



WCR (Text)
Ingleby -1
(W1038)

PE902066

GAS AND FUEL EXPLORATION N.L.

PEP 100
OTWAY BASIN
VICTORIA

PETROLEUM DIVISION

16 MAR 1993

WELL COMPLETION REPORT

INGLEBY -1

TEXT

A.TABASSI
MARCH,1993

INGLEBY NO. 1.

FIGURES

1. - Tenement Map
2. - Location Map
3. - Proposed and Actual Stratigraphy
4. - PEP 100 and Environs Stratigraphic Table
5. - Seismic Line OH85-16
6. - Time Structure Map
7. - Geological Cross-Section across PEP 100
8. - Vitrinite Reflectance Profile
9. - Proposed and Actual Drilling Time.

APPENDICES

1. Details of Drilling Plant *in text*
2. Summary of Wellsite Operation *in text*
3. Drilling Fluid Recap *separate*
4. Sample Description *"*
5. Sidewall Core Description *"*
6. Velocity Survey *"*
7. Synthetic Seismograms *"*
8. Vitrinite Reflectance *"*
9. Palynology *"*

ENCLOSURES

		<u>Scale</u>
1.	Composite Well Log	1:500
2.	Mud Log	1:500
	(Wireline Logs)	
3 & 4	DLL-MLL-GR-Cal	1:200 & 1:500
5 & 6.	Density-Neutron-GR-Cal	1:200 & 1:500
7 & 8.	Sonic-GR-Cal	1:200 & 1:500
9 & 10.	Compensated-Sonic-GR-Cal	1:200 & 1:500
11.	Log Evaluation.	

CONTENTS

	<u>PAGE</u>
SUMMARY	1
CONCLUSION	3
RECOMMENDATIONS	4
1. <u>INTRODUCTION</u>	5
2. <u>WELL HISTORY</u>	6
2.1 Location	6
2.2 General Data	6
2.3 Drilling Data	6
2.3.1 Drilling Contractor	6
2.3.2 Drilling Rig	6
2.3.3 Casing and Cementing Details	6
2.3.4 Drilling Fluid	7
2.3.5 Water Supply	7
2.4 Formation Sampling	8
2.4.1 Cuttings	8
2.4.2 Cores	8
2.4.3 Tests	9
2.5 Logging and Surveys	9
2.5.1 Mud Logging	9
2.5.2 Wireline Logging	9
2.5.3 Velocity Surveys	9
2.5.4 Deviation Survey	9
3. <u>RESULTS OF DRILLING</u>	10
3.1 Stratigraphy	10
3.2 Lithological Descriptions	10
3.2.1 Post-Heytesbury Group	10
3.2.2 Heytesbury Group	10
3.2.3 Nirranda Group	11
3.2.4 Wangerrip Group	11
3.2.5 Otway Group	12
3.3 Hydrocarbon Indications	12
3.3.1 Mud Gas Readings	12
3.3.2 Sample Fluorescence	12

	<u>PAGE</u>
4. <u>GEOLOGY</u>	
4.1 Structure	13
4.2 Discussion	13
4.3 Porosity and Water Saturation	14
4.4. Relevance to Occurrence of Hydrocarbons	15

SUMMARY

Ingleby No.1 was drilled as a wildcat exploration well in PEP100 Otway Basin.

Gas and Fuel Exploration N.L. was operator and the only participant.

Ingleby No.1 was located 19 km east of the township of Colac.

The basal Tertiary Pebble Point Formation and the sandstones of the Dilwyn Formation were primary objectives of the well.

Drilling commenced on 23rd October, 1990 and reached a total depth of 331.2m (KB) on 25th October, 1990.

At total depth the following logs were run:

- Dual Laterolog/Micro-Laterolog
- Compensated Sonic Log
- Compensated Density/Neutron Log
- Velocity Survey
- Side Wall Cores.

No drill stem test operations were performed.

No conventional coring operations were carried out.

No significant hydrocarbon shows were observed. The maximum background gas was 3.1 units (equivalent to 624 ppm C₁ only) recorded at 315.0 to 322.0m interval.

Ingleby No.1 well was plugged and abandoned as a dry hole and the rig was released at 1030 hours on 27th October, 1990.

PEP100 OTWAY BASIN INGLEBY NO.1 GAS & FUEL EXPLORATION NL

Status: P. & A. Dry hole Location: Lat. 38° 18' 53.6"S
Hole Size: 12 1/4" to 69.5m Long. 143° 47' 44.8"E
 8 1/2" to 363.0m

Seismic: OH85-16, SP 375

Casing Shoe: 9 5/8" at 64.4m

Elevation: 114.0m GL asl
 117.3m KB asl

Plugs: 265.0 - 205.0m,
 80.0 - 30.0m
 Surface

Spudded: 23rd October, 1990
Rig Released: 27th October, 1990

ROCK UNIT THICKNESS (M)		DEPTH (M)	SUBSEA (M)
----------------------------	--	-----------	------------

Newer Volcanics (Decomposed)	Surface	117.3	11.7
------------------------------	---------	-------	------

Heytesbury Group	15.0	102.3	136.0
------------------	------	-------	-------

Nirranda Group Demons Bluff	151.0	-33.7	42.0
--------------------------------	-------	-------	------

Wangerrip Group Eastern View (Older Volcanics - 225.0-240.0m)	193.0	-75.7	51.5 (15.0)
--	-------	-------	--------------------

Otway Group Eumeralla	244.5	-127.2	86.7+
--------------------------	-------	--------	-------

Total Depth (Driller)	331.2	-213.9	
-----------------------	-------	--------	--

Total Depth (Logger)	326.5	-209.2	
----------------------	-------	--------	--

Logs: DLS/MRS/GR/SP/CAL, CSS/GR/CAL, NCS/GR/CAL, Velocity Survey, SWC, Mud Log

Test: None

Core: 24SWC, nil Conventional

CONCLUSION

- Ingleby No.1 was drilled in a fault independent Tertiary age reverse faulted anticline.
- The basal Tertiary Pebble Point Formation, one of the Primary objective, was not present and its thin equivalent lacked reservoir characteristics.
- The sandstone of the Eastern View Formation of the Wangerrip Group was poorly developed and found to be water saturated.
- The Eumeralla Formation was entered 45.5m higher than prognosed.
- The entire sedimentary sequence drilled is generally considered too immature to generate significant quantity of hydrocarbons.
- The well appears to have been a valid test of the basal Tertiary play.
- The results of the well support a number of geological concepts in the area.

RECOMMENDATIONS

The following are recommended based on the above conclusions.

- The sandstones of the Eastern View Formation requires further investigation prior to being targeted as primary objective.
- The development of the Pebble Point Formation is doubtful in this area and should not be considered as a primary objective.
- The sandstones of the Pretty Hill Formation should be considered as the primary objective in PEP100.
- Any possible development of intra-Eumeralla sandstone should be considered as secondary objective as it may have reservoir characteristics.

Prepared By: A. Tabassi

1. INTRODUCTION

Ingleby No.1 was primarily drilled to penetrate the entire Tertiary sequence and to evaluate any hydrocarbon prospectivity.

In the Otway Basin the sandstones of the Dilwyn Formation is reported to have excellent reservoir characteristics. Its porosity could be as high as 30% with permeability in the order of a few darcies. One core sample from this formation in the South Australian portion of the Otway Basin has been reported to have oil show.

Similarly, the Pebble Point Formation is known to exhibit good to very good reservoir characteristics with reported oil and gas shows in a number of wells, eg. Lindon No. 1 and Curdie No. 1.

The above facts were in part responsible for justifying the targeting of these potential reservoirs as the primary objectives.

The Ingleby Prospect was defined as the result of the (1985) Stoneyford and (1988) Nalangil Seismic Surveys. It is a fault independent Tertiary age reverse faulted anticline. The claystone portion of the Eastern View formation was believed to provide adequate vertical and lateral seals.

The poor development of the basal Tertiary reservoir sands may have downgraded the prospectivity of the Tertiary sequences in PEP100, but the significance of the reservoir potential of the sandstones of the Pretty Hill Formation can not be discounted.

2. WELL HISTORY

2.1 Location (See Figures 1 and 2)

Co-ordinates:	Latitude:	38° 18' 53.6" S
	Longitude:	143° 47' 44.8" E
Geophysical Control:	Shot Point:	375
	Seismic Line:	OH85-16
Real Property:	Section:	XIX
	Parish of:	Birregurra
	Shire of:	Winchelsea
Property Owner:	I.D. Greig & H.R. King	
	Powers Lane	
	Birregurra Vic. 3242	

2.2 General Data

Well Name and Number:	Ingleby No.1
Operator:	Gas and Fuel Exploration N.L. 11th Floor, 151 Flinders Street <u>MELBOURNE</u> VIC. 3000
Participants:	None
Elevation:	Ground level: 114.0m ASL Kelly Bushing: 117.3m ASL (Unless otherwise stated, all depths refer to K.B.)
Total depth:	Driller: 331.2m Wireline Logger: 326.5m
Drilling Commencement:	23rd October 1990 @ 1630 hours
Total Depth Reached:	25th October 1990 @ 1800 hours
Rig Released:	27th October 1990 @ 1030 hours
Drilling Time to T.D.:	2 days
Status:	Plugged and abandoned, Dry hole.

