



APPENDIX-

PALYNOLOGICAL ANALYSIS OF YELLOWTAIL-2
GIPPSLAND BASIN

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PART I

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INTRODUCTION:

Twenty-three (23) sidewall cores from Yellowtail-2 were processed and examined for palynomorphs. Yield from most samples was fair to poor, but in most cases, the assemblages could be assigned to a stratigraphic zone.

Palynological zones and lithological facies subdivisions from the base of the Lakes Entrance Formation to the total depth are summarized below. The results of analysis for each sample are given in Table 1 and the occurrence of individual species is tabulated in the accompanying distribution charts.

SUMMARY

AGE/FACIES	ZONE	DEPTH (metres)
LAKES ENTRANCE FORMATION	<u>P. tuberculatus</u>	2411.0-2413.0
----- UNCONFORMITY -----		
GURNARD FORMATION	Middle <u>N. asperus</u>	2414.9-2421.0
----- UNCONFORMITY -----		
LATROBE GROUP	Upper <u>L. balmei</u>	2423.9-2526.0
(COARSE CLASTICS)	Lower <u>L. balmei</u>	2528.9-2537.1
----- T.D. 2558 -----		

GEOLOGICAL COMMENTS;

This well is very similar, stratigraphically, to Yellowtail-1. In both cases, the base of the Lakes Entrance Formation (P. tuberculatus Zone) is separated from the top of the Latrobe Group coarse clastics (Upper L. balmei Zone) by a thin, approximately 10 metres, glauconitic sandstone, referred to the Gurnard Formation, that appears to be entirely Middle N. asperus Zone in age.

As in Opah-1 the Gurnard Formation section was partially oxidised, however in this well it was possible to extract some palynomorphs and obtain a Middle N. asperus Zone age. It is likely that the barren interval in Opah-1 between 2406 to 2417 metres is also Middle N. asperus Zone age.

No P. asperopolus Zone section was recovered from Yellowtail-2 as found in Opah-1 in samples at 2417 metres and 2418.6 metres. Although the sampling gap of 2.9 metres between the Middle N. asperus Zone and Upper L. balmei Zone in Yellowtail-2 is the same order of magnitude the log character is quite distinct suggesting that the P. asperopolus Zone is absent in Yellowtail-2.

The marine influence noticed in the Paleocene section of Yellowtail-1 appears to be even stronger in Yellowtail-2. Almost all of the Paleocene samples in Yellowtail-2 contained a well developed, fairly diverse dinoflagellate flora.

DISCUSSION OF ZONES

Lower Lygistepollenites balmei Zone: 2528.9 to 2537.1 metres.

The three samples assigned to this zone contain good L. balmei Zone assemblages, but can only be assigned to the Lower subdivision on the

basis of the negative evidence of the absence of spore-pollen and dinoflagellate species diagnostic of the Upper subdivision of the L. balmei Zone. As the lowest sample at 2537.1 metres contains a fair yield of a moderately diverse assemblage the confidence for the age dating for this sample is considered good.

Upper Lygistepollenites balmei Zone; and -

Apetodinium homomorpha Dinoflagellate Zone: 2423.9 to 2526 metres

In addition to the zone name species Lygistepollenites balmei the samples contain the following zone and Paleocene marker species: Australopollis obscurus, Gambierina edwardsii, G. rudata and Polycolpites langstonii. Diagnostic of the Upper subdivision of the L. balmei Zone are the species Banksiaeidites elongatus and Cyathidites gigantis. The age based on the spore-pollen is independently confirmed by the dinoflagellates with occurrence of the zone species Apetodinium homomorpha in the sample at 2526 metres being the basis for choosing the base of the zone at this level.

Middle Nothofagidites asperus Zone; and -

Corrudinium incompositum Dinoflagellate Zone: 2414.9 to 2421 metres

The dinoflagellate assemblage from this section which includes Baltisphaeridium nanum, Hystiocysta variata, Deflandrea phosphoritica, Aceosphaeridium arcuatum, Corrudinium corrugatum and C. incompositum, clearly demonstrate that these sediments are from the Middle N. asperus Zone. The associated spore-pollen assemblages are less diagnostic and indicate only a Middle to Late Eocene age referable to the broader N. asperus Zone subdivision.

