R137/86

TPR OR-293

285001

THE FORAMINIFERAL SEQUENCE
in
KOORKAH # 1 - BASS BASIN

for:- AMOCO AUSTRALIAN PETROLEUM COMPANY

February 20th, 1985

DT/03/86

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285002

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1. INTRODUCTION.

Twenty intervals of ditch cutting samples were examined between 440m and 1600m in KOORKAH # 1. Unlike Yolla # 1 and Tilana # 1, mud contamination was prevalent in Koorkah # 1; note microfossil occurrences marked with an asterisk (*) on Tables 2 and 3. For instance, *Orbulina universa* was present some 600m to 800m below its assumed *in situ* position (refer Table 2). Rather than being cavings, these contaminants were as microscopic grains added to the mud when the bit penetrated the soft and plastic calcarenites at and around the 600m level.

A summary of the KOORKAH # 1 sequence is given as Table 1; whilst factual data on distribution of planktonic and benthonic foraminifera is presented on Tables 2 and 3. Biostratigraphic reliability is shown on Table 4.

A brief discussion of the sequence, in ascending stratigraphic order is given below, with correlation to other Bass Basin sequences.

2. ? LATE EOCENE? - FACIES D - top approximating 1420m.

No planktonic foraminifera were found in this unit. Therefore the Late Eocene age is purely by inference and similarity with other Late Eocene sediments of the Bass Basin which do contain Late Eocene planktonic faunas (for example, Tilana # 1).

The microfossil assemblages of dark grey/brown siltstones and quartz sandy siltstones, were dominated by pyritic tubes and other forms of biogenic pyrite as well as grey, fine textured specimen of *Haplophragmoides* spp; the arenaceous benthonic foraminifera which can tolerate anoxic conditions and fluctuating water salinities. This Facies D in Koorkah is a typical expression of the Demons Bluff Formation in the Bass Basin.

3. EARLY to LATE OLIGOCENE - FACIES C - top approximating 1240m.

This unit embraces assemblages which represent the Planktonic Foraminiferal Zones J-2; J-1 and I-1. Although Zone I-2 could not be identified, it was probably present, especially as *Globorotalia testarugosa* does not extend up into Zone I-1, yet it was associated with a definite Zone I-1 assemblage in

Koorkah (refer Table 2). Therefore sedimentation was probably continuous during the Oligocene in Koorkah and the sequence was more akin to the Bass # 1, # 2 and # 3 sequences than to Yolla # 1 and Tilana # 1 where the Oligocene hiatus occurred (refer Taylor, 1985, diagram on page 4).

Lithologically this unit consists of calcareous siltstones with varying amounts of quartz sand grains. The planktonic foraminiferal faunas were numerically sparse with low specific diversity, suggesting very limited access to oceanic currents. The occurrence of benthonic foraminifera was sporadic both numerically and in specific diversity. Burrowing gastropods occur in two samples, suggesting a soft substrate. These gastropods were always infilled with pyrite and there was an abundance of other forms of biogenic pyrite. The gross aspect of the microfossil associations suggest deposition in shallow water (<90m paleodepth), in an anoxic substrate beneath normal salinity sea water.

Facies C appears to be the equivalent of the Jan Juc Formation without any equivalents of the more sandy facies of the Angahook Formation being present in the sequence. Thus the Koorkah unit is more akin to the Bass # 1 and # 3 sequences than to Yolla # 1 and Tilana # 1 (refer Taylor, 1985, p.4).

4. LATE OLIGOCENE and EARLY to MID MIOCENE - FACIES B - top at 680m.

This is a bioclastic carbonate unit with continuous sedimentation from Zone # 2 (Late Oligocene) to Zone D-2 (Mid Miocene). Micro faunas were sporadic in both numerical frequency and specific diversity, suggesting some restriction to oceanic circulation, though oxygenation and sea water salinities appeared to have been normal. Fragmentation of bryozoal, skeletal debris, indicates high energy transportation and deposition; especially towards the base of the sequence. Paleo-water depths probably did not exceed 120 metres.