2.3 Drilling Data: (See also Appendices 1 and 2)

2.3.1 Drilling Contractor

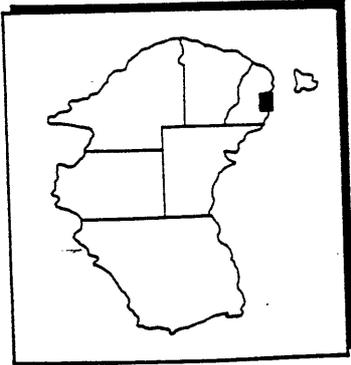
Drillcorp

2.3.2 Drilling Rig

Drillcorp Rig 24.

2.3.3 Casing and Cementing Details

A 18" Conductor Pipe was set at 13.0m prior to rig up.



143°30' 144°00' 144°30'

MELBOURNE

VICTORIA

PORT PHILLIP BAY

GEELONG

PEP 100

WARRACBARUNAH-1

Lake Corangamite

CAMPERDOWN

Lake Colac

STONEFYORD 1

PURRUMBETE 1

COLAC

NALANGIL 1

TIRRENGOWA 1

HINDHAUGH CREEK 1

INGLEBY 1

BIRREGURRA-1

ANGLESEA 1-0

GEELONG FLOW OIL-1

TORQUAY

RANGES

BASS STRAIT

ROSS CREEK 1

SEAVIEW 1

FERGUSON HILL 1

SHERBROOK 1

LORNE

OLANGOLAH 1

OTWAY

APOLLO BAY

PEP 100 LOCATION MAP

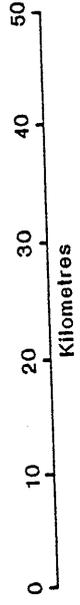


PLATE 2
OT.4360

Surface Casing

Size: 9 5/8"
Weight and Grade: 36 lb/ft, K55-8rd STC
Centralisers: 1st & 3rd coupling
Float Collar: 57.9m
Shoe: 64.4m
Cement: 155 sacks Class "A" with 2% CaCl₂
Method: Displacement
Equipment: Halliburton Services

Cement Plugs

Plug No. 1

Interval: 265.0 - 205.0m
Cement: 75 sacks Class "A" with 2% CaCl₂
Method: Balanced
Tested: 5,000 lbs.

Plug No. 2

Interval: 80.0 - 30.0m
Cement: 85 sacks Class "A" + 2% CaCl₂
Method: Balanced
Tested: 5,000 lbs.

Plug No. 3

Interval: Surface
Cement: 25 sacks Class "A" neat

2.3.4 Drilling Fluid

The hole was spudded using a prehydrated AQUAGEL mud, fluctuated with only a little additional lime. The viscosity was controlled to around 40-45 seconds during drilling with water dilution. The viscosity was deliberately increased to 55 seconds prior to casing point to improve hole condition.

The old mud, diluted with water, was used to drill the cement and casing shoe. While drilling 8 1/2" hole some of the old mud was replaced with new AQUAGEL with CMC HV and small amount of KCL. Hole problems were experienced from 150.0m to the top of the Old Volcanics @ 225.0m. This was due to sticky clay which was alleviated by gradual increase of KCI to a maximum of 4%. Drilling then continued without further problem to the total depth while adding CMC HV and DEXTRID to the mud to reduce the water loss to under 10 cc for logging. The wireline logging was then conducted without any problem and the caliper log showed the hole to be very close to gauge.

2.3.5 Water Supply

Drilling water was obtained and transported from the water supply bore which was some 5 kilometers from the well location.

2.4 Formation Sampling and Testing

2.4.1 Cuttings

Cutting samples were collected at 5m intervals from surface to total depth. Each sample was washed, air dried and divided into four splits, three of which were stored in labelled polythene bags and the fourth one was stored in a plastic sample tray. In addition, from surface casing to total depth unwashed samples were collected at 10m intervals. These samples were stored in labelled cloth bags. One set of the washed and air dried samples in the polythene bags was dispatched to DMID (Petroleum Group) and the rest were retained by the Operator. (See Appendix 4 for descriptions)

2.4.2 Cores

- (i) A conventional core was planned to be taken over the Pebble Point Formation interval. However due to the absence of this formation and/or other desirable lithology no conventional coring operations were carried out.
- (ii) Twenty four sidewall cores were attempted of which twenty three were recovered. These samples were used for a number of studies as indicated below:

The depth, recovery and analysis carried out on sidewall cores are as follows:-
(See Appendix IV for sidewall core descriptions);

No.	Depth (m)	Recovery (cm)	Analysis	
			Palynology	Vitrinite Reflectance
1	323.0	2.5		
2	313.5	None		
3	313.0	1.8	*	*
4	291.0	2.3	*	
5	268.0	4.0		
6	252.0	3.5		
7	248.0	2.3	*	*
8	245.0	2.0		
9	244.0	2.2	*	
10	242.0	3.5		
11	240.0	4.0	*	
12	233.0	1.7		
13	230.0	0.5		
14	224.5	3.0		
15	218.0	3.6		
16	177.0	3.3		
17	164.0	3.6	*	*
18	156.0	3.1		
19	150.0	3.0	*	*
20	147.5	3.5		
21	143.0	4.0		
22	12600	3.5		
23	100.0	3.0	*	*
24	75.0	3.1	*	*

2.4.3 Tests

No tests were carried out.

2.5 Logging and Surveys (See Enclosures 1 to 4)

2.5.1 Mud Logging

A standard skid-mounted Halliburton (Geodata Division) unit was used to record penetration rate, continuous mud gas monitoring, intermittent mud and cutting gas analysis, pump rate, and mud volume data. The mud log is included as Enclosure 2.

2.5.2 Wireline Logging

Wireline logging was performed by BPB Instruments Limited, using a standard truck mounted unit. One logging suite consisting of the following logs was carried out at total depth;

<u>Logging Suite</u>	<u>Interval (m)</u>
Dual Laterolog/Micro-Laterolog Gamma Ray, Spontaneous Potential and Caliper (DLS-MRS-GR-SP-Cal)	326.0 - 63.5 (GR to surface)
Compensated Density/Neutron Gamma Ray and Capiler (NCS-GR-Cal)	326.0 - 63.5
Compensated Sonic Log, Gamma Ray and Caliper (CSS-GR-Cal)	326.0 - 63.5
Sidewall Core-Gamma Ray (SCG-GR)	1 Gun

2.5.3 Velocity Survey

A velocity survey was carried out by Velocity Data Pty. Ltd. the result of which is included as Appendix 6.

2.5.4 Deviation Surveys

Hole deviation surveys were conducted regularly with the following results;

<u>Depth (m)</u>	<u>Deviation (Deg.)</u>
29.0	1
57.0	1/2
215.0	1/2
319.0	1

3. RESULTS OF DRILLING

3.1 Stratigraphy

The following stratigraphic intervals have been delineated using penetration rate, cutting analysis, wireline log interpretation and palynology (see Figures 3 & 4 and Appendix 7).

GROUP	FORMATION	DEPTH (m) KB	DEPTH (m) SS	THICKNESS (m)
Newer Volcanics	(Decomposed)	Surface	117.3	11.7
Heytesbury	(Northern Equivalent)	15.0	102.3	136.0
Nirranda	(Demons Bluff)	* 151.0	- 33.7	42.0
Wangerrip	(Eastern View) (Older Volcanics 225-240m)	* 193.0	- 75.7	51.5 (15.0)
Otway	(Eumeralla)	* 244.5	- 127.2	86.7
Total Depth (Driller)		331.2	- 213.9	
Total Depth (Logger)		326.5	- 209.2	

*Palynology

3.2 Lithological Description

3.2.1 Post Heytesbury Group (Surf. - 15.0m)

Newer Volcanics (Decomposed) 0.0 - 15.0m

Weathered Claystone, light yellowish brown, soft, dispersive, very silty, common very fine sand grains, common medium to coarse multi-coloured lithic fragments.

3.2.2 Heytesbury Group (Northern Equivalent) 15.0 - 151.0m

From 15.0 - 40.0m

Sandstone, (possibly a product of weathered lateritic profile), medium brownish grey to medium brownish green, becoming yellow to dark brown at base, loose at top, extremely hard at base, very fine to silt size, well sorted quartz with minor lithics, trace iron oxide pellets at base, common argillaceous matrix, rare calcite, silica and pyrite cement, trace shell fragments, very poor to nil visual porosity.

