PALYNOLOGY OF VICTORIAN GEOLOGICAL SURVEY

MOCAMBORO-11, OTWAY BASIN, VICTORIA

BY

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I SUMMARY:

9.8m (core)-28.8m (core) : upper paradoxa zone : mid Albian : non-marine : immature

102.99m (core) : lower paradoxa zone : mid Albian : non-marine : immature

213.44m (core)-360m (swc) : striatus zone : early Albian : non-marine : immature

414m (swc)-965m (swc) : hughesi zone : Aptian : non-marine : marginally mature

1006m (swc)-1066.7m (core) : upper wonthaggiensis zone : late Neocomian : marginally mature

1161.8m (core)-1258.8m (core) : lean and indeterminate : non-marine : marginally mature

1317m (core)-1346m (swc) : upper australiensis zone : early Neocomian : non-marine : marginally mature

II INTRODUCTION:

Twenty-six sidewall core and conventional core samples were processed, to provide information on age, environment and maturity .

Palynomorph occurence data are shown as Appendix I and form the basis for the assignment of the samples to six spore-pollen units of mid Albian to early Neocomian age. 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 and modified by Morgan (1985) for application in the Otway Basin. The Tertiary zonation is that of Stover and Partridge (1973) and Stover and Evans (1973) as modified by Partridge (1976).

Maturity data was generated in the form of Spore Colour Index, and is plotted on figure 2 Maturity profile of Mocamboro-11. The oil and gas windows in figure 2 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%.

