

# MARLIN-4

## SUBSIDY REPORT

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# MARLIN-4

## SUBSIDY REPORT

by

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G.A. SHORT

Esso Exploration and Production Australia Ltd.,
January, 1974

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MARLIN-4.
674.

# I SUMMARY

## (1) Drilling

Marlin-4 was drilled to a T.D. of 8601' by Global Marine's floating rig "Glomar Conception". The rig commenced operations on October 4, 1973. The well was spudded on October 5, 1973 and completed on October 24, 1973. Total rig time was 20.72 days.

Surface conductor casing was set at 602' (20" in 26" hole) and the surface string at 2750' (13-3/8" in 16½" hole).

On abandonment the well was plugged over the intervals 7778' - 7150' 2835' - 2605' and 558' - 320'. The well head and pile joint were shot off and recovered at surface.

## (2) Geological

Recent to Oligocene marls, limestones and mudstones were drilled to the top of the Latrobe Group at -5950. Pyritic shales and siltstones of the Eocene Turrum formation were drilled to -6168 followed by interbedded sandstones, shales and coals of the Latrobe 'coarse clastics' of Lower Eocene and Paleocene age which continued to total depth.

Within the Paleocene 'coarse clastics', 40 feet of net gas sand occurs between 7780 and 7845 KB with an additional 13' of net gas sand in three separate horizons between 7208 and 7557. No oil bearing sands were encountered.

## II. INTRODUCTION

The Turrum Field comprises the Paleocene intra Latrobe section of the Marlin structure. The field, which partially underlies the Marlin field is cut into several discrete blocks by major N.W./S.E. trending faults. Hydrocarbons had been encountered in the "C", "D" and Turrum fault blocks. Marlin-4 was designed to test the equivalent section in the "B" block to the north of the Marlin "A" platform.

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## III WELL HISTORY

1) General Data

(i) Well Name and Number

Marlin-4

(ii) Operator and Address

Esso Exploration & Production Australia Inc.,
c/- Price Waterhouse Nominees (Victoria) Pty.Ltd.,
The National Mutual Centre,
447 Collins Street,
MELBOURNE. VIC. 3000.

(iii) Title Holder and Address

Hematite Petroleum Pty. Ltd.,
B.H.P. House,
140 William Street,
MELBOURNE. VIC. 3000.

(iv) Petroleum Title

Petroleum Production Licence Vic. L/4

(v) District

AMG Zone 55

(vi) Location

Latitude 38° 14' 24.450" S
Longitude 148° 16' 02.596' E

(vii) Elevation

(a) -201' Seafloor
(b) + 32' KB

(viii) Total Depth

8601'

(ix) Spud Date

October 5, 1973

(x) Date T.D. Reached

October 21, 1973

(xi) Date of Completion

October 24, 1973

(xii) Rig Released

October 24, 1973

(xiii) Drilling Time

Total Drilling time 20.72 days

(xiv) Status

Plugged and abandoned

(xv) Total Cost

As of December 31, 1973 A$644,000 (estimate)

## 2. Drilling Data

### (i) Name and Address of Drilling Contractor

Global Marine A/Asia Pty. Ltd.,
380 Lonsdale Street,
MELBOURNE. VIC. 3000

### (ii) Drilling Plant

| | |
|---|---|
| Make: | National 1625 |
| Type: | Diesel Electric |
| Rated Capacity with Drill pipe used: | 25000 ft. with 5" drill pipe. |
| Motors: | |
| Make: | General Electric (X2) Caterpiller (X8) |
| Type: | Diesel Electric D398 V12 Diesel |
| BHP: | 752 DI x 2 8720 Intermittent<br>6800 Continuous |

### (iii) Derrick

| | |
|---|---|
| Make: | Built by Continental EMSCo. using a Global Marine Design (142 ft). |
| Type: | Standard type with travelling block guide rails. |
| Rated Capacity: | 1,000,000 lb. |

### (iv) Pumps

| | |
|---|---|
| Make: | National x 2 |
| Type: | N 1300 |
| Size: | 1300 HP each |
| Pump Motors: | |
| Make: | General Electric |
| Type: | DC Electric |
| BHP: | 752 - 2 per pump |

### (v) Blowout Preventer Equipment

| | |
|---|---|
| Make: | Vetco/Shaffer/Cameron/Hydril |
| Type: | 3 Cameron, 1 Shaffer, ram-type Preventers<br>1 Shaffer, 1 Hydril bag-type Preventer |
| Size: | 16-3/4" for 5" drill pipe. |
| API Series: | 1500; 5000 psi working pressure |

### (vi) Hole Sizes and Depths

| | |
|---|---|
| Conductor Hole: | 26" @ 650' KB |
| Surface Hole: | 16½" @ 2785' KB |
| Exploration Hole: | 12¼" @ 5893' KB<br>9-7/8" @ 8601' KB |

### (vii) Casing & Liner Cementing Details

| Size | Weight | Grade | Range | Depth Set |
|---|---|---|---|---|
| 20" | 91.5 lb/ft. | X-52 LP | 3 | 602' KB |
| 13-3/8" | 54.5 lb/ft. | J55 | 3 | 2750' KB |

| | 20" | 13-3/8" |
|---|---|---|
| Position of Float Collar | N/A | Top of Bottom Jt. |
| Position of Float Shoe | Bottom of String | Bottom of String |
| No. of Centralizers | 6 | 10 |
| Position of Centralizers | Top and Bottom of Bottom Joint. Top of 2nd Joint. Free on 4th, 5th, 6th Joints. | Top and Bottom of 1st Joint. Joint over 16 Joint total |
| No. of Scratchers | Nil | Nil |
| Position of Scratchers | - | - |
| Cement Used | 1400 sx. | 560 sx. |

| | | |
|---|---|---|
| Top of cement | Sea Floor | 1520' est. |
| Method used (Plug Multi-stage, etc) | Plug | Plug |

(viii) Drilling Fluid

Type: Lignosulphonate Fresh Water
Average Weight: 10.6 ppg
Treatment, average weekly analysis: Mud pumped over shale shaker and through de-sander and de-silter. Thinning accomplished by addition of fresh water, Q-broxin and CC16.

| WT. | FV. | WL. | F/CAKE | pH | SAND |
|---|---|---|---|---|---|
| 9.9 | 43 | 6.3 | 2/32 | 9.7 | Trace |

List of Types and Quantity of Mud Materials and Chemicals Consumed:

| | |
|---|---|
| Barytes | 400 sx. |
| Gel | 939 sx. |
| Caustic | 54 Cans |
| Q-broxin | 248 sx. |
| CC-16 | 136 sx |
| Aluminium Stearate | 1 sx. |
| Nitrate | 1.5 sx. |
| Soda Ash | 10 sx. |

Nitrate added to the mud system was used as tracer indicating filtrate recovery on formation testing. From the top of Latrobe, the desired concentration of nitrate was maintained in the range 120-180 ppm using 5 lb of commercial pellet fertilizer per 100 bbls of mud.

(ix) Water Supply

Barry's Beach tap water transported by workboat.

(x) Perforation and Shooting Record

Nil

(xi) (a) Plugging Back Cementation Jobs

| | 1 | 2 | 2 |
|---|---|---|---|
| Length and Type of Plug: | 628' (7778'-7150') 15.6 ppg | 230' (2835'-2605') 15.6 ppg | 238' (558' - 320') 15.6 ppg |
| No. of Sacks used: | 250 sx. | 220 sx. | 185 sx. |
| Methods Used: | Displacement through drill pipe. | | |
| Whether Plug Job was satisfactorily tested: | Yes | Yes | Yes |

(b) Squeeze Cementation Job

Nil

(xii) Fishing Operation

Nil

(xiii) Side Tracked Hole

Nil

3. Location

(i) Site Investigations Carried Out

Due to the proximity of the Marlin-Halibut pipeline to the recommended wellhead location, a survey of the pipeline by side-scan sonar was carried out by workboats. Only then was the drillship permitted to run anchors outside a 2300' safety corridor.

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(ii) Anchoring Methods

10 x 30,000 lb anchors were laid by workboats in a 45°/90° pattern on an average radius of 1,730 ft.

(iii) Transportation

1. Helicopters from Longford
2. Workboats from Barry's Beach and Lake's Entrance.

4, Sampling

(i) Ditch Cuttings

From 650' five sets of washed and dried samples every 30' to 4340'; from 4340' five sets of washed and dried samples every 20' to 6040'; and from 6040' five sets of washed and dried samples every 10' to T.D. One set of washed and bagged samples at the above intervals, one canned sample every 100'. All samples were lagged and caught off a standard shale shaker by Baroid Mud Logging personnel under the supervision of an Esso Wellsite Geologist.

A set of washed and dried samples was taken for Hematite Petroleum, Victorian Mines Department and Bureau of Mineral Resources. Esso retained two sets, one for palaeontological processing and the other for storage.

No cuttings were caught while coring.

(ii) Coring

| Core No. 1 | Interval Cored | Footage Cut | Recovery in feet | Recover % |
|---|---|---|---|---|
| 1 | 6123' - 6146' | 23 | 23 | 100 |
| 2 | 7368' - 7406' | 38 | 38 | 100 |

The core was slabbed longitudinally into three sections with the centre slab retained by Esso, one side slab forwarded to Victorian Mines Department and the other forwarded to the Bureau of Mineral Resources.

(iii) Sidewall Sampling

| DEPTH | RECOVERED | DEPTH | RECOVERED |
|---|---|---|---|
| 8546' | 1½" | 6280' | 1" |
| 8496' | 1" | 6250' | 1" |
| 8404' | 5/8" | 6208' | 1" |
| 8275' | 7/8" | 6190' | 1-3/8" |
| 8250' | 1" | 6170' | 3/8" |
| 8190' | 3/4" | 6100' | 1¼" |
| 8112' | N.O. | 6070' | 1½" |
| 8092' | 5/8" | 6050' | 1¼" |
| 8076' | 1¼" | 6030' | 1½" |
| 7990' | 3/4" | 6010' | 1½" |
| 7897' | 1¼" | 5990' | 5/8" |
| 7855' | ½" | 5970' | 5/8" |
| 7840' | 5/8" | 5950' | 3/8" |
| 7796' | 3/4" | 5930' | 1¼" |
| 7764' | 3/4" | 5900' | 1½" |
| 7706' | 5/8" | 5850' | 1" |
| 7506' | 3/4" | 5800' | 1" |
| 7460' | 3/4" | 5730' | 1½" |
| 7310' | 7/8" | 5650' | 1½" |
| 7170' | 3/4" | 5580' | 5/8" |
| 7076' | N.O. | 5500' | 1½" |
| 6954' | 1" | 5400' | N.O. |
| 6816' | 1½" | 5300' | 1½" |
| 6642 | 5/8" | 5200' | 3/4" |
| 6510' | 1-1/8" | 5000' | 1¼" |

cont'd

Sidewall Coring cont'd

| DEPTH | RECOVERED | DEPTH | RECOVERED |
|---|---|---|---|
| 6390' | 7/8" | 4800' | 1-1/8" |
| 6350' | 1" | 4580' | N.O. |
| 6300' | 1" | 4350' | 1¼" |
| 4090' | 1½" | 3550' | 1" |
| 3830' | 1¼" | 3050' | 5/8" |

All samples were retained by Esso for palaeontological processing. Any residue or unused portions were placed in storage. For full descriptions see Appendix 5.

5. Logging and Surveys

(i) Electric Logging

| LOG | INTERVAL | SCALE |
|---|---|---|
| SLK/GR | 2778 - 602 | 2" & 5" |
| Caliper | 2770 - 604 | 5" |
| BHC Sonic | 8035 - 2755 | 2" & 5" |
| FDC/CNL/GR/Cal | 8040 - 5850 FDC/CNL<br>- 2600 GR/Cal | 2" & 5" |
| ISF | 8034 - 2755 | 2" & 5" |
| ISF/SLK | 8597 - 7750 | 2" & 5" |
| FDC/CNL/GR/Cal | 8595 - 7750 | 2" & 5" |
| HDT | 5900 - 8591 | 10" |
| 6 F.I.T.'s | From 6253 to 8275 | |

Copies of all logs are in Enclosure 7.

(ii) Penetration Rate and Gas Logging

Full records of penetration rates, chromatographic gas analysis and total gas measurements were made from 650' to T.D. Shale densities, 'd' exponent values and drillability measurements were made from 5000' to T.D. (See Enclosure 5).

(iii) Deviation Surveys

The HDT continuous dipmeter run at total depth indicates deviation reached 2.9° at 8587' on an azimuth of 295°. (See Enclosure 6).

(iv) Temperature Surveys

Temperatures were recorded by Schlumberger during bottom hole logging. Maximum temperatures reached are recorded on each log. A maximum BHT of 210° was reached on the HDT log 19 hours after breaking circulation.

(v) Other Well Surveys

A velocity survey was conducted at total depth. (See Enclosure 3).

6. Testing

(i) Formation Testing

A total of six formation tests were made using Schlumberger's Formation Interval Tester. All were successful in recovering fluids from the formation and recording accurate pressures by use of the dual Amerada gauges.

Summary of depths and fluid recoveries:

| | DEPTH | RECOVERY |
|---|---|---|
| F.I.T. 1 | 7836' | Gas/Condensate/Mud |
| 2 | 7785' | Gas/Condensate/Mud |
| 3 | 8275' | Gas/Formation Water |
| 4 | 7460' | Gas/Condensate/Filtrate |
| 5 | 6880' | Gas/Mud/Formation Water |
| 6 | 6253' | Gas/Mud/Formation Water |

Detailed test results are tabulated in Appendix 7 and Enclosure 6.

(ii) Production Testing

No production tests were carried out.

## IV GEOLOGY

### (1) Summary of Previous Work

Exploration for oil and gas in the Gippsland Basin has been in progress since 1924 when oil and gas shows were encountered during the drilling of a water well near Lakes Entrance. A large number of wells were subsequently drilled by government agencies and private firms, all of which met with discouraging results, (K.A. Richards, B.M. Hopkins, 1969).

The modern exploration phase commenced onshore in 1954, when geophysical methods were used to delineate drilling targets. None of those prospects drilled encountered significant hydrocarbon accumulations.

Offshore exploration began in 1960, when the Broken Hill Pty. Ltd. conducted an aeromagnetic survey over their offshore lease. In 1962 Hematite Petroleum ( a wholly owned subsidiary of B.H.P.) shot 1005 miles of single-fold, analog seismic data.

In 1964, an agreement between Esso and B.H.P. was ratified for the exploration of the Gippsland Basin. Later that year Esso conducted the "EG' seismic survey (722 miles) and on June 5, 1965 completed the first Gippsland offshore well as a gas discovery (Barracouta-1, previously known as EGS-1).

Subsequent Esso/BHP seismic surveys are as follows:

| | |
|---|---|
| 1966 | ET Survey |
| 1967 | EX Survey |
| | EC Survey |
| 1968 | EH Survey |
| | G69A Survey |
| 1969 | G69A Survey |
| | G69B Survey |
| 1970 | G69B Survey |
| | G70A Survey |
| 1971 | G71A Survey |
| | G71B Survey |
| 1972 | G72A Survey |
| 1973 | G73A Survey |

Including the initial discovery, the drilling program to date has totalled 51 exploratory and stepout wells.

### (2) Regional Geology

The Gippsland Basin is the easternmost of three major Mesozoic-Tertiary basins aligned along the eastern part of the southern coast of mainland Australia. Although sedimentation may have started in the Jurassic, the oldest rocks seen in the area are of Lower Cretaceous age. The Lower Cretaceous lacustrine and fluviatile greywackes of the Strzelecki Formation were deposited within an east-west rift system, bordered on the north and south by major tensional fault systems. Sedimentation has been continuous in the basin from Early Cretaceous to Recent time.

Lacustrine and fluviatile non marine Latrobe Group sedimentation continued through the Upper Cretaceous to the Eocene. Although non marine sediments dominate the stratigraphic section in the central basin areas, Paleocene to Mid Eocene nearshore and marginal marine lateral equivalents occur in the southeast portion of the basin. During the Upper Eocene in the central Basin area, marine sedimentation, associated with complex channel down-cutting and infilling mark the last major phase of Latrobe sedimentation. (E.A. James and P.R. Evans, 1971)

Rocks of Oligocene age are mainly fossiliferous marine mudstones and marls. Coarse clastic deposition was confined to the hinterland along a narrow zone in the Yallourn Valley in the north west portion of the onshore basin area.

Sedimentation during Early Miocene was similar to that of the Oligocene. Rapid deposition of marls, bryozoal-skeletal limestones and calcarenites occurred during Late Miocene through Pliocene. Submarine channelling with gross scour and fill features are dominant depositional characteristics. The loading effect of this deposition in the central to eastern portion of the offshore Gippsland Basin resulted in severe isostatic re-adjustment with considerable tilting and change of the original Basin form.

Most of the major oil and gas accumulations which have been discovered in the basin, are trapped in either anticlinal culminations or palaeotographic closures at the top of the Latrobe Group.

## 3. Stratigraphic Table

The Stratigraphy encountered in Marlin-4 is summarised in the following Table.

| AGE | FORMATION | FORMATION TOP | SUBSEA DEPTH | THICKNESS |
|---|---|---|---|---|
| MIOCENE | WATER DEPTH<br>GIPPSLAND FORMATION | 'KB 233' | 201' | |
| MIOCENE | MID-MIOCENE MARKER | 5255 | 5193 | |
| MIOCENE | LAKES ENTRANCE FORMATION | 5390 | 5358 | 592' |
| EOCENE | TURRUM FORMATION | 5982' (923 | 5950' | 218' |
| EOCENE | LATROBE COARSE CLASTICS | 6200' | 6168' | 2401'+ |
| PALEOCENE | TURRUM "GAS SAND" | 7408' | 7376' | |
| PALEOCENE | MARLIN A-6 "OIL SAND" | 8189' | 8157' | |

## 4. Stratigraphic Description

### Gippsland Formation

650 -2750 — Calcarenite
Grey in colour, very fossiliferous containing bivalves, forams, bryozoa, gastropods and echinoids, minor quartz and lithics, becomes more silty and consolidated with depth.

2750-3680 — Marl
Usually well consolidated, light grey to light brown, very fossiliferous containing forams and bryozoa, minor quartz grains.

3680-4480 — Calcarenite
Light grey to tan is very soft to moderately hard, very fossiliferous containing forams, bryozoa and shell fragments with traces of pyrite, glauconite and gypsum, becoming more argillaceous with depth.

4480-5982 — Mudstone
Soft to hard and fissile, dark to light grey, very fossiliferous containing forams, bryozoa and shell fragments with traces of pyrite.

Shale
A medium grey, firm and fissile calcareous shale being fossiliferous with traces of pyrite.

### Latrobe Group

### Turrum Formation

5982-6200 — Shale
Medium grey to light grey green, slightly fissile, calcareous shale very fossiliferous with traces of pyrite.

Siltstone
Medium to coarse grained, poorly sorted, subrounded to rounded sandstone.

Latrobe Coarse Clastics

6200-6860 This interval is dominantly shale and siltstone with minor thin sandstones and coals.

Shale
Light brown to medium brown friable shale, carbonaceous, micaceous and dolomitic in parts.

Siltstone
Buff to medium brown friable, finely interlaminated siltstone carbonaceous and micaceous in parts.

