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Palynological analysis of core and cuttings samples from seven wells and bores from Western Otway Basin.

by

Alan D. Partridge

Biostrata Pty Ltd
A.C.N. 053 800 945

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Summary

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Equivalent to Dilwyn Formation.

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Equivalent to Dilwyn Formation.

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760-765m (cuttings): *L. balmei* & *E. crassitabulata* Zones: Paleocene.
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856.5m (cuttings): *M. druggii* Zone: Maastrichtian.
Equivalent to top of Sherbrook Group - Timboon Sand?

1140m (cuttings): *P. mawsonii* & *C. striatoconus* Zones: Coniacian.
Oolitic ironstone equivalent to basal Belfast Mudstone.

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Equivalent to Waarre Formation - Unit B.

1207m (cuttings): *P. mawsonii* & *P. infusorioides* Zones: Turonian.
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Fahley-1

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3110m (cuttings):	*P. mawsonii* & *P. infusorioides* Zones: Turonian.
	All samples equivalent to Flaxmans Formation.

Casterton-2

1433-1437m (core):	*C. hughesii* Zone: Aptian:
	Eumeralla Formation: Non-marine

Introduction and Methods

The samples were provided to address a number of geological age and correlation problems outlined in letter by Steve Ryan on 20 March 1995.

Five core samples and seventeen cuttings samples have been analysed from seven exploration wells and stratigraphic bores in the western Otway Basin. One cuttings sample submitted was split into two fractions to separate presumed caved and *insitu* lithologies in the sample. After noting the lithology and nature of the samples (Table 2) the author forwarded them to Laola Pty Ltd in Perth for processing to prepare the palynological slides.

Between 19 to 29 grams (average 23 g) of the core samples and between 5 to 30 grams (average 17.5 g) of the cuttings samples were processed for palynological analysis. Standard processing techniques were using in preparing the slides and where sufficient residue was recovered separate oxidised slides were prepared from fractions concentrated from the residues using 8 and 15 micron filters. In general kerogen slides were prepared with filtered and unfiltered fractions.

The results of the palynological analysis for all samples is summarised in Tables 1 & 2 which provide the zone identification. confidence ratings. residue yield and palynomorph concentration and preservation. Detailed discussion of the samples is provide for each well section. All species which have been identified with binomial names are tabulated on Tables 3 to 9. The organisation of the tables is roughly stratigraphically rather than alphabetical proceeding from the wells with the youngest samples to those with the oldest samples.

The zone and age determinations for the Cretaceous samples are based on the Australia wide Mesozoic spore-pollen and microplankton zonation schemes described by Helby. Morgan & Partridge (1987). For the Tertiary zone and age determinations are based on the spore-pollen zonation scheme of Stover & Partridge (1973) with subsequent unpublished modifications. and the dinoflagellate scheme published in outline by Partridge (1975. 1976). Author citations for most spore-pollen species can be sourced from Helby. Morgan & Partridge (1987). Dettmann (1963). Dettmann & Jarzen (1988). Stover & Partridge (1973) or other references sourced from these works. Author citations for dinoflagellates can be found in the fossil dinoflagellate index of Lentin & Williams (1993). Species names followed by "ms" are unpublished manuscript names.

Overall there was a considerable variation in the residue yield. palynomorph concentration and preservation reflecting the diverse character of the samples submitted for analysis. Because of severe cavings problems in most of the cuttings samples, which may represent more than 90% of the fossils recorded, species diversity for the samples is not provided as it is not considered meaningful.

In the cuttings samples species recorded fall into three categories. Firstly, there are species considered *insitu* which generally have short or specific ranges and can provide zone and age data on the samples. Secondly, there are obviously caved species which are identified by known short ranges and/or preservation character. The latter, is typically the light yellow colour of the caved fossils in contrast to the orange to brown colour of the *insitu* and carbonised palynomorphs. However, by far the largest group of palynomorphs in most samples are long ranging species which cannot be confidently distinguished as either caved or *insitu*. Many species of this group can dominate the counts or species abundances. Examples are *Cyathidites* spp., *Gleicheniidites circinidites*, *Stereisporites antiquisporites* and most gymnosperm pollen, particularly the broad category *Podocarpidites* spp. In some samples these long ranging species are nevertheless considered *insitu* because of their higher maturation/darker colour than the caved specimens in the sample. An attempt has been made on Table 2 to indicate the amount of caved material by expressing it as a percentage of the specimens counted. However, this differentiation between caved and *insitu* specimens could not be similarly applied to the abundances given in the species lists as the overall counts of the *insitu* specimens was too low in most samples.

Geological Comments

1. Core samples provided from Warrain-7 to check for correlation to the Pember Mudstone gave Early Eocene (*M. diversus* Zone) ages considered to belong to the younger Dilwyn Formation.

2. Two suites of samples from Koroit-10 (780-857m) and Windermere-1 (720-775m) were provided to improve the age datings of the transition from the Pebble Point Formation to Timboon Sand. Unfortunately the assemblages recovered from both suites of cuttings were heavily contaminated by fossils caved from younger Tertiary units. Although Paleocene (*L. balmei* Zone) and Maastrichtian (*M. druggii* Zone) ages were recognised their reliability is low due to the low numbers and therefore low diversity of interpreted *insitu* fossils recorded. Given the extent of the cavings problem which exceeds 50% in most samples it must be considered a possibility that even the interpreted *insitu* Paleocene and Maastrichtian ages could be displaced or caved down the sections.

3. Three cuttings samples collected from an oolitic ironstone within Sherbrook Group from wells Koroit-10, Pretty Hill-1 and Yangery-1 all gave similar spore-pollen and microplankton assemblages. The samples are all considered to belong to the *C. striatoconus* Zone even though the index species was not recorded from the low residue yield recovered from the sample in Yangery-1.

   Conosphaeridium striatoconus is an extremely important index species and datum horizon within the Otway Basin, but as yet has only been reported from a limited number of the early wells in the basin. It provides an important tie back to the type lithological sections in the Port Campbell Embayment as it is recorded by Cookson (1965) in the Port Campbell-2 well between 7403-7450ft (2256-2271m) from the lower part of Belfast Mudstone and in the Port Campbell-1 well between 5700-5705ft (1737-1739m) which was correlated to the upper part of the Waarre Formation by Glenie (1971). Discussion of the complexities of the age versus assign formation names implied by these observations is beyond the scope of this report.

4. Two suites of samples from Koroit-10 (1152-1207m) and Fahley-1 (2395-3110m) were provided for age dating of basal parts of the Sherbrook Group.

   The four samples in Fahley-1 gave Turonian ages belonging to the middle part of the *P. mawsonii* Zone. The assemblages recorded were of only moderate diversity, which is interpreted to be a reflection of the relatively high rates of deposition of the interval analysed, with consequent dilution of many of the more diagnostic index species. The section is considered to be age equivalent to the Flaxmans Formation or Unit D of the Waarre Formation as recognised in the Port Campbell Embayment.

   The two samples in Koroit-10 also gave Turonian ages but belonged to the lower part of the *P. mawsonii* Zone. The occurrence of the acme of the dinoflagellate *Cribroperidinium edwardsii* in the samples provides correlation to mainly Unit B of the Waarre Formation in the Port Campbell Embayment.

   The thick (>700m) section analysed in Fahley-1 is younger than the Koroit-10 section and is either missing from Koroit-10 or very condensed in the interval from 1140-1152m.

