COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Petroleum Search Subsidy Acts

PUBLICATION No. 52

SUMMARY OF DATA AND RESULTS

Drilling Operations in the Murray Basin New South Wales and South Australia 1961-1962

OF

AUSTRALIAN OIL AND GAS CORPORATION LIMITED

WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

AND

AUSTRALIAN OIL CORPORATION

Issued under the Authority of the Hon. David Fairbairn
Minister for National Development
1964 '9

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

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

SECRETARY: SIR HAROLD RAGGATT, C.B.E.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: J. M. RAYNER

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ASSISTANT DIRECTOR: M. A. CONDON

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Canberra A.C.T.

FOREWORD

Under the Petroleum Search Subsidy Act 1959-1961, 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 offices of the Bureau of Mineral Resources in Canberra and Melbourne (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 five drilling operations undertaken in the Murray Basin, New South Wales and South Australia: A.O.G. Wentworth No. 1, A.O.G. Jerilderie No. 1, W.O.N.L. Bundy No. 1, W.O.N.L. Balranald No. 1, and A.O.C. North Renmark No. 1. The information has been abstracted by the Petroleum Exploration Branch of the Bureau of Mineral Resources from well completion reports furnished by Australian Oil and Gas Corporation Limited, Woodside (Lakes Entrance) Oil Company No Liability, and Australian Oil Corporation.

J.M. RAYNER
DIRECTOR

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A.O.G. WENTWORTH NO. 1

of

AUSTRALIAN OIL AND GAS CORPORATION LIMITED

SUMMARY OF DATA AND RESULTS

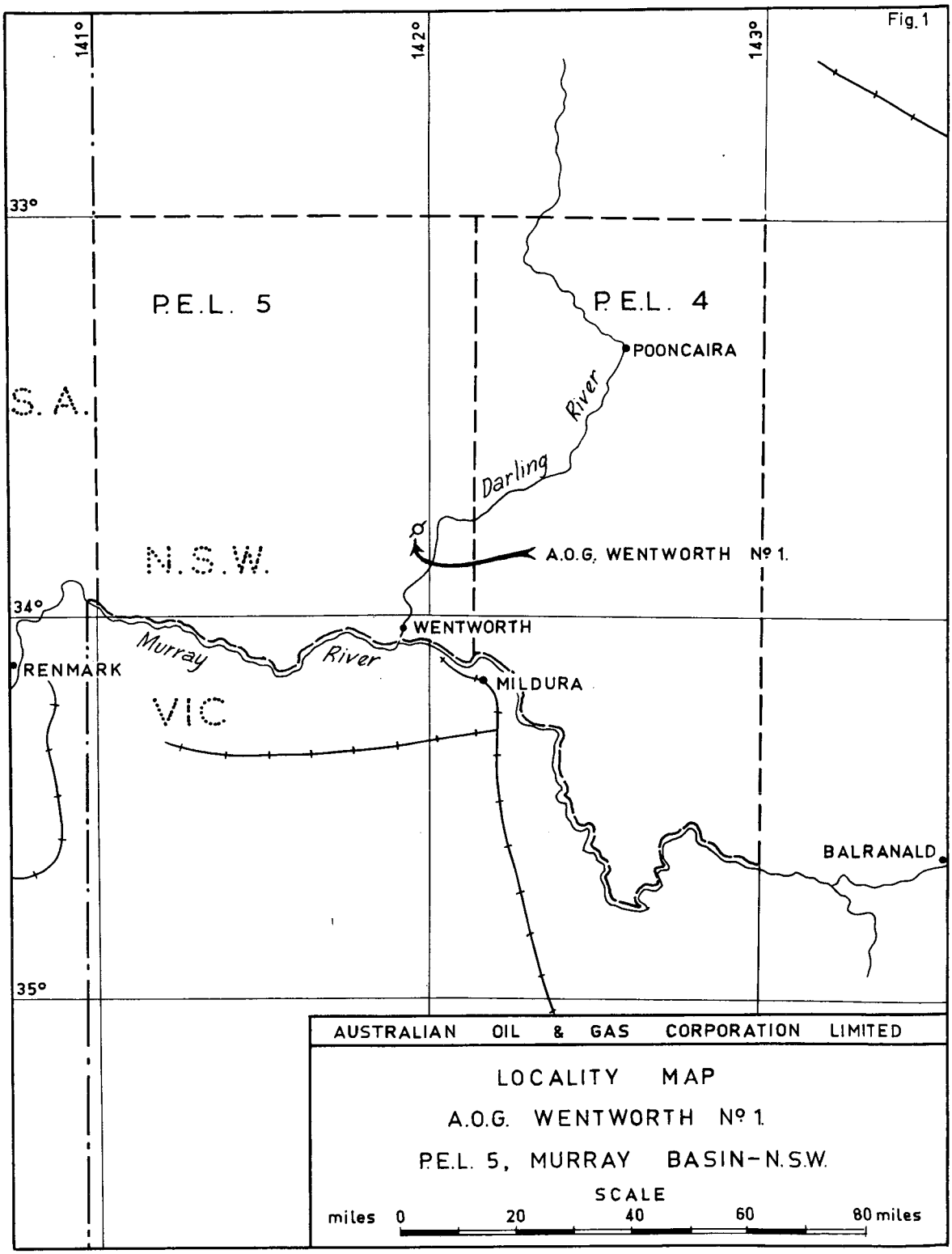
Fig. 1
141°
142°
143°
33°
34°
35°
P.E.L. 5
P.E.L. 4
S.A.
N.S.W.
VIC
POONCAIRA
Darling River
A.O.G. WENTWORTH Nº 1.
WENTWORTH
Murray River
RENMARK
MILDURA
BALRANALD
AUSTRALIAN OIL & GAS CORPORATION LIMITED
LOCALITY MAP
A.O.G. WENTWORTH Nº 1.
P.E.L. 5, MURRAY BASIN - N.S.W.
SCALE
miles 0 20 40 60 80 miles

A.O.G. WENTWORTH NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

A.O.G. Wentworth No. 1 Well was located in the Murray Basin, approximately 20 miles north of Wentworth, New South Wales. The well was drilled by W.L. Sides and Son Pty Limited for Australian Oil and Gas Corporation Limited to a total depth of 2081 feet. Drilling commenced on 8th September, 1961, and was completed on 14th October, 1961. A programme of coring and electric logging using a Widco unit was carried out, but no perforating, squeeze cementing,or testing operations were undertaken.

The well was drilled to determine the nature of the sediments immediately beneath the Tertiary sequence, with particular reference to a refractor at a calculated depth of 1650 feet. This was thought to be basement before drilling started, but it was not identified during logging.

The well penetrated 192 feet of Quaternary sands and grits; 1081 feet of Tertiary sands, silts, clays, marls, and limestones; 331 feet of Lower Cretaceous sediments, including Roma Formation Equivalents; 451 feet of Permian sandy mudstones; and bottomed in conglomerate of possible Permian age.

No shows of hydrocarbons were observed during the drilling operation. In the New South Wales part of the Murray Basin, Lower Cretaceous sediments had not been previously recorded, and Permian sedimentation had been recorded in only one area, between Oaklands and Coorabin, some 250 miles east of Wentworth No. 1 Well.

The off-structure drilling operation at A.O.G. Wentworth No. 1, New South Wales, was subsidized under the Petroleum Search Subsidy Act 1959, from surface to total depth.

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* Abstracted from Well Completion Report, A.O.G. Wentworth No. 1, New South Wales, by D.M. Rose, Australian Oil and Gas Corporation Limited, 1962.

WELL HISTORY

General Data

Well name and number:	A.O.G. Wentworth No. 1
Location:	Latitude 33° 48' S. Longitude 141° 58' E.
Name and address of Tenement Holder:	Australian Oil and Gas Corporation Limited, 261 George Street, Sydney, New South Wales.
Details of Petroleum Tenement:	Petroleum Exploration Licence No. 5, issued by the State of New South Wales.
Total Depth:	2081 feet
Date drilling commenced:	8th September, 1961
Date drilling completed:	14th October, 1961
Date well abandoned:	26th October, 1961
Date rig released:	26th October, 1961
Elevation (ground):	130 feet
Elevation (rotary table):	133 feet (datum for depths)
Status:	Dry hole; plugged and abandoned
Cost:	£11,106

Drilling Data

Drilling Plant:

Make:	Failing
Type:	1500
Hole sizes and depths:	9 5/8" to 98.5 feet 6" to 1611 feet 5 5/8" to 1880 feet 4 1/2" to 2081 feet

Casing details:

Size (in.):	8	5
Weight (lb./ft):	29	10
Setting depth (ft):	98.5	1880
	119 (final)	

Logging and Testing

Ditch Cuttings:

Interval:	10 feet from surface to total depth
Coring:	Seven cores were cut using 4" Failing and Mindrill core barrels. A total of 51.5 feet was cored and 32.75 feet recovered (63.6% recovery).
Electric and other logging:	Electrical logging was carried out by Department of Mines, Victoria, using a Widco Logger. Four runs were made between 97 and 2071 feet.

GEOLOGY

Stratigraphy

Sands (Quaternary): Surface to 192 feet

Twenty-three feet of ferruginous surface sands and 169 feet of grey-buff, coarse fluviatile sands.

Loxton Sands Equivalents (? Lower Pliocene-Upper Miocene): 192 to 264 feet (72 feet)

Grey-brown silty sands containing carbonized and pyritized wood fragments.

Bookpurnong Beds Equivalents (? Upper Miocene): 264 to 358 feet (94 feet)

Black to dark grey, calcareous, pyritic silt and clay.

Pata Limestone Equivalents (Middle Miocene): 358 to 462 feet (104 feet)

Black to dark grey, calcareous, pyritic silt and clay - subdivided on palaeontological grounds.

Morgan Limestone Equivalents (Lower Miocene): 462 to 617 feet (155 feet)

Black to dark green fossiliferous silt, clay, and sand. Pyritic and glauconitic in parts.

Mannum Formation Equivalents (Lower Miocene): 617 to 680 feet (63 feet)

Fossiliferous sand and silt with interbedded grey limestone and marl.

Gambier Limestone and Ettrick Formation Equivalents (Oligocene): 680 to 857 feet (177 feet)

Green and grey, glauconitic, fossiliferous limestone and marl.

Knight Group (Eocene): 857 to 1273 feet (416 feet)

Dark brown, ferruginous and lignitic sand and silt; grey and gritty in places with some clay bands.

Albian-Aptian (Lower Cretaceous): 1273 to 1427 feet (154 feet)

Unnamed formation consisting of fine-grained and silty sand and clay, lignitic in parts. The age is not confirmed.

(?) Roma Formation Equivalents (Lower Cretaceous-Aptian): 1427 to 1604 feet (177 feet)

Grey, fine to coarse sand, silt, and clay. The age is confirmed by palaeontology and palynology.

Mudstone (Permian): 1604 to 2055 feet (451 feet)

White silty clay grading downwards into grey-white mudstone with interbedded siltstone. Graded bedding is common. Small angular pebbles of igneous and metamorphic rocks are common below 1746 feet.

Conglomerate (Permian?): 2055 to 2081 feet (26 feet+)

Conglomerate, containing well-rounded pebbles and boulders of igneous and metamorphic rocks in a siliceous matrix, with interbeds of sandstone. Graded bedding was recorded.

Structure

The preliminary seismic survey indicated that the sediments were flat-lying. This was confirmed by drilling.

REFERENCES

EVANS, P.R., 1962: Palynological report on A.O.G. Wentworth No. 1, N.S.W., with observations on the Permian of the Oaklands - Coorabin area of the Murray Basin. Bur. Min. Resour. Aust. Rec. 1962/64 (Unpubl.).

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Fig. 2

MURRAY BASIN — CORRELATED SECTIONS

	A.O.G. LOXTON BORE S.A.	COMPANY BORE S.A.	A.O.G. WENTWORTH Nº 1. N.S.W.
TERTIARY — PLIOCENE	Loxton sands	Surface soil & kunkar.	Gry. buff sand & grit.
		Grey-buff clay. Grey clay.	Gry. buff clayey sand.
		Yellow argillaceous ss.	Gry. buff coarse sand.
		Br. coarse sand & grit.	
		Br. coarse sand & clay.	
		Lt. br. f. micaceous sand.	
		Lt. br. med. coarse sand.	
		Br.-gry. micaceous clay & grit.	
		Dk. br.-gry.-glauconitic sandy clay with shells.	Gry. br. silty sand.
			Br. pyritic silty sand.
	Bookpurnong beds	Fine shelly ss.	
		Gry. marly-ls.	Br. sandy pyritic siltstone.
		Gry. foss. sandy-marl.	
		Grey limestone.	
	Pata Limestone		Dk. gry. pyritic siltstone.
TERTIARY — MIOCENE	Morgan Limestone	Grey marly limestone.	Gry. carbonaceous & pyritic siltst.
			Gry. br. silty shell sand.
	Mannum Formation equivalents	Gry. limestone & marl.	Br'ish. pyritic siltstone.
			Dk. gry. pyritic & carbonaceous shelly mudstone.
		Gry. bryozoal ls. & marl.	Gry. carbonaceous & glauconitic siltstone.
		Grey marl.	Gry. bryozoal marl.
TERTIARY — OLIGOCENE	Ettrick Formation	Grey clay.	Gry. fairly dense bryozoal limestone.
		Br. carbonaceous sandy clay.	
		Lt. br. f. sand & clay.	
		Lt. br. argillaceous f. sand.	
		Gry. sandy clay.	Lt. gry. fine marly limestone.
			Gr. gry. glauconitic marl.
		Lignite.	Br. glauconitic sandstone.
		Lt. br. plastic clay.	
		Lt. br. f. to med. sand.	Br. ferruginous sandy siltstone.
TERTIARY — EOCENE	Knight Group	Dk. br. carb. sand & grit.	
		Br. & white pyritic clay.	Gry. coarse gritty sandstone.
		Dk. br. carb. clay.	
		Br. f. argillaceous sand.	Grey sandstone.
		Br. carb. clayey sand.	
		Br. carb. clay.	
		Buff fine sand.	Grey coarse quartz grit.
MESOZOIC — LOWER CRETACEOUS	Albian sediments	Buff med. sand.	Gr.-gry. siltstone.
		Buff fine sand.	
		Brown clay.	
		Buff fine sand.	
		Buff f. sand & clay.	
		Lt. br. very f. sand.	Gr.-gry. carbonaceous & glauconitic siltstone.
		Buff coarse sand.	Br'ish. dolomitic ss. & siltst.
		Buff-gry. med.—coarse sand.	Gr.-gry. f. glauconitic felspathic sandstone & siltstone.
		Br. lignitic f-coarse sand with pyritic nodules.	
	? Albian	Buff med. to fine sand.	Gry. carbonaceous mudstone.
		Lt. br. fine sand.	
		Gry. mudstone w. pyrite.	
		Gry. agillareous f. sand.	Lt. gry. claystone with sand lenticles.
		Qtz. grit & br. carb. clay.	
		Gr. mudstone.	
		Buff-gry. f to coarse sand.	
		Gry. mudstone with ironstone fragments.	
	1601	1805	2081
	Sandy clays.		
	Yellow coarse quartz sands.		
	Yellow micaceous fine to med. shelly sand.		
	Buff calc. sand with shells.		
	Gry. fn. glauconitic sand.		
	Fn. gry.-gr micaceous sand.		
	Buff shelly marl.		
	Gry. shelly-marly limestone.		
	Gry. glauconic sandy marl.		
	Gry. bryozoal limestone.		
	Gry. bryozoal limestone with Lepidocyclina.		
	Grey bryozoal limestone.		
	Lt. gry. marly bryozoal l.s.		
	Lt. gry. sandy bryozoal glauconitic l.s.		
	Lt. gry. mrly sdy. l.s. w Victoriella.		
	Lt. gry. glauconitic marl.		
	Dk. gr. plastic calc. clay.		
	Dk. gr. glauconitic clay.		
	Gr. pyritic & glauc. qtz. sand.		
	Blk. pyritic carbonaceous clay.		
	Dirty gry. f-m. clayey micaceous s.		
	Gry. m. s. w. ligniltic fragments.		
	Dk. br. pyritic silt & s.s.		
	Coarse carbonaceous sand.		
	Blk. carbonaceous sandy silt.		
	Dk. br. carbonaceous f. sand.		
	Highly carbonaceous sandy silt with lignite.		
	Br. blk. gritty pyritic silt.		
	Dk. br. carbonaceous f. sand.		
	Dk. br. pyritic sandy silt.		
	Dk. br. carbonaceous silty sand.		
	Gr. br. med. quartz sand.		
	Dirty gry. br. silty sand.		
	Lt. gry. br. med. sand.		
	Buff med. quartz sand.		
	Dk. br. silty gritty sand.		
	Lt. br. gravelly sand.		
	Lt. br. gry. f. sandy silt.		
	Lt. br. coarse silty grit.		
	Lt. br. gry. med. sharp sand.		
	Gry. sandy plastic clay w. glauconite & wood fragments.		
	Dk. gr. gry. plastic mudstone.		
	Bl. gry. laminated siltstone.		
	Gr. gry. siltstone.		
	Gr. gry. silty mudstone.		
	Dk. gry. carbonaceous mudstone.		
	Dk. gr. gry. carbonaceous shale with glauconite & pyrite.		

