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PETROPHYSICS REPORT

DUNBAR 1 DW1

PPL 1

OTWAY BASIN

VICTORIA

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April 2001

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1.0 INTRODUCTION

Dunbar 1 DW1 was spudded at 16:00 hrs on the 19th of March, 2001. Reeves were contracted to run Wireline Logs from TD to the Kick-Off point below the casing shoe. Table 1 gives a summary of the logging program.

TABLE 1 - DUNBAR 1 DW1 WIRELINE LOGGING

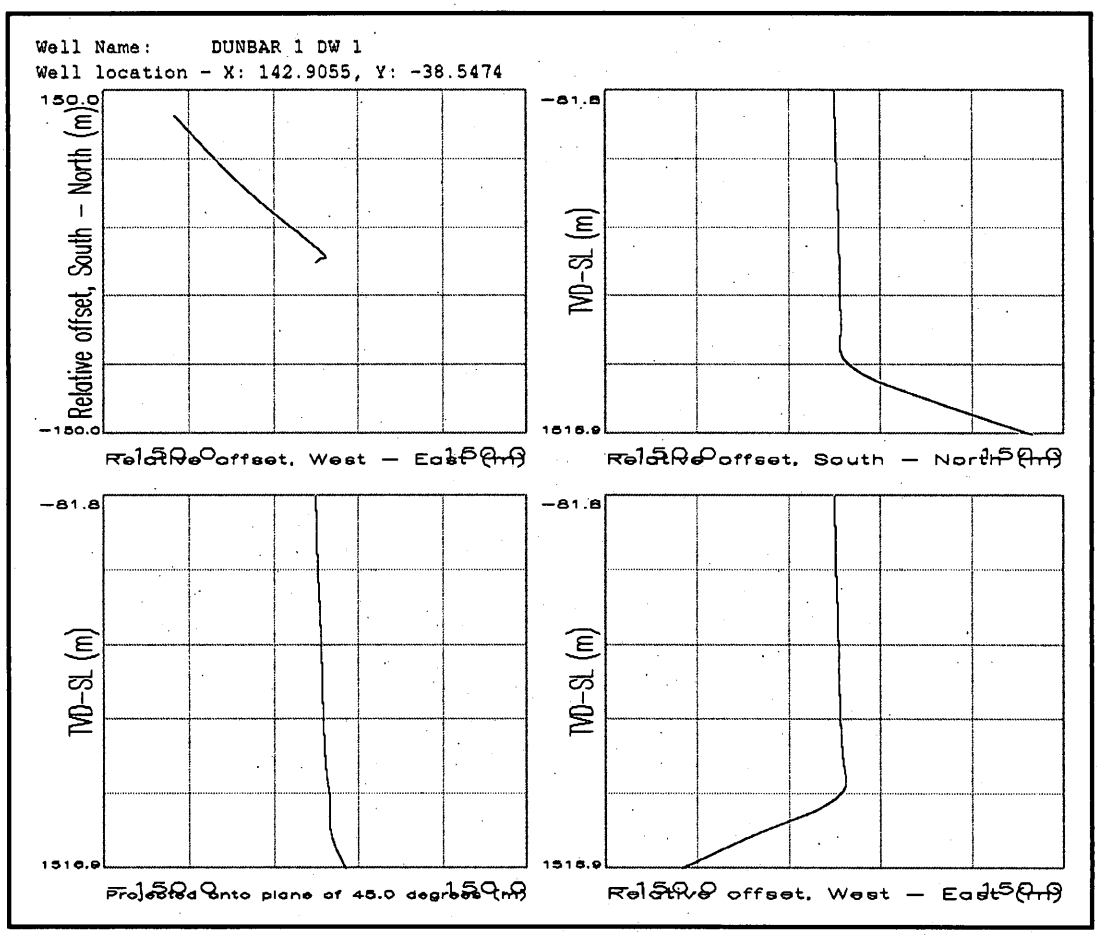
LOG	Base	Top	BHT	Circ	Rm	degC	Rmf	degC	Rmc	degC
DLL-SLL-MLL-SP-GR-CAL	1633	1210.6								
PDS-CNS-GR	1633	1210.6	64	9.4	0.222	16.8	0.212	16.4	0.441	18.1

This petrophysical analysis was performed using Terrastation software.

2.0 TVD

Sperry-sun provided deviation and azimuth data during the drilling of the sidetrack. The well path is plotted in Figure 1.

