MORGAN PALAEO ASSOCIATES

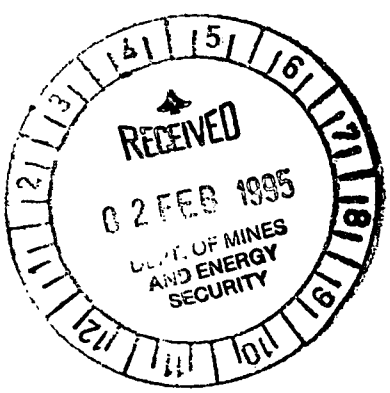
PALYNOLOGICAL/PETROLEUM GEOLOGICAL CONSULTANTS

POSTAL ADDRESS: Box 161, Maitland, South Australia 5573
DELIVERIES: 1 Shannon Tce, Maitland, South Australia 5573
Phone (088) 32 2795 Fax (088) 32 2798

PALYNOLOGY OF WYNN-1, ONSHORE OTWAY BASIN, SOUTH, AUSTRALIA

BY

ROGER MORGAN



7.6.94

RXL
JPP
JES
RJS
Atm

for SAGASCO RESOURCES

May 1994

REF:OTW.RPWYNN1

EW.7476/002
R95/00086

OTWYNN1

PALYNOLOGY OF WYNN-1, ONSHORE OTWAY BASIN, SOUTH, AUSTRALIA

BY

ROGER MORGAN

CONTENTS **PAGE**

I SUMMARY

Precision is low as all samples are cuttings and so the breakdown depends on picking oldest occurrences in cuttings. It is a pity that a comprehensive swc suite could not be obtained due to hole conditons. The results are therefore presented tentatively, and need to be evaluated against the logs.

480-90m(cutts) : *pannosus* Zone : latest Albian : slightly brackish : immature for hydrocarbons : usually topmost Eumeralla Formation

1395-1401m(cutts), 1479-85m(cutts), 1545-51m(cutts), 1569-75m(cutts) : apparently lower *hughesi* Zone : early Aptian : non-marine except slightly brackish at 1401m : marginally mature for oil, immature for gas/condensate : usually basal Eumeralla Formation

1596-1605m(cutts), 1650-59m(cutts), 1668-77m(cutts), 1677-95m(cutts) : apparently all upper *wonthaggiensis* Zone : latest Neocomian : non-marine with strong lacustrine influence (significant freshwater algae) : marginally mature for oil, immature for gas/condensate : usually topmost Crayfish Formation, including the Laira Shale

1746-52m(cutts), 1848-54m(cutts), 1944-50m(cutts), 2298-2301m(cutts) 2550-53m(cutts), 2748-51m(cutts) : apparently all lower *wonthaggiensis* Zone : Neocomian : non-marine probably fluvial except slightly brackish at 1854m : marginally mature for oil, immature for gas/condensate down to 2301m, then mature for oil, marginally mature for gas/condensate : usually Crayfish Formation equivalents

3066-70m(cutts) : indeterminate : mixed Albian, Aptian and Neocomian caving.

II INTRODUCTION

After well completion, sixteen samples (all cuttings as hole conditions prevented swcs) 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 four spore-pollen units of Neocomian to Albian 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), and modified by Morgan (1985) for application in the Otway Basin. Most recent improvements are unpublished in reports for Sagasco, but summarised on Figure 1.

Maturity data was generated in the form of Spore Colour Index, and is plotted on Figure 2 Maturity Profile of Wynn-1. 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 (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.

Sample processing usually involves the following steps. Extra techniques are only used if required:

(a) digest about 10gm of crushed rock in 50% HF overnight
(b) wash out several times over 10 micron polyester sieve. Acidify with conc HCl if fluorosilicate gel forms
(c) heavy liquid separation used concentrated $ZnBr_2$ with SG of 2.0.
(d) wash out float fraction over 10 micron polyester sieve. Acidify if $Zn(OH)_2$ precipitate forms
(e) mount a sieved kerogen slide
(f) oxidise in Schultze Solution (conc 30% HNO_3 with crystalline $KClO_3$)

(g) wash out over 10 micron polyester sieve
(h) add 5% KOH to dissolve humic acids
(i) wash out over 10 micron polyester sieve
(j) examine under microscope for satisfactory oxidation. repeat steps f to i if required
(k) heavy liquid separation using $ZnBr_2$ solution (SG of 2.0)
(l) wash out float fraction using polyester sieve. Acidify if $Zn(OH)_2$ precipitate forms
(m) dehydrate onto coverslip
(n) mount microscope slides using Eukitt medium.

