PALYNOLOGY OF BEACH SQUATTER-1,

OTWAY BASIN, AUSTRALIA

BY

ROGER MORGAN

FOR BEACH PETROLEUM NOVEMBER, 1987.

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CONTENTS

I SUMMARY

790m (cutts) : M. diversus Zone (possibly upper) : Early Eocene : very nearshore marine : immature

810m (cutts) : L. balmei Zone : Paleocene : nearshore marine : immature

820m (cutts) : mixed assemblage presumed L. balmei with minor reworked T. longus/M. druggii elements, but could be Late Cretaceous with extensive caving : presumed Paleocene with Maastrichtian reworking : marginally marine : immature

840m (cutts) : T. longus/M.druggii Zones : Maastrichtian : marginal marine : immature

1000m (cutts) : T. pachyexinus/N. aceras Zones : Santonian - Campanian : nearshore to marginal marine : immature

1310m (cutts) : C. triplex Zone : Turonian : nearshore marine : marginally mature for oil

1390m (cutts) - 1420m (cutts) : A. distocarinatus/P. infusorioides Zones : Cenomanian : very nearshore marine : marginally mature for oil

1500m (cutts) : P. pannosus Zone : late Albian : presumed non-marine : marginally mature for oil

II INTRODUCTION

Ten cuttings samples were examined from Beach Squatter-1 for biostratigraphy and spore colour. No sidewall cores were available due to poor hole conditions. Yields were generally good. The samples are assigned to seven palynological zones on the basis of the supporting data presented here as Appendix I. The Cretaceous zonation used is basically that of Helby, Morgan and Partridge (1987), which draws on all previous work. The Tertiary zonation is that of Stover and Partridge (1973) and Stover and Evans (1973) as modified by Partridge (1976). Figure 1 shows the zonation framework.

Maturity data was generated on the Thermal Alteration Index (TAI) Scale of Staplin and plotted on Figure 2 as a Maturity Profile. The oil and gas windows on Figure 2 follow the general consensus of geochemical literature. The oil window corresponds to spore colours of light-mid brown (2.7) to dark brown (3.6) and would correspond to Vitrinite Reflectances of 0.6% to 1.3%. Geochemists, however, have not reached universal agreement on these values and argue variations based 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 would probably not move the oil window by more than 200 metres. Instrumental geochemistry offers quantitative and repeatable raw data.

	AGE		SPORE - POLLEN ZONES	DINOFLAGELLATE ZONES
Early Tertiary	Early Oligocene		P. tuberculatus	
	Late Eocene		upper N. asperus	P. comatum
			middle N. asperus	V. extensa
	Middle Eocene		lower N. asperus	D. heterophlycta W. echinosuturata
			P. asperopolus	W. edwardsii W. thompsonae
	Early Eocene		upper M. diversus	W. ornata W. waipawaensis
			middle M. diversus	
			lower M. diversus	W. hyperacantha
	Paleocene		upper L. balmei	A. homomorpha
			lower L. balmei	E. crassitabulata T. evittii
Late Cretaceous	Maastrichtian		T. longus	M. druggii
	Campanian		T. lillei	I.korojonense
			N. senectus	X. australis
	Santonian		T. pachyexinus	N. aceras I. cretaceum O. porifera
	Coniacian		C. triplex	
	Turonian			C. striatoconus
	Cenomanian		A. distocarinatus	P. infusorioides
Early Cretaceous	Albian	Late	P. pannosus	
		Middle	upper C. paradoxa	
		Early	lower C. paradoxa	
			C. striatus	
	Aptian		upper C. hughesi	
			lower C. hughesi	
	Barremian		F. wonthaggiensis	
	Hauterivian			
	Valanginian		upper C. australiensis	
	Berriasian		lower C. australiensis	
Juras.	Tithonian		R. watherooensis	