Proteacidites tuberculatus Zone: 2411 to 2413 metres

This zone is readily defined by occurrence of the marker spore Cyatheacidites annulatus in the highest and lowest sample. The occurrence of the dinoflagellates Protoellipsodinium simplex and Pyxidinopsis mammilatus, both manuscript names, support this zone assignment and an Early Oligocene age.

TABLE 1
INTERPRETATIVE DATA
SUMMARY OF PALYNOLOGICAL ANALYSIS OF YELLOWTAIL-2, GIPPSLAND BASIN

SAMPLE	DEPTH (METRES)	DEPTH (FEET)	ZONE	AGE	CONFIDENCE RATING	YIELD	SPORE-POLLEN DIVERSITY	DINOS DIVERSITY	COMMENTS
SWC 35	2411.0	7910.0	<u>P. tuberculatus</u>	Oligo-Miocene	0	Fair	Low	Moderate	
SWC 34	2412.0	7913.5	Non diagnostic	?	-	Poor	Low	Low	
SWC 33	2413.0	7916.5	<u>P. tuberculatus</u>	Oligo-Miocene	0	Fair	Moderate	Moderate	
SWC 32	2413.9	7919.5	Indeterminate	?	-	Barren	-	-	
SWC 31	2414.9	7923.0	Middle <u>N. asperus</u>	Late Eocene	1	Poor	Poor	Moderate	
SWC 120	2415.9	7926.0	Middle <u>N. asperus</u>	Late Eocene	1	Fair	Moderate	Moderate	
SWC 119	2417.0	7930.0	Middle <u>N. asperus</u>	Late Eocene	1	Fair	Moderate	Moderate	
SWC 118	2418.0	7933.0	Middle <u>N. asperus</u>	Late Eocene	1	Fair	Moderate	Moderate	
SWC 117	2419.0	7936.0	Middle <u>N. asperus</u>	Late Eocene	1	Fair	Moderate	High	
SWC 116	2419.9	7939.0	Middle <u>N. asperus</u>	Late Eocene	1	Fair	Poor	Moderate	
SWC 115	2421.0	7943.0	Middle <u>N. asperus</u>	Late Eocene	1	Fair	Moderate	High	
SWC 114	2421.9	7946.0	Indeterminate	?	-	Poor	Low	Low	
SWC 113	2423.0	7949.5	Indeterminate	?	-	Barren	-	-	
SWC 112	2423.9	7952.5	Upper <u>L. balmei</u>	Paleocene	0	Fair	Moderate	Moderate	
SWC 111	2424.9	7956.0	Upper <u>L. balmei</u>	Paleocene	0	Fair	Moderate	Moderate	
SWC 106	2430.0	7972.5	Upper <u>L. balmei</u>	Paleocene	2	Poor	Low	None	
SWC 104	2445.0	8021.5	Upper <u>L. balmei</u>	Paleocene	0	Fair	Moderate	Moderate	
SWC 53	2488.0	8163.0	Upper <u>L. balmei</u>	Paleocene	0	Fair	Moderate	Low	
SWC 7	2502.0	8208.5	Upper <u>L. balmei</u>	Paleocene	0	Fair	Moderate	Moderate	
SWC 4	2526.0	8287.5	Upper <u>L. balmei</u>	Paleocene	1	Fair	Moderate	Moderate	
SWC 3	2528.9	8297.0	Lower <u>L. balmei</u>	Paleocene	2	Fair	Moderate	Moderate	
SWC 2	2534.0	8313.5	Non diagnostic	Paleocene	-	Poor	Low	None	
SWC 1	2537.1	8324.0	Lower <u>L. balmei</u>	Paleocene	1	Fair	Moderate	Low	

