APPENDIX

PALYNOLOGICAL ANALYSIS OF WHITING-2, GIPPSLAND BASIN

by

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INTERPRETATIVE DATA

INTRODUCTION

Eighty six sidewall core samples were processed and examined for spore-pollen and dinoflagellates. Despite the good sampling densities, recovery and preservation were mostly fair to poor with the Early Eocene and Paleocene sections providing few confident age determinations.

Lithological units and palynological zones from the base of the Lakes Entrance Formation to T.D. are summarized below; anomalous and unusual occurrences of taxa are listed in Table 2. Basic data are given in Table 3.

SUMMARY

AGE	UNIT	ZONE	DEPTH (m)
Early Miocene	Lakes Entrance Fm.	P. tuberculatus	1260.0m
minor log break at 1263.5m			
(undatable samples)	Gurnard Fm.	-	1265.0m-1268.0m
log break at 1269m			
Late Eocene	Latrobe Group coarse clastics	Middle N. asperus	1272.0-1285.0m
		Lower N. asperus	1289.0-1421.0m
Early Eocene	"	P. asperopolus	1440.9-1568.0m
Early Eocene	"	Upper M. diversus	1730.0m
Early Eocene	"	Middle M. diversus	not recognised
Early Eocene	"	Lower M. diversus	1754.0-1874.9m
Paleocene	"	Upper L. balmei	1899.9-2224.9m
Paleocene	"	Lower L. balmei	2308.0-2980.9m
Maastrichtian	"	Upper T. longus	3120.0-3235.0m
Late Cretaceous	"	Lower T. longus	3300.5-3434.0m
Late Cretaceous	'	T. lilliei	3489.0-3515.0m

T.D. 3353m

GEOLOGICAL COMMENTS

1. Although sediments of Middle *M. diversus* Zone age were not recognized in Whiting-2, it is highly likely that the well contains a continuous sequence of sediments from the Late Cretaceous *T. lilliei* Zone to the Late Eocene, Middle *N. asperus* Zone (see Biostratigraphy Section).

2. Unlike in Whiting-1 where a 4-5m thick section of Gurnard Formation is present (P. Arditto pers. comm.; cf. Macphail 1983; Rexilius 1985), the only evidence that the equivalent greensand occurs in Whiting-2 is sidewall cores 109 and 110, taken at 1268.0m and 1265.0m respectively. These are barren sandstones containing moderate to abundant pelletal glauconite and pyrite. A marked log break at 1269m separates this unit from the underlying glauconite-free, carbonaceous sandstones. Recognition of the Gurnard Formation in Whiting-2 is made more difficult by the fact that the typical 'Gurnard Formation log response' of (well-separated) high density, high neutron porosity between 1269.0-1277.0m is associated with the upper part of the unit of carbonaceous sandstones, dated as Middle *N. asperus* Zone in age. Based on log character, the maximum thickness of Gurnard Formation in Whiting-2 is 5.5m.

3. As in Whiting-1, dinoflagellates are rare to absent throughout most of the Latrobe Group coarse clastics section. In both wells, the earliest recorded marine influence is Early Eocene, basal Lower *M. diversus* Zone - the *Apectodinium hyperacantha* transgression, equated with the Rivernook Member, Princetown Section, onshore Otway Basin (see Cookson & Eisenack 1967). In both wells *L. balmei* Zone spore-pollen from the underlying

non-marine Paleocene sediments has been extensively reworked into the A. hyperacantha Zone sediments. This marine unit would appear to provide an ideal datum for correlating the two wells and also adjacent wells such as Snapper A-21 where the same transgression is recorded.

4. The absence of Paleocene-Late Cretaceous marine transgressions across the Whiting Field is consistent with data from the Barracouta Field. Evidently neither area was reached by the widespread Paleocene Apectodinium homomorpha marine transgression. This is not the case with the Snapper Field which lies closer to the axis of the Paleocene, Tuna-Flounder Channel. E.g. in Snapper-4, A. homomorpha Zone sediments occur at 1765.5m (overlying a non-marine basal Lower M. diversus Zone unit), and 2029.0m and 2078.9m (both Upper L. balmei Zone) (Macphail 1984).

5. Apart from the Lower M. diversus Zone, A. hyperacantha marine transgression, the only other marine-influenced sediments in Whiting-2 that can be assigned to a named (Partridge 1976) marine transgression is the carbonaceous sandstone at 1275.0m which is Corrudinium incompositum Zone in age. The equivalent marine-influenced unit was not recognized in Whiting-1 although dinoflagellates typically associated with C. incompositum, e.g. Vozzhenikovia extensa, occur in both wells. Of the other Eocene marginal marine sediments recognized in Whiting-2 (1421.0, 1466.0, 1530.0, 1766.0m), the one at 1530.0m which is characterized by common-abundant Homotryblium tasmaniense, is almost certainly the same as the P. asperopolus sediments at 1527.5m in Whiting-1 and 4498 ft in Barracouta-4. If correct this H. tasmaniense 'stratum' may prove to be a useful datum horizon.