Sandstone
Clear, coarse to pebbly rounded to subrounded moderately sorted quartz sandstone, dolomitic in parts.

Coals

6860-6950 Dominantly sandstone with minor siltstones.

Sandstone
Medium to very coarse grained, occasionally pebbly, well rounded, moderately well sorted, quartz, sandstone pyritic in parts

Siltstone
Medium brown, friable, slightly carbonaceous.

6950-7410 Dominantly shales and siltstones with minor sandstones and coals.

Shales
Dark grey to brown, moderately to highly carbonaceous, firm, fissile.

Siltstones
Dark to medium dark brown, carbonaceous, partly dolomitic, predominantly friable.

Sandstones
Light grey, sandy to silty, very fine to fine, some medium, subangular, poorly sorted, often slightly carbonaceous, minor dolomite.

Coals
Black, strong gas bleed.

7410-8380 Interbedded sandstones, siltstones, shales and coals.

Sandstone
Brown to white, fine to medium, subrounded to subangular, moderately friable, some fluorescence and cut.

Siltstone
Tan, very carbonaceous, moderately soft, sandy in part.

Shales
Brown, carbonaceous, subfissile, often trace white calcite.

Coals
Black, often bleeding gas

8380-8600 Dominantly siltstone, shales and coals with minor sandstone.

Siltstone
Light grey, soft, sometimes carbonaceous, often sandy.

Shales
Mostly brown, slightly carbonaceous.

Coals
Black, often bleeding gas

Sandstone
White to tan. medium to coarse, subrounded, consolidated, dolomitic, quartzose.

## 5. Structure

Marlin-4, located 2.5 miles to the east of Marlin-1 and the Marlin platform, was drilled to test Paleocene age sands within the fault block 'B' immediately to the north of the Marlin-1 and Marlin A-6 fault blocks, and south of Turrum-1. As mapped at the level of the Marlin A-6 oil sand, the Turrum field is a south west trending anticlinal high, cut by a series of generally east-southeast trending down to the south normal faults, having from 50-300' of throw. Minor southeast trending splay-faults are associated with these major faults. Faulting commenced during the Paleocene, but was most active during the Middle Eocene.

## 6. Hydrocarbon Occurrence

One major and four minor gas bearing sandstone intervals having a total net gas thickness of 53' were encountered by the Marlin-4 well. Forty feet of net gas sand is interpreted within the gross interval 7780'-7845' KB. The balance of 13' net gas sand is distributed between the remaining minor sand horizons. (See Appendix 6). No gas/water contacts were observed, nor were any oil bearing sands intersected.

As currently interpreted, each fault block within the field contains gas bearing sands at differing structural depths, inferring that adjoining fault blocks are not in communications, and do not possess common fluid contacts. Updip seals for the gas sands could be provided by either stratigraphic or structural means. The discontinuous point-bar and crevasse splay facies sandstones which, with interbedded shales and coals, constitute the reservoir section, readily lend themselves to stratigraphic accumulations. Juxtaposition of shale and sand across faults could also provide updip seals for gas bearing sands.

## 7. Relevance to Geological Concepts

The existing stratigraphic interpretation of the Marlin-Turrum area has not required significant revision as a result of the Marlin-4 well. Units encountered by the Turrum-1 and the Marlin wildcat wells were encountered as predicted by the Marlin-4 well. Above the Paleocene age Latrobe section the Eocene Turrum formation shales and siltstones which occupy the base of the Marlin channel, can be correlated with the equivalent section in Turrum-1. The Gurnard formation was not encountered, as it has been eroded by the Miocene age Marlin channel.

Lithologically the Paleocene section of the Latrobe Group consists of an interbedded sequence of delta plain carbonaceous shales and coals, with interspersed point bar and crevasse splay facies sandstones. These sand units can be correlated on a broad scale, with the Turrum and Marlin wells. Palynological data from conventional cores and sidewall cores confirms the electric log correlations.

The top of the Latrobe Group was intersected 150' shallow to prediction, and the A-6 oil sand horizon 96' shallow to prediction. These descrepancies are primarily due to seismic mapping difficulties in the area and did not detract from the validity of the test.

## 8. Porosity and Permeability

The sandstones found in the Paleocene Latrobe Group have excellent porosity and permeability. Electric Log analysis of the gas bearing sandstone intervals indicates an average porosity of 21%. The overlying Turrum and Gippsland Formations have no effective porosity, if the shallow unconsolidated, highly fossiliferous zones are disregarded. (See Appendix 6).

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## REFERENCES

James, E.A. and Evans P.R - "The Stratigraphy of Offshore Gippsland Basin", APEA, March, 1971.

Richards K.A. and Hopkins B.M. - " Exploration in the Gippsland, Bass and Otway Basins, Australia", ECAFE, 1969.

LIST OF ENCLOSURES

1. Stratigraphic Section (Pre & Post Drill)

2. Structure Map on the Top of the A-6 Oil Sand (Pre & Post Drill)

3. Time-Depth Curve

4. Well History Chart

5. Baroid ppm Gas Chromatograph Log
Baroid ADT Log
Baroid 'd' Exponent/Drillability Log

6. Composite Log

7. BHC Sonic 2" and 5"
ISF 2" and 5"
FDC/CNL/GR/Cal. 2" and 5"
BHC Sonic/GR 2" and 5"
HDT 10" Monitor Log
HDT Computed Log 2" and 5"
F.I.T. Log
ISF/Sonic Run 2 2" and 5"
FDC/CNL/GR/Cal. Run 2 2" and 5"

8. Fit Data (added by DNRE 25/5/99)

9. Logs and Log Analysis (added by DNRE 25/5/99).

LIST OF APPENDICES

# APPENDIX 1

## PALYNOLOGICAL DETERMINATIONS FOR MARLIN-4

## BETWEEN 5930 and 8546 FEET

By LEWIS STOVER

MARLIN-4

GIPPSLAND BASIN

# PALYNOLOGICAL DETERMINATIONS FOR MARLIN-4

## BETWEEN 5930 AND 8546 FEET

## SUMMARY


| Zones | Depths | Ages |
|---|---|---|
| *P. tuberculatus* | 5930' - 5970' | Early Oligocene |
| Undetermined | 5990' | Middle Eocene? |
| Lower *N. asperus* | 6030' - 6070' | Middle Eocene |
| *P. asperopolus* | 6100' - 6208' | Middle to Early Eocene |
| *L. balmei* | 6280' - 8250' | Paleocene |
| *T. longus* | 8496' - 8546' | Paleocene |


## INTRODUCTION

Palynological zone determinations for the Latrobe Group and the lower 50 feet of the overlying Lakes Entrance Formation in the Gippsland Basin Marlin-4 well are based on the palynomorph assemblages recovered from 34 sidewall and two conventional cores. Zone names are those proposed by Stover and Evans (1973) and by Stover and Partridge (1973) and the criteria used for the recognition of zones are presented in those publications. Species lists for each zone include those forms considered to be of stratigraphic value for subdividing Gippsland Basin Tertiary sections, consequently, long ranging species are not listed unless they represent a major constituent of a particular sample.

Spore-pollen preservation and abundance is generally good throughout the section. Microplankton--mainly dinoflagellates with some acritarchs--occur commonly to abundantly in the *Proteacidites tuberculatus* through the *P. asperopolus* zones; they are less abundant and their occurrences are sporadic in the *Lygistepollenites balmei* zone. None was found in the *Tricolpites longus* zone.

## DISCUSSION

*Proteacidites tuberculatus* Zone (5930 - 5970 feet)

Assignment to this zone is based on the occurrence of *Cyathaecidites annulatus* Cookson in each of the samples. The assemblages consist mainly of microplankton of which the majority of specimens are either *Operculodinium centrocarpum* (Deflandre and Cookson) Wall or of the *Spiniferites* type. Several undescribed species are also present. Forms identified from the *P. tuberculatus* zone include:

Spore-Pollen

*Cyathaecidites annulatus* Cookson
*Dacrycarpites australiensis* Cookson & Pike
*Haloragacidites harrisii* (Couper) Harris
*Ischyosporites irregularis* Stover and Evans MS
*Lygistepollenites florinii* (Cookson & Pike) Stover & Evans
*Matonisporites ornamentalis* (Cookson) Partridge
*Myrtaceidites parvus* Cookson & Pike
*Nothofagidites asperus* (Cookson) Stover & Evans
*N. deminutus* (Cookson) Stover & Evans
*N. emarcidus* (Cookson) Harris
*N. falcatus* (Cookson) Stover & Evans
*N. flemingii* (Couper) Potonie
*N. heterus* (Cookson) Stover & Evans
*Parvisaccites catastus* Partridge
*Phyllocladidites mawsonii* Cookson *ex* Couper

Microplankton

*Achomosphaera alcicornu* (Eisenack) Davey & Williams
*Hystrichokolpoma eisenackii* Williams & Downie
*Nematosphaeropis balcombiana* Deflandre & Cookson
*Nematosphaeropsis sp*
*Operculodinium centrocarpum* (Deflandre & Cookson) Wall
*Polysphaeridium fibrosum* Stover MS
*Spiniferites ramosa* (Ehrenberg) Loeblich & Loeblich
*Spiniferites spp.*

Assemblage from 5990 feet.

A positive zone assignment for the asemblage from 5990 feet is precluded because of the rarity of specimens and the lack of zone diagnostic spore-pollen. The overall character of the assemblage differs strikingly from those of the *P. tuberculatus* zone and the sparse spore-pollen species suggest it is most likely Middle Eocene. The few dinoflagellates present are not well preserved and identifications for the most part are uncertain owing to the poor preservation and the lack of complete specimens. Endophragmal fragments, probably of *Deflandrea heterophlycta*, two specimens of *Reticulodinium* and one of *Histiocysta* also suggest a Middle Eocene age. The following additional forms were identified.

Spore Pollen

*Beaupreaidites verrucosus* Cookson
*Ericipites crassiexinus* Harris
*Haloragacidites harrisii* (Couper) Harris
*Lygistepollenities florinii* (Cookson & Pike) Stover & Evans
*Nothofagidites deminutus* (Cookson) Stover & Evans
*N. emarcidus* (Cookson) Harris
*N. falcatus* (Cookson) Stover & Evans
*Peromonolites vellosus* Partridge
*Proteacidites adenanthoides* Cookson
*P. parvus* Cookson
*Santalumidites cainozoicus* (?) Cookson & Pike

Microplankton

*Cymatiosphaera sp.*
*Operculodinium centrocarpum* (Deflandre & Cookson) Wall.

Lower *Nothofagidites asperus* Zone (6030 - 6070 feet)

Spore-pollen from this zone are in general not well preserved nor does the assemblage contain a large number of species. The sample from 6030 feet yielded mainly spore-pollen whereas the other two samples assigned to this zone contained common to abundant dinoflagellates. Among the latter, specimens of *Cordosphaeridium dictyoplokus* (Klumpp) Eisenack dominate, and several undescribed forms are present. Palynomorphs identifed within the Lower *N. asperus* zone include:

Spore-pollen

*Baculatisporites disconformis* Stover
*Banksieaeidites arcuatus* Stover
*Beaupreaidites trigonalis* Harris MS
*B. verrucosus* Cookson
*Cupanieidites orthoteichus* Cookson & Pike
*Cyathidites splendens* Harris
*Dilwynites granulatus* Harris
*Ephedra notensis* Cookson
*Ericipites crassiexinus* Harris
*Gemmatricolporites gestus* Partridge
*Haloragacidites harrissi* Couper
*Ilexpollenites anguloclavatus* McIntyre
*Liliacidites bainii* Stover
*Lygistepollenites florinii* (Cookson & Pike) Stover & Evans
*Malvacipollis diversus* Harris
*Milfordia homeopunctata* (McIntyre) Partridge
*M. tenuis* Harris
*Nothofagidites asperus* (Cookson) Stover & Evans
*N. brachyspinulosus* (Cookson) Harris

*N. deminutus* (Cookson) Stover & Evans
*N. flemingii* (Couper) Potonie
*N. goniatus* (Cookson) Stover & Evans
*N. heterus* (Cookson) Stover & Evans
*Periporopollenities demarcatus* Stover
*Phyllocladidites mawsonii* Cookson
*Polycolpites esobalteus* (McIntyre) Stover
*Proteacidites adenanthoides* Cookson
*P. alveolatus* Stover
*P. annularis* Cookson
*P. asperopolus* Stover & Evans
*P. crassus* Cookson
*P. incurvatus* Cookson
*P. kopiensis* Harris
*P. leightonii* Stover
*P. obscurus* Cookson
*P. pachypolus* Cookson & Pike
*P. pseudomoides* Stover
*P. reticuloscabratus* Harris
*Santalumidites cainozoicus* Cookson & Pike
*Simplicepollenites meridianus* Harris
*Tricolpites phillipsii* Stover
*Verrucosisporites kopukuensis* (Couper) Stover

Microplankton

*Cordosphaeridium dictyoplokus* (Klumpp) Eisenack
*C. inodes* Eisenack
*Cymatiosphaera* sp.
*Deflandrea* sp. cf. *D. heterophlycta* Deflandre & Cookson
*Epicephalopyxis indentata* Deflandre & Cookson
*Hystrichokolpoma cinctum* Klumpp
*H. rigaudae* Deflandre & Cookson
*Horologinella incurvata* Cookson & Eisenack
*Leptodinium maculatum* Cookson & Eisenack
*Operculodinium centrocarpum* (Deflandre & Cookson) Wall
*Spiniferites ramosus* (Ehrenberg) Loeblich & Loeblich
*Spinidinium* spp.
*Veryhachium* sp.
*Wetzeliella homomorpha* Deflandre & Cookson
*Wetzeliella* spp.

Specimens of *Nothofagidites* are considerably more abundant than those of *Haloragacidites harrisii* in the Lower *N. asperus* zone. In addition, except for small, non-descript, long ranging forms, specimens and species of *Proteacidites* are sparse to rare in this interval.

*Proteacidites asperopolus* zone (6100 - 6208 feet)

A majority of the spore-pollen species found in the Lower *N. asperus* zone occur also in the *P. asperopolus* zone. The latter, however, has the following additional forms:

*Dilwynites tuberculatus* Harris
*Intratriporopollenites notabilis* (Harris) Stover
*Malvacipollis perimagnus* Stover MS
*M. subtilis* Stover
*Myrtaceoipollenites australis* Harris
*Nothofagidites vansteenisii* (Cookson) Stover & Evans
*Proteacidites grandis* Cookson
*P. latrobensis* Harris
*P. ornatus* Harris
*P. tenuiexinus* Stover
*Schizocolpus marlinensis* Stover
*Tricolporites adelaidensis* Harris MS
*T. delicatus* Harris MS
*Triorites scabratus* Couper
*Triporopollenites ambiguus* Stover

The few spore-pollen species identified in the Lower *N. asperus* zone and not found in the *P. asperopolus* interval in Marlin-4 are:

*Banksieaeidites arcuatus* Stover
*Ephedra notensis* Cookson
*Gemmatricolporites gestus* Partridge
*Liliacidites bainii* Stover
*Milfordia homeopunctata* (McIntyre) Partridge
*Nothofagidites brachyspinulus* (Cookson) Harris

Although the palynomorph assemblages from the *P. asperopolus* zone consist mostly of spore-pollen, microplankton are fairly common, especially in the assemblage from 6100 feet in which incomplete specimens of *Deflandrea flounderensis* Stover are numerous. Specimens of *Wetzeliella homomorpha* Deflandre & Cookson are more frequent in the samples from 6190 and 6208 feet where *W. hyperacantha* Cookson & Eisenack is also present. Undescribed species of *Spinidinium, Phthanoperidinium, Deflandrea* and *Wetzeliella* occur within the *P. asperopolus* interval, together with rare gonyaulacid types.

Specimens of *Nothofagidites* are much less common than in the Lower *N. asperus* zone while those of *Haloragacidites* and *Malvacipollis* increase in relative abundance, as do the proteaceous pollen.

Microplankton

*Deflandrea flounderensis* Stover
*Operculodinium centrocarpum* (Deflandre & Cookson) Wall
*Spinidinium* spp.
*Spiniferites ramosa* (Ehrenberg) Loeblich & Loeblich
*Veryhachium* sp.
*Wetzeliella homomorpha* Deflandre & Cookson
*W. hyperacantha* Cookson & Eisenack
*W. waiparaensis* ? Wilson

*Lygistepollenites balmei* Zone (6280 - 8250 feet)

In Marlin-4 this zone is exceptionally thick extending through an estimated 2000 to 2100 feet of section. The interval contains a rather monotonous spore-pollen assemblage with relatively few angiosperm pollen and numerous consistently occurring spore and gymnosperm pollen species. Dinoflagellates occur sporadically and are found more frequently in the upper 500 feet or so of the zone than in the lower part. In general, the microplankton from the *L. balmei* zone are poorly preserved and individual samples contain few species and it is not unusual to find only one or two species in an assemblage. Their relative abundance also varies greatly from very rare to abundant. Spore-pollen species that occur throughout the *L. balmei* zone include:

*Australopollis obscurus* (Harris) Krutzsch
*Ceratosporites equalis* Cookson & Dettmann
*Clavifera triplex* Bolkovitina
*Cyathidites splendens* Harris
*Dilwynites granulatus* Harris
*Ericipites scabratus* Harris
*Gambierina edwardsii* (Cookson & Pike) Harris
*G. rudata* Stover
*Gleicheniidites spp.* (Abundant at 6300 feet)
*Herkosporites elliottii* Stover
*Latrobosporites amplus* (Stanley) Stover
*L. crassus* Harris
*Lygistepollenites balmei* (Cookson) Stover & Evans
*L. ellipticus* (Harris) Stover & Evans
*Nothofagidites emarcidus/heterus* - undifferentiated
*Phyllocladidites mawsonii* Cookson
*P. reticulosaccatus* Harris
*Phyllocladus palaeogenicus* Cookson & Pike
*Periporopollenites polyoratus* (Couper) Stover
*Peromonolites densus* Harris
*Proteacidites annularis* Cookson
*P. minimus* Couper

*Proteacidites spp.* (small forms)
*Simplicepollis meridianus* Harris
*Stereisporites punctatus* Stover & Evans MS

In addition to the more or less continuously occurring species listed above, the following forms are present only in the upper part of the zone.

*Haloragacidites harrisii* (Couper) Harris
*Lygistepollenites florinii* (Cookson & Pike) Stover & Evans
*Malvacipollis diversus* Harris
*Nothofagidites brachyspinulosus* (Cookson) Harris
*N. flemingii* (Couper) Potonie
*Parvisaccites catastus* Partridge
*Polycolpites langstonii* Stover
*Proteacidites pseudomoides* Stover
*P. reticuloscabratus* Harris

Similarly, there are some species that have their last (youngest) occurrence in the lower two-thirds of the *L. balmei* zone in this well. These are:

*Latrobosporites ohaiensis* (Couper) Stover
*Proteacidites angulatus* Stover
*Tetracolporites verrucosus* Stover
*Stereisporites regium* (Drozhastichich) Drugg

Dinoflagellates from the *L. balmei* zone consist of *Cyclonephelium retiintextum* Cookson, *Deflandrea dilwynensis* Cookson, *D. medcalfii* Stover, and *Wetzeliella homomorpha* Deflandre and Cookson. In addition to these described species, some new forms of *Deflandrea* and *Spinidinium* are also present.

