AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WCR KYARRA-1, 1A
(W804)

210 pages
3 Enclosures

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

KYARRA NO. 1A

W804

WELL COMPLETION REPORT

VIC/P17

OFFSHORE GIPPSLAND BASIN

PG/194/83 V DJOKIC

DISTRIBUTION

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* 1. SET OF WIRELINE LOGS (in box - 180212)
* 2. VELOCITY SURVEY

* AVAILABLE ON REQUEST

I. SUMMARY

Kyarra No. 1, the third well to be drilled in permit VIC/P17 by Australian Aquitaine Petroleum Pty. Ltd. and its partners, was spudded on 11th February 1983. The well was plugged and abandoned on 15th February 1983 at the depth of 220m KB due to difficulties of setting the 20" casing.

The rig was moved 20m west-southwest and Kyarra No. 1A was spudded on 16th February 1983 and reached a total depth of 1280m KB on 23rd February, 1983.

The well was designed to test a structural culmination formed by slight drag folding of Late Cretaceous/Paleocene to Miocene sediments situated on the folded upthrown block of an east-west trending high angle reverse fault.

The primary objective of this well was the uppermost sequence of the Latrobe Group. This sequence was thought to contain a deltaic sand body (named Keera Sand) which is stratigraphically sealed and independent of structural closure. The deltaic sand body was not encountered at Kyarra No. 1.

The secondary objective was the fluviatile to deltaic intra Latrobe sequence in which the development of interbedded shales and sands may have formed intra Latrobe reservoirs.

The top of the Latrobe Group was intersected at 1013m KB (Gurnard Formation), and the top of undifferentiated Latrobe Formation at 1028m KB.

Log interpretation, sidewall cores and RFT analyses showed that the main reservoirs of the Oligocene, top of Latrobe sands as well as the Eocene intra Latrobe sands have excellent reservoir properties, but are water-saturated.

203m of Paleocene to Oligocene Latrobe sediments were penetrated before drilling into 35m of volcanics overlying interbedded shales and siltstones of the Strzelecki Group.

29m of Strzelecki sediments were penetrated before drilling stopped at 1280m KB on 23rd February, 1983 and the well was plugged on 28th February, 1983 and abandoned on 1st March, 1983.

II. INTRODUCTION

Kyarra No. 1A was the third well drilled in permit area VIC/P17 by Australian Aquitaine Petroleum Pty. Ltd. (25%) as operator for:-

Australian Occidental Pty. Ltd.	25%
Alliance Resources Pty. Ltd.	25%
Agex Pty. Ltd.	12.5%
Consolidated Petroleum (Aust.) N.L.	12.5%

Prior to drilling, the GA-81 and GA-82 seismic surveys were carried out.

The GA-81 commenced on 1st November, 1981 and was completed on 26th November, 1981. A total of 3495km of seismic was shot. This comprised a 1.5km x 1.5km grid over much of the area, with a wider spaced grid over the west and southwest part of the permit.

The GA-82 seismic survey commenced on 15th June, 1982 and was completed on 18th June, 1982. A total of 403km of seismic was shot.

The first well, Edina No. 1 was spudded on 26th September, 1982 and plugged and abandoned on 1st November, 1982.

Omeo No. 1 was spudded on 2nd November, 1982 and was plugged and abandoned on 10th February, 1983.

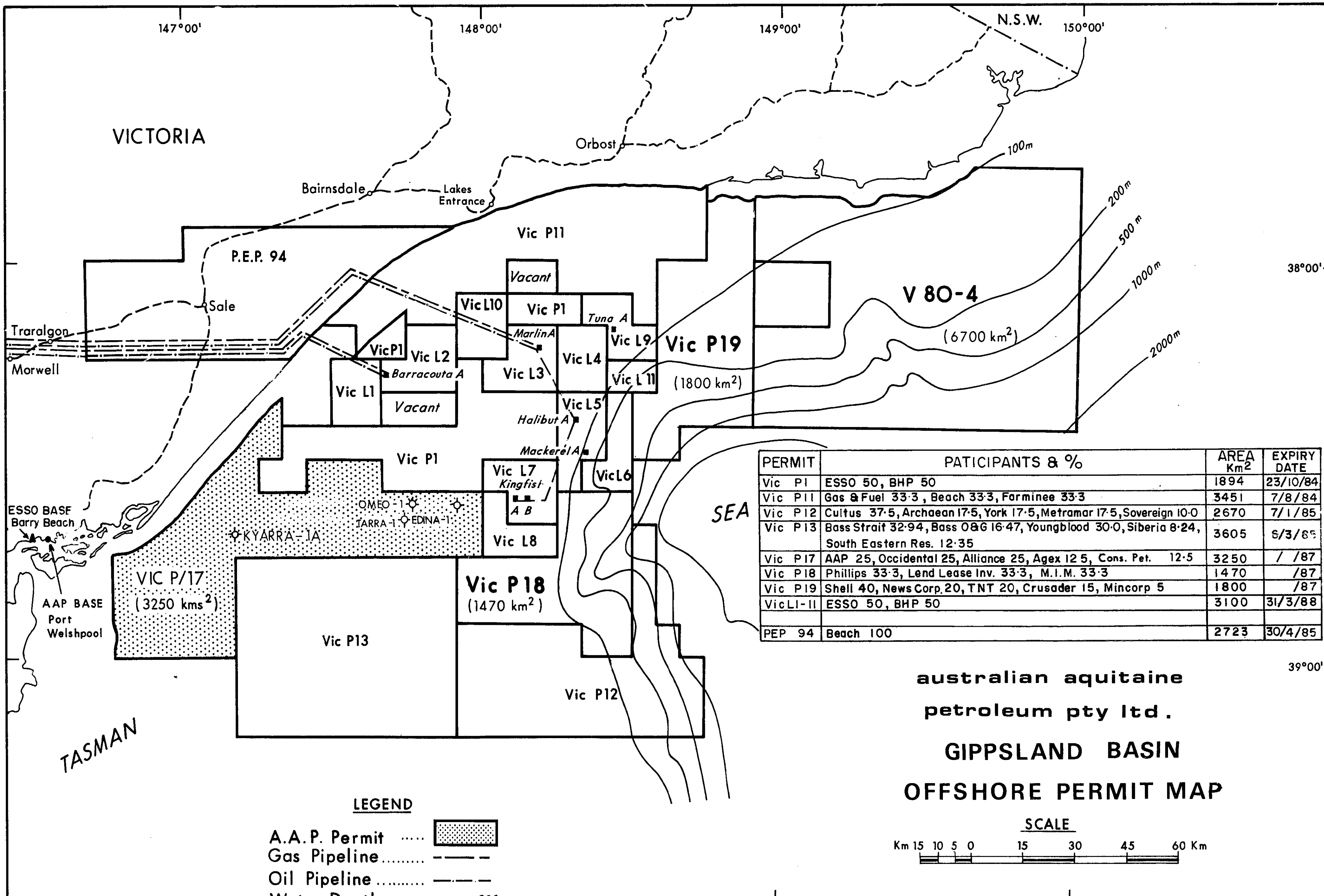
Based on interpretation of these surveys and regional stratigraphic correlation of a nearby well (Perch No. 1), the Kyarra No. 1 well location was chosen at shotpoint 780 on line GA-81-67.

The location was 63km east of Port Welshpool where a supply and logistics base had been established by Aquitaine in association with Phillips and Shell.

The semi-submersible "Ocean Digger" was contracted to carry out drilling operations and Kyarra No. 1A was spudded on 16th February, 1983. The well was plugged and abandoned as a dry hole at a total depth of 1280m KB and the rig released on 28th February, 1983.

The structure tested had been mapped as a small east-west closure which also represents the highest point of the deltaic sand body which was thought to be present at this location and was stratigraphically sealed (named Keera Sand). The anticipated deltaic sands in the upper part of the Latrobe Group were not encountered.

The structure was formed by compressional folding of the Late Cretaceous/Paleocene to Miocene sediments along a pre-existing fault line. The closure is independent of faulting and does not rely on the fault as seal.

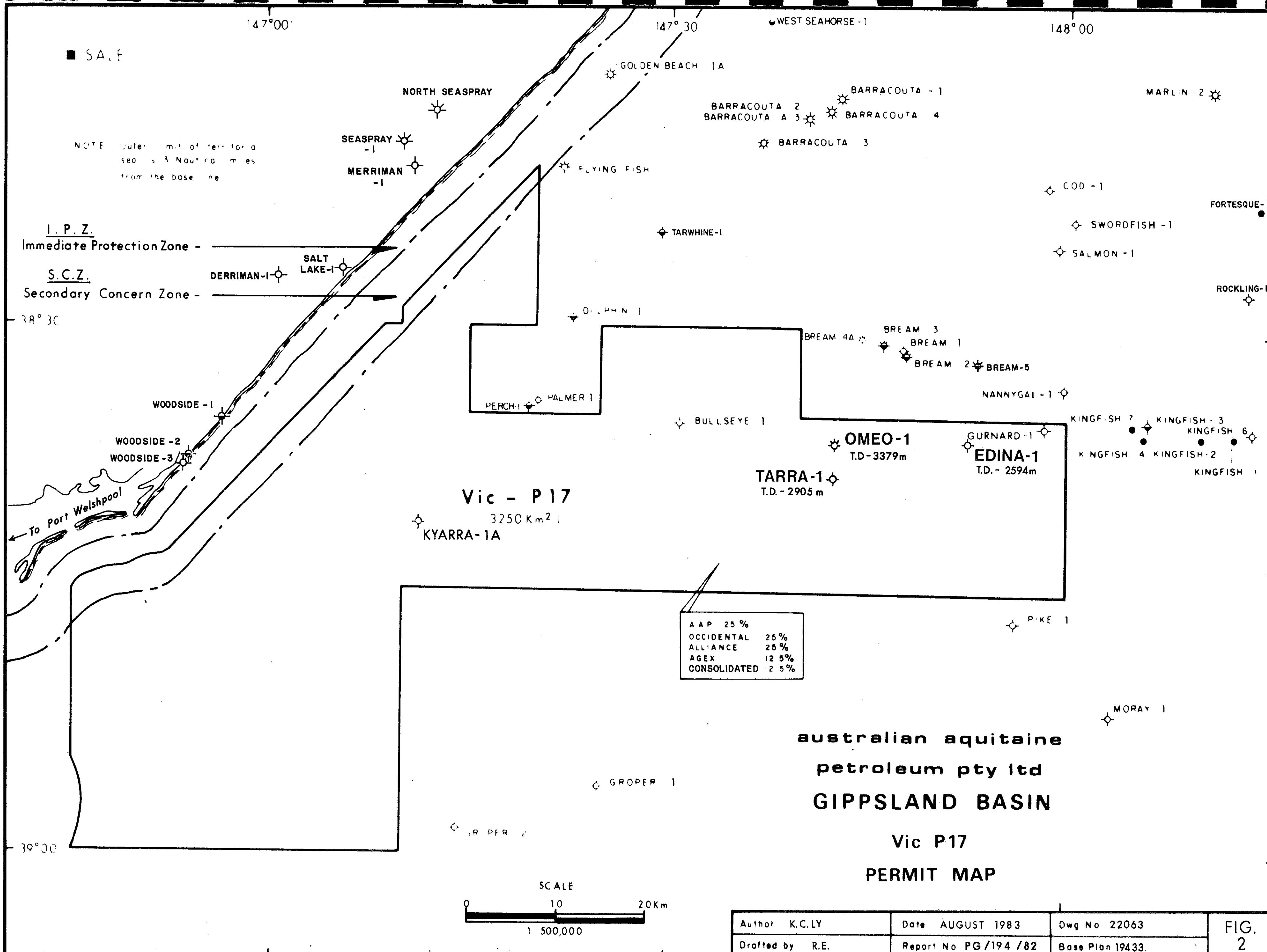


PERMIT	PATICIPANTS & %	AREA Km²	EXPIRY DATE
Vic P1	ESSO 50, BHP 50	1894	23/10/84
Vic P11	Gas & Fuel 33·3, Beach 33·3, Farminee 33·3	3451	7/8/84
Vic P12	Cultus 37·5, Archaean 17·5, York 17·5, Metramar 17·5, Sovereign 10·0	2670	7/1/85
Vic P13	Bass Strait 32·94, Bass O&G 16·47, Youngblood 30·0, Siberia 8·24, South Eastern Res. 12·35	3605	6/3/85
Vic P17	AAP 25, Occidental 25, Alliance 25, Agex 12 5, Cons. Pet. 12·5	3250	/ /87
Vic P18	Phillips 33·3, Lend Lease Inv. 33·3, M.I.M. 33·3	1470	/87
Vic P19	Shell 40, News Corp. 20, TNT 20, Crusader 15, Mincorp 5	1800	/87
Vic L1-11	ESSO 50, BHP 50	3100	31/3/88
PEP 94	Beach 100	2723	30/4/85

australian aquitaine petroleum pty ltd.

GIPPSLAND BASIN OFFSHORE PERMIT MAP

Author: C. ALLIOT	Date: AUGUST 1983	Dwg. No.: 22062	FIG. 1
Drafted by: J.H.	Report No.: PG/194/83	Base Plan: 19434	



147°00'
147° 30
148°00
38° 30
39°00
WEST SEAHORSE - 1
GOLDEN BEACH 1A
NORTH SEASPRAY
SEASPRAY -1
MERRIMAN -1
BARRACOUTA - 1
BARRACOUTA 2
BARRACOUTA A 3
BARRACOUTA 4
BARRACOUTA 3
MARLIN - 2
FLYING FISH
COD - 1
FORTESQUE-1
SWORDFISH - 1
SALMON - 1
TARWHINE-1
ROCKLING-1
I. P. Z.
Immediate Protection Zone -
S. C. Z.
Secondary Concern Zone -
SALT LAKE-1
DERRIMAN-1
BREAM 3
BREAM 4A
BREAM 1
BREAM 2
BREAM-5
NANNYGAI - 1
PERCH-1
PALMER 1
BULLSEYE 1
WOODSIDE - 1
WOODSIDE -2
WOODSIDE -3
OMEO-1
T.D-3379m
GURNARD - 1
EDINA-1
T.D.- 2594m
TARRA-1
T.D. - 2905 m
KINGFISH 7
KINGFISH - 3
KINGFISH 6
KINGFISH 4
KINGFISH - 2
KINGFISH 1
To Port Welshpool
Vic - P17
3250 Km²
KYARRA- 1A
AAP 25 %
OCCIDENTAL 25 %
ALLIANCE 25 %
AGEX 12 5%
CONSOLIDATED 12 5%
PIKE 1
MORAY 1
GROPER 1
SCALE
0 10 20Km
1 500,000
australian aquitaine
petroleum pty ltd
GIPPSLAND BASIN
Vic P17
PERMIT MAP
Author K.C. LY
Drafted by R.E.
Date AUGUST 1983
Report No PG/194/82
Dwg No 22063
Base Plan 19433.

FIG. 2

III. WELL HISTORY

A. GENERAL DATA

(i) Well Name & Number: Kyarra No. 1A

(ii) Name & Address of Operator:
Australian Aquitaine Petroleum P/L.
99 Mount Street,
NORTH SYDNEY NSW 2060

(iii) Name & Address of Titleholder:
Australian Aquitaine Petroleum P/L.
99 Mount Street,
NORTH SYDNEY NSW 2060.

Australian Occidental P/L.
66 Berry Street,
NORTH SYDNEY NSW 2060

Alliance Resources P/L
15th Floor, Collins Tower,
35 Collins Street,
MELBOURNE VIC 3000.

Consolidated Petroleum Aust. N.L.
Hartogen House,
15 Young Street,
SYDNEY NSW 2000

Agex Pty. Ltd.
16th Floor, AGL Building,
111 Pacific Highway,
NORTH SYDNEY NSW 2060.

(iv) Petroleum Title: Permit VIC-P17

(v) District: Gippsland Basin

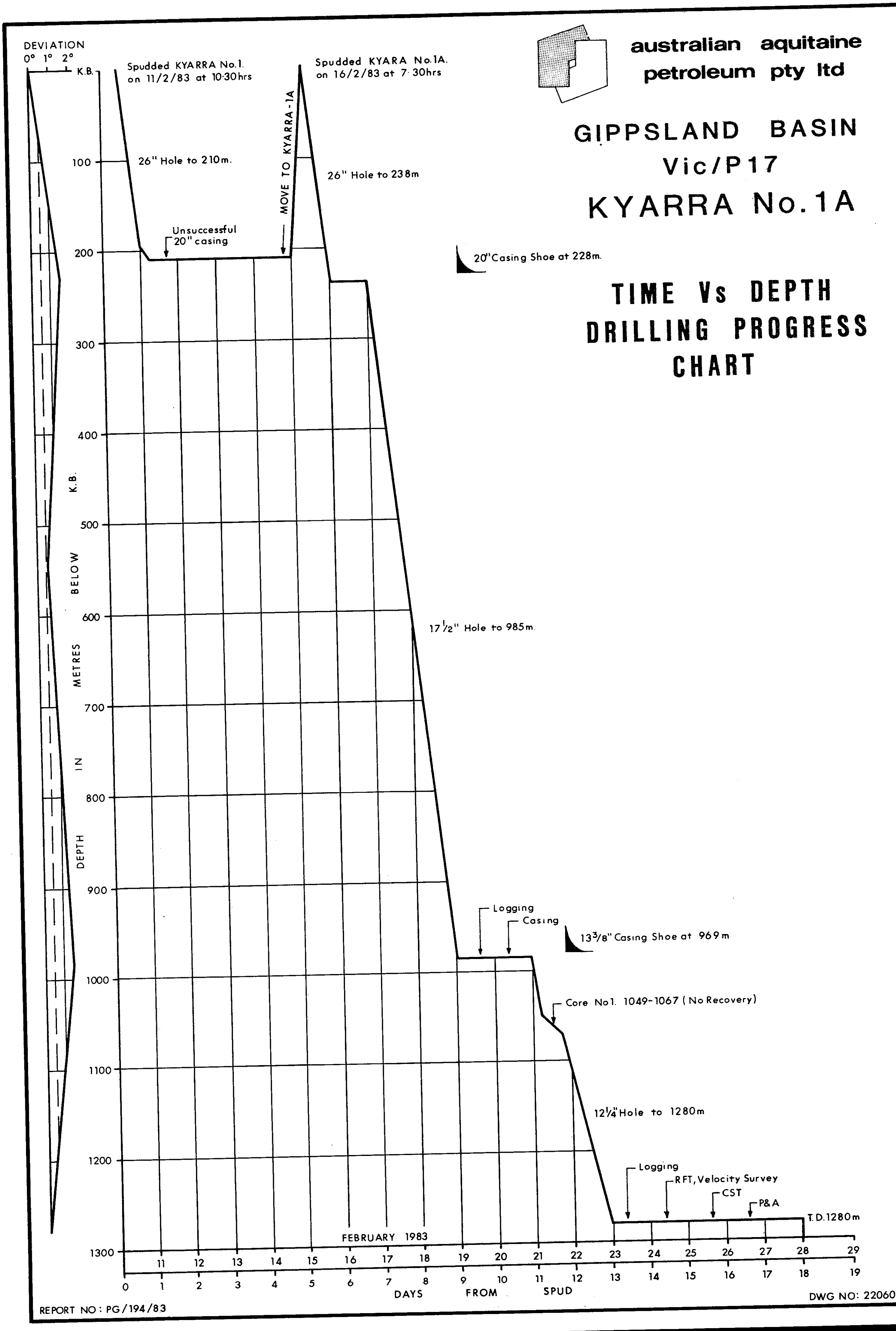
(vi) Location:
SP:No. 780 Line GA81-67
Latitude: 38°40'52.532"S
Longitude: 147°11'12.228"E
Northings: 5718562
Eastings: 516243

Elevation:
Water Depth:- 43.5m
Sea level: 30.5m KB

(viii) Total Depth: 1280m KB

(ix)	Date Drilling Commenced:	11th February, 1983. Kyarra No. 1 16th February, 1983. Kyarra No. 1A
(x)	Date Total Depth Reached:	23rd February, 1983.
(xi)	Date Well Abandoned:	28th February, 1983. Plugged 1st March, 1983. Abandoned
(xii)	Date Rig Released:	1st March, 1983.
(xiii)	Drilling Time in days to TD:	7 days
(xiv)	Status:	Plugged and abandoned
(xv)	Total Cost (by Technical Cost Control)	$4,255,432

FIG.3.



australian aquitaine petroleum pty ltd
GIPPSLAND BASIN
Vic/P17
KYARRA No.1A
TIME Vs DEPTH DRILLING PROGRESS CHART
DEVIATION
0° 1° 2°
K.B.
Spudded KYARRA No.1. on 11/2/83 at 10·30hrs
Spudded KYARA No.1A. on 16/2/83 at 7·30hrs
MOVE TO KYARRA-1A
26" Hole to 210m.
26" Hole to 238m
Unsuccessful 20" casing
20" Casing Shoe at 228m.
17½" Hole to 985m.
Logging
Casing
13⅜" Casing Shoe at 969m
Core No1. 1049-1067 (No Recovery)
12¼" Hole to 1280m
Logging
RFT, Velocity Survey
CST
P&A
T.D.1280m
DEPTH IN METRES BELOW K.B.
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
FEBRUARY 1983
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
DAYS FROM SPUD
REPORT NO: PG/194/83
DWG NO: 22060

B DRILLING DATA

(i) Drilling Contractor: Australian Odeco P/L.
14th Floor, CAGA Centre,
256 Adelaide Terrace,
PERTH WA 6000.

(ii) Drilling Plant: Semi Submersible rig "Ocean Digger" designed to drill to a depth of 5500 metres in water depths from 36 to 183 metres.

Power - Three Fairbanks - Morse. Model 38-D-8-1/8" diesel engines rated at 1800HP each.

Mooring System - Ten Baldt LWT 30,000lb anchors with 3,000 feet of 2 1/2" chain.

Mast - Lee C. Moore 40' x 40' x 142' 1,000,000lb static capacity.

Drawworks - Emsco A 1500 E.

Mud Pumps - 2 of Emsco D-1350.

Mud Tanks - 1020 barrels capacity

Drill String - 5" 19.5 lb/ft drill pipe. 9 1/2", 7 3/4" + 6 1/2" drill collars.

(iii) Blowout Preventer Equipment

18 3/4" 10,000 psi WP BOP stack consisting of:-

- 1 x CIW type "U" triple ram type preventer 10,000 psi WP' with 6 side outlets. Blind Shear Rams on top, 5" Pipe Rams in bottom and middle unit.
- 2 x CIW Collet Connectors 18 3/4" 10,000 psi.
- 1 x Hydril Type GL, 5,000 psi bag preventer.
- 1 x 18 3/4" Vetco pressure balanced ball joint.
  4 x 3 1/8" Shaffer 10,000 psi Fail Safe Valves.
- 2 x 3" 10,000 psi safety pressure lines to surface. One as Choke Line, one as Kill Line.
- Payne 320 gallon BOP Control System.
- 600 feet of 22" OD x 0.50" Regan integral marine riser with 45 foot stroke Slip Joint.
- Regan KFDS Diverter.
- 10,000 psi WP surface choke manifold. Two hand adjustable, two fixed and one remote controlled chokes - all CIW.

(iv) Hole Sizes & Depths

Size		Interval
26"	to	238m
17 1/2"	to	985m
12 1/4"	to	1280m

(v) Casing & Cementing Details

Size	Weight	Grade	Shoe Depth	Cement	Cement To
20"	133lb.ft	X56	228m	33T	Seabed
13 3/8"	68lb.ft	K55	969m	39T	Seabed

(vi) Drilling Fluid

26" Hole: High viscosity spud mud, with returns to seafloor. Viscosity Marsh, 110 plus.

17 1/2" Hole: Type: Sea water/Q. Mix.

Average properties:-
SG : 1.13
VIS (Marsh) : 44
PV : 8
YP : 27
WL : NC
pH : 9
Clna : 19,000 ppm.

12 1/4" Hole: Type: Seawater Polymer

Average properties:-
SG : 1.10
VIS : 47
PV : 11
YP : 19
WL : 6.8
pH : 9.5
Clna : 15,000 ppm

(vii) Water Supply

Potable water distilled on board drilling vessel. Fresh drill water from Welshpool.

(viii) Perforation & Shooting Record

NIL

(ix) Plug back & squeeze jobs: abandonment.

On abandonment:-

Plug No. 1: 12-1/4" hole/13-3/8" casing. 940m to 1200m

Plug No. 2: 13-3/8" casing. 110m to 180m

Total of 57 tones of class "G" cement

NOTE: 13-3/8" casing cut at 89m KB
20" casing cut at 89m KB
Sub sea wellhead recovered from seabed.

(x) Fishing Operations

NIL

(xi) Side Tracked Hole

NIL

(xii) Communications

VHF + UHF Radio link.
Ship to shore telex.
Telephone line with Facsimile.

(xiii) Base of Operations

Welshpool Victoria.

LOCATION

(i) Site Investigations

After plugging the well, and prior to moving the rig from the location of Kyarra No. 1A, divers inspected the sea floor within 30m of wellhead for any debris. No debris were found.

After rig move, a side scan sonar survey was conducted on 5th November, 1982, by Racal-Decca Survey personnel, to investigate the sea floor for any foreign objects that could be present in the area. (For operation details see Appendix 12).

An area of approximately 5.5 km^2 (2km x 2.8km) of sea floor around the wellhead was surveyed. This can be compared to the anchor pattern which was established on a 600m radius from the wellhead.

No debris could be detected on examination of the records.

All relevant data from the survey are filed with Australian Aquitaine Petroleum, North Sydney office.

(ii) Anchoring Methods

Rig anchors, (10) positioned approximately 600 metres from rig. Marked by special buoys.

(iii) Transportation

From Welshpool Base to rig location
1 x 5,600 HP + 1 x 5,400 HP Supply, anchor handling towing vessels. Landing, towing vessel.
1 x Standby vessel.
1 x Puma SA 330J helicopter.
1 x Bell 412 helicopter.

C. FORMATION SAMPLING

(i) Ditch Cuttings

Lagged samples were collected from rig shale shakers by the mud logging personnel (Geoservices). These samples were collected at 10 metre intervals from 20" casing depth 228m to 979m, and 3 metre intervals thereafter to total depth at 1280m.

Four sets of washed and dried cuttings were collected. One complete set was deposited with B.M.R's core and cuttings laboratory in Fyshwick, A.C.T and another with the Mines Department Store, Oil & Gas Division, Port Melbourne. One complete set of cuttings was kept by Aquitaine in their Artarmon store in Sydney and one set was sent to SNEA(P) in Pau - France for analysis. In addition, two sets of unwashed and air dried cuttings were collected and kept by Aquitaine in the Artarmon store.

(ii) Coring

One core was attempted to be cut.

Core No.	Interval	Meters Cut	Recovered	Recovery
1	1049m-1067m	18m	0m	(0%)

(iii) Side Wall Cores

Sidewall cores were taken with Schlumberger CST equipment. One 30 shot gun was run during Run 1 and one 30 shot gun during Run 2.

Run No.	No. of Shots	Recovery	Misfired	Lost	Empty	% Recovery
1	30	30	-	-	-	100
2	30	29	1	-	-	97
TOTAL	60	59	1	-	-	98

Recovered sidewall cores were sent to David Taylor (Paltech) and Wayne Harris (W.M.C) for palaeontological and palynological analyses respectively. In addition selected sidewall cores were sent to AMDEL for source rock analyses and detailed petrology (see Appendices No. 3,4,5 & 6)

Complete descriptions of sidewall cores are presented in Appendix No. 2

(iv) Canned Cuttings

Canned cuttings were collected for the Bureau of Mineral Resources for head space analysis of C1-C5.

One litre paint tins were used and samples were collected from 990m to total depth at an interval of 30 metres.

KYARRA - 1A

D. LOGGING AND SURVEYS

(i) Electric and Wireline Logging

Schlumberger ran the following logs.

DEPTH (m)	DATE	LOGS	ADDITIONAL SERVICES
Suite No. 1 983m Suite No. 2 1277m	20-2-83 24-2-83	1. ISF-SLS-G LDL-G 2. DLL-MSFL-G LDL-CNL-G SLS-G HDT	On 25/2/83 RFT 1 & 2 CST (Shot 60 Rec 59)

Details of Log interpretation are listed in Attachment No. 7.

(ii) Mud Log and Composite Log

The ditch gas was continuously monitored by Geoservices and the master log prepared by the Geoservices personnel is included in Enclosure 2.

A Field Wellsite Log was prepared by Aquitaine geologists and has been incorporated into the composite log, Enclosure 1.

(iii) Velocity Survey

A velocity survey was conducted by Seismograph Services Limited shooting at 41 levels from 105m to 1275m (KB). The results are included in Attachment 2.

(iv) Deviation Surveys

The deviation of hole from vertical was measured by Totco Survey equipment. Maximum deviation recorded was 1-1/4° and details are listed in Appendix 10 and plotted on the composite log - Enclosure 1.

(v) Navigation Survey

The rig was positioned using an "OASIS and "JMR-4A" positioning system. The survey was conducted by Racal-Decca Survey. Results are summarised in Appendix 11.

E TESTING

The testing programme was designed to measure the pressure gradient of the reservoir fluids and to obtain an uncontaminated sample if possible.

Repeat Formation Tester

A total of 16 formation pressure test measurements from 1019m to 1214m were obtained during two runs. In addition, a partly filled lower chamber of mud/water was recovered from 1022.4m RKB, and full upper and lower chamber of mud/water from 1018.5m RKB.

Results are included in Appendix 7 and summarised in Appendix 8.

IV. GEOLOGY

A. Previous Exploration and Surveys

The Gippsland Basin has been a target for oil exploration since the nineteen-thirties with early drilling activities concentrated in the onshore section of the basin where oil seeps are known. The first offshore drilling did not take place until 1965 when Esso drilled "Gippsland Shelf No. 1" which was renamed Barracouta No. 1. In this year both Barracouta and Marlin fields were discovered; the discovery wells were Gippsland Shelf No. 1 and No. 4 respectively. The history of exploration in offshore Gippsland is summarised in Table 3.

Production from the Gippsland Basin is now entering its twelfth year. The major oil and gas prospects have been defined and five oil and two gas fields have been developed. Further development of known fields is continuing and platforms are being designed or fabricated for Cobia, Fortescue, Flounder and Bream.

Exploration by Australian Aquitaine Petroleum and its partners commenced in November, 1981 after the granting of permit VIC/P17. During November the GA-81 seismic survey was carried out and a total of 3536 line km was shot.

This comprised a 1.5km x 1.5km grid over much of the permit area, with a wider spaced grid over the west and southwest part of the permit.

During June 1982, the GA-82 seismic survey was carried out and an additional 403km of seismic was shot.

In addition two wells, Edina No. 1 and Omeo No. 1 were drilled between September 1982 and February 1983.

Based on interpretation of those surveys and regional stratigraphic correlation with a nearby well (Perch No. 1), the Kyarra No. 1 well location was chosen at shotpoint 780 on line GA81-67.

TABLE 1

GIPPSLAND BASIN EXPLORATION HISTORY

SIGNIFICANT DATES

1951 - 1956	BMR runs regional gravity and aeromag.
1960	BHP granted PEP 38 and 39 over the whole basin.
1961 - 1962	BHP runs aeromag surveys.
1962 - 1963	BHP reconnaissance seismic survey.
May 1964	Esso-BHP Farmout Agreement.
1965	Barracouta, Marlin discoveries.
1966	Marlin delineation.
1967	Kingfish, Halibut discoveries.
1968	Tuna, Snapper discoveries.
1969	Mackerel discovery, Barracouta on production.
1970	Halibut, Marlin on production.
1971	Kingfish on production.
1972	Mackerel delineation wells.
1974	First major relinquishment.
1975	Shell relinquishment.
1976	Second round of relinquishments.
1978	Mackerel on production, Fortescue discovery.
1979	Tuna on production.
1980	Final relinquishments.

