PALYNOLOGY OF 24 MOSTLY TERTIARY SAMPLES FROM CODRINGTON 1, EUMERALLA 1, GREENSLOPES 1, KILLARA 1, NAJABA 1, NORTH EUMERALLA 1, PRETTY HILL 1 AND SHAW 1, ONSHORE OTWAY BASIN, VICTORIA

ROGER MORGAN

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MORGAN PALAEO ASSOCIATES

PALYNOLOGICAL / PETROLEUM GEOLOGICAL CONSULTANTS

POSTAL ADDRESS: Box 161, Maitland, South Australia 5573
DELIVERIES: 1 Shannon Tce, Maitland, South Australia 5573
Phone (088) 32 2795 Fax (088) 32 2798

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BY

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for VICTORIAN DEPT ENERGY AND MINERALS

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CONTENTS

320m(cutts) : *asperopolus* (or upper *diversus*) Zone : Early Eocene : apparently marginal marine, but marine elements could be caved : Dilwyn is consistent.

400m(cutts) : upper *diversus* Zone : Early Eocene : apparently marginal marine : Dilwyn Formation is likely.

690m(cutts), 785m(cutts) : upper or middle *diversus* Zones : Early Eocene : apparently brackish : rich yields with common amorphous organic matter dilute the age diagnostic taxa . The Dilwyn/Pember boundary usually falls in the middle *diversus* Zone.

900m(cutts), 1100m(cutts) : middle *diversus* Zone : Early Eocene : brackish to marginal marine : The Pember/Dilwyn boundary usually falls in this Subzone.

1400m(cutts) : lower *diversus* Zone : Early Eocene : marginal marine : Pember assignment is likely.

1460m(cutts) : lower *balmei* Zone : Paleocene : marginal marine : Pebble Point equivalent is indicated.

NORTH EUMERALLA-1

374.7-377.8m(cutts) : probably upper *diversus* with heavy *asperus* caving. : Early or Middle Eocene : marginally marine : Dilwyn Formation close to the base of the Nirranda Group seems likely.

767.8-770.8m(cutts) : indeterminate.

PRETTY HILL-1

390.6-396.7m(core) : middle *diversus* Zone : Early Eocene : marginally marine : Dilwyn Formation is therefore indicated, not Nirranda.

588-91m(cutts) : *balmei* Zone : Paleocene : marginally marine : Pebble Point or basal Pember Formation are both possible.

SHAW-1

280m(cutts) : apparently *tuberculatus* Zone : Oligocene : nearshore marine : Nirranda Subgroup seems likely, certainly not Dilwyn.

325m(cutts) : lower *asperus* Zone (*heterophlycta* Dino Zone) : Middle Eocene : nearshore marine : Nirranda Group is indicated. Top Dilwyn must be below this point.

1 SUMMARY

Resolution is restricted in many of these samples due to the availability of cuttings only. Downhole caving may therefore be masking older ages with older reworking difficult to interpret. Where this is suspected, I have highlighted it

CODRINGTON-1

417.4m(cutts) : *asperus* Zone : middle to Late Eocene : intermediate marine : Nirranda Sub Group is favoured and Mepunga Formation certainly possible.

469.2m(cutts), 481.4m(cutts), 670m(cutts) : lean apparently middle *diversus* Zone with caved *asperus* Zone : Early Eocene : marginal to brackish marine although marine influence could be largely caved : Either all Pember equivalent or some Pember and some Dilwyn is likely.

688.6m(cutts) : lower *diversus* Zone : Early Eocene : marginal marine : Pember equivalent rather than Dilwyn.

EUMERALLA-1

7o7.8-770.8m(cutts) : apparently middle *diversus* Zone : Early Eocene : marginally marine : lower Dilwyn or upper Pember equivalent is therefore suggested.

813.5-816.6m(cutts) : apparently *senectus* Zone/*australis* Dinoflagellate Zone : Campanian : marginal marine : assuming the oldest elements are in place, the Paaratte Formation is favoured.

GREENSLOPES-1

390-400m(cutts) : *longus* Zone : Maastrichtian : nearshore marine : topmost Cretaceous Paaratte Formation equivalent.

450-60m(cutts) : *paradoxa* Zone with younger caving : [illegible] : apparently nearshore but marine elements may be caved : apparently topmost Eumeralla, but Paaratte/Flaxmans is possible.

KILLARA-1

444m(cutts) : apparently *longus* Zone with caved *balmei* (Paleocene) and trace reworked *senectus* Zone (Campanian) : apparently Maastrichtian : marginal marine : overall, Paaratte assignment seems most likely.

NAJABA-1 Sample size was on the small side, so yields are generally poor.

II INTRODUCTION

This sample suite was submitted by Greg Parker of the Victorian Department of Energy and Minerals as part of a study of the onshore Otway Basin.

Palynomorph occurrence data are shown as Appendix 1 and from the basis for the assignment of the samples to the Tertiary and Cretaceous Zones.

The Tertiary zonation is basically that of Stover and Evans (1973) and Stover and Partridge (1973) as modified by Partridge (1976) and shown in Figure 1.

The Cretaceous spore-pollen zonation is essentially that of Dettmann and Playford (1969) combined with Stover and Evans (1973) and Stover and Partridge (1973). This framework has been significantly modified and improved by various authors since, and most recently discussed in Helby et al (1987), and modified in the Early Cretaceous by Morgan (1985) for application in the Otway Basin, as shown in Figure 2.

Sample processing usually involves the following steps. Extra techniques are only used if required:

(a) digest about 10gm of crushed rock in 50% HF overnight.
(b) wash out several times over 10 micron polyester sieve. Acidify with conc HCl if fluorosilicate gel forms.
(c) heavy liquid separation used concentrated $ZnBr_2$ with SG of 2.0.
(d) wash out float fraction over 10 micron polyester sieve. Acidify if $Zn(OH)_2$ precipitate forms.
(e) mount a sieved kerogen slide.
(f) oxidise in Schultze Solution (conc 30% HNO_3 with crystalline $KClO_3$).
(g) wash out over 10 micron polyester sieve.
(h) add 5% KOH to dissolve humic acids.
(i) wash out over 10 micron polyester sieve.
(j) examine under microscope for satisfactory oxidation. Repeat steps (f) to (i) if required.
(k) heavy liquid separation using $ZnBr_2$ solution (SG of 2.0).
(l) wash out float fraction using polyester sieve. Acidify if $Zn(OH)_2$ precipitate forms.
(m) dehydrate onto coverslip.
(n) mount microscope slides using Eukitt medium.

Sample examination usually involves the following steps:

(a) scan two traverses at x 10 to log the bulk of the assemblage and get some idea of age.

(b) scan at x 40 and count the first 100 specimens to get percentage contents for each species. From this, "Saline Microplankton Content" (%) can be developed to provide an index of marine influence. Where the sample is too lean to provide 100 specimens, frequency is estimated from the specimens seen with A=abundant, C=common, F=frequent, R=rare.

(c) return to x 10 to scan at least two large coverslips to log rare species, and finalise age conclusions. Log more slides if required.

(d) examine sieved kerogen slide for specimens of *Cyathidites* to establish spore colour for Spore Colour Maturity Index.

