DEPT. NAT. RES & ENV
PE902927

ESSO

WCR
MARLIN-1
(W496)

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MARLIN 1

<u>ESSO GIPPSLAND SHELF-4, VICTORIA</u>

<u>WELL COMPLETION REPORT</u>

by

Esso Exploration Australia, Inc.

May 1966

PE905268

This is an enclosure indicator page.
The enclosure PE905268 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905268 has the following characteristics:

ITEM_BARCODE =	PE905268
CONTAINER_BARCODE =	PE902927
NAME =	Marlin-1 Well Card
BASIN =	GIPPSLAND
PERMIT =	PEP 38
TYPE =	WELL
SUBTYPE =	WELL_CARD
DESCRIPTION =	Marlin-1 (Esso Gippsland Shelf-4) Well Card. Enclosure from WCR.
REMARKS =	Well Card is double sided.
DATE_CREATED =	10/04/1966
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	Marlin-1
CONTRACTOR =	
CLIENT_OP_CO =	Esso Exploration Australia Inc.

(Inserted by DNRE - Vic Govt Mines Dept)

CONTENTS

I SUMMARY

Drilling

Esso Gippsland Shelf-4 was spudded on December 5, 1965. It was drilled to a total depth of 8485 feet and completed as a suspended oil and gas well on April 10, 1966.

The well was originally programmed for a total depth of 7500 feet. Seismic control below this depth was not of a quality sufficient to determine adequate structural control. As the base of the Tertiary section was predicted at 6250 feet, it was felt that a total depth for the well of 7500 feet was sufficient to evaluate, not only the Eocene Latrobe Valley Coal Measures which contain commercial quantities of gas in Gippsland Shelf-1 and Gippsland Shelf-2 wells, but also the top part of the underlying Upper Cretaceous section. During drilling of the well below 7040 feet, indications of gas were noticed within a sandstone section. These shows persisted and to determine their full extent and nature, the well was deepened to the final depth of 8485 feet.

Geological

The well penetrated a Tertiary section from at least 760 feet (first samples recovered) to 6490 feet and an Upper Cretaceous section from 6490 to 8485 feet, total depth.

A gross gas column of 588 feet was logged in the top part of the Eocene Latrobe Valley Coal Measures from 4522 to 5110 feet. This was underlain by 54 feet of gross oil sand extending from 5110-5164 feet. A production test of the oil zone through perforations from 5122-5137 feet produced at a maximum flow rate of 1182 barrels of 51°-53° gravity oil per day. Within the gas zone three production tests were carried out. The first and lowermost, through perforations from 5069-5077 feet, designed to test the production capability of a tight zone in the formation, flowed gas at a maximum rate of 1.9 MMCFD plus condensate at the rate of 25.7 bbl/MMCFG. The second, through perforations from 4532-4552 feet, designed to evaluate the producing potential of the upper part of the pay zone, flowed initially at an unsatisfactory maximum rate of 4.6 MMCFGD. The zone was reperforated, and the maximum flow rate increased to 8.3 MMCFGD plus 57.6 bbls condensate per MMCFG. Due to possible formation damage in the tested zone, the test was still not considered to be representative of the reservoir potential, and a third test of the same zone, plus an additional twenty feet from 4562-4582 feet, was carried out. This final test of the two zones flowed at a maximum rate of 10.2 MMCFGD plus condensate at the rate of 44.6 bbls/MMCFG.

Within the Upper Cretaceous section a gross gas column of 591 feet was logged from 7049-7640 feet. A production test of this gas zone through perforations from 7514-7574 feet and 7406-7466 feet flowed at a maximum rate of 10.9 MMCFD plus condensate at the rate of 39 bbl/MMCF.

The well represents the first significant discovery of oil in the Latrobe Valley Coal Measures, and also the first significant gas show in the Upper Cretaceous section in the Gippsland Basin.

II INTRODUCTION

Esso Gippsland Shelf-4 was drilled on the highest part of a large domal feature, delineated by seismic survey and exhibiting closure from the top of the Oligocene Lakes Entrance Formation tothe lowest valid reflectors in the Upper Cretaceous section. From the available seismic and geological evidence this structure was of the same age and involved a similar sedimentary section as the Gippsland Shelf-1 structure, located some 26 miles to the west-south-west and known to contain gas.

The primary objective of the well was to evaluate the sandstones of the Latrobe Valley Coal Measures, the gas reservoir in the Gippsland Shelf-1 structure. The secondary objective was to evaluate the hydrocarbon potential of the Upper Cretaceous section, which in Gippsland Shelf-1 included fine to medium grained sands having generally good porosity and permeability and containing, in places, minor showings of oil.

III WELL HISTORY

1. General Data
   (a) Well name and number: Esso Gippsland Shelf-4.
   (b) Name & address of operator: Esso Exploration Australia, Inc. G.P.O. Box 4249, Sydney, N.S.W.
   (c) Name & address of tenement holder: Haematite Explorations Pty. Ltd. 500 Bourke Street, Melbourne, C1, Victoria.
   (d) Petroleum tenement: Petroleum Exploration Permit No. 38. issued by the State of Victoria and covering an area of 4450 square miles. Subsequent farm-in by Esso Exploration Australia, Inc. from Haematite Explorations Pty. Ltd.
   (e) District: Offshore Gippsland, Eastern Victoria waters. Sale 4 mile sheet.
   (f) Location: Latitude 38° 14' 03" S
Longitude 148° 13' 33" E
   (g) Elevation: Permanent Datum - Mean Sea Level
Rotary Table - 31 feet above mean sea level.
   (h) Total Depth: 8485 feet.
   (i) Date Drilling Commenced: December 5, 1965.
   (j) Date Total Depth Reached: February 3, 1966
   (k) Date Well Suspended: April 10, 1966.
   (l) Date Rig Released: April 10, 1966.
   (m) Drilling Time in Days to Total Depth: 61
   (n) Status: Suspended gas and oil well.
   (o) Total Cost: To be submitted later.

2. Drilling Data
   (a) Drilling Contractor: Global Marine Australasia Pty. Ltd. 360 Lonsdale Street, Melbourne, C1, Vic.
   (b) Drilling Plant:
       - Make .... National
       - Type .... 1625 DE
       - Rated Capacity .... 20,000' with 5" DP
       - Motors .... Cummins VT-12-GA-30 for electric power.
   (c) Derrick: 136' x 58' x 34' special design, galvanised, 1,000,000 lb. hookload capacity.
   (d) Pumps: (2)
       - Make .... National
       - Type .... G-1000-C Duplex
       - Size .... 7-3/4" x 16"
       - Motors .... Dual electric independent drives from above motors.
   (e) BOP Equipment:

Make	Hydril	Hydril	Cameron Triple U
Size	20" (MSP)	13-5/8" (GK)	13-5/8"
Working Pressure (psi)	12,000	5,000	5,000

(f) **Hole Sizes and Depths** (related to RT)

36"	to	345 feet
26"	to	758 feet
17½"	to	2294 feet
12-1/4"	to	6506 feet
8½"	to	8485 feet

(g) **Casing & Cementing Details:**

Size	30"	20"	13-3/8"	9-5/8"	5½" liner
Wt-Lb/ft.	196 & 310	105 & 167	54.5	36,40,47	17
Grade	EW	"B" SS	J-55	J-55 & N-80	N-80
Range	1 & 3	3	3	3	3
Setting Depth	317	728	2252	6289	8398 Top 5733
Float Equip. & Attachments	Float Shoe	Float shoe, Float Collar Field made, weld on centralizers inside 30"	Float Shoe, Float Collar top 2nd joint Centralizers Middle & top of 1st joint top 3rd & 5th joints	Float Shoe, Float Collar top 2nd joint 16 Centralizers from 5110-4490'	Shoe on bottom, swivel & hanger on top. 3 centralizers bottom 85 ft. 18 Centralizers 7700-7000, 3 Centralizers 6200-6120'
Cement - Sx.	400 + 1% $CaCl_2$	1530	1650	765 + 8% Gel + 3/10% H.R. 4.	650 + 5/10% H.R. 4
Top Cement	Circulated	Circulated	NR	3750' (Temp. Log.)	6180' (C.B. Log)
Method	Thru drill pipe	Thru drill pipe	Two Plug	Two Plug	Plug

(h) **Drilling Fluid**

XP-20, Spersene fresh water system using Bentonite for viscosity and fluid loss control. Barites for weight, and Caustic Soda for pH control.

Mud and Chemicals Used

Barytes	-	820,000 lbs
Gel	-	176,200 lbs
Zeogel	-	28,750 lbs
Magcophos	-	1,400 lbs
Spersene	-	33,950 lbs
XP-20	-	18,450 lbs
Caustic	-	13,250 lbs
C.M.C.	-	1,950 lbs
Chip Seal	-	720 lbs
Fibre Seal	-	660 lbs
Nut Plug (fine)	-	4,000 lbs
Nut Plug (medium)	-	250 lbs
Nut Plug (coarse)	-	3,050 lbs

Weekly Analysis:

Week Ending	Wt Lb/gal.	Viscosity Sec.	Fluid Loss C.C.	pH	Plastic Viscosity-CP	Yield Point	Gel Initial	Gel 10 min	Alkalinity %
18/12/65	10.3	42	11.4	9.2	12	7	6	23	0.40
25/12/65	10.1	50	9.2	9.9	17	6	7	41	0.70
1/ 1/66	11.4	59	7.6	10.0	24	10	7	52	0.40
8/ 1/66	11.9	50	5.7	10.2	25	5	5	7	0.40
15/ 1/66	11.9	53	5.7	9.0	28	8	5	8	0.50
22/ 1/66	11.5	43	7.7	10.7	18	4	3	9	0.90
29/ 1/66	11.1	44	7.9	9.4	17	3	3	6	0.40
5/ 2/66	11.3	44	6.0	9.4	25	2	4	8	0.40

(i) **Water Supply**: Fresh water obtained from Port Welshpool - transported to rig by Service Boats.

(j) **Perforations**:

Casing	Interval	Type Charge	Holes per Foot	Method
5½" liner	7514-74 7406-66	Jet	4	Schlumberger 1-11/16" Unijet through tubing gun
9-5/8"	5122-37	Jet	2	do. do.
9-5/8"	5069-77	Jet	2	do. do.
9-5/8"	4532-52	Jet	2	do. do.
	4532-52	Jet	2 (reperforate)	do. do.
9-5/8"	4562-82	Jet	2	do. do.

(k) **Plugs & Squeeze Jobs**:

Interval	No. Sx.	Max. Squeeze	Test	Remarks
7514-74) 7406-66)	150	4200 (thru tbg.)	Final Press-4200 psig	
5122-37	150	3200 (thru tbg.)	Final Press-3000 psig	9 sacks in casing above perforations
5069-77	150	3500 (thru tbg.)	Final Press-3500 psig.	48 sacks in casing above perforations
4532-52) 4562-82)	200	3100 (thru tbg.)	Final Press-3100	Dumped 15 Sx on top of packer

Cement Plugs:

Interval	No. Sx.	Test	Remarks
2090-2400	150	Top of plug checked with tubing	Spotted through tubing.
300- 600	115	Not tested.	

(l) **Fishing Operations**: No fishing jobs in open hole or during drilling operations; 3 fishing jobs inside casing or tubing consumed 2.85 rig days

(m) **Side-tracked Hole**: - None

3. Logging and Testing

(a) Ditch Cuttings: Cuttings were taken over a shale shaker at intervals of 30 feet down to a depth of 4000 feet, and thence every 10 feet to T.D. While coring, cuttings were taken at 5 foot intervals. All samples were logged and caught by the mud logging personnel under the supervision of Esso geologists and are representative of the labelled depth. Representative suites of cuttings are stored with the B.M.R., the Victorian Mines Department and with Esso in Melbourne.

(b) Coring: A total of fifteen (15) cores, tabulated below, was cut for a total footage of 400 feet. Recovery was 302 feet (75%).

Core No.	Interval Cored (Driller)	Interval Cored (adj. sonically)	Feet Cut	Feet Recovered	Recovery (%)
1	4570-4583	4570-4583	13	6	46
2	4583-4613	4583-4613	30	9	30
3	4634-4649	4625-4640	15	11	73
4	4649-4674	4640-4665	25	17	68
5	4750-4798	4742-4792	48	24	50
6	4891-4921	4898-4919	30	10	33
7	5040-5066	5034-5060	26	26	100
8	5066-5096	5060-5090	30	28	91
9	5096-5126	5090-5120	30	30	100
10	5126-5163	5120-5157	37	24	65
11	5163-5184	5157-5178	21	23	109
12	7237-7267	7237-7267	30	30	100
13	7473-7479	7460-7466	6	5	83
14	7480-7509	7467-7496	29	29	100
15	8434-8464	8434-8464	30	30	100

Christensen coring equipment was used exclusively. Representative pieces of these cores are stored with the B.M.R., the Victorian Mines Department, and with Esso in Melbourne.

(c) Sidewall Sampling: Two runs for sidewall cores were attempted using Schlumberger C.S.T. equipment. The first run, after attempting seven cores and recovering six over the interval 5208-5314 feet, was abandoned when the gun jammed. In the second run a total of 24 cores was attempted over the interval 6550-8086 feet and sixteen (16) were recovered.

All these sidewall cores have been used for paleontological studies.

(d) Electrical and Other Logging: Wire line logging was carried out by Schlumberger Seaco. The following types of logs were run:

Induction Electric Log
Sonic Gamma Ray Caliper
Microlaterolog
Microlog
Laterolog
Continuous Dipmeter
Gamma Ray Collar Locator
Temperature Log
Cement Bond Log

Details of the various log runs and coverage are contained in Appendix 5. A specially designed device was used in the majority of the log runs to compensate for movement of the vessel while logging.

In addition, a Velocity Survey was carried out at a depth of 7509 feet, details of which are included in Appendix 6.

(e) Penetration Rate and Gas Logs: A continuous drilling rate log and gas log are included as part of the Composite Well Log and as part of Core Lab's Grapholog. In addition to the continuous hot wire mud gas recorder, a chromatograph was used to detail mud gas shows. Cuttings gas was measured in a Waring blender and recorded.

(f) Deviation Surveys: These surveys were carried out with a Totco instrument and results are plotted on the Composite Log. The deviation of the hole from the vertical was irregular, having a maximum value of 3° at 5040 feet. Below this depth, the angular deviation was within the limits 3/4° - 2¼°. At 8361 feet, the greatest depth at which a survey was taken, the angular deviation was 1-3/4°. Schlumbergerddeviation recordings taken in conjunction with the Dipmeter Survey indicated that no dog legs were present.

(g) Temperature Survey: One temperature survey was run over the interval 3020-5800 feet after setting of the 9-5/8" casing at 6289 feet. The survey indicated the top of the cement at approximately 3880 feet. After setting the 5½" liner at 8398 feet, a Cement Bond Log was run over the interval 5660-7999 feet for casing cement bonding and cement top.

(h) Other Well Surveys: None

(i) Testing (Appendix 7): Six production tests through perforations were carried out over five intervals in Gippsland Shelf-4. One of these tests was carried out within the Upper Cretaceous section, while the others were taken within the Latrobe Valley Coal Measures. Maximum rates of production for each zone are summarised below.

Zone	Interval	Perforation Density	Packer Setting	Flow Duration Hrs.	Choke 64"	Well-head Pressure p.s.i.g.	Gas Rate MMCF/D	Fluid Rate Bbls/MMCF	Fluid Gravity at 60°F	Bbls/day
1	7406-7466 & 7514-7574 Upper Cretaceous	4 shots/ft.	7150	2.2	44.5	1650	10.9	38.7	62	
2	5122-5137 Latrobe V. Coal Measures (oil zone)	2 shots/ft.	5089	3.0	58	900	1.07	1182 BOPD	51-53	
3.	5069-5077 Latrobe V. Coal Measures(tight gas zone)	2 shots/ft.	4930	6.08	29	684	1.9	25.7	76.8	
4	4532-4552 Latrobe V. Coal Measures (gas zone)	2 shots/ft.	4472	2.0	42	713	4.6	26.2	72.2	120
4.	4532-4552 (as above)	4 shots/ft.	4472	1.0	61	1275	8.3	57.6	74	478
5	4532-4552 & 4562-4582 Latrobe V. Coal Measures (gas zone)	4 shots/ft. 2 shots/ft.	4472	2.17	64	1448	10.2	44.6	72.7	455

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IV GEOLOGY

(1) Summary of Previous Work

(a) Geological and Drilling - Onshore, exploration for various minerals, especially coal, has been going on in this region for about a century. An oil boom started in 1924 after a small oil and gas show was found in a water well from an Oligocene greensand aquifer. Since then, about 100 test wells for hydrocarbon have been drilled in the region by Commonwealth or State Government agencies and by private firms. The largest concentration of tests, over 50, was around Lakes Entrance town. This included a 10 foot diameter shaft dug to 1156 feet. Small amounts of crude measurable in gallons were intermittently produced along with fresh water by over 30 individual Lakes Entrance field wells until the complete cessation of production in 1957. Over 8,000 barrels total of asphaltic, 15.7° API crude were produced. Gas production, all methane, was insignificant.

Since 1954, drilling has been carried out in the onshore portion of the basin by Woodside, Frome Lakes, and Arco. None of these operators found commercial accumulations, although some hydrocarbon shows were recorded.

On December 27, 1964, Esso's Gippsland Shelf-1 well was spudded in the offshore Gippsland Basin, and subsequently discovered potentially commercial quantities of gas reservoired in sands of the Latrobe Valley Coal Measures. Gippsland Shelf-2 was then drilled on the same structure as a field confirmation well. On September 20, 1965, Gippsland Shelf-3 was spudded on a separate structure, some 13 miles ESE of Esso Gippsland Shelf-1. It proved to be dry.

(b) Geophysical

(i) Gravity and Magnetics - The Bureau of Mineral Resources regional gravity covers the onshore Gippsland Basin; gravity anomalies and trends are correlatable with major regional structural features. Much of the basin has been covered by aeromagnetic work. The B.M.R. conducted most of the older work but a portion of the offshore basin was flown in 1962 by Aero Service for Haematite Explorations Pty. Ltd. These surveys gave a good approximation of the basin edges, though because of their largely reconnaissance nature, their value towards understanding details of the Gippsland Tertiary Basin is limited.

(ii) Seismic - Regional seismic control was obtained from the reconnaissance survey conducted by Western Geophysical Company for Haematite Explorations in 1962-1963. Subsequently, the Western Geophysical Company carried out two additional detailed seismic surveys, subsidised by the B.M.R., for Esso. The first prior to the spudding of Esso Gippsland Shelf-1 and the second in February of this year.

(2) Regional Geology

The small-sized Gippsland Tertiary-Mesozoic Basin lies within, and near the southern extremity of, the Paleozoic Tasman Geosyncline which stretched 2,500 miles at times through easternmost Australia from New Guinea to Tasmania. Tens of thousands of feet of Cambrian to Carboniferous sediments, metasediments, intrusives, and effusives are consequently exposed around its northern rim in Victoria. In addition, Permian and older rocks are present in Tasmania to the southwest. Paleozoic rocks probably underlie all of the Gippsland Basin, at shallow depth near its margins directly below a thin

Tertiary veneer, and at great depth, of the order of 20,000 feet, within the central Mesozoic graben area where a thick lower Cretaceous-Jurassic section intervenes and the Tertiary alone reaches a thickness of 7000+ feet.

Triassic sediments are known in Tasmania, but the oldest Mesozoic beds recognised in Gippsland are of Jurassic-Lower Cretaceous age. Continental types of sandstone, arkose, siltstone, greywacke, mudstone, and minor amounts of coal were deposited during the Jurassic and Lower Cretaceous within a large graben or half-graben depression. Sediments of Upper Cretaceous age are apparently absent onshore. Offshore, this section consists of light grey, very fine to medium grained quartzose sandstones, with good porosity and permeability interbedded with siltstone, shale, and coal. Locally, pre-Tertiary uplift and deformation was considerable and erosion occurred regionally for a long period. Weathering and angularity at the top of the Strzelecki Group are pronounced when it has been seen onshore.

During Eocene time, gentle regional downwarp occurred in the basin. Volcanism and flow occurred in the west followed by widespread limnic to paralic swamp conditions with the deposition of peat, clay, and much coarse continental sand. The great thickness and characteristics of the brown coal in the west suggests that the deposits were autochthonous. Large volumes of fresh water must have consistently debouched into the basin from the surrounding highlands since the Latrobe Valley Coal Measures contains only traces, in the east, of any carbonate or shells or marine fauna which would reflect more normal marine salinity. In the west, over 2,000 feet of the mainly continental Latrobe was deposited. A thinner but slightly more brackish sequence containing less lignite was laid down to the east and southeast. Uplift and gentle deformation took place after the Eocene; the Latrobe was then truncated severely.

The Gippsland Basin acquired its general present shape and morphology with the incursion of a near-constantly transgressing sea during lower Oligocene time from the east and southeast. This invasion was perhaps related to the final foundering of an old offshore land mass; it was likely at this time that the Balook High was formed compensatorily onshore in the west. The first truly marine rocks were laid down, the Lakes Entrance calcareous shale.

Shallow and quiescent marine conditions continued without major interruption through the Miocene into the Lower Pliocene with further slow transgression of the sea and overlapping deposition of marl and argillaceous limestone which became sandier towards the end of this time, as marine regression began, completing the full cycle. By mid-Pliocene, regional uplift, probably accompanied by gentle deformation and small-scale faulting, occurred. The sea then regressed rapidly to its present limits. Deposition of fluvial clays, sands, and gravels took place onshore from the Upper Pliocene to the Holocene.

Possibly during the post-Eocene erosional period, but certainly again during the Quaternary, large volumes of fresh water have gained ingress around the elevated edges of the Tertiary basin into all permeable horizons known onshore.

(3) **Stratigraphic Table**

The following stratigraphic section was penetrated in ~~Gippsland Shelf-4:~~ Merlin No1 Well.

Age	Name	Formation Top (R.T.)	Ref. to M.S.L.	Thickness
Miocene	Gippsland Limestone Formation	760	- 729	3500+
Oligocene	Lakes Entrance Formation	4260	-4229	262
Eocene	Latrobe Valley Coal Measures	4522	-4491	1968
Upper Cretaceous	Unnamed	6490	-6459	1995
Total Depth		8485	-8454	

(4) **Stratigraphy**

Note: No sample returns above 780 feet.

Miocene (includes Gippsland limestone equivalent) (860-4260)

860-1060 Sandstone: Light grey, fine to coarse, angular to subrounded, very poorly sorted, very argillaceous, calcareous, glauconitic and fossiliferous, composed of lithic fragments and quartz with a marl matrix. Low permeability and porosity.

1060-1750 Sandstone: as above, with interbedded light grey sandy marl and very argillaceous calcarenite.

1750-3460 Sandy Marl: light grey, dense, very calcareous, soft, fossiliferous with occasional grains of glauconite. Sand is dispersed through marl and is silt to coarse size.

3460-4260 Marl Mudstone: light grey to light green grey, silty in parts, soft, calcareous, fossiliferous, few fine carbonaceous flecks.

Lakes Entrance Formation (Oligocene) (4260-4522')

4260-4522 Mudstone: light grey to light green grey, soft, calcareous, fossiliferous, with trace of grey green calcareous shale and light grey brown silty mudstone. Glauconitic to very glauconitic at base.

Latrobe Valley Coal Measures (Eocene) (4522-6490')

4522-4880 Sandstone: light grey, quartzose, very fine to pebbly, (generally fine to very coarse), sub-angular to well rounded, poorly sorted. Very glauconitic in top part, non-calcareous generally, with finely disseminated pyritic and carbonaceous flecks. Generally friable with mixed argillaceous matrix. Fair to good porosity and permeability.

Minor shale: brown-grey to dark brown, dense, carbonaceous, pyritic and micaceous.

Minor coal: black to brown-black.

4880-6490 Interbedded Sandstone, Shale, Coal and Dolomite bands. Sandstone: light grey, fine to very coarse, subangular to sub rounded, fair to poor sorting, carbonaceous, pyritic, soft and friable. Minor clay matrix, particularly below 6090 feet. Dolomitic nodules and lenses common. Fair to good porosity and permeability.

Shale: dark brown-grey, carbonaceous, micaceous, grading to Siltstone in places.

Coal: brown-black to black.

Unnamed Unit (Upper Cretaceous) (6490-8485' T.D.)

6093-8240 Interbedded **Sandstone**, **Siltstone**, **Shale**, **Coal** and **Dolomite**.

? Probably wrong

Sandstone: grey-white, quartzose, very fine to coarse grained, (dominantly fine-grained), angular to sub-rounded (dominantly sub-angular), fairly well sorted, trace feldspar, mica, pyrite and dolomitic in part. Trace sparsely disseminated glauconitic and fossiliferous in part. Variable white clay matrix. Generally fair porosity and permeability.

Siltstone: grey-brown, carbonaceous, micaceous, pyritic, grading into shale.

Coal: black with dull lustre.

Dolomite: light to medium brown, cryptocrystalline, dense, hard, and also dolomitic sandstone, light grey to grey-brown, very fine to fine, dense, hard, fairly well sorted.

8240-8485 Dominantly sandstone with minor interbedded siltstone, silty shale, and coal.

Sandstone: light grey, quartzose, fine to very coarse and some conglomeratic, sub-angular to sub-rounded, poorly sorted, dominantly with high percentage of kaolinitic matrix and in places light grey feldspar fragments, carbonaceous and pyritic. Trace chlorite? Porosity and permeability low due to clay content. Minor siltstone, light brown-grey to brown-grey, micaceous, pyritic and carbonaceous.

Coal: black as above.

(5) Structure

Gippsland Shelf-4 was drilled on the highest part of a large domal feature delineated by seismic and exhibiting closure from the top of the Oligocene Lakes Entrance Formation to the lowest valid reflectors in the Upper Cretaceous section. The structure covers an area of some 42 square miles with a maximum closure of 900 feet, as mapped on the unconformity at the base of the marine Tertiary (top of the Latrobe Valley Coal Measures for the most part). A post-Eocene to pre-Oligocene gorge cuts the eastern flank of this dome eroding the entire Eocene section and cutting into the underlying Upper Cretaceous sediments. This gorge is filled with Lakes Entrance sediments, probably interbedded shale and marl.

A structure map on the unconformity on the top of the Latrobe Valley Coal Measures was the primary basis for selecting the well location. The actual formation tops coincided closely to the seismic prognosis confirming the seismic structural picture. Continuous Dipmeter results confirm that the Tertiary section was encountered on or near the crest of the structure.

Structural configuration within the Upper Cretaceous section is not well known. The top of this section at 6490 feet is based primarily on paleontological and lithological evidence. The dipmeter survey does not indicate any obvious change in dip of the strata below the assumed unconformity at the base of the Latrobe Valley Coal Measures. However, there is a pronounced change in dip at 7049 feet, from a westerly to south-westerly dip of 4°-6° above, to an easterly to northeasterly dip of 10° below this depth. The significance of this abrupt change is, at the present time, uncertain. It might be indicative of an unconformity or faulting. This dip change cannot be correlated to any faunal change, while the only obvious lithological change is that below 7049 feet coal becomes prominent in the sedimentary section. It is significant, however, that the gas zone within the Upper Cretaceous section is present immediately below this dip change.

(6) Relevance to Occurrence of Petroleum

The primary objective, the Eocene Latrobe Valley Coal Measures, extending from 4522-6490 feet, proved to contain potentially commercial quantities of gas within the zone 4522-5110 feet. Of significance was the discovery below the gas of 54 feet of gross oil sand, which on testing flowed at a maximum rate of 1182 barrels per day of 51° to 53° gravity oil. This represents the first significant oil show within the Latrobe Valley Coal Measures.

The secondary objective, the Upper Cretaceous section, which in Gippsland Shelf-1 included fine to medium grained sandstones having generally good porosity and permeability, also proved to contain significant quantities of gas within the zone 7049-7640 feet. On production testing the gas zone flowed at a maximum rate of 11.5 MMCFGD. At the present time little is known of the structure within the Upper Cretaceous section, and the areal extent of the gas reservoir is conjectural.

(7) Porosity and Permeability of Sediments Penetrated

Porosity and permeability were measured by Core Lab on the various cores and are included in Appendix 4.

The Latrobe Valley Coal Measures consist essentially of friable, sub-angular to rounded, fine grained to pebbly sandstones, dolomitic in part, with minor interbedded shales and coal. Porosity and permeability within these sandstones is controlled by sorting, matrix content and degree of dolomitization. Generally the porosity is excellent with values of the order 26-30%, and permeability values up to 5000 md. Many sandstone samples were so loose as to be unsuitable for core analysis. However, the sandstones have in part suffered patchy dolomitization, resulting in considerably reduced porosity and permeability. Log analyses generally confirmed the range of measured porosities.

The Upper Cretaceous section consists essentially of a monotonous sequence of shales, siltstones, sandstones, and coal. The sandstones, generally fine to very fine-grained, sub-angular and with abundant white clay matrix, have generally fair porosities of the order of 15-20%. Visual examination of cuttings and sidewall cores indicates low permeability values. Core analysis results of a six foot sand section gave permeability values of the order of 5-12 md. However, pressure build-up rates in the production test of the gas zone indicate fairly good permeability characteristics.

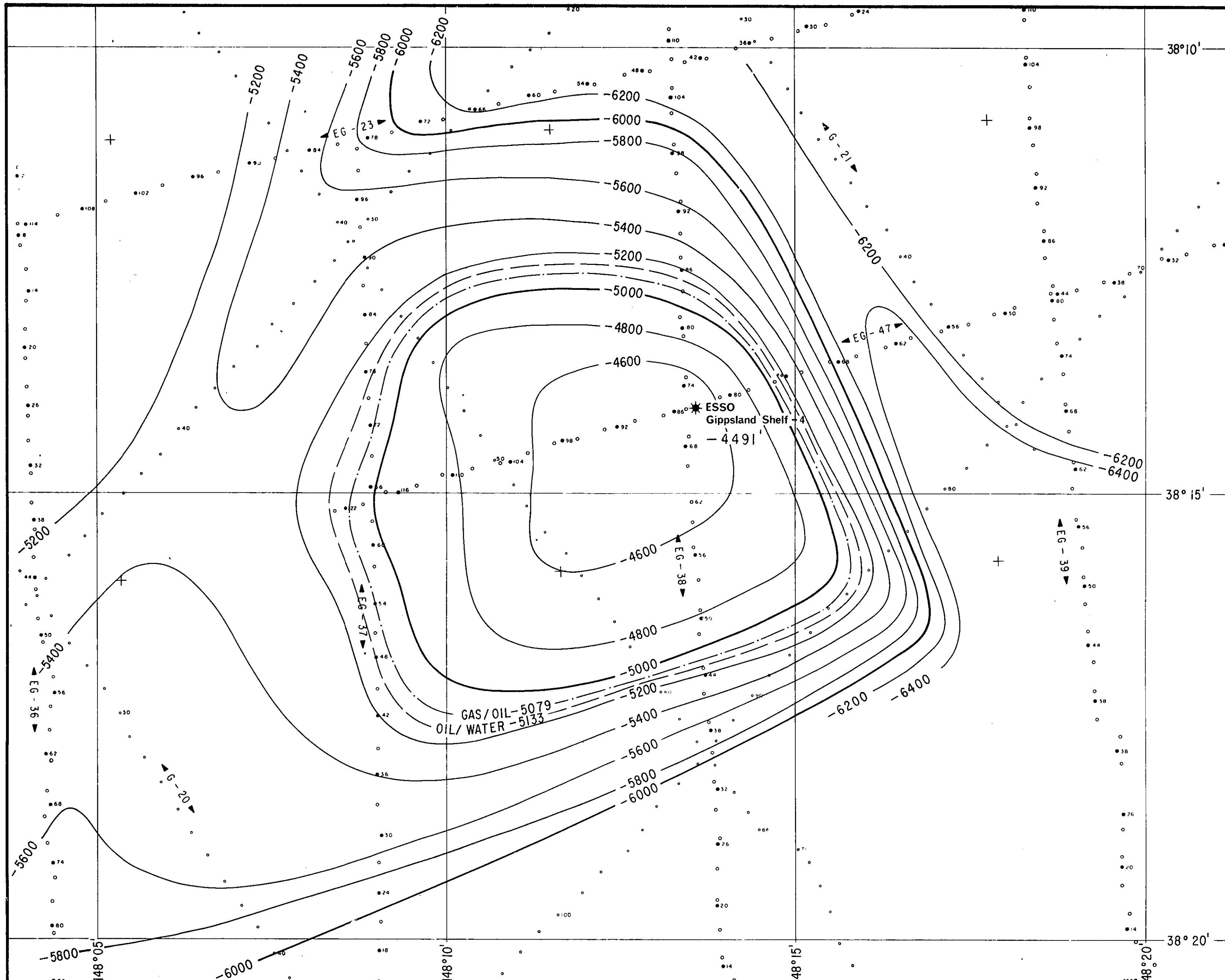
(8) Contribution to Geological Concepts Resulting from Drilling

The oldest section penetrated in Gippsland Shelf-4 is of Upper Cretaceous age, and consists essentially of interbedded siltstones, dolomitic in part. This section extends from 6490 to 8485 feet T.D. Rocks of the same age extend from 5378 to 8701 feet T.D. in Gippsland Shelf-1. The presence of a sparse arenaceous foraminiferal fauna in the Upper Cretaceous section of Gippsland Shelf-4 suggests a lagoonal or estuarine environment of deposition subject to sporadic marine ingression. The Upper Cretaceous sediments of Gippsland Shelf-1, although apparently lacking in any obvious marine characteristics, are generally lithologically similar to those of Gippsland Shelf-4, and were probably deposited in the same 'marginal marine' environment.

The Latrobe Valley Coal Measures, resting unconformably on the underlying Upper Cretaceous section, consist of friable fine grained to pebbly sandstones, dolomitic in part, with minor interbedded shale and coal. The lithology, thickness and stratigraphic relationships of the Latrobe Valley Coal Measures in Gippsland Shelf-4 are essentially the same as those in Gippsland Shelf-1. The sediments are dominantly continental in origin.

The Latrobe Valley Coal Measures are unconformably overlain by calcareous mudstone and shale of the Lakes Entrance Formation, indicative of the extensive marine environment that existed in the Gippsland Basin during Oligocene time. The thickness of the Lakes Entrance Formation on the Gippsland Shelf-1 and Gippsland Shelf-4 structures is considerably less than in adjacent areas reflecting local growth of these structures during Oligocene time.

The range of Miocene section seen in Gippsland Shelf-4 and Gippsland Shelf-1 is the same, the youngest rocks recovered being of Upper Miocene age and the oldest, resting unconformably on the Oligocene Lakes Entrance Formation, being of Lower Miocene age. However, the Miocene section in Gippsland Shelf-4 is some 1000 feet thicker than in Gippsland Shelf-1, reflecting the more basinward position of Gippsland Shelf-4 during Miocene time. The sections in the two wells, although marine and essentially similar lithologically, exhibit certain fundamental differences reflecting local variations in the depositional and tectonic history of the basin during Miocene time. In this respect, it is significant that at Gippsland Shelf-4 the entire Miocene section (as seen in the samples recovered) is complete, indicating a prolonged period of more or less continuous sedimentation, whilst at Gippsland Shelf-1 a period of non-deposition or erosion during Lower Miocene time resulted in a hiatus in the Miocene section. This diastem, possibly indicative of widespread shore line conditions or of local growth of the Gippsland Shelf-1 structure above or close to depositional base level was followed by a resumption of marine sedimentation with the formation of a local sandy unit not seen in Gippsland Shelf-4. This sand of lower mid-Miocene age is overlain conformably by calcareous mudstones, marls and limestones, indicative of deeper water sedimentation and lithologically similar to sediments of equivalent age in Gippsland Shelf-4. Throughout the rest of the mid-Miocene section, the depositional environment was essentially the same at the two well sites. During Upper Miocene time, foraminiferal evidence suggests that at Gippsland Shelf-1 a shallowing of the depositional environment occurred. A similar environmental change is evident lithologically at Gippsland Shelf-4, where the presence of a sandy unit reflects deposition in a higher energy environment. This shallowing at Gippsland Shelf-4 might well be due to local structural growth for on paleontological evidence the top of the Middle Miocene here is some 500 feet higher than in Gippsland Shelf-1.



ESSO EXPLORATION AUSTRALIA INC.

E.G.S.-4 FIELD

STRUCTURE CONTOURS ON TOP OF THE PRODUCING SANDS

CONTOUR INTERVAL 200'

SCALE

1 0 2 4

MILES

FIG. 3

V. REFERENCES

Esso Exploration (Aust) Inc.	Well Completion Report - Gippsland Shelf-1, Victoria.
Carter A.N.	Tertiary Foraminifera from Gippsland, Victoria and their stratigraphic significance. Geol. Surv. Vict., Mem. 23. 1964.
Hocking J.B. & Taylor D.J.	Initial marine transgression in the Gippsland Basin, Victoria. A.P.E.A. 1964.
Ingram F.T.	Well Completion Report - Merriman No.1. Arco Ltd./Woodside (Lakes Entrance) Oil Co. N.L. 1963.
Stanford E.B. & Caan A.J.	The Gippsland Basin, Victoria. Unpublished Company Report No. AUST-8. November 1963.

<u>Addendum to Section III (1) Fishing Operations</u>

(A) January 18-19, 1966

Dropped single joint of drill pipe, bumper sub and lifting sub in casing to top of 9-5/8 inch Float Collar. Fish completely recovered with overshot. Time lost 0.6 days.

(B) February 12-13, 1966

While retrieving wear bushing, the wear bushing caught in the marine riser line runner, causing a drill pipe drip above the retrieving tool to be pulled out of tool joint. Fish completely recovered with an overshot. Time lost 0.24 days.

(C) March 4-5-6, 1966

Surface control valve inadvertently closed on wireline, causing B.H.P. bombs to fall to bottom of well. Recovered wireline and B.H.P. bombs with grapple. Casing cleaned out and test completed. Time lost 2.01 days.

