COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Petroleum Search Subsidy Acts

PUBLICATION No. 55

SUMMARY OF DATA AND RESULTS PERTH BASIN, WESTERN AUSTRALIA

Jurien No. 1

Abbarwardoo No. 1

Eganu No. 1

OF

WEST AUSTRALIAN PETROLEUM PTY LIMITED

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

1964

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 three drilling operations undertaken in the Perth Basin, Western Australia: Jurien No. 1, Abbarwardoo No. 1, and Eganu No. 1. The information has been abstracted by the Petroleum Exploration Branch of the Bureau of Mineral Resources from well completion reports furnished by West Australian Petroleum Pty Limited.

J.M. RAYNER
DIRECTOR

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of

WEST AUSTRALIAN PETROLEUM PTY LIMITED

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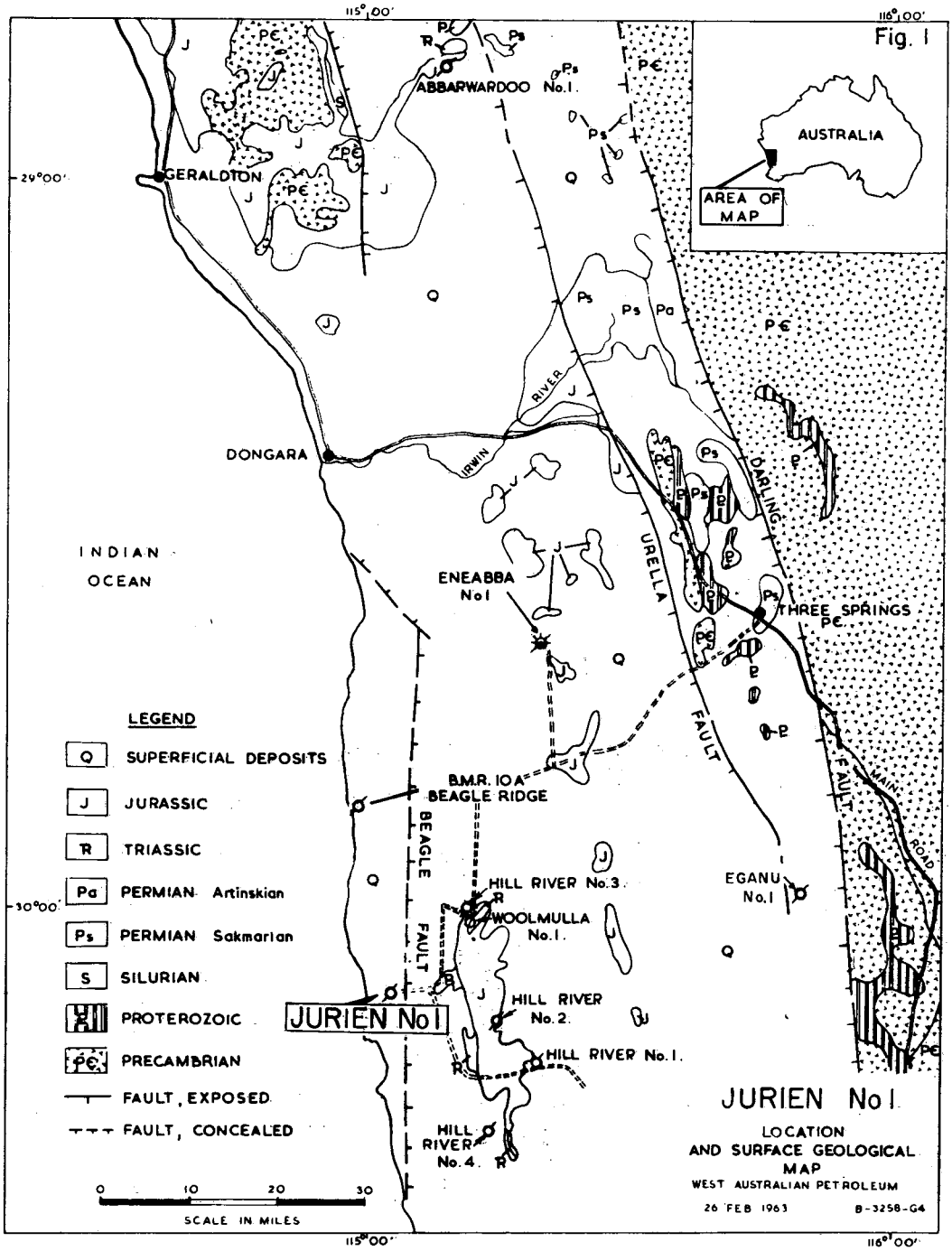
115°00'
116°00'
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JURIEN NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

Jurien No. 1 Well was located on the western margin of the Perth Basin, Western Australia, approximately 76 miles south-south-east of Geraldton. The well was drilled by Oil Drilling and Exploration (W.A.) Pty Limited for West Australian Petroleum Pty Limited, to a total depth of 3366 feet. Drilling commenced on 9th July, 1962, and was completed on 21st August, 1962. A full programme of logging, testing, and coring was undertaken.

The well was spudded in the Coastal Limestone of Pleistocene age, and penetrated 811 feet of Lower Triassic Kockatea Shale; 2274 feet of Permian (Artinskian) sediments; 35 feet of (?) Permian sandstone, and entered Precambrian granitic gneiss at 3208 feet.

The well was drilled to investigate the stratigraphy and petroleum potential of the Permian sediments in the Jurien Anticline. At least 200 feet of structural closure over eight square miles were proved for that area on the basement refractor. The main objectives were the sandstones in the Irwin River Coal Measures and High Cliff Sandstone. No potential reservoir beds were observed and only the Lower Triassic Kockatea Shale appeared to be a good source rock for hydrocarbons although minor oil traces were observed in some of the Permian section.

Three drillstem tests were carried out over the intervals 552 to 595 feet, 1940 to 2020 feet, and 2196 to 2356 feet. No water, oil, or gas was recovered in any of the tests.

The stratigraphic drilling operation at Jurien No. 1 was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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*Abstracted from: Well Completion Report, Jurien No. 1, by V. Pudovskis, West Australian Petroleum Pty Limited, February, 1963.

WELL HISTORY

General Data

Location:	Latitude 30° 08' 40" S. Longitude 115° 02' 54" E.
Name and address of Tenement Holder:	West Australian Petroleum Pty Limited, 251 Adelaide Terrace, Perth, W.A.
Details of Petroleum Tenement:	Licence to Prospect No. 98H, Permit to Explore No. 27H.
Total Depth:	3366 feet
Date drilling commenced:	9th July, 1962
Date drilling completed:	21st August, 1962
Date well abandoned:	28th August, 1962
Date rig released:	28th August, 1962
Elevation (ground):	30 feet
Elevation (derrick floor):	39 feet (datum for depths)
Status:	Abandoned
Cost:	£72,398

Drilling Data

Drilling Plant:		
Make:	National	
Type:	T-20	
Hole sizes and depths:	17 1/2" to 206 feet 12 1/4" to 948 feet 8 1/2" to 3366 feet	
Casing details:		
Size (in.):	13 3/8	9 5/8
Weight (lb./ft):	48	36
Grade:	H.40	J.55
Setting depth (ft):	206	945

Logging and Testing

Ditch Cuttings:	
Interval:	Ten feet while drilling, five feet while coring, from surface to total depth.

Coring:	Sixteen cores were cut using a Hughes "J" Type core barrel with 7 7/8" soft and hard formation core heads. The bottom-hole core was cut with a field fabricated core head. A total of 139 feet of formation was cored and 99 feet (71.2%) recovered.
Sidewall Cores:	Twenty sidewall cores were recovered by the Schlumberger core sample taker between 1416 and 1495 feet, in the Carynginia Formation.
Electric and other logging (Schlumberger):	
Electrical Log:	950 - 2300 feet (1 run)
Induction - Electrical Log:	206 - 3366 feet (3 runs)
Microlog:	206 - 3366 feet (3 runs)
Sonic Log:	206 - 3360 feet (2 runs)
Gamma Ray Log:	40 - 3363 feet (2 runs)
Continuous Dipmeter:	950 - 3364 feet (1 run)
Cement Bond Log:	160 - 974 feet (1 run)
Velocity Survey:	Measurements were made at four depths in the well between 888 and 3359 feet.

GEOLOGY

Stratigraphy

General:

The formation boundaries were established on lithological breaks and on the Induction-Electrical and Gamma Ray log interpretation. In general, the penetrated section in the Jurien No. 1 Well is the same as a corresponding section in the BMR. No. 10 and 10A wells, except for the additional section at the top of the Carynginia Formation and the basal sandstone in the Permian in Jurien No. 1. The Table of the penetrated formations is given below:

Age	Formation	Depth Intervals (feet)	Thickness (feet)
Pleistocene	Coastal Limestone	9 - 88	79+
	UNCONFORMITY		
Lower Triassic	Kockatea Shale	88 - 899	811
	UNCONFORMITY		
Permian (Artinskian)	Carynginia Formation	899 - 1983	1084
Permian (Artinskian)	Irwin River Coal Measures	1983 - 2918	935
Permian (Artinskian)	High Cliff Sandstone	2918 - 3020	102
Permian (L. Artinskian)	Fossil Cliff Formation	3020 - 3173	153
	?DISCONFORMITY		
Permian (?)	Basal sandstone	3173 - 3208	35
	UNCONFORMITY		
Precambrian	Granitic gneiss	3208 - 3366	158+

Detailed:

Coastal Limestone (Pleistocene) : 9 to 88 feet (79 feet +)

Cream to yellow, medium to coarse-grained, sandy calcarenite with coarse, sub-rounded quartz grains and abundant foraminifera, pelecypods, gastropods, echinoids, and bryozoa. The Coastal Limestone unconformably overlies the weathered top of the Kockatea Shale.

