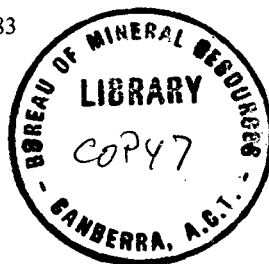


COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Petroleum Search Subsidy Acts

PUBLICATION No. 83



SUMMARY OF DATA AND RESULTS

BASS BASIN, TASMANIA

Esso Bass No. 1 and No. 2 Wells

OF

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
(formerly ESSO EXPLORATION AUSTRALIA INC.)

Published by
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and issued under the Authority of the Hon. R. W. Swartz
Minister for National Development
1970

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

MINISTER: THE HON. R. W. SWARTZ, M.B.E., E.D., M.P.

SECRETARY: L. F. BOTT, D.S.C.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: N. H. FISHER

THIS REPORT WAS PREPARED FOR PUBLICATION IN THE PETROLEUM EXPLORATION BRANCH

ASSISTANT DIRECTOR: L. W. WILLIAMS

FOREWORD

Under the Petroleum Search Subsidy Act 1959-1967, agreements relating to subsidized operations provide that the information obtained may be published by the Commonwealth Government six months after the completion of field work.

The growth of the exploration effort has greatly increased the number of subsidized projects and this increase has led to delays in publishing the results of operations.

The detailed results of subsidized operations may be examined at the office of the Bureau of Mineral Resources in Canberra (after the agreed period) and copies of the reports may be purchased.

In order to make the main results of operations available early, short summaries are being prepared for publication. These will be grouped by area and date of completion as far as practicable. Drilling projects and geophysical projects will be grouped separately. In due course, full reports will be published concerning those operations which have produced the more important new data.

This Publication contains summaries of data and results of two drilling operations undertaken in the Bass Basin, Tasmania: Esso Bass No. 1 and Esso Bass No. 2. The information has been abstracted by the Petroleum Exploration Branch of the Bureau of Mineral Resources from well completion reports furnished by Esso Exploration and Production Australia Inc. (formerly Esso Exploration Australia Inc).

N.H. FISHER
Director

CONTENTS

	<u>Page</u>
<u>ESSO BASS NO. 1</u>	
SUMMARY	1
WELL HISTORY	2
GEOLOGY	3
ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES	8
 <u>ESSO BASS NO. 2</u>	
SUMMARY	11
WELL HISTORY	12
GEOLOGY	13
REFERENCES	23
ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES	24

ILLUSTRATIONS

FIGURES

Figure 1 :	Regional geological map, showing locations of Esso Bass No. 1 and No. 2 wells	..	Frontispiece
Figure 2 :	Estimated cross-sections before and after drilling Esso Bass No.1	..	Opposite p. 6
Figure 3 :	Estimated cross-sections before and after drilling Esso Bass No.2	..	Opposite p. 21

PLATES

Plate 1 :	Composite well log, Esso Bass No. 1 (3 sheets)	..	At back of report
Plate 2 :	Composite well log, Esso Bass No. 2 (2 sheets)	..	At back of report

ESSO BASS NO. 1

of

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
(formerly ESSO EXPLORATION AUSTRALIA INC.)

SUMMARY OF DATA AND RESULTS

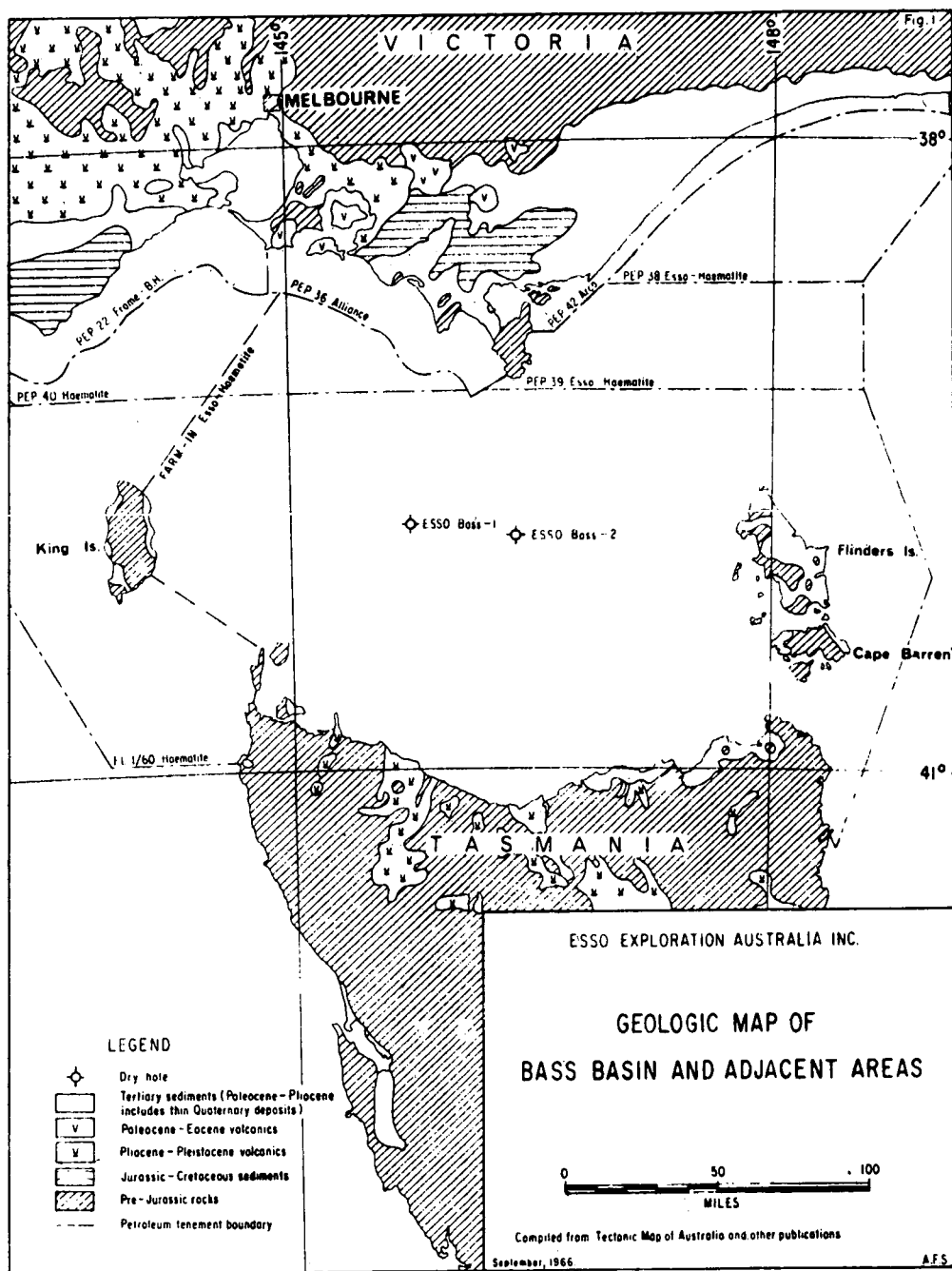


Figure 1

ESSO BASS NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

Esso Bass No. 1 Well was drilled by Global Marine Australasia Pty Ltd, using "Glomar III", for Esso Exploration Australia Inc., in Tasmanian waters of the offshore Bass Basin, about 88 miles east of King Island. The well was spudded on 21 July 1965, reached total depth of 7717 feet on 8 September, and was plugged and abandoned on 14 September 1965. A full programme of logging and coring was undertaken.

The Bass Basin, lying entirely between Victoria and Tasmania, covers an area of approximately 25,000 square miles. From magnetic data, it was inferred to contain a thick sedimentary section; from seismic data and extrapolated regional geology, the sedimentary section was thought to include Tertiary sediments favourable for petroleum generation and accumulation. The well was thus designed to gain stratigraphic information on the Tertiary and upper part of the Mesozoic sedimentary section in the north central Bass Basin, and, in particular, to test the petroleum potential of a postulated reef-type anomaly in the Miocene section.

Esso Bass No. 1 was drilled on a seismic anomaly thought to indicate a Tertiary carbonate reef complex, but later found to consist of pyroclastics. No structural closure was anticipated or encountered. The section penetrated in Bass No. 1 consisted of Miocene, Oligocene, and Eocene-Paleocene sediments, including pyroclastics, to 6380 feet, and Paleocene sands and shales to total depth at 7717 feet. No commercial hydrocarbons were logged, and the well was abandoned without testing.

The stratigraphic drilling operation at Esso Bass No. 1 Well was subsidized under the Petroleum Search Subsidy Act 1959-1964, from sea bed to total depth.

* Abstracted from: Well Completion Report, Esso Bass No. 1, Tasmania, by Esso Exploration Australia Inc., December, 1965.

WELL HISTORY

General Data

Well name and number:	Esso Bass No. 1
Location:	Latitude 39° 46' 18" S. Longitude 145° 44' 03" E.
Name and address of Operator:	Esso Exploration Australia Inc., 71-79 Macquarie Street, SYDNEY, N.S.W.
Name and address of Tenement Holder:	Haematite Explorations Pty Ltd, 500 Bourke Street, MELBOURNE, VICTORIA
Details of Petroleum Tenement:	E.L. 1/60 issued by the State of Tasmania, and covering an area of 25,134 square miles
Total Depth:	7717 feet
Date drilling commenced:	21 July 1965
Date drilling completed:	8 September 1965
Date rig released:	14 September 1965
Elevation:	
Permanent Datum:	Mean Sea Level
Rotary Table:	31 feet above M.S.L. (datum for depths)
Depth of Water:	265 feet
Status:	Plugged and abandoned
Total Cost:	\$851,989

Drilling Data

Drilling Plant:

Make:	National
Type:	1625 DE
Hole sizes and depths:	36 in. to 424 ft 26 in. to 820 ft 17 1/2 in. to 2304 ft 12 1/4 in. to 7692 ft 8 5/8 in. to 7717 ft (T.D.)

