APPENDIX

PALYNOLOGICAL ANALYSIS, WIRRAH-1

GIPPSLAND BASIN

by

M.K. MACPHAIL

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INTERPRETATIVE DATA

INTRODUCTION

Seventy nine (79) sidewall core and eight (8) conventional core samples were processed and examined for spore-pollen and dinoflagellates. Recovery and preservation were usually poor to very poor. Despite very detailed examination, confident age-determinations could only be provided for relatively few samples below 1929.0m (see Summary Table).

Palynological zones and lithological facies divisions from the base of the Lakes Entrance Formation to the total depth of the well are given below. The occurrences of the more stratigraphically important species are tabulated in the accompanying range chart.

SUMMARY

UNIT/FACIES	ZONE	DEPTH (metres)
Lakes Entrance Formation	P. tuberculatus	1412.0
Gurnard Formation	Middle N. asperus	1472.0-1488.0
Latrobe Group Coarse Clastics	Middle N. asperus	1491.0
	Lower N. asperus	1499.9-1604.0
	P. asperopolus	1627.0-1771.0
	Upper M. diversus	1811.0-1817.0
	Middle M. diversus	1840.0
	Lower M. diversus	1896.9-1929.0
	Upper L. balmei	2006.5-2198.5
	Lower L. balmei	2232.0-2363.0
	T. longus	2383.0-2752.5
	T. lilliei	2820.0-3028.5
		3031 TD

GEOLOGICAL COMMENTS

1. The Wirrah-1 well contains a continuous sequence of zones from the Late Cretaceous T. lilliei Zone up to at least the Middle/Late Eocene Middle N. asperus Zone.

2. The base of the Lakes Entrance Formation, picked log and lithological characteristics as occurring at 1465m (Rexilius 1983), occurs in an interval with poor sample control. The data are inadequate to say whether (i) a major unconformity or period of non-deposition covering all or part of the Oligocene occurs between the top of the Gurnard Formation and the base of the Lakes Entrance Formation or (ii) whether a condensed sequence including the Upper N. asperus and (Oligocene) J/I foraminiferal Zones occurs between 1446m (H-1, Early Miocene) and 1482m (probable Middle N. asperus Zone). It is noted that sediments of Upper N. asperus and J-2/H^2 Zone age occur in the 24 metre interval separating the H-1 and Middle N. asperus Zone sediments in the Seahorse-1 well. (Stacy & Partridge 1979).

3. The Gurnard Formation, picked on log and lithological characteristics as extending from 1465m to 1488.5m (Rexilius 1983) is wholly Middle N. asperus Zone in age. The abundance of dinoflagellates decrease within the Gurnard Formation and the sidewall core sample immediately below the greensands (SWC 99, 1491m) lacks dinoflagellates. The highest coal, at 1502m, is Lower N. asperus Zone in age.

4. As would be expected from the shoreward location of the well, no marine transgressions are recorded below the Middle N. asperus Zone. The only sample below this zone to contain significant numbers of dinoflagellates (1771.0m) includes the Lower N. asperus Zone marker species Areosphaeridium diktyoplokus. This strongly suggests the whole assemblage has been caved.

5. The "Upper M. diversus Seismic Marker" occurs between samples dated as Middle and Lower M. diversus Zone in age. Otherwise the age/depth relationships of the pre-Eocene strata correspond well with those predicted by seismic stratigraphy.

6. A feature of the Wirrah-1 well is the thickness of P. asperopolus Zone sediments (144 metres) relative to strata of the same age in Seahorse-1 (51 metres) and Snapper-3 (42 metres). Total depths of L. balmei Zone sediments are approximately the same in all three wells.

7. The occurrence of a volcanic sill between approximately 2655 to 2667 metres is reflected by a high T.A.I. (2.8-3.0) for palynomorphs in sidewall core 23 (2615.5m).

