PALYNOLOGICAL ANALYSIS OF PALMER-1

GIPPSLAND BASIN

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PART I

INTERPRETATIVE DATA

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INTRODUCTION:

Thirty five (35) sidewall core samples were processed and examined for palynomorphs. Recovery, in general, was poor to fair from most samples. One sample was barren of identifiable microfossils, and the yield from six others so poor that they could not be assigned to a stratigraphic zone with confidence.

Palynological zones and lithologic-facies subdivisions for this well section, from the lower part of the Lakes Entrance Formation to the bottom of the well is summarized below. Results of this palynological study are summarized for the individual samples in Table 1 and the occurrence and distribution of each species is tabulated in the accompanying check charts.

SUMMARY

UNIT/FACIES	ZONE	DEPTH (metres)
Lakes Entrance Fm	*P. tuberculatus*	1106 - 1184
	Upper *N. asperus*	1188 - 1190
1192		
Gurnard Formation	Middle *N. asperus*	1192 - 1236.5
1219		
	Lower *N. asperus*	1260 - 1331.2
Latrobe Group	Upper *M. diversus*	1376
"Coarse Clastics"	Middle *M. diversus*	1449
	UNCONFORMITY	
	Upper *L.balmei*	1478 - 1502
	Lower *L. balmei*	1545 - 1668
		T.D. 1723

GEOLOGICAL REMARKS:

1) Only one major stratigraphic break is evident in this section. That is the hiatus between the Middle M. diversus sediments at 1449 metres and the Upper L. balmei deposits at 1479 metres. Smaller, less obvious disruptions in sedimentation are possible between the lowest Lower N. asperus Zone sidewall core at 1331 metres and the Middle M. diversus Zone sample at 1449 metres.

2) A thin wedge of Upper N. asperus Zone (basal Oligocene to Uppermost Eocene) is shown by the two samples from 1188 metres and 1190 metres. Although not recorded from Perch-1, the lack of identification could easily be accounted for by the wider sidewall core spacing in this earlier well. This Upper N. asperus assemblage probably could not be distinguished from the overlying P. tuberculatus flora on the basis of cutting samples only.

3) It is of interest to note that the sediments with the Upper N. asperus flora (1188 and 1190 metres) are strongly calcareous and are lithologically similar to the overlying Lakes Entrance Formation, rather than the less calcareous Gurnard Formation or facies of Middle N. asperus Zone age which occur below 1192 metres.

4) The original pick, from the electric logs, for the Gurnard Formation (1155 to 1181 metres) is now shown to be too high, based on palynology. This section is entirely within the Oligocene, P. tuberculatus Zone. Based on the highest occurrence of an Eocene flora (the Middle N. asperus Assemblage), the top of the Gurnard is now considered to be at 1192 metres. The base of the Gurnard, selected from electric log and lithologic characters is placed 1219 metres, although the Middle N. asperus flora extends down through 1236.5 metres.

5) Vozzhenikova (al Deflandrea) extensa, the dinoflagellate marker for the Middle N. asperus Zone was identified in the sample from 1192 metres. This compares well with the occurrence of V. extensa reported in core samples from 1143 to 1161 metres (= 3750 to 3808 feet) in Perch-1.

6) Assemblages of undoubted Upper L. balmei Zone age were encountered in the section between 1478 and 1545 metres. Below this, however a generalised L. balmei flora was found in the samples from 1602 to 1668.5 metres, and below this only a poorly developed microflora with an overall Paleocene or older aspect.

DISCUSSION OF ZONES

Lower Lygistepollenites balmei Zone: 1545 to 1668.5 metres. The common occurrence of Lygistepollenites balmei, combined with the presence of Gambierina edwardsii, G. rudata and Australopollis obscurus confirm that these samples are Paleocene or older. The abundance of L. balmei is indicative of the L. balmei Zone, while the absence of any specimens of Cyathidites gigantis, Proteacidites grandis, Verrucosisporites kopukiensis or other species from the Upper part of the zone suggests that these sediments are probably from the Lower part of the L. balmei Zone. Samples below 1668.5 metres were barren of diagnostic fossils.

Upper Lygistepollenites balmei Zone: 1478 to 1502 metres. Abundant specimens of L. balmei continue through this section and the presence, although rare, of Tetracolporites textus suggests that these sediments should be assigned to the Upper part of the L. balmei Zone.

