MICROPALAEONTOLOGICAL ANALYSIS LA BELLA-1, PERMIT VIC-P-30 OTWAY BASIN

FOR

BHP PETROLEUM PTY LTD

J.P. REXILIUS
S.L. POWELL

SEPTEMBER, 1993

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CONTENTS

I. SUMMARY

La Bella-1 was drilled in offshore petroleum permit Vic-P-30, Otway Basin to a depth of 2735mKB. A total of 15 sidewall core samples from the Tertiary section have been examined for foraminifera and calcareous nannoplankton. A summary of the biostratigraphic and environmental sub-division for these samples is given below:-

Planktonic Foraminiferal Sub-division

635m-1115m	Zone H1	early Early Miocene
1151m-1364m	indeterminate	indeterminate

Calcareous Nannoplankton Sub-division

635m-832m	Zone NN1	early Early Miocene
896.5m	Zones NN1 & NP25/24	early Early Miocene-late Late Oligocene
997m-1151m	Zones NP25/24	late Late Oligocene
1200.5m-1364m	indeterminate	indeterminate

Integrated Biostratigraphic Sub-division

635m-832m	Zones H1, NN1	early Early Miocene
896.5m	Zones H1, NN1 to NP24	early Early Miocene-late Late Oligocene
997m-1115m	Zones H1, NP25/24	late Late Oligocene
1151m	Zones NP25/24	late Late Oligocene
1200.5m-1364m	indeterminate	indeterminate

Environment of Deposition

Samples 635m to 1027m inclusive	middle-outer neritic
1040m	outer neritic
1064m & 1115m	middle-outer neritic
1151m	middle neritic
1200.5m	indeterminate
1255m & 1264m	undifferentiated marine
1340m & 1364m	indeterminate

II. INTRODUCTION

A total of 15 sidewall core samples from the interval 635m to 1364m have been examined for foraminifera and calcareous nannoplankton.

Fossil assemblages identified in the well section have been plotted on the distribution chart (Appendix No 2).

III. BIOSTRATIGRAPHIC ANALYSIS

The planktonic foraminiferal letter scheme of Taylor (in prep.) and the nannoplankton letter scheme of Martini (1971) are used for biostratigraphic subdivision.

A. Planktonic Foraminiferal Sub-division

1. 635m-1115m : Zone H1 (early Early Miocene)

Assignment to Zone H1 is based on the occurrence of *Globigerina woodi connecta* and the lack of *Globigerinoides trilobus*.

2. 1151m-1364m : Indeterminate

The sidewall core sample at 1151m contains a single specimen of *Globigerina* while the other sidewall cores lower in the interval are barren of planktonic foraminifera.

B. Calcareous Nannoplankton Sub-division

1. 635m-832m : Zone NN1 (early Early Miocene)

The occurrence of *Cyclicargolithus abisectus* and lack of pre-Zone NN1 index species indicates assignment to Zone NN1.

2. 896.5m : Zones NN1 & NP25/24 (early Early Miocene-late Late Oligocene)

Assignment to Zones NN1 to NP24 inclusive is based on the association of a single specimen of *Dictyococcites bisectus* together with *Cyclicargolithus abisectus.*

3. 997m-1151m : Zones NP25/24 (late Late Oligocene)

Assignment to Zones NP25 and NP24 is based on the association of *Dictyococcites bisectus, Cyclicargolithus abisectus* and *Zygrhablithus bijugatus.*

4. 1200.5m-1364m : Indeterminate

The sidewall core samples in the interval are barren of calcareous nannoplankton.

IV. ENVIRONMENT OF DEPOSITION

1. Samples 635m to 1027m inclusive : Middle–outer neritic

The benthonic foraminiferal fauna includes the following bathymetrically important taxa: *Sphaeroidina bulloides* (rare–frequent), *Pullenia bulloides* (single–rare), *Globocassidulina subglobosa* (frequent–abundant), *Siphouvigerina canariensis* (rare) and *Cassidulina delicata* (rare–common). Deposition in a middle to outer neritic setting is envisaged.

2. 1040m : Outer neritic

The foraminiferal fauna at 1040m is dominated by benthonics with the following important taxa represented: *Globocassidulina subglobosa* (abundant), smooth *Hyperammina* (rare) and smooth *Bathysiphon* (single). Deposition in an outer neritic environment is envisaged.

3. 1064m & 1115m : Middle–outer neritic

The samples are interpreted to have been deposited in a middle to outer neritic setting on the basis of containing a similar benthonic foraminiferal fauna to that recorded in the overlying sample but without the flysch taxa, smooth *Hyperammina* and *Bathysiphon.*

4. 1151m : Middle neritic

The sidewall core sample at 1151m contains a benthonic foraminiferal assemblage that lacks outer neritic taxa and is dominated by *Eponides subhaidingeri* (common) and *Globocassidulina subglobosa* (common). Deposition in a middle neritic environment is envisaged.

