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Palynological Analysis of Halibut-2 Gippsland Basin

by

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INTERPRETATIVE DATA

Introduction

Twenty-three samples comprising 19 sidewall cores and 4 core samples were analysed in Halibut-2. The author cleaned, split the selected sidewall cores and forwarded them to Laola Pty Ltd in Perth for processing to prepare the palynological slides. The four core samples were sent directly to Laola Pty Ltd for initial urgent age dating.

An average of 21.8 grams of the conventional core samples but only 11.4 grams of the sidewall cores were processed for palynological analysis (Table 2). Residue yields were moderate from the cores and mostly low to very low from the sidewall cores. Palynomorph concentration on the slides was quite variable but generally low to barren in the coarser channel sands. The few high yielding sidewall cores with high palynomorph concentrations were from the Paleocene *L. balmei* Zone. Preservation of palynomorphs varied from poor to good. In the Paleocene portion of the Latrobe Group the poor preservation was due to greater maturation and over-oxidation of the palynomorph residues. The poor preservation of the shallower two samples from Turrum Formation is probably due to partial post-depositional oxidation of this unit. Preservation of palynomorphs from samples in the Flounder Formation varies from poor to excellent. Here the poor preservation is due to partial biodegradation of the fossils or to breakage and fragmentation of specimens. Fragmentation was particularly a problem with the dinoflagellates and could have been caused by early post-depositional bioturbation of the sediments or later during the palynological preparation of the samples. Spore-pollen diversity is very low to high from 2 to 39+ species. The average diversity is 23+ species in the twenty productive samples. Microplankton diversity is very low (1-4 species) in the undifferentiated Latrobe Group, and low to moderate (3-19 species) in the overlying Flounder and Turrum Formations. The single sample from the Seaspray Group has moderate diversity but not all species have been identified. The lower diversity samples correspond to low residue recoveries.

Lithological units and palynological zones from the base of the Seaspray Group to Total Depth are given in the following summary. The interpretative data with zone identification and Confidence Ratings are recorded in Table-1 and basic data on residue yields, preservation and diversity are recorded on Tables-2 and 3. All species which have been identified with binomial names are tabulated on the palynomorph range charts. Relinquishment list for palynological slides and residues from samples analysed in Halibut-2 are provided at the end of the report.

Palynological Summary of Halibut-2

AGE	UNIT/FACIES	SPORE-POLLEN ZONES (DINOFLAGELLATE ZONES)	DEPTHS (mKB)
MIOCENE TO OLIGOCENE	SEASPRAY GROUP	*P. tuberculatus*	2326.5
MIDDLE EOCENE	LATROBE GROUP Turrum Formation	Lower *N. asperus* (*A. australicum*) Undifferentiated interval	2332.5 (2332.5) 2338.5-2349
EARLY EOCENE	LATROBE GROUP Flounder Formation	*P. asperopolus* (*K. edwardsii*) (*K. thompsonae*)	2350-2381 (2350-2358) (2366.5-2381)
PALEOCENE	LATROBE GROUP Undifferentiated coastal plain facies of shale, coals and sands.	*L. balmei* undifferentiated (*A. homomorphum*) Lower *L. balmei*	2391.2-2495 *(2391.2)* 2560

T.D. 2590m

Geological Comments

1. Halibut-2 on the eastern flank of the Halibut field was expected to intersect the Marlin Channel and find sediments of the Middle Eocene Turrum Formation overlying the eroded Latrobe Group undifferentiated coarse clastics. Instead it found a sandy channel fill section assignable to the Early Eocene *P. asperopolus* Zone which is correlated to the older Flounder Formation. The discovery of channel fill sediments of this age was a surprise and implies that this distal part of the Marlin Channel as well as the eastern flank of the Halibut was originally eroded by older Tuna-Flounder Cannel events.

2. The initial erosion of the Top of Latrobe in the Halibut field area should now be correlated to at least the 50.5 Ma sequence boundary on the charts of Haq *et al.* (1987, 1988) and may even be older. This is distinctly older than the interpretation given by Marshall & Partridge (1988) which argued that the major erosive event at the top of the Latrobe Group coarse clastics was best correlated to the 49.5 Ma sequence boundary.

3. The unexpected discovery of an older fill within what has traditionally been mapped as the Marlin Channel reinforces the thalweg hypothesis, originally postulated by Dr P.R. Evans in 1971, that the location of the cutting of the Marlin Channel was controlled by the western flank of the earlier Tuna-Flounder Channel system.