5. Three core samples from Casterton-2 between 1433-1437m gave an Aptian *C. hughesii* Zone age consistent with assignment of the interval between 1400-1500m to the Eumeralla Formation.

6. All samples contain microplankton. Those recorded from the cores in Casterton-2 are indicative non-marine lacustrine environments whilst those from all the other samples are indicative of marine environments. Unfortunately it is not possible to provide any indication distance from palaeoshoreline or palaeobathymetry from the abundance and diversity of the marine assemblages recorded. These type of interpretations must await the analysis of assemblages in a more regional context.

Discussion of Assemblages and Zones

WARRAIN-7

Although both samples analysed belong to *M. diversus* Zone only the deeper core can be confidently assigned to the Lower subzone. This sample contains common *Malvacipollis diversus* and *M. subtilis* (12%) and common *Proteacidites* spp. (13%) associated with index pollen species *Intratriporopollenites notabilis*, *Proteacidites grandis*, *P. incurvatus* and the spore *Polyadiaceoisporites varus* ms without younger or older forms in a diverse assemblage.

The shallower sample from an unfavourable silicified sandstone lithology gave only a very low yield of eight species which are sufficient only to suggest a broad *M. diversus* Zone age with only low confidence.

The combined spore-pollen and microplankton assemblage indicate an age younger than the *Apectodinium hyperacanthum* microplankton Zone which occurs at the base of the Lower *M. diversus* Zone and is known from the Rivernook Member at the top of the Pember Mudstone in the type outcrop. The cores would therefore correlate to the Dilwyn Formation as used by Tickell *et al.* (1992). Given the above ages the Pember Mudstone as a time-rock unit must lie between the core at 1336m and the core sample at 1464.5-68.5m assigned to the Lower *L. balmei* Zone by Morgan (1994a).

WINDERMERE-1

The four cuttings samples analysed over the 55 metre interval from 720-775m are all overwhelmingly dominated by caved palynomorphs. The high abundances of *Nothofagidites* spp. and *Spiniferites* spp. suggest most of the cavings are coming from the Oligocene to Miocene Heytesbury Group. This is supported by the record of younger index species such as spore *Cyatheacidites annulatus* and dinoflagellates *Protoellipsodinium simplex* ms and *Pyxidinopsis pontus* ms which are all restricted to Oligocene or younger strata. The presence of such species as

Intratriporopollenites notabilis, Proteacidites crassus, P. leightonii and *P. rectomarginis* amongst others are indicative of cavings from the Eocene section.

Amongst the cavings, however, are rare index species for the Paleocene *L. balmei* Zone and Maastrichtian *M. druggii* Zone, which are interpreted as *insitu* and are sufficient for fairly reliable zone assignments.

In the shallowest cuttings at 720-725m the frequent occurrence of *Lygistepollenites balmei* and *Australopollis obscurus* indicates an age no younger than the *L. balmei* Zone, whilst the presence of *Proteacidites grandis, P. incurvatus* and spore *Cyathidites gigantis* is the basis for the assignment of this sample to Upper *L. balmei* Zone. No diagnostic Paleocene dinoflagellates were recorded from this sample. The age and lithology of the sample suggests assignment to the Pember Mudstone.

The sample at 740-745m does not contain any age restricted spore-pollen but occurrence of dinoflagellates *Deflandrea delineata* and *D. speciosus* indicate a Paleocene age and the sample is therefore equivalent to *L. balmei* Zone.

The sample at 760-765m contains elements typical of assemblages from the Pebble Point Formation which is consistent with the lithology. These are the common occurrence of *L. balmei*, the presence of *Proteacidites angulatus*, (which is diagnostic of an age no younger than the Lower *L. balmei* Zone) and the dinoflagellates *Eisenackia crassitabulata, Glaphrocysta retiintexta* (common) *Deflandrea speciosus, Alisocysta magarita* and *Palaeocystidinium australinum*. The two samples between 740-765m are interpreted as equivalent to the Pebble Point Formation.

The deepest sample analysed from 770-775m contains the first indicator species for a Late Cretaceous age in the form of numerous, mostly fragmented, specimens of *Manumiella* a few of which can be confidently assigned to species *M. druggii* and *M. coronata*. Unfortunately there were no diagnostic spore-pollen recorded to support the age from the dinoflagellates due mainly to the masking effect of the caved species in the assemblage. This sample is interpreted to be derived from or near the Cretaceous/Tertiary boundary shale.

The results from the cuttings are at odds with the original analysis of the sidewall core at 719m by Morgan (1987). He records the Late Cretaceous spore-pollen species *Forcipites* (al. *Tricolpites*) *longus*. *Tricolpites confessus, Tricolporites lilliei* and *Battenipollis* (al. *Triporopellenites*) *sectilis* from this sample suggesting a *T. longus* Zone assignment. This is supported by record of Late Cretaceous dinoflagellates *Manumiella druggii, Canninginopsis bretonica* and *Isabelidinium pellucidum* suggesting an age no younger than the *M. druggii* Zone. As it stands the ages from the sidewall core at 719m and cutting analysed here are irreconcilable. My preferred interpretation is that the sidewall core was either mislabelled or incorrectly shot or that there has been laboratory cross contamination of that sample, and consequently the cuttings are providing a better indication of age and hence formation assignment.

KOROIT-10

Seven cutting samples were analysed to provide data on separate problems related to Cretaceous/Tertiary boundary and probable top of Waarre Formation.

The three cuttings samples between 780-841m all gave Paleocene *L. balmei* Zone ages with the first Late Cretaceous index species *Manumiella coronata* occurring in the cuttings at 857m.

These results confirm and narrow the sampling gap between the cores examined by Morgan (1994c; 1995) from Koroit-10 at 551-57m, 846-53m and 901-53m.

All four cuttings between 780-857m are overwhelmingly dominated by cavings ranging from 35% to over 90% of all fossils recorded in the assemblages. Because of the extent of cavings index species are rare. The Paleocene *L. balmei* Zone is identified almost solely on the frequent presence of *Lygistepollenites balmei*. The age however is supported by the presence of key dinoflagellates diagnostic of Pebble Point Formation including *Deflandrea speciosus* at 780m; *Eisenackia crassitabulata*, *Renidinium vitilare* and *Glaphrocysta retiintexta* at 808-811m (indicating *E. crassitabulata* Zone) and *G. retiintexta* associated with common *Paralecaniella indentata* at 838-84m.

The *Manumiella druggii* Zone recorded at 857m is based on highest or youngest occurrence of index species *Manumiella coronata* in the cutting analysed. This species has previously been recorded by Morgan (1994b) from core at 846-853m.

The three cutting samples from the deeper section between 1140-1207m in Koroit-10 in contrast contained relatively limited cavings and as a result more diagnostic assemblages could be recorded.

The shallowest of these samples at 1140m was dominated by the algae cyst *Amosopollis cruciformis* which represented 37% of total count but 79% of the microplankton, associated with abundant bisaccate pollen referred to *Podocarpidites* spp. (28% of spore-pollen count) and *Cupressacites* pollen (19% of spore-pollen count). Associated with these characteristic abundances was the key microplankton index species *Conosphaeridium striatoconus* confirming presence of the zone named after this species and a position high within the *P. mawsonii* spore-pollen Zone. Aside from the abundance of *Cupressacites* sp.

there are no species restricted to the upper *P. mawsonii* Zone although the frequent occurrence of *P. mawsonii* is consistent with this stratigraphic level elsewhere in Otway Basin. This sample correlated to the basal part of the Belfast Mudstone in the Port Campbell Embayment.