5. 1200.5m : Indeterminate

The sandstone sidewall core sample is barren of foraminifera, nannoplankton and other skeletal material.

6. 1255m & 1264m : Undifferentiated marine

The sandstone samples in the interval are barren of foraminifera, nannoplankton and other skeletal material but do contain minor glauconite suggesting deposition in a marine setting.

7. 1340m & 1364m : Indeterminate

The sandstone sidewall core samples are barren of foraminifera, nannoplankton and other skeletal material.

V. REFERENCES

MARTINI, E., 1971. Standard Tertiary and Quaternary calcareous nannoplankton zonation, in Farinacci, A., (ed), *Proc. Second Plank. Conf*, Roma, 1970, 1: 739–785.

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

APPENDIX NO. 1: SUMMARY OF MICROPALAEONTOLOGICAL DATA, LA BELLA-1

DEPTH (mKB)	FORAM YIELD	FORAM PRESERV.	FORAM DIVERSITY	NANNO YIELD	NANNO PRESERV.	NANNO DIVERSITY
SWC60, 635	high	moderate	high	high	moderate	moderate-low
SWC59, 695	high	moderate	high	high	moderate	moderate
SWC57, 832	moderate	moderate	moderate	low	moderate	low
SWC55, 896.5	high	moderate	mod-high	high	moderate	moderate
SWC52, 997	moderate	moderate	mod-low	high	moderate	low
SWC51, 1027	high	moderate	high	high	moderate	moderate-high
SWC50, 1040	high	mod-good	mod-high	high	mod-good	moderate
SWC47, 1064	high	mod-good	mod-high	mod-low	poor	low
SWC45, 1115	high	mod-good	high	high	moderate	moderate
SWC44, 1151	mod-low	moderate	moderate	low-v. low	poor	low
SWC41, 1200.5	barren	-	-	barren	-	-
SWC38, 1255	barren	-	-	barren	-	-
SWC37, 1264	barrren	-	-	barren	-	-
SWC34, 1340	barren	-	-	barren	-	-
SWC33, 1364	barren	-	-	barren	-	-

APPENDIX NO. 2: DISTRIBUTION FORAMINIFERA AND NANNOPLANKTON, LA BELLA-1

SPECIES /SAMPLES	SWC, 635m	SWC, 695m	SWC, 832m	SWC, 896.5m	SWC, 997m	SWC, 1027m	SWC, 1040m	SWC, 1064m	SWC, 1115m	SWC, 1151m	SWC, 1200.5m	SWC, 1255m	SWC, 1284m	SWC, 1340m	SWC, 1364m
BENTHONIC FORAMINIFERA															
Lenticulina spp.	f	f	f	s	r	f	f		r	f					
Globocassidulina subglobosa	c	c		f	c	a	a	a	c	c					
Sphaeroidina bulloides	f	r	r	r		f		r	f	r					
Eponides subhaidingeri	c	c	c	a	c		f	r	c	c					
Stilostomella spp.	s			f		c	c	r							
Cibicides vortex	c	f	f						r						
Lagena spp.	f	f	f	f	r	c	s	c	f						
Fissurina spp.	a	r	s	r		c		f	s						
Dentalina spp.	s	s					r		f	r					
Loxostomum spp.	r														
Pullenia bulloides	r	r		s	r	s		s	r	s					
Protoglobobulimina spp.	s								r						
Anomalinoides glabrata	s			f											
Triloculina spp.	s					r									
Pseudonodosaria laevigata	r					r	r								
Nodosaria spp.	f	f	r	r	r	c	f	f	r						
Euuvigerina peregrina	f	r		f											
Euuvigerina schwageri	r														
Lagenonodosaria scalaris	s			r	s	s	s		s						
Cibicides thiara	c	f	f	r		f		r		r					
Trifarina bradyi	r	r	s	r			r	s	c	s					
Astrononion spp.	f	r	f	r	r	r	f		r	r					
Cibicides spp. (small)	a					c	c	c							
Siphonina spp.	r														
Brizalina robusta	f	r		f	r	f	f		r						
Cassidulina delicata	f	f	r	c		c		r	s						
Siphouvigerina canariensis	r	r	r	r	r			s							
Anomalina inversa	r		s		s	r									
Textularia spp.	r		r			r			s						
Haplophragmoides spp. (smooth)		r													
Euuvigerina flintii		r													
Ramulina spp.		s				s		s							
Pyrgo spp.		s				s									
Hanzawaia spp.		r	s	s	r	s	s								
Cibicides mediocris		r													
Sigmoidella elegantissima		s	s												
Nodosaria longiscata		r				r									
Neoeponides parantillarium		s													
Clavulina spp.		r				s	s								
Guttelina problema		s					s	s	s						
Pullenia quinqueloba		s													
Anomalina glabrata		r													
Bueningia creeki		s													
Bolivina mahoenica		r													
Heronallenia spp.		s				s									
Cibicides spp.		c	c	a	c				a	f					
Cibicides lobulatus			r	s		s									
Gyroidina spp.			r						r						
Gyroidina subzealandica			r			r									
Bolivina spp.			s		s	r									
Discorbis spp.				s											
Siphonina tubulosa				f	s	f		s	f						
Glandulina spp.				s	s	r		s							
Brizalina spp.				f	r	c		f	r						
Vaginulinopsis spp.				s											
Cassidulina bradyi					r										
Pleurostomella spp.					s										
Arenodosaria antipoda						r									
Gyroidina zealandica						c	r		s	r					
Pyrulina cylindroides						r									
Gaudryina spp.						r		s							
Baggina ampla						s									
Bulimina striata						r									
Dorothia spp.						s	s								
Cassidulina oblonga						f		f	s						
Quinqueloculina spp.						r									
Haplophragmoides spp.							r								
Hyperammina spp. (smooth)							s								
Reussella simplex							s								
Bathysiphon spp. (smooth)							s								