4. The base of the Flounder Formation is picked at 2390.5m at the base of a 3 metre sand which lies above the first sample containing only *L. balmei* Zone species at 2391.2m. The possibility of confirming a *P. asperopolus* Zone age for this sand, and hence Flounder Formation assignment, by palynological analysis of cuttings was discussed with Paul Hinton on 28 March 1994. However it was considered impractical because the top of the *L. balmei* Zone was unlikely to be confidently identified due to the consistent presence of reworked *L. balmei* Zone fossils as rare elements in most samples from the Flounder Formation.

5. The Flounder Formation in Halibut-2 contains the two dinoflagellate zones recognised in the *P. asperopolus* Zone. Dinoflagellate abundances between 22% to 25% (calculated as % of combined spore-pollen and microplankton count but excluding fungal spores) and total microplankton diversity of >34 species makes these assemblages distinctly different from those recovered from the Flounder Formation intersected in Turrum-4 where the microplankton abundances are <1% and total species diversity very low (Partridge, 1993). The reason for this marked difference in microplankton abundance and diversity is unknown. It may relate to differences in facies as the sequence in Turrum-4 consists of 44 metres of claystone overlying a 15.5 metre sand, whilst the section in Halibut-2 is mainly fairly coarse quartz sandstone. Alternatively, it may reflect increasing abundance of microplankton with increasing distance from the palaeoshoreline, although this is hard to rationalise with an equivalent increase in grain size. A more likely possibility is that the difference can be correlated to different system tracts, with the sands at Halibut-2 being deposited during low stand to transgressive system tracts and the finer claystones at Turrum-4 deposited during one or more high stand system tracts.

6. The sidewall core 22 at 2349m is quite distinct in assemblage composition from the four core samples between 2350-2356m and sidewall core 21 at 2358m. Because there is no clear break in the shale package from 2347-2353.7m it is **suggested as a possibility** that core-1 may be displaced and may have actually been recovered from below 2353.7m.

7. Mixed results were obtained from the interval assigned to the Turrum Formation as only the sidewall core at 2332.5m could be confidently assigned to a zone. Although the sidewall core lithologies indicate the interval is coarser grained than the typical Turrum Formation assignment to this unit rather than the Gurnard Formation is favoured because the samples lack the dominance of glauconite which characterise the latter unit. The distinctive microplankton assemblage at 2349m containing an abundance of the dinoflagellate *Arachnodinium antarcticum* has not been recorded elsewhere in the Gippsland Basin and may belong to either the Turrum or Flounder Formations.

8. The assemblage recovered from the base of the Seaspray Group although definitive on both spore-pollen and microplankton is overall nondescript and cannot be correlated to any particular foraminiferal zone. Thus it provides no more than a broad Oligocene to Miocene age.

Biostratigraphy

Zone and age determinations are based on the spore-pollen zonation scheme proposed by Stover & Partridge (1973), partially modified by Stover & Partridge (1982) and Helby, Morgan & Partridge (1987), and a dinoflagellate zonation scheme which has only been published in outline by Partridge (1975, 1976). Other modifications and embellishments to both zonation schemes can be found in the many palynological reports on the Gippsland Basin wells drilled by Esso Australia Ltd. Unfortunately this work is not collated or summarised in a single report.

Author citations for most spore-pollen species can be sourced from Stover & Partridge (1973, 1982), Helby, Morgan & Partridge (1987) or other references cited herein. Author citations for dinoflagellates can be found in the indexes of Lentin & Williams (1985, 1989), in the paper by Wilson (1988), or other references cited herein. Species names followed by "ms" are unpublished manuscript names.

***Proteacidites tuberculatus* Zone: 2326.5 metres** **Oligocene to Early Miocene.**

The single sidewall core analysed from the Seaspray Group gave a meagre yield from which were recorded moderate diversity spore-pollen and microplankton assemblages which were overall well preserved. The sample can be confidently assigned to the *P. tuberculatus* Zone on the frequent presence of the spore

Cyatheacidites annulatus. The remainder of the recorded spore-pollen are long ranging species. Rare reworked Permian spores were recorded from the sample.