APPENDIX 1

PALEONTOLOGICAL REPORT (see Attachment)

APPENDIX 2

GRAPHOLOG & COREGRAPH.

PE905626

This is an enclosure indicator page.
The enclosure PE905626 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905626 has the following characteristics:

ITEM_BARCODE = PE905626
CONTAINER_BARCODE = PE902927
NAME = Completion Coregraph
BASIN = GIPPSLAND
PERMIT = PEP/38
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Completion Coregraph (from WCR) for Marlin-1
REMARKS =
DATE_CREATED = 3/02/66
DATE_RECEIVED =
W_NO = W496
WELL_NAME = MARLIN-1
CONTRACTOR = CORE LABORATORIES
CLIENT_OP_CO = ESSO EXPLORATION AUSTRALIA INC..

(Inserted by DNRE - Vic Govt Mines Dept)

PE604560

This is an enclosure indicator page.
The enclosure PE604560 is enclosed within the container PE902927 at this location in this document.

The enclosure PE604560 has the following characteristics:

ITEM_BARCODE =	PE604560
CONTAINER_BARCODE =	PE902927
NAME =	Mudlog (grapholog)
BASIN =	GIPPSLAND
PERMIT =	PEP/38
TYPE =	WELL
SUBTYPE =	MUD_LOG
DESCRIPTION =	Mudlog (from WCR) for Marlin-1
REMARKS =	
DATE_CREATED =	3/02/66
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	MARLIN-1
CONTRACTOR =	CORE LABORATORIES
CLIENT_OP_CO =	ESSO EXPLORATION AUSTRALIA INC..

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 3

GAS ANALYSIS

APPENDIX 4

CORE DESCRIPTION & ANALYSES

CORE DESCRIPTION

EGS - 4 Cut 13' Core No. 1

Interval - 4570-4583 (Driller) Rec. 6'

4570-4583 (Sonic)

4570-4571: Calcareous Mudstone: medium grey, very soft, mucky, slightly pyritic and containing sparse carbonaceous flecks; micro-micaceous, abundant foraminifera.
This inteŕval is identical with all the large cavings we have seen from up hole, very probably jammed in barrel prior to cutting the sand.

4571-4576: Sandstone: grey and brown, heavily mudstained. Fine to very coarse grained to pebble size, predominantly in coarse to very coarse grained range; poor sorting, sub-angular to well rounded. Abundant grains of glauconite and much finely disseminated pyrite: argillaceous matrix with 2 mm., locally impede permeability.
Calcareous in part, particularly in bottom 1½' of core.
Definite strong odour when core from barrel.
No fluorescence or cut.
Porosity estimated at 30+%.
Permeability fair to very good.

Note: This core was cut with no circulation in the inner barrel, hence mud in inner barrel forced through and around core as it was cut. Definite light slick on mud remaining in the inner barrel.

CORE DESCRIPTION

EGS - 4 | Cut 30' | Core No. 2

Interval - 4583-4613 (Driller) | Rec. 9'

4583-4613 (Sonic)

Note: All the core fell out of the barrel when the core was pulled and hard to estimate recovery.

75% of Core: Sand-Sandstone: brown grey to light grey - (brown in some cases due to invasion). Made up of very fine to granule, very poorly sorted, sub-angular to well rounded, clear, milky and white quartz grains. Matrix where present is brown grey to brown, non-calcareous shale. Sandstone is very glauconitic and very pyritic. Extremely porous and permeable and friable.

25% of Core: Shale: brown grey to dark brown, dense, fissile, laminated in place with Sandstone as above. Shale has fine particles of black carbonaceous matter, pyrite, and mica flakes through it. Extremely strong hydrocarbon odour throughout core. No fluorescence or cut.

CORE DESCRIPTION

EGS - 4 | Cut 15' | Core No. 3

Interval - 4634-4649 (Driller) | Rec. 11'

4625-4640 (Sonic)

4634-4648: Sandstone: light grey mainly (brown grey in parts due to invasion); made up of clear, clean, milky and white quartz. Fine to granule, sub-angular to well rounded, very poor sorting with very fine to fine quartz filling pore space in some places. Also some calcite grains, but generally non-calcareous. No glauconite present and minor pyrite and carbon fragments. Fairly hard, compact and only slightly friable, and becoming less porous towards the bottom. Generally not as high porosity as previous cores in this section and permeability will be lower than other cores.

4648-4649: Sandstone: as above but harder, slightly more siliceous and lower porosity and permeability. Also the interval is dark grey in colour due to finely disseminated carbonaceous matter present through it.

Core has good hydrocarbon odour and taste (but not as strong as Core No. 2) throughout.
No fluorescence (apart from calcite) and no cut.
No dip.

CORE DESCRIPTION

EGS - 4 | Cut 25' | Core No. 4

Interval - 4649-4674 (Driller) | Rec. 17'

4640-4665 (Sonic)

4649-4649½: Sandstone: as for bottom of Core No. 3; probably recut.

4649½-4651: Shale: brown grey to dark brown to brown black; very carbonaceous, slightly micaceous; pyritic; grading to black coal in places. Pyrite lenses in spots.

4651-4652: Coal: black with interbedded brown black carbonaceous shale as above; pyritic.

4652-4654: Shale: as above

4654-4655: Coal: as above

4655-4659: Shale: as above
Coal: as above interbedded and laminated

4659-4661: Sandstone: light grey to medium grey to brown grey, very fine to fine, sub-angular to sub-rounded and rounded. Carbonaceous, micaceous, fair sorting. Thinly interbedded and laminated with carbonaceous shale and fine coal bands. Note: Some of the fine grained sandstone lenses have a dull yellow fluorescence which give a good dull yellow-gold cut with carbontetrachloride.

4661-4663: Shale: as above with minor very finely laminated sandstone bands as for 4659-4661.

4663-4666: Shale: as above with interbedded black coal and grading to coal in bottom foot.

Flat dip in core.
All core had good hydrocarbon odour and taste.
Gas bubbles escaping from the coal.

CORE DESCRIPTION

EGS - 4 | Cut 48' | Core No. 5

Interval - 4750-4798 (Driller) | Rec. 24'

4742-4792 (Sonic)

4750-4754: Coal: black with abundant resin (amber) and pyrite. Minor brown to brown black shale.

4754-4756: Shale and Coal: interbedded brown to dark brown carbonaceous, micaceous shale, with black coal; plant fragments.

4756-4768: Interbedded and laminated siltstone, sandstone, and shale. Sandstone: light grey, made up of clear, very fine to fine, mainly very fine, sub-angular to rounded quartz. Micaceous, carbonaceous, slightly calcareous, in places pyritic, non-fluorescent.
Siltstone: brown grey, micaceous; colour is browner due to carbonaceous fragments; pyrite.
Shale: brown to dark brown, plant fragments.
4765-4768: slightly harder due to more finely disseminated pyrite and slightly more siliceous.

4768-4771: Sandstone: light grey, very fine to medium, loose, extremely friable, mainly fine to medium. Sub-angular to rounded. Good porosity and permeability, soft, very well sorted.

4771-4774: Coal: black with minor dark brown shale.

Good odour throughout especially in sandstone.
Non-fluorescent.
Gas bubbles from coal.
No apparent dip.

CORE DESCRIPTION

EGS - 4 | Cut 30' | Core No. 6

Interval - 4891-4921 (Driller) | Rec. 10'

4898-4919 (Sonic)

4891-4891'3"	Sandstone: light grey (mud invasion) made up of clear and clean quartz, fine to granule, mainly medium to very coarse, sub-angular to rounded, fair to poor sorting abundant pyrite and minor carbonaceous grains. Very slightly calcareous to non-calcareous. Good hydrocarbon odour. Non-fluorescent but very slight cut on sandstone.
4891'3"-4894	Coal: black with pyrite nodules and streaks.
4894-4900	Shale: brown grey to dark brown, dense, carbonaceous with minor coal interbeds and minor light grey, very fine to fine, tight sandstone lenses and laminae.
4900-4901	Coal: black

Good odour throughout core.
Gas bubbles from coal.

CORE DESCRIPTION

EGS - 4 Cut 26' Core No. 7

Interval - 5040-5066 (Driller) Rec. 26'

5034-5060 (Sonic)

Macroscopic

5040-5053: Shale: mottled medium grey to light grey; banded by thin laminae and streaks of siltstone.

5053-5056: Sandstone: light grey.

5056-5060: Shale: mottled medium grey to light grey as above.

5060-5066: Shale: as above.

Microscopic

5040-5053: Shale: mottled medium dark grey to light grey, with thin discontinuous laminae and bands of argillaceous siltstone giving mottled appearance.

5053-5056: Sandstone: quartzose, mottled, light grey to medium grey, fine to very fine, sub-rounded to sub-angular, micaceous with some shale fragments, non-calcareous, silty, porosity 10%, fair permeability, trace glauconite, quartz grains clear to smoky, occasionally coarse grains; best sand taken for core analysis. Good odour, non-fluorescent, no cut.

5056-5059: Sandstone: mottled light grey to medium grey, very fine to silty, sub-rounded to sub-angular, fair sorting, few shale inclusions, medium, patchy, low order porosity, mostly tight, good hydrocarbon odour, trace glauconite, occasional coarse grains, pyrite nodule, occasional thin laminae carbonaceous material.

5059-5060: Shale: mottled, grey to medium dark grey, carbonaceous, very dolomitic.

5060-5066: Siltstone: light grey, some very silty, numerous thin laminae, carbonaceous material.

CORE DESCRIPTION

EGS - 4 | Cut 30' | Core No. 8

Interval - 5066-5096 (Driller) | Rec. 28'

5060-5090 (Sonic)

Macroscopic

5066-5071: Shale: medium dark grey, with occasional thin laminae siltstone; no dip.

5071-5072: Siltstone: with shale laminae.

5072-5074: Coal.

5074-5080: Shale, Siltstone: and thin laminae.

5080-5083: Shale: with thin laminae siltstone.

5083-5085: Siltstone: as above.

5085-5088: Shale: with thin siltstone laminae.

5088-5093: Shale: siltstone and sandstone thinly laminated.

5093-5094: Sandstone: light grey to brown, with thin laminae shale and few concretionary masses, up to 1" in diameter.

Microscopic

5066-5067: Shale: mottled light brown to light grey, very silty, with thin laminae of light grey siltstone, carbonaceous.

5067-5071: Shale: as above, with only nodules of siltstone, as above; probably worm burrows.

5071-5072: Sandstone: mottled light grey to light brown, fine to very fine, fair sorting, medium, sub-rounded, with some white to clear matrix material, very carbonaceous, as thin discontinuous laminae with fine to large micaceous flakes. Tight, no permeability.

5072-5074: Coal: mottled light brown to black, very argillaceous, pyritic in discontinuous bands, yielding gas on fresh surface.

5074-5076: Sandstone: light grey, very fine to silty, fair sorting, subangular to sub-rounded, with very thin laminae of carbonaceous material. Tight, no permeability.

5076-5079: Sandstone: as above, lenses and bands of carbonaceous material becoming more prominent.

5079-5080: Shale: mottled light brown to light grey, with thin laminae light grey siltstone, with salt and pepper appearance.

Core No. 8 (cont'd)

5080-5083: Shale: as above with occasional laminae and nodules of siltstone as above, one irregular lense of silt 4" long perpendicular to bedding (worm burrows).

5083-5085: Siltstone: mottled light grey to light brown, laminated, laminae interrupted by worm activity, churned appearance.

5085-5088: Shale: light brown, silty with occasional laminae of siltstone.

5088-5093: Sandstone: mottled light grey to light brown, fine to silty, sub-angular to sub-rounded, carbonaceous, with occasional coarse grains, poorly cemented with argillaceous material, tight, no permeability.

5093-5094: Sandstone: mottled, light grey to light brown, fine, fairly well sorted, sub-angular, with occasional pebble, with good patchy porosity, poorly cemented, friable, fine to large mica flakes in thin irregular laminae of shale as above, trace glauconite, few large nodules and rods of black material, very pyritic. Odour faint throughout core.

CORE DESCRIPTION

EGS - 4 | Cut 30' | Core No. 9

Interval - 5096-5126 (Driller) | Rec. 30'

5070-5120 (Sonic)

Macroscopic

5096-5098 — Sandstone: light brown to medium dark grey, with numerous laminae of carbonaceous shale.

5098-5089½ — Sandstone: medium grey, very hard.

5089½-5106 — Sandstone: light grey to medium grey, with slump or bondinage structure.
Shale: medium grey with numerous laminae siltstone and shale, irregular and discontinuous.

5106-5111 — Shale: as above, laminae parallel, no dip.

5111-5114 — Coal: dark grey.

5114-5115 — Shale: as above, few laminae.

5115-5118 — Siltstone: light grey to light brown grey, fairly well indurated, argillaceous.

5118-5126 — Sandstone: light grey, chiefly uniform, laminae of one foot, with parallel, continuous laminae shale, light brown to medium grey, no dip.

Microscopic

5096-5098 — Sandstone: light grey, fine to very fine, with occasional coarse to pebble, fair sorting, sub-angular to sub-rounded, quartz grains, translucent to smoky; soft, friable, matrix material, argillaceous, porosity very poor with numerous thin laminae; trace brown shale.

5098-5098½ — Dolomite: medium grey, very silty, very pyritic, very hard, fractures across sand grains; quartz grains, fine, occasionally coarse, pyrite finely disseminated throughout.

5098½-5098¾ — Sandstone: as above, as irregular mass in shale light brown, very carbonaceous.

5098¾-5106 — Shale: brown, laminations (uneven), pyritic.

5106-5111½ — Siltstone: light grey, very argillaceous, sub-angular, with numerous laminae.

5111½-5114½ — Coal: black, uneven to conchoidal fracture.

5114½-5120 — Shale: medium grey, soft, clayey, fine, carbonaceous, laminae.

5120-5121 — Sandstone: light grey, fine, sub-rounded, fairly well sorted, friable, few carbonaceous grains, cemented with small amount argillaceous material, possibly clear white quartz, fluorescent, porosity very low.

Core No. 9 (cont'd)

5121-5122: Sandstone: as above, with some fair porosity, slightly coarse.

5122-5124: Sandstone: as above, grading to slightly coarser, good porosity, completely flushed with mud, non-argillaceous.

5124-5126: Sandstone: as above, grading to argillaceous, with thin laminae white patch. Low order porosity.

Note: Upper 24' of core had faint to no odour, no fluorescence, no cut. Lower 6' fluoresces with light blue hue, instant cut, and fluorescence, good odour and taste.

CORE DESCRIPTIONS

EGS - 4 Cut 37' Core No. 10

Interval - 5126-5163 (Driller) Rec. 24'

5120-5157 (Sonic)

5127-5129: Sandstone: light grey quartzose, fine, fairly well sorted, sub-rounded to sub-angular, few carbon and coal grains, trace mica. Excellent porosity and permeability, with some white clay material in matrix, soft, friable.

5129-5131: Sandstone: as above, grading to more clayey and to fair porosity.

5131-5132: Sandstone: as for 5127-5129, slightly more mica and more clayey.

5132-5135: Sandstone: as for 5127-5129.

5135-5139: Sandstone: as above, grading to slightly coarser, fine to medium, fairly well sorting to well sorted, slightly argillaceous to non-argillaceous.

5139-5142: Sandstone: light grey, medium to coarse, well sorted, non-argillaceous, very porous, sub-rounded.

5142-5150: Sandstone: as above, grading to pyritic with patches completely silicified and patches with very fine grained sand in pores, with silica filled.

Macroscopic

5126-5135: Sandstone: light grey, trace carbonaceous lenses.

5135-5138: Sandstone: as above, becoming silicified.

5138-5140: Loose Sand.

5140-5150: Siliceous Sandstone: as above: .4 - .9 of total silicified.

All of core blue white fluorescence.
Instant cut - strong odour.
Bleeding small amount gas.

CORE DESCRIPTION

EGS - 4 Cut 21' Core No. 11

Interval - 5163-5184 (Driller) Rec. 23'

5157-5178 (Sonic) (2' rec. from Core 10)

Macroscopic

5163-5167: Sandstone: light grey, massive.

5167-5169: Sandstone: light grey, cross-bedded, dip to 30°.

5169-5171: Sandstone: light grey with occasional thin laminae, dark grey shale or coal. Dip flat to 10°.

5171-5175: Sandstone: light grey.

5175-5178: Sandstone: light grey, silicified in part as Core 10.

5178-5181: Shale & Siltstone: light grey.

5181-5183½: Sandstone: very fine.

5183½-5184: Sandstone: completely silicified.

Microscopic

5163-5166: Sandstone: mottled light grey to medium grey, quartzose, medium to granule, rounded to sub-angular, fairly well sorted, trace white clay in matrix (silica fluorescence), occasional coal grains, excellent porosity and permeability. Fluoresces as above.

5;66-5167: Sandstone: quartz, light grey with occasional coal grains, fine, sub-rounded to sub-angular, fairly well sorted, trace matrix as above, trace pyrite, excellent porosity and permeability: 25%. Fluoresces as above.

5167-5169: Sandstone: light grey as above, pyritic, grading to fair sorting, slightly argillaceous, good porosity and permeability: 20%. Fluoresces as above.

5169-5170: Sandstone: light grey, medium to coarse to fine. Quartzose, silty in patches, slightly pyritic and coaly. Good to excellent porosity and permeability with occasional thin laminae coal and shale. Fluorescence as above.

5170-5172: Sandstone: as above, silicified in part (40%). Excellent porosity, to good in unsilicified areas. No fluorescence.

5172-5173: Sandstone: light grey, with fine coal grains, quartzose fine to medium, sub-rounded to sub-angular, fairly well sorted, excellent porosity and permeability, silicified in part (15%), occasional clay nodules. No fluorescence.

5173-5174: Sandstone: light grey quartzose, fine to very fine, fair sorting, sub-rounded, argillaceous, occasional clay nodule as above. Good porosity: 15-20%; silicified in part (30%), silicified part tight. No show.

Core No. 11 (Cont'd)

5174-5175: Sandstone: as above, fine to good porosity, 40% silicified. No show.

5175-5178: Sandstone: light grey, fine quartzose, fairly well sorted, sub-angular to sub-rounded, good to excellent porosity in unsilicified part, 90% silicified. No show.

5178-5179: Sandstone: light grey, very fine to silty, poorly sorted quartz with few clay nodules as above, sub-rounded to sub-angular, with minor silicified cement, trace pyrite, fair to poor porosity. Silicified in part - 10%. No show.

5179-5180: Sandstone: as above with thin laminae shale; no dip. No show.

5180-5181: Siltstone: slightly sandy, light grey, pyritic; tight.

5181-5182: Sandstone: light grey, quartzose, very fine to silty to medium, poor sorting, sub-angular to rounded, patchy porosity, becoming tight, some fair to good porosity in part. No show.

5182-5183½: Sandstone: light grey, fine with few medium to coarse grains, fairly well sorted, round to sub-angular, friable, excellent porosity, silicified in part. No show.

5183½-5184: Sandstone: as above, completely silicified. No show.

CORE DESCRIPTIONS

EGS - 4 | Cut 30' | Core No. 12

Interval - 7237-7267 | Rec. 30'

Core has an apparent dip of 0^{o} - 5^{o}

7237-7249: Siltstone: with irregular, diffuse, lensoid bodies and stringers of sandstone.
Siltstone: dark grey to dark grey-brown, very finely sandy, carbonaceous, sparsely feldspathic, sparsely micromicaceous and pyritic. Trace partially pyritised plant remains.
Sandstone: light grey to buff, quartzose, silty, very fine grained, angular to sub rounded (dominantly sub angular to sub rounded), fairly well sorted; trace feldspar, mica and finely crystalline pyrite; moderate to abundant white clay matrix. Poor porosity and permeability. The section is massive.

Secondary Textures

Certain of these fine grained sandstone bodies have suffered selective and partial dolomitisation. Also scattered irregularly through the section occur ovoid bodies of mid brown to tan, dense, very hard crypto-crystalline dolomite. Such areas of dolomitisation have diffuse edges, are sparsely pyritic and contain relict clasts of fine grained sub angular quartz sand and feldspar; traversed by irregular veinlets of calcite, and contain solution cavities. Such cavities bleed fine bubbles of gas. The fine grained sandstone and also the silt itself bleed gas.

7249-7261: Shale: with fine lenses and plano-convex segments of sandstone, giving the rock an irregular finely banded character.
Shale: dark grey to dark grey brown, silty, very fine sandy, carbonaceous, sparsely feldspathic, pyritic and micromicaceous. Trace partially pyritised plant remains.
Sandstone: as above
The sandstone lenses, display micro cross-bedding, small scale slumping and hydroplastic low angle micro-faulting and boudinage. Individual lenses have maximum thickness of ½".
Shale is very carbonaceous within the section 7249-7250'6", in which interval occurs a 3" band of coal.
Coal: black, brilliant lustre, brittle, irregular to sub-conchoidal fracture. Bleeding gas is apparent from the carbonaceous streaks and also at the shale/sandstone contacts.

7261-7267: As from 7237 - 7249.
Bleeding gas evident within the sandier portion of the silt.

CORE DESCRIPTION

EGS - 4 Cut 6' Core No. 13

Interval - 7473-7479 (Driller) Rec. 9'

7460-7466 (Sonic)

When pulled out evident that whole core bleeding big bubbles of gas.

7473-7477: Sandstone: light grey, quartzose, very fine to fine grained, angular to sub rounded (dominantly sub angular), fairly well sorted with scattered angular to rounded (dominantly angular to sub angular), medium grained, to granular quartz sand (5% of rock); scattered carbonaceous grains and rare irregular carbonaceous patches, sparsely micaceous (white). Moderate to abundant white, kaolinitic, clay matrix. Massive, fairly dense, moderately hard. Porosity 15-20%, permeability poor.

Flourescence and Cut

Top 2'6" of core shows a somewhat patchy dull gold flourescence throughout, and gives a good, though somewhat slow, white cut. Towards the base of the section, flourescence becomes speckled. Core gives faint to good odour and taste.

7466-7478: Sandstone: as above, but clay matrix content increasing, and tending to choke all porosity; rock becoming more friable. Rock gives faint speckled gold flourescence, and has faint odour and taste.

CORE DESCRIPTION

EGS - 4 Cut 29' Core No. 14

Interval - 7480-7509 (Driller) Rec. 29'

7467-7496 (Sonic)

7480-7496: Siltstone: with finely interbedded laminae and lenses of sandstone, giving the rock in places an irregular finely banded character.
Siltstone: buff to light grey, argillaceous, very finely sandy, slightly dolomitic, sparsely micro-micaceous, with finely disseminated carbonaceous grains and streaks.
Sandstone: grey-white, quartzose, silty, very fine grained, angular to sub-rounded (dominantly angular to sub angular), fairly well sorted, sparsely micro-micaceous, with sparse finely disseminated carbonaceous grains and streaks. Moderate white clay matrix, compact, poor porosity and permeability.

Secondary Textures

Scattered throughout the siltstone occur very fine 'nuclei' of dolomitisation. Frequently the fine carbonaceous streaks are surrounded by a narrow zone of dolomitization. Rarely occur irregular 'gashes' and veinlets, cross cutting the trend of bedding, occupied by black, brilliant lustred coal, including fine (2-3 mm) euhedral, calcite crystals. Immediately adjacent to these 'gashes' the surrounding siltstone has suffered dolomitisation associated with minor finely crystalline pyrite. Certain sandstone laminae have also suffered minor dolomitisation.

General

In part section has slumped; sandstone laminae display irregular contortion, hydroplastic boudinage and tensional microfaulting and balling. Section massive, breaking irregular along an ill defined bedding, with dips 0° to 20°.
N.B. Lower 6" of section, immediately above underlying coal, grades to a dark brown, carbonaceous shale. Certain of the carbonaceous/siltstone, carbonaceous/sandstone and siltstone/sandstone interfaces bleed a very small amount of gas. In the top 2" of core a very fine grained sandstone band displays a very weak, speckled, dull gold flourescence with very faint taste, no odour.

7496-7508'6"

Coal: black, banded bituminous, with alternate laminae and bands of brilliant and dull lustred coal. Irregular to subconchoidal fracture. Throughout occur rare veinlets of calcite. Dip of banding sub-horizontal. In the interval 9507'6" - 9508' occur abundant, buff, fine nodules of dolomitisation, giving the rock a finely mottled appearance. Such nodules are frequently surrounded by a veneer of finely crystalline pyrite.

7508'6"-7509'

Shale: buff to light brown, silty, dense, massive, sparsely carbonaceous.

CORE DESCRIPTION

EGS - 4 | Cut 30' | Core No. 15

Interval - 8434-8464 (Driller) | Rec. 30'

8434-8456'6":

<u>Sandstone</u>: light grey, fine grained to medium grained to coarse grained, predominantly fine to medium grained range, poorly sorted, sub angular to sub rounded, fairly well compacted, contains abundant discontinuous irregular dark grey carbonaceous silty shale laminae from 1/16-3/4" thick.
Matrix made up of silt size quartz, kaolin (altered after feldspar?) mica, with minor finely disseminated pyrite and carbonaceous material.
Irregular pyrite nodules to ½" thick occur closely associated with shaley laminae.
Porosity 18-20% average. Permeability low due to choking by kaolinitic matrix.
Very sparse grains of blue green mineral? glauconite? Very small scale cross-bedding; dips to 5° with axis core. Mineral flourescence. No cut.

8456'6"-8458:

<u>Silty Mudstone</u>: dark brown-grey, massive, tough and well compacted, thin (1/16-¼") discontinuous bands and irregular nodular masses of very fine grained light grey silty sandstone, and thin ellipsoidal nodules of pyrite to 1/16" thick.

8458-8461'6":

<u>Sandstone</u>: light grey, fine grained to coarse to very coarse grained to granular; conglomeratic in part; very poorly sorted, angular to sub rounded, fairly well compacted; contains abundant light grey altered feldspar grains, much kaolin, mica pyrite, sparse carbonaceous grains, fairly soft blue-green mineral as above - glauconite.
Porosity 20+; Permeability low.
Contains very irregular thin discontinuous carbonaceous silty shale laminae.
Mineral flourescence. No cut.

8461'6"-8464:

<u>Sandy Argillaceous Siltstone</u>: dark brown-grey, very tough and well compacted, containing irregular rounded nodules and discontinuous bands of light grey fine grained kaolinitic sandstone; pyrite occurs as irregular nodules to ½" thick and very finely disseminated; abundant carbonaceous flecks and grains, sparse grains of glauconite, and fine grains of quartz and coal disseminated throughout. No dip.

CORE ANALYSIS RESULTS

(by Core Laboratories Inc.)

Sample Number	Depth Feet	PERMEABILITY MILLIDARCYS Horiz.	Vert.	Porosity Percent	RESIDUAL SATURATION Oil % Vol, % Pore	Total Water % Pore	DENSITY	REMARKS
	Core No.1							
1	4572	*		23	0	62	2.27	*= Not suitable for analysis
2	4573	*		25	0	58	2.16	Samples Nos. 1-5 Loose
3	4574	6122		22	1.4	56	2.30	Poorly sorted Sand, well
4	4575	1554		21	0	55	2.17	invaded by mud filtrate.
5	4576	3650		24	0	55	2.27	
	Core No.2							
6	4589	*		*	*	*	*	Very soft & wet w/filtrate
	Core No.3							
7	4635	*		20	0	54	2.30	
8	4636	9279*		22	0	51	2.28	Samples No. 8 & No. 12
9	4637	*		23	0	48	2.22	very loose unconsolidated
10	4638	1808		22	0	51	2.26	large grain SD-plug
11	4639	3829		21	0	50	2.31	possibly cracked
12	4640	8832*		15	0	47	2.41	
13	4641	16.0		12	0	38	2.45	
14	4642	38.0		12	0	41	2.47	
15	4643	2.8		7	0	32	2.60	
16	4644	1.0		6	0	30	2.63	Hard tight well cemented SD
17	4645	.8		5	0	24	2.66	
	Core No.4							
18	4650	.8		5	0	56	2.67	
19	4660	10.0		29	7.2	54	2.20	Very F grn SD lamin w/shale
20	4661	7.4		30	7.0	48	2.09	Very F grn SD lamin w/shale
	Core No.5							
21	4769	15.4		20	0	77	2.26	*not suitable for analysis
22	4770	417		32	0	51	1.98	
	Core No.7							
23	5054	123		31	0	43	2.01	
24	5055	63		33	0	43	2.02	Coal laminations
25	5056	2.9		23	0	56	2.22	Coal laminations
26	5061	.4		11	0	77	2.77	Mostly SH
27	5094	.4		17	0	74	2.48	Mostly SH
	Core No.8							
28	5097	10		20	0	63	2.24	Shly.
29	5098	5.7		19	0	73	2.31	Shly.
30	5099	*		31	0	51	2.06	
	Core No.9							
31	5107	*		26	0	58	2.12	
32	5120	6.1		18	0	77	2.36	Vy arg. V F grn. SS
33	5121	570		29	4.5	51	2.08	
34	5122	2000		32	8.7	43	2.02	
35	5123	745		30	11.6	47	2.06	
36	5124	2380		31	10.5	39	1.98	
37	5125	*		*	*	*	*	Mostly shale
38	5126	13.8		23	9.2	66	2.32	Hvy. SH laminations

Contd.....

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Sample Number	Depth Feet	PERMEABILITY MILLIDARCYS		Porosity Percent	RESIDUAL SATURATION		DENSITY	REMARKS
		Horiz.	Vert.		Oil % Vol. % Pore	Total Water % Pore		
	Core No.10							
[illegible]	5127	752		24	13.1	51	2.01	
40	5128	230		30	11.1	45	2.12	
41	5129	345		28	10.9	47	2.08	
42	5130	165		29	9.8	46	2.02	
43	5131	386		30	8.3	44	2.02	
44	5132	720		30	10.0	43	2.02	
45	5133	660		31	11.1	46	2.02	
46	5134	615		31	10.1	46	2.03	
47	5135	*		29	10.3	45	2.12	
48	5136	*		30	10.0	42	1.98	
49	5137	*		27	8.4	45	2.20	Lge grn. vy loose unconsol.
50	5138	*		20	8.3	51	2.33	SD flushed w/drlg. fluid
51	5139	*		22	6.8	49	2.12	
52	5140	1180		22	.9	47	2.10	SD.AA & w/patches comp-
53	5141	*		20	9.0	45	2.22	letely silicified SS
54	5142	*		16	13.1	47	2.38	
55	5143	*		20	7.5	41	2.21	
56	5144	5.2		12	9.1	58	2.44	
57	5145	*		10	11.0	54	2.53	
58	5146	*		9	9.5	50	2.42	
59	5147	*		8	3.1	65	2.51	
	Core No.11							
60	5161	5515		27	13.9	44	2.06	
61	5162	5142		28	7.9	54	2.09	
62	5163	5868		29	13.0	45	2.02	
63	5164	2605		29	10.5	47	2.09	
64	5165	957		21	9.5	56	2.22	
65	5166	2103		20	9.1	54	2.27	
66	5167	3347		20	4.1	54	2.22	
67	5168	110		19	5.5	59	2.32	
68	5169	915		21	6.2	58	2.24	
69	5170	373		22	0	83	2.25	
70	5171	1290		23	0	93	2.22	
71	5172	1725		23	0	94	2.26	
72	5173	1790		24	0	95	2.22	
73	5174	174		17	0	90	2.36	
74	5177	130		14	0	86	2.32	Partially silicified
75	5178	415		17	0	92	2.35	Shale siltstone
76	5179	120		21	0	75	2.30	
77	5181	7.8		17	0	85	2.30	
78	5182	5.6		22	0	83	2.22	
	Core No.13							
79	7474	4.8		19	0	47	2.22	Sl. carb.
80	7475	5.0		19	0	48	2.31	
81	7476	2.5		20	0	50	2.28	
82	7477	12		22	0	48	2.35	
	Core No.15							
83	8434	0.8		13.6	0	68.3	2.44	*= Not suitable for analysis
84	8435	*		*	*	*		Heavy coal lam/S:Fissile
85	8436	*		*	*	*		Heavy coal lam/S:Fissile
86	8437	*		*	*	*		Heavy coal lam/S:Fissile
87	8438	4.7		16.0	0	72.6	2.35	
88	8439	3.1		16.8	0	67.9	2.30	
89	8440	6.2		16.8	0	69.1	2.31	
90	8442	4.8		13.7	0	62.8	2.31	

Sample Number	Depth Feet	PERMEABILITY MILLIDARCYS		Porosity Percent	RESIDUAL SATURATION		DENSITY	REMARKS
		Horiz.	Vert.		Oil % Vol. % Pore	Total Water % Pore		
	Core No.15 Contd.							
[illegible]	8445	*		*	*	*		Heavy coal lam/s & Fissile
[illegible]	8446	*		10.3	0	76.8	2.42	Heavy coal lam/s & Fissile
93	8447	3.3		13.4	0	65.7	2.38	
94	8449	4.8		13.9	0	77.0	2.50	
95	8450	1.3		10.6	0	70.7	2.49	
96	8452	.1		11.1	0	68.6	2.40	
97	8453	*		*	*	*		Heavy coal lam/s & Fissile
98	8455	1.3		9.4	0	61.7	2.22	
99	8460	8.0		17.7	0	78.6	2.32	

ESSO GIPPSLAND SHELF-4

SIDEWALL CORE DESCRIPTIONS

Depth	Recovery	
5208	3/4"	Coal: brownish black, vitrous, conchoidal fracture, soft.
5232	½"	Shale:very light grey, silty, occasional micaceous flecks, non-calcareous, no shows.
5244	½"	Sandstone: white, very fine grained, angular quartz, slight clay matrix, non calcareous, no shows.
5273	½"	Shale: medium chocolate brown, with finely disseminated carbonaceous matrix, occasional 1-2 mm. white silty bands, no shows.
5280	½"	Siltstone: light grey, clayey, thin carbonaceous streaks, no shows.
5314	3/4"	Siltstone: light grey, clayey, soft, no shows.
7825		Sandstone: light grey - light grey brown, very fine grained-medium grained-very coarse grained, predominantly fine-medium grained, sub angular-sub rounded, poorly sorted, much kaolinitic matrix, micaceous; trace pyrite, thin 1/16" dark grey-black carbonaceous bands outline small scale cross-bedding; very sparse grains glauconite? Estimated porosity 12-14% . Permeability low. Light yellow fluorescence. Instant white yellow cut.
7592		Mudstone: chocolate brown grey, fairly well compacted, non fissile - slightly silty, carbonaceous, micromicaceous. Faint hydrocarbon odour from bottle.
7558		Sandstone: light grey, fine-medium grained, with sparse carbonaceous grains, quartzose, sub angular-sub rounded, poorly sorted, mica, kaolin, matrix, as above, carbonaceous flecks. Definite hydrocarbon odour. Mineral fluorescence. No cut. Estimated porosity 16-18%. Permeability low.
7524		Silty Mudstone: brown grey, fairly well compacted, very carbonaceous, micaceous, slightly pyritic, contains small lense of sandstone - light brown grey - fine - coarse grained, very similar to above. Faint hydrocarbon odour.
7454		Sandstone: light grey, fine-very coarse grained, very poorly sorted, angular-sub rounded, fairly well compacted, mica, pyritic, carbonaceous flecks, sparse glauconite grains? Much kaolin matrix. Mineral fluorescence. No cut. Porosity 16-18%. Permeability low-fair. Faint hydrocarbon odour.
7414		Sandstone: light grey, very fine-fine-medium grained, predominantly very fine-fine grained, fairly well compacted, carbonaceous flecks, mica, and much kaolin matrix. No fluorescence. Estimated porosity 12-14%. Permeability very low. Faint hydrocarbon odour.

7538 **Sandstone**: medium grey, very fine-medium grained, predominantly fine grained, brittle and well compacted, quite dirty, contains abundant mica, carbonaceous flecks, finely disseminated pyrite with much kaolin and grey clay matrix. Dull yellow fluorecence. No cut. Faint hydrocarbon odour. Estimated porosity 10-14%. Permeability low.

7264 **Sandstone**: light grey, fine-medium grained with very sparse coarse grained quartzose, sub angular-sub rounded, fairly well compacted, fairly brittle, thin discontinuous carbonaceous streaks, non calcareous, minor pyrite, very sparse grains glauconite? Much kaolin matrix. Estimated porosity 14%. Permeability low. Faint hydrocarbon odour. No cut. No fluorescence.

7214 **Silty Mudstone**: brown grey - as previously with thin 1/16"-1/4" very fine sandy lenses. Faint hydrocarbon odour.

7112 **Mudstone**: chocolate brown grey, slightly silty, micaceous, slightly carbonaceous, pyritic, fairly well compacted. No hydrocarbon odour.

7054 **Sandstone**: light grey, very fine-fine grained, fairly well sorted, fairly well compacted, contains abundant thin dark grey-black carbonaceous streaks, mica, and much kaolin matrix. Non calcareous. Faint hydrocarbon odour. Estimated porosity 12-14%. Permeability low. Faint dull yellow mineral fluorescence? No cut.

7006 **Sandstone**: light grey, very fine-medium grained, with sparse sandy grains quartzose, grains angular-sub rounded, fairly well compacted, much finely disseminated mica, minor pyrite, abundant thin dark grey-black carbonaceous streaks (1/16" thick), much kaolin matrix. Estimated porosity 12-14%. Permeability low. Faint hydrocarbon odour. Light yellow fluorescence. Instant cut, light whitish yellow.

6900 **Silty Mudstone**: chocolate brown grey as previously. Faint hydrocarbon odour.

6792 **Sandstone**: light grey, very fine grained, fairly well sorted, fairly well compacted, contains abundant thin (1/16-1/8") dark grey brown argillaceous carbonaceous streaks, sparse carbonaceous grains, kaolin matrix, mica flecks, very finely disseminated pyrite. Estimated porosity 10-12%. Permeability very low. Faint hydrocarbon odour. No fluorescence. No cut.