From 40.0 - 151.0m

Claystone, medium green grey at top, medium grey to medium brownish and occasionally medium greenish grey with depth, soft, dispersive in part, sticky in part, slightly calcareous with depth, extremely fossiliferous, silty at top, trace glauconite, rare mica, interbedded/interlaminated with;

INGLEBY No.1

PROGNOSSED AND ACTUAL STRATIGRAPHY

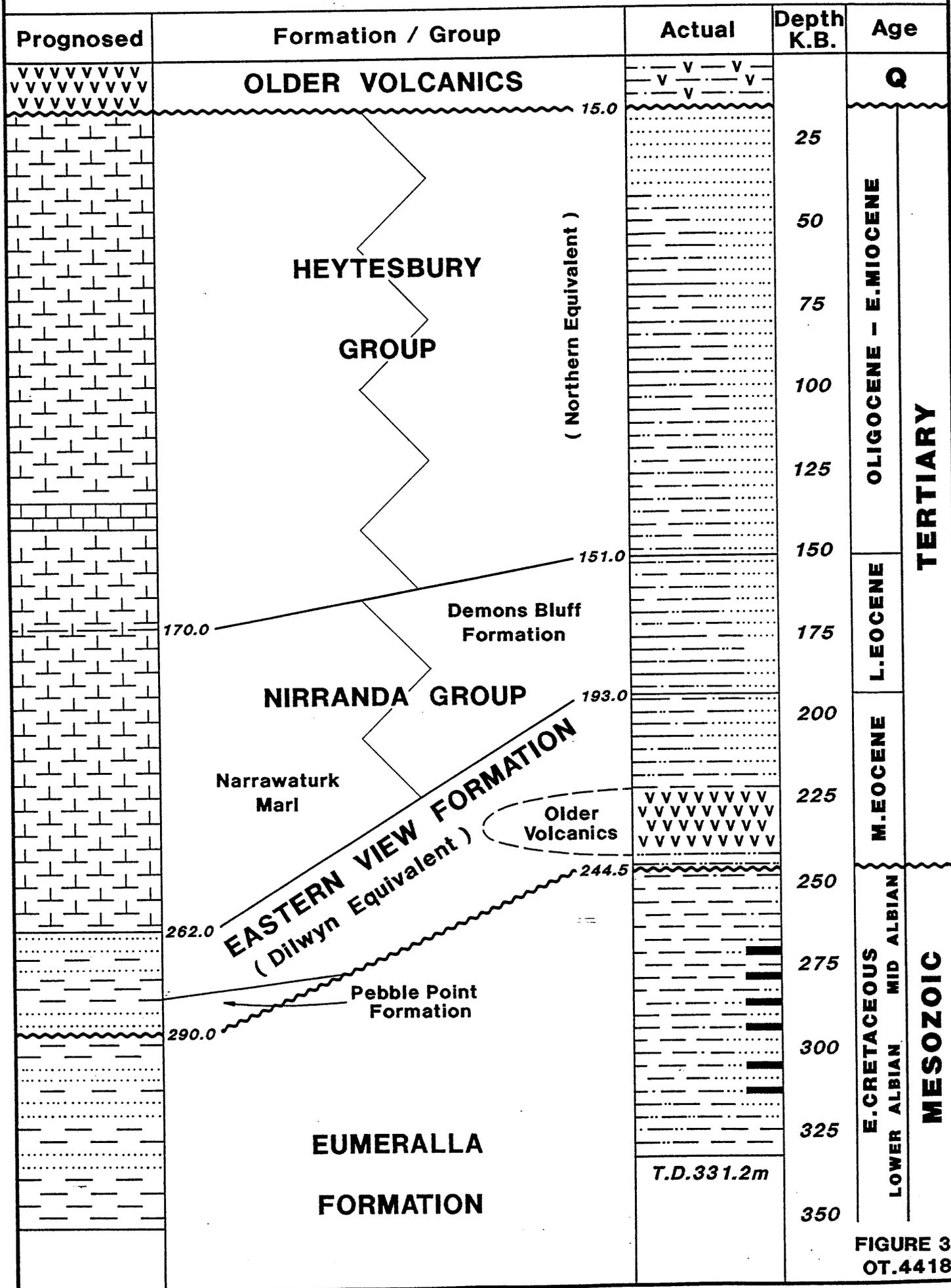


FIGURE 3
OT.4418

GENERALISED STRATIGRAPHIC COLUMN PEP 100 - COLAC TROUGH OTWAY BASIN

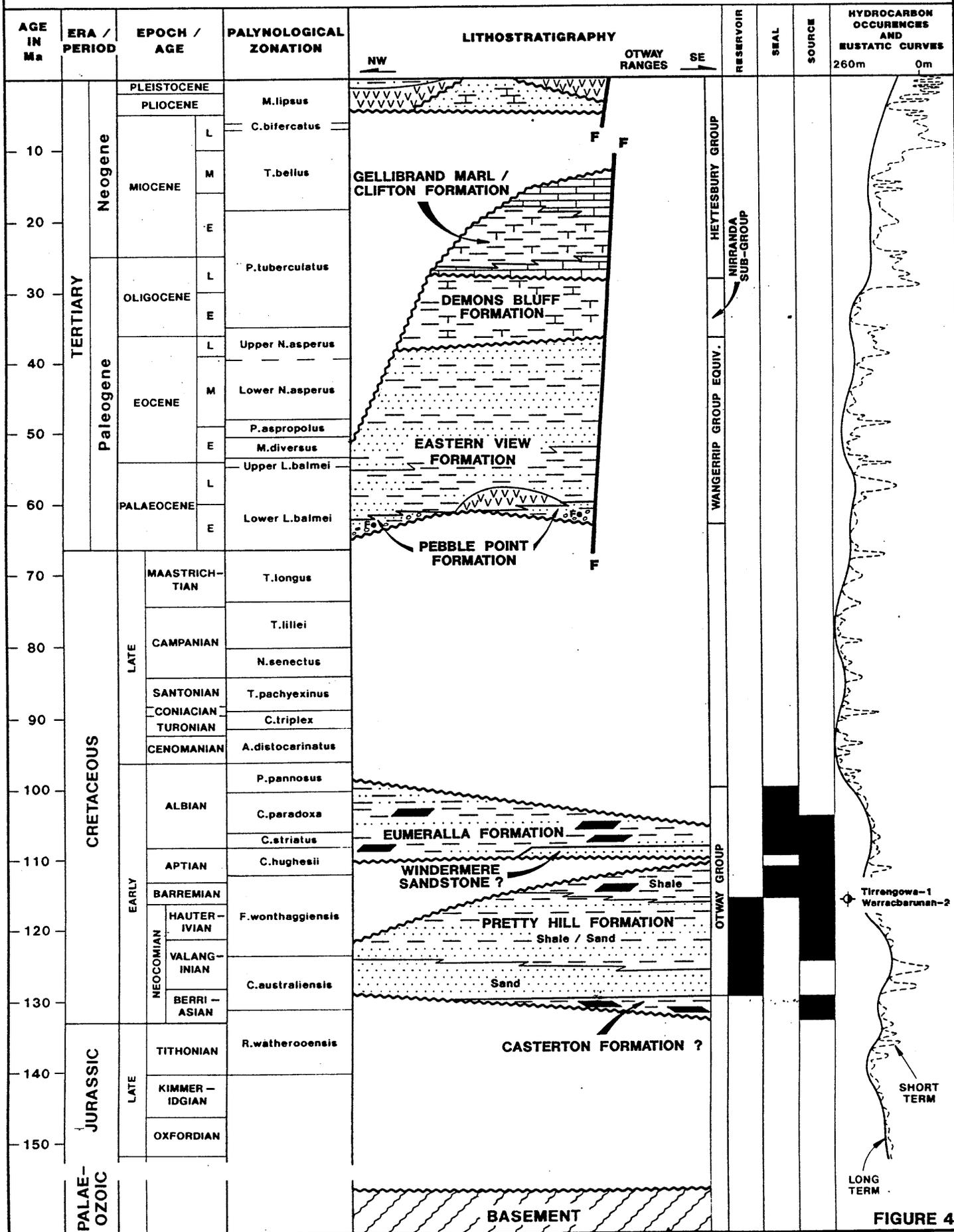


FIGURE 4

Sandstone, medium grey to medium brownish grey, loose to friable, silt size to very fine, subangular to subrounded, fairly well sorted quartz, common medium grey argillaceous matrix, trace lithics, very poor to nil visual porosity, interlaminated with minor;

Siltstone, medium grey to medium brownish grey, soft to firm, dispersive in part, common lithic fragments.

3.2.3 Nirranda Group (Demons Bluff Formation) 151.0 - 193.0m

Siltstone, medium to dark brown, soft, dispersive, commonly micaceous, abundantly argillaceous, trace lithics, common glauconite pellets, trace pyrite nodules, trace shell fragments, in part grading into;

Sandstone, clear to frosty, loose, very fine to coarse, dominantly medium to coarse, subangular to subrounded, poorly sorted quartz with no apparent matrix, rare quartz overgrowth, trace pyrite nodule, good visual porosity.

