Palynology cross-section between Megascolides-1 and 2 wells, onshore Gippsland Basin.

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Summary

The accompanying cross-section prepared using the StrataBugs™ range charting program provides a palynological and electric log correlation of the Strzelecki Group penetrated by the Megascolides-1 and 2 wells, located in the Narracan Trough.

The two wells are interpreted to penetrate similar age Strzelecki Group sections, starting at the top in the Aptian part of the *Pilosisporites notensis* Zone, and bottoming in the Hauterivian (or possible uppermost Valanginian) age *Foraminisporis wonthaggiensis* Zone at around 1900m. Over the bottom 100 to 200 metres of the Strzelecki Group in both wells the preservation of the palynological assemblages becomes extremely poor and the reliability of the age dating declines dramatically, and as a consequence the true age of the base of the group is uncertain and potentially confused by downhole cavings.

The principal conclusions derived from the review of the palynological data, as displayed on the cross-section, are as follows:

1. The shallowest Cretaceous assemblages in Megascolides-1 are re-interpreted as no younger than the *Pilosisporites notensis* Zone, and these assemblages do not extend into the younger *Crybelosporites striatus* Zone as has been previously suggested.
2. The base of the *Pilosisporites notensis* Zone is identified as deep as 1475m in Megascolides-2 and as deep as 1550m in Megascolides-1, indicating a thickness of >1.5 km for this zone in both wells.
3. Based on re-examination of palynological slides from Megascolides-1 and a review of the assemblages in Megascolides-2 the next older *Foraminisporis wonthaggiensis* Zone is identified between 1780 and 1895m in Megascolides-1, and between 1625 and 1915m in Megascolides-2.
4. Within the *F. wonthaggiensis* Zone the new *Laevigatosporites belfordii* Subzone is established. This new local subzone is based on the incoming of a suite of spore species that have not previously been recorded in the Gippsland Basin. The subzone was first identified in Megascolides-2 between 1720 and 1915m, and has in this report has been found in the cuttings samples at 1780 and 1875m in Megascolides-1.
5. The bottom six cuttings samples in Megascolides-2 and the core sample and two deeper cuttings in Megascolides-1 are all extremely poorly preserved, adversely affecting the confidence in the zone assignments. These assemblages are definitely no older than Early Cretaceous, and are probably not older than the *Foraminisporis wonthaggiensis* Zone.

Combining the palynological zones with the electric logs and cuttings lithologies a "basal shale" unit is identified in both wells which increases in thickness from 52 metres in Megascolides-1 to 160 metres in Megascolides-2. Immediately above this "basal shale" is identified a thin "transition unit" which can be identified in both wells. Based on a larger scale portion of the cross-section the thin "Rintouls Creek" oil reservoir which lie at the base of the "transition unit" in Megascolides-1 is suggested to correlate with the interval 1895 to 1900m in Megascolides-2.

Introduction

This report presents the results of the re-examination of palynological slides from Megascolides-1 well, which were originally analysed by Wagstaff (2005), and the comparison and integration of the new results obtained with the existing palynological data from Megascolides-2. The need for a review and additional analysis of the Megascolides-1 palynological assemblages became apparent at a meeting at the offices of Karoon Gas Australia Ltd on 14th May 2007. During a presentation at that meeting of the results of the palynological analysis of Megascolides-2 by Partridge (2007) it was found that the available palynological data did not allow a rational correlation between the two wells. Therefore, it was resolved, to attempt to improve the correlations by displaying selected palynological data against the electric logs and cuttings lithologies on a cross-section between the two wells using the capabilities of the StrataBugs™ range charting program.

Two versions of the StrataBugs™ cross-section are provided in the form of Adobe PDF images as attachments to this report. The larger chart is 1:5000 scale version of the complete Cretaceous section in the two wells, while the smaller chart is a 1:2000 scale version of bottom part of the succession in the wells which is datumed on the top of the "basal shale" unit. The accompanying text in this report provides discussion of the principal palynological and geological interpretations, and background information on the construction of the cross-sections. The latter explanation is necessary as not all panels displayed on the cross-sections are self-explanatory, and it is not possible to provide either extended explanations or comprehensive legends on the charts. To avoid unnecessary clutter only selected palynological species and abundance data from the two wells have been plotted.