*Tricolpites longus* Zone (8496 to 8546 feet)

The lowermost two sidewall core samples from Marlin-4 are assigned to the *T. longus* zone based on the shallowest occurrences of the following spore-pollen species.

*Quadraplanus brossus* Stover
*Proteacidites cleinei* Stover & Partridge MS
*P. palisadus* Couper
*P. reticuloconcavus* Stover & Partridge MS
*Tetradopollis securus* Stover & Partridge MS
*Tricolpites confessus* Stover
*T. waiparaensis* Couper

Palynomorph assemblages from this zone consist entirely of spore-pollen in which specimens of *Gambierina rudata* are frequent and those of *Nothofagidites* are lacking.

## CONCULSIONS

In Marlin-4 an unconformity located between 5970 and 5990 feet separates the post-Latrobe Oligocene section from the Middle Eocene Latrobe sequence represented at the top by the Lower *Nothofagidites asperus* zone. This zone is underlain by the middle to early Eocene *Proteacidites asperopolus* zone. Both zones contain sparse to abundant microplankton as well as spore-pollen.

Another unconformity situated between 6208 and 6280 feet separates the *P. asperopolus* zone from the Paleocene *Lygistepollenites balmei* zone. No assemblage indicative of the early Eocene *Malvacipollis diversus* zone was identified in Marlin-4. The *L. balmei* zone is exceedingly thick in this well, extending through an estimated 2000 to 2100 feet of section and is underlain conformably by the Paleocene *Tricolpites longus* zone. Spore-pollen assemblages dominate the Paleocene interval, although microplankton occur discontinuously in the *L. balmei* zone.

## SAMPLES EXAMINED

| Sample | Depth | Zone |
|---|---|---|
| SWC 42 | 5930' | *P. tuberculatus* |
| SWC 41 | 5950' | *P. tuberculatus* |
| SWC 40 | 5970' | *P. tuberculatus* |
| SWC 39 | 5990' | Indeterminate |
| SWC 38 | 6010' | Indeterminate |
| SWC 37 | 6030' | Lower *N. asperus* |
| SWC 36 | 6050' | Lower *N. asperus* |
| SWC 35 | 6070' | Lower *N. asperus* |
| SWC 34 | 6100' | *P. asperopolus* |
| Core 1 | 6130' | *P. asperopolus* |
| SWC 32 | 6190' | *P. asperopolus* |
| SWC 31 | 6208' | *P. asperopolus* |
| SWC 29 | 6280' | *L. balmei* |
| SWC 28 | 6300' | *L. balmei* |
| SWC 27 | 6350' | *L. balmei* |
| SWC 26 | 6390' | *L. balmei* |
| SWC 25 | 6510' | *L. balmei* |
| SWC 24 | 6642' | *L. balmei* |
| SWC 23 | 6816' | *L. balmei* |
| SWC 22 | 6954' | *L. balmei* |
| SWC 20 | 7170' | *L. balmei* |
| SWC 19 | 7310' | *L. balmei* |
| Core 2 | 7403' | *L. balmei* |
| SWC 17 | 7506' | *L. balmei* |
| SWC 16 | 7706' | *L. balmei* |
| SWC 15 | 7764' | *L. balmei* |
| SWC 12 | 7855' | *L. balmei* |
| SWC 11 | 7897' | *L. balmei* |
| SWC 10 | 7990' | *L. balmei* |
| SWC 9 | 8076' | *L. balmei* |
| SWC 8 | 8092' | *L. balmei* |
| SWC 6 | 8190' | *L. balmei* |
| SWC 5 | 8250' | *L. balmei* |
| SWC 3 | 8404' | Indeterminate |
| SWC 2 | 8496' | *T. longus* |
| SWC 1 | 8546' | *T. longus* |

## REFERENCES

Stover, L. E., and Evans, P. R., 1973, Upper Cretaceous--Eocene spore-pollen zonation, offshore Gippsland Basin, Australia: Geol. Soc. Austr. Spec. Publ. 4.

Stover, L. E., and Partridge, A. D., 1973, Tertiary and Late Cretaceous spore-pollen from the Gippsland Basin, southeastern Australia: Proc. Royal Soc. Victoria, v. 85, pt. 2.

# APPENDIX 2

## FORAMINIFERAL BIOSTRATIGRAPHY - MARLIN-4

By DAVID TAYLOR

MARLIN-4

GIPPSLAND BASIN

# FORAMINFERAL BIOSTRATIGRAPHY - MARLIN-4

By David Taylor

Twenty eight sidewall cores between 3050' and 7855' and samples from a conventional core between 6130' and 6146' were examined for foraminifera. No fauna was found at 6030', 6070', 6124', 6170', 6208' and 7855'.

## BIOSTRATIGRAPHY

The planktonic foraminiferal biostratigraphic scheme used for Marlin-4 is that which has been applied to other Esso Gippsland Basin wells.

The oldest fauna is at 6190' which contained Globigerina linaperta which is considered to have been confined to the Eocene. A conventional core sample at 6146' had this species together with Globorotalia centralis which indicates a late Eocene age below Zone K. Zone K (late Eocene) is probably present at 6050' and definitely present at 5990' and 5970' where there was an association of Globigerina linaperta, G. angioporoides and G. ampliapertura.

The Oligocene interval is greatly abbreviated and it is probable that there was a hiatus during most of the Oligocene as Zone J was not recognised and only 20' separates the Late Eocene at 5970' and the upper part of Zone I (Late Oligocene) at 5950'. Another 20' up hole zone I was present at 5930', but at 5900 the base of Zone H (Oligocene/Miocene boundary) was marked by the appearance of Globigerina woodi. Zone J was not recognised in all other Marlin wells examined, although only rotary cuttings were available from these wells.

The presence of such species as Globorotalia kugleri and G. praescitula indicates definite basal Miocene corresponding to the upper part of Zone H at 5800', with the top of Zone H being placed at 5650'. The initial appearance of Globigerinoides trilobus and Globoquadrina dehiscens at 5580' gives a Zone G determination. Zone F was represented at 5300' by the association of Globigerinoides bisphericus G. trilobus and Globorotalia praemenardii. The top of the early Miocene (top of Zone F) was at or above 5200'.

Zone E, at the base of the late Miocene was not present in the samples, but there was a sample gap between 5200' and 4800'. The sidewall core at 4800', contained a lower Zone D fauna with Orbulina universa. Zone E is no doubt present within this 400' sample gap. Zone D continued upwards to at least 3550'. The preservation of fauna 3050' was so poor that determination was impossible.

## ENVIRONMENT

The Eocene faunas between 6190' and 5970' are sparse with few planktonic forms, no doubt washed in by strong tidal currents. The earlier benthonic faunas consist of the euryhaline forms, Haploghragmoides spp. and Ammonia sp. cf. beccarii, which indicate either low salinities or strongly fluctuating polyhaline conditions.

Towards the top of the Eocene the calcareous benthonic fauna became more specifically diverse, though not numerically abundant. This suggests increase in salinity and probable stabilization of salinity level. However, the salinity did not attain that of normal sea water. The interpretation of the environment is that it was a high energy (i.e. hydrodynamic) estuary, reminiscent of the modern estuary of the Fly River, Papua (Taylor, 1973). The estuary migrated during the Eocene and the Marlin-4 site assumed gradually a more seaward position with time. It is noted that estuarine faunas (e.g. Ammonia sp.cf beccarii) were reported in Marlin-1 at 5280', 5314', 7240' and 7250' (sidewall and conventional cores).

Foraminiferal Biostratigraphy - Marlin-4 cont'd

The late Oligocene and early Miocene sediments were globigerinid oozes and the presence of such benthonic species as Epistominell sp. cf. E. exigua, "Planulina" wullerstorfi and Cibicides sp. cf. C. mundulus suggest a deep water origin. Flucuations specific diversity and numerical abundance suggest flucuations in environmental stability. Water depth decreased gradually and deposition on the continental shelf occurred at and above 4350', as is evident from the presence of shallow water Cibicides spp. and Notorotalia spp. and from the decrease in the percentage of the planktonic element in the total fauna.

The progression of environmental events in Marlin-4 are identical to those in Marlin-1.

## REFERENCES

TAYLOR, David J., 1973 - A preliminary report on the marine geology of the Fly River estuary, Papua. University Sydney., Dept. of Geology and Geophysics. Unpubl. reps. 1973/1.

Form R 193 3/71

BASIN GIPPSLAND BY David Taylor

WELL NAME MARLIN - 4 DATE 10-1-74 ELEV. _____

Foram Zonules

| | | Highest Data | Quality | 2 Way Time | Lowest Data | Quality | 2 Way Time |
|---|---|---|---|---|---|---|---|
| MIOCENE | A | | | | | | |
| | Alternate | | | | | | |
| | B | | | | | | |
| | Alternate | | | | | | |
| | C | | | | | | |
| | Alternate | | | | | | |
| | $D_1$ | 3550 | 1 | | 4350 | 1 | |
| | Alternate | | | | | | |
| | $D_2$ | 4800 | 1 | | 4800 | 1 | |
| | Alternate | | | | | | |
| | E | | | | | | |
| | Alternate | | | | | | |
| | F | 5200 | 2 | | 5300 | 0 | |
| | Alternate | | | | | | |
| | G | 5500 | 2 | | 5580 | 0 | |
| | Alternate | | | | | | |
| | $H_1$ | 5650 | 0 | | 5800 | 0 | |
| | Alternate | | | | | | |
| | $H_2$ | 5850 | 2 | | 5900 | 1 | |
| | Alternate | | | | | | |
| OLIGOCENE | $I_1$ | 5930 | 1 | | 5950 * | 0 | |
| | Alternate | | | | | | |
| | $I_2$ | | | | | | |
| | Alternate | | | | | | |
| | $J_1$ | | | | | | |
| | Alternate | | | | | | |
| | $J_2$ | | | | | | |
| | Alternate | | | | | | |
| EOC. | K | *5970 | 1 | | 6050 | 2 | |
| | Alternate | | | | | | |
| | Pre K | @6146 | 1 | | 6190 | 2 | |

* Probable hiatus between 5950' & 5970'

@ Conventional core no.1 has sparse late Eocene Brown's Ck. fauna.

COMMENTS: No fauna was found in side wall cores at 6030', 6070', 6124', 6170', 6208' & 7855'. Faunas were too sparse or too poorly preserved for determination at 6100' & 3050'.

Note: 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 zonule, 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 zonule 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 _____

BASIN GIPPSLAND DATE

WELL NAME MARLIN-4 ELEVATION KB +32'

| 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 |
| MIO. | P. tuberculatus | 5930 | 1 | | | | 5970 | 1 | | | |
| EOCENE | U. N. asperus | | | | | | | | | | |
| | M. N. asperus | | | | | | | | | | |
| | L. N. asperus | 6030 | 0 | | | | 6208 | 0 | | | |
| | P. asperopolus | | | | | | | | | | |
| | U. M. diversus | | | | | | | | | | |
| | M. M. diversus | | | | | | | | | | |
| | L. M. diversus | | | | | | | | | | |
| PALEOCENE | U. L. balmei | 6280 | 0 | | | | 6642 | 1 | | | |
| | L. L. balmei | 6816 | 1 | | | | 8250 | 1 | | | |
| | T. longus | 8496 | 1 | | | | 8546 | 1 | | | |
| CRETACEOUS | T. lilliei | | | | | | | | | | |
| | N. senectus | | | | | | | | | | |
| | C. trip./T.pach. | | | | | | | | | | |
| | C. distocarin. | | | | | | | | | | |
| | T. pannosus | | | | | | | | | | |
| EARLY CRETACEOUS | | | | | | | | | | | |
| PRE-CRETACEOUS | | | | | | | | | | | |

COMMENTS: DINOFLAGELLATE ZONES:
Deflandrea heterophylcta Zone 6030'(1) – 6208'(2)
Wetzeliella homomorpha Zone 6300'(1) – 6642'(1)
Eisenackia crassitabulata Zone 6954'(2) – 7310(2)
Dinoflagellates also occur at the base of the Lower L. balmei at 825(
and may be referred to the T. evittii Zone.

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 Jan. 1974; Dec 1974.

DATA REVISED BY: A.D.P DATE Jan. 1975.

FORM No R 315 12/72

# APPENDIX 3

## OIL, GAS AND WATER

## ANALYSIS

## MARLIN-4

## GIPPSLAND BASIN

November, 1973

## OIL, GAS AND WATER ANALYSIS

No production tests were run in Marlin-4. However wellsite analyses of fluids recovered from six Formation Interval Tests in the Latrobe were performed. A nitrate ion ($NO_3^=$) level of 100 to 140 ppm was maintained in the drilling mud to assist in differentiating filtrate from formation water.

F.I.T. #1 @ 7836'

Properties: (a) Main Chamber

Gas ppm (Baroid Chromatograph)

| $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ |
|---|---|---|---|---|---|
| 120M | 120M | 23M | 3100ISO 7000N&R | 2000 | 0 |

Oil $58^o$ API @ $60^oF$

Water $Cl^-$ 3800 ppm $NO_3^=$ 19 ppm (By titration)

(b) Segretator

Not opened, kept for laboratory analysis.

F.I.T. #2 @ 7785'

Properties: (a) Main Chamber

Gas ppm (Baroid Chromatograph)

| $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ |
|---|---|---|---|---|---|
| 170M | 1205M | 23M | 5MISO 7MN | 2100 | 0 |

Oil $56^o$ @ $60^oF$

(b) Segregator

Not opened, kept for laboratory analysis.

F.I.T. #3 @ 8275'

Properties: (a) Main Chamber

Gas ppm (Baroid Chromatograph)

| $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ |
|---|---|---|---|---|---|
| 130M | 80M | 115M | 21MISO 24M N | 5000 | 0 |

Water $Cl^-$ 6800 ppm $NO_3^=$ 44 ppm (by titration)

Rrf .453 @ $68^oF$ (by resistivity)

(b) Segregator

Not run

F.I.T. #4 @ 7460'

Properties: (a) Main Chamber

Gas ppm (Baroid Chromatograph)

| $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ |
|---|---|---|---|---|
| 170M | 130M | 22.5M | 5100ISO<br>6000 Norm. | 1000 |

Oil 52° API @ 60°F

Water $Cl^-$ 4100 ppm $NO_3^=$ 94 ppm (by titration)

(b) Segregator — No opened kept, for laboratory analysis.

F.I.T. #5 @ 6880'

Properties (a) Main Chamber

Gas ppm (Baroid Chromatograph)

| $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ |
|---|---|---|---|---|---|
| 130M | 50M | 100M | 24.5MISO<br>26.5 M N. | 6000 | 0 |

Water $Cl^-$ 3800 ppm $NO_3^=$ 88ppm (by titration)

Rrf .635 @ 68°F (by resistivity)

(b) Segregator — Not run

F.I.T. #6 @ 6253'

Properties: (a) Main Chamber

Gas ppm (Baroid Chromatograph)

| $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ |
|---|---|---|---|---|---|
| 125M | 100M | 17M | 6.5 ISO<br>9.5 Norm. | 300 | 0 |

Water $Cl^-$ 7100 ppm $NO_3^=$ 44(?) ppm (by titration)

Rrf .407 @ 68°F (by resistivity)

(b) Segregator — Not run

## CHROMATOGRAPHIC ANALYSIS OF F.I.T. TESTS OF MARLIN-4, GIPPSLAND BASIN

| F.I.T. No. | DEPTH | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ | $Cl^-$ | A.P.I. Gravity | $NO_3^=$ * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7836' | 170M | 120M | 23M | 3.1M ISO 7M Norm. | 2M | - | 5000+ | 3800 | 58°@ 60°F | 19 ppm |
| 2 | 7785' | 170M | 120.5M | 23M | 5M ISO 7M Norm. | 2.1M | - | 5000+ | - | 56°@ 60°F | - |
| 3 | 8275' | 130M | 80M | 115M | 21M ISO 24M Norm. | 5M | - | 5000+ | 6800 | | 44ppm |
| 4 | 7460' | 170M | 130M | 22.5M | 5.1M ISO 6M Norm. | 1.6M | - | 5000+ | 4100 | 52°@ 60°F | 94ppm |
| 5 | 6880' | 130M | 50M | 100M | 24.5M ISO 26.5M Norm. | 6M | - | 5000+ | 3800 | - | 88ppm |
| 6 | 6253' | 125M | 100M | 17M | 6.5M ISO 9.5M Norm. | 3M | - | 5000+ | 7100 | - | 44ppm |

* Nitrate added to drilling mud as a filtrate tracer (kept at a constant level between 120 - 180 ppm).