Sample examination usually involved the following steps:

(a) scan two traverses at x10 to log the bulk of the assemblage and get some idea of age.
(b) scan at x40 and count the first 100 specimens to get percentage contents for each species. From this, saline "Microplankton Content" (%) can be developed to provide an index of marine influence. Where the sample is too lean to provide 100 specimens, frequency is estimated from the specimens seen with A=abundant, C=common, F=frequent, R=rare.
(c) return to x10 to scan at least two large coverslips to log rare species, and finalise age conclusions. Log more slides if required.
(d) examine sieved kerogen slide for specimens of *Cyathidites* to establish spore colour for Spore Colour Maturity Index.

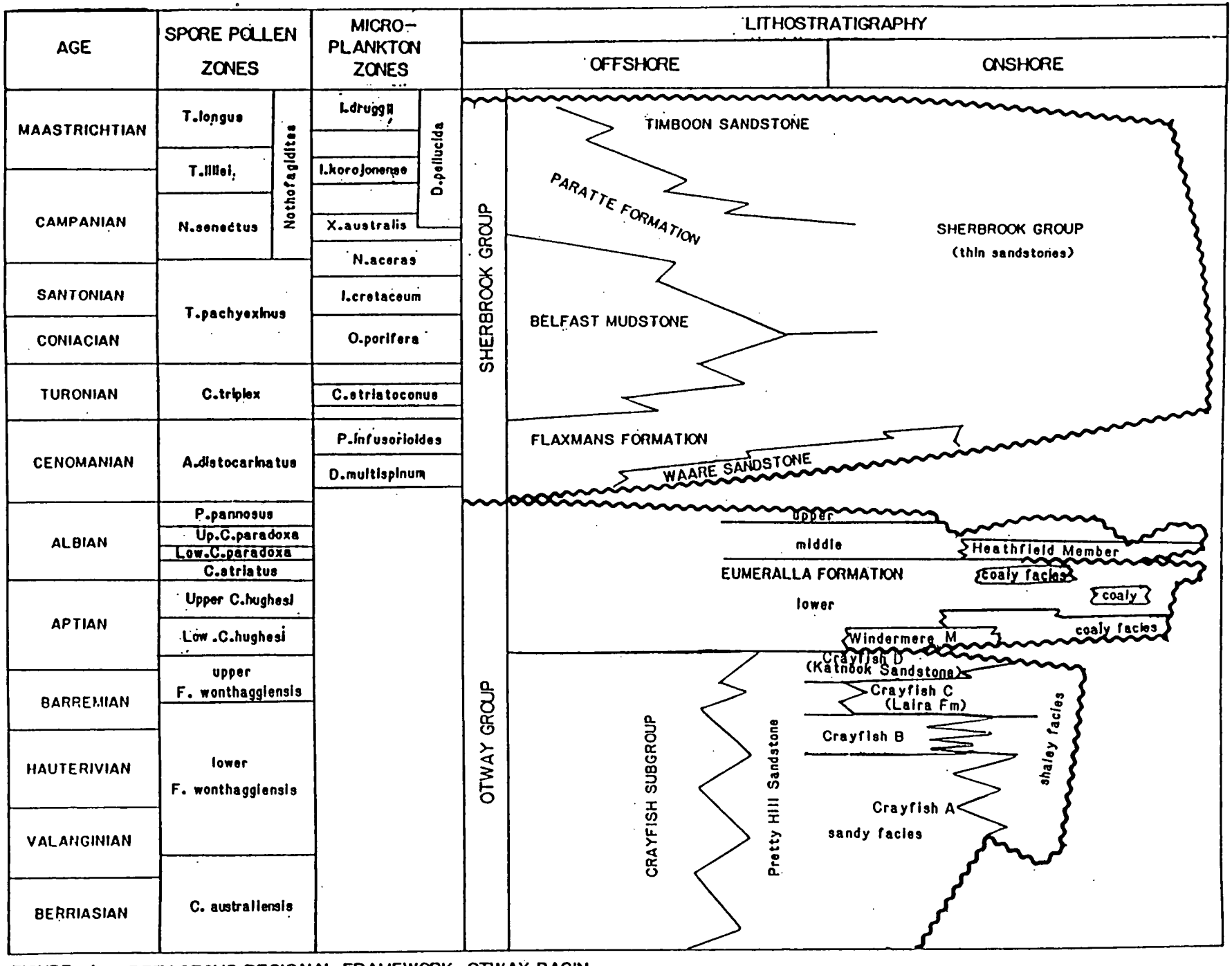


FIGURE 1. CRETACEOUS REGIONAL FRAMEWORK, OTWAY BASIN