TABLE 2

SURVEYS IN GIPPSLAND BASIN

YEAR	NAME OF SURVEY	BY	TYPE
1944	Morwell Brown Coal Field	B.M.R.	Onshore Gravity
1948	Morwell Brown Coal Field	B.M.R.	Onshore Gravity
1948-59	Traralgon South	B.M.R.	Onshore Gravity
1951	Yallourn - Morwell - Traralgon	B.M.R.	Onshore Gravity
1951	East Gippsland	B.M.R.	Onshore Gravity
1951-52	Gippsland	B.M.R.	Onshore Magnetic
1952	Avon Area	B.M.R.	Onshore Seismic
1952	Darriman	B.M.R.	Onshore Gravity
1952-53	Gippsland	B.M.R.	Onshore Gravity
1954	Darriman	B.M.R.	Onshore Seismic
1955	"Seven Mile" Nowa Nowa	B.M.R.	Onshore Magnetic
1956	Gippsland Offshore	B.M.R.	Onshore Magnetic
1958	Baragwanath Anticline	B.M.R.	Onshore Gravity
1959	Latrobe Valley	B.M.R.	Onshore Seismic
1960	Bairnsdale - Sale (E. Gippsland) Woodside.		Onshore Seismic
1960	Bass Strait	B.H.P.	Offshore Magnetic
1960	Longford	B.M.R.	Onshore Gravity
1961	Anderson's Inlet	Oil Dev.	Onshore Magnetic
1961	Bass Strait & Encounter Bay	Hematite	Onshore Magnetic
1961	Gippsland Basin	B.M.R.	Onshore Gravity
1961	Rosedale	B.M.R.	Onshore Seismic
1961	Sale - Lake Wellington	Woodside	Onshore Seismic

1962	Sale (Extended)	Arco (Woodside)	Onshore Seismic
1962-63	Flinders Island	Hematite	Offshore Seismic
1962-63	Ninety Mile Beach	ARCO Woodside	Offshore Seismic
1963	Gormandale	A.P.M.	Onshore Seismic
1964	Gippsland Shelf (EG)	Esso	Offshore Seismic
1964	Seaspray	AROC	Offshore Seismic
1965	Offshore Gippsland Basin	Shell	Offshore Seismic
1965	Paynesville	Woodside	Onshore Seismic
1965	Woodside - Paynesville	Woodside	Onshore Seismic
1966	ET 66 G.B.	Esso	Offshore Seismic
1966	Rosedale	A.P.M.	Onshore Gravity
1966	Stockyard Hill	Woodside	Onshore Gravity
1966-67	Hydrosonds Survey	B.O.C.	Onshore Seismic
1967	Eastern & Western Bass Strait	Magellan	Aeromagnetic
1967	Ex-67 G.B.	Esso	Offshore Seismic
1967	EC-67 G.B.	Esso	Offshore Seismic
1967	Golden Beach	B.O.C.	Offshore Seismic
1967	Sole Sparker	Shell	Sparker offshore Seismic
1967	Venus Bay	Alliance	Sparker Offshore Seismic
1968	EH-68 G.B.	Esso	Sparker Offshore Seismic
1968	Tarwin	AOD	Onshore Seismic
1968	Toongabbie	APM	onshore Seismic
1968-69	East Gippsland	Magellan	Seis & Magnetic

1968-69	G69A	Esso	Offshore Seis & Mag
1969	Bemm River	WYP Dev.	Onshore Gravity & magnetic
1969	Cape Patterson	Alliance Oil	Onshore Gravity & Seismic
1969	Gippsland Basin Onshore	Woodside	Onshore Seismic
1969	Lakes Entrance Offshore	BOC & Woodside	Offshore Seismic
1969	Tasman - Bass Strait	Magellan	Offshore Seismic Sparker & Magnetic
1970	Bemm River	YPO Dev.	Onshore Seismic
1970	G69B (Sole Structure)	Hematite	Offshore Seismic
1970	G70A (Tuna Structure)	Hematite	Offshore Seismic
1970	Seaspray	Woodside Planet Etc.	Offshore Seismic
1970	Central High Survey	Shell	Offshore Seismic
1970	Tarwin	A.O.D.	Onshore Seismic
1970-73	Continental Margin	B.M.R.	Offshoe Seismic
1971	G71A	Esso	Offshore Seismic
1971	G71B	Esso	Offshore Seismic
1972	G72A	Esso	Offshore Seismic
1972-73	Continental Margin	Shell	Offshore Geophysical
1973	North East Furneaux	Magellan	Offshore Seismic
1973	G73A	Esso	Offshore Seismic
1973	G73B	Esso	Offshore Seismic
1973	Offshore Gippsland Basin Survey	Shell	Offshore Seismic
1974	G74A	Esso	Offshore Seismic
1976	G76A	Esso	Offshore Seismic
1977-78	G77A	Esso	Offshore Seismic

1980	G80A	Esso	Offshore Seismic
1980	GB-79	Beach	Offshore Seismic
1980	GBS-80	Bass Strait O & G	Offshore Seismic
1980	GC-80	Cultus Pacific	Offshore Seismic
1980	MGS-80	Mincorp	Airborne Geochemical
1980	MSI-80	Mincorp	Airborne Geochemical
1981	GB-81	Beach	Offshore Seismic
1981	GBS-81	Bass Strait O & G	Offshore Seismic
1981	G81A	Esso	Offshore Seismic
1981	GM81A	Mincorp	Onshore Seismic
1981	GB81A	Beach	Onshore Seismic
1981	GA81A	Aust. Aquitaine	Offshore Seismic
1981	GA81A Ext.	Bass Strait O & G	Offshore Seismic
1981	GP81A	Phillips	Offshore Seismic
1981	GC82A	Cultus Pacific	Offshore Seismic
1981-82	GS81A	Shell	Offshore Seismic
1981-82	G82A	Esso	Offshore Seismic
1981-82	G82B	Esso	Offshore Seismic
1982	CSR-82A	Sion Resources	Onshore Seismic
1982	GH82A	Hudbay	Offshore Seismic
1982	GB82A	Beach	Onshore Seismic
1982	G82C	Esso	Offshore Seismic
1982	GA82B	Aust. Aquitaine	Offshore Seismic.

IV. B. REGIONAL GEOLOGY

The Gippsland Basin formed as the result of two separate phases of continental separation along new plate boundaries. Initial formation has been related to a phase of intra-cratonic rifting between the Tasmanian block and the Australian mainland which occurred between 140 and 100 MY BP (Elliot; 1972). This rift extended from the Otway Basin to the Bellona Gap on the Lord Howe Rise to the East.

The boundary of the Gippsland Basin is marked to the south by the marginal fault system which brings basement rocks of the Bassian Rise in contact with basinal sediments. The northern boundary is an unconformable contact between basin sediments and rocks of the Tasman Fold Belt, while the western boundary with the Otway Basin is marked by the Selwyn Fault on Mornington Peninsula.

Initial sedimentation occurred in the latest Jurassic or Early Cretaceous with a sequence of entirely non-marine greywackes, chloritic mudstones and occasional coals being deposited. Much of the coarse clastic component of these sediments was derived from contemporaneous acid to intermediate volcanics which are inferred to have a southerly provenance. These sediments are collectively termed the Strzelecki Group and appear to have limited hydrocarbon source and reservoir potential.

The separation of the Lord Howe Rise and New Zealand from eastern Australia abound 80 MY to 60 MY BP marked a general increase in the rate of subsidence within the Gippsland Basin. Fluviatile sedimentation continued in the Late Cretaceous but gave way to prograding deltaic complexes during the Palaeocene and Eocene. Individual complexes have yet to be delineated by well and seismic data although Loutit and Kennett (1981) have related sedimentary cycles within the Gippsland Basin to global eustatic and sea level changes. These depositional cycles are recognisable from the Late Cretaceous to Late Eocene Latrobe Group through to the Oligocene to Early Miocene Lakes Entrance Formation (Figure 4). At the top of the Latrobe Group a regional transgression inundated the basin and caused the formation of a series of barrier systems during periods of stillstand. Associated with these barrier systems are glauconitic, nearshore marine facies together with lagoonal and marsh facies in which coal-forming carbonaceous sediments were laid down. This transgressive sequence, which marks the final phase of Latrobe sedimentation, is termed the Gurnard Formation; although this classification is still informal.

The Latrobe sequence, containing many channel, point bar and barrier sand bodies, is the primary reservoir sequence within the Gippsland Basin. Intra-Latrobe seals are formed by siltstone and coal sequences of the marsh facies while the top of the Latrobe Group is sealed by the glauconitic siltstone of the Gurnard Formation and the calcareous siltstones and claystones of the Lakes Entrance Formation.

The transgressive phase which resulted in the formation of the Gurnard and Lakes Entrance sediments has been related to the separation of Antarctica from southern Australia, which began about 45 MY BP. During this period and the Late Miocene en echelon anticlines and shear faults were generated. This pattern of faults and northeast-southwest trending anticlines is compatible with the existence of a dextral wrench couple operating in the region at the time. It is this phase of structuration which acted upon the Latrobe sediments and formed the major structural targets for hydrocarbon exploration within the basin.

During the Oligocene and into the Early Miocene, deposition of shale and marl occurred throughout the basin and onlapped the basin margins and structural "highs". Miocene sedimentation gradually changed in style from the shales and marls of the Lakes Entrance Formation to the bryozoan limestone and marl of the Gippsland Limestone. This limestone sequence is characterised offshore by two major depositional features. On the southern platform a massive linear slump zone occurs which can be traced seismically for more than 130km. Over the remainder of the basin complex channeling is in evidence caused by structural movements and eustatic sea level changes.

The final period of basin development was marked by a return to continental clastic sedimentation in southern Gippsland with marine sedimentation continuing on the continental shelf. The highland region north of the basin and the South Gippsland Hills along the western margin were uplifted during the Kosciusko uplift in the Late Pliocene.

C. (i) REGIONAL STRATIGRAPHY

The Stratigraphy of the offshore Gippsland Basin is summarised in Figure 4.

Basement

The basement is composed of slighlty metamorphosed Paleozoic sediments of the Tasman Geosyncline. These rocks are exposed in the Victorian Ranges to the north and form islands along the Bassian Rise to the south. The geosyncline sediments are composed of deformed siltstones, shales, sandstones and igneous rocks of Ordovician and Silurian age which are overlain by Devonian - Carboniferous red beds made up of conglomerates, sandstones and pebbly sandstones with interbedded rhyolite, rhyodacite and trachytes (Threlfall et al., 1976). These Devonian - Carboniferous rocks are believed to have been the major source of coarse clastic sediments in the Gippsland Basin.

Four wells (Groper 1, Groper 2, Bluebone 1 and Mullet 1), located along the southern margin of the basin, reached basement rocks in granite and in red siltstones and sandstones. Although the basin centre has never been reached by drilling, aeromagnetic surveys suggest that basement rock will be similar to those found onshore.

Early Cretaceous (Strzelecki Group)

The Strzelecki Group represents the first sediments to have deposited in the Basin. The group consists of non-marine, immature greywackes, shales and coals. The greywackes are medium-grained and composed of quartz, rock fragments and feldspar grains held together by abundant chloritic and kaolinite clay matrix and minor calcareous cement. The shales are micaceous and slightly carbonaceous. The rocks are interpreted to have been deposited in alluvial fan and alluvial plain environments in a rapidly subsiding basin. The sandstones contain much volcanic material and have poor reservoir characteristics. Therefore, the group has been generally regarded as economic basement in the offshore area. The maximum thickness of the Group is estimated to be more than 3,500m (James and Evans, 1971).

The Strzelecki Group is exposed onshore at Narracan and Balook Highs. Offshore, in the areas where the group is reached by drilling or recognised seismically, it is separated from the overlying Latrobe by an angular unconformity.

Late Cretaceous - Eocene (Latrobe Group)

Latrobe undifferentiated: This sequence refers to the Late Cretaceous-Eocene sediments offlapping the Strzelecki Group and which contain major hydrocarbon accumulations. The maximum thickness of the sequence is estimated to be approximately 5,000m. In the western and central basin, non-marine deposition was predominant from Late Cretaceous to Early Eocene with the formation of alluvial and delta plain deposits comprising quartzose sandstone, coal, mudstone, siltstone and shale. Sand grains range from very fine to very coarse. Volcanic rock fragments and feldspars are less abundant than in the Strzelecki Group. The sandstones are poorly sorted but more mature than the underlying Strzelecki sandstones. At the end of the Late Cretaceous the southeastern side of the basin was encroached by a marine shoreline, but the centre of the basin was still largely a site of non-marine deposition. The upper section of Paleocene-Eocene age shows numerous point bar sandstones embedded in swamp deposits. The paleocurrent direction, as determined from the variation of these sandstones, is from the northwest (Threfall et al., 1976).

Gurnard Formation: This formation refers to the reworked sediments which were formed during the major transgression of the Eocene. These sediments vary from nearshore muds containing glauconite, to shoreline deposits including beach sand and backswamp coal. The unit, which has an erosional contact with the underlying deltaic sediments, is in turn overlain by marine sediments of the Lakes Entrance Formation.

Flounder Formation: This occurs only in the eastern side of the basin (outside of VIC/P17) and is composed of marginal marine to marine sediments which filled the channels cut during the Early Eocene time. The fill of up to 500m thick (as encountered at Flounder No. 1) consists of clayey siltstone containing varying amounts of coarse clastics. The siltstone is grey-brown in colour, micaceous, pyritic, and contains both benthonic and planktonic foraminifera.

Turrum Formation: This also occurs only in the eastern side of the basin where, during the Late Eocene, the area was eroded by the Marlin channel and later filled with marine shales of latest Eocene age. The shales are up to 350m thick, dark grey-brown in colour, slightly calcareous, slightly pyritic and micaceous.

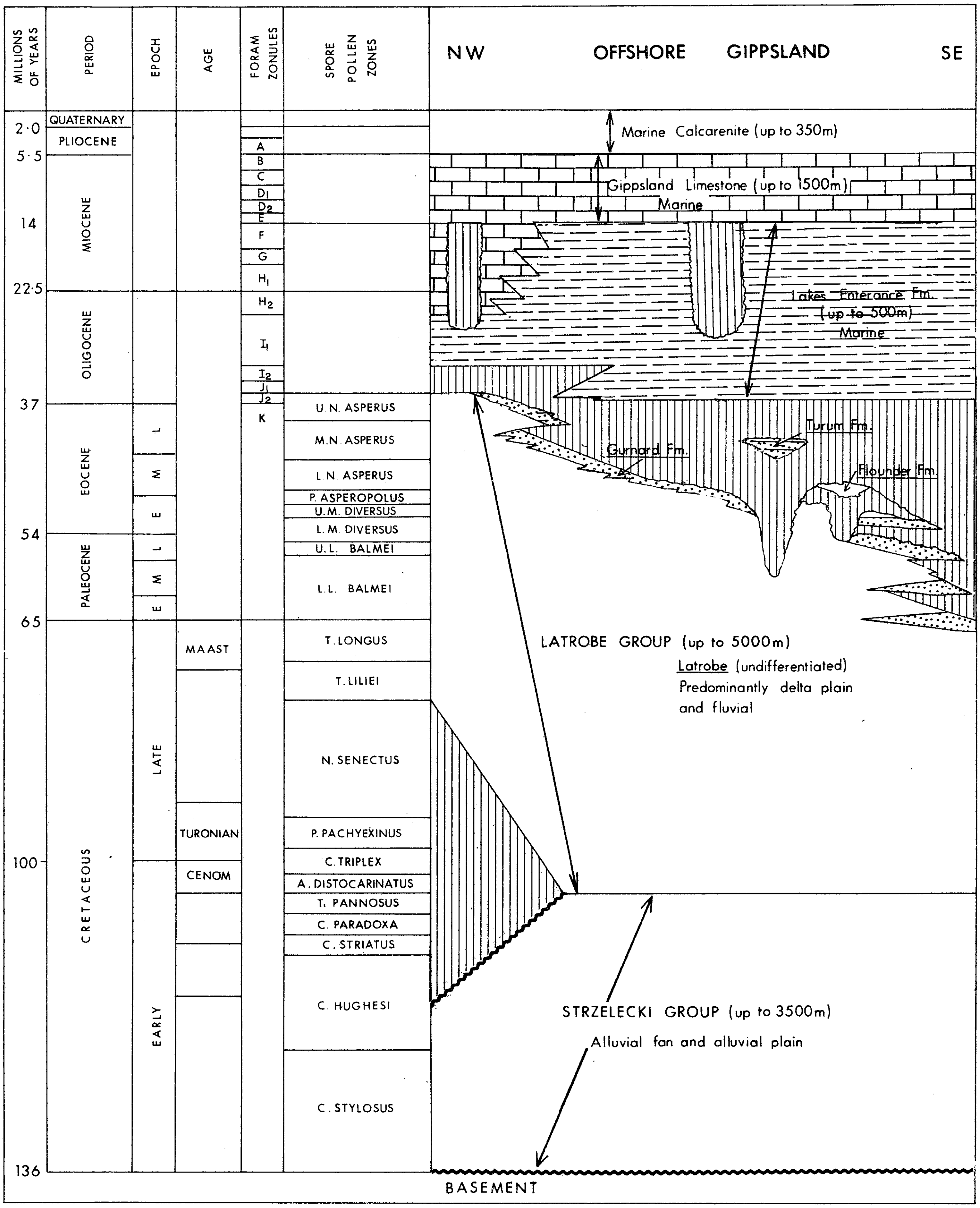
Oligocene - Miocene

The Oligocene-Miocene sequence consists of two formations: the Lakes Entrance Formation and the Gippsland Limestone (figure 4). Although these two formations represent two separate units onshore, their offshore contact is gradational. The Lakes Entrance Formation refers to the maximum 500m thick unit of marine mudstone overlying the Latrobe Group. The mudstone is light olive-green in colour, sometimes grey with a variable argillaceous and calcareous content. It contains pyrite, glauconite and marine fauna.

The Gippsland Limestone was first used to describe the onshore Miocene limestones and marls which overlie the Lakes Entrance Formation. Offshore, the Lakes Entrance Formation grades upward to a unit of 1500m of Miocene limestone, calcarenite and marl with occasional coarse clastics of mudstone. Slumping and sub-marine channelling are common in the Miocene and are probably related to the tectonic and structural movements in the basin and sea level changes.

Pliocene - Recent

Up to 350m of marine calcarenites lie between the Miocene Gippsland Limestone and the sea floor. Stratigraphic data on this uppermost sequence are generally lacking, although foraminiferal assemblages suggest that the lower part of the sequence may belong to Late Miocene.



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Gippsland Basin VIC/P17

STRATIGRAPHY

OFFSHORE GIPPSLAND BASIN

C. (ii) STRATIGRAPHY OF SEDIMENTS PENETRATED

The regional stratigraphy of the offshore Gippsland Basin is summarised in Fig. 4.

The stratigraphy and thickness of sediments penetrated in Kyarra No. 1A are summarised in Fig. 6 and Table 3.

TABLE 3

<table>
<tr><th colspan="2">AGE</th><th>FORAM ZONULES</th><th>SPORE POLLEN ZONE</th><th colspan="2">FORMATION</th><th>GROUP</th><th>FORMATION TOP (K.B.)</th><th colspan="2">THICKNESS</th></tr>
<tr><td colspan="2">PLIOCENE TO RECENT</td><td></td><td></td><td colspan="2">UNDIFFERENTIATED</td><td></td><td>74m</td><td colspan="2">272m?</td></tr>
<tr><td rowspan="2">MIOCENE</td><td>? LATE</td><td></td><td></td><td colspan="2">GIPPSLAND LIMESTONE</td><td></td><td>272m ?</td><td>646m</td><td rowspan="2">740m</td></tr>
<tr><td>EARLY</td><td>H1</td><td></td><td colspan="2">LAKES ENTRANCE FORMATION</td><td></td><td>919m</td><td>94m</td></tr>
<tr><td colspan="2" rowspan="2">EARLY OLIGOCENE</td><td>NFF</td><td>UNA *E</td><td colspan="2">GURNARD FORMATION</td><td rowspan="4">LATROBE GROUP</td><td>1013m</td><td>15m</td><td rowspan="2">78m</td></tr>
<tr><td>NFF</td><td>*E</td><td rowspan="3">UNDIFFERENTIATED LATROBE FORMATION</td><td>UPPER</td><td>1028m</td><td>63m</td></tr>
<tr><td colspan="2">EOCENE</td><td>NFF</td><td>UNA *E UNA</td><td>INTRA</td><td>1091m</td><td colspan="2">82m</td></tr>
<tr><td colspan="2">PALEOCENE</td><td>NFF</td><td>NFF ULB</td><td>BASAL</td><td>1173m</td><td colspan="2">43m</td></tr>
<tr><td colspan="2">?</td><td>NFF</td><td></td><td colspan="2">VOLCANICS</td><td></td><td>1216m</td><td colspan="2">35m</td></tr>
<tr><td colspan="2">EARLY CRETACEOUS</td><td>NFF</td><td></td><td colspan="2">STRZELECKI</td><td></td><td>1251m</td><td colspan="2">29m</td></tr>
</table>

NFF = NO FOSSIL FOUND
UNA = UPPER N. ASPERUS (EARLY OLIGOCENE TO LATE EOCENE)
ULB = UPPER L. BALMEI (LATE PALEOCENE)
*E = EXTENSA (REWORKED MIDDLE TO LATE EOCENE)

PLIOCENE TO RECENT (UNDIFFERENTIATED) SEA FLOOR - 272m ? KB

Most of this section was drilled with no sample returns (Sea floor - 240m KB).

The base of this sequence has been picked at 272m from log character and lithological changes of the cuttings after drilling out 20" casing shoe. On a regional bases, up to 350m of marine calcarenites lie between the Miocene-Gippsland Limestone and the sea floor.

Stratigraphic data of this sequence are lacking and the lower part of this sequence may be transitional into the Late Miocene - Gippsland Limestone.

Lithology is composed of Calcarenite (80%) light grey, white, fine to medium angular grains, poorly sorted, moderately to well cemented, common fossil fragments (5-15%) with minor Limestone white, opaque, tan, microcrystalline, hard, and traces of loose quartz grains, clear-opaque, medium grained, rounded to subrounded.

MIOCENE (272m? to 1013m KB)

The Miocene sequence consists of two formations, the Gippsland Limestone and the Lakes Entrance Formation.

Although these two formations represent two distinct units onshore, their offshore contact is often gradational.

GIPPSLAND LIMESTONE - EARLY TO LATE MIOCENE (272m? -919m KB)

The Gippsland Limestone formation is composed mainly of Calcareous claystone, interbedded with minor Calcarenite & Limestone, with local beds of Sandstone and Siltstone.

Calcareous claystone is light grey, grey, occasionally white and light brown, soft, dispersing, sticky, with minor calcareous grains, clay chips, silty carbonaceous particles, and loose quartz grains, fossiliferous, with traces of glauconite and pyrite towards the base.

Calcarenite is light grey to white, occasionally light brown, firm to friable, generally fine grained, angular - subangular, poorly sorted, moderately to well cemented.

Limestone is white, opaque, tan, occasionaly light grey and dark grey, generally hard, microcrystalline.

Sandstone is quartzose, fine grained, subangular to subrounded, soft, calcareous clay cement, fairly sorted.

Siltstone is grey to dark grey, soft to firm, slightly laminated and carbonaceous in part.

LAKES ENTRANCE FORMATION - EARLY MIOCENE (919 - 1030m KB)

The sequence is comprised of glauconitic, Calcareous Claystone and Siltstone, deposited in a shallow marine environment. It represents the initiation of the fully trangressive marine, sedimentation in the Gippsland Basin.

However, at Kyarra No. 1A the basal sediments representing this transgression are all Early Miocene and are younger than the base of the trangressive sequence in the more basinward situation where carbonate sedimentation commenced in Late Oligocene.

The top of this sequence has been picked at 919m from log character and lithological change.

The Lakes Entrance Formation is composed of Claystone, light grey, grey - grey green, occasionally light brown, soft, sticky, becoming firmer towards the base, calcareous, silty in part, with traces of fossil fragments, slightly glauconitic and pyritic, becoming very glauconitic towards the base; interbedded with Siltstone grey to dark grey, becoming light grey to grey green towards the base, soft to firm, carbonaceous and micaceous in part, slightly calcareous, glauconitic and pyritic.

LATE PALEOCENE TO EARLY OLIGOCENE (LATROBE GROUP) 1013 - 1216m KB

The Latrobe Group is comprised of two formations, the Gurnard and undifferentiated Latrobe Formation.

Stratigraphic data on this sequence are lacking for an accurate stratigraphic classification (see Appendix 3 & 4).

All of this sequence was barren of foraminifera although the palynological analyses of most samples have yielded a very well preserved assemblage. The presence of Upper N. Asperus in most samples from 1013 to 1166m did not help to establish the boundary between Oligocene and Eocene.

The lower part of this sequence (1166 to 1216m) was also barren of assemblages except for the sample at 1215.5m which infers the Upper L. Balmei palynological zone (Late Paleocene).

GURNARD FORMATION - EARLY OLIGOCENE 1013 - 1028m KB

The Gurnard Formation unconformably underlies the Miocene sediments and has been interpreted as being deposited in a shallow marine environment.

The sequence is composed of Sandstone, greenish grey to dark grey, fine grained, subangular - angular, moderately to well sorted, very glauconitic (15 - 25%) micaceous, non calcareous, slightly argillaceous in part, good visual porosity; with minor Siltstone, light grey, light brown, argillaceous, slightly calcareous and micaceous, trace pyrite.

The presence of an Extensa (Middle to Late Eocene) dinoflagellate zone in SWC at 1013m and fragments of micaceous siltstone from below 1252m demonstrate that previously deposited sediments were reworked in this sequence.

The base of the Gurnard Formation has been picked at 1028m.

UNDIFFERENTIATED LATROBE FORMATION - EARLY OLIGOCENE TO LATE PALEOCENE 1028 - 1216m KB

This sequence unconformably underlies the Gurnard Formation, and has been interpreted as having three major lithological and stratigraphical zones.

UPPER LATROBE - EARLY OLIGOCENE 1028 - 1091m KB

This sequence has been interpreted as being deposited in a shore zone environment and consists of Sandstone, grey, clear to opaque, medium to coarse, slightly glauconitic (1%) and pyritic at top (1028-1040m) becoming light grey, clear, greenish grey, fine to medium below. The Sandstone is generally well sorted, quartzose, rounded to subrounded with excellent visual porosity, with minor interbeds of silty Claystone, light grey to grey, soft occasionally firm and blocky, slightly glauconitic and pyritic.

INTRA LATROBE - EOCENE 1091 - 1173m KB

This sequence has been interpreted as being deposited in a deltaic environment and consists of interbedded Siltstone, Sandstone, Claystone, carbonaceous Shale and Coal (1191 - 1133m) overlying a delta front Sandstone (1133 - 1162m) grey, quartzose, generally coarse, subangular, occasionally fine to medium, angular, micaceous and carbonaceous in part, moderately sorted, with good visual porosity. This overlies an interbedded sequence of Coal, Siltstone and Sandstone (1162 - 1173m).

BASAL LATROBE - PALEOCENE - 1173 - 1216m KB

This sequence consists of interbedded Claystone light grey, soft, micaceous, silty and Sandstone light grey, fine grained, angular, clean, quartzose at top becoming argillaceous towards the base, slightly miceous, carbonaceous and pyritic.

The base of this formation is marked by an erosional surface on volcanics.

VOLCANICS 1216 - 1251m KB

No stratigraphic data are available on this sequence.

This sequence consists of interbedded weathered pyroclastics and basalt flows overlying a fresh basaltic lava at the base.

EARLY CRETACEOUS (1251m - 1280m TD) STRZELECKI GROUP

The Strzelecki Group consists of interbedded Siltstone, grey, green grey, micaceous and carbonaceous, lithic, slightly weathered at the top grading to silty shale in part, tight, slightly fissile; and Shale black, carbonaceous, soft, containing some coal fragments.

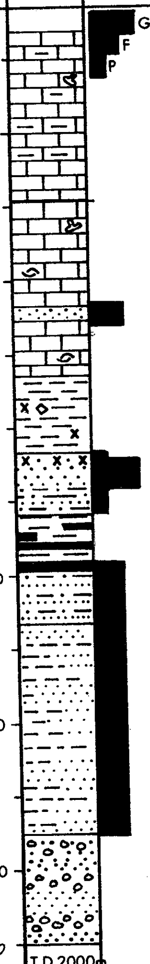
The reappearance of this rock type as a component of the Gurnard Formation at 1020m suggests that this unit of the Strzelecki Group was exposed on the margins during deposition of the upper part of the Latrobe Group.

FIG. 3.

AUSTRALIAN AQUITAINE PETROLEUM PTY. LIMITED

KYARRA #1 (Proposed)

Casing and Cores	Depth m. ft. M.S.L.	Section	Reservoir Sal (g/l)	Seismic Horizon Tests & Shows	Lithology	Stratigraphy
				T.W.T.	SEA FLOOR -43 m	



Depth scale (m): 200, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3200, 3400, 3600, 3800

Depth scale (ft): 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10 000, 11 000, 12000, 13000

Seismic Horizon (T.W.T.)	Lithology	Stratigraphy
	43 - 440 m (397 m) Limestone : Skeletal - detrital, white to buff, slightly argillaceous and glauconitic, firm, massive.	GIPPSLAND LIMESTONE – LATE – MIOCENE - RECENT
0·465	**440 - 815 m (375)** Limestone : Buff to grey/brown, firm, detrital, slightly argillaceous, granular matrix. Sandstone : Light grey, fine to coarse grain, chert frags.	GIPPSLAND LIMESTONE – EARLY – MIOCENE - RECENT
0·745	**815 - 970 m (155)** Mudstone : Light grey to light green, calcareous, pyrytic, glauconitic, fossiliferous	LAKES ENTR. FM. – E-L – OLIG.
BROWN 0·885	970 m Sandstone : Medium to fine.	GURNARD
0·930 YELLOW	1050 m Predominantly Siltstone.	UNDIFFERENTIATED LATROBE – LATROBE GROUP – EARLY - LATE – EOCENE
	1105 m Lignitic Shale.	
	1150 m Coal with Siltstone and Shale.	
	1211 m Siltstone and Sandstone interbedded.	
1·090 PURPLE	**1335m - 1770m (435 m)** Sandstone : fine to medium grain, light grey/green, lithic, calcareous, micaceous and carbonaceous. Siltstone : grey to grey/brown, very argillaceous, hard, pyritic, micaceous, carbonaceous.	UNDIFFERENTIATED LATROBE – LATROBE GROUP – L. CRETACEOUS TO PALAEOCENE
1·335	**1770m - T.D.** Metamorphosed. Conglomerates, sandstones and pebbly sandstones (red beds) and interbedded Rhyolite.	DEVONIAN
1·437		

Note:
T.D. will be 2,000m unless basement is encountered at a shallower depth. Prognosed depth to basement is shallowest probable case.

Permit	VIC/P17
Location	Line GA81-67 S.P. 780
Latitude	38° 40' 51·9" S
Longitude	147° 11' 12·4" E
Rig	OCEAN DIGGER
K.B.	+30·5 m M.S.L.
G.L.	-43·0 m M.S.L.
T.D.	2000m
Status	WILDCAT
Spudded	DECEMBER 1982
Operator	A.A.P.
Cost	
Cost/ft.	

Objectives
(1) Upper Latrobe Group delta front sand body.
(2) Channel and bar sands of Latrobe Group.

Structure: Late Miocene rollover associated with reverse faulting, but independant of fault closure.

Comments
(1) Location is selected to test Top-Latrobe structure and also a deltaic sand, stratigraphic play of probable Late Eocene age.
(2) Top of basement is very indistinct on seismic and may be deeper than indicated.
(3) From seismic character basement is of Devonian metamorphosed sediments.
(4) Strzelecki Group is interpreted to be absent at this location.