8. The well bottomed in T. lilliei Zone sediments.

DISCUSSION OF ZONES

The zone boundaries have been established using the criteria of Stover & Evans (1973), Stover & Partridge (1973), Partridge (1976) and subsequent unpublished observations. The well contains a higher number of occurrences of species outside of their known or characteristic age-range than is usual for the Gippsland Basin.

Tricolporites lilliei Zone: 3028.5 to 2820.0m

The zone is distinguished by the occurrences of Gambierina rudata and Tricolporites lilliei, and the absence of definite indicators of the Tricolporites longus zone. Gambierina rudata occurs in the basal sample at 3028.5m and Tricolporites lilliei some 30m higher, at 3010.0m. Because of extremely poor recovery throughout the section, it is not possible to ascertain whether the abundance of Nothofagidites spp. is significantly higher than Gambierina (see Stover & Evans, 1973). Of interest are the occurrence of Lygistepollanites balmei at 3010.0m and Tricolpites waiparensis at 2994.5m. The latter species has not been previously recorded below the T.longus Zone except in Hapuku-1.

Tricolpites longus Zone: 2752.5 to 2382.0m

Most of the samples from this section contained diverse assemblages, dominated by gymnosperms of which Podosporites spp. and Phyllocladus mawsonii were the most abundant, Gambierina rudata, and Proteacidites species of which one or more of P. otwayensis, P. reticuloconcavus, P. cliniei and P. wahooensis were usually present. These Proteacidites spp. are characteristic of the zone and their occurrence along with Tetradopollis securus and Tricolpites waiparensis at 2752.5m defines the base of the zone in this well. The first appearance of the zone indicator species Tricolpites longus is at 2715.3m. The lowest occurence of Stereisporites (Tripunctisporis) punctatus which also first appears in this zone at 2615.5m.

The first appearance of Proteacidites gemmatus and Tetracolporites verrucosus is higher again, at 2576.0m and 2567.7m respectively. These taxa extend into the Lower L. balmei Zone and may be useful in subdividing the T. longus Zone at a later date. The top of the zone is picked at 2383.0m, based on the highest occurrence of Tricolpites longus and Proteacidites cliniei. This sample may be close to the Late Cretaceous/Paleocene boundary since Australopollis obscurus, which is typically common only in the L. balmei Zone, is frequent.

Lower Lygistepollenites balmei Zone 2363.0 to 2232.0m.

The section is unusual in that it lacks the general L. balmei Zone indicators, e.g. Polycolpites longstonii and frequent to abundant Australopollis obscurus. Sidewall cores are assigned to the zone on the basis of Tetracolporites verrucosus, often but not always in association with the nominate species. The base of the zone at 2363.0m is defined by the first occurrence of T. verrucosus in a species-poor assemblage which lacks the distinctively large named (and unnamed) Proteacidites species characteristic of the T. longus Zone.

The top of the zone is picked at 2232.0m, based on the highest occurrence of Tetracolporites verrucosus in an assemblage lacking Verrucosisporites kopukensis. There is some uncertainity about the position of the Upper/Lower L. balmei Zone boundary since T. verrucosus occurs at 2164.0m in an otherwise good Upper L. balmei Zone assemblage and V. kopukuensis occurs within the Lower L. balmei Zone at 2306.0m. No previous examples of an overlap in the range of the two species are known and the preferred explanation in that reworking/caving has occurred.

Upper Lygistepollanites balmei Zone 2198.5 to 2006.5m.

The zone is distinguished by the constant presence of Verrucosisporites kopukuensis in association with frequent to abundant Lygistepollenites balmei. The top of the zone is defined by the highest occurrence of L. balmei at 2006.5m. This sample contains caved Nothofagidites spp. and the Paleocene/Late Cretaceous species Gambierina tenuis. The highest occurrence of Polycolpites langstoni, which is restricted to the L. balmei Zone is at 2025.2m. This sample contains Matonisporites ornamentalis, a species which was believed to range no lower than the (Middle Eocene) Lower N. asperus Zone but which now appears to also be characteristic of Paleocene sediments.

