THE PETROLEUM GEOLOGY OF THE OTWAY BASIN

A NON-EXCLUSIVE STUDY

APPENDIX 1: PALYNOLOGY

by

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OTWAY BASIN OIL DRILLING:

A SELECTIVE PALYNOLOGY REVIEW

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CONTENTS

I SUMMARY

A. The existing zonation is generally good, with the Aptian-Neocomian being the most difficult. Minor modification of zonal criterea has been required there, to improve reliability. In the Late Cretaceous, both dinoflagellate and spore-pollen based zonations can be used.

B. Data quality is generally excellent to good and provides a good regional time framework. The breakdowns herein are internally consistent and based on the latest criterea, and so differ in some respect from pre-existing breakdowns. This highlights the need for systematic palynological review before new geological synthesis and basin study is attempted. Otherwise, confident well to seismic ties are not possible.

Thirteen wells are interpreted from pre-existing reports. Of these, two (Eumeralla-1 and Pretty Hill-1) require substantial restudy, as raw data is not available. One (Pt. Campbell-4 requires substantial restudy, as the existing data is poor. Two (North Eumeralla-1 and Garvoc-1) require minor restudy to clarify the age of the top Pretty Hill sands. Four (Mussel-1, Pecten-1 Prawn-1 and Voluta-1) require restudy of the latest Cretaceous - Lower Tertiary to increase precision, as they predate substantial taxonomic work. Two (Greenbanks-1 and Najaba-1) require restudy of the Otway Group due to their broad sample spacing and patchy fossil recovery, and partial restudy of the Sherbrook Group due to broad sample spacing.

Eleven wells were recently restudied by me for Ultramar Australia and have been rechecked herein. One (Burrungule-1) could benefit from restudy of cuttings in the Late Cretaceous to fill in a data blank.

Four wells have been restudied herein. Due to pressure of time, some minor resampling of lean intervals has not been possible, and minor extra work on Caroline-1, Casterton-1 and Flaxmans-1 would increase precision.

C. The Late Jurassic is seen only in Casteron-1 where it comprises poorly sorted sandstones and shales. The Neocomian commonly comprises partly brackish clean quartz sandstones of the Pretty Hill Formation of excellent reservoir quality. The unconformable base of the formation onlaps basement and is diachronous from well to well. The Aptian to Albian Eumeralla Formation unconformably overlies this and is dominantly siltstones and shales often with two coaly intervals (one in the early Aptian lower C. hughesi Zone and the second in the early Albian C. striatus Zone). Pretty Hill sandstones occur in some wells at the base of the Aptian lower C. hughesi Zone, and so are time equivalents of the basal Eumeralla elsewhere. These are probably reworked from the underlying Pretty Hill Formation which therefore shows a dichronous top, although the angular seismic unconformity is probably always at the Neocomian/Aptian boundary. A marine pulse in seen in the late Aptian of Lucindale-1 (presumably a a spillover from the Murray Basin) and brackish conditions occur intermittently towards the top of the Albian. Unconformities occur at the top of the C. striatus Zone and at the top of the Albian, removing considerable section in some wells.

The Late Cretaceous shows strong wedging from thick nearshore marine sediments (in the present offshore area) to very thin condensed marginal marine sediments (in the present inland onshore area). Superimposed on this shoreward trend is a deepening, then shallowing, in time, resulting in marginal marine to brackish environments overlain by nearshore marine, then by marginal marine to non-marine environments. The lithological boundaries are therefore strongly diachronous with basal clean reservoir sands (Waare Sandstone) overlain by a mixed sand/shale sequence (Flaxmans Formation), marine shale (Belfast Formation), a second mixed sequence (Paratte Formation) and finally clean sandstones again (Timboon Sandstone).

The Lower Tertiary has not been extensively sampled, but appears to consists of a thin or absent Paleocene sand (Pebble Point Formation) and a thicker but incomplete Early Eocene marginal marine to non-marine shale sequence (Dilwyn Formation).

II INTRODUCTION

This report comprises the palynological framework to a large geological study on the Otway Basin by Phillip Connard. The report is intended as an information package and geological introduction to the Otway Basin for companies interested in the round of acreage licensing planned in January 1987.

Wells were chosen by their geological relevance and the availability of range charts or processed residues. Many have been the subject of recent review by me for Ultramar Australia, who operate Otway Basin acreage in South Australia.

Where possible, range charts were obtained and interpreted to produce the breakdowns. This data suffers from several limitations, including operator error and inconsistency (caused by different operators with different levels of experience working at different times). The only test of the validity of the data is to see if it is internally consistent and consistent with modern knowledge. Thus, although this data is quick to interpret, its accuracy can be difficult to assess. Some of the older Victorian wells were first studied 20 years ago, and substantial new taxonomy, particularly in the Late Cretaceous and Tertiary, has been published since. This data is thus probably the weakest.

III ZONATION

A. TERTIARY

Two main spore pollen zonations exist for the Tertiary of South-Eastern Australia. Harris(1971) developed a zonation baed primarily on the Otway Basin. Stover and Partridge(1973) and Partridge(1976) developed a scheme based on the Gippsland and Bass Basins. The two are largely compatible due to the high degree of microfloral uniformity along the southern margin of Australia. I prefer to use the latter scheme, even in the Otway Basin, as it is based on events of more regional significance, and so permits more confident correlation between basins.

The zonation was developed in the thick equences of the Gippsland Basin. In Otway Basin wells, this sequence is thin and of minor interest. There are thus few samples available, and the recorded sequences are incomplete. Sampling in most cases has been directed to locate the Tertiary/Cretaceous boundary, which often lies within a continuously sandy sequence.

No comprehensive dinoflagellate zonal scheme has been published for the Tertiary. Partridge(1976) published a set of zone names, but the zones were not described or defined. Harris (1985) published a sequence of four zones, but these only cover the mid Early Eocene to Early Oligocene. As very few dinoflagellates were seen in the present study, these samples are not assigned to either of these schemes, but their existence is mentioned for completeness.

B. CRETACEOUS

The available spore-pollen zonation is most recently and best summarised in Helby, Morgan and Partridge (1987). This draws on the earlier work of Dettman (1963), Evans (1966) and Dettmann and Douglas (1976) for the Early Cretaceous and Dettmann and Playford (1969), Stover and Evans (1973) and Stover and Partridge (1973) for the Late Cretaceous.

In the Early Cretaceous, the scheme of Dettmann and Douglas(1976) provides a finer subdivision for the Otway Basin than does Helby et al (in prep.), which describes a zonation for a wider geographic area. However, it has proven difficult to use the Dettmann and Douglas(1976) subdivisions as defined, due to scarcity of some key forms, and ranges which appear to be different. Minor modification has therefore been necessary. In particular

1. The top of the lower *C.hughesi* Zone (= top middle *C. hughesi* Zone of Dettmann and Douglas) is taken herein on the youngest occurrence of *Cooksonites variabilis* in place of the oldest occurrence of *Foraminisporis asymmetricus* which is too sporadic in occurrence. This moves the boundary very slightly younger.

2. The top of the *F. wonthaggiensis* Zone (= lower *C. hughesi* Zone of Dettmann and Douglas) is taken herein on the oldest occurrence of *Pilosisporites notensis* instead of the oldest occurrence of *Triporoletes reticulatus*, which is sporadic in occurrence. The boundary does not move significantly, as the oldest occurrences of *T.reticulatus* and *P.notensis*, and the youngest occurrence of *Murospora florida*, are all coincident.

3. The top of the upper C. australiensis Zone (= C.stylosus Zone of Dettmann and Douglas) is taken herein on the oldest occurrence of Dictyotosporites speciosus instead of the youngest occurrence of Crybelosporites stylosus which is too sporadic and also inclined to reworking. This moves the boundary very slightly older.

4. Pilosisporites grandis has a significant range overlap with Phimopollenites pannosus herein (in contrast to the range shown in Dettmann and Douglas(1976)) and therefore cannot be used to identify the pannosus/paradoxa boundary.

These changes do not significantly alter the sense or usage of the existing zonation, but they are slightly different.

In the Late Cretaceous onshore, the sequnce is thin and sandprone. The lack of suitable lithologies in a condensed sequence makes it impossible to detect the zones represented, and results in very incomplete data. Sampling of cuttings has proved intermittently useful, as Tertiary caving tends to swamp the "in situ" assemblage. Good sidewall programmes are clearly needed in the future to clarify the onshore late Cretaceous.

A dinocyst zonal scheme exists for the Late Cretaceous marine sections, and is most recently summarized by Helby et al (in prep.). This scheme draws most heavily on the work of Evans(1966). However, since most of the section is only marginally marine, the key species are often very rare and intermittent in occurrence. It is thus rare that the full zonal scheme can be recognised in any one section.

Correlations based on these zones are thus apt to be diachronus, and the spore-pollen zones, although offering lower resolution, are probably more reliable time lines. Dinocysts are almost always absent from the Early Cretaceous, with rare spiny acritarchs the only indication of marine influence. The early Cretaceous dinocyst zones of Helby et al (1987) can thus not be recognised.

C. ERRORS

Within the zonation, some boundaries are more distinctive than others, and are thus picked with higher confidence. These are shown with a double asterisk on the list below. Where one of these boundaries is picked with an Excellent (=0 or 4) or Good (=1) confidence rating, the boundary should be considered firm, to within one, or possibly two samples. The sense of likely error is discussed below.

Lower confidence boundaries are shown by a single asterisk. Where these boundaries have high confidence ratings, the seismic should not cross-cut more than two to possibly three samples without the conflict being resolved by new samples.

The arrows show the sense of likely error, or the direction in which a boundary can more easily be moved. Those boundaries marked with an upright arrow are picked on youngest occurrences, or extinctions. Their true location in the well is thus as picked, or shallower in the well. If they must be moved, it is easier to go shallower, and unlikely that they might be deeper. Those boundaries with arrows pointing down are those picked substantially on oldest occurences, or inceptions. They are thus likely to be as picked, or deeper in the well. If these boundaries must be moved, it is easier to go deeper, and less likely that they might be shallower.

1. Spore- pollen Zones

top upper <u>asperus</u> (= base <u>tuberculatus</u>)	* ↓
top middle <u>asperus</u>	* ↑
top lower <u>asperus</u>	* ↓
top <u>asperopolus</u>	** ↓
top upper <u>diversus</u>	* ↓
top middle <u>diversus</u>	* ↓
top lower <u>diversus</u>	* ↓
top upper <u>balmei</u>	** ↑
top lower <u>balmei</u>	* ↓
top <u>longus</u>	** ↑
top <u>lillei</u>	** ↓
top <u>senectus</u>	** ↓
top upper <u>pachyexinus</u>	* ↓
top lower <u>pachyexinus</u>	* ↓
top <u>triplex</u>	* ↓
top <u>distocarinatus</u>	** ↓
top <u>pannosus</u>	* ↑
top upper <u>paradoxa</u>	* ↓
top lower <u>paradoxa</u>	* ↓
top <u>striatus</u>	* ↓
top upper <u>hughesi</u>	** ↓
top lower <u>hughesi</u>	* ↑
top <u>wonthaggiensis</u>	** ↓
top upper <u>australiensis</u>	** ↓
top lower <u>australiensis</u> to <u>watherooensis</u>	* ↓
base <u>watherooensis</u>	* ↓

2. Dinoflagellate Zones.

Due to their facies controlled nature, these zone boundaries are often only approximate, and all are less accurate than the spore-pollen ones. They therefore have no asterisks.

top *druggii* ↑
base *druggii* ↓
top *korojonense* ↑
top *australis* ↑
top *aceras* ↓
top *cretaceum* ↓
top *porifera* ↓
top *striatoconus* ↓
top *infusorioides* ↓
base *infusorioides* ↓

older dinoflagellate zones have not yet been recorded from the Otway Basin.

D. CONFIDENCE RATINGS

Confidence ratings are given to all boundaries according to a modified Esso scheme as below.

0 : Core or swc, *Good to Excellent Confidence*, diverse assemblage with frequent and consistent zone species of spore and pollen and/or dinoflagellates.

1 : Core or swc, *Fair Confidence*, limited assemblage with zone species which may be rare or inconsistent.

2 : Core or swc, Poor Confidence, assemblage with non-diagnostic spores and pollen. Boundary is usually defined by diagnostic species in an adjacent sample.

3 : Cuttings, Fair Confidence, oldest occurrences diagnostic of zone but reliability low because of possility of contamination by cavings.

4 (top range) : Cuttings, Good to Excellent Confidence, assemblage with youngest occurrences diagnostic of zone. Reliability high unless reworked (as with core or swc)

? : No Confidence, data is internally inconsistent, and the problem cannot be resolved. The depths given are a "best guess".

IV WELLS STUDIED

These wells are arranged alphabetically for easy retrieval, and in a new page per well format, for easy copying and insertion into well files.

A. ARGONAUT-1 (new study of 70 new Esso preparations in Morgan 1985a)

1. 1715 ft. (swc)-2310 ft. (cutts) (2113 ft. CORE) : lower to middle M. diversus Zone at the top on the absence of younger indicators and at the base on oldest common Malvacipollis diversus, Proteacidites grandis and rare P. incurvatus without older indicators. Subdivision of the interval is not possible as the key species (Triporopollenites ambiguus, Bankseidites arcuatus) occur in cuttings and may be partly caved. Myrtaceidites tenuis in cuttings at 1900 ft. is considered caved. Marginally marine to non-marine environments on the absence or rare presence of dinoflagellates, and the dominance of plant cuticle.

2. 2360 ft. (swc) : indeterminate due to very low yield

3. 2640 ft. (swc)-2668 ft. (CORE) : T. longus Zone at the top on youngest Tricolpites confessus and at the base on oldest common Gambierina rudata and rare Nothofagidites, supported at 2640 ft. by oldest Tripunctisporis. Permian reworking is common. Non-marine to marginal marine environments are indicated by absent or very rare dinoflagellates, and abundant cuticle and spores and pollen.

4. 2907 ft. (swc) : T. lillei Zone at the top on youngest Tricolpites sabulosus, common Nothofagidites and at the base on oldest common Nothofagidites. Non-marine

environments are indicated by the abundant spores and pollen, and absent dinoflagellates.

5. 3225 ft. (swc)-4292 ft. (swc) : upper N. senectus Zone at the top on the absence of younger indicators and at the base on oldest Tricolpites sabulosus, Gambierina rudata and Nothofagidites senectus. The sample at 3225 ft. (swc) is apparently contaminated with Early Eocene M. diversus taxa and Triporopollenites sectilis (T. lillei - T. longus restricted). The sample might have been assigned to the T. lillei Zone but for the dinoflagellates. The interval is assigned to the X. australis Dinoflagellate Zone at the top on youngest Xenikoon australis and Nelsoniella aceras, and at the base on oldest X. australis. Very nearshore environments are indicated by the rare low diversity dinoflagellates amongst abundant and diverse spores and pollen

6. 4301 ft. (CORE)-8758 ft. (swc) : upper T. pachyexinus Zone at the top on the absence of younger indicators, and at the base on oldest Tricolpites confessus. Youngest common Amosopollis cruciformis occurs at 8526 ft. (swc) confirming the assignment. Two Dinoflagellate Zones can be recognized. The interval 4301 ft. (CORE) to 5145 ft. (swc) is assigned to the N. aceras Dinoflagellate Zone at the top on the absence of younger indicators, and at the base on oldest Nelsoniella aceras. The interval 5320 ft. (swc) to 5867 ft. is assigned to the I. cretaceum Dinoflagellate Zone at the base on oldest Isabelidinium cretaceum. Nearshore marine environments are indicated in the N. aceras Zone by common moderately diverse dinoflagellates. Marginal marine environments are indicated in the rest of the section by rare low diversity dinoflagellates.

7. 8958 ft. (swc)-10,505 ft. (CORE) : lower T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites pachyexinus. Age diagnostic dinoflagellates are rare but include youngest Conosphaeridium striatoconus at 8958 ft. (swc) indicating penetration of the O. porifera Dinoflagellate Zone. Nearshore marine environments are indicated by common relatively diverse dinoflagellates.

8. 10,600 ft. (swc)-12,148 ft. (CORE) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. The interval 11,100 ft. (swc) to 11,322 ft. (CORE) is assigned to the C. striatoconus Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest Conosphaeridium tubulosum. The interval 12,135 ft. (CORE) to 12,148 ft. (CORE) is assigned to the P. infusorioides Dinoflagellate Zone at the top and base on common Palaeohystrichophera infusorioides. Marginal marine to nearshore marine environments are indicated by the low to moderate content of low to moderate diversity dinoflagellates.

9. No further work is required on this well.

B. BANYULA-1 (existing completion report plus new examination of the 40 old preparations and 22 new preparations in Morgan 1985h)

1. 566.5m (swc) : lower M. diversus Zone at the top on the absence of younger indicators and at the base on oldest Malvacipollis diversus and Cupaneidites orthoteichus without older indicators. Non-marine environments on the absence of microplankton.

2. 640m (swc)-653m (swc) : L. balmei Zone at the top on youngest Phyllocladities reticulosaccatus and Lygistepollenites balmei without younger indicators, and at the base on the absence of older indicators. Marginally marine environments on the presence of rare dinoflagellates.

3. T. longus to P. pannosus Zones : not seen

   The Maastrichtian to latest Albian Zones have not been recognized, but their time interval may be represented by the unfavourable sandy lithologies.

4. 819.5m (swc) : Indeterminate Cretaceous due to a very low yield, but a generally Cretaceous aspect.

5. 900m (cutts)-920m (cutts) : P. pannosus Zone at the top on youngest Coptospora paradoxa and Pilosisporites grandis and at the base on oldest Phimopollenites pannosus. Brackish on the presence of rare spiny acritarchs.

6. 1000m (cutts)-1305m (cutts) : upper C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Pilosisporites grandis. Non-marine except

at the top (1000-20m, cutts) on the usual absence of microplankton, but presence of rare spiny acritarchs at 1000-20m. P. grandis is seen caved in cuttings samples beneath this interval.

