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PALYNOLOGY OF BHPP MINERVA-2A,

OFFSHORE OTWAY BASIN, VICTORIA, AUSTRALIA

BY

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for BHP PETROLEUM

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I SUMMARY

570-600m(cutts) : *diversus* Zone : Early Eocene : brackish to non-marine : immature

600-620m(cutts) : apparently *balmei* Zone : ? Paleocene : marginally marine : immature

620-740m(cutts) : *balmei* Zone : Paleocene : marginally marine : immature

740-60m(cutts) : upper *longus* Zone (*druggii* dino Zone) : Maastrichtian : nearshore marine : immature

760-840m(all cutts) : *longus* Zone (*druggii* dino Zone markers are probably caved) : Maastrichtian marginally marine : immature

860-940m(cutts) : *lillei* Zone (900-940m *korojonense* dino Zone) : Maastrichtian-Campanian : marginally marine : immature

960-1140m(all cutts) : upper *senectus* Zone (960-1020m upper *australis* dino Zone, 1040-1140 lower *australis* dino Zone) : Campanian : very nearshore to marginal marine : immature

1140-1300m(all cutts) : middle *senectus* Zone (1140-1180m upper *aceras* dino Zone 1230-1300m middle to lower *aceras* Zone) : Campanian : nearshore to very nearshore marine : immature

1340-60m(cutts) : lower *senectus* Zone (middle to lower *aceras* dino Zone) : Campanian : nearshore marine : immature

1380(cutts)-1565.5m(swc), upper *apoxyexinus* Zone (1380-1460m upper *cretaceum* dino Zone, 1480-1565.5m lower *cretaceum* Zone) : Santonian : nearshore marine : immature

1589.5m(swc)-1701.0m(swc) : middle *apoxyexinus* Zone (1589.5m lower *cretaceum* dino zone, 1620.0-1643.5m upper *porifera* dino Zone) : Santonian : nearshore to very nearshore : immature

1717.75m(swc)-1820.5m(swc) : lower *apoxyexinus* Zone : Santonian : nearshore marine : immature

1828.0m(swc)-1917.35(Core) : upper *mawsonii* Zone : Coniacian : marginal marine, brackish and non-marine : marginally mature for oil

1926.25m(Core)-2049.0m(swc) : lower *mawsonii* Zone : Turonian : nearshore marine below 1970m, very nearshore, brackish and non-marine above 1970m : marginally mature

2066.0m(swc)-2131.0m(swc) : *distocarinatus* Zone : Cenomanian : nearshore to non-marine : marginally mature.

Depth	Sample	S/P Zone	Dino %	Dino diversity	Algal %	Likely Environment
1728.50	Core	lower apoxyexinus	10	7	0	nearshore marine
1733.60	Core	lower apoxyexinus	8	10	0	nearshore marine
1755.0	swc	lower apoxyexinus	26	11	0	nearshore marine
1774.0	swc	lower apoxyexinus	15	12	0	nearshore marine
1801.5	swc	lower apoxyexinus	36	17	0	nearshore approaching intermediate marine
1820.5	swc	lower apoxyexinus	24	16	0	nearshore marine
1828.0	swc	upper mawsonii	15	16	1	nearshore marine
1839.75	Core	upper mawsonii	1	1	5	slightly brackish anoxic lake
1841.00	Core	upper mawsonii	1	1	11	slightly brackish oxic lake
1843.20	Core	upper mawsonii	<1	1	20	slightly brackish oxic lake
1857.30	Core	upper mawsonii	1	2	10	slightly brackish anoxic lake
1860.30	Core	upper mawsonii	3	2	10	brackish lake (tidal influence)
1866.50	Core	upper mawsonii	5	5	2	marginal marine lagoon or estuary
1876.50	Core	upper mawsonii	2	4	2	marginal marine lagoon or estuary
1879.00	Core	upper mawsonii	7	9	1	nearshore (?tidal lagoon or estuary)
1881.00	Core	upper mawsonii	5	4	2	very nearshore anoxic (?stagnant brackish lagoon or estuarine backwater)
1900.0	swc	upper mawsonii	absent	0	0	non-marine (?levee bank or freshwater swamp)
1917.35	Core	upper mawsonii	3	5	1	brackish swamp (wood shards)
1926.25	Core	lower mawsonii	absent	0	1	non-marine (?levee bank or freshwater swamp)
1933.10	Core	lower mawsonii	3	3	0	brackish swamp (wood shards, spores)
1935.50	Core	lower mawsonii	8	8	5	nearshore marine lagoon or estuary (significant freshwater algal influence)
1939.35	Core	lower mawsonii	6	6	8	nearshore marine lagoon or estuary (significant freshwater influence)
1941.65	Core	lower mawsonii	3	11	4	nearshore marine lagoon or estuary (significant freshwater influence)
1943.00	Core	lower mawsonii	absent	0	5	non-marine (freshwater lake)
1948.00	Core	lower mawsonii	absent	0	4	non-marine (freshwater lake or swamp)
1953.00	Core	lower mawsonii	6	3	3	brackish lagoon or estuary
1955.60	Core	lower mawsonii	3	10	1	very nearshore (near normal salinity estuary)
1961.25	Core	lower mawsonii	5	10	6	very nearshore (?backbarrier tidal lagoon-note significant freshwater and saline influences)
1968.25	Core	lower mawsonii	3	7	8	very nearshore (?backbarrier tidal lagoon-note significant freshwater and saline influences)
1996.5	swc	lower mawsonii	13	13	0	nearshore marine
2012.5	swc	lower mawsonii	28	9	1	nearshore marine
2049.0	swc	lower mawsonii	9	12	0	nearshore marine
2066.0	swc	distocarinatus	16	13	0	nearshore marine
2077.0	swc	distocarinatus	11	7	0	nearshore marine
2105.0	swc	distocarinatus	9	8	0	nearshore marine
2119.0	swc	distocarinatus	absent	0	4	freshwater lake or swamp
2131.0	swc	distocarinatus	1	5	0	very nearshore (?brackish tidal lagoon)

Table 1 Detailed suggested environments, reservoir section of Minerva-2A

REF:OTW.MINERV2

II INTRODUCTION

After well completion, sixty eight samples (23 core chips, 20 swcs, 25 cuttings) were submitted for detailed study. These results are summarised herein.

Palynomorph occurrence data are shown as Appendix I and form the basis for the assignment of the samples to fourteen spore-pollen and dinoflagellate units of Early Eocene to Cenomanian age.

Specimen counts were made on all assemblages and expressed in the raw data as percentages. In the running text, percentages from cuttings are always bracketed (5%) to show that they may be inaccurate due to caving.

The Cretaceous spore-pollen zonation is essentially that of Dettmann and Playford (1969), but has been significantly modified and improved by various authors since, and most recently discussed in Helby et al (1987), as shown on Figure 1. The Late Cretaceous zonation has been modified by Morgan (1992) in project work for BHPP (Figure 2). Tertiary zones are essentially those of Partridge (1976).

Maturity data was generated in the form of Spore Colour Index, and is plotted on Figure 3 Maturity Profile of Minerva-2A. The oil and gas windows on Figure 3 follow the general consensus of geochemical literature. The oil window corresponds to spore colours of light-mid brown (Staplin Spore Colour Index of 2.7) to dark brown (3.6). These correspond to vitrinite reflectance values of 0.6% to 1.3%. Geochemists argue variations on kerogen type, basin type and basin history. The maturity interpretation is thus open to reinterpretation using the basic colour observations as raw data. However, the range of interpretation philosophies is not great, and probably would not move the oil window by more than 200 metres.

