PALYNOLOGICAL ANALYSIS, AMBERJACK-1

GIPPSLAND BASIN

by

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Palaeontological report prepared 14 September 1990
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INTRODUCTION

Twenty eight sidewall core and two cuttings samples, representing the interval 1010.0 to 1700m in Amberjack-1 were processed and examined for spore-pollen and dinoflagellates.

With the exception of SWCs between 1495 and 1632m, yields and preservation were medium to high and most samples yielded diagnostic species. It is noted that spore-pollen does not allow the carbonates overlying Top of Latrobe to be dated with the same degree of precision as planktonic foraminifera.

Palynological determinations and interpreted lithological units are summarized below. Interpretative and basic data are given in Tables 1 and 2 respectively. Check lists of all species recorded are attached. Electric log data were unavailable.

SUMMARY

AGE	UNIT	ZONE	DEPTH RANGE (m)	ENVIRONMENT
?Mid-Late Miocene	GIPPSLAND LIMESTONE	T. bellus?	1010.0	open marine
Late Oligocene -Early Miocene	"	P. tuberculatus	1031.0-1210.4	"
"	LAKES ENTRANCE FORMATION	P. tuberculatus	1215.2-1248.1	"
Early Oligocene	unnamed shale	P. tuberculatus	1255.0	open marine
Late Eocene	LATROBE GROUP	Middle N. asperus	1279.9-1333.0	marginal marine
Middle Eocene	"	Lower N. asperus	1351.0-1360.1	"
"	"	Lower N. asperus	1441.0	coastal plain
Early Eocene	"	P. asperopolus	1495.5-1519.0	"
"	"	Lower M. diversus	1633.0	"
Paleocene	"	Upper L. balmei	1697-1700	"

GEOLOGICAL COMMENTS

1. It is unclear whether Amberjack-1 contains a continuous sequence of zones from the Paleocene Upper L. balmei Zone to the late Early Miocene T. bellus Zone or - the preferred option - whether sediment accumulation at the wellsite has been characterized by long periods of erosion or slow or non-deposition during the Early Eocene and ?Early Oligocene.

2. This uncertainty is due (i) to the possibility of bioturbation and reworking across Top of Latrobe, blurring the distinction between the Middle and Upper N. asperus Zone and Upper N. asperus and P. tuberculatus Zone palynofloras, and (ii) the unsuitable nature of many Early Eocene facies for preserving palynomorphs.

3. The occurrence at 1255.0m of a [calcareous?] claystone at the base of the P. tuberculatus Zone strongly suggests that Amberjack-1 has penetrated the equivalent of the latest Eocene-Early Oligocene shale unit overlying non-calcareous siltstones in Perch-2 and adjacent wells such as Bullnose-1.

   The presence or not of a greensand between 1279.9-1325.0m may be helpful in determining if the silty sandstone sampled at 1279.9m is related genetically to the above unit, i.e. Upper N. asperus Zone, or to the underlying Middle N. asperus Zone claystone interval.

4. The sporadic occurrences of diverse spore-pollen between 1441.0-1633.0m confirm the existence of P. asperopolus [plus Upper M. diversus?] and Lower M. diversus Zone units but as yet no Middle M. diversus Zone unit has been substantiated in this sector of the basin. Thicknesses in Amberjack-1 [maximum 192m] are consistent with thinning of Early Eocene sediments as these onlap the margin of the basin [cf Palmer-1].

5. Amberjack-1 almost certainly terminated within (Upper) L. balmei Zone sediments, consistent with palynological data for Palmer-1.

PALAEOENVIRONMENTS

1. With the possible exception of cuttings at 1697m, all Paleocene and Early Eocene samples represent a coastal plain environment.

2.. Marginal marine conditions were established at the well-site within the Middle Eocene Lower N. asperus Zone given the absence of dinocysts at 1441.0m and their abundance some 80m upsection at 1360.1m. The latter may be a correlative of the A. diktyoplokus marine transgression of Partridge (1976).

