THE FORAMINIFERAL SEQUENCE
in
BIGNOSE # 1,
GIPPSLAND BASIN.

for: SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

November 17, 1983.

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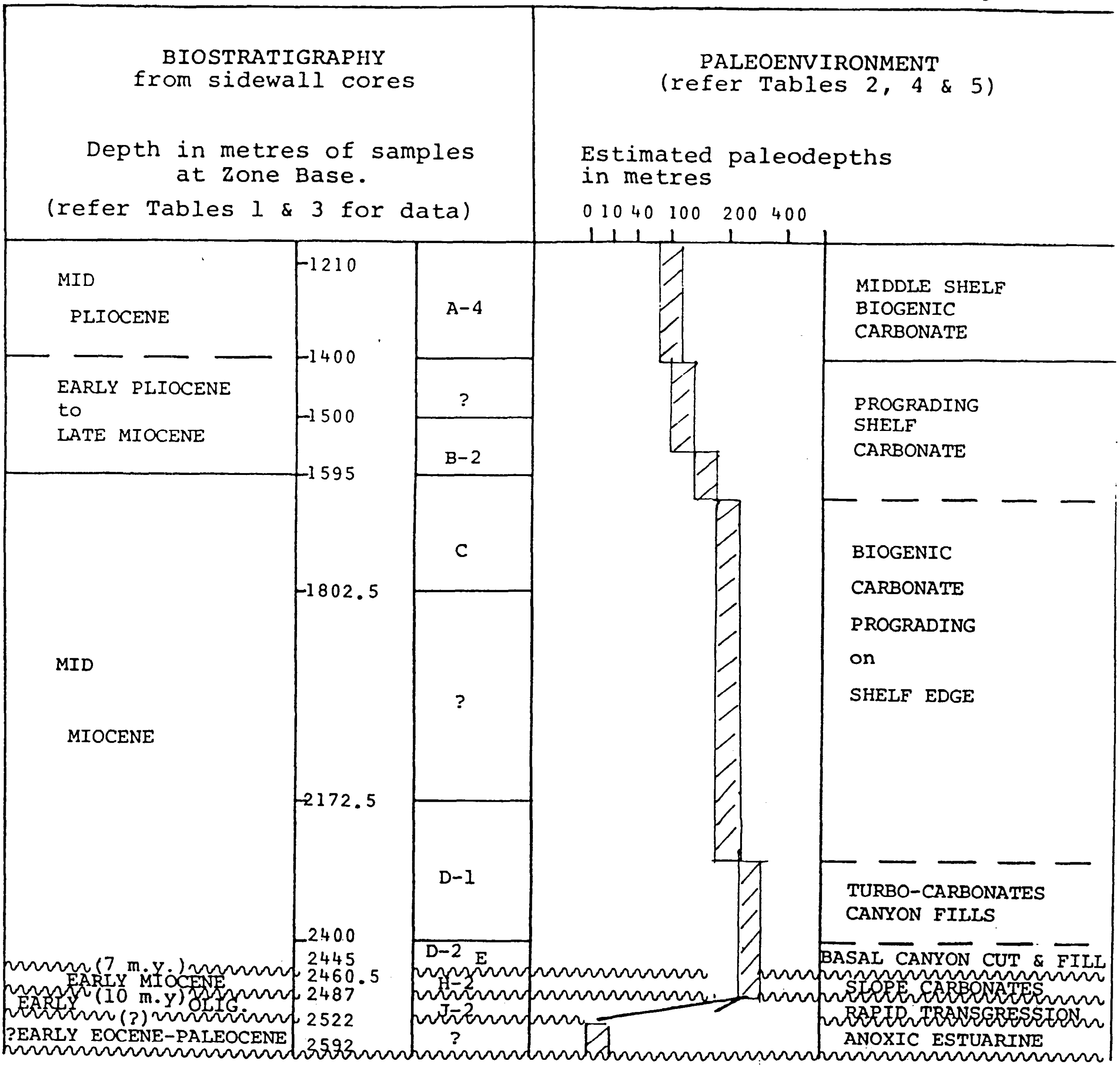

Deepest sample - 2592m.

(7 m.y.) = hiatus with time span parentheses

To Scale 10cm = 100m

FIGURE 1: INTERPRETED FORAMINIFERAL SEQUENCE for BIGNOSE # 1.