7. 1350m (cutts)-1535m (cutts) : lower C. paradoxa Zone at the top on youngest Dictyotosporites speciosus at 1350 (cutts) (supported by the toprange of Coptospora striata at 1400-05m (cutts)) at at the base by oldest Coptospora paradoxa at 1530-35m (cutts). As oldest occurrence is picked from cuttings, it may be slightly low. The only sidewall core in this interval (1486m) and the one beneath (1560m) were too lean for the absence of C. paradoxa to be reliable. Environments are entirely non-marine, with abundant and diverse spores and pollen, and rare algal acritarchs of the genus Schizosporis.

8. 1567m (cutts)-1711m (cutts) (1600m swc) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest reliable Crybelosporites striatus. C. striatus does occur in cuttings beneath this point (as low as 1819-25m) but is considered to be caved. Its absence from the swc at 1737m, and the youngest Cyclosporites hughesi (at 1747m beneath) are taken to mark the top of the underlying zone. It is possible that the zone base is picked slightly too low, as it is taken on an oldest occurrence in cuttings in a section where caving has occurred. Its oldest occurrence in sidewall cores is at 1600m. Non-marine partly lacustrine environments on the abundant and diverse spores and pollen, and very scarce freshwater algae of the genera Botryococcus and Schizosporis.

9. 1737m (swc)-1753m (cutts) : upper C. hughesi Zone at the top on the absence of younger indicators confirmed by

youngest Cyclosporites hughesi at 1747m (cutts), and at the base by the absence of older indicators. Non-marine environments on the absence of dinoflagellates.

10. 1798m (swc)-1989m (swc) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis, Foraminisporis asymmetricus, Triporoletes reticulatus and probably also Cicatricosisporites australiensis (present only in cuttings beneath this point). Non-marine partly lacustrine environments on the abundant and diverse spores and pollen and presence of very occasional algal acritarchs.

11. 1996.13m (CORE)-2782m (cutts) : F. wonthaggiensis Zone at the top on the absence of younger indicators (confirmed by youngest Murospora florida at 1997.4m and at its base by oldest Dictyotosporites speciosus and the absence of older indicators. D. speciosus occurs consistently in sidewall cores down to 2679.0m, and in cuttings down to 2773-82m. The absence of the older indicators Crybelosporites stylosus and Aequitriradites hispidus suggest strongly that D. speciosus is in place at 2773-82m. Generally non-marine environments are indicated by the common and diverse spores and pollen and usually absence of microplankton. However, spiny Micrhystridium spp. at 2400.2m (core) and non-spiny Microfasta evansii at 2773-82m (cutts) suggest intermittent brackish conditions.

12. 2788.2m (CORE) : indeterminate as the assemblage is too lean.

C. BREAK SEA REEF-1 (92 samples reported by Morgan 1984)

1. 771m (swc)-1022m (swc) : upper M. diversus Zone at the top on the absence of younger indicators, and at the base on oldest Proteacidites pachypolus. Marginal marine to non-marine on the scarce to absent, very low diversity microplankton.

2. lower and middle M. diversus Zones and L. balmei Zone not seen, presumed absent by hiatus.

3. 1050m (swc)-1098m (swc) : T. longus Zone at the top on youngest Tricolpites confessus and T. longus and at the base on oldest T. longus and Proteaceadites angulatus. Common Gambierina and rare Nothofagidites confirm the assignment. Non-marine to marginal marine on the absence or very rare presence of dinoflagellates.

4. 1224m (swc)-1608m (swc) : T. lillei Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites lillei, Triporopollenites sectilis and common Nothofagidites senectus. Non-marine to marginal marine environments on largely absent to very scarce microplankton.

5. 1694.1m (cutts)-1788.1m cutts) : upper N. senectus Zone at the top on the absence of younger indicators and at the base on oldest Nothofagidites senectus, Tricolpites sabulosus and Gambierina rudata. The lower part of the zone is either absent due to unconformity, or condensed into the sample gap 1788.1m to 1863.1m. Marginal marine environments on the very low diversity, very scarce microplankton.

6. 1863.1m (swc)-2774m (swc) : upper *T. pachyexinus* Zone at the top on the absence of younger indicators and at the base on oldest *Tricolpites confessus* and *T. gillii*. Top common *Amosopollis cruciformis* at 2856m (swc) confirms the assignment. Several samples can be assigned to correlative Dinoflagellate Zones. The interval 2007m (swc) to 2053m (swc) is assigned to the *N. aceras* Zone at the top on youngest *Odontochitina porifera* and at the base on oldest *Nelsoniella aceras*. The interval 2245m (swc) to 2622m (swc) is assigned to the *I. cretaceum* Zone at the top on youngest *Amphidiadema denticulata* and at the base on oldest *Isabelidinium cretaceum*. The interval 2636m (swc) to 3120m (swc) (extending below this spore-pollen unit) is assigned to the *O. porifera* Zone at the top on the absence of younger indicators and at the base on oldest *Odontochitina porifera*. Nearshore to marginal marine on the rare low diversity dinoflagellates.

7. 2811.1m (swc)-3120m (swc) : lower *T. pachyexinus* Zone at the top on the absence of younger indicators (confirmed by top common *Amosopollis cruciformis*), and at the base on oldest *Tricolporites pachyexinus* and *Ornamentifera sentosa*. The *O. porifera* Dinoflagellate Zone occurs throughout, as discussed in 6 above. Offshore marine environments at the base (on common and moderately diverse microplankton) passing upward to nearshore and marginal marine environments, are indicated.

8. 3145m (swc)-4380m (cutts) : *C. triplex* Zone at the top on the absence of younger indicators and at the base on oldest *Clavifera triplex* and *Phyllocladidites mawsonii*. Environments are nearshore marine to marginal marine, generally becoming more shallow towards the top, on relatively common moderately diverse dinoflagellates at

the base, but becoming rare and of lower diversity toward the top.

9. 4410m (cutts)-4468m (cutts) : A. distocarinatus Zone at the top on the absence of younger indicators (confirmed by youngest Appendicisporites distocarinatus, and at the base by oldest A. distocarinatus without older indicators. The correlative P. infusorioides Dinoflagellate Zone is also identified, on youngest Cribroperidinium edwardsii, common Diconodinium pusillum and consistent P. infusorioides. Nearshore marine environments on moderate microplankton diversity.

D. BURRUNGULE-1 (11 new sample in Morgan 1985b)

1. 5396 ft. (swc) : mid T. pachyexinus Zone or older at the top on youngest Foraminisporis asymmetricus. The base is uncontrolled, as the assemblage is very lean. Marine environments are indicated by the presence of dinoflaellates.

2. 6524 ft. (swc)-6860 ft. (cutts) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii (cuttings at 6850-60 ft., sidewall cores at 6630 ft.). Nearshore marine environments on the rare but moderately diverse dinoflagellates.

3. 7073 ft. (swc) : probably C. triplex Zone on the absence of Appendicisporites distocarinatus in an assemblage dominated by Cicatricosisporites spp. Brackish marine environments on very rare spiny acritarchs (Micrhystridium).

4. 7454 ft. (swc)-7560 ft. (swc) : A. distocarinatus Zone at the top on youngest Appendicisporites distocarinatus without younger indicators and at the base on the absence of older indicators. Brackish marine on the scarce spiny acritarchs. Minor Triassic reworking was noted.

5. 7724 ft. (swc)-7827 ft. (swc) : P. pannosus Zone at the top on youngest Coptospora paradoxa and at the base on oldest Phimopollenites pannosus. Non-marine on the absence of dinoflagellates or acritarchs.

E. CAROLINE-1 (15 new samples plus 15 old SA Mine Dept. samples for this study)

1. 700-705 ft. (CORE) : P. asperopolus Zone at the top on youngest Myrtaceidites tenuis and Haloragacidites harrisii dominated microfloras and at the base on oldest Proteacidites asperopolus (700 ft.) and Kisselovia edwardsii (705 ft.). Marginal marine environments are indicated by the presence of very low diversity dinoflagellates, despite the high frequency of Cassidium fragile at 705 ft.

2. 2454 ft. (CORE)-2712 ft. (CORE) : middle M. diversus Zone at the top on the absence of younger indicators and youngest Tricolpites gillii (2580 ft., CORE), and at the base on oldest Banksieacidites elongatus, Proteacidites clarus and P. obesolabrus (2712 ft.) supported by oldest Proteacidites ornatus (2675 ft.), Polycolpites esobalteus and Triporopollenites ambiguus (2665 ft.). Non-marine to very marginally marine environments are indicated by the absence and very rare low diversity presence of dinoflagellates respectively, in these samples.

3. 3050 ft. (CORE) : probably L. balmei due to youngest Stereisporites regium without older indicators. The sample is inertinite dominated with common non-diagnostic dinoflagellates and very scarce mostly non-diagnostic pollen and spores. Nearshore marine environments are indicated by the common moderately diverse dinoflagellates. This marine incursion is usually seen in the Paleocene in the Pebble Point Formation or equivalent.

4. 3840-50 ft. (cutts) : T. lillei Zone at the top on the lack of younger indicators and at the base on oldest

Triporopollenites sectilis and Stereisporites regium. Other supporting species include oldest Nothofagidites senectus and Tricolpites sabulosus. As these taxa are all from cuttings, it is possible that this zone may be picked slightlytoo low due to caving. Slightly brackish environments are likely on a single dinoflagellate specimen considered to be in place.

5. 4095 ft. (CORE) : indeterminate due to the very few palynomorphs present in this old preparation.

6. 4105 ft. (CORE)-4660 ft. (cutts) : N. senectus Zone at the top on the absence of younger indicators, and at the base on oldest Nothofagidites senectus supported by oldest Tricolpites sabulosus. The interval base may be piced slightly too low, as it is taken on oldest occurrences in cuttings, which may be caved. The cuttings generally, however, show good agreement with the cores and so caving is considered to be minor. Rare dinoflagellates favour nearshore environments at the base (4650-60 ft.) shallowing to marginal marine at the top (4105-4330 ft.). Few dinoflagellates are age diagnostic, but the presence of Odontochitina cribropoda and Trithyrodinium "psilatum" indicate assignment to correlatives of the T. pachyexinus to N. senectus spore-pollen Zones.

7. 4970 ft. (cutts)-7700 ft. (CORE) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolpites confessus and certain dinoflagellates (7700 ft., core) supported by oldest T. gillii (7110 ft., cutts). Supporting events within the zone include oldest Tricolporites pachyexinus at 5440 ft. (cutts), oldest Latrobosporites ohaiensis (4970 ft. cutts) and a downhole influx of Amosopollis cruciformis

at 5440 ft. (cutts). Some minor downhole caving from the N. senectus Zone was seen at 5730 ft. (cutts) and 7110 ft. (cutts), but the lighter spore colour and its intermittent nature make it easy to detect. Age diagnostic dinoflagellates include oldest Trithyrodinium "psilatum" (down to 7700 ft.), indicating assignment to the Odontochitina porifera or younger Dinoflagellate Zones (correlative with the T. pachyexinus or younger Spore-Pollen Zone). Marginal marine to nearshore marine environments are indicated by the presence of low diversity dinoflagellates.

8. 7900 ft. (CORE)-8690 ft. (cutts) : C. triplex Zone at the top on the absence of younger indicators and at the base on the oldest Phyllocladidites mawsonii. Nearshore to marginal marine environments are indicated by the low content of low to moderate diversity dinoflagellates.

9. 9040 ft. (cutts)-9360 ft. (cutts) : A. distocarinatus Zone at the top on the absence of younger indicators (and coincident with youngest Appendicisporites distocarinatus) and at the base on oldest Amosopollis cruciformis. Key dinoflagellates include youngest consistent Cribroperidinium edwardsii at 9040 ft. (cutts) indicating the Palaeohystrichophora infusorioides Dinoflagellate Zone (correlative with the A. distocarinatus Zone). Marginal marine environments are indicated by the low content (5%) of dinoflagellates and their low diversity.

10. 9750 ft. (cutts)-11,052 ft. (CORE) : P. pannosus Zone at the top on the absence of younger indicators and downhole influx of C. striatus and at the base on oldest Phimopollenites pannosus and Appendicisporites distocarinatus. The zone top is not very clearly

defined, as some dinoflagellates (C. edwardsii, P. infusorioides) occur at 9750 ft., probably caved from higher in the well. The zone top could therefore be as low as 10,061 ft. (CORE). However, a palynofacies change occurs with inertinite and coarse cuticle dominating at 9750 ft. and below, in contrast to the fine cuticle and spore-pollen domination above. I thus favour assignment at 9750 ft. to the P. pannosus Zone although the usual zone fossil Coptospora paradoxa has not been seen in this well. Brackish environments are favoured by the presence of isolated dinoflagellates and spiny acritarchs (Micrhystridium, Cauca sp.) (Except at 11,052 ft., core) but these may be caved in all except the core at 10,061 ft. Lacustrine environments are favoured by the presence of non-spiny algal acritarchs (Schizosporis spp.).

11. The section is now fairly well controlled. However, the old core preparations are generally very poor and resampling of the cores (especially core 10 at 3050 ft., core 11 at 4095 ft., core 16 at 10,061 ft. and core 17 at 11,052 ft.) would be useful, but not essential.

F. CASTERTON-1 (17 new samples herein plus brief Evans 1966 work)

1. 2016-27 ft. (CORE) : C. striatus Zone at the top on youngest Cyclosporites hughesi supported by youngest Dictyotosporites speciosus and common Pilosisporites notensis, and at the base by oldest Crybelosporites striatus. Non-marine on the absence of dinoflagellates or acritarchs.

2. 2430 ft. (CORE)-3596 ft. (CORE) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis (supported by the absence of younger indicators) and at the base on oldest Pilosisporites notensis and Foraminisporis asymmetricus. Probably freshwater lacustrine on the presence of the non-spiny acritarch Microfasta evansii in all samples, common at 3596 ft. (CORE).

3. ?4908 ft. (CORE)-5968 ft. (CORE) : F. wonthaggiensis Zone at the top on the absence of younger indicators (including Cicatricosisporites australiensis) and at the base on oldest Dictyotosporites speciosus. The interval top is questionably located as assemblages from 4908-17 ft. and 5084 ft. (both core) are very lean. Non-marine (4908-17 ft. on lack of dinoflagellates or acritarchs), lacustrine (5084 ft. and 5958-68 ft. on rare algal acritarchs (Schizosporis)) to slightly brackish (5280 ft. on single dinoflagellate specimen) environments indicated.

4. 6406 ft. (CORE)-6769 ft. (CORE) : upper C. australiensis Zone at the top on the lack of younger indicators and at the base on oldest Cyclosporites hughesi. Non-marine (6406 ft.) to possibly lacustrine (6763-69 ft.) on absence and presence of algal acritarchs respectively.

5. 6853-59 ft. (CORE) : indeterminate on the lack of diagnostic fossils in a very lean assemblage.

6. 7253 ft. (CORE)-7957 ft. (CORE) : lower *C. australiensis* to *R. watherooensis* Zones at the top on the lack of younger indicators and at the base on oldest *Ceratosporites equalis* and *Microcachryidites antarcticus* (7947-57 ft., CORE) and *Retitriletes watherooensis* (7739-49 ft., CORE). The absence of *Cicatricosisporites* spp. suggests that the interval should be wholly assigned to the *R. watherooensis* Zone. However, regional experience has shown that *Cicatricosisporites* is very rare below the Aptian in the Otway Basin, and its absence from this level cannot be considered conclusive. Mostly non-marine on common cuticle and absence of microplankton, but partly slight brackish at 7253 ft. (CORE) on presence of single microforaminifera.

7. 8029-39 ft. (CORE) : indeterminate as sample is almost totally barren of recognisable palynomorphs. Logs indicate probably Palaeozoic basement.

8. Two problems exist with this section. First, several cores were either not sampled (core 3 at 3142-52 ft., core 6 at 4194 ft., core 7 at 4505 ft., core 9 at 4509 ft. and perhaps others) or proved very lean of palynomorphs (4908-17 ft., 5084 ft., 6853 ft.). Selected resampling and reprocessing is recommended. The second problem concerns reconciliation with the data of Evans (1966). In particular, Evans assigned section down to 3152 ft. to the C. striatus Zone, but I cannot duplicate that result and in fact see evidence for the C. hughesi Zone up to 2430 ft., as discussed in 2 above. Sampling of core 3 (3142-52 ft.) and repeat sampling of core 2 (2425 ft.) might totally resolve this conflict.

G. CHAMA-1 and 1A (39 old and 23 new reported in Morgan 1986)

1. 1235 ft. (swc) : lower N. asperus Zone at the top on the absence of younger indicators and at the base on the oldest dinoflagellates Deflandrea phosphoritica and Schematophora speciosa. Offshore marine on the common and diverse dinoflagellates.

2. P. asperopolus to N. senectus Zones not seen but at least part of the late Cretaceous is probably represented in the sandy sample gap.

3. 1654 ft. (swc)-1689 ft. (swc) : upper T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolpites confessus and T. gillii. Dinoflagellates are not particularly age diagnostic. Marginal marine on the rare low diversity dinoflagellates.

4. 1859 ft. (swc)-1950 ft. (swc) : lower T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites pachyexinus. Youngest common Amosopollis cruciformis occurs at 1950 ft. Marginal marine on scarce low diversity dinoflagellates.

5. 1960 ft. (swc)-2520 ft. (cutts) (2395 ft. swc) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Phyllocladidites mawsonii at 2420 ft. (cutts) (supported in swc by oldest Clavifera triplex at 2395 ft.). Nearshore marine on common but moderate diversity dinoflagellates.

6. A. distocarinatus Zone not seen, but could be present as

a thin interval in the sample gap.