Fluviatile sands. | Equiv. Loxton sands | Bookpur. nong bed | Equiv. of Pata Ls. | Equivalent of Morgan Ls. | Equiv. Mannum f/m. | Equiv. of Gambier Ls. & Ettrick Formation | Knight Group | Albian-Aptian sediments | Equivalent of Roma f/m. | LOWER PERMIAN

Grey conglomerate.

AUSTRALIAN OIL & GAS CORPORATION LIMITED

MURRAY BASIN
CORRELATED SECTIONS

VERTICAL SCALE: 200 FEET TO 1 INCH

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

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

(i) Well Completion Report — 11 pp.

Appendix 1 - Palaeontological report by N.H. Ludbrook — 14 pp.

Appendix 2 - Palynological report by P.R. Evans — 6 pp.

Appendix 3 - Palynological report by B.E. Balme. — 2 pp.

Appendix 4 - Report on electrical logging by W.A. Esplan — 7 pp.

(ii) Daily drilling reports for period 7th September, 1961 to 26th October, 1961.

(iii) Widco Well Logs

Run 1, 97 - 1694 feet (2" = 100 ft)

Run 2, 118 - 1875 feet (2" = 100 ft)

Run 2, 1599 - 1876 feet (2" = 100 ft)

Run 3, 1878 - 2076 feet (2" = 100 ft)

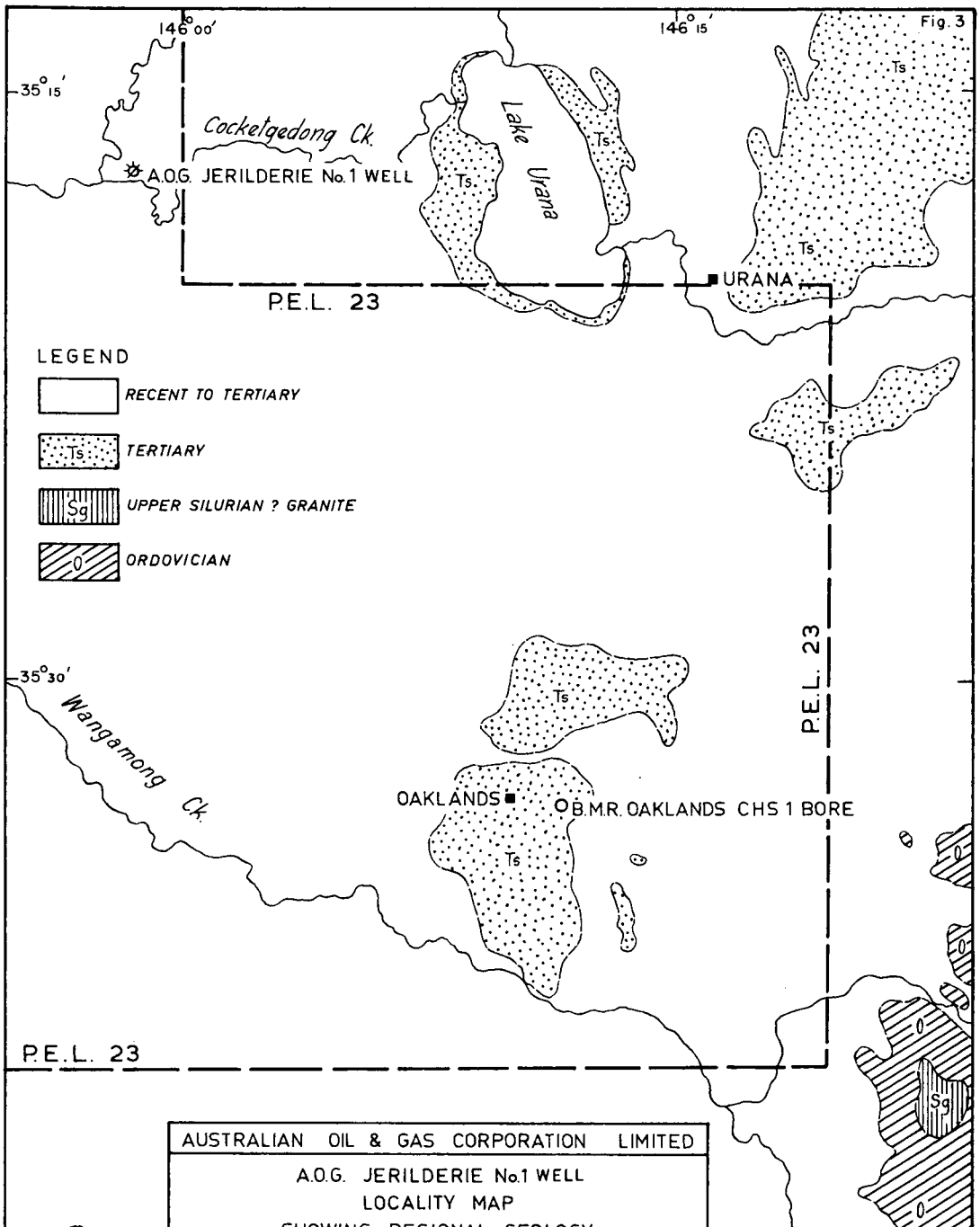
(iv) Locality Map - Traverse F, B.M.R. Seismic Survey, 1960.

A.O.G. JERILDERIE NO. 1

of

AUSTRALIAN OIL AND GAS CORPORATION LIMITED

SUMMARY OF DATA AND RESULTS


146°00'
146°15'
Fig. 3
35°15'
Cocketgedong Ck.
A.O.G. JERILDERIE No.1 WELL
Lake Urana
Ts
URANA
P.E.L. 23
LEGEND
RECENT TO TERTIARY
TERTIARY
UPPER SILURIAN ? GRANITE
ORDOVICIAN
35°30'
Wangamong Ck.
OAKLANDS
B.M.R. OAKLANDS CHS 1 BORE
P.E.L. 23
P.E.L. 23
Sg
O
AUSTRALIAN OIL & GAS CORPORATION LIMITED
A.O.G. JERILDERIE No.1 WELL
LOCALITY MAP
SHOWING REGIONAL GEOLOGY
SCALE OF MILES
0 2 4 8 12
35°45'

A.O.G. JERILDERIE NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

A.O.G. Jerilderie No. 1 Well was located in the south-eastern lobe of the Murray Basin, 14 miles east-north-east of Jerilderie, New South Wales. The well was drilled for Australian Oil and Gas Corporation Limited to a total depth of 4360 feet. Drilling commenced on 8th May, 1962 and was completed on 29th November, 1962. A programme of coring, logging, and testing was undertaken.

The well was drilled to determine the stratigraphy and petroleum potential of a sequence of Permian sediments indicated by seismic surveys and partly confirmed by shallow water and coal bores.

A light rotary rig drilled and cored from surface to 1243 feet and casing was then run to 1233 feet. Cable tool drilling was carried out between 1243 feet and 2110 feet; a second rotary rig was then used to drill the hole to total depth.

The well penetrated 355 feet of clay and sand of Recent to Tertiary age; 833 feet of non-marine sediments equivalent to the Tertiary (Eocene) Knight Group; 227 feet of Permian coal measures; 2912 feet of Lower Permian marine sediments; and entered metamorphic rocks of possible Ordovician age at 4327 feet.

Two small gas shows were encountered in Lower Permian sediments during the drilling operations. No fluorescence or other traces of oil were observed at the well site. An open hole formation test over the interval 1843 to 1848 feet yielded gas at the rate of only 500 cubic feet per day. A smaller gas show detected only as very slight bleeding from the top of Core No. 20 (2995 to 3010 feet), was not tested.

The off-structure drilling operation at A.O.G. Jerilderie No. 1, New South Wales, was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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* Abstracted from Well Completion Report, A.O.G. Jerilderie No. 1, New South Wales, by A.J. Wright and J. Stuntz, Australian Oil and Gas Corporation Limited, 1963.

WELL HISTORY

General Data

Well name and number:	A.O.G. Jerilderie No. 1
Location:	Latitude 35° 15' S. Longitude 145° 58' E.
Name and address of Tenement Holder:	Australian Oil and Gas Corporation Limited, 261 George Street, Sydney, New South Wales.
Details of Petroleum Tenement:	Petroleum Exploration Licence No. 23, issued by the State of New South Wales.
Total Depth:	4360 feet
Date drilling commenced:	8th May, 1962
Date drilling completed:	29th November, 1962
Date well abandoned:	5th December, 1962
Date rig released:	5th December, 1962
Elevation (ground):	376 feet
Elevation (rotary table):	382 feet (Failing 2500)
Elevation (collar level):	380 feet (Cable tool rig)
Elevation (rotary table):	387 feet (National T.20)
Status:	Dry hole; plugged and abandoned
Cost:	£70,133

Drilling Data

Drilling Plant:

	0-1243 ft	1243-2110 ft	2110-4360 ft
Make:	Failing	Bucyrus Erie	National Ideal
Type:	2500	48L	T.20

Hole sizes and depths:

24"	to 19 feet
17"	to 1243 feet
12 1/2"	to 1865 feet
8 7/8"	to 2110 feet
8 3/4"	to 4360 feet

Casing details:

Size (in.):	18 5/8	13 3/8	9 5/8
Weight (lb./ft):	(Conductor)	48	36
Grade:		H.40	J.55
Range:		2	2
Setting depth (ft):	19	1233	1865

Logging and Testing

Ditch Cuttings:

Interval: 10 feet from surface to 1243 feet (Rotary); 2-10 feet from 1243-2110 feet (Cable Tool); 10 feet from 2110-4360 feet (Rotary).

Coring: Twenty-six cores between 395 feet and 4346 feet. A total of 199 feet was cored and 109 feet 8 inches recovered (55.1% recovery).

Electric and other logging: Electrical logging using a Widco logging unit was carried out by the Bureau of Mineral Resources and the Department of Mines, Victoria. Five runs were made between 56 and 4350 feet.
A velocity survey was conducted by Petty Geophysical Engineering Company.

GEOLOGY

Stratigraphy

The stratigraphic succession encountered in A.O.G. Jerilderie No. 1 Well is summarized in the following table:

Depth (feet)	Thickness (feet)	Age	Possible Correlation
0- 355	355	Recent to Tertiary	
355-1188	833	Tertiary (Eocene)	Includes equivalents of the Knight Group, Murray Basin
1188-1415	227	Permian	Coal measures at Oaklands
1415-4327	2912	Lower Permian	Marine sediments at Oaklands
4327-4360	33+	Palaeozoic	(?) Ordovician

Clays and Sands, Recent to Tertiary: Surface to 355 feet

Brown clay and sand changing to grey-white at 277 feet.

Knight Group Equivalents (Eocene): 355 to 1188 feet (833 feet)

Brown sandy lignite; interbedded grey sandstone, siltstone, and mudstone, with thin bands of black coal; loosely consolidated white quartz pebble conglomerate with bands of white clayey sandstone.

Coal Measures (Permian): 1188 to 1415 feet (227 feet)

Soft, grey silty clay and sand with pebble bands, thin seams of black coal, and thin bands of carbonaceous mudstone. A non-marine interval; no foraminifera present in cores.

Marine Sediments (Lower Permian): 1415 to 4327 feet (2912 feet)

Irregularly spaced, interbedded grey clay, siltstone, shale, mudstone, sandstone, and conglomerate, calcareous in part.

Metasediments (Pre-Permian, (?) Ordovician): 4327 to 4360 feet (33 feet+)

Green phyllite, dark grey, metamorphosed siltstone and fine-grained sandstone.

Structure

The well was located on the eastern flank of a north-west trending trough, indicated by geophysical exploration. No local structure suitable for the accumulation of petroleum was known.

There exists the possibility of disconformities within the Permian sequence encountered in Jerilderie No. 1. One possible break occurs at about the 2105-foot level. Another occurs at the base of the Permian coal measures. On seismic grounds there is no evidence for strong angular unconformities either within the Permian or with the overlying Tertiary at the well location.

The disconformity between the Permian and Tertiary leads to a feature associated with seismic work in the Murray Basin. There appears to be a high velocity layer at a relatively shallow depth in this Basin which tends to obscure seismic reflections from lower levels. Its nature is not clear but it is suggested it may represent an old weathered surface or duricrust. At Jerilderie No. 1 and Wentworth No. 1 it appears to correspond with the old Permian surface.