6650 **Sandstone**: light grey, fine-medium grained, fairly well sorted, angular-rounded, fairly friable, containing mica flecks, carbonaceous flecks and grains with finely disseminated pyrite. Minor kaolin matrix. Estimated porosity 24%. Permeability fair. Faint Hydrocarbon odour. No fluorescence. No cut.

6610 **Mudstone**: chocolate brown grey, slightly silty, fairly well compacted carbonaceous flecks and thin 1/16-1/8" lenses, micromicaceous, very finely disseminated pyrite, and thin lenses of very fine grained, light grey kaolinitic sandstone to 1/8" thick. Faint hydrocarbon odour. No fluorescence in sandstone.

Petroleum Technology Laboratory, Bureau of Mineral Resources, Geology and Geophysics, Canberra

CORE ANALYSIS RESULTS

NOTE:- (i) Unless otherwise stated, the porosities and permeabilities were determined on two small plugs (V&H) cut at right angles from the core. Ruska porosimeter and permeameter were used with, air at 30 p.s.i.g. and dry nitrogene, respectively, as the saturating and flowing media. (ii) Residual oil and water saturations were determined using soxhlet type apparatus. (iii) Acetone test precipitates are recorded as nil, trace, fair, strong or very strong.

WELL NAME AND NO. GIPPSLAND SHELF NO. 4 DATE OF TEST. 7th FEBRUARY, 1966

Core No.	Depth From:- To:-	Lithology	Average Effective Porosity from two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm /cc.)		Fluid Saturation (% of pore space)		Acetone Test	Core Water Salinity (P.P.M. NaCl)	Solubility in 15% HCl (% Bulk vol.)	Fluorescence of freshly broken core.
				V	H	Dry Bulk	Apparent Grain	Water	"Oil"				
3	4634' 0" 4634' 0"	Sandstone	22	1720	1670	2.11	2.67	11	6	Trace	N.D.	N.D.	Bluish white spots
3	4634' 0" 4636' 0"	"	21	2520	2410	2.10	2.66	20	4	"	"	"	"
3	4638' 3" 4639' 0"	"	18	1360	1745	[illegible]	2.69	19	3	"	"	"	"
3	4640' 0" 4640' 9"	"	10	218	298	2.40	2.68	8	10	"	"	"	"
3	4642' 0" 4642' 9"	"	28	30	32	1.93	2.67	0	1	"	"	"	Bright blue spots
3	4644' 3" 4645' 0"	"	7	12	13	2.49	2.68	2	10	"	"	"	Dull blue spots
10	5126' 6" 5127' 3"	"	26	111	[illegible]	[illegible]	2.65	29	6	Fair	"	"	Bright blue

Remarks:- Core samples were received slabbed and unsealed. Oil and Water Saturations obtained on analysis do not, therefore, reflect the "true" saturations in any way.

General File No. 62/399.
Well File No. 65/4183

Petroleum Technology Laboratory, Bureau of Mineral Resources, Geology and Geophysics, Canberra

CORE ANALYSIS RESULTS

NOTE:- (i) Unless otherwise stated, the porosities and permeabilities were determined on two small plugs (V&H) cut at right angles from the core. Ruska porosimeter and permeameter were used with, air at 30 p.s.i.g. and dry nitrogen, respectively, as the saturating and flowing media.
(ii) Residual oil and water saturations were determined using soxhlet type apparatus. (iii) Acetone test precipitates are recorded as nil, trace, fair, strong or very strong.

WELL NAME AND NO. GIPPSLAND SHELF NO. 4 **DATE OF TEST.** 7TH FEBRUARY 1966

Core No.	Depth From:- To:-	Lithology	Average Effective Porosity from two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy) V	Absolute Permeability (Millidarcy) H	Average Density (gm /cc.) Dry Bulk	Average Density (gm /cc.) Apparent Grain	Fluid Saturation (% of pore space) Water	Fluid Saturation (% of pore space) "Oil"	Acetone Test	Core Water Salinity (P.P.M. NaCl)	Solubility in 15% HCl (% Bulk vol.)	Fluorescence of freshly broken core.
10	5129'0" 5129'6"	Sandstone	22	28	119	2.07	2.65	12	6	Fair	N.D.	N.D.	Bright blue
10	5131'0" 5131'6"	"	27	332	860	1.94	2.65	15	8	"	"	"	"
10	5133'0" 5133'6"	"	25	354	675	1.97	2.65	3	5	"	"	"	"
10	5135'6" 5136'0"	"	24	N.D.	2,370	2.02	2.64	7	6	"	"	"	Blue
10	5137'6" 5138'0"	Sandstone,	19	"	414	2.15	2.65	9	4	"	"	"	Blue-white spots
10	5139'6" 5140'3"	Sandstone, pyrite,	18	"	3,150	2.45	2.98	2	6	Strong	"	"	"
10	5141'9" 5142'6"	"	17	364	630	[illegible]	[illegible]	5	6	"	"	"	"

Remarks:- Core samples were received slabbed and unsealed.
Oil and water saturations obtained on analysis do not, therefore, reflect the "true" saturations in any way.

General File No. 62/399.
Well File No. 65/4183

Petroleum Technology Laboratory, Bureau of Mineral Resources, Geology and Geophysics, Canberra

CORE ANALYSIS RESULTS

NOTE:- (i) Unless otherwise stated, the porosities and permeabilities were determined on two small plugs (V&H) cut at right angles from the core. Ruska porosimeter and permeameter were used with, air at 30 p.s.i.g. and dry nitrogen, respectively, as the saturating and flowing media.
(ii) Residual oil and water saturations were determined using soxhlet type apparatus. (iii) Acetone test precipitates are recorded as nil, trace, fair, strong or very strong.

WELL NAME AND NO. GIPPSLAND SHELF NO. 4 DATE OF TEST. 7TH FEBRUARY 1966

Core No.	Depth From:- To:-	Lithology	Average Effective Porosity from two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm./cc.)		Fluid Saturation (% of pore space)		Acetone Test	Core Water Salinity (P.P.M. NaCl)	Solubility in 15% HCl (% Bulk vol.)	Fluorescence of freshly broken core.
				V	H	Dry Bulk	Apparent Grain	Water	"Oil"				
10	5144'0" 5145'0"	Conglomerate	8	2	27	2.44	2.66	0	6	Trace	N.D.	N.D.	Rare blue spots
10	5147'0" 5147'6"	"	11	825	240	2.40	2.71	9	4	"	"	"	"
10	5149'6" 5150'0"	"	10	286	630	2.40	2.66	1	6	"	"	"	Rare blue and yellow spots
10	5161'0" 5161'8"	Sandstone	26	2,875	3,120	1.97	2.65	11	7	Strong	"	"	Blue white spots
11	5163'0" 5163'9"	"	29	2,300	3,560	1.91	2.67	15	6	"	"	"	Bright blue
11	5165'3" 5166'0"	"	24	3,070	4,240	2.04	2.67	22	6	"	"	"	Blue spots
11	5167'6" 5168'3"	Sandstone, carb. [illegible]	17	728	1,790	2.22	2.69	12	2	Fair	"	"	Blue white spots

Remarks:- Core samples were received slabbed and unsealed.
Oil and water saturations obtained on analysis do not, therefore, reflect the "true" saturations in any way

General File No. 62/399.
Well File No. 65/4183

Petroleum Technology Laboratory, Bureau of Mineral Resources, Geology and Geophysics, Canberra

CORE ANALYSIS RESULTS

NOTE:- (i) Unless otherwise stated, the porosities and permeabilities were determined on two small plugs (V&H) cut at right angles from the core. Ruska porosimeter and permeameter were used with, air at 30 p.s.i.g. and dry nitrogen, respectively, as the saturating and flowing media. (ii) Residual oil and water saturations were determined using soxhlet type apparatus. (iii) Acetone test precipitates are recorded as nil, trace, fair, strong or very strong.

WELL NAME AND NO. GIPPSLAND SHELF NO. 4 DATE OF TEST. 7TH FEBRUARY 1966

Core No.	Depth From:- To:-	Lithology	Average Effective Porosity from two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm./cc.)		Fluid Saturation (% of pore space)		Acetone Test	Core Water Salinity (P.P.M. NaCl)	Solubility in 15% HCl (% Bulk vol.)	Fluorescence of freshly broken core.
				V	H	Dry Bulk	Apparent Grain	Water	"Oil"				
11	5169'9" 5170'6"	Sandstone, carb. material	22	252	578	2.11	2.70	7	2	Nil	N.D.	N.D.	Rare blue & yellow spots
11	5171'3" 5172'0"	Sandstone	21	1,580	2,260	2.10	2.68	9	6	"	"	"	"
11	5173'6" 5174'3"	"	22	2,430	3,800	2.09	2.68	13	4	"	"	"	"
11	5175'9" 5176'6"	Conglomerate	10	512	810	2.43	2.71	4	Nil	"	"	"	Rare yellow spots
11	5178'0" 5178'9"	Sandstone	19	508	555	[illegible]	2.73	5	"	"	"	"	Rare blue & yellow spots
11	5180'3" 5181'0"	"	13	N.D.	N.D.	2.35	2.71	12	"	"	"	"	Nil
11	5183'3" 5184'0"	Sandstone, carbonaceous	5	Nil	Nil	2.61	2.74	17	"	"	"	"	Yellow spots

Remarks:- Core samples were received slabbed and unsealed. Oil and water saturations obtained on analysis do not, therefore, reflect the "true" saturations in any way

General File No. 62/399.
Well File No. 65/4183

APPENDIX 5

ELECTRICAL LOGS.

APPENDIX 5

MARLIN - 1

List and Interpretation of Electrical Logs

	Run No.	Interval (feet)
Induction Electric Log	1	730 - 2287
	2	2250 - 6488
	3	6289 - 8475
Microlaterolog	1	725 - 2283
	2	2249 - 6190
	3	6289 - 8474
Microlog	1	2248 - 6480
Sonic Gamma Ray Caliper	1	728 - 2283
	2	2252 - 6480
	3	6289 - 8467
Laterolog	1	2251 - 6486
Continuous Dipmeter	1	728 - 2283
	2	2280 - 6470
	3	6289 - 8470
Gamma Ray Collar Locator	1	4500 - 6300
Cement Bond Log	1	5660 - 7999
Temperature Log	1	3020 - 5800

Miocene (760' - 4260') - No major permeable zones present MA[illegible]N-1

Oligocene - Lakes Entrance Formation (4260' - 4522') - No major permeable zones present

Eocene - Latrobe Valley Coal Measures (4522-6490)

Interval	Log Run	SP	Rmf/ Rwe	Rw	(MLL) Rxo	Ø 1	F=Rxo/ Rmf	Ro	Rt	Sw %	$Ø_s$	F_s	Fm Fluid	ML	Rxo ML	
4522-4548	2	-20	-	.16	6	20	20	2.3	19	32	30+	< 8	G	2	7.5	Sonic indicates gas
4608-4614	2	-	-	.16	5	20	18	2.3	100	32	23	22	G	-	-	
4992-4997	2	-	-	.16	7	20	25	2.3	17	33	30+	< 8	G	-	-	
5012-5015	2	-	-	.16	5	20	18	2.3	7	52	30+	< 8	G	-	-	
5109-5125	2	-	-	.16	7.8	27	28	2.3	19	24	30+	< 8	O	-	-	
5138-5140	2	-	-	.16	6	22	20	2.0	50	17	-	-	O	-	-	
5227-5240	2	-	-	.16	3.2	30	11	3.2	4	85	27	11	W	-	-	
5310-5315	2	-	-	.16	-	-	-	4.05	4.4	100	27	12	W	-	-	
5406-5410	2	-	-	.16	-	-	-	2.50	3.6	82	24	12.5	W	-	-	
5632-5637	2	-	-	.10	-	-	-	4.65	4.5	101	17.6	25.8	W	-	-	
5879-5884	2	-	-	.10	-	-	-	1.81	1.7	104	20.8	18.1	W	-	-	
6076-6080	2	-	-	.08	-	-	-	1.81	2.2	90	20.8	18.1	W	-	-	
6276-6282	2	-	-	.08	-	-	-	2.09	2.4	93	19.5	20.9	W	-	-	
6455-6459	2	-	-	.08	-	-	-	1.95	1.8	105	20.1	19.5	W	-	-	
Upper Cretaceous (6490-8485' T.D.)																
6646-6652	3	-36	2.8	.07	5.0	27	25	1.75	1.66	100	23	15	W	-	-	
6898-6906	3	-32	2.3	.085	7.0	15	35	3	2.5	100+	25	12	W	-	-	(shaly)
7002-7012	3	-35	2.6	.075	10.0	30	50	4	5.5	90	18	25	W	-	-	(shaly)
7050-7065	3	-32	2.2	.095	7.0	-	35	3.3	12.5	48	22	18.5	G	-	-	(shaly in part)
7340-7350	3	-30	2.0	.09	14.0	-	70	2.3(S)	11	45	15	35	G	-	-	(shaly)
7420-7430	3	-42	2.8	.07	9.0	-	45	.95(S)	15	25	22	18.5	G	-	-	
7460-7470	3	-48	3.3	.06	8.0+	-	40	1.2(S)	9	37	20	20	G	-	-	(shaly in part)
7550-7560	3	-30	1.9	.09	9.0	-	45	1.2(S)	11	33	19	22	G	-	-	(shaly in part)
7610-7620	3	-30	1.9	.09	9.0	-	45	1.9(S)	22	29	16	31	G	-	-	(shaly)
7670-7680	3	-48	3.3	.06	9.0	-	45	1.1(S)	3.5	57	21	19	W?	-	-	(shaly)

MARLIN-1

2/2

APPENDIX 6

VELOCITY SURVEY

MARLIN -1

VELOCITY SURVEY

ESSO GIPPSLAND SHELF NO. 4

by

R.R. Tharp

A. INTRODUCTION

Esso Australia contracted Western Geophysical Co. to perform the velocity survey. Under the contract Western agreed to furnish the following:

(1) Instruments.

- a. SSC Model GCE101 Pressure Sensitive Well Geophones.
- b. Twelve SIE GA-11 Amplifiers, Input Switching and Power Supply.
- c. Western 30 Channel Camera
- d. Three 12 volt Batteries and Charger
- e. Portable Developing System
- f. Two 300 volt Blasters
- g. Three Kaar TR 327 CB Radios
- h. Two RC-5 Remote Control Units for Shooters Radio
- i. Two TA-12 Break amplifier units
- j. Adequate spare parts

(2) One Instrument Operator and One Marine Shooter.

(3) One Licensed Shooting Boat.

All equipment and personnel were assembled on January 20, 1966 but due to weather conditions the velocity survey was not made until the 27th of January.

B. SURVEY PROCEDURES

Weather conditions were marginal during the survey. Due to drilling problems, the hole was not released for the velocity survey until 3 p.m. the afternoon of January 27th. Intermittent rain and electrical disturbances contributed greatly to the high noise level experienced during the survey.

1. Shot Positioning
Prior to the start of the survey, buoys were placed on both sides of Glomar III at distances of approximately 1000 ft. and 500 ft. from the well site. Glomar III was anchored in an approximately east-west orientation and the buoys were on an approximate NE-SW line passing through the well site. A reference geophone was lowered 25 ft. below the water in the moonpool and was used to record the water break.

2. Charge Size
Fifty pound charges were used at the 1000 ft. positions and 25 lb. charges from the 500 ft. positions.

   During the down run, shots were made at the 1000 ft. SW buoy and on the up run at the 1000 ft. NE buoy. Two shots were made, 500 ft. SW and 500 ft. NE, at the end of the survey in an attempt to minimize the triangulation error due to the shallow depth (2200 ft.) of the well geophone. Eleven shots were made during the survey. Shot distances were checked with the recorded water break arrival.

3. Well Geophone Positioning
All depth measurements were made using the Schlumberger depth indicator. To minimize rig noise due to heavy swells, the marine riser was disconnected from the derrick floor and lowered to the casing top. Schlumberger cable was clamped with a T-Bar device

which rested on the casing top at each geophone depth in an attempt to de-couple from the rig movement.

4. Instrumentation

The seismic instruments were set up in the mud room of the Glomar III near the Schlumberger logging unit. This afforded protection from the wind and rain but resulted in communication difficulty with Schlumberger and the derrick floor.

Seven traces were utilized on the survey records. Traces 1 thru 4 recorded the well geophone break at 4 different recording levels. Traces 5 and 6 recorded the well reference geophone. The time break was recorded on trace 7. Wide band filtering (out-92) and a fixed-gain recording mode were used throughout the survey. Level settings proved extremely critical due to the input gain control being located at the 2nd stage of amplification in the recording amplifier. The SIE GA 11 amplifier is an AGC type seismic amplifier and was changed to a fixed-gain mode by removing the AGC tubes.

C. RESULTS

Eleven shots were taken at six different levels. Repeat shots (i.e. one from each side) were made at 2200 ft., 4522 ft., 6000 ft., and 7450 ft. Copies of the records are included in the back of the report.

The noise level was extremely high on all records. Several conditions contributed to this situation -

(1) Rain and thunder storms in the area.
(2) Leakage in the Schlumberger cable which increased with depth.
(3) Necessity of running mud pumps during the survey
(4) Casing to 6289 ft.

Shot No. 1 was made with the input open. This was due to poor communications with Schlumberger concerning pin number designations. The hole was cased with 9-5/8" pipe to a depth of 6289 ft. Consequently, the shots at 6000 ft. and 7450 ft. would appear to be most reliable. Unfortunately there is an apparent 42 ft. depth error (twice distance from KB to Riser top) at 7450 ft. which will explain the difference in integrated time on the sonic versus the time pick. The figure 7492 ft. has been used in calculations. The noise level was so high and of such a nature as to seriously reduce the hoped for accuracy in working from the uncased portion of the hole up through the cased portion and thereby identifying legitimate picks. Each of the various choices were picked and calculated in an attempt to give the most reasonable curve utilizing the sonic log and its integrated curve. The final check shot times and integrated sonic curve are considered in good agreement as is shown by the error chart of Fig. 1.

D. CONCLUSIONS

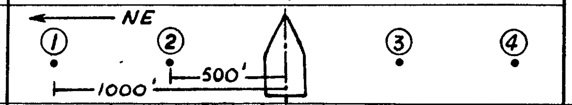
The velocity survey was successful in tying the integrated Sonic Log into absolute time values.

MARLIN – 1

FIGURE 1

Av. Vertical Time from Velocity Survey	T Check Shots	T CUL	Diff.	Interval Depth	Microsec per foot error
0.299					
	0.132	0.128	+0.004	1300	+ 3.0
0.431					
	0.115	0.113	+0.002	1022	+ 1.9
0.546					
	0.061	0.062	-0.001	590	- 1.7
0.607					
	0.091	0.085	+0.005	888	+ 5.6
0.698					
	0.132	0.132	0	1492	0
0.830					

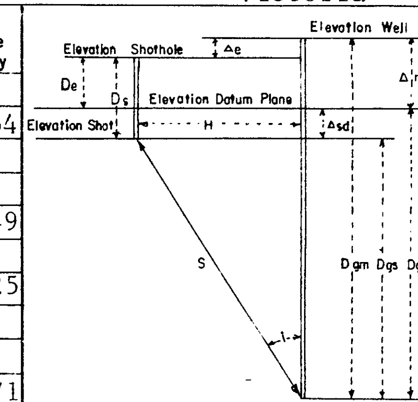
Shothole information:- Elevation, Distance & Direction from Well



Company	Well	Elevation (Derrick Floor)	Total Depth	Coordinates	Section, Township, Range	County	Area or Field
ESSO EXPLORATION AUSTRALIA INC.	GIPPSLAND SHELF -4	31' above S.L.	8485'	38° 14' 03" S 148° 14' 33" E	DATUM : Sea Level		Gippsland Basin Victoria

Record Number	Shothole Number	Time of Shot	Dgm	Ds	tus	tr	T Reading	T Polarity	T Grade	Dgs	H	TAN i	Cos i	Tgs	Δsd	Δsd/V	Tgd	Tgd Average	Dgd	ΔDgd	ΔTgd	Vi Interval Velocity	Va Average Velocity
10	2	19.50	2200	6	.001	.094	.304	U	P	2163	462	.2136	.9779	.297	6	.001	.298	.299	2169				7254
11	3	20.00	2200	6	.001	.124	.310	U	P	2163	610	.2820	.9625	.298	6	.001	.299						
																				1300	.132	9848	
9	1	19.35	3500	6	.001	.189	.445	U	F	3463	930	.2686	.9658	.430	6	.001	.431	.431	3469				8049
																				1022	.115	8887	
8	1	19.15	4522	6	.001	.189	.555	U	F	4485	930	.2074	.9792	.543	6	.001	.544	.546	4491				8225
2	4	17.10	4522	10	.002	.212	.561	U	F	4481	1043	.2328	.9740	.546	10	.002	.548						
																				590	.061	9672	
7	1	18.50	5112	6	.001	.182	.615	U	F	5075	895	.1764	.9848	.606	6	.001	.607	.607	5081				8371
																				888	.091	9758	
6	1	18.25	6000	6	.001	.186	.703	U	F	5963	915	.1534	.9884	.694	6	.001	.695	.698	5969				8552
3	4	17.30	6000	10	.002	.223	.710	U	F	5959	1097	.1841	.9835	.698	10	.002	.700						
																				1492	.132	11303	
5	1	18.00	7492	6	.001	.185	.834	U	F	7455	910	.1220	.9927	.828	6	.001	.829	.830	7464				8989
4	4	17.50	7492	6	.001	.224	.838	U	F	7455	1102	.1478	.9893	.829	6	.001	.830						

A depth error of 42' (twice the distance from the K.B. to the riser top) appears to have been made in the 7450 depth.



Dgm = Geophone depth measured from well elevation
Dgs = " " " " shot "
Dgd = " " " " datum "
Ds = Depth of shot
De = Shothole elevation to datum plane
H = Horizontal distance from well to shotpoint
S = Straight line travel path from shot to well geophone
tus = Uphole time at shotpoint
T = Observed time from shotpoint to well geophone.
tr = " " to reference geophone.
Δe = Difference in elevation between well & shotpoint.
Δsd = " " " " shot & datum plane
$\Delta sd = Ds - De$
$Dgs = Dgm - Ds \pm \Delta e$; $\tan i = \frac{H}{Dgs}$
$Tgs = \cos i \; T$ = Vert. travel time from shot elev. to geophone
$Tgd = Tgs \pm \frac{\Delta sd}{V}$ = " " " " datum plane " "
$Dgd = Dgm - \Delta md$
Vi = Interval velocity = $\frac{\Delta Dgd}{\Delta Tgd}$
Va = Average = $\frac{Dgd}{Tgd}$

Surveyed by: R.R. Tharp
Date: 27-1-66
Weathering Data:
Casing Record 6289'

MARLIN - 1

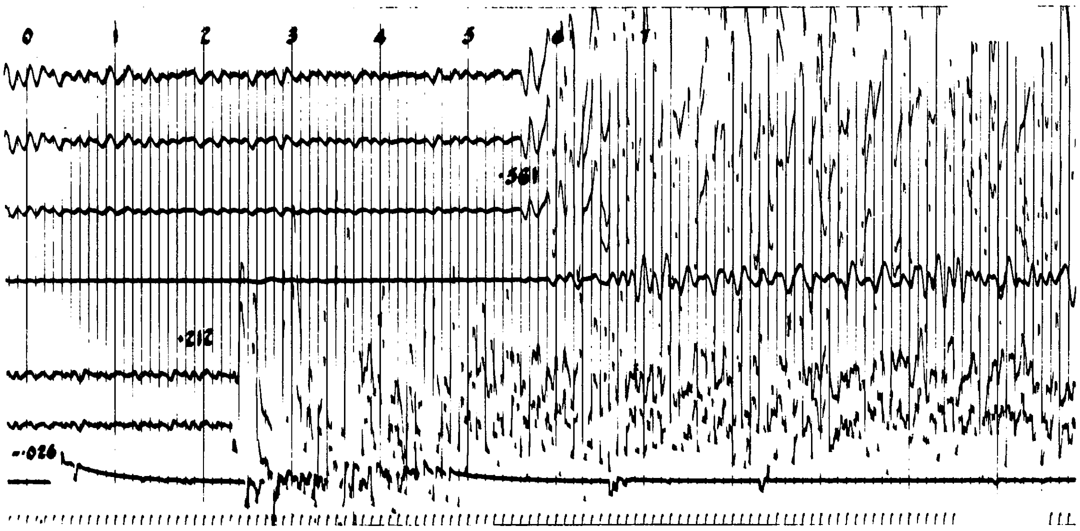
578

MARLIN - 1

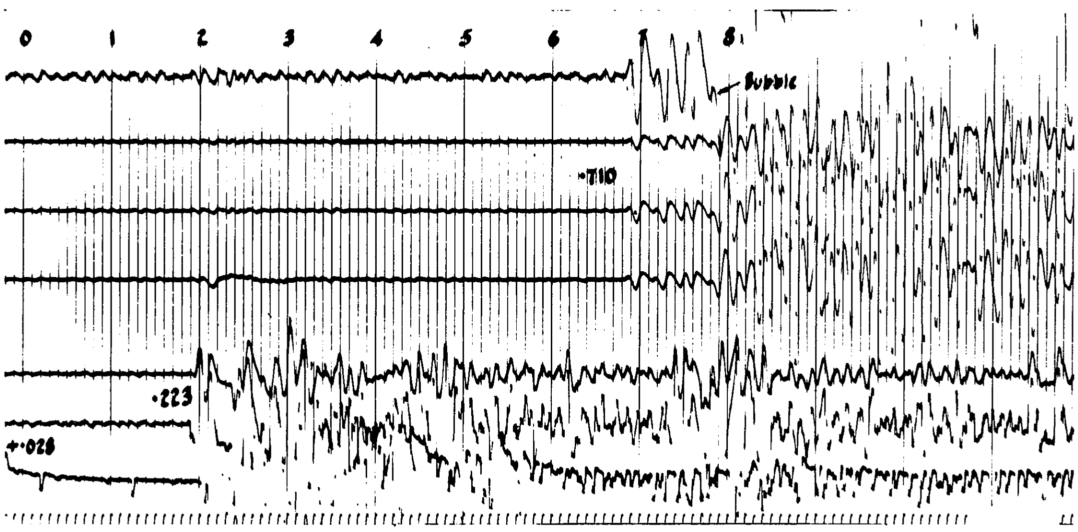
ESSO GIPPSLAND SHELF 4

WELL VELOCITY RECORDS

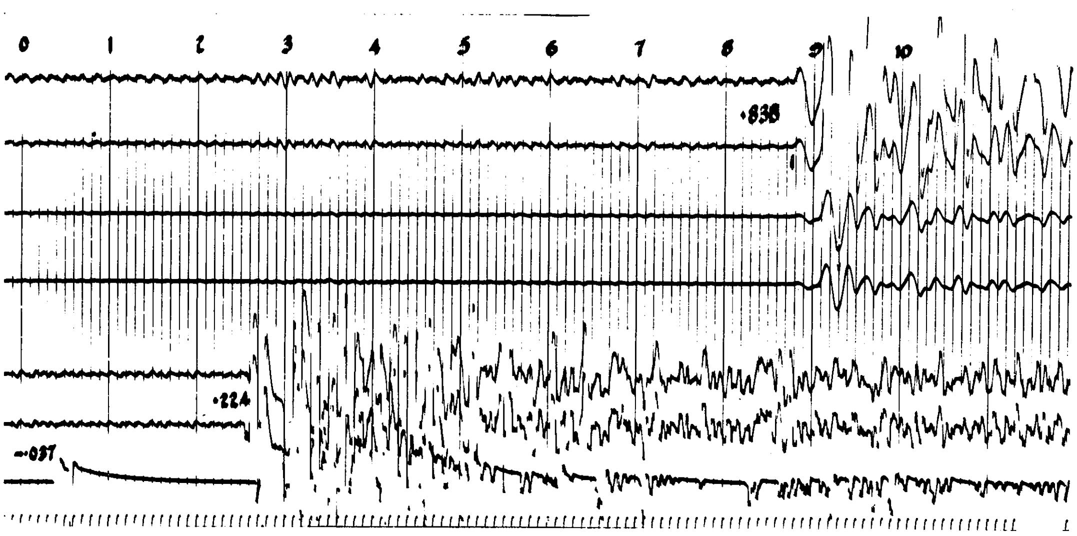
SHOT 2
OFFSET 1000' S.W.
DEPTH OF GEOPHONE 4522'
17:10 27·1·66



SHOT 3
OFFSET 1000' S.W.
DEPTH OF GEOPHONE 6000'
17:30 27·1·66



SHOT 4
OFFSET 1000' S.W.
DEPTH OF GEOPHONE 7450'
17:50 27·1·66

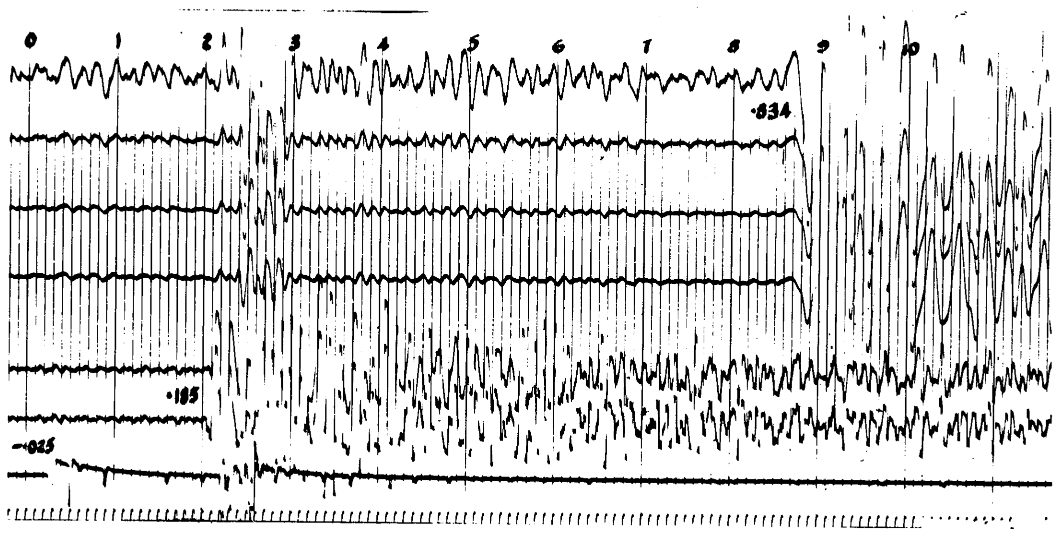


MARLIN – 1

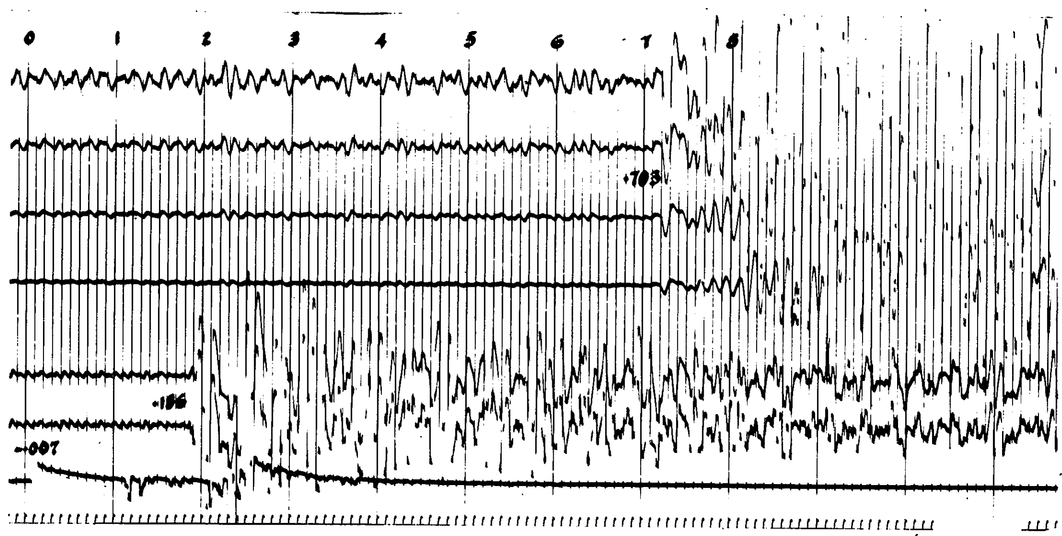
ESSO GIPPSLAND SHELF 4

WELL VELOCITY RECORDS

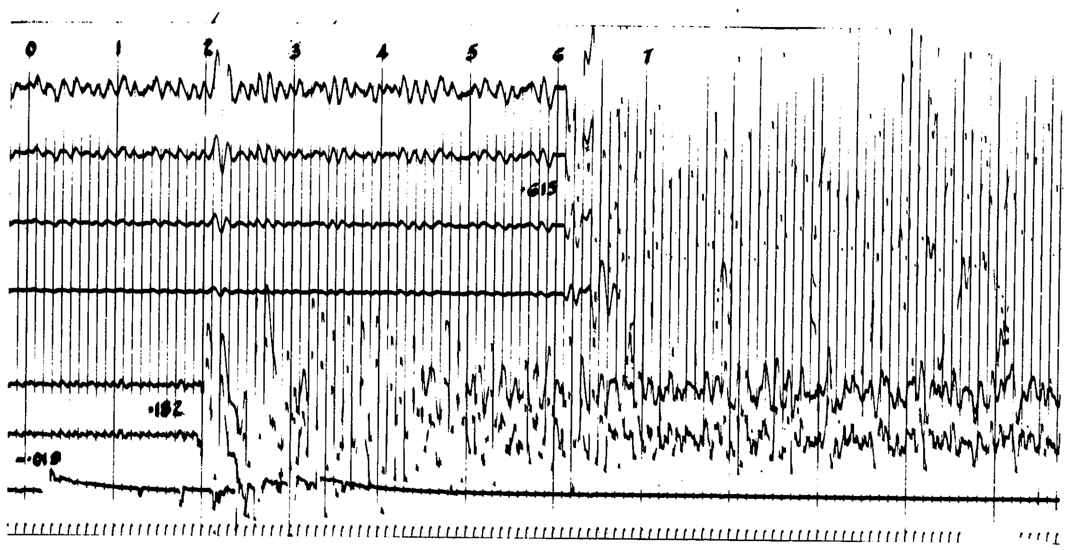
SHOT 5
OFFSET 1000' N.E.
DEPTH OF GEOPHONE 7450'
18:00   27·1·66



SHOT 6
OFFSET 1000' N.E.
DEPTH OF GEOPHONE 6000'
18:25   27·1·66



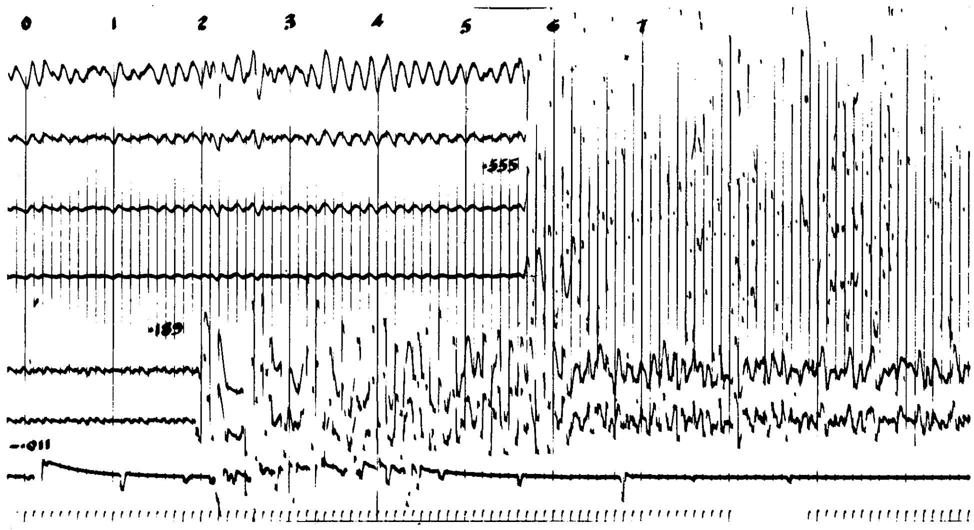
SHOT 7
OFFSET 1000' N.E.
DEPTH OF GEOPHONE 5112'
18:50   27·1·66



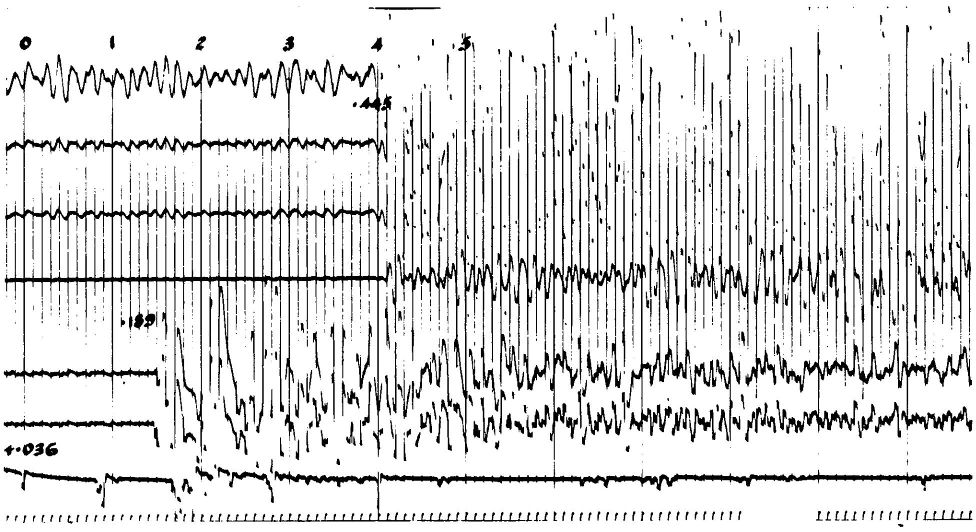
ESSO GIPPSLAND SHELF 4

WELL VELOCITY RECORDS

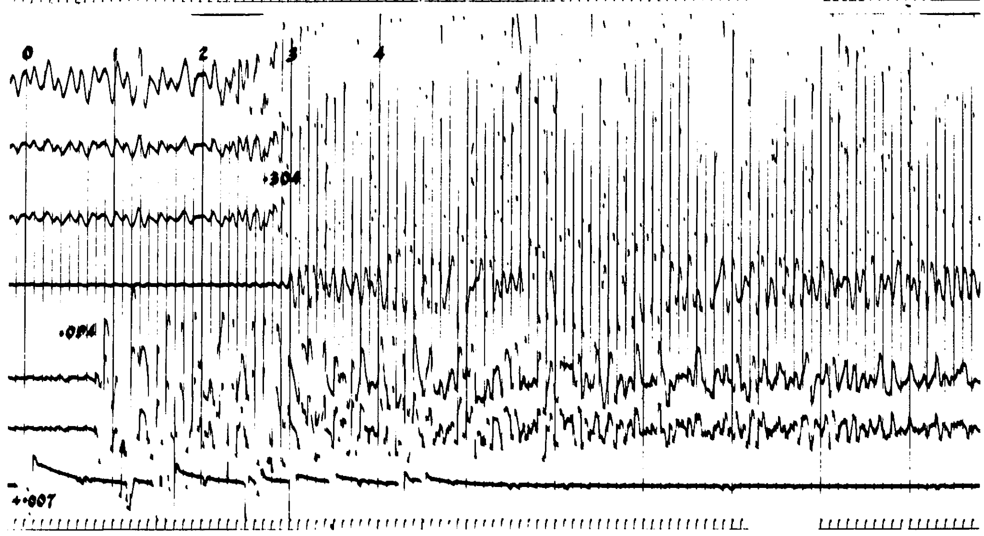
SHOT 8
OFFSET 1000' N.E.
DEPTH OF GEOPHONE 4522'
19:15 27·1·66



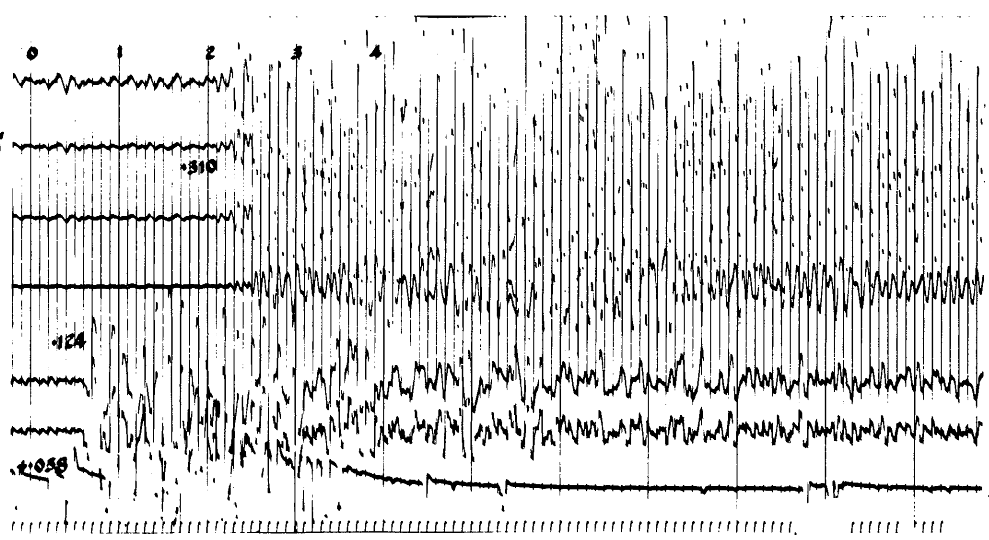
SHOT 9
OFFSET 1000' N.E.
DEPTH OF GEOPHONE 3500'
19:35 27·1·66



SHOT 10
OFFSET 500' N.E.
DEPTH OF GEOPHONE 2200'
19:50 27·1·66



SHOT 11
OFFSET 500' S.W.
DEPTH OF GEOPHONE 2200'
20:00 27·1·66



APPENDIX 7

FORMATION TEST RESULTS

Zone No. 1
Flow Summary (Best Periods)
Perforations 7514-74 & 7406-66
(4 shots per foot)
Packer Set at 7150 Feet

Date & Time	Flow (Hrs)	Separator Inlet Pressure (psig)	Choke (/64")	Orifice Plate (inches) 4.026" MR	Separator Temperature °F	Differential Inches W.C.	Static (psig)	Fluid (Meter) Bbls/ MMCF	Gravity @ 60° F	Sand	Water	Gas Rate MMCF/D
March 7-66												
1233-1445	2.2	1,280	44.5	3.0	80.4	35.2	911	38.7	(1)	(1)	(1)	10.928
1630-1830	2.0	1,910	34.5	3.0	70	19.9	910	40.5	61	Trace	0	8.334
2135-2245	1.167	2,122	21	2.0	49.7	67.6	938	(2) 54.6	60	Trace	0	6.191
March 8												
0030-0145	1.25	2,320	22.5(3)	2.0	35.3	23.7	916	35.0	63	Trace	0	3.710

Notes: (1) Improper sampling

(2) Probably in error (gauged tank volume within 9.7% of total metered fluid)

(3) ½" choke on flare line to control back pressure valve.