CHROMATOGRAPH ANALYSIS OF SIDEWALL CORES, MARLIN-4

| CORE No. | DEPTH | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ |
|---|---|---|---|---|---|---|
| 1 | 8546' | 700 | 400 | - | - | - |
| 2 | 8496' | 19000 | 4000 | 1200 | Tr. | Tr. |
| 3 | 8404' | 4500 | 900 | 200 | - | - |
| 4 | 8275' | 400 | Tr. | - | - | - |
| 5 | 8250' | 3000 | 600 | 200 | - | - |
| 6 | 8190' | 2500 | 600 | 300 | - | - |
| 8 | 8092' | 17000 | 2000 | 300 | - | - |
| 9 | 8076' | 140000 | 5000(?) | 700 | - | - |
| 10 | 7990' | 6000 | 600 | - | - | - |
| 11 | 7897' | 110000 | 10000 | 1700 | 100 | - |
| 12 | 7855' | 500 | 200 | - | - | - |
| 13 | 7840' | 1200 | 400 | 300 | 500 | 1200 |
| 14 | 7796' | 1200 | 500 | 200 | - | - |
| 15 | 7764' | 6000 | 1200 | 500 | - | - |
| 16 | 7706' | 1200 | 700 | 200 | - | - |
| 17 | 7506' | 16500 | 5000 | 1300 | - | - |
| 18 | 7460' | 500 | 400 | 1000 | 700 | 600 |
| 19 | 7310' | 2800 | 1300 | 500 | - | - |
| 20 | 7170' | 1000 | 400 | 200 | - | - |
| 22 | 6954' | 400 | Tr. | - | - | - |
| 23 | 6816' | 27000 | 14000 | 5000 | 500 | - |
| 24 | 6642' | 16000 | 3000 | 600 | - | - |
| 25 | 6510' | 11000 | 2800 | 600 | - | - |
| 26 | 6390' | 4500 | 1200 | 300 | - | - |
| 27 | 6350' | 4000 | 1300 | 500 | - | - |
| 28 | 6300' | 7000 | 2700 | 1200 | - | - |
| 29 | 6280' | 100 | Tr. | - | - | - |
| 30 | 6250' | Tr. | - | - | - | - |
| 31 | 6208' | 5000 | 5000 | 4500 | 600 | 200 |
| 32 | 6190' | 5500 | 5000 | 4000 | 700 | 200 |
| 33 | 6170' | 200 | 200 | 200 | Tr. | - |
| 34 | 6100' | 200 | 600 | 800 | 200 | - |

M = 1000 ppm

APPENDIX 4

# DESCRIPTION

# WELL CUTTING SAMPLES

# MARLIN-4

# GIPPSLAND BASIN

November, 1973

SAMPLE DESCRIPTIONS

MARLIN 4

G.A. Short
7.10.1973

| DEPTHS | % | DESCRIPTION |
|---|---|---|
| 650- 680 | 90 | Cement |
| | 10 | Shell fragments |
| 680- 710 | 70 | Cement |
| | 30 | Shell fragments, bivalves dominating |
| 710- 740 | 70 | Cement |
| | 30 | Shell fragments |
| 740- 800 | 20 | Cement |
| | 50 | Calcarenite, grey, fossiliferous, unconsolidated |
| | 30 | Shell fragments |
| 800- 830 | 10 | Cement |
| | 80 | Calcarenite, grey, quartzose, lithics, very fossiliferous, calcareous |
| | 10 | Shell fragments |
| 830- 860 | 30 | Cement |
| | 10 | Shell fragments |
| | 60 | Calcarenite |
| 860- 890 | 30 | Cement |
| | 10 | Shell fragments |
| | 60 | Calcarenite |
| 890- 920 | 30 | Cement |
| | 10 | Shell fragments |
| | 60 | Calcarenite |
| 920- 950 | 30 | Cement |
| | 10 | Shell fragments |
| | 60 | Calcarenite |
| 950- 980 | 70 | Calcarenite |
| | 20 | Shell fragments |
| | 10 | Cement |
| 980-1010 | 70 | Calcarenite, trace crystalline calcite |
| | 10 | Cement |
| | 20 | Shell fragments |
| 1010-1070 | 70 | Calcarenite, grey, soft, unconsolidated, quartzose, lithics, very |
| | 20 | Shell fragments, bryozoans, bivalves, forams. fossiliferous |
| | 10 | Cement |
| 1070-1100 | 70 | Calcarenite, clayey |
| | 20 | Shell fragments |
| | 10 | Cement |
| 1100-1130 | 90 | Calcarenite |
| | 10 | Shell fragments |
| 1130-1160 | 90 | Calcarenite, grey, firm to hard, siliceous, clayey, fossiliferous |
| | 10 | Fossil fragments |
| 1160-1220 | 90 | Calcarenite as above |
| | 10 | Fossil fragments |
| 1220-1280 | 80 | Calcarenite, firm, very calcareous |
| | 20 | Shell fragments |
| 1280-1310 | 70 | Calcarenite, grey, very firm, siliceous, lithics, very calcareous, clayey, |
| | 30 | Shell fragments, dominantly pelecypods |

..2/

| DEPTHS | % | DESCRIPTION |
|---|---|---|
| 1310-1340 | 90 | Calcarenite |
| | 10 | Shell fragments |
| 1340-1370 | 90 | Calcarenite, grey, firm, siliceous, very clayey, fossiliferous, trace coarse sand grains (quartz) |
| | 10 | Shell fragments |
| 1370-1400 | 100 | Calcarenite, trace shell fragments as above |
| 1400-1430 | 70 | Calcarenite, very fossiliferous |
| | 30 | Shell fragments, dominantly bryozoans |
| 1430-1490 | 70 | Calcarenite |
| | 30 | Shell fragments, dominantly bryozoans, minor bivalves, forams, gastropods, echinoids |
| 1490-1520 | 80 | Calcarenite |
| | 20 | Shell fragments |
| 1520-1550 | 90 | Calcarenite, grey green, firm, argillaceous, quartzose, fossiliferous |
| 1550-1610 | 90 | Calcarenite as above |
| | 10 | Fossil fragments |
| 1610-1640 | 90 | Calcarenite as above |
| | 10 | Fossil fragments |
| 1640-1670 | 90 | Calcarenite, silty, grey green, clayey, very fossiliferous |
| | 10 | Fossil fragments |
| 1670=1700 | 100 | Calcarenite, trace calcite, fossil fragments |
| 1700-1730 | 100 | Calcarenite, very fossiliferous |
| 1730-1760 | 100 | Calcarenite as above, slightly more angular |
| 1760-1790 | 100 | Calcarenite, as above, becoming hard and dense in part |
| 1790-1820 | 100 | Calcarenite as above, fossiliferous |
| 1820-1850 | 100 | Calcarenite as above, some minor very hard dense silty limestone |
| 1850-1910 | 100 | Calcarenite as above, abundant foram tests |
| 1910-1940 | 100 | Calcarenite as above |
| 1940-1970 | 100 | Calcarenite as above, trace foram tests |
| 1970-2030 | 100 | Calcarenite, grey, firm to hard, silty in part, very fossiliferous (forams abundant), argillaceous |
| 2030-2270 | 100 | Calcarenite as above |
| 2270-2300 | 100 | Calcarenite, grey, firm, silty, very siliceous, fossiliferous |
| 300-2360 | 100 | Calcarenite as above, becoming slightly less calcareous than above, abundant broken pelecypod fragments |
| 2360-2420 | 100 | Calcarenite as above |
| 2420-2450 | 100 | Calcarenite as above, becoming more silty |
| 2450-2480 | 100 | Calcarenite |

..3/

| DEPTHS | % | DESCRIPTION |
|---|---|---|
| 2480-2510 | 100 | Calcarenite |
| 2510-2540 | 100 | Calcarenite, abundant pelecypod fragments |
| 2540-2570 | 80 | Calcarenite as above |
| | 20 | Marl, grey, soft, gummy, very calcareous, silty, fossiliferous |
| 2570-2600 | 60 | Calcarenite |
| | 40 | Marl as above |
| 2600-2630 | 70 | Calcarenite, silty, very calcareous (approaching a silty limestone) |
| | 30 | Marl as above |
| 2630-2660 | 30 | Calcarenite |
| | 70 | Marl |
| 2660-2690 | 30 | Calcarenite |
| | 70 | Marl |
| 2690-2720 | 20 | Calcarenite |
| | 80 | Marl |
| 2720-2780 | 30 | Calcarenite |
| | 70 | Marl |

MARLIN-4

H. Stead
October 10/16, 197

SAMPLE DESCRIPTIONS

| DEPTH | % | DESCRIPTIONS |
|---|---|---|
| | | Casing set 13-3/8" @ 2750' with 560 sx. Aust. "N". Ceme t tagged @ 2700'. Bit type XDG. Drilling with Sea Water. |
| 2780-2810' | | Cement Only. |
| 2810-2840' | 100 | Formation interpreted as: Marl, light grey, soft, with forams, calcareous. Sample almost 100% cement. |
| 2840-2870 | 100 | Marl, as above Sample approximately 60% cement cavings. |
| 2870-2900 | 100 | Marl, (interpreted) Sample mostly cement cavings. |
| 2900-2930 | 100 | Marl, as above Sample approximately 50% cement cavings. |
| 2930-2960 | 100 | Marl, as above (interpreted) Sample approximately 60% cement cavings. |
| 2960-2990 | 100 | Marl, as above. |
| 2990-3020 | 100 | Marl, as above. |
| 3020-3050 | 100 | Marl, as above |
| 3050-3080 | 100 | Marl, as above. |
| 3080-3110 | 100 | Marl, as above |
| 3110-3140 | 100 | Sample quality becoming better - less cement cavings. Marl, as above |
| 3140-3170 | 100 | Marl, as above |
| 3170-3200 | 100 | Sample quality good. Marl, light to medium grey, arenaceous, moderate to hard, with abundant foram tests and bryozoa. |
| 3220-3260 | 100 | Marl, as above, hard. |
| 3260-3290 | 100 | Marl, as above. |
| 3290-3320 | 100 | Marl, as above. |
| 3320-3350 | 100 | Marl, medium grey, arenaceous, moderate to hard, with abundant forams and bryozoa. |
| 3350-3380 | 100 | Marl, as above. |
| 3380-3410 | 100 | Marl, as above |
| 3410-3440 | 100 | Marl, as above |
| 3440-3470 | 100 | Marl, as above |
| 3470-3500 | 100 | Marl, as above |
| 3500-3530 | 100 | Marl, as above |
| 3530-3560 | 100 | Changed-over to mud system. Marl, as above Sample taken from desander almost 100% small foram tests with occasional clear quartz grain, bryozoa fragment. |

...../2

Marlin-4
Sample Descriptions

H. Stead
October 10/16,1973

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 3560-3590 | 100 | Marl, as above. |
| 3590-3620 | 100 | Marl, as above. |
| 3620-3650 | 100 | Marl, grading to Calcarenite. Note: Sample appearance changed with change over to fresh water mud system. Marl is dissolved by mud and appears soft and sticky, whereas with salt water drilling Marl was moderate to hard.<br><br>Desander sample predominantly foram tests. |
| 3650-3680 | 100 | Marl, grading to calcarenite, medium green-grey, moderately hard - to very soft, composed of foram tests and minor quartz grains, organic fragments, lithics set in a very fine calcareous matrix, trace pyrite on foram tests. |
| 3680-3710 | 100 | Calcarenite: light to medium brown, grey, moderately hard, predominantly foram tests and calcareous fragments with rare clear quartz grains. |
| 710-3740 | 100 | Calcarenite, as above. |
| 3740-3770 | 100 | Calcarenite, light tan-light grey, as above. |
| 3770-3800 | 100 | Calcarenite, light tan-light grey, moderately hard, trace of glauconite and pyrite, broken fossil fragments and trace of quartz grains. |
| 3800-3830 | 100 | Calcarenite, as above. |
| 3830-3860 | 100 | Calcarenite, as above. |
| 3860-3890 | 100 | Calcarenite, as above. |
| 3890-3920 | 100 | Calcarenite, as above |
| 3920-3950 | 100 | Calcarenite, as above |
| 3950-3980 | 100 | Calcarenite, as above |
| 3980-4010 | 100 | Calcarenite, as above |
| 4010-4040 | 100 | Calcarenite, as above |
| 4040-4070 | 100 | Calcarenite, as above |
| 4070-4100 | 100 | Calcarenite, as above |
| 4100-4130 | 100 | Calcarenite, as above |
| 4130-4160 | 100 | Calcarenite, light to medium tan, very soft to moderately hard, with abundant forams, shell fragments, trace glauconite. |
| 4160-4190 | 100 | Calcarenite, as above |
| 4190-4220 | 100 | Calcarenite, as above |
| 4220-4250 | 100 | Calcarenite, as above |
| 4250-4280 | 100 | Calcarenite, light to medium tan to medium grey, becoming argillaceous, with abundant forams, shell fragments, traces of glauconite, gypsum. |

...../3

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 4280-4310 | 100 | Calcarenite - argillaceous, as above. |
| 4310-4340 | 100 | Calcarenite - as above. |
| 4340-4360 | 100 | Calcarenite - as above |
| 4360-4380 | 100 | Calcarenite - as above |
| 4380-4400 | 100 | Calcarenite - as above |
| 4400-4420 | 100 | Calcarenite - as above |
| 4420-4440 | 100 | Calcarenite - as above |
| | | POH for new bit @ 4456' XDG. Trip Gas 50 units Hot Wire. |
| 4440-4460 | 100 | Calcarenite - argillacous in part, light tan, medium grey, very soft to moderately hard, very fossiliferous, with abundant forams, bryozoa fragments, other shell debris, slightly glauconitic in part, with occasional micro oolitic pyrite on foram tests. |
| 4460-4480 | 50<br>50 | Calcarenite, as above.<br>Mudstone, very calcareous, medium to dark grey, very soft, to firm, very fossiliferous, with abundant forams. |
| 4480-4500 | 60<br>40 | Mudstone, as above<br>Calcarenite, as above |
| 4500-4520 | 80<br>20 | Mudstone, as above<br>Calcarenite, as above |
| 4520-4540 | 100 | Mudstone, very calcareous, medium to dark grey, firm to very soft, very fossiliferous, with abundant forams, bryozoa, shell debris. |
| 4540-4560 | 100 | Mudstone, as above |
| 4560-4580 | 100 | Mudstone, as above, calcareous, light to medium grey. |
| 4580-4600 | 100 | Mudstone as above. |
| 4600-4620 | 100 | Mudstone, as above |
| 4620-4640 | 100 | Mudstone, as above |
| 4640-4660 | 100 | Mudstone, as above. |
| 4660-4680 | 100 | Mudstone, as above |
| 4680-4700 | 100 | Mudstone, calcareous, light to medium grey, soft to moderately hard, very fossiliferous, mainly foram tests, with crinoid, bryozoa and shell fragments. |
| 4700-4720 | 100 | Mudstone, as above |
| 4720-4740' | 100 | Mudstone, as above |
| 4740-4760 | 100 | Mudstone, as above |
| 4760-4780 | 100 | Mudstone, as above |
| 4780-4800 | 100 | Mudstone, as above. |
| 4800-4820 | 100 | Mudstone, as above. |
| 4820-4840 | 100 | Mudstone, as above. |
| 4840-4860 | 100 | Mudstone, as above |

...../4

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 4860-4880 | 100 | Mudstone as above |
| 4880-4900 | 100 | Mudstone, increase in very soft sticky mudstone |
| 4900-4920 | 100 | Mudstone as above |
| 4920-4940 | 100 | Mudstone as above |
| 4940-4960 | 100 | Mudstone as above |
| 4960-4980 | 100 | Mudstone, calcareous, light grey to medium grey, very soft and sticky to moderately hard, very fossiliferous as above |
| 4980-5000 | 100 | Mudstone as above |
| 5000-5020 | 100 | Mudstone, predominantly light grey, very soft, sticky, very fossiliferous |
| 5020-5040 | 100 | Mudstone, glauconitic in part |
| 5040-5060 | 100 | Mudstone as above |
| 5060-5080 | 100 | Mudstone, non glauconitic, as above |
| 5080-5100 | 100 | Mudstone as above |
| 5100-5120 | 100 | Mudstone, predominantly (80%) very soft and sticky, light grey, very fossiliferous, calcareous. |
| 5120-5140 | 100 | Mudstone as above |
| 5140-5160 | 100 | Mudstone as above |
| 5160-5180 | 100 | Mudstone as above |
| 5180-5200 | 100 | Mudstone as above |
| 5200-5220 | 100 | Mudstone. 50% light grey, sticky,and 50% medium grey, moderately hard. |
| 5220-5240 | 100 | Mudstone as above |
| 5240-5260 | 100 | Mudstone as above |
| 5260-5280 | 100 | Mudstone as above. Note: Lignosulphate added to mud system and appears as small carbonaceous particles in this sample. |
| 5280-5300 | 100 | Mudstone as above |
| 5300-5320 | 100 | Mudstone predominantly light grey, very soft and sticky, very fossiliferous, mainly forams with crinoid stems and bryozoa |
| 5320-5340 | 100 | Mudstone, trace of pyrite and trace of light green shale |
| 5340-5360 | 100 | Mudstone as above. Increase in pyrite. |
| 360-5380 | 100 | Mudstone as above |
| 5380-5400 | 100 | Mudstone as above |
| 5400-5420 | 100 | Mudstone, becoming slightly fissile in part. |
| 5420-5440 | 100 | Mudstone as above |
| 5440-5460 | 100 | Mudstone as above |

...../5

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 5460-5480 | 100 | Mudstone, medium grey, calcareous, moderately hard, slightly fissile in part, becoming very pyritic, very fossiliferous |
| 5480-5500 | 80 | Mudstone as above |
| | 20 | Shale, medium grey, calcareous, firm, fissile, very fossiliferous, pyritic |
| 5500-5520 | 60 | Mudstone as above |
| | 40 | Shale as above |
| 5520-5540 | 50 | Mudstone as above |
| | 50 | Shale as above |
| 5540-5560 | 50 | Mudstone as above |
| | 50 | Shale as above |
| 5560-5580 | 50 | Mudstone, light to medium grey, very soft to moderately hard, very fossiliferous, very calcareous |
| | 50 | Shale, medium grey, fissile, calcareous, firm, very fossiliferous, pyritic |
| 5580-5600 | 50 | Mudstone as above |
| | 50 | Shale as above |
| 5600-5620 | 50 | Mudstone as above |
| | 50 | Shale as above |
| | | Note: Formation closing around drill string. Probably the very soft sticky mudstone between 4900-5400 heaving. Worked pipe for 12 hours to clean hole and condition mud. |
| 5620-5640 | 80 | Shale, medium grey, fissile, calcareous, firm, fossiliferous, trace pyrite. |
| | 20 | Mudstone, medium grey, moderately hard, calcareous, fossiliferous |
| 5640-5660 | 80 | Shale as above |
| | 20 | Mudstone as above |
| 5660-5680 | 50 | Shale as above |
| | 50 | Mudstone as above |
| 5680-5700 | 50 | Shale as above |
| | 50 | Mudstone as above |
| 5700-5720 | 50 | Shale as above |
| | 50 | Mudstone as above |
| 5720-5740 | 50 | Shale as above |
| | 50 | Mudstone as above |
| 5740-5760 | 50 | Shale as above |
| | 50 | Mudstone as above |
| 5760-5780 | 40 | Shale as above |
| | 60 | Mudstone as above |
| 5780-5800 | 100 | Shale, medium grey, calcareous, fissile, firm, very fossiliferous |
| 5800-5820 | 50 | Shale as above |
| | 50 | Mudstone, light grey, soft, sticky, very fossiliferous, calcareous |
| 5820-5840 | 50 | Shale as above |
| | 50 | Mudstone as above |

...../6

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 5840-5860 | 50 | Shale as above |
| | 50 | Mudstone as above |
| 5860-5880 | 50 | Shale as above |
| | 50 | Mudstone as above |
| | | P.O.H. for new bit @ 5893'. J.22. T.G65 units. 13 October, 1973 |
| 5880-5900 | 100 | Shale, medium grey, firm, fissile, very fossiliferous |
| 5900-5920 | 100 | Shale as above<br>Abundant cavings after trip. |
| 5920-5940 | 100 | Shale as above. Abundant cavings |
| 5940-5960 | 100 | Shale as above. Abundant cavings. Trace pyrite |
| 5960-5980 | 100 | Shale, medium grey to light grey-green, calcareous, pyritic, slightly fissile, very fossiliferous. |
| 5980-6000 | 100 | Shale as above |
| 6000-6020 | 100 | Shale, light to medium grey, calcareous, fissile, fossiliferous, firm.<br>Trace of clay, medium brown. |
| 6020-6040 | 60 | Shale as above |
| | 40 | Siltstone, medium to dark brown, very friable, slightly pyritic, slightly glauconitic, slightly fossiliferous, slightly calcareous.<br>No shows. |
| 6030' | | Approximate top of Turrum Formation. |
| 6040-6050 | 100 | Siltstone, very shaley, medium to dark brown, very friable, glauconitic, slightly pyritic, trace plant material, very slightly calcareous occasionally very carbonaceous and bleeding gas, micaceous. No show. Abundant shale cavings. |
| 6050-6060 | 100 | Siltstone, very shaley in part, medium dark brown, very friable, glauconitic, as above. No show. |
| 6060-6070 | 100 | Siltstone as above. No show. |
| 6070-6080 | 100 | Siltstone as above. No show. |
| 6080-6090 | 100 | Siltstone as above. No show. |
| 6090-6100 | 100 | Siltstone as above. No show. |
| 6100-6110 | 100 | Siltstone, shaley in part, medium to dark brown, very friable, glauconitic, slightly pyritic, very slightly calcareous, occasional carbon and bleeding gas, micaceous. No show. |
| 6110-6120 | 100 | Siltstone as above |
| | | Ran Core #1 6123'-6146'. Cut 23' Rec. 23'<br>See Core Desc. #1 for complete description. |
| 6123-6146 | | Shale, very silty, probably sideritic, very dark grey to black in hand specimen, very dark brown under microscope, hard, very micaceous glauconitic, biotite and muscovite, pyritic, fissile. |