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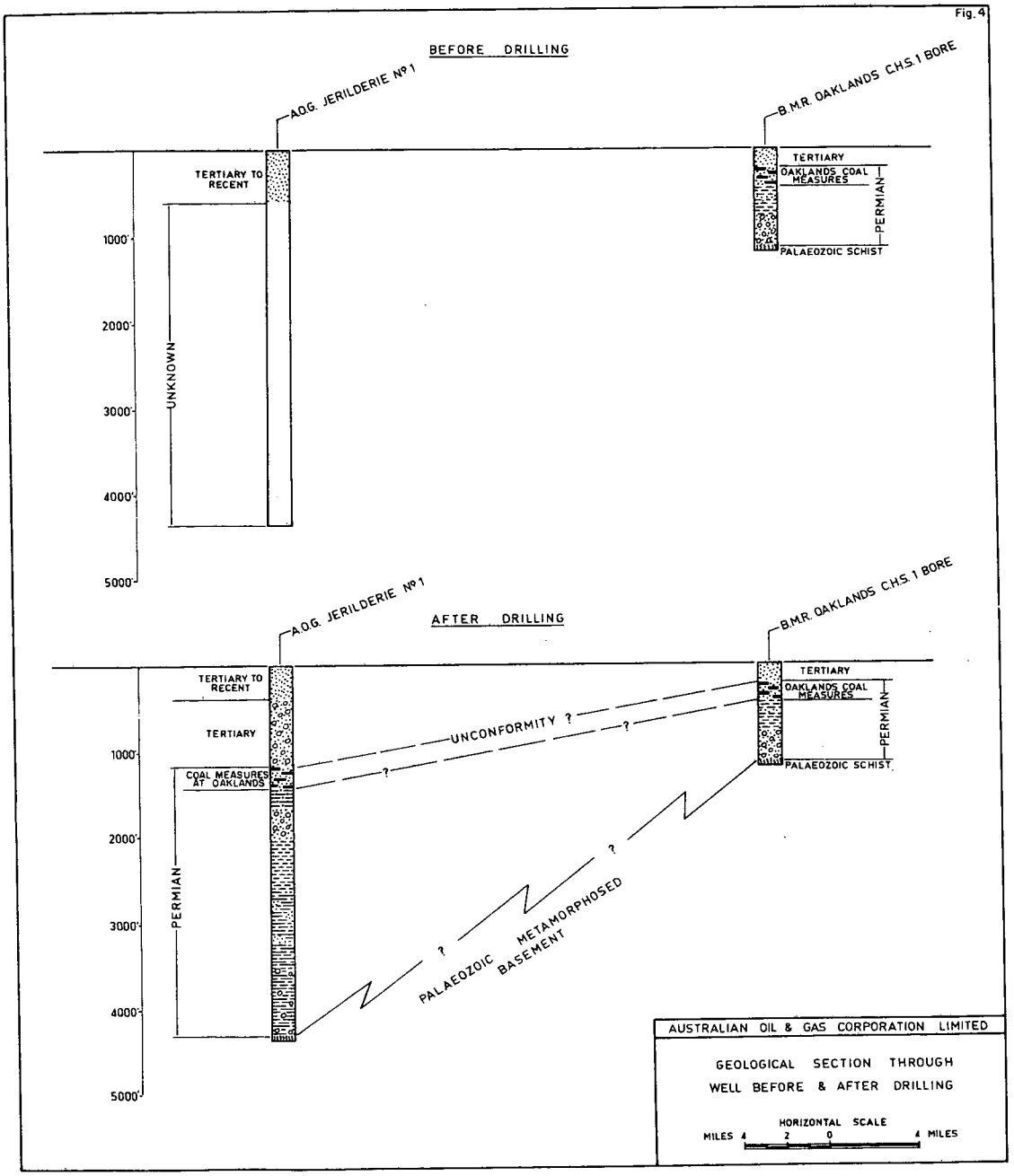
Fig. 4


BEFORE DRILLING
A.O.G. JERILDERIE Nº 1
B.M.R. OAKLANDS C.H.S. 1 BORE
TERTIARY TO RECENT
UNKNOWN
TERTIARY
OAKLANDS COAL MEASURES
PERMIAN
PALAEOZOIC SCHIST
1000'
2000'
3000'
4000'
5000'
AFTER DRILLING
A.O.G. JERILDERIE Nº 1
B.M.R. OAKLANDS C.H.S. 1 BORE
TERTIARY TO RECENT
TERTIARY
COAL MEASURES AT OAKLANDS
PERMIAN
UNCONFORMITY ?
PALAEOZOIC METAMORPHOSED BASEMENT
AUSTRALIAN OIL & GAS CORPORATION LIMITED
GEOLOGICAL SECTION THROUGH WELL BEFORE & AFTER DRILLING
HORIZONTAL SCALE
MILES 4 2 0 4 MILES

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

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

(i) Well Completion Report — 22 pp.

Appendix 1	-	Petrological report by D.R. Pinkstone	2 pp.
Appendix 2(a)	-	Micropalaeontological report by G.R.J. Terpstra ..	6 pp.
Appendix 2(b)	-	Palynological report by P.R. Evans	3 pp.
Appendix 3(a)	-	Gas analysis by N.S.W. Department of Mines	1 p.
Appendix 3(b)	-	Underground water analyses by Water Conservation and Irrigation Commission of N.S.W.	1 p.
Appendix 4	-	Core analyses by Bureau of Mineral Resources	1 p.
Appendix 5(a)	-	Electric logs report ..	2 pp.
Appendix 5(b)	-	Velocity Survey report by W.E. Strangman ..	3 pp.

(ii) Daily drilling reports for period 7th May, 1962 to 5th December, 1962.

(iii) Widco Well Logs

Run 3, 1221 - 1550 feet (2" = 100 ft)

Run 4, 1402 - 1859 feet (2" = 100 ft)

Run 5, 1871 - 4350 feet (2" = 100ft)

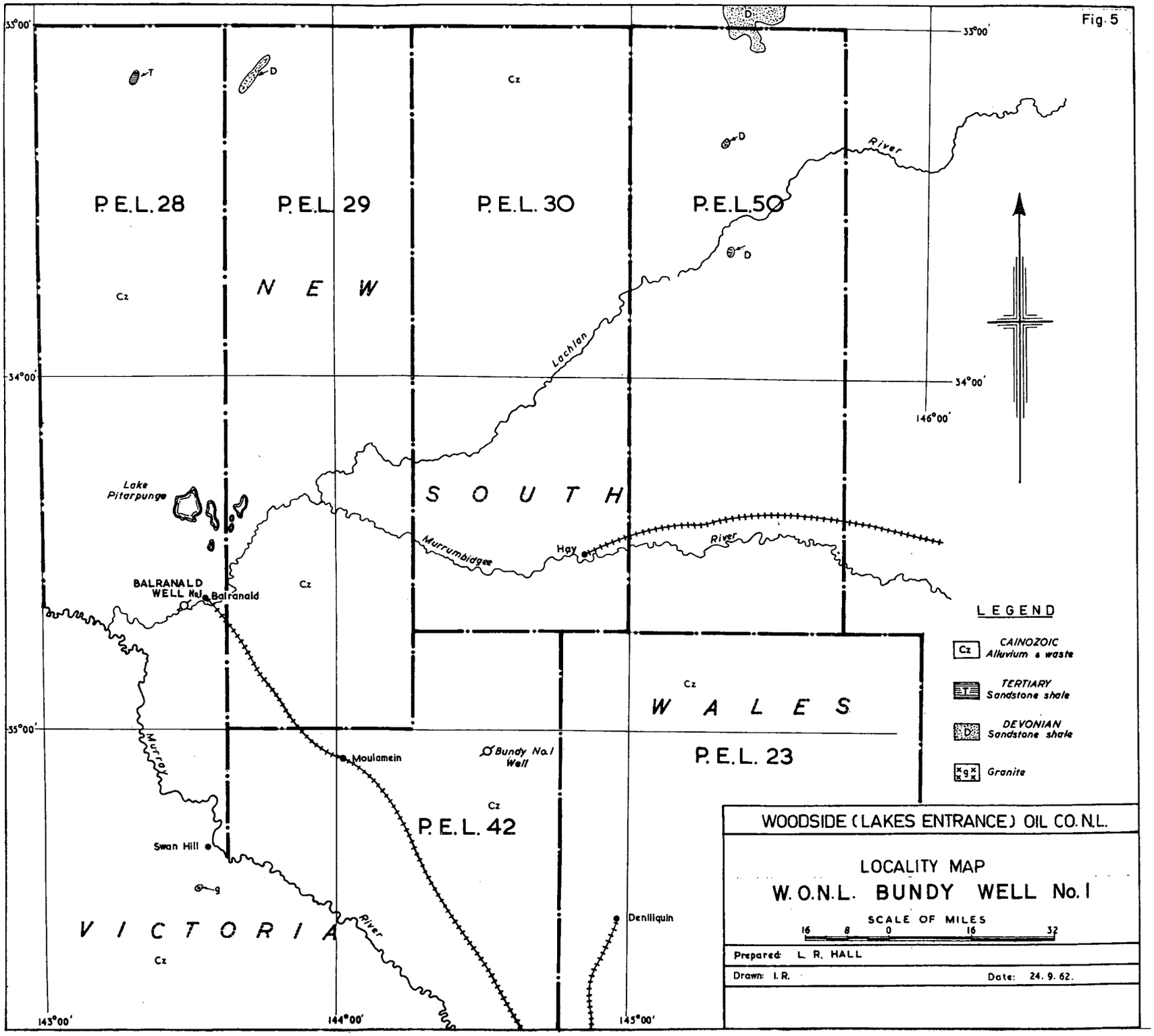
W.O.N.L. BUNDY NO. 1

of

WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

SUMMARY OF DATA AND RESULTS

Fig. 5



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

LOCALITY MAP

W. O. N. L. BUNDY WELL No. 1

SCALE OF MILES 16 8 0 16 32

Prepared: L. R. HALL

Drawn: I. R. Date: 24. 9. 62.

W.O.N.L. BUNDY NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

W.O.N.L. Bundy No. 1 Well was located near the eastern margin of the Murray Basin, 28 miles east of Moulamein, New South Wales. The well was drilled by the Operator, Woodside (Lakes Entrance) Oil Company No Liability, to a total depth of 1376 feet. Drilling commenced on 12th May, 1962 and was completed on 26th May, 1962. A programme of coring, and electric logging by Schlumberger Seaco Inc., was undertaken.

The well was drilled to establish the stratigraphic sequence and depth to basement in an area devoid of outcrop but in which a broad gravity low was thought to indicate either a thickened sedimentary section or the presence of granite. Drilling confirmed the absence of pre-Tertiary sediments and the presence of shallow granitic basement.

The well penetrated 221 feet of Quaternary alluvium and a sequence of 1110 feet of non-marine lignitic sands and silts of Tertiary age, the oldest of which are Eocene and the youngest probably Pliocene. Granite basement of probable Ordovician age was penetrated at 1340 feet. No oil or gas shows were encountered while drilling the well and no potential petroleum source or reservoir beds were observed in the non-marine Tertiary section.

The off-structure drilling operation at W.O.N.L. Bundy No. 1, New South Wales, was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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* Abstracted from Well Completion Report, W.O.N.L. Bundy No. 1, Murray Basin, N.S.W., by O.J. Shiels, Woodside (Lakes Entrace) Oil Company No Liability, 1962.

WELL HISTORY

General Data

Well name and number:	W.O.N.L. Bundy No. 1
Location:	Latitude 35° 03' 00" S. Longitude 144° 31' 18" E.
Name and address of Tenement Holder:	Woodside (Murray Valley) Oil Company Pty Limited, 792 Elizabeth Street, Melbourne, Victoria.
Details of Petroleum Tenement:	Petroleum Exploration Licence No. 42, issued by the State of New South Wales.
Total Depth:	1376 feet
Date drilling commenced:	12th May, 1962
Date drilling completed:	26th May, 1962
Date well abandoned:	28th May, 1962
Date rig released:	28th May, 1962
Elevation (ground):	262 feet
Elevation (rotary table):	271 feet (datum for depths)
Status:	Dry hole; plugged and abandoned
Cost:	£36,543

Drilling Data

Drilling Plant:

Make:	Brewster
Type:	N.4
Hole sizes and depths:	17" to 325 feet 12 1/2" to 1373 feet 5 5/8" to 1376 feet

Casing details:

Size (in.):	13 3/8
Weight (lb./ft):	48
Grade:	H.40
Range:	2
Setting depth (ft):	320

Logging and Testing

Ditch Cuttings:

Interval:	10 feet while drilling, 5 feet while coring, from surface to total depth.
Coring:	Six cores were cut, five using a Hughes "J" Type core barrel with 8 3/4" soft formation core head, and one using a Reed "Kor-King" K.500 barrel with 5 5/8" Reed hard formation core head. A total of 101 feet was cored and 37'6" recovered (37% recovery).

Electric and other logging:

Electric Log:	320 - 1365 feet (1 run)
Microlog-Caliper:	320 - 1363 feet (1 run)

GEOLOGY

Stratigraphy[1]

Fluviatile Sands (Quaternary): Surface to 230 feet

Buff, angular, coarse quartz sand containing feldspar, muscovite, carbonaceous matter, and limonite.

Loxton Sands Equivalents (? Lower Pliocene): 230 to 315 feet (85 feet)

Yellow-brown and grey-brown silty sand, with few fish bone fragments and foraminifera.

Bookpurnong Beds Equivalents (? Upper Miocene): 315 to 410 feet (95 feet)

Brown, ferruginized, and grey, pyritic sandstone.

Pata Limestone Equivalents (Middle Miocene): 410 to 534 feet (124 feet)

Grey, pyritic sandstone and grit, and brown, carbonaceous grit.

Morgan Limestone and Mannum Formation Equivalents (Lower Miocene): 534 to 696 feet (162 feet)

Dark brown to black carbonaceous silt and sand with lignite.

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(1) Footnote by Bureau of Mineral Resources:

This summary has been abstracted from Appendix 2 to the Well Completion Report: "Palaeontological Report on Bundy No. 1 Well, N.S.W.," by N.H. Ludbrook.

Gambier Limestone and Ettrick Formation Equivalents (? Oligocene): 696 to 871 feet (175 feet)

Coal, brown silty sand, and carbonaceous silt.

Knight Group (Eocene): 871 to 1340 feet (469 feet)

Brown-grey siltstone with abundant animal burrows or algal markings, fine angular quartz, muscovite, and earthy coal.

Granite (? Ordovician): 1340 to 1376 feet (36 feet +)

Biotite granodiorite.

Structure

No dips were recorded from the cores and there is no other indication of structure in this part of the Murray Basin.

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relating to W.O.N.L. Bundy No. 1 Well, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

(i) Well Completion Report 7 pp.

Appendix 1 - Electric log interpretation 1 p.

Appendix 2 - Palaeontological report by N.H. Ludbrook .. .. 6 pp.

(ii) Daily drilling reports for period 12th May, 1962 to 26th May, 1962.

