11 pages

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FORAMINIFERAL SEQUENCE IN FORTESCUE-1,

GIPPSLAND BASIN

by

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FORAMINIFERAL SEQUENCE

- FORTESQUE # 1

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SUMMARY

This sequence appeared to be a normal one when compared with other Basin Deep wells in the vicinity. But detailed comparison shows that the timing and nature of similar events were not consistent, in that:-

(i) The time span of the Mid Oligocene sequence break of the COBIA EVENT was longer than in Cobia # 2 and other neighbouring wells.

(ii) The latest Oligocene and earliest Miocene sedimentation was condensed.

(iii) The commencement of canyon development was 1m.y. earlier.

The coincidence of these events lead to a conjecture that Fortesque #1 was structurally higher than neighbouring wells, from late Oliogcene to mid Miocene.

INTRODUCTION

Fiftysix sidewall core samples were examined from FORTESQUE # 1. One sample (at 1855) was an indurated limestone which could not be broken down. The sidewall cores at 2414 and 2413 (SWCs 27 & 28) contained out of sequence faunas (see Distribution Chart & Data Sheets). As the rest of the samples fit into the established Gippsland sequence, it is believed that these sidewall cores were mishot or mislabelled. The faunally barren quartz sand at 2412 (SWC 37) may be in sequence and represented the mid Oligocene unconformity surface.

All sample depths are in metres, as labelled on sample containers.

Data is collated on the following sheets.

FACTUAL Biostratigraphic Data Sheet

FACTUAL Sample Data Sheets

FACTUAL Distribution Chart of planktonic foraminifera.

BIOSTRATIGRAPHY

The lowest sample at 2416 was barren of foraminifera with the sequence commencing at 2415.

EARLY OLIGOCENE - ZONE J-2 at 2415 - The association of *Globigerina brevis*, *G. angiporoides* and *Globorotalia gemma* restricts this fauna precisely to Zone J-2 at the base of the Oligocene.

MID OLIGOCENE SEQUENCE BREAK - between 1415 & 1411 - Unfortunately this is not clear cut because of sampling muddling in that SWC 27 at 1414 contains a Zone G fauna and SWC 28 at 1413 contains a Zone D-2 fauna. This was apparently misfiring, rather than straight depth substitution as Zone J or H faunas do not occur out of sequence higher in well. The quartz sand of SWC 37 at 2412 may be erosive products of the break and represented the actual unconformity surface.

However a sequence jump is evident from J-2 at 1415 to H-2 at 1411 without Zones J-1, I-2 or I-1 faunas present. Furthermore Zone H-2 was abbreviated with the fauna at 1411 representing the very top of the Zone.

This sequence break represents the *COBIA EVENT* which has been documented in other sections in the vicinity of Fortesque # 1.

LATE OLIGOCENE - Zone H-2 at 1411 - The association of *Globoquadrina dehiscens* (S.L.) and *Globigerina woodi woodi* without *G. woodi connecta* identifies this fauna as Zone H-2. The presence of *Globorotalia bella* positions the fauna at the very top of the Zone. The Zone is represented by either a very condensed or probably abbreviated sequence with a later than usual resumption of sedimentation after the *COBIA EVENT*.

EARLY MIOCENE - ZONES H-1 to E-2 - 2410 to 2158 - The *Globigerina woodi connecta* FAD* at 2410 marks the base of the early Miocene. With the initial appearance of *Globigerinoides trilobus* (=base Zone G) being at 2400, Zone H-1 is obviously condensed when compared with neighbouring sections. This may have been a factor of structural growth.

Top of the early Miocene (=E-2) at 2158 is distinctly marked by the presence of *Praeorbulina glomerosa curva*.

MID MIOCENE - ZONES E-1 to C - 2123 to 1100 - The base of the mid Miocene is clear cut with the FAD of the *Orbulina* form as *O. suturalis* in a range overlap with *Praeorbulina glomerosa curva* at 2123.

Above this the record becomes fuzzy with a low diversity D-2 fauna being recorded at 2038. All the D-2 faunas are of a typically, under represented specifically, when compared with neighbouring sections. The boundary between D-2 & D-1 and between D-1 and C is hazy. The base of Zone C was recognised on the FAD*

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*FAD = Faunal Appearance Datum.

of *Globorotalia miotumida miotumida* in a fairly diverse association at 1400.

LATE MIOCENE - ZONE B-2 - 1040 to 980. - The base of late Miocene has been designated as the sample immediately above the *G. mayeri* LAD*. The Zone B-2 interval in Fortesque # 1 is of low reliability as it is based on absences of *G. mayeri* and other globorotalids, rather than on FADs.

ENVIRONMENT.

The J-2 fauna at 2415 consisted of 20 planktonic specimens with no benthic element, so that environmental interpretation was impossible. After the mid Oligocene depositional break there is some evidence of reworked detritus from older sediments, with the late Oligocene (= H-2) sample containing a dominance of apple green glauconitic pellets. This may also be the case for the angular quartz sand at 2412, if the SWC was correctly labelled.

The environmental sequence in Fortesque # 1 is the normal one for this Basin Deep location. There was a gradual transition during the early Miocene from a continental rise to lower slope situations in Zone H-1 and part of Zone G (to 2336). At 2310 (Zone G) there was a sudden influx of displaced shelf species mixed with an upper slope assemblage. This mixed association persisted to 2123 (Zone E-1) at base mid Miocene, where there was a 98% planktonic component. Abruptly at 2097 and still in E-1, there was a marked decline in faunal quality.

Base of the canyon fill was evident at 1947 (in D-2) with the presence of a dominance of pellet glauconite and quartz sand. The"Battered *Robulus*" fauna was recorded at 1912 and 1825. This association of large sized, abraded specimens of shallow water, usually lens shaped benthic foraminifera was a characteristic of the basal part of the canyon fill sequence in other wells (e.g. Halibut # 1). The poor faunas (both planktic and benthics) of the canyon

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*LAD = Last Appearance Datum.

fill facies persisted throughout the mid Miocene with one incursion of a rich planktonic fauna at 1400 (base Zone C). Top of the canyon fill was at or above 1100 (= Tope Zone C).

The late Miocene benthic fauna were of high specific diversity and had a mid continental shelf aspect.

Although the Fortesque # 1 environmental sequence was normal, the timing of the canyon cutting and filling episode was approximately lm.y. earlier than in neighbouring wells, such as Halibut # 1, Cobia # 2 and probably West Halibut # 1. This is deduced from the facts that the Fortesque D-2 planktonic faunas are generally very poor, both numerically and in diversity, and that the D-2 sediment contain detrital material. In the neighbouring wells the D-2 planktonic faunas were well developed, with numerical and diversity decline and incoming of detrital material not occurring till the base of D-1.

