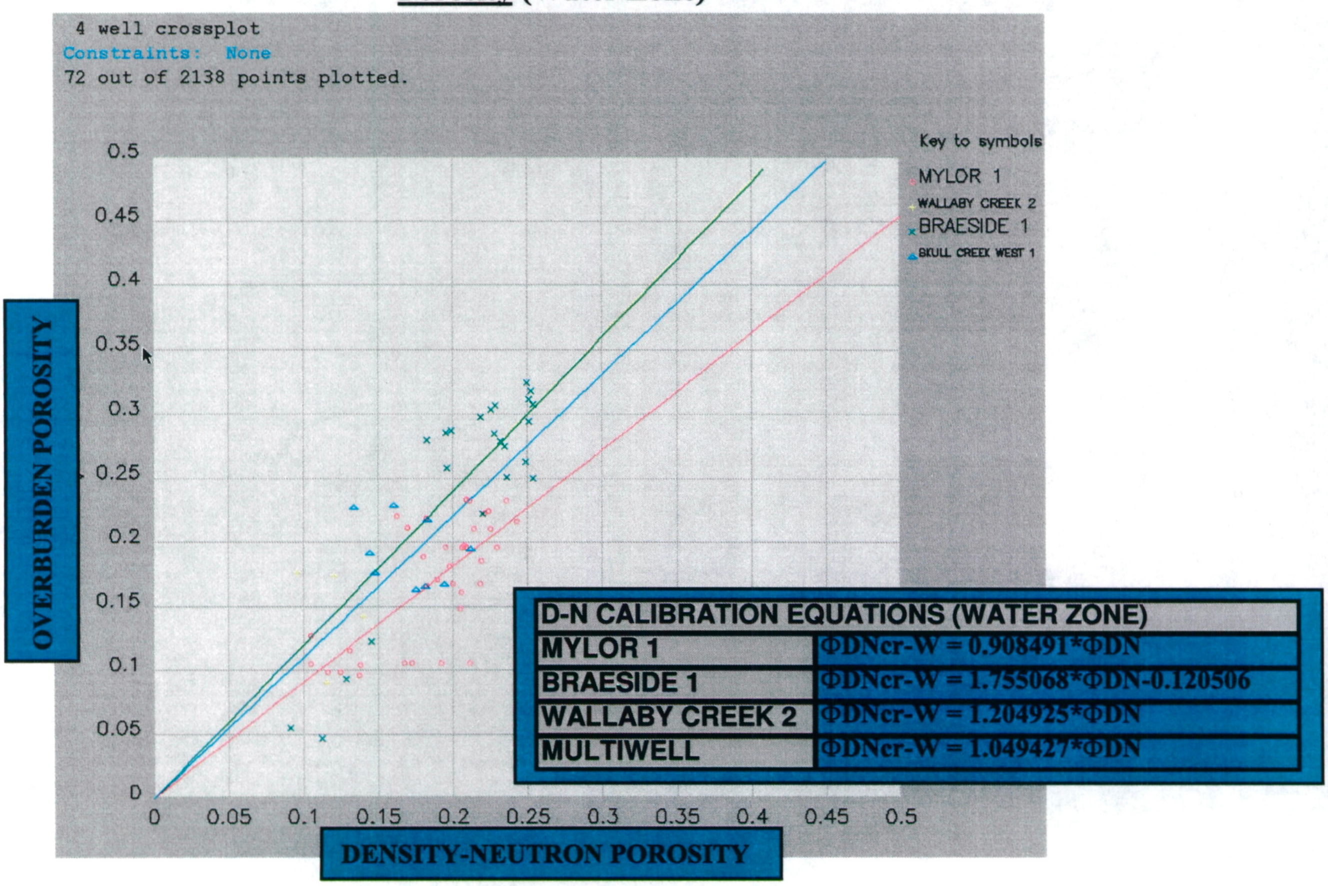
The inset tables show the regression derived Density-Neutron Porosity core calibration equations. To core calibrate Density-Neutron Porosity at North Paaratte 4 & 5, the composite multiwell equation was used.

Figure 18a – Multiwell Crossplot, Density-Neutron Porosity vs Core Overburden Porosity (Gas Zone)



D-N CALIBRATION EQUATIONS (GAS ZONE)	
MYLOR 1	ΦDNcr-G = 0.925772*ΦDN
NORTH PAARATTE 2	ΦDNcr-G = 0.940352*ΦDN
WALLABY CREEK 2	ΦDNcr-G = 1.059572*ΦDN
MULTIWELL	ΦDNcr-G = 0.95792*ΦDN

Figure 18b – Multiwell Crossplot, Density-Neutron Porosity vs Core Overburden Porosity (Water Zone)



D-N CALIBRATION EQUATIONS (WATER ZONE)	
MYLOR 1	ΦDNcr-W = 0.908491*ΦDN
BRAESIDE 1	ΦDNcr-W = 1.755068*ΦDN-0.120506
WALLABY CREEK 2	ΦDNcr-W = 1.204925*ΦDN
MULTIWELL	ΦDNcr-W = 1.049427*ΦDN

Figure 19a provides a summary of all Porosity models generated thus far. Core Calibrated Density Neutron-Porosity appears in Red in Track 7. Above the GWC, the gas zone equation was used whilst below the GWC the water zone equation was used. Figures 19b & 19c show core calibrated Density-Neutron Porosity for North Paaratte 4 and 5.

Figure 19a - Mylor1 – Density-Neutron Core Calibration

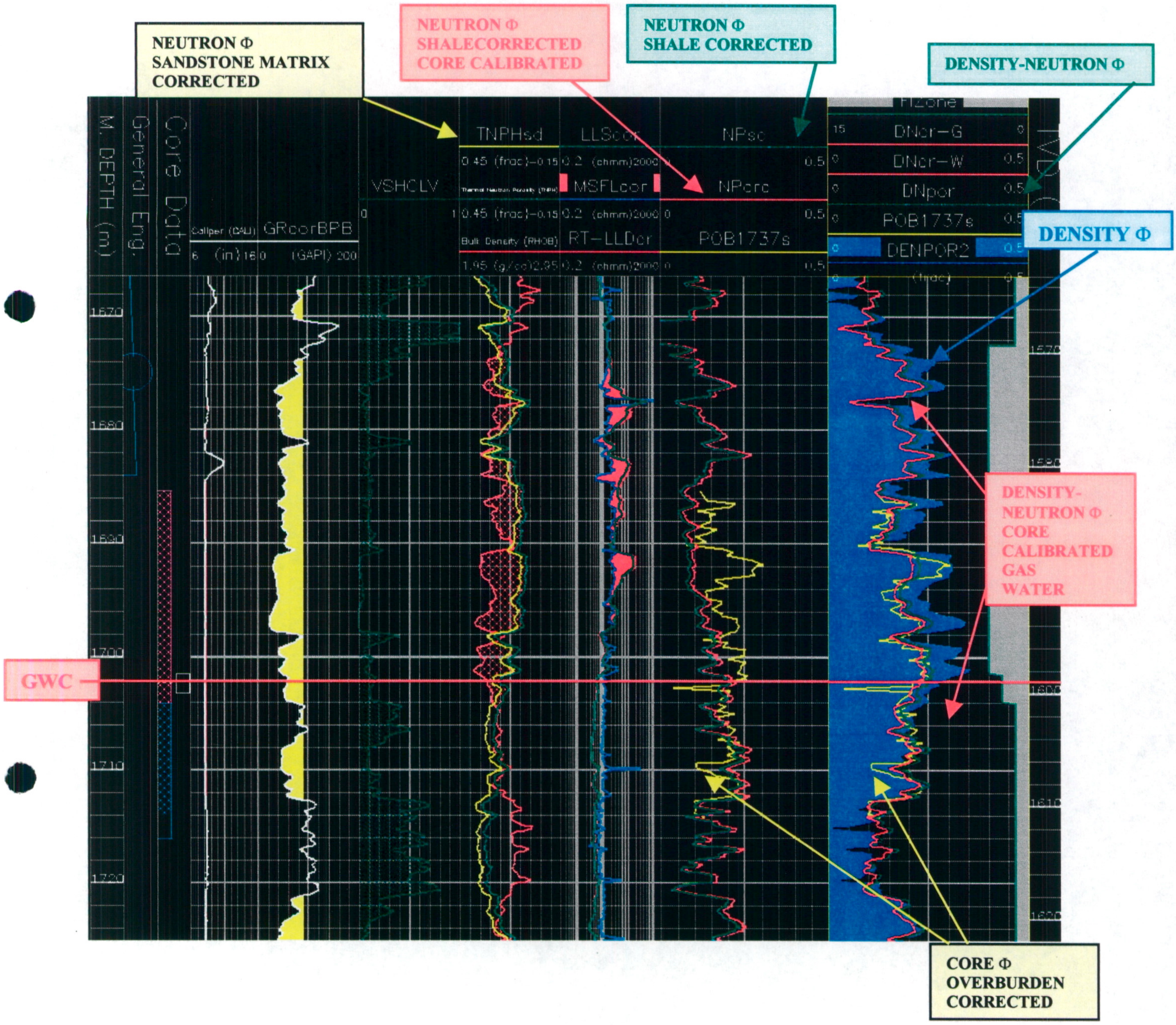


Figure 19b - North Paaratte 4
Density-Neutron Core Calibrated Porosity

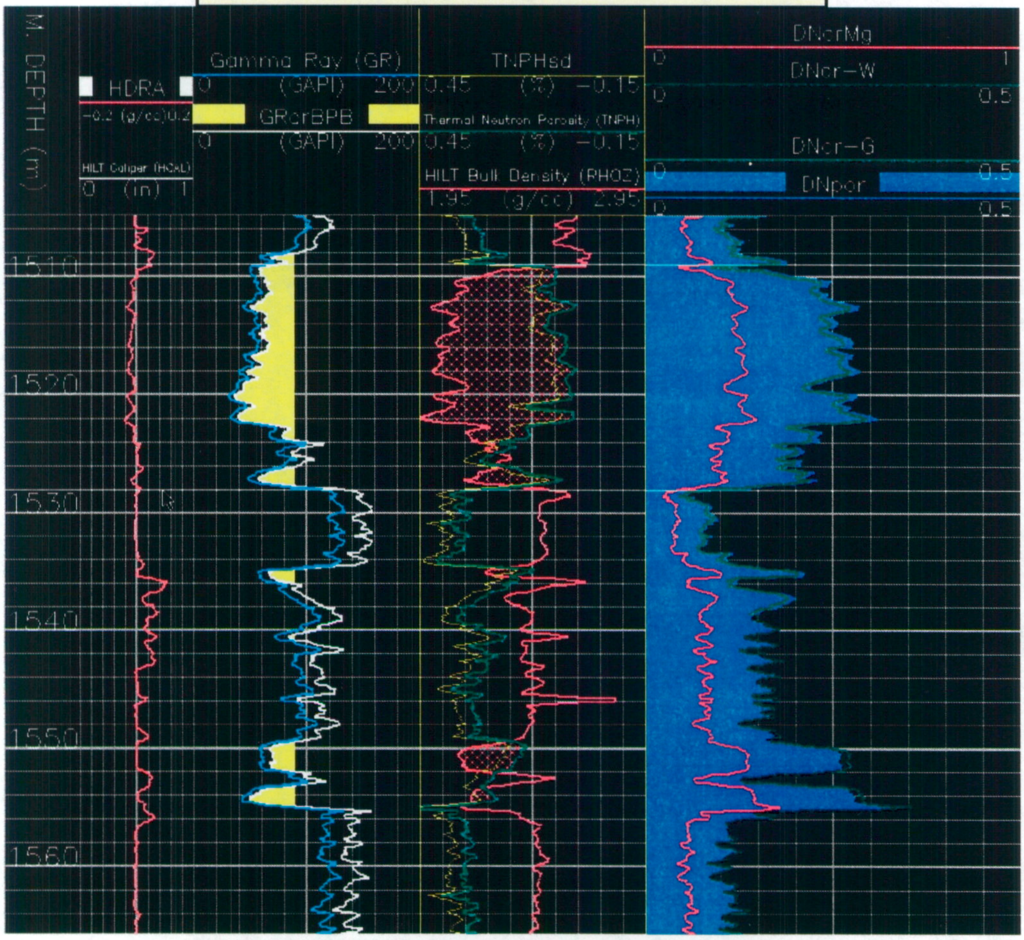
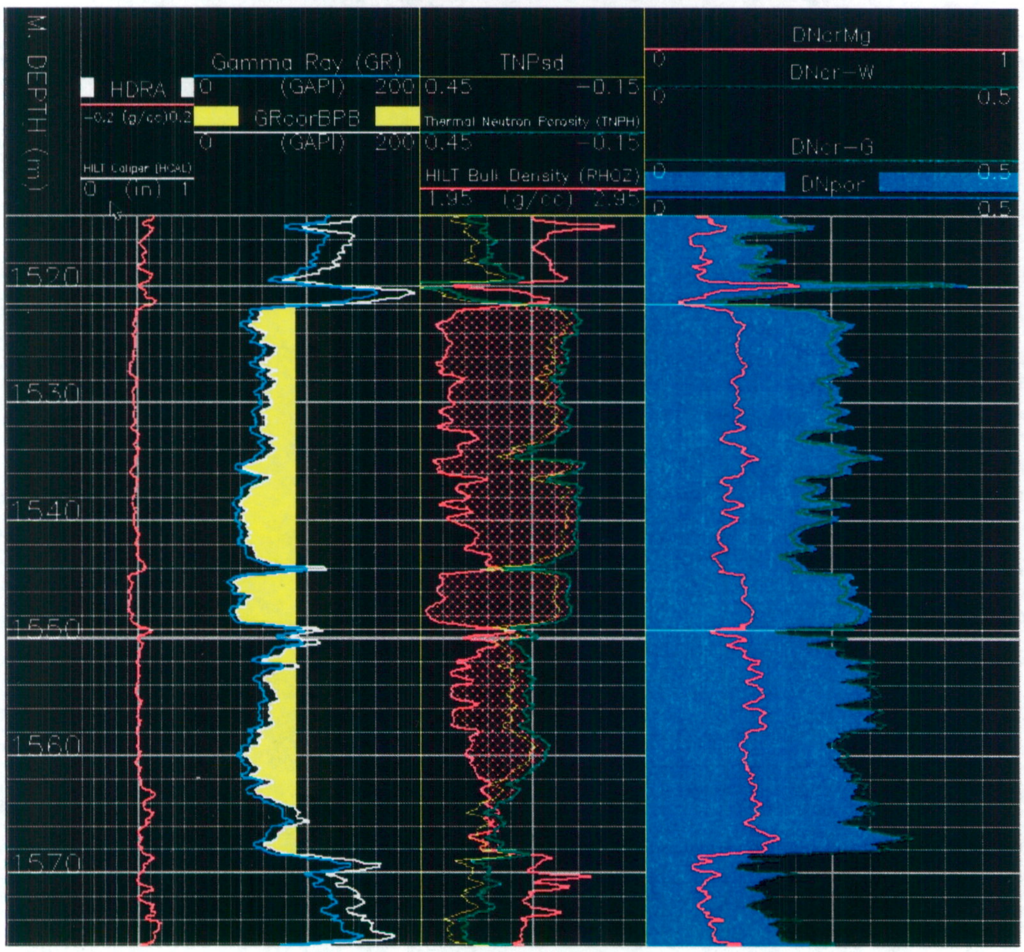


Figure 19c - North Paaratte 4
Density-Neutron Core Calibrated Porosity



9.8 SONIC (Δt) POROSITY

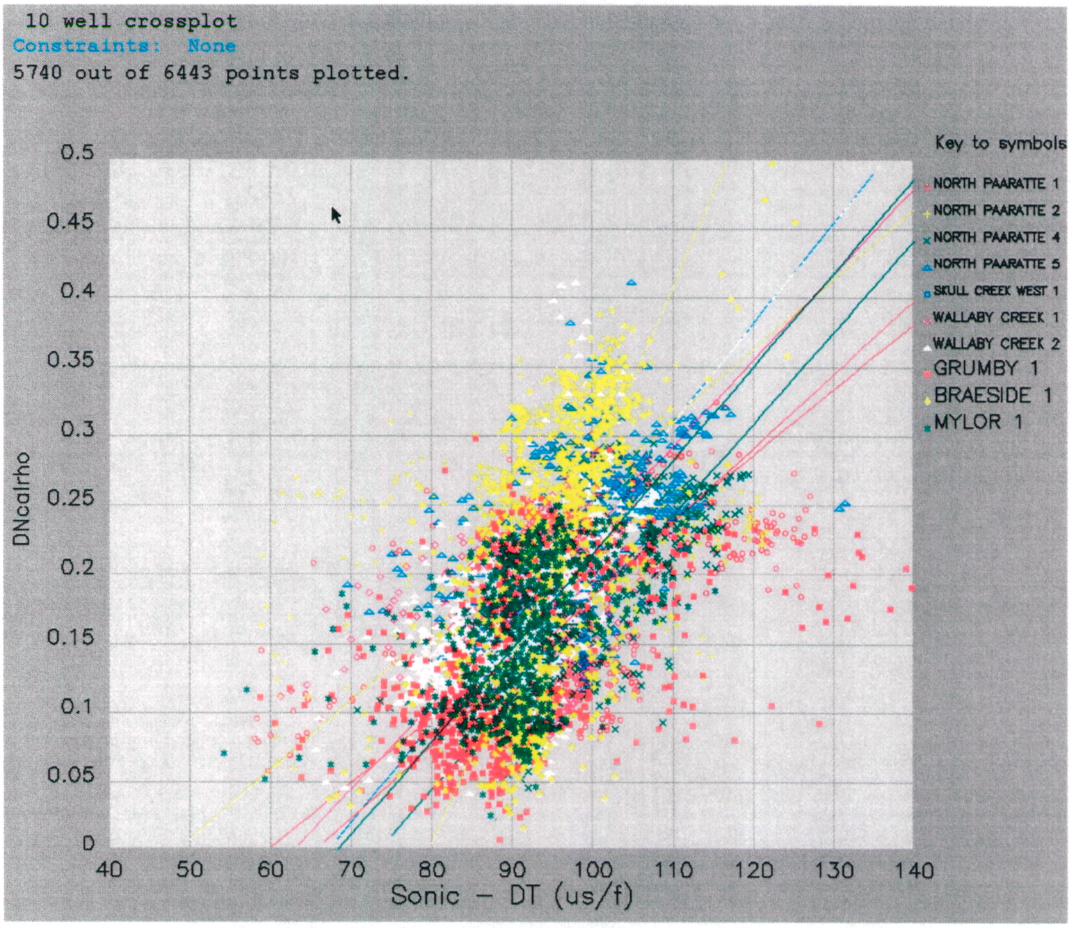
The sonic tool is less sensitive to hole size and rugosity than the density or neutron tools. However, sonic porosity lacks the useful opposing effect to density porosity with variations in matrix and fluid which makes neutron porosity so useful.

With this in mind, sonic porosity was calculated to substitute for core calibrated density-neutron porosity where bad hole was identified.

A multiwell crossplot of Sonic versus Density-Neutron (core calibrated) Porosity was made over the Waarre Formation interval (Figure 20). All badhole zones over the interval were excluded from the crossplot using the following constraints;

1.	CALIPER	> 10.5 inches
2a.	DRHO	< -0.1
2b.	DRHO	> 0.1

Figure 20 – Sonic vs Density-Neutron Porosity (Core Calibrated)

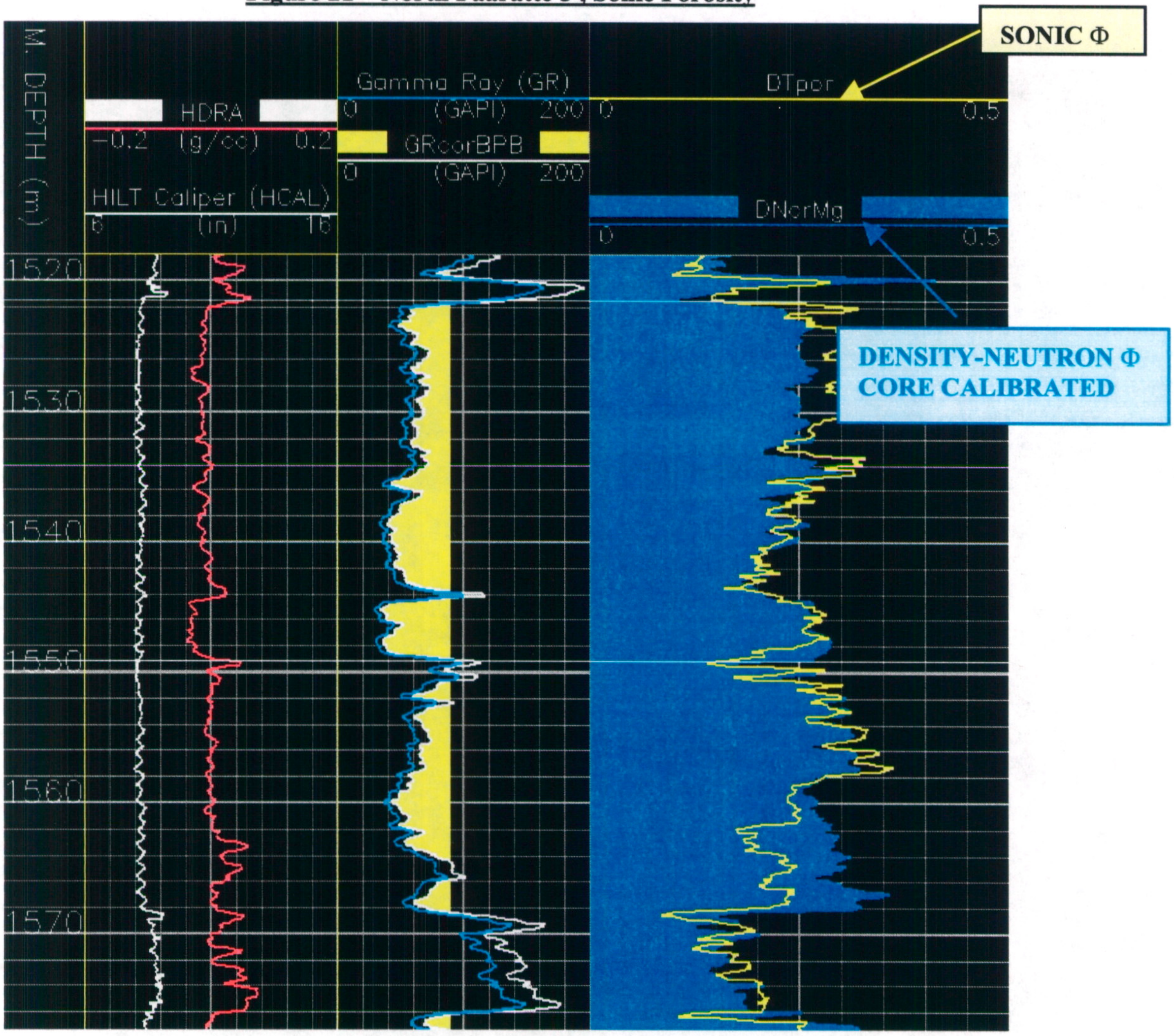


For each well, a RMA (Reduced Major Axis) regression was plotted and an equation calibrating the Sonic Log obtained (Table 11).

TABLE 8 - DN to SONIC POROSITY CALIBRATION		
DT Calibrated=SLOPE*DT+INTERCEPT		
WELL	SLOPE no exclusion	I'CEPT no exclusion
Nth Paaratte 4	0.00662	-0.485642
Nth Paaratte 5	0.007217	-0.485544
Mylor 1	0.00677	-0.462474

Figure 21 shows the resulting Sonic Porosity curve at North Paaratte 5. Sonic Porosity is plotted with Density-Neutron Core Calibrated Porosity for comparison.

Figure 21 – North Paaratte 5 , Sonic Porosity



9.9 V-SHALE POROSITY

Cycle skipping in the presence of gas or poor hole condition causes sonic derived porosity to become invalid. A Gamma Ray sourced V-Shale Porosity is less effected by hole condition. V-Shale Porosity was calculated for North Paaratte 4 & 5 but was not required in these two wells.

9.10 FINAL POROSITY

In general, excellent hole was achieved in North Paaratte 4 and 5 and the badhole cutoffs were never reached. However, in North Paaratte 5, Sonic Porosity was applied below 1556m KB to correct for the effect of increasing water saturation on the Neutron Log.

Figures 22a and 22b show Density-Neutron Porosity, Sonic Porosity and Composite Final Porosity (P-Final) for North Paaratte 4 and North Paaratte 5. Key zones where substitute porosities were used are illustrated.