6. The Whiting-2 well is unusual in that the Middle/Lower N. asperus Zone boundary is well-defined by confidently-dated samples only ca 4m apart. Logs indicate the intervening unsampled section (1285.0-1289.0m) is one of a number of small coarsening upwards parasequences occurring between

1372-1390m - possibly representing a lower shoreface environment although dinoflagellate numbers and diversity in samples taken within this interval are low.

7. Significant differences exist in the total thicknesses of Upper and Lower L. balmei sediments between Whiting-1 and -2. In the case of Upper L. balmei Zone sediments (469m in Whiting-1, 325m in Whiting-2) the difference largely disappears if the first occurrence of Malvacipollis spp., not Verrucosisporites kopukuensis (a species now known to first appear infrequently in the Lower L. balmei Zone), is used to define the base of the Upper L. balmei Zone. The revised thickness of Upper L. balmei Zone sediments in Whiting-1 is 333m (from 1889.5 to 2233.0m, see revised data sheet). Differences in the thickness of Lower L. balmei Zone sediments between the two wells (336m in Whiting-1, 673m in Whiting-2) are less easily resolved. The critical difference here is that the highest Upper T. longus Zone sediments occur at 2767.0m in Whiting-1 and 3120.0m in Whiting-2. Explanations include (i) the - very unlikely - mislabelling of SWC's 30 (2960.0m) and 29 (2980.9m) which contain good Lower L. balmei Zone palynofloras or (ii) intersection of an oblique growth fault.

8. Palynofloras at 2485, 2774.0m and between 3434.0-3515.0m have TAI values of 2.2-2.4, slightly above TAI values found in adjoining samples or in samples from similar depths in other Gippsland wells. This may be due to hydrothermal activity related to volcanic intrusions, e.g. 18m of volcanics were encountered near the base of the Lower L. balmei Zone in Whiting-1.

9. Consistent with its deeper T.D., Whiting-2 penetrated older Late Cretaceous sediments than Whiting-1 (T. lilliei Zone versus Upper T. Longus Zone respectively).

BIOSTRATIGRAPHY

Zone boundaries have been established using the criteria of Stover & Partridge (1973) and subsequent proprietary revisions.

Tricolporites lilliei Zone: 3489.0-3515.0m

Three samples are assigned to this zone on the basis of common to abundant Nothofagidites associated with two species which first appear in this zone, Gambierina edwardsii and G. rudata.

Lower Tricolpites longus Zone: 3300.5-3434.0m

Samples within this section contain either or both common to abundant Nothofagidites and Gambierina pollen. The base of the zone is defined by the first appearance of Tricolpites longus and the upper boundary is picked at the highest sample lacking Upper T. longus Zone indicator species.

Upper Tricolpites longus Zone: 3120.0-3235.0m

Occurrences of Stereisporites punctatus with frequent to common Gambierina rudata confirm an Upper T. longus Zone age for this section. Species which range no higher than this zone occur at: 3235.0m (Triporopollenites sectilis, Proteacidites reticuloconcavus, P. wahooensis), 3165.0m (Tricolporites lilliei) and 3120.0m (Triporopollenites megasectilis ms.).

Lower Lygistepollenites balmei Zone: 2308.0-2980.9m

Palynofloras within this and the Upper L. balmei Zone are dominated by (i) gymnosperms, in particular Lygistepollenites balmei and Podocarpidites spp., and (ii) Proteacidites spp. with sporadic but occasionally frequent occurrences of species which range no higher than the Upper L. balmei Zone e.g. Australopollis obscurus, Proteacidites angulatus, Gambierina spp., Tetracolporites verrucosus and Integricorpus antipodus.

The base of the Lower L. balmei Zone is picked at 2980.9m, the lowest sample lacking Late Cretaceous indicator species. Integricorpus antipodus shows this sample is no older than the Lower L. balmei Zone. Haloragacidites harrisii is first recorded at 2960.0m. Tetracolporites verrucosus is frequent in this sample and at 2739.0m, the highest sample containing T. verrucosus (3 specimens). the first appearance of Verrucosisporites kopukuensis is at 2390.0m

Upper Lygistepollenites balmei Zone: 1899.9-2224.9m

The lower boundary is provisionally placed at 2224.9m, based on the abundance of Gleicheniidites and presence of Verrucosisporites kopukuensis. Malvacipollis spp. pollen first occurs at 2105.9m, in a sample containing Polycolpites langstonii. The upper boundary is placed at 1899.9m, based on the occurrence of Banksieaeidites lunatus and frequent Lygistepollenites balmei and Nothofagidites endurus.

Lower Malvacipollis diversus Zone: 1754.0-1874.9m

Occurrences of Cyathidites gigantis, Crassiretitriletes vanraadshoovenii, Spinzonocolpites prominatus (abundant), and Polypodiaceosporites varus in a Malvacipollis diversus-dominated palynoflora at 1874.9m confirm a Lower M. diversus Zone age for this sample. The presence of Apectodinium hyperacantha, Fibrocysta bipolare and Proteacidites pachypolus in the same assemblage demonstrate this sample is the time-equivalent of the Rivernook Member, Princetown Section in the onshore Otway Basin (see Cookson & Eisenack 1967). Frequent occurrences of reworked Paleocene-Late Cretaceous species, including Lygistepollenites balmei and Australopollis obscurus, are consistent with the marine-nature of this sample. Other samples assigned to this zone contain general M. diversus Zone palynofloras (including Malvacipollis diversus, Tricolporites moultonii and Schizocolpus marlinensis) but lack indicator species. The upper boundary is provisionally placed at 1754.0m, the highest sample lacking species first appearing in the Middle M. diversus Zone.

