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WCR VOL 2

LEATHERJACKET-1

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ESSO EXPLORATION AND PRODUCTION
AUSTRALIA INC.

65 pages
+ 5 ENCL

WELL COMPLETION REPORT

LEATHERJACKET-1
INTERPRETED DATA
VOLUME 2

GIPPSLAND BASIN
VICTORIA

ESSO AUSTRALIA LIMITED

Compiled by: M.FITTALL

APRIL 1987

LEATHERJACKET-1

WELL COMPLETION REPORT

VOLUME 2

(Interpretative Data)

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GEOLOGICAL AND GEOPHYSICAL ANALYSIS

INTRODUCTION

Leatherjacket-1 was the first well drilled by Esso Australia Ltd. as part of the farmin by Esso Exploration and Production Inc. and B.H.P. Petroleum (Australia) Pty. Ltd. into permit VIC/P19 in the north-eastern part of the Gippsland Basin. The well drilled a dominantly fault-dependent closure situated on the highside of a NE-SW trending inverted normal fault.

Leatherjacket-1 successfully tested the dominantly fault-dependent target. A 25.5m gross oil-bearing section was discovered in the upper part of the Latrobe Group "coarse clastics" section, and a further 7.7m gross oil column was discovered deeper in the Latrobe Group.

GEOLOGICAL DISCUSSION

Stratigraphy (Stratigraphic Table, Enclosure 1, Appendices 1 & 2)

Leatherjacket-1 penetrated 618.0m of Miocene to Pliocene Seaspray Group, consisting of limestone and calcareous siltstone/claystone. The base of the Seaspray Group is Early Miocene in age (H1 foraminiferal zone).

The Seaspray Group unconformably overlies 11.0m of Gurnard Formation consisting of sandy glauconitic pyritic siltstone of early Mid Eocene age (*P. asperopolus* to Lower *N. asperus* palynological zones). The Gurnard Formation is interpreted to represent a period of condensed shallow marine sedimentation.

The Gurnard Formation unconformably overlies 62.0m of Latrobe Group "coarse clastics" sediments of latest Cretaceous (interpreted Upper *T. longus* palynological zone) to Late Paleocene age (Upper *L. balmei* palynological zone). The top 24.0m consists of interbedded sands, shales and thin coals which are interpreted to have been deposited in a coastal plain environment. This sequence overlies a 26.0m thick regressive nearshore sand and a 5.0m thick transgressive glauconitic silty marine shale of Lower *L. balmei* age (*T. evittii* dinoflagellate zone). This latest Cretaceous (top of *T. longus*) marine transgression is recorded throughout most of the Gippsland Basin. The underlying 7.0m of sand is postulated to be Upper *T. longus* age, and is interpreted to be a fluvial/estuarine sand deposited during the lowstand phase of the 68.0MY eustatic event.

An intra-Latrobe Group unconformity is tentatively interpreted at 818.0mKB on the basis of a change in sandstone quality, and C. triplex palynological zone age dating approximately 20m lower. This 30.0m thick sequence of basal Latrobe Group sediments consists of poor quality conglomerates and coarse sandstones containing reworked lithics near the base, which are interpreted to have been deposited in an alluvial to fluvial environment.

The above Latrobe Group section is underlain with marked angular unconformity (as can be seen on seismic lines) by Strzelecki Group sediments, consisting dominantly of conglomeratic to coarse lithic sandstones in Leatherjacket-1. These rift valley sediments are much coarser than previously seen in the Gippsland Basin, and are postulated to have been deposited near the edge of the rift basin. One sidewall core from this section yielded an Early Cretaceous age (C. hughesi palynological zone).

Structure (Enclosures 2 & 3)

Formation/Horizon	Pre-Drill Depth (mSS)	Post-Drill Depth (KB=21m ASL) (mSS)
SEASPRAY GROUP	106	106
LATROBE GROUP	703	724
Top of "coarse clastics"		735
STRZELECKI GROUP	830	836
TOTAL DEPTH	930	930

The top of the Latrobe Group was penetrated 21.0m low to prediction, which was due to different processing parameters associated with the S81A seismic data. Consequently, the seismic time pick for the top of Latrobe Group was too shallow and a shallow depth prediction resulted. Although the overall shape of the highside structure is essentially unchanged from the pre-drill map, the top of the Latrobe Group is now mapped higher on the lowside of the fault due to a revised top of Latrobe Group interpretation.

The top of the Strzelecki Group was penetrated 6.0 m low to prediction, and the Strzelecki Group structure remains essentially as mapped pre-drill.

The Leatherjacket structure is situated on the highside of a NE-SW trending inverted normal fault, and is mostly fault-dependent closure with a minor amount of independent closure. The inverted normal fault shows complete inversion along the central portion, displacing the top of Latrobe Group. Similar inversion is seen at top of the Strzelecki Group level.

The Leatherjacket structure formed as a result of a late compressive event reactivating an existing normal fault. The Mid Eocene Gurnard Formation thins over the structure . This could be due to onlap onto the structure during deposition, suggesting compression began before Mid Eocene time. Alternatively, the thin Gurnard Formation could be due to erosion after deposition, suggesting compression began after Mid Eocene time. Structuring of basal Seaspray Group sediments show compression ceased during Early to Mid Miocene time.

Seal (Figure 1)

The upper hydrocarbon accumulation is top-sealed by shales and coals of the Latrobe Group "coarse clastics" section. Impermeable Seaspray Group and some Latrobe Group is juxtaposed to the highside reservoir. The fault-plane profile of the Leatherjacket fault shows the OWC is controlled by a juxtaposed lithology leak point within the Gurnard Formation. Alternatively, it is possible the structure is underfilled (25.5m of a possible 43m) due to limited migration of hydrocarbons.

The lower hydrocarbon accumulation is top-sealed by the overlying marine shale. The 7.7m gross oil column is similar to the amount of independent closure mapped at the top of Latrobe Group level (approximately 10m). Therefore, this accumulation fills the independent closure and leaks at the fault plane, where Latrobe Group sediments are juxtaposed to the highside reservoir.

Reservoir and Hydrocarbons (Appendices 3 to 5)

Leatherjacket-1 discovered a 25.5m gross (18.3m net) oil-bearing section from 763.5mKB (-742.5m) to an OWC at 789.0mKB (-768.0m), reservoired in very good quality Lower L. balmei sands. Log analysis indicates an average porosity of 30% and an average oil saturation of 54% for these sands. Core-1 was cut across the base of this oil column and into the underlying water-bearing sand. The core barrel recovered completely disaggregated friable sand, suggesting that reservoir quality is excellent. An RFT sample taken at 765.0mKB (-744.0m) recovered 26.0 litres of 23.4° API oil, and a further sample at 788.05mKB (-767.5m) recovered 0.5 litres of 25.5° API oil. The low API gravities and geochemical analysis show these oils are moderately biodegraded and are interpreted to have originally been normal waxy Gippsland Basin oils. RFT pressure data interpretation suggests two separate oil systems are present in this upper oil-bearing zone. This interpretation is based on PVT analysis of an oil sample, which estimated the oil zone would have a gradient of 1.22 psi/m. However, this interpretation is not conclusive due to the low pressures involved and the biodegraded nature of the oil. It is possible to interpret a single oil column with an OWC similar to the log-derived OWC if the oil zone has a gradient higher than 1.22 psi/m.

Leatherjacket-1 also discovered a 7.7m gross (6.5m net) oil column from 811.3mKB (-790.3m) to an OWC at 819.0mKB (798.0m), reservoired in good quality sands of interpreted Upper T. longus age. Log analysis indicates an average porosity of 21% and an average oil saturation of 55% for this zone. An RFT sample taken at 812.8mKB (-791.8m) recovered 0.25 litres of 25.3° API oil, which is also moderately biodegraded. RFT pressure data, although not conclusive, supports the log-derived OWC.

These two oil accumulations have anomalously low resistivities (and hence oil saturations) for the reservoir quality involved. This is also observed at the other biodegraded oil occurences in this northern area i.e. Sperm Whale-1 and Flathead-1. The reason for these low oil saturations is not clearly understood. It may be related to the biodegradation of the oil, or to partial leakage of oil leaving almost residual oil accumulations, or alternatively to the particular petrographic character of the sands in this area.

Log analysis shows the Strzelecki Group sands to be of moderate reservoir quality with average porosities of 13% to 19%, which suggests the Strzelecki Group has slightly better reservoir quality at this location than elsewhere in the Gippsland Basin.

Geochemical analysis of cuttings samples shows the sandy Latrobe Group and Strzelecki Group sections have very poor source potential and are immature. The oil accumulations are interpreted to have been sourced and generated from the mature part of the Gippsland Basin to the southwest, and undergone extensive lateral and vertical secondary migration to be trapped in the Leatherjacket structure. This has also occurred elsewhere on the shallow Northern Platform of the Gippsland Basin i.e. Sperm Whale, Flathead.

GEOPHYSICAL DISCUSSION

Introduction

The checkshot data and synthetic seismic trace tie for Leatherjacket-1 shows the top of Latrobe Group seismic marker was originally picked at the top of the "coarse clastics" section. The top of "coarse clastics" and top of Gurnard Formation seismic markers are close together at the crest of the structure, but separate downdip and on the lowside of fault. The Leatherjacket structure has been remapped using the top of Gurnard Formation pick.

Time Map (Enclosure 2)

The following migrated seismic lines have been used during the re-interpretation of Leatherjacket:

G77A - 3157, 3158, 3159, 3167, 3168
G80A - 4133
S81A - 9, 10, 11, 12, 15a, 72, 74, 76, 78, 80a

These lines give a grid of approximately 1 km^2 over the area.

The top of Latrobe Group (Gurnard Formation) seismic marker was tied to Leatherjacket-1 and Wahoo-1 to the north. Lags of +5msec, -5 msec and +15 msec were applied to the G80A, G77A and S81A data to tie these lines to the check shot times from the wells, and to the G85A data.

The Time map shows the Leatherjacket inverted normal fault and the associated highside closure. Approximately 40 msecs of fault throw is shown at the crest of the structure, compared to approximately 75 msecs throw mapped pre-drill. The difference is due to the revised (post-drill) top of Latrobe Group interpretation.

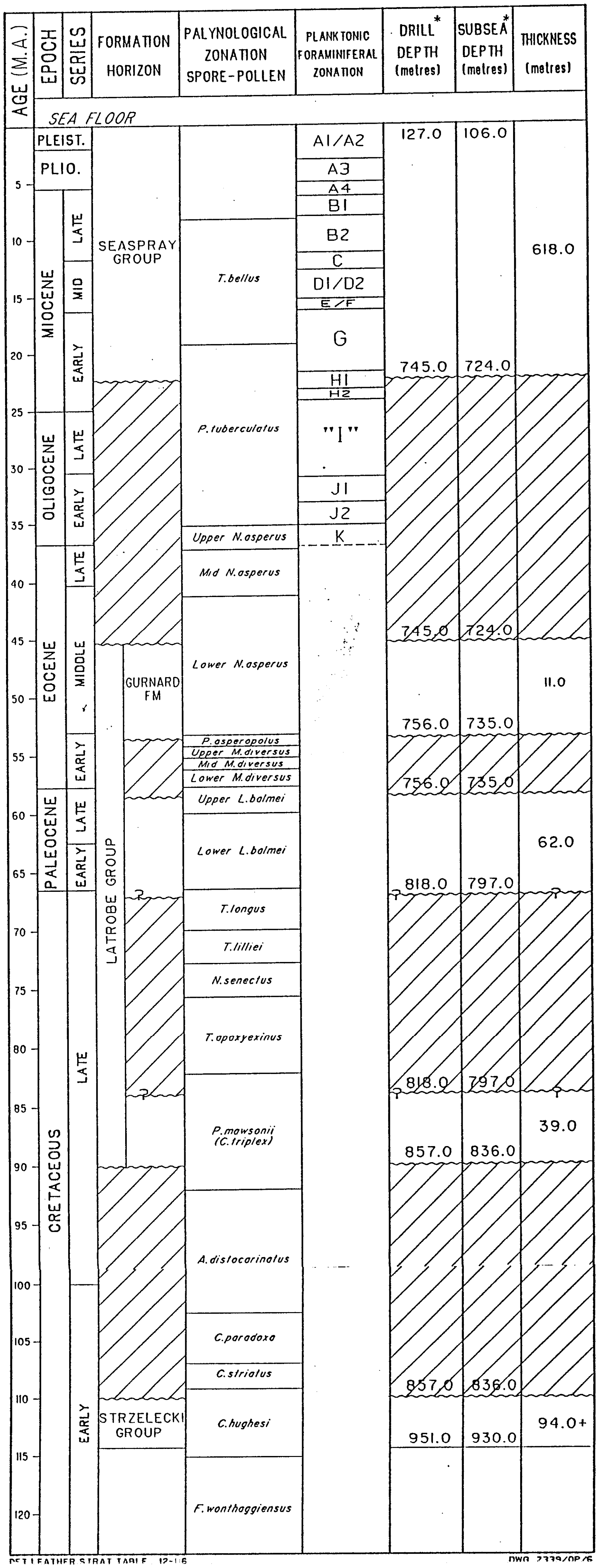
Depth Map (Enclosure 3)

A Vnmo map was constructed by obtaining velocity analyses generated along the seismic lines used in the interpretation so that the time interpretation could be converted to depth. The scatter in the resulting computer generated Vnmo map was not large so this map was hand smoothed. The Vnmo's to the top of the Latrobe Group show a moderately uniform southerly gradient over the Leatherjacket area, reflecting the structural trends.

The Vnmo map was then multiplied by a constant conversion factor of 0.954, which was calculated from the comparison of the Vnmo velocity (2060 m/s) at Leatherjacket-1 with the velocity recorded during the velocity survey (1965 m/s). The resulting average velocity grid was merged with the time interpretion grid to produce the Depth map.

The Depth map shows the NE-SW trending dominantly fault-dependent closure located on the highside of the reversed Leatherjacket fault. Approximately 43m of closure is mapped; 33m of this is fault-dependent. The amount of Seaspray Group juxtaposed to the highside Latrobe Group has been reduced from 100m (pre-drill) to 45m due to the revised top of Latrobe Group interpretation.

