

DEPT. NAT. RES. & ENV
PE906474



WCR

TUNA-2

WS31

WCR

TUNA-2

WS31

LIST OF ILLUSTRATIONS

Figure 2	Cross-section
Figure 3	Structure - Top of Latrobe
Plate I	Locality Map (Figure 1)
Plate II	I.E.S. Tuna 2 with lithology + other details
Plate III	Time-Depth curve Tuna 2
Plate IV	Mud Log Tuna 2
	Completion Coregraph
	FIT Data

APPENDICES

Appendix A	Core descriptions
Appendix B	Sidewall Core descriptions
Appendix C	Palynology and Palaeontology
Appendix D	Core Analysis
Appendix E	Log Analysis

TUNA 2 WELL SUMMARY

Type of Well: Confirmation Test.

Purpose of Well: The Tuna 2 well was located approximately 1.75 miles west-southwest of Tuna A-1, and drilled as a confirmation test of the two oil and gas reservoirs discovered in the Tuna A-1 well (Plate I).

The Tuna structure as mapped in the Latrobe Delta Topographic surface is a domal feature elongated in an east-west direction. This structure is cut by a down-to-the-north fault which strikes nearly east-west.

The oil and gas productive zones occurred both at the top and within the Latrobe Delta Sandstone complex (Plate II).

Well Statistics:

Status: Abandoned as successful gas and oil confirmation test.

Location: Latitude: 38° 10' 52" S
Longitude: 148° 23' 14" E
Coordinates: X = 628,750
Y = 289,635

Elevation: 31' K.B.

Water Depth: 195'.

Spudded: October 30, 1968.

Suspended: December 9, 1968.

Drilling Time: 42.45 days (includes rigging up and plugging).

Total Depth: 9060'.

Casing: 30' at 372'
13 3/8" at 1517'
9 5/8" at 4902'

<u>Plugs:</u>	<u>Plug No.</u>	<u>Interval</u>	<u>Cement</u>
	1	6750-6450	140 sacks
	2	5650-4750	110 sacks
	3	4650-4400	90 sacks
	4	385-240	50 sacks

below rotary

Placed cap on well.

Mud Logging: Core Lab logged the well from 1560' to a total depth of 9060' (Plate IV).

Electric Logging:

<u>Type</u>	<u>Run</u>	<u>Interval</u>
Induction-Electrical	1	372-1569
" "	2	1517-4890
" "	3	4902-7208

..... continued

Electric Logging:
(continued)

<u>Type</u>	<u>Run</u>	<u>Interval</u>
Induction-Electrical	4	7000-9069
Borehole Compensated Sonic	1	372-1560
" " "	2	1517-4886
" " "	3	4902-7209
" " "	4	7000-9069
Formation Density	1	1517-4888
" "	2	4902-7208
" "	3	7000-9069
Gamma Ray-Neutron	1	4290-4810
" "	2	4902-7209
" "	3 (casing)	4300-4700

Velocity Survey: A velocity survey was run at 4924' (Plate III).

Coring: Nine conventional cores were cut. Total footage cut was 364' with 209' of core recovered for a core recovery of 57.4% (Appendix A).

A total of 120 sidewall cores were attempted, and 93 recovered (Appendix B).

Hydrocarbons: After encountering a strong gas show at 4375' in the top of the Latrobe Delta sandstone complex, continuous conventional cores were cut from 4391 to 4607'. Cores and electrical logs indicated the following gas and oil pays within the uppermost Latrobe section:

<u>Interval</u>	<u>Gross Thickness</u>	<u>Type of Hydrocarbon</u>
4382-4550	168'	Gas
4550-4587	37'	Oil

Conventional cores and electrical logs indicate the lowermost Latrobe oil pay to be present from 6582-6634'. This pay zone was continuously cored. No other significant shows of hydrocarbons were encountered.

Testing: Eleven wireline tests were conducted on the well with the following results:

Open Hole

- F.I.T. No. 1 at 6644' Recovered 0.05 ft³ gas, 700 cc. of Filtrate and 200 cc. of mud. F.P. 100 psi; F.S.I.P. 2980 psi; Hyd. P. 3700 psi; Surface P. 10 psi.
- F.I.T. No. 2 at 6615' Failure - recovered 20,000 cc. of mud.
- F.I.T. No. 3 at 6632' Failure - recovered mud.
- F.I.T. No. 4 at 6591' Recovered some gas, a scum of oil and 19000 cc. of mud filtrate. F.P. 2240 psi; F.S.I.P. 2410 psi; Hyd. P. 3050 psi; Surface P. 100 psi.

..... continued

Open Hole (continued)

F.I.T. No. 5 at 6615' Recovered 23.6 ft³ gas, 9500 cc. of oil and 10,000 cc. of mud Filtrate. F.P. 970 psi, F.S.I.P. 3000 psi; Hyd. P. 3570 psi; Surface P. 1100 psi.

F.I.T. No. 6 at 6633' Failure - recovered mud.

F.I.T. No. 7 at 6632½' Failure - recovered mud.

F.I.T. No. 8 at 6615' Failure - recovered trace of mud.

F.I.T. No. 9 at 6603' Recovered 3 ft³ gas, estimated 800 cc. of oil, 18,200 cc. of mud Filtrate, and 1800 cc. of mud. F.P. 1530 psi; F.S.I.P. 2960 psi; Hyd. P. 3700 psi; Surface P. 400 psi.

F.I.T. No. 10 at 4544' Recovered 212½ ft³ gas, 1200 cc. of condensate and 200 cc. of sand. F.P. 1940 psi; F.S.I.P. 1720 psi; Hyd. P. 2240 psi; Surface P. 1400 psi.

F.I.T. No. 11 at 4543' Recovered 77 ft³ gas and mud - Sample guage shorted by mud.

Stratigraphy:

<u>Formation</u>	<u>Age</u>	<u>Drill Depth</u>	<u>Sub Sea</u>	<u>Thickness</u>
Gippsland	Miocene & younger	Sea Floor	-195	4156'+
Latrobe Delta	Eocene & Paleocene	4382	(-4351)	2192'
Latrobe Delta	Upper Cretaceous	6574	(-6543)	2486'+

continued

LITHOLOGIC SUMMARY

Miocene & Younger

Gippsland Formation:

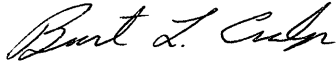
- Sea Floor-1610' Marl - light gray, soft and crumbly, abundant fossil debris, trace of glauconite and pyrite.
- 1610-2070' Limestone - gray to white, skeletal, unconsolidated to hard, interbedded with marl, trace of pyrite and glauconite.
- 2070-3500' Marl - as above.
- 3500-4382' Mudstone - medium gray, calcareous, fairly well compacted, glauconitic and pyritic, fossiliferous.

Eocene, Paleocene and Upper Cretaceous

Latrobe Delta Complex:

- 4382-4610' Sandstone - quartzose, gray to clear, fine to granular grained, unconsolidated, angular to subrounded. Occasional beds of soft carbonaceous brown shale. Gas odor and no fluorescence above 4540'. Below 4540' strong oil fluorescence, cut and odor. No oil fluorescence or cut below 4587'.
- 4610-4790' Shale - brown to gray, carbonaceous, silty, pyritic, slightly micaceous firm to hard.
- 4790-5560' Sandstone - quartzose, fine to coarse-grained, angular to subrounded, unconsolidated to compacted and dolomitic, poorly sorted. Occasional thin interbeds of silty carbonaceous shale and coal.
- 5560-5925' Shale, Siltstone and Coal - interbedded with sandstone. Shale is gray to black, firm and carbonaceous; Siltstone - light gray, argillaceous, carbonaceous and firm; Sandstone - as above.
- 5925-8250' Sandstone - as above interbedded with coal and thin shales. Sandstone contains oil fluorescence and cut from 6582-6634'.
- 8250-8340' Shale - dark gray to brownish black, carbonaceous, weakly pyritic, firm to hard. Thin medium to coarse grained dolomitic sandstone in the interval 8300-8310'.
- 8340-9060' Sandstone - as above interbedded with occasional thin siltstone and shales.

BLC/LW


Burt L. Culp

COMPLETION REPORT

Page 1 of 4

WELL DATA RECORD

w.e.r.

Date 24.6.70.

LOCATION

DEPT. NAT. RES & ENV



PE902870

WELL NAME TUNA -2	STATE Victoria	PERMIT or LICENCE Vic L/4	GEOLOGICAL BASIN Gippsland	FIELD Outpost
CO-ORDINATES Lat. Long. X Y		MAP PROJECTION Australian Transverse Mercator	GEOGRAPHICAL DESCRIPTION Offshore 1.75 miles WSW of Tuna -1	
Surface 38° 10'52" 148° 23'14"		628,750 289,635		
Bottom Hole				
<u>ELEVATIONS & DEPTHS</u>				
ELEVATIONS Ground KB RT	WATER DEPTH 196 Feet	TOTAL DEPTH M.D. 9060 Feet T.V.D.	Avg. Angle	
Braden Head Top Deck Platform	PLUG BACK DEPTH 240 Feet	REASONS FOR P.B. ABANDONMENT		
<u>DATES</u>				
MOVE IN 27.10.68.	RIG UP 27.10.68.	SPUDED 30.10.68.		
RIG DOWN COMPLETE 9.12.68.	RIG RELEASED 9.12.68.	PROD. UNIT - Start Rigging Up		
PROD. UNIT - Rig Down Complete		I.P. ESTABLISHED		
<u>MISCELLANEOUS</u>				
OPERATOR Esso	PERMITTEE or LICENCEE Esso	ESSO INTEREST 50%	OTHER INTEREST Hematite 50%	
CONTRACTOR GLOBAL MARINE	RIG NAME GLOMAR III	EQUIPMENT TYPE SHIP-SHAPE DRILLING VESSEL		
TOTAL RIG DAYS 42.0	DRILLING AFE NO. 238107	COMPLETION NO.	TYPE COMPLETION	
LAHEE WELL	Before Drilling	Outpost		
CLASSIFICATION	After Drilling	Abandoned	with shows of hydrocarbon.	

P.M. COONEY

Geologist

TUNA-2

II INITIAL PRODUCTION TEST						
Date	WELL COMPLETION AS: Oil Well _____ Gas Well _____ Dry Hole _____					
Choke size, inch				Calculated P.I.		
Length of Test				Calculated A.O.F.		
Oil, BPD				Perforations		
Water, BPD				Shut-In BHP		
Gas, MCFD				Flowing BHP		
Gas Liquids, BPD				Shut-In Tubing Press		
Gas-Oil Ratio				Flowing-Tubing Press		
Gravity, API				Flowing Temperature		

III PERFORATING RECORD (Prod.test, Completion, DST, FIT)						
INTERVAL	HPF	TOTAL SHOTS	SERV. CO.	DIFF. PRESS.	PERFORATION FLUID	SIZE AND TYPE GUN
FIT's at 4544' and 4563' were taken through casing.						

R.L. Wood
Engineer

WELL

TUNA #2

3 of 4

W.C.R.