At base mid Miocene, the Fortesque # 1 site may have been in a more susceptible location for commencement of the Canyon cycles than the other wells mentioned. There is the possibility that Fortesque # 1 was structurally higher at the top of the Oligocene as:-

(i) The mid Oligocene depositional break was of longer time span than in neighbouring wells.

(ii) Zones H-2 and H-1 were condensed sequences when compared with other wells.

Whether this relative structural elevation continued to mid Miocene (D-2) times is conjectural, but the coincidence of a condensed and interrupted Oliogcene to basal Miocene sequence with an earlier commencement of canyon development appears significant.

<u>MICROPALEONTOLOGICAL MATERIAL</u>

WELL NAME AND NO. FORTESQUE # 1 — *DATE:* 10.1.1979.

PREPARED BY: David Taylor. — *SHEET NO.* 1 of 3.

DRAW:

DEPTH	*SAMPLE TYPE*	*SLIDE* / *ADDITIONAL INFORMATION*
2416	SWC 25	N.F.F. - f-m ang. qtz snd.
2415	SWC 36	J-2(0) - Calc. shale - some limonite - staining: r subrd. qtz.
2414	SWC 27	G(1) - misplaced or contamination - f-m ang qtz + f. ang. qtz. sdst with limonite staining, r f qtz sdst. with mica & mafic. small pebble wh. qtz.
2413	SWC 28	D-2(0) - Misplaced - 80% micrite, 20% f-c ang. qtz. r. glauc.
2412	SWC 37	N.F.F. - f - c ang qtz.
2411	SWC 30	H-2(1) - dom glauc.
2410	SWC 38	H-1(1) - Dom planks - 10% deep water benths including *Cibidides wuellerstorfi* & Aren Dom.
2408	SWC 40	H-1(2) *ibid*
2407	SWC 40	H-1(2) *ibid*
2405	SWC 43	H-1(2) *ibid*
2404	SWC 44	H-1(1) *ibid*
2403	SWC 45	H-1(1) *ibid*
2402	SWC 46	H-1(1) *ibid*
2401	SWC 47	H-1(1) *ibid*
2400	SWC 48	G(0) *ibid*
2399	SWC 49	G(2) *ibid*
2398	SWC 50	G(1) *ibid*
2397	SWC 51	G(0) *ibid*
2396	SWC 52	G(0) *ibid*
2395	SWC 53	G(1) - *ibid* + displaced benths.
2356	SWC 54	G(1) *ibid*
2336	SWC 55	G(0) - *ibid* with common glauc infilling
2310	SWC 56	G(1) - Forams Dom - 60% planks - upper slope benths + ? displaced sp.

MICROPALEONTOLOGICAL MATERIAL

WELL NAME AND NO. FORTESQUE # 1 ***DATE:*** 10.1.1979.

PREPARED BY: DAVID TAYLOR ***SHEET NO.*** 2 of 3.

DRAW:

DEPTH	*SAMPLE TYPE*	*SLIDE* *ADDITIONAL INFORMATION*
2277	SWC 57	F(0) - gy mdst - 80% planks - slope + displaced shelf benths.
2240	SWC 58	F(0) - Foram Dom - 98% planks - displaced benths.
2217	SWC 59	F(0) *ibid*
2188	SWC 60	F(0) *ibid*
2158	SWC 61	E-2(1), Forams Dom - 96% planks - slope benths incl. *Hoeglundina elegans*
2123	SWC 62	E-1(0) - *ibid*
2097	SWC 63	E-1(1) very poor fauna in micritic lst.
2063	SWC 64	?? *ibid*
2038	SWC 65	D-2(1) *ibid*
2000	SWC 66	D-2(2) *ibid*
1975	SWC 67	D-2(1) Dom Forams, 97% planks. poor benths.
1947	SWC 68	D-2(2) Dom glauc & f-m ang qtz. 60% planks - displaced benths? Base canyon fill.
1912	SWC 69	D-2(2) - Forams Dom. 99% planks - Displaced benths incl. "Battered *Robulus*".
1885	SWC 70	D-1(2) - Dom Forams - r ang. qtz & limonite
1855	SWC 71	indet. indurated lst - not processed.
1825	SWC 72	D-1(1) - mdst - 95% planks displaced benths - incl. "Battered *Robulus*"
1795	SWC 73	D-1(1) *ibid*
1765	SWC 74	D-1(2) micrite v. poor fauna
1740	SWC 75	D-1(2) - micrite - v. poor fauna
1705	SWC 76	D-1(2) - micrite v. poor fauna
1640	SWC 77	D-1(0) micrite - 92% planks all small specimens

MICROPALEONTOLOGICAL MATERIAL

WELL NAME AND NO. FORTESQUE # 1. *DATE:* 10.1.79.

PREPARED BY: DAVID TAYLOR. *SHEET NO.* 3 of 3.

DRAW:

DEPTH	*SAMPLE TYPE*	*SLIDE*	*ADDITIONAL INFORMATION*
1585	SWC 78	D-1(2) - micrite v. poor fauna - small specimens	
1520	SWC 79	D-1(2) *ibid*	
1460	SWC 80	indet -*ibid*	
1400	SWC 81	C(0) - mdst. + common limonite good fauna with some displaced. 96% planks.	
1340	SWC 82	C(2) - mdst - v. poor fauna	
1280	SWC 83	C(2) - *ibid*	
1270	SWC 84	C(1) - *ibid* + displaced benths	
1160	SWC 85	C(2) - *ibid*	
1100	SWC 86	C(1) - *ibid*, top canyon fill.	
1040	SWC 87	B-2(2) - mdst - large fauna - low plank diversity - high shelf benth diversity	
980	SWC 88	B-2(2) - *ibid*	
870	SWC 90	indet - v. poor fauna.	

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: +25.3m GL: -65m

WELL NAME: FORTESQUE # 1 TOTAL DEPTH: -2691m

AGE		FORAM. ZONULES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3										
		A_4										
		B_1										
MIOCENE	LATE	B_2	980	2				1040	2			
		C	1100	2				1400	0			
	MIDDLE	D_1	1520	2	1640	0		1885	2	1825	1	
		D_2	1912	2				2038	1			
		E_1	2097	1				2123	1			
		E_2	2158	1				2158	1			
	EARLY	F	2188	1				2277	0			
		G	2310	1				2400	0			
		H_1	2401	1				2410	1			
OLIGOCENE	LATE	H_2	2411	1				2411*	1			
		I_1										
		I_2										
	EARLY	J_1										
		J_2	2415*	1				2415	1			
EOCENE		K										
		Pre-K										

COMMENTS: * SWC # 28 at 2413 has excellent Zone D-2(0) fauna whilst SWC # 27 at 2414 has good Zone G (1) fauna. This suggests muddling as sequence is disrupted by these two determinations. SWC # 37 at 2412 was a barren quartz sand and could represent the H-2/J-2 surface of the Cobia Event.