FIGURE 22a
NORTH PARRATTE 4 – FINAL COMPOSITE POROSITY

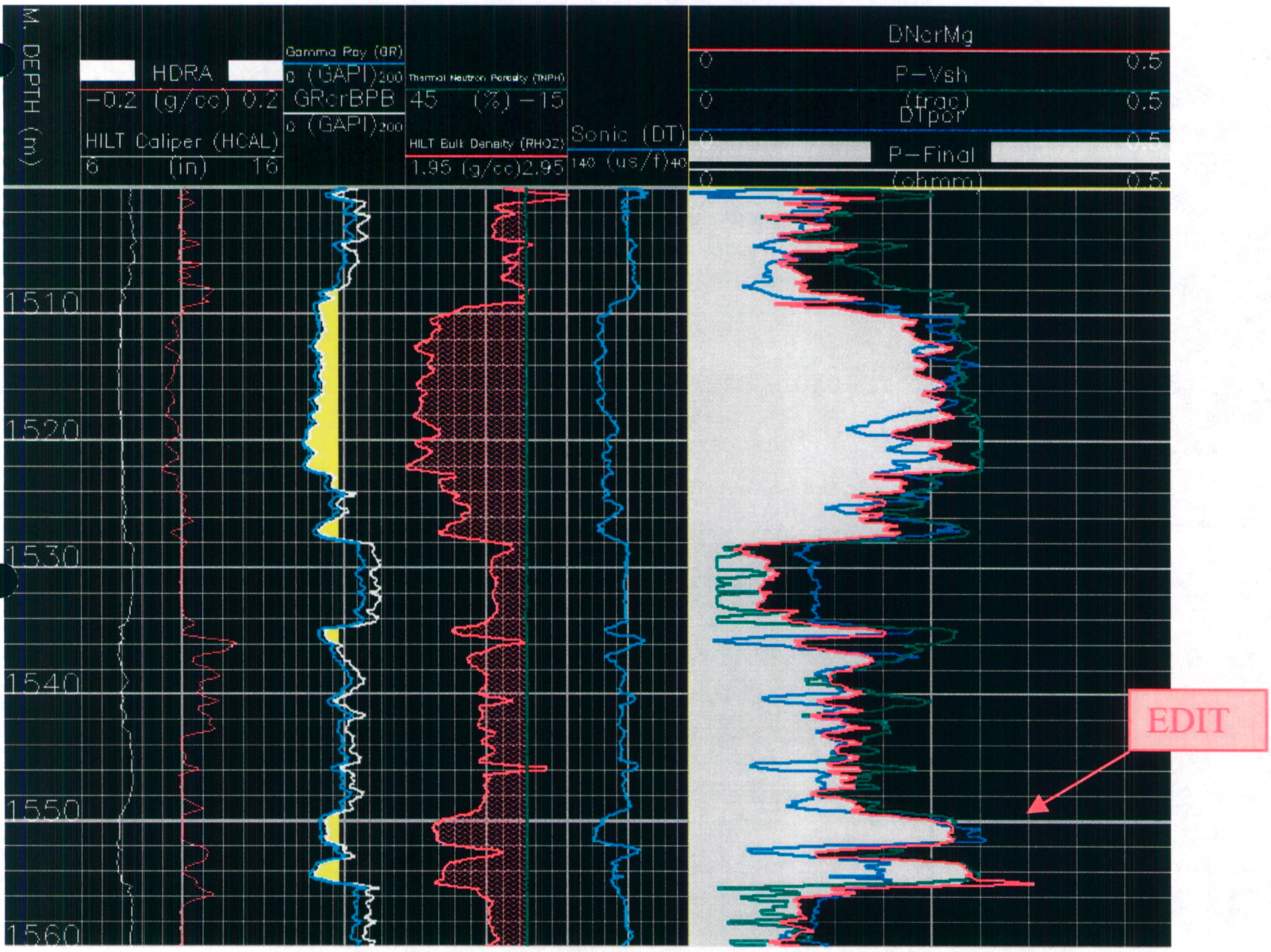
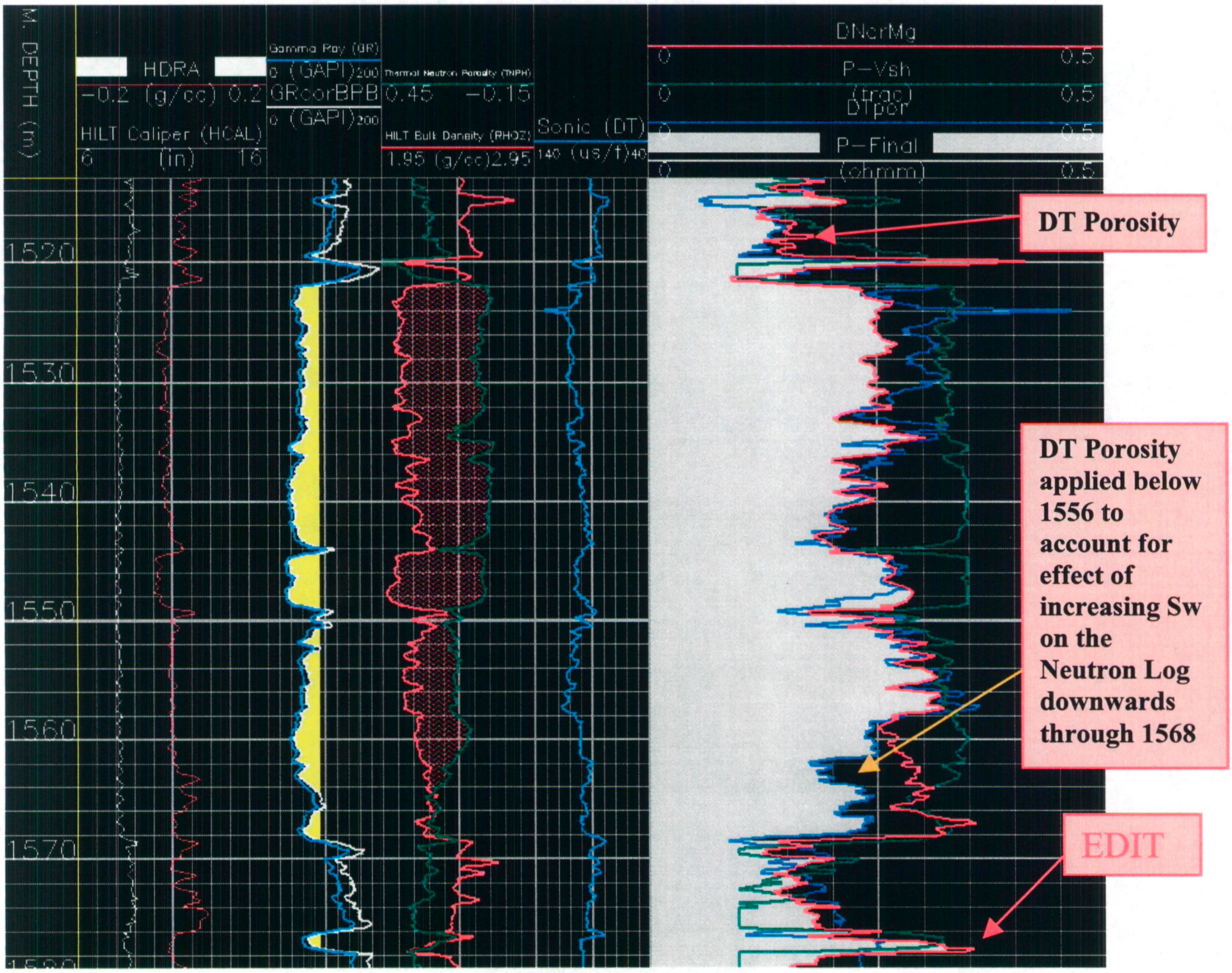


FIGURE 22b
NORTH PARRATTE 5 – FINAL COMPOSITE POROSITY



10.0 WATER SATURATION (Sw)

10.1 ARCHIE APPARENT WATER RESISTIVITY (Rwa)

Apparent water resistivity (Rwa) is calculated from the Archie equation with Water Saturation (Sw) set at unity;

$$Sw^2 = \frac{a \times Rw}{\Phi^m \times Rt}$$

Equation 10 (Archie)

Therefore, when Sw=1 (ie. 100% Water Saturated Formation), the Equation becomes;

$$1^2 = \frac{a \times Rwa}{\Phi^m \times Rt}$$

$$Rwa = \frac{\Phi^m \times Rt}{a}$$

Equation 11 (Rwa)

Where;

Sw	=	Water Saturation (frac)	Rw	=	Water Resistivity
a	=	Tortuosity Factor	Rwa	=	Apparent Water Resistivity
Φ	=	Porosity (pu)	m	=	Cementation Exponent
Rt	=	True Formation Resistivity			

10.1.1 Pickett Plots

Pickett Plots were used to determine Rwa. However, before Rt could be plotted against Porosity, a number of steps needed to be taken;

1. Rwa assumes 100% water saturated reservoir. A Pickett plot of 100% water saturated sands only is much safer than a minimum Rwa from Pickett plots. In order to plot only wet sands, total gas, cuttings, sidewall and conventional core shows were examined and tabulated to ensure intervals were in fact fully saturated (Table 13).

TABLE 9 - GAS SHOWS IN PPL1 - Sw 100 Zones

WELL	INTERVAL m MDKB	HOLE COND	POR:RLLD TREND	WFT	SHOWS	CHROMATOGRAPH C1/C2	CHROMATOGRAPH TG	INFER'D Sw	COMMENT
NORTH PAARATTE 4	1549.3-1551.9 1553-1555	gd gd	wtr wtr						
NORTH PAARATTE 5	1550.5-1562.6 1565.8-1568.3	gd gd	resid gas wtr		gas ns	C1/C2/tr C1	200u 20u	0.5	
	Wet Sands (included in Pickett Plot)								
	Possible gas sands (excluded from plot)								

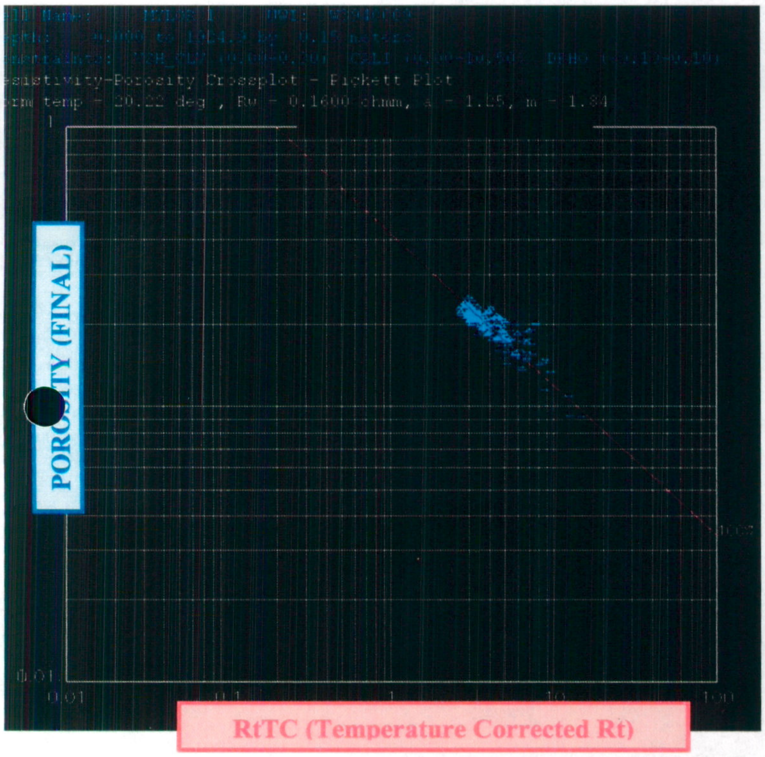
2. The wells within the dataset intersected the Waarre "C" Sand at a variety of depths. Consequently, the Waarre"C" reservoir temperature at each well varied. To eliminate temperature error in the Resistivity tool, Rt was corrected to an average Waarre Formation reservoir temperature of 35.6°C. Table 14 shows how this average temperature was calculated.

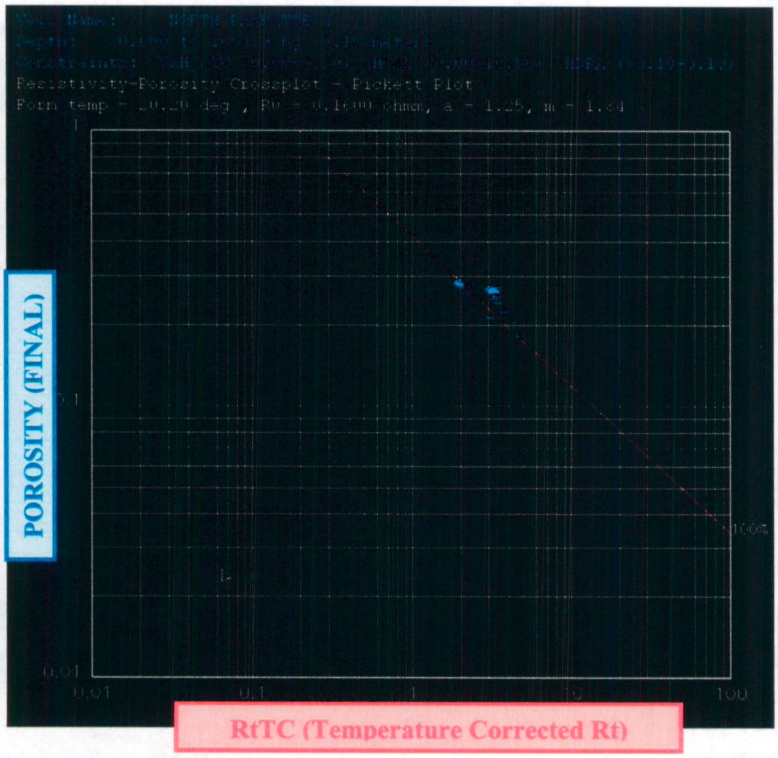
TABLE 10 - Waarre Reservoir Temperature

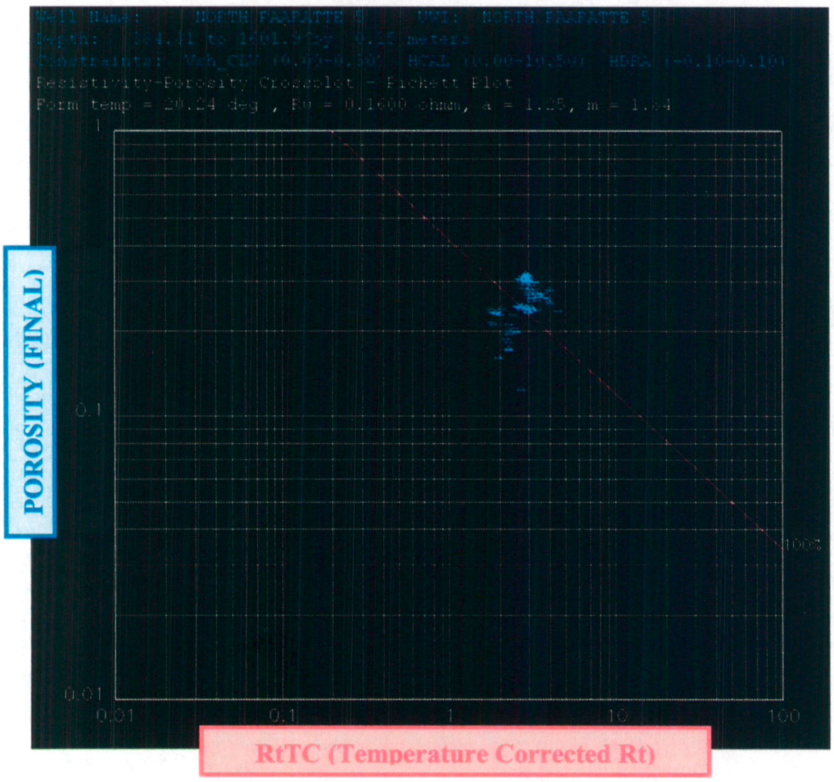
Well	TD TVDGL	BHT	Tgrad degC/m	DEPTH WAARRE "A" TVD m GL	T@ Res degC
North Paaratte 4	1550.1	56.7	0.0237	1419.5	33.6
North Paaratte 5	1496.3	55.6	0.0238	1422.9	33.9
Mylor 1	1916.2	64.5	0.0232	1667.2	38.7

Following these two steps, temperature corrected resistivity (RtTC) was plotted against porosity for water saturated sands only. Figures 23a,b,& c shows the resulting Pickett plots for Mylor1, North Paaratte 4 & 5;

Figure 23 a,b.c – Mylor 1, NP-4 & 5 Pickett Plots







The regression line which achieved the best fit for the Mylor1, North Paaratte 4 and North Paaratte 5 Pickett plots had a, Rw and m parameters of;

a	=	1.25
Rw	=	0.16Ωm @ 35.6 °C (or 0.2Ωm at 25 °C)
m	=	1.84

10.2 FORMATION WATER RESISTIVITY

Independent confirmation of Rw was achieved by examining formation water recoveries from PPL1. The Rw required is from water in the hydrocarbon zone but pore water in this zone is immovable and cannot be flowed to the surface. Water from the aquifer may have been flushed following hydrocarbon emplacement with salinities unrelated to immovable water in the hydrocarbon zone. The transition zone is less likely to have been effected by aquifer flushing and provides the water sample of choice.

It is extremely important to understand the source of each water sample, its acquisition method and therefore whether it is likely to be representative of the hydrocarbon zone. Generally, well tests are the best sources of Rw because of the large volumes of produced water which dilute contaminants. However, well tests may suffer from aquifer contamination and behind casing flows. Alternatively, wireline samples, whilst not sampling large volumes, can produce representative samples. Figure 24 and Table 15 lists all water samples obtained and their acquisition details.

Figure 24 – Waarre Formation Water Analysis

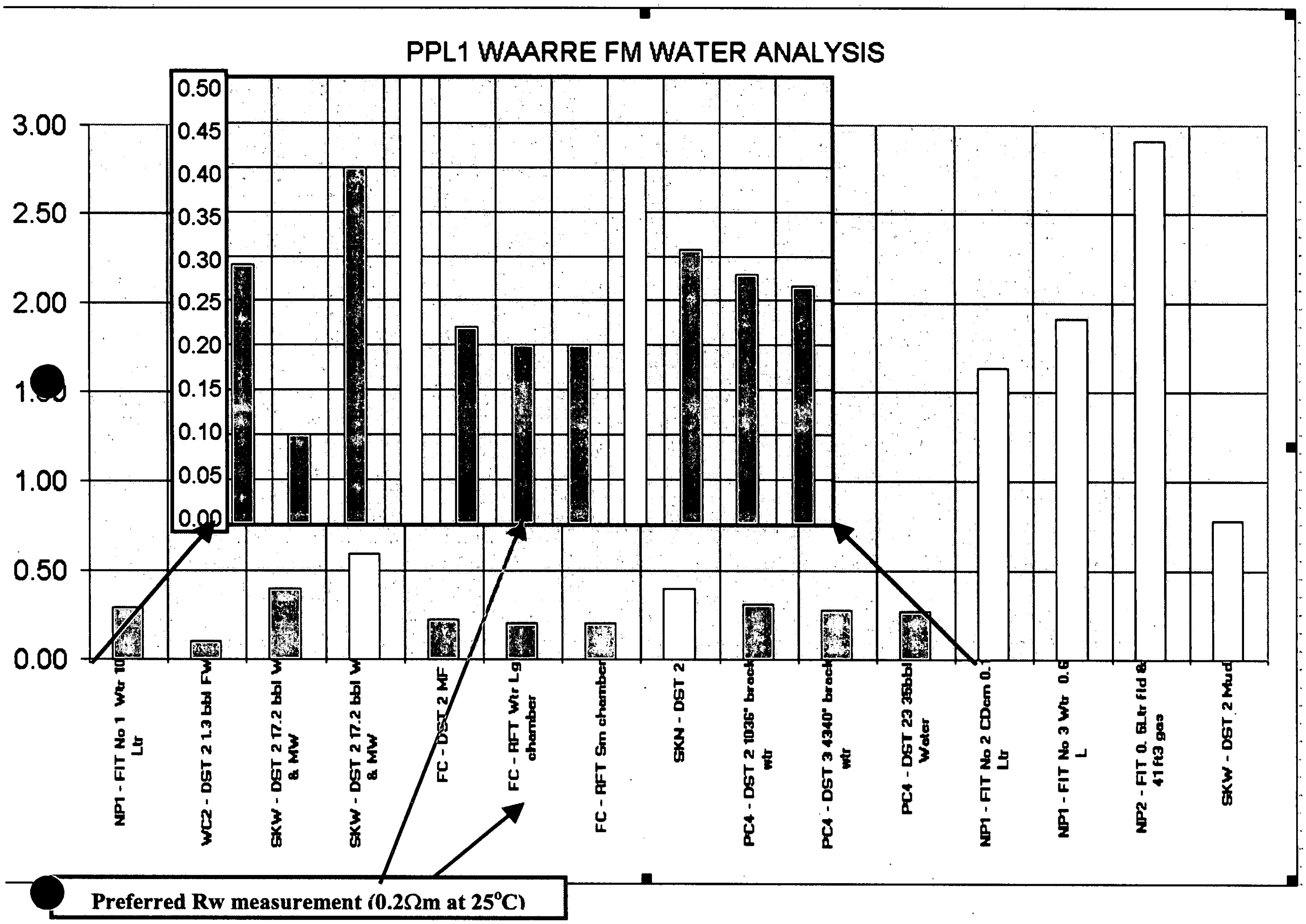


Figure 24 shows that there is little reliable water analysis from which to determine Rw. Water samples from DST appear contaminated where significant volumes were produced. An RFT at Fenton Creek 1 (SANTOS, PEP 108) recovered a water sample from a large chamber with a Rw of 0.2 at 25°C. This is consistent with values of Rw derived from Pickett plots (Chapter 10.1).

Table 11 – Waarre Formation Water Analysis

PPL1 WAARRE FM WATER ANALYSIS

Well	Comment	FM	KB	TD	TD mSS	DEPTH m MDKB	BHT
North Paaratte 1	NP1 - FIT No 1 Wtr 10 Ltr	WAARRE A	96	1535.887	1439.887	1494	52.2
Wallaby Creek 2	WC2 - DST 2 1.3 bbl FW	WAARRE "A"	54.7	1697	1642.3	1510	62
Skull Creek West 1	SKW - DST 2 17.2 bbl W & MW	WAARRE	100.3	2002	1901.7	1311	67
Skull Creek West 1	SKW - DST 2 17.2 bbl W & MW	WAARRE	100.3	2002	1901.7	1311	67
Fenton Creek 1	FC - DST 2 MF	WAARRE	86.9	1840	1753.1	1574	66
Fenton Creek 1	FC - RFT Wtr Lg chamber	WAARRE	86.9	1840	1753.1	1662	66
Fenton Creek 1	FC - RFT Sm chamber	WAARRE	86.9	1840	1753.1	1665	66
Skull Creek North 1	SKN - DST 2	WAARRE	82.2	1810	1727.8	1280	61
Port Campbell 4	PC4 - DST 2 1036' brack wtr	WAARRE	134.1	2597	2462.9	1512	79
Port Campbell 4	PC4 - DST 3 4340' brack wtr	WAARRE	134.1	2597	2462.9	1525	79
Port Campbell 4	PC4 - DST 23 35bbl Water	WAARRE	134.1	2597	2462.9	1604	79
North Paaratte 1	NP1 - FIT No 2 CDcm 0.1 Ltr	WAARRE C	96	1535.887	1439.887	1460	52.2
North Paaratte 1	NP1 - FIT No 3 Wtr 0.6 L	WAARRE C	96	1535.887	1439.887	1456	52.2
North Paaratte 2	NP2 - FIT 0. 5Ltr fld & 41 ft3 gas	WAARRE	120.2	1603	1482.8	1481	57
Skull Creek West 1	SKW - DST 2 Mud	WAARRE	100.3	2002	1901.7	1311	67

Rw @ degC OhmM	deg C	Tgrad degC/m	T@ Res degC	Rw@ 25degC	Rw @ Tres	Rw=0.2 Rw at Tres	Source	Report	Comment
0.34	18.3	0.021	31.322	0.29	0.256	0.176	DME Vic		Water Sample from FIT No 1 (4902 ft) 10 Litres
0.1	25	0.0247	37.372	0.10	0.079	0.158	DST 2	AMDEL	
0.4	25	0.0235	30.778	0.40	0.356	0.178	DST 2 sample 3	AMDEL	Water Sample
0.59	25	0.0235	30.778	0.59	0.525	0.178	DST 2 sample 2	AMDEL	Water Sample
0.22	25	0.025	39.35	0.22	0.168	0.153	DST 2, Sample 9	AMDEL	Mud Filtrate
0.2	25	0.025	41.55	0.20	0.148	0.148	RFT Sample 1	AMDEL	Water Sample, 1662m, Lg Sample
0.2	25	0.025	41.625	0.20	0.147	0.147	RFT Sample 2	AMDEL	Small sample chamber
0.4	25	0.0227	28.994	0.40	0.368	0.184	DST 2		
0.381	16	0.0227	34.35	0.31	0.256	0.167	DST2	WCR	1036' brackish water (+90' mud and water)
0.346	16	0.0227	34.646	0.28	0.231	0.166	DST 3	WCR	90' rhm, 180' mcw, 4340' brackish water
0.324	16.7	0.0227	36.441	0.27	0.214	0.161	DST 23	WCR	35BBL Water swabbed
1.7	23.3	0.021	30.609	1.64	1.462	0.178	DME Vic		Sample from FIT No 2 100mL Condensate cut mud
2.2	18.9	0.021	30.525	1.91	1.708	0.179	DME Vic		Water Sample from FIT No 3 (4778ft) 0.6 L
2.98	23.9	0.0231	34.184	2.91	2.430	0.167			FIT at 1481m, 500mL of fluid and 41 cuft gas
0.78	25	0.0235	30.778	0.78	0.694	0.178	DST 2 sample 4	AMDEL	Mud Sample

10.3 SATURATION EXPONENT "n"

Electrical resistivities of partially saturated plugs were measured during Special Core Analysis performed on 7 plugs from Braeside 1 and North Paaratte 2. Resistivity Index values were calculated and the results tabulated below.

TABLE 12 - SCAL SATURATION EXPONENT "n"

	SAMPLE	K	POR	FF	Sw	RI
NORTH PAARATTE 2	2H	1170	0.232	11.5	1	1
					0.693	1.97
					0.512	3.4
					0.395	5.42
					0.309	8.5
NORTH PAARATTE 2	5H	587	0.251	9.9	1	1
					0.673	1.98
					0.561	2.75
					0.483	3.55
					0.446	3.94
BRAESIDE 1	1	529	0.258	10.3	1	1
					0.875	1.25
					0.614	2.41
					0.475	3.71
					0.411	4.38
					0.352	6.62
					0.276	10.8
BRAESIDE 1	8	2770	0.283	8.3	1	1
					0.941	1.12
					0.405	5.29
					0.248	12.1
					0.224	14.8
					0.189	23.8
					0.153	31.6
BRAESIDE 1	11	5860	0.274	9.5	1	1
					0.868	1.3
					0.271	10.5
					0.192	17.1
					0.182	18.4
					0.169	21.7
					0.143	26.8
BRAESIDE 1	20	270	0.249	11.1	1	1
					0.902	1.21
					0.615	2.34
					0.502	3.65
					0.438	4.76
					0.367	6.26
					0.219	16.9
BRAESIDE 1	23	4420	27.2	9.2	1	1
					0.821	1.43
					0.325	6.83
					0.26	9.61
					0.224	13.1
					0.186	22.5
					0.153	28.8

Resistivity Index is defined as the ratio of Rt and Ro;

$$RI = \frac{Rt}{Ro}$$ Equation 12

and is related to Sw by the equation;

$$RI = \frac{Rt}{Ro} = Sw^{-n}$$ Equation 13

Taking the LOG of both sides gives;

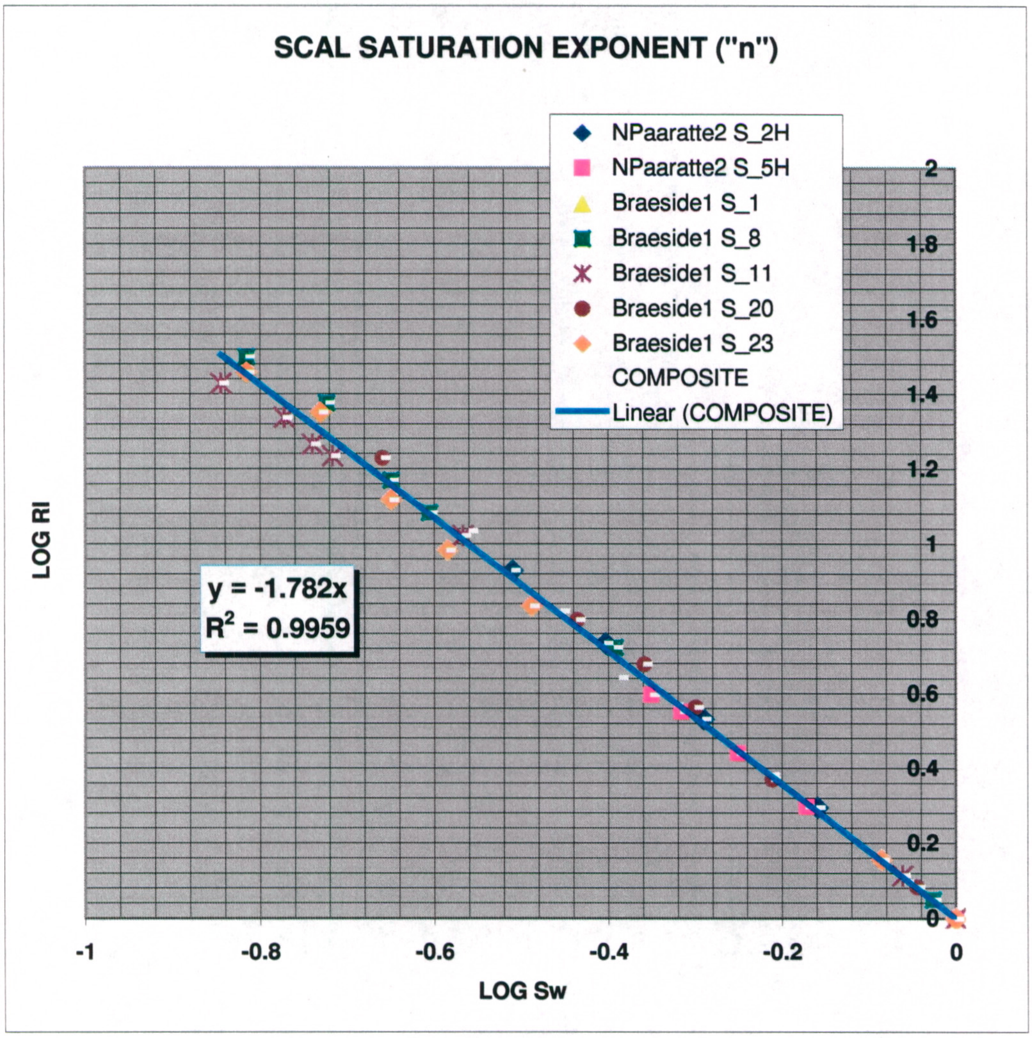
$$LOG(RI) = LOG(Sw^{-n})$$
$$LOG(RI) = -n * LOG(Sw)$$

Equation 14

Therefore, by plotting the log of Resistivity Index against the log of Sw, the slope of the regression line is the value of "n" (Figure 25).