Casing details:

Size (in.):	30	20	13 3/8
Weight (lb./ft):	310/196	129	54
Grade:	B	B	J,55 Butt
Setting depth (ft):	398	768	2258

Logging and Testing

Ditch Cuttings:

Interval: Ten feet while drilling and five feet while coring.

Coring: Fifteen cores were cut using Christensen coring equipment with both drag type and diamond core bits. A total of 393 feet was cored and 319 feet (81.2%) recovered.

Sidewall Cores: Seventeen sidewall samples were recovered from the interval 4160 to 7570 feet.

Electric and other logging (Schlumberger):

Induction-Electrical Log: 770-7708 feet (4 runs)

Sonic-Gamma Ray - Caliper Log: 770-7696 feet (4 runs)

Microlaterolog: 770-7704 feet (4 runs)

Continuous Dipmeter: 770-7680 feet (3 runs)

Velocity Survey: A velocity survey was carried out at total depth over the interval 2210 to 7671 feet.

Drilling Time and Gas Log: Continuous drilling rate and mud-gas detector logs (hot wire and chromatograph) were run during drilling.

Formation Testing: No testing was undertaken.

Deviation Survey: Regular readings were taken with a Totco instrument during drilling. Maximum hole deviation of 2° was recorded at 5328 feet. At total depth, the deviation was 1 1/4°.

GEOLOGY

General

A summary of the history of exploration, regional geology, and generalised stratigraphy of the Bass Basin is given on pages 13 to 17.

Stratigraphy

General:

The stratigraphic sequence encountered in Esso Bass No. 1 Well is shown in the following Table. The succession was based on lithology, palaeontology, and log analysis.

Cuttings were not collected above 860 feet, and it is not known in what formation the well was spudded. Below 860 feet it penetrated Miocene, Oligocene, Eocene, and Paleocene sediments and bottomed in Paleocene at 7717 feet.

<u>Age</u>	<u>Lithology</u>	<u>Depth Intervals</u> (feet)	<u>Thickness</u> (feet)
Upper-mid-Miocene	Calcareenite	860-1950	1090+
Mid-Miocene	Calcareous mudstone	1950-2214	264
	Marl and calcareous mudstone	2214-2535	321
Miocene	Tuffite	2535-3090	555
Lower Miocene	Shale	3090-3775	685
Oligocene	Shale and sandstone	3775-4020	245
	Tuffite	4020-4260	240
	Shale, siltstone, and sandstone	4260-5377	1117
Eocene	Shale, siltstone	5377-5935	558
Eocene-Paleocene	Sandstone, siltstone, and shale	5935-6380	445
Paleocene	Sandstone, siltstone, shale, and coal	6380-7717 (T.D.)	1337+

Detailed:

Miocene: 860 to 3775 feet (2915 feet+)

860 to 1950 feet:

Calcareenite: loosely consolidated, light grey, fine to medium-grained, made up chiefly of calcareous fossil fragments, bryozoa, pelecypods, gastropods, and foraminifera, with a slightly argillaceous micritic matrix.

1950 to 2214 feet:

Calcareenite: as above, and Calcareous Mudstone: light grey-green, soft, non-fissile, very fossiliferous, very few carbonaceous flecks.

2214 to 2535 feet:

Predominantly Calcareous Mudstone as above and Marl.

2535 to 3090 feet: Tuffite: grey-green, mottled, buff and light grey-brown, soft and crumbly; lapilli and bombs of very fine-grained, soft, light brown-grey tuffite in green-grey, coarse fragmental matrix (zeolite minerals).

3090 to 3775 feet: Shale (mudstone): medium grey, very slightly calcareous, slightly silty, micromicaceous, fossiliferous, few pyrite nodules.

Oligocene: 3775 to 5377 feet (1602 feet)

3775 to 3845 feet: Dolomitic Sandstone: buff, light brownish-grey, tight and compact, argillaceous, tuffaceous (?); and very argillaceous Dolomite, buff to light brown-grey. No porosity.

3845 to 3965 feet: Shale: medium grey, slightly calcareous with carbonaceous flecks, fossiliferous, pelecypods, protozoa (foraminifera).

3965 to 4020 feet: Sandstone (silty): light grey, fine-grained, fairly well sorted, dolomitic and calcareous. Nil to very low porosity.

4020 to 5352 feet: Shale (mudstone): mottled medium grey-brown to grey, very fossiliferous, calcareous, slightly sandy and silty, few scattered grains glauconite and fine, disseminated, black carbonaceous material; and Siltstone: very argillaceous, brown to grey, soft, crumbly, calcareous, micromicaceous, pyritic, carbonaceous flecks as above.

5352 to 5377 feet: Sandstone: buff to light brown to grey, fine to coarse-grained, very poorly sorted, tuffaceous, pyritic, calcareous, soft and crumbly, subangular to well-rounded, clear and light grey quartz sand grains, and well-rounded, grey to green, volcanic grains; dolomitic in part. Low porosity.

Eocene: 5377 to 5935 feet (558 feet)

5377 to 5935 feet: Silty Mudstone: chocolate-brown to grey, soft and non-fissile, micromicaceous, slightly calcareous, fossiliferous, occasionally dolomitic, very pyritic, carbonaceous flecks as above. Occasional grains of grey to green and dark green volcanic mineral.

Eocene-Paleocene: 5935 to 6380 feet (445 feet)

5935 to 6380 feet: Alternating sandstone, siltstone, and shale. Sandstone: light grey to light brown to grey, fine to medium-grained, usually fairly well sorted, subangular to subrounded, occasionally conglomeratic, kaolinitic in part, generally good porosity, permeability in part reduced by kaolinitic and argillaceous matrix; small scale cross-bedding in part.

Siltstone: brown to grey to light brown-grey, argillaceous, sandy, carbonaceous flecks; gradational into very fine and fine, quartzose sandstone as above.

Shale: dark brown to grey, medium grey, silty in part, occasionally with light grey, very fine-grained sand lenses, carbonaceous flecks, worm burrows.

Paleocene: 6380 to 7717 feet (T.D.) (1337 feet+)

6380 to 7717 feet:

Sandstone, Siltstone, and Shale as above, with abundant coal, black and brown, brittle with conchoidal fracture.

The Eocene-Paleocene sand top is picked from the Microlaterolog. Although the section from 5935 feet to total depth is lithologically similar, there are a few differences on which the Paleocene top has been picked at 6380 feet, viz:

- (i) The sands present from 5935 to 6380 feet are generally slightly coarser than those below 6380 feet.
- (ii) There is no coal present in the section from 5935 to 6380 feet, whereas coal bands are present from 6380 feet to total depth.
- (iii) Seismic evidence indicates the presence of an unconformity at the edges of the basin which correlates into the well at about 6400 feet.

Structure

Esso Bass No. 1 was designed primarily to test the petroleum potential of a seismic anomaly interpreted as a reef in the Miocene section. This abrupt seismic "build-up", the most basinward of a group of similar anomalies, covers an area of some three square miles with a maximum relief of 900 feet. Apart from local draping over the feature, the anomaly is not associated with any structural closure.

Drilling of the well proved this initial seismic interpretation of structure to be essentially correct. However, the seismic anomaly, originally postulated as a carbonate reef complex, was in fact pyroclastic material.

In cores below 6000 feet small-scale current bedding was present. The regional dip in these sediments is shown from the dipmeter survey to be about one degree towards the south.

Relevance to Occurrence of Petroleum

Esso Bass No. 1 achieved its primary objective of evaluating the petroleum potential of an abrupt seismic "build-up", originally postulated as a carbonate reef complex. This anomaly, one of a group of similar anomalies found in the Miocene section throughout the basin, was found to be tuffite.

In addition, the well provided stratigraphic information of considerable value in assessing the petroleum potential of the basin as a whole. Of significance was the thick