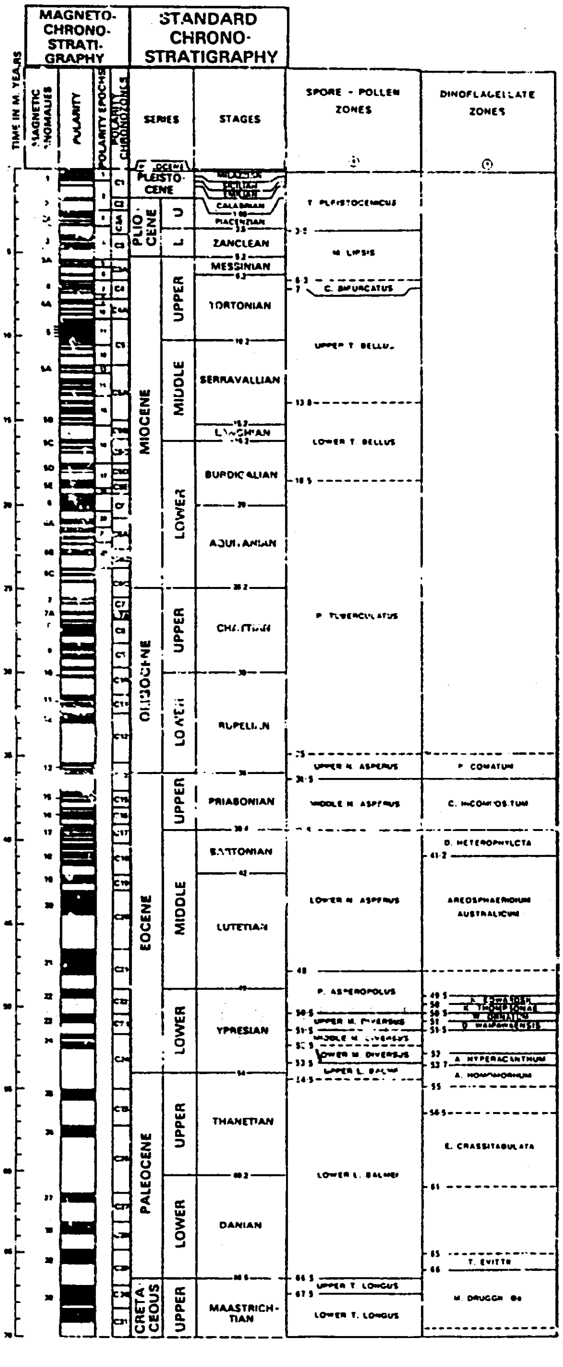

FIGURE 1 ZONAL FRAMEWORK

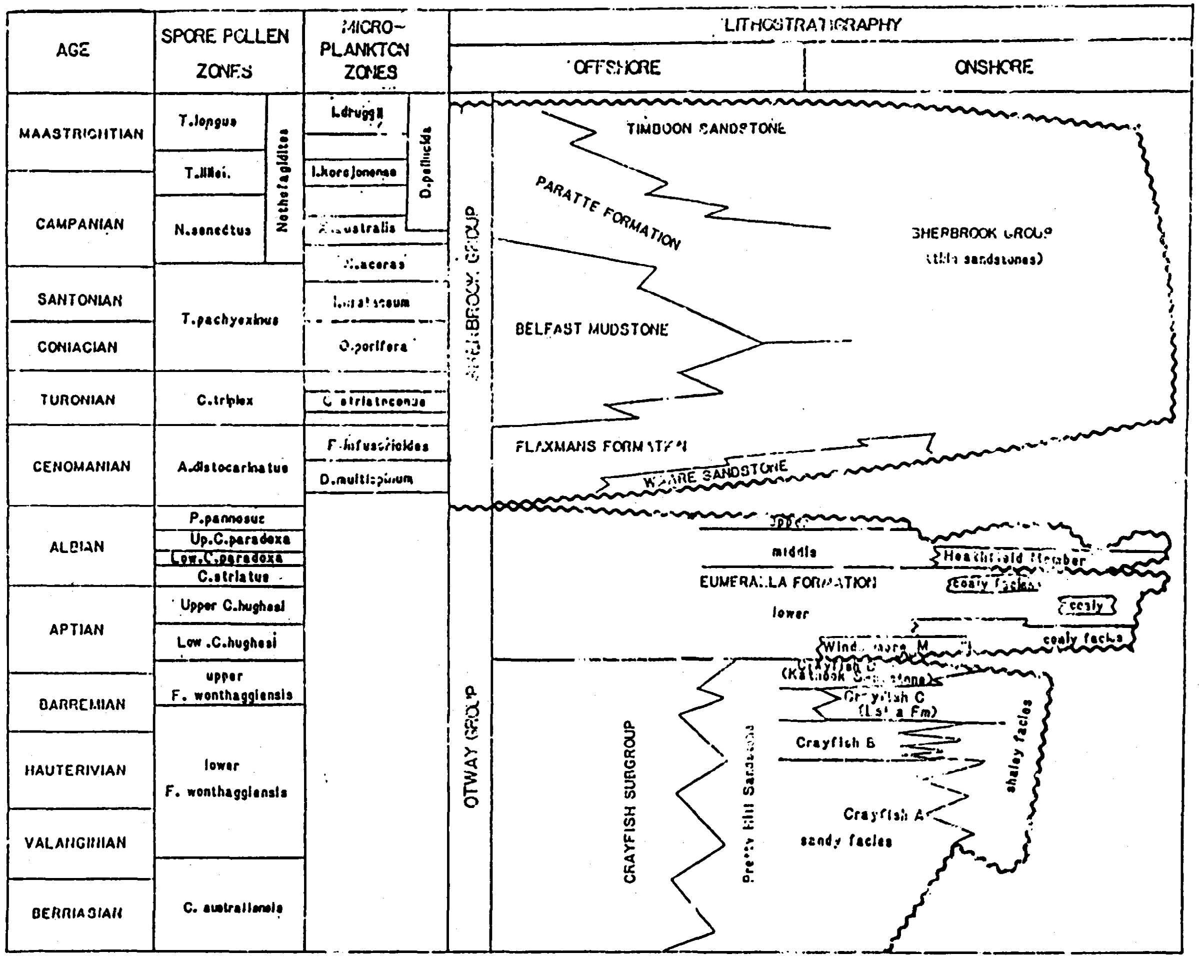

FIGURE 2 CRETACEOUS REGIONAL FRAMEWORK, OTWAY BASIN

III PALYNOSTRATIGRAPHY

A CODRINGTON-1

1 417.4m(cutts) : *asperus* Zone

Assignment to the *Nothofagidites asperus* Zone of Middle Eocene to earliest Oligocene age is indicated by the dominance of *Nothofagidites* spp (30%) without other markers. Yields are lean, typical of this part of the section. Frequent in a low diversity assemblage are *Cyathidites*, *Dilwynites*, *Falcisporites* and *Haloragacidites harrisii*.

The common dinoflagellates include very common *Spiniferites ramosus* with frequent *Botryococcus* and *Micrhystridium*. Rare elements include *Lingulodinium machaerophorum*, *Glaphyrocysta* and *Systematophora*.

Equal quantities of marine derived dinoflagellates and terrestrially derived spores and pollen suggest intermediate marine environments. The lean yield suggests that a more offshore situation may be likely.

Colourless spore colours indicate immaturity for hydrocarbon generation.

These features are consistent with the Nirranda Group and certainly something younger than the Dilwyn Formation.

2 469.2m(cutts), 481.4m(cutts), 670m(cutts) : lean apparently middle *diversus* Zone with caved *asperus* Zone

Assignment to the *Proteacidites asperopolus* or older Zones is indicated by the downhole influx of common *H. harrisii* and youngest *Malvacipollis diversus*, *Proteacidites grandis*, *P. ornatus*, *P. tuberculiformis* and *Spinozonocolpites prominatus*. The presence of *P. tuberculiformis* and *Triporopollenites ambiguus* suggests the middle *Malvacipollis diversus* or younger zones, but these could be caved slightly. Thus assignment in the middle *diversus* to *asperopolus* Zones interval is indicated and the absence of any definitive upper *diversus* or *asperopolus* Zone markers (such as *Proteacidites pachypolus* or *P. asperopolus)* suggests the middle *diversus* Zone is most likely. This implies a sizeable hiatus at the Dilwyn/Nirranda boundary, but this could be largely apparent if scarcity of zone taxa has caused them to be missed in this lean yield. Overall, *H. harrisii* is common with *Cyathidites*, *Dilwynites*, *Falcisporites* and *Proteacidites* frequent. Other rare but significant taxa include *Beaupreadites verrucosus*, *Cupaneidites orthoteichus*, *Intratriporopollenites notabilis* and *Proteacidites nasus*. Minor caving includes *Nothofagidites lemmunitus* and a single *Lygistepollenites balmei* at 670m is considered reworked.

Amongst the dinoflagellates, *Homotriblium tasmaniense* at 469.2m suggests the lower *asperus* to upper *diversus* Zones, and may be in place, or caved. Obviously caved are *Areosphaeridium arcuatum* (lower *asperus* Zone) and *Impletosphaeridium sp* (Oligo-Miocene). Minor Cretaceous reworking includes *Circulodinium deflandrei*. Overall, the dinoflagellates are not age diagnostic. *Spiniferites* are common at 469.2 and 481.4m, but may be largely caved.

Environments are uncertain given the obvious caving. At 469.2 and 481.4m, environments appear to be intermediate to nearshore marine with very common dinoflagellates, but at 670m, non-marine lacustrine environments are suggested by the total absence of saline markers, and the presence of frequent freshwater algae (*Botryococcus*).

Colourless to yellow spore colours indicate immaturity for hydrocarbons.

These features are typical of the Dilwyn and Pember units with the Pember/Dilwyn boundary usually falling in the middle *diversus* Zone.

3 688.6m(cutts) : lower *diversus* Zone

Assignment to the lower *Malvacipollis diversus* Zone of Early Eocene age is indicated by *Malvacipollis diversus* and *Periporopollenites demarcatus* without younger or older markers. *H. harrisii* is common with *Dilwynites*, *Falcisporites*, *Gleicheniidites* and *Proteacidites* frequent. Rare elements include *Malvacipollis subtilis*, *P. grandis* and *Proteacidites incurvatus*.

Amongst the rare dinoflagellates, *Spiniferites* are frequent. The presence of *Deflandrea pachyceros* is consistent with the zonal assignment, as it is usually restricted to the lower and middle *diversus* Zones.

Marginally marine environments are indicated by the dominant and diverse spores and pollen, rare low diversity dinoflagellates, and common freshwater algae (*Botryococcus*).

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the Pember Formation.

B EUMERALLA-1

1 767.8-770.8m(cutts) : apparently middle *diversus* Zone

Assignment to the middle *M. diversus* Zone of Early Eocene age is indicated by *Proteacidites kopiensis* and *P. ornatus* without younger or older markers. These elements could, however, be caved into the lower *diversus* Zone. The sample can be no younger than the *P. asperopolus* Zone on youngest *I. notabilis*, *P. grandis* and *P. ornatus*. The absence of even caved *P. pachypolus* and *P. asperopolus* at this level suggests a hiatus removing the upper *diversus* and *asperopolus* Zones. *P. pachypolus* occurs caved at 816.5m, but may originate in the *asperus* Zone. Common are *Nothofagidites* and *Proteacidites* with frequent *Cyathidites*, *Dilwynites* and *Falcisporites*. The high *Nothofagidites* content (including *N. deminutus* and *N. falcata*) suggests significant Nirranda Group caving. Rare but age significant are *C. orthoteichus*, *I. notabilis* and *P. nasus*. Obviously caved from the Miocene is *Acaciapollenites*.

Dinoflagellates are rare and include *D. pachyceros* (usually seen in the lower and middle *diversus* Zones), and *A. arcuatum* (considered caved with the other *asperus* Zone elements.). *Spiniferites* and *Micrhystridium* are the most frequent.

Marginally marine environments are indicated by the rare low diversity dinoflagellates (some of which are clearly caved), and the dominant and diverse spores and pollen.

Colourless to yellow spores and pollen suggest immaturity for hydrocarbon generation.

These features are normally seen in the lower Dilwyn or upper Pember units, but clearly Nirranda Group caving has occurred.

2 813.5-816.6m(cutts) : apparently *senectus* Zone/*australis* Dinoflagellate Zone

Spores and pollen are not very age diagnostic, but include the Late Eocene to middle Eocene (*P. pachypolus*), Early Eocene *diversus* Zone (*M. diversus*, *C. orthoteichus*) and Paleocene *balmei* Zone to Campanian *senectus* Zone (*Gambierina edwardsii*). *Proteacidites*, *Cyathidites* and *Falcisporites* are common, with *Nothofagidites* and *Podosporites microsaccatus* frequent.