The regression line in Figure 25 has a slope or "n" value of 1.782. The regression has a 99% correlation, suggesting that "n" does not vary systematically with overburden. Therefore it is inappropriate to vary "n" from the ambient SCAL measurements.

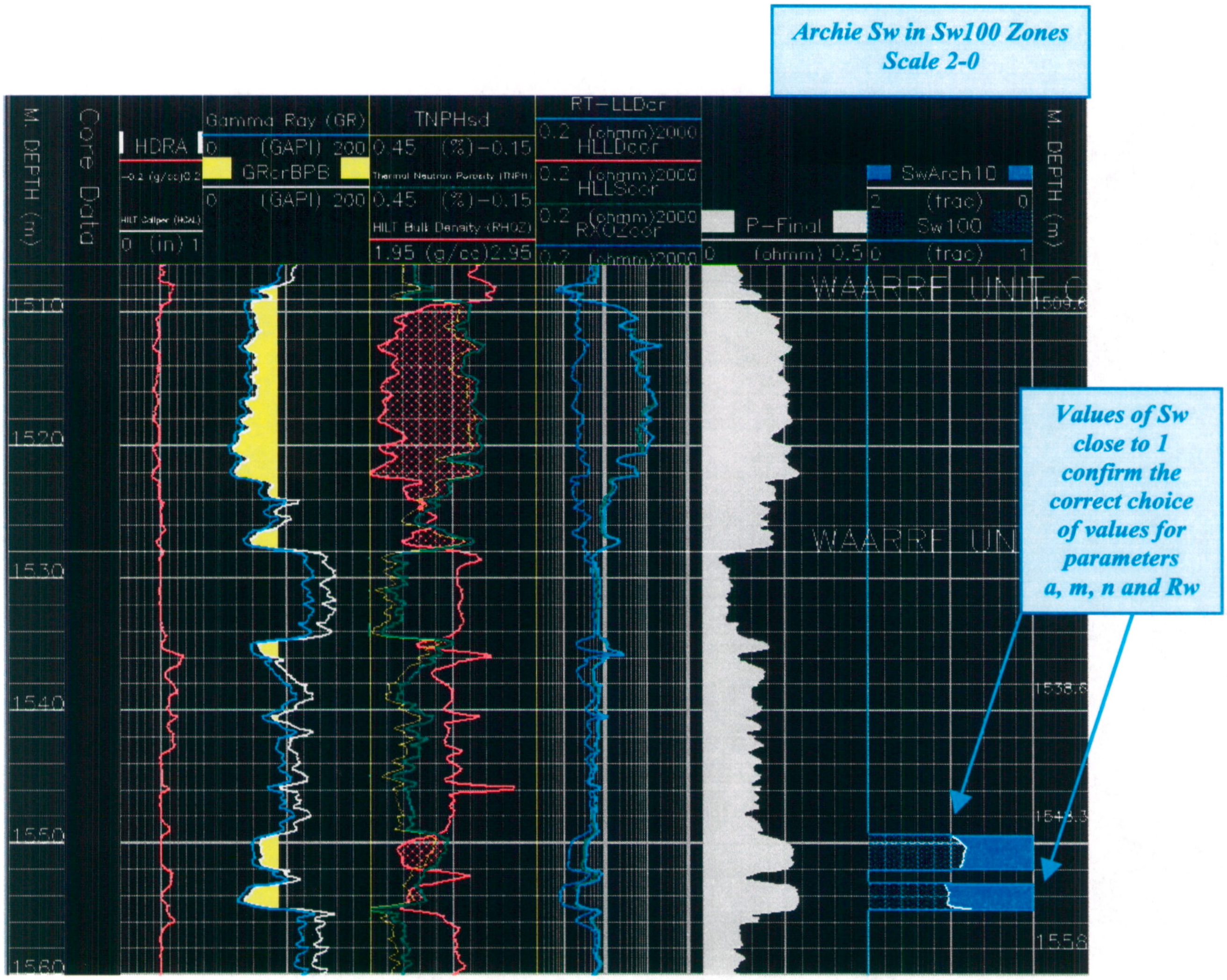
Figure 25 – Saturation Exponent



10.4 Sw100 PLOTS

In order to confirm the derived resistivity equation parameters of a, Rw, m and n, Archie Water Saturation was calculated in the previously defined 100% water saturated zones (Sw100). A result of Sw equal to 1 in these zones would confirm that these parameters were correct. Figure 26 shows Archie Water Saturation in the Sw100 zones of North Paaratte 4;

Figure 26 – Archie Water Saturation in Sw100 Zones at North Paaratte 4



Sw100 plots for North Paaratte 5 and Mylor 1 confirmed the suitability of the a, m, n, and Rw values;

Table 13 – Sw Equation Parameters.

Sw Equation Parameter	Value
a	1.25
m	1.84
n	1.782
Rw	0.2 @ 25degC

Following confirmation of these values, Archie water saturation was run over the entire Waarre Formation interval for North Paaratte 4 and North Paaratte 5. Calculated Water Saturation for North Paaratte 4 and 5 is shown in track 6 of Figure 27a and 27b. Track 7 shows Water Saturation and Gas Saturation as a fraction of overall porosity (Bulk Volume Water and Bulk Volume Gas);

Figure 27a - Archie Water Saturation, North Paaratte 4

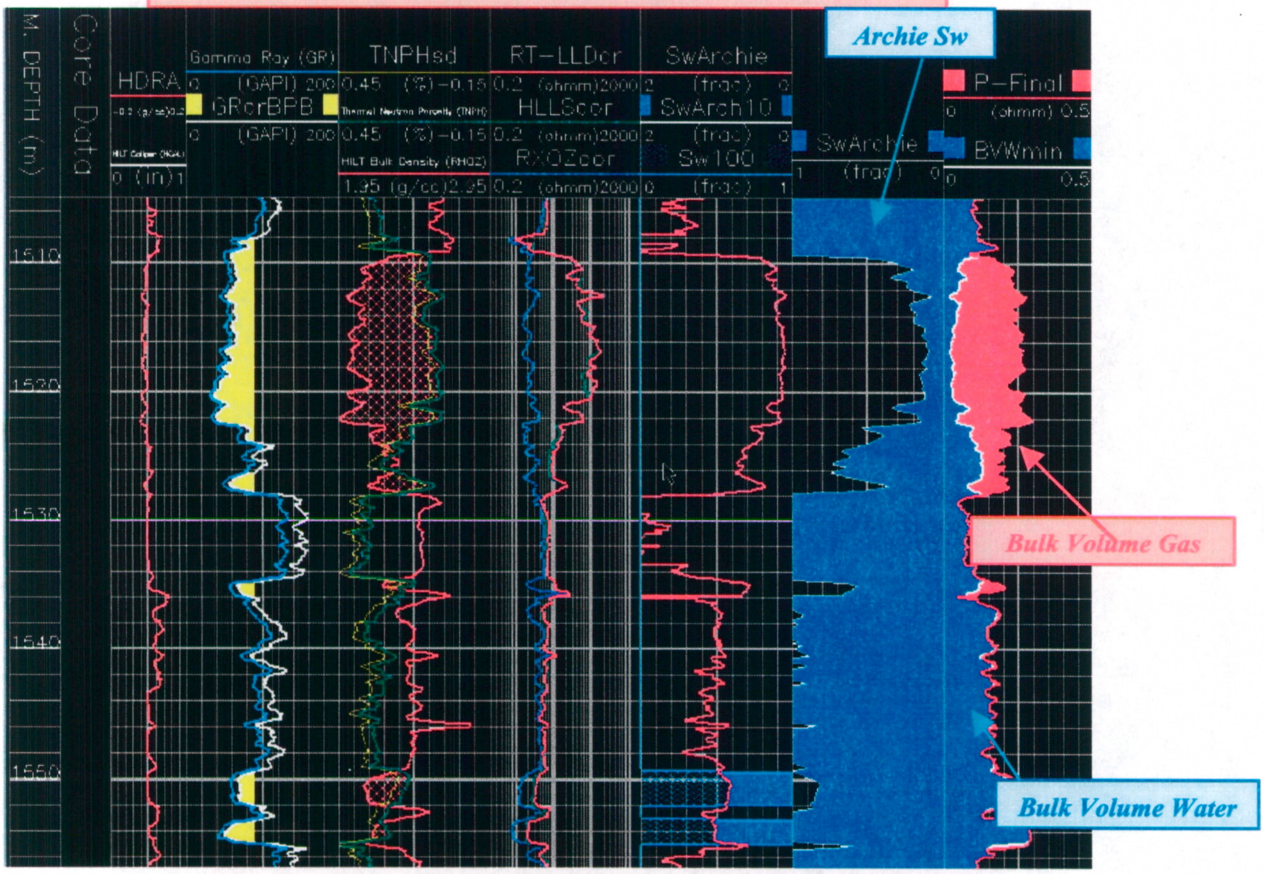
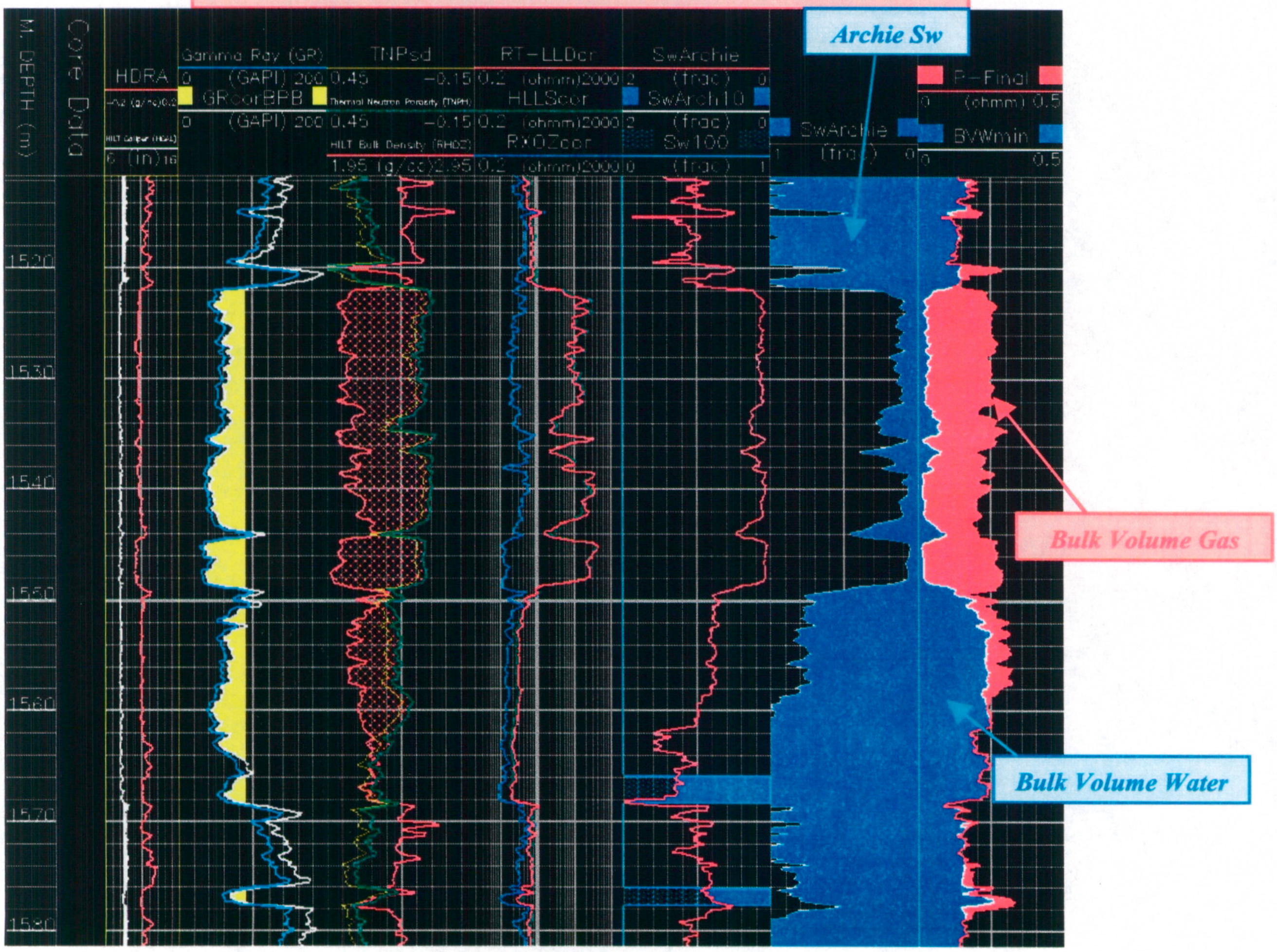


Figure 27b - Archie Water Saturation, North Paaratte 5



10.5 FLUID ZONE CLASIFICATION

Fluid zone classification determines whether or not calculated hydrocarbons will be included in Net Pay and Volumetric calculations. During the classification process, horizontal slices of formation containing different fluids are identified. Fluid Zone categories were;

- Gas Zone
- Oil Zone
- Transition Zone
- Residual Oil Zone and water encroachment Zone
- Water Zone

Initially, the fluid zone classification was done without reference to RFT pressure data. Instead, fluid zones were defined by reference to;

- Resistivity response
- Neutron-Density separation
- Calculated Sw and Bulk Hydrocarbon Volume.
- Lithlog/Mudlog Cut, Fluorescence, Stain, Chromatograph
- Produced fluids from DST and RFT

Current, Original and Palaeo Gas-Water contacts, or Original Gas Down To and Original Water Up To, were deduced from the above information and tabulated (Table 18). At this stage no reference was made to RFT derived contacts.

Table 14 – Nth Paaratte & Mylor 1 Fluid Zone Table

KB	95.4528		121.5		98.4		98.4		103.2	
FLUID ZONE	NORTH PAARATTE 1		NORTH PAARATTE 2		NORTH PAARATTE 4		NORTH PAARATTE 5		MYLOR 1	
	Pre-Prodn	TVDSS	Pre-Prodn	TVDSS	Post-Prodn	TVDSS	Post-Prodn	TVDSS	Pre-Prodn	TVDSS
Top Reservoir	1449	1353.5	1469.5	1348	1509.3	1327.5	1521.6	1329.56	1672.4	1569.2
Current GWC	1454.8	1359.3	1483?	1361.5			1548.6	1354.01	1702	1598.8
Original GWC	x		1489	1367.5			1558.6	1363.09	1702	1598.8
Palaeo GWC	1470.4	1374.9								
Original GDTo					1527.8	1344.4				
Original WUTo					1549.3	1363.8	1565.8	1365.86	1706.7	1603.5
RFT GWC	1460.653	1365.2	1486.7	1365.2	1552.2	1365.2	1562.405	1365.2	1701.4	1598.2
Original OWC									1704	1600.8
COMMENT	FIT @ 1460 rec 1.4m3 gas and cond cut mud	1354.5	RFT @1481 rec1.13m3 gas & 500ml wtr/mud	1359.5	No Tests		No Tests		RFT entirely consistent with data	
	DST to 1454.5 7 mmcfd	1358.8	DST Fail						OIL Core contained oil from 1701.4-1704 RFT at 1702.3 rec 1.3m3 gas,150ml oil	
SUMMARY	Overall, data is consistent with an OGWC at 1365.2mSS. The RFT data in NP2 supports at contact at 1365.2mSS. Whilst NP1 logs may suggest a highr contact at 1359.3mSS, an FIT which recovered gas at 1364.5mSS suggets otherwise.								GWC 1702.74 MDKB	1599.54
Fluid Zone 3	1449.0192	1353.6	1469.5117	1348	1509.2172	1327.5	1521.714	1329.8		
	1461.8208	1366.4	1487.94	1366.4	1528.1148	1344.6	1548.384	1353.8		
Fluid Zone 1.5					1528.2672	1344.7	1548.6888	1354		
					1552.194	1366.5	1562.4048	1366.5		

For the North Paaratte gasfields, all contacts were plotted on multiwell cross-sections. Discrepancies and anomalies in fluid contacts were identified and field consistent fluid contacts were agreed upon.

In North Paaratte field, it was found that the original Gas-Water contact identified by this methodology was entirely consistent with the Gas-Water contact suggested by the RFT pressure data. A Water

Encroachment Zone was identified in North Paaratte 5 which was found to be consistent with Gas Down To (GDTo) and Water Up To (WUTo) levels in North Paaratte 4[2].

Table 19 summarises final agreed contacts;

TABLE 15 - SUMMARY OF FLUID CONTACTS		
FIELD	Original GWC	Current GWC
	m TVDSS	m TVDSS
NORTH PAARATTE	1365.2	1354.01

Fluid Zones were input into a Terrastation curve called FlZone which is shown in Track 6 of Figure 32 & 33.

A numerical value was ascribed to each zone according to the following classification;

Table 16 – Fluid Zone Classification

VALUE	ZONE
1	WATER ZONE
1.5	WATER ENCROACHMENT ZONE
2	OIL ZONE
3	GAS ZONE

[2] North Paaratte 1 and 2 were drilled prior to production whilst North Paaratte 4 and 5 are post production wells.

11.0 PERMEABILITY

11.1 Poro-Permeability (K-Φ)

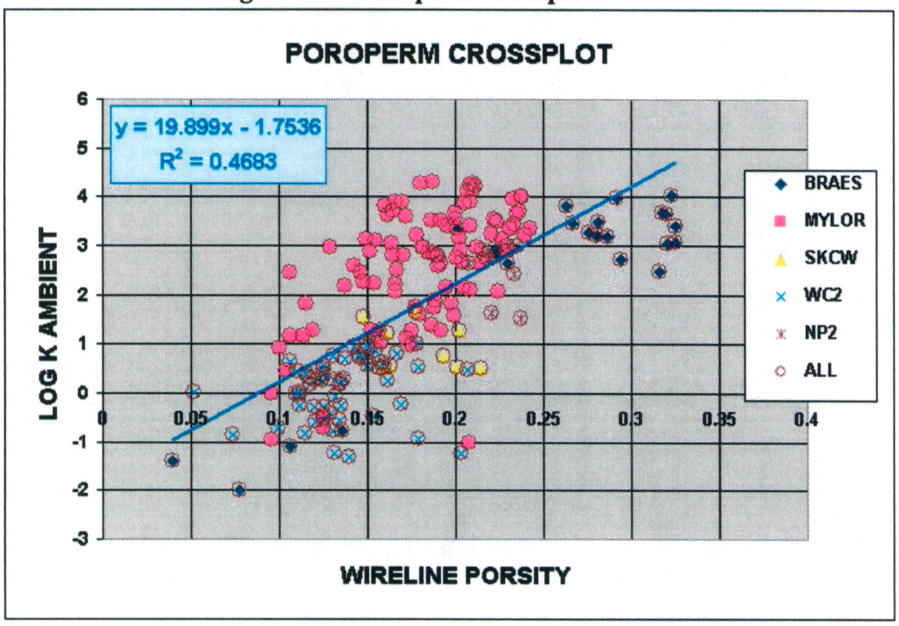
The traditional permeability predictor is porosity. The advantages of porosity are;

- Relatively well defined by log evaluation
- Can be used over all fluid zones
- Simple, traditional, universally accepted

The disadvantage is that it often does not correlate with permeability as well as saturation, and it places unnecessary dependence on RHOB, resulting in an "under-determined" evaluation (Deakin, 1999).

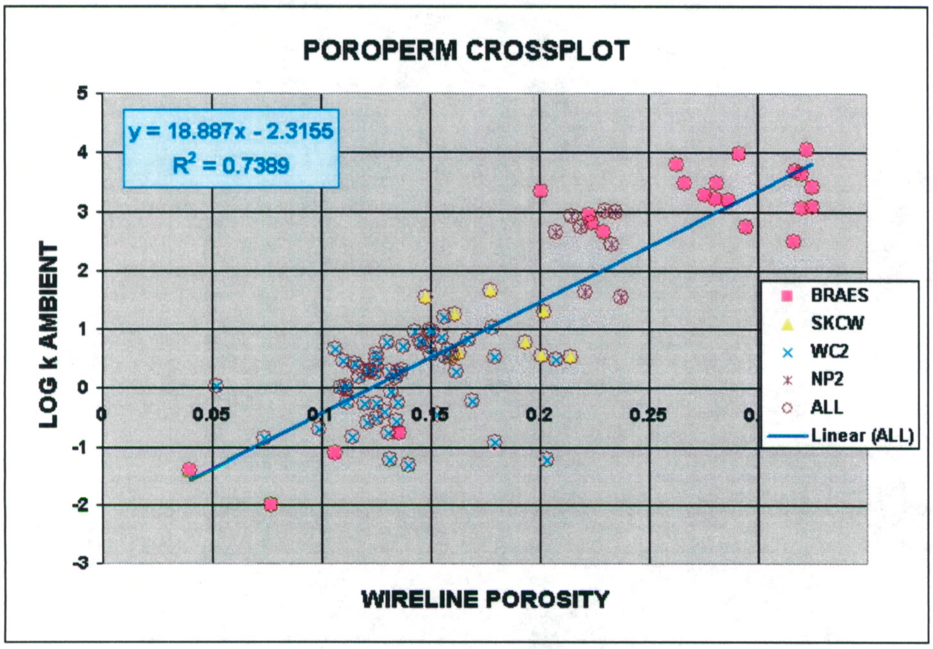
The Porosity-Permeability relationship was defined in this study by crossplotting the wireline porosity against Ambient Core Permeability for the wells North Paaratte 2, Wallaby Creek 2, Skull Creek West 1, Mylor 1 and Braeside 1;

Figure 28a– Poroperm Crossplot



The Poroperm crossplot (Figure 28a) shows a moderate correlation factor of 47%, chiefly due to data from Mylor 1. It was thought that a better correlation could be achieved if Mylor was excluded (Figure 28b).

Figure 28b– Poroperm Crossplot (excluding Mylor 1)



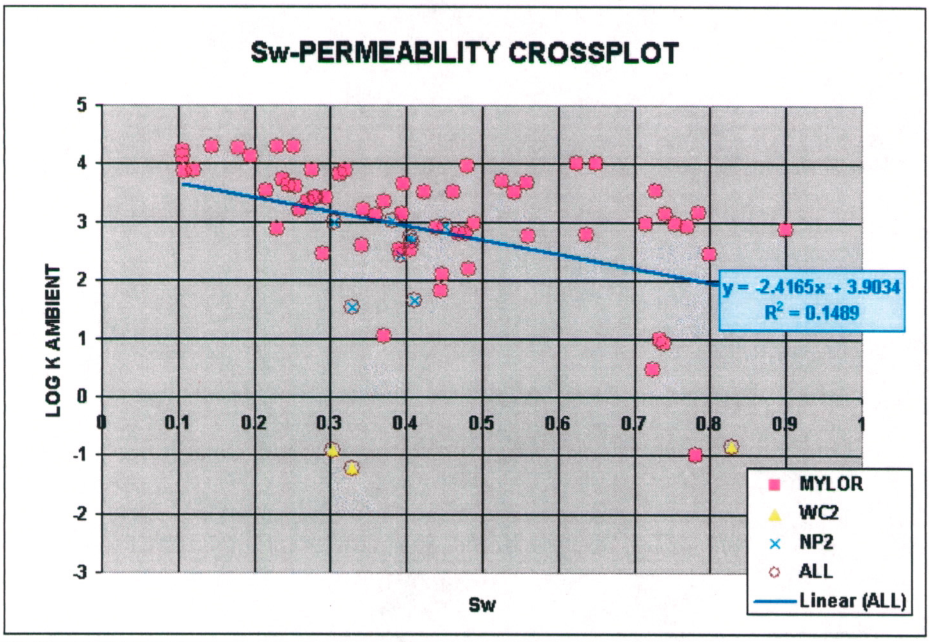
A much stronger correlation (74%) was achieved by excluding Mylor 1. The formation of diagenetic clays would alter the porosity-permeability relationship. It may be that the Waarre Formation at Mylor 1 has undergone a different style of diagenesis compared with wells to the south.

11.2 Water Saturation Permeability (K-Sw)

Both permeability and water saturation are influenced by pore throat size and pore surface area. This creates a stronger relationship between *Swi* (Irreducible Water Saturation) and *K* (Permeability) than between Φ (Porosity) and *K*. The Sw-K relationship is also more stable across changing pore geometry than the
k-Φ. The basic concept of predicting permeability with Sw has been in existence for 50 years (Wyllie and Rose 1950). Given that Sw is determined with reasonable accuracy during evaluation, it is the ideal candidate for hydrocarbon zone permeability prediction if contacts are known with reasonable certainty (Deakin, 1999)

Unfortunately, the Sw-K Crossplot for this study did not show the close relationship which has been described above. A correlation coefficient of 15% resulted, 22% if the Wallaby Creek 2 core points were excluded.

Figure 29– Sw-Permeability Crossplot



11.3 Vsh-Permeability (K-Vsh)

Shale volume (Vsh) is the least useful of the permeability predictors. However, in fields with poor porosity data, Vsh will provide benefit. The advantages of Vsh prediction are;

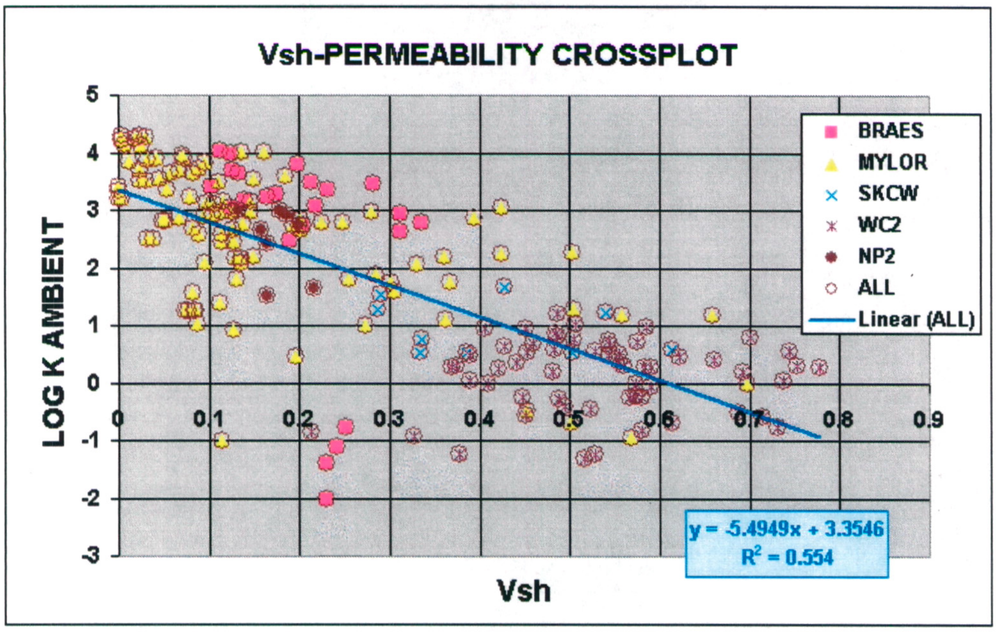
- Provides independent input as insurance against tool error
- Remains more valid over badhole than K-Φ and K-Sw
- Corresponds to "gut" feelings as to what *is* and *is not* good reservoir.

Disadvantages are;

- Reliable, but poor correlation coefficient with core K.
- Vsh may not correlate with dispersed clays which are influential to Core K .
- Vsh is usually inaccurate

(Deakin, 1999)

Figure 30– Vsh-Permeability Crossplot



Surprisingly, the Vsh-Permeability Crossplot achieved a respectable correlation factor of 55%, easily surpassing the Sw-K relationship.

