CAROLINE 1.

APPENDIX 1 OF WCR:

PALYNOLOGY REPORTS

PE904308

PALY.
CAROLINE 1.

SADME 92

2550.0	to 4720.0	F. WONTHAGGIENSIS	E.CRET	S
5322.0	to 5750.0	UPPER C. AUSTRALIENSIS	E.CRET	S
_____	to _____	_____	_____	-
_____	to _____	_____	_____	-
_____	to _____	_____	_____	-
_____	to _____	_____	_____	-
_____	to _____	_____	_____	-

Comment : _____

TYPE S = Sidewall Core C = Core D = Ditch Cuttings

South Australian Department of Mines and Energy -- Data Package Rec 9

<<< P A L Y N O L O G Y >>>

Well : CAROLINE 1 Units : Feet

Date : 30/11/86

Palynologist : R. MORGAN

Loggers	Depths	Zone	Age	Type
700.0	to 705.0	P ASPEROPOLUS	EOCENE	C
2454.0	to 2712.0	M. DIVERUS	EOCENE	C
3050.0	to _____	L. BALMEI	PALEOC	C
3840.0	to 3850.0	T. LILLEI	L.CRET	D
4105.0	to 4660.0	N. SENECTUS	L.CRET	D
4970.0	to 7700.0	T. PACHYEXINUS	L.CRET	C
7900.0	to 8690.0	C. TRIPLEX	L.CRET	D
9040.0	to 9360.0	A. DISTOCARINATUS	L.CRET	D
9750.0	to 11052.0	P.PANNOSUS	E.CRET	C
_____	to _____	_____	_____	-

Comment : _____

TYPE S = Sidewall Core C = Core D = Ditch Cuttings

South Australian Department of Mines and Energy -- Data Package Rec 10

<<< P A L Y N O L O G Y >>>

Well : CHAMA 1A Units : Feet

Date : 30/06/86

Palynologist : R. MORGAN

Loggers	Depths	Zone	Age	Type
1225.0	to 1235.0	N.ASPERUS	EOCENE	S
1654.0	to 1950.0	T. PACHYEXINUS	L.CRET	S
1960.0	to 2395.0	C.TRIPLEX	L.CRET	S
2600.0	to 4760.0	P.PANNOSUS TO C.PARADOXA	E.CRET	D
4904.0	to 5960.0	C.PARADOXA	E.CRET	D
6100.0	to 6350.0	C.STRIATUS	E.CRET	S
6840.0	to 8700.0	C. HUGHESI	E.CRET	D
8764.0	to 9014.0	F.WONTHAGGIENSIS	E.CRET	C
_____	to _____	_____	_____	-
_____	to _____	_____	_____	-

Comment : _____

TYPE S = Sidewall Core C = Core D = Ditch Cuttings

South Australian Department of Mines and Energy -- Data Package Rec 11

ALLIANCE CAROLINE NO. 1 WELL

Lat. 140° 54' 30" S
Long. 37° 56' 30" E

Title O.E.L. 22

S.A.

PRELIMINARY PALYNOLOGICAL REPORT

Samples from four cores, taken in the Cretaceous interval of Caroline No. 1, were examined on spores and microplankton. Microfossils were recovered from every sample, preservation was moderate to fairly good.

The dating of the microfossil assemblages appears to conform with the ages of the associated lithological formations (LeBlanc 1967) and are given below.

Sample	Number (MFP)	Depth	Lithology	Age
core 11	4337	4093'0-4"	Paaratte Fm.	Coniacian to basal Santonian
core 12	4338	4102'0-3"	"	"
core 15	4339	7957'0-6"	Belfast Fm.	Turonian/Coniacian
core 16	4340	10061'0-1"	Eumaralla Fm.	Albian

Sample no. 4340 10061

Yielded a moderate microflora, in which the following types were recognized:

Spores: Classopollis spp.,
Cicatricosisporites australiensis,
C. hughesi,
C. pseudotripartitus,
Trilobosporites trioreticulosus,
Laevigatosporites ovatus,
Contignisporites sp.,
Microplankton: Hystrichospaeridea (fragment)

This assemblage is known from Albian sediments in the Great Artesian Basin. The presence of L. ovatus and T. trioreticulosus restricts the maximum age of the microflora to upper spore unit K 1d. The absence of certain angiospermous pollen grains, Appendicisporites (al Plicatella) sp. and Coptospora paradoxa is an indication that the microflora may be older than spore units K 2a or K 2b while the presence of C. pseudotripartitus suggests a K 2 age. The assemblage is therefore probably of upper K 1d to K 2a age, so that the sample may be regarded as the equivalent of the upper Wallumbilla Formation or the Toolebuc Limestone in the Great Artesian Basin, (Burger 1968).

