MAGELLAN PETROLEUM (NT) PTY LIMITED

PALM VALLEY No. 10/10A

PETROPHYSICAL REPORT AND

WELL CORRELATION

MAGELLAN

M.D. Berry
April, 1995

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ENCLOSURES

1. INTRODUCTION

Palm Valley No. 10/10A was drilled from November 1994 to February 1995 without intersecting a commercial flow of gas, and was completed as an observation well.

The first hole, Palm Valley No. 10, reached a total depth of 2,143.9 m and achieved a hole deviation of 39.90 at an azimuth of N128.7°E. A maximum flow rate of 0.455 MMCFGD was recorded from the upper Pacoota P1 unit. The well was then sidetracked as Palm Valley No. 10A to a total depth of 2,343 m, achieving a maximum hole deviation of 60.1° at an azimuth of N218.9°E through the reservoir section. A maximum flow rate of 1.382 MMCFGD was recorded, again, from the upper Pacoota P1 unit. A minor influx of formation water was intersected while air mist drilling through the Pacoota P2 unit at a depth of 2,311 m.

Although a full suite of logs were recorded in both holes, no cores were taken to assist with reservoir description.

This report details the petrophysical analysis of Palm Valley No. 10 and 10A. The methodology follows that employed and described in the report entitled "Petrophysical Report and Well Correlation: A Review", M.D. Berry, 1993.

2. LOG DATA BASE

Palm Valley No. 10 and 10A added the following logs to the field data base:-

Palm Valley No. 10			**Bottom of Logged Interval**
Run 1	-	FMS-GR-AMS	1,453.0
	-	AS-GR	1,452.5
	-	DLL-MSFL-PI-GR-SP	1,451.0
RUN 2	-	AS-GR-AMS	2,138.0
	-	FMS-GR-AMS	2,141.0
	-	LDL-CNL-NGS-AMS	2,141.0
	-	DLL-MSFL-PI-GR-SP-AMS	2,122.0
	-	WSS (WELL SEISMIC)	(20 LEVELS)

Palm Valley No. 10A

RUN 1	-	FMS-GR-AMS	2,338.0
	-	DLL-MSFL-GR-SP-AMS	2,334.0
	-	AS-GR-AMS	2,331.5
	-	LDL-CNL-NGT-AMS	2,337.5

In general the log quality was very good, and borehole conditions were excellent. The FMS image quality was affected in Palm Valley No. 10A, partly due to the 6" hole size and partly due to an inability to maintain a slip-free logging run.

Depth Matching

Both Palm Valley No. 10 and 10A required careful depth matching to ensure the integrity of the data base prior to analysis. In every case, each suite of logs was separately matched using the gamma-ray and the appropriate depth corrections were then applied to the remainder of the logs in each suite.

Firstly the Laterolog suite (Run 1) in Palm Valley No. 10 was matched to the array sonic suite (-.305 m at the top and + .152 m at the bottom). Then the array sonic suite from run 2 was matched to the array sonic suite from run 1 (-0.1 m).

The Laterolog suite (Run 2) was then carefully matched to the array sonic suite (Run 2), requiring 24 depth shift points (Appendix A). Finally, the nuclear suite (Run 2) was matched to the array sonic suite (Run 2) with a total of 45 separate corrections (Appendix A).

The final logs run in Palm Valley No. 10A were then depth matched with the intermediate log suite. The array sonic suite was found to be perfectly on depth. However the Laterolog suite required 70 separate depth shifts (Appendix A) to match the array sonic suite precisely. This was because of the high angle of hole deviation which resulted in fluctuating line tension (from the AMS). Similarly, the nuclear suite also required a total of 74 separate depth shifts (Appendix A).

Attention to such detail, ensuring that all logs matched perfectly, provided a sound data base from which a reliable petrophysical analysis could be carried out.

Data quality in all cases was extremely good. The exception to this was the Δt in Palm Valley No. 10A. The extremely high noise level in the Δt and Δtl made them unusable. A Δt compressional and shear was therefore backed out of the full waveform by the Schlumberger interpretation centre.

3. PETROPHYSICAL ANALYSIS

3.1 TEMPERATURE

Stabilized bottom hole temperatures were derived for both Palm Valley No. 10 (Figure 1) and 10A (Figure 2) of 70.50°C and 73.7°C respectively. The higher temperature in Palm Valley No. 10A was a result of a sudden rise in temperature on the final logging run. These provide temperature gradients of 2.226°C/100m and 2.172°C/100m respectively which compares favourably with previous estimates.

3.2 CLAY/SHALE VOLUME

Shale volume (VSHALE) was computed in Palm Valley No. 10 and 10A from the corrected gamma-ray and using the Clavier method as outlined below:-

$$VSH_{(LIN)} = (GR - GR_{CLEAN})/(GR_{SHALE} - GR_{CLEAN})$$

$$BASE = 3.38 - ([VSH_{(LIN)} + 0.7]^2)$$

$$VSH_{(CLAVIER)} = 1.7 - (BASE)^{.5}$$

where

GR_{CLEAN} = Refer to Table 5 and 6

GR_{SHALE} = Refer to Table 5 and 6

The resultant values were subsequently corrected to core VSHALE using the following (previously derived) equation:-

$$VSH_{(LOG)} = 1.359\ (VSH_{(CORE)}) - 0.01$$

The "clean" and "shale" limits used for VSHALE computation in Palm Valley No. 10 and 10A appear in Appendix B.

3.3 POROSITY

As with the "Petrophysical Report and Well Correlation: A Review, 1993", a series of porosity computations were attempted with Palm Valley No. 10 and 10A. A comparison of these resultant porosities is shown in Figure 3 (Palm Valley No. 10) and Figure 4 (Palm Valley No. 10A). However, the effective porosity was eventually derived primarily from the shale corrected density porosity supplemented with shale corrected sonic porosity in areas of bad hole.

The shale corrected density porosity was obtained from the neutron-density crossplot which outputs both shale corrected neutron and density logs:-

$\rho_{SC} = \rho + VSH \times (\rho_M - \rho_{SH})$

$\phi_{DEN(SC)} = (\rho_M - \rho_{SC})/(\rho_M - \rho_f)$

where

ρ_M = 2.67 gm/cc (Based on field derived valve, ref; 1990 update)

ρ_f = 1.14 gm/cc (Based on a Formation water salinity of 189,000 ppm)

ρ_{SH} = 2.5 gm/cc

The shale corrected sonic porosity was obtained from the Hunt-Raymer equation, where:-

$\Delta t_{SC} = \Delta t - VSH \times (\Delta t_m - \Delta t_{SH})$

$\varnothing_{SON(SC)} = (\Delta t_{SC} - \Delta t_m)/(\Delta t_f - \Delta t_m)$

where

Δt_m = 57 μs/ft (Based on field derived valve, Ref: 1990 update)

Δt_f = 189 μs/ft

Δt_{SH} = 80 μs/ft

VSH = Clavier Shale Volume (previously described)

Note: The Hunt-Raymer equation uses:- Δt_{SH}, Δt_{MSH} (Shale transit time, no water, no ϕ) and k (compaction correction factor, 0.8 used).