11.4 FINAL PERMEABILITY

Final Permeability was predicted from a weighted average of individual predictions found to influence permeability i.e. Porosity, Vsh and Sw. The weighting was determined by the correlation coefficients of the linear regressions in each case;

Table 17 – Permeability Equation Correlation Coefficients

	CORRELATION COEFFICIENT	K EQUATION
PORO-K	73.89%	$k = 10^{18.887(\phi) - 2.3155}$
Sw-K	14.90%	$k = 10^{-2.4165(Sw) + 3.9034}$
Vsh-K	55.40%	$k = 10^{-5.4949(Vsh) + 3.3546}$

The Final Permeability equation contained the greatest weighting on the Porosity-Permeability relationship and the Vsh-Permeability relationship. The Sw-Permeability relationship received a very minor weighting.

$$K = [0.6 \times fn(\Phi)] + [0.3 \times fn(Vsh)] + [0.1 \times fn(Sw)]$$ **Equation 15**

11.5 OVERBURDEN PERMEABILITY CORRECTION

Overburden Permeability analysis was performed on core from Skull Creek West 1 and Wallaby Creek 2. At Skull Creek West 1, air permeability was calculated for four core plugs which were placed under an overburden pressure of 2550psi. At Wallaby Creek 2, overburden pressure of 2500psi was applied to six core plugs.

Equivalent Hydrostatic Stress (EQHS) for the Waarre Formation at Skull Creek West 1 and Wallaby Creek 2 was 1311psi and 1577psi respectively. A linear interpolation was applied to correct SCAL overburden permeabilities to EQHS. A crossplot of Ambient Permeabilty versus Overburden Permeability was used to define a composite overburden permeability correction factor. This factor was applied to Ambient Permeability calculations for wells within the study area.

Figure 31 – Ambient Permeability vs Overburden Permeability

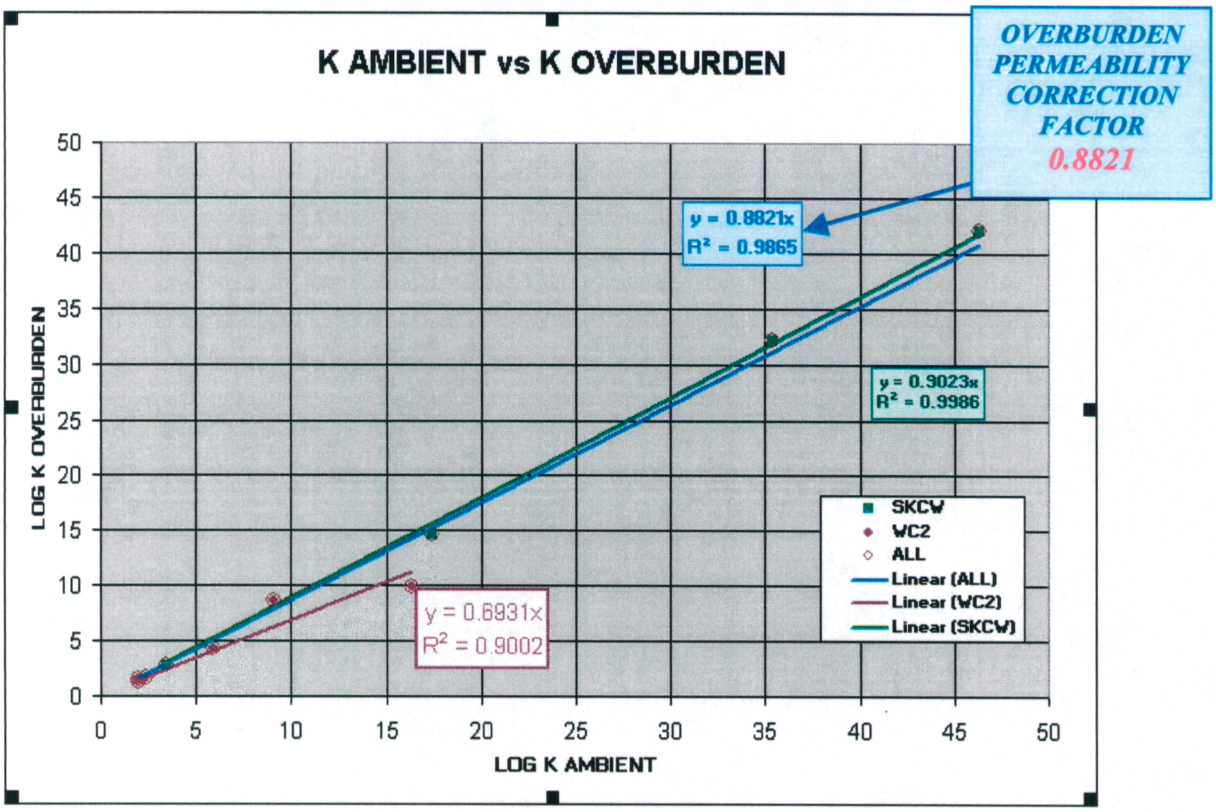


FIGURE 32 - NORTH PAARATTE 4, PERMEABILITY

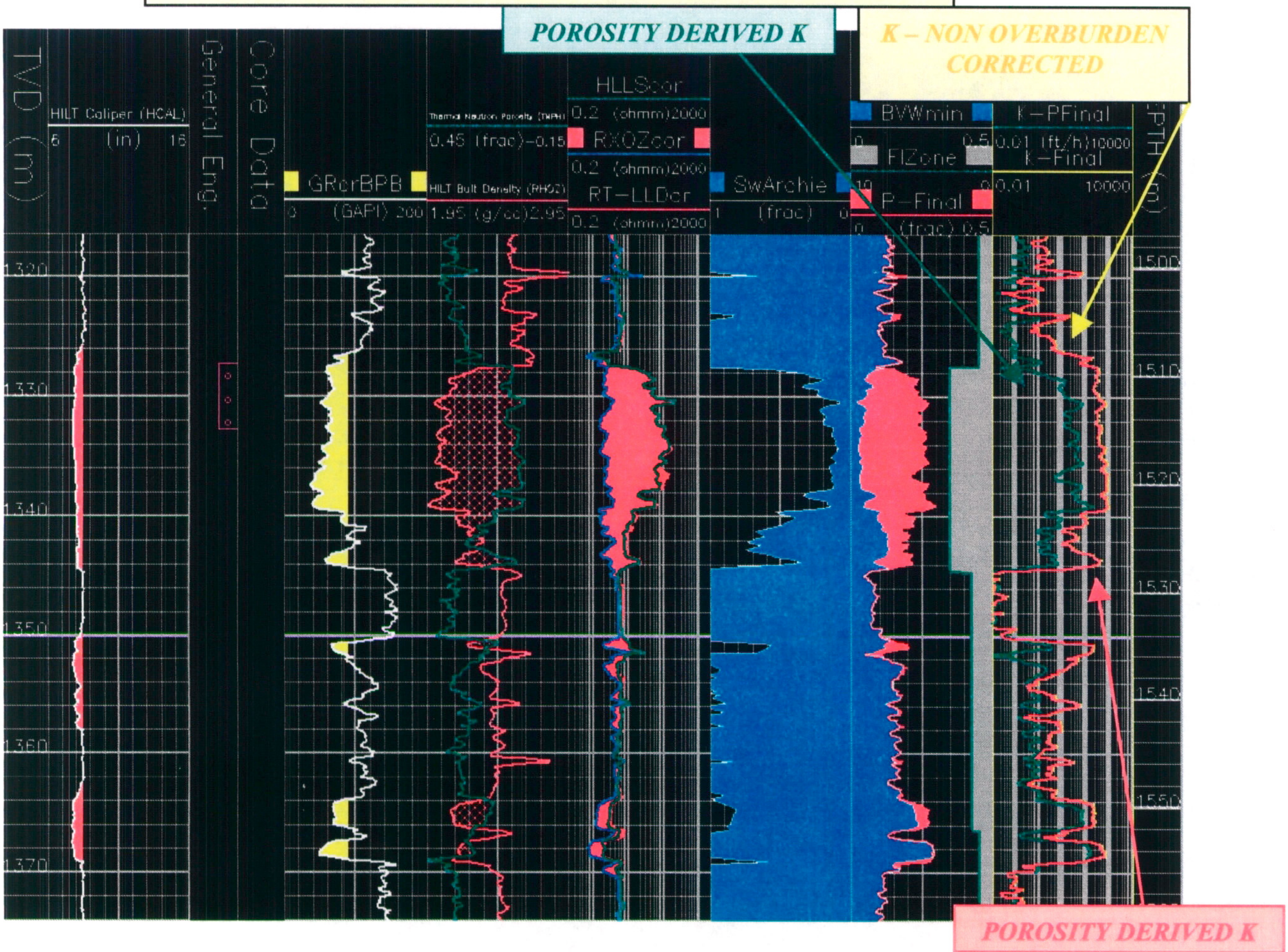
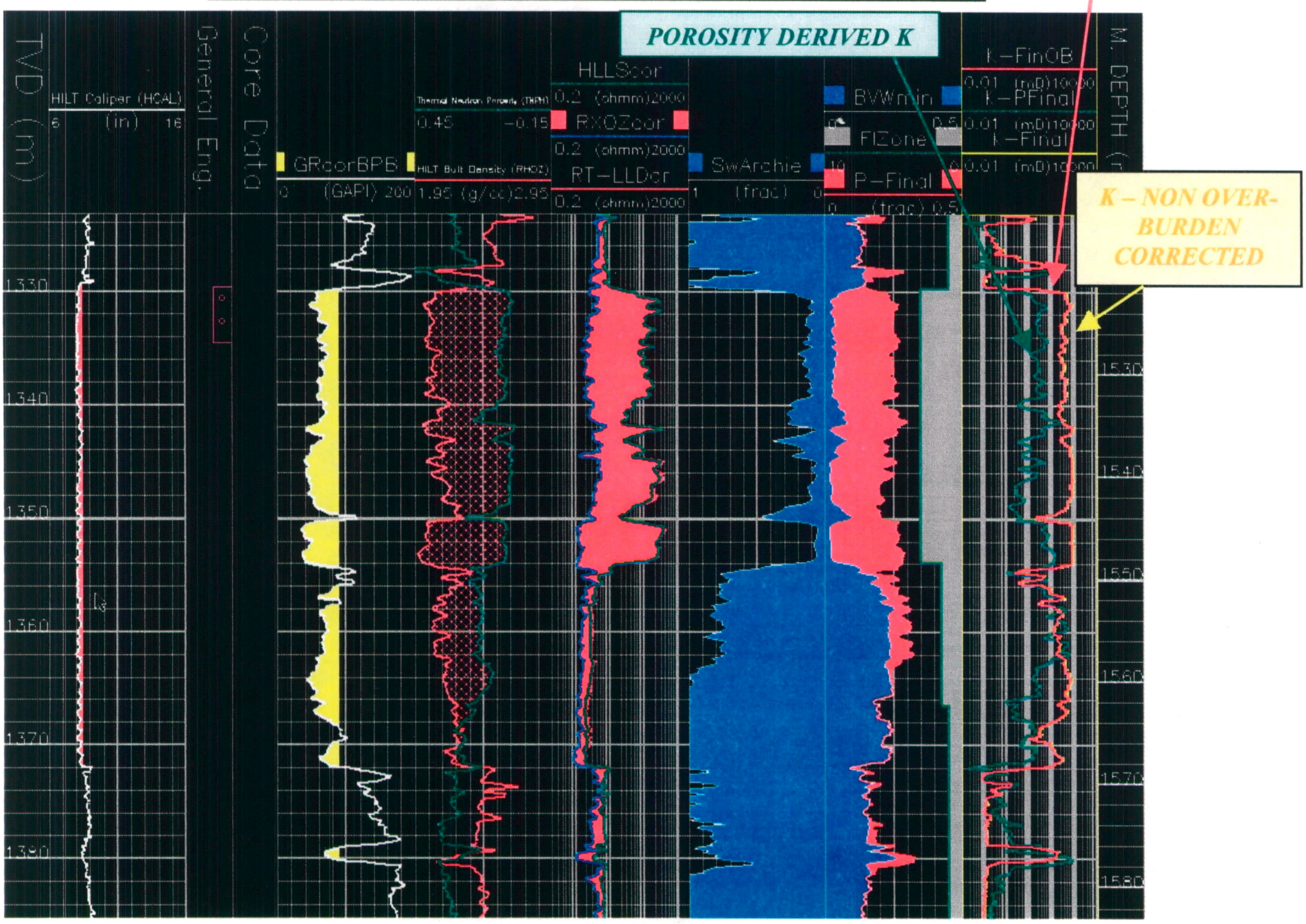


FIGURE 33 - NORTH PAARATTE 5, PERMEABILITY



12.0 NET PAY

12.1 NET PAY CUTOFFS

The objective of a net pay cutoff is to delineate intervals containing fluids which make no contribution to production during the life of a field. Fluids which move or experience a change in pressure during production will make a finite, if small, contribution to production. This includes fluids which move at sub-commercial rates (Deakin, 1999).

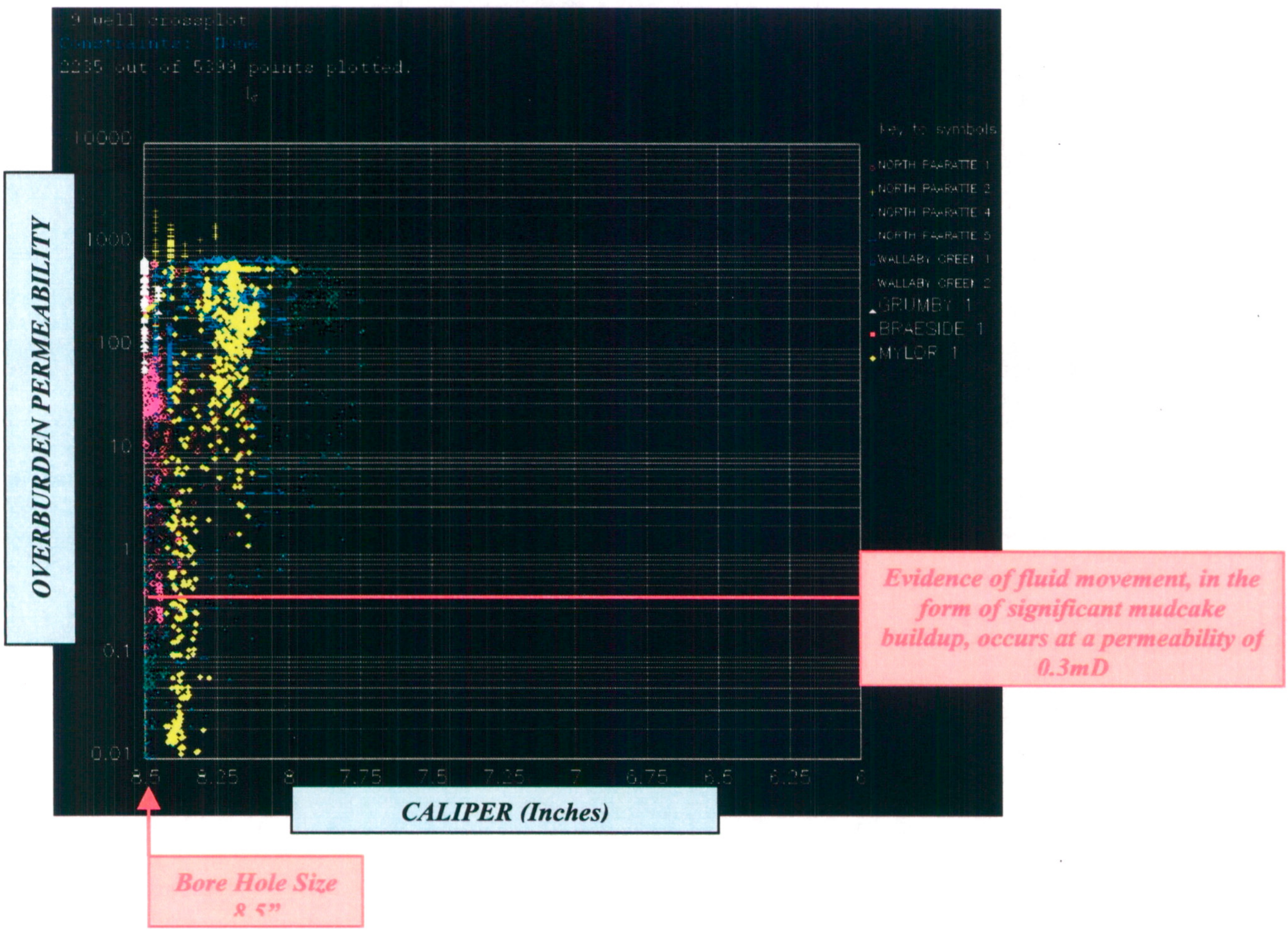
Permeability is the preferred criteria for net determination because it is a measure of a rock's ability to pass fluids. Shale volume and porosity are inadequate measures of a rock's ability to pass fluids. A rock will or will not pass fluids for a given shale content or porosity, depending on shale distribution and pore geometry. Conversely, permeability is the result of such influences and measures directly the rock's ability to pass fluids. The relationship between net indicators and permeability is stronger than with porosity and shale volume (Deakin, 1999).

12.1.1 Evidence of Fluid Movement - Mudcake

Mudcake provides direct evidence of net intervals because filtration (fluid movement) is implied. If the borehole has remained in gauge, a correctly calibrated caliper log will detect mudcake build-up. Shading the log from caliper to bitsize reveals intervals where mudcake has built-up.

In order to relate mudcake build-up and fluid movement/net pay to permeability, a crossplot of mudcake vs permeability was made.

Figure 34 – Crossplot of Mudcake vs Permeability (Waarre Formation Interval)



Evidence of fluid movement, and hence net pay, is indicated by mudcake build-up at a permeability of 0.3mD. Therefore, the permeability cut-off for net pay is 0.3mD.

12.1.2 Evidence of Fluid Movement – Invasion

A resistivity invasion profile will show one of three things;

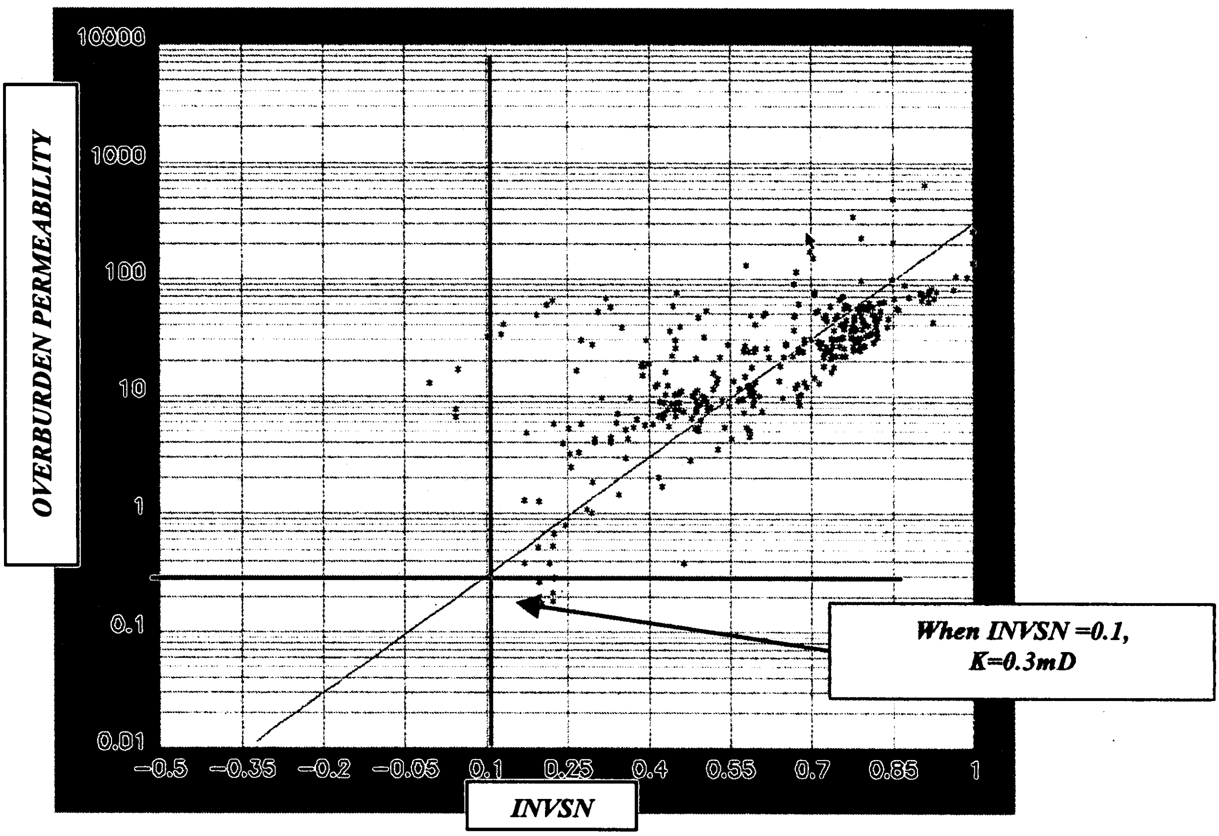
- Impermeable massive shales
- Porous hydrocarbon zones
- Porous water zones.

Impermeable shales show approximately overlying Rshallow, Rmedium and Rdeep. The lack of invasion results in little change in resistivity from the borehole wall to further into the formation. Good reservoir quality, hydrocarbon saturated units will show clear invasion profiles with Rdeep>> Rshallow. Such units are clearly net pay.

In this study, confidence in the permeability net pay cutoff of 0.3mD was enhanced by crossplotting a parameter named INVSN with permeability (Figure 35).

Where , $$INVSN = LOG(Rt) - LOG(Rxo) > 0.1$$ **Equation 16**

Figure 35 – Permeability vs INVSN, Wallaby Creek 2
(Gas zones only)



12.2 FINAL CUTOFFS

Final Net Pay was run within Fluid Zone 3 (Chapter 10.5) using a permeability cut-off of 0.3 mD. A backup Vsh cut-off of 50% was added to ensure reservoir quality. Table 22 is a summary of the Net Pay cutoffs;

Table 18 – Net-Pay Cutoffs

FINAL NET PAY CUT-OFFS	
Fluid Zone	3
Permeability	0.3mD
Vsh	0.5

12.3 NET PAY

Table 23 lists net pay and average net pay statistics for the wells North Paaratte 4 and 5. Figures appearing in black are pays and averages for stratigraphic subdivisions, whereas those in red are well totals. Enclosures 1 and 2 provide a guide to stratigraphic subdivisions and correlations. A complete pay-depth listing for each well can be found in Appendix 1.

Pay flags are shown for each well in Enclosures 1 and 2. .

Table 19 – Net Pay & Pay Statistics

NORTH PAARATTE 4

LAYERS	TOP	BOTTOM	Vshale	Sw	Porosity	Perm(mD)	PAY THK
TOP C3- TOP B	-1326.36	-1344.55	0.104	0.453	0.223	324.211	18.095
TTL TOP C3-TOP B	-1326.36	-1344.55	0.104	0.453	0.223	324.211	18.095
TOP B1 -BASE B1	-1350.34	-1351.92	0.171	0.932	0.145	99.093	1.522
BASE B1-TOP A (TWE)	-1351.92	1354.8	0.337	0.995	0.170	13.883	1.660
TTL TOP C3-TOP A (TWE)	1326.36	1354.8	0.127	0.529	0.213	283.950	21.277
TOPA-BASE A1	1354.8	1359.66	0.381	1.038	0.159	8.845	4.294
TOP A2-BASE A2	1360.39	1362.42	0.407	1.091	0.160	5.921	1.941
BASE A2-TOP A3	1362.42	1363.73	0.418	0.976	0.172	3.670	0.832
TOP A3-GWC	1363.73	1365.2	0.144	0.887	0.236	135.116	1.388
TTL TOP C3-GWC	1326.36	1365.2	0.191	0.668	0.202	211.435	29.733
GWC-EUM	1365.2	1369.56	0.168	0.974	0.245	202.493	3.888

NORTH PAARATTE 5

	TOP	BOTTOM	Vshale	Sw	Porosity	Perm(mD)	PAY THK
TOP C1-BASE C1	1329.72	1339.78	0.087	0.141	0.245	322.224	10.030
BASE C1-TOP C2	1339.78	1341.12	0.116	0.256	0.239	192.140	1.375
TOP C2-TWE	1341.12	1354.01	0.037	0.156	0.237	565.592	12.928
TOP C1-TWE	1329.72	1354.01	0.062	0.155	0.241	444.121	24.333
TWE-BASE C2	1354.01	1354.39	0.138	0.447	0.263	186.050	0.413
BASE C2-TOP C3	1354.39	1355.93	0.332	0.727	0.224	15.178	1.514
TOP C3-GWC	1355.93	1365.2	0.092	0.829	0.279	233.623	9.236
TTL TOP C1-GWC	1329.72	1365.2	0.082	0.358	0.250	368.167	35.496
GWC-TOP B	1365.2	1372.19	0.140	1.348	0.209	163.844	6.904
TOP B - MFSb	1372.19	1378.55	0.475	0.838	0.201	1.580	0.138
TOP B1-BASE B1	1378.8	1380.48	0.177	0.829	0.262	86.841	1.384

12.4 SENSITIVITY STUDY

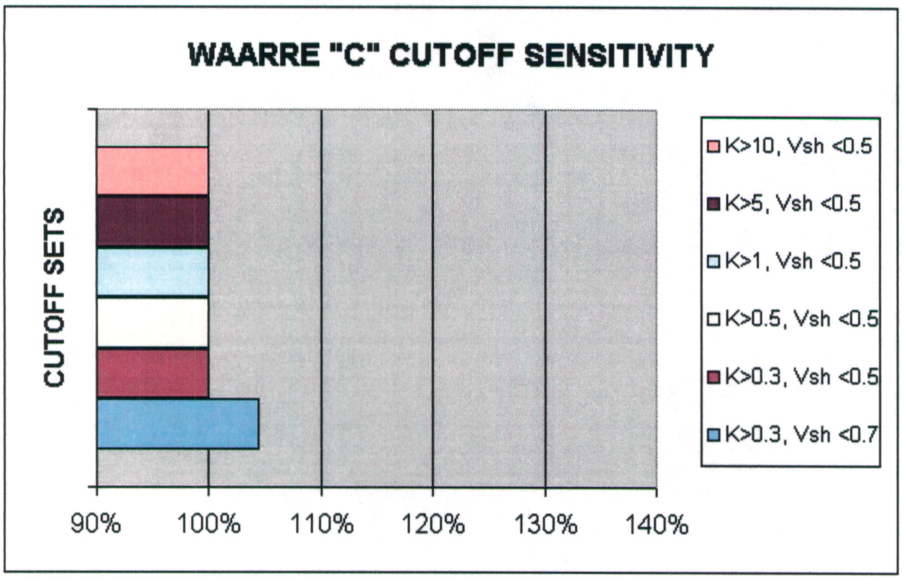
A sensitivity study was performed upon the "A" and "C" sands of Wallaby Creek 2.

12.4.1 Cutoff Sensitivity

The Net Pay cutoffs of Permeability and Vsh were varied to determine the Net Pay sensitivity to these cutoffs. Firstly Vsh was increased from the base case of <0.5 to a generous <0.7. Little effect was seen in the "C" sand (Figure 36).

Increases in the permeability cutoff from 0.3mD to 10mD had no effect in the "C" Sand (Figure 36).