The two deepest samples between 1152-1207m are also assigned to the *P. mawsonii* Zone but to the lower part of the zone based on frequent occurrence of dinoflagellate *Cribroperidinium edwardsii*. The middle part of the *P. mawsonii* Zone is considered to be missing or very condensed. *Cribroperidinium edwardsii* has been recently documented (Partridge 1994) as having a distinct acme in Unit B of the Waarre Formation in the Port Campbell Embayment. Whilst there were no particularly diagnostic spore-pollen recorded from the shallower sample at 1152m the occurrence of the new species *Hoegisporis trinalis* and *Rugulatisporites admirabilis* in the deeper sample at 1207m confirm the spore-pollen zone assignment and support the assignment of the microplankton to the *P. infusorioides* Zone.

PRETTY HILL-1

The cuttings sample supplied from Pretty Hill-1 at 865-869m was noted as containing large splinters of brown-grey claystone mixed with a brown limonitic sandstone. Because the claystone lithology was suspected of being caved as much as possible was picked out and processed separately from the limonitic sandstone. The results obtained (Tables 1 & 7) confirmed the suspicion with the claystone lithology giving a Santonian and the sandstone a Coniacian age.

The claystone was assigned to the *Tricolporites apoxyexinus* Zone on the presence of *Ornamentifera sentosa* and the *Odontochitina porifera* microplankton Zone on presence of the eponymous species associated with common to abundant *Chatangiella tripartita* and rare *C. victoriensis*. The claystone is obviously caved relative to the sandstone because of the different assemblage composition and hence age. It is interpreted as caved from somewhere between 732m and 865m because it is clearly older than the sample reported on from the core at 726-732m by Morgan (1994b) and assigned a *T. apoxyexinus* Zone age. This shallower core sample can be distinguished by its higher abundance of *Proteacidites* spp. a feature of the higher parts of the *T. apoxyexinus* Zone.

The limonitic sandstone component gave a most interesting assemblage dominated by abundant *Cupressacites* pollen (>32%) with secondary bisaccate pollen mostly belonging to *Podocarpidites* spp. (18%) and the algal cyst *Amosopollis cruciformis* which comprises 35% of the microplankton count but 7% of total count. These abundances together with the presence of the spore

Coptospora pileolus ms favours an age no younger than the *P. mawsonii* Zone. Rare fragments of *Conosphaeridium striatoconus* indicates assignment to zone named after that species and confirms association document elsewhere in Otway Basin of abundant *Cupressacites* pollen occurring with *C. striatoconus*.

Both lithological fractions from the sample are clearly marine, and both would correlate to basal part of Belfast Mudstone in the Port Campbell Embayment.

YANGERY-1

Although a comparatively large quantity (30g) of the sample was processed only an extremely meagre yield was recovered and only two half cover slip slides prepared. Fortunately the kerogen slide contained a high concentration of palynomorphs sufficient to obtain a representative count.

Like the Pretty Hill-1 cuttings sample A at 865-69m and cuttings from Koroit-10 at 1140m the counts were dominated by *Cupressacites* pollen (37%): *Podocarpidites* spp. (17%) and the algal cyst *Amosopollis cruciformis* which comprised 14% of total count and 46% of microplankton count.

On the basis of this combination of abundances the sample is assigned to both the *P. mawsonii* spore-pollen and *C. striatoconus* microplankton Zones, but with low confidence as key index species are lacking for both zones. Although *Phyllocladidites mawsonii* was frequent in the counts it is likely to be partially caved. No species which are considered restricted to either zone were recorded.

Like equivalent assemblage in Pretty Hill-1 and Koroit-10, the environment of deposition is clearly marine, and correlation is to basal part of Belfast Mudstone.

FAHLEY-1

The four cuttings samples all contained relatively poor assemblages with low palynomorph concentration which were impractical to count. They are assigned to the middle part of the *P. mawsonii* Zone on the consistent occurrence of *Phyllocladidites mawsonii* and *Clavifera triplex* and absence of older indicator species such as *Appendicisporites distocarinatus* and *Hoegisporis trinalis* ms found consistently in lower part of the zone. The assemblages are no younger than the *P. mawsonii* Zone on absence of frequent *Proteacidites* spp. and tricolpate and other angiosperm pollen species characteristic of younger parts of the section.

The age given by the spore-pollen is supported by associated microplankton assemblages. Although microplankton diversity is limited the assemblage is consistent with those found in upper part of *P. infusorioides* Zone elsewhere in the Otway Basin. The common occurrence, in all samples except the shallowest, of *Kiokansium polypes* is considered a reliable local top to this zone in the Otway Basin as this species it is not recorded as overlapping with the index species for succeeding *C. striatoconus* Zone in this basin. The samples are considered to lie within upper part of *P. infusorioides* because they lack *Cribroperidinium edwardsii* characteristic of lower part of Waarre Formation in the Port Campbell Embayment. The section would correlate to Flaxmans Formation or part of Unit D of the Waarre Formation in sense of Buffin (1989).

CASTERTON-2

The three core samples can be assigned to the *Cyclosporites hughesii* Zone on the consistent presence of *Pilosisporites notensis* associated with the rare occurrence of eponymous species *Cyclosporites hughesii* in the deepest sample. The other index species considered typical of this zone is *Foraminisporis asymmetricus* which was not recorded in any of the samples.

The assemblages are dominated by bisaccate pollen broadly referred to *Podocarpidites* spp. and the following five spore categories: *Baculatisporites* spp., *Cyathidites* spp., *Ceratosporites equalis*, *Retitriletes* spp. and *Stereisporites antiquisporites* which together comprised over 80% of the assemblages counts.

An interesting aspect of the assemblages are the occurrences of the species *Januasporites multispinus* and *Krauselisporites whitfordensis*, originally described from the Perth Basin by Backhouse (1988). These species to my knowledge have not been previously recorded from the Otway Basin. *Aequitriradites acusus* is another species originally described from Western Australia by Balme (1957) which I am uncertain whether it has previously been recorded from Otway Basin. All three species are examples of rarer species in Otway Group sediments with biostratigraphic potential.

The samples also contain algal microplankton cysts referred to *Micrhystridium* sp. and *Sigmopollis carbonis* and *S. hispidus* which are considered typical of the shallow and ephemeral lakes interpreted as common within Otway Group (see Dettmann, 1986).

The zone identification would suggest assignment of the core to the Eumeralla Formation according to most stratigraphic tables, but it could belong to older Pretty Hill Sandstone following Tickell *et al.* (1992, fig.1).