Upper Malvacipollis diversus Zone: 1730.0m

One sample is provisonally assigned to this zone, based on the occurrence of a single poorly preserved specimen of Proteacidites pachypolus. Since spore-pollen yield from this sample was very low and the assemblage contained reworked Australopollis obscurus, the Upper M. diversus Zone age is of low confidence. The sample at 1703.0m contains Proteacidites tuberculiformis, Cupanieidites orthoteichus and Intratriporopollenites notabilis (all first occurrences) and is therefore no older than Middle M. diversus Zone in age. The overlying section from 1601.9 to 1670.9m was barren.

Proteacidites asperopolus Zone: 1440.9-1568.0m

The base of this zone is defined by the first appearances of Clavastephanocolporites meleosus and Proteacidites asperopolus at 1568.0m. This sample includes species which range no higher than this zone, e.g. Myrtaceidites tenuis, Proteacidites ornatus, P. tuberculiformis and (usually) Intratriporopollenites notabilis. Clavastephanocolporites meleosus and (frequent) Myrtaceidites tenuis also occur at 1547.5m, this time in association with Proteacidites leightonii and P. xestoformis. The typically Early Eocene dinoflagellate Homotryblium tasmaniense is common at 1530.0m, associated with Conbaculites apiculatus, Tricolpites incisus and Sapotaceoidaepollenites rotundus. The highest occurrence of Myrtaceidites tenuis is at 1460.0m. The upper boundary is picked at 1440.9m, the highest sample containing Proteacidites asperopolus and P. leightonii.

Lower Nothofagidites asperus Zone: 1289.0-1421.0m

The lower boundary is placed at 1421.0m, based on the simultaneous first appearance of Tricolpites simatus and Tricolporites leuros in a Nothofagidites- dominated palynoflora containing Proteacidites asperopolus. Tricolporites delicatus first appears at 1353.9m, associated with a rare instance of Intratriporopollenites notabilis occurring above the P. asperopolus Zone. The upper boundary is picked at the highest occurrence of Proteacidites asperopolus at 1289.0m.

Middle Nothofagidites asperus Zone: 1272.0-1285.0m

Three samples are assigned to this zone. The lowermost at 1285.0m contains multiple specimens of Tricolpites thomasii with Verrucatosporites attinatus, species which first appears in the uppermost Lower N. asperus Zone; the middle sample at 1275.0m contains the Middle N. asperus Zone indicator dinoflagellate Corrudinium incompositum; the uppermost at 1272.0m contains Proteacidites pachypolus, and Bysmapollis emaciatus, species which ranges no higher than this zone. This sample also includes Proteacidites rectomarginis and P. stipplatus, species which range no lower than the Middle N. asperus Zone.

Proteacidites tuberculatus Zone: 1260.0m.

The occurrence of the dinoflagellates Protoellipsodinium simplex and Pyxidinopsis pontus indicate a P. tuberculatus Zone age for this sample. The samples at 1265.0 and 1268.0m yielded insufficient microfossils for dating but did contain single specimens of Pyxidinopsis pontus.

REFERENCES

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PALYNOLOGY DATA SHEET

BASIN: Gippsland | ELEVATION: KB: +21.0m GL:

WELL NAME: Whiting-2 | TOTAL DEPTH: 3353m

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
NEOGENE	*M. lipsis*										
NEOGENE	*C. bifurcatus*										
NEOGENE	*T. bellus*										
NEOGENE	*P. tuberculatus*	1260.0	2				1260.0	2			
PALEOGENE	Upper *N. asperus*										
PALEOGENE	Mid *N. asperus*	1272.0	1				1285.0	1			
PALEOGENE	Lower *N. asperus*	1289.0	1				1421.0	1			
PALEOGENE	*P. asperopolus*	1440.9	2	1466.0	0		1568.0	0			
PALEOGENE	Upper *M. diversus*	1730.0	2				1730.0	2			
PALEOGENE	Mid *M. diversus*										
PALEOGENE	Lower *M. diversus*	1754.0	2				1874.9	0			
PALEOGENE	Upper *L. balmei*	1899.9	1				2224.9	2			
PALEOGENE	Lower *L. balmei*	2308.0	2				2980.9	1			
LATE CRETACEOUS	Upper *T. longus*	3120.0	1				3235.0	1			
LATE CRETACEOUS	Lower *T. longus*	3300.0	2				3434.0	1			
LATE CRETACEOUS	*T. lilliei*	3489.0	2				3515.0	1			
LATE CRETACEOUS	*N. senectus*										
LATE CRETACEOUS	*T. apoxyexinus*										
LATE CRETACEOUS	*P. mawsonii*										
LATE CRETACEOUS	*A. distocarinatus*										
EARLY CRET.	*P. pannosus*										
EARLY CRET.	*C. paradoxa*										
EARLY CRET.	*C. striatus*										
EARLY CRET.	*C. hughesi*										
EARLY CRET.	*F. wonthaggiensis*										
EARLY CRET.	*C. australiensis*										