Author: S. FORDER
Date: NOV. 1982
Base Map No 9112
Dwg. No.: 21229

FIG : 6

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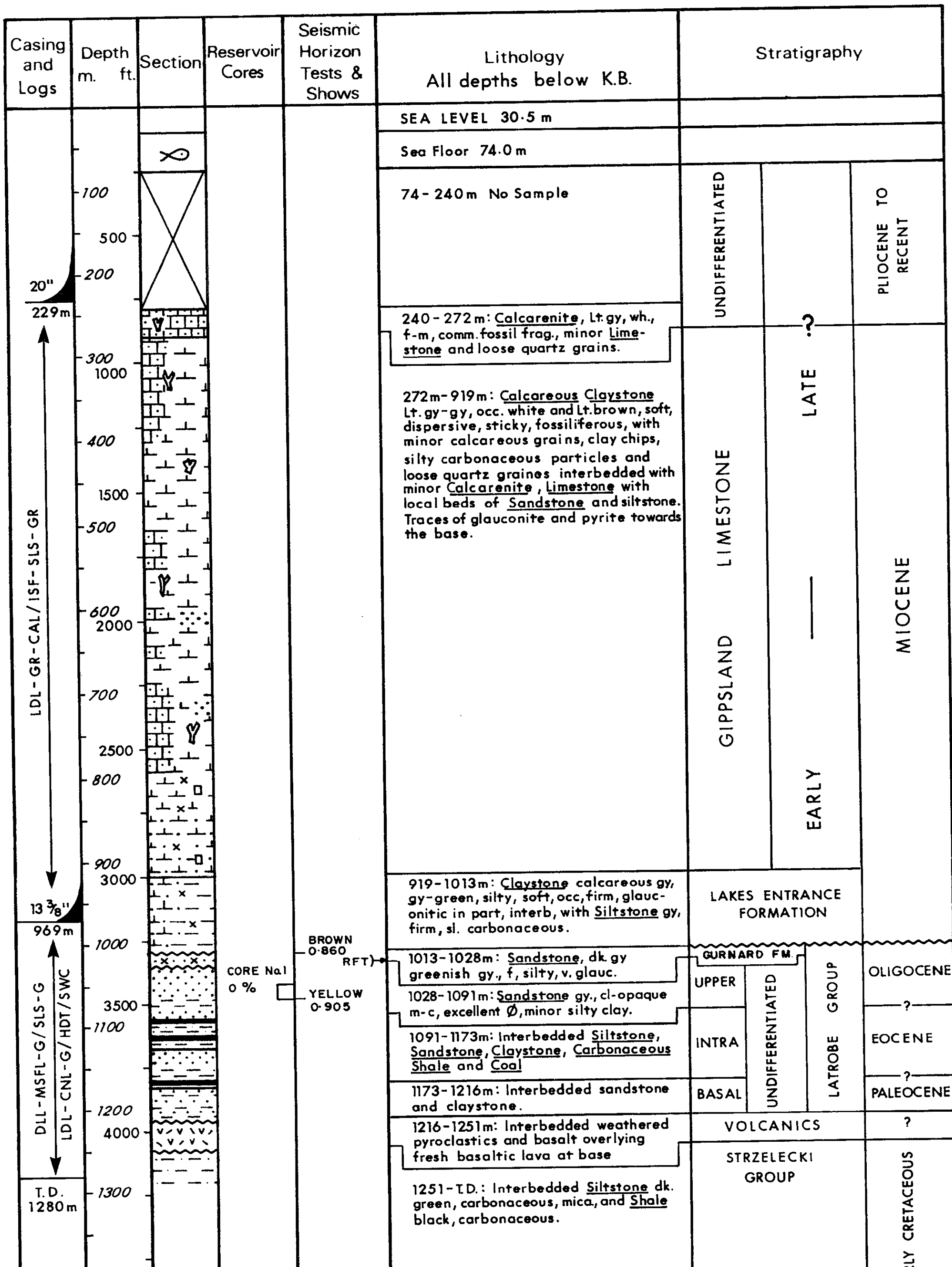
KYARRA No.1A COMPLETED SECTION



RFT No.1 : (1022·4 m) Sample with lower chamber for 24min at 24-80psi then seal failure. Recovered 2000cc of mud & 1750 of water, resistivity of 0·31 ohm-m at 74°F, 20,000 ppm Na Cl equiv.

RFT No.2 : (1018·5 m) Sample with lower chamber for 43 min at 450-1430 psi formation pressure. Recovered 1500cc of mud & 8,000cc of water, resistivity of 0·035 ohm-m at 72°F, 18,000 ppm Na Cl equiv. Sample with upper chamber for 50 min at 470-1428 psi formation pressure. Recovered 9250cc of water, resistivity 0·48 ohm-m at 72°F, 13,000 ppm Na Cl equiv. (7,000 ppm measured Cl.)

Core No.1 : 1049-1067m. No Recovery

Permit	Vic/P17
Location	S.P. 780 Line GA81-67
Latitude	38°40'52·532"S
Longitude	147°11'12·288"E
Rig	Ocean Digger
K.B.	30·5m (A.M.S.L)
W.D.	74·0m (K.B.)
T.D.	1280 m (K.B.)
Status	P&A on 28-2-83
Spudded	11-2-83 (No.1) 16-2-83 (No.1A) T.D. Reached 23-2-83
Operator	A.A.P.
Cost	$ A 4,255,452
Cost/ft.	$ A 3,324·57

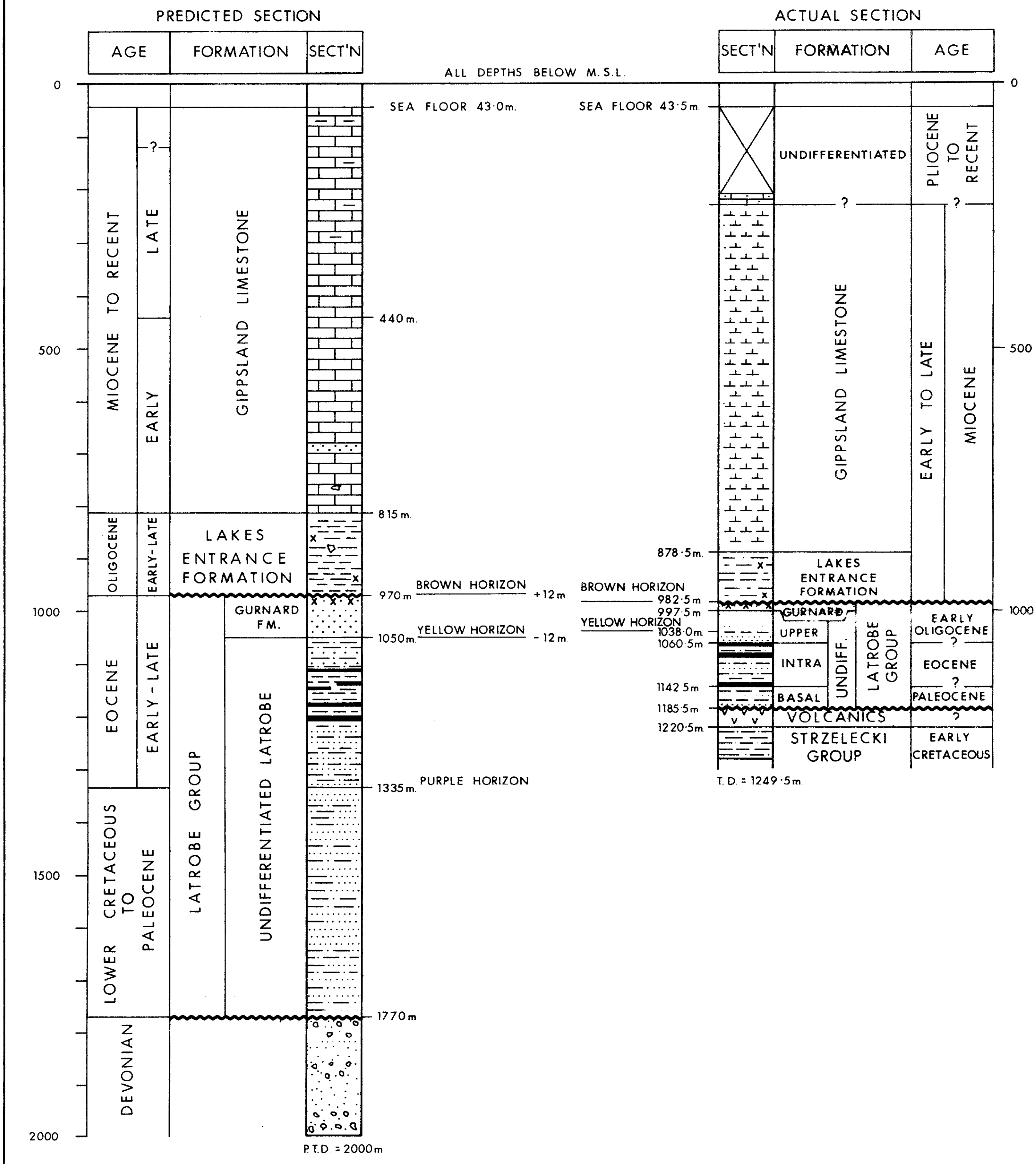
Objectives
1. Upper Latrobe Group Delta Front Sand Body.
2. Channel & Bar Sands of Intra Latrobe Group

Structure
Late miocene rollover associated with reverse faulting but independant of fault closure.

Comments
1. Strzelecki top not predicted in implantation.
2. Dip of 20° below 1251m (CYBERDIP)
3. No closure at Brown Horizon.
4. Yellow Horizon corresponds to thin claystone band with in the shore-zone sand in the Upper Latrobe
5. Delta front sand body in the Upper Latrobe Group not present.

Author: V. DJOKIC

Date: AUGUST 1983
Base Map No 9112
Reference No. 22064



COMPARISON OF PREDICTED TO ACTUAL DRILL SECTION

australian aquitaine petroleum pty ltd

VIC/P17

GIPPSLAND BASIN

KYARRA No.1

Author : V. DJOKIC	Date : AUGUST 1983	Dwg. No. 22065	FIG. 7
Drafted by : C.O'C.	Report No. PG 194/83	Base Plan :	

D. STRUCTURE

Kyarra is a small structural culmination situated on the folded upthrown block of an east-west trending high angle reverse fault. The fault, which probably also has a component of dextral shear, is considered to be largely Late Miocene in age as deformation can be traced through much of the Miocene sequence with sedimentary onlap occurring in the uppermost Miocene. Above this level the seismic horizons show no disturbance. Strzelecki Group sediments are present below the Latrobe Formation and dip consistently at around 15° to the west-southwest.

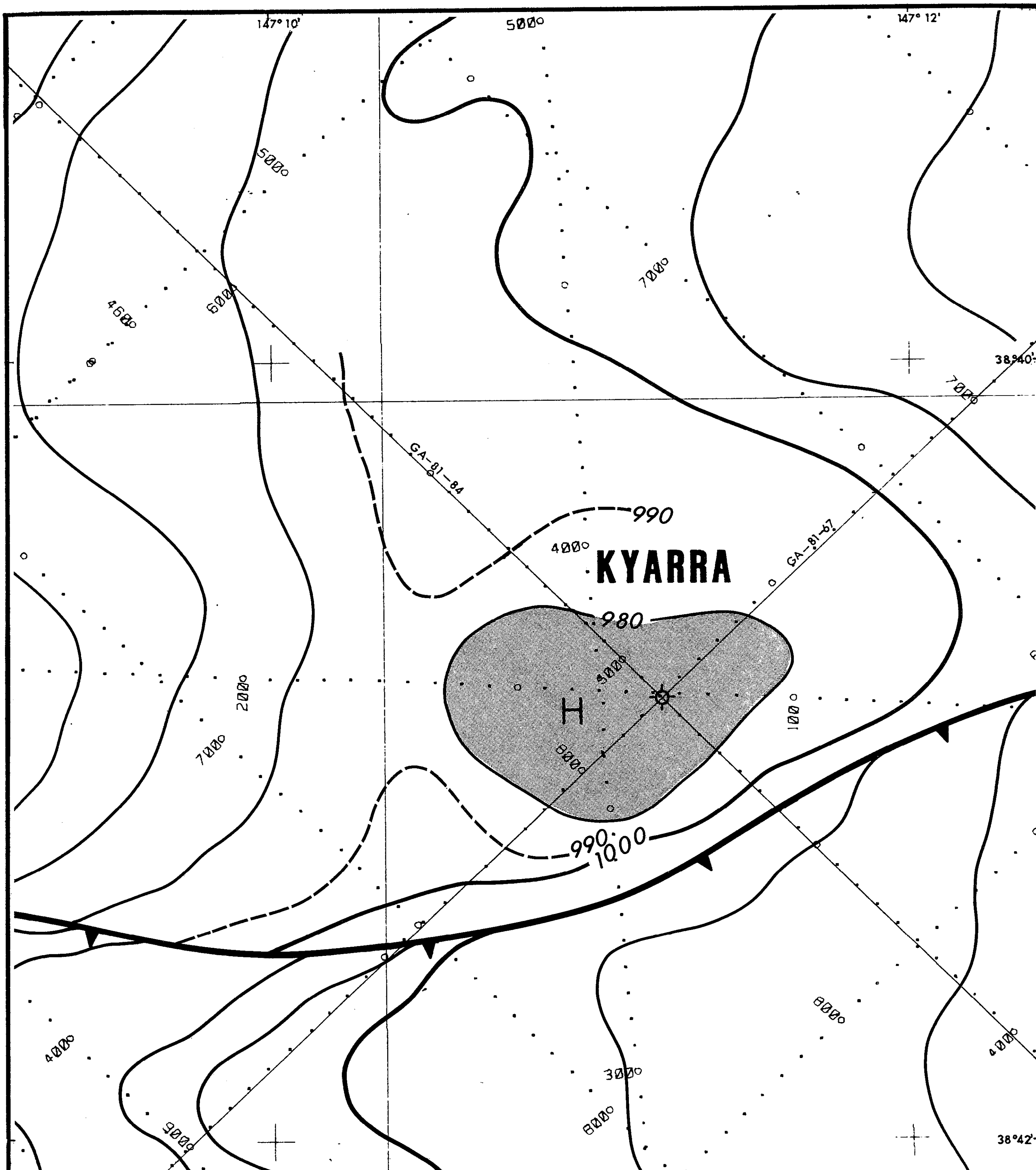
The "brown horizon", top of the Latrobe Group event, corresponds to the Oligo-Miocene unconformity some 15 metres above the top of Latrobe clastics. The structural closure is small at this horizon and no shows were encountered.

The "yellow horizon", top of Latrobe Formation event, corresponds to a thin shale band within shore-zone sands in the Upper Latrobe Group. The "purple horizon", as mapped, was not encountered due to the premature intersection of Strzelecki Group sediments.

The Strzelecki Group was not anticipated to be present upon the fault block underlying the Kyarra location. It was interpreted (based on seismic correlations from Perch No. 1) that the Latrobe Group (predicted to be 800m thick) rested directly on the top of metamorphosed Devonian sediments which formed the basement at Perch No. 1, located 16.5m northeast of Kyarra No. 1A.

Table below shows comparison of seismic events as mapped prior to drilling and well velocity survey results from Kyarra No. 1A (S.P. 780 line GA81-67).

HORIZON	SEISMIC		WELL VELOCITY SURVEY	
	TWT	DEPTH	TWT	DEPTH
BROWN	0.885	970m	0.860	979.5m
YELLOW	0.930	1050m	0.905	1038m
PURPLE	1.090	1335m	NOT PENENTRATED	



KYARRA DEPTH STRUCTURE

Contour Interval : 20 metres

Datum: Sea Level

SCALE : 1:25000

0 500 1000 Metres

australian aquitaine petroleum pty. ltd.

GIPPSLAND BASIN VIC/P17

DEPTH TO TOP OF LATROBE GROUP

Author: C.HODGE.	Date : AUGUST 1983	Dwg No: 21529	FIG : 8.
Drafted By: S.JACOBS	Report No: PG/194/83	Base Plan: 21384	

E. RESERVOIR PROPERTIES AND SOURCE ROCKS

The first major sands encountered in Kyarra No. 1A were in the Gurnard Formation (1013 - 1028m KB) of the Latrobe Group. Both the S.P. and separation between the MSFL and LLD (1017 - 1028m) indicate that the zone is permeable. The sonic and density indicate it may have porosity. The RFT results confirmed the zone has both permeability and effective porosity.

RFT sampling at 1018.5m recovered formation water of 13000 ppm NaCl (7000 ppm measured Cl) with a resistivity of 0.48 ohm-m at 72^{O}F (see appendix 7 & 8) compared to an RMF of 0.259 ohm at 70^{O}F.

The sequence between 1028 and 1216m KB belongs to undifferentiated Latrobe Group. A number of potential reservoirs were encountered from 1028 to 1216m, major zones being 1028 - 1074m, 1077 - 1091m, 1133 - 1162m and number of smaller intervals below 1169m

Log analyses indicate good to excellent porosity (20 - 36% calculated form LDL-CNL logs). No accurate permeabilitie were measured, as only one unsuccessful attempt to core was made at 1049 - 1067m.

It is reasonable to assume that these sands have good permeability due to the unconsolidated nature of the sands and mud cake buildup.

Permeability estimates from RFT pretests infer that permeability is greater than 100md. for most of these reservoirs.

The source rock analyses of sidewall cores in this sequence as well as in Strzelecki Group (1250 - T.D) indicate that although there is adequate organic mater of a favourable nature (see Appendix 6) it is still immature for generation of hydrocarbons.

The presence of fluorinite in SWC 44 (1100m) and exsudatinite in SWC 34 (1164.5m) indicate that generation and mobilisation of hydrocarbons have in fact commenced.

At a slightly higher maturity level these sediments would have excellent source potential for light oil and/or condensate by virtue of their appreciable resinite content (up to 60-70% of the total exinite).

F. RELEVANCE TO THE OCCURRENCE OF HYDROCARBONS

The maximum gas reading obtained over the Gurnard Formation (1013 - 1028m KB) was 0.1% total gas (C_1 only) and a maximum of 0.6% total gas (C_1 = 0.21%, C_2 =0.0067%) over undifferentiated Latrobe Group. (1028 - 1216m KB).

Due to such low readings, checks of lines and gas trap were done daily from 850m to TD and found to be in operational order.

No indication of oil or fluorescence were detected in the sidewall cores, cuttings or drilling fluid.

Log analyses verified the absence of hydrocarbons.

The formation pressures form RFT were plotted (see Appendix 7) and show the following results:-

A fresh water gradient of 1.01 g/cc is clearly seen from 1060 - 1214.6m KB.

An apparent gradient of 0.68 g/cc is present from 1018.5 - 1060m KB.

This apparent hydrocarbon gradient is contradictory as RFT fluid recoveries from 1022.4m and 1018.5m recovered only formation water and mud filtrate and no shows were recorded in sidewall cores or cuttings over this interval.

G. CONTRIBUTION TO GEOLOGICAL CONCEPTS RESULTING FROM DRILLING

1. The Lakes Entrance Formation (919 - 1013m KB) is interpreted as being Early Miocene.

   Although only samples at and above 995m KB contained planktonic foraminifera belonging to H_1 assemblage zone, the samples at 1003.5m and 1001m were identical in all other respects to samples at and above 995m

   The base of the Miocene sequence was picked at 1013m KB from electric log and lithological changes.

   The basin-wide transgression was diachronous and the Kyarra sequence was a marginal one in Oligocene-Miocene times.

   Both Kyarra No. 1A and Groper No. 2 were more marginal than Groper No. 1, Perch No. 1 and Dolphin No. 1 where the transgression was apparent in Oligocene times

2. The top of the Latrobe Group (composed of Gurnard Formation and undifferentiated Latrobe Formation) has been picked at 1013m KB.

   As oxidation of pyrite and glauconite is evident in the top sidewall core at 1013m it suggests that a hiatus may mave occurred between the Gurnard Formation and the overlying Lakes Entrance.

   However this stratigraphic relationship cannot be assessed as no planktonic foraminifera was found in the Gurnard Formation and there was a sample gap between 1013 - 1003.5m. In addition, palynological studies of samples within the Gurnard Formation (1013 - 1028m) show the assemblage of the Upper N. Asperus palynological zone which ranges in age from Late Eocene to Early Oligocene.

3. The Gurnard Formation at Kyarra No. 1A consist of very glauconitic, fine grained Sandstone, non calcareous, slightly argillaceous with minor Siltstone probably deposited in a shallow marine environment.

   Although there is a sharp change in lithology and on the electric log between the base of this formation and underlying undifferentiated Latrobe Formation, the stratigraphic relationship is not clear.

   Both Gurnard and undifferentiated Latrobe Formation were barren of foraminifera.

   Palynological studies of the samples within the Gurnard and upper part of undifferentiated Latrobe Formation gave only assemblages of Upper N. Asperus palynological zone with some reworked sediments of an Extensa (Middle to Late Eocene) dinoflagellates zone.

4. The top of undifferentiated Latrobe Formation occurs at 1028m KB where it is overlain unconformably by glauconitic Sandstone of the Gurnard Formation.

   The Latrobe clastics are composed of Sandstones with excellent porosity and permeability interbedded with Siltstone, Claystones, Shale and Coal.

   The Sandstone encountered between 1028m - 1092m has been interpreted as being a shore zone (tidal inlet/tidal delta or beach complex) whereas the interbedded claystone, siltstone, sandstone, shale and coal below is believed to have been deposited in a delta plain environment.

5. Presence of Late Paleocene (Upper L. Balmei) in the Latrobe Group is indicated only by one sample near the base of the formation at 1215.5m.

   As the interval between 1172.5m (Upper N. Asperus) and 1215.5m was devoid of assemblages the contact of Eocene/Paleocene sequence is not conclusive. Also lithologicaly, a sample at 1215.5m contains some weathered brown material (possible reworked sediments from underlying unit) and it could be suggested that the Paleocene sequence is not present in the Latrobe Group.

6. The base of the Latrobe Group was picked at 1216m KB which is represented by a erosional surface on an underlying volcanic sequence. The age of these volcanics is not known.

7. The top of the Strzelecki Group (Early Cretaceous) occurs at 1251m KB where it is overlain by the volcanic sequence.

   The Strzelecki Group consists of interbedded Siltstone micaceous and carbonaceous and carbonaceous Shale.

   The reappearance of this rock type as a component of the Gurnard Formation at 1020m suggests that this unit of the Strzelecki Group was exposed on the margins during deposition of the upper part of the Latrobe Group at Kyarra.

APPENDIX 1

CUTTING SAMPLE DESCRIPTIONS

APPENDIX 1

KYARRA NO. 1A

CUTTING SAMPLE DESCRIPTIONS

74m - 240m	:	No returns - samples to sea floor.
240m - 272m	:	Calcarenite (80%): White, fine to medium, angular grains, poorly sorted, moderately to well cemented with minor Limestone, white, opaque, tan, microcrystalline, hard, traces of loose quartz grains, clear-opaque. rounded to subrounded, and fossil fragments (5-15%).
272m - 334m	:	Calcarenite (30%): Light grey, firm to friable, fine to medium angular grains, moderately to well cemented, poorly sorted, with occasional cemented fossil fragments, interbedded with Calcareous Claystone (Marl) - (40-60%): Grey, soft, dispersive, calcareous clay matrix with very fine calcite grains, fossil fragments (5-30%), silty, carbonaceous particles, firm to hard, and loose quartz grains, clear to opaque, medium grained, rounded to subrounded, minor Limestone (<10%), white, opaque, tan, hard, microcrystalline.
334m - 457m	:	Calcareous Claystone (Marl) - (80-90%): Light grey to grey, soft, dispersive, sticky, clay fraction generally washed out, embedded with fossil fragments (10-20%) and minor Limestone (Trace-10%), white, light grey, hard, microcrystalline.
457m - 480m	:	Calcareous Claystone (Marl) - (80%): Grey, soft, dispersive, calcareous clay matrix with minor calcareous grains, clay chips, carbonaceous, silty particles and loose quartz grains, medium to coarse, rounded, embedded with fossil fragments (20%).
480m - 513m	:	Calcareous Claystone (80%): Grey, occasionally light grey to light brown, soft, dispersive, embedded with fossil fragments (10-20%), loose quartz grains and carbonaceous siltstone, black, slightly calcareous, hard, silica cement.

513m - 546m : <u>Calcareous Claystone</u> (60-80%): Grey, occasionally light grey to white, soft, dispersive, sticky, embedded with fossil fragments (10%), minor calcareous grains and carbonaceous silty particles interbedded with <u>Sandstone</u> (20-30%), quartzose, fine grained, subangular to subrounded, fairly sorted, soft, with calcareous clay cement, occasionally loose quartz grains, clear to opaque, rounded, fine to medium grained.

546m - 582m : <u>Calcareous Claystone</u> (80-90%): Grey, light grey, soft, dispersive, sticky, embedded with fossil fragments (5-10%), calcareous grains and loose quartz grains, medium to coarse, rounded. Minor <u>Siltstone</u> (5-10%): grey, soft to firm, calcareous, slightly laminated.

582m - 625m : <u>Calcareous Claystone</u> (70-90%): Grey, light grey, soft, sticky, slightly silty in part, occasionally white, chalky, calcareous, soft, embedded with fossil fragments (Trace-20%), loose quartz grains, (Trace-20%), medium to coarse, rounded, and minor <u>Calcarenite</u> (Trace-5%), light grey, fine grained, angular, firm to friable, moderately cemented.

625m - 678m : <u>Calcareous Claystone</u> (60-70%): Light grey, white chalky, soft, sticky, dispersive, minor green-grey, silty, firm fractions, embedded with fossil fragments (20%), loose quartz, medium to coarse rounded grains, occasionally subangular, interbedded with <u>Calcarenite</u> (10%): light grey, fine to medium grained, angular, firm, poorly sorted, trace of <u>Siltstone</u> : dark grey, carbonaceous, firm and <u>Limestone</u>: dark grey, hard, microcrystalline.

678m - 750m : <u>Calcareous Claystone</u> (50-60%): Light grey, occasionally white, soft, dispersive, sticky, minor green soft fractions, common fossil fragments (5-20%), decreasing with depth, interbedded with <u>Calcarenite</u> (20-40%): light grey to white, fine to medium grained, subangular to subrounded, poorly sorted, firm to hard, sandy in part, and minor <u>Limestone</u> (Trace-5%): towards the base, white, generally hard, good vuggy porosity.

750m - 787m : <u>Calcareous Claystone</u> (50%): Light grey, soft, dispersive, sticky, minor firm clay chips, common fossil fragments (20%) and <u>Calcarenite</u> (30%): light grey to white, fine grained, subangular, firm, traces of <u>Limestone</u>: white, microcrystalline, generally hard, occasionally light grey, argillaceous, grading to marl.

787m - 851m :	Calcareous Claystone (50-80%): Light grey, soft, sticky, dispersive, minor light brown, slightly silty, blocky to subfissile, firm, decrease in fossil fragments (Trace-10%), and Calcarenite (20-40%): light grey, occasionally light brown, firm, fine angular grains, minor Limestone (Trace-10%): offwhite, hard, crystalline to microcrystalline; traces of pyrite and glauconite.
851m - 894m :	Calcareous Claystone (90-100%): Light grey to grey, soft, dispersive, clay fractions, generally washed out, gradual decrease in carbonate content; minor Calcarenite, light grey, occasionally light brown, firm, fine angular grains, fine trace fossil fragments.
894m - 919m :	Calcareous Claystone (60-80%): Light grey to grey-green,soft, sticky, dispersive, interbedded with Siltstone (20-40%): grey to grey-brown, slightly calcareous, soft to firm, subfissile in part, traces of glauconite and pyrite towards the base, fine trace fossil fragments.
919m - 946m :	Claystone (60%): Light grey to grey-green, soft, sticky, calcareous, silty, occasionally firm, subfissile, fine trace fossil fragments, interbedded with Siltstone (40%): grey to dark grey, soft to firm, slightly calcareous, traces of lithic fragments and loose quartz grains, fine trace of glauconite and pyrite.
946m - 970m :	Claystone (80%): Grey, soft, sticky, calcareous, interbedded with Siltstone (20%): grey, dark grey to black, carbonaceous in part, soft to firm, blocky, trace glauconite.
970m - 1013m :	Claystone (90%): Greenish grey, occasionally light grey to light brown, soft to firm, blocky, calcareous, silty in part, very glauconitic (5-30%), pyritic, slightly micaceous, minor forams, pyritised gastro-pod at 1003m, minor Siltstone (10 %): light grey, grey, green, soft to firm, glauconitic, slightly calcareous and micaceous, pyritic and carbonaceous in part, occasionally light brown, soft, argillaceous siltstone grading to very fine Sandstone.
1013m - 1028m :	Sandstone : Greenish grey to dark green, fine grained, moderately to well sorted, subangular to angular, very glauconitic (15-25%), micaceous, non-calcareous, slightly argillaceous in part, good visual porosity, minor Siltstone: light grey, light brown, argillaceous, slightly calcareous and micaceous, trace of pyrite.
1028m - 1040m	Sandstone : Grey, clear-opaque, medium to coarse grained, loose, quartzose, rounded to subrounded, well sorted, excellent visual porosity, slightly glauconitic ($<1\%$) and pyritic.

1040m - 1092m	:	Sandstone: Light grey, clear, greenish grey, fine to medium grained, quartzose, rounded to sub-rounded, well to moderately sorted, excellent visual porosity, minor interbeds of Silty Claystone, light grey, grey, soft, occasionally firm and blocky, slightly glauconitic and pyritic.
1092m - 1099m	:	Siltstone: Grey, grey-brown, micaceous, carbonaceous, very argillaceous, non-calcareous, soft to firm, minor Claystone: light grey, soft, silty, slightly glauconitic and pyritic.
1099m - 1102m	:	Coal: Dark brown to black, firm, brittle.
1102m - 1107m	:	Claystone: Dark grey, firm, very carbonaceous with minor Sandstone: grey, very fine grained, silty and argillaceous.
1107m - 1117m	:	Sandstone: Grey, quartzose, fine grained, well sorted, argillaceous in part, good visual porosity.
1117m - 1126m	:	Carbonaceous Shale: Black, micaceous, pyritic, blocky, brittle, minor Siltstone: grey to dark grey brown, firm, lignitic in part.
1126m - 1129m	:	Coal: Black, firm, brittle, blocky, occasionally fissile.
1129m - 1133m	:	Siltstone: Grey, slightly micaceous, carbonaceous, sandy in part, fair visual porosity.
1133m - 1162m	:	Sandstone: Grey, quartzose, generally coarse, subangular, occasionally fine to medium, angular grains, micaceous and carbonaceous in part, moderately sorted, unconsolidated, good visual porosity.
1162m - 1172m	:	Interbedded Coal: Black, firm, brittle, fissile; Siltstone: grey, grey brown, firm, lignitic, and Sandstone: light grey to white, coarse grained, occasionally pebbly, angular to subrounded.
1172m - 1216m	:	Interbedded Claystone: Light grey, soft, micaceous, silty, occasionally carbonaceous, and Sandstone: light grey, fine grained, angular, generally clean, quartzose at top, becoming argillaceous with occasionally black, clay pellets towards the base. Slightly micaceous, carbonaceous and pyritic in part, with weathered brown material below 1215m (possible reworked sediments from underlying unit).