3.2.4 Wangerrip Group (Eastern View Formation) 193.0 - 244.5m

From 193.0 - 225.0m

Sandstone, clear to frosty, loose to very coarse occasionally fine, dominantly medium to coarse, subangular to subrounded, dominantly subrounded, poor to fair sorted quartz, no apparent matrix, trace glauconite and pyrite nodules, good visual porosity, interbedded/interlaminated with;

Siltstone, medium green grey, medium grey and medium brown in part, soft, occasionally firm, dispersive in part, commonly argillaceous, trace lithics, interlaminated with minor;

Claystone, medium bluish grey, medium grey, trace medium brownish grey, soft, firm in part, dispersive in part, trace lithics, lightly silty.

From 225.0 - 240.0m

Basalt, dark grey to black, medium to dark green in part, hard to very hard when it is fresh, partly weathered and/or decomposed, friable to firm, with off white kaolinitic and in part with medium greenish grey and green tuffitic clay matrix, abundant very coarse fragments of relatively fresh dark grey to black basalt, trace silt, very poor to nil visual porosity.

From 240.0 - 244.5m

Sandstone, clear to frosty, light brown to medium orange at the top, loose, medium to very coarse, angular to subangular, dominantly angular, fair sorted quartz (the angularity of the grains appear to be the product of bit action), common light brown to orange dispersive clay matrix at the top, no apparent matrix with depth, quartz grains at the top have iron staining, good to very good-visual porosity.

Note: The top of this interval appears to be an unconformity surface (?).

3.2.5 Otway Group 244.5 - 331.2m

Eumeralla Formation 244.5 - 331.2m

Claystone, light grey to beige at top, medium green grey and occasionally medium to dark brown at depth, firm to occasionally hard, dispersive, rarely blocky in part, rarely carbonaceous at top, becoming common with depth, rarely micaceous, slightly silty, grading into minor;

Siltstone, in part, interlaminated with;

Sandstone; light grey to beige, off white to light grey with depth, friable, firm in part, very fine to fine, subangular to subrounded, fairly-well sorted quartz and common volcanolithics, trace partially altered feldspar, trace to common argillaceous matrix, rare calcareous cement, very poor to nil visual porosity, with trace of;

Coal, black, firm, brittle and subconchoidal fracture.

3.3 Hydrocarbon Indications

3.3.1 Mud Gas Reading

The mud gas detection equipment was operational from surface to 331.2 metres (Total Depth).

Levels of gas in the drilling mud from surface to the depth of 130.0m were below the detection capabilities of the system.

The level of background gas rose to a maximum of 58 PPM C₁ only at the base of the Heytesbury Group.

The background mud gas reading decreased to an average of 20 PPM C₁ only in the Nirranda and Wangerrip Groups. However, whilst drilling through relatively weathered basalt (towards the base of the Wangerrip Group), the level of mud gas rose again to a maximum of 85 PPM C₁ only.

From 244.5m (Top Eumeralla Formation), back-ground gas decreased to a trace of C₁ only but gradually rose to a maximum of 3.1 units (624 PPM) C₁ only at around 315.0 - 320.0m. This interval coincides with minor sandstone and coal.

3.3.2 Sample Fluorescence

Cutting samples were routinely inspected for fluorescence at 5 metre intervals from surface to the total depth.

No fluorescence or oil staining were reported in any of the cutting samples or sidewall cores cut.

4. GEOLOGY

4.1 Structure

Ingleby prospect was defined as a result of the Stoneyford Seismic Survey (1985) and Nalangil Seismic Survey (1988). It was interpreted as a fault independent Tertiary age reverse faulted anticline.

Age of the faulting and folding which has resulted in forming the Ingleby Prospect is Late Tertiary and coincident with uplift of the Otway Ranges. Structural intensity associated with this Late Tertiary compressional structure decreases away from the Otway Ranges. Reverse faulting appears to have rejuvenated pre-existing east-west trending normal faults although the sense of movement has been reversed.

Ingleby No.1 was located on seismic line OH 85-16, shot point 375 and was drilled to test the sandstones of the Pebble Point/Dilwyn Formations at crestal position (see Figures 5 & 6).

4.2 Discussion

The well results indicated that:

- No major unconformity and/or discomformity was recognised between the undifferentiated Tertiary Groups. However the presence of an iron-stained quartz sandstone at the top of the interval 240.0 to 244.5m could be indicative of a minor unconformity.
- The Heytesbury Group differs lithologically to those penetrated in the deeper part of the basin in the south. The restricted marine environment for this group suggested by palynological analysis may be indicative of the proximity of the prospect area to the basin margin. Hence the change in the lithology.
- The term "Heytesbury Group - Northern Equivalent" is suggested for this group.
- A similar hypothesis may apply to the Nirranda Group lithology. No typical marl and ferruginous sands generally associated with this group was present at this location.
- The Palynological study result has not recognised the Wangerrip Group in this well and the entire interval of 151.0 to 244.5m has been assigned to the Nirranda Group. However, the opinion of this report varies to that of the palynological analysis.
- The Nirranda and Wangerrip Groups are palynologically diachronous. The Nirranda Group spanning from the Upper Eocene to the lower most Oligocene, whilst the Wangerrip Group has been reported from Palaeocene to Late Eocene or perhaps to very Early Oligocene.
- In the southern part of the basin where these two groups have more distinguishable lithologies, their contact can be easily recognised. However, in Ingleby No.1, the two lithologies are very similar and the recognition of contact between these two groups on lithology alone should not be considered reliable.

PE906630

This is an enclosure indicator page.
The enclosure PE906630 is enclosed within the
container PE902066 at this location in this
document.

The enclosure PE906630 has the following characteristics:

ITEM_BARCODE = PE906630
CONTAINER_BARCODE = PE902066
NAME = Seismic Section OH85-16
BASIN = OTWAY
PERMIT = PEP100
TYPE = SEISMIC
SUBTYPE = SECTION
DESCRIPTION = Interpreted Seismic Section OH85-16
showing Ingleby-1(enclosure from
WCR-text-) for Ingleby-1
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 31/03/85
W_NO = W1038
WELL_NAME = INGLEBY-1
CONTRACTOR = GEOPHYSICAL SERVICES INC
CLIENT_OP_CO = HARTOGEN ENERGY LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

BHO

DEPT. NAT. RES & ENV
PE906630

ENCLOSURE No. 5

HARTOGEN ENERGY LIMITED
LINE OH85-16

VP. 820 TO 100
STONEFORD SURVEY
PEP 100, VICTORIA

MIGRATED STACK

FIELD DATA

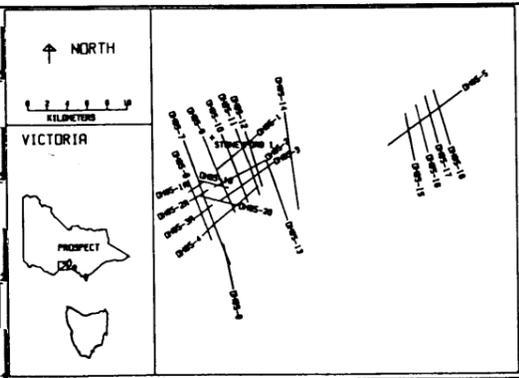
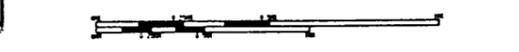
RECORDED BY	GEOPHYSICAL SYSTEMS
PARTY NUMBER	GSC NO 204
DATE	MARCH 1985
FIELD TAPE NUMBERS	OHGFA051 - OHGFA063
INSTRUMENTS	1024 CHANNEL - GEOPOR IV
GEOPHONE TYPE	MARK L21A 10HZ
SAMPLE RATE	2 MSEC
ENERGY SOURCE	VIBROSEIS
SOURCE	30 M
V.P. INTERVAL	6 LINEAR UPSWEEPS
SWEEPS	9000 MSEC
SWEEP LENGTH	12 - 76 HZ
SWEEP FREQUENCY	12 - 80 HZ
	13 - 84 HZ
	14 - 88 HZ
	14 - 92 HZ
	14 - 96 HZ
RECEIVER DATA	NUMBER OF GROUPS 512
	GROUP INTERVAL 10 M
	COVERAGE 8700 PER CENT AT MAX
	SPREAD PATTERN 2540M ---- 0 ---- 2570M