TUNA - 2

IV CASING - LINER - TUBING RECORD							
Type	Size	Weight	Grade	Thread	No. Joints	Amount	Depth
Conductor	30"	310/196		Vetco	4	164.57	372
Surface	13-3/8"	54.5#	J-55	Butt.	31	1311	1517
Inter- mediate	9-5/8"	40.5#	N-80	Butt.	121	4696.73	4903

V CEMENT RECORD			
String	30"	13-3/8"	9-5/8"
Type of Cement	450 sx w/4% Gel and 2% CaCl ₂	1500 sx w/4% Gel	420 sx w/4% Gel plus 200 sx Neat
Number of FT ³	657	2190	850
Average weight of slurry	14.2	14.2	14.0/14.2
Cement Top	Sea Floor	Sea Floor	2900' Calc.
Casing Tested with	0	1600 psi	1500 psi-
Number of Centralizers	0	4	13
Number of Scratchers	0	0	0
Stage Collar etc.	0	0	0
Remarks			

R.L. Wood
Engineer

TUNA -2

TUNA - 2

VII SAMPLES, CONVENTIONAL CORES, SW CORES					
INTERVAL	TYPE	RECOVERED	INTERVAL	TYPE	RECOVERED
1560-9060.	Cuttings	Samples taken every 10'			
2126-8960	Sidewall Cores	120 Shot 93 Recovered			
4391-4429	Conventional	10'			
4432-4492	"	8'			
4492-4530	"	25'			
4530-4565	"	13'			
4565-4607	"	25'			
6580-6619	"	35'			
6619-6679	"	60'			
7215-7251	"	21'			
8013-8030	"	12'			

5
A
5

VIII WIRELINE LOGS AND SURVEYS (Incl. FIT)

Type & Scale	From	To	Type & Scale	From	To
IES 2" and 5"	372	9069			
BHCS " " "	372	9069			
CDM " " "	1517	9070			
FDC " " "	1517	9069			
GRN " " "	(4290 4902)	(4810 7209)			
Velocity Survey	1710	4800			
FIT (11)	6644, 6633(3), 6615(3), 6591, 6603, 4544, 4543.				

1
C

P.M. COONEY
Geologist

IX	FORMATION TOPS/Zones					REMARKS	
	NAME	Tops		Gross Interval (ft)	Net Pay (ft).		
		M.D.	Sub-sea		Gas		Oil
Gippsland Fmn.	Sea Floor	-196	4133				
Latrobe Group							
(<u>M. diversus</u>)	4360	-4329	821	152	20	4360-4550 4550-4587	
(<u>L. balmei</u>)	5181	-5150	1389				
(<u>T. lilliei</u>)	6570	-6539			29	6582-	

INTERPRETATIVE

X GEOLOGIC ANALYSIS (Pre Drilling prognosis Vs actual results)

Pre-drill: On flank of a faulted anticline to test pay sections at a down dip location in order to confirm reservoir extent.

Basis of Location

Depth	Formation
0- 195	Water
- 195	Gippsland Formation
-4380-T.D.	Latrobe Group
-4519	Gas-Oil contact
-4569	Oil-Water contact
-6450	2nd Pay
Not encountered	Gas-Oil contact
-6603	Oil-Water contact

Depths from mean sea level; for drill depths add 31' for height of rotary table.

Tuna-2 is a stepout to confirm the two oil and gas pools discovered in Tuna -1. Specific objectives of this well are to obtain additional data for structural mapping, determine the nature of the stratigraphy in the pay zones as far away from Tuna -1 as practical, to establish the elevations of the gas-oil and oil-water contacts at this location.

Post-Drill: Formation Tops as in section IX.

Tuna-2 confirmed the presence of both the top of Latrobe and intra-Latrobe hydrocarbons on the western part of the field. In addition, continuity of potential reservoirs exists between the Tuna 1 and 2 wells.

Top of L. balmei appears to be an erosional surface, with the Eocene, Upper M. diversus, the upper pay zone at Tuna 1 and 2, being channel fill laying unconformably over L. balmei.

Summary report on log interpretation of the Interval
4300' - 4800' in the Tuna No.2 well.

1. Lithology:-

- Down to a depth of 4359ft - Calcareous mudstone
- 4359' - 4378' - - - Sandstone, slightly glauconitic.
- 4378' - 4605' - - - Predominantly sand with some shale beds.
- 4605' - 4800' - - - Predominantly shale with some sandstone
beds - particularly towards base of section.


The Top of the Latrobe Valley Coal Measures is at either a depth of 4378 ft or 4359 ft depending on whether the sandstone from 4359' - 4378' is considered as a sandstone at the base of the Lakes Entrance Formation or a sandstone at top of Latrobe Valley Coal Measures. As an erosional unconformity separates these two stratigraphic units there would also be an age difference between them, thus micropalaeontological work is of use here. This information is not yet available.

2. Hydrocarbon content

High gas readings were first recorded on the gas detectionst at a depth of 4370 ft and persisted to a depth of 4510 ft, from which point they very slowly decreased. From a study of the electrical and other logs the following broad divisions have been made.

- 4375' - 4508' Gas bearing sandstone.
- 4508' - 4538' Shale.
- 4538' - 4546' Oil or Gas bearing sandstone-Probably gas. (X)
- 4546' - 4552' Shale.
- 4552' - 4570' Oil bearing sandstone.
- 4570' - 4605' Water bearing sandstone.
- 4605' - 4800' Shale.

A wire-line test is required of the interval 4538' - 4546' to determine if this sandstone carries oil or gas.


P.W. Bollen.

22/11/68.

(X) Gas confirmed (9/12/68) by sample test at 4544' which returned gas.

141' Gas
18' Oil.

Hydrocarbon Indications & Notes

I. From Weekly reports.

Strong gas show recorded on the mud log from 4375' - 4391'

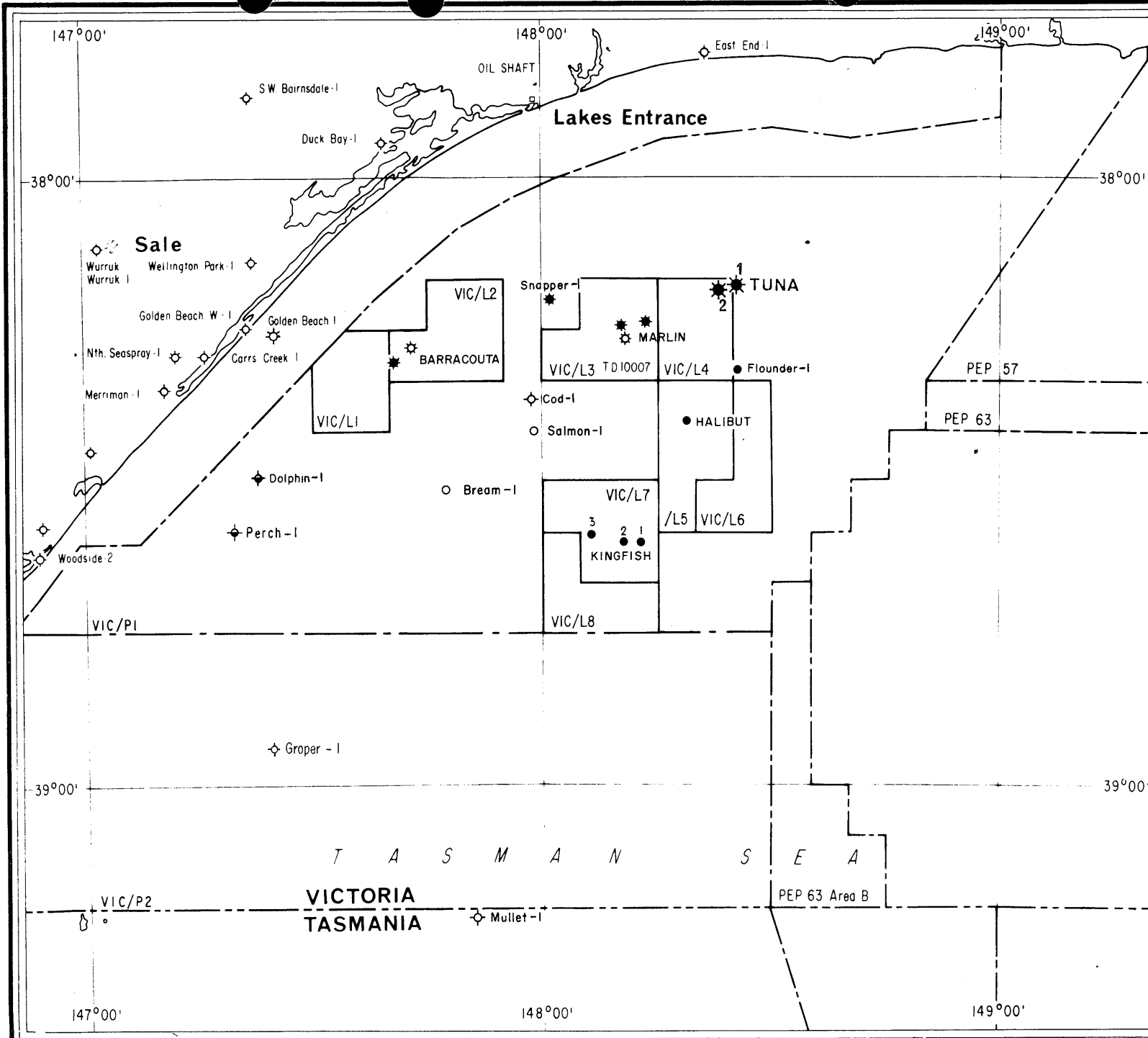
4375' - 4391'	Cuttings	Spotty white fluorescence
4391' - 4429'	Core 1, cut 38' Rec 10'	Petroliferous odour, spotty white fluorescence and fair cut.
4433' - 4492'	Core 2, cut 59' Rec 8'	" " " " "
4492' - 4530'	Core 3, cut 38' Rec 25'	" " " " "

Cores 1, 2 and 3 are interpreted as being gas production on the basis of visual examination and core analysis.

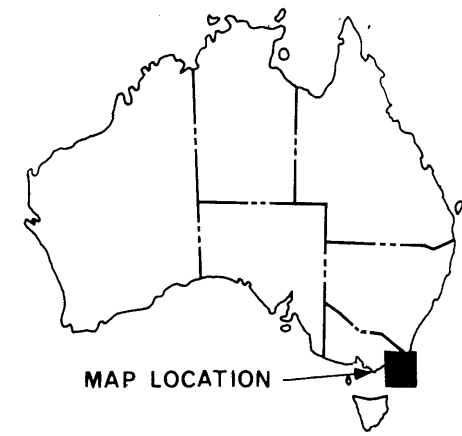
4530' - 4565'	Core 4, cut 35' Rec 13'	Good oil fluorescence in bottom 3 feet recovered.
4565' - 4607'	Core 5, cut 42' Rec 25'	Good oil fluorescence in bottom 3 feet recovered but no oil fluorescence, odour or cut in bottom 3 feet of recovery.
6580' - 6619'	Core 6, cut 39' Rec 35'	21½ feet of sandstone recovered in core, sandstone with spotty to even blue white oil fluorescence and cut.
7208' - 7215'	Cuttings	Faint blue fluorescence and cut.
7215' - 7251'	Core 8, cut 36' Rec 21'	14½' total sandstone recovered, bright pale blue fluorescence, weak blue cut.