Figure 36 – Cutoff Sensitivity Histograms

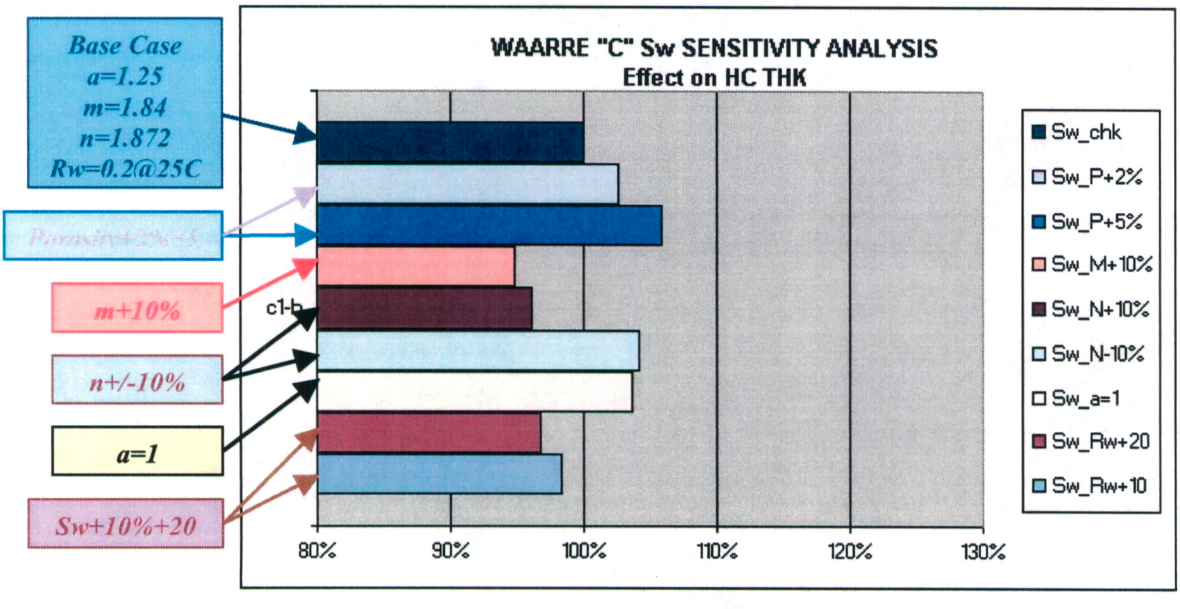


12.4.2 Water Saturation Equation - Input Parameter Sensitivity

Porosity, m, n, a and Rw inputs to the Archie Equation were varied to understand their effect on Hydrocarbon Thickness. A Histogram for the "C" sands is plotted below in Figure 37.

The critical factor seems to be the Cementation Exponent "m". When increased by 10%, hydrocarbon thickness decreased by 5% in the "C" sand. Fortunately, a high level of confidence is placed in the Pickett Plot derived value of "m" (1.84).

Figure 37 – Hydrocarbon Thickness Sensitivity to Archie Equation Input Parameters



PE605475

This is an enclosure indicator page.
The enclosure PE605475 is enclosed within the container PE907475 at this location in this document.

The enclosure PE605475 has the following characteristics:

ITEM_BARCODE = PE605475
CONTAINER_BARCODE = PE907475
NAME = North Paaratte-4 Composite Plot
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = MONTAGE_LOG
DESCRIPTION = North Paaratte-4 Composite Plot Enclosure 1 of Appendix 2 - Wireline Log Analysis "Petrophysical Report North Paaratte-4 & North Paaratte-5" by Donley,J.A. & Deakin, M.
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 27-JAN-2000
RECEIVED_FROM = Boral Energy Ltd
WELL_NAME = North Paaratte-4
CONTRACTOR =
AUTHOR =
ORIGINATOR = Boral Energy Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605476

This is an enclosure indicator page.
The enclosure PE605476 is enclosed within the container PE907475 at this location in this document.

The enclosure PE605476 has the following characteristics:

ITEM_BARCODE = PE605476
CONTAINER_BARCODE = PE907475
NAME = North Paaratte-5 Composite Plot
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = MONTAGE_LOG
DESCRIPTION = North Paaratte-5 Composite Plot Enclosure 2 of Appendix 2 - Wireline Log Analysis "Petrophysical Report North Paaratte-4 & North Paaratte-5" by Donley, J.A. & Deakin, M.
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 27-JAN-2000
RECEIVED_FROM = Boral Energy Ltd
WELL_NAME = North Paaratte-5
CONTRACTOR =
AUTHOR =
ORIGINATOR = Boral Energy Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 3

BIT RECORD

OIL COMPANY OF AUSTRALIA LIMITED
BIT RECORD

NB: USE YOU "TAB" KEY TO MOVE FROM CELL TO CELL
Fill in these cells "DATA Cells"
These cells will calculate results from "DATA" cells.

Well : **NORTH PAARATTE 5** Basin / Area : **Otway** Permit : **PPL 1** Field : Nth Paaratte

Location : Latitude : 38 ° 33 ' 9.78 ' SOUTH State : **VIC.** G.L. **92.90** metres Spud Date: 22-Mar-99

Longitude : 142 ° 57 ' 14.32 ' NORTH K.B. **98.40** metres T.D. Date: 28-Mar-99

Contractor : Century Drilling Rig Number: 2 Well Site Supervisor/s: **Barry Beetson / Ernie Trethowan** Rig Released Date: 30-Mar-99

PUMPS

No.	Type	Stroke (mm)	Liner (mm)	Output (gpm)
1	National	216.00	152.00	2.97
2	National	216.00	152.00	2.97

MUD TYPES

INTERVAL					TYPE
SURFACE HOLE:	0.00	to	406.00	metres	Gel-Native clay Spud mud
MAIN HOLE:	406.00	to	1603.00	metres	KCl PHPA

Please use IADC Dull Bit Grading Nomeculature provided on the following sheet.

Bit No.	Run No.	Size (mm)	Make	Type	IADC Code	Serial No.	Nozzles	Motor Yes / No	Depth Out	Shock-Sub Serial No.	Metres	Hours	ROP (m/hr)	Accum Hours	Bit Grading I	O	D	L	B	G	O	R	WOB Mn	WOB Mx	RPM Mn	RPM Mx	Press (psi)	Pump (gpm)
1RR	2	311	Varel	L114	114	142725	3 x16	NO	406.00	NO	406.00	14.00	29.00	14.00	3	3	WT	A	E	1	NO	TD	2	7	120	140	1500	594
2	1	216	Hughes	MX-03	417	E82DC	3 x 15	YES	1278.00	NO	872.00	42.00	20.76	56.00	5	8	BT	A	F	4	SD	TQ	2	16	65	70	2150	523
3	1	216	Varel	ETD417M	417	144262	2x14,1x16	YES	1603.00	NO	325.00	19.00	17.11	75.00	3	2	LT	M	E	1	BT	TD	20	30	65	80	2000	451
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												
0																												

Comments :

907475 137

IADC DULL BIT GRADING

CUTTING STRUCTURE				BEARING / SEALS	GAGE	OTHER DULL CHAR.	REASON PULLED
INNER	OUTER	DULL CHAR.	LOCATION				
①	②	③	④	⑤	⑥	⑦	⑧

① INNER CUTTING STRUCTURE (All inner rows)

② OUTER CUTTING STRUCTURE (Gage row only)

In columns 1 and 2 a linear scale from 0 to 8 is used to describe the condition of the cutting structure according to the following:

STEEL TOOTH BITS	INSERT BITS	FIXED CUTTER BITS
A measure of lost tooth height due to abrasion and / or damage	A measure of total cutting structure reduction due to lost, worn and / or broken inserts	A measure of lost, worn and / or broken cutting structure
0 - NO LOSS OF TOOTH HEIGHT	0 - NO LOST, WORN AND/OR BROKEN INSERTS	0 - NO LOST, WORN AND/OR BROKEN CUTTING STRUCTURE
8 - TOTAL LOSS OF TOOTH HEIGHT	8 - ALL INSERTS LOST, WORN AND/OR BROKEN	8 - ALL OF CUTTING STRUCTURE LOST, WORN AND/OR BROKEN

③ DULL CHARACTERISTICS (Use only cutting structure related codes.)

BC *	BROKEN CONE	FC	FLAT CRESTED WEAR	RG	ROUNDED GAGE
BF	BOND FAILURE	HC	HEAT CHECKING	RO	RING OUT
BT	BROKEN TEETH / CUTTERS	JD	JUNK DAMAGE	SD	SHIRT-TAIL DAMAGE
BU	BALLED UP BIT	LC *	LOST CONE	SS	SELF-SHARPENING WEAR
CC *	CRACKED CONE	LN	LOST NOZZLE	TR	TRACKING
CD *	CONE DRAGGED	LT	LOST TEETH / CUTTERS	WO	WASHED OUT BIT
CI	CONE INTERFERENCE	OC	OFF-CENTRE WEAR	WT	WORN TEETH / CUTTERS
CR	CORED	PB	PINCHED BIT	NO	NO DULL CHARACTERISTICS
CT	CHIPPED TEETH / CUTTERS	PN	PLUGGED NOZZLE / FLOW PASSAGE		
ER	EROSION			* Show Cone # or #'s under location ④	

④ LOCATION

ROLLER CONE		
N	NOSE ROW	CONE #
M	MIDDLE ROW	1
G	GAGE ROW	2
A	ALL ROWS	3

FIXED CUTTER			
C	CONE	S	SHOULDER
N	NOSE	G	GAGE
T	TAPER	A	ALL AREAS

⑤ BEARINGS /SEALS

NON-SEALED BEARINGS	
A linear scale estimating bearing life used.	
0	No life used
8	All life used (No bearing life left.)

SEALED BEARINGS			
E	SEALS EFFECTIVE	X	FIXED CUTTER (BEARINGLESS)
F	SEALS FAILED		
N	NOT ABLE TO GRADE		

⑥ GAGE (Measure in sixteenths of an inch)

0	1	2	4
- IN GAGE	1/16" OUT OF GAGE	1/8" OUT OF GAGE	1/4" OUT OF GAGE

⑦ OTHER DULL CHARACTERIST (Refer to column ③ codes)

⑧ REASON PULLED OR RUN TERMINATED

BHA	CHANGE BOTTOM HOLE ASSEMBLY	LIH	LEFT IN HOLE	HR	HOURS ON BIT
		RIG	RIG REPAIR	PP	PUMP PRESSURE
DMF	DOWNHOLE MOTOR FAILURE	CM	CONDITION MUD	PR	PENETRATION RATE
DTF	DOWNHOLE TOOL FAILURE	CP	CORE POINT	TD	TOTAL DEPTH / CASING DEPTH
DSF	DRILL STRING FAILURE	DP	DRILL PLUG	TQ	TORQUE
DST	DRILL STEM TEST	FM	FORMATION CHANGE	TW	TWIST OFF
LOG	RUN LOGS	HP	HOLE PROBLEMS	WC	WEATHER CONDITIONS

907475 139

APPENDIX 4

DRILLING FLUID SUMMARY

by

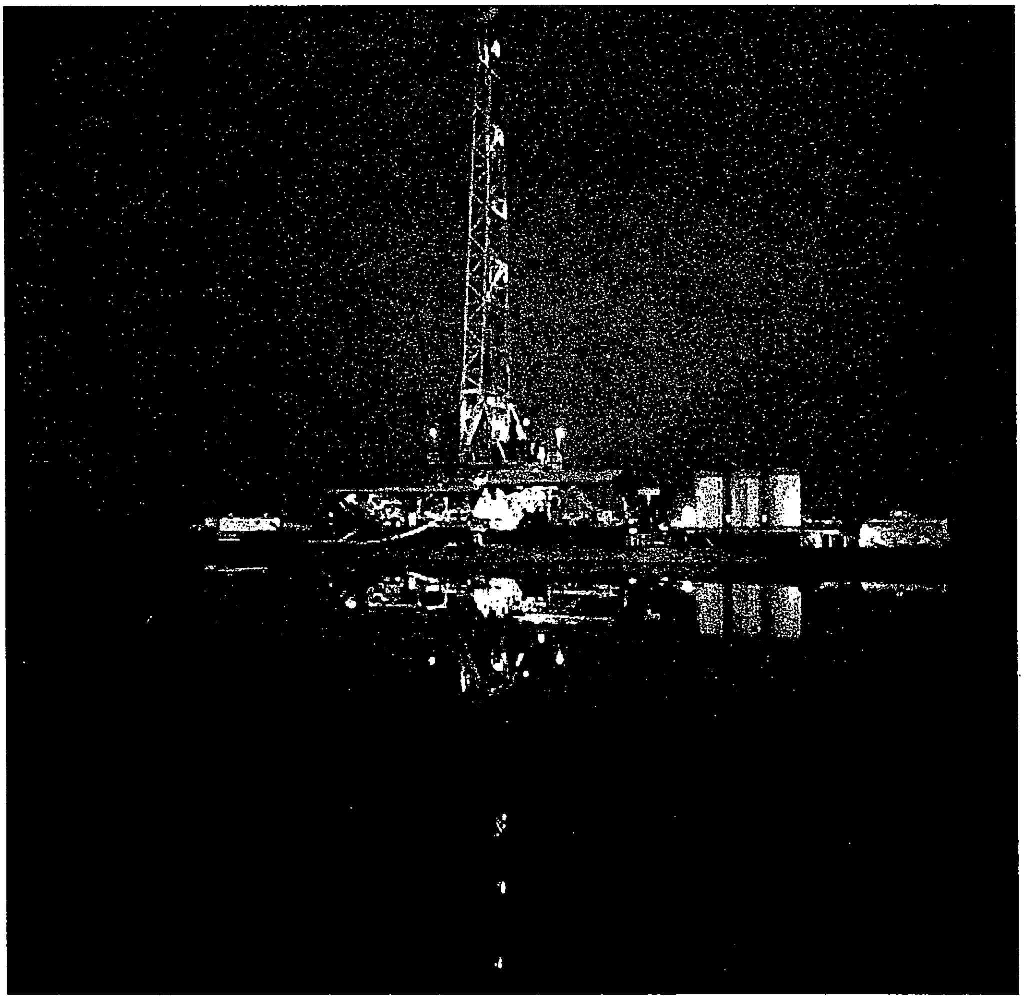
M-I PTY. LTD.

907475 140

DRILLING FLUIDS

M-I Drilling Fluids L.L.C.

BORAL ENERGY
NORTH PAARATTE 5
PAARATTE
OTWAY BASIN



M-I Drilling Fluids L.L.C.

FDC4

DRILLING FLUIDS DATA MANAGEMENT SYSTEM

Operator :	BORAL ENERGY	Spud Date :	22/03/99
Well Name :	NORTH PAARATTE 5	TD Date :	29/03/99
Field/Area :	PAARATTE	Loc Code :	VICTORIA
Description :	DEVELOPMENT	Dist Engr :	MONTEATH T
Location :	OTWAY BASIN	Sales Engr :	KELLEHER J
Warehouse :	ADELAIDE	Sales Engr :	
Contractor :	CENTURY DRILLING	Well Number :	P0005

Comments : REPORTS UP TO MIDNIGHT

Type	Size in	Depth m	TVD m	Hole in	MaxMW lb/gal	Mud 1	Mud 2	Drilling Problem	Days	Cost
Casing	9.625	401	401	12.250	9.1	FW SPUD MUD		NO PROBLEMS	2	853
Casing	7.000	1600	1499	8.500	9.5	PHPA/KCL/MUD		NO PROBLEMS	6	18373

Total Depth: 1603 m TVD : 1502 m Water Depth: m Drilling Days: 8 Total Mud Cost: 19225

BORAL ENERGY

NORTH PAARATTE 5

1 Discussion by Interval
2 Daily Discussion Report
3 Product Usage by Interval
4 Volume Summary
5 Total Material Consumption
6 Hydraulics Recap
7 Daily Recap
8 Daily Mud & Inventory Reports

DISCUSSION BY INTERVAL

BORAL ENERGY
NORTH PAARATTE 5

DRILLING FLUIDS
Performance Through Engineering

North Paaratte 5 was a gas development well for Boral Energy Petroleum Pty Ltd drilled by Century Rig 2. The well is located in the Otway Basin in Victoria. After spudding on the 22nd March 1999, the well reached TD of 1603 meters on the 28th March 1999.

The primary objective was the Waarre Formation Unit "C" sand, which is the sole reservoir in the field.

STRATIGRAPHY:

Formation	Rock Type	Period	Formation Tops (m MD KB)
Port Campbell Limestone	Limestone	Miocene	5.5
Gellibrand Marl	Marl	Oligocene	78
Clifton Formation	Sandstone	Early Oligocene	323
Narrawaturk Marl	Marl	Late Eocene	353
Mepunga Formation	Sandy Marl	Late Eocene	388
Dilwyn Formation	Sandstone	Middle Eocene	426
Pember Mudstone	Mudstone	Early Eocene	666
Pebble Point Formation	Sandstone	Late Palaeocene	754
Paaratte Formation	Sand	Late Cretaceous	798
Skull Creek Member	Silt	Late Cretaceous	1192
Nullawarre Greensand	Sand	Late Cretaceous	1317
Belfast Formation	Silt	Late Cretaceous	1422
Waarre Formation (Unit C sand)	Sand	Late Cretaceous	1515
Total Depth			**1603**

BORAL ENERGY
NORTH PAARATTE 5

DRILLING FLUIDS
Performance Through Engineering

INTERVAL I	0 – 406 m	12.25" HOLE	9.625" CASING SET @ 401 m

MUD TYPE : **Spud Mud**

HOLE PROBLEMS : **Mud Rings**

MUD PROPERTIES : Mud Weight : 8.8 ppg (1.06 SG)
Funnel Viscosity : 40 seconds

OPERATIONS:

North Paaratte 5 was spudded in at 17:30 hrs on the 22nd March 1999 with a 12.25" Varel I114 bit. There were no problems drilling down through mainly clays until 362m, where the hole became packed off and a large mud ring was circulated out of the system. A total of 200 bbls of mud was lost downhole while circulating the mud ring out of the system and an hour of rig time was lost due to blockages in the flowline.

No further mud rings were encountered down to 406m where a wiper trip was made back to surface with good hole all the way and no fill on bottom. On circulating bottoms up after the wiper trip, a much smaller mud ring was circulated out of the system.

Operations went smoothly while running the 9.625" casing to the required depth of 401 meters and cementing although with the 100% excess cement pumped meant that with the hole near to in-gauge, 100 bbls of cement was pumped into the sump. Cement returns were observed at the surface before the actual displacement of the cement commenced.

MUD:

Initially mixed up just 120 bbls of Spud Mud at 23 ppb Trugel and flocculated with Lime. This mud was used to drill out the mouse hole and rat hole. While drilling the 12.25", the hole was making mud especially just before the mud ring was encountered and water was the only additive. After circulating out the mud ring, 200 barrels of mud was pumped away downhole requiring minor amounts of Trugel to maintain properties.

SOLIDS CONTROL:

Flat 84 mesh screens on the 2 DFE shakers had no trouble handling the 594 gal/min flow rate. Once a full circulating system was established, the 2X10" desander was operated plus the 10x6" desilter with both putting out large volumes of limestone sand.

BORAL ENERGY
NORTH PAARATTE 5

DRILLING FLUIDS
Performance Through Engineering

INTERVAL I	0 – 406 m	12.25" HOLE	9.625" CASING SET @ 401 m

OBSERVATIONS AND RECOMMENDATIONS:

This section of the well was drilled cheaply and effectively and no changes are recommended on the upcoming North Paaratte 4 well. Because of the limited capacity of the sump, the sump water from this well will be used on North Paaratte 4. The sump by this stage will have a reasonable high KCl content from the mud dumped from the 8.5" interval. This will not give as high a yield from the native clays but should be of benefit in preventing or minimising the severity of any mud rings.

BORAL ENERGY
NORTH PAARATTE 5

DRILLING FLUIDS
Performance Through Engineering

INTERVAL II	406 - 1603 m	8.5" HOLE	7" CASING SET @ 1600 m

MUD TYPE	:	**KCl/PHPA**		
HOLE PROBLEMS	:	**Tight Hole on wiper trip.**		
MUD PROPERTIES	:	Mud Weight	:	8.6-9.5 ppg (1.03-1.13 SG)
		Funnel Viscosity	:	41-56 secs
		Plastic Viscosity	:	9-21 cps
		Yield Point	:	26-31 lb/100 sq ft
		Initial Gel Strenghs	:	4-7 lb/100 sq ft
		10 min Gels	:	7-15 lb/100 sq ft
		6 rpm reading	:	5-10 dial units
		Fluid Loss	:	5.2-9.0 cc
		KCL% by wt	:	4-5%-
		PHPA Content	:	1.4-2.0 ppb
		Sulphites	:	100-160 ppm
		Reactive Clays (MBT)	:	5-10 ppb

OPERATIONS:

An 8.5" HTC MX03 was run in the hole with MWD and mud motor. After drilling out the floats etc with water, 3m of new hole was drilled to 409m and the hole displaced to 8.6ppg KCl/PHPA mud. A leak off test was run to 14.2 ppg before drilling ahead

The deviation was gradually built up to about 25 degrees and this angle was maintained to TD with limited amounts of sliding.

At 1278m the bit was suspected of being balled up and 30 bbls straight 5% KCl brine was pumped around in an endeavour to free the bit. As this did not work and the torque was erratic, the bit was pulled with some tight hole. The cones were just barely hanging on to the axles on inspection of the bit.

On running back in with an 8.5" Varel ETD 417, the hole proved to be in good shape with no drag and no fill. Drilled mainly sands down to TD of 1603m. The last couple of connections before TD were a bit sticky but came free after repeated reaming.

On a wiper trip after reaching TD, tight hole had to be worked from 1402 to 1345m. This interval was mainly in the Nullaware Greensand. On running back in, there was a reported 6m of fill before getting to TD. The hole on pulling out to run logs was in good shape.

MUD:

An initial 600 bbls of KCl/PHPA mud was made up at 8.6 ppg with 4.0% KCl by weight. The percentage of PHPA was kept low at 0.5 ppb at this stage to save any hassles with unsheared PHPA skidding over the shaker screens. Caustic and Soda Ash were used to lower the hardness

INTERVAL II	406 - 1603 m	8.5" HOLE	7" CASING SET @ 1600 m

in the water. C-121 Viscosifier was added at 0.5 ppb to lower the fluid loss and increase the Yield Point. Duovis at 0.5 ppb was used to get the low end rheologies up to the recommended levels.

The initial brew was made up with fresh water but all the premixes had to be made up from sump water as the sump was close to overflowing. Unfortunately 100 bbls of excess cement was dumped into the sump when displaceing on the casing cement job. This raised the pH level to 12. As high pH adversely affects the PHPA just a limited amount of PHPA was "slam dunked" into the premix pit with the rest being trickled into the active at a slow rate to avoid shaker screen blockages. Hydrochloric Acid was ordered out to the rig to neutralise the high pH but by the time it arrived at the rig site the pH in the sump had fallen to a tolerable level from heavy rain and wash down requirements.

All the subsequent premixes contained 2.0 ppb PHPA and variable amounts of C-121, Duovis, and KCl depending on hole conditions and active system requirements. Towards the end of the well, Yield Point and the low end rheology readings tended to rise without Polymer additions so the last couple of premixes just contained KCl, PHPA and C-122 which was used for Fluid Loss reduction without affecting Yield Point.

Also towards the end of the well, the weight tended to rise a little above recommended due to non-reactive clays entering the system. On circulating bottoms up after the wiper trip at TD, a prodigous amount of mushy cuttings came over the shakers for about half an hour raising the mud weight by 2 points and increasing the funnel viscosity by 7 seconds. About 40 bbls of water was added at this stage to keep the mud pumpable.

SOLIDS CONTROL:

For the initial circulations until the PHPA in the mud had sheared, two 84 mesh screens were used on each DFE shaker with the third screen equivalent to a 20 mesh screen by ripping off the fine mesh from two old shaker screens just leaving the backing. This allowed normal circulation at 505 gpm without the need to bypass the shaker screens or slow the pumps or pull back into the shoe to shear the mud.

The 2x10" desander and the 10x6" desilter were run at all times while circulating. Both the desander and desilter performed well while drilling sands and silts with almost a dry solid discharge.

OBSERVATIONS AND RECOMMENDATIONS:

This mud system performed well to give almost trouble free in-gauge hole at under-budget cost. No changes are recommended to the mud system.

DAILY DISCUSSION REPORT

M-I DRILLING FLUIDS DAILY DISCUSSION

Operator	: BORAL ENERGY	Contractor	: CENTURY DRILLING	Description	: DEVELOPMENT	Page:	1
Well Name	: NORTH PAARATTE 5	Field/Area	: PAARATTE	Location	: OTWAY BASIN	Well:	P0005

Date : 22/03/99 Depth : 153.0 Day : 1

North Paaratte 5 was spudded in at 17:30 hrs with a 12.25" Varel L114 bit. Drilled to 153m by midnight report time without problems. Initially mixed up 120 bbls of spud mud at 36 vis using Trugel. Used 1 sack C 121 Viscosifier in 35 bbls of water in the pill tank to judge yield. This gave a 64 funnel vis. Will use as a high vis sweep when required.

Date : 23/03/99 Depth : 406.0 Day : 2

Drill 12.25" to TD the interval at 406m. Hole packed off at 362m while working mud ring out of system. Downhole losses while packed off was around 200 bbls. A wiper trip to the surface was made back from 406m with good hole all way. On circulating after the wiper trip, a smaller mud ring was circulated out. M-I Gel was used for the upcoming cement job and the 2 sacks of SAPP was written off as damaged.

Date : 24/03/99 Depth : 406.0 Day : 3

The 9 5/8" casing was run to 401m and cemented with cement returns to surface. The cement was displaced with water with gel spud mud dumped. Nippled up BOP and pressure tested. Dumped and cleaned pits. Made up 600 bbls of KCl/PHPA at 8.6 ppg with 4% by weight KCl, 1.0 lb/bbl PHPA, 0.5 lb/bbl Duovis and 0.5 lb/bbl C 121 Viscosifier

---

Date : 25/03/99 Depth : 695.0 Day : 4

Run in with 8.5" HTC MX03 with MWD and mud motor. Tag cement at 383m and pressure test. Drill out float and shoe track plus 3m new formation to 409m using water. Change over to KCl/PHPA mud at 8.6 ppg and run FIT to 14.2 ppg. Directional drill to 695m with deviation 25.3 degrees at 675m. Cuttings from the Dilwyn sandstone of reasonable quality. Using water from the sump for premixes because the sump is getting full. This water has a pH of 12. Adding some of the PolyPlus directly to the active to avoid degradation in the high pH water. Full test kit not on sight as yet.

Date : 26/03/99 Depth : 1244.0 Day : 5

Drill deviated hole through claystones and sandstone at an average 23 meters/hour. Deviation at 1195m was 25.9 degrees. Still using sump water for premixes but the pH now down to 10.0 in the water. Clay cuttings still discrete but some non reactive clays getting into the system raising the mud weight.

Date : 27/03/99 Depth : 1418.0 Day : 6

Drill 8.5" from 1244 to 1278m. Circulate hole clean and pull out for bit change. Some tght hole on coming out. Run in with a new bit Varel ETD 417 encountering good hole and no fill. Reamed from 1260 to 1278m before drilling ahead to 1418m.

Drilling mainly sands. Mud properties stable. Draining the 30 bbl dead volume from the premix pit with portable pump to prevent hopper blocking up when adding polymers.

Date : 28/03/99 Depth : 1603.0 Day : 7

Drill deviated hole (25.5 degrees at 1545m) to TD at 1603m. Circulate hole clean. Work tight interval from 1402 to 1345m during wiper. Run back in to 1603m with 6m fill. Circulate and condition mud. Pull out to run logs.

Tight hole section was mainly in the Nullaware Greensands.

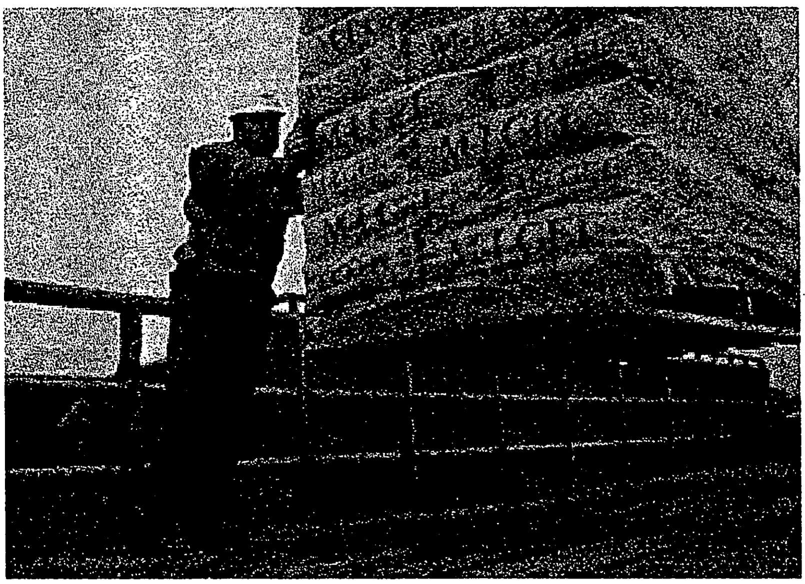
On circulating bottoms up after the wiper trip, prodigious quantities of very mushy cuttings came over the shakers. This raised the mudweight by 2 points despite the addition of an extra 40 bbls of water into the system while the mushy cuttings were evident.