5. MID MIOCENE and younger - FACIES A - top sample at 440m.

The litho-facies of this unit was a bioclastic carbonate identical to that of Facies B, but the rich foraminiferal faunas denote a dramatic improvement in water circulation and availability of nutrients. The presence of the planktonic species *Globorotalia conica* and *G. miozea* at 600m is suggestive of an influx of oceanic water from the east (the Gippsland Basin) rather than from the west (the Otway Basin).

6. REFERENCE.

TAYLOR, David, 1985 - The Foraminiferal Sequence in Tilana # 1 - Bass Basin. for: Amoco Australian Petroleum Company, October 30, 1985.

BIOSTRATIGRAPHY				
AGE	Sample depth for 'Tops' * in metres	PLANKTONIC FORAMINIFERAL ZONE	PALEO-DEPTH Estimates in metres (0 100 200)	LITHO - UNITS and PALEO-ENVIRONMENTS
Top Sample	440			
MID MIOCENE or YOUNGER		?		FACIES A - Bryozoal calcarenite - nutrient enriched with oxygenated with apparent access by oceanic currents from the Tasman Sea.
	600			680
MID MIOCENE		D-2/ E-1		FACIES B - Bryozoal calcarenite. Restricted oceanic circulation though oxygenation increased gradually upsection, with marked improvement above 1010 metres.
EARLY	900	E-2 /F		
MIOCENE	1010	G/H-1		
LATE OLIGOCENE	1140	H-2		
	1240	I-1/2		1240 FACIES C - Calcareous siltstone with varying amount of quartz sand. Restricted anoxic marine environment, with limited oceanic circulation.
EARLY OLIGOCENE	1320	J-1		
	1380	J-2		
? ?	1420	? ?		1420 FACIES D - Dark grey/brown siltstone & sandy siltstones. Marginal marine anoxic environment with no oceanic circulation.
? LATE ? EOCENE		? K ?		
Basal Sample at 1590-1600				

TABLE 1: INTERPRETED FORAMINIFERAL SEQUENCE - KOORKAH # 1 - BASS BASIN.

(Factual data Tables 2 & 3)

