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LAKES ENTRANCE - 1

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Work Completion Report

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(W499)

WOODSIDE (LAKES ENTRANCE) OIL CO. NO LIABILITY

WOODSIDE LAKES ENTRANCE NO. 1

COMPLETION REPORT

by

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MARCH 1966

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1 ABSTRACT

The Woodside Lakes Entrance No. 1 Well was spudded on March 28, 1966 in Petroleum Exploration Permit No. 61 issued by the State of Victoria; drilled with a Failing 2,500 rig to a total depth of 1,386 feet, and subsequently completed on April 7, 1966.

The well penetrated 1,353 feet of Tertiary sediments and bottomed at 1,386 feet in granitic basement of ? Ordovician age.

The Tertiary penetrated is broadly divisible into four principal marine formations:-

- (i) Post Miocene coquina, sand, and marl of the Jemmy's Point Formation.
- (ii) Upper Miocene fossiliferous marls and marls of the Tambo River Formation.
- (iii) Miocene bryozoan limestone, fossiliferous marl, limestone bands, and hard recrystallized limestone bands of the Gippsland Limestone Formation.
- (iv) Oligocene micaceous clay and glauconitic sand of the Lakes Entrance Formation.

Indication of hydrocarbons ranging from strong yellow fluorescence to free oil shows in fractures were recorded from cores taken over the interval 1,274 - 1,316 feet, and subsequently in Drill-Stem Tests Nos. 2 and 3 within the cored interval.

The well confirmed the presence of hydrocarbons within the Glauconitic Member of the Lakes Entrance Formation but of an uneconomic nature.

As no commercial quantities of oil or gas were encountered, the well was subsequently plugged and abandoned.

11 INTRODUCTION

The Woodside Lakes Entrance No. 1 Well was drilled about 2 miles north of the township of Lakes Entrance, between Midwest No. 1 and the Imray Bore, and west of Midwest No. 2.

It was designed as a stratigraphic test to investigate the possibility that gas may be in sufficient quantity to justify commercial exploitation. No tests of gas flows had ever been made in the Lakes Entrance Area, and the descriptions of gas indication varied from "blow-outs" to "very strong" to "weak". These previously recorded gas indications appeared to have been in thin porous and permeable zones throughout the section, with the main interest at this location being the zone, which, at Midwest No. 1 "blew-in".

111 WELL HISTORY1. GENERAL DATA

- |   |   |
|---|---|
| (a) <u>Well Name and Number:</u>                | Woodside Lakes Entrance No.   |
| (b) <u>Location:</u>                            | Latitude: 37° 52' 0" S.<br>Longitude: 147° 59' 42" E.<br>North of the township of Lakes Entrance, County of Tambo, Parish of Colquhoun. |
| (c) <u>Name and Address of Tenement Holder:</u> | Woodside (Lakes Entrance) Oil Co. N.L.<br>792 Elizabeth St., Melbourne Victoria.  |
| (d) <u>Details of Petroleum Tenement:</u>       | P.E.P. 61 covering an area of 4,043 square miles in the State of Victoria. (originally P.P.L. 248 held by Oilco).                       |
| (e) <u>District:</u>                            | Lakes Entrance, Victoria.   |
| (f) <u>Total Depth:</u>                         | 1,386 feet. Driller<br>1,386 feet. Schlumberger.  |
| (g) <u>Date Drilling Commenced:</u>             | 28th March, 1966.   |
| (h) <u>Date Drilling Completed:</u>             | 6th April, 1966.  |
| (i) <u>Date Rig Released:</u>                   | 7th April, 1966.  |
| (j) <u>Drilling Time to Total Depth:</u>        | 10 days.  |
| (k) <u>Elevation:</u>                           | 163 feet Ground Level.<br>171 feet Rotary Table.  |
| (l) <u>Status:</u>                              | Dry, plugged and abandoned.   |
| (m) <u>Cost:</u>                                | \$23,224. as at Aug. 31st. '66.   |

2. DRILLING DATA:

- |                |   |
|----------------|---|
| (a) Contractor | W.L. Sides & Son Pty. Ltd.,<br>Wellington Road,<br>CLAYTON, Victoria. |
|----------------|---|

2. DRILLING DATA (cont'd...)

- (b) Drilling Plant:
- |                                       |                  |
|---------------------------------------|------------------|
| Make                                  | Failing          |
| Type                                  | 2500             |
| Rated Capacity with<br>3½" drill pipe | 2,500 feet       |
| Rated Capacity with<br>4½" drill pipe | Nil              |
| Motors                                | G.M. Diesel 4-71 |
- (c) Mast:
- |          |                 |
|----------|-----------------|
| Make:    | Geo. E. Failing |
| Type     | Telescopic      |
| Capacity | 160,000 lbs.    |
- (d) Pumps - Two:
- |           |                |
|-----------|----------------|
| (i) Make  | Gardner-Denver |
| Type      | FXO            |
| Size      | 7¼" x 10"      |
| Motors    | G.M. 6-71      |
| (ii) Make | Wheatley       |
| Type      | ---            |
| Size      | 5" - 10"       |
| Motors    | G.M. 4-71      |
- (e) Blowout preventer equipment:
- |          |         |
|----------|---------|
| (i) Make | Shaffer |
| Size     | 10"     |
| Series   | 900     |
- (f) Hole sizes and depths:
- |           |                      |
|-----------|----------------------|
| 12¼" Hole | R.T. to 150 ft.      |
| 7⅞" Hole  | 150 ft. to 1366 ft.  |
| 5⅝" Hole  | 1366 ft. to 1386 ft. |
- (g) Casing details:
- |               |         |
|---------------|---------|
| (i) Size      | 9⅝"     |
| Weight        | 36 lbs. |
| Grade         | J.55    |
| Range         | 2       |
| Setting depth | 141 ft. |
- (h) Casing cementing details:
- |                |                                      |
|----------------|--------------------------------------|
| (i) Size       | 9⅝"                                  |
| Setting depth  | 141 ft.                              |
| Qty. cmt. used | 60 sacks                             |
| Cemented to:   | 80 ft.                               |
| Method         | Mixed in tank and pumped<br>to hole. |
- (i) Drilling fluid:
- |                        |   |
|------------------------|---|
| (i) Type: 0 to 150 ft. | Bentonite/water only  |
| 150 ft. to T.D.        | Ligno-sulphonate system   |
| (ii) Treatment         | With stock chemicals on<br>location on day to day<br>basis as required. |
- (iii) Mud Material & Chemical  
Consumption:
- |               |            |                             |
|---------------|------------|-----------------------------|
| Supercol      | 2,100 lbs. | (Viscosity)                 |
| Volclay       | 5,600 lbs. | (Viscosity)                 |
| Unical        | 2,350 lbs. | (Thinners and pH)           |
| Milcon        | 550 lbs.   | (Water loss control)        |
| Caustic       | 260 lbs.   | (Thinners and pH)           |
| Cal. Chloride | 220 lbs.   | (Advance cmt. setting time) |
| Sawdust       | 1,000 lbs. | (Lost circ. control)        |
- (iv) Average Weight Analysis:-
- | Week | Depth | Weight | Visc. | W.L. | F.C. | pH. |
|------|-------|--------|-------|------|------|-----|
| 1.   | 1368' | 9.5    | 58    | 5.1  | 2/32 | 9.5 |

2. DRILLING DATA (cont'd...)

- (j) Water Supply: Water was pumped from water-hole, 1400 ft. from Wellhead.
- (k) Perforation and Shooting: Nil
- (l) Plug back and Cementation Jobs:  
 Plug back on abandonment -
- |    |               |                          |
|----|---------------|--------------------------|
| 1. | 1300' - 1200' | 25 sacks, 15 lbs. Slurry |
| 2. | 650' - 550'   | 25 sacks, 15 lbs. Slurry |
| 3. | 200' - 100'   | 25 sacks, 15 lbs. Slurry |
| 4. | 20' - 0'      | 8 sacks, 15 lbs. Slurry  |
- (m) Fishing Operation: Nil
- (n) Side-tracking Hole: Nil

3. LOGGING AND TESTING

- (a) Ditch Cuttings: Cuttings were taken over a normal shale shaker at 10 foot intervals while drilling and 5 foot intervals whilst coring.  
 The suite of cuttings are stored with the Victorian Mines Department and with the Company in Melbourne.
- (b) Coring: The original coring programme called for cores to be taken whenever considered necessary by the well-site geologist, and for the well to be cored continuously from 1,250 feet to "basement". The Woodside Lakes Entrance No. 1 Well was cored continuously from 1,247 feet to 1,386 feet for a total footage of 139 feet and a recovery of 55½ feet. (Apparently no core analysis)

<u>Core No.</u>	<u>Interval</u>	<u>Cut</u>	<u>Recovery</u>	<u>% Recovery</u>
1	1247 - 1267	20'	8'	40%
2	1267 - 1281	14'	9'	64%
3	1286 - 1306	20'	1½'	7.5%
4	1306 - 1326	20'	10'	50%
5	1326 - 1346	20'	10'	50%
6	1346 - 1366	20'	8'	40%
7	1366 - 1386	20'	9'	45%

The suite of cores is stored with the Victorian Mines Department in Melbourne.

