

ATTACHMENT 7
WCR SPEKE-1
W870

ATTACHMENT No. 7

W870

FORAMINIFERAL SEQUENCE

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SPEKE No. 1

by: D. TAYLOR

OIL and GAS DIVISION

1 6 AUG 1985

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FORAMINIFERAL SEQUENCE and CORRELATION of SPEKE # 1, GIPPSLAND BASIN.

for: AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

September 12, 1984.

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			Page 1	777
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BIOSTRATIGRAPHY from side	val1		PALEOENVIRONMENTS	+++
cores & inferred from E-logs.			(refer Table 4)	
Depth in metres for sample at		E-LOG		
base of Zone (refer Table 3).		1. 4 4 4 1 4 4 4 5 1 4 4 4 6		
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			Estimated	
			Paleodepths (in metres)	
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	D-2		with high energy,	
MICOENE -1284			biogenic carbonate	
1204	E-1		deposition	
-1353				- - -
	- - 3	- 1380		Eii
-1449.5	E-2		High energy deposit	
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-1603			on upper continenta	-+ +-+
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	H-1	scale		1++
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1712	+	4cm:100m		
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OLIGOCENE (unsampled)	to		?	
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inferred			╏┊┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆┆	
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INTRODUCTION

Twenty eight sidewall cores were examined from SPEKE # 1 between 2304 and 1051 metres.

No foraminifera were found in the basal four samples at 2304, 1946, 1907.5 and 1848.5 metres, although Helene Martin recovered dinoflagellates from four of these samples, thus indicating a marine influence.

Two sidewall cores were submitted, both with a *labelled depth* of 1825 metres. However, each represented a distinctly different facies; one beign an estuarine glauconitic mudstone with Mid Eocene foraminifera, whilst the other, barren of foraminifera, was probably dune sand.

Unfortunately, there was a gap in sidewall core sampling over the interval between 1814 and 1712 metres. Within this interval, there obviously occurred the rapid transition from Eocene estuarine deposition to the deep oceanic sediments of the Oligocene and the related *Cobia Event*. The composition of this unsampled interval is deduced from E-log interpretation (refer Table 1) and correlations with sequences in adjacent wells (refer Table 2).

The following tables are embodied in this report:-

- TABLE 1: INTERPRETED FORAMINIFERAL SEQUENCE in SPEKE # 1 page 1 of this report.
- TABLE 2: INFERRED CORRELATION of SPEKE # 1 with ADJACENT WELLS for MID EOCENE to EARLY MIOCENE based on Planktonic Foraminiferal Biostratigraphy (Letter Zones) and Rock Stratigraphy refer this text and Table 1, with data on adjacent wells in Taylor & Martin, 1983 and Taylor, 1983. page 4 of this report.
- TABLE 3: PLANTKONIC FORAMINIFERAL DISTRIBUTION SPEKE # 1 back of this report.
- TABLE 4: BENTHONIC FORAMINIFERAL DISTRIBUTION and SEDIMENT GRAIN
 ANALYSIS SPEKE # 1 back of this report.
- TABLE 5: MICROPALEONTOLOGICAL DATA SHEET with confidence ratings for biostratigraphic picks back of this report.

BIOSTRATIGRAPHY, PALEOENVIRONMENT and LITHO-UNIT CORRELATIONS.

<u>EOCENE - 2304 to 1907 metres</u>: Despite reports of dinoflagellates, no foraminifera were found at 2304, 1946 and 1907.5 metres, despite the presence of dinoflagellates in these samples (see Palynology Report). This suggests very transient marine influence.