Kockatea Shale (Lower Triassic) : 88 to 899 feet (811 feet)

Medium to dark grey, micaceous siltstone, thinly interbedded in places with dark grey shale and light grey sandstone. The sandstone is fine, micaceous, and silty with flakes of graphite and a siliceous calcareous cement. Cross-bedding is common. Few macrofossils were recorded but there is a rich assemblage of microfossils. Below 550 feet, the formation contains several thin beds of brownish-grey, oil-stained sandstone which shows yellow-green fluorescence. The basal bed consists of 13 feet of calcarenite.

Carynginia Formation (Permian-Artinskian): 899 to 1983 feet (1084 feet)

Four lithological units have been identified in this formation in Jurien No. 1 Well:

Unit A (899 to 979 feet) consists of coquinite. Crinoid fragments, corals, and bryozoa are embedded in a matrix of dark brown to grey, calcareous, pyritic siltstone.

Unit B (979 to 1336 feet) consists of poorly bedded, dark grey, micaceous, pyritic, sandy siltstone, grading in places into claystone and argillaceous limestone. Few macrofossils were recorded but there is a rich spore assemblage.

Unit C (1336 to 1740 feet) consists of interbedded, Unit B siltstone with scattered pebbles and light to medium grey, very fine to fine-grained, pyritic, non-porous sandstone. Some calcareous bands grading into argillaceous sandy limestone were noted. A few brachiopods were recorded in the lower part of the sequence.

Unit D (1740 to 1983 feet) consists mostly of siltstone, as in Units C and B, grading into black, micaceous shale and argillaceous, fossiliferous limestone.

Irwin River Coal Measures (Permian-Artinskian): 1983 to 2918 feet (935 feet)

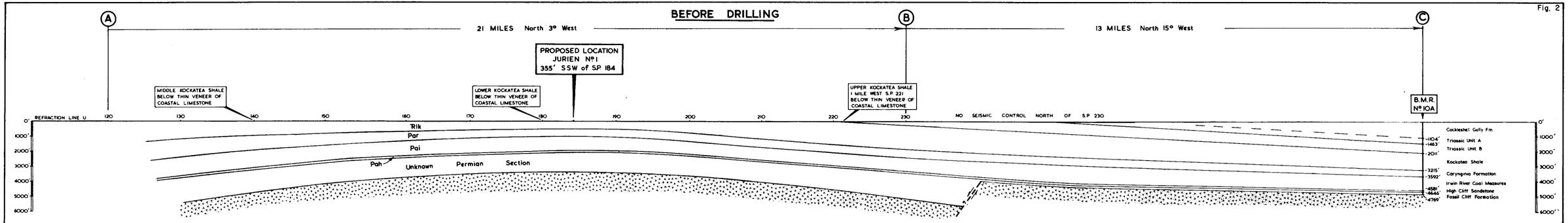
This formation which is conformably overlain by the Carynginia Formation, consists of interbedded sandstone, siltstone, shale, and coal. The "Upper Member", from 1983 to 2253 feet, contains thin, minor limestones and no coal beds.

The "Lower Member", from 2253 to 2918 feet contains black vitreous coal seams up to five feet thick. The sandstone ranges from grey to pink, calcareous to non-calcareous, fine-grained to medium, and may be micaceous. The siltstone and shale are carbonaceous, and clayey in parts.

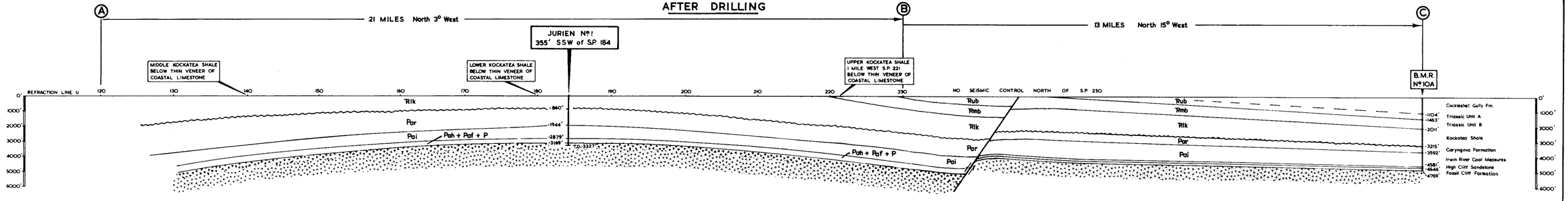
The Irwin River Coal Measures are conformably underlain by the High Cliff Sandstone.

Fig. 2

BEFORE DRILLING



AFTER DRILLING



LOWER JURASSIC		Cockleshell Gully Formation
TRIASSIC	Rub	Triassic Unit A
	Rmb	Triassic Unit B
	Rlk	Kockatea Shale
PERMIAN	Par	Carynginia Formation
	Pai	Irwin River Coal Measures
	Pah	High Cliff Sandstone
	Paf	Fossil Cliff Formation
	P	Basal Sandstone (Permian ?)
		Unknown Permian Section (PROBABLY NANGETTY GLACIALS OR HOLLYWOOD SHALE)
PRECAMBRIAN		Precambrian

REVISIONS	WEST AUSTRALIAN PETROLEUM PTY. LIMITED
	PERTH BASIN STRUCTURAL CROSS-SECTION ALONG JURIEN ANTICLINE BEFORE AND AFTER DRILLING JURIEN No.1 0 1 2 MILES
	V. PUDOVSKIS 30 OCT. 1962
DR. BY	DATE: 30 OCT. 1962 — SCALE: — C – 3297
TR. BY	
CH. BY	

High Cliff Sandstone (Permian-Artinskian): 2918 to 3020 feet (102 feet)

This formation consists of light grey, fine, medium, and coarse-grained, non-porous sandstone. No fossils were observed throughout the section. The High Cliff Sandstone conformably overlies the Fossil Cliff Formation.

Fossil Cliff Formation (Permian-Lower Artinskian): 3020 to 3173 feet (153 feet)

This formation consists of fossiliferous, dark grey, micaceous, calcareous, pyritic, sandy siltstone grading in places into limestone and interbedded with medium to dark grey, fine-grained, micaceous, calcareous sandstone.

The section is fairly fossiliferous and contains the typical Fossil Cliff Formation brachiopods Neospirifer sp. and Heteralosia irwinensis Coleman.

Basal Sandstone (Permian ?): 3173 to 3208 feet (35 feet)

This sandstone unit was not present in BMR. No. 10A and its age is uncertain. It consists of unfossiliferous sandstone similar to the other Permian sandstones, but separated from them by a disconformity. No fossils were observed in this section. The sandstone unconformably overlies the Precambrian basement.

Granitic Gneiss (Precambrian): 3208 to 3366 feet (158 feet+)

Light grey, coarse-grained, granitic gneiss containing microcline and quartz, with subordinate plagioclase and mica and minor amounts of sillimanite, zircon, and tourmaline.

Structure

Jurien No. 1 Well was located on the eastern flank, near the apex, of the Jurien Anticline.

A refraction seismic survey conducted by West Australian Petroleum Pty Limited indicated that beneath the Jurien Anticline, the basement is about 1500 feet higher than in the BMR. No. 10 area. This refraction survey showed that the Jurien structure represents a "high" in the Precambrian basement with a vertical closure of at least 200 feet over eight square miles.

Oil and Gas Indications and Potential

Slight traces of methane were recorded in the Carynginia Formation and slight shows of this gas were present in the Irwin River Coal Measures. The highest gas readings coincided with the penetration of coal beds.

Traces of oil were observed in the lower part of the Kockatea Shale. Below 550 feet the formation contains several lenses and thin beds of very fine, silty, oil-stained sandstone, which shows yellow-green fluorescence and gives a fluorescent cut with carbon tetrachloride. However, the porosity of this sandstone is very low, and the permeability is practically nil. In the drillstem test from 595 to 552 feet no formation fluid was recovered.

The report of the Government Chemical Laboratories on the coal sample from the Irwin River Coal Measures suggests that some traces of oil may be present in the coal beds.

All sandstone beds in the Triassic and Permian sections are very tight. Core analyses show nil permeability, and an average of two percent porosity. Sandstone pore spaces are filled with a siliceous and clayey matrix, which is partly of primary and partly of secondary (feldspar decomposition) origin.

While Eneabba No. 1 established the Kockatea Shale as a potential source rock for hydrocarbons, Jurien No. 1 Well proved that this formation also maintains its status of source rock throughout the width of the Perth Basin. Core analysis and electric logs indicated that the Permian sandstones have very low effective porosity and permeability and do not represent good reservoir rocks on this part of the Beagle Ridge.

REFERENCES

McTAVISH, R.A., 1960: Completion report on Bore BMR. 10, Beagle Ridge, Western Australia. Bur. Min. Resour. Aust. Rec. 1960/31 (Unpubl.).

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PUDOVSKIS, V., 1962: Eneabba No. 1 Well Completion Report. Unpubl. report for West Australian Petroleum Pty Limited.

PUDOVSKIS, V., 1963: Jurien No. 1 Well Completion Report. Unpubl. report for West Australian Petroleum Pty Limited.