The dinoflagellates are mostly Cretaceous restricted forms, but are also mixed, including latest Paleocene-Oligocene *Apectodinium homomorphum*; Maastrichtian-Campanian *Isabelidinium pellucidum* and Campanian *Xenikoon australis* as well as long ranging Cretaceous taxa *Cordinifera oceanica* and *Heterosphaeridium cf laterobrachius*.

Assuming that the oldest elements are in place, a Campanian *senectus australis* Zone assignment is indicated. However, reworking into something younger cannot be excluded.

Marginal marine environments are indicated by the very rare low diversity dinoflagellates and the dominant and diverse pollen and spores.

Yellow spore colours indicate immaturity for hydrocarbons.

If the *australis* dinoflagellate Zone is in place, these features are normally seen in the Paaratte Formation.

C GREENSLOPES-1

1 390-400m(cutts) : *longus* Zone

Assignment to the *Tricolpites longus* Zone of Maastrichtian age is suggested by the zone restricted taxa *Quadraplanus brossus* and *Tricolpites longus*, but these could conceivably be caved slightly. Other diagnostically Cretaceous youngest occurrences include *Tricolporites lillei* and *Triporopollenites sectilis*, but these range down into the *lillei* Zone. *Proteacidites* are common with

Cyathidites, *Gambierina rudata*, *P. microsaccatus* and *Stereisporites antiquasporites* frequent. Rare elements include *L. balmei* and *P. incurvatus*. Inertinite and cuticle are common.

Amongst the dinoflagellates are *Alterbia acutula* and *Manumiella druggii* suggesting the Maastrichtian *M. druggii* Dinoflagellate Zone, plus *Odontochitina spp* suggesting slightly older Campanian horizons in the *I. korojonense* Dinoflagellate Zone (correlative with the *lillei* Spore-Pollen Zone). These elements are considered reworked slightly, but could conceivably be in place with a *lillei korojonense* assignment indicated. It would make little difference to the lithostratigraphy.

Very nearshore marine environments are indicated by the very low dinoflagellate content and low to moderate diversity (some of which may be caved or reworked), and dominant and diverse pollen and spores.

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the topmost Paaratte Formation.

2 **450-60m(cutts) : *paradoxa* Zone**

This assemblage is clearly mixed, but youngest and consistent *Coptospora paradoxa* and *Crybelosporites striatus* indicate the *C. paradoxa* Zone of mid Albian age. The absence of older markers (such as *Pilosisporites notensis*, *Cyclosporites hughesi* and *Dictyotosporites speciosus*) confirm the assignment. Younger elements are present and include *Amosopollis cruciformis*, *P. mawsonii*, *Stereisporites regium* and *Gambierina rudata*, considered caved. Common taxa include *Cyathidites* and *Falcisporites* and frequent taxa include *M. antarcticus* and *P. microsaccatus*. Rare taxa include *Aequitriradites spinulosus*, *Balmeisporites holodictyus*, *Cicatricosisporites australiensis*, *Foraminisporis wonthaggiensis* and *Triporoletes reticulatus*, consistent with the zonal assignment.

Dinoflagellates include caved Eocene (*Alisocysta ornatum* and *A. arcuatum*) and Late Cretaceous taxa (*Spinidinium balmei*), as well as long ranging taxa considered caved from the Late Cretaceous.

Environments are probably non-marine or brackish on regional geological grounds, with the rare low diversity dinoflagellates considered all caved. Spores and pollen are dominant and diverse.

Yellow to light brown spore colours indicate immaturity approaching marginal maturity for oil but immaturity for gas/condensate.

These features are normally seen in the Eumeralla Formation, assuming that the *paradoxa* Zone is in place.

D KILLARA-1

1 444m(cutts) : apparently *longus* Zone with caved *balmei* Zone (Paleocene) and trace reworked *senectus* Zone (Campanian)

This assemblage is clearly mixed but the dominant elements support the *T. longus* Zone (*T. longus*, *T. sectilis*, *Tetracolporites verrucosus* plus the dinoflagellates), with some obvious caved Eocene (*N. falcata*, *P. pachypolus* plus dinoflagellates), and Paleocene (dinoflagellates). Common are *Falcisporites* and *Proteacidites* with frequent *Cyathidites*. Rare elements include *A. cruciformis*, *G. rudata*, *L. balmei*, *S. regium*, *T. longus* and *T. sectilis*.

Dinoflagellates are also clearly mixed with Eocene (*D. pachyceros*, *A. homomorphum*), Paleocene (*Palaeoperidinium pyrophorum* *D. speciosus*), Maastrichtian (*M. druggii*, *M. coronata*) and a single Campanian specimen (*X. australis*). It seems most likely that the Maastrichtian *longus* Zone is in place, but other options exist in these cuttings.

Nearshore marine environments are suggested by the low dinoflagellate content (34%) and moderate diversity, some of which is clearly caved. These environments may therefore be unreliable.

Yellow spore colours indicate immaturity for hydrocarbons.

If the *longus* Zone is in place, a Paaratte assignment is most likely.

E NAJABA-1

1 320m(cutts) : *asperopolus* (or upper *diversus*) Zone

Youngest *Myrtaceidites tenuis*, *M. diversus*, *P. grandis*, *P. ornatus*, and *S. prominatus* and dominant *H. harrisii* indicate the *P. asperopolus* or older zones. Frequent *P. pachypolus* and oldest *M. tenuis* (if in place and not caved) indicate the upper *diversus* or younger zones. Thus the interval upper *diversus* to *asperopolus* Zones is indicated. The absence of *P. asperopolus* suggest the upper *diversus* Zone is more likely, but *P. asperopolus* can be very rare. The dinoflagellates noted below favour the *asperopolus* Zone, but could be slightly caved. Overall, on species present, the *asperopolus* Zone is favoured. Common are *H. harrisii* and *Proteacidites* with *Malvacipollis subtilis* and *P. pachypolus* frequent . Rare are *I. notabilis*, *M. diversus*, *P. nasus*, *P. ornatus* and *S. prominatus*.

Dinoflagellates present include *Kisselovia coleothrypta* with *Kisselovia thompsonae* caved into the sample below (400m), suggesting the lower part of the *P. asperopolus* Zone. Clearly caved is *A. arcuatum*, from the lower *asperus* Zone above.

Environments are apparently marginal marine, but the few dinoflagellates could be caved into non-marine lacustrine environments, given the common freshwater algae (*Botryococcus*). Pollen and spores are abundant and diverse. Yield was lean with cuticle common.

Yellow spore colours indicate immaturity for hydrocarbons.

These features are usually seen in the Dilwyn Formation, not the Nirranda Group.

2 400m(cutts) : upper *diversus* Zone

Dominant *H. harrisii* with oldest consistent *P. pachypolus* indicates the upper *M. diversus* Zone of Early Eocene age. *H. harrisii* is abundant (31%) with common *M. subtilis* and *Proteacidites*. Rare but significant elements include *C. orthoteichus*, *M. diversus*, *P. demarcatus*, *P. ornatus*, *P. tuberculiformis* and *S. prominatus*. Minor Nirranda Group caving includes consistent *Nothofagidites deminutus*.

Dinoflagellates are extremely scarce and may all be caved.

Environments appear to be marginal marine, but could be non-marine lacustrine, given the high freshwater algal content (9% *Botryococcus*). Pollen and spores are abundant and diverse. Yield was lean with cuticle common.

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the Dilwyn Formation.

3 **690m(cutts), 785m(cutts) : upper or middle *diversus* Zones**

Assignment to the *M. diversus* Zone is indicated by common *H. harrisii* with *I. notabilis*, *C. orthoteichus* and *S. prominatus*. At 690m, *P. tuberculiformis* suggests the middle *diversus* Zone while at 785m, *P. pachypolus* suggests the upper *diversus* Zone. If *P. pachypolus* is caved, the interval is entirely middle *diversus* Zone. If *P. pachypolus* is in place, the interval is entirely upper *diversus* Zone. In these cuttings, it is impossible to distinguish the possibilities, so the interval is lumped. Overall, *H. harrisii* is common, with *Falcisporites* and *Proteacidites* frequent.

Dinoflagellates are very scarce, not age diagnostic, and may be entirely caved.

Environments appear to be brackish, but all the dinoflagellates may be caved. Lacustrine conditions are likely, with very common to abundant *Botryococcus*, and abundant cuticle and amorphous organic matter (AOM). Pollen and spores are abundant and diverse.

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the lower Dilwyn Formation and upper Pember Mudstone.

4 **900m(cutts), 1100m(cutts) : middle *diversus* Zone**

Oldest *P. tuberculiformis*, *P. ornatus* and *Triporopollenites ambiguus* indicate the middle *M. diversus* Zone of Early Eocene age. Common are *Dilwynites* and *H. harrisii*, with frequent *Falcisporites* and *Proteacidites*. Rare but useful elements include *C. orthoteichus*, *I. notabilis*, *M. diversus*, *P. kopiensis*, *P. nasus* and *S. prominatus*.

Amongst the very rare dinoflagellates, youngest *D. pachyceros* at 1100m is consistent with the zonal assignment. *A. arcuatum* is considered caved.

Environments appear brackish to marginal marine, but at least some dinoflagellates are caved. Lacustrine conditions are favoured by the common freshwater algae (*Botryococcus*). Pollen and spores are abundant and diverse.

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the lower Dilwyn Formation and upper Pember Mudstone.

5 **1400m(cutts) : lower *diversus* Zone**

Assignment to the lower *M. diversus* Zone of Early Eocene age is indicated at the top by youngest *Cyathidites gigantis* and the absence of younger markers considered in place, and at the base on oldest *M. diversus* and *S. prominatus* without older markers. Very frequent are *Cyathidites* and *M. diversus* with frequent taxa including *Dilwynites*, *H. harrisii* and *Falcisporites*. Very rare *P. pachypolus* are considered caved. Morgan (1987) assigned swcs at 1311m and 1400m to the upper *diversus* Zone on oldest *P. pachypolus*. These specimens are now considered caved probably as mudcake on the swcs.

Dinoflagellates support the assignment with youngest *Hafniasphaera septata* and a downhole influx of *Muratodinium fimbriatum*. Other taxa include *A. homomorphum* and *D. pachyceros*.