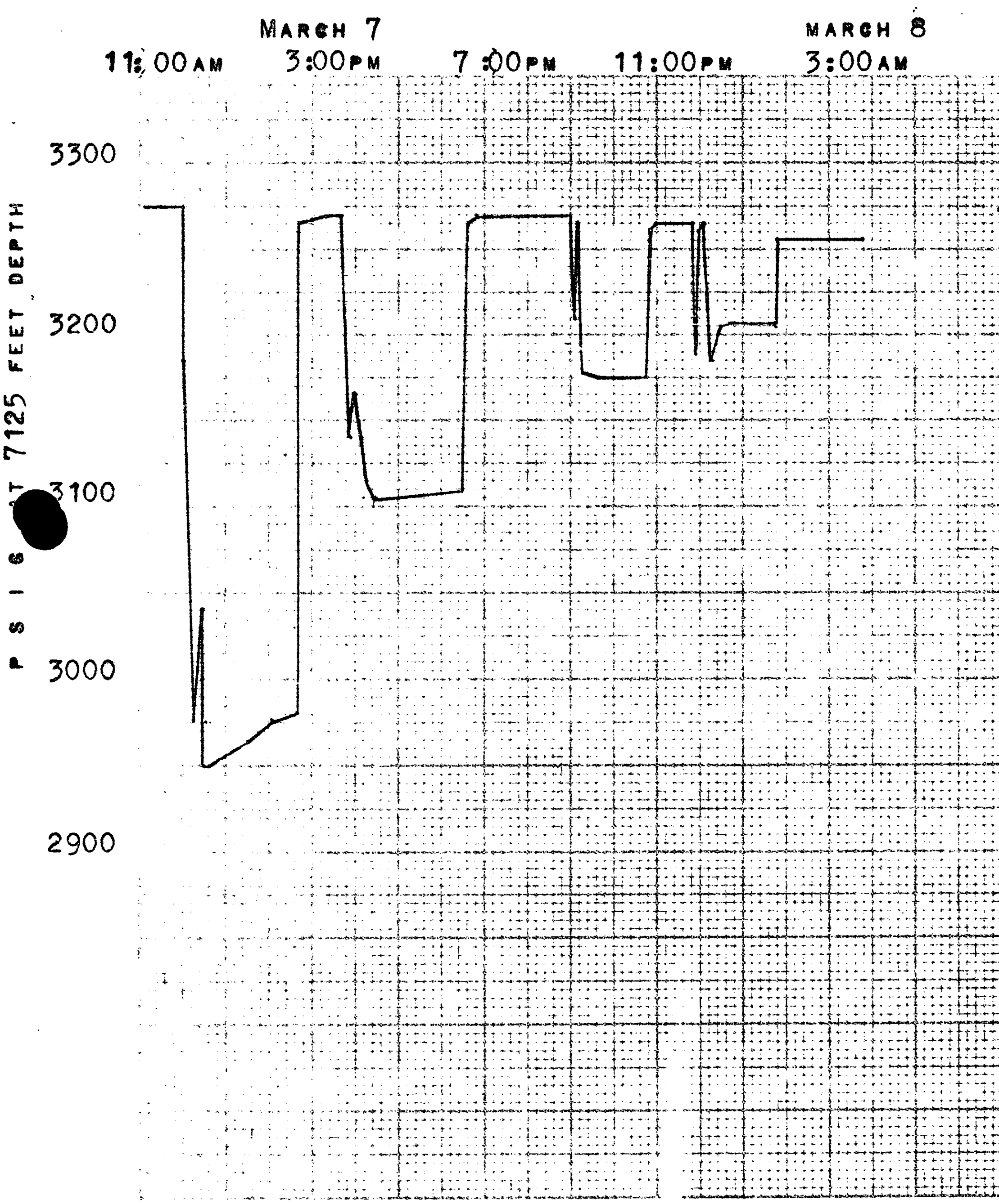
SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW
P.O. BOX 384
DALBY, QUEENSLAND

PHONE DALBY 1022

OWNER ESSO EXPLORATION FIELD GIPPSLAND SHELF WELL NAME E.G.S. No. 4
CASING 9-5/8" C 6284' ELEV. 31' K.B. DATE MARCH 7 & 8, 1966
LINER DESCRIPTION 5½" TOP AT 5733'. ZERO POINT KELLY BUSHING
PERFORATED 7406'-7466' & 7514-7574'. DEPTH 8354' EFFECTIVE
TUBING DETAIL 2-7/8" ON 5½" MODEL "D" PRODUCTION PACKER ZONE
SET AT 7150'.

PURPOSE PERIOD SURVEY DURING 4 POINT POTENTIAL TEST. STABILIZATION PERIOD
REMARKS ON BOTTOM AT 7125' 11:10 AM MARCH 7, 1966. GROSS FLUID RATE B/D
PICK UP @ NONE MAXIMUM TEMPERATURE 210 °F @ 7125' NET OIL RATE B/D
ELEMENT 8000 PSI SERIAL NO. 3969-N FORMATION GAS MCF/D
GAS OIL RATIO CFT/BBL
CIRCULATED GAS MCF/D
OIL GRAVITY °API
BEAN SIZE
CASING PRESSURE PACKER
TUBING PRESSURE 2495 PSIG

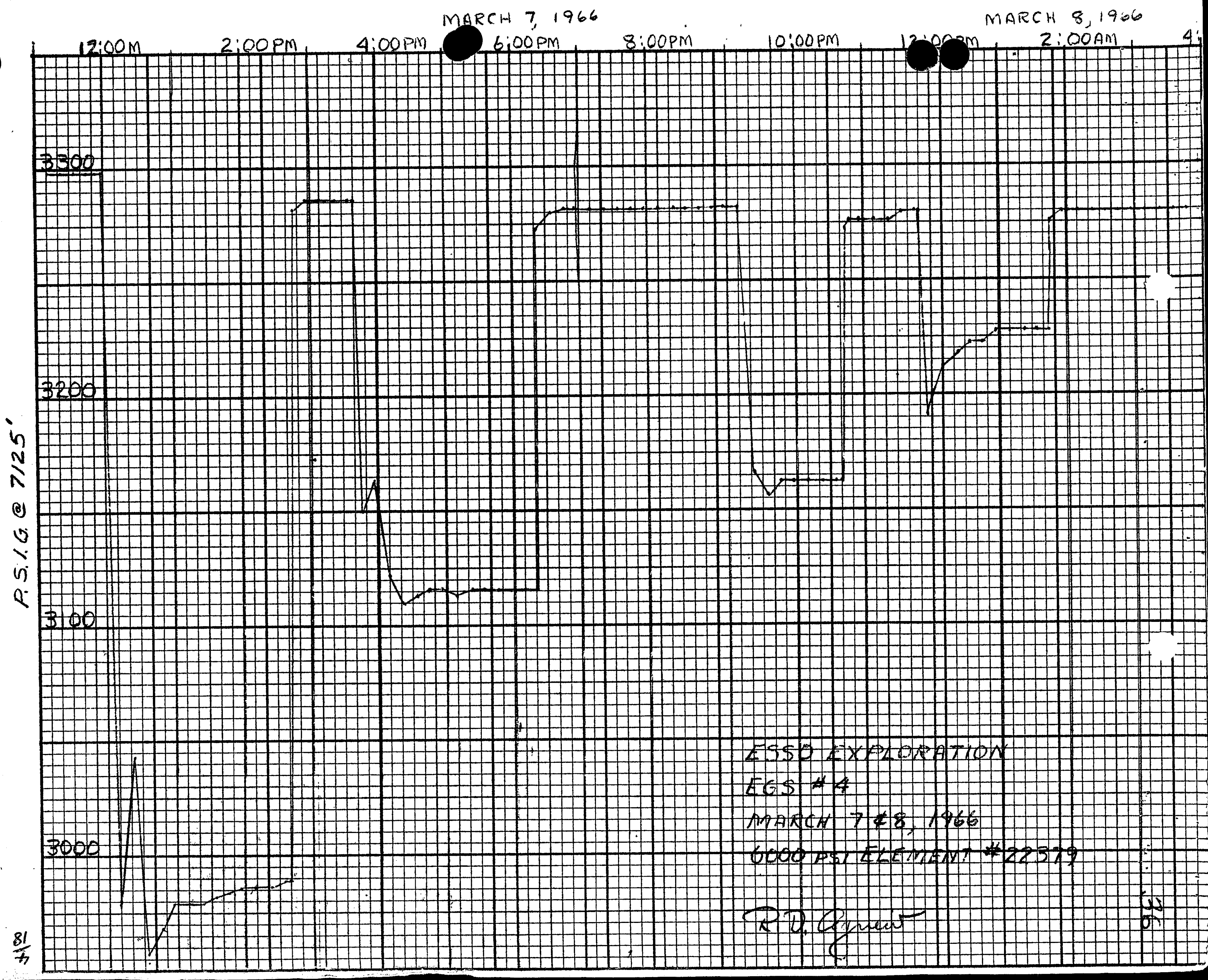


TIME	PSIG	TIME	PSIG
11:10A	3275	6:30P	3109
11:30A	3275	6:36P	3265
12:00M	3275	9:00P	3269
12:01P	3185	9:06P	3210
12:17P	2977	9:10P	3265
12:29P	3041	9:12P	3265
12:33P	2950	9:14P	3177
12:40P	2950	9:40P	3150
12:56P	2960	10:45P	3150
1:30P	2964	10:50P	3261
2:02P	2977	11:50P	3265
2:40P	2981	11:55P	3189
2:46P	3265	11:59P	3261
3:16P	3269	12:05A	3265
3:40P	3269	12:18A	3185
3:52P	3135	12:32A	3205
4:00P	3165	1:45A	3212
4:18P	3115	1:48A	3261
4:28P	3105	3:47A	3261

OFF BOTTOM 3:47AM MAR 8

BY: ROBERT D. AGNEW

3/8



MARCH 7, 1966
MARCH 8, 1966
12:00M
2:00PM
4:00PM
6:00PM
8:00PM
10:00PM
2:00AM
3300
3200
3100
3000
P.S.I.G @ 7125'
ESSO EXPLORATION
EGS #4
MARCH 7 & 8, 1966
6000 PSI ELEMENT #22579

Zone No. 2
Flow Summary
Perforations 5122-5137' G.R.
(2 shots per foot)
Packer Set at 5089 Feet

Date & Time	Flow Hours	Separator Inlet Pressure (psig)	Choke @ C.B. Head	Choke @ Sep. (1)	Sep. Pressure (psig)	Sep. Temp. °F	Production Rate Bbl/day Meter	° API	% BS & W	Ratio CF/Bbl
14 March, 1966 1350-1505 Clean Up	1.9	700-800	3/8	59/64	200	80	935	52.8	Trace	1280
14 March, 1966 1800-2300	5	947	½	58/64	110	70	732 (2)	52.0	Trace	1018
15 March, 1966 1030-1330	3	900	Open	58/64	150-190	85	1182 (3)	51.5	Trace	907

(1) Adjustable choke at Sep. Reading probably not accurate

(2) Tank gauge indicated 15% higher production rate.

(3) Tank gauge indicated 6% higher production rate.

Note: Adjustable choke not operating properly.
Effective choke probably considerably less than that shown.

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW

P.O. BOX 384
DALBY, QUEENSLAND

PHONE DALBY 1022

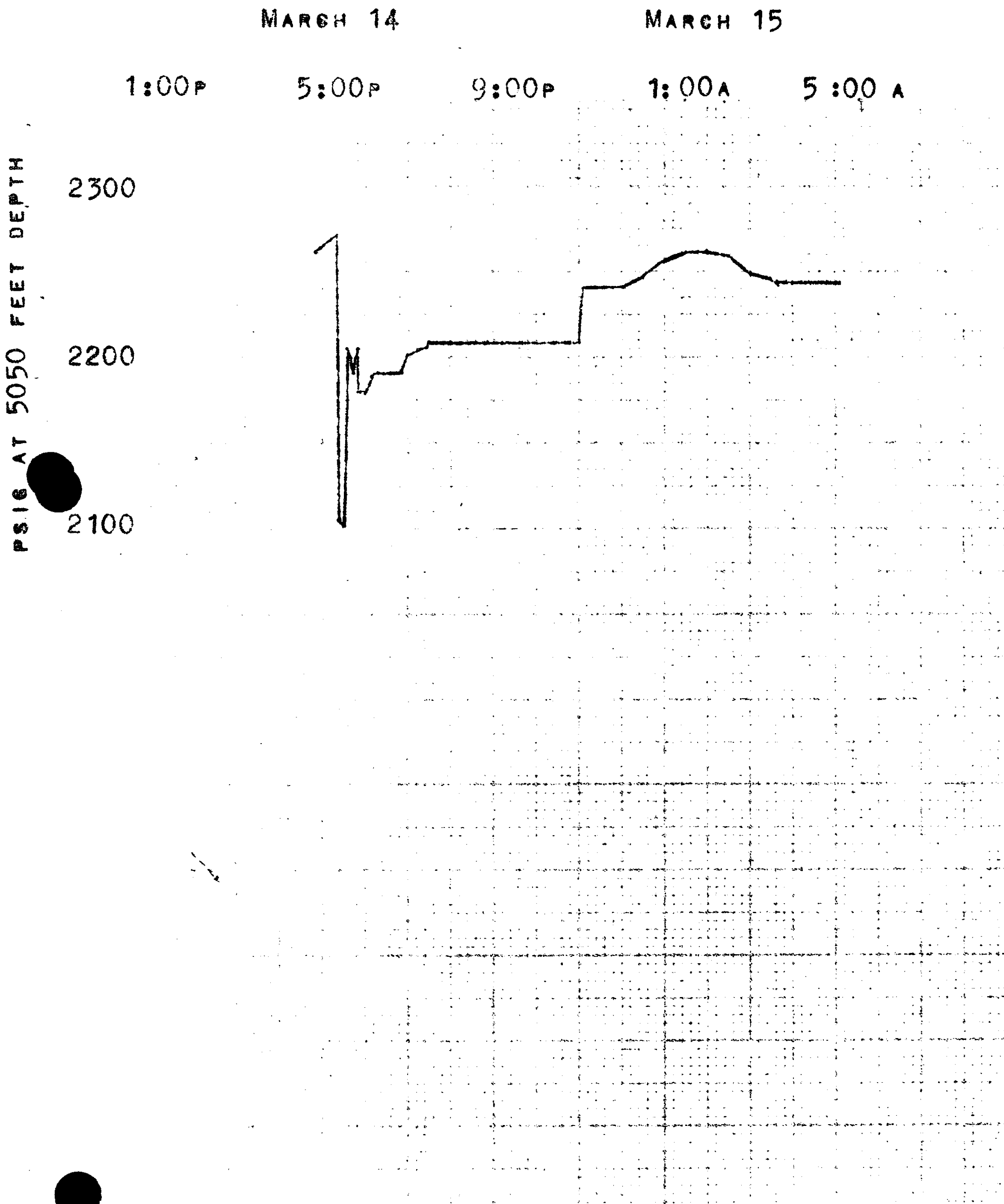
OWNER Esso Exploration
CASING 9-5/8" C 6284'.
LINER DESCRIPTION
RFORATED 5122'-5137'.
BING DETAIL 2-7/8" ON 9-5/8" MODEL "D" PRODUCTION PACKER SET AT 5089'.

FIELD GIPPSLAND SHELF
ELEV. 31' K.B.

WELL NAME E.G.S. No. 4
DATE MARCH 14 & 15, 1966
ZERO POINT KELLY BUSHING
DEPTH 7150' EFFECTIVE
ZONE

PURPOSE PERIOD FLOWING & STATIC SURVEY DURING TESTING.
REMARKS
PICK UP @ NONE MAXIMUM TEMPERATURE 178 °F @ 5050'
ELEMENT 3000 PSI SERIAL NO. 5588-N

STABILIZATION PERIOD
GROSS FLUID RATE B/D 732
NET OIL RATE B/D 732
FORMATION GAS MCF/D 748
GAS OIL RATIO CFT/BBL 1020
CIRCULATED GAS MCF/D X
OIL GRAVITY °API 52.6
BEAN SIZE -0-
CASING PRESSURE PACKER
TUBING PRESSURE



TIME	PSIG	TIME	PSIG
4:50P	2261	7:30P	2208
5:20P	2272	11:00P	2208
5:25P	2104	11:05P	2240
5:30P	2101	12:04A	2241
5:35P	2205	12:30A	2247
5:40P	2205	1:00A	2257
5:45P	2191	1:30A	2261
5:50P	2205	2:00A	2261
5:55P	2179	3:00A	2249
6:00P	2179	3:30A	2246
6:10P	2188	3:42A	2243
6:20P	2191	4:00A	2243
6:52P	2191	5:05A	2243
7:00P	2202		
7:26P	2206		

ON BOTTOM 4:50 PM MAR 14
OFF BOTTOM 5:05A MAR 15

INSTRUMENT HUNG 5050'.

BY: ROBERT D. AGNEW

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW

P.O. BOX 384
DALBY, QUEENSLAND

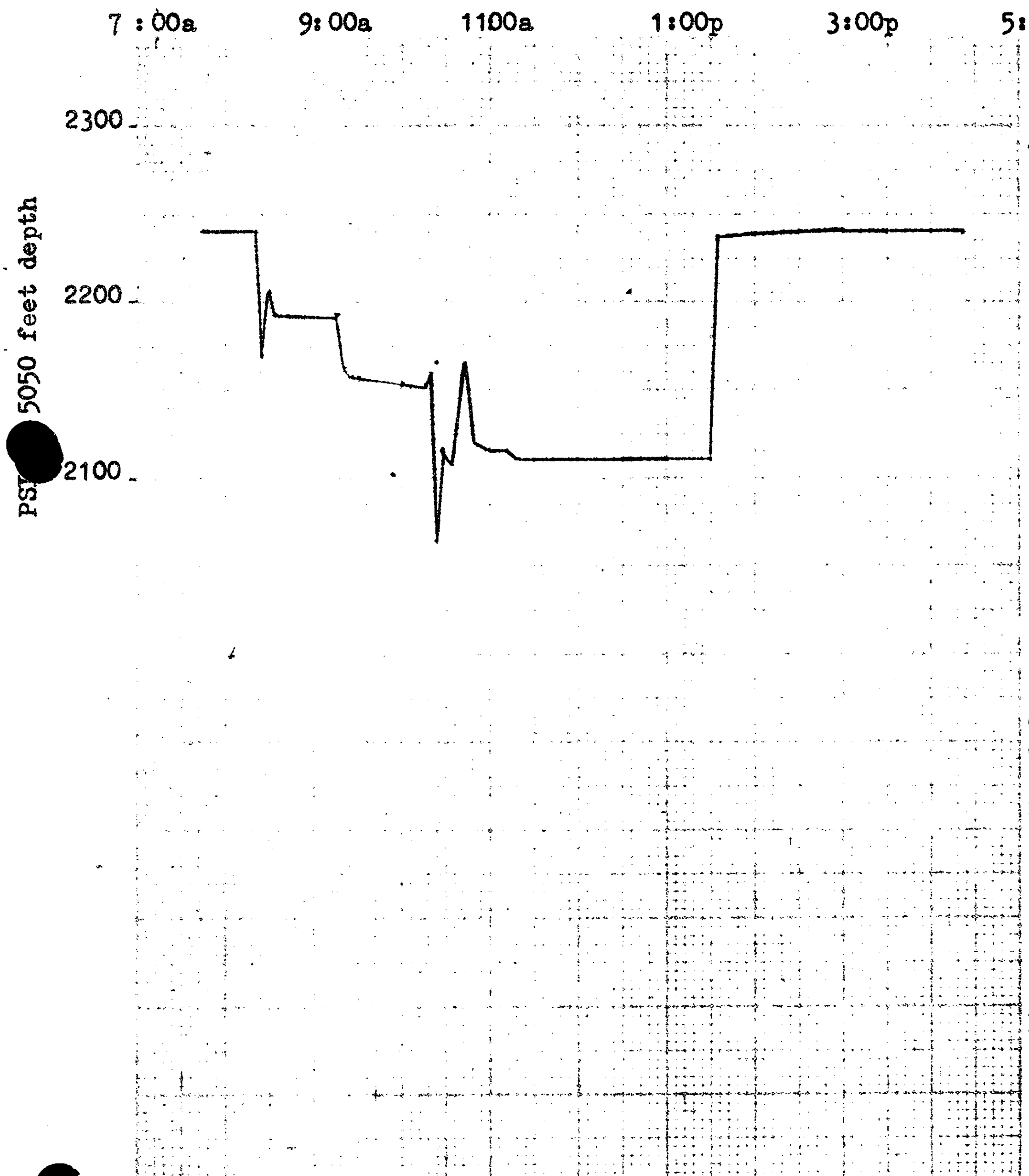
PHONE DALBY 1022

OWNER Esso Exploration FIELD Gippsland Shelf WELL NAME E.G.S. No. 4
CASING 9-5/8" C 6284'. ELEV. 31' K.B. DATE March 15, 1966
LINER DESCRIPTION ZERO POINT Kelly Bushing
ERFORATED 5122'-5137'. DEPTH 7150' effective
BING DETAIL 2-7/8" on 9-5/8" production packer set @ 5089'. ZONE

PURPOSE Period Flowing and Static Buildup Survey (Testing)
REMARKS
PICK UP @ None MAXIMUM TEMPERATURE 177 °F @ 5050'
ELEMENT 3000 psi SERIAL NO. 5588-N

STABILIZATION PERIOD	x
GROSS FLUID RATE B/D	1182
NET OIL RATE B/D	1182
FORMATION GAS MCF/D	1070
GAS OIL RATIO CFT/BBL	907
CIRCULATED GAS MCF/D	x
OIL GRAVITY °API	50
BEAN SIZE	-0-
CASING PRESSURE	packer
TUBING PRESSURE	900

March 15, 1966



Time	PSIG	Time	PSIG
7:45a	2241	11:00a	2116
8:21a	2240	11:12a	2116
8:25a	2169	11:20a	2111
8:30a	2205	11:30a	2111
8:35a	2194	12:00m	2111
9:15a	2192	12:30p	2111
9:20a	2162	1:00p	2111
9:25a	2157	1:30p	2111
9:30a	2157	1:35p	2237
10:00a	2153	1:40p	2237
10:16a	2151	1:50p	2237
10:19a	2159	2:00p	2238
10:24a	2065	2:30p	2240
10:28a	2116	3:00pm	2241
10:35a	2108	3:30p	2241
10:43a	2165	4:00p	2241
10:50a	2120	4:20p	2241

on bottom 7:45am March 15
off bottom 4:20pm March 15

instrument hung @ 5050'.

By: Robert D. Agnew

Zone No. 3
Flow Summary
Perforations 5069-77
(2 shots per foot)
Packer Set at 4930 Feet

March 20, 1966.

Time	Hours	Sep Temp. °F	Sq. Rt. Chart	Diff Inches W.C.	Static (psig)	Static DWT (psig)	Sep. Press (psig)	Sep. Inlet (psig)	Meter Liquid (Bbls)	Wellhead Press (psig)	Wellhead Temp. °F	Tank Bbls	Gravity ° API Corr@60°	Percent Water	Percent Clay	Percent Sand	Gas MMCF/D	Cond. Bbl/MMCF (Meter)
04:00-10:15	6.083	64.8	5.37	28.8	614	605	610	633	12.60	684	57	13.05	76.8	0	0.1	0	1.93	25.7
08:30-10:15	1.58	65.3	5.63	31.7	555	550	548	597	2.65	596	57	4.5	76.3	0	0.3	0	1.93	20.8

Notes: (1) Gas volume based on .65 specific gravity.

(2) Total fluid metered from 02:20 - 10:15 - 17.23 bbls, tank volume for same period 17.35 bbls - use metered volume for long test.

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW
P.O. BOX 384
DALBY, QUEENSLAND

PHONE DALBY 1022

III-15

OWNER Esso Exploration
CASING 9-5/8" C 6284'
LINER DESCRIPTION
PERFORATED 5069'-5077'
TUBING DETAIL 2-7/8" on model "D" production packer set @ 4930'.

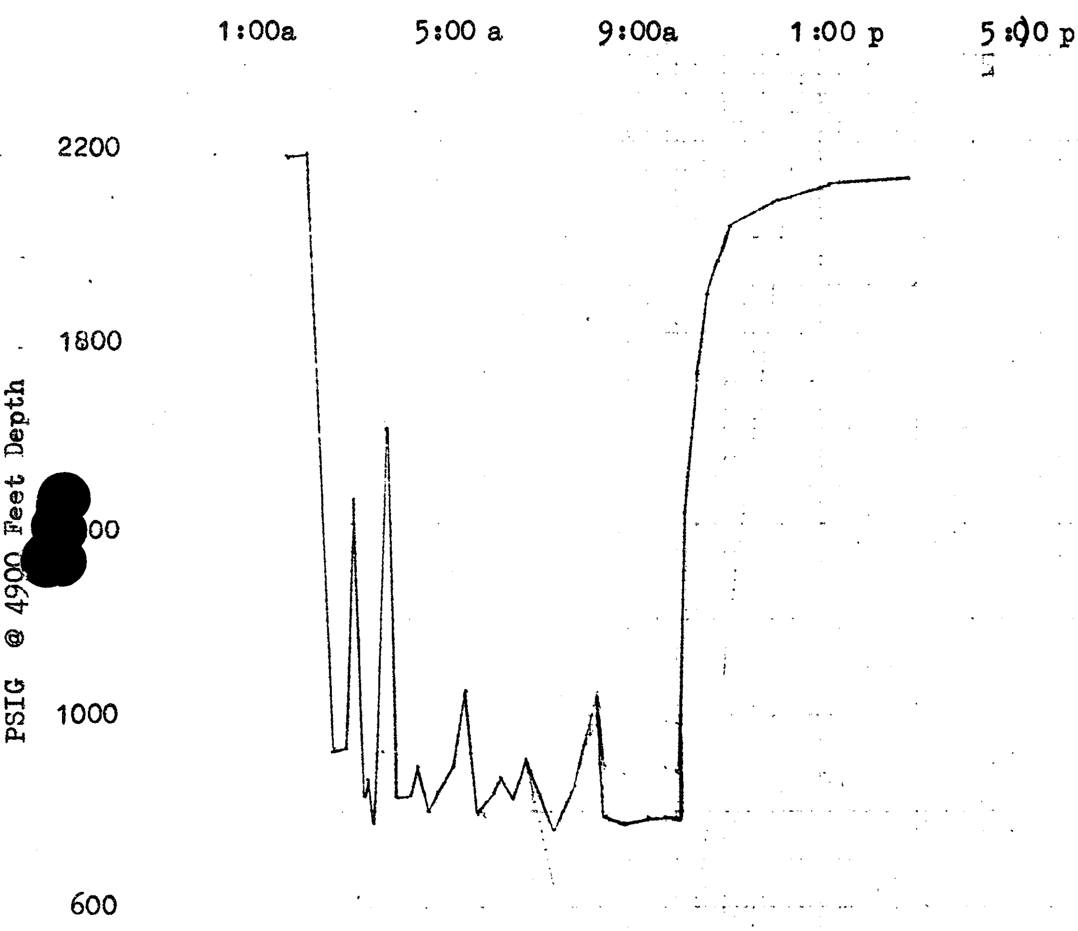
FIELD Gippsland Shelf
ELEV. 31' K.B.

WELL NAME E.G.S. No. 4
DATE March 20, 1966
ZERO POINT Kelly Bushing
DEPTH 5089' Effective
ZONE

PURPOSE Period Flowing & Static Buildup Survey, (Testing)
REMARKS
PICK UP @ none MAXIMUM TEMPERATURE 164 °F @ 4900'
ELEMENT 3000 psi SERIAL NO. 5588-N

STABILIZATION PERIOD
GROSS FLUID RATE B/D
NET OIL RATE B/D
FORMATION GAS MCF/D 1,800 APPX
GAS OIL RATIO CFT/BBL
CIRCULATED GAS MCF/D
OIL GRAVITY °API
BEAN SIZE
CASING PRESSURE packer
TUBING PRESSURE

MARCH 20, 1966



On bottom 1:50 am Mar 20, 66

Time	PSIG	Time	PSIG
1:50a	2172	6:35a	827
2:15a	2177	6:52a	909
2:53a	925	7:25a	763
3:05a	932	7:54a	854
3:15a	1454	8:20a	1049
3:30a	822	8:32a	792
3:35a	865	8:58a	778
3:42a	787	9:25a	793
3:56a	1600	9:47a	787
4:08a	833	10:05a	781
4:27a	834	10:13a	1422
4:36a	897	10:25a	1717
4:52a	801	10:38a	1881
5:22a	898	10:50a	1948
5:36a	1052	11:06a	2023
5:51a	798	12:08p	2079
6:11a	839	1:11p	2110
6:20a	872	2:50p	2124

Note: Attempted to come off bottom @ 1:20pm but bombs were siezed by tubing in compression. Fluid was pumped into tubing @ 2:50pm stopping buildup.

By: Robert D. Agnew

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW

P.O. BOX 384
DALBY, QUEENSLAND

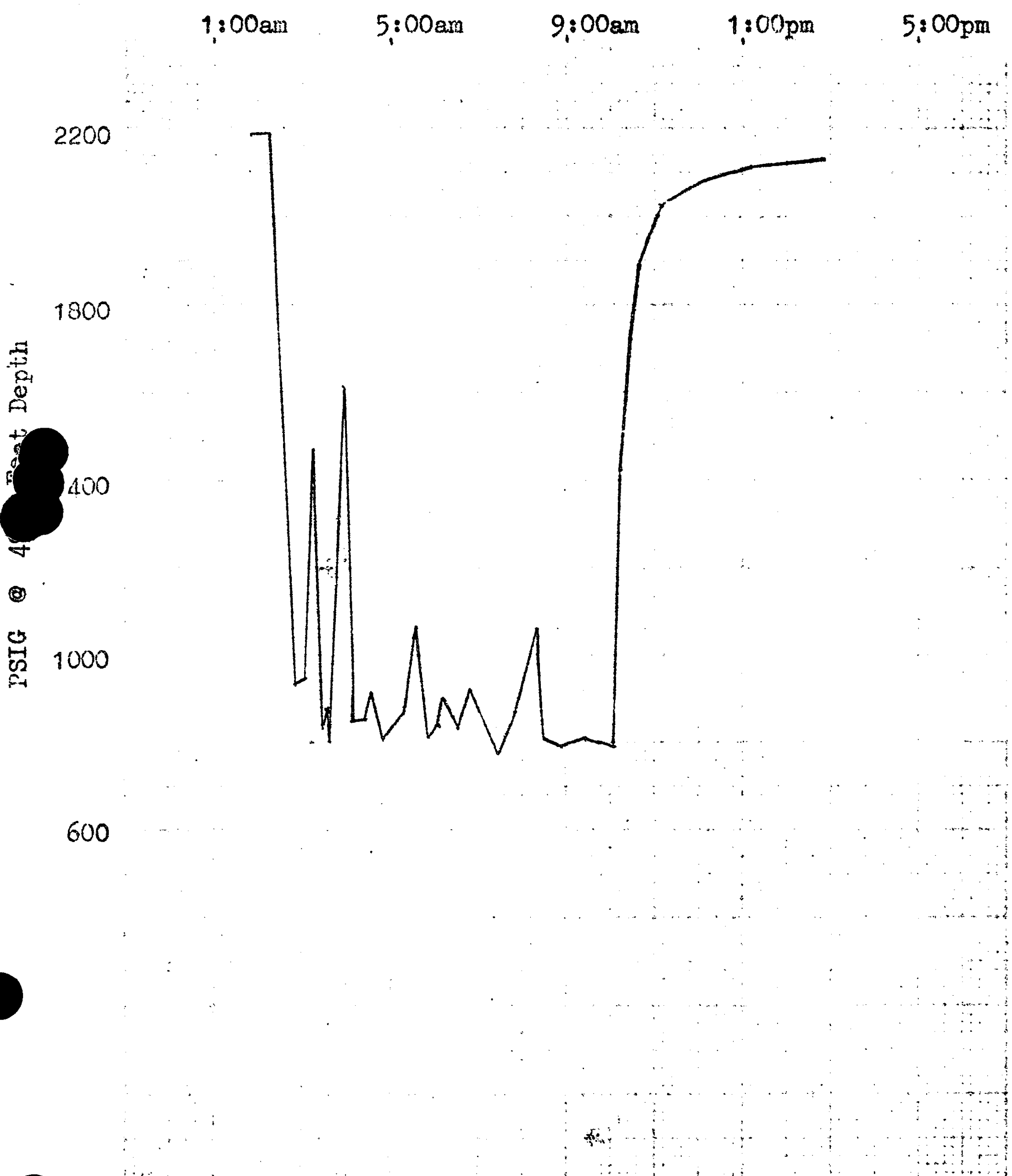
PHONE DALBY 1022

OWNER Esso Exploration
FIELD Gippsland Shelf
WELL NAME E.G.S. No. 4
CASING 9-5/8" C 6284'.
ELEV. 31' K. B.
DATE March 20, 1966
LINER DESCRIPTION
ZERO POINT Kelly Bushing
PERFORATED 5069'-5077'.
DEPTH 5089' Effective
TUBING DETAIL 2-7/8" on Model "D" Production Packer set @ 4930'.
ZONE

PURPOSE Period Flowing & Static Buildup Survey (Testing)
REMARKS
PICK UP @ none
MAXIMUM TEMPERATURE 164 °F @ 4900'
ELEMENT 6000 psi
SERIAL NO. 22379-N

STABILIZATION PERIOD
GROSS FLUID RATE B/D
NET OIL RATE B/D
FORMATION GAS MCF/D 1,800 approx
GAS OIL RATIO CFT/BBL
CIRCULATED GAS MCF/D
OIL GRAVITY °API
BEAN SIZE
CASING PRESSURE Packer
TUBING PRESSURE

MARCH 20, 1966



On bottom 1:50 am Mar. 20

Time	PSIG	Time	PSIG
1:50a	2182	6:35a	837
2:15a	2187	6:52a	920
2:53a	936	7:25a	775
3:05a	945	7:54a	865
3:15a	1469	8:20a	1060
3:30a	833	8:32a	805
3:35a	877	8:58a	790
3:42a	800	9:25a	805
3:56a	1610	9:47a	800
4:08a	846	10:05a	790
4:27a	848	10:13a	1426
4:36a	909	10:25a	1720
4:52a	811	10:38a	1890
5:22a	973	10:50a	1950
5:36a	1065	11:06a	2025
5:51a	809	12:08p	2080
6:11a	849	1:11p	2110
6:20a	882	2:50p	2126

Note: Attempted to come off bottom @ 1:20pm. Wireline was siezed by tubing being in compression. Fluid was pumped into tubing @ 2:50pm stopping buildup.