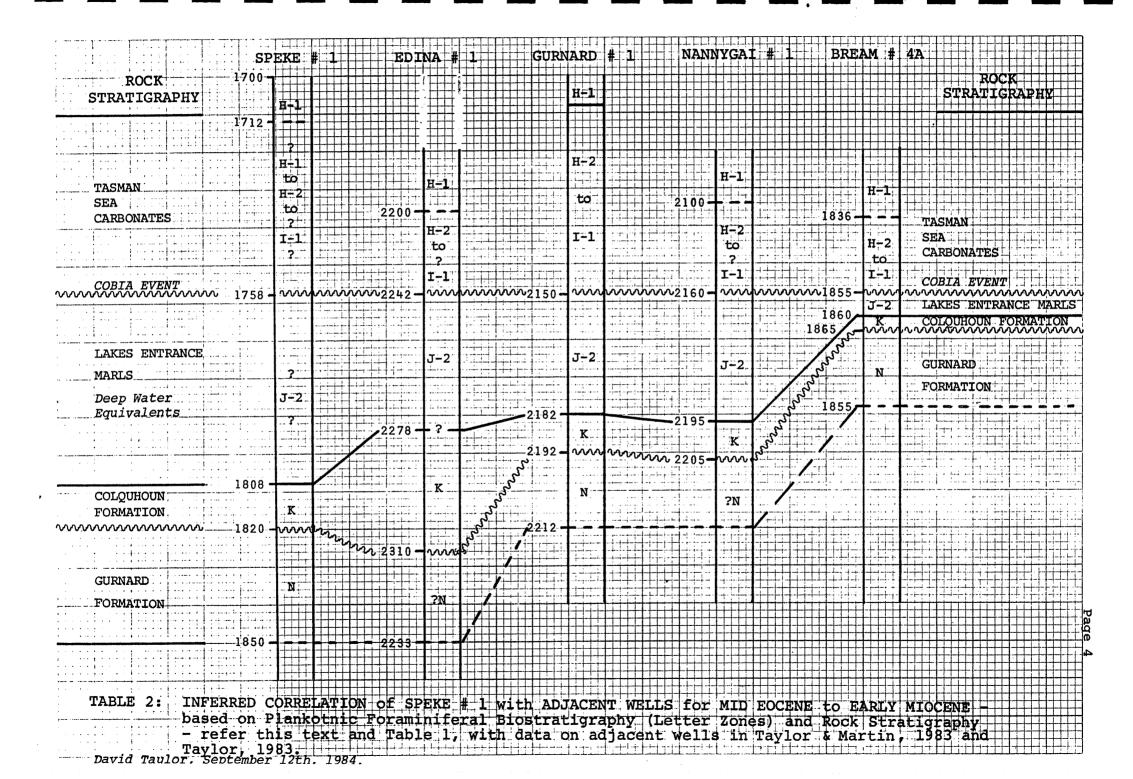
MID EOCENE - ? ZONE N - 1848.5 to 1825 metres \equiv GURNARD FORMATION (E-log interval 1850 to 1820m).

Samples at 1835 and 1825 metres (mudstone SWC # 29/Run 2) contained poorly biostratigraphically diagnostic, planktonic assemblages, probably representing Zone N at the top of the Mid Eocene; possibly straddling the Mid/Late Eocene boundary. It is noted that these samples revealed a ?Middle N. asperus microfloral assemblage and was thus designated, following convention; as ?Late Eocene in the accompanying palynological report. However, the dating of Middle N. asperus Zone is a contentious one, yet to be resolved.

The benthonic assemblages in these two samples were also of low specific diversity, with assemblages characteristic of estuarine environments during a marine transgressive phase. The transient nature of the transgression is clearly illustrated by the distinctly differing lithologies of the two sidewall cores with the identical depth labels of 1825m. The mudstone of SWC 29/Run 2 is of estuarine, marginal marine origin, being a glauconitic Greensand with foraminiferal and dinoflagellate assemblages (see above and Palynology Report), whilst the quartz sands and limonitic clay of SWC 50/Run 22 is indicative of dune sands and barren of foraminifera, dinoflagellates or other marine indicators; such as These two sidewall cores were a minute part of a spatially glauconite. and temporally migrating barrier dune, estuarine/lagoonal system, analagous to the present day regime of the Gippsland shoreline (refer Taylor, 1983). This unit can be correlated with the GURNARD FORMATION on faunal and lithological grounds; particularly the presence of non calcareous Greensands (refer Table 2 this report and Taylor, 1.c.).

The single sample (at 1814m) has a poor planktonic fauna assignable to Zone K at the very top of the Late Eocene. The benthonic fauna is very similar to that of the Mid Eocene unit directly below, thus suggesting the repetition of paleoenvironmental conditions after a hiatus of 2 to 3 million years between the two units.

Most of the glauconite in this Late Eocene unit is oxidized, having the



appearance of *Brownsand*, rather than that of the *Greensand* of the unit below. Also the Late Eocene sediment is weakly calcareous. Therefore, this Late Eocene unit is equated with the *COLQUHOUN FORMATION* (refer Table 2 this report and Taylor, 1983).

UNSAMPLED INTERVAL between 1814 and 1712 metres: The identities of units within this sequence have been deduced from E-log characters (Table 1 this report) and a knowledge of the sequences in previously drilled wells, adjacent to SPEKE # 1 (refer Table 2 this report).

These units are, in all probability:-

LOWER OLIGOCENE - ZONE J-2 \(\exists\) LAKES ENTRANCE MARLS (E-Log interval 1808 to 1758m).