The absence of marine microplankton indicates freshwater environments of deposition.

Sample no. 4339 7957

Recovery of microfossils moderate. The following types were observed:

late Coniacian – early Santonian
T. pachyexinus Zone.

Spores: Triorites minor,
Tricolpites spp.,
cf. Tricolporopollenites sp.,
Neoraistrickia truncata,
Baculatisporites comaumensis,
Monocolpate, granulate form,

Microplankton: Wetzeliella irregularis,
Deflandrea cf. cretacea,
cf. Coronifera sp.,
cf. Baltisphaeridium heteracanthum
Hystrichosphaeridium spp.,

Dettmann & Playford (1968) report the earliest T. minor forms from their (?Cenomanian/Turonian) Appendicisporites distocarinatus Zone. Burger (in prep.) never observed Triorites among the Angiosperms from the (presumably Cenomanian) Winton Formation in the Great Artesian Basin. Evans (1966) reported various forms of Deflandrea from the Upper Cretaceous of the Otway Basin, notably D. cretacea from the Belfast Mudstone (FBH Port Campbell No. 1 Well) in the interval of the D. cretacea Zone, succedding the Ascodinium parvum Zone, both of which Evans regards to be of Upper Cretaceous age.

U. Cret

These data indicate that the sample is most probably younger than the Winton Formation. This, coupled with the probable age of sample no. 4338, seems to restrict the age of the microflora to the Turonian-Coniacian interval.

Rich microplankton contents point to open marine surroundings during sedimentation.

Sample no. 4338 4102

Well preserved spores and pollen grains were recovered from this sample, among which the most significant are:

Santonian – Early Campanian
T. pachyexinus – N. senectus

Spores: Cicatricosisporites australiensis,
Laevigatosporites ovatus,
Camarozonosporites amplus,
Proteacidites spp.,
Triorites minor,
Tricolporopollenite sp.,
Stereisporites viriosus,
Clavifera triplex,

Microplankton: Indetermin. (2 specimens),

This assemblage contains some types that were recently described by Dettmann & Playford (1968). C. amplus and S. viriosus first appear in the Tricolpites pachyexinus Zone (Santonian). C. triplex was reported from the C. triplex Zone (?Turonian/Coniacian) and younger assemblages, while the group of Proteacidites seems to be restricted to the higher (i.e. Santonian-Danian) parts of the Upper Cretaceous in eastern Australia. The co-occurrence of Proteacidites sp., C. triplex and C. amplus might therefore point to an age close to the C. triplex and T. pachyexinus Zone, that is according to Dettmann & Playford in the interval of (upper) Coniacian to basal Santonian.

Probably brackish to freshwater surroundings dominated during sedimentation of the McDonnell Member.

Sample no. 4337 · 4093 see 4102'

Very few types were recovered, among which occurred:

Spores: Triorites minor,
cf. Proteacidites sp.,
cf. Abietineaepollenites sp.,

These types do not warrant an age determination. Regarding the close proximity to the previous sample, its age is thought to be identical.

REFERENCES

Burger, D., 1968 - Palynology of marine Lower Cretaceous strata in the northern and eastern Eromanga Basin, Queensland. Bur. Min. Resour. Aust. Rec. 1968/62 (unpubl.).

Dettmann, Mary E., & Playford, G., 1968 - Taxonomy of some Cretaceous spores and pollen grains from eastern Australia. Proc. Roy. Soc. Vict. N.S. 81 (2); 69-93

Evans, P.R., 1966 - Mesozoic stratigraphic palynology of the Otway Basin. Bur. Min. Resour. Aust. Rec. 1966/69 (unpubl.).

LeBlanc, M.C., 1967 - Alliance Oil Development Australia N.L. Completion Report Caroline Well No. 1. (unpubl.).

Canberra, 19th November, 1968.

(signed) D. BURGER

E. CAROLINE-1 (15 new samples plus 15 old SA Mine Dept. samples for this study)

1. 700-705 ft. (CORE) : P. asperopolus Zone at the top on youngest Myrtaceidites tenuis and Haloragacidites harrisii dominated microfloras and at the base on oldest Proteacidites asperopolus (700 ft.) and Kisselovia edwardsii (705 ft.). Marginal marine environments are indicated by the presence of very low diversity dinoflagellates, despite the high frequency of Cassidium fragile at 705 ft.

2. 2454 ft. (CORE)-2712 ft. (CORE) : middle M. diversus Zone at the top on the absence of younger indicators and youngest Tricolpites gillii (2580 ft., CORE), and at the base on oldest Banksieacidites elongatus, Proteacidites clarus and P. obesolabrus (2712 ft.) supported by oldest Proteacidites ornatus (2675 ft.), Polycolpites esobalteus and Triporopollenites ambiguus (2665 ft.). Non-marine to very marginally marine environments are indicated by the absence and very rare low diversity presence of dinoflagellates respectively, in these samples.

3. 3050 ft. (CORE) : probably L. balmei due to youngest Stereisporites regium without older indicators. The sample is inertinite dominated with common non-diagnostic dinoflagellates and very scarce mostly non-diagnostic pollen and spores. Nearshore marine environments are indicated by the common moderately diverse dinoflagellates. This marine incursion is usually seen in the Paleocene in the Pebble Point Formation or equivalent.

4. 3840-50 ft. (cutts) : T. lillei Zone at the top on the lack of younger indicators and at the base on oldest

Triporopollenites sectilis and Stereisporites regium. Other supporting species include oldest Nothofagidites senectus and Tricolpites sabulosus. As these taxa are all from cuttings, it is possible that this zone may be picked slightlytoo low due to caving. Slightly brackish environments are likely on a single dinoflagellate specimen considered to be in place.

5. 4095 ft. (CORE) : indeterminate due to the very few palynomorphs present in this old preparation.

6. 4105 ft. (CORE)-4660 ft. (cutts) : N. senectus Zone at the top on the absence of younger indicators, and at the base on oldest Nothofagidites senectus supported by oldest Tricolpites sabulosus. The interval base may be piced slightly too low, as it is taken on oldest occurrences in cuttings, which may be caved. The cuttings generally, however, show good agreement with the cores and so caving is considered to be minor. Rare dinoflagellates favour nearshore environments at the base (4650-60 ft.) shallowing to marginal marine at the top (4105-4330 ft.). Few dinoflagellates are age diagnostic, but the presence of Odontochitina cribropoda and Trithyrodinium "psilatum" indicate assignment to correlatives of the T. pachyexinus to N. senectus spore-pollen Zones.

7. 4970 ft. (cutts)-7700 ft. (CORE) : T. pachyexinus Zone at the top on the absence of younger indicators and at the base on oldest Tricolpites confessus and certain dinoflagellates (7700 ft., core) supported by oldest T. gillii (7110 ft., cutts). Supporting events within the zone include oldest Tricolporites pachyexinus at 5440 ft. (cutts), oldest Latrobosporites ohaiensis (4970 ft. cutts) and a downhole influx of Amosopollis cruciformis

at 5440 ft. (cutts). Some minor downhole caving from the N. senectus Zone was seen at 5730 ft. (cutts) and 7110 ft. (cutts), but the lighter spore colour and its intermittent nature make it easy to detect. Age diagnostic dinoflagellates include oldest Trithyrodinium "psilatum" (down to 7700 ft.), indicating assignment to the Odontochitina porifera or younger Dinoflagellate Zones (correlative with the T. pachyexinus or younger Spore-Pollen Zone). Marginal marine to nearshore marine environments are indicated by the presence of low diversity dinoflagellates.

8. 7900 ft. (CORE)-8690 ft. (cutts) : C. triplex Zone at the top on the absence of younger indicators and at the base on the oldest Phyllocladidites mawsonii. Nearshore to marginal marine environments are indicated by the low content of low to moderate diversity dinoflagellates.

9. 9040 ft. (cutts)-9360 ft. (cutts) : A. distocarinatus Zone at the top on the absence of younger indicators (and coincident with youngest Appendicisporites distocarinatus) and at the base on oldest Amosopollis cruciformis. Key dinoflagellates include youngest consistent Cribroperidinium edwardsii at 9040 ft. (cutts) indicating the Palaeohystrichophora infusorioides Dinoflagellate Zone (correlative with the A. distocarinatus Zone). Marginal marine environments are indicated by the low content (5%) of dinoflagellates and their low diversity.

10. 9750 ft. (cutts)-11,052 ft. (CORE) : P. pannosus Zone at the top on the absence of younger indicators and downhole influx of C. striatus and at the base on oldest Phimopollenites pannosus and Appendicisporites distocarinatus. The zone top is not very clearly

defined, as some dinoflagellates (C. edwardsii, P. infusorioides) occur at 9750 ft., probably caved from higher in the well. The zone top could therefore be as low as 10,061 ft. (CORE). However, a palynofacies change occurs with inertinite and coarse cuticle dominating at 9750 ft. and below, in contrast to the fine cuticle and spore-pollen domination above. I thus favour assignment at 9750 ft. to the P. pannosus Zone although the usual zone fossil Coptospora paradoxa has not been seen in this well. Brackish environments are favoured by the presence of isolated dinoflagellates and spiny acritarchs (Micrhystridium, Cauca sp.) (Except at 11,052 ft., core) but these may be caved in all except the core at 10,061 ft. Lacustrine environments are favoured by the presence of non-spiny algal acritarchs (Schizosporis spp.).

11. The section is now fairly well controlled. However, the old core preparations are generally very poor and resampling of the cores (especially core 10 at 3050 ft., core 11 at 4095 ft., core 16 at 10,061 ft. and core 17 at 11,052 ft.) would be useful, but not essential.

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY SPORE-POLLEN ZONES ELEVATION: KB: _____ GL: _____

WELL NAME: CAROLINE-1 TOTAL DEPTH: _____

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
NEOGENE	Pleis	T. pleistocenicus								
	Plio	M. lipsus								
	Mio.	C. bifurcatus								
		T. bellus								
		P. tuberculatus								
	Olipo	upper N. asperus								
PALEOGENE	L. Eo	mid N. asperus								
	M. Eo	lower N. asperus								
		P. asperopolus	700	0			705	0		
	E. Eo	upper M. diversus								
		mid M. diversus	2454	1			2712	0		
		lower M. diversus								
	Paleo	upper L. balmei	3050	2			3050	2		
		lower L. balmei								
LATE CRETACEOUS	Maast.	T. longus								
		T. lillei	3840	3			3850	3		
	Camp.	N. senectus	4105	1			4660	3	4105	0
	Sant.	up. T. pachyexinus	4970	3			5440			
	Con.	lower T. pachyexinus	5730	4			7700			
	Turon	C. triplex	7900	1			8690	3	7900	0
	Ceno.	A. distocarinatus	9040	3			9360	3		
EARLY CRETACEOUS	Alb.	P. pannosus	9750	3	10061	1	11052	0		
		upper C. paradoxa								
		lower C. paradoxa								
		C. striatus								
	Apt.	upp. C. hughesi								
		low. C. hughesi								
	l.Neo	P. wonthaggiensis								
	e.Neo	up. C. australiensis								

1. All depths in feet.

2. Old core nos. 10, 11, 16 and 17 could be reprocessed to acheive better data.

DATA RECORDED BY: Roger Morgan, November 1986

PALYNOLOGICAL DATA SHEET

BASIN: OTWAY DINOFLAGELLATE ZONES ELEVATION: KB: _____ GL: _____

WELL NAME: CAROLINE-1 TOTAL DEPTH: _____

AGE		PALYNOLOGICAL ZONES	HIGHEST DATA				LOWEST DATA			
			Preferred Depth	Rtg	Alternate Depth	Rtg	Preferred Depth	Rtg	Alternate Depth	Rtg
LATE CRETACEOUS	Maas.	M. druggii								
	Camp	I. korojonense								
		X. australis								
	Sant	N. aceras	4105	0						
		I. cretaceum								
	Con	O. porifera					7700	0		
	Turon	C. striatoconus								
	Cenom	P. infusorioides	9040	4			9360	3		

3. Voluta-1

Restudy of the interval 4150 ft. to 7099 ft. using the old swc preparations and selected new cuttings samples is required.

4. Prawn-1

Restudy of two swcs at 4120 and 4145 ft. from the original preparations is required.

E. Several other wells would benefit from some minor "tidying up" of selected weak data intervals.

1. Burrungule-1

A large part of the late Cretaceous was not sampled by sidewall coring. Cuttings study up to the Lower Tertiary is recommended.

2. Caroline-1

Several very old South Australian Mines Department core preparations were very lean or barren. Resampling of 4 cores is recommended.

3. Casterton-1

Several cores were not sampled, or yielded poorly. Resampling of 7 cores is recommended.

4. Flaxmans-1