(iii) Schlumberger Well Logs

(a) Electric Log

Run 1, 320 - 1365 feet (2" = 100 ft)

Run 1, 320 - 1365 feet (5" = 100 ft)

(b) Microlog-Caliper

Run 1, 320 - 1363 feet (2" = 100 ft)

Run 1, 320 - 1363 feet (5" = 100 ft)

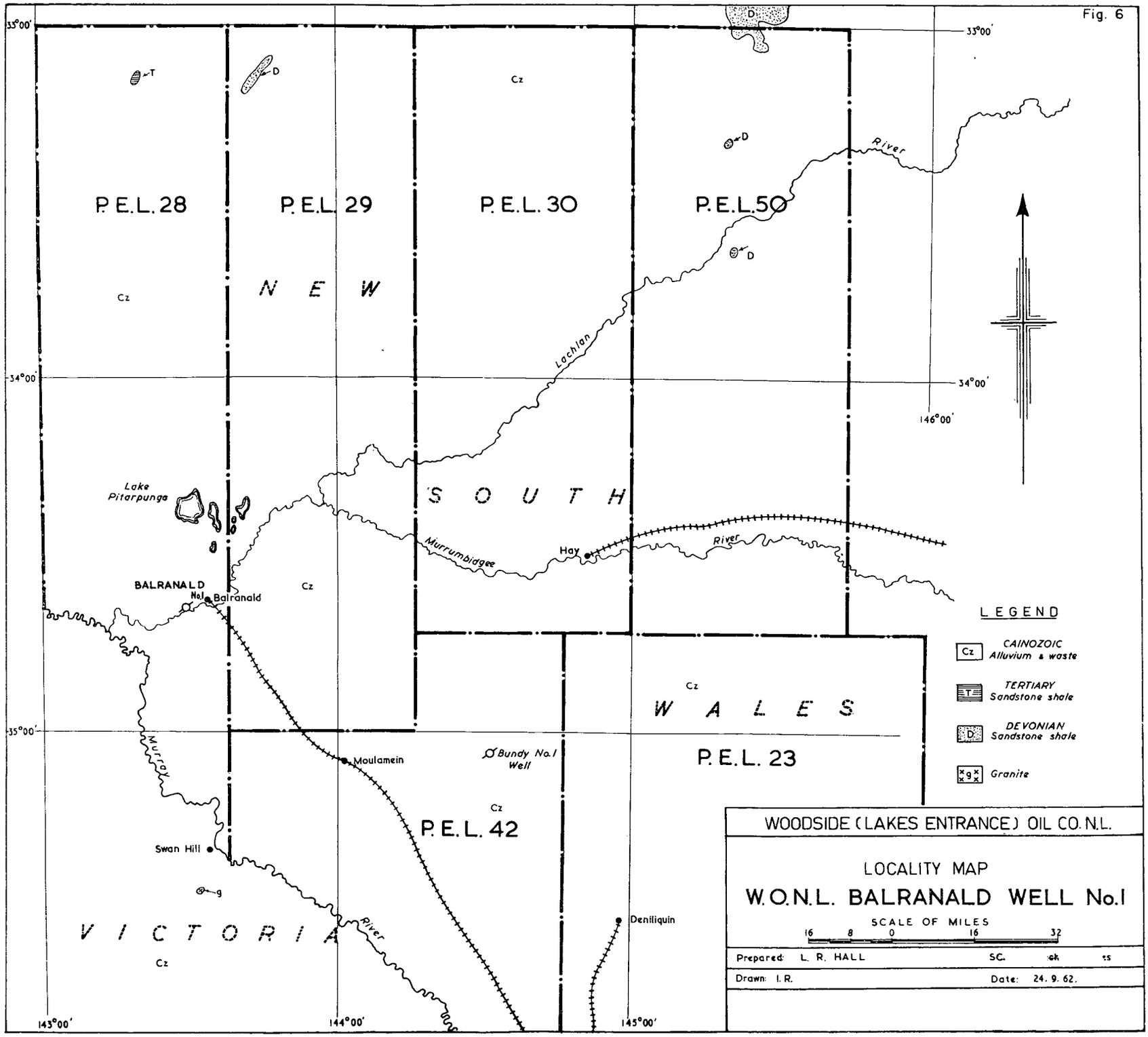
W.O.N.L. BALRANALD NO. 1

of

WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

SUMMARY OF DATA AND RESULTS

Fig. 6



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

LOCALITY MAP

W.O.N.L. BALRANALD WELL No.1

SCALE OF MILES

16 8 0 16 32

Prepared: L. R. HALL SC. ck ts

Drawn: I. R. Date: 24. 9. 62.

W.O.N.L. BALRANALD NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

W.O.N.L. Balranald No. 1 Well was located about four miles west-south-west of Balranald and approximately 65 miles west-north-west of Bundy No. 1, in the Murray Basin of New South Wales. The well was drilled by the Operator, Woodside (Lakes Entrance) Oil Company No Liability, to a total depth of 1322 feet. Drilling commenced on 25th June, 1962 and was completed on 6th July, 1962. A programme of coring, and electric logging by Schlumberger Seaco Inc., was undertaken.

The well was drilled to determine the depth to basement and the stratigraphy in an area in which very few outcrops occur and to locate beds suitable for the accumulation of petroleum.

The well intersected a sequence of 148 feet of Quaternary fluviatile sands and 904 feet of Tertiary marine and paralic sediments of Eocene to Pliocene age. Steeply dipping dolomitic shale and minor sandstone of unknown but possible Ordovician age were penetrated at 1064 feet. No oil or gas shows were encountered while drilling the well.

The off-structure drilling operation at W.O.N.L. Balranald No. 1, New South Wales, was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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* Abstracted from Well Completion Report, W.O.N.L. Balranald No. 1, Murray Basin, N.S.W., by D.D. Benbow, Woodside (Lakes Entrance) Oil Company No Liability, 1962.

WELL HISTORY

General Data

Well name and number:	W.O.N.L. Balranald No. 1
Location:	Latitude 34° 39' 20" S. Longitude 143° 29' 32" E.
Name and address of Tenement Holder:	Planet Exploration Company Pty Limited, 196 Grey Street, Brisbane, Queensland.
Details of Petroleum Tenement:	Petroleum Exploration Licence No. 28, issued by the State of New South Wales.
Total Depth:	1322 feet
Date drilling commenced:	25th June, 1962
Date drilling completed:	6th July, 1962
Date well abandoned:	7th July, 1962
Date rig released:	7th July, 1962
Elevation (ground):	215 feet
Elevation (rotary table):	227 feet (datum for depths)
Status:	Dry hole; plugged and abandoned
Cost:	£25,133

Drilling Data

Drilling Plant:

Make:	Brewster
Type:	N.4
Hole sizes and depths:	17" to 300 feet 12 1/4" to 1270 feet 8 3/4" to 1322 feet

Casing details:

Size (in.):	13 3/8
Weight (lb./ft):	48
Grade:	H.40
Range:	2
Setting depth (ft):	296

Logging and Testing

Ditch Cuttings:

Interval:	10 feet while drilling, 5 feet while coring, from surface to total depth.
Coring:	Five cores were cut, using a Hughes "J" Type core barrel with 8 3/4" soft and hard formation core heads. A total of 84 feet was cored and 70 feet recovered (83% recovery).

Electric and other logging:

Electric Log:	295-1320 feet (1 run)
Microlog-Caliper:	295-1320 feet (1 run)

GEOLOGY

Stratigraphy [2]

Fluviatile Sands (Quaternary): Surface to 160 feet

Cream-yellow, ill-sorted, calcareous and kaolinitic sand.

Loxton Sands Equivalents (? Lower Pliocene): 160 to (?) 378 feet (218 feet)

Brown, carbonaceous, pyritic sands. The base is difficult to determine, because of poor recovery of samples.

Bookpurnong Beds Equivalents (? Upper Miocene): 378 to 460 feet (82 feet)

Brown and yellow, carbonaceous sandy silt with crustacea fragments.

Pata and Morgan Limestones Equivalents (Middle to Lower Miocene): 460 to 650 feet (190 feet)

Brown, carbonaceous, pyritic siltstone and dolomite with pyritized molluscan fragments and few foraminifera.

Mannum and Ettrick Formations Equivalents (Lower Miocene to Upper Oligocene): 650 to 830 feet (180 feet)

Earthy lignitic and pyritic sands with foraminifera.

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(2) Footnote by Bureau of Mineral Resources:

This summary has been abstracted from Appendix 2 to the Well Completion Report: "Palaeontological Report on Balranald No. 1 Well, N.S.W.", by N.H. Ludbrook.

Knight Group (Eocene): 830 to 952 feet (122 feet)

Brown, carbonaceous siltstone with sharks' teeth near the top of the sequence.

Dolomitic Sandstone (? Eocene): 952 to 1064 feet (112 feet)

Light brown, dolomitic sandstone with finely disseminated pyrite and muscovite. This may be the basal bed of the Knight Group.

Grey Shale (age undetermined - possibly Ordovician): 1064 to 1322 feet (258 feet+)

Grey shale with few sandy and dolomitic bands; banded in part; steeply dipping, and unfossiliferous.

Structure

Little is known of the structure of the Tertiary rocks in the area. High dips of approximately 80^{o} were observed in cores of the pre-Tertiary rocks.

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relating to W.O.N.L. Balranald No. 1 Well, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

(i) Well Completion Report 7 pp.

Appendix 1 - Electric log interpretation 1 p.

Appendix 2 - Palaeontological report by N.H. Ludbrook .. 6 pp.

(ii) Daily drilling reports for period 23rd June, 1962 to 6th July, 1962.

(iii) Schlumberger Well Logs

(a) Electric Log

Run 1, 295 - 1320 feet (1" = 100 ft)

(b) Microlog-Caliper

Run 1, 295 - 1320 feet (1" = 100 ft)

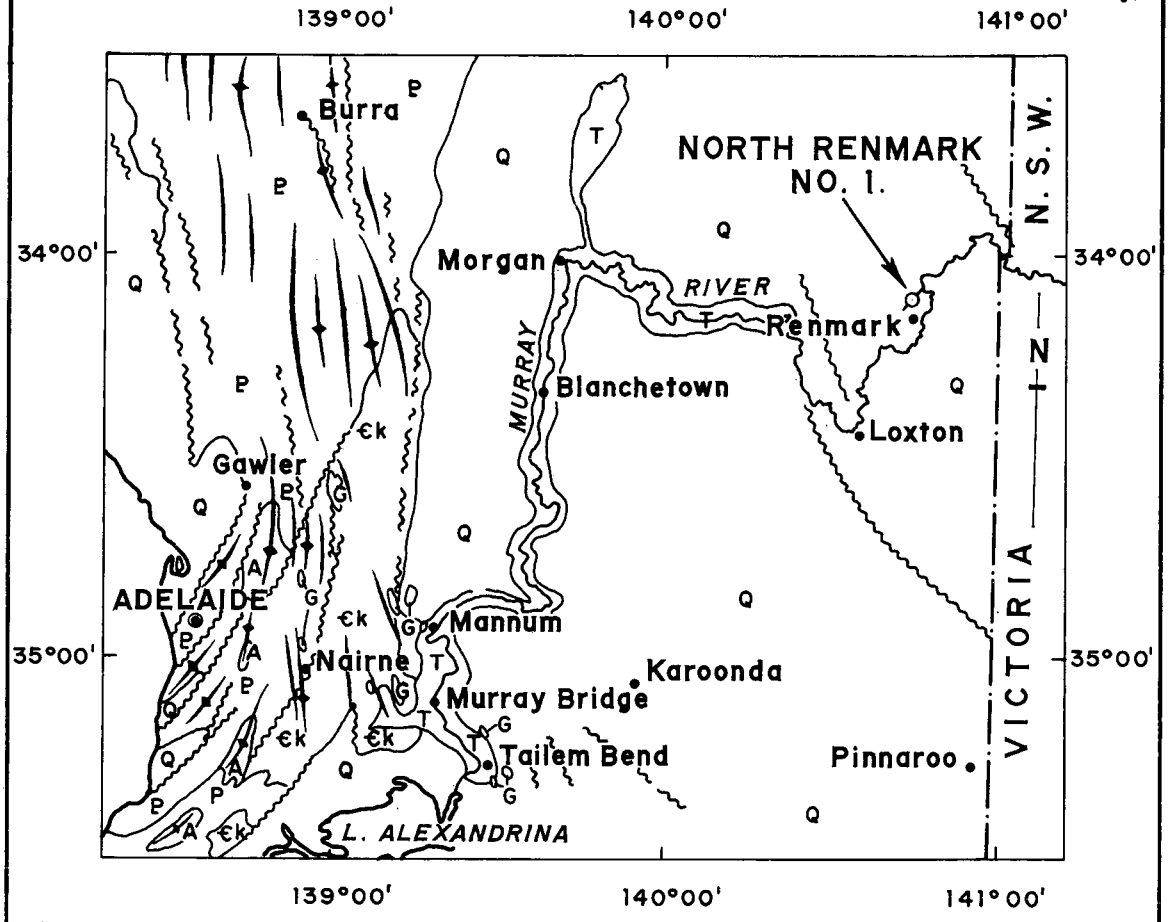
A.O.C. NORTH RENMARK NO. 1

of

AUSTRALIAN OIL CORPORATION

SUMMARY OF DATA AND RESULTS

Fig. 7



AUSTRALIAN OIL CORPORATION
O.E.L. 29

LOCALITY PLAN

A.O.C. NORTH RENMARK NO. 1 WELL

A.O.C. NORTH RENMARK NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

A.O.C. North Renmark No. 1 Well was located about six miles north of Renmark, in the Murray Basin of South Australia. The well was drilled by the South Australian Department of Mines for the Operator, Australian Oil Corporation, to a total depth of 4018 feet. Drilling commenced on 29th November, 1962 and was completed on 11th February, 1963. A programme of coring, and electric logging by the Department of Mines, Victoria, was undertaken.

The primary objective of the well was to examine the nature and thickness of the Permian section and to determine stratigraphy of the pre-Permian sediments. The base of the Permian was deeper than expected, and drilling was suspended in marine beds of Lower Permian age.

A light rotary rig drilled and cored from surface to 1761 feet, and casing (second string) was then run to 1741 feet. Below this depth, drilling was continued with the Mindrill B5000 rig to total depth.

The well penetrated 57 feet of Quaternary sands; a Tertiary sequence 1740 feet thick ranging in age from Lower Pliocene to Eocene; 1445 feet of Cretaceous sandstone and shale ranging in age from possible Cenomanian to (?) Neocomian; and 773 feet of Lower Permian glacial marine sediments. No testing was undertaken and the only oil show was a few faint fluorescent specks of indefinite origin, observed in cuttings between 3441 and 3550 feet.

The off-structure drilling operation at A.O.C. North Renmark No. 1, South Australia, was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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* Abstracted from Well Completion Report, North Renmark No. 1, South Australia, by R. Grasso for Australian Oil Corporation, 1963.