- | | | |
|------|-----------------|---|
| II. | Core analysis | See Core Lab's Completion Coregraph. |
| III. | Mud log | Good oil show - 4535' to 4540' : 4585' to 4590'
Trace oil show - 7180' to 7215' : 7245' to 7255' |
| IV. | Wire-line tests | See results. |
| V. | Log analysis | |

FIGURES



AUSTRALIA



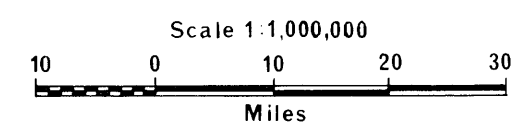
LEGEND

- Oil well
- ★ Gas well
- ◆ Well, abandoned with oil show
- Drilling location
- ◇ Well, dry and abandoned
- Producing license boundary
- - - Petroleum tenement boundary

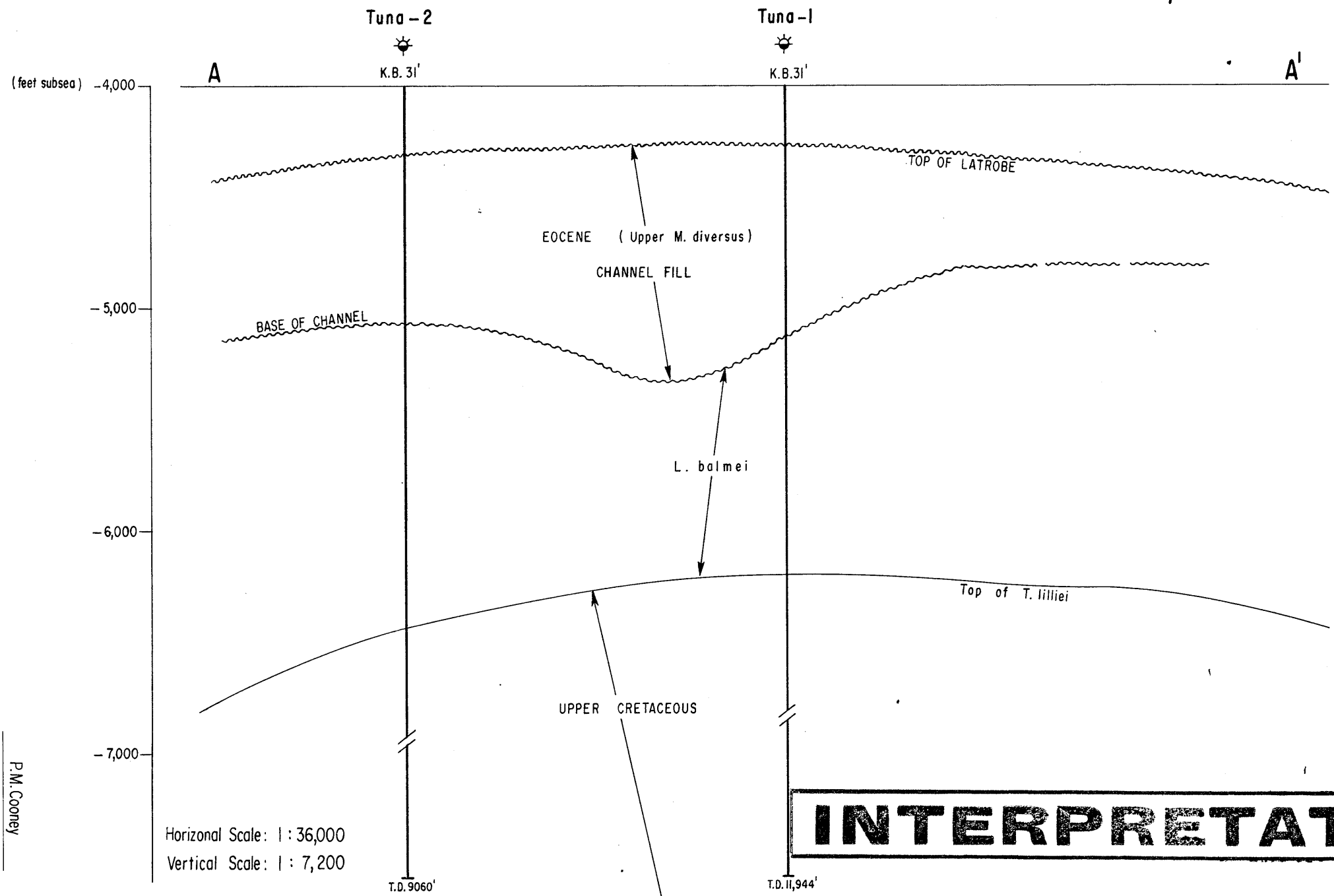
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

GIPPSLAND BASIN
VICTORIA - TASMANIA

LOCALITY MAP



TO ACCOMPANY: TUNA - 1, 2 COMPLETION REPORT
DATE: JANUARY, 1969

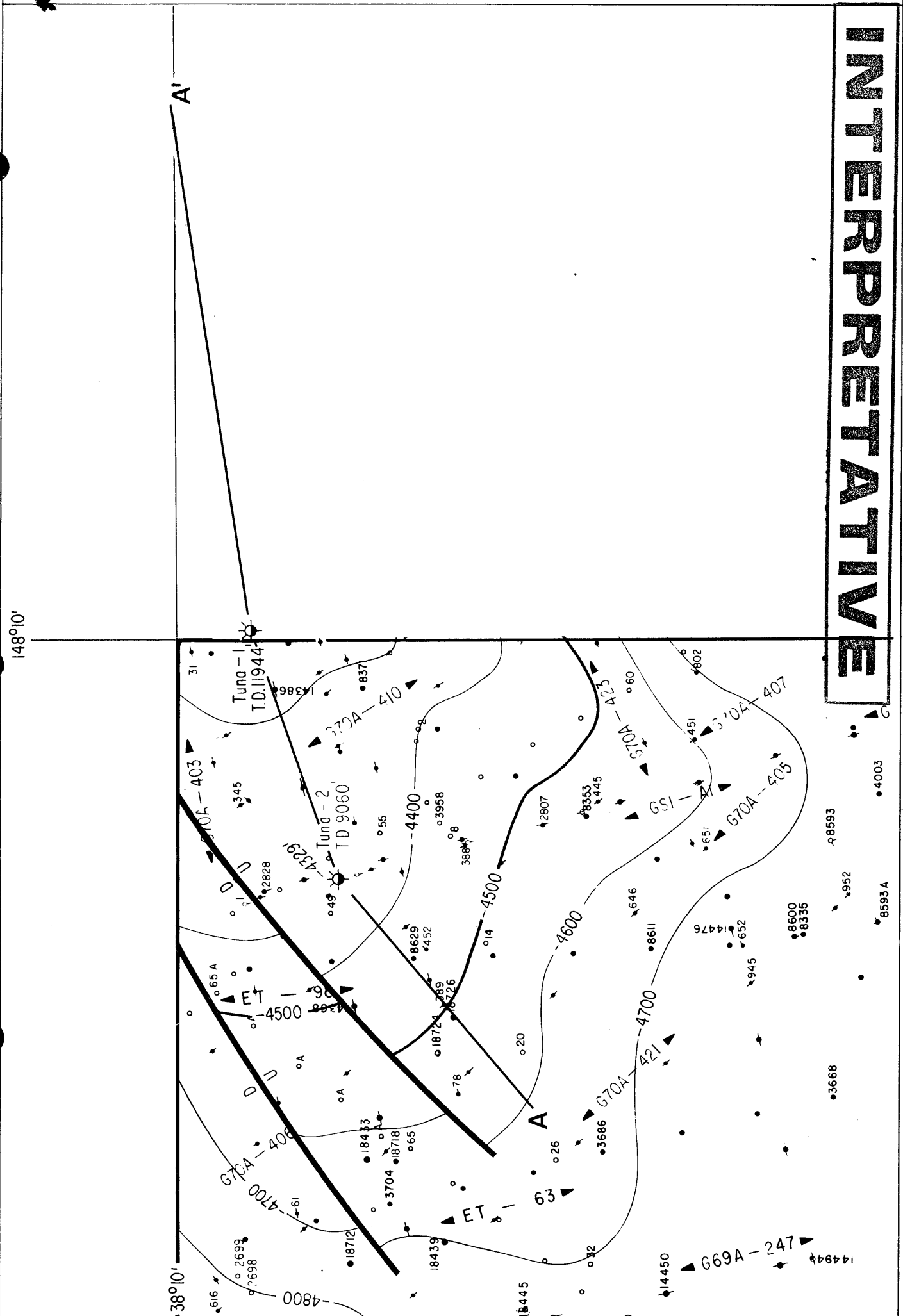


INTERPRETATIVE

P.M. Cooney
Geologist
Dwg: 1033/09/23

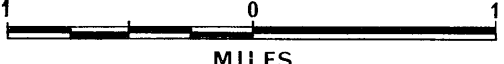
GEOLOGIC MAP OF AFTER DRILLING PICTURE

INTERPRETATIVE



STRUCTURE MAP ON TOP OF LATROBE GROUP

SCALE 1 : 50,000



MILES

P.M.COONEY

Geologist

CONTOUR INTERVAL : 100'

DATUM : SEA LEVEL

Dwg. 1033/OP/24

Appendix A

Conventional Core Descriptions

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 1.

WELL: TUNA - 2

Interval Cored 4391 - 4429 ft., Cut 38 ft., Recovered 10 ft., (%) Fr. LV.

Bit Type Diamond, Bit Size 8 3/4 " in., Desc. by W.H.N. Date NOV 6 '68

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
91				CORE FEEL JUMBLED FROM THE BARREL INTO A PILE OF LOOSELY CONSOLIDATED SAND 3/4' TK SECTION RECOVERED AT BASE APPROX - 4400'
				S.S. Quartzose, f-granule c occasional pebbles grey & brown grey; Matrix material mica with very minor to carb material
01				very clean sand - brownish coloured sand contains fine dark brn carbonaceous matrix material which is non fluorescent
				Faint colour lamination evident in occasional small chunks, Laminae marked by increase in clay matrix content
				Very strong petroliferous odour and spotty bright yellow white fluorescence.
10				
20				

REMARKS:

1 core analysis at ~ 4400'

SAMPLE	DEPTH	PERM	POROSITY	PORE SAT	Oil	Water	Gr
		HORZ - VERT					
1	4400'	4630 2870	22.3	3-45	55-2		9.2.

CORE DESCRIPTION

Core No. 2

WELL: TUNA - 2

Interval Cored 4432 - 4492 ft., Cut 59' ft., Recovered 8' ft., () % Fr. L.V.

Bit Type DIAMOND, Bit Size 8 3/4 in., Desc. by RAB. Date 6 NOV '68

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
33		☆	4433 - 34.5	Sandstone - quartzose It gney brown, fine to granular grains, angular to sub rounded with larger grains better rounded - poorly sorted & poorly consolidated ab. mica & poss. clay matrix, some tiny carbonac. flecks Strong petroliferous odour when freshly broken.
41		☆	34.5 - 41	Sandstone - quartzose, It gney, friable poorly consolidated. gen well sorted & grains angular to sub angular of fine to medium sand size. Very occasional larger grain. Suggest. of even parallel bedding. Scarce columnar struct. suggest burrowing? Some platy mica grains but quite clean sand gen in finely disseminated pyrite & in carbonaceous material Very porous & permeable Petroliferous odour when broken, no obvious fluorescence

REMARKS:

Cone Analysis 4433, 35, 37, 39

Sample	Depth	HOR. PERY	VERT	Por.	Oil	T. Water	Gb
2	4433	496	168	23.0	3.35	58.3	8.83
3	4435	381	6.6	30.2	0.66	56.9	12.8
4	4437	790	716	31.1	0.64	64.3	10.9
5	4439	593	172	33.9	0.59	59.0	13.7

CORE DESCRIPTION

Core No. 3

WELL: TUNA-2

Interval Cored 4492-4530 ft., Cut 38 ft., Recovered 25 ft., (%) Fm. L.V.

