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TABLE 1: INTERPRETATIVE DATA, WIRRAH-3

INTRODUCTION

Eighteen (18) sidewall core samples were processed for foraminiferal analysis in Wirrah-3 from 1375.4 to 1509.0m. Tables 1 and 2 provide a summary (Basic and Interpretative) of the palaeontological analysis in Wirrah-3. A summary of the biostratigraphic breakdown of the stratigraphic units in the well is given below.

AGE	UNIT	ZONE	DEPTH(mKB)
Early Miocene	Lakes Entrance Formation	G	1375.4-1425.6
——————log break at 1430m (mid-Early Miocene disconformity)——————			
Early Miocene	Lakes Entrance Formation	G	1435.7-1455.8
Early Miocene		H-1	1465.4-1475.4
——————————log break at 1488.5m (30 Ma event)——————————			
latest Eocene - earliest Oligocene	Un-named carbonate unit (Early "Oligocene Wedge")	K	1491.5
——————————————log break at 1495m ——————————————			
latest Eocene - earliest Oligocene	Gurnard Formation	K Indeterminate	1495.3-1501.0 1503.0-1509.0
——————————————log break at 1510m ——————————————			
	Latrobe Group (coarse clastics)	(not studied)	

T.D. 3257mKB

GEOLOGICAL COMMENTS

The Gurnard Formation is assignable to the Middle N. asperus palynological Zone (Macphail, 1984). The top part of the unit (1495.3-1501.0m) contains planktonic foraminifera and is Zone K (early Zone K) in age. Sidewall core 123 at 1485.3m is out of sequence. The sample is a greensand (Gurnard Formation) which has been age-dated as Zone K (early K) and Middle N. asperus. The sample almost certainly was shot in the interval 1495-1510m and probably above 1501.0m.

The Gurnard Formation is conformably (?) overlain by the un-named carbonate unit (Early "Oligocene Wedge"). One sidewall core (SWC 122 at 1491.5m) intersected the unit. The sample contains a very rich, well preserved planktonic foraminiferal fauna and approximately 5% pelletal glauconite. On the basis of log character the base and top of the unit are estimated to be 1488.5 and 1495m. The "wedge" is Zone K (late Zone K) in age. The sample at 1491.5m is assignable to the Middle N. asperus palynological Zone (Macphail, 1984). There is evidence in Wirrah-3 that Zone K has the potential to be sub-divided into two zones (see Discussion of Zones). Further sections need to be examined to refine the planktonic foraminiferal zonation for the time interval Late Eocene-Early Oligocene in the Gippsland Basin.

The Early "Oligocene Wedge" is disconformably overlain by the Lakes Entrance Formation. The basal portion of the Lakes Entrance Formation has been age-dated as Zone H-1 and contains reworked Zone K planktonic foraminifera. Reworking of older assemblages (generally Early Oligocene "Wedge" assemblages) during the Early Miocene (Zone H-1 time) has been noted in most recently drilled Gippsland Basin Wells. The hiatus between the "wedge" and the overlying Lakes Entrance Formation spans most of the Oligocene (approximately 14 my). The disconformity at 1488.5m most probably equates with the mid-Oligocene disconformity (30 Ma event) of Vail et al. (1977). This event is seismically mapped as the "Top of Latrobe" over most of the Gippsland Basin.

There is a probable disconformity within the Lakes Entrance Formation at 1430m. A strong sonic/density log break is present at this depth in Wirrah-3. The break probably equates with a mid-Early Miocene disconformity which has now been recognized in a number of Gippsland Basin wells including Wrasse-1 (see Rexilius, 1984).

DISCUSSION OF ZONES

The Tertiary biostratigraphy in Wirrah-3 is based on the Gippsland Basin planktonic foraminiferal zonal scheme of Taylor (in prep.).

Indeterminate Interval : 1503.0-1509.0m
The interval is barren of planktonic foraminifera but has been assigned to the Middle N. asperus palynological Zone by Macphail (1984).

Zone K : 1491.5-1501.0m
A very rich Zone K assemblage occurs in the sidewall core sample at 1491.5m (un-named carbonate unit). The assemblage includes Globigerina angiporoides, G. brevis, G. euapertura, G. linaperta and Globorotalia gemma. The presence of Globigerina euapertura indicates a position high in Zone K. A more impoverished assemblage at 1493.3m (greensand facies - Gurnard Formation) comprising Globigerina ampliapertura, G. angiporoides, G. linaperta and Globorotalia gemma, is indicative of a position low in Zone K. Globigerina ampliapertura is considered by Taylor (in prep.) to represent the progenitor of G. euapertura. However he documents the evolutionary appearance of Globigerina euapertura later, at the base of Zone J-2, in the Gippsland Basin. Jenkins (1971) also records the entry of the species at the same level in New Zealand, that is, after the extinction of Globigerina linaperta (the defining event for the top of Zone K). The overlap in ranges of Globigerina euapertura and G. linaperta in several recently drilled wells in the Gippsland Basin may enable Zone K to be sub-divided into two zones, Zone K-1 and Zone K-2. Analysis of other sections in the Gippsland Basin is required to confirm the sub-division of Zone K. Zone K-2 is provisionally for now defined by the interval from the appearance of Globigerina brevis (and Globorotalia gemma - based on recent data) to the entry of G. euapertura. Zone K-1 is tentatively defined by the interval from the appearance of Globigerina euapertura to the extinction of G. linaperta. Zone K-2 is also characterized by the presence of Globigerina ampliapertura.