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Table 1: Interpretive Palynological Data

Sample Type	Depth (Metres)	Depth (feet)	Spore-pollen Zone	*CR OLD	* CR NEW	Microplankton Zone (Subzone)	*CR OLD	* CR NEW	Comments
WARRAIN-7									
Core	1267-67		*M. diversus*	4	A5				*Polypodiaceoisporites varus* ms present.
Core	1336		Lower *M. diversus*	1	A2				Fungal remains comprise 37% of total count. *Malvacipollis* spp. comprise 13% of spore-pollen component.
WINDERMERE-1									
Cuttings	720-725		Upper *L. balmei*	3	D3				*Cyathidites gigantis* present.
Cuttings	740-745		Indeterminate						*Deflandrea delineata* rare.
Cuttings	760-765		*L. balmei*	3	D4	*E. crassitabulata*	3	D3	*Glaphrocysta retiintexta* frequent.
Cuttings	770-775		Indeterminate			*M. druggii*	3	D3	Common *Manumiella* spp. including *M. druggii* and *M. conorata*.
KOROIT-10									
Cuttings	780	2560	*L. balmei*	4	D5				Assemblage mainly caved.
Cuttings	808-811	2650-60	*L. balmei*	4	D5	*E. crassitabulata*	3	D3	Index dinoflagellates very rare.
Cuttings	838-841	2750-60	*L. balmei*	4	D5				*Gambierina rudata* frequent.
Cuttings	856.5	2810	Indeterminate			*M. druggii*	3	D3	*Manumiella conorata* present.
Cuttings	1140	3740	*P. mawsonii*	3	D3	*C. striatoconus*	3	D2	*Cupressacites* sp. 19%, *Amosopollis cruciformis* 37%.
Cuttings	1152	3780	*P. mawsonii*	4	D3	*P. infusorioides* (*C. edwardsii* Acme)	3	D2	*Cribroperidinium edwardsii* conspicuous.
Cuttings	1207	3960	*P. mawsonii*	3	D3	*P. infusorioides* (*C. edwardsii* Acme)	3	D2	*C. edwardsii* frequent.

Table 1: Interpretive Palynological Data Cont...

Sample Type	Depth (Metres)	Depth (feet)	Spore-pollen Zone	*CR OLD	* CR NEW	Microplankton Zone (Subzone)	*CR OLD	* CR NEW	Comments
PRETTY HILL-1									
Cuttings B	865-869		*T. apoxyexinus*	3	D3	*O. porifera*	3	D3	Assemblage caved.
Cuttings A	865-869		*P. mawsonii*	3	D3	*C. striatoconus*	3	D3	*Cupressacites* sp. 33%, *Amosopollis cruciformis* 7%.
YANGERY-1									
Cuttings	860		*P. mawsonii*	3	D3	= *C. striatoconus*	4	D5	*Cupressacites* sp. 37%, *Amosopollis cruciformis* 14%.
FAHLEY-1									
Cuttings	2395		*P. mawsonii*	4	D5				Few significant species recorded.
Cuttings	2875		*P. mawsonii*	3	D3	*P. infusorioides*	3	D3	*Kiokansium polypes* frequent.
Cuttings	3055		*P. mawsonii*	3	D3	*P. infusorioides*	3	D3	*Diconodinium cristatum* recorded.
Cuttings	3110		*P. mawsonii*	3	D3	*P. infusorioides*	3	D3	*K. polypes* frequent.
CASTERTON-2									
Core	1433	4704-06.5	*C. hughesii*	1	A1				
Core	1435	4709-11.5	*C. hughesii*	1	A1				
Core	1437	4714-16.5	*C. hughesii*	0	A1				

*CR OLD = Old Confidence Ratings
*CR NEW = New Confidence Ratings

Table 2: Basic Sample and Palynomorph Data

Sample Type	Depth (Metres)	Depth (feet)	Lithology	Sample Wt (g)	Residue Yield	Palynomorph Concentration	Palynomorph Preservation	Abundance Caved Palynomorphs	Microplakton Abundance
WARRAIN-7									
Core	1267-67		Silicified quartz sandstone.	28.7	Very low	Very low	Poor	NA	Rare
Core	1336		Brown-grey laminated claystone.	19.0	High	Moderate	Poor	NA	2%
WINDERMERE-1									
Cuttings	720-725		Clumped claystone with white shelly fragments.	19.8	Moderate	High	Fair-good	>60%	Abundant
Cuttings	740-745		Limonitic (altered glauconite?) sandstone.	13.9	Very low	Moderate	Poor-good	High	Common
Cuttings	760-765		Dark grey sandstone with minor limonitic grains (<5%).	18.1	Moderate	High	Fair-good	>75%	<20%
Cuttings	770-775		Brown claystone/sandstone-clumped.	22.5	Low	High	Fair-good	<50%	>25%
KOROIT-10									
Cuttings	780	2560	Brown clayey sandstone. Sample clumped.	17.7	Low	High	Poor-good	>35%	>25%
Cuttings	808-811	2650-60	Grey claystone mixed with coarse quartz sandstone.	25.7	Moderate	High	Fair-good	>60%	~40%
Cuttings	838-841	2750-60	Clumped sample of sandstone/ claystone.	14.0	Low	High	Good	>40%	>20%
Cuttings	856.5	2810	Mixed claystone and sandstone.	16.2	Moderate	High	Fair-good	>90%	>65%
Cuttings	1140	3740	Brown-grey claystone.	16.3	Low	High	Fair-good	Low	47%
Cuttings	1152	3780	Dark grey claystone-clumped.	15.6	Moderate	Moderate	Poor-fair	~12%	9%
Cuttings	1207	3960	Medium grey claystone-clumped.	16.4	Low	Moderate	Poor-good	Low	<7%

Table 2: Basic Sample and Palynomorph Data Cont...

Sample Type	Depth (Metres)	Depth (feet)	Lithology	Sample Wt (G)	Residue Yield	Palynomorph Concentration	Palynomorph Preservation	Abundance Caved Palynomorphs	Microplakton Abundance
PRETTY HILL-1									
CuttingsB	865-869		Brown-grey claystone as large splinters-possibly caved.	5.3	Moderate	High	Fair-good	Low	Common
CuttingsA	865-869		Brown limonitic sandstone.	18.3	Very low	High	Good	Low	<20%
YANGERY-1									
Cuttings	860		Brown-black limonitic sandstone with caved white limestone.	30.4	Very low	High	Fair-good	Low	32%
FAHLEY-1									
Cuttings	2395		Medium grey claystone - sand sized.	13.4	High	Low	Poor-fair	High	Frequent
Cuttings	2875		Dark grey claystone - sand sized.	14.2	High	Low	Poor	Moderate	Frequent
Cuttings	3055		Dark grey claystone - sand sized.	17.2	High	Low	Poor	Low	Frequent
Cuttings	3110		Medium grey claystone - sand to gravel sized.	20.9	High	Low	Poor	Low	Frequent
CASTERTON-2									
Core	1433	4704-06.5	Medium grey laminated claystone-siltstone.	22.4	Low	High	Good	NA	<2%
Core	1435	4709-11.5	Medium grey laminated claystone (laminae <2mm).	21.3	Moderate	High	Good	NA	Rare
Core	1437	4714-16.5	Greenish grey claystone with visible mud pellets.	23.2	Low	High	Good	NA	<2%

Confidence Ratings

The concept of Confidence Ratings applied to palaeontological zone picks was originally proposed by Dr. L.E. Stover in 1971 to aid the compilation of micropalaeontological and palynological data and to expedite the revision of the then rapidly evolving zonation concepts in the Gippsland Basin. The original or OLD scheme which mixed confidence in fossil species assemblage with confidence due to sample type gradually proved to be rather limiting as additional refinements to existing zonations were made. With the development by AGSO of the STRATDAT computer database as a replacement for the increasingly unwieldy paper based Palaeontological Data Sheet files a NEW format for the Confidence Ratings was proposed. Both OLD and NEW Confidence Ratings are given for individual zone assignments on Table 1, and their meanings are summarised below:

Old Confidence Ratings

0 SWC or CORE, **Excellent Confidence**, assemblage with zone species of spore, 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 spore and pollen or microplankton, or both.