COMMENTS: C. incompositum Zone 1275.0m

H. tasmaniense common at 1530.0m

A. hyperacantha Zone 1874.9m

CONFIDENCE RATING:

- O: 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: 21 November 1985

DATA REVISED BY: | DATE:

PALYNOLOGY DATA SHEET

BASIN: Gippsland | ELEVATION: KB: +21.0m GL: -53.0m

WELL NAME: Whiting-1 | TOTAL DEPTH: 3011m

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
	P. tuberculatus	1276.6	0				1276.6	0			
PALEOGENE	Upper *N. asperus*										
	Mid *N. asperus*	1301.2	2				1301.2	2			
	Lower *N. asperus*	1317.8	0				1417.0	1			
	P. asperopolus	1456.0	1				1542.0	0			
	Upper *M. diversus*	1577.5	1				1590.3	0			
	Mid *M. diversus*	1640.7	2				1715.8	1			
	Lower *M. diversus*	1734.0	0				1859.1	0			
	Upper *L. balmei*	1889.5	2				2233.0	1			
	Lower *L. balmei*	2358.5	2				2738.5	2	2551.0	1	
LATE CRETACEOUS	Upper *T. longus*	2767.0	1				2993.5	1			
	Lower *R. longus*										
	T. lilliei										
	N. senectus										
	T. apoxyexinus										
	P. mawsonii										
	A. distocarinatus										
EARLY CRET.	*P. pannosus*										
	C. paradoxa										
	C. striatus										
	C. hughesi										
	F. wonthaggiensis										
	C. australiensis										

COMMENTS: A. hyperacantha Zone 1859.1m

Homotryblium tasmaniense assemblage 1527.5m

CONFIDENCE RATING:

- O: 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: 27 June 1983

DATA REVISED BY: M.K. Macphail | DATE: 21 Nov. 1985

TABLE I: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

WHITING-2

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 111	1260.0	*P. tuberculatus*	-	Early Miocene	2	*P. simplex*, *P. pontus*, *V. attinatus*
SWC 110	1265.0	Indeterminate	-			*P. pontus*
SWC 109	1268.0	Indeterminate	-			
SWC 108	1272.0	Middle *N. asperus*	-	Late Eocene	1	*P. stipplatus*, *P. rectomarginis*, *P. pachypolus*, *S. punctatus*
SWC 107	1275.0	Middle *N. asperus*	*C. incompositum*	Late Eocene	0	*C. incompositum*, *T. thomasii*, *P. pachypolus*
SWC 106	1280.0	*N. asperus*	-	Eocene	-	-
SWC 105	1285.0	Middle *N. asperus*	-	Late Eocene	1	*T. thomasii*, *V. attinatus*
SWC 104	1289.0	Lower *N. asperus*	-	Middle Eocene	1	*P. asperopolus*, abund. *Nothofagidites*
SWC 102	1302.0	Lower *N. asperus*	-	Middle Eocene	2	
SWC 101	1337.5	Lower *N. asperus*	-	Middle Eocene	1	*P. asperopolus*, abund. *Nothofagidites*
SWC 100	1353.9	Lower *N. asperus*	-	Middle Eocene	1	*T. delicatus*, *I. notabilis*
SWC 99	1374.0	Lower *N. asperus*	-	Middle Eocene	1	*T. leuros*, *P. asperopolus*, *N. falcatus*
SWC 98	1397.0	Lower *N. asperus*	-	Middle Eocene	1	*T. leuros*, *P. recavus*
SWC 97	1421.0	Lower *N. asperus*	-	Middle Eocene	1	*T. leuros*, *T. simatus*, *P. asperopolus*, abund. *Nothofagidites*
SWC 96	1440.9	*P. asperopolus*	-	Early Eocene	2	*P. asperopolus*, *T. incisus*, *S. rotundus* *P. leightonii*
SWC 95	1466.0	*P. asperopolus*	-	Early Eocene	0	*P. asperopolus*, *M. tenuis*, freq. *P. leightonii*

TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

WHITING-2

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 94	1484.9	-	-	-	-	
SWC 93	1517.5	No older than Upper M. diversus		Early Eocene	-	P. pachypolus, M. tenuis
SWC 92	1530.0	P. asperopolus	-	Early Eocene	1	S. rotundus, T. incisus, common H. tasmaniense
SWC 90	1547.5	P. asperopolus	-	Early Eocene	1	C. meleosus, M. tenuis, I. notabilis, P. leightonii, abund. P. pachypolus
SWC 89	1568.0	P. asperopolus	-	Early Eocene	0	P. asperopolus, C. meleosus, P. ornatus, M. tenuis
SWC 88	1601.9	-	-	-	-	
SWC 87	1603.0	-	-	-	-	
SWC 86	1613.0	-	-	-	-	
SWC 84	1670.9	-	-	-	-	
SWC 83	1703.0	No older than Middle M. diversus		Early Eocene	-	P. tuberculiformis
SWC 82	1730.0	Upper M. diversus	-	Early Eocene	2	Sing poor spm. of P. pachypolus
SWC 81	1754.0	Lower M. diversus	-	Early Eocene	2	General M. diversus Zone palynoflora
SWC 80	1766.0	Lower M. diversus	-	Early Eocene	2	M. diversus freq., S. marlinensis
SWC 78	1800.0	Lower M. diversus	-	Early Eocene	2	General M. diversus Zone palynoflora
SWC 77	1840.0	Lower M. diversus	-	Early Eocene	2	General M. diversus Zone palynoflora
SWC 76	1860.0	Lower M. diversus	-	Early Eocene	2	General M. diversus Zone palynoflora
SWC 75	1874.9	Lower M. diversus	A. hyperacantha	Early Eocene	0	M. diversus and S. prominatus abund., C. gigantis, P. varuno, P. pachypolus, A. hyperacantha