The microplankton assemblage can be assigned to the informal *Operculodinium* spp. Association of Partridge (1976) on the frequent occurrence of the long ranging *Operculodinium centrocarpum* associated with the Oligocene or young index species *Protoellipsodinium simplex* ms, and *Pyxidinopsis pontus* ms.

Lower *Nothofagidites asperus* Zone
and
***Areosphaeridium australicum* Zone: 2332.5 metres** **Middle Eocene.**

The spore-pollen assemblage is assigned to the Lower *N. asperus* Zone based on the incoming of abundant *Nothofagidites* spp. (47% of spore-pollen count) and continued presence of *Proteacidites asperopolus* and *P. pachypolus* (the latter 5% of spore-pollen count). The last two species typically range no higher than this zone. The abundant microplankton (40% of total count) in the sample supports the spore-pollen age and provides further refinement. The presence of *Areosphaeridium australicum* ms, together with *Tritonites pandus* and *T. tricornus* indicated the middle part of the Lower *N. asperus* Zone with approximate equivalence to the planktonic foraminiferal zones P.12 to P.13 (Marshall & Partridge 1988).

The sample at 2338.5m may also belong to this zone but although a high residue yield was extracted the palynomorphs were extremely rare in the slides and consequently insufficient species could be identified and recorded to assign the sample to a zone based on either species ranges or abundances.

Arachnodinium antarcticum
Microplankton Association: 2349 metres **Middle or Early Eocene.**

This sidewall core is best characterised by containing common *Arachnodinium antarcticum*. The author has never previously examined nor seen reported a sample from the Gippsland Basin containing this species is such abundance. Unfortunately the few other dinoflagellates recorded are not diagnostic, whilst the spore-pollen recorded although of high diversity (29+ species) lack key indicators for either the Lower *N. asperus* or *P. asperopolus* Zones. The dominance of *Haloragacidites harrisii* over *Nothofagidites* spp. would however favour assignment to the *P. asperopolus* Zone. The unusual nature of the assemblage suggests this particular section or marine environment has not previously been sampled in the basin.

***Proteacidites asperopolus* Zone: 2350-2381 metres Early Eocene.**

This zone is recorded from four core samples and four sidewall cores and there are an additional five sidewall cores in the zone interval which were either barren or contained too few recorded species to be zone diagnostic. The key zone species identified are *Proteacidites asperopolus* at 2350m and *Conbaculites apiculatus* ms between 2350-2366.5m. The samples below 2366.5m lack these species but are still considered to belong to the zone because of the associated dinoflagellates. The larger sample size processed from the conventional cores clearly show that, where yields are good, recorded species diversity is characteristically high. Total spore-pollen diversity recorded in the zone is 88+ species,

Characteristic species which don't range above this zone are *Myrtaceidites tenuis* (LAD at 2350m), *Intratriporopollenites notabilis* (between 2350-2377m) and *Proteacidites ornatus* (at 2355m). Supporting an age no older than this zone are the consistent presence of *Santalumidites cainozoicus* whose FAD is within the upper part of the underlying Upper *M. diversus* Zone, and common abundance of *Proteacidites pachypolus* (eg. 9% at 2350m). Reworking of sediments of the older undifferentiated Latrobe Group cut by the channel is evidenced by the recording of *Lygistepollenites balmei* from most of the more productive samples.

***Kisselovia edwardsii* Zone: 2350-2358 metres Early Eocene.**

Kisselovia edwardsii occurs in four of the five samples in the interval and samples are only assigned to the zone if they contain this species. Other diagnostic Early Eocene microplankton in the high diversity (>35 species) suite recorded are *Deflandrea flounderensis*, *Homotryblium tasmaniense*, *Systematophora traphosus* ms, *Tritonites bilobus*, *Wetzeliella articulata*, and *Wilsonidinium quirratus* ms. The last species has only previously been recorded from near the top of the Flounder Formation in Grunter-1 from the sidewall core at 1870m.

***Kisselovia thompsonae* Zone: 2366.5-2381 metres Early Eocene.**

The top and bottom samples from this interval each contain several specimens of *Kisselovia thompsonae* ms. Although no other species diagnostic of the zone were recorded the presence of *Deflandrea flounderensis* and *Wetzeliella articulata* are characteristic of Flounder Formation. Total microplankton species diversity in the interval is a modest 14 species, but this is largely a reflection of the overall low yields.