- (c) Side Wall Sampling: Nil
- (d) Electrical and Other Logging: The original programme called for the following logs to be run on attaining a depth of 1,250 feet: Electric, Microlog-Caliper, Sonic, and Gamma Ray-Neutron. The Victorian Mines Department requested later that an Electric log be run a total depth.

3. LOGGING AND TESTING (Cont'd...)

(d) The details of the logs run are:-

<u>Run 1</u>	<u>Run 2</u>
Electric Log 144' - 1245'	Electric Log 1070' - 1385'
Sonic Log 143' - 1241'	
Microlog- 143' - 1245'	
Caliper	
Gamma Ray- 100' - 1246'	
Neutron	

(e) Penetration Rate Log: A geograph was not installed at the rig-site. The rate of penetration was determined by the driller-in-charge who logged the actual time taken to penetrate 10 foot intervals. This log is included as part of the Composite Well Log.(f) Gas Log: A Core Laboratories (Australia) Limited portable continuous hot wire mud gas recorder was in operation throughout drilling. The gas trap was of the floating type fitted with an electrically operated agitator. The latter, however, was inoperative hence lessening the efficiency of the recorder. It was necessary, therefore, to increase the efficiency of the recorder by keeping the lignosulfonate mud at a viscosity of between 45 - 50. Throughout the drilling of the well the gas detector showed no indication of gas.(g) Formation Testing: Three conventional open-hole drill stem tests were conducted during the drilling of the well. The details of which follow:-

<u>D.S.T.No.</u>	<u>Interval</u>	<u>Method</u>	<u>Recovery</u>
1	845'-883'	Dual bottom hole	322' muddy water (825 ppm Nace)
2	1266'-1286'	Dual bottom hole	12' slightly oil cut mud.
3	1290'-1310'	Single straddle test	90' oil-and gas-cut mud 275' oil and gas-cut watery mud (1320 ppm Nace calculated).

(h) Deviation Surveys: These surveys were carried out with a Totco instrument. The results of which are:-

<u>Depth</u>	<u>Deviation</u>
847'	$\frac{1}{4}^{\circ}$
1220'	$\frac{1}{2}^{\circ}$

(i) Temperature Surveys: Nil(j) Velocity Surveys: Nil(k) Other Well Surveys: Nil



1V GEOLOGY1. SUMMARY OF PREVIOUS WORK

(a) Geological: The Lakes Entrance Field, in the easternmost sector of the Gippsland Basin, has been subjected to intense petroleum exploration since the discovery of oil there in 1924. A large number of relatively shallow wells have been drilled, many of them producing oil by various methods, such as pumping and bailing. The oil is an asphaltic base crude of 15.7° API gravity devoid of gasoline and kerosene fractions.

The gas present is essentially composed of methane and nitrogen, and totally lacks ethane or higher homologues. The glauconitic sandstone reservoir rock forms irregular patches and pockets of extremely variable and unpredictable porosity and permeability. Generally, however, it is completely tight and produces no oil.

The gravels and sands below the glauconitic sandstone are of good and uniform porosity and permeability, but are now completely fresh water flushed. The artesian water head is under a pressure of approximately 600 p.s.i. with the water moving down dip through these gravels in a general seaward direction.

The Lakes Entrance Field produced over 8,000 barrels of oil in intermittent amounts from over 30 wells, until the complete cessation of production in 1957. The cessation was largely due to the extremely low permeability and variable nature of the reservoir rock, together with the method of production and the low gravity of the crude.

From the data made available by the numerous cable tool and rotary wells drilled in the area, subsurface geological maps and section have been prepared.

(b) Geophysical

(i) Gravity and Aeromagnetics - Two gravimetric surveys have been carried out since the end of the last war. In 1949 an R.H. Ray gravity survey was carried out on behalf of Lakes Oil Limited. Later, the B.M.R. conducted a regional gravity survey, and an aeromagnetic survey over the whole Gippsland Basin.

(ii) Seismic - The only Seismic survey in the area was conducted by Austral Geoprospectors in the vicinity of Lake King. No Seismic Survey was made over the Lakes Entrance Field.

2. REGIONAL GEOLOGY

The Gippsland Basin - and area of Tertiary and Mesozoic deposition - is essentially an east-west trending graben, occupying an area of some 3,000 square miles onshore.

The basin proper may be considered as that area west of the Lakes Entrance granite high, south of the Tertiary - Palaeozoic contact on the north side of the basin and east of a line between the Wilson's Promontory granite and the town of Warragul. The southernmost boundary of the basin is unknown, lying in the area of Bass Strait.

The basement is believed to consist of Ordovician and Silurian metasediments which have been intruded by "granite", probably underlying the Mesozoic sediments over most of the basin.

Highly folded Middle Devonian marine sandstones, siltstones, shales, and limestone with a basal conglomerate unconformably overlie the "basement". These rocks outcrop north of the eastern half of the basin.

Unconformably overlying the highly folded Middle Devonian of the northern side of the basin is a moderately folded thick continental sequence of red and green shales, sandstones, conglomerate, and volcanics of Upper Devonian to Lower Carboniferous in age, which were penetrated in the South West Bairnsdale No. 1 Well.

Permian sediments are almost completely absent, but did occur in the Duck Bay No. 1 Well. A conglomerate, exposed along a major fault on the south side of the Carrajung uplift is thought to be a glacial tillite of Permian age. Not  
So.

No sediments of Triassic age are known in the Gippsland Basin.

A thick sequence of continental sandstone, arkose, siltstone, greywacke mudstone, with minor amounts of coal are represented by the Strzelecki Group of Jurassic to Lower Cretaceous age, and unconformably overlies the Lower Carboniferous. The thickness varies between 5,000 feet to 20,000+ feet and has never been fully penetrated except at the northern edges of the basin. ?

Sediments of Upper Cretaceous age are apparently absent in outcrop onshore, but they have been penetrated in the Hollands Landing Well, Golden Beach West No. 1, Dutson Downs No. 1, Merriman No. 1, Gippsland Shelf Wells, and are suspected in a few others. This sequence is composed of deltaic and marine sandstones, siltstones, shales, and mudstones.

2. REGIONAL GEOLOGY (Cont'd)

The Lakes Entrance Field, located on the Bairnsdale Shelf, in the easternmost sector of the Gippsland Basin, was a structural high during the Mesozoic and the earlier part of the Tertiary. There, a thinning of the Tertiary sequence, and an absence of the Mesozoic sequence is observed.

Marine Tertiary transgression occurred over an Ordovician granitic and metasedimentary basement with no interfingering between marine and non-marine facies observable. The transgression began in the Oligocene with the deposition of gravel, sand, restricted glauconitic sandstones, marls, and limestone of the Lakes Entrance Formation.

Miocene limestone and marl of the Gippsland limestone, followed by fossiliferous marls, and limestone of the Tambo River Formation were deposited as the transgressive sea gradually encroached over the basin, which became more sandier and shelly (Jemmy's Point Formation) as marine regression began.

By mid-Pliocene the sea began to regress to its present limits.

The generalized stratigraphic succession in the area may be represented thus:-

	<u>Age</u>	<u>Formation</u>	<u>Rock Type</u>
T E R T I A R Y	Lower Pliocene	Jemmy's Point	Fossiliferous sands and marl.
	Upper Miocene	Tambo River	Fossiliferous marl.
	Miocene	Gippsland Limestone	Limestone and fossiliferous marl.
	Oligocene	Lakes Entrance	Micaceous marl, limestone, glauconitic sandstone, sand and gravel.
	-	"Basement"	"Granite" and meta-sediments (schists, phyllites, slates).