Similar conditions were maintained throughout the Late Eocene, with open marine conditions being present at the wellsite by Late Oligocene, P. tuberculatus Zone times.

BIOSTRATIGRAPHY

Zone and age-determinations have been made using criteria proposed by Stover & Partridge (1973), Helby et al. (1987) and unpublished observations made on Gippsland Basin wells drilled by Esso Australia Ltd.

It is noted that spore-pollen criteria published in Stover & Partridge (1973) for subdividing the Oligocene-Early Miocene P. tuberculatus Zone are no longer considered reliable (see Macphail & Truswell, 1989). Dinoflagellates may provide an alternative method, but to date the relevant formations in the Gippsland Basin have not closely sampled or all the species systematically recorded

Upper Lygistepollenites balmei Zone 1697-1700m Paleocene

Palynofloras in this interval are characterized by frequent Lygistepollenites balmei and multiple specimens of other species which also range no higher than this zone, e.g. Gambierina rudata, Latrobosporites amplus and (1700m) Camarozonosporites bullatus. Cupanieidites orthoteichus is frequent in the SWC at 1698.0m and present in cuttings at 1697m, picked as the top of the zone.

All palynofloras included Oligo-Miocene dinoflagellates and (1697m) the Paleocene species Glaphyracysta retiintexta. It is unclear whether this species is in situ and therefore evidence for a marine influence.

Lower Malvacipollis diversus 1633.0m Early Eocene

One sample is provisionally assigned to this zone, based on Crassiretitriletes vanraadshoovenii, frequent occurrences of Polypodiaceoisporites varus and frequent-common specimens of Malvacipollis diversus. A few specimens of Lygistepollenites balmei in this palynoflora are assumed to be contaminants. Dinoflagellates are absent.

Sidewall cores between 1542.5-1589.0m yielded sparse palynofloras in which the majority of spore-pollen and all dinoflagellates appear to be caved. Isolated occurrences of Proteacidites pachypolus at 1542.5m, Conbaculites apiculatus at 1566.4m and 1589.0m and frequent Malvacipollis diversus at 1575.0m are consistent with an Early Eocene date, probably no older than Upper M. diversus Zone.

Proteacidites asperopolus 1495.5-1519.0m Early Eocene

The association of Proteacidites asperopolus and frequent P. pachypolus with Myrtaceidites tenuis and Intratriporo-pollenites notabilis provide a very confident P. asperopolus Zone date for the SWC sample at 1519.0m.

The SWC at 1495.5m is no younger than P. asperopolus Zone, based on a single specimen of M. tenuis in a very sparse and mud-contaminated palynoflora.

Lower Nothofagidites asperus Zone 1351.0-1441.0m

The three palynofloras within this interval are characterized by common-abundant Nothofagidites emarcidus-heterus and Proteacidites spp.

The sample picked as the base of the zone [1441.0m] is confidently dated as Lower N. asperus Zone, based on the simultaneous occurrence of the zone index species Proteacidites asperopolus and Tricolpites simatus. However unusually for this zone, Beaupreadites verrucosus, Malvacipollis spp. and Myrtaceidites parvus-mesonesus also are frequent.

Both the above index species occur at 1360.1m but at this level the assemblage also includes a number of typically Eocene dinoflagellates, e.g. Areosphaeridium capricornum, as well as an undescribed Alisocysta and long-ranging species of Spiniferites and Operculodinium.

The upper boundary is placed provisionally at 1351.0m, a sample which is no older than Lower N. asperus Zone or younger than Middle N. asperus Zone based on specimens of Rugulatisporites trophus and Proteacidites pachypolus respectively. As at 1360.1m, the palynoflora includes low numbers of undiagnostic marine dinoflagellates.