***Lygistepollenites balmei* Zone: 2391.2-2495.0 metres** **Paleocene.**
and
***Apectodinium homomorphum* Zone: 2391.2 metres** **Late Paleocene.**

All five samples over this zone interval clearly belong to the broader *L. balmei* Zone based on the consistent and often common occurrence of *Lygistepollenites balmei*. Associated indicator species which range no younger than this zone are *Australopollis obscurus*, *Gambierina rudata*, and *Polycolpites langstonii* (at 2408.5m) all of which are less consistent. No species were recorded which clearly assign the samples to either the Upper or Lower *L. balmei* Zones even though the total diversity over the interval is >45 species and individual sample diversity can be >30 species. The poor preservation of all the samples is undoubtedly the reason index species were so hard to find.

The shallowest sample in the interval a 2391.2m can be assigned to the *A. homomorphum* dinoflagellate Zone on the frequent occurrence of the short spined variety of *Apectodinium homomorphum* in an otherwise extremely limited assemblage.

Lower *Lygistepollenites balmei* Zone: 2560 metres **Early Paleocene.**

The deepest sidewall core recovered in Halibut-2 can be confidently assigned to the Lower *L. balmei* Zone on the mutual occurrence of *L. balmei* with *Juxtacolpus pieratus* ms, *Proteacidites angulatus* and *Tetracolporites verrucosus* in a diverse assemblage of >35 species. A single fragment of a palynomorph with the characteristic ornament of *Eisenackia crassitabulata* was recorded but searching all of the available slides failed to find a complete specimen to enable confident assignment of the sample to the *E. crassitabulata* Zone. If confirmation of this zone is required additional palynological slides could be prepared from remaining residue or cuttings samples analysed between 2560m and T.D. at 2590m.

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Table-1: Interpretative Palynological Data for Halibut-2, Gippsland Basin.

Sample Type	Depth (m)	Spore-Pollen Zone	CR	Microplankton Zone (or Association)	CR	Comments or Key Species
SWC-29	2326.5	*P. tuberculatus*	B3	(*Operculodinium* spp.)		FAD *Cyatheacidites annulatus*.
SWC-27	2332.5	Lower *N. asperus*	B1	*A. australicum* (*T. pandus*)	B3	*Tritonites pandus* and *T. tricornus*. Microplankton 41%.
SWC-25	2338.5	Indeterminate				Abundant altered kerogen recovered with palynomorphs extremely rare.
SWC-22	2349.0	Indeterminate		(*A. antarcticum*)		ACME assemblage of *Arachnodinium antarcticum*. *H. harrisii* >> *Nothofagidites*.
Core-1	2350.0	*P. asperopolus*	B2	*K. edwardsii*	B2	*Proteacidites asperopolus* and *Conbaculites apiculatus* ms. Microplankton 25%.
Core-1	2351.0	*P. asperopolus*	B4			Few diagnostic species. Microplankton 24%.
Core-1	2355.0	*P. asperopolus*	B1	*K. edwardsii*	B2	*Conbaculites apiculatus* ms.
Core-1	2356	*P. asperopolus*	B1	*K. edwardsii*	B2	*C. apiculatus* ms.
SWC-21	2358.0	*P. asperopolus*	B4	*K. edwardsii*	B3	Low diversity due to low yield.
SWC-20	2360.0	Indeterminate				Barren of palynomorphs.
SWC-19	2362.5	Indeterminate				No diagnostic species recorded.
SWC-17	2366.5	*P. asperopolus*	B2	*K. thompsonae*	B3	*Conbaculites apiculatus* ms.
SWC-16	2368.0	Indeterminate				Barren of palynomorphs.
SWC-15	2372.0	Indeterminate				No zone diagnostic palynomorphs recorded.
SWC-14	2373.5	Indeterminate				Barren of palynomorphs.
SWC-13	2377.0	*P. asperopolus*	B4			*Wetzeliella articulata* present.
SWC-12	2381.0	*P. asperopolus*	B1	*K. thompsonae*	B2	FAD *Conbaculites apiculatus* ms Microplankton 22%.
SWC-10	2391.2	*L. balmei*	B3	*A. homomorphum*	B3	Very low yield assemblage, could be reworked.
SWC- 9	2397.0	*L. balmei*	B3			Common *Lygistepollenites balmei*.
SWC- 7	2408.5	*L. balmei*	B1			*Polycolpites langstonii* present.
SWC- 5	2459.0	*L. balmei*	B2			Very poorly preserved.
SWC- 3	2495	*L. balmei*	B2			*Camarozonosporites bullatus* and *Tetracolporites textus* ms.
SWC- 1	2560.0	Lower *L. balmei*	B1			LADs *Proteacidites angulatus*, *Tetracolporites verrucosus* and *Juxtacolpus pieratus* ms. A possible fragment of *Eisenackia crassitabulata* also recorded.