3. STRATIGRAPHIC TABLE (Formations encountered in the Well)

	<u>Age</u>	<u>Formation</u>	<u>Top (R.T.)</u>	<u>Subsea</u>	<u>Thick- ness</u>
T E R T I A R Y	Lower Pliocene	Jemmy's Point	-	-	-
	Upper Miocene	Tambo River	242'	71'	52'
	Miocene	Gippsland Limestone	294'	123'	771'
	Oligocene	Lakes Entrance			
		(i) Micaceous Marl Member	1065'	894'	208'
		(ii) Glauconitic Sandstone Member	1273'	1102'	69'
		(iii) Basal Gravel and Sand Member	1342'	1171'	12'

3. STRATIGRAPHIC TABLE (Cont'd...)

	<u>Age</u>	<u>Formation</u>	<u>Top (R.T.)</u>	<u>Subsea</u>	<u>Thickness</u>
O R D O V I C I A N	-	Weathered Granite	1353'	1182'	29'
	-	Biotite Granite	1382'	1211'	4'+
		T.D.	1386'	1215'	

4. STRATIGRAPHY

The lithological sequences present in the well is divisible into a marine Tertiary and a Lower Palaeozoic(? Ordovician)) biotite granite basement.

- (1) The Tertiary sequence is quite gradational in nature; there being, in general, no real distinct breaks between the formations as a whole. The formation tops have been selected basically from electric and gamma-ray log characteristics, together with a consideration of their microfaunal assemblages.

The Tertiary is broadly divisible into four principal lithological units.

(a) Jemmy's Point Formation (Lower Pliocene) ? -242'

The top of this formation has not been determined since the surface casing was set at 143 feet and no samples were collected previously.

The unit comprises a sequence of marl with minor bands of fossiliferous material, and very minor sand (never exceeding 5%)  
143' - 242' Marl: blue grey to medium grey, soft, clayey, sticky, argillaceous, variably glauconitic, silty, and sandy (very fine-grained) in part.

Coquina: white and cream, skeletal with the skeletal remains dominantly gastropods, pelecypods, bryozoans, and foraminiferal tests. The fauna becomes mainly bryozoan at about 230 feet.

Sand: light grey, very coarse-grained, subangular to subrounded, quartzose.

(b) Tambo River Formation (Upper Miocene) 242' - 294'

This unit consists of fossiliferous marl, and is characterized at its top by a decrease in API units as shown on the gamma-ray log, the readings ranging from 20 to 30 API units. The electric log shows a slightly wavy resistivity which ranges from 26 to 35 ohms -  $m^2/m$ .

On the sonic log low velocities may be seen with the transit time varying between 145 to 155 microseconds per foot.

(b) Tambo River Formation (Upper Miocene) (Cont'd)

242' - 294' Marl: blue grey to medium grey, soft, clayey, sticky, argillaceous, calcareous, variably glauconitic, silty and sandy (very fine-grained) in part, fossiliferous (white, cream, fawn bryozoan material and minor foraminifera).

(c) Gippsland Limestone (Miocene) 294' - 1065'

This formation comprised of bryozoan limestone at its top followed by inter-bedded fossiliferous marl and tight limestone bands. The top of the sequence is characterized by a general resistivity build-up on the electric log reaching a maximum of 90 ohm-m<sup>2</sup>/m on the lateral device, with the gamma-ray log showing a corresponding general decrease in radioactivity down to 10 API units. The limestone bands further down the sequence show-up well on the sonic, gamma, and electric logs -

294' - 406' Limestone: white, cream, fawn, pale grey, fossiliferous dominantly bryozoan, but with minor foraminiferal tests; showing moderate to good porosity.

406' - 1065' Marl: blue grey to medium grey, clayey, soft, argillaceous, slightly calcareous and glauconitic, rare carbonaceous specks, fossiliferous.  
Limestone: as above, but of poor porosity.

(d) Lakes Entrance Formation (Oligocene) 1065' - 1342'

The sequence in this formation is micaceous marl (very clayey), glauconitic sandstone, gravel and sand. The top of this formation has been taken close to where the typical foraminiferal assemblage commences, corresponding on the electric log to the point where the average resistivity gradient builds up, i.e. It has been taken at the lowest reading of the increasing resistivity gradient.

The formation has been divided into three relatively distinct members:-

- (i) The Micaceous Marl Member.
- (ii) The Glauconitic Sandstone Member.
- (iii) Basal Gravel and Sand Member.

(d) Lakes Entrance Formation (Oligocene) 1065'-1342' (Cont'd)(i) Micaceous Marl Member

1065'-1273' Marl: grey, brownish grey, dark brown, greenish, very clayey, becoming sandier toward base, finely divided light grey mica, slightly glauconitic. (black, very fine-grained in pellet form), pyritic, calcareous, with thin stringers of hard, creamy fossiliferous limestone. Limestone: dark to medium grey, very fine-grained, moderately hard, fairly glauconitic, tightly packed, slightly lithic and quartzose, pyritic, recrystallized in nature.

(ii) Glauconitic Sandstone Member

1273'-1342' Sandstone: dark grey at top becoming dark green in colour toward base, fine-to medium-grained subangular to rounded, quartzose, glauconitic, friable, soft, pyritic, with an argillaceous matrix, fair porosity. Limestone: Very minor thin, hard bands of dark blue-grey colour.

(iii) Basal Sand and Gravel Member

1342'-1353' Gravel: grading to a very coarse sand, dark grey to brown, subangular to subrounded, glauconitic, calcareous, with some shelly material. Sand: dark green, very fine-to fine-grained, glauconitic, shaley, calcareous.

- (2) At 1,353 feet the well penetrated yellowish white bentonitic clay, which, with depth becomes more granitic in nature. The interval 1,353 to 1,382 feet is considered to be a zone of weathering above the basement proper. At 1,382 feet the well penetrated the hard crystalline basement which consists of a biotite granite.

5. STRUCTURE

The Woodside Lakes Entrance No. 1 Well was drilled as a stratigraphic test of the Tertiary sediments of the Lakes Entrance Area. As no seismic work has been conducted in the vicinity of the well, the structural information has been based solely on well data

Contouring of the "basement" showed the well to be sited on the eastern side of a generally broad "basement" high plunging seawards in a south-easterly direction.

The Tertiary sediments in the Lakes Entrance Area are in an on-lap position on the fringe of the Gippsland Basin, thinning against the "basement" high, and having a gentle seaward dip toward the basin proper.

## 6. OCCURRENCE OF HYDROCARBONS

The following cores contained showings of hydrocarbons:-

Core No. 2:- At 1274 feet and below free oil was (1267'-1281') observed in fractures in the clayey sand.

Core No. 3:- This core contained some yellow fluorescence (1286'-1306') in the bottom 2 inches of the recovered portion.

Core No. 4:- A strong yellow fluorescence and some free (1306'-1326') oil was observed between 1306 and 1310 feet; between 1310 and 1316 feet only sporadic yellow fluorescence was present.

The following Drill Stem Tests also had hydrocarbon showings:-

D.S.T. No. 2:-This test covered the interval of Core No. (1266'-1286') 2 and produced slightly oil-cut mud.

D.S.T. No. 3:-The interval of Core No. 3 was covered by (1290'-1310') this test, which produced oil-and gas-cut mud and watery mud.

No gas showings were recorded on the gas detector whilst drilling.

## 7. POROSITY AND PERMEABILITY

Porosity values have been computed using the Microlog, Neutron, and Electric log.

The Microlog shows moderate positive separation down the section to about the 580 foot level. Between 580 to 1,030 feet the nature of the formations are tight and impermeable, but with rare very thin permeable zones. Below the 1,030 foot level to the end of the logging run, the Microlog exhibits negative separation.

Porosity values computed from the Microlog between 152 feet and 865 feet, in zones showing moderate separation, ranged from 26% to 42%. These values are considered to be optimistic.

Use of the Sonic log was avoided owing to the unconsolidated nature of the formations, and also to the lack of information concerning fluid and matrix velocities. The Neutron log porosity computations over the same intervals gave values generally 8% - 10% lower than the Microlog.

