463001

Biostratigraphic, Paleoenvironmental & Geochemical Analysis of the

Amoco Australia Petroleum Company

Cape Sorell 1 Well

Offshore Western Tasmania, Australia

Prepared for: Maxus Energy Corporation
Dallas, Texas

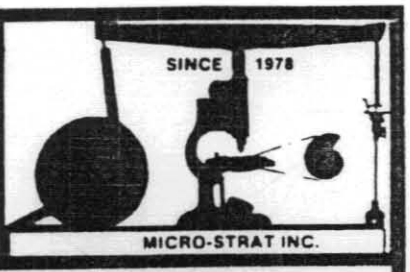
Project No: MSI 89-10

Date: August 1989

OR-0358D

MICRO-STRAT INC.

Sequence Stratigraphy Analysis
Palynology-Palynofacies
Micropaleontology
Geochemistry



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INTERNATIONAL — Dallas, TX 214-701-8811 — Los Angeles, CA 213-620-6292 — DOMESTIC

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BIOSTRATIGRAPHIC, PALEOENVIRONMENTAL AND GEOCHEMICAL ANALYSIS OF THE AMOCO AUSTRALIA PETROLEUM COMPANY CAPE SORELL 1 WELL, OFFSHORE WESTERN TASMANIA, AUSTRALIA

for Maxus Energy Corporation, Dallas, Texas

Introduction

Samples from the Amoco Australia Petroleum Company Cape Sorell-1 well, offshore western Tasmania, Australia were submitted by Maxus Energy Corporation of Dallas, Texas to MICRO-STRAT INC. of Denver, Colorado (Figure 1). These samples were analyzed for biostratigraphic determination and paleoenvironmental interpretation on the basis of palynomorphs and calcareous nannofossils. The samples were also analyzed for source rock geochemistry. The results of these analyses follow in this report.

The section covered by these samples can be related to eustatic sea level changes by means of a global chart presented in Figure 2. The large chart (in pocket) summarizes, in graphic form, all results of the analyses.

Maxus Energy Corporation contracted with MICRO-STRAT INC. for the analysis of these samples.

SUMMARY

- Based on the stratigraphic occurrences and ranges of stratigraphically significant palynomorphs and calcareous nannofossils, the samples from the Cape Sorell 1 well can be grouped into the following ages:

  5,100- 7,750 feet - Paleocene
  7,790-10,010 feet - Transitional Paleocene to Cretaceous
  10,210-11,570 feet - Upper Cretaceous, Maastrichtian

- Preservation of palynomorphs is generally fair to poor.

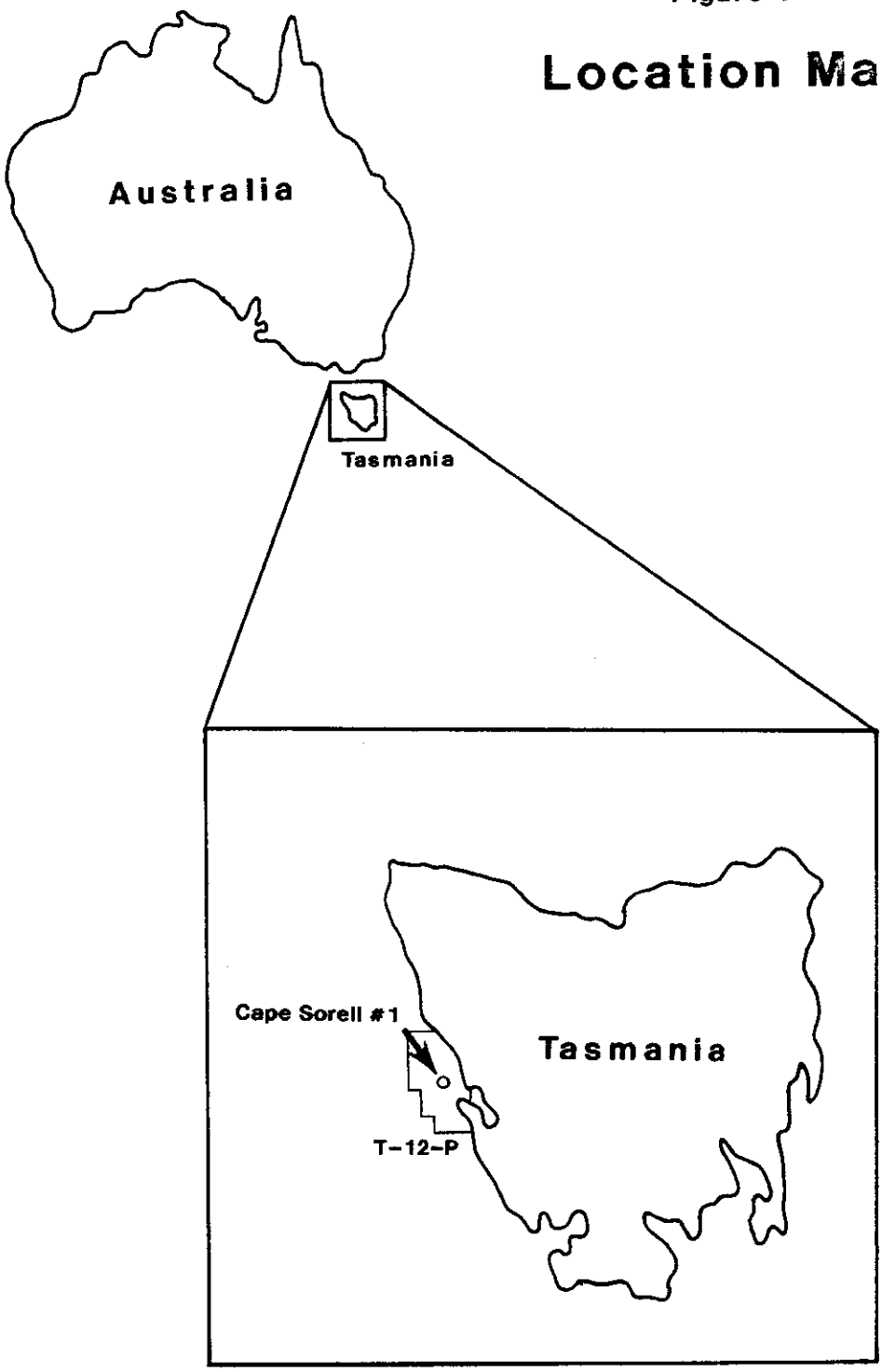
- The paleoenvironment is marginal marine.