Because reworking of the condensed Gurnard Formation/un-named Early Oligocene carbonate is probable in the Gippsland Basin, care must be taken in establishing that assemblages are in situ. In Wirrah-3 there is good evidence that there are older (Zone K-2) and younger (Zone K-1) Zone K assemblages which are in situ. The richer assemblages in the un-named carbonate unit (1491.5m) contain a minimum amount of pelletal glauconite (Note - the greensand at 1493.3m is very rich in pelletal glauconite) and in addition contain abundant Globigerina euapertura with no record of its progenitor G. ampliapertura. Reworking of foraminiferal assemblages in the sample of the un-named carbonate unit at 1491.5 is totally lacking.

A very sparse Zone K planktonic foraminiferal assemblage comprising rare Globigerina linaperta and Globorotalia gemma was recorded in the sidewall core sample at 1501.0m. Other samples in the interval at 1497.4 and 1499.3m were barren of planktonic foraminifera.

Zone H-1 : 1465.4m-1475.4m

A Zone H-1 assemblage comprising the index species Globigerina woodi connecta with reworked latest Late Eocene-earliest Early Oligocene foraminifera (including Globigerina angiporoides and G. linaperta) occurs in the sidewall core sample at 1475.4m. A typical Zone H-1 assemblage also occurs at 1465.4m but without a reworked component. Reworking of older faunal elements into the basal portion of Zone H-1 has now been documented in numerous wells in the Gippsland Basin.

Zone G : 1375.4-1455.8m

The uphole appearance of Globigerinoides trilobus at 1455.8m defines the base of Zone G in Wirrah-3.

REFERENCES

JENKINS, D.G., 1971. New Zealand Cenozoic planktonic foraminifera. New Zealand Geol. Surv. Palaeont. Bull., No. 42, 178p.

MACPHAIL, M.K., 1984. Palynological analysis, Wirrah-3, Gippsland Basin. Esso Australia Ltd., Palaeontological Report 1984/19.

REXILIUS, J.P., 1984. Foraminiferal analysis, Wrasse-1, Gippsland Basin. Esso Australia Ltd., Palaeontological Report 1984/15.

TAYLOR, D.J., (in prep.). Observed Gippsland biostratigraphic sequences of planktonic foraminiferal assemblages.

VAIL, P.R., MITCHUM, J.R. & THOMPSON, S., 1977. Seismic stratigraphy and global changes of sea level, Part 4: global cycles of relative changes of sea level. In: PAYTON, C.E. (editor), Seismic Stratigraphy - Applications to Hydrocarbon Exploration. Am. Assoc. Pet. Geol., Mem. 26: 83-97.

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: +21.0m GL: 49.0m

WELL NAME: WIRRAH-3 TOTAL DEPTH: 3257m KB

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
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3										
		A_4										
MIOCENE	LATE	B_1										
		B_2										
		C										
	MIDDLE	D_1										
		D_2										
		E_1										
		E_2										
	EARLY	F										
		G	1375.4	0				1455.8	1			
		H_1	1465.4	1				1475.4	1			
OLIGOCENE	LATE	H_2										
		I_1										
		I_2										
	EARLY	J_1										
		J_2										
EOCENE		K	1491.5	0				1501.0	2			
		Pre-K										

COMMENTS: SWC 123 at 1485.3m is out of place. It is a greensand which was shot within the Gurnard Formation (1495 - 1510m).

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 zonule 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: J.P. Rexilius DATE: 2/2/84