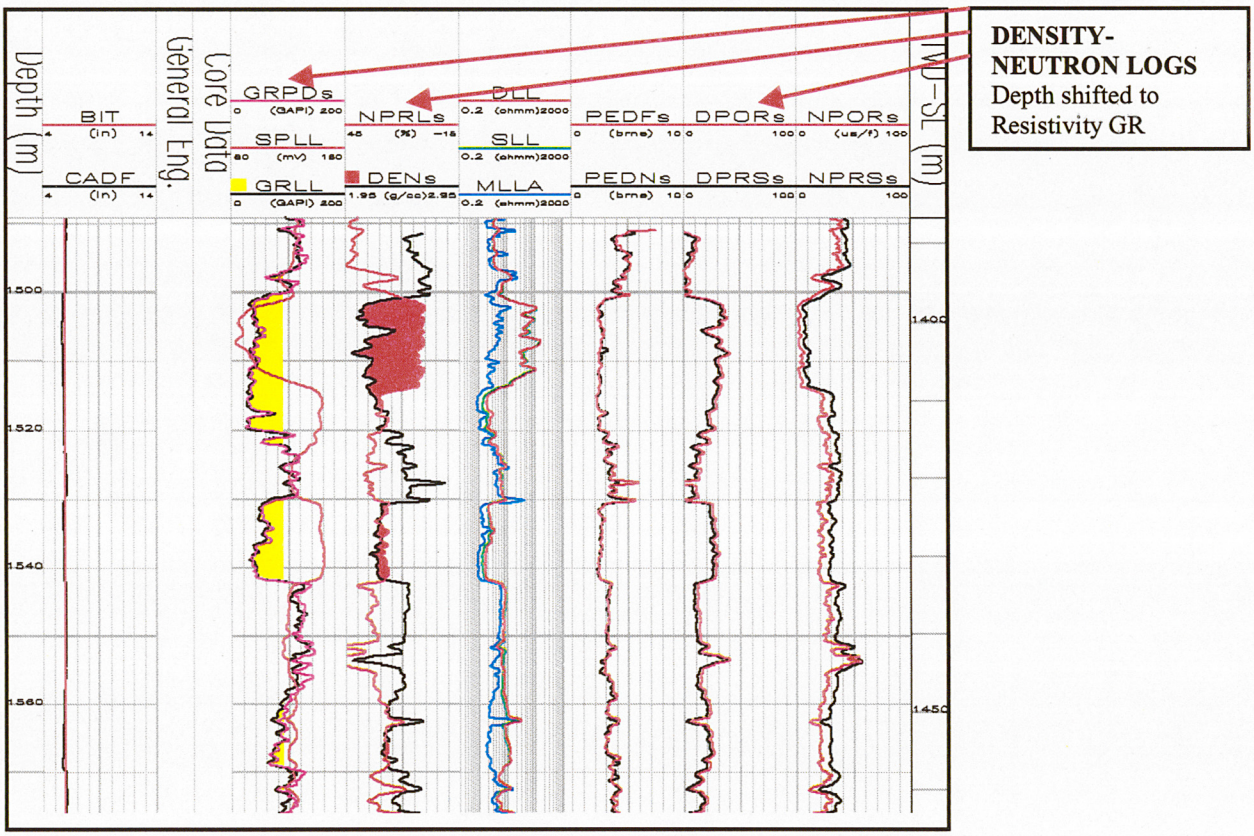
Figure1 - Dunbar 1 DW1 Well Path



3.0 LOG SHIFTING

A small depth discrepancy was noted between the Resistivity and Neutron-Density Logging runs. The PDS-CNS logs were depth matched to the Resistivity GR.