Values of Δt_{SH} (80) and Δt_{MSH} (70) were chosen by examination of the data and GR vs DT cross plot (Figure 5).

Finally, the density and sonic porosities were corrected to core porosity at overburden conditions using the following relationships:-

$$\phi_{DEN(SC)} = 2.455\ (\phi_{CORE(OB)}) - 0.059$$

$$\phi_{SON(SC)} = 1.492\ (\phi_{CORE(OB)}) - 0.041$$

Any zones of bad data were edited accordingly and the resultant effective porosity (PHIE) was considered very satisfactory.

3.4 FORMATION RESISTIVITY

Formation resistivity (R_t) was derived from the deep reading Laterolog tool after being corrected for borehole conditions and invasion. Resultant R_t values are shown graphically in Enclosures 1 and 2.

3.5 FORMATION WATER SALINITY AND Rw

Following previous interpretations, a formation water salinity of 189,000 ppm has been used, based on the analysis of produced water. Calculated equivalent formation water resistivities (R_w's) are as follows:-

Well	Temp °C	@	Depth (m)	Rw
PV-10	64.51		1,875	0.0241
PV-10A	66.20		2,000	0.0236

3.6 WATER SATURATION

The Indonesian equation was used for water saturation estimation:

$$S_w = [VSH^{.5(2-VSH)}/(R_{SH}/R_t)^{.5} + (R_t/R_o)^{.5}]^{(-2/n)}$$

where

$R_o = a\ R_w/\phi^m$

R_{SH} = 15 ohm-m (in most cases)

V_{SH} = Shale volume from Clavier method

R_t = Formation resistivity

a = 1

n = 2

m = 2.21 (Average measured value from core analysis)

3.7 SUMMARY OF RESULTS

A set of coloured log interpretations for Palm Valley No. 10 and 10A appear in Enclosures 1 and 2. This includes the final computed VSHALE, formation resistivity (R_t), water saturation (S_W), effective porosity (PHIE) and bulk volume water (BVW). Shading on the bulk volume water curve is from 0.025 (for coarse grained sands) and 0.05 (very fine grained sands). This is meant as a guide only as most of the sandstones of the lower Stairway and Pacoota Formations at Palm Valley are very fine grained and exhibit extensive cementation and recrystallization.

Also included as Enclosure 4 is a structural cross-section of the field with gramma-ray and water saturation curves plotted. This gives some visual representation of the vertical and lateral extent of the computed hydrocarbon saturation in the field.

A summary of the net pay statistics including average effective porosity, average water saturation and net pay is shown in Table 1. A full set of net pay statistics appears in Appendix C. Net pay statistics are computed from the log data using a water saturation cutoff of 55%, in order to be consistent with the previous Petrophysical Report. Net pay figures are also based on true vertical depth as both Palm Valley 10 and 10A were deviated holes.

TABLE 1

SUMMARY TABLE OF RESULTS

Palm Valley No. 10

Formation	Effective Porosity Average, %	Water Saturation Average, %	Net Pay m
lower Stairway	4.45	44.48	5.5857
Pacoota P1 unit	4.57	45.18	2.3704
Pacoota P2 unit	3.72	47.72	0.2404

Palm Valley No. 10A

lower Stairway	3.97	42.71	4.9542
Pacoota P1 unit	4.73	42.57	1.8859
Pacoota P2 unit	3.60	42.56	0.2137

NET PAY TOTALS (m)

	Palm Valley 10	Palm Valley 10A
lower Stairway	5.5857	4.9542
Pacoota P1 Unit	2.3704	1.8859
Pacoota P2 Unit	0.2404	0.2137
Total Net Pay	8.1965	7.0538

Notes:-
- Cutoff: Water saturation = 55%.
- Palm Valley No. 10 only penetrated approximately 79% of the P2 unit.
- Palm Valley No. 10A only penetrated approximately 81% of the P2 unit.

Results are as follows:-

- Palm Valley No. 10
  - Average porosity of 4.45% in the lower Stairway with 5.6 m of pay averaging 55.5% hydrocarbon saturation.
  - Average porosity of 4.57% in the P1 unit with 2.4 m of pay averaging 54.8 % hydrocarbon saturation.
  - The very low calculated net pay (0.24 m) in the P2 unit is a function of the partial penetration only of the unit; Similar to Palm Valley No. 9.
- Palm Valley No. 10A
  - Average porosity of 3.97% in the lower Stairway with 5.0 m of pay averaging 57.3% hydrocarbon saturation.
  - Average porosity of 4.73% of the P1 unit with 1.9 m of net pay averaging 57.4% hydrocarbon saturation.
  - Similarly, a partial penetration of the P2 unit resulted in a very low net pay (0.21 m).
- <u>General Comments</u>
  - Palm Valley No. 10A displays only slightly reduced reservoir matrix quality from Palm Valley No. 10. Both are very close as expected.
  - The computed net pay for the P2 unit is not representative as the unit was only partially penetrated in both wells.
  - Hydrocarbon saturation in the matrix above (57% at 2,303 m) and below (42% at 2,313 m) the depth at 2,311 m where a minor formation water influx was reported, suggests that the formation water was entering the borehole from minor fractures (seen on the FMS) and not the low porosity matrix.

    Very low porosity water saturated matrix occurs at various points in both wells which is not associated with water entry, further supporting the belief that water requires fractures for movement within the reservoir.

- Calculated net pay in the region of Palm Valley No. 10/10A suggests that reservoir matrix quality may slightly decrease away from the central (crestal) region of the field.

Overall, the methodology employed in this report has been consistent with previous petrophysical evaluation and the results are considered accurate.

4. WELL CORRELATION

As part of this report, the fan-fold stratigraphic table of the field has been updated with the measured depth, true vertical depth, elevation (from TVD) and true stratigraphic thicknesses calculated for Palm Valley No. 10 and 10A (Enclosure 3).