By: Robert D. Agnew

Zone No. 4
Flow Summary
Perforations 4532-52
(2 shots per foot)
Packer Set at 4472 Feet

March 24, 1966.

Time	Sep. Temp	Differential		Static-psig		4.026" Meter Run Orifice	Sep. Press (psig)	Sep. Inlet Press (psig)	(1) Sep Choke (/64")	Fluid				Gravity API-60°	Wellhead		Gas MMCF/D	Condensate B/MMCF (Meter)
		Rdg	"WC	Chart	DWT					Meter Bbls	Tank Bbls	Sand %	Water %		Press (psig)	Temp °F		
0050-0250	62	3.02	9.12	506	498	3.0	507	587	42	10.13	14.1	Trace	0	72.2	713	60	4.65	26.2
0140-0250	63.5	3.03	9.18	476	473	3.0	474	559	42	5.17		Trace	0	71.8	675	60.2	4.38	24.3
0800-1015	36.3	4.61	21.25	500	499	2.0	501	664	(2) 58.8	12.04	-	Trace	0	76.5	1608	63	2.75	46.5
0915-1015	33.3	4.26	18.15	494	492	2.0	496	628	58.8	4.43		0	0	77.6	1634	64	2.5	41.5
1115-1325	48.1	6.38	40.6	464.4	473	2.0	474	868	59	16.40	15.72	Trace	0	75.0	903	66.8	3.6	50.5
1200-1325	49.4	6.66	44.3	467	470	2.0	472	900	59	10.67		Trace	0	75.0	930	66.5	3.8	47.5
1505-1620	43	3.34	11.15	570	582?	2.5	570	1331	58	9.24	10.34	0	0	76.5	1363	63.6	3.31	53.5

Remarks: (1) Choke not working properly during test
(2) Had well on 3/8" choke at "CB" - did not discover till end of test.

IV-18

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW

P.O. BOX 384
DALBY, QUEENSLAND

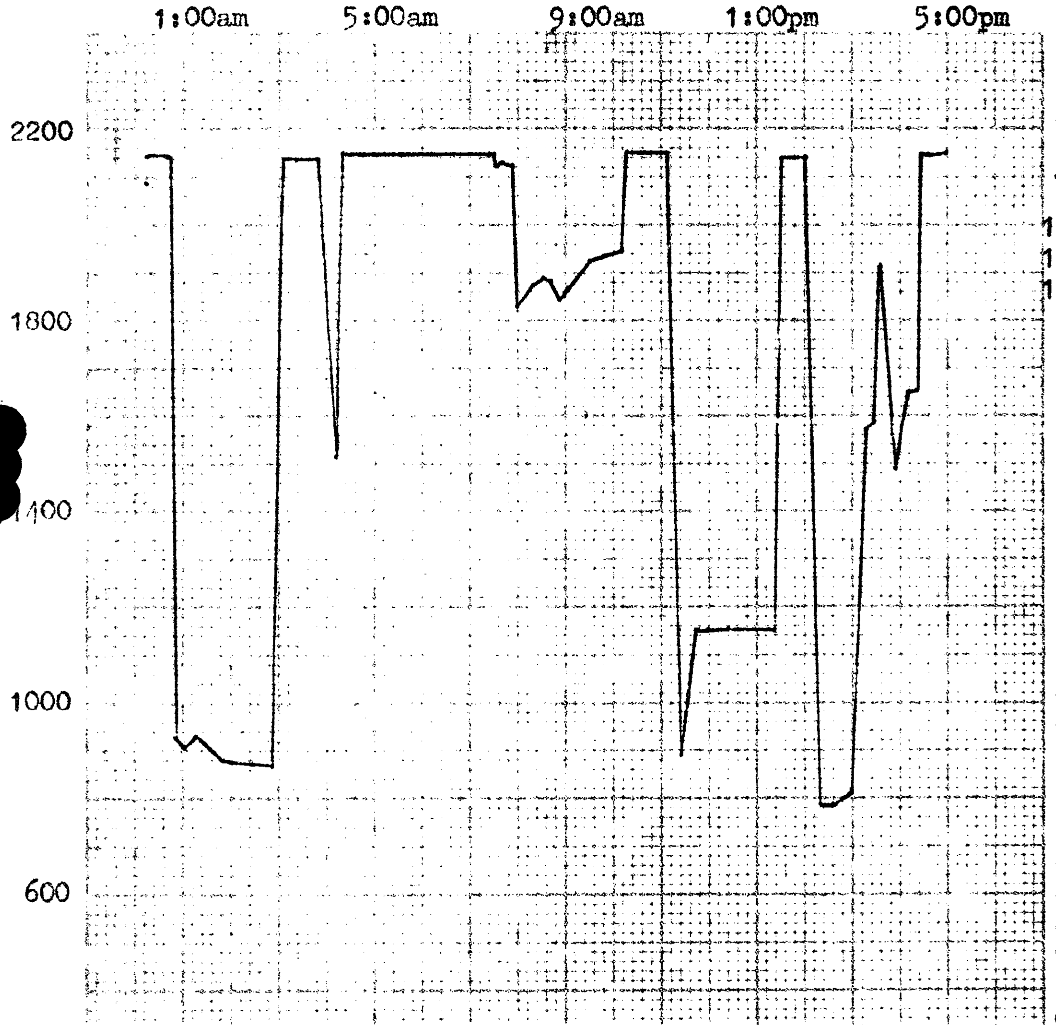
PHONE DALBY 1022

OWNER Esso Exploration FIELD Gippsland Shelf WELL NAME E.G.S. No. 4
CASING 9-5/8" C 6284'. ELEV. 31' K.B. DATE March 22 & 23, 1966
LINER DESCRIPTION ZERO POINT Kelly Bushing
PERFORATED 4532'-4552'. DEPTH 4930' Effective
TUBING DETAIL 2-7/8" on Model "D" Production Packer set @ 4472'. ZONE

PURPOSE Period Flowing & Static Buildup Survey, (Testing).
REMARKS
PICK UP @ None MAXIMUM TEMPERATURE 146 °F @ 3500'
ELEMENT 3000 psi SERIAL NO. 5588-N

STABILIZATION PERIOD
GROSS FLUID RATE B/D
NET OIL RATE B/D
FORMATION GAS MCF/D
GAS OIL RATIO CFT/BBL
CIRCULATED GAS MCF/D
OIL GRAVITY °API
BEAN SIZE
CASING PRESSURE
TUBING PRESSURE

MARCH 23, 1966



On bottom 12:15am Mar. 23

Time	PSIG	Time	PSIG
12:15a	2145	9:29a	1925
12:41a	2145	10:11a	1945
12:52a	927	10:17a	2153
1:01a	909	11:07a	2150
1:15a	933	11:24a	890
1:50a	880	11:45a	1152
2:00a	878	11:59a	1155
2:27a	872	12:24p	1156
2:53a	869	12:53p	1156
3:05a	2139	1:22p	1155
3:19a	2136	1:34p	2140
3:49a	2139	2:01p	2140
4:11a	1518	2:19p	789
4:19a	2148	2:36p	789
7:27a	2148	2:59p	816
7:31a	2124	3:17p	1574
7:39a	2130	3:28p	1588
7:53a	2124	3:35p	1915
7:59a	1828	3:55p	1488
8:17a	1878	4:12p	1653
8:33a	1890	4:22p	1658
8:43a	1881	4:28p	2146
8:54a	1846	5:00p	2148
9:04a	1872		

Off bottom 5:00pm Mar. 23

Note: Instruments were hung @ 3500' because at below this depth tools could not be readily pulled without taking tension on tubing string. Safety and weather conditions prompted this decision.

By: Robert D. Agnew

80/8

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW
P.O. BOX 384
DALBY, QUEENSLAND

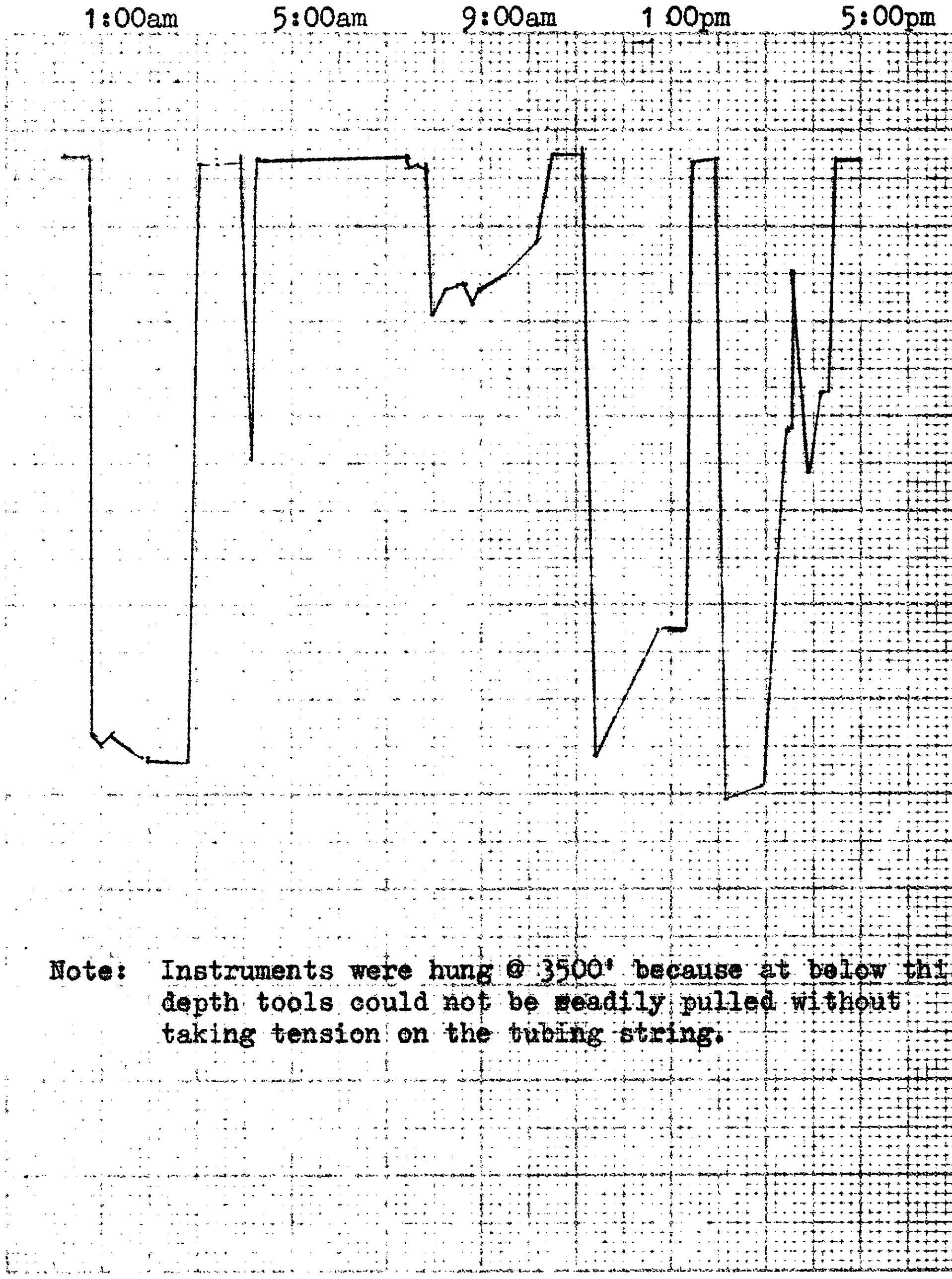
PHONE DALBY 1022

OWNER Esso Exploration
FIELD Gippsland Shelf
WELL NAME E.G.S. No. 4
CASING 9-5/8" C 6284'.
ELEV. 31' K. B.
DATE March 22 & 23, 1966
LINER DESCRIPTION
ZERO POINT Kelly Bushing
PERFORATED 4532'-4552'.
DEPTH 4930' Effective
TUBING DETAIL 2-7/8" on Model "D" Production Packer set @ 4472'.
ZONE

PURPOSE Period Flowing & Static Buildup Survey, (Testing)
REMARKS
PICK UP @ None
MAXIMUM TEMPERATURE 146 °F @ 3500'
ELEMENT 6000 psi
SERIAL NO. 22379-N

STABILIZATION PERIOD
GROSS FLUID RATE B/D
NET OIL RATE B/D
FORMATION GAS MCF/D
GAS OIL RATIO CFT/BBL
CIRCULATED GAS MCF/D
OIL GRAVITY °API
BEAN SIZE
CASING PRESSURE
TUBING PRESSURE

MARCH 23, 1966



On Bottom 12:15am Mar. 23

Time	PSIG	Time	PSIG
12:15a	2143	9:29a	1900
12:41a	2143	10:11a	1964
12:53a	925	10:17a	2148
1:01a	905	11:07a	2145
1:15a	930	11:24a	885
1:50a	880	11:45a	1150
2:00a	875	11:59a	1155
2:27a	870	12:24p	1155
2:53a	870	12:53p	1155
3:05a	2130	1:22p	1155
3:19a	2130	1:34p	2137
3:49a	2135	2:01p	2140
4:11a	1510	2:10p	785
4:19a	2140	2:36p	785
7:27a	2143	2:59p	819
7:31a	2124	3:17p	1570
7:39a	2127	3:28p	1580
7:53a	2118	3:35p	1905
7:59a	1816	3:55p	1480
8:17a	1870	4:12p	1650
8:33a	1875	4:22p	1655
8:43a	1880	4:28p	2140
8:54a	1840	5:00p	2140
9:00a	1870		

Off bottom 5:00pm Mar. 23

Note: Instruments were hung @ 3500' because at below this depth tools could not be readily pulled without taking tension on the tubing string.

By: Robert D. Agnew

Zone No. 4
Flow Summary
Perforations 4532-52 Ft.
(4 shots per foot)
Packer Set at 4472 Feet

March 24, 1966

Time	Sep. Temp. °F	Differential		Static-psig		4.026" Meter Orifice Plate	Sep. Press (psig)	Sep. Inlet Press (psig)	Sep. Choke (/64")	Fluid-U.S.Bbls		Percent		Gravity °API-Corr	Wellhead		Gas MMCF/D	Condensate Bbls/MMCF (Meter)
		Rdg	"WC	Chart	DWT					Meter	Tank	Sand	Water		Press (psig)	Temp ° F		
1645-1750	58.4	5.41	29.3"	574	583	2.5"	581	733	64	11.7	7.5	-	-	74	944	60	5.5	47.2
1800-1900	54.9	7.69	59.0"	659	663	2.5"	661	955	64	19.9	21.6	-	-	74	1275		8.3	57.6

Remarks: (1) At 1755 the wellhead pressure & flow increased without any surface changes - See flowing gradient.

(2) Well shut in at 1900 due to gas leak in tubing above rams.

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW

P.O. BOX 384
DALBY, QUEENSLAND

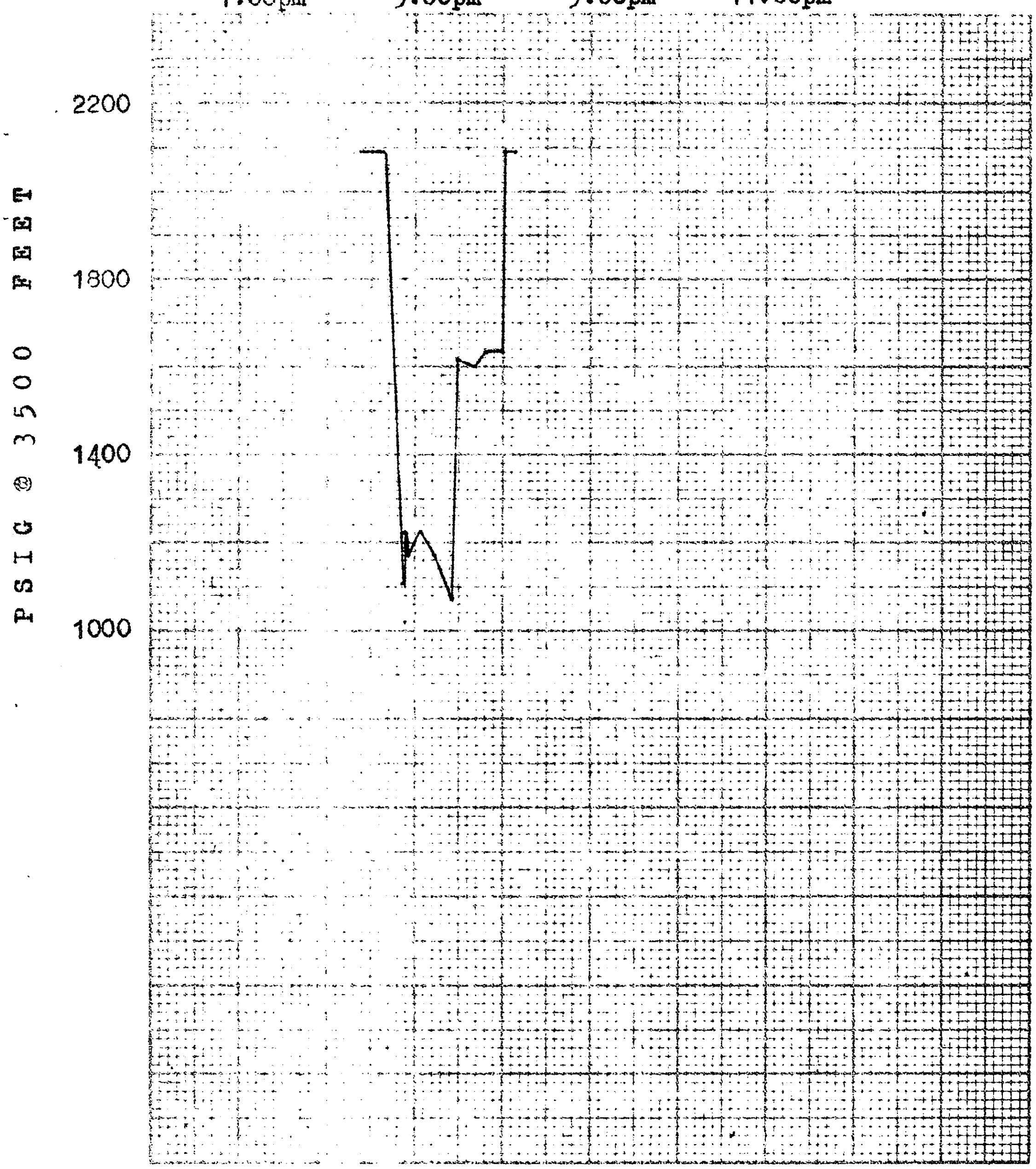
PHONE DALBY 1022

OWNER Esso Exploration
FIELD Gippsland Shelf
WELL NAME E.G.S. No. 4
CASING 9-5/8" C 6284'.
ELEV. 31' K.B.
DATE March 24, 1966
LINER DESCRIPTION
ZERO POINT Kelly Bushing
PERFORATED 4532'-4552'.
DEPTH 4930' Effective
TUBING DETAIL 2-7/8" on model "D" Production Packer set @ 4472'.
ZONE

PURPOSE Period Flowing & Static Buildup Survey, (Testing)
REMARKS
PICK UP @ None
MAXIMUM TEMPERATURE 147 °F @ 3500'
ELEMENT 3000 psi
SERIAL NO. 5588-N

STABILIZATION PERIOD
GROSS FLUID RATE B/D
NET OIL RATE B/D
FORMATION GAS MCF/D
GAS OIL RATIO CFT/BBL
CIRCULATED GAS MCF/D
OIL GRAVITY °API
BEAN SIZE
CASING PRESSURE
TUBING PRESSURE

MARCH 24, 1966



On Bottom 3:45 pm Mar 4

Time	PSIG
3:45p	2090
4:15p	2090
4:40p	1106
4:42p	1220
4:49p	1170
5:08p	1225
5:25p	1176
5:52p	1077
5:56p	1615
6:20p	1600
6:37p	1637
6:59p	1637
7:01p	2091
7:15p	2096

Off bottom 7:15pm Mar. 24

See V-21
Bomb probably had leaky [illegible]. [illegible]
6000 psi chart IV 4.

By: Robert D. Agnew

SERVICES
DYNAMOMETER
PRESSURE SURVEYS
TEMPERATURE SURVEYS
PIANO WIRE LINE SERVICE
SONOLOG WELL SOUNDING SERVICE

ROBERT D. AGNEW

P.O. BOX 384
DALBY, QUEENSLAND

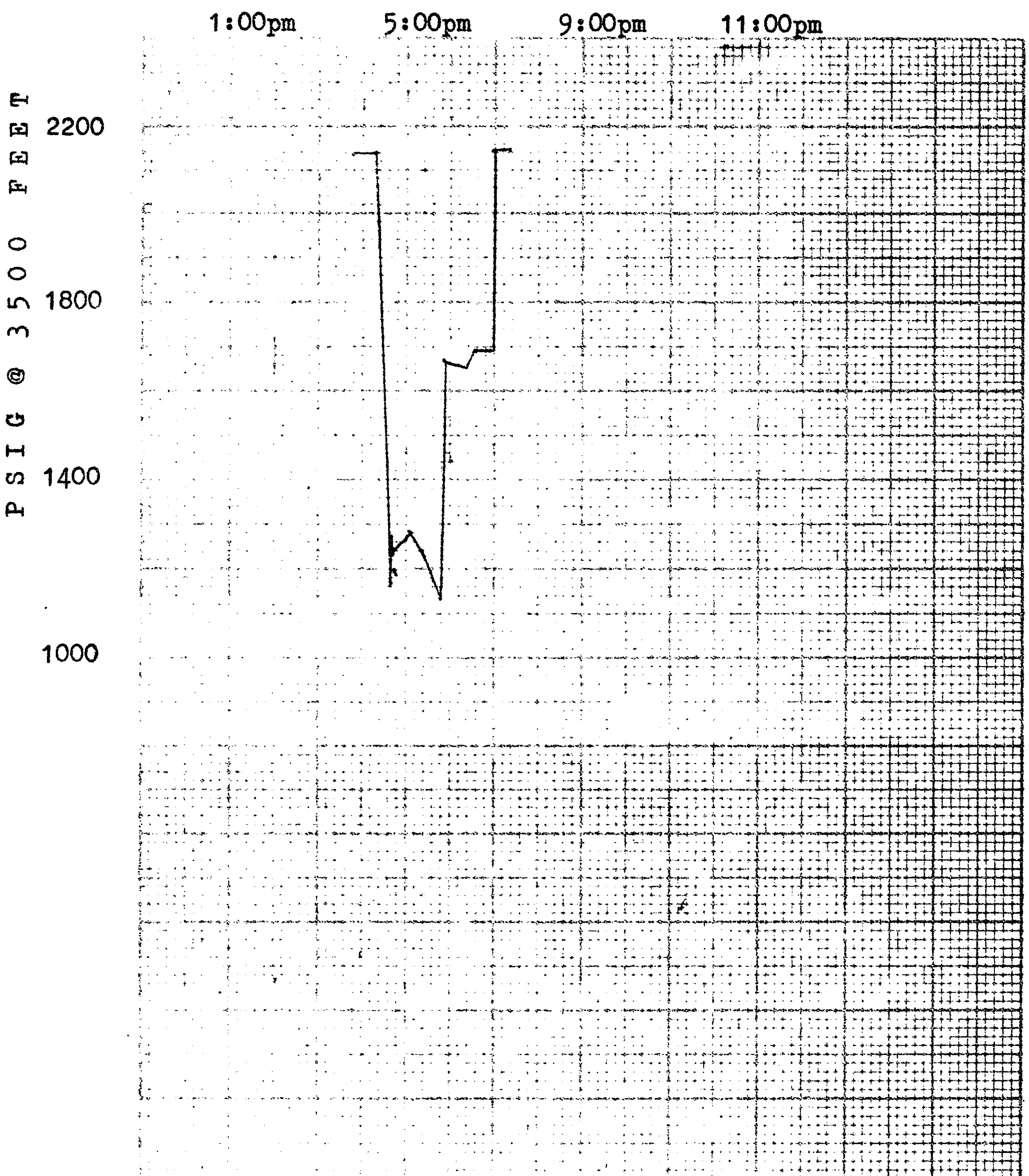
PHONE DALBY 1022

IV 4

OWNER	Esso Exploration	FIELD	Gippsland Shelf	WELL NAME	E.G.S. No. 4
CASING	9-5/8" C 6284'	ELEV.	31' K.B.	DATE	March 24, 1966
LINER DESCRIPTION				ZERO POINT	Kelly Bushing
PERFORATED	4532'-4552'.			DEPTH	4930' Effective
TUBING DETAIL	2-7/8" on Model "D" Production Packer set @4472'			ZONE	

PURPOSE	Period Flowing and Static Buildup Survey, (Testing)	STABILIZATION PERIOD	
REMARKS		GROSS FLUID RATE B/D	
PICK UP @	None — MAXIMUM TEMPERATURE 147 °F @ 3500'	NET OIL RATE B/D	
ELEMENT	6000 psi — SERIAL NO. 22379-N	FORMATION GAS MCF/D	
		GAS OIL RATIO CFT/BBL	
		CIRCULATED GAS MCF/D	
		OIL GRAVITY °API	
		BEAN SIZE	
		CASING PRESSURE	
		TUBING PRESSURE	

MARCH 24, 1966



On bottom 3:45pm Mar

Time	PSIG
3:45p	2139
4:15p	2139
4:40p	1168
4:42p	1279
4:49p	1232
5:08p	1280
5:25p	1240
5:52p	1137
5:56P	1668
6:20p	1653
6:37p	1690
6:59p	1690
7:01p	2145
7:15p	2149

Off bottom 7:15pm Mar. 24

By: Robert D. Agnew

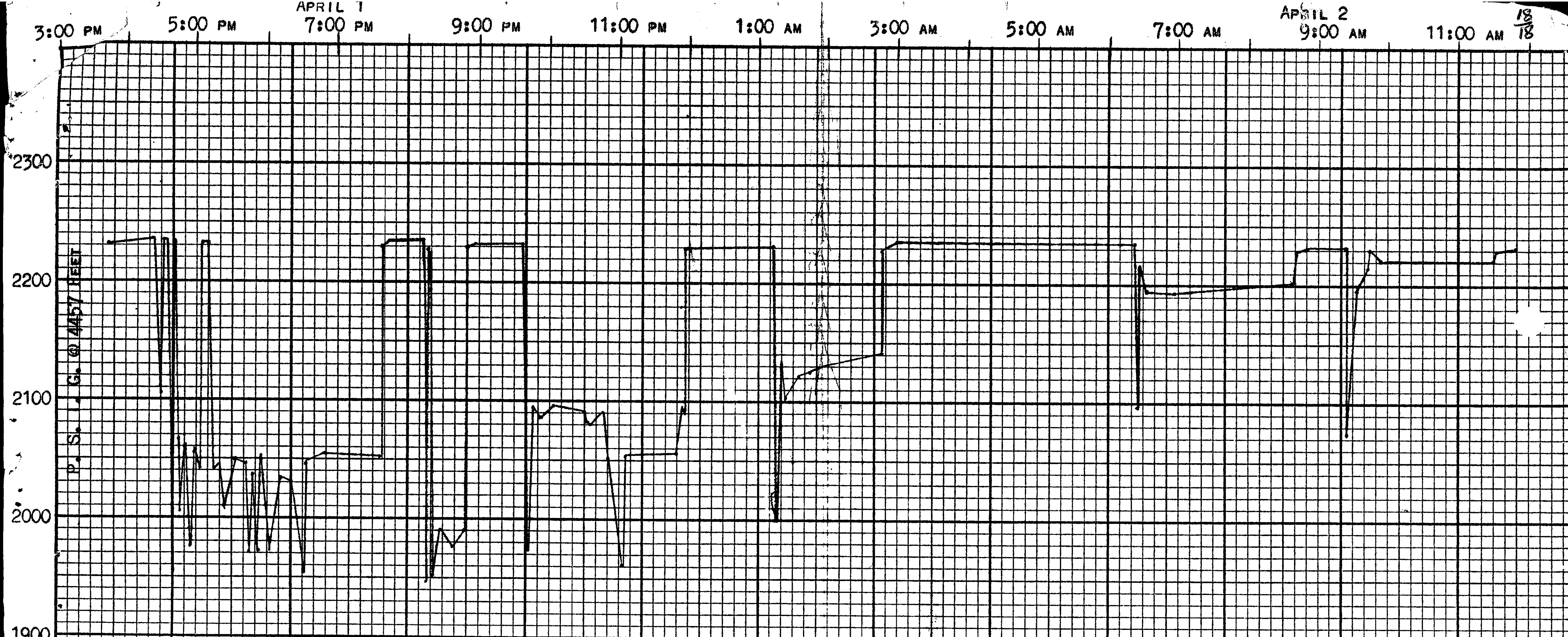
PE905638

This is an enclosure indicator page.
The enclosure PE905638 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905638 has the following characteristics:

ITEM_BARCODE =	PE905638
CONTAINER_BARCODE =	PE902927
NAME =	Flow Summary Table
BASIN =	GIPPSLAND
PERMIT =	PEP/38
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Flow Summary Table (from appendix 7 in WCR) for Marlin-1
REMARKS =	
DATE_CREATED =	2/04/66
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	MARLIN-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO EXPLORATION AUSTRALIA INC..

(Inserted by DNRE - Vic Govt Mines Dept)



TIME	PRESS	TIME	PRESS	TIME	PRESS	TIME	PRESS	TIME	PRESS	TIME	PRESS
3:45 PM	2232	5:16 PM	2042	7:37 PM	2052	9:52 PM	2087	1:16 AM	2000	6:57 AM	2194
4:24 PM	2236	5:20 PM	2045	7:38 PM	2230	10:04 PM	2097	1:20 AM	2132	8:38 AM	2201
4:30 PM	2106	5:23 PM	2010	7:42 PM	2232	10:30 PM	2091	1:23 AM	2103	8:41 AM	2229
4:32 PM	2236	5:32 PM	2050	8:13 PM	2236	10:31 PM	2082	1:35 AM	2122	8:50 AM	2232
4:35 PM	2236	5:42 PM	2047	8:16 PM	1946	10:34 PM	2080	1:45 AM	2126	9:23 AM	2232
4:40 PM	1955	5:44 PM	1971	8:17 PM	2229	10:46 PM	2091	2:00 AM	2132	9:25 AM	2075
4:41 PM	2232	5:47 PM	2037	8:21 PM	1951	10:50 PM	2052	2:47 AM	2141	9:33 AM	2196
4:44 PM	2066	5:51 PM	1971	8:28 PM	1990	11:02 PM	1961	2:48 AM	2229	9:42 AM	2215
4:46 PM	2006	5:55 PM	2052	8:39 PM	1977	11:06 PM	2054	3:00 AM	2236	9:45 AM	2230
4:50 PM	2060	6:01 PM	1971	8:48 PM	1990	11:50 PM	2057	6:23 AM	2236	9:55 AM	2221
4:55 PM	1976	6:11 PM	2054	8:50 PM	2230	11:55 PM	2094	6:25 AM	2097	11:30 AM	2221
4:58 PM	2057	6:20 PM	2031	8:57 PM	2232	11:57 PM	2091	6:27 AM	2215	11:32 AM	2230
5:03 PM	2042	6:31 PM	1955	9:39 PM	2232	11:57 PM	2229	6:33 AM	2196	11:50 AM	2232
5:05 PM	2232	6:32 PM	2047	9:41 PM	1975	12:00 AM	2230				
5:10 PM	2232	6:[illegible]	2055	9:46 PM	2095	1:12 AM	2232				

MAXIMUM [illegible]EMPERATURE 164°F @ 4457'

ELEMENT 6000 PSI
22379-N

NOTE: READINGS CORRECTED AFTER CALIBRATION OF 6000 PSI ELEMENT. PRIOR PRESSURE READINGS OF THIS TEST SHOULD BE DISCARDED. R.D.A. APRIL 30, 1966

E.C.S. # 4
A[illegible] & 2, 1966
ROBERT D. AGNEW

APPENDIX 8

FLOW SUMMARY

INTERPRETATIVE

FLOW SUMMARY - EGS-4 (BEST PERIODS)

PERFORATIONS 7514-74 AND 7406-66

Date and Time	Flow (Hrs.)	Separator - Inlet Pressure - (psig)	Choke (64")	Orfice Plate (inches) 4.026' MR.	Separator Temp. (°F)	Differential Inches W.C.	Static (psig)	Fluid (Meter) Bbls./MMCF *	Gravity @ 60°F	Sand	Water	Gas Rate MMCF/D *
March 7.66.												
12:33-14:45	2.2	1,280	44.5	3.0	80.4	35.2	911	36.8	(1)	(1)	(1)	11.55
16:30-18:30	2.0	1,910	34.5	3.0	70	19.9	910	38.5	61	Trace	0	8.65
21:35-22:45	1.167	2,122	21	2.0	49.7	67.6	938	56.2 (2)	60	Trace	0	6.26
March 8.66.												
00:30-01:45	1.25	2,320	22.5 (3)	2.0	35.3	23.7	916	36.3	63	Trace	0	3.65

NOTES:
(1) Improper Sampling.
(2) Probably in error (Gauged Tank Volume within 9.7% of Total Metered Fluid).
(3) ½" Choke on Flare Line to Control Back Pressure Valve.

* See corrected Flow Summary data in Memo. dated 27th May, 1966.

....

FLOW SUMMARY - EGS-4

PERFORATIONS 5122 - 5137' G.R.

Date and Time	Flow Hours	Separator - Inlet Pressure - p.s.i.	Choke @ C.B. Head	Choke @ Sep. (1)	Sep. Pressure p.s.i.	Sep. Temp. °F	Production Rate Bbl./day Meter	°A.P.I.	% BS and W-	Ratio CF/Bbl.
14 March 1966										
1350 - 1505 Hours Clean up	1.9	700-800	3/8	59/64	200	80	935	52.8	Tr.	1280
14 March 1966										
1800 - 2300 Hours	5	947	1/2	58/64	110	70	732 (2)	52.0	Tr.	1018
15 March 1966										
1030 - 1330 Hours	3	900	Open	58/64	150-190	85	1182 (3)	51.5	Tr.	907

(1) Adjustable choke at Sep. reading prob. not accurate.

(2) Tank gauge indicated 15% higher prod. rate.

(3) Tank gauge indicated 6% higher prod. rate.

(Note): Adjustable choke not operating properly.
Effective choke probably considerably less than that shown.

FLOW SUMMARY - EGS-4

PERFORATIONS 5069-77

Time	Hours	Sep. Temp. °F	Sq.Rt. Chart	Diff. Inches W.C.	Static (psig)	Static DWT (psig)	Sep. Press. (psig)	Sep. Inlet (psig)	Meter Liquid (Bbls.)	Wellhead Press. (psig)	Wellhead Temp. °F	Tank Bbls.	Gravity °API Corr. @ 60°
March 20 '66													
04:00 / 10:05	6.083	64.8	5.37	28.8	614	605	610	633	12.60	684	57	13.05	76.8
08:30 / 10:05	1.58	65.3	5.63	31.7	555	550	548	597	2.65	596	57	4.5	76.3

Time	Percent Water	Percent Clay	Percent Sand	Gas MMcf/D	Condensate Bbl/MMcf (on Meter)
March 20 '66					
04:00 / 10:05	0	0.1	0	1.93	25.7
08:30 / 10:05	0	0.3	0	1.93	20.8

Remarks

(1) Gas volume based on 65 specific Gravity.

(2) Total Fluid Metered from 02:20-10:05 - 17.23 Bbls., Tank volume for same period 17.35 Bbls. - Use metered volumes for long test.