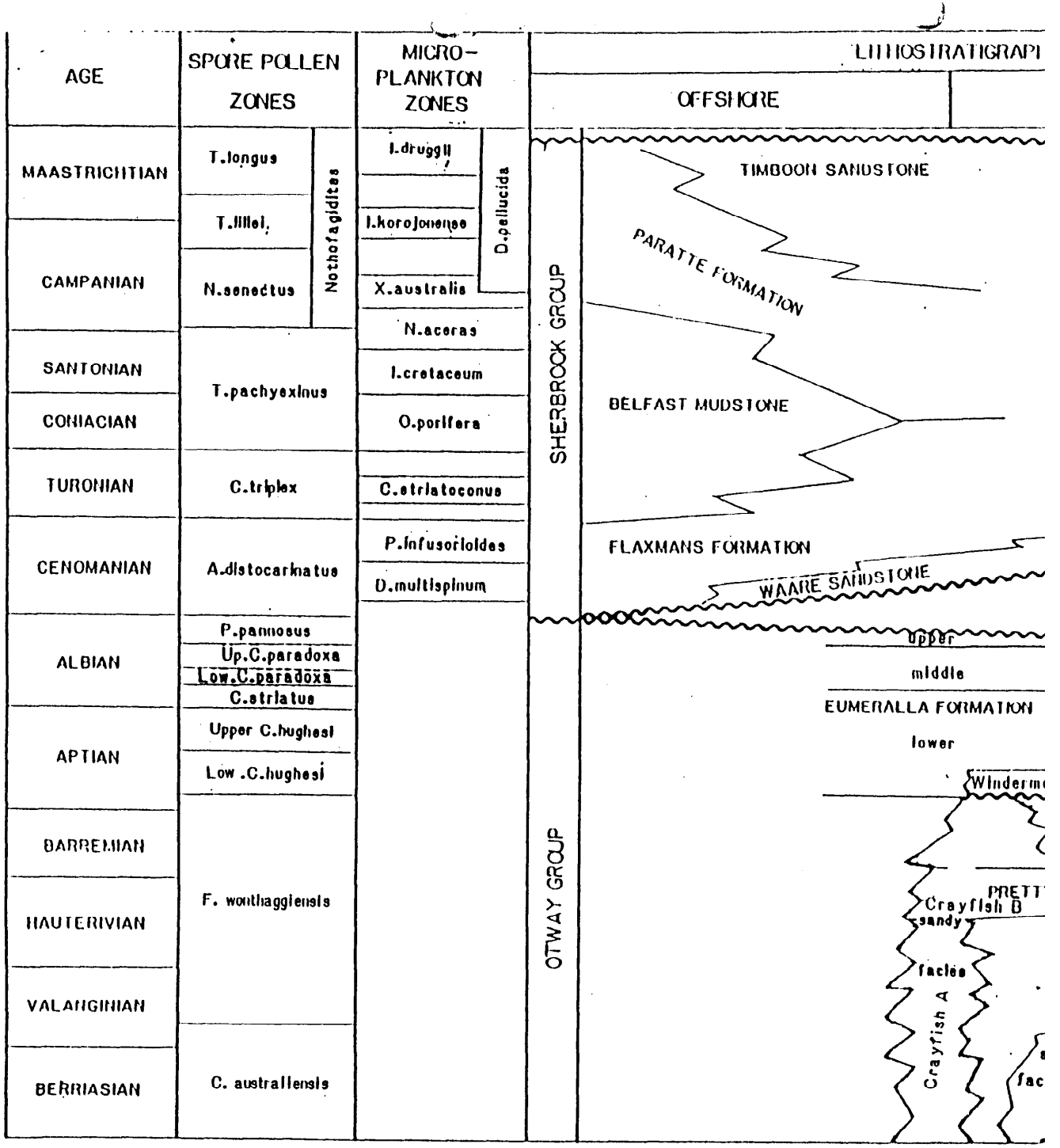

FIGURE 1. CRETACEOUS REGIONAL FRAMEWORK, OTWAY BASIN

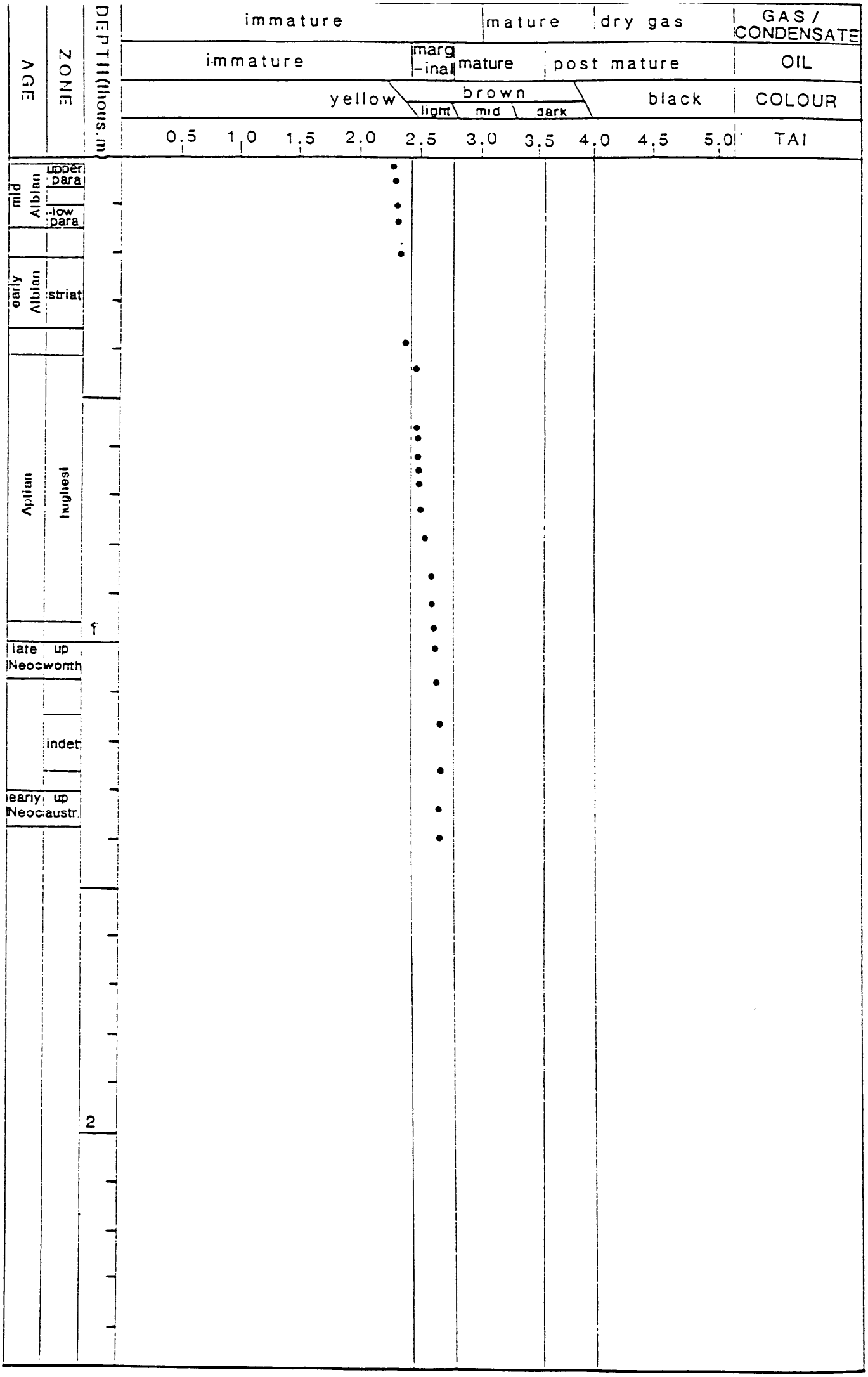

FIGURE 2 MATURITY PROFILE, MOCAMBORO-11

IIII PALYNOSTRATIGRAPHY:

A. 9.8m (core)-28.8m (core) : upper paradoxa zone

Assignment to the upper Coptospora paradoxa zone of mid Albian age is indicated at the top by the absence of younger indicators and at the base by oldest Pilosisporites grandis. Trilobosporites tribotrys was not seen below this interval and confirms the assignment. Frequent species include Cyathidites, Falcisporites similis and Microcachryidites antarcticus.

Non-marine fluvial environments are indicated by the common and diverse spore-pollen, common cuticle, and absence of freshwater or saline acritarchs.

Yellow to light brown spore colours indicate immaturity for hydrocarbon generation.

These features normally occur in the upper part of the middle Eumeralla Formation in the sense of the Kopsen and Scholefield (1990). this implies that the upper Eumeralla Formation has been lost by erosion.

B. 102.99m (swc) : lower paradoxa zone

Assignment to the lower C. paradoxa zone of mid Albian age is indicated by oldest C. paradoxa without younger indicators. Common forms are Cyathidites spp and Cicatricosisporites australiensis. Trilobosporites trioreticulosus occurs to the interval base.

Non-marine fluvial environments are indicated by the common and diverse spore-pollen and the absence of acritarchs.

Yellow to light brown spore colours indicate immaturity for hydrocarbon generation.

These features normally occur in the lower part of the middle Eumeralla Formation of Kopsen and Scholefield (1990) including the Heathfield Sandstone Member.

C. 213.44m (core)-360m (swc) : striatus zone