WELL HISTORY

General Data

Well name and number:	A.O.C. North Renmark No. 1
Location:	Latitude 34° 07' S. Longitude 140° 41' E.
Name and address of Tenement Holder:	Australian Oil Corporation, 47 Waymouth Street, Adelaide, South Australia.
Details of Petroleum Tenement:	Oil Exploration Licence No. 29, issued by the State of South Australia.
Total Depth:	4018 feet
Date drilling commenced:	29th November, 1962
Date drilling completed:	11th February, 1963
Date well suspended:	11th February, 1963
Date rig released:	11th February, 1963
Elevation (ground):	77.43 feet
Elevation (rotary table):	80.43 feet (datum for depths)
Status:	Suspended

Drilling Data

Drilling Plant:

	0-1761 ft	1761-4018 ft
Make:	Failing	Mindrill
Type:	1500	B5000

Hole sizes and depths:

10"	to	8 feet (conductor pipe)
9 1/4"	to	208 feet
6 1/4"	to	1761 feet
4 1/2"	to	4008 feet
3 1/2"	to	4018 feet

Casing details:

Size (in.):	8	5
Weight (lb./ft):	23.19	9.6
Grade:	AWBC.16	AWBC.16
Setting depth (ft):	197	1741

Logging and Testing

Ditch Cuttings:

Interval:	10 feet to 1800 feet; 5 feet from 1800 feet to total depth.
Coring:	Nineteen cores were cut between 307 and 4018 feet. A total of 170 feet was cored and 68 feet recovered (40% recovery).
Electric and other logging:	The well was logged by the Department of Mines, Victoria, using a Widco logging unit. One electric log was run between 1739-4001 feet, and one Gamma-Ray log between surface and 1630 feet.
Deviation survey:	2 1/2° deviation at 023° was recorded at 4001 feet using a Tro-Pari instrument.

GEOLOGY

Stratigraphy

The stratigraphic succession encountered in North Renmark No. 1 Well is summarized in the following table*:

Rock Unit	Depth (feet)	Thickness (feet)	Age
-	3- 60	57	Quaternary
Loxton Sands	60- 140	80	L. Pliocene
Bookpurnong Beds	140- 200	60	U. Miocene-L. Pliocene
Pata Limestone	200- 250	50	L. Miocene
Morgan Limestone	250- 450	200	L. Miocene
Mannum Formation	450- 530	80	L. Miocene
Gambier Limestone	530- 656	126	Oligocene
Ettrick Formation	656- 706	50	Oligocene
Knight Group	706-1800	1094	Eocene
"Cretaceous Sandstone"	1800-2405	605	?Cenomanian-Albian
"Cretaceous Shale"	2405-2840	435	Aptian
"Cretaceous Shale and Sandstone"	2840-3015	175	Aptian
"?Cretaceous Sandstone"	3015-3245	230	?Neocomian
"Glacial Marine Rocks"	3245-4018	773+	L. Permian

* Table established by Dr N.H. Ludbrook.

Fluviatile Sands (Quaternary): Surface to 60 feet

Grey to brown, fluviatile, unconsolidated clay and quartz sand.

Loxton Sands (Lower Pliocene): 60 to 140 feet (80 feet)

Coarse-grained, unconsolidated quartz sand with minor amounts of dark grey clay and siltstone and a few foraminifera below 110 feet.

Bookpurnong Beds (Upper Miocene-Lower Pliocene): 140 to 200 feet (60 feet)

Green-grey to dark green, micaceous siltstone with bryozoa and shell fragments.

Pata Limestone (Lower Miocene): 200 to 250 feet (50 feet)

Grey, fossiliferous, clayey, glauconitic marl and recrystallized limestone with foraminifera, bryozoa and echinoids.

Morgan Limestone (Lower Miocene): 250 to 450 feet (200 feet)

Fossiliferous marl containing abundant bryozoa and foraminifera, with interbeds of grey, fossiliferous, recrystallized limestone in lower part.

Mannum Formation (Lower Miocene): 450 to 530 feet (80 feet)

Hard, light grey limestone with abundant bryozoa, echinoids, and molluscs.

Gambier Limestone (Oligocene): 530 to 656 feet (126 feet)

Porous, light grey, marly limestone with thin interbeds of dark grey shale with glauconite grains, and abundant bryozoa, echinoids, molluscs, and brachiopods.

Ettrick Formation (Oligocene): 656 to 706 feet (50 feet)

Grey-green, sandy clay and marl with glauconite grains and abundant fossils.

Knight Group (Eocene): 706 to 1800 feet (1094 feet)

Coarse sand containing pyrite, chert, and lignite. Fine sand, silt, and mudstone interbeds are common in the upper part.

"Cretaceous Sandstone" (?Cenomanian-Albian): 1800 to 2405 feet (605 feet)

Greenish-grey, fine-grained sandstone and siltstone with minor shale beds. The sandstone contains chlorite, pyrite, feldspar, muscovite, dolomite, and graphite.

"Cretaceous Shale and Sandstone" (Aptian): 2405 to 3015 feet (610 feet)

Interbedded, light grey shale, medium to coarse-grained sandstone, and light grey siltstone, containing arenaceous and calcareous foraminifera, carbonaceous material, plant remains, glauconite, pyrite, and fragments of metamorphic rocks and limestone.

"?Cretaceous Sandstone" (?Neocomian): 3015 to 3245 feet (230 feet)

Medium-grained kaolinitic sandstone, rarely fine and coarse-grained; pyritic, carbonaceous, and micaceous in places, and containing shaly and silty interbeds. No diagnostic fossils were found.

"Glacial Marine Rocks "(Lower Permian): 3245 to 4018 feet (773 feet +)

Interbedded shale, siltstone, fine and coarse sandstone, pebble beds, cobble beds, and boulder beds. Slump structures are common in the finer grained sediments. Poor sorting is common throughout the sequence and coarse material occurs even in the shales. The sequence is thought to be glacigene deposited in a trough or fjord. Palynological studies indicate an Upper Sakmarian or early Artinskian age.

Structure

The well was located in a syncline marked by a seismic "low" indicated by reflections from the (?) Lower Cretaceous and by a "low" gravity anomaly. Slight differences between the two anomalies may indicate that the axis of the syncline migrated westwards during sedimentation. Dip values observed in cores indicate that the upper sediments are generally flat-lying, and that they gradually steepen with depth to about 10 degrees.

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ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relating to A.O.C. North Renmark No. 1 Well, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

(i) Well Completion Report 14 pp.

Appendix 1 - Palaeontological report by N.H. Ludbrook 20 pp.

(ii) Daily drilling reports for period 27th November, 1962 to 13th February, 1963.

(iii) Widco Well Logs

(a) Electrical Log

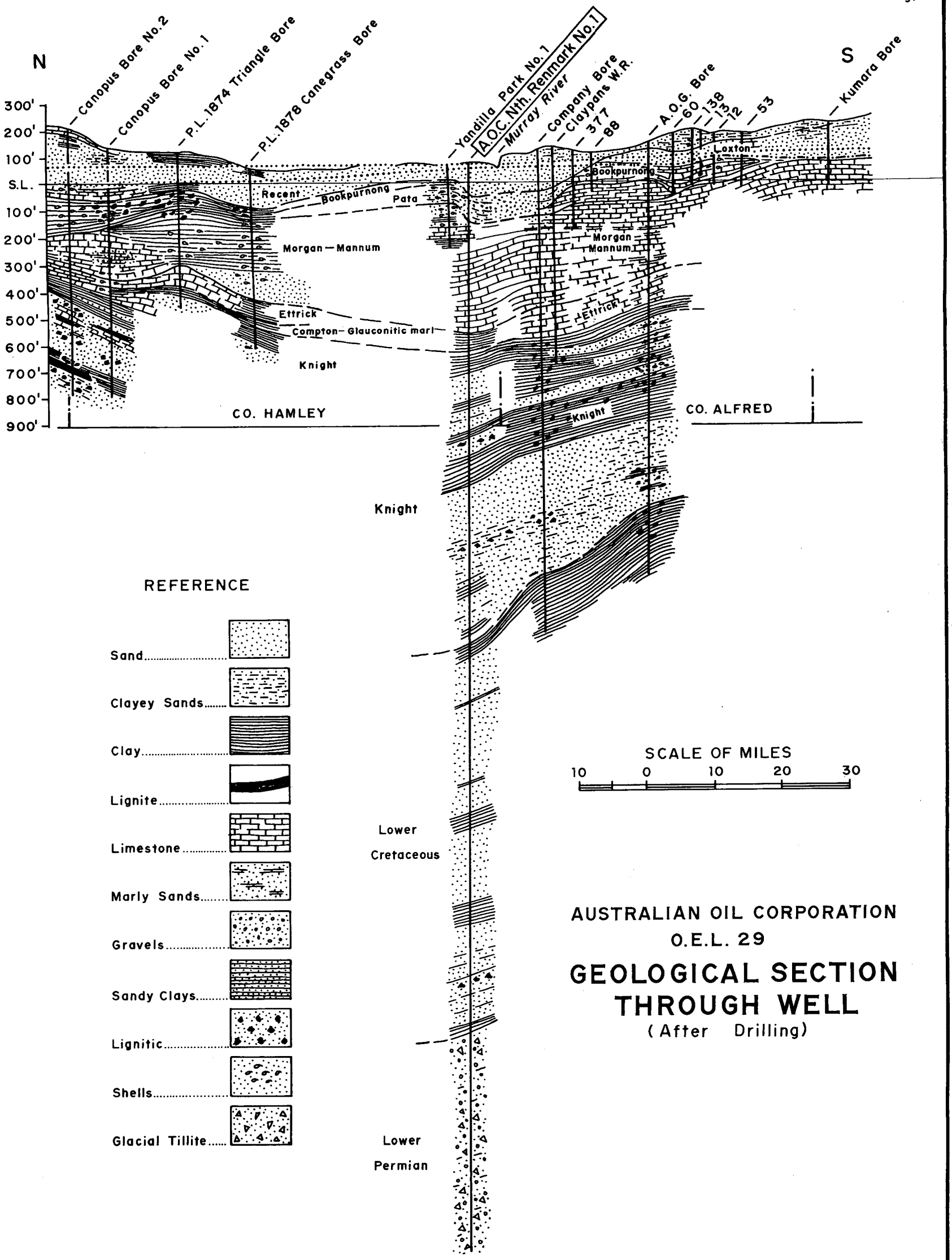
Run 1, 1739-4001 feet (2" = 100 ft)

(b) Gamma Ray Log

Run 1, 0-1630 feet (2" = 100 ft)

(iv) Lithologic Log.

Fig. 8



AUSTRALIAN OIL CORPORATION

O.E.L. 29

GEOLOGICAL SECTION THROUGH WELL

(After Drilling)

After O'Driscoll 1960.

Plate 1

AUSTRALIAN OIL AND GAS CORPORATION LIMITED

A.O.G. WENTWORTH Nº I.

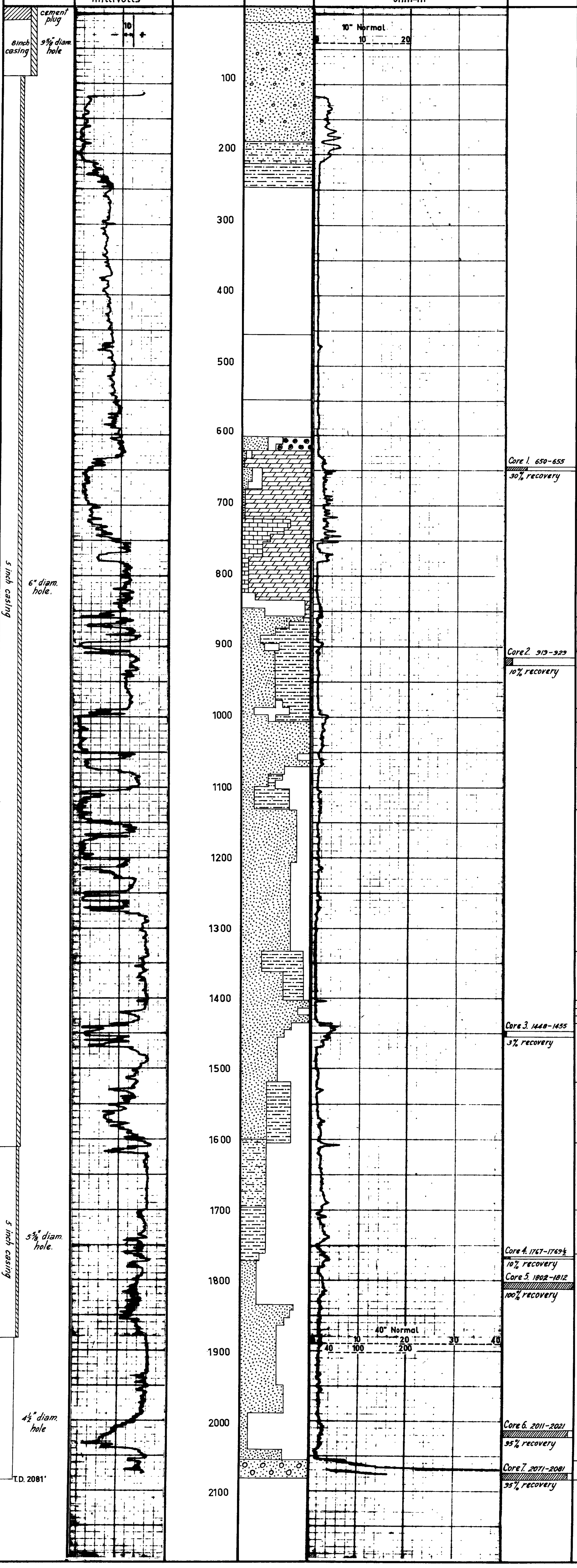
COMPOSITE LOG

LOCATION: 33° 48' S. 141° 58' E.
DATE SPUDDED: 8·9·61
DATE COMPLETED: 26·10·61.
ROTARY TABLE ELEVATION: 133' A.S.L.
ELECTRIC LOGGING: Victorian Mines Dept.: Widco unit Nº 306. (W. Esplan operator)

LEGEND

- Limestone.
- Marl.
- Sand & sandstone.
- Conglomerate.
- Siltstone, mudstone.
- Clay.
- Fossiliferous.

HOLE SIZE CASING DIAMETER | SPONTANEOUS POTENTIAL CURVE millivolts | DEPTH IN FEET | % LITHOLOGY | RESISTIVITY CURVE ohm-m | CORES



DESCRIPTIVE LITHOLOGY

Depth	Description
23'	Ferruginous surface sands and clays.
100'	Grey buff coarse sand and grit, occasional carbonaceous material.
192'	Grey brown silty sand.
223'	Grey clayey silts.
264'	Black to dark grey calcareous pyritic silty clays.
462'	Black to dark grey fossiliferous pyritic silty clays.
553	Dark green fossiliferous pyritic glauconitic silts and clays.
607	Highly fossiliferous sands and clays.
628	Grey fossiliferous marl, clay and siltstone.
680	Grey fossiliferous marl with limestone bands becoming increasingly abundant.
722	Grey fossiliferous marls and limestones.
826	Dark green clayey marls.
857	Dark brown occasionally pyritic lignitic clays sands and silts.
909	Dark brown ferruginous lignitic sands and silts with occasional calcareous bands.
992	Grey silts and gritty sands.
1010	Grey gritty sands.
1074	Sands, brown-grey lignitic sills and brown clays.
1137	Light grey, medium to coarse sands and brown grey clays.
1335	Green brown fossiliferous silts, lignitic clays and sands.
1407	Grey coarse sand.
1417	Grey clay and coarse sand.
1427	Grey coarse sand.
1437	Grey sands and clays.
1520	Grey clays, siltstones and sandstones.
1604	White clays and silts.
1699	White clays and silts much harder than above.
1746 / 1769	
1833	White mudstones, siltstones, sandstones.
1991	
2055	Conglomerates.
2081 T.D.	