DATA REVISED BY: J.P. Rexilius DATE: 14/6/84

TABLE 1

SUMMARY OF PALAEONTOLOGICAL ANALYSIS, WIRRAH-3, GIPPSLAND BASIN

INTERPRETATIVE DATA

NATURE OF SAMPLE	DEPTH (mKB)	PLANKTONIC FORAMINIFERAL YIELD	PRESERVATION	PLANKTONIC FORAMINIFERAL DIVERSITY	ZONE	AGE	COMMENTS
SWC 113	1509.0	Barren	-	-	-	-	-
SWC 114	1507.0	Barren	-	-	-	-	-
SWC 115	1505.0	Barren	-	-	-	-	Fish teeth
SWC 116	1503.0	Barren	-	-	-	-	-
SWC 117	1501.0	Very low	Poor	Very low	K	L. Eocene/E. Oligocene	-
SWC 118	1499.3	Barren	-	-	-	-	Fish teeth
SWC 119	1497.4	Barren	-	-	-	-	-
SWC 120	1495.3	Low	Moderate/Poor	Low	K	L. Eocene/E. Oligocene	-
SWC 122	1491.5	High	Good	Moderate	K	Probably E. Oligocene	-
SWC 123	1485.3	Low	Good	Low	K	L. Eocene/L. Oligocene	Sidewall core out of sequence.
SWC 125	1475.4	High	Good	Moderate	H-1	Early Miocene	Contains reworked Zone K assemblages. Fish teeth present.
SWC 126	1465.4	High	Good	Moderate	H-1	Early Miocene	
SWC 127	1455.8	Moderate	Moderate	Moderate/High	G	Early Miocene	-
SWC 128	1445.4	High	Good	Moderate/High	G	Early Miocene	-
SWC 129	1435.7	Moderate/High	Moderate	Moderate	G	Early Miocene	-
SWC 130	1425.6	High	Good	High	G	Early Miocene	-
SWC 131	1400.4	Moderate	Good	Moderate	G	Early Miocene	-
SWC 132	1375.4	High	Good	High	G	Early Miocene	Shell fragments, echinoid spines

BASIC DATA

TABLE 2: FORAMINIFERAL DATA, WIRRAH-3

RANGE CHART: TERTIARY PLANKTONIC FORAMINIFERA

TABLE 1

SUMMARY OF PALAECNTOLOGICAL ANALYSIS, WIRRAH-3, GIPPSLAND BASIN

BASIC DATA

NATURE OF SAMPLE	DEPTH (mKB)	PLANKTONIC FORAMINIFERAL YIELD	PRESERVATION	PLANKTONIC FORAMINIFERAL DIVERSITY
SWC 113	1509.0	Barren	-	-
SWC 114	1507.0	Barren	-	-
SWC 115	1505.0	Barren	-	-
SWC 116	1503.0	Barren	-	-
SWC 117	1501.0	Very low	Poor	Very low
SWC 118	1499.3	Barren	-	-
SWC 119	1497.4	Barren	-	-
SWC 120	1495.3	Low	Moderate/Poor	Low
SWC 122	1491.5	High	Good	Moderate
SWC 123	1485.3	Low	Good	Low
SWC 125	1475.4	High	Good	Moderate
SWC 126	1465.4	High	Good	Moderate
SWC 127	1455.8	Moderate	Moderate	Moderate/High
SWC 128	1445.4	High	Good	Moderate/High
SWC 129	1435.7	Moderate/High	Moderate	Moderate
SWC 130	1425.6	High	Good	High
SWC 131	1400.4	Moderate	Good	Moderate
SWC 132	1375.4	High	Good	High

FOSSIL TYPE : PLANKTONIC FORAMINIFERA

Well Name WIRRAH-3 Basin Gippsland Sheet No. 1 of 1

SAMPLE TYPE OR NO. *	113	114	115	116	117	118	119	120	122	123	125	126	127	128	129	130	131	132
DEPTHS / FOSSIL NAMES	1509.0	1507.0	1505.0	1503.0	1501.0	1499.3	1497.4	1495.3	1491.5	1485.3	1475.4	1465.4	1455.8	1445.4	1435.7	1425.6	1400.4	1375.4
Globigerina linaperta					---			—	■	---	R							
Globorotalia gemma					---			---	■	---								
Globigerina angiporoides								---	—	—	R							
Globigerina ampliapertura								---										
Globigerina euapertura									—									
Globigerina praebulloides									---			---	—	■	■	■	—	■
Globigerina brevis									—									
Chiloguembelina cubensis									---									
Globigerina sp. 1									---									
Globigerina woodi connecta											—	■		—		■	—	—
Globorotalia opima nana											■	—	—					
Globorotalia opima opima											---							
Globigerina woodi woodi												—	—	■	—	■	■	—
Globigerina continuosa													—	—	—	■	—	—
Globorotalia bella													---	---	---	—	—	—
Catapsudrax dissimilis													---	---	---	—		
Globigerinoides trilobus													---	—	—	■	—	—
juvenile planktonics													■					
Globorotalia obesa														—		—	—	---
Globoquadrina dehiscens s.s.															---	—	—	—
Globoquadrina advena																—	---	---
Globoquadrina dehiscens s.l.																---		

* C=CORE S=SIDEWALL CORE
T=CUTTINGS J=JUNK BASKET

--- RARE
— FEW

■ ABUNDANT
REWORKED

PALAEO.CHART-2
DWG.1107/OP/287