Discussion of Palynological Results

For this review the original palynological samples from Megascolides-1 were all given a basic count of at least 100 specimens and most of the slides were also scanned to confirm the presence (or absence) of the species recorded by Wagstaff (2005), and to also find any additional species that may have been missed. The revised zone assignments for all palynological samples are provided in Tables 1 and 2, while the principal zones identified are discussed under the subheadings below:

Non-verification of the *Crybelosporites striatus* Zone: All the oxidised slides from the three shallowest cuttings at 75m, 295m and 550m in Megascolides-1 were fully scanned without finding the species *Crybelosporites striatus* or *Coptospora striata* that had been recorded by Wagstaff (2005). As the presence of these key index species could not be verified the shallowest assemblages are re-interpreted as belonging to the older *Pilosisporites notensis* Zone and **not** the *Crybelosporites striatus* Zone. This change makes Megascolides-1 more consistent with the results obtained from Megascolides-2. The revision is also more consistent with the occurrence of *Cooksonites variabilis*, which is recorded from the shallowest productive sample at 75m in Megascolides-2 and from the second shallowest sample at 295m in Megascolides-1. Because the top of the known stratigraphic range of *Cooksonites variabilis* defines the top of the Lower *P. notensis* Zone according to Morgan *et al.* (1975), the presence of this species at or near the top of the Cretaceous section in both wells suggests forcefully that the eroded top of the Strzelecki Group is not even close to the top of the *P. notensis* Zone.

***Pilosisporites notensis* Zone:** This zone is identified as deep as 1475m in Megascolides-2 and as deep as 1550m in Megascolides-1, indicating a thickness of in excess of 1500 metres in both wells. The rare deeper records of the species *Pilosisporites notensis* and *Foraminisporis asymmetricus* in Megascolides-1 are in this report interpreted to be caved specimens in the assemblages.

***Foraminisporis wonthaggiensis* Zone:** In Megascolides-1 this zones is now identified between 1780 to 1895m, with new records of the eponymous species *Foraminisporis wonthaggiensis* extending the base of the zone to the core at 1890m and cuttings at 1895m. The only deeper sample analysed from Megascolides-1 is the cuttings at 2000m from the interval identified as the Duck Bay Volcanics, and the poor assemblage recovered most likely reflects cavings coming from the "basal shale" unit between 1890 and 1942m. This caved assemblage is no older than Early Cretaceous.

In Megascolides-2 the *F. wonthaggiensis* Zone is identified between 1625 and 1915m. Although the eponymous species is only recorded down to 1855m, the base of the zone is now picked deeper at 1915m based on the joint occurrence in that cuttings of *Triporoletes reticulatus* and the acritarch

Microfasta evansii. These two species are not considered to range below the *F. wonthaggiensis* Zone according to Morgan *et al.* (1995, fig.6.1). Assemblages from the four cuttings between 1950 and 2055m from the "basal shale" unit are extremely poorly preserved and cannot be confidently assigned to a zone, while the two deepest at 2070 and 2130m, from the basement section, are interpreted to be entirely caved. Notwithstanding the latter, when the deepest six samples are treated as a single composite assemblages they are interpreted as definitely not older than Early Cretaceous, and probably no older than the *F. wonthaggiensis* Zone.

***Laevigatosporites belfordii* Subzone:** This is a new local subzone, within the *F. wonthaggiensis* Zone, which is based on the first downhole occurrence of a suite of spore species that are not found in shallower cuttings. The important species are *Laevigatosporites belfordii, Murospora florida, Aequitriradites hispidus, Cicatricosisporites* sp. cf. *C. hughesii* of Backhouse 1988, and some questionably identified specimens of *Crybelosporites stylosus*. These five species were initially identified in cuttings from Megascolides-2 between 1720 and 1915m, and most have subsequently been identified in the cuttings samples at 1780 and 1875m in Megascolides-1.

To the best of the author’s knowledge this association or grouping of species has never previously been recorded from the Gippsland Basin. This probably means the age interval represented by this new subzone has not previously been intersected in other wells and bores. Alternatively, and sadly just as likely, these palynomorphs may have simply been overlooked by other palynologists. The latter possibility is hinted at by other isolated occurrences of a couple of the species. For instance, the only previous record of *Murospora florida* in the Gippsland Basin is from an outcrop sample described as a “*highly carbonaceous slate*” collected from near the base of the Tyers Subgroup along Paradise Creek in the Boola Forest (Dettmann, 1963; p.131). While the only known prior record of the spore *Crybelosporites stylosus* is from a coal sample from the Kirrak Area of the Wonthaggi State Coal Mine, whose precise stratigraphic position is unknown (Dettmann, 1963; p.120).

