

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

*Petroleum Search Subsidy Acts*

PUBLICATION No. 71

**SUMMARY OF DATA AND RESULTS  
GIPPSLAND BASIN, VICTORIA**

**Wellington Park No. 1 Well**

**OF**

**WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.**

*Issued under the Authority of the Hon. David Fairbairn  
Minister for National Development  
1966<sup>12</sup>*

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

MINISTER: THE HON. DAVID FAIRBAIRN, D.F.C., M.P.

SECRETARY: R. W. BOSWELL

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: J. M. RAYNER

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THIS REPORT WAS PREPARED FOR PUBLICATION IN THE PETROLEUM EXPLORATION BRANCH

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*Published by the Bureau of Mineral Resources, Geology and Geophysics  
Canberra A.C.T.*

## FOREWORD

Under the Petroleum Search Subsidy Act 1959, agreements relating to subsidized operations provide that the information obtained may be published by the Commonwealth Government twelve 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 a summary of data and results of the drilling operation undertaken at Wellington Park No. 1 in the Gippsland Basin, Victoria. The information has been abstracted by the Petroleum Exploration Branch of the Bureau of Mineral Resources from the well completion report furnished by Woodside (Lakes Entrance) Oil Company No Liability.

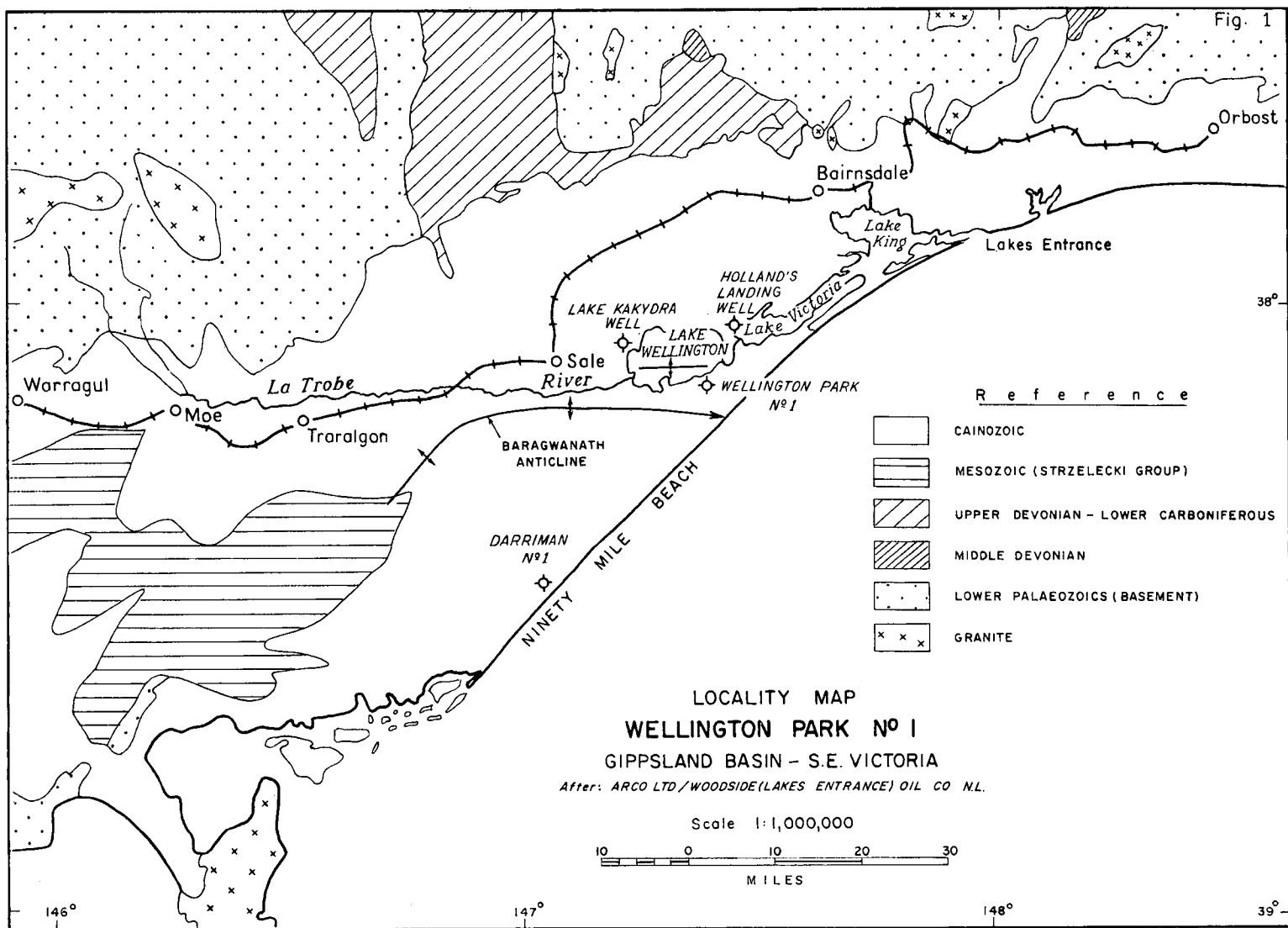
J.M. RAYNER  
DIRECTOR

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## WELLINGTON PARK NO. 1

### SUMMARY OF DATA AND RESULTS\*

#### SUMMARY

Wellington Park No. 1 Well was located in the Gippsland Basin, Victoria, on the south-eastern shore of Lake Wellington, about 25 1/2 miles south-west of Bairnsdale. The well was drilled by Oil Drilling and Exploration Limited for Woodside (Lakes Entrance) Oil Company No Liability, to a total depth of 12,011 feet. Drilling commenced on 6th December, 1961 and was completed on 3rd April, 1962. A comprehensive programme of drilling engineering, mud logging, coring, cuttings examination, and electric logging was conducted, but no significant shows of oil or gas were encountered.