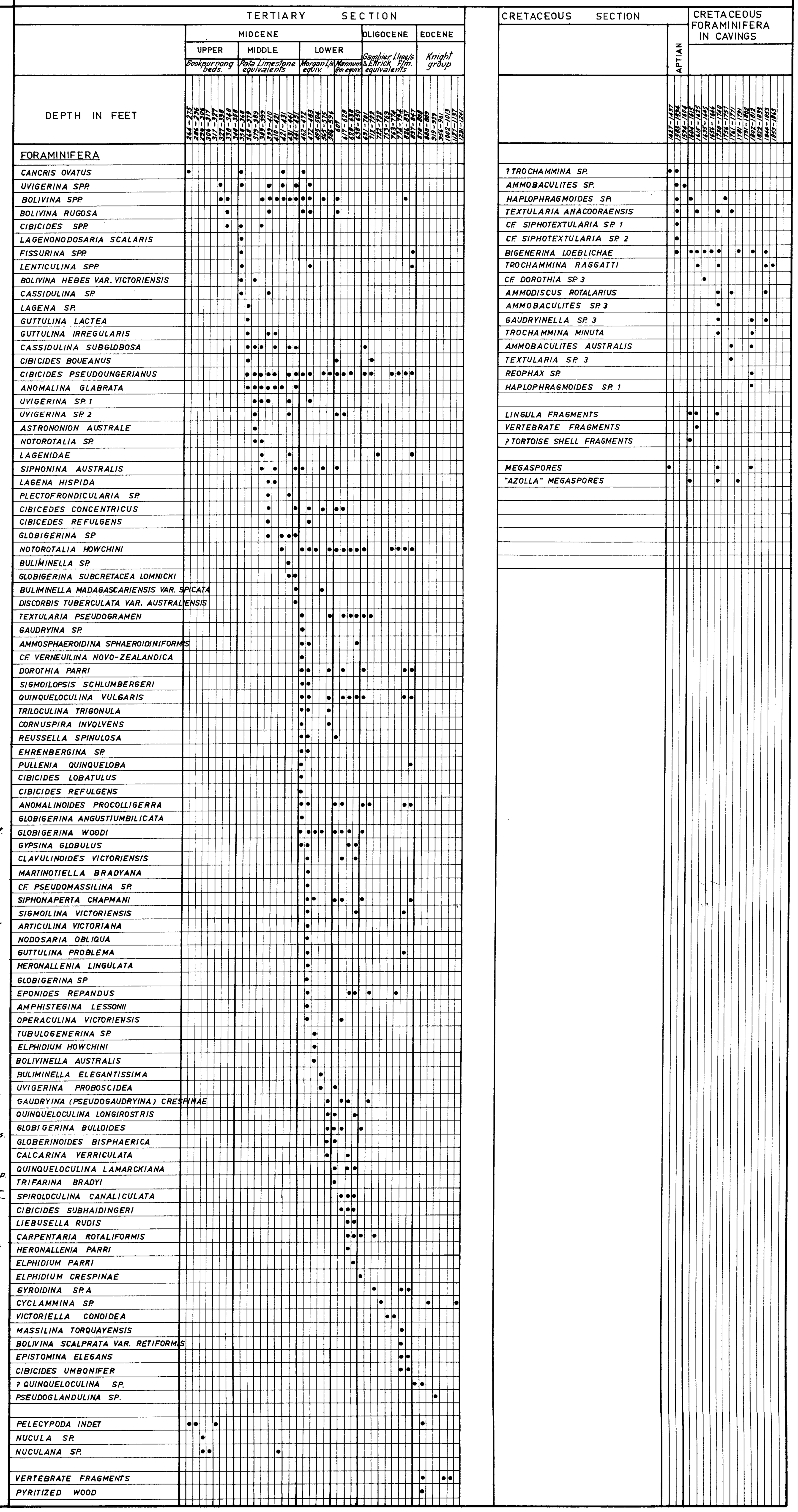
STRATIGRAPHY

Era	Period	Epoch / Stage	Sub-division	Formation
TERTIARY	QUATERNARY			FLUVIATILE SANDS
	PLIO-CENE			EQUIV. OF LOXTON SANDS
	MIOCENE	UPPER		BOOKPURNONG BEDS
		MIDDLE		EQUIVALENT OF PATA LIMESTONE
		LOWER		EQUIVALENT OF MORGAN LIMESTONE
				EQUIV. OF MANNUM F/m.
	OLIGOCENE			EQUIVALENT OF GAMBIER LIMESTONE AND ETTRICK FORMATION
	MIDDLE TO UPPER EOCENE			KNIGHT GROUP
MESOZOIC	LOWER CRETACEOUS	?APTIAN - ALBIAN		ALBIAN-APTIAN SEDIMENTS
		APTIAN		EQUIVALENT OF ROMA FORMATION
PALAEOZOIC	PERMIAN			FLUVIOGLACIALS

PALYNOLOGY (P.R. EVANS)

Depth	Palynology
940 - 950	Nothofagus Spp. Triporate Spp. Angiosperms undet. Hystrichosphaera sp.
993 - 1033	Nothofagus Spp. Triporate Spp. Angiosperms undet. Hystrichosphaera. sp.
1127-1137	Nothofagus Spp. Triporate Spp. Angiosperms undet.
1199-1210	Nothofagus Spp. Triporate Spp. Angiosperms undet.
1273-1283	Nothofagus Spp. Triporate Spp. Angiosperms undet.
1335-1345	Nothofagus Spp. Triporate Spp. Lycopodiumsporites-austroclavidites. Podocarpidites grandis. Cyathidites Spp. Podocarpidites Spp.
1397-1407	" " "
1455-1460, 1501-1511, 1553-1563	Nothofagus Spp. Triporate Sp. Lycopodiumsporites-austroclavidites. Podocarpidites grandis. Microcachryidites antarcticus. Araucariacites-australis. Classopollis torosus. Cyathidites Spp. C. australis rimalis. C. crassiangulatus. Podocarpidites Spp. Sphagnumsporites clavus. Granulatisporites dailyi. Neoraistrickia sp. Cicatricosisporites australiensis. Baculatisporites comaumensis. Zonati Sp. A. Ginkocycadophytus nitidus. Podocarpidites ellipticus. Zonati Sp. B Pilosisporites Sp. Microreticulatisporites pudens. Hystrichosphaeridium Spp Peridinida Sp.
1604-1615, 1645-1656	Nothofagus Spp. Triporate Sp. Lycopodiumsporites-austroclavidites. Podocarpidites grandis. Microcachryidites antarcticus. Araucariacites-australis. Cyathidites Spp. C. australis rimalis. Podocarpidites Spp. Podocarpidites ellepticus. Pilosisporites Sp. Appiculatisporis wonthaggiensis. Cymatiosphaera Sp. Hystrichosphaera furcata.
1699-1705	Nothofagus Spp. Triporate Sp. Lycopodiumsporites-austroclavidites. Podocarpidites grandis. Microcachryidites antarcticus. Podocarpidites Spp. Podocarpidites ellepticus. Pilosisporites Sp. Apiculatisporis wonthaggiensis. Sphagnumsporites-australis. Hystrichosphaeridium Spp. Odontochitina-operculata. aff. Aptodinium maculatum.
1760-1769, 1802-1812	Nothofagus Spp. Triporate Sp. Lycopodiumsporites-austroclavidites. Podocarpidites grandis. Microcachryidites antarcticus. Apiculatisporis-wonthaggiensis. Inaperturopollenites Spp. Zonati Sp. Lycopodiumsporites aff. circolumenus. Hystrichosphaeridium. Spp. aff. Apteodinium maculatum. Scriniodinium Sp. Gonyaulax cf. G. edwardsi.
	Leiosphaera Sp.
	Nuskoisporites triangularis. Marsupipollenites Sp. Reguliatisporites Sp. Laevigati Sp. Leiosphaera Sp.
	Nuskoisporites triangularis. Marsupipollenites Sp. Rugulatisporites Sp. Laevigati Sp. Leiosphaera Sp. Tasmanites Sp.
	Leiosphaera Sp. Tasmanites Sp.
2011-2021	Leiosphaera Sp. Tasmanites Sp.

PALAEONTOLOGY (N. H. LUDBROOK)



A.O.G. JERILDERIE Nº1 WELL
COMPOSITE WELL LOG

STATE: N.S.W. P.E.L. 23
COUNTY: URANA
PARISH: COCKETGEDONG
PORTION: 67
LATITUDE: 35° 15' S.
LONGITUDE: 145° 58' E.
ELEVATION: R.K.B. 382' A.S.L.
GROUND: 376' A.S.L.
DATE SPUDDED: 8·5·62
DATE DRILLING STOPPED: 29·11·62
DATE RIG OFF: 5·12·62
TOTAL DEPTH. DRILLER: 4360'

WELL HEAD FITTINGS: STEEL PLATE WELDED OVER CASING
DRILLED BY: W.L.SIDES, A.O.G, O.D.&E.
DRILLING METHOD: PERCUSSION & ROTARY.
LOGGED BY: B.M.R. & VIC. MINES DEPT.

SYMBOLS

CLAY
SILTSTONE
SANDSTONE
COAL
LIGNITE
SHALE
CONGLOMERATE
PHYLLITE
MUDSTONE

ELECTRICAL LOG DATA

TYPE OF LOG	SELF POTENTIAL & RESISTIVITY				
RUN NUMBER	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5
DATE	24·5·62	24·5·62	24·7·62	15·8·62	30·11·62
LOGGED FROM	1190	415	1550	1859	4350
LOGGED TO	56	60	1221	1402	1871
FOOTAGE LOGGED	1134	355	329	457	2479
T.D. E.LOG					
T.D. DRILLER					4360
CASING SHOE E.LOG.			1221	1402	1871
CASING SHOE DRILLER			1233	1410	1865
CASING SIZE			13 3/8"	9 5/8"	9 5/8"
BIT SIZE	0-19' 24"	0-19' 24"	1231'-1312' 12 1/2"	1410'-1850' 8 7/8"	1867'-2110' 8 7/8"
BIT SIZE	20'-1193' 12 1/2"	20'-1243' 12 1/2"	1312'-1556' 8 7/8"		2110'-4360' 8 3/4"
MUD: NATURE				BENTONITE AND WATER	NATURAL BENTONITE AND WATER
DENSITY					76 lb/cu.ft.
VISCOSITY					43 s
RESISTIVITY	8·3 a 64° F	8·3 a 64° F			1·8 a 101° F
RES a B.H.T.			1·3 a 97° F	1·0 a 122° F	1·5 a 124° F
B.H. TEMP			97° F	122° F	124° F
RECORDED BY	A.RADESKI	A.RADESKI	W.ESPLAN	W.ESPLAN	W.ESPLAN

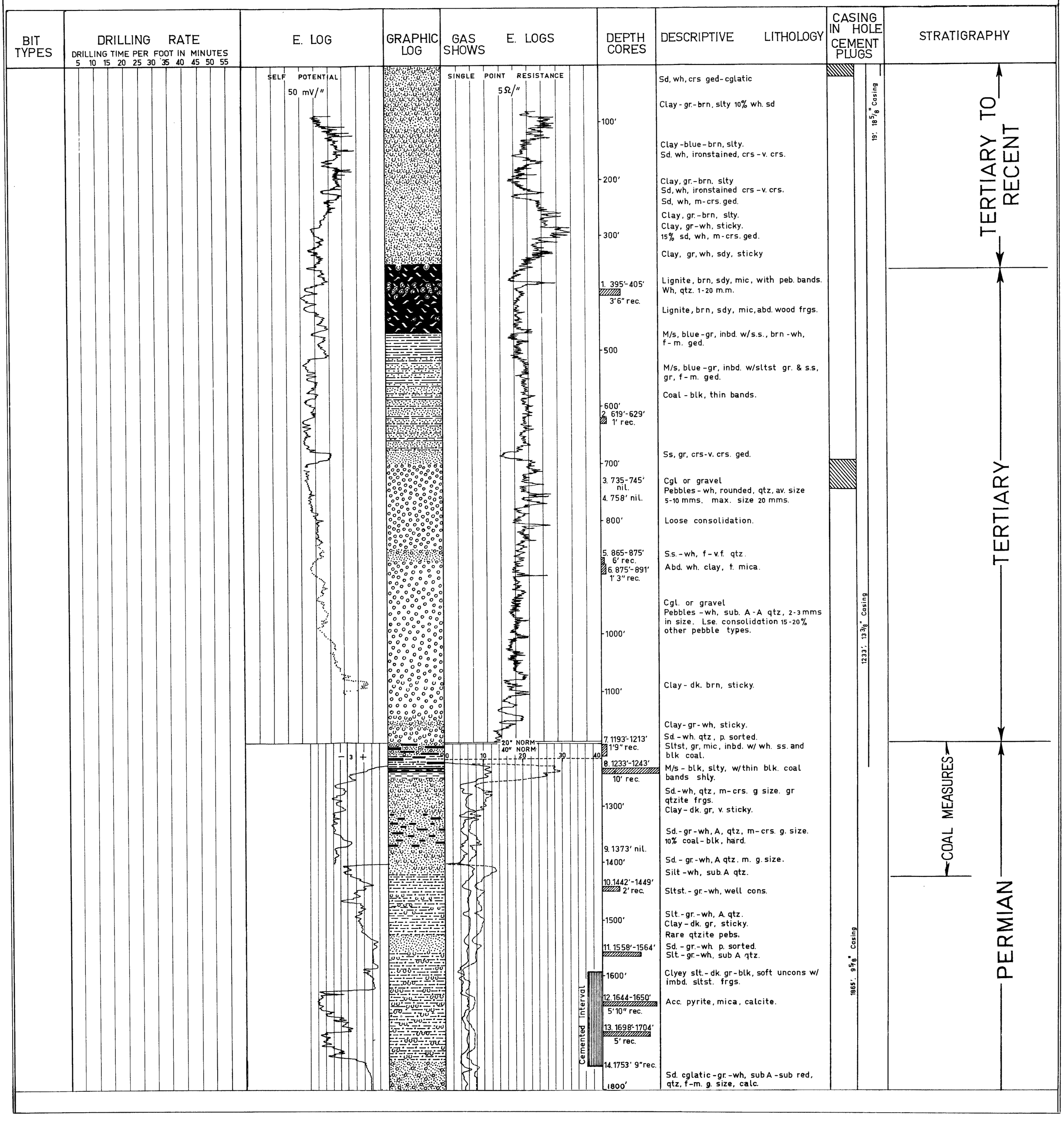
HOLE SIZE:

in.	from	to
24	0'	19'
17	19'	1243'
12 1/2	1243'	1865'
8 7/8	1865'	2110'
8 3/4	2110'	4360'

CASING:

in.	Wt.	Gr.	Depth	Cem'td. to.
18 5/8	Cond.		19	Surface
13 3/8	48 lb/ft.	H40	1233	Surface
9 5/8	36 lb/ft.	J55	1865	