Figure 2 - Depth Shift



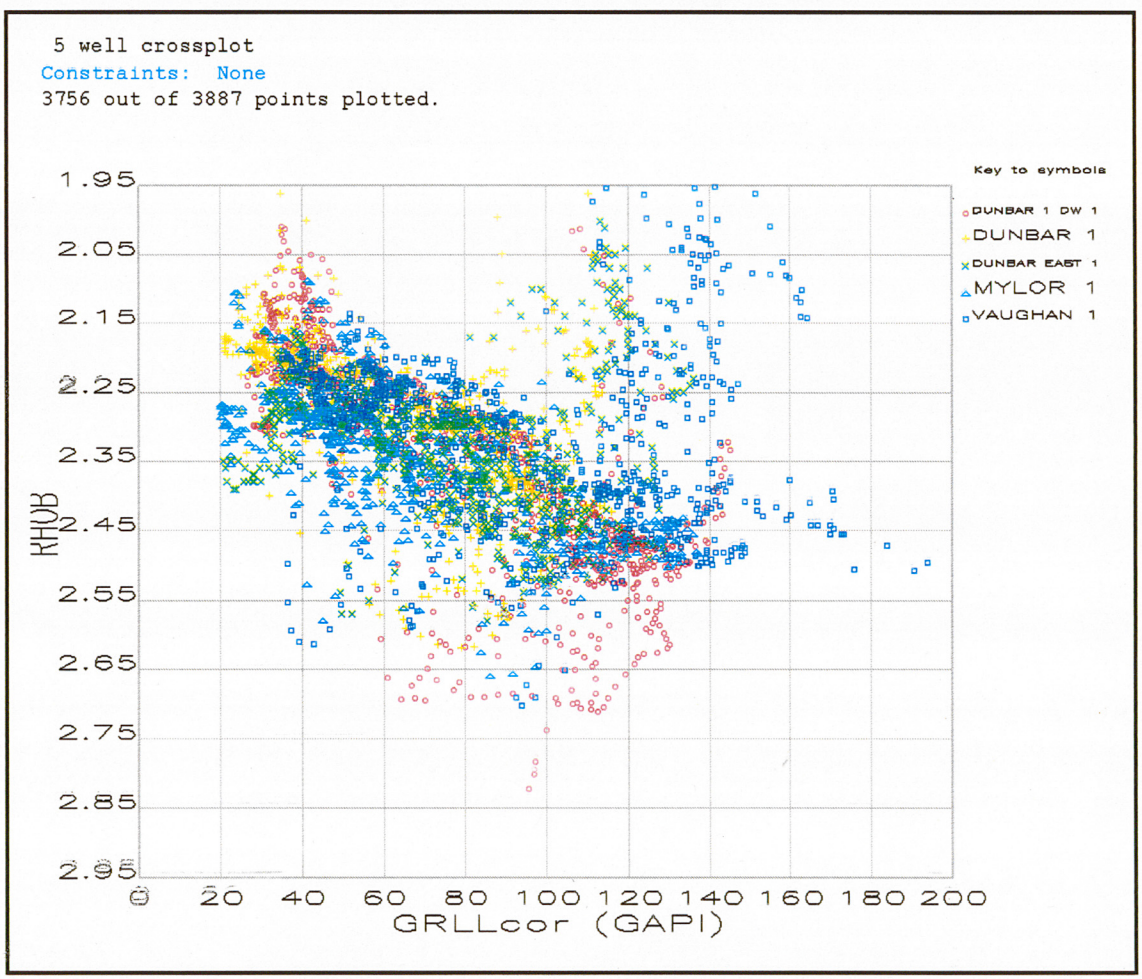
4.0 ENVIRONMENTAL CORRECTIONS

Environmental corrections for the GRLL were done using the Reeves GR correction algorithm within Terrastation. The Neutron Log (NPRL) was corrected for SDST Matrix using the Terrasation Reeves algorithm. Environmental corrections were performed on the DLL-SLL and MLL and DI, Rt and Rxo derived using the Tornado plot.

5.0 NORMALISATION

Logging tools from Dunbar-1 DW1, Dunbar-1, Dunbar East-1, Mylor-1 and Vaughan-1 were crossplotted over the Waarre Formation interval to investigate the presence of anomalous logs. Three crossplots were made, **GR vs RHOB, GR vs NPHI and ROB vs DLL.