

THE FORAMINIFERAL SEQUENCE  
in  
TARRA # 1,  
GIPPSLAND BASIN.

for: AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

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BIOSTRATIGRAPHY from sidewall cores			PALEOENVIRONMENTS (refer Table 4)		
Depth in metres at Base of Zones (refer Tables 2 & 3 for data)			E-LOG PICKS	BIOFACIES with estimated paleodepths 0 10 40 100 200 400m	LITHOFACIES
LATE MIOCENE	1134.1	B-2		SHELF/ SLOPE BREAK anoxic →	biomicrites pyrite at base.
MID MIOCENE ~ (7 2my) ~	1282.0 †	C	~ 1315 †		
MID MIOCENE	1627.0	D-2		UPPER  SLOPE	biomicrite & marl  with recycling at base
	1694.9	?E-1			
	1752.1	E-2			
EARLY MIOCENE	1867.1	F			
	2020.1 †	G		MID INNER SHELF	micrites & marls with "GREENSANDS"
~ (10 my) ~	2108.0	H-1	2060 †		
early OLIGOCENE	2160.0	J-2	2110		
late EOCENE	2208.1	K	2165		
? ? ?	2250.5	? ?	2209	INTERTIDAL	micaceous "GREENSANDS"
MID to ? EARLY EOCENE	2543.0	N to P	2480	ESTUARINE INTERTIDAL	micaceous & lignitic silts & sands with biogenic pyrite

TABLE 1: INTERPRETED FORAMINIFERA SEQUENCE for TARRA # 1.

~ (10 my) ~ hiatus with time span in parenthesis.

† offsets due to sample gaps.

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## INTRODUCTION.

Thirtyeight sidewall cores were submitted for examination from TARRA # 1 well, between 2543.0 and 1134.1 metres. Only three samples were barren of foraminifera and these were all within the Eocene estuarine/deltaic sequence at and below 2220.9 metres. However, foraminifera, particularly planktic ones, were by no means frequent within this interval (2220.9 to 2543.0 metres) and biostratigraphic zonation is imprecise.

The sidewall core at 2257.0metres was very soft and unable to be cleaned of mudcake before processing, thus it was not surprising that the prepared residue contained a 50/50 mixture of Mid Eocene micaceous quartz sandstone and Mid Miocene fine grained carbonates. The obvious contaminants in this sample were not plotted on Tables 3 and 4, although note is made on each of the Tables.

The following Tables accompany this report:-

TABLE 1: INTERPRETED FORAMINIFERAL SEQUENCE based on Tables 3 & 4:  
on Page 1.

TABLE 2: Interpretative:- BIOSTRATIGRAPHIC DATA SHEET with reliability of Zonal picks: at back of text.

TABLE 3: Factual data:- PLANKTONIC FORAMINIFERAL DISTRIBUTION: at back of text.

TABLE 4: Factual data:- BENTHONIC FORAMINIFERAL DISTRIBUTION & SEDIMENT GRAIN ANALYSIS: at back of text.

The TARRA # 1 sequence is discussed freely in ascending biostratigraphic sequence (i.e. uphole).

### ? EARLY to MID EOCENE - 2543.0 to 2257.0m (top at 2257m on E-logs).

This interval contains sporadic assemblages of planktonic foraminifera, which are numerically sparse in specimens and low in specific diversity (refer Tables 3 & 4). A planktonic assemblage, including *Globigerina primitiva*, *Globorotalia turgida* and *G. centralis* was present at the top of the interval, at 2257m, whilst at the base at 2543m, the fauna contains *G. frontosa* (= *G. boweri* of Jenkins) but lacks *G. centralis*. In terms of the New Zealand sequence (Jenkins, 1971) this would infer a range from the Early/Mid Eocene boundary at 2543m to a position high in

the Mid Eocene at 2257m. Recent studies in North Africa confirm that this biostratigraphic succession, from *G. frontosa* to *G. centralis*, took place within the Mid Eocene (e.g. Boukharry et al, 1982). Furthermore, Boukharry et al (l.c.) consider this succession to be an evolutionary lineage; referring to *G. frontosa* as *Globorotalia cerroazulensis frontosa* and to *G. centralis* as *G. cerroazulensis pomeroli*. The former morphotype ranges from the base of the Mid Eocene (Blow Zone P10) to the base of Blow Zone P.12 (= top Zone of Mid Eocene); whilst the latter morphotype first appears at the base of Blow Zone P.12 with range extending in the Late Eocene. However, in Tarra # 1, the association of *G. primitiva* with *G. centralis*, confines the sample at 2257m to the top of the Mid Eocene (= Zone N).

The sporadic occurrence of planktonics together with the dominance of primitive arenaceous, benthonic foraminifera, *Haplophragmoides* spp, indicates fluctuating salinities in estuarine/lagoonal paleoenvironments during deposition of this Mid Eocene interval (refer Taylor, 1965). This interpretation is collaborated by the presence of lignite and biogenic pyrite within this interval.

EOCENE - 2250.5 to 2220.9 (2257 to 2209m on E-logs).

No precise zone can be assigned to this Eocene interval of "Green" and "Brown" sands (glauconite, limonite, ? goethite and quartz), as it was barren of planktonics. It contained very few benthonic foraminifera; *Haplophragmoides* spp. being most noticeable. An intertidal, estuarine situation is envisaged. The presence of windblown quartz sand at the base of the interval suggests a barrier barred regime (refer Table 4).