*What a great waste of opportunity*

The Electric log was the only device run below 1,070 feet, and the porosities computed between 1,273 to 1,353 feet were evaluated using this device. The porosities found in this interval varied between 15% and 28%.

Little movement on the S.P. curve and the generally low resistivity readings over this interval tend to reflect the relatively impermeable nature of the glauconitic

7. POROSITY AND PERMEABILITY (Cont'd...)  
 .....sandstone. Resistivity build-up indicated at the top of the glauconitic sandstone reflects hydrocarbon saturation.
8. CONTRIBUTIONS TO GEOLOGICAL KNOWLEDGE
- (i) The Woodside Lakes Entrance No. 1 Well has the distinction of being the first well in the Lakes Entrance Field to have been logged. Considering the area contains many of the type sections for the Tertiary in the Gippsland Basin, the logs are a valuable asset for correlation purposes in the deeper parts of the basin.
  - (ii) The irregularity of the oil saturation in the glauconitic sandstone reservoir rock was demonstrated, and the reservoir pressure at this level, supplied by the artesian water head, is about 510 p.s.i.
  - (iii) The zone of gas saturation at 917 feet in Midwest No. 1, which blew-in, was not present in this well. It has either been flushed, escaped, or was just a small pocket. The gas saturation is likewise variable and extremely unpredictable.
  - (iv) The well confirmed the on-lap position of the marine Tertiary sediments on to a basement high on the fringe of the Gippsland Basin.

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APPENDIX NO. 1  
CORE DESCRIPTIONS  
WOODSIDE (L.E.) NO. 1 WELL

<u>CORE NO. 1</u>	1247'-1267' Cut 20', recovered 8' (40% recovery).
Top 1"	<u>CLAY</u> ; dark green, hard, very calcareous.
2'5"	<u>CLAY</u> ; dark brown, calcareous, glauconitic, fossiliferous, micaceous, pyritic, massive.
1"	<u>PYRITE</u> ; aggregated in grains and nodules.
5'1"	<u>CLAY</u> ; as above.
Bottom 4"	<u>LIMESTONE</u> ; white to cream, very fossiliferous with bryozoans and foraminifera, pyritic, glauconitic, and rare mica flakes. No indication of hydrocarbons or structure.
<u>CORE NO. 2</u>	1267'-1281' Cut 14', recovered 9' (64% recovery).
Top 7'	<u>CLAY</u> ; dark brown, micaceous, fossiliferous, pyritic, calcareous, sandy with occasional thin stringers of hard, creamy, fossiliferous limestone.
Bottom 2'	<u>SANDY CLAY</u> ; green, very hard, sandy, glauconitic with fractures below 1274' showing free oil. No indication of structure, but a showing of free oil as described.
<u>CORE NO. 3</u>	1286'-1306' Cut 20', recovered 1'6" (7.5% recovery)
1'6"	<u>SHALE</u> ; dark grey to black, hard, very sandy with rounded medium-sized grains, grading in part to a sandstone with an argillaceous matrix, tight. No indication of structure, but with some yellow fluorescence in bottom 2".
<u>CORE NO. 4</u>	1306'-1326' Cut 20', recovered 10' (50% recovery).
10'	<u>SAND</u> ; soft, dark greenish-grey, glauconitic, pyritic, fine-to medium-grained, argillaceous, quartzose, subrounded to subangular, fair porosity. No indication of structure. Strong yellow fluorescence and free oil 1306'-1310', and occasional sporadic fluorescence between 1310'-1316'.
<u>CORE NO. 5</u>	1326'-1346' Cut 20', recovered 10' (50% recovery).
Top 9'8"	<u>SAND</u> ; soft, dark greenish-grey, glauconitic, pyritic, fine-to medium-grained, argillaceous, quartzose, friable, fair porosity with the appearance of being water-bearing.
Bottom 4"	<u>LIMESTONE</u> ; dark blue-grey, very hard.

CORE NO. 6 1346'-1366' Cut 20', recovered 8' (40% recovery).  
Top 1'3" GRAVEL; grading to VERY COARSE SANDSTONE, dark  
grey, calcareous, subrounded to subangular grains  
glaucinitic, some shell fragments.  
6" SAND; dark green, very fine-grained, glauconitic,  
quartzose, shaley.  
9" GRAVEL; as above.  
1'6" SAND; as above, but calcareous.  
1' SAND; as above, but more shaley, calcareous.  
1'6" SAND; as above, but less shaley, calcareous.  
6" GRAVEL; brown, calcareous.  
Bottom 1" CLAY; yellow, bentonitic, non-calcareous.  
No. hydrocarbon or structural indications.

CORE NO. 7 1366'-1386' Cut 20', recovered 9' (45% recovery).  
9' WEATHERED GRANITE; massive, generally pinkish  
white though dark greenish in blotches, friable,  
badly weathered, holocrystalline, medium-grained,  
uniform. The major minerals are: grey, vitreous  
quartz; pinkish K-felspar (?microcline); whitish  
plagioclase generally kaolinized; heavily altered  
dark green pyroxene; minor biotite.

2<sup>nd</sup> Copy.

Page 1 of 10

WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

WELL: WOODSIDE (L.E) No. 1  
 SHEET No: ONE  
 DATE: 30/3/66  
 LOGGED BY: R. PERRY & R. JESSOP  
 INTERVAL FROM:  
 TO:

**SAMPLE DESCRIPTION**

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
150-160 (15)	80 15 5	MARL SHELL FRAGMENTS SAND	Blue-grey, clayey, soft, calc, carb. + silty, <sup>pellet</sup> glauc (bl), arg. Gastropods, pelecypods & rare forams, molluscans Light grey, v. coarse, slang-s/rd, qtzose, cloudy.			0
160-170 (7)	75 20 5	MARL SHELL FRAG SAND	As above Abundant gastropods, pelecypods, polyp coral (trace) molluscan, echinoid spines, bryozoans, rare forams As above + some grey lithics			0
170-180 (9)	90 10 TR	MARL SHELL FRAG SAND	> as above			0
180-190 (10)	70 25 5	MARL SHELL FRAG SAND	> as above			0
190-200 (2)	90 10 TR	MARL SHELL FRAG SAND	As above As above Colourless, clear, cloudy, lt gry, med-gm, qtzose, slang. + some gry lithics			0
200-10 (4)	90 10	MARL SHELL FRAG	As above Abundant fossils of all types; but sl. more forams than above incl. <u>Quinquiloculina</u> & <u>Triloculina</u> type			0
210-20 (4)	100 TR	MARL SHELL FRAG	<sup>Tr. mica</sup> Blue grey, clayey, soft, calc, carb, silty, lithic, qtzose, some chips mod. hard, As above.			0
						glauc (bl) arg pellet

**SAMPLE DESCRIPTION**

WELL: WOODSIDE (L.E.) No. 1  
 SHEET No: 2  
 DATE: 31/3/66  
 LOGGED BY: R. JESSOP  
 INTERVAL FROM: 220  
 TO:

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
220-30 (8)	100	MARL	Blue grey to med grey, <sup>streaky</sup> glauc (bl ± dk green when crushed), silty to v. fine sandy, gen clayey, sl. calc, argillaceous. The glauc pellets are quite abundant thru' out the sample & embedded in the marl. Some recryst. marl.	-	-	0
	TR.	SAND	Glauc. sand (bl.) of gen med-grade - more strictly a glauc bearing marl. Abundant in washed sample only. Rare lithic frags.			
	TR.	SHELL FRAG	Gastropods, lamellibranchs, forams, bryozoans, spines			
230-40 (3)	100	MARL	As above abundantly glauc. as before	-	-	0
	TR.	SHELL FRAG	As above ± bryozoa more abundant			
240-50 (12)	80	MARL	As above less glauc.	-	-	0
	20	SHELL FRAG	As above, but abundant bryozoa. & much less of the other remains as before.			
250-60 (15)	95	MARL	As above prac no glauc	-	-	0
	5	SHELL FRAG	As above, dom. bryozoans & few foraminifera			
260-70 (15)	90	MARL	As above.	-	-	0
	10	SHELL FRAG				
270-80 (10)	80	MARL	As above	-	-	0
	20	SHELL FRAG	Mainly bryozoa fragments			
280-90 (10)	100	MARL	As above, but sl. more silty & sandy (v. fine sand lithic & quartzose, ang-s/ang, cloudy, whitish) & becoming more glauc.	-	-	0
	TR.	SHELL FRAG	As above dom. bryozoans & forams (also noted rare uniserial type in banded form)			

**SAMPLE DESCRIPTION**

WELL: WOODSIDE (LE) No. 1  
 SHEET No. THREE  
 DATE: 31/3/66  
 LOGGED BY: R. JESSOP  
 INTERVAL FROM: 290  
 TO: .....