Bit Type DIAMOND, Bit Size 8 3/4" in., Desc. by R.B. & U.N. Date NOV 7 '68

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology																								
92		⊕	4492-97	Sandstone - granular, grey, poorly consolidated, with occ. evidence of even parallel bedding at low angle grains fine to coarse & occ. granule i.e. ill sorted, clean & high porosity & permeable. Some darker lithic grains, little mica & finely disseminated pyrite, little carbonaceous mat. Interbedded more shaly layers. brown grey showing current? ripple lamination, some evidence of low angle inclined sets of even parallel laminae suggesting festoon cross bedding (runnel???)																								
500		⊕	97-4500	Pebbly Sandstone - grey - fine to granular & pebbles granular. clay matrix, little mica high porosity & perm. carbonaceous flecks faint suggestion of parallel bedding																								
		⊕	4500-16	Sandstone & shaly ss. as in 92-97 interval burrowing evident																								
		⊕	4516-17	Claystone & very thin ss laminae suggestion of current ripples burrowing evident & coarsely filled burrow tubes - carbonaceous mat. common																								
20				Strong petroliferous odour when freshly broken even whole interval.																								
50			Cone analysis	<table border="0"> <tr> <td>4494</td> <td>4508</td> <td>Wax Samples</td> <td>4495-96</td> </tr> <tr> <td>97</td> <td>10</td> <td></td> <td>4501-2</td> </tr> <tr> <td>4500</td> <td>12</td> <td></td> <td>4503-04</td> </tr> <tr> <td>04</td> <td>13</td> <td></td> <td>4508-09</td> </tr> <tr> <td>05</td> <td>15</td> <td></td> <td>4514-15</td> </tr> <tr> <td>07</td> <td>16</td> <td></td> <td></td> </tr> </table>	4494	4508	Wax Samples	4495-96	97	10		4501-2	4500	12		4503-04	04	13		4508-09	05	15		4514-15	07	16		
4494	4508	Wax Samples	4495-96																									
97	10		4501-2																									
4500	12		4503-04																									
04	13		4508-09																									
05	15		4514-15																									
07	16																											

REMARKS:

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 4

WELL: TURK - 2

Interval Cored 4530-65 ft., Cut 35 ft., Recovered 13 ft., (%) Fr. L.V.

Bit Type DIAMOND, Bit Size 8 3/4" in., Desc. by RAB. Date 8 NOV '68

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
30		♂		NB. GOOD CORE RECOVERY IN SHALY UNITS ONLY. SANDY BANDS ARE LOOSLY CONSOLIDATED AND MUCH WAS WASHED FROM BARREL BY MUD WHEN RECOVERING CORE.
31.5		♂	4530 - 31.5	Sandstone - quartzose, mid grey, fine to granular grain size, grains sub angular to sub rounded & larger grains better rounded, loosely consolidated. Little mica & clay matrix, good perm & porosity. Interbedded shale & silty layers. Even parallel bedding laminae & suggestion of current ripple bedding. abundant carbonaceous material & pyritic layers. Sharp ^{scour} contacts between shale and granular bands. some questionable burrow tubes.
38.5			4531.5 - 38.5	Interbedded sand & shale. sand s. grey fine to med, ang to subang. shale brown, carbonaceous, burrowing?? & associated slumping, reasonable porosity & perm in small sand stringers - ab. pyrite finely disseminated.
43			4538.5 - 39.5	S.S. quartzose - fine to granular similar int: 30-31.5 burrowing??
			4539.5 - 43	Interbedded sand & shale similar unit 31.5 - 38.5
				Strong fluorescence below 4540 feet and pet. odour. Above 4540' pet. odour when broken, no obvious fluorescence but good cut

REMARKS: Core analysis 4530, 4531, 4532, 4536, 4538, Wax Samples 4533 - 33.5
 4540, 4541, 4542, 4543 4536 - 36.5
 4541 - 41.5

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 5

WELL: TUNA-2

Interval Cored 4565 - 4607 ft., Cut 42' ft., Recovered 25' ft., (% Fm. L.V.

Bit Type DIAMOND, Bit Size 8 3/4 in., Desc. by R.A.B. Date 9 Nov '68

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology	
65			4565 - 66.5	Interbedded finely laminated silty mudst. and sandstone. - silty mudst. dark brown, quite silty & abundant carbonaceous material. finely laminated & quite fissile along bedding abundant finely disseminated pyrite.	
70				- Sandstone grey, fine to granular, poorly sorted & loosely consolidated. Grains angular to sub rounded abundant mica and finely diss. pyrite.	
					- Sharp scour type contacts between interbeds, some lenticular sands - gen well bedded & carbonaceous & micaceous layers.
80				4566.5 - 81	Interbedded silty mudstone & sand. - mudstone - silty, brown, carbonaceous & micaceous & abundant pyrite
					- sandstone grey, fine to medium-coarse & very occasional granule ab pyrite & carb. material & mica
					- contorted bedding & sand scour contacts & possible current ripple bedding. No obvious burrowing but some evidence of horizontal working of sediment possible lole or flute casting ?? quite good porosity & perm in sand interbeds.
90			N.F. No Cut	4581 - 82.5	sandstone - large interbed. grey fine to granular, ill sorted, angular to sub rounded grains ab. mica, pyrite & little clay matrix. Good perm & porosity
				4582.5 - 90	Interbedded sand & silty mudstone similar to 66.5 - 81 interval above. Coarse pebbly sand at -88' & suggestion of alternate graded beds of granule to fine sand & silt (coarse at base) good porosity & permeability
					Good colour & oil staining & good fluorescence from top of core to approx 4587' - below -87' no colour & no cut

REMARKS:

Good colour & oil staining & good fluorescence from top of core to approx 4587' - below -87' no colour & no cut

Cone analysis	4567	4581	WAX Samples	4570 - 71
	68	84		73 - 73.5
	71	86		75 - 76
	75	87		80 - 80.5
	76	88		

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 6

WELL: JANA 2

Interval Cored 6580-6619 ft., Cut 39 ft., Recovered 35 ft., (90 %) Fr. LATROBE

Type CHRISTENSEN C-20, Bit Size 8 5/16 in., Desc. by R.V. HICKS Date 19 Nov 1968

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
80		1	1	Shale v dk brn gy, v silty, mica, wavy coal lense to 3mm
		2	2	Sandstone m.lt. gy. sa, vt-t, occ m, mod w srt'd, fr por sl spty bri blk wh flour, q cut, w/ faint burrows
85		3	3	Sandstone gte. lt gy, vt-t, q-sa, w srt'd, fr phi spty gal to blk wh flour, fr cut. finely desim pyrite, highly burrowed, w/ wavy discontinuous sl. lam
90		4	4	Shale v dk brn gy, aa. w/ sd filled burrows, some burrows w/ shoo aa others w/ NS.
		5	5	Sandstone gte. lt gy, slt-ut, m-lt gy, sa aa. shoo aa, w/ wavy shale lam & burrows
95		6	6	Sandstone gte. vt-t, a, w. srt'd, fr phi some clay plugging sl fr lithic, spty to even blk wh flour fr cut, large scale X-bed, occ vt carb. lam.
6600		7	7	Shale v dk brn gy to gy blk, v carb, w/ coal lense
		8	8	Sandstone, v lt gy, vt-t, sa, v spty blk wh flour to NS fr cut in flour, wavy carb lam, some burrows
		9	9	Shale v dk brn gy aa
05		10	10	Sandstone lt gy vt-t aa. spty blk wh flour even bdd w/ occ horiz to sl wavy carb lam
		11	11	Siltstone & Shale inter lam, fine lam, siltstn, v lt gy sdy (vt) NS. shale gy blk v carb, occ micro fault
10		12	12	Sandstone gte, lt gy, f-m, str, w srt'd, q phi even bdd, even to sl spty bri blk wh flour q. cut
15		13	13	Shale brn gy, silty, mica, carb, w/ occ thin coal lense
20				

REMARKS:

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 7

WELL: TUNA 2

Interval Cored 6619-6679 ft., Cut 60 ft., Recovered 60 ft., (100 %) Fr. LATROBE

Bit Type C 20, Bit Size 8 5/16 in., Desc. by R. L. GRAHAM Date 20TH Nov, 1968

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

REMARKS:

some lithics, med-v. crs gr, porous + perm, some clay, choking, carbonaceous bands + shaly streaks, pyritic, sl. micaceous

6659-61 COAL: low grade, w/ v. silty streaks containing some sandstone aggregations

CORE DESCRIPTION

Core No. 7

WELL: TUNA 2

Interval Cored 6619-79 ft., Cut 60 ft., Recovered 60 ft., (100%) Fm. LATROBE

Bit Type C 20, Bit Size 8 5/16 in., Desc. by R.L. GRAHAM Date 20TH NOV, 1968

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
60			6661-6666 1/2	SILTSTONE: v. carbonaceous and shaly with contorted laminae due to burrowing and slumping; some irregular coaly bands. Well sorted, med. grey, quartzo-felds, w/ some lithics, sl. micac., sub rounded, contains shale clasts and grades into f. gr. sandst. of similar comp. in places. No shows.
61	m - m		6666 1/2 - 67 1/2	COAL: v. silty and shaly, low grade.
62	m - m		6667 1/2 - 68 1/2	SHALE: dk grey, carbon, micac. some COALY streaks.
63	m - m		6668 1/2 - 69	SILTSTONE: as for 6661 1/2 - 6666 1/2
64	m - m		6669 - 71	SHALE: as for 6667 1/2 - 68 1/2.
65	m - m		6671 - 72	SILTSTONE: as for 6661 1/2 - 6666 1/2 but v. shaly and grades to silty shale.
66	m - m		6672 - 74	SHALE: as above
67	m - m		6674 - 75	SILTSTONE: as for 6671 - 72
68	m - m		6675 - 76	SANDSTONE: v. silty and shaly, similar to siltstone in 6659 1/2 - 6666 1/2 but slightly coarser.
69	m - m		6676 - 77	SANDSTONE: buff to lt. brown, qtzose with some feldspar and v. minor dk grey and green lithics, sub round, well sorted, clay choked, fine - m. gr, flat bedded, carbonaceous laminae, sl. micaceous, bleeding gas (mainly from carbonaceous mat'l) but no odor, fluv. or cut.
70	m - m		6677 - 78 1/2	SHALE: dk grey, silty, finely micaceous, v. carb, with fine flat bedded coal laminae.
71	m - m		6678 1/2 - 79	COAL: silty, low grade.

REMARKS:

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 8

WELL: TUNA #2

Interval Cored 7215-7251 ft., Cut 36 ft., Recovered 21 ft., (58%) Fr. L.A.T.R.D.B.E

Bit Type _____, Bit Size _____ in., Desc. by R.L. GRAHAM Date 24th Nov, 1968.