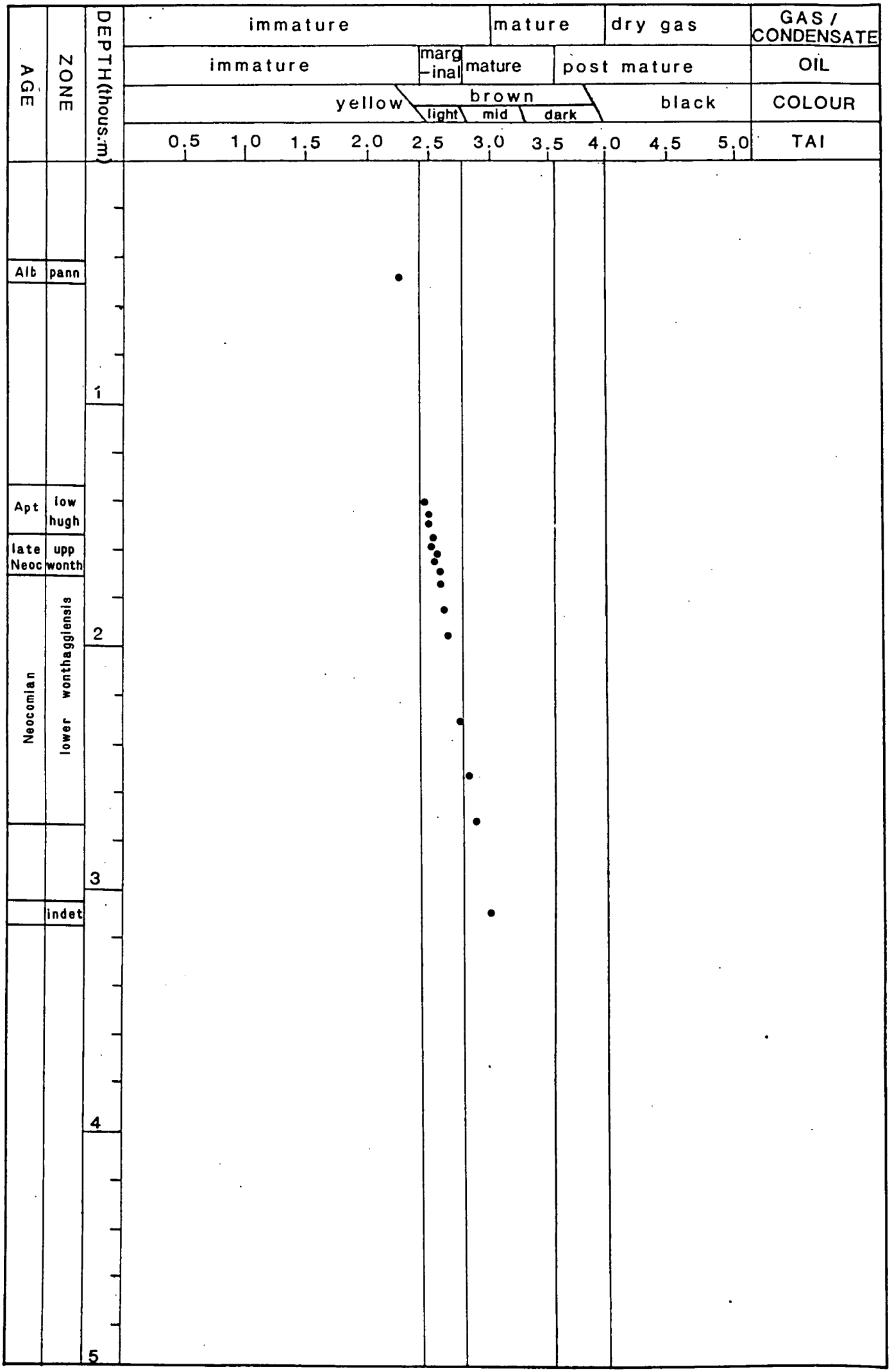


FIGURE 2 MATURITY PROFILE : WYNN-1

III PALYNOSTRATIGRAPHY

A 480-90m(cutts) : *pannosus* Zone

Assignment to the *Phimopollenites pannosus* Zone of latest Albian age is indicted at the top by youngest *Coptospora paradoxa* and at the base by oldest *P. pannosus*. Other age significant types include *Balmeisporites holodictyus*, *Clavatipollenites hughesi*, *Cupuliferoidaepollenites parvulus*, *Foraminisporis asymmetricus*, *Perotriletes majus*, *Trilobosporites trioreticulatus* and frequent *Cicatricosisporites australiensis*. Common are *Cyathidites*, *Microcachryidites* and *Osmundacidites*. Minor caving of *Proteacidites* is seen in these cuttings.

Slightly brackish environments are indicated by the very rare presence of spiny acritarchs (*Micrhystridium*) amongst the rich and diverse spores and pollen.