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: David Taylor DATE: 7 DECEMBER 1978

DATA REVISED BY: David Taylor DATE: 15.2.1979.

FORTESQUE # 1

Sidewall cores in metres

PLANKTIC FORAMINIFERA	870	980	1040	1100	1160	1270	1280	1340	1400	1460	1520	1585	1640	1705	1740	1765	1795	1825	1855
ORBULINA UNIVERSA	I	I	I	I	I	°		I	I		I	I	I	I	°	I	I	I	
GLOBOROTALIA SCITULA	?	?			cf			I			°		°						N
GLOBIGERINA BULLOIDES	?		I						°				°						O
G. FALCONENSIS		°		°	°														T
GLOBOROTALIA MIOZEA CONOIDEA		°	I		I				I			°				I	I	I	
G. CONTINUOSA			cf						°										
GLOBIGERINOIDES TRILOBUS			I						I	I			°						P
GLOBOROTALIA MAYERI MAYERI				°		°				N								°	R
GLOBIGERINA DECORAPERTA					°					D									O
GLOBOROTALIA MIOTUMIDA MIOTUMIDA							°		°	E									C
G. MENARDII									°	T									E
G. CONICA																			S
G. MIOZEA MIOZEA															°		°		S
G. c.f. SPHERICOMIOZEA																°			E
GLOBIGERINA NEPENTHES																	?		D
GLOBIGERINOIDES SICANUS																		°	
GLOBOROTALIA PRAESCITULA																		?	I
GLOBOQUADRINA DEHISCENS (S.S.)																			N
GLOBIGERINA WOODI													°						D
GLOBOROTALIA PRAEMENARDII																			U
ORBULINA SUTURALIS																			R
GLOBIGERINA RUBESCENS																			A
PRAEORBULINA GLOMEROSA CURVA																			T
GLOBOROTALIA ZEALANDICA																			E
G. OPIMA NANA																			D
GLOBIGERINA WOODI CONNECTA																			
GLOBOQUADRINA ALTISPIRA (S.L.)																			S
GLOBIGERINA CIPEROENSIS																			P
GLOBOROTALIA BELLA																			
GLOBOQUADRINA DEHISCENS (S.L.)																			
GLOBIGERINA PREBULLOIDES																			
GLOBIGERINA EUAPERTURA																			
GLOBIGERINA BREVIS																			
G. ANGIPOROIDES																			
GLOBOROTALIA GEMMA																			

PLANKTIC FORAMINIFERA	1885	1912	1947	1975	2000	2038	2063	2097	2123	2158	2188	2217	2240	2277	2310	2336	2356	2395
ORBULINA UNIVERSA	I	I	I	I	I	I												
GLOBOROTALIA SCITULA																		
GLOBIGERINA BULLOIDES	°								°		?	I			I	I	I	I
G. FALCONENSIS																		
GLOBOROTALIA MIOZEA CONOIDEA	I	I	I	I	I	I	I	cf										
G. CONTINUOSA										°								
GLOBIGERINOIDES TRILOBUS									I	I	I		I	I	I	I	°	°
GLOBOROTALIA MAYERI MAYERI																		
GLOBIGERINA DECORAPERTA											°							
GLOBOROTALIA MIOTUMIDA MIOTUMIDA																		
G. MENARDII																		
G. CONICA		°		°														
G. MIOZEA MIOZEA				°					°		°		I					
G. c.f. SPHERICOMIOZEA						°	°	cf										
GLOBIGERINA NEPENTHES				cf														
GLOBIGERINOIDES SICANUS										°	I	I	I	°				
GLOBOROTALIA PRAESCITULA		°							I	I		°	°	°				
GLOBOQUADRINA DEHISCENS (S.S.)	°									I	°	I		I		I	I	
GLOBIGERINA WOODI			°						I	I		I	I	I	°	I	I	
GLOBOROTALIA PRAEMENARDII				°					I	I	°			I	I	I		
ORBULINA SUTURALIS								°	I									
GLOBIGERINA RUBESCENS									°		°							
PRAEORBULINA GLOMEROSA CURVA									°	°								
GLOBOROTALIA ZEALANDICA													°		°	°		
G. OPIMA NANA													°	°				
GLOBIGERINA WOODI CONNECTA															I			
GLOBOQUADRINA ALTISPIRA (S.L.)																		
GLOBIGERINA CIPEROENSIS																		
GLOBOROTALIA BELLA																	°	
GLOBOQUADRINA DEHISCENS (S.L.)																		
GLOBIGERINA PREBULLOIDES																		
GLOBIGERINA EUAPERTURA																		
GLOBIGERINA BREVIS																		
G. ANGIPOROIDES																		
GLOBOROTALIA GEMMA																		

PLANKTIC FORAMINIFERA	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2407	2408	2410	2411	2412	2413	2414	2415	2416
ORBULINA UNIVERSA															N	I			N
GLOBOROTALIA SCITULA																			
GLOBIGERINA BULLOIDES	I	I													F				F
G. FALCONENSIS																			
GLOBOROTALIA MIOZEA CONOIDEA															F				F
G. CONTINUOSA																			
GLOBIGERINOIDES TRILOBUS	I	°			°	•				?							I		
GLOBOROTALIA MAYERI MAYERI																			
GLOBIGERINA DECORAPERTA																			
GLOBOROTALIA MIOTUMIDA MIOTUMIDA																			
G. MENARDII																			
G. CONICA																°			
G. MIOZEA MIOZEA																			
G. c.f. SPHERICOMIOZEA																			
GLOBIGERINA NEPENTHES																			
GLOBIGERINOIDES SICANUS			?																
GLOBOROTALIA PRAESCITULA			°														°		
GLOBOQUADRINA DEHISCENS (S.S.)	I	I		I	I								°						
GLOBIGERINA WOODI	I	I	I	I	I	I	I	I	I		I	I	I	I			I		
GLOBOROTALIA PRAEMENARDII																			
ORBULINA SUTURALIS																			
GLOBIGERINA RUBESCENS																			
PRAEORBULINA GLOMEROSA CURVA																			
GLOBOROTALIA ZEALANDICA																			
G. OPIMA NANA			°				°	°	°	°		°	°						
GLOBIGERINA WOODI CONNECTA		°	I	I	I	°	°	°	I				I				I		
GLOBOQUADRINA ALTISPIRA (S.L.)																			
GLOBIGERINA CIPEROENSIS																			
GLOBOROTALIA BELLA											°			°			°		
GLOBOQUADRINA DEHISCENS (S.L.)						I	I	I	I	I	I	I	I	I			I		
GLOBIGERINA PREBULLOIDES													°						
GLOBIGERINA EUAPERTURA														I				°	
GLOBIGERINA BREVIS																		°	
G. ANGIPOROIDES																		°	
GLOBOROTALIA GEMMA																		°	

Base in metres of Zone	?	1040 B-2	1400 C	?	1885 D-1	2038 D-2	2123 E-1	E 2	2277 F	2400 G	2410 H-1	H 2	?	* D 2	* G	J 2

* Misplaced

APPENDIX 4

PALYNOLOGICAL ANALYSIS OF FORTESCUE-1, GIPPSLAND BASIN

by

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and

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Palaeontology Report 1978/19 October 2, 1978.