4 CUTTINGS, **No Confidence**, assemblage with non-diagnostic spores, pollen and/or microplankton.

New Confidence Ratings

Alpha codes: Linked to sample type

A Core
B Sidewall core
C Coal cuttings
D Ditch cuttings
E Junk basket
F Miscellaneous/unknown
G Outcrop

Numeric codes: Linked to fossil assemblage

1 **Excellent confidence:** High diversity assemblage recorded with key zone species.

2 **Good confidence:** Moderately diverse assemblage recorded with key zone species.

3 **Fair confidence:** Low diversity assemblage recorded with key zone species.

4 **Poor confidence:** Moderate to high diversity assemblage recorded without key zone species.

5 **Very low confidence:** Low diversity assemblage recorded without key zone species.

Table 3: Species List for Warrain-7

Species	Core	
	1265-67m	1336m
SPORE-POLLEN		
Araucariacites australis		X
Baculatisporites spp.		2.5%
Bysmapollis emaciatus		X
Clavifera triplex		X
Cupanieidites orthoteichus		X
Cyathidites spp.		11%
Cyathidites paleospora		X
Cyathidites splendens		X
Dicotetradites clavatus		1%
Dilwynites granulatus		<12%
Dilwynites tuberculatus		X
Gleicheniidites circinidites		3.4%
Haloragacidites harrisii		5%
Intratriporopollenites notabilis		X
Laevigatosporites ovatus		<2%
Latrobosporites crassus		X
Lygistepollenites florinii	X	2%
Malvacipollis spp.		12%
Malvacipollis diversus		F
Malvacipollis subtilis		X
Microcachryidites antarcticus		X
Myrtaceidites parvus/mesonesus	X	X
Periporopollenites demarcatus		<3%
Phyllocladidites mawsonii	X	
Podocarpidites spp.	X	12%
Polypodiaceoisporites varus ms	X	X
Proteacidites spp.	X	X
Proteacidites grandis		X
Proteacidites incurvatus		X
Proteacidites reticuloscabratus		X
Rugibivesiculites sp.		X
Rugulatisporites mallatus		X
Dicotetradites clavatus		1%
Stereisporites (Tripunctisporis) spp.		F
Stereisporites antiquisporites		2.5%
Trilcolp(or)ates undiff.		10%
Tricolporites moultonii ms		X
Tricolporites paenestriatus		X
Verrucatosporites speciosus		X
Verrucosisporites kopukuensis	X	
TOTAL SPORE-POLLEN COUNT		**116**
Reworked Spores & Pollen		
Cicatricosisporites australiensis		X
Cyclosporites hughesii		X
Dictyotosporites speciosus		X
Plicatipollenites spp.		X
Pseudoreticulatispora pseudoreticulata		X

Table 3: Species List for Warrain-7 Cont...

Species	Core	
	1265-67m	1336m
MICROPLANKTON (% relative to S-P)		3%
Apectodinium sp.	X	
Cleistosphaeridium spp.		X
Cribroperidinium sp.		X
Deflandrea obliquipes (long horn)		X
Diphyes colligerum		X
Glaphyrocysta retiintexta		X
Kenleyia sp.	X	
Spiniferites ramosus		X
OTHER PALYNOMORPHS		
Fungal spores & hyphae (% of total count)		35%
TOTAL COUNT		179

Table 4: Species List for Windermere-1

Species	Cuttings			
	720-725m	740-745m	760-765m	770-775m
SPORE POLLEN				
Aequitriradites verrucosus	RW			
Araucariacites australis	X	X	X	X
Australopollis obscurus	X		X	
Baculatisporites spp.				X
Basopollis mutabilis ms			X	
Clavifera triplex	X		X	X
Cupanieidites orthoteichus			X	
Cyatheacidites annulatus	caved			
Cyathidites spp.	6%		<2%	14%
Cyathidites australis				X
Cyathidites gigantis	X			
Cyathidites splendens	X		X	X
Dicotetradites clavatus	X			X
Dilwynites granulatus	9%	X	6%	17%
Dilwynites tuberculatus	X		X	
Gleicheniidites circinidites	3%		X	X
Haloragacidites harrisii	4%	X	3%	X
Herkosporites elliottii		X	X	<3%
Ilexpollenites anguloclavatus	X		X	
Intratriporopollenites notabilis	X		X	
Laevigatosporites major	X			X
Laevigatosporites ovatus	5%		X	X
Latrobosporites crassus			X	
Liliacidites spp.	X			X
Liliacidites bainii			X	
Lygistepollenites balmei	X		C	F
Lygistepollenites florinii	2%	X	X	14%
Malvacipollis spp.	4%			<3%
Malvacipollis diversus	X	F		
Malvacipollis subtilis	X	X	X	X
Microcachryidites antarcticus		X	X	X
Myrtaceidites verrucosus	X			
Nothofagidites asperus	X			
Nothofagidites brachyspinulosus			X	
Nothofagidites emarcidus/heturus	18%	X	16%	X
Nothofagidites falcatus	X		X	
Nothofagidites vansteenisii	X	X		
Parvisaccites catastus				X
Peninsulapollis gillii			X	X
Periporopollenites demarcatus				X
Periporopollenites polyoratus	X			X
Peromonolites densus	C	X	C	X
Phyllocladidites mawsonii			X	X
Phyllocladidites verrucosus				X
Pilosisporites notensis RW				RW
Podocarpidites spp.	5%	X	<2%	24%
Podosporites microsaccatus	2%	X	X	

Table 4: Species List for Windermere-1 cont...

Species	Cuttings			
	720-725m	740-745m	760-765m	770-775m
Proteacidites spp.	16%	C	50%	6%
Proteacidites adenanthoides	X			
Proteacidites angulatus			X	
Proteacidites annularis	X			caved
Proteacidites biornatus ms				caved
Proteacidites crassus				caved
Proteacidites grandis	C		X	caved
Proteacidites incurvatus	F			
Proteacidites latrobensis			X	
Proteacidites leightonii			X	caved
Proteacidites rectomarginis	X-caved			caved
Proteacidites xestoformis ms	X-caved			
Retitriletes spp.	X		X	X
Rotverrusporites stellatus ms	X			
Rugulatisporites mallatus	F		X	X
Stereisporites (Tripunctisporis) spp.	X		X	X
Stereisporites antiquisporites	X		X	X
Tricolp(or)ates spp.	15%		6%	
Tricolpites phillipsii		X		X
Tricolporites adelaidensis				X
Tricolporites moultonii			X	
Tricolporites paenestriatus				caved
Tricolporites scabratus	X			
Triletes tuberculiformis	X			
Verrucatosporites alienus	X			
Verrucosisporites kopukuensis	X			
TOTAL SPORE-POLLEN COUNT	**103**		**108**	**77**
MICROPLANKTON (% relative to S-P)	**34%**		**15%**	**28%**
Achomosphaera crassipellis			X	
Achomosphaera ramulifera		X		
Acomosphaera cruciformis				X
Alisocysta circumtabulata			X	X
Alisocysta margarita			X	
Amosopollis cruciformis				X
Apteodinium australiense	X	X	X	
Areoligera senonensis				X
Areosphaeridium capricornum	X	X		
Chiropteridium dispersum		X		
Dapsilidinium pseudocolligerum	7%		X	
Deflandrea delineata		X		
Deflandrea medcalfii				caved
Deflandrea speciosus		X	X	X
Eisenackia crassitabulata			X	X
Fromea sp. cf. F. chytra	2%	X		
Glaphyrocysta retiintexta		X	A	F
Hystrichokolpoma rigaudae	7%	X	F	F

Table 4: Species List for Windermere-1 cont...