...../7

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 6146-6150 | 100 | Shale, very silty as above<br>Abundant marine U. Tertiary shales and cavings |
| 6150-6160 | 100 | Shale, very silty as above<br>Abundant cavings |
| 6160-6170 | 100 | Shale, very silty as above |
| 6170-6180 | 50 | Sandstone, clear loose grains, medium to very coarse, poorly sorted, subrounded to rounded, good porosity and permeability, no fluorescence, no cut. |
| | 50 | Shale, very silty as above |
| | | Top Latrobe coarse clastics ≈ 6175 feet |
| 6180-6190 | 60 | Sandstone, as above. No fluorescence, no cut. |
| | 10 | Dolomite, buff, hard, brittle. |
| | 30 | Siltstone, very light brown, friable, micaceous, slightly carbonaceous - plant material.<br>Abundant cavings. |
| 6190-6200 | 70 | Sandstone as above, no fluorescence, no cut |
| | 30 | Siltstone as above<br>Abundant cavings |
| 6200-6210 | 20 | Sandstone as above. No fluorescence, no cut |
| | 80 | Siltstone. Very light brown, as above |
| 6210-6220 | 80 | Sandstone, clear loose quartz grains, coarse to pebbly, rounded to subrounded, moderate sorting, good porosity and permeability, no fluorescence, no cut. |
| | 20 | Siltstone as above |
| 6220-6230 | 60 | Sandstone as above, no fluorescence, no cut. |
| | 40 | Siltstone, carbonaceous, dark brown, friable. |
| 6230-6240 | 60 | Sandstone, clear loose quartz, medium to pebbly, rounded to subrounded, moderately sorted, good porosity and permeability, no fluorescence, no cut. |
| | 40 | Siltstone, carbonaceous in part, buff to medium brown, friable. |
| 6240-6250 | 10 | Sandstone as above |
| | 90 | Siltstone as above |
| 6250-6260 | 100 | Sandstone, clear to frosted quartz, coarse to pebbly, rounded, moderate sorting, good porosity and permeability, no fluorescence, no cut. |
| 6260-6270 | 60 | Sandstone as above |
| | 40 | Siltstone as above<br>Trace coal |
| 6270-6280 | 80 | Sandstone as above. No fluorescence, no cut. |
| | 20 | Siltstone, sandy, light grey to buff, micaceous, friable. |
| 6280-6290 | 30 | Sandstone as above |
| | 50 | Siltstone as above |
| | 20 | Shale, dolomitic, light grey to buff, firm to hard |
| 6290-6300 | 30 | Sandstone as above |
| | 50 | Siltstone as above |
| | 20 | Shale as above |
| 6300-6310 | 30 | Sandstone as above |
| | 70 | Siltstone as above |

...../8

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 6310-6320 | 30 | Sandstone, clear to frosted loose quartz, medium to pebbly, rounded, moderate sorting, good porosity and permeability, no fluorescence, no cut. |
| | 40 | Siltstone as above |
| | 30 | Shale, dolomite, buff, hard |
| 6320-6330 | 10 | Sandstone as above |
| | 40 | Siltstone as above |
| | 50 | Shale, dolomitic as above |
| 6330-6340 | 40 | Siltstone as above |
| | 60 | Shale as above |
| 6340-6350 | 60 | Siltstone as above |
| | 40 | Shale as above |
| 6350-6360 | 70 | Siltstone, shaley, buff to medium brown, friable, micaceous, slightly carbonaceous |
| | 30 | Shale, silty in part, medium grey, firm. |
| 6360-6370 | 100 | Siltstone, shaley, buff to medium brown, friable, finely interlaminated light and dark layers. |
| 6370-6380 | 100 | Siltstone, shaley as above |
| 6380-6390 | 100 | Siltstone, shaley as above |
| 6390-6400 | 100 | Siltstone, shaley as above |
| 6400-6410 | 80 | Siltstone, shaley as above |
| | 20 | Coal, black, vitreous, pyritic, bleeding gas |
| 6410-6420 | 40 | Siltstone as above |
| | 60 | Shale, silty, dolomitic, hard, brittle |
| 6420-6430 | 100 | Siltstone, shaley in part, medium brown to buff, friable |
| 6430-6440 | 30 | Sandstone, dolomitic, very fine grained, consolidated, hard, yellow mineral fluorescence |
| | 40 | Siltstone as above |
| | 30 | Shale, dolomitic as above |
| 6440-6450 | 50 | Sandstone 30% fine grained, dolomitic as above<br>20% coarse to pebbly loose quartz grains. No shows |
| | 30 | Siltstone as above |
| | 20 | Shale, dolomitic as above |
| 6450-6460 | 30 | Sandstone 20% fine grained as above<br>10% coarse to pebbly as above |
| | 40 | Siltstone |
| | 30 | Shale, dolomitic as above |
| 6460-6470 | 60 | Sandstone, partly dolomitic, very fine to silt consolidated, partly carbonaceous, yellow mineral fluorescence, no cut. |
| | 40 | Siltstone, medium to dark brown, friable |
| 6470-6480 | 40 | Sandstone, partly dolomitic as above |
| | 60 | Siltstone, shaley as above |
| 6480-6490 | 10 | Sandstone, dolomitic, mineral fluorescence |
| | 70 | Siltstone as above |
| | 20 | Shale, medium grey brown, fissile, carbonaceous in part. |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| 6490-6500 | 30 | Sandstone, clear loose quartz grains, coarse to pebbly, rounded, moderately sorted, no fluorescence, no cut, good porosity and permeability. |
| | 70 | Siltstone as above |
| 6500-6510 | 70 | Siltstone as above |
| | 30 | Shale, partly dolomitic |
| 6510-6520 | 70 | Siltstone as above |
| | 30 | Shale as above |
| 6520-6530 | 10 | Sandstone, dolomitic, very fine silt, consolidated, hard, dull yellow mineral fluorescence, no show. |
| | 90 | Siltstone as above |
| 6530-6540 | 60 | Sandstone, dolomitic, very fine to silt as above, no show. |
| | 40 | Siltstone, medium brown, carbonaceous, friable, micaceous |
| 6540-6550 | 50 | Sandstone as above |
| | 50 | Siltstone as above |
| 6550-6560 | 50 | Sandstone as above |
| | 50 | Siltstone as above |
| 6560-6570 | 70 | Sandstone, dolomitic, very fine to silt as above |
| | 30 | Siltstone |
| 6570-6580 | 30 | Siltstone as above |
| | 70 | Shale, light grey, firm, with occasional plant material |
| 6580-6590 | 70 | Siltstone as above |
| | 30 | Shale as above |
| 6590-6600 | 10 | Sandstone, dolomitic, very fine grained |
| | 50 | Siltstone, medium brown, carbonaceous, friable, micaceous |
| | 40 | Shale as above |
| 6600-6610 | 10 | Sandstone, dolomitic, very fine grained, consolidated, dull yellow mineral fluorescence |
| | 90 | Siltstone, shaley, medium brown, friable |
| 6610-6620 | 60 | Siltstone as above |
| | 40 | Shale, light grey to light brown, firm |
| 6620-6630 | 10 | Sandstone, very fine grained |
| | 50 | Siltstone |
| | 40 | Shale |
| 6630-6640 | 30 | Sandstone, very fine grained |
| | 30 | Siltstone |
| | 40 | Shale |
| 6640-6650 | 30 | Sandstone as above |
| | 30 | Siltstone as above |
| | 40 | Shale as above |
| 6650-6660 | 70 | Siltstone |
| | 30 | Shale |
| 6660-6670 | 40 | Sandstone |
| | 30 | Siltstone |
| | 30 | Shale |

...../10

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 6670-6680 | 40 | Sandstone |
| | 30 | Siltstone |
| | 30 | Shale |
| 6680-6690 | 60 | Siltstone |
| | 40 | Shale |
| 6690-6700 | 20 | Sandstone as above |
| | 50 | Siltstone as above |
| | 30 | Shale |
| 6700-6710 | 40 | Siltstone as above |
| | 60 | Shale as above |
| 6710-6720 | 20 | Sandstone, non calcareous, light grey, very fine to silty, subrounded, moderate sorting, with carbon-disseminated material, pyritic, micaceous, fair porosity and permeability, no show. |
| | 40 | Siltstone, dolomitic in part, buff to medium dark brown, friable to hard, carbonaceous, micaceous. |
| | 40 | Shale, medium to dark brown, carbonaceous, firm |
| 6720-6730 | 40 | Siltstone as above |
| | 60 | Shale as above |
| 6740-6750 | 30 | Sandstone as above |
| | 40 | Siltstone as above |
| | 30 | Shale as above |
| 6750-6760 | 10 | Sandstone as above |
| | 40 | Siltstone as above |
| | 20 | Shale as above |
| | 30 | Coal, black, vitreous, bleeding gas |
| 6760-6770 | 40 | Sandstone, dolomitic, light grey, very fine to silty, carbonaceous, trace pyrite, dull yellow mineral fluorescence, no cut. |
| | 60 | Siltstone as above |
| 6770-6780 | 60 | Siltstone as above |
| | 40 | Shale |
| 6780-6790 | 60 | Siltstone as above |
| | 40 | Shale as above |
| 6790-6800 | 60 | Siltstone as above |
| | 40 | Shale as above |
| 6800-6810 | 60 | Siltstone as above |
| | 40 | Shale as above |
| 6810-6820 | 100 | Siltstone, medium grey to brown, very friable, slightly carbonaceous |
| 6820-6830 | 10 | Sandstone, dolomitic, light grey, very fine to silty, angular to subangular, dull yellow mineral fluorescence, no cut, fair to poor porosity and permeability, trace of pyrite. |
| | 70 | Siltstone as above |
| | 20 | Coal, black, vitreous to dull |
| 6830-6840 | 30 | Sandstone, dolomitic, very fine to silty, dull yellow mineral fluorescence, no cut. |
| | 20 | Siltstone as above |
| | 30 | Shale, medium brown, firm, carbonaceous |
| | 20 | Coal as above |
| 6840-6850 | 10 | Sandstone as above |
| | 20 | Shale as above |
| | 70 | Coal, black, vitreous, pyritic |

...../11

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 6850-6860 | 20 | Sandstone, clear loose quartz grains, medium to very coarse with occasional pebble, well rounded, moderately sorted, pyrite coating occasional grains, good porosity and permeability, no fluorescence, no show. |
| | 30 | Siltstone as above |
| | 20 | Shale as above |
| | 30 | Coal, bleeding gas |
| 6860-6870 | 100 | Sandstone, clear loose quartz grains, medium to very coarse with occasional pebble, well rounded, moderately sorted, pyrite coating occasional grains, good porosity and permeability, no fluorescence, no show. |
| 6870-6880 | 100 | Sandstone as above, no fluorescence, no show |
| 6880-6890 | 90 | Sandstone as above |
| | 10 | Sandstone, DOLOMITIC, very fine grained, consolidated, hard, dull yellow mineral fluorescence. |
| 6890-6900 | 20 | Sandstone as above |
| | 50 | Siltstone, dolomitic, buff, hard |
| | 30 | Shale, light grey, firm, fissile. |
| 6900-6910 | 30 | Siltstone, dolomitic |
| | 30 | Sandstone as above |
| | 40 | Shale as above |
| 6910-6920 | 10 | Sandstone as above |
| | 40 | Siltstone, dolomitic as above |
| | 50 | Shale as above |
| 6930-6940 | 50 | Sandstone, clear to frosted quartz grains, medium to very coarse occasionally pebbly, rounded, moderate sorting, good porosity and permeability, no fluorescence, no show |
| | 30 | Siltstone, dolomitic, buff, hard, dull yellow mineral fluorescence |
| | 20 | Shale, light grey, firm, fissile. |
| 6940-6950 | 80 | Sandstone as above |
| | 20 | Coal, black, bleeding gas |
| 6950-6960 | 20 | Sandstone as above |
| | 20 | Siltstone, dolomitic |
| | 40 | Shale |
| | 20 | Coal, bleeding gas |
| 6960-6970 | 20 | Sandstone as above |
| | 40 | Siltstone as above |
| | 40 | Shale as above |
| 6970-6980 | 20 | Siltstone as above |
| | 80 | Shale as above |
| | | Trace quartz sand |
| 6980-6990 | 30 | Siltstone, very carbonaceous, dark brown, friable |
| | 70 | Shale, light grey, firm |
| 6990-7000 | 100 | Shale, light grey, firm |
| 7000-7010 | 100 | Coal, black, vitreous, bleeding gas<br>HW110, $C_1$ 11,000, $C_2$ 1500, $C_3$ 700, $C_4$ 400 |
| | | Note: No sand could be found in this sample. Drill rate 7-14 ft/hr. Reverse drilling break. |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| 7010-7012 | 100 | Coal as above, no sand present. |
| 7010-7020 | 70 | Shale |
| | 30 | Coal |
| 7020-7030 | 50 | Siltstone, medium brown, carbonaceous, pyritic, friable, micaceous |
| | 50 | Shale |
| 7030-7040 | 70 | Siltstone, partly carbonaceous, partly dolomitic, pyritic, micaceous, friable to hard |
| | 30 | Shale, carbonaceous, firm |
| 7040-7050 | 100 | Siltstone, sandy, carbonaceous, micaceous, pyritic, friable. No fluorescence, no show |
| 7050-7060 | 100 | Siltstone, sandy as above, no fluorescence |
| 7060-7070 | 100 | Coal, black, vitreous, strong gas bleed |
| 7070-7080 | 40 | Siltstone, as above |
| | 40 | Shale, carbonaceous, medium brown, firm, slight gas bleed |
| | 20 | Coal bleeding gas |
| 7080-7090 | 60 | Sandstone, silty, very fine to silt, subangular, moderately sorted, with carbonaceous laminae, dolomitic in part. |
| | 40 | Shale, carbonaceous, firm, fissile |
| 7090-7100 | 20 | Sandstone, silty, dolomitic in part, very fine to silty, moderate sorting, carbonaceous, pyritic, no fluorescence, no show. |
| | 40 | Siltstone, carbonaceous, friable, medium to dark brown |
| | 40 | Siltstone, dark brown, firm, carbonaceous |
| 7100-7110 | 80 | Siltstone, dark brown, carbonaceous, friable, no fluorescence, no show |
| | 20 | Shale, dark brown, carbonaceous |
| 7110-7120 | 100 | Siltstone, medium to dark brown, carbonaceous, partly dolomitic, predominantly friable |
| 7120-7130 | 100 | Siltstone as above |
| 7130-7140 | 40 | Sandstone, very silty, light to medium grey, very carbonaceous, very fine to silty, consolidated, micaceous, no fluorescence, no cut |
| | 40 | Shale as above |
| | 20 | Coal, black, strong gas bleed |
| 7140-7150 | 10 | Siltstone, shaley, carbonaceous, light to dark brown, friable, micaceous, no fluorescence, no cut, bleeding gas |
| | 90 | Coal, black, strong gas bleed |
| 7150-7160 | 70 | Siltstone as above, no show |
| | 30 | Shale, carbonaceous, dark brown. |
| 7160-7170 | 20 | Sandstone, silty, light grey to medium tan, carbonaceous, micaceous, very fine to silty, consolidated, subangular, moderately sorted, no fluorescence, no cut, no show. |
| | 50 | Siltstone as above |
| | 30 | Shale as above |
| 7170-7180 | 100 | Siltstone, sandy to shaley, carbonaceous, micaceous, pyritic, friable |
| 7180-7190 | 100 | Siltstone, sandy to shaley, dolomitic in part, very carbonaceous, pyritic, firm to hard. No fluorescence, no show |
| 7190-7200 | 80 | Siltstone as above |
| | 20 | Coal as above |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| 7200-7210 | 30 | Siltstone as above |
| | 70 | Shale, very carbonaceous, firm, dark brown, some gas bleed |
| 7210-7220 | 10 | Sandstone, light grey consolidated quartz, very fine grained, subangular, clay matrix, no fluorescence, no show. |
| | 60 | Siltstone, dolomitic, medium to dark brown, carbonaceous, micaceous, pyritic, dull yellow mineral fluorescence. |
| | 20 | Shale, dark brown, very carbonaceous |
| | 10 | Coal |
| 7220-7230 | 60 | Sandstone, partly dolomitic, consolidated, very fine grained as above, dull yellow mineral fluorescence, no cut, no shows, fair porosity and permeability |
| | 40 | Siltstone as above |
| 7230-7240 | 40 | Sandstone, consolidated, very fine grained, clay matrix, hard, no fluorescence, no cut, poor to fair porosity and permeability |
| | 60 | Siltstone as above |
| 7240-7250 | 100 | Siltstone as above |
| 7250-7260 | 100 | Siltstone as above |
| 7260-7270 | 100 | Siltstone as above |
| 7270-7280 | 50 | Siltstone as above |
| | 50 | Shale, dark brown, carbonaceous, firm |
| 7280-7290 | 100 | Siltstone, shaley, dark brown, carbonaceous, micaceous, dolomitic in part<br>Trace of very fine sand |
| 7290-7300 | 100 | Siltstone, shaley as above |
| 7300-7310 | 100 | Siltstone, shaley as above |
| 7310-7320 | 100 | Siltstone, shaley as above |
| 7320-7330 | 70 | Siltstone as above |
| | 30 | Coal bleeding gas |
| 7330-7337 | 100 | Coal |
| 7337-7340 | 100 | Siltstone |
| 7340-7350 | 50 | Sandstone, light brown, very fine to silty, subrounded, friable, clay matrix, no fluorescence, slight pale white-blue crush cut |
| | 50 | Siltstone, shaley, carbonaceous, dark brown, friable to hard, dolomitic |
| 7350-7360 | 50 | Sandstone, light brown, partly dolomitic, very fine to silty, clay matrix in part, occasional pale bluish-white fluorescence, abundant dull yellow mineral fluorescence, yellow-white pale crush cut. |
| | 50 | Siltstone as above |
| 7360-7368 | 70 | Sandstone, light brown, partly dolomitic, partly clay matrix, very fine to silty, pale yellow mineral fluorescence, few grains with pale bluish-white fluorescence, weak whitish-yellow crush cut |
| | 30 | Siltstone, light brown, carbonaceous |

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Marlin-4 SAMPLE DESCRIPTIONS 17th October 1973
J.R. Black