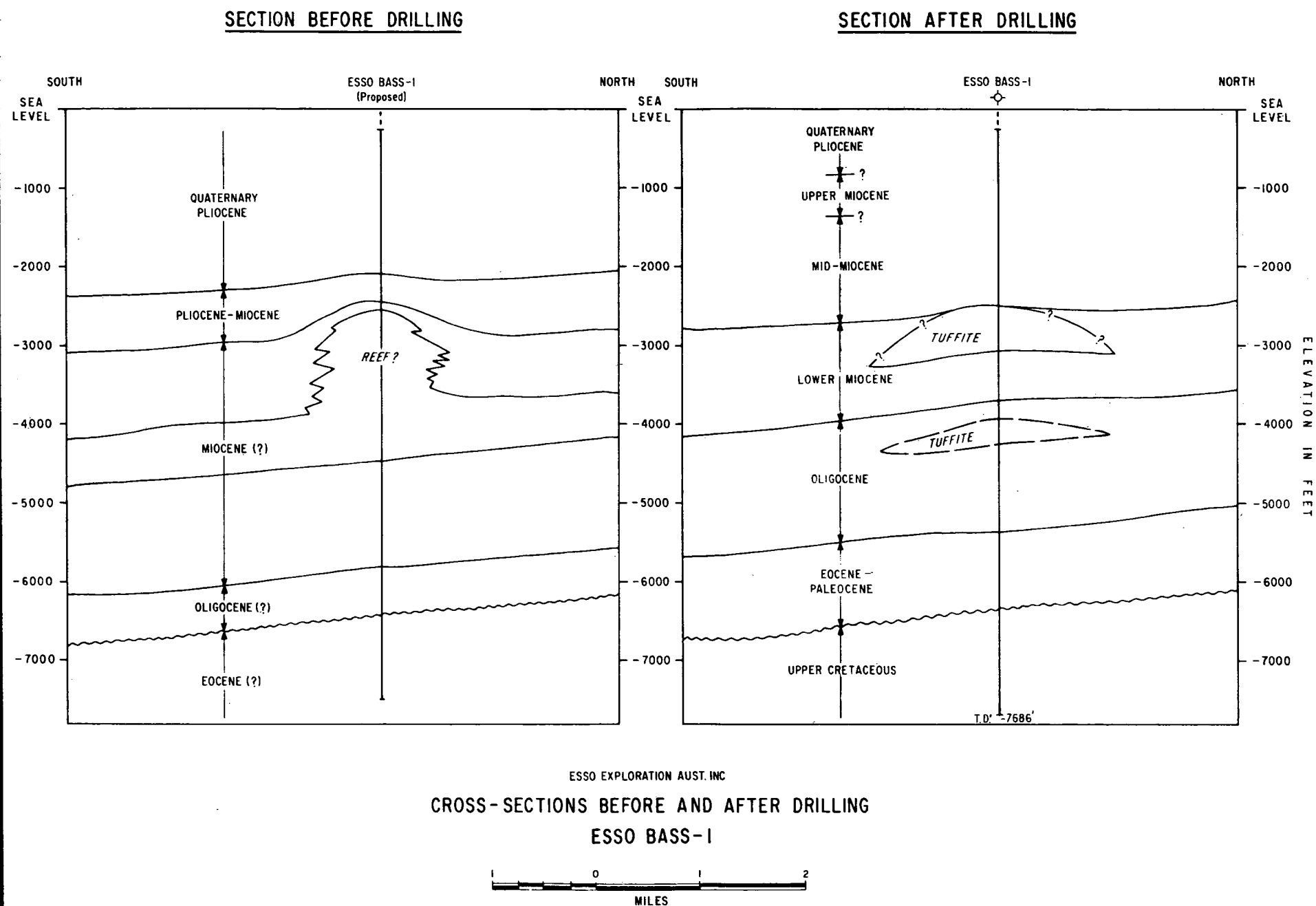


Figure 2

Tertiary section favourable for the generation and accumulation of hydrocarbons. In this regard the following relevant information was obtained:

- (i) A thick section of marine shales was present in the Oligocene and Eocene providing a possible hydrocarbon source.
- (ii) Sandstone of Eocene-Paleocene age of sufficient thickness, porosity, and permeability to provide a commercial hydrocarbon reservoir was present.

Porosity and Permeability of Sediments Penetrated

The only rocks in Esso Bass No. 1 exhibiting good reservoir characteristics and in a favourable position stratigraphically are the sandstones from 5935 feet to total depth. Electric log analysis indicates that the porosity of these rocks ranges from approximately 20 to 35 percent - these values correspond favourably to core analysis where cores are available. Measured permeabilities range to 161 millidarcies.

Contribution to Geological Concepts Resulting from Drilling

Contributions to the knowledge of this region of offshore Australia by the drilling of Esso Bass No. 1 are:

- (i) The well has established the presence in the Bass Basin of 6857+ feet of strata of marine, non-marine, and volcanic origin of Tertiary age.
- (ii) The "reef" type carbonate build up as originally postulated was found to be volcanic tuffite.
- (iii) The most interesting rocks exhibiting good reservoir characteristics are the sandstones encountered below 5935 feet, of Eocene and Paleocene age.
- (iv) Oligocene and Eocene sediments exhibit good source rock characteristics.
- (v) The section penetrated indicates that the basin is primarily a Tertiary feature as previously thought.
- (vi) From late Eocene to upper Miocene time marine conditions prevailed in the Bass Basin.
- (vii) The drilling of Esso Bass No. 1 has provided the first stratigraphic tie with seismic data of the Tertiary and pre-Tertiary series present in the well.

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relevant to Esso Bass No. 1 Well have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- (i) Well Completion Report, by Esso Exploration Australia Inc. 14 pp.
 - Appendix 1 : Palaeontological Report, by D.J. Taylor 14 pp.
 - Appendix 2 : Palynological Report, by J.G. Douglas 2 pp.
 - Appendix 3 : Log Interpretation, by Esso Exploration Australia Inc. 1 p.
 - Appendix 4 : Core Descriptions and Analyses 7 pp.
 - Appendix 5 : Velocity Survey Report, by W.C. Crealey 6 pp.
 - Appendix 6 : Petrological Report 2 pp.
- (ii) Daily drilling reports for the period 16 July 1965 to 14 September 1965.
- (iii) Schlumberger well logs including the following:
 - (a) Induction-Electrical Log
 - Run 1, 770 - 2300 feet (scale 2',5" : 100 ft)
 - Run 2, 2263 - 4001 feet (scale 2',5" : 100 ft)
 - Run 3, 3801 - 6407 feet (scale 2',5" : 100 ft)
 - Run 4, 5900 - 7708 feet (scale 2',5" : 100 ft)
 - (b) Sonic-Gamma Ray-Caliper Log
 - Run 1, 770 - 2280 feet (scale 2',5" : 100 ft)
 - Run 2, 2267 - 3998 feet (scale 2',5" : 100 ft)
 - Run 3, 2263 - 6398 feet (scale 2',5" : 100 ft)
 - Run 4, 6198 - 7696 feet (scale 2',5" : 100 ft)
 - (c) Microlaterolog
 - Run 1, 770 - 2300 feet (scale 2',5" : 100 ft)
 - Run 2, 2261 - 4000 feet (scale 2',5" : 100 ft)
 - Run 3, 3800 - 6407 feet (scale 2',5" : 100 ft)
 - Run 4, 6207 - 7704 feet (scale 2',5" : 100 ft)
 - (d) Continuous Dipmeter
 - Run 1, 770 - 2301 feet (scale 2' : 100 ft)
(with data sheets)
 - Run 2, 2261 - 4402 feet (scale 2' : 100 ft)
(with data sheets)
 - Run 3, 2263 - 7680 feet (scale 2' : 100 ft)
(with data sheets)

ESSO BASS NO. 2

of

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
(formerly ESSO EXPLORATION AUSTRALIA INC.)

SUMMARY OF DATA AND RESULTS

ESSO BASS NO. 2

SUMMARY OF DATA AND RESULTS*

SUMMARY

Esso Bass No. 2 Well was located about 31 1/4 miles east-south-east of Bass No. 1, in the offshore Bass Basin, Tasmania. It was drilled for Esso Exploration Australia Inc., by Global Marine Australasia Pty Ltd, using the 268-foot drilling vessel "Glomar III". The well was spudded on 14 April 1966, reached total depth of 5910 feet on 21 May, and was plugged and abandoned on 25 May 1966. A full programme of coring and logging was undertaken.

Esso Bass No. 2 was drilled on the crest of a closed seismic anticlinal structure which persisted from basement to the top of the Oligocene. The section drilled consisted of Tertiary sediments ranging from upper Miocene to Paleocene down to 5511 feet; possibly Mesozoic trachyte to 5767 feet; and altered mudstone, thought to be Mesozoic, to total depth of 5910 feet. No hydrocarbons were encountered in the well and no testing was undertaken.

The two offshore wells drilled in the Bass Basin have proven the prospective nature of the section in the Basin, but no indications of hydrocarbons were observed during the operations.

The stratigraphic drilling operation at Esso Bass No. 2 Well was subsidized under the Petroleum Search Subsidy Act 1959-1964, from sea bed to total depth.

* Abstracted from: Well Completion Report, Esso Bass No. 2, Tasmania, by Esso Exploration Australia Inc., June, 1966.

WELL HISTORY

General Data

Well name and number:	Esso Bass No. 2
Location:	Latitude 39° 53' 09" S. Longitude 146° 18' 15" E.
Name and address of Operator:	Esso Exploration Australia Inc., 71-79 Macquarie Street, SYDNEY, N.S.W.
Name and address of Tenement Holder:	Haematite Explorations Pty Ltd, 500 Bourke Street, MELBOURNE, VICTORIA.
Details of Petroleum Tenement:	E.L. 1/60 issued by the State of Tasmania
Total Depth:	5910 feet
Date drilling commenced:	14 April 1966
Date drilling completed:	21 May 1966
Date rig released:	25 May 1966
Elevation:	
Permanent Datum:	Mean Sea Level
Rotary Table:	31 feet above M.S.L. (datum for depths)
Depth of Water:	280 feet
Status:	Plugged and abandoned
Total Cost:	\$712,213

Drilling Data

Drilling Plant:

Make:	National
Type:	1625 DE

Hole sizes and depths:	36 in. to 420 ft
	26 in. to 850 ft
	17 1/2 in. to 2100 ft
	12 1/4 in. to 5910 ft (T.D.)

Casing details:

Size (in.):	30	20	13 3/8
Weight (lb./ft):	310/196	129/105/167	54.5
Grade:	B	B	J, 55
Setting depth (ft):	404	817	2100

Logging and Testing

Ditch Cuttings:	
Interval:	Thirty feet from 850 to 2000 feet, and ten feet from 2000 feet to total depth while drilling, and five feet while coring.
Coring:	Ten cores were cut using Christensen coring equipment with both drag type and diamond core bits. A total of 319 feet was cored and 233 feet (73%) recovered.
Sidewall Cores:	Fourteen sidewall samples were recovered from the interval 3345 to 5468 feet using Schlumberger C.S.T. equipment.
Electric and other logging (Schlumberger):	
Induction-Electrical Log:	822-5907 feet (3 runs)
Sonic-Gamma Ray-Caliper Log:	822-5904 feet (2 runs)
Microlaterolog:	822-5532 feet (2 runs)
Continuous Dipmeter:	822-5910 feet (3 runs)
Velocity Survey:	Seven horizons were tested between 2070 and 5413 feet.
Drilling Time and Gas Log:	Continuous drilling rate and mud-gas detector logs (hot wire and chromatograph) were run during drilling.
Formation Testing:	No testing was undertaken.
Deviation:	Regular readings were taken with a Totco instrument during drilling. Maximum hole deviation was 2°.

GEOLOGY

History of Exploration

Before the completion of Esso Bass No. 1, the Bass Basin was virtually unknown geologically. No wells had been drilled in the Basin, and wells drilled in the adjacent Otway and Gippsland Basins were so far away that they provided information of regional significance only. Reconnaissance surface geological investigations of the very few Upper Tertiary outcrop areas around the margins of this offshore basin, made by government agencies and Esso geologists, are only of limited value.