* only ditch cutting samples available

David Taylor,
February 18th, 1986

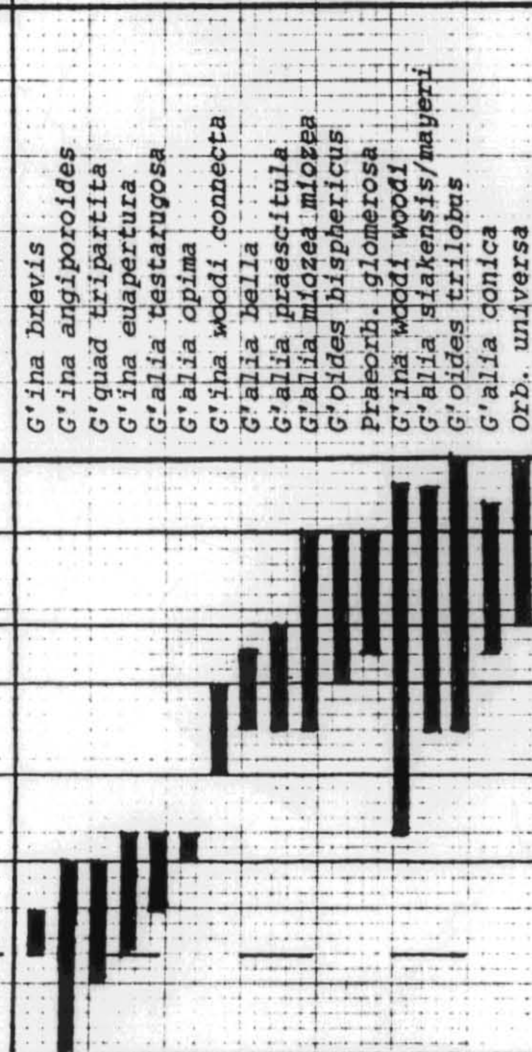
5 cm

TABLE 2 - BIOSTRATIGRAPHIC DATA - KOORKAH # 1 - BASS BASIN

PLANKTONIC FORAMINIFERA ACTUAL DISTRIBUTION

DITCH CUTTING SAMPLE INTERVALS in metres	G'ina & G'alia indet (<.2mm	G'ina woodi woodi	G'ina bulloides	Orb. universa	G'alia conica	G'alia praemenardii	G'alia miozea miozea	G'alia miozea coinoidea	G'oides trilobus	G'oides bisphericus	G'quad dehiscens (SS)	G'quad altispira	Preorb. glomerosa	Cat dissimilis	G'alia bella	G'alia siakensis/mayeri	G'alia obesa	G'ina praebulloides	G'ina woodi connecta	G'alia praebulloides	G'alia opima	G'alia testarugosa	G'ina euapertura	G'quad tripartita	G'ina angiporoides	G'ina brevis
440- 50	D	X	X	o																						
490-500	D	X	X	o																						
600-610		X	X	X	X	o	o	o	X	X	X	o														
680-700		o	o	o					o	o	o															
800-810			o	o					o	o	o		o													
900-910			o						o																	
950-960									o					o												
1010- 20		o							o			o			o	o	o	o	o							
1060- 70		o		*					o						o	o	o	o	o							
1100- 20		o													o				o	o						
1140- 50				*												*	o	o								
1200- 10		o														*	o									
1240- 50				*														o			o	o	o			
1320- 30																							o	o	o	
1350- 60																										
1380- 90				*														o					o		o	?
1420- 30	NO PLANKTONIC FAUNA																									
1500- 10	NO PLANKTONIC FAUNA																									
1540- 50	NO PLANKTONIC FAUNA																									
1590-600	NO PLANKTONIC FAUNA																									

PLANKTONIC FORAMINIFERA INFERRED RANGES



BIOSTRATIGRAPHY

PLANKTONIC FORAM ZONES	ZONAL TOPS; depth in metres	GEOCHRONOLOGY
?		MID MIOCENE or YOUNGER
? D-2/E-1	600	? MID MIOCENE
E-2/F	900	EARLY MIOCENE
G/H-1	1010	EARLY MIOCENE
H-2	1140	LATE OLIGOCENE
I-1/2	1240	LATE OLIGOCENE
J-1	1320	EARLY OLIGOCENE
J-2	1380	EARLY OLIGOCENE
? ?K?	1420	?? ? LATE ? ?EOCENE?

o = 1-20 specimens : X = >20 specimens: D = Dominant >60% specimens: ? identification: * = mud contaminant.

David Taylor, Feb. 3rd, 1986

295007

Arenaceous Foraminifera

Ditch cutting sample intervals in metres	Ammosphaeroidina sp.	Textularia spp.	Gaudryina convexa	Ammodiscus sp.	Pseudoclavulina rudis	Gaudryina heywoodensis	Trochammina sp.	Haeuslerella sp.	Bathysiphon sp.	Haplophragmoides spp. (coarse grained)	Haplophragmoides spp. (fine grained)
440- 450											
490- 500	°										
600- 610		x	°								
680- 700	°	°									
800- 810	°	°	x	°	°						
900- 910	°										
950- 960			°			°					
1010-1020			°		°	°				°	
1060-1070	°		°		°	°				°	
1100-1120			°							°	
1140-1150						°				°	
1200-1210	°		°		°		°	°		°	
1240-1250						x		°	°	°	
1320-1330				°			°		°	°	
1350-1360			°						°	x	
1380-1390	°	°	°		°	°			°	x	
1420-1430									°		D
1500-1510	*										
1540-1550				°		*			°		D
1590-1600											D

Calcareous Benthonic Foraminifera

Ditch cutting sample intervals in metres	Cassidulina subglobosa	Cibicides opacus	C. thiara	C. pseudoungerianus	C. molestus	C. mediocris	Notorotalia spp.	Nonionella spp.	Hetrolepa victoriensis	Oridorsalis umbonifer	O. tenera	Eponides repandus	Anomalina procolligera	Sphaeroidina bulloides
440- 450	°													
490- 500		x	°	x	°	°	°	°						
600- 610		x							x	°	°	°	x	°
680- 700		x		°	°	°			°	°				°
800- 810		x			x				°				°	
900- 910		°				°	°		°					
950- 960		°				°							°	
1010-1020	°	°			°		x							°
1060-1070							°							
1100-1120													°	
1140-1150	°												°	°
1200-1210	°													°
1240-1250				x	x									°
1320-1330														
1350-1360	°													
1380-1390														
1420-1430														
1500-1510														
1540-1550														
1590-1600														