Assignment to the Crybelosporites striatus spore-pollen zone is indicated at the top by the absence of younger markers and confirmed by youngest Pilosisporites parvispinosus and at the base by oldest C. striatus, confirmed by youngest Cyclosporites hughesi in the sample beneath. Within the interval, common species include Cyathidites spp., Cicatricosisporites australiensis, F. similis, M. antarcticus, and Osmundacidites wellmannii. The top sample is distinctively different from the others by containing frequent C. australiensis and Aequitriradites verrucosus. Within the interval, Dictyotosporites speciosus, Pilosisporites spp. and Triassic reworking are consistent.

Non-marine environments are indicated by common and diverse spores and pollen, common cuticle fragments, and the absence of saline acritarchs. Rare algal acritarchs (Schizosporis spp) indicate some lacustrine influence.

Yellow to light brown spore colours indicate immaturity for hydrocarbon generation.

These features are normally seen in the upper part of the lower Eumeralla Formaiton, often in coaly facies.

D. 414m (swc)-965m (swc) : hughesi zone

Assignment to the Cyclosporites hughesi zone is indicated at the top by youngest C. hughesi and at the base by oldest Pilosisporites notensis. Within the interval Cyathidites, F. similis and O. wellmanii are frequent in most samples. C. australiensis, P. notensis and Aequitriradites verrucosus are intermittently frequent (618.14m, 788m and 835m) and may represent particular fern rich environments at lake or swamp margin. C. australiensis does not occur below this interval while D. speciosus, C. hughesi and P. notensis are consistent elements. In contrast to the zone above, Triassic reworking was not seen.