The interval from 1975.0m to 1652.6m (Lower M. diversus to P. asperopolus Zone) comprised mostly barren sediments. Nevertheless the spore-pollen assemblages that were recovered were sufficiently diverse to enable confident age determinations.

Lower M. diversus Zone 1929.0 to 1896.9m

Lower M. diversus Zone assembleges are recorded in two sidewall core samples. The lower, at 1929.0m, contains the first occurence of the nominate species and Anacolosidites acutullus, a species which is mostly confined to the Middle M. diversus Zone and younger sediments, but which may occur very rarely in Lower M. diversus Zone sediments (A.D. Partridge pers. comm.). The higher sample, at 1896.9m, contains Cyathidites gigantis a species which ranges no higher than the Lower M. diversus Zone, and Crassiretitriletes vanraadshoovenii, a species which first appears in this zone.

Middle M. diversus Zone 1840.0m

The Middle M. diversus Zone is represented by one sample only. The age-determination is based on the occurrence of Proteacidites leightonii, P. tuberculiformis, T. ambiguus and Cupanieidites orthoteichus, species which all first appear in this zone. The sample lacks Malvacipollis diversus and species which first appear in the Upper M. diversus Zone, e.g. Myrtceidites tenuis.

Upper M. diversus Zone 1817.0 to 1811.0m

As with the Lower M. diversus Zone, the Upper M. diversus Zone is represented by two samples only. The age-determinations are confirmed by the occurrence of common to abundant Malvacipollis diversus, Myrtceidites tenuis and, at 1811.0m, Proteacidites pachypolus.

Proteacidites asperopolus Zone 1771.0 to 1627.0m

Samples within this interval are dominated by Haloragacidites harrisii and Proteacidites spp. including P. pachypolus and P. biornatus. The base of the zone is defined by the first occurrence of Proteacidites asperopolus, a species which first appears in this zone, and Spinizonocolpites prominatus, a species which is last recorded in sediments of this age. The sample is unusual in that it also contained the rare species Myrtaceoipollenites australis. This taxon is not known to range above the lower part of the Upper M. diversus Zone. Tricolporites leuros which rarely appears below the Lower N. asperus Zone in Gippsland wells is first recorded at 1652.6m. The top of the zone is picked at 1627.0m, based on the occurrence of Spinizonocolpites prominatus, Proteacidites tuberculiformis and Myrtaceidites tenuis in an assemblage containing frequent Proteacidites pachypolus and lacking common to abundant Nothofagidites. Again the assemblage is an unusual one, containing: Helcisporites astrus, Proteacidites xestoformis and Polypodiaceoisporites varus which have not been recorded in Lower N. asperus Zone; Intra-triporopollenites notabilis, Tricolporites moultonii which range marginally into the Lower N. asperus Zone; Proteacidites reticulatus which is extremely rare below the upper part of the Lower N. asperus Zone as well as rare taxa such as Proteacidites scitulus, Tricolpites reticulatus (Stover & Evans) and Gleicheniidites magnus (Stough).

Lower Nothofagidites asperus Zone 1604.0 to 1499.9m,

The base of the zone is defined by the increase in Nothofagidites spp. from 11% at 1627.0m to 28% 1604.0m The occurrence of Tricolpites simatus shows this sample is no older than Lower N. asperus Zone in age. Proteacidites asperopolus and Tricolporites moultonii at 1590.0m show this sample is no younger than Lower N. asperus Zone in age. Milfordia hypolaenoides, Tricolporites leuros and the extremely rare species Tricolpites arcilineatus occur at 1543.0m. A number of core samples, e.g. 1586.13m, 1578.70m and 1506.2m contained Proteacidites tuberculiformis, a species hitherto recorded as last appearing in the P. asperopolus Zone. The top of the zone is picked at 1499.9m, based on the occurrence of Proteacidites plemmelus and Tricolporites leuros in an assemblage lacking indicator species of the Middle N. asperus Zone. Proteacidites pachypolus, P. recavus and Polycolpites esobalteus at 1499.92m show this sample is no younger than early Middle N. asperus Zone in age but a Lower N. asperus Zone age cannot be demonstrated with confidence.