Environments appear to be marginal marine with some of the rare dinoflagellates probably caved. Pollen and spores are dominant and diverse. Cuticle fragments are abundant. Lacustrine influence is major with very common freshwater algae (21% *Botryococcus*).

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the Pember Mudstone.

6 1460m(cutts) : lower *balmei* Zone

This lean assemblage is assigned to the lower *Lygistepollenites balmei* Zone on dinoflagellate evidence. Spores and pollen are too few to provide definitive age control. *Dilwynites*, *Falcisporites*, *M. subtilis* and *Proteacidites* are frequent. A single *P. pachypolus* is considered caved. Morgan (1987) assigned swcs at 1405m and 1460.5m to the lower *balmei* Zone.

Amongst the dinoflagellates, *Deflandrea speciosus* and *Palaeoperidinium pyrophorum* indicate the lower *L. balmei* Zone. Elements considered caved include *A. homomorphum*, *D. pachyceros*, and *H. septata*. Two specimens of the Maastrichtian *M. druggii* were seen but are considered reworked.

Marginal marine environments are suggested by the low content of dinoflagellates (their moderate diversity is considered mostly due to caving) Freshwater algal acritarchs are frequent (*Paralecaniella* and *Botryococcus* both 5%). Pollen and spores are dominant and diverse.

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the Pebble Point Formation.

F NORTH EUMERALLA-1

1 374.7-377.8m(cutts) : probably upper *diversus* Zone with heavy *asperus* Zone caving.

This rich assemblage is unclear. The obvious dominance of *Nothofagidites* (43%) suggests the *asperus* Zone. Youngest *P. tuberculiformis* and *P. grandis* favour the *P. asperopolus* Zone or older, as does the scarcity of dinoflagellates. Youngest *P. ornatus* and *I. notabilis* also favour the *asperopolus* or older Zones, but do range into the basal lower *asperus* Zone. *Nothofagidites* dominate, with *Cyathidites*, *Dilwynites*, *H. harrisii*, and *Tricolporites* frequent. On this data alone, either is possible.

Wilschut studied the palynology for the completion report and studied a swc from 1244ft (379.2m) which had very common *H. harrisii* (23%) and youngest *S. prominatus*, *P. grandis* and *M. diversus* indicating the *asperopolus* or older zones. He saw *P. pachypolus* down to 1771ft (539.8m), but *P. asperopolus* has never been seen. This data indicates the upper *diversus* Zone and his data indicates the *asperus* Zone at 1172ft (357.2m).

Dinoflagellates are very scarce, and may be largely caved.

Environments appear to be marginal marine with extremely rare very low diversity dinoflagellates amongst the abundant and diverse pollen and spores.

Colourless to yellow spore colours indicate immaturity for hydrocarbons.

Assignment to the topmost Dilwyn Formation seems most likely with heavy Nirranda Group caving. However, drillers depths on cuttings are notoriously unreliable at this scale and a log top Dilwyn at 382m may be within the scope of likely error.

2 767.8-770.8m(cutts) : indeterminate

This sample is almost barren and so is indeterminate. However, swc data from Wilschut at 2526ft (= 769.9m) suggests a lower *diversus* Zone assignment, consistent with the Pember Formation.

G PRETTY HILL-1

1 390.6-396.7m(cutts) : middle *diversus* Zone

Assignment to the middle *M. diversus* Zone is indicated by oldest *Banksieacidites elongatus*, *Proteacidites kopiensis*, *P. nasus* and *P. tuberculiformis* without younger markers, although these elements could conceivable be caved slightly. The samples could also be slightly younger if the key markers *P. asperopolus* and *P. pachypolus* have been missed due to their scarcity, rather than the stratigraphy. *Dilwynites* and *Falcisporites* are common with *H. harrisii*, *M. diversus* and *Proteacidites* frequent. Rare but significant are *C. orthoteichus*, *I. notabilis*, *P. kopiensis*, *P. ornatus* and *P. tuberculiformis*.

Amongst the dinoflagellates, *D. pachyceros* is consistent as it usually occurs in the middle *diversus* to upper *balmei* Zones.

Environments are marginally marine to brackish as indicated by the dominant and diverse pollen and spores and very rare low diversity dinoflagellates, some of which may be caved. Significant lacustrine influence is evident, as freshwater algae are frequent (7% *Botryococcus*).

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the lower Dilwyn or upper Pember units, and not in the Nirranda Group.

2 588-91m(cutts) : *balmei* Zone

Assignment to the *L. balmei* Zone of Paleocene age is indicated by youngest *L. balmei* without older markers. The yield was very lean and limits resolution. *Dilwynites*, *Falcisporites* and *Proteacidites* are common, with *M. antarcticus* frequent. *L. balmei* and *Australopollis obscurus* are rare but multiple specimens indicate the zone. *Polycolpites esobalteus* is present but considered caved.

Dinoflagellates are extremely rare, not age diagnostic and may be caved.

Environments appear to be brackish with dominant and diverse pollen and spores and minor low diversity dinoflagellates. Spiny acritarchs are frequent (4%) and freshwater algae frequent (6% comprising *Paralecaniella* 2% and *Botryococcus* 3%)

Yellow spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the Pebble Point Formation, or lower Pember Mudstone.

H SHAW-1

1 280m(cutts) : apparently *tuberculatus* Zone

Dominance of *Nothofagidites* with *Cyatheacidites annularis* suggests the *Proteacidites tuberculatus* Zone of Oligocene to Early Miocene age. However, this zone may exist higher in the well and be caving into the *asperus* Zone in this very lean assemblage. There is no evidence for the *asperopolus* or older zones, so the Nirranda Group is favoured. *Nothofagidites spp* are abundant with *N. brachyspinulosus* and *N. falcata* frequent. *H. harrisii* is common and *Falcisporites* frequent.

Amongst the dinoflagellates, *Spiniferites* are common with *Tectatodinium* frequent. *Pentadinium laticinctum* and *Impletosphaeridium sp* suggest an Oligocene age but may be caved.

Nearshore marine environments are suggested by the dinoflagellate content (26%) and moderate diversity, but much of this may be caved.

Colourless pollen and spores indicate immaturity for hydrocarbons.

2 **325m(cutts) : lower *asperus* Zone (*heterophlycta* Dino Zone)**

Assignment to the lower *N. asperus* Zone of Middle Eocene age is indicated by dominant *Nothofagidites* and the dinoflagellate data in a very lean assemblage. A single *C. annulatus* specimen is considered caved. *Nothofagidites* are abundant (44%) with *N. deminutus* and *N. falcata* frequent. Other frequent taxa include *Dilwynites*, *Falcisporites* and *H. harrisii*. Rare but significant are *Milfordia hypolaenoides*, *Nothofagidites asperus* and *Proteacidites rectomarginus*.

Amongst the dinoflagellates, *Alisocysta ornatum* and *Deflandrea heterophlycta* indicate the *D. heterophlycta* Dinoflagellate Zone, correlative with the lower *N. asperus* Zone. *P. laticinctum* is considered caved from the Oligocene. *Spiniferites* are frequent with other elements rare.

Nearshore environments are indicated by the low dinoflagellate content (17%) and diversity, some of which may be caved. Pollen and spores are abundant and diverse.

Colourless spores indicate immaturity for hydrocarbons.

These features are normally seen in the Nirranda Group and not in the Dilwyn Formation.

IV CONCLUSIONS

Where the lithological criteria are equivocal, palynology has provided definitive clarification in most cases, despite the availability of only cuttings, especially for the top Dilwyn boundary.

One aspect is of concern. At the Nirranda/Dilwyn boundary several wells show a non descript *asperus* Zone above, and apparently middle *diversus* Zone below, implying a sizeable hiatus removing the *asperopolus* and upper *diversus* Zones. This may be real, but the same conclusion would be drawn if the zone markers (*P. asperopolus* and *P. pachypolus M. tenuis* respectively) were missed due to their extreme scarcity.

Two of the current wells suggest this may be so. First, in North Eumeralla-1, Wilschut (1974) records an interval 1244ft (379.2m)-1552ft (473.0m) without *P. pachypolus* (therefore apparently middle *diversus* Zone) above an interval 1636ft (498.7m)-1771ft (539.8m) with *P. pachypolus* and so clearly upper *diversus* Zone. Second, in Eumeralla-1, 767.8-770.8m(cutts) is assigned to the middle *diversus* Zone on the absence of *P. pachypolus*, which is present as caving in the late Cretaceous sample beneath (813.3-816.6m). In this case, however, *P. pachypolus* could be caved from the *asperus* Zone.

On the other hand, Najaba-1 shows an obvious upper *diversus* Zone showing frequent *P. pachypolus* (7%) with *M. tenuis*, and *P. pachypolus* caving downhole beneath this point. This suggests *P. pachypolus* can be consistent to frequent and therefore that its absence is real and indicates a hiatus.

Any geological feedback (seismic or detailed log correlation) on the validity and extent of a hiatus at the Nirranda/Dilwyn boundary would be useful to evaluate the palynology.