LATE EOCENE - 2208.1 to 2177.5m (2209 to 2165m on E-logs).

Those assemblages were poor in planktonic faunas. The basal sample at 2208.1 contained only one species, *Globigerina linaperta*, diagnostic of the Late Eocene, but this was in association with forms which ranged up into the Early Oligocene. Therefore the interval has been designated as Zone K. Lithologically the interval commenced as a silty "Greensand" with a decrease in glauconite and increase in carbonate up sequence. The benthonic fauna indicates a shallow, inner continental shelf environment.

OLIGOCENE HIATUS between 2113 and 2108 (= 2110m on E-logs).

As in many offshore Gippsland wells, a hiatus of some 10 million years in time span was evident in Tarra # 1; as was also the case in Edina # 1 and Omeo # 1. The association at 2113m was of early Oligocene (Zone J-2) character with *Globigerina angiporoides*, *G. brevis* and *Globorotalia gemma*. A complete disruption of biostratigraphic events was apparent as the planktonic fauna at 2108m was definitely of early Miocene (Zone H-1) age with *Globigerina woodi connecta*, *Globoquadrina dehiscens* and *Catapsydrax dissimilis*. The benthonic fauna also reflect this disruption with mid shelf deposition at 2113m and upper slope deposition at 2108m. The paleodepth increase across this hiatus from early Oligocene to early Miocene was of the order of 200 metres. This hiatus was a widespread event, not only in Gippsland, but over the entire Tasman Sea, Southern Ocean region (Louitt & Kennett, 1981).

EARLY to MID MIOCENE - 2108 to 1389m (2110 to 1315m on E-logs).

A complete sequence from Zone H-1 to Zone D-2 was represented in the Tarra samples. However, the planktonic assemblages were seldom high in specific diversity, reflecting the geographic location in the south west sector of the Basin. Miocene faunas to the east and north-east were much more diverse, reflecting the influence of the warm, East Australian Current which did not (and does not) reach the western sector of the Gippsland Basin. Deposition was on the upper part of the continental slope.

MID MIOCENE HIATUS between 1389 and 1282m (= 1315 on E-logs).

Zone D-1 appears to be absent in both the Tarra and Omeo sections which is significant in that most wells drilled to the east and south-east contain a thick accumulation of D-1 carbonates as canyon fills. The supposition may be drawn that the Tarra and Omeo locations were source areas for sediment redeposited in submarine canyons.

MID to LATE MIOCENE - 1282 to 1134.1m (base at 1315 on E-logs).

Once again the planktonic assemblages were not as diverse as those in the east. Environmentally slight shallowing in paleodepth occurs on resumption of sedimentation compared with that before the mid Miocene hiatus.

Topographic hollows may have developed from high energy scouring which removed or prevented accumulations of D-1 sediment. The assumption is made on the abundance of pyrite above the Mid Miocene hiatus in both Tarra and Edina, suggesting restriction of oxygen at the sediment/water interface.

REFERENCES.

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- LOUTIT, T.S. & KENNETT, J.P., 1981b - New Zealand and Australian Cenozoic Sedimentary Cycles and Global Sea-Level Changes. *AAPG Bull* 65(9); 1586-1601.
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TABLE 2

## MICROPALAEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 30.5m GL: -62.8m  
 WELL NAME: TARRA # 1 TOTAL DEPTH: \_\_\_\_\_

AGE	FORAM. ZONULES	HIGHEST DATA				LOWEST DATA					
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEIS- TOCENE	A <sub>1</sub>										
	A <sub>2</sub>										
PLIO- CENE	A <sub>3</sub>										
	A <sub>4</sub>										
MIOCENE	B <sub>1</sub>										
	LATE B <sub>2</sub>	1134.1	1				1134.1	1			
	C	1282	0				1282	0			
	MIDDLE D <sub>1</sub>	*					*				
		D <sub>2</sub>	1389	0				1627	1		
	E <sub>1</sub>	1694.9	2				1694.9	0			
		E <sub>2</sub>	1752.1	1				1752.1	1		
	EARLY F	1790	1				1867.1	1			
		G	1916.1	1				2020.1	1		
		H <sub>1</sub>	2060.1	1				2108	1		
H <sub>2</sub>		†					†				
OLIGOCENE	LATE I <sub>1</sub>										
		I <sub>2</sub>									
	EARLY J <sub>1</sub>	†					†				
		J <sub>2</sub>	2113	1				2160	0		
EOCENE	K	2177.5	2				2208	1			
	Pre-K	2257.0	1				2543	1			

COMMENTS: \*Probable hiatus with D-1 absent due to slope slumping at

≈1315m (E-log).

†Definite Oligocene hiatus with Zones H-2, I-1, I-2 & J-1 absent from sequence. E-log surface ≈2110.

Pre-K Sporadic occurrences of Zone N, O & P assemblages = Mid to ? Early Eocene. Contact relationship with late Eocene uncertain.

CONFIDENCE RATING: 0: SWC or Core - Complete assemblage (very high confidence).  
 1: SWC or Core - Almost complete assemblage (high confidence).  
 2: SWC or Core - Close to zone change but able to interpret (low confidence).  
 3: Cuttings - Complete assemblage (low confidence).  
 4: Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: David Taylor  
 DATA REVISED BY:         

DATE: 7/6/1983  
 DATE: 5/15/1985