INTRODUCTION

Thirty-eight samples were examined from Fortescue-1, consisting of six cores, twenty-seven sidewall cores, and five cuttings samples. Overall, the preservation of the fossils was poor owing to extensive pyrite pitting of the spore-pollen and dinoflagellate specimens. Yield varied from very low to abundant.

Zones and environmental/lithological subdivision of the basal part of the Lakes Entrance Formation and Latrobe Group examined is summarised below. All samples examined are listed on Table-1 while fossil assembages are given on accompanying distribution charts.

SUMMARY

UNIT/FACIES	ZONE	DEPTH
LAKES ENTRANCE FM. Deep-water marine marl	P. tuberculatus	2410-2415m
——2415m——	Unconformity	
LATROBE GROUP "Offshore marine facies" Fine-grained clastics with accessory glauconite	Upper M. diversus	2416-2444m
——2452m——		
"Shore-face sand facies" Coarse clean sands with rare fine grained usually carbonaceous layers	Middle M. diversus	2454.5-2551m
——2522m——		
"Deltaic facies" Interbedded coals, sands and shales, with varying marine influence in both sands and shales	Lower M. diversus Upper L. balmei	2559-2655m 2666-2679m
——T.D. 2691m——		

GEOLOGICAL COMMENTS

1. The Middle Malvacipollis diversus Zone is recognised in Fortescue-1 as an additional subdivision between the Lower and Upper M. diversus Zones. The Middle M. diversus Zone was originally erected and used in the Bass Basin where several wells contain exceptionally thick Early Eocene sections. The zone has not previously been utilised in the Gippsland Basin because the Early Eocene section is thinner and sample control, particularly in the early wells, has prevented it being recognised throughout the basin. Better sample control in Fortescue-1 and the need for more refinement of the zones in the Fortescue-Halibut-Cobia area necessitates resuscitation of this zone.

   The base of the Middle M. diversus Zone is picked principally on the first occurrence of Proteacidites tuberculiformis and/or P. xestoformis. An additional morphologically similar species Proteacidites obesolabrus is also used in the Bass Basin, but is exceptionally rare in the Gippsland Basin. Accessory species indicative of the base of this zone as identified in Fortescue-1 are Diporites delicatus and Polycolpites esobalteus.

2. The boundary between the Latrobe Group and overlying Lakes Entrance Formation is believed to be a non-depositional disconformity rather than an erosional unconformity at the Fortescue-1 location. The Latrobe section penetrated at Fortescue-1 shows a typical downhole progression through :

   (a) An "Offshore marine facies", which is characterised by burrowed, fine grained sediments with accessory glauconite and pyrite. In other wells, this is the Gurnard Formation or facies. The fact that the section in Fortescue-1 contains less glauconite is probably because the original depositional rate was slightly higher (i.e., there was a greater contribution of clastics) and the original depositional site was in slightly shallower water in comparison to the main development of Gurnard Formation of Lower N. asperus Zone age.

   This offshore marine facies section (between 2415m-2452m) is 37m thick and was deposited in a maximum of 2 million years. This gives a deposition rate of 19 millimetres per 1,000 years. The Gurnard facies in Kingfish-7 which is much more glauconitic has a depositional rate between 3.5mm/1000 years to 8.8mm/1000 years, half the rate (see Partridge 1977). Typical rates for the younger Lower N. asperus Zone Gurnard Formation are even less.

(b) A unit of massive clean sands underlies this fine grained facies. These sands are interpreted as a "Shore-face sand facies". The sand can be characterised by the lack of fine shale beds and virtual absence of coal. The environment of deposition is considered to lie immediately offshore from the shoreline out to an estimated water depth of 150m. The thin coal stringers identified in cuttings between 2505-2520m could easily have been reworked into a shore face environment.

Compared to the overlying section, the depositional rates within this unit is 46mm/1000 years. This is 2 to 3 times greater than the overlying unit.

(c) Next, the sequence merges into a predominently "Deltaic facies", from 2522m to T.D. at 2691m. The occurrence of significant coal seams suggesting that most of the deposition occurred behind the shoreline.

The presence of dinoflagellates in both sand and shales does, however, indicate that there are significant marine beds within this unit.

Deposition rates within this deltaic facies is of the order of 75mm/1000 years.

3. The good sampling in Fortescue-1 has necessitated a revision of the Wetzeliella hyperacantha Dinoflagellate Zone.

For the first time, we have documented an overlap in the ranges of typical L. balmei Zone indicator species with that of W hyperacantha in the sidewall core samples at 2666m, 2670m, and 2672m.

Partridge (1976) proposed the idea that there was a significant disconformity between the Upper L. balmei Zone and overlying Lower M. diversus Zone reflecting a eustatic regression followed by a major transgression which penetrated onto the coastal plain up to 30 kilometres beyond the strand line, inundating 2500 square kilometres.

This transgression is the W. hyperacantha Zone and is characterised palynologically by the occurrence of the nominated species, the presence of reworked L. balmei Zone fossils and Early Cretaceous and Permian palynomorphs plus the presence and often abundance of pollen and spores from mangrove environments. Key species of the last are : Spinizonocolpites prominatus, Crassoretitriletes vanraadshoovenii, and Polypodiaceoisporites varus.

These features are all displayed by the sample at 2666m. However, this sample contains the key L. balmei Zone species : L. balmei, Australopollis obscurus, and Amosopollis cruciformis as such common elements that it is difficult to justify regarding them as reworked. The absence of Spinizonocolpites prominatus and I. notabilis suggests we are still not in the Lower M. diversus Zone. This sample therefore, must be placed in the Upper L. balmei Zone.

The overlap of L. balmei Zone fossils and W. hyperacantha is thus rationalised as a new refinement of the Upper L. balmei Zone previously unrecognised because of inadequate sampling control. How it relates to the eustatic transgressions and regressions in the basin is as yet uncertain. However, considering the Fortescue-1 location (in respect to the palaeogeography during Late Paleocene-Early Eocene) near the strandline of this time; it is not unreasonable to expect it to display an additional complication or detail of known transgressions.

4. It is worth commenting that the sample at 2551m is a special environment as it contains common Spinizonocolpites prominatus, Wetzeliella homomorpha, and rare Crassoretitriletas vanraadshoovenii. It is possible that this represents an additional transgression at the base of the Middle N. asperus Zone to those documented by Partridge (1976).