LEATHERJACKET-1
STRATIGRAPHIC TABLE



LEATHERJACKET FAULT PLANE PROFILE

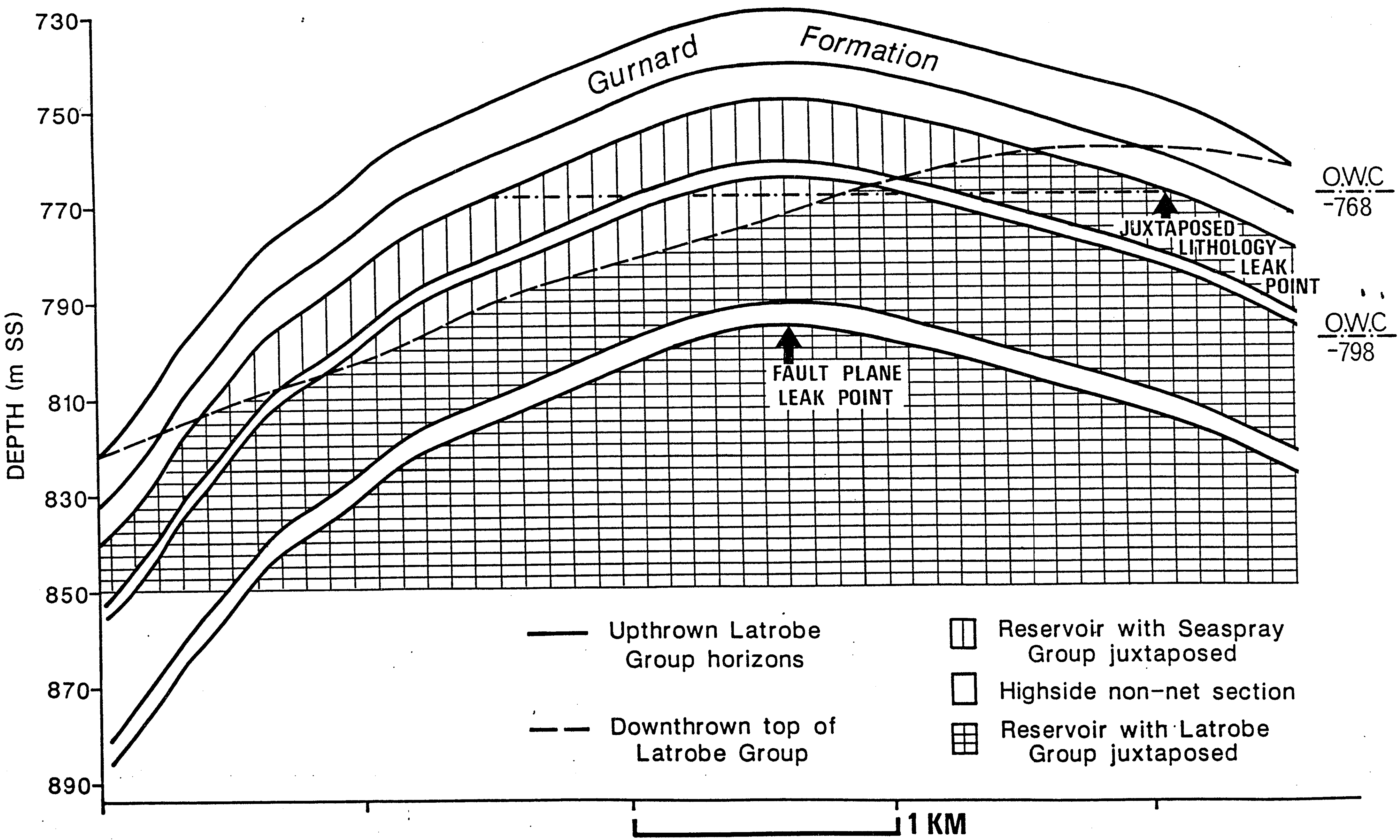


Figure-1

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APPENDIX 1

APPENDIX 1

MICROPALEONTOLOGICAL ANALYSIS

FORAMINIFERAL ANALYSIS, LEATHERJACKET-1
GIPPSLAND BASIN

by

M.J. HANNAH

ESSO AUSTRALIA LTD.
PALAEONTOLOGY REPORT 14/1986 APRIL 1986

2218L

INTRODUCTION

The washed residues of seven samples from near the Top of the Latrobe Group in Leatherjacket-1 have been examined and their foraminiferal content noted.

Only two samples (from 742.1m and 740.3m) yielded foraminifera, both are assigned to the Early Miocene.

LITHOLOGY

A brief lithological description of each of the washed residues is given in the Data Summary table. The top of the Latrobe group occurs between sidewall core 28 at 745.5 and sidewall core 29 at 742.1m. The boundary is marked by a change from a greensand dominated by pelletal glauconite to a carbonate dominated residue.

Sidewall core 28 at 745.5m is the only true greensand examined, although traces of glauconite have been found in samples from below this level.

BIOSTRATIGRAPHY

Zone H1 - Early Miocene
742.1 to 740.3 m

Foraminiferal assemblages from both samples assigned to this zone contain Globigerina woodi connecta without Globigerinoides trilobus. This is sufficient for the zonal assignment.

Assemblages recovered were of moderate diversity and included Globorotalia miozea, Globigeria falconensis and Globigerina venezuelana.

Sidewall core 29 at 742.1m also contained Globigerina brevis which is considered to be restricted to Zone K, indicating a significant amount of reworking.

2218L/2

MICROFOSSIL

DEPTH (m)	SWC NO.	YIELD	PRESERVATION	ZONE	AGE	LITHOLOGY*
759.8	21	Barren	-	-	Indeterminate	fine quartz sand
757.4	22	Barren	-	-	Indeterminate	fine quartz sand
752.4	25	Barren	-	-	Indeterminate	fine quartz sand, glauconitic, micaceous
747.3	27	Barren	-	-	Indeterminate	fine, ferruginous quartz sand, glauconitic, slightly micaceous.
745.5	28	Barren	-	-	Indeterminate	Greensand, dominated by pelletal glauconite, some fine quartz grains and pyrite.

MICROFOSSIL

DEPTH (m)	SWC NO.	YIELD	PRESERVATION	ZONE	AGE	LITHOLOGY*
742.1	29	Low	Fair	H1	Early Miocene	Recrystalized carbonate
740.3	30	Moderate	Fair	H1	Early Miocene	Recrystalized carbonate

Summary diagram - Leatherjacket-1

Lithologies from washed residues.

2218L

PE906163

This is an enclosure indicator page.
The enclosure PE906163 is enclosed within the container PE906161 at this location in this document.

The enclosure PE906163 has the following characteristics:

ITEM_BARCODE = PE906163
CONTAINER_BARCODE = PE906161
NAME = Palynological Chart
BASIN = GIPPSLAND
PERMIT = VIC/P19
TYPE = WELL
SUBTYPE = DIAGRAM
DESCRIPTION = Palynological Chart for Leatherjacket-1
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 29/04/1987
W_NO = W928
WELL_NAME = LEATHERJACKET-1
CONTRACTOR =
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 2

APPENDIX 2

PALYNOLOGICAL ANALYSIS

APPENDIX-2

PALYNOLOGICAL ANALYSIS OF LEATHERJACKET-1, GIPPSLAND BASIN

by

M.K. Macphail
and
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Esso Australia Ltd
Palaeontology Report 1986/17

August, 1986

2311L

INTERPRETATIVE DATA SECTION

INTRODUCTION

Twenty-nine sidewall core samples were processed and examined for spore-pollen and dinoflagellates, however, only 16 samples contained datable assemblages. Recovered palynomorph yield was noticably variable from very low to high. Preservation, likewise variable, was generally fair to good.

Lithological units and palynological zones from the base of the Lakes Entrance Formation to T.D. are summarised below. Interpretative data with zone identifications and confidence ratings are recorded in Table-1 and basic data on residue yield, preservation and diversity are recorded in Table-3. The occurrence of spore-pollen and dinoflagellate species are tabulated on the accompanying range chart. Counts of key species or species groups from selected samples are given in Table-4. Specific anomalous and unusual occurrence of palynomorphs taxa in Leatherjacket-1 are given in Table-2.

SUMMARY TABLE

LEATHERJACKET-1

AGE	UNIT	SPORE-POLLEN/KEY MICROPLANKTON ZONE	DEPTH (mKB)
Early Miocene	Lakes Entrance Fm.	*P. tuberculatus*	742.1
	log break at 745.0m		
Middle Eocene	Gurnard Fm.	Lower *N. asperus*	750.7
Middle Eocene		Lower *N. asperus*/*T. pandus*	752.4-754.0
Early Eocene		*P. asperopolus*	755.6
Paleocene		Upper *L. balmei*?	757.4
	log break at 758.0m		
Paleocene	Latrobe Group coarse clastics	Upper *L. balmei*/*A. homomorphum*	759.8
Paleocene		Lower *L. balmei*/*A. homomorphum*	775.9
Paleocene		Lower *L. balmei*/*T. evittii*	800.0-809.9
	log break at 811.0m		
Maastrichtian	Latrobe Group coarse clastics	Barren interval	
	log break at 825.0m		
Coniacian/ Turonian	Latrobe Group coarse clastics	*P. mawsonii*	838.8-849.0
	log break at 857.0m		
Early Cretacous	Strzelecki Group	*C. hughesii*	910.7
	T.D. 951.0m		

GEOLOGICAL COMMENTS

1. The assignment of the interval of lithic sandstones and conglomerates (as per sidewall core descriptions) between 857m to 951m (T.D.) to the Strzelecki Group is supported by the Early Cretaceous (probably Aptian) age obtained for the sidewall core at 910.7m. This relatively old age suggests significant erosion at the top of the Strzelecki Group at Leatherjacket-1.

2. The Late Cretaceous interval in Leatherjacket-1 between 811-857m is represented by quartz sandstones and conglomerates and have proved to be barren except for two samples near the base of the sequence which are assigned to the P. mawsonii Zone. The Coniacian-Turonian age of these samples, the coarse lithologies and thin Late Cretaceous sequence, suggest the presence of one or more unconformities in the lower part of the Latrobe Group. The log break at 825.0m, on the basis of the sequences in adjacent wells, probably represents an unconformity between late Maastrichtian (Upper T. longus Zone) and Coniacian-Turonian (P. mawsonii Zone).

3. The identification of the early Danian Trithyrodinium evittii dinoflagellate Zone between 800m to 809.9m suggests that the log break at 811.0m represents the downlap surfaces at the Cretaceous/Tertiary boundary.

4. The Gurnard Formation is picked on sidewall lithologies as the interval 745m to 758m. The lowest sidewall core from this unit, a pebbly glauconitic sandstone is considered to contain an entirely reworked Upper L. balmei Zone assemblage. The presence of the acritarch Tritonites pandus at 752.4m and 754.0m suggests the bulk of the Gurnard Formation is early Middle Eocene in age. The unconformity identified 758.0m is considered to correlate with the sea level drop at which the Marlin Channel was cut. The P. asperopolus Zone sample in Leatherjacket-1 at 755.6m is thus younger than samples from this zone in the Flounder Formation.

5. On available age dating the top of Latrobe at 745m represents a significant unconformity. The maximum time gap is Early Miocene above, and early Middle Eocene below the unconformity.

BIOSTRATIGRAPHY

The zone boundaries have been established for Tertiary zones using the criteria of Stover & Partridge (1973), and subsequent proprietary revisions, and follows Helby, Morgan & Partridge (in press) for the Cretaceous zones.

Cyclosporites hughesii Zone: 910.7 metres

The single sample assigned to this zone contains a low diversity but characteristic Early Cretaceous spore-pollen assemblage with frequent specimens of the nominated species. The deepest sidewall core at 933.5m also contains Early Cretaceous spore-pollen and may belong to this zone. Unfortunately its exact age is obscured by downhole contamination and common reworked Permo/Triassic spore-pollen.

Phyllocladidites mawsonii Zone: 838.8 - 849.0 metres.

This zone is a new name proposed by Helby, Morgan & Partridge (in press) for the Clavifera triplex Zone of Dettmann & Playford (1969). The zone has been renamed and the original definition modified because the spore C. triplex has not proved to be a reliable indicator species. The zone is defined, and also recognised in this well, by the oldest occurrence of P. mawsonii. The top of the zone is defined by the oldest occurrences of Tricolporites apoxyexinus Partridge (in press) which does not occur in either sample in Leatherjacket-1. Important accessory species for the P. mawsonii Zone are the occurrences of Cyatheacidites tectifera in both samples and Appendicisporites distocarinatus at 849.0m only.

Lower Lygistepollenites balmei Zone: 775.9 - 809.9 metres.

The bottom of the zone is represented by three good samples with moderate diversity of both spore-pollen and dinoflagellates. The spore-pollen assemblages are consistent with a basal Lower L. balmei Zone assignment. This is strongly supported by the frequent occurrence of the dinoflagellate Trithyrodinium evittii which is diagnostic of the early Danian T. evittii Zone of Helby, Morgan & Partridge (in press). Although dinoflagellate diversity is recorded as moderate (last column on Table-3) only those specimens confidently identified to species level are recorded on the range chart. The pollen species Proteacidites otwayensis, Pseudowinteropollis wahooensis and Triporopollenites sectilis which are recorded from 806.0m and 809.9m are generally more typical of the T. longus Zone. Their occurrence in the lowest two samples in this zone is considered as either reworking or slight extensions of their ranges. The shallowest sample from the Lower L. balmei-

Zone at 775.9m is assigned on the absence of any spore-pollen diagnostic of the Upper subdivision. Polycolpites langstonii is the most diagnostic species in this sample. The Apectodinium homomorphum Zone is also indentified from this sample on the basis of the frequent occurrence of the nominate species.

Lygistepollenites balmei Zone (undifferentiated): 761.0-770.5 metres.

Between the Upper and Lower subdivisions are one barren and two low yield samples, which although confidently assigned to the broader L. balmei Zone, cannot be assigned to either subdivision because of the lack of key species.