Ditch cutting sample intervals in metres	Ceratobulimina sp.	Gyroidina spp.	Cibicides subhaidingeri	C. perforatus	Siphonina australis	Notorotalia crassimurra	Glandulina spp.	Guttulina problema	Alabamina sp.	Discorbinella bertholotti	Hetrelopa crespinae	Vaginulinopsis gippslandica	nodosarids	miliolids
440- 450														
490- 500														
600- 610													x	x
680- 700														
800- 810													x	x
900- 910	°	°												
950- 960														
1010-1020		°	°	x									°	°
1060-1070				x										°
1100-1120				x	°	°							°	
1140-1150	°	°		°			°						°	
1200-1210		°		x		°	°						x	
1240-1250				x		°		°	°	°	°		°	x
1320-1330				°								°		°
1350-1360				°										
1380-1390		°		°		°		°					°	
1420-1430														
1500-1510														*
1540-1550														*
1590-1600														

Statistics, Other Fauna and Facies

Ditch cutting sample intervals in metres	Foram count	% planktonic forams	% arenaceous forams	Bryozoal fragments	ostracods	Echinoid spines	Bivalve mollusca	Gastropods	Biogenic pyrite	Pyrite tubes	Pyrite spheres	Facies (Refer Table 1) with Top Depth in metres
440- 450	?	?90	–	D								
490- 500	500	60	?	A	r	r						A
600- 610	1000	60	5	D			r					
680- 700	100	15	5	A		r						600m
800- 810	250	10	20	D	r			r	r			
900- 910	30	10	10	D	r							
950- 960	50	10	10	D			r		r			
1010-1020	200	10	10	A	C	C	C		A			
1060-1070	100	10	20	D			C		A			B
1100-1120	100	10	10	A	r				r			
1140-1150	150	10	10	D	r				r			
1200-1210	100	10	30	D			r	r	A	r		
1240-1250	200	10	20	*		C				A		1240m
1320-1330	20	10	80		r		r	C	A	A		
1350-1360	100	–	70			r	r	A	A	A		C
1380-1390	100	10	50	*	A				A		r	
1420-1430	50	–	100	*				A	D	A		1420m
1500-1510	*	–	*	*			r	A	D	A	r	
1540-1550	50	–	100	*					A	A		D
1590-1600	20	–	100						D	A		

TABLE 3: BIOFACIES DATA – KOORKAH # 1 – BASS BASIN.

° = 1-20 specimens
x = >20 specimens
D = Dominant >60% specimens
* = mud contaminants
A = Abundant 1-10%
C = Common
r = rare

5 cm

David Taylor,
February 12, 1986.

285008

285009

Form R 193 3/71

TABLE 4

BASIN BASS BY David Taylor

WELL NAME KOORKAH # 1 DATE 20/2/1986 ELEV. ______

Foram Zonules

		Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
MIOCENE	A						
	Alternate						
	B						
	Alternate						
	C						
	Alternate						
	D_1						
	Alternate						
	D_2	600	3		810	3	
	Alternate						
	E	900	4				
	Alternate						
	F						
	Alternate						
	G	1010	3				
	Alternate						
	H_1						
	Alternate						
	H_2	1140	3		1210	4	
	Alternate						
OLIGOCENE	I_1	1240	3		1250	3	
	Alternate						
	I_2	*			*		
	Alternate						
	J_1	1320	4		1360	4	
	Alternate						
	J_2	1380	3		1390	3	
	Alternate						
EOC.	K	1420	4		1600	4	
	Alternate						
	Pre K						

*probably present

COMMENTS:

Note: If highest or lowest data is a 3 or 4, then an alternate 0, 1, 2 highest or lowest data will be filled in if control is available.

If a sample cannot be interpreted to be one zonule, as apart from the other, no entry should be made.

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).