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SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
1	--- MICROPLANKTON CONTENT (%) ---
2	ACACIAPOLLENITES
98	ACHOMOSPHAERA ALCICORNU
99	ACHOMOSPHAERA RAMULIFERA
3	AEQUITRIRADITES SPINULOSUS
100	ALISOCYSTA ORNATA
101	ALTERBIA ACUTULA
4	AMOSOPOLLIS CRUCIFORMIS
102	APECTODINIUM HOMOMORPHUM (l.sp)
103	APECTODINIUM HOMOMORPHUM (sh.sp
104	APTEODINIUM AUSTRALIENSE
5	ARAUCARIACITES AUSTRALIS
105	AREOLIGERA SENONENSIS
106	AREOSPHAERIDIUM ARCUATUM
107	AREOSPHAERIDIUM CAPRICORNUM
6	AUSTRALOPOLLIS OBSCURUS
7	BALMEIOPSIS HOLODICTYUS
8	BANKSIEACIDITES ARCUATUS
9	BANKSIEACIDITES ELONGATUS
10	BEAUPREAIDITES VERRUCOSUS
177	BOTRYOCOCCUS
11	CAMEROZONOSPORITES OHAIENSIS
108	CASSIDIUM FRAGILE
12	CERATOSPORITES EQUALIS
13	CICATRICOSISPORITES AUSTRALIENSIS
14	CINGUTRILETES CLAVUS
109	CIRCULODINIUM DEFLANDREI
15	CLAVIFERA TRIPLEX
110	CLEISTOSPHAERIDIUM SPP
16	COPTOSPORA PARADOXA
111	CORDOSPHAERIDIUM INODES
17	COROLLINA TOROSUS
112	CORONIFERA OCEANICA
18	CRYBELOSPORITES STRIATUS
19	CUPANIEIDITES ORTHOTEICHUS
20	CYATHEACIDITES ANNULATUS
21	CYATHIDITES GIGANTIS
22	CYATHIDITES SP
23	CYCADOPITES FOLLICULARIS
113	CYCLOPSIELLA VIETA
114	CYMATIOSPHAERA
24	DACRYCARPITES AUSTRALIENSIS
115	DEFLANDREA HETEROPHLYCTA
116	DEFLANDREA PACHYCEROS (sh. h).
117	DEFLANDREA SPECIOSUS
118	DEFLANDREA TRUNCATA
25	DILWYNITES GRANULATUS
119	DYPHES COLLIGERUM
120	EOCLADOPYXIS PENICULATA
26	ERICIPITES SCABRATUS
27	FALCISPORITES SIMILIS
121	FIBROCYSTA BIPOLARE
122	FIBROCYSTA SP
28	FORAMINISPORIS WONTHAGGIENSIS
29	GAMBIERINA EDWARDSII
30	GAMBIERINA RUDATA
123	GLAPHYROCYSTA DIVARICATUM
124	GLAPHYROCYSTA RETIINTEXTA
31	GLEICHENIIDITES CIRCINIDITES
125	HAFNIASPHAERA SEPTATA
126	HAFNIASPHAERA SP
32	HALORAGACIDITES HARRISII
127	HEMICYSTODINIUM ZOHARYI
33	HERKOSPORITES ELLIOTTII
128	HETEROSPHAERIDIUM SP
129	HETTEROSPHAERIDIUM CF LAEROBRACHIUS
130	HOMOTRYBLIUM TASMANIENSE
131	HYSTRICHKOLPOMA EISENACKII
132	HYSTRICHOKOLPOMA RIGAUDAE
133	HYSTRICHOSPHAERIDIUM TUBIFERUM
134	IMPAGIDINIUM SP
135	IMPAGIDINIUM VICTORIANUM
136	IMPLETOSPHAERIDIUM SP
34	INTRATRIPOROPOLLENITES NOTABILIS
137	ISABELIDINIUM PELLUCIDUM
138	KENLEYIA PACHYCERATA
139	KISSELOVIA COLEOTHRYPTA
140	KISSELOVIA THOMPSONAE
35	LAEVIGATOSPORITES OVATUS
36	LEPTOLEPIDITES MAJOR
141	LINGULODINIUM MACHAEROPHORUM
37	LYCOPDIACIDITES ASPERATUS
38	LYGISTEPOLLENITES BALMEI
39	LYGISTEPOLLENITES FLORINII
40	MALVACIPOLLIS DIVERSUS
41	MALVACIPOLLIS SUBTILIS
142	MANUMIELLA CONORATUM
143	MANUMIELLA DRUGGII
144	MICHRYSTRIDIUM
42	MICROCACHRYIDITES ANTARCTICUS
43	MILFORDIA HYPOLAENOIDES

37	LYCOPDIACIDITES ASPERATUS
38	LYGISTEPOLLENITES BALMEI
39	LYGISTEPOLLENITES FLORINII
40	MALVACIPOLLIS DIVERSUS
41	MALVACIPOLLIS SUBTILIS
142	MANUMIELLA CONORATUM
143	MANUMIELLA DRUGGII
144	MICHRYSTRIDIUM
42	MICROCACHRYIDITES ANTARCTICUS
43	MILFORDIA HYPOLAENOIDES
145	MILLIOUDODINIUM TENUITABULATUM
146	MUDERONGIA MCWHAEI
147	MURATODINIUM FIMBRIATUM
148	MURATODINIUM SP
44	MYRTACEIDITES PARVUS/MESONESUS
45	MYRTACEIDITES TENUIS
46	MYRTACEIDITES VERRUCOSUS
149	NEMATOSPHAEROPSIS BALCOMBIANA
47	NOTHOFAGIDITES ASPERUS
48	NOTHOFAGIDITES BRACHYSPINULOSUS
49	NOTHOFAGIDITES DEMINUTUS
50	NOTHOFAGIDITES EMARCIDUS/HETERUS
51	NOTHOFAGIDITES ENDURUS
52	NOTHOFAGIDITES FALCATA
53	NOTHOFAGIDITES FLEMINGII
54	NOTHOFAGIDITES SENECTUS
150	ODONTOCHITINA CRIBROPODA
151	ODONTOCHITINA INDISTINCTA
152	ODONTOCHITINA OPERCULATA
153	ODONTOCHITINA TRIANGULARIS
154	OLIGOSPHAERIDIUM COMPLEX
155	OPERCULODINIUM CENTROCARPUM
55	ORNAMENTIFERA SENTOSA
56	OSMUNDACIDITES WELLMANII
156	PALAEOPERIDINIUM PYROPHORUM
157	PALAEOSTOMOCYSTIS RETICULATA
158	PARALECANIELLA INDENTATA
159	PENTADINIUM LATICINCTUM
57	PERIPOROPOLLENITES DEMARCATUS
58	PERIPOROPOLLENITES POLYORATUS
59	PERIPOROPOLLENITES VESICUS
60	PHYLLOCLADIDITES MAWSONII
61	PHYLLOCLADIDITES VERRUCOSUS
62	PODOSPORITES MICROSACCATUS
63	POLYCOLPITES ESOBALTEUS
160	POLYSPHAERIDIUM PSEUDOCOLLIGERUM
64	PROTEACIDITES ANNULARIS
65	PROTEACIDITES BUN GRANDIS
66	PROTEACIDITES CLARUS
67	PROTEACIDITES CRASSUS
68	PROTEACIDITES GRANDIS
69	PROTEACIDITES INCURVATUS
70	PROTEACIDITES KOPIENSIS
71	PROTEACIDITES NASUS
72	PROTEACIDITES ORNATUS
73	PROTEACIDITES PACHYPOLUS
74	PROTEACIDITES PALISADUS
75	PROTEACIDITES RECTOMARGINIS
76	PROTEACIDITES SCABORATUS
77	PROTEACIDITES SP
78	PROTEACIDITES TUBERCULIFORMIS
79	QUADRAPLANUS BROSSUS
80	RETITRILETES AUSTROCLAVATIDITES
161	SAMLANDIA SPP
162	SPINIDINIUM
163	SPINIDINIUM BALMEI
164	SPINIFERITES RAMOSUS
81	SPINIZONOCOLPITES PROMINATUS
82	STEREISPORITES (TRIPUNCTISPORIS) PUNCTATUS
83	STEREISPORITES ANTIQUISPORITES
84	STEREISPORITES REGIUM
165	SYSTEMATOPHORA PLACACANTHA
166	TANYOSPHAERIDIUM SALPINX
167	TECTATODINIUM SPP
85	TETRACOLPORITES VERRUCOSUS
168	THALASSIPHORA PELAGICA
169	TRICHODINIUM CF INTERMEDIUM
170	TRICHODINIUM SP
86	TRICOLPITES
87	TRICOLPITES GILLII
88	TRICOLPITES LONGUS
89	TRICOLPITES PHILLIPSII
90	TRICOLPORITES
91	TRICOLPORITES LILLIEI
92	TRILETES TUBERCULIFORMIS
93	TRIPOROLETES RETICULATUS
94	TRIPOROPOLLENITES AMBIGUUS
95	TRIPOROPOLLENITES SECTILIS
171	TRITHYRODINIUM EVITTII
172	TRITHYRODINIUM GLABRA
173	TRITHYRODINIUM SPP
174	TURBIOSPHAERA GALATEA
175	TURBIOSPHAERA SP
96	VERRUCOSISPORITES KOPUKUENSIS
97	VITREISPORITES PALLIDUS
176	XENIKOON AUSTRALIS

	177 BOTRYOCOCCUS	
CODRINGTON-1	.	CODRINGTON-1
0417.4 CUTTS	4	0417.4 CUTTS
0469.2 CUTTS	11	0469.2 CUTTS
0481.4 CUTTS	4	0481.4 CUTTS
0663.9-70 CUT	5	0663.9-70 CUT
0688.6 CUTTS	14	0688.6 CUTTS
EUMERALLA-1	.	EUMERALLA-1
0767.8-770.8C	5	0767.8-770.8C
0813.5-816.6C	4	0813.5-816.6C
GREENSLOPES-1	.	GREENSLOPES-1
0390-400 CUTT	5	0390-400 CUTT
0450-60 CUTTS	X	0450-60 CUTTS
KILLARA-1	.	KILLARA-1
0444 CUTTS	1	0444 CUTTS
NAJABA-1A	.	NAJABA-1A
0320 CUTTS	13	0320 CUTTS
0400 CUTTS	9	0400 CUTTS
0690 CUTTS	24	0690 CUTTS
0785 CUTTS	36	0785 CUTTS
0900 CUTTS	14	0900 CUTTS
1100 CUTTS	12	1100 CUTTS
1400 CUTTS	21	1400 CUTTS
1460 CUTTS	5	1460 CUTTS
NTH EUMERALLA	.	NTH EUMERALLA
0374.7-377.8C	4	0374.7-377.8C
0767.8-0770.8	X	0767.8-0770.8
PRETTY HILL-1	.	PRETTY HILL-1
0390.6-396.7C	7	0390.6-396.7C
0588-91 CUTTS	3	0588-91 CUTTS
SHAW-1	.	SHAW-1
0280 CUTTS	1	0280 CUTTS
0325 CUTTS	1	0325 CUTTS