1216m - 1228m	:	Volcanics: Contaminated lava, light grey, microcrystalline texture, slightly weathered and clay-rich at top with feldspar microphenocrysts embedded in green groundmass of volcanic glass, with well preserved fluidal texture towards the base. Trace of pyrite crystals and contaminating rock fragments, possibly tuffaceous.
1228m - 1245m	:	Volcanics (Basalt ?): White to brown, red to dark brown, weathered but relicts of crystalline texture still evident. Most of groundmass is weathered with weathered microcrystalline feldspar. The rock is grey and coarser crystalline towards the base with abundant evidence of weathered olivine and mafic minerals.
1245m - 1251m	:	Volcanics (Basalt): Dark grey, with crystalline texture. The rock is basic with abundance of mafic minerals; olivine is probably being weathered and other dark minerals (possibly pyroxene) are recognised by their cleavages (See Appendix for detailed petrology).
1251m - 1280m	:	Interbedded Siltstone: Grey, green grey, micaceous and carbonaceous, lithic, slightly weathered at top, grading to silty shale in part, tight, slightly fissile, and Shale: black, carbonaceous, soft, containing some coal fragments.

513m - 546m : Calcareous Claystone (60-80%): Grey, occasionally light grey to white, soft, dispersive, sticky, embedded with fossil fragments (10%), minor calcareous grains and carbonaceous silty particles interbedded with Sandstone (20-30%), quartzose, fine grained, subangular to subrounded, fairly sorted, soft, with calcareous clay cement, occasionally loose quartz grains, clear to opaque, rounded, fine to medium grained.

546m - 582m : Calcareous Claystone (80-90%): Grey, light grey, soft, dispersive, sticky, embedded with fossil fragments (5-10%), calcareous grains and loose quartz grains, medium to coarse, rounded. Minor Siltstone (5-10%): grey, soft to firm, calcareous, slightly laminated.

582m - 625m : Calcareous Claystone (70-90%): Grey, light grey, soft, sticky, slightly silty in part, occasionally white, chalky, calcareous, soft, embedded with fossil fragments (Trace-20%), loose quartz grains, (Trace-20%), medium to coarse, rounded, and minor Calcarenite (Trace-5%), light grey, fine grained, angular, firm to friable, moderately cemented.

625m - 678m : Calcareous Claystone (60-70%): Light grey, white chalky, soft, sticky, dispersive, minor green-grey, silty, firm fractions, embedded with fossil fragments (20%), loose quartz, medium to coarse rounded grains, occasionally subangular, interbedded with Calcarenite (10%): light grey, fine to medium grained, angular, firm, poorly sorted, trace of Siltstone : dark grey, carbonaceous, firm and Limestone: dark grey, hard, microcrystalline.

678m - 750m : Calcareous Claystone (50-60%): Light grey, occasionally white, soft, dispersive, sticky, minor green soft fractions, common fossil fragments (5-20%), decreasing with depth, interbedded with Calcarenite (20-40%): light grey to white, fine to medium grained, subangular to subrounded, poorly sorted, firm to hard, sandy in part, and minor Limestone (Trace-5%): towards the base, white, generally hard, good vuggy porosity.

750m - 787m : Calcareous Claystone (50%): Light grey, soft, dispersive, sticky, minor firm clay chips, common fossil fragments (20%) and Calcarenite (30%), light grey to white, fine grained, subangular, firm, traces of Limestone: white, microcrystalline, generally hard, occasionally light grey, argillaceous, grading to marl.

APPENDIX 2

SIDEWALL CORE DESCRIPTIONS

APPENDIX 2

KYARRA 1A

SIDEWALL CORES DESCRIPTION

Depth (m)	No.	Recovery	Description
976.50	60	Nil	Misfire.
980.00	59	5.0 cm	Siltstone: greenish-grey, glauconitic (15%), slightly calcareous, slightly micaceous, non-carbonaceous, pyritic.
986.50	58	4.5 cm	Claystone: greenish-grey, silty, glauconitic (10%), slightly calcareous, slightly micaceous, non-carbonaceous, pyritic.
991.00	57	6.0 cm	Claystone: greenish-grey, silty, glauconitic (10%), slightly calcareous and micaceous, non-carbonaceous, pyritic.
995.50	56	4.8 cm	Claystone: grey, slightly silty, glauconitic (5%), calcareous, micaceous, non-carbonaceous, pyritic.
1001.00	55	5.7 cm	Claystone: greenish-grey, silty, glauconitic (30%), calcareous, micaceous, non-carbonaceous, pyritic.
1005.50	54	4.5 cm	Claystone: greenish-grey, glauconitic (5%), non-carbonaceous.
1013.00	53	5.5 cm	Claystone: greenish-grey, glauconitic (20%), calcareous and micaceous, non-carbonaceous, pyritic.
1017.00	30	3.0 cm	Sandstone: dark green, fine grained, unimodal, glauconitic (20%), non-calcareous, micaceous, some dark minerals (possibly heavy minerals). Sample has some porosity and permeability and was invaded by mud filtrate. Sand fraction is well sorted and subangular.
1020.00	29	4.8 cm	Sandstone: greenish-grey, fine grained, unimodal, glauconitic (15%), micaceous, non-calcareous, porous and permeable. Sand fraction is well sorted and subangular to angular.

Depth (m)	No.	Recovery	Description
1024.00	28	4.8 cm	Sandstone: greenish-grey, fine grained, unimodal, glauconitic (25%) micaceous, non-calcareous, porous and permeable, sand fraction is moderately sorted and subangular to angular.
1026.50	27	5.6 cm	Sandstone: dark green, gine grained and slightly silty, micaceous, non-calcareous, less porous and permeable than S.W.C. 30, 29 and 28.
1028.50	26	3.0 cm	Sandstone: grey, medium grained, well to moderately sorted, unimodal, excellent porosities and permeabilities (invaded by mud filtrate), very slightly glauconitic (less than 1%). Quartzose, and grains are well rounded to subrounded.
1030.00	25	4.8 cm	Sandstone: grey, medium grained, well sorted, unimodal, excellent porosities and permeabilities, very slightly glauconitic (less than 1%). Sand is quartzose and grains are well rounded to subrounded.
1031.00	24	3.5 cm	Sandstone: grey, medium grained, well sorted, unimodal, excellent porosities and permeabilities, quartzose, and sand grains are rounded to subrounded.
1032.00	23	5.0 cm	Sandstone: grey, medium grained, well sorted, unimodal, excellent porosities and permeabilities, strongly invaded by mud filtrate. Sand is quartzose and grains are rounded to subrounded.
1034.00	22	3.0 cm	Sandstone:grey, medium grained, well sorted, unimodal, excellent porosities and permeabilities, quartzose, and grains are rounded to subrounded.
1040.00	21	3.0 cm	Sandstone: light grey, medium grained, unimodal,well to moderately sorted, excellent porosities and permeabilities, quartzose, and grains are rounded to subrounded.
1042.50	20	3.8 cm	Sandstone: light grey, fine grained, well sorted,unimodal, good porosities and permeabilities, quartzose, and sand grains are subrounded to subangular.
1045.00	52	5.0 cm	Sandstone: greenish-grey, medium to fine grained, unimodal, moderately sorted, good porosities and permeabilities, quartzose grains are subrounded to subangular.

Depth (m)	No.	Recovery	Description
1049.00	51	3.5 cm	Sandstone: light grey, medium to fine grained, well to moderately sorted, unimodal, good porosities and permeabilities, quartzose, and grains are subrounded to subangular.
1060.50	50	4.0 cm	Sandstone: grey, fine grained, well to moderately sorted, unimodal, good porosities and permeabilities, quartzose, and grains are subrounded to subangular.
1074.00	49	6.0 cm	Sandstone: green to dark grey, bimodal sand, fine grained, silty carbonaceous, micaceous, slightly porous and permeable, quartzose, and sand grains are subangular to subrounded.
1081.50	48	4.5 cm	Sandstone: unimodal sand, fine grained, clean, good porosities and permeabilities, quartzose, and sand grains are subangular to subrounded.
1086.00	47	4.3 cm	Sandstone: grey, unimodal sand, fine grained, clean, good porosities and permeabilities, quartzose, and sand grains are subangular to subrounded.
1095.00	46	4.7 cm	Siltstone: grey, very fine grained, argillaceous, micaceous, porous and permeable, carbonaceous, mainly quartzose and angular.
1098.00	45	5.0 cm	Siltstone: dark grey, argillaceous, carbonaceous, non-calcareous, micaceous, slightly porous and permeable.
1100.00	44	4.0 cm	Coal: dark brown to black, firm to soft.
1106.00	43	5.0 cm	Claystone: dark grey, firm, very carbonaceous; contains some pellets of very fine grained sand.
1107.50	42	3.8 cm	Sandstone: grey, fine grained, unimodal, good porosities and permeabilities, quartzose, and sand grains are subrounded to subangular.
1118.00	41	5.0 cm	Carbonaceous Shale: black, micaceous, pyritic, soft to firm.
1122.50	40	4.5 cm	Carbonaceous Shale: black, micaceous, pyritic, slightly sandy, firm.

Depth (m)	No.	Recovery	Description
1127.50	39	4.0 cm	Coal: black.
1131.00	38	4.8 cm	Siltstone: grey, sandy, slightly micaceous, carbonaceous, slightly porous and permeable.
1133.00	37	3.5 cm	Sandstone: grey, coarse and bimodal. The coarser fraction is subangular whereas the finer mode is angular, excellent porosities and permeabilities; mainly quartzose, carbonaceous, unconsolidated.
1136.50	36	4.5 cm	Sandstone: grey, bimodal; coarse, containing granules. Sand fraction is quartzose and grains are subangular to angular. Contains carbonaceous fragments.
1148.50	35	5.5 cm	Sandstone: grey, fine grained, unimodal, contains carbonaceous fragments, micaceous, good porosities and permeabilities, quartzose and angular.
1164.50	34	4.0 cm	Coal: black, firm, brittle.
1166.00	33	4.5 cm	Coal: black, firm, brittle.
1172.50	32	4.1 cm	Claystone: light grey, soft, slightly micaceous.
1178.00	31	4.5 cm	Claystone: light grey, silty, micaceous, soft.
1182.50	19	4.8 cm	Claystone: light grey, sandy; sand fraction is fine grained and angular, micaceous, carbonaceous.
1192.00	18	3.5 cm	Sandstone: light grey, fine grained, unimodal, clean, quartzose and angular, non-calcareous, good porosities and permeabilities; micaceous.
1207.00	17	6.0 cm	Claystone: light grey, clean, micaceous, slightly silty, soft.
1210.00	16	4.0 cm	Claystone: light grey, clean, micaceous, slightly silty, soft.
1212.50	15	4.0 cm	Sandstone: light grey, argillaceous, sand fraction is unimodal, fine grained and angular, slightly carbonaceous.

Depth (m)	No.	Recovery	Description
1215.50	14	5.5 cm	Siltstone: grey, argillaceous and sandy, contains black pellets of clay and carbonaceous material, weathered brown material, possibly reworked from underlying unit, pyritic.
1217.00	13	4.5 cm	Volcanic rock: grey, showing microcrystalline texture, slightly weathered.
1222.00	12	4.5 cm	Volcanic rock: grey, with microcrystalline texture consisting of feldspar microphenocrysts embedded in green groundmass of volcanic glass.
1228.00	11	5.8 cm	Weathered volcanic rock: white to brown, showing relict of a crystalline texture consisting of weathered feldspar embedded in weathered glass and mafic minerals (possibly basalt).
1234.50	10	5.0 cm	Weathered volcanic rock: red to dark brown, strongly weathered but relict of a crystalline texture is still evident. Most of the groundmass is weathered and red in colour with some weathered microcrystalline feldspars (possibly basalt).
1240.00	9	6.0 cm	Weathered volcanic rock: grey with crystalline texture. The rock is coarser crystalline than samples 13, 12, 11 and 10. Evidence of weathered olivine and mafic minerals are abundant.
1247.00	8	1.0 cm	Volcanic rock: dark grey with crystalline texture. The rock is strongly fractured. The rock is a basic with abundance of mafic minerals, ollvine is probably being weathered and other dark minerals (possibly pyroxene) are recognised by their cleavages.
1253.00	7	4.2 cm	Weathered Siltstone: grey white, with clastic texture showing weathered feldspar grains.
1257.00	6	5.0 cm	Siltstone: grey, lithic, micaceous, non-calcareous, carbonaceous, slightly porous and permeable, slightly fissile.
1260.00	5	4.8 cm	Carbonaceous Shale: black, containing some coal fragments, soft.

Depth (m)	No.	Recovery	Description
1265.00	4	2.5 cm	Carbonaceous Shale: black, soft, containing coal fragments.
1270.00	3	3.5 cm	Siltstone: green-grey, lithic. micaceous, carbonaceous, non-calcareous, slightly porous and permeable.
1275.00	2	4.5 cm	Shale/Siltstone: green-grey, lithic, micaceous, carbonaceous, non-calcareous, tight.
1276.00	1	4.2 cm	Siltstone: green-grey, lithic, micaceous, carbonaceous, non-calcareous, slightly porous and permeable.

* *

APPENDIX 3

FORAMINIFERAL SEQUENCE IN KYARRA NO. 1A

BY: D. TAYLOR

FOLD-OUT A3 CHART (PE906062)

FORAMINIFERAL SEQUENCE

in

KYARRA # 1

GIPPSLAND BASIN.

for: AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

March 14, 1983.

David Taylor,
23 Ballast Point Road, Birchgrove, 2041.
AUSTRALIA. (02) 82.5643.

Twenty three sidewall cores were examined from KYARRA # 1. Of these samples, only the top six (from 1003.5 to 980m) contained foraminifera. These faunas consisted predominantly of shallow water benthonic forms, but the sparse associated planktonic specimens indicated an early Miocene age. Little comment can be made regarding the section below 1003.5m, apart from an interpretation based on grain analysis.

On Table 1 are tabulated data of planktonic and benthonic foraminiferal distribution as well as analysis of all sediment grains in the residues (>.075mm).

1003.5 to 980m (base at 1012m on E-log) EARLY MIOCENE.

This unit is equated with the "marl member" of the Lakes Entrance Formation; being glauconitic, calcareous siltstones / claystones. This interval contained shallow water benthonic foraminiferal assemblages, representing the initiation of the fully marine, carbonate phase of sedimentation during Oligocene to early Miocene times in the Gippsland Basin. Although the lowest two samples, at 1003.5 and 1001m, did not contain planktonic foraminifera, they were identical in all other respects to samples at and above 995m, where a Zone H-1 association with *Globigerina woodi connecta*, was present. *G. woodi connecta*, in the absence of *Globigerinoides* spp. (*sensu stricto*) is the accepted indicator of basal Miocene in southern Australia and New Zealand (Jnekins, 1974). Identical planktonic and similar benthonic faunas to these in Kyarra are recorded along the Gippsland Basin margins; onshore in the Sale/Longford area (Carter, 1964 and Hocking & Taylor, 1964) on the Bassian Rise to the south-west (Quilty, 1972). However, the Kyarra and other examples of the basal sediments representing this transgression, were all early Miocene and were younger than the base of the transgressive sequence in more basinward situations. Even onshore, at Lakes Entrance, carbonate sedimentation commenced in late Oligocene times (Jenkins, 1974, table 3), whilst offshore, the carbonate sedimentary phase commenced at the Eocene/Oligocene boundary (Zones K and J-2 of Taylor).

This basin-wide transgression was clearly a diachronous one (see also

Hocking & Taylor, 1964), so that the Kyarra sequence was a marginal one in Oligo/Miocene times. Kyarra # 1 contained the same Early Miocene H-1 planktonic fauna and benthonic assemblages as did the base of the carbonate sequence in Groper # 2 (at 750m). Both Kyarra # 1 and Groper # 2 were more marginal than Groper # 1, Perch # 1 or Dolphin # 1, where the transgression was apparent in Oligocene times.

1026 to 1013m (base at 1028m on E-log).

This unit was barren of foraminifera. Basically it is a "Greensand", being equated by position within the sequence, as the "Greensand" and "Colquhoun Sands" members of the Lakes Entrance Formation. The contact between this unit and the overlying "marl" member was probably a sharp one. As oxidation of pyrite and glauconite evident in the top sidewall core at 1013m, a hiatus may have occurred between this "greensand" and deposition of the overlying "marl" members. However, this stratigraphic relationship cannot be assessed because of the absence of planktonic foraminifera in the "greensand" and the sample gap between 1013 and 1003.5m.

Apart from glauconite, the other lithological components are quartz sands and rock fragments. The residue lithology histogram on Table 1, demonstrates that previously deposited sediment was reworked into this "greensand unit" with fragment of micaceous silty sandstone from below 1252m being redeposited at 1020m. Also wind blown, quartz sand reappears suddenly at 1017m, suggesting also, that this may have been reworked from the immediately underlying unit, below 1028m.

1215.5 to 1030m (base at 1218m.).

This unit is barren of foraminifera. The residue grains are dominated by frosted, pitted and impact fractured quartz and rock fragments, indicating surface sculpturing and modification by aeolian processes on criteria outlined by Margolis & Krinsley (1974). This suggests that deposition could have taken place in a coastal plain/delta front situation, proximal to a barrier/dune system.

The sample at 1215.5 may contain remnants of an erosion surface, as claystone fragments are silicified and could have come from a duricrust.

E-log Unit 1218m to 1252m - not represented by samples.

1257 to 1270m to T.D.

No foraminifera were found in this unit of micaceous silty sandstones and sandy siltstones which contain a high proportion of fine-grained maffic minerals and "rock flour" of possible volcanogenic origin.
The reappearance of this rock type as a component of the "greensand" at 1020m, strongly suggests that the micaceous unit was exposed on the margins during deposition of the upper part of the Kyarra sequence.

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PE906062

This is an enclosure indicator page.
The enclosure PE906062 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906062 has the following characteristics:

ITEM_BARCODE = PE906062
CONTAINER_BARCODE = PE902584
NAME = Biostratigraphy and Sediment Analysis
BASIN = GIPPSLAND
PERMIT = VIC/P17
TYPE = WELL
SUBTYPE = DIAGRAM
DESCRIPTION = Planktonic foraminiferal biostratigraphy and sediment grain analysis chart for Kyarra-1A.
REMARKS =
DATE_CREATED = 11/03/83
DATE_RECEIVED = 21/10/83
W_NO = W804
WELL_NAME = KYARRA-1A
CONTRACTOR =
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 4

PALYNOLOGICAL RESULTS - KYARRA NO. 1A

BY: W. HARRIS

KYARRA NO. 1 WELL
GIPPSLAND BASIN

Palynological examination and kerogen typing of sidewall cores.

by

W.K. Harris

Palynological Report

Client: Australian Aquitaine Petroleum

Study: Kyarra No. 1 Well, Gippsland Basin

Aims: Determination of age and distribution of kerogen types

INTRODUCTION

Thirty six sidewall cores from Kyarra No. 1 well drilled in the Gippsland Basin at Lat 38°40'51.9"S, Long 147°11'13.1"E in Vic P17 were processed by normal palynological procedures.

The basis for the biostratigraphy and consequent age determinations are based on Stover & Partridge (1973) and Partridge (1976) for the Tertiary sediments; and principally on Dettmann (1963), Dettmann & Playford (1969), with the modifications of Dettmann & Douglas (1976) and Burger (1973), for the Cretaceous sequence.

OBSERVATIONS AND INTERPRETATION

A. Biostratigraphy

Table I summarises the biostratigraphy and age determinations for the samples studied. Tables II to IV indicate the distribution of species identified in the Cretaceous and Tertiary sequences.

Preservation, and diversity data are indicated on Table 1. Most samples yielded reasonably well preserved and moderately diverse assemblages. Six samples were barren of plant microfossils.

1. Early Cretaceous, undifferentiated: 1257-1276 m.

In keeping with Early Cretaceous assemblages elsewhere in the Gippsland Basin, the assemblages from Kyarra No. 1 Well lack sufficient index forms to permit a confident correlation with accepted zonal schemes of this age. The presence of D. speciosus at 1276 m would suggest that that sample is no older than the D. speciosus zone but because of the low diversity there is little supportive evidence of this assignment. There is evidence of Triassic (e.g. Aratrisporites sp.) and Permian (striate bisaccate pollen) reworking in the lower samples from this interval. Otherwise there is nothing in the assemblage to indicate an age other than Early Cretaceous.

There are no marine indicators in the assemblage which is derived from a non-marine source.

2. Upper Lygistepollenites balmei zone: - 1215 m

Only one sample was recorded as belonging to this zone. The assemblage is characterised by L. balmei together with K. papillatus, N. flemingii V. kopukuensis and C. orthoteichus. The presence of the latter species suggests a position close to L. balmei/M. diversus boundary.

The absence of marine phytoplankton indicates deposition in a non-marine environment.

TABLE I

KYARRA NO. 1 WELL

SUMMARY OF PALYNOLOGICAL DATA

DEPTH (m)	SWC	PRESERVATION	DIVERSITY	SPORE POLLEN ZONE	DINOFLAGELLATE ZONE	CONFIDENCE LEVEL	ENVIRONMENT
980	59	Good	V. low	Oligo/Miocene	unamed	4	Marine
986.5	58	Good	V. low	Oligo/Miocene	unamed	4	Marine
991	57	Good	V. low	Oligo/Miocene	unamed	4	Marine
995.5	56	Good	V. low	Oligo/Miocene	unamed	4	Marine
1001	55	Good	V. low	Oligo/Miocene	unamed	4	Marine
1005.5	54	Good	V. low	Oligo/Miocene	unamed	4	Marine
1013	53	Good	Moderate	U.N. asperus	?P. coreoideum	5	Marginal marine
1017	30	Fair	Moderate	U.N. asperus	?P. coreoideum	5	Marginal marine
1020	29	Good	Moderate	U.N. asperus	?P. coreoideum	5	Marginal marine
1024	28	Good	Moderate	U.N. asperus	?P. coreiodeum	5	Marginal marine
1026.5	27	Good	Moderate	U.N. asperus	?P. coreiodeum	5	Marginal marine
1074	49	Good	Moderate	U.N. asperus	V. extensa	5	Marginal marine
1095	46	V. poor	V. low	Indeterminate	-	-	-
1098	45	Good	Moderate	U.N. asperus	V. extensa	5	Marginal marine
1100	44	Good	Moderate	U.N. asperus	-	5	Non marine
1106	43	Good	Moderate	U.N. asperus	V. extensa	5	Marginal marine
1118	41	Good	Moderate	U.N. asperus	-	5	Non marine
1122.5	40	Good	Moderate	U.N. asperus	V. extensa	5	Marginal marine
1127.5	39	Good	Moderate	U.N. asperus	-	5	Non marine
1131	38	Good	Moderate	U.N. asperus	-	5	Non marine
1148.5	35	Good	Moderate	M-U.N. asperus	V. extensa	5	Marginal marine
1164.5	34	Good	Moderate	M-U.N. asperus	-	5	Non marine
1166	33	Good	Moderate	M-U.N. asperus	-	5	Non marine
1172.5	32	Barren	-	-	-	-	-
1178	31	Barren	-	-	-	-	-
1182.5	19	Barren	-	-	-	-	-
1207	17	Barren	-	-	-	-	-
1210	16	Barren	-	-	-	-	-
1215	14	Good	Moderate	Upper L. balmei	-	5	Non marine
1253	7	Barren	-	-	-	-	-
1257	6	Fair	V. low	Early Cretaceous	-	-	Non marine
1260	5	Fair	V. low	Early Cretaceous	-	-	Non marine
1265	4	Fair	V. low	Early Cretaceous	-	-	Non marine
1270	3	Fair	V. low	Early Cretaceous	-	-	Non marine
1275	2	Fair	V. low	Early Cretaceous	-	-	Non marine
1276	1	Fair	V. low	Early Cretaceous	-	-	Non marine

Table II

Kyarra # 1 Cretaceous Spore /Pollen

CHECKLIST OF PRESENCE/ABSENCE BY LOWEST APPEARANCE

	11260M	1257M	1265M	1270M	1275M	1276M
AQUETRIRADITES SPINULOSUS	.	.	.	.	.	■
ARATRISPORITES SP.	.	.	.	.	.	■
BACULATISPORITES COMAUMENSIS	■	■	.	.	■	■
CALLIALASPORITES DAMPIERI	.	■	■	.	■	■
CERATOSPORITES EQUALIS	■	■	■	■	■	■
CICATRICOSISPORITES AUSTRALIENSIS	■	■	■	.	■	■
CINGUTRILETES CLAVUS	■	.	■	.	■	■
COROLLINA SP.	■	■	■	.	■	■
CORONATISPORA PERFORATA	.	■	.	.	.	■
CYATHIDITES AUSTRALIS	■	■	■	■	■	■
DICTYOTOSPORITES SPECIOSUS	.	.	.	.	.	■
FALCISPORITES GRANDIS	■	■	■	■	■	■
FALCISPORITES SIMILIS	■	■	■	■	■	■
GLEICHENIIDITES SP.	.	■	■	■	■	■
LYCOPODIUMSPORITES AUSTRALOCLAVATIDITES	■	■	■	■	■	■
LYCOPODIUMSPORITES ROSEWOODENSIS	.	.	.	.	.	■
MICROCACHYRIDITES ANTARCTICUS	■	■	■	.	■	■
PODOSPORITES SP.	.	■	■	.	■	■
STEREISPORITES ANTIQUASPORITES	.	■	■	■	■	■
VITREISPORITES PALLIDUS	■	■	■	.	■	■
BOTRYOCOCCUS SP.	.	.	.	.	■	.
GINKOCYCADOPHYTUS SP.	.	.	.	.	■	.
ISCHYOSPORITES PUNCTATUS	.	.	.	.	■	.
KLUKISPORITES	.	■	.	.	■	.
LEPTOLEPIDITES SP.	.	.	.	.	■	.
MATONISPORITES SP.	.	.	.	.	■	.
NEORAISTRICKIA TRUNCATA	.	.	.	.	■	.
PODOCARPIDITES SP.	.	.	.	.	■	.
ROUSEISPORITES RADIATUS	.	.	.	.	■	.
STRIATE BISACCATE INDET.	.	.	.	.	■	.
VERYHACHIUM SP.	.	.	.	.	■	.
DICTYOPHYLLIDITES HARRISII	.	.	■	.	.	.
LEPTOLEPIDITES VERRUCATUS	.	■	.	.	.	.
STAPLINISPORITES CAMINUS	.	■	.	.	.	.
CYCADOPITES SP	■	.	.	.	.	.

Table III
Kyarra 1
Tertiary Spore/Pollen

CHECKLIST OF PRESENCE/ABSENCE BY LOWEST APPEARANCE

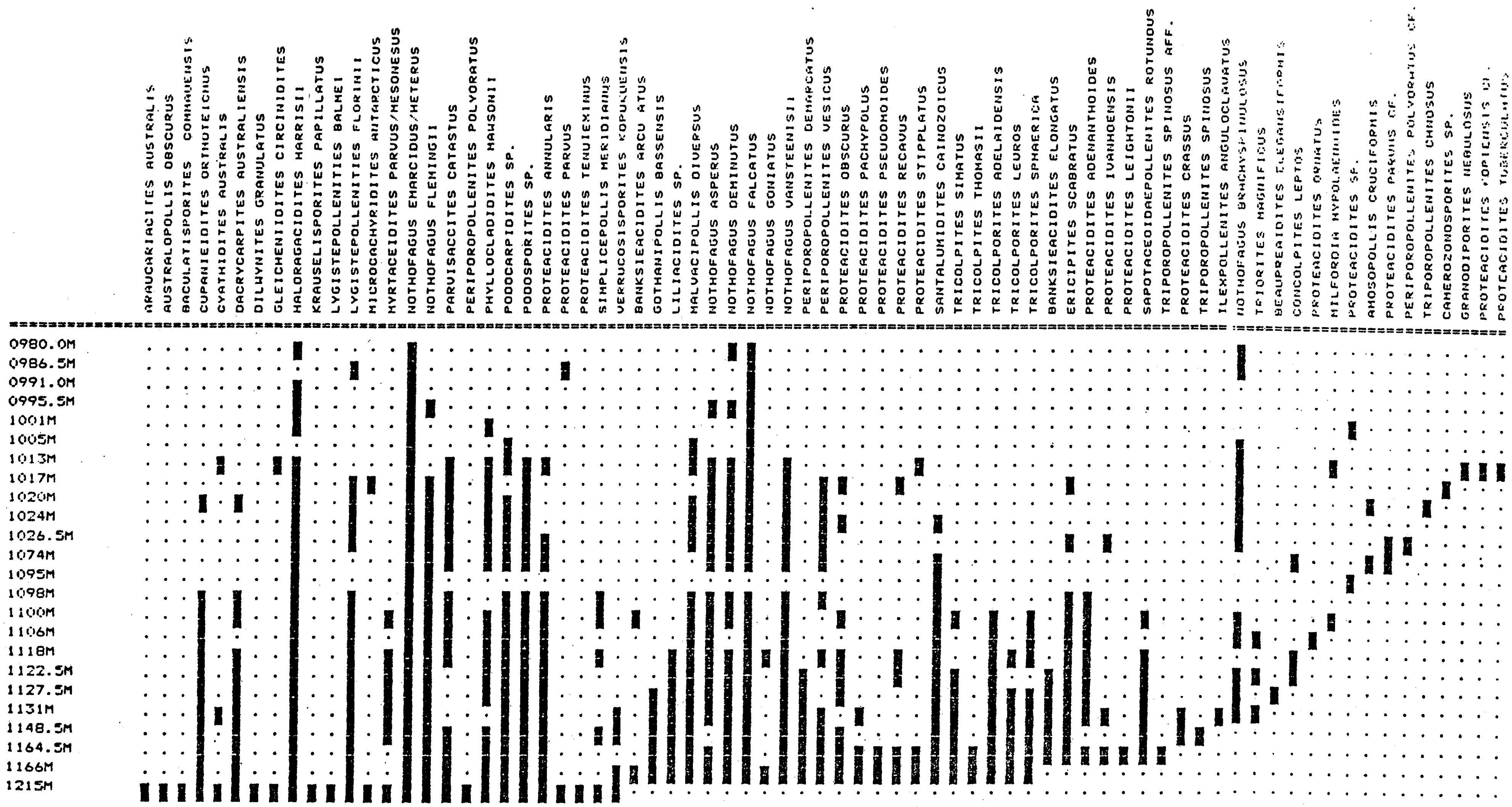
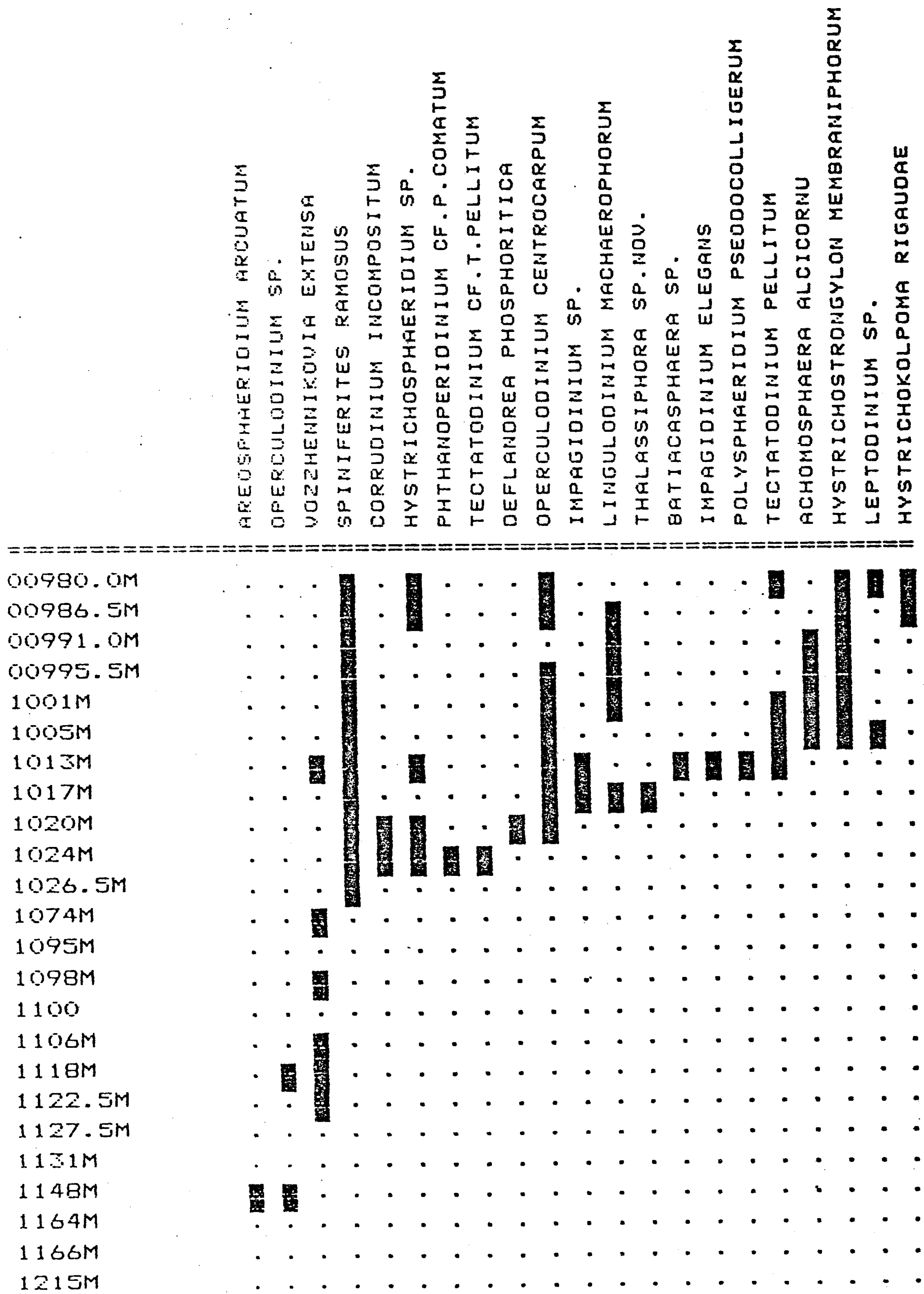


Table IV

KYARRA DINOFLAGELLATES

CHECKLIST OF PRESENCE/ABSENCE BY LOWEST APPEARANCE



3. Nothofagidites asperus zone:- 1013-1166 m

The first appearance of N. asperus together with G. bassensis, N. falcatus, P. vesicus, P. recavus, T. simatus, T. thomasii and T. leuros at 1166 m marks the onset of the N. asperus zone. The assemblage from 1166 and 1164.5 m are essentially similar to that at 1148.5 m where the first appearance of the dinoflagellate V. extensa occurs and its inception is coincident with the middle N. asperus sub-zone. V. extensa extends intermittently to 1074 m. One occurrence at 1013 m is possibly due to reworking. The section between 1131 and 1074 is certainly no older than Middle N. asperus and is possibly as young as Upper N. asperus. Because of the low diversity of Proteacidites spp. and of the assemblge in general, the latter alternative is preferred. Between 1026.5 and 1013 m the assemblage is consistent with the low diversity Upper N. asperus sub-zone.