The well penetrated Quaternary sediments from surface to 120 feet, Tertiary sediments from 120 to 3370 feet, and Mesozoic non-marine sediments from 3370 feet, and bottomed in the Lower Cretaceous - (?) Jurassic Strzelecki Group at 12,011 feet. Palaeozoic rocks, one of the main objectives, were not reached because of the extreme thickness of the Mesozoic section.

Five open hole formation tests over various intervals between 7348 and 9930 feet were undertaken, but only three were successful. These tests produced mud filtrate, mud, and formation water. The well was plugged and abandoned as a dry hole on 7th April, 1962.

The stratigraphic drilling operation at Wellington Park No. 1 was subsidized under the Petroleum Search Subsidy Act 1959, from 3391 feet to total depth.

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\* Abstracted from: Well Completion Report Wellington Park No. 1 Well, Victoria, by F.T. Ingram, Arco Limited, for Woodside (Lakes Entrance) Oil Company No Liability, July, 1962.

## WELL HISTORY

### General Data

Well name and number:	Wellington Park No. 1
Location:	Latitude $38^{\circ}08'25''\text{S}$ . Longitude $147^{\circ}22'30''\text{E}$ .
Name and address of Tenement Holder:	Woodside (Lakes Entrance) Oil Company No Liability, 792 Elizabeth Street, Melbourne, Victoria
Details of Petroleum Tenement:	Petroleum Exploration Permit No. 44, issued by the State of Victoria
Total Depth:	12,011 feet (Schlumberger)
Date drilling commenced:	6th December, 1961
Date drilling completed:	3rd April, 1962
Date well abandoned:	7th April, 1962
Date rig released:	7th April, 1962
Elevation (ground):	2 feet
Elevation (K.B.):	21 feet (datum for depths)
Status:	Dry hole; plugged and abandoned
Cost:	£221,953

### Drilling Data

#### Drilling Plant:

Make:	National-Ideal
Type:	55

Hole sizes and depths:	17 1/2" to 736 feet
	12 1/4" to 5379 feet
	8 3/4" to 12011 feet

#### Casing details:

Size (in.):	20	13 3/8	9 5/8
Weight (lb./ft):	94	48	36
Grade:	H.40	H.40	J.55
Range:	1	2	2
Setting depth (ft):	19	726	5379

## Logging and Testing

### Ditch Cuttings:

Interval: Ten feet from surface to total depth.

### Coring:

Seventeen cores were cut using a Hughes "J" Type core barrel with both hard formation and soft formation cutter heads. A total of 216 feet was cored and 159.5 feet (74%) recovered.

### Sidewall Cores:

One run was made with the Schlumberger 30 - shot sample taker. Twenty-four cores were recovered between 2420 and 3794 feet.

### Electric and other logging: (Schlumberger):

Electrical Log: 728 - 12008 feet (6 runs)

Laterolog: 728 - 12002 feet (6 runs)

Microlog: 728 - 12006 feet (7 runs)

Sonic Log: 728 - 11930 feet (3 runs)

Continuous Dipmeter: 2000 - 11998 feet (4 runs)

Temperature Log: 27 - 5311 feet (1 run)

### Velocity Survey:

A survey was conducted by Austral Geo Prospectors Pty Ltd, on 4th April, 1962. Measurements were made at 740, 3740, 5396, and 12,000 feet.

### Drilling Time and Gas Log:

A Core Laboratories, Inc. logging unit was in continuous operation from 726 feet to total depth.

### Formation Testing:

Five drillstem tests were made of which three were successful.

DST No. 1A - 7348 to 7389 feet

DST No. 1B - 7321 to 7389 feet

DST No. 2 - 8761 to 8888 feet

Recovered very slightly gas-cut formation water and mud filtrate.

DST No. 3 - 9669 to 9796 feet

Recovered only rat-hole mud.

DST No. 4 - 9886 to 9930 feet

Recovered formation water and mud.



## GEOLOGY

### General

The area around the well location is flat-lying, and covered by Quaternary sand and clay.

The geology of the Tertiary sediments in the Gippsland Basin is well known from numerous water bores, wells drilled for oil by private companies, and core holes drilled by the Victorian Department of Mines. The geology of the Mesozoic section in the Basin, prior to drilling Wellington Park No. 1, was known from reports on outcrops in the Strzelecki Ranges, and from wells drilled through the Tertiary sequence. At least thirteen wells have entered Mesozoic rocks, but only six of these penetrated more than about 100 feet of the section. The deepest well drilled in the area before Wellington Park No. 1 was the Woodside No. 2 Well, which bottomed in sediments of the Strzelecki Group at 8862 feet.

The Palaeozoic rocks, which are believed to underlie the Mesozoic section in the Lake Wellington area, are exposed along the northern side of the Gippsland Basin. Numerous reports, by private companies and the Victorian Department of Mines, describe the stratigraphy and structure of these rocks. Only one well in the vicinity of Wellington Park No. 1, Frome Lakes Pty Ltd No. 5, located about six miles south-west of Bairnsdale, and completed in 1957 at 1550 feet, has encountered these Palaeozoic rocks.