** No major shifts were noted and evaluation proceeded without Normalisation
Figure 2 shows a normalisation crossplot of GR vs Density.

Figure 3 - GR vs RHOB Normalisation Crossplot



6.0 Vsh (Volume of Shale)

A composite GR Histogram was plotted for the Waarre Formation interval using the wells Dunbar-1 DW1, Dunbar-1, Dunbar East-1, Mylor-1 and Vaughan-1. GR cutoffs of 30 and 130 gapi were calculated using the 5% and 95% values for the Histogram. Vsh was derived from Clavier Equation.

Figure 4 - Composite GR Histogram

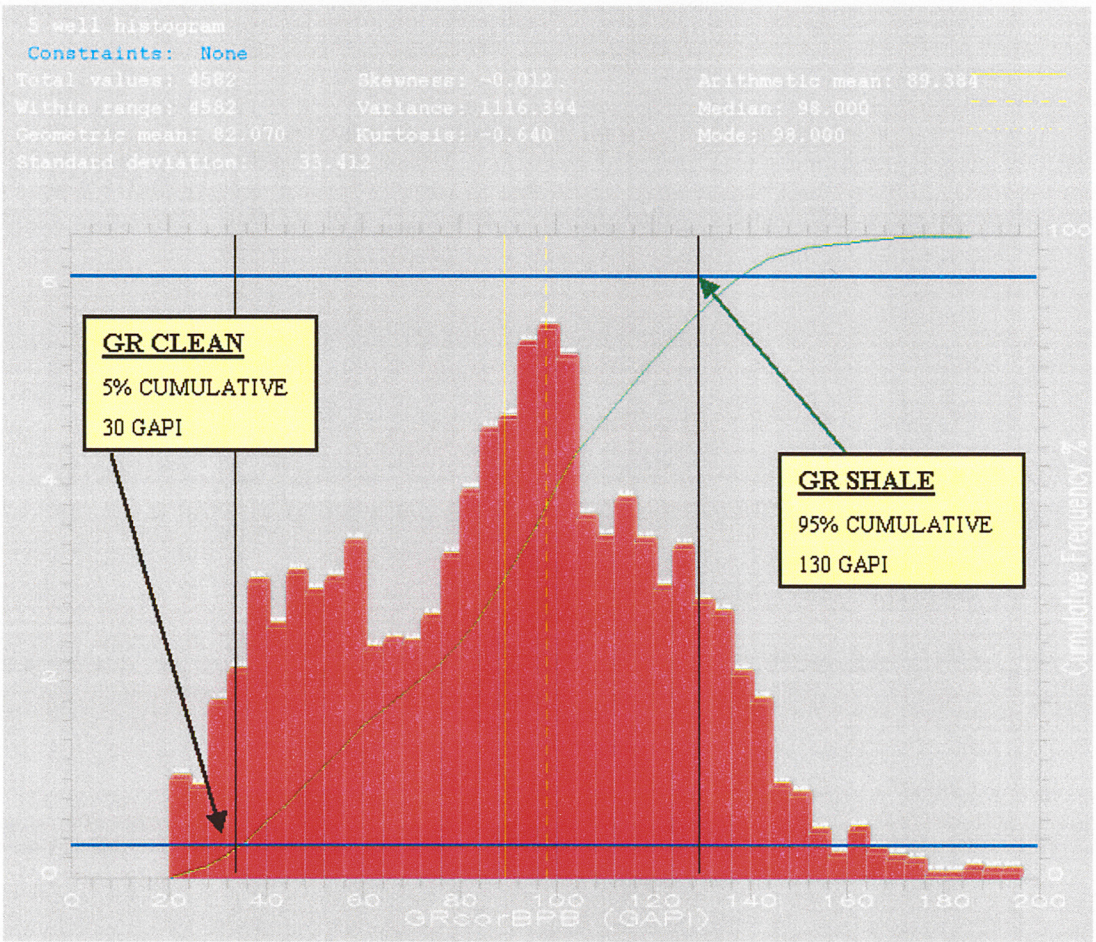
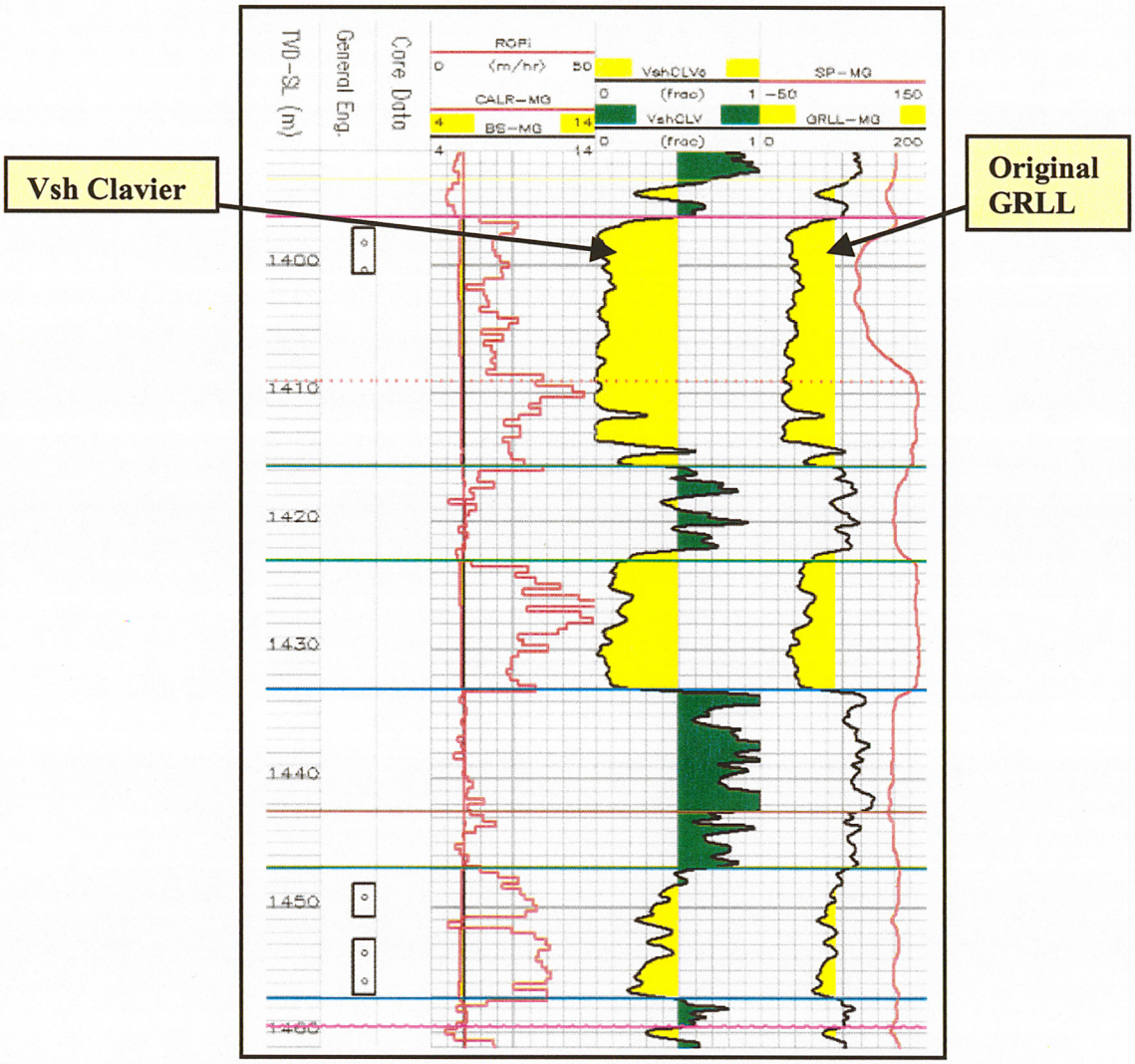