Date : 29/03/99 Depth : Day : 8

Ran 7" casing to 1600m. Mud Engineer already released by this time.

Products used for trips and completion.

PRODUCT USAGE BY INTERVAL



PRODUCT SUMMARY

Operator : BORAL ENERGY PETR PL | Contractor : CENTURY DRILLING | Description : DEVELOPMENT

Well Name : NORTH PAARATTE 5 | Field/Area : PAARATTE | Location : OTWAY BASIN

SUMMARY OF PRODUCT USAGE FOR 12.25" INTERVAL FROM 22/03/99 - 23/03/99, 0 - 406 m

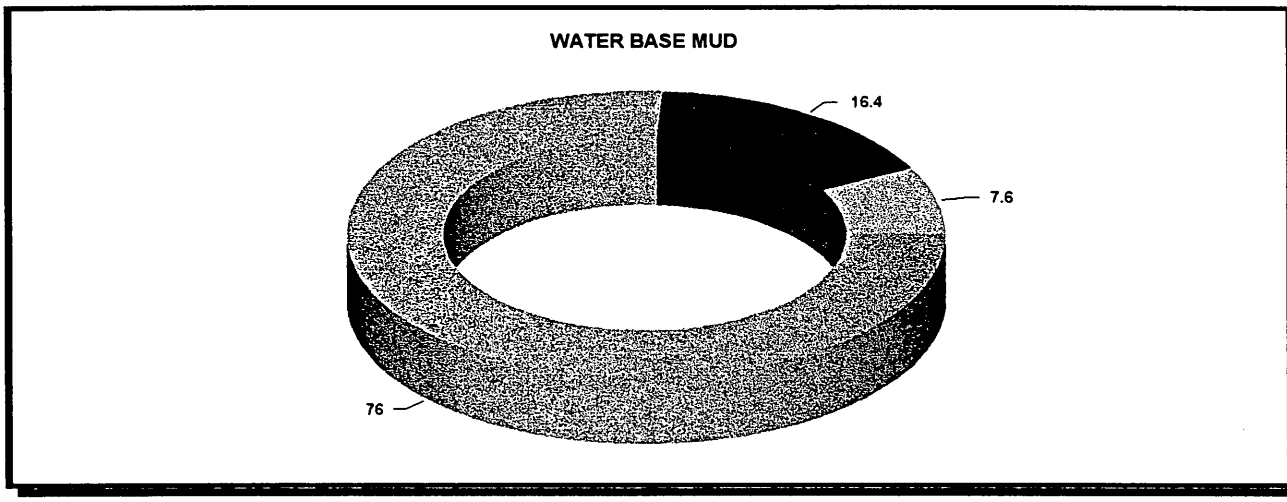
WATER-BASE PROD	SIZE	AMOUNT	UNIT COST	PROD COST
C121	25 KG SX	1	140.10	140.10
Caustic Soda	25 KG SX	1	29.50	29.50
Lime	25 KG SX	2	10.36	20.72
M-I Gel	25 KG SX	12	7.90	94.80
SAPP	25 KG SX	2	0.00	0.00
Soda Ash	25 KG SX	1	14.43	14.43
Trugel	25 KG SX	70	7.90	553.00

***** INTERVAL WATER-BASE MUD COST TOTAL = 852.55**

Operator :	BORAL ENERGY PETR PL
Well Name :	NORTH PAARATTE 5
Field/Area :	PAARATTE
Description :	DEVELOPMENT
Location :	OTWAY BASIN

COST ANALYSIS

BREAKDOWN OF COST BY PRODUCT GROUP 22/03/99 - 23/03/99, 0 - 406 m



WATER BASE MUD PRODUCTS	Cost	% Total
1 - BENTONITE	647.80	76.0
2 - VISCOSIFIERS	140.10	16.4
3 - ALKALINITY CONTROL	64.66	7.6
WATER BASE MUD TOTAL COST	852.56	100.0

PRODUCT SUMMARY

Operator : BORAL ENERGY PETR PL | Contractor : CENTURY DRILLING | Description : DEVELOPMENT

Well Name : NORTH PAARATTE 5 | Field/Area : PAARATTE | Location : OTWAY BASIN

SUMMARY OF PRODUCT USAGE FOR 8.5" INTERVAL FROM 24/03/99 - 29/03/99, 460 - 1603 m

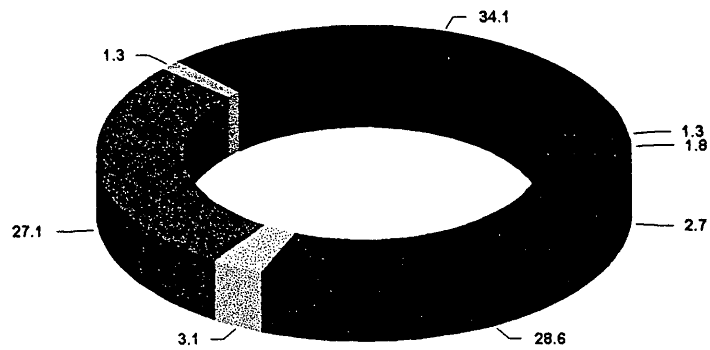
WATER-BASE PROD	SIZE	AMOUNT	UNIT COST	PROD COST
C121	25 KG SX	10	140.10	1401.00
C122	25 KG SX	4	140.10	560.40
Caustic Soda	25 KG SX	2	29.50	59.00
Duovis	25 KG SX	10	385.29	3852.90
Glute 25	25 LT DM	3	111.09	333.27
M-I Bar	25 KG SX	90	5.53	497.70
Polyplus	25 KG SX	49	101.70	4983.30
Potassm Chloride	25 KG SX	490	12.79	6267.10
Soda Ash	25 KG SX	13	14.43	187.59
Sodium Sulphite	25 KG SX	8	28.80	230.40

*** INTERVAL WATER-BASE MUD COST TOTAL = 18,372.66

Operator :	BORAL ENERGY PETR PL
Well Name :	NORTH PAARATTE 5
Field/Area :	PAARATTE
Description :	DEVELOPMENT
Location :	OTWAY BASIN

COST ANALYSIS

BREAKDOWN OF COST BY PRODUCT GROUP 24/03/99 - 29/03/99, 406 - 1603 m



WATER BASE MUD PRODUCTS	Cost	% Total
1 - WEIGHT MATERIAL	497.70	2.7
2 - VISCOSIFIERS	5,253.90	28.6
3 - FLUID LOSS REDUCERS	560.40	3.1
4 - ENCAPSULATORS	4,983.30	27.1
5 - ALKALINITY CONTROL	246.59	1.3
6 - SALTS	6,267.10	34.1
7 - CORROSION CONTROL	230.40	1.3
8 - MISC.	333.27	1.8
WATER BASE MUD TOTAL COST	18,372.66	100.0

VOLUME SUMMARY

BORAL ENERGY
NORTH PAARATTE 5

DRILLING FLUIDS
Performance Through Engineering

12.25" Hole

	Mud Volume Status					Mud Volume Built							Mud Volume Lost							
Date 1999	Depth	Hole	Surf Active	Res	Total Vol	Water	Mud Built	Brine	Bar	Mud Recvd	Daily Total	Cum Built	Solids Equip	Surf	Dump	Back loaded	Hole	Casing Plugs	Daily Total	Cummul Lost
22-Mar	153	59	279		338		338				350	350	12						12	12
23-Mar	406	173	230		403	180					180	530	60		55				115	127
24-Mar	406	DW			0						0	530			403				403	530

8.5" Hole

	Mud Volume Status					Mud Volume Built							Mud Volume Lost							
Date 1999	Depth	Hole	Surf Active	Res	Total Vol	Water	Mud Built	Brine	Bar	Mud Recvd	Daily Total	Cum Built	Solids Equip	Surf	Dump	Back loaded	Hole	Casing Plugs	Daily Total	Cummul Lost
24-Mar	406	DW			0		600				600	600							0	0
25-Mar	695	145	332		477		100				100	700	123	100					223	223
26-Mar	1244	261	416		677		360				360	1060	100	60					160	383
27-Mar	1418	298	372		670		150				150	1210	90		67				157	540
28-Mar	1603	337	350		687	80	120				200	1410	110		73				183	723
29-Mar	1603	DW	0		0						0	1410			687				687	1410
30-Mar					0						0	1410							0	1410

TOTAL MATERIAL CONSUMPTION

PRODUCT SUMMARY

Operator : BORAL ENERGY PETR PL | Contractor : CENTURY DRILLING | Description : DEVELOPMENT

Well Name : NORTH PAARATTE 5 | Field/Area : PAARATTE | Location : OTWAY BASIN

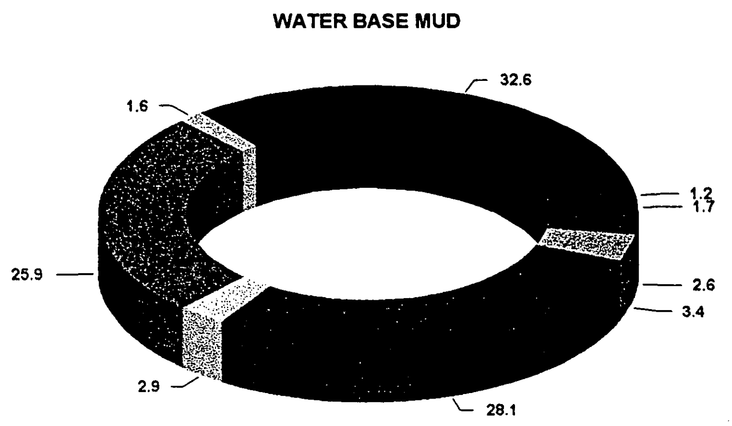
SUMMARY OF PRODUCT USAGE WELL FROM 22/03/99 - 29/03/99, 0 - 1603 m

WATER-BASE PROD	SIZE	AMOUNT	UNIT COST	PROD COST
C121	25 KG SX	11	140.10	1541.10
C122	25 KG SX	4	140.10	560.40
Caustic Soda	25 KG SX	3	29.50	88.50
Duovis	25 KG SX	10	385.29	3852.90
Glute 25	25 LT DM	3	111.09	333.27
Lime	25 KG SX	2	10.36	20.72
M-I Bar	25 KG SX	90	5.53	497.70
M-I Gel	25 KG SX	12	7.90	94.80
Polyplus	25 KG SX	49	101.70	4983.30
Potassm Chloride	25 KG SX	490	12.79	6267.10
SAPP	25 KG SX	2	0.00	0.00
Soda Ash	25 KG SX	14	14.43	202.02
Sodium Sulphite	25 KG SX	8	28.80	230.40
Trugel	25 KG SX	70	7.90	553.00

***** INTERVAL WATER-BASE MUD COST TOTAL = 19,225.21**

	Operator : BORAL ENERGY PETR PL Well Name : NORTH PAARATTE 5 Field/Area : PAARATTE Description : DEVELOPMENT Location : OTWAY BASIN	***COST ANALYSIS***

BREAKDOWN OF COST BY PRODUCT GROUP 22/03/99 - 29/03/99, 0 - 1603 m



WATER BASE MUD PRODUCTS	Cost	% Total
1 - WEIGHT MATERIAL	497.70	2.6
2 - BENTONITE	647.80	3.4
3 - VISCOSIFIERS	5,394.00	28.1
4 - FLUID LOSS REDUCERS	560.40	2.9
5 - ENCAPSULATORS	4,983.30	25.9
6 - ALKALINITY CONTROL	311.24	1.6
7 - SALTS	6,267.10	32.6
8 - CORROSION CONTROL	230.40	1.2
9 - MISC.	333.27	1.7
WATER BASE MUD TOTAL COST	19,225.21	100.0

PRODUCT SUMMARY

Operator : BORAL ENERGY PETR PL **Contractor :** CENTURY DRILLING **Description :** DEVELOPMENT

Well Name : NORTH PAARATTE 5 **Field/Area :** PAARATTE **Location :** OTWAY BASIN

BREAKDOWN OF PRODUCT USAGE BY GROUP 22/03/99 - 29/03/99, 0 - 1603 m

PRODUCT CATEGORY	PRODUCTS USED		
- WATER BASE MUD -			
WEIGHT MATERIAL			
	M-I Bar		
BENTONITE			
	M-I Gel	Trugel	
VISCOSIFIERS			
	C121	Duovis	
FLUID LOSS REDUCERS			
	C122		
ENCAPSULATORS			
	Polyplus		
ALKALINITY CONTROL			
	Caustic Soda	Lime	Soda Ash
SALTS			
	Potassm Chloride		
CORROSION CONTROL			
	Sodium Sulphite		
MISC.			
	Glute 25	SAPP	

HYDRAULICS RECAP

HYDRAULICS SUMMARY

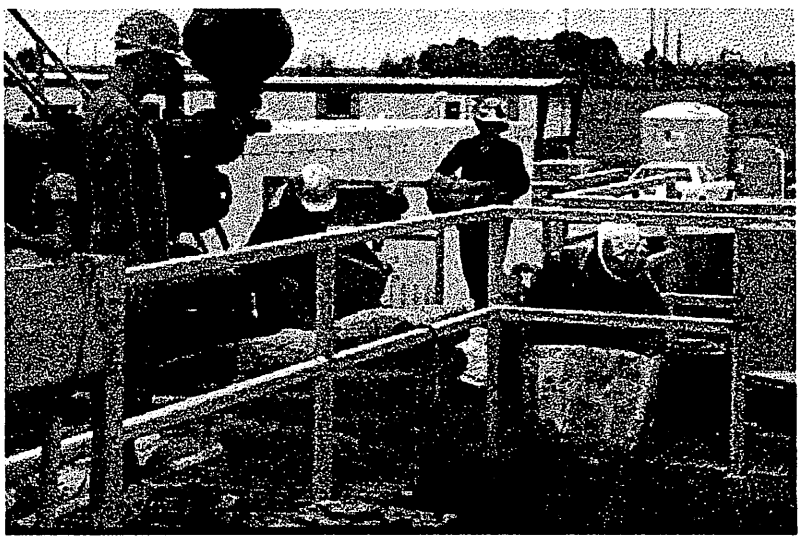
Operator : BORAL ENERGY PETR PL **Contractor :** CENTURY DRILLING **Description :** DEVELOPMENT

Well Name : NORTH PAARATTE 5 **Field/Area :** PAARATTE **Location :** OTWAY BASIN

*Date	22/03/99	23/03/99	24/03/99	25/03/99	26/03/99	27/03/99	28/03/99	29/03/99	
*Depth	153.0	406.0	406.0	695.0	1244.0	1418.0	1603.0	0.0	
*Days Since Spud	1	2	3	4	5	6	7	8	
*RHEOLOGICAL PROPERTIES									
Mud Wt -lb/gal	8.8	9.1	8.6	8.9	9.4	9.4	9.5	0.0	
Plastic Visc -cps	0	0	0	9	16	17	21	0	
Yield Point -lb/100ft2	0	0	0	27	26	28	31	0	
3-rpm Rdg -Fann deg	0	0	0	0	0	5	0	0	
np Value	***	***	***	0.322	0.465	0.462	0.489	***	
Kp -lb-sec^n/100ft2	***	***	***	5.1656	2.4605	2.6914	2.6277	***	
na Value	***	***	***	0.322	0.465	0.477	0.489	***	
Ka -lb-sec^n/100ft2	***	***	***	5.1656	2.4605	2.4499	2.6277	***	
*FLOW DATA									
Flow Rate -gal/min	594	594	0	505	487	487	451	0	
Pump Pressure -psi	1000	1500	0	1700	1900	2000	2000	0	
Pump -hhp	347	520	***	501	540	568	526	***	
*PRESSURE LOSSES									
Drill String -psi	***	***	***	282	542	604	639	***	
Bit -psi	820	850	***	780	770	830	720	***	
Annulus -psi	***	***	***	64	105	124	153	***	
Total System -psi	***	***	***	1126	1417	1558	1512	***	
*BIT HYDRAULICS									
Nozzles -1/32 inch	16/16/16	16/16/16	/ /	15/15/15	15/15/15	14/14/16	14/14/16	14/14/16	
Nozzles -1/32 inch	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	
Bit Pressure -%	82	57	***	46	40	42	36	***	
Bit -hhp	286	295	***	230	218	236	190	***	
Bit HSI (Index)	2.40	2.50	***	4.10	3.80	4.20	3.30	***	
Jet Velocity -m/sec	98.6	98.6	***	95.4	92.0	95.8	88.7	***	
Impact Force -lbs	875	905	***	728	715	745	645	***	
*DRILL COLLARS ANNULUS									
Velocity -m/min	***	***	***	125.8	121.3	121.3	112.3	***	
Critical Vel -m/min	***	***	***	137.7	139.5	145.3	158.1	***	
Reynolds Number	***	***	***	2602	2284	2139	1671	***	
Crit Re (Lam - Tran)	***	***	***	3029	2832	2816	2800	***	
*DRILL PIPE ANNULUS									
Velocity -m/min	***	***	***	63.6	61.3	61.3	56.8	***	
Critical Vel -m/min	***	***	***	118.3	109.7	113.3	122.3	***	
Reynolds Number	***	***	***	1069	1160	1105	879	***	
Crit Re (Lam - Tran)	***	***	***	3029	2832	2816	2800	***	
*HOLE CLEANING									
Slip Velocity -m/min	***	***	***	7.0	9.8	9.4	8.3	***	
Rising Velocity -m/min	***	***	***	56.5	51.5	51.9	48.5	***	
Lifting Capacity -%	***	***	***	89	84	85	85	***	
Cuttings Conc -%	***	***	***	0.99	0.91	0.48	0.63	***	
Penetration Rate -m/hr	23.0	30.0	***	27.5	23.0	12.4	15.0	***	
*CASING SHOE PRESSURES									
ECD -lb/gal	***	***	***	9.3	9.8	9.8	9.9	***	
ECD+Cuttings -lb/gal	***	***	***	9.4	9.9	9.8	10.0	***	
*TOTAL DEPTH PRESSURES									
ECD -lb/gal	***	***	***	9.4	9.9	9.9	10.1	***	
ECD+Cuttings -lb/gal	***	***	***	9.6	10.0	10.0	10.2	***	

M-I Drilling Fluids L.L.C. DRILLING FLUIDS DATA MANAGEMENT SYSTEM P0005 May 7, 1999

DAILY RECAP



DRILLING FLUIDS SUMMARY

Operator : BORAL ENERGY PETR P **Contractor :** CENTURY DRILLING **Description :** DEVELOPMENT

Well Name : NORTH PAARATTE 5 **Field/Area :** PAARATTE **Location :** OTWAY BASIN

Date - Day	22/03/99- 1	23/03/99- 2	24/03/99- 3	25/03/99- 4	26/03/99- 5	27/03/99- 6	28/03/99- 7
Depth/TVD -m	153.0 | 153.0	406.0 | 406.0	406.0 | 406.0	695.0 | 689.0	1244.0 | 1179.0	1418.0 | 1335.0	1603.0 | 1502.0
Activity	SPUD	RUN CSG	PRESS TEST	DRILL	DRILL	DRILL	LOGGING
Mud Type Code	200	200	252	252	252	252	252
Hole Size -in	12.25	12.25	8.500	8.500	8.500	8.500	8.500
Circ Volume -bbl	338	403		477	677	670	687
Flow Rate -gal/min	594	594		505	487	487	451
Circ Pressure -psi	1000	1500		1700	1900	2000	2000
Avg ROP -m/hr	23.0	30.0		27.5	23.0	12.4	15.0
Sample From	PIT 24:00	PIT 24:00	PIT 24:00	FL 24:00	FL 24:00	FL 24:00	PIT 24:00
Flow Line Temp -°F							
Mud Wt -lb/gal	8.8	9.1	8.6	8.9	9.4	9.4	9.5
Funnel Vis -s/qt	38	40	45	41	45	47	56
PV -cps				9	16	17	21
YP/R3 -lb/100ft2				27	26	28 | 5	31
10s/10m Gel				4 | 7	4 | 7	5 | 10	7 | 15
API Filtrate -cm3				9.0	5.2	5.2	5.8
HTHP Filtrate -cm3							
Cake API/HT -1/32"				1	1	1	1
Solids -%vol					8	8	8.5
Oil/Water -%vol					0 | 92	0 | 92	0 | 91.5
Sand -%vol					0.25	0.25	0.25
MBT -lb/bbl					5.0	7.5	10
pH				9.5	10	9.2	9.2
Alkal Mud (Pm)					0.4	0.2	0.2
Pf/Mf					0.35 | 1.0	0.15 | 0.7	0.15 | 0.7
Chlorides -mg/L					29500	27000	22000
Hardness (Ca)-mg/L					80	160	160
				4	5.0	5	4.0
JET VEL	99	99		1.4	2.0	2.0	2.0
IMPACT F	875	905		95	92	96	89
				728	715	745	645
Daily Mud Cost -	589	263	6507	2534	4763	1852	1799
Cumml Mud Cost -	589	853	7360	9894	14657	16510	18309
Sales Engineer	KELLEHER J	KELLEHER J	KELLEHER J	KELLEHER J	KELLEHER J	KELLEHER J	KELLEHER J
Products Used	TGEL 50	TGEL 20	SODA 2	SODA 3	SODA 6	SODA 1	GLUT 2
	SODA 1	LIME 1	C121 6	C121 2	C121 2	KCL 40	SODA 1
	C121 1	GEL 12	CAUS 2	KCL 40	KCL 160	POL+ 10	KCL 40
	CAUS 1	SAPP 2	KCL 160	DVIS 2	DVIS 1	SODS 1	DVIS 1
	LIME 1		DVIS 6	POL+ 8	POL+ 16	C122 2	POL+ 3
			POL+ 12	SODS 4	SODS 2		SODS 1
					C122 2		BAR 60

Remarks

22/03 : SPUD IN NORTH PAARATTE 5. DRILL 12.25" TO 153M.

23/03 : DRILL TO INTERVAL TD AT 406M. WIPER TRIP. POOH AND RUN CASING.

24/03 : RUN CASING AND CEMENT. NIPPLE UP BOP AND TEST.

25/03 : RIH AND DRILL OUT CEMENT AND NEW HOLE TO 409M. RUN FIT. DRILL 8.5" DEVIATED HOLE TO 695M.

26/03 : DIRECTIONAL DRILL 8.5" TO 1244M.

27/03 : DIRECTIONAL DRILL TO 1278M. CIRC BU. POOH. RIH WITH NEW BIT. DRILL FROM 1278 TO 1418M.

28/03 : DIRECTIONAL DRILL TD AT 1603M. CIRC. WIPER TRIP (TIGHT). POOH TO RUN LOGS.

DRILLING FLUIDS SUMMARY

Operator : BORAL ENERGY PETR P **Contractor :** CENTURY DRILLING **Description :** DEVELOPMENT

Well Name : NORTH PAARATTE 5 **Field/Area :** PAARATTE **Location :** OTWAY BASIN

Date - Day	29/03/99- 8						
Depth/TVD -m							
Activity	RUN CASING						
Mud Type Code	252						
Hole Size -in	8.500						
Circ Volume -bbl							
Flow Rate -gal/min							
Circ Pressure -psi							
Avg ROP -m/hr							
Sample From							
Flow Line Temp -°F							
Mud Wt -lb/gal							
Funnel Vis -s/qt							
PV -cps							
YP/R3 -lb/100ft2	|						
10s/10m Gel	|						
API Filtrate -cm3							
HTHP Filtrate -cm3							
Cake API/HT -1/32"	|						
Solids -%vol							
Oil/Water -%vol	|						
Sand -%vol							
MBT -lb/bbl							
pH							
Alkal Mud (Pm)							
Pf/Mf	|						
Chlorides -mg/L							
Hardness (Ca)-mg/L							
KCL %WT							
PHPA PPB							
JET VEL							
IMPACT F							
Daily Mud Cost -	916						
Cumml Mud Cost -	19225						
Sales Engineer	KELLEHER J						
Products Used	GLUT 1						
	KCL 50						
	BAR 30						

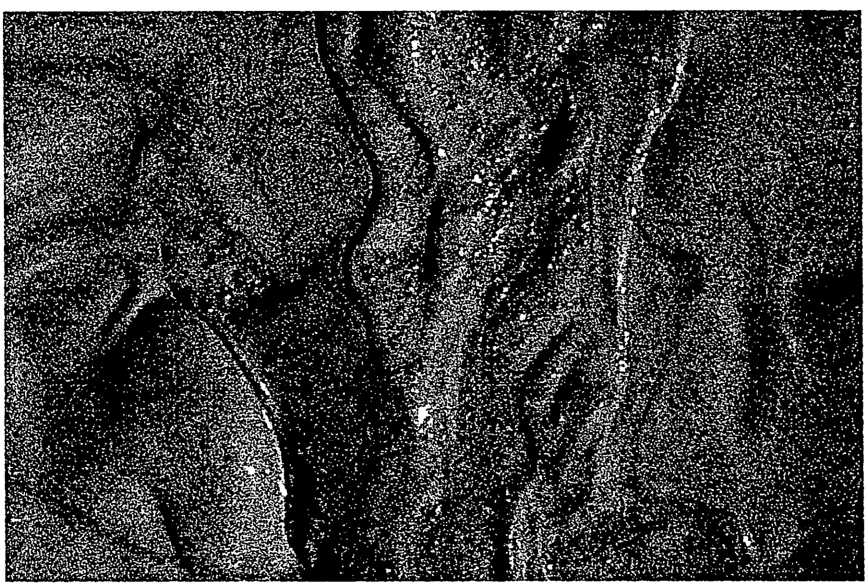
Remarks

29/03 : FINALIZE WELL

M-I Drilling Fluids L.L.C. **DRILLING FLUIDS DATA MANAGEMENT SYSTEM** **P0005** **May 7, 1999**

907475 168

DAILY MUD & INVENTORY REPORTS



DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #: | Date: 22/03/99 | Depth: 153.0 m

Well No.: P0005 | Spud Date: 22/03/99 | Activity: SPUD

Operator: BORAL ENERGY | Contractor: CENTURY DRILLING | Description: DEVELOPMENT

Well Name: NORTH PAARATTE 5 | Field/Area: PAARATTE | Location: OTWAY BASIN

Report For: B. BEETSON

Bit	12.250in		CASING				MUD VOLUME	(bbl)
Nozzles	16/16/16/ / / 1/32"		Casing OD		Liner OD		Hole Volume	
Drill Pipe 1 OD	5.000 in	75 m	Casing ID		Liner ID		Pits Volume	
Drill Pipe 2 OD			Casing TD		Liner TD		Circulating volume	338
Drill Collar OD	6.500 in	78.0 m	Casing TVD		Liner TVD		Mud	FW SPUD MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		PIT 24:00			
Flow Line Temp					
Depth/TVD	-m	153.0 /153.0			
Mud Wt	-lb/gal	8.8			
Funnel Visc	-s/qt	38 @ °F			
Plastic Visc	-cps				
YP/R3	-lb/100ft2 /deg				
10s/10m Gel	-lb/100ft2				
API F Loss	-cc/30 min				
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"				
Solids	-% Vol				
Oil/Water	-% Vol				
Sand	-% Vol				
MBT	-lb/bbl				
pH					
Alkal Mud (Pm)					
Pf/Mf					
Chlorides	-mg/l				
Hardness Ca					
JET VEL		99			
IMPACT F		875			
np Value					
Kp	-lb-sec^n/100ft				
na Value					
Ka	-lb-sec^n/100ft				

CIRCULATION DATA		
Flow Rate	-gal/min	594
DP Annular Vel	-m/min	
DC Annular Vel	-m/min	
DP Critical Vel	-m/min	
DC Critical Vel	-m/min	
Circ. Pressure	-psi	1000
Bottoms Up	-min	
Total Circ Time	-min	

SOLIDS ANALYSIS	(% / lb/bbl)
NaCl	
KCl	
Low Gravity Solids	
Bentonite	/
Drill Solids	/
Weight Material	
Chemical Conc	
Inert/React	Average SG

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	84	
Shaker #2	84	
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander		
Desilter		
Degasser		

Remarks:

SPUD IN NORTH PAARATTE 5. DRILL 12.25" TO 153M.