Probably a unit of calcareous shales, deposited in rapidly increasing depth, truncated by the mid to late Oligocene Hiatus of the COBIA EVENT at 1758m. Table 2 shows that this unit was thicker in SPEKE than in other wells. This may be a reflection of variation in depositional rates relative to the shoreline. For instance, the COLQUHOUN FORMATION may have persisted longer in EDINA and in fact, may have been deposited in part during J-2 times; this infers that EDINA was closer to availability of terrigenous detritus than SPEKE.

LATE OLIGOCENE to EARLY MIOCENE - ZONES I-1, H-2 and H-1 (E-log interval 1728 to 1712m).

No doubt the interval contained the oceanic TASMAN SEA CARBONATES; a conclusion supported by the correlation Table 2 and remarks below regarding the EARLY to MID MIOCENE sequence.

EARLY to MID MIOCENE - ZONES H-1 to D-2 to ? ZONE C.

There appears to have been uninterrupted sedimentation from the Early to Mid Miocene, although assemblages representing every Zone could not be identified due to extreme carbonate diagenesis at some levels; for example, Zone F could not be designated. Richly biogenic carbonate deposition was on the upper continental slope during the Early Miocene, with faunal evidence suggesting progradation of the shelf edge in the Mid Miocene (note E-log change at 1380m). This pattern of shelf progradation was apparent also in the adjacent wells, with sedimentation on the Oligo/Miocene boundary commencing in fairly deep water and rapidly shallowing during the Early Miocene. Thus the unsampled Oligo/Miocene, between 1758 and 1712m in SPEKE # 1 may have been of deeper water origin than that evident at and above 1712m.

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 July 20, 1983.
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TABLE 3: PLANKTONIC FORAMINIFERAL DISTRIBUTION - SPEKE # 1 David Taylor, September 6, 1984.

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N.F.	x = >20 specimens D = Dominant >60% specimens F. = No foraminifera found			A = Abundant C = Common > r = rare <20	20 grains		

TABLE 4: BENTHONIC FORAMINIFERAL DISTRIBUTION and SEDIMENT GRAIN ANALYSIS - SPEKE # 1.

David Taylor, September 10, 1984.

TABLE 5

MICROPALEONTOLOGICAL DATA SHEET

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		VISED BY:	 		· · · · · · · · · · · · · · · · · · ·			DATE:	-			
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AGE (not to scale)	SPORE POLLEN ZONES	DINOFLAGELLATE ZONES	RANGE
	Upper N. asperus	P. comptum	ת ת
LATE	Middle N. asperus	C. incompositum	
-?-?-		D. heterophlycta	tica 🗖
MID	Lower N. asperus	W. echinosuturatum	D. phosphoritica V. extensa A. ornata
EOCENE		A. diktyoplokus	D. pi
3 3 3	P. asperopolus	K. edwardsii	
? ? ?		K. thompsonae	
	Upper	R. ornatum	
EARLY	M. diversus	R. waipawaense	
EOCENE	Middle M. diversus		
? ? ?	Lower M. diversus Upper	A. hyperacanthum	
	L. balmei	A. homomorphum	
	Lower		hum F ra
PALEOCENE	L. balmei	E. crassitabulata	A. homomorphum K. lophophora M. fimbriatum
	? ?	T. evittii	A. h K. 1, M. f.
	T. longus	I. druggii	
MAASTRICHTIAN			

FIGURE 2: DINOFLAGELLATE RANGE CHART. Ranges from Stover, Helby & Partridge, 1979.

AUSTRALIAN AQUITAINE PETROLEUM SPEKE # 1.

Helene A Martin, September 1984.