DIGITAL PROCESSING

- FIELD TAPE TRANSLATION - TO 'TIPEX' FORMAT ZERO TO MINIMUM PHASE CONVERSION RESAMPLE TO 4 MSEC
- FIELD STATIC COMPUTATION - DATUM : 150 M ASL MODEL : SMOOTHED WHOLE STATICS
- PRE-DECONVOLUTION RAMP - OFFSET: 100 300 800 2565 METRES TIME : 0 225 510 1700 MSEC
- VELOCITY FILTER (VS) - 9.4 MSEC/TR (NORM COSINE RAMP)
- DESIGNATURE (VS) - F-X MULTICHANNEL DECONVOLUTION
- DECIMATE - 3.1 CDP DECIMATION
- TIME VARIANT SCALING - MODE : DGCS, GATE LENGTH= 500MS
- PRE STACK MUTE (PREMHO RAMP) - OFFSET: 100 340 1480 2565 METRES TIME : 100 575 1220 1900 MSEC
- VELOCITY ANALYSIS - 15 CDP VELPACS AT 3 KM INTERVALS (SURFACE REFERENCED - ADD DATUM CORRECTION FOR TRUE TIME)
- BRUTE STACK - 86 FOLD (AVERAGE)
- RESIDUAL STATICS - SURFACE CONSISTENT CORRECTION TIME AND SPACE VARIANT GATES
- VELOCITY ANALYSIS (RESIDUAL STATICS APPLIED) - 15 CDP VELPACS AT 1.5 KM INTERVALS (SURFACE REFERENCED - ADD DATUM CORRECTION FOR TRUE TIME)
- NMO & STATIC CORRECTIONS - 86 FOLD (AVERAGE) STACK
- MIGRATION VELOCITY CONDITIONING - HORIZON CONSISTENT MIGRATION VELS DETERMINED FROM SPACEVELS (VERS 2)
- F-K MIGRATION - DIPCONTROLLED MIGRATION (45 DEG MAX)
- BANDPASS FILTER - 15 - 90HZ
- TIME VARIANT SCALING - MODE : DGCS, GATE LENGTH=1000MS

DISPLAY

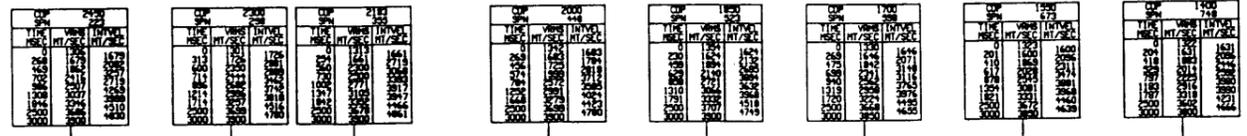
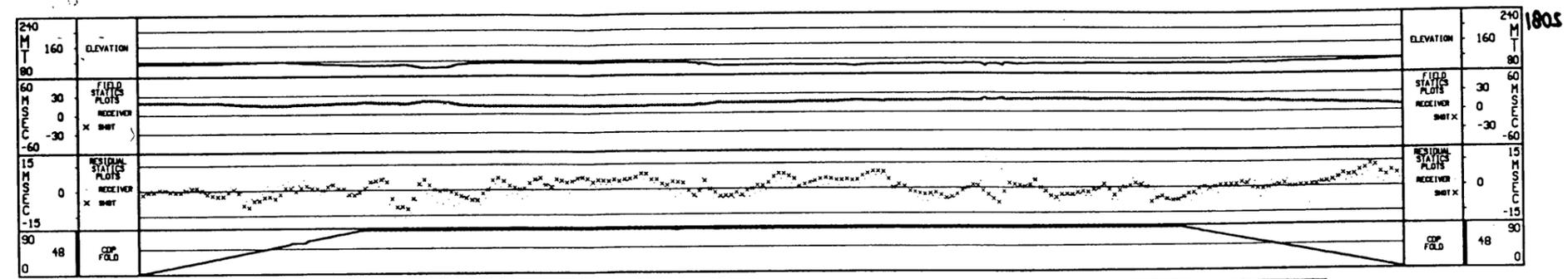
HORIZONTAL SCALE	20 0 TR/IN	66 666657	TR/KM
VERTICAL SCALE	15 0 CH / SEC		
POLARITY	NORMAL		
TRACE TYPE	UTVAR	0 0 PERCENT	
DATUM	150R ASL		
DISPLAY UNIT	0.725711 CH		