### Stratigraphy

The stratigraphic sequence encountered in Wellington Park No. 1 Well is shown in the Table below:

<u>Age</u>	<u>Formation</u>	<u>Depth Intervals</u> (feet)	<u>Thickness</u> (feet)
Quaternary	Alluvium	21 - 120	99
Upper Pliocene	Haunted Hill Gravels	120 - 380	260
Lower Pliocene	Jemmy's Point Formation	380 - 460	80
Upper Miocene	Tambo River Formation	460 - 725	265
Miocene	Gippsland Limestone	725 - 2150	1425
Oligocene	Lakes Entrance Formation	2150 - 2385	235
Lower Oligocene - Upper Eocene	Latrobe Valley Coal Measures	2385 - 3370	985
(?) Lower Cretaceous	Unnamed	3370 - 3800	430
Lower Cretaceous - (?) Jurassic	Strzelecki Group	3800 - 12011	8211+

Detailed:

Quaternary Alluvium: Surface to 120 feet

White to red, medium to coarse-grained, subrounded sand with scattered pebbles; and blue-green-brown clay.

Haunted Hill Gravels (Upper Pliocene): 120 to 380 feet (260 feet)

Fine to coarse-grained, micaceous sand consisting of quartz grains of several colours, fragments of igneous and metamorphic rocks, traces of lignite and pyrite, with some pebbles.

Jemmy's Point Formation (Lower Pliocene): 380 to 460 feet (80 feet)

Sand similar to the Haunted Hill Gravels, with abundant remains of gastropods, pelecypods, bryozoa, and foraminifera, and with traces of soft, argillaceous siltstone.

Tambo River Formation (Upper Miocene): 460 to 725 feet (265 feet)

Brown to grey-green, silty and slightly sandy, friable to hard, glauconitic marl, with abundant fossil fragments.

Gippsland Limestone (Miocene): 725 to 2150 feet (1425 feet)

Light to dark grey, sandy, argillaceous, glauconitic marl, with abundant bryozoa and other fossils, intercalated with grey to cream, fine-grained, fossiliferous limestone down to 1600 feet. Below this depth the formation consists of soft, glauconitic, fossiliferous, silty marl becoming more argillaceous towards the base.

Lakes Entrance Formation (Oligocene): 2150 to 2385 feet (235 feet)

Grey, green, and brown, soft, calcareous, glauconitic shale with abundant foraminifera.

Latrobe Valley Coal Measures (Lower Oligocene to Upper Eocene): 2385 to 3370 feet (985 feet)

Brown, grey, and green, fine to coarse-grained, quartz sand, clean to argillaceous and lignitic; earthy, silty, and shaly brown coal; brown to grey-green, argillaceous siltstone, mostly soft; light to dark brown lignitic clay; and traces of hard, tight, fine-grained, sucrosic, brown dolomite between 3029 and 3036 feet.

Unnamed Formation (Lower Cretaceous?): 3370 to 3800 feet (430 feet)

Interbedded, brown to green, fine to coarse-grained, quartzose sandstone; commonly with weathered feldspar and white kaolin, and claystone and mudstone in which occur thin seams and laminations of black coal. The unit, which is lithologically similar to the Lower Cretaceous Waarre Formation of the Otway Basin, grades downward into the Strzelecki Group.

Strzelecki Group (Lower Cretaceous to (?)Jurassic): 3800 to 12,011 feet (8211 feet+)

This formation consists of arkose, greywacke, siltstone, and shale interbedded in varying proportions. The arkose, restricted to the top 500 feet, is light grey, fine to medium-grained, biotitic and kaolinitic, and grades downwards into greywacke. The greywacke is grey to green, very fine to medium-grained, chloritic, friable to hard, calcareous to varying degrees, carbonaceous, slightly micaceous, and may contain orange to pink feldspar. It is crossbedded in places. The siltstone is grey to grey-green, argillaceous, slightly micaceous, and firm. The shale is brown and grey to grey-green, may be carbonaceous and silty, and contains abundant plant remains. It is siliceous in parts.

Structure

A seismic survey during 1961 in the Lake Wellington area revealed the presence of an east-west trending anticline with closure against a fault on the north flank. The Wellington Park No. 1 Well was drilled on the south-eastern side of this structure. The total area of closure is about 36 square miles and the maximum closure against the fault is about 400 feet. Faults are thought to have been intersected in the well between 8768 and 8780 feet, and between 10,088 and 10,110 feet.

The Wellington Park structure is parallel to a larger structure a few miles south of Lake Wellington known as the Baragwanath Anticline. The Baragwanath Anticline is the eastward extension of the Carrajung uplift, where Mesozoic rocks crop out to form the Strzelecki Ranges.

Relevance to Occurrence of Petroleum

Only one indication of oil was found while drilling Wellington Park No. 1 Well, and this occurred as a bright yellow fluorescence in Core No. 9 in the interval 7379.2 to 7380.5 feet. The fluorescence occupied 10 to 20 percent of the area on a freshly broken core surface, and a faint light brown stain was visible. A bright yellow cut was obtained with carbon tetrachloride. No gas was recorded in the drilling mud while coring. Porosity of the core was determined to be only 5.8 percent, while the permeability was less than one millidarcy. Two attempts to test this cored interval failed.

A small amount of methane was present in the fluids recovered during DST's Nos 2 and 4, but no free gas was present above the fluid. No zones of interest were shown on the electric logs, and no gas shows were recorded other than those related to trips.

The only marine sediments in the well were found in the Tertiary section extending from the top of the Jemmy's Point Formation to the base of the Lakes Entrance Formation (380 to 2385 feet). These beds are highly fossiliferous.

The section from 2385 to 3800 feet, non-marine in character, contains sands with fair to good porosity. However, only fresh water, with no evidence of oil or gas, was found in these sands.

The section from 3800 feet to total depth is non-marine, tight, and impervious. Any producible hydrocarbons in these beds would have to occupy fractures, but two formation tests taken in fractured intervals produced only slightly gas-cut water. The gas consisted entirely of methane and was probably generated by carbonaceous material, a common constituent of sediments in the Strzelecki Group.