										- T	. :			. m	rates		-					
SIDEWALL CORES Depth in metres	Baculatisporites disconformis 3 Geratosporites equalis 1 Cerasoretiriletes sp. Cyatha paleospor 2 Cyathidites australis 1 C. minor 1	Gleichenidites circinidites 1 Ischyosporites gremius 3 Laevigatosporites overus 1		Stereisporites antiquasporites Todisporites sp. Terucosisporites cristatus 3 V. Appukuensis 3	GYMNOSPERN POLIEN Alisporites sp. Araucariacites australis 1 Borrycarpites australiensis 5 Lygistepollenites balmei 5	L. ellipticus 3 L. florinii 3 Microcachryidites antarcticus 1 Phyllocladidites mawsonii 3 P. reticulosaccatus 3	P. verrucosus 3 Podocarpidites spp. Podosporites Infrosecatus 1 Nodosporites Infrosecatus 1	Australopolis obscurus 3 Dilwynites granulatus 3 Gambierina rudate 3 Haloragaciditės harrisii	Tretportentes angulociavaus s Malvacipoliis diversus Myrtaceidites eucalyptoides 2 Myrtaceidites sevens 3 Nothofaddites sevens 3	inclosis 3		Periporopolegies pologialis 3 Profesoidites ademanthoides P. angliatus 3 P. annulais 3 P. asperopolus 3	P. iyanboansis 21 P. pachypolus 3 P. recavus 3 Procacuis 3 Procaccidites spp.	Sapotaceoidaebollentes rotudus Simplicaepollis meridianus 3 Spinizonocolpites prominatus 3 Tricolpites confessus 3	Tricolporites adelaidensis 4 Unidentifia tricolpate/tricolpor	DINUTIAGELIATES Alisocysta ornata; 7 Apectodinium tomormorphum:6	Batlacasphaera sp. Cleistosphaeridium sp. Defiandrea phosphoritica 6 Impagidinium sp.	enl ura per per	<i>Spiniterites</i> sp. <i>Veztatodinium</i> sp. <i>Vozchennikovia</i> extensa 6 unidentified dinoflagellates	Spore pollen concentration Spore pollen preservation Abudance of plant tissue Dinoflagellate concentration Dinoflagellate preservation	SPORE POLLEN ZONE	DINOFLAGELLATE ZONE
1814.0, *1825.0A *1825.0B 1835.0, 1848.5, 1865.0, 1907.5,	+ + + + BARREN +	+	† -	+	+ + - +	++	+	; <u>;</u> ;	++	+	+ + + + + + + + + + + + + + + + + + + +	 + +	+ + + + + + + + + + + + + + + + + + + +	+	† -	j	+ +	j ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	cf cf 2 µ 5 5 4	# + + + + + + + + + + + + + + + + + + +	? Middle N. asperus Middle N.asperus BARREN	? ? C. incompositum
1946.0, 1994.5, 2070.0, 2204.0, 2304.0,	+	+ + + + + + + + + + + + + + + + + + + +	+ + l	cf +	+	+		# + # +	_	. 1	+ #				+		+	<u> </u>		N N N ++ N ++ N N N N N N N N N N N N N	? Lower N. asperus INDETERMINATE M.diversus	? - ?
2325.0+ 2351.9+ 2361.0+ 2370.0+ 2390.6+ 2441.5+ 2526.0+ 2575.5+ 2575.5+ 2599.0+		+ +	+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +	+	+ + + + + + + + + + + + + + + + + + + +	+ + + ++ - + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + +		-	+ + +	 - - -	+ + + + + + + + + + + + + + + + + + + +	+	 + +		 	 		11 10 10 10 10 10 10 10 10 10 10 10 10 1	P.asperopolus L. balmei	
2648.5, 2671.5, 2688.0, 2698.1, 2709.0, 2717.0, 2750.5,	1 1	<u>.</u>	<u> </u>	· :::::::	-	+ + + + + + + + + + + + + + + + + + + +	+ + + - + - + + + + 1.3+1.11	⁺			- -	+ - - -	+	#			<u> </u>	<u> </u>	-	0	? T. longus T. longus	
	*1825.0A - *1825.0B -	clay sand &	silt		REFERENCES 1. Dettman 2. Martin, 3. Stover 4. Stover 5. Cookson 6. Lentin 7. Stover	n, 1963 1973 & Partrid & Partrid & Pike, & William	ge, 1973 ge, 1982 1953 s, 1977											.2	φ: o: †: z: cf:	similar to	e average	ot identification

TABLE 1: SPORES, POLLEN and DINOFLAGELLATES IDENTIFIED in AUSTRALIAN AQUITAINE PETROLEUM SPEKE No. 1.

Helene A Martin, September 1984.

MAASTRICHT	IAN	PALEOCENE	1	OLIGOCENE			
	<u> </u>			P .	N.	asperus	Upper
ZONES	T. longus	L. balmei	M. diversus	asperopo	lus Lower	Middle	N. asperus
L. amplus							
T. confessus				<u> </u>			
P. angulatus -							
P. verrucosus							
L. balmei -				ļ			
S. obscurus							
L. ellipticus							
P. reticulosaccatus							
G. rudata -							
N. endurus							
T. gillii			-				
P. poly o ratus -				4			ے.
H. harrisii							
N. flemingii				 			
R. mallatus					ļ		
P. adenanthoides				ļ			
		N. emarcidus			,		
		S. prominatus			-		
		S. cainozoicus	-	<u> </u>			
		P. asperopolus			 -		
ETCHER 1. CROPE POT	TEN DANCE	P. pachypolus		 	 		
FIGURE 1: SPORE POL	LEN KANGE	S. rotundus					
Ranges from Stover	& Partridge,		P. recavus				
1973.			N. vansteenisii	ļ			
AUSTRALIAN AQUITAIN SPEKE # 1.	E PETROLEUM		N. falcatus	}		,	
SPEAL # 1.	4	·	V. cristatus	ı	·		<u> </u>