- The values of Thermal Alteration Index (TAI) range from 2- to 2.

- The Total Organic Carbon (TOC) ranges from 0.08 to 3.70 % .

Figure 1

Location Map



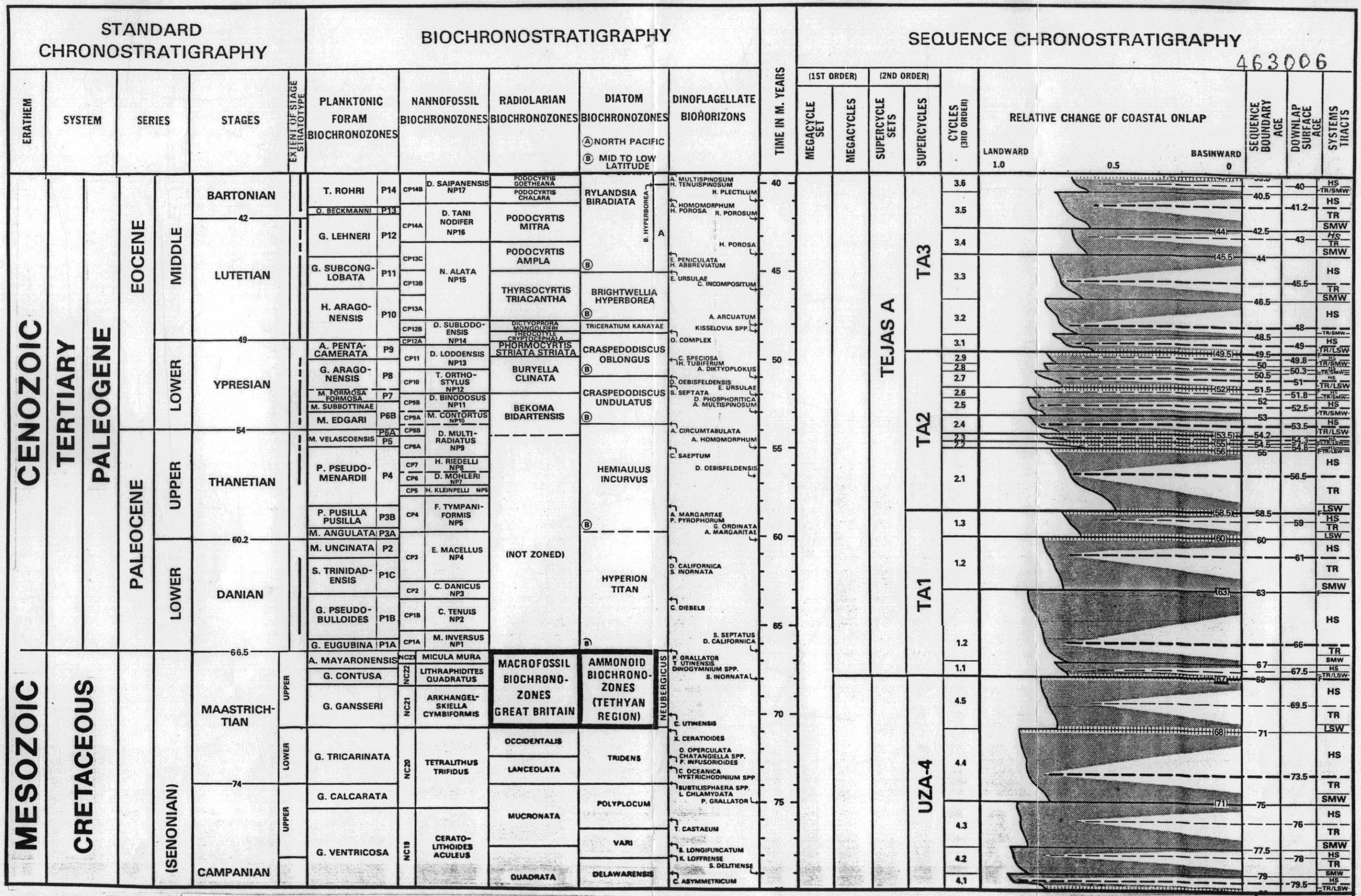


Figure 2 After Haq, B.U., J. Hardenbol and P.R. Vail, The new chronostratigraphic basis of Cenozoic and Mesozoic sea level cycles, Cushman Foundation for Foraminiferal Research, Special publication No. 24, 1987.

5 cm

RESULTS OF PALYNOLOGICAL ANALYSIS

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Thirty-eight (38) samples in two lots from 5,100 to 11,570 feet from the Cape Sorell 1 well, offshore Tasmania were processed and analyzed for palynomorphs, thermal maturation and kerogen analysis. Sample depths are as follows:

5100-5130	7310-7330	9090- 9110
5650-5670	7430	9330- 9350
6150-6170	7490	9630- 9650
6690-6710	7610	9990-10,010
6790	7670	10,210-10,230
6850	7710-7750	10,530-10,540
6970	7790	10,760-10,770
6990-7010	8090-8110	10,970-10,980
7050	8190	11,120-11,130
7110	8310	11,310-11,315
7190	8470-8490	11,565-11,570
7250	8510	Sample #1
7310	8850-8870	

Biostratigraphic interpretations follow. Refer to the accompanying Checklist (Chart 1, in pocket) for species occurrence versus sample depth. Thermal Alteration Index (T.A.I.) for all samples, plus kerogen analysis for the 14 samples containing sufficient organic matter are summarized on Chart 2.