## Contribution to Geological Concepts resulting from Drilling

Because of the lack of recognizable "key" beds in the Strzelecki Group, and the structural complexity in the areas of outcrop, estimates of the thickness of this sequence have ranged from 2000 to 20,000 feet. Wellington Park No. 1 Well has proved a thickness of possibly 8641 feet for the Strzelecki Group in the Lake Wellington area. The information gained from the refraction survey profile through the well suggests the thickness may be greater than 10,000 feet.

The Strzelecki Group, equivalent in lithology and approximate age to the Otway Group in south-western Victoria, is now thought to be mostly Lower Cretaceous in age, with possible Upper Jurassic in the basal part. Palynological work on cores from Wellington Park No. 1 suggests that the well was still in Lower Cretaceous at 11,246 feet. The last core from 11,969 to 11,975 feet was barren of recognizable spores.

The section from 3370 to 3800 feet, consisting of poorly consolidated sands, shales, mudstones, and minor coal, is similar in lithology and thickness to the sediments of the Waarre Formation in the Otway Basin, where they represent a transition from marine Middle Cretaceous above to the non-marine Otway Group below. These same poorly consolidated beds were encountered in the Rosedale No. 1 Well in the interval 2345 to 2800 feet. There is no sharp boundary at the base of the poorly consolidated unit; rather, it appears to be gradational downward into kaolinitic arkose, which in turn grades into grey-green greywacke.

### REFERENCES

- |                 |       |   |
|-----------------|-------|---|
| BOUTAKOFF, N.,  | 1955: | A new approach to petroleum geology and oil possibilities in Gippsland. <u>Min. geol. J.</u> 5 (4-5).                                       |
| DUDLEY, P.H.,   | 1959: | Oil possibilities of Petroleum Prospecting Licence 212 in the South Gippsland Highlands, Victoria. Report for Victorian Oil N.L. (Unpubl.). |
| RINGWOOD, A.E., | 1955: | The geology of the Mitchell River area. Report for Frome-Lakes Pty Ltd (Unpubl.).   |

### ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relating to Wellington Park No. 1, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- |  |        |
|--|--------|
| (i) Well Completion Report, By F.T. Ingram | 22 pp. |
| Appendix 1 : Core descriptions             | 5 pp.  |
| Appendix 2 : Core analyses                 | 2 pp.  |
| Appendix 3 : Sidewall core descriptions    | 2 pp.  |

Appendix 4 :	List of logs	2 pp.
Appendix 5 :	Report on formation tests	2 pp.
Appendix 6a:	Report on well velocity survey, by V.B. Bychok	6 pp.
Appendix 6b:	Report on seismic refraction survey, by W.B Miller	1 p.
Appendix 7 :	Palynological reports, by J. Douglas, and P.R. Evans	3 pp.
Appendix 8 :	Micropalaeontological report, by D.J. Taylor	4 pp.
Enclosures :	Geological sections through well before and after drilling. Generalized stratigraphic column, Gippsland Basin.	

(ii) Daily drilling reports for period 20th November, 1961 to 7th April, 1962.

(iii) Well logs including the following:

(a) Electrical Log

Run 1, 728- 3840 feet ( 5" = 100 ft)  
 Run 2, 3740- 5382 feet ( 5" = 100 ft)  
 Run 3, 5379- 7388 feet (2", 5" = 100 ft)  
 Run 4, 7288- 9639 feet ( 5" = 100 ft)  
 Run 5, 9539-11382 feet (2", 5" = 100 ft)  
 Run 6, 11282-12008 feet (2", 5" = 100 ft)

(b) Laterolog

Run 1, 728- 3838 feet ( 5" = 100 ft)  
 Run 2, 3738- 5379 feet ( 5" = 100 ft)  
 Run 3, 5379- 7385 feet (2", 5" = 100 ft)  
 Run 4, 7285- 9634 feet (2", 5" = 100 ft)  
 Run 5, 9534-11376 feet (2", 5" = 100 ft)  
 Run 6, 11276-12002 feet (2", 5" = 100 ft)

(c) Microlog

Run 1, 728- 3836 feet (2", 5" = 100 ft)  
 Run 2, 3736- 5380 feet (2", 5" = 100 ft)  
 Run 3, 5379- 7387 feet (2", 5" = 100 ft)  
 Run 4, 7277- 8888 feet (2", 5" = 100 ft)  
 Run 5, 8788- 9793 feet (2", 5" = 100 ft)  
 Run 6, 9693-11374 feet (2", 5" = 100 ft)  
 Run 7, 11250-12006 feet (2", 5" = 100 ft)

(d) Sonic Log

Run 1, 728- 3756 feet (2", 5" = 100 ft)

Run 2, 5375- 9622 feet (2", 5" = 100 ft)

Run 3, 9520-11930 feet (2", 5" = 100 ft)

(e) Continuous Dipmeter

Composite log, plotted, Runs 1 to 4 (1.2" = 100 ft)

Run 1, 2000- 3772 feet

Run 2, 7994- 9440 feet

Run 3, 5375- 7994 feet

Run 3, 9440-11368 feet

Run 4, 11368-11998 feet

(f) Temperature Log

Run 1, 27- 5311 feet (2" = 100 ft)

(g) Grapholog (Core Laboratories, Inc.)

Continuous log, 726-12011 feet (2" = 100 ft)

## COMPOSITE WELL LOG

PLATE 1  
SHEET 1

COMPANY ARCO LTD./WOODSIDE(LAKES ENTRANCE) OIL CO. N.L.