Geophysical information however, was somewhat more detailed. Haematite Explorations Pty Ltd had made aeromagnetic and reconnaissance seismic surveys over the Basin in 1961 and 1963. Esso Exploration completed a more detailed seismic survey in 1965.

The geophysical data, combined with extrapolated regional geology, indicated the Basin to be primarily of Cainozoic depositional origin, covering an area of some 25,000 square miles, containing a sedimentary section some 12,000 feet thick in the centre. Possibly this section included Tertiary marine sediments favourable for petroleum generation and accumulation. Of the prospects outlined by the Haematite seismic survey, the reef-like anomalies were deemed the most interesting, and after detailed seismic work by Esso, the Esso Bass No. 1 Well was located at the apex of one of these anomalies. The anomalies proved to be of volcanic origin. Esso Bass No. 2 was located at the crest of an anticlinal feature about 32 miles east-south-east of Esso Bass No. 1.

Regional and Historical Geology

The Bass Basin lies at the southern end of the Palaeozoic Tasman Geosyncline whose rocks probably exceed 25,000 feet in thickness on the Mornington Peninsula, north of the Basin (Kemble, 1950). The strata range in age from Cambrian to Carboniferous and consist of folded, faulted, and intruded, marine to non-marine, sedimentary, metamorphic, and extrusive and intrusive igneous, rocks. Similar complex rocks, tens of thousands of feet thick, and more than 25,000 feet of Precambrian sedimentary and metamorphic rocks occur in Tasmania. It is logical to expect the Bass Basin to be underlain by these rocks, extending downwards from shallow depths at the basin edge, and from 12,000 feet in its deepest part.

The Bass Basin is essentially a Cainozoic basin, although it may contain Permian, Triassic, Jurassic, and Lower-Middle Cretaceous rocks between the relatively undisturbed Tertiary above and complexly folded and intruded pre-Permian rocks below. Permian "tillites" are known from small outcrops along the northern Tasmanian coastline. These may extend northward for some distance into the Bass Basin. The Triassic is represented by sandstone and shale with minor conglomerate and coal in Tasmania, and by minor glacial beds in Victoria. The Jurassic-Lower Cretaceous, generally non-marine, Otway Group occurs in the Gippsland and Otway Basins, and may be present in the Bass Basin.

During the Paleocene and Eocene, gentle regional downwarping occurred in the Gippsland and Otway Basins and similar downwarp occurred in the Bass Basin. Tasmania remained a positive area. Volcanism and lava flows were abundant from the western part of Gippsland westward to the eastern part of Otway. Similarly, a few small flows occurred in Tasmania. No volcanic rocks of this age were deposited in the axial part of the Bass Basin (at the Esso Bass No. 1 location). During this time in the Bass Basin peat, clay, sand, silt, and gravel were deposited under widespread swamp conditions. During the lower and middle Eocene occasional thin marine sediments may have been intercalated with these non-marine rocks. Upper Eocene time saw a change in sedimentary conditions from non-marine to restricted marine.

Uplift and slight deformation took place in Gippsland after deposition of the Eocene coal measures. Deposition apparently was continuous during this time in the Otway Basin. In the Bass Basin, however, there is seismic evidence of local unconformity at the top of the Eocene towards the basin margins.

During the Oligocene and Miocene, marine conditions prevailed in the Bass Basin with deposition of fossiliferous limestone, calcareous mudstone, marl, and minor siltstone beds. Local angularity beneath the Oligocene-Miocene contact on seismic sections indicates minor regression at the beginning of Miocene time. Outcrops of mainly Miocene skeletal limestone and some marine fossiliferous siltstone occur at and near the present edges of the Bass Basin in Tasmania and Victoria.

In the south-western part of the Bass Basin (in the vicinity of Three Hummock Island), and in the northern half of the basin, tuffite cones of upper Oligocene and lower Miocene age indicate tectonic activity during this period.

During the Pliocene, the marine transgression reached the end of its full cycle in Gippsland and Otway. During middle Pliocene time, these areas, and also the entire Bass Strait region, were subjected to uplift, probably accompanied by some gentle deformation and faulting. Volcanism and outpouring of lava were widespread in Tasmania and west-central Victoria.

The sea in general regressed to its present limits during late Pliocene and Pleistocene time.

Generalised Stratigraphy of the Bass Basin

Palaeozoic Rocks:

Palaeozoic sediments (marine to non-marine), metamorphics, and igneous intrusive and extrusive rocks are believed to comprise "economic" basement in the greater Bass Strait region.

This was so in the Mesozoic-Tertiary Otway Basin where two wells (Fergusons Hill No. 1 and Pretty Hill No. 1) reached the Palaeozoic, and in the Gippsland Basin where the Arco Southwest Bairnsdale No. 1, Duck Bay No. 1, and other wells reached Lower Palaeozoic basement. Hence it is reasonable to expect that a similar Palaeozoic basement will be found in the Bass Basin.

Mesozoic Rocks:

Mesozoic rocks occur at the surface in both Victoria and Tasmania. They have been penetrated or encountered in many wells in the Otway and Gippsland Basins. In onshore Gippsland, more than 8600 feet of the Jurassic and Lower Cretaceous Otway Group have been drilled. This Group consists of non-marine feldspathic sandstone, chloritic greywacke, siltstone, mudstone, and carbonaceous shale, with fossil plants and thin black coal seams. In the Otway Basin, the Cretaceous and Jurassic rocks have a maximum composite thickness of 15,000 feet. They consist of several marine and non-marine formations comprised of siltstone, sandstone, and greywacke, with lesser amounts of conglomerate, mudstone, and coal. Plant fragments, spores, and foraminifera are present.

Some thin non-marine Triassic rocks are present in west-central Victoria. In Tasmania the only known Mesozoic sedimentary rocks are of Triassic age. They consist of 1500 to 2000 feet of lacustrine and fluvialite proto-quartzites, lithic arenites, lutites, minor fine-grained conglomerates, and coal beds (Spry and Banks, 1962).

The volcanic association occurring at the bottom of Esso Bass No. 2 (from 5511 to 5910 feet) is possibly of Mesozoic age. It may be correlative with the widespread Jurassic dolerite of Tasmania.

Tertiary Rocks:

Paleocene-Eocene: The basal Tertiary section encountered by drilling in the Bass Basin is deltaic. This unit is the principal reservoir objective in the basin. Its distribution is largely controlled by the boundary fault systems, with the bulk of the

sediment confined to central downdropped portions of the basin. The sequence may overlap the Mornington-King Island basement ridge to the north-east and be in part continuous with the Easternview Coal Measures. It is made up of interbedded sandstone, siltstone, shale, and coal, all of dominantly continental origin. Sparse microplankton were noted in cores from Esso Bass No. 1 Well suggesting that paralic and/or marine conditions prevailed in the central part of the basin during the deposition of this interval.

The sequence was 1782 feet thick in Esso Bass No. 1 Well and 1673 feet thick in Esso Bass No. 2. It lies unconformably on economic basement and is transitional into the overlying marine sequence.

A persistent seismic reflecting horizon occurs near the top of this sequence (at 6380 feet in Esso Bass No. 1) and local angularity beneath this reflection has led to the interpretation of an unconformable surface within the deltaic section. In Esso Bass No. 1, the beds lying above this supposed unconformity show a transition from coal and coarse sand upwards through fine sand, to carbonaceous silty mudstone of restricted marine origin. The seismic reflection occurs at 4495 feet in Esso Bass No. 2 and the beds on either side are of similar lithological type. In Esso Bass No. 2 the transition from coarse sandstone to silty mudstone of marine origin is abrupt at 3838 feet.

Upper Eocene: Upper Eocene siltstones and shales, of marine origin, lie with apparent conformity upon mid-Eocene and older rocks, of continental origin, in the central part of the Bass Basin where the thickness reaches 550 feet. There is an unconformity (based on seismic evidence) near the top of the marine Eocene sequence. The sequence is correlative with the Demon's Bluff Formation of the Anglesea area, Victoria (Taylor, 1966).

Oligocene: The Oligocene in the Bass Basin is as much as 2000+ feet thick in the axial part of the Basin. The sediments extend throughout the basin proper and overlap the basin margin in the north-west, over the Mornington-King Island "high", and possibly to the east, over the basement ridge which extends from Wilsons Promontory to north-eastern Tasmania.

The base of the marine Oligocene sequence in the central Bass Basin is marked by a thin (25 feet in Esso Bass No. 1) tuffaceous, poorly sorted, tight sandstone. The remainder of the section is made up of argillaceous siltstone, silty mudstone, and minor sandstone. Two hundred and forty feet of pyroclastic tuffite were encountered in the upper part of the section at the Esso Bass No. 1 location.

In Esso Bass No. 2, the Oligocene is represented by 632 feet of marine sandstone, siltstone, and shale, and the basal sand at this locality has thickened to 328 feet.

A small late Oligocene volcanic build-up is present to the south-west of the Esso Bass No. 2 location, but the well did not penetrate this section. The top of the Oligocene is marked by a tuffaceous sandstone, 62 feet thick, which apparently represents an offshore bar associated with the volcanic interval to the south-west.

Miocene: At least 3000 feet of Miocene rocks were drilled in the Esso Bass No. 1 Well from the 20-inch casing shoe to a depth of 3775 feet. The lower Miocene is fossiliferous, calcareous shale, overlain by a thick (555 feet) tuffite interval; the mid-Miocene is marl, calcareous mudstone, and skeletal calcarenite, and the upper Miocene is skeletal calcarenite.

A similar section, with the exception of the tuffite, is seen in Esso Bass No. 2. Also, quartzose sand grains are much more evident in the interval from 1400 to 2164 feet in Esso Bass No. 2.