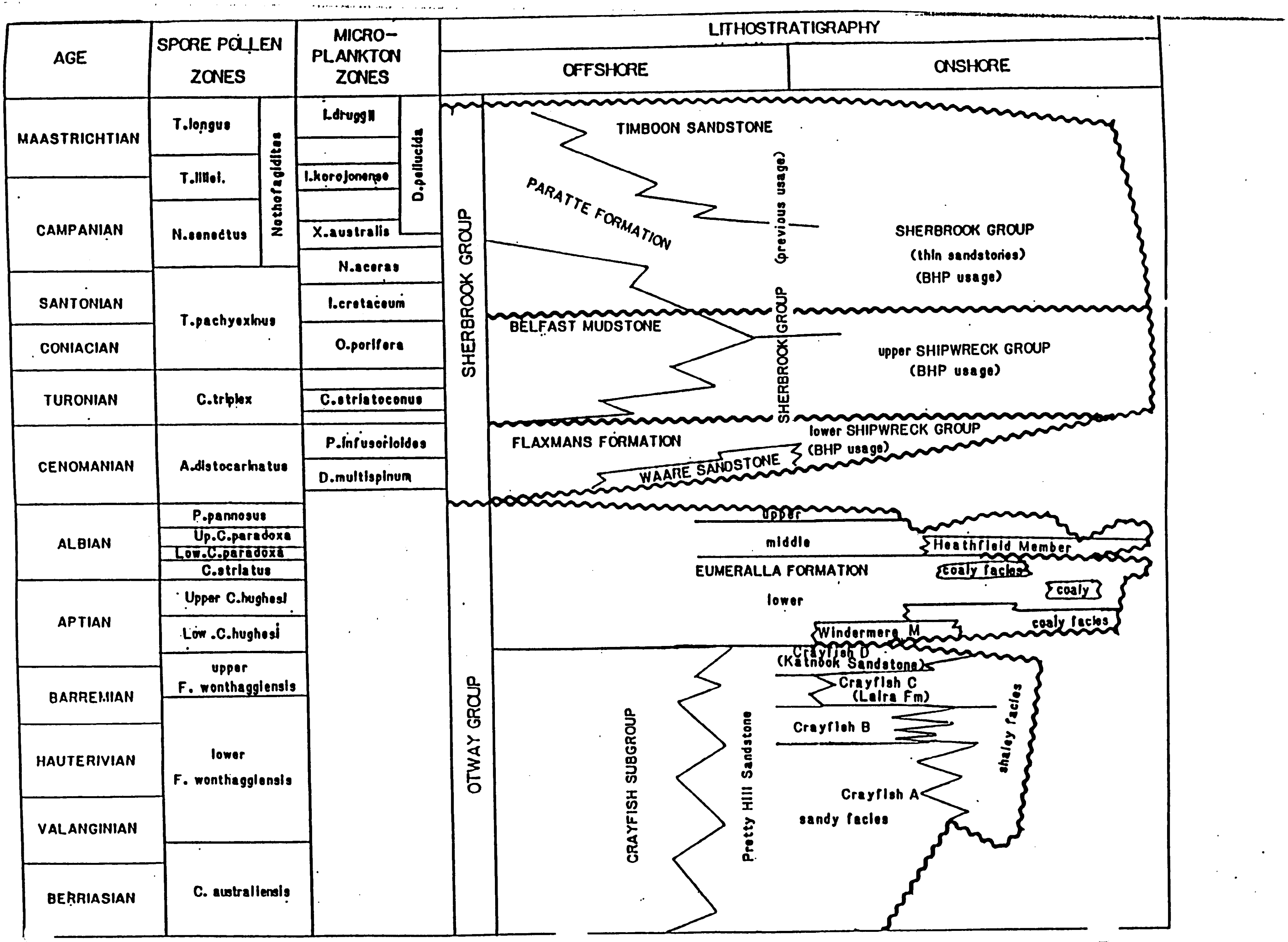

FIGURE 1. CRETACEOUS REGIONAL FRAMEWORK, OTWAY BASIN

SPORE-POLLEN ZONES	SPORE-POLLEN HORIZONS	DINOFLAGELLATE ZONES	DINOFLAGELLATE HORIZONS
LONGUS upper	T. confessus / T. sectilis 1; G. rudata ● 1b	DRUGGII	M. conorata 1a; M. conorata 1c
LONGUS lower	N. senectus ● 1d; T. sabulosus 2a; T. longus 2b		M. druggii 1e; I. pellucida 2
LILLEI upper	T. sectilis 3a	KOROJONENSE	I. korojonense / I. cretacea 3
LILLEI lower	T. lillei 3b		I. korojonense / I. pellucida 3c
SENECTUS upper	G. rudata 7a	AUSTRALIS upper	X. australis / X. ceratoides / A. wisemaniae 4; A. suggestium 4a
		AUSTRALIS lower	N. aceras 5 / N. semireticulata / X. australis ⬤ 6
SENECTUS middle	T. sabulosus 7e	ACERAS upper	N. tuberculata 7; X. australis 7b; N. tuberculata / N. semireticulata 7c
		ACERAS middle	O. obesa 7d; T. suspectum / Heterosphaeridium 10%+ 8
SENECTUS lower	N. senectus 9a	ACERAS lower	Heterosphaeridium 20%+ 9; N. aceras 9b
APOXYEXINUS upper	A. cruciformis <1%; A. cruciformis 1-4% 11	CRETACEA upper	I. belfastense 10 / A. denticulata; Heterosphaeridium 20%+ 10a; I. belfastense / A. denticulata 11a
APOXYEXINUS middle	12 A. cruciformis 10%+	CRETACEA lower	I. cretacea 11b
APOXYEXINUS lower	12a A. cruciformis 10%+	PORIFERA	O. porifera 12b
MAWSONII	A. distocarinatus 12c; consistent A. distocarinatus 13; P. mawsonii 15a	STRIATOCONUS	C. edwardsii 14
		INFUSORIOIDES	C. edwardsii ● 15; C. edwardsii ● 15b
DISTOCARINATUS	common saccates / A. cruciformis		dinoflagellates

FIGURE 2 ZONATION USED HEREIN SHOWING THE NUMBERED HORIZONS AGAINST THE EXISTING FORMAL ZONATION.

● = frequent (4-10%) ⬤ = common (11-30%)

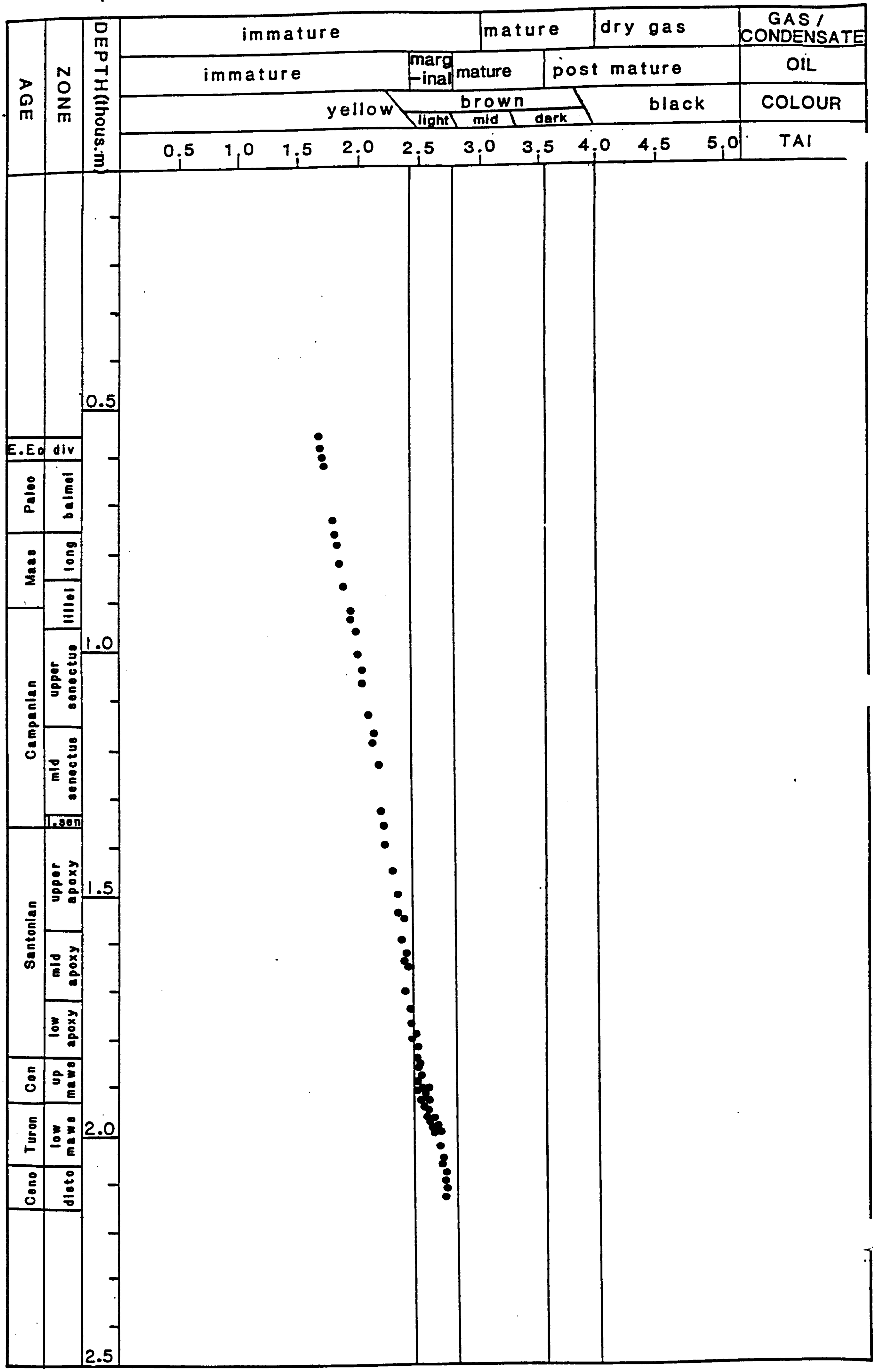

FIGURE 3 MATURITY PROFILE : MINERVA-2A

III PALYNOSTRATIGRAPHY

A 570-80m(cutts), 580-600m(cutts) : *diversus* Zone

Assignment to the middle *Malvacipollis diversus* Zone of Early Eocene age is suggested at the top by the absence of younger markers and at the base by oldest *Proteacidites kopiensis* (580m) *P. clarus* (600m) and *Triporopollenites ambiguus* (580m). The presence of *Cyathidites gigantis* at 580m may suggest the lower *diversus* Zone or older, but its range is not well documented in the Otway Basin. In these cuttings, the middle *diversus* markers may be caved, so a general *diversus* assignment only is made. Common species are *Proteacidites* and *Dilwynites granulatus* with frequent *Lygistepollenites florinii*, *Haloragacidites harrisii*, *Falcisporites* and *Cyathidites*.

Amongst the very rare dinoflagellates, *Deflandrea medcalfii* is consistent with the Early Eocene age.

Marginally marine (580m) to non-marine (600m) environments are indicated by the dominant and diverse spore-pollen, abundant cuticle, and rare dinoflagellates (1% and absent downhole). Common freshwater algae (26% and 39% downhole) indicate lake environments, although brackish at 580m.

Colourless spore colours indicate immaturity for hydrocarbons.

B 600-620m(cutts) : apparently *balmei* Zone

This assemblage appears to belong to the *Lygistepollenites balmei* Zone on youngest *L. balmei* without older markers. However, only one good specimen was seen and the other key marker *Gambierina rudata* was not seen. It is therefore possible that this sample might belong to the *diversus* Zone with minor reworking of *L. balmei*. Taxa normally restricted to the *diversus* and younger zones include *C. orthoteichus*, *Intratriporopollenites notabilis*, *Proteacidites clarus*, *P. ornatus* and *Spinozonocolpites prominatus*, but these could all be caved slightly in these cuttings. *Proteacidites* spp are common, with *Dilwynites* and *Falcisporites* very frequent and *H. harrisii*, *Cyathidites* and *Gleicheniidites* frequent.

Amongst the very rare dinoflagellates, youngest *Deflandrea speciosus* supports the *balmei* assignment and rare *Apectodinium* spp and *Wetzeliella articulata* suggest the very youngest part of it, but could be caved.

Brackish lake environments are favoured by the high freshwater algal content (12%) with low content (4%) and diversity of dinoflagellates. Spores and pollen are dominant and diverse. Considering the high *Botryococcus* contents above, part of their presence in this sample may be caved.

Colourless spore colours indicate immaturity for hydrocarbons.

C 620-40m, 720-40m(cutts) : *balmei* Zone

The presence of consistent *L. balmei* and *G. rudata* without older markers, indicates the *L. balmei* Zone. *Falcisporites* and *Proteacidites* are common with *Dilwynites*, *Cyathidites* and *Microcachryidites* frequent.

The dinoflagellate *Deflandrea speciosa* confirms the Paleocene assignment. A single *Homotriblium tasmaniense* is caved from upper *diversus* to *asperopolus* zones unsampled at the top of the section.

Marginally marine environments are indicated by the low dinoflagellate content (1% and 6%) and their low diversity. *Botryococcus* content is significant (7% and 4%) but could be partly caved.

Colourless spore colours indicate immaturity for hydrocarbons.

D 740-60m(cutts) : upper *longus* Zone

Assignment to the upper *Tricolpites longus* Zone of late Maastrichtian age is indicated at the top by youngest *T. longus* supported by youngest *Grapnelispora evansii*, *Tricolpites confessus*, *Tricolporites lillei* and *Triporopollenites sectilis*. At the base, oldest *Stereisporites punctatus* and low *Nothofagidites* content is diagnostic. *Proteacidites* and *Falcisporites* are common with *Cyathidites* and *Dilwynites* very frequent.

Amongst the scarce dinoflagellates (6%), *Manumiella coronata* and *M. druggii* indicate the *druggii* dinoflagellate Zone, correlative with the upper *longus* Spore-Pollen Zone. *M. coronata* and *Spiniferites* are the most frequent dinoflagellates. *Deflandrea speciosa*, *D. striata* and *D. pachyceros* are all rare and considered caved.

Nearshore marine environments are indicated by the low dinoflagellate content (6%) and their low diversity. *Botryococcus* is frequent (9%) suggesting significant freshwater influence, but could be caved.

Yellow spore colours indicate immaturity for hydrocarbons.

E 760-80m, 820-40m(cutts) : *longus* Zone

Assignment to the lower *T. longus* Zone of Maastrichtian age is indicated at the top by the absence of younger markers and a downhole influx of *Nothofagidites* and at the base by oldest *T. longus* (although this could be caved slightly). Common taxa are *Proteacidites* and *Falcisporites* with *Phyllocladidites mawsonii* very frequent. *Nothofagidites* (3%) out number *G. rudata* (1 and 2%). Minor Permian reworking was seen. The presence of *M. coronata* suggests the *druggii* dino Zone but these are considered caved.

Environments are probably marginally marine although the dinoflagellate content (11% and 8% downhole) suggests nearshore environments. This content is discounted here as it is probably caved. The correlable section in Minerva-1 contains 6% and 0% dinoflagellates.