Middle Nothofagidites asperus Zone 1279.9-1333.0m Late Eocene

Palynofloras in this interval are wholly dominated by Nothofagidites spp. All include low to moderate numbers of marine dinocysts, chiefly Gippslandica extensa.

The lower boundary is defined by the first occurrence of Anacolosidites sectus at 1333.0m. Proteacidites pachypolus indicates the sample is no younger than Middle N. asperus Zone. The zone index species, Triorites magnificus, occurs at 1325.0m.

The palynoflora at 1279.9m is similar in terms of species composition and is certainly no older than upper Middle N. asperus Zone based on Aglaoreidia qualumis. However, given the absence of definite zone index species, an Upper N. asperus Zone date remains possible **if** the single specimen of Proteacidites pachypolus is reworked. It is noted that occurrences of P. recavus and the dinoflagellate Gippslandica extensa are more consistent with a Late Eocene rather than an Oligocene date but all species are known to range above the Middle N. asperus Zone outside of the Gippsland Basin.

Proteacidites tuberculatus Zone 1031.0-1255.0m Oligocene-Early Miocene

Palynofloras within this interval are wholly dominated by marine dinoflagellates, in particular Lingulodinium machaerophorum, Operculodinium centrocarpum, Spiniferites and Steptodinium spp. Spore-pollen numbers are variable and Nothofagidites emarcidus-heterus consistently dominates what is recovered.

The lower boundary is defined by the first appearance of Cyatheacidites annulatus at 1255.0m. This palynoflora includes an undescribed Deflandrea sp. [related to D. leptodermata] and a Psilodiporites sp. which is ancestral to modern Alyxia [Apocynaceae: see Macphail & Truswell, 1989]. Acaciapollenites myriosporites first appears at 1226.6m, Foveotriletes lacunosus at 1218.8m, and F. crater associated with Chenopodipollis chenopodiaceoides and Tubulifloridites antipoda at 1138.8m.

A number of unusual faunal microfossils are preserved in the interval: e.g. trochospiral liners of foraminifera, fish teeth and - possibly a first record in Australia - fragmented and whole nematocyts [stinging cells] of a unidentified Cnidarian.

The upper boundary is placed at 1031.0m, based on the occurrence of Cyatheacidites annulatus and Chenopodipollis chenopodiaceoides in an assemblage lacking index species of the T. bellus Zone. Alyxia and Tricolpites reticulatus are present in this palynoflora and also at 1050.0m

Triporopollenites bellus Zone? 1010.0m late Early Miocene?

The palynoflora at 1010.0m may be T. bellus Zone, based on a badly corroded, **possible** specimen of the nominate species and an undescribed dinocyst [Protoellipsodinium cf simplex] which

typically occurs only above the P. tuberculatus Zone. The sample definitely is no older than P. tuberculatus Zone or younger than T. bellus Zone.

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TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

SWC	DEPTH (m)	ZONE S-P	. DINO	CONF. RTG.	COMMENT
60	1010.0	T. bell.	-	2	No older than P. tub.
59	1031.0	P. tub.	-	1	C. annulatus
58	1050.0	P. tub.	-	1	C. annulatus
57	1095.9	P. tub.	-	1	C. chenopodiac.
56	1111.5	P. tub.	-	1	F. crater
55	1138.8	P. tub.	-	1	T. antipoda
54	1160.0	P. tub.	-	1	F. lacunosus
53	1210.4	P. tub.	-	0	Reworked P. pachypolus
51	1215.2	P. tub.	-	1	D. mammilatus
50	1218.8	P. tub.	-	0	C. annulatus
49	1226.6	P. tub.	-	1	A. myriosporites
48	1236.0	P. tub.	-	2	P. demarcatus
47	1248.1	P. tub.	-	2	I. anguloclavat.
46	1255.0	P. tub.	-	0	C. annulatus
33	1279.9	M. N.a.	G. extensa	2	P. pachypolus
29	1325.0	M. N.a.	G. extensa	0	T. magnificus
28	1333.0	M. N.a.	G. extensa	0	A. sectus
26	1351.0	L. N.a.	-	2	N. falcatus
23	1360.1	L. N.a.	A. dicty.?	0	P. asperopolus
19	1441.0	L. N.a.	-	0	P. asperopolus
12	1495.5	P. asp.	-	2	M. tenuis
11	1519.0	P. asp.	-	0	P. asperopolus
10	1542.5	No older than Upper M. div.			P. asperopolus
09	1566.4	Indet.	-	-	C. apiculatus
08	1575.0	Indet.	-	-	Mud contaminants only
07	1589.0	Indet.	-	-	C. apiculatus
06	1633.0	L. M.d.	-	1	C. vanraadshoov.
ctg	1697	U.L.b.	-	3	C. orthoteichus
03	1698.0	U. L.b.	-	1	L. balmei freq.
ctg	1700	U. L.b.	-	3	C. bullatus