Middle Nothofagidites asperus Zone 1491.0 to 1472.0m

The base of the zone is picked on the first occurrence of the zone species Triorites magnificus at 1491.0m but the possibility exists that the interval between 1543.0m to 1499.9m is also Middle N. asperus Zone in age. Samples from 1488.0 to 1476.0m contain dinoflagellate species characteristic of the Middle N. asperus Zone, e.g. Corrudinium corrugatum, C. incompositum, Vozzhenikova extensa and Hystrichokolpoma rigaude. The highest occurrence of Triorites magnificus is at 1478.0m. Proteacidites leightonii, a species which ranges no higher than the Middle N. asperus Zone occurs at 1476.0m. The sidewall core at 1472.0m contains Proteacidites rectomarginis which appears as a rare species in the Middle N. asperus Zone, Foveotriletes crater which first appears at the top of this zone in the Bass Basin but rarely before the P. tuberculatus Zone in the Gippsland Basin, and the rare P. tuberculatus Zone species Verrucatosporites attinatus. The sample has been provisionally assigned to the Middle N. asperus Zone because of its lithological similarity to the underlying greensands, but its position immediately below the base of the Lakes Entrance Formation (Rexilius 1983) makes reworking/bioturbation during Upper N. asperus and Early P. tuberculatus Zone times (early Oligocene-Miocene) a strong possibility. The sample at 1446.0m contains an indeterminate Nothofagidites spore-pollen assemblages and early Miocene foraminifera (Rexilius ibid).

P. tuberculatus Zone 1412.0 to 1384.0m

The regular occurrence of Cyatheacidites annulatus confirms a P. tuberculatus Zone age for this glauconite-free calcareous interval.

REFERENCE

PARTRIDGE, A.D. 1976. The geological expression of eustacy in the Early Tertiary of the Gippsland Basin. Apea (1976) 73-79.

REXILIUS, J. 1983. Micropalaeontological analysis of Wirrah-1, Gippsland Basin Victoria. Esso Australia Ltd., Palaeontological Report, 1983/9.

STACY, H.E. & PARTRIDGE, A.D. 1979. A palynological analysis of Seahorse-1, Gippsland Basin, Esso Australia Ltd., Palaeontological Report 1979/27.

STOVER, L.E. & EVANS P.R. 1973. Upper Cretaceous spore-pollen zonation, offshore Gippsland Basin, Australia. Spec. Pub. Geol. Soc. Aust., 4, 55-72.

STOVER L.E. & PARTRIDGE A.D. 1973. Tertiary and Late Cretaceous spores and pollen from the Gippsland Basin, Southeastern Australia. Proc. Roy. Soc. Vict., 85, 237-86.