Figure 5 - Vsh Clavier



7.0 POROSITY

7.1 Density Porosity

Density Porosity was derived using a Fluid Density for the gas zone of 0.49 g/cc. This RHOf was derived from a Core Porosity vs RHOB crossplot performed at Mylor 1 (Donley, 1999). Grain Density analysis was performed on Waarre Formation core taken from North Paaratte 2, Mylor-1, Skull Creek West-1, Braeside-1 and Wallaby Creek-2. An average grain density of 2.67 g/cc was calculated from these analyses and was used in the density porosity calculation.

7.2 Neutron Porosity

Neutron Porosity (SDST Matrix) was shale corrected using the equation;

$$NPSC = NPHI\text{-}Vsh\ (NPHI_{shale} - DENPOR_{shale})$$

$$NPSC_{DUNBAR1DW1} = NPHI\text{-}Vsh\ (0.45 - 0.044)$$

Values of NPHI shale and RHOB shale were derived from crossplots of Vsh vs NPHIsd and Vsh vs RHOB respectively.

Shale corrected NPHI was calibrated to Density Porosity using the RMA equation derived from crossplotting Density Porosity and Shale corrected NPHI.

Figure 6 - Crossplot to calibrate NPsc to Density Porosity

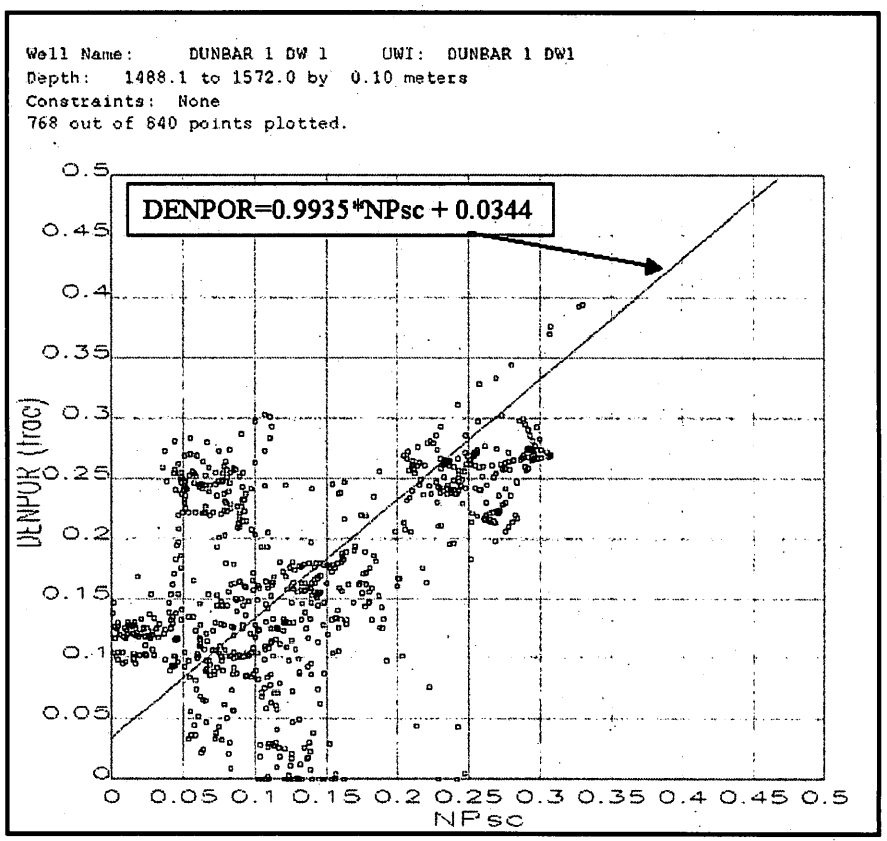
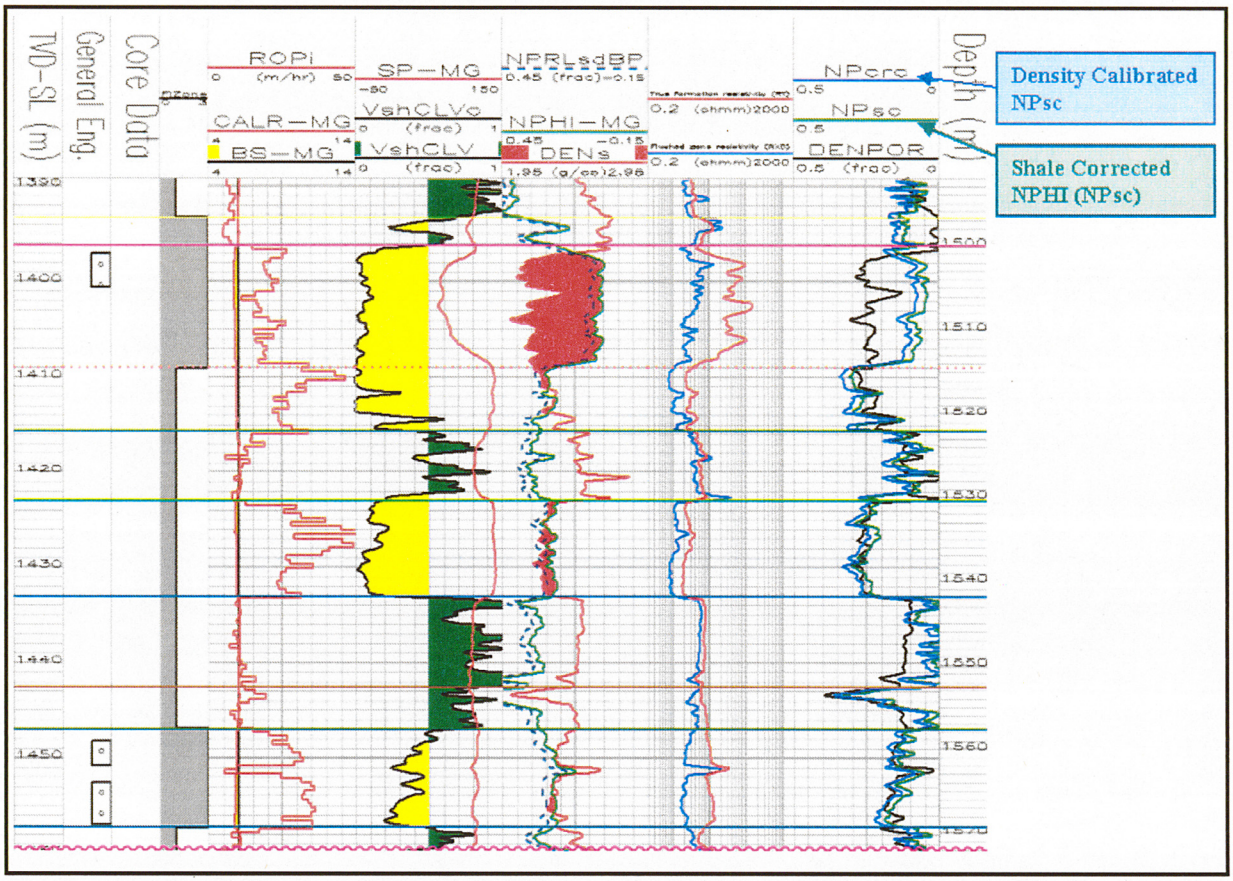


Figure 7 - NPHI Calibration



7.3 Density - Neutron Porosity

Density-Neutron Porosity was calculated using Equation 1;

$$\Phi DN = \sqrt{\frac{\Phi D^2 + \Phi N^2}{2}}$$ **Equation 1**

Where ;