5. It should also be pointed out that, from the evidence at hand, the W. hyperacantha transgression at the base of the M. diversus zone is widespread and, therefore, the associated shales, such as the one at 2640m, would be expected to be more extended and continuous than most of the shales higher in the section. The shale at 2551m, because it also contains a mixture of mangrove environmental types (S. prominatus, C. vanraadshoovenii) and marine dinoflagellates (W. homomorpha, C. inodes) and is thus very similar to the W. hyperacantha Zone could also be one of the more extensive shale horizons.

DISCUSSION OF ZONES

The presence and distribution of all identified species are given in Table-1 and the distribution sheets. The basis for separating the well section into the floral zones is discussed below.

Upper Lygistepollenites balmei Zone - 2666m-2679m :

The top of this zone is picked on the highest "in-place" occurrence of L. balmei, A. obscurus, A. cruciformis, and C. bullatus. It is shown to be in the upper part of the L. balmei Zone by the presence of Wetzeliella homomorpha, Proteacidites grandis, and Proteacidites annularis. None of these forms are known to extend into the Lower L. balmei Zone, and P. grandis was quite common in the deepest sample (2979m). Wetzeliella homomorpha and Wetzeliella hyperacantha are present in fair abundance in the samples between 2666m and 2672m.

Wetzeliella hyperacantha Zone - 2636m-2672m :

This zone is the more marine equivalent of the uppermost part of the L. balmei zone and lower part of the M. diversus zone. With the exception of the nominate species and Kenleyia fimbriata, most associated dinoflagellates are long ranging forms.

Lower Malvacipollis diversus Zone - 2559m-2655m :

The base of this zone is recognised by the presence of S. prominatus and Polypodiaceoisporites varus and the absence of L. balmei index fossils. The top of the zone is considered to be just below the first occurrence of P. tuberculiformis, Diporites delicatus, and Polycolpites esobalteus. In general, this is a poorly developed flora, being recognised more by the lack of the zone fossils from above and below, than by specific marker species for this zone.

Middle Malvacipollis diversus Zone - 2454.5m-2551m :

Proteacidites tuberculiformis is recorded from only one sample (2532m) in this zone. However, other forms, such as Diporites delicatus, Triporopollenites helosus, and Polycolpites esobalteus, whose presence helps distinguish Middle from Lower M. diversus are found is several of the samples from this section.

The paucity of diagnostic forms in this and the Lower M. diversus zone is mainly a reflection of the overall poor preservation and low specimen recovery. Even the coal cuttings (2505-10m, 2510-20m, 2530-35m) yielded poor floras of low diversity that were not diagnostic enough to distinguish between Lower and Middle subdivisions of the M. diversus zone. The bottom two samples in this zone (2532m and 2551m) show some evidence of marine influence by the presence of such dinoflagellates as Deflandria dartmooria, Dyphes colligerium, and Wetzeliella homomorpha (short spine var.).

Upper Malvacipollis diversus Zone - 2416m-2444m :

Samples from 2416m to 2429m are assigned to the Upper M. diversus zone based on the presence of P. pachypolus and M. tenuis through this interval. The frequent occurrence of Homotryblium tasmaniense in the samples down to 2444m suggest that everything from 2416m to 2444m should be assigned to this interval. The absence of P. pachypolus and M. tenuis in the lower part of this section is not surprising, considering the low yields and poor preservation of many of the samples concerned.

This interval is believed to be older than the P. asperopolus zone since neither the name species nor such forms as Conbaculites apiculatus or Sapotaceoidaepollenites rotundus are present and Santalumidites cainozoicus occurs only rarely. The presence, however, of Clavatistephanocolporites meleosus at 2432.3m, in Core #2, is somewhat anomalous, since this form has not been recorded previously from sediments below the P. asperopolus zone.

Evidence of marine influence, in the form of dinoflagellates is present in most of the samples in this section, and is completely lacking only at 2420m. Quite a varied assemblage is found in most samples and include such species as Deflandria flounderensis, Wetzeliella homomorpha (long spine var.) Hemicystidinium sp., Adnatosphaeridium reticulense, and Cordosphaeridium inodes.

Proteacidites tuberculatus Zone - 2410m-2415m :

The occurrence of rare specimens of Cyatheacidites annulatus in assemblages rich in dinoflagellates of the Spiniferites spp. and Dinosphaera simplex/mammlatus type is characteristic of this zone and is in agreement with what would be picked as base of Lakes Entrance Formation from electric logs.

REFERENCES

Partridge, A.D., 1977, Palynological Analysis Kingfish-7, Gippsland Basin, ESOA Palaeo Rept. 1977/25.

Partridge, A.D., 1976, The Geological Expression of Eustacy in the Early Tertiary of the Gippsland Basin.

ATTACHMENTS

1. Data Sheet.

2. Table-1.

3. Distribution Sheets.

BASIN GIPPSLAND DATE October 5, 1978.

WELL NAME FORTESCUE-1 ELEVATION +25.3m (+83 feet)

AGE	PALYNOLOGIC ZONES	HIGHEST DATA Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	LOWEST DATA Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
OLIG-MIO.	P. tuberculatus	2410m	0				2415m	0			
EOCENE	U. N. asperus										
	M. N. asperus										
	L. N. asperus										
	P. asperopolus										
	U. M. diversus	2416m	1				2449m	1			
	M. M. diversus	2454.5m	2				2551m	2			
	L. M. diversus	2559m	2				2655m	1			
PALEOCENE	U. L. balmei	2666m	0				2679m	1			
	L. L. balmei										
	T. longus										
LATE CRETACEOUS	T. lilliei										
	N. senectus										
	C. trip./T.pach.										
	C. distocarin.										
	T. pannosus										
EARLY CRETACEOUS											
PRE-CRETACEOUS											

COMMENTS: Wetzeliella hypercantha Dinoflagellate zone : 2636m - 2672m

T.D. : 2691m

RATINGS:
- 0; SWC or CORE, EXCELLENT CONFIDENCE, assemblage with zone species of spores, pollen and microplankton.
- 1; SWC or CORE, GOOD CONFIDENCE, assemblage with zone species of spores and pollen or microplankton.
- 2; SWC or CORE, POOR CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3; CUTTINGS, FAIR CONFIDENCE, assemblage with zone species of either spore and pollen or microplankton, or both.
- 4; CUTTINGS, NO CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If a sample cannot be assigned to one particular zone, then no entry should be made. Also, if an entry is given a 3 or 4 confidence rating, an alternate depth with a better confidence rating should be entered, if possible.

DATA RECORDED BY: A. Partridge & H. Stacy DATE October 5, 1978.