Palynomorphs are very rare to sparse in the well samples, even in those with abundant organic matter. They include spores and pollen from land plants, and marine dinoflagellate cysts, which suggest a marginal marine paleoenvironment. Preservation is fair to poor. In the upper part of the sampled interval (from 5,100 to 7,750 feet), dinocysts are generally not well preserved, though they are sufficient to indicate a Paleocene age.

The middle portion of the sampled interval (from 8,090 to 10,010 feet) includes samples with little organic matter and extremely rare non-age diagnostic palynomorphs. The lower part of the interval (from 10,210 to 11,570 feet) includes both pollen and dinocysts that are indicative of Maastrichtian age. The following summary outlines these results.

The sampled section of this well, 5,100 to 11,570 feet, can be divided into three intervals:

5,100 to 7,750 feet	Paleocene
7,790 to 10,010 feet	Transitional Cretaceous/Paleocene
10,210 to 11,570 feet	Maastrichtian

Interval 5,100 to 7,750 feet

Epoch: Paleocene

Paleoenvironment: Marginal Marine

The samples in this interval yield spores and pollen that are mostly long-ranging, and a few that are typical of Paleocene and younger strata, including Haloragacidites harrisii, and Rhoipites spp. The dinocysts through these 2,650 feet of sediments include poorly-preserved species of the Deflandrea-Cerodinium complex, including Cerodinium dartmoorium (in the sample at 6,690-6,710 feet) and C. ?striatum (in the sample at 7,310-7,330 feet), plus ?Danea sp. and Glaphrocysta retiintexta.

Cerodinium dartmoorium is restricted to the Paleocene and early Eocene in the southeast Australia-New Zealand region and C. striatum is restricted to the lower Paleocene (Danian) in this area. Danea is

typical of the Paleocene-Eocene, and G. retiintexta, although it may range down into the Cretaceous, is typical of the Paleocene-early Eocene in this area. This assemblage suggests a Paleocene age for this interval.

Rare specimens of Manumiella, including M. druggii (in the sample at 6,690-6,710 feet), are also recognized in this well. These are typical Cretaceous forms, and M. druggii characterizes the late Maastrichtian (see below). They may be reworked (a common phenomenon in marginal marine environments) or in place in basal Paleocene beds. A few specimens of the M. druggii-M. seelandica complex range upward into basal Teurian (basal Paleocene) in Cretaceous/Tertiary boundary sections in New Zealand (e.g., Wilson, 1987; Wilson & Moore, 1989), where they might be in place or reworked, and in Antarctica (Jacobson, unpubl. data).

A relatively well-preserved specimen of the middle early Eocene dinocyst Wilsonidium ornatum in the sample at 7,310-7,330 feet is believed to be derived from uphole caving contamination.

Interval 7,790 to 10,010 feet

Epoch: Transitional Paleocene to Late Cretaceous

Paleoenvironment: Non-Marine?

This interval contains samples with little to almost no organic residue and extremely rare, non-age diagnostic palynomorphs. In some samples, distinctive reworked Permian spores and pollen are more common than presumed in-place palynomorphs. Reworking is commonplace

during periods of regression (and downcutting), and Permian "Gondwana" outcrops surround this area.

Interval 10,210 to 11,570 feet

Epoch: Late Cretaceous

Age: Maastrichtian

Paleoenvironment: Marginal Marine

The interval from 10,210 to 11,570 feet is assigned to the Tricolpites longus Zone of Late Cretaceous, Maastrichtian Age based on the restricted range of the palynomorphs Triporopollenites sectilis (in the sample at 10,270-11,050 feet) and Tubulifloridites (Tricolporites) lilliei (in the sample at 11,120-11,230 feet). These species are restricted to the Late Cretaceous and range no higher than Maastrichtian Age in New Zealand-southeast Australia (e.g., Helby, et al., 1987) and disappear at the Cretaceous/Tertiary boundary throughout the high southern latitudes.

The aforementioned palynomorphs are characteristic of the Tricolpites longus Zone. This zone is now placed in the Late Cretaceous, Maastrichtian Age, whereas in earlier papers, the T. longus Zone was placed in the early to middle Paleocene.

Partridge (1976) and subsequent authors (e.g., Helby, et al., 1987) have moved the T. longus Zone down into the Maastrichtian, based on improved biostratigraphic control and data from other fossil groups such as foraminifers. Because Manumiella specimens sometimes occur in the basal Danian in this area, the top of the T. longus Zone is

accepted by many workers as in the basal Danian.

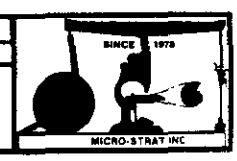
Samples through this interval also yield spores, pollen and dinocysts including Gambierina edwardsii and common G. rudata. G. edwardsii and G. rudata range from upper Campanian through the Paleocene, though they are particularly common in the Maastrichtian, T. longus Zone in the Gippsland-Bass basin area, southeast Australia (Helby, et al., 1987).

The nonmarine palynomorphs in this interval provide a correlation with the T. longus Zone of latest early to late Maastrichtian age (to possibly very basal Danian) (see Helby, et al., 1987 for the most recent definition of this zone).

Rare dinocysts in these samples also indicate a Maastrichtian age for this stratigraphic interval. The diagnostic forms are species of Manumiella (including M. druggii and M. conorata) that indicate correlation with the M. druggii Zone (the marine equivalent of the upper T. longus Zone), of late Maastrichtian age (?to very basal Danian). As noted above, a few specimens of Manumiella occur in the basal Tertiary (Wilson, 1987; Wilson & Moore, 1989; Helby, et al., 1987).

"Sample #1"

(?outcrop sample from adjacent Tasmania?) This is a low diversity assemblage (nonmarine, possibly locally derived ?swamp flora) which includes Haloragacidites harrisii, and species of Triporopollenites, Spinizonocolpites prominatus, Arecipites sp., Tiliaepollenites notabilis, Malvacipollis sp., Margocolporites sp., etc. Presence of S. prominatus and T. notabilis indicate correlation to the Malvacipollis diversus - Proteacidites asperopolus zones, and an uppermost Paleocene to Middle Eocene age.