Species	Cuttings			
	720-725m	740-745m	760-765m	770-775m
Hystrichosphaeridium tubiferum				
Impagidinium spp.	X			
Impagidinium maculatum			X	
Isabelidinium bakeri				X
Lingulodinium machaerophorum	X	X	X	
Lingulodinium solarum			X	
Manuniella spp.				C
Manumiella conorata				X
Manumiella druggii				X
Operculodinium centrocarpum	7%	caved	X	caved
Palaeocystodinium australinum			X	X
Paralecaniella indentata	<1%	X	X	>10%
Pentadinium laticinctum		X-caved		
Protoellipsodinium mamilatus ms	X			
Protoellipsodinium simplex ms	>10%	X-caved	X	caved
Pyxidinopsis pontus ms	X	X		
Spinidinium sp.			C	X
Spiniferites spp (mainly caved)	46%	X	>30%	X
Systematophora placacantha	X-caved	X-caved	X	X
Tectatodinium scabroellipticus ms			X	
Thalassiphora peligica			X	X
Wetzeliella symmetrica/spinulosa			X	
TOTAL MICROPLANKTON COUNT	**56**		**20**	**28**
OTHER PALYNOMORPHS				
Microforaminiferal inner liners	3%	X		
TOTAL COUNT	**164**		**132**	**99**

Table 5: Species List for Koroit-10

Species	Cuttings	Cuttings	Cuttings	Cuttings
	780m	808-811m	838-841m	857m
SPORE POLLEN				
Anacolosidites acutullus	X	X		
Araucariacites australis		X		X
Australopollis obscurus				X
Baculatisporites spp.	<2%			
Basopollis mutabilis ms				X
Caliallasporites dampieri RW		RW		
Cicatricosporites australiensis RW				RW
Cingulatisporites bifurcatus		caved		
Clavifera triplex	X		X	X
Crassiretitriletes vanraadshoovenii		caved		
Cupanieidites orthoteichus		X	X	
Cyathidites spp.	7%	>8%	5%	
Cyathidites paleospora				X
Cyathidites splendens	X	X		
Cyathidites subtilis			caved	
Dicotetradites clavatus	X			X
Dictyophyllidites spp.	X			
Dictyotosporites speciosus RW	RW			
Dilwynites granulatus	8%	6%	5%	X
Dilwynites tuberculatus	X			X
Diporites delicatus			X	
Ericipites scabratus	X			
Gambierina rudata			X	X
Gleicheniidites circinidites	<1%	X	5%	X
Haloragacidites harrisii	6%	8%	11%	F
Helciporites astrus			X	
Herkosporites elliottii	<1%		X	F
Ischyosporites gremius		X		
Kuylisporites waterbolkii		caved		
Laevigatosporites major	X			
Laevigatosporites ovatus	<1%	X	X	X
Liliacidites spp.	<2%			
Lygistepollenites balmei	3%	X	<2%	
Lygistepollenites florinii	6%	X	<2%	X
Malvacipollis diversus	X	6%	X	X
Malvacipollis grandis ms		X		
Malvacipollis subtilis	<1%	X	X	X
Microcachryidites antarcticus	1%	X	2%	
Monosulcites spp.	X			
Myrtaceidites parvus/mesonesus			X	
Nothofagidites asperus		X	X	
Nothofagidites brachyspinulosus	<2%		<2%	
Nothofagidites deminutus			caved	caved
Nothofagidites emarcidus/heturus (caved!)	12%	33%	20%	>35%
Nothofagidites falcatus	caved		caved	caved
Nothofagidites flemingii		X	X	X
Nothofagidites vansteenisii	caved	caved		

Table 5: Species List for Koroit-10 cont...

Species	Cuttings	Cuttings	Cuttings	Cuttings
	780m	808-811m	838-841m	857m
Periporopollenites demarcatus	X		F	
Periporopollenites polyoratus	X			
Peromonolites densus		X	X	
Phyllocladidites mawsonii	8%	X	5%	X
Plicatipollenites spp. RW	RW			RW
Podocarpidites spp.	8%	8%	10%	6%
Podosporites microsaccatus	3%	X		
Proteacidites spp. (some caved)	14%	11%	18%	20%
Proteacidites adenanthoides	X	X		
Proteacidites angulatus				X
Proteacidites annularis		X	X	
Proteacidites differentipolus		caved		
Proteacidites grandis	X	X	X	
Proteacidites leightonii	caved			
Proteacidites rectomarginis	caved	caved		
Proteacidites tenuiexinus	X			
Protohaploxypinus spp. RW		RW		
Pseudoreticulaspora pseudoreticulata RW				RW
Retitriletes spp.		X		
Retitriletes nodosa				RW
Rugulatisporites mallatus	X	X	X	X
Rugulatisporites microaulaxus	caved			
Stereisporites (Tripunctisporis) spp.		X		X
Stereisporites antiquisporites	<3%	X	X	4%
Tricolpites phillipsii	X	X		X
Tricolporites spp.				
Tricolporites adelaidensis		X		
Tricolporites sphaerica		X		
Triletes tuberculiformis		X		
Verrucosisporites cristatus		caved		
Verrucosisporites kopukuensis	X			
TOTAL SPORE-POLLEN COUNT	**107**	**63**		**115**
MICROPLANKTON (% relative to s-p)				
Achomosphaera crassipellis		X		
Achomosphaera ramulifera			caved	
Apectodinium homomorpha (long spines)	caved		caved	
Apteodinium australiense		F		caved
Cordosphaeridium inodes		X		
Dapsilidinium pseudocolligerum		caved		caved
Deflandrea sp.				X
Deflandrea speciosus	X			
Eisenackia crassitabulata		X		
Fromea leos ms				caved
Glaphyrocysta retiintexta		X	X	
Hystrichokolpoma rigaudae	caved	caved	caved	4% caved
Impagidinium spp.				X
Lingulodinium machaerophorum		caved	caved	2% caved
Lingulodinium solarum		caved		

Table 5: Species List for Koroit-10 cont...

Species	Cuttings	Cuttings	Cuttings	Cuttings
	780m	808-811m	838-841m	857m
Manumiella conorata				F
Melitasphaeridium choanophorum	caved			
Nematosphaeropsis rhizoma ms				caved
Operculodinium centrocarpum	caved	caved		6% caved
Paralecaniella indentata	X	X	<10%	X
Pentadinium laticinctum	caved	caved		caved
Protoellipsodinium mamilatus ms	caved			
Protoellipsodinium simplex ms	caved	caved	caved	7% caved
Pyxidinopsis pontus ms	caved	caved		
Renidinium vitilare		X		
Schematophora speciosus		caved		
Spiniferites spp. (mostly caved!)	>50%	>45%	>60%	>60%
Systematophora placacantha	caved	caved		2% caved
Tectatodinium marlum ms				caved
Tectatodinium ovatum ms		caved		
Tectatodinium pellitum	caved			caved
TOTAL MICROPLANKTON COUNT	**40**	**42**		**36**
OTHER PALYNOMORPHS				
Microforaminiferal inner liners	X	X		
Fungal spores & hyphae	1%	<1%		
TOTAL COUNT	**151**	**106**		**152**