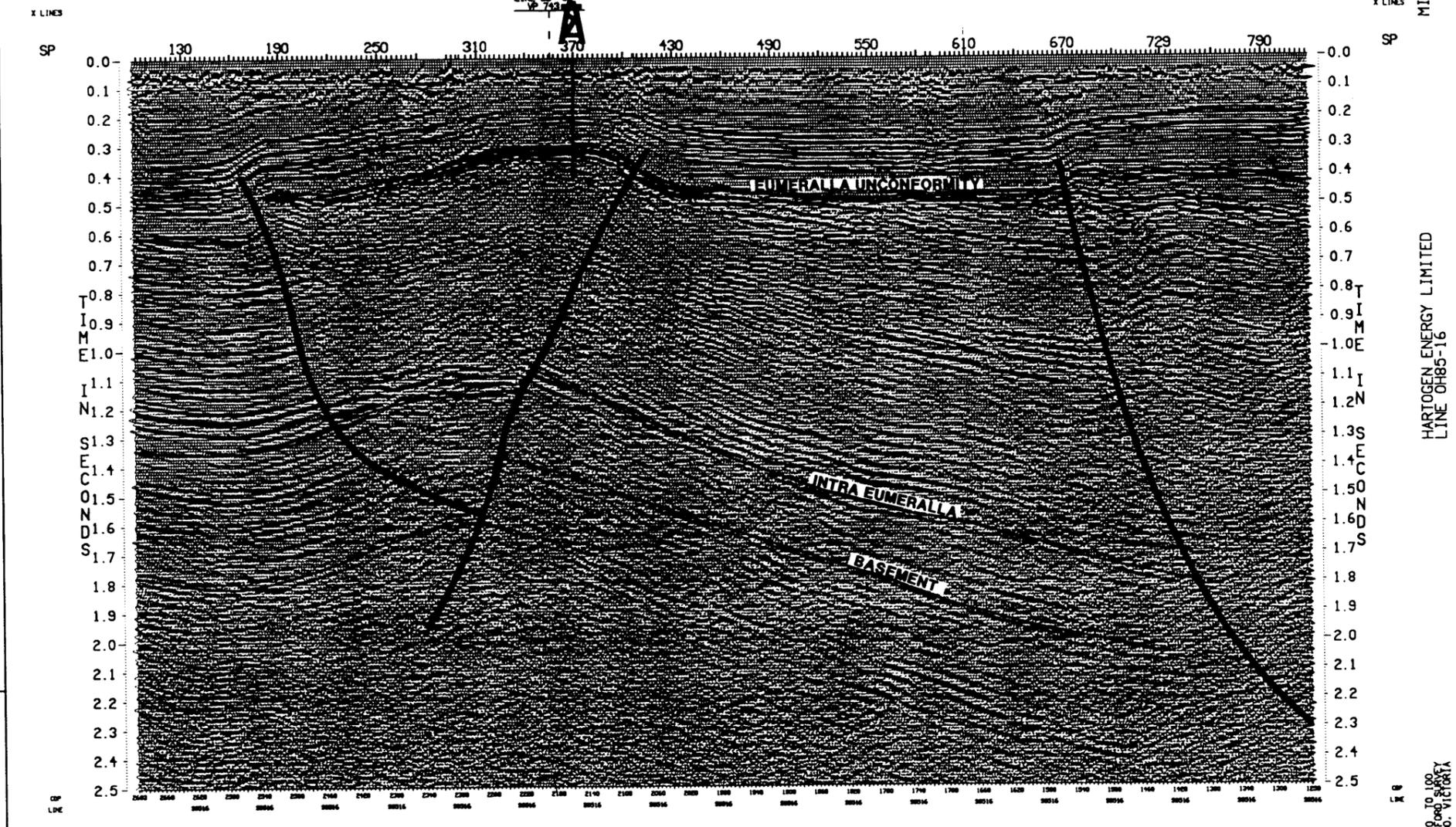
25 SEP 1985 18:24:52

GEOPHYSICAL SERVICE INC
SYDNEY, NEW SOUTH WALES, AUSTRALIA

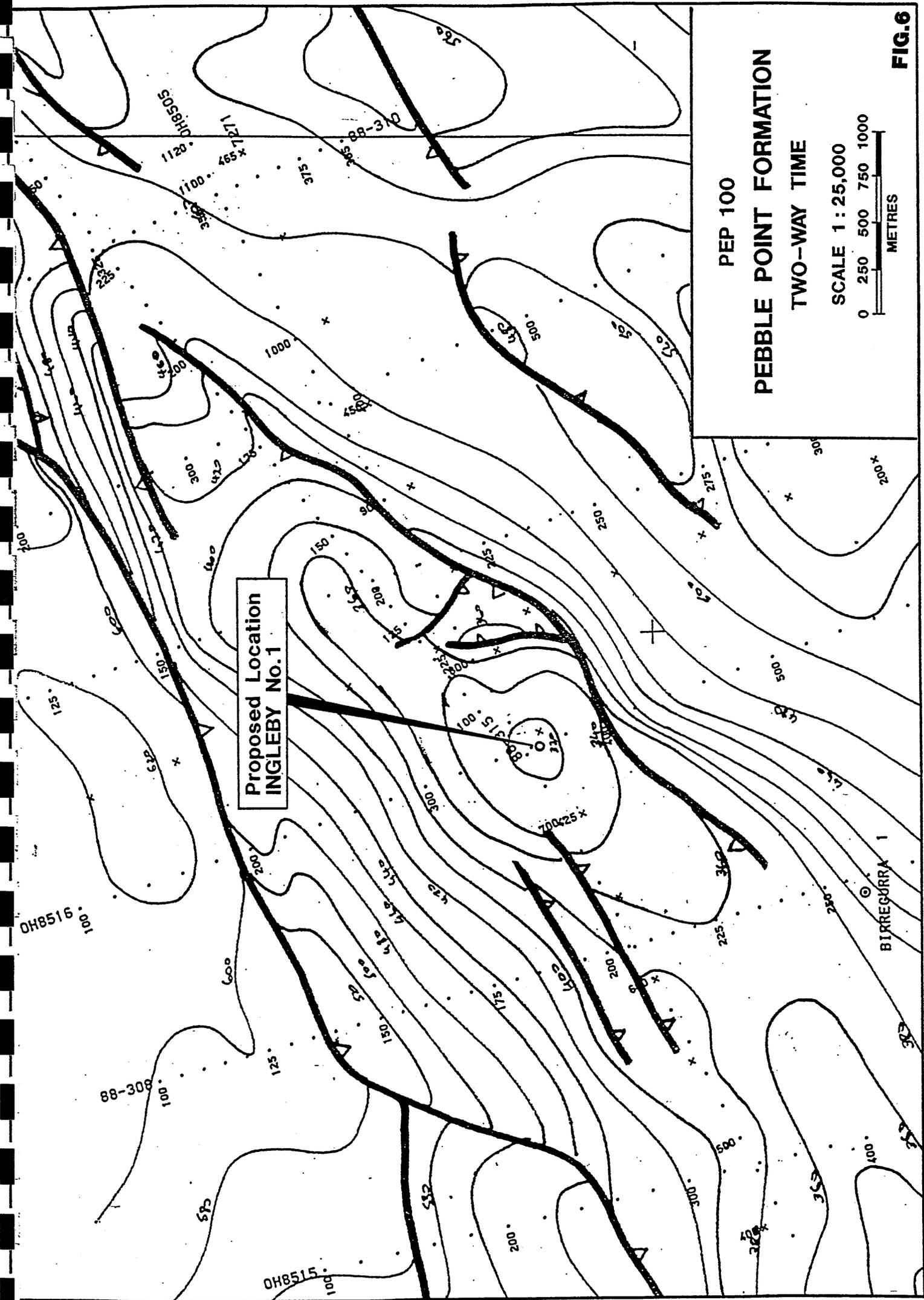
PROCESSING CHECKED BY -



INGLEBY No. 1



MIGRATED STACK
HARTOGEN ENERGY LIMITED
LINE OH85-16
VP. 820 TO 100
STONEFORD SURVEY
PEP 100, VICTORIA



PEP 100

PEBBLE POINT FORMATION

TWO-WAY TIME

SCALE 1 : 25,000



BIRREGURRA 1

FIG. 6

- The interval of 151.0m to 193.0m is here assigned to the more marginal marine Demons Bluff Formation of the Nirranda Group.
- Based on the lithology, environment of deposition (recognised by the palynological analysis) and other aspects which were discussed above, this report assigns the interval 193.0 to 244.5m to the Eastern View Formation of the Wangerrip Group.
- The sandstone of the Pebble Point Formation, the primary objective was not present. However, the interval 240.0 to 244.5m may be considered as "Pebble Point Equivalent".
- The thin nature of this interval together with unavoidable cavings from the mostly weather overlying basalt did not allow the prompt description of this interval at the time of drilling. This was further complicated by the gravelly nature of this interval in which the grain sizes, identified under binocular microscope, were not represented of the formation. The dispersive nature of the argillaceous matrix had also contributed to this complexity.
- A number of sidewall cores, targeted at this interval, have also failed to sample a true representative of this section.
- However, by interpreting the observed lithology it can be compared to that penetrated in Birregurra No.1 a nearby government waterbore. Birregurra No.1 encountered a gravelly, lag-type deposit between 321.6 to 324.0m which has been cored. The unconsolidated conglomerate consists of pebbles up to 2-3 cm across with a silty/sandy argillaceous matrix.
- A thin iron-stained sandstone at the top of this section could represent an unconformity. Although this could be a minor and localized one.
- The major recognizable unconformity is at the top of the Lower Cretaceous Eumeralla Formation. Palynological studies suggest that this unconformity is probably associated with a major and regional peneplanation as *C. paradoxa* was the first palynological zone to be identified. This is particularly true if we assume that the prospect has been uplifted by several hundreds of metres and subsequently folded later in Tertiary time.

The overall thickness of the Tertiary sediments was found to be 45.5 metres thinner than prognosed.

4.3 Porosity and Water Saturation

Two zones were selected for log analysis using the Crocker Data Processing (CDP) Petrographic log Package. Both zones proved to be water saturated with no significant hydrocarbon. See Enclosure 4 for details.

4.4 Contribution to Geology and Relevance to occurrence of Hydrocarbon

Ingleby No.1 was the fifth exploration well drilled in PEP100.

The prospect was tested on the basis of significant reservoir sand expected to have been developed at the base Tertiary Pebble Point Formation and the overlying Dilwyn Formation. The Pebble Point Formation was reported to have excellent reservoir sand with live oil shows in Curdie No.1 in the Port Campbell Embayment and elsewhere within the basin.

Post drilling analysis has revealed that the Pebble Point Formation was not developed at this location. The interval of 240.0 to 244.5m may, however, be considered as its equivalent. It has also revealed that the Wangerrip Group generally contains the sedimentary sequence of the Eastern View Formation not the Dilwyn Formation (the former is considered the non-marine equivalent of the latter). See Figure 7.

The recent data of the Ingleby No.1 drilling supports the hypothesis being forwarded by the Geological Survey of Victoria in redefining the Torquay Embayment Tectonic evolution.

The results also confirmed that there has been a number of movements during Tertiary in the area covered by PEP100, most which were believed to be compressional and have caused the reversal of the fault movements.

The post-Lower Cretaceous uplift and erosion appears to have occurred a number of times and penoplenation is uneven. The palynological comparison of the top of the Eumeralla Formation in Ingleby No.1 and Nalangil No.1 may support the above hypotheses. The C. paradoxa palynological zone is absent in the latter.

The presence of the basal Tertiary Older Volcanics was confirmed, although due to weathered nature of the basalt the attempted K-Ar age dating failed to confirm its age.

It is interesting to note the differences between the present well temperature of Ingleby No.1 and Nalangil No.1. Although their trends are paralleled, the latter is significantly higher. This may be due to the proximity to the Older Volcanics.

The vitrinite reflectance evaluation suggests that the entire Tertiary sequence is immature. It further suggests that the penetrated portion of the Lower Cretaceous Eumeralla Formation might have just reached the early stage of maturation. It does not, however, suggest that any significant quantity of hydrocarbons have been generated from the drilled section.

The vitrinite reflectance profile (Fig. 8) reveals;

- (a) a major unconformity between the base Tertiary and the Lower Cretaceous, and
- (b) the vitrinite reflectance value of the sample close to the top of the Eumeralla Formation is higher than the deeper one.

The presence of the overlying Older Volcanics may have contributed to this higher value.