s = single, r = rare, f = frequent, c = common, a = abundant.

APPENDIX NO. 2: DISTRIBUTION FORAMINIFERA AND NANNOPLANKTON, LA BELLA-1

SPECIES /SAMPLES	SWC, 635m	SWC, 695m	SWC, 832m	SWC, 896.5m	SWC, 997m	SWC, 1027m	SWC, 1040m	SWC, 1064m	SWC, 1115m	SWC, 1151m	SWC, 1200.5m	SWC, 1255m	SWC, 1264m	SWC, 1340m	SWC, 1364m
Protoglobobulimina affinis								r							
Marginulina spp.								s	s						
Discorotalia tenuissima								s	r						
Cibicides semiperforatus								s		s					
Melonis affinis								r							
Cyclammina spp.									r						
Anomalina spp.									r	s					
Notorotalia stachei									s						
Protoglobobulimina ovata									r	s					
Lamarckina spp.									s						
Alabamina spp.									r						
Anomalinoides evolutus									s						
Bolivinopsis cubensis									r						
Epistominella cassidulinoides										r					
PLANKTONIC FORAMINIFERA															
Globigerina praebulloides	f	f	r			f		f	f						
Globigerinoides spp.	c	f	f												
Globoquadrina dehiscens s.s.	s	r	r												
Globigerina brazieri	c							r							
Globigerina woodi woodi	c					s	r	r	s						
Globigerinoides altiaperturus	r		r												
Globigerina woodi connecta	f	r	s	s		r		f	r						
Turborotalia continuosa	r														
Globigerina aff. angustiumbilicata	s	f		s											
Catapsydrax aff. dissimilis			s					r							
Turborotalia cf. kugleri				r											
Globigerina obesa				r		f									
Globigerinoides aff. primordius				s											
Globigerina spp.				f	f		r			s					
Globigerina euapertura						r		r	r						
Globigerina aff. woodi connecta							s								
Turborotalia opima nana								s							
Catapsydrax aff. unicavus									s						
CALCAREOUS NANNOPLANKTON															
Cyclicargolithus floridanus	a	a	f	a	a	a	a	c	a	f					
Cyclicargolithus abisectus	f	f	f	r	f	c	f	s	f	s					
Dictyococcites productus	c	r		f		r	r	s	f	r					
Sphenolithus moriformis	f	c	f	c	f	f	s	r	r	s					
Discoaster deflandre	s	r							r						
Coronocyclus nitescens	s														
Coccolithus miopelagicus	r	f	s	s	f	c	r	f	r	r					
Reticulofenestra haqii	r	r													
Helicosphaera kamptneri	s														
Sphenolithus abies	r	r							s						
Braarudosphaera bigelowii		r	f	r	f	f	f		r						
Helicosphaera spp.		r		r		s	s								
Micrantholithus attenuatus		r	r	s			r								
Pontosphaera aff. discopora		s													
Micrantholithus spp.				s					s						
Pontosphaera multipora				f		r	r		r						
Helicosphaera euphratis				s		r									
Dictyococcites bisectus				s	r	f	r	f	c						
Zygrhablithus bijugatus					f	f	f		r	s					
Micrantholithus fornicatus					s	s									
Helicosphaera kamptneri						s									
Pontosphaera spp.						r	r								
Helicosphaera aff. recta								s							
Helicosphaera recta									f						
OTHER SKELETAL MATERIAL															
Bryozoan debris	f	f	c					s	f	f					
Ostracods	f	f	r	s	s	f		r	r	r					
Echinoid debris	f	r	c	f					r	f					
Gastropods		r													
Bivalve fragments		r													

s = single, r = rare, f = frequent, c = common, a = abundant.