WILLMOTT, S.P., 1961: Bureau of Mineral Resources Stratigraphic Bore No. 10A (Beagle Ridge). Geological Completion Report. Unpubl. report for West Australian Petroleum Pty Limited.

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

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

(i) Well Completion Report, by V. Pudovskis. 16 pp.

Appendix 1: Palaeontological reports by P.J. Coleman, B.E. Balme, and E.M. Fowler 9 pp.

Appendix 2: Petrographic reports by J.E. Glover 7 pp.

Appendix 3:	Mineralogical report by Government Chemical Laboratories, Perth	1 p.
Appendix 4:	Core analyses by BMR.	2 pp.
Appendix 5:	Coal analyses by Government Chemical Laboratories, Perth	2 pp.
Appendix 6:	Core analyses and specific gravity data	2 pp.
Appendix 7:	List of Schlumberger logs	1 p.
Appendix 8:	Drillstem Tests	1 p.
Appendix 9:	Deviation records	1 p.
Appendix 10:	Velocity Survey by R.G. Dennison	1 p.

(ii) Daily drilling reports for period 1st July, 1962 to 28th August, 1962.

(iii) Well logs including the following:

(a) Electrical Log

Run 1, 950-2300 feet (2" = 100 ft)

(b) Induction - Electrical Log

Run 1, 206- 595 feet (2" = 100 ft)
Run 2, 206-1002 feet (1", 2" = 100 ft)
Run 3, 950-3366 feet (1", 2" = 100 ft)

(c) Microlog

Run 1, 206- 595 feet (2" = 100 ft)
Run 2, 500-1002 feet (2" = 100 ft)
Run 3, 950-3366 feet (2" = 100 ft)

(d) Sonic Log

Run 1, 206- 997 feet (2" = 100 ft)
Run 2, 950-3360 feet (2" = 100 ft)

(e) Gamma Ray Log

Run 1, 40- 998 feet (2" = 100 ft)
Run 2, 900-3363 feet (2" = 100 ft)

(f) Continuous Dipmeter

Run 1, 950-3364 feet
Final plotted log (1" = 100 ft)

(g) Cement Bond Log

Run 1, 160- 974 feet (2" = 100 ft)

(h) Drilling Rate, Oil and Gas Log (2" = 100 ft)

(i) Graphic Log, Jurien No. 1 (Predicted section)

(iv) Velocity Survey determinations, Jurien No. 1 Well.

ABBARWARDOO NO. 1

of

WEST AUSTRALIAN PETROLEUM PTY LIMITED

SUMMARY OF DATA AND RESULTS

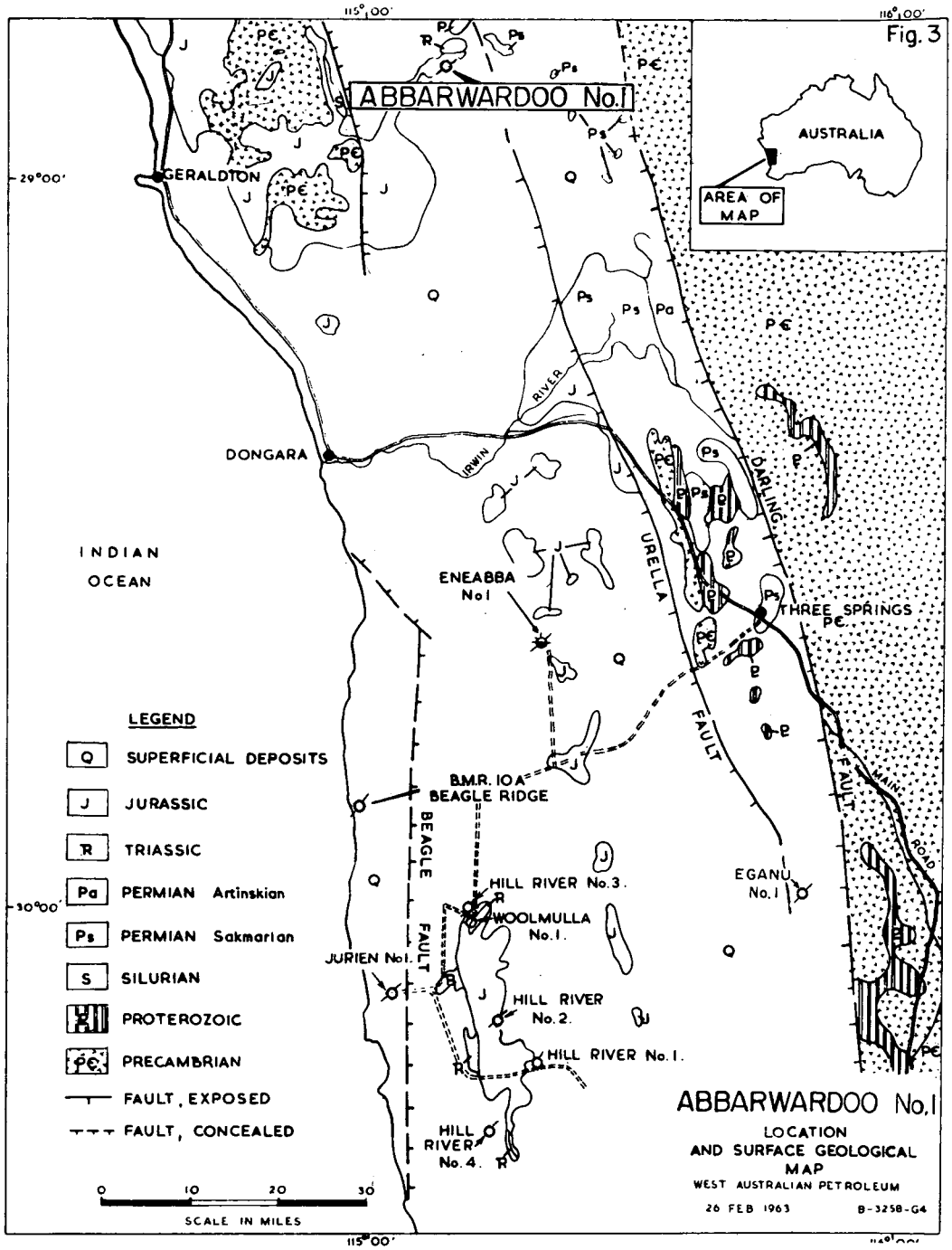
Fig. 3
AUSTRALIA
AREA OF MAP
ABBARWARDOO No.1
GERALDTON
DONGARA
INDIAN OCEAN
ENEABBA No.1
B.M.R. 10A BEAGLE RIDGE
HILL RIVER No.3.
WOOLMULLA No.1.
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THREE SPRINGS
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LOCATION AND SURFACE GEOLOGICAL MAP
WEST AUSTRALIAN PETROLEUM
26 FEB 1963
B-3258-G4

ABBARWARDOO NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

Abbarwardoo No. 1 Well was located about 36 miles east of Geraldton, Western Australia, near the northern end of the deeper part of the Perth Basin. The well was drilled by Geophysical Service International for West Australian Petroleum Pty Limited, to a total depth of 1970 feet. Drilling commenced on 12th December, 1962, and was completed on 20th December, 1962. A programme of coring and logging was undertaken.

The well spudded in weathered sandstone of the Lower Cretaceous - Upper Jurassic Yarragadee Formation, entered presumed Lower Triassic Kockatea Shale at 75 feet, Permian (Artinskian) Irwin River Coal Measures at 185 feet, and High Cliff Sandstone at 529 feet, and penetrated the Permian (Sakmarian) Holmwood Shale at 651 feet. Total depth at 1970 feet was reached while still drilling in the Holmwood Shale.

The primary objective of the well was to obtain stratigraphic information and porosity and permeability data on the Lower Triassic Kockatea Shale and the underlying Permian sediments near known outcrops of these formations, in this part of the Perth Basin.

No signs of hydrocarbons were recorded in the well and no testing was undertaken. It was observed that the Permian section included sediments of high porosity and permeability.

The off-structure drilling operation at Abbarwardoo No. 1 was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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*Abstracted from: Well Completion Report, Abbarwardoo No. 1, by J.W. Burdett, West Australian Petroleum Pty Limited, May, 1963.

WELL HISTORY

General Data

Location:	Latitude 28° 35' 10" S. Longitude 115° 09' 35" E.
Name and address of Tenement Holder:	West Australian Petroleum Pty Limited, 251 Adelaide Terrace, Perth, W.A.
Details of Petroleum Tenement:	Permit to Explore 27H
Total Depth:	1970 feet
Date drilling commenced:	12th December, 1962
Date drilling completed:	20th December, 1962
Elevation (ground):	720 feet
Elevation (K.B.):	725 feet (datum for depths)
Status:	Dry hole; plugged and abandoned.
Cost:	£9212

Drilling Data

Drilling Plant:	
Make:	Mayhew
Type:	2000
Hole sizes and depths:	8 1/2" to 66 feet 5 5/8" to 1970 feet (T.D.)
Casing details:	Ran 6" I.D. casing from surface to 66 feet (K.B.); cemented to surface with 14 sacks of cement.

Logging and Testing

Ditch Cuttings:	
Interval:	Ten feet from surface to total depth.
Coring:	Ten cores were cut using a 10-foot Mayhew core barrel. A total of 100 feet of formation was cored and 42.6 feet recovered.
Electric and other logging (Schlumberger):	
Electrical Log:	100-1967 feet (1 run)
Gamma Ray Log:	40-1968 feet (1 run)

GEOLOGY

Stratigraphy

General:

The most prominent feature of the northern Perth Basin is the large Precambrian gneissic inlier lying to the east and north-east of Geraldton. This inlier which separates the Perth and Carnarvon Basins is covered by a thin veneer of Lower Triassic and Middle Jurassic marine sediments.