7. 2600 ft. (cutts)-4760 ft. (cutts) : P. pannosus - upper C. paradoxa Zones at the top on youngest Coptospora paradoxa and at the base on oldest Pilosisporites grandis. Subdivision of the interval is not possible due to caving and lean swcs. Generally non-marine, but occasionally brackish at 3980-4070 ft. (cutts) on the usual absence, but occasional presence, of rare spiny acritarchs. Non-marine samples often have rare non-spiny acritarchs, suggesting lacustrine deposition.

8. 5607 ft. (swc)-5960 ft. (swc) : lower C. paradoxa - C. striatus Zones at the top on youngest Pilosisporites notensis (supported by youngest Coptospora striata at 5940-60 ft.) and at the base on oldest Coptospora paradoxa considered to be "in place". Non-marine on the absence of dinoflagellates or acritarchs.

9. 6100 ft. (cutts) (6350 ft. swc)-6700 ft. (cutts) (6350 ft. swc) : C. striatus Zone at the top on the absence of younger indicators considered to be "in place" and at the base on oldest Crybelosporites striatus without older indicators. Non-marine, partly lacustrine, on the presence of rare non-spiny acritarchs, and total absence of dinoflagellates or spiny acritarchs.

10. 6840 ft. (cutts)-?8700 ft. (cutts) (8037 ft. swc) : C. hughesi Zone at the top on youngest Cyclosporites hughesi and at the base on oldest Pilosisporites notensis considered to be "in place". P. notensis is present at 8037 ft. in swc, and absent from good swc assemblages from 8764 ft. and beneath. Extensive caving of younger zones has occurred. Mostly non-marine (partly lacustrine) but occasionally brackish environments are

indicated by the usual absence of microplankton, but rare presence of non-spiny acritarchs, spiny acritarchs, and even a single dinoflagellate.

11. 8764 ft. (swc)-9014 ft. (CORE) : F. wonthaggiensis Zone at the top on the absence of younger indicators and at the base on oldest Dictyotosporites speciosus. Non-marine environments, partly lacustrine towards the top, on the usual absence, but occasional presence, of non-spiny acritarchs, and the total absence of spiny acritarchs and dinoflagellates.

12. No further work is required, particularly in view of the heavy cuttings contamination at the base of the well.

H. CRAYFISH-1 (Data from 65 samples from Dettmann (1968c) plus 29 new samples in Morgan 1985c)

1. 1192 ft. (swc) : L. balmei Zone at the top on youngest Lygistepollenites balmei, Gambierina edwardsii and Phyllocladidites reticulosaccatus and at the base on oldest L. balmei without older indicators. Marginal marine environment on the low diversity dinoflagellates.

2. T. longus to N. senectus Zones : not seen and probably absent from the 47 foot sample gap.

3. 1239 ft. (swc)-1245 ft. (swc) : upper T. pachyexinus Zone at the top on the absence of younger indicators, and at the base on oldest Tricolpites gillii. The interval is also assigned to the correlative N. aceras Dinoflagellate Zone at the top on the absence of younger indicators, and at the base on oldest Nelsoniella aceras. Marginal marine on the low diversity dinoflagellates.

4. 1250 ft. (swc)-1305 ft. (swc) : lower T. pachyexinus Zone at the top on absent younger indicators and at the base on oldest Tricolporites pachyexinus. The interval is also assigned to the I. cretaceum Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest Isabelidinium oretaceum. Marginal marine environments on the low diversity dinoflagellates.

5. C. triplex Zone : not seen but may be present in the 168 ft. sample gap.

6. 1473 ft. (core)-1510 ft. (core) : A. distocarinatus Zone at the top on the absence of younger indicators and at the base on the absence of older indicators, in the

presence of Appendicisporites distocarinatus. Youngest Cribroperidinium edwardsii in this core indicates assignment to the correlative P. infusorioides Dinoflagellate Zone. Very marginal marine environments on scarce low diversity dinoflagellates.

7. 1510 ft. (cutts)-1700 ft. (cutts) : P. pannosus Zone at the top on youngest Coptospora paradoxa and at the base on oldest Phimopollenites pannosus. The base may be picked low as it depends on an oldest occurrence in cuttings, and may be caved. Non-marine environments are indicated by the lack of dinoflagellates or acritarchs.

8. 1710 ft. (cutts)-3165 ft. (swc) : upper C. paradoxa Zone at the top on youngest Pilosisporites grandis without younger indicators and at the base on oldest P. grandis. Mostly non-marine, partly lacustrine with rare brackish intervals are indicated on the usual absence of any microplankton, rare freshwater algae (Botryococus and Schizosporis) and very rare spiny acritarchs at 1786 ft. and 2773-95 ft.

9. 3297 ft. (core) : lower C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Coptospora paradoxa. Non-marine on the absence of acritarchs.

10. 3685 ft. (core)-4452 ft. (swc) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest Crybelosporites striatus. Non-marine on the absence of microplankton.

11. 4608 ft. (swc) : upper C. hughesi Zone at the top on the absence of younger indicators (confirmed by youngest Cyclosporites hughesi) and at the base on the absence of

older indicators. Non-marine on the absence of microplankton.

12. 4816 ft. (core)-5236 ft. (swc) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis and consistent Cicatricosisporites spp. Non-marine on the absence of microplankton.

13. 5276 ft. (swc)-5579 ft. (core) : indeterminate due to very poor yields from sandy lithologies.

14. 5588 ft. (core)-8780 ft. (swc) : F. wonthaggiensis Zone at the top on the absence of younger indicators (confirmed by youngest Murospora florida) and at the base on oldest Dictyotosporites speciosus. Non-marine to partly brackish environments on the usual absence but occasional presence of spiny and non-spiny acritarchs.

15. 9094 ft. (core)-10481 ft. (core) : upper C. australiensis Zone at the top on the absence of younger indicators (confirmed by youngest Crybelosporites stylosus) and at the base on oldest Cyclosporites hughesi. Non-marine to very rarely brackish on the absence of microplankton except very rare spiny acritarchs at 9094 feet.

16. 10483-10484 ft. (both cores) : probably upper C. australiensis Zone as yields were too poor to be diagnostic, but these assemblages are only 3 feet deeper than those above.

17. No new work is required. This well makes an excellent reference section for the Otway Group.

I. EUMERALLA-1 (Wilschut 1974 interpretation - no good data available)

1. 2835 ft. : T. pachyexinus Zone. In the absence of raw data, the assignment cannot be checked. However, Wilchut's interpretation of this interval in North Eumeralla-1 was not straightforward.

2. C. triplex and A. distocarinatus Zones not seen. These are likely to be absent or extremely condensed in the thin Late Cretaceous at this location.

3. 3311 ft. : T. pannosus Zone. From its stratigraphic position and zonal criterea, this interval is likely to be correctly identified.

4. 3800 ft.-5816 ft. : upper C. paradoxa Zone. This interval is likely to be correctly identified, from its stratigraphic position and defining criterea.

5. lower C. paradoxa Zone not seen, but probably present in the 200 ft. sample gap.

6. 6034 ft.-6720 ft. : C. striatus Zone. This interval is probably correctly identified, as its defining criterea are clear.

7. 7225 ft.-?9890 ft. : C. hughesi Zone. The zone top is probably reliable, but the zone base and subdivision criterea used herein are probably different to those used by Wilschut.

8. 10,300 ft. : F. wonthaggiensis Zone at the top on the absence of younger indicators (supported by youngest Murospora florida) and at the base on oldest Dictyotosporites speciosus and Foraminisporis

wonthaggiensis. This assignment is based on data from a single sample by Dettmann (1970).

9. The lower part of the section is poorly controlled due to the lack of raw data. The report of Dettmann (1963a) would provide raw data, but it is not available. Restudy of new samples is therefore recommended.

J. FLAXMANS-1 (6 new samples plus 31 new Esso samples plus Evans 1966 plus Dettmann and Playford 1969 plus Stacy 1981)

1. 4126-4983 ft. (CORE) : N. senectus Zone at the top on the absence of younger indicators and at the base on oldest Nothofagidites senectus, Gambierina rudata and Tricolpites sabulosus. Age significant dinoflagellates include Nelsoniella aceras and common Xenikoon australis, indicating assignment of the interval 4309 ft. (CORE) to 4983 ft. (CORE) to the X. australis Dinoflagellate Zone (correlative with the upper two thirds of the N. senectus Spore-pollen Zone). Nearshore marine environments are indicated by the high dinoflagellate content (50%) but low diversity (6 species).

2. 4987 ft. (CORE)-6381 ft. (CORE) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites pachyexinus (6381 ft. in Stacy 1981, 5961 ft. herein, 5970 ft. in Dettmann and Playford 1969). The interval 4987 ft.-5961 ft. is assigned to the upper subzone on oldest Tricolpites confessus and T. gillii. The sample at 6381 ft. is assigned to the lower subzone. Within the interval, oldest Latrobosporites ohaiensis (5543-46 ft., CORE) confirms the assignment. Age diagnostic dinoflagellates were seen and indicate assignment of 4987 ft. (CORE)-5336 ft. (CORE) to the N. aceras Dinoflagellate Zone at the top on youngest Heterosphaeridium "laterobrachius" and absence of younger indicators, and at the base on oldest Nelsoniella aceras. The interval 5360 ft. (CORE)-6381 ft. (CORE) is assigned to the I. cretaceum Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest Isabelidinium cretaceum (6381 ft. in Stacy 1981, 5961 ft. herein). The presence of Amphidiadema denticulata at 5531-39 ft. confirms the

assignment. These Dinoflagellate Zones are correlative with the T. pachyexinus Spore-Pollen Zone and so confirm the spore-pollen assignment. They differ from those of Evans (1966) and Stacy (1981) who appear to have been less taxonomically rigourous with Nelsoniella aceras. Nearshore marine environments are indicated by the presence of frequent (5%) to common (50%) but low diversity dinoflagellates.

3. 6385 ft. (CORE)-6877 ft. (CORE) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. Age diagnostic dinoflagellates include oldest Odontochitina cribropoda at 6385 ft. (CORE) (indicating assignment of 6385 ft. to the O. porifera Dinoflagellate Zone) and oldest Conosphaeridium striatoconus and Isabelidinium balmei at 6838 ft. (CORE) (indicating assignment of 6390 ft.-6838 ft. to the C. striatoconus Dinoflagellate Zone). These dinoflagellate assignments are consistent with the spore pollen ones. Very nearshore to marginal marine environments are indicated by the low dinoflagellate content and diversity.

4. 6871 ft. (CORE)-6903 ft. (CORE) : indeterminate due to very poor yields from the Esso preparations. Nearshore to marginal marine due to the presence of few low diversity dinoflagellates.

5. 6902 ft. (CORE)-7220 ft. (CORE) : A. distocarinatus Zone at the top on the absence of younger indicators and on dinoflagellate evidence and at the base on dinoflagellate evidence. Within the interval, Appendicisporites distocarinatus occurs at 6905 ft.-7212 ft., providing broad confirmation. Several of the Esso preparations are poor. Age diagnostic dinoflagellates include youngest

consistent Cribroperidinium edwardsii at 6902 ft. (CORE) and oldest C. edwardsii at 7220 ft. (CORE) indicating assignment to the P. infusorioides Dinoflagellate Zone (correlative with the A. distocarinatus Spore-Pollen Zone). Nearshore to marginal marine environments are indicated by the presence of few low to moderate diversity dinoflagellates.

6. 7651 ft. (CORE) : indeterminate as this Esso preparation is almost totally barren.

7. Not seen : P. pannosus Zone which may be present in the uncontrolled interval 7220 ft. to 8139 ft., or absent through hiatus.

8. 7212 ft. (CORE)-7978 ft. (CORE) : probably upper C. paradoxa on the conclusions of Evans (1966), without whose raw data the assignment cannot be checked. The Esso samples are few and very lean of palynomorphs.

9. 8139 ft. (CORE)-9129 ft. : upper C. paradoxa Zone at the top on the absence of younger indicators plus the downhole influx of Crybelosporites striatus and at the base on oldest Pilosisporites grandis. Non-marine to lacustrine on the absence of dinoflagellates and intermittent presence of non-spiny algal acritarchs (Schizosporis spp.).

10. 9499 ft. (CORE)-10,135 ft. (CORE) : probable upper C. paradoxa Zone. Evans (1966) assigned this interval to the upper C. paradoxa Zone but without his raw data, the assignment cannot be checked. The single new Esso preparation studied herein was virtually barren.

11. 10,490-10,502 ft. (CORE) : probable lower C. paradoxa

Zone. Evans (1966) assigned this single core to his Zone K2a, equivalent to the lower C. paradoxa Zone. Without his data, the assignment cannot be checked. The Esso slides do not extend down this far.

12. 10,807 ft. (CORE)-11,521 ft. (CORE) : probable C. striatus Zone. Evans (1966) assigned this interval to his Zone Kld, equivalent to the C. striatus Zone herein. Without his data, the assignment cannot be checked, but there is no reason to assume that he was wrong. The Esso slides do not extend down this far.

13. The Late Cretaceous cored section is well controlled and needs no further work. However, cuttings from above the cored section might identify missing latest Cretaceous spore-pollen zones, and confirm the log picked base Tertiary. Notably, the present spore-pollen assignments differ only in detail from those of Dettmann and Playford (1969), but do represent significant revisions. They also differ in some respects to those of Evans (1966), but this is probably due to more rigid taxonomy here, particularly in the Nelsoniella/Isabelidinium group. In the Early Cretaceous, the Esso preparations are quite poor and are scattered and so cores 29 (7648-7666 ft.) to 44 should be resampled and restudied to confirm or refute Evans (1966) conclusions.

K. GARVOC-1 (Dettman (1968b) report on 18 samples)

1. 3076 ft. (swc)-3262 ft. (swc) : Indeterminate due to very low yield.

2. 3334 ft. (swc) : lower C. paradoxa at the top on youngest Dictyotosporites speciosus (supported by youngest Pilosisporites notensis) and at the base on oldest Coptospora paradoxa. Non-marine lacustrine environments on non-spiny acritarchs.

3. C. striatus Zone not seen. It could be present in the 215 ft. sample gap but Dettmann and Douglas (P. 169) clearly state that it is absent from Garvoc-1. They may have new unpublished data to justify this statement, but the present data does not prove its absence by hiatus.

4. 3549 ft. (swc) : upper C. hughesi Zone at the top on youngest Cyclosporites hughesi without younger indicators, and at the base on the absence of older indicators. Non-marine with lacustrine influence on the rare non-spiny acritarchs.

5. 3642 ft. (swc)-4489 ft. (swc) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis. The single record of P. notensis at 4964 ft. is anomolous, and is considered caved, as discussed below. Mostly non-marine, partly lacustrine on the occasional presence of non-spiny acritarchs.

6. 4532 ft. (CORE)-4798 ft. (swc) : Indeterminate due to very low yields.

7. 4878 ft. (swc)-4964 ft. (swc) : probably F.

wonthaggiensis Zone at the top on the absence of younger indicators (supported by youngest Murospora florida) and at the base on oldest Dictyotosporites speciosus. If P. notensis at 4964 ft. (swc) is in place, this interval may belong to the lower C. hughesi Zone. Support for this might be the presence of consistent Cicatricosisporites australiensis. However, the presence of Murospora florida contradicts these data, and indicates the F. wonthaggiensis Zone. Either M. florida at 4878 ft. and 4964 ft. is reworked, or P. notensis at 4964 ft. is caved. All possibilities considered, the latter is more likely, but cannot be proved beyond doubt.

8. Further work is recommended to resolve two areas of uncertainty. Firstly, cuttings in the interval 3334 ft. to 3549 ft. might resolve uncertainty regarding the presence or absence of the C. striatus Zone, but only if the cuttings are not heavily contaminated. Secondly, examination of the original sidewall cores and some cuttings might help decide whether the P. notensis recorded from 4964 ft. is caved, or in place.

L. GELTWOOD BEACH-1 (Data on 39 mostly core samples of Morgan 1985i)

1. 1880-1900 ft. (cutts) : middle M. diversus Zone at the top on the lack of younger indicators and at the base on oldest Anacolosidites acutullus, and Proteacidites tuberculiformis. Rare Lygistepollenites balmei suggest the L. balmei Zone, but are considered reworked. Since this interval is composed entirely of cuttings, it might possibly be older (lower M. diversus or L. balmei) with heavy caving of the middle M. diversus Zone. Marginal marine on the rare (5%) dinoflagellates and their very low diversity.

2. lower M. diversus and L. balmei Zones not seen, but could be condensed in the 100 ft. sample gap.

3. 2000-15 ft. (CORE) : T. longus Zone at the top on youngest Tricolpites longus and T. confessus (supported by common Gambierina rudata and scarce Nothofagidites spp.) and at the base on oldest T. longus. Brackish marine on a single dinoflagellate amongst abundant and diverse spores and pollen.

4. 2290 ft. (cutts)-2340 ft. (CORE) : caved Tertiary. The cuttings at 2290-2300 ft. contain a middle M. diversus Zone assemblage (Proteacidites ornatus and Bankseidites elongatus without younger indicators) and a single Gambierina rudata (suggesting a L. balmei to N. senectus Zone assignment). In view of the overlying core data, the diversus assemblage is considered caved. The core at 2328-40 ft. is mostly drilling mud and cuttings fragments, and contains a P. asperopolus Zone assemblage (Myrtaceidites tenuis with Proteacidites asperopolus and the dinoflagellate Homotriblium tasmaniense) which is therefore considered caved.

5. T. lillei and N. senectus Zones not seen, but probably present in the effective sample gap 2015-2650 ft.

6. 2650 (CORE)-3332 (CORE) ft. : upper T. pachyexinus Zone at the top on the lack of younger indicators and at the base on oldest Tricolpites confessus and Tricolporites pachyexinus. Nearshore marine on the low numbers of low diversity dinoflagellates.

7. lower T. pachyexinus Zone not seen, but probably present in the 300 ft. sample gap.