David Taylor, November 15, 1983.

INTRODUCTION.

Sixtyone sidewall cores were submitted from BIGNOSE # 1, between 1210m and 2592m. The carbonate section from 2522m to the highest sample at 1210m contained Oligo-Miocene to Pliocene planktonic foraminifera, although preservation quality varied with nine samples containing specifically indeterminate faunas, due to carbonate diagenesis. Sandy siltstone samples, between 2592m and 2525m, were biostratigraphically indeterminate because of absence of planktonic foraminifera, although the arenaceous species present have affinities with Paleocene to Early Eocene faunas in the Tasman Sea and New Zealand.

The following Figures and Tables constitute this report:-

FIGURE 1:	*INTERPRETED FORAMINIFERAL SEQUENCE* based on Figures 2 to 5.
TABLE 1:	*BIOSTRATIGRAPHIC DATA SUMMARY* with reliability of zonal picks.
TABLE 2:	*PRE-OLIGOCENE BENTHONIC FORAMINIFERA and SEDIMENT GRAIN ANALYSIS.*
TABLE 3:	*OLIGO-MIOCENE and PLIOCENE PLANKTONICFORAMINIFERAL DISTRIBUTION.*
TABLE 4:	*OLIGO-MIOCENE and PLIOCENE BENTHONIC FORAMINIFERAL DISTRIBUTION.*
TABLE 5:	*OLIGO-MIOCENE and PLIOCENE PALEOENVIRONMENTAL ANALYSIS* based on Tables 2, 3 & 4.

PRE-OLIGOCENE = ? LATE PALEOCENE to EARLY CRETACEOUS - 2592m to 2525m (E-logs - 2593m to 2524m).

These quartz, sandy siltstones contain numerically and specifically sparse arenaceous benthonic foraminiferal faunas (see Table 2). The overall assemblage interval includes two species, *Gaudyrina whangaia* and *Controtrochammina whangaia*, which Webb (1975) regards as being diagnostic of the Teurian Stage in New Zealand. The Teurian is regarded by Webb and other New Zealand workers as being Paleocene age, but may well extend into the Early Eocene, when represented purely by arenaceous foraminifera.

This is the first known occurrence of these "Teurian" arenaceous faunas in Gippsland or elsewhere along the southern Australian margin, although similar faunas are reported at DSDP Site 283 in the South Tasman Sea, (Webb, 1975) as well as on Campbell Island and the adjoining Campbell Plateau (Oliver et al, 1950 and Jenkins, 1975). These faunas are quite distinct from the early to mid Eocene faunas I have studied from the upper unit of the *Flounder Formation* in Flounder # 1, # 2 and # 4 wells. But the basal unit of the *Flounder Formation* is barren of foraminifera in all wells previously studied. Therefore, it could be assumed, on somewhat tenuous grounds, that this late Paleocene to early Eocene unit in BIGNOSE # 1 represents the lower part of the Flounder Formation.

The Bignose "Teurian" arenaceous faunas lack *Rhabdammina* spp. and *Rzehakina* spp., which were present in the Tasman Sea (D.S.D.P. Site 283) and led Webb (1975) to assume a deep water abyssal origin for the sediments. However, Webb (l.c.) suggests that the absence of *Rhabdammina* and *Rzehakina* from Teurian fauna in New Zealand, east coast outcrops indicates shallower water, more onshore environments. Therefore, the Bignose "Teurian" assemblages would be evidence of shallow water conditions. The Bignose sedimentation site was precluded from open oceanic circulation and restricted with regard to oxygenation; as apparent from the absence of planktonic calcareous benthonic foraminifera. The dominance of morphologically primitive arenaceous species (for example, *Haplophragmoides* spp.) implies low or fluctuating salinities of the water (Taylor, 1965). Also present were pyritized discs and spheres; obviously of biological origin and probably were diatoms. The paleo-biological evidence strongly points to an estuarine, environment which is supported by the occurrence of frosted and fractured quartz grains, which suggests aeolian transport and thus the presence of barrier sand dunes in the vicinity of the Bignose site in Late Paleocene and/or Early Eocene times.