PART II

BASIC DATA

TABLE 2: BASIC DATA
PALYNOMORPH DISTRIBUTION CHARTS

TABLE 2
 BASIC DATA
 YELLOWTAIL-2, GIPPSLAND BASIN

SAMPLE SAMPLE	DEPTH (METRES)	DEPTH (FEET)	YIELD	SPORE-POLLEN DIVERSITY	DINOS DIVERSITY
SWC 35	2411.0	7910.0	Fair	Low	Moderate
SEC 34	2412.0	7913.5	Poor	Low	Low
SWC 33	2413.0	7916.5	Fair	Moderate	Moderate
SWC 32	2413.9	7919.5	Barren	-	-
SWC 31	2414.9	7923.0	Poor	Poor	Moderate
SWC 120	2415.9	7926.0	Fair	Moderate	Moderate
SWC 119	2417.0	7930.0	Fair	Moderate	Moderate
SWC 118	2418.0	7933.0	Fair	Moderate	Moderate
SWC 117	2419.0	7936.0	Fair	Moderate	High
SWC 116	2419.9	7939.0	Fair	Poor	Moderate
SWC 115	2421.0	7943.0	Fair	Moderate	High
SWC 114	2421.9	7946.0	Poor	Low	Low
SWC 113	2423.0	7949.5	Barren	-	-
SWC 112	2423.9	7952.5	Fair	Moderate	Moderate
SWC 111	2424.9	7956.0	Fair	Moderate	Moderate
SWC 106	2430.0	7972.5	Poor	Low	None
SWC 104	2445.0	8021.5	Fair	Moderate	Moderate
SWC 53	2488.0	8163.0	Fair	Moderate	Low
SWC 7	2502.0	8208.5	Fair	Moderate	Moderate
SWC 4	2526.0	8287.5	Fair	Moderate	Moderate
SWC 3	2528.9	8297.0	Fair	Moderate	Moderate
SWC 2	2534.0	8313.5	Poor	Low	None
SWC 1	2537.1	8324.0	Fair	Moderate	Low

SAMPLE TYPE *	DEPTHS																							
	S	S	S	S	S	S	S	S	S	S	S	S	S	S										
	2411	2412	2413	2413.9	2414.9	2415.9	2417	2418	2419	2419.9	2421	2421.9	2423	2423.9	2424.9	2450	2445	2488	2502	2526	2528.9	2534	2537.1	
<i>M. subtilis</i>																								
<i>M. ornamentalis</i>																								
<i>M. hypolaenoides</i>																								
<i>M. homeopunctatus</i>																								
<i>M. parvus/mesonesus</i>																								
<i>M. tenuis</i>																								
<i>M. verrucosus</i>																								
<i>M. australis</i>																								
<i>N. asperus</i>																								
<i>N. asperoides</i>																								
<i>N. brachyspinulosus</i>																								
<i>N. deminutus</i>																								
<i>N. emarcidus/heterus</i>																								
<i>N. endurus</i>																								
<i>N. falcatus</i>																								
<i>N. flemingii</i>																								
<i>N. goniatus</i>																								
<i>N. senectus</i>																								
<i>N. vansteenisii</i>																								
<i>O. scintosa</i>																								
<i>P. ochesis</i>																								
<i>P. catastus</i>																								
<i>P. demarcatus</i>																								
<i>P. magnus</i>																								
<i>P. polyoratus</i>																								
<i>P. vesicus</i>																								
<i>P. densus</i>																								
<i>P. vellosus</i>																								
<i>P. morqanii/jubatus</i>																								
<i>P. mawsonii</i>																								
<i>P. reticulosaccatus</i>																								
<i>P. verrucosus</i>																								
<i>P. crescentis</i>																								
<i>P. esobalteus</i>																								
<i>P. langstonii</i>																								
<i>P. reticulatus</i>																								
<i>P. simplex</i>																								
<i>P. varus</i>																								
<i>P. adenantoides (Prot.)</i>																								
<i>P. alveolatus</i>																								
<i>P. amolosexinus</i>																								
<i>P. anquilatus</i>																								
<i>P. annularis</i>																								
<i>P. asperopolus</i>																								
<i>P. biornatus</i>																								
<i>P. clarus</i>																								
<i>P. cleinei</i>																								
<i>P. confragosus</i>																								
<i>P. crassus</i>																								
<i>P. delicatus</i>																								
<i>P. formosus</i>																								
<i>P. grandis</i>																								
<i>P. grevillaensis</i>																								
<i>P. incurvatus</i>																								
<i>P. intricatus</i>																								
<i>P. kopiensis</i>																								
<i>P. lapis</i>																								
<i>P. latrobensis</i>																								
<i>P. leightonii</i>																								
<i>P. obesolabrus</i>																								
<i>P. obscurus</i>																								
<i>P. ornatus</i>																								
<i>P. otwayensis</i>																								
<i>P. pachypolus</i>																								
<i>P. palisadus</i>																								
<i>P. parvus</i>																								
<i>P. plummelus</i>																								
<i>P. prodigus</i>																								
<i>P. pseudomoides</i>																								
<i>P. recavus</i>																								