WELL NUMBER

WELLINGTON PARK NO. 1

PETROLEUM TENEMENT: P.E.P. 44

STATE: VICTORIA 4-MILE SHEET: WARRAGUL BASIN: GIPPSLAND WELL STATUS: ABANDONED

LOCATION - LAT. 36°06' 25"S LONG. 147° 22' 30"E  
ELEVATION - REFERENCE PT. KB 21.1' ASL  
GROUND 2.0' ASLDATE SPUDDED DECEMBER 6, 1961  
DATE DRILLING STOPPED APRIL 3, 1962  
DATE RIG OFF APRIL 7, 1962  
TOTAL DEPTH 12,001'  
DRILLER E. LOG 12,011'HOLE SIZE IN. FROM TO  
17 1/2 0' 736'  
12 1/4 736' 5379'  
8 3/4 5379' 12,011'CEMENT PLUGS FROM TO SACKS  
20' 70' 25  
5082' 5379' 100WELL HEAD FITTINGS HALF COLLAR ON  
IS 3/8" CASING WITH 1/4" WELDED STEEL PLATE  
DRILLED BY OIL DRILLING & EXPLORATION LTD.  
LOGGED BY SCHLUMBERGER  
MUD LOGGING BY CORE LAB  
CEMENTED BY OIL DRILLING & EXPLORATION LTD.  
DRILLING METHOD ROTARY

## WELL SYMBOLS

- GAS SHOW, SLIGHT  
◐ DEAD OIL SHOW  
● LIVE OIL SHOW, SLIGHT  
◇ FLUORESCENCE  
✱ CIRCULATION LOSS, PARTIAL  
AND S.S. OF MUD  
FOSSILS  
⑩ MACRO ⑪ PLANT  
Ⓐ MICRO ⑫ SPORE, POLLEN
- CORE, INTERVAL,  
NUMBER AND  
RECOVERY (BLACK)  
▶ SIDE-WALL CORE  
⊗ PLUGGED INTERVAL  
○ FORMATION TEST  
INTERVAL & NUMBER  
① O.H., ② IN CASING

## ELECTRIC LOG DATA

RUN NUMBER	1	2	3	4	5	6
DATE	14-12-61	24-12-61	23-1-62	18-2-62	21-3-62	3-4-62
FOOTAGE LOGGED	3112'	1642'	2009'	2351'	1843'	726'
LOGGED FROM	3840'	5382'	7388'	9639'	11382'	12,008'
LOGGED TO	726'	3740'	5379'	7288'	9539'	11,282'
TOTAL DEPTH-E. LOG	3841'	5383'	7389'	9640'	11,383'	12,011'
TOTAL DEPTH-DRILLER	3839'	5381'	7387'	9635'	11,376'	12,001'
CASING SHOE-E. LOG	726'		5379'		5379'	5379'
CASING SHOE-DRILLER	726'	726'	5379'	5375'	5379'	5379'
BIT SIZE	8 3/4"	8 3/4"	8 3/4"	8 3/4"	8 3/4"	8 3/4"
MUD KIND	BENT.	SPERSENE	SPERSENE	SPERSENE	SPERSENE	SPERSENE
TREATMENT	SPERSENE	XP 20	XP 20/OIL	XP 20/OIL	XP 20/OIL	XP 20/OIL
WTR. LOSS CC/90 W	9.5	4.5	7.0	11.4	5.8	3.2
WEIGHT LBS/CU FT.	9.8	10.1	10.2	10.0	9.5	9.7
VISCOSITY (SEC.)	36	39	42	47	43	52
pH	9.0	11.0	11.0	11.0	10.0	9.3
RESISTIVITY ΔM/M	1.36	0.75	0.8	0.62	0.62	0.49
AT TEMP. F	92°	96°	120°	68°	90°	104°
MAX. RECORDED TEMP.	127°	152°	190°	208°	240°	278°
ELECTRODE SPACING	16"	16"	16"	16"	16"	16"
SYMMETRICAL	64"	64"	64"	64"	64"	64"
NON-SYMMETRICAL	18" 8"	18" 8"	18" 8"	18" 8"	18" 8"	18" 8"
RECORDED BY	WHITE	WHITE	METENIER	WHITE	WHITE	WHITE

## CASING RECORD

RUN NO.	SIZE INCHES	WT.-LBS	INTERVAL-FT. TO	BIT SIZE INCHES	INTERVAL-FT. TO
1	13 3/8	48	SURF. 726	12 1/4	SURF. 736
2	9 5/8	36	3250 5379	17 1/2	SURF. 736
				8 3/4	736 5379
				12 1/4	736 5379
				8 3/4	5379 12,011

## OPEN HOLE RECORD

## OTHER BORE HOLE LOGS

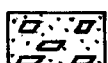
SONIC 728'-3756' & 5375'-11,930' RUNS 1-3  
LATEROLOG 728'-12,002' RUNS 1-6  
MICROLOG 728'-12,006' RUNS 1-7  
DIPMETER 728'-5940' & 5379'-11,995' RUNS 1-4  
TEMPERATURE 27'-5311' RUN 1  
CORE LAB MUD LOG 726'-12,011'