ϕDN = Density-Neutron Porosity
ϕD = Density Porosity
ϕN = Shale Corrected, Density calibrated Neutron Porosity

Density-Neutron Porosity was calibrated to overburden core porosity using core from Langley-1. Overburden core porosity at Langley-1 was crossplotted against Density-Neutron Porosity for the gas and water zones. Equations 2 &3 are the regression derived equations used to calibrate Density-Neutron Porosity.

$$\Phi DN_{GASZONE} = 1.227578 \times \Phi DN$$ **Equation 2**

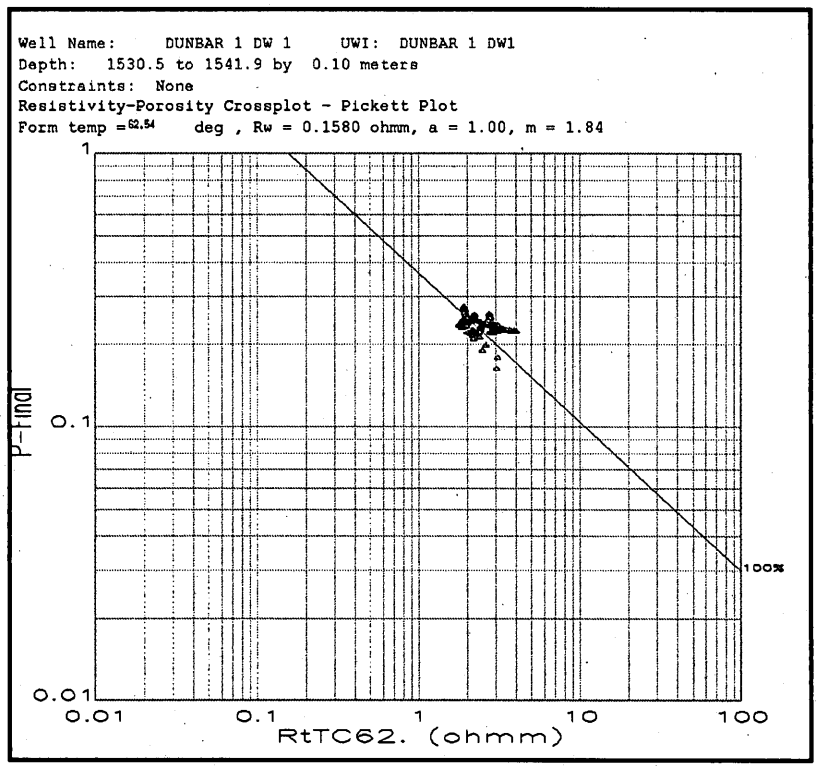
$$\Phi DN_{WATERZONE} = 0.887349 \times \Phi DN$$ **Equation 3**

8.0 WATER SATURATION

8.1 Rw

Rw was derived from a Pickett Plot run over the water saturated Waarre B Sand interval. Rt was corrected to a formation temperature of 62.54 degC prior to plotting. An Rw of 0.158 @ 62.5degC (0.286 @25degC) and an m of 1.84 was derived using this method

Figure 8 - Pickett Plot Dunbar 1 DW1 Waarre B Sand



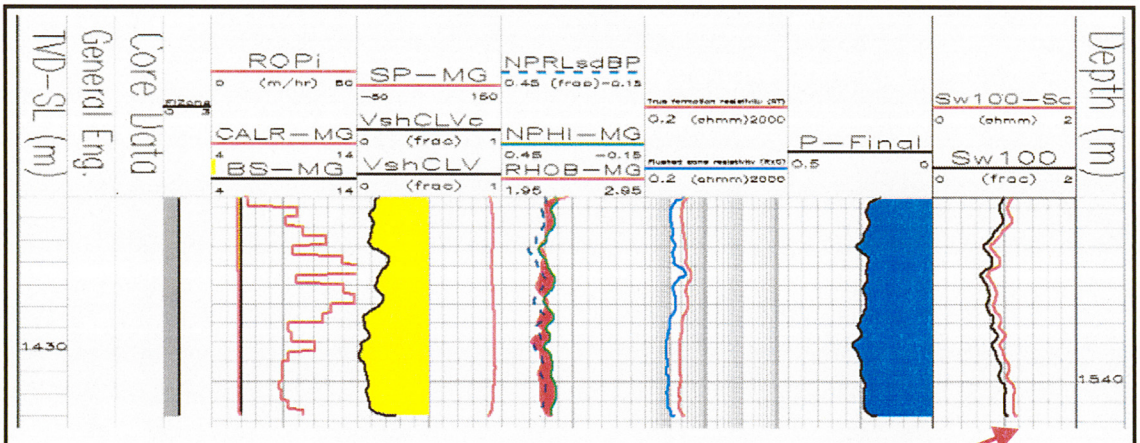
8.2 Saturation Exponent "n"

Special Core analysis at Braeside -1 derived an "n" value of 1.782 (Donley, 1999).

8.3 Sw100

In order to confirm the Archie water saturation parameters of **a, Rw, m** and **n**, Sw was calculated for the 100% water saturated Waarre "B Sand". A result of Sw equal to 1 in this zone would confirm that the choice of parameters was correct. Figure 9 shows that a **Rw = 0.158 at 62.54degC, a =1, m=1.84 and n=1.782** gives an average Sw of 1 in the water saturated "B Sand".