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
290-300 (14)	20 80	MARL LIMESTONE SHELL FRAG	As before $\bar{c}$ less glauc pellets (gen f-m grn) Bryozoan remains $\bar{c}$ few foraminifera.	-	-	0
300-10 (16)	100	LIMESTONE SHELL FRAG	Bryozoans, white, cream, pale grey, fawn. $\bar{c}$ a few foraminifera.	-	-	0
310-320 (12)	100	LIMESTONE	As above	-	-	0
320-30 (10)	100	LIMESTONE	As above	-	-	0
330-40 (12)	100	LIMESTONE	As above	-	-	0
340-50 (13)	100	LIMESTONE	As above	-	-	0
350-60 (10)	100	LIMESTONE	As above	-	-	0
360-70 (12)	100	LIMESTONE	As above, but much larger chips of bryozoan fragments.	-	-	0
370-80 ( )	100	LIMESTONE	Typically all bryozoan fragments as before, again in rel. large chip form (1cm being greatest) $\bar{c}$ few foraminiferal tests.	-	-	0
380-90 (9)	100	LIMESTONE	As above	-	-	0
390-400 (8)	100	LIMESTONE	As above.	-	-	0
400-10 (8)	10 90	MARL LIMESTONE	> as above	-	-	0
410-20 (19)	90 10	MARL LIMESTONE	> as above	-	-	0

**SAMPLE DESCRIPTION**

WELL: WOODSIDE (L.E) #1  
 SHEET No: 4  
 DATE: 31/3/66  
 LOGGED BY: R. JESSOP  
 INTERVAL FROM: 420'  
 TO: 560

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
420-30 (13)	100	MARL	Blue grey, medium grey, clayey, argillaceous, sl. calc. v. sl. glauconitic, soft.	-	-	1.
	TR.	LIMESTONE	Dominantly bryzoan & rare echinoid spines & few forams.			
400-40 (8)	100	MARL	As above	-	-	1
	TR	LIMESTONE	As above			
440-50 (12)	95	MARL	As above	-	-	1
	5	LIMESTONE	Bryzoan			
450-60 (12)	90	MARL	As above	-	-	-
	10	LIMESTONE	As above			
460-70 (13)	90	MARL	As above	-	-	-
	10	LIMESTONE	As above			
470-480 (13)	90	MARL	As above	-	-	-
	10	Limestone	As above			
480-490 (7)	95	MARL	As above	-	-	-
	5	Limestone	As above			
490-500 (12)	85	MARL	As above	-	-	-
	15	Limestone	As above			
500-510 (10)	90	MARL	As above	-	-	-
	10	Limestone	As above			
510-520 (12)	90	MARL	As above	-	-	-
	10	Limestone	As above			
520-530 (10)	85	MARL	As above w/ small carbonaceous specks	-	-	-
	15	Limestone	As above			
530-540 (14)	85	MARL	As above	-	-	-
	15	Limestone	As above			
540-550 (5)	80	Marl	As above	-	-	-
	20	Limestone	As above			
550-560 (16)	80	Marl	As above	-	-	-
	20	Limestone	As above			

**SAMPLE DESCRIPTION**

WELL: WOODSIDE L.E. NO. 1  
 SHEET No: 5  
 DATE: 31-3-16  
 LOGGED BY: R. JESSOP + R.G. PERRY  
 INTERVAL FROM: 560-690  
 TO: \_\_\_\_\_

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
560-570 (13)	90	MARL.	Grey; with carbonaceous spacks; argillaceous; some specks glauconite; soft.			
	10	Limestone	Mainly bryozoan, with some forams; white to cream	-	-	2
570-80 (7)	80	MARL.	As above.			
	20	Limestone	Cream; fossiliferous (mainly Bryozoa, some forams)			
580-590 (11)	80	MARL	As above.		-	2
	20	Limestone	As above.			
590-600 (12)	80	MARL.	As above.			
	20	Limestone	As above. Suspicion of oil staining but no cut or fluorescence	?	?	2
600-610 (9)	80	MARL.	As above.			
	20	Limestone	As above			
610-620 (5)	85	MARL	As above. Mainly grey to blue-grey, carbonaceous <sup>part</sup> spacks	-	-	2
	15	Limestone	As above. Mostly Bryozoa.			
620-630 (18)	90	MARL	As above.			2
	10	Limestone	As above.			
630-640 (12)	90	MARL.	As above.			2
	10	Limestone	As above.			
640-640 (2)	95	MARL	As above.			2
	5	Limestone	As above.			
640-650 (8)	90	MARL	As above light-grey to grey; slightly glauconitic and carbonaceous			2
	10	Limestone	As above			
650-660 (10)	90	Marl	As above			2
	10	Limestone	As above.			
660-670 (9)	90	Marl.	As above light grey to grey; slightly glauconitic.			2
	10	Limestone	As above. Cream to white; fossiliferous (mainly Bryozoa).			
670-680 (14)	90	Marl.	As above. Colour has changed to a faintly greenish-grey			2
	10	Limestone	As above.			
680-690 (8)	90	Marl	As above			2
	10	Limestone	As above.			

WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

SAMPLE DESCRIPTION

WELL: Woodside L&E N°1  
 SHEET No: 6  
 DATE: 31-3-66  
 LOGGED BY: P. Joseph + P. G. Parry  
 INTERVAL FROM: 690 -  
 TO: .....

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluorescence	CUT	GAS
690-700 (20 min)	90	MARL	Light-greenish-grey; slightly glauconitic; some carbonaceous specks	-	-	-
	10	Limestone	Whitish-grey to creamy; richly fossiliferous (mainly bryozoa with some foraminifera)			
700-710 (10)	30	Marl	As above	-	-	-
	70	Limestone	As above			
710-720 (18)	60	Marl	As above	-	-	-
	40	Limestone	As above			
720-730 (21)	50	Marl	As above	-	-	-
	50	Limestone	As above			
730-740 (6)	50	<del>Marl</del>	As above	-	-	-
	50	Limestone	As above			
740-750 (12)	60	Marl	As above, but greyish-white	-	-	-
	40	Limestone	As above			
750-760 (12)	50	Marl	As above	-	-	-
	50	Limestone	As above			
760-770 (16)	50	Marl	As above	-	-	-
	50	Limestone	As above			
770-780 (15)	50	Marl	As above	-	-	-
	50	Limestone	As above			
780-790 (19)	95	Marl	As above	-	-	1
	5	Limestone	As above			
790-800 (20)	80	Marl	As above	-	-	1
	20	Limestone	As above			
800-810 (6)	80	MARL	Greenish grey, rarely glauc., clayey, argillaceous, soft, puggy	-	-	1
	20	LIMESTONE	Whitish, cream, pale grey, grey bryozoans & some minor foraminifera			
810-820 (16)	70	MARL	} As above	-	-	1
	30	LIMESTONE				



**SAMPLE DESCRIPTION**

WELL: WOODSIDE (L.E) No. 1

SHEET No: 7

DATE: 31/3/66

LOGGED BY: R. JESSOP & R. PERRY

INTERVAL FROM: 820

TO:

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluorescence	CUT	GAS
820-30	60	MARL	} As above	-	-	1
(8)	40	LIMESTONE				
930-40	90	MARL	} As above	-	-	1
(13)	10	LIMESTONE				
850-50	90	MARL	} As above	-	-	1
(25)	10	LIMESTONE				
850-60	80	MARL	} As above	-	-	2
(14)	20	LIMESTONE				
860-70	80	MARL	} As above	-	-	2
(16)	20	LIMESTONE				
870-80	80	MARL	} As above	-	-	2
(22)	20	LIMESTONE				
880-90	80	MARL	Soft; light grey; carbonaceous specks; fossiliferous CREAM; abundantly fossiliferous (mainly Bryozoa);	-	-	-
(15)	20	LIMESTONE				
890-900	80	MARL	some forams; rare specks of glauconite As above	-	-	-
(10)	20	LIMESTONE				
900-10	90	MARL	As above. Note: Most of the marl washes away.	-	-	-
(10)	10	LIMESTONE				
910-20	90	MARL	As above. Some black carbonaceous specks	-	-	-
(15)	10	LIMESTONE				
920-930	90	MARL	As above	-	-	-
(13)	10	LIMESTONE				
930-40	90	MARL	As above	-	-	-
(8)	10	LIMESTONE				
940-50	90	MARL	As above. Glauconite increasing	-	-	-
(11)	10	LIMESTONE				
950-60	90	MARL	As above	-	-	-
(10)	10	LIMESTONE				
960-70	90	MARL	As above	-	-	-
(10)	10	LIMESTONE				
970-80	90	MARL	As above	-	-	-
(3)	10	LIMESTONE				

WELL: WOODSIDE L.E. N°1  
 SHEET No.: 8  
 DATE: 1-4-66  
 LOGGED BY: R. Jessop + T. Perry  
 INTERVAL FROM: 980'  
 TO: \_\_\_\_\_

**SAMPLE DESCRIPTION**

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
980-90 (10)	90	MARL.	Light-grey; soft; with rare specks glauconite & carbon; fossiliferous.	-	-	1
	10	Limestone.	Creamy; some specks glauconite; some carbonaceous material; abundant fossils (mainly bryozoa).			
990-1000 (14)	90	MARL.	As above	-	-	-
	10	LIMESTONE	As above.			
1000-10 (18)	95	MARL.	As above + me HCE	-	-	2
	5	LIMESTONE	As above.			
1010-20 (8)	95	MARL	As above	-	-	2
	5	LIMESTONE	As above.			
1020-30 (14)	100	MARL	As above + me HCE. Very soft.			
	TR	LIMESTONE	As above	-	-	-
1030-40 (20)	100	MARL	As above	-	-	-
	TR	LIMESTONE	As above			
1040-50 (9)	95	MARL	As above	-	-	-
	5	LIMESTONE	As above			
1050-60 (9)	95	MARL.	As above. + me HCE.	-	-	-
	5	LIMESTONE	As above.			
1060-70 (12)	95	MARL.	As above	-	-	<del>1</del>
	5	LIMESTONE	As above			
<p style="text-align: center;">(2025 hrs) (6 units)</p> <p>NB: Conditioning hole at 20:30 hrs gave gas kick of 14 units at 1900' (meagre to fair considering instrument not working at full efficiency). Remembering carbide thru' drill pipe gave 10-12 units kick the day previous</p> <p style="text-align: center;">2100 hrs — 7 units at 1005'</p> <p>Check <math>\bar{e}</math> Sonic - Neutron logs.</p>						

WELL: WOODSIDE (L.E.) #1  
 SHEET No: 9  
 DATE: 1/14/66  
 LOGGED BY: R. JESSOP & R. PERRY  
 INTERVAL FROM: 1070  
 TO: \_\_\_\_\_

**SAMPLE DESCRIPTION**

N.B. Hard band 1078' - 1'  
 " " 1114' - 6"

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluor-escence	CUT	GAS
1070-80 (9)	100	MARL-CLAY	Greenish-grey, grey, dark greenish, clayey, argillaceous, soft, but can be broken open & silty	-	-	2
		TR LIMESTONE	Typically bryozoan fragments as before & a minor number of foraminifera.			
1080-90 (8)	95	MARL-CLAY	As above, but sl. glauc. in v.f-f grms.; sl. micac.	-	-	2
	5	LIMESTONE	As above & minor foraminifera cf. <i>Elphidium</i> sp <i>Amphistegina</i> sp ? <i>Lepidocyclina</i>			
1090-1100 (10)	95	MARL-CLAY	> As above, but more softer & clayey (very); sl micac	-	-	3
	5	LIMESTONE				
1100-110 (7)	100	MARL	> As above, sl micac.	-	-	3
		TR LIMESTONE				
1110-20 (20)	100	MARL-CLAY	Grey, glauc (v.f gm) & trace of lt. grey mica, v. clayey	-	-	3
		TR. LIMESTONE	As above			
		HARD BANDS	{ 1098 1' ① 1114 6" ② 1136-39 3' (3) ③ 1150 9" 1175 1/2 1 1/2' 1193 9" 1217 3" 1235 9"			
1120-30 (9)	100	MARL } CLAY } LIMESTONE	As above, but inc. micaceous, v. clayey	-	-	2
1130-40 (20)	40	MARL-CLAY	As above			-
	60	<del>MARL</del> RECRYST. LIMESTONE	Very fine grained, dark to medium grey, fairly glauconitic moderately hard, calcareous, tightly packed, poorly sorted, sil. lithic, quartzose (medium grey, arg/sang) matrix <del>or calcareous</del> though probably partly argillaceous, pyritic. [HARD BAND #3]	-	-	-
	20	LIMESTONE	Bryozoans & foraminifera.			

WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

WELL: WOODSIDE LAKES ENT. NO 1  
 SHEET No: 10  
 DATE: 3-4-66  
 LOGGED BY: R. Jessop & R.G. Perry  
 INTERVAL FROM: 1140'  
 TO: 1247'

**SAMPLE DESCRIPTION**

DEPTH	%	LITHOLOGY	DESCRIPTION	Fluorescence	CUT	GAS
1140-1150 (51)	Clay } Marls }	100	Extremely clayey, grading to clay, arg. grey, minor finely divided mica flakes, glauconitic, silty	-	-	2
1150-60 (65)	100	Clay } Marls }	→ Grading to clay as above	-	-	2
1160-70 (33)	80 } 20 }	Clay } Marls }	As above	-	-	2
1170-80 (39)	70 } 30 }	Clay } Perm. Lst. }	As above	-	-	2
1180-90 (15)	100	Clay	As above	-	-	2
1190-1200 (27)	70 } 30 }	Clay } Perm. Lst. }	As above with a few glauconite pellets (black) oil film No film	-	-	2
1200-10 (10)	80 } 15 }	Clay } Perm. Lst. }	As above	-	-	2
1210-20 (8)	5 } 100 }	Sand } Clay }	Glauconite pellets of black colour of med. grain	-	-	2
1215-35 (9)	100	Clay	As above. With ab. fragments of bryozoa & some forams, slightly glauconitic. Trace mica. Slightly sandy	-	-	2
1235-40 (4)	100	Clay	Brownish grey. As above. Traces mica	-	-	2
1240-47	100	Clay	Yellowish-grey but as above. Some fragments of bryozoa & gastropods. Traces pyrite & mica. Sparingly glauconitic	-	-	2
CORE NO. 1247'-1267'. Recovered 8'. (See Graphic Core Log)						

W499

1071

JCE:SP

Lakes Entrance - 1.

31st October,

56

An. 22/23/29/4

Report on Sample No. 365/56

U.W.R.S. 4203

Sample : Water from Oil Well  
 Locality : Parish : Colquhoun  
 Sender : The Manager,  
 Woodside (Lakes Entrance) Oil Co.,  
 792 Elizabeth Street,  
 Melbourne.

Particulars:

No. 365  
 U.W.R.S. 4203  
 Bore Woodside (L.E.) / No.1 Well  
 Sample D.E.T. No.1  
 Depth (feet) -  
 Aquifer level (feet) 845 to 883  
 Position Woodside  
 Remarks: Water recovered at 322 feet. Fresh water.

Results:

Parts per million (ppm) per litre

	Parts per million (ppm)	per litre
Total solids in solution	2480	
Chloride (Cl)	248	7.0
Carbonate (CO <sub>3</sub> )	20	0.7
Bicarbonate (HCO <sub>3</sub> )	1216	19.9
Sulphate (SO <sub>4</sub> )	367	7.6
Sulphide-Total (S)	48	3.0
Nitrate (NO <sub>3</sub> )	N.D.	N.D.
Calcium (Ca)	66	3.3
Magnesium (Mg)	8	0.7
Sodium (Na)	1054	45.8
Potassium (K)	41	1.0
Iron-Soluble (Fe)	1.3	0.05
Silica-Soluble (SiO <sub>2</sub> )	285	19.8
Total hardness (as CaCO <sub>3</sub> )	197	

pH 8.4

Comment

As in another bore (Dutton Downs No.1), the anion sum considerably exceeds the cation sum. It is considered that this is most likely due to the presence of some synthetic organic acid-conditioner.

*John G. Kennedy*

Senior Chemist.

BEFORE DRILLING

DEPTH	LITHOLOGY	FORMATIONS & ROCK TYPES	THICK- NESS	AGE	SYSTEM
		ALLUVIUM	95'	RECENT	QUARTER- NARY
		JEMMY'S POINT FORMATION - Fossiliferous lmst. and sands	155'	PLIOCENE	T E R T I A R Y
		TAMBO RIVER FORMATION - Marls	50'	U. MIOCENE	
500'		GIPPSLAND LIMESTONE FORMATION - Lmst. and marls	730'	MIOCENE	
1000'		LAKES ENTRANCE FORMATION - Marls and minor lmst.	290'	OLIGOCENE	
1500'		BASEMENT - Granite	?	?	PALAEOZOIC

AFTER DRILLING

DEPTH	LITHOLOGY	FORMATIONS & ROCK TYPES	THICK- NESS	AGE	SYSTEM
		ALLUVIUM	95'	RECENT	QUARTER- NARY
		JEMMY'S POINT FORMATION - Fossiliferous lmst. and sands.	147'	PLIOCENE	T E R T I A R Y
		TAMBO RIVER FORMATION - Marls	52'	U. MIOCENE	
500'		GIPPSLAND LIMESTONE FORMATION - Lmst. and marls	771'	MIOCENE	
1000'		LAKES ENTRANCE FORMATION - Marls, glaucouitic sandst. and gravel.	260'	OLIGOCENE	
T.D. 1330		BASEMENT - Granite	?	?	PALAEOZOIC

WOODSIDE (LAKES ENTRANCE) OIL CO. N.L.

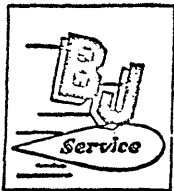
R.E.P. 61, VICTORIA

GENERALISED STRATIGRAPHIC COLUMN

As assumed before and after drilling WOODSIDE LAKES ENTRANCE No.1

by R.G.C. JESSOP  
&  
A.A. MARIMUTHU

DATE: April 1966



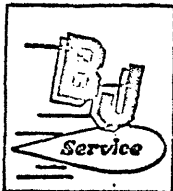
## DRILL-STEM TEST DATA

Well Name <i>LAKES ENTRANCE</i>	Test No. <i>1. GUN ISLAND LIMESTONE</i>
Well Number <i>ONE</i>	Zone Tested <i>Fossiliferous MARL.</i>
Company <i>WOODSIDE LAKES ENTRANCE</i>	Date <i>1. 4. 64.</i>
Comp. Rep. <i>CHARLIE MANN.</i>	Tester <i>L.B. THRUPP.</i>

Recorder No. *2237*.....Clock Range *12 HRS*.....Recorder No. *2238*.....Clock Range *24 HRS*.  
Depth.....*869*.....Depth.....*875*  
Initial Hydro Mud Press.....*195*.....Initial Hydro Mud Press.....*195*  
Initial Shut-in Press..........Initial Shut-in Press.....  
Initial Flow Press.....*30 - 160*.....Initial Flow Press.....*70 - 220*  
Final Flow Press..........Final Flow Press.....  
Final Shut-in Press..........Final Shut-in Press.....  
Final Hydro Mud Press.....*170*.....Final Hydro Mud Press.....*170*..... *A.M.*  
Temperature.....*75°*.....Tool Open Before I.S.I.....*40*.....Mins. *832-912*  
Mud Drop.....*4'*.....Initial Shut-in..........Mins.  
Mud Weight.....*9.6*.....Viscosity.....*1.8*.....Flow Period..........Mins.  
Fluid Loss.....*4.5*.....Final Shut-in..........Mins.  
Interval Tested.....*848 - 883*.....Surface Choke Size.....*3/4" NICKIS CHOKE*  
Net Pay Tested..........Bottom Choke Size.....*1/2"*  
Top Packer Depth.....~~843~~ *839*.....Main Hole Size.....*7 1/2"*  
Bottom Packer Depth.....~~843~~ *845*.....Rat Hole Size.....*-*  
Total Depth.....*883*.....Feet of Rat Hole.....*-*  
Drill Pipe Size.....*3/2 x H*.....Wt.....*13.5*.....Type of Test.....*DUAL BOTTOM HOLE*  
Drill Collar I.D.....*2 1/4*.....Ft. Run.....*233*.....Cushion Amount—Type.....*-*  
Annulus Size.....*4 3/4"*.....Rubber size.....*6 3/4"*  
Recovery—Total Feet.....*322*  
Recovered.....*322*.....Feet Of.....*MUDDY WATER.*  
Recovered.....Feet Of.....  
Recovered.....Feet Of.....  
Recovered.....Feet Of.....

## Remarks

*TOOK OPENED WITH A MODERATE BLOW, & CONTINUED  
STEADILY THROUGHOUT TEST. AFTER 40 MTS FLOW,  
PULLED TOOLS OFF BOTTOM TO CLOSE HYDRAULIC TOOL,  
BROKE CHICKSANS & CAME OUT OF HOLE. DID NOT  
ROTATE TO SHUT IN AS THE NUBBIN & TEST HEAD  
HAD MADE UP, DID NOT ALLOW US TO ROTATE.*



## DRILL-STEM TEST DATA

Well Name	LAKES ENTRANCE	Test No.	2.
Well Number	ONE	Zone Tested	SANDY CLAY.
Company	WOODSIDE LAKES ENTRANCE	Date	4.4.66.
Comp. Rep.	CHARLIE MANN	Tester	L.B. THRUPP.

Recorder No. 2237..... Clock Range 12 HRS. Recorder No. 2238..... Clock Range 24 HRS.

Depth 1249..... Depth 1279

Initial Hydro Mud Press. 690..... Initial Hydro Mud Press. 700

Initial Shut-in Press. 20..... Initial Shut-in Press. 20

Initial Flow Press. 10..... Initial Flow Press. 70

Final Flow Press..... Final Flow Press.....

Final Shut-in Press..... Final Shut-in Press.....

Final Hydro Mud Press. 690..... Final Hydro Mud Press. 700

Temperature 80°..... Tool Open Before I.S.I. 2A..... Mins. 9-16-9. A.M.

Mud Drop 2'..... Initial Shut-in 1A..... Mins. 4-50-50

Mud Weight 9.6..... Viscosity 4k..... Flow Period..... Mins.

Fluid Loss 6..... Final Shut-in..... Mins.

Interval Tested 1266 - 1286..... Surface Choke Size 3/4" WILLIS ADJUSTABLE.

Net Pay Tested..... Bottom Choke Size 1/2"

Top Packer Depth 1260..... Main Hole Size 7/8"

Bottom Packer Depth 1266..... Rat Hole Size -

Total Depth 1286..... Feet of Rat Hole -

Drill Pipe Size 3 1/2 X H. Wt. 13.5..... Type of Test DUAL BOTTOM HOLE.

Drill Collar I.D. 2 1/4" Ft. Run 238..... Cushion Amount—Type -

Anchor Size 4 3/4"..... Rubber size 6 3/4"

Recovery—Total Feet 12

Recovered 12 Feet Of SKIMMITY OIL CUT MUD

Recovered..... Feet Of.....

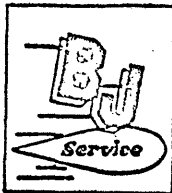
Recovered..... Feet Of.....

Recovered..... Feet Of.....

## Remarks

TOOL OPENED WITH A VERY NEAR BLOW, & DIED  
 IN 15 MTS. WOODSIDE REQUESTED ONLY FLOW &  
 SHUT IN ONLY.





SERVICE (AUSTRALIA) PTY. LTD.