8. 3632 ft. (CORE)-3720 ft. (cutts) (3647 ft. CORE) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Phyllocladidites mawsonii and Proteacidites spp. The interval base in core is firm, but the cuttings base may be too low if significant caving has occurred. Nearshore marine on the low (5%) content of low diversity dinoflagellates.

9. 3771 ft. (CORE)-3910 ft. (cutts) (3791 ft., CORE) : A. distocarinatus Zone on the presence of Appendicisporites distocarinatus without younger or older indicators. Dinoflagellates include Ascodinium parvum, A. serratum and Cribroperidinium edwardsii, all indicating assignment to the correlative Diconodinium multispinum Dinoflagellate Zone.

10. 4090 ft. (CORE)-4405 ft. (CORE) : P. pannosus Zone at the top on youngest Coptospora paradoxa and at the base on oldest Phimopollenites pannosus. Slightly brackish on very rare spiny acritarchs and common Botryococcus.

11. 4519 ft. (CORE)-6520 ft. (CORE) : upper C. paradoxa Zone at the top on the lack of younger indicators and at the base on oldest Pilosisporites grandis. Non-marine partly lacustrine on the absence of marine indicators and occasionally common freshwater Botryococcus.

12. 7030-40 ft. (CORE) : C. paradoxa Zone, subzone uncertain. The presence of Coptospora paradoxa clearly indicates the C. paradoxa Zone, but no subzone assignment is possible due to the absence of subzonal indicators. Non-marine on the absence of microplankton.

13. 7546-50 ft. (CORE) : probably lower C. paradoxa Zone at the top on youngest Dictyotosporites speciosus and at the base on oldest probably Coptospora paradoxa (single poorly preserved specimen). Common Triassic reworking seen. Brackish marine on rare spiny acritarchs.

14. 8046 ft. (CORE)-9369 ft. (CORE) : C. striatus Zone at the top on the absence of younger indicators, and at the base on oldest Crybelosporites striatus. Intermittent Cyclosporites hughesi is considered reworked. Non-marine partly lacustrine on rare Botryococcus and absent spiny acritarchs.

15. 9857 ft. (CORE)-10,326 ft. (CORE) : upper C. hughesi Zone at the top on the absence of younger indicators (supported by youngest consistent Cyclosporites hughesi) and at the base by the absence of older indicators. Non-marine partly lacustrine on rare Botryococcus and absence of spiny acritarchs.

16. 10781 ft. (CORE)-12,300 ft. (cutts) (11,741 ft., CORE) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis without older indicators.

17. The major data gap is in the Late Cretaceous T. lillei - N. senectus Zones interval, but limited cuttings sampling has shown high levels of downhole contamination and sandy lithologies. Further work can thus not be justified.

M. GREENBANKS-1 (data on 7 swcs by Archer 1983)

1. 290m (cutts)-380m (cutts) : lower-middle M. diversus Zones at the top on youngest Cyathidites gigantis and the absence of younger indicators and at the base on oldest Proteacidites grandis without older indicators. Brackish on the very rare low diversity dinoflagellates.

2. L. balmei Zone not seen, but could be present in the 74m sample gap

3. 454.0m (swc) : T. longus Zone at the top on youngest Tricolpites longus, T. waipawaensis, T. confessus, Tricolporites lillei and Triporopollenites sectilis, and at the base on oldest Quadraplanus brossus, Tripunctisporis punctatus and T. longus. The presence of T. punctatus indicates a point near the top of the zone. Marginal marine on the rare low diversity dinoflagellates.

4. 510-20m (cutts) : indeterminate due to the lack of a diverse assemblage.

5. T. lillei to A. distocarinatus Zones not seen, but may be present in the 115m data gap.

6. 569.0m (swc)-812.0m (swc) : C. paradoxa Zone (possibly all lower) at the top on youngest Dictyotosporites speciosus and at the base on oldest Coptospora paradoxa. However, the record of D. speciosus at 569.0m is a single record, not repeated in the other samples, and could be reworked. If in place, the interval should be assigned to the lower C. paradoxa Zone. If reworked, it should be assigned to the whole C. paradoxa Zone. Non-marine on the absence of dinoflagellates.

7. *C. striatus* Zone not seen, but may be present in the 343m sample gap.

8. 1155.0m (swc)-1195m (swc) : *C. hughesi* Zone at the top on yongest *Cyclosporites hughesi* without younger indicators and at the base on oldest *Pilosisporites notensis* and *Cicatricosisporites ludbrookiae* (supported by oldest *C. australiensis* at 1155.0m, swc). Non-marine on the absence of dinoflagellates.

9. 1207m (swc) : indeterminate on the lack of a diverse assemblage although the absence of younger markers may suggest assignment to the *F. wonthaggiensis* Zone. Non-marine on the absence of dinoflagellates.

10. Data quality is patchy. Restudy is recommended to

    (a) test for the seven missing zones in the gap 454-569m.

    (b) provide better zonal resolution in the Otway Groups (569-1207m) where too few low diversity assemblages have been studied.

N. KALANGADOO-1 (data on 11 core samples of Dettmann (1965) plus 21 new samples reported in Morgan 1985g).

1. 1600-10 ft. (cutts) : probably upper L. balmei Zone at the top on dominant Clavifera triplex and Dilwynites granulatus without younger indicators (weakly supported by youngest Tricolpites gillii) and at the base on oldest Proteacidites incurvatus, P. annularis and Malvacipollis subtilis. Non-marine environments on the lack of microplankton.

2. 1993-2008 ft. (CORE) : T. longus Zone at the top on youngest Tricolpites longus and T. sabulosus and at the base on oldest T. longus and scarcity of Nothofagidites. Marginal marine on rare dinoflagellates.

3. T. lillei to T. pachyexinus Zones : not seen but may be present in the 500 ft. sample gap in sandy lithologies.

4. 2503-13 ft. (CORE) : C. triplex zone at the top on the absence of younger indicators and at the base on oldest Phyllocladidites mawsonii and Clavifera triplex. Nearshore marine on the low dinoflagellate content and moderate diversity.

5. 2600 ft. (cutts)-3414 ft. (CORE) : P. pannosus zone at the top on youngest Coptospora paradoxa and Pilosisporites grandis and at the base on oldest Phimopollenites pannosus in core. P. pannosus occurs down to 3800-10 ft. in cuttings but is probably caved at that level. Non-marine partly lacustrine on the presence of non-spiny acritarchs only.

6. ?3600 ft. (cutts) (3917 ft. in CORE)-4363 ft. (CORE) : upper C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Pilosisporites grandis in core, and the absence of older indicators. Non-marine to occasionally brackish on the

usual absence of acritarchs but rare presence of spiny acritarchs.

7. 4480 ft. (cutts)-?4620 ft. (both cutts) : lower C. paradoxa Zone at the top on youngest Coptospora striata (supported by youngest Pilosisporites notensis and Dictyotosporites speciosus at 4610-20 ft., cutts) and at the base on oldest Coptospora paradoxa which occurs in cuttings at 4610-20 ft. and is absent from the core at 4771-76 ft. This may be picked slightly too low, as it relies on an oldest occurrence in cuttings. Non-marine on the total absence of acritarchs.

8. 4770-76 ft. (CORE) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest Crybelosporites striatus. Non-marine on the absence of microplankton.

9. 5288-95 ft. (CORE) : upper C. hughesi Zone at the top and base on the absence of younger or older indicators respectively. Non-marine lacustrine on the presence of non-spiny acritarchs.

10. 5634 ft. (CORE)-6134 ft. (CORE) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis, and the absence of older indicators. Non-marine lacustrine on the presence of non-spiny acritarchs only.

11. 6632 ft.-6642 ft. (CORE) : F. wonthaggiensis Zone at the top on the lack of younger indicators and at the base on oldest Dictyotosporites speciosus. I am unable to duplicate Dettmann's (1965) record of P. notensis in this basal core, despite repeated sampling. Non-marine lacustrine on the non-spiny acritarchs.

12. Upper C. australiensis Zone not seen. Since Kalangadoo-1 section enters basement at this point, the zone is thus

not present in the well section, indicating that deposition commenced later at this site than elsewhere.

13. No further work is required on this section.

O. LINDON-1 (8 old Beach samples plus 17 new preparations for this study)

1. 1206.8m (swc) : indeterminate Late Cretaceous due to very low yield but including late Cretaceous restricted Isabelidinium cooksoniae. Nearshore marine environments are indicated by the presence of common but low diversity dinoflagellates.

2. 1216.5m (swc)-1223.1m (swc) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Ornamentifera sentosa. Within the unit, oldest Tricolporites pachyexinus (1216.5m) and youngest common Amosopollis cruciformis (1223.1m) confirm the assignment. Dinoflagellates present include youngest Odontochitina cribropoda (1216.5m) and oldest Trithyrodinium "psilatum" (1223.1m) without younger elements indicating assignment to the O. porifera Dinoflagellate Zone (correlative with the T. pachyexinus Spore-Pollen Zone). The presence of Nelsoniella aceras caved into cuttings at 2980m indicates that the N. aceras Dinoflagellate Zone is probably present above this point, but not sampled. Nearshore to marginal marine environments are indicated by the rare low diversity dinoflagellates.

3. 1237.5m : indeterminate due to very poor yield in this old Beach preparation.

4. 1545.0m (swc)-1948.0m (swc) : upper C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Pilosisporites grandis. Oldest Perotriletes jubatus at 1545.0m (swc) confirms the assignment. Non-marine partly lacustrine environments are indicated by the absence of dinoflagellates (except obviously caved taxa) and intermittent presence of

non-spiny acritarchs (Schizosporis spp.).

5. 2010m (cutts)-2253.0m (swc) : lower C. paradoxa - C. striatus at the top on youngest Dictyotosporites speciosus (supported by youngest Pilosisporites notensis) and at the base by oldest Crybelosporites striatus in sidewall core. The base of the lower C. paradoxa Zone cannot be reliably picked in this interval as oldest Coptospora paradoxa is obviously caved in the cuttings available from this section. It must be above the swc at 2253.0m, as C. paradoxa was not seen there. Non-marine environments are indicated by the lack of dinoflagellates and lacustrine deposition is suggested by rare intermittent non-spiny acritarchs (Schizosporis spp.)

6. 2330m (cutts)-2400m (cutts) : C. striatus - upper C. hughesi Zones interval as the cuttings nature of the samples do not allow clear assignment. At the top, younger indicators are absent from the overlying swc and at the base, C. striatus occurs, but may be caved a short distance. Non-marine environments are indicated by the absence of dinoflagellates or acritarchs.

7. 2449m (swc)-2500m (cutts) upper C. hughesi Zone at the top on the lack of younger indicators (supported by youngest Cyclosporites hughesi) and at the base by the lack of older indicators. Non-marine partly lacustrine conditions are indicated by the lack of dinoflagellates but rare and intermittent presence of non-spiny acritarchs.

8. 2620m (cutts)-2980m (cutts) (2902.5m swc) lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base by oldest Pilosisporites notensis (2848m in swc, 2980m in cutts) Foraminisporis

asymmetricus (2980m in cutts, 2902.5 in swc) and consistent *Cicatricosisporites australiensis*. Non-marine environments are indicated by the absence of dinoflagellates. Minor lacustrine influence is suggested by the rare non-spiny acritarchs.

9. 3005m (swc) : indeterminate Cretaceous due to the lack of a diverse assemblage in this old Beach preparation. It can be no older than Cretaceous however, as it contains oldest *Cicatricosisporites ludbrookiae*. It is not likely to be significantly older than the overlying lower *C. hughesi* Zone, and too few specimens were seen to be sure about the environment, although non-marine conditions are probable on regional considerations.

10. Obvious deficiencies in this section are the lack of Tertiary, more detailed Late Cretaceous control and the large sample gap between 1238m and 1545m. Further cuttings sampling is required to fill these gaps.

P. LUCINDALE-1 (data from 16 samples studied by Evans and Mulholland, 1970 plus new examination of these and 7 new samples in Morgan 1985f)

1. 1000-1090 ft. (cuttings) : lower C. paradoxa Zone at the top on the absence of younger indicators (supported by youngest Dictyotosporites speciosus at 1080-90 ft., cutts) and at the base on oldest Coptospora paradoxa. As the base is taken on an oldest occurrence in cuttings, it may be picked slightly too low. Non-marine environments on the absent microplankton.

2. 1200-1600 ft. (both swcs) (1800 ft. cuttings) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest Crybelosporites striatus. Youngest Cyclosporites hughesi at 1680-1700 ft. (cutts) is general confirmation. As the base is taken on an oldest occurrence in cuttings, it may be picked slightly too low. Non-marine partly lacustrine, on algal Botryococcus and non-spiny acritarchs.

3. 1850 (swc)-2000 ft. (swc) : upper C. hughesi Zone at the top and base on the absence of younger and older indicators, respectively. Partly non-marine lacustrine on the rare presence of non-spiny acritarchs, partly marginal marine on the 9 species of dinoflagellates at 1850 ft.

4. 2100 ft. (swc)-2350 ft. (swc) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis and Cicatricosisporites australiensis. Non-marine partly lacustrine on the presence of rare non-spiny acritarchs.

5. 2408 ft. (swc)-3000 ft. : F. wonthaggiensis Zone at the

top on the absence of younger indicators and at the base on oldest Dictyotosporites speciosus. Non-marine partly lacustrine on the rare presence of non-spiny acritarchs.

6. 3100 ft. (swc)-3152 ft. (swc) : upper C. australiensis Zone at the top on the absence of younger indicators (confirmed by youngest Crybelosporites stylosus), and at the base on oldest Cyclosporites hughesi. Brackish environments on the presence of very rare spiny acritarchs.

7. No further work is required.

Q. MORUM-1 (Data from 47 old samples in Partridge 1975 plus re-examination of 12 of these in Morgan 1985d)

1. T. lillei Zone : 1790-1820 ft. (cutts) at the top on the absence of younger indicators and at the base on oldest Tricolpites waipawaensis and Triporopollenites sectilis. As the base is taken on an oldest occurrence in cuttings, the base may be picked slightly too low. The presence of Isabelidinium korojonense indicates assignment to the I. korojonense Dinoflagellate Zone, correlative with the T. lillei Spore-pollen Zone. Marginal marine on the very scarce low diversity (and possibly partly reworked) dinoflagellates.

2. N. senectus Zone : 2000 ft. (cutts)-3080 ft. (cutts) at the top on the absence of younger indicators and at the base on oldest Nothofagidites senectus supported by oldest Tricolpites sabulosus at 2450-80 ft. (cutts), and suggesting that the entire zone is represented. The interval 2210 ft. (cutts)-2780 ft. (cutts) is also assigned to the X. australis Dinoflagellate Zone at the top on youngest Xenikoon australis and at the base on oldest common X. australis, and the absence of older indicators. The interval 3020 ft. (cutts)-3320 ft. (cutts) is assigned to the N. aceras Dinoflagellate Zone at the top on youngest Odontochitina porifera and at the base on oldest Nelsoniella aceras. Marginal marine on the scarce very low diversity dinoflagellates.

3. upper T. pachyexinus Zone : 3290 ft. (cutts)-4500 ft. (swc) at the top on the absence of younger indicators and at the base on oldest Tricolpites confessus. The interval 3020 ft. (cutts)-3320 ft. (cutts) is assigned to the N. aceras Dinoflagellate Zone as explained above. The interval 3550 ft. (swc)-4908 ft. (CORE) is assigned

to the I. cretaceum Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest Isabelidinium cretaceum. Nearshore to marginal marine on the rare to common, low to moderate diversity dinoflagellates.

4. lower T. pachyexinus Zone : 4600 ft. (swc)-6305 ft. (swc) at the top on the absence of younger indicators, and at the base on oldest Tricolporites pachyexinus. The interval 3350 ft. (swc)-4908 ft. (swc) is assigned to the I. cretaceum Dinoflagellate Zone as discussed above. The interval 5058 ft. (swc)-6353 ft. (swc) is assigned to the O. porifera Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest psilate Trithyrodinium spp. (supported by oldest Odontochitina porifera at 5760 ft. (swc). Nearshore to marginal marine environments on the usually scarce low diversity dinoflagellates.

5. C. triplex Zone : 6353 ft. (swc)-7985 ft. (swc) at the top on the absence of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. Youngest Appendicisporites distocarinatus occurs in the basal sample. The interval 6490 ft. (swc)-6623 ft. (swc) is assigned to the C. striatoconus Dinoflagellate Zone at the top on youngest Conosphaeridium striatoconus without younger indicators, and at the base on oldest C. striatoconus. The sample at 7985 ft. is assigned to the P. infusorioides Dinoflagellate Zone at the top and base on youngest and oldest common Palaeohystrichophora infusorioides, respectively. Nearshore to marginal marine on the rare generally low diversity dinocysts.

6. No further work is required.

R. MUSSEL-1 (14 cores and sidewall cores and 7 cuttings studied by Evans and Mulholland 1969).

1. 4152 ft. (swc)-4208 ft. (swc) : upper M. diversus Zone at the top on the absence of younger indicators and at the base on oldest Proteacidites pachypolus. This is generally confirmed by the presence at 4208 ft. only of Homotriblium ?sp. nov. (presumably Homotriblium tasmaniense). Marginal marine to non-marine environments on absence or rare low diversity presence of dinoflagellates.

2. Middle M. diversus to lower L. balmei Zones (Early Eocene to Paleocene) not seen, and probably missing on a hiatus in the 107 ft. sample gap.

3. 4315 ft. (swc)-4854 ft. (swc) : T. longus to T. lillei Zones at the top on youngest Tricolporites lillei, T. pachyexinus and Tricolpites waipawaensis (4462 ft., swc) and at the base on oldest T. waipawaensis. The absence of spore-pollen clearly indicating the Tricolpites longus Zone may suggest that the interval belongs entirely to the T. lillei Zone. However, the data precedes documentation of these key taxa. The dinoflagellates are largely inconclusive as they are not firmly identified. However, their affinity to Isabedidinium pellucidum (4462 ft. swc to 4654 ft. swc) and I. korojonense (4654 ft. swc) suggest affinity with the I. korojonense Dinoflagellate Zone (correlative with the T. lillei Spore Pollen Zone). The basal sample (4854 ft. swc) contains Xenikoon australis without older indicators and so is assigned to the X. australis Dinoflagellate Zone. Thus, although the evidence is not conclusive, it suggests that most or all of the interval belongs to the T. lillei Zone. Marginal marine on the rare presence of low diversity dinoflagellates.