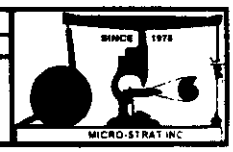
Evaluation of the Robertson Research results for the interval from 5,100 to 11,570 feet

Based on the range chart provided, this previous report correctly assigned the interval from 5,770 to 7,170 feet to the Lygistepollenites balmei Zone and to the upper Paleocene. Recently (for the interval from approximately 5,100 to 5,770 feet) the lower part of Stover & Evans' (1973) Malvacipollis diversus Zone (then assigned to the Eocene), has been moved down into the upper Paleocene. Therefore the Lygistepollenites balmei Zone was moved down into the middle Paleocene.

The interval from 10,270 to 11,570 feet was assigned to the T. longus Zone of Paleocene Age. These 1,300 feet of section is characterized by the palynomorphs, Triporopollenites sectilis (10,270-11,050 feet), Quadraplanus brossus (10,470 feet) and Tubulifloridites (Tricolporites) lilliei (in 11,120-11,230 feet). These species are restricted to the Late Cretaceous and range no higher than Maastrichtian Age in Australia.

As originally defined by Stover & Evans (1973), both the L. balmei and T. longus Zones were assigned a Paleocene age, and this usage was followed by Robertson Research. They therefore assigned the entire interval from 5,770 to T.D. to the Paleocene.

Partridge (1976) and subsequent authors (e.g., Helby, et al., 1987) have moved the T. longus Zone down into the Maastrichtian, based on improved biostratigraphic control and data from other fossil groups



such as foraminifers. Because Manumiella specimens sometimes occur in the basal Danian in this area, the top of the T. longus Zone is accepted by many workers as in the basal Danian.

It is clear that the T. longus Zone as delimited by Robertson Research (below 10,270 feet) should be assigned to the Maastrichtian, based on recent biostratigraphic refinements of the zonation.

The presence of "consistent Nothofagus brassii type and rare N. fusca type is restricted to Paleocene or younger sediments" according to the Robertson Research Report. According to this recent publication, in Australia and Antarctica these two species range into the Late Cretaceous, Campanian Age and are not restricted to the Paleocene and younger sediments.

ROBERTSON RESEARCH RESULTS

Interval (feet)	Floral Zone	Calcareous Nannofossil Zone	Age
?4050- 5770	Malvacipollis diversus	D. lodoensis - D. mohleri	Early Eocene
5770- 7170	Lygistepollenites balmei		Paleocene
7170- 7590	Lygistepollenites balmei/Tricolpites longus		
7590-10270		?D. mohleri and older	
10270-11576 (T.D.)	Tricolpites longus		

MICRO-STRAT RESULTS

Interval (feet)	Floral Zone	Calcareous Nannofossil Zone	Age	TAI
5100- 5770		D. lodoensis / D. mohleri	Early Eocene	2 to 2-
5770- 7010	Lygistepollenites balmei		Paleocene	
7310- 7350	(based on 2 poorly-preserved dinos.)		Maastrichtian?? L. Cretaceous??	?
7710-10010	very sandy, indeterminate			
10210-11576 (T.D.)	Tricolpites longus		Maastrichtian L. Cretaceous	2 woody

FIG. 3.

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GEOCHEMISTRY

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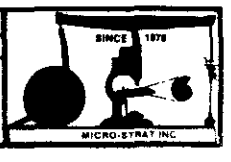


RESULTS OF CALCAREOUS NANNOFOSSIL ANALYSIS

Thirty-seven (37) samples in two lots from the Cape Sorrel 1 well from the interval from 5,100 to 11,570 feet were examined for possible calcareous nannofossil age determinations. One sample, 7,310-7,330 feet, was present in both lots. Extremely rare calcareous nannofossils are noted in five samples from 6,150 to 7,210 feet and in one sample at 9,090-9,110 feet. If these occurrences are in place, a Lower Paleocene (Danian) age is probable. The samples examined and the results of the analysis are presented below:

Samples analyzed:	5,100-5,130	7,430-7,450	9,330- 9,350
(depths in feet)	5,650-5,670	7,490-7,510	9,630- 9,650
	6,150-6,170	7,610-7,630	9,990-10,010
	6,690-6,710	7,670-7,690	10,210-10,230
	6,790-6,810	7,710-7,750	10,530-10,540
	6,850-6,870	7,790-7,810	10,760-10,770
	6,990-7,010	8,090-8,110	10,970-10,980
	7,050-7,070	8,190-8,210	11,120-11,130
	7,110-7,130	8,310-8,330	11,310-11,315
	7,190-7,210	8,470-8,490	11,565-11,570
	7,250-7,280	8,510-8,530	Sample #1
	7,310-7,330	8,850-8,870	
	7,310-7,330	9,090-9,110	

Samples 5,100-5,130 and 5,650-5,670 feet

Age: Indeterminate

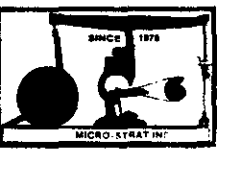
These two samples are barren of calcareous nannofossils.

Sample 6,150-6,170 feet

Epoch: Paleocene

Age: Danian

A single occurrence of *Coccolithus cavus* (= *Coccolithus pelagicus*?) is noted in this sample. This species is not particularly age diagnostic, but is a common constituent of early Paleocene Danian assemblages.



Sample 6,690-6,710 feet

Epoch: Paleocene

Age: Danian

A single occurrence of each of Coccolithus cavus and Transversopontis obliquipons is recorded in this sample. T. obliquipons is a middle to upper Eocene form and is considered a downhole contaminant.

Samples 6,790-6,810 and 6,850-6,870 feet

Age: Indeterminate

These two samples are barren of calcareous nannofossils.

Sample 6,990-7,010 feet

Epoch: Paleocene

Age: Danian

One occurrence of Chiasmolithus danicus is recognized in this sample. Although this species ranges into the middle Paleocene, its first evolutionary appearance in the Danian is an important bioevent.

Sample 7,050-7,070 feet

Age: Indeterminate

This sample is barren of calcareous nannofossils.