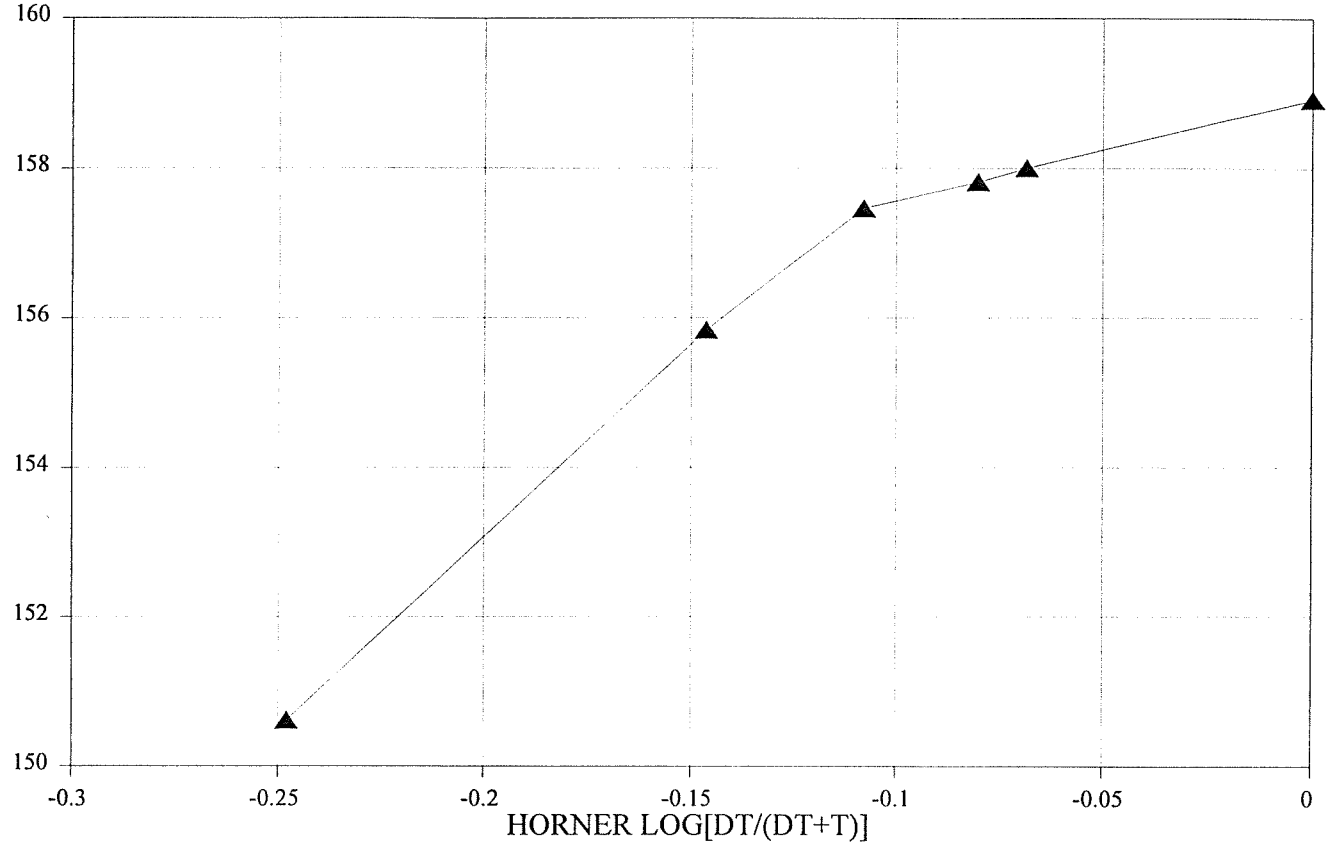
Also a new structural cross-section has been generated for the field (Enclosure 4). Each well is displayed at true vertical elevation in order to ensure that the data represented is at a true structural position in the field.

5. REFERENCES

- Palm Valley Field Petrophysical Report and Well Correlation: A Review, M.D. Berry, July 1993.

FIGURES

STABILIZED BOTTOM HOLE TEMPERATURE
PALM VALLEY No. 10



PALM VALLEY 10
PV10BHT.WB1
FEB 20 1995
BHT HORNER PLOT

T = CIRCULATION TIME (HRS) 5.0
DT = TIME SINCE CIRCULATION STOPPED
0415 27 JAN 93
ASSUMED DEPTH [FT] 7031

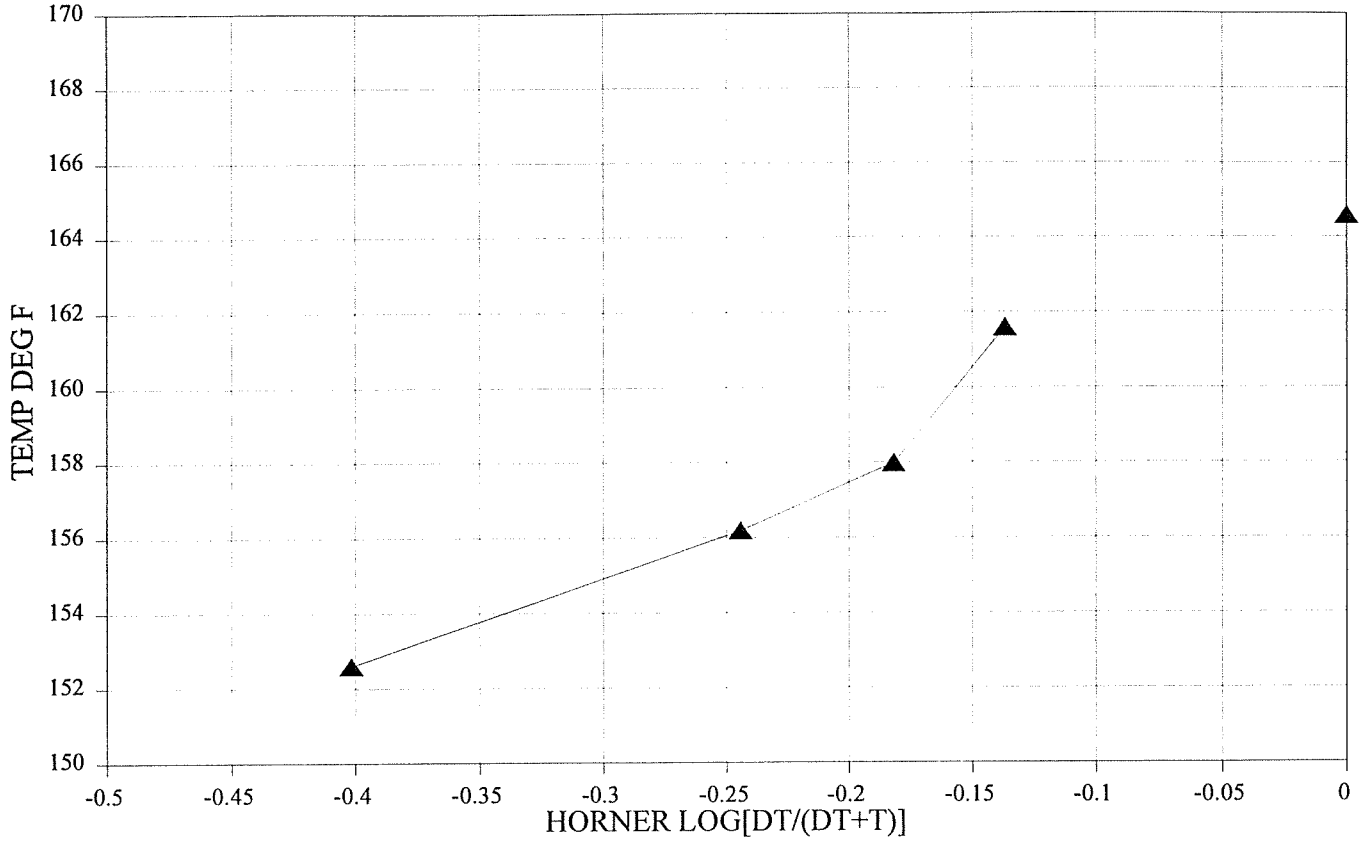
LOG	ON B	DT	LOG DT/(DT+	DEG F
AS/GR	1225	6.50	5.0 -0.24778	150.6
FMS/GR	1900	12.50	5.0 -0.14613	155.8
LDL	0015	17.75	5.0 -0.10778	157.5
DLL	0710	24.65	5.0 -0.08021	157.8
WSS	1150	29.32	5.0 -0.06838	158.0
STABILIZED BOTTOM HOLE TEMP			0	158.9
ASSUMED SURFACE TEMPERATURE				73
GEOTHERMAL GRADIENT [DEG/100FT]				1.22204