COMPILED AND DRAWN BY FRANK T. INGRAM

## LITHOLOGIC REFERENCE



SANDSTONE



ARKOSE



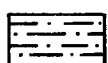
LIMESTONE



GYPSIFEROUS



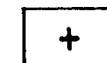
SILTSTONE



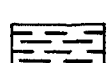
GREYWACKE



DOLOMITE



CARBONACEOUS



CLAYSTONE



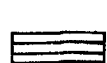
MUDSTONE



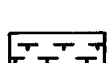
COAL



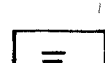
GLAUCONITIC



SHALE



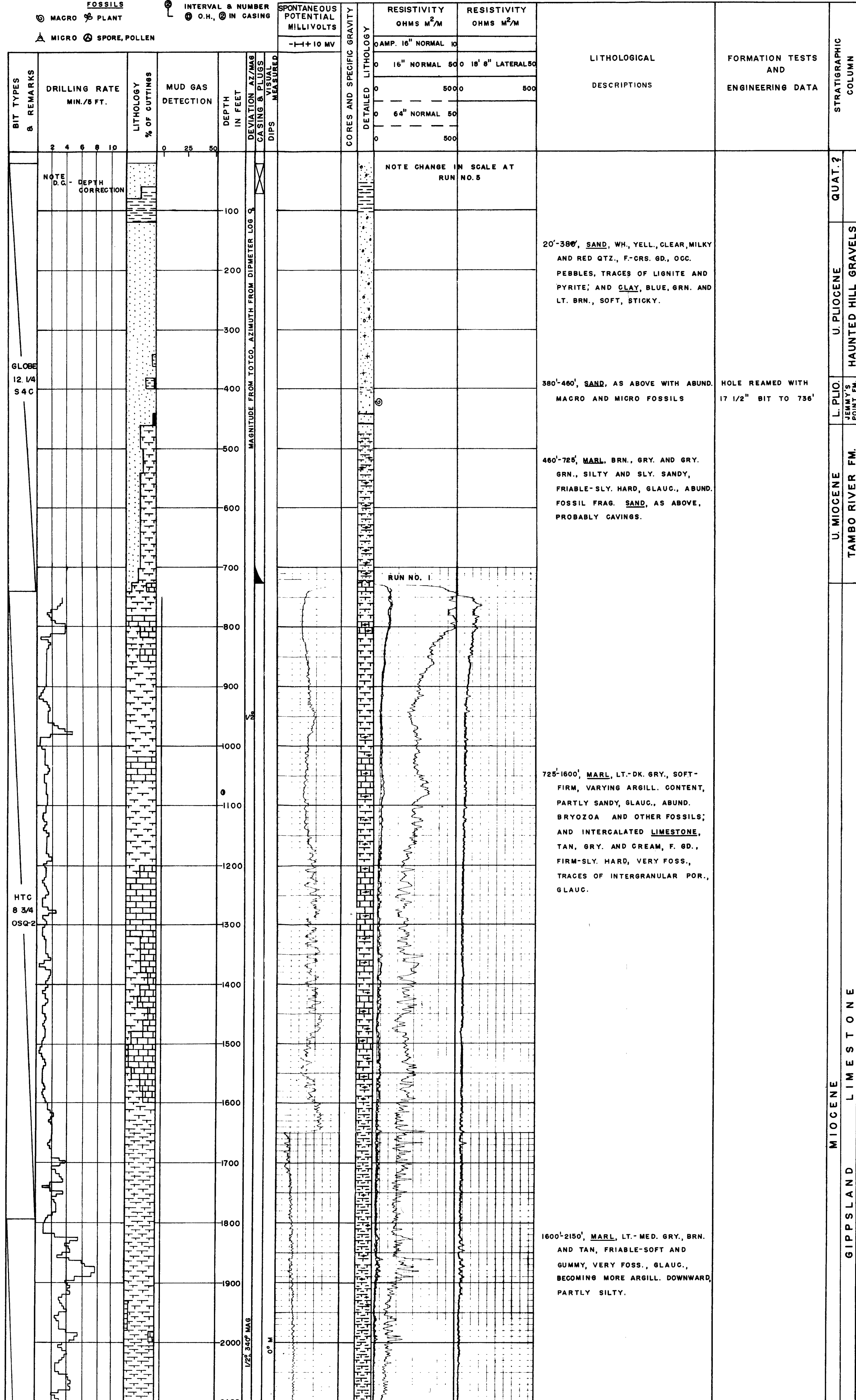
MARL



MICACEOUS



CALCAREOUS

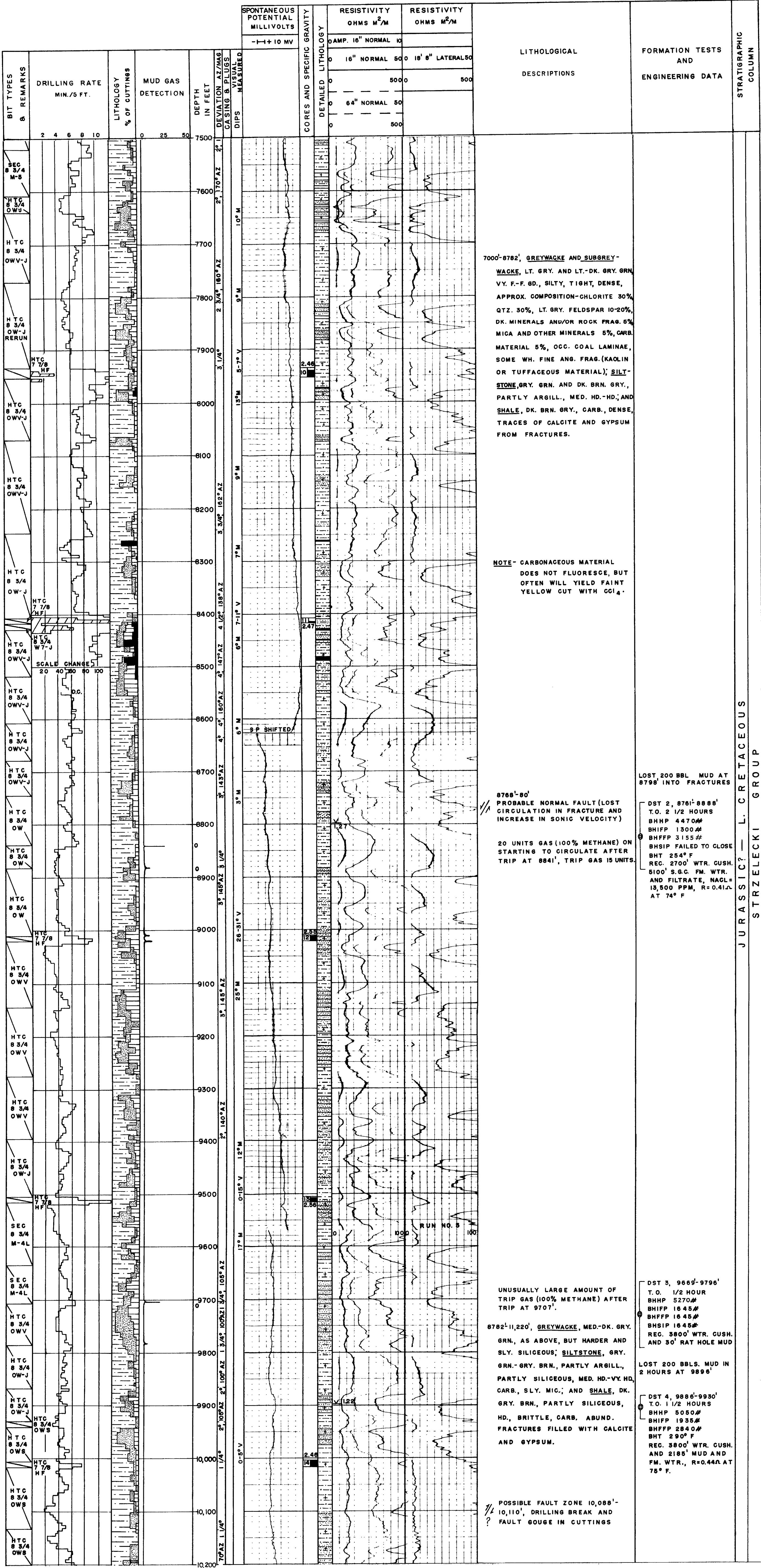


BIT TYPES & REMARKS		DRILLING RATE MIN./5 FT.				LITHOLOGY % OF CUTTINGS	MUD GAS DETECTION	DEPTH IN FEET	DEVIATION AZ/MAG CASING & PLUGS MEASURED	DIPS	SPONTANEOUS POTENTIAL MILLIVOLTS	CORES AND SPECIFIC GRAVITY	RESISTIVITY OHMS M <sup>2</sup> /M	RESISTIVITY OHMS M <sup>2</sup> /M	LITHOLOGICAL DESCRIPTIONS	FORMATION TESTS AND ENGINEERING DATA	STRATIGRAPHIC COLUMN
		2	4	6	8	10	0	25	50	2100			OHMS M <sup>2</sup> /M	OHMS M <sup>2</sup> /M			
													0 AMP. 16" NORMAL 10	0 16" NORMAL 50 0 16" 8" LATERAL 50			
													0 500 0 500	0 500 0 500			
													0 64" NORMAL 50	0 500			
													0 500				
2150'-2385', SHALE, GRN.-GRY. GRN. AND BRN., SOFT AND GUMMY, VERY CALC., ABUND. FORAMINIFERA, ABUND. GLAUC., ESPECIALLY AT BASE.																	