Pliocene-Pleistocene: Strata of Pliocene-Pleistocene age were not observed during the drilling of the Esso Bass No. 1 Well. Doubtless, strata of this age lie within the interval drilled prior to setting 20-inch casing (0 to 768 feet). It is considered that a similar situation exists in the surface hole of Esso Bass No. 2.

Detailed Stratigraphy

The succession in Esso Bass No. 2 Well, shown below, is based on lithology, palaeontology, and log analysis. These units can be tied to seismic marker reflections which can be traced across the basin. At this stage, no formation names have been applied to the units.

<u>Age</u>	<u>Lithology</u>	<u>Depth Intervals</u> (feet)	<u>Thickness</u> (feet)
Upper and middle Miocene and younger	Calcarenite (and some quartz sand)	850-2164	1314+
Middle and lower Miocene	Calcareous mudstone	2164-2986	822
Oligocene	Mudstone, siltstone and sandstone	2986-3618	632
Upper Eocene	Argillaceous silt- stone	3618-3838	220
Middle and lower Eocene	Sandstone, siltstone, and coal	3838-4495	657
Paleocene (?)	Sandstone, siltstone, and coal	4495-5511	1016
Unknown (possibly Mesozoic)	Altered "trachyte" (volcanics)	5511-5767	256
Unknown (possibly Mesozoic)	Altered mudstone (tuffaceous)	5767-5910 (T.D.)	143+

Miocene: 850 to 2986 feet (2136 feet +)

850 to 2164 feet:

Coarse Calcarenite: (or bryozoan biomicrudite), light grey, fine to very coarse-grained; made up largely of assorted calcareous fossil debris (bryozoa, echinoids, pelecypods or lamellibranchs and foraminifera). The rock is loosely consolidated. Trace of glauconite, pyrite, and very minor

carbonaceous flecks and grains. The interval from 1400 to 2164 feet contains varying amounts of quartz sand grains which are generally fine-grained, subangular to well rounded; these grains are clear, white, light grey, grey, and in some cases translucent. A minor amount of marly or micritic matrix is evident throughout the interval.

2164 to 2986 feet:

Calcareous Mudstone: light grey-green and grey-green, very soft and plastic, micromicaceous in part, with very sparse carbonaceous flecks. The interval is fossiliferous containing abundant foraminifera, echinoids, bryozoa, and pelecypod fragments. It contains relatively sparse calcareous pyrite nodules. The bottom twenty feet of this interval contains abundant grains of glauconite.

Oligocene: 2986 to 3618 feet (632 feet)

2986 to 3048 feet:

Silty Sandstone: light olive-grey, very fine to medium-grained, very argillaceous, calcareous, soft, friable, very glauconitic. Pyrite, as fine euhedral crystals and pyritized fossil fragments and worm impressions; with minor quartzose material; fossiliferous, including foraminifera, bryozoa, and pelecypods. Becomes more argillaceous and silty towards bottom of interval; thin brown-grey, argillaceous lenses up to one-quarter inch thick parallel to bedding. No apparent dip. No effective porosity or permeability.

3048 to 3290 feet:

Silty Mudstone: light olive-grey, fairly soft, plastic, waxy, micromicaceous, calcareous and pyritic; the pyrite occurs finely disseminated and as pyritized fossil fragments. Contains fossils as in the above interval. The interval grades in part to argillaceous siltstone.

3290 to 3618 feet:

Silty Sandstone: grey and buff, fine and medium-grained, angular to rounded, fairly well sorted, quartzose, very tough and compact, dolomitized, and in part calcareous cement. Abundant grains of glauconite, tuffaceous, and much finely disseminated pyrite. Sparsely dolomitized fossil fragments (foraminifera). Minor mineral fluorescence, dull yellow.

Sandstone: brown-grey, mottled, fine to medium-grained, angular to rounded, fairly well-sorted, quartzose, very loose and unconsolidated. An undolomitized version of the above sandstone. Argillaceous and tuffaceous matrix, with fairly abundant clear mica flakes, approx. 0.2mm across. Contains sparse foraminifera.

Too soft for core analysis.

This interval grades in part to siltstone.

Upper Eocene: 3618 to 3838 feet (220 feet)

3618 to 3838 feet:

Argillaceous Siltstone: chocolate to brown-grey, moderately well compacted, fine irregular banded appearance in hand specimen and massive. Contains much pyrite, finely disseminated, as discrete lens-like nodules up to one-sixteenth inch thick, and pyritized foraminiferal fragments. Lenses of very fine-grained pyritic sandstone up to one-quarter inch thick.

Occasional quartz sand grains, fine to medium size, argillaceous, micromicaceous, and with fairly abundant flecks of clear mica up to 0.3 mm across. Non-calcareous; much fine fossiliferous debris locally (dolomitized).

Non-carbonaceous; no dip, no hydrocarbon odour, no fluorescence, no cut.

Dolomitic Siltstone: buff-orange to brown-grey, very hard, well cemented. Much pyrite, finely disseminated and in irregular nodules up to three-quarter inch long abundant, finely pyritized, fossiliferous fragments (foraminifera). Interval is a dolomitic version of the above siltstone, and is in part not completely dolomitized.

Eocene-Paleocene: 3838 to 4495 feet (657 feet)

(Delta complex above seismic reflection)

3838 to 4495 feet:

Sandstone: light grey, grey with grey-brown, fine to coarse to granule size, generally poorly sorted, angular to subrounded grains. In part the interval is pyritic and carbonaceous and locally contains a white kaolinitic matrix; tight in part and has bright yellow mineral fluorescence. No hydrocarbon fluorescence.

Carbonaceous Sandy Siltstone: dark brown-grey, streaked black, very tough and well compacted, contains abundant carbonaceous plant remains, elongate willow-like leaves, and stem-like vascular remains. Very micaceous with clear crystals of mica to an average 1.5 mm across; sand occurs in elongate lenses and disseminated throughout; sand content is quartzose in the fine to medium range, and angular to subangular. The matrix is kaolinitic, argillaceous, and finely carbonaceous. Trace pyrite. Rock has an irregular streaked and lensed appearance parallel to bedding; coaly streaks up to one-quarter inch thick. No fluorescence, no cut, very strong hydrogen sulphide odour. No apparent dip.

Argillaceous Siltstone (minor): light brown-grey to buff, bentonitic, (tuffaceous?), well compacted, massive, abundant flecks of clear mica, very sparse thin carbonaceous streaks, very sparse quartz sand grains (fine to medium-grained).

Fine carbonaceous flecks in residue; non-calcareous; strong hydrogen sulphide odour from freshly broken surfaces, mineral fluorescence. No hydrocarbon fluorescence, no cut. Few carbonaceous streaks approximately on bedding surface suggest grass-like plant remains.

Paleocene (?): 4495 to 5511 feet (1016 feet)
(Delta complex below seismic reflection)

4495 to 5511 feet:

Sandstone: light grey and grey, very fine to coarse-grained, but largely in the fine and medium size range, and sorting is generally poor. The degree of rounding varies from angular to well rounded and there is generally an argillaceous (kaolinitic) matrix. The interval contains many thin discontinuous shaly and carbonaceous laminae. It is slightly pyritic and contains a few mica flakes in the matrix.

The above sandstone grades to sandy siltstone locally, which is light grey, argillaceous, sandy, and in part very slightly calcareous. The siltstone contains thin carbonaceous and micaceous laminae. It is generally tight. Both the sandstone and siltstone are locally dolomitized. The interval contains a few black coal beds which range in thickness up to five feet, and minor shale; medium grey, carbonaceous, micromicaceous and slightly silty in part.

Mesozoic: 5511 to 5910 feet (T.D.) (399 feet +)

5511 to 5670 feet:

Volcanic rock (altered): Trachyte(?), varicoloured, brownish-grey, greenish-blue, tan, and grey-blue and green. In part quite soft, and also fairly well indurated. Contains soft bands of greenish-blue (chloritic?) material and brownish clay-like laminae. No apparent bedding.

5670 to 5767 feet:

Volcanic rock (relatively unaltered): blue-grey and green, fairly hard, microcrystalline in part. Amorphous vein quartz noted locally throughout this interval and some tuffaceous-like, soft, light tan coloured material also present.

5767 to 5910 feet:

Mudstone (altered): (tuffaceous), medium olive-grey and bluish-grey, hard and dense, faintly banded. Highly fractured with vertical fractures filled by soft, white clay mineral and pyrite. The white clay mineral also occurs along bedding planes. Pyrite also occurs finely disseminated throughout the rock.