Regression Output:

Constant	158.921
Std Err of Y Est	0.01427
R Squared	0.99865
No. of Observations	3
Degrees of Freedom	1
X Coefficient(s)	13.5905
Std Err of Coef.	0.49912

FIGURE 1

STABILIZED BOTTOM HOLE TEMPERATURE
PALM VALLEY No. 10A



PALM VALLEY 10A
PV10ABHT.WB1
FEB 20 1995
BHT HORNER PLOT

T = CIRCULATION TIME (HRS) 9.5
DT = TIME SINCE CIRCULATION STOPPED
0415 27 JAN 93
ASSUMED DEPTH [FT] 7687

LOG	ON B	DT	T	LOG DT/(DT+	DEG F
FMS	1715	6.25	9.5	-0.4014	152.6
DLL	2335	12.60	9.5	-0.24402	156.2
AS	0517	18.30	9.5	-0.18159	158.0
LDL	1246	25.75	9.5	-0.13638	161.6

STABILIZED BOTTOM HOLE TEMP 0 164.6
ASSUMED SURFACE TEMPERATURE 73
GEOTHERMAL GRADIENT [DEG/100FT] 1.19136

Regression Output:

Constant	164.58
Std Err of Y Est	1.292
R Squared	0.921
No. of Observations	4.000
Degrees of Freedom	2.000
X Coefficient(s)	31.06
Std Err of Coef.	6.44