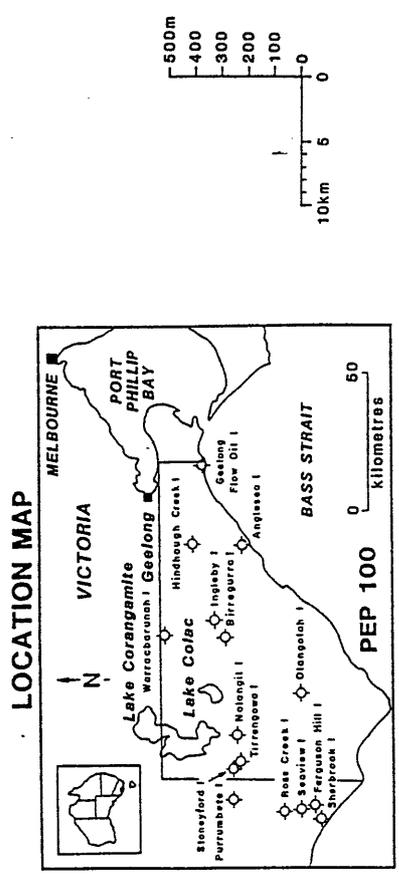
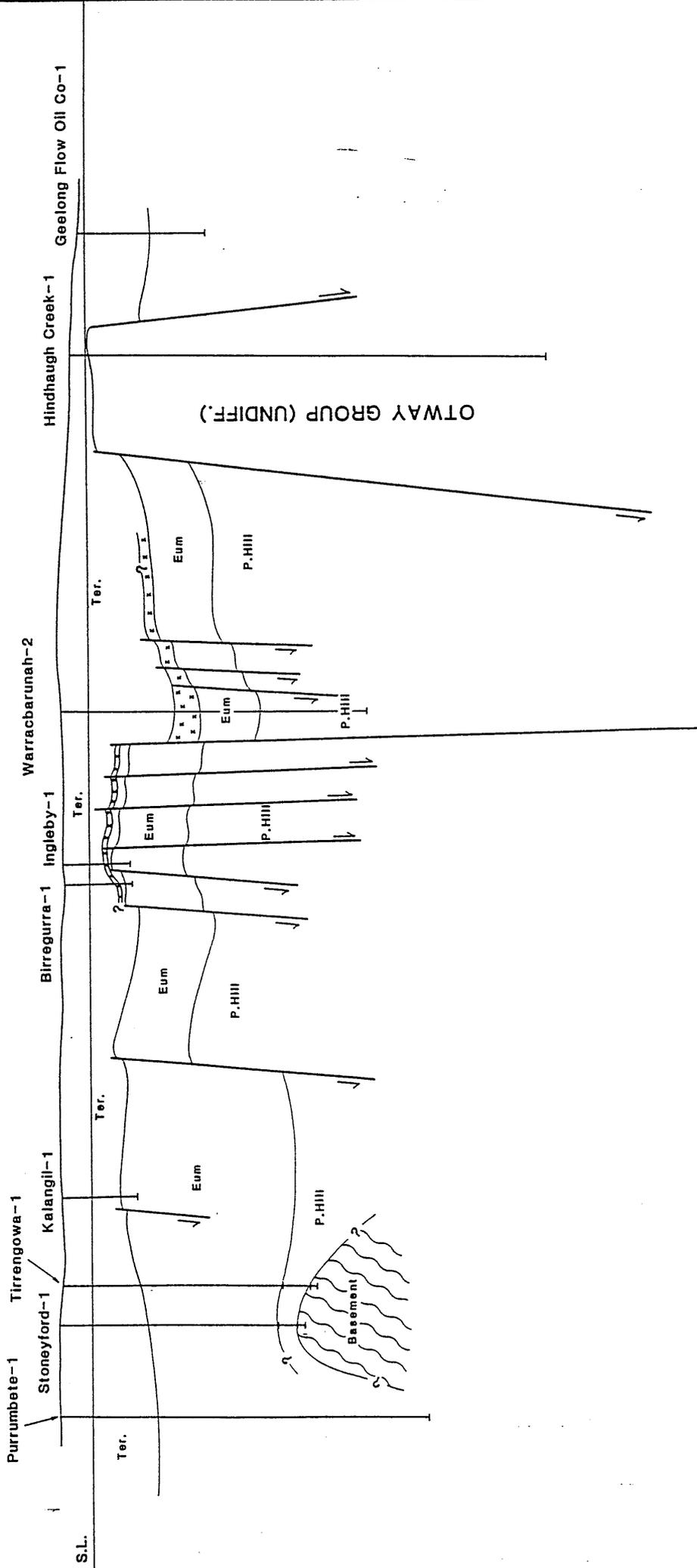


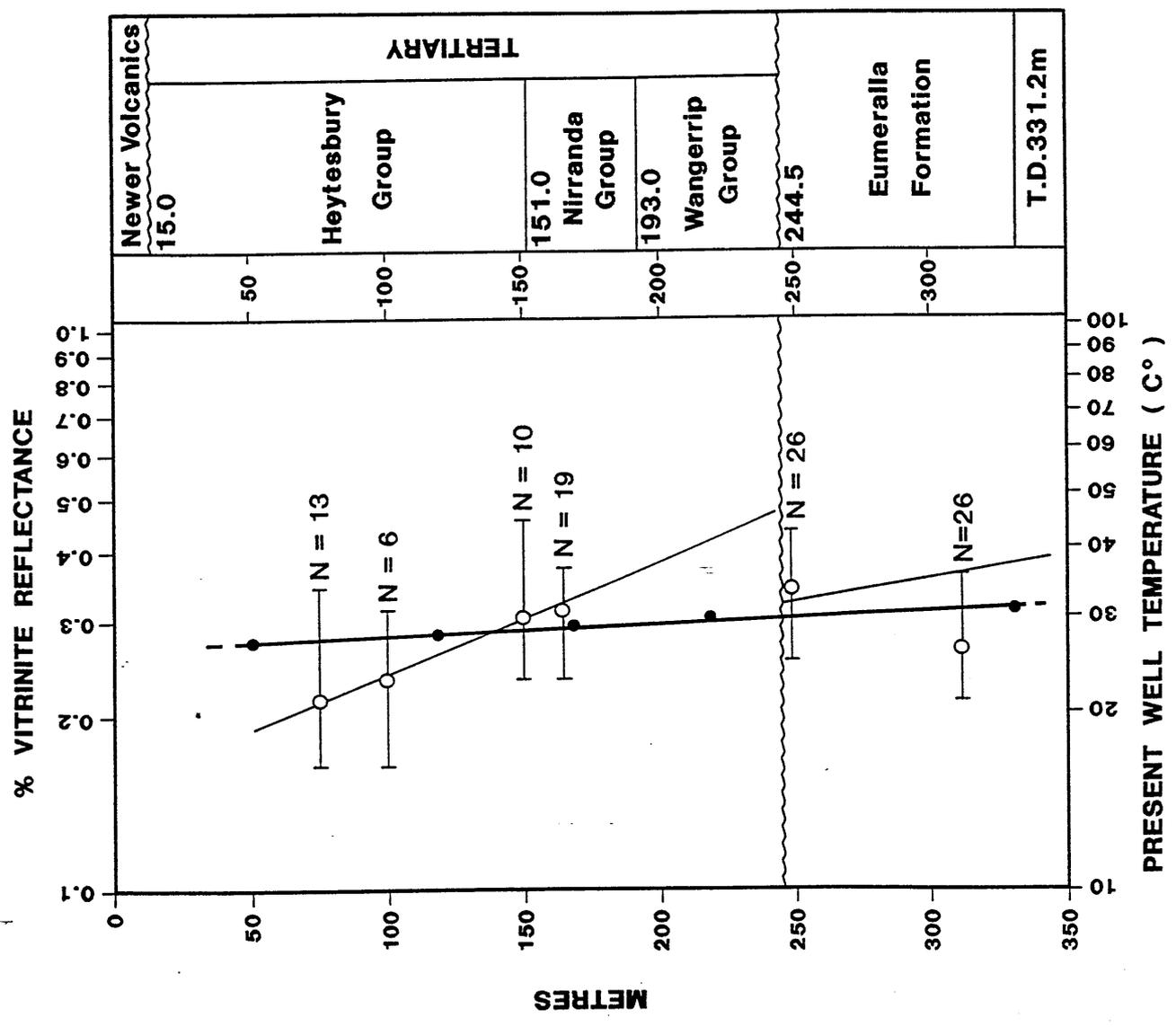
Fig.7 Schematic Geological Cross Section across PEP 100

INGLEBY No.1

VITRINITE REFLECTANCE PROFILE

LEGEND

- Rv Max-Range
- Reflectance Profile
- N Number of Vitrinite
- Present Well Temperature
- Present Well Temperature Profile
- Sidewall Core



APPENDIX 1



5th Cut
A4 Dividers
Re-order code 97052

APPENDIX

I

DETAILS OF

DRILLING PLANTS

DRILLCORP LTD.

RIG 24

INVENTORY

TYPE: Franks Cabot Explorer, Carrier Mounted

CAPACITY: 5,000' - 1,600m

DERRICK: Cabot 96' - 150'
96 X 150,000 lb. capacity
4 leg telescoping

DRAWWORKS: Cabot Split Drawworks Drilling/Tripping
Drums
Model 1D58/150-2
2 Detroit Diesel GM6V-71N
Belt compound

SUB-STRUCTURE: 1 Piece 8' X 14'

MUD PUMPS: 1. Ideco MM450 Duplex 7-1/4" X 12"
Powered by 2 6-71GM

ROTARYTABLE: Gardner-Denver No. RT-18, 18" opening

SWIVEL: Brewster Model 40S

BLOCKS: McKissick Model 83A

HOOK: Web Wilson Hydra Hook

CROWN: Cabot 152,000 lb. capacity with 5 X 25"
Sheeves

B.O.P.: Shaffer Type "E" Double Gate, 10" X 3,000 psi
1. Annular Shaffer 10" X 3,000 psi
2. Annular Regan 9" X 3,000psi

B.O.P.CONTROL: Koomey 80 Gallon, 8 Bottles with 2 Air Pumps

CHOKEMANIFOLD: Demco 2 X 2 X 3,000 psi, 1/fixed,
1/adjustable

DrillCorp Rig 24 Inventory (cont):

DRILLING LINE: 2,500' X 7/8" OD 6 X 19 E.I.P.S. APISQA

MUDCONTROL EQUIPMENT: 2-FMC 5 x 4 Shakers
1-Warman 2 x 10" Desander Unit
1-Warman 4 x 6" Desilter Unit

KELLY: ONCOR 4-1/4" Hex 40"

MUDTANKS: Shaker tank = 250 BBLs
Suction tank = 150 BBLs

**WATER TANK:
& DOGHOUSE** 200 BBLs

FUEL TANKS: 400 gallons, 300 gallons

SUCTION TANK: 150 barrels (optional)

GENERATORS: 1 Rolls Royce with 130 KVA Unit 50 HZ

POWER TONGS: Farr Hydraulic Tubing Tongs, complete with inserts for 2.3/8 inch, 2.7/8 inch, 3.1/2 inch, 4.1/2 inch, 5.1/2 inch, tubing and drillpipe.