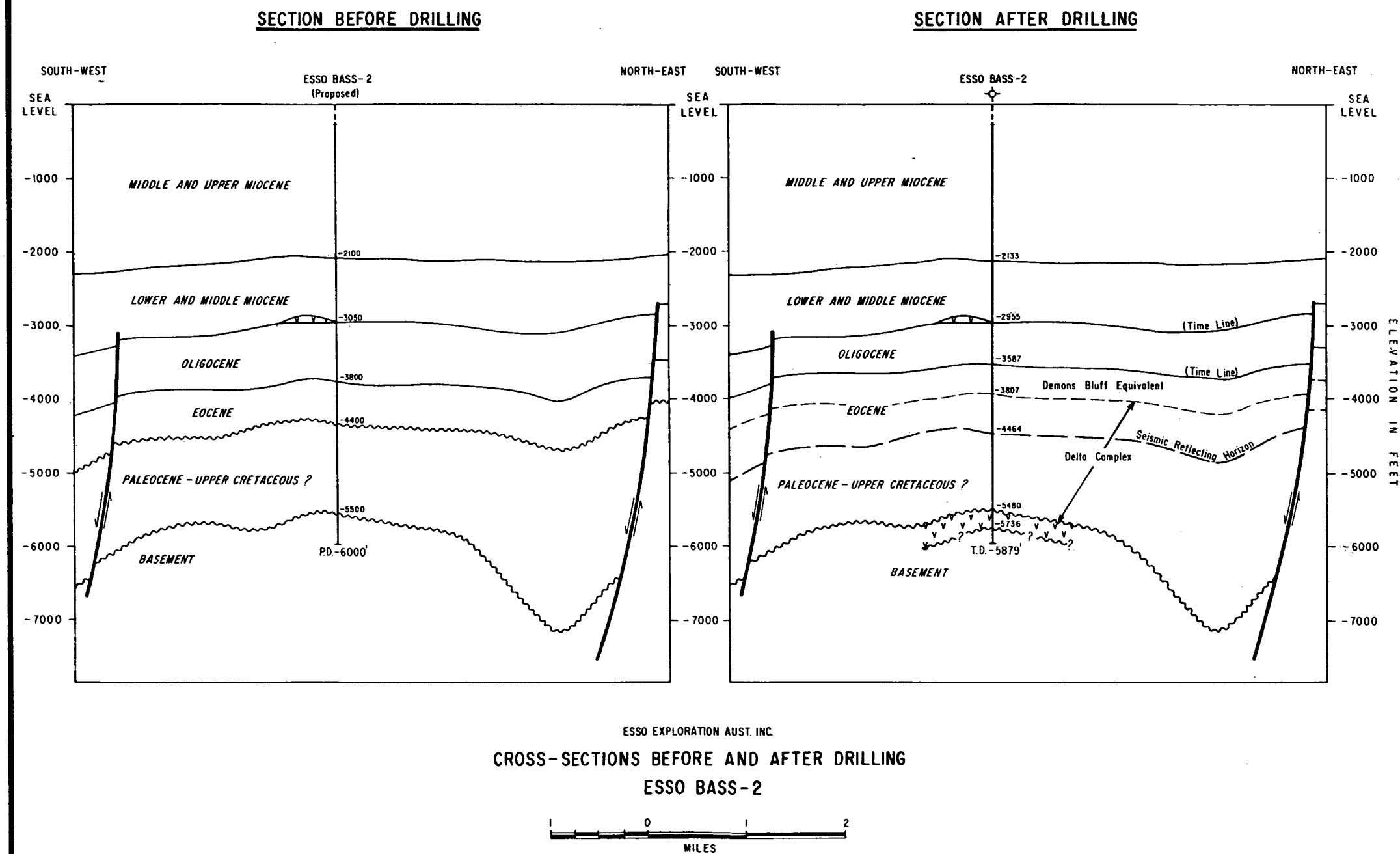


Figure 3

Structure

Esso Bass No. 2 was located on the crest of a well-defined anticlinal feature, as mapped by seismic survey, trending north-west. The structure is developed from basement to the top of the Oligocene. The age of the structure is primarily Upper Cretaceous (?) or Paleocene, but exhibits some growth during Eocene time. A basement fault block is responsible for this being a positive area. This faulting was active from Mesozoic time up to the close of the Oligocene; however, closure is primarily anticlinal and not dependent upon faulting.

Vertical closure at the intra "delta complex" reflecting horizon (seismic unconformity) is 250+ feet and areal closure is approximately 40 square miles. Vertical closure has decreased to 200 feet at the top of the Eocene and to 100 feet at the top of the Oligocene. There is approximately 1000 feet of vertical closure on basement.

Relevance to the Occurrence of Petroleum

The drilling of Esso Bass No. 2 has indicated that relatively rapid lateral facies changes occur within the Tertiary sequence in the eastern half of the Bass Basin. Significant quartzose sand developments were encountered in the calcarenite unit of middle and upper Miocene age, in the base of the Oligocene section, and in the basal Tertiary delta complex: these are discussed below.

Middle and upper Miocene: Esso Bass No. 2 encountered fine quartzose sand from approximately 1400 to 2164 feet. This is significant in that it may reflect proximity of a provenance area during this period and it may be evidence of a regional transgressive pulse which is seen in both the Otway and Gippsland Basins during this time.

Oligocene: Three hundred and twenty-eight feet of quartzose sandstone of marine origin were encountered in Esso Bass No. 2 at the base of the Oligocene; this compares with only 25 feet of sandstone at the base of the Oligocene in Esso Bass No. 1. The thick sandstone interval seen in Esso Bass No. 2 reflects a large-scale facies change in the Oligocene series. The change from silty mudstone to sandstone may in fact be so rapid laterally, over the Esso Bass No. 2 structure as to open the closure seen by the seismograph on the top of the Eocene.

Upper Eocene: The Eocene marine mudstone interval (Demon's Bluff equivalent) in Esso Bass No. 2 is 220 feet thick. This compares with 558 feet of the same interval in Esso Bass No. 1. The same rapid lateral facies change as seen in the base of the Oligocene apparently also occurs at the base of the Demon's Bluff and it is quite possible that this change means that the porosity in the Demon's Bluff Formation is not sealed.

Paleocene-Eocene delta complex: Sixty-eight percent or 1212 feet of the total 1782 feet of this sequence in Esso Bass No. 1 was porous sandstone; this compares with 80 percent sand count in the Esso Bass No. 2 Well over the same interval. The sands within the complex at Esso Bass No. 2 were generally more coarsely grained, cleaner and hence better reservoir rocks than those at the Esso Bass No. 1 Well. Again, as in the overlying intervals, an increase in sand count is evident in an easterly direction from Esso Bass No. 1. Closure evident on the intra-complex reflecting surface is a "sand on sand" contact and hence represents no effective seal.

Porosity and Permeability of Sediments Penetrated

Porosity and permeability measurements indicate that sands developed in the Oligocene and in the delta complex in Ezzo Bass No. 2 are potential reservoir rocks.

Measured core porosities range to 34 percent and permeabilities to 190 millidarcies in this deltaic sequence. No core analysis was done on the sands in the Oligocene series. A certain amount of matrix plugging by clay and some dolomitization locally reduces the permeability of these rocks. The skeletal calcarenite and quartzose sandstone in the middle Miocene and younger section is of no economic interest as it is probably unsealed.

Contribution to Geological Concepts Resulting from Drilling

The most significant fact resulting from the drilling of Ezzo Bass No. 2 is that relatively rapid facies changes occur laterally within the Tertiary section of the north-eastern part of the basin. These facies changes are particularly noteworthy in basal parts of the Oligocene and Miocene series and within the delta complex.

Other contributions to the knowledge of the Bass Basin are:

- (i) The basal Tertiary "delta complex" represents a relatively rapid infilling of a continually subsiding basin during Paleocene-Eocene time.

It is also evident that basement blocks, such as the one upon which Ezzo Bass No. 2 was located, have had a strong local influence on sedimentation during the deposition of this interval. The Ezzo Bass No. 2 feature was apparently positive during Paleocene-Eocene deposition and the bulk of sediment was deposited around the flanks of the feature. Dipmeter and seismic data indicate a large north-west trending trough to the north and east of the Ezzo Bass No. 2 location.

- (ii) The marine Tertiary sequence in the Bass Basin is similar to that in the Anglesea Sub-Basin. Taylor (1966) suggests that from upper Eocene time the two basins have been joined.
- (iii) The 'volcanic' interval (5511 to 5767 feet) in Ezzo Bass No. 2 is petrologically unlike any extrusives seen either in Tasmania or Victoria, and its age is unknown.
- (iv) The well bottomed in an altered 'quartzitic mudstone' and 'bedded tuff' (Apthorpe, 1966) of indeterminate age (from 5767 to 5910 feet). This interval may well be associated with the overlying 'volcanic' sequence.

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ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relevant to Esso Bass No. 2 Well have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- (i) Well completion report by Esso Exploration Australia Inc. 14 pp.
 - Appendix 1: Palaeontological Report, by D.J. Taylor 11 pp.
 - Appendix 2: Palynological Report, by J.G. Douglas 1 p.
 - Appendix 3: Log Interpretation, by Esso Exploration Australia Inc. 1 p.
 - Appendix 4: Core and Cuttings Descriptions and Analyses 19 pp.
 - Appendix 5: Velocity Survey Report, by P.E. Towey 8 pp.
 - Appendix 6: Petrological Report, by G.B. Everard 3 pp.
 - Appendix 7: Petrological Report, by M. Apthorpe 6 pp.
- (ii) Daily drilling reports for the period 11 April 1966 to 25 May 1966.
- (iii) Schlumberger well logs including the following:
 - (a) Induction-Electrical Log
 - Run 1, 822 - 2100 feet (scale 2", 5" : 100 ft)
 - Run 2, 2100 - 5536 feet (scale 2", 5" : 100 ft)
 - Run 3, 5536 - 5907 feet (scale 2", 5" : 100 ft)
 - (b) Sonic-Gamma Ray-Caliper Log
 - Run 1, 822 - 2091 feet (scale 2", 5" : 100 ft)
 - Run 2, 2044 - 5904 feet (scale 2", 5" : 100 ft)
 - (c) Microlaterolog
 - Run 1, 822 - 2100 feet (scale 2", 5" : 100 ft)
 - Run 2, 2100 - 5532 feet (scale 2", 5" : 100 ft)
 - (d) Continuous Dipmeter
 - Run 1, 822 - 2100 feet (scale 2", 5" : 100 ft)
 - Run 2, 2098 - 5535 feet (scale 2", 5" : 100 ft)
 - Run 3, 5390 - 5910 feet (scale 2", 5" : 100 ft)

COMPOSITE WELL LOG OF ESSO BASS-1

PETROLEUM TENEMENT : E.L. 1/60 STATE : TASMANIA 4 MI. SHEET : KING ISLAND BASIN : BASS WELL STATUS : DRY AND ABANDONED

LOCATION : Lat. 39° 48' 18" Long. 145° 44' 03" E ELEVATION : 31' above M.S.L. (R.T.) DATE SPUDDED July 21, 1965 DATE DRILLING STOPPED Sept. 8, 1965 DATE RIG OFF : Sept. 14, 1965 TOTAL DEPTH : 7717' (Driller) 7769' (I.E.S.)
Permanent datum M.S.L.
Water depth 265'