Yellow spore colours indicate immaturity for hydrocarbons.

F 860-880m, 900-920m, 920-940m(cutts) : *lillei* Zone

Assignment to the *Tricolporites lillei* Zone of Campanian age is indicated at the top by the absence of younger markers and at the base by oldest *T. lillei* (920m) and *T. sectilis* (940m) without older dinoflagellate markers. *Proteacidites* are common and *Cyathidites*, *Falcisporites* and *Podosporites microsaccatus* are frequent. *Tricolporites apoxyexinus* and *T. confessus* are rare elements. Rare Cretaceous and Permian reworking were seen, and the Cretaceous taxa notably include *Dingodinium cerviculum* at 920m (suggesting that marine Aptian is present in this part of the basin).

Dinoflagellates are rare and some are clearly caved. Present and probably in place is *Isabelidinium korojonense* at 920m and 940m indicating the *korojonense* Dinoflagellate Zone, correlative with the *lillei* Spore-Pollen Zone.

Environments are marginally marine with rare dinoflagellates (3%, 2%, <1%) of low diversity, some of which are clearly caved (*M. coronata*). *Botryococcus* is common (4%, 13%, 3%) suggesting a brackish lake.

Yellow spore colours indicate immaturity for hydrocarbons.

G 960-80m, 1000-1020m, 1040-60m, 1080-1100m, 1120-40m(all cutts) : upper *senectus* Zone

Assignment to the upper *Nothofagidites senectus* Zone of Campanian age is indicated at the top by the absence of younger markers confirmed by the dinoflagellates and at the base by oldest *G. rudata* (although this could be caved slightly). Common are *Falcisporites* and *Proteacidites* with frequent forms *Cyathidites*, *Gleicheniidites*, *Dilwynites* and *Microcachryidites*. *Tricolpites sabulosus* has a distinctive acme at 1100m (5%) and 1140m (3%). *T. confessus* was not seen below 1060m. Rare Permian and Triassic reworking was seen.

Amongst the dinoflagellates, youngest *Xenascus australense* (980m) and *Xenikoon australis* (1020m) without older markers indicate the upper *australis* Dinoflagellate Zone, correlative with the upper *senectus* Spore-Pollen Zone. Beneath this, youngest *Nelsoniella semireticulata* at 1060m (also present at 1100m), the presence of frequent to common *Xenikoon australis*, and the absence of older markers indicate the lower *X. australis* Zone, correlative with the upper *senectus* Spore-Pollen Zone. *X. australis* is the only common form, all other being rare. *Nelsoniella aceras* is a rare component of all assemblages.

Environments are very nearshore to marginal marine, as shown by the low dinoflagellate content (2%, 2%, 16%, 10%, 7% downhole). Spores and pollen are dominant and diverse.

Yellow spore colours indicate immaturity for hydrocarbons.

H 1140-60m, 1160-80m, 1220-40m, 1280-1300m(all cutts) : mid *senectus* Zone

Assignment to the mid *N. senectus* Zone of Campanian age is indicated at the top by the absence of younger markers and at the base by oldest *T. sabulosus* (although this could be caved slightly). Common taxa are *Dilwynites*, *Falcisporites* and *Proteacidites* with *Cyathidites* and *Microcachryidites* frequent. *Nothofagidites* are rare (1-2%) and *T. sabulosus* is very rare but consistent.

Amongst the dinoflagellates, *Nelsoniella tuberculata* at 1160m and 1180m indicates the upper *Nelsoniella aceras* Dinoflagellate Zone, while the rare presence of *N. aceras* to the base suggests the middle to lower *aceras* Dinoflagellate Zone. *X. australis* occurs to the interval base but is considered caved below 1180m. *Heterosphaeridium heteracanthum*, *Spiniferites* and caved *X. australis* are the most frequent of the rare dinoflagellates.

Nearshore to very nearshore marine environments are indicated by the low dinoflagellate content (12%, 5%, 8%, 9% downhole) with low to moderate diversity. Spores and pollen are abundant and diverse.

Yellow spore colours indicate immaturity for hydrocarbons.

I 1340-60m(cutts) : lower *senectus* Zone

Assignment to the lower *N. senectus* Zone of Campanian age is indicated at the top by the absence of younger markers and at the base by oldest *N. senectus* (which could be caved slightly in these cuttings) and the absence of older markers. *Dilwynites* and *Falcisporites* are common with *Proteacidites* and *Cyathidites* frequent. Minor Permian and early Cretaceous reworking was seen.

Amongst the dinoflagellates, *N. aceras* and *Odontochitina obesa* suggest the middle to lower aceras Zone, but these elements could be caved in these cuttings. *H. heteracanthum* is frequent (4%) with all other dinoflagellates rare, including *Odontochitina porifera*, *Gillinia hymenophora* and *Areosphaeridium suggestium*.

Environments appear to be nearshore with low dinoflagellate content (10%) but moderate diversity. Spores and pollen are abundant and diverse.

Yellow spore colours indicate immaturity for hydrocarbons.

J 1380-1400m, 1440-60m, 1480-1500m, 1535-38m(all cutts), 1565.5m(swc) : upper *apoxyexinus* Zone

Assignment to the upper *Tricolporites apoxyexinus* Zone of Santonian age is indicated at the top by the absence of younger markers and confirmed by the dinoflagellates, and at the base by very rare *Amospopollis cruciformis* and frequent *Proteacidites* without older markers. Within the interval, *Dilwynites* and *Falcisporites* are common, with *Microcachryidites*, *Podosporites* and *Proteacidites* frequent. Rare Permian reworking was seen.

Amongst the dinoflagellates, the presence of *Isabelidinium belfastense* (1400m and 1460m) and youngest *Chatangiella victoriensis* (1400m) indicate the upper *Isabelidinium cretaceum* Dinoflagellate Zone, but could be caved at the base. Beneath this, oldest *I. cretaceum* down to 1565.5m(swc) without younger markers, indicates the lower *I. cretaceum* Dinoflagellate Zone. *Heterosphaeridium* and *Odontochitina* spp are the most common taxa. *Trithyrodinium glabra* occurs at 1400m, 1460m and 1500m but could be caved at the base range.

Nearshore marine environments are indicated by the low dinoflagellate content (12%, 30%, 30%, 22%, 13% downhole) and moderate dinoflagellate diversity. Spores and pollen are dominant and diverse in generally inertinite dominated assemblages.

Yellow spore colours indicate immaturity for hydrocarbons.

K 1589.5m, 1620.0m, 1643.5m, 1664.0m, 1701.0m(all swcs) : middle *apoxyexinus* Zone

Assignment to the middle *T. apoxyexinus* Zone of Santonian age is indicated at the top by the downhole influx of *A. cruciformis* (from <1% above to 2-9% in the interval) and at the base by the absence of older markers. Within the interval, *Falcisporites* are common with *Cyathidites*, *Microcachryidites* and *Dilwynites* frequent. *A. cruciformis* is mostly around 5%. Minor Permian reworking is seen.

Amongst the dinoflagellates, oldest *I. cretaceum* at 1589.5m indicates the lower *cretaceum* Dinoflagellate Zone. At 1620.0m and 1643.5m, consistent *Isabelidinium rectangulare* occurs, indicating the upper *Odontochitina porifera* Dinoflagellate Zone. Beneath that, dinoflagellates do not clearly indicate workable dinoflagellate zones. *Conosphaeridium striatoconus* and *Isabelidinium balmei* occur at 1701.0m(swc). *H. heteracanthum* is very frequent with *Spiniferites* frequent. Other taxa are rare. *C. deflandrei* is consistent from 1565.5m and below. Oldest *O. porifera* is at 1643.5m.

Nearshore to very nearshore marine environments are indicated by low dinoflagellate content (16%, 20%, 14%, 9%, 23% downhole) and their low to intermediate diversity. Spores and pollen are dominant and diverse in inertinite dominated assemblages.

Yellow spore colours indicate immaturity for hydrocarbons.

L 1717.75m(swc), 1728.5m(Core), 1733.60m(Core), 1755.0m(swc), 1774.0m(swc), 1801.5m(swc), 1820.5m(swc) : lower *apoxyexinus* Zone

Assignment to the lower *T. apoxyexinus* Zone of Santonian age is indicated at top and base by the common presence of *A. cruciformis* (10% plus). Within the interval, *Falcisporites* are consistently common to very common, with *Cyathidites* frequent to common. *Dilwynites* are rare at the top (1, 2% at 1717.5m and 1755.0m) but frequent to common (8-31%) beneath. *A. cruciformis* is also frequent to common, mostly around 10%. Minor Permian reworking is seen.

Amongst the dinoflagellates, zone diagnostic taxa were not seen. Potentially useful are *I. balmei* (consistent down to 1755.0m) *Apteodinium granulatum* (top at 1733.60m), *Aptea* sp (top at 1801.5m) and *Chlamydophorella nyei/ambigua* (top at 1820.5m). *H. heteracanthum* and *Spiniferites* are the most frequent forms. A single *Cribroperidinium edwardsii* occurs at 1820.5 but is considered reworked.

Nearshore marine environments are indicated by the low dinoflagellate content (30%, 10%, 8%, 26%, 15%, 36%, 24% downhole) and their moderate to high diversity. Spores and pollen are abundant and diverse in inertinite dominated microfloras.

Yellow to light brown spore colours indicate immaturity for hydrocarbons.

M 1828.0m(swc), 1839.75m(Core), 1841.00m(Core), 1843.00m(Core), 1857.30m(Core), 1860.30m(Core), 1866.50m(Core), 1876.50m(Core), 1879.00m(Core), 1881.00m(Core), 1900.0m(swc), 1917.35m(Core) : upper *mawsonii* Zone

Assignment to the upper *Phyllocladidites mawsonii* Zone of Coniacian age is indicated at the top by youngest *Appendicisporites distocarinatus* coincident with the downhole decrease of *A. cruciformis* (from 10% plus above, to near 5% within the unit), and at the base by the downhole decrease of *A. cruciformis* (from 5% within the unit to 1% or less beneath). Within the zone, *Dilwynites* and *Falcisporites* are common with *Cyathidites* and *Microcachryidites* very frequent, and *A. cruciformis* frequent (around 5%). *A. distocarinatus* and *P. mawsonii* are consistent but rare. Rare Permian and very rare Triassic reworking were seen. Dinoflagellates are scarce to very scarce and are not zone diagnostic. *Heterosphaeridium* and *Botryococcus* are the most frequent microplankton.

Environments are variable within the range of marginal marine, brackish, and non-marine, as shown by microplankton content of low to absent (15%, 1%, 1%, <1%, 1%, 3%, 5%, 2%, 7%, 5%, absent, 3%) and low to very low diversity. The single exception is the topmost sample (15% dinoflagellates of moderate diversity) which is considered nearshore marine. More detailed environments are suggested in table 1 which also tabulates the dinoflagellate diversity and the freshwater algal content. Dinoflagellate diversity is higher towards the base (1866.50-1881.0m) suggesting more marine influence, while freshwater algae are more common towards the top (1839.75-1860.30m) suggesting lakes and brackish lakes. Cuticle fragments are abundant throughout. Some anoxic environments are suggested by common amorphous organic matter (AOM). The detailed environments are suggestions only, based on the palynological data and should be evaluated in concert with the sedimentological data [illegible].

Light brown spore colours indicate marginal maturity for oil, but immaturity for gas/condensate.