The western edge of the Perth Basin proper in this area is the Mt Michael Fault, a down-to-the-east fault which throws Silurian rocks against the Precambrian gneisses of the inlier. The post-Silurian sedimentary section thickens rapidly to the east of the Mt Michael Fault and the characteristic eastward-thickening wedge of sediments in the main trough of the Perth Basin is developed. Permian sediments overlain by a thin veneer of Lower Triassic Kockatea Shale crop out along the bed of the Greenough River as it traverses this part of the Basin. These are overlain by a thin marine Middle Jurassic sequence which in turn is overlain by the thick continental sequence of the Lower Cretaceous to Upper Jurassic Yarragadee Formation.

The eastern margin of the deeper part of the Perth Basin is the Urella Fault, a strong down-to-the-west normal fault which, in this part of the Basin, parallels the main bounding fault (the Darling Fault). These two major faults lie approximately fourteen miles apart and the zone between them contains about 2500 feet of Permian sediments (mainly glacials) over Silurian and/or Proterozoic sediments.

In this northern part of the Perth Basin, the Urella Fault rapidly dies in throw towards the north and, as a corollary, the thick Jurassic section, which was deposited as a result of the activity of the Urella Fault, thins rapidly to the north. The Abbarwardoo No. 1 Well was located to take advantage of this thinning of the Jurassic section.

The ages shown in the following Table are based on palynological data, although no diagnostic spores or pollens were recognized above 270 feet.

Age	Formation	Depth Intervals (feet)	Thickness (feet)
Lower Cretaceous-Upper Jurassic	Yarragadee Formation	5 - 75	70+
Lower Triassic	Kockatea Shale	75 - 185	110
Permian (Artinskian)	Irwin River Coal Measures	185 - 529	344
Permian (Artinskian)	High Cliff Sandstone	529 - 651	122
Permian (Sakmarian)	Holmwood Shale	651 -1970	1319+

Detailed:

Yarragadee Formation (Lower Cretaceous-Upper Jurassic): 5 to 75 feet (70 feet+)

Deeply weathered, fine-grained, kaolinitic sandstone grading into siltstone. Unfossiliferous.

Kockatea Shale (Lower Triassic): 75 to 185 feet (110 feet)

Deeply weathered, grey to brown claystone grading into shale. The identification has not been confirmed.

Irwin River Coal Measures (Permian-Artinskian): 185 to 529 feet (344 feet)

Interbedded kaolinitic, fine-grained, pyritic sandstone, and black to brown, carbonaceous, micaceous, pyritic shale.

High Cliff Sandstone (Permian-Artinskian): 529 to 651 feet (122 feet)

Fine to medium-grained, yellow to grey, pyritic sandstone, with some coarse sandstone lenses.

Holmwood Shale (Permian-Sakmarian): 651 to 1970 feet (1319 feet+)

Brownish-grey, dark grey, sometimes greenish-grey (near the base), carbonaceous, micaceous shale grading into siltstone, containing two (964 - 1082 feet, and 1270 - 1405 feet) discrete beds of pale grey, fine-grained, porous and permeable, clayey sandstone.

Structure

The well was not drilled on any known structure.

Oil and Gas Indications and Potential

The Abbarwardoo No. 1 Well did not encounter any signs of hydrocarbons. However, the presence of sandstone beds with good porosity and permeability within the Permian section (185 - 1405 feet), and lying just beneath the Kockatea Shale which has good source characteristics in the Eneabba No. 1, Jurien No. 1, and Woolmulla No. 1 wells indicates that suitable reservoirs may exist in a favourable part of the section in the northern Perth Basin.

The marine aspect of the equivalent of the Irwin River Coal Measures indicates that Abbarwardoo No. 1 was drilled in a part of the Basin that in Permian times was deeper than the sections known previously in outcrop and in Jurien No. 1. The section below 651 feet is the first proven existence of the Holmwood Shale in the Perth Basin.

REFERENCES

BURDETT, J.W., 1963: Abbarwardoo No. 1 Well Completion Report. Unpubl. report for West Australian Petroleum Pty Limited.

JOHNSON, W., de la HUNTY, L.E., and GLEESON, J.S., 1955: The geology of the Irwin River and Eradu Districts and adjacent country. Geol. Surv. W. Aust. Bull. 108.

KRAMER, O.S., and REYNOLDS, C.B., 1962: Dongara-Mullewa gravity survey, Perth Basin, Western Australia. Unpubl. report for West Australian Petroleum Pty Limited.

Fig. 4

115°00'E

28°30'S

28°45'S

N

ABBARWARDOO No.1

ABBARWARDOO POOL

THURNOONGGNOO

ERADU

AMBANIA

INDARRA

NORTHERN GULLY

WICHERINA DAM

47¼ MILE PEG BORE

KOCKATEA GULLY

URELLA

TO TENINDEWA

GERALDTON — MULLEWA ROAD

RAILWAY

FAULT

TO GERALDTON

SOIL OVER PC GNEISS

Jlc Psh St KJy Pai Rlk Jmc Pd Pa Pay Psn PC

0 5

SCALE IN MILES

LEGEND

UPPER JURASSIC	KJy Yarragadee Formation	PERMIAN (ARTINSKIAN)	Pay Carynginia Formation
MIDDLE JURASSIC	Jmc Champion Bay Group	" "	Pai Irwin River Coal Measures
LOWER JURASSIC	Jlc Chapman Group	" (SAKMARIAN)	Psh Holmwood Shale
LOWER TRIASSIC	Rlk Kockatea Shale		Psn Nangetty Formation
UPPER PERMIAN	Pd Indarra Beds	LOWER SILURIAN	St Tumblagooda Sandstone
PERMIAN (ARTINSKIAN)	Pa Byro Group	PRECAMBRIAN	PC Gneiss

REVISIONS	WEST AUSTRALIAN PETROLEUM PTY. LIMITED
	NORTHERN PERTH BASIN GEOLOGICAL MAP SHOWING ABBARWARDOO No.1
DR. BY	M. H. JOHNSTONE — 23 JUNE 1963
TR. BY	DATE: 23·6·63 — SCALE:
CH. BY	

REFERENCES (Cont'd)

PLAYFORD, P.E., and WILLMOTT, S.P., 1958: The stratigraphy and structure of the Perth Basin, Western Australia. Unpubl. report for West Australian Petroleum Pty Limited.

PLAYFORD, P.E., 1957: Report on some deep bores in the Perth Basin. Unpubl. report for West Australian Petroleum Pty Limited.

PLAYFORD, P.E., 1959: Jurassic stratigraphy of the Geraldton District, Western Australia. J. Roy. Soc. W. Aust., 42, 101-124.

THYER, R.F., and EVERINGHAM, I.B., 1956: Gravity survey of the Perth Basin, Western Australia. Bur. Min. Resour. Aust. Bull. 33.

ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

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

(i) Well Completion Report, by J.W. Burdett 11 pp.

Appendix A: Sample and core descriptions 14 pp.

Appendix B: Palynological report by E.M. Fowler 4 pp.

Appendix C: Core analysis 1 p.

(ii) Daily drilling reports for period 13th December, 1962 to 22nd December, 1962.

(iii) Well logs including the following:

(a) Electrical Logs

Run 1, 100 - 1967 feet (2" = 100 ft)

(b) Gamma Ray Log

Run 1, 40 - 1968 feet (2" = 100 ft)