North Paaratte 5 was spudded in at 17:30 hrs with a 12.25" Varel L114 bit.
Drilled to 153m by midnight report time without problems.
Initially mixed up 120 bbls of spud mud at 36 vis using Trugel.
Used 1 sack C 121 Viscosifier in 35 bbls of water in the pill tank to judge yield. This gave a 64 funnel vis. Will use as a high vis sweep when required.

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	
Mud Built	360
Mud Received	
Mud Disposed	22

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	589	589

DRILLING FLUIDS

WELLSITE MUD INVENTORY

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. : -
Date : 22/03/99

COST SUMMARY

Total Daily Cost : 589.39
Cumulative Cost : 589.39

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90		57			57		0.00
Trugel	25 KG S	7.90		600		50	550	50	395.00
M-I Bar	25 KG S	5.53		400			400		0.00
C121	25 KG S	140.10		80		1	79	1	140.10
C122	25 KG S	140.10		40			40		0.00
Flovis	25 KG S	385.29		56			56		0.00
Defoamer	25 LT D	54.21		5			5		0.00
Polyplus	25 KG S	101.70		120			120		0.00
Potassm Chloride	25 KG S	12.79		600			600		0.00
Mica Medium	25 KG S	12.10		32			32		0.00
Kwik Seal M	40 LB S	35.37		48			48		0.00
MIX2	25 KG S	42.02		48			48		0.00
GLUT	25 LT D	111.09		10			10		0.00
Caustic Soda	25 KG D	29.50		32		1	31	1	29.50
Lime	25 KG S	10.36		54		1	53	1	10.36
Soda Ash	25 KG S	14.43		48		1	47	1	14.43
SODS	25 KG S	28.80		40			40		0.00
SAPP	25 KG S			20			20		0.00
C209	208 LT	606.43		4			4		0.00

907475 171

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #:
Date: 23/03/99
Depth: 406.0 m

Well No.: P0005
Spud Date: 22/03/99
Activity: RUN CSG

Operator: BORAL ENERGY
Contractor: CENTURY DRILLING
Description: DEVELOPMENT

Well Name: NORTH PAARATTE 5
Field/Area: PAARATTE
Location: OTWAY BASIN

Report For: B. BEETSON

Bit	12.250in		CASING				MUD VOLUME	(bbl)
Nozzles	16/16/16/ / / 1/32"		Casing OD		Liner OD		Hole Volume	
Drill Pipe 1 OD	4.500 in	133 m	Casing ID		Liner ID		Pits Volume	
Drill Pipe 2 OD	5.000 in	195.0m	Casing TD		Liner TD		Circulating volume	403
Drill Collar OD	6.500 in	78.0 m	Casing TVD		Liner TVD		Mud	FW SPUD MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		PIT 24:00			
Flow Line Temp					
Depth/TVD	-m	406.0 /406.0			
Mud Wt	-lb/gal	9.1			
Funnel Visc	-s/qt	40 @ °F			
Plastic Visc	-cps				
YP/R3	-lb/100ft2 /deg				
10s/10m Gel	-lb/100ft2				
API F Loss	-cc/30 min				
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"				
Solids	-% Vol				
Oil/Water	-% Vol				
Sand	-% Vol				
MBT	-lb/bbl				
pH					
Alkal Mud (Pm)					
Pf/Mf					
Chlorides	-mg/l				
Hardness Ca					
JET VEL		99			
IMPACT F		905			
np Value					
Kp	-lb-sec^n/100ft				
na Value					
Ka	-lb-sec^n/100ft				

CIRCULATION DATA		
Flow Rate	-gal/min	594
DP Annular Vel	-m/min	
DC Annular Vel	-m/min	
DP Critical Vel	-m/min	
DC Critical Vel	-m/min	
Circ. Pressure	-psi	1500
Bottoms Up	-min	
Total Circ Time	-min	

SOLIDS ANALYSIS	(% / lb/bbl)
NaCl	
KCl	
Low Gravity Solids	
Bentonite	/
Drill Solids	/
Weight Material	
Chemical Conc	
Inert/React	Average SG

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	84	
Shaker #2	84	
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	10
Desilter	10X6"	10
Degasser		

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	180
Mud Built	
Mud Received	
Mud Disposed	88
Downhole Los	200

Remarks:

DRILL TO INTERVAL TD AT 406M. WIPER TRIP. POOH AND RUN CASING.
Drill 12.25" to TD the interval at 406m. Hole packed off at 362m while working mud ring out of system. Downhole losses while packed off was around 200 bbls. A wiper trip to the surface was made back from 406m with good hole all way. On circulating after the wiper trip, a smaller mud ring was circulated out.
M-I Gel was used for the upcoming cement job and the 2 sacks of SAPP was written off as damaged.

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	263	853

DRILLING FLUIDS

WELLSITE MUD INVENTORY

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. :
Date : 23/03/99

COST SUMMARY

Total Daily Cost : 263.16
Cumulative Cost : 852.55

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	57			12	45	12	94.80
Trugel	25 KG S	7.90	550			20	530	70	158.00
M-I Bar	25 KG S	5.53	400				400		0.00
C121	25 KG S	140.10	79				79	1	0.00
[illegible]22	25 KG S	140.10	40				40		0.00
[illegible]ovis	25 KG S	385.29	56				56		0.00
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	120				120		0.00
Potassm Chloride	25 KG S	12.79	600				600		0.00
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	10				10		0.00
Caustic Soda	25 KG D	29.50	31				31	1	0.00
Lime	25 KG S	10.36	53			1	52	2	10.36
Soda Ash	25 KG S	14.43	47				47	1	0.00
SODS	25 KG S	28.80	40				40		0.00
SAPP	25 KG S		20			2	18	2	0.00
C209	208 LT	606.43	4				4		0.00

907475 173

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #: | **Date:** 24/03/99 | **Depth:** 406.0 m

Well No.: P0005 | **Spud Date:** 22/03/99 | **Activity:** PRESS TEST

Operator: BORAL ENERGY | **Contractor:** CENTURY DRILLING | **Description:** DEVELOPMENT

Well Name: NORTH PAARATTE 5 | **Field/Area:** PAARATTE | **Location:** OTWAY BASIN

Report For: B. BEETSON

Bit	8.500 in	CASING				MUD VOLUME (bbl)	
Nozzles		Casing OD	9.625 in	Liner OD		Hole Volume	
Drill Pipe 1 OD	406 m	Casing ID	8.921 in	Liner ID		Pits Volume	
Drill Pipe 2 OD		Casing TD	401.0 m	Liner TD		Circulating volume	
Drill Collar OD		Casing TVD	401.0 m	Liner TVD		Mud	PHPA/KCL/MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		PIT 24:00			
Flow Line Temp					
Depth/TVD	-m	406.0 /406.0			
Mud Wt	-lb/gal	8.6			
Funnel Visc	-s/qt	45 @ °F			
Plastic Visc	-cps				
YP/R3	-lb/100ft2 /deg				
10s/10m Gel	-lb/100ft2				
API F Loss	-cc/30 min				
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"				
Solids	-% Vol				
Oil/Water	-% Vol				
Sand	-% Vol				
MBT	-lb/bbl				
pH					
Alkal Mud (Pm)					
Pf/Mf					
Chlorides	-mg/l				
Hardness Ca					
JET VEL					
IMPACT F					
np Value					
Kp	-lb-sec^n/100ft				
na Value					
Ka	-lb-sec^n/100ft				

CIRCULATION DATA		
Flow Rate	-gal/min	
DP Annular Vel	-m/min	
DC Annular Vel	-m/min	
DP Critical Vel	-m/min	
DC Critical Vel	-m/min	
Circ. Pressure	-psi	
Bottoms Up	-min	
Total Circ Time	-min	

SOLIDS ANALYSIS	(% / lb/bbl)
NaCl	
KCl	
Low Gravity Solids	
Bentonite	/
Drill Solids	/
Weight Material	
Chemical Conc	
Inert/React	Average SG

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	84	
Shaker #2	84	
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	
Desilter	10X6"	
Degasser		

Remarks:

RUN CASING AND CEMENT. NIPPLE UP BOP AND TEST.

The 9 5/8" casing was run to 401m and cemented with cement returns to surface.
The cement was displaced with water with gel spud mud dumped.
Nippled up BOP and pressure tested.
Dumped and cleaned pits.
Made up 600 bbls of KCl/PHPA at 8.6 ppg with 4% by weight KCl, 1.0 lb/bbl PHPA, 0.5 lb/bbl Duovis and 0.5 lb/bbl C 121 Viscosifier

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	
Mud Built	600
Mud Received	
Mud Disposed	403
Downhole Los	

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	6507	7360

DRILLING FLUIDS

WELLSITE MUD INVENTORY

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. :
Date : 24/03/99

COST SUMMARY

Total Daily Cost : 6507.00
Cumulative Cost : 7359.55

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	45				45	12	0.00
Trugel	25 KG S	7.90	530				530	70	0.00
M-I Bar	25 KG S	5.53	400				400		0.00
C121	25 KG S	140.10	79			6	73	7	840.60
C122	25 KG S	140.10	40				40		0.00
Duovis	25 KG S	385.29	56			6	50	6	2311.74
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	120			12	108	12	1220.40
Potassm Chloride	25 KG S	12.79	600			160	440	160	2046.40
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	10				10		0.00
Caustic Soda	25 KG D	29.50	31			2	29	3	59.00
Lime	25 KG S	10.36	52				52	2	0.00
Soda Ash	25 KG S	14.43	47			2	45	3	28.86
SODS	25 KG S	28.80	40				40		0.00
SAPP	25 KG S		18				18	2	0.00
C209	208 LT	606.43	4				4		0.00

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #:		Date:	25/03/99	Depth:	695.0 m
Well No.:	P0005	Spud Date:	22/03/99	Activity:	DRILL
Operator:	BORAL ENERGY	Contractor:	CENTURY DRILLING	Description:	DEVELOPMENT
Well Name:	NORTH PAARATTE 5	Field/Area:	PAARATTE	Location:	OTWAY BASIN
Report For:	B. BEETSON				

Bit	8.500 in		CASING				MUD VOLUME	(bbl)
Nozzles	15/15/15/ / / 1/32"		Casing OD	9.625 in	Liner OD		Hole Volume	145
Drill Pipe 1 OD	4.500 in	381 m	Casing ID	8.921 in	Liner ID		Pits Volume	332
Drill Pipe 2 OD	5.000 in	272.0m	Casing TD	401.0 m	Liner TD		Circulating volume	477
Drill Collar OD	6.500 in	42.0 m	Casing TVD	401.0 m	Liner TVD		Mud	PHPA/KCL/MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		FL 24:00			
Flow Line Temp					
Depth/TVD	-m	695.0 /689.0			
Mud Wt	-lb/gal	8.9			
Funnel Visc	-s/qt	41 @ °F			
Plastic Visc	-cps	9 @ °F			
YP/R3	-lb/100ft2 /deg	27 /			
10s/10m Gel	-lb/100ft2	4 //			
API F Loss	-cc/30 min	9.0			
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"	1 /			
Solids	-% Vol				
Oil/Water	-% Vol				
Sand	-% Vol				
MBT	-lb/bbl				
pH		9.5 @ °F			
Alkal Mud (Pm)					
Pf/Mf					
Chlorides	-mg/l				
Hardness Ca					
KCL %WT		4			
PHPA PPB		1.4			
JET VEL		95			
IMPACT F		728			
np Value		0.322			
Kp	-lb-sec^n/100ft	5.16558			
na Value		0.322			
Ka	-lb-sec^n/100ft	5.16558			

CIRCULATION DATA		
Flow Rate	-gal/min	505
DP Annular Vel	-m/min	79.8
DC Annular Vel	-m/min	125.8
DP Critical Vel	-m/min	123.7
DC Critical Vel	-m/min	137.7
Circ. Pressure	-psi	1700
Bottoms Up	-min	9.8
Total Circ Time	-min	39.7

SOLIDS ANALYSIS	(% / lb/bbl)
NaCl	
KCl	
Low Gravity Solids	
Bentonite	/
Drill Solids	/
Weight Material	
Chemical Conc	
Inert/React	Average SG

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	84	11
Shaker #2	84	11
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	8
Desilter	10X6"	8
Degasser		

Remarks:

RIH AND DRILL OUT CEMENT AND NEW HOLE TO 409M. RUN FIT.
DRILL 8.5" DEVIATED HOLE TO 695M.
Run in with 8.5" HTC MX03 with MWD and mud motor. Tag cement at 383m and pressure test. Drill out float and shoe track plus 3m new formation to 409m using water. Change over to KCl/PHPA mud at 8.6 ppg and run FIT to 14.2 ppg. Directional drill to 695m with deviation 25.3 degrees at 675m.
Cuttings from the Dilwyn sandstone of reasonable quality.
Using water from the sump for premixes because the sump is getting full. This water has a pH of 12. Adding some of the PolyPlus directly to the active to avoid degradation in the high pH water. Full test kit not on sight as yet.

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	
Mud Built	100
Mud Received	
Mud Disposed	223
Downhole Los	
Solids Contr	120

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	2534	9894

907475 176

WELLSITE MUD INVENTORY

DRILLING FLUIDS

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. :
Date : 25/03/99

COST SUMMARY

Total Daily Cost : 2534.47
Cumulative Cost : 9894.02

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	45				45	12	0.00
Trugel	25 KG S	7.90	530				530	70	0.00
M-I Bar	25 KG S	5.53	400				400		0.00
C121	25 KG S	140.10	73			2	71	9	280.20
C122	25 KG S	140.10	40				40		0.00
Duovis	25 KG S	385.29	50			2	48	8	770.58
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	108			8	100	20	813.60
Potassm Chloride	25 KG S	12.79	440			40	400	200	511.60
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	10				10		0.00
Caustic Soda	25 KG D	29.50	29				29	3	0.00
Lime	25 KG S	10.36	52				52	2	0.00
Soda Ash	25 KG S	14.43	45			3	42	6	43.29
SODS	25 KG S	28.80	40			4	36	4	115.20
SAPP	25 KG S		18				18	2	0.00
C209	208 LT	606.43	4				4		0.00

907475 177

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #: | Date: 26/03/99 | Depth: 1244.0m

Well No.: P0005 | Spud Date: 22/03/99 | Activity: DRILL

Operator: BORAL ENERGY | Contractor: CENTURY DRILLING | Description: DEVELOPMENT

Well Name: NORTH PAARATTE 5 | Field/Area: PAARATTE | Location: OTWAY BASIN

Report For: B. BEETSON

Bit	8.500 in		CASING				MUD VOLUME	(bbl)
Nozzles	15/15/15/ / / 1/32"		Casing OD	9.625 in	Liner OD		Hole Volume	261
Drill Pipe 1 OD	4.500 in	930 m	Casing ID	8.921 in	Liner ID		Pits Volume	416
Drill Pipe 2 OD	5.000 in	272.0m	Casing TD	401.0 m	Liner TD		Circulating volume	677
Drill Collar OD	6.500 in	42.0 m	Casing TVD	401.0 m	Liner TVD		Mud	PHPA/KCL/MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		FL 24:00			
Flow Line Temp					
Depth/TVD	-m	1244.0/1179.0			
Mud Wt	-lb/gal	9.4			
Funnel Visc	-s/qt	45 @ °F			
Plastic Visc	-cps	16 @ °F			
YP/R3	-lb/100ft2 /deg	26 /			
10s/10m Gel	-lb/100ft2	4 /7			
API F Loss	-cc/30 min	5.2			
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"	1 /			
Solids	-% Vol	8			
Oil/Water	-% Vol	0 /92			
Sand	-% Vol	0.25			
MBT	-lb/bbl	5.0			
pH		10.0 @ °F			
Alkal Mud (Pm)		0.4			
Pf/Mf		0.35 / 1.0			
Chlorides	-mg/l	29500			
Hardness Ca		80			
KCL %WT		5.0			
PHPA PPB		2.0			
JET VEL		92			
IMPACT F		715			
np Value		0.465			
Kp	-lb-sec^n/100ft	2.46050			
na Value		0.465			
Ka	-lb-sec^n/100ft	2.46050			

CIRCULATION DATA		
Flow Rate	-gal/min	487
DP Annular Vel	-m/min	77.0
DC Annular Vel	-m/min	121.3
DP Critical Vel	-m/min	117.8
DC Critical Vel	-m/min	139.5
Circ. Pressure	-psi	1900
Bottoms Up	-min	18.0
Total Circ Time	-min	58.4

SOLIDS ANALYSIS		(% / lb/bbl)	
NaCl		0.2 / 3	
KCl		1.8 / 17	
Low Gravity Solids		5.8 / 53	
Bentonite		0.5 / 5	
Drill Solids		4.9 / 45	
Weight Material		N/A / N/A	
Chemical Conc		- / 3.0	
Inert/React	8.98	Average SG	2.60

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	110	24
Shaker #2	84	24
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	24
Desilter	10X6"	24
Degasser		

Remarks:

DIRECTIONAL DRILL 8.5" TO 1244M.

Drill deviated hole through claystones and sandstone at an average 23 meters/hour. Deviation at 1195m was 25.9 degrees.
Still using sump water for premixes but the pH now down to 10.0 in the water.
Clay cuttings still discrete but some non reactive clays getting into the system raising the mud weight.

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	
Mud Built	360
Mud Received	
Mud Disposed	160
Downhole Los	
Solids Contr	100

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	4763	14657

DRILLING FLUIDS

WELLSITE MUD INVENTORY

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
M-I Well No. : P0005
Well Name : NORTH PAARATTE 5
Report No. : [illegible]
Location : OTWAY BASIN
Date : 26/03/99

COST SUMMARY

Total Daily Cost : 4763.47
Cumulative Cost : 14657.49

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	45				45	12	0.00
Trugel	25 KG S	7.90	530				530	70	0.00
M-I Bar	25 KG S	5.53	400				400		0.00
C121	25 KG S	140.10	71			2	69	11	280.20
C122	25 KG S	140.10	40			2	38	2	280.20
Duovis	25 KG S	385.29	48			1	47	9	385.29
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	100			16	84	36	1627.20
Potassm Chloride	25 KG S	12.79	400			160	240	360	2046.40
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	10				10		0.00
Caustic Soda	25 KG D	29.50	29				29	3	0.00
Lime	25 KG S	10.36	52				52	2	0.00
Soda Ash	25 KG S	14.43	42			6	36	12	86.58
SODS	25 KG S	28.80	36			2	34	6	57.60
SAPP	25 KG S		18				18	2	0.00
C209	208 LT	606.43	4				4		0.00

907475 179

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #:		Date:	27/03/99	Depth:	1418.0m
Well No.:	P0005	Spud Date:	22/03/99	Activity:	DRILL
Operator:	BORAL ENERGY	Contractor:	CENTURY DRILLING	Description:	DEVELOPMENT
Well Name:	NORTH PAARATTE 5	Field/Area:	PAARATTE	Location:	OTWAY BASIN
Report For:	B. BEETSON				

Bit	8.500 in		CASING				MUD VOLUME	(bbl)
Nozzles	14/14/16/ / / 1/32"		Casing OD	9.625 in	Liner OD		Hole Volume	298
Drill Pipe 1 OD	4.500 in	1104 m	Casing ID	8.921 in	Liner ID		Pits Volume	372
Drill Pipe 2 OD	5.000 in	272.0m	Casing TD	401.0 m	Liner TD		Circulating volume	670
Drill Collar OD	6.500 in	42.0 m	Casing TVD	401.0 m	Liner TVD		Mud	PHPA/KCL/MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		FL 24:00			
Flow Line Temp					
Depth/TVD	-m	1418.0/1335.0			
Mud Wt	-lb/gal	9.4			
Funnel Visc	-s/qt	47 @ °F			
Plastic Visc	-cps	17 @ °F			
YP/R3	-lb/100ft2 /deg	28 /5			
10s/10m Gel	-lb/100ft2	5 /10			
API F Loss	-cc/30 min	5.2			
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"	1 /			
Solids	-% Vol	8			
Oil/Water	-% Vol	0 /92			
Sand	-% Vol	0.25			
MBT	-lb/bbl	7.5			
pH		9.2 @ °F			
Alkal Mud (Pm)		0.2			
Pf/Mf		0.15 / 0.7			
Chlorides	-mg/l	27000			
Hardness Ca		160			
KCL %WT		5			
PHPA PPB		2.0			
JET VEL		96			
IMPACT F		745			
np Value		0.462			
Kp	-lb-sec^n/100ft	2.69137			
na Value		0.477			
Ka	-lb-sec^n/100ft	2.44985			

CIRCULATION DATA		
Flow Rate	-gal/min	487
DP Annular Vel	-m/min	77.0
DC Annular Vel	-m/min	121.3
DP Critical Vel	-m/min	121.9
DC Critical Vel	-m/min	145.3
Circ. Pressure	-psi	2000
Bottoms Up	-min	20.5
Total Circ Time	-min	57.8

SOLIDS ANALYSIS		(% / lb/bbl)	
NaCl		0.1 / 1	
KCl		1.8 / 17	
Low Gravity Solids		6.0 / 54	
Bentonite		0.8 / 8	
Drill Solids		4.8 / 44	
Weight Material		N/A / N/A	
Chemical Conc		- / 3.0	
Inert/React	5.86	Average SG	2.60

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	110	24
Shaker #2	84	24
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	14
Desilter	10X6"	10
Degasser		

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	
Mud Built	150
Mud Received	
Mud Disposed	157
Downhole Los	
Solids Contr	90

Remarks:

DIRECTIONAL DRILL TO 1278M. CIRC BU. POOH. RIH WITH NEW BIT. DRILL FROM 1278 TO 1418M.

Drill 8.5" from 1244 to 1278m. Circulate hole clean and pull out for bit change. Some tght hole on coming out. Run in with a new bit Varel ETD 417 encountering good hole and no fill. Reamed from 1260 to 1278m before drilling ahead to 1418m.

Drilling mainly sands. Mud properties stable. Draining the 30 bbl dead volume from the premix pit with portable pump to prevent hopper blocking up when adding polymers.

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	1852	16510

MI DRILLING FLUIDS

WELLSITE MUD INVENTORY

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. : [illegible]
Date : 27/03/99

COST SUMMARY

Total Daily Cost : 1852.03
Cumulative Cost : 16509.52

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	45				45	12	0.00
Trugel	25 KG S	7.90	530				530	70	0.00
M-I Bar	25 KG S	5.53	400				400		0.00
C121	25 KG S	140.10	69				69	11	0.00
C122	25 KG S	140.10	38			2	36	4	280.20
Duovis	25 KG S	385.29	47				47	9	0.00
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	84			10	74	46	1017.00
Potassm Chloride	25 KG S	12.79	240			40	200	400	511.60
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	10				10		0.00
Caustic Soda	25 KG D	29.50	29				29	3	0.00
Lime	25 KG S	10.36	52				52	2	0.00
Soda Ash	25 KG S	14.43	36			1	35	13	14.43
SODS	25 KG S	28.80	34			1	33	7	28.80
SAPP	25 KG S		18				18	2	0.00
C209	208 LT	606.43	4				4		0.00
HCL	25 LT D	28.55		4			4		0.00

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #:		**Date:**	28/03/99	**Depth:**	1603.0m
Well No.:	P0005	**Spud Date:**	22/03/99	**Activity:**	LOGGING
Operator:	BORAL ENERGY	**Contractor:**	CENTURY DRILLING	**Description:**	DEVELOPMENT
Well Name:	NORTH PAARATTE 5	**Field/Area:**	PAARATTE	**Location:**	OTWAY BASIN
Report For:	B. BEETSON				

Bit	8.500 in		CASING				MUD VOLUME	(bbl)
Nozzles	14/14/16/ / / 1/32"		Casing OD	9.625 in	Liner OD		Hole Volume	337
Drill Pipe 1 OD	4.500 in	1289 m	Casing ID	8.921 in	Liner ID		Pits Volume	350
Drill Pipe 2 OD	5.000 in	272.0m	Casing TD	401.0 m	Liner TD		Circulating volume	687
Drill Collar OD	6.500 in	42.0 m	Casing TVD	401.0 m	Liner TVD		Mud	PHPA/KCL/MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From		PIT 24:00			
Flow Line Temp					
Depth/TVD	-m	1603.0/1502.0			
Mud Wt	-lb/gal	9.5			
Funnel Visc	-s/qt	56 @ °F			
Plastic Visc	-cps	21 @ °F			
YP/R3	-lb/100ft2 /deg	31 /			
10s/10m Gel	-lb/100ft2	7 /15			
API F Loss	-cc/30 min	5.8			
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"	1 /			
Solids	-% Vol	8.5			
Oil/Water	-% Vol	0 /91.5			
Sand	-% Vol	0.25			
MBT	-lb/bbl	10.0			
pH		9.2 @ °F			
Alkal Mud (Pm)		0.2			
Pf/Mf		0.15 / 0.7			
Chlorides	-mg/l	22000			
Hardness Ca		160			
KCL %WT		4.0			
PHPA PPB		2.0			
JET VEL		89			
IMPACT F		645			
np Value		0.489			
Kp	-lb-sec^n/100ft	2.62768			
na Value		0.489			
Ka	-lb-sec^n/100ft	2.62768			

CIRCULATION DATA		
Flow Rate	-gal/min	451
DP Annular Vel	-m/min	71.3
DC Annular Vel	-m/min	112.3
DP Critical Vel	-m/min	131.9
DC Critical Vel	-m/min	158.1
Circ. Pressure	-psi	2000
Bottoms Up	-min	25.0
Total Circ Time	-min	64.0

SOLIDS ANALYSIS		(% / lb/bbl)	
NaCl		-0.1 / -1	
KCl		1.8 / 17	
Low Gravity Solids		7.1 / 64	
Bentonite		1.1 / 10	
Drill Solids		5.7 / 51	
Weight Material		N/A / N/A	
Chemical Conc		- / 3.0	
Inert/React	5.15	Average SG	2.60

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	110	14
Shaker #2	84	14
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	14
Desilter	10X6"	12
Degasser		

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	80
Mud Built	120
Mud Received	
Mud Disposed	183
Downhole Los	
Solids Contr	110

Remarks:

DIRECTIONAL DRILL TD AT 1603M. CIRC. WIPER TRIP (TIGHT).
POOH TO RUN LOGS.
Drill deviated hole (25.5 degrees at 1545m) to TD at 1603m. Circulate hole clean. Work tight interval from 1402 to 1345m during wiper. Run back in to 1603m with 6m fill. Circulate and condition mud. Pull out to run logs.
Tight hole section was mainly in the Nullaware Greensands.
On circulating bottoms up after the wiper trip, prodigious quantities of very mushy cuttings came over the shakers. This raised the mudweight by 2 points despite the addition of an extra 40 bbls of water into the system while the mushy cuttings were evident.