	155 OPERCULODINIUM CENTROCARPUM	156 PALAEOPERIDINIUM PYROPHORUM	157 PALAEOSTOMOCYSTIS RETICULATA	158 PARALECANIELLA INDENTATA	159 PENTADINIUM LATICINCTUM	160 POLYSPHAERIDIUM PSEUDOCOLLIGERUM	161 SAMLANDIA SPP	162 SPINIDINIUM	163 SPINIDINIUM BALMEI	164 SPINIFERITES RAMOSUS	165 SYSTEMATOPHORA PLACACANTHA
CODRINGTON-1	.	.	.	.	.	.	.	.	.	.	.
0417.4 CUTTS	3	.	.	.	.	.	.	.	.	23	3
0469.2 CUTTS	2	.	.	2	.	.	.	.	.	19	2
0481.4 CUTTS	2	.	.	.	.	.	.	.	.	21	1
0663.9-70 CUT	.	.	.	.	.	.	.	.	.	.	.
0688.6 CUTTS	X	.	.	.	.	.	.	.	.	5	X
EUMERALLA-1	.	.	.	.	.	.	.	.	.	.	.
0767.8-770.8C	.	.	.	X	.	.	.	.	.	3	.
0813.5-816.6C	.	.	.	1	.	1	X	1	.	.	.
GREENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.
0390-400 CUTT	.	.	.	.	.	.	.	X	.	1	.
0450-60 CUTTS	.	.	.	.	.	.	.	.	X	3	.
KILLARA-1	.	.	.	.	.	.	.	.	.	.	.
0444 CUTTS	1	X	.	2	.	.	.	.	.	3	.
NAJABA-1A	.	.	.	.	.	.	.	.	.	.	.
0320 CUTTS	1	.	.	.	.	.	.	.	.	.	.
0400 CUTTS	.	.	.	.	.	.	.	.	.	X	.
0690 CUTTS	.	.	.	.	.	.	.	.	.	X	X
0785 CUTTS	X	.	.	.	.	.	.	.	.	1	.
0900 CUTTS	.	.	.	1	.	.	.	.	.	1	.
1100 CUTTS	.	.	.	.	.	.	.	.	.	2	.
1400 CUTTS	1	.	.	.	.	.	.	.	.	X	.
1460 CUTTS	.	X	X	5	.	.	.	.	.	4	.
NTH EUMERALLA	.	.	.	.	.	.	.	.	.	.	.
0374.7-377.8C	.	.	.	.	X	.	.	.	.	X	.
0767.8-0770.8	.	.	.	.	.	.	.	.	.	.	.
PRETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.
0390.6-396.7C	.	.	.	X	.	.	.	.	.	X	?
0588-91 CUTTS	.	.	.	2	.	.	.	.	.	X	.
SHAW-1	.	.	.	.	.	.	.	.	.	.	.
0280 CUTTS	3	.	.	.	2	.	.	.	.	10	1
0325 CUTTS	1	.	.	.	X	.	.	.	.	8	2

	166 TANYOSPHAERIDIUM SALPINX	167 TECTATODINIUM SPP	168 THALASSIPHORA PELAGICA	169 TRICHODINIUM CF INTERMEDIUM	170 TRICHODINIUM SP	171 TRITHYRODINIUM EVITTII	172 TRITHYRODINIUM GLABRA	173 TRITHYRODINIUM SPP	174 TURBIOSPHAERA GALATEA	175 TURBIOSPHAERA SP	176 XENIKOON AUSTRALIS
CODRINGTON-1	.	.	.	.	.	.	.	.	.	.	.
0417.4 CUTTS	.	.	.	.	.	.	.	.	.	.	.
0469.2 CUTTS	.	X	X	X	.	.	.	.	.	.	.
0481.4 CUTTS	.	.	1	.	X	.	.	.	.	.	.
0663.9-70 CUT	.	.	.	.	.	.	.	.	.	.	.
0688.6 CUTTS	.	.	.	.	.	.	.	.	.	.	.
EUMERALLA-1	.	.	.	.	.	.	.	.	.	.	.
0767.8-770.8C	.	.	1	.	.	.	.	.	.	.	.
0813.5-816.6C	.	.	X	.	.	.	.	.	.	.	X
GREENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.
0390-400 CUTT	1	.	.	.	.	.	X	.	.	.	.
0450-60 CUTTS	.	X	.	.	.	.	.	.	.	.	.
KILLARA-1	.	.	.	.	.	.	.	.	.	.	.
0444 CUTTS	.	X	.	.	.	.	.	X	X	.	X
NAJABA-1A	.	.	.	.	.	.	.	.	.	.	.
0320 CUTTS	.	.	.	.	.	.	.	.	.	.	.
0400 CUTTS	.	.	.	.	.	.	.	.	.	.	.
0690 CUTTS	.	.	X	.	.	.	.	.	.	.	.
0785 CUTTS	.	.	.	.	.	.	.	.	.	.	.
0900 CUTTS	.	.	.	.	.	.	.	.	.	.	.
1100 CUTTS	.	.	X	.	.	.	.	.	.	.	.
1400 CUTTS	.	.	.	.	.	.	.	.	.	.	.
1460 CUTTS	.	.	.	.	.	?	.	.	.	X	.
NTH EUMERALLA	.	.	.	.	.	.	.	.	.	.	.
0374.7-377.8C	.	.	.	.	.	.	.	.	.	.	.
0767.8-0770.8	.	.	.	.	.	.	.	.	.	.	.
PRETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.
0390.6-396.7C	.	.	.	.	.	.	.	.	.	.	.
0588-91 CUTTS	.	.	.	.	.	.	.	.	.	.	.
SHAW-1	.	.	.	.	.	.	.	.	.	.	.
0280 CUTTS	.	5	.	.	.	.	.	.	.	.	.
0325 CUTTS	.	.	X	.	.	.	.	.	.	.	.

	133 HYSTRICHOSPHAERIDIUM TUBIFERUM	134 IMPAGIDINIUM SP	135 IMPAGIDINIUM VICTORIANUM	136 IMPLETOSPHAERIDIUM SP	137 ISABELIDINIUM PELLUCIDUM	138 KENLEYIA PACHYCERATA	139 KISSELOVIA COLEOTHRYPTA	140 KISSELOVIA THOMPSONAE	141 LINGULODINIUM MACHAEROPHORUM	142 MANUMIELLA CONORATUM	143 MANUMIELLA DRUGGII	144 MICHRYSTRIDIUM	145 MILLIOUDODINIUM TENUITABULATUM	146 MUDERONGIA MCWHAEI	147 MURATODINIUM FIMBRIATUM	148 MURATODINIUM SP	149 NEMATOSPHAEROPSIS BALCOMBIANA	150 ODONTOCHITINA CRIBROPODA	151 ODONTOCHITINA INDISTINCTA	152 ODONTOCHITINA OPERCULATA	153 ODONTOCHITINA TRIANGULARIS	154 OLIGOSPHAERIDIUM COMPLEX
)DRINGTON-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117.4 CUTTS	X	X	.	.	.	.	.	.	1	.	.	4	1	.	.	.	.	.	.	.	.	.
169.2 CUTTS	1	.	.	X	.	.	.	.	X	.	.	X	1	.	.	.	.	.	.	.	.	.
181.4 CUTTS	.	.	.	.	.	.	.	.	.	.	.	2	X	.	.	.	X	.	.	.	.	.
563.9-70 CUT	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.
588.6 CUTTS	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.
IMERALLA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
'67.8-770.8C	.	.	.	X	.	.	.	.	X	.	.	3	1	.	.	.	.	.	.	.	.	.
313.5-816.6C	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IEENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
190-400 CUTT	.	.	.	.	.	.	.	.	X	.	X	6	.	.	.	.	.	X	X	.	X	.
:50-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	X	.	X
:LLARA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
:44 CUTTS	.	.	.	X	.	.	.	.	.	X	X	7	1	.	.	.	.	.	.	.	.	.
·JABA-1A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
120 CUTTS	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
:00 CUTTS	.	.	.	.	.	.	.	X	.	.	.	1	.	.	.	.	.	.	.	.	.	.
590 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
'85 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
'00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.
:00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	1	2	.	4	X	.	.	.	.	.	.
:60 CUTTS	X	.	.	.	.	X	.	.	.	.	X	2	X	.	2	.	.	.	.	.	.	.
'H EUMERALLA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
:74.7-377.8C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
'67.8-0770.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
:ETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
:90.6-396.7C	.	.	.	.	.	.	.	.	.	.	.	1	.	X	.	.	.	.	.	.	.	.
·88-91 CUTTS	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.
!AW-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.80 CUTTS	.	.	.	X	.	.	.	.	2	.	.	.	X	.	.	.	.	.	.	.	.	.
:25 CUTTS	.	.	X	.	.	.	.	.	1	.	.	2	2	.	.	.	.	.	.	.	.	.