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
7215 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51		<p>☀</p>	<p>7215'-16½' SANDSTONE: lt grey, qtzose with a dolomitic cement, med- v. crs grained, poorly sorted, angular-subang, closed framework, v. hd, tight; tr. lithics, carbonaceous mat'l, pyrite. Brilliant pale blue fluorescence - mostly mineral fluor. - but also has a pale bluish cut.</p> <p>7216½'-18½' SHALE: v. silty and irregularly laminated with siltstone similar to above but finer. Shale is dk brown, carbonaceous, micaceous and sl. pyritic.</p> <p>7218½'-22' Very dolomitic SANDSTONE similar to 7215'-16½' but grading to a sandy dolomite with better sorted f-m.gr. sand particles (qtz, feldspar and lithics). Contains numerous carbonaceous inclusions bleeding a little gas, and occasional pyrite nodules up to 15mm. Cementing material in patches appears to be calcite. From 221'-21½' the core is mostly pyrite cementing angular qtz pebbles and carbonaceous material</p> <p>7222'-29½' SANDSTONE: buff, m-crs gr, well sorted, rounded to sub rounded, non calc, qtzose with some lithics, carbonaceous, porous and perm, med. friable. No. fluor. No cut.</p> <p>7229½'-31½' very dolomitic SANDSTONE similar to 7215'-16½'.</p> <p>7231½'-36' SHALE: dk brown to dk grey, v. silty and grading to carbonaceous siltstone in places. v. pyritic - containing radiating growths to several centimetres, sl. micaceous.</p>	

REMARKS:

CORE DESCRIPTION

Core No. # 9

WELL: TUNA 2

Interval Cored 8013 - 8030 ft., Cut 17 ft., Recovered 12 ft., (70 %) Frm. Latrobe

Bit Type C-20, Bit Size 8 5/16 in., Desc. by F.K. Swalbe Date 29/11/68

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
<p>8013</p> <p>15</p> <p>20</p> <p>25</p> <p>30</p>			<p>8013-25' mudstone: mottled lt brn, dk brn, gy brn; massive to v. weakly laminated, subfissile to conchoidal fracture. Hard locally carbonaceous with root mottlings & carb'n root filaments perpendicular to bedding. Also scattered, rare discontinuous carbonaceous laminae parallel to bedding. Carbonaceous leaf & twig impressions on bedding surfaces.</p> <p>Very pyritic, c. v. fg disseminated pyrite throughout core & locally developed massive pyrite-marcasite concentrations as semi-conformable 5"-8"-thick bands (8017' & 8024'); also, numerous large nodular pyrite-marcasite bodies ranging to 4" in diam. Some rare sulphide partings & small nodules show alteration (subaerial weathering?) to chamosite & Fe oxides.</p> <p>Two stages of sulphide genesis are possibly evident: - an initial syndepositional phase producing conformable, concentrated beds c. some minor mudstone "relic" islands within them; also some of the nodular concentrations which exhibit "draping" over the bodies of subsequent mudstone. During the 2nd stage, recrystallisation of the preexisting, more diffuse, v. fg pyrite into relatively pure, nodular, sulphide bodies, with a consequent formation of "halos" about these v. conc. bodies.</p> <p>Bedding generally massive to v. weakly developed even, horizontal. Some poorly developed burrows? & minor slumping evident. Draping over pyrite - marcasite nodules.</p> <p>Possible environment - alluvial plain or interdistributary lake-marsh?</p>	

REMARKS:

Palynology dating samples 8013, 8025'

Appendix B

Sidewall Core Descriptions

file
SIDEWALL CORE DESCRIPTIONS

- 4820 Argillaceous Sandstone tending to siltstone; light mid grey, very fine grained sand, tending to silt size, very argillaceous, abundant finely disseminated pyrite in lenticular concentration. Seems to be interbedded with light brown silty mudstone.
- 4780 Silty mudstone; brown-grey calcareous, micaceous, fine carbonaceous flecks, faint colour-lamination with lighter silty bands.
- 4750 Silty mudstone; as above.
- 4726 Laminated silty mudstone; as above.
- 4700 Laminated silty mudstone; as above.
- 4674 Laminated silty mudstone; as above.
- 4607 Mudstone; mid grey-brown, laminated mudstone with interbedded more silty bands, fairly well compacted, abundant finely disseminated pyrite, mica is plentiful and carbonaceous material also, concentrated into black carbonaceous bands. No petroliferous odour and no cut.
- 4603 Siltstone; and interbedded, more argillaceous bands; some evidence of laminations - mid grey-brown grey, generally dirty silt - low porosity and permeability; abundant finely disseminated pyrite and some carbonaceous material, mica plentiful. No petroliferous odour, faint patchy fluorescence (?), and no cut (?).
- 4594 Sandstone; quartzose, light grey, loosely consolidated, fine to coarse grained with odd granule. Small percentage of lithic grains, some mica; seems fairly clean sand, grains angular-sub rounded and larger grains better rounded; high porosity and permeability. Good petroliferous odour, no fluorescence and no cut.
- 4592 Sandstone; light grey, fine to granular, loosely consolidated, quartz arenite with approximately 5% lithic fragments, angular-subangular, micaceous with slight argillaceous matrix - yellow white fluorescence, petroliferous odour and faint cut.
- 4590 Sandstone; quartzose, light grey, loosely consolidated, fine to granule, quite clean, little mica as above; good odour, patchy fluorescence and good cut.
- **
- 4583 Sandstone; quartzose, silty, light grey, loosely compacted, angular-sub angular, silt to fine sand size, generally ill sorted with some clay matrix, mica abundant and some disseminated pyrite. Some carbonaceous flecks - quite good porosity and permeability, good petroliferous odour, yellow fluorescence and good cut.
- 4580 Sandstone; very fine grained (quartzose), micaceous and slightly argillaceous matrix, finely disseminated pyrite; soft and loosely consolidated bright yellow-white fluorescence and strong petroliferous odour; good cut.
- 4561 Silty sandstone; quartzose, light grey, silt to medium sand size, angular-sub rounded larger grains - ill sorted and loosely consolidated; few lithic grains, some mica and little pyrite, few black carbonaceous flecks; concentrated in part into dark brown carbonaceous bands, evidence of even parallel laminations with variation in carbonaceous and clay content, good odour, fluorescence and cut, with fluorescence good in more sandy bands.

- 4555 Sandstone (tending to siltstone), very fine grained with occasional medium grain. Quartzose with clay matrix, very finely disseminated pyrite in matrix, thinly laminated with brown-grey argillaceous laminae, strong petroliferous odour and bright yellow white fluorescence; good cut.
- 4552 Sandstone; with little silty material, and interbedded brown mudstone. Good fluorescence and odour, fair to good cut.
- 4550 Argillaceous siltstone; light brown-grey, tending to a dirty, very fine sandstone in part; laminated, micaceous, very fine carbonaceous (?) flecks, slight petroliferous odour, no fluorescence except occasional patch (mineral fluorescence ?).
- 4548 Sandstone; quartzose and little silty material, silt - coarse sand, sub angular grains, generally with some larger grains sub rounded, some lithic grains, little mica and little clay matrix; faint odour and no fluorescence and no cut.
- 4546 Sandstone; light grey, very fine to granular, soft, loosely consolidated, minor trace clay matrix, high porosity and permeability, approximately 5%, heavy minerals, minor mica flakes. - Petroliferous odour, but no fluorescence.
- 4542 Sandstone; quartzose, light grey, fine to coarse sand, loosely consolidated, angular to sub rounded larger grains; some lithics, little mica and clay matrix, generally good porosity and permeability. Faint odour, no fluorescence and no cut.
- 4537 Laminated - silty Mudstone; brown-grey, fairly soft. Tending to a dirty silty sandstone with some medium sand sized grains, carbonaceous and micaceous bands, which give bedding features.
- 4484 Sandstone; light grey - dominately fine grained, fairly well sorted, grains angular - subangular, soft and loosely consolidation, minor clay matrix, 80% quartz, 20% lithics and mica; abundant finely disseminated and crystalline pyrite, few grains of kaolin from feldspar, petroliferous odour, but no fluorescence.
- 4468 Sandstone; grey to brown-grey mottled, very fine to granular, poorly sorted, dominately subangular-angular grains, coaly fragments, abundant mica and clay matrix in part, abundant fine disseminated pyrite; still with high porosity and permeability; slight petroliferous odour, but no fluorescence.
- 4418 Sandstone; medium brown-grey to brown-grey; fine to granular, angular to subangular, clay matrix, mica trace, trace fine disseminated pyrite and occasional masses of finely crystalline pyrite, no fluorescence, slight petroliferous odour.
- 4386 Sandstone; light gray, fine to granular, poorly sorted, soft and loose consolidated, minor clay matrix; angular to subangular grains, finely crystalline pyrite, high porosity and permeability, slight petroliferous odour, no fluorescence.
- 4350 Medium grey-brown marl; dense and quite well compacted; little fossil debris, little finely disseminated pyrite.
- 4300, Marl; as above
4250-
4202
- 4099 Marl; as above, abundant finely disseminated pyrite.

**

- 4586 Silty Sandstone; and interbedded grey-medium grey-brown silty mudstone; silt and fine sand sized grains angular- sub angular, with abundant clay matrix material even in the cleander bands. Mica and dark carbonaceous material abundant; abundant finely disseminated pyrite; generally quite low porosity and permeability. No obvious odour, no fluorescence and no cut.
- 4025, Marl; as above.
3960-
3888
- 3741 Marl; medium light grey, massive, with some silt sized calcareous debris; abundant finely disseminated pyrite.
- 3662 As above.
- 3580, Marl; medium-dark grey as above.
3504-
3440
- 3347 Marl; medium-dark grey, dense and quite well consolidated; trace silt sized carbonaceous debris and odd foram-little crystalline gypsum.
- 3238 Marl; as above.
- 3162 Marl; as above.
- 3048 Marl; medium-dark grey, dense, but quite soft and crumbly; dominantly mud and very fine calcareous material; some silt-fine sand sized calcareous debris and odd mica flake. Some finely disseminated pyrite, odd foram is visible but possibly more present.
- 2947 Marl; as above; abundant forams and other calcareous debris.
- 2890 Marl; as above; abundant forams and other calcareous debris; light grey-medium grey, dense, but crumbly, some recrystalline calcite, little finely disseminated pyrite.
- 2746, As above.
2645
- 2568 Light-medium grey marl (very calcareous mudstone); as above. Abundant forams and trace other fossil debris, abundant, finely disseminated pyrite.
- 2460 As above, with odd glauconitic grain.
- 2344, As above.
2245
- 2126 Light-medium grey marl (very calcareous mudstone). Quite soft and crumbly, reasonably abundant forams and sponge spicules, little black carbonaceous material.

R.A. Brotherton.

RAB:AS
27-11-68

DEWALL CORE DESCRIPTIONS

WELL TUNA #2

SERV. CO. SCHLUM.

DATE 6/12/68

LITH. CORE NO. 3

GEOLOGIST R. L. G.

REF. #

FIELD STEP OUT

STATE VICTORIA

ATT.

REC.