SUMMARY OF PALYNOLOGICAL ANALYSIS, WIRRAH-1, GIPPSLAND BASIN
INTERPRETATIVE CHART

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY	ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 116	1384.0	Fair	low	Calcilut.	P. tuberculatus	Early Miocene	0	C. annulatus
SWC 115	1412.0	Poor	Low	Calcilut.	P. tuberculatus	Early Miocene	0	C. annulatus
SWC 114	1446.0	Poor	Low	Calcisit	Indeterminate	Early Miocene (forams)	-	H. rigaude
SWC 113	1472.0	Fair	High	Slst.,glau.	Middle N. asperus	Late Eocene	2	P. rectomarginis, F. crater, V. attinatus
SWC 112	1476.0	Good	High	Slst.,glau.	Middle N. asperus	Late Eocene	2	P. leightonii, Q. psilatispora, V. rigaude
SWC 102	1478.0	Poor	Low	Slst.,glau.	Middle N. asperus	Late Eocene	0	T. magnificus, C. incompositum
SWC 101	1482.0	Good	Moderate	Slst.,glau.	Middle N. asperus	Late Eocene	0	T. magnificus, R. trophus, V. extensa, C. incompositum
SWC 100	1488.0	Poor	Low	Ss., glau.	Middle N. asperus	Late Eocene	1	C. incompositum
SWC 99	1491.0	Poor	Low	Ss.	Middle N. asperus	Late Eocene	0	T. magnificus
Core 1	1499.9	Fair	High		Lower N. asperus	Middle Eocene	2	No younger than Middle N. asperus
Core 1	1499.92	Good	High		Lower N. asperus	Middle Eocene	2	P. esobalteus, T. scabratus, P. recavus
Core 2	1506.2	Fair	Moderate		N. asperus	Middle Eocene	-	P. tuberculiformis
Core 3	1526.72	Poor	Low		Inderterminate	-	-	Reworked A. obscurus
SWC 98	1543.0	Fair	High	Ss.	Lower N. asperus	Middle Eocene	1	T. arcilineatus
Core 4	1578.70	Good	High		Lower N. asperus	Middle Eocene	1	P. asperopolus, D. delicatus, T. simatus
Core 5	1586.13	Good	High		Lower N. asperus	Middle Eocene	1	P. asperopolus, P. esobalteus
SWC 96	1590.0	Fair	Moderate	Ss., carb.	Lower N. asperus	Middle Eocene	1	abundant P. asperopolus and P. koplensis
SWC 111	1604.0	Poor	Low		Lower N. asperus	Middle Eocene	1	T. simatus, Nothofagidites (28%)
SWC 92	1627.0	Fair	High	Ss., carb.	P. asperopolus	Middle Eocene	0	M. tenuis, frequent P. pachypolus, S. prominatus, P. varus, H. astrus
SWC 91	1652.8	Fair	High	Ss., carb.	P. asperopolus	Middle Eocene	1	P. recavus, T. leuros, N. falcatus
SWC 90	1671.0	Nil	-	Ss.	-	-	-	
SWC 89	1678.0	Nil	-	Ss.	-	-	-	
SWC 88	1685.5	Nil	-		-	-	-	
SWC 37	1702.2	Good	High	Slt., carb.	P. asperopolus	Early/Middle Eocene	1	P. asperopolus, P. pachypolus

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY	ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 86	1726.0	Good	Low	Sltst.	P. asperopolus	Early/Middle Eocene	2	Spore-dominated assemblage including, Crassiretitriletes vanraadshoovenii T. incisus
SWC 85	1751.0	Nil	-	Clyst.	-	-	-	
SWC 84	1771.0	Fair	High	Mudst.,	P. asperopolus		0	P. asperopolus, S. prominatus
SWC 83	1811.0	Good	Moderate	Slst.,	Upper M. diversus	Early Eocene	0	M. tenuis, P. pachypolus, abundant M. diversus
SWC 82	1817.0	Fair	Moderate	Slst.,	Upper M. diversus	Early Eocene	1	P. varus, M. tenuis
SWC 81	1840.0	Poor	Low	Ss.	Middle M. diversus	Early Eocene	1	P. varus, M. Tenuis, P. leightonii, T. ambiguus
SWC 80	1855.0	Nil	-	Clyst.	-	-	-	
SWC 79	1896.0	Good	Moderate	Clyst.	Lower M. diversus	Early Eocene	0	C. gigantis, C. vanraadshoovenii, C. orthoteichus
SWC 78	1912.0	Nil	-	Clyst.	-	-	-	
SWC 76	1929.0	Fair	Moderate	Slst.	Lower M. diversus	Early Eocene	2	A. acutullus, abundant M. diversus
SWC 75	1950.0	Nil	-	Sltst.	-	-	-	
SWC 76	1975.0	Nil	-	Sltst.	-	-	-	
SWC 73	2006.5	Poor	Moderate	Ss.	Upper L. balmei	Paleocene	2	L. balmei
SWC 72	2025.2	Good	High	Sh.	Upper L. balmei	Paleocene	1	L. balmei, M. ornamentalis, P. annularis, V. kopukuensis
SWC 69	2030.0	Nil	-	-	-	-	-	
SWC 68	2030.7	Nil	-	Ss.	-	-	-	
Core 6	2046.0	Negligible			Indeterminate		-	Caved P. asperopolus
SWC 66	2048.0	Poor	Moderate	Slst.	Upper L. balmei	-	2	L. balmei, P. incurvatus
Core 6	2061.12	Good	Moderate		Upper L. balmei	Paleocene	1	L. balmei, V. kopukuensis
SWC 65	2072.0	Good	Moderate	Slst.	Upper L. balmei	Paleocene	1	L. balmei, V. kopukuensis
SWC 63	2106.9	Good	Low	Slst.	Upper L. balmei	Paleocene	1	L. balmei, V. kopukuensis
SWC 61	2164.0	Good	High	Slst.	Upper L. balmei	Paleocene	2	V. kopukuensis, T. verrucosus
SWC 60	2186.5	Fair	Low	Sh.	L. balmei		-	L. balmei
SWC 59	2198.5	Good	Moderate	Sh.	Upper L. balmei	Paleocene	1	V. kopukuensis