Specimens questionably referred to *Aequitriradites hispidus* have also been reported from the Loy Yang-1A well in cuttings between 805 and 1100m by Hos (1995). However, as the reported occurrences come from the upper part of the thick *P. notensis* Zone in Loy Yang-1A it is considered more likely that they represent misidentification of the related species *Aequitriradites spinulosus*, which is overall much more common in the Strzelecki Group yet was not reported in any of the samples analysed by Hos (1995).

Geological Implications

The two Megascolides wells provide significant new information on the Strzelecki Group in the Gippsland Basin, with the most important insights summarised in descending stratigraphic order below:

1. The eroded top of the Strzelecki Group encountered in both wells lies **within** the Aptian (*P. notensis* Zone), and based on the known thickness of the younger *Crybelosporites striatus* and *Coptospora paradoxa* Zones in the Gippsland Basin it is estimated that a minimum of 2 km has been eroded from the top of the group at the two well locations.

2. The *P. notensis* Zone in the two Megascolides wells is over 1500 metres thick. This is comparable to the thickness recorded in the Loy Yang-1A well, where the zone has been recorded between 178 and 1534m. The only other well that probably penetrates a comparable thickness is Wellington Park-1. In the latter, the *P. notensis* Zone is identified between 2086 and 2565m, but potentially could be much thicker as there is another 1096 metres of undated section, with carbonised and indeterminate palynological assemblages down to the TD of the well at 3661m. The next thickest penetration of the Strzelecki Group is by the Woodside-2 well

which drilled ~1590 metres of the group. In Woodside-2 the *P. notensis* Zone is recorded from the bottom hole core at 2701mTD, but can extend no shallower than the core at 2100m for a maximum zone thickness of less than 600 metres.

3. The *F. wonthaggiensis* Zone has a sampled thickness of 115 metres in Megascolides-1 and 290 metres in Megascolides-2, but based on log correlations derived from the cross-sections, and the assumption that the zone extends to the top of the Duck Bay Volcanics in the first well and top of the meta-sediments in the second well, the overall thickness of the zone could be of the order of 300 metres in Megascolides-1 compared to 450 metres in Megascolides-2, with the extra section being introduced near the base of the Strzelecki Group in the latter well.[1] If the entire time duration of the zone is indeed present these comparatively limited thicknesses represent a decline in the overall rate of deposition for the lower part of the Strzelecki Group to less than one-third of that found in the younger section belonging to the *P. notensis*, *C. striatus* and *C. paradoxa* Zones, based on the latest geologic time scale (Partridge, 2006). Other alternative explanations are that either the complete duration of the *F. wonthaggiensis* Zone is not represented, or that a significant unconformity is present in the basal part of the succession.

   Deciding which is the most likely alternative is currently not possible as the distribution of the *F. wonthaggiensis* Zone in the Gippsland Basin is very poorly understood. This is largely because most poorly preserved, low diversity assemblages, are by default assigned to this zone if they lack index species diagnostic of the younger zones. However, recent palynological analyses by the author based on fresh laboratory preparations from many of the old wells have demonstrated that many early palynological zone assignments are in error simply because the recovered assemblages are too limited to make a confident age assignment. Such poor assemblages can only confirm a much broader and generalised Early Cretaceous age.

   These types of problems with the *F. wonthaggiensis* Zone extend to the important question of the age range of the Tyers River Subgroup. In the recent study of the outcrops of the subgroup by Tosolini *et al*. (1999) the palynological assemblages recovered from the Rintouls Creek Formation are assigned to the *F. wonthaggiensis* Zone, while assemblages from the underlying Tyers Conglomerate lack this zone species and may be older. Unfortunately, the latter unit has so far only yielded low diversity assemblages which could simply be non-diagnostic. The full species lists recorded by the co-authors of the Tosolini *et al*. (1999) paper are not available for review so it is not possible to make an independent assessment of their zone assignments.

4. The identification of the new *Laevigatosporites belfordii* Subzone in both Megascolides wells provides an important correlation horizon between the two wells and confirms that both wells penetrated essentially the same age section. Sadly, this conclusion could not be derived from a comparison of the original palynological reports from the two wells. The larger number of cuttings samples analysed in Megascolides-2 also suggest that the *L. belfordii* Subzone occurs within, rather than at the top of the *F. wonthaggiensis* Zone.