PAGE 9 OF 1 PAGE

NO.	DEPTH	REC	LITHOLOGY	COLOR	DISS CLAY	CONS	CALC	ODOR	FIDO	FLUORESCENCE			CUT		CUT FLUOR.		SHOW	PROB. PROD.
										DIST	INT	COL	QUAN	COL	INT	COL		
30	5098	2"	CLAY: brownish grey, firm, slightly carb., micro-micaceous.	brown grey	✓	firm	No	No	-	-	-	-	-	-	-	-	-	-
27	5296	3/4"	SHALE: firm, sl. carb, shmic, silty, qtzose, non calc	lt. olive grey	✓	..	-	-	-	-	-	-	-	-	-	-	-	-
28	5494	2"	CLAY: dk brown with lt grey silty streaks, v. carb., micaceous	dk. brown	✓	..	-	-	-	-	-	-	-	-	-	-	-	-
27	5684	2"	CLAY: sl. micaceous	med. light grey	✓	..	-	-	-	-	-	-	-	-	-	-	-	-
26	5914	1 1/4"	SHALE: carb, silty, pyritic, micaceous	olive grey	✓	..	-	-	-	-	-	-	-	-	-	-	-	-
25	6196	3/4"	SHALE: carb, sl. silty, micaceous.	olive grey	✓	..	-	-	-	-	-	-	-	-	-	-	-	-
24	6790	1 1/4"	SHALE: carb., silty, micaceous	brownish grey	✓	firm	-	-	-	-	-	-	-	-	-	-	-	-
23	6868	1"	SHALY SILTSTONE: finely pyritic, qtzose, arg., poor sorting, carb., micac.	olive grey	✓	med hd.	-	-	-	-	-	-	-	-	-	-	-	-
22	7158	1/2"	SHALE: v. silty, carb., micac., v. sl. pyritic, poorly sorted.	dk. greenish brown	✓	..	-	-	-	-	-	-	-	-	-	-	-	-
19	7360	1/2"	CLAY: v. silty, sl. micac, poorly sorted w/ arg. silt sized qtz grains.	lt. olive grey	✓	firm	-	-	-	-	-	-	-	-	-	-	-	-
18	7548	1"	SHALE: sl. carb., sl. micaceous, well sorted.	lt. grey	✓	med. hd	-	-	-	-	-	-	-	-	-	-	-	-
21	7274	3/4"	SANDSTONE: pebbly (med - 4mm pebbles) v. poorly sorted, clay choked, tight, qtz, 0/R, w/ dk lithics.	lt. grey	✓ tends to swell	firm to friable	✓ + do lo.	Faint hydro.	-	pin point	mod.	bluish yellow	-	-	distinct	yellow blue	✓	poor.
16	7674	1/2"	SANDSTONE: v. fine - med. gr., poor sorting, any - sub round, clay choked, tight, qtz w/ dk lithics	lt. grey	✓ swells	mod. hd	✓ do lo	-	-	..	..	yellow	-	-	..	..	✓	poor
15	7723	1"	SANDSTONE: f - crs gr, poor sorting, any - sub round, clay choked, tight, qtz w/ dk lithics	lt. grey	✓ swells	..	✓	possibly	-	..	..	yellow	-	-	distinct	..	✓	poor
11	8200	3/4"	SHALE: carbonaceous, micaceous	dk. grey	✓	mod. hd	-	-	-	-	-	-	-	-	-	-	-	-
10	8396	1/4"	SHALE: very silty, carbonaceous, micaceous.	dk. grey	✓	hd	-	-	-	-	-	-	-	-	-	-	-	-
9	8405	1/2"	SANDSTONE: f - mgr, well sorted, any - sub rnd, qtz w/ lithics, clay choked, tight.	lt. grey	✓ swells	hd	✓	-	-	pin point	faint	yellow	-	-	weak	blue	✓	poor.
8	8427	1/2"	SANDSTONE: m - crs gr, well sorted, any - sub rnd, qtz w/ lithics, fair porosity & be. fm.	lt. grey	✓	hd	sl. dolo.	-	-	..	..	blue	-	-	weak	blue	✓	poor.
7	8550	3/4"	SANDSTONE: m - v. crs gr, poor sorted, sub any - sub rnd, qtz w/ lithics, clay choked, tight.	lt. grey	✓ swells	hd	sl. dolo.	possibly	-	scattered patchy	fair	blue	-	-	good	blue	✓	poor.
5	8692	1/2"	CONGLOMERATE: pebbles & shale clasts from 8mm to crs gr, clay choked, tight, round qtz pebbles	lt. grey	✓	mod. soft	-	-	-	-	-	-	-	-	-	-	-	-
2	8960	1/2"	SANDSTONE: m - gr, well sorted, sub any - sub rnd, some clay chocking, qtz w/ lithics, mod. p. & p.	lt. grey	✓	friable	sl. calc	-	-	faint. pin point	fair	blue	-	-	weak	yellow blue	✓	v. poor.

APPENDIX C

PALYNOLOGY AND PALAEOBIOLOGY

W 51.

TUNA-2.

TECHNICAL FILE

INTERPRETATIVE

PALYNOLOGY OF THE TUNA FIELD

GIPPSLAND BASIN

by

P.R. Evans

Palyn. Rept. 1970/29

July 1970.

INTRODUCTION

Three wells have been drilled into the Tuna field. A full palynological report was written only for Tuna -1 (Palyn. Rept. 1969/2). Preliminary reports of data from Tuna -2 and -3 have been issued and the relationships between Tuna -1 and -2 were considered in discussions on the Flounder field (Palyn. Rept. 1969/9). Dinoflagellates from the Early Eocene upper M. diversus zone in Tuna -1 were described in Palyn. Rept. 1970/2 and from the Early-Late Eocene of Tuna -3 in Palyn. Rept. 1970/23.

The present report includes a revised view of all palynological data from the three Tuna wells.

Interest in Tuna has centred around two main problems: 1) The size, age and characteristics of the Eocene "channel fill". 2) The position of the top of the Cretaceous. Both problems have had a direct bearing on regional interpretations of the Gippsland Basin.

Other palynological features about Tuna have received less attention, but are at least recorded below for possible future study as need arises.

INTERPRETATIVE

SUMMARY

	Tuna -2	Tuna -1	Tuna -3
<u>N. goniatus</u> Zone			
			S.4450
			S.4460
			S.4470
			S.4480
<hr/>			
			S.4490
			S.4500
<hr/>			
Undiff.		C.4430	
		C.4439	
<hr/>			
Upper <u>M. diversus</u> Zone	C.4535		
	C.4565		
	C.4578		
	C.4590		
<hr/>			
		C.4507	C.4586
		4549	?S.4606
		4565	
		4574	
		4588	
		4592	
		4597	
		4607	
		4621	
<hr/>			
Undiff.	S.4726		
	S.4750		
	S.4800		
	S.4820		
	S.5098		
<hr/>			
Lower <u>M. diversus</u> Zone			S.4623
			S.4654
			S.4692
			S.4719
			?S.4758

* = dinoflagellate zone. C. = core; S. = sidewall core.
 Depths are in feet.

INTERPRETATION

	Tuna -2	Tuna -1	Tuna -3
<u>L. balmei</u> Zone	S.5494	C.5390	S.4994
	S.5684	S.5618	S.5024
	S.6196	S.5708	S.5142
	C.6508	S.5927	S.5520
	S.6580	S.6118	S.5619
	C.6615	C.6190	S.5902
		C.6205	S.6015
		C.6220	S.6181
			S.6409
			S.6414
		C.6523	
		S.6530	
<u>T. lilliei</u> Zone	S.6968	C.6462	
	S.7150	C.6478	S.6579
	C.7246	C.6493	S.6594
		C.6510	S.6602
		C.6578	S.6646
			S.6652
			S.6674
<u>N. senectus</u> Zone	? S.7548	C.7409	S.7067
	? S 8200	C.7436	S.7824
		C.7439	S.8027
		C.8070	S.8044
		C.8074	
<u>T. pachyexinus</u> - <u>C. triplex</u>		C.9349	S.8382
		C.9358	8478
		C.10128	8770
			9067
			9192
<u>A. distocarinatus</u> <u>T. pannosus</u>		C.10280	
		C.11621	
		S.11921	
		S.11940	

INTERPRETATIVE

COMMENT

Lower Cretaceous - Upper Cretaceous

There is no good evidence that Tuna -1, the deepest well, entered the Lower Cretaceous although it probably ended in sediments of the T. pannosus Zone. The T. pannosus Zone is thought to straddle the L-U. Cretaceous boundary, but at the time of drilling, evidence for the C. paradoxa Zone as a mark of distinct Lower Cretaceous was sought.

The deepest sample in Tuna -1. 11940 feet did not yield T. pannosus, but several of the spores present were atypical of the paradoxa Zone and hence even the bottom of the hole is tentatively referred to the pannosus Zone.

T. pannosus was positively identified at 11,621 feet.

The Lower Cretaceous is generally equated with the Strzlecki Group in most discussions about the Gippsland Basin. Basal section in Tuna -1 did not resemble the Strzlecki Group.

However, the T. pannosus Zone in the Otway Basin extends into the Otway Group, a lithological equivalent to the Strzelecki Group. Furthermore, a sequence in Golden Beach West -1 below a drill depth of about 5900 feet which represents in part the T. pannosus Zone has been regarded as either Strzlecki Group or an "intermediate" unit, the "Barracouta Sandstone".

It is possible, therefore, that a lower portion of the Tuna sequence, perhaps that below the lithological change at about 9800 in Tuna -1, is related to the intermediate type of lithology between the typical Strzlecki below (not encountered at Tuna) and the Latrobe Group above.

INTERPRETATIVE

UPPER CRETACEOUS

T. pachyexinus - C. triplex Zones

Studies in the Otway Basin have shown it is difficult to support the pachyexinus and triplex Zones as distinct units and insufficient data are available from Tuna by which separation might be attempted.

Representative samples of the interval are very poor in Tuna -1, but good in Tuna -3. The sidewall core from Tuna -3, 8770 feet is remarkable for its content of dinoflagellates. They have not been studied in detail, but are notable for the absence among their numbers of Deflandreid species by which equivalent levels in the Otway Basin are zoned. Nevertheless, this horizon in Tuna -3 is the only one in the Upper Cretaceous of the Gippsland Basin to yield this type of microfossil.

N. senectus - T. lilliei Zones

The limits and content of the senectus Zone are best demonstrated in Tuna -3,

Tuna -1 at 6462 feet has provided a "standard" for the lilliei zone in the eastern part of the basin. Revised determinations of the extent of the lilliei Zone undertaken during the first part of 1970 were largely based on Tuna.

The top of the zone, based on the decline in Nothofagidites spp. and the first stratigraphic appearance of Tripunctisporis sp. is documented to within an interval of about 50 feet. Main core no. 6 from within this interval could provide additional data about the top of the zone.

INTERPRETATIVE

TERTIARY

Numerous samples are available from the balmei Zone and subdivision of the zone should be possible after further study. The uppermost section of the zone (previously referred to as Pla) is recognizable in Tuna -1 at 5390 feet and Tuna -2 at 5494 feet. Presumably it continues in younger horizons in Tuna - but has not been specifically identified there as a subdivision of the zone. The lower M. diversus Zone above the balmei Zone in Tuna -3 is, therefore, likely to be the result of continuous deposition from balmei to diversus times.

In contrast the presence of late M. diversus Zone above the balmei Zone in Tuna -2 is an indication of the break at the base of the "channel fill" (recognized in Palyn. Rept. 1969/9 in discussion of the Flounder wells).

The upper M. diversus Zone in Tuna -1 has long been noted for its content of dinoflagellates including Wetzeliella thompsonae, at least over a short interval. No dinoflagellates were identified in Tuna -2, but their "absence" is explicable in terms of sample position.

The thompsonae Zone is represented in Tuna -3 only in core at 4596 feet, but relatively abundant dinoflagellates of uncertain zonal position occur immediately below, at 4606 feet, and are provisionally assigned to the same zone.

If the "channel" was filled only with upper M. diversus sediments (as at Flounder) the base of the "channel" could lie as traced on the accompanying diagram. The "channel" has thus cut out the lower M. diversus and a portion of the L. balmei Zone at the locations of Tuna -1 and Tuna -2.

Unlike the "channel" at Flounder, a greater portion of sandstone comprises the fill at Tuna, fewer dinoflagellates are present and the cut was not so deep.

INTERPRETATIVE

The upper M. diversus Zone appears to continue above horizons which could bear W. thompsonae in Tuna -2. However, its relationship to the N. goniatus Zone is less clear. Core at 4439 feet in Tuna -1 is assigned to the goniatus Zone mainly because of its much higher Nothofagidites content. The numerous samples from the upper N. goniatus (= N. asperus) Zone in Tuna -3 are yet stratigraphically higher and are marked by the presence of dinoflagellates of both the extensa and dictyoplokus Zones. Thus the pay section at the top of the Tuna Eocene sequence appears to be referable to the N. goniatus Zone. Whether or not one or more breaks occur below or within the goniatus Zone cannot be determined, although they remain a possibility in view of the brevity of the sequence.