FIGURE 2

PALM VALLEY No.10

COMPARISON OF RESULTANT POROSITIES

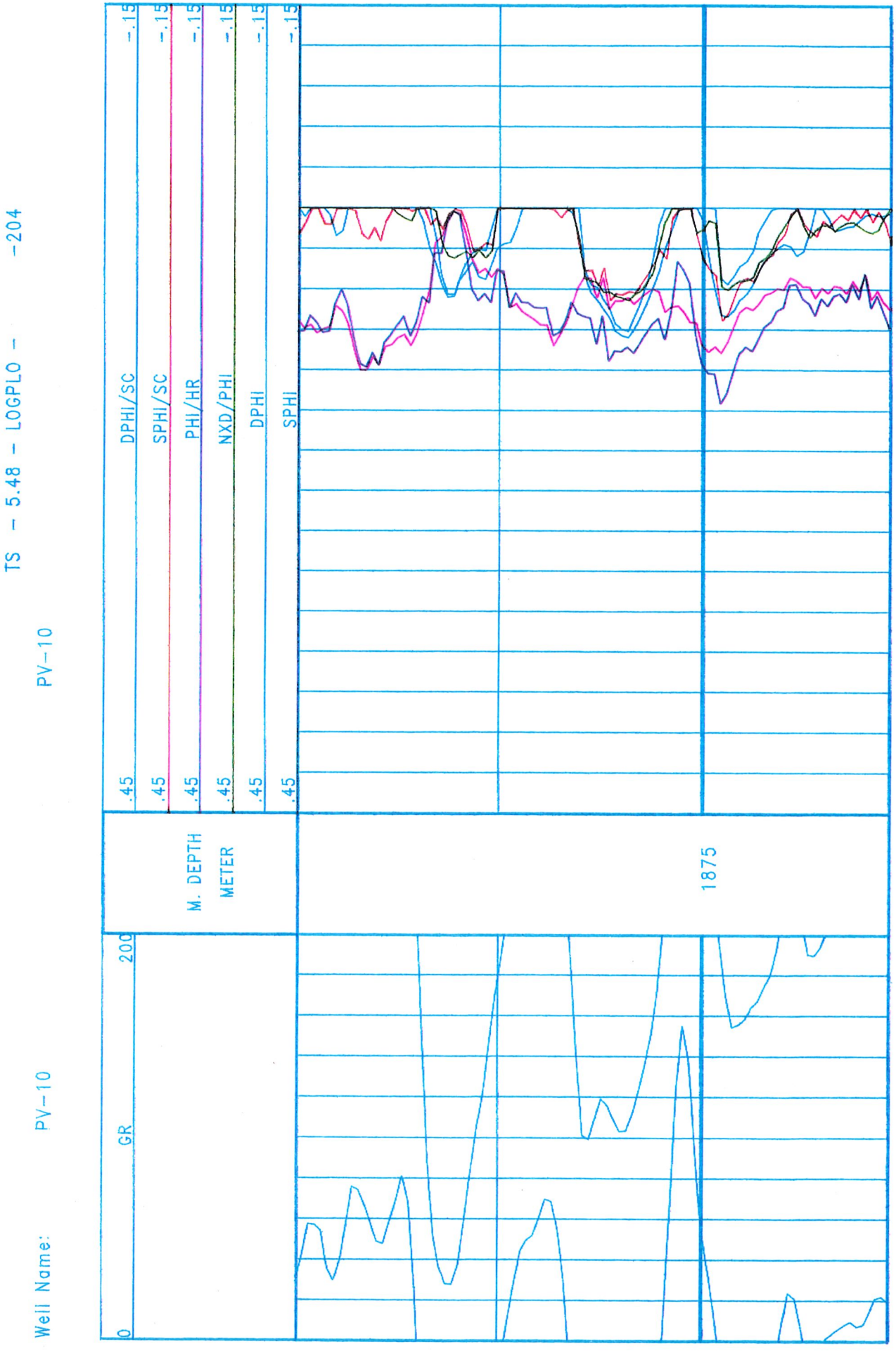


FIGURE 3

PALM VALLEY No. 10A

COMPARISON OF RESULTANT POROSITIES

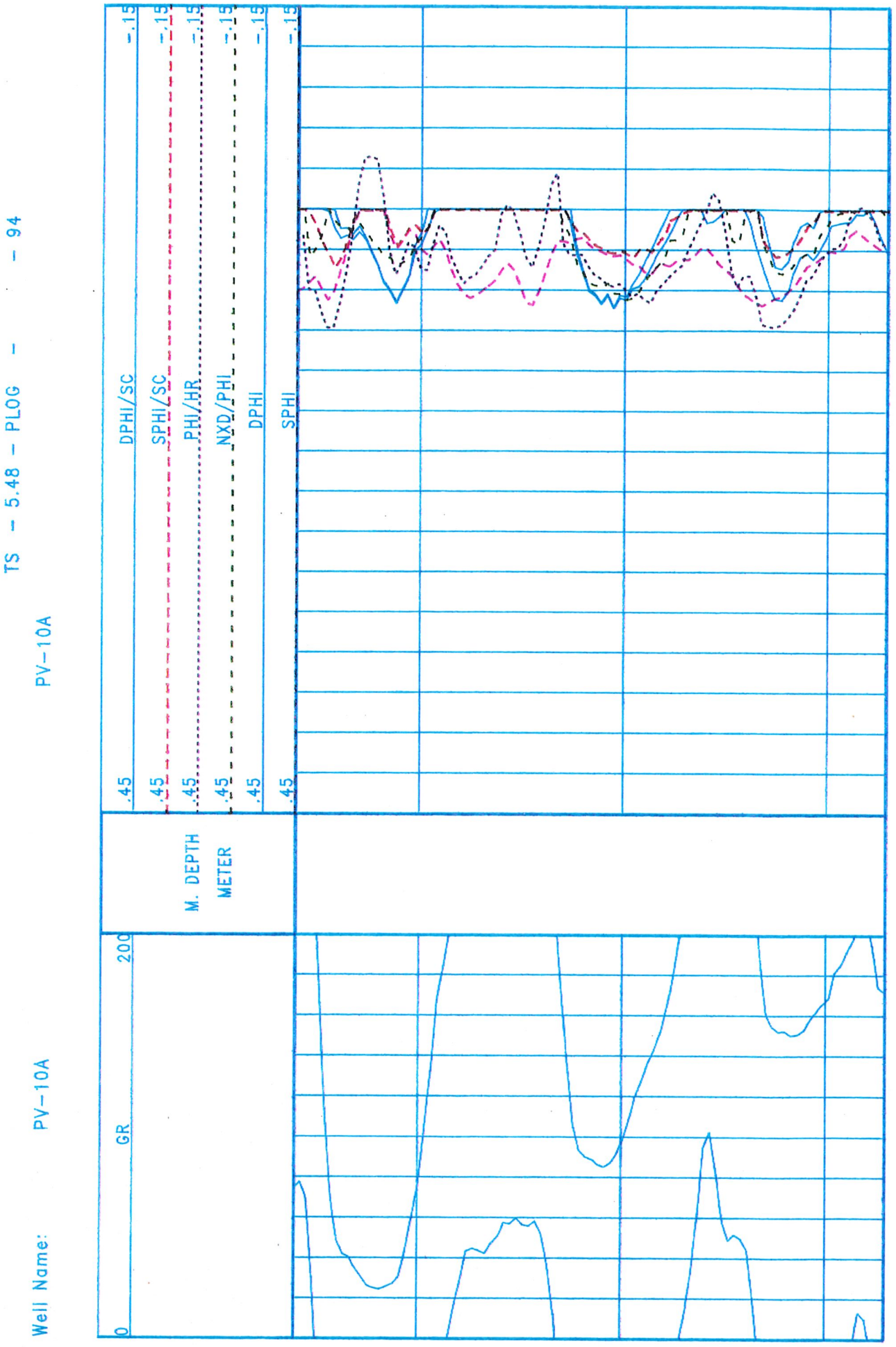
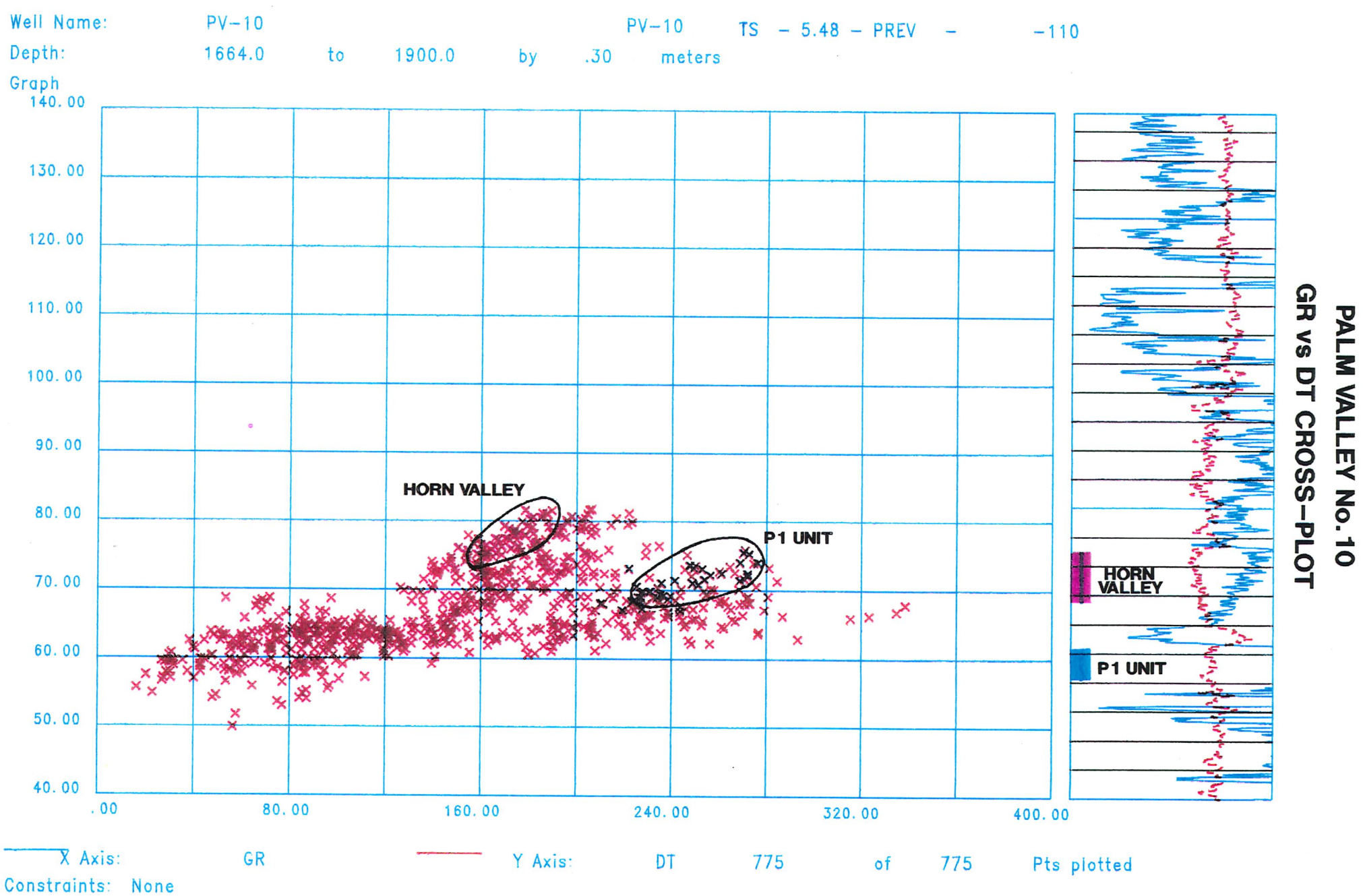