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY	ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 53	2232.0	Poor	Low	Sh.	Lower L. balmei	Paleocene	1	T. verrucosus, T. sectilis
SWC 52	2255.0	Nil	-	Slst.	-		-	
SWC 50	2306.0	Fair	Moderate	Slst.	Lower L. balmei	Paleocene	2	P. gemmatus, T. multistrixus, L. amplus, V. kopukuensis
SWC 49	2320.0	Poor	Low	Sh.	Indeterminate	-	-	S. (Tripunctisporis) punctatus
SWC 48	2339.5	Poor	Low	Sh.	Lower L. balmei	Paleocene	2	T. verrucosus, S. punctatus
SWC 47	2363.0	Good	High	Slst.	Lower L. balmei	Paleocene	2	L. balmei, T. verrucosus
SWC 45	2383.0	Good	High	Sh.	T. longus	Late Cretaceous	0	T. longus, abundant T. verrucosus and A. obscurus, P. gemmatus
SWC 43	2409.0	Poor	Moderate	Sh.	T. longus	Late Cretaceous	0	T. longus, P. otwayensis, P. wahooensis S. (Tripunctisporis) punctatus
SWC 40	2435.0	Good	Very high	Sh.	T. longus	Late Cretaceous	0	as above plus P. gemmatus, P. reticuloconcavus, T. waiparensis, T. lilliei, G. wahooensis and abundant G. rudata
SWC 36	2479.5	Nil	-	Slst.	-	-	-	
SWC 34	2525.2	Poor	Low	Slst.	Indeterminate	-	-	G. rudata
SWC 33	2543.5	Poor	Moderate	Sh.	Indeterminate	-	-	C. eyrensis
SWC 31	2567.7	Fair	Moderate	Slst., coaly	T. longus	Late Cretaceous	-	T. verrucosus; S. regium, P. clinei
SWC 30	2569.0	Fair	Low	Slst.	T. longus	Late Cretaceous	2	T. renmarkensis, T. sectilis, S. regium
SWC 29	2576.0	Fair	Low	Ss.	T. longus	Late Cretaceous	2	P. gemmatus
SWC 23	2615.5	Fair	Moderate	Slst.	T. longus	Late Cretaceous	1	S. (Tripunctisporis) puncatatus, T. longus. TAI = 2.8 to 3.0
SWC 15	2655.0	Nil	-	Volcanics	-	-	-	
SWC 9	2705.0	Fair	Low	Slst.	T. longus	Late Cretaceous	2	P. otwayensis, S. regium, T. lilliei
SWC 8	2715.3	Poor	Low	Slst.	T. longus	Late Cretaceous	0	T. longus, T. renmarkensis
SWC 6	2752.5	Poor	Moderate	Slst., carb.	T. longus	Late Cretaceous	0	P. otwayensis, P. reticuloconcavus, T. waiperensis, T. securus
SWC 2	2786.0	Nil	-	Slst.	-	-	-	
SWC 183	2798.5	Nil	-	Slst., carb.	-	-	-	
SWC 1	2800.0	Poor	Low	Slst.	Indeterminate	-	-	Eocene and Palocene spore-pollen only
SWC 181	2805.0	Nil	-	-	-	-	-	