Upper Lygistepollenite balmei Zone: ?757.4-759.8 metres

The lower sample at 759.8m is confidently assigned to the Upper subdivision of the L. balmei Zone on the presence of Cyathidites gigantis/splendens species complex, Malvacipollis diversus, M. subtilis, Proteacidites adenanthoides and P. annularis. The upper sample at 757.4m contains a good L. balmei Zone assemblage and clearly needs to be assigned to the Upper subdivision on superposition. The lithology of the sidewall core sample however is characteristic of the Gurnard Formation and atypical of the L. balmei Zone sequence; and this has influenced the log pick for the base of the Gurnard Formation. The L. balmei Zone identified from the base of the Gurnard Formation is therefore interpreted as entirely reworked.

Proteacidites asperopolus Zone: 755.6 metres.

The single sample near the base of the Gurnard Formation is assigned to the P. asperopolus Zone on the nearly equal abundance of Haloragacidites harrisii and Nothofagidites spp. and the significant percentages for Conbaculties apiculatus (2.2%) and Myrtaceidites tenuis (1.3%). See Table-4 for details. Proteacidites pachypolus and P. asperopolus are both present but their composite abundance is only 0.8%, which is not significant. Common Deflandrea flounderensis is also supportive of this zone assignment, although the species is not restricted to this zone.

Lower Nothofagidites asperus Zone: 750.7 - 754.0 metres.

The base of the Lower N. asperus Zone within the Gurnard Formation in Leatherjacket-1 is taken at both the increase of Nothofagidites spp. and its increase in abundance relative to Haloragacidites harrisii. The samples at 752.4m and 754.0m meet these criteria based on the pollen counts presented in Table-4. Supporting the gross compositional changes are the oldest occurrences of Gothanipollis bassensis, Nothofagidites asperus, N. falcatus and Tricolpites simatus in the deepest two samples. In conflict with these Lower N. asperus Zone indicators is the occurrence of Myrtaceidites tenuis at both 752.4m and 754.0m. M. tenuis generally does not overlap with the previous four species. The slightly younger extension of its range in Leatherjacket-1 is interpreted as indicating some reworking (probably caused by burrowing) within the Gurnard Formation. The associated microplankton in the lower two samples are of moderate concentration and diversity. The most diagnostic species is the undescribed acritarch given the manuscript name Tritonites pandus. This small horse-shoe shaped arcritarch appears to be diagnostic of the oldest sediments overlying the unconformity linked with the erosion of the Marlin Channel, and is earliest Middle Eocene in age. A new microplankton zone is informally proposed characterized by this acritarch and it lies in the unzoned interval in the Middle Eocene (see Partridge 1976, fig. 2).

Palynomorph yield and zone confidence is significantly poorer in he highest sample assigned to the Lower N. asperus Zone. The highest two samples in the Gurnard Formation are even poorer, with the lower barren (747.3m) and the higher (745.5m) being contaminated with P. tuberculatus Zone fossils. A progressive decline in palynomorph yields and reliability of zone determinations upwards through the Gurnard Formation is characteristic of many wells in the basin. It is interpreted as reflecting a progressive decline in sedimentation rate, and hence the ability to preserve palynomorphs.

Proteacides tuberculatus Zone: 742.1 metres.

Represented by a poor assemblage, but containing the key spore Cyatheacidites annulatus. The palynomorph assemblage is consistent with the Miocene age reported from foraminifera (Hannah, 1986).

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TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

LEATHERJACKET-1

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 30	740.3	-	-	-	-	Barren
SWC 29	742.1	P. tuberculatus	-	Early Miocene	2	Zone H1 Forams, reworked Zone K forams
SWC 28	745.5	Indeterminate	-	Late Eocene?	2	N. falcatus; v. abundant pelletal glauconite, ?caved D. mammilatus and P. pontus
SWC 27	747.3	-	-	-	-	Barren
SWC 26	750.7	Lower N. asperus	-	Middle Eocene	2	N. falcatus, D. flounderensis
SWC 25	752.4	Lower N. asperus	T. pandus	Middle Eocene	0	P. asperopolus, T. simatus T. pandus, abund. Nothofagidites
SWC 24	754.0	Lower N. asperus	T. pandus → D. heterophlyca W. echinosuturata	Middle Eocene	0	T. pandus, Nothofagidites H. harrisii.
SWC 23	755.6	P. asperopolus		Early Eocene	2	M. tenuis, P. plemmelus S. morayensis
SWC 22	757.4	Upper L. balmei	-	Paleocene	2	L. balmei, A. obscurus, G. rudata
SWC 21	759.8	Upper L. balmei	A. homormorphum	Paleocene	1	P. annularis, P. langstonii, M. diversus M. subtilis, abund. L. balmei
SWC 20	761.0	L. balmei	-	Paleocene		L. balmei
SWC 19	765.0	-	-	-	-	Barren
SWC 18	770.5	L. balmei	-	Paleocene	-	L. balmei, A. obscurus
SWC 17	775.9	Lower L. balmei	A. homomorphum	Paleocene	2	H. harrisii, P. langstonii, frequent. P. reticulosaccatus, common L. balmei.

TABLE 1: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

LEATHERJACKET-1

SAMPLE NO.	DEPTH (m)	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC 16	800.0	Lower L. balmei	T. evittii	Paleocene	0	Frequent L. florinii, T. evittii freq. T. gillii D. speciosus.
SWC 15	806.0	Lower L. balmei	T. evittii	Paleocene	0	L. balmei, T. gillii, T. verrucosus, freq. T. evittii, D. speciosus, P. golzowense.
SWC 14	809.9	Lower L. balmei	T. evittii	Paleocene	0	L. balmei, T. verrucosus, freq. T. gillii & T. evittii.
SWC 13	813.1	-	-	-	-	Barren
SWC 12	818.6	-	-	-	-	Barren
SWC 11	820.7	-	-	-	-	Barren
SWC 10	827.8	-	-	-	-	Barren
SWC 9	834.2	-	-	-	-	Barren
SWC 8	838.8	P. mawsonii	-	Turonian - Coniacian	1	P. mawsonii, P. paleogenicus.
SWC 7	849.0	P. mawsonii	-	Turonian - Coniacian	1	P. mawsonii, C. tectifera.
SWC 5	863.8	-	-	-	-	Barren
SWC 4	884.8	-	-	-	-	Barren
SWC 3	898.5	Indet.	-	Cretaceous	-	Early Cretaceous spp. caved Late Cretaceous spp.
SWC 2	910.7	C. hughesii	-	Early Cretaceous	2	C. hughesii,
SWC 1	933.5	Indet.	-	-	-	Long-ranging spores and Permo-Triassic gymnosperms.

PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND | ELEVATION: KB: +21.0m GL: 106.0m (MSL)

WELL NAME: LEATHERJACKET-1 | TOTAL DEPTH: 951m

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
	P. tuberculatus						742.1	2			
PALEOGENE	Upper *N. asperus*										
	Mid *N. asperus*										
	Lower *N. asperus*	750.7	2	752.4	0		754.0	0			
	P. asperopolus	755.6	2				755.6	2			
	Upper *M. diversus*										
	Mid *M. diversus*										
	Lower *M. diversus*										
	Upper *L. balmei*	757.4	2	759.8	1		759.8	1			
	Lower *L. balmei*	775.9	2	800.0	0		809.9	0			
LATE CRETACEOUS	Upper *T. longus*										
	Lower *T. longus*										
	T. lilliei										
	N. senectus										
	T. apoxyexinus										
	P. mawsonii	838.8	1				849.0	1			
	A. distocarinatus										
EARLY CRET.	*P. pannosus*										
	C. paradoxa										
	C. striatus										
	C. hughesi	910.7	2				910.7	2			
	F. wonthaggiensis										
	C. australiensis										

COMMENTS: All depths in metres. Dinoflagellate Zones: Tritonites pandus 752.4-754.0m A. homomorphum 759.8-775.9m T. evittii 800.0-809.9m

CONFIDENCE RATING:
- O: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
- 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.
- 2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.
- 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: M.K. Macphail/A.D. Partridge DATE: June 1986

DATA REVISED BY: DATE:

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF PALYNOMORPH TAXA IN LEATHERJACKET-1

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 28	745.5	Indeterminate	Phyllocladidites paleogenicus	Uncommon sp.
SWC 26	750.7	Lower N. asperus	Phyllocladidites paleogenicus	Uncommon sp.
SWC 26	750.7	Lower N. asperus	Milfordia homeopunctatus	Rare sp.
SWC 26	750.7	Lower N. asperus	Banksieaeidites lunatus	More typical of Paleocene floras
SWC 26	750.7	Lower N. asperus	Basopollis otwayensis	More typical of Paleocene floras
SWC 26	750.7	Lower N. asperus	Curpressaceae - type pollen	Modern taxon
SWC 25	752.4	Lower N. asperus/T. pandus	Concolpites leptos	Rare sp.
SWC 25	752.4	Lower N. asperus/T. pandus	Gemmatricolporites divaricatus	Rare sp.
SWC 25	752.4	Lower N. asperus/T. pandus	Kuylisporites waterbolkii	Rare in this zone.
SWC 25	752.4	Lower N. asperus/T. pandus	Phyllocladidites palaeogenicus	See above
SWC 25	752.4	Lower N. asperus/T. pandus	Schizocolpus rarus	Rare sp.
SWC 25	752.4	Lower N. asperus/T. pandus	Gothanipollis bassensis	Rare sp.
SWC 25	752.4	Lower N. asperus/T. pandus	Ornamentifera apiculatus	Rare ms. sp., assoc. with C. apiculatus
SWC 25	752.4	Lower N. asperus/T. pandus	Matonisporites oramentalis	Rare in this zone
SWC 25	752.4	Lower N. asperus/T. pandus	Aglaoreidia qualumis	Not. prev. recorded below upper Middle N. asperus Zone.
SWC 25	752.4	Lower N. asperus/T. pandus	Myrtaceidites tenuis	V. rare occurrences above. P. asperopolus Zone,
SWC 25	752.4	Lower N. asperus/T. pandus	Basopollis mutabilis	Top of range of species?
SWC 25	752.4	Lower N. asperus/T. pandus	Milfordia homeopunctatus	Rare sp.
SWC 25	752.4	Lower N. asperus/T. pandus	Triporopollenites spinosus	Rare sp.
SWC 25	752.4	Lower N. asperus/T. pandus	Deflandrea pachyceros	Rare dino, assoc. with T. pandus, S. morayensis, D. flounderensis.

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF PALYNOMORPH TAXA IN LEATHERJACKET-1

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 24	754.0	Lower N. asperus/T. pandus	Myrtaceidites tenuis	As above; assoc. with T. simatus, common Nothofagidites.
SWC 24	754.0	Lower N. asperus/T. pandus	Anacolosidites rotundus	Rare sp.
SWC 24	754.0	Lower N. asperus/T. pandus	Beaupreaidites trigonalis	Rare sp.
SWC 24	754.0	Lower N. asperus/T. pandus	Cunoniaceae 2-p, 3-p	Modern taxa.
SWC 24	754.0	Lower N. asperus/T. pandus	Gothanipollis bassensis	Rare sp.
SWC 24	754.0	Lower N. asperus/T. pandus	Milfordia homeopunctatus	Rare sp.
SWC 24	754.0	Lower N. asperus/T. pandus	Myrtaceidites parvus/mesonesus	Abundant in sample.
SWC 24	754.0	Lower N. asperus/T. pandus	Phyllocladidites paleogenicus	Frequent; assoc. with Parvisaccites catastus
SWC 24	754.0	Lower N. asperus/T. pandus	Proteacidites ornatus	Not previously recorded in this zone.
SWC 24	754.0	Lower N. asperus/T. pandus	Tricolpites reticulatus Cookson	Rare sp.; assoc. P. asperopolus, T. incisus, S. rotundus, freq. S. cainozoicus.
SWC 24	754.0	Lower N. asperus/T. pandus	Deflandrea flounderensis	Freq., assoc. with T. pandus. S. morayensis.
SWC 24	754.0	Lower N. asperus/T. pandus	D. pachyceros	Freq.,
SWC 24	754.0	Lower N. asperus/T. pandus	Dicotetradites clavatus	Planer tetrad (formerly Simplicepollis meridianus)
SWC 24	754.0	Lower N. asperus/T. pandus	Aglaoreidia qualumis	Not prev. recorded below Middle N. asperus Zone.
SWC 24	754.0	Lower N. asperus/T. pandus	Matonisporites ornamentalis	Rare in this zone.
SWC 24	754.0	Lower N. asperus/T. pandus	Ornamentifera apiculatus ms.	Rare form of C. apiculatus?