FIGURE 1 ZONATION FRAMEWORK

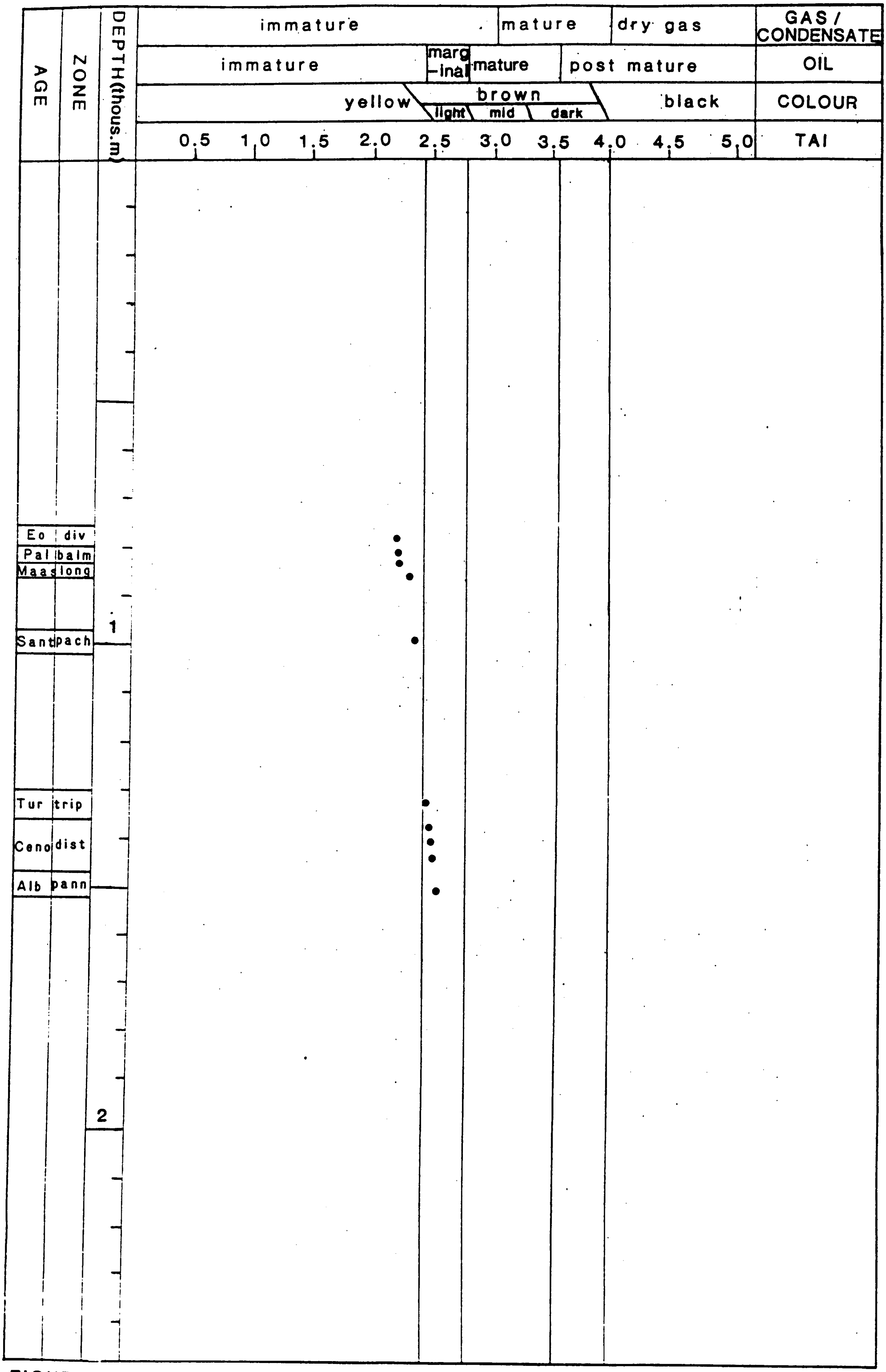

FIGURE 2 MATURITY PROFILE, SQUATTER-1

III PALYNOSTRATIGRAPHY

A. 790m (cutts) : M. diversus Zone (possibly upper)

Assignment to the Malvacipollis diversus Zone is clearly indicated at the top by the absence of younger indicators such as Proteacidites asperopolus, Nothofagidites falcatus etc, and at the base by oldest Cupaneidites orthoteichus, Intratriporopollenites notabilis, Spinozinocolpites prominatus and Malvacipollis diversus without older indicators. Subzonal assignment is problematic, as the subzones are defined on oldest occurrences which are easily caved in cuttings samples. Oldest Proteacidites clarus and P. kopiensis suggest middle M. diversus Zone or younger, and oldest Proteacidites pachypolus suggests upper M. diversus Zone or younger, but these taxa could all be caved from above. If all the taxa seen are in place, an upper M. diversus age would be indicated. Dilwynites and Proteacidites are dominant. Minor Cretaceous and Permian reworking were seen.

Dinoflagellates include frequent Muratodinium fimbriatum and rare Hafniasphera septata, consistent with the M. diversus assignment, but not sufficient to indicate a subzone.

Very nearshore marine environments are suggested by the low dinoflagellate content (10% of palynomorphs) and their low diversity (5 species). Pollen and spores are dominant and diverse.

These features are normally seen in the Pember Member of the Dilwyn Formation.

Light yellow spore colours indicate immaturity for hydrocarbon generation.

B. 810m (cutts) : L. balmei Zone

Assignment to the Lygistepollenites balmei Zone is indicated at the top by youngest Gambierina edwardsii, G. rudata and L. balmei, and at the base by oldest L. balmei without older indicators. Proteacidites grandis and P. incurvatus are present and suggest the upper subzone, but they could be caved. Tetracolporites verrucosus is also present and suggests the lower subzone. However, only a single specimen was seen and so confidence is low (it could be reworked). Minor Cretaceous and Permian reworking were seen. Dilwynites, Falcisporites and Cyathidites are frequent.