FIGURE 4



PALM VALLEY No. 10

GR vs DT CROSS-PLOT

FIGURE 5

APPENDIX A

DEPTH SHIFT POINTS LLD SUITE TO AS SUITE
PALM VALLEY NO. 10, RUN 2

Logplot - Depth Shift Modification Screen Total number of shifts: 24			
	Reference Depth	**Shift Depth**	**Relative Shift**
1	1427.683	1427.988	-.305
2	1472.946	1472.946	.000
3	1530.706	1531.010	-.305
4	1641.653	1641.653	.000
5	1657.807	1657.960	-.152
6	1701.546	1701.851	-.305
7	1761.592	1761.744	-.152
8	1844.345	1844.192	.152
9	1864.004	1864.004	.000
10	1891.894	1892.046	-.152
11	1958.797	1958.950	-.152
12	1970.075	1970.380	-.305
13	1987.448	1987.753	-.305
14	2002.536	2002.993	-.457
15	2010.613	2010.918	-.305
16	2023.110	2023.262	-.152
17	2040.636	2040.788	-.152
18	2043.227	2043.227	.000
19	2050.542	2050.542	.000
20	2095.805	2096.110	-.305
21	2104.034	2104.187	-.152
22	2111.655	2111.807	-.152
23	2113.331	2113.636	-.305
24	2115.007	2115.617	-.610

DEPTH SHIFT POINTS LDL SUITE TO AS SUITE
PALM VALLEY NO. 10, RUN 2

Logplot - Depth Shift Modification Screen Total number of shifts: 45			
	Reference Depth	Shift Depth	Relative Shift
1	1423.264	1423.111	.152
2	1427.683	1427.683	.000
3	1431.798	1432.255	-.457
4	1445.666	1445.971	-.305
5	1459.992	1460.297	-.305
6	1472.946	1472.946	.000
7	1513.332	1513.332	.000
8	1526.743	1527.048	-.305
9	1530.553	1530.858	-.305
10	1537.411	1538.021	-.610
11	1556.004	1556.614	-.610
12	1566.215	1566.672	-.457
13	1582.369	1582.826	-.457
14	1608.277	1608.430	-.152
15	1680.058	1680.210	-.152
16	1686.458	1686.763	-.305
17	1738.579	1738.884	-.305
18	1743.304	1743.456	-.152
19	1760.830	1760.982	-.152
20	1844.497	1844.345	-.152
21	1864.004	1864.004	.000
22	1873.453	1873.453	.000
23	1874.520	1874.672	-.152
24	1876.196	1876.349	-.152
25	1880.159	1880.616	-.457
26	1891.894	1892.351	-.457
27	1892.960	1893.265	-.305
28	1914.906	1915.058	-.152

29	1926.488	1926.488	.000
30	1932.737	1932.889	-.152
31	1943.862	1943.862	.000
32	1953.006	1953.006	.000
33	1956.664	1956.968	-.305
34	1961.388	1961.540	-.152
35	1978.304	1978.457	-.152
36	1981.048	1981.352	-.305
37	2008.632	2008.937	-.305
38	2022.196	2022.348	-.152
39	2046.580	2046.732	-.152
40	2110.588	2110.740	-.152
41	2111.655	2111.655	.000
42	2114.245	2114.398	-.153
43	2116.379	2116.379	.000
44	2127.809	2127.809	.000
45	2128.266	2128.418	-.152

DEPTH SHIFT POINTS LLD SUITE TO AS SUITE
PALM VALLEY NO. 10A, RUN 2

Logplot - Depth Shift Modification Screen Total number of shifts: 70			
	Reference Depth	**Shift Depth**	**Relative Shift**
1	1431.950	1432.560	-.610
2	1446.276	1446.886	-.610
3	1468.679	1469.288	-.610
4	1485.748	1486.357	-.610
5	1529.486	1529.944	-.457
6	1571.244	1571.701	-.457
7	1586.941	1586.941	.000
8	1593.494	1593.647	-.152
9	1595.018	1595.018	.000
10	1597.304	1597.457	-.152
11	1626.108	1626.260	-.152
12	1634.795	1634.490	.305
13	1638.148	1637.843	.305
14	1641.500	1641.500	.000
15	1643.329	1643.024	.305
16	1644.396	1644.244	.152
17	1666.189	1666.037	.152
18	1674.266	1674.266	.000
19	1681.124	1680.972	.152
20	1708.861	1708.709	.152
21	1723.187	1723.187	.000
22	1732.331	1732.331	.000
23	1739.798	1739.646	.152
24	1750.162	1750.009	.152
25	1753.362	1753.514	-.152
26	1757.324	1757.324	.000
27	1761.744	1761.896	-.152
28	1762.811	1762.658	.152