   The base of the *L. belfordii* Subzone most likely lies at or just above the "basal shale" unit that is present in both wells. The occurrence of the eponymous index species *Laevigatosporites*

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[1] To derived the suggested possible maximum thickness for the *F. wonthaggiensis* Zone the difference between the actual cuttings samples analysed have been roughly split, and referring to the density/porosity logs in preference to the gamma ray the log pick at ~1640m in Megascolides-1 is correlated to ~1610m in Megascolides-2. These picks are for the purpose of discussion of the geology and may not necessarily withstand the test of more detailed palynological sampling and analysis.

belfordii at 1915m in Megascolides-2 is possibly caved, and consequently the base of the subzone in that well may have been identified too low.

5. Both wells contain a distinctive “basal shale” unit at the bottom of the Strzelecki Group which is best expressed on the gamma ray and density/porosity logs. In Megascolides-2 this unit extends from 1900 to 2060m and is 160 metres thick, whereas in Megascolides-1 the unit extends from 1890 to 1942m and is only 52 metres thick. Based on the palynological assemblages from the conventional core sample at 1890m in Megascolides-1, which contains *Foraminisporis wonthaggiensis*, and the assemblages from cuttings between 1915 and 2000m in Megascolides-2, which contain the acritarch *Microfasta evansii*, this basal shale unit is interpreted to be no older than the *F. wonthaggiensis* Zone.

6. Immediately above the “basal shale” there is a thin 25 metre thick “transition unit” that is best expressed on the combined density/porosity logs. This “transition unit” extends from 1865 to 1890m in Megascolides-1 and from 1875 to 1900m in Megascolides-2, and contains the thin sandstone identified as the Rintouls Creek Formation and Main Oil Zone on the composite log for Megascolides-1. According to the palynological assemblages recovered from cuttings over these intervals this “transition unit” in both wells lies at the base of the *L. belfordii* Subzone. Although the oil horizon was not recognised in Megascolides-2 based on the correlations displayed on the larger scale and datumed cross-section the thin "Rintouls Creek" oil reservoir, which lie at the base of this "transition unit" in Megascolides-1 is suggested to be equivalent to the interval 1895 to 1900m in Megascolides-2.

Description of StrataBugs™ cross-section

The StrataBugs™ range charting program, developed and distributed by StrataData Ltd of the United Kingdom, is a PC based application principally designed to display the distribution of all types of fossil assemblages in either subsurface well sections or in measure outcrop stratigraphic sections. The key strengths of the program are its ability to displayed the distribution of the fossils proportional to their depth of occurrence in well sections and in terms of either their absolute or relative abundances (the latter expressed as a percentage). Ancillary strengths of the program are its ability to display the fossil biostratigraphic data against electric logs, lithological and environmental columns, and to provide various interpretative columns for stratigraphy, zones, ages and sequences. More than one well can also be displayed on a single chart, which provides the functionality to use the program to construct cross-sections. The various “panels” or columns displayed for the two wells on the cross-section charts are briefly described below in order from left to right:

Depth Panel: Provides a scale for charts in feet or metres in terms of measured depth.

Stratigraphy Panel: This column provides a summary of the stratigraphic units within the well and is derived from tables compiled within the IGD (Interpreted Geological Data) menu of the program.

Reservoirs Panel: This column on the larger scale and cropped cross-section displays the position of the thin "Rintouls Creek" oil reservoir in Megascolides-1.

Casing Panel: Shows the position of the casing points within the succession analysed. Knowledge of the casing points can be important for interpretation of the palynological succession based on cuttings, because their locations are often reflected in the assemblages by marked changes in the abundance and diversity of caved palynomorphs.

Electric log Panels: Where available separate columns for the Gamma Ray and SP logs, the sonic, and density/porosity logs are provided for the two wells on the cross-section. The log data is read by the StrataBugs™ program from ".txt" files. Where possible the logs are scaled so they resemble the original paper-copies of the logs. However, in some columns the scales have been shifted so that the log traces are separated and easier to decipher (eg. columns with gamma ray and SP logs).

Cuttings Lithologies Panel: In place of the standard graphical lithological panel provided by the StrataBugs program, the percentages of "sand", "shale", "coal" and either "volcanics" or "meta-sediments" derived from the detailed cuttings descriptions have been prepared as ".txt" files, and this data is added to the cross-section using the same procedures for adding the Electric Log Panels. There are however some constraints on this procedure as only four curves (ie. lithologies) can be used and the colours available for display are restricted. Notwithstanding these limitations the resultant panels display approximate sand**:**shale ratios through the two wells, which are far more informative than what can be achieved by using the standard graphical procedure. Note also that on these lithological profiles the "shale" category represents the sum of all the fine-grained mudstone, claystone and siltstone lithologies in the cuttings descriptions.