EGANU NO. 1

of

WEST AUSTRALIAN PETROLEUM PTY LIMITED

SUMMARY OF DATA AND RESULTS

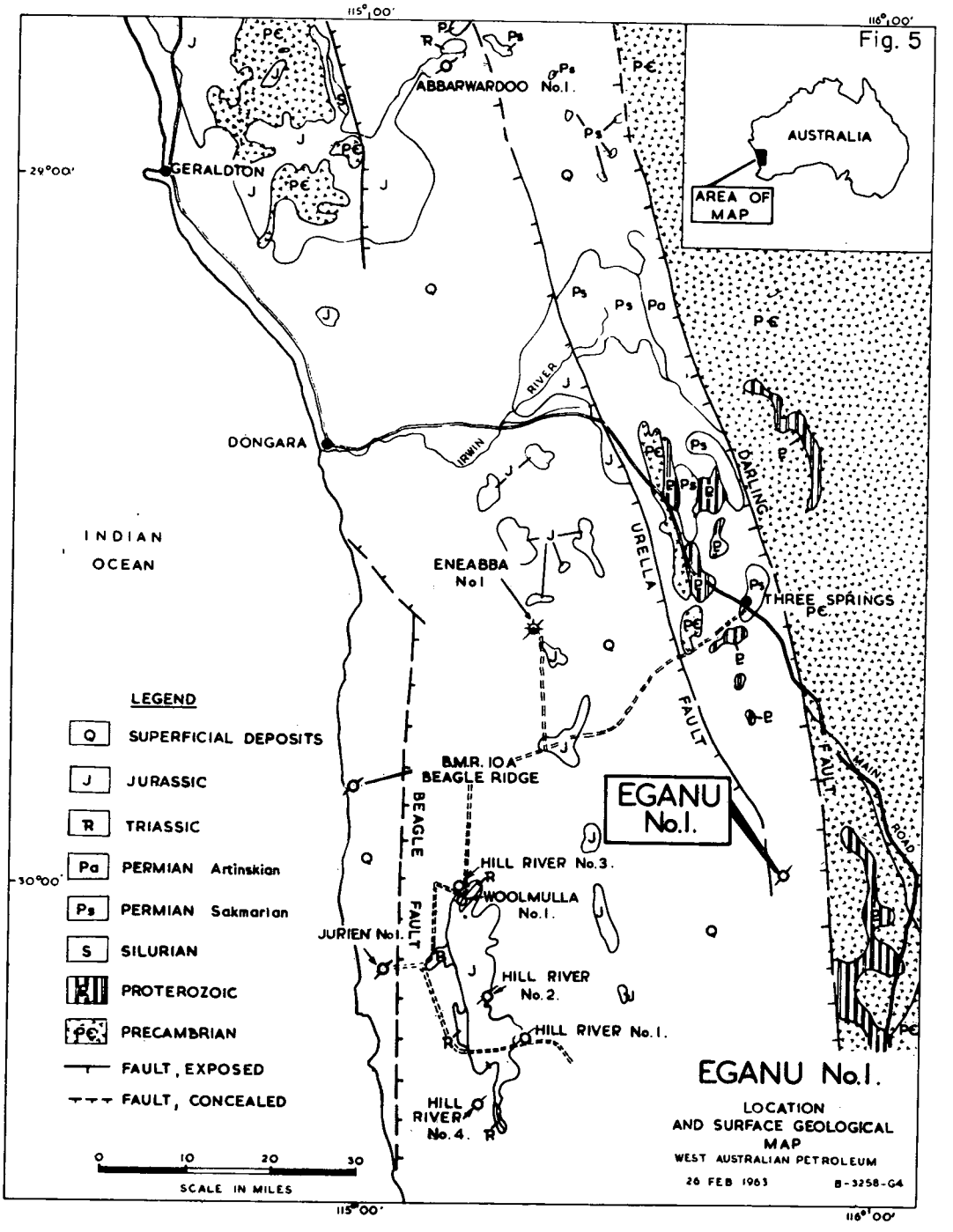
Fig. 5
AUSTRALIA
AREA OF MAP
115°00'
116°00'
29°00'
30°00'
GERALDTON
ABBARWARDOO No.1.
DONGARA
IRWIN RIVER
DARLING FAULT
URELLA FAULT
MAIN ROAD FAULT
BEAGLE FAULT
INDIAN OCEAN
ENEABBA No.1
THREE SPRINGS
EGANU No.1.
B.M.R. 10A
BEAGLE RIDGE
HILL RIVER No.3.
WOOLMULLA No.1.
JURIEN No.1.
HILL RIVER No.2.
HILL RIVER No.1.
HILL RIVER No.4.
LEGEND
Q SUPERFICIAL DEPOSITS
J JURASSIC
R TRIASSIC
Pa PERMIAN Artinskian
Ps PERMIAN Sakmarian
S SILURIAN
PROTEROZOIC
PC PRECAMBRIAN
FAULT, EXPOSED
FAULT, CONCEALED
0 10 20 30
SCALE IN MILES
EGANU No.1.
LOCATION AND SURFACE GEOLOGICAL MAP
WEST AUSTRALIAN PETROLEUM
26 FEB 1963
B-3258-G4

EGANU NO. 1

SUMMARY OF DATA AND RESULTS*

SUMMARY

Eganu No. 1 Well was located near the eastern margin of the Perth Basin, Western Australia, about 14 miles west-south-west of Coorow, and approximately 47 miles east-north-east of Jurien No. 1. The well was drilled by Geophysical Service International for West Australian Petroleum Pty Limited, to a total depth of 1970 feet. Drilling commenced on 31st December, 1962, and was completed on 15th January, 1963. A programme of coring and logging was undertaken.

The well was drilled in the vicinity of a residual gravity maximum anomaly which was noted during the reconnaissance gravity survey of the Perth Basin conducted by Robert H. Ray Geophysics in 1954-1955. The aeromagnetic survey carried out by the Bureau of Mineral Resources in 1957 also indicated a shallowing of basement in this area.

This is the only large-scale gravity and aeromagnetic anomaly located near the Darling Fault, along the eastern side of the Perth Basin. Gravity surveys indicate that the Eganu area is in the zone where the large, predominantly Jurassic, fault movement is transferred from the Urella Fault trend to the north to the Darling Fault trend to the south.

The objective of the well was to examine the section down to 2000 feet, before undertaking expensive seismic surveys in the area. On regional geological considerations, it appeared likely that the Eganu area would be underlain at shallow depth by Lower Permian or even Proterozoic rocks.

The Eganu No. 1 Well showed that the section down to 1970 feet was entirely of Jurassic age, being Upper to Middle Jurassic at the top and possibly Middle to Lower Jurassic at the base. The sediments are remarkably unconsolidated down to 1600 feet and are mainly claystones, siltstones, sandstones and fine conglomerates.

No traces of hydrocarbons were observed and the most significant feature of the well was the failure to reach Permian or Proterozoic rocks in an area in which these had been expected.

The off-structure drilling operation at Eganu No. 1 was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

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*Abstracted from: Well Completion Report, Eganu No. 1, by J.W. Burdett, West Australian Petroleum Pty Limited, May, 1963.

WELL HISTORY

General Data

Location:	Latitude 29° 59' 05" S. Longitude 115° 49' 35" E.
Name and address of Tenement Holder:	West Australian Petroleum Pty Limited, 251 Adelaide Terrace, Perth, W.A.
Details of Petroleum Tenement:	Permit to Explore 27H
Total Depth:	1970 feet
Date drilling commenced:	31st December, 1962
Date drilling completed:	15th January, 1963
Elevation (ground):	772 feet
Elevation (K.B.):	777 feet (datum for depths)
Status:	Dry hole; plugged and abandoned
Cost:	£7882

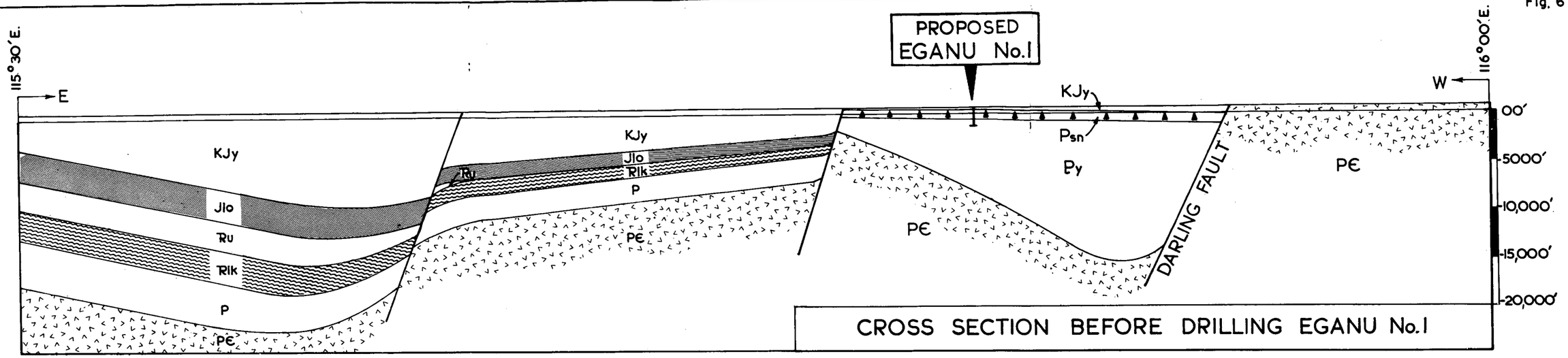
Drilling Data

Drilling Plant:	
Make:	Mayhew
Type:	2000
Hole sizes and depths:	8 1/2" to 67 feet 5 5/8" to 1970 feet (T.D.)
Casing details:	Ran 6" I.D. casing from surface to 67 feet (K.B.); cemented to surface with 15 sacks of cement.

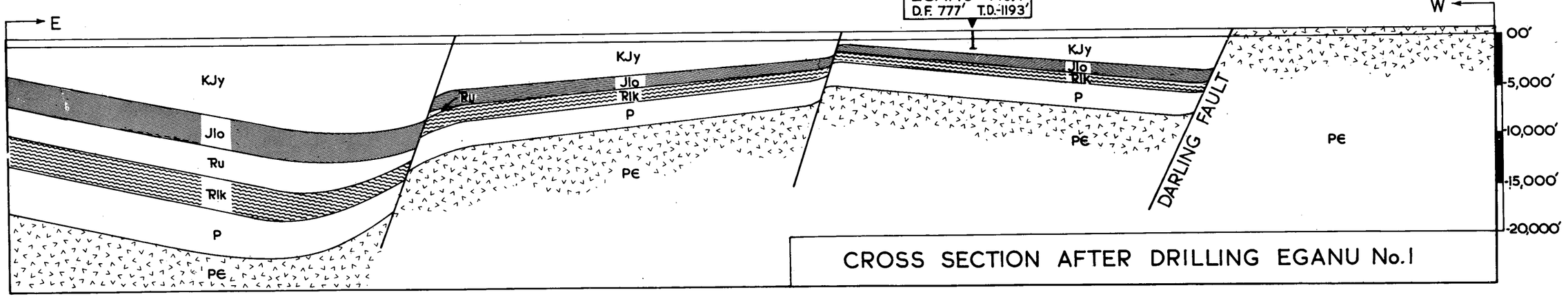
Logging and Testing

Ditch Cuttings:	
Interval:	Ten feet from surface to total depth.
Coring:	Nine cores were cut using a 10-foot Mayhew core barrel. A total of 84 feet of formation was cored and 45 feet (53.5%) recovered.