<u>EARLY OLIGOCENE - ZONE J-2</u>; 2522m to 2492m (E-logs - 2523m to 2491m). Typical Zone J-2 planktonic assemblages were fairly well represented in this assemblage. The outstanding feature was the change in benthonic components. Benthonic fauans at 2522m and 2520m represented the shallower "Jan Jukian stage" assemblages of Crespin (1943), with shelf edge and upper

slope faunas being evident at and above 2515m (on criteria presented by Hayward & Buzas, 1979). This rapid trend of increasing water depth is one of a rapid transgression on a subsiding margin.

EARLY MIOCENE - ZONE H-1 and the "COBIA EVENT" HIATUS between 2487m and 2465m (E-log 2491m).

Well developed Zone H-1 faunas directly overly the Early Oligocene Zone J-2 assemblages, indicating a hiatus of some 10 million years effected this sequence. Despite the biostratigraphic dislocation, there was no paleoenvironmental disruption, as sediment on both sides of the hiatus contained upper slope benthonic faunas. This hiatus can be demonstrated in many of the sections drilled previously within the deeper parts of the offshore Gippsland Basin.

EARLY/MID MIOCENE to MID PLIOCENE - 2460m to 1210m.

The basal sample at 2460m has the *Praeorbulina* fauna, whilst that at 2455m has the initial appearance of *Orbulina* forms. Therefore, these two samples represent the Early/Mid Miocene transition and indicate an unconformable contact with the underlying earliest Miocene. This hiatus at 2463m (on E-log) had a time span of some 7 million years. The facies between 2460m and 2276m was that of typical Gippsland Miocene "turbo-carbonate", canyon fill; note for instance, size and shape sorting of faunas (refer Table 5). Therefore, the missing sediment was removed by an episode of canyon cutting at the termination of the Early Miocene.

Extreme diagenetic effects made biostratigraphic determination difficult; especially above 2200m. However, a continuous Mid Miocene to Mid Pliocene sequence is inferred, despite the inability to identify the Zone B-1 interval. The sequence above 2255m was a prograding one, shallowing from a shelf edge situation to a mid shelf one in the Pliocene.

REFERENCES.

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HAYWARD, B.W. & BUZAS, M.A., 1979 - Taxonomy and Paleoecology of Early Miocene Benthic Foraminifera of Northern New Zealand and the North Tasman Sea. *Smithsonian Conts. to Paleobiology, 36;* 1-154.

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TAYLOR, D.J., 1965 - Preservation, composition and significance of Victorian Lower Tertiary "*Cyclammina* faunas". *Proc. Roy. Soc. Vict., 87;* 143-160.

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TABLE 1

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND — ELEVATION: KB: 25.3m GL: ______

WELL NAME: BIGNOSE # 1 — TOTAL DEPTH: -379.00m

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	1210	1				1400	0			
		B_1	*					*				
MIOCENE	LATE	B_2	1550	1				1595	1			
		C	1605	1				1802.5	0			
	MIDDLE	D_1	2200					2400	2	2385	0	
		D_2	2410	1				2445	0			
		E_1	2450	1				2455	0			
		E_2	2460.5	0				2460.5	0			
	EARLY	F										
		G										
		H_1	2472.5	0				2487	0			
OLIGOCENE	LATE	H_2										
		I_1										
		I_2										
	EARLY	J_1										
		J_2	2492	2	2500	1		2522	1			
EOCENE		K										
		Pre-K	2525					2592				

COMMENTS: Pre K benthonic arenaceous foraminifera was biostratigraphically indeterminant, but by comparison was probably of Paleocene to possibly early Eocene age (see report).

*Probably present but indeterminant due to carbonate diagnesis.