FLOW SUMMARY - EGS-4

PERFORATIONS 4532-52

Time	Sep. Temp. °F	Differential Rdg.	Differential "WC	Static - psig Chart	Static - psig DWT	4.026" Meter Run Orfice	Sep. Press. psig	Sep. Inlet Press. psig	Sep. Choke/64" (1)	Fluid Meter-Bbls.	Fluid Tk. Bbls.	Percent Sand	Percent Water
23 March '66													
00:50 / 02:50	62	3.02	9.12	506	498	3.0	507	587	42	10.13	14.1	Trace	0
01:40 / 02:50	63.5	3.03	9.18	476	473	3.0	474	559	42	5.17		Trace	0
08:00 / 10:15	36.3	4.61	21.25	500	499	2.0	501	664	58.8 (2)	12.04	-	Trace	0
9.15 / 10.15	33.3	4.26	18.15	494	492	2.0	496	628	58.8	4.43		0	0
11.15 / 13.25	48.1	6.38	40.6	464.4	473	2.0	474	868	59	16.40	15.72	Trace	0
12.00 / 13.25	49.4	6.66	44.3	467	470	2.0	472	900	59	10.67		Trace	0
15:05 / 16:20	43	3.34	11.15	570	582?	2.5	570	1,331	58	9.24	10.34	0	0

...2/

FLOW SUMMARY - EGS-4

PERFORATIONS 4532-52 (Cont'd.)

Time	Gravity °API-60°F	Wellhead Press. psig	Wellhead Temp. °F	Gas MMcf/D	Condensate B/MMcf(Meter)
23 March '66					
00:50 / 02:50	72.2	713	60	4.65	26.2
01:40 / 02:50	71.8	675	60.2	4.38	24.3
08:00 / 10:15	76.5	1,608	63	2.75	46.5
09:15 / 10:15	77.6	1,634	64	2.5	41.5
11:15 / 13:25	75.0	903	66.8	3.6	50.5
12:00 / 13:25	75.0	930	66.5	3.8	47.5
15:05 / 16:20	76.5	1,363	63.6	3.31	53.5

Remarks

(1) Choke not working properly during test.

(2) Had well on 3/8" choke at "CB" - did not discover till end of test.

FLOW SUMMARY - EGS-4

PERFORATIONS 4532-52 - (4 Shots/Ft.)

Time	Sep. Temp. °F	Differential Rdg.	Differential "WC	Static - psig Chart	Static - psig DWT	4.026" Meter Run Orfice	Sep. Press. psig	Sep. Inlet Press. psig	Sep. Choke/ 64"	Meter Bbls.	Fluid - U.S. Bbls. Tank	Fluid - U.S. Bbls. Sand	Fluid - U.S. Bbls. Water
24 March '66													
16:45 / 17:50	58.4	5.41	29.3	574	583	2.5	581	733	64	11.7	7.5	-	-
18:00 / 19:00	54.9	7.69	59.0	659	663	2.5	661	955	64	19.9	21.6	-	-

Time	Gravity °API-60° F	Wellhead Press. psig	Wellhead Temp. °F	Gas MMcf/D	Condensate B/MMcf(Meter)
24 March '66					
16:45 / 17:50	74	944	60	5.5	47.2
18:00 / 19:00	74	1,275		8.3	57.6

Remarks

(1) At 17:55 the wellhead pressure and flow increase without any surface changes - see flowing gradients.

(2) Well SI at 19:00 due to gas leak in tubing above rams.

FLOW SUMMARY - PACKER AT 4,472' - EGS-4

PERFORATIONS 4,532-52 (4S) AND 4,562-82 (2S)

Time	Flow Hrs.	Sep. Temp. °F	Differential Rdg.	Differential "WC	Static - psig Chart	Static - psig DWT	4.026" Meter Run Orfice	Sep. Press. psig	Sep. Inlet Press. psig	Sep. Choke 64"	Percent Sand	Percent Water	Gravity °API-60°F
April 1 & 2 '66													
16:37-17:00	.38	62.6	5.3	28.09	881	876	$2\frac{3}{4}$	836	1,175	64			
17:10-19:35	2.416	66.3	6.62	43.82	728.7	735.8	$2\frac{3}{4}$	741.3	1,074.2	64	0	0	66.5
18:35-19:35	1.0	68.5	6.71	45.02	724	732	$2\frac{3}{4}$	738	1,070	64			
20:15-20:45	.5	60.6	6.66	44.36	724	735	$2\frac{3}{4}$	742	1,055	64	0	0	74
21:40-23:50	2.167	63.2	6.76	45.69	728.5	739.8	$2\frac{3}{4}$	747.4	1,083.5	64	0	0	72.7
23:15-23:45	.5	66.8	6.68	44.62	741.4	753.4	$2\frac{3}{4}$	761.4	1,085	64			
01:20-02:50	1.5	52.2	5.01	25.06	741	747	$2\frac{3}{4}$	757	1,500	59	0	0	72.4
06:20-08:35	2.25	39.0	6.55	42.9	716	731	2	736	1,757	57	0	0	75.4
07:05-08:35	1.5	39.6	6.4	40.96	728	744	2	747	1,790	57	0	0	75.7
09:50-11:30	1.67	36.4	3.75	14.06	727	736.3	2	735	1,897	51	0	0	74.5
10:30-11:30	1.0	35.3	3.63	13.18	722.5	730.8	2	733	1,900	53[(2)]	0	0	74.6

...2/

FLOW SUMMARY - PACKER AT 4,472' - EGS-4

PERFORATIONS 4,532-52 (4S) AND 4,562-82 (2S) (Cont'd.)

Time	Wellhead Press. psig	Wellhead Temp. °F	Gas MMcf/D	Condensate Bbls. Meter	Condensate Bbls. Tank	Condensate Bbls./MM Meter	Condensate Bbls./MM Tank	Remarks
April 1 & 2 '66								
16:37-17:00	1,400	69.5	7.8	3.48		32.2		(1) Blowing gas through liquid Dump Meter.
17:10:19:35	1,398	72	9,85	70.25[1]	45.34	70.8[1]	45.8	(2) Put ½" Choke in flare line.
18:35-19:35	1,385	72	10.0	21.15		50.7		
20:15-20:45	1,525	64	10.3	6.2	5.7	28.9		
21:40-23:50	1,448	73	10.2	41.2	31.8	44.6	34.0	
23:15-23:45	1,456	75	10.0	10.9		52.3		
01:20-02:50	1,613	70	7.64	21.0	28.0	44.0	58.6	
06:20-08:35	1,763	65	4.5	21.1	14.1	50	33.4	
07:05-08:35	1,775	66	4.78	17.1		57.3		
09:50-11:30	1,775	62	2.78	11.1	9.9	51.4	51.3	
10:30-11:30	1,775	62	2.72	5.8		51.2		

ESSO EXPLORATION AUSTRALIA, INC.

B. Hopkins

COPY

CONFIDENTIAL

May 27, 1966

Mr. John H. Hamlin

The gas flow rates quoted in the report "Esso Gippsland Shelf-4, Flow Tests, 12 February - 2 April 1966" were calculated based on preliminary estimates of gas gravity. We now have received final reports of the composition of the gas produced during the tests and are able to accurately calculate gas gravity.

The calculated gravities of the gas produced from the Latrobe Valley Formation (Zones II through V in the above-mentioned report) closely agreed with those used in the flow rate calculations. Variation is such that no correction of gas flow rates is required.

The gravity calculated for the Upper Cretaceous Formation (0.83) is sufficiently different from the estimate to warrant gas flow rate corrections. The maximum correction amounts to 3.4 per cent. The attached sheet incorporates the corrections and should replace page 2, Zone I of the aforementioned report.

E. J. Stanley
Operations Manager

SJR:SC
Attach.

c.c. Mr. Zeb Mayhew - Attn: Mr. J.L.Roman (2)
Mr. J.L.Langston (2) ✓
Mr. E.J.Stanley
Mr. W.F.Bohlmann
Mr. S.J.Reso
Esso Production Research - Attn: Mr. F.A.Smith

CALCULATION SHEET 990-0142 (A-165)

SUBJECT	PREPARED BY	DATE	DEPARTMENT	PAGE

Corrected Flow Summary

EGS-4 (Best Periods)

Perforations 7514-74 & 7406-66

Date & Time	Flow (Hrs)	Inlet Separator Pressure (psig)	Choke (64 in)	Plate Size (in)	Flow Temperature °F	Flow Differential (in. water)	Static Press. (psig)	Condensate Ratio (Bbls Sep. Fluid/MMCF)	Sep. Fluid Gravity (° API)	Sand	Water	Gas Flow Rat (MMCF/D)
7 March '66												
12:33-14:45	2.2	1280	44.5	3.0	80.4	35.2	911	38.7	(1)	(1)	(1)	10.928
16:30-18:30	2.0	1910	34.5	3.0	70.0	19.9	910	40.5	61	Tr.	0	8.334
21:35-22:45	1.167	2122	21	2.0	49.7	67.6	938	54.6 (2)	60	Tr	0	6.191
8 March '66												
00:30-01:45	1.25	2320	22.5 (3)	2.0	35.3	23.7	916	35.0	63	Tr	0	3.710

Notes: (1) Sampling Difficulties

(2) Probably in Error - Gas passed meter (Tank gauge within 9.7% of meter volum

(3) ½-in choke on Flare Line to control back pressure value.

Oil + Gas

Jack Dauin

RECD 22.4.86 KG.

Amoco Australia Petroleum Company
(Inc. in Delaware, U.S.A., with Limited Liability — Registered as a Foreign Company in Tasmania)
15 Blue Street, North Sydney
P.O. Box 126, North Sydney 2060
Phone (02) 957 4500
Telex AA23359
Facsimile (02) 922 4886

April 16, 1986

22 APR 1986

OIL and GAS DIVISION

The Director of Mines,
Department of Minerals and Energy,
East Tower, Princes Gate,
151 Flinders Street,
Melbourne. Vic. 3000

Dear Sir,

Re: Gippsland Basin Vitrinite Reflectance Measurements
MISC-AUP-141-L-310-SCB

In 1985 Amoco Australia Petroleum Company collected core and cutting samples from thirteen Gippsland Basin wells for vitrinite reflectance determinations. The following attachments are a summary of the work.

Yours faithfully,

MARLIN-1

S.C. Bane

S.C. Bane
Exploration Manager

SCB/lrc

Attach.

Depth (ft)	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
ALBACORE -1				
9380&9390	0.42	0.04	0.31-0.48	42
9720&2730	0.46	0.06	0.36-0.59	36
10070	0.46	0.04	0.36-0.55	39
10320	0.47	0.04	0.38-0.54	34
BARRACOUTA-3				
7310-7320	0.54	0.05	0.46-0.63	35
8590	0.60	0.08	0.43-0.71	35
9100-9120	0.62	0.10	0.41-0.80	41
9330-9360	0.64	0.10	0.43-0.93	36
9540-9560	0.73	0.05	0.63-0.84	33
BATFISH-1				
7560-7570	0.61	0.05	0.53-0.69	34
8170-8180	0.64	0.05	0.56-0.75	34
8640-8650	0.69	0.05	0.55-0.81	31
9170-9190	0.76	0.04	0.66-0.81	28
9430-9450	0.76	0.05	0.69-0.90	41
BONITA-1A				
9780-9790	0.54	0.06	0.46-0.68	36
10050	0.56	0.05	0.47-0.64	36
10280-10290	0.55	0.04	0.47-0.64	47
BREAM-2				
8070-8090	0.63	0.05	0.52-0.70	39
8380-8390	0.67	0.06	0.53-0.80	41
8933-8944	0.73	0.05	0.62-0.85	43
9730-9750	0.83	0.07	0.71-0.98	38
10638-10641	0.88	0.11	0.62-1.13	42

Depth (ft)	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
COD-1				
7100-7120	0.63	0.06	0.53-0.81	41
8333-8339	0.59	0.05	0.47-0.67	34
9030-9060	0.75	0.06	0.61-0.85	32
9460-9470	0.77	0.06	0.61-0.86	41
FLOUNDER-1				
7430	0.44	0.05	0.36-0.56	39
8783-8795	0.64	0.04	0.56-0.77	36
9140	0.61	0.06	0.52-0.77	42
10395-10400	0.72	0.06	0.58-0.80	34
11350-11356	0.90	0.05	0.76-0.97	36
11676-11682	0.90	0.07	0.78-1.04	44
HALIBUT-1				
7888-7891	0.49	0.07	0.37-0.67	39
8450-8460	0.54	0.04	0.47-0.61	31
9250-9260	0.57	0.06	0.46-0.66	43
9630-9640	0.61	0.04	0.54-0.69	35
9870-9880	0.63	0.06	0.47-0.75	52
MACKEREL-1				
8760-8780	0.63	0.05	0.52-0.71	31
9630-9650	0.66	0.05	0.69-0.76	25
9870-9890	0.65	0.02	0.60-0.73	28

Depth (ft)	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
MARLIN-1				
7070-7080	0.65	0.08	0.52-0.80	32
7497-7501	0.65	0.04	0.54-0.72	38
7780-7800	0.67	0.09	0.47-0.88	39
8230-8240	0.71	0.07	0.64-0.79	4
8455-8461	0.70	0.06	0.56-0.79	32
NANNYGAI-1				
7760-7670	0.052	0.07	0.39-0.65	33
8320-8340	0.50	0.05	0.42-0.65	32
9450-9470	0.64	0.04	0.57-0.71	35
9860-9880	0.64	0.06	0.51-0.75	31
SALMON-1				
7670-7690	0.50	0.06	0.38-0.64	35
8030-8050	0.56	0.05	0.45-0.67	37
8860	0.60	0.05	0.45-0.67	33
9250-9260	0.64	0.06	0.54-0.79	36
9856-9862	0.80	0.05	0.68-0.87	37
SNAPPER-1				
7280-7300	0.56	0.06	0.43-0.69	37
7754-7760	0.56	0.09	0.38-0.73	38
9254-9257	0.68	0.03	0.60-0.72	33
9900-9903	0.86	0.10	0.62-0.96	17
10140-10200	0.81	0.10	0.58-1.01	31
10495-10507	0.99	0.06	0.81-1.06	35

APPENDIX 9

HYDROCARBON REPORT

PETROLEUM DIVISION

E 78

Esso Production Research Company

Post Office Box 2189

Houston, Texas 77001

Production Engineering Division
F. Ames Smith, Manager

September 20, 1966

Mr. J. H. Hamlin
Esso Exploration Australia, Inc.
Box 4249, G.P.O.
Sydney, N. S. W.
Australia

Attention: Mr. E. J. Stanley

Dear Sir:

Hydrocarbon Analysis,
Esso Gippsland Shelf No. 4 MARLIN - 1

Attached are four copies of the report "Hydrocarbon Analysis, Esso Gippsland Shelf No. 4 Subsurface Samples," EPR66-PS97, September 1966. This report presents results of the hydrocarbon analysis requested in your letter of May 30, 1966. These samples were received by the Research Center on August 15, 1966.

Two copies of the report are being forwarded to Mr. J. L. Roman, as you requested.

Yours very truly,

F. AMES SMITH

By R.V. Randall
R. V. Randall

ACBroyles:jjb
Attachments (4)

cc: Producing Coordination
(Mr. M. C. Sons)
Mr. Zeb Mayhew
Mr. J. L. Roman
Dr. C. R. Hocott

ESSO PRODUCTION RESEARCH COMPANY

PRODUCTION ENGINEERING DIVISION

HYDROCARBON ANALYSIS, ESSO GIPPSLAND SHELF NO. 4 SUBSURFACE SAMPLES

PRODUCTION LIBRARY

J. R. Wright
H. W. Faulkner
H. H. Shepherd

EPR66-PS97

September 1966

CONFIDENTIAL: For use by the Esso Exploration Australia, Inc. only.

Charges for this work are specifically authorized by Esso Exploration, Inc. and are not covered by production research agreements with Esso Production Research Company.

Examination of Subsurface Oil Sample No. 1

Source: Esso Exploration Austrailia, Inc., Gippsland Shelf No. 4

Date Taken: March 15, 1966

Sampling Data:

Sampling Depth, ft. (Zone II, 5127-37)	5120
Pressure Required to Open Sampler, psig	2225
Indicated Bubble Point Pressure, psig	2300
Time Shut in Prior to Sampling	2 hrs., 50 mins.

Reservoir Data:

Elevation RDB, ft.	31
Pressure Datum, ft. ss	5079
Gas-Oil Contact, ft. ss	5079
Oil-Water Contact, ft. ss	5131
Original Reservoir Pressure (psig @ 5079 ft. ss)	2276
Original Reservoir Temperature (°F @ 5079 ft. ss)	180

Saturation Pressure:

1767 psig @ 75° F
2240 psig @ 180° F

Properties of Sample:

Pressure-Volume Relations of Subsurface Oil Sample	Table I
Flash Liberation and Differential Liberation Results	Table II
Comparison of Experimental and Computed Flash Liberation Data	Table II-A
Hydrocarbon Analysis of Subsurface Oil Sample	Table III
Viscosity of Reservoir Oil	Table IV
Compositional Analysis of Gas and Liquids at 0, 50, 100, and 200 psig	Table V
Pressure-Volume Relations of Subsurface Oil Sample	Figure 1
Differential Liberation - Gas in Solution and Volumetric Shrinkage Curve	Figure 2
Differential Liberation - Gravity and Compressibility Factors of Liberated Gas Increments Versus Liberated Pressure	Figure 3
Pressure-Viscosity Relationship	Figure 4

TABLE I

Pressure-Volume Relations of Subsurface Oil Sample

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Temperature: 180° F

Pressure, psig	Relative Volume, V/V_{Bpt}	V_{Liq}/V_{Bpt}	$Y = \frac{P_s - P^*}{P\Delta V}$
3000	0.9843		
2780	0.9885		
2565	0.9927		
2315	0.9983		
2240	1.0000		
2170	1.0110		2.900
2075	1.0278		2.840
1990	1.0455	0.9445	2.741
1875	1.0732	0.9308	2.641
1750	1.1064	0.9157	2.525
1615	1.1552	0.9030	2.471
1415	1.2581	0.8772	2.235
1260	1.3669	0.8600	2.085
1140	1.4615	0.8442	2.064
1050	1.5841	0.8300	1.913
970	1.7070	0.8204	1.824
905	1.8299	0.8128	1.749
845	1.9529	0.8013	1.702
800	2.0757	-	1.643
710	2.3173	-	1.602
640	2.5883	-	1.542
585	2.8512	-	1.490
535	3.1306	0.7747	1.444
495	3.4095	0.7717	1.420

Compressibility
.0000206 = .0157/760
.0000224
.0000226
Best .0001571 .0455/250
.0001634
.0041820

Specific Volume at Saturation Pressure = 0.02605 cu. ft./lb. 33.4 #/cu ft / 62.366

* Calculated data for use in correcting subsurface oil sample.

P_s = Saturation pressure of sample at 180° F; psia
P = Pressure below saturation pressure; psia
V_t = Two-phase relative volume factor at 180° F and P.
V_{bp} = Saturated oil relative volume at 180° F and 2240 psig (2255 psia)

Compressibility average of best of #1 & #2 samples

C = 0.0001728

TABLE II

Flash Liberation[a] and Differential Liberation Results

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Sampling Conditions: Well Shut In

Properties of Saturated Oil:

Temperature, °F	75	180
Saturation Pressure, psig	1767	2240

Gas Liberation and Shrinkage of Oil:
(Flash)

Pressure (p_1) psig	Temp. °F	Gas-Oil Ratio: cu. ft. at 60 °F and 14.7 psia/bbl. Residual Oil: Flashed at p_1	Gas-Oil Ratio: Flashed from p_1 to 0	Residual Oil Gravity °API at 60 °F	Sp. Gr. Gas at 60 °F (air=1)	V_R/V_S*
0[b]	76	1041	-	49.7	0.9672	0.6153
50	76	872	39	52.0	0.8450	0.6530
100	76	811	86	52.2	0.8022	0.6572
200	76	736	171	52.0	0.7590	0.6545

(Differential at 180° F)

Pressure psig	Properties of Liberated Gas at 180° F and Indicated Pressure***: Compressibility, Z	Viscosity, cp	Gas-Oil Ratio: cu. ft. at 14.7 psia and 60°F/bbl. Reservoir Oil at 2240 psig, 180° F	Residual Oil Gravity °API at 60 °F	V**/V_S
2240	-	-	0		1.0000
1950	0.810	0.0161	85		0.9408
1645	0.822	0.0148	167		0.9002
1385	0.843	0.0137	230		0.8702
1085	0.862	0.0132	307		0.8390
780	0.885	0.0128	377		0.8100
530	0.908	0.0123	432		0.7943
270	0.935	0.0117	495		0.7560
140	0.963	0.0113	531		0.7343
0 (180°F)	1.000	0.0000	611		0.6697
0 (60°F)	-	-	-	50.5	0.6297

*V_R, Volume residual oil at 0 psig, 60°F
V_S, Volume saturated oil at 2240 psig, 180° F
**V, Volume saturated oil at indicated pressure, 180° F
***, Determined from calculated composition of equilibrium gas
a = Computer values
b = Run No. 2

TABLE II

Flash Liberation[a] and Differential Liberation Results

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Sampling Conditions: Well Shut In

Properties of Saturated Oil:

Temperature, F	75	180
Saturation Pressure, psig	1767	2240

Gas Liberation and Shrinkage of Oil:
(Flash)

Pressure(p_1) psig	Temp. °F	Gas-Oil Ratio: cu. ft. at 60 F and psia/bbl. Residual Oil — Flashed at p_1	Flashed from p_1 to 0	Residual Oil Gravity °API at 60 F	Sp. Gr. Gas at 60 F (air=1)	V_R/V_S*
0[b]	76	1092	-	49.7	0.9737	0.6078
50	76	916	41	51.9	0.8559	0.6452
100	76	851	93	52.2	0.8140	0.6493
200	76	770	184	52.0	0.7707	0.6464

(Differential at 180° F)

Pressure psig	Properties of Liberated Gas at F and Indicated Pressure*** — Compressibility, Z	Viscosity, cp	Gas-Oil Ratio: cu. ft. at psia and 60 F/bbl. Reservoir Oil at psig, 180° F	Residual Oil Gravity °API at 60 F	V**/V_S
2240	-	-	0		1.0000
1950	0.810	0.0161	85		0.9408
1645	0.822	0.0148	167		0.9002
1385	0.843	0.0137	230		0.8702
1085	0.862	0.0132	307		0.8390
780	0.885	0.0128	377		0.8100
530	0.908	0.0123	432		0.7943
270	0.935	0.0117	495		0.7560
140	0.963	0.0113	531		0.7343
0 (180° F)	1.000	0.0000	611		0.6697
0 (60° F)				50.5	0.6297

*V_R, Volume residual oil at 0 psig, 60 F
V_S, Volume saturated oil at 2240 psig, 180 F
**V, Volume saturated oil at indicated pressure, 180 F
***Z, Determined from calculated composition of equilibrium gas

a - Computer values

TABLE II-A

Comparison of Experimental and Computed Flash Liberation Results

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

(P_1) Pressure psig	Temperature °F	Gas-Oil Ratio - cu ft/bbl Residual Oil: Flashed at P_1		Gas-Oil Ratio - cu ft/bbl Residual Oil: Flashed from P_1 to 0		Residual Oil Gravity °API at 60 F		V_R/V_S	
		Experimental	Computed	Experimental	Computed	Experimental	Computed	Experimental	Computed
0	76	-	-	1065	1041[a]	50.4	49.7	0.6122	0.6153

a = Run No. 1

USED IN DATA BOOK

Data Used in Flash Calculations

Component	Mol %	gal/mol
Hydrogen Sulfide	-	
Carbon Dioxide	4.22	9.09
Nitrogen	-	
Methane	37.59	
Ethane	6.06	
Propane	6.27	
Iso-Butane	1.33	
N-Butane	3.49	
Iso-Pentane	1.08	
N-Pentane	1.93	
Hexanes	3.47	15.83
Heptanes	5.42	16.36
Octanes	4.11	17.77
Nonanes	3.98	18.54
Heavier Fraction	21.05	29.29
Total	100.00	

K-value Source: NGAA (1957)
Convergence Pressure: 10,000 psia

Unadjusted Flash Data

Molecular weight of heavier fraction	196
Density of heavier fraction, gm/cc at 60 F	0.8099
Specific volume of reservoir fluid at bubble point and 180° F temperature, cu. ft./lb.	0.02605
Mols per barrel	2.817

TABLE II-A

Comparison of Experimental and Computed Flash Liberation Results

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

(P_1) Pressure psig	Temperature °F	Gas-Oil Ratio - cu ft/bbl Residual Oil: Flashed at P_1		Gas-Oil Ratio - cu ft/bbl Residual Oil: Flashed from P_1 to 0		Residual Oil Gravity °API at 60 F		V_R/V_S	
		Experimental	Computed	Experimental	Computed	Experimental	Computed	Experimental	Computed
0	76	-	-	1065	1087[a]	50.4	49.7	0.6122	0.6087

a - Run No. 1

Data Used in Flash Calculations

Component	Mol %	gal/mol
Hydrogen Sulfide	Nil	
Carbon Dioxide	4.13	9.09
Nitrogen	Nil	
Methane	36.73	
Ethane	8.34	
Propane	6.12	
Iso-Butane	1.31	
N-Butane	3.41	
Iso-Pentane	1.06	
N-Pentane	1.88	
Hexanes	3.38	15.83
Heptanes	5.29	16.36
Octanes	3.91	17.77
Nonanes	3.89	18.54
Heavier Fraction	20.55	29.29
Total	100.00	

K-value Source: NGAA (1957)
Convergence Pressure: 10,000

Unadjusted Flash Data

Molecular weight of heavier fraction	196
Density of heavier fraction, gm/cc at 60 F	0.8099
Specific volume of reservoir fluid at bubble point and 180° F temperature, cu. ft./lb.	0.02605
Mols per barrel	2.951

TABLE III

Hydrocarbon Analysis of Subsurface Oil Sample

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Component	Weight %	Density g/cc at 60°F	Molecular Weight
Hydrogen Sulfide	-		
Carbon Dioxide	2.43		
Nitrogen	-		
Methane	7.88		
Ethane	2.38		
Propane	3.61		
Iso-Butane	1.01		
N-Butane	2.65		
Iso-Pentane	1.02		
N-Pentane	1.82		
Hexanes	4.12	0.6890	91
Heptanes	7.15	0.7396	101
Octanes	5.82	0.7486	111
Nonanes	6.19	0.7692	119
Heavier Fraction	53.92	0.8099	196
Total	100.00		
Pentane-Free Fraction		0.7861	157

Orsat Analysis of Gas Liberated at 0 psig and 75°F

Component	Volume %
Hydrocarbons	94.6
Hydrogen Sulfide	0.0
Carbon Dioxide	5.4
Total	100.0

TABLE III

Hydrocarbon Analysis of Subsurface Oil Sample

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

see new chart

Component	Weight * %	Density g/cc at 60 F	Molecular Weight
Hydrogen Sulfide	-		
Carbon Dioxide	2.43		
Nitrogen	-		
Methane	7.88		
Ethane	2.38		
Propane	3.61		
Iso-Butane	1.01		
N-Butane	2.65		
Iso-Pentane	1.02		
N-Pentane	1.82		
Hexanes	4.12	0.6890	91
Heptanes	7.15	0.7396	101
Octanes	5.82	0.7486	111
Nonanes	6.19	0.7692	119
Heavier Fraction	53.92	0.8099	196
Total	100.00		
Pentane-Free Fraction		0.7861	157

Orsat Analysis of Gas Liberated at 0 psig and 75°F

Component	Volume %
Hydrocarbons	94.6
Hydrogen Sulfide	0.0
Carbon Dioxide	5.4
Total	100.0

* Analysis of hydrogen sulfide and carbon dioxide free sample.

TABLE IV

Viscosity of Reservoir Oil at 180° F

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Pressure, psig	Viscosity, cp	Density, gm/cc
3000	0.175	0.6228
2800	0.170	0.6203
2600	0.165	0.6168
2400	0.160	0.6160
2300	0.158	0.6151
2240	0.157	0.6147
2100	0.165	0.6225
1800	0.180	0.6391
1500	0.198	0.6557
1200	0.217	0.6723
900	0.240	0.6889
600	0.270	0.7056
300	0.310	0.7222
90	0.370	0.7338
0	0.613	0.7504

Saturation pressure of oil = 2240 psig @ 180° F

TABLE V

Compositional Analysis of Gas and Liquids at 0, 50, 100 and 200 psig

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Component	0 psig Flash		50 psig Flash		100 psig Flash		200 psig Flash	
	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %
Carbon Dioxide	0.087	6.970	0.413	7.543	0.737	7.710	1.326	7.740
Methane	.370	62.356	1.740	68.879	3.113	72.141	5.930	76.097
Ethane	.325	9.876	1.444	10.089	2.411	9.717	3.834	8.767
Propane	1.163	9.668	4.110	8.155	5.765	6.776	7.268	5.057
Iso-Butane	.566	1.838	1.520	1.165	1.816	0.843	1.964	0.558
N-Butane	2.093	4.419	4.557	2.558	5.181	1.795	5.413	1.151
Iso-Pentane	1.202	0.999	1.861	0.398	1.901	0.257	1.837	0.160
N-Pentane	2.419	1.605	3.466	0.589	3.483	0.374	3.327	0.231
Hexanes	6.789	1.261	7.041	0.353	6.715	0.218	6.213	0.134
Heptanes	12.443	0.747	11.399	0.202	10.704	0.125	9.813	0.077
Octanes	9.990	0.198	8.759	0.052	8.178	0.033	7.472	0.021
Nonane	9.868	0.062	8.521	0.016	7.941	0.011	7.247	0.007
Heavier Fractions	52.684	0.001	45.169	0.000	42.055	0.000	38.356	0.000
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
	L = 0.39954	V = 0.60046	L = 0.46603	V = 0.53397	L = 0.50053	V = 0.49947	L = 0.54879	V = 0.45121

TABLE V

Compositional Analysis of Gas and Liquids at 0, 50, 100, and 200 psig

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 1

Date Taken: March 15, 1966

Component	0 psig Flash		50 psig Flash		100 psig Flash		200 psig Flash	
	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %
Carbon Dioxide	0.084	6.694	0.396	7.240	0.709	7.417	1.282	7.484
Methane	0.355	59.783	1.666	65.931	2.984	69.155	5.709	73.265
Ethane	0.439	13.347	1.954	13.658	3.277	13.205	5.243	11.988
Propane	1.118	9.290	3.982	7.901	5.617	6.603	7.114	4.950
Iso-Butane	0.552	1.791	1.501	1.151	1.803	0.836	1.951	0.555
N-Butane	2.030	4.285	4.483	2.517	5.114	1.772	5.341	1.136
Iso-Pentane	1.182	0.983	1.856	0.397	1.896	0.256	1.825	0.159
N-Pentane	2.368	1.571	3.436	0.584	3.451	0.370	3.283	0.228
Hexanes	6.738	1.252	7.016	0.352	6.672	0.217	6.138	0.132
Heptanes	12.457	0.748	11.400	0.202	10.666	0.125	9.716	0.077
Octanes	9.774	0.193	8.544	0.051	7.946	0.032	7.213	0.020
Nonanes	9.929	0.063	8.541	0.017	7.927	0.011	7.187	0.007
Heavier Fraction	52.974	0.001	45.226	0.000	41.937	0.000	37.998	0.000
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
	L = 0.38791	V = 0.61209	L = 0.45439	V = 0.54561	L = 0.44002	V = 0.50998	L = 0.54081	V = 0.45919

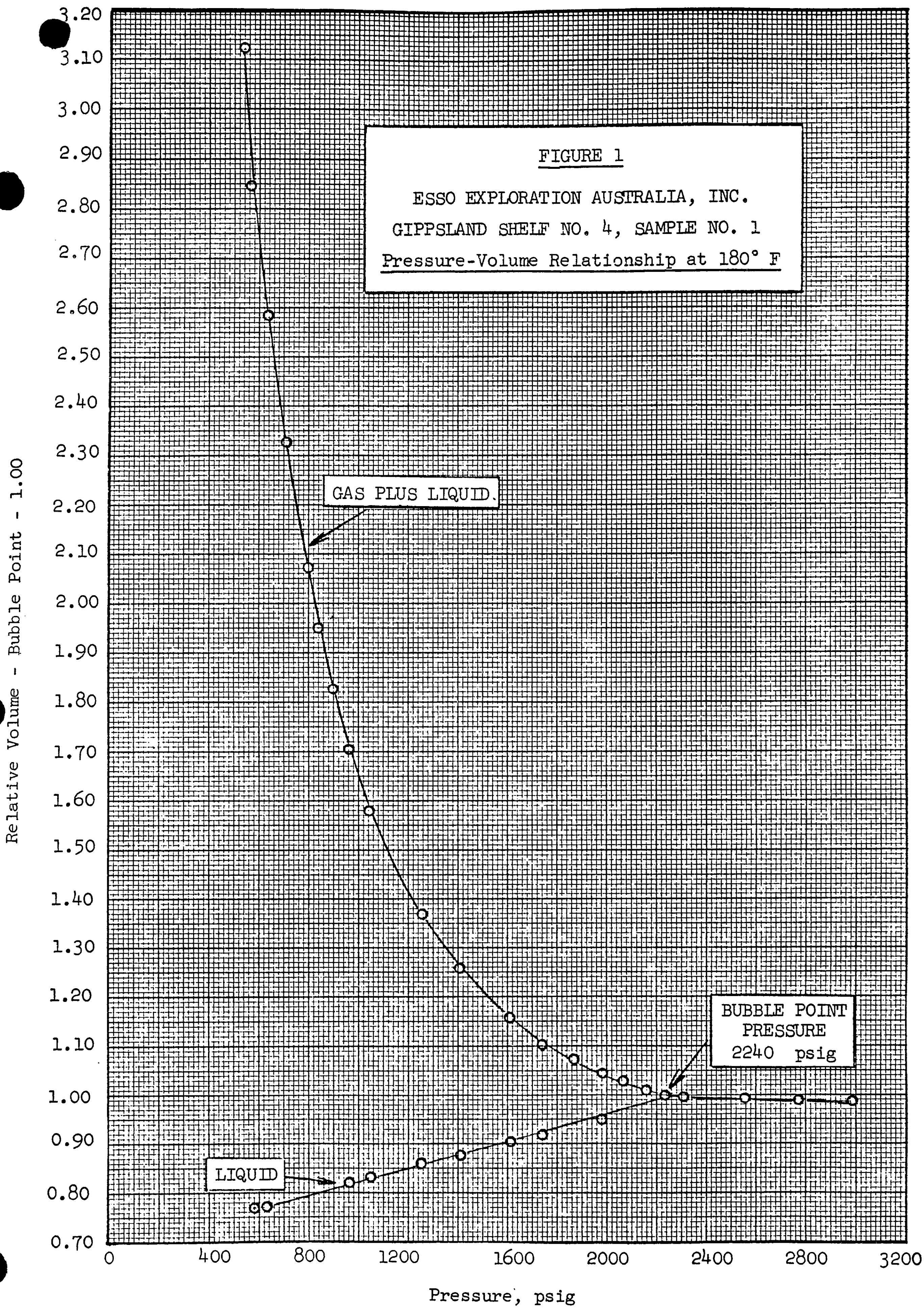


FIGURE 1
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 1
Pressure-Volume Relationship at 180° F
GAS PLUS LIQUID
BUBBLE POINT PRESSURE 2240 psig
LIQUID
Relative Volume - Bubble Point - 1.00
3.20
3.10
3.00
2.90
2.80
2.70
2.60
2.50
2.40
2.30
2.20
2.10
2.00
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0
400
800
1200
1600
2000
2400
2800
3200
Pressure, psig

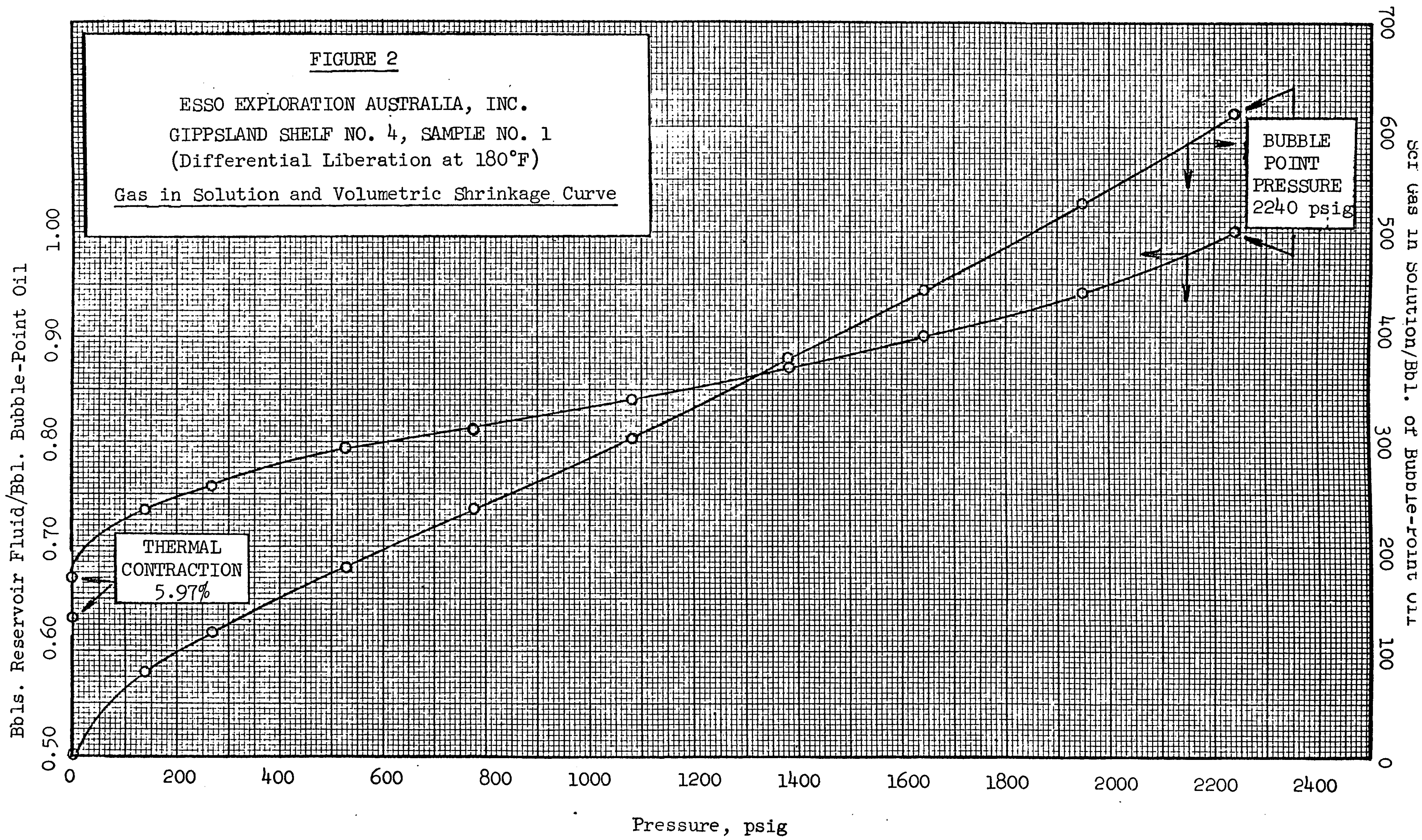


FIGURE 2
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 1
(Differential Liberation at 180°F)
Gas in Solution and Volumetric Shrinkage Curve
BUBBLE POINT PRESSURE 2240 psig
THERMAL CONTRACTION 5.97%
Bbls. Reservoir Fluid/Bbl. Bubble-Point Oil
0.50
0.60
0.70
0.80
0.90
1.00
Scf Gas in Solution/Bbl. of Bubble-Point Oil
0
100
200
300
400
500
600
700
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
Pressure, psig