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF PALYNOMORPH TAXA IN LEATHERJACKET-1

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 23	755.6	P. asperopolus	Clavatipollenites glarius	V. rare sp.
SWC 23	755.6	P. asperopolus	Concolpites leptos	Rare sp.
SWC 23	755.6	P. asperopolus	Cunoniaceae 2-p	Modern taxon.
SWC 23	755.6	P. asperopolus	Umbelliferae	Modern taxon
SWC 23	755.6	P. asperopolus	Senoniasphaera morayensis	Uncommon dino?
SWC 21	759.8	Upper L. balmei/A. homormophum	Bysmapollis emaciatus	Not previously recorded in this zone.
SWC 21	759.8	Upper L. balmei/A. homormophum	Dicotetradites clavatus	Planar testrad (formerly Simplicepollis meridianus)
SWC 17	775.9	Lower L. balmei/A. homormophum	Dicotetradites clavatus	Planar testrad (formerly Simplicepollis meridianus)
SWC 17	775.9	Lower L. balmei/A. homormophum	Amosopollis cruciformis	Rare sp.
SWC 17	775.9	Lower L. balmei/A. homormophum	Nothofagidites asperus	V. rare below Upper L. balmei Zone
SWC 17	775.9	Lower L. balmei/A. homormophum	Phyllocladidites reticulosaccatus	Freq. in sample.
SWC 16	800.0	Lower L. balmei/T. evittii	Amosopollis cruciformis	Rare sp. also at 806.0m
SWC 16	800.0	Lower L. balmei/T. evittii	Cunoniaceae 3-p	Modern taxon.
SWC 16	800.0	Lower L. balmei/T. evittii	Palambages	Colonial algal. cyst.
SWC 15	806.0	Lower L. balmei/T. evittii	Proteacidites otwayensis	Typically Late K. species
SWC 15	806.0	Lower L. balmei/T. evittii	Tricolpites vergilius	Typically Late K. species
SWC 15	806.0	Lower L. balmei/T. evittii	Geophyrapollenites wahooensis	Typically Late K. species

TABLE 2

ANOMALOUS AND UNUSUAL OCCURRENCES OF PALYNOMORPH TAXA IN LEATHERJACKET-1

SAMPLE NO.	DEPTH(m)	ZONE	TAXON	COMMENTS
SWC 14	809.9	Lower *L. balmei/T. evittii*	*Tricolporites balmei*	manuscript sp.
SWC 14	809.9	Lower *L. balmei/T. evittii*	*Palambages*	as for SWC 16
SWC 14	809.9	Lower *L. balmei/T. evittii*	*Apectodinium homomorphum*	*In situ?*
SWC 14	809.9	Lower *L. balmei/T. evittii*	*Eisenackia* sp. nov.	Assoc. with *D. speciosus*
SWC 8	838.8	*P. mawsonii*	*Phyllocladidites palaeogenicus*	Bottom of range?
SWC 8	838.8	*P. mawsonii*	*Cyatheacidites tectifera*	Rare sp.
SWC 8	838.8	*P. mawsonii*	*Cyclosporites hughesii*	Early K. sp.
SWC 7	849.0	*P. mawsonii*	*Appendicisporites distocarinatus*	Rare sp. assoc. with *C. hughesii*
SWC 7	849.0	*P. mawsonii*	Permo-Triassic spp. including striate bisaccates and *Aratisporites* sp.	
SWC 2	910.7	*C. hughesii*	*Lygistepollenites balmei*	Caved?
SWC 2	910.7	*C. hughesii*	Permo-Triassic striate bisaccates	
SWC 1	933.5	Indeterminate	Frequent Permo-Triassic spp.	

BASIC DATA SECTION

TABLE-3: SUMMARY OF BASIC DATA

TABLE-4: COUNTS OF KEY ELEMENTS OF POLLEN SUM

PALYNOMORPH DISTRIBUTION CHART

TABLE 3: SUMMARY OF BASIC PALYNOLOGICAL DATA FOR LEATHERJACKET

SAMPLE TYPE	DEPTH (m)	LITHOLOGY (from SWC desc.)	PRESERVATION	SPORE-POLLEN YIELD	DINOFLAGELLATES YIELD	NO. SPECIES
SWC 30	740.3	Calcilutite	NA	Barren	-	
SWC 29	742.1	Calcilutite	Fair	Very low	Low	5+
SWC 28	745.5	Glauc. Siltst.	Good	Very low	Very low	3+
SWC 27	747.3	Pebbly. sst.	NA	Barren	-	
SWC 26	750.7	Argil. sst.	Good	Moderate	Low	
SWC 25	752.4	Glauc. sst.	Fair-good	High	Moderate	6+
SWC 24	754.0	Glauc. sst.	Good	High	Moderate	7+
SWC 23	755.6	Glauc. slst.	Fair-good	High	Moderate	6+
SWC 22	757.4	Glauc. pebbly sst.	Fair	Moderate	Very low	1+
SWC 21	759.8	Carb. sst.	Good	High	High	2
SWC 20	761.0	Argil. sst.	Good	Low	NR	
SWC 19	765.0	Argil. sst.	NA	Barren	-	
SWC 18	770.5	Argil sst.	Poor-fair	Very low	NR	
SWC 17	775.9	Lam. carb. sst.	Good	High	Low	1
SWC 16	800.0	Argil. sst.	Very good	Moderate	Low	9+
SWC 15	806.0	Clean sst.	Good	Moderate	Low	5+
SWC 14	809.9	Silty sst.	Fair-good	Moderate	Low	5
SWC 13	813.1	Pebbly sst.	NA	Barren	-	
SWC 12	818.6	Qtz. sst.	NA	Barren	-	
SWC 11	820.7	Qtzose. sst.	NA	Barren	-	
SWC 10	827.8	Conglomerate	NA	Barren	-	
SWC 9	834.2	Conglomerate	NA	Barren	-	
SWC 8	838.8	Qtz. sst.	Fair-good	High	NR	
SWC 7	849.0	Qtz. sst.	Fair-good	Moderate	NR	
SWC 5	863.8	Pebbly lith. sst.	NA	Barren	-	
SWC 4	884.8	Pebbly lith. sst.	NA	Barren	-	
SWC 3	898.5	Qtzose. sst.	Poor	Low	NR	
SWC 2	910.7	Conglomerate	Fair	Low	NR	
SWC 1	933.5	Conglomerate	Poor	Low	NR	

NA = not applicable NR = none recorded

TABLE 4: COUNTS OF KEY ELEMENTS OF POLLEN SUM FROM SELECTED SAMPLES IN LEATHERJACKET-1

CATEGORIES	SAMPLES		
	752.4 m	754.0 m	755.6 m
% Dinoflagellates relative to spore-pollen	2.7	2.9	8.2
% Fungii relative to spore pollen	5.3	11.3	7.8
Total Spores %	9	4	23
Total gymnosperms %	12	11	15
Total angiosperms %	79	85	61
Cyathidites spp. %	4.5	1.5	7.6
Conbaculites apiculatus %	X	X	2.2
Laevigatosporites spp. %	1.4	1.9	5.4
Podocarpidites spp. %	4.5	3.0	3.6
Lygistepollenites florinii %	1.0	3.7	3.6
Phyllocladidites mawsonii %	4.2	1.9	2.2
Dilwynites spp. & Araucariacites australis %	1.4	X	5.3
H. harrisii (= Casuarina pollen) %	5.6	8.2	9.0
Nothofagidites spp. %	12.9	17.2	11.2
Malvacipollis spp. %	1.4	1.9	1.8
Myrtaceidites spp. %	14.7	13.4	4.9
M. tenuis %	X	X	1.3
Proteacidites spp. %	13.6	15.3	15.2
Tricolporites spp. %	17.1	25.0	10.7
TOTAL COUNT (no. specimens):	310	310	262

X = less than 1%

APPENDIX 3

APPENDIX 3

PE603538

This is an enclosure indicator page.
The enclosure PE603538 is enclosed within the container PE906165 at this location in this document.

The enclosure PE603538 has the following characteristics:

ITEM_BARCODE =	PE603538
CONTAINER_BARCODE =	PE906165
NAME =	Log Analysis
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Log Analysis for Leatherjacket-1 containing gamma ray, shale volume, porosity and SW.
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	29/04/1987
W_NO =	W928
WELL_NAME =	LEATHERJACKET-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 3

QUANTITATIVE LOG ANALYSIS

LEATHERJACKET-1

QUANTITATIVE LOG ANALYSIS

Interval: 744 - 937m MDKB

Analyst : J.B. Kulla

Date : March, 1986

LEATHERJACKET-1 QUANTITATIVE LOG ANALYSIS

SUMMARY

Leatherjacket-1 wireline logs have been analysed for effective water saturation (SWE) and effective porosity (PHIE) over the interval 744m to 937m MDKB. Two oil zones were encountered (Table 1), the first from 763.50 to the oil-water contact at 789.00m and the second from 811.25 to the oil-water contact at 819.00m.

The first oil sand at 763.50 has 25.5m of gross section and 18.25m of net with an average PHIE of 30% and an average SWE of 46%. The RFT sampled at 788.5m retrieved .14 cfg, .5 litres oil (26.5 API) and 8 litres water. A second RFT in the same oil zone at 765.00m retrieved 7.7 cfg, 26 litres of oil and 17 litres of water.

The second oil sand at 811.25 has 13.00m of gross section and 6.50m of net with an average PHIE of 21% and an average SWE of 45%. The RFT sampled at 812.8m retrieved .31 cfg, .25 litres of oil and 12 litres of water.

SCHLUMBERGER WIRELINE LOG QUALITY

Schlumberger went into the hole with the supercombination DLL-MSFL-LDL-CNL-SDT-G (deep laterolog, micro-spherically focused laterolog, litho-density, compensated neutron, digital sonic and gamma ray). Usually we run a supercombination of DLL-MSFL-LDL-CNL-GR; therefore the addition to this tool string was the digital sonic. The combination has been run elsewhere, but this was the first time in Australia. Unfortunately, the DLL failed - later determined to be from a burnt rotary switch in the DLL surface module. A good DLL was finally obtained with a different tool brought over from the Flounder Platform.

Log quality was affected by poor borehole conditions, especially in the oil zones. The LDL-CNL was most affected as expected and the sonic was normalised to the density in good hole in order to use as a porosity log in the oil zones as necessary.

LOG ANALYSIS

The following well log curves were used in the log analysis:

1. Laterolog Deep (LLD)
2. Laterolog Shallow (LLS)
3. Gamma Ray
4. Caliper
5. Density Curve (RHOB) from the Lithology Density Log (LDL) and
6. Neutron porosity (NPHI) from the Compensated Neutron Log (CNL)
7. Micro spherically focused log (MSFL)
8. Long-Spaced Digital Sonic (SDT)

PHIE and SWE are calculated using reiterative techniques for (a) hydrocarbon corrections to the porosity logs, (b) shale volume determinations using density-neutron crossplot porosities, and (c) convergence on a preselected grain density window by shale volume adjustment. The Dual Water model is used to correct for clay-bound water effects in the calculation of water saturation.

ANALYSIS PARAMETERS

a	1.00
m	2.00
n	2.00
*RHOB (Shale) gm/cc	2.35
*NPHI (Shale)	0.39
Rmf @ 21.5°C ohm.m	0.246
Grain density (window) gm/cc	2.65 - 2.67
*RSH ohm.m	3.00
RHOH gm/cc	1.00

* Read from well logs.

APPARENT FORMATION SALINITIES

Interval (m)	Salinity (ppm NaCl equivalent)
744.00 - 763.50	14,000
763.50 - 789.00	20,000
789.00 - 810.75	11,000
810.75 - 819.25	20,000
819.25 - 826.00	9,000
826.00 - 856.25	11,000
856.25 - 893.00	15,000
893.00 - 937.00	17,000

SHALE VOLUME

An initial estimate of VSH is calculated from the density neutron separation:

$$VSH = \frac{NPHI - \frac{2.65 - RHOB}{1.65}}{NPHISH - \frac{2.65 - RHOBSH}{1.65}} \qquad - 1a$$

In zones with bad borehole, a fake density log was made using the sonic log. The Wyllie Time Average Equation and the Hunt-Raymer Equation could not be used with the sonic because of the high degree of undercompaction. A relationship was established between the sonic and the density in good hole and extrapolated for the poor borehole:

$$dT = - 316.2\ RHOB + 1074.73 \qquad \text{(figure 1)} \qquad - 1b$$

TOTAL POROSITY

Total porosity was initially calculated from the density-neutron log using the following algorithms:

$$h = 2.71 - RHOB + NPHI\ (RHOF - 2.71) \qquad -2$$

if h is greater than 0, then

$$\text{apparent matrix density, } RHOMa = 2.71 - h/2 \qquad -3$$

if h is less than 0, then

$$\text{apparent matrix density, } RHOMa = 2.71 - 0.64h \qquad -4$$

$$\text{Total porosity: } PHIT = \frac{RHOMa - RHOB}{RHOMa - RHOF} \qquad -5$$

where RHOB = bulk density in gms/cc
NPHI = environ. corrected neutron porosity in limestone porosity units.
RHOF = fluid density (1.0 gms.cc)

Where the density-neutron log could not be used reliably, the sonic log was used to calculate total porosity.The sonic was used to make a 'pseudo' RHOB.

FREE WATER SALINITY

Apparent free water salinities are calculated using the following relationships:

$$Rw = \frac{Rt * PHIT^{m}}{a} \qquad -6$$

$$\text{Salinity (ppm)} = \left(\frac{300{,}000}{Rw\ (Ti + 7) - 1}\right)^{1.05} \qquad -7$$

where Ti = formation temperature in °F.

BOUND WATER RESISTIVITIES (RWB) AND SATURATION OF BOUND WATER (SWB)

Rwb and Swb were calculated using the following relationships:

$$Rwb = \frac{RSH * PHISH^{m}}{a} \qquad -8$$

where PHISH = total porosity in shale from density-neutron crossplots.
RSH = Rt in shales.

$$Swb = \frac{VSH * PHISH}{PHIT} \qquad -9$$

WATER SATURATIONS

Water saturations were determined from the Dual Water model using the following relationships:

$$\frac{1}{Rt} = SwT^{n} * \frac{PHIT^{m}}{aRw} + SwT^{(n-1)} \left[\frac{Swb * PHIT^{m}}{a}\left(\frac{1}{Rwb} - \frac{1}{Rw}\right)\right] \qquad -10$$

and

$$\frac{1}{Rxo} = SxoT^{n} * \frac{PHIT^{m}}{aRw} + SxoT^{(n-1)} \left[\frac{Swb * PHIT^{m}}{a}\left(\frac{1}{Rwb} - \frac{1}{Rmf}\right)\right] \qquad -11$$

where SwT = total saturation in the virgin formation
Rmf = resistivity of mud filtrate
n = saturation exponent

HYDROCARBON CORRECTIONS

No hydrocarbons corrections were applied due to the density of the hydrocarbon - approximately 1 gm/cc.

GRAIN DENSITY

Grain density (RHOG) was calculated from the hydrocarbon corrected density and neutron logs using the following relationships:

$$RHOBC = \frac{RHOBHC - VSH * RHOBSH}{1 - VSH} \qquad -12$$

$$NPHIC = \frac{PHINHC - VSH * NPHISH}{1 - VSH} \qquad -13$$

and equations 2, 3 and 4 are then used to compute RHOG.

