Anzon Australia
LIMITED

MANTA-2A
WELL COMPLETION REPORT
VOLUME 2
INTERPRETIVE DATA

February 2007

VIC/L26
OFFSHORE GIPPSLAND BASIN
VICTORIA

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1. WELL DATA RECORD

Well Name	MANTA-2A
Designation	Development
Permit Name	VIC/L26 Production Licence
Title Holders	Anzon Australia Limited (Anzon) 50% and Beach Petroleum Limited (Beach) 50%
Operator per P(SL)A Well Operations Regulations	Anzon Australia Limited
Surface Location (GDA94, GRS80, MGA, UTM Zone 55)	Latitude 38º 16' 39.41"S Longitude 148º 42' 58.03"E 650106.19mE 5761989.60mN
Bottom Hole Location	Latitude 38º 16' 19.84"S Longitude 148º 43' 31.10"E 650920.90mE 5762577.79mN
Project Manager	Upstream Petroleum Pty. Ltd.
Rig Received	13:00 hrs 23 January, 2006
Spud Time/Date	19:30 hrs 23 January, 2006
TD date	03:00hrs 9 February, 2006
End Drilling/Start Completion Phase	06:00hrs 13 February, 2006
End Completion Phase	12:00hrs 24 February, 2006
Rig Released (after anchors retrieved)	08:00 hrs 25 February, 2006
Total Time Rig on Contract	33.7 days (809 hours)
Water Depth	134.2m (below mean sea level) (133.3 LAT)
Rotary Table	21.5m (above mean sea level)
Drilling Contractor / Rig Name / Type	Diamond Offshore General Company / Ocean Patriot / Semi-submersible
Well Status	Completed and suspended for production
Total Depth	3113.0mMDRT (2873.9mTVDSS)
Maximum Deviation	28.0^{o}, at TD (3113.0mMDRT)
Bottom Hole Location Offset	588.2m north and 814.7m east, on an azimuth of 54.2 degrees from surface location.

2. INTRODUCTION

The Manta-2A well (Figures 2.1 and 2.2) was drilled as a development well to enable production from the oil reservoirs discovered by the Manta-1 exploration well in 1984. Manta-2A was the first development well drilled in the Manta Field. It was the second well of the Basker-Manta Project Full Field Development (FFD), Basker-2 having been the first well. It was a discretionary well (it was not drilled to satisfy any specific work program obligation) and was the first well to be drilled by the Basker-Manta-Gummy (BMG) Joint Venture since the award of the VIC/L26 Production Licence (previously the VIC/RL6 Retention Lease). It was drilled with the "Ocean Patriot" semi-submersible drilling rig with a wellhead located to the southwest of the target reservoirs, in 134.2 metres of water.

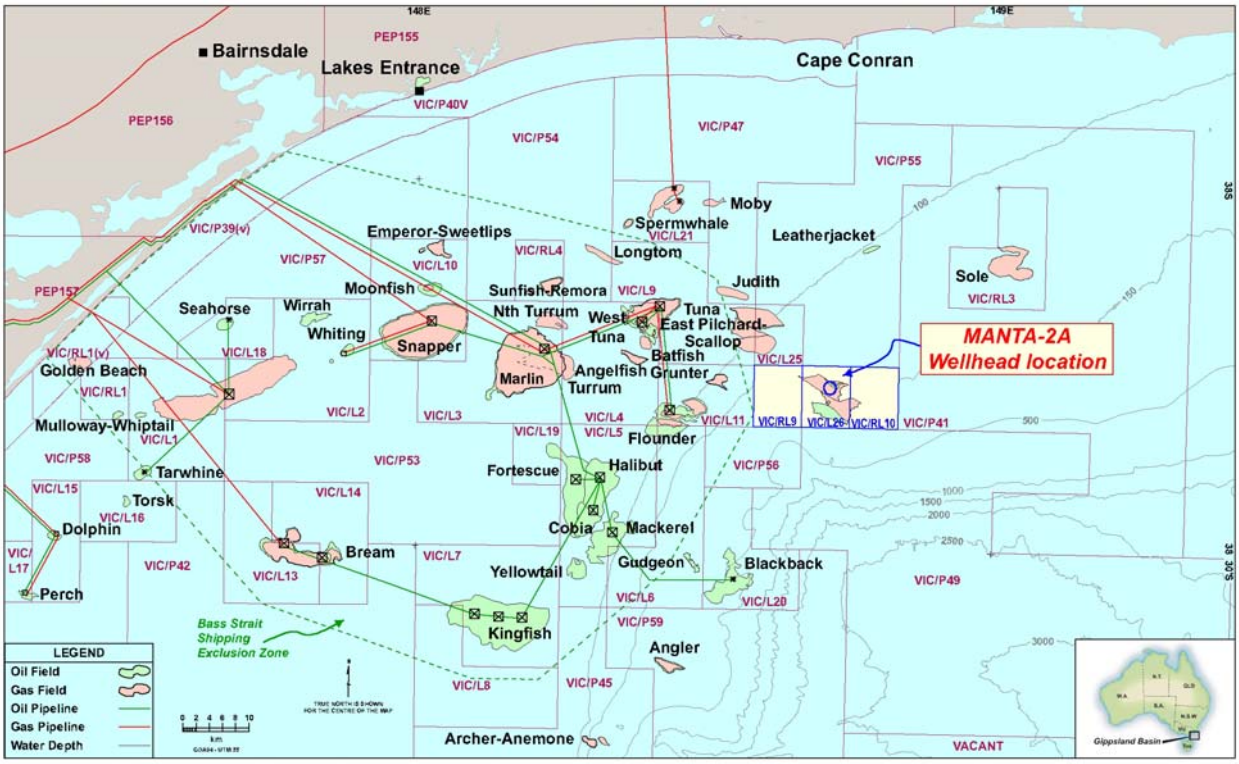


Figure 2.1 Manta-2A Location Map

The Manta-2A wellhead is located 20m southwest of Manta-2 (Figure 2.3). Manta-2 was plugged and abandoned at 971mMDRT (936mTVDRT) after pressure testing showed that the 13⅜" casing would not hold pressure.

Manta-2A was spudded on the 23rd January 2006. The objective of the well was to intersect all of the Intra-Latrobe oil and gas reservoirs encountered in Manta-1, at a location that was near to Manta-1 (within 120m) but slightly updip. It was drilled as a "3D" deviated well with two changes of direction, one in a vertical plane and one in an inclined plane (Figures 2.4 and 2.5). This 3D well path was necessary to meet the well objective, given constraints associated with the sea-floor layout intended for FFD. The well was "kicked off" to the northeast and then "turned" so that it headed almost due east, reaching a total depth of 3113.0mMDRT (2895.4mTVDSS). The TD is offset 1005m from the wellhead (on a bearing of 54.2°). The well was completed as a future oil producer and the rig was released on the 25th February 2006.

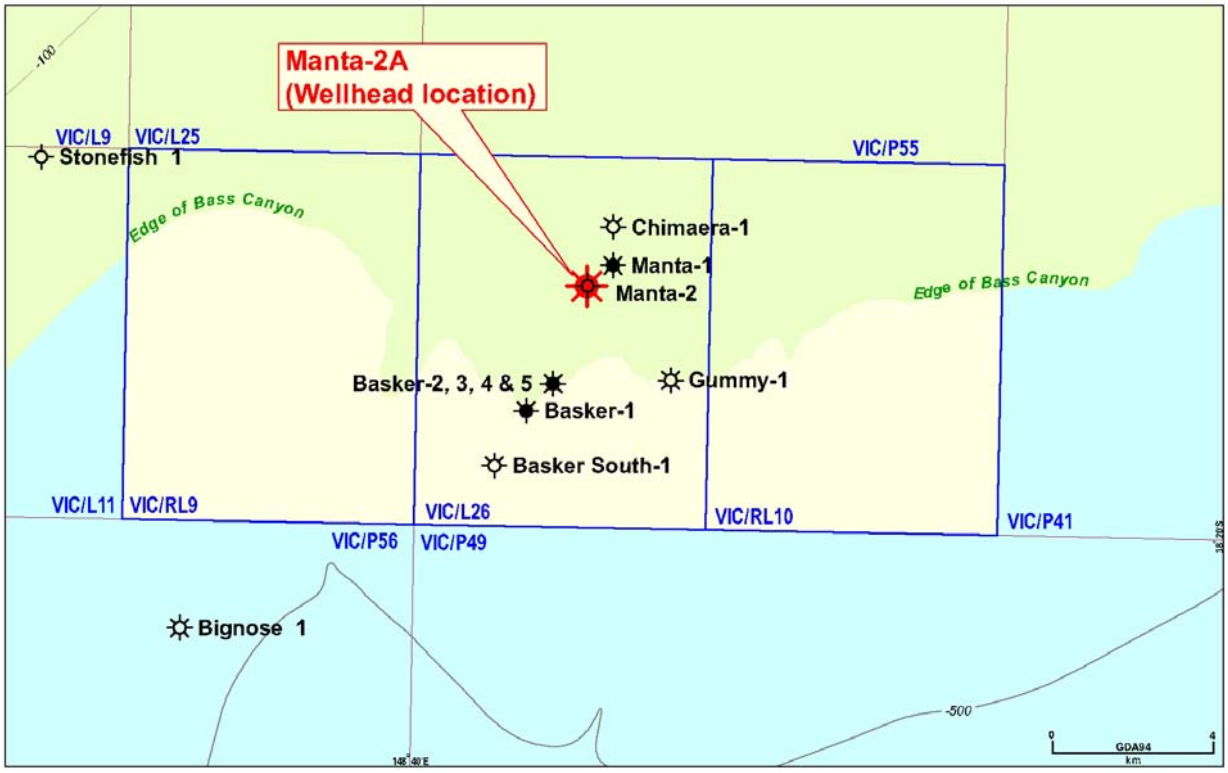


Figure 2.2 Manta-2A Location Map (Detail)

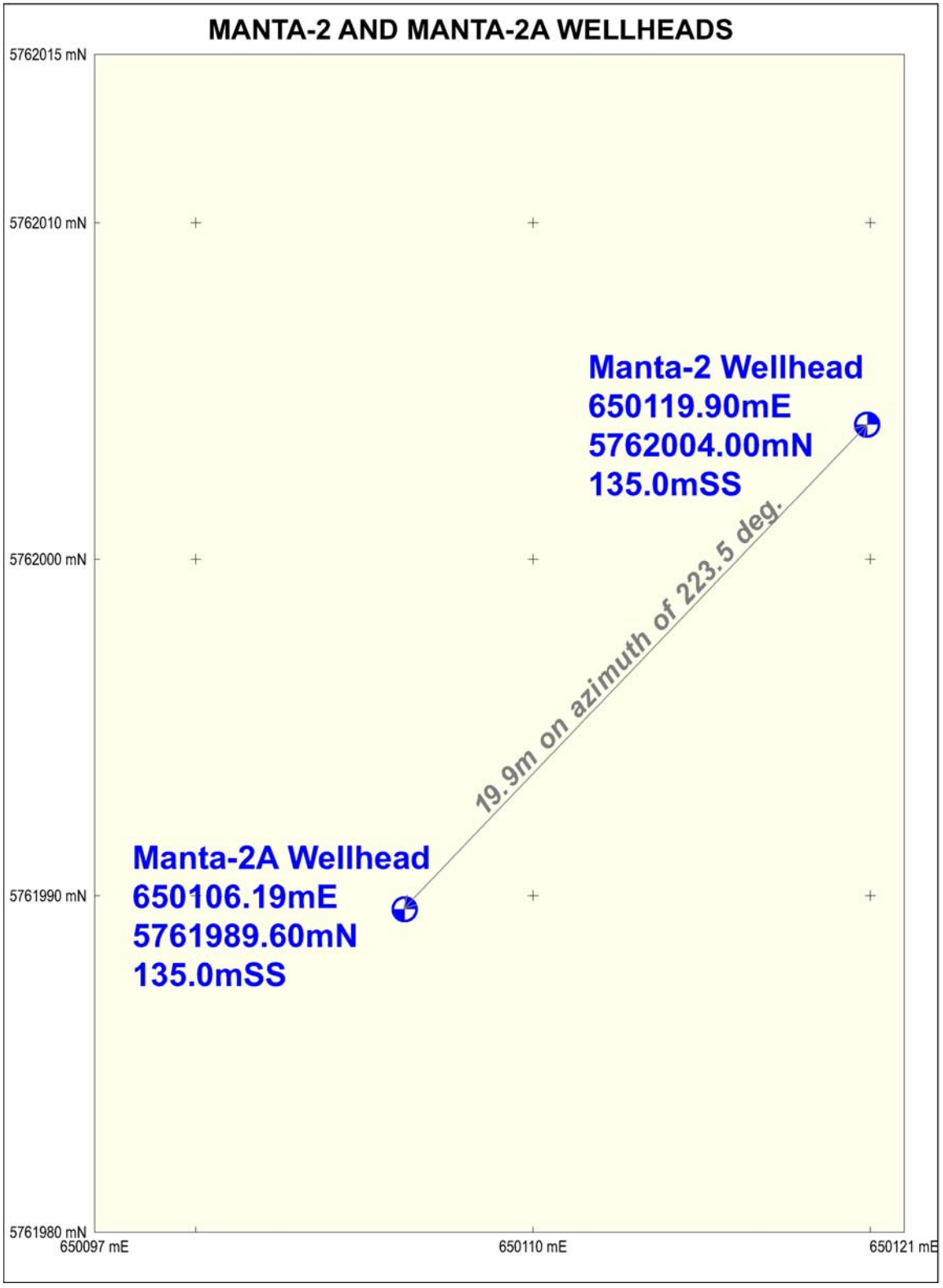


Figure 2.3 Manta-2A and Manta-2 Wellhead Locations

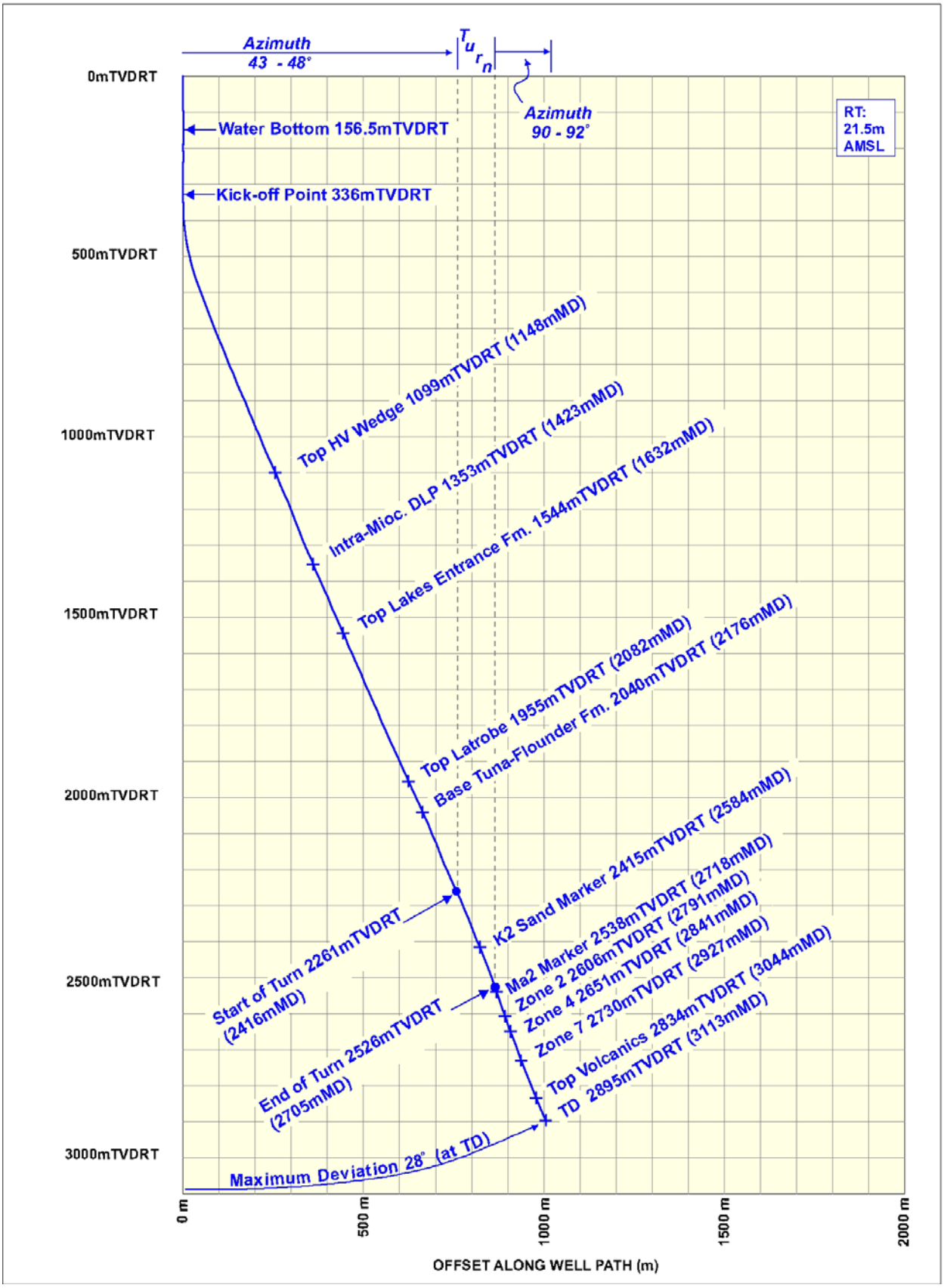


Figure 2.4 Vertical Cross-Section Along the Manta-2A Well Path

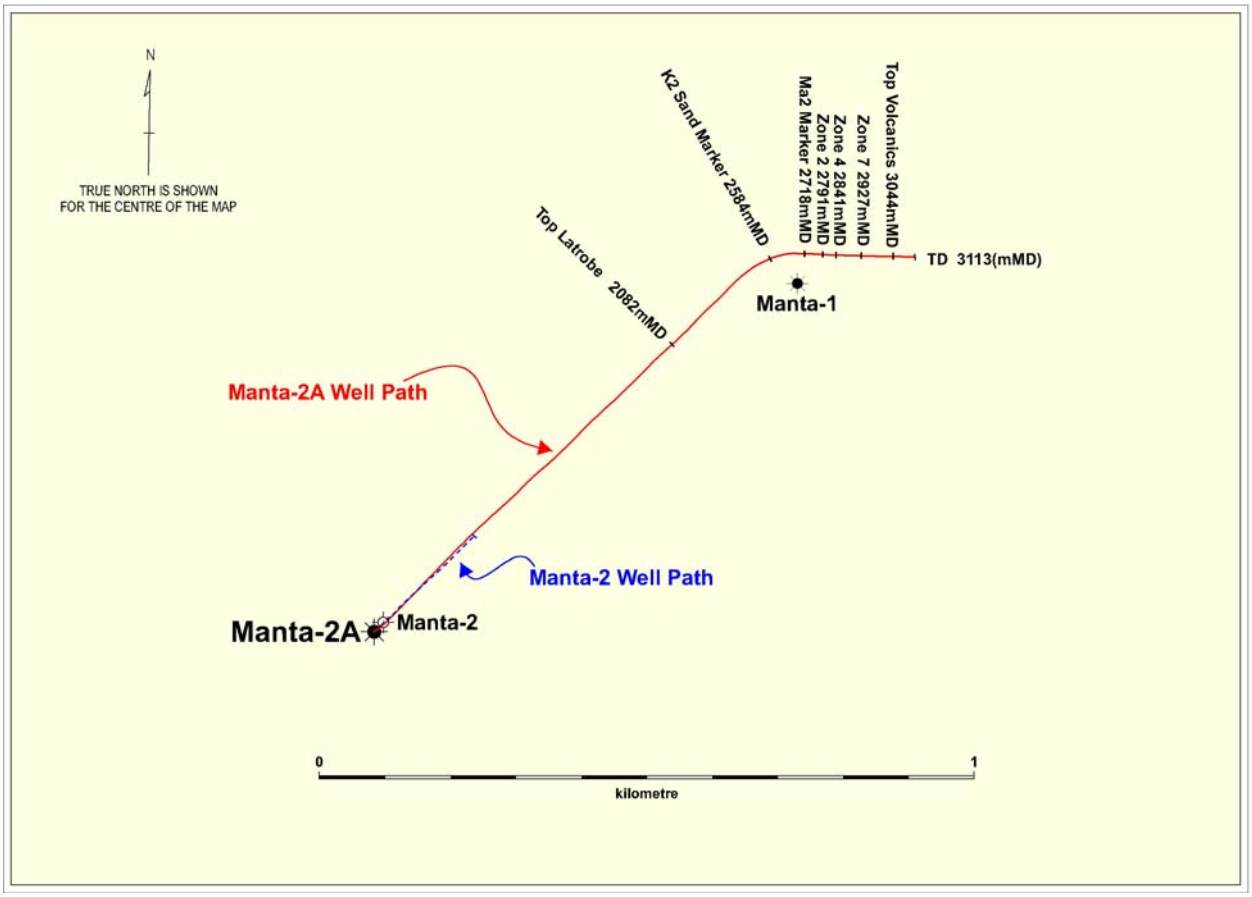


Figure 2.5 Plan View of Manta-2A and Manta-2 Well Paths

3. SUMMARY OF WELL RESULTS

All of the Intra-Latrobe oil and gas reservoirs intersected in Manta-1 were also encountered in Manta-2A but with slightly different reservoir properties. Three of the reservoirs (Zones 2, 4 and 7) were at slightly higher stratigraphic levels in Manta-2A (relative to Manta-1) and there are some differences in the thickness of individual sand units (Figure 3.1). A number of sands below the main Zone 7 reservoir were interpreted as possible oil reservoirs in Manta-1. Three of these sands were confirmed as oil reservoirs by Manta-2A (Zone 7.3 and Zone 7.4/7.5). These and three other oil reservoirs were perforated for production (Table 3.1).

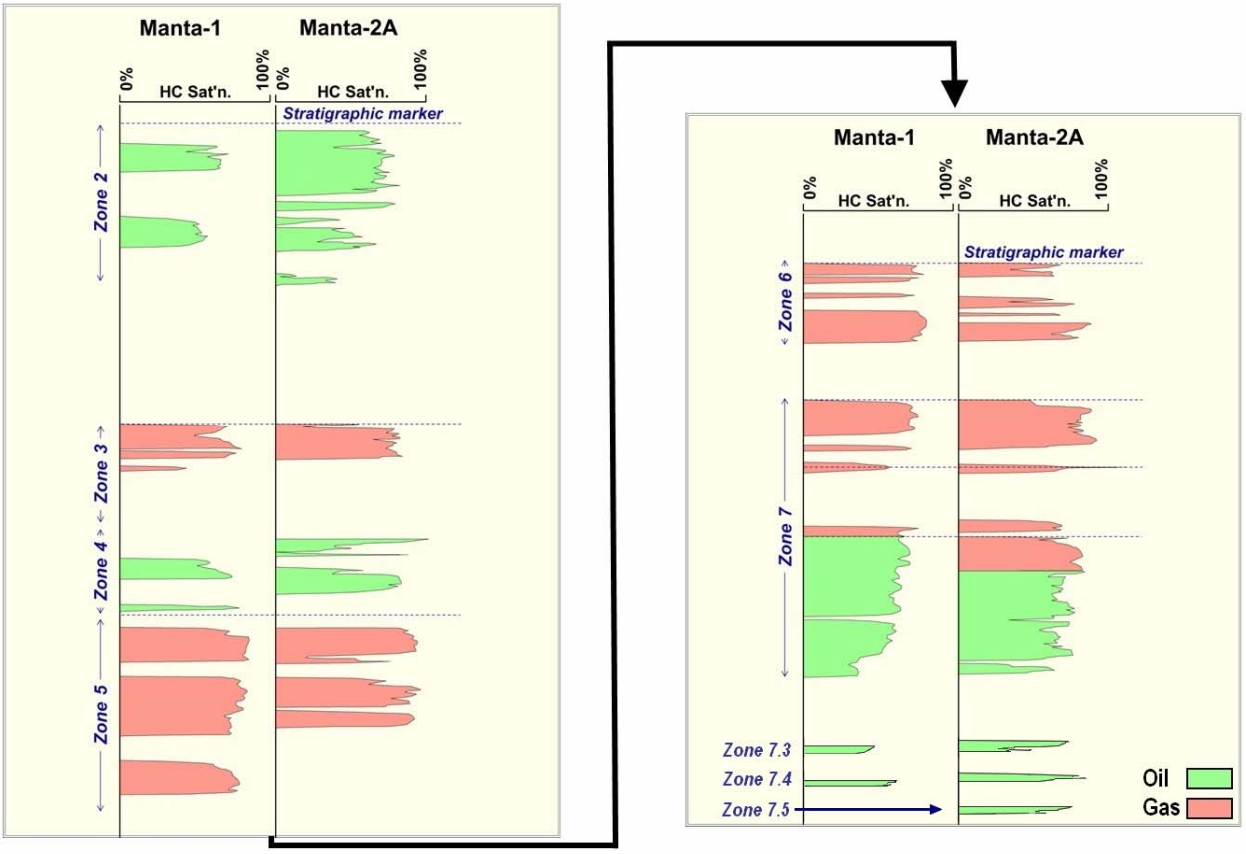


Figure 3.1 Diagram showing Manta-1 to Manta-2A Reservoir Correlation

A total of 31.7m of oil pay and 27.2m of gas pay (true vertical thickness) was intersected in Manta-2A. The oil pay was 29% more than was expected (based on the Manta-1 oil intersections).

Manta-2A achieved a stabilised flow rate of 6370 stbopd (on a commingled flow test, Figure 3.2), at an average produced gas/oil ratio of 727 scf/stb, through a ¾“choke, at a flowing wellhead pressure of 1509 psig. The highest stabilised oil flow rate (6443 stbopd) was achieved at the end of the two hour flow test. Production from all six perforated intervals commenced in December 2006.

Table 3.1 Manta-2A Perforation Intervals

Reservoir Zone	Perforation Interval (mMDRT)	Perforation Interval (mTVDSS)	Total (mMDRT)
Zone 2 (Oil)	2791.0-2806.5	2584.2-2598.4	15.5
Zone 4 (Oil)	2843.5-2848.0	2632.1-2636.2	4.5
Zone 7 (Oil)	2954.0-2960.0	2732.1-2737.6	6.0
Zone 7.3 (Oil)	2999.0-3001.5	2772.6-2774.8	2.5
Zone 7.4 (Oil)	3007.0-3010.5	2779.7-2782.9	3.5
Zone 7.5 (Oil)	3015.0-3017.0	2786.9-2788.7	2.0
		Total	34.0

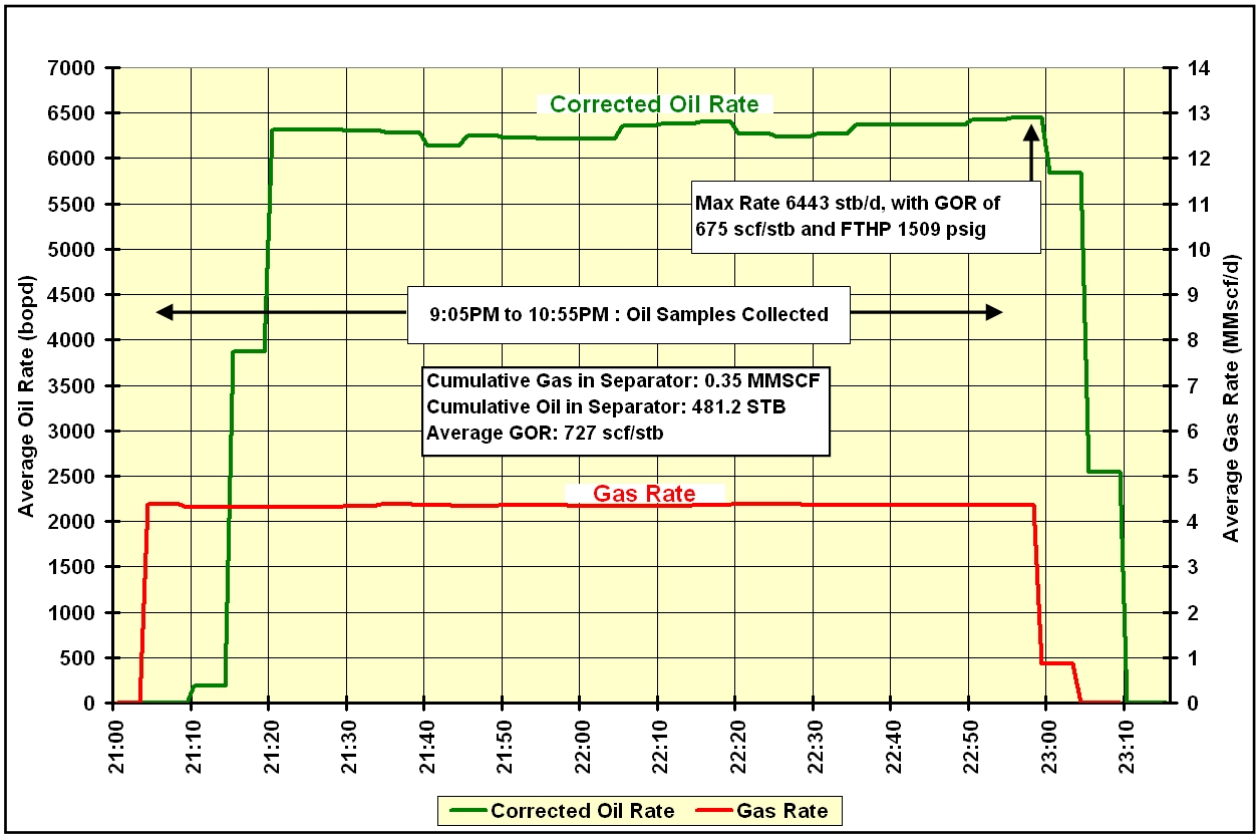


Figure 3.2 Separator Flowrates Achieved During the Manta-2A Well Clean-up

4. GEOLOGICAL DISCUSSION

The Manta-2A well penetrated a section interpreted to be Recent to Campanian (T. lilliei zone) in age. The ages used are based on the results of Manta-1 and correlated with Manta-2A. The well correlation between Manta-1 and Manta-2A is shown in Enclosure 1.

The chronostratigraphy for Manta-2A is summarised in Figure 4.1 below.

System	Series	Epoch	Time	Stages	Spore Zollen Zones	Formation	Group
Q	Pliestocene		0 0.95	Ionian			
			0.95 1.77	Calabrian		Gippsland Lst	SEASPRAY
Tertiary	Pliocene	Late/Upper	1.77 2.6	Gelasian			
			2.6 3.58	Piacenzian			
		Early/Lower	3.58 5.32	Zanclean			
	Miocene	Upper	5.32 7.12	Messinian			
			7.12 11.2	Tortonian			
		Middle	11.2 14.8	Serravallian		Lakes Entrance	
			14.8 16.4	Langhian			
		Early/Lower	16.4 20.52	Burdigalian			
			20.52 23.8	Aquitanian			
	Oligoene	Late/Upper	23.8 28.5	Chattian			
		Early/Lower	28.5 33.7	Rupelian	Middle Proteacidites tuberculatus Lower P. tuberculatus		
	Eocene	Late/Upper	33.7 37	Priabonian	Upper N.asperus Middle N. asperus		
		Middle	37 41.3	Bartonian	Lower N.aspertus		
			41.3 49	Lutetian	P.asperopolus		
		Early/Lower	49 54.8	Ypresian	Upper M. diversus Middle M. diversus Lower M. diversus	Tuna-Flounder Formation	LATROBE
	Paleocene	Late/Upper	54.8 57.9	Thanetian	Upper L.balmei Lower L.balmei	Intra-Latrobe Siliclastics	
			57.9 60.9	Selandian			
		Early/Lower	60.9 65	Danian			
Cretaceous	Late/Upper		65 71.3	Maast	Upper F. longus Lower F. longus		
		Senonian	71.3	Campanian	T. lilliei N. senectus	TD	

Figure 4.1 Manta-2A Chronostratigraphy

Lithostratigraphy

SEASPRAY GROUP

Gippsland Limestone (155.7 - 1632mMDRT; 134.2 – 1522.8mTVDSS)

The Gippsland Limestone is Miocene to Pliocene in age and was deposited in outer shelf and slope depositional environments.

In the riserless section drilled to 994mMDRT, returns were to the seafloor.

The section from 994 - 1070mMDRT is described as interbedded marls (calcareous content 40-60%) and calcilutites (calcareous content 80 - 100%), occasionally inter-bedded with calcareous claystone (calcareous content 60 - 80%) and calcarenites (calcareous content greater than 80%). The marls are very light olive grey in colour, very soft to soft, with rare sand grains and traces of forams, crinoids and carbonaceous material. The calcilutites are light olive grey, very soft, amorphous with rare silt, very fine sand grains and trace forams. The Calcareous claystones are light olive grey and very soft to soft. The Calcarenites are light olive grey, very fine grained and poorly sorted with an argillaceous matrix and trace forams.

Between 1070mMDRT and 1632mMDRT marl is the dominant lithology. The marl is interbedded with occasional calcareous claystones and calcarenites. The marl is light grey, olive, very soft to amorphous with abundant siliceous clay, occasional calcareous silt and traces of forams, pyrite and glauconite. The calcareous claystone is light olive grey and very soft to soft. The calcarenites are light grey, light brownish grey, dominantly medium to fine grained, moderately well sorted, with abundant forams and traces of glauconite and calcite cement.

The gamma ray averages between 80-100 units.

Lakes Entrance Formation (1632 - 2086.1mMDRT; 1522.8 - 1937.6mTVDSS)

The top of the Lakes Entrance Formation is a significant downlap surface on seismic and is indicated by a decrease in the resistivity and a decrease in velocity. There is no obvious lithology change across the Gippsland Limestone/Lakes Entrance boundary until approximately 1720mMDRT. The upper section of the Lakes Entrance Formation comprises marl with interbedded occasional calcareous claystones and calcarenites. The claystones are light grey, olive, with abundant siliceous clay, occasional calcareous silt and traces of forams, pyrite, and glauconite.

With increasing depth the Lakes Entrance Formation gradually decreases in calcareous content. The uppermost comprises of marl to calcareous claystones with occasional claystone. Calcareous claystones and claystones dominate below 1740mMDRT (1640mTVDSS).

The calcareous claystone is light grey, medium light grey, medium grey and very soft to soft with traces of pyrite, glauconite and feldspar. The claystones are light grey, light medium grey, very soft to soft with minor calcareous content.

In the Basker-Manta-Gummy (BMG) area there is no detailed age analysis for the Lakes Entrance/ Gippsland Limestone boundary. Based on analysis in other parts of the basin, the age is Mid Miocene. Deposition occurred in an outer shelf to slope environment.

LATROBE GROUP

For the purpose of this report, the Latrobe Coarse Clastics and Intra-Latrobe Siliclastics have not been separated and are grouped under the Intra-Latrobe Siliclastics.

Tuna-Flounder Formation (2082.1 - 2171.5mMDRT; 1937.6 - 2018.5mTVDSS)

Below the Lakes Entrance Formation, at the top of Latrobe (top of Tuna-Flounder Formation) there is a significant change in the character of the gamma ray, resistivity and sonic logs, regardless of whether the Latrobe lithology is a sandstone, siltstone or claystone. This represents a significant time break from Eocene (M. diversus) to Early-Mid Miocene at the base of the Lakes Entrance Formation.

In Manta-2A a thick prograding, neritic sand package (2082.1 - 2027mMDRT; 1937.6 - 1975.3mTVDSS, 37.7mTVD gross) is present. The sandstone is translucent to white/green comprising speckled aggregates and is loose to friable, dominantly medium grained, occasionally fine and coarse grained, moderately sorted and occasionally very glauconitic.

The basal section of the prograding unit is described as a claystone which is brownish grey and very soft to amorphous with traces of silt and sand. The similar section at Manta-1 is described as a siltstone suggesting minor lateral variations in deposition.

Intra-Latrobe Siliclastics (2171.5 - 3113mMDRT; 2018.5 – 2873.9mTVDSS)

The unconformity between the Tuna-Flounder Formation and the underlying Intra-Latrobe Siliclastics is taken at the base of a prograding unit. It represents a significant time-break of approximately 3 million years from Upper L. balmei to Middle M. diversus (Palaeocene - Early Eocene). The siliciclastic section is T. lilliei – Upper L. balmei in age with the hydrocarbon interval being T. lilliei to possibly F. longus in age.

The siliclastic section penetrated in Manta-2A presents an overall rising sea level from coastal plain to shallow marine. The change from dominantly non-marine to marine occurs over the interval 2600 - 2650mMDRT (2408mTVDSS - 2455mTDVSS) in an interbedded sandstone/ claystone section.

In Manta-2A there is no economic interest in the marine section. The marine section is dominantly medium to coarse sandstones interbedded with claystone and occasional siltstone beds. As the section becomes younger the higher energy sandstones become dominant with only occasional claystones present.

The coastal plain sequence below the K2 Sand comprises sandstones, siltstones, claystones and thin coals and includes the Manta Field Intra-Latrobe reservoir interval. The base of this sequence is the top of Volcanic Unit 1.

The sandstones within this coastal plain sequence are dominantly loose, medium to coarse grained occasionally grading to very coarse or very fine grained, poor to moderately sorted and very carbonaceous in part. The siltstones are brown grey, dark brownish grey, grading to carbonaceous siltstone and claystone, with traces of pyrite and mica. The claystones are brown grey, dark brown and silty in part. The coals are black, argillaceous in part and grading to claystone and siltstone.

Within the coastal plain sequence, approximately 50mTVT above the Manta reservoir interval, a dolomitised sandstone marker, the Ma2 Marker, was anticipated. The sandstone is present, however it is not dolomtised.

Volcanics

Three major volcanics units (Units 1, 2 and 3) have been observed in the Basker, Manta and Gummy wells. They range in thickness from 30 to 150m. The volcanic sequence underlying the Manta-2A reservoir interval (Volcanic Unit 1) is regionally extensive and comprises mainly interbedded fresh and weathered basalts. It is a multicoloured mixture of fresh minerals and weathered clays which are green grey, white light brown with relict volcanic crystalline texture, with, rare calcite cement, rare pyrite and rare chert. The volcanic units are characterised by a variable gamma log response and a general decrease in resistivity with a wide separation on the density-neutron log.

The Composite Well Log is shown in Enclosure 3.

Correlation

The basic correlation between Manta-1 and Manta-2A is presented in Enclosure 1. The formation top depths are shown in Table 4.1. The table also shows the major seismic horizons for the reservoir interval and their interpreted well depths.

Table 4.1 Manta-1 Versus Manta-2A Formation Tops

	Manta-1		Manta-2A	
	mMDRT	mTVDSS	mMDRT	mTVDSS
Seabed (Top Gippsland Limestone)	158.44	-133.44	155.7	-134.2
Lakes Entrance Formation	1534.0	-1509.0	1632.0	-1522.8
Top Latrobe Group	1956.0	-1931.0	2086.1	-1937.6
Base Tuna-Flounder Formation	2038.0	-2013.0	2175.5	-2018.5
K2 Sand	2400.5	-2375.5	2563.9	-2375.6
K2 Sand Seismic Marker	2421.9	-2396.9	2584.0	-2394.0
Ma2 Marker	2540.0	-2515.0	2716.2	-2515.7
Manta Zone 1	2592.9	-2568.0	2767.2	-2562.3
Manta Zone 1 Reservoir	2607.0	2582.0	No HC	No HC
Manta Zone 2	2615.2	-2590.2	2791.3	-2584.5
Manta Zone 2 Reservoir	2615.2	-2590.2	2791.3	-2584.5
Manta Zone 3	2635.3	-2610.3	2815.7	-2606.9
Manta Zone 3 Reservoir	2646.2	-2621.0	2828.0	-2618.0
Manta Zone 4	2660.2	-2635.0	2840.1	-2629.1
Manta Zone 4 Reservoir	2660.2	-2635.0	2841.8	-2630.5
Manta Zone 5	2668.2	-2643.0	2851.7	-2639.5
Manta Zone 5 Reservoir	2668.2	-2643.0	2851.7	-2639.5
ZC1	2682.1	-2657.0	2873.5	-2659.4
ZC2	2705.1	-2680.0	2899.2	-2682.7
Manta Zone 6	2720.0	-2695.0	2909.0	-2691.3
Manta Zone 6 Reservoir	2720.0	-2695.0	2909.0	-2691.3
Manta Zone 7	2736.5	-2711.5	2927.0	-2707.9
Manta Zone 7 Reservoir	2736.5	-2711.5	2927.0	-2707.9
ZC3	2740.6	-2715.0	2933.6	-2713.8
Manta Zone 7.3 Reservoir	2801.1	-2775.9	2999.3	-2772.9
Manta Zone 7.4/7.5 Reservoir	2808.8	-2783.6	3007.3	-2780.0
ZC4	2817.2	-2793.0	3020.8	-2792.1
ZC5 (Volcanics Unit 1)	2836.2	-2811.0	3045.8	-2814.4

The hydrocarbons encountered in Manta-2A are found between the Ma2 and the top of Volcanics Unit 1. In Manta-1 gas was also encountered in the deeper Golden Beach.

The reservoir zonation is based on Shell's original zonation of Manta-1 (1-7). The detailed correlation across zones 1-7 between the Manta wells is presented in Enclosure 2.

Manta-2A confirmed the presence of the hydrocarbons and the continuity of the reservoirs between the wells.

5. GEOPHYSICAL DISCUSSION

The trap for the Manta Field hydrocarbons is a fault-dependent closure on the downthrown side of a high-angle normal fault (the Manta Fault) which cuts across a south to southwest plunging nose which joins the Basker, Manta and Gummy fields (Figure 5.1). Low viscosity basaltic intrusives are believed to have congealed in the fault planes, providing the fault seal for all three fields.

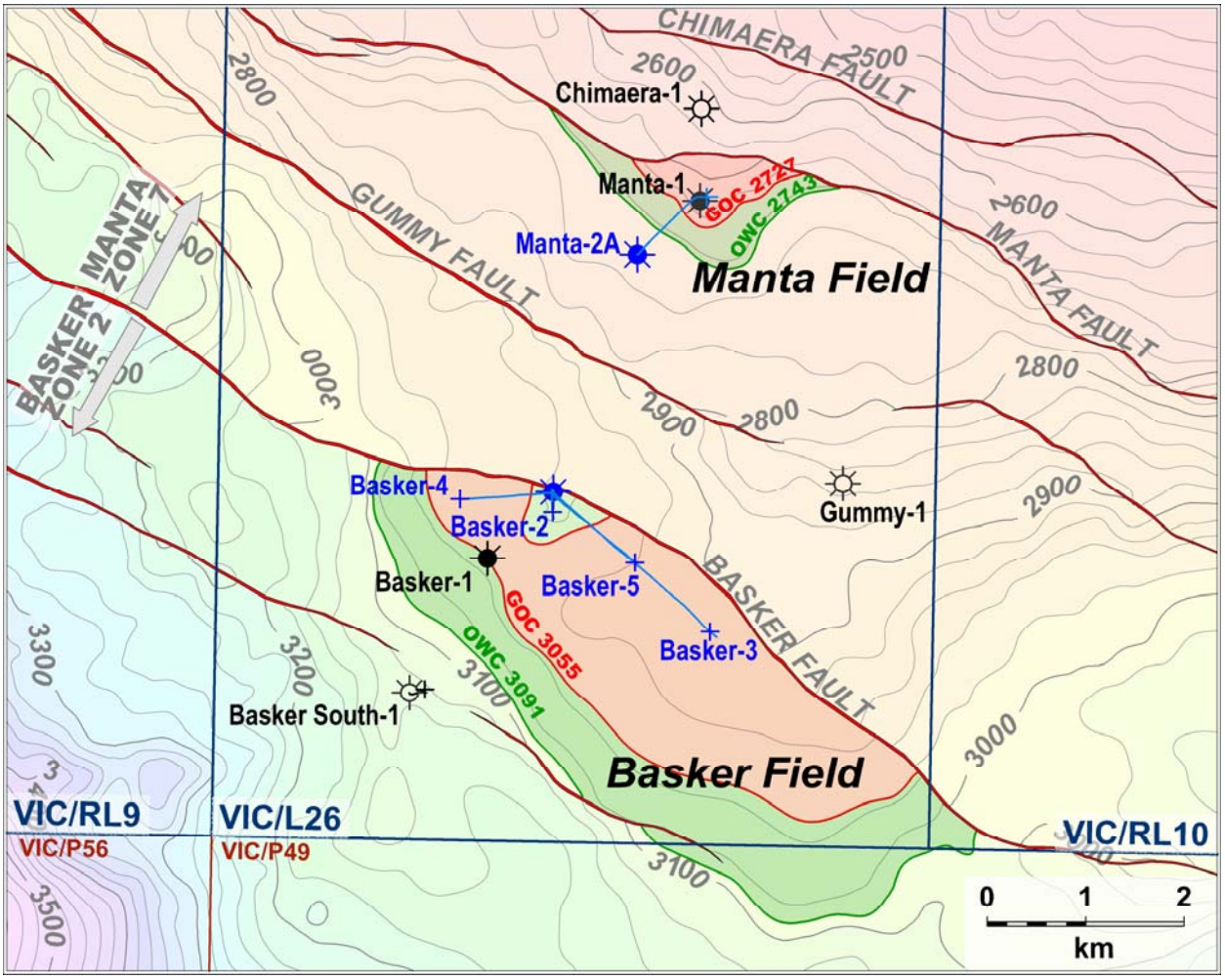


Figure 5.1 Composite Structure Map, Top of Manta Field Zone 7 Reservoir and Top of Basker Field Zone 2 Reservoir (Contour Interval 20m)

Six reservoir mapping seismic horizons (MZN2 and ZC1 to ZC5) have been mapped over the reservoir interval tested by Manta-2A, dividing the reservoir section into five intervals. Figure 5.2 shows the relationship of these horizons to the reservoir nomenclature that has been developed for the Basker, Manta and Gummy wells. Reservoir zones of the same name are not stratigraphically equivalent in the three wells. Figure 5.3 (an arbitrary 3D seismic line through the Basker and Manta wells) shows the key Manta reservoirs in relation to the reservoir seismic markers.

Seismic coverage for the Basker, Manta and Gummy fields is provided by the 1996 Basker-Manta 3D Seismic Survey. Two processed versions of this survey are presently available: the original 1997 processing by Shell's Melbourne Processing Centre and reprocessing completed by Woodside in 2001, which included both merging with the Kipper 3D and pre-stack depth

migration (PSDM). The current reservoir maps were derived from Anzon's interpretation of the 2001 merged and reprocessed Kipper-Basker-Manta PSDM 3D seismic (KBM3D), after scaling from depth back to two-way time.

Seismic data quality in the vicinity of the Manta Field is excellent and well-to-seismic ties are relatively straightforward, with good agreement between the seismic and the synthetics over most of the logged section. The KBM3D seismic is nominally quadrature phase (zero phase with a 90º phase shift) and is displayed with the Australian normal polarity convention (an increase in acoustic impedance gives a positive reflection coefficient, is written to tape as a negative number and is displayed as a trough). Hence the marked increase in impedance at the top of Latrobe appears at the zero crossing between a strong trough and peak on both the synthetics and the KBM3D seismic (the peaks are displayed in blue on Figure 5.3).

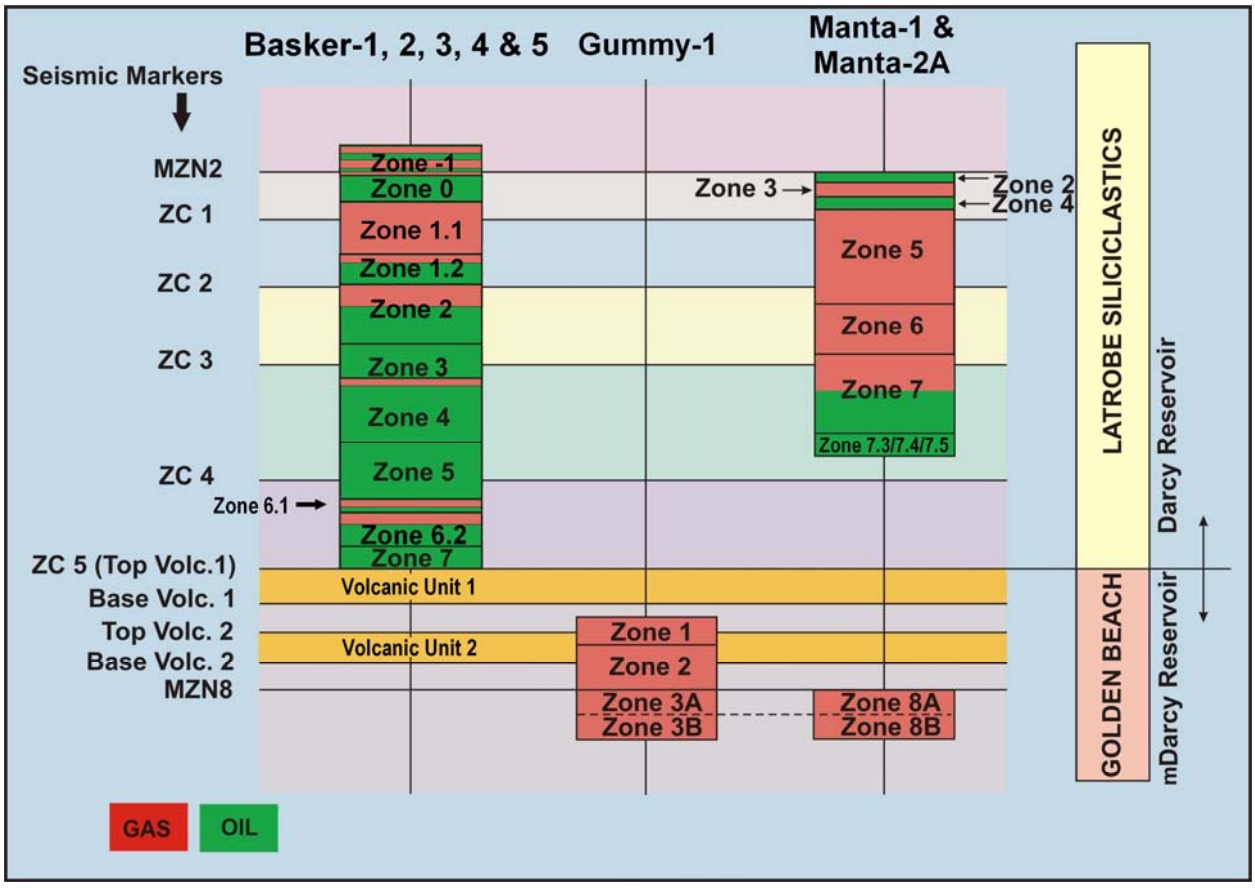


Figure 5.2 Schematic Illustration of Seismic Markers and Reservoir Zonation for the Intra-Latrobe and Golden Beach Sections in the BMG Wells

Although correlation of the Intra-Latrobe reservoir interval is relatively straightforward between Manta-1 and Manta-2A (because they are so close to each other), it is generally difficult to correlate individual sands, shales and coals between the more widely-spaced BMG wells, using well logs. The gross reservoir correlation for the BMG wells was hence derived from the seismic interpretation. Six reservoir seismic markers (MZN2, ZC1, ZC2, ZC3, ZC4 and ZC5) were correlated on the seismic over the reservoir interval, on zero-crossings. Synthetic seismograms were then used to derive the well correlations. Table 5.1 shows how the six mapping horizons have been correlated between the wells, based on the seismic.

Previously all six seismic markers were used to map the Intra-Latrobe reservoirs of the Manta Fields. In contrast only two markers (the ZC1 and ZC4 markers) were used for the post Manta-2A reservoir mapping. The reliability of the other markers was discounted by the results of the vertical seismic profile (VSP) surveys in the Basker development wells. The VSP surveys demonstrated a high degree of multiple contamination of all events through the reservoir interval, other than the ZC1 and ZC4 events.

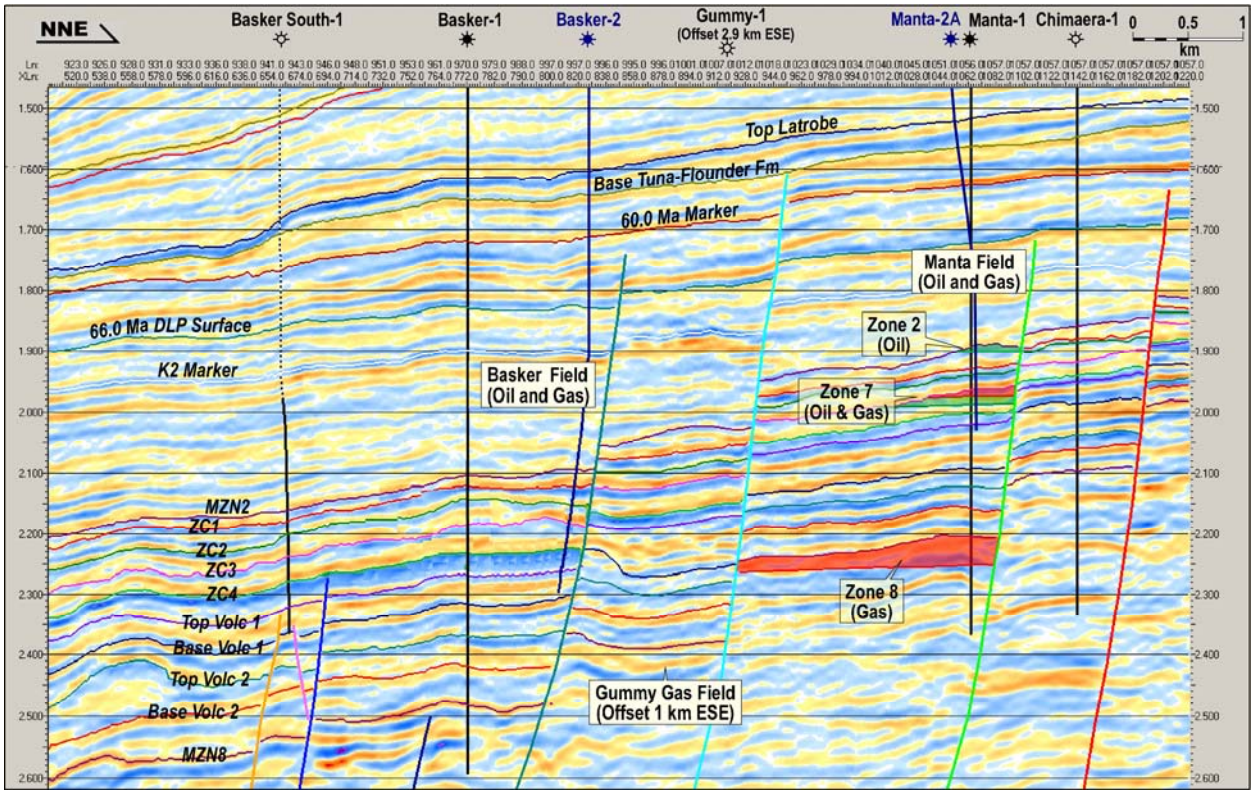


Figure 5.3 Arbitrary Seismic Line Through the Basker and Manta Wells

Table 5.1 Well Correlation of the Intra-Latrobe Reservoir Horizons

Well	MZN2 Depth mTVDSS	ZC1 Depth mTVDSS	ZC2 Depth mTVDSS	ZC3 Depth mTVDSS	ZC4 Depth mTVDSS	ZC5* Depth mTVDSS
Basker-1	-2963	-3000	-3052	-3108	-3200	-3261
Basker-2	-2949	-3001	-3045	-3099	-3183	-3239
Basker South-1	-3021	-3065	-3124	-3190	-3258	-3345
Chimaera-1	-2480	-2560	-2560	-2628	-2674	-2674
Gummy-1	-2736	-2799	-2822	-2883	-2950	-3008
Manta-1	-2590	-2657	-2680	-2715	-2793	-2811

* The ZC5 marker is at the Top of Volcanics Unit 1

.

The top of Latrobe was chosen as the key horizon, from which the ZC1 and ZC4 depth conversions were "hung". Six different depth conversion approaches were tested (in order: stacking velocity, PSDM velocity, PSDM velocity slice, layer-cake, velocity function (V0-K) and

Dix interval velocity). Two previous depth conversions (by Shell and by Woodside) were also re-visited. A final hand-drawn top Latrobe average velocity map was derived by combining (as top Latrobe average velocity) the output from all of these depth conversions.

Average velocity grids for each of the two reservoir mapping horizons (ZC1 and ZC4) were derived from the top of Latrobe average velocity grid, using average velocity difference grids. These difference grids were generated from hand-drawn average velocity difference maps which were based on the well values and the form of maps of the top of Latrobe to ZC1 and ZC4 interval two-way time. Depth conversion for each of the Manta Intra-Latrobe reservoirs was then achieved by phantoming from the nearest mapping horizon (ZC1 or ZC4). The ten post Manta-2A reservoir maps are presented as Figures 5.4 to 5.11. In each case the map is at the top of the uppermost reservoir sand or its stratigraphic equivalent (so as to mimic seismic reflectors). The stratigraphic equivalent is used where a sand is stratigraphically higher in the other well (Figure 3.1).

The predicted and actual formation tops are set out in Table 5.2. The top reservoir depths are the picks as used for the mapping (at the top of the uppermost reservoir sand or its stratigraphic equivalent).

Table 5.2 Predicted Versus Actual Formation Tops

Formation	Predicted Depth (mMDRT)	Predicted Depth (mTVDSS)	Actual Depth (mMDRT)	Actual Depth (mTVDSS)
Sea Floor	155.8	-134.3	155.7	-134.2
Base Pleistocene	433.7	-412.0	Not picked	Not picked
Top High Velocity Unit	658.4	-627.0	Not picked	Not picked
Top High Velocity Wedge	1138.9	-1070.0	1148.0	-1077.8
Intra-Mioc. Downlap Surf.	1419.8	-1329.0	1423.0	-1331.4
Top Lakes Entrance	1625.9	-1519.0	1632.0	-1522.8
Top Latrobe Group	2081.4	-1939.0	2086.1	-1937.6
Base Tuna-Flounder Formation	2171.4	-2022.0	2175.5	-2018.5
K2 Sand Seismic Marker	2578.0	-2397.0	2584.0	-2394.0
Ma2 Marker	2710.4	-2518.0	2716.2	-2515.7
Top Zone 2 Reservoir	2784.8	-2585.0	2791.3	-2584.5
Top Zone 4 Reservoir	2834.7	-2630.0	2841.8	-2630.5
Top Zone 7 Reservoir	2923.5	-2710.0	2925.8	-2706.7
Top Volcanics	3034.6	-2810.0	3045.8	-2814.4
Total Depth	3101.6	-2870.4	3113.0	-2873.9

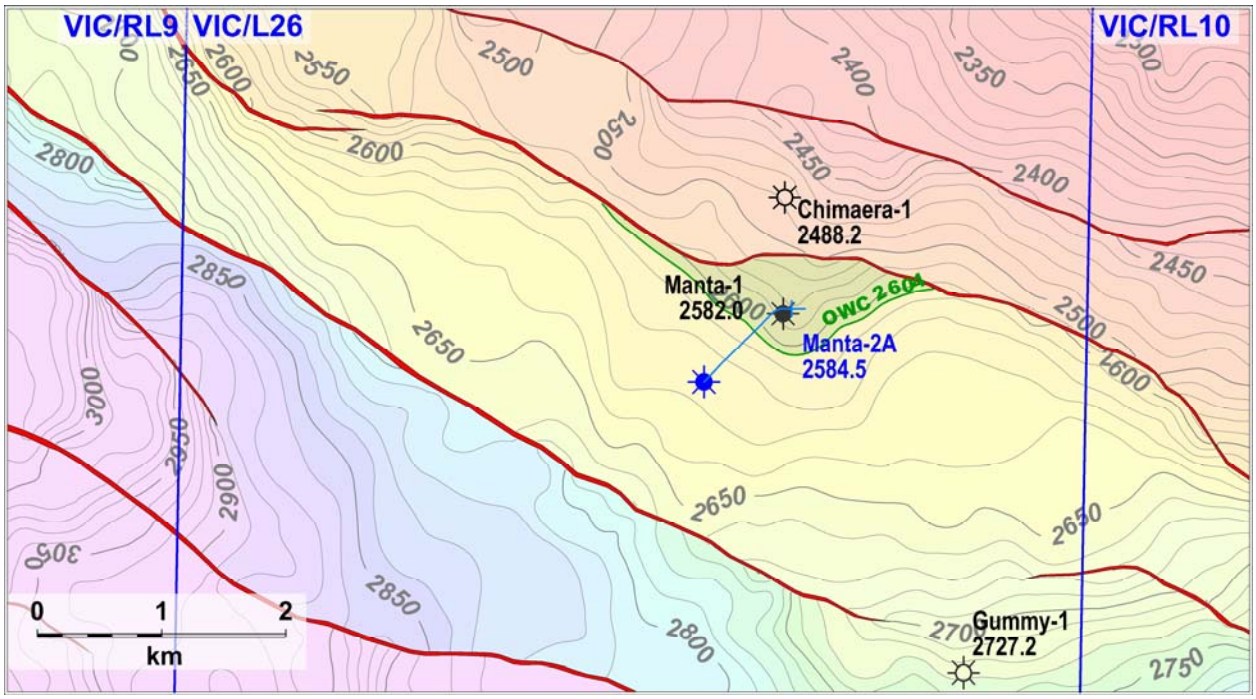


Figure 5.4 Structure Map, Top of Manta Zone 2 Oil Reservoir (Contour Interval 10m)

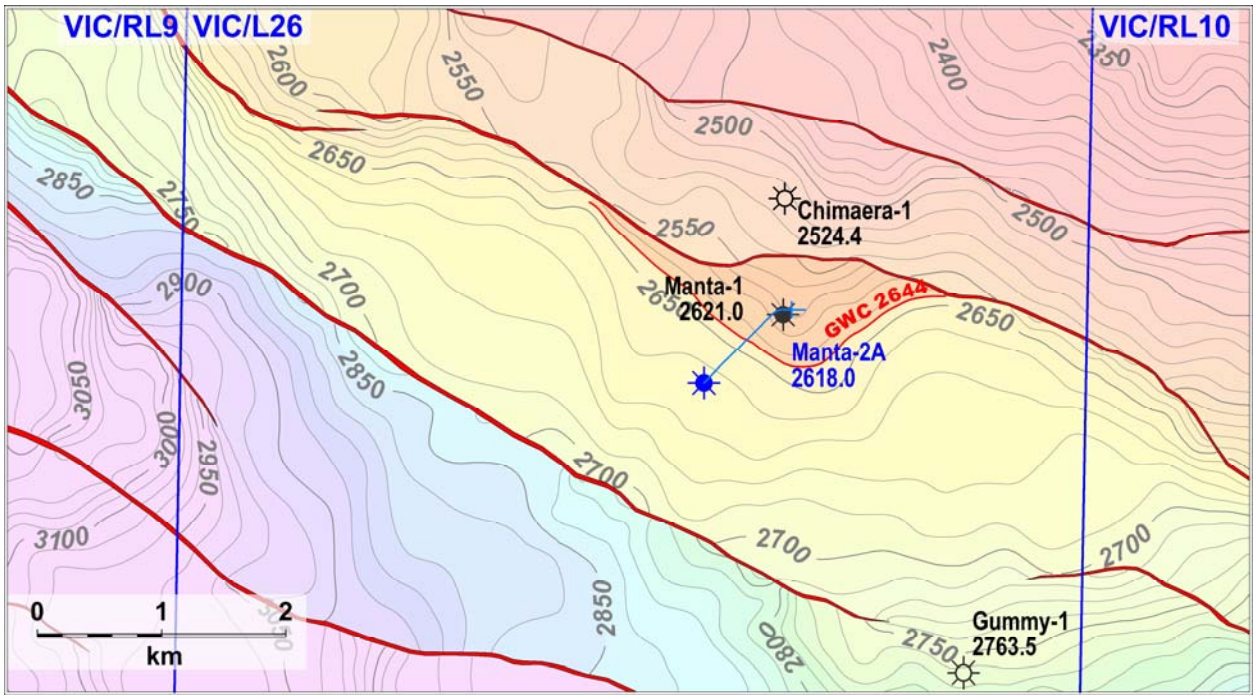


Figure 5.5 Structure Map, Top of Manta Zone 3 Gas Reservoir (Contour Interval 10m)

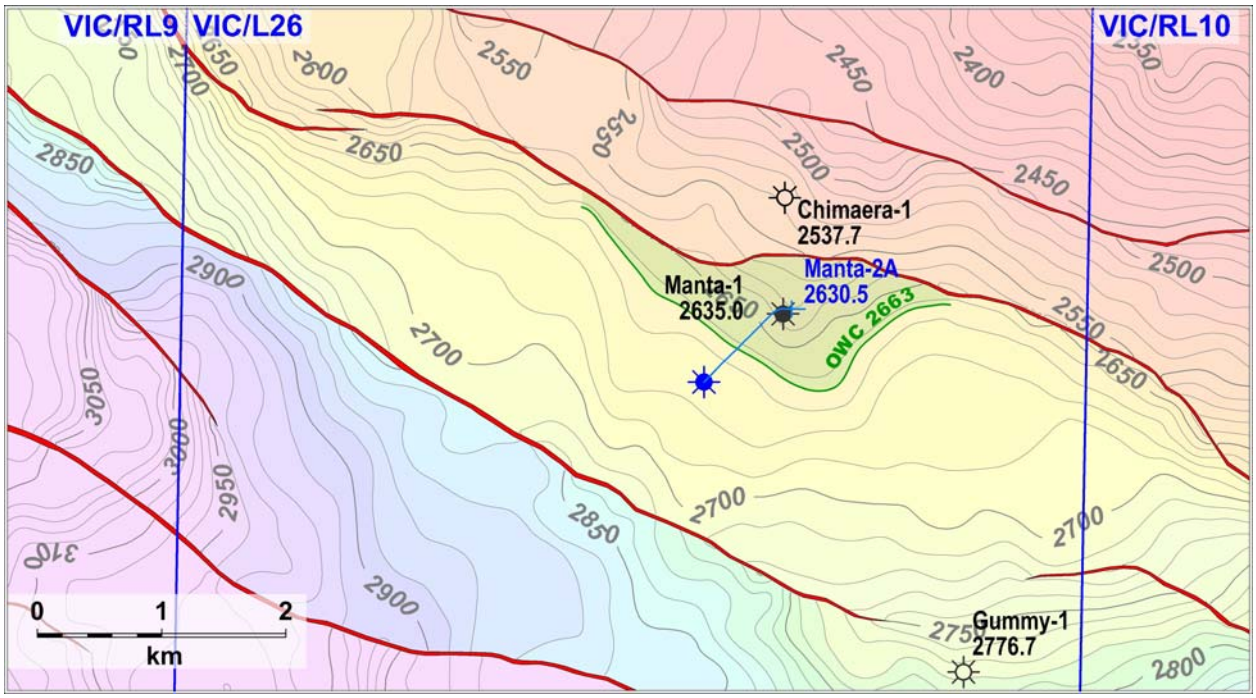


Figure 5.6 Structure Map, Top of Manta Zone 4 Oil Reservoir (Contour Interval 10m)

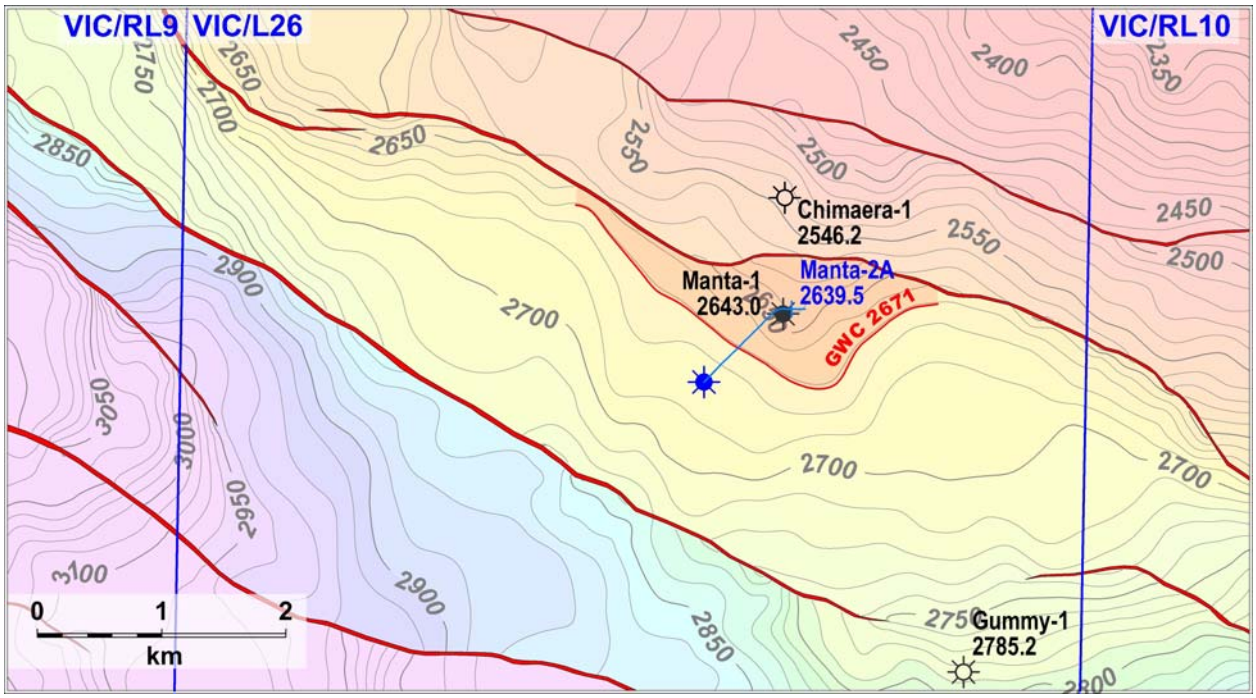


Figure 5.7 Structure Map, Top of Manta Zone 5 Gas Reservoir (Contour Interval 10m)

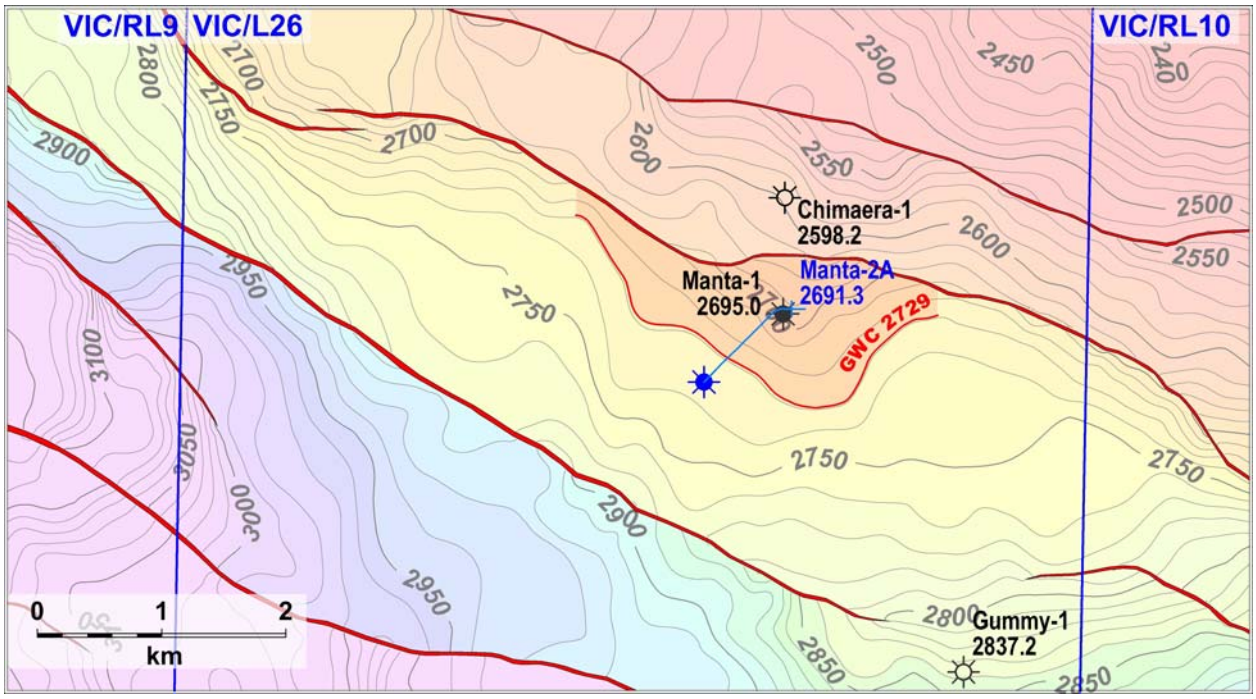


Figure 5.8 Structure Map, Top of Manta Zone 6 Gas Reservoir (Contour Interval 10m)

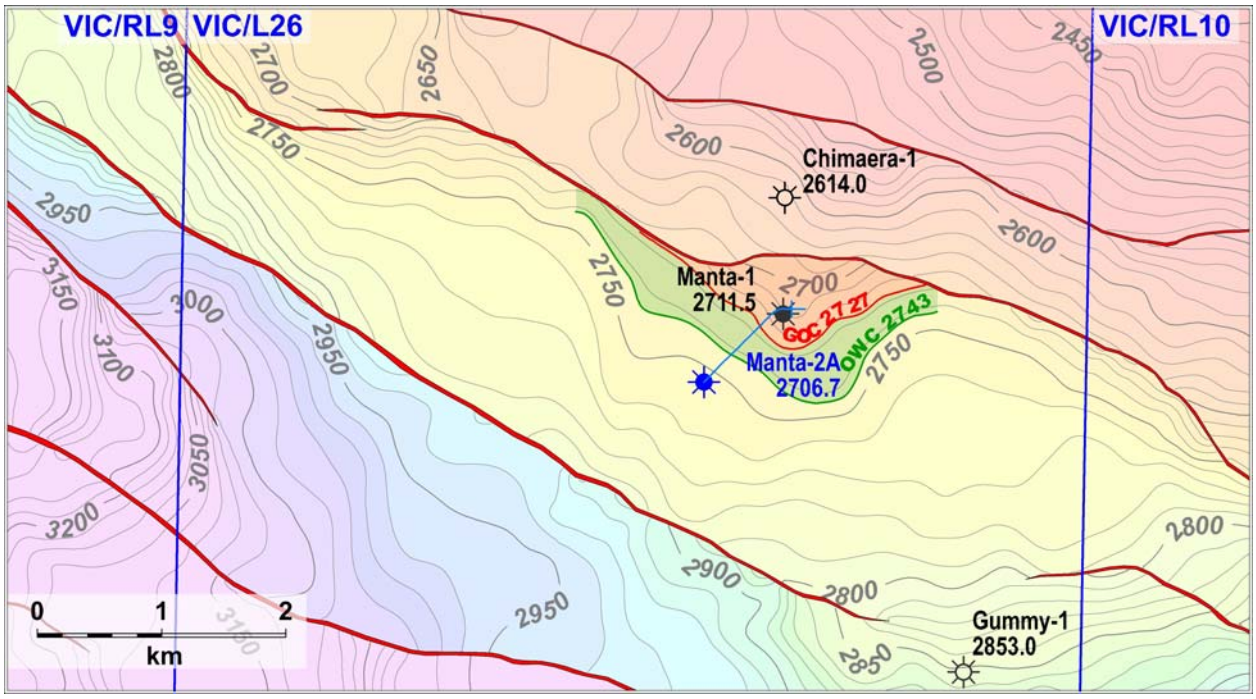


Figure 5.9 Structure Map, Top of Manta Zone 7 Oil and Gas Reservoir (Contour Interval 10m)

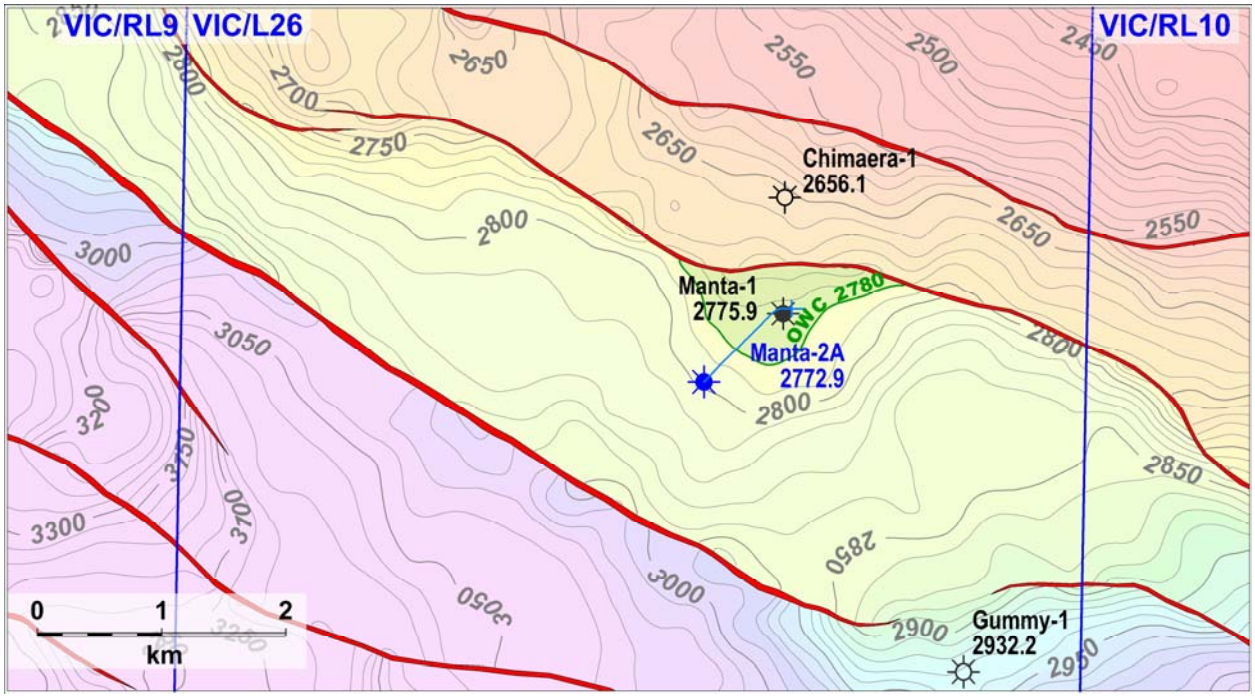


Figure 5.10 Structure Map, Top of Manta Zone 7.3 Oil Reservoir (Contour Interval 10m)

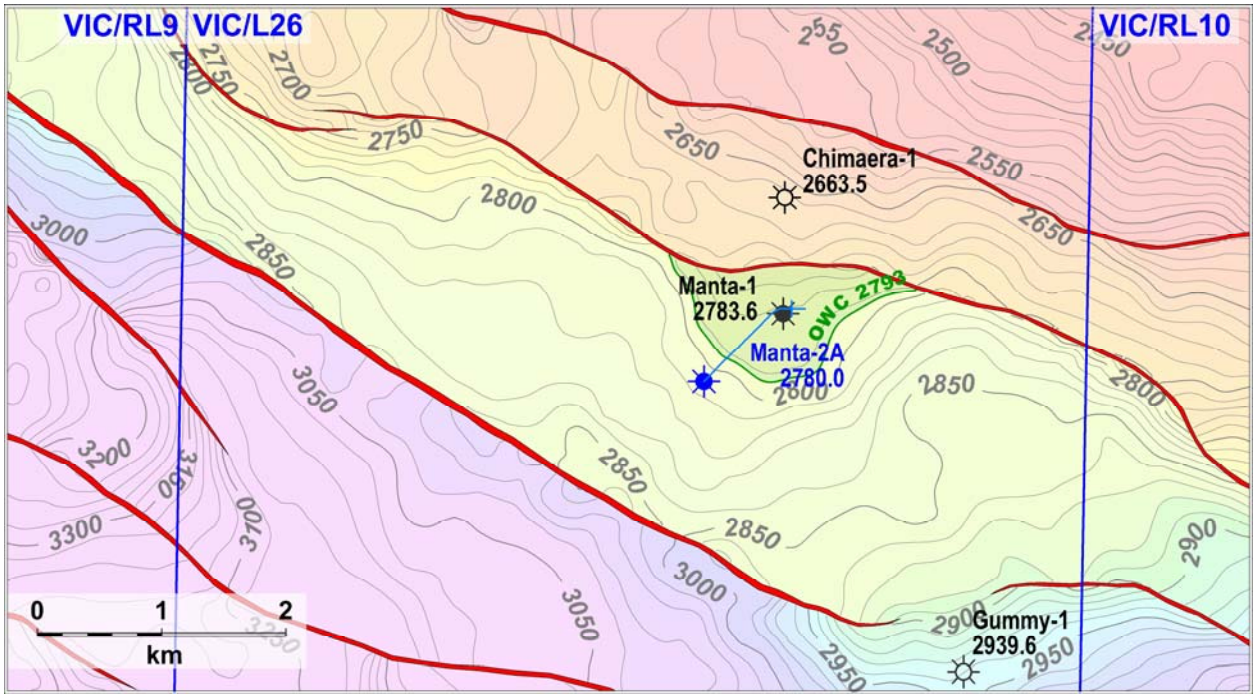


Figure 5.11 Structure Map, Top of Manta Zone 7.4/7.5 Oil Reservoir (Contour Interval 10m)

6. OPEN HOLE WIRELINE LOG ANAYSIS

The Manta-2A development well was designed to develop the oil and Intra-Latrobe gas reserves discovered in Manta-1.

The well spudded on 23 January 2006 and reached total depth in 8.5" hole at 3113mMDRT (Drillers Depth) on 9 February 2006. During drilling, the Halliburton Sperry Drilling Services MWD/LWD logging system recorded directional data and gamma ray (DIR-GR) in real time from 189 - 994mMDRT; DIR-FE-GP from 994 - 2715mMDRT and DIR-FE from 2715 - 3113mMDRT. After total depth was reached Schlumberger provided open-hole wireline-logging services with the PEX logging system and data was acquired from 2704 - 3083.6mMDRT.

For the purpose of formation evaluation the Schlumberger open-hole wireline logs have been interpreted from 2700 - 3113mMDRT using the Crocker Data Processing "Petrolog" Complex Lithology modules.

The results obtained and methods used are summarised in this report. A summary of the results is presented in Table 6.2.

General Information

All depths quoted in this report are m MDRT.

Table 6.1 Logging - General Data

Well Name	Manta 2A				
Country	Australia				
Company	Anzon Australia Limited				
Location	VIC/L26				
State	Victoria				
Permanent Datum	MSL				
Elevation of DF (M)	21.5				
Depth to SF (M)	133.6				
Logging Co.	Schlumberger				
Logging Date	9 Feb 2006				
Logs Recorded	FMI-DSI-HRLA-PEX-HNGS MDT-GR				
Bottom Log Interval (M)		3083.6			
Top Log Interval (M)		2704.0			
Casing shoe (M)		2704.0			
Bit size (inch)		8.5			
Fluid Type		KCL/PHPA Polymer			
Density g/cc		1.09			
RM (Ohmm) @ TEMP (DegC)		0.0104 @23.0			
RMF (Ohmm) @ TEMP (DegC)		0.094 @ 23.0			
RMC (Ohmm) @ TEMP (DegC)		0.185 @ 24.0			
BHT (DegC)		98.9			
Recorded by	S.Kasian/Kyaw Kyaw Aung				

Deviation

The maximum hole deviation was 27.97° at 3113.0mMDRT (TD). Telemetry and directional data from the Sperry Sun LWD run was used as the basis to convert measured depth to true vertical depth in this interpretation.

Data Acquisition and Quality Control

Although depth offsets occur between the LWD curve data and the wireline data, no depth alignments were carried out between the two data sets.

No problems were encountered during acquisition of the data and all of the reservoir interval curves were recorded in the same run.

The PEX tool string was run in high resolution mode and was run eccentered using a 1.5" standoff. The caliper log indicates that the hole was mostly in-gauge throughout the zones of

interest. The digital data received was of acceptable quality, there were no cycle skips observed on the sonic log and no further processing was undertaken.

Log Compositing and Editing

The MDT data points (pre-tests and samples) acquired during drilling operations were depth referenced to the Schlumberger wireline GR. All other curves were examined for depth alignment using this reference. No log edits were applied as all log data was sufficiently on depth.

A composite display of input logs is presented together with the log analysis results composite plot (Enclosure 4).

Environmental Corrections

Environmental corrections were applied at the wellsite by Schlumberger.

Logs Used

The primary logs from Suite-1 Run-1 used in the interpretation were GR, RLA4, RLA5, RX08, RH08, HTNP, HDRA, PEF8, SP, DTCO, HTO, HURA, and HFK.

Temperature Gradient

A temperature gradient of 2.4DegC/100m was used in this interpretation.

Hydrocarbon Type Identification

The methodology used to identify hydrocarbon type consisted of a combination of the neutron-density log character, resistivity anomaly, ditch gas readings and hydrocarbon fluorescence shows described in the ditch cuttings.

At Manta-2A the identification of hydrocarbon zones was complex because of a relatively low resistivity contrast between the hydrocarbon zones and the water sands, due to clay mineral conductivity. Complex mineralogy and detritus (eg pyrite) within the reservoir units also masked log responses.

An MDT programme was conducted to verify and validate the hydrocarbon type interpreted from the logs. The MDT programme consisted of pre-tests, sample recoveries and the application of Schlumberger's Down-Hole Fluid Analyser (DFA). The MDT Interpretation is presented in Section 7 of this report.

MDT Oil samples were recovered from 2795.0mMDRT, 2846.7mMDRT, 2954.5mMDRT, 2958.0mMDRT and 3008.5mMDRT. A DFA test at 2804.5mMDRT confirmed oil. Gas samples were recovered from 2829.0mMDRT and 2928.0mMDRT.

A gas-oil contact at 2947.6mMDRT (2726.3mTVDSS) was recognised on logs (Figure 6.1) and confirmed by the MDT pre-test depth gradient.

The interpreted oil and gas zones are presented in Table 6.2.

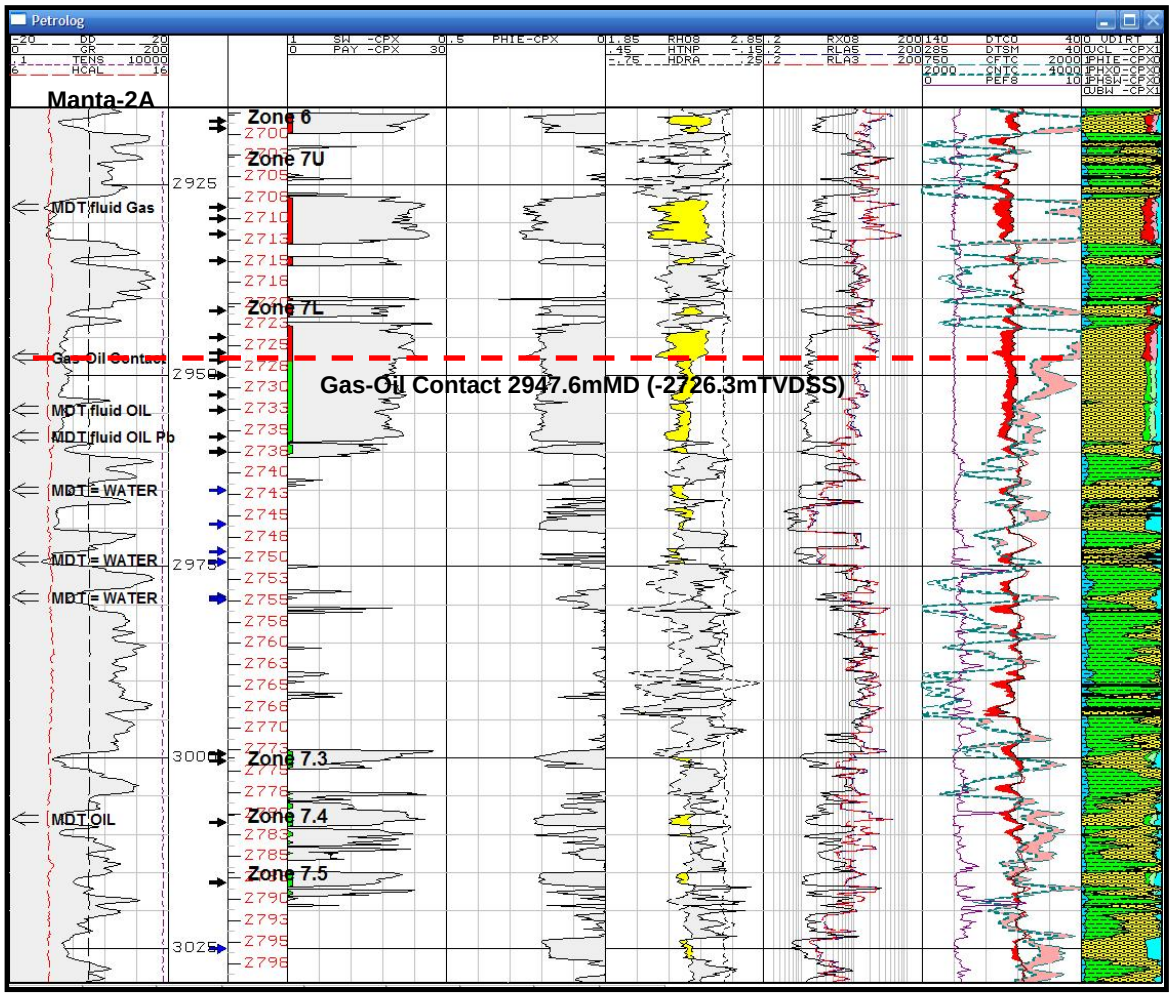


Figure 6.1 Manta-2A Hydrocarbon Type, Example of Methodology

Petrolog Model Selection

The Petrolog deterministic Complex Lithology (CPX) model was selected for the interpretation to compute Vsand, Vclay, Vdolomite, Vcoal, Vvolcanic, total porosity (PHIT), effective porosity (PHIE), total water saturation (SWT) and effective water saturation (SWE).

Complex Lithology

The CPX model was constructed to use a combination of the density and neutron logs to compute Vsand, Vclay, Vdolomite, Vcoal, and Vvolcanic.

A composite colour display of the output of the Spectral Gamma Ray tool, which displays the relative abundance of Thorium (Th), Uranium (U) and Potassium (K), shows the mineral complexity throughout the section (Figure 6.2). Although the Th abundance is relatively constant, the K abundance is not uniform, indicating changes in clay mineralogy. High U concentrations indicate increases in organic matter.