N 1926.25m(Core), 1933.10m(Core), 1935.50m(Core), 1939.35m(Core), 1941.65m(Core), 1943.00m(Core), 1948.00m(Core), 1953.00m(Core), 1955.60m(Core), 1961.25m(Core), 1968.25m(Core), 1996.5m(swc), 2012.5m(swc), 2049.0m(swc) : lower *mawsonii* Zone

Assignment to the lower *P. mawsonii* Zone of Turonian age is indicated at the top by the downhole decrease of *A. cruciformis* (5% to <1%), and at the base on oldest *P. mawsonii*. Within the interval, *Cyathidites*, *Dilwynites* and *Falcisporites* are common to very common, with *Podosporites* and *Microcachryidites* frequent. *A. distocarinatus* and *P. mawsonii* are consistent but rare. Rare Permian and very rare Triassic reworking are seen.

Dinoflagellates are very rare to absent above 1970m and frequent to common beneath but largely lack zone diagnostic taxa. In the basal sample (2049.0m) rare *Cribroperidinium edwardsii* occurs, indicating the *Palaeohystrichophora infusorioides* Dinoflagellate Zone. *Heterosphaeridium* and *Botryococcus* are the most frequent microplankton.

Environments are variable but fall into two fairly distinct groups. The upper part of the section (above 1970m) is very nearshore, brackish and non-marine, as shown by low dinoflagellate contents (absent, 3%, 8%, 6%, 3%, absent, absent, 6%, 3%, 5%, 3%), low dinoflagellate diversity, and significant freshwater algae (*Botryococcus*) and high cuticle content. Some anoxic environments are indicated by significant to abundant amorphous organic matter (AOM). More detailed environments are suggested in table 1 but these are only suggestions, made in ignorance of the sedimentological data. The lower part of the section (below 1970m) is nearshore marine as shown by higher dinoflagellate content (13%, 28%, 9% downhole) and diversity. Spores and pollen are common and diverse throughout.

Light brown spore colours indicate marginal maturity for oil but immaturity for gas/condensate.

O 2066.0m(swc), 2077.0m(swc), 2105.0m(swc), 2119.0m(swc), 2131.0m(swc) : *distocarinatus* Zone

Assignment to the *A. distocarinatus* Zone of Cenomanian age is indicated at the top and base by *A. distocarinatus* without younger and older markers. Within the interval, *Falcisporites* are very common with *Dilwynites*, *Cyathidites* and *Microcachryidites* common to frequent. *Clavifera triplex* occurs down to 2066m but not beneath. *Phyllocladidites ennuchus* occurs rarely to the interval base.

Amongst the rare dinoflagellates, *C. edwardsii* occurs down to 2105m indicating the *infusorioides* Dinoflagellate Zone. *Heterosphaeridium* and *Spiniferites* are the most frequent taxa.

Environments range from nearshore marine to non-marine with low dinoflagellate content (16%, 11%, 9%, absent, 1% downhole) and low diversity. High freshwater algal content at 2119.0m (4%) suggests a freshwater lake or swamp. Detailed environments are suggested in table 1. Spores and pollen are common and diverse in all samples.

Light brown spore colors indicate marginal maturity for oil, and immaturity for gas/condensate.

IV CONCLUSIONS

At the top, the sampled section is Tertiary (Paleocene to Early Eocene) in very nearshore marine and marginally marine environments. Conformably beneath, almost all of the late Cretaceous is seen from Cenomanian to Maastrichtian although the late Campanian *lillei* Zone is condensed. At the base, the reservoir section is mostly very nearshore to non-marine (Cenomanian *distocarinatus* to Coniacian *mawsonii* Zone). Above this, claystone dominated facies in mostly nearshore to marginal marine environments (Santonian *apoxyexinus* to Maastrichtian *longus* zones).

V REFERENCES

Dettmann ME and Playford G (1969) Palynology of the Australian Cretaceous : a review **In** Stratigraphy and Palaeontology. Essays in honour of Dorothy Hill, **KSW Campbell ED.** ANU Press, Canberra 174-210

Helby RJ, Morgan RP and Partridge AD (1987) A palynological zonation of the Australian Mesozoic **In** Studies in Australian Mesozoic Palynology **Assoc. Australas. Palaeontols. Mem 4** 1-94

Morgan RP (1992) Overview of new cuttings based Late Cretaceous correlations, Otway Basin, Australia **unpubl. rept. for BHPP**

Partridge AD (1976) The geological expression of eustacy in the early Tertiary of the Gippsland Basin **APEA J 16(1)** 73-79.

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C L I E N T: BHPP
W E L L: MINERVA #2A
F I E L D / A R E A: OFFSHORE OTWAY BASIN, VICTORIA
A N A L Y S T S: Roger Morgan / Nigel Hooker D A T E: Feb. '94
N O T E S: all depths are in metres
all figures are percentages based on 100 specimen count
"X" represents RARE presence outside the count
in uncounted samples: "A" = abundant "C" = common
"F" = few "R" = rare

RANGE CHART OF OCCURRENCES BY % & HIGHEST APPEARANCE:grouped

Sample	Type	1 MICROPLANKTON %	2 REWORKING: PERMIAN	3 REWORKING: CRETACEOUS	4 REWORKING: TRIASSIC	5 BOTRYOCOCCUS	6 PARALECANIELLA INDENTATA	7 NUMMUS	8 NUMMUS MONOCULATUS	9 DEFLANDREA MEDCALFII	10 SPINIDINIUM SP	11 SPINIFERITES FURCATUS/RAMOSUS	12 APECTODINIUM HOMOMORPHA (SH. SP)	13 AREOLIGERA SENONENSIS	14 DEFLANDREA OBLIQUIPES (L.M.)	15 DEFLANDREA SPECIOSUS	16 HYSTRICHOSPHAERIDIUM TUBIFERUM	17 MICRHYSTRIDIUM SP	18 WETZELIELLA ARTICULATA	19 HOMOTRIBLIUM TASMANIENSE	20 GLAPHYROCYSTA RETIINTEXTA	21 HAFNIASPHAERA SEPTATA	22 HAFNIASPHAERA SP	23 TRITHYRODINIUM EVITTII	24 ALISOCYSTA CIRCUMTABULATA	25 CORDOSPHAERIDIUM INODES	26 DEFLANDREA PACHYCEROS (SH. M)	27 DEFLANDREA STRIATA	28 MANUMIELLA CORONATA	29 MANUMIELLA DRUGGII	30 ALISOCYSTA MARGARITA	31 EXOCHOSPHAERIDIUM PHRAGMITES	32 HETEROSPHAERIDIUM CONJUNCTUM	33 KIOKANSIUM POLYPES	34 VERYHACHIUM	35 CRIBROPERIDINIUM SP	36 ISABELIDINIUM PELLUCIDUM	37 CANNINGINOPSIS BRETONICA	38 EISENACKIA CRASSI[illegible]ULATA
0570-80	CUTTS	1	.	.	.	26	.	.	.	X	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0580-00	CUTTS	.	.	.	.	38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0600-20	CUTTS	5	.	.	.	12	1	.	.	.	.	1	X	1	X	X	1	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0620-40	CUTTS	1	.	.	.	7	.	.	.	.	.	1	.	.	.	X	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0720-40	CUTTS	6	.	.	.	2	2	.	.	.	X	2	.	4	.	.	.	.	.	.	?	X	X	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0740-60	CUTTS	6	.	.	.	9	2	.	.	.	.	3	.	1	.	X	.	.	.	.	.	.	.	.	X	X	X	X	2	X	.	.	.	.	.	.	.	.	.
0760-80	CUTTS	11	.	.	.	7	1	.	.	.	1	1	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	X	X	1	.	.	.	.	.	.	.
0820-40	CUTTS	8	X	.	.	1	.	.	.	.	X	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	1	1	1	.	.	.	.
0860-80	CUTTS	3	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	2	1	.	.
0900-20	CUTTS	2	X	X	.	13	.	X	.	.	X	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	X	X
0920-40	CUTTS	>1	.	.	.	3	.	2	.	.	X	.	.	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	X	.	.	.	.	.	.	X	X	.	.
0960-80	CUTTS	2	.	.	.	9	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
1000-20	CUTTS	2	.	.	.	2	.	X	.	.	.	.	.	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
1040-60	CUTTS	16	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1080-00	CUTTS	10	1	.	1	1	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	1	.	.	.
1120-40	CUTTS	7	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.
1140-60	CUTTS	12	.	.	.	3	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1160-80	CUTTS	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
1220-40	CUTTS	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1280-00	CUTTS	9	.	.	.	.	.	.	.	.	X	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1340-60	CUTTS	10	X	.	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	X	.	.	.	.
1380-00	CUTTS	12	X	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	1	.	.	.	.
1440-60	CUTTS	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
1480-00	CUTTS	30	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1535-38	CUTTS	22	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1565.5	SWC	13	X	.	.	.	.	.	X	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.
1589.5	SWC	16	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
1620.0	SWC	20	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
1643.5	SWC	14	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
1664.0	SWC	9	1	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1701.0	SWC	23	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	1	.	.	.	.
1717.75	SWC	30	X	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1728.50	CORE1	10	.	.	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
1733.60	CORE1	8	X	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	1	.	.	.	.	.
1755.0	SWC	26	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
1774.0	SWC	15	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.
1801.5	SWC	36	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
1820.5	SWC	24	.	.	.	.	.	.	2	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
1828.0	SWC	15	.	.	.	.	.	.	1	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
1839.75	CORE2	1	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1841.0	CORE2	1	.	.	.	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1843.20	CORE2	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
1857.3	CORE3	1	X	.	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1860.3	CORE3	3	1	.	1	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
1866.05	CORE3	5	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1876.5	CORE3	2	.	.	.	2	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1879.0	CORE3	7	.	.	.	1	.	X	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.
1881.0	CORE3	5	.	.	.	2	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
1900.0	SWC	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1917.35	CORE4	3	1	.	.	1	.	.	.	.	.	X	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
1926.25	CORE4	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1933.1	CORE4	3	X	.	X	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
1935.50	CORE4	8	.	.	.	4	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
1939.35	CORE4	6	.	.	.	8	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
1941.65	CORE4	3	.	.	.	4	.	1	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	X	.	.	.	.	.
1943.0	CORE5	.	X	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1948.0	CORE5	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
1953.0	CORE5	6	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.
1955.60	CORE5	3	.	.	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	X	.	.	.	.	.
1961.25	CORE5	5	1	.	.	6	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	1	.	.	.	.	.
1968.25	CORE5	3	.	.	.	8	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
1996.5	SWC	13	.	.	X	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	X	.	.	.	.	.
2012.5	SWC	28	.	.	.	1	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	.	1	.	.	.
2049.0	SWC	9	.	.	.	X	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.
2066.0	SWC	16	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	X	.	.	.
2077.0	SWC	11	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
2105.0	SWC	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2119.0	SWC	.	.	.	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2131.0	SWC	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.