TABLE 2: SUMMARY OF BASIC PALYNOLOGICAL DATA

SWC	DEPTH (m)	YIELD S-P	YIELD DINO	DIVERSITY S-P	DIVERSITY DINO	PRES.	LITH.*
60	1010.0	low	high	med.	med.	poor	marl
59	1031.0	med. v.	high	med.	med.	mod.	marl
58	1050.0	med.	high	med.	high	good	marl
57	1095.9	low	low	low	med.	mod.	marl
56	1111.5	med.	high	med.	med.	poor	marl
55	1138.8	med.	high	med.	med.	mod.	marl
54	1160.0	low v.	high	low	high	mod.	marl
53	1210.4	med.	high	med.	high	good	marl
51	1215.2	low	low	low	low	mod.	marl
50	1218.8	med.	high	med.	low	mod.	marl
49	1226.6	low	med.	low	low	mod.	marl
48	1236.0	low	med.	low	low	mod.	marl
47	1248.1	low	low	low	low	mod.	marl
46	1255.0	med. v.	high	med.	high	mod.	clst.
33	1279.9	med.	low	high	low	good	Slty sst
29	1325.0	high	low	med.	low	poor	clst.
28	1333.0	high	low	med.	low	good	slst.
26	1351.0	med.	low	med.	low	mod.	slst.
23	1360.1	high	low	high	low	mod.	clst.
19	1441.0	high	-	med.	-	mod.	slst.
12	1495.5	low	caved	low	low	mod.	clst.
11	1519.0	low	-	high	-	good	clst.
10	1542.5	low	caved	low	low	mod.	slst.
09	1566.4	low	caved	low	low	mod.	clst.
08	1575.0	low	-	low	-	mod.	clst.
07	1589.0	low	-	low	-	mod.	clst.
06	1633.0	high	-	med.	-	good	clst.
ctg	1697	med.	caved	med.	low	poor	clst.
03	1698.0	low	-	high	-	poor	Slst.
ctg	1700	med.	caved	med.	low	poor	clst.

* Lithological descriptions [main rock type only] taken from sidewall core sample description on transmittal sheets.