DRILLED BY : GLOBAL MARINE AUSTRALASIA PTY LTD GLOMAR III
DRILLING METHOD : ROTARY
MUD LOGGING : CORE LAB
LOGGED BY : SCHLUMBERGER
CEMENTED BY : HALLIBURTON
WELL HEAD FITTINGS WELL HEAD REMOVED AFTER PLUGGING

HOLE SIZE			CASING					
SIZE	FROM	TO	SIZE	WEIGHT	GRADE	DEPTH	CEMENT	CEMENTED TO
36"	285'	424'	30"	198 lbs	B	398'	350 +13% CaCl ₂	Ocean Floor
26"	424'	820'						
17 1/2"	820'	2304'	20"	129 lbs	B	768'	1140	Ocean Floor
12 1/4"	2304'	7682'						
8 1/2"	7682'	7717'	13 1/8"	54 lbs	J-55 Butt	2258'	1670	Ocean Floor

PERFORATIONS				CEMENT PLUGS		
TYPE	FROM	TO	Nb / Ft	FROM	TO	CEMENT
				320'	520'	150 +1% CaCl ₂
				2100'	2400'	250 +1% CaCl ₂
				3800'	4000'	140
				5980'	6100'	140

INDUCTION LOG DATA							
RUN NUMBER	1	2	3	4			
DATE	6 AUG. 1965	23 AUG. 1965	30 AUG. 1965	8 SEPT. 1965			
FOOTAGE LOGGED	1530	1738	2606	1808			
LOGGED FROM	2300	4001	6407	7708			
LOGGED TO	770	2263	3801	5900			
TOTAL DEPTH - ELECTRIC LOG	2301	4002	6408	7709			
TOTAL DEPTH - DRILLER	2304	4405	6405	7717			
CASING SHOE - ELECTRIC LOG	770	2263	2263	2263			
CASING SHOE - DRILLER	768	2258	2258	2258			
BIT SIZE	12 1/4"	12 1/4"	12 1/4"	12 1/4"			
MUD TYPE	Bentonite Sorensen XP-20 Caustic						
TREATMENT							
WATER LOSS cc/30 min	12	7	8	5			
WEIGHT lbs/cu ft	10.1	10.2	10.4	10.8			
VISCOSITY (Marsh) sec	43	42	52	40			
pH	10.3	10.0	10.0	11.0			
R _{ir}	0.80 at 66"	1.77 at 62"	1.65 at 92"	1.28 at 86"			
R _{mf}	0.39 at 104"	0.98 at 127"	0.91 at 167"	0.53 at 206"			
R _{inc}	0.46 at 61"	1.17 at 53"	1.59 at 56"	1.06 at 51"			
MAX. RECORDED TEMP °F	1.69 at 61"	2.63 at 53"	2.42 at 56"	2.78 at 51"			
RECORDED BY	1. Smether	1. Smether	1. Smether	1. Smether			

OTHER LOGS

SONIC GAMMA RAY CALIPER 770' - 7696'
MICROLATEROLOG 770' - 7704'
CONTINUOUS DIPMETER 770' - 7680'
RUNS 1 - 4
RUNS 1 - 4
RUNS 1 - 3

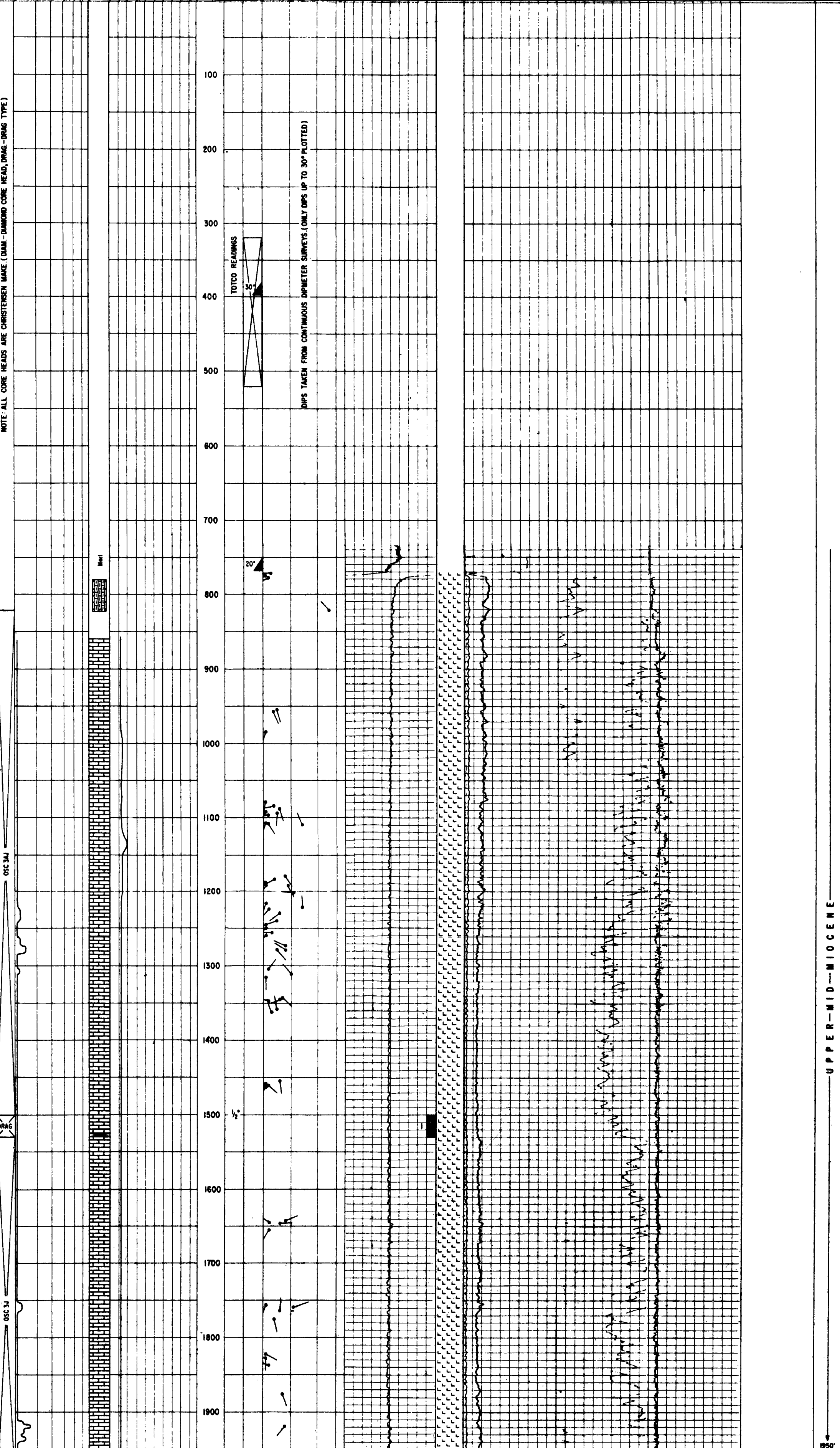
WELL SYMBOLS

- Gas show
- Oil show
- Fluorescence
- Core, interval, number and recovery
- Casing shoe
- Perforated interval
- Sidewall core
- Plugged interval
- Blowout
- Macro
- Micro
- Plant
- Spore, pollen

LITHOLOGY

Conglomerate	Graywacke	Dolomite	Coal	Calcareous
Breccia	Siltstone	Calcareous	Igneous rocks	Glaucousitic
Tillite	Claystone	Calcilite	Volcanic rocks	Pyritic
Quartz sandstone	Shale	Marl	Metamorphic rocks	Carbonaceous
Arkose	Limestone	Evaporite	Bituminous	Charly

NOTE: ALL CORE HEADS ARE CHRISTENSEN MAKE (DAM - DIAMOND CORE HEAD - DRAG TYPE)