Fig. 6



CROSS SECTION BEFORE DRILLING EGANU No.1



CROSS SECTION AFTER DRILLING EGANU No.1

LEGEND

JURASSIC	KJy — YARRAGADEE FORMATION	PERMIAN	P — UNDIFFERENTIATED
	Jlo — COCKLESHELL GULLY FORMATION		▲ Psn ▲ — NANGETTY FORMATION
TRIASSIC	Ru — COARSE SANDSTONE MEMBER	PROTEROZOIC	Py — YANDANOOKA GROUP
	Rlk — KOCKATEA SHALE	PRECAMBRIAN	Pє — UNDIFFERENTIATED GNEISSES AND METASEDIMENTS

0 5
SCALE IN MILES

REVISIONS	WEST AUSTRALIAN PETROLEUM PTY. LIMITED		
	PERTH BASIN NATURAL SCALE CROSS SECTIONS ALONG 29°54'05" S. THROUGH EGANU No.1 SHOWING PREDICTED SECTIONS BEFORE AND AFTER DRILLING M. H. JOHNSTONE 14 JUNE 1963		
DR. BY	DATE	SCALE	B — 3606
TR. BY	14 JUNE 1963	—	
CH. BY			

Electric and other logging (Schlumberger):	
Electrical Log:	67-1954 feet (1 run)
Laterolog:	120-1954 feet (1 run)
Sonic Log:	200-1954 feet (1 run)
Gamma Ray Log:	0-1954 feet (1 run)

GEOLOGY

Stratigraphy

Detailed:

Sand (Recent) : 5 to 20 feet (15 feet +)

Loose to poorly cemented, medium-grained quartz sand.

Yarragadee Formation (Lower Cretaceous-Upper Jurassic): 20 to 1970 feet (1950 feet +)

The upper part of the formation consists of interbedded, cream, medium to coarse-grained, kaolinitic sandstone, and multicoloured claystone and siltstone. This grades downwards into dark grey, micaceous siltstone with beds of greenish-grey, medium-grained, friable sandstone, and then into coarsely-interbedded, grey-green, friable, medium-grained to conglomeratic sandstone, green, purple, and brown, micaceous siltstone, and white, brown, and red claystone. Spores and pollens from a core between 1960 and 1970 feet indicate a Jurassic age, but no more precise dating is available. The lower part of the sequence may be either Yarragadee Formation or an equivalent of the Cockleshell Gully Formation.

Structure

The well was drilled to obtain stratigraphic information in an area of sparse outcrop, and one in which no structure was known to be present. The area lies within the complex zone between the Darling Fault and the south end of the Urella Fault.

Oil and Gas Indications and Potential

No signs of hydrocarbons were noted in the Jurassic sequence encountered in the well. No actual measurements of porosity and permeability were made, but the Sonic Log shows that the section down to 1600 feet is virtually unconsolidated. Although the sequence is continental, and the sands are not as well sorted as in a marine environment, they have a high porosity and thus would be expected to have a reasonable permeability in their unconsolidated state.

The drilling of Eganu No. 1 has shown that nearly 2000 feet of Jurassic rocks underlie the surface sand in the area around Lake Eganu where it was suspected that Permian or Proterozoic rocks would be present at shallow depth. It thus indicates that the Darling Fault was active in Jurassic times at least as far north as the well-site, a fact which could not be inferred directly from the regional gravity map. Hence the prospective Triasic sequence and possibly the Permian may be preserved in some of the adjustment structures in the vicinity. Triassic and a thin Permian sequence could comprise part of the 5000 feet of section to "basement" as indicated by the aeromagnetic and gravity surveys over this area.

REFERENCES

BURDETT, J.W., 1963: Eganu No. 1 Well Completion Report. Unpubl. report for West Australian Petroleum Pty Limited.

GARRETT, M.J., 1958: B.M.R. aeromagnetic survey of the Perth Basin. Unpubl. report for West Australian Petroleum Pty Limited.

LANE, E.P., and REYNOLDS, C.B., 1963: Eganu gravity project. Unpubl. report for West Australian Petroleum Pty Limited.

PUDOVSKIS, V., 1963: Woolmulla No. 1 Well Completion Report. Unpubl. report for West Australian Petroleum Pty Limited.

QUILTY, J.H., 1963: Perth Basin aeromagnetic survey, Western Australia, 1957. Bur. Min. Resour. Aust. Rec. 1963/74 (Unpubl.).

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Appendix A: Sample and core descriptions 18 pp.

Appendix B: Palynological report by E.M. Fowler 2 pp.

(ii) Daily drilling report for period 31st December, 1962 to 15th January, 1963.

(iii) Well logs including the following:

(a) Electrical Log

Run 1, 67-1954 feet (2" = 100 ft)

(b) Laterolog

Run 1, 120-1954 feet (2" = 100 ft)

(c) Sonic Log

Run 1, 200-1954 feet (2" = 100 ft)

(d) Gamma Ray Log

Run 1, 0-1954 feet (2" = 100 ft)

(iv) Geological map showing location of Abbarwardoo No. 1 and Eganu No. 1.

COMPOSITE WELL LOG

WEST AUSTRALIAN PETROLEUM PTY LIMITED

JURIEN No 1

PERMIT TO EXPLORE 27 H.

LICENCE TO PROSPECT 98H.

LOCATION LAT. 30° 08' 40"S LONG 115° 02' 54"E
ELEVATION GROUND LEVEL +30'
DERRICK FLOOR +39'

DATE SPUDDED: 9TH JULY 1962
DATE WELL ABANDONED : 28TH AUGUST 1962
TOTAL DEPTH D.F. 3366'

STATE: WESTERN AUSTRALIA 4 MILE SHEET: HILL RIVER BASIN: PERTH WELL STATUS: ABANDONED

HOLE SIZE:

IN.	FROM	TO
17½"	SURFACE	206'
12¼"	206'	948'
8½"	948'	T.D.

CASING:

SIZE	WT.	G R.	DEPTH	CMT.	CMT.TO
13⅜"	48	H-40	206'	160	SURFACE
9⅝"	36	J-55	945'	200	150'

CEMENT PLUGS:

FROM	TO	TOP	SACKS
2450'		2356'	160
2150'		2020'	65
1040'		775'	90

PERFORATIONS: NIL

WELL HEAD FITTINGS: ½" STEEL PLATE WELDED ON TOP OF CASING
DRILLED BY: OIL DRILLING & EXPLORATION PTY LTD.
DRILLING METHOD: ROTARY

INDUCTION – ELECTRICAL LOG → STANDARD E-LOG

RUN No.		1	2	3		1
DATE		17. 7. 62.	21. 7. 62.	20. 8. 62		23. 8. 62
FOOTAGE LOGGED		389	796	2416		1350
TOTAL DEPTH ELECTRIC LOG		596	1003	3367		—
TOTAL DEPTH DRILLER		595	1002	3365		—
CASING SHOE ELECTRIC LOG		206	206	950		950
CASING SHOE, DRILLER		206	206	945		945
BIT SIZE		8½	8½	8½		8½
MUD DATA TYPE		BENTONITE				
TREATMENT		GEL	GEL	GEL		GEL
WATER LOSS 30 MIN		4.8	6.4	6.4		6.4
WEIGHT		73	73	80		80
VISCOSITY		48	42	56		56
P.H.		11	11	11		11
RESISTIVITY & TEMP.						
	RM	.94@70°F	.95@60°F	1.07@69°F		.90@68°F
	RMF	.76@70°F	.73@60°F	.85@63°F		—
	RMC	1.4 @70°F	1.3@60°F	3.0 @63°F		—
MAXIMUM RECORDED TEMP.		—	80°F	158°F		140°F
ELECTRODE SPACING						
AM	AM 1	16"	16"	16"		16"
IND	AM 2	40"	40"	40"		64"
SO	A.O.	1½"	1½"	1½"		18' 8"
RECORDED BY		SOCK	SOCK	SOCK		SOCK

RADIOMETRIC LOG DATA

TYPE OF LOG	GR	GR
RUN NUMBER	1	2
DATE IN 1962	JULY 21	AUG. 20
TOTAL DEPTH DRILLER	1002	3363
TOP OF LOGGED INTERVAL	40	900
BOTTOM LOGGED INTERVAL	998	3363
TYPE OF FLUID IN HOLE	M U D	
FLUID LEVEL	F U L L	
MAXIMUM RECORDED TEMP.	80°F	150°F
SONDE SIZE & TYPE	3⅝" GNT—H	
TIME CONSTANT SECONDS	2	2
LOGGING SPEED FT/HR	1800	1800
SENSITIVITY REFERENCE	200	300