4. 5084 ft. (swc)-6061 ft. (swc) : N. senectus Zone at the top on the absence of younger indicators and at the base on oldest Gambierina rudata (as "Triorites edwardsii"), supported by oldest Nothofagidites spp. (5764 ft.) and Tricolpites sabulosus (possibly 6061 ft). The presence of Xenikoon australis throughout the interval 5084 ft. to 6061 ft. indicates assignment to the X. australis Dinoflagellate Zone which is usually correlative with the upper two thirds of the N. senectus Spore-Pollen Zone. Marginal marine to nearshore marine on the abundance of low diversity dinoflagellates. Both the spore-pollen and dinoflagellate data suggest that the lower half of the Zone was not seen, and may be missing by hiatus from the 600 ft. sample gap.

5. 6660 ft. (swc) : ?T. pachyexinus Zone at the top on the absence of younger indicators and at the base on dinoflagellate data. I. cretaceum Dinoflagellate Zone at the top on the absence of younger indicators, and at the base on oldest Isabelidinium cretaceum. This zone is usually correlative with the middle part of the T. pachyexinus Zone. No species list is available. Marginal marine on the rare low diversity dinoflagellates.

6. 6891 ft. (CORE) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. Marginal marine to brackish on the extremely rare dinoflagellates.

7. 7337 ft. (CORE)-7396 ft. (swc) : A. distocarinatus Zone at the top on the absence of younger indicators (supported by youngest consistent Appendicisporites

distocarinatus), and at the base on oldest Amosopollis cruciformis (supported by oldest A. distocarinatus without older indicators). Assignment of the interval 7348 ft. (swc) to 7396 ft. (swc) to the P. infusorioides Dinoflagellate Zone is indicated at the top and base by youngest and oldest Cribroperidinium edwardsii, respectively. Marginally marine on the very scarce low diversity dinoflagellates.

8. 7500 ft. (cutts)-8010 ft. (cutts) : indeterminate. These cuttings were too heavily contaminated to be reliable, and conclusive evidence for penetration of the Otway Group was not seen.

9. The data are generally internally consistent. Re-examination of the original preparations in the longus-lillei interval would be worthwhile to determine the completeness of the latest Cretaceous. New preparations of picked lithology cuttings at the well base might help if penetration of the Otway Group is suspected. The thick N. senectus Zone and apparent large hiatus underlying the N. senectus Zone is unusual and may relate to shifting depocentres.

S. NAJABA-1 (Dettmann 1986 data on 11 swcs)

1. 1311m (swc)-1382m (swc) : upper M. diversus Zone at the top on the absence of younger indicators and youngest Spinozonocolpites prominatus and at the base on oldest Proteacidites pachypolus. Marginal marine on very rare low diversity dinoflagellates.

2. Middle M. diversus to upper L. balmei Zones not seen, and may be condensed or absent in the 80m sample gap.

3. 1460.5m (swc) : lower L. balmei Zone at the top on youngest Tetracolporites verrucous, Gambierina edwardsii, and Lygistepollenites balmei without younger indicators and at the base on oldest Proteacidites adenanthoides and Haloragacidites harrisii without older indicators "in situ". Tricolpites confessus and T. waipawaensis were recorded and suggest a Late Cretaceous age. However, since they contradict other data and T. confessus also occurs at 1382m, they are considered reworked. Dinoflagellates include Eisenackia crassitabulata and Ceratiopsis dartmooria without older indicators, and indicate assignment to the E. crassitabulata Dinoflagellate Zone of Partridge (1976). Marginal marine on the rare low diversity dinoflagellates.

4. 1496m (swc) : T. longus Zone at the top on youngest Tricolpites longus, T. sabulosus, Triporopollenites sectilis and Tricolporites lillei (supported by dinoflagellate data) and at the base on oldest T. longus. Dinoflagellates include Manumiella druggii indicating the M. druggii Dinoflagellate Zone and confirming the spore-pollen assignment. Marginal marine on the lower diversity dinoflagellates.

5. T. lillei to upper T. pachyexinus Zone not seen, but probably present in the 690m sample gap.

6. 2186.5m (swc) : lower T. pachyexinus Zone at the top on youngest consistent Amosopollis cruciformis without younger indicators, and at the base on oldest Tricolporites pachyexinus, and Ornamentifera sentosa. Dinoflagellates include Odontochitina porifera without younger indicators and indicate the O. porifera Dinoflagellate Zone confirming the spore-pollen assignment. Nearshore to marginal marine on the rare moderate diversity dinoflagellates.

7. 2520m (swc)-2805m (swc) : C. triplex Zone at the top on the lack of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. Marginal marine on rare low diversity dinoflagellates.

8. A. distocarinatus and P. pannosus Zones not seen and may be condensed or absent in the 82m sample gap.

9. 2887m (swc) : upper C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Pilosisporites grandis. Oldest Coptospora poradoxa and Balmeisporites holodictyus provide broad confirmation of the assignment. Non-marine on the absence of dinoflagellates.

10. 2997m (swc)-3023m (cutts) : indeterminate due to the sparse and poorly preserved section from which key indicators are absent. Substantial caving was seen in the cuttings sample.

11. 3400m (swc) : lower C. paradoxa to C. striatus Zones at the top on youngest Pilosisporites notensis and at the base on oldest Crybelosporites striatus. Placement into one or other of these two zones is not possible, as the assemblage is too sparse for the absence of key species to be reliable.

12. This section is poorly controlled due to large sample gaps in parts, and the poor sampling and yields in the base of the section. Further work is required to -

(a) test for the three missing late Paleocene to Early Eocene Zones (20m cuttings between 1382m-1460m)

(b) test for the three missing Late Cretaceous Zones (50m cuttings between 1500-2180m), possibly closer sampling at the top to test for the frequently condensed latest Cretaceous zones)

(c) test for the two missing Middle Cretaceous Zones (20m cuttings between 2805-2885m)

(d) clarify the virtually uncontrolled basal 500m (50m cuttings between 2900-3400).

T. NORTH EUMERALLA-1 (detailed data on 52 swcs of Wilschut 1974)

1. 1172 ft. (swc) : lower N. asperus Zone at the top on the absence of younger indicators and at the base on oldest Nothofagidites falcatus, N. deminutus, Triporopollenites chnosus, Tricolpites leuros and common Nothofagidites spp. Brackish to marginal marine on the presence of very rare dinoflagellates.

2. P. asperopolus not seen. May be absent or possibly present but unrecognised as part of the underlying zone.

3. 1244 ft. (swc)-2526 ft. (swc) : upper M. diversus Zone at the top on the absence of younger indicators and at the base on oldest Proteacidites pachypolus (supported by oldest Myrtaceidites tenuis at 2069 ft., swc). Marginal marine to non-marine on the absent to very rare dinoflagellates.

4. Middle M. diversus to upper L. balmei Zones apparently absent. If the single specimen of Proteacidites pachypolus at 2526 ft. (swc) is caved contamination, then the early and middle M. diversus zones could be identified. There would still be no evidence for the upper L. balmei Zone. A hiatus is therefore present in the 106 ft. sample gap, although its extent may be open to question.

5. 2632 ft. (swc)-2792 ft. (swc) : lower L. balmei Zone at the top on youngest Lygistepollenites balmei and Gambierina edwardsii without younger indicators and at the base on the absence of older indicators. Marginal marine on the rare low diversity dinoflagellates.

6. 2852 ft. (swc) : T. longus Zone at the top on youngest Tricolpites confessus (as T. fissilis) and T. longus and at the base on oldest T. longus and Tripunctisporis punctatus. Marginal marine to brackish on very low diversity dinoflagellates.

7. 2946 ft. (swc)-3241 ft. (swc) : T. lillei Zone at the top on the absence of younger indicators (plus youngest Tricolporites lillei) and at the base on oldest Phyllocladidites reticulosaccatus (supported by oldest Tricolporites lillei and T. pachyexinus at 3217 ft. swc). The presence of the dinoflagellate Nelsoniella aceras at 2946 ft. (swc) and 3020 ft. (swc) is inconsistent with spore-pollen assignment and so is considered reworked. If N. aceras was "in place", assignment to the T. pachyexinus or N. senectus Zones would be expected, and T. lillei would have to be caved. Another possibility is misidentification of either T. lillei or N. aceras.

8. N. senectus to A. distocarinatus Zones not seen and are probably largely absent from a hiatus in the 160 ft. sample gap.

9. 3402 ft (swc) : P. pannosus Zone at the top on the downhole influx of Crybelosporites striatus (supported by youngest Coptospora paradoxa at 3534 ft. swc). The swc at 3332 ft. probably also belongs to this Zone, but lacks diagnostic taxa. Non-marine on the absence of dinoflagellates or acritarchs.

10. 3534 ft. (swc)-4802 ft. (swc) : C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Coptospora paradoxa. Assignment to either subzone is not possible due to poor yields in this part

of the section. The zone base could be as low as 5269 ft. (swc). Non-marine on the absence of dinoflagellates.

11. 5467 ft. (swc)-5884 ft. (swc) : C. striatus Zone at the top on the absence of younger indicators from diverse assemblages, and at the base on oldest Crybelosporites striatus (supported by the short range overlap with Cyclosporites hughesi). Non-marine on the absence of dinoflagellates.

12. 6100 ft. (swc)-6294 ft. (swc) : C. hughesi Zone at the top on the absence of younger indicators and at the base on oldest Pilosisporites notensis supported by oldest Cicatricosisporites spp. Non-marine on the absence of dinoflagellates.

13. 6815 ft. (swc)-8777 ft. (swc) : F. wonthaggiensis Zone at the top on the absence of younger indicators and at the base on oldest Foraminisporis wonthaggiensis (supported by oldest Dictyotosporites speciosus at 8647 ft.). Youngest Crybelosporites stylosus at 6815 ft. (swc) and Murospora florida at 8575 ft. (swc) confirm the assignment. Non-marine on the absence of dinoflagellates.

14. The data appears to be very good, and the assignments firmly based. Lithological and seismic evidence, however suggest a hiatus near 7100 ft. which often coincides with the C. hughesi/F. wonthaggiensis Zone boundary. Re-examination of 6815 ft. (swc) is recommended to see it should be assigned to the C. hughesi Zone. Alternatively, velocity data could be re-examined to see if the siesmic hiatus could lie in the gap 6294 ft. to 6815 ft. Re-examination of samples at 2946 ft. and 3020

ft. might resolve the conflict of dinoflagellates and spore-pollen.

U. PECTEN-1A (Tertiary 11 swcs from Muller 1967, Tertiary and Cretaceous 41 swcs, 2 cutts from Dettmann 1967).

1. 1892 ft. (swc) : lower N. asperus Zone at the top on the absence of younger indicators and at the base on oldest dominant Nothofagidites spp. Marine environments on the common dinoflagellates.

2. 2632 ft. (swc)-3280 ft. (swc) : upper M. diversus Zone at the top on the absence of younger indicators and at the base on oldest Myrtaceidites tenuis (supported by oldest Proteacidites pachypolus at 2632 ft. (swc)). Nearshore marine to brackish on the consistent dinoflagellates.

3. 3338 ft. (swc)-3362 ft. (swc) : lower M. diversus at the top on the absence of younger indicators and at the base on oldest Malvacipollis diversus without older indicators. Non-marine on the absence of dinoflagellates.

4. 3456 ft. (swc) : indeterminate on the lack of index species. Offshore marine on the high dinoflagellate content which would probably enable dating in the light of current knowledge. On regional considerations, a Paleocene assignment is likely.

5. 3618 ft. (swc)-3695 ft. (swc) : L. balmei Zone at the top on youngest Gambierina rudata (as aff T. edwardsii) and Lygistepollenites balmei and at the base on the absence of older indicators. Brackish to non-marine on the absence or rare presence of dinoflagellates.

6. 3735 ft. (swc)-4493 ft. (swc) : T. longus-T. lillei Zones at the top on youngest Tricolporites lillei (supported by youngest Tricolpites confessus (as T. cf. fissilis) at 3797 ft. (swc) and by dinoflagellate evidence, and at the

base on dinoflagellate evidence (supported by oldest T. lillei at 4044 ft. swc). Isabelidinium pellucidum occurs throughout the interval and indicates assignment to the I. korojonense Dinoflagellate Zone and an unzoned overlying interval, correlative with the T. lillei Spore-pollen Zone and the basal T. longus Zone. Brackish to marginal marine on the rare low diversity dinoflagellates.

7. 4685 ft. (swc)-5078 ft. (swc) : N. senectus Zone at the top on the absence of younger indicators, and at the base on oldest Tricolpites sabulosus (supported by oldest Nothofagidites senectus at 5030 ft. (swc). Xenikoon australis at 4685 ft. (swc) indicates assignment to the correlative X. australis Dinoflagellate Zone. Non-marine to slightly brackish on the absence or rare presence of low diversity dinoflagellates.

8. 5182 ft. (swc)-5650 ft. (swc) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites pachyexinus (supported by oldest Ornamentifera sentosa at 5398 ft, swc). The dinoflagellate datum of oldest Trithyrodinium sp. (as Hexagonifera vermiculata) at 5650 ft. (swc) indicates assignment to the O. porifera or younger Dinoflagellate Zones.

9. 5735 ft. (swc) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Phyllocladidites mawsonii. Brackish on rare dinoflagellates.

10. 5827 ft. (swc) : A. distocarinatus Zone at the top on the absence of younger indicators with Appendicisporites distocarinatus and at the base on the absence of older indicators. Marginal marine on the rare low diversity dinoflagellates.

11. 5920 ft. : P. pannosus Zone at the top on youngest Coptospora paradoxa and at the base on oldest Phimopollenites pannosus. Brackish on the single dinoflagellate.

12. 5977 ft. (swc)-7920 ft. (swc) : upper C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Coptospora paradoxa and Pilosisporites grandis. Non-marine on the absence of dinoflagellates.

13. lower C. paradoxa Zone not seen, but may be present in the 626 ft. sample gap.

14. 8546 ft. (swc)-9132 ft. (swc) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest Crybelosporites striatus. Non-marine on the absence of dinoflagellates.

15. 9210 ft. (swc)-9305 ft. (swc) : indeterminate due to low diversity of microfloras. The presence of Cicatricosisporites australiensis suggests the C. hughesi Zone or younger.

16. The data is excellent. The longus-lillei interval could be re-examined to increase resolution, as the report predates the taxonomy of many taxa from this interval.

V. PENOLA-1 (Data from 18 core samples in Dettmann 1963b plus 21 new core samples reported in Morgan 1985e).

1. 1200-10 ft. (CORE) : P. pannosus Zone at the top on youngest Coptospora paradoxa and at the base on oldest Phimopollenites pannosus. Brackish on rare spiny acritarchs (Micrhystridium spp.).

2. 1400 ft. (CORE)-2596 ft. (CORE) : upper C. paradoxa Zone at the top on the absence of younger indicators and at the base on oldest Pilosisporites grandis (supported by youngest Dictyotosporites speciosus at 2790-98 ft., CORE). Non-marine except 1400-18 ft. where rare spiny acritarchs indicate brackish environments.

3. 2790 ft. (CORE)-3190 ft. (CORE) : lower C. paradoxa Zone at the top on youngest Dictyotosporites speciosus (supported by youngest Dictyotosporites filosus and oldest Trilobosporites troreticulosus at 2790-98 ft.) and at the base on oldest Coptospora paradoxa. Non-marine lacustrine on non-spiny algal acritarchs.

4. 3363-73 ft. (CORE) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest Crybelosporites striatus. Youngest Cyclosporites hughesi confirms the assignment. Non-marine lacustrine on the non-spiny algal acritarchs.

5. upper C. hughesi Zone not seen, but may be present in the 141 ft. sample gap.

6. 3514 ft. (CORE)-3729 ft. (CORE) : lower C. hughesi Zone at the top on youngest Cooksonites variabilis and at the base on oldest Pilosisporites notensis (supported by oldest consistent Cicatricosisporites australiensis). Non-marine partly lacustrine on the occasional non-marine algae.

7. 3917 ft. (CORE)-4776 ft. (CORE) : F. wonthaggiensis Zone at the top on the absence of younger indicators (supported by youngest Murospora florida) and at the base on oldest Dictyotosporites speciosus. Single specimens of Crybelosporites stylosus (4270-80 ft., 4760-76 ft.) and Aequitriradites hispidis (4270-80 ft.) may be reworked. Single specimens of Pilosisporites notensis, Cicatricosisporites australiensis and Foraminisporis asymmetricus were seen in one of the two preparations from 4766-76 ft. They are interpreted as caved or contaminated. Largely non-marine, partly lacustrine (on rare algal acritarchs), partly brackish (or spiny acritarch at 4082-92 ft. and single dinoflagellate at 4766-76 ft.).

8. upper C. australiensis Zone not seen, but may be undrilled beneath T.D.

9. The existing data appears to be very good. No further work is recommended.

W. PORT CAMPBELL-4 (Data on 11 core samples of Stacy 1981).

1. 4590 ft. (CORE)-4605 ft. (CORE) : T. pachyexinus Zone at the top on the absence of younger indicators, and at the base on dinoflagellate evidence plus oldest Ornamentifera sentosa (4601 ft.) and oldest Tricolpites spp. aff. confessus and aff. gillii). The dinoflagellates indicate assignment of 4590 ft., CORE to 4601 ft. CORE to the I. cretaceum Dinoflagellate Zone (at the top on the absence of younger indicators and at the base on oldest Isabelidinium cretaceum) and 4605 ft. (CORE) to the O. porifera Zone (at the top on the absence of younger indicators and at the base on oldest O. porifera). Nearshore marine on the moderately diverse dinoflagellates.