Dinoflagellates are dominated by Deflandrea speciosa, suggesting a general Paleocene age. Other taxa include Isabelidinium bakeri (suggesting the lower L. balmei Zone), and several obviously or probably caved taxa (Apectodinium hyperacantha, Deflandrea obliquipes, Wetzeliella articulata, Hafniasphaera septata and Muratodinium fimbriatum) and some obviously reworked taxa (Isabelidinium pellucidum). An unusual new reticulate Senoniasphaera was seen.

Nearshore marine environments are indicated by the moderate dinoflagellate content (20%) and moderate diversity (although some of the diversity is caved).

These features are normally seen in the Pebble Point Formation.

Light yellow spore colours indicate immaturity for hydrocarbons.

C. 820m (cutts) : mixed assemblage presumed L. balmei with latest Cretaceous T. longus reworking.

Assignment of this sample is problematic. The majority of the assemblage is consistent with an L. balmei assignment (including dominant Haloragacidites harrisii with scarce Gambierina rudata and Jaxtacolpus peirensis. However, single specimens of Tricolpites sabulosus and Triporopollenites sectilis and six specimens of dinoflagellates suggest the latest Cretaceous T. longus Zone. Since late Cretaceous specimens are rare, and many markers are missing, a Paleocene L. balmei Zone assignment is considered likely, with minor Late Cretaceous reworking. However, it is not impossible that the Cretaceous has been penetrated near the base of the cuttings interval. Obvious Eocene caving comprises about 5% of the assemblage.

Dinoflagellates are very scarce and either long ranging or obviously caved Eocene or presumably reworked Cretaceous (Isabelidinium coronatum). Only D. speciosus, H. tubiferum and G. retiintexta may be in place, suggesting a general Paleocene age.

Marginally marine environments are indicated by the very scarce low diversity "in place" dinoflagellate assemblage, and the diverse and common pollen and spores.

The L. balmei Zone assignment is normally seen in the Pebble Point Formation, while a T. longus assignment is normally seen in the Timboon/Paaratte Formations.

Yellow spore colours indicate immaturity for hydrocarbons.

D. 840m (cutts) : T. longus Zone (M. druggii dinoflagellate Zone)

This sample is assigned to the Tricolpites longus Zone at the top on youngest T. longus, T. confessus, T. waiparaensis and Triporopollenites sectilis. T. longus in particular is relatively frequent and the numerous late Cretaceous indicators leave no doubt, in contrast to the sample above. At the base, oldest T. longus and Tetracolporites verrucosus indicate the assignment. Proteacidites and Phyllocladidites mawsonii are common.

Dinoflagellates include Manumiella coronata, clearly indicating assignment to the M. druggii Dinoflagellate Zone. Other significant taxa include Isabelidinium pellucidum and some specimens of I. pellucidum showing affinites towards I.

korojonense.

Marginal marine environments are indicated by the very rare (1%) of very low diversity (3 species) of dinoflagellates.

These features are normally seen in the Timboon/Paaratte interval.

Spore colours of yellow indicate immaturity for hydrocarbon generation.

E. 1000m (cutts) : *T. pachyexinus* Zone (*N. aceras* Dinoflagellate Zone)

Assignment is indicated at the top by the absence of younger indicators such as *Nothofagidites senectus*, and at the base by oldest *Tricolporites pachyexinus*. The absence of *Amosopollis cruciformis* suggests the upper part of the zone, and is consistent with the dinoflagellate evidence. *Proteacidites* sp. dominate the samples, with frequent *P. mawsonii* and persistent *Australopollis obscurus*. Obvious Eocene caving comprises about 5% of palynomorphs.

Dinoflagellates include *Nelsoniella aceras* without *Xenikoon australis* and so indicate the *N. aceras* Dinoflagellate Zone, confirming the spore-pollen assignment. *Heterosphaeridium heteracanthum* and *Trithyrodinium* spp. dominate.

Nearshore to marginal marine environments are indicated by the dinoflagellate content (10% of palynomorphs) and their very low diversity (3 species).

These features are normally seen in the Paaratte Formation.

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

F. 1310m (cutts) : *C. triplex* Zone

Assignment to the Clavifera triplex Zone is indicated at the top on youngest Appendicisporites distocarinatus and at the base on oldest Clavifera triplex and P. mawsonii considered to be in place. Younger indicators include Nothofagidites senectus (suggesting the N. senectus or younger zones) and Ornamentifera sentosa (suggesting the T. pachyexinus or younger zones), but their light spore colours and the other evidence show that they are caved. Eocene caving comprises about 5% of the assemblage, but inertinite dominates the sample. Gleicheniidites is common.