OTHER ELECTRICAL LOGS: VELOCITY SURVEY



BIT TYPES	DRILLING RATE (DRILLING TIME PER FOOT IN MINUTES 5 10 15 20 25 30 35 40 45 50 55)	E. LOG	GRAPHIC LOG	GAS SHOWS E. LOGS	DEPTH CORES	DESCRIPTIVE LITHOLOGY	CASING IN HOLE CEMENT PLUGS	STRATIGRAPHY
SECURITY 8¾" S3-146 2117'-2263'				10" NORMAL 10 20 30 40	1800'	20% pebbles - qtz, granite Qtzite, ss, gneiss.		
				40" NORMAL 10 20 30	15. 1843'-1848' 4'3" rec.	Boulders - over 6" diam. w/ sd. - wh, some m. ged.		
					1900'	Sdy. clay - gr. wh, w/ sltst - dk. gr. f. ged.		
				Cemented Interval	16. 1970'-1976' 3' rec.	Sd. - clear, sub red - sub A, p. sorted pebbles. 10-20% qtz. gneiss etc. Slty clay - soft, gr. - blk. Sd. - gr - wh, f. ged.		
					2000'	Pebbles - up to 1" diam - qtz, ss, sltst, imbd. in slty clay.		
					2100'			
					17. 2130'-2136' 5' rec.	Shale - lt - dk gr, fri, soapy appance. Sd. - wh, f. ged, fri.		
				40" NORMAL 40 1000	2200'	Pebs - inc. qtzite, sltst, gneiss, claystone - calc.		
						Shale - dk. gr, soft, fri. shly. cleav. typ.		
S3-177 2263'-2430'					2300'	15-50% pebble frags. incl. lst. qtzite s.s, claystone.		
					2400'			
					18. 2430'-2440' 10' rec.	M/s - lt. gr, irreg. fracture often slty, sdy & shaly. Pebble frgs - lst, ss, claystone, gneiss, granite. Ss. - gr - wh, fri, mic. as lenses.		
					2500'			
S3-265' 2430'-2695'						M/s, lt. gr, shaly 20-30% ss. - wh & gr. col, f - m. ged. 10-15% pebble fragments.		
					2600'			
					19. 2695'-2705' 10' rec.	M/s - lt. gr, consled, irreg fracture. 5-10% pebble fragments.		
					2800'			
S3-300' 2695'-2995'						Ss. - gr - wh, m. ged, sl. calc. wh - slty - clay matrix. M/s - lt. gr, w/ imbd. pebble frgs. present as bands typcly 3'-4' wide.		
					2900'	Shale - gr. - wh, banded, silty.		
					20. 2995'-3010' 15' rec.			
						Dom. ss. - gr - wh, m. ged, sl. calc, w/ wh, slty - clay matrix.		
					3100'	Thin shale bands.		
S3-300' 3295'-2995'						10-20% pebble frags. incl. claystone ss, qtzite, granite, lst, basalt.		
					3200'			
					4'1" rec. 21. 3295'-3301'			
S4-112' 3295'-3407'					22. 3301'-3304' 3' rec.	M/s - gr-blk, slty, w/ drk. shale bands up to ½" imbd. pebble frags. - often conglomeratic.		
					3400'			
S6-53' 3407'-3460'						M/s - lt, gr, soft shale - drk. gr, cleaved faces. Imbd. pebble frgs. up to 50%.		
M4N 38' 3460'-3498'					3500'			
S6-102' 3498'-3600'						Ss. - wh - gr. wh, f. ged. well cons, calc. cem.		
					23. 3600'-3602' 1'3" rec.	Claystone - wh - gr. wh, well cons. mic.		
						Shale - drk. gr, fiss, as thin bands.		
S3-181' 3600'-3781'						M/s - lt. gr. soft		
					3700'	Shale - drk. gr, fiss. Claystone - wh. mic.		
						Ss - gr - brn, f. ged. M/s. - lt. gr, silty.		
					3800'			
SECURITY 8¾" S4-88 3781'-3869'						M/s. - lt. drk. gr, shalley imbd. pebble frgs. 10%.		
					24. 3869'-3879' 8'4" rec.			
S6-112' 3869'-3981'					3900'	M/s. - lt. drk. gr, shaley imbd. pebble frgs.		
					4000'			
S6-88' 3981'-4069'						Ss. - gr - wh, f. ged, calc, sl. mic, as bands 2'-3' wide.		
M4N68' 4069'-4127'					4100'			
S3-113' 4127'-4240'					25. 4127'-4134' 5'6" rec.	M/s, silty, shaley, drk. gr, massive, heavy. imbd. pebble frags. inc. granite, basalt, qtzite, ss.		
					4200'			
S4-60' 4204'-4310'						M/s, silty, shaley & bcming sandy.		
				10" NORMAL 40 100 200 300 400	4300'	Pebble frgs up to 50%.		
REED 8¾" YSJ 31' SEC 8¾" M4L 19'				40" NORMAL	26. 4341'-4346' 4'1" rec.	Phyllite, greenish, w/ metamorphosed sandy sltstone.		
					T.D. 4360'			ORDOVICIAN ?

PERMIAN

COMPOSITE WELL LOG

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

PETROLEUM TENEMENT: P.E.L. 42, NSW

WELL NUMBER: BUNDY No. 1

STATE: NEW SOUTH WALES 4-MILE SHEET: DENILIQUIN BASIN: MURRAY WELL STATUS: ABANDONED

LOCATION — Lat. 35° 03′ 00″S Long. 144° 31′ 18″E

ELEVATION — Reference Pt. K.B. 271·30
Ground 262·00

Date Spudded: 12th May, 1962
Date Drilling Stopped: 26th May, 1962
Date Rig Off: 1st June, 1962

Total Depth Driller 1376′
E. Log 1373′

Hole Size	In	From	To
	17″	0	325′
	12½″	325′	1373′
	5⅝″	1373′	1376′

Casing

In	Wt.	Gr.	Depth	Cmt.	Cmt'd To
13⅜	48 lb	H-40	320′	—	Surface

Cement Plugs	From	To	Sacks
	0′	20′	25
	300′	320′	25

Well Head Fitting: Capped with Plate
Drilled by: Woodside
Logged by: Schlumberger Cemented by: Woodside
Drilling Method: Rotary

ELECTRIC LOG DATA

RUN NUMBER	1
DATE	25 May
FOOTAGE LOGGED	1045′
LOGGED FROM	1365′
LOGGED TO	320′
TOTAL DEPTH—ELECTRIC LOG	1366′
TOTAL DEPTH—DRILLER	1369′
CASING SHOE—ELECTRIC LOG	320′
CASING SHOE—DRILLER	320′
BIT SIZE	12¼″
MUD-KIND	Bento—Baryte
— TREATMENT	—
WATER LOSS ccs/30 min.	—
WEIGHT lbs cu/ft	—
VISCOSITY (Marsh) sec.	52
pH	—
RESISTIVITY Ω m²/m & TEMP	8.75 @ 48° F
	7.50 @ 70° F
MAX RECORDED TEMPERATURE	70° F
ELECTRODE SPACING	16″
SYMMETRICAL	64″
	18′ 8″
NON-SYMMETRICAL	—
RECORDED BY	G. Guigues

CASING RECORD					OPEN HOLE RECORD		
RUN No.	SIZE-IN	WT-LBS	INTERVAL—FT.	TO	BIT SIZE	INTERVAL—FT.	TO
1	13⅜″	48	Surface	320	12½″	325	1373

OTHER BORE-HOLE LOGS
Micro-log 320–1363′
Run 1

LITHOLOGIC REFERENCE

- Quartz sand
- Clay
- Coal
- Granodiorite
- Micaceous
- Pyritic
- Carbonaceous
- Gypseous

Lithology by O.J. Shiels

WELL SYMBOLS

- Core interval number and recovery
- Plugged interval
- 13⅜ Casing shoe

WOODSIDE (LAKES ENTRANCE) OIL CO N.L.

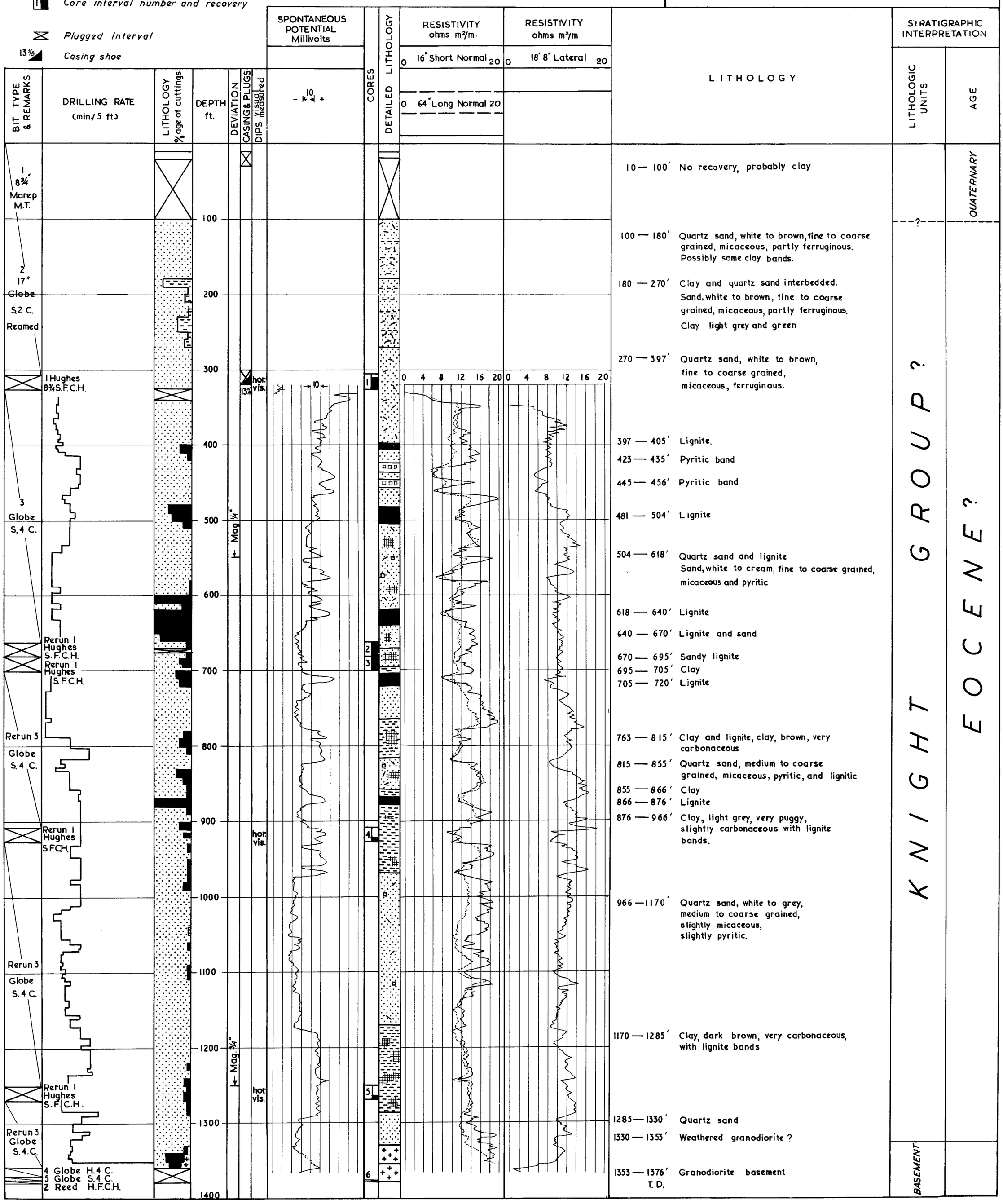
COMPOSITE WELL LOG

BUNDY WELL No. 1

Prepared by O.J. SHIELS and K. BRADLEY

Drawn: I.R. Date: 3.7.62.

DRG. No. W2/A/5



10 — 100′	No recovery, probably clay	QUATERNARY
100 — 180′	Quartz sand, white to brown, fine to coarse grained, micaceous, partly ferruginous. Possibly some clay bands.	?
180 — 270′	Clay and quartz sand interbedded. Sand, white to brown, fine to coarse grained, micaceous, partly ferruginous. Clay light grey and green	KNIGHT GROUP ?
270 — 397′	Quartz sand, white to brown, fine to coarse grained, micaceous, ferruginous.	
397 — 405′	Lignite.	
423 — 435′	Pyritic band	
445 — 456′	Pyritic band	
481 — 504′	Lignite	
504 — 618′	Quartz sand and lignite Sand, white to cream, fine to coarse grained, micaceous and pyritic	
618 — 640′	Lignite	
640 — 670′	Lignite and sand	
670 — 695′	Sandy lignite	
695 — 705′	Clay	
705 — 720′	Lignite	
763 — 815′	Clay and lignite, clay, brown, very carbonaceous	EOCENE ?
815 — 855′	Quartz sand, medium to coarse grained, micaceous, pyritic, and lignitic	
855 — 866′	Clay	
866 — 876′	Lignite	
876 — 966′	Clay, light grey, very puggy, slightly carbonaceous with lignite bands.	
966 — 1170′	Quartz sand, white to grey, medium to coarse grained, slightly micaceous, slightly pyritic.	
1170 — 1285′	Clay, dark brown, very carbonaceous, with lignite bands	
1285 — 1330′	Quartz sand	
1330 — 1353′	Weathered granodiorite ?	
1353 — 1376′ T.D.	Granodiorite basement	BASEMENT

COMPOSITE WELL LOG

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

PETROLEUM TENEMENT: P.E.L. 28, N.S.W.