The distribution of dinoflagellates indicates fluctuating marine/non-marine conditions in the earlier part of the sequence represented by the V. extensa zone, culminating in more stable marginal marine environments represented by the P. coreoideum zone.

4. Mid Tertiary Assemblages: 980-1005.5 m

Spores and pollen in this interval are very sparse and no correlation can be made on this basis with the onshore Gippsland Basin zones of this age. Although the assemblages are very sparse, they are dominated by marine dinoflagellates. No formal or informal zones have been proposed for these assemblages in Australia.

The palynomorphs in this section indicate an age no older than latest Eocene and no further refinement is possible using palynomorphs. However the assemblages are consistent with Oligo/Miocene assemblages elsewhere in the Basin.

The dominance of dinoflagellates over terrestrial palynomorphs indicates deposition in an open marine environment.

Kerogen Types and Spore Colouration

During routine palynological processing of sidewall cores an unoxidised kerogen sample was taken and the nature of the kerogens and spore colouration are documented in Table VI. Spore colour is expressed as the "Thermal Alteration Index" (TAI) of Staplin (1969) according to the scale in Table V.

Total organic matter (TOM) is expressed semi-quantitatively in the scale- abundant, moderate, low, very low, barren. Samples classed as having abundant or moderate amounts of TOM would be expected to have TOC's (total organic content) greater than 1%.

In this report four classes of organic matter are recognised - amorphogen, phyrogen, hylogen and melanogen and these terms are more or less synonymous with amorphous, herbaceous, woody, and coaly. For reasons as outlined by Bujak et al (1977) the former terms are preferred because they do not have a botanical connotation. The thermal alteration index scale follows that of Staplin (1969) and as outlined by Bujak et al. (1977). At a TAI of 2+ all four types of organic material contributed to hydrocarbon generation whereas at a TAI of 2, only

Table V

MATURATION LEVELS, Bujak et al. 1977

CATEGORIES	ORGANIC COMPONENTS		OIL	GAS CONDENSATE	THERMALLY DERIVED METHANE
			TAI	TAI	TAI
HYLOGEN	NON-OPAQUE FIBROUS PLANT MATERIAL OF WOODY ORIGIN }	TRACHEIDS VESSELS	>2→3 (2.5-2.9)	>2→≥3 (2.3-3.2)	2→4
PHYROGEN	NON-OPAQUE NON-WOODY ORIGIN }	SPORES POLLEN ALGAE ACRITARCHS CUTICLES	>2→3 (2.2→3)	2→<3+	>2⁻→4
AMORPHOGEN	STRUCTURELESS ORGANIC MATTER }	FINELY DISSEMINATED or COAGULATED FLUFFY MASSES	2→<3+	2→3+	3+→5
MELANOGEN	OPAQUE ORGANIC DEBRIS		-	2+→<3	2.5-4

Notes: (1) Hylogen, Phyrogen, Melanogen 4→5: Traces of Dry Gas and Co_2

(2) Hylogen, Phyrogen, Melanogen 1→2: Biogenic methane (Marsh gas).

TAI (Thermal Alteration Index):

- 1+, 2-, 2 - YELLOWS
- 2, 2+, 3, 4 - BROWNS
- 4-, 5 - BLACK

TABLE VI

KYARRA NO. 1 WELL

SUMMARY OF MATURATION AND KEROGEN DATA

Depth	TAI	TOM	Phyr. %	Amorph	Hylo	Melano
1013	1+	Low	5	50	5	40
1017	1+	Low	10	60	-	30
1020	1+	Very low	10	70	-	20
1024	1+	Low	5	80	-	15
1026.5	1+	Low	5	15	-	80
1074	1+	Low	10	30	-	60
1095	N.D.	Very low	10	80	-	10
1098	1+	Moderate	25	50	5	20
1100	1+	Moderate	5	10	-	85
1106	1+	Moderate	10	20	-	70
1118	1+	Low	10	30	-	60
1122.5	1+	Moderate	10	10	-	80
1127.5	1+	Low	15	5	-	80
1131	1+	Low	15	50	-	35
1148.5	1+	Very low	20	70	-	10
1164.5	1+	Moderate	5	-	-	95
1166	1+	Low	5	-	-	95
1172.5	N.D.	Very low	-	-	-	100
1178	N.D.	Very low	60	-	10	30
1182.5	-	Barren	-	-	-	-
1207	-	Very low	-	-	-	100
1210	-	Very low	-	-	-	100
1215	2-	Moderate	30	10	-	60
1253	N.D.	Very low	-	10	-	90
1257	2+	Low	10	30	10	50
1260	2	Low	10	15	5	70
1265	2	Moderate	20	10	10	60
1270	2+	Very low	5	-	5	90
1275	2+	Low	10	5	5	80
1276	2+	Moderate	15	-	5	80

amorphogen forms liquid hydrocarbons. The upper boundary defining the oil window is at a TAI of approximately 3 but varies according to the organic type. Above TAI 3+ all organic types only have a potential for thermally derived methane.

Spore colouration in Kyarra No. 1 well ranges from values of 1 to 2+ at T.D. The Tertiary sequence shows very little evidence of alteration and below the Tertiary - Cretaceous unconformity there is a very gradual increase in maturity. However all values indicate that the entire section is immature for the generation of hydrocarbons.

Kerogen is dominated in the Early Tertiary sequence by amorphogen which is a potential source for liquid hydrocarbons whereas the Late Cretaceous section is dominated by melanogen. The potential in this section is for the generation of gaseous hydrocarbons with some liquid fraction.

No kerogen typing was carried out on the Oligo-Miocene section.

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Consulting Geologist - Petroleum
1.9.83

APPENDIX 5

DETAIL PETROLOGY AND MACERAL GROUP PROPORTIONS

BY: AMDEL

KYARRA NO.1

DETAILED PETROLOGY AND MACERAL GROUP PROPORTIONS

Australian Aquitaine Petroleum Pty. Ltd

F3/422/0-4633/83 March 1983

The Australian Mineral Development Laboratories

amdel

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Please address all correspondence to
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30 March 1983

F3/422/0
4633/83 - Part 2 (Final)

Australian Aquitaine Petroleum Pty. Ltd.,
PO Box 725,
NORTH SYDNEY NSW 2060

Attention: Mr Frank Brophy

REPORT F4633/83 - Part 2 (Final)

YOUR REFERENCE:	Transmittal No.011822 dated 3/3/83
MATERIAL:	Four sidewall cores
LOCALITY:	KYARRA No.1
IDENTIFICATION:	SWC's 8, 9, 12, 13
DATE RECEIVED:	4 March 1983
WORK REQUIRED:	Detailed petrology and maceral group proportions

Investigation and Report by: Don McColl (Petrology)
Brian Watson (Organic Petrology)

Chief - Fuel Section: Dr Brian G. Steveson
Manager, Mineral and Materials Sciences Division: Dr William G. Spencer

for Norton Jackson
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1. INTRODUCTION

This report is a formal presentation of the petrographic descriptions communicated by telex on the 16 March 1983. Also incorporated in this report are photomicrographs of thin sections illustrating the textures in these rocks and photomicrographs of the dispersed organic matter in the samples reported in Part 1 (16/3/83). These photomicrographs may be found in Appendices 1 and 2 respectively. Appendix 3 contains the proportions of vitrinite, exinite and inertinite in samples from a number of drill holes previous studied.

2. PETROGRAPHIC DESCRIPTIONS

Sample Kyarra-1 SWC8 TSC 39294

Rock Name:
Basalt

Hand Specimen:
A dark grey fine grained volcanic rock

Thin Section:
A visual estimate of the constituents is as follows:

	%
Plagioclase (labradorite)	~50
Pyroxene	15-20
Chlorite	~20
Clay mineral	5-10
Goethite	3-5
Opaques	2-3

This is a rather altered fine grained mafic volcanic in which elongate lath-like prisms of plagioclase feldspar form a random mesh enclosing an intergranular fabric of pyroxene, altered ?olivine, and iron oxides. Although the rock is rather altered it appears to be by retrogressive deuteric fluids rather than conventional weathering.

The feldspar crystals are generally fairly clear and only marginally altered, patches of clay minerals appearing within interstices and along fractures. The prisms are commonly from 0.1 to 0.4 mm long and are fairly extensively multiple twinned. Extinction angles suggest a composition approximating to sodic labradorite (Ab_{50}). The feldspars most commonly enclose angular interstices infilled with pyroxene although various intergrowths of the two minerals do occur spasmodically, including a tendency for coarser pyroxenes to enwrap the feldspars. Although the pyroxenes are relatively clear and transparent the crystals are small and their crystallographic directions indefinite. It is difficult therefore to make more exact conclusions about their composition except to observe that they are the clino-variety and most probably augite.

Quite large (up to 0.5 mm) areas of chlorite-clay intergrowths occur throughout this rock many showing clear pseudomorphous outlines heavily outlined in reddish brown goethitic stain. The pseudomorphous outlines are not sufficiently distinct for positive identification but may have been olivine with iddingsitic alteration rims. Alternatively it may have been another pyroxene, which could equally degenerate to limonite or the indefinite hydrous iron oxide stains which are distributed throughout these components. The true opaques are often quite independent of this staining and have rather bladed or lamellar forms up to 0.2 mm long but from only 0.01 to 0.05 mm wide. They appear to be magnetite or hematite.

The rock has a very typical basaltic composition and texture which has been extensively but patchily affected throughout by chloritisation and argillisation, which appears to have preferentially affected certain components. This has probably been by deuteric fluids generated during late magmatic changes in the original lava.

Sample Kyarra-1 SWC9 TSC 39295

Rock Name:
Tuffaceous sideritic oolitic marl

Hand Specimen:
A pale coloured medium to fine grained granular rock with greenish, white and yellowish mottling in an argillaceous matrix between the granules.

Thin Section:
A visual estimate of the constituents is as follows:

	%
Carbonate (sideritic)	~50
Clay minerals	40-50
Chlorite	trace
?Leucoxene	2-5
Opaques (?hematite or ?goethite)	2-5

The granular texture within this rock is revealed in section as principally carbonate oolites up to 0.5 mm diameter. The carbonate is not simple calcite as it failed to respond to the alizarin red-S reagent normally used on these sections, and the components were indicated by X-ray diffraction to consist of the following.

Siderite (possibly magnesian)	Dominant
Montmorillonite	Sub-dominant
Kaolin	Accessory
?Anatase	Trace

The sideritic oolites have a radial texture of cryptocrystalline acicular needles and frequently enclose trains and ragged fragments of opaques which in strong illumination are translucent and deep red and are presumably hematite or goethite. They appear to have acted as nuclei to precipitate the carbonate. The oolites generally occur in patches and irregular trains separated by a minor thin matrix of turbid clays, and similarly sized masses of clay mineral derived from a quite different component.

This argillised component occurs as irregular streaks and angular blocks up to 0.7 mm diameter which are now almost devoid of relict textures except for vague curving outlines preserved in the crystal textures of the clays, or weakly outlined by traces of light coloured earthy opaques (?leucoxene). In some respects these relict structures are reminiscent of perlitic devitrification patterns often seen in vitreous pyroclasts. The complete lack of quartz is however unusual for a pyroclastic sediment, which must have been derived from exceedingly felsic to mafic volcanics.

The more turbid intergranular matrix is a turbid and rather stained mass of indeterminate clays and is probably a mixture. There are fine dark and light coloured earthy opaques scattered throughout which may be iron oxides, leucoxene and possibly even a small amount of carbonaceous organic staining.

The rock is interpreted as a sideritic oolitic marl formed by rapid unsorted sedimentation adjacent to a source of abundant volcanogenic components. Considerable argillisation of the pyroclastic components, and minor recrystallisation of the carbonate could have been of diagenetic origin.

Sample Kyarra-1 SWC12 TSC 39296

Rock Name:
Contaminated lava (?basalt)

Hand Specimen:
This is a very fine grained pale grey lava with a strong well preserved fluidal texture and a sparse scattering of pyrite crystals and contaminating rock fragments.

Thin Section:
A visual estimate of the constituents is as follows:

	%
Felspar (extensively argillised)	∿30-40
Carbonate (sideritic)	5
Clay mineral	∿50
?Leucoxene	2-5
Opaques (sulphide)	2

This rock is characterised by a very strong fluidal texture and pronounced parallelism of lath-like feldspar prisms, although the whole rock is very altered and argillised. Clear outlines of feldspars up to 0.4 mm long and 0.1 mm wide can be seen in the section although all are somewhat altered and the X-ray diffraction identification of the components suggests that no feldspar has survived. Components recorded by that technique are as follows:

Kaolin	Dominant
Siderite	Sub-dominant
?Anatase	Trace

The siderite in this sample occurs as irregular to polygonal single crystals or aggregates of a few anhedral crystals up to 0.5 mm diameter. These fragments often lie at odd angles to the fluidal texture which is distorted and curved around them. The siderite fragments look very like phenocrysts except that they are irregular in form and mineralogical composition.

The lava groundmass now consists of an intermittently turbid mass of clays which may contain earthy trains of exsolved ?leucoxene from former titanian silicates or iron oxides. Distributed among these are irregular trains of fine sulphides (probably pyrite) with just a few coarser crystals often occurring in conjunction with carbonate fragments.

In its altered state it is difficult to determine exactly what rock type this lava may have been. The complete lack of free quartz however suggests that it must have been rather felsic. It may therefore have been an andesite, trachyte, or a bleached basalt.

Sample Kyarra-1 SWC13 TSC 39297

Rock Name:
Contaminated Lava or Tuff-Lava

Hand Specimen:
A very fine grained almost white clay-rich rock containing coarse fragments of darker iron-rich rock.

Thin Section:
A visual estimate of the constituents is as follows:

	%
Clay minerals	>80
Quartz	1-2
?Leucoxene	2-5
Opaques	2

This rock proved most difficult to section owing to the very large quantity of virtually unconsolidated clay in its composition. The constituents were investigated by X-ray diffraction techniques as a matter of course with such optically indeterminate materials. This gave the following results:

Kaolin	Dominant
Siderite	Accessory
Anatase	Trace to Accessory
Rutile	Trace

The section shows two sharply demarcated phases. A light coloured clay matrix in which there are some faint textures, and dark coloured angular fragments in which detrital grains and ?sedimentary laminations can be seen.

The almost white clay matrix shows faint swirling lines of what is almost certainly a relict fluidal texture, from a former lava. The clays are rather densely turbid, and apart perhaps from some earthy leucoxene, the lack of any other components does not aid resolution of relict structures, but there seems to be a faint suggestion of very fine grained aligned feldspar crystals which originally defined the flow schlieren. In this case the lava would have been very rapidly chilled, and it could be inferred that it represents either the base or upper surface of the flow. Accordingly it would be quite understandable that a large proportion of contaminating clasts would occur within the lava.

Within the section the coarsest clast is almost 2 cm long and actually occupies most of the section area. It shows a weakly defined lamination texture which is rarely flat but often curved in conflicting directions. This could however have been a consequence of immersion in a fluid lava which would impart some contact metamorphic effects. Detrital and often angular grains of quartz up to 0.1 mm diameter, and somewhat coarser patches of varying transparency may indicate that the clasts were originally a laminated tuff but this is difficult to state with certainty. The matrix is a deep brown almost opaque mass of clays. No carbonate could be seen in the section either in the clasts or the argillised lava although it appeared in the X-ray diffractometer trace.

The rock is interpreted as an intensely argillised felsic lava, possibly from the chilled margin of a flow, contaminated by lithic fragments of probable tuffaceous origin. It could therefore correspond to the rocks that are commonly called 'tuff-lavas', or may simply have been contaminated mechanically during extrusion or flow.

APPENDIX 1

PHOTOMICROGRAPHS OF THIN SECTIONS

PE906063

This is an enclosure indicator page.
The enclosure PE906063 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906063 has the following characteristics:

ITEM_BARCODE	= PE906063
CONTAINER_BARCODE	= PE902584
NAME	= Thin Section Photographs
BASIN	= GIPPSLAND
PERMIT	= VIC/P17
TYPE	= WELL
SUBTYPE	= PHOTOMICROGRAPH
DESCRIPTION	= Colour microphotographs of thin sections from Kyarra-1A Plates 1-2.
REMARKS	=
DATE_CREATED	= 31/03/83
DATE_RECEIVED	= 8/04/83
W_NO	= W804
WELL_NAME	= KYARRA-1A
CONTRACTOR	= AMDEL
CLIENT_OP_CO	= AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

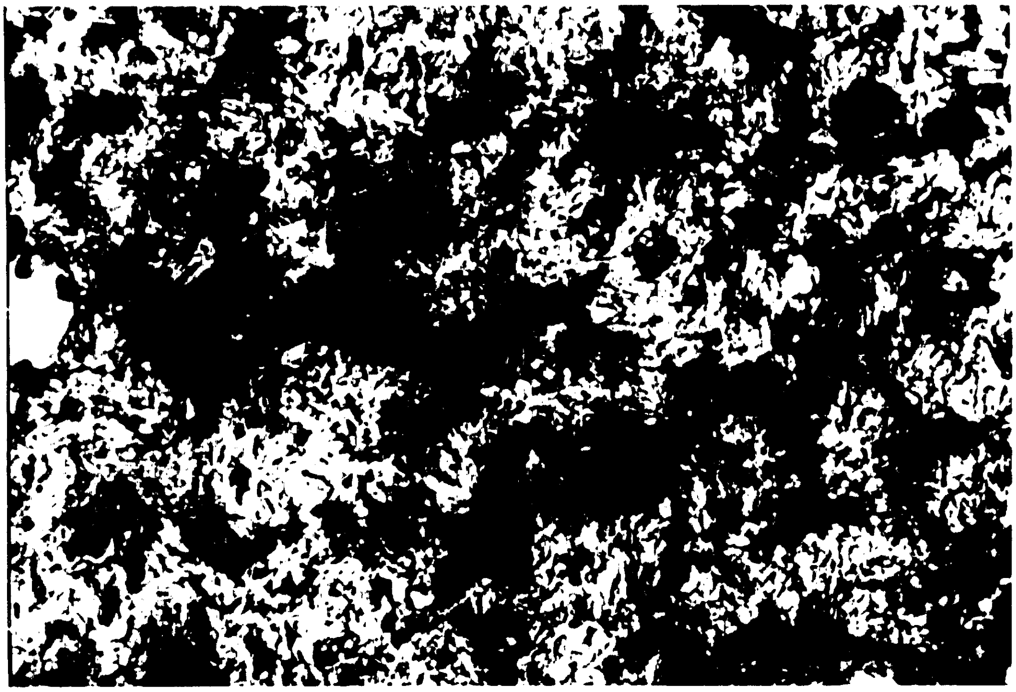

PLATE 1: SAMPLE SWC8 - TYPICAL BASALTIC TEXTURE IN ORDINARY LIGHT (x25 magnification)

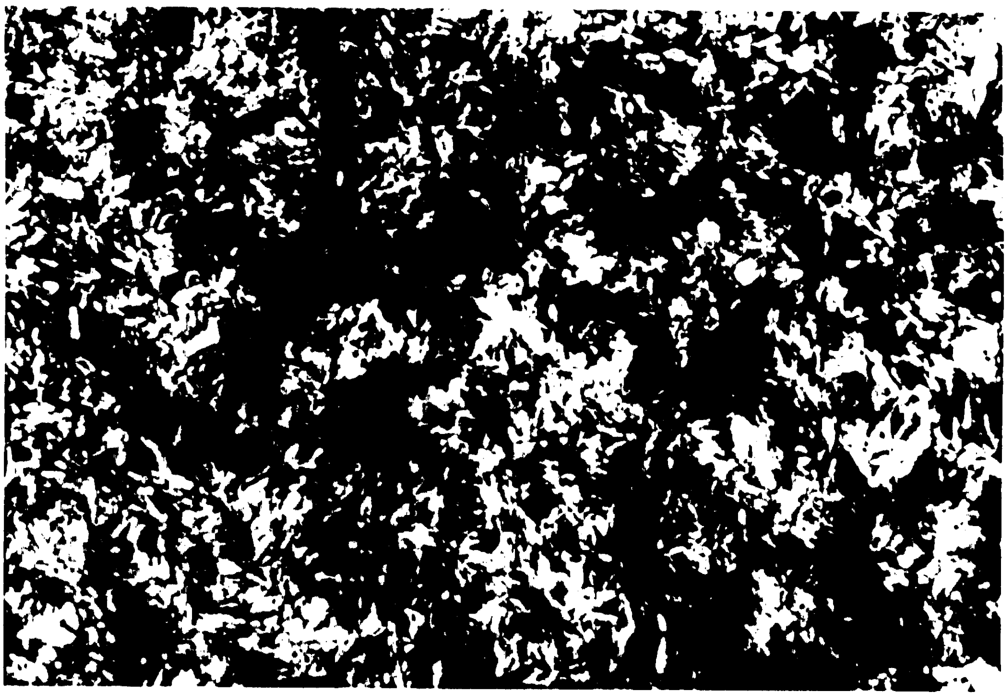

PLATE 2: SAMPLE SWC8 - A SIMILAR VIEW OF BASALTIC TEXTURE IN POLARISED LIGHT. BRIGHT COLOURS ARE PYROXENES (x25 magnification)

PE906064

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CONTAINER_BARCODE = PE902584
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BASIN = GIPPSLAND
PERMIT = VIC/P17
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Colour microphotographs of thin sections from Kyarra-1A Plates 3-4.
REMARKS =
DATE_CREATED = 31/03/83
DATE_RECEIVED = 8/04/83
W_NO = W804
WELL_NAME = KYARRA-1A
CONTRACTOR = AMDEL
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

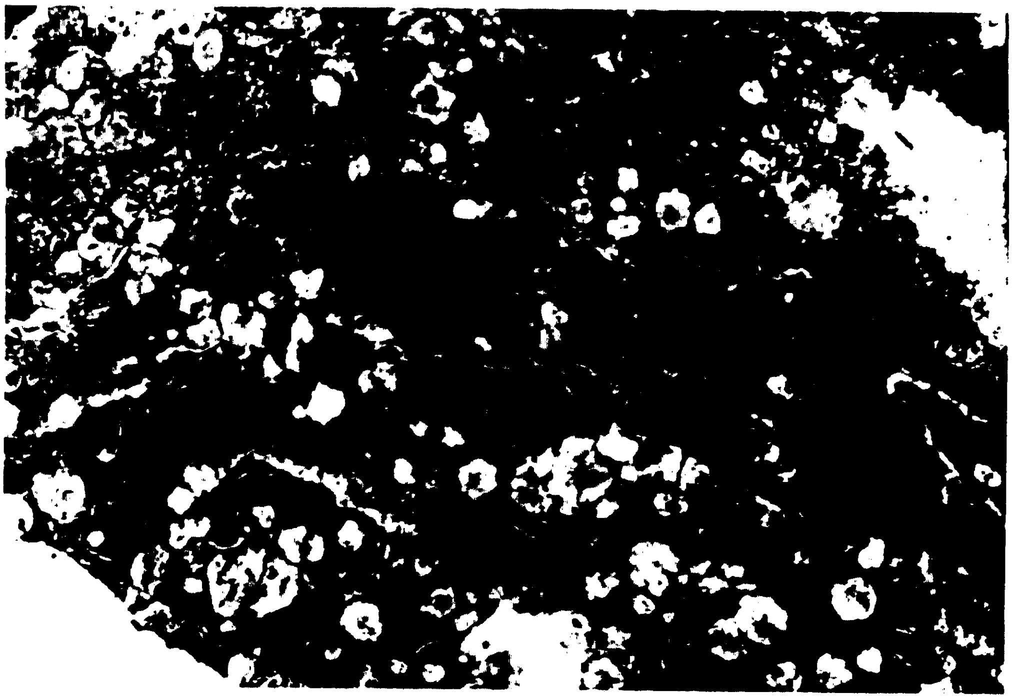

PLATE 3: SAMPLE SWC9 - OOLITES OF CARBONATE (white) IN VARIOUSLY COLOURED CLAYS FROM ALTERED FELSIC PYROCLASTS. (x14 magnification)

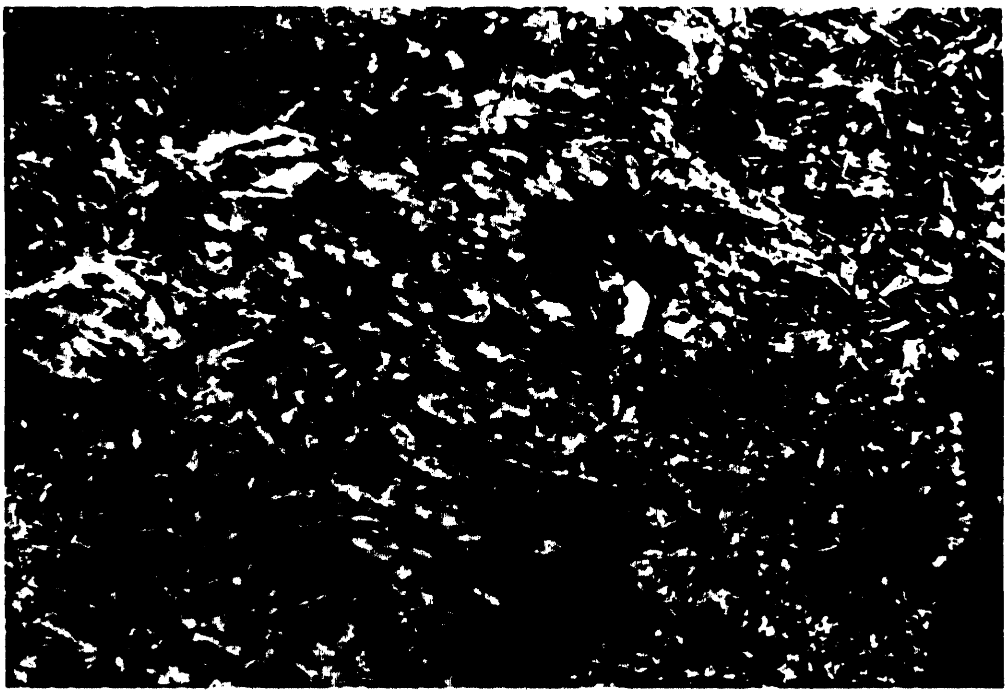

PLATE 4: SAMPLE SWC12 - FLUIDAL TEXTURE IN VOLCANIC (x12 magnification)

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TYPE =	WELL
SUBTYPE =	PHOTOMICROGRAPH
DESCRIPTION =	Colour microphotographs of thin sections from Kyarra-1A Plates 5-6.
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DATE_CREATED =	31/03/83
DATE_RECEIVED =	8/04/83
W_NO =	W804
WELL_NAME =	KYARRA-1A
CONTRACTOR =	AMDEL
CLIENT_OP_CO =	AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PLATE 5: SAMPLE SWC12 - FLUIDAL TEXTURE ENWRAPPING CARBONATE XENOCRYSTS IN POLARISED LIGHT.
(x28 magnification)

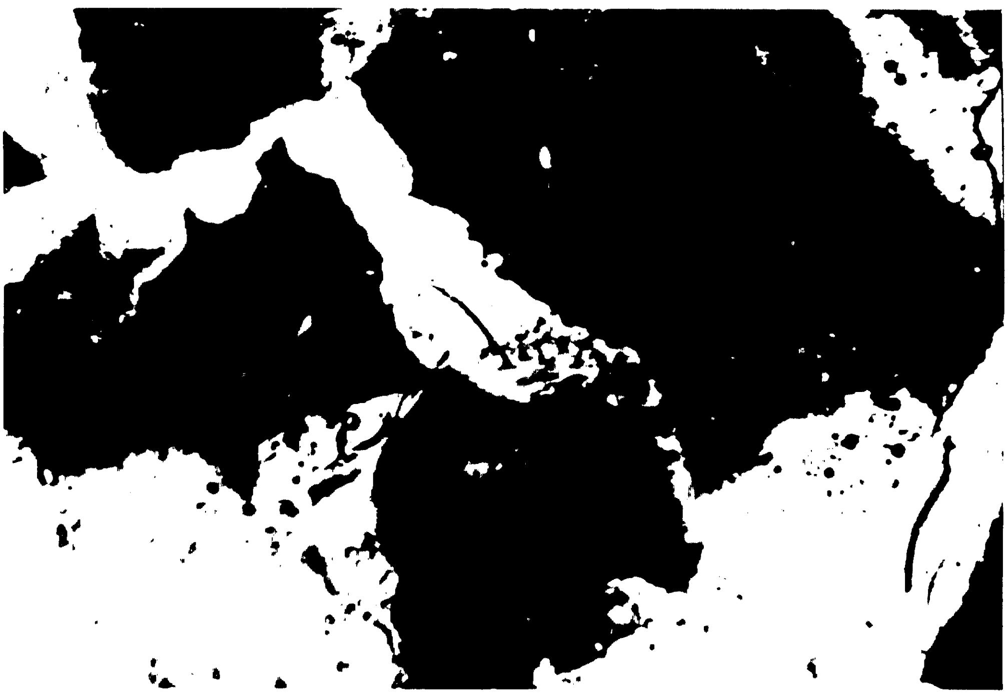

PLATE 6: SAMPLE SWC13 - DISTORTED STRATIFICATION AND ANGULAR QUARTZ GRAINS IN FRAGMENTS OF CLAST COMING APART DURING SECTIONING.
(x25 magnification)

APPENDIX 2

PHOTOMICROGRAPHS OF DISPERSED ORGANIC MATTER

PE906066

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CONTAINER_BARCODE =	PE902584
NAME =	Thin Section Photographs
BASIN =	GIPPSLAND
PERMIT =	VIC/P17
TYPE =	WELL
SUBTYPE =	PHOTOMICROGRAPH
DESCRIPTION =	Colour microphotographs of thin sectioned organic matter from Kyarra-1A Plates 1-2.
REMARKS =	
DATE_CREATED =	31/03/83
DATE_RECEIVED =	8/04/83
W_NO =	W804
WELL_NAME =	KYARRA-1A
CONTRACTOR =	AMDEL
CLIENT_OP_CO =	AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

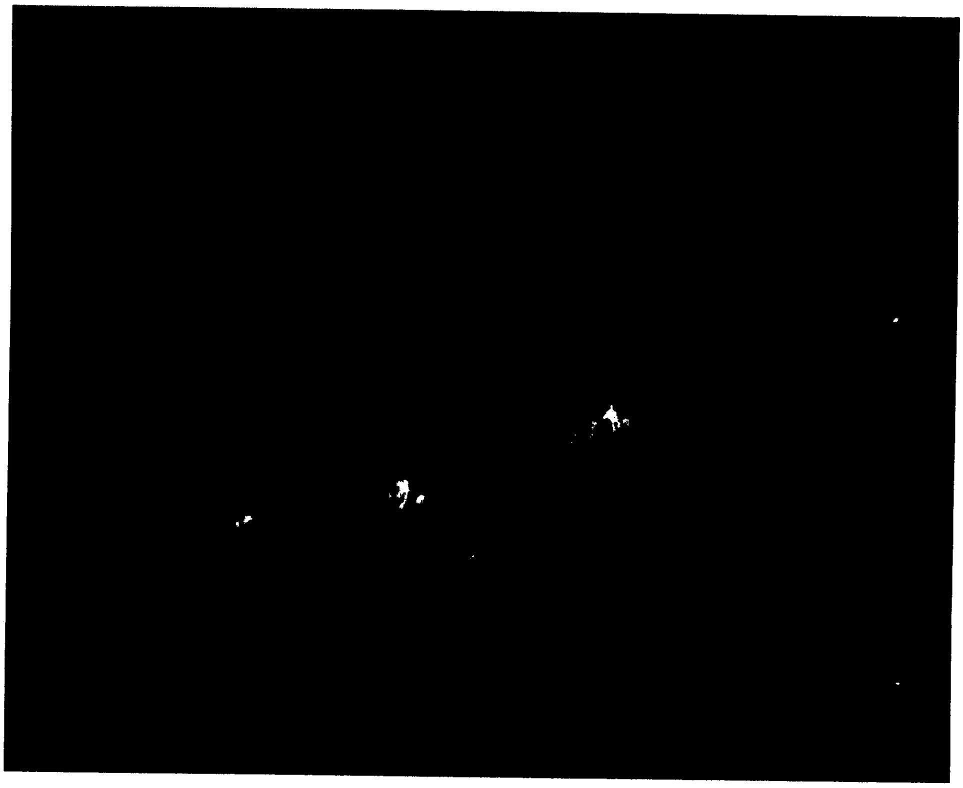

PLATE 1: 1260 m Reflected Light

Cutinite, resinite and huminite in a carbonaceous shale. Much of the original leaf structure is still preserved.