TABLE I: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

WHITING-2

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 74	1899.9	Upper L. balmei	-	Paleocene	1	B. lunatus, freq. L. balmei and N. endurus
SWC 73	1924.0	Upper L. balmei	-	Paleocene	1	M. subtilis, freq. L. balmei
SWC 72	1945.0	Upper L. balmei	-	Paleocene	1	M. subtilis, freq. L. balmei
SWC 71	1970.0	Upper L. balmei	-	Paleocene	2	G. rudata, V. kopukuensis, freq. L. balmei
SWC 70	1985.0	Upper L. balmei	-	Paleocene	1	B. lunatus, G. rudata, freq. L. balmei
SWC 69	2000.0	L. balmei	-	Paleocene	-	I. antipodus, freq. L. balmei
SWC 67	2045.0	L. balmei	-	Paleocene	-	I. antipodus, L. amplus, H. elliotii, V. kopukuensis, common L. balmei
SWC 66	2073.0	L. balmei	-	Paleocene	-	common L. balmei
SWC 65	2105.9	Upper L. balmei	-	Paleocene	1	M. diversus, M. subtilis, P. langstonii
SWC 63	2144.9	L. balmei	-	Paleocene	-	common L. balmei
SWC 61	2185.0	L. balmei	-	Paleocene	-	L. balmei
SWC 60	2205.0	Upper L. balmei	-	Paleocene	2	Freq. L. balmei, V. kopukuensis
SWC 59	2224.9	Upper L. balmei	-	Paleocene	2	L. balmei and Gleicheniidites common, V. kopukuensis
SWC 58	2250.0	L. balmei	-	Paleocene	-	Abund. L. balmei
SWC 57	2285.0	L. balmei	-	Paleocene	-	H. harrisii
SWC 56	2308.0	Lower L. balmei	-	Paleocene	2	T. verrucosus, common L. balmei
SWC 55	2330.0	L. balmei	-	Paleocene	-	A. obscurus abundant

TABLE I: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

WHITING-2

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 53	2370.0	L. balmei	-	Paleocene	-	L. balmei
SWC 52	2390.0	L. balmei	-	Paleocene	-	V. kopukuensis, L. balmei
SWC 51	2409.9	L. balmei	-	Paleocene	-	A. obscurus common
SWC 50	2438.0	Lower L. balmei	-	Paleocene	2	T. verrucosus, freq. L. balmei
SWC 48	2485.0	L. balmei	-	Paleocene	-	A. obscurus frequent
SWC 47	2505.0	L. balmei	-	Paleocene	-	L. balmei common
SWC 46	2526.0	L. balmei	-	Paleocene	-	L. balmei frequent
SWC 45	2548.0	L. balmei	-	Paleocene	-	L. balmei frequent
SWC 44	2570.0	L. balmei	-	Paleocene	-	A. obscurus common
SWC 43	2590.0	L. balmei	-	Paleocene	-	L. balmei
SWC 42	2608.0	Indeterminate	-	-	-	A. obscurus
SWC 40	2655.0	L. balmei	-	Paleocene	-	Abund. P. angulatus, sample extensively contaminated
SWC 39	2675.0	L. balmei	-	Paleocene	-	P. angulatus common
SWC 38	2694.0	No older than Upper T. longus		-	-	S. punctatus
SWC 36	2739.9	Lower L. balmei	-	Paleocene	-	L. balmei, freq. T. verrucosus
SWC 35	2774.0	Indeterminate	-	-	-	
SWC 34	2801.0	Indeterminate	-	-	-	A. obscurus
SWC 33	2892.9	Indeterminate	-	-	-	
SWC 30	2960.0	Lower L. balmei	-	Paleocene	1	H. harrisii, freq. L. balmei and T. verrucosus

TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

WHITING-2

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 29	2980.9	Lower L. balmei	-	Paleocene	1	I. antipodus, T. verrucosus, L. balmei
SWC 26	3049.9	Indeterminate	-	-	-	
SWC 25	3075.0	Indeterminate	-	-	-	
SWC 23	3120.0	Upper T. longus	-	Maastrichtian	1	S. punctatus, freq. G. rudata
SWC 20	3133.5	Indeterminate	-	-	-	Badly contaminated sample
SWC 19	3165.0	T. longus	-	Late Cretaceous	-	T. verrucosus, T. lilliei, G. Rudata, N. endurus
SWC 14	3235.0	Upper T. longus	-	Maastrichtian	1	S. punctatus, T. sectilis, common G. rudata
SWC 6	3300.0	Lower T. longus	-	Late Cretaceous	2	G. rudata and Nothofagidites abund.
SWC 4	3318.0	Indeterminate	-	-	-	
SWC 2	3329.8	Lower T. longus	-	Late Cretaceous	2	G. rudata common
SWC	3417.3	Indeterminate	-	-	-	
SWC 129	3434.0	Lower T. longus	-	Late Cretaceous	1	Nothofagidites common, T. longus
SWC 121	3489.0	T. lilliei	-	Late Cretaceous	2	Nothofagidites common, T. sectilis
SWC 120	3492.3	T. lilliei	-	Late Cretaceous	2	Nothofagidites abund., G. rudata
SWC 118	3515.0	T. lilliei	-	Late Cretaceous	1	G. rudata, G. edwardsii
SWC 114	3534.3	Indeterminate	-	-	-	
SWC 112	3548.2	Indeterminate	-	-	-	

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF SPORE-POLLEN TAXA IN WHITING-2

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 108	1272.0	Middle N. asperus (1)	Lygistepollenites balmei	Reworked
SWC 108	1272.0	Middle N. asperus (1)	Proteacidites stipplatus	Rare sp. (assoc. with V. attinatus)
SWC 108	1272.0	Middle N. asperus (1)	Bysmapollis emaciatus	Close to top of rare
SWC 107	1275.0	Middle N. asperus (1)	Tricolpites thomasii	Rare sp.
SWC 107	1275.0	Middle N. asperus (1)	Helcisporites astrus	Uncommon sp.
SWC 106	1280.0	(Middle N. asperus)	Cunoniaceae 3-p	Modern taxon
SWC 105	1285.0	Middle N. asperus (1)	Tricolpites thomasii	Rare sp. (assoc. with V. attinatus)
SWC 105	1285.0	Middle N. asperus (1)	Beaupreadites trigonalis	Rare sp. (assoc. with V. attinatus)
SWC 104	1289.0	Lower N. asperus (1)	Clavatipollenites glarius	V. rare sp.
SWC 104	1289.0	Lower N. asperus (1)	Concolpites leptos	V. rare sp.
SWC 104	1289.0	Lower N. asperus (1)	Cunoniaceae 3-p	Modern taxon
SWC 104	1289.0	Lower N. asperus (1)	Matonisporites ornamentalis	Uncommon in this zone
SWC 104	1289.0	Lower N. asperus (1)	Phyllocladidites palaeogenicus	Uncommon sp.
SWC 102	1302.0	Lower N. asperus (2)	Proteacidites reflexus	Rare sp.
SWC 102	1302.0	Lower N. asperus (2)	Proteacidites echinatus	Ms. sp. (MKM)
SWC 100	1353.9	Lower N. asperus (1)	Cupanieidites reticulatus	Rare sp.
SWC 100	1353.9	Lower N. asperus (1)	Intratriporopollenites notabilis	Rare above P. asperopolus Zone
SWC 98	1397.0	Lower N. asperus (1)	Ephredripites notensis	Rare sp.
SWC 97	1421.0	Lower N. asperus (1)	Quintinia	Modern taxon
SWC 97	1421.0	Lower N. asperus (1)	Stephanocolpites sp.	cf. oblatus
SWC 97	1421.0	Lower N. asperus (1)	Tricolpites thomasii	Not prev. recorded below Middle N. asperus Zone
SWC 96	1440.9	P. asperopolus (2)	Droseraceae	Rare taxon

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF SPORE-POLLEN TAXA IN WHITING-2

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 96	1440.9	P. asperopolus (2)	Gyrostemonaceae-type	Modern taxon
SWC 96	1440.9	P. asperopolus (2)	Reticulosporis	Uncommon in Eocene
SWC 96	1440.9	P. asperopolus (2)	Stephanocolpites	cf. oblatus
SWC 95	1466.0	P. asperopolus (1)	Proteacidites obesolabrus	V. rare sp., first offshore record in Basin
SWC 95	1466.0	P. asperopolus (1)	Proteacidites tuberculotumulatus	Rare sp.
SWC 95	1466.0	P. asperopolus (1)	Proteacidites reticulatus	Rare sp.
SWC 95	1466.0	P. asperopolus (1)	Tricolpites palisadus	Ms. sp. (MKM)
SWC 92	1530.0	P. asperopolus (1)	Conbaculites apiculatus	Ms. sp. (ADP)
SWC 92	1530.0	P. asperopolus (1)	Triporopollenites heleosus	Uncommon sp.
SWC 92	1530.0	P. asperopolus (1)	Homotryblium tasmaniensis	Population of this dino. assoc. with Wetzeliella longispinosa
SWC 90	1547.5	P. asperopolus (1)	Clavastephinocolporites meleosus	Rare sp.
SWC 90	1547.5	P. asperopolus (1)	Dryptopollenites semilunatus	Rare sp.
SWC 90	1547.5	P. asperopolus (1)	Triporopollenites heleosus	Uncommon sp.
SWC 90	1547.5	P. asperopolus (1)	Gamblerina rudata	In essentially non-marine sample
SWC 89	1568.0	P. asperopolus (1)	Crassiretitriletes vanraadshoovenii	Uncommon in this zone
SWC 89	1568.0	P. asperopolus (1)	Kuylisporites waterbolkii	Uncommon in this zone
SWC 89	1568.0	P. asperopolus (1)	Cupanieidites reticulatus	Rare sp.
SWC 83	1703.0	(Upper M. diversus)	Basopollis mutabilis	Uncommon in this zone
SWC 83	1703.0	(Upper M. diversus)	Retistephanocolpites nixonii	Rare sp.
SWC 81	1754.0	Lower M. diversus (2)	Tricolpites gigantis	Ms. sp. (MKM)
SWC 80	1766.0	Lower M. diversus (2)	Dryptopollenites semilunatus	Rare sp.