Non-marine environments with alternating lacustrine and fluvial influence is indicated by the common and diverse spore-pollen, common cuticle, absence of saline acritarchs and intermittent presence of algal forms (Schizosporis spp). Algal forms are absent at 550m, 590m 669m, 907m and 965m, and present at 414m, 578m, 609m, 618m, 706m, 778m and 835m.

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

These features are normally seen in all except the top of the lower Eumeralla Formation of Kopson and Scholefield (1990).

E. 979.1 (swc)-1000m (core) : indeterminate

These samples were virtually barren with only a few spores and pollen. The upper core includes C. paradoxa and T. trioreticulosus which are clearly caved into the

porous sandstone. The lower core contains a very nondescript assemblage of long ranging forms and could be in place. Clearly neither are zone diagnostic.

F. 1006m (swc)-1066.7m (core) : upper wonthaggiensis

Assignment to the upper Foraminisporis wonthaggiensis zone is indicated at the top by the absence of younger indicators (supported by youngest Microfasta evansii and a downhole influx of Contignisporites cooksoniae) and at the base by oldest Foraminisporis wonthaggiensis (at 1006m swc) and Triporoletes reticulatus (at 1066.7m core) Retitriletes watherooensis has its youngest occurrence at 1066.7m. Within the interval, Cyathidites, Falcisporites and Osmundacidites are common. C. hughesi, D. speciosus, C. cooksoniae and T. reticulatus are consistent components.

Non-marine dominantly fluvial environments are indicated by the common and diverse spore-pollen and absence of spiny acritarchs. Non-spiny acritarchs are represented only by a single specimen of M. evansii at 1006m suggest slight lacustrine influence.

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

These features are normally seen in the upper part of the Pretty Hill or Crayfish Formations (in the Crayfish C to D units of Kopsen and Scholefield (1990)).

G. 1161.8m (core)-1258.8m (core) : lean and indeteminate

these samples are very lean but do contain small assemblages of longranging spores and pollen. zone diagnostic taxa are absent, but the dates above and

below suggest that this interval probably belongs to the lower wonthaggiensis zone.

Non-marine fluvial environments are indicated by the dominant spore-pollen, common cuticle and absence of acritarchs.

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

These features are common in the very sandy parts of the Pretty Hill Formation and correlatives.

H. 1317m (core)-1346m (swc) : upper australiensis zone

Assignment to the upper part of the Cicatricosisporites australiensis zone is indicated at the top by the absence of the younger indicator D. speciosus and at the base by oldest Cyclosporites hughesi. Crybelosporites stylosus occurs at 1317-23m and R. watherooensis occurs at 1346m. Cyathidites, Falcisporites and Osmundacidites are frequent.

Non-marine fluvial environments are indicated by the common and diverse spore-pollen and the absence of acritarchs or algal forms.

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

These features are normally seen at the base of the Pretty Hill Formation and its correlatives.

IV CONCLUSIONS:

The well appears to have drilled a conformable Pretty Hill to middle Eumeralla sequence. The most likely Pretty Hill top is the log pick at 968m with the shaley interval 968-1164m corresponding to the shaley upper Pretty Hill (= Crayfish B-D) and the massive sand 1164-1374m to the sandy lower Pretty Hill (= Crayfish A). The minor sand at 588-602m is therefore an intra Eumeralla sand significantly older than the Heathfield Member and younger than the Eumeralla Marker.

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MOCAMBORA — 11 Palynological data

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C L I E N T: GEOLOGICAL SOCIETY of VICTORIA
W E L L: MOCAMBORO-11
F I E L D / A R E A: ONSHORE OTWAY BASIN, VICTORIA

A N A L Y S T: ROGER MORGAN D A T E : MAY 1991
N O T E S: ALL DEPTHS IN METRES

RANGE CHART OF GRAPHIC ABUNDANCES BY LOWEST APPEARANCE Dinos & S/P

Key to Symbols

| = Very Rare
▌ = Rare
▌ = Few
▌ = Common
▌ = Abundant
? = Questionably Present
. = Not Present