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: *November 16, 1983.*

DATA REVISED BY: ______ — DATE: ______

SIDEWALL CORES Depth in metres	*Haplophragmoides suborbicularia*	*H. cf. kirki*	*H. sp.?*	*Textularia cf. plummerae*	*Ammobaculites sp.*	*Bathysiphon cylindrica*	*Conotrochammina whangaia*	*Ammomarginulina stephensoni*	*Gaudryina whangaia*	Total foram count	% planktonics	pyritized discs ? diatoms	pyritized spheres ? diatoms	pyrite	mica	carbonaceous matter	glauconite pellets	coarse rock fragments	MAJOR CONSTITUENTS (P : pyrite; .... : f quartz; ∇Δ∇ : c-f frosted & fractured quartz)	E-LOG CHARACTER CHANGE	AGE
	ARENACEOUS FORAMINIFERA									RESIDUE GRAIN LITHOLOGY (>.075mm) — MINOR CONSTITUENTS											
2520.0→ 2522.0→	refer Tables 3, 4 & 5																				EARLY OLIGOCENE (ZONE J-2)
2525.0→	x	x			°				°	50	nil		r				C		.... PPPPP	2524	? EARLY EOCENE or LATE PALEOCENE ? (similar to fauna at DSDP Site 283 - Webb, 1975).
2544.5→	x	x				°				100	nil		A	C			C	A	∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇		
2559.0→	°				°		°	°		10	nil	A	A	A			C		....		
2568.0→				°	°	°				10	nil	r		C	C		C		Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ		
2585.0→	N.F.F.									-	-			A	A	A			....		
2590.0→			°							10	nil			A	A	A	r	A	∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇		
2592.0→	°	°	°							10	nil			C	C				Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ∇Δ	2593	

KEY:

° = <20 specimens
x = >20 specimens
N.F.F. = no foraminifera found

A = 1-5% of grains
C = >20 grains
r = <20 grains

TABLE 2: PRE-OLIGOCENE BENTHONIC FORAMINIFERA and SEDIMENT GRAIN ANALYSIS - BIGNOSE # 1.

David Taylor,
November 10, 1983.

SIDEWALL CORE Depth in metres	G'ina brevis	G'ina labiacrassata	G'ina angiporoides (S.S.)	G'ina praebulloides	G'ina euapertura	G'alia gemma	G'alia munda	G'alia obesa	G'ina tripartita	G'alia continuosa	G'alia spp. indet	G'alia nana	G'quad dehiscens (S.L.)	G'ina woodi woodi	G'ina woodi connecta	G'ina bulloides	G'alia zealandica incognita	G'oides parawoodi	Cat. dissimilis	G'alia bella	Praeorb. glomerosa	G'oides bisphericus	G'oides trilobus	G'oides trilobus (elongate)	G'quad dehiscens (S.S.)	G'quad advena	G'quad altispira	G'alia praescitula	G'alia miozea miozea	G'alia siakensis/mayeri	G'alia praemenardii	G'ina & G'alia indet (<.2mm)	Orb. suturalis	G'alia peripheronda	G'alia conica	Orb. universa	G'oides ruber	G'alia miozea conoidea	G'alia peripheroacuta	G'ina ciperoensis Gp.	G'alia miotumida	G'alia scitula	G'alia lenguaensis	G'alia acostaensis	G'ina decoraperta	G'ina falconensis	G'ina pachyderma	G'alia crassaformis	G'alia humerosa	G'alia conomiozea	G'alia puncticulata	G'ina nepenthes	PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY: Depth to Base of Zone	ZONE
1210.0																x																												x	x	x	x		x	x	x			
1261.0																x											•									•								•	x	x	x	•	x		x			
1300.0																x																				•						•		•	x	x	x		x		•	•		A-4
1345.0																x																										•				x			•					
1400.0																x									•		•											•						•	x	x	x	x	•	x	x		1400	
1450.5																																x												•			•							
1500.0																x											•											•						•	x	x	x						1500	INDET
1550.0																x											•											•				•		x	x	•	x							B-2
1595.0														x		x											•													x		•		•									1595	
1605.0														x		x											•			x						•		•		x	•	•												
1645.0																x																								x		•												
1695.0														x		x														x		D				x		x		x	•	•	•											C
1750.0														x		x											•									D		•		x														
1802.5														x		x											•			x						x		x		x	•	•											1802.5	
1855.0																																																						
1885.0	indet																																																					
1898.5																																																						
1911.0																																																						
1950.0														x		x									•											x																		INDET
2050.0														•																		D																						
2100.0																																D																						
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2249.0														•														•				D			•			•																
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2422.5														x		x						•	x	•	•				•							•		x																
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2515.0	x	x	x	x	x	x	•	•	x	•																																										J-2
2520.0			•		•																																																	
2522.0	x	x	x	x	x	•	•	•																																												2522	
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2525.0 - 2592.0 - No planktonics, See Table

KEY:
- • = <20 specimens
- x = >20 specimens
- D = Dominant >60% of specimens
- ∿∿∿∿∿ = definite hiatus
- indet = specifically indeterminate due to diagenesis.

TABLE 3: OLIGO-MIOCENE and PLIOCENE PLANKTONIC FORAMINIFERAL DISTRIBUTION - BIGNOSE # 1.

David Taylor, November 8, 1983.

	"JAN JUK" TRANSGRESSION					CONTINENTAL SLOPE																				SHELF EDGE → MID SHELF																	MID → INNER SHELF										PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY	
SIDEWALL CORES Depth in metres	*Bathysiphon angleseaensis*	NODOSARIDS	*Haplophragmoides* spp.	*Ammodiscus parri*	*Vaginulinopsis gippslandica*	*Oridorsalis umbonifer*	*Melonis simplex*	*Karreriella bradyi*	*Discorbinella scopos*	*Cassidulina leavigata*	*Cibicides mediocris* & *temperatus*	*C. vortex*	*Stillostomella antillea*	*Sphaeroidina bulloides*	*Osangularia bengalensis*	*Cibicides molestus*	*Globobulimina* spp.	*Epistominella exigua*	*Trifarina bradyi*	*Anomalina macroglabra*	*Gyroidina zealandica*	*Pleurostomella tenua*	*Cibicides subhaidingeri*	*C. wuellerstorfi*	*Siphouvigerina proboscidea*	*Anomalina procolligera*	*Cibicides thiara*	*Discorbinella bertheloti*	*Lagena* (spherical)	*Fissurina* spp.	*Euuvigerina bassensis* & *pygmea*	*Amphicoryna scalaris*	*Bolivinita* sp?	*Bolivina reticulata*	*Siphonina australis*	*Melonis affinis*	*Nonionella* spp.	*Euuvigerina bassensis* "*paucicostata*"	*Siphouvigerina canariensis*	*Bolivina alata*	*Virgulina* spp. (plexus)	*Chilostomella* sp.	"Battered Robulus"	miliolids	*Discorotalia* & *Cribrorotalia*	*Karreria maoria*	*Cibicides refulgens*	*Karreria cygnorum*	*Discoanomalina mitchelli*	*Cibicides lobatulus*	*Elphidium crispum*	*Notorotalia clathrata*	Depth at Base	ZONE
1210.0																x											x	•	•	x	x			•		x	x			x	x				•				•		•	•		
1261.0														•													•	•	x	x	•									•	•	•		•					•	•	•			
1300.0										x																	x	•	•	x	x						•			•	x	•		•		•		•						
1345.0										•						•							•						•		•															•			•					
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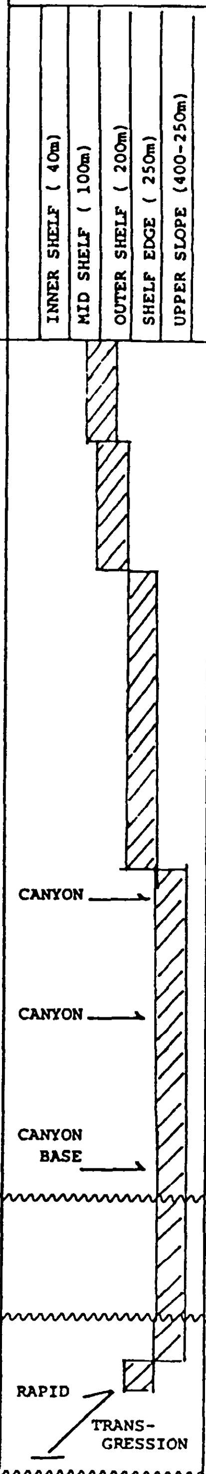
REFER TABLE 2 for Pre-Oligocene Benthonic fauna.

<u>KEY</u>:
• = <20 specimens
x = >20 specimens
D = Dominant >60% benthonic fauna
ξ = environmentally misplaced specimens
〰 = definite hiatus
indet = specifically indeterminate due to diagenesis.

TABLE 4 - OLIGO-MIOCENE and PLIOCENE BENTHONIC FORAMINIFERAL DISTRIBUITON - BIGNOSE # 1.

David Taylor, November 11, 1983.