DATA REVISED BY: DATE

TABLE 1 : SUMMARY OF PALYNOLOGICAL ANALYSES, FORTESCUE-1 GIPPSLAND BASIN

Sample	Depth (m)	Depth (ft.)	Zone	Age	Confidence Rating	Yield	Diversity
SWC38	2410	7907	P. tuberculatus	Oligocene	0	Good	Moderate
SWC30	2411	7910	"	"	0	Good	Moderate
SWC37	2412	7913	U. M. diversus	Early Eocene	0	Good	Moderate
SWC28	2413	7917	Indeterminate	-	2	V.Poor	V.Low
SWC27	2414	7920	Indeterminate	-	2	V.Poor	V.Low
SWC36	2415	7923	P. tuberculatus	Oligocene	0	Fair	Low
SWC25	2416	7926	U. M. diversus	Early Eocene	1	Good	Moderate
Core #1	2417.2*	7930.4	"	"	0	V.Good	Moderate
Core #1	2420.85*	7942.4	"	"	0	V.Good	High
Core #1	2423*	7949.5	"	"	0	Good	Moderate
Core #1	2425.6*	7958	"	"	0	V.Good	High
Core #1	2429.3*	7970.1	"	"	0	V.Good	High
Core #2	2432.29*	7979.9	"	"	1	V.Good	High
SWC35	2435	7989	"	"	2	Poor	V.Low
SWC24	2449	8081	"	"	1	Good	Moderate
SWC34	2454.5	8089	Middle M. diversus	"	2	Fair	Low
SWC22	2465.5	8051	"	"	2	Poor	V.Low
SWC21	2500	8202	Indeterminate	-	-	Barren	Barren
Ctngs (coal)	2505-10	8218-35	Indeterminate	-	3	V.Poor	V.Low
Ctngs (coal)	2510-20	8235-68	Middle M. diversus	Early Eocene	3	Fair	Low
SWC19	2525	8284	"	"	2	Good	Moderate
Ctngs (coal)	2530-35	8300-17	"	"	3	Fair	Low
SWC18	2532	8307	"	"	1	Good	Moderate
SWC16	2551	8369	"	"	2	V.Good	High
SWC15	2559	8396	Lower M. diversus	"	2	Fair	Low
SWC13	2585	8481	"	"	1	Poor	V.Low
Ctngs (coal)	2590-95	8479-8514	"	"	3	Good	Moderate
SWC12	2595	8514	"	"	1	Fair	Low
SWC10	2616	8583	"	"	1	Fair	Low
SWC9	2627	8619	"	"	1	Good	Moderate
SWC8	2636	8648	"	"	1	Good	Moderate
SWC7	2645	8678	"	"	1	Good	Moderate
SWC6	2655	8711	"	"	1	Fair	Low
SWC4	2666	8747	Upper L. balmei	Paleocene	0	Good	High
SWC3	2670	8760	"	"	0	Good	High
Ctngs (coal)	2670-75	8760-76	"	"	3	Good	Moderate
SWC2	2672	8766	"	"	1	Fair	Low
SWC1	2679	8789	"	"	1	Fair	Low

(*Core Depths Corrected)

Well Name Fortescue-1 Basin Gippsland Sheet No. 1 of 8

PALYNOMORPHS / DEPTHS	2410	2411	2412	2413	2414	2415	2416	2417.2	2420.85	2423	2425.6	2429.3	2432.29	2435	2444	2454.5	2465.5	2500	2505-10	2510-20	2525	2530-35	2532	2551	2559-	2585	2590-95	2595
SAMPLE TYPE *	S	S	S	S	S	S	S	C	C	C	C	C	C	S	S	S	S	S	T	T	S	T	S	S	S	S	T	S
A. qualumis																												
A. acutullus									/																			
A. luteoides											/																	
A. oculatus												/																
A. sectus																												
A. triplaxis																												
A. obscurus																												
B. disconformis							/								/											/		
B. arcuatus																												
B. elongatus																												
B. mutabilis																												
B. otwayensis																												
B. elegansiformis																												
B. trigonalis																												
B. verrucosus																												
B. bombaxoides																												
B. emaciatus											/																	
C. bullatus																												
C. heskermensis																												
C. horrendus																												
C. meicosus													/															
C. apiculatus																												
C. leptos																												
C. striatus																												
C. vanraadshoovenii								/																/				
C. orthoteichus/major							/		/		/		/		/	/							/	/				
C. annulatus	/					/																						
C. gigantis																							/					
C. splendens							/					/				/								/		/		
D. australiensis																												
D. granulatus							/						/		/								/	/				/
D. tuberculatus															/								/					/
D. delicatus																					/			/				
D. semilunatus																												
E. notensis											cf																	
E. crassiexinus			/						/	/																		
F. balteus																	/											
F. crater																												
F. lucunosus																												
F. palaequetrus																												
G. edwardsii																												
G. rudata																												
G. divaricatus																												
G. gestus																												
G. catathus																												
G. cranwellae																												
G. wahooensis																												
G. bassensis																												
G. nebulosus																												
H. harrisii		/	/			/	/	/	/		/	/	/		/	/			/	/	/	/	/	/	/	/	/	
H. astrus																												
H. elliottii		/																										
I. anguloclavatus																												
I. antipodus																							/					
I. notabilis								/				/									/			/				
I. gremius									/		/					/												
I. irregularis																												
J. peiratus																												
K. waterbolkii																												
L. amplus																												
L. crassus							/																					
L. ohaiensis																												
L. bainii																												
L. lanceolatus																												
L. balmei								RW				RW					RW				RW				FW			
L. florinii								/				/			/	/						/	/	/	/		/	
M. diversus			/				/	/	/	/	/	/	/		/					/	/	/	/	/	/	/	/	
M. duratus																												
M. grandis																												
M. parimagnus																												

*C=core; S=sidewall core; T=cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 2 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	T	S	S
PALYNOMORPHS / DEPTHS	2616	2627	2636	2645	2655	2666	2670	2670-75	2672	2679
A. cualumis										
A. acutullus										
A. luteoides										
A. oculatus										
A. sectus										
A. triplaxis										
A. obscurus						/			/	
B. disconformis	/			/		/		/		/
B. arcuatus										
B. elongatus										
B. mutabilis										
B. otwayensis										
B. elegansiformis										
B. trigonalis										
B. verrucosus										
B. bombaxoides										
B. emaciatus										
C. bullatus						/				
C. heskermensis										
C. horrendus										
C. meleosus										
C. apiculatus										
C. leptos										
C. striatus										
C. vanraadshoovenii						/				
C. orthoteichus/major										
C. annulatus										
C. gigantis								/		
C. splendens		/	/	/	/	/		/	/	
D. australiensis										
D. granulatus		/	/				/		/	/
D. tuberculatus			/							
D. delicatus										
D. semilunatus										
E. notensis						/				
E. crassiexinus										
F. balteus						/				
F. crater										
F. lucunosus										
F. palaequetrus										
G. edwardsii										
G. rudata										
G. divaricatus										
G. gestus										
G. catathus										
G. cranwellae										
G. wahooensis										
G. bassensis										
G. nebulosus										
H. harrisii		/	/	/		/	/	/		/
H. astrus										
H. elliottii						/				
I. anguloclavatus							/			
I. antipodus										
I. notabilis		/								
I. gremius										
I. irregularis	/	/	/							
J. peiratus										
K. waterbolkii										
L. amplus								/		
L. crassus				/		/				/
L. ohaiensis										
L. bainii										
L. lanceolatus										
L. balmei	RW					/	/	/	/	/
L. florinii					/		/		/	/
M. diversus				/	/					
M. duratus										
M. grandis										
M. perimagnus										