2. 4900 ft. (CORE)-5000 ft. (CORE) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. Nearshore to marginal marine on the rare low diversity dinoflagellates.

3. 5154 ft. (CORE)-5466 ft. (CORE) : Indeterminate due to very poor recovery. Resampling of these cores might provide useful data.

4. 5759 ft. (CORE) : P. pannosus Zone at the top on the downhole influx of diverse non-marine microfloras including common Cicatricosisporites and at the base on oldest Phimopollenites pannosus. Non-marine on the absence of dinoflagellates.

5. upper C. paradoxa Zone apparently missing, but may be present in the 323 ft. sample gap, or its recognition may be confused by reworking.

6. 6082 ft. (CORE) : possibly lower C. paradoxa Zone at the

top on youngest _Dictyotosporites speciosus_ and _Pilosisporites notensis_ and at the base on oldest _Coptospora_ cf. _paradoxa_ and _Balmeisporites holodictyus_. If these youngest occurrences are reworked, this core could be younger. Non-marine on the absence of dinoflagellates.

7. The data from this well are generally poor. Resampling of selected cores and study of samples from above 4590 ft. is recommended.

X. PRAWN A1 (Dettmann July 1968 summary report on 60 core and swc samples)

1. 3204 ft. (swc)-3680 ft. (swc) : Indeterminate due to poor recovery.

2. 3938 ft. (swc)-3957 ft. (swc) : lower to middle M. diversus Zone on the absence of younger indicators and at the base on oldest Cupaneidites orthoteichus, Proteacidites incurvatus and P. grandis without older indicators. Non-marine on the apparent lack of dinoflagellates.

3. L. balmei Zone not seen, but could be present in the 63 ft. sample gap.

4. 4120 ft. (swc)-4145 ft. (swc) : T. longus-T. lillei Zones at the top on youngest Tricolpites sabulosus and Tricolporites lillei and at the base on oldest T. lillei. The presence of "Deflandrea cf. pellucida" at 4120 ft. suggests assignment to the I. korojonense Dinoflagellate Zone and therefore the correlative T. lillei Spore-Pollen Zone. The T. longus Zone may therefore be absent. Marginal marine on the rare presence of dinoflagellates.

5. 4254 ft. (CORE)-4962 ft. (swc) : N. senectus Zone at the top on the absence of younger indicators (confirmed by the dinoflagellates) and at the base on oldest Tricolpites sabulosus and Nothofagidites senectus. Oldest Gambierine edwardsii at 4590 ft. suggests that the zone is complete. The sample at 4254-83 ft. contains the dinoflagellate Xenikoon australis and is therefore assigned to the X. australis Dinoflagellate Zone. Part of the rest of the interval contains Nelsoniella aceras without younger indicators and should be assigned to the N. aceras Dinoflagellate Zone. However, Dettmann (1968) does not give depths for these occurrences. Marginal

marine on the rare low diversity dinoflagellates.

6. 5297 ft. (swc)-7177 ft. (swc) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites pachyexinus and Ornamentifera sentosa. Very rare diagnostic dinoflagellates include Isabelidinium cretaceum without younger indicators (6145 ft. assigned to the I. cretaceum Zone). Nearshore to marginal marine on the rare low diversity dinoflagellates.

7. 7278 ft. (CORE)-8307 ft. (swc) : C. triplex Zone at the top on the lack of definite younger indicators, and at the base on oldest Clavifera triplex and Phyllocladidites mawsonii. Dinoflagellates include Conosphaeridium striatoconus without younger indicators at 7278-98 ft. (CORE) indicating assignment to the C. striatoconus Dinoflagellate Zone. The presence of Gonyaulax sp. (may be Cribroperidinium edwardsii) at 7694 ft. may suggest the P. infusoroides Dinoflagellate Zone, but it does appear to be a single occurrence, and may be reworked. Nearshore to marginal marine on the rare low diversity dinoflagellates.

8. 8697 ft. (swc)-9560 ft. (swc) : A. distocarinatus Zone at the top on the absence of younger indicators and at the base only on the absence of microplankton, and the inferred base of Appendicisporites distocarinatus. The dinoflagellate Gonyaulax sp. (may be Cribroperidinium edwardsii) suggests assignment to the P. infusorioides Dinoflagellate Zone, but in the absence of precise depths of occurrence, is rather vague. Marginal marine on the presence of rare dinoflagellates.

9. 9869 ft. (swc)-10,087 ft. (swc) : P. pannosus Zone at the top (poorly defined as discussed above), and at the base on oldest Phimopollenites pannosus. Non-marine on the absence of dinoflagellates.

10. 10,450-77 ft. (CORE) : upper <u>C. paradoxa</u> Zone at the top on the absence of younger indicators and at the base on oldest <u>Pilosisporites grandis</u> and <u>Trilobosporites trioreticulosus</u>. Non-marine on the absence of dinoflagellates.

11. Restudy of the two sidewall cores at 4120 ft. and 4145 ft. might resolve zonal confusion. Otherwise no further work is justified.

Y. PRETTY HILL-1 (Wilschut 1974 interpretation - no good data available).

1. 2726 ft. : T. pachyexinus Zone. In the absence of raw data, the validity of this assignment cannot be checked. Notably, samples from North Eumeralla-1 assigned by Wilschut to the T. pachyexinus Zone were assigned herein to the T. lillei Zone. The sample is certain to be Late Cretaceous and unlikely to more than a zone or two younger than assigned.

2. C. triplex and A. distocarinatus Zones not seen. These are likely to be absent or extremely condensed in the thin Late Cretaceous at this location.

3. 2928 ft. : P. pannosus Zone. Considering its stratigraphic position and zone definition, this sample is likely to be correctly assigned.

4. 3340 ft.-4655 ft. : upper C. paradoxa Zone. This interval is likely to be correctly assigned.

5. 4940 ft. : lower C. paradoxa Zone. This assignment is tentative in Wilschut (1974), and so should be regarded as doubtful.

6. C. striatus Zone not identified, but could be present in the 500 ft. sample gap.

7. 5420 ft.-5947 ft. : upper C. hughesi Zone. From the way Wilschut (1974) has drawn his test-figure 6, this interval corresponds to this zone as used herein. This assignment is considered reliable.

8. 6070 ft.-6388 ft. : lower <u>C. hughesi</u> Zone to <u>F. wonthaggiensis</u> Zone. This interval is assigned by Wilschut (1974) without subdivision. Inspection of the raw data to locate a boundary on the criterea used herein is vital.

9. ?6690 ft.-?7214 ft. : upper <u>C. australiensis</u> Zone. This interval is shown by Wilschut as highly tentative, and should therefore be discounted.

10. The available palynological information is not sufficent for confident correlation except in a few narrow intervals. An unpublished report does exist, (Dettmann 1963a), but is not currently available. The well logs show sufficient character to suggest correlation and time relationships within the Eumeralla Formation. New study of cores and cuttings is recommended to provide reliable time correlation.

Z. TRITON-1 (Esso (1982) data on 22 swcs and 54 cuttings samples)

1. 1700m (cutts)-1720m (cutts) : lower N. asperus at the top on the absence of younger indicators and at the base on oldest Nothofagidites falcatus, and the dinoflagellates Deflandrea phosphoritica and Systematophora placacantha. Nearshore marine on the common moderately diverse dinoflagellates.

2. P. asperolus to M. diversus Zones not seen, and presumably lost on an hiatus in the 10m sample gap.

3. 1730m (cutts) : L. balmei Zone at the top on youngest Lygistepollenites balmei without older indicators and at the base on the absence of older indicators. Probably non-marine as the dinoflagellates seen are probably caved or reworked.

4. 1740m (cutts)-1750m (cutts) : T. longus-T. lillei Zones at the top on youngest Tricolpites confessus and Triporopollenites sectilis, and at the base on dinoflagellate evidence in these caved cuttings samples. Non-marine to marginal marine on the absent or rare low diversity dinoflagellates.

5. 1760m (cutts)-2095m (cutts) : N. senectus Zone at the top on dinoflagellate data (youngest Xenikoon australis) and at the base on oldest consistent Nothofagidites senectus and oldest N. endurus (supported by oldest Gambierina rudata at 1795m, cutts and G. edwardsii at 2395m, cutts). The interval 1760m (cutts) to 1895m (cutts) is assigned to the X. australis Dinoflagellate Zone at the top on youngest Xenikoon australis and at the base on the absence of older indicators. The interval 1945m (cutts)-2395m (cutts) is assigned to the N. aceras Dinoflagellate Zone at the top on youngest Nelsoniella

aceras and at the base on the absence of older indicators. These dinoflagellate assignments are entirely consistent with the spore-pollen zone. Marginal marine environments on the low diversity dinoflagellates, although these may be partly caved.

6. 2395m (cutts)-2595m (cutts) : upper T. pachyexinus Zone at the top and base on the absence of younger and older indicators respectively. The sample at 2395m (cutts) is assigned to the N. aceras Dinoflagellate Zone, as discussed above. The interval 2495m (cutts)-2975m (cutts) is assigned to the I. cretaceum Dinoflagellate Zone at the top on youngest Amphidiadema denticulata and Isabelidinium belfastense and at the base on oldest common Isabelidinium cretaceum (which may be affected by caving). Nearshore marine environments are indicated by the common moderately diverse dinoflagellates.

7. 2795m (cutts)-3225m (cutts) : lower T. pachyexinus Zone at the top on youngest common Amosopollis cruciformis, and at the base on oldest Australopollis obscurus. This lower boundary must be considered somewhat approximate, as it is picked from oldest occurrences in cuttings. The interval down to 2795m is assigned to the I. cretaceum Dinoflagellate Zone, as discussed above. The interval 2995m (cutts)-3250m (cutts) is assigned to the O. porifera Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest Odontochitina porifera. Marginal marine to nearshore marine on the low to moderate diversity dinoflagellates.

8. 3260m (cutts)-3375m (cutts) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Phyllocladidites mawsonii (supported by oldest Clavifera triplex at 3360m, cutts). Marginal to nearshore marine on the low to moderate diversity dinoflagellates, which are partly caved.

9. 3385m (cutts)-3540m (cutts) : indeterminate due to the lack of diverse microfloras caused at least partly by poor hole condition.

10. The data available is excellent and no further work is required. The lack of data near T.D. is unfortunate, but better data is not possible.

AA. TRUMPET-1 (Stover 1975 data on 30 core and swc samples)

1. 2794 ft. (swc)-3306 ft. (swc) : C. striatus Zone at the top on the absence of younger indicators and at the base on oldest Crybelosporites striatus. Non-marine on the absence of dinoflagellates.

2. 3740 ft. (swc)-4333 ft. (swc) : C. hughesi Zone at the top on youngest consistent Cyclosporites hughesi without younger indicators and at the base on oldest Pilosisporites notensis (supported by oldest Cicatricosisporites ludbrookiae and C. australiensis). Youngest Cooksonites variabilis at 4333 ft. suggests that 3740-4310 ft. should be assigned to the upper C. hughesi Zone herein and 4333 ft. to the lower C. hughesi Zone herein, but without re-examining the samples or comparing logs, this subdivision is very tentative. Stovers (1975) comments suggest a hiatus below this point. Non-marine on the absence of dinoflagellates.

3. 4608 ft. (swc)-7050 ft. (swc) : F. wonthaggiensis Zone at the top on the absence of younger indicators (supported by tentative youngest in situ Murospora florida at 4608 ft., definite at 6120 ft.), and at the base on oldest Dictyotosporites speciosus. As noted elsewhere, this assemblge is rather bland, dominated by Cyathidites and Retitriletes and with Coronatispora perforata consistent within, but rare above it. Non-marine on the absence of dinoflagellates.

4. The existing data is adequante, but no samples were taken above 2794 ft. If control of the upper Otway Group, the late Cretaceous and the Tertiary are required, further sampling should be undertaken.

BB. VOLUTA-1 (Data of Dettmann 1968a on 63 samples, mostly swcs)

1. 4151 ft. (swc) : middle to lower M. diversus Zone at the top on the absence of younger indicators and at the base on oldest Cupaneidites orthoteichus and Malvacipollis diversus without older indicators. This report predates description of the taxa on which the subdivision of this interval is based. Brackish on the single rare dinoflagellate.

2. 4267 ft. (swc) : upper L. balmei Zone at the top on youngest Gambierina edwardsii and at the base on the oldest dinoflagellate Wetzeliella hyperacantha. Nearshore marine on the moderately diverse dinoflagellates.

3. 4370 ft. (swc) : lower L. balmei Zone at the top on the absence of younger indicators (confirmed by youngest Lygistepollenites balmei and Gambierina rudata) and at the base on the absence of older indicators. Brackish on the single rare dinoflagellate.

4. 4566 ft. (swc)-5971 ft. (swc) : T. longus to T. lillei Zones at the top on youngest Tricolporites lillei (supported by youngest Tricolporites pachyexinus and the dinoflagellate Isabelidinium pellucidum at 4620 ft., swc), and at the base on oldest common Nothofagidites senectus. The zone base may be slightly too low, as dinoflagellate evidence suggests that it should be at 5773 ft. (swc) and other spore-pollen data (oldest T. lillei) at 4958 ft. (CORE). As this report predates much taxonomy, restudy is likely to clarify the interval. The dinoflagellates include I. pellucidum at 4620 ft. (swc)-4806 ft. (swc) indicating assignment to the I.

korojonense Dinoflagellate Zone and overlying unzoned interval and suggesting that most of this interval belongs to the T. lillei Zone, with only a thin T. longus Zone. At the base of the interval, 5885 ft. (CORE)-6917 ft. (swc) is assigned to the X. australis Dinoflagellate Zone at the top and base on youngest and oldest Xenikoon australis respectively. Non-marine to brackish marine on the intermittent presence of very rare dinoflagellates.

5. 6054 ft. (swc)-7099 ft. (CORE) : N. senectus Zone at the top on the absence of younger indicators and at the base on oldest Tricolpites sabulosus (supported by oldest Nothofagidites senectus at 6793 ft., swc). The interval 5885 ft. (CORE)-6917 ft. (swc) is assigned to the X. australis Dinoflagellate Zone as discussed above. Nearshore to non-marine on the intermittent presence of dinoflagellates.

6. 7101 ft. (CORE)-8901 ft. (swc) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolporites pachyexinus. The interval 7101 ft. (CORE)-7103 ft. (CORE) is assigned to the N. aceras Dinoflagellate Zone at the top on the absence of younger indicators, and at the base on oldest Nelsoniella aceras. The interval 7320 ft. (swc)-8224 ft. (swc) is assigned to the I. cretaceum Dinoflagellate Zone at the top on the absence of younger indicators, and at the base on oldest Isabelidinium cretaceum. The interval 8387 ft. (swc)-8617 ft. (CORE) is assigned to the O. porifera Dinoflagellate Zone at the top on the absence of younger indicators and at the base on oldest Odontochitina porifera (supported by oldest Trithyrodinium "psilate" (as Hexagonifera glabra)). Nearshore to marginal marine on the consistent presence of dinoflagellates.

7. 9962 ft. (CORE)-11989 ft. (CORE) : C. triplex Zone at the top on the absence of younger indicators and at the base on oldest Clavifera triplex. Nearshore to marginal marine on the rare but consistent dinoflagellates.

8. 12634 ft. (junk basket)-13020 (cutts) : indeterminate due to very poor preservation caused by high maturity. The presence of Appendicisporites at 12767 ft. (junk basket) suggest penetration of the A. distocarinatus Zone.

9. The data is generally very good and easily integrated into the regional pattern. However, the balmei-lillei interval has been the subject of much taxonomic work since Dettmann's (1968) Voluta-1 report, and restudy of this interval would provide more precision. To a lesser extent, restudy of the entire section would provide an excellent reference section.

V CONCLUSIONS

A. PALYNOLOGICAL

1. The existing zonation is sound, with the Aptian to Neocomian the most difficult. As discussed in Chapter III, I have used slightly different criterea to Dettmann and Douglas (1976) and believe my criterea to be more valid. It is unfortunate that the top Pretty Hill Sandstone and "top Pretty Hill unconformity" occur in this interval, and so my geological understanding of the Pretty Hill Sandstone distribution in time and space will inevitably be different to others. However, I believe that my interpretation is more accurate, and more easily related to synchronous geology elsewhere in Australia.

2. The pre-existing data is generally good, particularly that generated by Dettmann.

   However, some of the older wells were studied prior to the extensive taxonomic work of Stover and Evans (1973) and Stover and Partridge (1973). Thus, data in the latest Cretaceous and Tertiary can be badly dated, and clean resolution, particularly of the balmei, longus, lillei and senectus Zones, is not possible.

   Detailed raw data is not available for two of the studied wells (Eumeralla-1 and Pretty Hill-1) and poor recoveries from sandy lithologies (mostly Pretty Hill Sandstones) has restricted data quality in some wells (Garvoc-1, North Eumeralla-1). Sparse sampling combined with poor yields has limited some Eumerella data (Greenbanks-1 and Najaba-1). Sandy lithologies and extreme condensation in some thin Late Cretaceous sequences onshore has also restricted data quality.

B. GEOLOGICAL

1. In general, the existing zonation and breakdowns appear to provide an excellent framework for regional correlation, despite some patchiness in the raw data.

2. The dinoflagellates and acritarchs show considerable variation in their distribution.

   In the Early Cretaceous Otway Group, brackish marine conditions occur intermittently in the Neocomian Pretty Hill interval, once in the Late Aptian (Lucindale-1, presumably as a spillover from the Murray Basin), and intermittently in the latest Albian uppermost Eumeralla Formation. Full marine equivalents of the entire Aptian and Albian interval are widespread to the north-east (Murray and Great Artesian Basins) north-west (Officer Basin) and intermittently in the west (Eucla and Duntroon Basins). Marine sources are not hard to find for that section. In the Neocomian, however, they are more obscure. Marine sourcing of this age may have been through largely undrilled equivalent section along the southern margin from the west.