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 7368-7406 | | Core #2 Cut 38' Recov. 38' |
| 7406-7410 | 90 | Shale, half dark brown, and half medium grey. Dark brown shale is carbonaceous, firm, silty; medium grained shale is firm, massive, very silghtly carbonaceous. |
| | 10 | Siltstone, brown, firm, sandy with trace blue white fluorescence. |
| 7410-7420 | 10 | Sandstone, tan, white, fine to medium grained, subrounded to subangular, moderately friable, spotty blue white fluorescence, good cut. |
| | 20 | Siltstone |
| | 60 | Shale |
| | 10 | Coal |
| 7420-7430 | 10 | Siltstone, trace pyrite |
| | 80 | Shale, dark brown, very carbonaceous, firm. |
| | 10 | Coal |
| 7430-7440 | 10 | Siltstone with some tan dolomite |
| | 80 | Shale |
| | 10 | Coal |
| 7440-7450 | 90 | Siltstone, tan, very carbonaceous, moderately soft, sandy in places. |
| | 10 | Shale |
| 7450-7460 | 10 | Sandstone |
| | 50 | Siltstone |
| | 40 | Shale |
| 7460-7470 | 90 | Sandstone, tan, white, very fine to fine, silty, unconsolidated to very friable, spotty blue white fluorescence, faint to fair blue white cut, subrounded, good show on chromatograph |
| | 10 | Coal |
| 7470-7480 | 10 | Siltstone, tan, carbonaceous, dolomitic |
| | 80 | Shale, brown, carbonaceous, trace white calcite |
| | 10 | Coal |
| 7480-7490 | 10 | Siltstone |
| | 70 | Shale |
| | 20 | Coal |
| 7490-7500 | 10 | Siltstone |
| | 90 | Shale, brown, silty, very carbonaceous |
| 7500-7510 | 10 | Siltstone |
| | 50 | Shale |
| | 40 | Coal |
| 7510-7520 | 10 | Siltstone |
| | 80 | Shale, brown, very carbonaceous, soft, trace pyrite |
| | 10 | Coal |
| 7520-7530 | 20 | Siltstone, tan to brown, carbonaceous, slightly dolomitic, hard. |
| | 80 | Shale, as above |
| 7530-7540 | 30 | Sandstone, white, fine to medium grained, unconsolidated and part friable, fair yellow white fluorescence and fair yellow white cut. Subrounded to subangular, poorly sorted. |
| | 70 | Shale as above |
| 7540-7550 | 10 | Sandstone as above |
| | 10 | Siltstone, tan, sandy, firm |
| | 80 | Shale, as above |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| 7550-7560 | 20 | Sandstone, white, fine to medium grained, subrounded, unconsolidated and friable, spotty yellow white fluorescence with fair cut. |
| | 80 | Shale as above |
| 7560-7570 | 30 | Sandstone, white, medium grained, unconsolidated, subrounded with few unconsolidated coarse quartz grains. Trace blue white fluorescence with fair yellow white cut. |
| | 60 | Shale, as above |
| | 10 | Coal |
| 7570-7580 | 60 | Sandstone, white, fine to coarse grains, unconsolidated, subrounded quartz, fair yellow white fluorescence with fair blue white cut. |
| | 40 | Shale |
| 7580-7590 | 70 | Sandstone, predominantly white coarse to medium grained unconsolidated quartz, subrounded, very pyritic with some medium grained consolidated friable sandstone with yellow mineral fluorescence, poor blue white cut. (Probably wet) |
| | 30 | Shale |
| 7590-7600 | 80 | Sandstone, white, coarse, unconsolidated, subrounded quartz with some consolidated moderately firm slightly dolomitic sand with mineral fluorescence, wet,no cut |
| | 20 | Shale as above |
| 7600-7610 | 90 | Sandstone, white, medium to coarse consolidated hard tight, subrounded to subangular, quartz, dolomitic, dull yellow mineral fluorescence |
| | 10 | Shale |
| 7610-7620 | 90 | Sandstone as above |
| | 10 | Shale |
| 7620-7630 | 10 | Shale |
| | 90 | Coal |
| 7630-7640 | 100 | Coal |
| 7640-7650 | 10 | Sandstone, white, medium grained, very pyritic, unconsolidated and consolidated dolomite |
| | 70 | Shale, brown, carbonaceous |
| | 20 | Coal |
| 7650-7660 | 10 | Sandstone, white, medium grained, slightly dolomitic, firm, no show |
| | 90 | Shale, brownish grey, moderately soft |
| 7660-7670 | 30 | Siltstone, tan, dolomitic, hard, pyritic, mineral fluorescence |
| | 70 | Shale as above |
| 7670-7680 | 70 | Siltstone, tan, dolomitic, hard, some mineral fluorescence. |
| | 30 | Shale |
| 7680-7690 | 80 | Siltstone |
| | 10 | Shale |
| | 10 | Coal |
| 7690-7700 | 40 | Shale |
| | 60 | Coal |
| 7700-7710 | 40 | Shale |
| | 60 | Coal |
| 7710-7720 | 30 | Shale |
| | 70 | Coal |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| 7720-7730 | 10 | Siltstone |
| | 70 | Shale |
| | 20 | Coal |
| 7730-7740 | 50 | Siltstone |
| | 40 | Shale |
| | 10 | Coal |
| 7740-7750 | 40 | Siltstone |
| | 50 | Shale |
| | 10 | Coal |
| 7750-7760 | 10 | Siltstone |
| | 90 | Shale, brown, carbonaceous and medium grey, moderately soft |
| 7760-7770 | 50 | Shale, dark brown, very carbonaceous, soft |
| | 50 | Coal, black, platey, bleeding gas |
| 7770-7780 | 10 | Sandstone, white, fine grained, slightly dolomitic, trace yellow white fluorescence, very spotty |
| | 80 | Shale, brown, slightly silty, moderately firm |
| | 10 | Coal |
| 7780-7790 | 20 | Sandstone, tan to white, fine to medium grained, poorly sorted, slightly dolomitic, consolidated, firm to moderately friable, fair porosity and permeability. No show |
| | 80 | Shale as above |
| 7790-7800 | 30 | Sandstone, tan, fine grained, silty, dolomitic, bright yellow mineral fluorescence with trace yellow white fluorescence and faint yellow white cut. |
| | 70 | Shale, brown, silty |
| 7800-7810 | 90 | Sandstone, tan, white, medium grained to silty, poorly sorted, consolidated, firm, dolomitic with bright yellow mineral fluorescence, some yellow white fluorescence, very faint yellow white cut. |
| | 10 | Shale |
| 7810-7820 | 70 | Sandstone, mostly as above but with some subrounded coarse, unconsolidated grains |
| | 30 | Shale as above |
| 7820-7830 | 70 | Sandstone as above with mineral fluorescence, no cut, dolomitic |
| | 30 | Shale, brown, silty, carbonaceous |
| 7830-7840 | 100 | Sandstone, white, unconsolidated, medium to coarse, subrounded quartz and some consolidated dolomite with mineral fluorescence. No show. No cut. |
| 7840-7850 | 30 | Sandstone as above |
| | 70 | Shale |
| 7850-7860 | 100 | Shale, grey brown, moderately soft, slightly carbonaceous |
| 7860-7870 | 100 | Shale, light brownish grey, moderately soft, slightly carbonaceous, trace coal |
| 7870-7880 | 90 | Shale as above, but becoming silty |
| | 10 | Coal |
| 7880-7890 | 100 | Shale, dark brown, silty, very carbonaceous |
| 7890-7900 | 60 | Shale as above |
| | 40 | Coal |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| 7900-7910 | 10 | Sandstone, fine grained, tan, dolomitic, with mineral fluorescence, hard, tight. |
| | 20 | Siltstone, tan, dolomitic, hard |
| | 50 | Shale, brown, carbonaceous |
| | 20 | Coal |
| 7910-7920 | 10 | Sandstone, white, fine to medium grained, trace blue white fluorescence with faint cut. |
| | 10 | Siltstone |
| | 60 | Shale, brown, carbonaceous, silty |
| | 20 | Coal |
| 7920-7930 | 20 | Sandstone, white, fine to medium grained, poorly sorted, consolidated, with some unconsolidated mineral fluorescence, dolomitic |
| | 20 | Siltstone |
| | 50 | Shale |
| | 10 | Coal |
| 7930-7940 | 60 | Sandstone, white, fine to medium grained, silty, subangular, hard, tight, very dolomitic with trace mineral fluorescence, poor porosity and permeability |
| | 30 | Shale, tan to brown, silty, firm. |
| | 10 | Coal |
| 7940-7950 | 20 | Sandstone |
| | 60 | Siltstone, tan, white, firm, dolomitic with mineral fluorescence |
| | 20 | Shale, brown, silty, finely micaceous |
| 7950-7960 | 30 | Sandstone, tan, white, fine grained, silty, with few coarse grains, friable to unconsolidated, mineral fluorescence. |
| | 40 | Shale |
| | 30 | Coal |
| 7960-7970 | 10 | Sandstone, tan, white, fine to medium grained, silty |
| | 70 | Shale, dark grey, carbonaceous |
| | 20 | Coal |
| 7970-7980 | 60 | Shale |
| | 40 | Coal |
| 7980-7990 | 30 | Siltstone, tan, moderately soft |
| | 50 | Shale |
| | 20 | Coal |
| 7990-8000 | 40 | Shale |
| | 60 | Coal, black, platey |
| 8000-8010 | 20 | Sandstone, white, fine to medium grained, consolidated, dolomitic, hard |
| | 60 | Shale |
| | 20 | Coal |
| 8010-8020 | 70 | Sandstone, white, fine to medium grained, unconsolidated and consolidated, friable, poorly sorted, subrounded quartz with mineral fluorescence, no cut. |
| | 30 | Shale, as above with trace coal |
| 8020-8030 | 80 | Sandstone, white, fine grained, silty, moderately friable, poor to fair porosity and permeability, mineral fluorescence. |
| | 20 | Shale, dark grey, carbonaceous |
| 8030-8041 | 40 | Sandstone as above |
| | 40 | Siltstone, tan, firm, carbonaceous |
| | 20 | Shale |

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| DEPTH | % | DESCRIPTION |
|---|---|---|
| | | C.O.H. to log 1300<br>Ran ISF, SONIC and FDC/CNL |
| | | 19.10.73 |
| | | On bottom drilling at 1030 |
| 8041-8050 | 10 | Siltstone |
| | 50 | Shale |
| | 40 | Coal |
| 8050-8060 | 10 | Sandstone, tan, fine grained, silty, firm |
| | 80 | Shale, grey, moderately soft, calcareous |
| | 10 | Coal |
| 8060-8070 | 100 | Coal, bleeding gas |
| 8070-8080 | 100 | Coal, as above |
| 8080-8085 | 100 | Coal, as above |
| | | Circ. bottoms up. |
| 8085-8090 | 80 | Shale, medium grey, calcareous, moderately soft |
| | 20 | Coal |
| 8090-8100 | 90 | Shale |
| | 10 | Coal |
| 8100-8110 | 10 | Siltstone |
| | 70 | Shale, light grey, trace fossil, splintery fracture |
| | 20 | Coal, with abundant light amber |
| 8110-8120 | 10 | Sandstone, tan, medium to fine grained, silty, dolomitic, hard with mineral fluorescence |
| | 70 | Shale |
| | 20 | Coal |
| 8120-8130 | 20 | Sandstone, light brown white, medium to coarse, consolidated dolomite and some coarse unconsolidated subrounded quartz, consolidated has bright yellow mineral fluorescence but faint to fair cut. |
| | 70 | Shale, trace glauconite |
| | 10 | Coal |
| 8130-8140 | 40 | Sandstone, white, unconsolidated, coarse grains (shards) and some consolidated dolomitic hard dense slow drilling dolomitic sandstone with mineral fluorescence. |
| | 30 | Shale, grey, firm |
| | 30 | Coal |
| 8140-8150 | 70 | Sandstone, white, unconsolidated, medium to very coarse with shards of quartz, angular to subrounded, pyritic, good porosity and permeability, no show. |
| | 10 | Shale |
| | 20 | Coal |
| 8150-8160 | 50 | Sandstone as above |
| | 40 | Shale, trace slickensides |
| | 10 | Coal |
| | | POH to CB at 8166<br>Left 3 cones in hole after drilling 125' with previous bit. Milling on cones. |

..19/

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 8160-8170 | 30 | Sandstone as above, trace mineral fluorescence in dolomitic sandstone |
| | 50 | Shale |
| | 20 | Coal |
| 8170-8180 | 60 | Sandstone, white, medium to very coarse and pebbly, subrounded quartz, very pyritic |
| | 20 | Shale, grey with trace glauconite |
| | 20 | Coal |
| 8180-8190 | 40 | Sandstone as above |
| | 50 | Shale |
| | 10 | Coal |
| 8190-8200 | 40 | Sandstone as above but with some consolidated, slightly calcareous with mineral fluorescence, abundant pyrite, good porosity and permeability, medium to very coarse grains |
| | 50 | Shale, grey, very calcareous, firm |
| | 10 | Coal, some amber |
| 8200-8210 | 40 | Sandstone as above |
| | 40 | Shale as above |
| | 20 | Coal as above |
| 8210-8220 | 50 | Sandstone as above |
| | 30 | Shale as above |
| | 20 | Coal as above |
| 8220-8230 | 40 | Sandstone as above |
| | 30 | Shale |
| | 30 | Coal |
| 8230-8240 | 40 | Sandstone as above |
| | 20 | Shale |
| | 40 | Coal (cavings?) |
| 8240-8250 | 30 | Sandstone |
| | 40 | Shale |
| | 30 | Coal |
| | | COH to CB at 8265 |
| 8250-8260 | 10 | Sandstone, sample in hole during trip |
| | 40 | Shale |
| | 60 | Coal |
| 8260-8270 | 10 | Sandstone |
| | 40 | Shale |
| | 60 | Coal |
| 8270-8280 | 90 | Sandstone, frosty white, very coarse to coarse, subrounded, unconsolidated quartz, with good porosity and permeability, very little scattered medium grained consolidated firm tight quartz sandstone with yellow fluorescence and good cut (probably residual oil) |
| | 10 | Shale |
| 8280-8290 | 90 | Sandstone |
| | 10 | Shale |

..20/

Marlin-4

J.R. Black
20.10.73

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 8290-8300 | 100 | Sandstone as above with some pyrite |
| 8300-8310 | 100 | Sandstone |
| 8310-8320 | 100 | Sandstone |
| 8320-8330 | 100 | Sandstone |
| 8330-8340 | 100 | Sandstone |
| 8340-8350 | 100 | Sandstone |
| 8350-8360 | 100 | Sandstone as above with increase in consolidated portion. |
| 8360-8370 | 100 | Sandstone, consolidated portion increasing (about 10% of sample) |
| 8370-8380 | 90 | Sandstone as above but about 50% consolidated with dolomitic cement |
| | 10 | Shale, dark grey, carbonaceous, coaly |
| 8380-8390 | 70 | Sandstone, white, consolidated, coarse to very coarse with dolomitic cement, mineral fluorescence. |
| | 30 | Shale, brown, dark grey, carbonaceous, silty |
| 8390-8400 | 40 | Sandstone |
| | 40 | Shale |
| | 20 | Coal |
| 8400-8410 | 20 | Sandstone, white and tan, medium to coarse, consolidated, subrounded, dolomitic quartz |
| | 80 | Shale, dark brown, silty, partly carbonaceous |
| 8410-8420 | 10 | Sandstone, medium grained, dolomitic, mineral fluorescence with faint crush cut |
| | 90 | Shale |
| 8420-8430 | 20 | Siltstone, light grey, soft, some carbonaceous, sandy |
| | 80 | Shale as above |
| 8430-8440 | 10 | Siltstone as above with yellow fluorescence, faint crush cut |
| | 80 | Shale |
| | 10 | Coal |
| 8440-8450 | 10 | Siltstone |
| | 70 | Shale |
| | 20 | Coal |
| 8450-8460 | 10 | Siltstone |
| | 80 | Shale, mostly brown carbonaceous silty with some grey |
| | 10 | Coal |
| 8460-8470 | 10 | Siltstone, trace sandstone, dolomitic, yellow fluorescence, faint crush cut |
| | 90 | Shale |
| 8470-8480 | 10 | Siltstone, grey, sandy, trace fluorescence with faint crush cut |
| | 90 | Shale |
| 8480-8490 | 10 | Siltstone |
| | 90 | Shale, brown, silty, carbonaceous, moderately soft |
| 8490-8500 | 30 | Siltstone |
| | 70 | Shale |
| 8500-8510 | 20 | Sandstone, grey, fine grained, very silty, carbonaceous, moderately friable |
| | 80 | Shale |

..21/

| DEPTH | % | DESCRIPTION |
|---|---|---|
| 8510-8520 | 20 | Sandstone as above |
| | 80 | Shale |
| 8520-8530 | 10 | Sandstone as above |
| | 30 | Siltstone, grey, slightly calcareous, moderately friable, slightly carbonaceous |
| | 60 | Shale, as above, with some red brown soft shale |
| 8530-8539 | 30 | Sandstone, white, fine to medium grained, consolidated, friable and unconsolidated, pyritic, silty, poor to fair porosity and permeability |
| Circ. drilling break | 30 | Siltstone as above |
| | 40 | Shale |
| 8539-8550 | 10 | Sandstone |
| | 10 | Siltstone |
| | 80 | Shale |
| 8550-8560 | 10 | Sandstone, grey, fine to medium grained, silty, tight |
| | 20 | Siltstone, grey, soft, sandy |
| | 70 | Shale |
| 8560-8570 | 20 | Sandstone |
| | 20 | Siltstone |
| | 60 | Shale |
| 8570-8580 | 20 | Sandstone |
| | 40 | Siltstone |
| | 40 | Shale |
| 8580-8590 | 10 | Sandstone |
| | 30 | Siltstone |
| | 60 | Shale |
| 8590-8600 | 50 | Siltstone, light grey, sandy, carbonaceous, soft, sandy, trace bright yellow fluorescence, with fair yellow white cut (residual oil?) |
| | 50 | Shale |
| | | Well reached TD ± 8601' at 0700. Made wiper trip (10 stands), went back to bottom, circulated clean and came out to log. |

APPENDIX 5

# DESCRIPTION OF CONVENTIONAL AND SIDEWALL CORES AND CORE ANALYSIS

MARLIN-4

GIPPSLAND BASIN

November, 1973

# ESSO STANDARD OIL (AUSTRALIA) LTD.

## CORE DESCRIPTION

Core No. 1

WELL: MARLIN-4

Interval Cored 6123 - 6146 ft., Cut 23 ft., Recovered 23 ft., (100 %) Fm. TURRUM

Bit Type C-22 F.D., Bit Size 8-15/32 in., Desc. by H.S. STEAD Date October 14, 197

| Depth & Coring Rate (min./ft.) | Graphic (1" = 5') | Shows | Interval (ft.) | Descriptive Lithology |
|---|---|---|---|---|
| 0 10 20 | 6123' | | | |
| | 25' | | 6123'-6146' | Shale - very silty; probably sideritic, very dark grey to black in hand specimen, very hard, very dense, micaceous with biotite and small amounts of muscovite, splintery, with very fine parallel laminae The laminae being replaced by pyrite. No recognisable fossils present. Rare burrows in-filled by pyrite. When soaked in acid the rock disintergrates into a dark brown mud, probably high in iron. |
| | 30' | | | |
| | 35' | | | |
| | 40' | | | |
| | 6143' | | | |

REMARKS: ← Samples taken for palynology.

Barrel jammed at 6146'.

ESSO STANDARD OIL (AUSTRALIA) LTD.