WELL NUMBER: BALRANALD No. 1

STATE: NEW SOUTH WALES | 4-MILE SHEET: BALRANALD | BASIN: MURRAY | WELL STATUS: ABANDONED

LOCATION — Lat. 34° 39′ 20″S
Long. 143° 29′ 32″E

ELEVATION — Reference Pt. K.B. 227.00′
Ground 214.83′

Date Spudded 25th June, 1962
Date Drilling Stopped 6th July, 1962
Date Rig Off 11th July, 1962

Total Depth Driller 1322′
E. Log 1310′

Hole Size	In.	From	To
	17	Surface	300′
	12¼	300′	1270′
	8¾	1270′	1322′

Casing	In.	Wt.	Gr.	Depth	Cmt.	Cmt'd to
	13⅜	48	H—40	296	—	Surface

Cement Plugs	From	To	Sacks
	0′	50′	60
	900′	950′	60

Well Head Fittings: Capped with plate
Drilled by: Woodside
Logged by: Schlumberger
Drilling Method: Rotary
Cemented by: Woodside

ELECTRIC LOG DATA

RUN NUMBER	1
DATE	6 June 1962
FOOTAGE LOGGED	1025
LOGGED FROM	1320
LOGGED TO	295
TOTAL DEPTH- ELECTRIC LOG	1321
TOTAL DEPTH-DRILLER	1322
CASING SHOE-ELECTRIC LOG	295
CASING SHOE- DRILLER	296
BIT SIZE	
MUD-KIND	Bentonite
-TREATMENT	
WATER LOSS ccs/ 30 min	4.5
WEIGHT lbs/ cu. ft.	9.8
VISCOSITY (Marsh) Sec.	10.6
pH	8.2
RESISTIVITY Ω m²/m & TEMP.	3.90 @ 80°F
	3.60 @ 88°F
MAX. RECORDED TEMPERATURE	88° F
ELECTRODE SPACING	16″
SYMMETRICAL	64″
	18′ 8″
NON-SYMMETRICAL	
RECORDED BY	G. Guigues

CASING RECORD					OPEN HOLE RECORD		
Run No.	Size-In	Wt-Lbs	Interval-Ft		Bit Size in	Interval-Ft to	
1	13⅜	48	Surface to	296	12¼	300	1270
					8¾	1270	1322

WELL SYMBOLS

- Core, interval, number, and recovery
- Plugged interval
- Casing shoe

LITHOLOGIC REFERENCE

- Quartz sand
- Sandstone
- Siltstone
- Mudstone
- Dolomite
- Shale
- Pyritic
- Micaceous
- Carbonaceous
- Lignitic
- gl Glauconitic
- Fossils

Lithology by: D.D. Benbow

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

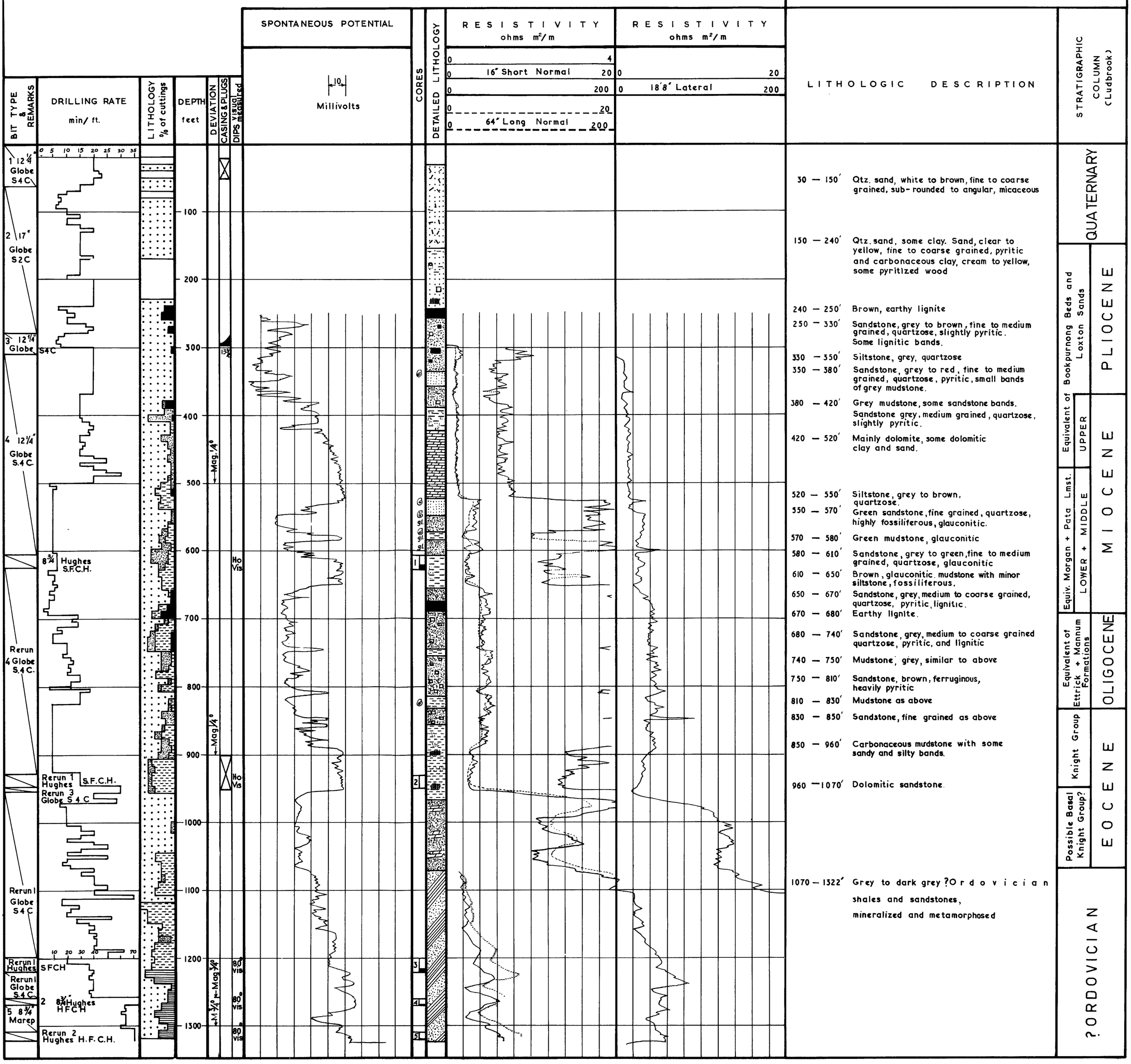
COMPOSITE WELL LOG

BALRANALD WELL No. 1

Prepared by D.D. BENBOW and K. BRADLEY

Drawn: I. Rade Date: 20. 9. 1962

DRG. No.



COMPOSITE WELL LOG

COMPANY **AUSTRALIAN OIL CORPORATION**

PETROLEUM TENEMENT **O.E.L.29**

WELL NUMBER **NORTH RENMARK NO.1**

STATE **SOUTH AUST.** 4-MILE SHEET **RENMARK** BASIN **MURRAY** WELL STATUS **SUSPENDED**

LOCATION - Lat. 34°07'S Long. 140°41'E APPROX.
ELEVATION - Reference Pt. (RT/) 80·43 A.S.L.
Ground 77·43 Ft. A.S.L.

Date Spudded 29/11/62 F.1500; 13/1/63 B.5000
Date Drilling Stopped 11/12/62 F.1500; 11/2/63 (B.5000)
Date Rig Off. 11/2/63
Total Depth Driller 4,018'
E.Log 4,001'

Hole Size	In.	From	To
	10"	0'	8'
	9¼"	8'	208'
	6¼"	208'	1,761'
Casing	4½"	1,761'	4,008'
	3½"	4,008'	4,018'

In.	Wt.	Gr.	Depth	Cmt.	Cmt'd to
8"	23·19	AWBC	197Ft.	24SX	SURFACE
5"	9·6	AWBC	1741Ft.	30SX	1241Ft.

Cement Plugs	From	To	Sacks
NIL			

Perforations	Type	Size	From	To	No/ft
NIL					

Well Head Fittings: ***Capped with plate***
Drilled by: ***South Aust. Department of Mines***
Logged by: ***Victorian Dept. of Mines*** Cemented by: ***S.A.D. of M.***
Drilling Method: ***Rotary*** Mud logging by: ***S.A.D. of M.***

ELECTRIC LOG DATA

RUN NUMBER	1
DATE	11-2-63
FOOTAGE LOGGED.	2261Ft.
LOGGED FROM	4000
LOGGED TO	1,739'
TOTAL DEPTH - ELECTRIC LOG	4,001'
TOTAL DEPTH - DRILLER	4,008'
CASING SHOE - ELECTRIC LOG	1,739'
CASING SHOE - DRILLER	1,741'
BIT SIZE	4½"
MUD - KIND	bentonite
- TREATMENT	caustic/myn
WATER LOSS ccs/30 min.	10·5
WEIGHT lbs/cu. ft.	72·3
VISCOSITY (Marsh) Sec.	60
pH	8
RESISTIVITY Ω m²/m & TEMP	2·05@28·5°C
MAX. RECORDED TEMPERATURE	143°F
ELECTRODE SPACING	10"
SYMMETRICAL	40"
NON-SYMMETRICAL	W.A Esplan
RECORDED BY	

RADIOMETRIC LOG DATA

TYPE OF LOG	Gamma-Ray
RUN NUMBER	1
DATE	14-3-63
TOTAL DEPTH - DRILLER	4,018'
TOP OF LOGGED INTERVAL	0'
BOTTOM OF LOGGED INTERVAL	1630'
TYPE OF FLUID IN HOLE	Water
FLUID LEVEL	0'
MAXIMUM RECORDED TEMPERATURE	
NEUTRON SOURCE, STRENGTH & TYPE	
SOURCE SPACING - IN.	
LENGTH OF MEASURING DEVICE	
O.D. OF INSTRUMENT - IN.	
TIME CONSTANT - SECS.	3 secs.
LOGGING SPEED - FT/MIN.	30'/min.
STATISTICAL VARIATION - IN	
SENSITIVITY REFERENCE	Unknown
RECORDED BY	W.A.Esplan

CASING RECORD					OPEN HOLE RECORD		
RUN NO.	SIZE - IN.	WT - LBS.	INTERVAL - FT TO		BIT SIZE - IN.	INTERVAL - FT TO	
1	8"	23·19	0	197			
1	5"	9·6	0	1741			

LITHOLOGIC REFERENCE

- Conglomerate
- Breccia
- Tillite
- Quartz sandstone
- Arkose
- Greywacke
- Siltstone
- Claystone
- Shale
- Limestone
- Dolomite
- Calcarenite
- Calcilutite
- Marl
- Evaporite s: Salt
- Coal
- Igneous rocks gr: Granite
- Volcanic rocks b: Basalt
- Metamorphic rocks gn: Gneiss
- mi: Micaceous
- cal: Calcareous
- gl: Glauconitic
- py: Pyritic
- c: Carbonaceous
- ch: Cherty

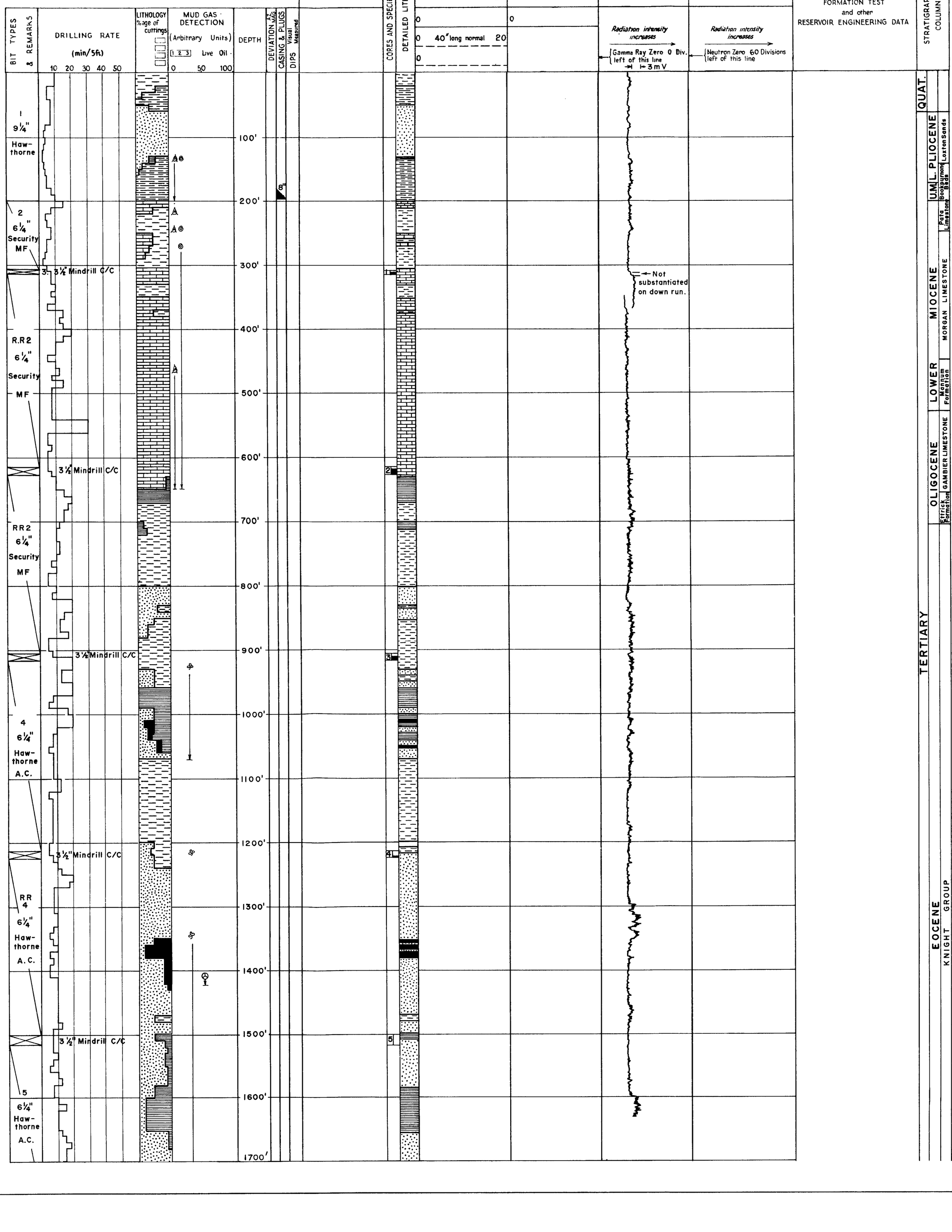
OTHER BORE-HOLE LOGS

Temperature — not run
Micro-Caliper — not run
Velocity — not run

WELL SYMBOLS

- Gas show, slight
- Gas show, strong
- Oil show, slight
- Oil show, strong
- Oil and gas show
- Fluorescence
- Circulation loss, partial, and s.g. mud
- Circulation loss, complete, and s.g. mud
- Flow into well, and s.g. mud
- Blowout
- Core, interval, number and recovery
- Sidewall core
- Perforated interval
- Formation test interval, and no (① O.H. ② in csg.)
- Plugged interval
- Fossils: Macro, Micro, Plant, Spore, pollen

Lithology by **G. P. Mc Donough** **R. Grasso**



BIT TYPES & REMARKS

DRILLING RATE (min/5ft) 10 20 30 40 50

LITHOLOGY % per 5ft cuttings

MUD GAS DETECTION (Arbitrary Units) 0 50 100 Live Oil

DEPTH 4000' 3900' 3800' 3700' 3600' 3500' 3400' 3300' 3200' 3100' 3000' 2900' 2800' 2700' 2600' 2500' 2400' 2300' 2200' 2100' 2000' 1900' 1800' 1700'

DEVIATION AZ. MAG.

CASING & PLUGS

DIPS Visual Measured

SPONTANEOUS POTENTIAL Millivolts — 0 — +10 mV

CORES AND SPECIFIC GRAVITY

DETAILED LITHOLOGY

RESISTIVITY ohms m²/m — 10" short normal 0 20 — 40" long normal 0 20 — 18'8" Lateral 0

GAMMA RAY Micrograms Ra-eq./metric ton — Radiation intensity increases (Gamma Ray Zero 0 Div) (left of this line +1 to +3 mV)

NEUTRON counts/sec — Radiation intensity increases (Neutron Zero 60 Divisions) (left of this line)

FORMATION TEST and other RESERVOIR ENGINEERING DATA

STRATIGRAPHIC COLUMN

LOWER PERMIAN	CRETACEOUS			TERTIARY
	? NEOCOMIAN	APTIAN	ALBIAN —— ? CENOMANIAN	EOCENE
GLACIAL MARINE ROCKS				KNIGHT GROUP

Plate 5
Sheet 2