2385'-3370', SAND, BROWN, LT. GRY. AND GRY. GRN, F.-CRS. GD., QTZ., CLEAN ARGILL., LIGNITIC, CALC. IN TOP 10', FAIR-GOOD POR.; BROWN COAL, EARTHY, OFTEN SILTY AND SHALY; SILTSTONE, BRN.-GRY. GRN ARGILL., SOFT, CALC. AND HARD AT 3029'-36' AND 3162'-73'; CLAY, LT.-DK. BRN., LIGNITIC; AND TRACE DOLOMITE, BRN., F.GD., SUCROSIC, BRITTLE-MED. HARD, TIGHT, AT 3029'-36'.																	
3370'-3800', (VERY POOR SAMPLES, UN-CONSOLIDATED SEDIMENTS WITH ABUND. CAVINGS OF TERTIARY COAL AND SHALE) SANDSTONE, RED BRN., LT. GRY. AND GRN. GRY., F.-CRS. GD., QTZ., ANG-SUBANG, WEATHERED FELDSPAR AND KAOLIN COMMON, FRIABLE, FAIR POR., CARB. ABUND. PLANT FOSSILS, POORLY SORTED; CLAYSTONE AND MUDSTONE LT. BRN.-LT. GRY. AND CREAM, SOFT, OFTEN LAMINATED WITH BLACK COAL, ALSO THIN SEAMS OF COAL. GRADES DOWNWARD INTO CONSOLIDATED SEDIMENTS.																	
3800'-4290', ARKOSE, LT. GRY., F.-MED. GD., ABUND. BIOTITE, WEATHERED FELDSPAR AND KAOLIN, GRADING DOWNWARD INTO GREYWACKE, GRY. GRN., F.-MED. GD., FRIABLE-SLY. HARD, CARB., CROSS-BEDDED; AND SHALE, LAVEN-DAR, SILTY, FIRM, CARB. ALSO THIN COAL SEAMS.																	
4290'-4920', MOSTLY SHALE, MED. GRY., GRY. GRN. AND LAV. GRY., FIRM, CARB., ABUND. PLANT FOSSILS, PARTLY SILTY; AND SILTSTONE, LT.-MED. GRAY, LAV. AND GRY. GRN., ARGILL., CARB., SLY. MIC.; WITH OCC. THICK BEDS OF GREYWACKE, LT. GRY.-GRY. GRN., CHLORITIC WITH ABUND. PINK FELD-SPAR, VY. F.-F.GD., FRIABLE-MED. HD., CARB. LAMINAE COMMON, SLY.-VY. CALC., SLY. MIC., TIGHT.																	