Well Name BHP AMBERJACK-1 Basin GIPPSLAND Sheet No. 1 of 5

SAMPLE TYPE OR NO. *	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
FOSSIL NAMES / DEPTHS (m)	1010.0	1031.0	1050.0	1095.9	1111.5	1138.8	1160.0	1210.4	1215.2	1218.8	1226.6	1236.0	1248.1	1255.0	1279.9	1325.0	1333.0	1351.0	1360.1	1441.0	1495.5	1519.0	1542.5	1566.4	1575.0	1589.0
Acaciapollenites myriosporites											•															
Aglaoreidia qualumis															•											
Anacolosidites sectus																	•									
Araucariacites australis	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						
Australopollis obscurus																										
Baculatisporites disconformis																		•	•	•			•			
Banksieaeidites arcuatus																•	•		•							
B. elongatus	•		•		•					•									•							
Basopollis otwayensis															•											
Beaupreaidites elegansiformis														•												
B. trigonalis										•	•						•									
B. verrucosus														•		•	•	•	•	•						
Camarozonosporites bullatus																										
C. heskermensis					•										•											
Chenopodipollis chenopodiaceoides		•		•		•																				
Clavifera triplex																										
Conbaculites apiculatus																								•		•
Concolpites leptos																				•						
Corollinia spp. R								•																		
Crassiretitriletes vanraadshooveni																										
Cupaneidites orthoteichus	•						•								•	•	•	•	•	•		•			•	
Cyatheacidites annulatus	•	•	•		•			•		•				•												
Cyathidites australis		•	•	•	•			•				•	•			•				•		•				
C. minor	•		•												•		•	•				•				
C. palaeospora	•	•	•		•	•		•	•	•					•											
C. splendens	•			•		•	•	•				•			•										•	
C. subtilis									•																	
Dacrycarpites australiensis							•					•			•					•						
Dicotetradites meridianus																		•				•				
Dictyophyllidites arcuatus		•				•	•	•																		
Dilwynites granulatus		•			•	•		•	•	•				•				•						•		
D. tuberculatus		•													•					•						
Diporites delicatus																						•				
Dodonaea triquetra-type																										
Elphedripites notensis																						•				
Ericipites scabratus			•			•	•				•					•	•	•	•	•			•			
Foveotriletes balteus																			•							
F. crater		•	•		•	•																				
F. lacunosus	•		•		•		•	•	•	•																
Gambierina edwardsii																										
G. rudata																										
Gleicheniidites spp.	•	•			•	•		•				•	•	•	•				•	•	•		•	•	•	•
Gothanipollis bassensis																	•		•	•						
Gramminidites media										•																
Gyropollis psilatus																		•								
Haloragacidites cainozoica	•	•	•			•	•								•											
H. harrisii	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Herkosporites elliotii			•				•				•			•	•											
Ilexpollenites anguloclavatus							•			•			•	•	•	•	•	•					•			
Integricorpus antipoda																										
Intratriporopollenites notabilis																						•				
Ischyosporites gremius	•				•	•		•	•	•	•					•						•				
I. irregularis								•																		
Kuylisporites waterbolkii		•	•		•	•																•				
Laevigatosporites spp.	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•		