Zone Panels: The columns for the Spore-Pollen zones and subzones are derived from data entered into tables in the IGD menu. The picks for the zone boundary are wherever possible the actual samples analysed, but alternatively arbitrary log depths may need to be added between samples so that there is enough room in the columns for the zone names to be printed on the charts.

Samples Panel: This column displays the samples analysed for palynology in the two wells. The sample types are represented by symbols. A simple line is for cuttings samples, a filled triangle is of sidewall cores and a filled circle is for conventional cores.

Biostratigraphic Panels: The final three panels for each well display the distribution of individual palynomorphs. The first panel for each well shows the variation in abundance of the most dominant spore-pollen species in the assemblages. The final two panels display the stratigraphic ranges of the principal index species of spore-pollen and microplankton in the assemblages. As none of these index species are recorded in abundances of more than a few percent in the samples it is not essential to display their abundances. The species are plotted within the panels either in alphabetical order or according to their shallowest or youngest occurrences. The following abbreviations apply to the individual species occurrences and abundances on the range chart:

Numbers	=	Abundance expressed as percentage
+	=	Species outside of count
C	=	Caved species
R	=	Reworked species
?	=	Questionable identification of species.

Author citations for the recorded spore-pollen species can be sourced from papers by Dettmann (1963), Dettmann & Playford (1968), Helby *et al.* (1987) and Stover & Partridge (1973), while the author citations for the microplankton species can be sourced from the indexes for dinocysts and other organic-walled microplankton prepared by Fensome *et al.* (1990) and Williams *et al.* (1998).

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Table 1. Interpretative data for Megascolides-1, onshore Gippsland Basin.

Sample Type	Depths	Spore-Pollen Zones STAGE/AGE	CR*	Comments and Key Species Present
Cuttings	75m	Upper *P. notensis* Zone **Barremian to Aptian**	D2	LADs of *Pilosisporites notensis* and *Cyclosporites hughesii* and algae *Schizosporis reticulatus*
Cuttings	295m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	LADs of *Cooksonites variabilis* and angiosperm pollen *Clavatipollenites hughesii*.
Cuttings	550m	Lower *P. notensis* Zone **Barremian to Aptian**	D3	*Pilosisporites notensis* present in sample dominated by *Cyathidites* spores.
Cuttings	770m	Lower *P. notensis* Zone **Barremian to Aptian**	D2	*Pilosisporites notensis* present in sample dominated by *Cyathidites* spores.
Cuttings	1005m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	FAD in well of *Cooksonites variabilis*
Cuttings	1235m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	FAD of angiosperm pollen *Clavatipollenites hughesii*.
Cuttings	1550m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	FADs (*in situ*) of key index species *Pilosisporites notensis* and *Foraminisporis asymmetricus*
Cuttings	1780m	*F. wonthaggiensis* Zone and *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D1	LADs of spores *Laevigatosporites belfordii* and *Aequitriradites hispidus* in assemblage containing *Foraminisporis wonthaggiensis*.
Cuttings	1875m	*F. wonthaggiensis* Zone and *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D2	LADs of spore *Murospora florida* and acritarch *Microfasta evansii* and FAD of *Laevigatosporites belfordii*.
Core	1890m	*F. wonthaggiensis* **Valanginian to Barremian**	D3	FADs in core of *Foraminisporis wonthaggiensis* and acritarch *Microfasta evansii.*
Cuttings	1895m	*F. wonthaggiensis* Zone **Valanginian or younger**	D3	FADs in cuttings of *Foraminisporis wonthaggiensis* and *Ruffordiaspora australiensis.*
Cuttings	2000m	Zone Indeterminate **CAVED Early Cretaceous**		Very low yield, poorly preserved assemblage from basal volcanics section is interpreted as CAVED from higher in the well.

FAD and LAD = First and Last Appearance Datums

*Confidence Ratings used in STRATDAT database and applied to Tables 1 and 2.

Alpha codes: Linked to sample		**Numeric codes:** Linked to fossil assemblage		
A	Core	**1**	**Excellent confidence:**	High diversity assemblage recorded with key zone species.
B	Sidewall core	**2**	**Good confidence:**	Moderately diverse assemblage with key zone species.
C	Coal cuttings	**3**	**Fair confidence:**	Low diversity assemblage recorded with key zone species.
D	Ditch cuttings	**4**	**Poor confidence:**	Moderate to high diversity assemblage without key zone species.
E	Junk basket	**5**	**Very low confidence:**	Low diversity assemblage without key zone species.