# CORE DESCRIPTION

Core No. 1

WELL: MARLIN-4

Interval Cored 6123-6146 ft., Cut 23 ft., Recovered 23 ft., (100 %) Fm. TURRUM

Type C-22 F.D., Bit Size 8 15/32 in., Desc. by H.S. STEAD Date 14th Oct. 73.

| Depth & Coring Rate (min./ft.) | Graphic (1" = 5') | Shows | Interval (ft.) | Descriptive Lithology |
|---|---|---|---|---|
| 0 10 20 | 6123' | | | |
| | | | 6123'-6146' | Shale - very silty; probably sideritic, very dark gray to black in hand specimen, very hard, very dense, micaceous with biotite & small amounts of muscovite, splintery, with very fine parallel laminae. The laminae being replaced by Pyrite. No recognisable fossils Present. Rare burrows infilled by pyrite. When soaked in acid the rock disintergrates into a dark brown mud, probably high in iron. |
| | 25' | | | |
| | 30' | | | |
| | 35' | | | |
| | 40' | | | |
| | 6143' | | | |

REMARKS: ← Samples taken for palynology.
Barrel jammed at 6146'.

ESSO STANDARD OIL (AUSTRALIA) LTD.

# CORE DESCRIPTION

Core No. 1

WELL: MARLIN-4

Interval Cored 6123-6146 ft., Cut 23 ft., Recovered 23 ft., ( 100 %) Fm. TURRUM

Type C-22 F.D., Bit Size 8 15/32 in., Desc. by H.S.STEAD. Date 14th Oct 73

| Depth & Coring Rate (min./ft.) | Graphic (1" = 5') | Shows | Interval (ft.) | Descriptive Lithology |
|---|---|---|---|---|
| 0 10 20 | 6143' ◆ 7 ◆ 7 6146' ← | | | |

REMARKS: ← Samples taken for palynology
Barrel jammed at 6146'

ESSO STANDARD OIL (AUSTRALIA) LTD.

# CORE DESCRIPTION

Core No. 2

WELL: MARLIN-4

Interval Cored 7368 - 7406 ft., Cut 38 ft., Recovered 38 ft., ( 100 %) Fm. LATROBE

Bit Type C-20, Bit Size 8-15/32 x 4 in., Desc. by J. BLACK Date October 17, 197

| Depth & Core Time (min./ft.) | Graphic (1" = 5') | Shows | Interval (ft.) | Descriptive Lithology |
|---|---|---|---|---|
| 68 | | ← | 7368'-7377' | Shale, dark brownish grey, silty, very micaceous fine to medium, mica (biotite), firm, indurated, carbonaceous, pyrite, scattered carbonaceous wood fragments. |
| 70 | | | | |
| | | ← | | |
| 75 | | | | |
| | | | 7377'-7381½' | Shale & Siltstone, thinly interbedded. Shale is dark brown-grey, and silty as above, siltstone is tan, hard indurated with few subrounded quartz grains, bedding is thin, discontinuous irregular & mostly destroyed by burrowing. Few small green grains (probably not glauc |
| | | ← | | |
| 80 | | ← | | |
| | | | 7381½'-7384 | Siltstone, tan white, micaceous, hard, tight, with few thin horizontal, carbonaceous laminae |
| | | ← | | |
| | | | 7384'-7394' | Shale & Siltstone, thinly interbedded, horizontal discontinuous beds, siltstone decreasing downwards, scattered thin laminae of coal. Shales are silty, very carbonaceous; Siltstone is tan-white, hard, no burrowing 2" coal seam at 7378' |
| 35 | | | | |
| | | ← | | |
| 88 | | | | |

REMARKS:

← Core chip for palynology.

# ESSO STANDARD OIL (AUSTRALIA) LTD.

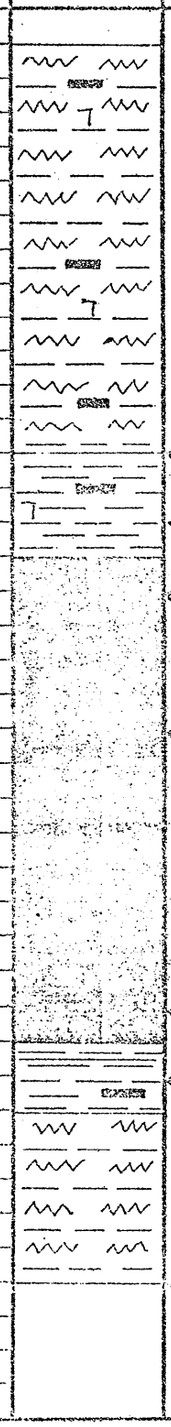
# CORE DESCRIPTION

Core No. 2

WELL: MARLIN-4

Interval Cored 7368 - 7406 ft., Cut 38 ft., Recovered 38 ft., (100 %) Fm. LATROBE

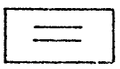
Bit Type C-20, Bit Size 8-15/32 x 4 in., Desc. by J. BLACK Date October 17, 1973

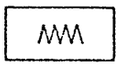
| Depth & Coring Rate (min./ft.) | Graphic (1" = 5') | Shows | Interval (ft.) | Descriptive Lithology |
|---|---|---|---|---|
| 88 90 95 00 05 06 |  | ← ← ← ← ← ← ← | 7394'-7395½' | Shale, dark brown grey, finely micaceous, platty horizontal fractures, carbonaceous. |
| | | | 7395½'-7402½' | Coal, black, conchoidal fractures, very light weight, scattered bands, pyrite, some fractured and re-cemented with pyrite. |
| | | | 7402½'-7403½' | Shale, dark grey, firm, very carbonaceous, with many horizontal coal laminae. |
| | | | 7403½'-7406' | Siltstone & Shale, thin interbeds of dark grey, very carbonaceous shale and light brown, hard, dense siltstone. |

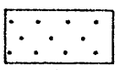
REMARKS:

← Core chip for paleo.

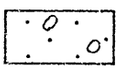
# LEGEND OF CORE DESCRIPTION

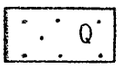

Shale


Silt

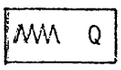

Sandstone


Coal

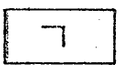

Conglomerate



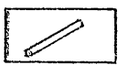
Sandy (Silica)

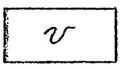


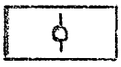
Silty (Silica)


Micaceous


Carbonaceous Matter


Plant Remains


Burrows


Siderite


Pyrite

s Sharp Contact

g Gradational Contact

No core analysis was carried out on the Marlin-4 cores due to the nature of the lithologies penetrated.

PAGE 1 OF 3

ATT 60 REC 56

DATE 23 Oct. 1973

IES RUN NO 1 SWC RUN NO 2

**ESSO AUSTRALIA LTD.**

SIDEWALL CORE DESCRIPTIONS

SERVICE CO Schlumb.

GEOLOGIST J. Black

WELL Marlin - 4

| NO. 1a | DEPTH 1 | REC 2 | ROCK TYPE 3 | MODIFIERS 4 | CAL 5 | COLOR 6 | INDUR DEG 7 | GRAIN SIZE 8 | SRTG 9 | RND 10 | DISS CLAY 11 | STAIN 12 | FLOURESCENCE % RK | FLOURESCENCE DISTR 14 | FLOURESCENCE INTEN 15 | FLOURESCENCE COLOR 16 | CUT FLUOR. INTEN 17 | CUT FLUOR. COLOR 18 | CUT RESIDUE QUAN 19 | CUT RESIDUE COLOR 20 | SHOW 21 | PROB PROD 22 | REMARKS - GAS 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8546 | Y Z | Sltst | F.mica, Hoz. | - | LT.GR | SFT | SIT | | | | | | | | | | | | | | | |
| | | | | CARB. LAMIN | | | | | | | | | | | | | | | | | | | |
| 2 | 8496 | 1 | SH | Thin Hoz. SLT | - | DK.GR | SFT | - | | | | | | | | | | | | | | | |
| | | | | LAM, CARB. | | | | | | | | | | | | | | | | | | | |
| 3 | 8404 | 5/8 | SITST. | HORZ. CARB. LAM | - | LT.GR | SFT | SIT | | | | | | | | | | | | | | | |
| 4 | 8275 | 7/8 | Ss | QTZ, clean | - | LT.GR | Uncons | N/C | P | SR | | - | - | - | - | - | - | - | - | - | - | WTR | |
| 5 | 8250 | 1 | SH | | - | DKGR. | Mod set | - | | | | | | | | | | | | | | | |
| 6 | 8190 | 3/4 | Sltst | F.MKA. HORZ. | - | LT.GR | SFT | Slt. | | | | | | | | | | | | | | | |
| | | | | SH. LAM. | | | | | | | | | | | | | | | | | | | |
| 7 | 8112 | NO Recov. | | (Empty) | | | | | | | | | | | | | | | | | | | |
| 8 | 8092 | 5/8 | SH | Slty, carb | - | DK. BRN | FRM. | | | | | | | | | | | | | | | | |
| 9 | 8076 | 1¼ | Coal | Brittle, dirty | - | BLK. | BRIT. | | | | | | | | | | | | | | | | |
| 10 | 7990 | 3/4 | Slts. | SHLY, F. MICA | - | GR. | FRM | Slt. | | | | | | | | | | | | | | | |
| 11 | 7897 | 1¼ | Coal | | - | BLK. | | | | | | | | | | | | | | | | | |
| 12 | 7855 | ½ | SH | CARB. FRAG. V. | - | LT.gr | FRM | Slt. | | | | | | | | | | | | | | | |
| | | | | Silty. | | | | | | | | | | | | | | | | | | | |
| 13 | 7840 | 5/8 | Ss | | - | WH | V. FRI | M/CRS | MOD | SR | | - | 100 | ev | fnt | blue WH | FNT | blue WH | H | blue WH | GC | GC | |
| 14 | 7796 | 3/4 | Ss | CARB. LAM, V. | - | Ltqv. | SFT | F/slt. | F | SR | I30 | - | - | - | - | - | - | - | - | - | - | - | |
| | | | | Silty. | | | | | | | | | | | | | | | | | | | |
| 15 | 7764 | 3/4 | SH | V. CARB. | - | Dr. GR | FRM | | | | | | | | | | | | | | | | |
| 16 | 7706 | 5/8 | V. CARB. | | - | DK. GR | FRM | | | | | | | | | | | | | | | | |
| 17 | 7506 | 3/4 | SH | V. CARB, COALY | - | DK BRN | FRM | | | | | | | | | | | | | | | | |
| 18 | 7460 | 3/4 | Ss | Sl: CARB. | - | TAN | FRI | f/m | MOD | SR | | | 100 | ev | fnt | dull yellow | FNT | blue WH | H | blue WH | GC | GC | |
| 19 | 7310 | 7/8 | SH | V. CARB. | - | DK. GR | FRM | | | | | | | | | | | | | | | | |
| 20 | 7170 | 3/4 | SHst. | Sl: CARB. | - | GR | SFT | SH. | | | | | | | | | | | | | | | |
| 21 | 7076 | NO | RECOV. | (EMPTY). | | | | | | | | | | | | | | | | | | | |
| 22 | 6954 | 1 | SHst. | CARB, SDY | - | DK. GR | SFT | SH. | | | | | | | | | | | | | | | |
| 23 | 6816 | 1½ | SH | CARB, COALY | - | DK. GR | FRM | | | | | | | | | | | | | | | | |

FORM R 257 3-72

PAGE 2 OF 3

ATT 60 REC 56

DATE 23/10/73

**ESSO AUSTRALIA LTD.**
SIDEWALL CORE DESCRIPTIONS

IES RUN NO 1 SWC RUN NO 2

WELL Marlin - 4

GEOLOGIST J. Black

SERVICE CO Schlum.

| NO. | DEPTH | REC | ROCK TYPE | MODIFIERS | CAL | COLOR | INDUR DEG | GRAIN SIZE | SRTG | RND | DISS CLAY | STAIN | FLOURESCENCE % RK | FLOURESCENCE DISTR | FLOURESCENCE INTEN | FLOURESCENCE COLOR | CUT FLUOR. INTEN | CUT FLUOR. COLOR | CUT RESIDUE QUAN | CUT RESIDUE COLOR | SHOW | PROB PROD | REMARKS - GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 6612 | 5/8 | SH | CARB. | - | DK.BRN | FRM | | | | | | | | | | | | | | | | |
| 25 | 6510 | 1 1/8 | SH | F.MICA,PYR. CARB. | - | DK.GR. | FRM | | | | | | | | | | | | | | | | |
| 26 | 6390 | 7/8 | SH | CMICA,CARB. | - | DK.GR | FRM | | | | | | | | | | | | | | | | |
| 27 | 6350 | 1 | SH | CARB. | - | DK.GR | FRM | | | | | | | | | | | | | | | | |
| 28 | 6300 | 1 | SH | CARB. | - | DK. R | FRM | | | | | | | | | | | | | | | | |
| 29 | 6280 | 1 | Ss. | MICA,SILTY | - | LTGR. | FRI | F.g. M/V.C. | MOD | SR | +/- -20 | - | - | - | - | - | - | - | - | - | - | WTR. | |
| 30 | 6250 | 1 | Ss. | | - | WH | FRI | | P | SA | - | - | - | - | - | - | - | - | - | - | - | WTR | |
| 31 | 6208 | 1 | SH | S1: SLTY. | M | DK.GRN | FRM | | | | | | | | | | | | | | | | |
| 32 | 6190 | 1 3/8 | SH | S1:SITY,F.MICA. | M | DKBRN | FRM | | | | | | | | | | | | | | | | |
| 33 | 6170 | 3/8 | SH | V.SILTY | M | DKBRN | FRM | | | | | | | | | | | | | | | | |
| 34 | 6100 | 1¼ | SH | | M | DKBRN | FRM | | | | | | | | | | | | | | | | |
| 35 | 6070 | 1½ | SH | SILTY,MICA | V | DKBRN | FRM | | | | | | | | | | | | | | | | |
| 36 | 6050 | 1¼ | | | | | | | | | | | | | | | | | | | | | |
| 37 | 6030 | 1½ | SH | SILTY,MICA | V | DKBRN | FRM | | | | | | | | | | | | | | | | |
| 38 | 6010 | 1½ | SH | SILTY,MICA | V | DKBRN | FRM | | | | | | | | | | | | | | | | |
| 39 | 5990 | 5/8 | SH | | V | GRY. | HARD | | | | | | | | | | | | | | | | |
| 40 | 5970 | 5/8 | SH | SILTY | V | BRN | FRM | | | | | | | | | | | | | | | | |
| 41 | 5950 | 3/8 | SH | SILTY | V | BRN | FRM | | | | | | | | | | | | | | | | |
| 42 | 5930 | 1¼ | SH | | V | GRY | FRM | | | | | | | | | | | | | | | | |
| 43 | 5900 | 1½ | SH | | V | GRY | FRM | | | | | | | | | | | | | | | | |
| 44 | 5850 | 1 | SH | S1: SLTY | V | GRY | FRM | | | | | | | | | | | | | | | | |
| 45 | 5800 | 1 | SH | | V | GRY | FRM | | | | | | | | | | | | | | | | |
| 46 | 5730 | 1½ | MDST | | V | GRN GRY | SFT | | | | | | | | | | | | | | | | |
| 47 | 5650 | 1½ | MDST | | V | GRN GRY | SFT | | | | | | | | | | | | | | | | |
| 48 | 5580 | 5/8 | SH | FOSS,SLISLTY | V | GRY | FRM | | | | | | | | | | | | | | | | |
| 49 | 5500 | SH | SH | CARB,FRAGS SLTY, PYR. | V | GRY | FRM | | | | | | | | | | | | | | | | |

FORM R 257 3/72

PAGE 3 OF 3

ATT 60 REC 56

DATE 23/10/73

**ESSO AUSTRALIA LTD.**

SIDEWALL CORE DESCRIPTIONS

IES RUN NO 1 SWC RUN NO 2

WELL Marlin-4

GEOLOGIST J. Black

SERVICE CO Schlum.

| NO. 1a | DEPTH 1 | REC 2 | ROCK TYPE 3 | MODIFIERS 4 | CAL 5 | COLOR 6 | INDUR DEG 7 | GRAIN SIZE 8 | SRTG 9 | RND 10 | DISS CLAY 11 | STAIN 12 | FLOURESCENCE % RK | FLOURESCENCE DISTR 14 | FLOURESCENCE INTEN 15 | FLOURESCENCE COLOR 16 | CUT FLUOR. INTEN 17 | CUT FLUOR. COLOR 18 | CUT RESIDUE QUAN 19 | CUT RESIDUE COLOR 20 | SHOW 21 | PROB PROD 22 | REMARKS - GAS 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 5400 | NO | RECOV. | (EMPTY) | | | | | | | | | | | | | | | | | | | |
| 51 | 5300 | 1½ | MDST | | V | GRY | FRM | | | | | | | | | | | | | | | | |
| 52 | 5200 | 3/4 | MDST | FOSS | V | GRN GRY | SFT | | | | | | | | | | | | | | | | |
| 53 | 5000 | 1½ | MDST | FOSS | V | GRY | SFT | | | | | | | | | | | | | | | | |
| 54 | 4800 | 1 1/8 | MDST | SLTY | V | GRN GRY | SFT | | | | | | | | | | | | | | | | |
| 55 | 4580 | NO | RECOV. | (EMPTY) | | | | | | | | | | | | | | | | | | | |
| 56 | 4350 | 1¼ | SLTST. | | V | GRY | MOD SFT | | | | | | | | | | | | | | | | |
| 57 | 4090 | 1½ | MDST | V.SILTY,SDV TR. GLAUC. | V | GRY | SFT | | | | | | | | | | | | | | | | |
| 58 | 3830 | 1¼ | MDST | SLTY | V | LT GEY | SFT | | | | | | | | | | | | | | | | |
| 59 | 3550 | 1 | MDST | SLTY | V | GRN GRY | SFT | | | | | | | | | | | | | | | | |
| 60 | 3050 | 5/8 | SH | SILTY, FOSS | V | LT.GR | FRM | | | | | | | | | | | | | | | | |

FORM R 257 3/72

APPENDIX 6

# LIST AND INTERPRETATION

# OF WIRELINE LOGS AND SURVEYS

## MARLIN-4

## GIPPSLAND BASIN

November, 1973

The following logs and wireline services were performed by Schlumberger in Marlin-4 :-

1) SLK/GR 2" and 5" Scales 2778-602

2) Caliper 5" Scale 2770-604

3) B.H.C. Sonic 2" and 5" Scales 8035-2755

4) FDC/CNL/GR/Cal 2" and 5" Scales FDC/CNL 8040-5850
GR/Cal -2600

5) ISF 2" and 5" 8034-2755

6) FDC/CNL/GR/Cal 2" and 5" 8595-7750

7) ISF/SLK 2" and 5" 8597-7750

8) HDT (four arm High Resolution Dipmeter) 5" : 100' Scale on Monitor log 8591' - 5900'. Interpretation of logs of HDT Tapes by Data Analysis 2" and 5" in 1.5', 2.5', and 9' step intervals

9) FIT's at 7836', 7785', 8275', 7460', 6880', and 6253'.

10) Shot 60 CST's and recovered 56 in the interval 8546' - 3050'.

11) A velocity survey was performed by United Geophysical - 12 levels were taken between 8351' and 2968' (See Time-Depth Curve, Enclosure 3).