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF SPORE-POLLEN TAXA IN WHITING-2

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 80	1766.0	Lower M. diversus (2)	Rouseisporites reticulatus	Uncommon in Eocene
SWC 77	1840.0	Lower M. diversus (2)	Retistephanocolpites nixonii	Rare sp.
SWC 77	1840.0	Lower M. diversus (2)	Rotverrusporites stellatus	V. rare sp.
SWC 77	1840.0	Lower M. diversus (2)	Selagosporis	V. rare ms. sp. (Stough)
SWC 72	1945.0	Upper L. balmei (1)	Triporopollenites sp.	Rel. to T. bellus
SWC 72	1945.0	Upper L. balmei (1)	Gleicheniidites apiculatus	Ms. sp. (MKM)
SWC 71	1970.0	(Upper L. balmei)	Schizaea digitatoides	Uncommon sp.
SWC 66	2073.0	(Upper L. balmei)	Peromonolites baculatus	Uncommon sp.
SWC 65	2105.9	Upper L. balmei (1)	Phyllocladidites verrucosus	Uncommon in this zone
SWC 57	2285.0	(Upper L. balmei)	Nothofagidites asperus	Uncommon in this zone
SWC 56	2308.0	Lower L. balmei (2)	Tricolporites scabratus	Assoc. with T. verrucosus
SWC 56	2308.0	Lower L. balmei (2)	Proteacidites ademonosus	Not previously recorded in Paleocene

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA

WHITING-2

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD SPORE-POLLEN	YIELD DINOS	DIVERSITY SPORE-POLLEN	DIVERSITY DINOS	PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
SWC 111	1260.0	Low	Low	Low	Low	Good	Slst., calc., glau.	-	
SWC 110	1265.0	Low	Low	Medium	Low	Fair	Ss., glau.	-	
SWC 109	1268.0	Negl.	Negl.	-	-	Good	Ss., glau.	-	
SWC 108	1272.0	Low	Fair	High	High	Good	Ss., carb.	-	
SWC 107	1275.0	Low	V. low	High	Low	Fair	Ss., slty, carb.	-	
SWC 106	1280.0	V. low	V. low	Medium	Low	Good	Ss., carb.	-	
SWC 105	1285.0	Fair	Low	High	Low	Good	Ss., carb.	-	
SWC 104	1289.0	Fair	V. low	High	Low	Fair	Ss., carb.	-	
SWC 102	1302.0	V. low	V. low	Medium	Low	Good	Ss., slty, carb.	-	
SWC 101	1337.5	Low	-	Low	-	Poor	Slst., clayey	-	hydrocarbon-affected?
SWC 100	1353.9	Low	-	Medium	-	Good	Slst.	Minor	
SWC 99	1374.0	Fair	-	Medium	-	Good	Slst.	-	
SWC 98	1397.0	Fair	-	Medium	-	Good	Slst./lignite	-	
SWC 97	1421.0	High	V. low	High	Low	V. good	Slst., carb.	-	
SWC 96	1440.9	High	-	High	-	Good	Slst., carb.	-	
SWC 95	1466.0	High	High	High	Low	Fair	Slst., carb.	-	

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA

WHITING-2

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD SPORE-POLLEN	YIELD DINOS	DIVERSITY SPORE-POLLEN	DIVERSITY DINOS	PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
SWC 94	1484.9	Negl.	-	-	-	-	Ss., slty.	-	
SWC 93	1517.5	Low	-	:pw	-	Fair	Clyst.	-	
SWC 92	1530.0	High	High	High	Medium	Fair	Slst., carb.	-	
SWC 90	1547.5	Fair	V. low	High	Low	Fair	Slst., carb.	-	
SWC 89	1568.0	Fair	-	High	-	Good	Slst.	-	
SWC 88	1601.9	-	-	-	-	-	Clyst.	-	
SWC 87	1603.0	Negl.	-	-	-	Poor	Slst.	-	
SWC 86	1615.0	-	-	-	-	-	Ss.	-	
SWC 84	1670.9	-	-	-	-	-	Slst.	-	
SWC 83	1703	Fair	-	High	-	Good	Slst.	-	
SWC 82	1730.0	V. low	-	Low	-	Fair	Slst.	-	
SWC 81	1754.0	Good	-	Medium	-	Good	Slst.	-	
SWC 80	1766.0	Good	Medium	High	Low	Fair	Slst., carb.	-	
SWC 78	1800.0	Fair	-	High	-	Fair	Clyst.	-	
SWC 77	1840.0	Low	-	High	-	Fair	Slst.	-	
SWC 76	1860.0	Low	-	Medium	-	Fair	Slst.	-	
SWC 75	1874.9	High	High	High	Medium	Good	Slst., calc., carb.	-	

