



APPENDIX 1

MICROPALAEONTOLOGICAL ANALYSIS

APPENDIX -1  
A FORAMINIFERAL ANALYSIS OF  
SEAHORSE-2, GIPPSLAND BASIN, VICTORIA.  
by  
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Esso Australia Ltd.  
Palaeontology Report, 1982/40.  
0246L

December 1, 1982.

Appendix -1  
A Foraminiferal Analysis of Seahorse - 2,  
Gippsland Basin, Victoria  
by  
M J Hannah

PART - 1

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Esso Australia Ltd  
Paleontology Report, 1982/70  
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INTRODUCTION

The planktonic foraminiferal content of forty sidewall cores from the Gurnard and Lakes Entrance Formations of Seahorse-2 has been examined (ie. from 1405.0 to 1210.0m). Unfortunately, no sidewall cores were shot above 1210.0m and no cuttings above this level were examined as any results obtained would be marginal compared to the effort required.

The preservation of material in Seahorse-2 is usually good, if a little variable. In contrast, preservation in the greensand is very poor. The fauna throughout the well is of low to moderate diversity with no keeled forms present.

GEOLOGICAL SUMMARY  
SEAHORSE-2

AGE	FORMATION	LITHOLOGY*	ZONE	DEPTH in metres
Recent to Middle Miocene	Gippsland Limestone and Lakes Entrance Formation	Section not sampled with sidewall cores		Seafloor - 1210
		Top sidewall core		
Early Miocene	Lakes Entrance Formation	Dominantly Marl with reworking at base	F	1210.0 - 1264.0
			G	1269.9 - 1386.8
			H-1	1390.5
Early Oligocene to Late Eocene	Gurnard Formation	1393.5m Pelletal Glauconite occasionally pyritic and micaceous	J/K	1396.0 - 1399.0
		1417.5m		
	Latrobe Group Coarse Clastics			
Total Depth				2021m

\* Lithology based on washed residues.  
Boundaries based on log picks.

GEOLOGICAL COMMENTS.

The Gurnard Formation was examined in sidewall cores 62 to 65 (1405.0m to 1396.0m). The unit is delineated by log breaks at 1393.5m (top of Latrobe Group) and 1426.1m. Lithologically the Gurnard Formation is dominated by pelletal glauconite which is at times both pyritic and micaceous. First foraminifera are found in sidewall core 63 at 1402.0m. These consist of fragments of agglutinated benthonics and a single specimen of an unidentified planktonic. Sidewall core 64 at 1399.0 m contains an agglutinated benthonic assemblage including Bathysiphon and Haplophragmoides together with the very rare planktonic form, Globigerina angiporoides. The final sample from the Gurnard Formation has a limited planktonic fauna (see range chart) which is poorly preserved.

With the transition to the Lakes Entrance Formation at about 1396.5m, the lithology changes to a marl. The coaly fragments and glauconite present in sidewall core 67 at 1390.0m are considered to be reworked from the underlying Latrobe Group. This reworking is confirmed by the presence of Globorotalia postcretacea in the basal six samples of the Lakes Entrance Formation. A similar situation regarding reworking was recorded by Taylor (1974) at Seahorse-1 and Paltech (1981) at West Seahorse-1.

The low diversity of fauna recovered from all the samples examined is indicative of shallow water (minimal layer) conditions. The dearth of keeled forams implies this water mass was one of cool aspect.

BIOSTRATIGRAPHY

GURNARD FORMATION.

Zones J to K, Late Eocene to Early Oligocene.

1399.0m to 1396.0m.

Only two species of planktonic foraminifera (Globigerina angiporoides and Globorotalia postcretacea) were identified in the Gurnard Formation. Together these species provide an age of Zone J and/or Zone K for the unit. The lack of Globigerina linaperta in any sample makes distinguishing Zone J from Zone K impossible.

It should be recognised that the foraminifera from Seahorse-2

provides a minimum age only for the Gurnard Formation. That is, without the presence of such species as Globigerina brevis, and Globigerinatheka index to further refine the age, it is possible that some, if not all of the Gurnard Formation was deposited pre Zone K. However, palynological dating of SWC 63 at 1402.0m, provides an upper N. asperus zone age for that sample (Stacy 1982), indicating that the J/K determination for the unit is correct. This is consistent with evidence from Seahorse-1 (Taylor 1979).

#### LAKES ENTRANCE FORMATION.

Zone H-1 (Early Miocene) 1390.0m.