* C=CORE S=SIDEWALL CORE
T=CUTTINGS J=JUNK BASKET

R - REWORKED SP.
C - CONTAMINANT

Well Name BMR AMBERJACK-1 Basin GIPPSLAND Sheet No. 2 of 5

SAMPLE TYPE OR NO. *	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
FOSSIL NAMES / DEPTHS (m)	1010.0	1031.0	1050.0	1095.9	1111.5	1138.8	1160.0	1210.4	1215.2	1218.8	1226.6	1236.0	1248.1	1255.0	1279.9	1325.0	1333.0	1351.0	1360.1	1441.0	1495.5	1519.0	1542.5	1566.4	1575.0	1589.0
Latrobosporites amplus																										
L. crassus					•									•					•							
L. marginis						•																				
Liliacidites lanceolatus															•											
L. spp.																			•							
Lygistepollenites balmei						R		R				R							R		R			R		R
L. florinii	•	•	•	•	•	•	•	•	•		•		•	•	•	•	•		•				•	•		•
Malvacipollis diversus							•					•										•		•	•	
M. robustus			•			•						•				•	•	•	•							
M. subtilis			•			•		•	•							•	•	•	•	•	•	•	•		•	•
Matonisporites ornamentalis		•	•		•		•	•					•									•				
Microalatidites palaeogenicus		•			•		•		•	•					•	•	•			•						
Microcachrydites antarcticus	•						•	•							•		•			•						
Monogemmites gemmatus																	•		•							
Monolites alveolatus						•																				
Myrtaceidites eucalyptoides		•	•				•		•						•											
M. parvus-mesonesus	•	•	•			•	•					•		•	•		•		•	•			•			
M. tenuis		R													R						•	•				
M. verrucosus		•													•				•							
Nothofagidites asperus		•	•		•	•	•	•							•	•	•	•		•						
N. brachyspinulosus				•		•		•	•		•		•		•	•	•	•	•	•	•	•				
N. deminutus-vansteenii	•	•	•	•	•	•	•	•			•			•	•	•	•	•	•	•						•
N. emarcidus-heterus	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•
N. endurus																										
N. falcatus					•	•	•	•		•	•		•		•	•	•	•	•							
N. flemingii					•	•		•	•	•					•	•	•	•	•	•		•	•	•		
N. goniatus															•	•	•			•		•				
Nuphar ipollis						•																				
Peninsulapollis gillii																			•							
Periporopollenites demarcatus												•		•	•	•	•	•	•			•				
P. polyoratus																										
P. vesicus														•	•		•		•							
Peromonolites vellosus		•	•							•																
Phyllocladidites mawsonii	•	•	•		•	•		•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		•	•
P. reticulosaccatus																										R
Pilosisporites parvisaccatus R																										
Podocarpidites exiguus								•																		
P. spp.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•		•
Podosporites microsaccatus						•		•				•	•				•									•
Polycolpites langstonii																										
P. reticulatus															•											
Polycolporopollenites esobalteus													•				•		•	•		•				
Polypodiaceoisporites varus																										
Polypodiisporites histeopteroides															•											
P. spp.	•	•		•				•		•				•	•	•										
Proteacidites adenanthoides																•	•	•	•							
P. annularis		•	•		•	•		•	•	•	•		•	•	•		•	•								
P. asperopolus																			•	•		•				
P. callosus	•																		•							
P. crassus						•										•	•	•	•							
P. differentipollis																						•	•			
P. kopiensis							•												•			•				
P. latrobensis																		•	•	•						
P. obscurus																•	•	•	•							
P. pachypolus		R					R	R	R						•	•	•	•	•	•		•	•			
P. rectus																										

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R - REWORKED SP.
C - CONTAMINANT

Well Name BMR AMBERJACK-1 Basin GIPPSLAND Sheet No. 3 of 5

SAMPLE TYPE OR NO. *	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
FOSSIL NAMES / DEPTHS (m)	1010.0	1031.0	1050.0	1095.9	1111.5	1138.8	1160.0	1210.4	1215.2	1218.8	1226.6	1236.0	1248.1	1255.0	1279.9	1325.0	1333.0	1351.0	1360.1	1441.0	1495.5	1519.0	1542.5	1566.4	1575.0	1589.0	
Proteacidites recavus															•	•			•								
P. rectomarginis					•		•																				
P. reticuloscabratus																		•	•					•			
P. rugulatus																											
P. tenuiexinus																				•							
P. truncatus														•													
P. tuberculatus			•		•																						
P. spp.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•			•	
Pseudowinterapollis calathus								•																			
P. cranwellae		•													•		•										
Psilodiporites sp. [Alyxia]		•	•											•													
Quintiapollis psilatispora															•												
Retitriletes australoclavatidites									•																		
R. spp.		•						•							•												
Rhoipites sphaerica		•	•		•										•		•	•	•	•		•					
Rugulatisporites cowrensis																						C					
R. mallatus			•										•		•							•					
R. trophus																		•									
Rubipollis oblatus																											
Santaluminidites cainozoicus													•				•	•	•			•					
Sapotaceoidaepollenites rotundus		•			•		•						•	•	•				•								
Simpsonipollis sp.					•																						
Stereisporites australis f. crassa			•		•					•		•															
S. (Tripunctisporis) sp.																		•	•	•		•					
S. spp.		•	•		•	•	•	•	•		•		•	•	•			•	•	•					•		
Tetracolporites multistrixus																						•					
T. verrucosus																											
Tricolpites phillipsii																	•	•									
T. reticulatus		•	•			•								•								•					
T. simatus															•		•	•	•	•							
Tricolporites adelaidensis								•						•	•	•		•	•								
T. angurium									•						•												
T. halis						•																					
T. leuros																•		•									
T. sp. cf T. leuros	•		•	•	•			•						•													
T. paenestriatus						•									•				•		•	•					
T. scabratus	•	•																•	•			•					
Indet. tricolpate/tricolporates	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	
Indet. trilete spores	•		•	•	•		•	•		•	•	•	•	•	•	•		•	•	•		•	•		•		
Triletes tuberculiformis						•							•	•	•	•			•			•					
Triporopollenites ambiguus															•				•								
T. heleosus																			•								
T. spinosus															•												
Tubulifloridites antipoda						•																					
Verrucosisporites cristatus			•			•																					
V. kopukuensis	•		•		•										•			•	•	•		•					
Anacolosidites acutullus																						•					
Cupanieidites reticularis																						•					
Milfordia homeopunctatus												•															
M. hypolaenoides										•																	
Nothofagidites longispina										•																	
Proteacidites grandis																						•					
P. stipplatus																				•							
Schizocolpus marlinensis																						•					
Triorites magnificus																•											