29	1816.760	1816.608	.152
30	1949.348	1949.196	.152
31	1998.116	1997.964	.152
32	2000.402	2000.402	.000
33	2033.168	2033.168	.000
34	2035.150	2035.302	-.152
35	2045.360	2045.513	-.152
36	2056.181	2056.181	.000
37	2090.776	2090.776	.000
38	2092.757	2092.909	-.152
39	2100.986	2101.139	-.153
40	2105.406	2105.406	.000
41	2117.141	2117.141	.000
42	2124.304	2124.304	.000
43	2125.980	2126.132	-.152
44	2129.638	2129.790	-.152
45	2132.533	2132.533	.000
46	2138.782	2138.782	.000
47	2144.725	2144.878	-.152
48	2147.621	2147.773	-.152
49	2184.959	2185.111	-.153
50	2186.026	2186.330	-.305
51	2193.341	2193.645	-.305
52	2193.950	2194.103	-.152
53	2201.570	2201.723	-.153
54	2202.790	2202.790	.000
55	2215.134	2215.134	.000
56	2216.201	2216.353	-.152
57	2221.382	2221.382	.000
58	2243.176	2243.176	.000
59	2247.748	2247.595	.152
60	2282.190	2282.190	.000

61	2285.695	2285.543	.153
62	2290.420	2290.115	.305
63	2293.315	2293.010	.305
64	2295.144	2294.992	.152
65	2303.069	2302.916	.152
66	2306.269	2306.269	.000
67	2309.165	2309.165	.000
68	2313.889	2314.042	-.153
69	2316.328	2316.328	.000
70	2318.004	2318.156	-.152

DEPTH SHIFT POINTS LDL SUITE TO AS SUITE
PALM VALLEY NO. 10A, RUN 2

Logplot - Depth Shift Modification Screen Total number of shifts: 74			
	Reference Depth	**Shift Depth**	**Relative Shift**
1	1445.209	1445.362	-.152
2	1469.288	1469.441	-.152
3	1567.434	1567.586	-.152
4	1568.806	1568.806	.000
5	1571.396	1571.549	-.152
6	1575.968	1575.968	.000
7	1584.198	1584.046	.152
8	1588.313	1588.313	.000
9	1623.517	1623.365	.152
10	1626.108	1625.956	.152
11	1632.052	1631.594	.457
12	1637.233	1636.776	.457
13	1640.586	1640.434	.152
14	1672.895	1672.742	.152
15	1674.114	1674.114	.000
16	1678.381	1678.381	.000
17	1680.515	1680.362	.152
18	1735.074	1734.922	.152
19	1743.608	1743.304	.305
20	1750.162	1749.857	.305
21	1753.362	1753.210	.152
22	1757.324	1757.020	.305
23	1758.544	1758.391	.152
24	1760.982	1760.830	.152
25	1762.811	1762.506	.305
26	1806.854	1806.550	.305
27	1809.445	1808.988	.457
28	1812.493	1812.188	.305

29	1946.758	1946.605	.152
30	1949.348	1949.044	.305
31	1996.440	1996.135	.305
32	2000.555	2000.402	.152
33	2020.062	2019.910	.152
34	2035.150	2035.150	.000
35	2041.398	2041.398	.000
36	2042.922	2042.770	.152
37	2048.866	2048.866	.000
38	2067.306	2067.306	.000
39	2074.926	2074.774	.152
40	2114.398	2114.245	.153
41	2120.646	2120.494	.152
42	2124.151	2123.846	.305
43	2125.980	2126.132	-.152
44	2134.514	2134.362	.152
45	2138.934	2138.934	.000
46	2171.700	2171.700	.000
47	2173.834	2173.681	.153
48	2177.339	2177.339	.000
49	2209.952	2209.952	.000
50	2215.134	2214.982	.152
51	2216.201	2216.201	.000
52	2221.535	2221.382	.153
53	2224.735	2224.583	.152
54	2225.650	2225.650	.000
55	2228.545	2228.393	.152
56	2237.080	2237.080	.000
57	2240.585	2240.432	.152
58	2247.900	2247.595	.305
59	2282.190	2281.885	.305
60	2285.695	2285.543	.153

61	2290.267	2289.962	.305
62	2293.163	2293.010	.152
63	2297.430	2297.278	.152
64	2299.716	2299.259	.457
65	2300.173	2300.021	.153
66	2303.069	2302.764	.305
67	2308.403	2308.098	.305
68	2310.689	2310.536	.152
69	2316.328	2316.175	.152
70	2318.614	2318.614	.000
71	2324.557	2324.557	.000
72	2325.472	2325.167	.305
73	2325.776	2325.319	.457
74	2325.929	2325.776	.152

APPENDIX B

PALM VALLEY NO. 10
CORRECTED GAMMA-RAY LIMITS USED FOR VSHALE COMPUTATION

Depth Interval (m)		Gamma-Ray Range	
From	To	Clean	Shale
1439.0	1468.0	37	150
1468.0	1571.0	43	230
1571.0	1664.0	50	240
1664.0	1715.0	45	168
1715.0	1724.0	50	270
1724.0	1742.0	15	155
1742.0	1761.0	35	231
1761.0	1847.0	43	240
1847.0	1871.0	21	294
1871.0	1943.0	82	280
1943.0	1948.0	27	260
1948.0	2004.0	70	285
2004.0	2022.0	51	233
2022.0	2049.7	35	208
2049.7	2095.0	73	280
2095.0	2100.0	73	326
2100.0	2130.6	50	238

PALM VALLEY NO. 10A
CORRECTED GAMMA-RAY LIMITS USED FOR VSHALE COMPUTATION

Depth Interval (m)		Gamma-Ray Range	
From	To	Clean	Shale
1439.0	1468.0	30	160
1468.0	1500.0	60	254
1500.0	1676.0	52	243
1676.0	1746.0	36	169
1746.0	1759.0	70	266
1759.0	1770.0	20	216
1770.0	1785.0	6	216
1785.0	1798.0	28	216
1798.0	1816.0	47	216
1816.0	1950.0	35	225
1950.0	1978.0	36	260
1978.0	1988.5	11	254
1988.5	1993.0	83	294
1993.0	2025.0	71	254
2025.0	2089.0	92	254
2089.0	2097.0	56	247
2097.0	2145.0	61	220
2145.0	2192.0	70	281
2192.0	2235.0	40	220
2235.0	2290.0	70	300
2290.0	2310.0	61	220
2310.0	2321.0	82	223
2321.0	2326.7	45	220

APPENDIX C

Well Name: PV-10 lower Stairway PV-10

Depth: 1664.3 to 1761.2 by .15 meters

Minimum allowed thickness of netpay unit: .0000

Vertical reference channel: TVD Date: 23 APR 95

Curve Type (# - Name)	Cutoff value(s)	Method
Sw (32 - SW)	.5500	LE
Porosity (60 - PHIE)	.0000	GE