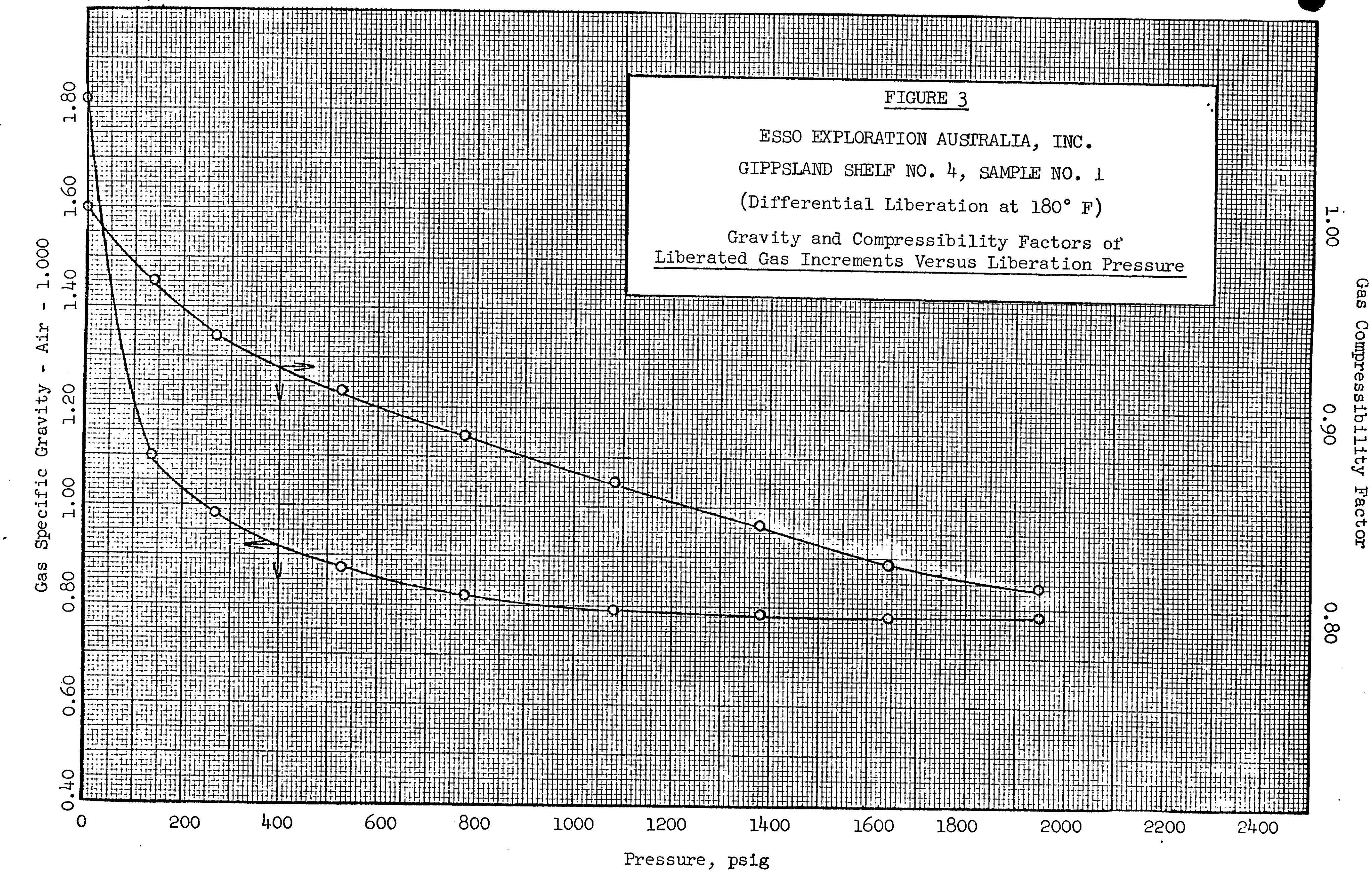


FIGURE 3
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 1
(Differential Liberation at 180° F)
Gravity and Compressibility Factors of
Liberated Gas Increments Versus Liberation Pressure
Gas Specific Gravity - Air - 1.000
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
Gas Compressibility Factor
0.80
0.90
1.00
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
Pressure, psig

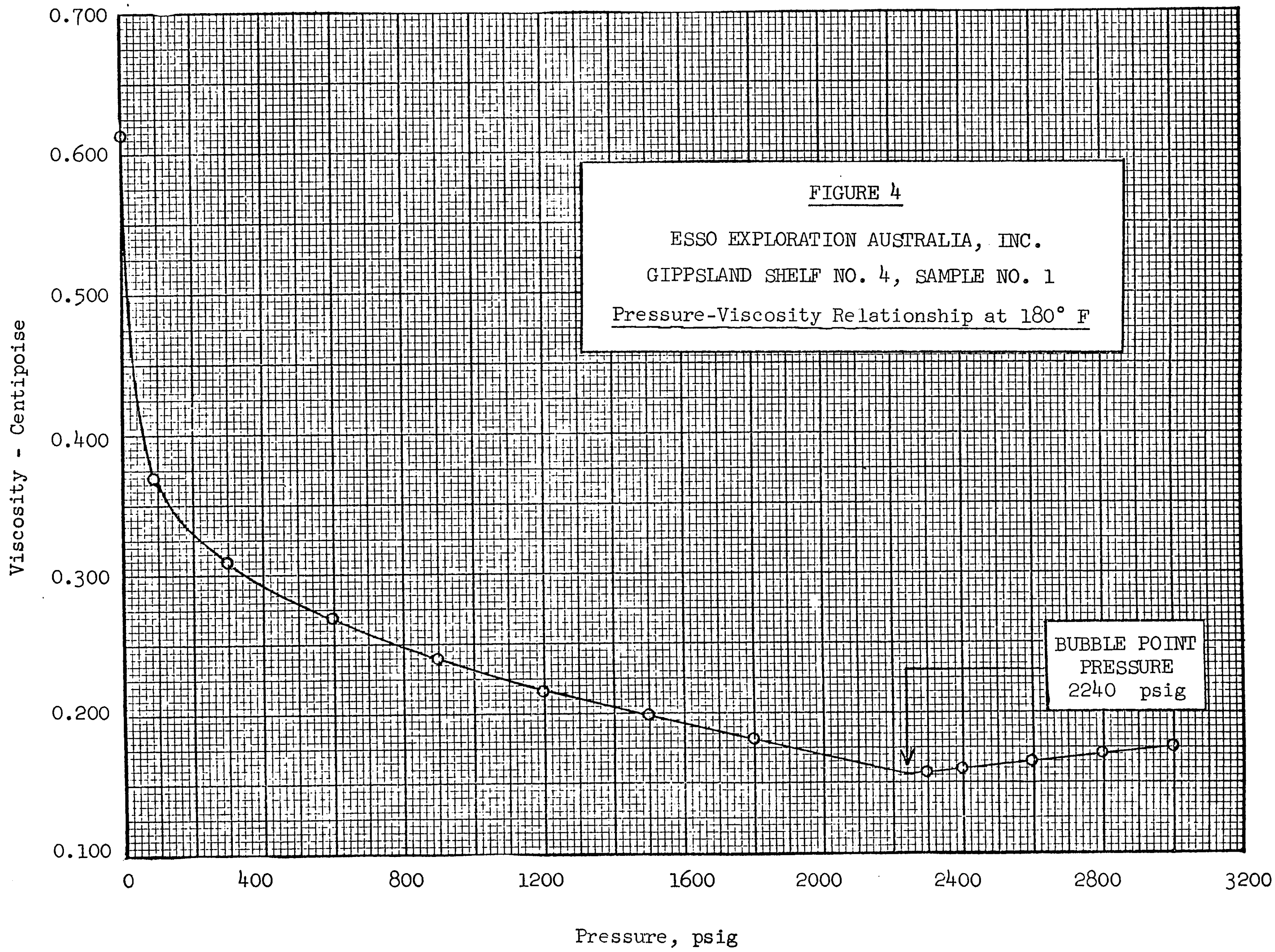


FIGURE 4
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 1
Pressure-Viscosity Relationship at 180° F
BUBBLE POINT PRESSURE 2240 psig
Viscosity - Centipoise
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0
400
800
1200
1600
2000
2400
2800
3200
Pressure, psig

Examination of Subsurface Oil Sample No. 2

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4

Date Taken: March 15, 1966 (Note: Sampling date shown as March 15, 1966, on tagged sample container as received. Esso Exploration Australia, Inc., oil sample data sheet of May 26, 1966, gives date as March 25, 1966.)

Sampling Data:

Sampling Depth, ft. (Zone II, 5122-37)	5120
Pressure Required to Open Sampler, psig	2125
Indicated Bubble Point Pressure, psig	2300
Time Shut In Prior to Sampling	5 hrs., 20 mins.

Reservoir Data:

Elevation RDB, ft.	31
Pressure Datum, ft. ss	5079
Gas-Oil Contact, ft. ss	5079
Oil-Water Contact, ft. ss	5131
Original Reservoir Pressure (psig @ 5079 ft. ss)	2276
Original Reservoir Temperature (°F @ 5079 ft. ss)	180

Saturation Pressure:

1175 psig @ 75° F
2235 psig @ 180° F

Properties of Sample:

Pressure-Volume Relations of Subsurface Oil Sample	Table I
Flash Liberation and Differential Liberation Results	Table II
Comparison of Experimental and Computed Flash Liberation Data	Table II-A
Hydrocarbon Analysis of Subsurface Oil Sample	Table III
Viscosity of Reservoir Oil	Table IV
Compositional Analysis of Gas and Liquids at 0, 50, 100, and 200 psig	Table V
Pressure-Volume Relations of Subsurface Oil Sample	Figure 1
Differential Liberation - Gas in Solution and Volumetric Shrinkage Curve	Figure 2
Differential Liberation - Gravity and Compressibility Factors of Liberated Gas Increments Versus Liberated Pressure	Figure 3
Pressure-Viscosity Relationship	Figure 4

TABLE I

Pressure-Volume Relations of Subsurface Oil Sample

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4, Sample No. 2

Date Taken: March 15, 1966

Temperature: 180° F

.0001733
.0001925

Pressure, psig	Relative Volume, V/V_{Bpt}	Relative Volume, V_{Liq}/V_{Bpt}	$Y = \frac{P_s - P^*}{P\Delta V}$
3000	0.9827		
2780	0.9869		
2570	0.9911		
2365	0.9953		
2250	0.9999		
2235	1.0000		
2220	1.0026		2.581
2195	1.0077		2.351
2105	1.0273	0.9780	2.245
2015	1.0514	0.9585	2.105
1905	1.0867	0.9390	1.985
1795	1.1341	0.9201	1.813
1615	1.2164	0.8891	1.758
1420	1.3371	0.8603	1.685
1270	1.4581	0.8448	1.639
1060	1.7000	0.8232	1.561
915	1.9424	0.8063	1.506
805	2.1847	-	1.472
715	2.4271	-	1.445
650	2.6697	-	1.432
585	2.9121	0.7772	1.422
540	3.1547	0.7713	1.417
500	3.3940	-	1.407

Specific Volume at Saturation Pressure = 0.02474 cu. ft./lb.

* Calculated data for use in correcting subsurface oil sample.

P_s = Saturation pressure of sample at 180° F; psia
P = Pressure below saturation pressure; psia
V_t = Two-phase relative volume factor at 180° F and P.
V_{bp} = Saturated oil relative volume at 180° F and 2235 psig (2250 psia)

TABLE II

Flash Liberation[a] and Differential Liberation Results

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4., Sample No. 2

Date Taken: March 15, 1966

Sampling Conditions: Well Shut In

Properties of Saturated Oil:

Temperature, F	76	180
Saturation Pressure, psig	1775	2235

Gas Liberation and Shrinkage of Oil:
(Flash)

Pressure(p_1) psig	Temp. °F	Gas-Oil Ratio: cu. ft. at 60 F and psia/bbl. Residual Oil — Flashed at p_1	Flashed from p_1 to 0	Residual Oil Gravity °API at 60 F	Sp. Gr. Gas at 60 F (air=1)	V_R/V_S*
0	76	1011	-	50.2	0.9570	0.6550
50	76	847	39	52.4	0.8337	0.6938
100	76	786	87	52.6	0.7902	0.6980
200	76	711	171	52.5	0.7462	0.6950

(Differential at 180° F)

Pressure psig	Properties of Liberated Gas at 180° F and Indicated Pressure*** — Compressibility, Z	Viscosity, cp	Gas-Oil Ratio: cu. ft. at psia and 60 F/bbl. Reservoir Oil at psig, 180° F	Residual Oil Gravity °API at 60 F	V^{**}/V_S
2235	-	-	0		1.0000
1915	0.815	0.0159	91		0.9363
1660	0.826	0.0149	157		0.9034
1445	0.840	0.0141	222		0.8750
1110	0.861	0.0133	305		0.8405
770	0.886	0.0128	385		0.8031
490	0.917	0.0123	447		0.7788
270	0.945	0.0117	498		0.7588
120	0.965	0.0110	538		0.7281
0 (180° F)	1.000	0.0000	617		0.6693
0 (60° F)				50.9	0.6293

*V_R, Volume residual oil at 0 psig, 60 F
V_S, Volume saturated oil at 2235 psig, 180° F
**V, Volume saturated oil at indicated pressure, 180° F
***, Determined from calculated composition of equilibrium gas

a - Computer Values

TABLE II-A

Comparison of Experimental and Computed Flash Liberation Results

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4, Sample No. 2

Date Taken: March 15, 1966

(P_1) Pressure psig	Temperature °F	Gas-Oil Ratio - cu ft/bbl Residual Oil: Flashed at P_1		Flashed from P_1 to 0		Residual Oil Gravity °API at 60 F		V_R/V_S	
		Experimental	Computed	Experimental	Computed	Experimental	Computed	Experimental	Computed
0	76	-	-	1046	1011	50.4	50.2	0.6465	0.6550
50	76	843	847	41	39	51.8	52.4	0.6812	0.6938

Data Used in Flash Calculations

Component	Mol %	gal/mol
Hydrogen Sulfide	Nil	
Carbon Dioxide	3.23	9.09
Nitrogen	Nil	
Methane	37.50	
Ethane	6.65	
Propane	6.30	
Iso-Butane	1.37	
N-Butane	3.39	
Iso-Pentane	1.37	
N-Pentane	1.69	
Hexanes	3.36	15.40
Heptanes	5.44	16.08
Octanes	4.52	17.38
Nonanes	4.01	18.58
Heavier Fraction	21.17	29.25
Total	100.00	

K-value Source: NGAA (1957)
Convergence Pressure: 10,000

Unadjusted Flash Data

Molecular weight of heavier fraction	198
Density of heavier fraction, gm/cc at 60 F	0.8029
Specific volume of reservoir fluid at bubble point and 180° F temperature, cu. ft./lb.	0.02474
Mols per barrel	3.114

TABLE III

Hydrocarbon Analysis of Subsurface Oil Sample

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4, Sample No. 2

Date Taken: March 15, 1966

Component	Weight %	Density g/cc at 60 F	Molecular Weight
Hydrogen Sulfide	-		
Carbon Dioxide	1.84		
Nitrogen	-		
Methane	7.77		
Ethane	2.58		
Propane	3.59		
Iso-Butane	1.03		
N-Butane	2.55		
Iso-Pentane	1.28		
N-Pentane	1.59		
Hexanes	3.92	0.7004	90
Heptanes	7.03	0.7450	100
Octanes	6.42	0.7585	110
Nonanes	6.21	0.7739	120
Heavier Fraction	54.19	0.8029	198
Total	100.00		
Pentane-Free Fraction		0.7877	156

Orsat Analysis of Gas Liberated at 0 psig and 75° F

Component	Volume %
Hydrocarbons	92.9
Hydrogen Sulfide	0.0
Carbon Dioxide	7.1
Total	100.0

* Analysis of hydrogen sulfide and carbon dioxide free sample.

TABLE IV

Viscosity of Reservoir Oil at 180° F

Source: Esso Exploration Australia, Inc., Gippsland Shelf No. 4, Semple No. 2

Date Taken: March 15, 1966

Pressure, psig	Viscosity, cp	Density, gm/cc
3000	0.184	0.6576
2750	0.182	0.6529
2500	0.180	0.6506
2400	0.179	0.6492
2300	0.178	0.6478
2235	0.177	0.6470
2000	0.190	0.6567
1700	0.205	0.6690
1400	0.225	0.6813
1100	0.250	0.6936
800	0.280	0.7059
465	0.325	0.7197
300	0.355	0.7265
100	0.410	0.7347
0	0.611	0.7406

Saturation pressure of oil = 2235 psig @ 180° F

TABLE V

Compositional Analysis of Gas and Liquids at 0, 50, 100, and 200 psig

Source: Esso Exploration Australia, Inc.; Gippsland Shelf No. 4, Sample No. 2

Date Taken: March 15, 1966

Component	0 psig Flash		50 psig Flash		100 psig Flash		200 psig Flash	
	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %	Liquid Mol %	Vapor Mol %
Carbon Dioxide	0.067	5.384	0.319	5.834	0.570	5.966	1.026	5.990
Methane	0.373	62.785	1.755	69.473	3.143	72.847	5.996	76.950
Ethane	0.359	10.934	1.598	11.169	2.667	10.748	4.232	9.678
Propane	1.178	9.788	4.146	8.227	5.798	6.816	7.284	5.068
Iso-Butane	0.0586	1.904	1.563	1.198	1.862	0.864	2.008	0.571
N-Butane	2.041	4.309	4.411	2.476	5.001	1.733	5.212	1.109
Iso-Pentane	1.523	1.266	2.341	0.501	2.388	0.323	2.304	0.020
N-Pentane	2.113	1.402	3.008	0.512	3.018	0.324	2.880	0.020
Hexanes	6.516	1.211	6.738	0.338	6.423	0.209	5.941	0.128
Heptanes	12.340	0.741	11.298	0.200	10.607	0.124	9.723	0.077
Octanes	10.842	0.714	9.510	0.057	8.879	0.036	8.111	0.023
Nonanes	9.807	0.062	8.475	0.016	7.897	0.011	7.207	0.007
Heavier Fractions	52.254	0.001	44.837	0.000	41.747	0.000	38.075	0.000
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
	L = 0.40513	V = 0.59487	L = 0.47215	V = 0.52785	L = 0.50710	V = 0.49290	L = 0.55600	V = 0.44400

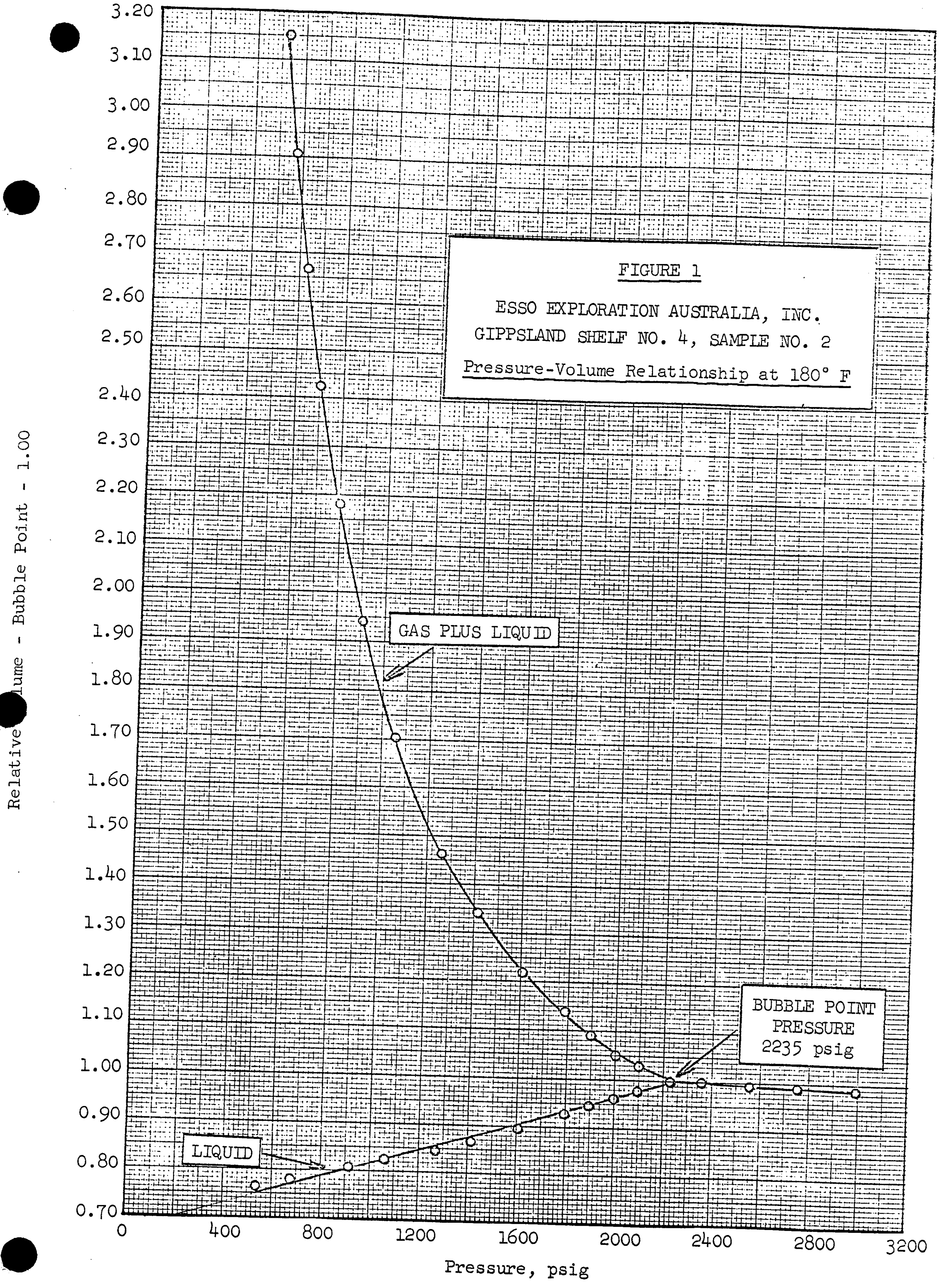


FIGURE 1
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 2
Pressure-Volume Relationship at 180° F
GAS PLUS LIQUID
BUBBLE POINT PRESSURE 2235 psig
LIQUID
Relative Volume - Bubble Point - 1.00
Pressure, psig
3.20
3.10
3.00
2.90
2.80
2.70
2.60
2.50
2.40
2.30
2.20
2.10
2.00
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0
400
800
1200
1600
2000
2400
2800
3200

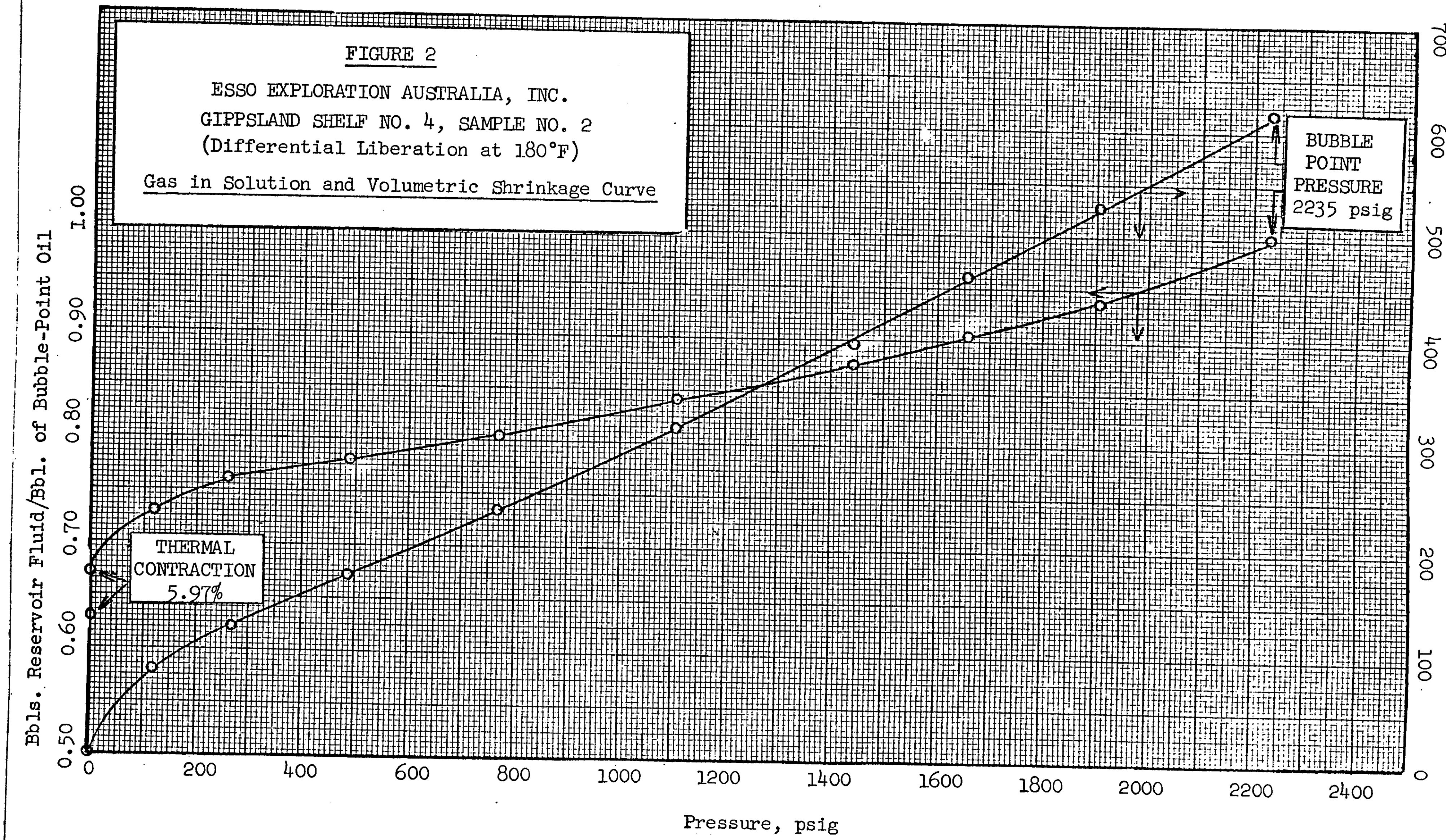


FIGURE 2
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 2
(Differential Liberation at 180°F)
Gas in Solution and Volumetric Shrinkage Curve
BUBBLE POINT PRESSURE 2235 psig
THERMAL CONTRACTION 5.97%
Bbls. Reservoir Fluid/Bbl. of Bubble-Point Oil
0.50
0.60
0.70
0.80
0.90
1.00
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
Pressure, psig
0
100
200
300
400
500
600
700

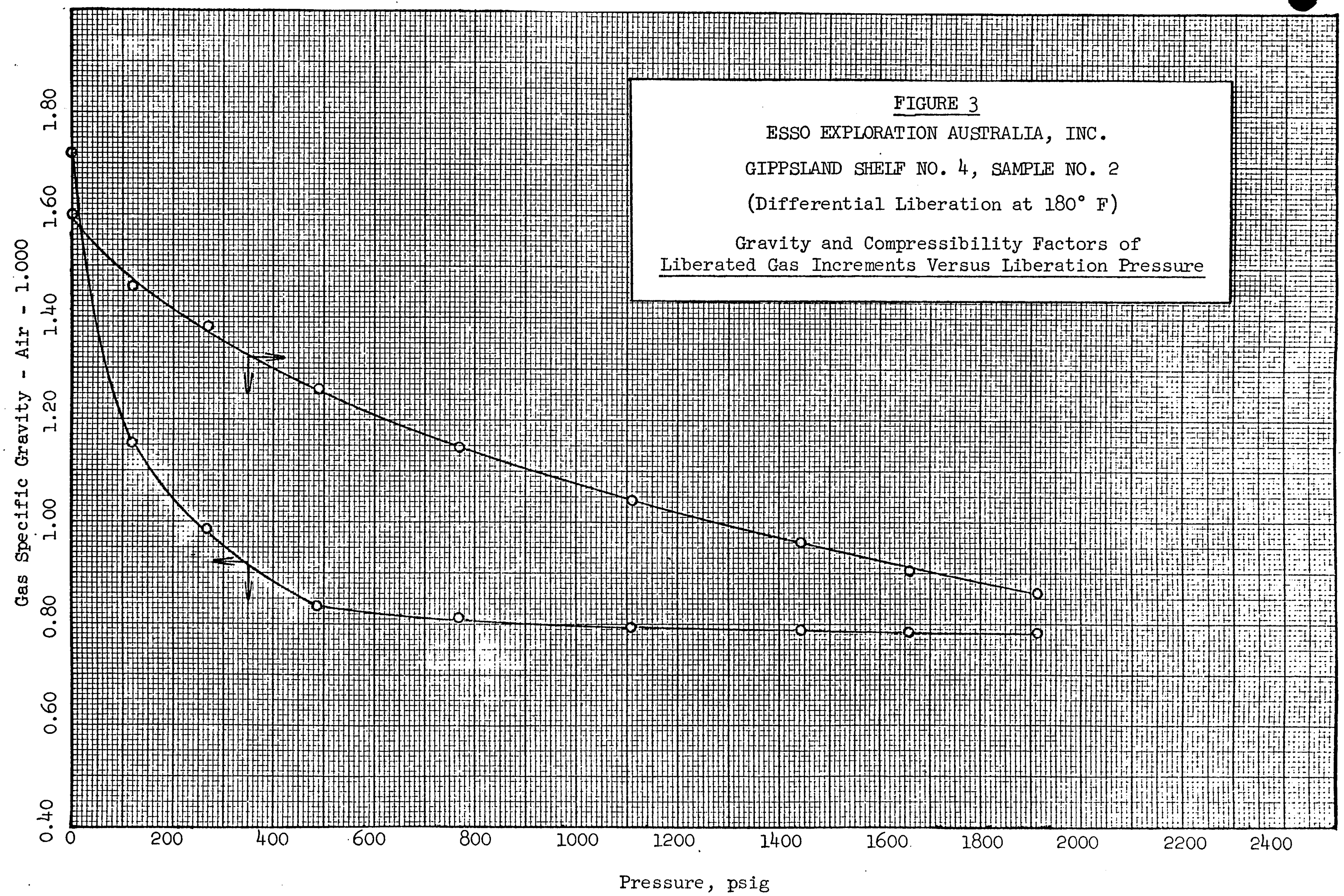


FIGURE 3

ESSO EXPLORATION AUSTRALIA, INC.

GIPPSLAND SHELF NO. 4, SAMPLE NO. 2

(Differential Liberation at 180° F)

Gravity and Compressibility Factors of Liberated Gas Increments Versus Liberation Pressure

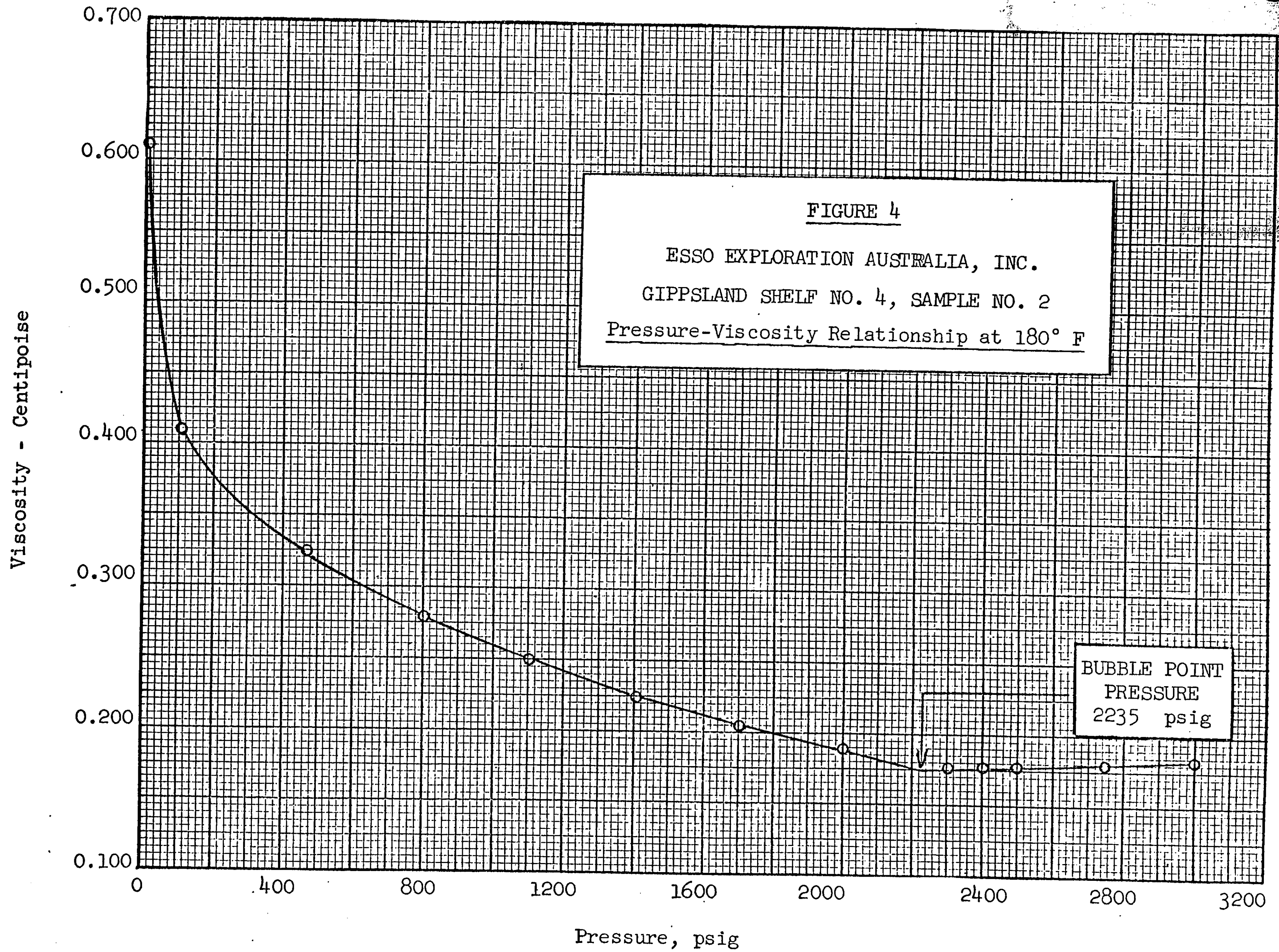


FIGURE 4
ESSO EXPLORATION AUSTRALIA, INC.
GIPPSLAND SHELF NO. 4, SAMPLE NO. 2
Pressure-Viscosity Relationship at 180° F
BUBBLE POINT PRESSURE 2235 psig
Viscosity - Centipoise
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0
400
800
1200
1600
2000
2400
2800
3200
Pressure, psig

APPENDIX 10

PALYNOLOGICAL REPORT

1

PALYNOLOGICAL REPORT ON CORE 12, ESSO GIPPSLAND SHELF No.4 WELL

The two samples taken from 7239 feet and 7251 feet in core 12, Esso Gippsland Shelf No.4 well provided fair concentrations of reasonably well preserved spores, pollen grains, and microplankton. The microfloras from both samples are essentially similar in composition and comprise the following species:

Spores	Cyathidites minor Couper
	C. splendens Harris
	Gleicheniidites cercinidites (Cookson)
	Laevigatosporites ovatus Wilson & Webster (7251 feet only)
Pollen	Dacrydiumites balmei Cookson
	D. ellipticus Harris (7251 feet only)
	Microcachyridites antarcticus Cookson
	Nothofagidites emarcida (Cookson)
	Podocarpidites ellipticus Cookson
	Phyllocladidites mawsonii Cookson
	Proteacidites subscabratus Couper
	P. crassipora Harris (7239 feet only)
	P. reticuloscabratus Harris (7239 feet only)
	Polyporina fragilis Harris (7239 feet only)
	Tricolpites gillii Cookson
Microplankton	Cyclonephelium retiintextum Cookson
	Deflandrea delineata Cookson & Eisenack
	Svalbardella australina Cookson & Eisenack

The three species of microplankton have been described recently (Cookson & Eisenack 1965a,b) from the Pebble Point Formation in western Victoria; the distribution of the species in this formation is apparently restricted to the basal beds. Harris (1965) records a similar restricted distribution in the Pebble Point Formation for Dacrydiumites balmei Cookson, a species that occurs only in his Triorites edwardsii Assemblage. Harris assigns a Middle Paleocene age to his T. edwardsii Assemblage. A similar age has been suggested (Dettmann 1965) for beds at 9514 feet in Gippsland Shelf No.3 well and at 8695 feet in Gippsland Shelf No.1 well. These horizons may be considered equivalents of beds at 7239 feet and 7251 feet in Gippsland Shelf No.4 well.