Field Dimensions 0.26 mm x 0.18 mm

PLATE 2: 1260 m Fluorescence Mode

This is the same field as Plate 1 in fluorescence mode illustrating yellow-green fluorescence of the resinite and the moderate orange fluorescence of the cutinite.

Field Dimensions 0.26 mm x 0.18 mm

PE906067

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The enclosure PE906067 has the following characteristics:

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CONTAINER_BARCODE =	PE902584
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BASIN =	GIPPSLAND
PERMIT =	VIC/P17
TYPE =	WELL
SUBTYPE =	PHOTOMICROGRAPH
DESCRIPTION =	Colour microphotographs of thin sectioned organic matter from Kyarra-1A Plates 3-4.
REMARKS =	
DATE_CREATED =	31/03/83
DATE_RECEIVED =	8/04/83
W_NO =	W804
WELL_NAME =	KYARRA-1A
CONTRACTOR =	AMDEL
CLIENT_OP_CO =	AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

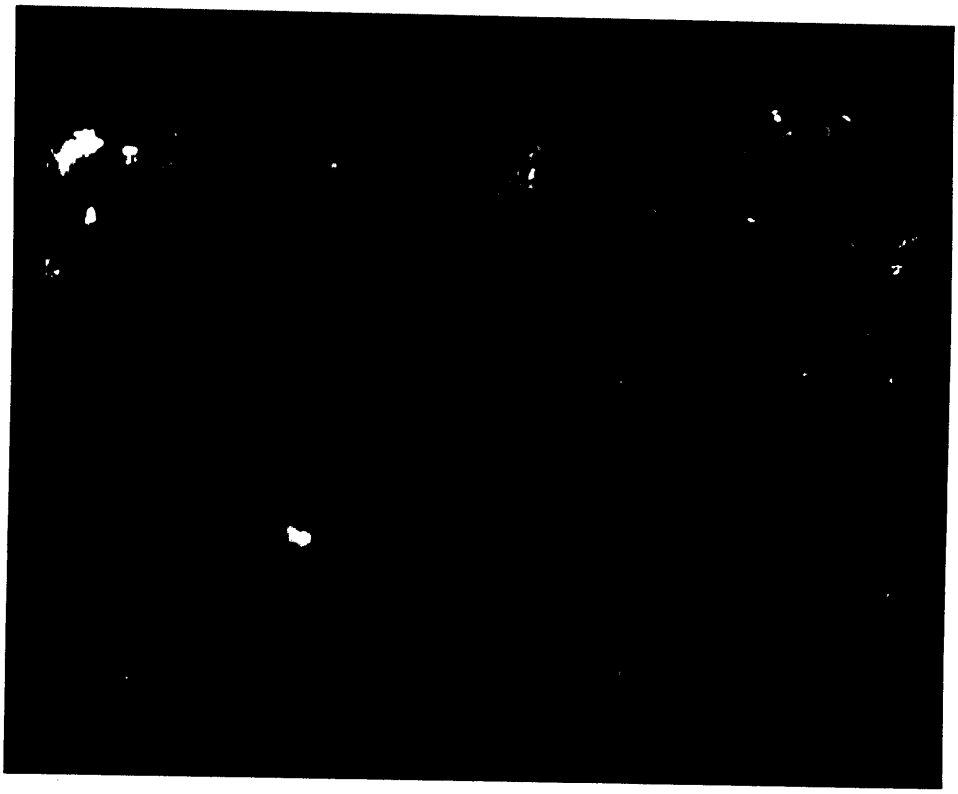

PLATE 3: 1164.5 m Reflected Light

This is a clarite grain consisting chiefly of huminite.

Field Dimensions 0.26 mm x 0.18 mm

PLATE 4: 1164.5 m Fluorescence Mode

This is the same field as Plate 3 showing the sporinite, resinite, suberinite, cutinite and liptodetrinite in the clarite.

Field Dimensions 0.26 mm x 0.18 mm

APPENDIX 3

PROPORTIONS OF VITRINITE, EXINITE AND INERTINITE IN PERCH NO.1, GURNARD No.1 AND OMEO No.1

Depth (ft)	% O.M.		
	Vitrinite	Exinite	Inertinite
Perch No.1			
3822-3825	∿95	∿5	<1
4170-4180	∿75	∿6	∿20
4410-4420	∿60	∿10	∿30
4800-4810	∿65	∿10	∿25
5500-5530	∿65	∿20	∿15
6350-6360	∿65	∿20	∿15
6730-6740	∿ 5	∿10	∿85
6680-6890			
7170-7180	∿50	∿20	∿30
7670-7680	∿50	∿20	∿30
8200-8210	∿45	∿15	∿40
8250-8260			
8726-8731	∿15	∿10	∿80
4300-4310	∿15	∿10	∿80
Gurnard No.1			
7350-7360	∿ 3	∿ 2	∿95
7720-7730	∿60	∿15	∿25
8320-8330	∿55	∿10	∿35
8760-8770	∿55	∿ 5	∿40
9050-9060	∿55	∿10	∿35
9580-9590	∿50	∿ 5	∿45
9710-9720	∿40	∿ 5	∿55
Omeo No.1 - Depth (m)			
2848	∿20	∿10	∿70
2851	∿30	∿10	∿60
2856	∿30	∿25	∿45
3361	∿ 5	∿15	∿80

APPENDIX 6

SOURCE ROCK ANALYSES

BY: AMDEL

SOURCE ROCK ANALYSIS OF SEVEN SIDEWALL
CORES, KYARRA No.1, VIC-P-17,
GIPPSLAND BASIN

Australian Aquitaine Petroleum Pty. Ltd

F3/422/0-4633/83 March 1983

The Australian
Mineral Development
Laboratories

lemington Street, Frewville,
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Phone Adelaide 79 1662
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Please address all
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P.O. Box 114 Eastwood
SA 5063
In reply quote:

amdel

16 March 1983

F3/422/0
4633/83 - Part 1

Australian Aquitaine Petroleum Pty. Ltd.,
99 Mount Street,
NORTH SYDNEY NSW 2060

Attention: Mr Frank Brophy

REPORT F4633/83 - Part 1

YOUR REFERENCE:	Transmittal No.011822, dated 3/3/83
MATERIAL:	Sidewall cores
LOCALITY:	KYARRA No.1
IDENTIFICATION:	SWC's 2, 5, 17, 34, 40, 43 and 44
DATE RECEIVED:	4 March 1983
WORK REQUIRED:	Total organic carbon (R3/3); Rock Ev Vitrinite reflectance (R3/11); Description of dispersed organic matter (R3/12); Interpretation.

Investigation and Report by: Dr David M. McKirdy, Mr Brian L. Wats
Rock Eval Analysis by: Dr Robert E. Cox

Chief - Fuel Section: Dr Brian G. Steveson
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1. INTRODUCTION

This report is a formal presentation of the data and interpretative comments communicated by telex on 11 March, 1983. Selected photomicrographs of the dispersed organic matter (DOM) in these samples will be incorporated in a subsequent report.

2. RESULTS

Total organic carbon (TOC) and Rock Eval data are listed in Table 1. Kerogen type and maturity as inferred from hydrogen index and T_{max} values are illustrated in Figure 1.

Vitrinite reflectance (VR) data and organic matter descriptions are summarised in Tables 2 and 3. Histograms of VR Measurements and detailed descriptions of the DOM for each sample may be found in Appendices 1 and 2, respectively.

3. DISCUSSION

The interval of the Strzelecki Group sampled (1100-1275 metres) is immature for significant hydrocarbon generation (VR = 0.35-0.42%). This level of thermal maturity is consistent with the Rock Eval data plotted in Figure 1.

SWC's 44 and 34 are exinite-rich brown coals and this accounts for their high organic carbon values (TOC = 56-59%). SWC's 43, 40, and 5 are carbonaceous shales with excellent organic richness (TOC = 7-15%) and very high potential hydrocarbon yields ($S_1 + S_2$ = 14-31 kg/tonne).

The Type III kerogen (Fig. 1) comprises land plant-derived woody-herbaceous organic matter rich in vitrinite and exinite (Table 3). The proportion of vitrinite in the DOM decreases with increasing depth, whereas exinite content remains relatively high (10-25% of DOM). Resinite is the dominant exinite maceral, comprising up to 60-70% of the total exinite.

By virtue of their high resinite content these Strzelecki Group sediments, at only slightly higher maturity (VR ≅ 0.5%), would have excellent source potential for light naphthenic oil and/or condensate (Snowdon and Powell, 1982). This, of course, requires basinward continuity of the organic facies into areas of deeper burial.

Although these sediments lack sufficient maturity at the Kyarra-1 well locality to be effective sources of oil and gas, the presence of ?fluorinite (SWC 44) and ?exsudatinite (SWC 34) indicate that the generation and mobilisation of hydrocarbons has in fact commenced.

NB Top Gurnard 1015
Latrobe 1028
Volc. 1216
Stg 1251.

4. CONCLUSIONS

Coals and carbonaceous shales of the Strzelecki Group from the depth interval 1100-1275 metres in Kyarra-1 contain abundant immature Type III kerogen comprising mostly vitrinite and exinite. Appreciable concentrations of resinite (up to 17% of DOM) impart excellent source potential for light oil and/or condensate where these sediments are laterally continuous into areas of slightly higher thermal maturity (VR ≧ 0.45-0.5%).

5. REFERENCE CITED

SNOWDON, L.R., and POWELL, T.G., 1982. Immature oil and condensate - modification of hydrocarbon generation model for terrestial organic matter. *Bull. Am. Assoc. Petrol. Geol.,* 66, 775-788.

FIGURE 1

KEROGEN TYPE AND MATURITY, KYARRA-1

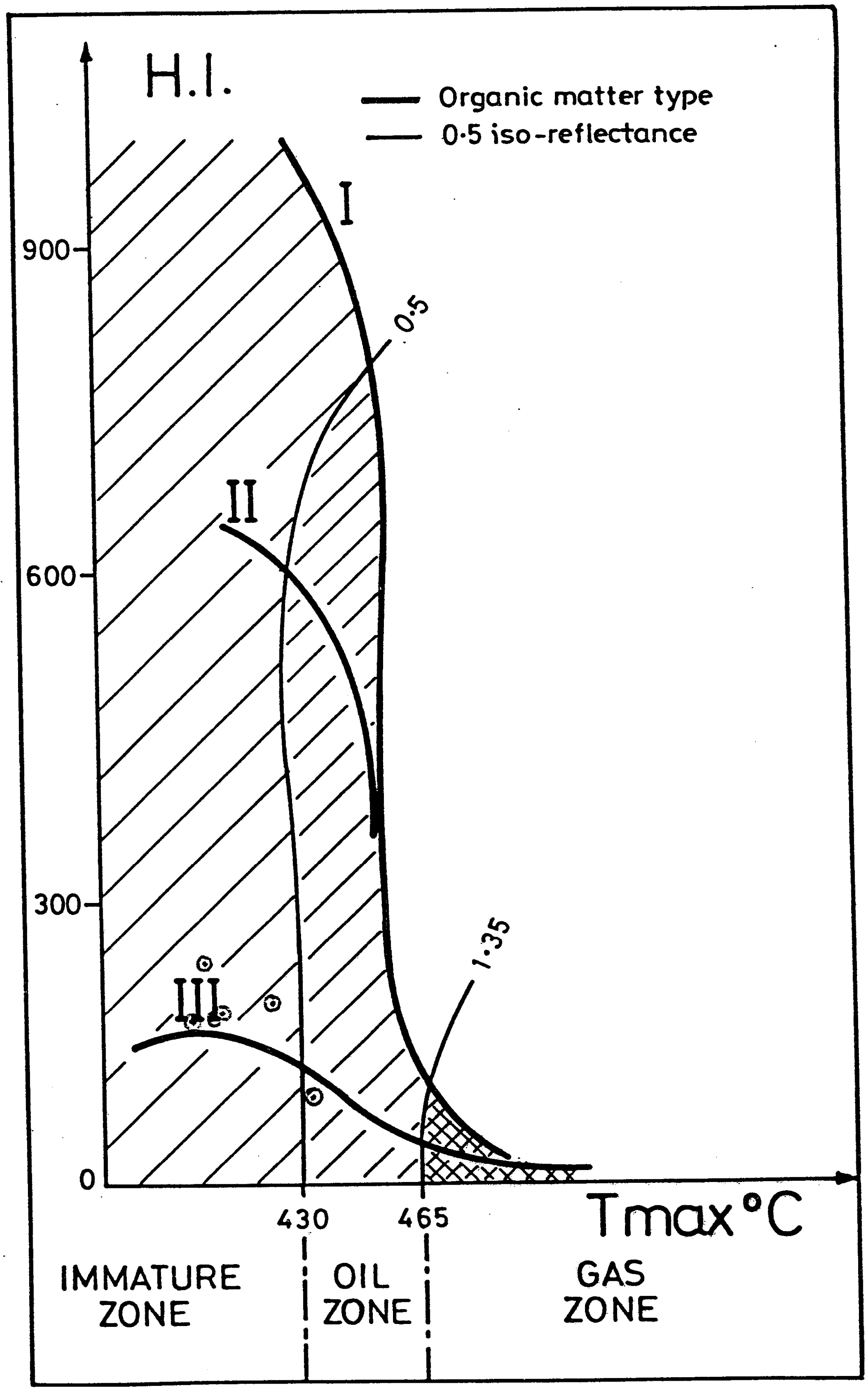


TABLE 1: ROCK EVAL AND TOC DATA, KYARRA-1

SWC	Depth m	T_{max}	S_1	S_2	S_3	PI	S_2/S_3	PC	TOC	HI	OI
44	1100	400	12.18	102.88	15.30	0.11	6.72	9.58	59.2	174	26
43	1106	408	1.16	12.86	2.41	0.08	5.33	1.16	7.10	181	34
40	1122.5	407	1.24	16.12	2.45	0.07	6.57	1.44	9.10	177	27
34	1164.5	405	15.75	131.34	10.23	0.11	12.83	12.25	56.7	231	18
17	1207	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.07	n.d.	n.d.
5	1260	422	0.71	30.38	2.46	0.02	12.34	2.59	15.5	196	16
2	1275	433	0.09	0.76	0.92	0.11	0.82	0.07	0.84	90	109

KEY TO ROCK-EVAL PYROLYSIS DATA SHEET

	PARAMETER	SPECIFICITY
T max	position of S_2 peak in temperature program ($^{\circ}C$)	Maturity/Kerogen type
S_1	kg hydrocarbons (extractable)/tonne rock	Kerogen type/Maturity/Migrated oil
S_2	kg hydrocarbons (kerogen pyrolysate)/tonne rock	Kerogen type/Maturity
S_3	kg CO_2 (organic)/tonne rock	Kerogen type/Maturity *
$S_1 + S_2$	Potential Yield	Organic richness/Kerogen type
PI	Production Index ($S_1/S_1 + S_2$)	Maturity/Migrated Oil
PC	Pyrolysable Carbon (wt. percent)	Organic richness/Kerogen type/Maturity
TOC	Total Organic Carbon (wt. percent)	Organic richness
HI	Hydrogen Index (mg h'c (S_2)/g TOC)	Kerogen type/Maturity
OI	Oxygen Index (mg $CO_2(S_3)$/g TOC)	Kerogen type/Maturity *

*Also subject to interference by CO_2 from decomposition of carbonate minerals.

TABLE 2: SUMMARY OF VITRINITE REFLECTANCE DATA

SWC	Depth	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
44	1100	0.35	0.03	0.29-0.40	41
43	1106	0.36	0.04	0.28-0.42	37
40	1122.5	0.38	0.03	0.32-0.43	33
34	1164.5	0.38	0.03	0.30-0.44	40
17	1207	0.41	0.04	0.36-0.46	9
5	1260	0.42	0.06	0.31-0.57	32
2	1275	0.40	0.06	0.27-0.51	30

TABLE 3: ORGANIC MATTER TYPE, KYARRA-1

SWC	Depth (m)	Relative Maceral Group Volume	Proportion of Vitrinite (% O.M.)	Proportion of Exinite (% O.M.)	Proportion of Inertinite (% O.M.)	Exinite Macerals
44	1100	*V >> E > I	80	15	5	res, sp, sub, ?fluor
43	1106	V >> E > I	85	10	5	res, sp, sub, cut
40	1122.5	V >> E > I	80	15	5	sp, res, lipto, sub
34	1164.5	*V > E > I	75	20	5	res, sp, cut, sub, lipto, ?exs
17	1207	V ≧ I	60	-	40	-
5	1260	I > E > V	10	25	65	res, cut, sp, sub
2	1275	I >> E ≧ V	5	10	85	cut, lipto, ?phyto, sp

KEY

V	Vitrinite	res	resinite	lipto	liptodetrinite
E	Exinite	sp	sporinite	phyto	phytoplankton
I	Inertinite	cut	cutinite	exs	exsudatinite
*	Coals	sub	suberinite	fluor	fluorinite

APPENDIX 1

HISTOGRAMS OF VITRINITE REFLECTANCE MEASUREMENTS

KYARRA NO. 1

1106 M SWC 43

SORTED LIST
.28 .29 .29 .29 .3 .31 .32 .32 .33 .34 .34 .35 .35 .35 .35 .35
.36 .36 .36 .37 .37 .37 .37 .37 .37 .38 .39 .39 .39 .4 .4 .4 .41
.41 .41 .41 .42
Number of values = 37

MEAN OF VALUES .359
STD DEVIATION .038

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
28  |*
29  |***
30  |*
31  |*
32  |**
33  |*
34  |**
35  |*****
36  |***
37  |******
38  |*
39  |***
40  |***
41  |****
42  |*
```

KYARRA NO. 1

1122.5M SWC 40

SORTED LIST

.32 .33 .33 .33 .34 .35 .35 .35 .36 .36 .37 .37 .37 .37 .37 .38
.38 .38 .39 .39 .39 .39 .39 .39 .4 .41 .41 .41 .41 .42 .42 .42
.43

Number of values = 33

MEAN OF VALUES .378
STD DEVIATION .029

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
32  |*
33  |***
34  |*
35  |***
36  |**
37  |*****
38  |***
39  |******
40  |*
41  |****
42  |***
43  |*
```

KYARRA NO. 1

1164.5 M SWC 34

SORTED LIST
.3 .33 .33 .34 .34 .34 .35 .35 .36 .36 .36 .37 .37 .37 .37 .37
.37 .38 .38 .38 .38 .38 .38 .38 .39 .39 .4 .4 .4 .4 .4 .41 .41
.41 .42 .42 .43 .43 .44 .44
Number of values = 40

MEAN OF VALUES .381
STD DEVIATION .032

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
30  |*
31  |
32  |
33  |**
34  |***
35  |**
36  |***
37  |******
38  |*******
39  |**
40  |*****
41  |***
42  |**
43  |**
44  |**
```

KYARRA NO. 1

1207 M SWC 17

SORTED LIST
.36 .37 .38 .38 .39 .41 .45 .45 .46
Number of values = 9

MEAN OF VALUES .406
STD DEVIATION .036

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
36  |*
37  |*
38  |**
39  |*
40  |
41  |*
42  |
43  |
44  |
45  |**
46  |*
```

KYARRA NO. 1

1100 M SWC 44

SORTED LIST

.29	.29	.29	.29	.31	.31	.32	.32	.32	.33	.33	.33	.33	.33	.34	.34
.34	.35	.35	.35	.35	.35	.35	.35	.36	.36	.36	.36	.36	.37	.37	.37
.37	.38	.38	.39	.39	.39	.39	.4	.4							

Number of values = 41

MEAN OF VALUES .348
STD DEVIATION .03

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
29  |****
30  |
31  |**
32  |***
33  |*****
34  |***
35  |*******
36  |*****
37  |****
38  |**
39  |****
40  |**
```

KYARRA NO. 1

1260 M SWC 5

SORTED LIST
.31 .33 .34 .34 .35 .35 .36 .36 .37 .38 .38 .39 .4 .4 .41 .41 .
42 .43 .43 .44 .45 .45 .45 .46 .46 .46 .49 .5 .5 .53 .53 .57
Number of values = 32

MEAN OF VALUES .42
STD DEVIATION .064

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
31   |*
32   |
33   |*
34   |**
35   |**
36   |**
37   |*
38   |**
39   |*
40   |**
41   |**
42   |*
43   |**
44   |*
45   |***
46   |***
47   |
48   |
49   |*
50   |**
51   |
52   |
53   |**
54   |
55   |
56   |
57   |*
```

KYARRA NO. 1

1275M SWC 2

SORTED LIST
.27 .29 .3 .36 .36 .37 .37 .37 .37 .37 .38 .38 .38 .38 .39 .39
.39 .4 .4 .4 .41 .42 .43 .44 .47 .47 .48 .48 .48 .51
Number of values = 30