* C=CORE S=SIDEWALL CORE
T=CUTTINGS J=JUNK BASKET

R - REWORKED SP.
C - CONTAMINANT

Well Name BHP AMBERJACK-1 Basin GIPPSLAND Sheet No. 4 of 5

SAMPLE TYPE OR NO. *	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
FOSSIL NAMES / DEPTHS (m)	1010.0	1031.0	1050.0	1095.9	1111.5	1138.8	1160.0	1210.4	1215.2	1218.8	1226.6	1236.0	1248.1	1255.0	1279.9	1325.0	1333.0	1351.0	1360.1	1441.0	1495.5	1519.0	1542.5	1566.4	1575.0	1589.0
DINOFLAGELLATES																											
Alisocysta sp.												•							•								
Areosphaeridium cf capricornum																			•		C						
Cleistosphaeridium epacrum								•					•	•		•		•									
Glaphyracysta sp. [Neogene]	•						•	•		•				•													
Hystrichokolpoma rigaude					•		•	•					•	•													
Schematophora speciosa						•							•														
Deflandrea sp. cf D. leptodermata														•													
Gippslandica extensa s.s.							R								•	•	•										
G. extensa (bald)																•	•										
"G." macmurdoensis																•											
Lejeunacysta																											
Achomosphaera alcicornu				•	•	•	•		•									•									
Impagidinium spp.		•	•	•	•		•	•	•	•	•	•		•							C						
Lingulodinium machaerophorum	•	•	•	•	•			•	•	•	•		•	•										C			
Nematosphaeropsis balcombiana-labrynthica	•	•	•	•		•		•	•	•		•	•	•										C			
Operculodinium centrocarpum	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•			C		C			
Pentadinium laticinctum			•	•	•		•																				
Protoellipsodinium clatatum		•	•	•	•																						
P. mammilatus							•	•	•	•	•			•													
P. simplex		•	•	•	•	•	•																				
Pyxidinopsis pontus	•	•	•	•	•	•	•					•		•													
Rottnestia borussica			•				•																				
Spiniferites spp.	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•			•				C			C	
Tectatodinium pellitum			•										•														
Thalassiphora flammea/peligica									•					•													
Polysphaeridium zoharyii	•		•	•			•		•																		
Dapsilodinium pseudocolligerum												•															
Crassosphaera concinna						•																					
Cyclopsiella vieta s.l.		•			•				•																		
Holoroginella spinata																											
Tritonites sp. cf H. spinata														•													
MICROFAUNA																											
fish teeth		•	•		•		•	•																			
netatocysts [Cnidaria]				•	•							•		•													
trochospiral liners [Foraminifera]	•			•									•				•										