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	1799	18309

907475 182

WELLSITE MUD INVENTORY

DRILLING FLUIDS

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. :
Date : 28/03/99

COST SUMMARY

Total Daily Cost : 1799.20
Cumulative Cost : 18308.72

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	45				45	12	0.00
Trugel	25 KG S	7.90	530				530	70	0.00
M-I Bar	25 KG S	5.53	400			60	340	60	331.80
C121	25 KG S	140.10	69				69	11	0.00
[illegible]22	25 KG S	140.10	36				36	4	0.00
Duovis	25 KG S	385.29	47			1	46	10	385.29
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	74			3	71	49	305.10
Potassm Chloride	25 KG S	12.79	200			40	160	440	511.60
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	10			2	8	2	222.18
Caustic Soda	25 KG D	29.50	29				29	3	0.00
Lime	25 KG S	10.36	52				52	2	0.00
Soda Ash	25 KG S	14.43	35			1	34	14	14.43
SODS	25 KG S	28.80	33			1	32	8	28.80
SAPP	25 KG S		18				18	2	0.00
C209	208 LT	606.43	4				4		0.00
HCL	25 LT D	28.55	4				4		0.00

DRILLING FLUIDS

WATER BASE MUD REPORT

Report No.:

API #:		Date:	29/03/99	Depth:	m
Well No.:	P0005	Spud Date:	22/03/99	Activity:	RUN CASING
Operator:	BORAL ENERGY	Contractor:	CENTURY DRILLING	Description:	DEVELOPMENT
Well Name:	NORTH PAARATTE 5	Field/Area:	PAARATTE	Location:	OTWAY BASIN
Report For:	B. BEETSON				

Bit	8.500 in		CASING				MUD VOLUME (bbl)	
Nozzles	14/14/16/ / / 1/32"		Casing OD	9.625 in	Liner OD		Hole Volume	
Drill Pipe 1 OD	4.500 in	Errorm	Casing ID	8.921 in	Liner ID		Pits Volume	
Drill Pipe 2 OD	5.000 in	272.0m	Casing TD	401.0 m	Liner TD		Circulating volume	
Drill Collar OD	6.500 in	42.0 m	Casing TVD	401.0 m	Liner TVD		Mud	PHPA/KCL/MUD

MUD PROPERTIES		Primary	# 1	# 2	# 3
Sample From					
Flow Line Temp					
Depth/TVD	-m	/			
Mud Wt	-lb/gal				
Funnel Visc	-s/qt				
Plastic Visc	-cps				
YP/R3	-lb/100ft2 /deg				
10s/10m Gel	-lb/100ft2				
API F Loss	-cc/30 min				
HTHP F Loss	-cc/30 min				
Cake API/HT	-1/32"				
Solids	-% Vol				
Oil/Water	-% Vol				
Sand	-% Vol				
MBT	-lb/bbl				
pH					
Alkal Mud (Pm)					
Pf/Mf					
Chlorides	-mg/l				
Hardness Ca					
KCL %WT					
PHPA PPB					
JET VEL					
IMPACT F					
np Value					
Kp	-lb-sec^n/100ft				
na Value					
Ka	-lb-sec^n/100ft				

CIRCULATION DATA		
Flow Rate	-gal/min	
DP Annular Vel	-m/min	
DC Annular Vel	-m/min	
DP Critical Vel	-m/min	
DC Critical Vel	-m/min	
Circ. Pressure	-psi	
Bottoms Up	-min	
Total Circ Time	-min	

SOLIDS ANALYSIS	(% / lb/bbl)
NaCl	
KCl	
Low Gravity Solids	
Bentonite	/
Drill Solids	/
Weight Material	
Chemical Conc	
Inert/React	Average SG

SOLIDS EQUIPMENT	Size	Hours
Shaker #1	110	
Shaker #2	84	
Shaker #3		
Shaker #4		
Mud Cleaner		
Centrifuge		
Desander	1X10"	
Desilter	10X6"	
Degasser		

MUD VOLUME ACCOUNTING	(bbl)
Oil Added	
Water Added	
Mud Built	
Mud Received	
Mud Disposed	
Downhole Los	
Solids Contr	

Remarks:

FINALIZE WELL

Ran 7" casing to 1600m. Mud Engineer already released by this time.
Products used for trips and completion.

M-I Sales Engineer	Warehouse	Daily Cost $	Cumul Cost $
KELLEHER J	ADELAIDE	916	19225

907475 184

WELLSITE MUD INVENTORY

DRILLING FLUIDS

DAILY MUD INVENTORY REPORT

Operator : BORAL ENERGY PETR PL
Well Name : NORTH PAARATTE 5
Location : OTWAY BASIN

M-I Well No. : P0005
Report No. :
Date : 29/03/99

COST SUMMARY

Total Daily Cost : 916.49
Cumulative Cost : 19225.21

MUD INVENTORY

Product Name	Unit	Price	Begin Invent	Recvd Today	Return Today	Used Today	Final Invent	Used Total	Daily Cost
M-I Gel	25 KG S	7.90	45				45	12	0.00
Trugel	25 KG S	7.90	530				530	70	0.00
M-I Bar	25 KG S	5.53	340			30	310	90	165.90
C121	25 KG S	140.10	69				69	11	0.00
[illegible]22	25 KG S	140.10	36				36	4	0.00
Duovis	25 KG S	385.29	46				46	10	0.00
Defoamer	25 LT D	54.21	5				5		0.00
Polyplus	25 KG S	101.70	71				71	49	0.00
Potassm Chloride	25 KG S	12.79	160			50	110	490	639.50
Mica Medium	25 KG S	12.10	32				32		0.00
Kwik Seal M	40 LB S	35.37	48				48		0.00
MIX2	25 KG S	42.02	48				48		0.00
GLUT	25 LT D	111.09	8			1	7	3	111.09
Caustic Soda	25 KG D	29.50	29				29	3	0.00
Lime	25 KG S	10.36	52				52	2	0.00
Soda Ash	25 KG S	14.43	34				34	14	0.00
SODS	25 KG S	28.80	32				32	8	0.00
SAPP	25 KG S		18				18	2	0.00
C209	208 LT	606.43	4				4		0.00
HCL	25 LT D	28.55	4				4		0.00

APPENDIX 5

WELL LOCATION SURVEY

907475 186

Alan Simpson
B. App. Sci. (Survey), L.S., M.I.S.

Trevor McDowell
B. App. Sci. (Survey), L.S., M.I.S.

ALAN H. SIMPSON
LAND SURVEYOR - WARRNAMBOOL

A.C.N. 062 912 510

LICENSED SURVEYORS PLANNING CONSULTANTS DEVELOPMENT MANAGERS

P.O. Box 421,
Warrnambool 3280
(125a Kepler Street,)

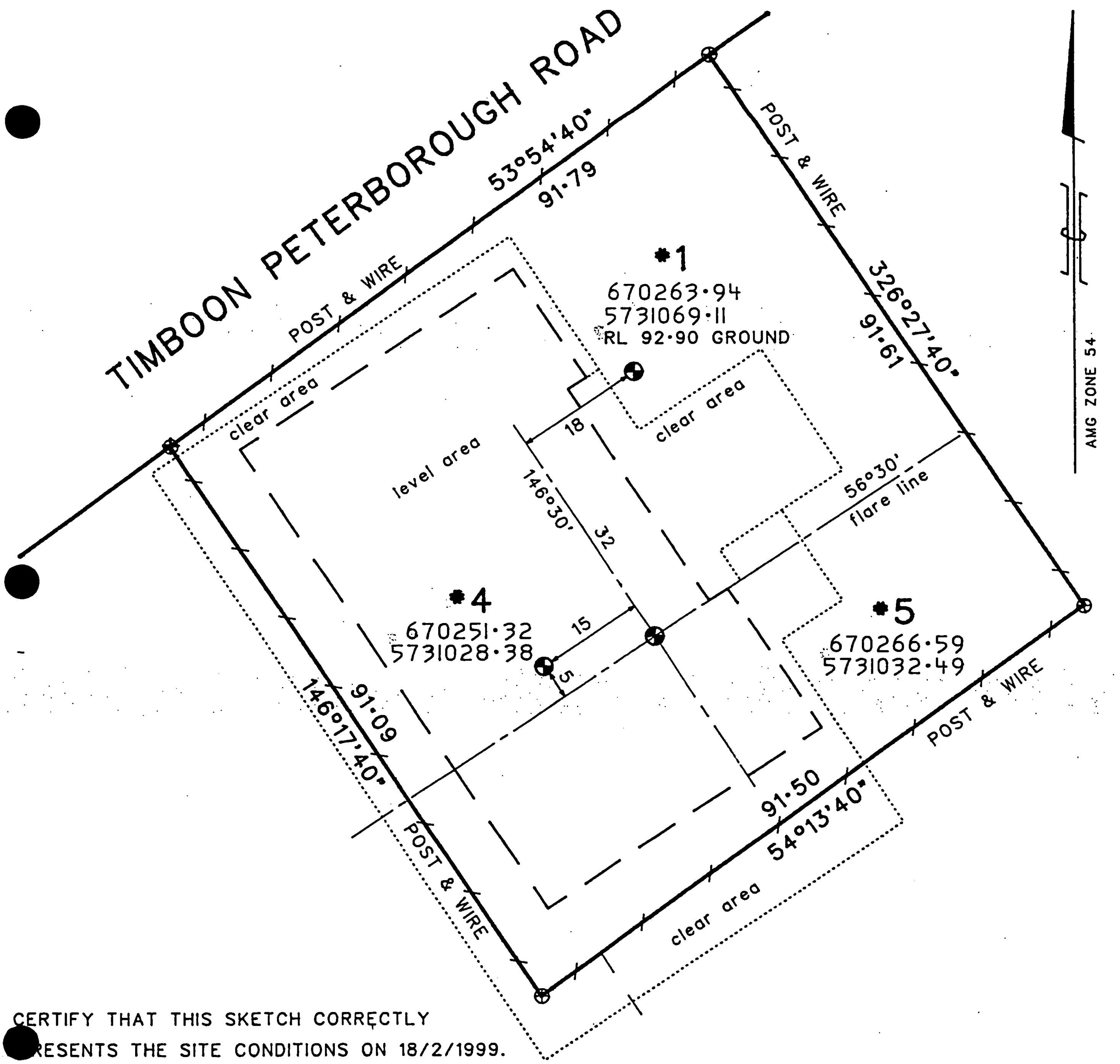
Ph: (03) 5561 1846
Fax: (03) 5562 1775

NORTH PAARATTE

SCALE 1:800

DATUM OF BEARINGS IS TO AMG ZONE 54

	EASTING	NORTHING	LATITUDE	LONGITUDE
NORTH PAARATTE *1	670263·94	5731069·11	-38°33'08·59"	142°57'14·18"
NORTH PAARATTE *4	670251·32	5731028·38	-38°33'09·92"	142°57'13·70"
NORTH PAARATTE *5	670266·59	5731032·49	-38°33'09·78"	142°57'14·32"



I CERTIFY THAT THIS SKETCH CORRECTLY REPRESENTS THE SITE CONDITIONS ON 18/2/1999.

Trevor McDowell

TREVOR McDOWELL L.S.

APPENDIX 6

MWD SURVEY DATA

By

SPERRY-SUN

sperry-sun
DRILLING SERVICES

MWD End of Well Report for

BORAL ENERGY PTY LTD

Rig : CENTURY RIG #2
Well : NORTH PAARATTE 5
Field : OTWAY BASIN
Country : AUSTRALIA

Job No. : AU-DW-90021 Date : 31-MAR-99

907475 189

Contents

1. General Information
2. Operational Overview
3. Summary of MWD Runs
4. Bitrun Summary
5. Surveys

907475 190

Section 1. : General Information

907475 191

General Information

Company	:	BORAL ENERGY PTY LTD
Rig	:	CENTURY RIG #2
Well	:	NORTH PAARATTE 5
Field	:	OTWAY BASIN
Country	:	AUSTRALIA
	:	
Sperry-Sun job number	:	AU-DW-90021
Job start date	:	22-MAR-99
Job end date	:	31-MAR-99
North reference	:	GRID
Declination	:	12.1
Dip angle	:	-69.8
Total magnetic field	:	60.98
Date of magnetic data	:	23-MAR-99
Wellhead coordinates N	:	
Wellhead coordinates E	:	
Vert. section direction	:	73.3
MWD Engineers	:	PAUL DAUD
	:	
	:	
	:	
Company Representatives	:	B.BEETSON
	:	
Company Geologists	:	

Engineering units used :

Depth / length	:	metres	Viscosity	:	sec/litre
OD / ID	:	inches	PV	:	cp
Temperature	:	deg. C	YP	:	Pa
Flow Rate	:	galls/min	Chlorides	:	mg/l
Pressure	:	psi	Fluid loss	:	ml (cc.)
Weight on bit	:	metric Tonnes	Casing weight	:	lbs/ft
Mud Weight	:	ppg			

907475 192

Section 2. : Operational Overview

Operational Overview

Sperry-Sun Drilling Services were contracted by Boral Energy Resources Pty Ltd to provide directional only services while drilling the 8 1/2" hole section of North Paaratte 5 by Century Rig #2.

The section successfully reached TD at 1603 mRT in two bit runs. No MWD problems were experienced during the drilling of this well.

907475 194

Section 3. : Summary of MWD Runs

907475 195

sperry-sun
DRILLING SERVICES

Summary of MWD runs

MWD Run	Bit No.	Hole Size	MWD Sensors	Start Depth	End Depth	Drill/Wipe Distance	Run Start Time	Run Start Date	Run End Time	Run End Date	BRT Hours	Oper. Hours	Circ. Hours	Max. Temp.	Service Interrupt	Trip for MWD	Failure Type
1	2	8.50	DIR	406.0	1278.0	872.0	05:00	25-MAR-99	12:00	27-MAR-99	55.00	55.00	36.60	52.0			
2	3	8.50	DIR	1278.0	1603.0	325.0	12:45	27-MAR-99	21:30	28-MAR-99	32.75	32.75	19.30	52.0			
				TOTALS ⟹		1197.0					87.75	87.75	55.90		0	0	

AU-DW-90021

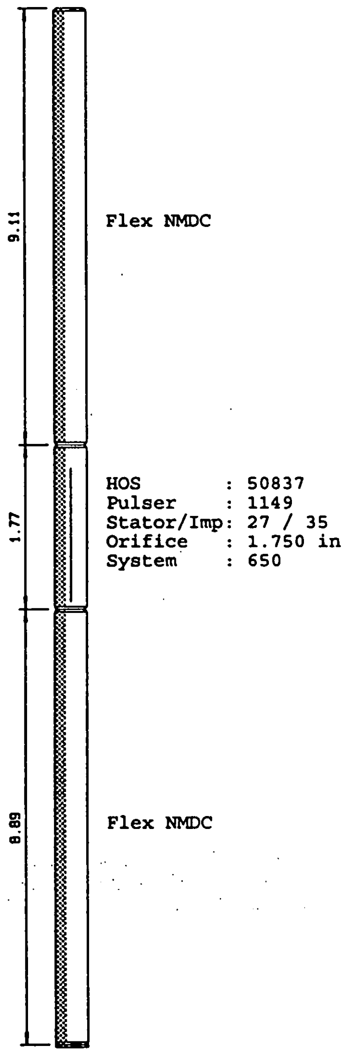
Section 4. : Bitrun Summary

Bitrun Summary

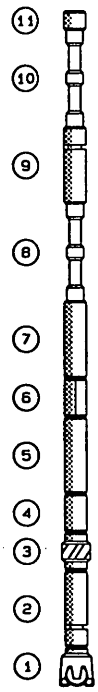
sperry-sun DRILLING SERVICES

MWD Run Time Data	Drilling Data	Mud Data
MWD Run : 1	Start Depth: 406.0 m	Mud type : KCL/PHPA
Rig Bit : 2	End Depth : 1278.0 m	Weight/Visc: 9.40 / 45.0
Hole Size: 8.50 in	Footage : 872.0 m	Chlorides : 29500
Run Start: 05:00 25-MAR-99	Flow Rate : 500.00 gpm	PV / YP : 16 / 26
Run End : 12:00 27-MAR-99	R.P.M. : 80	Solids/Sand: 8.0 / 0.25
BRT hrs : 55.00	W.O.B. : 25 T	
Circ.hrs : 36.60	R.O.P. : 21.3 m/hr	Max. Temp. : 52.0 deg C
Oper.hrs : 55.00	S.P.P : 2000 psi	

MWD Schematic



BHA Schematic



Component	Length	O.D.	I.D.
11. X/O	0.48	6.500	2.813
10. 10 x HWDP	91.00	5.000	3.000
9. JAR	9.40	6.500	2.500
8. 20 x HWDP	182.00	5.000	3.000
7. Flex NMDC	9.11	6.500	2.813
6. HOS	1.77	6.750	2.813
5. Flex NMDC	8.89	6.500	2.813
4. Float sub	0.84	6.500	2.813
3. String stab	1.97	6.750	2.813
2. Sperrydrill 1.5 deg	9.04	6.750	4.498
1. Tricone	0.25	8.500	

Comments

Drill 8 1/2" hole from 406.0m to 1278.0m
POOH to change bit.

MWD Performance

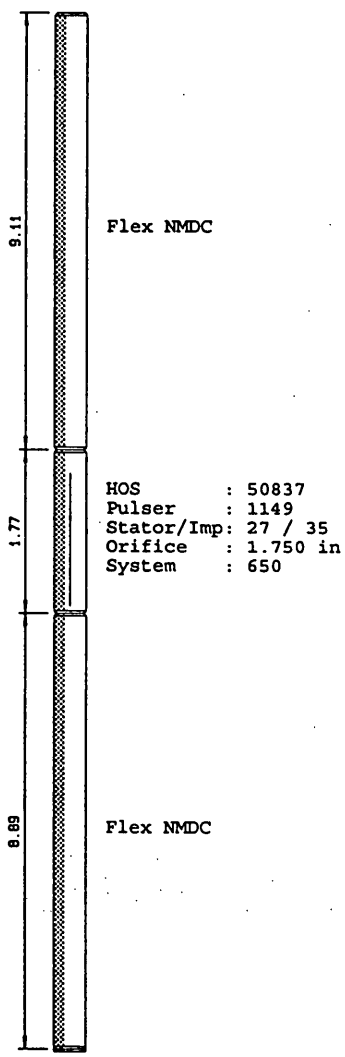
Sys Sz/Type: 650 /D/GWD
Survey/TF %: 95 / 96
Gam RT/Rec%: 0 / 0
Min. Inc. : 0.9 /420
Max. Inc. : 27.0 /836
Min/Max Az.: 37.2 /82.3
Pulser RPM : 2100

Bitrun Summary

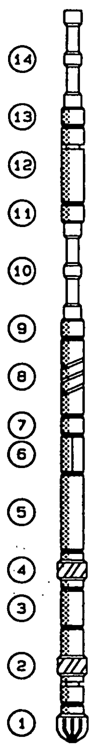
sperry-sun DRILLING SERVICES

MWD Run Time Data	Drilling Data	Mud Data
MWD Run : 2	Start Depth: 1278.0 m	Mud type : KCL/PHPA
Rig Bit : 3	End Depth : 1603.0 m	Weight/Visc: 9.40 / 47.0
Hole Size: 8.50 in	Footage : 325.0 m	Chlorides : 27000
Run Start: 12:45 27-MAR-99	Flow Rate : 500.00 gpm	PV / YP : 17 / 28
Run End : 21:30 28-MAR-99	R.P.M. : 65	Solids/Sand: 8.0 / 0.25
BRT hrs : 32.75	W.O.B. : 20 T	
Circ.hrs : 19.30	R.O.P. : 19.0 m/hr	Max. Temp. : 52.0 deg C
Oper.hrs : 32.75	S.P.P : 2000 psi	

MWD Schematic



BHA Schematic



Component	Length	O.D.	I.D.
14. 18 X 5" HWDP	164.49	5.000	3.000
13. X/O SUB	0.88	6.500	2.625
12. JAR	9.81	6.375	2.813
11. X/OVER SUB	0.63	6.437	2.688
10. 5 X 5" HWDP	45.41	5.000	3.000
9. X/O SUB	0.90	6.500	2.750
8. 3 X 6 1/2" DC	27.43	6.500	2.875
7. X/O SUB	0.51	6.500	2.250
6. HOS	1.84	6.500	2.875
5. NMDC	8.73	6.500	2.815
4. TMS	1.58	6.500	2.875
3. FLOAT SUB	0.92	6.500	2.875
2. 6 1/2" SPERRYDRILL	6.95	6.500	
1. Tricone 8 1/2" bit	0.25	8.500	

Comments

Drill 8 1/2" hole from 1278m to 1603m
POOH to run wireline logs.

MWD Performance

Sys Sz/Type: 650 /D/GWD
Survey/TF %: 95 / 96
Gam RT/Rec%: 0 / 0
Min. Inc. : 24.6 /2583
Max. Inc. : 27.5 /1422
Min/Max Az.: 74.3 /81.3
Pulser RPM : 2000

Section 5. : Surveys

SPERRY-SUN DRILLING SERVICES

NORTH PAARATTE 5

BORAL ENERGY PTY LTD
22-Mar-99
AU-DW-90021

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	VERTICAL DEPTH	LATITUDE METRES		DEPARTURE METRES		VERTICAL SECTION	DOG LEG
0	0	0	0	0	0	0		0	
220	0.3	0	220	0.58	N	0		0.17	0.04
391.2	0.2	0	391.2	1.32	N	0		0.38	0.02
419.51	0.9	58	419.51	1.49	N	0.19	E	0.61	0.86
476.35	1.4	37.2	476.33	2.28	N	0.99	E	1.6	0.34
495.27	1.8	45.7	495.25	2.67	N	1.34	E	2.05	0.74
504.75	3.2	62	504.72	2.9	N	1.68	E	2.44	4.93
514.2	4.6	65.5	514.15	3.18	N	2.26	E	3.07	4.51
523.53	6.2	69.2	523.43	3.51	N	3.07	E	3.95	5.26
542.47	8.3	75.6	542.22	4.22	N	5.35	E	6.33	3.56
551.85	9.6	80	551.49	4.52	N	6.78	E	7.79	4.7
561.38	10.7	81.8	560.87	4.79	N	8.43	E	9.45	3.6
570.82	12.5	82.3	570.12	5.05	N	10.31	E	11.33	5.73
580.23	13.4	79.4	579.29	5.39	N	12.39	E	13.42	3.54
589.76	14.1	77.5	588.54	5.84	N	14.61	E	15.67	2.62
599.23	14.9	76.1	597.71	6.38	N	16.92	E	18.04	2.77
608.7	16.9	75.3	606.82	7.02	N	19.43	E	20.63	6.37
618.18	18.7	74.8	615.84	7.77	N	22.23	E	23.53	5.72
627.67	19.7	74	624.81	8.61	N	25.24	E	26.65	3.27
637.17	20.8	75.3	633.72	9.48	N	28.41	E	29.94	3.75
646.54	21.2	75.3	642.47	10.33	N	31.66	E	33.29	1.28
665.34	24	76.3	659.82	12.1	N	38.66	E	40.51	4.51
674.84	25.3	76.2	668.46	13.04	N	42.51	E	44.47	4.11
684.37	26.2	76.4	677.04	14.02	N	46.53	E	48.6	2.85
693.91	26.2	76	685.6	15.03	N	50.62	E	52.81	0.56
703.41	26.2	76.5	694.12	16.03	N	54.7	E	57	0.7
722.38	26.4	75.1	711.13	18.09	N	62.85	E	65.39	1.03
731.35	26.7	74	719.15	19.16	N	66.71	E	69.4	1.93
760.29	26.9	71.7	744.99	23	N	79.18	E	82.45	1.09
788.66	26.9	70.7	770.29	27.14	N	91.33	E	95.27	0.48
836.02	27	71.6	812.5	34.07	N	111.64	E	116.72	0.27
864.35	26.1	73.4	837.85	37.88	N	123.71	E	129.38	1.28
892.82	26	73.9	863.42	41.4	N	135.71	E	141.88	0.25
921.06	25.7	73.4	888.84	44.87	N	147.53	E	154.2	0.39
968.08	25.5	74.8	931.24	50.44	N	167.06	E	174.51	0.41
1005.95	26.6	74.2	965.26	54.88	N	183.09	E	191.14	0.9
1034.37	26.5	73.8	990.69	58.38	N	195.3	E	203.84	0.22
1062.85	26.7	73.2	1016.15	62.01	N	207.53	E	216.59	0.35
1110.22	25.8	70.9	1058.64	68.46	N	227.46	E	237.53	0.86
1138.65	25.9	71.9	1084.22	72.41	N	239.2	E	249.92	0.47
1167.09	24.9	69.3	1109.92	76.46	N	250.71	E	262.1	1.58
1195.5	25.9	70.9	1135.58	80.6	N	262.17	E	274.27	1.28
1242.79	25.4	71.7	1178.21	87.16	N	281.56	E	294.73	0.39
1257.8	25.4	73.5	1191.77	89.09	N	287.7	E	301.16	1.54
1280.59	25.5	74.9	1212.35	91.76	N	297.12	E	310.96	0.8
1308.75	25	75	1237.82	94.87	N	308.72	E	322.96	0.53
1337.1	25.8	74.5	1263.43	98.07	N	320.45	E	335.12	0.88
1365.43	26.7	74.5	1288.83	101.42	N	332.53	E	347.65	0.95
1393.83	27.5	74.5	1314.12	104.88	N	345	E	360.58	0.85
1422.36	27.5	74.3	1339.42	108.42	N	357.68	E	373.75	0.1
1460.12	27.2	76.3	1372.96	112.82	N	374.46	E	391.09	0.77
1488.48	26.3	78.9	1398.29	115.57	N	386.92	E	403.82	1.56
1516.96	25.7	80.3	1423.89	117.83	N	399.2	E	416.23	0.9
1545.14	25.5	81	1449.3	119.8	N	411.22	E	428.3	0.39
1582.92	24.6	81.2	1483.52	122.28	N	427.02	E	444.15	0.72
1603	24.3	81.3	1501.8	123.54	N	435.24	E	452.38	0.45

THE DOGLEG SEVERITY IS IN DEGREES PER 30.00 METRES
THE VERTICAL SECTION WAS COMPUTED ALONG 73.34ø (GRID)
BASED UPON MINIMUM CURVATURE TYPE CALCULATIONS. THE BOTTOM HOLE
DISPLACEMENT IS 294.74 METRES, IN THE DIRECTION OF 72.80ø (GRID)
ALL DIRECTIONS REFERENCED TO GRID NORTH.
ALL DEPTHS RELATIVE TO RKB.
TOTAL CORRECTION 12.11 deg. HAS BEEN APPLIED.
LAT 5731032.49 N
DEP 670265.59 E
SURVEYS @ 220m AND 391m ARE FROM TOTCO RING.

PE605477

This is an enclosure indicator page.
The enclosure PE605477 is enclosed within the container PE907475 at this location in this document.

The enclosure PE605477 has the following characteristics:

ITEM_BARCODE = PE605477
CONTAINER_BARCODE = PE907475
NAME = North Paaratte-5 Composite Well Log
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = MONTAGE_LOG
DESCRIPTION = North Paaratte-5 Composite Well Log (Measured Depths) Enclosure 1 Scale 1:500
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 27-JAN-2000
RECEIVED_FROM = Boral Energy Ltd
WELL_NAME = North Paaratte-5
CONTRACTOR =
AUTHOR =
ORIGINATOR = Boral Energy Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605478

This is an enclosure indicator page.
The enclosure PE605478 is enclosed within the container PE907475 at this location in this document.

The enclosure PE605478 has the following characteristics:

ITEM_BARCODE = PE605478
CONTAINER_BARCODE = PE907475
NAME = North Paaratte-5 Composite Well Log
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = MONTAGE_LOG
DESCRIPTION = North Paaratte-5 Composite Well Log (Measured Depths) Enclosure 2 Scale 1:200
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 27-JAN-2000
RECEIVED_FROM = Boral Energy Ltd
WELL_NAME = North Paaratte-5
CONTRACTOR =
AUTHOR =
ORIGINATOR = Boral Energy Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605479

This is an enclosure indicator page.
The enclosure PE605479 is enclosed within the container PE907475 at this location in this document.

The enclosure PE605479 has the following characteristics:

ITEM_BARCODE = PE605479
CONTAINER_BARCODE = PE907475
NAME = North Paaratte-5 Mud Log
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = MUD_LOG
DESCRIPTION = Formation Evaluation Mud Log North Paaratte-5 Enclosure 3 Scale 1:200
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 27-JAN-2000
RECEIVED_FROM = Boral Energy Ltd
WELL_NAME = North Paaratte-5
CONTRACTOR =
AUTHOR =
ORIGINATOR = Boral Energy Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)