LUBRICATOR: Guiberson Hydraulic Wireline Stripper with 2.3/8 inch, 2.7/8 inch, 3.1/2 inch JV rubbers.

DEGASSER: 13ft x 1ft 6 inch Baffled Poor Boy Degasser.

HANDLING TOOLS: Slips and elevator for 2.3/8 inch, 2.7/8 inch, 3.1/2 inch tubing. Air Slips Cavin model 'C' for 2.3/8 inch, 2.7/8 inch 3.1/2 inch tubing.

MISCELLANEOUS: 2.7/8 inch stabbing valves with 2.3/8 inch X/O.
2 sets pipe racks.
Swabbing equipment includes Mandrel and sinker bars.

TUBULARS AVAILABLE: 4,000 ft x 4.1/2 inch pipe grade 'E' 16.60 lb/ft

DRILL COLLARS AVAILABLE: 22 x 6.1/4 inch 2.3/4 inch x 30 ft 4.1/2 in XH conn.

DrillCorp Rig 24 Inventory (cont):

ITEMS AVAILABLE ON REQUEST

DRILL COLLARS	15 X 4.3/4 inch x 30 ft with 3.1/2 inch IF conn.
FISHING EQUIPMENT	Wide rang available.
TUBULARS	<ol style="list-style-type: none">1. 6014 ft (194 JTS 2.7/8 inch OD x 10.4 lb/ft range 2 grade 'E' drillpipe with 4.1/8 OF tool having 2.7/8 inch IF pin x box connections.2. 12 JTS 4.1/8 inch OD range 2 slick drillcollars with 2.7/8 inch IF pin x box connections.3. 12 JTS 3.1/2 inch OD range 2 slick drillcollars with 2.3/8 inch IF pin x box connections.
TUBULARS	DP 4,200Ft x 3.1/2 inch GR 'E' primium 13.3lb/ft 3.1/2 inch IF connection DC 22 x 6.1/4 inch zip with 4 inch IF connection.
MUD TANKS	Shaker tank - 250BBLS
WATER TANK	200BBLS
FUEL TANK	1,000 gallons
GENERATORS	1 Rolls Royce with 130 KVA unit 50HZ.

APPENDIX 2



5th Cut
A4 Dividers
Re-order code 97052

APPENDIX 2

Summary of Wellsite Operation

The Ingleby No.1 drill site was prepared by Gordon Rudolf.

Prior to rig arrival, an 18" conductor pipe had been installed and cemented.

The Drillcorp Rig 24 was rigged up and Ingleby No.1 was spudded at 1630 hours on 23rd October, 1990.

Drilling 12 1/4" hole continued to 69.5m where the 9⁵/₈" casing was run and cemented with float at 57.9m and shoe at 64.4m.

The B.O.P.'s, choke manifold and flareline were installed and the B.O.P.'s were successfully tested to the following pressures;

Blind Rams	1000 PSI
Pipe Rams	1000 PSI
Hydrill	1000 PSI

The float, cement and shoe were drilled out and after drilling five metres of new hole, a formation integrity test was established having 8.7 lb/gal mud in the hole. The formation held 17.8 lb/gal equivalent.

Drilling 8 1/2" hole continued uneventfully and reached the total depth of 331.2m at 1800 hours on 25th October, 1990.

The following logs were then run by BPB Instrument Limited;

- DLS/MRS/GR/SP/CAL
- CSS/GR/CAL
- NCS/GR/CAL
- SWC
- Velocity Survey

Cement plugs were then set over the interval 265.0 - 205.0m and 80.0 - 30.0m.

Both plugs were successfully tested to 5000 lbs prior to the surface plugs and abandonment of the well.

The rig was released at 1030 hours, on 27th October, 1990.

INGLEBY No.1 PROPOSED AND ACTUAL DRILLING TIMES

CO-ORDINATES : LAT: 38°18'53.6"S
LONG: 143°47'44.8"E

ELEVATION : GL.114.0m KB.117.3m

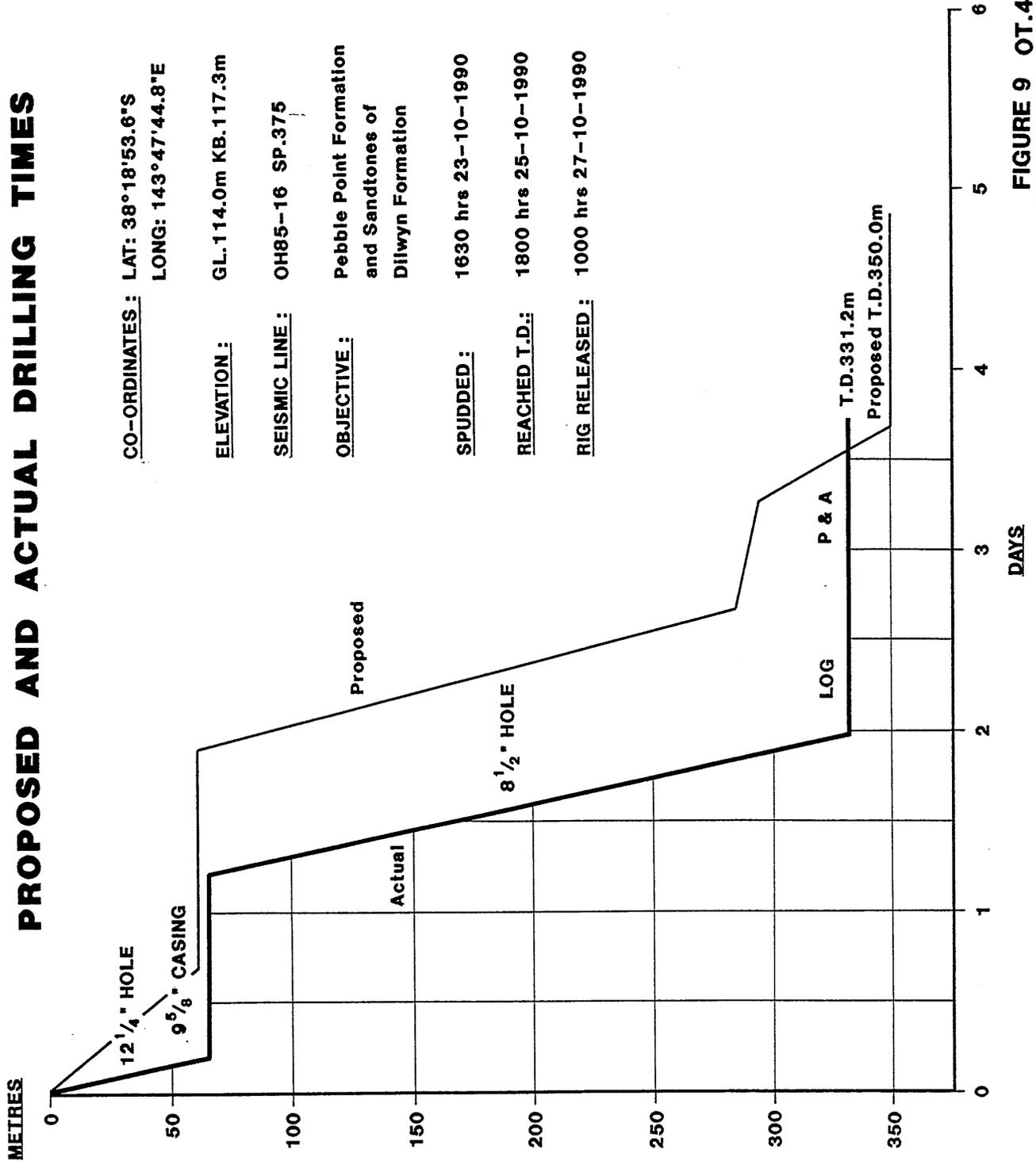
SEISMIC LINE : OH85-16 SP.375

OBJECTIVE : Pebble Point Formation
and Sandtones of
Dilwyn Formation

SUDDDED : 1630 hrs 23-10-1990

REACHED T.D. : 1800 hrs 25-10-1990

RIG RELEASED : 1000 hrs 27-10-1990



CASING	FORMATION	RESULTS
18" Conductor	Newer Volcanics	Lack of significant hydrocarbon indications did not warrant a Drill Stem Test to be carried out.
9 5/8" Casing at 64.4m	Heytesbury Group	
Plugs 1/ 265-205 2/ 90-30 3/ Surface	TERTIARY Nirrada Group Wangerrip Group	NONE
	Eumeralla Formation	
	T.D.331.2m	