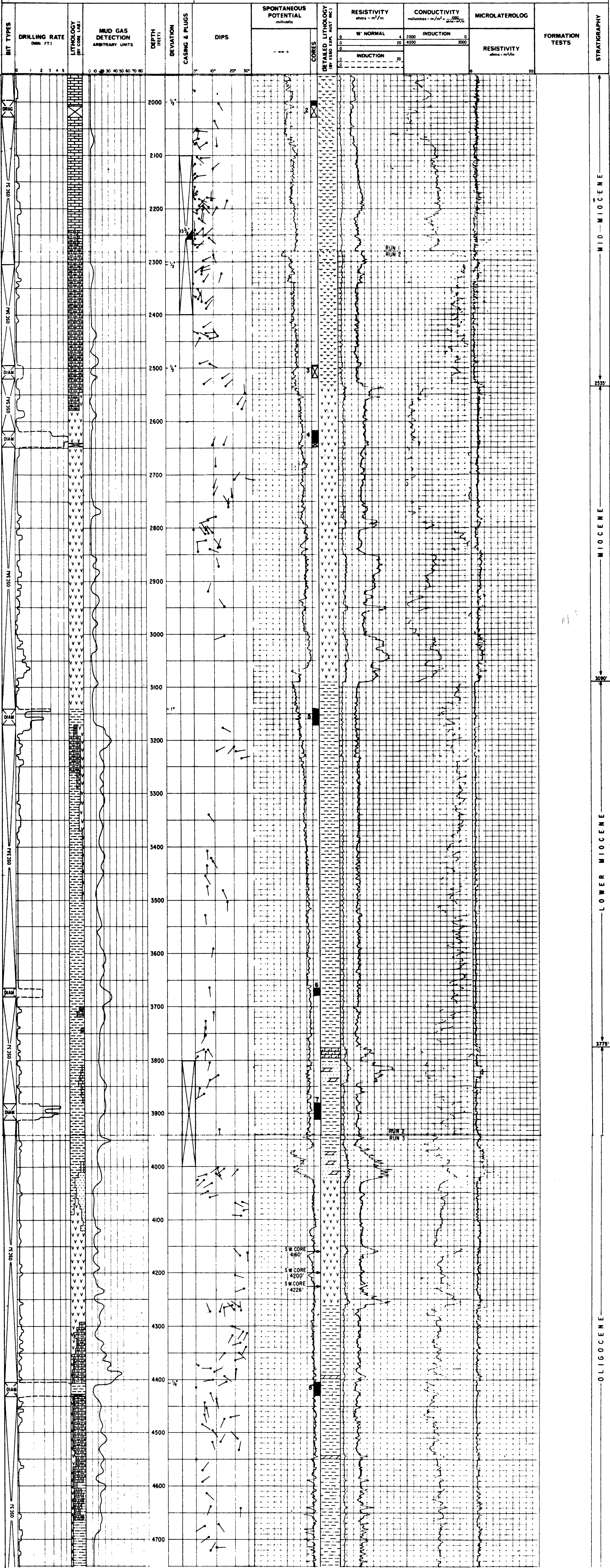


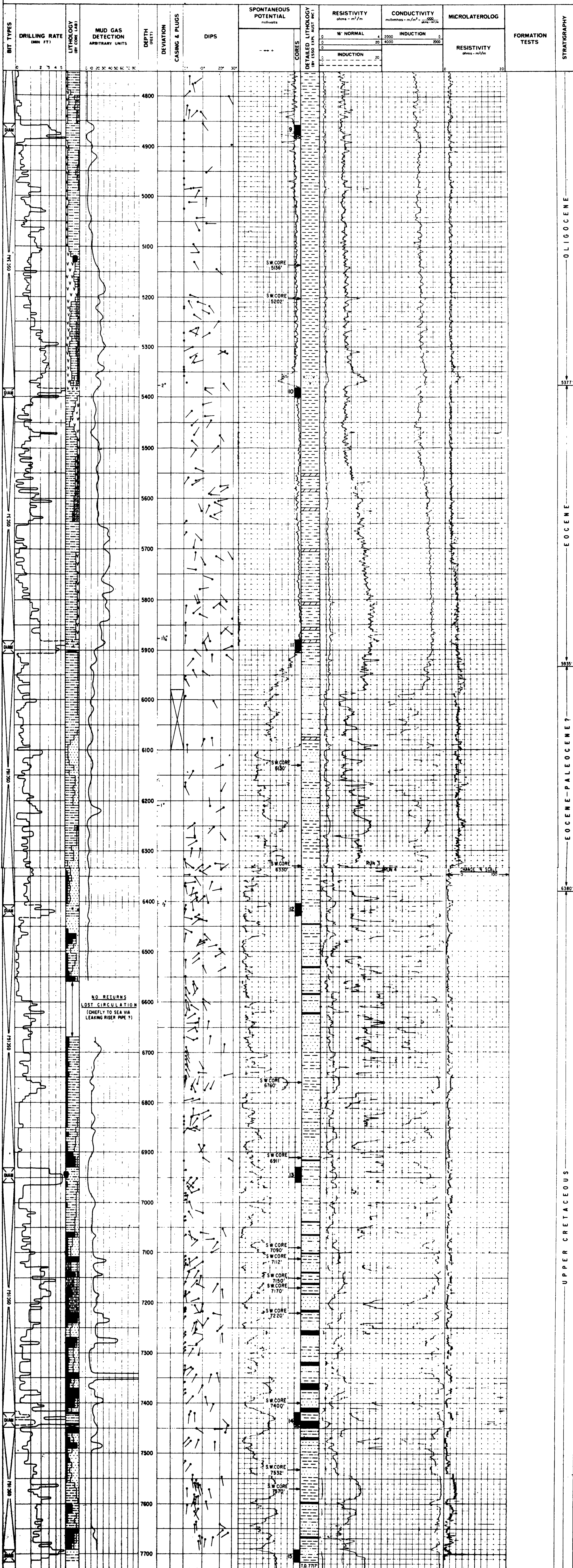
UPPER-MID-MIOCENE

1950'

ESSO BASS - I

PLATE 1
Sheet 2





ESSO EXPLORATION AUSTRALIA INC.
WELL COMPLETION LOG
ESSO BASS-2

CONCESSION : E.L. 1/60 STATE : TASMANIA BASIN : BASS

LOCATION : Lat. 39° 53' 09"S Long 146° 18' 15"E

ELEVATION : K.B. 31' G.L. M.S.L. WATER DEPTH : 280'

SUDDDED : APRIL 14, 1966 COMPLETED : MAY 25, 1966 DRILLED BY : GLOBAL MARINE AUSTRALASIA PTY. LTD.

CLASSIFICATION : STRATIGRAPHIC STATUS : DRY AND ABANDONED

TOTAL DEPTH : 5910' PLUGGED BACK T.D. : _____

STRUCTURE REASONS FOR DRILLING OBJECTIVE ETC.

TO TEST ANTICLINAL CLOSURE WITH APPROX 40 SQUARE MILES OF AREA
AND 200 FEET OF VERTICAL CLOSURE ON POTENTIAL RESERVOIR OBJECTIVE

RESULTS

FORMATION TOPS ESSENTIALLY AS PREDICTED, RESERVOIR INTERVAL FOUND TO BE DEVOID OF HYDROCARBONS

LITHOLOGY

	Sandstone		Calcarene
	Siltstone		Dolomite
	Shale		Coal
	Mudstone		Volcanic rocks

CASING AND TUBING				PLUGS		PERFORATIONS	
SIZE	SET AT	SX CMT.	FORMATION	FROM	TO	FROM	TO
30"	404	400	PLIOCENE 2	3900	3700	170	
20"	817	1078	MIOCENE	3400	3200	135	
13 3/8"	2100	1725	MIOCENE	2200	1900	240	

TESTS

NO TESTS RUN

WIRE LINE LOGGING SERVICES

COMPANY	TYPE OF LOG	FROM	TO
SCHLUMBERGER	INDUCTION ELECTRIC	822	5907
"	SONIC GAMMA RAY CALIPER	822	5904
"	MICROLATEROLOG CALIPER	822	5532
"	CONTINUOUS DIPMETER	822	5907

WELL-SITE GEOLOGISTS: B.R. GRIFFITH, J.L. ELLIOTT, W.H. NIXON LITHOLOGY INTERPRETED BY: W.H. NIXON, DATE: JUNE, 1966

MUD LOGGING BY: CORE LABORATORIES AUSTRALIA LTD.

ABBREVIATIONS

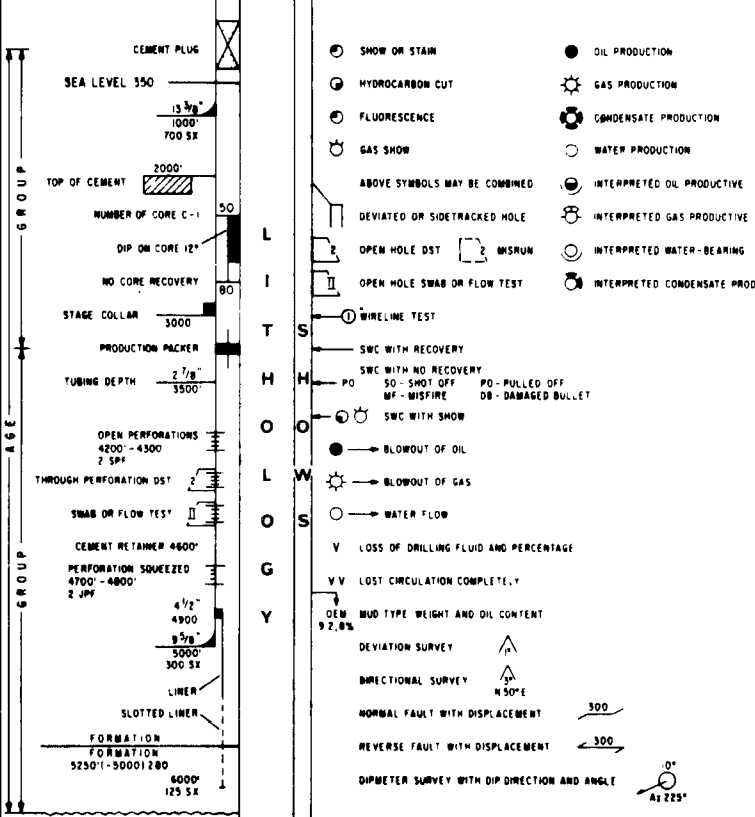
NB = NEW BIT
NCB = NEW CORE BIT
CO = CIRCULATED OUT
DST = DRILL STEM TEST
LAT = LOGGED AFTER TRIP

TRIP GAS
NR = NO RETURNS
DS = DIRECTIONAL SURVEY
DC = DEPTH CORRECTION

RESISTIVITY, OHM-METERS
RM = MUD
RMC = MUD CAKE
RMF = MUD FILTRATE
W = WEIGHT
S = SALINITY, ppm Cl

MUD DATA
CR = CORE THICKNESS 32nds
V = VISCOSITY, API SECONDS
F = FILTRATE API CC'S
W = WEIGHT
S = SALINITY, ppm Cl

DEPTHS CORRESPOND TO DRILL PIPE MEASUREMENTS MEASURED FROM KELLY BUSHING



Run No.	Depth (feet)	2"	3"	4"
1	2100	5536	5907	
2	2100	5536	5907	
3	2100	5536	5907	
4	2100	5536	5907	
5	2100	5536	5907	
6	2100	5536	5907	
7	2100	5536	5907	
8	2100	5536	5907	
9	2100	5536	5907	
10	2100	5536	5907	

Run No.	Depth (feet)	2"	3"	4"
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6	2100	5536	5907	
7	2100	5536	5907	
8	2100	5536	5907	
9	2100	5536	5907	
10	2100	5536	5907	

DRILLING RATE	POROSITY	PERCENTAGE LITHOLOGY	DEPTH	HYDROCARBON ANALYSIS		REMARKS	SPONTANEOUS POTENTIAL	RESISTIVITY	CONDUCTIVITY
				DRILLING MUD	DRILL CUTTINGS				