*C=core; S=sidewall core; T=cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 3 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	C	C	C	C	C	C	S	S	S	S	S	T	T	S	T	S	S	S	S	T	S
PALYNOMORPHS / DEPTHS	2410	2411	2412	2413	2414	2415	2416	2417.2	2420.85	2423	2425.6	2429.3	2432.29	2435	2444	2454.5	2465.5	2500	2505-10	2510-20	2525	2530-35	2532	2551	2559—	2585	2590-95	2595
M. subtilis		/	/				/	/				/	/		/ A						/		/	/				
M. ornamentalis	cf																											
M. hypolaenoides																												
M. homeopunctatus																												
M. parvus/mesonesus							/	/	/	/	/	/	/		/	/								/				
M. tenuis			/							/	/	/																
M. verrucosus													/															
M. australis																								/				
N. asperus																												
N. asperoides																												
N. brachyspinulosus									/				/			/												
N. deminutus																												
N. emarcidus/heterus		/					/								/	/								/				
N. endurus																												
N. falcatus	/																											
N. flemingii								/	/		/		/			/	/					/	/	/				/
N. goniatus			/			/	/																					
N. senectus																												
N. vansteenisii																												
O. sentosa																												
P. ochesis																												
P. catastus								cf.																				/
P. demarcatus								/	cf		/		/								/			/				
P. magnus																												
P. polyoratus																							/					/
P. vesicus																												
P. densus																												
P. velosus											/										/							
P. morganii/jubatus																												
P. mawsonii	/	/						/					/										/		/		/	/
P. reticulosaccatus																												
P. verrucosus																												
P. crescentis																												
P. esobalteus								/				/			/						/							
P. langstonii																												
P. reticulatus																												
P. simplex																												
P. varus									/																			
P. adenanthoides (Prot.)			/				/	/	/	/	/	/	/		/	/								/			/	
P. alveolatus																												
P. amolosexinus																												
P. angulatus																												
P. annularis							/	/			/	/			/									/			/	
P. asperopolus																												
P. biornatus												/									/							
P. clarus																												
P. cleinei																												
P. confragosus																												
P. crassis																					/							
P. delicatus																												
P. formosus																												
P. grandis							/			/			/		/	/					/ A	/	/	/	/	/	/	/
P. grevillaensis																												
P. incurvatus			/																		/		/				/	
P. intricatus																												
P. kopiensis																												
P. lapis								/																				
P. latrobensis											/				/													
P. leightonii			/			cf	/	/				/	/															
P. obesolabrus																												
P. obscurus								/														/						
P. ornatus							/	/			/	/	/													/		
P. otwayensis																												
P. pachypolus			/					/	/	/	/	/	/															
P. palisadus																												
P. parvus																												
P. plemmelus																												
P. prodigus							/	/				/															/	
P. pseudomoides												/	/							/			/	/	cf		/	
P. recavus																												

*C = core; S = sidewall core; T = cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 4 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	T	S	S
PALYNOMORPHS / DEPTHS	2616	2627	2636	2645	2655	2666	2670	2670-75	2672	2679
M. subtilis			/		/		/		/	
M. ornamentalis										
M. hypolaenoides										
M. homeopunctatus										
M. parvus/mesonesus		/		/						
M. tenuis										
M. verrucosus										
M. australis										
N. asperus										
N. asperoides										
N. brachyspinulosus										
N. deminutus										
N. emarcidus/heterus							/			
N. endurus						/				
N. falcatus										
N. flemingii						/	/		/	
N. goniatus								/		
N. senectus										
N. vansteenisii										
O. sentosa										
P. ochesis										
P. catastus										
P. demarcatus										
P. magnus										
P. polyoratus		/	/			/	/			
P. vesicus										
P. densus					/	/				
P. velosus										
P. morganii/jubatus										
P. mawsonii		/			/	/	/	/	/	
P. reticulosaccatus										
P. verrucosus										
P. crescentis										
P. esobalteus										
P. langstonii										
P. reticulatus										
P. simplex										
P. varus				/						
P. adenanthoides (Prot.)		/	/	/			/			
P. alveolatus										
P. amolosexinus										
P. angulatus							cf			
P. annularis			/				/	/		
P. asperopolus										
P. biornatus										
P. clarus										
P. cleinei										
P. confragosus										
P. crassis										
P. delicatus										
P. formosus										
P. grandis	/	/	/							/
P. grevillaensis										
P. incurvatus										
P. intricatus										
P. kopiensis										
P. lapis								/		
P. latrobensis										
P. leightonii										
P. obesolabrus										
P. obscurus		/		/						
P. ornatus	/		/							
P. otwayensis										
P. pachypolus										
P. palisadus										
P. parvus										
P. plemmelus										
P. prodigus				/		/			/	
P. pseudomoides					/					
P. recavus										