Sample 7,110-7,130 feet

Epoch: Paleocene

Age: Danian

This sample yields a single occurrence of Coccolithus cavus, which is a non-diagnostic form characteristic of Lower Paleocene (Danian) assemblages. A large form of Coccolithus pelagicus (C. eopelagicus) is also noted, which has probably caved from the Eocene section.

Sample 7,190-7,210 feet

Epoch: Paleocene

Age: Indeterminate

This sample yields a single occurrence of Coccolithus cavus.

Samples	7,250-7,280	7,610-7,630	8,190-8,210
	7,310-7,330	7,670-7,690	8,310-8,330
	7,310-7,330	7,710-7,750	8,470-8,490
	7,430-7,450	7,790-7,810	8,510-8,530
	7,490-7,510	8,090-8,110	8,850-8,870 feet

Age: Indeterminate

These 15 samples are barren of nannofossils.

Sample 9,090-9,110 feet

Epoch: Paleocene

Age: Early Danian

A single occurrence of Cruciplacolithus tenuis is recorded in this sample. The first appearance of C. tenuis in the early Danian (below the C. danicus datum) is an important bioevent.

Samples		
	9,330- 9,350	10,760-10,770
	9,630- 9,650	10,970-10,980
	9,990-10,010	11,120-11,130
	10,210-10,230	11,310-11,315
	10,530-10,540	11,565-11,570 feet

Age: Indeterminate

These ten samples are barren of calcareous nannofossils.

Sample #1

Age: Indeterminate

This sample is barren of calcareous nannofossils.

Appendix 2

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RESULTS OF SOURCE ROCK GEOCHEMICAL ANALYSIS

Twenty-two (22) samples were analyzed for source rock geochemistry, specifically Total Organic Carbon (TOC) and Thermal Alteration Index (TAI).

Results of these analyses are presented on Chart 2 (following page) along with kerogen types (in percent) and preservation.

Refer to Figure 4 for a correlation between maturation indices and petroleum generation and destruction.

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Results of Source Rock Geochemical Analysis

Chart 2

Depth (feet)	TOC	Source Material in % (Kerogen types)							Preservation			TAI								Color		Age
		Finely disseminated	Amorphous	Herbaceous	Woody plant debris	Coal fragment	Algal fragments	Barren	Good	Fair	Poor	2-	2	2+	3-	3	3+	4-	4	Yellow	Yellow Orange	
Sample #1	21.26	+	13	5	70	12			X			X								X		Paleocene
5100-5130	0.24	55	10	3	13	19	+			X		X								X		Paleocene
5650-5670	0.35	10	26	7	38	19	+			X		X								X		Paleocene
6150-6170	1.18	15	16	2	59	8	+			X		X								X		Paleocene
6690-6710	0.17	5	21	4	23	47	+			X		X								X		Paleocene
6990-7010	0.26	5	35	6	42	12	+				X	X								X		Paleocene
7310-7330	0.10	5	26	8	32	29	+			X		X								X		Paleocene
7710-7750	0.09	10	13	12	19	46	+				X	X								X		Paleocene
8090-8110	0.22							X			X	X								X		Indeterminate
8470-8490	0.35							X			X	X								X		Cret.\Tertiary
8850-8870	0.12							X		X		X								X		Cret.\Tertiary
9090-9110	0.19							X			X		X								X	Indeterminate
9330-9350	0.11							X			X		X								X	Indeterminate
9630-9650	0.11							X			X											Indeterminate
9990-10010	0.08							X			X											Indeterminate
10210-10230	0.79	2	12	5	53	28	+			X			X								X	Maastrichtian
10530-10540	3.70	10	14	2	45	29	+			X			X								X	Maastrichtian
10760-10770	1.83	15	10	+	34	41	+				X		X								X	Maastrichtian
10970-10980	1.34	5	14	+	48	33	+				X		X								X	Maastrichtian
11120-11130	2.85	2	2	+	38	58	+			X			X								X	Maastrichtian
11310-11315	2.20	15	15	3	45	22	+			X			X								X	Maastrichtian
11565-11570	0.22							X			X		X								X	Indeterminate

TRANSMITTED LIGHT MICROSCOPY DATA

Transmitted light slides are prepared from isolated kerogens using elvacite as a mounting medium. Analysis is done with a tungsten light source on a Zeiss Universal microscope. Blue light fluorescence using a xenon light source is used to help identify kerogen type.

TAI color values are normally recorded only on spores and pollen but when this material is absent, amorphous kerogen is substituted. In such cases the TAI value is preceded by an "*" on the data table. Kerogen color is usually slightly darker for amorphous material than spores and pollen in the sample and this must be considered when evaluating the TAI results.

A brief description of the color for each TAI unit is as follows:

TAI COLOR SCALE

1-	straw yellow	3-	reddish brown
1	pale yellow	3	medium brown
1+	yellow	3+	dark brown
2-	yellow-orange	4-	brown-black
2	golden	4	black with structure
2+	amber	5	black without structure