Taylor reports Miocene unit G at 4350 feet in Tuna -2, immediately above the "Latrobe". The extensa and dictyoplokus Zones appear to correlate with Eocene foraminiferal zonules L or K. An hiatus at the top of the "Latrobe" therefore represents the interval Oligocene unit J to Miocene unit H.

INTERPRETATIVE

BASIN _____ CIPRES AND _____ DATE _____ June 1973

WELL NAME _____ EUNA -2 _____ ELEVATION _____ 431 feet _____

AGE	PALYNOLOGIC ZONES	HIGHEST DATA				LOWEST DATA					
		Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
Eocene	<i>T. bellus</i>										
	<i>P. tuberculatus</i>										
Eocene	<i>U. N. asperus</i>										
	<i>L. N. asperus</i>	4418	1			1123	4550	1			1160
	<i>P. asperopolus</i>	4565	1			1164	4800	2			1208
	<i>U. M. diversus</i>	4820	2			1211	5098	1			1257
Paleocene	<i>L. balmei</i>	5494	1			1322	5680	1			1354
	<i>T. longus</i>	6196	1			1463	6615	1			1517
Late Cretaceous	<i>T. lilliei</i>	6968	1			1578	7246	1			1624
	<i>N. senectus</i>										
	<i>C. trip./T. pach.</i>										
	<i>C. distocarin.</i>										
Early Cretaceous	<i>T. pannosus</i>										
	<i>C. paradoxa</i>										
	<i>C. striatus</i>										
	<i>U. C. hughesii</i>										
Early Cretaceous	<i>L. C. hughesii</i>										
	<i>C. stylosus</i>										
Pre-Cretaceous											

COMMENTS: *T. D. 9060 (1997)*

- RATINGS:
- 0; 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 a sample cannot be assigned to one particular zone, then no entry should be made. Also, if an entry is given a 3 or 4 confidence rating, an alternate depth with a better confidence rating should be entered, if possible.

DATE RECORDED BY: L. E. Stover / A. E. Partidge. DATE June 1973.

DATA REVISED BY: CHERRY: L. E. S. DATE Dec. 1973

BASIN GIPPSLAND

DATE

INTERPRETATIVE

WELL NAME TUNA - 2

ELEVATION

KB + 31 feet.

AGE	PALYNOLOGIC ZONES	HIGHEST DATA				LOWEST DATA					
		Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
EOCENE	<u>P. tuberculatus</u>										
	<u>U. N. asperus</u>										
	<u>M. N. asperus</u>										
	<u>L. N. asperus</u>										
	<u>P. asperopolus</u>	4418	2	4537	1		4800	2			
	<u>U. M. diversus</u>	4820	2				5098	1			
	<u>M. M. diversus</u>										
	<u>L. M. diversus</u>										
PALEOCENE	<u>U. L. balmei</u>										
	<u>L. L. balmei</u>	5494	1				5914	2	5684	1	
	<u>T. longus</u>	6196	1				6615	1			
CRETACEOUS	<u>T. lilliei</u>	6968	1				7246	1			
	<u>N. senectus</u>										
	<u>C. trip./T.pach.</u>										
	<u>C. distocarin.</u>										
	<u>T. pannosus</u>										
EARLY CRETACEOUS											
PRE-CRETACEOUS											
	<u>T.D.</u>	9060									

COMMENTS:

- RATINGS: 0; 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 spore and pollen or microplankton, or both.
 4; CUTTINGS, NO CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If a sample cannot be assigned to one particular zone, then no entry should be made. Also, if an entry is given a 3 or 4 confidence rating, an alternate depth with a better confidence rating should be entered, if possible.

DATA RECORDED BY: LES/A.D.P.

DATE June 1971; Dec. 1971

DATA REVISED BY: A.D.P.

DATE Jan. 1975.

BASIN G. BRISLAND BASIN

BY David TAYLOR

WELL NAME TUNA-2

DATE 22 April 1971 ELEV. +31'

Foram Zones

		Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
MIOCENE	A	Alternate					
	B	Alternate					
	C	2126	1		2126	1	
	D	2246	1		2997	1	
	D ₁	Alternate					
	D ₂	3048	1		3317	1	
	E	3440	1		4099	1	
	F	4202	1		4503	1	
	G	4300	1		4350	1	
	H ₁	Alternate					
	H ₂	Alternate					
OLIGOCENE	I ₁	Alternate					
	I ₂	Alternate					
	J ₁	Alternate					
	J ₂	Alternate					
EOC.	K	Alternate					
	Pre K						

COMMENTS:

Notes: If highest or lowest data is a 3 or 4, then an alternate 0, 1, 2 highest or lowest data will be filled in if control is available.

If a sample cannot be interpreted to be one zone, as apart from the other, no entry should be made.

- 0 SWC or Core - Complete assemblage (very high confidence).
- 1 SWC or Core - Almost complete assemblage (high confidence).
- 2 SWC or Core - Close to zone change but able to interpret (low confidence).
- 3 Cuttings - Complete assemblage (low confidence).
- 4 Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

Date Revised _____

By _____

APPENDIX D

CORE ANALYSIS

CORE ANALYSIS RESULTS

NOTE: (i) Unless otherwise stated, porosities and permeabilities were determined on two plugs (V&H) cut vertically and horizontally to the axis of the core. Ruska porosimeter and permeameter were used with air and dry nitrogen as the saturating and flowing media respectively. (ii) Oil and water saturations were determined using Soxhlet type apparatus. (iii) Acetone test precipitates are recorded as Neg., Trace, Fair, Strong or Very Strong.

WELL NAME AND NO. Tuna No 2

DATE ANALYSIS COMPLETED 14 January 1976

Core No.	Sample Depth		Lithology	Average Effective Porosity two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm/cc.)		Fluid Saturation (% pore space)		Core Water Salinity (p.p.m. NaCl)	Acetone Test	Fluorescence of freshly broken core	Sample "cut" in tetrachlorethylene
	From	To			V	H	Dry Bulk	Apparent Grain	Water	Oil				
1	4395'0"	4396'6"	Sst; m.gr. v. arg.	22.9	ND	492	2.06	2.67	4.9	0.20	ND	N11	N11	N11
2	4437'0"	4438'0"	Sst; f.gr. sl. arg.	28.5	ND	421	1.87	2.61	52	0.99	ND	Trace	N11	N11
3	4510'0"	4511'0"	Sst; f.gr. arg.	24.6	ND	66	2.00	2.65	69	0.92	ND	Fair	N11	N11
4	4542'0"	4543'0"	Sst; v.f.gr. arg. silty	17.9	2.5	2.6	2.18	2.66	14	0.88	ND	N11	N11	Trace
5	4568'0"	4569'0"	Sst; arg. slty	21.5	5.0	140	2.09	2.66	5.2	1.4	ND	N11	N11	Trace
6	6584'11"	6585'8"	Sst; f.gr. slty shly	12.9	0.12	0.56	2.32	2.66	11	10.9	ND	Fair	N11	Trace
6	6591'0"	6592'0"	Sst; m.gr.	24.3	332	479	2.02	2.66	4.8	5.5	ND	Trace	N11	Trace
6	6597'0"	6598'0"	Sst; m.gr. carb.	17.7	17	17	2.19	2.66	5.9	2.8	ND	Trace	N11	Trace

Remarks: -

General File No. 62/398 74/1076
Well File No. _____

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CORE ANALYSIS RESULTS

NOTE: (i) Unless otherwise stated, porosities and permeabilities were determined on two plugs (V&H) cut vertically and horizontally to the axis of the core. Ruska porosimeter and permeameter were used with air and dry nitrogen as the saturating and flowing media respectively. (ii) Oil and water saturations were determined using Soxhlet type apparatus. (iii) Acetone test precipitates are recorded as Neg., Trace, Fair, Strong or Very Strong.

WELL NAME AND NO. Tuna No 2

DATE ANALYSIS COMPLETED 14 January 1976

Core No.	Sample Depth		Lithology	Average Effective Porosity two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm/cc.)		Fluid Saturation (% pore space)		Core Water Salinity (p.p.m. NaCl)	Acetone Test	Fluorescence of freshly broken core	Sample "cut" in tetrachlorethylene
	From	To			V	H	Dry Bulk	Apparent Grain	Water	Oil				
6	6505'9"	6606'10"	Sst; m.gr. to c.gr.	23.2	122	575	2.05	2.68	1.6	5.3	ND	Fair	Nil	Trace
6	6613'8"	6614'3"	Slst;carb	8.7	ND	<0.1	2.44	2.68	21	1.2	ND	Nil	Nil	Nil
7	6627'0"	6628'0"	Sh; slty	11.2	<0.1	0.22	2.39	2.69	14	0.79	ND	Trace	Nil	Nil
7	6638'7"	6639'4"	Sst; f.gr. carb.	16.5	12	1.8	2.22	2.66	7.6	Nil	ND	Nil	Nil	Nil
7	6644'2"	6645'1"	Sst; f.gr. arg.	16.4	5.3	4.1	2.22	2.66	11.2	Nil	ND	Nil	Nil	Nil
7	6662'2"	6663'1"	Sst; f.gr. carb.	17.8	1.7	3.5	2.19	2.66	9.4	Trace	ND	Nil	Nil	Nil
8	7215'7"	7216'5"	Sst; m.gr. calc.	3.0	<0.1	1.0	2.64	2.73	7.9	Trace	ND	Nil	Good even yellow	Nil
8	7224'3"	7225'1"	Sst; m.gr. to c.gr.	23.7	15.8	121	2.03	2.67	26	Trace	ND	Nil	Nil	Nil

Remarks: -

General File No. 62/200 74/1076
Well File No. _____

2/3

343

CORE ANALYSIS RESULTS

NOTE: (i) Unless otherwise stated, porosities and permeabilities were determined on two plugs (V&H) cut vertically and horizontally to the axis of the core. Ruska porosimeter and permeameter were used with air and dry nitrogen as the saturating and flowing media respectively. (ii) Oil and water saturations were determined using Soxhlet type apparatus. (iii) Acetone test precipitates are recorded as Neg., Trace, Fair, Strong or Very Strong.

WELL NAME AND NO. Tuna No 2

DATE ANALYSIS COMPLETED 14 January 1976

Core No.	Sample Depth		Lithology	Average Effective Porosity two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm/cc.)		Fluid Saturation (% pore space)		Core Water Salinity (p.p.m. NaCl)	Acetone Test	Fluorescence of freshly broken core	Sample "cut" in tetrachlorethylene
	From	To			V	H	Dry Bulk	Apparent Grain	Water	Oil				
8	7227'5"	7228'8"	Sst; m.gr. to c.gr.	22.5	205	126	2.05	2.65	20	Trace	ND	N11	N11	N11
9	8023'0"	8023'11"	Sh; carb.	2.7	ND	2.1*	2.54	2.62	100	Trace	ND	Trace	N11	N11

Remarks: - *Fractured

General File No. 62/229 74/1076
Well File No. _____

3/3

Geochem

26 JUN 1987

TUNA 2
TUN-2

Gippsland Basin

38 10 s. lat.

148 23 e. long.