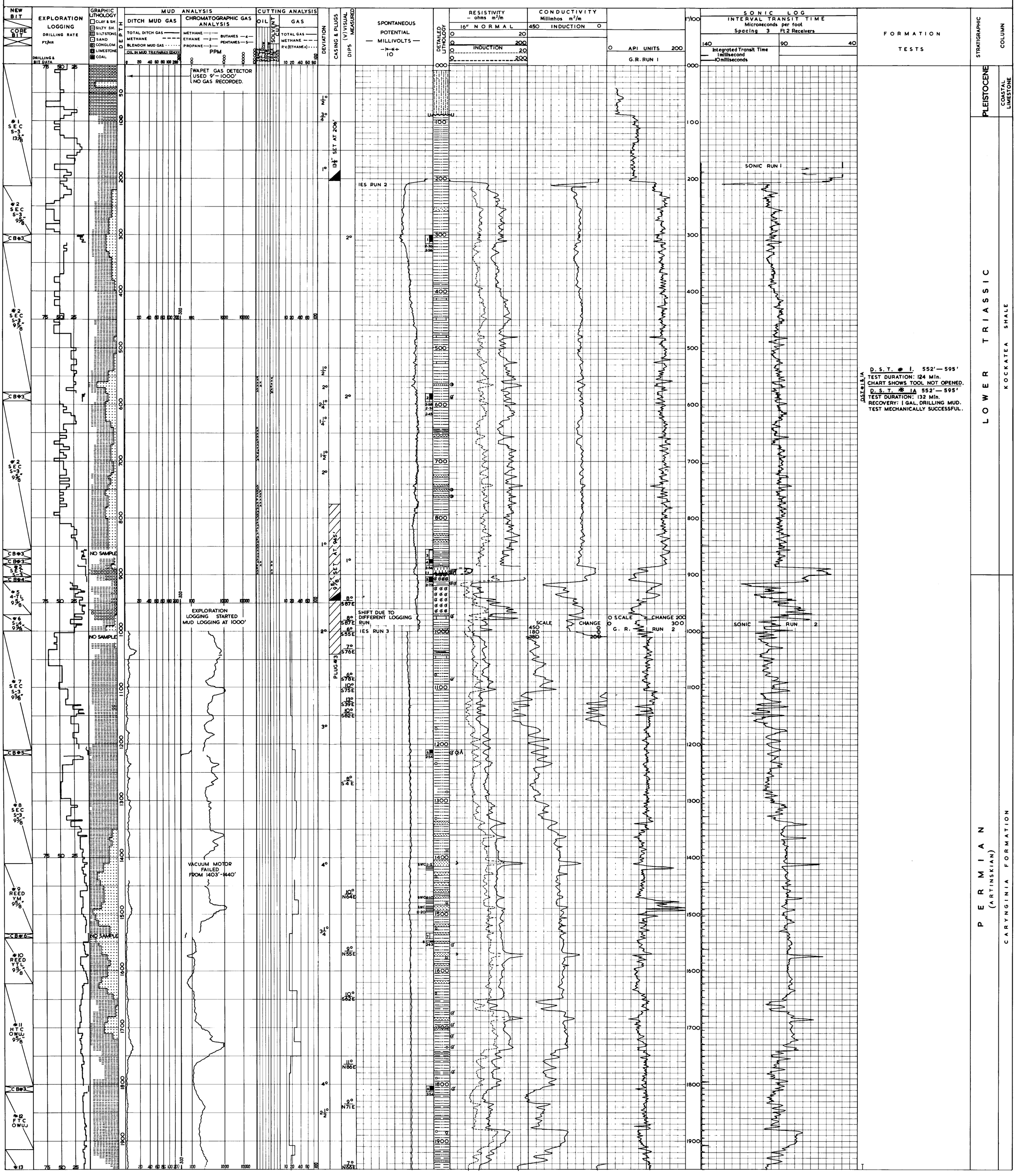
OTHER LOGS

CEMENT BOND LOG	974'—160'	RUN 1
CONTINUOUS DIPMETER	3364'—950'	RUN 1
MICROLOG	3366'—206'	RUN 1 TO 3
SONIC LOG (VLS-G)	3360'—206'	RUN 1 TO 2

LITHOLOGIC REFERENCE & WELL SYMBOLS

SANDSTONE, SILTSTONE, CLAYSTONE, LIMESTONE, SHALE, PYRITIC, COAL, CARBONACEOUS MATTER, PEBBLY, CALCARENITE, COQUINITE, CALCAREOUS, GRANITIC GNEISS, FOSSILIFEROUS, OIL SHOW, GAS SHOW, CORE (Recovery black) SPECIFIC GRAVITY, SIDE WALL CORE, CASING SHOE

LITHOLOGY BY: V. PUDOVSKIS, R.M.L. ELLIOTT.
COMPILED BY: V PUDOVSKIS
LOGGED BY: SCHLUMBERGER (ELECTRIC)
EXPLORATION LOGGING (MUD)



D.S.T.#1&1A

D. S. T. # 1. 552'—595'
TEST DURATION: 124 Min.
CHART SHOWS TOOL NOT OPENED.

D. S. T. # 1A 552'—595'
TEST DURATION: 132 Min.
RECOVERY: 1 GAL. DRILLING MUD.
TEST MECHANICALLY SUCCESSFUL.

PLATE 1
SHEET 2

COMPOSITE WELL LOG
WEST AUSTRALIAN PETROLEUM PTY. LTD.
JURIEN No. 1

LOCATION : LAT. 30° 08' 40"S LONG. 115° 02' 54" E STATE: WESTERN AUSTRALIA 4-MILE SHEET: HILL RIVER BASIN: PERTH

ELEVATION: GROUND LEVEL + 30' DERRICK FLOOR + 39'

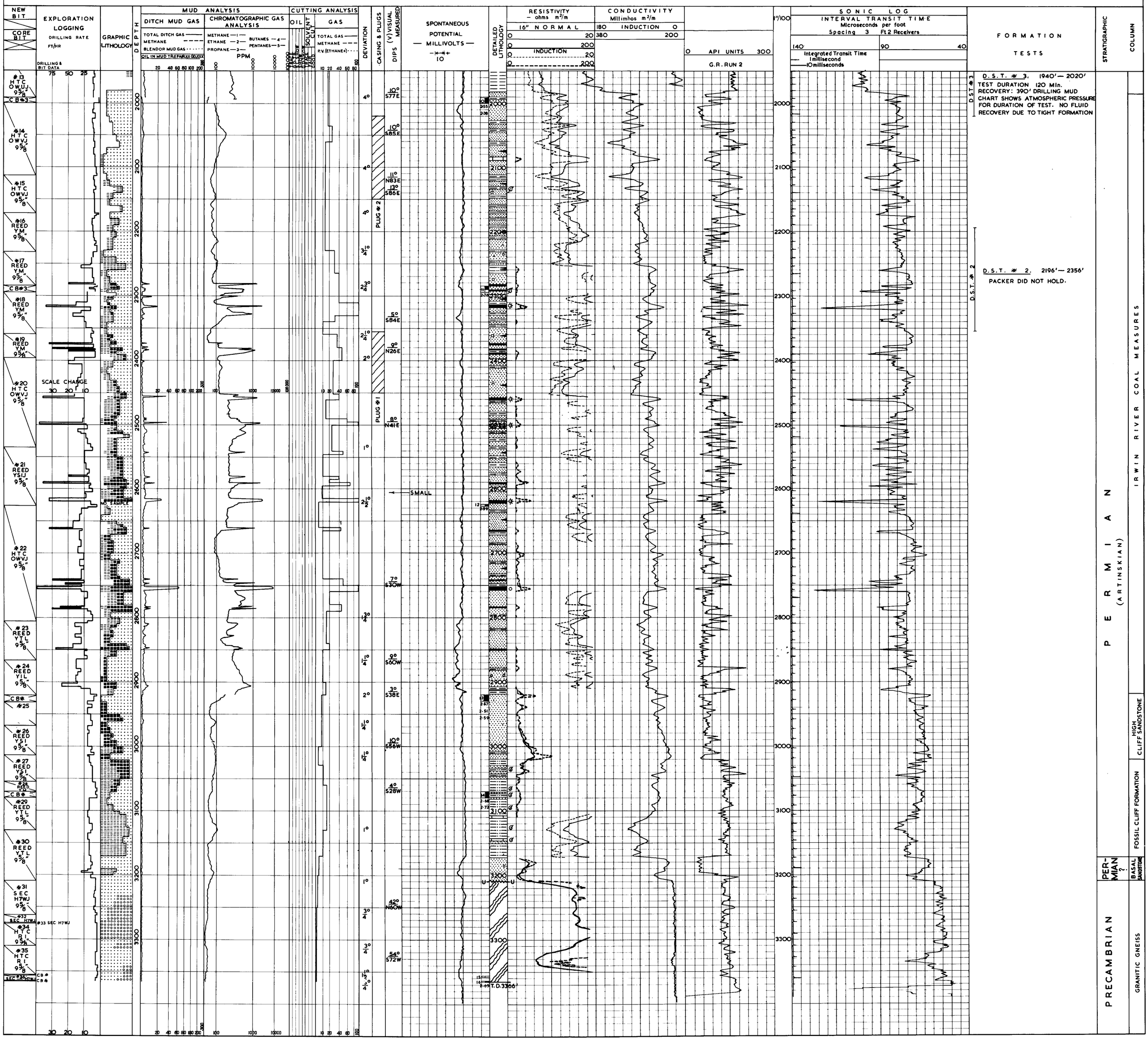


PLATE 2

COMPOSITE WELL LOG

WEST AUSTRALIAN PETROLEUM PTY LIMITED

ABBARWARDOO No 1

STATE: WESTERN AUSTRALIA 4 MILE SHEET: GERALDTON BASIN: PERTH WELL STATUS: ABANDONED

PERMIT TO EXPLORE 27H

LOCATION: LAT. 28° 35' 10"S. LONG 115°09' 35"E

ELEVATION: GROUND LEVEL: 720'; KELLY BUSHING: 725'

DATE SPUDDED: 12 DEC. 1962
DATE DRILLING COMPLETED 20 DEC. 1962
TOTAL DEPTH K.B.: 1970'