MEAN OF VALUES .397
STD DEVIATION .056

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
27  |*
28  |
29  |*
30  |*
31  |
32  |
33  |
34  |
35  |
36  |**
37  |*****
38  |****
39  |***
40  |***
41  |*
42  |*
43  |*
44  |*
45  |
46  |
47  |**
48  |***
49  |
50  |
51  |*
```

APPENDIX 2

ORGANIC MATTER DESCRIPTIONS

Sample 1: Depth 1100 metres, SWC 44

This sample consists of an exinite-rich clarite. The exinite macerals present in this brown coal, in order of abundance, are resinite (bright yellow green to bright orange and moderate orange fluorescence), sporinite (bright green to bright yellow fluorescence), suberinite (moderate to dull yellow and dull orange fluorescence) and ?fluorinite (bright yellow fluorescence).

Approximately 80% of the coal is vitrinite. Exinite constitutes approximately 15% of the coal, and inertinite approximately 5%.

Sample 2: Depth 1106 metres, SWC 43

This sample is a carbonaceous shale containing abundant dispersed organic matter. In the DOM vitrinite is much more abundant than exinite which is more abundant than inertinite.

Exinite is common in this shale. The exinite macerals present, in order of abundance, are resinite (bright yellow-green to bright yellow and moderate orange fluorescence), suberinite (moderate yellow fluorescence), cutinite (bright yellow fluorescence) and sporinite (bright yellow-green to bright yellow fluorescence). Approximately one-third of the resinite displays oxidation rims.

Vitrinite comprises approximately 85% of the DOM in this shale. Approximately 10% of the organic matter is exinite and the remainder is inertinite.

Sample 3: Depth 1222.5 metres, SWC 40

This core is very similar to Sample 2 and consists of carbonaceous shale rich in dispersed organic matter. Vitrinite is again much more abundant than exinite which is more abundant than inertinite.

The exinite macerals present in this shale are sporinite (bright yellow fluorescence), resinite (bright yellow fluorescence), liptodetrinite (bright yellow fluorescence) and suberinite (moderate to dull orange fluorescence).

The DOM in this carbonaceous shale consists of approximately 80% vitrinite, 15% exinite and 5% inertinite.

Sample 4: Depth 1164.5 metres, SWC 34

This core is an exinite-rich clarite similar to Sample 1.

The exinite macerals of this coal are resinite (bright yellow fluorescence, commonly with dull brown oxidation rims), sporinite (bright yellow-green fluorescence), cutinite (bright yellow-green fluorescence), suberinite (moderate yellow to moderate orange and dull orange fluorescence), liptodetrinite (bright yellow-green to bright yellow fluorescence) and ?exsudatinite (moderate orange fluorescence).

The coal consists of approximately 75% vitrinite, 20% exinite and 5% inertinite.

Sample 5: Depth 1207 metres, SWC 17

This siltstone contains very little organic matter. Vitrinite and inertinite are very rare, and exinite is absent. Vitrinite is slightly more abundant than inertinite and is thought to occupy approximately 60% of the DOM.

Sample 6: Depth 1260 metres, SWC 5

This sample is a carbonaceous shale containing abundant dispersed organic matter. However, in contrast to the other carbonaceous shales in this sequence, inertinite is more abundant than exinite which is more abundant than vitrinite.

Exinite is particularly abundant in this shale. It comprises resinite (bright yellow-green to bright yellow, moderate yellow to moderate orange and dull orange fluorescence), cutinite (moderate orange fluorescence), sporinite (moderate yellow to moderate orange fluorescence) and suberinite (dull orange fluorescence).

The DOM in this carbonaceous shale consists of approximately 65% inertinite, 25% exinite and 10% vitrinite.

Sample 7: Depth 1275 metres, SWC 2

This sample is a sandy siltstone containing only sparse dispersed organic matter. In the DOM inertinite is much more abundant than exinite which is slightly more abundant than vitrinite. A few carbonate grains are also present in the core but these lack organic matter.

Exinite is rare in this sample. The exinite macerals present are cutinite (moderate orange fluorescence), liptodetrinite (moderate orange fluorescence), ?phytoplankton (bright yellow fluorescence) and sporinite (moderate orange fluorescence).

The DOM in this sandy siltstone consists of approximately 85% inertinite, 10% exinite and 5% vitrinite.

APPENDIX 7

LOG ANALYSES - FORMATION EVALUATION

BY: J. BOWLER

AUSTRALIAN AQUITAINE
PETROLEUM PTY. LTD.

KYARRA 1A

EVALUATION OF 24 - 26 FEBRUARY, 1983
LOGS AND RFT

BOWLER LOG CONSULTING SERVICES PTY. LTD.

JACK BOWLER
Telephone: (051) 56 6170

P.O. BOX 2,
PAYNESVILLE. 3880
VICTORIA,
AUSTRALIA

28th February, 1983

Mr. F. Brophy,
Australian Aquitaine Petroleum Pty. Ltd.,
Elf Aquitaine Centre,
14th Floor,
99 Mount Street,
NORTH SYDNEY. N.S.W. 2060.

Dear Frank,

Please find enclosed my evaluation of the Kyarra 1A logs and RFT of 24 - 26 February, 1983.

They show the sands to be highly porous, permeable, and water wet. The radioactive formation immediately above the top of the Latrobe sand was sampled with the RFT and found to have a permeability of 6 md and to be water bearing.

The RFT showed a 0.68 g/cc gradient from 1018.5 to 1060 meters which was not supported by sidewall cores, RFT fluid recoveries or the logs.

Yours very truly,

J. Bowler.

LOGS RUN

KYARRA NO. 1A

DATE	RUN	LOGS	INTERVAL	CIRC TIME (HRS)	TIME CIRC STOPPED (HRS)	TIME LOGGER ON BOTTOM (HRS)	MAX RECORDED TEMP (BHT)	RMF @ BTM (OHM-M)	SCALE 1:200	SCALE 1:500	SCALE OTHER
20.2.83	1	ISF-SLS-G	78m - 981m	1½	2400/19th	0400/20th	110^{0} F	0.180	x	x	
	1	LDL-G	228.5m - 983m		2400/19th		114^{0} F	0.174	x	x	
24.2.83	1	DLL-MSFL-G	969.5m - 1273m	1½	0130/24th	0615/24th	120^{0} F	0.157	x	x	
	2	SLS-G	969.5m - 1277m		0130/24th	1000/24th	126^{0} F	0.149	x	x	
	1	LDL-CNL-G	969.5m - 1273m		0130/24th	1500/24th	131^{0} F	0.144	x	x	
		HDT	969.5m - 1277m		0130/24th	1630/24th	135^{0} F	0.140	x	x	
26.2.83	1	RFT	1018.8m - 1049m	1½	1900/25th	2000/25th	120^{0} F	0.157			x
	2	RFT	1018.5m - 1214.6		1900/25th	0800/26th	130^{0} F	0.145			x
	1	CST									
	2	CST									
PROCESSED LOGS	1	CYBERDIP	969m - 1277m						x		
									x		

SEABED TEMPERATURE @ 74m (KB) = 50^{0} F (10^{0}C)

EXTRAPOLATED BHT @ 1280m (KB) = 137^{0} F (58^{0}C)

TEMPERATURE GRADIANT = 3.96^{0}C/100m OR 2.19^{0}F/100 FEET.

I. EVALUATION OF OPEN HOLE LOGS

Despite the enlarged borehole in several places the pad contact tools (MSFL and LDL) are working well over most of the logged interval. One major exception is the sand from 1029 - 1039 meteres where the washout is so bad that even the sonic may be reading too high. The LDL and CNL show the sands to be very porous and clean. Porosities are as high as 36 per cent and average around 33 in the upper part of the hole. Unfortunately the sands are water wet as may be seen on Plots 1 and 2. The SP suggests a formation water change around 1100 meters with salinity around 5,500 PPM NaCl below and 2,300 PPM NaCl above.

The most interesting feature of these logs is the apparent permeability of the highly radioactive formation from 1015 to 1029. Both the SP and separation between the MSFL and LLD confirm the zone is permeable. The sonic and density suggest it may have porosity. The RFT confirmed the zone has both permeability and effective porosity. If this is also true on Perch A1 the reservoir in that well may extend upward from 3730 to 3707 feet as suggested in my report to you on Perch A1 on 21st June, 1982.

Computation of Rw from the SP

1135 - 1160

RmF = 0.16 at 120 deg. F.
SSP = + 35 mv.
Rw = .65
RmF is 25,000 PPM NaCl

RmFe = .14
Rwe = .4
5,500 PPM NaCl

A SP derived Rw of 0.65 is reasonable for all the sands below 1100 meters. This agrees well with the Rw derived from Plot No. 1.

1000 - 1100

There seem to be several shifts of the SP shale baseline but + 45 mv is a reasonable SP for the sands in this interval from which Rw = 1.3 at 120 deg. F. (2,800 PPM NaCl).

This is a lower Rw than that of 1.55 derived from Plot No. 2. (2,300 PPM NaCl), but agreement is good.

TABLE NO. 1

Level	Depth	R_T	Density-Neutron	Rwa	Probable Production
1	1214.5	9.	20	.44	Water
2	1213.5	6.	27	.54	Water
3	1203	7.	27	.63	Water
4	1201	11.	22	.66	Water
5	1195	9.	27	.81	Water
6	1187.5	6.	30	.67	Water
7	1181.5	10	25	.77	Water
8	1170	5.	33	.67	Water
9	1156.5	6.	34	.86	Water
10	1148	6.	37	1.0	Water
11	1136.5	14	26	1.17	Water
12	1116	5.2	31	.62	Water
13	1112	5.	35	.76	Water
14	1109	5.	36	.8	Water
15	1085	12.	35	1.8	Water
16	1075.5	10.	33	1.34	Water
17	1067	9.	35	1.36	Water
18	1059	8.8	35	1.33	Water
19	1055	8.8	36	1.41	Water
20	1049	8.	35	1.21	Water
21	1041	12.	36 *	1.92	Water
22	1039	8.4	38 *	1.5	Water
23	1034	16.	29 *	1.66	Water
24	1031	16.	35 *	2.42	Water
25	1022	10.	33	1.34	Water
26	1020	10.	33	1.34	Water

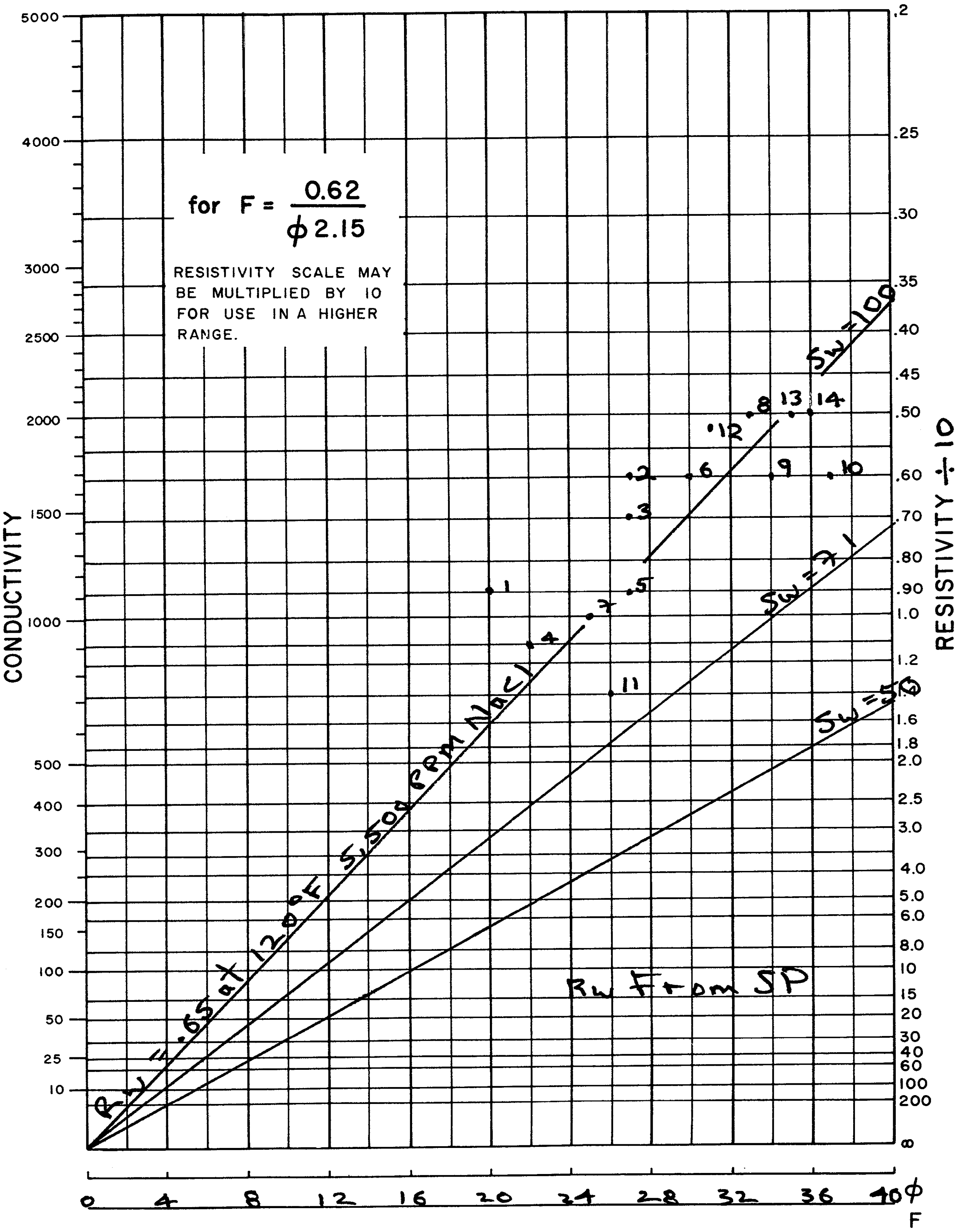
* Denotes porosity from sonic which has been calibrated to Density-Neutron Porosity in good hole. Note that even the sonic porosity may read too high in the washed out hole.

PLOT NO. 1

Schlumberger

RESISTIVITY VS POROSITY

1214.5 – 1109

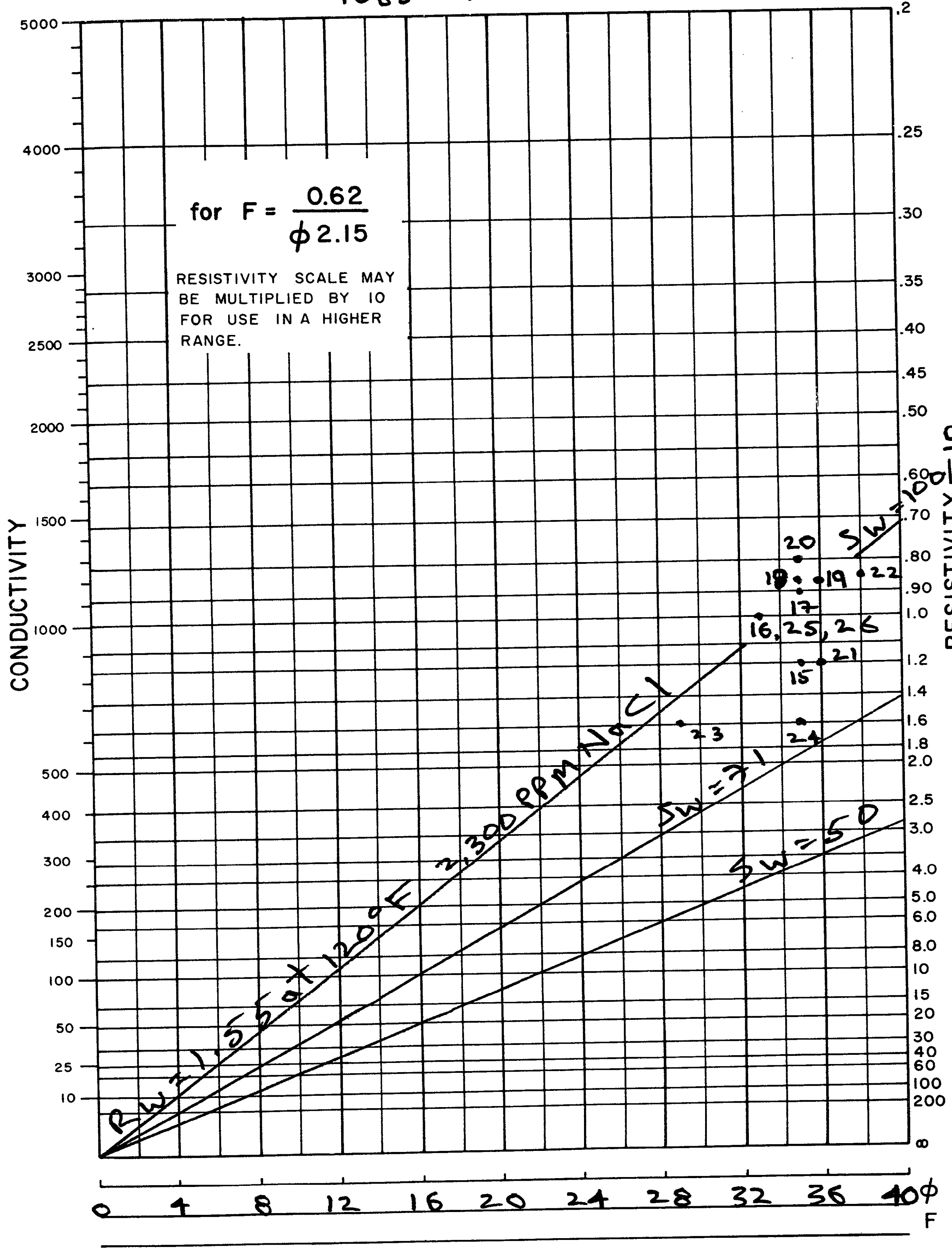


PLOT NO. 2

Schlumberger

RESISTIVITY VS POROSITY

1085- 1020



II. EVALUATION OF RFT PRESSURES AND SAMPLE RECOVERIES

The formation pressures from the RFT along with the mud pressures are plotted on Plot No. 3. A 1.01 fresh water gradient is clearly seen in the bottom part of the hole from 1060 to 1214.6. A 0.68 g/cc gradient is present from 1018.5 to 1060. This apparent hydrocarbon gradient is hard to explain as RFT fluid recoveries from 1022.4 and 1018.5 recovered only formation water and mud filtrate and no shows were seen in the sidewall cores. In addition the logs suggest this interval is wet. The RFT pressures appear to be valid as the mud gradient is constant over the section measured.

It was decided to take fluid samples in the radioactive section from 1015 to 1029 to confirm it's permeability and also because it was just above the washed out sand from 1029 - 1039. Because of the severe caving it was questionable as to the ability to accurately evaluate this sand due to the corrections made to the resistivity logs. Therefore a fluid sample immediately above was the next best choice.

Fluid recoveries suggest the following amount of formation water was recovered depending on the salinity used for formation water.

	Per cent Formation Water	
Depth	2,800 PPM NaCl (SP derived)	2,300 PPM NaCl (Plot derived)
1022.4	22.5	22
1018.5 Lower Chamber	31.5	31
1018.5 Upper Chamber	54.	53

TABLE NO. 2

File	Depth	Pressure (PSIG) Formation	Mud	Remarks
RUN NO. 1				
19	1019	1452	1641 - 1637	
10	1022.5	1459	1640 - 1642	
11	1025.5	-	1645 - 1647	Tight
12	1026.5	-	1646 - 1646	Tight
13	1018.8	1450	1632 - 1637	
14	1022.5	Seal Failure	1637 - 1637	
15	1022.4	1452	1636 - 1639	

Sample with lower chamber for 29 minutes at 24 to 80 PSI then Seal Failure. Recover 2,000 cc of mud and 1750 cc of water with resistivity of 0.31 at 74 degrees F. (20,000 PPM NaCl). No gas, oil or surface pressure.

16	1034	Seal Failure	1658	
17	1041	Seal Failure	1670	
18	1049	Seal Failure	1682	

Pull out of hole to check packer and found it lightly scored which could have caused Seal Failures.

TABLE NO. 2

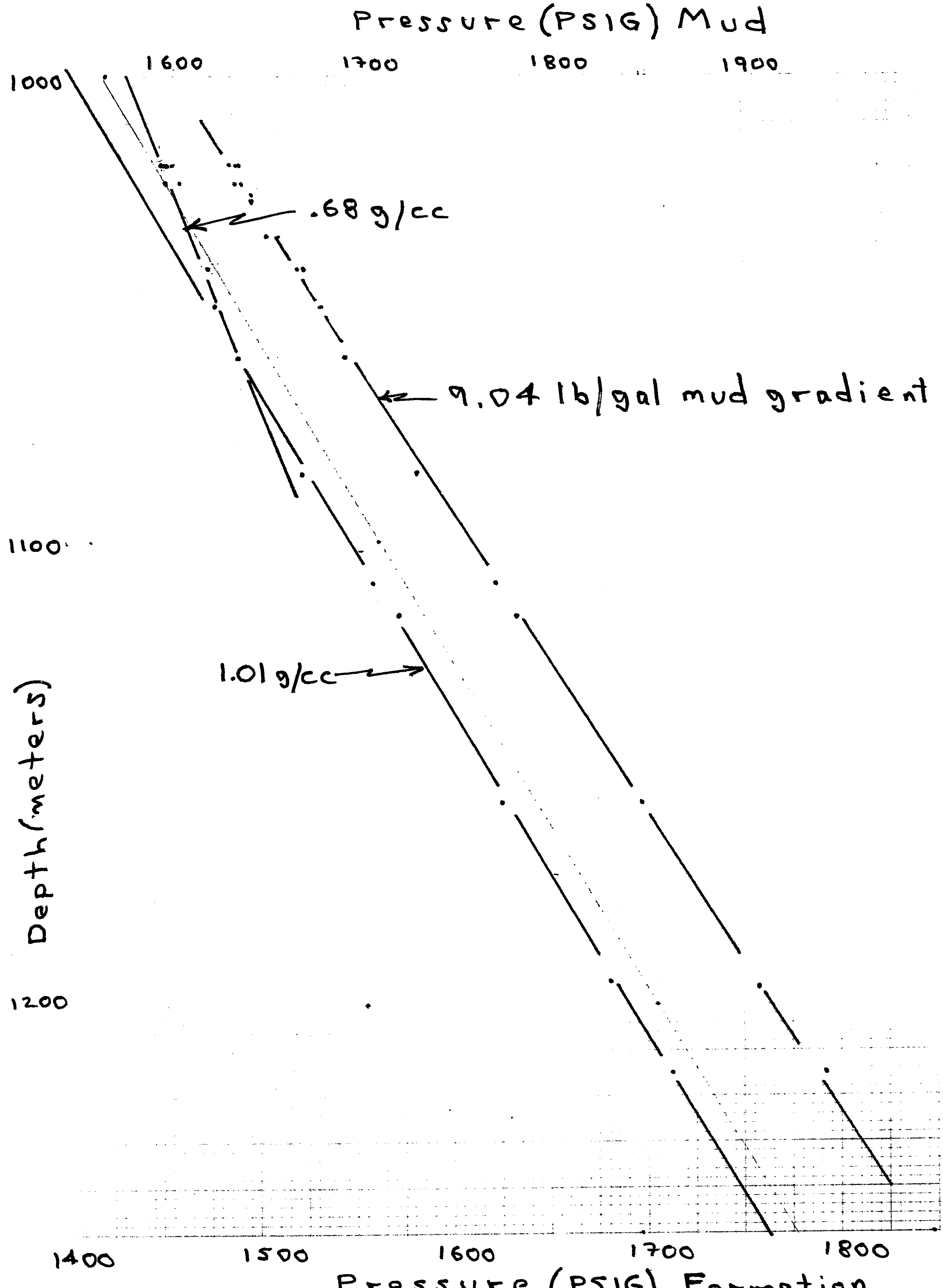
File	Depth	Pressure (PSIG) Formation	Mud	Remarks
RUN NO. 2				
19	1019	1455	1641 - 1642	
20	1019	Seal Failure	1638	
21	1018.5	1449	1637 - 1632	

Fill Lower Sample Chamber with 1,500 cc muddy water and 8,000 cc water with 0.35 resistivity at 72 degrees F. (18,000 PPM NaC1). Sample for 43 minutes around 450 PSI to 1430 PSI formation pressure. Fill Upper Sample Chamber with 9,250 cc of .48 ohmm water at 72 degrees F. (13,000 PPM NaC1) (7,000 PPM measured C1). Sample for 50 minutes at 470 PSI to buildup of formation pressure at 1428 PSI. Both sample chambers have 10,400 cc capacity and final reservoir pressure may not have been reached in each chamber. Radial Flow permeability estimate for Lower Chamber is 6 md and 6 md for Upper Chamber. Constant for new Martineau probe for permeability computation is 2738 instead of 5660. No oil, gas or surface pressure seen in either chamber recovery at 1018.5. Only a rainbow seen on top of Upper Chamber fluid which was thought to be saltex added to the mud. Both Upper and Lower Sample Chamber water fluoresced a light green colour the same as the mud Filtrate.

23	1041	1473	1672 - 1674	
24	1049	1477	1681	
25	1059.9	1490	1695	
26	1085	1522	1732 - 1733	
27	1108.5	1558	1771 - 1773	
28	1116	1571	1787 - 1788	
29	1156.5	1625	1846 - 1848	
30	1196	Seal Failure	1909 - 1905	
31	1195	1680	1905 - 1909	
32	1214.6	1712	1942 - 1943	
33	1071	1517	1730 - 1726	

This last measurement was taken on way out of the hole while all others were taken on the way in the hole. As on previous jobs it seems to exhibit some sort of hysterisis so it has not been plotted.

PLOT NO. 3



Pressure (PSIG) Mud
1600
1700
1800
1900
1000
.68 g/cc
9.04 lb/gal mud gradient
1100
1.01 g/cc
Depth (meters)
1200
1400
1500
1600
1700
1800
Pressure (PSIG) Formation

APPENDIX 8

RFT RESULT SUMMARY

APPENDIX 8

RFT RESULTS SUMMARY

KYARRA NO. 1A

LOG SUITE NO. 1 (FEBRUARY 26, 1983) - RFT NO. 1

Test No.	Depth in metres		Formation Pressure		Hydrostatic Pressure		Permeability estimate from pre-test
	RKB	MSL	psig	kg/cm^2	psig	kg/cm^2	
1	1019.0	988.5	1452	102.1	1641-1637	115.4-115.1	< 5 md
2	1022.5	992.0	1459	102.6	1640-1642	115.3-115.5	< 5 md
3	1025.5	995.0	-	-	1645-1647	115.7-115.8	Tight
4	1026.5	996.0	-	-	1646	115.7	Tight
5	1018.8	988.3	1450	102.0	1632-1637	114.8-115.1	< 5 md
6	1022.5	992.0	-	-	1637	115.1	Seal failure
7*	1022.4	991.9	1452	102.1	1636-1639	115.0-115.3	< 5 md
8	1034.0	1003.5	-	-	1658	116.6	Seal failure
9	1041.0	1010.5	-	-	1670	117.4	Seal failure
10	1049.0	1018.5	-	-	1682	118.3	Seal failure

* Sample at 1022.4m RKB.

Sample with lower (10400 cc) chamber for 29 minutes at 24-80 psi, then seal failure.

Recovery: 0 gas, zero surface pressure.
2000 cc of mud, 1750 cc of water, 0.31 ohm-m at 74°F, (20,000 ppm NaCl).

Note:
1: Mud filtrate 0.26 ohm at 70°F (25,000 ppm NaCl).
2: Final pressure not reached due to seal failure.

LOG SUITE NO. 1 (FEBRUARY 26, 1983) - RFT NO. 2							
Test No.	Depth in metres		Formation Pressure		Hydrostatic Pressure		Permeability estimate from pre-test
	RKB	MSL	psig	kg/cm^2	psig	kg/cm^2	
1	1019.0	988.5	1455	102.3	1641-1642	115.4-115.5	< 5 md
2	1019.0	988.5	-	-	1638	115.2	Seal failure
3*	1018.5	988.0	1449	101.9	1637-1632	115.1-114.8	6 md
4	1941.0	1010.5	1473	103.6	1672-1674	117.6-117.7	> 100 md
5	1049.0	1018.5	1477	103.9	1681	118.2	>,100 md
6	1059.9	1029.4	1490	104.8	1695	119.2	> 100 md
7	1085.0	1054.5	1522	107.0	1732-1733	121.8-121.9	> 100 md
8	1108.5	1078.0	1558	109.6	1771-1773	124.5-124.7	> 100 md
9	1116.0	1085.5	1571	110.5	1787-1788	125.7-125.7	≅ 20 md
10	1156.5	1126.0	1625	114.3	1846-1848	129.8-130.0	< 50 md
11	1196.0	1165.5	-	-	1909-1905	134.2-133.7	Seal failure
12	1195.0	1164.5	1680	118.1	1905-1909	133.7-134.2	> 100 md
13	1214.6	1184.1	1712	120.4	1942-1943	136.6-136.6	> 100 md
14	1071.0	1040.5	1517	106.7	1730-1726	121.7-121.4	> 100 md

* Sample at 1018.5m RKB.

(a) Open lower (10400 cc) chamber for 43 minutes, 1430 psi Formation Pressure.

Recovery: 0 gas, zero surface pressure.
1500 cc muddy water, 8000 cc water, 0.35 ohm-m at 72°F (18000 ppm NaCl).

(b) Open upper (10400 cc) chamber for 50 minutes, 1428 psi Formation Pressure.

Recovery: 0 gas, zero surface pressure.
9250 cc water, 0.48 ohm-m at 72°F (13000 ppm NaCl), (7000 ppm measured Cl).

Note:

1: Mud filtrate 0.26 ohm-m at 70°F (25000 ppm NaCl).

2: Final buildup pressure of 1449 psi not reached on early sample termination.

APPENDIX 9

WEEKLY WELL SUMMARY

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WEEKLY WELL SUMMARY

WELL NAME: ....KYARRA NO. 1.................... REPORT NO.: ....1..........

PERIOD: FROM: .10TH.FEBRUARY,.1983............ TO: ....15TH.FEBRUARY,.1983....

All depths relate to Rotary Kelly Bushings at zero tide datum (Low Water Indian Springs) which is ...75... metres above seabed.

HOLE	SIZE	36"	26"	17½"	12¼"	8½"	
	DEPTH (m)	NA	210				
CASING	SIZE	NA	20"	13 3/8"	9 5/8"		
	DEPTH (m)	NA	202				

DATE	DEPTH AT 2400 HRS.	PROGRESS	REMARKS
10.2.83	--	--	UNDER TOW TO KRA1 FROM OME1 AT 0630HRS. ARRIVE KRA1 AT 1300HRS. RUN & PRETEST ANCHORS BALLAST RIG TO 70FOOT DRAFT. PROV CO-ORDS: LAT 38°40'51.9"S LONG 147°11'13.0"E HEADING 259 DEG.
11.2.83	197M	122M 13½HRS	BALLAST RIG. TEST ANCHORS. RUN GUIDE BASE. RIH 26" BIT. SPUD WELL AT 1030HRS. DRILL 26" HOLE WITH SEAWATER.
12.2.83	210M.	13M 4½HRS	DRILL 26" HOLE. SLOW ROP. SPOT 40M^3 HI-VIS MUD PULL BACK TO GUIDE BASE. RIH. SPOT 56M^3 HI-VIS MUD. POOH. RUN 20" CASING. CASING HUNG UP AT 131M, & STUCK AT 134M. POOH. RIH 26" BIT.
13.2.83	210M DEVIATION = ½	NIL DEG/210M	REAM 26" HOLE. SPOT 40M^3 HI-VIS MUD. PULL BACK TO GUIDE BASE. RIH. SPOT 72M^3 MUD. POOH. RUN 20"CASING. SHOE AT 202M. CEMENT WITH 80.5TONNES CLASS "G". SLURRY WEIGHT 1.90 SG. DISPLACE WITH 20.4M^3 1.50 SG MUD. PULL 18 3/4 RUNNING TOOL. RUN BOP.
14.2.83	210M	NIL	RUN BOP STACK. TEST 20:CASING. NO TEST. CIRCULATED THROUGH CASING MAKE PICK UP TEST. CASING NOT CEMENTED. RIH OPEN END DRILL PIPE. TAG FLOAT COLLAR AT 197M. CLOSE HYDRIL. ESTABLISHED CIRCULATION. PERFORM SECONDARY CEMENTATION THROUGH OPEN END PIPE. 22T"G" + 4% GEL - 1.36 SG: PLUS 7T "G" NEAT + 2% $CACL_2$ - 1.82/1.85SG. DISPLACE WITH SEAWATER. WOC WITH ANNULUS + PIPE CLOSED, AS ANNULUS LEVEL DROPPING AFTER CEMENT JOB.

(1)

15.2.83	75M	PBD	WOC. POOH. PIPE STUCK IN CEMENT. PULL 90T OK. RIH 17½" BIT. TOC 82M. DRILL CEMENT T 140M. POOH. CUT 20" CASING AT 18.5M. RIH 20" RUNNING TOOL. PULL WELLHEAD, TGB + PGB 10M ABOVE SEABED. WITH 5" STINGER 46M BELOW RUNNING TOOL, PLACE CEMENT PLUG 110 TO 75M (13T, "G" CEMENT). PULL WELLHEAD. MOVE RIG 20M, DIRECTION 24 DEGREES FOR KYARRA NO. 1A.

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

TIME SUMMARY

WELL NAME: ....KYARRA NO. 1..... PERIOD: FROM: ...10.2.83...... TO: ..15.2.83......

TIME ANALYSIS (HOURS)	FOR WEEK	TOTAL
D: MOVING		
D1 Moving of rig, rigging up/down, anchoring	28	28
D2 Waiting on weather during moving		
D3 Other waiting time		
F: DRILLING - CASING		
F1 Drilling on bottom, incl. connection time	18	18
F2 Trips for new bit		
F3 Ancillary Drilling Operations, incl. Totco, reaming, hole cleaning, testing BOP or casing.		
F4 Casing and Cementing	66	66
G: FORMATION SURVEYS		
G1 Coring		
G2 Related Coring Operations, incl. tripping etc.		
G3 Tests and associated operations		
G4 Electric Logging Operations		
A: INTERRUPTION OF OPERATIONS UNDER F OR G		
A1 Stuck Pipe and Fishing Operations	23	23
A2 Mud-Losses, Flows, Treatment		
A3 Waiting on Weather		
A4 Other waiting time - Repairs	2½	2½
C: COMPLETION - PLUGGING		
C1 Completion, Stimulation, Production Tests		
C2 Abandonment of Well		
C3 WOW during completion, plugging, testing		
C4 Other Waiting time		
TOTAL TIME:	137½	137½

DOWN TIME: HOURS PERCENTAGE

NOTE: RIG MOVED 20M IN DIRECTION OF 240 DEGREES TO DRILL KYARRA NO. 1A.
KYARRA NO. 1 FROM 0630HRS 10.2.83
TO 2400HRS 15.2.83

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WEEKLY SUMMARY - BITS AND MUD

BIT AND CORE RECORD

BIT NO.	SERIAL NO.	MAKE	TYPE	NOZZLES	FROM	TO	METRES	HOURS	m/h	CONDITION
1	SAS 248	SMI	DSJ	3x18	75	210	135	18	7.5	

MUD PRODUCT

CHEMICAL	UNIT KG	CONSUMPTION		STOCK	CHEMICAL	UNIT KG	CONSUMPTION		STOCK
		WEEK	CUMULATIVE				WEEK	CUMULATIVE	
CEMENT "G"	KG	122500	122500						
BARYTES	KG	23612	23612						
BENTONITE	KG	17695	17695						
CAUSTIC	KG	700	700						
SODA ASH	KG	1280	1280						
LIME	KG	550	550						
$CACL_2$	KG	1200	1200						

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WEEKLY WELL SUMMARY

WELL NAME: KYARRA NO. 1A REPORT NO.: 1

PERIOD: FROM: 16TH FEBRUARY, 1983 TO: 22ND FEBRUARY, 1983

All depths relate to Rotary Kelly Bushings at zero tide datum (Low Water Indian Springs) which is 74 metres above seabed.

HOLE	SIZE	36"	26"	17½"	12¼"	8½"	
	DEPTH (m)	NA	240	985	1114	-	
CASING	SIZE	NA	20"	13-3/8"	9-5/8"	7"	
	DEPTH (m)	NA	229	980	-	-	

DATE	DEPTH AT 2400 HRS.	PROGRESS	REMARKS
16-2-83	238m	164m 13hrs	Run Guide Base. RIH 26" bit. Spud KRA 1A at 1300hrs. Drill 26" hole. Spot Hi-Vis mud on connections and at 238m. Survey. POOH to Guide Base. Retrieve survey. WOW - 75 knot winds. Deviation: ½ deg/238m.
17-2-83	240m	2m ½hr	WOW. RIH. Ream and wash to bottom. Drill 2m. Wiper trip. Spot Hi-Vis mud. POOH. Run 20" casing (12jts, 133 lb/ft). Shoe at 229m. Cement casing (Refer Drilling Report No. 2). Run BOP. Divers recovered cement sample from Base Plate.