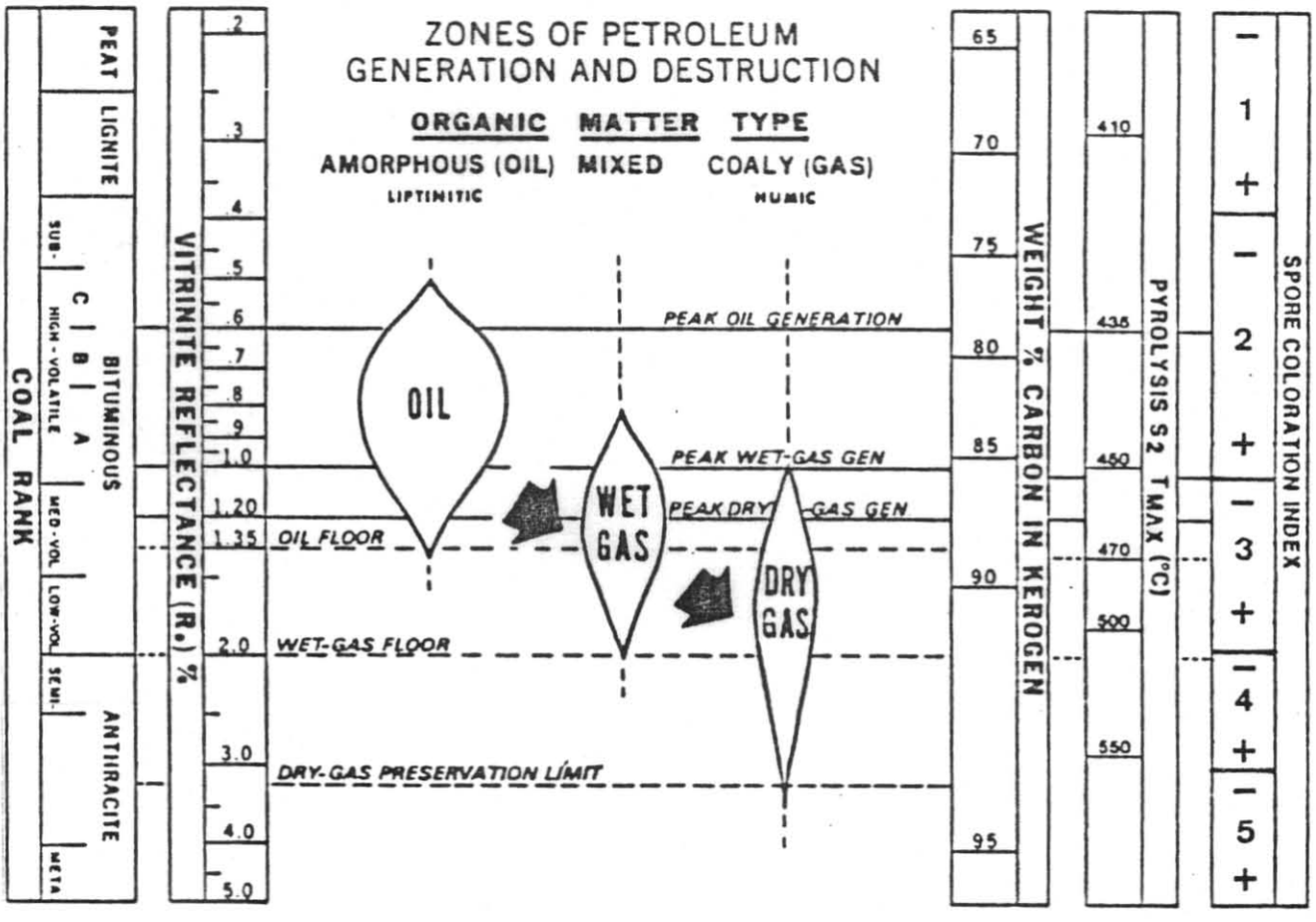
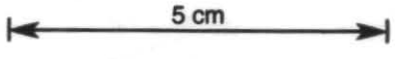


Figure 4. Correlation of various maturation indices and zones of petroleum generation and destruction.



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MICRO-STRAT'S STRATIGRAPHIC CHART
CHART 1
AMOCO AUSTRALIA PETROLEUM CO.
CAPE SORELL #1
OFFSHORE WESTERN TASMANIA BLOCK T-12-P
PROJECT MSI 89-10
AUGUST 1989
GRAPHIC ABUNDANCES WITH
FIRST APPEARANCE DOWNHOLE

5 cm

AS BASED ON MICRO-STRAT'S ANALYSIS

PERIOD: PALEOCENE

EPOCH: TRANSITIONAL CRET. (MAAS.) TO PALEOCENE; MAASTRICHTIAN

AGE

SPECIES

DEPTH (FEET)