A single sample from near the base of the Lakes Entrance Formation is assigned to this zone on the basis of it containing rare Globigerina woodi connecta without Globigerinoides quadrilobatus trilobus. Because planktonic foraminiferal diversity is low and their preservation poor, only a low confidence rating can be applied.

Zone G (Early Miocene) 1386.0 to 1369.9m.

The base of Zone G is marked by the first appearance of Globigerinoides quadrilobatus trilobus in side wall core 68 at 1386.8m. This sample is also the first in the section to yield a reasonable diversity of planktonics. This heightened diversity is maintained throughout the well. Four species dominate the assemblage: Globigerinoides quadrilobatus trilobus, Globigerina praebulloides, Globorotalia mayeri and Globorotalia opima nana.

Reworked specimens of Globorotalia postcretacea are common in the basal six samples of the Lakes Entrance Formation and a single reworked specimen of Chilquembelina cubensis was found in sidewall core 72 at 1375.0m.

The assignment of sidewall cores 68, 69 and 92 (at 1386.8m, 1384.0m and 1269.9m respectively) to Zone G is in accord with the P. tuberculatus zone age derived from palynology.

Zone F (Early Miocene) - 1264.0 to 1210.0m.

The addition of Globigerinoides sicanus to the assemblage in sidewall core 93 at 1264.0m marks the base of Zone F. At the base of its range this species is difficult to distinguish from

Globigerinoides quadrilobatus trilobus and the zonal assignment carries a low degree of confidence. Throughout the zone, Globigerinoides sicanus is rare and was not found in SWC 96 at 1246.0m.

Several species make their first appearance during Zone F, including two globorotalids (Globorotalia miozea and Globorotalia fohsi peipheroronda). A similar increase in globorotalid diversity also occurs within Zone F at Seahorse-1.

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Esso Australia Ltd., Palaeontology Report, 1982/37.

SEAHORSE-2, SUMMARY TABLE-2.

SIDEWALL CORE NUMBER	DEPTH (M)	Interpretive Data.				ZONE (RATING)	AGE
		MICROFOSSIL		PLANKTON	DIVERSITY		
		YIELD	PRESERVATION				
102	1210.0	Moderate	Poor	Moderate	F(1)	late Early Miocene	
101	1216.0	Moderate	Poor	Moderate	F(2)	late Early Miocene	
100	1222.0	High	Good	Moderate	F(2)	late Early Miocene	
99	1228.0	High	Moderate	High	F(2)	late Early Miocene	
98	1234.0	Moderate	Moderate	Moderate	F(1)	late Early Miocene	
97	1240.0	High	Good	High	F(1)	late Early Miocene	
96	1246.0	Moderate	Moderate	Moderate	non- diagnostic	late Early Miocene	
95	1252.0	High	Moderate	Moderate	F(2)	late Early Miocene	
94	1258.0	High	Good	Moderate	F(2)	late Early Miocene	
93	1264.0	High	Good	High	F(2)	late Early Miocene	
92	1269.9	High	Moderate	Moderate	G(1)	mid Early Miocene	
91	1276.0	Moderate	Poor	Poor	G(1)	mid Early Miocene	
90	1282.0	High	Good	Low	G(1)	mid Early Miocene	
89	1288.0	Moderate	Poor	Low	G(1)	mid Early Miocene	
88	1294.0	Moderate	Poor	Low	G(1)	mid Early Miocene	
87	1300.0	High	Poor	Low	G(1)	mid Early Miocene	
86	1306.0	Moderate	Moderate	Low	G(1)	mid Early Miocene	
85	1312.0	High	Good	Low	G(1)	mid Early Miocene	
84	1318.0	Moderate	Good	Moderate	G(1)	mid Early Miocene	
83	1324	Low	Poor	Low	G(1)	mid Early Miocene	
82	1330.0	High	Good	Low	G(1)	mid Early Miocene	
81	1336.0	High	Good	Low	G(1)	mid Early Miocene	
80	1342.0	High	Good	Moderate	G(1)	mid Early Miocene	
79	1348.0	Good	Good	Low	G(1)	mid Early Miocene	
78	1354.0	Good	Good	Moderate	G(1)	mid Early Miocene	
77	1360.0	Moderate	Poor	Moderate	G(1)	mid Early Miocene	
76*	1362.9	High	Good	High	G(1)	mid Early Miocene	



SEAHORSE-2, SUMMARY TABLE-2.

Interpretive Data.