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY	ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 178	2820.0	Poor	Low	Slst.	T. lilliei	Late Cretaceous	2	T. lilliei
SWC 172	2865.0	Poor	Moderate	Slst.	T. lilliei	Late Cretaceous	2	T. lilliei, T. renmarkensis
SWC 171	2866.5	Nil	-	-	-	-	-	
SWC 166	2917.5	Nil	-	-	-	-	-	
SWC 163	2940.0	Nil	-	-	-	-	-	
SWC 194	2994.5	Poor	Low	Ss.	T. lilliei	Late Cretaceous	2	G. rudata, T. waiparensis, N. senectus
SWC 192	3000.0	Poor	Low	Ss.	T. lilliei	Late Cretaceous	2	G. rudata
SWC 163	2004.5	Nil	-	Ss., slty.	-	-	-	
SWC 188	3008.5	Good	Moderate	Slst.	T. lilliei	Late Cretaceous	1	T. lilliei, G. rudata
SWC 143	3010.0	Fair	Moderate	Ss.	T. lilliei	Late Cretaceous	1	T. lilliei, G. rudata
SWC 140	3016.5	Nil	-	Ss.	-	-	-	
SWC 186	3020.0	Nil	-	Ss.	-	-	-	
SWC 137	3021.5	Poor	Low	Ss.	T. lilliei	Late Cretaceous	2	G. rudata
SWC 185	3024.0	Nil	-	Ss.	-	-	-	
SWC 184	3028.5	Poor	Low	Ss.	T. lilliei	Late Cretaceous	2	G. rudata, G. edwardsii
								T.D. 3031m

BASIC DATA

Table 2 - Palynological Data

Range Chart - Dinoflagellates

Range Chart - Spore-pollen

SUMMARY OF PALYNOLOGICAL ANALYSIS, WIRRAH-1, GIPPSLAND BASIN

BASIC DATA

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY
SWC 116	1384.0	Fair	low	Calcilut.
SWC 115	1412.0	Poor	Low	Calcilut.
SWC 114	1446.0	Poor	Low	Calcislt
SWC 113	1472.0	Fair	High	Slst.,glau.
SWC 112	1476.0	Good	High	Slst.,glau.
SWC 102	1478.0	Poor	Low	Slst.,glau.
SWC 101	1482.0	Good	Moderate	Slst.,glau.
SWC 100	1488.0	Poor	Low	Ss., glau.
SWC 99	1491.0	Poor	Low	Ss.
Core 1	1499.9	Fair	High	
Core 1	1499.92	Good	High	
Core 2	1506.2	Fair	Moderate	
Core 3	1526.72	Poor	Low	
SWC 98	1543.0	Fair	High	Ss.
Core 4	1578.70	Good	High	
Core 5	1586.13	Good	High	
SWC 96	1590.0	Fair	Moderate	Ss., carb.
SWC 111	1604.0	Poor	Low	
SWC 92	1627.0	Fair	High	Ss., carb.
SWC 91	1652.8	Fair	High	Ss., carb.
SWC 90	1671.0	Nil	-	Ss.
SWC 89	1678.0	Nil	-	Ss.
SWC 88	1685.5	Nil	-	
SWC 87	1702.2	Good	High	Slt., carb.
SWC 86	1726.0	Good	Low	Sltst.
SWC 85	1751.0	Nil	-	Clyst.
SWC 84	1771.0	Fair	High	Mudst.,
SWC 83	1811.0	Good	Moderate	Slst.,
SWC 82	1817.0	Fair	Moderate	Slst.,
SWC 81	1840.0	Poor	Low	Ss.
SWC 80	1855.0	Nil	-	Clyst.
SWC 79	1896.0	Good	Moderate	Clyst.
SWC 78	1912.0	Nil	-	Clyst.
SWC 76	1929.0	Fair	Moderate	Slst.
SWC 75	1950.0	Nil	-	Sltst.