The calculated grain density was then compared to the upper and lower limits of the grain densities and if it fell within the limits, effective porosity (PHIE) and effective saturation (Swe) were calculated as follows:

$$PHIE = PHIT - VSH * PHISH \qquad -14$$

$$Swe = 1 - \frac{PHIT}{PHIE} (1-SwT) \qquad -15$$

If the calculated grain density fell outside the limits, VSH was adjusted in appropriate increments and PHIT, SwT, SxoT and RHOG recalculated.

All zones with VSH greater than 60%, carbonaceous shales and coals, Swe was set to 1 and PHIE set to 0.

TABLE 1 - SUMMARY OF RESULTS

Interval (m)	Gross (m)	*Net (m)	Average Porosity	Average Water Saturation	Comments
763.50 - 789.00 (OWC)	25.50	18.25	.30 ± .06	.46 ± .09	Oil
789.00 - 809.00	20.00	19.50	.28 ± .04	.97	Water
811.25 - 819.00 (OWC)	7.75	6.50	.21 ± .06	.45 ± .09	Oil
819.00 - 824.50	5.25	2.75	.17 ± .04	.95	Water
836.75 - 848.00	11.25	7.75	.20 ± .05	.97	Water
857.50 - 865.75	8.25	1.25	.13 ± .02	.96	Water
868.50 - 874.00	5.50	2.25	.17 ± .06	1.00	Water
877.75 - 900.25	22.50	5.00	.19 ± .05	.97	Water
902.50 - 917.75	15.25	6.00	.17 ± .06	.97	Water
920.25 - 922.00	1.75	.50	.15 ± .02	1.01	Water
924.00 - 936.50	12.50	3.50	.18 ± .05	.97	Water

* Net porosity cutoff of 10%.

30271/69

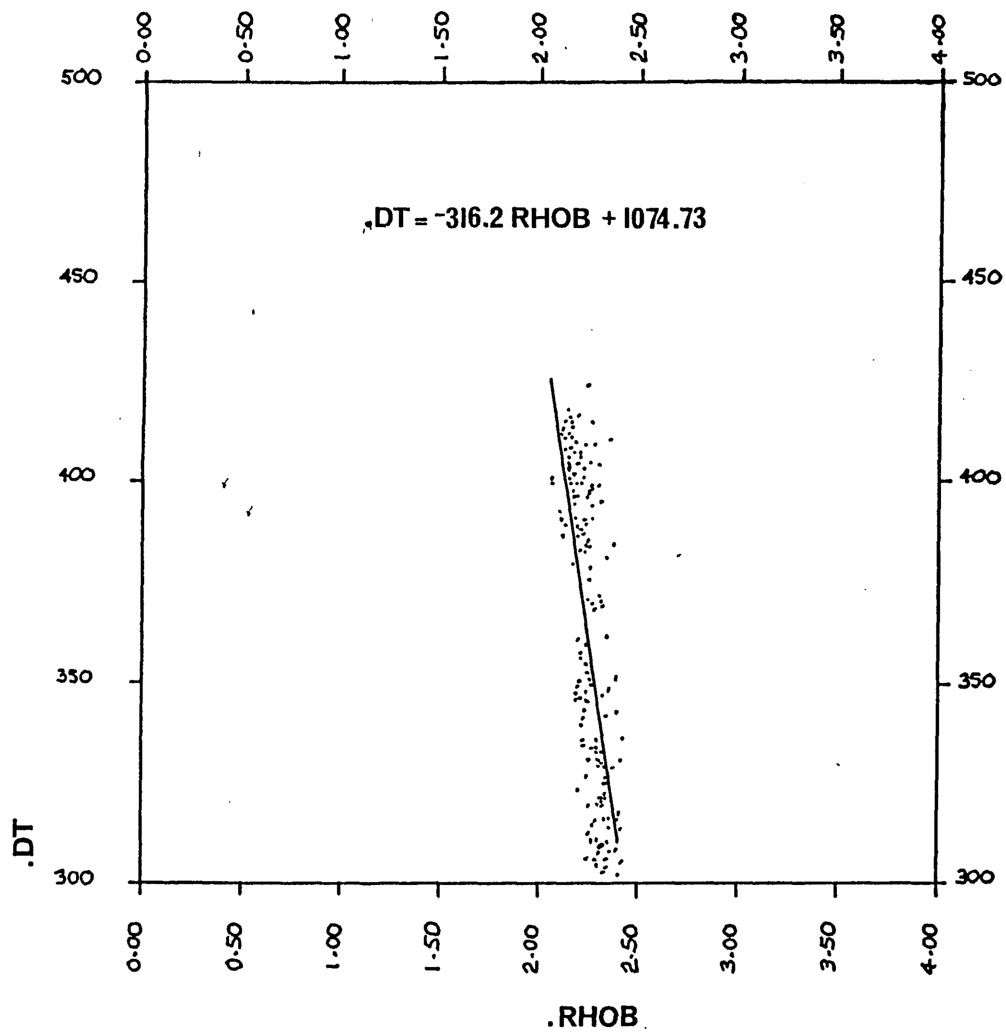


FIGURE One: XPLOT OF SONIC vs DENSITY

APPENDIX 4

APPENDIX 4

WIRELINE TEST REPORT

LEATHERJACKET-1 RFT SURVEYS

SUMMARY

RFT surveys were run in the Leatherjacket-1 well on February 28, 1986. As a result of the surveys, the following conclusions have been drawn:

1. The RFT data indicates oil water contacts consistent with the two log derived contacts.

2. Based on the PVT determined oil gradient of 1.22 psi/m, the pressure data indicates that the upper oil zone could possibly be two independent systems separated by a sealing shale or coal bed.

3. There has been a reduction of 20 psi in aquifer pressures at the Top of Latrobe compared with the average Gippsland Aquifer gradient. The pressure drawdown is due to production in neighbouring fields.

PROGRAM

A total of 46 seats were attempted during the RFT survey on Leatherjacket-1. 24 pretests were taken with a long-nosed probe and 19 pretests were taken with a Martineau probe. 23 seats were aborted due to seal failure and a further 13 seats were aborted because of tight formation.

Three samples were attempted with the first run aborted due to tight formation and the second run also unsuccessful because of plugging/seal failure. Although no segregated sample was taken in these runs, enough oil was recovered to confirm the presence of oil-bearing sands. A third run was made at 744m TVDSS where the segregated sample was preserved and is considered representative of oil from the upper zone.

Pretests were taken in the upper and lower oil and water zones although data gained was limited due to the large number of invalid tests.

Further details are available in the attached pretest and sampling data sheets.

INTERPRETATION

1. Aquifer Pressures

Two water gradient lines are interpreted in the tested section. The slopes of the water gradient lines were taken as 1.42 psi/m typical of the Gippsland Basin. The upper line extends from 768.0 to 790.3 mTVDSS and the lower line extends below 798.0 mTVDSS. There is a pressure difference of approximately 3 psi between the two lines, with the upper aquifer system being at a lower pressure, indicating a more direct link between the upper system and pressure drawdown due to production. A reduction of 20 psi in aquifer pressures in the upper system compared with the average initial Gippsland aquifer gradient was observed, showing the overall pressure drawdown that the area has been subjected to as a result of Gippsland production. It was not possible to accurately estimate the OWC's because sufficient reliable aquifer and reservoir pressure datapoints could not be obtained, although the OWC's calculated did not differ significantly from the two log-interpreted OWC's considering the uncertainties in the calculated values.

.../2

2. Upper Oil Zone

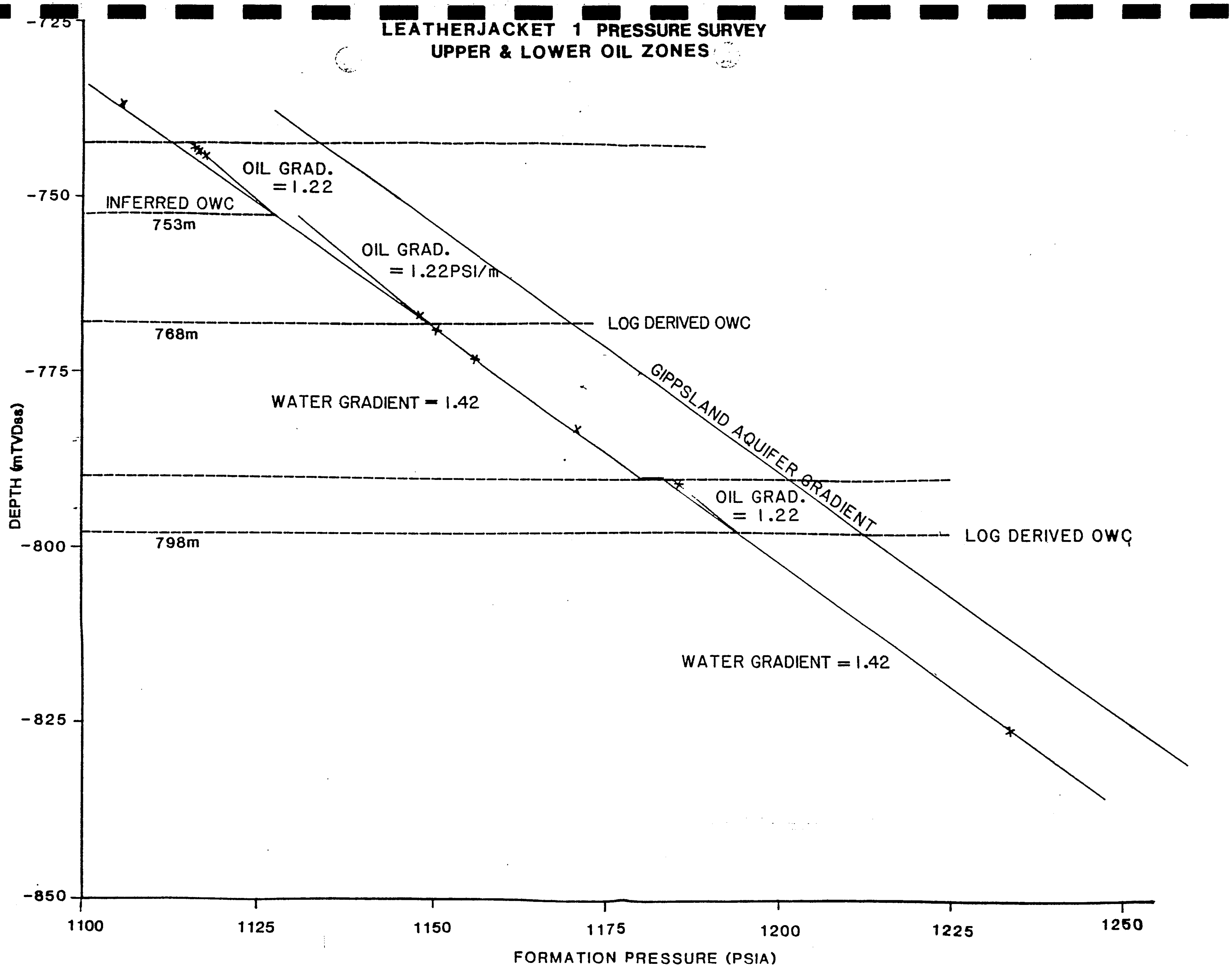
The oil gradient for the upper oil zone was calculated over the complete interval and was found to be substantially higher (1.32 psi/m) than the value calculated from the Corelab PVT analysis (1.22 psi/m). Using the oil gradient from the PVT study results in a pressure difference of 3 psi between the top and base of the upper zone which suggests two separate systems within the upper oil zone. The inferred OWC for the top of the upper oil zone can be seen graphically as 753.0 mTVDSS (see Figure 1). The logs indicate a shale bed and underlying coals which could contain an effective seal between two independent systems. Although there is no reason to doubt the PVT derived gradient, the existence of two separate systems should not be considered certain.

The API gravity on the rig was measured at 24.4° which compares well with the laboratory analysis value of 23.4°.

As measured on the rig, the oil sample had very little CO_2 and no indication of H_2S. This was confirmed by the reservoir fluid study.

3. Lower Oil Zone

A successful sample was not taken from the lower oil zone (790.3 to 798 mTVDSS) but sufficient oil was recovered to indicate the presence of oil bearing sands. Only one pretest in the interval was valid. Using the assumed oil and water gradients, the RFT pressure is consistent with the log-derived OWC.


LEATHERJACKET 1 PRESSURE SURVEY
UPPER & LOWER OIL ZONES
OIL GRAD. =1.22
INFERRED OWC
753m
OIL GRAD. = 1.22PSI/m
LOG DERIVED OWC
768m
GIPPSLAND AQUIFER GRADIENT
WATER GRADIENT = 1.42
OIL GRAD. = 1.22
LOG DERIVED OWC
798m
WATER GRADIENT = 1.42
DEPTH (mTVDss)
-725
-750
-775
-800
-825
-850
1100
1125
1150
1175
1200
1225
1250
FORMATION PRESSURE (PSIA)

APPENDIX 5

APPENDIX 5

GEOCHEMICAL REPORT

GEOCHEMICAL REPORT
LEATHERJACKET-1 WELL, GIPPSLAND BASIN
AUSTRALIA

by

B.J. BURNS

Sample handling and Analyses by:

- D. Ford)
- J. Johnston)
- H. Schiller) ESSO AUSTRALIA LTD.
- M. Sparke)

Esso Australia Ltd.
Geochemical Report 12th September, 1986

2449L

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LEATHERJACKET-1

INTRODUCTION

Selected canned cuttings and sidewall cores from the Leatherjacket-1 well, Gippsland Basin, were analysed for their geochemical characteristics in order to determine the hydrocarbon source potential of the drilled section. since the well only penetrated a 200 metre interval of Latrobe sediments at shallow depths (less than 1000m) it was considered that maturation data would be of little value and so only minimal analyses were run. Greater emphasis was placed on the richness and oil-proneness of the kerogen and on the nature of the oil zones that were encountered. Canned cuttings were analysed at 30m intervals from 615m to 885m while TOC, Rockeval and kerogen elemental analyses were run on sidewall cores from 745.5m-910.7m. Vitrinite reflectance was determined by A.C. Cook of Kieraville Konsultants.