* C=core: S=sidewall core: T=cutting

SAMPLE TYPE *	DEPTHS																								
	2411	2412	2413	2413.9	2414.9	2415.9	2417	2418	2419	2419.9	2421	2421.9	2423	2423.9	2424.9	2430	2445	2488	2502	2526	2528.9	2534	2537.1		
PALYNOMORPHS																									
<i>P. rectomarginis</i>																									
<i>P. reflexus</i>																									
<i>P. reticulatus</i>																									
<i>P. reticuloconcavus</i>																									
<i>P. reticulosabratus</i>																									
<i>P. rugulatus</i>																									
<i>P. scitus</i>																									
<i>P. stipplatus</i>																									
<i>P. tenuixinus</i>														/	/	/			/	/	/	/	/	/	/
<i>P. truncatus</i>																									
<i>P. tuberculatus</i>																									
<i>P. tuberculiformis</i>																									
<i>P. tuberculotumulatus</i>																									
<i>P. xestiformis</i> (Prot.)																									
<i>Q. brossus</i>																									
<i>R. boxatus</i>																									
<i>R. stellatus</i>																/									
<i>R. mallatus</i>																									
<i>R. trophus</i>	/																								
<i>S. cainozoicus</i>																									
<i>S. rotundus</i>																									
<i>S. digitoides</i>																									
<i>S. marlinensis</i>																									
<i>S. rarus</i>																									
<i>S. meridianus</i>															/	/	/	/	/	/	/	/	/	/	/
<i>S. prominatus</i>																									
<i>S. uvatus</i>																									
<i>S. punctatus</i>																									
<i>S. regium</i>			/																						
<i>T. multistrixis</i> (CP4)															cf.								/		
<i>T. textus</i>																									
<i>T. verrucosus</i>																									
<i>T. securus</i>																									
<i>T. confessus</i> (C3)																			cf.						
<i>T. gillii</i>																							/		
<i>T. incisus</i>																									
<i>T. longus</i>																									
<i>T. phillipsii</i>																/						/	/	/	/
<i>T. renmarkensis</i>																									
<i>T. sabulosus</i>																									
<i>T. simatus</i>																									
<i>T. thomasi</i>																									
<i>T. waiparaensis</i>																									
<i>T. adalaidensis</i> (CP3)									/																
<i>T. angurium</i>																									
<i>T. delicatus</i>																									
<i>T. geraniodes</i>																									
<i>T. leuros</i>																									
<i>T. lillicii</i>																									
<i>T. marginatus</i>																							/		
<i>T. moultonii</i>																									
<i>T. paenestriatus</i>																									
<i>T. retequetrus</i>																									
<i>T. scabratus</i>																									
<i>T. sphaerica</i>																									
<i>T. magnificus</i> (P3)																									
<i>T. spinosus</i>																									
<i>T. ambiguus</i>																									
<i>T. chnosus</i>																									
<i>T. helosus</i>															cf.										
<i>T. scabratus</i>																									
<i>T. sectilis</i>																				cf.					
<i>V. attinatus</i>																									
<i>V. cristatus</i>																									
<i>V. kopukuensis</i>																									

*C= core; S= sidewall core; T= cuttings.