   In the Late Cretaceous, dinoflagellates occur in most samples, with brackish to marginal marine environments deepening to nearshore marine, and shallowing again to marginal to non-marine conditions by the end of the Late Cretaceous. The strength of marine influence is clearly seen at a maximum in wells closest to the present shelf edge (such as Voluta-1 and Flaxmans-1), and decreasing inland from the present shore line. The Late Cretaceous also shows a rapid wedging from thick offshore sequences to very condensed ones onshore. Marine sourcing is apparently from the west along the southern marginal rift. Equivalent section to the north is either absent or non-marine.

In the thin lower Tertiary, too few sections have been studied to be very useful. The Paleocene, where present, is often sandy and brackish to non-marine, but with a strong marine incursion corresponding to the Pebble Point event, seen in some localities. The overlying Eocene Dilwyn Formation is not well sampled but is usually brackish to non-marine according to the intermittent dinoflagellates. In the middle Eocene, rapid continental drift has commenced, and open marine and subsequent carbonate deposition became established.

3. Thicknesses of the individual zones shows variability in this basin.

The late Jurassic R. watherooensis-lower C. australiensis is rarely preserved in basement lows such as Casterton-1 and is a shale and dirty sand rich interval, here informally called the pre Pretty Hill Shale. Its top is probably unconformable.

Neocomian upper C. australiensis and F. wonthaggiensis Zones are often extremely thick and are associated with the sandy Pretty Hill Formation, reflecting very rapid deposition. The top Pretty Hill is sometimes recognised as a facies change (usually from sand beneath to shale with coal above) and sometimes as an unconformity (often with angular relationships). Where a clear unconformity and facies change are seen, they are usually located at the Neocomian/Aptian boundary (wonthaggiensis/lower hughesi) as in Lucindale-1, and Crayfish-1. Where a facies change is seen, it is usually at the boundary (Chama-1, Casterton-1), or above it (intra Aptian or intra hughesi) as in Garvoc-1, North Eumeralla-1, Lindon-1, Trumpet-1. This latter situation may represent more prolonged sand sourcing, or simply reworking of the underlying sand during the hiatus represented by the unconformity, and its incorporation into the overlying section.

The Aptian C. hughesi Zone is variable in thickness, but is often comparatively thin and associated with the lower Eumeralla Formation, coaly at the base, and silty and shaly towards the top. The variable thickness is probably related to lost section on the underlying seismic unconformity.

The C. striatus Zone is also very variable in thickness (and may even be absent from Garvoc-1), but this variation may be due to a hiatus removing the upper part of the zone. The C. striatus section is often marked by a return to coaly deposition marked by a spiky sonic signature.

The lower C. paradoxa and upper C. paradoxa Zones are usually extremely thick and have monotonous log signatures.

The P. pannosus Zone is variable in thickness and can be very thick, or totally absent. The mid Cretaceous unconformity is probably responsible, eroding the underlying P. pannosus Zone.

Within the late Cretaceous, enormous variation of the sequence is observed with the dramatic wedging noted above, and the resultant strong diachroneity of formations. In the condensed onshore section, the T. pachyexinus Zone is most consistently identified. This is partly due to its lateral persistence, but may also be partly due to the unfavourable sandy lithologies representing the other zones. In the thicker wedges, the A. distocarinatus and C. triplex Zones are of variable thickness, but can be quite thin (Mussel-1, Pecten-1). The T. pachyexinus Zone is consistently quite to very thick (as much as 2500 ft. in Voluta-1) and represents maximum subsidence and also maximum marine influence. The N. senectus Zone can be fairly thick, but is often thin, and may have an underlying hiatus in some wells. The T. lillei Zone is generally quite thin (the exception being Voluta-1) and the T. longus Zone is very thin or absent from most wells. This is in strong contrast to the situation in the Gippsland Basin to the east. The changing thickness of these Late Cretaceous Zones shows a pattern of shifting depocentres related to both subsidence rates and relative base levels.

Too few data are available on the Early Tertiary other than to say that the Paleocene L. balmei Zone is generally thin or absent, and that the Eocene M. diversus Subzones are thicker, but incomplete.

VI RECOMMENDATIONS

Data quality in a number of wells is poor or patchy. The following further work is recommended to clarify uncertainties and bring the data up to a consistent standard. These recommendations are in priority order, as I see them.

A. In the absence of any raw data, the following two wells require restudy.

1. Eumeralla-1

   No detailed data is available, and study of the well is important to the clear understanding of time relationships of the Eumeralla Formation. The age of the thin Late Cretaceous is also unclear.

2. Pretty Hill-1

   No detailed data is available, and study of the well is important to a clear understanding of time relationships of the Pretty Hill Formation. The age of the thin Late Cretaceous is also unclear.

B. Broad sample gaps due to very sparse sampling and poor fossil yields have left some thick Otway Group sections with little time control. Wells requiring restudy with cuttings if necessary are

1. Greenbanks-1

2. Najaba-1

C. Consistent clear zone boundaries near the base of the section are important to understand the time distribution of the major target, the Pretty Hill Sandstone. Wells requiring new work to improve data quality near this boundary include:

1. North Eumeralla-1

   In particular, the sample from 6815 ft. (swc) needs restudy to check the age of the visible seismic unconformity.

2. Garvoc-1

   Restudy of the section below 4500 ft. is required.

D. Some old wells were studied before the taxonomic work of Stover and Partridge (1973) and Stover and Evans (1973). New work is required in the <u>senectus</u> to <u>balmei</u> intervals of the following wells to provide crisp zonal assignments consistent with those in more recent wells.

1. Mussel-1

   Restudy of the interval 4200 ft. to 6061 ft. using old swc preparations and a few new cuttings samples to locate the top Cretaceous, is required.

2. Pecten-1

   Restudy of the interval 3618 ft. to 5078 ft. using the old swc preparations is required.

3. Voluta-1

Restudy of the interval 4150 ft. to 7099 ft. using the old swc preparations and selected new cuttings samples is required.

4. Prawn-1

Restudy of two swcs at 4120 and 4145 ft. from the original preparations is required.

E. Several other wells would benefit from some minor "tidying up" of selected weak data intervals.

1. Burrungule-1

A large part of the late Cretaceous was not sampled by sidewall coring. Cuttings study up to the Lower Tertiary is recommended.

2. Caroline-1

Several very old South Australian Mines Department core preparations were very lean or barren. Resampling of 4 cores is recommended.

3. Casterton-1

Several cores were not sampled, or yielded poorly. Resampling of 7 cores is recommended.

4. Flaxmans-1

Several Esso preparations in the Early Cretaceous were almost barren. Resampling of 15 cores is recommended.

5. Port Campbell-4

Cores at the well top (upper Sherbrook Group) and base (top Otway Group) require restudy due to very poor data.

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APPENDIX I

WELL DATA SHEETS

(arranged alphabetically)

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: ARGONAUT-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T.pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus	1715	0						
		lower M. diversus					2301	3	2113	0
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	2640	0			2668	1		
		T. lillei	2907	1			2907	1		
	Camp.	N. senectus	3225	1			4292	0		
	Sant.	up. T. pachyexinus	4301	0	deeper		8758	0		
	Con.	lower T. pachyexinus	8958	2	deeper		10505	0		
	Turon	C. triplex	10600	2	deeper		12148	0		
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

DATA RECORDED BY: Roger Morgan, March 1985

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: ____ GL: ____

WELL NAME: ARGONAUT-1 TOTAL DEPTH: ____

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
		I. korojonense								
	Camp	X. australis	3225	0			4292	0		
	Sant	N. aceras	4301	0			5145	0		
		I. cretaceum	5320	1			5867	0		
	Con	O. porifera	8958	0			8958	0		
	Turon	C. striatoconus	11100	0			11322	0		
	Ceno	P. infusorioides	12135	0			12148	0		

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: BANYULA-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus	566.5	1			566.5	1		
	Paleo	upper L. balmei	640	0						
		lower L. balmei					653	2		
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus	900	4			920	3		
		upper C. paradoxa	1000	3	1120	0	1305	3	1264	0
		lower C. paradoxa	1350	4			1535	3		
		C. striatus	1567	3			1711	3	1600	0
	Apt.	upp. C. hughesi	1737	1			1753	3		
		low. C. hughesi	1798	0			1989	0		
	l.Neo	F. wonthaggiensis	1996.13	1	1997.4	0	2782	3	2679	0
	e.Neo	up. C. australiensis								

1. All depths in metres.

DATA RECORDED BY: Foster and Harris, 1983
Roger Morgan, September 1985

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: BREAK SEA REEF-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus	771	1			1022	0		
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	1050	0			1098	0		
		T. lillei	1224	1			1608	0		
	Camp.	N. senectus	1698	1			1788	0		
	Sant.	up. T. pachyexinus	1863	1			2774	0		
	Con.	lower T. pachyexinus	2811	1			3120	0		
	Turon	C. triplex	3145	1			4380	0		
	Ceno.	A. distocarinatus	4410	1			4468	1		
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in metres.

DATA RECORDED BY: Roger Morgan, 1984

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: BREAK SEA REEF-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras	2007	0			2053	0		
		I. cretaceum	2245	0			2622	0		
	Con	O. porifera	2636	1			3120	0		
	Turon	C. striatoconus	?				?			
	Ceno	P. infusorioides	4410	1			4468	1		

1. All depths in metres.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: BURRUNGULE-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus	5396	1						
	Turon	C. triplex	6524	2			7073	2	6630	0
	Ceno.	A. distocarinatus	7454	1			7560	1		
EARLY CRETACEOUS	Alb.	P. pannosus	7724	0			7857	0		
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.
2. Very few samples studied, only from the lower part of the section.
3. New cuttings samples would give better coverage in the upper part of the section.
4. No Dinoflagellate Zones recognised.

DATA RECORDED BY: Roger Morgan, March 1985

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: CAROLINE-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus	700	0			705	0		
	E. Eo	upper M. diversus								
		mid M. diversus	2454	1			2712	0		
		lower M. diversus								
	Paleo	upper L. balmei	3050	2			3050	2		
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei	3840	3			3850	3		
	Camp.	N. senectus	4105	1			4660	3	4105	0
	Sant.	up. T. pachyexinus 1514	4970	3		1658	5440			
	Con.	lower T. pachyexinus 1746	5730	4		2346	7700			
	Turon	C. triplex 2407	7900	1		2648	8690	3	7900	0
	Ceno.	A. distocarinatus 2755	9040	3		2852	9360	3		
EARLY CRETACEOUS	Alb.	P. pannosus 2970	9750	3	10061	1	11052	0		
		upper C. paradoxa					3368			
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Old core nos. 10, 11, 16 and 17 could be reprocessed to acheive better data.

DATA RECORDED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: CAROLINE-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras 1250	4105	0						
		I. cretaceum								
	Con	O. porifera			2346		7700	0		
	Turon	C. striatoconus								
	Ceno	P. infusorioides 2755	9040	4	2855		9360	3		

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** **GL:**

WELL NAME: CASTERTON-1 **TOTAL DEPTH:**

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus 614	2016	1		617	2027	0		
	Apt.	upp. C. hughesi								
		low. C. hughesi 740	2430	0		1095	3596	0		
	l.Neo	F. wonthaggiensis 1495	?4908	?		1818	5968	0		
	e.Neo	up. C. australiensis 1952	6406	1		2062	6769	0		
E. CRET.		low. C. australiensis to	7253	1						
L. JUR.		R. watherooensis	2210				7957	0		

2425

1. All depths in feet.

2. Some lean samples require reprocessing (Nos. 3, 6, 7, 9).

3. Cuttings sampling would clarify the upper Otway Group.

DATA RECORDED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB:______ GL:______

WELL NAME: CHAMA 1 and 1A TOTAL DEPTH:______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
NEOGENE	Plio	M. lipsus								
NEOGENE	Mio.	C. bifurcatus								
NEOGENE	Mio.	T. bellus								
NEOGENE	Mio.	P. tuberculatus								
NEOGENE	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
PALEOGENE	M. Eo	lower N. asperus	1235	1			1235	0		
PALEOGENE	M. Eo	P. asperopolus								
PALEOGENE	E. Eo	upper M. diversus								
PALEOGENE	E. Eo	mid M. diversus								
PALEOGENE	E. Eo	lower M. diversus								
PALEOGENE	Paleo	upper L. balmei								
PALEOGENE	Paleo	lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
LATE CRETACEOUS	Maast	T. lillei								
LATE CRETACEOUS	Camp.	N. senectus								
LATE CRETACEOUS	Sant.	up. T. pachyexinus	1654	2			1689	0		
LATE CRETACEOUS	Con.	lower T. pachyexinus	1859	1			1950	0		
LATE CRETACEOUS	Turon	C. triplex	1960	1			2395	1	2520	3
LATE CRETACEOUS	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus (792)	2600	0						
EARLY CRETACEOUS	Alb.	upper C. paradoxa					(1450) 4760	1		
EARLY CRETACEOUS	Alb.	lower C. paradoxa (1709)	5607	0			?			
EARLY CRETACEOUS	Alb.	C. striatus	?		(1859) 6100	1	(2042) 6700	3	(1935) 6350	0
EARLY CRETACEOUS	Apt.	upp. C. hughesi (2084)	6840	1						
EARLY CRETACEOUS	Apt.	low. C. hughesi					(2650) ?8700	3	(2449) 8037	0
EARLY CRETACEOUS	l.Neo	F. wonthaggiensis	(2670) 8764	2			9014 (2747)	0		
EARLY CRETACEOUS	e.Neo	up. C. australiensis								

1. All depths in feet.

DATA RECORDED BY: Roger Morgan, June 1986

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: CRAYFISH-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei	1192	0						
		lower L. balmei					1192	1		
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus	1239	1			1245	0		
	Con.	lower T. pachyexinus	1250	1			1305	0		
	Turon	C. triplex	?				?			
	Ceno.	A. distocarinatus	1473	1			1510	1		
EARLY CRETACEOUS	Alb.	P. pannosus 460	1510	0	517		1700	3	1510	0
		upper C. paradoxa	1710	4			3165	0		
		lower C. paradoxa	3297	0	1005		3297	0	1064	
		C. striatus 1123	3685	1	1356		4452	0		
	Apt.	upp. C. hughesi 1404	4608	1	1474		4608	1		
		low. C. hughesi 1467	4816	0	1595		5236	0		
	l.Neo	F. wonthaggiensis 1703	5588	1	2675		8780	0		
	e.Neo	up. C. australiensis 2770	9094	1	2191		10481	0		

1. All depths in feet.

2. Original slides have been lost.

DATA RECORDED BY: Mary Dettmann, March 1968
Roger Morgan, June 1985

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: CRAYFISH-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras	1239	1			1245	0		
		I. cretaceum	1250	1			1305	0		
	Con	O. porifera	?				?			
	Turon	C. striatoconus	?				?			
	Ceno	P. infusorioides	1473	0			1500	1		

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: EUMERALLA-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus	2835	?						
	Con.	lower T. pachyexinus					2835	?		
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus 1009	3311				3311			
		upper C. paradoxa 1158	3800				5816	1772		
		lower C. paradoxa								
		C. striatus 1839	6034				6720	2047		
	Apt.	upp. C. hughesi 2200	7225							
		low. C. hughesi					?9890	3013		
	l.Neo	F. wonthaggiensis 3138	10300	1			10300	0		
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Wilschut interpretation cannot be checked without raw data. Therefore recommend restudy of new samples.

DATA RECORDED BY: No detailed data available

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: FLAXMANS-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus	4126	1	1518		4983	0		
	Sant.	up. T. pachyexinus 1520	4987	1	1816		5961	0		
	Con.	lower T. pachyexinus 1944	6381	1	1944		6381	0		
	Turon	C. triplex 1945	6385	1	2095		6877	0		
	Ceno.	A. distocarinatus 2103	6902	1	2200		7220	1		
EARLY CRETACEOUS	Alb.	P. pannosus		?						
		upper C. paradoxa (-) 2197	7212	1	3088		10135	1	9129	0
		lower C. paradoxa 3196	10490	1	3200		10502	1		
		C. striatus 3292	10807	1	3510		11521	1		
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Data depends on Evans (1966) in the Early Cretaceous.

3. Recommend cuttings study to provide data over the Cretaceous/Tertiary boundary interval.

4. Recommend core restudy near base of well to check Early Cretaceous assignment.

DATA RECORDED BY: Dick Evans, 1966
Roger Morgan, November 1986

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: FLAXMANS-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis	4309	0	15	18	4983	0		
	Sant.	N. aceras 1520	4987	1	16	25	5336	0		
		I. cretaceum 1633	5360	1	19	44	6381	0		
	Con	O. porifera 1945	6385	1	19	45	6385	0		
	Turon	C. striatoconus 1947	6390	1	20	83	6838	0		
	Ceno	P. infusorioides 2103	6902	1	22	00	7220	1		

1. All depths in feet.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: GARVOC-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast.	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa 1015	3334	0	10	15	3334	0		
		C. striatus								
	Apt.	upp. C. hughesi 1081	3549	1	10	81	3549	1		
		low. C. hughesi 1110	3642	0	13	68	4489	0		
	l.Neo	F. wonthaggiensis N86	?4878		15	12	?4964			
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Recommend cuttings and sidewall core re-examination below 4500 ft. to resolve F. wonthaggiensis problems.