SUMMATION STATISTICS

TOP INTERVAL		(M)	1653.2252
TOP INTERVAL	- MD	(M)	1664.3605
BASE INTERVAL		(M)	1742.6702
BASE INTERVAL	- MD	(M)	1761.1344
GROSS THICKNESS		(M)	89.5973
GROSS THICKNESS	- MD	(M)	96.9263
NET PAY THK		(M)	5.5857
NET PAY THK	- MD	(M)	6.0958
NET/GROSS RATIO			.0623
PAY ARITH AVG Sw			.4448
PAY HC THK		(M)	.1366
PAY HC THK	- MD	(M)	.1491
PAY ARITH AVG POROSITY			.0445
PAY POROSITY THK		(M)	.2486
PAY POROSITY THK	- MD	(M)	.2712

Well Name: PV-10 P1 Unit PV-10

Depth: 1847.2 to 2051.0 by .15 meters

Minimum allowed thickness of netpay unit: .0000

Vertical reference channel: TVD Date: 23 APR 95

Curve Type (# - Name)	Cutoff value(s)	Method
Sw (32 - SW)	.5500	LE
Porosity (60 - PHIE)	.0000	GE

SUMMATION STATISTICS

TOP INTERVAL		(M)	1819.5430
TOP INTERVAL	- MD	(M)	1847.2405
BASE INTERVAL		(M)	1996.5237
BASE INTERVAL	- MD	(M)	2050.9993
GROSS THICKNESS		(M)	177.1331
GROSS THICKNESS	- MD	(M)	203.9111
NET PAY THK		(M)	2.3704
NET PAY THK	- MD	(M)	2.7433
NET/GROSS RATIO			.0134
PAY ARITH AVG Sw			.4518
PAY HC THK		(M)	.0598
PAY HC THK	- MD	(M)	.0690
PAY ARITH AVG POROSITY			.0457
PAY POROSITY THK		(M)	.1085
PAY POROSITY THK	- MD	(M)	.1254

Well Name: PV-10 P2 Unit PV-10

Depth: 2051.0 to 2143.9 by .15 meters

Minimum allowed thickness of netpay unit: .0000

Vertical reference channel: TVD Date: 23 APR 95

Curve Type (# - Name)	Cutoff value(s)	Method
Sw (32 - SW)	.5500	LE
Porosity (60 - PHIE)	.0000	GE

SUMMATION STATISTICS

TOP INTERVAL		(M)	1996.5237
TOP INTERVAL	- MD	(M)	2050.9993
BASE INTERVAL		(M)	2070.8000
BASE INTERVAL	- MD	(M)	2143.9631
GROSS THICKNESS		(M)	74.4287
GROSS THICKNESS	- MD	(M)	93.1162
NET PAY THK		(M)	.2404
NET PAY THK	- MD	(M)	.3049
NET/GROSS RATIO			.0032
PAY ARITH AVG Sw			.4772
PAY HC THK		(M)	.0047
PAY HC THK	- MD	(M)	.0059
PAY ARITH AVG POROSITY			.0372
PAY POROSITY THK		(M)	.0090
PAY POROSITY THK	- MD	(M)	.0114

Well Name: PV-10A lower Stairway PV-10A

Depth: 1676.5 to 1816.0 by .15 meters

Minimum allowed thickness of netpay unit: .0000

Vertical reference channel: TVD Date: 23 APR 95

Curve Type (# - Name)	Cutoff value(s)	Method
Sw (32 - SW)	.5500	LE
Porosity (60 - PHIE)	.0000	GE

SUMMATION STATISTICS

TOP INTERVAL		(M)	1652.2097
TOP INTERVAL	- MD	(M)	1676.5524
BASE INTERVAL		(M)	1738.1152
BASE INTERVAL	- MD	(M)	1815.9984
GROSS THICKNESS		(M)	86.0579
GROSS THICKNESS	- MD	(M)	139.5984
NET PAY THK		(M)	4.9542
NET PAY THK	- MD	(M)	8.3820
NET/GROSS RATIO			.0576
PAY ARITH AVG Sw			.4271
PAY HC THK		(M)	.1113
PAY HC THK	- MD	(M)	.1886
PAY ARITH AVG POROSITY			.0397
PAY POROSITY THK		(M)	.1969
PAY POROSITY THK	- MD	(M)	.3330

Well Name: PV-10A P1 Unit PV-10A

Depth: 1950.0 to 2235.0 by .15 meters

Minimum allowed thickness of netpay unit: .0000

Vertical reference channel: TVD Date: 23 APR 95

Curve Type (# - Name)	Cutoff value(s)	Method
Sw (32 - SW)	.5500	LE
Porosity (60 - PHIE)	.0000	GE

SUMMATION STATISTICS

TOP INTERVAL		(M)	1807.0747
TOP INTERVAL	- MD	(M)	1949.9580
BASE INTERVAL		(M)	1978.2468
BASE INTERVAL	- MD	(M)	2234.9460
GROSS THICKNESS		(M)	171.3245
GROSS THICKNESS	- MD	(M)	285.1404
NET PAY THK		(M)	1.8859
NET PAY THK	- MD	(M)	3.3528
NET/GROSS RATIO			.0110
PAY ARITH AVG Sw			.4257
PAY HC THK		(M)	.0511
PAY HC THK	- MD	(M)	.0911
PAY ARITH AVG POROSITY			.0473
PAY POROSITY THK		(M)	.0893
PAY POROSITY THK	- MD	(M)	.1586

Well Name: PV-10A P2 Unit PV-10A

Depth: 2235.0 to 2343.0 by .15 meters

Minimum allowed thickness of netpay unit: .0000

Vertical reference channel: TVD Date: 23 APR 95

Curve Type (# - Name)	Cutoff value(s)	Method
Sw (32 - SW)	.5500	LE
Porosity (60 - PHIE)	.0000	GE

SUMMATION STATISTICS

TOP INTERVAL		(M)	1978.2468
TOP INTERVAL	- MD	(M)	2234.9460
BASE INTERVAL		(M)	2052.8564
BASE INTERVAL	- MD	(M)	2342.9976
GROSS THICKNESS		(M)	74.7620
GROSS THICKNESS	- MD	(M)	108.2039
NET PAY THK		(M)	.2137
NET PAY THK	- MD	(M)	.3049
NET/GROSS RATIO			.0029
PAY ARITH AVG Sw			.4256
PAY HC THK		(M)	.0044
PAY HC THK	- MD	(M)	.0063
PAY ARITH AVG POROSITY			.0360
PAY POROSITY THK		(M)	.0077
PAY POROSITY THK	- MD	(M)	.0110