18-2-83	623m	383m 9½hrs	Run BOP. Test 20" casing with shear rams to 500 psi- ok. Test BOPS 5000 psi. Run Wear Bushing. RIH 17½" BHA. TOC 223m. Drill out 20" Drill 17½" hole. Survey at 544m. Control trip to 20" shoe. Losses to hole after drilling out 20", 4m³/hr. Deviation: ½deg/544m. Mud SG = 1.12, VIS = 37, PV = 8, YP = 27, WL=UNCONTROLL
19-2-83	985m	362m 18hrs	Drill 17½" hole to 985m. Losses 4m³/hr. Circulate. Wiper trip to 20" shoe. Circulate for logs. Deviation = 1½deg/985m. Mud SG = 1.12, Vis = 36/43, PV = 7, YP = 25, WL = Uncontrolle
20-2-83	985m	NIL	POOH. Run Schlumberger logs, ISF/Sonic/MSFL, LDL/GR/CAL. RIH 17½" bit. Ream and condition hole. Circulate. POOH. Run 13-3/8" casing. Mud SG = 1.14, Vis = 38/50, PV = 8, YP = 32 WL = Uncontrolled.
21-2-83	985m	NIL	Run 75 jts 13-3/8" 68 lb/ft. casing.Shoe at 980m. Cement with 615 sx 'G' plus 3.97% Gel (1.45 SG), plus 300 sx 'G' neat (1.90 SG). Displace with mud. Set and test seal assembly to 1500 psi. Test BOP stack. RIH 12¼" bit. TOC 905m. Test casing 2000 psi. Drill out float collar cement and shoe.
22-2-83	1114m	129m 6hrs	Drill out 20".Drill 3m of 12¼" hole.FPT.DEQV= 1.79SG. Drill 12¼" hole, to 1049m. Circulate. POOH. Cut core No.1 1049-1067m. No rec. RIH bit. Ream out core hole. Drill 12¼" hole. Deviation = 1¼ deg/1049m, Mud SG=1.09,Vis=38/45 PV=11, YP=14, WL=6.3

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

TIME SUMMARY

WELL NAME: KYARRA NO. 1A PERIOD: FROM: 16-2-83 TO: 22-2-83

TIME ANALYSIS (HOURS)	FOR WEEK	TOTAL
D: MOVING		
D1 Moving of rig, rigging up/down, anchoring	5	5
D2 Waiting on weather during moving		
D3 Other waiting time		
F: DRILLING - CASING		
F1 Drilling on bottom, incl. connection time	46½	46½
F2 Trips for new bit	12½	12½
F3 Ancillary Drilling Operations, incl. Totco, reaming, hole cleaning, testing BOP or casing.	7½	7½
F4 Casing and Cementing	63½	63½
G: FORMATION SURVEYS		
G1 Coring	½	½
G2 Related Coring Operations, incl. tripping etc.	12	12
G3 Tests and associated operations		
G4 Electric Logging Operations	15½	15½
A: INTERRUPTION OF OPERATIONS UNDER F OR G		
A1 Stuck Pipe and Fishing Operations		
A2 Mud-Losses, Flows, Treatment		
A3 Waiting on Weather	2½	2½
A4 Other waiting time - Repairs	2½	2½
C: COMPLETION - PLUGGING		
C1 Completion, Stimulation, Production Tests		
C2 Abandonment of Well		
C3 WOW during completion, plugging, testing		
C4 Other Waiting time		
TOTAL TIME:	168	168

DOWN TIME: HOURS PERCENTAGE

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WEEKLY SUMMARY - BITS AND MUD

BIT AND CORE RECORD

BIT NO.	SERIAL NO.	MAKE	TYPE	NOZZLES	FROM	TO	METRES	HOURS	m/h	CONDITION
1R	SAS248	SMI	DSJ	3 x 18	74	240	166	13½	12.30	1-1-I 26"
2	124WR	HTC	OWV	3 x 18	240	985	745	27½	27.09	4-4-I 17½"
3	XA6634	SMI	FDGH	3 x 13	985	1049	64	3½	18.28	2-2-I 12¼"
1K	8280932	CHRIS	RC3	CORE	1049	1067	18	½	36	OK 8½"
4	948498	REED	HS51	3 x 14	1049	1067	18	1	-	REAM CORE HOLE
4	948498	REED	HS51	3 x 14	1067	1114	47	2	23.50	DRILL 12¼"

MUD PRODUCT

CHEMICAL	UNIT KG	CONSUMPTION		STOCK	CHEMICAL	UNIT KG	CONSUMPTION		STOCK
		WEEK	CUMULATIVE				WEEK	CUMULATIVE	
CEMENT "G"	KG	72000	72000		CACL2	KG	450	450	
BARYTES	"	17270	17270		MICA	"	570	570	
BENTONITE	"	24267	24267		CONDET	LIT	205	205	
CAUSTIC	"	560	560						
SODA ASH	"	1120	1120						
LIME	"	2375	2375						
Q. BROXIN	"	100	100						
DEXTRID	"	1407	1407						
CMC HV	"	200	200						

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WEEKLY WELL SUMMARY

WELL NAME: KYARRA NO. 1A REPORT NO.: 2 (FINAL)

PERIOD: FROM: 23RD FEBRUARY, 1983 TO: 1 MARCH, 1983

All depths relate to Rotary Kelly Bushings at zero tide datum (Low Water Indian Springs) which is 74 metres above seabed.

HOLE	SIZE	36"	26"	17½"	12¼"	8½"	
	DEPTH (m)	NA	240M	985M	1280M TD		
CASING	SIZE	NA	20"	13 3/8"			
	DEPTH (m)	NA	229M	980M			

DATE	DEPTH AT 2400 HRS.	PROGRESS	REMARKS
23.2.83	1280M	166M 18½HRS.	CIRCULATE SAMPLE, DRILL, CIRCULATE SAMPLE, DRILL, CIRCULATE BOTTOM-UP, WIPER TRIP TO CASING SHOE, CIRCULATE AND CONDITION BEFORE LOGGING. DEVIATION = 0^{0}. MUD SG: 1.10 VIS: 47/51, PV: 11 YP: 15 WL: 6.8
24.2.83	1280M TD	--	CIRCULATE AND CONDITION HOLE, LOG: MSFL/DLL GR, SLS/GR, LDL/CNL, HDT. WIPER TRIP TO CIRCULATE AND CONDITION HOLE. MUD SG: 1.10, VIS: 47/53 PV: 11 YP: 19 WL: 6.8 NACL: 16,000PPM
25.2.83	1280M TD	--	POOH, RUN SCHLUMBERGER: RFT = MISRUN, RUN VELOCITY SURVEY (VSP), WIPER TRIP, RIG SCHLUMBERGER AND RUN RFT. MUD SG: 1.10 VIS: 47/55 PV: 12 YP: 22 WL: 7.2 NACL = 15,000PPM.
26.2.83	1280M TD	--	RUN RFT2 NO. 2 AND RFT NO. 3, SHOT 60 SIDE WALL CORES, RECOVERY 100%, RIH WITH OPEN ENDED DP, SET CEMENT PLUG NO. 1 (1200-940M). POOH SIDEWAYS. MUD SG: 1.10 - CEMENT SG: 1.90.
27.2.83	1280M TD	--	POOH. SIDEWAYS - TEST CEMENT PLUG NO. 1 AT 1000PSI FOR 15 MINS, SET SURFACE PLUG (170-110M), PULL BOP STACK, CUT CASING AT 83M. RETRIEVE BASE PLATES, CARRY OUT SEA BED INSPECTION WITH DIVERS, PREPARE TO PICK UP ANCHORS. CEMENT SG 1.90.
28.2.83	1280M TD	--	PICK UP ANCHORS NO. 6, 1, 2, 5, 10, 7, 4 STANDBY WAITING ON SUPPLY BOATS UNIONISED CREWS.

1.3.83	1280 TD	--	WAIT ON SUPPLY BOATS. PULL ANCHORS, TIME LOST DUE TO ACCIDENT. PULLED LAST ANCHOR UP AT 1830 HRS. ON TOW TO TARRA NO. 1.

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

TIME SUMMARY

WELL NAME: KYARRA NO. 1A PERIOD: FROM: 23.2.83 TO: 1.3.83

TIME ANALYSIS (HOURS)	FOR WEEK	TOTAL
D: MOVING		
D1 Moving of rig, rigging up/down, anchoring		5
D2 Waiting on weather during moving		
D3 Other waiting time		
F: DRILLING - CASING		
F1 Drilling on bottom, incl. connection time	18½	65
F2 Trips for new bit		12¼
F3 Ancillary Drilling Operations, incl. Totco, reaming, hole cleaning, testing BOP or casing.	2	9½
F4 Casing and Cementing		63½
G: FORMATION SURVEYS		
G1 Coring		½
G2 Related Coring Operations, incl. tripping etc.		12
G3 Tests and associated operations		
G4 Electric Logging Operations	67	82½
A: INTERRUPTION OF OPERATIONS UNDER F OR G		
A1 Stuck Pipe and Fishing Operations		
A2 Mud-Losses, Flows, Treatment		2½
A3 Waiting on Weather	2½	5
A4 Other waiting time - Repairs	62½	62½
C: COMPLETION - PLUGGING		
C1 Completion, Stimulation, Production Tests		
C2 Abandonment of Well		
C3 WOW during completion, plugging, testing	10	10
C4 Other Waiting time		
TOTAL TIME:	162.5	330.5

DOWN TIME: HOURS 17.5 PERCENTAGE 5.3%

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

WEEKLY SUMMARY - BITS AND MUD

BIT AND CORE RECORD

BIT NO.	SERIAL NO.	MAKE	TYPE	NOZZLES	FROM	TO	METRES	HOURS	m/h	CONDITION
4	948498	REED	HS51	3x14	1067	1280	213	20½	10.39	2-2-I
4R	948498	REED	HS51	3x14						WIPER TRIPS

MUD PRODUCT

CHEMICAL	UNIT KG	CONSUMPTION		STOCK	CHEMICAL	UNIT KG	CONSUMPTION		STOCK
		WEEK	CUMULATIVE				WEEK	CUMULATIVE	
CEMENT "G"	KG	51,000	123,000	KG	$CACL_2$	KG		450	
BARYTES	KG	9,060	26,330	KG	MICA	KG		570	
BENTONITE	KG	2,948	27,215	KG	CONDET	LIT.		205	
CAUSTIC	KG	210	770						
SODA ASH	KG	560	1,680						
LIME	KG	--	2,375						
Q.BROXIN	KG	75	175						
DEXTRID	KG	454	1,861						
CMC HV	KG	125	325						
SOLTEX	KG	499	499						
BICARBONATE	KG	200	200						

APPENDIX 10

FINAL TECHNICAL REPORT

F3a Bis 2-78

WELL DATA

WELL: KYARR

1) WELL NAME : KYARRA 1A

2) IDENT.: KYA - 1 - A

3) GEOGRAPHICAL AREA : AUSTRALIA OFFSHORE BASS STRAIT

4) GEOLOGICAL BASIN : GIPPSLAND

5) FIELD : WILDCAT

6) BLOCK VIC P 17

7) PERMIT/HOLDERS :

A.A.P.

AUSTRALIAN AQUITAINE PETROLEUM

8) PARTNERS :

Name	%	Name	
A.A.P.	25%	AUSTRALIAN OCCIDENTAL	
ALLIANCE RESOURCES LTD	25	CONSOLIDATED PETROLEUM	
AGEX PTY LTD	12.5	(CLUFF HARTOGEN)	

9) OPERATOR : AUSTRALIAN AQUITAINE PETROLEUM PTY LTD

11) REFERENCE WELLS :

Name

PERCH NO. 1

10) INITIAL STATUS

- Exploration ☒
- Development ☐
- Other ☐

12) LOCATION COORDINATES

site

- Land ☐
- Offshore ☒
- Swamp ☐
- Other ☐

geographical coordinates

Latitude 38 DEG 40" 52.54'S

Longitude 147 DEG11" 12.31' E

reference meridian

- Paris ☐
- Greenwich ☒

LAMBERT coord

X(m) :

Y(m) :

Z(m) :

SITE	LAND	OFFSHORE		SWAMP		OTHER	
Distance RKB/REF.		74	30m				
Reference	GROUND	MUD LINE	ZERO HYDRO				

13) DRILLING OBJECTIVES

Objective n°	Formation	Formation tops vertical depth	Departure	Directi
	UPPER FORMATION GROUP			
1	DELTA FRONT SAND BODY	970		
2	CHANNEL AND BAR SANDS of latrobe group	1211		

14) WELL COURSE

Vertical ☒ Deviated ☐

Normal ☐ Scourse ☐

15) WAS THE OBJECTIVE REACHED ?

	yes	no	Formation tops vertical depth	Departure	Direct
OBJECTIVE 1	☒	☐	1013m		
OBJECTIVE 2	☒	☐	1028m		
OBJECTIVE 3	☐	☐			
OBJECTIVE 4	☐	☐			

16) RESULTS

- ☐ Oil production
- ☐ Gas production
- ☐ Water production
- ☐ Shows but no reservoir
- ☐ Injection well
- ☒ Dry well
- ☐ Temporarily plugged
- ☐ Plugged and abandonned
- ☐ Completed

17) DATES (•)

BEGINNING		END	
Well	16/2/83	Drilling	23/2/83
Drilling :	16/2/83	Well	1/3/83

TOTAL DURATION

- Drilling : 7 days
- Well : 14 DAYS 18.5 HRS days

18) WELL END (••)

- Total depth : 1280M
- Drilled footage : 1207m
- Total departure : 0 Deg
- Vertical depth : –
- Lost footage : –
- Direction : –

19) COSTS

CURRENCY U AUSTRALIAN

- Before drilling $158,129
- During drilling $4,097,303
- After drilling --
- Total well $4,255,432

Imp. 4998 SNEA(P) RGM 959.004.011

F3a' Bis 2-78	LOGISTICS	WELL: KYA 1A

Area management : AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD
99 MOUNT STREET, NORTH SYDNEY NSW 2060
Located : P.O. BOX 725

Land Base : AQUITAINE WELSHPOOL SHORE BASE
MIDLAND HIGHWAY
Located : WELSHPOOL. VIC 3966
P.O. BOX 27

- **SERVICE COMPANIES**

. Mud	BAROID	. Under water T.V.	ODECO
. Mud logging	GEO SERVICES	. Testing	HALLIBURTON
. Production tests	FLOPETROL	. Well head	CAMERON
. Fishing	TRI STATE	. Depollution	A.A.P.
. Positioning	DECCA SURVEY	. Air transportation	COMMERCIAL AVIATI(
. Electrical logging	SCHLUMBERGER	. Sea transportation	A.O.S.
. Meteo	OCEANROUTES		"LADY JANE"
. Diving	OCEANEERING		"SEA SAPPHIRE"
. H.P. Pumping	DOWELL SCHLUMBERGER		STAND BY -
. Bulking	BAROID		LOMBARDO MARINE
			CHRISTMAS CREEK

Beginning of well = first moving in date (if this date is known)
Beginning of drilling = spudding date
End of drilling = date of last bit pulling out or end of electrical logging operations, or pressure surge at the end of production casing cementing operation
End of well = end of well plugging operations laying down included or end of completion

** - Depths ot be calculated from the rotary table
- Drilled footage: distance RKB/ground (or mud line) not included, but side tracks resulting from fishing incl
- Lost footage resulting from fishing or course modification without changing the geological objective. Shoul geological objective vary, well name or number will change, and the previous well drilled footage is not considered as a lost footage
- Except change in geological objective requiring a side track, the formula is: Drilled footage - Lost footage Total depth - Distance RKB/ground

AREA

LAND	SEA	SWAMP	LAKE
[ ]	[X]	[ ]	[ ]

ALTITUDE : SEA LEVEL

WATER DEPTH : 44m

DISTANCE FROM BASE : 55 Km

DISTANCE FROM SHORE : 23 Km

RELIEF	Flat [X]	Slightly undulate [ ]	Undulate [ ]	Very undulate [ ]	
SEA CONDITIONS	Calm [ ]	Medium [ ]	Strong [X]	Very strong [ ]	
POLLUTION RISK	Low [ ]	Medium [X]	High [ ]	Very high [ ]	
WEATHER	Equatorial [ ]	Hot [ ]	Temperate [ ]	Cold [X]	Arctic [ ]
POPULATION DENSITY	Nil [X]	Low [ ]	Medium [ ]	High [ ]	Very high [ ]

MEANS USED

NAME OF THE RIG (LAND) :

SUPPORT

TYPE

Land [ ]	Artificial island [ ]	Jack-up [ ]	Drillship [ ]	Semi-submersible [X]
Swamp barge [ ]	Non assisted Platform [ ]	Assisted platform [ ]	Tender [ ]	Other [ ]

SEA SUPPORT NAME : OCEAN DIGGER

PROPULSION:

Towed [X]

Self propelled [ ]

Power :

Speed :

POSITIONING

Mooring
- Classical [X]
- Dynamic [ ]

Head : 259 DEG

Imp 4996 SNEA(P) · RGM 959 004.011

DRILLING EQUIPMENT

DRAWORK MANUFACTURER: EMSCO MODEL A 1500E

CONTRACTOR: ODECO

RANGE: Light [ ] Medium [ ] Heavy [X] Super Heavy [ ] Extra Heavy [ ]

TRANSMISSION: Mechanical [ ] Electric [X] Hydraulic [ ]

MAIN PUMPS: Number [2] EMSCO D-1350 hp Total hydraulic power [ ]

RIG DESIGN: Normal design [X] Compact [ ] Portable [ ] Helirig [ ]

Flexorig [ ] Automatic racking [ ] Winterised [ ] [ ]

SURFACE OR SUBSEA EQUIPMENT

B.O.P. STACK	Diameter	API WP
Number 1	18 3/4" CAMERON "U"	10,000 PSI
Number 2	18 3/4" HYDRIL	5,000 PSI
Number 3		

WELL HEAD	Manufacturer	Type	Diameter	API WP
Number 1	CAMERON	TORQUE SET	18 3/4"	10,000 PSI
Number 2				
Number 3				

MUD LINE SUSPENSION: yes [ ] no [X] Manufacturer :

RISER

Number 1		Number 2	
Diameter :	50' ~~x 22"~~ OD x0.50" wall	Diameter :	
Connector :	VETCO MR-4B	Connector :	
Buoyancy system :	no [X] yes [ ]	Buoyancy system	no [ ] yes [ ]

Imp 4996 SNEA(P) RGM 959 004.011

F3c Bis 2-78

TECHNICAL SECTION

WELL : KYARRA 1 A

• OPEN HOLE SECTIONS •		• CASINGS •				
DIAMETER	TOTAL DEPTH	DIAMETER	COMPOSITE STRING DIAMETERS	SHOE DEPTH	HANGER DEPTH	TOP CEMENT IN ANNULUS
26"	240 m	20"		229 m	71.50 m	SEABED
17 ½"	985 m	13-3/8"		969.5 m	72.80m	MUD LINE [RETURN INSIDE BOP]
12¼ "	1280 m					

F3c' Bis 2-78	FOOTAGE (METERS OR FEET)																	WELL : KYARRA 1A		
Interval	Total footage in the interval	DRILLING			CORING			TURBODRILLING			SIMULTANEOUS PILOT DRILLING AND HOLE OPENING			HOLE OPENING		RE-DRILLING AND/OR REAMING		Abandonned footage in the interval	Drilling fluid
		Ø	m or ft	h	Ø	m or ft	h	Ø	m or ft	h	Ø	m or ft	h	m or ft	h	m or ft	h		
26"	166	26	166	13½															SEA WATER
17½"	745	17½	745	27½															LIME MUD S.G. 1.10
12¼"	296	12¼	278	24	8½	18	0.5							18	1	75	2.5		MUD GEL POLMER SG 1.1

F3d Bis 2-78

CORE DATA SUMMARY

WELL : KYARRA 1

Core Number	DEPTH Ft or m. from	DEPTH Ft or m. to	% Recovered	Formation	Core Number	DEPTH Ft or m. from	DEPTH Ft or m. to	% Recovered	Formation
1	1049	1067	0%	SAND					

CLABS

Run N°	DEPTH ft or m. from	DEPTH ft or m. to	Number of samples	Formation	Run N°	DEPTH ft or m. from	DEPTH ft or m. to	Number of samples	Formation
1 & 2	1270	976.5	60	SANDSTONE					

Imp. 4996 SNEA(P) RGM 959 004.011

F3d' Bis 2-78

FORMATION TEST SUMMARY

WELL :KYARRA 1A

Test N°	Date	Type of test *	Tested interval from ft or m.	Tested interval to ft or m.	Succeful Yes	Succeful No	Reason of failure (**)	Observations
1	25/2/83	RFT	1029 m			X		SHEAR PIN IN ARM BROKEN
2	26/2/83	RFT	1029 m			*X		* RECOVERED 355 cc OF MUD PACKER LEAKING
2	26/2/83	RFT	1029 m		X			2 SAMPLES AND PRESSURE MEASURES RECOVERED.

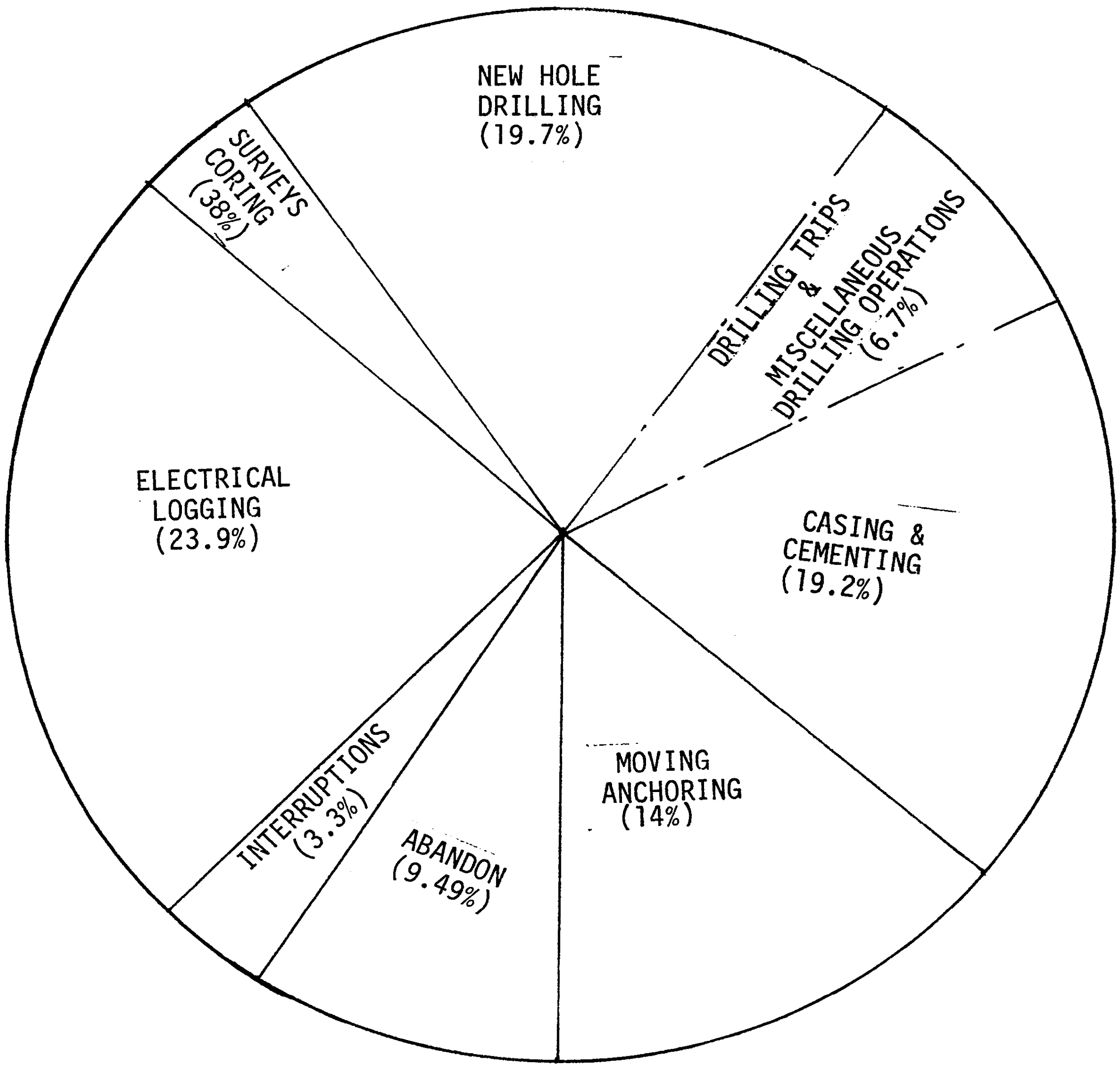
* TOHP - Test open hole full diameter
TOHR - Test open hole - rat hole
STOHP - Straddle test open hole full diameter
STOHR - Straddle test open hole rat hole
TCSG - Test casing
STCSG - Straddle test casing
FIT - Formation interval tester

** FP - Packer leak
BO - Tool plugged
NO - Test not opened
IN - Test interrupted
XX - Other (to be specified)

ELECTRICAL LOGGING SUMMARY

Interval	Date	Nature and Run N°	DEPTH ft or m. from	DEPTH ft or m. to	Scale 1/20	Scale 1/200
17½"	20/2/83	NO.1 INDUCTION/SONIC/MSFL	240	983		X
17½"	20/2/83	NO.2 LDL /GR / CAL	240	983		X
12¼"	24/2/83	NO. 1 MSFL / DLT/GR/CAL	983	1280		X
12¼"	24/2/83	NO.2 SLS /GR /CAL	983	1280		X
12¼"	24/2/83	NO. 3 LDL/CNL/GR	983	1280		X
12¼"	24/2/83	NO. 4 HDT	983	1280		
12¼"	25/2/83	VELOCITY SURVEY				

F3e Bis 2-78		TIME DISTRIBUTION	WELKYARRA 1A									
• ITEMS •			INTERVALS : Duration in hours									Dura… tot dura
			D	26	17½	12¼	C	D				
MOVING	D1	Rigging up, transportation and tearing down	5					31.5				3 11
	D2	Waiting on weather										
	D3	Waiting : other						10				10 3%
DRILLING - CASING	F1	New hole drilling		13.5	27.5	24						65 19.
	F2	Drilling trips		2.5	6	4						12 3.
	F3	Miscellaneous drilling operations		1.5	5	3						9. 2.
	F4	Casing and cementing		21	42.5							63. 19.
FORMATION SURVEYS	G1	Coring										
	G2	Coring trips and miscellaneous				12.5						12 3
	G3	Testing and related operations										
	G4	Electrical logging			15.5	63.5						79 23
INTERRUPTIONS OF OPERATIONS UNDER F & G	A1	Sticking - Fishing										
	A2	Losses and well flowing mud treatment										
	A3	Waiting on weather		2.5								2. 0.
	A4	Waiting : other		2	0.5	6						8. 2.
COMPLETION AND PLUGGING	C1	Completion - Formation treatment and Production tests										
	C2	Abandon					31					3 9
	C3	Waiting on weather										
	C4	Waiting : other										
DURATION BY INTERVAL →			5 1	43 13%	97 29.3%	113 34.2%	31 9.4%	41.5 12.5%				33 10


NEW HOLE
DRILLING
(19.7%)
DRILLING TRIPS
&
MISCELLANEOUS
DRILLING OPERATIONS
(6.7%)
CASING &
CEMENTING
(19.2%)
MOVING
ANCHORING
(14%)
ABANDON
(9.49%)
INTERRUPTIONS
(3.3%)
ELECTRICAL
LOGGING
(23.9%)
SURVEYS
CORING
(38%)

F3e' Bis 2-78

INTERRUPTIONS OF OPERATIONS

WELL : KYARRA 1A

OPERATIONS IN PROGRESS	DURATION ↓ / REASONS →	STICKING FISHING Number	STICKING FISHING Duration (h)	LOSSES, FLOWING MUD TREATMENT Number	LOSSES, FLOWING MUD TREATMENT Duration (h)	WAITING ON WEATHER Number	WAITING ON WEATHER Duration (h)	WAITING : OTHER Number	WAITING : OTHER Duration (h)
Moving (D2-D3)	Less than 24 h							1	10
	From 1 to 5 days								
	More than 5 days								
	TOTAL →								
Drilling, casing formation surveys (A1-A2-A3-A4)	Less than 24 h					1	2.5	5	8.5
	From 1 to 5 days								
	More than 5 days								
	TOTAL →								
Completion (C3-C4)	Less than 24 h								
	From 1 to 5 days								
	More than 5 days								
	TOTAL →								
TOTAL →		0	0	0	0	1	2.5	6	18.5

TOTAL DURATION OF INTERRUPTIONS

- During moving : 10
- During drilling - Casing or formation surveys : 11
- During completion and plugging : 0
- TOTAL IN HOURS → 21 HRS

F3f Bis 2-78

MUD SUMMARY BY INTERVAL

WELL : KYARR

INTERVAL : 26" PHASE From 74m to : 210m

Mud type used in this interval : SEA WATER WITH HI. VIS GEL SLUGS

• USEFUL DATA •

CASINGS

- Diameter : 20"
- Hanger : -
- Shoe : 202m
- Casing : 94 lbs/ft
- Lenght : 66m

BALANCE OF VOLUMES bbl on m3

- Initial volume FW : 421
- Added volume SW : 119
- Jetted volume : 397
- Losses in formation : 48
- Final volume : 95

DRILLING

Drilled (m or ft) from : 136m to : 210m; duration (date) from : 11 to : 12

Footage (m or ft) : 136m in :

Average dllg rate : drilling hours :

Internal casing vol. : losses :

Pumping rate : 100 spm/20.7 bbl/min

• MUD CHARACTERISTICS •

		mini	maxi	average
Weight	in flow	9.0	12.5	
	out flow	[1.08]	[1.5]	
Viscosity	M.V.	100	120	
	A.V.			
	P.V.			
	Y.P.			
Gels	0'			
	10'			
API WL	API			
	HP-HT			
	Pressure			
	T°			
Ph				
Pf				
Pm				
Ca^{++} (g/l)				
SO4Ca				
Clna				
CaCl2				
% water				
% oil				
oil/water ratio				
% solids				
Solids density				
% Sand				
T °C				

Depth (ft)	Lithology
136-210	LIMESTONE

• CONSUMPTIONS •

CHEMICALS	QUANTITY: Total m^3 or T	Kg/ or m drilled	Kg/m^3	COST: Unit Price	Total Cost
BARITE	23.612 MT	173	43.7	8.00	4160.
AQUAGEL	23.175 MT	170	42.9	14.00	7140.
CAUSTIC	0.700 MT	5	1.3	74.70	747
SODA ASH	1.280 MT	9	2.4	13.88	444
LIME	0.550 MT	4	1.0	6.75	148
CAL. CHLOR.	1.200 MT	9	*13.7	11.46	550
TOTAL	50.517 MT				13189

THIS CONSUMPTION INCLUDES ALL CHEMICALS USED FOR CEMENTING PURPOSES.

* CEMENT MIX WATER ONLY

Total cost of Interval : A$ 13,189.74

Total cost of Drilled meter : A$ 97

Currency : AUSTRALIAN DOLLARS

Conversion rate used :

F3f Bis 2-78

MUD SUMMARY BY INTERVAL

From : 74 m to : 238 m

INTERVAL : 26" HOLE

Mud type used in this interval : LIME FLOCCULATED PREHYDRATED GEL SLUGS

• USEFUL DATA •

CASINGS

- Diameter : 20"
- Hanger :
- Shoe : 228.6 m
- Casing : 133 lb/ft
- Lenght : 157m³

BALANCE OF VOLUMES bbl on m3

- Initial volume : 99m³
- Added volume : 210m³
- Jetted volume : -
- Losses in formation :
- Final volume : 65 m³

PUMPED DOWN HOLE: 235 m³

DRILLING

Drilled (m or ft) from : 74 to : 238

duration (date) from : 16 FEB to : 17 FEB

Footage (m or ft) : 164m in : 2 days

Average dllg rate : 12.6m/hr drilling hours : 13 HRS

Internal casing vol. : losses :

Pumping rate : 110 spm [3.6 m³/min]

• MUD CHARACTERISTICS •

		mini	maxi	average
Weight	in flow	1.08	1.08	1.08
	out flow			
Viscosity	M.V.	110	110	110
	A.V.			
	P.V.			
	Y.P.			
Gels	0'			
	10'			
API WL	API			
	HP-HT			
	Pressure			
	T°			
	Ph			
	Pf			
	Pm			
	Ca^{++} (g/l)			
	SO4Ca			
	Clna			
	CaCl2			
	% water			
	% oil			
	oil/water ratio			
	% solids			
	Solids density			
	% Sand			
	T °C			

• CONSUMPTIONS •

CHEMICALS	QUANTITY: Total m³ or T	Kg/ or m drilled	Kg/m³	COST: Unit Price	Total Cost	%
AQUAGEL	13.064 T	80	43.5	14.00	4,032.00	84
CAUSTIC SODA	0.35 T	2.1	1.2	74.70	373.50	8
SODA ASH	0.24 T	1.5	0.8	13.88	83.28	2
LIME	0.375 T	2.3	1.25	6.75	101.25	2
CALCIUM CHLORIDE	0.45 T	2.7	-	11.46	206.28	4
TOTAL	14.48 T				4,796.31	10

Depth (ft)	Lithology
	RETURNS TO SEA FLOOR

Total cost of Interval : AUST $ 4796.31

Total cost of Drilled meter : AUST $ 29.25

Currency :

Conversion rate used :

F3f Bis 2-78

MUD SUMMARY BY INTERVAL

From : 238m to : 984.5 m

INTERVAL 17½"

Mud type used in this interval : LIME FLOCCULLATED GEL AND NATIVE CLAY

• USEFUL DATA •

CASINGS

- Diameter : 13-3/8"
- