Grayling-1/1A

VIC/P54

Well Completion Report

Interpretive Data

February 2006

CONTENTS

1. WELL SUMMARY

Grayling-1/1A is located in the southeast corner of permit VIC/P54, approximately 5.6 km east southeast of Sunfish-2, and 6.1 km northeast of Turrum-1 (Figure 1). The well was drilled to explore a northeast-southwest trending faulted anticline with some fault independent four-way dip closure at the primary objective Volador Formation - *F.longus* stratigraphic level and deeper secondary objective Golden Beach Sub-group sandstones (Figues 2 and 3). The deeper objective level is the same as as the reservoir in the Kipper Field where volcanics appear to provide some of the lateral cross fault seal, as well as top seal.

Grayling-1 was spudded at 20:30 hrs on December 23, 2004 by the Ocean Patriot rig, in 58.5 m of water. After reaching a total depth -778.4 mTVDAHD (800.0 mMDRT) mechanical problems were encountered and the well was abandoned (Figure 4). The rig was then skidded to the Grayling-1A location. Grayling-1A was spudded at 16:30 hrs on December 28, 2004. The vertical well reached a total depth of -2891.8 mTVDAHD (2914.0 mMDRT) at 14:30hrs on January 11, 2005.

In addition to the acquisition of logging-while-drilling data (Sperry-Sun LWD), the following suite of wireline logs was run:

Run 1: RCI-GR (Baker Atlas)
Run 2: RCI-GR (Baker Atlas)
Run 3: MLR-GR (Baker Atlas)

No conventional coring or testing was carried out.

The primary objective Volador Formation (*F. longus* section) was intersected at -2134.7 mTVDAHD (2156.5 mMDRT), 87.3 m high to prognosis (Figure 5). Total average gas values remained low throughout the well. No hydrocarbon shows were observed within the Volador Formation. Weak hydrocarbon shows were observed and several significant gas peaks were recorded in the lower part of the Kingfish Formation above the Volador Formation, and in the deeper objective Chimaera Formation, which lies below.

Petrophysical analysis (Appendix 1) has interpreted an 8.8 m gross gas column that contains 8.8 m net pay within the Lower Kingfish Formation. Average porosity and water saturations are 22.2% and 34.0%, respectively. The base of the sandstone unit represents a ‘gas-down-to’ level as no gas-water contact is evident on logs. The Golden Beach Formation has been interpreted to contain a 68.2 m gross gas column with 31.6 m net pay. Average porosity and water saturations are 15.4% and 36.2%, respectively. The gas-water contact is evident at -2617.2 mTVDAHD (2639.1 mMDRT).

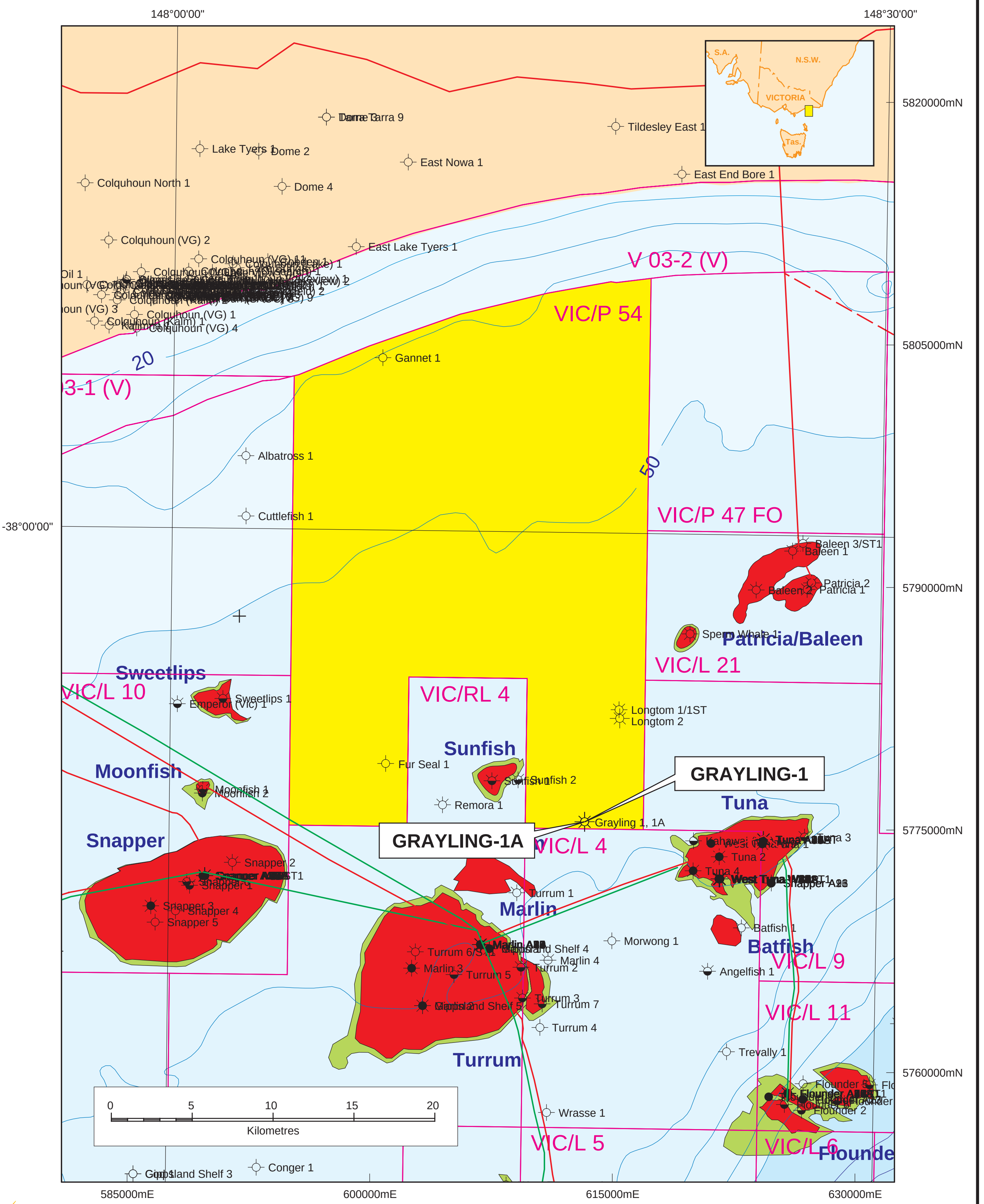
An RCI pressure survey was run over the Lower Kingfish Formation and Golden Beach Formation intervals and 20 pressure points were acquired. Interpretation of these survey points suggests that the gas column identified within the Golden Beach Sub-group comprises two zones, with the upper zone gas-water contact at -2594.0 mTVDAHD (2615.9 mMDRT), and the lower zone gas-water contact the same as that identified on log analysis.

Grayling-1A, a gas discovery, was plugged and abandoned and the rig was skidded to complete abandonment operations in Grayling-1. Following abandonment operations the rig was released at 05:00 hrs on January 27, 2005 when 1 km from location.

Apache ENERGY

VIC/P-54

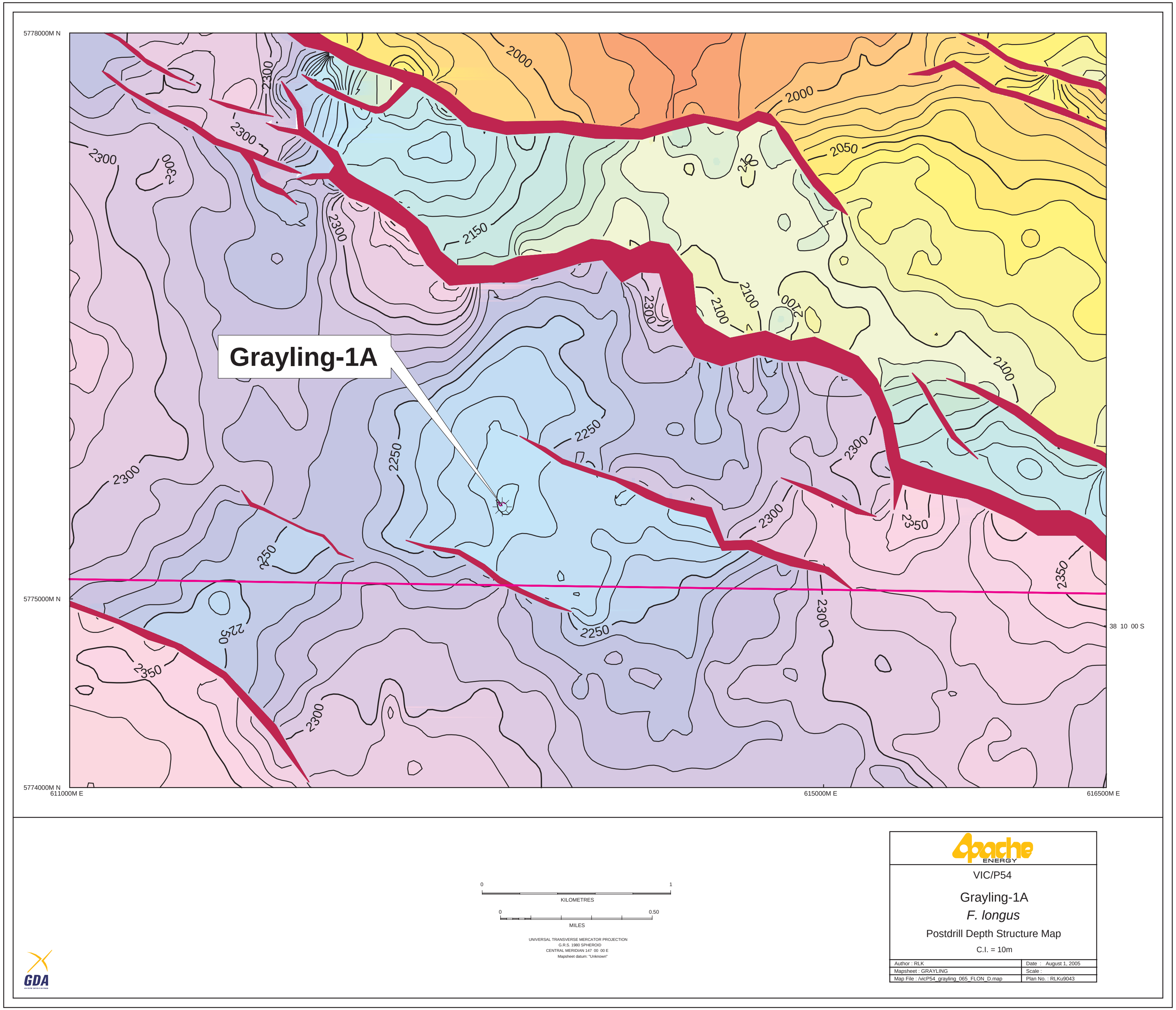
GRAYLING-1/1A LOCATION MAP



GDA

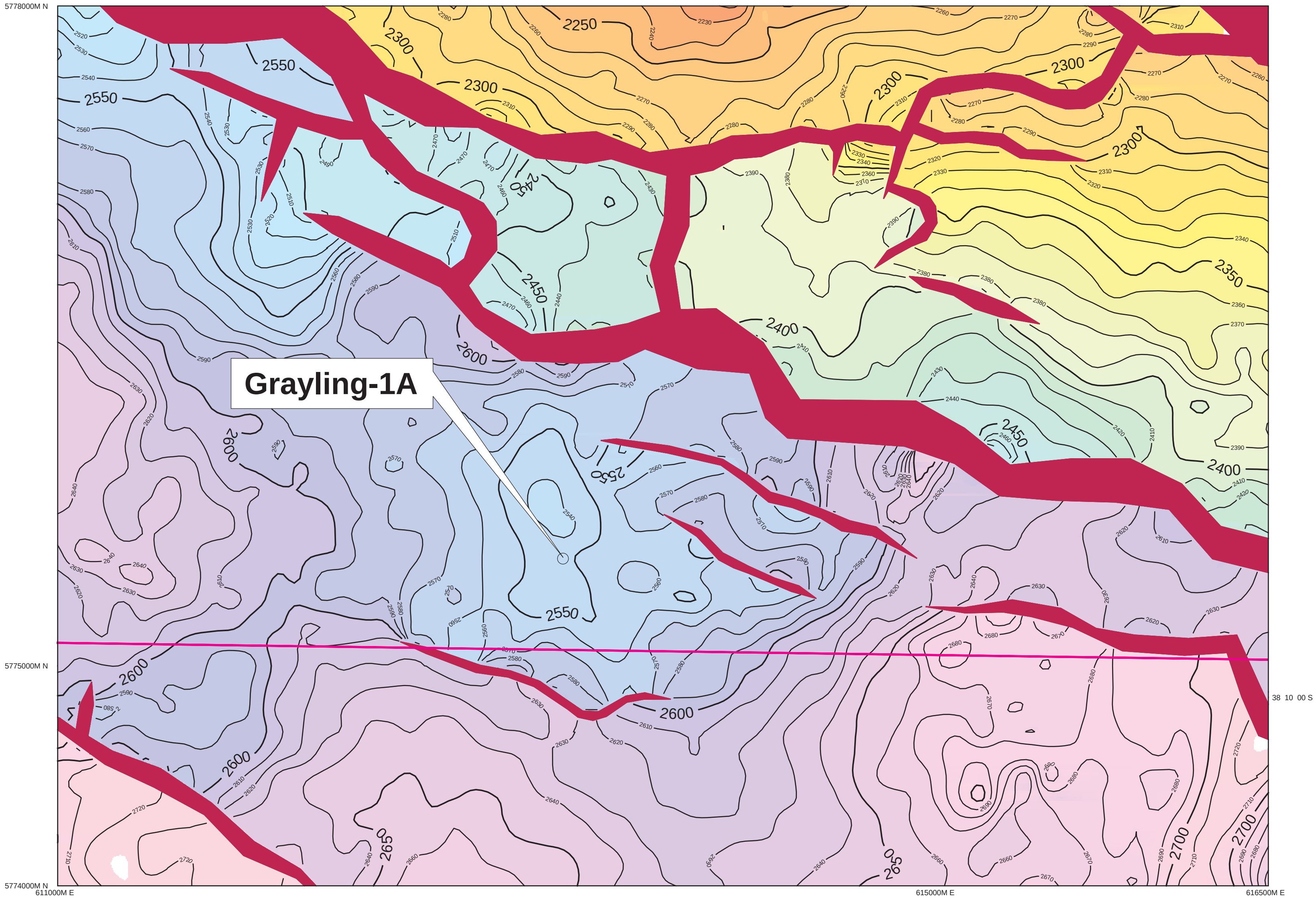
July 2005 WLMu8383

Figure 1



5778000M N
5775000M N
5774000M N
611000M E
615000M E
616500M E
38 10 00 S
Grayling-1A
2000
2050
2100
2150
2250
2300
2350
0
1
KILOMETRES
0
0.50
MILES
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
G.R.S. 1980 SPHEROID
CENTRAL MERIDIAN 147 00 00 E
Mapsheet datum: "Unknown"
GDA
Apache ENERGY
VIC/P54
Grayling-1A
F. longus
Postdrill Depth Structure Map
C.I. = 10m
Author : RLK
Date : August 1, 2005
Mapsheet : GRAYLING
Scale :
Map File : /vicP54_grayling_065_FLON_D.map
Plan No. : RLKu9043

Figure 2



0
1
KILOMETRES
0
0.50
MILES
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
G.R.S. 1980 SPHEROID
CENTRAL MERIDIAN 147 00 00 E
Mapsheet datum: "Unknown"

GDA

Apache ENERGY

VIC/P54

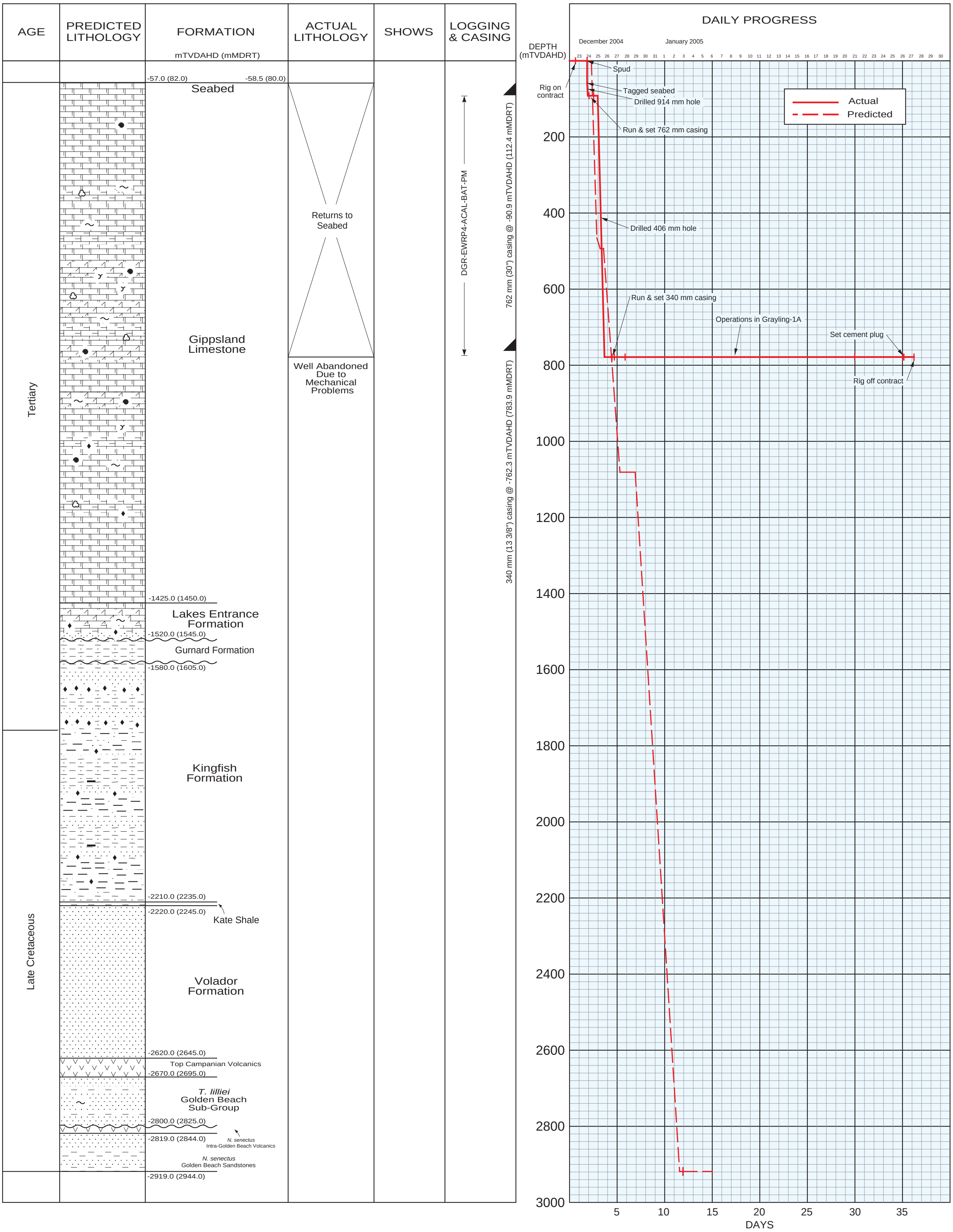
Grayling-1A
Top Golden Beach
Postdrill Depth Structure Map
(well vav)

C.I. = 10m

Author : RLK	Date : August 1, 2005
Mapsheet : GRAYLING	Scale :
Map File : /vicP54_grayling_074_GB_D.map	Plan No. : RLKu9044

Figure 3

GRAYLING-1



LATITUDE :	38° 09' 40.26" S	UTM:	5,775,510.94 mN
LONGITUDE :	148° 17' 35.90" E		613,302.06 mE
SEISMIC LINE :	IL 3708, XL 7845		
SPUD DATE :	23 December 2004, 20:30 hrs		
REACHED T.D.:	25 December 2004, 15:30 hrs		
ELEVATION R.T.:	21.5 m above AHD		
WATER DEPTH :	58.5 m below AHD		
SEA BED :	80.0 m below R.T.		
STATUS :	Plugged & Abandoned, Dry Hole		
RIG :	Ocean Patriot		
RIG RELEASED :	27 January 2005, 05:00 hrs		

GDA

Apache ENERGY

VIC/P-54
GIPPSLAND BASIN

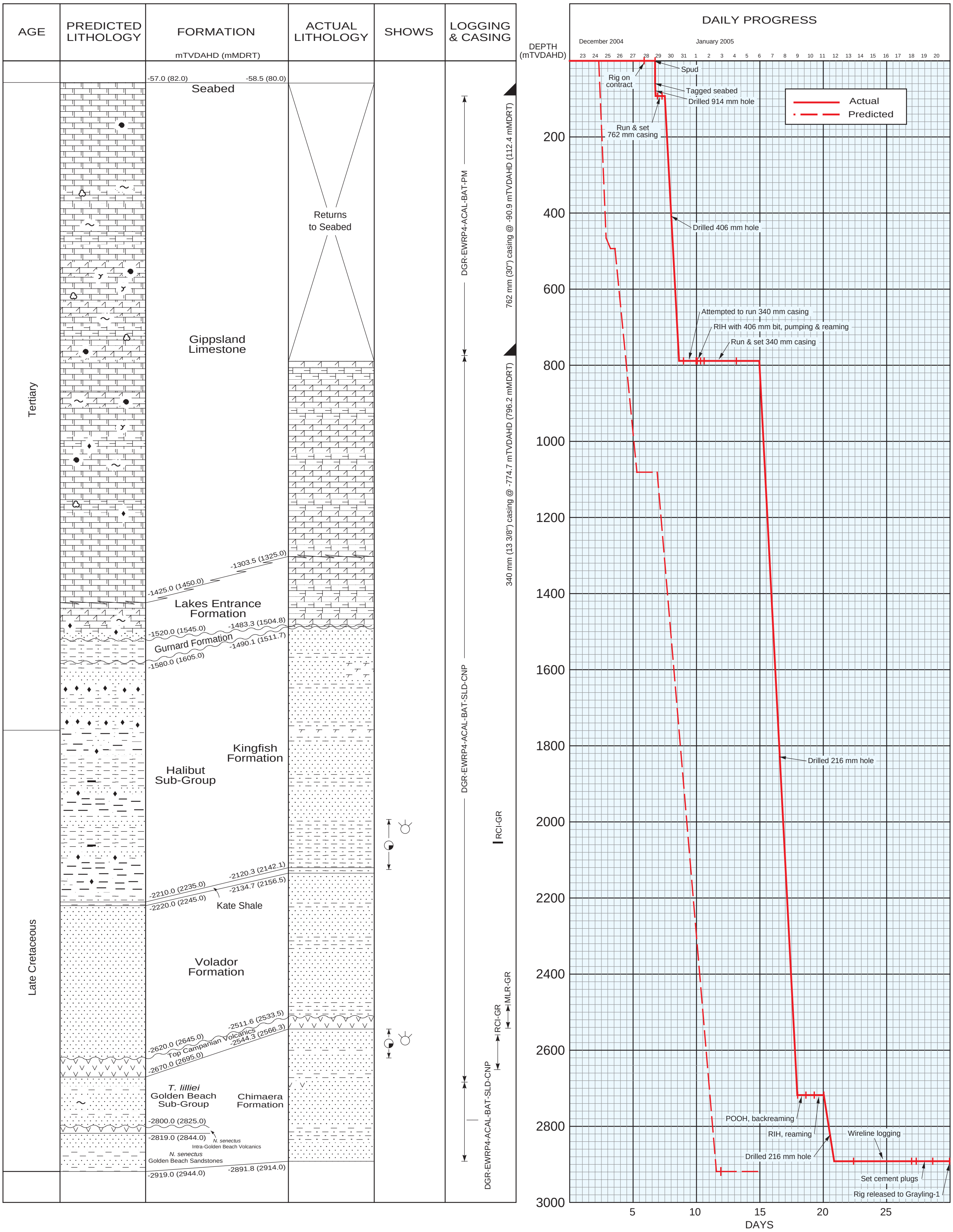
GRAYLING-1

PREDICTED vs ACTUAL SECTION & WELL HISTORY

Author : WCR		Date :	June 2005
Drawn : Perth Exploration Dept.		Plan No.	ASu8983

Figure 4

GRAYLING-1A



LATITUDE :	38° 09' 40.28" S	UTM:	5,775,510.58 mN
LONGITUDE :	148° 17' 34.73" E		613,273.61 mE

SEISMIC LINE : IL 3708, XL 7845
SPUD DATE : 28 December 2004, 16:30 hrs
REACHED T.D.: 11 January 2005, 14:30 hrs
ELEVATION R.T.: 21.5 m above AHD
WATER DEPTH : 58.5 m below AHD
SEA BED : 80.0 m below R.T.
STATUS : Plugged & Abandoned, Gas Discovery
RIG : Ocean Patriot
RIG RELEASED : 20 January 2005, 23:00 hrs

GDA

Apache ENERGY
VIC/P-54
GIPPSLAND BASIN
GRAYLING-1A
PREDICTED vs ACTUAL SECTION & WELL HISTORY

Author : WCR | Date : June 2005
Drawn : Perth Exploration Dept. | Plan No. ASu8979

Figure 5

2. WELL INDEX SHEETS

2.1 Grayling-1

Well:	Grayling-1	**Operator:**	Apache Energy Limited
Well Type:	Exploration	**Partners:**	Apache Northwest Pty Ltd Nexus Energy Vic P54 Pty Ltd
Basin:	Gippsland		
Tenement:	VIC/P54		
Objective:	Volador Formation – *F. longus* section		
Status:	P & A, Dry Hole		
Spudded:	20:30hrs 23 December 2004	**Latitude:**	38° 09' 40.26" S
TD Reached:	15:30hrs 25 December 2004	**Longitude:**	148° 17' 35.90" E
Rig Released:	05:00hrs 27 January 2005	**Northing:**	5,775,510.94 mN
		Easting:	613,302.06 mE
Total Depth:	-778.4 mTVDAHD (800.0mMDRT)		
RT Elevation:	21.5 m above AHD	**Datum:**	GDA94, Spheroid GRS80
Water Depth:	58.5 m below AHD	**Projection:**	MGA Zone 55, CM 147° E
Drill. Contr.:	Diamond Offshore	**Seis Loc:**	Northern Fields 3D Inline 3708, Crossline 7845
Rig (Type):	Ocean Patriot (Semi-Sub)		

Formation Tops

Subgroup	Formation/Marker	Tops		
		mMDRT	mTVDAHD	mTVT
Seaspray	Gippsland Limestone (seabed)	80.0	-58.5	719.9
	Total Depth	800.0	-778.4	

MWD/LWD Logs

Bit No.	Log Suite	Interval (mMDRT)	Max °C	Hole Size (mm)	Remarks
2	DGR-EWRP4-ACAL-BAT-PM	113.0 to 800.0	29	406	Drilled 406mm hole section from 113.0 to 800.0 mMDRT. Gap in data due to air retriever line breaking. Periods of poor detection due to downhole noise and some pump noise. All recorded data was recovered at surface.

Hole and Casing Details

Hole Size (mm)	Interval (mMDRT)	Interval (mTVDAHD)	Casing Size (mm)	Depth (mMDRT)	Depth (mTVDAHD)
914	80.0 to 113.3	-58.5 to -91.8	762	112.4	-90.9
406	113.3 to 800.0	-91.8 to -778.4	340	783.9	-762.3

Cement Plugs

Plug No.	Interval (mMDRT)	Tagged
1	170.0 to 100.0	N

Testing: No testing was carried out.

Coring: No conventional cores were cut.

Comments: Grayling-1 was abandoned due to mechanical problems. Abandonment operations were completed following the drilling of Grayling-1A.

2.2 Grayling-1A

Well:	Grayling-1A	**Operator:**	Apache Energy Limited
Well Type:	Exploration	**Partners:**	Apache Northwest Pty Ltd
Basin:	Gippsland		Nexus Energy Vic P54 Pty Ltd
Tenement:	VIC/P54		
Objective:	Volador Formation-*F.longus* section		
Status:	P & A, Gas Discovery		
Spudded:	16:30hrs 28 December 2004	**Latitude:**	38° 09' 40.28" S
TD Reached	14:30hrs 11 January 2005	**Longitude:**	148° 17' 34.73" E
Rig Released:	23:00hrs 20 January 2005	**Northing:**	5 775 510.58 mN
		Easting:	613 273 .61 mE
Total Depth:	-2891.8 mTVDAHD (2914.0 mMDRT)		
RT Elevation:	21.5 m above AHD	**Datum:**	GDA94, Spheroid GRS80
Water Depth:	58.5 m below AHD	**Projection:**	MGA Zone 55, CM 147° E
Drill. Contr.:	Diamond Offshore	**Seis Loc:**	Northern Fields 3D
Rig (Type):	Ocean Patriot (Semi-Sub)		Inline 3708, Crossline 7845

Formation Tops

Subgroup	Formation/Marker	Tops		
		mMDRT	mTVDAHD	mTVT
Seaspray	Gippsland Limestone (Seabed)	80.0	-58.5	1245.0
	Lakes Entrance Formation	1325.0	-1303.5	179.8
Cobia	Gurnard Formation	1504.8	-1483.3	6.8
Halibut	Kingfish Formation	1511.7	-1490.1	288.2
	Lower *M. diversus* seq	1799.9	-1778.3	342.0
	Kate Shale	2142.1	-2120.3	14.4
	Volador Formation	2156.5	-2134.7	376.9
	Top Campanian Volcanics	2533.5	-2511.6	32.7
Golden Beach	Chimaera Formation	2566.3	-2544.3	347.5
	Total Depth	2914.0	-2891.8	

Wireline Logs

Suite	Run	Log Suite	Interval (mMDRT)	BHT (°C)	Remarks
2	1	RCI-GR	2074.0 to 2077.8	N/A	Tool fished & latched onto pipe. POOH to change out backup RCI tool. One sample.
	2	RCI-GR	2683.7 to 2572.2	N/A	POOH due to communication failure with tool. 20 pressure points and 3 samples collected.
	3	MLR-GR	2569.4 to 2503.9	N/A	

Hole and Casing Details

Hole Size (mm)	Interval (mMDRT)	Interval (mTVDAHD)	Casing Size (mm)	Depth (mMDRT)	Depth (mTVDAHD)
914	80.0 to 114.0	-58.5 to -92.5	762	112.4	-90.9
406	114.0 to 811.0	-92.5 to -789.5	340	796.2	-774.7
216	811.0 to 2914.0	-789.5 to -2891.8			

Grayling-1A Well Index Sheet (Cont.)

MWD/LWD Logs

Bit No.	Log Suite	Interval (mMDRT)	Max °C	Hole Size (mm)	Remarks
2	DGR-EWRP4-ACAL-BAT-PM	114.0 to 810.0	28	406	Drilled to section TD at 800.0 mMDRT. All recorded data recovered at surface.
3	DGR-EWRP4-ACAL-BAT-SLD-CNP	810.0 to 2740.0	85	216	Drilled 216mm hole section from 810.0 to 2740.0 mMDRT.
4	DGR-EWRP4-ACAL-BAT-SLD-CNP	2740.0 to 2914.0	107	216	Drill 216mm hole section to TD at 2914.0 mMDRT, all recorded data recovered at surface.

Cement Plugs

Plug No.	Interval (mMDRT)	Tagged
1a	2675.0 to 2585.0	N
1b	2585 to 2538.0	Y
2	2110.0 to 1996.0	Y
3	826.0 to 737.0	Y
4	170.0 to 100.0	N

Testing: No testing was carried out.

Coring: No conventional cores were cut.

Comments: Grayling-1A was drilled following abandonment of Grayling-1 due to mechanical problems.

3. GEOLOGY

3.1 Summary of Regional Geology

The Grayling structure is located within the Rosedale Fault System on the southern edge of the Northern Terrace of the Gippsland Basin (Figure 1). The Gippsland Basin is located at the eastern end of the major Late Jurassic to Late Cretaceous rift system that formed the southern edge of the Australian continent. It developed as a series of asymmetrical grabens in response to the break-up of Australia and Antarctica during the Early Cretaceous, and separation of Australia from the Lord Howe Rise/Campbell Plateau during the Late Cretaceous.

Clastic deposition commenced during the Early Cretaceous and continued in the basin at least until the Miocene in onshore regions. The onshore western part of the basin is dominated by terrestrial rift-fill of the Early Cretaceous Strzelecki Group which is Albian and older in age. The eastern offshore part has a much more complete and complex sedimentary record and all of the economic hydrocarbon accumulations. A thick interval of carbonates, the Gippsland Limestone, was deposited in the offshore Gippsland during the Miocene.

The structural evolution of the Gippsland Basin involved extensional and compressional events. Two phases of superimposed extension associated with southeastern Australian rifting events affected the region. Extension resulted in a series of NW-SE to WNW-ESE orientated en-echelon basement-involved normal faults on both the northern and southern margins of the basin. The en-echelon, soft-linked dog-leg pattern of normal faults on both the southern and northern margins of the basin is a characteristic of basement involvement in faulting, suggesting pre-existing structural grain influencing the orientation of subsequent faults. Locally, on the basin margins, these faults accommodate large syn-depositional thickness variations.

During the Cenomanian and Turonian, sediments of the syn-rift phase were deposited in lacustrine and lake margin settings (Emperor Sub-Group). The separation of the Lord Howe Rise and the onset of the Tasman Sea opening to the east of the Gippsland Basin during the Santonian were responsible for generating a basin-wide unconformity surface referred to as the Longtom Unconformity. This unconformity separates the underlying lacustrine Emperor Sub-Group from the overlying braided fluvial, deltaic to paralic and shallow marine rocks of the Golden Beach Sub-Group. Shallow marine depositional environments within the Golden Beach Sub-Group are only recorded from the eastern part of the basin. As the Tasman Sea rifting progressed to seafloor spreading in the mid-Campanian (*T. lilliei* biozone), basaltic volcanism within the basin and on the basin flanks reached a peak, covering much of the Golden Beach coastal plain environment with basic extrusives. The unconformity at the top of the Golden Beach Sub-Group is known as the Seahorse Unconformity.

Following this volcanic episode the sediments of the Halibut Sub-Group were deposited during the late syn-rift to post-rift thermal subsidence phase of basin evolution. These were deposited in fluvial, alluvial, deltaic and paralic environments in a basin that opened out to the east onto a developing ocean. The majority of the Halibut Sub-Group was deposited in a non-marine coastal plain setting behind a generally NE-SW orientated beach-barrier complex. During the deposition of the Halibut Sub-Group syn-depositional growth was achieved via extensional reactivation of pre-existing NW-SE to WNW-ESE faults. This faulting progressively ceased during the Paleocene to Eocene. Towards the end of the

Lower Eocene the coastal plain was well established with fluvial systems feeding a strand line beach/barrier system.

Compressional tectonics began to affect the Gippsland Basin from the Early Eocene. Uplift and inversion of the central region and northern margins initiated at this stage caused erosion and generation of initially fluvially incised canyon systems. Within the eastern part of the basin several erosional monadnocks are formed within these canyon systems. In eastern parts of the basin significant amounts of erosion have resulted in a prominent unconformity surface which cuts down into the Halibut Sub-Group to the level of the Maastrichtian Volador Formation. The section underlying the Top Latrobe Unconformity in the western part of the basin is much younger than in eastern parts of the basin. Backstepping (or transgressing) of a series of barrier beach/strandline complexes from east to west occurred during the Eocene. Subsequent to this period of incision and downcutting several pulses of relative sea-level rise took place as subsidence and sedimentation rates slowed, allowing flooding/transgressive pulses to gradually push the shoreline system towards the NW. The depositional lows (eroded canyons) are flooded first preferentially as Eocene offshore marine facies, e.g. the Flounder Formation, are deposited. By the Middle Eocene the palaeo-shoreline had transgressed westwards. By the end of the Eocene the palaeo-shoreline is believed to have moved inland from Lakes Entrance. In most of the offshore areas deposition of condensed glauconitic siltstones and shales replaced deposition of coarse siliciclastics.

Northwest directed compression and transpression began in the Early Eocene and continued episodically with varying intensity through to the Pliocene. Major pulses of compression subsequent to the Early Eocene affected the basin during the Lower Oligocene, Middle Miocene and Pliocene. A series of NE to ENE trending anticlines are the result of this compression. Whilst many of the resultant compressional features are eroded and partially truncated, suggesting periods of sub-aerial exposure, several structures in the west of the basin are not eroded, suggesting they were not emergent sub-aerially.

The marine marls of the Lakes Entrance formation record the final marine transgression in the Early Oligocene. Locally, this succession onlaps onto the flanks of the earlier formed compressional features. From the Mid-Miocene onwards a thick limestone unit, the Gippsland Limestone, was deposited. Major incisions during the mid to Late Miocene are interpreted as offshore erosion/mass wasting events that may have been initiated during compressional reactivation. These incisions are infilled by prograding limestone depositional wedges, which are ultimately responsible for creating the present day shelf-slope break.

The presence of mature source rock intervals within the basin is evidenced by significant oil and gas reserves in the basin. Within the Central Deep portion of the basin coals, coaly or carbonaceous shales of the Strzelecki Group, Golden Beach and Halibut Sub-Groups have all contributed to the oil and gas pools reservoired in the basin. The most prolific source rock intervals however, are suggested to be within the lower coastal plain facies of the Golden Beach and Halibut Sub-Groups. Contributions from source rock intervals in more marine-influenced shales in the eastern parts of the basin have been noted. The regional top seal for the reservoirs in the Gippsland Basin is the Lakes Entrance Formation, however, the presence of volcanics, shales, coaly shales, coals, shales and glauconitic shales related to marine flooding within the Golden Beach and Halibut Sub-Groups have been proven at several intersections to provide valid top seals and cross-fault seals. Within the Latrobe Group there are several proven reservoir levels distributed throughout the entire stratigraphy. The various extensional phases of faulting and subsequent compressional events and incision, in combination with the presence of intra-formational seal units, have developed a myriad of proven trapping configurations in the basin.

3.2 Surrounding Wells

Well Name	Permit	Operator	Date Completed	TD (mRT)	Status
Tuna-2	VIC/L4	Esso Aust. Ltd.	09/12/1968	2761	P & A*, oil & gas shows
Turrum-1	VIC/L3	Esso Aust. Ltd.	27/06/1969	3057	P & A*, oil & gas shows
Sunfish-1	VIC/P1	Esso Aust. Ltd.	03/03/1974	2492	P & A*, oil & gas shows
Sunfish-2	VIC/P1	Esso Aust. Ltd.	14/10/1983	2647	P & A*
Tuna-4	VIC/L4	Esso Aust. Ltd.	31/08/1984	3321	P & A*
Remora-1	VIC/P1	Esso Aust. Ltd.	29/05/1987	2961	P & A*
Longtom-1	VIC/P1	BHP Petroleum	14/06/1995	2242	Abandoned Gas Well
Longtom-2	VIC/P54	Apache Energy Ltd.	22/12/2004	2422	P & A*, Gas Discovery

P & A*- Plugged & Abandoned

3.3 Structure

The Grayling feature is a northeast-southwest trending faulted anticline, with some fault independent four-way dip closure, located within the Rosedale Fault System on the southern edge of the Northern Terrace, Gippsland Basin (Figures 2, 3 and 6). At the primary objective Volador Formation - *F. longus* level there is both fault independent, four-way dip closure and fault dependent closure. The structure formed in response to NW directed compression and transpression which began in the Early Eocene and continue episodically with varying intensity through to the Pliocene. Major pulses of compression affected the basin during the Lower Oligocene, Middle Miocene and Pliocene. A series of NE to ENE trending anticlines, including the Grayling structure, are the result of this compression. The structure is bounded to the north and south by two SE-NW trending normal faults with downthrows to the SSW. Both of these faults are part of the Rosedale Fault System.

3.4 Stratigraphy

The stratigraphic section penetrated in Grayling-1A is described below and summarised in Figure 7; delineation of age units is based on log correlation with nearby wells together with palynological data (Appendix 1). Detailed lithological descriptions are included in the cuttings descriptions, daily geological reports and mudlog section of the Grayling-1/1A Basic Data Well Completion Report. Age, lithology and drilling data have been collated on the composite well logs accompanying this report (Enclosures 1 & 2). No cuttings were recovered from spud to -789.5 mTVDAHD (811.0 mMDRT).

Grayling-1A: Northern Fields 3D tie line

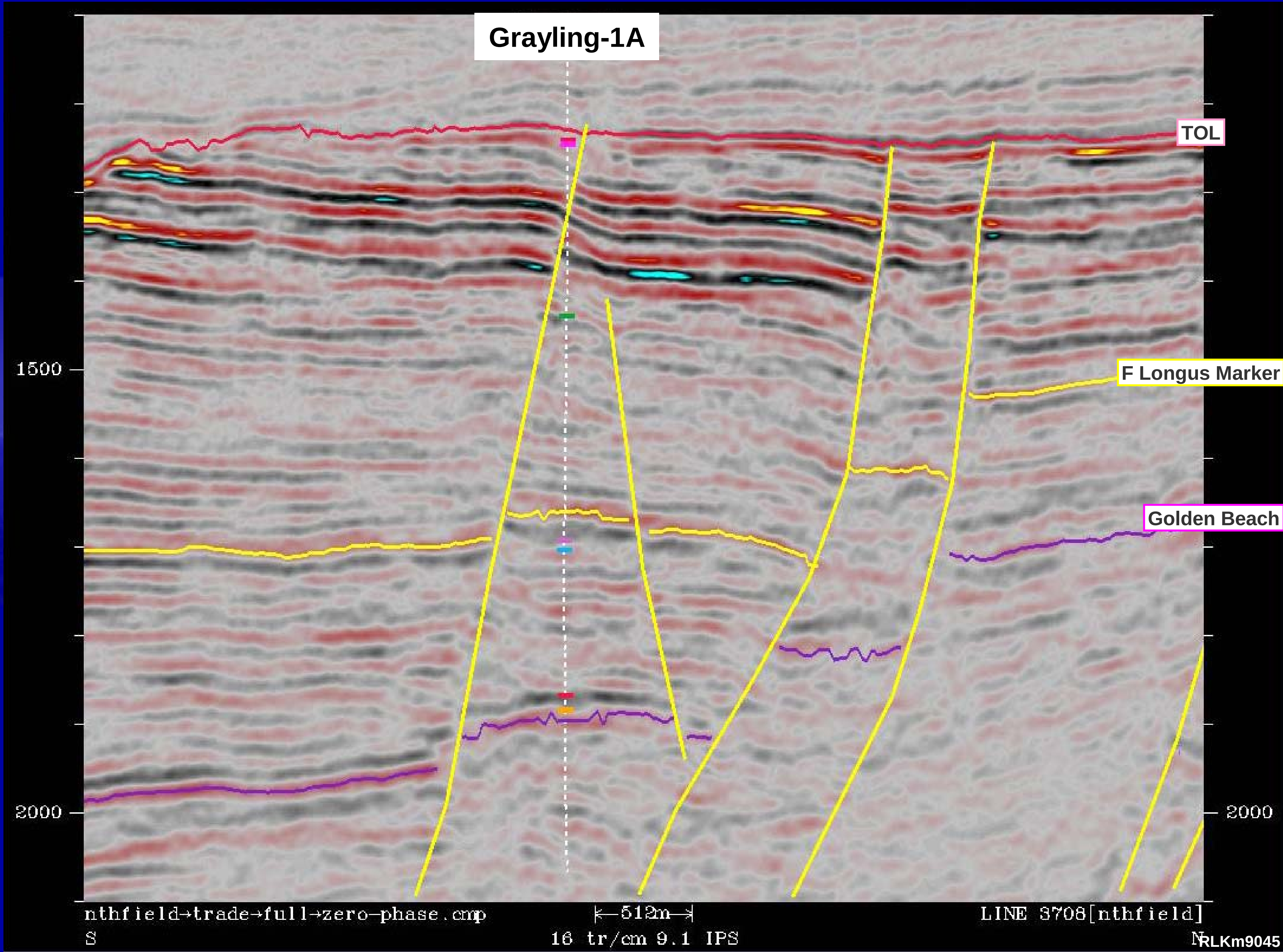


Figure 6

ENERGY

GRAYLING-1A

STRATIGRAPHY

SYSTEM	SERIES	STAGE	SUB-GROUP	FORMATION	MEASURED DEPTH (mMDRT)	SUBSEA TVD DEPTH (mTVDAHD)	THICKNESS (mTVT)	DEPOSITIONAL ENVIRONMENT	APPROXIMATE PALYNOLOGICAL ZONATIONS
TERTIARY		Late Oligocene to Recent	Seaspray	GIPPSLAND LIMESTONE	80.0	-58.5	1245.0	OFFSHORE MARINE	
TERTIARY		Oligocene	Seaspray	LAKES ENTRANCE FORMATION	1325.0	-1303.5	179.8	OFFSHORE MARINE	*P. tuberculatus*
TERTIARY		Early Oligocene to Middle Eocene	Cobia	GURNARD FORMATION	1504.8	-1483.3	6.8	NEARSHORE MARINE TO NON - MARINE	
TERTIARY		Mid Paleocene to Early Eocene; Paleocene	Halibut	KINGFISH FORMATION	1511.7	-1490.1	630.2	NEARSHORE MARINE TO NON - MARINE	*M. diversus*; *L. balmei*
CRETACEOUS	LATE	Maastrichtian	Halibut	KATE SHALE	2142.1	-2120.3	14.4	NEARSHORE MARINE TO NON - MARINE	(?) caved
CRETACEOUS	LATE	Maastrichtian	Halibut	VOLADOR FORMATION	2156.5	-2134.7	376.9	NEARSHORE MARINE TO NON - MARINE	*F. longus*
CRETACEOUS	LATE	Campanian	Golden Beach	TOP CAMPANIAN VOLCANICS	2533.5	-2511.6	32.7	NEARSHORE MARINE TO NON - MARINE	(?) caved
CRETACEOUS	LATE	Santonian to Campanian	Golden Beach	CHIMAERA FORMATION	2566.3	-2544.3	> 347.5	NEARSHORE MARINE TO NON - MARINE	*T. lilliei*; *N. senectus*
					2914.0	-2891.8			

AUTHOR: WCR	DATED : June 2005
DRAWN: Perth Drafting Dept.	PLAN No. : STRu8993

Figure 7

Gippsland Limestone

Depth: -58.5 (Seabed) to -1303.5 mTVDAHD (80.0 to 1325.0 mMDRT)
Thickness: 1245.0 mTVT
Age: Late Oligocene to Recent

The Gippsland Limestone sediments were not sampled above -789.5 mTVDAHD (811.0 mMDRT) as returns were circulated to the seafloor. Below this level the lithology comprises interbedded calcisiltite, which becomes argillaceous below -1128.5 mTVDAHD (1150.0 mMDRT), and calcilutite. Rare limestone, silty dolomite and chert are seen. Regionally, the Gippsland Limestone is interpreted to have been deposited in an offshore marine environment.

Lakes Entrance Formation

Depth: -1303.5 to -1483.3 mTVDAHD (1325.0 to 1504.8 mMDRT)
Thickness: 179.8 mTVT
Age: Oligocene

The Lakes Entrance Formation lies disconformably below the Gippsland Limestone. The lithology comprises argillaceous calcisiltite with minor calcilutite and rare limestone. Regionally, the Lakes Entrance Formation is interpreted to have been deposited in an offshore marine environment.

Gurnard Formation

Depth: -1483.3 to -1490.1 mTVDAHD (1504.8 to 1511.7 mMDRT)
Thickness: 6.8 mTVT
Age: Early Oligocene to Middle Eocene

The Gurnard Formation lies unconformably below the Lakes Entrance Formation. It is interpreted from LWD logs by an increase in resistivity and minor increase in gamma ray response. The lithology comprises argillaceous calcisilutite with minor calcilutite and rare limestone.

Palynological analysis (Appendix 1) has interpreted these sediments to be Late Eocene in age, deposited within the *P. tuberculatus* biozone, in a shallow to open, offshore marine environment.

Kingfish Formation

Depth: -1490.1 to -2120.3 mTVDAHD (1511.7 to 2142.1 mMDRT)
Thickness: 630.2 mTVT
Age: Early Eocene to Middle Paleocene

The Kingfish Formation lies unconformably below the Gurnard Formation. It is interpreted from LWD logs by peaks in gamma ray response and resistivity, and a sharp decrease in neutron porosity and formation density. The lithology comprises interbedded sandstone, carbonaceous siltstone, siltstone and silty claystone below -1868.4 mTVDAHD (1890.0 mMDRT). Minor calcareous claystone and argillaceous siltstone, and rare coal and lignite are seen. The lithology becomes predominately sandy siltstone below -2028.3 mTVDAHD

(2050.0 mTVDAHD). The sandy siltstone is fine to medium-grained with abundant white clay matrix. Poor visual porosity and weak hydrocarbon shows are seen. Log analysis, gas peaks and RDT pressure points all indicate gas columns of ~8.5 m.

Palynological analysis has interpreted these sediments to be Early Eocene to Paleocene in age, spanning the *M. diversus* to *L. balmei* biozone. Deposition is interpreted to have been in a non-marine to marginal marine environment.

Kate Shale

Depth: -2120.3 to -2134.7 mTVDAHD (2142.1 to 2156.5 mMDRT)
Thickness: 14.4 mTVT
Age: Paleocene

The Kate Shale lies conformably below the Kingfish Formation. It is interpreted from LWD logs by a peak in gamma ray response. The lithology comprises sandy siltstone with minor silty claystone. Rare siltstone and very fine-grained sandstone are seen. Weak hydrocarbon shows are associated with the sandy siltstone (Section 3.5).

Palynological analysis has interpreted these sediments to be Paleocene in age, deposited within the *L. balmei* biozone, in a non-marine to marginal marine environment although regionally the presence of marine dinocysts in the Kate Shale and its regional correlatability show it to be a marine transgression shale related to a major flooding event.

Volador Formation

Depth: -2134.7 to -2511.6 mTVDAHD (2156.5 to 2533.5 mMDRT)
Thickness: 376.9 mTVT
Age: Maastrichtian

The Volador Formation lies conformably below the Kate Shale. It is interpreted from LWD logs by a decrease in gamma ray and resistivity. The lithology comprises interbedded and intergradational sandstone, sandy siltstone, siltstone that is carbonaceous in parts and silty claystone. Minor argillaceous sandstone and sandy claystone are seen. The sandstone is dominantly fine to medium-grained with sub-spherical, sub-angular grains that are moderately to well sorted. Visual and inferred porosity are fair to poor. No hydrocarbon shows were observed within this primary objective formation.

Palynological analysis has interpreted these sediments to be Paleocene to Maastrichtian in age, spanning the *L. balmei* to *F. longus* biozones, in a non-marine to nearshore marine environment.

Top Campanian Volcanics

Depth: -2511.6 to -2544.3 mTVDAHD (2533.5 to 2566.3 mMDRT)
Thickness: 32.7 mTVT
Age: Campanian

The Top Campanian Volcanics lie unconformably below the Volador Formation. They are interpreted from LWD logs by a sharp decrease in gamma ray and resistivity. The lithology comprises massive volcanics.

Palynological analysis has interpreted these sediments to be Maastrichtian in age, deposited within the *F. longus* biozone, in a non-marine to nearshore marine environment.

<u>Chimaera Formation</u>

Depth: -2544.3 to -2891.8 mTVDAHD (2566.3 to 2914.0 mMDRT)
Thickness: >347.5 mTVT
Age: Santonian to Campanian

The Chimaera Formation lies unconformably below the Top Campanian Volcanics. The lithology comprises interbedded claystone and sandstone, with minor coaly claystone, silty claystone and siltstone in part. Rare volcanics are seen. The sandstone is dominantly fine to medium-grained, with sub-angular to sub-rounded and sub-spherical grains that are poorly to well sorted. Weak hydrocarbon shows were observed (Section 3.5). Gas peaks, log analysis, and RDT points and samples indicate a gas column of 68.2 m.

Palynological analysis has interpreted these sediments to be Maastrichtian to Campanian in age, spanning the *F. longus* to *N. senectus* biozones. Deposition is interpreted to have been in a non-marine to marginal marine environment.

3.5 Hydrocarbon Occurrences

Total gas and chromatographic gas analysis were recorded during the drilling of Grayling-1A and results are presented in the daily geological reports and the mudlog section of the Grayling-1/1A Basic Data Well Completion Report. Riserless drilling resulted in no returns to surface from spud to -789.5 mTVDAHD (811.0 mMDRT) and therefore no gas or cuttings data were available.

Total gas levels recorded remained low throughout the entire interval drilled and ranged between 0.08 to 2.70%. Gas composition was predominantly C_1 but included up to C_4 components. Two significant gas peaks of 20.7% over a background of 0.4% and 11.9% over a background of 1.1% were recorded within Kingfish and Chimaera Formations. Gas data is unreliable due to problems with calibration of both the total gas and chromatograph machines.

Very weak hydrocarbon shows were observed in cuttings samples taken from -2038.3 to -2048.3 mTVDAHD (2060.0 to 2070.0 mMDRT) and -2088.2 to -2128.2 mTVDAHD (2110.0 to 2150.0 mMDRT) within the Kate Shale and Kingfisher Formation intervals. Fluorescence was non-direct, with a weak diffuse to very slow solvent cut and thin residual ring. Very weak shows (1 to 4%) were also seen from -2568.1 to -2588.1 mTVDAHD (2590.0 to 2610.0 mMDRT) and -2613.1 to -2638.1 mTVDAHD (2635.0 to 2660.0 mMDRT) in the Chimaera Formation. Fluorescence was direct with a diffuse, slow pale blue solvent and crush cut and thin residual ring.

Petrophysical analysis (Appendix 1) has interpreted an 8.8 m gross gas column that contains 8.8 m net pay within the Lower Kingfish Formation. Average porosity and water saturations are 22.2% and 34.0%, respectively. The base of the sandstone unit represents a ‘gas-down-to’ level as no gas-water contact is evident on logs. The Golden Beach Sub-group has been interpreted to contain a 68.2 m gross gas column with 31.6 m net pay. Average porosity and water saturations are 15.4% and 36.2%, respectively. A gas-water contact is evident at -2617.2 mTVDAHD (2639.1 mMDRT).

An RCI pressure survey was run over the Lower Kingfish Formation (Figure 8) and Golden Beach Sub-group (Figure 9) intervals and 20 pressure points were acquired. Interpretation of these survey points suggests that the gas column identified within the Golden Beach Sub-group comprises two zones, with the upper zone gas-water contact at -2594.0 mTVDAHD (2615.9 mMDRT), and the lower zone gas-water contact the same as that identified on log analysis.

3.6 Contributions to Geological Knowledge and Conclusions

Grayling-1/1A was designed as an exploration well to test the northeast-southwest trending faulted anticline, mapped at Top Volador Formation - *F.longus* stratigraphic level.

The primary objective Volador Formation (*F. longus*) was intersected at -2134.7 mTVDAHD (2156.5 mMDRT) and was dry (no hydrocarbons). Significant gas peaks were observed in the Kingfish and Chimaera Formations although gas data was unreliable due to equipment calibration problems throughout the drilling of the well.

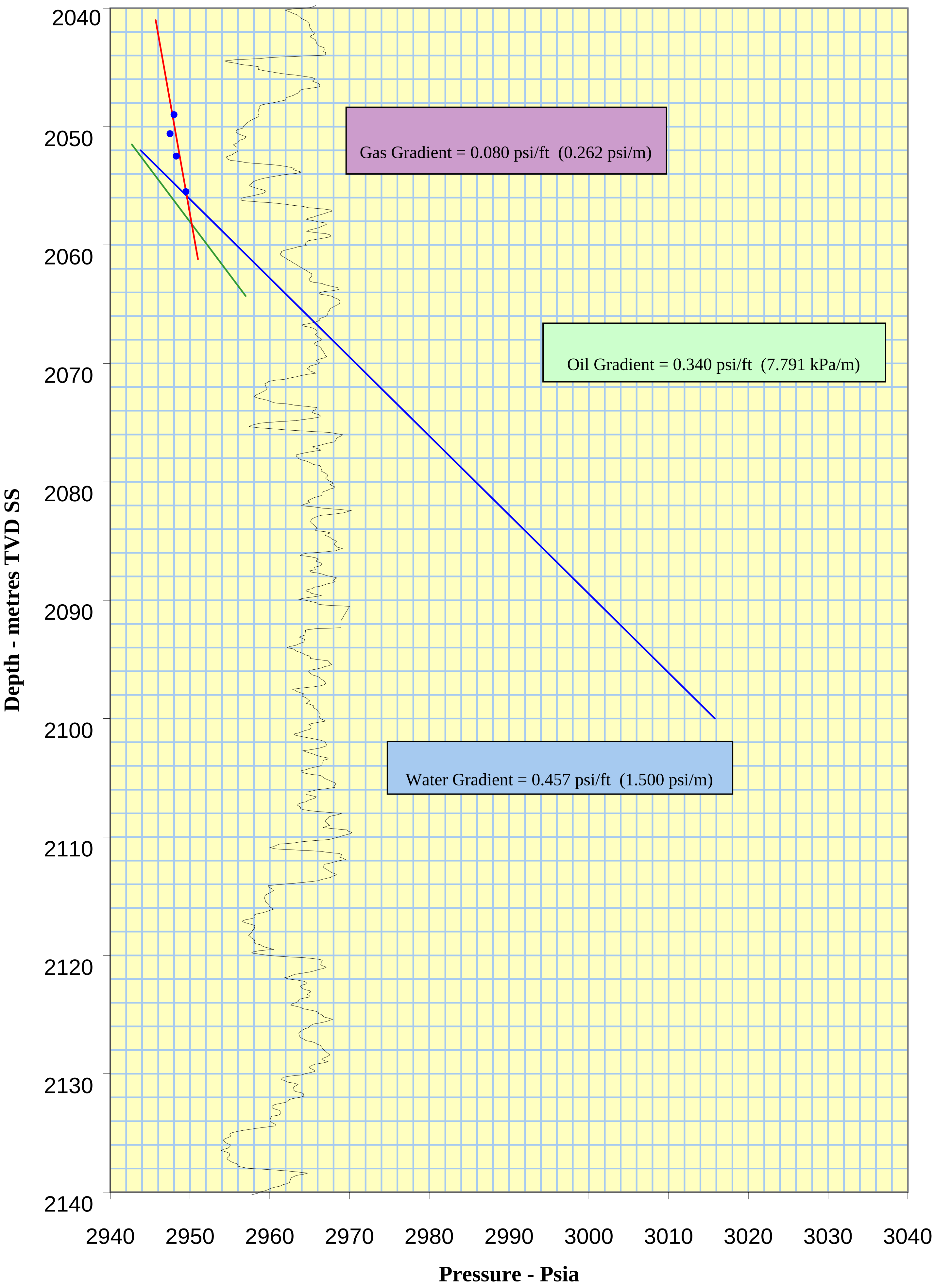
An 8.8 m gas column was encountered within the Kingfish Formation, whilst in the Chimaera Formation (Golden Beach Sub-group) a 68.2 m column (gross) was identified. RCI interpretation suggests the latter is comprised of two separate gas zones.

The deeper *N. senectus*, intra-Golden Beach Sub-group volcanics predicted pre-drill from offset well data were not encountered at the Grayling location. Total depth was consequently called 27.2 m higher than pre-drill prognosis.

Palynology data from the well should be used with caution due to caving (see note at end of palynology report).

Grayling-1A was plugged and abandoned, a gas discovery, and the rig was released at 23:00 hrs on January 20, 2005 when 1 km from location.

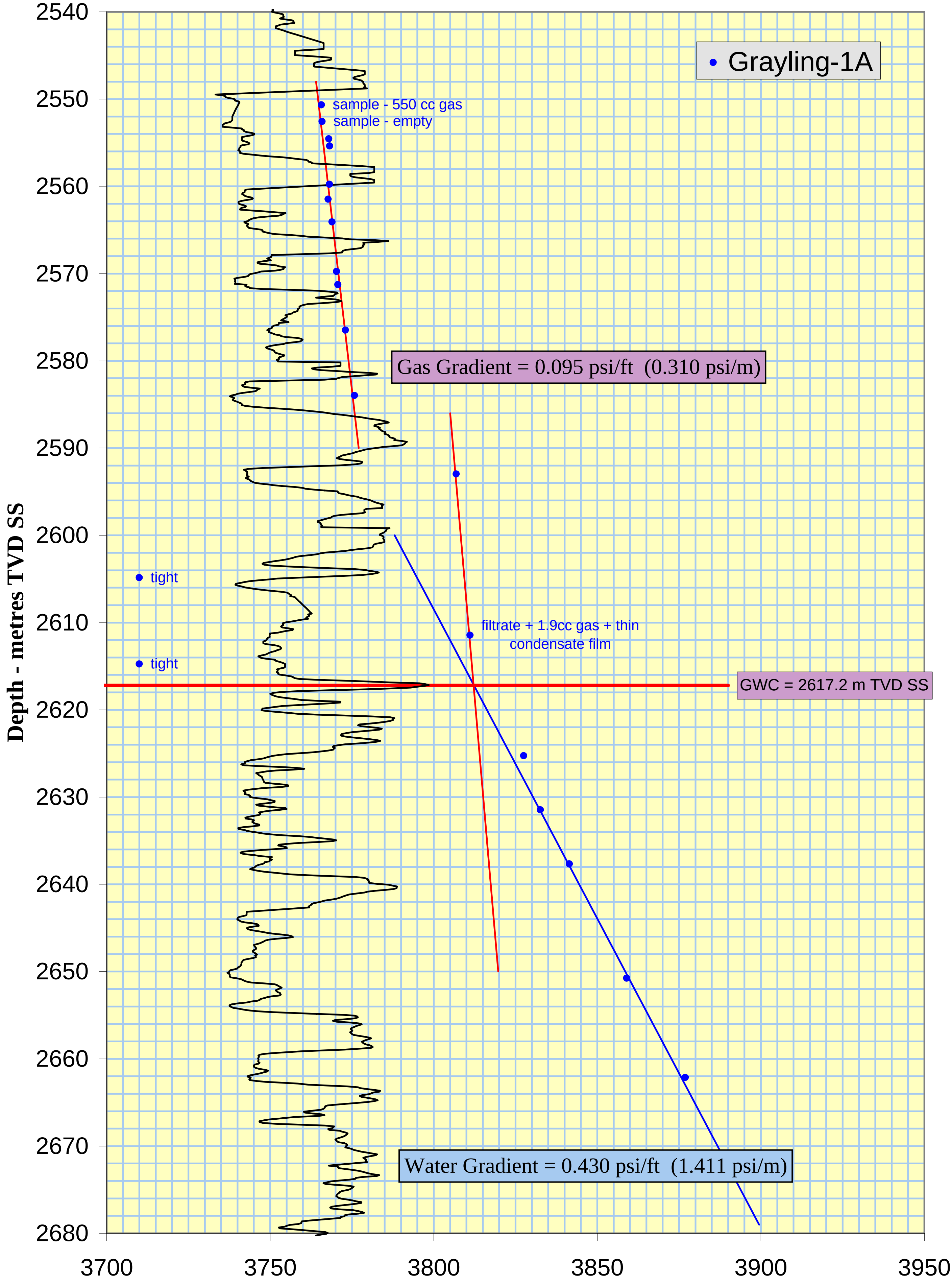
RCI Interpretation of the Lower Kingfish Formation



Apache Energy

Figure 8

Grayling-1A : Golden Beach Sub-group



APPENDIX 1

Palynological Interpretation Report

PALYNOLOGY OF

GRAYLING-1A

GIPPSLAND BASIN, AUSTRALIA

by

ROGER MORGAN

Prepared for
APACHE ENERGY

June 2005

REF: GIP.GRAYLING-1A REPORT

PALYNOLOGY OF

GRAYLING-1A

GIPPSLAND BASIN, AUSTRALIA

CONTENTS **PAGE**

1 SUMMARY

1480 m (cutts) – 1510 m (cutts) : apparently *P. tuberculatus* Zone, middle subzone : Late Eocene : offshore marine : immature for hydrocarbons

1600 m (cutts) : *M. diversus* Zone, upper subzone : Early Eocene : non-marine swamp : marginal mature for oil, immature for gas/condensate

1660 m (cutts) : *M. diversus* Zone, middle subzone : Early Eocene : ?marginal marine : marginal mature for oil, immature for gas/condensate

1720 m (cutts) : *M. diversus* Zone, lower subzone : Early Eocene : marginal marine : marginal mature for oil, immature for gas/condensate

1820 m (cutts) – 2040 m (cutts) : *L. balmei* Zone, upper subzone : Paleocene : marginal marine : marginal mature for oil, immature for gas/condensate

2060 m (cutts) – 2260 m (cutts) : *L. balmei* Zone, lower subzone : Paleocene : some non-marine, some brackish to marginal marine samples : marginal mature for oil, immature for gas/condensate

2280 m (cutts) – 2460 m (cutts) : *F. longus* Zone, upper subzone : Maastrichtian : non-marine lake to floodplain : early mature for oil, early marginal mature for gas/condensate

2500 m (cutts) – 2675 m (cutts) : *F. longus* Zone, lower subzone : Maastrichtian : non-marine swamp to floodplain : early mature for oil, early marginal mature for gas/condensate

2690 m (cutts) – 2740 m (cutts) : lean apparently *T. lilliei* Zone : Maastrichtian to Campanian : non-marine to possibly brackish : early mature for oil, early marginal mature for gas/condensate

2800 m (cutts) – 2890 m (cutts) : *N. senectus* Zone, upper subzone : Campanian : non-marine to brackish : early mature for oil, marginal amture for gas/condensate

2900 m (cutts) – 2914 m (cutts) : *N. senectus* Zone, lower subzone : Campanian : ?marginal marine to non-marine, but saline elements could be caved : mature for oil, early mature for gas/condensate

2 INTRODUCTION

Palynology of the Grayling-1A section is entirely cuttings based using 40 samples submitted by Steve Moss of Apache. The Cretaceous zonation is basically that of Helby, Morgan and Partridge (1987) shown in Figure 1 with subdivisions as discussed in the test. The Tertiary zones are those of Partridge (1976 and pers. comm.) as shown on Figure 2.

All depths are given in metres and are recorded drillers depths. No corrections or conversions have been applied as some (such as core corrections), involve assumptions and interpretations.

Palaeoenvironmental assessments are based on specimen counts of 100 specimens, also providing a percentage content of all species. Criterea for the palaeo-environmental subdivisions are given on Table 1. In running text, rare = <1-3%, frequent = 4-10%, common = 11-30%, abundant = 31-50% and superabundant = 51-100%.

Confidence ratings include the factor of sample type, and distinctiveness of the fossil event, according to the scheme shown on Table 1. This is the STRATDAT scheme used by Esso.

Maturity data were generated in the form of Spore Colour Index, and are plotted on Figure 3 Maturity Profile : Grayling-1A. The oil and gas windows follow the general concensus of geochemical literature. The oil window corresponds to spore colours of light-mid brown (Staplin Spore Colour Index of 2.7) to dark brown (3.6) equal to vitrinite reflectance values of 0.6% to 1.3%. Geochemists argue variations on kerogen type, basin type and basin history. The maturity data is thus open to reinterpretation using the basic colour observations as reworked. However, the range of interpretation philosophies is not great, and probably would not move the oil window by more than 200 m.

TABLE 1

SUMMARY OF PALYNOLOGICAL DATA : GRAYLING-1A

DEPTH (m)	SAMPLE TYPE	MICROFOSSIL YIELD	PERCENTAGE				DIVERSITY *1		SPORE-POLLEN ZONE	CR *2	MICROPLANKTON ZONE	CR *2	ENVIRONMENT *3
			MICROPLANKTON			SPORE-POLLEN-	SALINE MICROPLANKTON	SPORE-POLLEN					
			DINOFLAG	SPINY AC.	FRESH ALGAE								
1480	CUTTS	LOW	88	2	0	10	LOW	MODERATE	P. TUBERCULATUS, MIDDLE	D3			OFFSHORE MARINE
1510	CUTTS	LOW	63	4	28	5	MODERATE	LOW	P. TUBERCULATUS, MIDDLE	D3			OFFSHORE MARINE
1600	CUTTS	VERY LOW	(1)	0	5	94	(EX LOW)	MODERATE	M. DIVERSUS, UPPER	D2			NON-MARINE, SWAMP
1660	CUTTS	LOW	2	0	11	89	(EX LOW)	HIGH	M. DIVERSUS, MIDDLE	D2			?MARGINAL MARINE
1720	CUTTS	LOW	<1	0	5	95	EX LOW	HIGH	M. DIVERSUS, LOWER	D2			MARGINAL MARINE
1820	CUTTS	MODERATE	2	0	1	97	EX LOW	HIGH	L. BALMEI, UPPER	D1			MARGINAL MARINE
1840	CUTTS	LOW	2	0	7	91	EX LOW	HIGH	L. BALMEI, UPPER				MARGINAL MARINE
1870	CUTTS	LOW	<1	0	10	90	EX LOW	HIGH	L. BALMEI, UPPER				MARGINAL MARINE
1920	CUTTS	LOW	<1	0	7	93	EX LOW	HIGH	L. BALMEI, UPPER				MARGINAL MARINE
2040	CUTTS	LOW	2	0	5	93	LOW	HIGH	L. BALMEI, UPPER	D2			MARGINAL MARINE
2060	CUTTS	LOW	<1	0	3	97	EX LOW	MODERATE	L. BALMEI, LOWER	D1			MARGINAL MARINE
2080	CUTTS	LOW	4	0	4	92	EX LOW	HIGH	L. BALMEI, LOWER				MARGINAL MARINE
2110	CUTTS	LOW	0	0	7	93	NIL	HIGH	L. BALMEI, LOWER				NON-MARINE, SWAMP MARGIN
2130	CUTTS	LOW	0	1	8	91	EX LOW	MODERATE	L. BALMEI, LOWER				BRACKISH MARINE
2140	CUTTS	LOW	0	0	5	95	EX LOW	HIGH	L. BALMEI, LOWER				NON-MARINE, FLOODPLAIN
2150	CUTTS	LOW	0	0	7	93	NIL	MODERATE	L. BALMEI, LOWER				NON-MARINE, SWAMP MARGIN
2220	CUTTS	LOW	0	1	4	95	EX LOW	HIGH	L. BALMEI, LOWER				BRACKISH MARINE
2260	CUTTS	LOW	(1)	0	15	84	EX LOW	HIGH	L. BALMEI, LOWER	D3			MARGINAL MARINE
2280	CUTTS	LOW	(<1)	0	10	90	(EX LOW)	HIGH	F. LONGUS, UPPER	D1			?NON-MARINE, LAKE
2380	CUTTS	EX LOW	-	NEAR	BARREN	-	NIL	EX LOW	INDETERMINATE				?NON-MARINE, ?FLUVIAL
2460	CUTTS	LOW	0	0	5	95	NIL	HIGH	F. LONGUS, UPPER	D3			NON-MARINE, FLOODPLAIN
2500	CUTTS	LOW	0	0	4	96	NIL	HIGH	F. LONGUS, LOWER	D2			NON-MARINE, SWAMP MARGIN
2520	CUTTS	LOW	0	0	6	94	NIL	HIGH	F. LONGUS, LOWER				NON-MARINE, FLOODPLAIN
2530	CUTTS	LOW	0	0	2	98	NIL	HIGH	F. LONGUS, LOWER				NON-MARINE, SWAMP MARGIN
2570	CUTTS	LOW	0	0	2	98	NIL	HIGH	F. LONGUS, LOWER				NON-MARINE, SWAMP MARGIN
2610	CUTTS	LOW	0	0	2	98	NIL	HIGH	F. LONGUS, LOWER				NON-MARINE, SWAMP MARGIN
2620	CUTTS	LOW	0	0	6	94	NIL	HIGH	F. LONGUS, LOWER				NON-MARINE, SWAMP MARGIN
2675	CUTTS	LOW	(<1)	0	2	98	(EX LOW)	HIGH	F. LONGUS, LOWER	D2			NON-MARINE, SWAMP
2690	CUTTS	LOW	0	0	1	99	NIL	HIGH	?T. LILLEI	D4			NON-MARINE, FLOODPLAIN
2700	CUTTS	VERY LOW	(<1)	0	3	97	(EX LOW)	HIGH	?T. LILLIEI				NON-MARINE, SWAMP MARGIN
2710	CUTTS	LOW	(<1)	0	4	96	(EX LOW)	HIGH	T. LILLIEI				NON-MARINE, FLOODPLAIN
2740	CUTTS	LOW	(<1)	<1	2	98	EX LOW	HIGH	T. LILLIEI	D3			BRACKISH MARINE
2800	CUTTS	LOW	0	0	2	98	NIL	HIGH	N. SENECTUS, UPPER	D4			NON-MARINE, FLOODPLAIN
2805	CUTTS	LOW	0	<1	2	98	EX LOW	HIGH	N. SENECTUS, UPPER				?BRACKISH MARINE
2830	CUTTS	LOW	1	0	3	96	EX LOW	HIGH	N. SENECTUS, UPPER				?MARGINAL MARINE
2860	CUTTS	VERY LOW	0	0	1	99	NIL	MODERATE	N. SENECTUS				NON-MARINE, FLOODPLAIN
2885	CUTTS	EX LOW	-	NEAR	BARREN	-	NIL	MODERATE	N. SENECTUS				NON-MARINE, ?FLUVIAL
2890	CUTTS	VERY LOW	1	1	4	94	EX LOW	HIGH	N. SENECTUS, UPPER	D2			?MARGINAL MARINE
2900	CUTTS	VERY LOW	1	0	4	95	EX LOW	HIGH	N. SENECTUS, LOWER	D4			?MARGINAL MARINE
2914	CUTTS	LOW	(<1)	0	2	98	(EX LOW)	HIGH	N. SENECTUS, LOWER	D1			NON-MARINE, SWAMP MARGIN

*1 DIVERSITY	
V HIGH	30+ SPECIES
HIGH	20-29 SPECIES
MOD	10-19 SPECIES
LOW	5-9 SPECIES
EX LOW	1-4 SPECIES

*2 CONFIDENCE RATINGS	
A = Core Bp = Sidewall core (percussion)	1 = Excellent Confidence High diversity with key species
Br = Sidewall core (rotary/mechanical) C = Coal cuttings	2 = Good Confidence Moderate diversity with key species
D = Ditch cuttings E = Junk basket	3 = Fair Confidence Low diversity with key species
F = Miscellaneous/unknown G = Outcrop	4 = Poor Confidence Moderate to high diversity without key species
	5 = Very Low Confidence Low diversity without key species

*3 ENVIRONMENTS	DINOFLAGELLATE CONTENT%	DINOFLAGELLATE DIVERSITY	FRESHWATER ALGAE CONTENT%
OFFSHORE MARINE	67 to 100	VERY HIGH	LOW
SHELFAL MARINE	34 to 66	HIGH	“
NEARSHORE MARINE	11 to 33	MODERATE	“
VERY NEARSHORE MARINE	5 to 10	MODERATE-LOW	“
MARGINAL MARINE	<1 to 4	LOW-VERY LOW	“
BRACKISH	0, SPINY ACRITARCHS ONLY	EXTREMELY LOW	“
NON-MARINE (UNDIFF)	0, NO SPINY ACRITARCHS	NIL	LOW
NON-MARINE (LACUSTRINE)	0, NO SPINY ACRITARCHS	NIL	MODERATE 10%+

( ) BRACKETS INDICATE COUNT CONSIDERED UNRELIABLE DUE TO CAVING.

TABLE 2 ENVIRONMENTAL RAW DATA : GRAYLING-1A

Depths (m)	Type	Total Marine MP	Total Fresh MP	Total Angiosperm Pollen	Total Gymnosperm Pollen	Total Spores	Total Other (mostly fungal)	Environments
1480	cutts	90	2	6	1	2	1	offshore marine
1510	cutts	67	28	<1	3	2	0	offshore marine
1600	cutts	0	5	50	13	31	0	non-marine, swamp
1660	cutts	2	11	31	26	32	0	?marginal marine
1720	cutts	<1	5	3	12	80	0	marginal marine
1820	cutts	2	1	21	41	35	0	marginal marine
1840	cutts	2	7	18	33	40	0	marginal marine
1870	cutts	<1	10	8	41	41	0	marginal marine
1920	cutts	<1	7	6	43	44	0	marginal marine
2040	cutts	2	5	10	45	39	0	marginal marine
2060	cutts	<1	3	7	41	49	0	marginal marine
2080	cutts	4	4	15	52	25	0	marginal marine
2110	cutts	0	7	16	40	37	0	non-marine, swamp margin
2130	cutts	1	8	14	50	27	0	brackish marine
2140	cutts	0	5	18	50	26	1	non-marine, floodplain
2150	cutts	0	7	6	40	46	1	non-marine, swamp margin
2220	cutts	1	4	12	52	31	0	brackish marine
2260	cutts	(1)	15	7	42	34	1	marginal marine
2280	cutts	(<1)	10	13	45	31	1	?non-marine, lake
2380	cutts	-	-	-	-	-	-	?non-marine, ?fluvial
2460	cutts	0	5	14	59	21	1	non-marine, floodplain
2500	cutts	0	4	25	34	37	0	non-marine, swamp margin
2520	cutts	0	6	10	57	27	0	non-marine, floodplain
2530	cutts	0	2	24	41	33	0	non-marine, swamp margin
2570	cutts	0	2	16	49	30	3	non-marine, swamp margin
2610	cutts	0	2	25	42	31	0	non-marine, swamp margin
2620	cutts	0	6	20	40	33	1	non-marine, swamp margin
2675	cutts	(<1)	2	38	25	35	0	non-marine, swamp
2690	cutts	0	1	18	47	34	0	non-marine, floodplain
2700	cutts	(<1)	3	26	32	38	1	non-marine, swamp margin
2710	cutts	(<1)	4	27	40	29	0	non-marine, floodplain
2740	cutts	<1	2	28	37	33	0	brackish marine
2800	cutts	0	2	19	50	29	0	non-marine, floodplain
2805	cutts	<1	2	14	50	32	2	?brackish marine
2830	cutts	1	3	14	54	27	1	?marginal marine
2860	cutts	0	1	14	60	25	0	non-marine, floodplain
2885	cutts	-	-	-	-	-	-	non-marine, ?fluvial

2890	cutts	2	4	17	53	24	0	?marginal marine
2900	cutts	1	4	18	49	28	<1	?marginal marine
2914	cutts	<1	2	22	42	34	0	non-marine, swamp margin

THE NON-MARINE ENVIRONMENTS ARE RECOGNISED ON BINT & MARSHALL & HELBY (1988) CRITERA, NAMELY	
FLUVIAL:	LEAN, SANDY, POLLEN DOMINANT
FLOODPLAIN:	RICH, POLLEN DOMINANT, SPORES SUBORDINATE AND DIVERSE, NO OR VERY FEW FRESHWATER ALGAE
SWAMP MARGIN:	RICH, POLLEN AND SPORES CO-DOMINANT, SPORES VERY DIVERSE, MINOR FRESHWATER ALGAE <10%
SWAMP:	RICH, SPORES DOMINANT AND LOW DIVESITY, MINOR FRESHWATER ALGAE <10%
LACUSTRINE:	RICH, FRESHWATER ALGAE 10%+, POLLEN USUALLY DOMINANT, SPORES SUBORDINATE WITH USUALLY MODERATE TO LOW DIVERSITY

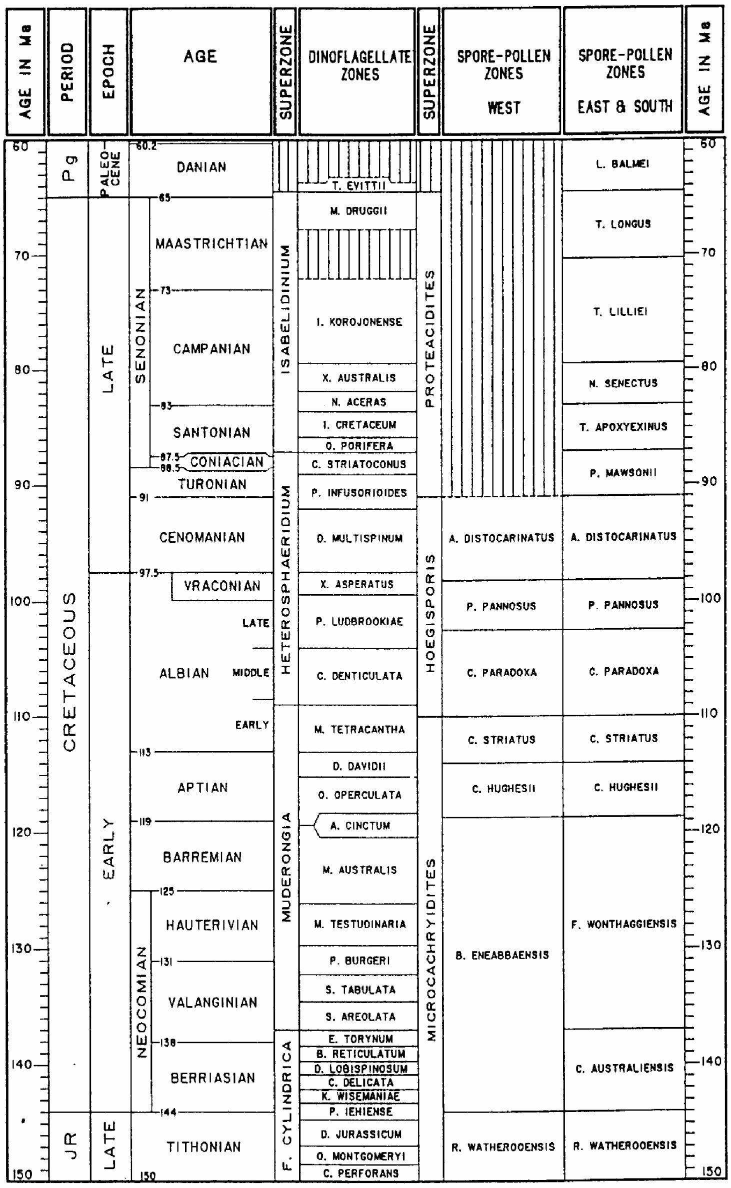


Figure 1a ZONATION FRAMEWORK - LATEST JURASSIC TO PALEOCENE

(from Helby et al, 1987)

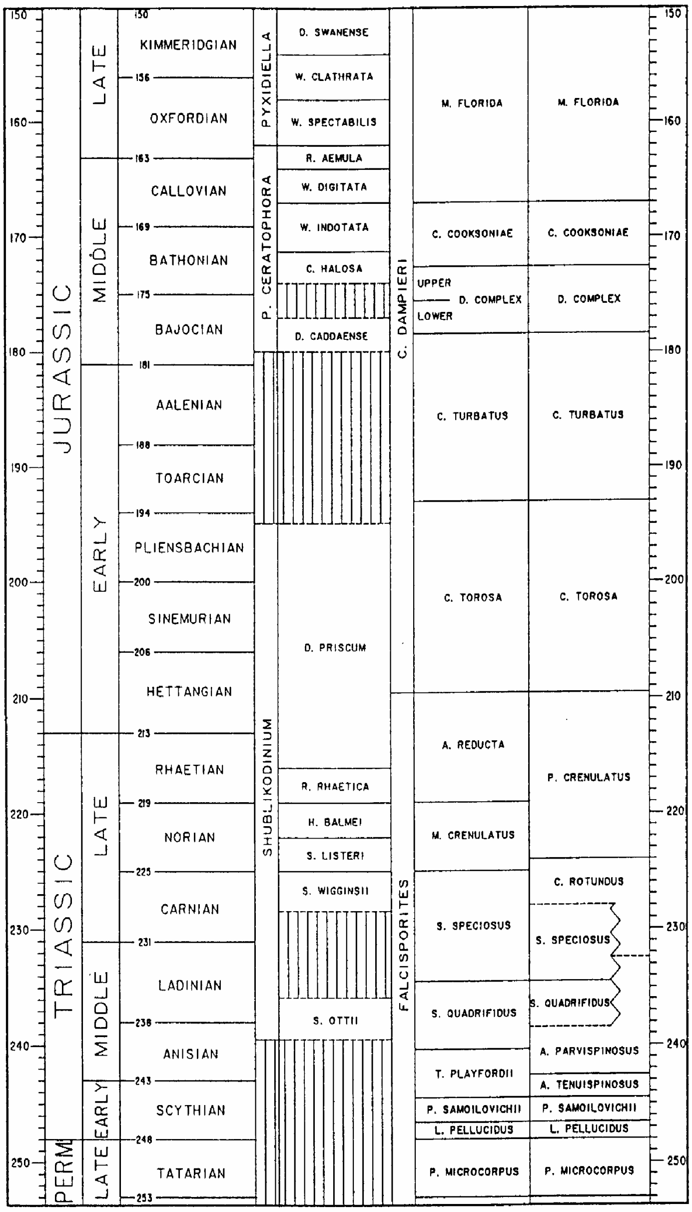


Figure 1b ZONATION FRAMEWORK - LATE PERMIAN TO LATE JURASSIC
(from Helby et al, 1987)

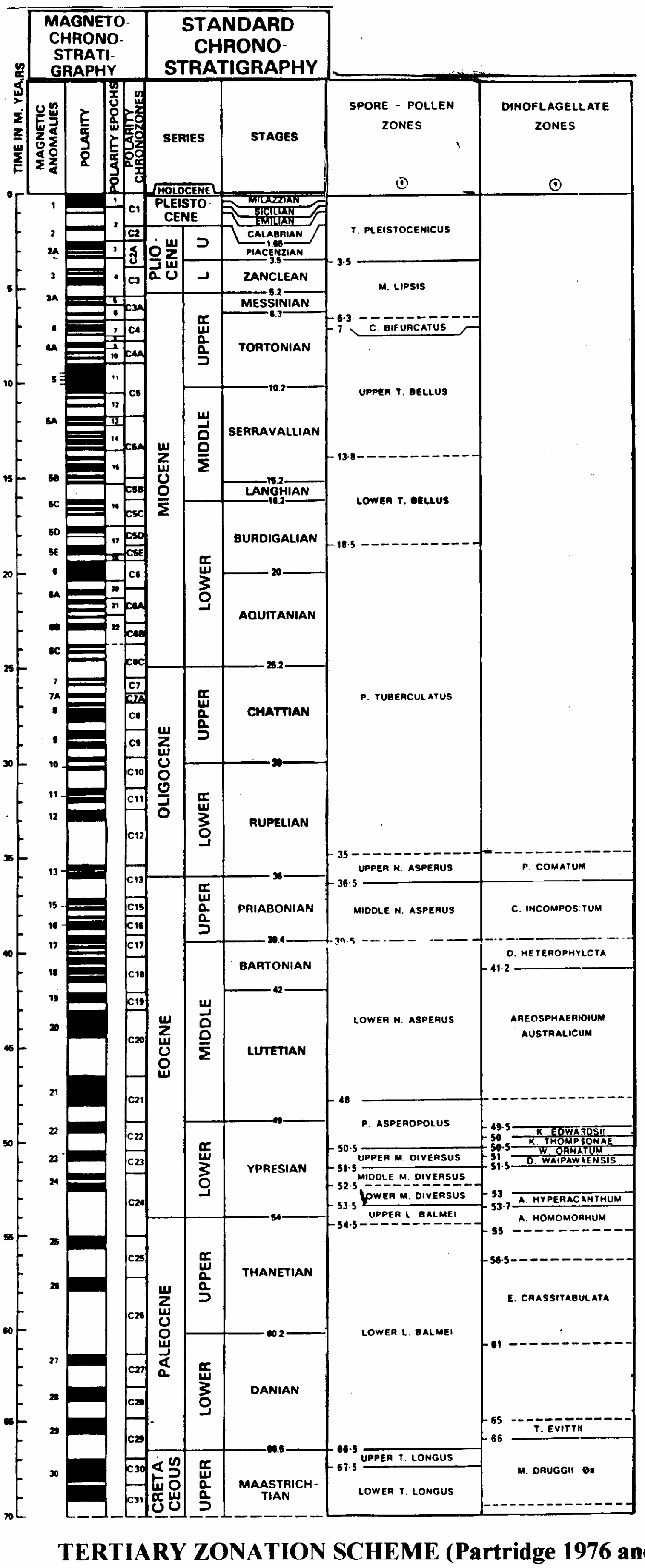
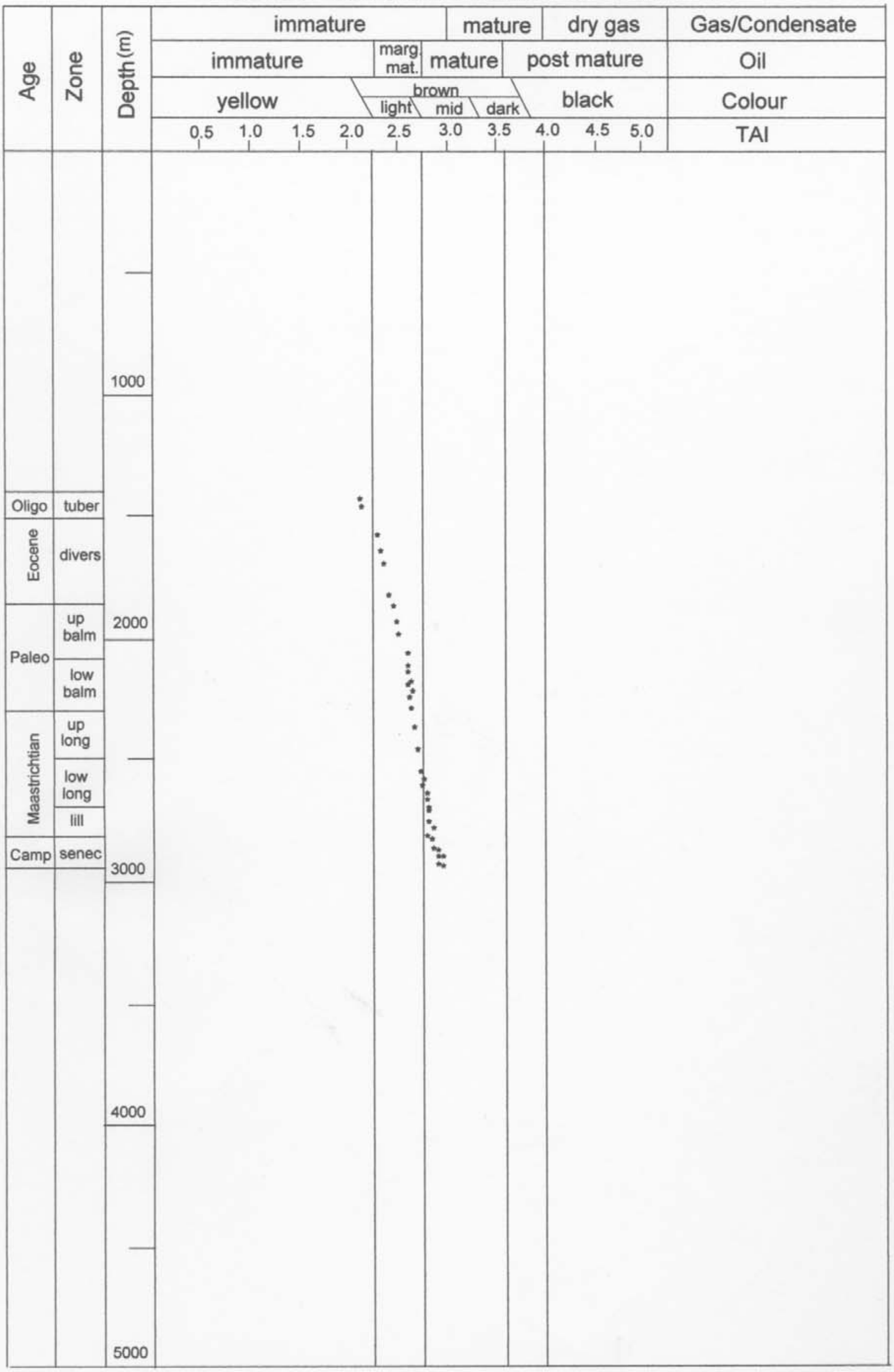


FIGURE 1 **TERTIARY ZONATION SCHEME (Partridge 1976 and pers. comm. using time scale of Haq et al)**

FIGURE 3 MATURITY PROFILE : GRAYLING-1A



3 PALYNOSTRATIGRAPHY

3.1 1480 m (cutts) – 1510 m (cutts) : apparently *P. tuberculatus* Zone, middle subzone

Spores and pollen are extremely rare in this assemblage but the presence of *Foveotriletes lacunosus* with possible *Cyatheacidites annulata* and without younger markers suggests the assignment. However, in cuttings, these might be caved, reducing confidence. Dinoflagellates are totally dominant but non-descript. The presence of rare *Eisenackia ornata* suggests assignment to the *C. incompositum* unpublished dinoflagellate zone of Partridge, but may be reworked. Rare *Systematophora placacantha* is consistent with this assignment or younger. Abundant are *Spiniferites ramosus* with common *Operculodinium* spp. and *Schizosporis psilatus*. Rare elements include *Cordosphaeridium multispinosum, Cyclopsiella vieta, Impletosphaeridium* sp. A, *Lingulodinium machaerophorum, E. ornata* and *S. placacantha*. Spores and pollen are very scarce and mostly non-descript with the most numerous being *Nothofagidites emarcidus* and *Haloragacidites harrisii.*

Total dominance of diverse dinoflagellates indicate far offshore marine environments.

Yellow spore colours indicate immaturity for hydrocarbon generation.

3.2 1600 m (cutts) : *M. diversus* Zone, upper subzone

Assignment is indicated by abundant *H. harrisii* and rare *Proteacidites pachypolus* without younger markers. Abundant is *H. harrisii* with common *Laevigatosporites ovatus* and frequent *Cyathidites australis, Cyathidites splendens, Dilwynites granulatus* and *Proteacidites* spp. Dinoflagellates are extremely scarce and considered caved. Freshwater algae (*Botryococcus*) are frequent.

Non-marine environments are indicated by the lack of dinoflagellates considered in place. Spores and pollen are dominant but only moderately diverse. Spores outnumber saccate pollen, suggesting swamp.

Light brown spore colours indicate marginal maturity for oil, but immaturity for gas/condensate.

3.3 1660 m (cutts) : *M. diversus* Zone, middle subzone

Assignment is indicated by oldest *Proteacidites ornatus* without younger markers. Common are *Cyathidites minor* and *Vitreisporites pallidus* with frequent *C. splendens, D. granulatus, H. harrisii, Proteacidites grandis* and *P. ornatus*. Rare elements include *Malvacipollis diversus, Malvacipollis subtilis* and *Stereisporites regium*. Dinoflagellates are extremely rare and mostly considered caved. A single *Senegalinium dilwynensis* may be in place and suggests marginal marine environments.

Possibly marginal marine environments are suggested by a single dinoflagellate specimen which may be in place, amongst the dominant and diverse pollen and spores.

Light brown spore colours indicate marginal maturity for oil, but immaturity for gas/condensate.

3.4 1720 m (cutts) : *M. diversus* Zone, lower subzone

Assignment is indicated by consistent *P. grandis* without younger or older markers. abundant is *C. minor* with common *C. australis* and *L. ovatus*, and frequent *Dictyophyllidites* spp., *D. granulatus, Falcisporites similis* and *Gleicheniidites* spp. Rare elements include *M. subtilis, Phyllocladidites mawsonii* and *P. grandis*. Dinoflagellates are extremely rare but include *Apectodinium homomorphum*, consistent with the spore-pollen zonal assignment.

Marginal marine environments are indicated by the dominant and diverse spores and pollen and extremely rare dinoflagellates. Frequent *Botryococcus* and spore dominance are consistent with swamp environments.

Light brown spore colours indicate marginal maturity for oil, but immaturity for gas/condensate.

3.5 1820 m (cutts) – 2040 m (cutts) : *L. balmei* Zone, upper subzone

Assignment is indicated by at the top by youngest *Lygistepollenites balmei*, confirmed by youngest *Gambierina rudata* at 1840 m. The base of the subzone is defined at lower confidence by the absence of older markers (top *Tetracolporites* *verrucosus* seen below at 2060 m) and the base of persistent *P. grandis* and the dinoflagellate *A. homomorphum* at 2040 m (but these may be caved some distance in this cuttings suite). The subzone base may therefore be picked too low relative to core or swc controlled wells nearby. Single specimens of *Tricolpites confessus* occur at 1920 m and 2040 m suggesting top *F. longus* Zone, but are considered reworked. Top frequent *L. balmei* occurs at 1870 m. Common are *C. minor, Dictyophyllidites* spp. and *F. similis* with frequent *Australopollis obscuris, Gleicheniidites* spp., *L. balmei*, *P. mawsonii*, *Proteacidites* spp. and *V. pallidus*. Rare elements include *Camarazonosporites ohaiensis, G. rudata, H. harrisii* and *P. grandis*. Very rare elements include *Polycolpites esobalteus* (1820 m only) and *Stereisporites punctatum* (1870 m and 1920 m only).

Dinoflagellates are rare and considered mostly caved. Considered in place at least towards the top of the interval is *A. homomorphum*, with *Adnatosphaeridium* sp. and *Ceratiopsis speciosus* probably in place at 2040 m. Freshwater algae (*Botryococcus*) are frequent throughout.

Environments appear to be all marginal marine, suggested by the rare presence of dinoflagellates in all samples, amongst dominant and diverse pollen and spores. However, some of these dinoflagellates may be caved into non-marine environments.

Light brown spore colours indicate marginal maturity for oil, but immaturity for gas/condensate.

3.6 2060 m (cutts) – 2260 m (cutts) : *L. balmei* Zone, lower subzone

Assignment is indicated at the top by youngest *T. verrucosus* and at the base by the absence of older markers (top *Quadraplanus brossus* at 2280 m). A single *T. confessus* at 2060 m is considered reworked. *L. balmei* is intermittently frequent down to 2150 m. The subzone may be picked too low due to caving and masking of older assemblages in the cuttings suite. Common are *C. minor, F. similis, P. mawsonii* and *V. pallidus* with frequent *Australopollis obscurus* (peak at 2140 m), *C. australis, C. spendens, L. ovatus, Microcachryidites antarcticus* and *Proteacidites* spp. Rare elements include *G. rudata* and *T. verrucosus*. Top rare *Concavissimisporites penolaensis* occurs at 2220 m.

Dinoflagellates are extremely scarce and in only some samples. Very rare *Adnatosphaeridium* sp. and *C. speciosus* occur at 2060 m and 2080 m. Dinoflagellates are absent at 2110 m – 2220 m. At 2260 m, a single

Cordosphaeridium inodes may be in place, but the *A. homomorphum* is considered caved.

Environments are therefore mixed, with 2060 m, 2080 m and 2260 m probably marginal marine, assuming the dinoflagellates are in place amongst the dominant and diverse spores and pollen. Samples from 2130 m and 2220 m are considered brackish marine, with the only saline markers being spiny acritarchs amongst the dominant and diverse spores and pollen. Samples from 2110 m, 2140 m and 2150 m are considered non-marine, with non-marine algae (*Botryococcus*) being frequent amongst the dominant and diverse spores and pollen.

Light brown spore colours indicate marginal maturity for oil, but immaturity for gas/condensate.

3.7 2280 m (cutts) – 2460 m (cutts) : *F. longus* Zone, upper subzone

Assignment is indicated at the top by youngest *Q. brossus* (numerous specimens) and in place *T. confessus* and at the base by the absence of older markers (downhole influx of *Nothofagidites* seen at 2500 m) confirmed by oldest frequent *G. rudata* at 2460 m. The zone top could be picked too low due to masking by younger caving. Common are *F. similis, P. mawsonii* and *V. pallidus* with frequent *Araucariacidites australis, A. obscurus, C. splendens, G. rudata, L. ovatus* and *M. antarcticus*. Rare elements include *Q. brossus, L. balmei, N. endurus, T. verrucosus* and *T. confessus*.

Dinoflagellates are virtually absent with a single *C. speciosus* at 2280 m probably caved. Freshwater algae (*Botryococcus*) are frequent to common.

Environments are considered non-marine, with the single dinoflagellate considered caved. High freshwater algal content suggests wet environments including lake at 2280 m.

Light to mid brown spore colours suggest early maturity for oil and early marginal maturity for gas/condensate.

3.8 2500 m (cutts) – 2675 m (cutts) : *F. longus* Zone, lower subzone

Assignment is suggested at the top by the top downhole influx of *N. endurus*, and at the base by oldest persistent *T. verrucosus*, supported by oldest *F. longus* at 2610 m and oldest *Triporopollenites "megasectilis"* at 2620 m. However, all are base-ranges and may be caved causing the subzone to be picked too low. Within the interval, oldest frequent *G. rudata* occurs at 2520 m, and youngest *T. "megasectilis"* occurs at 2610 m suggesting further subdivision.

Common are *C. minor, F. similis* and *P. mawsonii* with frequent *L. ovatus, M. antarcticus, N. endurus, Podosporites microsaccatus, Proteacidites* spp. *and V. pallidus.* Rare elements include *Aequitriradites verrucosus, A. obscurus* (peak at 2610 m), *Battenipollis sectilis, F. longus, G. rudata, G. evansii* (2530 m only), *Peninsulapollis gillii, T. verrucosus, T. confessus* and *Tubulifloridites lilliei*.

Dinoflagellates are extremely rare and all considered caved from the Eocene/Oligocene above. Freshwater algae (*Botryococcus*) are frequent.

Environments are considered non-marine with the extremely rare dinoflagellates considered caved amongst the dominant and diverse spores and pollen. Frequent freshwater algae and co-dominance of miospores and saccate pollen suggest mostly swamp margin environments.

Light to mid brown spore colours suggest early maturity for oil and early marginal maturity for gas/condensate.

3.9 2690 m (cutts) – 2740 m (cutts) : lean apparently *T. lilliei* Zone

Assignment is suggested at the top by the absence of younger markers, and at the base by oldest *T. lilliei* (2740 m) and *B. sectilis* (2710 m). However, these are base ranges in cuttings, and may be caved, causing the zone to be picked too low. In addition, the samples are lean, suggesting that caving may be making a large contribution. Rare *T. verrucosus* at 2710 m suggests the *F. longus* Zone but is considered caved.

Common are *A. obscurus, C. minor, L. ovatus* and *P. mawsonii* with frequent *F. similis, Gleicheniidites, M. antarcticus, Proteacidites* spp. and *V. pallidus*. Rare elements considered in place include *B. sectilis*, *Camarazonosporites ohaiensis, G. rudata, L. balmei, N. endurus, P. gillii, T. confessus* and *T. lilliei*.

Dinoflagellates are extremely rare and considered all caved. Freshwater algae are rare.

Non-marine environments are suggested by the dominant and diverse pollen and spores with the very rare dinoflagellates considered caved. A spiny acritarch at 2740 m suggests brackish environments, but may also be caved.

Light to mid brown spore colours suggest early maturity for oil and early marginal maturity for gas/condensate.

3.10 2800 m (cutts) – 2890 m (cutts) : *N. senectus* Zone, upper subzone

Assignment is suggested at the top by the absence of younger markers and at the base by oldest *G. rudata*. However, these are base-ranges in cuttings and may be caved, causing the subzone to be picked too low. Consistent to the top is *Forcipites sabulosus* with top frequent *F. sabulosus* at 2890 m suggesting further subdivision. *T. verrucosus* occurs at 2800 m but is considered caved along with *Stereisporites punctatus* at 2805 m and 2830 m.

Common are *C. minor, F. similis* and *P. mawsonii* with frequent *L. ovatus, M. antarcticus, Proteacidites* and *V. pallidus*. Rare elements considered in place include *F. sabulosus, G. rudata, N. endurus* and *T. confessus*.

Dinoflagellates are extremely scarce and considered mostly or all caved. Rare *Spiniferites ramosus* at 2830 m and 2890 m might be in place and suggest marginal marine environments. Rare spiny acritarchs at 2805 m and 2890 m might be in place and suggest brackish marine environments. Freshwater algae are rare.

Non-marine to brackish environments seem mostly likely with dominant and diverse pollen and spores and minor saline markers, probably all caved.

Mid brown spore colours suggest early maturity for oil and early marginal mature for gas/condensate.

3.11 2900 m (cutts) – 2914 m (cutts) : *N. senectus* Zone, lower subzone

Assignment is suggested at the top by the absence of younger markers and at the base by oldest *N. endurus* and *F. sabulosus*. However, these are base ranges in cuttings and may be caved, causing the subzone to be picked too low. A single *T. verrucosus* at 2914 m suggests the *F. longus* Zone but is considered caved. Common are *C. minor, F. similis, P. mawsonii* and *V. pallidus* with frequent *A. obscurus* (peak at 2914 m considered caved), *L. ovatus* and *Proteacidites*. Rare elements considered in place include *A. verrucosus, F. sabulosus, N. endurus, P. gillii* and *T. confessus*.

Dinoflagellates are very rare and considered mostly caved from the Oligocene. A single mid brown *S. ramosus* at 2900 m is most likely to be in place. Freshwater algae are frequent.

Non-marine (2914 m) to marginal marine (2900 m) environments are suggested by the absent to extremely rare dinoflagellates amongst the dominant and diverse pollen and spores.

Mid brown spore colours suggest early maturity for oil and early marginal mature for gas/condensate.

4 DISCUSSION

Several of the palynology intervals appear to be too deep within the well when compared against the log-based lithostratigraphy. This may be real, but may also be caused by caving in this entirely cuttings based sample set.

5 REFERENCES

Helby, R.J, Morgan, R.P and Partridge, A D (1987) A Palynological Zonation of the Australian Mesozoic *In* Studies in Australian Mesozoic Palynology *Assoc. Australas. Palaeontols. Mem. 4, 1-94*

Partridge, A.D. (1976) The Geological Expression of Eustacy in the early Tertiary of the Gippsland Basin APEA J.

Well Name : GRAYLING-1A

Operator : APACHE ENERGY

Interval : 1460m - 2934m

Scale : 1:5000

Chart date: 20 June 2005

Palynological Data Chart : BASIC DATA

% Abundance histogram : Highest occurrence

Roger Morgan

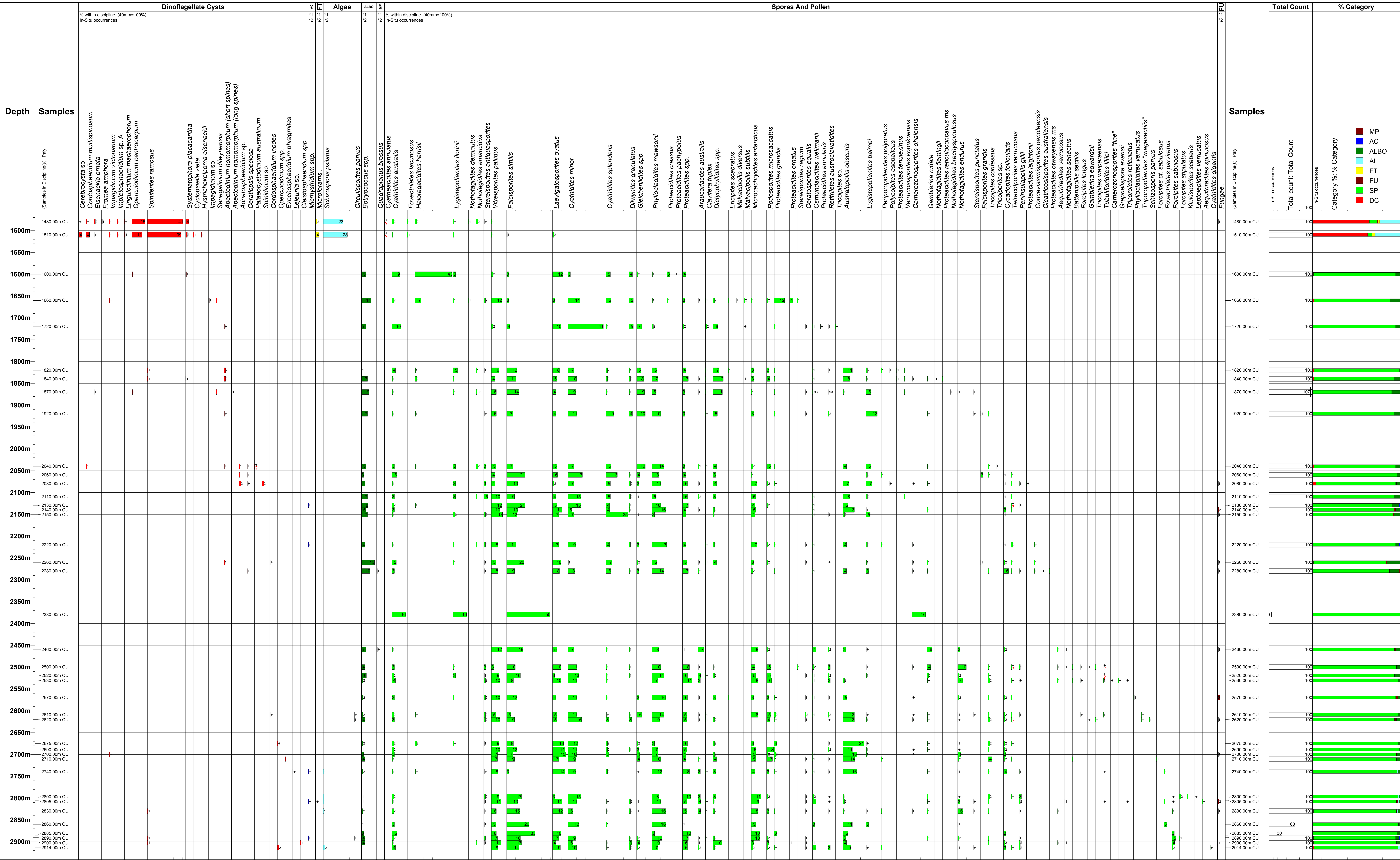
GRAYLING-1A

Morgan Palaeo Associates
Maitland, South Australia

Enclosure 1

Sampling
Cutting
Core
Sidewall core

Text Keys
*1 % within discipline (40mm=100%)
*2 In-Situ occurrences



Well Name : GRAYLING-1A

Operator : APACHE ENERGY
Interval : 1460m - 2934m
Scale : 1:5000
Chart date: 20 June 2005

Palynological Data Chart : INTERPRETIVE DATA
% Abundance histogram : Highest occurrence
Roger Morgan

GRAYLING-1A

Morgan Palaeo Associates
Maitland, South Australia

Enclosure 1

Sampling
Cutting
Core
Sidewall core

Text Keys
*1 % within discipline (40mm=100%)
*2 In-Situ occurrences

APPENDIX 2

Petrophysical Report

PETROPHYSICAL REPORT

GRAYLING-1/1A

VIC/P-54

VICTORIA

Paul Bingaman **January 2006**

1. INTRODUCTION

Grayling-1/1A was drilled as a vertical exploration well to test relatively small four-way dip closures (with potential for much larger fault-dependant closures) at two stratigraphic levels, the Early Eocene to Mid-Paleocene Halibut Sub-group (*L. balmei*) and the deeper Late Cretaceous Golden Beach Sub-group (*T. lilliei* to *F. longus*). Both objectives were found to contain gas accumulations.

Log analysis was performed using PETROLOG software (Crocker Data Processing) Rev 9.3 7 September 2004. The interpretation workflow comprised temperature gradient determination, environmental corrections using service company-specific algorithms, Vcl and porosity calculations using a complex lithology crossplot method, and water saturation calculation using an Indonesian algorithm. Formation water resistivities (salinities) were calculated using a Pickett porosity/resistivity crossplot in water-bearing sandstones below the gas columns. Formation water salinities of 25,000 to 30,000 ppm NaCl equivalent allowed the establishment of 100% calculated water saturation baselines.

2. MUD PROPERTIES AND TEMPERATURE DATA (Section of Interest)

Type	Wt. (sg)	Cl (ppm)	KCl (%)	Rm @ °C	Rmf @ °C	Rmc @ °C
KCl/IDCAP	1.15	53,000	8.0	0.12 @ 22.2	0.07 @ 22.2	0.18 @ 22.2

Depth (m)	Temperature (°C)	Gradient (°C/100m)
0.0	15.0	
2683.7	121.2 *	3.96

(* - Maximum recorded RDT temperature)

3. ANALYSIS PARAMETERS (Intra-Halibut/Golden Beach)

Input Parameter	Value	Input Parameter	Value
Bit Size (inch)	8.5	RHOB clay (g/cc)	2.56
Rw @ 75° F	0.185	PHIN clay (dec)	0.23/0.18
Rw Salinity (ppm)	30,000/25,000	DT clay (msec/ft)	83/75
RHOH (g/cc)	0.50/0.60	a	1.0
RHOF (g/cc)	1.066/1.060	m	2.0
RHOMA (g/cc)	2.65	n	2.0
GR clean (API)	40	Clay Cutoff	0.50
GR clay (API)	160/165	Phi Cutoff	0.10
R clay (ohm-m)	8.5/13.0	Sw Cutoff	0.70

4. DISCUSSION

Log quality at Grayling-1/1A is excellent with the borehole in-gauge through the primary objectives.

The Intra-Halibut Sub-group objective at this location is an 8.8 metre thick, massive sandstone within a section dominated by claystones and minor coal beds. An 8.8 metre thick gross gas column is interpreted with 8.8 metres net pay (100% net-to-gross) The sandstone exhibits an average porosity of 22.2% and an average calculated water saturation of 34.0%. The base of the sandstone unit represents a ‘gas-down-to’ with no gas/water contact evident.

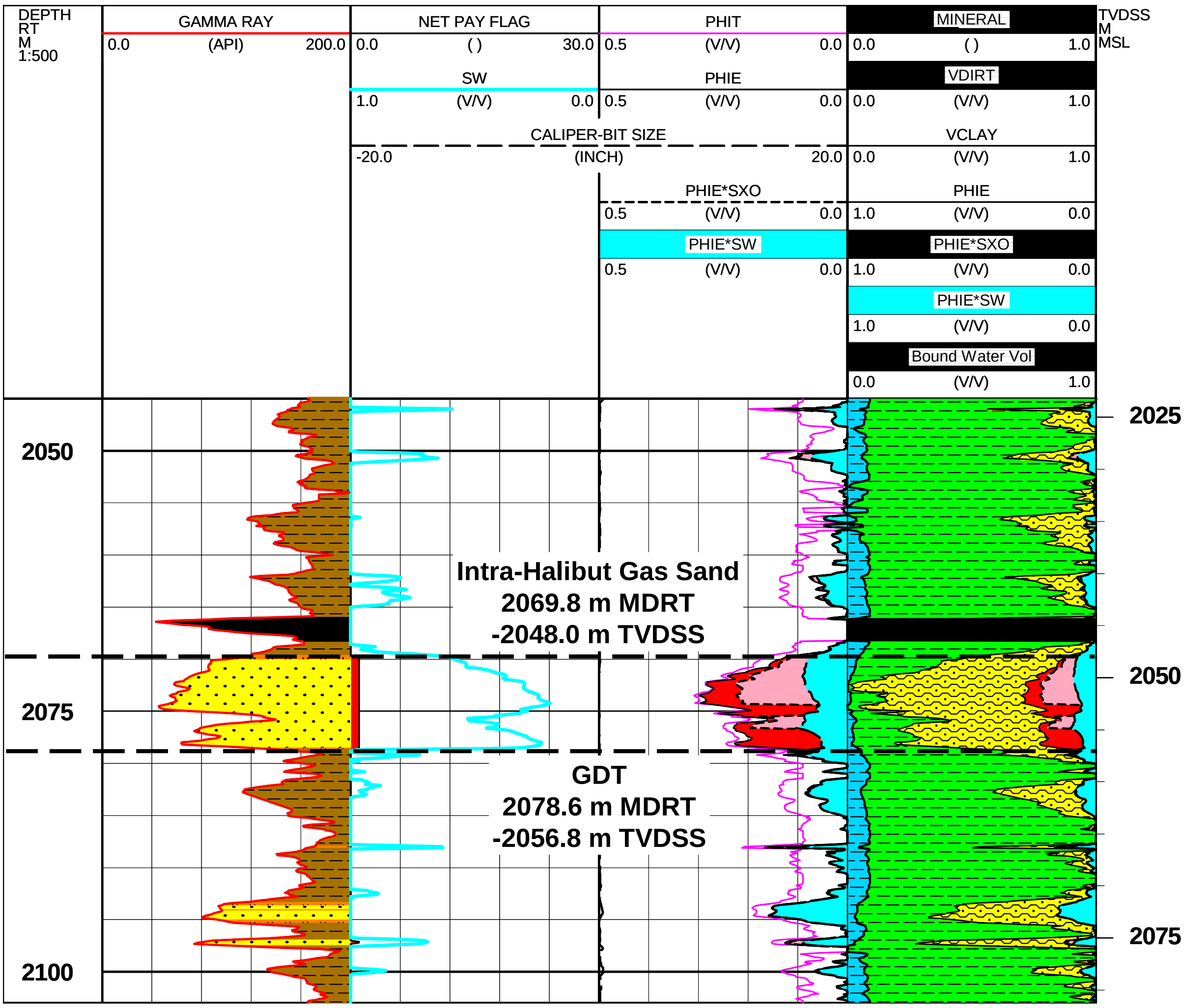
The Golden Beach Sub-group objective at this location comprises a series of interbedded massive sandstones (2 to 10 metres thick) and claystones (1 to 8 metres thick). A 68.2 metre gross gas column is interpreted with 31.6 metres of net pay (46.3% net-to-gross). The sandstones exhibit average porosities of 15.4% and average calculated water saturations of 36.2%. The gas/water contact can be relatively confidently placed and is in good agreement with the contact interpreted from RDT pressure profiles (-2617.2 m TVDSS).

The results of the analysis for the Intra-Halibut and Golden Beach Sub-Group Sandstones are summarised in the tables and log analysis plots on the following pages.

Log Analysis Summary for Grayling-1/1A - Intra-Halibut

Depth - TVD SS		Gross	Net	Avg Sand	Net	Avg HC	Avg
From	To	Interval	Sand	Porosity	HC Pay	Porosity	Sw
metres	metres	metres	metres	percent	metres	percent	percent
2,048.0	2,049.0	1.0	1.0	14.7 %	1.0	14.7 %	55.3 %
2,049.0	2,050.0	1.0	1.0	21.2 %	1.0	21.2 %	41.3 %
2,050.0	2,051.0	1.0	1.0	26.7 %	1.0	26.7 %	31.8 %
2,051.0	2,052.0	1.0	1.0	28.3 %	1.0	28.3 %	26.3 %
2,052.0	2,053.0	1.0	1.0	26.2 %	1.0	26.2 %	23.4 %
2,053.0	2,054.0	1.0	1.0	20.8 %	1.0	20.8 %	37.9 %
2,054.0	2,055.0	1.0	1.0	21.1 %	1.0	21.1 %	43.3 %
2,055.0	2,056.0	1.0	1.0	20.5 %	1.0	20.5 %	31.0 %
2,056.0	2,056.8	0.8	0.8	19.8 %	0.8	19.8 %	26.1 %
Total / Averages		8.8	8.8	22.2 %	8.8	22.2 %	34.0 %
Net/Gross Ratio			100.0 %		100.0 %		

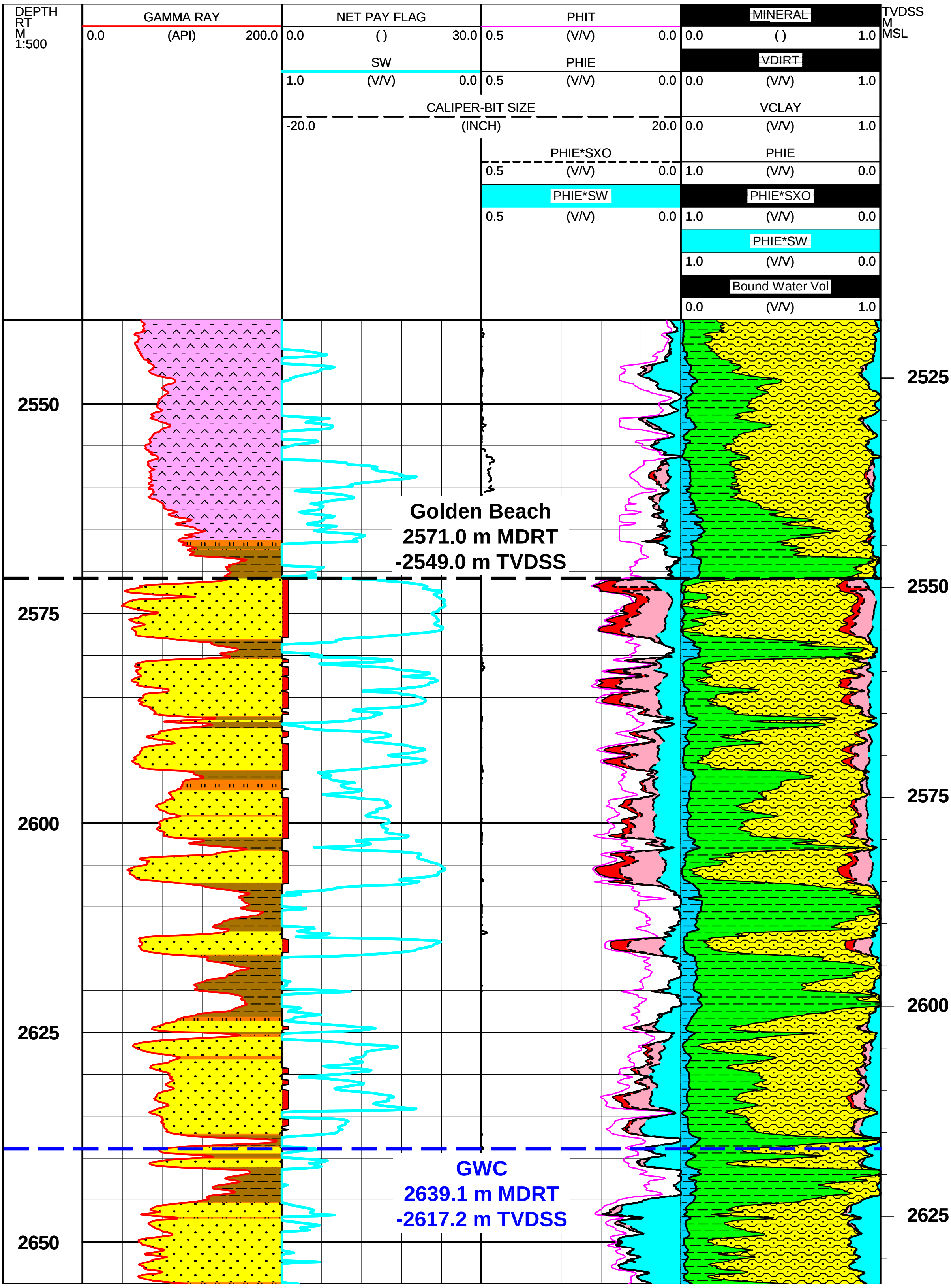
Cutoffs Applied	Vclay = 50.0 %	Porosity = 10.0 %	Sw = 70.0 %



Log Analysis Summary for Grayling-1/1A - Golden Beach

Depth - TVD SS		Gross	Net	Avg Sand	Net	Avg HC	Avg
From	To	Interval	Sand	Porosity	HC Pay	Porosity	Sw
metres	metres	metres	metres	percent	metres	percent	percent
2,549.0	2,551.0	2.0	2.0	18.5 %	2.0	18.5 %	29.4 %
2,551.0	2,553.0	2.0	2.0	13.0 %	2.0	13.0 %	20.1 %
2,553.0	2,555.0	2.0	2.0	17.5 %	2.0	17.5 %	21.8 %
2,555.0	2,557.0	2.0	0.9	16.3 %	0.9	16.3 %	33.3 %
2,557.0	2,559.0	2.0	0.4	12.6 %	0.4	12.6 %	48.1 %
2,559.0	2,561.0	2.0	1.5	15.1 %	1.5	15.1 %	32.0 %
2,561.0	2,563.0	2.0	1.8	17.9 %	1.8	17.9 %	32.2 %
2,563.0	2,565.0	2.0	1.6	15.8 %	1.6	15.8 %	33.7 %
2,565.0	2,567.0	2.0	0.1	10.7 %	0.1	10.7 %	50.1 %
2,567.0	2,569.0	2.0	1.2	13.1 %	1.2	13.1 %	43.8 %
2,569.0	2,571.0	2.0	2.0	17.0 %	2.0	17.0 %	33.3 %
2,571.0	2,573.0	2.0	0.7	13.8 %	0.7	13.8 %	52.3 %
2,573.0	2,575.0	2.0	0.2	10.1 %	0.2	10.1 %	61.7 %
2,575.0	2,577.0	2.0	2.0	13.4 %	2.0	13.4 %	50.4 %
2,577.0	2,579.0	2.0	2.0	13.7 %	2.0	13.7 %	49.0 %
2,579.0	2,581.0	2.0	0.8	15.9 %	0.8	15.9 %	41.0 %
2,581.0	2,583.0	2.0	1.7	15.5 %	1.7	15.5 %	29.5 %
2,583.0	2,585.0	2.0	2.0	19.1 %	2.0	19.1 %	24.5 %
2,585.0	2,587.0	2.0	0.2	15.2 %	0.2	15.2 %	33.3 %
2,587.0	2,589.0	2.0	-	0.4 %	-	0.0 %	0.0 %
2,589.0	2,591.0	2.0	-	1.1 %	-	0.0 %	0.0 %
2,591.0	2,593.0	2.0	1.2	16.8 %	1.2	16.8 %	25.2 %
2,593.0	2,595.0	2.0	0.4	14.4 %	0.4	14.4 %	34.4 %
2,595.0	2,597.0	2.0	-	0.7 %	-	0.0 %	0.0 %
2,597.0	2,599.0	2.0	-	3.0 %	-	0.0 %	0.0 %
2,599.0	2,601.0	2.0	-	1.8 %	-	0.0 %	0.0 %
2,601.0	2,603.0	2.0	0.4	11.4 %	0.4	11.4 %	56.9 %
2,603.0	2,605.0	2.0	-	5.2 %	-	0.0 %	0.0 %
2,605.0	2,607.0	2.0	-	8.5 %	-	0.0 %	0.0 %
2,607.0	2,609.0	2.0	1.4	11.4 %	1.0	11.7 %	62.1 %
2,609.0	2,611.0	2.0	1.4	13.7 %	1.4	13.7 %	52.6 %
2,611.0	2,613.0	2.0	1.2	14.7 %	1.2	14.7 %	47.0 %
2,613.0	2,615.0	2.0	1.7	13.4 %	0.9	13.2 %	68.4 %
2,615.0	2,617.0	2.0	0.3	12.3 %	-	0.0 %	0.0 %
2,617.0	2,617.2	0.2	-	8.8 %	-	0.0 %	0.0 %
Total / Averages		68.2	33.0	15.2 %	31.6	15.4 %	36.2 %
Net/Gross Ratio			48.5 %		46.3 %		

Cutoffs Applied	Vclay = 50.0 %	Porosity = 10.0 %	Sw = 70.0 %



DEPTH
RT
M
1:500
GAMMA RAY
0.0 (API) 200.0
NET PAY FLAG
0.0 ( ) 30.0
SW
1.0 (V/V) 0.0
CALIPER-BIT SIZE
-20.0 (INCH) 20.0
PHIT
0.5 (V/V) 0.0
PHIE
0.5 (V/V) 0.0
PHIE*SXO
0.5 (V/V) 0.0
PHIE*SW
0.5 (V/V) 0.0
MINERAL
0.0 ( ) 1.0
VDIRT
0.0 (V/V) 1.0
VCLAY
0.0 (V/V) 1.0
PHIE
1.0 (V/V) 0.0
PHIE*SXO
1.0 (V/V) 0.0
PHIE*SW
1.0 (V/V) 0.0
Bound Water Vol
0.0 (V/V) 1.0
TVDSS
M
MSL
2550
2575
2600
2625
2650
2525
2550
2575
2600
2625
Golden Beach
2571.0 m MDRT
-2549.0 m TVDSS
GWC
2639.1 m MDRT
-2617.2 m TVDSS

ENCLOSURE 1

Grayling-1

Composite Log 1: 500 TVD

COMPOSITE WELL LOG

GRAYLING-1

GIPPSLAND BASIN

OFFSHORE VICTORIA

Latitude:	38 deg 09' 40.260" S	Well Status:	Plugged & Abandoned, Dry Hole
Longitude:	148 deg 17' 35.900" E	Date Spudded:	23 December 2004 @ 20:30 hrs
Datum:	GDA 94	Date at TD:	25 December 2004 @ 15:30 hrs
Permit:	VIC/P54	Date Rig Released:	27 December 2005 @ 05:00 hrs
Sheet:	Melbourne SJ55	Geologist(s):	J.Sonego/P.Sliderink
Block Number:	1852	Casing:	762mm (30") -90.9 mTVDAHD (112.4 mMDRT)
Water Depth:	58.5 m below AHD		340mm (13 3/8") -762.3 mTVDAHD (783.9 mMDRT)
RT-AHD:	21.5 m		
Total Depth:	-778.4 mTVDAHD (800.0 mMDRT)		

Remarks: Grayling-1 was abandoned due to mechanical problems. Abandonment operations were completed following the drilling of Grayling-1A.

Drafted: 22-Jun-05 CLu9071

DEVIATION

Angle °

@ Azimuth °

ENGINEERING SYMBOLS

13 3/8"

Drill Casing Shoe

Drill Stem Test (Details at end of log)

Wireline Formation Tester Data
- Tight
- Lost seal
- Pressure reading

Fluid Sample taken (details at end of log)

Perforations

Cement Plug

Bridge Plug

GEOLOGICAL SYMBOLS

1 Sidewall Core No Recovery

2 Sidewall Core Recovered

3,5 Sidewall Core Recovered (Multiple Samples)

6,9 Sidewall Core No Recovery (Multiple Samples)

10,15 Sidewall Core Recovery/No Recovery (Multiple Samples)

Recovered Core

Core No. (Log adjusted recovered core in depth track)

No Recovery

HYDROCARBON SHOWS

Oil: Weak, Good

Gas: Weak, Good

MWD LOGS

Run	Bit #	Hole Size (mm)	Logging Suite	Interval mTVDAHD (mMDRT)	Max Temp (deg C)	Remarks
1	2	406	DGR-EWRP4-ACAL-BAT-PM	-91.5 to -778.4 (113.0 to 800.0)	29.0	Drilled 406mm hole section from 113.0 mMDRT 800.0 mMDRT. Gap in data due to air retriever line breaking. Periods of poor detection due to downhole noise and some pump noise. All recorded data was recovered at surface.

LOG DESCRIPTION

RESD	Deep Resistivity (Sperry-Sun SEDP)
RESM	Medium Resistivity (Sperry-Sun SEMP)
RESS	Shallow Resistivity (Sperry-Sun SESP)
RESX	Extra Shallow Resistivity (Sperry-Sun SEXP)
ROP	Rate of Penetration (Sperry-Sun SROP)
GR	Gamma Ray (Sperry-Sun SGRC)
DTC	Compressional Sonic (Sperry-Sun BATC)

COMPOSITE WELL LOG

GRAYLING-1

CLu9071

ENCLOSURE 2

Grayling-1A

Composite Log 1: 500 TVD

COMPOSITE WELL LOG
GRAYLING-1A

GIPPSLAND BASIN
OFFSHORE VICTORIA

Latitude: 38 deg 09' 40.280" S
Longitude: 148 deg 17' 34.730" E
Datum: GDA 94
Permit: VIC/P54
Sheet: Melbourne SJ55
Block Number: 1852
Water Depth: 58.5 m below AHD
RT-AHD: 21.5 m
Total Depth: -2891.8 mTVDAHD (2914.0 mMDRT)
Remarks: Grayling-1A was drilled following abandonment of Grayling due to mechanical problems.

Well Status: Plugged & Abandoned, Gas Discovery
Date Spudded: 28 December 2004 @ 16:30 hrs
Date at TD: 11 January 2005 @ 14:30 hrs
Date Rig Released: 20 January 2005 @ 23:00 hrs
Geologist(s): J.Senego/P.Sliderink
Casing: 762mm (30") -90.9 mTVDAHD (112.4 mMDRT)
340mm (13 3/8") -774.7 mTVDAHD (796.2 mMDRT)

Drafted: 22-Jun-05 CLu9072

DEVIATION
Angle °
@ Azimuth °

ENGINEERING SYMBOLS
13 3/8" Drill Casing Shoe
Drill Stem Test (Details at end of log)
Wireline Formation Tester Data: Tight; Lost seal; Pressure reading
Fluid Sample taken (details at end of log)
Perforations
Cement Plug
Bridge Plug

GEOLOGICAL SYMBOLS
1 Sidewall Core No Recovery
2 Sidewall Core Recovered
3,5 Sidewall Core Recovered (Multiple Samples)
6,9 Sidewall Core No Recovery (Multiple Samples)
10,15 Sidewall Core Recovery/No Recovery (Multiple Samples)
Recovered Core
Core No. (Log adjusted recovered core in depth track)
No Recovery

HYDROCARBON SHOWS
Oil: Weak, Good
Gas: Weak, Good

WIRELINE LOGS

Suite	Run	Log Type	Interval (mTVDAHD)	Interval (mMDRT)	Max.Temp (degC)	Hrs since last circ.	Remarks
	1	RCI-GR	-2052.5 to -2056.3	2074.0 to 2077.8	-	-	Tool fished and latched onto pipe. POOH to change out backup RCI tool. One Sample.
	2	RCI-GR	-2550.7 to -2662.2	2572.2 to 2683.7	-	-	POOH due to communication failure with tool. 20 pressure points and 3 samples collected.
	3	MLR-GR	-2482.0 to -2547.5	2503.9 to 2569.4	-	-	

MWD LOGS

Run	Bit #	Hole Size (mm)	Logging Suite	Interval mTVDAHD (mMDRT)	Max Temp (deg C)	Remarks
2	2	406	DGR-EWRP4-ACAL-BAT-PM	-92.5 to -788.5 (114.0 to 810.0)	28.0	Drilled to section TD at 800.0 mMDRT. All recorded data was recovered at surface.
3	3	216	DGR-EWRP4-ACAL-BAT-SLD-CNP	-114.0 to -2718.0 (810.0 to 2740.0)	85.0	Drill 216mm hole section from 810.0 mMDRT to 2740.0 mMDRT.
4	4	216	DGR-EWRP4-SLD-ACAL-BAT-SLD-CNP	-2718.0 to -2891.8 (2740.0 to 2914.0)	107.0	Drill 216mm hole section to TD at 2914.0 mMDRT, all recorded data recovered at surface

LOG DESCRIPTION

CAL	Caliper (Sperry-Sun ACAL)
RESD	Deep Resistivity (Sperry-Sun SEDP)
RESM	Medium Resistivity (Sperry-Sun SEMP)
RESS	Shallow Resistivity (Sperry-Sun SESP)
RESX	Extra Shallow Resistivity (Sperry-Sun SEXP)
RHOB	Formation Density (Sperry-Sun SBD2)
NPHI	Neutron Porosity (Sperry-Sun NUCL)
DTS	Shear Sonic (Sperry-Sun BATS)
ROP	Rate of Penetration (Sperry-Sun SROP)
GR	Gamma Ray (Sperry-Sun SGRC)
DTC	Compressional Sonic (Sperry-Sun BATC)

FORMATION PRESSURE AND SAMPLE SUMMARY

Grayling-1A
SUITE-2 RUN-1 RCI-GR
PRESSURE POINT and SAMPLING PROGRAMME

13/01/2005

Pressure Point #	Actual Depth mMDRT	Actual Depth mTVDAHD	Theo Hydrostatic Pressure RT	Mobility md/cp	Time Pad Set	Initial Hydrostatic Pressure psia	Final Hydrostatic Pressure psia	Drawdown Volume cc	Sandface Pressure	Initial Drawdown Pressure psia	Final Buildup Pressure psia	Buildup Time mins	Time Pad Retracted	Temp. deg C	Remarks
Mud Weight (ppg) 13/01/2005		11.0													
1	2067.1	2045.6	3879.1	0.000	15:35									91.2	Tight point/ Coal seam/ Point aborted
2	2070.5	2049.0	3885.5	78.400	15:45	3957.9	3957.9	10.3		2882.5	2948.60	2			Valid sample
				95.400		3957.9	3957.9	10.0		2882.5	2948.00	4			Valid sample
													16:04	91.2	
3	2072.1	2050.6	3888.5	43.000	16:12	3971.8	3955.0	9.8		2842.7	2949.10	2			Valid Sample
				60.400		3971.8	3955.0	10.10		2839.0	2947.50	4			Valid Sample
													16:20	91.8	Delays in time when attempting to obtain final hydrostatic
4	2074.0	2052.5	3892.1	295.500	16:25	3944.1	3948.3	10.3		2929.2	2948.30	2			Good Point?
				290.100		3944.1	3948.3	10.2		2926.7	2948.30	4			Noted drop in hydrostatic. Questioned engineer. Point questionable.
													16:37	92.1	
5	2077.0	2055.5	3897.7	23.000	16:43	3929.4	3948.2	10.10		2716.2	2949.50	2			Hydrostatic not functioning possibly due to isolation by packer. Good point?
				28.500		3929.5	3948.2	9.9		2718.6	2949.40	4			Hydrostatic not functioning possibly due to isolation by packer. Good point?
													16:55	92.2	
7	2074.0	2052.5	3892.1		17:56 18:47 19:04 19:37 20:00										Commnece pump at 5000 (Partially open valve) Open chamber and pump for sampling Pumped total of 4 L. Stop pumping. Fluctuating increase in back pressure observed indicating chamber full. Retract probe and packer
															TOOL FISHED AND LATCHED ONTO PIPE
14/01/2005															
1	2074.2	2052.7	3892.4	47.600	20:25	3956.2		10.1		2956.4	3058.50		20:40	94.8	Hydro fluctuating 2psi. Invalid point.
				17.900		3956.2		10.6		2583.4	2908.90				Flush lines 1.5L. Invalid point.
				12.800		3950.9	3950.7	10.4		2542.7	2909.7	1			Cleaning up. Pressures unreliable. Incomplete drawdown
				13.800		3950.9	3950.7	10.4		2487.2	2950.7	2			Good Point? +0.6 psi pressure variance from 2077.0 mMDRT point taken on wireline (2049.5 mMDRT).
				13.000		3950.9	3950.7	10.3		2513.6	2950.1	4	22:18	95.0	Repeatable Pressure. Good point? +0.6 psi difference but very stable buildup
3	2077.8	2056.3	3899.2	25.600	22:19	3955.5	3955.3	10.3		2895.4	3058.20	2			Fluctuating pressure +/- 10psi. Hydrostatic unreliable. Invalid Point.
				13.300			3955.3	9.6		2540.5	2908.90	1			Cleaning up. Pressures unreliable. Incomplete drawdown
				11.200			3955.3	8.6		2496.2	2949.80	2			Good Point?
				12.000			3955.3	10.3		2538.7	2949.80	2	22:44	95.3	Repeatable Pressure
16/01/2005															
1	2572.2	2550.7	4826.9	58.400	6:48	4870.1		7.6	3782.3	3657.6	3782.40	3			Unstable
	2572.2			117.500				10.4	3765.1	3641.1	3765.10	3			Buildup pressure stabilising. Reasonable point? Take another pressure.
	2572.2			233.000				10.3	3765.7	3697.8	3765.70	3			Repeatable point.
2	2574.1	2552.6	4830.6	28.500	7:10	4874.8		7.5	3767.9	3531.7	3767.90	3			Bad point
	2574.1			34.500				10.6	3765.5	3429.5	3765.50	3			Buildup pressure stabilising. Reasonable point? Take another pressure.
	2574.1			33.300				10.3	3765.9	3427.4	3765.90	3			Check correlation. Good correlation
							4877.1						7:20	116.1	No overpull
3	2576.1	2554.6	4834.3	70.900	7:25	4876.1		10	3767.7	3411.3	3767.70	4			Not stabilising
	2576.1			39.700				6.7	3767.3	3567.0	3767.30	3			Stabilising
	2576.1			24.800				10.809	3767.9	3574.1	3767.90	4			Stable. Reasonable correlation
4	2576.9	2555.4	4835.8	21.100	7:47	4882.5		10.1	3808.4	3421.3	3080.40	2			Not stable draw down again as pressure not stable. draw down again as pressure not stable.
	2576.9			94.300				9	3768.4	3664.0	3768.20	4			Good point
							4878.8						8:05	116.7	No overpull
5	2581.3	2559.8	4844.1	20.000	8:12	4889.2		9.8	3772.8	3356.1	3772.80	1			Not stabilising suspected pipe movement
	2581.3			16.900				8.4	3828.5	3321.3	3828.50	2			Not stabilising suspected pipe movement
	2581.3			18.900				6.5	3767.1	3326.6	3767.10	4			Very slow buildup
	2581.3			25.400				8.4	3766.1	3403.0	3768.10	4			Point stable
							4888.9						8:26	116.8	No overpull.
6	2583.0	2561.5	4847.3	24.400	8:32	4890.1		9.8	3769.9	3445.4	3769.90	2			Stable? Slow buildup
	2583.0			15.900				8.7	3767.7	3243.7	3767.70	2			Repeat. Gauge stable. Point good
							4891.7						8:40	117.2	No overpull
	2585.6			51.900				10.8	3768.5	3478.3	3768.50	3			Stable point?
							4895.0						8:55	117.2	
8	2591.3	2569.8	4862.8	30.900	9:05	4906.3		9.3	3842.5	3554.1	3842.50	2			Buildup not stabilising
	2591.3			32.100				6.6	3770.2	3508.4	3770.20	3			Drawdown again
							4905.1						9:12	117.3	Overpull 15000 lb but not seen on tool
	2592.8			13.900				8.6	3770.7	3209.3	3770.70	3			Stabilised but difference of 3.5 psi from first point
	2592.8			15.000				8.8	3770.7	3207.3	3770.70	3			Stabilised but difference of 3.5 psi from first point
							4911.8						9:25	117.4	
10	2598.0	2576.5	4875.4	15.000	9:32	4920.9		10.2	3780.7	3258.1	3780.70	2			Unstable very slow buildup
	2598.0			8.600				10.3	3773.0	2853.2	3773.00	3			Good point
							4921.5						9:52	117.6	
															CONDUCT DEPTH CORRELATION PASS
11	2605.5	2584.0	4889.5	37.100	10:26	4933.1		9.2	3782.1	3527.5	3782.10	3			Very slow buildup
	2605.5			92.800				10.5	3775.4	3581.8	3775.40	2			Repeat drawdown
	2605.5			67.400				6.5	3775.8	3651.8	3775.80	2			Good point
							4935.1						10:38	118.7	
							4958.9						10:55	118.7	
13	2626.4	2604.9	4928.7	0.000	11:00	4972.5						3			Insufficient drawdown
							4973.9						11:18	118.9	
13a	2626.6	2605.1	4929.1	0.000	11:19	4973.1					3695+				
	2626.6										2977+				Tight extremely slow buildup sample aborted
14	2633.0	2611.5	4941.1	16.900	11:44	4988.9		9.8	3813.9	3320.3	3813.90	2			Unstable buildup
	2633.0			21.000				6.1	3811.1	3466.5	3811.10	3			Stable buildup.
							4988.5						11:50	119.0	
							4993.8						12:07	119.2	
															CONDUCT DEPTH CORRELATION PASS
16	2646.8	2625.3	4967.0	6.300	12:34	5020.5		9	4976.2	3397.6	3829.70	2			
	2646.8			7.200				10.6	3828.4	2879.6	3828.30	3			Repeat first buildup
							5021.1						12:45	119.8	Stable point
	2653.0			11.200				8.6	3832.6	3042.7	3832.60	3			Reasonable point 0.7 psi diference
							5027.0						12:56	119.8	
18	2659.2	2637.7	4990.3	5.300	13:10	5034.4		10.6	4063.3	3529.3	4063.30	2			First drawdown unstable.
	2659.2			14.300				10.7	3846.4	3274.9	3846.40	3			Draw still not stabilising very slow drawdown.
	2659.2			12.200				10.2	3841.4	3202.4	3851.40	4			Good point. Repeat drawdown.
	2659.2			28.200				5	3841.5	3398.5	3841.50	3			Good point.
							5034.7						13:27	120.0	
	2672.3			15.600				5.7	3858.8	3347.3	3859.00	3			Good point
							5065.7						13:47	120.2	
	2683.7			22.300				10.6	3877	3356.8	3876.90	4			Relatively stable. Good point? FRA indicates good test
	2683.7			24.500				10.2	3876.9	3449.2	3876.90	3			Good point. Repeat confirmed
							5084.5						14:35	121.2	
21	2633.0	2611.5	4941.1		15:10 15:11 15:16 15:38 15:45 15:48										On depth Open packer Increase pump rate to 7000 Recharge packer Pump 1L close chamber Close packer
22	2571.9	2550.4	4826.4		16:15 16:16 16:22 17:05 17:20 17:21										On depth Open packer Res fluctuating between 0.5 and 1.3 ohmms. Stepper motor increased to 7000 Change step motor to 5000 Pump 1.5L close chamber Close packer Move off location.
23	2574.0	2552.5	4830.4		17:46 17:50 17:53 18:03										Close packer and reopen suspected leak reading 4200+ on drawdown Settting packer and recharging Problems with packer seal. Reestablish reliable drawdown. Lose comms again. While pumping sample through BB Restablish communication
					18:18 18:42 19:00 19:06 19:16 19:19 19:39									118.6	Stepper motor increased to 7000. Res=0.701 ohmm Increase rate to 7000 on RV Average flowrate 5.6 cc/s Increase rate to 9000 on RV: 20L. Press=3734psi Lost comm Established comms retract packer. Move pipe
					19:46 19:54 20:05 20:18 20:19										Commence pumping Lost comm Established comms retract packer. Move pipe Set packer Lost comm. Repeat attempts to obtain sample thawarted by losing communications.
					20:32 20:33 20:35 20:37 20:39										Set packer. Small pump at 7000. 3700psi Change to RV pump at 5000. 3790psi. RV to 7000. 3702psi. RV to 8000. move back on depth.
					21:04 21:05 21:08 21:10 21:10 21:19 21:26 21:41 21:45									118.9	Set packer RV pump at 5000. DD 3620psi back upto 3715psi. RV at 7000. DD 3665psi. RV to 8500. 3720psi. Res=0.737ohmms. Pumped 2.0L RV at max rate. Pumped 7.5L. DD=3738psi. Internal tool temp 89C Pumped 11L. move back on depth. At 2574.0 mMDRT. Lost Comms.
					22:10 22:03 22:05 22:08 22:15 22:41 22:42 22:45 22:46 22:49 22:56 22:57 23:03 23:06 23:11 23:12 23:15 23:55										Set packer. RV pump at 5000. 3681psi. RV pump at 8000. 3450psi. Pumped 2.5L. Res=0.767 Ohmms. Pumped 6.5L. Lost Comms. Set packer. RV at 5000. DD 3310psi. RV at 7000. 3510psi. Res=0.747Ohmms. RV at maximum rate. Pumped 2.5L. Pumped 3.5L. Pumped 8.0L. Take sample. Fill chamber 3. Pump 1.5L. Attempt Bubble point/compressibilty. Unsuccessful. Retract packer. Lost Comms. Move pipe. Require 20klbs to move.. Establish comms. Call town. POOH to SES and check wet connection. At 2515.0 mMDRT. Swabbing hole. Pump at max 100psi..