	111 CORDOSPHAERIDIUM INODES	112 CORONIFERA OCEANICA	113 CYCLOPSIELLA VIETA	114 CYMATIOSPHAERA	115 DEFLANDREA HETEROPHLYCTA	116 DEFLANDREA PACHYCEROS (sh. h'.	117 DEFLANDREA SPECIOSUS	118 DEFLANDREA TRUNCATA	119 DYPHES COLLIGERUM	120 EOCLADOPYXIS PENICULATA	121 FIBROCYSTA BIPOLARE	122 FIBROCYSTA SP	123 GLAPHYROCYSTA DIVARICATUM	124 GLAPHYROCYSTA RETIINTEXTA	125 HAFNIASPHAERA SEPTATA	126 HAFNIASPHAERA SP	127 HEMICYSTODINIUM ZOHARYI	128 HETEROSPHAERIDIUM SP	129 HETEROSPHAERIDIUM CF LAEROBRACHII	130 HOMOTRYBLIUM TASMANIENSE	131 HYSTRICHOKOLPOMA EISENACKII	132 HYSTRICHOKOLPOMA RIGAUDAE
CODRINGTON-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0417.4 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.
0460.2 CUTTS	X	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	X	2	.
0481.4 CUTTS	X	.	4	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X	.
0663.9-70 CUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0688.6 CUTTS	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
EUMERALLA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0767.8-770.8C	X	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	1
0813.5-816.6C	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.
GREENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0390-400 CUTT	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0450-60 CUTTS	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KILLARA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0444 CUTTS	.	.	.	.	.	1	X	X	.	.	X	.	2	.	.	.	.	.	.	.	X	.
NAJABA-1A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0320 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
0400 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0690 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0785 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0900 CUTTS	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1100 CUTTS	X	.	.	.	.	X	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.
1400 CUTTS	X	.	.	.	.	X	.	.	.	.	.	X	.	1	X	X	.	.	.	.	.	.
1460 CUTTS	2	.	.	.	.	X	1	.	.	.	.	1	X	2	X	1	.	.	.	.	.	.
NTH EUMERALLA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0374.7-377.8C	.	.	.	1	.	.	.	.	X	.	.	X	.	.	.	.	.	.	.	.	.	.
0767.8-0770.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PRETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0390.6-396.7C	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0588-91 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SHAW-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0280 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	3	.
0325 CUTTS	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	X

No.	Species	CODRINGTON-1	0417.4 CUTTS	0469.2 CUTTS	0481.4 CUTTS	0663.9-70 CUT	0688.6 CUTTS	EUMERALLA-1	0767.8-770.8C	0813.5-816.6C	GREENSLOPES-1	0390-400 CUTT	0450-60 CUTTS	KILLARA-1	0144 CUTTS	MAJABA-1A	0320 CUTTS	040C CUTTS	0690 CUTTS	0785 CUTTS	0900 CUTTS	1100 CUTTS	1400 CUTTS	1460 CUTTS	NTH EUMERALLA	0374.7-377.8C	0767.8-0770.8	PRETTY HILL-1	0390.6-396.7C	0588-91 CUTTS	SHAW-1	0280 CUTTS	0325 CUTTS
89	TRICOLPITES PHILLIPSII	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	X	.	.	.	.	.	.	.	.	.
90	TRICOLPORITES	.	.	X	.	3	3	.	.	1	.	.	.	.	.	.	.	2	1	4	1	2	1	3	.	4	.	.	2	2	.	.	X
91	TRICOLPORITES LILLIEI	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	TRILETES TUBERCULIFORMIS	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	1	.	1	.	2	.	.	.	.	.	.	1
93	TRIPOROLETES RETICULATUS	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	TRIPOROPOLLENITES AMBIGUUS	.	.	X	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
95	TRIPOROPOLLENITES SECTILIS	.	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	VERRUCOSISPORITES KOPUKUENSIS	.	X	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	1	.	.	.	1	.	.	.	.	.	.	.
97	VITREISPORITES PALLIDUS	.	.	.	1	.	.	.	1	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	ACHOMOSPHAERA ALCICORNU	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	X	.	.	.	.	.	X	.
99	ACHOMOSPHAERA RAMULIFERA	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
100	ALISOCYSTA ORNATA	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X
101	ALTERBIA ACUTULA	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	APECTODINIUM HOMOMORPHUM (l.sp)	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	X	[illegible]	.	.	.	.	.	.	.	.	.
103	APECTODINIUM HOMOMORPHUM (sh.sp)	.	.	.	3	.	.	.	.	X	.	.	.	.	1	.	.	.	.	.	.	3	X	[illegible]	.	.	.	.	.	.	.	.	.
104	APTEODINIUM AUSTRALIENSE	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
105	AREOLIGERA SENONENSIS	.	.	X	.	.	.	.	.	X	.	X	1	.	14	.	.	.	.	.	.	.	1	X	.	1	.	.	.	.	.	.	.
106	AREOSPHAERIDIUM ARCUATUM	.	.	.	1	.	.	.	X	.	.	.	X	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
107	AREOSPHAERIDIUM CAPRICORNUM	.	.	.	X	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	CASSIDIUM FRAGILE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	[illegible]	.	X	.	.	.	.	.	.	.
109	CIRCULODINIUM DEFLANDREI	.	.	X	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	CLEISTOSPHAERIDIUM SPP	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.

	67 PROTEACIDITES CRASSUS	68 PROTEACIDITES GRANDIS	69 PROTEACIDITES INCURVATUS	70 PROTEACIDITES KOPIENSIS	71 PROTEACIDITES NASUS	72 PROTEACIDITES ORNATUS	73 PROTEACIDITES PACHYPOLUS	74 PROTEACIDITES PALISADUS	75 PROTEACIDITES RECTOMARGINIS	76 PROTEACIDITES SCABORATUS	77 PROTEACIDITES SP	78 PROTEACIDITES TUBERCULIFORMIS	79 QUADRAPLANUS BROSSUS	80 PETITRILETES AUSTROCLAVATIDITES	81 SPINIZONOCOLPITES PROMINATUS	82 STEREISPORITES (TRIPUNCTISPORIS) PUN	83 STEREISPORITES ANTIQUISPORITES	84 STEREISPORITES REGIUM	85 TETRACOLPORITES VERRUCOSUS	86 TRICOLPITES	87 TRICOLPITES GILLII	88 TRICOLPITES LONGUS
CODRINGTON-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0417.4 CUTTS	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
0469.2 CUTTS	.	X	.	X	.	X	.	.	.	.	6	X	.	2	X	X	X	.	.	X	.	.
0481.4 CUTTS	.	.	X	.	.	.	.	.	.	.	4	X	.	1	1	.	1	.	.	.	.	.
0663.9-70 CUT	.	1	1	.	X	X	.	.	.	1	16	X	.	.	.	.	1	.	.	1	1	.
0688.6 CUTTS	.	1	X	.	.	.	.	.	.	.	9	.	.	.	.	.	1	.	.	1	.	.
EUMERALLA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0767.8-770.8C	.	1	X	1	X	1	.	.	.	.	13	.	.	.	.	.	.	.	.	.	1	.
0813.5-816.6C	.	.	.	.	.	.	X	.	.	.	17	.	.	2	.	.	2	.	.	1	.	?
GREENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0390-400 CUTT	.	.	1	.	.	.	.	X	.	.	23	.	X	.	.	1	5	.	.	.	3	2
0450-60 CUTTS	.	.	.	.	.	.	.	.	.	.	4	.	.	3	.	.	3	1	.	.	.	.
KILLARA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0444 CUTTS	1	.	.	.	.	.	X	.	.	.	10	.	.	2	.	2	2	1	X	.	2	1
NAJABA-1A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0320 CUTTS	.	X	.	1	X	X	7	.	.	[illegible]	17	.	.	1	X	.	2	.	.	.	.	.
0400 CUTTS	.	.	.	.	.	X	X	.	.	.	10	X	.	1	1	.	1	.	.	1	.	.
0690 CUTTS	.	.	X	.	.	.	.	.	.	1	8	X	.	.	X	.	X	.	.	1	.	.
0785 CUTTS	.	.	.	.	.	.	X	.	.	.	6	.	.	.	.	.	1	.	.	2	.	.
0900 CUTTS	.	X	.	?	.	.	.	.	.	.	7	.	.	.	.	.	1	.	.	1	X	.
1100 CUTTS	.	1	1	X	1	X	?	.	.	1	5	X	.	.	2	X	1	.	.	1	X	.
1400 CUTTS	.	X	X	X	.	.	X	.	.	.	5	.	.	1	X	.	3	.	.	.	.	.
1460 CUTTS	.	.	.	.	.	.	1	.	.	1	7	.	.	.	.	X	3	.	.	1	1	.
NTH EUMERALLA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0374.7-377.8C	.	X	X	.	X	X	.	.	.	X	3	X	.	.	.	.	.	.	.	3	.	.
0767.8-0770.8	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.
PRETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0390.6-396.7C	.	X	X	X	X	X	.	.	.	.	8	X	.	2	.	X	1	.	.	2	X	.
0588-91 CUTTS	.	.	.	.	.	.	.	.	.	.	17	.	.	.	.	.	.	.	.	2	.	.
SHAW-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0280 CUTTS	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1	.	.	.	.	.
0325 CUTTS	.	.	1	.	.	.	.	.	X	X	4	.	.	1	.	X	X	.	.	X	.	.