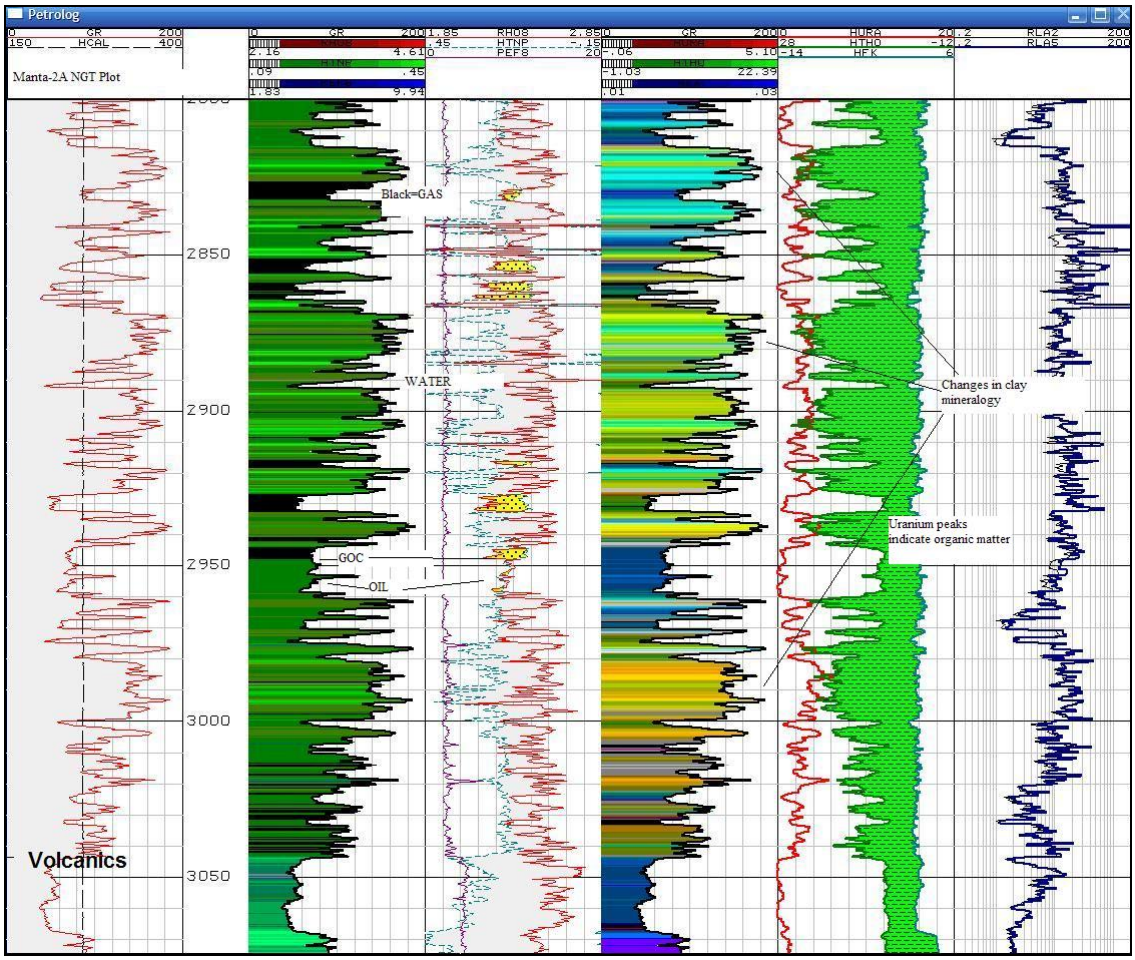


Figure 6.2 Manta-2A NGT Composite

Porosity Determination

PHIT was calculated using the density and neutron logs. PHIE was calculated after the Vcl determination, using:

PHIE = PHIT * (1-Vcl).

Water Resistivity Determination

In conventional log analysis, the calculation of hydrocarbon saturation assumes that the formation water salinity in the hydrocarbon zone is the same as that of the underlying water sands. Crossplots of PHIT and true resistivity (RT) across the water sands in Manta-2A indicate a water salinity of 15,000ppm NaCl equivalent (Figure 6.3). It is considered that this value is inconsistent with salinity values for a near-shore fluvial depositional environment and use of this value would result in pessimistic hydrocarbon saturations. It has been recognised that in some regions within the offshore Gippsland Basin a period of meteoric water influx displaced the aquifer without flushing the emplaced hydrocarbons (Kuttan, Kulla and Neumann 1986), resulting in relatively fresh aquifer water underlying hydrocarbon reservoir systems.

As a consequence, the assumption that the underlying aquifer is of the same salinity as the associated hydrocarbon zones is not always correct. For the purpose of this interpretation a formation water salinity equivalent to 30,000ppm NaCl equivalent has been used to calculate

hydrocarbon saturations. The PHIT-RT crossplot (Figure 6.4) supports the use of this value and 15,000ppm NaCl equivalent for the water zones.

Measurements of water salinity taken during production would be useful to reduce the uncertainty of water salinity associated with the hydrocarbon zones. If further drilling into the field is planned, consideration could also be given recovery of core for special core analysis, in particular capillary pressure measurements (which could be used to validate computed hydrocarbon saturations).

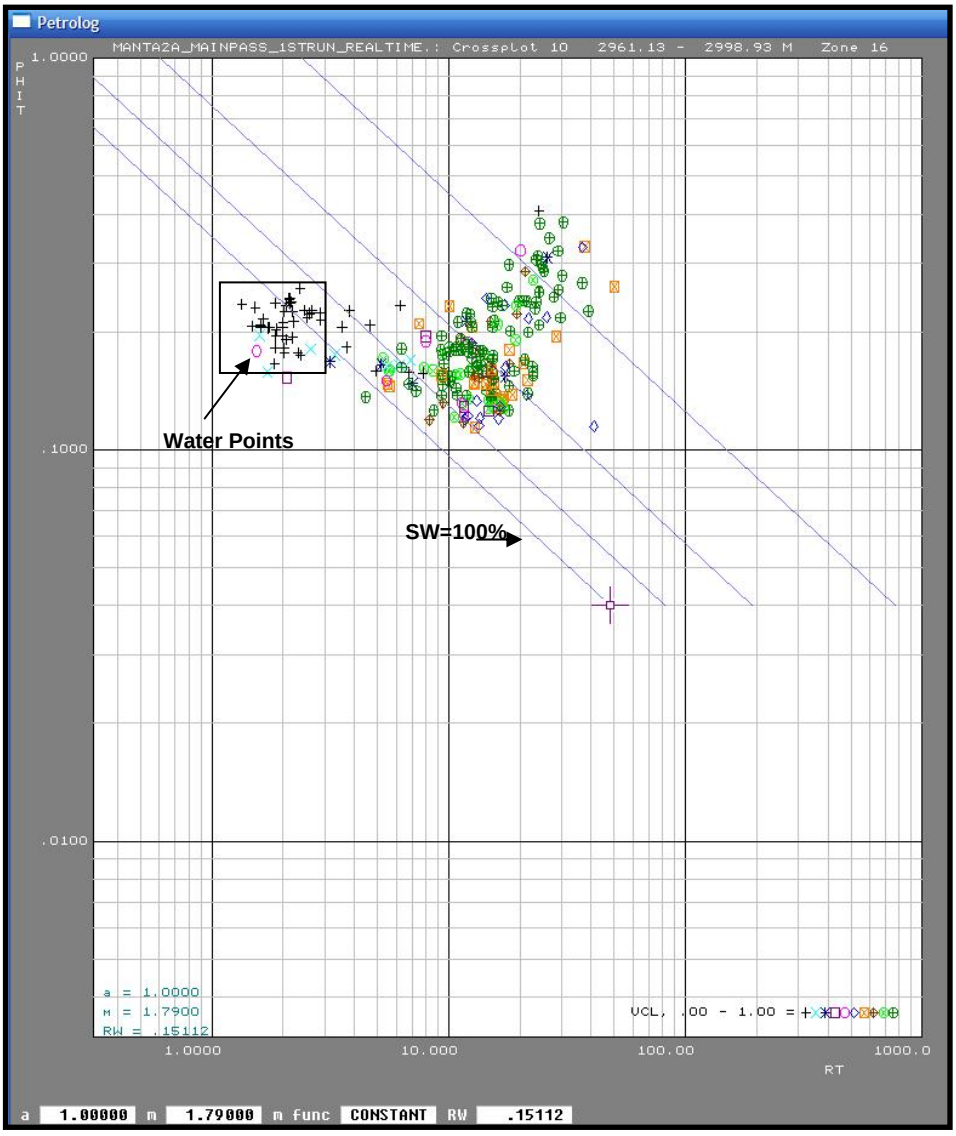


Figure 6.3 Manta-2A PHIT-RT Crossplot for the Water Sand Interval 2961-2999mMDRT

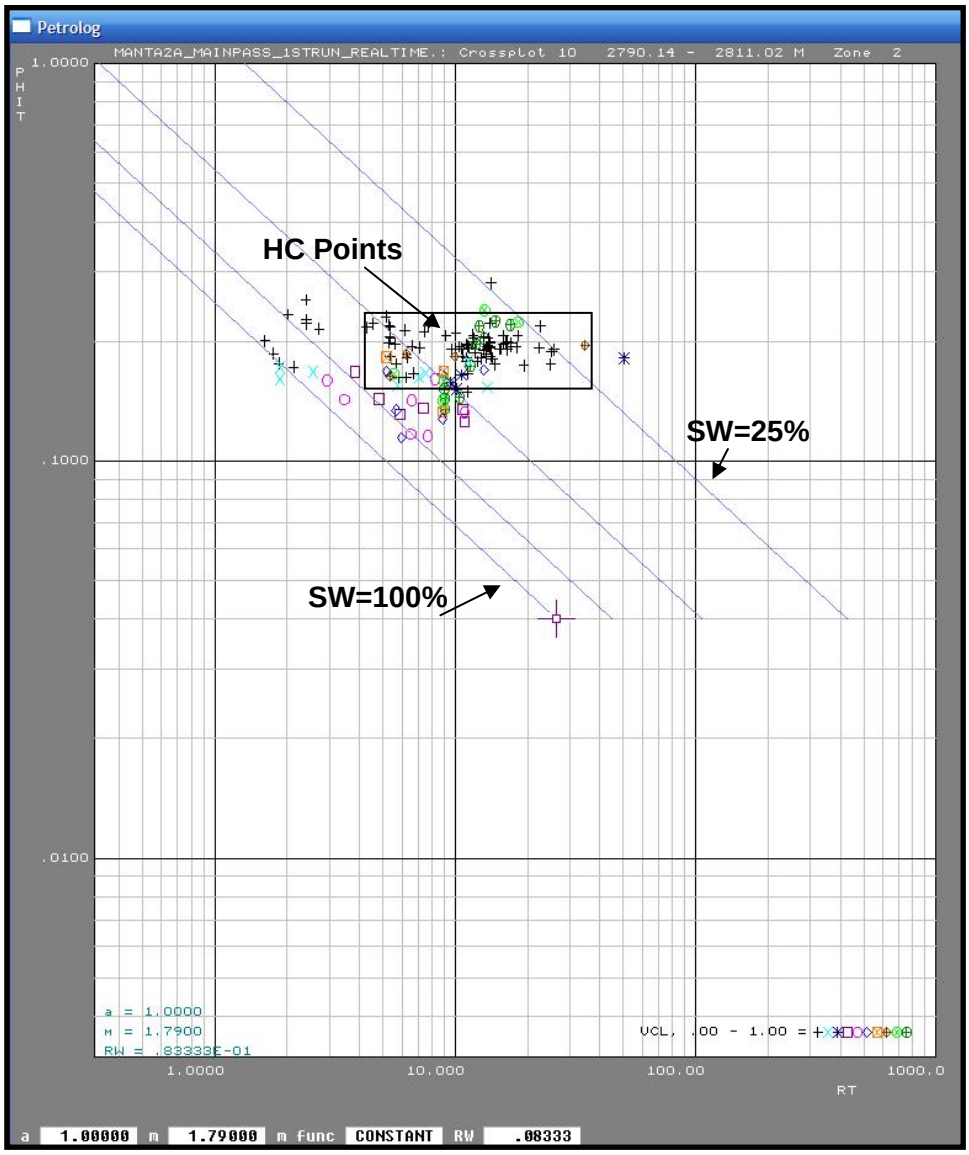


Figure 6.4 Manta-2A PHIT-RT Crossplot for the Hydrocarbon Interval 2790-2811mMDRT

Determination of Sw, a, m, n

For this interpretation the Simandoux equation was used to compute water saturation (Sw) and is defined as follows:

SWe = (a*Rw/(2.0*PHIE**m))*(SQRT((VCL/RCL)**2.0
+ 4.0*PHIE**m/(a*Rw*RT))-VCL/RCL)

In this interpretation a=1, m= 1.79 and n=2.00

Results

Table 6.2 lists the results of the interpretation. Based on cut-off parameters: PHIE>=10%; Vclay<50% and SWE <=75%. An interpreted total of 31.7m of net oil pay and 27.2m of net gas pay was intersected by the well.

The PHIE cut-offs for net reservoir and net pay determination were established using the core porosity-permeability relationship from Manta-1. A crossplot of core porosity and permeability from Manta-1 indicates that core porosity >10% has permeability >1md (Figure 6.5). The SWE cut-off (<=75%) for net pay determination has been used frequently for gas reservoirs in offshore Gippsland Basin.

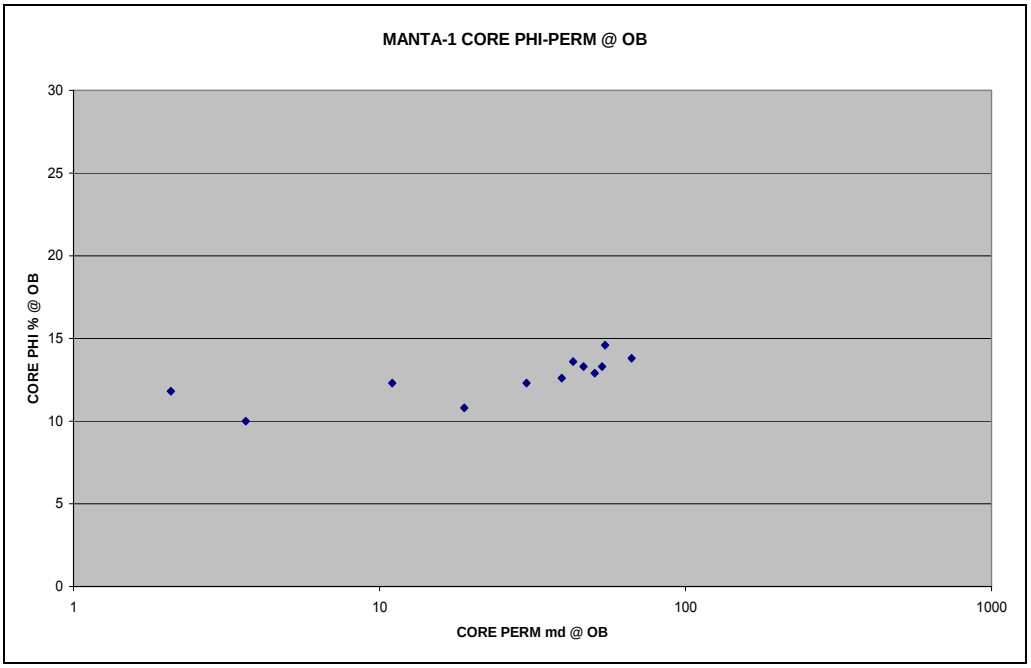


Figure 6.5 Manta-1 Core Porosity-Permeability Crossplot

The input parameters are presented in Table 6.3.

The Schlumberger PEX Log Suite-1 Run-1 information is presented in Table 6.4.

A 1:200 scale log interpretation plot is presented as Enclosure 4.

Table 6.2 Manta-2A Reservoir Summary

Cutoffs reservoir phie > 10%; vcl<50%
cutoffs: pay - phie >10%; vcl<50%; swe <=75%
Based on Final Las Data Jun2006
RT=21.5m

top	base	top	base	top	base	reservoir					pay				
md	md	tvdkb	tvdkb	tvdss	tvdss	gross	net res	vcl	phie	swe	net pay	vcl	phie	swe	comments
						tvt	m tvt	%	%	%	mtvt	%	%	%	
2751.0	2754.8	2569.0	2572.5	2547.5	2551.0	3.5	2.5	3.9	18.9	100.0					water saturated; MDT P = WATER GRADIENT
2773.5	2775.8	2589.7	2591.8	2568.2	2570.3	2.1	1.8	3.4	18.6	100.0					water saturated
2783.9	2784.8	2599.2	2600.0	2577.7	2578.5	0.8	0.7	11.6	16.9	100.0					water saturated
2790.9	2810.3	2605.6	2623.3	2584.1	2601.8	17.7	12.3	1.9	19.0	42.0	12.0	1.8	19.0	40.7	oil; MDT P = OIL GRADIENT 1.06psi/m
2811.9	2814.8	2624.8	2627.5	2603.3	2606.0	2.6	2.6	2.2	21.9	100.0					water saturated; MDT P = WATER GRADIENT
2827.9	2832.4	2639.4	2643.4	2617.9	2621.9	4.0	3.9	1.2	19.3	31.0	3.9	1.2	19.3	31.0	gas; MDT P = GAS GRADIENT 0.24psi/m
2843.9	2847.8	2654.0	2657.4	2632.5	2635.9	3.5	2.4	3.1	17.6	26.2	2.4	3.1	17.6	26.2	oil; MDT P = OIL GRADIENT 0.78psi/m
2851.4	2863.8	2660.8	2672.0	2639.3	2650.5	11.2	9.1	1.7	20.8	20.2	9.1	1.7	20.8	20.2	gas; MDT P = GAS GRADIENT
2890.4	2891.8	2696.1	2697.4	2674.6	2675.9	1.2	0.1	26.5	11.6	100.0					water saturated; MDT P = WATER GRADIENT
2908.4	2909.8	2712.4	2713.6	2690.9	2692.1	1.2	0.7	7.9	17.7	32.9	0.7	7.9	17.7	32.9	gas
2912.5	2913.3	2716.1	2716.8	2694.6	2695.3	0.7	0.4	15.5	13.5	70.3	0.3	12.2	14.2	65.2	gas
2916.0	2918.3	2719.3	2721.4	2697.8	2699.9	2.1	2.1	0.0	19.2	25.3	2.1	0.0	19.2	25.3	gas; MDT P = GAS GRADIENT
2926.5	2932.8	2728.8	2734.5	2707.3	2713.0	5.6	5.4	1.0	21.9	24.7	5.4	1.0	21.9	24.7	gas; MDT P = GAS GRADIENT 0.43psi/m
2934.5	2935.4	2736.0	2736.8	2714.5	2715.3	0.8	0.8	2.0	18.8	37.9	0.8	2.0	18.8	37.9	gas; MDT P = GAS GRADIENT
2940.4	2942.4	2741.3	2743.1	2719.8	2721.6	1.8	1.2	1.2	18.6	38.9	1.2	1.2	18.6	38.9	gas; MDT P = GAS GRADIENT
2943.5	2947.6	2744.1	2747.8	2722.6	2726.3	3.7	3.7	2.6	19.8	25.2	3.7	2.6	19.8	25.2	gas; MDT P = GAS GRADIENT GOC @ 2947.6mMD; 2726.3mTVDSS
2947.7	2960.4	2747.9	2759.3	2726.4	2737.8	11.4	11.0	0.8	19.9	36.3	11.0	0.8	19.9	36.3	oil; MDT P = OIL GRADIENT 0.99psi/m; LKO 2960.4mMD; 2737.8mTVDSS
2964.0	2965.9	2762.6	2764.3	2741.1	2742.8	1.6	0.4	12.3	15.6	100.0					water saturated
2966.9	2970.3	2765.2	2768.2	2743.7	2746.7	3.0	2.5	2.7	18.4	100.0					water saturated
2972.4	2974.9	2770.2	2772.4	2748.7	2750.9	2.2	0.8	10.7	17.0	100.0					water saturated
2977.9	2979.9	2775.1	2776.9	2753.6	2755.4	1.8	0.6	7.1	14.5	100.0					water saturated
2998.9	3001.4	2794.0	2796.2	2772.5	2774.7	2.2	1.8	13.5	18.3	37.5	1.8	13.5	18.3	37.5	oil; MDT P = OIL GRADIENT
3005.0	3010.4	2799.4	2804.2	2777.9	2782.7	4.8	2.6	6.3	17.8	39.1	2.6	6.3	17.8	39.1	oil; MDT P = OIL GRADIENT 0.94psi/m
3014.9	3017.8	2808.3	2810.9	2786.8	2789.4	2.6	2.1	3.9	17.9	42.8	2.1	3.9	17.9	42.8	oil; MDT P = OIL GRADIENT
3021.0	3025.3	2813.8	2817.6	2792.3	2796.1	3.8	1.6	2.6	17.6	100.0					water saturated
3028.5	3033.4	2820.4	2824.8	2798.9	2803.3	4.3	1.6	3.4	17.2	100.0					water saturated
TOTAL	**OIL**						**32.0**				**31.7**				
	GAS						**27.3**				**27.2**				

REFERENCES:

Kuttan, K., Kulla, J.B. and Neumann, R.G.: "Freshwater Influx in the Gippsland Basin: Impact on Formation Evaluation, Hydrocarbon Volumes, and Hydrocarbon Migration." The APEA Journal 1986.