The oil samples from RFT's at 765m, 788.5m and 812.8m were examined for API gravity and whole oil gas chromatography. The oils were centrifuged to remove any mud or water emulsion.

The results are listed in Tables 1-5 and graphically in Figures 1-6.

DISCUSSION AND INTERPRETATIONS

Richness

The C_{1-4} headspace cuttings gas yields (Table 1, Fig 1) are poor to fair over the whole interval and consist almost entirely of methane except for two samples in the Gippsland Limestone which have 'wet' fractions of about 11-12%. However these values are still only typical of dry gas generation which is to be expected given the very low maturity of the section (see later). It is worth noting that the sample at 795m covers the oil zone at 788.5m (RFT 1/6) and yet has no significant gas increase suggesting that the oil zones do not have much dissolved gas and are most likely undersaturated as is indicated by the GOR of only 47.1 SCF/BBL for the RFT at 765m.

The TOC yields (Table 2, Fig 2) from sidewall cores are generally quite low but this is due to the fairly sandy nature of the Latrobe and Strzelecki sections. The Gurnard and Strzelecki samples are all sandy and have TOC's less than 0.5% making them non-source intervals. A few of the Latrobe samples have TOC's in the 1-2% range which is more in line with the values recorded for the Paleocene in neighbouring wells. The overall absence of significant shales at the Leatherjacket-1 location severely downgrades any local hydrocarbon generation potential.

Hydrocarbon Type

Atomic H/C and atomic O/C* ratios for Latrobe Group sediments are recorded in Table 3 and plotted on the modified Van Krevelen diagram in Figure 3. All of the samples have low H/C ratios typical of Type III gas-prone kerogen.

* The atomic O/C ratio is approximate since the oxygen content is determined by difference, and the sulphur content which may be up to a few percent was not determined.

Maturity

Two of the three samples for vitrinite analysis indicate an immature section (R_o=0.39) of Latrobe Group sediments down to 809.9m as expected (Table 4). The third sample, at 863.8m was intended to check the maturity of the Strzelecki sediments to ascertain if there was any significant change in maturity across the unconformity. No vitrinite was present and only three inertinite grains of questionable origin were noted. Their average inertinite reflectance value of 1.45% is equivalent to a vitrinite value of about 0.47% reflectance. This suggests that the Strzelecki Group sediments may be slightly more mature than the immediately overlying Latrobe sediments but the data are too uncertain to try and determine the extent or significance of any differences in maturation histories across the unconformity.

Liquid Hydrocarbons

Three oil samples were recovered from RFTs at 765m, 788.5m and 812.8m. API gravities (Table 5) range from 23.4^o to 25.5^o and this low value strongly suggested that oils were biodegraded. This was confirmed by whole oil chromatograms (Figs 4-6) which show moderate degradation to the extent where all of the n-alkanes have been removed from the 765.0m and 788.5m oils but the branched isomers, eg. pristane and phytane have been relatively untouched. The deepest sample at 812.8m is slightly less degraded with just a trace of n-alkanes remaining in the C_{16}-C_{29} range. The presence of these C_{27-29} n-alkanes indicates that the original oil was most likely a normal waxy oil similar to the intra-Latrobe oils at Tuna. When these oils are biodegraded the medium high molecular weight naphthenes and aromatics in the residual oil result in a significant drop in API gravity from the low 40's to the low 20's and in the extreme, down to about 15^o API (eg Flathead and Lakes Entrance oils).

CONCLUSIONS

1. The Latrobe Group and the Strzelecki rocks seen in the well have poor-hydrocarbon potential and are immature. Hence considerable lateral and vertical migration from the more basin-ward areas is required for the oil accumulations.

2. The oils have undergone moderate biodegradation with resulting drop in API gravity.

2449L:5

C1-C4 HYDROCARBON ANALYSES

REPORT A - HEADSPACE GAS

BASIN - GIPPSLAND
WELL - LEATHERJACKET 1

SAMPLE NO.	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS) METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	GAS COMPOSITION (PERCENT) TOTAL GAS M	TOTAL GAS E	TOTAL GAS P	TOTAL GAS IB	TOTAL GAS NB	WET GAS E	WET GAS P	WET GAS IB	WET GAS NB
77949 B	615.00	2449	142	90	36	33	301	2750	10.95	89.	5.	3.	1.	1.	47.	30.	12.	11.
77949 D	645.00	1188	89	34	27	23	173	1361	12.71	87.	7.	2.	2.	2.	51.	20.	16.	13.
77949 F	675.00	2592	22	8	6	6	42	2634	1.59	98.	1.	0.	0.	0.	52.	19.	14.	14.
77949 H	705.00	10191	53	20	16	21	110	10301	1.07	99.	1.	0.	0.	0.	48.	18.	15.	19.
77949 J	735.00	1017	4	1	1	0	6	1023	.59	99.	0.	0.	0.	0.	67.	17.	17.	0.
77949 L	765.00	5314	37	14	10	17	78	5392	1.45	99.	1.	0.	0.	0.	47.	18.	13.	22.
77949 N	795.00	13498	226	83	35	28	372	13870	2.68	97.	2.	1.	0.	0.	61.	22.	9.	8.
77949 P	825.00	7337	66	17	8	3	94	7431	1.26	99.	1.	0.	0.	0.	70.	18.	9.	3.
77949 R	855.00	4524	20	7	7	3	37	4561	.81	99.	0.	0.	0.	0.	54.	19.	19.	8.
77949 T	885.00	2199	30	11	15	3	57	2258	2.61	97.	1.	0.	1.	0.	51.	19.	25.	5.

TOTAL ORGANIC CARBON REPORT

-ASIN - GIPPSLAND
-ELL - LEATHERJACKET 1

SAMPLE NO.	DEPTH	AGE	FORMATION	AN	TOC%	AN	TOC%	AN	TOC%	DESCRIPTION
77910 A	745.50	MID-EARLY EOCENE	GURNARD	1	.16					SST TANISH GY
77909 Y	750.70	MID-EARLY EOCENE	GURNARD	1	.16					SST BRNISH GY
77909 X	752.40	MID-EARLY EOCENE	GURNARD	1	.45					SST BRNISH DK GY
77909 W	754.00	MID-EARLY EOCENE	GURNARD	1	.44					SST DK OL GY
77909 V	755.50	MID-EARLY EOCENE	GURNARD	1	.34					SLST DK GY
77909 T	759.80	PALEOCENE	LATROBE GROUP	1	1.23					SLST DK GY
77909 Q	770.50	PALEOCENE	LATROBE GROUP	1	.34					SST MED DK GY
77909 P	775.90	PALEOCENE	LATROBE GROUP	1	2.27					SST BRNISH GY
77909 N	806.00	PALEOCENE	LATROBE GROUP	1	.42					SST DK BRNISH GY
77909 M	809.90	PALEOCENE	LATROBE GROUP	1	.87					SST GRNISH GY-MED DK GY
77909 F	849.00	LATE CRETACEOUS	LATROBE GROUP	1	1.21					SST DK GRNISH GY
77909 D	884.80	EARLY CRETACEOUS	STRZELECKI GROUP	1	.08					SST GRNISH GY
77909 B	910.70	EARLY CRETACEOUS	STRZELECKI GROUP	1	.17					SST OLGY GY

KEROGEN ELEMENTAL ANALYSIS REPORT

BASIN - GIPPSLAND
WELL - LEATHERJACKET 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	N%	C%	H%	S%	O%	ASH%	COMMENTS
			ELEMENTAL % (ASH FREE)						
77909 X	752.40	CRSW	1.14	62.74	4.60	.00	31.53	5.16	
77909 W	754.00	CRSW	.71	53.73	3.86	.00	41.70	4.36	
77909 V	755.50	CRSW	.78	59.17	3.94	.00	36.11	5.17	
77909 U	757.40	CRSW	.51	61.11	3.80	.00	34.58	5.34	
77909 T	759.80	CRSW	.36	62.78	3.99	.00	32.87	5.53	
77909 Q	770.50	CRSW	.96	64.21	3.88	.00	30.96	3.84	
77909 P	775.90	CRSW	.22	66.57	4.49	.00	28.73	2.91	
77909 O	800.00	CRSW	.72	65.16	4.02	.00	30.10	5.54	
77909 N	806.00	CRSW	.93	64.79	4.04	.00	30.23	5.44	77909
77909 M	809.90	CRSW	.57	66.51	3.69	.00	29.24	4.81	
77909 F	849.00	CRSW	1.35	66.49	4.16	.00	28.00	.21	

KEROGEN ELEMENTAL ANALYSIS REPORT

BASIN - GIPPSLAND
WELL - LEATHERJACKET 1

SAMPLE NO.	DEPTH	SAMPLE TYPE	AGE	FORMATION	ATOMIC RATIOS H/C	O/C	N/C	COMMENTS
77909 X	752.40	CRSW	MID-EARLY EOCENE	GURNARD	.88	.38	.02	
77909 W	754.00	CRSW	MID-EARLY EOCENE	GURNARD	.86	.58	.01	
77909 V	755.50	CRSW	MID-EARLY EOCENE	GURNARD	.80	.46	.01	
77909 U	757.40	CRSW	MID-EARLY EOCENE	GURNARD	.75	.42	.01	
77909 T	759.80	CRSW	PALEOCENE	LATROBE GROUP	.76	.39	.00	
77909 Q	770.50	CRSW	PALEOCENE	LATROBE GROUP	.72	.36	.01	
77909 P	775.90	CRSW	PALEOCENE	LATROBE GROUP	.81	.32	.00	
77909 O	800.00	CRSW	PALEOCENE	LATROBE GROUP	.74	.35	.01	
77909 N	806.00	CRSW	PALEOCENE	LATROBE GROUP	.75	.35	.01	77909
77909 M	809.90	CRSW	PALEOCENE	LATROBE GROUP	.67	.33	.01	
77909 F	849.00	CRSW	LATE CRETACEOUS	LATROBE GROUP	.75	.32	.02	

TABLE 4 - VITRINITE REFLECTANCE

5.5.86 A1/1

LEATHERJACKET NO. 1

KK No.	Esso No.	Depth m	$\bar{R}_v$ max %	Range R_v max %	N	Description including Exinite Fluorescence
x4922	77909 -T	759.8 SWC 21	0.38	0.31-0.43	30	Sparse sporinite, yellow to orange, rare cutinite, yellow to dull orange, rare resinite, yellow, rare ?fluorinite, green, rare liptodetrinite, yellow to dull orange. (Siltstone>-sandstone. Dom common, I>V>E. All three maceral groups sparse. Iron oxides common. Pyrite abundant.)
x4923	77909 -M	809.9 SWC 14	0.39	0.32-0.48	26	Sparse cutinite, yellow orange, rare to sparse sporinite and rare liptodetrinite, yellow to orange, rare fluorinite, green. (Sandstone> siltstone>>coal. Coal rare, vitrite. Dom common, V>E>I. Vitrinite sparse to common, exinite sparse, inertinite rare. Iron oxides sparse. Sand sized glauconite rare. Framboidal pyrite major.)
x4924	77909 -G	863.8 SWC 5	-	-	-	No exinite fluorescence. (Sandstone. Dom rare, I only. Inertinite rare, vitrinite and exinite
		$\bar{R}_I$	1.45	0.90-2.08	3	absent - may be contaminants. Inorganic mud additive sparse. Sand sized glauconite sparse. Rare ?igneous rock fragments present. Mineral matter fluorescence weak to absent. Pyrite rare.)

06/08/86 TABLE 5.

ESSO AUSTRALIA LTD.

OIL - API GRAVITY

BASIN - GIPPSLAND-1
WELL - LEATHERJACKET-1

SAMPLE NO.	DEPTH	AGE	FORMATION	API GRAVITY
77917 A	765.00	PALEOCENE	LATROBE GROUP	23.40
77917 Z	788.50	PALEOCENE	LATROBE GROUP	25.48
77917 B	812.80	PALEOCENE	LATROBE GROUP	25.30