Figure 9 - Sw100 Plot



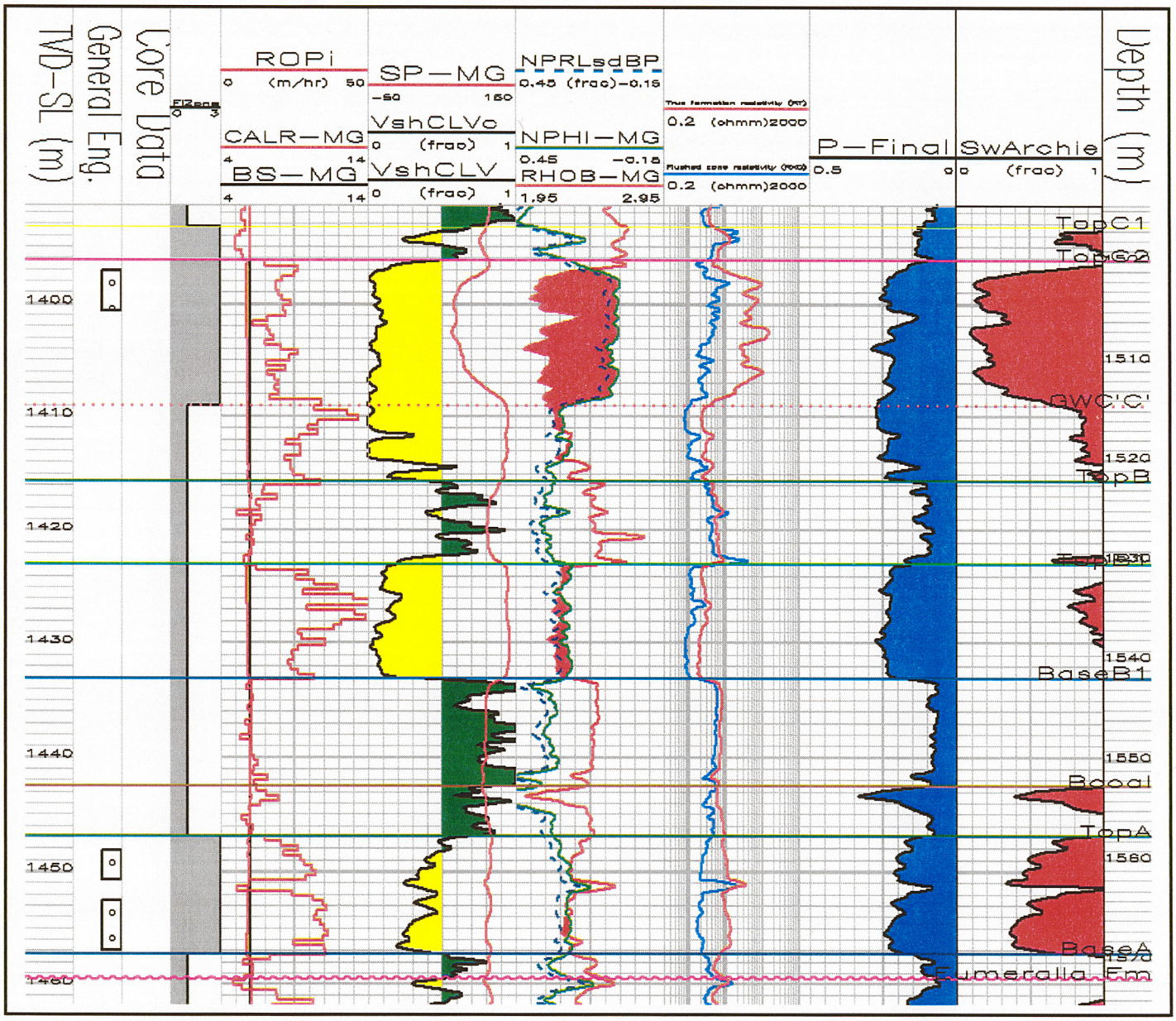
Rw=0.286 @ 25degC (0.158 @62.54degC) Sw Average =0.979537

Rw = 0.25 @ 25degC (0.138 @ 62.54degC) Sw Average=0.87037

8.4 Archie Sw

Archie Water Saturation was run over the entire Waarre Sandstone interval using the derived equation parameters. The results are shown in Figure 10.