Manta-2/2A Well Completion Report Volume 1 Basic Data

Table 6.3 Analysis Parameters (Zones of Interest)

Input Parameter	Value
Analysis Interval (mMDRT)	2700-3113
Bit Size (inches)	8.5
Rw HC Zone (salinity ppm NaCl equivalent)	30,000
Rw water Zone (salinity ppm NaCl equivalent)	15,000
a	1.0
m	1.79
n	2.0
Rclay (ohm-m)	2.0
RHOH (g/cc)	0.2
RHOF (g/cc)	1.04
RHOMA (g/cc)	2.65
PHIN clay (v/v)	0.27
RHOB clay (g/cc)	2.40
RHOB dolomite (g/cc)	2.60
RHOB volcanic (g/cc)	2.92
RHOB coal	2.00
DT clay (usec/ft)	100.0

Table 6.4 Schlumberger PEX Log Suite-1 Run-1 Information

Schlumberger PEX Log Suite-1 Run1 Main Pass

VERS	**2.0 CWLS log ASCII Standard Version 2.00**	
WRAP.	**YES Multiple lines per depth step**	
~Well Information Block		
#MNEM.UNIT	**VALUE**	**INFORMATION**
STRT.M	2686.2024	START
STOP.M	3119.7804	STOP
STEP.M	.1524	STEP
NULL.	-999.25	NULL VALUE
COMP.	Anzon	Company
WELL.	Manta 2A	Well Name
FLD .	Manta	Field
NATI.	Australia	Nation
STAT.	Victoria	State
PROV.		Province
CNTY.	Ocean Patriot	County or Rig name
LOC .	VIC/L26	Field Location
FL1 .	Northing5,761,989.6 m	Field Locn. Line 1
FL2 .	Easting650,106.2 m	Field Locn. Line 2
LATI.	038 16' 39.410" S DMS	Latitude
LONG.	148 42' 58.030" E DMS	Longitude
PD.	Mean Sea Level	Permanent Datum
EPD .M	.00	Elevation of PD
UWI .	Unique Well ID	
EKB .M	21.50	Elevation of KB
EDF .M	21.50	Elevation of DF
EGL .M	-133.60	Elevation Ground lv
ELZ .M	21.50	Elevation Log Zero
APD .M	21.50	Above Perm. Datum
LMF .	DF	Log measured from
MP.	DF	Drill measured from
OS.		Services
OS1 .	MDT-GR	Other Services Ln 1
SON .	AUSL06151650	Service Order No
SRVC.	Service company	
DATE.	Date	

~Curve Information (Table 6.4 continued)

#MNEM.	UNIT	API CODE	CURVE DESCRIPTION
DEPT	.M	1	Depth
BS	.IN	2	Bit Size
CS	.FT/H	3	Cable Speed
TENS	.LBF	4	Cable Tension
ETIM	.S	5	Elapsed Logging Time
DEVI	.DEG	6	Hole Deviation
HAZI .	.DEG	7	Hole Azimuth
P1AZ	.DEG	8	Pad 1 Azimuth
RB.	.DEG	9	Relative Bearing
SDEV .	.DEG	10	Sonde Deviation
ITT	.S	11	Integrated Transit Time
DTCO	.US/F	12	Delta-T Compressional
DTSM	.US/F	13	Delta-T Shear
DT1	.US/F	14	Delta-T Shear - Lower Dipole
DT2	.US/F	15	Delta-T Shear - Upper Dipole
DT4P	.US/F	16	Delta-T Compressional - Monopole P&S
DT4S	.US/F	17	Delta-T Shear - Monopole P&S
ECGR	.GAPI	18	Gamma-Ray
GR	.GAPI	19	Gamma-Ray
NPHI	.M3/M	20	Thermal Neutron Porosity (Ratio Method)
TNPH	.M3/M	21	Thermal Neutron Porosity
CFTC	.1/S	22	Corrected Far Thermal Counting Rate
CNTC	.1/S	23	Corrected Near Thermal Counting Rate
NPOR	.M3/M	24	Enhanced Thermal Neutron Porosity
HTHO	.PPM	25	HNGS Formation Thorium Concentration
HURA	.PPM	26	HNGS Formation Uranium Concentration
HFK	.M3/M	27	HNGS Formation Potassium Concentration
HSGR	.GAPI	28	HNGS Standard Gamma Ray
HCGR	.GAPI	29	HNGS Computed Gamma Ray
HTPR .		30	HNGS Thorium/Potassium Ratio
HTUR .		31	HNGS Thorium/Uranium Ratio
HUPR .		32	HNGS Uranium/Potassium Ratio
SP	.MV	33	SP Shifted
SPAR	.MV	34	SP Armor Return
DPTR	.DEG	35	DIP TREND
DPAZ	.DEG	36	DIP AZIMUTH
QUAF	.	37	DIP QUALITY FACTOR
HDAR	.IN	38	Hole Diameter from Area
TIME	.MS	39	6-Inch Frame Time
CVEL	.M/MN	40	Cable Velocity
DF.	.N	41	Uncalibrated Downhole Force
IHV	.M3	42	Integrated Hole Volume
SCD.	.1IN	43	Speed Corrected Depth
HCAL	.IN	44	HRCC Cal. Caliper
TIME	.MS	45	1-Inch Frame Time
TIME	.MS	46	0.1 Inch River Time Index
FCAX	.M/S2	47	High Resolution X Acceleration
FCAY	.M/S2	48	High Resolution Y Acceleration
FCAZ	.M/S2	49	High Resolution Z Acceleration
FTIM	.MS	50	Fast Channels Acquisition Time
TIME	.MS	51	1.5 Inch River Time Index
C1	.IN	52	Caliper 1
C2	.IN	53	Caliper 2
AX	.M/S2	54	X Acceleration
AY	.M/S2	55	Y Acceleration
AZ	.M/S2	56	Z Acceleration
TIME	.MS	57	HRLT 2 Inch River Time Index
RT_HRLT	.OHMM	58	HRLT Computed True Resistivity
RM_HRLT	.OHMM	59	HRLT Mud Resistivity
RLA0	.OHMM	60	HRLT Borehole Corrected Resistivity 0
RLA1	.OHMM	61	HRLT Borehole Corrected Resistivity 1
RLA2	.OHMM	62	HRLT Borehole Corrected Resistivity 2
RLA3	.OHMM	63	HRLT Borehole Corrected Resistivity 3
RLA4	.OHMM	64	HRLT Borehole Corrected Resistivity 4
RLA5	.OHMM	65	HRLT Borehole Corrected Resistivity 5
HDRA	.G/CM	66	HRDD Density Correction
PEFZ .		67	HRDD Standard Resolution Formation Photoelectric Factor
PEF8 .		68	HRDD High Resolution Formation Photoelectric Factor
RHOZ	.G/CM	69	HRDD Standard Resolution Formation Density
RHO8	.G/CM	70	HRDD High Resolution Formation Density
RXOZ	.OHMM	71	MCFL Standard Resolution Invaded Zone Resistivity
HGR	.GAPI	72	HiRes Gamma-Ray
HTNP	.M3/M	73	HiRes Thermal Neutron Porosity
HNPO	.M3/M	74	HiRes Enhanced Thermal Neutron Porosity
TIME	.MS	75	HILT 0.2 inch River Time Index
TIME	.MS	76	HNG Coin Msg River Time

#MNEM.	UNIT	API CODE	CURVE DESCRIPTION
BS	.IN	77	Bit Size
CS	.FT/H	78	Cable Speed
TENS	.LBF	79	Cable Tension
ETIM	.S	80	Elapsed Logging Time
DEVI	.DEG	81	Hole Deviation
HAZI	.DEG	82	Hole Azimuth
P1AZ	.DEG	83	Pad 1 Azimuth
RB	.DEG	84	Relative Bearing
SDEV	.DEG	85	Sonde Deviation
ITT	.S	86	Integrated Transit Time
DTCO	.US/F	87	Delta-T Compressional
DTSM	.US/F	88	Delta-T Shear
DT1	.US/F	89	Delta-T Shear - Lower Dipole
DT2	.US/F	90	Delta-T Shear - Upper Dipole
DT4P	.US/F	91	Delta-T Compressional - Monopole P&S
DT4S	.US/F	92	Delta-T Shear - Monopole P&S
ECGR	.GAPI	93	Gamma-Ray
GR	.GAPI	94	Gamma-Ray
NPHI	.M3/M	95	Thermal Neutron Porosity (Ratio Method)
TNPH	.M3/M	96	Thermal Neutron Porosity
CFTC	.1/S	97	Corrected Far Thermal Counting Rate
CNTC	.1/S	98	Corrected Near Thermal Counting Rate
NPOR	.M3/M	99	Enhanced Thermal Neutron Porosity
HTHO	.PPM	100	HNGS Formation Thorium Concentration
HURA	.PPM	101	HNGS Formation Uranium Concentration
HFK	.M3/M	102	HNGS Formation Potassium Concentration
HSGR	.GAPI	103	HNGS Standard Gamma Ray
HCGR	.GAPI	104	HNGS Computed Gamma Ray
HTPR	.	105	HNGS Thorium/Potassium Ratio
HTUR	.	106	HNGS Thorium/Uranium Ratio
HUPR	.	107	HNGS Uranium/Potassium Ratio
SP	.MV	108	SP Shifted
SPAR	.MV	109	SP Armor Return
DPTR	.DEG	110	DIP TREND
DPAZ	.DEG	111	DIP AZIMUTH
QUAF	.	112	DIP QUALITY FACTOR
HDAR	.IN	113	Hole Diameter from Area
TIME	.MS	114	6-Inch Frame Time
CVEL	.M/MN	115	Cable Velocity
DF	.N	116	Uncalibrated Downhole Force
IHV	.M3	117	Integrated Hole Volume
SCD.	.1IN	118	Speed Corrected Depth
HCAL	.IN	119	HRCC Cal. Caliper
TIME	.MS	120	1-Inch Frame Time
TIME	.MS	121	0.1 Inch River Time Index
FCAX	.M/S2	122	High Resolution X Acceleration
FCAY	.M/S2	123	High Resolution Y Acceleration
FCAZ	.M/S2	124	High Resolution Z Acceleration
FTIM	.MS	125	Fast Channels Acquisition Time
TIME	.MS	126	1.5 Inch River Time Index
C1	.IN	127	Caliper 1
C2	.IN	128	Caliper 2
AX	.M/S2	129	X Acceleration
AY	.M/S2	130	Y Acceleration
AZ	.M/S2	131	Z Acceleration
TIME	.MS	132	HRLT 2 Inch River Time Index
RT_HRLT	.OHMM	133	HRLT Computed True Resistivity
RM_HRLT	.OHMM	134	HRLT Mud Resistivity
RLA0	.OHMM	135	HRLT Borehole Corrected Resistivity 0
RLA1	.OHMM	136	HRLT Borehole Corrected Resistivity 1
RLA2	.OHMM	137	HRLT Borehole Corrected Resistivity 2
RLA3	.OHMM	138	HRLT Borehole Corrected Resistivity 3
RLA4	.OHMM	139	HRLT Borehole Corrected Resistivity 4
RLA5	.OHMM	140	HRLT Borehole Corrected Resistivity 5
HDRA	.G/CM	141	HRDD Density Correction
PEFZ .		142	HRDD Standard Resolution Formation Photoelectric Factor
PEF8	.	143	HRDD High Resolution Formation Photoelectric Factor
RHOZ	.G/CM	144	HRDD Standard Resolution Formation Density
RHO8	.G/CM	145	HRDD High Resolution Formation Density
RXOZ	.OHMM	146	MCFL Standard Resolution Invaded Zone Resistivity
HGR	.GAPI	147	HiRes Gamma-Ray
HTNP	.M3/M	148	HiRes Thermal Neutron Porosity
HNPO	.M3/M	149	HiRes Enhanced Thermal Neutron Porosity
TIME	.MS	150	HILT 0.2 inch River Time Index
TIME	.MS	151	HNG Coin Msg River Time

~Parameter Information (Table 6.4 continued)

#MNEM.UNIT	Value	Description
RUN	1	Run number
DATE	9-Feb-2006	Log date
DD.M	3113.00	Depth-Driller
DL.M	3112.00	Depth-Logger
BLI .M	3083.60	Bottom log interval
TLI .M	2704.00	Top log interval
CBD1.M	2706.50	Casing-Driller
CBL1.M	2704.00	Casing-Logger
CS.IN	9.6250	Casing Diameter
CW1 .LB/F	47.0000	Casing Weight
CSD .M	2704.00	Casing Depth
CJT .	Primary	Casing Job Type
FCD .IN	7.0000	Future Casing diam
BS.IN	8.5000	Bit Size
DFT .	KCl Polymer	Hole Fluid type
DFD .G/C3	1.0900	Fluid Density
DFV .S	54.0000	Fluid Viscosity
DFPH.	9.500000	Fluid PH
DFL .C3	6.8000	Fluid Loss
MSS .	Flow Line	Mud Sample Source
RMS .OHMM	.1040	RM@ Surface
RMT .DEGC	23.00	Mud temp Surface
RMFS.OHMM	.0940	RMF @ Surface
RMTF.DEGC	23.00	MF temp Surface
RMCS.OHMM	.1850	RMC @ Surface
RMTC.DEGC	24.00	MC Temp Surface
MFSS.	Pressed	Source of RMF/RMC
RM.OHMM	.0385	RM @ Bottom
RMF .OHMM	.0348	RMF @ Bottom
MST .DEGC	23.00	Mud Sample Temp
MFST.DEGC	23.00	Mud Filt.SampleTemp
MCSS.	Pressed	MudCakeSample Source
TCS .	800	Time circ. stopped
DCS	9-Feb-2006	Date circ. stopped
TLAB.	2148	Time logger at btm
DLAB.	10-Feb-2006	Date logger at btm
SHT .DEGC	25.00	Surface hole temp
BHT .DEGC	98.90	Bottom hole temp
STEM.DEGC	22.50	Surface temperature
MRT .DEGC	98.90	Max recorded temp
MRT1.DEGC	98.90	Max recorded temp 1
MRT2.DEGC	98.90	Max recorded temp 2
MRT3.DEGC	98.90	Max recorded temp 3
LUN .	1909	Logging unit No
LUL	.AUSL	Logging unit Loc
LCC .	440	Logging Company ID
ENGI.	Kasian S. / Kyaw KRecorded by	
WITN.M.	Woodmansee / R.Witness	
PVER.	13C0-300	Program Version
BHS .	OPEN	Bore Hole Status
FLEV.M	.00	Fluid Level
GDEV..	0000000	Avg Angular Deviat
GTSE.	TEMP	General.Temp Select
MHD .DEG	28.7000	Maximum Hole Deviation
TD.M	3112.00	Total depth
TWS .DEGC	37.78	Temp Conn.WaterSamp

Other Information (related to Table 6.4)

Toolstring run eccentered using 1.5" stand off.
First run in the well, All Schlumberger depth control policy followed. Depth correlated to Downlog.
Extra 2 CME-Z were placed on the DSI in order to help centralization inside casing.
Platform Express run in High Resolution mode.
Neutron porosity correction applied Hole size correction using caliper, Mud weight, Pressure Temperature, Borehole salinity.
No Barite present in mud, HNGS potassium correction applied in Playback.
DSI firing mode P&S, Upper and Lower Dipole in open hole, P&S in casing.
FMI EMEX current was disconnected at 2708m.
Tide correction -1.916m / Tide 1.05LAT + 0.866m for conversion to MSL.
Tide charts, Commonwealth of Australia, National tide centre, for Lat 38.18'S Long 148.42' E
Log recorded in Mean Sea Level.
Maximum recorded Temp 98.9DegC, 98.9DegC, 98.9DegC using thermometers.
Additional mud properties Solid 5%, KCl 6%, Cl- 33000mg/l, Hardness Ca 200mg/l

7. MDT PRESSURE INTERPRETATION, FLUID CONTACTS AND SAMPLING

MDT Pressure Data

A total of 61 MDT pressures were successfully measured in Manta-2A. Of these, eight data points were measured in apparently clean water sands. A plot of all the pressures is displayed in Figure 7.1.