= Few
= Common
= Abundant
? = Questionably Present
. = Not Present

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
	SCHIZOSPORIS RETICULATUS	SCHIZOSPORIS PAROUS	SCHIZOSPORIS PSILATUS	CALLIALASPORITES DAMPIERI	CALLIALASPORITES TURBATUS	CERATOSPORITES EQUALIS	CORPULLINA TOROSUS	CYATHIDITES AUSTRALIS	CYATHIDITES MINOR	CYCLOGRANISPORITES FULLIGINOSUS	CYCLOSPORITES HUGHESII	DICTYOPHYLLIDITES HARRISII	FOVEOSPORITES CANALIS	CRANWELLIPOLLIS PUNCTATUS	LYCOPODIUMSPORITES CERMUSIUS	LEPTOLEPIDITES MAJOR	LEPTOLEPIDITES VERRUCATUS	MICRORAGLANVOIDITES ANTARCTICUS	NEVESISPORITES DELCOURTI	OSMUNDACIDITES BALMEI	RETITRILETES AUSTRALOMARGINATUS	RETITRILETES AUSTRALOMENSIS	STEREISPORITES ANTIQUASPORITES	VELOSPORITES TRIQUETRUS	ARAUCARIACITES AUSTRALIS	CYCADOPITES SPECIOSUS	DICTYOTOSPORITES SPECIOSUS	MURONISPORITES CONCINNUS	PEROTRILETES LINEARIS	RETITRILETES CIRCOLUMENUS	CONCAVISSIMISPORITES VARIVERRUCATUS	DICTYOTOSPORITES COMPSE	ILLIPOLLENITES SP.
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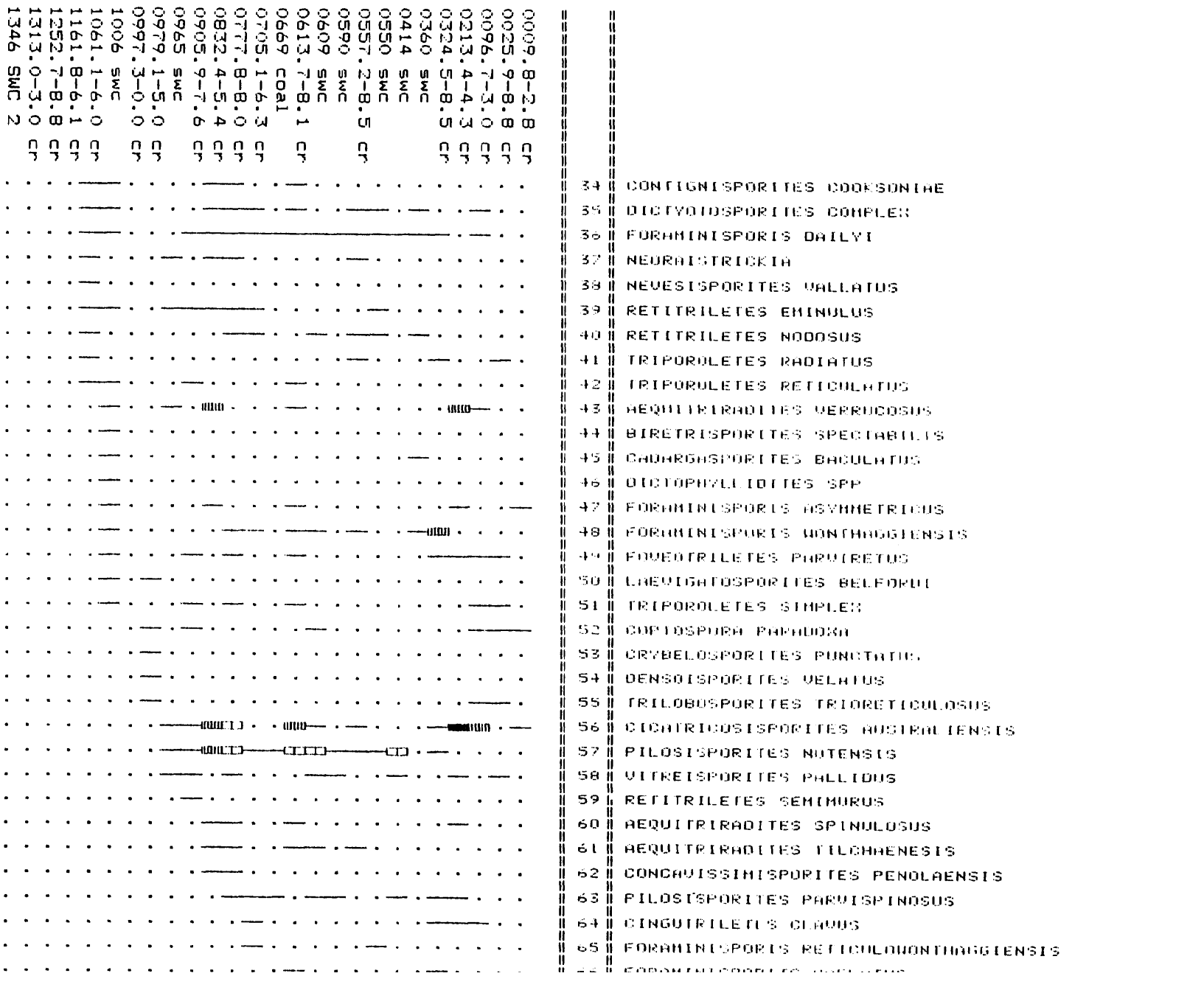
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0590 swc
0609 swc
0613.7-8.1 cr
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0705.1-6.3 cr
0777.8-8.0 cr
0832.4-5.4 cr
0905.9-7.6 cr
0965 swc
0979.1-5.0 cr
0997.3-0.0 cr
1006 swc
1061.1-6.0 cr
1161.8-6.1 cr
1252.7-8.8 cr
1313.0-3.0 cr
1346 SWC 2
34 CONTIGNISPORITES COOKSONIAE
35 DICTYOTOSPORITES COMPLEX
36 FORAMINISPORIS DAILYI
37 NEURAISTRICKIA
38 NEVESISPORITES VALLATUS
39 RETITRILETES EMINULUS
40 RETITRILETES NODOSUS
41 TRIPOROLETES RADIATUS
42 TRIPOROLETES RETICULATUS