Table 2. Interpretative data for Megascolides-2, onshore Gippsland Basin.

Sample Type	Depths	Spore-Pollen Zones STAGE/AGE	CR*	Comments and Key Species Present
Cuttings	35m	Sample BARREN **Probably Tertiary**		Sole palynomorph recorded is likely contamination. Lithology of samples suggests Tertiary age.
Cuttings	75m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	LADs of *Cooksonites variabilis, Pilosisporites notensis* and *Foraminisporis asymmetricus*.
Cuttings	295m	Lower *P. notensis* Zone **Barremian to Aptian**	D2	*Pilosisporites notensis* present in sample dominated by *Cyathidites* spores.
Cuttings	500m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	*Pilosisporites notensis*, *Cooksonites variabilis* and *Foraminisporis asymmetricus* all present.
Cuttings	780m	Indeterminate **Early Cretaceous**		Low yielding, low diversity assemblage dominated by *Cyathidites* spores >60%.
Cuttings	1120m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	LAD of *Concavissimisporites variverrucatus* in association with *Cyclosporites hughesii*.
Cuttings	1475m	Lower *P. notensis* Zone **Barremian to Aptian**	D1	FADs in well of key index species *Pilosisporites notensis* and *Foraminisporis asymmetricus*
Cuttings	1625m	*F. wonthaggiensis* Zone **Valanginian to Barremian**	D3	*Foraminisporis wonthaggiensis* present in assemblage lacking younger index species.
Cuttings	1675m	*F. wonthaggiensis* Zone **Valanginian to Barremian**	D3	*Foraminisporis wonthaggiensis* present in relatively non-descript assemblage.
Cuttings	1720m	*F. wonthaggiensis* Zone and *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D1	LADs of *Laevigatosporites belfordii, Murospora florida* and *Coronatispora perforata*.
Cuttings	1760m	*F. wonthaggiensis* Zone and *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D1	LADs of *Cicatricosisporites* sp. cf. *C. hughesii* of Backhouse 1988 and *Aequitriradites hispidus*.
Cuttings	1790m	Upper *F. wonthaggiensis* Zone *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D3	*Triporoletes reticulatus* present in diverse but poorly preserved assemblage.
Cuttings	1855m	*F. wonthaggiensis* Zone **Valanginian to Barremian**	D2	FADs of *Cyclosporites hughesii, Foraminisporis wonthaggiensis* and *Ruffordiaspora australiensis.*
Cuttings	1880m	*F. wonthaggiensis* Zone *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D3	Assemblage dominated by bisaccate pollen, but containing FAD of poor *Dictyotosporites speciosus*
Cuttings	1915m	Upper *F. wonthaggiensis* Zone and *Laevigatosporites belfordii* Subzone **Valanginian to Barremian**	D3	FADs *Laevigatosporites belfordii* and *Triporoletes reticulatus* and LAD of frequent *Microfasta evansii*.
Cuttings	1950m	Probable *F. wonthaggiensis* Zone **Valanginian to Barremian**	D5	Very poorly preserved, with rare *Microfasta evansii* and questionable FAD of *Cyclosporites hughesii.*
Cuttings	2000m	Probable *F. wonthaggiensis* Zone **Valanginian to Barremian**	D5	Extremely poorly preserved assemblage, but with FAD of acritarch *Microfasta evansii*
Cuttings	2045m	Zone Indeterminate **Undiff. Early Cretaceous**		Extremely poorly preserved, dominated by smooth *Cyathidites* spores (34% of count).
Cuttings	2055m	Zone Indeterminate **CAVED Early Cretaceous**		Extremely poorly preserved dominated by spores of *Baculatisporites/Osmundacidites* plexus (>66%).
Cuttings	2070m	Zone Indeterminate **CAVED Early Cretaceous**		Extremely poorly preserved (carbonised) assemblage with FAD of spore *Ceratosporites equalis*.
Cuttings	2130m	Effectively BARREN **Age Indeterminate**		Very low yield with less than 10 palynomorphs recovered all with long stratigraphic ranges.

FAD and LAD = First and Last Appearance Datums

Attachment to Biostrata Report 2007/07

Chart date: 08 June 2007

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Chart date: 29 June 2007

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