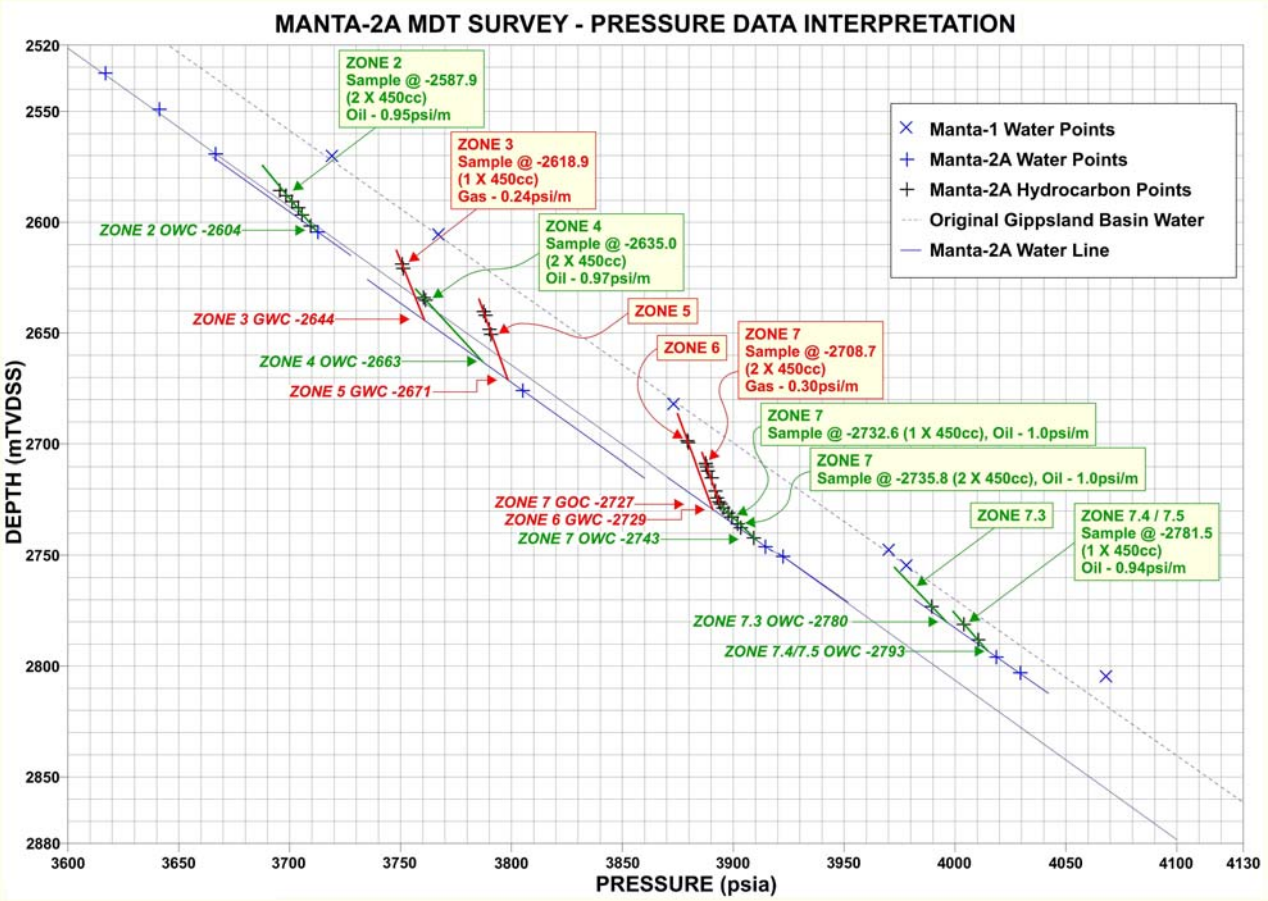


Figure 7.1 Manta-2A MDT Survey Pressure Data Interpretation

Seven of the water points in the upper reservoir section lie on a straight line with a gradient of 1.42 psi/m (0.433 psi/ft). This line is parallel to the original Gippsland Basin aquifer pressure line which can be calculated with the equation:

$$p = (D + 150) * 0.433$$, where the pressure (p) is in psia and the depth (D) is in feet.

The Manta-2A water line exhibits a pressure depletion of about 50 psi relative to the original Gippsland Basin aquifer pressure, which indicates good aquifer support in the intra-Latrobe reservoirs. However, at depths below 2760mTVDSS (within Zones 7.3 and 7.4/7.5), the pressure depletion is significantly smaller at 16-17 psi, which is possibly because the reservoir is over-pressured or because of weaker aquifer support.

Fluid Contacts

Where a sufficient number of data points exist to establish a pressure trend in the hydrocarbon column, the fluid contacts were determined at the intersection of the hydrocarbon gradient with the water line. However, for Zones 3, 4 and 5, the fluid contacts based on the Manta-2A water line were too shallow compared to the contacts in Manta-1 (which were determined from RFT pressures, before pressure depletion). The water line in the vicinity of these three zones was therefore shifted 12 psi lower to honour the single water point at 2676mTVDSS. The Manta-2A fluid contacts for Zones 3, 4 and 5 determined with the new water line are closer to the Manta-1 contacts except for Zone 3, which is 9m deeper. The justification for shifting the water line in Manta-2A is that the hydrodynamic system acting is acting differently at different levels over the reservoir interval.

A comparison between the fluid contacts determined from Manta-1 and Manta-2A is shown below:

Table 7.1 Manta-1 and Manta-2A Fluid Contacts Comparison

Zone	Contact	Manta-1 mTVDSS	Manta-2A mTVDSS
2	OWC	2602	2604
3	GWC	2635	2644
4	OWC	2662	2663
5	GWC	2667	2671
6	GWC	2728	2729
7	GOC	2727	2727
7	OWC	2743	2743
7.3	OWC	n/a	2780
7.4 / 7.5	OWC	n/a	2793

Fluid Sampling

Oil and gas samples were recovered during the MDT runs at the following depths

Table 7.2 MDT Oil and Gas Samples

Depth	Fluid Type	Zone	Number of Samples Recovered
2954.5	Oil	7	1
2958.0	Oil	7	2
2928.0	Gas	7U	2
2846.7	Oil	4	2
2795.0	Oil	2	1
3008.5	Oil	7	1
2829.0	Gas	3	1

8. PVT STUDIES

PVT studies were carried out by PetroLab on one each of the oil and gas samples listed above. A brief summary of the key properties is presented below. Complete descriptions of the reservoir fluids and fluid compositions can be found in the respective PVT reports.

Table 8.1 Oil Sample from Zone 7 at 2958mMDRT (2736mTVDSS)

Initial reservoir pressure	psig	3885
Reservoir Temperature	ºF	221
Oil saturation pressure (P_b)	psig	3815
Initial solution GOR @ P_b	scf/stb	1071
Solution GOR (separator test)	scf/bbl	1043 (@71 psig and 63 ºF)
Oil FVF (B_{oi})	rb/stb	1.628
Oil viscosity	cp	0.322 at reservoir conditions
Residual oil gravity	ºAPI	41.7

Table 8.2 Gas Sample from Zone 7 at 2928mMDRT (2708.3mTVDSS)

Initial reservoir pressure	psig	3888
Dew point pressure	psig	3890
Reservoir Temperature	ºF	219
Gas FVF (B_g)	rf/scf	0.00449
Gas Expansion Factor (E_v)	scf/rf	222.8
Gas deviation factor (z)		0.913
Gas gravity (Air = 1)		0.841
Condensate Gas Ratio (CGR)	bbl/MMscf	26.7

Anzon Australia LIMITED

ENCLOSURE 1

Manta-1 and Manta-2A Well Correlation

MANTA-1

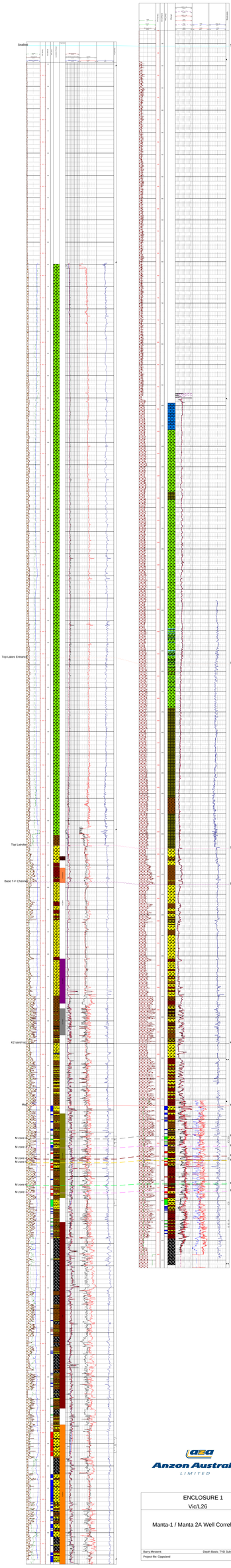
MANTA-2A

0.193 Km

At TD

Surface: 0.837km

Scale: 1:2,000



Anzon Australia LIMITED

ENCLOSURE 1

Vic/L26

Manta-1 / Manta 2A Well Correlation

Barry Messent	Depth Basis: TVD Subsea
Project file: Gippsland	Date: 3-Mar-07

Anzon Australia LIMITED

ENCLOSURE 2

Manta-1 and Manta-2A Reservoir Correlation

MANTA-1

MANTA-2A

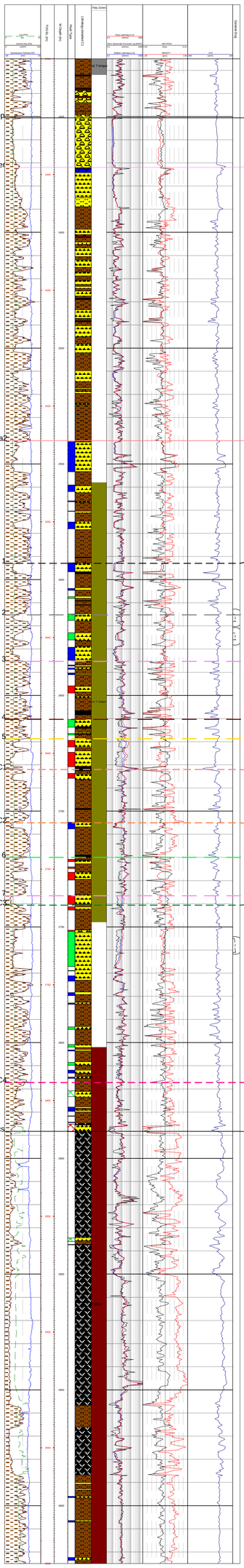
0.193 Km

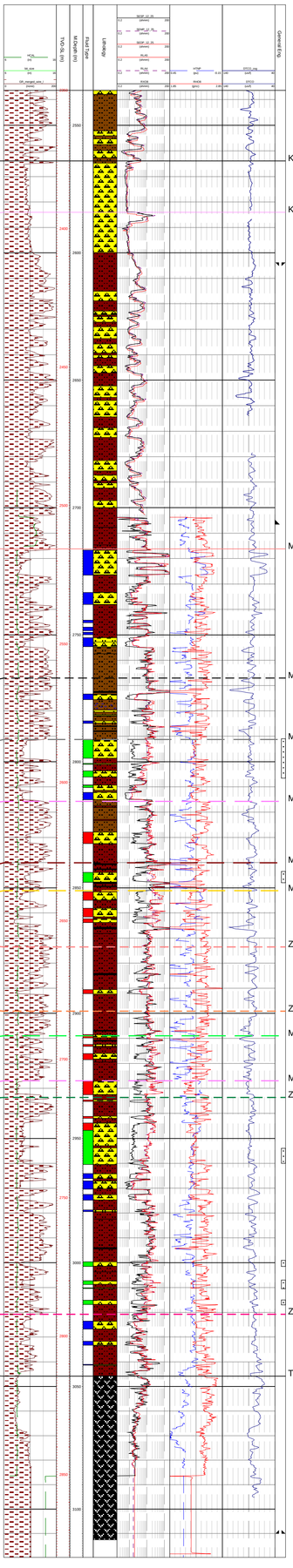
At TD

(0.837km at Surface)

Elev: 21.50m

Scale 1:1,000





Anzon Australia LIMITED

ENCLOSURE 2

Vic/L26

Manta-1 / Manta 2A Reservoir Correlation

Barry Messent — Depth Basis : TVD Subsea

Project file: Gippsland — Date: 1-Mar-07

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ENCLOSURE 3

Manta-2A Composite Well Log

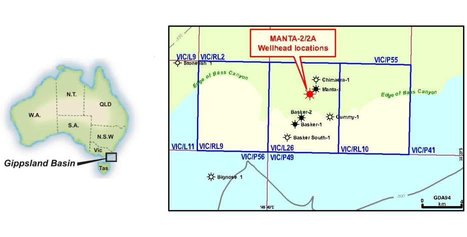
Manta-2A
Composite Well Log

Anzon Australia Limited

1:1000 (TVD)

ENCLOSURE 3

50% Anzon Australia Limited 50% Beach Petroleum Limited



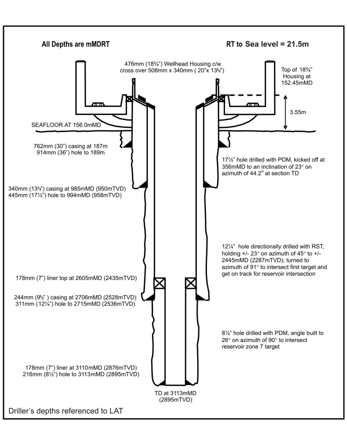
Permit: Vic/L26
Operator: Anzon Australia Ltd

SURFACE LOCATION

Latitude:	-38" 16' 39.41' S
Longitude:	148" 42' 58.03' E
X:	650106.19mE
Y:	5761989.60mN
Datum/Ellipsoid:	GDA94/GRS80, MGA
UTM Zone:	55

BOTTOM HOLE LOCATION

Latitude:	-38" 16' 19.84' S
Longitude:	148" 43' 31.10' E
X:	650920.90mE
Y:	5762577.79mN



Geologists:	Mike Woodmansee/ Rob Blackmore	Well Status:	Development	TD MDRT:	3113m
Rig:	Ocean Patriot	Rig Recieved:	23rd January 2006	TD TVDSS:	2873.9m
Drilling:	Diamond Offshore General Company	Spud:	19:30hrs 23rd January 2006	Water Depth:	134.2m(133.3mLAT)
Wireline:	Schlumberger	TD:	03:00hrs 9th February 2006	Rotary Table:	21.5m
LWD:	Sperry	Date Completed:	12:00hrs 24th February 2006	Datum:	Wire:MSL; Drill:LAT
Mud Logging:	Geoservices	Rig Release:	08:00hrs 25th February 2006		
		Completion Status:	Suspended as a future oil and gas producer		

LEGEND

Calcarenite	Calcisiltite	Calcilutite	Argillaceous Limestone	Marl	Calcareous Claystone
Claystone	Siltstone	Very Fine-Fine Gn Sandstone	Medium Gn Sandstone	Coarse Gn Sandstone	Conglomerate
Weathered Volcanics (Basalts)		Coal	Gas	Oil	Water

Anzon Australia LIMITED

ENCLOSURE 4

Manta-2A Complex Lithology Model

Anzon Australia LIMITED

Enclosure 4

Manta 2A

COMPLEX LITHOLOGY MODEL

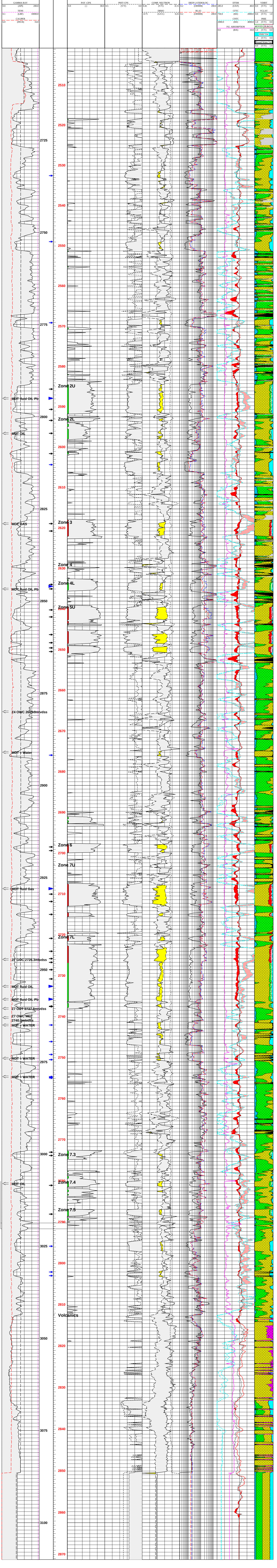
Company	Anzon
Well Name	Manta 2A
Field	Manta
Country	Australia
State	Victoria
County or Rig name	Ocean Patriot
Field Location	VIC/L26
Latitude	038 16' 39.41" S DMS
Longitude	148 42' 58.03" E DMS
Permanent Datum	Mean Sea Level
Elevation of PD	
Elevation Log Zero	
Above Perm. Datum	21.50 M
Log measured from	DF
Service company	Schlumberger
Log date	09-Feb-2006
Date computed	20-10-06
Date plotted	03-11-2006
Time plotted	15:56:44

PETROLOG SOFTWARE Revision 9.50

CROCKER DATA PROCESSING

Since well log interpretations are opinions based upon inferences from well logs, we cannot and do not guarantee the correctness or accuracy of any interpretation. Therefore we shall not be liable or responsible for any loss, damage, cost or expense incurred or sustained by anyone resulting from any interpretation.

LITHOLOGIES

Rock Structure · Shales · Shales · OIL · GAS · Rock Structure

CALIPER-BIT SIZE	DEPTH	TVDSS	SW	PHIE	DENSITY	MICRO SFL	COMP. SONIC	MINERAL
-20.0 (INCH) 20.0	M 1:200	M TVDSS	1.0 (V/V) 0.0	0.5 (V/V) 0.0	1.85 (G/CC) 2.85	0.2 (OHMM) 200.0	140.0 (US/F) 40.0	0.0 ( ) 1.0
GAMMA RAY 0.0 (API) 200.0			PAY -CPX 0.0 ( ) 30.0	PHIT-CPX 0.5 (V/V) 0.0	COMP. NEUTRON 0.45 (V/V) -0.15	DEEP LATEROLOG 0.2 (OHMM) 200.0	DTSM 285.0 (US/F) 40.0	VDIRT 0.0 (V/V) 1.0
TENS 0.1 (LBF) 10000.0					DRHO -0.75 (G/CC) 0.25	RLA3 0.2 (OHMM) 200.0	CFTC 750.0 (HZ) 2000.0	VCLAY 0.0 (V/V) 1.0
CALIPER 6.0 (INCH) 16.0							CNTC 2000.0 (HZ) 4000.0	PHIE 1.0 (V/V) 0.0
							P.E. ABSORPTION 0.0 (B/E) 10.0	MOVED OIL&GAS 1.0 (V/V) 0.0
								PHIE*SW 1.0 (V/V) 0.0
								Bound Water Vol 0.0 (V/V) 1.0