FIGURE 1a

C_{1-4} CUTTINGS GAS LOG

LEATHERJACKET 1

GIPPSLAND BASIN

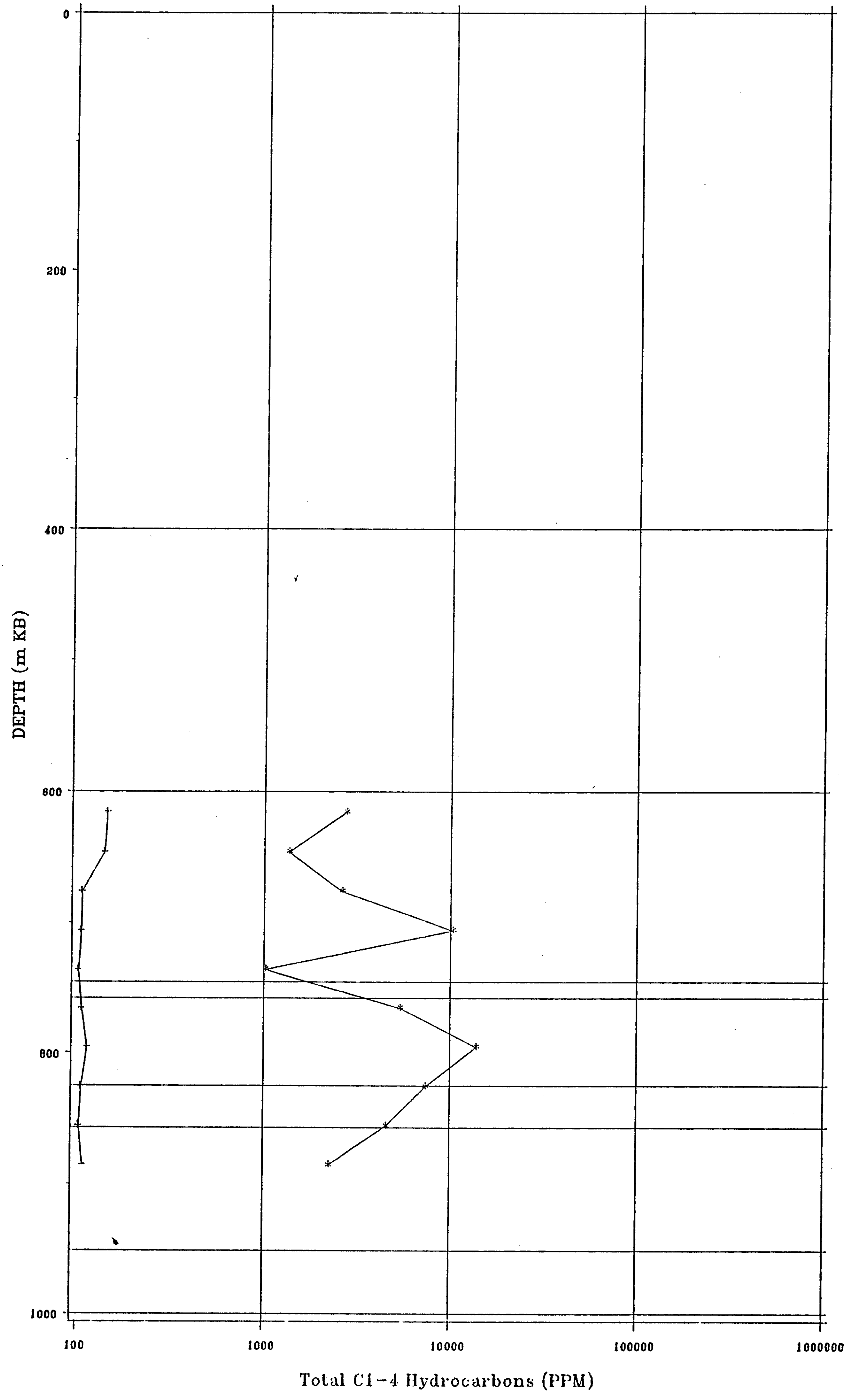


FIGURE 1b

C_{1-4} CUTTINGS GAS LOG

LEATHERJACKET 1

GIPPSLAND BASIN

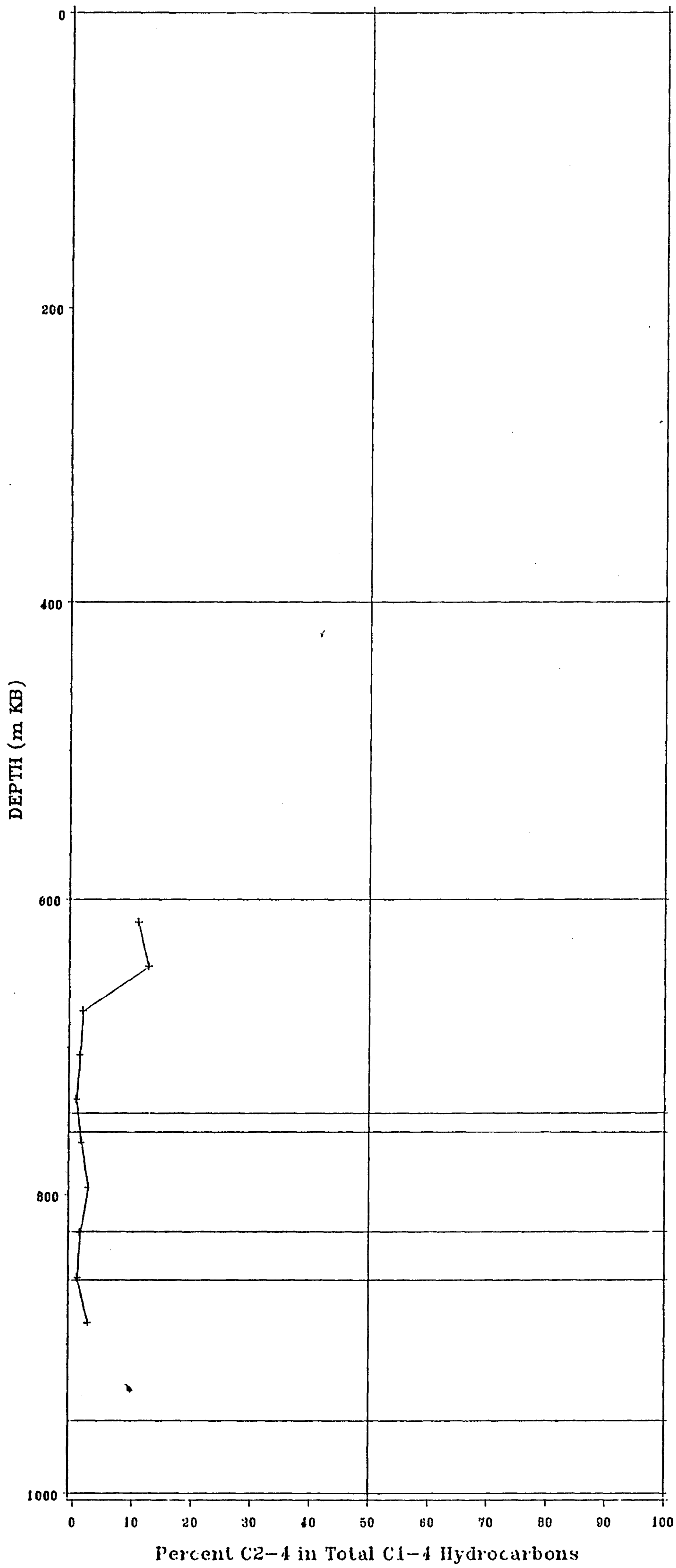


FIGURE 2

TOTAL ORGANIC CARBON
LEATHERJACKET 1
GIPPSLAND BASIN

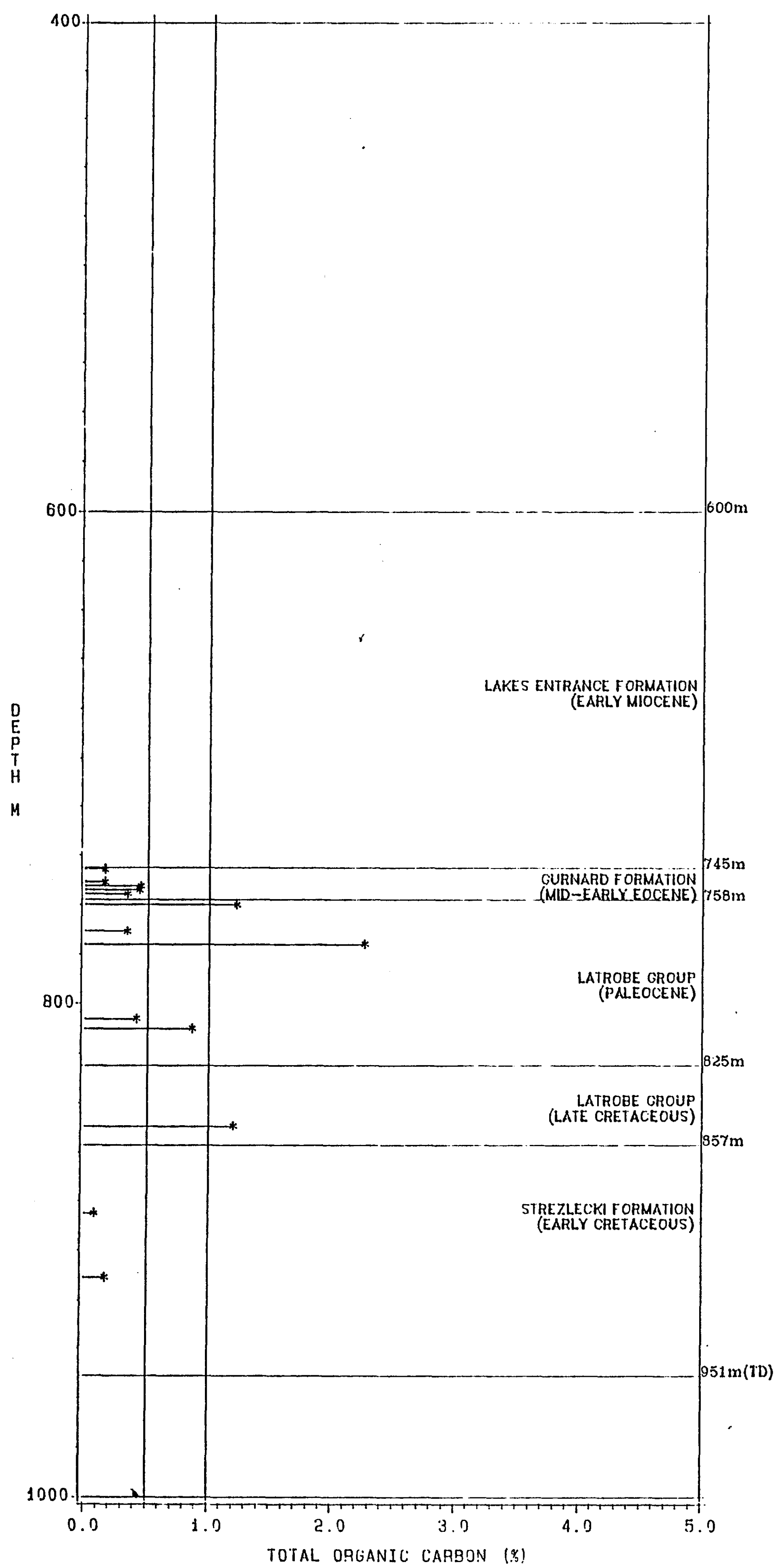
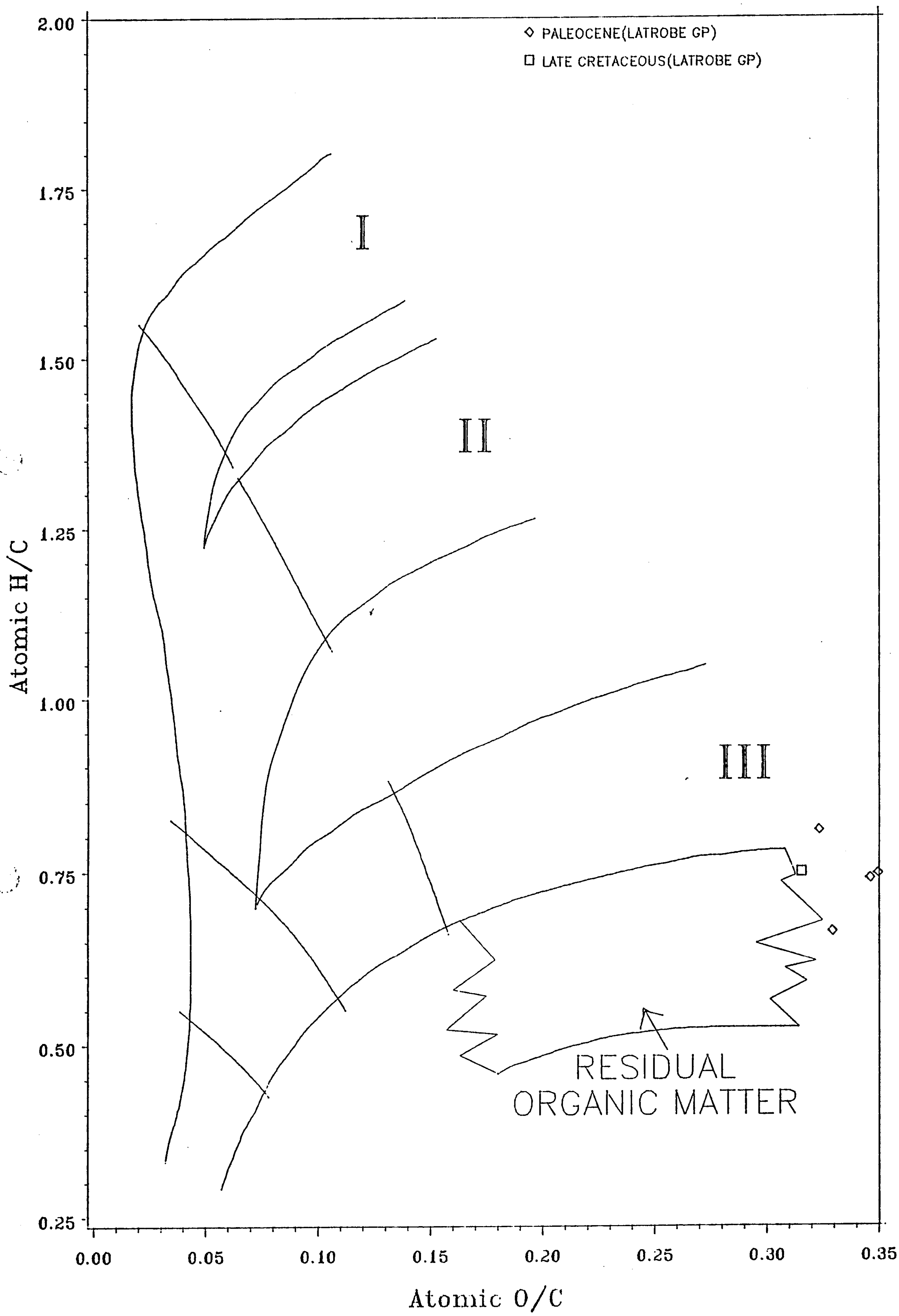