SIDEWALL CORES Depth in metres	GROSS FORAMINIFERAL ASSEMBLAGE CHARACTERS: Total foram count	% planktonic forams	ASSEMBLAGE FEATURE	ENERGY REGIME	OXYGENATION	PRESERVATION	RESIDUE GRAINS – MINOR COMPONENTS: Glauconite pellets	Angular quartz	Pyrite	Limonitic pellets	Echinoid spines	Ostracods	Sponge spicules	Bryozoal fragments	MAJOR COMPONENTS (f : foraminifera; m : biomicrite; Ψ : recryst. biomicrite; ... : f angular qtz)	PALEO-ENVIRONMENTAL ASSESSMENT (refer also Table 4)	E-LOG CHARACTER CHANGE
1210.0	2000	70				G					A				mmmmmmmm ffffff		
1261.0	1000	80				G		A			A				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1300.0	2000	80				M					C				mmmm ffffffffff		
1345.0	?	?				P					r				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1400.0	2000	70				M	r				A	r			ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1450.5	?	?				MP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1500.0	250	75	ξ	PRO		MP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1550.0	250	75	ξ	PRO		MP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1595.0	?	?				MP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1605.0	750	75				MP						r			ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1645.0	200	90				MP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1695.0	500	90				MP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		1650
1750.0	1000	60	ξ S	PRO		M					A			A	ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1802.5	1000	60				M					C			C	ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1855.0	?	?				VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1885.0	?	?	ξ	PRO		VP								ξ	ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1898.5	?	?	ξ	PRO		VP								ξ	ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1911.0	?	?				VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
1950.0	?	?	S	HIGH		P							A		ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2050.0	?	?	ξ	PRO		VP		r					r	ξ	ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2100.0	?	?				VP					C				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2147.0	?	?	ξ	PRO		VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2172.5	?	?				VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2200.0	?	?				VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2225.0	?	?	S	HIGH		VP	C								ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2249.0	?	?	ξ S	PRO		P		r							ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2276.0	2000	95	S	HIGH		G									fffffffffffffff		2255
2299.5	?	?				VP							C		ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	CANYON →	
2320.0	?	?				VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2338.0	200	80	S	HIGH		M									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2355.0	250	98	S	HIGH		G			A						ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2375.0	100	95				M									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2385.0	250	95				M		r			r				Ψ ffffffffffff		
2400.0	20	90	S	HIGH		M		r							ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	CANYON →	
2410.0	500	98	S	HIGH		G									Ψ ffffffffffff		
2422.5	500	99				M/P									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2430.0	500	90				G						r			ΨΨ ffffffffffff		
2440.0	?	?				P									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2445.0	300	80				G			A				r		ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2450.0	50	95				M			A						ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	CANYON	
2455.0	500	99				EX		r							fffffffffffffff	BASE →	
2460.5	500	100				G			A				C		ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿								∿∿∿	∿∿∿	2463
2465.0	?	?				VP									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2472.5	1000	95			P	M			A						ΨΨΨΨΨΨΨΨ ffffff		
2475.0	?	?			P	VP			A						ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2479.0	100					P						r			ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2487.0	500	98			P	M			A	r					ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿								∿∿∿	∿∿∿	2491
2492.0	?	?				VP		r							ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2500.0	?	?				VP		r	r						ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ		
2508.0	1000	95				M		r							ΨΨΨΨΨΨΨ ffffff		
2510.0	?	?				P			r						ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	RAPID	
2515.0	1000	95				M		r			r				ΨΨΨΨΨΨΨΨ ffffff	TRANS-	
2520.0	?	?				P	r	A							ΨΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	GRESSION	
2522.0	250	95				M/P	r								.... mmmmmmmm		
∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿	∿∿∿								∿∿∿	∿∿∿	2523
	REFER TABLE 2 for Pre-Oligocene Benthonic Fauna.																



PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY

Depth to Base of Zone	ZONE
1400	A-4
1500	INDET
1595	B-2
1802.5	C
2172.5	INDET
2400	D-1
2445	D-2
2455	E-1
2460.5	E-2
2487	H-1
2522	J-2

KEY: ξ = environmentally misplaced specimens from shallower water situations, indicating - PRO = PROGRADATION

S=size or shape sorting, indicating HIGH ENERGY CURRENTS

A = abundant
C = common
r = rare
ξ = misplaced

TABLE 5: OLIGO-MIOCENE and PLIOCENE PALEOANALYSIS - BIGNOSE # 1.

David Taylor, November 15, 1983.