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA

WHITING-2

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD SPORE-POLLEN	YIELD DINOS	DIVERSITY SPORE-POLLEN	DIVERSITY DINOS	PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
SWC 74	1899.9	Low	-	Medium	-	Fair	Slst.	-	
SWC 73	1924.0	Fair	-	Medium	-	Fair	Slst., carb.	-	
SWC 72	1945.0	High	-	Medium	-	Fair	Slst.	-	
SWC 71	1970.0	Low	-	Medium	-	Fair	Slst., carb.	-	
SWC 70	1985.0	High	-	Medium	-	Fair	Coal	-	
SWC 69	2000.0	Fair	-	Medium	-	Fair	Slst., carb.	-	
SWC 67	2045.0	Low	-	Medium	-	Fair	Slst.	-	
SWC 66	2073.0	Fair	-	Low	-	Fair	Slst., carb.	-	
SWC 65	2105.9	Low	-	Medium	-	Fair	Slst.	-	
SWC 63	2144.9	Fair	-	Medium	-	Poor	Slst., carb.	-	
SWC 61	2185.0	Negl.	-	-	-	Good	Ss.	-	
SWC 60	2205.0	Low-	-	Low	-	Poor	Slst., carb.	-	
SWC 59	2224.9	High	-	Medium	-	Poor	Slst.	-	
SWC 58	2250.0	Low	-	Medium	-	Poor	Slst.	-	
SWC 57	2285.0	Low	-	Medium	-	Fair	Slst., carb.	-	
SWC 55	2330.0	High	-	Low	-	Poor	Slst., carb.	-	
SWC 53	2370.0	V. low	-	Low	-	V. poor	Ss.	-	
SWC 52	2390.0	Low	-	Low	-	Poor	Slst.	-	

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA

WHITING-2

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD		DIVERSITY		PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
		SPORE-POLLEN	DINOS	SPORE-POLLEN	DINOS				
SWC 51	2409.9	Fair	-	Low	-	Poor	Slst.	-	contaminated
SWC 50	2438.0	Low	-	Low	-	Poor	Slst.	-	
SWC 48	2485.0	Low	-	Low	-	V. poor	Slst.	-	
SWC 47	2505.0	Fair	-	Low	-	Poor	Slst.	-	
SWC 46	2526.0	Low	-	Low	-	Poor	Slst.	-	
SWC 45	2548.0	Low	-	Low	-	V. poor	Slst., carb.	-ISWC 44	2570.0
Low	-	Low	-	Poor	Slst.	-			
SWC 43	2590.0	Low	-	Low	-	Poor	Slst.	-	
SWC 42	2608.0	V. low	-	Low	-	V. poor	Slst.	-	
SWC 40	2655.0	Low	-	Medium	-	Poor	Slst., carb.	-	contaminated
SWC 39	2675.0	Low	-	Low	-	Fair	Slst., carb.	-	
SWC 38	2694.0	V. low	-	Low	-	V. poor	Slst.	-	
SWC 36	2739.9	Low	-	Low	-	Poor	Carb., slst.	-	
SWC 35	2744.0	Negl.	-	-	-	-	Carb., slst.	-	
SWC 34	2801.4	Negl.	-	-	-	-	Coal	-	
SWC 33	2892.9	-	-	-	-	-	Slst.	-	
SWC 30	2960.0	High	-	High	-	Fair	Slst., carb.	-	
SWC 29	2980.9	High	-	Medium	-	Fair	Ss.	-	

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA

WHITING-2

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH (m)	YIELD		DIVERSITY		PRESERVATION /	LITHOLOGY	PYRIZATION	COMMENTS
		SPORE-POLLEN	DINOS	SPORE-POLLEN	DINOS				
SWC 26	3049.9	Negl.	-	-	-	-	Ss.	-	
SWC 25	3075.0	Negl.	-	-	-	-	Carb., ss.	-	
SWC 23	3120.0	Low	-	Medium	-	Poor	Ss.	-	
SWC 20	3133.5	Fair	-	Medium	-	Poor	Slst.	-	contaminated
SWC 19	3165.0	V. low	-	Low	-	Poor	Slst., carb.	-	
SWC 14	3235.0	Low	-	Medium	-	V. poor	Slst.	-	contaminated
SWC 6	3300.5	High	-	Medium	-	V. poor	Carb. shale	-	
SWC 4	3318.0	Negl.	-	-	-	-	Slst.	-	
SWC 2	3329.8	Fair	-	High	-	V. poor	Slst.	-	
SWC 132	3417.3	-	-	-	-	-	Coal	-	
SWC 129	3434.0	Low	-	Medium	-	V. poor	Slst., carb.	-	
SWC 121	3489.0	Fair	-	Low	-	V. poor	Slst., carb.	-	
SWC 120	3492.3	Fair	-	Low	-	V. poor	Slst./coal	-	
SWC 118	3515.0	Low	-	Medium	-	V. poor	Slst.	-	
SWC 114	3534.3	-	-	-	-	-	Slst., carb.	-	
SWC 112	3548.2	-	-	-	-	-	Coal	-	