Middle Malvacipollis diversus Zone: 1449 metres.
The single sample from 1376 metres yielded a large, well developed assemblage of Middle M. diversus Zone age. Index species includes Malvacipollis diverus, Banksieacidites arcuatus, Polycolpites esobalteus, Periporopollenites demarcatus and Triporopollenites ambiguus. In addition to the Early Eocene species there was a number of reworked specimens from the L. balmei Zone.

Upper Malvacipollis diversus Zone: 1376 metres.
The presence in this large flora of Proteacidites pachypolus, Myrataceidites tenuis and Santalumidites cainozoicus show that this assemblage is Upper M. diversus Zone or younger. A count of the flora demonstrated that P. pachypolus was much less than 5% of the total assemblage and that Casuarina (H. harrisii) significantly exceeded the amount of Nothofagus pollen, both of which are associated with an Upper M. diversus rather than a P. asperopolus, Zone assemblage.

Lower Nothofagidites asperus Zone: 1260 to 1331.2 metres.
In addition to the occurrence of Areosphaeridium dictyoplokus at 1300 metres and Rhombodinium glabrum at 1285 metres, the scattered presence of Proteacidites asperopolus, P. pachypolus and Nothofagidites falcatus, as well as the absence of Myrataceidites tenuis, place these samples in the Lower Nothofagidites asperus Zone. The sidewall core from 1257 metres yielded a poor N. asperus assemblage, without specific markers that allowed further subdivision.

Middle Nothofagidites asperus Zone: 1192 to 1236.5 metres.
Triorites magnificus is the principal marker for this zone and it occurred in both the 1192 and 1236.5 metre samples. Vozzhenikova? (al Deflandrea) extensa marks a marine influence in this zone at 1192 metres.

Upper Nothofagidites asperus Zone: 1188 to 1190 metres.
The flora from these samples is similar to the overlying P. tuberculatus Zone assemblage, except that no specimens of Cyatheacidites annulatus or Protoellipsodinium simplex are found and several uppermost Eocene dinoflagellates, such as Systematophora placacantha and Phthanoperidinium eocenicum are present.

Proteacidites tuberculatus Zone: 1106 metres.
Regular and consistent occurrence of C. annulatus and P. simplex mark these samples as coming from the P. tuberculatus Zone.