Figure 10 - Archie Sw



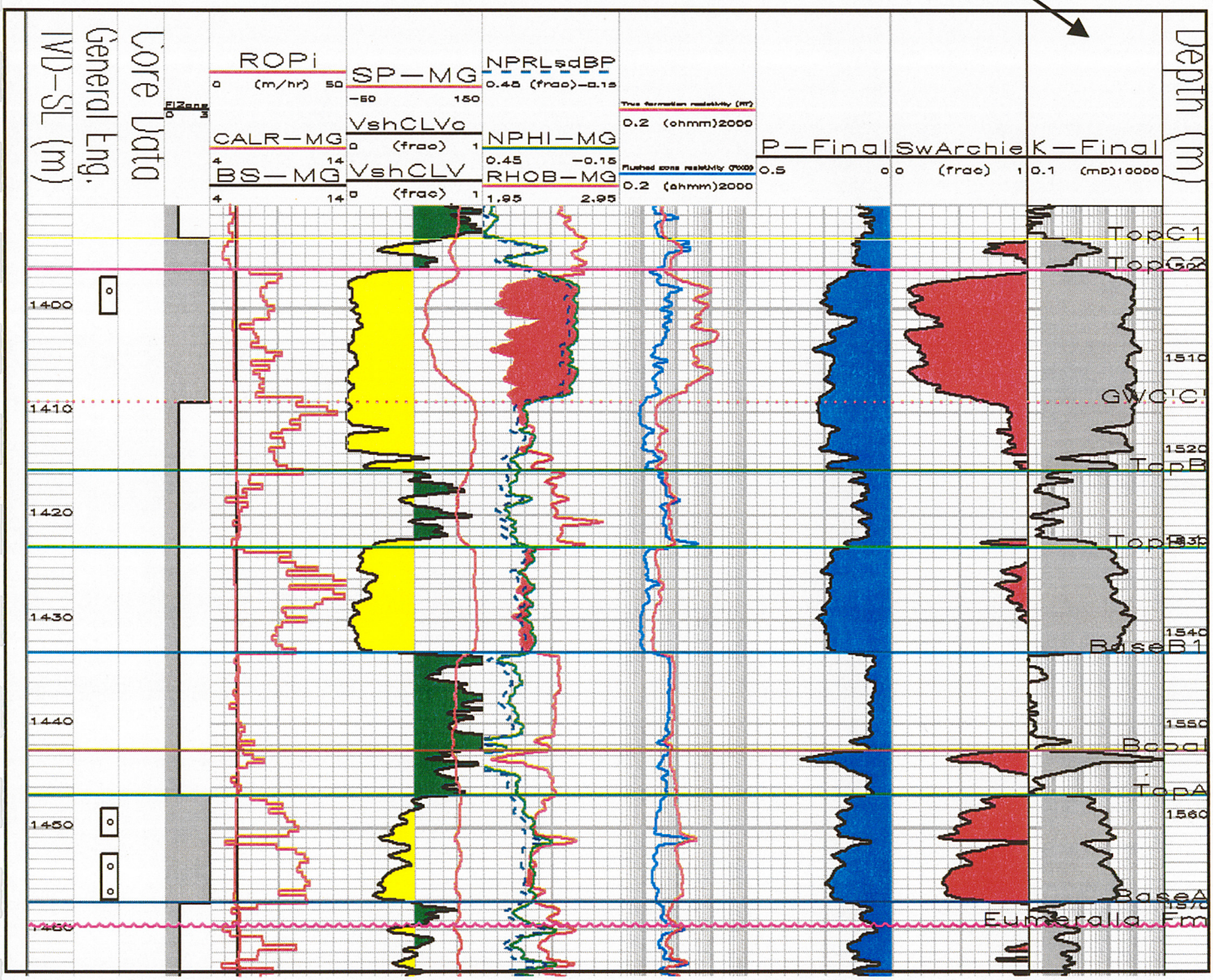
9.0 PERMEABILITY

Core permeability from Braeside 1, Mylor-1, Skull Creek West-1, Wallaby Creek-2, and North Paaratte-2 was cross plotted against log porosity, Sw and Vsh. Permeability was predicted from a weighted average of individual predictions found to influence permeability ie. Porosity, Vsh and Sw. The weighting was determined by the correlation coefficients of the linear regression in each case.

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

Equation 4

Figure 11 - Permeability



10.0 SUMMARY

Table 2 shows a Petrophysical Summary for each defined stratigraphic interval in Dunbar1 DW1 (see Enclosure 1 for intervals). Net Pay was calculated using a permeability cutoff of 0.3mD and a Vsh cutoff of 50%.

10.1 C Sand

Net Pay of 12.8m is present in the Waarre "C Sand" with an average Sw of 28%. Permeabilities are excellent.

10.2 A Sand

Net Pay of 10.32m is present in the Waarre "A Sand" with an average Sw of 51%. Permeabilities, whilst significantly lower than the "C Sand", are excellent nonetheless.

DUNBAR 1 DW 1 - PETROPHYSICAL SUMMARY

INTERVAL	TOP	BASE	INCR	PAY INCR	Vsh	Sw	Por	K	N/G
TOP C1-TOPC2	-1393.3	-1396.21	2.91	1.15	0.33	0.75	0.13	28.82	0.39
TOP C2-GWC	-1396.21	-1408.98	12.77	12.77	0.06	0.28	0.22	709.42	1.00
GWC-TOPB	-1408.98	-1415.65	6.69	6.43	0.09	0.87	0.24	447.55	0.96
TOPB-TOPB1	-1415.65	-1423	7.40	2.29	0.38	0.93	0.14	10.00	0.31
TOPB1-BASEB1	-1423	-1433.02	10.03	10.03	0.11	0.94	0.24	266.47	1.00
BASEB1-TOPA	-1433.02	-1446.9	13.83	0.09	0.38	1.00	0.16	7.94	0.01
TOPA-BASEA	-1446.9	-1457.25	10.32	9.44	0.35	0.51	0.20	100.30	0.91
BASEA-EUM	-1457.25	-1459.44	2.20	0.09	0.47	0.72	0.18	22.66	0.04

11.0 REFERENCES

DONLEY, J. (1999): "Petrophysics Report, North Paaratte, Wallaby Creek and Grumby Gasfields, PPL1, Otway Basin, Victoria." *Internal Boral Energy Report, (unpublished).*

DEAKIN, M. (1999): "Integrating Petrophysical Data, Established and Emerging Techniques." *Course Notes (unpublished)*

PE606550

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DESCRIPTION	Encl.1 Dunbar-1 Montage Seismic Plot, W1310, VIC/PPL1. Enclosure 1 contained within "Dunbar-1 Petrophysics Report" [PE909116].
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WELL_NAME	Dunbar-1
CONTRACTOR	Origin Energy Petroleum Pty Limited
AUTHOR	
ORIGINATOR	Origin Energy Petroleum Pty Limited
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	CD000_SW

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