CHARLIE  
TESTING REPORT

DRILL-STEM TEST DATA

Well Name <i>LAKES ENTRANCE</i>	Test No. <i>3</i>
Well Number <i>ONE</i>	Zone Tested <i>ULTRACONCRETE SAND</i>
Company <i>WOODSIDE LAKES ENTRANCE</i>	Date <i>5.4.66</i>
Comp. Rep. <i>CHARLIE MANN</i>	Tester <i>L.B. THRUPP.</i>

Recorder No. *2737* Clock Range *12 HRS* Recorder No. *2738* Clock Range *24 HRS*

Depth *1278* Depth *1303*

Initial Hydro Mud Press. *700* Initial Hydro Mud Press. *720*

Initial Shut-in Press. *530* Initial Shut-in Press. *550*

Initial Flow Press. *10 - 170* Initial Flow Press. *60 - 220*

Final Flow Press. Final Flow Press.

Final Shut-in Press. Final Shut-in Press.

Final Hydro Mud Press. *700* Final Hydro Mud Press. *720*

Temperature *84°* Tool Open Before I.S.I. *10* Mins. *5:54 - 6:3*

Mud Drop *3'* Initial Shut-in *30* Mins. *6:34 - 7:0*

Mud Weight *9.5* Viscosity *58* Flow Period. Mins.

Fluid Loss *5* Final Shut-in. Mins.

Interval Tested *1290 - 1310* Surface Choke Size *3/4" NIPHS ADJUSTABLE*

Net Pay Tested. Bottom Choke Size *1 1/2"*

Top Packer Depth *1290* Main Hole Size *7 1/8"*

Bottom Packer Depth *1310* Rat Hole Size

Total Depth *1326* Feet of Rat Hole

Drill Pipe Size *3 1/2 XH* Wt. *13.5* Type of Test *SINGLE STRADDLE*

Drill Collar I.D. *2 1/4* Ft. Run *238* Cushion Amount—Type

Chor Size *4 3/4"* Rubber size *6 3/4"*

Recovery—Total Feet *365*

Recovered *90* Feet Of *OIL & GAS CUT MUD*

Recovered *275* Feet Of *OIL & GAS CUT WATERY MUD*

Recovered. Feet Of

Recovered. Feet Of

Recovered. Feet Of

Remarks

TOOL OPENED WITH A LIGHT TO MODERATE BLOW, &

INCREASING TO A MODERATE TO STRONG BLOW IN

5 MTS, & REMAINED STEADY THROUGHOUT TEST.

WOODSIDE REQUESTED ONE FLOW & SHUT IN ONLY.

PE603531

This is an enclosure indicator page.  
The enclosure PE603531 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE603531 has the following characteristics:

- ITEM\_BARCODE = PE603531
- CONTAINER\_BARCODE = PE902914
- NAME = Electrical Log
- BASIN = GIPPSLAND
- PERMIT = PEP61
- TYPE = WELL
- SUBTYPE = WELL\_LOG
- DESCRIPTION = Electrical Log for Lakes Entrance-1
- REMARKS =
- DATE\_CREATED = 06/04/1966
- DATE\_RECEIVED =
- W\_NO = W499
- WELL\_NAME = LAKES ENTRANCE-1
- CONTRACTOR = SCHLUMBERGER
- CLIENT\_OP\_CO = WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE603532

This is an enclosure indicator page.  
The enclosure PE603532 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE603532 has the following characteristics:

- ITEM\_BARCODE = PE603532
- CONTAINER\_BARCODE = PE902914
- NAME = Gamma-Ray Neutron
- BASIN = GIPPSLAND
- PERMIT = PEP61
- TYPE = WELL
- SUBTYPE = WELL\_LOG
- DESCRIPTION = Gamma-Ray Neutron Log for Lakes  
Entrance-1
- REMARKS =
- DATE\_CREATED = 03/04/1966
- DATE\_RECEIVED =
- W\_NO = W499
- WELL\_NAME = LAKES ENTRANCE-1
- CONTRACTOR = SCHLUMBERGER
- CLIENT\_OP\_CO = WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE603533

This is an enclosure indicator page.  
The enclosure PE603533 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE603533 has the following characteristics:

ITEM\_BARCODE = PE603533  
CONTAINER\_BARCODE = PE902914  
NAME = Sonic Log  
BASIN = GIPPSLAND  
PERMIT = PEP61  
TYPE = WELL  
SUBTYPE = WELL\_LOG  
DESCRIPTION = Sonic Log for Lakes Entrance-1  
REMARKS =  
DATE\_CREATED = 03/04/1966  
DATE\_RECEIVED =  
W\_NO = W499  
WELL\_NAME = LAKES ENTRANCE-1  
CONTRACTOR = SCHLUMBERGER  
CLIENT\_OP\_CO = WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE603534

This is an enclosure indicator page.  
The enclosure PE603534 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE603534 has the following characteristics:

ITEM\_BARCODE = PE603534  
CONTAINER\_BARCODE = PE902914  
NAME = Microlog  
BASIN = GIPPSLAND  
PERMIT = PEP61  
TYPE = WELL  
SUBTYPE = WELL\_LOG  
DESCRIPTION = Microlog for Lakes Entrance-1  
REMARKS =  
DATE\_CREATED = 02/04/1966  
DATE\_RECEIVED =  
W\_NO = W499  
WELL\_NAME = LAKES ENTRANCE-1  
CONTRACTOR = SCHLUMBERGER  
CLIENT\_OP\_CO = WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE603535

This is an enclosure indicator page.  
The enclosure PE603535 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE603535 has the following characteristics:

- ITEM\_BARCODE = PE603535
- CONTAINER\_BARCODE = PE902914
- NAME = Composite Well Log
- BASIN = GIPPSLAND
- PERMIT = PEP61
- TYPE = WELL
- SUBTYPE = COMPOSITE\_LOG
- DESCRIPTION = Composite Well Log for Lakes Entrance-1  
containing electrical logs and mud log  
data.
- REMARKS =
- DATE\_CREATED = 06/04/1966
- DATE\_RECEIVED = 31/07/1966
- W\_NO = W499
- WELL\_NAME = LAKES ENTRANCE-1
- CONTRACTOR =
- CLIENT\_OP\_CO = WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE902915

This is an enclosure indicator page.  
The enclosure PE902915 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE902915 has the following characteristics:

ITEM\_BARCODE = PE902915  
CONTAINER\_BARCODE = PE902914  
NAME = Isopach Map Lakes Entrance Formation  
BASIN = GIPPSLAND  
PERMIT = PEP 61  
TYPE = SEISMIC  
SUBTYPE = ISOPACH\_MAP  
DESCRIPTION = Isopach Map Lakes Entrance Formation,  
showing distribution of oil shows.  
REMARKS =  
DATE\_CREATED = 31/03/66  
DATE\_RECEIVED =  
W\_NO = W499  
WELL\_NAME = Lakes Entrance-1  
CONTRACTOR = WOODSIDE OIL CO  
CLIENT\_OP\_CO = WOODSIDE OIL CO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902916

This is an enclosure indicator page.  
The enclosure PE902916 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE902916 has the following characteristics:

- ITEM\_BARCODE = PE902916
- CONTAINER\_BARCODE = PE902914
- NAME = Biostratigraphic Correlation Chart
- BASIN = GIPPSLAND
- PERMIT =
- TYPE = WELL
- SUBTYPE = DIAGRAM
- DESCRIPTION = Biostratigraphic Correlation Chart
- REMARKS =
- DATE\_CREATED =
- DATE\_RECEIVED =
- W\_NO = W499
- WELL\_NAME = Lakes Entrance-1
- CONTRACTOR = WOODSIDE OIL CO
- CLIENT\_OP\_CO = WOODSIDE OIL CO

(Inserted by DNRE - Vic Govt Mines Dept)



PE902917

This is an enclosure indicator page.  
The enclosure PE902917 is enclosed within the  
container PE902914 at this location in this  
document.

The enclosure PE902917 has the following characteristics:

- ITEM\_BARCODE = PE902917
- CONTAINER\_BARCODE = PE902914
- NAME = Vertical Bio-Facies Sequence Compared  
with E-Log Characters
- BASIN = GIPPSLAND
- PERMIT =
- TYPE = WELL
- SUBTYPE = DIAGRAM
- DESCRIPTION = Vertical Bio-Facies Sequence Compared  
with E-Log Characters
- REMARKS =
- DATE\_CREATED =
- DATE\_RECEIVED =
- W\_NO = W499
- WELL\_NAME = Lakes Entrance-1
- CONTRACTOR = WOODSIDE OIL CO
- CLIENT\_OP\_CO = WOODSIDE OIL CO

(Inserted by DNRE - Vic Govt Mines Dept)