# WELL LOG ANALYSIS REPORT



TO Well File
c.c. W.W. Fraser (2)
~~C.N. Curnow~~

OPERATOR ESSO AUSTRALIA WELL MARLIN-4 DATE 5 Nove.1973

STATE VICTORIA ELEV. 32/KB.

| DEPTH INTERVAL | POROSITY ESTIMATE | WATER SAT. ESTIMATE | REMARKS |
|---|---|---|---|
| 6215-17 (2 | 21-22 | Indeterminate | Probably gas production |
| 7208-11 (3 | 24-25 | 21-22 | Gas productive |
| 7457-64 (7 | 20-21 | 18-19 | " " |
| 7554-57 (3 | 22-23 | 28-30 | " " |
| 7780-86 (6 | ~~22~~-24 | 7-8 | " " |
| 7786-90 (4 | 22-23 | 8-9 | " " |
| 808-12 (4 | 20-21 | 12-13 | " " |
| 7812-16 (4 | 17-18 | 12-13 | " " |
| 7816-22 (6 | 22-23 | 7-8 | " " |
| 7829-32 (3 | 22-23 | 8-9 | " " |
| 7832-35 (3 | 22-23 | 7 | " " |
| 7835-45 (10 | 20-21 | 8-9 | " " |

ISF depths.

TESTS:

FIT'S

FORMATION:

LATROBE

LOGS:

ISF, BHC, FDC - CNL - GR

COMMENTS:

Other sands in the gross interval 6200 to 8590 feet are interpreted to be water bearing.

BY

# APPENDIX 7

## TEST DATA

## MARLIN-4

## GIPPSLAND BASIN

November, 1973

## LIST AND DESCRIPTION OF TESTS AND INTERPRETATION OF TEST RESULTS

Six F.I.T. tests were performed in Marlin-4 by Schlumberger using, in addition ot Schlumberger pressure gauges, dual Amerada gauges with rated capacities of 0 -10,250 and 0 - 11,800 PSIG. These gauges were run on the F.I.T. tool and interpreted by Agnew-GO-Western Ltd.

Note: All depths are ISF depths
(Mud properties Rmf 0.54 @ 67° F, $Cl^-$ 4,400 ppm, $NO_3^=$ 150 ppm)

### F.I.T. #1 @ 7836'

Recovered

(Main Chamber) 150.7 c.ft. gas
750 cc condensate
250 cc mud

(Segregator) Not opened.

Properties
(Main Chamber

| Gas | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ |
|---|---|---|---|---|---|---|---|
| | 120M | 120M | 23M | 3100 MISO<br>7000 M Norm. | 2000 | 0 | 5M+ |

Oil 58° API @ 60°F

Water $Cl^-$ 3800 ppm $NO_3^=$ 19 ppm (by titration)

(Segregator) Not opened.

Pressures

| | Agnew | (Dual Ameradas) |
|---|---|---|
| Sampling Pressure | 3399 psi | 3391 psi |
| Final Shut In | 3399 psi | 3391 psi |
| Hydrostatic | Int. 4136 psi | 4133 psi |
| | F. 3907 psi | 3948 psi |

### F.I.T. #2 @ 7785'

Recovered

(Main Chamber) 153.7 c.ft. gas
1200 cc condensate
300 cc muddy condensate

(Segregator) Not opened

Properties

(Main Chamber)

| Gas | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ |
|---|---|---|---|---|---|---|---|
| | 170M | 1205M | 23M | 5M ISO<br>7M Norm. | 2100 | 0 | 5M+ |

Oil 56°API @ 60°F.

(Segregator) Not opened.

| Pressures: | SCHLUMBERGER | | AGNEW (DUAL AMERADA) | |
|---|---|---|---|---|
| (Main Chamber) Sampling | 3250 psi | | 3331 psi | 3343 psi |
| Final Shut-In | 3300 psi | | 3447 psi | 3454 psi |
| Hydrostatic | 3750 psi | INT. | 3919 psi | 3953 psi |
| Sampling Time | 4½ min. | F.HY. | 3870 | 3893 F.Hyd. |
| Shut-In Time | 4 min. | | | |

F.I.T. #3 @ 8275'

Recovered

(Main Chamber) 0.9 c.ft. gas

21,000 cc water

(Segregator)

Properties

(Main Chamber)

| Gas | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ |
|---|---|---|---|---|---|---|---|
| | 130M | 80M | 115M | 21M ISO<br>24M Norm. | 5000 | 0 | 5M+ |

Water $Cl^-$ 6800 ppm $NO_3^=$ 44 ppm (by titration)

Rrf .453 @ 68°F

(Segregator)

Pressures

| (Main Chamber) | SCHLUMBERGER | | AGNEW (DUAL AMERADAS) | |
|---|---|---|---|---|
| Sampling | 3300 psi | | 3331 psi | 3334 psi |
| Final Shut-In | 3450 psi | | 3613 psi | 3616 psi |
| Hydrostatic | 4050 psi | INT | 4152 psi | 4179 psi |
| Sampling Time | 4 min. | FHY | 4109 | 4128 |
| Shut-In Time | 4½ min. | | | |

F.I.T. #4 @ 7460'

Recovered

(Main Chamber) 82.8 c.ft. gas

300 cc condensate

8700 cc water

(Segregator)

Properties

(Main Chamber)

| Gas | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ |
|---|---|---|---|---|---|---|---|
| | 170M | 130M | 22.5M | 5100M ISO<br>6000M Norm. | 1000 | - | 5M+ |

Oil 52° API @ 60°F

Water $Cl^-$ 4100 ppm $NO_3^=$ 94 ppm

Pressures

| (Main Chamber) | SCHLUMBERGER | | AGNEW (DUAL AMERADAS) | |
|---|---|---|---|---|
| Sampling | 2800 psi | | 2890 psi | 2890 psi |
| Final Shut-In | 3125 psi | | 3331 psi | 3334 psi |
| Hydrostatic | 3575 psi | INT. | 3748 psi | 3768 psi |
| Sampling Time | 9 min. | F | 3705 | 3722 |
| Shut-In time | 7 min. | | | |

F.I.T. #5 @ 6880'

Recovered

(Main Chamber) 0.3 c.ft. gas
22000 cc water
100 cc mud

(Segregator)

Properties

(Main Chamber)

| Gas | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ |
|---|---|---|---|---|---|---|---|
| | 130M | 50M | 100M | 24.5M IOS<br>26.5M Norm. | 6000 | 0 | 5M+ |

Water $Cl^-$ 3800 ppm $NO_3^=$ 88 ppm (by titration)
Rrf .635 @ 68°F

Pressures

| (Main Chamber) | SCHLUMBERGER | | AGNEW (DUAL AMERADAS) | |
|---|---|---|---|---|
| Sampling | 3100 psi | | 2951 psi | 2978 psi |
| Final Shut-In | 3175 psi | | 3000 psi | 3043 psi |
| Hydrostatic | 3650 psi | INT. | 3453 psi | 3468 psi |
| Sampling Time | 4 min | F. | 3423 | 3436 |
| Shut-in Time | 4½ min. | | | |

F.I.T. #6 @ 6253'

Recovered

(Main Chamber) 0.2 c.ft. gas
22000 cc water
100 cc mud

(Segregator)

Properties

(Main Chamber)

| Gas | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | $H_2S$ | $CO_2$ |
|---|---|---|---|---|---|---|---|
| | 125M | 100M | 17M | 6.5M ISO<br>9.5 M Norm. | 300 | 0 | 5M+ |

Water $Cl^-$ 7100 ppm $NO_3^=$ 44(?)ppm(by titration)
Rrf .407 @ 68°F

Pressures

| (Main Chamber) | SCHLUMBERGER | | AGNEW (DUAL AMERADAS) | |
|---|---|---|---|---|
| Sampling | 2700 psi | | 2644 psi | 2669 psi |
| Final Shut-In | 2800 psi | | 2730 psi | 2752 psi |
| Hydrostatic | 3300 psi | INT. | 3141 psi | 3154 psi |
| Sampling Time | 4½ min. | F. | 3110 | 3144 |
| Shut-In Time | 6½ min. | | | |

AGNEW-GO-WESTERN PTY. LTD.
582 St. Kilda Road
Melbourne, Victoria 3004

ESSO AUSTRALIA LIMITED — MARLIN — MARLIN No. 4
October 22, 1973

PURPOSE: Obtain subsurface pressures with Amerada Gauges run in tandem with Schlumberger Formation Interval Tester.

TOOLS USED: Kuster 11,800 psi element Serial No. 8282 12 hour clock
Kuster 10,300 psi element Serial No. 9403 12 hour clock

## F. I. T. No. 1 @ 7846'

| HOURS | PSIG 11,800 | PSIG 10,300 | REMARKS |
|---|---|---|---|
| 0405 | | | Run in hole |
| 0459 | 3954.3 | 3953.7 | Set Packer — Initial hydrostatic |
| 0501 | | | Open tool |
| 0503 | 3394.1 | 3380.7 | |
| 0505 | 3474.1 | 3479.6 | |
| 0507 | 3474.1 | 3479.6 | |
| 0509 | 3474.1 | 3479.6 | |
| 0511 | 3474.1 | 3479.6 | |
| 0512 | | | Seal tool — open segregator |
| 0513 | 2538.3 | 2528.3 | |
| 0515 | 3474.1 | 3479.6 | |
| 0516 | 3474.1 | 3479.6 | Seal Segregator |
| 0518 | 3935.9 | 3948.5 | Unseat packer — final hydrostati |

## F. I. T. No. 2 @ 7785'

| HOURS | PSIG 11,800 | PSIG 10,300 | REMARKS |
|---|---|---|---|
| 1830 | | | Run in hole |
| 1921 | 3948.2 | 3926.8 | Set packer — initial hydrostatic |
| 1926 | 3357.1 | 3362.7 | |
| 1928 | 3357.1 | 3353.5 | |
| 1930 | 3461.8 | 3458.7 | |
| 1931 | 3474.1 | 3468.7 | |
| 1932 | | | Seal tool — open segregator |
| 1933 | 3474.1 | 3468.7 | |
| 1935 | 3474.1 | 3468.7 | |
| 1937 | 3898.9 | 3900.9 | Unseat packer — final hydrostati |

AGNEW-GO-WESTERN PTY. LTD.
582 St. Kilda Road
Melbourne, Victoria 3004

ESSO AUSTRALIA LIMITED | MARLIN | MARLIN No. 4
October 22-23, 1973

PURPOSE: Obtain subsurface pressures with Amerada Gauges run in tandem with Schlumberger Formation Interval Tester.

TOOLS USED: Kuster 11,800 psi element Serial No. 8282 12 hour clock
Kuster 8,900 psi element Serial No. 9390 12 hour clock

## F. I. T. No. 3 @ 8275'

| HOURS | PSIG 11,800 | PSIG 8,900 | REMARKS |
|---|---|---|---|
| 2146 | | | Run in hole |
| 2234 | 4182.3 | 4171.4 | Set Packer - initial hydrostatic |
| 2236 | | | Open tool |
| 2237 | 3357.1 | 3353.5 | |
| 2239 | 3357.1 | 3353.5 | |
| 2241 | 3634.1 | 3634.3 | |
| 2243 | 3640.3 | 3634.3 | |
| 2244 | 3640.3 | 3634.3 | |
| 2248 | 4139.1 | 4139.1 | Unseat packer - final hydrostati |

## F. I. T. No. 4 @ 7460'

| HOURS | PSIG 11,800 | PSIG 8,900 | REMARKS |
|---|---|---|---|
| 0045 | | | Run in hole |
| 0146 | 3757.3 | 3758.5 | Set packer - initial hydrostatic |
| 0149 | | | Open tool |
| 0150 | 84.9 | 58.6 | |
| 0151 | 90.6 | 71.4 | |
| 0152 | 90.6 | 80.0 | |
| 0153 | 90.6 | 88.7 | |
| 0154 | | | Fire shape charge |
| 0156 | 2907.7 | 2910.8 | |
| 0158 | 2913.9 | 2906.2 | |
| 0200 | 3307.9 | 3298.2 | |
| 0204 | 3351.0 | 3348.9 | |
| 0205 | 3351.0 | 3348.9 | |
| 0206 | | | Seal tool - open segregator |
| 0208 | 3357.1 | 3348.9 | |
| 0210 | 3357.1 | 3348.9 | |
| 0212 | 3357.1 | 3348.9 | |
| 0213 | 3357.1 | 3348.9 | Seal segregator |
| 0215 | 3732.7 | 3725.5 | Unseat packer - final hydrostatic |

AGNEW-CO-WESTERN PTY. LTD.
582 St. Kilda Road
Melbourne, Victoria 3004

ESSO AUSTRALIA LIMITED

MARLIN

MARLIN No. 4
October 23, 1973

PURPOSE: Obtain subsurface pressures with Amerada Gauges run in tandem with Schlumberger Formation Interval Tester.

TOOLS USED: Kuster 11,800 psi element Serial No. 8282 12 hour clock
Kuster 8,900 psi element Serial No. 9390 12 hour clock

## F. I. T. No. 5 @ 6880'

| HOURS | PSIG 11,800 | PSIG 8,900 | REMARKS |
|---|---|---|---|
| 0412 | | | Run in hole |
| 0456 | 3480.2 | 3459.5 | Set packer — initial hydrostatic |
| 0459 | | | Open tool |
| 0500 | 2969.3 | 2970.8 | |
| 0502 | 2975.5 | 2970.8 | |
| 0504 | 3024.7 | 3035.4 | |
| 0506 | 3024.7 | 3035.4 | |
| 0508 | 3024.7 | 3035.4 | |
| 0511 | 3449.5 | 3427.2 | Unseat packer — final hydrostatic |

## F. I. T. No. 6 @ 6253'

| HOURS | PSIG 11,800 | PSIG 8,900 | REMARKS |
|---|---|---|---|
| 0650 | | | Run in hole |
| 0731 | 3166.3 | 3146.1 | Set packer — initial hydrostatic |
| 0733 | | | Open tool |
| 0734 | 2655.3 | 2661.4 | |
| 0736 | 2667.6 | 2661.4 | |
| 0738 | 2753.8 | 2744.5 | |
| 0740 | 2753.8 | 2744.5 | |
| 0742 | 2753.8 | 2744.5 | |
| 0743 | 2753.8 | 2744.5 | Seal tool |
| 0746 | 3135.5 | 3136.9 | Unseat packer — final hydrostatic |

PE902330

This is an enclosure indicator page.
The enclosure PE902330 is enclosed within the container PE902327 at this location in this document.

The enclosure PE902330 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE902330 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Stratigraphic Section - Hydrocarbon Distribution in Marlin-Turrum Paleocene |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = CROSS_SECTION |
| DESCRIPTION | = Stratigraphic Section showing Hydrocarbon Distribution in Marlin - Turrum Paleocene(enclosure from WCR) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 28/02/74 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = Marlin-4 |
| CONTRACTOR | = ESSO |
| CLIENT_OP_CO | = ESSO |

PE905643

This is an enclosure indicator page.
The enclosure PE905643 is enclosed within the container PE902327 at this location in this document.

The enclosure PE905643 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE905643 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Stratigraphic Section |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = CROSS_SECTION |
| DESCRIPTION | = Stratigraphic Section showing Hydrocarbo Distribution in Marlin/Turrum Paleocene (from WCR--enclosure-1) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 28/02/73 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE902328

This is an enclosure indicator page.
The enclosure PE902328 is enclosed within the container PE902327 at this location in this document.

The enclosure PE902328 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE902328 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Structure Map on the A-6 Oil Sand Horizon Post Drill |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = SEISMIC |
| SUBTYPE | = HRZN_CONTR_MAP |
| DESCRIPTION | = Structure Map on the A-6 Oil Sand Horizon Post Drill (enclosure from WCR) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 28/02/1974 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = Marlin-4 |
| CONTRACTOR | = ESSO |
| CLIENT_OP_CO | = ESSO |

(Inserted by DNRE - Vic Govt Mines Dept)

PE902329

This is an enclosure indicator page.
The enclosure PE902329 is enclosed within the container PE902327 at this location in this document.

The enclosure PE902329 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE902329 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Structure Map A-6 Sand -8454+- Paleocene Pre Drill |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = SEISMIC |
| SUBTYPE | = HRZN_CONTR_MAP |
| DESCRIPTION | = Structure Map A-6 Sand -8454+- Paleocene Pre Drill (enclosure from WCR) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 31/03/1972 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = Marlin-4 |
| CONTRACTOR | = ESSO |
| CLIENT_OP_CO | = ESSO |

(Inserted by DNRE - Vic Govt Mines Dept)

PE905644

This is an enclosure indicator page.
The enclosure PE905644 is enclosed within the container PE902327 at this location in this document.

The enclosure PE905644 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE905644 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Time Depth Curve |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = VELOCITY_CHART |
| DESCRIPTION | = Time Depth Curve (from WCR--enclosure-3) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 21/10/73 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE905645

This is an enclosure indicator page.
The enclosure PE905645 is enclosed within the container PE902327 at this location in this document.

The enclosure PE905645 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE905645 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Well History Chart |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = DIAGRAM |
| DESCRIPTION | = Well History Chart (from WCR--enclosure 4) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 28/02/74 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE601442

This is an enclosure indicator page.
The enclosure PE601442 is enclosed within the container PE902327 at this location in this document.

The enclosure PE601442 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE601442 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Baroid ppm Mud Log |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = MUD_LOG |
| DESCRIPTION | = Baroid ppm Mud Log (enclosure from WCR) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 21/10/73 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = Marlin-4 |
| CONTRACTOR | = BAROID WELL INFORMATION SYSTEMS ANSD ENGINEERING |
| CLIENT_OP_CO | = ESSO |

(Inserted by DNRE - Vic Govt Mines Dept)

PE604016

This is an enclosure indicator page.
The enclosure PE604016 is enclosed within the container PE902327 at this location in this document.

The enclosure PE604016 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE604016 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Baroid ADT Log |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = MUD_LOG |
| DESCRIPTION | = Baroid ADT Log (from WCR--enclosure 5) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = BAROID |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE604017

This is an enclosure indicator page.
The enclosure PE604017 is enclosed within the container PE902327 at this location in this document.

The enclosure PE604017 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE604017 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Drill Data Plot |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = WELL_LOG |
| DESCRIPTION | = Baroid Well Information Systems and Engineering Drill data Plot (from WCR--enclosure 5) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = BAROID WELL INFORMATION SYSTEMS AND ENGINEERING |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE604015

This is an enclosure indicator page.
The enclosure PE604015 is enclosed within the container PE902327 at this location in this document.

The enclosure PE604015 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE604015 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Well Composite Log |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = COMPOSITE_LOG |
| DESCRIPTION | = Composite Well Log (from WCR--enclosure 6) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = 5/10/73 |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE905646

This is an enclosure indicator page.
The enclosure PE905646 is enclosed within the container PE902327 at this location in this document.

The enclosure PE905646 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE905646 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Fit Data |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = FIT |
| DESCRIPTION | = Fit Data (from WCR) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)

PE604018

This is an enclosure indicator page.
The enclosure PE604018 is enclosed within the container PE902327 at this location in this document.

The enclosure PE604018 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE604018 |
| CONTAINER_BARCODE | = PE902327 |
| NAME | = Computer Generated Log |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L4 |
| TYPE | = WELL |
| SUBTYPE | = WELL_LOG |
| DESCRIPTION | = Computer Generated Log, Logs and Log Analysis (enclosure from WCR) for Marlin-4 |
| REMARKS | = |
| DATE_CREATED | = |
| DATE_RECEIVED | = |
| W_NO | = W674 |
| WELL_NAME | = MARLIN-4 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC. |

(Inserted by DNRE - Vic Govt Mines Dept)