HOLE SIZE:

IN.	FROM	TO
8½	0'	66'
5⅞	66'	1970'

CASING:
SIZE: 6"
DEPTH: 66'
CMT: 66'
CMT. TO: SURFACE

CEMENT PLUGS
FROM 247
TO 220
SACKS 5

PERFORATIONS: NIL

WELL HEAD FITTINGS: NIL
DRILLED BY: GEOPHYSICAL SERVICE INTERNATIONAL
DRILLING METHOD: ROTARY

E. LOG DATA

RUN NUMBER	1
DATE IN 1962	21 DECEMBER
FOOTAGE LOGGED	1967'-100'
TOTAL DEPTH (LOG)	1970'
TOTAL DEPTH (DRILLER)	1970'
CASING SHOE (LOG)	—
CASING SHOE (DRILLER)	66' K.B.
BIT SIZE	8½" 0-66' 5⅞" 66'-1970'
MUD DATA - TYPE	LOW P.H. C.B.
TREATMENT	GEL
WATER LOSS 30 MIN	9 cc
WEIGHT	78 lbs/c. Ft.
VISCOSITY	47 @ 74°F
RESISTIVITY Rm	4.4 @ 74°F
ELECTRODE SPACING AM 1	16"
AM 2	64"
AO	18'8"
RECORDED BY:	SOCK

RADIOMETRIC LOG DATA

TYPE OF LOG	GR
RUN NUMBER	1
DATE IN 1962	21 DECEMBER
TOTAL DEPTH (DRILLER)	1970'
TOP OF LOGGED INTERVAL	40'
BOTTOM LOGGED INTERVAL	1968'
TYPE OF FLUID IN HOLE	MUD
SONDE TYPE	GNP-C
TIME CONSTANT (SECONDS)	2
LOGGING SPEED FT/HR	1800
SENSITIVITY REFERENCE	300

LITHOLOGIC REFERENCE & WELL SYMBOLS

CONGLOMERATE; CLAYSTONE; SANDSTONE, COARSE; SANDSTONE, FINE; SILTSTONE; CALCILUTITE; SHALE; PYRITIC; COAL; CARBONACEOUS MATTER; PEBBLY; CALCARENITE; CALCAREOUS; FOSSILIFEROUS; OIL SHOW; GAS SHOW; CORE (Recovery black); CASING SHOE

LITHOLOGY BY: J.W. BURDETT
COMPILED BY: J.W. BURDETT

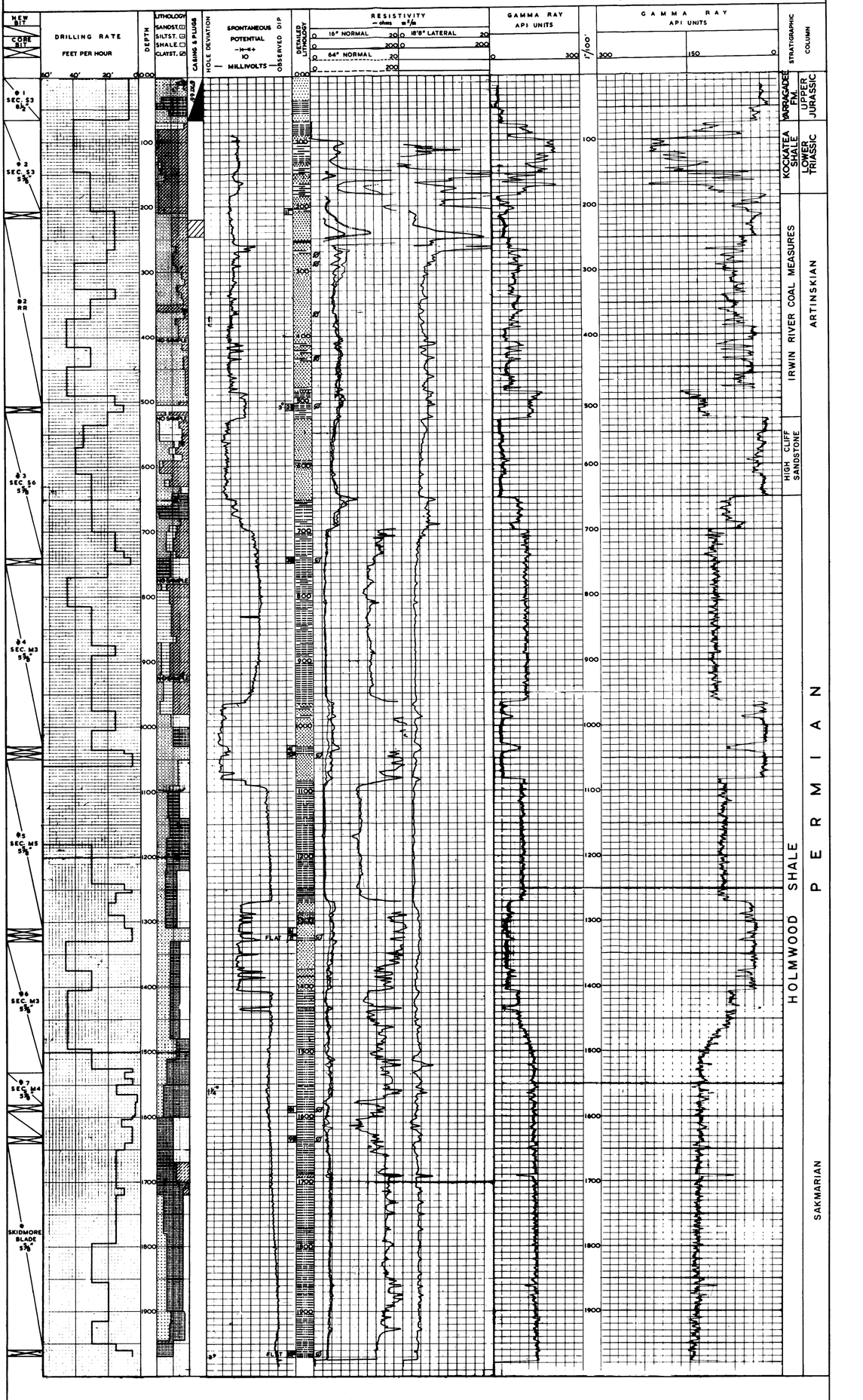


PLATE 3

COMPOSITE WELL LOG

WEST AUSTRALIAN PETROLEUM PTY LIMITED

EGANU No 1

STATE: WESTERN AUSTRALIA 4 MILE SHEET: PERENJORI BASIN: PERTH WELL STATUS: ABANDONED

PERMIT TO EXPLORE 27H

LOCATION LAT 29° 59' 05"S, LONG 115° 49' 35"E

ELEVATION GROUND LEVEL: 772'
KELLY BUSHING: 777'

DATE SPUDDED: 31 DEC 1962
DATE DRILLING COMPLETED: 15 JAN 1963
TOTAL DEPTH K.B.: 1970'

HOLE SIZE:

IN:	FROM	TO
8½	0'	67'
5⅞	67'	1970'

CASING:
SIZE: 6"
DEPTH: 67'
CMT: 67'
CMT. TO: SURFACE

CEMENT PLUGS:
FROM 70'
TO 50'
SACKS 5

PERFORATIONS: NIL

WELL HEAD FITTINGS: NIL
DRILLED BY: GEOPHYSICAL SERVICE INTERNATIONAL
DRILLING METHOD: ROTARY

E. LOG DATA

RUN NUMBER	1
DATE IN 1963	15 JANUARY
FOOTAGE LOGGED	1954'-67'
TOTAL DEPTH (LOG)	1955
TOTAL DEPTH (DRILLER)	1970'
CASING SHOE (LOG)	67'
CASING SHOE (DRILLER)	67'
BIT SIZE	8½ 0-67' 5⅞ 67'-1970'
MUD DATA—TYPE — LOWPH	WATER BASE
TREATMENT	STARCH
WATER LOSS 30 MIN	13cc
WEIGHT	74 lbs/C. Ft.
VISCOSITY	40 @ 72°F
RESISTIVITY Rm	0.41 @ 72°F
ELECTRODE SPACING AM 1	16"
AM 2	64"
LATERAL	18'8"
RECORDED BY:	BOCK

RADIOMETRIC LOG DATA

TYPE OF LOG	GR
RUN NUMBER	1
DATE IN 1963	16 JANUARY
TOTAL DEPTH (DRILLER)	1970'
TOP OF LOGGED INTERVAL	0'
BOTTOM LOGGED INTERVAL	1954'
TYPE OF FLUID IN HOLE	SALT WATER
SONDE TYPE	GNP-C
TIME CONSTANT (SECONDS)	2
LOGGING SPEED FT/HR	1800
SENSITIVITY REFERENCE	200

OTHER ELECTRIC LOGS
SONIC 1954-200 RUN 1 16 JANUARY 1963
LATEROLOG 1954-120 RUN 1 16 JANUARY 1963

LITHOLOGIC REFERENCE & WELL SYMBOLS

CONGLOMERATE, CLAYSTONE, SANDSTONE, COARSE, SANDSTONE, FINE, SILTSTONE, CALCILUTITE, SHALE, PYRITIC, COAL, CARBONACEOUS MATTER, PEBBLY, CALCARENITE, CALCAREOUS, FOSSILIFEROUS, OIL SHOW, GAS SHOW, CORE (Recovery black), CASING SHOE

LITHOLOGY BY: J.W. BURDETT
COMPILED BY: J.W. BURDETT