FIGURE 3

KEROGEN TYPE

LEATHERJACKET 1

GIPPSLAND BASIN



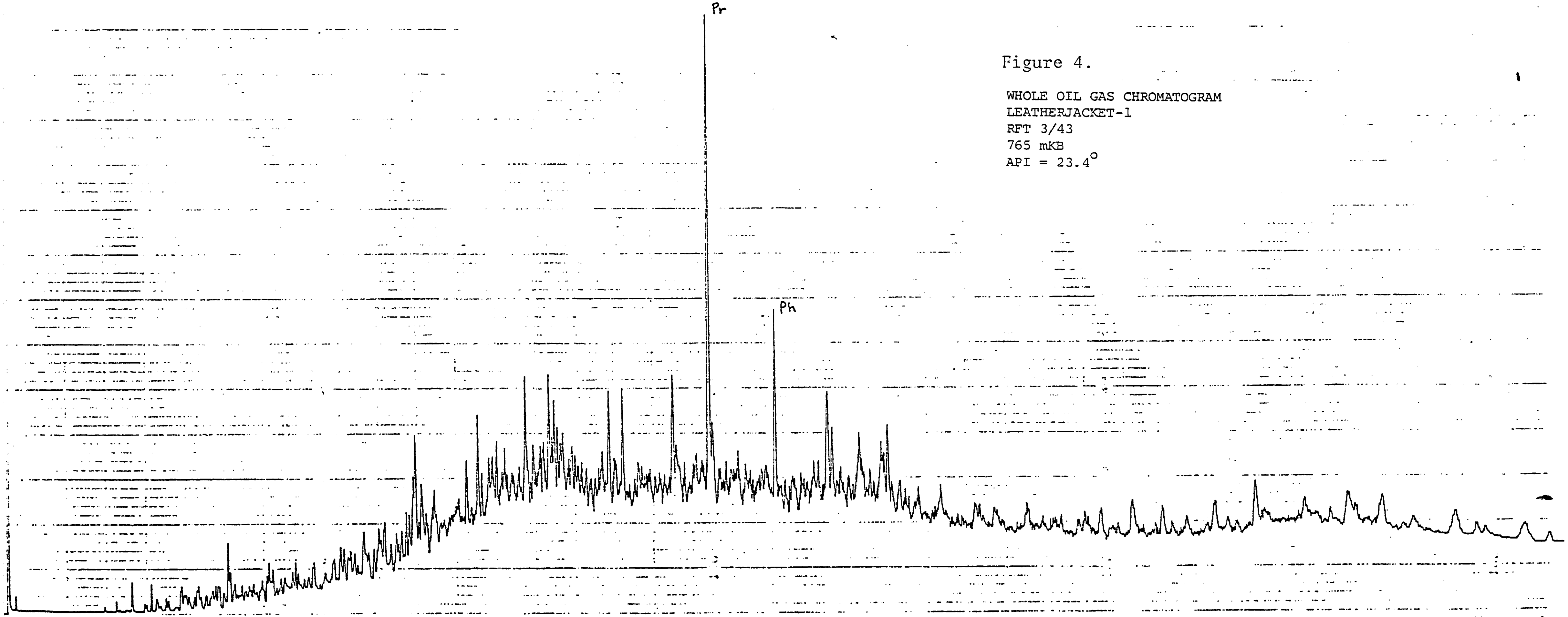


Figure 4.

WHOLE OIL GAS CHROMATOGRAM
LEATHERJACKET-1
RFT 3/43
765 mKB
API = 23.4°

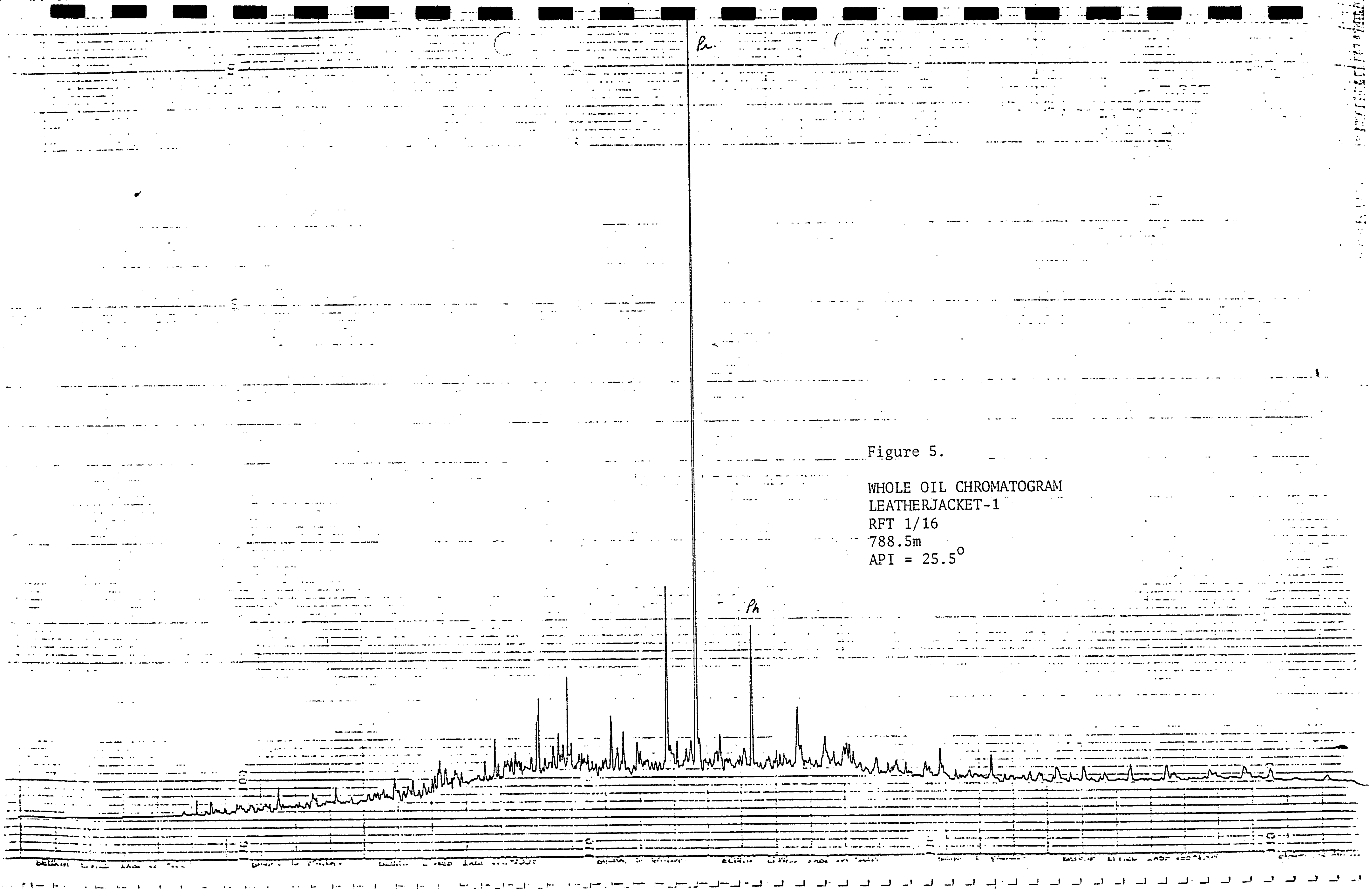


Figure 5.

WHOLE OIL CHROMATOGRAM
LEATHERJACKET-1
RFT 1/16
788.5m
API = 25.5°

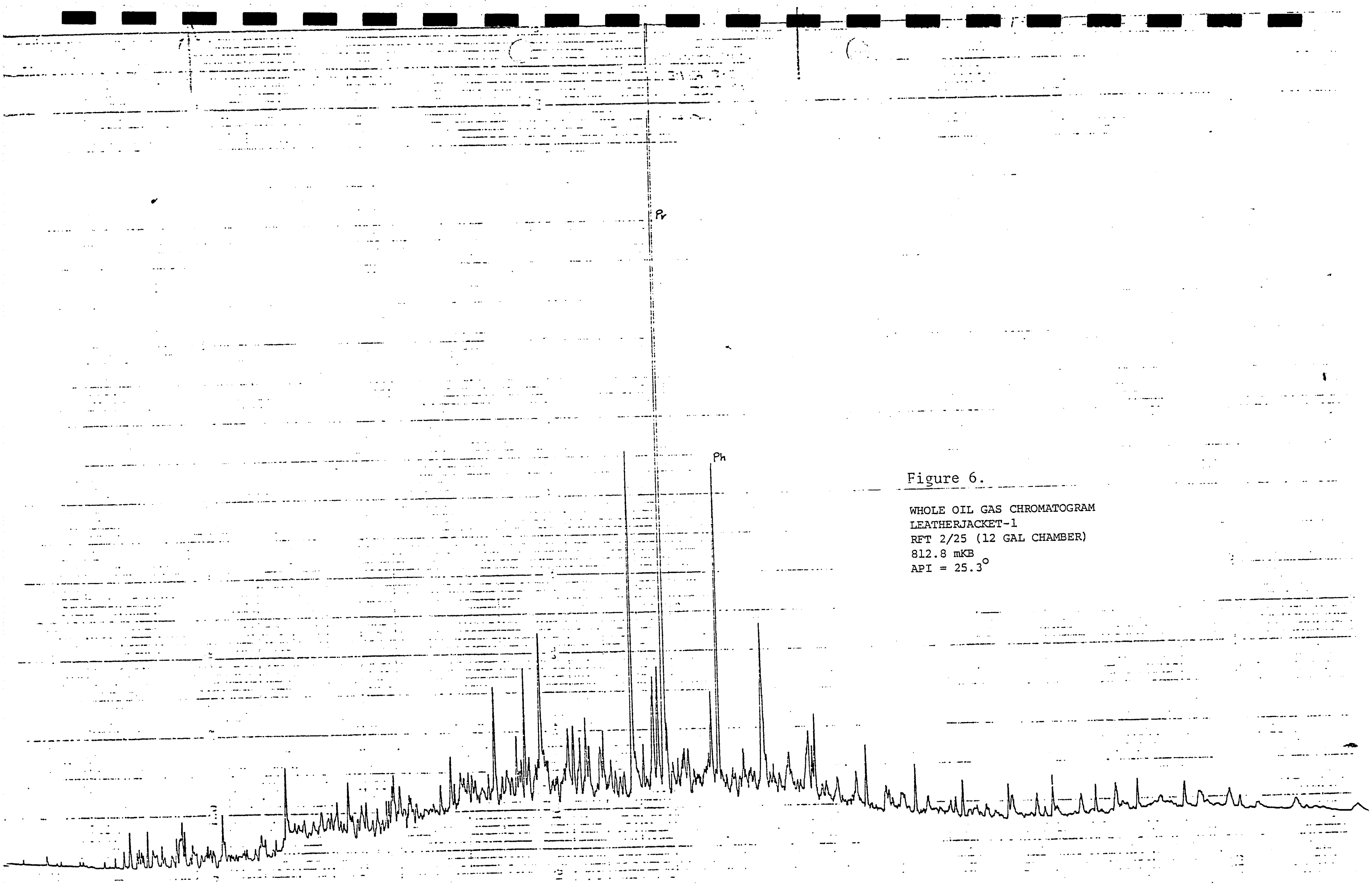


Figure 6.

WHOLE OIL GAS CHROMATOGRAM
LEATHERJACKET-1
RFT 2/25 (12 GAL CHAMBER)
812.8 mKB
API = 25.3°

APPENDIX 6

APPENDIX 6

SYNTHETIC SEISMIC TRACE

PE603539

This is an enclosure indicator page.
The enclosure PE603539 is enclosed within the container PE906165 at this location in this document.

The enclosure PE603539 has the following characteristics:

ITEM_BARCODE =	PE603539
CONTAINER_BARCODE =	PE906165
NAME =	Synthetic Seismic Trace
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	SYNTH_SEISMOGRAPH
DESCRIPTION =	Synthetic Seismic Trace for Leatherjacket-1 with Time-Depth Plot.
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	29/04/1987
W_NO =	W928
WELL_NAME =	LEATHERJACKET-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURES

PE906166

This is an enclosure indicator page.
The enclosure PE906166 is enclosed within the container PE906165 at this location in this document.

The enclosure PE906166 has the following characteristics:

ITEM_BARCODE = PE906166
CONTAINER_BARCODE = PE906165
NAME = Geological Cross-Section
BASIN = GIPPSLAND
PERMIT = VIC/P19
TYPE = WELL
SUBTYPE = CROSS_SECTION
DESCRIPTION = Schematic Cross-section containing Leatherjacket-1.
REMARKS =
DATE_CREATED = 31/10/1986
DATE_RECEIVED = 29/04/1987
W_NO = W928
WELL_NAME = LEATHERJACKET-1
CONTRACTOR =
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE906167

This is an enclosure indicator page.
The enclosure PE906167 is enclosed within the container PE906165 at this location in this document.

The enclosure PE906167 has the following characteristics:

ITEM_BARCODE =	PE906167
CONTAINER_BARCODE =	PE906165
NAME =	Top of Latrobe Group Time Map
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	SEISMIC
SUBTYPE =	HRZN_CNTR_MAP
DESCRIPTION =	Time Structure Map of Top of Latrobe Group around Leatherjacket-1
REMARKS =	
DATE_CREATED =	31/03/1987
DATE_RECEIVED =	29/04/1987
W_NO =	W928
WELL_NAME =	LEATHERJACKET-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE906168

This is an enclosure indicator page.
The enclosure PE906168 is enclosed within the container PE906165 at this location in this document.

The enclosure PE906168 has the following characteristics:

ITEM_BARCODE =	PE906168
CONTAINER_BARCODE =	PE906165
NAME =	Top of Latrobe Group Structure Map
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	SEISMIC
SUBTYPE =	HRZN_CNTR_MAP
DESCRIPTION =	Structure Map of Top of Latrobe Group around Leatherjacket-1
REMARKS =	
DATE_CREATED =	31/03/1987
DATE_RECEIVED =	29/04/1987
W_NO =	W928
WELL_NAME =	LEATHERJACKET-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE604151

This is an enclosure indicator page.
The enclosure PE604151 is enclosed within the container PE906165 at this location in this document.

The enclosure PE604151 has the following characteristics:

ITEM_BARCODE =	PE604151
CONTAINER_BARCODE =	PE906165
NAME =	Well Completion Log
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	COMPLETION_LOG
DESCRIPTION =	Leatherjacket-1 Well Completion Log. Enclosure 4 from WCR Volume 2.
REMARKS =	
DATE_CREATED =	01/03/1986
DATE_RECEIVED =	29/04/1987
W_NO =	W928
WELL_NAME =	Leatherjacket-1
CONTRACTOR =	Esso Exploration and Production Australia Inc.
CLIENT_OP_CO =	Esso Australia Limited

(Inserted by DNRE - Vic Govt Mines Dept)