Dinoflagellates are not age diagnostic and are partly caved from younger horizons.

Nearshore marine environments are indicated by the low dinoflagellate content (10%) and diversity (5 species).

These features are normally seen in the Belfast Mudstone and Flaxmans Formation.

Yellow/light brown spore colours indicate early marginal maturity for oil, and immaturity for gas/condensate.

G. 1390m (cutts)-1420m (cutts) : A. distocarinatus Zone (P. infusorioides Dinoflagellate Zone)

Assignment to the Appendicisporites distocarinatus Zone is indicated at the top by the absence of younger indicators considered to be in place, a downhole influx of A. distocarinatus and A. tricornitatus, and the dinoflagellate evidence. C. triplex, A. obscurus and P. mawsonii in this interval show light spore colours, indicating their caved provenance. Gleicheniidites and Falcisporites are the most common forms. Eocene caving is generally rare, comprising 2-3% of palynomorphs. At the base of the interval, a downhole increase of spore diversity (including the typically Early Cretaceous forms Cicatricosisporites australiensis, Trilobosporites trioreticulosus and Triporoletes reticulatus) suggests proximity to shoreline.

Dinoflagellates include a distinct downhole influx of *Cribroperidinium edwardsii* at the interval top, indicating penetration of the *Palaeohystrichophora infusorioides* Dinoflagellate Zone. The *C. edwardsii*/*Chlamydophorella nyei* association is a useful local assemblage. Other taxa are either caved or long ranging.

Very nearshore marine environments are indicated by the very low dinoflagellate content (5% or less) and very low diversity (2-3 species considered in place).

These features are normally seen in the Flaxmans/Waare interval.

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

H. 1500m (cutts) : *P. pannosus* Zone

Assignment to the *Phimopollenites pannosus* Zone is indicated at the top by youngest *Coptospora paradoxa*, which is coincident with a major palynofacies change from inertinice domination above, to liptinite/vitrinite below, and a downhole increase in diversity and content especially of taxa like *Balmeisporites holodictyus* and *Cicatricosisporites* spp. *Appendicisporites* are notably absent. The Zone base is defined by oldest *P. pannosus*, although this could conceivably be caved from the Late Cretaceous, and this sample belong to the upper *C. paradoxa* Zone. In the absence of sidewall cores, these possibilities cannot be resolved. *Cyathidites* is dominant, with frequent *Cicatricosisporites australiensis*, *Gleicheniidites* and *Microcachryidites antarcticus*. Eocene caving comprises 3% and Late Cretaceous caving comprises 10% of palynomorphs.

Dinoflagellates are extremely rare and spore colours suggest that they are probably caved. Environments are therefore probably non-marine.

These features are normally seen in the topmost Eumeralla Formation.

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

IV CONCLUSIONS

A. Geological

Given the log picks supplied, there appears to be no major problem. Top Eumeralla at 1425m is consistent, but major erosion of the Eumeralla cannot be demonstrated by palynology from the cuttings samples available. There is no obvious clean sand at the base of the Late Cretaceous, so no Waare Sandstone is identified, and the base Flaxmans Formation is therefore more subtle than usual. Top Flaxmans at 1352m, top Belfast at 1297m and top Paaratte/Timboon at 825m are generally compatible with the palynology.

The sample at 820m showing mixed latest Cretaceous and Tertiary suggests several possibilities. First, as discussed above, significant reworking of the Cretaceous into the basal Tertiary may have occurred. Second, the cuttings depths may not be exact against log depth, and the cuttings from 820m may include rock material below 825m. This seems unlikely, as the lithology below 825m appears to be clean sandstone from logs, and would probably be barren of palynomorphs. Third, the top Late Cretaceous may be picked low, and could lie as high as 812m (the palynology sample at 810m lacks Late Cretaceous), with a terminal Cretaceous shale being present between 812-825m, characterised by the spikey sonic response. Overall, the first possibility may be the most likely.

Top Pebble Point at 792 or 795m is consistent with the palynology, but as discussed above, the Pebble Point may comprise only the interval 795-812m (showing its typical high but relatively flat sonic response). The overlying Pember is also consistent, but in the absence of sidewall cores, the conformability or unconformability of the boundary cannot be determined. The existing data suggests that a sizable unconformity is possible.

B. Palynological

These data do not radically alter palynological concepts regarding the known sequence.

The Paleocene samples do however, contain some significant information which hints at possible detailed subdivision of the Pebble Point interval. The section studied herein is probably from the lower L. balmei Zone and appears to be dominated by Deflandrea speciosa types. The presence of Isabelidinium bakeri may also be a valid indicator of the lower part of the Pebble Point Formation. There appears to be scope for a project to erect a palynological subdivision of this interval, if drilling priorities warrant a more detailed understanding of the Pebble Point.

Eocene samples from recent wells also suggest that there is potential for a dinoflagellate zonation of the Pember/topmost Pebble Point based on acme horizons. For example, 790m contains frequent M. fimbriatum while 810m contains frequent Apectodinium spp. Such an acme based zonation could be worked easily in cuttings, and therefore overcome the problems of identifying the subdivisions of the M. diversus Zone (which are based on oldest occurrences).

C. Maturity

Spore Colours suggest marginal maturity at the well base, apparently in contrast to other data. Spore colour is a qualitative assessment made by eye. If other maturity data are instrumental and quantitative and therefore more repeatable, they would be favoured. However, those methods cannot distinguish between what is in place and what is caved in cuttings samples. A palynologist can determine what is in place and therefore assess the exent of caving, and account for it in his maturity evaluation.

V REFERENCES

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APPENDIX I

PALYNOMORPH OCCURRENCE DATA

SQUATTER #1

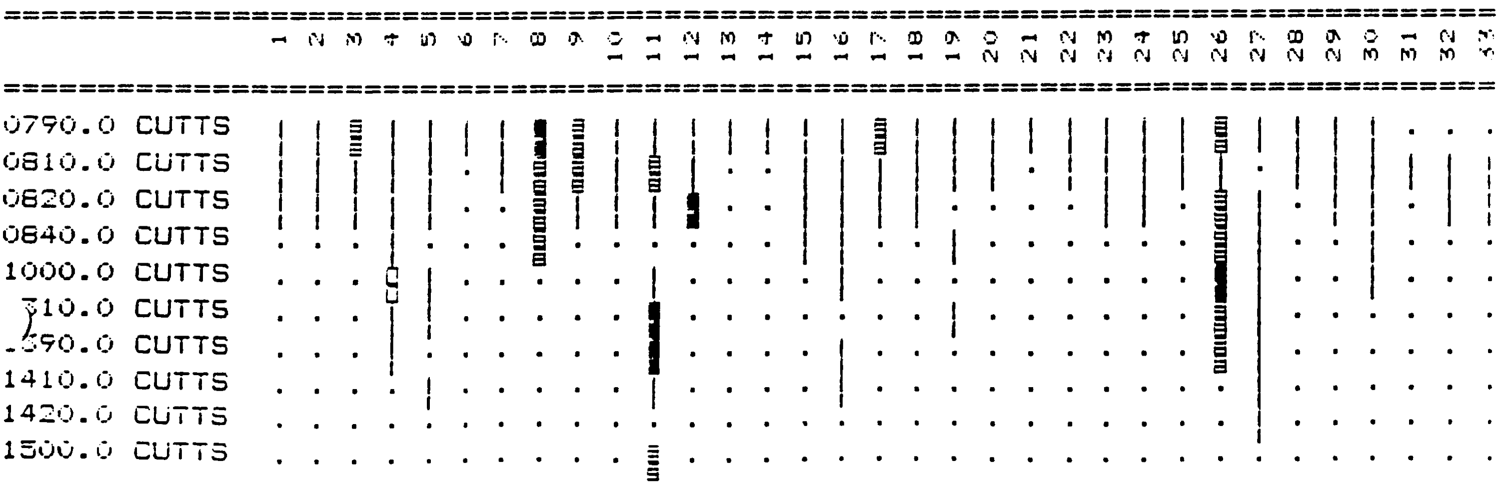
DESCRIPTION:

PALYNOLOGICAL INTERPRETATION OF DATA FOR BEACH PETROLEUM BY ROGER MORGAN.
ALL SAMPLES ARE CUTTINGS AND DEPTHS ARE IN METRES.
* INDICATED DINOFLAGELLATE *   WORK COMPLETED NOVEMBER 1987.

CHECKLIST OF GRAPHIC ABUNDANCE BY HIGHEST APPEARANCE

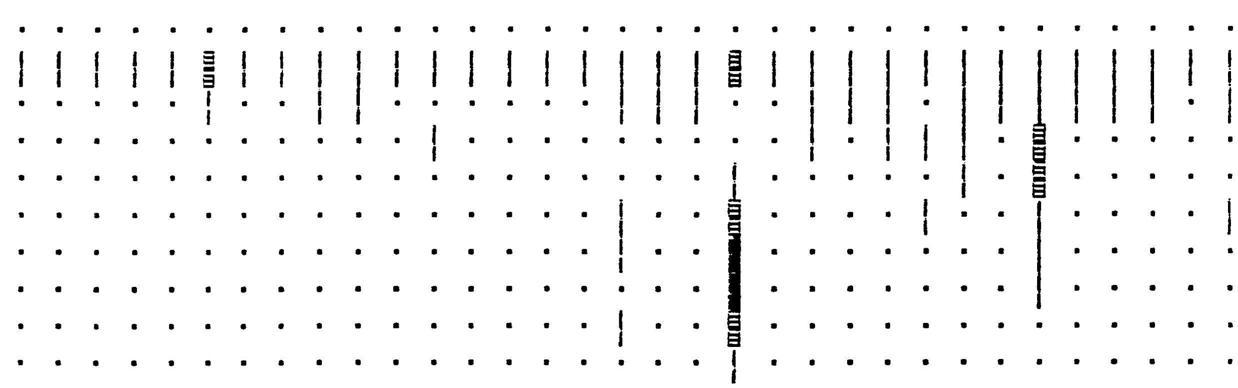
- █ = Abundant
- ▌ = Common
- ≡ = Few
- = Rare
- | = Very Rare
- ? = Questionably Present
- . = Not Present

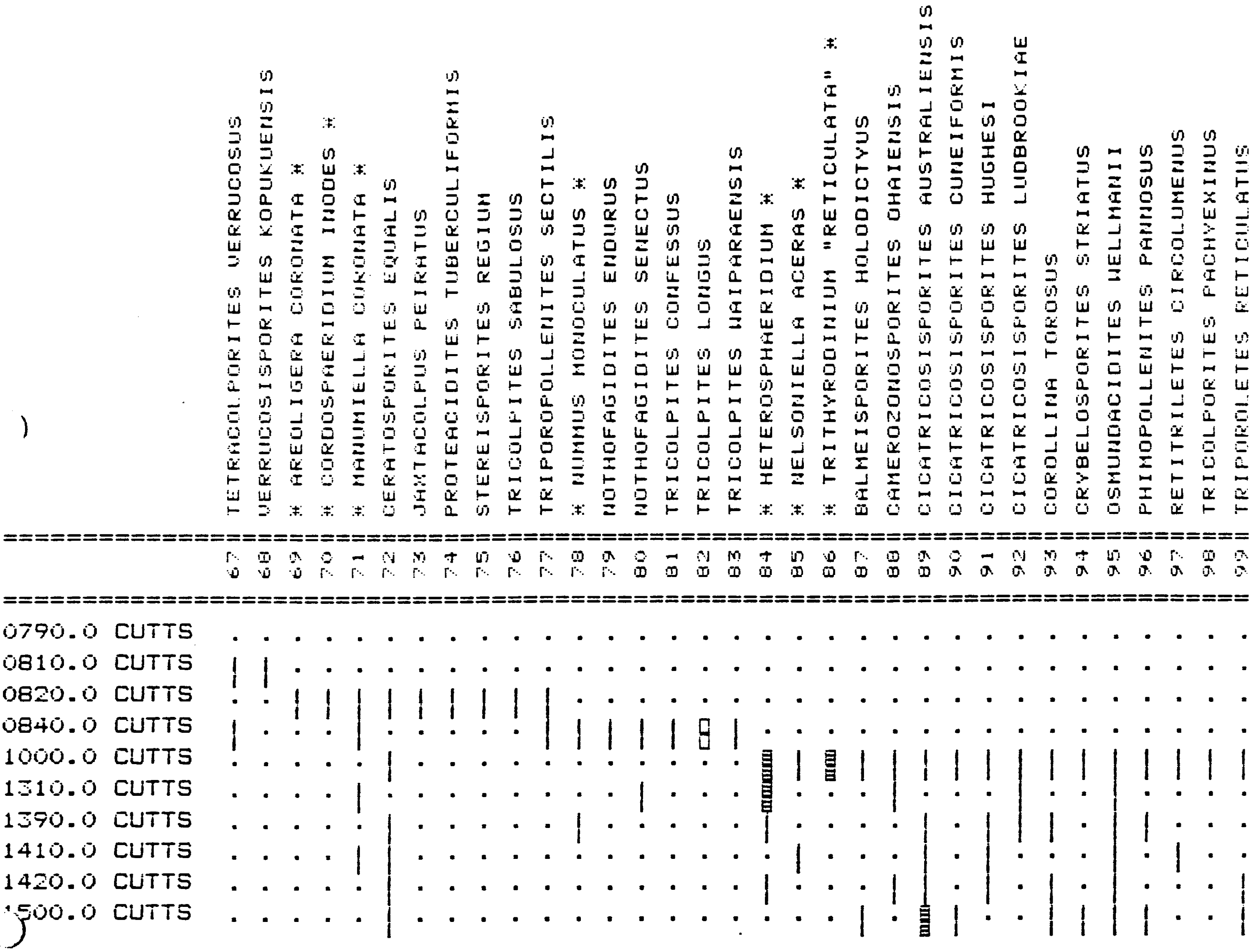
1	* AREOLIGERA SENONENSIS *
2	* HAFNIASPHAERA SEPTATA *
3	* HURATODINIUM FIMBRIATUM *
4	AUSTRALOPOLLIS OBSCURUS
5	CLAVIFERA TRIPLEX
6	CUPANIEIDITES ORTHOTEICHUS
7	CYATHIDITES SPLENDENS
8	CYATHIDITES SPP.
9	DILWYNITES GRANULATUS
10	ERICIPITES SCABRATUS
11	GLEICHENIIDITES
12	HALORAGACIDITES HARRISII
13	INTRATRIPOROPOLLENITES NOTABILIS
14	ISCHYOSPORITES GREMIUS
15	LATROBOSPORITES OHAIENSIS
16	LYGISTEPOLLENITES FLORINII
17	MALVACIPOLLIS DIVERSUS
18	MALVACIPOLLIS SUBTILIS
19	PERIPOROPOLLENITES POLYORATUS
20	PROTEACIDITES ANNULARIS
21	PROTEACIDITES CLARUS
22	PROTEACIDITES GRANDIS
23	PROTEACIDITES INCURVATUS
24	PROTEACIDITES KOPIENSIS
25	PROTEACIDITES PACHYPOLUS
26	PROTEACIDITES SPP.
27	RETITRILETES AUSTROCLAVATIDITES
28	SPINIZONOCOLPITES PROMINATUS
29	STEREISPORITES (TRIPUNCTISPORIS) SPP.
30	STEREISPORITES ANTIQUASPORITES
31	* APECTODINIUM HOMOMORPHA (L.) *
32	* APECTODINIUM HOMOMORPHA (SH.) *
33	* APECTODINIUM HYPERACANTHA *



34	* APTEODINIUM AUSTRALIENSE *
35	* CORDOSPHAERIDIUM MULTISPINOSUM *
36	* DEFLANDREA DILWYNENSIS *
37	* DEFLANDREA MEDCALFII *
38	* DEFLANDREA OBLIQUIPES *
39	* DEFLANDREA SPECIOSUS *
40	* DEFLANDREA STRIATA *
41	* FIBROCYSTA BIPOLARE *
42	* GLAPHYROCYSTA RETIINTEXTA *
43	* HYSTRICHOSPHAERIDIUM TUBIFERUM *
44	* ISABELIDINIUM BAKERI *
45	* ISABELIDINIUM PELLUCIDUM *
46	* OPERCULODINIUM CENTROCARPUM *
47	* OPERCULODINIUM SP. *
48	* SENONIASPHAERA SP. *
49	* WETZELIELLA ARTICULATA *
50	AMOSOPOLLIS CRUCIFORMIS
51	DACRYCARPITES AUSTRALIENSIS
52	DILWYNITES TUBERCULATUS
53	FALCISPORITES SIMILIS
54	GAMBIERINA EDWARDSII
55	GAMBIERINA RUDATA
56	HERKOSPORITES ELLIOTTII
57	LATROBOSPORITES CRASSUS
58	LYGISTEPOLLENITES BALMEI
59	NOTHOFAGIDITES BRACHYSPINULOSUS
60	PEROMONOLITES VELLOSUS
61	PHYLLOCLADIDITES MAWSONII
62	PHYLLOCLADIDITES RETICULOSACCATUS
63	PHYLLOCLADIDITES VERRUCOSUS
64	PODOSPORITES MICROSACCATUS
65	PROTEACIDITES PALISADUS
66	PROTEACIDITES TENUIEXINUS

0790.0 CUTTS
0810.0 CUTTS
0820.0 CUTTS
0840.0 CUTTS
1000.0 CUTTS
1310.0 CUTTS
1390.0 CUTTS
[illegible]10.0 CUTTS
1420.0 CUTTS
1500.0 CUTTS





67 TETRACOLPORITES VERRUCOSUS
68 VERRUCOSISPORITES KOPUKUENSIS
69 * AREOLIGERA CORONATA *
70 * CORDOSPAERIDIUM INODES *
71 * MANUMIELLA CORONATA *
72 CERATOSPORITES EQUALIS
73 JAXTACOLPUS PEIRATUS
74 PROTEACIDITES TUBERCULIFORMIS
75 STEREISPORITES REGIUM
76 TRICOLPITES SABULOSUS
77 TRIPOROPOLLENITES SECTILIS
78 * NUMMUS MONOCULATUS *
79 NOTHOFAGIDITES ENDURUS
80 NOTHOFAGIDITES SENECTUS
81 TRICOLPITES CONFESSUS
82 TRICOLPITES LONGUS
83 TRICOLPITES WAIPARAENSIS
84 * HETEROSPHAERIDIUM *
85 * NELSONIELLA ACERAS *
86 * TRITHYRODINIUM "RETICULATA" *
87 BALMEISPORITES HOLODICTYUS
88 CAMEROZONOSPORITES OHAIENSIS
89 CICATRICOSISPORITES AUSTRALIENSIS
90 CICATRICOSISPORITES CUNEIFORMIS
91 CICATRICOSISPORITES HUGHESI
92 CICATRICOSISPORITES LUDBROOKIAE
93 COROLLINA TOROSUS
94 CRYBELOSPORITES STRIATUS
95 OSMUNDACIDITES WELLMANII
96 PHIMOPOLLENITES PANNOSUS
97 RETITRILETES CIRCOLUMENUS
98 TRICOLPORITES PACHYEXINUS
99 TRIPOROLETES RETICULATUS
0790.0 CUTTS
0810.0 CUTTS
0820.0 CUTTS
0840.0 CUTTS
1000.0 CUTTS
1310.0 CUTTS
1390.0 CUTTS
1410.0 CUTTS
1420.0 CUTTS
1500.0 CUTTS

	100 * ODONTOCHITINA OPERCULATA *	101 * OLIGOSPHAERIDIUM COMPLEX *	102 APPENDICISPORITES DISTOCARINATUS	103 CINGUTRILETES CLAVUS	104 CYATHIDITES AUSTRALIS	105 CYATHIDITES MINOR	106 CYCADOPITES FOLLICULARIS	107 FORAMINISPORIS DAILYI	108 MICROCACHRYIDITES ANTARCTICUS	109 NEORAISTRICKIA TRUNCATA	110 ORNAMENTIFERA SENTOSA	111 PERINOPOLLENITES ELATOIDES	112 * APTEA POLYMORPHA *	113 * CHLAMYDOPHORELLA NYEI *	114 * CLEISTOSPHAERIDIUM SP. *	115 * CRIBROPERIDINIUM EDWARDSI *	116 * CYCLONEPHELIUM COMPACTUM *
790.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0810.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0820.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0840.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1000.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1310.0 CUTTS	|	|	|	|	|	|	|	|	|	|	|	|	.	.	.	.	.
1390.0 CUTTS	.	.	□	|	▮	.	.	|	|	|	.	.	|	|	|	▮	|
1410.0 CUTTS	|	.	□	|	▮	▮	.	.	|	|	.	|	|	|	.	▮	.
1420.0 CUTTS	|	.	|	.	|	▮	|	.	|	|	.	|	.	.	.	▮	.
1500.0 CUTTS	.	.	.	|	.	▮	|	.	▮	|	.	.	.	.	.	.	.

	117 * ISABELIDINIUM BALMEI *	118 * ISABELIDINIUM COOKSONIAE *	119 * SPINIFERITES RAMOSUS *	120 ANNULISPORITES FOLLICULOSA	121 APPENDICISPORITES TRICORNITATUS	122 DICTYOTOSPORITES COMPLEX	123 FORAMINISPORIS WONTHAGGIENSIS	124 LYCOPODIACIDITES ASPERATUS	125 PEROTRILETES JUBATUS	126 PEROTRILETES SP.	127 TRILETES TUBERCULIFORMIS	128 ARAUCARIACITES AUSTRALIS	129 CALLIALASPORITES DAMPIERI	130 LEPTOLEPIDITES VERRUCATUS	131 CONTIGNISPORITES COOKSONIAE	132 CORONATISPORA PERFORATA
790.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0810.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0820.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0840.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1000.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1310.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1390.0 CUTTS	|	|	|	|	|	|	|	|	|	|	|	.	.	.	.	.
1410.0 CUTTS	.	.	.	.	|	.	.	|	.	.	.	|	|	|	.	.
1420.0 CUTTS	.	.	|	|	|	|	.	.	.	.	.	.	.	.	|	|
1500.0 CUTTS	.	.	.	|	.	|	.	.	.	.	.	|	|	|	.	.

	133 ISCHYOSPORITES PUNCTATUS	134 KLUKISPORITES SCABERIS	135 TRILOBOSPORITES TRIORETICULOSUS	136 TRIPOROLETES RADIATUS	137 ANTULSPORITES VARIGRANULATUS	138 CAMEROZONOSPORITES BULLATUS	139 COPTOSPORA PARADOXA	140 FALCISPORITES GRANDIS	141 FORAMINISPORIS ASYMMETRICUS	142 LEPTOLEPIDITES MAJOR	143 RETITRILETES FACETUS	144 TRILOBOSPORITES PURVERULENTUS	145 TRIPOROLETES SIMPLEX
0790.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
0810.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
0820.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
0840.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
1000.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
1310.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
1390.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
1410.0 CUTTS	.	.	.	.	.	.	.	.	.	.	.	.	.
1420.0 CUTTS	|	|	|	|	.	.	.	.	.	.	.	.	.
1500.0 CUTTS	|	.	.	|	|	|	|	|	|	|	|	|	|

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