Depth	Sample	39 ISABELIDINIUM KOROJONENSE	40 APTEA SP	41 CHATANGIELLA TRIPARTITA	42 HETEROSPHAERIDIUM HETEROCANTHUM	43 OLIGOSPHAERIDIUM PULCHERRIMUM	44 TRICHODINIUM INTERMEDIUM	45 XENASCUS AUSTRALIENSE	46 XENIKOON AUSTRALIS	47 NELSONIELLA ACERAS	48 NELSONIELLA SEMIRECTICULATA	49 NELSONIELLA SP	50 ODONTOCHITINA PORIFERA	51 ODONTOCHITINA STUBBY	52 TRICHODINIUM	53 NELSONIELLA TUBERCULATA	54 PALAEOHYSTRICHOSPHORA INFUSORIOIDES	55 EUCLADINIUM MADURENSE	56 MADURADINIUM PENTAGONUM	57 ODONTOCHITINA OPERCULATA
0570-80	CUTTS																			
0580-00	CUTTS																			
0600-20	CUTTS																			
0620-40	CUTTS																			
0720-40	CUTTS																			
0740-60	CUTTS																			
0760-80	CUTTS																			
0820-40	CUTTS																			
0860-80	CUTTS																			
0900-20	CUTTS	1																		
0920-40	CUTTS	X	X	X	X	X														
0960-80	CUTTS				1															
1000-20	CUTTS		X		X		X	X	X											
1040-60	CUTTS								17	X	X	?								
1080-00	CUTTS								7	1	X		X	X						
1120-40	CUTTS				1				3	X					1					
1140-60	CUTTS				1				5	1						2	1			
1160-80	CUTTS				2				1				1			X		X	1	X
1220-40	CUTTS				2				3								2		1	
1280-00	CUTTS				1	1			2	X										
1340-60	CUTTS				4					2			X		X		1			1
1380-00	CUTTS				6					1			X				1		X	1
1440-60	CUTTS			X	7									4						12
1480-00	CUTTS				12									X						4
1535-38	CUTTS				5								2	X				X		1
1565.5	SWC				4								X							
1589.5	SWC				3												1			
1620.0	SWC				11	X											1			X
1643.5	SWC		X		3								X							X
1664.0	SWC				3															1
1701.0	SWC				7										1		2			2
1717.75	SWC				5												1			4
1728.50	CORE1				2															
1733.60	CORE1				1															
1755.0	SWC				11										1					
1774.0	SWC				3										1		2			1
1801.5	SWC		1		12			X							X		7			X
1820.5	SWC		2		5												1			2
1828.0	SWC		1		4	X											1			1
1839.75	CORE2																			
1841.0	CORE2				1															
1843.20	CORE2																			
1857.3	CORE3				X															
1860.3	CORE3																			
1866.05	CORE3				2															
1876.5	CORE3				1															
1879.0	CORE3				1															
1881.0	CORE3				2															
1900.0	SWC																			
1917.35	CORE4				X															
1926.25	CORE4																			
1933.1	CORE4																			
1935.50	CORE4				1	2														
1939.35	CORE4				1															
1941.65	CORE4				X	X									X					
1943.0	CORE5																			
1948.0	CORE5																			
1953.0	CORE5				2															
1955.60	CORE5				X	1														
1961.25	CORE5				1															X
1968.25	CORE5				2	X														
1996.5	SWC				2	1														
2012.5	SWC				10	1														
2049.0	SWC				2	X														
2066.0	SWC				3	X														
2077.0	SWC				1															
2105.0	SWC																			X
2119.0	SWC																			
2131.0	SWC					X														

Depth	Sample	58 HETEROSPHAERIDIUM CF LATEROBRACHIUS	59 GILLINIA HYMENOPHORA	60 ISABELIDINIUM CRETACEUM	61 PTEROSPERMELLA AUREOLATA	62 TRITHYRODINIUM MARSHALLII	63 AREOSPHAERIDIUM SUGGESTIUM	64 NELSONIELLA CF ACERAS (PSILATE)	65 ODONTOCHITINA CRIBROPODA	66 ODONTOCHITINA OBESA	67 PTEROSPERMELLA AUSTRALIENSIS	68 XIPHOPHORIDIUM ALATUM	69 CHLAMOISPHAERIDIUM ASYMMETRICUM	70 CHATANGIELLA VICTORIENSIS	71 ISABELIDINIUM BELFASTENSE ROTUNDATA	72 TRITHYRODINIUM (THICK RETIC)	73 TRITHYRODINIUM GLABRA (THICK SMOOTH)	74 BOURKIDINIUM GRANULATUM	75 HYSTRICHODINIUM PULCHRUM	76 ISABELIDINIUM BELFASTENSE
0570-80	CUTTS																			
0580-00	CUTTS																			
0600-20	CUTTS																			
0620-40	CUTTS																			
0720-40	CUTTS																			
0740-60	CUTTS																			
0760-80	CUTTS																			
0820-40	CUTTS																			
0860-80	CUTTS																			
0900-20	CUTTS																			
0920-40	CUTTS																			
0960-80	CUTTS																			
1000-20	CUTTS																			
1040-60	CUTTS																			
1080-00	CUTTS																			
1120-40	CUTTS																			
1140-60	CUTTS																			
1160-80	CUTTS																			
1220-40	CUTTS	X																		
1280-00	CUTTS	X	1	X	1	1														
1340-60	CUTTS		X	X		X	X	X	X	X	X	?								
1380-00	CUTTS												X	X	1	X	X			
1440-60	CUTTS					1	?		1					X	X	X	2	X	X	1
1480-00	CUTTS			1		2			1					X		2	X			
1535-38	CUTTS		1	4		2			2	X										
1565.5	SWC					X														
1589.5	SWC			1		X											X			
1620.0	SWC		1																	
1643.5	SWC					1							1							
1664.0	SWC																			
1701.0	SWC					2														
1717.75	SWC					2														
1728.50	CORE1																			
1733.60	CORE1		X																	
1755.0	SWC																		1	
1774.0	SWC					X														
1801.5	SWC																		X	
1820.5	SWC												X						1	
1828.0	SWC																			
1839.75	CORE2																			
1841.0	CORE2																			
1843.20	CORE2																			
1857.3	CORE3																			
1860.3	CORE3																			
1866.05	CORE3																			
1876.5	CORE3																			
1879.0	CORE3																			
1881.0	CORE3																			
1900.0	SWC																			
1917.35	CORE4																			
1926.25	CORE4																			
1933.1	CORE4																			
1935.50	CORE4																			
1939.35	CORE4																			
1941.65	CORE4																			
1943.0	CORE5																			
1948.0	CORE5																			
1953.0	CORE5																			
1955.60	CORE5																			
1961.25	CORE5					X														
1968.25	CORE5																			
1996.5	SWC					1							X							
2012.5	SWC																			
2049.0	SWC																			
2066.0	SWC																			
2077.0	SWC																			
2105.0	SWC												X							
2119.0	SWC																			
2131.0	SWC																			