43 AEQUITRIRADITES VERRUCOSUS
44 BIRETRISPORITES SPECTABILIS
45 CAMAROSPORITES BACULATUS
46 DICTOPHYLLIDITES SPP
47 FORAMINISPORIS ASYMMETRICUS
48 FORAMINISPORIS WONTHAGGIENSIS
49 FOVEOTRILETES PARVIRETUS
50 LAEVIGATOSPORITES BELFORDII
51 TRIPOROLETES SIMPLEX
52 COPTOSPORA PAPILLOSA
53 CRYBELOSPORITES PUNCTATUS
54 DENSOISPORITES VELATUS
55 TRILOBOSPORITES TRIORETICULOSUS
56 CICHRICOSISPORITES AUSTRALIENSIS
57 PILOSISPORITES NOTENSIS
58 VITREISPORITES PALLIDUS
59 RETITRILETES SEMIMURUS
60 AEQUITRIRADITES SPINULOSUS
61 AEQUITRIRADITES TILCHAENSIS
62 CONCAVISSIMISPORITES PENOLAENSIS
63 PILOSISPORITES PARVISPINOSUS
64 CINGUTRILETES CLAVUS
65 FORAMINISPORIS RETICULOWONTHAGGIENSIS

	67 LYCOPODIACIDITES ASPERATUS	68 STOVERISPORITES LUNARIS	69 RETITRILETES FACETUS	70 CRYBELOSPORITES STRIATUS	71 CRYBELOSPORITES BERBEROIDES	72 NOTHOFAGIDITES EMARCIDUS	73 NOTHOFAGIDITES FALCATA	74 PROTEACIDITES SP	75 CICATRICOSISPORITES CUNEIFORMIS	76 CICATRICOSISPORITES HUGHESI	77 COPTOSPORA SP	78 DICTYOPHYLLIDITES HARRISII	79 DICTYOPHYLLIDITES MORTONI	80 LAEVIGATOSPORITES OVATUS	81 PILOSISPORITES GRANDIS	82 TRILOBOSPORITES TRIBOTRYS	83 FOVEOSPORITES MORETONENSIS	
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1061.1-6.0 cr	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1061.1-6.0 cr
1161.8-6.1 cr	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1161.8-6.1 cr
1252.7-8.8 cr	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1252.7-8.8 cr
1313.0-3.0 cr	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1313.0-3.0 cr
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