CHECKLIST OF PALYNOMORPHS

1 CLAVIFERA TRIPLEX
2 CYATHIDITES SPP.
3 GLEICHENIIDITES CIRCINNIDITES
4 HALORAGACIDITES HARRISII
5 PARALECANIELLA INDENTATA
6 PHYLLOCLADIDITES MAWSONII
7 PROPYLIPOLLIS CF. P. MICROVERRUCATUS
8 PROTEACIDITES SPP., INCL. P. SUBSCABRATUS
9 SPINIFERITES RAMOSUS
10 STEREISPORITES ANTIQUASPORITES
11 TRICOLPITES SP.
12 CERODINIUM SP.
13 CONCAVISSIMISPORITES SP.
14 FROMEA CHYTRA
15 HOLOCHOANOCYSTIS GOLZOWENSE
16 PODOCARPIDITES SP.
17 PROTEACIDITES SP.
18 RHOIPITES SP.
19 ISPINIFERITES SP.
20 LAEVIGATOSPORITES OVATUS
21 PODOCARPIDITES SP.
22 PODOCARPIDITES SP.
23 RETITRILETES AUSTRACLAVATIDITES
24 TRIPOROPOLLENITES SP.
25 IDANEA SP.
26 BATIACASPHAERA SP.
27 CERATOSPORITES EQUALIS
28 CERODINIUM DARTMOORIUM, C. SP.
29 CHORATE DINOCYST (INDET.)
30 GLAPHROCYSTA RETIINTEXTA
31 MANUMIELLA SP.
32 PHELODINIUM ?MAGNIFICUM
33 PROTEACIDITES SPP., INCL. P. CF. P. ADENATHOIDES
34 STRIATOPODOCARPITES SP.
35 PODOCARPOITES SP.
36 POLLEN (INDET.)
37 ARAUCARIACITES AUSTRALIS
38 MANUMIELLA DRUGII
39 OSMUNDACIDITES WELLMANII
40 PERIDINIOID DINOCYST (INDET.)
41 SPINIFERITES SP.
42 TRIPOROPOLLENITES SPP.
43 TRIPROPOLLENITES SP.
44 CERODINIUM SPP.
45 CF. CYATHIDITES SP.
46 DEFLANDREA SP.
47 GLAPHROCYSTA SP.
48 IPHELODINIUM SP.
49 CYATHIDITES MINOR
50 LUNATISPORITES SP.
51 MALVACIPOLLIS SUBTILIS
52 APICULATISPORIS SP.
53 GRANULATISPORITES TRISINUS
54 PLICATIPOLLENITES SP.
55 APICULATE SPORE (INDET.)
56 IMPLETOSPHAERIDIUM SP.
57 IPERIDINIOID DINOCYST (INDET.)
58 ISPINIDIUM SP.
59 CERODINIUM SP., C. ?STRAITUM
60 ISABELIDINIUM SP.
61 PROTEACIDITES SUBSCABRATUS
62 WILSONIDIUM ORNATUM
63 PARASACCITES SP.
64 PROTOHAPLOXYPINUS SP.
65 VITTATINA SP.
66 LAEVIGATOSPORITES MAJOR
67 ?CORDOSPHAERIDIUM SP.
68 CYATHIDITES SP.
69 GLAPHROCYSTA RETIINTEXTA, G. SP.
70 TAENIATE BISACCATE (INDET.)
71 TRICOLPORATE POLLEN (INDET.)
72 BATIACASPHAERA SP.
73 MANUMIELLA ?CONDRATA
74 MANUMIELLA ?DRUGII
75 CF. CYATHIDITES SP.
76 IPERIDINIOID DINOCYST (INDET.)
77 ISPINIDIUM SP.
78 POLYCOLPATE POLLEN (INDET.)
79 PROTEACIDITES SUBSCABRATUS
80 MONOSACCATE POLLEN
81 BILATERAL MONOSACCATE (INDET.)
82 PHYLLOCLADIDITES VERRUCOSUS
83 TRICOLPORITES SP.
84 TRILETE SPORE (INDET.)
85 OSMUNDACIDITES WELLMANII
86 BISACCATE POLLEN (INDET.)
87 SPORES (INDET.)
88 MONOSACCATE POLLEN
89 GAMBIERINA RUDATA
90 MANUMIELLA SP. (INDET.)
91 MANUMIELLA SPP., INCL.M.CONDRATA
92 NOTHOFAGIDITES SPP. (FUSCA & BRASSII GROUPS)
93 PENINSULAPOLLIS (TRICOLPITES) GILLII
94 PROTEACIDITES SPP.
95 RETITRILETES SP.
96 MANUMIELLA SPP., INCL.M.CONDRATA
97 NOTHOFAGIDITES SPP.
98 STEREISPORITES REGIUM
99 TRIPOROPOLLENITES SECTILIS, T. SP.
100 DINOCYST (INDET.)
101 MANUMIELLA CONDRATA, M.?DRUGGII
102 TRICHOTOMOSULCITES SUBGRANULATUS
103 TUBULIFLORIDITES (TRICOLPORITES) LILLIEI
104 GAMBIERINA EDWARDSII
105 ISABELIDINIUM SP. CF. I. PELLUCIDUM
106 MANUMIELLA CONDRATA
107 NOTHOFAGIDITES SPP. (FUSCA GROUP)
108 ARECIPITES SP.
109 DACRYDIUMITES SP.
110 LILIACIDITES SP.
111 MARSDCOLPORITES SP.
112 NOTHOFAGIDITES SPP. (INCL. FUSCA GROUP) [N. FLEMINGII], BRASSII]
113 SPINIZONOCOLPITES PROMINATUS
114 TETRACOLPORITES SP.

05100–05130
05650–05670
06150–06170
06690–06710
06790
06850
06870
06930–07010
07080
07110
07190
07250
07310–07330
07430
07490
07610
07670–07750
07790
08090–08110
08190
08310
08470–08490
08610
08850–08870
09090–09110
09330–09350
09630–09650
09990–10010
10210–10230
10530–10540
10760–10770
10970–10980
11120–11130
11310–11315
11565–11570
Sample #1

MICRO-STRAT INC.
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MICROPALEONTOLOGY
PALEOENVIRONMENTS
GEOCHEMISTRY
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Key to Symbols