	45 MYRTACEIDITES TENUIS	46 MYRTACEIDITES VERRUCOSUS	47 NOTHOFAGIDITES ASPERUS	48 NOTHOFAGIDITES BRACHYSPINULOSUS	49 NOTHOFAGIDITES DEMINUTUS	50 NOTHOFAGIDITES EMARCIDUS/HETERUS	51 NOTHOFAGIDITES ENDURUS	52 NOTHOFAGIDITES FALCATA	53 NOTHOFAGIDITES FLEMINGII	54 NOTHOFAGIDITES SENECTUS	55 ORNAMENTIFERA SENTOSA	56 OSMUNDACIDITES WELLMANII	57 PERIPOROPOLLENITES DEMARCATUS	58 PERIPOROPOLLENITES POLYORATUS	59 PERIPOROPOLLENITES VESICUS	60 PHYLLOCLADIDITES MAWSONII	61 PHYLLOCLADIDITES VERRUCOSUS	62 PODOSPORITES MICROSACCATUS	63 POLYCOLPITES ESOBALTEUS	64 PROTEACIDITES ANNULARIS	65 PROTEACIDITES BUN GRANDIS	66 PROTEACIDITES CLARUS
ODRINGTON-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
417.4 CUTTS	.	.	.	4	2	22	.	2	.	.	.	.	.	.	.	3	.	.	.	.	.	.
469.2 CUTTS	.	.	.	.	1	4	.	.	1	.	.	1	X	.	.	.	.	2	.	X	.	.
481.4 CUTTS	.	.	.	.	1	5	.	.	.	.	.	.	1	.	.	1	.	3	.	1	X	.
563.9-70 CUT	.	.	.	1	.	3	.	.	X	.	.	.	.	2	1	1	.	X	.	2	.	.
588 6 CUTTS	.	.	.	.	.	3	.	.	1	.	.	.	1	3	1	2	.	[illegible]	.	X	.	.
UMERALLA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
767.8-770.8C	.	.	.	1	1	15	.	4	X	.	.	.	.	X	X	1	.	5	.	.	.	.
813.5-816.6C	.	.	.	1	2	6	.	.	.	X	.	.	.	1	X	1	.	6	.	.	.	.
REENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
390-400 CUTT	.	.	.	.	.	2	1	.	.	.	.	.	.	X	.	2	1	8	.	.	.	.
450-60 CUTTS	.	.	.	.	.	4	.	.	.	.	.	4	.	.	.	3	.	7	.	.	.	.
ILLARA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
444 CUTTS	.	.	X	.	.	2	.	1	.	.	X	.	.	1	.	.	.	3	.	.	.	.
AJABA-1A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
320 CUTTS	X	.	.	.	.	2	.	.	.	.	.	.	2	.	.	.	.	1	.	1	.	.
400 CUTTS	.	.	.	.	3	4	.	.	.	.	.	.	1	.	.	1	.	2	.	X	.	.
590 CUTTS	.	.	.	1	.	1	.	.	.	.	.	.	3	.	1	1	.	2	.	.	.	.
785 CUTTS	.	.	.	X	.	4	.	.	1	.	.	.	3	.	.	.	.	1	.	.	.	.
900 CUTTS	.	.	.	X	.	1	.	.	.	.	.	1	1	6	.	.	.	6	.	.	.	.
100 CUTTS	.	.	.	X	.	X	.	.	.	.	.	.	3	1	.	.	.	2	.	X	.	.
400 CUTTS	.	.	.	.	.	1	.	.	.	.	.	2	.	X	.	1	.	1	.	.	.	.
460 CUTTS	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	1	.	.	.	.
H EUMERALLA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
374.7-377.8C	.	X	.	2	4	33	.	7	1	.	.	.	1	X	.	1	.	3	.	X	.	.
767.8-0770.8	.	.	.	X	.	X	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.
RETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
390.6-396.7C	?	.	.	X		2	.	.	1	.	.	.	2	3	X	.	.	2	.	X	X	X
588-91 CUTTS	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	3	.	3	X	X	.	.
IAW-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
280 CUTTS	.	.	1	4	2	24	.	7	.	.	.	.	.	.	.	1	.	1	.	1	.	.
325 CUTTS	.	.	X	2	7	28	.	7	.	.	.	.	.	.	.	X	.	1	.	X	.	.

	23 CYCHOOPITES FOLLICULARIS	24 DACRYCARPITES AUSTRALIENSIS	25 DILWYNITES GRANULATUS	26 ERICIPITES SCABRATUS	27 FALCISPORITES SIMILIS	28 FORAMINISPORIS WONTHAGGIENSIS	29 GAMBIERINA EDWARDSII	30 GAMBIERINA RUDATA	31 GLEICHENIIDITES CIRCINIDITES	32 HALORAGACIDITES HARRISII	33 HERKOSPORITES ELLIOTTII	34 INTRATRIPOROPOLLENITES NOTABILIS	35 LAEVIGATOSPORITES OVATUS	36 LEPTOLEPIDITES MAJOR	37 LYCOPODIACIDITES ASPERATUS	38 LYGISTEPOLLENITES BALMEI	39 LYGISTEPOLLENITES FLORINII	40 MALVACIPOLLIS DIVERSUS	41 MALVACIPOLLIS SUBTILIS	42 MICROCACHRYIDITES ANTARCTICUS	43 MILFORDIA HYPOLAENOIDES	44 MYRTACEIDITES PARVUS-MESONESUS
CODRINGTON-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0417.4 CUTTS	.	.	5	.	5	.	.	.	.	5	.	.	1	.	.	.	1	.	.	2	.	.
0469.2 CUTTS	.	.	4	X	X	.	.	.	.	15	.	.	.	.	.	.	1	2	8	1	.	.
0481.4 CUTTS	.	.	3	.	2	.	.	.	2	15	1	.	4	.	.	.	1	.	6	1	.	.
0663.9-70 CUT	.	1	11	2	10	.	.	.	5	7	X	X	1	.	.	X	2	1	4	1	.	.
0688.6 CUTTS	.	X	8	.	7	.	.	.	7	10	.	.	2	.	.	.	2	2	4	1	.	.
EUMERALLA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0767.8-770.8C	.	.	7	X	10	.	.	.	1	1	.	X	2	.	.	.	3	.	2	3	.	.
0813.5-816.6C	.	1	11	1	12	.	X	.	2	3	.	.	1	.	.	.	3	1	.	2	.	.
GREENSLOPES-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0390-400 CUTT	.	.	[illegible]	1	3	.	.	5	3	X	X	.	4	.	.	1	1	.	1	3	.	.
0450-60 CUTTS	.	.	1	.	20	X	.	1	3	X	1	.	.	.	.	.	.	.	.	7	.	.
KILLARA-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0444 CUTTS	.	.	2	1	13	.	.	X	2	2	2	.	1	.	1	X	1	.	.	1	.	.
NAJABA-1A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0320 CUTTS	.	.	3	2	2	.	.	.	.	22	.	X	3	.	.	.	3	1	8	3	.	X
0400 CUTTS	.	.	2	3	8	.	.	.	1	31	.	.	.	.	.	.	.	1	11	1	.	.
0690 CUTTS	.	.	3	7	9	.	.	.	1	21	.	X	7	.	.	.	1	1	1	1	.	.
0785 CUTTS	.	.	3	.	4	.	.	.	3	17	.	.	1	.	.	.	.	X	1	6	.	.
0900 CUTTS	.	.	8	3	10	.	.	.	4	14	.	1	3	.	.	.	.	1	2	6	.	.
1100 CUTTS	.	.	12	3	6	.	.	.	2	8	.	X	5	.	.	.	4	4	3	1	.	.
1400 CUTTS	.	.	5	3	4	.	.	.	3	5	.	.	1	.	.	.	.	10	3	2	.	.
1460 CUTTS	.	.	8	.	7	.	.	.	3	2	1	.	2	.	.	.	1	2	5	1	.	.
NTH EUMERALLA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0374.7-377.8C	.	X	4	X	4	.	.	.	.	6	.	X	4	.	.	.	3	.	X	1	.	.
0767.8-0770.8	.	.	X	.	X	.	.	.	X	X	.	.	X	.	.	.	.	.	.	X	.	.
PRETTY HILL-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0390.6-396.7C	.	.	13	4	15	.	.	.	.	5	1	X	1	.	.	.	2	5	4	.	.	.
0588-91 CUTTS	1	1	19	1	14	.	.	.	3	2	1	.	1	1	.	X	.	.	1	5	.	.
SHAW-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0280 CUTTS	.	1	2	.	6	.	.	.	1	15	.	.	.	.	.	.	3	.	X	.	.	.
0325 CUTTS	.	2	5	.	6	.	.	.	1	4	1	.	3	.	.	.	1	.	.	.	1	.

	1 MICROPLANKTON CONTENT (%)	2 ACHEIIIPOLLENITES	3 AEQUITRIRADITES SPINULOSUS	4 AMOSOPOLLIS CRUCIFORMIS	5 ARAUCARIACITES AUSTRALIS	6 AUSTRALOPOLLIS OBSCURUS	7 BALMEIOPSIS HOLODICTYUS	8 BANKSIEAEIDITES ARCUATUS	9 BANKSIEAEIDITES ELONGATUS	10 BEAUPREAIDITES VERRUCOSUS	11 CAMEROZONOSPORITES OHAIENSIS	12 CERATOSPORITES EQUALIS	13 CICATRICOSISPORITES AUSTRALIENSIS	14 CINGUTRILETES CLAVUS	15 CLAVIFERA TRIPLEX	16 COPTOSPORA PARADOXA	17 COROLLINA TOROSUS	18 CRYBELOSPORITES STRIATUS	19 CUPANIEIDITES ORTHOTEICHUS	20 CYATHEACIDITES ANNULATUS	21 CYATHIDITES GIGANTIS	22 CYATHIDITES SP
CODRINGTON-1																						
0417.4 CUTTS	37	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
0469.2 CUTTS	40	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	10
0481.4 CUTTS	33	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	.	.	4
0663.9-70 CUT	.0	.	.	.	1	2	.	.	X	X	.	.	.	.	1	.	.	.	2	.	.	8
0688.6 CUTTS	.5	.	.	.	X	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	5
EUMERALLA-1																						
0767.8-770.8C	.9	1	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	X	.	.	8
0813.5-816.6C	.3	.	.	.	.	2	.	.	.	.	.	X	X	.	X	.	.	.	X	.	.	1
GREENSLOPES-1																						
0390-400 CUTT	.8	.	.	1	2	2	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	5
0450-60 CUTTS	.5	.	X	X	2	.	X	.	.	.	.	1	X	1	.	X	3	X	.	.	.	2
KILLARA-1																						
0444 CUTTS	34	.	.	1	.	1	.	.	.	.	X	1	.	.	X	.	.	.	.	.	.	7
ʼAJABA-1A																						
0320 CUTTS	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
0400 CUTTS	.1	.	.	.	2	.	.	.	X	.	.	.	.	.	.	.	.	.	X	.	.	3
0690 CUTTS	.1	.	.	.	X	.	.	.	.	.	.	.	.	.	X	.	.	.	1	.	.	1
0785 CUTTS	.1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
0900 CUTTS	.9	.	.	.	2	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	5
1100 CUTTS	.5	.	.	.	1	.	.	X	.	.	.	.	.	.	1	.	.	.	1	.	.	8
1400 CUTTS	12	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	10
1460 CUTTS	25	.	.	3	3	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7
NTH EUMERALLA																						
0374.7-377.8C	.2	.	.	.	1	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	6
0767.8-0770.8	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X
PRETTY HILL-1																						
0390.6-396.7C	.2	.	.	.	2	.	.	.	X	.	.	.	1	.	2	.	.	.	3	.	.	8
0588-91 CUTTS	.4	.	.	.	1	1	.	.	.	.	.	.	.	.	3	.	1	.	.	.	.	5
SHAW-1																						
0280 CUTTS	26	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
0325 CUTTS	17	.	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	X	.	5