BIT TYPES & REMARKS	DRILLING RATE MIN./5 FT.	LITHOLOGY % OF CUTTINGS	MUD GAS DETECTION	DEPTH IN FEET	DEVIATION AZ/MAG CASING & PLUGS VISUAL MEASURED DIPS	SPONTANEOUS POTENTIAL MILLIVOLTS -1+10 MV	CORES AND SPECIFIC GRAVITY DETAILED LITHOLOGY	RESISTIVITY OHMS M <sup>2</sup> /M		LITHOLOGICAL DESCRIPTIONS	FORMATION TESTS AND ENGINEERING DATA	STRATIGRAPHIC COLUMN
								0 AMP. 16" NORMAL	18" 8" LATERAL			
								0 16" NORMAL	500 18" 8" LATERAL			
HTC 8 3/4 OWV-J				4800	1 3/4°		4			4920'-5090', SHALE, LT.-MED. BRN. AND GRY, CARB. LAMINAE AND PLANT FOSSILS; SILTSTONE, LT.-MED. GRY, ARGILL., CARB.; AND GREYWACKE, DK. GRY. GRN., F.-MED. GD., SLY. CALC., FRI- SLY. HARD, TIGHT. TRACE SHALE, LT. GRY, WAXY, TRANSLUCENT, TUFF.		
HTC 8 3/4 OWV-J				4900								
HTC 8 3/4 OWV-J				5000						5090'-5215', SHALE LT-DK. BRN. AND MED. GRY SOFT AND GUMMY, PARTLY BENTO- NITIC, SILTY AND CARB.; SILTSTONE, LT.-MED. GRY., AS ABOVE.		
HTC 8 3/4 OWV-J				5100								
HTC 8 3/4 OWV-J				5200	3 1/2°					5215'-5410', GREYWACKE, GRY. GRN, GRY. AND TAN, VY. F.-F. GD., FRI.-MED. HARD, SLY. CALC. CARB., SHALE, MED GRY. AND BRN, FIRM, CARB.; AND SILT- STONE, LT.-MED. GRY., ARGILL., FIRM, CARB.	REAM HOLE WITH 12 1/4" BIT TO 5379'	
HTC 8 3/4 OWV-J				5300	2°							
HTC 8 3/4 OWV-J				5400	0.20° V		5			5410'-5590', (POOR SAMPLES, CUTTINGS GOING THROUGH SHALE SHAKER,) <u>SILTSTONE</u> AND VY. F. GD. SAND- STONE, LT. GRY, FRIABLE, PARTLY CALC., CARB. SPECKS COMMON; AND SHALE, LT.-MED. GRY. AND BRN, SILTY, SOFT-FIRM, CARB. TRACE QTZ. PEBBLES.		
HTC 8 3/4 OWV-J				5500	1 1/2 3/8°							
HTC 8 3/4 OWV-J				5600	5° M					5590'-6125', MOSTLY GREYWACKE, GRY. GRN. AND GRY. WITH MINOR TAN, ABUND. LT. GRY. AND PINK FELD- SPAR, VY. F.-F. GD., SILTY, FRI- SLY. HARD, TAN IS VY. CALC., CHLORITIC, CARB. TIGHT; WITH SILTSTONE, LT.-MED. GRY., ARGILL., SMALL AMOUNTS OF BLACK COAL		
HTC 8 3/4 OWV-J				5700	4° M							
HTC 8 3/4 OWV-J				5800	3 1/2° AZ							
HTC 8 3/4 OWV-J				5900	6° V							
HTC 8 3/4 OWV-J				6000	1° 20' AZ							
HTC 8 3/4 OWV-J				6100	5°							
HTC 8 3/4 OWV-J				6200	5°					6125'-7000', GREYWACKE AND SUBGREY- WACKE, LT.-DK. GRY. GRN. AND LT. GRY., VY. F.-F. GD., APPROX. MINE- RAL CONTENT - QTZ. 30%, ORANGE AND LT. GRY. FELDSPAR 30%, CHLO- RITE 30%, DK. GRY. MINERALS AND APHANTIC ROCK FRAG. 5%, MICA AND OTHER MINERALS 5%, CARB., TIGHT, SLY. CALC., CROSS-BEDDED; SILTSTONE, LT.-MED. GRY., ARGILL., CARB.; AND SHALE-MUDSTONE, MED. -DK. GRN. GRY. AND DK. GRY. GRN., OFTEN CONCHOIDAL FRACTURE, DENSE, PLANT FOSSILS, TRACES OF CALCITE FROM FRACTURES.		
HTC 8 3/4 OWV-J				6300	5-10° V							
HTC 8 3/4 OWV-J				6400	15° M							
HTC 8 3/4 OWV-J				6500	15° M							
HTC 8 3/4 OWV-J				6600	13° M							
HTC 8 3/4 OWV-J				6700	13° M							
HTC 8 3/4 OWV-J				6800	13° M							
HTC 8 3/4 OWV-J				6900	13° M							
HTC 8 3/4 OWV-J				7000	13° M							
HTC 8 3/4 OWV-J				7100	13° M							
HTC 8 3/4 OWV-J				7200	13° M							
HTC 8 3/4 OWV-J				7300	13° M							
HTC 8 3/4 OWV-J				7400	13° M					FLUORESCENCE IN 10-20% OF CORE, FAINT BROWN STAIN AND GOOD CUT. POR. 5.8%, PERM. LESS THAN 1 MD.		

WELLINGTON PARK NO. 1





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