Yellow to light brown spore colours indicate immaturity for hydrocarbons.

These features are normally seen in the topmost Eumeralla Formation (upper Eumeralla Formation of Kopsen and Scholefield 1990).

B 1395-1401m(cutts), 1479-85m(cutts), 1545-51m(cutts), 1569-75m(cutts) : lower *hughesi* Zone

Assignment to the lower *Cyclosporites hughesi* Zone of Aptian age is indicated at the top by youngest *Cooksonites variabilis* and at the base by oldest *Pilosisporites notensis* considered in place. Common are *Cyathidites*, *Falcisporites* and *Microcachryidites*. Frequent are *Osmundacidites* and *Retitriletes austroclavatidites*. Thick walled spores like *Cooksonites variabilis*, *Aequitriradites verrucosus* and *Pilosisporites notensis* are rare but consistent. Very rare Permian reworking was seen at 1569-75m only.

Non-marine environments are indicated by the abundant and diverse spores and pollen and almost total absence of saline markers. Slight brackish influence is suggested at 1395-1401m by the presence of a single spiny acritarch, but this could be caved. Cuticle fragments are common.

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

These features are normally seen in the lower Eumeralla Formation and Windermere Sand, often associated with coaly section.

C 1596-1605m(cutts), 1650-59m(cutts), 1668-77m(cutts), 1677-95m(cutts) : apparently all upper *wonthaggiensis* Zone

Assignment to the upper *Foraminisporis wonthaggiensis* Zone of late Neocomian age is indicated at the top by youngest *Microfasta evansii* and at the base by oldest consistent *Cicatricosisporites australiensis*, *Foraminisporis wonthaggiensis* and *Triporoletes bireticulatus* considered in place. Neither boundary is foolproof however, as only cuttings were available for study.

At the top, *P. notensis* occurs at 1596-1605m with *M. evansii* and so *P. notensis* is considered caved. However, it is possible that the *M. evansii* is reworked and that the sample could belong to the *hughesi* Zone, implying a thin Windermere Sand equivalent.

At the base, rare *C. australiensis* and *T. bireticulatus* occur intermittently down to 1950m, but are considered likely to be caved on their anomalously light spore colour, and intermittent occurrence. In addition, *Osmundacidites wellmanii* is more frequent below 1752m (25-30% rather than 15-20% above), a feature usually seen in the lower *wonthaggiensis* Zone.

Within the interval, *Cyathidites* spp are abundant with *Osmundacidites* common, *Falcisporites* frequent to common, and *Microcachryidites* frequent. *Contignisporites cooksoniae* and *Retitriletes watherooensis* are consistent, with minor obvious caving (*Crybelosporites striatus*, *Foraminisporis asymmetricus* and *Pilosisporites notensis*) and very rare Permian and Triassic reworking.

Environments are non-marine as shown by the total absence of saline markers and the abundant and diverse spore pollen and common cuticle. Strong lacustrine influence is shown at 1659m, 1677m, and 1695m by the significant freshwater algal content (4-10%) made up of *Botryococcus*, *Microfasta* and *Schizosporis*. This is consistent with similar algal blooms seen in the Laira Shale elsewhere.

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

These features are normally seen in the topmost Crayfish Group, including the Laira Shale.

D 1746-52m(cutts), 1848-54m(cutts), 1944-50m(cutts), 2298-2301m(cutts), 2550-53m(cutts), 2748-51m(cutts) : apparently all lower *wonthaggiensis* Zone

Assignment to the lower *Foraminisporis wonthaggiensis* Zone of Neocomian age is indicated at the top by the absence of younger markers considered in place, and at the base by oldest *Dictyotosporites speciosus* considered in place. In these cuttings, oldest occurrences are liable to cave, and so confidence is low. Within the interval, *O. wellmanii* and *Cyathidites* spp are very common, with *Falcisporites* common. *Retitriletes* and *Microcachryidites* are frequent. As discussed above, rare younger elements were seen but are considered caved.

Environments are mostly non-marine as shown by the abundant and diverse spores and pollen and common cuticle. Slight brackish influence is suggested at 1854m by a single *Micrhystridium*, and very rare specimens of a dinoflagellate *Dissiliodinium* spA. Minor lacustrine influence is shown by low freshwater algal content (0-2%).

Light brown spore colours down to 2301m indicate marginal maturity for oil and immaturity for gas/condensate. Beneath that, mid brown spore colours indicate early maturity for oil, and marginal maturity for gas/condensate.

E 3066-70m(cutts) : indeterminate

This assemblage is rich and diverse, but clearly caved and mixed, including *C. paradoxa*, *Crybelosporites striatus*, *Cooksonites variabilis*, *Foraminisporis asymmetricus*, *Cicatricosisporites australiensis* and *D. speciosus*. It could therefore belong to the lower *wonthaggiensis* Zone but is really indeterminate. The assemblage could be entirely caved and mixed within barren sandy lithologies.