SIDEWALL CORE NUMBER	DEPTH (M)	MICROFOSSIL		PLANKTON	ZONE (RATING)	AGE
		YIELD	PRESERVATION	DIVERSITY		
75	1366.0	Moderate	Good	Low	G(1)	mid Early Miocene
74	1369.0	Good	Good	Moderate	G(1)	mid Early Miocene
73	1372.0	Good	Good	Moderate	G(1)	mid Early Miocene
72	1375.0	Good	Good	High	G(1)	mid Early Miocene
71	1378.0	Good	Good	Moderate	G(1)	mid Early Miocene
70*	1381.0	High	Poor	Low	G(1)	mid Early Miocene
69*	1384.0	Good	Good	Low	G(1)	mid Early Miocene
68*	1386.8	Moderate	Poor	Moderate	G(1)	mid Early Miocene
67*	1390.0	Low	Poor	Low	H-1(2)	Early Miocene
65*	1396.0	Low	Poor	Low	J/K(2)	Late Eocene/Early Oligocene
64*	1399.0	Low	Very Poor	Very Low	J/K(2)	Late Eocene/Early Oligocene
63*	1402.0	Very Poor	Very Poor	Low	Indeterminate	-
62	1405.0			Nil	N.F.F.	-

\* = Reference slide prepared.

MICROPALAEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND

ELEVATION: KB: 21m GL: -42.1m

WELL NAME: Seahorse-2

TOTAL DEPTH: 2010m

AGE	FORAM. ZONULES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE	A <sub>1</sub>										
	A <sub>2</sub>										
PLIOCENE	A <sub>3</sub>										
	A <sub>4</sub>										
MIOCENE	LATE	B <sub>1</sub>									
		B <sub>2</sub>									
		C									
	MIDDLE	D <sub>1</sub>									
		D <sub>2</sub>									
		E <sub>1</sub>									
		E <sub>2</sub>									
		EARLY	F	1201.0	1				1264.0	2	
	G		1269.9	1				1386.0	1		
	H <sub>1</sub>		1390.0	2				1390.0	2		
	H <sub>2</sub>										
	OLIGOCENE	LATE	I <sub>1</sub>								
			I <sub>2</sub>								
			J <sub>1</sub>	1396.0	2						
EARLY		J <sub>2</sub>									
		K						1399.0	2		
EOCENE	Pre-K										

COMMENTS: The non recognition of zones I and H-2 may be due to either  
a) Hiatus in the section or  
b) A condensed interval between 1396.0m and 1390.0m which was  
not successfully samples with sidewall cores.

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: M.J. Hannah

DATE: November 1982.

DATA REVISED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

PART - 2

BASIC DATA

SUMMARY TABLE

RANGE CHART

SEAHORSE-2, Summary Table-2.

SIDEWALL CORE NUMBER	DEPTH (M)	Basic Data		PLANKTON DIVERSITY
		MICROFOSSIL		
		YIELD	PRESERVATION	
102	1210.0	Moderate	Poor	Moderate
101	1216.0	Moderate	Poor	Moderate
100	1222.0	High	Good	Moderate
99	1228.0	High	Moderate	High
98	1234.0	Moderate	Moderate	Moderate
97	1240.0	High	Good	High
96	1246.0	Moderate	Moderate	Moderate
95	1252.0	High	Moderate	Moderate
94	1258.0	High	Good	Moderate
93	1264.0	High	Good	High
92	1269.9	High	Moderate	Moderate
91	1276.0	Moderate	Poor	Poor
90	1282.0	High	Good	Low
89	1288.0	Moderate	Poor	Low
88	1294.0	Moderate	Poor	Low
87	1300.0	High	Poor	Low
86	1306.0	Moderate	Moderate	Low
85	1312.0	High	Good	Low
84	1318.0	Moderate	Good	Moderate
83	1324	Low	Poor	Low
82	1330.0	High	Good	Low
81	1336.0	High	Good	Low
80	1342.0	High	Good	Moderate
79	1348.0	Good	Good	Low
78	1354.0	Good	Good	Moderate
77	1360.0	Moderate	Poor	Moderate
76*	1362.9	High	Good	High
75	1366.0	Moderate	Good	Low
74	1369.0	Good	Good	Moderate
73	1372.0	Good	Good	Moderate
72	1375.0	Good	Good	High
71	1378.0	Good	Good	Moderate
70*	1381.0	High	Poor	Low
69*	1384.0	Good	Good	Low
68*	1386.8	Moderate	Poor	Moderate
67*	1390.0	Low	Poor	Low
65*	1396.0	Low	Poor	Low
64*	1399.0	Low	Very Poor	Very Low
63*	1402.0	Very Poor	Very Poor	Low
62	1405.0			Nil

\* = Reference slide prepared.