3. Recommend cuttings examination between 3334 and 3549 ft. to locate C. striatus Zone.

DATA RECORDED BY: Mary Dettmann, October 1968

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** **GL:**

WELL NAME: GELTWOOD BEACH-1 **TOTAL DEPTH:**

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T.pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus	1880	3			1900	3		
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	2000	0			2015	0		
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus	2650	1			3332	0		
	Con.	lower T. pachyexinus								
	Turon	C. triplex	3632	1			3720	3	3647	0
	Ceno.	A. distocarinatus	3771	1			3910	3	3791	1
EARLY CRETACEOUS	Alb.	P. pannosus	4090	0			4405	0		
		upper C. paradoxa	4519	1			6520	0		
		lower C. paradoxa	7546	0			7550	1		
		C. striatus	8046	1			9369	0		
	Apt.	upp. C. hughesi	9857	1			10326	1		
		low. C. hughesi	10781	0			12300	3	11741	0
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. No further work required.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: GL:

WELL NAME: GELTWOOD BEACH-1 TOTAL DEPTH:

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras								
		I. cretaceum								
	Con	O. porifera								
	Turon	C. striatoconus								
	Ceno	P. infusorioides	3771	0			3910	3	3791	0

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: GREENBANKS-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus	290	3						
		lower M. diversus					380	3		
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	454.0	0			454.0	0		
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa	569.0	0						
		lower C. paradoxa	?569.0				812.0	0		
		C. striatus								
	Apt.	upp. C. hughesi	1155.0	0						
		low. C. hughesi					1195.0	0		
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								
		indeterminate	1207.0				1207.0			

1. All depths in metres.

2. Data quality is patchy. Restudy is required to -

   - test for 7 missing zones between 454-569m.
   - improve Otway Group zonal resolution.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: KALANGADOO-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
NEOGENE	Plio	M. lipsus								
NEOGENE	Mio.	C. bifurcatus								
NEOGENE	Mio.	T. bellus								
NEOGENE	Mio.	P. tuberculatus								
NEOGENE	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
PALEOGENE	M. Eo	lower N. asperus								
PALEOGENE	M. Eo	P. asperopolus								
PALEOGENE	E. Eo	upper M. diversus								
PALEOGENE	E. Eo	mid M. diversus								
PALEOGENE	E. Eo	lower M. diversus								
PALEOGENE	Paleo	upper L. balmei	?1600	3			?1610	3		
PALEOGENE	Paleo	lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	1993	0			2008	0		
LATE CRETACEOUS	Maast	T. lillei								
LATE CRETACEOUS	Camp.	N. senectus								
LATE CRETACEOUS	Sant.	up. T. pachyexinus								
LATE CRETACEOUS	Con.	lower T. pachyexinus								
LATE CRETACEOUS	Turon	C. triplex	2503	1			2513	0		
LATE CRETACEOUS	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus	2600	4			3414	0	3810	3
EARLY CRETACEOUS	Alb.	upper C. paradoxa	3600	3	3917	1	4363	0		
EARLY CRETACEOUS	Alb.	lower C. paradoxa	4480	3			4620	3		
EARLY CRETACEOUS	Alb.	C. striatus	4770	1			4776	0		
EARLY CRETACEOUS	Apt.	upp. C. hughesi	5288	1			5295	1		
EARLY CRETACEOUS	Apt.	low. C. hughesi	5634	0			6134	0		
EARLY CRETACEOUS	l.Neo	F. wonthaggiensis	6632	1			6642	0		
EARLY CRETACEOUS	e.Neo	up. C. australiensis								

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: LINDON-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus	1216.5	1			1216.5	0		
	Con.	lower T. pachyexinus	1223.1	1			1223.1	0		
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa	1545	1			1948	0		
		lower C. paradoxa	2010	0						
		C. striatus					2400	3		
	Apt.	upp. C. hughesi	2449	1			2500	3		
		low. C. hughesi	2620	4			2980	3	2902.5	0
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in metres.

DATA RECORDED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: LINDON-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras								
		I. cretaceum								
	Con	O. porifera	1216.5	1			1223.5	0		
	Turon	C. striatoconus								
	Ceno	P. infusorioides								

DATA RECORDED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: GL:

WELL NAME: LUCINDALE-1 TOTAL DEPTH:

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa	1000	3			1090	3		
		C. striatus	1200	1			1600	0		
	Apt.	upp. C. hughesi	1850	1			2000	1		
		low. C. hughesi	2100	0			2350	0		
	l.Neo	F. wonthaggiensis	2408	1			3000	0		
	e.Neo	up. C. australiensis	3100	1			3152	0		

1. All depths in feet.

DATA RECORDED BY: Evans and Mulholland, 1970
Roger Morgan, July 1985

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: MORUM-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast.	T. longus								
		T. lillei	1790	3			1820	3		
	Camp.	N. senectus	2000	3			3080	3		
	Sant.	up. T. pachyexinus	3290	3			4500	0		
	Con.	lower T. pachyexinus	4600	1			6305	0		
	Turon	C. triplex	6353	1			7985	0		
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

DATA RECORDED BY: Alan Partridge, 1975
Roger Morgan, June 1985

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: MORUM-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense	1790	3			1820	3		
		X. australis	2210	0			2780	1		
	Sant	N. aceras	3020	0			3320	3		
		I. cretaceum	3550	1			4908	0		
	Con	O. porifera	5058	1			6353	0		
	Turon	C. striatoconus	6490	0			6623	0		
	Ceno	P. infusorioides	7985	0			7985	1		

1. All depths in feet.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: MUSSEL-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus	4152	1			4208	0		
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	4315	0						
		T. lillei					4854	0		
	Camp.	N. senectus	5084	0			6061	0		
	Sant.	up. T. pachyexinus	?6660							
	Con.	lower T. pachyexinus					?6660			
	Turon	C. triplex	6891	1			6891	0		
	Ceno.	A. distocarinatus	7337	1			7396	0		
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								
		undiff. Cret.								
		(cutts)	7500				8010			

1. All depths in feet.

2. lillei-longus interval needs re-examination. Original work predates much taxonomic work.

3. Cuttings at section base could be useful if Otway Group penetration is suspected.

DATA RECORDED BY: Dick Evans & Robin Mulholland, 1969

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: ________ GL: ________

WELL NAME: MUSSEL-1 TOTAL DEPTH: ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense	?4462				?4654			
		X. australis	4854	0			6061	0		
	Sant	N. aceras								
		I. cretaceum	6660	1			6660	0		
	Con	O. porifera								
	Turon	C. striatoconus								
	Ceno	P. infusorioides	7348	0			7396	0		

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ________ GL: ________

WELL NAME: NAJABA-1 TOTAL DEPTH: ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus	1311	1			1382	0		
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei	1460.5	0			1460.5	1		
LATE CRETACEOUS	Maast.	T. longus	1496	0			1496	0		
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus	2186.5	1			2186.5	0		
	Turon	C. triplex	2520	1			2805	0		
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa	2887	1			2887	0		
		lower C. paradoxa	3400	0						
		C. striatus					3400	0		
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in metres.

2. Data is poor and incomplete to due large effective sample gaps.

   Further work is required to

   - test for the missing Paleocene-Early Eocene Zones (80m gap)
   - test for the 3 missing Late Cretaceous Zones (680m gap)
   - test for the 2 missing Middle Cretaceous Zones (80m gap)
   - Clarify the poorly controlled basal section (500m)

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: GL:

WELL NAME: NAJABA-1 TOTAL DEPTH:

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii	1496	0			1496	0		
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras								
		I. cretaceum								
	Con	O. porifera	2186.5	2			2186.5	0		
	Turon	C. striatoconus								
	Ceno	P. infusorioides								

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: NORTH EUMERALLA-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus	1172	2			1172	0		
		P. asperopolus								
	E. Eo	upper M. diversus	1244	2			2526	0		
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei	2632	0			2792	1		
LATE CRETACEOUS	Maast	T. longus	2852	0			2852	0		
		T. lillei	2946	1			3241	1	3217	0
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus 1036	3402	1			3402	0		
		upper C. paradoxa 1077	3534	1						
		lower C. paradoxa			14	63	4802	0		
		C. striatus 1666	5467	1	17	93	5884	0		
	Apt.	upp. C. hughesi 1859	6100	1						
		low. C. hughesi			19	18	6294	0		
	1.Neo	F. wonthaggiensis 2076	6815	1	26	74	8777	0		
	e.Neo	up. C. australiensis								
		metamorphic								
		basement 2697	8850		29	67	9737	10		

1. All depths in feet.

2. Re-examination of 6815 ft. (swc) recommended to clarify apparent seismic/palynological discrepency.

3. Re-examination of 2946 ft. (swc) and 3020 ft. (swc) recommended to resolve apparent dinoflagellate/spore-pollen conflict.

DATA RECORDED BY: Wilschut, 1974

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: PECTEN-1A TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus	1892	2			1892	0		
		P. asperopolus								
	E. Eo	upper M. diversus	2632	2			3280	0		
		mid M. diversus								
		lower M. diversus	3338	2			3362	2		
	Paleo	upper L. balmei	3618	0						
		lower L. balmei					3695	2		
LATE CRETACEOUS	Maast	T. longus	3735	0						
		T. lillei					4493	1	4044	0
	Camp.	N. senectus	4685	1	15	47	5078	0		
	Sant.	up. T. pachyexinus 1579	5182	1						
	Con.	lower T. pachyexinus			17	22	5650	0		
	Turon	C. triplex 1747	5735	1	17	48	5735	0		
	Ceno.	A. distocarinatus 1775	5827	1	17	75	5827	1		
EARLY CRETACEOUS	Alb.	P. pannosus 1804	5920	0	18	03	5920	0		
		upper C. paradoxa 1820	5977	1	24	13	7920	0		
		lower C. paradoxa								
		C. striatus 2604	8546	1	27	83	9132	0		
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								
		undiff. K.	9210				9305			

1. All depths in feet.

2. lillei-longus interval needs new study to resolve zones.

DATA RECORDED BY: Muller, 1967
Mary Dettmann, 1967

DATA REVIEWED BY: Roger Morgan, 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB:____ GL:____

WELL NAME: PECTEN-1A TOTAL DEPTH:____

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense	3735	1			4493	0		
		X. australis	4685	0			4685	0		
	Sant	N. aceras								
		I. cretaceum								
	Con	O. porifera								
	Turon	C. striatoconus								
	Ceno	P. infusorioides								

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: PENOLA-1 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus	1200	0			1210	0		
		upper C. paradoxa	1400	1			2596	0		
		lower C. paradoxa	2790	0			3190	0		
		C. striatus	3363	1			3373	0		
	Apt.	upp. C. hughesi								
		low. C. hughesi	3514	0			3729	0		
	l.Neo	F. wonthaggiensis	3917	1			4776	0		
	e.Neo	up. C. australiensis								

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: ______ GL: ______

WELL NAME: PORT CAMPBELL-4 TOTAL DEPTH: ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus 1399	4590	1						
	Con.	lower T. pachyexinus			1403		4605	0		
	Turon	C. triplex 1493	4900	1	1524		5000	0		
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus 1755	5759	1	1755		5759	0		
		upper C. paradoxa								
		lower C. paradoxa 1853	?6082	2			?6082	2		
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.
2. Data is generally poor and non-existent above 4590 ft. Restudy is recommended particularly above 4590 ft. and below 5759 ft.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: PORT CAMPBELL-4 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras								
		I. cretaceum 1399	4590	1	14	02	4601	0		
	Con	O. porifera 1403	4605	1	14	03	4605	0		
	Turon	C. striatoconus								
	Ceno	P. infusorioides								

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: PRAWN A-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
NEOGENE	Plio	M. lipsus								
NEOGENE	Mio.	C. bifurcatus								
NEOGENE	Mio.	T. bellus								
NEOGENE	Mio.	P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
PALEOGENE	M. Eo	lower N. asperus								
PALEOGENE	M. Eo	P. asperopolus								
PALEOGENE	E. Eo	upper M. diversus								
PALEOGENE	E. Eo	mid M. diversus	3938	1						
PALEOGENE	E. Eo	lower M. diversus					3957	1		
PALEOGENE	Paleo	upper L. balmei								
PALEOGENE	Paleo	lower L. balmei								
LATE CRETACEOUS	Maast	T. longus	4120	0						
LATE CRETACEOUS		T. lillei	?4120				4145	0		
LATE CRETACEOUS	Camp.	N. senectus	4254	1			4962	0		
LATE CRETACEOUS	Sant.	up. T. pachyexinus	5297	1						
LATE CRETACEOUS	Con.	lower T. pachyexinus					7177	0		
LATE CRETACEOUS	Turon	C. triplex	7278	1			8307	0		
LATE CRETACEOUS	Ceno.	A. distocarinatus	8697	1			9560	2		
EARLY CRETACEOUS	Alb.	P. pannosus	9869	2			10087	0		
EARLY CRETACEOUS	Alb.	upper C. paradoxa	10450	1			10477	0		
EARLY CRETACEOUS	Alb.	lower C. paradoxa								
EARLY CRETACEOUS	Alb.	C. striatus								
EARLY CRETACEOUS	Apt.	upp. C. hughesi								
EARLY CRETACEOUS	Apt.	low. C. hughesi								
EARLY CRETACEOUS	l.Neo	F. wonthaggiensis								
EARLY CRETACEOUS	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Restudy of the longus-lillei sidewall cores is recommended

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: PRAWN A-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense	?4120				?4120			
		X. australis	4254	0			4283	0		
	Sant	N. aceras	?				?			
		I. cretaceum	6145	1			6145	0		
	Con	O. porifera								
	Turon	C. striatoconus	7278	1			7298	0		
	Ceno	P. infusorioides	?8697				?9560			

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** KB: ________ GL: ________

WELL NAME: PRETTY HILL-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast.	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus 831	2726	?						
	Con.	lower T. pachyexinus					2726	?		
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus 892	2928				2928			
		upper C. paradoxa 1018	3340		1418		4655			
		lower C. paradoxa 1505	4940	?			4940	?		
		C. striatus								
	Apt.	upp. C. hughesi 1651	5420		1812		5947			
		low. C. hughesi 1850	6070							
	l.Neo	F. wonthaggiensis			1946		6388			
	e.Neo	up. C. australiensis 2039	6690	?	2198		7214	?		
		basement 2399	7874		2475		8124			

1. All depths in feet.

2. Wilschut (1974) interpretation only. Cannot be evaluated.

3. Recommend full restudy.

DATA RECORDED BY: No detailed data available.

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES **ELEVATION:** **KB:** ________ **GL:** ________

WELL NAME: TRITON-1 **TOTAL DEPTH:** ________

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus	1700	3			1720	3		
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei	1730	4						
		lower L. balmei					1730	3		
LATE CRETACEOUS	Maast	T. longus	1740	4						
		T. lillei					1750	3		
	Camp.	N. senectus	1760	4			2095	3		
	Sant.	up. T. pachyexinus	2395	3			2595	3		
	Con.	lower T. pachyexinus	2795	4			3225	3		
	Turon	C. triplex	3260	3			3375	3		
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								
		indeterminate	3385				3540			

1. All depths in metres.
2. Precision is often low due to the lack of sidewall cores.
   The data is almost entirely cuttings based.

DATA RECORDED BY: Esso, 1982

DATA REVIEWED BY: Roger Morgan, November, 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB:______ GL:______

WELL NAME: TRITON-1 TOTAL DEPTH:______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Maas.									
	Camp	I. korojonense								
	Camp	X. australis	1760	4			1895	3		
	Sant.	N. aceras	1945	4			2395	3		
	Sant.	I. cretaceum	2495	3			2975	3		
	Con	O. porifera	2995	3			3250	3		
	Turon	C. striatoconus								
	Ceno	P. infusorioides								

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: GL:

WELL NAME: TRUMPET-1 TOTAL DEPTH:

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus								
		lower M. diversus								
	Paleo	upper L. balmei								
		lower L. balmei								
LATE CRETACEOUS	Maast.	T. longus								
		T. lillei								
	Camp.	N. senectus								
	Sant.	up. T. pachyexinus								
	Con.	lower T. pachyexinus								
	Turon	C. triplex								
	Ceno.	A. distocarinatus								
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus 851	2794	1			1007 3306	0		
	Apt.	upp. C. hughesi 1140	3740	0			?4310		1313	
		low. C. hughesi 1320	?4333				4333	0	1380	
	l.Neo	F. wonthaggiensis 1404	4608	1			7050	0	2148	
	e.Neo	up. C. australiensis								

1. All depths in feet.
2. No control exists above the mid Eumeralla Formation.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB:______ GL:______

WELL NAME: VOLUTA-1 TOTAL DEPTH:______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	HIGHEST DATA Alternate Depth	Rtg	LOWEST DATA Preferred Depth	Rtg	LOWEST DATA Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Oligo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus								
	E. Eo	upper M. diversus								
		mid M. diversus	4151	1						
		lower M. diversus					4151	1		
	Paleo	upper L. balmei	4267	0			4267	0		
		lower L. balmei	4370	1			4370	1		
LATE CRETACEOUS	Maast	T. longus	4566	0						
		T. lillei					5971	2	5773	1
	Camp.	N. senectus	6054	1	2163		7099	0		
	Sant.	up. T. pachyexinus 2166	7101	1						
	Con.	lower T. pachyexinus			2712		8901	0		
	Turon	C. triplex 3035	9962	1	3653		11989	0		
	Ceno.	A. distocarinatus 3590	12767	?						
EARLY CRETACEOUS	Alb.	P. pannosus								
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	F. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Data generally good, but balmie-lillei interval needs restudy.

DATA RECORDED BY: Mary Dettmann, 1968

DATA REVIEWED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES **ELEVATION:** **KB:** ______ **GL:** ______

WELL NAME: VOLUTA-1 **TOTAL DEPTH:** ______

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
			4620	0						
	Camp	I. korojonense					4806	0		
		X. australis	5885	0	21	07	6917	0		
	Sant	N. aceras 2164	7101	1	21	64	7103	0		
		I. cretaceum 2230	7320	1	25	05	8224	0		
	Con	O. porifera 2555	8387	1	26	26	8617	0		
	Turon	C. striatoconus								
	Ceno	P. infusorioides								