*C= core; S= sidewall core; T = cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 5 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	C	C	C	C	C	C	S	S	S	S	S	T	T	S	T	S	S	S	S	T	S
PALYNOMORPHS / DEPTHS	2410	2411	2412	2413	2414	2415	2416	2417.2	2420.85	2423	2425.6	2429.3	2432.29	2435	2444	2454.5	2465.5	2500	2505-10	2510-20	2525	2530-35	2532	2551	2559	2585	2590-95	2595
P. rectomarginis																												
P. reflexus																												
P. reticulatus																												
P. reticuloconcavus																												
P. reticuloscabratus			/				/				/	/															/	
P. rugulatus																												
P. scitus																												
P. stipplatus																												
P. tenuiexinus									/		/										/		/	/			/	/
P. truncatus																												
P. tuberculatus																												
P. tuberculiformis			/									/			/								/					
P. tuberculotumulatus																												
P. xestoformis (Prot.)																												
Q. brossus																												
R. boxatus																												
R. stellatus																												
R. mallatus	/	/					/	/			/					/								/	/			
R. trophus																												
S. cainozoicus										/				/														
S. rotundus																												
S. digitatoides																												
S. marlinensis																												
S. rarus												/																
S. meridianus			/										/		/	/					/		/	/				
S. prominatus								/	/		/	/												/			/	
S. uvatus																												
S. punctatus													/															
S. regium																												
T. multistrixus (CP4)																						/						
T. textus																												
T. verrucosus																												
T. securus																												
T. confessus (C3)																												
T. gillii																												
T. incisus																												
T. longus																												
T. phillipsii																												
T. renmarkensis																												
T. sabulosus																												
T. simatus																												
T. thomasii																												
T. waiparaensis																												
T. adelaidensis (CP3)												/									/	/						
T. angurium																				/								
T. delicatus							cf.																					
T. geraniodes																												
T. leuros																												
T. lilliei																												
T. marginatus																												
T. moultonii												/	/			/												
T. paenestriatus							/			/	/	/	/		/	/					/		/	/				
T. retequetrus																												
T. scabratus																								/				
T. sphaerica									/	/	/				/	/					cf.			/				
T. magnificus (P3)																												
T. spinosus																												
T. ambiguus											cf.				/													
T. chnosus																												
T. helosus																	/											
T. scabratus																												
T. sectilis																												
V. attinatus																												
V. cristatus	I																											
V. kopukuensis		/					/				/					/							/	/			/	/
Tricolpites reticulatus, sf.			/				/				/											/						
Clavifera triplex											/	/													/			
Amosopollis cruciformis																												

*C = core; S = sidewall core; T = cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 6 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	T	S	S
PALYNOMORPHS \ DEPTHS	2616	2627	2636	2645	2655	2666	2670	2670-75	2672	2679
P. rectomarginis										
P. reflexus										
P. reticulatus										
P. reticuloconcavus										
P. reticuloscabratus			✓							
P. rugulatus										
P. scitus										
P. stipplatus										
P. tenuiexinus	✓			✓	✓	✓	✓			✓
P. truncatus										
P. tuberculatus										
P. tuberculiformis										
P. tuberculotumulatus										
P. xestoformis (Prot.)										
Q. brossus										
R. boxatus										
R. stellatus										
R. mallatus		✓			✓	✓	✓		✓	
R. trophus										
S. cainozoicus										
S. rotundus										
S. digitatoides										
S. marlinensis						✓				
S. rarus										
S. meridianus						✓		✓	✓	
S. prominatus					✓					
S. uvatus										
S. punctatus						✓		✓		
S. regium										
T. multistrixus (CP4)						✓	✓	✓		
T. textus								cf.		
T. verrucosus										
T. securus										
T. confessus (C3)										
T. gillii										
T. incisus										
T. longus										
T. phillipsii						✓				
T. renmarkensis										
T. sabulosus										
T. simatus										
T. thomasii										
T. waiparaensis										
T. adelaidensis (CP3)										
T. angurium										
T. delicatus										
T. geraniodes										
T. leuros										
T. lilliei										
T. marginatus										
T. moultonii				✓						
T. paenestriatus										
T. retequetrus										
T. scabratus										
T. sphaerica										
T. magnificus (P3)										
T. spinosus										
T. ambiguus										
T. chnosus										
T. helosus										
T. scabratus										
T. sectilis										
V. attinatus										
V. cristatus										
V. kopukuensis	✓	✓	✓	✓		✓	✓		✓	
Tricolporites reticulatus, sl.										
Clavifera triplex		✓					✓		✓	
Amosopollis cruciformis						✓	✓		✓	

*C = core; S = sidewall core; T = cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 7 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	C	C	C	C	C	C	S	S	S	S	S	T	T	S	T	S	S	S	S	T	S
PALYNOMORPHS \ DEPTHS	2410	2411	2412	2413	2414	2415	2416	2417.2	2420.85	2423	2425.6	2429.3	2432.29	2435	2444	2454.5	2465.5	2500	2505-10	2510-20	2525	2530-35	2532	2551	2559	2585	2590-95	2595
Achomosphaera spp.	/					/	/																					
Leptodinium spp.	/	/	/			/																						
Dino. scabroellipticus	/																											
Dino. simplex	/	/				/																						
Spiniferites spp.	/	/				/										/								/				
H'kolp. rigaudae	/	/																										
Nematosphaeropsis sp.	/																											
Oper. centocarpum	/	/		/																								
Dino. pontus		/				/ A										/												
Dino. mamilatus		/ A																										
Polysp. fibrosum		/																										
Nema balcombiana		/				/																						
Achom. alcicornu		/																										
H'kolp. varispinosa			/																									
Syst. placacantha			/																									
Defl. flounderensis							/	/													/							
Homot. tasmanensis							/	/		/		/																
Hemicystodinium sp.							/																					
Wetz. homomorpha (l.sp.)							/	/		/	/	/											/	/				
Para. indentata							/									/							/					
Tubios. filosa							/			/																		
Defl. delineata								cf																				
Adnat. reticulense								/																				
Cord. inodes								/		/						/								/				
Ken. lophophora								/																				
Hystr. tubiferum								/		/		/	/		/													
Spinidinium sp.																/												
Paleo. australinum																/												
Wetz. homomorpha (s.sp.)																							/					
Defl. dartmooria																							/					
Dyphes colligerum																								/				
Thal. pelagicus						cf																		/				
Cord. bipolar																								/				
Wetz. hyperacantha										cf					cf													
Ken. fimbriata																												

*C=core; S=sidewall core; T=cuttings.

Well Name Fortescue-1 Basin Gippsland Sheet No. 8 of 8

SAMPLE TYPE *	S	S	S	S	S	S	S	T	S	S
PALYNOMORPHS / DEPTHS	2616	2627	2636	2645	2655	2666	2670	2670-75	2672	2679
Achomosphaera spp.										
Leptodinium spp.										
Dino. scabroellipticus										
Dino. simplex										
Spiniferites spp.				/	/					
H'kolp. rigaudae										
Nematosphaeropsis sp.										
Oper. centocarpum				/						
Dino. pontus										
Dino. mamilatus										
Polysp. fibrosum										
Nema balcombiana										
Achom. alcicornu										
H'kolp. varispinosa										
Syst. placacantha										
Defl. floundercnsis										
Homot. tasmanensis										
Hemicystodinium sp.										
Wetz. homomorpha (l.sp.)			/		/	/	/		/	
Para. indentata										
Tubios. filosa										
Defl. delineata										
Adnat. reticulense										
Cord. inodes										
Ken. lophophora										
Hystr. tubiferum										
Spinidinium sp.										
Paleo. australinum										
Wetz. homomorpha (s.sp.)							/			
Defl. dartmooria										
Dyphes colligerum										
Thal. pelagicus										cf
Cord. bipolar										
Wetz. hyperacantha			A			A	/		/	
Ken. fimbriata						/	/			

*C= core; S= sidewall core; T= cuttings.