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 (1985) Palynology review of selected oil drilling, Otway Basin, South Australia, **unpubl. rept. for Ultramar Australia**.

WYNN #1 PALYNOLOGICAL DATA

MORGAN PALAEO ASSOCIATES : Palynological Consultants
Box 161, Maitland, South Australia, 5573.
Phone (088) 322795 ... Fax (088) 322798

C L I E N T: SAGASCO RESOURCES

W E L L: WYNN #1

F I E L D / A R E A: OTWAY BASIN SOUTH AUSTRALIA

K B E L E V A T I O N: T O T A L D E P T H:

A N A L Y S T: ROGER MORGAN D A T E : MAY 1994

N O T E S: ALL DEPTH IN METRES ALL NUMBERS ARE PERCENTAGES FROM A 100
SPECIMEN COUNT X = RARE PRESENCE OUTSIDE THE COUNT

RANGE CHART OF OCCURRENCES BY % & HIGHEST APPEARANCE:grouped

No.	Taxon	0480-90 CUTTS	1395-01 CUTTS	1479-85 CUTTS	1545-51 CUTTS	1569-75 CUTTS	1596-05 CUTTS	1650-59 CUTTS	1668-77 CUTTS	1677-95 CUTTS	1746-52 CUTTS	1848-54 CUTTS	1944-50 CUTTS	2298-01 CUTTS	2550-53 CUTTS	2748-51 CUTTS	3066-70 CUTTS
1	-- FRESHWATER ALGAE --	2	1	2	X	1	1	4	10	6	1	2	.	1	1	X	.
2	-- SALINE MICROPLANKTON --	X	1	.	.	.	.	.	.	.	.	X	.	.	.	.	.
3	BOTRYOCOCCUS SP	1	1	1	.	1	1	.	2	1	.	.	.	.	.	.	.
4	SCHIZOSPORIS PARVUS	X	X	.	.	X	.	.	.	.	.	1	.	.	.	.	.
5	SCHIZOSPORIS PSILATUS	1	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
6	SCHIZOSPORIS RETICULATUS	.	X	1	.	X	X	X	.	1	.	X	.	.	1	X	.
7	MICROFASTA EVANSII	.	.	.	.	.	X	4	8	4	1	1	.	1	.	X	.
8	APECTODINIUM HOMOMORPHUM	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	MICRHYSTRIDIUM	X	1	.	.	.	.	.	.	.	.	X	.	.	.	.	.
10	DISSILIODINIUM	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
11	AEQUITRIRADITES SPINULOSUS	X	.	.	.	1	1	.	.	.	.	.	.	.	.	.	1
12	AEQUITRIRADITES TILCHAENSIS	1	1	1	.	X	X	.	.	.	1	.	.	.	.	.	.
13	AEQUITRIRADITES VERRUCOSUS	X	2	1	.	X	1	.	.	.	1	.	.	.	.	.	.
14	APPENDICISPORITES DISTOCARINATUS	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	ARAUCARIACITES AUSTRALIS	1	1	1	1	1	.	X	3	1	1	2	1	1	2	3	.
16	BALMEISPORITES HOLODICTYUS	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	BALMEISPORITES TRIDICTYUS	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	CICATRICOSISPORITES AUSTRALIENSIS	4	3	2	1	X	1	1	X	X	1	.	X	.	.	X	7
19	CICATRICOSISPORITES HUGHESI	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	CICATRICOSISPORITES LUDBROOKIAE	1	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.
21	CLAVATIPOLLENITES HUGHESI	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	CONTIGNISPORITES COOKSONIAE	1	.	X	.	X	X	X	1	.	X	X	X	1	X	1	X
23	COPTOSPORA PARADOXA	2	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X
24	COPTOSPORA RADIATA	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	COROLLINA TOROSUS	2	.	1	2	4	1	X	3	5	6	3	3	3	2	1	.
26	CRYBELOSPORITES STRIATUS	1	.	.	.	.	.	X	.	.	X	.	.	.	.	.	X
27	CUPULIFEROIDAEPOLLENITES PARVULUS	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28	CYATHIDITES AUSTRALIS	3	13	12	16	17	26	16	16	18	12	7	11	16	17	25	13
29	CYATHIDITES MINOR	15	9	20	20	15	13	18	12	12	12	11	10	16	10	5	15
30	CYCADOPITES FOLLICULARIS	1	X	3	2	X	2	1	X	1	.	.	4	2	1	1	.
31	DICTYOPHYLLIDITES	1	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
32	DICTYOTOSPORITES SPECIOSUS	X	X	.	1	1	.	1	1	.	X	X	X	X	.	X	1
33	FALCISPORITES GRANDIS	6	5	3	11	3	5	2	2	2	1	3	3	1	3	1	5
34	FALCISPORITES SIMILIS	15	32	17	20	16	9	9	15	15	13	14	18	15	17	16	22
35	FORAMINISPORIS ASYMMETRICUS	X	X	X	.	X	.	X	.	.	.	.	X	.	.	.	1
36	FORAMINISPORIS WONTHAGGIENSIS	1	X	3	2	.	X	1	1	X	.	X	X	.	.	.	X
37	FOVEOTRILETES PARVIRETUS	X	1	1	.	.	.	X	.	.	X	.	.	.	.	.	.
38	GLEICHENIIDITES	2	X	1	1	2	.	X	1	1	.	1	1	X	1	1	X