Confidence Ratings

The concept of Confidence Ratings applied to palaeontological zone picks was originally proposed by Dr. L.E. Stover in 1971 to aid the compilation of micropalaeontological and palynological data and to expedite the revision of the then rapidly evolving zonation concepts in the Gippsland Basin. The original scheme which mixed confidence in fossil species assemblage with confidence due to sample type gradually proved to be rather limiting as additional refinements to existing zonations were made. With the development of the STRATDAT computer database as a replacement for the increasingly unwieldy paper based Palaeontological Data Sheet files a new format for the Confidence Ratings was proposed. These are given for individual zone assignments on Table 1, and their meanings are summarised below:

Alpha codes: Linked to sample type

- **A** Core
- **B** Sidewall core
- **C** Coal cuttings
- **D** Ditch cuttings
- **E** Junk basket
- **F** Miscellaneous/unknown
- **G** Outcrop

Numeric codes: Linked to fossil assemblage

1. **Excellent confidence:** High diversity assemblage recorded with key zone species.
2. **Good confidence:** Moderately diverse assemblage recorded with key zone species.
3. **Fair confidence:** Low diversity assemblage recorded with key zone species.
4. **Poor confidence:** Moderate to high diversity assemblage recorded without key zone species.
5. **Very low confidence:** Low diversity assemblage recorded without key zone species.

BASIC DATA

Table 2: Basic Sample Data

Table 3: Basic Palynomorph Data

Relinquishment Lists Of Palynological Slides & Residues

Palynomorph Range Chart

Format: Relative Abundance By Highest Appearance

Table 2: Basic Sample Data for Halibut-2, Gippsland Basin

Sample Type	Depth (metres)	Lithology	Sample Wt (g)	Residue Yield
SWC-29	2326.5	Med. gry calcareous claystone. Not laminated.	15.8	Low
SWC-27	2332.5	Blk-brn poorly sorted sandstone in siltstone matrix, with mica, weathered glauconite and quartz pebbles up to 3mm.	15.1	Low
SWC-25	2338.5	Reddish brn mod. sorted sandstone with white clay flecks and iron staining. Probable weathered glauconite present. Broken friable portion processed, contamination likely.	16.0	High
SWC-22	2349	Med. gry f.-crs grn. sandstone with arg. matrix. Broken, friable portion of sample processed contamination likely.	9.1	Low
Core-1	2350	Med.-dk brn, f.-med grn. sandstone with abundant arg. matrix, tr. glauconite.	23.6	Moderate
Core-1	2351	Grey-brn glauconitic sandstone.	21.2	Moderate
Core-1	2355	Med. brn-gry, med-crs gran. sandstone with abundant arg. matrix, tr. glauconite.	20.2	Moderate
Core-1	2356	Lt. gry, med-crs grn. sandstone, tr. glauconite.	22.1	Moderate
SWC-21	2358	Med. gry friable sandstone. No obvious glauconite. Broken portion processed contamination likely.	11.5	Low
SWC-20	2360	Lt gry friable qtz sandstone with tr. (<5%) glauconite. Not cleaned contamination likely.	10.1	Very low
SWC-19	2362.5	Lt-med. gry, med-crs grn friable qtz sandstone with tr. (<5%) glauconite. Not cleaned contamination likely.	12.2	Very low
SWC-17	2366.5	Med gry poorly sorted crs friable qtz sandstone with tr. (<5%) glauconite. Not cleaned contamination likely.	11.1	Low to moderate
SWC-16	2368	Green and grey crs grn friable qtz sandstone with glauconite <10%. Not cleaned contamination likely.	17.9	Very low
SWC-15	2372	Lt gry poorly sorted crs friable qtz sandstone, tr. (<2%) glauconite. Not cleaned contamination likely.	8.6	Very low
SWC-14	2373.5	Lt & dk gry, f.-med grn pyritic sandstone. No obvious glauconite. Not cleaned contamination likely.	13.2	Very low
SWC-13	2377	Gry white, f.-med. grn friable qtz sandstone, tr. (<2%) glauconite. Not cleaned contamination likely.	10.1	Moderate
SWC-12	2381	Med. gry, poorly sorted med-crs grn friable sandstone with silty matrix. Glauconite not obvious. Not cleaned contamination likely.	11.7	Low to Moderate
SWC-10	2391.2	Lt. gry-off-white, med-crs grn. friable sandstone with tr. (<2%) glauconite. Not cleaned contamination likely.	6.9	Very low
SWC- 9	2397	Med. gry, f. grn sandstone. Not cleaned contamination likely	5.8	Very low