Table 6: Species Lists for Koroit-10

Species	Cuttings		
	1140m	1152m	1207m
SPORE-POLLEN			
Aequitriradites spinulosus			2%
Aequitriradites verrucosus			X
Aratrisporites spp. **RW**			RW
Araucariacites australis	<1%	<1%	5%
Australopollis obscurus	<2%	X	
Baculatisporites spp.	<3%	<2%	9%
Camarozonosporites bullatus		Caved	
Ceratosporites equalis		X	
Cicatricosisporites spp.	<1%	X	5%
Cicatricosisporites australiensis		X	
Cicatricosisporites cuneiformis			X
Cicatricosisporites ludbrookiae			X
Cicatricosisporites rhodanos ms		X	F
Clavatipollenites spp.			X
Clavifera triplex	<1%		X
Coptospora paradoxa			RW
Corollina torosa	<1%	X	<2%
Crybelosporites brennerii			X
Crybelosporites striatus			X
Cupressacites sp.	19%	16%	<5%
Cyathidites australis	<1%		<1%
Cyathidites minor	3%	5%	21%
Dictyophyllidites spp.	<3%	<2%	
Dilwynites echinatus ms		X	
Dilwynites granulatus	5%	13%	2%
Dilwynites pusillus ms (sm.var.)	4%	5%	
Dulhuntyispora **RW**	RW		
Foraminisporis asymmetricus			X
Gleicheniidites circinidites	7%	19%	<1%
Gleicheniidites sagitta ms	X		
Herkosporites elliottii	1%	X	
Hoegisporis trinalis ms			F
Laevigatosporites musa ms			X
Laevigatosporites ovatus	1%	2%	<3%
Latrobosporites ohaiensis		Caved	
Leptolepidites verrucosus			X
Lygistepollenites florinii	Caved		
Marratisporites scabratus	<1%	<1%	
Microcachryidites antarticus	3%	7%	8%
Osmundacidites wellmanii			X
Perotrilites jubatus			F
Perotrilites majus	X		X
Perotrilites oepikii Burger 1976	X		
Phyllocladidites eunuchus ms	<2%	<2%	
Phyllocladidites mawsonii	1%	1%	

Table 6: Species Lists for Koroit-10 cont...

Species	Cuttings		
	1140m	1152m	1207m
Pilosisporites notensis **RW**	RW		RW
Plicatipollenites spp. **RW**	RW		RW
Podocarpidites spp.	29%	14%	16%
Podosporites microsaccatus	<2%	2%	<1%
Proteacidites spp.	<2%	X	caved
Retitriletes spp.		X	4%
Retitriletes austroclavatidites		X	X
Retitriletes circolumenus			X
Rugulatisporites admirabilis ms			X
Stereisporites antiquisporites	<1%	5%	4%
Tricolpites spp.	1%	X	2%
Triporoletes laevigtus			X
Triporoletes reticulatus			X
Tuberculatosporites sp. A. Burger 1980		X	
Vitreisporites pallidus	<1%	<1%	
TOTAL SPORE POLLEN COUNT	**181**	**131**	**129**
MICROPLANKTON (% relative to S-P)	**47%**	**9%**	**7%**
Apteodinium sp.	X	X	
Cassiculosphaeridia sp.	X		
Chlamydophorella nyei	X		
Circulodinium deflandrei			X
Conosphaeridium striatoconus	<1%		
Cribroperidinium edwardsii		F	F
Cyclonephelium compactum	X		X
Cyclonephelium distinctum		X	
Heterosphaeridium spp.	6%	X	
Heterosphaeridium heteracanthum	X	X	
Isabelidinium cretaceum	X		
Isabelidinium glabrum		X	
Kiokansium polypes			X
Odontochitina costata	X		
Odontochitina harrisii Marshall ms	X		
Odontochitina operculata		X	
Oligosphaeridinium complex	X		X
Oligosphaeridium pulcherrimum	X	X	X
Palaeoperidinium cretaceum			X
Spiniferites spp.	6%	X	X
Trichodinium castanea	X		
Trithyrodinium spp.	1%		
Xenascus spp.	X		
Xenikoon australis	Caved		Caved
Xiphophoridium alatum			X

Table 6: Species Lists for Koroit-10 cont...

Species	Cuttings		
	1140m	1152m	1207m
ALGAL SPECIES			
Amosopollis cruciformis	79%	<30%	X
Botryococcus spp.			
Nummus monoculatus	X		
Palambages spp.		X	
Schizosporis reticulatus			X
Sigmopollis carbonis			X
Veryhachium spp.		X	
TOTAL MICROPLANKTON COUNT	142	12	9
OTHER PALYNOMORPHS			
Fungal hyphae	X	X	X
Fruiting bodies	X		
Microforaminiferal liners	>2%	X	X
TOTAL COUNT	365	163	138

Table 7: Species Lists for Pretty Hill-1 and Yangery-1.

Species	Cuttings		
	Pretty Hill-1		Yangery-1
	Sample B	Sample A	
	865-69m	865-69m	860m
SPORE-POLLEN			
Aequitriradites spinulosus		X	
Araucariacites australis	X	X	4%
Australopollis obscurus	X	<2%	X
Baculatisporites spp.		<2%	X
Camarozonosporites australiensis	X		
Cicatricosisporites spp.		X	
Cicatricosisporites australiensis	X		X
Clavifera vultuosus		X	
Coptospora pileolus ms		X	
Corollina torosa		<1%	X
Cupressacites sp.		33%	37%
Cyathidites australis	X	<2%	>3%
Cyathidites minor		10%	<2%
Cyclosporites hughesii **RW**		RW	
Densoisporites velatus		X	
Dictyophyllidites spp.		X	>2%
Dictyotosporites speciosus	X		
Didecitriletes ericainus **RW**		RW	
Dilwynites echinatus ms		X	F
Dilwynites granulatus		3%	8%
Foraminisporis asymmetricus			X
Gleicheniidites circinidites	X	6%	5%
Granulatisporites trisinus **RW**		RW	
Herkosporites elliottii	X	<1%	X
Ilexpollenites primus ms		X	
Laevigatosporites ovatus	X	3%	3%
Liliacidites spp.		X	
Lygistepollenites florinii		X	<1%
Marratisporites scabratus		X	
Microcachryidites antarticus	X	X	6%
Ornamentifera sentosa	X		
Phyllocladidites mawsonii	F	<1%	3%
Plicatipollenites spp. **RW**	RW	RW	
Podocarpidites spp.		18%	17%
Podosporites microsaccatus		<2%	3%
Proteacidites spp.		X	
Retitriletes spp.	X	<2%	
Retitriletes austroclavatidites		X	
Rugulatisporites mallatus	X		
Stereisporites antiquisporites		<1%	<1%
Tricolpites spp.		X	>3%
Triporoletes reticulatus		5%	X
Vitreisporites pallidus		X	<1%
TOTAL SPORE POLLEN COUNT		**154**	**120**

Table 7: Species Lists for Pretty Hill-1 and Yangery-1 cont...