2/5

The microplankton recovered in the present investigation comprises an association that elsewhere occurs in stratigraphically lower horizons than that reported (Dettmann 1965) from between 7836-43 feet in Gippsland Shelf No.3 well (see Cookson and Eisenack 1965c).

References

Cookson, I.C. and Eisenack, A. 1965a. Microplankton from the Paleocene Pebble Point Formation, south-western Victoria. Part 1. Proc. Roy. Soc. Vict., 78, 137-141.

Cookson, I.C. and Eisenack, A. 1965b. Microplankton from the Paleocene Pebble Point Formation, south-western Victoria. Proc. Roy. Soc. Vict., 79, 139-146.

Cookson, I.C. and Eisenack, A. 1965c. Microplankton from the Dartmoor Formation, SW. Victoria. Proc. Roy. Soc. Vict., 79, 133-137.

Dettmann, M.E. 1965. Palynological report on sidewall cores from between 7783 feet and 9514 feet in Esso Gippsland Shelf No.3 well. Unpublished report submitted to Esso Exploration Australia, Inc., 17/12/65.

Harris, W.K. 1965. Basal Tertiary microfloras from the Princetown area, Victoria, Australia. Palaeontographica, 115B, 75-106.

21st February, 1966.

Mary E. Dettmann,
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University of Queensland,
St. Lucia, Queensland.

PALYNOLOGICAL REPORT ON SIDEWALL CORES FROM BETWEEN 6650 FEET AND 7524 FEET IN ESSO GIPPSLAND SHELF NO.4 WELL

Palynological evidence obtained from sidewall cores in Esso Gippsland Shelf No.4 well indicates that sediments between 6650 feet and 7524 feet are Lower Tertiary (Paleocene) in age with a possible extension into the Upper Cretaceous (Senonian or later). A Paleocene age has already been suggested for core 12 (7239-51 feet) in this well (Dettmann 1966). The sidewall cores examined in the present study yielded low concentrations of plant microfossils that exhibit fair to good preservation. Species identified in each of the samples are tabulated in Table 1 and a discussion of their stratigraphical significance is presented below.

Microfloral Assemblages and Correlations

The sample from 7524 feet yielded poor concentrations of spores and pollen grains. The only stratigraphically significant species observed include *Tricolpites gillii* Cookson and *Phyllocladidites mawsonii* Cookson both of which are known from uppermost Cretaceous (Senonian and later) and Lower Tertiary deposits.

Samples higher in the sequence (between 7214 and 7358 feet) yielded more diverse microfloras in which microplankton are rare components. Microplankton species identified include *Cyclonephelium retiintextum* Cookson which is known from Upper Cretaceous and Middle Paleocene strata (Cookson 1965, Cookson and Eisenack 1965). The spore and pollen species *Triorites edwardsii* Cookson & Pike and *Dacrydiumites balmei* Cookson were also observed, their combined occurrence suggesting conformity of the microflora with Harris's (1965) *Triorites edwardsii*

Assemblage. As discussed previously (Dettmann 1965), this assemblage is no younger than Middle Paleocene and may extend into the Upper Cretaceous. The sample from 7006 feet yielded a meagre microflora, which, in containing Dacrydiumites ellipticus Harris, conforms with the T. edwardsii Assemblage. The presence of the T. edwardsii Assemblage in horizons between 7006 feet and 7358 feet in Gippsland Shelf No.4 well indicates their correlation with beds between 8336 feet and 9514 feet in Gippsland Shelf No.3 well and at 8695 feet in Gippsland Shelf No.1 well.

The uppermost sample examined from 6650 feet contains Triorites edwardsii and Tricolpites gillii together with the microplankton Baltisphaeridium taylorii Cookson & Eisenack and Cordosphaeridium bipolare Cookson & Eisenack. A similar microfloral assemblage was obtained from Gippsland Shelf No.3 well between 7836 feet and 7843 feet (Dettmann 1965). The microfloras obtained from these horizons have been shown to be Middle to Upper Paleocene in age and a comparable age is suggested for the horizon at 6650 feet in Gippsland Shelf No.4 well.

References

Cookson, I.C. 1965. Cretaceous and Tertiary micropalnkton from south-eastern Australia. Proc. Roy. Soc. Vict., 78, 85-93.

Cookson, I.C., and Eisenack, A. 1965. Micropalnkton from the Paleocene Pebble Point Formation, south-western Victoria. Proc. Roy. Soc. Vict., 78, 137-141.

Dettmann, M.E. 1965. Palynological report on sidewall cores from between 7783 feet and 9514 feet in Esso Gippsland Shelf No.3 well. Unpublished report submitted to Esso Exploration Australia, Inc., 17/12/65.

Dettmann, M.E. 1966. Palynological report on core 12, Esso Gippsland Shelf No.4 well. Unpublished report submitted to Esso Exploration Australia, Inc., 21/2/66.

Harris, W.K. 1965. Basal Tertiary microfloras from the Princetown area, Victoria, Australia. Palaeontographica, 115B, 75-106.

28th February, 1966.

Mary E. Dettmann,
Department of Geology,
University of Queensland,
St. Lucia, Queensland.

Group	Species	7524'	7358'	7214'	7006'	6650'
Spores	Cyathidites australis and/or C. minor	+	+	+	+	
	Cyathidites splendens				+	
	Gleicheniidites cercinidites		+	+	+	+
	Laevigatosporites ovatus	+		+		+
	Trilites tuberculiformis		+	+		
Pollen	Microcachyridites antarcticus					+
	Podocarpidites ellipticus	+	+	+		
	Dacrydiumites balmei			+		
	Dacrydiumites ellipticus				+	
	Dacrydiumites florinii		+			+
	Phyllocladidites mawsonii	+	+	+	+	+
	Triorites edwardsii		+	+		+
	Triorites harrisii	+				
	Tricolpites gillii	+	+			+
	Nothofagidites emarcida		+	+	+	+
	Nothofagidites cf. brachyspinulosa			+		+
	Proteacidites subscabratus	+	+	+	+	+
	Proteacidites reticuloscabratus	+				+
	Proteacidites adenanthoides				+	
	Proteacidites similis					+
	Stephanopollenites obscurus		+			
	Polyporina fragilis				+	+
	Tricolporites prolata					+
Micro-plankton	Cyclonephelium retiintextum		+	+		
	Baltisphaeridium taylorii					+
	Cordosphaeridium bipolare					+

Table 1. Distribution of selected spores, pollen, and microplankton in samples from between 6650 feet and 7524 feet in Esso Gippsland Shelf No.4 well.

+ - species present

INTERPRETATIVE

BASIN GIPPSLAND DATE

WELL NAME MARLIN-1 ELEVATION +31 feet

PALYNOLOGIC ZONES	HIGHEST DATA Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg.	2 way time
P. tuberculatus										
U. N. asperus										
M. N. asperus										
L. N. asperus	4570	1				4583	1			
P. asperopolus	4592	1				4674	1			
U. M. diversus	4750	2				4921	2			
M. M. diversus										
L. M. diversus	5040	1				5126	1	5184	2	
U. L. balmei	6610	1				6855	1			
L. L. balmei	7112	1				7825	1			
T. longus	8463	0				8463	0			
T. lilliei										
N. senectus										
C. trip./T.pach										
C. distocarin.										
T. pannosus										
T.D.	8485									

COMMENTS: Dinoflagellate Zones

Wetzeliella homomorpha Zone 6610(1) - 6855(1)

Eisenackia crassitabulata Zone 7240(2) - 7250(2)

Deflandrea druggii Zone 8468(1)

Deflandrea heterophylcta Zone 4570(1) - 4583(2)

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. DATE Dec. 1971.

DATA REVISED BY: ADP. DATE Jan. 1975.

FORM No R 315 12/72

2/13

MARLIN - 1

7524'	7358'	7214'	7006'	6650'	Species	Group
+	+	+	+		Cyathidites australis and/or C. minor	Spores
			+		Cyathidites splendens	Spores
	+	+	+	+	Gleicheniidites cercinidites	Spores
+		+		+	Laevigatosporites ovatus	Spores
	+	+			Trilites tuberculiformis	Spores
				+	Microcachyridites antarcticus	Pollen
+	+	+			Podocarpidites ellipticus	Pollen
		+			Dacrydiumites balmei	Pollen
			+		Dacrydiumites ellipticus	Pollen
	+			+	Dacrydiumites florinii	Pollen
+	+	+	+	+	Phyllocladidites mawsonii	Pollen
	+	+		+	Triorites edwardsii	Pollen
+					Triorites harrisii	Pollen
+	+			+	Tricolpites gillii	Pollen
	+	+	+	+	Nothofagidites emarcida	Pollen
		+		+	Nothofagidites cf. brachyspinulosa	Pollen
+	+	+	+	+	Proteacidites subscabratus	Pollen
+				+	Proteacidites reticuloscabratus	Pollen
			+		Proteacidites adenanthoides	Pollen
				+	Proteacidites similis	Pollen
	+				Stephanopollenites obscurus	Pollen
			+	+	Polyporina fragilis	Pollen
				+	Tricolporites prolata	Pollen
	+	+			Cyclonephelium retiintextum	Micro-plankton
				+	Baltisphaeridium taylorii	Micro-plankton
				+	Cordosphaeridium bipolare	Micro-plankton

Table 1. Distribution of selected spores, pollen, and microplankton in samples from between 6650 feet and 7524 feet in Esso Gippsland Shelf No.4 well.

+ - species present

INTERPRETATIVE

Form [illegible] 3/71 3/13 [illegible]

BASIN [illegible] BY David TAYLOR

WELL NAME MARLIN-1 DATE 20 [illegible] 1971 ELEV. +31'

Foram [illegible]

	Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
A				1000	3	
Alternate						
B	1050	3		1150	3	
Alternate						
C	1200	3		1700	3	
Alternate						
D_1	1800	3		2500	3	
Alternate						
D_2	2600	3		3300	3	
Alternate						
E	3400	3		3850	3	
Alternate						
F						
Alternate						
G						
Alternate						
H_1	3900	3		4100	3	
Alternate						
H_2	4200	3		4300	3	
Alternate						
I_1	4400	3		4518	3	
Alternate						
I_2						
Alternate						
J_1						
Alternate						
J_2						
Alternate						
K						
Alternate						
Pre K	5280 7240	2 2		5314 7250	2 2	

COMMENTS: No conventional or sidewall cores in sequence down to 4518' — thus very low reliability.

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

4/13

MARLIN-1

FORMAINIFERAL SEQUENCE - ESSO GIPPSLAND SHELF NO. 4 WELL

By

David J. Taylor
Geological Survey of Victoria

Unpublished report 8/1966.

MARLIN - 1

FORAMINIFERAL SEQUENCE - ESSO GIPPSLAND SHELF

NO. 4 WELL

By

David J. Taylor

Geological Survey of Victoria

Unpublished report 8/1966.

SUMMARY OF SEQUENCE

Depth in Feet	Biostrat. Unit	Age
- 850	A	UPPER MIOCENE
850-1200	B	" "
1200-1800	C	MIDDLE MIOCENE
1800-2300	D	" "
2300-2700	E	" "
2700-3000	F	LOWER MIOCENE
3000-3700	G	" "
3700-4300	H	" "
4300-4510	I	OLIGOCENE
4510-4800	J	LOWER OLIGOCENE
4800 (approx.)	K	UPPER EOCENE
?4800-6500		? PALEOCENE ?
6500-7267		UPPERMOST CRETACEOUS
7267-8485 (T.D.)	No new fauna in cuttings of fauna in cores found.	Probable UPPER CRETACEOUS

MARLIN - 1

INTRODUCTION:

Esso Gippsland Shelf No.4 Well was drilled in 197 feet of water, 27 miles south-east of Lakes Entrance, on a structure separate from the "Gippsland Shelf Structure" and some 29 miles east of the No.1 well.

All depths, discussed here, were those shown on submitted samples. The datum for all samples was taken from the rotary table at +31 feet M.S.L.

Cutting samples and 15 cores were examined between 758 feet (first returns) and 8485 feet (total depth). The 20" casing shoe was at 728 feet; the 13⅜" casing shoe was at 2252 feet; and the 9⅝" casing shoe at 6289 feet. Rotary cutting contamination is present throughout but decreases considerably below the 9⅝" casing shoe (at 6289 feet).

THE FORAMINIFERAL SEQUENCE:

The sequence is summarised on the title page. An uninterrupted mid-Tertiary sequence extends from the upper Miocene (from 758 feet or higher) to uppermost Eocene at approximately 4800 feet. Possible upper Paleocene planktonic species are present in core 6 (4891 to 4921 feet). A sparse arenaceous fauna with rare calcareous forms was found below 6500 feet. This fauna has Upper Cretaceous affinities to the Upper Cretaceous to Lower Tertiary faunas of western Victoria as described by Taylor (1964 and 1965a).

BIOSTRATIGRAPHIC CORRELATION:

(i) MID TERTIARY:

The mid-Tertiary sequence is correlation with the zonule scheme established by Taylor (1965b) for Esso Gippsland Shelf No.1 well.

(a) Upper Miocene: ? to 1200 feet.

A fairly nondescript benthonic fauna is present down to 850 feet. This fauna includes *Cancris auriculus*, *Elphidium imperatrix*, *Notorotalia clathrata*, *Rosalina mitchelli* and *Uvigerina* sp.1 which is typical of Zonule A as well as of the Mitchellian (upper Miocene) and Kalimnan (lower Pliocene) faunas of Carter (1964). Taylor (1965b) regarded Zonule A as being upper Miocene because of its close association with the definite upper Miocene Zonule B. But Zonule A is an expression of environmental change, thus can not be considered as a laterally consistant biostratigraphic unit.

The highest appearance of Globorotalia menardii Group is at 850 feet marking the top of Zonule B.

(b) Middle Miocene: 1200 to 2700 feet.

The top of the middle Miocene is marked by the highest appearance of Globorotalia mayeri and benthonic species which do not extend above Zonule C. The top of the middle Miocene appears to form a horizontal surface at 1700 feet on the crest and southeast flank of the "Gippsland Shelf/No.1 Structure" (No.1 to 3 wells). This surface is 500 foot higher in the No.4 well, suggesting that the No.4 structure moved independently to the No.1 structure. The total thickness of the middle Miocene is similar to that in the No.1 well, though both are considerably less than that in the No.3 well which was drilled on the flank of the No.1 structure.

The complete middle Miocene sequence is represented with Zonules C, D and E present. The top of Zonule E is marked by the highest appearance of Globigerinoides triloba, G. rubra and G. bispherica and the restricted presence of Plectofrondicularia australis. Although the vertical range of Globigerinoides spp. extends higher, its extinction at this level appears to be a consistent feature on the Gippsland Shelf and in cores is seldom associated with Orbulina universa.

(c) Lower Miocene: 2700 to 4300 feet.

Unlike the No.1 well, the No.4 well contains a complete sequence of lower Miocene. Zonules F and G, missing in the No.1 well, are present. There is an abrupt change in the benthonic fauna at 2700 feet with the highest appearance of Cibicides perforatus, Anomalinoides procilligera, Astrononion centroplax, Gyroidinoides sp.4 and the arenaceous form Vulvulina sp. Larger foraminifera, including Lepidocyclina sp. were not reported. The large costate "Uvigerina" sp.9 and Uvigerina sp.10 were first reported at 3000 feet. There is a gradual increase in arenaceous forms down the section. Haplophragmoides spp. (including H. rotundata) are common below 3300 feet. For the above reasons the top of Zonule G. was placed at 3000 feet.

Below 3700 feet, there is a marked decline in Globigerinoides spp. and a predominance of Globigerina woodi. Globorotalia cf. miozea is present below 3700 feet. These factors strongly indicate Zonule H.

(d) Oligocene: 4300 to 4510 feet.

A thin development of Zonule I is present between 4300 and 4510 feet. Such Oligocene planktonic species as Globigerina euapertura, Globorotalia opima and G. extans are present.

(e) Lower Oligocene - Uppermost Eocene: 4510 to 4800 feet.

The highest appearance of Globorotalia testarugosa is recorded at 4510 feet which is within the calcareous section, some 30 feet above the incoming of sand in the cuttings. G. testarugosa is the index species of Zonule J and its upper range is very consistent. Jenkins (1960) first reported it from the basal 30 feet of the Lakes Entrance Formation marls (i.e. 30 ft. above the "Greensand"). I have shown a similar range in other wells.

At 4800 feet Glogigerina linaperta and G. angipora suggest an upper Eocene age and the presence of Zonule K.

(ii) LOWER TERTIARY (? PALEOCENE): 4800 to 6500 feet.

The upper Eocene fauna, Zonule K is probably at the Eocene/Oligocene boundary and is equivalent to Carter's (1964) Faunal Unit 3. Globigerapsis faunas were not found in this section and thus Carter's upper Eocene Faunal Units 1 and 2 are absent, as they are in every Gippsland section (on and off shore) I've examined. This strongly suggests that there was very little marine influence in upper Eocene sedimentation in the Gippsland Basin. There is no evidence of marine sedimentation during the lower and middle Eocene.

Core No.6 (4891-4921 feet) contains a sparse fauna of small planktonic specimens. Poor preservation makes this fauna perplexing. One species could be poorly preserved juvenile Globorotalia cf. miozea and thus the result of mud contamination penetrating the porous sandstone core. G. cf. miozea does not range below Zonule I. On the other hand, this species could be Globorotalia pseudomenardii and specimens compare closely with my western Victorian material. McGowran (1965) regards G. pseudomenardii as being an upper Paleocene species in western Victoria, whilst Berggren (1965) and others demonstrate that this species is restricted to, but does not reach the top of, the upper Paleocene of the Gulf Coast (U.S.A.) and the Caucasus (U.S.S.R.). Other species present in core 6 are stratigraphically nondescript. On the whole, the material cannot be taken as concrete evidence of a Paleocene age, especially as morphologically convergent forms to G. pseudomenardii (e.g. G. cf. miozea and G. menardii) are present higher in the well and are noted as rotary cutting contaminants.

(iii) UPPER CRETACEOUS: 6500 to 7267 feet.

Core No.12 (7237 to 7267 feet) contains sporadic and sparse faunas of arenaceous foraminifera, including Ammobaculites goodlandensis, A. fragmentaria, A. subcretacea, Ammodiscus sp. (non A. parri), Bathysiphon sp., Haplophragmoides paupera, H. sp. B of Taylor 1964 and Reophax sp. Calcareous species are extremely rare, consisting of single specimens of Nodosaria alternistriata, Lenticulina navarroensis, Nonionella sp. and a buliminid. Most of these species make their first appearance at 6500 feet.

Specifically the fauna contains elements of the Upper Cretaceous faunas of western Victoria described by Taylor (1964). Detailed work on the western Victorian Paleocene arenaceous faunas by Taylor (1965a and manuscript) shows subtle differences between the Upper Cretaceous and Paleocene arenaceous faunas, in that:

UPPER CRETACEOUS (Senonian)		PALEOCENE (mid to upper)
Ammobaculites goodlandensis	replaced by	A. expandus
A. subcretacea	" "	A. midwayensis
Ammodiscus sp.	" "	A. parri
Haplophragmoides spB.	becomes very rare and is replaced by	H. complanata

Fig.1 shows the distribution of Haplophragmoides faunas in western Victoria and their distributions are related to diagnostic planktonic species. The above data certainly indicates an Upper Cretaceous age for core 12 faunas and suggests that they represent the uppermost Cretaceous (i.e. Senonian to ? Maastrichtian). The presence of Haplophragmoides paupera (= H. sp.A of Taylor 1964) and Ammobaculites subcretacea precludes a Turonian age.

The rare calcareous species confirm the age determination, as neither Nodosaria alternistriata and Lenticulina navarroensis are reported in the western Victorian Paleocene by McGowran (1965) or Taylor (manuscript).

? UPPER CRETACEOUS: 7267 to 8485 feet (T.D.)

No new faunas were reported below 7267 feet, but in all probability this is within the Upper Cretaceous.

DEPOSITIONAL HISTORY:

The oldest fauna in this section is designated as uppermost Cretaceous. This predominately arenaceous fauna is sparse. Analagous faunas are euryhaline, living today in lagoons and estuaries where there is a high coastal run-off, resulting in diluted, muddy sea water, which is deleterious to most calcareous foraminifera. Taylor (1964) discusses a similar environment in the Upper Cretaceous Paaratte Formation of western Victoria. Coal deposits associated with these Upper Cretaceous sediments support the contended lagoonal and estuarine environment. Ingressions of sea water are obviously sporadic. The sedimentary sequence could be best defined as paralic.

At this stage no comment can be made on Paleocene deposition.

Both the Upper Cretaceous and the ? Paleocene faunas would have been the result of sporadic ingressions onto coastal lowlands from the continental shelf. These ingressions can not be regarded as transgressions as they are short-lived and are by no means wide-spread. However a definite transgression was initiated in the uppermost Eocene and deposition continued to at least the upper Miocene. The facies sequence is broadly similar to that described for the Gippsland Shelf No.1 sequence by Taylor (1965b), with the exception that there is no hiatus in the lower Miocene of the No.4 sequence. During the lower Miocene there was gradual deepening and the early middle Miocene deposition (Zonule E) was in deeper water than the No.1 sequence, where deposition had just recommenced after the lower Miocene hiatus.

GEOLOGICAL SETTING:

When comparing the Mid-Tertiary sequence of Gippsland Shelf No.1, No.2 with Gippsland Shelf No.4, it is apparent that the No.4 well is structurally unrelated from the former two wells in that:

(i) There is no hiatus in the lower Miocene in No.4.

(ii) The top of the middle Miocene appears to form a horizontal surface between No.1 and No.2 at the 1700 foot level. This surface is some 500 feet higher in No.4.

In none of the wells does there appear to be a hiatus between the calcareous sequence and the underlying sandy sequence. In No.2, No.3 and No.4 wells the lowermost Oligocene Zonule J fauna is present in the basal 30 feet of the Calcareous sequence as well as in the top of the sand. This situation can be directly correlated with the Lakes Entrance area where Zonule J is in the basal 30 feet of the Micaceous Marl Member of the Lakes Entrance Formation and the top of the Greensand Member of the Lakes Entrance Formation.

The possibility of upper Paleocene sediments below 4800 feet is of particular interest, as above 4800 feet to 4510 feet uppermost Eocene to lower Oligocene faunas are present. If this Paleocene age is substantiated, then there must have been a depositional break at 4800 feet.

I have already reported a sparse Cretaceous foraminiferal fauna in Holland's Landing bore (Bengworden South No.1), although this determination was disputed on palyonological grounds (refer also Hocking and Taylor, 1964). The faunas in Gippsland Shelf No.4 are also sparse but do provide concrete evidence of marine influence during the Upper Cretaceous in the Gippsland Basin. In terms of Hocking and Taylor's (l.c) structural division of the Gippsland Basin, Holland's Landing bore is within the Lake Wellington Trough of marine Tertiary deposition. This trough trends south east and Gippsland Shelf No.4 is within this trend. Taylor (1964) found that the Upper Cretaceous marine sedimentation trended from the south east in western Victoria. Thus it is suspected that the Lake Wellington Trough may well have been effective during the Upper Cretaceous as well as during the mid-Tertiary, the magnitude of the Upper Cretaceous "down-warping" may have been minute as only marine ingressions in two localities have as yet been noted.

...

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TAYLOR, D.J., 1965b. The mid-Tertiary foraminiferal sequence Esso Gippsland Shelf No.1 Well. Appendix to Comm. Petrol. Search Subsidary Acts Publ. (in press).

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13/13

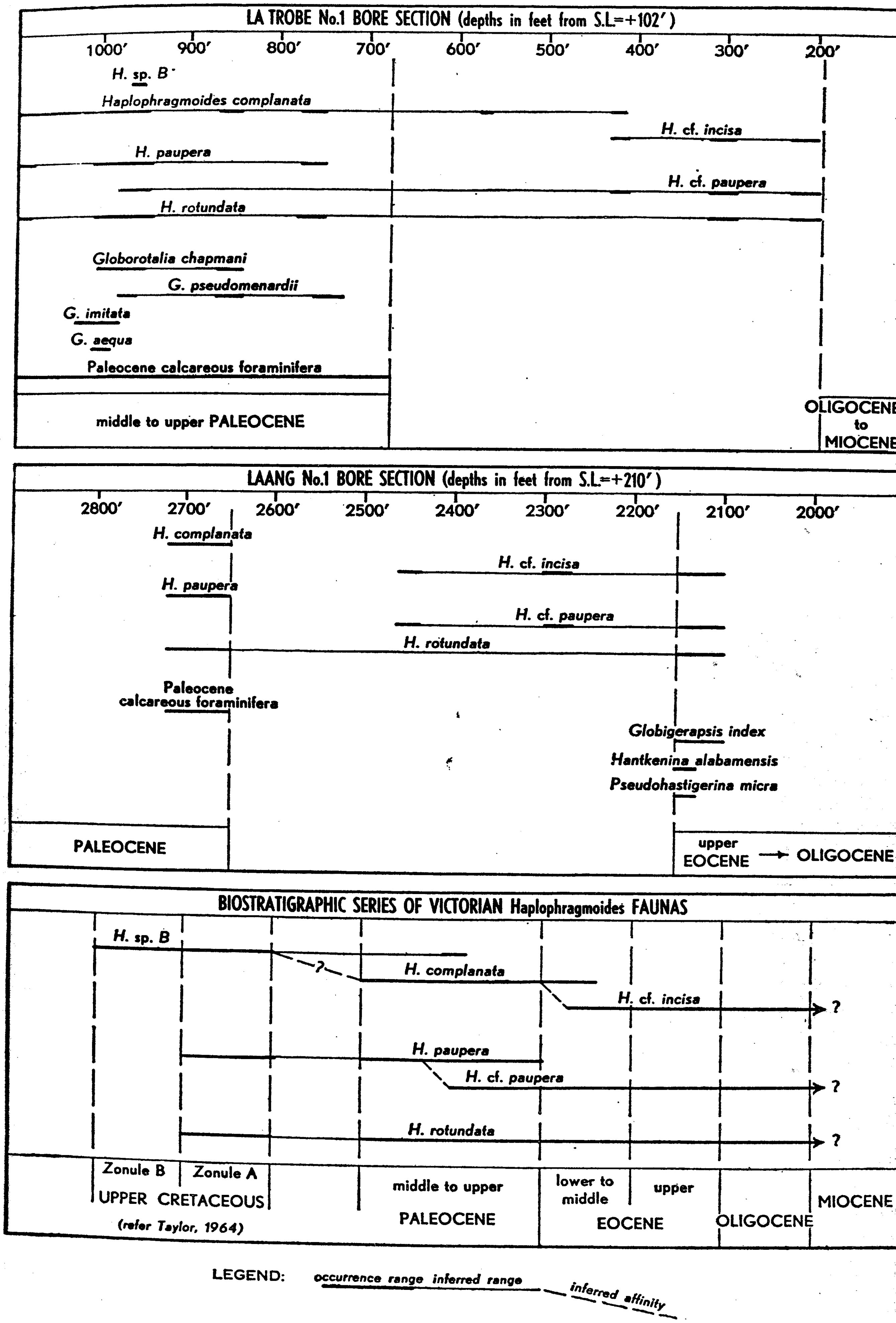
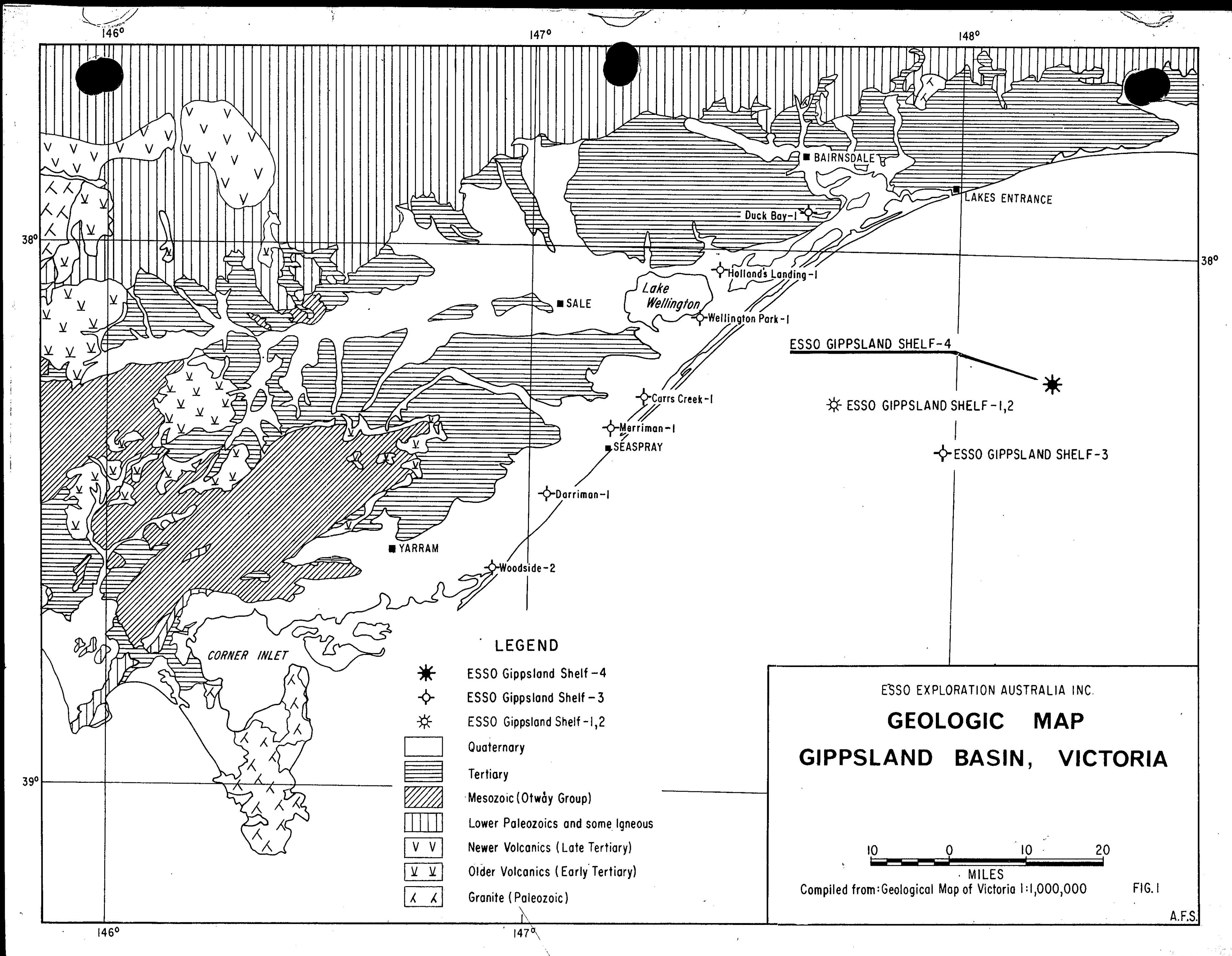


FIG. 1 – Stratigraphic distribution of Upper Cretaceous and Lower Tertiary Haplophragmoides faunas in relation to diagnostic planktonic faunas. Figure copied from Taylor (1965a).

ADDED ENCLOSURES

(Added by D.N.R.E 24/5/99)


146°
147°
148°
38°
39°
BAIRNSDALE
LAKES ENTRANCE
Duck Bay-1
Holland's Landing-1
Lake Wellington
SALE
Wellington Park-1
ESSO GIPPSLAND SHELF-4
ESSO GIPPSLAND SHELF-1,2
ESSO GIPPSLAND SHELF-3
Carrs Creek-1
Merriman-1
SEASPRAY
Darriman-1
YARRAM
Woodside-2
CORNER INLET
LEGEND
ESSO Gippsland Shelf-4
ESSO Gippsland Shelf-3
ESSO Gippsland Shelf-1,2
Quaternary
Tertiary
Mesozoic (Otway Group)
Lower Paleozoics and some Igneous
Newer Volcanics (Late Tertiary)
Older Volcanics (Early Tertiary)
Granite (Paleozoic)
ESSO EXPLORATION AUSTRALIA INC.
GEOLOGIC MAP
GIPPSLAND BASIN, VICTORIA
10 0 10 20
MILES
Compiled from: Geological Map of Victoria 1:1,000,000
FIG. 1
A.F.S.

PE905636

This is an enclosure indicator page.
The enclosure PE905636 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905636 has the following characteristics:

ITEM_BARCODE =	PE905636
CONTAINER_BARCODE =	PE902927
NAME =	Logs and Log Analysis
BASIN =	GIPPSLAND
PERMIT =	PEP/38
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Logs and Log Analysis (from WCR) for Marlin-1
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	8/06/88
W_NO =	W496
WELL_NAME =	MARLIN-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO EXPLORATION AUSTRALIA INC..

(Inserted by DNRE - Vic Govt Mines Dept)

PE905637

This is an enclosure indicator page.
The enclosure PE905637 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905637 has the following characteristics:

ITEM_BARCODE = PE905637
CONTAINER_BARCODE = PE902927
NAME = Time Depth curve
BASIN = GIPPSLAND
PERMIT = PEP/38
TYPE = WELL
SUBTYPE = VELOCITY_CHART
DESCRIPTION = Time Depth Curve (from WCR) for Marlin-1
REMARKS =
DATE_CREATED =
DATE_RECEIVED =
W_NO = W496
WELL_NAME = MARLIN-1
CONTRACTOR =
CLIENT_OP_CO = ESSO EXPLORATION AUSTRALIA INC..

(Inserted by DNRE - Vic Govt Mines Dept)

PE905635

This is an enclosure indicator page.
The enclosure PE905635 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905635 has the following characteristics:

ITEM_BARCODE =	PE905635
CONTAINER_BARCODE =	PE902927
NAME =	Porosity vs. Permeability Plot
BASIN =	GIPPSLAND
PERMIT =	PEP/38
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Porosity vs. Permiability Plot
REMARKS =	
DATE_CREATED =	28/10/66
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	MARLIN-1
CONTRACTOR =	
CLIENT_OP_CO =	

(Inserted by DNRE - Vic Govt Mines Dept)

PE905624

This is an enclosure indicator page.
The enclosure PE905624 is enclosed within the container PE902927 at this location in this document.

The enclosure PE905624 has the following characteristics:

ITEM_BARCODE =	PE905624
CONTAINER_BARCODE =	PE902927
NAME =	Structure Contour Map
BASIN =	GIPPSLAND
PERMIT =	PEP/38
TYPE =	SEISMIC
SUBTYPE =	STRUCTURE_MAP
DESCRIPTION =	Structure Contour Map on Unconformity at Base of Marine Tertiary (from WCR) for Marlin-1
REMARKS =	Interpretive Map only
DATE_CREATED =	23/03/65
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	MARLIN-1
CONTRACTOR =	
CLIENT_OP_CO =	ESSO EXPLORATION AUSTRALIA INC., SYDNEY, N.S.W.

(Inserted by DNRE - Vic Govt Mines Dept)

PE601521

This is an enclosure indicator page.
The enclosure PE601521 is enclosed within the container PE902927 at this location in this document.

The enclosure PE601521 has the following characteristics:

ITEM_BARCODE =	PE601521
CONTAINER_BARCODE =	PE902927
NAME =	Composite Well Log
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	COMPOSITE_LOG
DESCRIPTION =	Composite Well Log of Esso Gippsland Marlin 1. Enclosure 4 of WCR.
REMARKS =	
DATE_CREATED =	03/02/1966
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	Marlin-1
CONTRACTOR =	ESSO
CLIENT_OP_CO =	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE903907

This is an enclosure indicator page.
The enclosure PE903907 is enclosed within the container PE902927 at this location in this document.

The enclosure PE903907 has the following characteristics:

ITEM_BARCODE =	PE903907
CONTAINER_BARCODE =	PE902927
NAME =	Marlin 1 well history chart
BASIN =	GIPPSLAND
PERMIT =	PEP38
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Marlin 1 Well history chart (figure-5 from WCR)
REMARKS =	
DATE_CREATED =	10/04/66
DATE_RECEIVED =	
W_NO =	W496
WELL_NAME =	Marlin-1
CONTRACTOR =	
CLIENT_OP_CO =	Esso Exploration Australia Inc

(Inserted by DNRE - Vic Govt Mines Dept)

PE902928

This is an enclosure indicator page.
The enclosure PE902928 is enclosed within the container PE902927 at this location in this document.

The enclosure PE902928 has the following characteristics:

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     ITEM_BARCODE = PE902928
CONTAINER_BARCODE = PE902927
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            BASIN = GIPPSLAND
           PERMIT =
             TYPE = WELL
          SUBTYPE = CROSS_SECTION
      DESCRIPTION = Cross sections Before & after drilling
                    Esso Gippsland Marlin1
          REMARKS =
     DATE_CREATED =
    DATE_RECEIVED =
             W_NO = W496
        WELL_NAME = Marlin-1
       CONTRACTOR = ESSO
     CLIENT_OP_CO = ESSO
```

(Inserted by DNRE - Vic Govt Mines Dept)