= RARE
= FEW
= COMMON
= ABUNDANT
? = Questionably Present
. = Not Present

SPECIES LOCATION INDEX
Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
72	?BATIACASPHAERA SP.
67	?CORDOSPHAERIDIUM SP.
25	?DANEA SP.
58	?GLAPHROCYSTA RETIINTEXTA
47	?GLAPHROCYSTA SP.
74	?IMPLETOSPHAERIDIUM SP.
85	?OSMUNDACIDITES WELLMANII
51	?PALAEOCYSTODINIUM SP.
76	?PERIDINIOID DINOCYST (INDET.)
48	?PHELODINIUM SP.
43	?PROTEACIDITES SP.
77	?SPINIDINIUM SP.
19	?SPINIFERITES SP.
55	APICULATE SPORE (INDET.)
52	APICULATISPORIS SP.
37	ARAUCARIACITES AUSTRALIS
108	ARECIPITES SP.
26	BATIACASPHAERA SP.
81	BILATERAL MONOSACCATE (INDET.)
86	BISACCATE POLLEN (INDET.)
27	CERATOSPORITES EQUALIS
28	CERODINIUM DARTMOORIUM, C. SP.
12	CERODINIUM SP.
59	CERODINIUM SP., C. ?STRAITUM
44	CERODINIUM SPP.
75	CF. CYATHIDITES SP.
29	CHORATE DINOCYST (INDET.)
1	CLAVIFERA TRIPLEX
13	CONCAVISSIMISPORITES SP.
49	CYATHIDITES MINOR
68	CYATHIDITES SP.
2	CYATHIDITES SPP.
109	DACRYDIUMITES SP.
46	DEFLANDREA SP.
100	DINOCYST (INDET.)
14	FROMEA CHYTRA
104	GAMBIERINA EDWARDSII
89	GAMBIERINA RUDATA
30	GLAPHROCYSTA RETIINTEXTA
69	GLAPHROCYSTA RETIINTEXTA, G. SP.
3	GLEICHENIIDITES CIRCINNIDITES
53	GRANULATISPORITES TRISINUS
4	HALORAGACIDITES HARRISII
56	IMPLETOSPHAERIDIUM SP.
60	ISABELIDINIUM SP.
105	ISABELIDINIUM SP. CF. I. PELLUCIDUM
66	LAEVIGATOSPORITES MAJOR
20	LAEVIGATOSPORITES OVATUS
110	LILIACIDITES SP.
50	LUNATISPORITES SP.
73	MANUMIELLA ?CONDRATA
80	MANUMIELLA ?DRUGGII
106	MANUMIELLA CONDRATA
101	MANUMIELLA CONDRATA, M.?DRUGGII
38	MANUMIELLA DRUGII
31	MANUMIELLA SP.
90	MANUMIELLA SP. (INDET.)
96	MANUMIELLA SPP., INCL.M.CONDRATA
111	MARSDCOLPORITES SP.
45	MICROTHYRIACEOUS FUNGUS
88	MONOSACCATE POLLEN
91	MYRTACEIDITES SP.
97	NOTHOFAGIDITES SPP.
92	NOTHOFAGIDITES SPP. (FUSCA & BRASSII GROUPS)
107	NOTHOFAGIDITES SPP. (FUSCA GROUP)
112	NOTHOFAGIDITES SPP. (INCL. FUSCA GROUP) [N. FLEMINGII], BRASSII]
39	OSMUNDACIDITES WELLMANII
15	PALAEOCYSTODINIUM GOLZOWENSE
5	PARALECANIELLA INDENTATA
63	PARASACCITES SP.
93	PENINSULAPOLLIS (TRICOLPITES) GILLII
40	PERIDINIOID DINOCYST (INDET.)
32	PHELODINIUM ?MAGNIFICUM
21	PHELODINIUM SP.
6	PHYLLOCLADIDITES MAWSONII
82	PHYLLOCLADIDITES VERRUCOSUS
54	PLICATIPOLLENITES SP.
35	PODOCARPOITES SP.
22	PODOCARPIDITES SP.
16	PODOCARPIDITES SPP.
36	POLLEN (INDET.)
78	POLYCOLPATE POLLEN (INDET.)
7	PROPYLIPOLLIS CF. P. MICROVERRUCATUS
57	PROPYLIPOLLIS SP.
61	PROTEACIDITES ?SUBSCABRATUS
17	PROTEACIDITES SP.
94	PROTEACIDITES SPP.
33	PROTEACIDITES SPP., INCL. P. CF. P. ADENATHOIDES
8	PROTEACIDITES SPP., INCL. P. SUBSCABRATUS
79	PROTEACIDITES SUBSCABRATUS
64	PROTOHAPLOXYPINUS SP.
23	RETITRILETES AUSTRACLAVATIDITES
95	RETITRILETES SP.
18	RHOIPITES SP.
9	SPINIFERITES RAMOSUS
41	SPINIFERITES SP.
113	SPINIZONOCOLPITES PROMINATUS
87	SPORES (INDET.)
10	STEREISPORITES ANTIQUASPORITES
98	STEREISPORITES REGIUM
34	STRIATOPODOCARPITES SP.
70	TAENIATE BISACCATE (INDET.)
114	TETRACOLPORITES SP.
102	TRICHOTOMOSULCITES SUBGRANULATUS
11	TRICOLPITES SP.
71	TRICOLPORATE POLLEN (INDET.)
83	TRICOLPORITES SP.
84	TRILETE SPORE (INDET.)
99	TRIPOROPOLLENITES SECTILIS, T. SP.
24	TRIPOROPOLLENITES SP.
42	TRIPOROPOLLENITES SPP.
103	TUBULIFLORIDITES (TRICOLPORITES) LILLIEI
65	VITTATINA SP.
62	WILSONIDIUM ORNATUM

CHART 3.

BIOSTRATIGRAPHIC, PALEOENVIRONMENTAL AND GEOCHEMICAL ANALYSIS

of the Amoco Australia Petroleum Co.

CAPE SORELL – 1 WELL

Offshore West Tasmania, Australia

for Maxus Energy Corporation

● Samples Analyzed

Date: 8/89

Project No.: MSI 89–10

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Calcareous Nannofossils: Age	Palynomorphs: Age	Geochemistry TAI	Paleo-Environment (Marginal Marine): Samples Analyzed
Barren		2–	5100 ●
Barren		2–	5550 ●
Danian		2–	6150 ●
Danian		2–	6690 ●
Barren			6790 ●
Barren			6850 ●
Danian		2– to 2	6970 ● 6990 ●
Barren			7050 ●
Danian			7110 ●
Danian			7190 ●
Barren			7250 ●
Barren		2– to 2	7310 ●
Barren			7430 ●
Barren			7490 ●
Barren			7610 ●
Barren			7670 ●
Barren		2– to 2	7710 ●
Barren			7790 ●
Barren		2– to 2	8090 ●
Barren	Transitional Maastrichtian to Paleocene		8190 ●
Barren			8310 ●
Barren		2– to 2	8470 ●
Barren			8510 ●
Barren		2– to 2	8850 ●
Danian		2	9090 ●
Barren		2	9330 ●
Barren			9630 ●
Barren			9990 ●
Barren	Maastrichtian	2	10210 ●
Barren	Maastrichtian	2	10530 ●
Barren	Maastrichtian	2	10760 ●
Barren	Maastrichtian	2	10970 ●
Barren	Maastrichtian	2	11120 ●
Barren	Maastrichtian	2	11310 ●
Barren	Maastrichtian	2	11565 ●

Calcareous Nannofossils – Period / Epoch: INDETERMINATE; TERTIARY / LOWER PALEOCENE; INDETERMINATE; TERTIARY / LOWER PALEOCENE; INDETERMINATE

Palynomorphs – Period / Epoch: TERTIARY / PALEOCENE; TRANSITIONAL CRETACEOUS TO PALEOCENE; UPPER CRETACEOUS

COMPOSITE WELL LOG / LITHOLOGICAL DESCRIPTION

Total Depth: Driller 11,576′ Logger 11,560′

5 cm