Species	Cuttings		
	Pretty Hill-1		Yangery-1
	SampleB	SampleA	
	865-69m	865-69m	860m
MICROPLANKTON			
Apteodinium sp.			X
Chatangiella tripartita	C	F	
Chatangiella victoriensis	X		
Conosphaeridium striatoconus		X	
Cyclonephelium distinctum		X	
Heterosphaeridium spp.	C	>7%	19%
Heterosphaeridium conjunctum			
Heterosphaeridium heteracanthum	X	X	X
Hystrichodinium oligacanthum		X	
Isabelidinium cretaceum		cf.	cf.
Odontochitina spp.		>10%	
Odontochitina costata	C	X	X
Odontochitina porifera	F	X	
Oligosphaeridium pulcherrimum		X	3%
Palaeohystrichophora infusorioides		>5%	
Palaeoperidinium cretaceum			X
Paralecaniella indentata			X
Spiniferites spp.		>7%	>8%
Xenascus spp.		>5%	
Xenascus sp. cf. X. australiense		X	X
ALGAL SPECIES			
Amosopollis cruciformis	F	35%	45%
Cymatiosphaera spp.		X	
Micrhystridium spp.			X
Nummus monoculatus		X	
Pseudoschizea spp.		X	
TOTAL MICROPLANKTON COUNT		**37**	**59**
OTHER PALYNOMORPHS			
Fungal hyphae	X	<1%	4%
Fungal spores		2.5%	<1%
Microforaminiferal liners			F
SELECTED CAVED SPECIES			
Gambierina edwardsii		X	
TOTAL PALYNOMORPH COUNT		**197**	**192**

Table 8: Species Lists for Fahley-1

Species	Cuttings			
	2395m	2875m	3055m	3110m
SPORE-POLLEN				
Aequitriradites spinulosus				X
Araucariacites australis	X	X	X	X
Australopollis obscurus	F			X
Baculatisporites spp.	X	X		F
Balmeisporites holodictyus				X
Ceratosporites equalis	X			
Cicatricosisporites spp.	X	X	X	
Cicatricosisporites australiensis		X		X
Clavifera triplex	F	F	X	X
Contignisporites cooksonae **RW**			RW	
Corollina torosa				X
Cyathidites asper				X
Cyathidites australis		X	F	X
Cyathidites minor		X	X	X
Densoisporites velatus			X	
Dictyophyllidites spp.	X			
Dictyotosporites speciosus	X	X		X
Dilwynites echinatus ms				X
Dilwynites granulatus	F	X		X
Dilwynites tuberculatus	Caved			
Gleicheniidites circinidites	X	X	X	X
Gleicheniidites sagitta ms	X	X		
Laevigatosporites ovatus			X	
Leptolepidites verrucosus	X			
Lygistepollenites florinii	Caved			
Marratisporites scabratus	X			
Microbaculispora spp. **RW**	RW			
Microcachryidites antarticus	X	X	X	X
Perotrilites jubatus		X		X
Perotrilites majus			X	
Perotrilites oepikii Burger 1976		X		
Phyllocladidites mawsonii	X	F	F	X
Pilosisporites notensis **RW**		RW		
Plicatipollenites spp. **RW**	RW			
Podocarpidites spp.	X	X	X	X
Podosporites microsaccatus		X		
Proteacidites spp.				X
Retitriletes spp.	X	X		X
Rugulatisporites mallatus		X		
Stereisporites antiquisporites	X	X		X
Tricolpites spp.	X			
Vitreisporites pallidus	X			

Table 8: Species Lists for Fahley-1 cont...

Species	Cuttings			
	2395m	2875m	3055m	3110m
MICROPLANKTON				
Apteodinium sp.				X
Circulodinium deflandrei				F
Cleistosphaeridium spp.			X	
Cribroperidinium spp.		X		X
Cribroperidinium apione				X
Cyclonephelium compactum		X		
Cyclonephelium distinctum		X		
Cyclonephelium vannophorum				X
Diconodinium cristatum			X	
Exochosphaeridium phragmites s.l.		X		
Florentinia deanei			F	
Heterosphaeridium spp.	X	X	C	C
Heterosphaeridium conjunctum				X
Heterosphaeridium heteracanthum	X	X	X	C
Kiokansium polypes		C	C	F
Odontochitina costata				X
Odontochitina operculata			X	C
Oligosphaeridinium complex		X	X	X
Oligosphaeridium pulcherrimum		X	X	X
Palaeohystrichophora infusorioides		X		X
Spiniferites spp.		X		X
Tanyosphaeridium salpinx Norvick		X		
Trithyrodinium spp.	X			
Valensiella griphus Norvick 1975		X		cf
ALGAL SPECIES				
Amosopollis cruciformis	C	X	F	C
Botryococcus spp.		X		
Micrhystridium spp.			X	X
Pterospermella aureolata				X
Pterospermella australiensis				X
Veryhachium spp.			X	
OTHER PALYNOMORPHS				
Fungal hyphae	X	X		C
Fruiting bodies	X	X	C	
Microforaminiferal liners			X	
SELECTED CAVED SPECIES				
Acaciapollenites myriosporites	X			
Haloragacidites harrisii	X			
Malvacipollis diversus	X			
Proteacidites pachypolus	X			
Spinozonocolpites prominatus	X			
Stereisporites (Tripunctisporis) spp.	X			
Nothofagidites senectus				X
Cordosphaeridium inodes	X			
Deflandrea obliquipes	X	X		
Deflandrea speciosus				X
Operculodinium centrocarpum		X		
Protoellipsodinium simplex ms	X			

Table 9: Species Lists for Casterton-2

Species	Core Samples		
	1433m	1435m	1437m
	4704-06.5ft	4709-11.5ft	4714-16.5ft
SPORE-POLLEN			
Aequitriradites acusus	X	X	
Araucariacites australis	2%	<1%	X
Baculatisporites spp.	9%	14%	7%
Ceratosporites equalis	5%	7%	10%
Cicatricosisporites spp.	X	<2%	X
Cicatricosisporites australiensis	X	F	X
Corollina torosa	4%	X	<5%
Cyathidites asper			X
Cyathidites australis	12%	28%	19%
Cyathidites minor	17%	14%	3%
Cyathidites punctatus	X		
Cyathidites rafaeli			X
Cycadopites follicularis	<3%		X
Cyclosporites hughesii			X
Dictyophyllidites crenatus		X	
Dictyotosporites complex	X	X	F
Dictyotosporites speciosus	F	F	1%
Falcisporites australis **RW**			RW
Falcisporites grandis		X	X
Falcisporites simplis	X		X
Foraminisporis dailyi	X		X
Foraminisporis wonthaggiensis		<1%	
Foveotriletes parviretus		X	
Gleicheniidites circinidites		<1%	
Ischyosporites punctatus	X		
Januasporites multispinus		X	
Klukisporites scabreris	X		X
Krauselisporites whitfordensis		X	
Leptolepidites verrucosus	<3%	<2%	3%
Leptolepidites major			X
Microcachryidites antarticus	<3%	<1%	3%
Neoraistrickia truncata	<1%		<2%
Obtusisporites canadensis			X
Osmundacidites wellmanii		X	
Pilosisporites notensis	C	X	X
Podocarpidites spp.	17%	17%	21%
Podosporites microsaccatus	<1%	X	
Retitriletes spp.	6%	<3%	18%
Retitriletes austroclavatidites	X		X
Retitriletes circolumenus	X		X
Retitriletes douglasii		X	
Retitriletes facetus		X	X
Retitriletes nodosus	F		X
Retitriletes parvireticulatus	F		X
Retitriletes semimurus			X
Rugulatisporites mallatus		X	

Table 9: Species Lists for Casterton-2 cont...

Species	Core Samples		
	1433m	1435m	1437m
	4704-06.5ft	4709-11.5ft	4714-16.5ft
Stereisporites antiquisporites	17%	6%	<5%
Vitreisporites pallidus	<1%		
Trilete spores undiff.		3%	2%
TOTAL SPORE POLLEN COUNT	180	108	175
MICROPLANKTON			
Micrhystridium spp.			X
Sigmopollis carbonis	X		X
Sigmopollis hispidus	X		
OTHER PALYNOMORPHS			
Fungal spores		X	