SUMMARY OF PALYNOLOGICAL ANALYSIS, WIRRAH-1, GIPPSLAND BASIN

BASIC DATA

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY
SWC 76	1975.0	Nil	-	Sltst.
SWC 73	2006.5	Poor	Moderate	Ss.
SWC 72	2025.2	Good	High	Sh.
SWC 69	2030.0	Nil	-	-
SWC 68	2030.7	Nil	-	Ss.
Core 6	2046.0	Negligible		
SWC 66	2048.0	Poor	Moderate	Slst.
Core 6	2061.12	Good	Moderate	
SWC 65	2072.0	Good	Moderate	Slst.
SWC 63	2106.9	Good	Low	Slst.
SWC 61	2164.0	Good	High	Slst.
SWC 60	2186.5	Fair	Low	Sh.
SWC 59	2198.5	Good	Moderate	Sh.
SWC 53	2232.0	Poor	Low	Sh.
SWC 52	2255.0	Nil	-	Slst.
SWC 50	2306.0	Fair	Moderate	Slst.
SWC 49	2320.0	Poor	Low	Sh.
SWC 48	2339.5	Poor	Low	Sh.
SWC 47	2363.0	Good	High	Slst.
SWC 45	2383.0	Good	High	Sh.
SWC 43	2409.0	Poor	Moderate	Sh.
SWC 40	2435.0	Good	Very high	Sh.
SWC 36	2479.5	Nil	-	Slst.
SWC 34	2525.2	Poor	Low	Slst.
SWC 33	2543.5	Poor	Moderate	Sh.
SWC 31	2567.7	Fair	Moderate	Slst., coal
SWC 30	2569.0	Fair	Low	Slst.
SWC 29	2576.0	Fair	Low	Ss.
SWC 23	2615.5	Fair	Moderate	Slst.
SWC 15	2655.0	Nil	-	Volcanics
SWC 9	2705.0	Fair	Low	Slst.
SWC 8	2715.3	Poor	Low	Slst.
SWC 6	2752.5	Poor	Moderate	Slst., carb
SWC 2	2788.0	Nil	-	Slst.
SWC 183	2798.5	Nil	-	Slst., carb

SUMMARY OF PALYNOLOGICAL ANALYSIS, WIRRAH-1, GIPPSLAND BASIN

BASIC DATA

SAMPLE	DEPTH (metres)	YIELD	DIVERSITY	LITHOLOGY
SWC 1	2800.0	Poor	Low	Slst.
SWC 181	2805.0	Nil	-	-
SWC 178	2820.0	Poor	Low	Slst.
SWC 172	2865.0	Poor	Modetate	Slst.
SWC 171	2866.5	Nil	-	-
SWC 166	2917.5	Nil	-	-
SWC 163	2940.0	Nil	-	-
SWC 194	2994.5	Poor	Low	Ss.
SWC 192	3000.0	Poor	Low	Ss.
SWC 163	2004.5	Nil	-	Ss., slty.
SWC 188	3008.5	Good	Moderate	Slst.
SWC 143	3010.0	Fair	Moderate	Ss.
SWC 140	3016.5	Nil	-	Ss.
SWC 186	3020.0	Nil	-	Ss.
SWC 137	3021.5	Poor	Low	Ss.
SWC 185	3024.0	Nil	-	Ss.
SWC 184	3028.5	Poor	Low	Ss.