Table 2: Basic Sample Data for Halibut-2, Gippsland Basin Cont...

Sample Type	Depth (metres)	Lithology	Sample Wt (g)	Residue Yield
SWC- 7	2408.5	Gry black friable siltstone. Sample broken and mud penetrated not cleaned.	9.9	High
SWC- 5	2459	Gry blk fissile shale. Sample broken, could not be cleaned.	13.0	High
SWC- 3	2495	Med.-dk gry, f.-crs grn. pyritic sandstone with silty matrix. Loose fragments processed, not cleaned.	6.9	Moderate
SWC- 1	2560	Gry. black siltstone. Sample broken could not be cleaned.	11.7	High

Table-3: Basic Palynomorph Data for Halibut-2, Gippsland Basin

Sample Type	Depth (m)	Palynomorph Concentration	Palynomorph Preservation	Number S-P Species*	Microplankton Abundance	Number MP Species*
SWC-29	2326.5	High	Fair-good	18+	Abundant	10+
SWC-27	2332.5	Moderate	Poor-very poor	31+	Abundant	19+
SWC-25	2338.5	Very low	Very poor	5+		NR
SWC-22	2349.0	Low	Poor-good	29+	Common	6+
Core-1	2350.0	High	Fair-good	39+	Common	14+
Core-1	2351.0	Moderate	Fair-good	29+	Common	9+
Core-1	2355.0	Moderate	Fair-good	37+	Common	18+
Core-1	2356.0	Moderate	Fair-good	31+	Common	18+
SWC-21	2358.0	Moderate	Poor-good	27+	Common	4+
SWC-20	2360.0	Very low	Poor	NR		NR
SWC-19	2362.5	Very low	Poor-good	2+	Low	3+
SWC-17	2366.5	Low	Poor-good	17+	Frequent	4+
SWC-16	2368.0	Barren		NR		NR
SWC-15	2372.0	Low	Poor-fair	10+		NR
SWC-14	2373.5	Barren		NR		NR
SWC-13	2377.0	Moderate	Poor-good	40+	Low	8+
SWC-12	2381.0	Low	Fair	28+	Common	8+
SWC-10	2391.2	Very low	Poor	4+	Very low	2
SWC- 9	2397.0	Low	Poor	9+		NR
SWC- 7	2408.5	High	Poor	30+	Very low	1
SWC- 5	2459.0	High	Very poor	24+	Very low	1?
SWC- 3	2495.0	Moderate	Poor-fair	19+	Very low	2
SWC- 1	2560.0	High	Poor-fair	35+	Very low	4

NR = Not recorded

Diversity:

Very low	= 1-5	species
Low	= 6-10	species
Moderate	= 11-25	species
High	= 26-74	species
Very high	= 75+	species