#	M	FT	ZI-C	ZO-C	ZN	ZH	S1	S2	TMAX	PI	HI	GP
1	503	1650	71.0	0.45	bd1	0.24	bd1	bd1	ndm	---	---	---
2	659	2160	68.6	bd1	bd1	0.27	0.16	bd1	ndm	---	---	0.3
3	832	2730	51.9	0.31	bd1	0.43	0.23	0.5	465	0.36	163	0.8
4	1024	3360	42.3	0.35	bd1	0.47	0.16	0.3	464	0.34	88	0.5
5	1159	3800	44.1	0.41	bd1	0.51	0.14	bd1	ndm	---	---	0.3
6	1360	4460	24.9	0.29	bd1	0.26	0.13	bd1	ndm	---	---	0.2
7	1582	5190	0.3	44.16	0.12	3.78	2.50	149.0	457	0.02	337	151.5
8	1619	5310	bd1	64.49	0.52	5.19	8.28	207.0	460	0.03	445	295.3
9	1674	5490	bd1	35.30	0.23	3.43	3.55	179.0	465	0.02	507	182.6
10	1716	5630	1.8	35.69	0.20	2.23	1.57	52.9	465	0.03	148	54.5
11	1759	5770	bd1	64.90	0.40	4.62	5.05	166.0	463	0.03	256	171.1
12	1802	5910	0.5	36.14	0.16	3.16	2.53	132.0	464	0.02	365	134.5
13	1835	6020	bd1	46.40	0.20	3.57	4.43	158.0	457	0.03	341	162.4
14	1854	6080	5.8	16.20	0.05	1.38	0.80	17.0	467	0.05	105	17.8
15	1918	6290	bd1	11.30	bd1	1.48	0.60	22.9	466	0.03	203	23.5
16	1979	6490	bd1	35.60	0.21	3.07	3.24	104.0	466	0.03	292	107.2
17	2034	6670	bd1	28.40	0.17	2.43	1.99	93.2	466	0.02	346	100.2
	2073	6800	0.7	24.92	0.13	2.23	1.34	80.9	466	0.02	325	92.2
	2116	6940	0.2	30.87	0.18	2.54	2.79	99.7	466	0.03	323	102.5
	2171	7120	bd1	11.60	bd1	1.29	0.97	20.3	465	0.05	175	21.3
21	2235	7330	0.4	5.92	bd1	0.95	0.31	7.6	467	0.04	129	8.0
22	2485	8150	bd1	7.38	bd1	1.07	1.42	16.2	466	0.08	220	17.6
23	2537	8320	0.7	15.42	bd1	1.41	2.18	23.1	466	0.09	150	25.3
24	2604	8540	0.2	18.38	0.05	1.65	2.12	21.4	466	0.09	116	23.5
25	2625	8610	3.4	8.30	bd1	0.97	6.31	23.3	472	0.21	201	29.6
26	2698	8850	10.2	6.88	bd1	0.61	0.61	4.3	471	0.12	63	4.9
27	2723	8930	9.8	3.04	bd1	0.62	0.70	3.5	463	0.16	116	4.2
28	2756	9040	3.3	2.68	bd1	0.31	0.68	3.6	467	0.16	135	4.3
29	1381	4530	bd1	1.46	bd1	0.70	0.21	1.0	456	0.18	65	1.2
30	1384	4541	bd1	1.82	bd1	0.84	0.30	1.5	457	0.17	81	1.8
31	2030	6657	bd1	3.66	bd1	0.76	0.29	6.6	467	0.04	180	6.9
32	2036	6678	bd1	5.30	bd1	1.08	0.50	22.6	470	0.02	426	23.1
33	2205	7233	bd1	1.81	bd1	0.60	0.64	2.6	466	0.20	142	3.2
34	2445	8018	bd1	0.94	bd1	0.65	0.21	2.8	477	0.07	298	3.0

Pyrolysis run with CUS Pyroprobe and modified interface: TMAX inaccurate.

M is sample depth in meters.

FT is sample depth in feet.

ZI-C is inorganic carbon as % calcium carbonate in rock.

ZO-C is organic carbon as % carbon in rock.

ZN is % nitrogen in rock.

ZH is % hydrogen in rock.

S1 is pyrolysis free-hydrocarbon signal (mg hydrocarbons/g rock).

S2 is pyrolysis kerogen signal (mg S2 hydrocarbons/g rock).

PI is production index $[S1/(S1+S2)]$.

TMAX is temperature at which S2 signal is maximum (deg C).

HI is hydrogen index (mg hydrocarbons/g O-C).

GP is genetic potential (kg hydrocarbons/ton rock) $(S1+S2)$.

'bd1' means 'below detection limit'; '---' means 'not determined'.

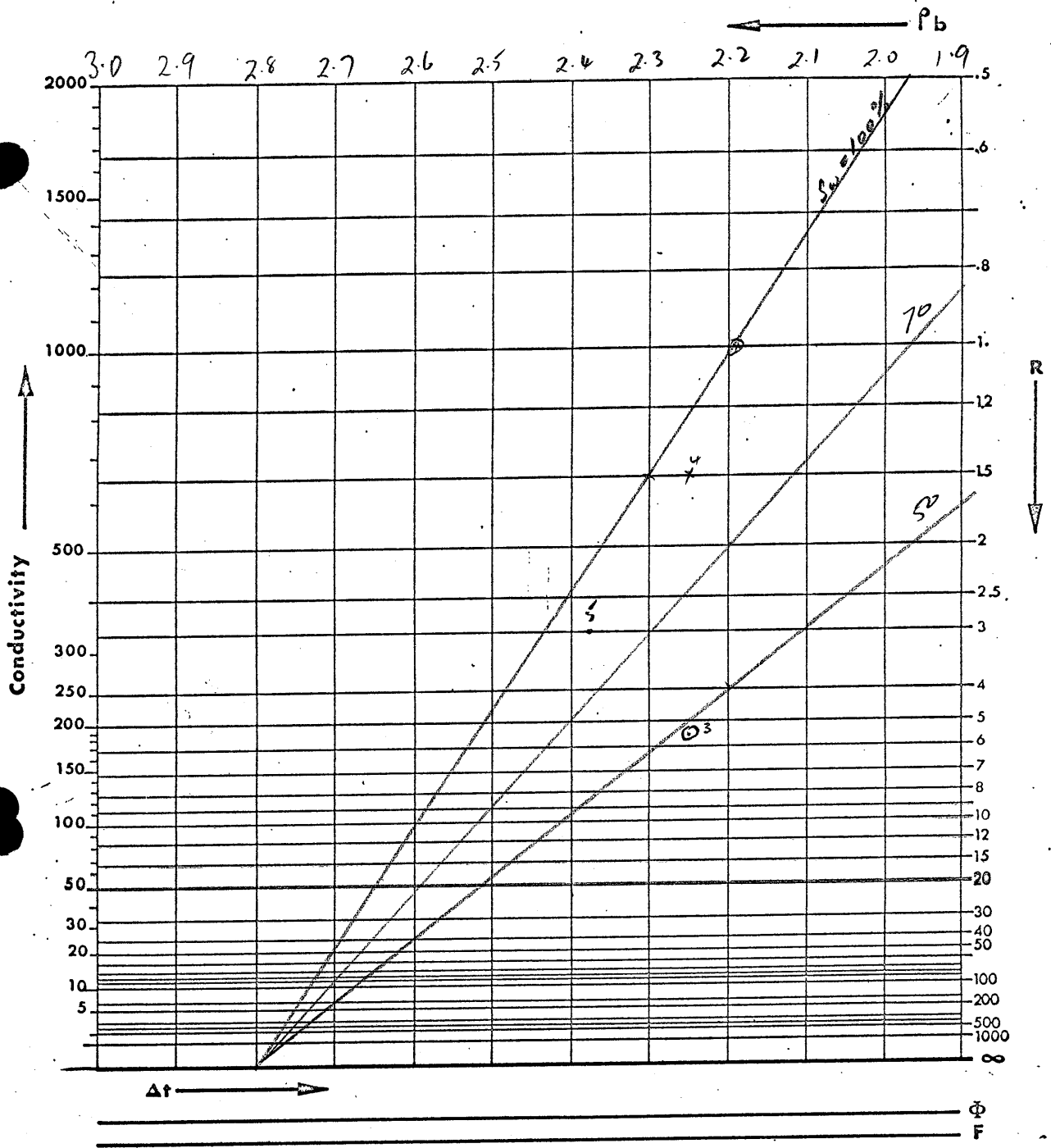
'ndm' means 'no definitive maximum'.

APPENDIX E

LOG ANALYSIS

GRID FOR SONIC — RESISTIVITY OR FD — RESISTIVITY PLOTS

Tuna 2



Grid for Resistivity vs Sonic or vs Formation Density Plot

$$F = \frac{.62}{\phi^{2.15}}$$

ENCLOSURES

PE603824

This is an enclosure indicator page.
The enclosure PE603824 is enclosed within the
container PE906474 at this location in this
document.

The enclosure PE603824 has the following characteristics:

ITEM_BARCODE = PE603824
CONTAINER_BARCODE = PE906474
NAME = Well Completion Log
BASIN = GIPPSLAND
PERMIT = VIC/L4
TYPE = WELL
SUBTYPE = COMPLETION_LOG
DESCRIPTION = Well Completion Log (Ind-Elec) for
Tuna-2
REMARKS =
DATE_CREATED = 5/12/68
DATE_RECEIVED =
W_NO = W531
WELL_NAME = TUNA-2
CONTRACTOR = SCHLUMBERGER
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE603825

This is an enclosure indicator page.
The enclosure PE603825 is enclosed within the
container PE906474 at this location in this
document.

The enclosure PE603825 has the following characteristics:

ITEM_BARCODE = PE603825
CONTAINER_BARCODE = PE906474
NAME = Mud Log
BASIN = GIPPSLAND
PERMIT = VIC/L4
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Mud Log (Grapholog) for Tuna-2
REMARKS =
DATE_CREATED = 10/12/68
DATE_RECEIVED =
W_NO = W531
WELL_NAME = TUNA-2
CONTRACTOR = CORE LABORATORIES
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE603826

This is an enclosure indicator page.
The enclosure PE603826 is enclosed within the
container PE906474 at this location in this
document.

The enclosure PE603826 has the following characteristics:

ITEM_BARCODE = PE603826
CONTAINER_BARCODE = PE906474
NAME = Completion Coregraph
BASIN = GIPPSLAND
PERMIT = VIC/L4
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Completion Coregraph for Tuna-2
REMARKS =
DATE_CREATED =
DATE_RECEIVED =
W_NO = W531
WELL_NAME = TUNA-2
CONTRACTOR = CORE LABORATORIES
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE902872

This is an enclosure indicator page.
The enclosure PE902872 is enclosed within the
container PE906474 at this location in this
document.

The enclosure PE902872 has the following characteristics:

ITEM_BARCODE = PE902872
CONTAINER_BARCODE = PE906474
NAME = Time Depth Curve
BASIN = GIPPSLAND
PERMIT = VIC/L4
TYPE = WELL
SUBTYPE = VELOCITY_CHART
DESCRIPTION = Time Depth Curve (enclosure from WCR)
for Tuna 2
REMARKS =
DATE_CREATED =
DATE_RECEIVED =
W_NO = W531
WELL_NAME = TUNA-2
CONTRACTOR = ESSO EXPLORATION AND PRODUCTION
AUSTRALIA INC
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902871

This is an enclosure indicator page.
The enclosure PE902871 is enclosed within the
container PE906474 at this location in this
document.

The enclosure PE902871 has the following characteristics:

ITEM_BARCODE = PE902871
CONTAINER_BARCODE = PE906474
 NAME = Formation Tester Recovery Data
 BASIN = GIPPSLAND
 PERMIT = VIC/L4
 TYPE = WELL
 SUBTYPE = FIT
DESCRIPTION = Formation Tester Recovery Data
 (enclosure from WCR) for Tuna-2
REMARKS =
DATE_CREATED =
DATE_RECEIVED =
 W_NO = W531
 WELL_NAME = Tuna-2
CONTRACTOR = Schlumberger
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)