No.	Species	0480-90 CUTTS	1395-01 CUTTS	1479-85 CUTTS	1545-51 CUTTS	1569-75 CUTTS	1596-05 CUTTS	1650-59 CUTTS	1668-77 CUTTS	1677-95 CUTTS	1746-52 CUTTS	1848-54 CUTTS	1944-50 CUTTS	2298-01 CUTTS	2550-53 CUTTS	2748-51 CUTTS	3066-70 CUTTS
39	JANUASPORITES SPINULOSUS	X	.	2	.	1	.	1	2	.	X	.	.	.	.	.	.
40	KLUKISPORITES SCABERIS	X	1	X	X	.	.	1	X	X	2	X	.	X	X	.	X
41	LAEVIGATOSPORITES OVATUS	1	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.
42	MICROCACHRYIDITES ANTARTICUS	13	12	6	8	7	3	7	13	4	4	6	4	3	5	3	6
43	OSMUNDACIDITES WELLMANII	11	6	7	2	8	22	21	5	18	28	29	24	25	24	25	13
44	PEROTRILETES MAJUS	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45	PHIMOPOLLENITES PANNOSUS	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	PODOSPORITES MICROSACCATUS	1	2	1	.	.	.	1	1	2	.	.	1	.	.	.	.
47	PROTEACIDITES	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	RETITRILETES AUSTROCLAVATIDITES	3	9	4	3	9	2	6	3	5	6	9	7	9	5	6	4
49	STERIESPORITES ANTIQUASPORITES	1	X	1	1	2	X	1	1	1	.	.	1	X	.	1	3
50	TRILOBOSPORITES TRIORETICULOSUS	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	TRIPOROLETES RETICULATUS	2	.	1	1	1	.	X	.	.	.	.	.	.	.	.	.
52	VELOSPORITES TRIQUETRUS	X	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.
53	VITREISPORITES PALLIDUS	1	.	.	1	1	1	.	.	.	2	1	2	X	.	.	1
54	CERATOSPORITES EQUALIS	.	X	4	4	4	4	4	6	1	4	3	2	1	.	2	3
55	CINGUTRILETES CLAVUS	.	X	1	.	.	.	.	.	1	1	.	1	.	.	1	.
56	COOKSONITES VARIABILIS	.	X	1	X	.	.	.	.	.	.	.	X	.	.	.	X
57	CYCLOSPORITES HUGHESI	.	X	1	.	X	X	1	X	1	X	.	.	.	X	X	.
58	FORAMINISPORIS DAILYI	.	X	1	X	3	X	.	.	1	X	1	.	.	.	.	X
59	FORAMINISPORIS RETICULOWONTHAGGIENSIS	.	X	.	.	X	.	.	.	.	.	.	.	.	.	.	.
60	ISCHYOSPORITES PUNCTATUS	.	X	.	X	.	.	1	.	.	.	X	1	.	.	.	X
61	KUYLISPORITES LUNARIS	.	X	.	.	1	.	.	.	.	.	.	.	.	.	.	.
62	LEPTOLEPIDITES MAJOR	.	X	.	.	.	1	X	.	.	1	1	1	.	2	X	1
63	LEPTOLEPIDITES VERRUCATUS	.	1	1	X	1	3	.	3	1	1	3	1	.	1	2	X
64	PILOSISPORITES NOTENSIS	.	X	X	1	X	X	.	X	.	.	X	.	.	1	X	.
65	RETITRILETES CIRCOLUMENUS	.	X	.	.	.	1	X	X	.	1	.	1	1	.	.	.
66	RETITRILETES EMINULUS	.	1	.	.	X	.	2	.	.	X	.	.	.	X	.	.
67	RETITRILETES FACETUS	.	X	.	.	X	1	X	.	X	X	X	X	.	1	.	.
68	RETITRILETES NODOSUS	.	X	.	1	.	.	X	X	.	.	1	.	.	.	X	.
69	RETITRILETES WATHAROOENSIS	.	X	.	.	X	X	.	X	X	.	1	.	X	.	X	.
70	PILOSISPORITES PARVISPINOSUS	.	.	X	X	.	X	X	.	.	.	X	.	.	.	.	.
71	TRIPOROLETES SIMPLEX	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
72	NEORAISTRICKIA	.	.	.	1	.	1	.	.	.	.	.	.	2	1	1	.
73	TRIPOROLETES RADIATUS	.	.	.	X	X	.	X	.	.	.	X	.	.	.	.	.
74	CALLIALASPORITES TURBATUS	.	.	.	.	1	1	.	.	.	.	.	1	1	1	2	1
75	DICTYOTOSPORITES COMPLEX	.	.	.	.	X	X	.	X	.	1	.	.	.	.	.	X
76	PEROTRILETES LINEARIS	.	.	.	.	X	.	X	.	1	.	.	.	.	.	.	.

No.	Species	0480-90 CUTTS	1395-01 CUTTS	1479-85 CUTTS	1545-51 CUTTS	1569-75 CUTTS	1596-05 CUTTS	1650-59 CUTTS	1668-77 CUTTS	1677-95 CUTTS	1746-52 CUTTS	1848-54 CUTTS	1944-50 CUTTS	2298-01 CUTTS	2550-53 CUTTS	2748-51 CUTTS	3066-70 CUTTS
77	REWORKING PERMIAN	.	.	.	.	X	.	.	X	.	X	X	.	X	.	.	.
78	CORONATISPORA PERFORATA	.	.	.	.	.	X	.	.	.	.	X	.	X	X	1	.
79	FOVEOSPORITES CANALIS	.	.	.	.	.	X	X	.	.	X	.	.	.	.	.	.
80	CALLIALASPORITES DAMPIERI	.	.	.	.	.	.	1	.	X	.	1	1	.	4	1	2
81	DICTYOTOSPORITES FILOSUS	.	.	.	.	.	.	X	.	.	X	.	.	.	X	.	X
82	CRYBELOSPORITES STYLOSUS	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	.
83	LYCOPODICADITES ASPERATUS	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.
84	PERINOPOLLENITES ELATOIDES	.	.	.	.	.	.	.	1	.	.	.	.	2	1	.	.
85	REWORKING TRIASSIC	.	.	.	.	.	.	.	X	.	X	.	.	.	.	X	.
86	TRIPOROLETES BIRETICULATUS	.	.	.	.	.	.	.	X	1	.	.	X	.	.	.	.
87	BIRETRISPORITES	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
88	LAEVIGATOSPORITES BELFORDI	.	.	.	.	.	.	.	.	X	.	.	.	X	.	.	.
89	PERIPOROPOLLENITES POLYORATUS	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
90	COUPERISPORITES TABULATUS	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
91	SESTROSPORITES PSEUDOALVEOLATUS	.	.	.	.	.	.	.	.	.	X	.	.	.	.	1	.
92	BIRETRISPORITES SPECTABILIS	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
93	PEROTRILETES WHITFORDENSIS	.	.	.	.	.	.	.	.	.	.	1	.	.	X	X	.
94	ARAUCARIACITES FISSUS	.	.	.	.	.	.	.	.	.	.	.	1	.	.	X	.
95	CONCAVISSIMISPORITES VARIVERRUCATUS	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.
96	MUROSPORA FLORIDA	.	.	.	.	.	.	.	.	.	.	.	X	1	X	X	.
97	ANNULISPORITES FOLLICULOSA	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.
98	CONCAVISSIMISPORITES PENOLAENSIS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1

0480-90 CUTTS 1395-01 CUTTS 1479-85 CUTTS 1545-51 CUTTS 1569-75 CUTTS 1596-05 CUTTS 1650-59 CUTTS 1668-77 CUTTS 1677-95 CUTTS 1746-52 CUTTS 1848-54 CUTTS 1944-50 CUTTS 2298-01 CUTTS 2550-53 CUTTS 2748-51 CUTTS 3066-70 CUTTS

SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
1	-- FRESHWATER ALGAE --
2	-- SALINE MICROPLANKTON --
11	AEQUITRIRADITES SPINULOSUS
12	AEQUITRIRADITES TILCHAENSIS
13	AEQUITRIRADITES VERRUCOSUS
97	ANNULISPORITES FOLLICULOSA
8	APECTODINIUM HOMOMORPHUM
14	APPENDICISPORITES DISTOCARINATUS
15	ARAUCARIACITES AUSTRALIS
94	ARAUCARIACITES FISSUS
16	BALMEISPORITES HOLODICTYUS
17	BALMEISPORITES TRIDICTYUS
87	BIRETRISPORITES
92	BIRETRISPORITES SPECTABILIS
3	BOTRYOCOCCUS SP
80	CALLIALASPORITES DAMPIERI
74	CALLIALASPORITES TURBATUS
54	CERATOSPORITES EQUALIS
18	CICATRICOSISPORITES AUSTRALIENSIS
19	CICATRICOSISPORITES HUGHESI
20	CICATRICOSISPORITES LUDBROOKIAE
55	CINGUTRILETES CLAVUS
21	CLAVATIPOLLENITES HUGHESI
98	CONCAVISSIMISPORITES PENOLAENSIS
95	CONCAVISSIMISPORITES VARIVERRUCATUS
22	CONTIGNISPORITES COOKSONIAE
56	COOKSONITES VARIABILIS
23	COPTOSPORA PARADOXA
24	COPTOSPORA RADIATA
25	COROLLINA TOROSUS
78	CORONATISPORA PERFORATA
90	COUPERISPORITES TABULATUS
26	CRYBELOSPORITES STRIATUS
82	CRYBELOSPORITES STYLOSUS
27	CUPULIFEROIDAEPOLLENITES PARVULUS
28	CYATHIDITES AUSTRALIS
29	CYATHIDITES MINOR
30	CYCADOPITES FOLLICULARIS
57	CYCLOSPORITES HUGHESI
31	DICTYOPHYLLIDITES
75	DICTYOTOSPORITES COMPLEX
81	DICTYOTOSPORITES FILOSUS
32	DICTYOTOSPORITES SPECIOSUS
10	DISSILIODINIUM
33	FALCISPORITES GRANDIS
34	FALCISPORITES SIMILIS
35	FORAMINISPORIS ASYMMETRICUS
58	FORAMINISPORIS DAILYI
59	FORAMINISPORIS RETICULOWONTHAGGIENSIS
36	FORAMINISPORIS WONTHAGGIENSIS
79	FOVEOSPORITES CANALIS
37	FOVEOTRILETES PARVIRETUS
38	GLEICHENIIDITES
60	ISCHYOSPORITES PUNCTATUS
39	JANUASPORITES SPINULOSUS
40	KLUKISPORITES SCABERIS
61	KUYLISPORITES LUNARIS
88	LAEVIGATOSPORITES BELFORDI
41	LAEVIGATOSPORITES OVATUS
62	LEPTOLEPIDITES MAJOR
63	LEPTOLEPIDITES VERRUCATUS
83	LYCOPODICADITES ASPERATUS
9	MICRHYSTRIDIUM
42	MICROCACHRYIDITES ANTARTICUS
7	MICROFASTA EVANSII
96	MUROSPORA FLORIDA
72	NEORAISTRICKIA
43	OSMUNDACIDITES WELLMANII
84	PERINOPOLLENITES ELATOIDES
89	PERIPOROPOLLENITES POLYORATUS
76	PEROTRILETES LINEARIS
44	PEROTRILETES MAJUS
93	PEROTRILETES WHITFORDENSIS
45	PHIMOPOLLENITES PANNOSUS
64	PILOSISPORITES NOTENSIS
70	PILOSISPORITES PARVISPINOSUS

89	PERITRIPOLLENITES POLYGRATUS
76	PEROTRILETES LINEARIS
44	PEROTRILETES MAJUS
93	PEROTRILETES WHITFORDENSIS
45	PHIMOPOLLENITES PANNOSUS
64	PILOSISPORITES NOTENSIS
70	PILOSISPORITES PARVISPINOSUS
46	PODOSPORITES MICROSACCATUS
47	PROTEACIDITES
48	RETITRILETES AUSTROCLAVATIDITES
65	RETITRILETES CIRCOLUMENUS
66	RETITRILETES EMINULUS
67	RETITRILETES FACETUS
68	RETITRILETES NODOSUS
69	RETITRILETES WATHAROOENSIS
77	REWORKING PERMIAN
85	REWORKING TRIASSIC
4	SCHIZOSPORIS PARVUS
5	SCHIZOSPORIS PSILATUS
6	SCHIZOSPORIS RETICULATUS
91	SESTROSPORITES PSEUDOALVEOLATUS
49	STERIESPORITES ANTIQUASPORITES
50	TRILOBOSPORITES TRIORETICULOSUS
86	TRIPOROLETES BIRETICULATUS
73	TRIPOROLETES RADIATUS
51	TRIPOROLETES RETICULATUS
71	TRIPOROLETES SIMPLEX
52	VELOSPORITES TRIQUETRUS
53	VITREISPORITES PALLIDUS