RELINQUISHMENT LIST - PALYNOLOGY SLIDES

WELL NAME & NO: HALIBUT-2
PREPARED BY: A.D. PARTRIDGE
DATE: 26 APRIL 1994

Sheet 1 of 2

SAMPLE TYPE	DEPTH (M)	CATALOGUE NUMBER	DESCRIPTION
SWC-29	2326.5	P196478	Kerogen slide sieved/unsieved fractions
SWC-29	2326.5	P196479	Oxidised slide 2
SWC-27	2332.5	P196480	Kerogen slide sieved/unsieved fractions
SWC-27	2332.5	P196481	Oxidised slide 2
SWC-25	2338.5	P196482	Kerogen slide sieved/unsieved fractions
SWC-25	2338.5	P196483	Oxidised slide 2
SWC-25	2338.5	P196484	Oxidised slide 3
SWC-25	2338.5	P196485	Oxidised slide 4
SWC-25	2338.5	P196486	Oxidised slide 5
SWC-22	2349.0	P196487	Kerogen slide sieved/unsieved fractions
SWC-22	2349.0	P196488	Oxidised slide 2
CORE-1	2350.0	P196489	Kerogen slide sieved (1/2 cover slip)
CORE-1	2350.0	P196490	Oxidised slide 2
CORE-1	2350.0	P196491	Oxidised slide 3
CORE-1	2351.0	P196492	Oxidised slide 2
CORE-1	2351.0	P196493	Oxidised slide 3
CORE-1	2355.0	P196494	Oxidised slide 2
CORE-1	2355.0	P196495	Oxidised slide 3
CORE-1	2356.0	P196496	Oxidised slide 2
CORE-1	2356.0	P196497	Oxidised slide 3
SWC-21	2358.0	P196498	Kerogen slide sieved/unsieved fractions
SWC-21	2358.0	P196499	Oxidised slide 2
SWC-20	2360.0	P196500	Kerogen slide sieved/unsieved fractions
SWC-19	2362.5	P196501	Kerogen slide sieved/unsieved fractions
SWC-17	2366.5	P196502	Kerogen slide sieved/unsieved fractions
SWC-17	2366.5	P196503	Oxidised slide 2 (1/2 cover slip)
SWC-16	2368.0	P196504	Kerogen slide sieved (1/2 cover slip)
SWC-15	2372.0	P196505	Kerogen slide sieved/unsieved fractions
SWC-14	2373.5	P196506	Kerogen slide sieved (1/3 cover slip)
SWC-13	2377.0	P196507	Kerogen slide sieved/unsieved fractions
SWC-13	2377.0	P196508	Oxidised slide 2
SWC-13	2377.0	P196509	Oxidised slide 3
SWC-13	2377.0	P196510	Oxidised slide 4 (1/2 cover slip)

RELINQUISHMENT LIST - PALYNOLOGY SLIDES

WELL NAME & NO: HALIBUT-2
PREPARED BY: A.D. PARTRIDGE
DATE: 26 APRIL 1994

Sheet 2 of 2

SAMPLE TYPE	DEPTH (M)	CATALOGUE NUMBER	DESCRIPTION
SWC-12	2381.0	P196511	Kerogen slide sieved/unsieved fractions
SWC-12	2381.0	P196512	Oxidised slide 2 (1/2 cover slip)
SWC- 9	2397.0	P196514	Kerogen slide sieved/unsieved fractions
SWC- 7	2408.5	P196515	Kerogen slide sieved/unsieved fractions
SWC- 7	2408.5	P196516	Oxidised slide 2
SWC- 7	2408.5	P196517	Oxidised slide 3
SWC- 7	2408.5	P196518	Oxidised slide 4
SWC- 7	2408.5	P196519	Oxidised slide 5
SWC- 5	2459.0	P196520	Kerogen slide sieved/unsieved fractions
SWC- 5	2459.0	P196521	Oxidised slide 2
SWC- 5	2459.0	P196522	Oxidised slide 3
SWC- 5	2459.0	P196523	Oxidised slide 4
SWC- 5	2459.0	P196524	Oxidised slide 5
SWC- 3	2495.0	P196525	Kerogen slide sieved/unsieved fractions
SWC- 3	2495.0	P196526	Oxidised slide 2 (1/2 cover slip)
SWC- 1	2560.0	P196527	Kerogen slide sieved/unsieved fractions
SWC- 1	2560.0	P196528	Oxidised slide 2
SWC- 1	2560.0	P196529	Oxidised slide 3
SWC- 1	2560.0	P196530	Oxidised slide 4
SWC- 1	2560.0	P196531	Oxidised slide 5

RELINQUISHMENT LIST - PALYNOLOGY RESIDUES

WELL NAME & NO: HALIBUT-2
PREPARED BY: A.D. PARTRIDGE
DATE: 26 APRIL 1994

SAMPLE TYPE	DEPTH (M)	DESCRIPTION
SWC-27	2332.5	Kerogen residue
SWC-25	2338.5	Oxidised residue
SWC- 7	2408.5	Kerogen residue
SWC- 7	2408.5	Oxidised residue
SWC- 5	2459.0	Kerogen residue
SWC- 5	2459.0	Oxidised residue
SWC- 1	2560.0	Kerogen residue
SWC- 1	2560.0	Oxidised residue