Sample	77 ODONTOCHITINA NO HORNS	78 OLIGOSPHAERIDIUM COMPLEX	79 CASSICULOSPHAERIDIA RETICMAGNA	80 DINOGYMNIUM ACUMINATUM	81 ODONTOCHITINA COSTATA	82 SUBTILISPHAERA ROTUNDATA	83 CIRCULODINIUM DEFLANDREI	84 ISABELIDINIUM CF BELFASTENSE	85 ISABELIDINIUM COOKSONIAE	86 AMPHIDIADEMA DENTICULATA	87 ISABELIDINIUM RECTANGULARE CONTRACTUM	88 TRITHYRODINIUM SUSPECTUM	89 ISABELIDINIUM RECTANGULARE DIVERSUM	90 ISABELIDINIUM RECTANGULARIS	91 ISABELIDINIUM BALMEI	92 TANYOSPHAERIDIUM SALPINX	93 CONOSPHAERIDIUM STRIATOCONUS	94 XENASCUS CERATOIDES	95 CIRCULODINIUM SOLIDA
0570-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0580-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0600-20 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0620-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0720-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0740-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0760-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0820-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0860-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0900-20 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0920-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0960-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1000-20 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1040-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1080-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1120-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1140-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1160-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1220-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1280-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1340-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1380-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1440-60 CUTTS	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1480-00 CUTTS	X	X	X	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.
1535-38 CUTTS	.	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1565.5 SWC	.	.	.	.	.	.	1	X	1	.	.	.	.	.	.	.	.	.	.
1589.5 SWC	.	.	.	.	X	.	1	.	4	?	X	X	.	.	.	.	.	.	.
1620.0 SWC	.	X	.	.	.	.	1	.	3	.	X	.	X	X	.	.	.	.	.
1643.5 SWC	.	1	.	.	.	.	1	.	.	.	X	.	2	X	1	.	.	.	.
1664.0 SWC	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.
1701.0 SWC	.	.	.	.	.	.	1	.	.	.	.	X	.	.	2	.	X	3	.
1717.75 SWC	.	4	.	.	.	.	3	.	.	.	.	.	.	.	2	.	.	.	X
1728.50 CORE1	.	.	.	.	.	.	2	.	.	.	.	.	.	.	X	.	.	.	1
1733.60 CORE1	.	1	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	1
1755.0 SWC	.	.	.	.	.	1	3	.	.	.	.	.	.	.	2	1	.	.	.
1774.0 SWC	.	X	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2
1801.5 SWC	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
1820.5 SWC	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	1
1828.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1839.75 CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1841.0 CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1843.20 CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1857.3 CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1860.3 CORE3	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1866.05 CORE3	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1876.5 CORE3	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
1879.0 CORE3	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1881.0 CORE3	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
1900.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1917.35 CORE4	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1926.25 CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1933.1 CORE4	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1935.50 CORE4	.	X	.	.	.	.	2	.	X	.	.	.	.	.	.	.	.	.	.
1939.35 CORE4	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1941.65 CORE4	.	X	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1943.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1948.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1953.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1955.60 CORE5	.	X	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	.	.
1961.25 CORE5	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1968.25 CORE5	.	1	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
1996.5 SWC	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
2012.5 SWC	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2049.0 SWC	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2066.0 SWC	.	3	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
2077.0 SWC	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2105.0 SWC	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
2119.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2131.0 SWC	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Sample	96 APTEODINIUM GRANULATUM	97 CYMOSOSPHAERIDIUM MAGNIFICA	98 DAPSILIDINIUM SP	99 FLORENTINIA DEANEI	100 ALTERBIA ACUMINATUM	101 CHLAMYDOPHORELLA NYEI/AMBIGUA	102 CRIBROPERIDINIUM EDWARDSII	103 PALAEOPERIDINIUM CRETACEUM	104 CONOSPHAERIDIUM TUBULOSUM	105 ISABELIDINIUM GLABRUM	106 CYCLONEPHELIUM COMPACTUM	107 CHATANGIELLA MICROCANTHA	108 ISABELIDINIUM SP	109 CANNINGIA SPINY	110 CLEISTOSPHAERIDIUM	111 ARAUCARIACITES AUSTRALIS	112 CLAVIFERA TRIPLEX	113 CYATHIDITES GIGANTIS	114 CYATHIDITES SPP
														.	.	2	2	X	7
0570-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	X	.	4
0580-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	6
0600-20 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	.
0620-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	7
0720-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	9
0740-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.
0760-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
0820-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
0860-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	.
0900-20 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
0920-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.
0960-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1000-20 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1040-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	1	.	.
1080-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1120-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1140-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1160-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.
1220-40 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	X	.	.
1280-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.
1340-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.
1380-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	
1440-60 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	
1480-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2	.	.
1535-38 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	1	.	.
1565.5 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	.
1589.5 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
1620.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1	.	.
1643.5 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	2	.	.
1664.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
1701.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1717.75 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.
1728.50 CORE1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	X	.	.
1733.60 CORE1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.
1755.0 SWC	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2	.	.
1774.0 SWC	2	1	X	1	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
1801.5 SWC	1	.	.	.	X	2	1	.	.	.	.	.	.	.	.	5	.	.	.
1820.5 SWC	1	.	.	.	X	X	.	X	.	.	.	.	.	.	.	3	.	.	.
1828.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.
1839.75 CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
1841.0 CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
1843.20 CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.
1857.3 CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	X	.	.
1860.3 CORE3	.	.	.	.	X	.	.	1	.	.	.	.	.	.	.	5	.	.	.
1866.05 CORE3	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	4	1	.	.
1876.5 CORE3	.	.	.	.	X	.	.	.	.	X	.	.	.	.	.	2	X	.	.
1879.0 CORE3	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	4	.	.	.
1881.0 CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.
1900.0 SWC	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.
1917.35 CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
1926.25 CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.
1933.1 CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.
1935.50 CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.
1939.35 CORE4	.	.	.	.	.	.	.	X	.	.	X	.	.	.	.	2	X	.	.
1941.65 CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1	.	.
1943.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
1948.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	1	.	.
1953.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	4	1	.	.
1955.60 CORE5	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	1	1	.	.
1961.25 CORE5	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
1968.25 CORE5	.	.	.	.	X	1	.	2	.	.	X	.	.	.	.	3	.	.	.
1996.5 SWC	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	3	.	.	.
2012.5 SWC	.	.	.	1	.	.	X	1	.	.	1	.	.	.	.	2	1	.	.
2049.0 SWC	.	.	.	.	X	.	2	1	.	.	X	.	.	.	.	4	X	.	.
2066.0 SWC	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	3	.	.	.
2077.0 SWC	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
2105.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2119.0 SWC	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	3	.	.	.
2131.0 SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Depth	Sample	115 DILWYNITES GRANULATUS	116 ERICIPITES SCABRATUS	117 FALCISPORITES SIMILIS	118 FOVEOTRILETES CRATER	119 GEPHYRAPOLLENITES WAHOOENSIS	120 HALORAGACIDITES HARRISII	121 LAEVIGATOSPORITES OVATUS	122 LAEVIGATOSPORITES USHENSIS	123 LYGISTIPOLLENITES FLORINII	124 MALVACIPOLLIS DIVERSUS	125 MALVACIPOLLIS SUBTILIS	126 MICROCACHRYIDITES ANTARCTICUS	127 MYRTACEIDITES PARVUS/MESONESUS	128 NOTHOFAGUS BRACHYSPINULOSUS	129 NOTHOFAGUS EMARCIDUS/HETERUS	130 NOTHOFAGUS FLEMINGII	131 PERIPOROPOLLENITES POLYORATUS	132 PERIPOROPOLLENITES VESICUS	133 PHYLLOCLADIDITES MAWSONII	134 PODOSPORITES MICROSACCATUS	135 PROTEACIDITES	136 PROTEACIDITES GRANDIS	137 PROTEACIDITES INCURVATUS	138 PROTEACIDITES KOPIENSIS	139 STEREISPORITES ANTIQUISPORITES	140 STEREISPORITES PUNCTATUS	141 TRICOLPORITES	142 TRILETES TUBERCULIFORMIS	143 TRIPOROPOLLENITES AMBIGUUS	144 VERRUCOSISPORITES KOPUKUENSIS	145 CUPANIEIDITES ORTHOTEICHUS	146 GLEICHENIIDITES CIRCINIDITES	147 PROTEACIDITES CLARUS	148 PROTEACIDITES LEIGHTONII	149 PROTEACIDITES SCABORATUS	150 RETITRILETES AUSTROCLAVATIDITES	151 AUSTRALOPOLLIS OBSCURUS	152 CAMEROZONOSPORITES BULLATUS
0570-80	CUTTS	15	1	7	?	X	5	1	X	7	1	4	2	1	X	1	X	1	1	3	2	6	2	X	X	X	1	1	X	X	X	.	.	.	.	.	.	.	.
0580-00	CUTTS	10	1	6	.	.	6	1	.	5	1	1	1	.	X	.	.	1	1	.	2	13	.	1	.	.	.	.	.	.	X	X	4	X	1	X	1	.	.
0600-20	CUTTS	11	.	8	.	.	5	1	.	2	.	1	2	.	1	.	X	.	.	2	.	21	.	.	.	4	.	1	1	.	1	1	5	1	.	.	.	1	1
0620-40	CUTTS	17	2	7	.	.	3	2	.	5	X	1	1	.	2	.	.	2	.	1	.	9	1	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.
0720-40	CUTTS	10	.	20	.	.	.	.	.	X	.	.	7	.	1	.	.	.	.	5	5	15	X	.	.	2	3	.	.	.	.	.	3	.	.	.	2	3	.
0740-60	CUTTS	9	.	14	.	.	.	.	.	.	2	1	3	.	.	.	.	.	.	4	3	16	.	.	.	3	1	.	.	.	.	.	4	.	.	X	.	1	X
0760-80	CUTTS	5	.	14	.	.	.	1	.	2	.	.	4	.	.	.	.	1	.	11	1	15	.	.	.	2	.	.	1	.	.	.	.	.	.	.	1	.	.
0820-40	CUTTS	2	.	11	.	X	.	3	.	1	.	.	5	.	.	.	.	.	.	7	4	9	.	.	.	5	.	.	.	.	.	.	.	.	.	.	2	.	.
0860-80	CUTTS	7	2	11	.	X	3	1	.	3	.	.	7	.	.	.	.	.	.	4	6	18	.	.	.	2	.	.	.	.	.	.	.	.	.	.	1	.	.
0900-20	CUTTS	3	1	7	.	X	.	1	.	1	.	.	.	.	.	.	.	X	.	3	5	21	.	.	.	3	.	.	.	.	.	.	.	.	.	.	4	1	.
0920-40	CUTTS	9	1	16	.	.	1	.	.	.	.	.	4	.	.	.	.	.	.	5	4	13	.	.	.	1	X	.	.	.	.	.	.	.	.	.	1	.	.
0960-80	CUTTS	4	.	13	.	1	1	.	.	.	.	.	4	.	.	.	.	.	.	4	.	10	.	.	.	3	.	.	.	.	.	.	.	.	.	.	2	.	.
1000-20	CUTTS	3	1	15	.	.	.	.	.	X	.	.	6	.	.	18	.	1	.	4	5	13	.	.	.	1	.	X	.	.	.	.	.	.	.	.	2	.	.
1040-60	CUTTS	1	.	16	.	.	.	2	.	.	.	.	3	.	.	.	.	.	.	3	2	7	.	.	.	1	.	1	.	.	.	.	.	.	.	.	2	X	.
1080-00	CUTTS	6	.	13	.	.	.	1	.	.	.	.	7	.	.	.	.	.	.	2	4	11	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5	.	.
1120-40	CUTTS	10	.	20	.	.	.	1	.	.	.	.	12	.	.	.	.	.	.	3	3	9	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2	1	.
1140-60	CUTTS	11	.	17	.	.	.	1	.	.	.	.	14	.	.	.	.	.	.	4	X	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.
1160-80	CUTTS	22	.	11	.	.	.	2	.	.	.	.	4	.	.	.	.	.	.	3	8	15	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	2	.
1220-40	CUTTS	5	.	15	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	4	2	5	.	.	.	2	.	.	.	.	.	.	.	.	.	.	1	3	.
1280-00	CUTTS	14	.	21	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	3	1	9	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	1	.
1340-60	CUTTS	11	.	18	.	.	.	1	.	.	.	.	7	.	.	.	.	.	.	.	8	8	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	X	.
1380-00	CUTTS	16	.	26	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	2	2	6	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	1	.
1440-60	CUTTS	19	.	11	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	1	4	3	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	1	.
1480-00	CUTTS	13	.	15	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.	1	4	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
1535-38	CUTTS	11	.	15	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	2	6	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.
1565.5	SWC	17	.	21	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	3	8	X	.	.	.	4	.	.	.	.	.	.	.	.	.	.	2	.	.
1589.5	SWC	16	.	30	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	1	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.
1620.0	SWC	9	.	24	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	1	2	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	.	.
643.5	SWC	6	.	18	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.
64.0	SWC	7	.	22	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1701.0	SWC	8	.	23	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1717.75	SWC	1	.	25	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	.	.
1728.50	CORE1	2	.	16	.	.	.	1	.	.	.	.	8	.	.	.	.	.	.	2	5	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	1	1	.
1733.60	CORE1	9	.	18	.	.	.	1	.	.	.	.	9	.	.	.	.	.	.	5	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	2	.
1755.0	SWC	8	.	15	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	1	4	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	.	.
1774.0	SWC	12	.	26	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	X	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
1801.5	SWC	16	.	16	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1820.5	SWC	31	.	12	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
1828.0	SWC	17	.	21	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	3	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	1	.	.
1839.75	CORE2	9	.	9	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	1	32	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
1841.0	CORE2	21	.	20	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.	1	6	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	1	.	.
1843.20	CORE2	10	.	17	.	.	.	X	.	.	.	.	14	.	.	.	.	.	.	2	6	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	1	.	.
1857.3	CORE3	14	.	13	.	.	.	2	.	.	.	.	7	.	.	.	.	.	.	2	10	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
1860.3	CORE3	22	.	12	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	3	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1866.05	CORE3	7	.	22	.	.	.	1	.	.	.	.	13	.	.	.	.	.	.	.	6	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
1876.5	CORE3	11	.	27	.	.	.	2	.	.	.	.	6	.	.	.	.	.	.	1	4	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
1879.0	CORE3	14	.	21	.	.	.	.	.	.	.	.	11	.	.	.	.	.	.	.	5	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2	.	.
1881.0	CORE3	27	.	13	.	.	.	1	.	.	.	.	7	.	.	.	.	.	.	.	2	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2	.	.
1900.0	SWC	5	.	24	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	1	6	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	2	.	.
1917.35	CORE4	16	.	25	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	1	4	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.
1926.25	CORE4	15	.	10	.	.	.	4	.	.	.	.	3	.	.	.	.	.	.	6	10	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	X	.
1933.1	CORE4	27	.	14	.	.	.	1	.	.	.	.	8	.	.	.	.	.	.	.	4	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.
1935.50	CORE4	7	.	18	.	.	.	1	.	.	.	.	9	.	.	.	.	.	.	3	6	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	1	.
1939.35	CORE4	20	.	10	.	.	.	3	.	.	.	.	9	.	.	.	.	.	.	1	3	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	.	.
1941.65	CORE4	8	.	14	.	.	.	5	.	.	.	.	8	.	.	.	.	.	.	5	15	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2	X	.
1943.0	CORE5	4	.	21	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	5	3	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2	.	.
1948.0	CORE5	3	.	20	.	.	.	1	.	.	.	.	11	.	.	.	.	.	.	6	6	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	2	.	.
1953.0	CORE5	9	.	21	.	.	.	1	.	.	.	.	8	.	.	.	.	.	.	3	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.
1955.60	CORE5	20	.	20	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.
1961.25	CORE5	16	.	22	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	2	4	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.
1968.25	CORE5	17	.	16	.	.	.	1	.	.	.	.	10	.	.	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
1996.5	SWC	20	.	15	.	.	.	X	.	.	.	.	8	.	.	.	.	.	.	.	5	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
2012.5	SWC	18	.	13	.	.	.	X	.	.	.	.	4	.	.	.	.	.	.	X	4	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	X	.	.
2049.0	SWC	15	.	15	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.	X	6	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.
2066.0	SWC	19	.	17	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
2077.0	SWC	20	.	14	.	.	.	X	.	.	.	.	13	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	.	.
2105.0	SWC	X	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	?	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
2119.0	SWC	.	.	30	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	3	.	.
2131.0	SWC	12	.	20	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.

	INTRATRIPOROPOLLENITES NOTABILIS	LYGISTIPOLLENITES BALMEI	NOTHOFAGUS ENDURUS	PROTEACIDITES ANNULARIS	PROTEACIDITES ORNATUS	SPINIZONOCOLPITES PROMINATUS	TRICOLPITES	AMOSOPOLLIS CRUCIFORMIS	CAMEROZONOSPORITES OHAIENSIS	CERATOSPORITES EQUALIS	CICATRICOSISPORITES FOVEOAUSTRALIENSIS	CYATHIDITES MINOR	CYATHIDITES SPLENDENS	FALCISPORITES GRANDIS	FOVEOGLEICHENIDITES	GAMBIERINA RUDATA	GLEICHENIIDITES	TRICOLPITES PHILLIPSII	TRIPOROLETES RETICULATUS	AEQUITRIRADITES SPINULOSUS	NOTHOFAGUS SENECTUS	CONTIGNISPORITES COOKSONIAE	GAMBIERINA EDWARDSII	GRAPNELISPORA EVANSII	HERKOSPORITES ELLIOTTII	PROTEACIDITES HAPUKUI	TRICOLPITES CONFESSUS	TRICOLPITES LONGUS	TRICOLPORITES LILLIEI	TRIPOROPOLLENITES SECTILIS	COROLLINA TOROSUS	CYATHIDITES AUSTRALIS	PROTEACIDITES PALISADUS	CINGUTRILETES CLAVUS	CYCADOPITES FOLLICULARIS	GAMBIERINA RUDATA (TWISTED)	UERMMENTIFERA SENTUSA	OSMUNDACIDITES WELLMANII
	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
0570-80 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0580-00 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0600-20 CUTTS	1	1	1	1	1	X	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0620-40 CUTTS	.	1	4	1	.	.	.	X	X	2	1	7	1	6	1	X	5	3	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0720-40 CUTTS	.	1	1	.	.	.	.	1	.	.	.	.	.	.	.	1	.	1	.	X	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0740-60 CUTTS	.	1	1	.	.	.	.	.	X	2	.	.	.	.	.	4	.	.	.	.	1	1	X	X	X	1	1	1	X	X	.	.	.	.	.	.	.	.
0760-80 CUTTS	.	1	3	.	.	.	1	3	1	1	.	4	.	2	.	1	1	.	.	.	.	.	.	.	.	X	.	X	.	.	1	1	X	.	.	.	.	.
0820-40 CUTTS	.	.	3	.	.	.	.	.	.	3	.	4	.	2	.	2	5	.	.	X	.	.	.	.	2	1	.	1	2	1	1	3	1	1	1	1	1	3
0860-80 CUTTS	.	1	4	.	.	.	.	.	1	1	.	6	.	.	.	1	3	.	.	.	1	.	X	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1
0900-20 CUTTS	.	X	2	.	.	.	.	.	1	1	.	5	.	5	.	3	2	.	.	.	1	.	.	.	.	.	X	.	X	.	1	5	2	.	1	.	.	1
0920-40 CUTTS	.	.	7	.	.	.	.	.	.	3	.	3	.	3	.	2	10	.	.	.	3	.	X	.	.	.	.	X	.	1	.	5	.	.	.	.	.	1
0960-80 CUTTS	.	2	8	.	.	.	.	.	2	1	.	7	.	4	.	2	2	.	.	.	3	.	.	.	.	.	.	.	1	.	.	3	.	.	.	.	.	2
1000-20 CUTTS	.	.	.	.	.	.	.	.	1	1	.	6	.	.	.	.	4	.	.	.	3	.	.	.	.	.	1	.	.	.	.	5	.	.	.	.	.	X
1040-60 CUTTS	.	.	.	.	.	.	1	.	2	2	.	8	.	2	.	.	7	.	.	.	1	.	.	.	.	.	1	.	.	.	1	3	.	1	1	.	.	1
1080-00 CUTTS	.	.	.	.	.	.	.	.	.	2	.	7	.	2	.	.	2	.	.	.	5	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1
1120-40 CUTTS	.	.	.	.	.	.	.	1	1	.	.	5	.	2	.	X	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	1	.	.	2
1140-60 CUTTS	.	.	1	.	.	.	.	X	2	.	.	10	.	1	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	1	2	1	1	2	.	.	2
1160-80 CUTTS	.	.	1	.	.	.	2	.	.	1	.	5	.	1	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	1	1	.	2	1	.	.	1
1220-40 CUTTS	.	.	1	.	.	.	.	.	X	.	.	10	.	4	.	.	3	.	.	.	3	1	.	.	.	.	.	.	.	.	4	2	.	2	2	.	.	5
1280-00 CUTTS	.	.	1	.	.	.	1	.	X	1	.	8	.	4	.	X	3	.	.	.	1	.	.	.	.	.	.	.	.	.	1	1	.	1	1	.	1	4
1340-60 CUTTS	.	.	.	.	.	.	2	.	.	2	.	6	.	6	.	.	2	.	.	.	X	X	.	.	.	.	.	.	.	.	1	2	.	X	.	.	X	4
1380-00 CUTTS	.	.	.	.	.	.	.	.	X	.	.	8	.	2	.	.	1	.	X	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	2	.	.	2
1440-60 CUTTS	.	.	.	.	.	.	X	X	1	2	.	7	.	1	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	1	1	.		
1480-00 CUTTS	.	.	.	.	.	.	.	X	.	2	.	3	.	3	.	.	3	.	2	.	.	.	.	.	.	.	.	.	.	.	1	2	.	1	1	.	.	
1535-38 CUTTS	.	.	.	.	.	.	.	1	2	1	.	9	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	.	2	.	.	2
1565.5 SWC	.	.	.	.	.	.	.	X	.	1	.	7	.	1	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	X	.	.	2
1589.5 SWC	.	.	.	.	.	.	.	5	.	1	.	2	.	4	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1
1620.0 SWC	.	.	.	.	.	.	.	5	.	2	.	8	.	6	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	1	.	.	1
1643.5 SWC	.	.	.	.	.	.	.	9	.	2	.	18	.	3	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	1
1664.0 SWC	.	.	.	.	.	.	.	2	.	5	.	9	.	5	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	1	.	X	1
1701.0 SWC	.	.	.	.	.	.	.	5	.	1	.	10	.	3	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	.	.	.	.	1
1717.75 SWC	.	.	.	.	.	.	.	10	.	1	.	7	.	4	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	6	.	.	1	.	.	2
1728.50 CORE1	.	.	.	.	.	.	1	9	.	1	.	10	.	3	.	.	9	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4	.	1	1	.	.	3
1733.60 CORE1	.	.	.	.	.	.	1	10	.	2	.	13	.	2	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	5	.	1	1	.	.	1
1755.0 SWC	.	.	.	.	.	.	.	12	.	.	.	6	.	3	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	.	2	.	.	1
1774.0 SWC	.	.	.	.	.	.	.	6	.	2	.	3	.	5	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	1	.	.	5
1801.5 SWC	.	.	.	.	.	.	.	2	.	.	.	5	.	3	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	1	1	.	.	2
1820.5 SWC	.	.	.	.	.	.	.	11	.	1	.	1	.	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	1
1828.0 SWC	.	.	.	.	.	.	.	8	.	1	.	5	.	4	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	1	.	.	.	5
1839.75 CORE2	.	.	.	.	.	.	.	.	.	1	.	14	.	1	.	.	5	.	.	X	.	.	.	.	.	.	.	.	.	.	3	4	.	1	1	.	.	1
1841.0 CORE2	.	.	.	.	.	.	.	3	.	.	.	7	.	3	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	1	.	.	1
1843.20 CORE2	.	.	.	.	.	.	.	3	.	1	.	7	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	1
1857.3 CORE3	.	.	.	.	.	.	.	5	.	2	.	9	.	1	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	1	2	.	.	2
1860.3 CORE3	.	.	.	.	.	.	.	3	.	3	.	3	.	3	.	.	9	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	1	1	.	.	1
1866.05 CORE3	.	.	.	.	.	.	.	4	.	1	.	7	.	3	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	5	.	1	2	.	.	4
1876.5 CORE3	.	.	.	.	.	.	1	4	.	.	.	10	.	3	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	6	.	1	1	.	.	4
1879.0 CORE3	.	.	.	.	.	.	1	3	.	.	.	13	.	5	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	1	.	.	4
1881.0 CORE3	.	.	.	.	.	.	.	4	.	X	.	10	.	2	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	1	4	.	.	1
1900.0 SWC	.	.	.	.	.	.	.	X	.	2	X	14	.	4	.	.	4	.	X	.	.	.	.	.	.	.	.	.	.	.	5	5	.	1	2	.	.	1
1917.35 CORE4	.	.	.	.	.	.	.	6	.	1	.	5	.	4	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	1	2	.	.	4
1926.25 CORE4	.	.	.	.	.	.	.	.	.	1	.	18	.	4	.	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.	1	6	.	1	1	.	.	1
1933.1 CORE4	.	.	.	.	.	.	.	1	.	1	.	8	.	2	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	1	1	.	.	6
1935.50 CORE4	.	.	.	.	.	.	.	.	.	3	.	7	.	4	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	1	.	.	.	2
1939.35 CORE4	.	.	.	.	.	.	.	3	.	1	.	5	.	2	.	.	7	.	.	.	.	X	.	.	.	.	.	.	.	.	2	4	.	1	.	.	.	3
1941.65 CORE4	.	.	.	.	.	.	1	.	.	.	.	10	.	1	.	.	9	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	1	1	.	.	1
1943.0 CORE5	.	.	.	.	.	.	.	.	.	3	.	19	.	3	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	2	6	.	1	2	.	.	5
1948.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	17	.	3	.	.	9	.	X	.	.	.	.	.	.	.	.	.	.	.	2	3	.	1	1	.	.	2
1953.0 CORE5	.	.	.	.	.	.	.	.	.	.	.	5	.	6	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	1	1	.	.	2
1955.60 CORE5	.	.	.	.	.	.	.	.	.	.	.	13	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	1	1	.	.	1
1961.25 CORE5	.	.	.	.	.	.	.	.	.	1	.	11	.	2	.	.	6	.	.	.	.	X	.	.	.	.	.	.	.	.	1	4	.	1	1	.	.	2
1968.25 CORE5	.	.	.	.	.	.	.	.	.	2	.	10	.	1	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	1	1	.	.	2
1996.5 SWC	.	.	.	.	.	.	.	.	.	.	X	12	.	3	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	2	4	.	.	.	.	.	1
2012.5 SWC	.	.	.	.	.	.	.	.	.	1	.	14	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	1	.	.	.
2049.0 SWC	.	.	.	.	.	.	.	.	.	2	.	7	.	2	.	.	5	.	1	.	.	.	.	.	.	.	.	.	.	.	3	1	.	1	2	.	.	1
2066.0 SWC	.	.	.	.	.	.	.	1	.	X	.	12	.	1	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4	.	.	1	.	.	4
2077.0 SWC	.	.	.	.	.	.	.	2	.	1	.	14	.	4	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	X	1	.	.	2
2105.0 SWC	.	.	.	.	.	.	.	X	.	X	.	X	.	.	.	.	X	.	.	.	.	X	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	[illegible]
2119.0 SWC	.	.	.	.	.	.	.	.	.	1	.	18	.	3	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	8
2131.0 SWC	.	.	.	.	.	.	.	.	.	2	.	23	.	3	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.	3	6	.	.	1	.	.	3

Depth	Sample	191 PEROTRILETES JUBATUS/MORGANII	192 TRICOLPITES GILLII	193 VITREISPORITES PALLIDUS	194 ISCHYOSPORITES PUNCTATUS	195 TRICOLPORITES APOXYEXINUS	196 CICATRICOSISPORITES AUSTRALIENSIS	197 CICATRICOSISPORITES LUDBROOKIAE	198 TRICOLPITES SABULOSUS	199 KLUKISPORITES SCABERIS	200 PHYLLOCLADIDITES VERRUCOSUS	201 CALLIALASPORITES TURBATUS	202 CRYBELOSPORITES STRIATUS	203 LEPTOLEPIDITES MAJOR	204 PROTEACIDITES LARGE	205 TETRACOLPORITES RETICULATA	206 MUROSPORA FLORIDA	207 AEQUITRIRADITES VERRUCOSUS	208 ORNAMENTIFERA MINIMA	209 CAMEROZONOSPORITES HORRENDUS	210 LYCOPODIACIDITES ASPERATUS	211 COPTOSPORA PILEOSA	212 LEPTOLEPIDITES VERRUCATUS	213 PHIMOPOLLENITES PANNOSUS	214 PILOSISPORITES NOTENSIS	215 RETITRILETES NODOSUS	216 CALLIALASPORITES DAMPIERI	217 TRIPOROLETES SIMPLEX	218 DENSOISPORITES VELATUS	219 PERINOPOLLENITES ELATOIDES	220 PEROTRILETES MAJUS	221 CYCLOSPORITES HUGHESI	222 BALMEISPORITES HOLODICTYUS	223 RETITRILETES CIRCOLUMENUS	224 FORAMINISPORIS DAILYI	225 CYATHEACIDITES TECTIFERA	226 RETITRILETES EMINULUS	227 APPENDICISPORITES DISTOCARINATUS	228 DILWYNITES TUBERCULATUS
0570-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0580-00	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0600-20	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0620-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0720-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0740-60	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0760-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0820-40	CUTTS	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0860-80	CUTTS	.	4	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0900-20	CUTTS	.	1	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0920-40	CUTTS	X	.	.	.	1	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0960-80	CUTTS	.	.	.	1	.	1	.	2	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1000-20	CUTTS	.	2	.	.	.	1	X	1	.	.	1	X	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1040-60	CUTTS	.	.	1	.	.	.	X	1	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1080-00	CUTTS	.	.	3	1	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1120-40	CUTTS	.	.	1	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1140-60	CUTTS	.	.	.	.	.	.	.	2	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1160-80	CUTTS	.	.	1	.	.	1	.	2	.	.	.	.	.	.	.	.	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1220-40	CUTTS	.	.	2	.	.	.	.	1	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1280-00	CUTTS	.	X	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	X	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1340-60	CUTTS	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	X	1	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1380-00	CUTTS	.	.	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.
1440-60	CUTTS	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1480-00	CUTTS	1	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1535-38	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1565.5	SWC	.	.	X	X	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.
1589.5	SWC	.	1	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	X	1	X	.	.	.	.	.	.	.	.
1620.0	SWC	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	X	.	.	.	.	.	.	.
1643.5	SWC	.	.	.	.	X	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1664.0	SWC	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	1	X	.	.	.	.	.
1701.0	SWC	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
1717.75	SWC	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.
1728.50	CORE1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
1733.60	CORE1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.
1755.0	SWC	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
1774.0	SWC	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	.	.
1801.5	SWC	.	.	.	X	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1820.5	SWC	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1828.0	SWC	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	X	.
1839.75	CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	X	1
1841.0	CORE2	.	.	3	1	.	X	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1843.20	CORE2	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	X	.
1857.3	CORE3	.	.	1	.	.	X	.	.	.	.	2	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
1860.3	CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1866.05	CORE3	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1876.5	CORE3	X	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1879.0	CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	1	.
1881.0	CORE3	.	.	1	.	.	X	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
1900.0	SWC	.	.	2	.	.	X	.	.	.	.	.	.	X	.	.	.	.	.	.	1	.	1	.	.	.	1	.	.	1	.	.	X	.	.	.	.	X	.
1917.35	CORE4	1	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
1926.25	CORE4	1	.	1	1	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
1933.1	CORE4	X	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1935.50	CORE4	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	X	.	.	.	.
1939.35	CORE4	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
1941.65	CORE4	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1943.0	CORE5	.	.	.	1	.	1	.	.	.	.	.	.	X	.	.	X	X	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
1948.0	CORE5	.	.	.	1	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	X	.
1953.0	CORE5	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	X	.
1955.60	CORE5	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1961.25	CORE5	.	.	.	1	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	X	.	X	.	.	X	.
1968.25	CORE5	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1996.5	SWC	1	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	X	.	.	.	1	X	.
2012.5	SWC	.	.	X	X	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	1	.
2049.0	SWC	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	1	.
2066.0	SWC	.	.	.	1	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
2077.0	SWC	1	.	.	X	.	1	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	X	.
2105.0	SWC	.	.	.	X	.	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
2119.0	SWC	1	.	.	.	.	.	.	.	.	.	5	.	2	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
2131.0	SWC	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.

Depth	Sample	229 TRICOLPITES VARIVERRUCATUS	230 LAEVIGATOSPORITES SPP	231 FORAMINISPORIS WONTHAGGIENSIS	232 SESTROSPORITES PSEUDOALVEOLATUS	233 APPENDICISPORITES TRICORNITATUS	234 CAMEROZONOSPORITES SOLIDA	235 RETITRILETES FACETUS	236 PHYLLOCLADIDITES EUNUCHUS	237 COPTOSPORA PARADOXA	238 KUYLISPORITES ZIPPERI	239 SENECTOTETRADITES FISTULOSUS	240 DICTYOPHYLLIDITES	241 HOEGISPORIS	242 TRIPOROLETES RADIATUS	243 PHYLLOCLADIDITES CF. HAUSONII	244 DICTYOTOSPORITES SPECIOSUS	245 FORAMINISPORIS ASYMMETRICUS	246 STERIESPORITES REGIUM	Depth	Sample
0570-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0570-80	CUTTS
0580-00	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0580-00	CUTTS
0600-20	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0600-20	CUTTS
0620-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0620-40	CUTTS
0720-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0720-40	CUTTS
0740-60	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0740-60	CUTTS
0760-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0760-80	CUTTS
0820-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0820-40	CUTTS
0860-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0860-80	CUTTS
0900-20	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0900-20	CUTTS
0920-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0920-40	CUTTS
0960-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0960-80	CUTTS
1000-20	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1000-20	CUTTS
1040-60	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1040-60	CUTTS
1080-00	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1080-00	CUTTS
1120-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1120-40	CUTTS
1140-60	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1140-60	CUTTS
1160-80	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1160-80	CUTTS
1220-40	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1220-40	CUTTS
1280-00	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1280-00	CUTTS
1340-60	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1340-60	CUTTS
1380-00	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1380-00	CUTTS
1440-60	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1440-60	CUTTS
1480-00	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1480-00	CUTTS
1535-38	CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1535-38	CUTTS
1565.5	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1565.5	SWC
1589.5	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1589.5	SWC
1620.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1620.0	SWC
1643.5	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1643.5	SWC
1664.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1664.0	SWC
1701.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1701.0	SWC
1717.75	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1717.75	SWC
1728.50	CORE1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1728.50	CORE1
1733.60	CORE1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1733.60	CORE1
1755.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1755.0	SWC
1774.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1774.0	SWC
1801.5	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1801.5	SWC
1820.5	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1820.5	SWC
1828.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1828.0	SWC
1839.75	CORE2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1839.75	CORE2
1841.0	CORE2	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1841.0	CORE2
1843.20	CORE2	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1843.20	CORE2
1857.3	CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1857.3	CORE3
1860.3	CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1860.3	CORE3
1866.05	CORE3	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1866.05	CORE3
1876.5	CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1876.5	CORE3
1879.0	CORE3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1879.0	CORE3
1881.0	CORE3	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1881.0	CORE3
1900.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1900.0	SWC
1917.35	CORE4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1917.35	CORE4
1926.25	CORE4	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	1926.25	CORE4
1933.1	CORE4	.	.	.	.	.	1	X	.	.	.	.	.	.	.	.	.	.	.	1933.1	CORE4
1935.50	CORE4	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1935.50	CORE4
1939.35	CORE4	.	.	1	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	1939.35	CORE4
1941.65	CORE4	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1941.65	CORE4
1943.0	CORE5	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	1943.0	CORE5
1948.0	CORE5	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	1948.0	CORE5
1953.0	CORE5	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1953.0	CORE5
1955.60	CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1955.60	CORE5
1961.25	CORE5	.	.	.	.	.	X	.	.	.	.	1	.	.	.	.	.	.	.	1961.25	CORE5
1968.25	CORE5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1968.25	CORE5
1996.5	SWC	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1996.5	SWC
2012.5	SWC	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	2012.5	SWC
2049.0	SWC	.	.	.	.	1	.	.	X	.	.	.	2	1	1	.	.	.	.	2049.0	SWC
2066.0	SWC	.	.	.	.	.	.	.	X	.	.	.	.	.	.	X	.	.	.	2066.0	SWC
2077.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2077.0	SWC
2105.0	SWC	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	2105.0	SWC
2119.0	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2119.0	SWC
2131.0	SWC	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	X	1	X	2131.0	SWC

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77	ODONTOCHITINA NO HORNS
66	ODONTOCHITINA OBESA
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50	ODONTOCHITINA PORIFERA
51	ODONTOCHITINA STUBBY

51	ODONTOCHITINA STUBBY
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133	PHYLLOCLADIDITES MAWSONII
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235	RETITRILETES FACETUS
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4	REWORKING: TRIASSIC
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158	SPINIZONOCOLPITES PROMINATUS
139	STEREISPORITES ANTIQUISPORITES
140	STEREISPORITES PUNCTATUS
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82	SUBTILISPHAERA ROTUNDATA
92	TANYOSPHAERIDIUM SALPINX
205	TETRACOLPORITES RETICULATA
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44	TRICHODINIUM INTERMEDIUM
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179	TRICOLPITES CONFESSUS
192	TRICOLPITES GILLII
180	TRICOLPITES LONGUS
170	TRICOLPITES PHILLIPSII
198	TRICOLPITES SABULOSUS
229	TRICOLPITES VARIVERRUCATUS
141	TRICOLPORITES
195	TRICOLPORITES APOXYEXINUS
181	TRICOLPORITES LILLIEI
142	TRILETES TUBERCULIFORMIS
242	TRIPOROLETES RADIATUS
171	TRIPOROLETES RETICULATUS
217	TRIPOROLETES SIMPLEX
143	TRIPOROPOLLENITES AMBIGUUS
182	TRIPOROPOLLENITES SECTILIS
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94	XENASCUS CERATOIDES
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