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R - REWORKED SP.
C - CONTAMINANT

Well Name BHP AMBERJACK-1 Basin GIPPSLAND Sheet No. 5 of 5

SAMPLE TYPE OR NO. *	S	T	S	T
FOSSIL NAMES / DEPTHS (m)	1633.0	1697	1698.0	1700
Araucariacites australis	•	•		•
Australopollis obscurus		•	•	•
Clavifera triplex	•			
Crassiretitriletes vanraadshooveni	•			
Cupaneidites orthoteichus	•	•	•	•
Cyathidites splendens	•	•	•	•
Dicotetradites meridianus				•
Ericipites scabratus		•		
Gambierina edwardsii		•		
G. rudata		•	•	•
Gleicheniidites spp.	•	•	•	•
Haloragacidites harrisii	•	•		•
Integricorpus antipoda		•		
Laevigatosporites spp.	•	•	•	•
Latrobosporites amplus			•	
Lygistepollenites balmei	R	•	•	•
L. florinii		•	•	•
Malvacipollis diversus	•	•		
M. subtilis	•	•		•
Microalatidites palaeogenicus		•		
Microcachrydites antarcticus				•
Nothofagidites asperus		•		
N. endurus		•	•	•
N. flemingii		•	•	•
Periporopollenites polyoratus		•		
Peromonolites densus				•
Phyllocladidites mawsonii		•	•	•
P. reticulosaccatus		•	•	•
Podocarpidites spp.		•	•	
Podosporites microsaccatus		•	•	
Polypodiaceoisporites varus	•			
Proteacidites annularis				•
P. pachypolus				C
P. rectus			•	•
P. spp.	•	•	•	•
Rugulatisporites mallatus	•	•		
Stereisporites antiquisporites			•	
S. (Tripunctisporis) sp.	•		•	
S. spp.		•		
Tetracolporites multistrixus		•	•	•
T. verrucosus		•		
Tricolpites phillipsii			•	•
T. simatus				C
Tricolporites marginatus		•		
undescribed tricolpate/tricolporates	•	•	•	•
undescribed trilte spores	•	•	•	•
Verrucosisporites kopukuensis				
Camarozonosporites bullatus				•
Glaphyracysta retiintextum [in situ?]		•		
Caved Lakes Entrance Fm. dinoflagellates		•	•	•

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PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: _____ GL: _____

WELL NAME: AMBERJACK-1 TOTAL DEPTH: _____

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	1010.0	2				1010.0	2			
	P. tuberculatus	1031.0	1				1255.0	1			
PALEOGENE	Upper *N. asperus*										
	Mid *N. asperus*	1279.9	2	1325.0	0		1333.0	0			
	Lower *N. asperus*	1351.0	2	1360.1	0		1441.0	0			
	P. asperopolus	1495.5	2	1519.0	0		1519.0	0			
	Upper *M. diversus*										
	Mid *M. diversus*										
	Lower *M. diversus*	1633.0	1				1633.0	1			
	Upper *L. balmei*	1697	3	1698.0	1		1700	3	1698.0	1	
	Lower *L. balmei*										
LATE CRETACEOUS	Upper T. longus										
	Lower T. longus										
	T. lilliei										
	N. senectus										
	T. apoxyexinus										
	P. mawsonii										
	A. distocarinatus										
EARLY CRET.	*C. paradoxus*										
	C. striatus										
	F. asymmetricus										
	F. wonthaggiensis										
	C. australiensis										
PRE-CRETACEOUS											

COMMENTS: Gippslandica (Deflandrea) extensa Zone 1279.9-1333.0m

The SWC sample at 1542.5m is no older than Upper M. diversus Zone

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: M.K. Macphail DATE: 18 September 1990

DATA REVISED BY: _____ DATE: _____