TABLE 1 - INTERPRETATIVE DATA

SUMMARY OF PALAEONTOLOGICAL ANALYSIS, PALMER-1, GIPPSLAND BASIN

SAMPLE	DEPTH METRES	DEPTH FEET	ZONE	AGE	CONFIDENCE RATING	YIELD	SPORE-POLLEN DIVERSITY	DINO. DIVERSITY	COMMENTS
SWC 74	1106	3628.5	P. tuberculatus	Oligocene	1	Poor	Low	Moderate	
SWC 73	1118	3668	P. tuberculatus	Oligocene	1	Fair	Moderate	High	
SWC 72	1130	3707	P. tuberculatus	Oligocene	0	Good	High	Fair	C. annulatus
SWC 68	1144	3753	P. tuberculatus	Oligocene	0	Fair	Low	Moderate	C. annulatus
SWC 65	1156	3792.5	P. tuberculatus	Oligocene	2	Poor	Moderate	Moderate	
SWC 63	1164	3819	P. tuberculatus	Oligocene	2	Poor	Moderate	Moderate	
SWC 61	1170	3838.5	P. tuberculatus	Oligocene	1	Fair	Low	Moderate	
SWC 55	1184	3884.5	P. tuberculatus	Oligocene	0	Fair	Moderate	High	C. annulatus
SWC 53	1188	3897.5	Upper N. asperus	Late Eocene	1	Fair	Moderate	Moderate	
SWC 52	1190	3904	Upper N. asperus	Late Eocene	1	Fair	Low	Moderate	
SWC 51	1192	3911	Middle N. asperus	Late Eocene	0	Good	High	Low	D. extensa, T. magnificus
SWC 42	1217	3993	Indeterminate	-	-	Poor	Low	Low	
SWC 41	1233	4045	Indeterminate	-	-	Very Poor	None	Low	
SWC 40	1236.5	4057	Middle N. asperus	Late Eocene	1	Poor	Moderate	None	T. magnificus
SWC 37	1257	4124	N. asperus	Middle Eocene	2	Poor	Moderate	None	
SWC 36	1260	4134	Lower N. asperus	Middle Eocene	1	Fair	Moderate	None	
SWC 31	1280	4199.5	Lower N. asperus	Middle Eocene	2	Poor	Low	None	
SWC 30	1286	4219	Lower N. asperus	Middle Eocene	1	Fair	Moderate	Moderate	
SWC 28	1300	4265	Lower N. asperus	Middle Eocene	0	Fair	Moderate	Low	A. dictyoplokus
SWC 27	1331.2	4367.5	Lower N. asperus	Middle Eocene	2	Good	Moderate	None	
SWC 25	1348.5	4424	Indeterminate	-	-	Poor	Moderate	None	
SWC 24	1369	4491.5	Indeterminate	-	-	Poor	Moderate	None	
SWC 23	1376	4514.5	Upper M. diversus	Early Eocene	1	Good	high	None	
SWC 21	1423.5	4670	Indeterminate	-	-	Poor	Moderate	None	
SWC 20	1449	4754	Middle M. diversus	Early Eocene	1	Good	High	None	
SWC 18	1478	4849	Upper L. balmei	Late Paleocene	1	Fair	Moderate	None	
SWC 17	1500	4921	Indeterminate	-	-	Very Poor	Low	None	
SWC 16	1502	4928	Upper L. balmei	Late Paleocene	1	Fair	High	None	
SWC 13	1545	5069	Lower L. balmei	Paleocene	2	Fair	High	None	
SWC 8	1602	5256	Lower L. balmei	Paleocene	2	Poor	Low	none	
SWC 7	1607	5272	Lower L. balmei	Paleocene	2	Poor	Moderate	None	
SWC 6	1627.5	5339.5	Lower L. balmei	Paleocene	2	Poor	Moderate	None	
SWC 4	1668.5	5474	Lower L. balmei	Paleocene	2	Poor	Low	None	
SWC 3	1690	5544.5	Indeterminate	-	-	Barren	-	-	
SWC 1	1715	5626.5	Indeterminate	-	-	Poor	Low	None	

P A L Y N O L O G Y D A T A S H E E T

B A S I N: GIPPSLAND ELEVATION: KB: 21 GL: 42.6

WELL NAME: PALMER-1 TOTAL DEPTH: 1723 metres

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
PALEOGENE	*P. tuberculatus*	1106	1				1184	0			
	Upper *N. asperus*	1188	1				1190	1			
	Mid *N. asperus*	1192	0				1236.5	1			
	Lower *N. asperus*	1260	1				1331.2	2	1300	0	
	P. asperopolus										
	Upper *M. diversus*	1376	1				1376	1			
	Mid *M. diversus*	1449	1				1449	1			
	Lower *M. diversus*										
	Upper *L. balmei*	1478	1				1502	1			
	Lower *L. balmei*	1545	2				1668.5	2			
LATE CRETACEOUS	*T. longus*										
	T. lilliei										
	N. senectus										
	U. *T. pachyexinus*										
	L. *T. pachyexinus*										
	C. triplex										
	A. distocarinatus										
EARLY CRET.	*C. paradoxus*										
	C. striatus										
	F. asymmetricus										
	F. wonthaggiensis										
	C. australiensis										
PRE-CRETACEOUS											

COMMENTS: D. extensa = 1192 metres; A. dictyoplokus = 1300 metres

CONFIDENCE RATING:
- 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 spores and pollen or microplankton, or both.
- 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

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: _____ DATE: _____

DATA REVISED BY: _____ DATE: _____

PART II

BASIC DATA

Table-1: Basic Data

Range Charts

TABLE 1 - BASIC DATA

SUMMARY OF PALAEONTOLOGICAL ANALYSIS, PALMER-1, GIPPSLAND BASIN

SAMPLE	DEPTH METRES	DEPTH FEET	YIELD	SPORE-POLLEN DIVERSITY	DINO. DIVERSITY
SWC 74	1106	3628.5	Poor	Low	Moderate
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SWC 65	1156	3792.5	Poor	Moderate	Moderate
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SWC 53	1188	3897.5	Fair	Moderate	Moderate
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SWC 16	1502	4928	Fair	High	None
SWC 13	1545	5069	Fair	High	None
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SWC 4	1668.5	5474	Poor	Low	None
SWC 3	1690	5544.5	Barren	-	-
SWC 1	1715	5626.5	Poor	Low	None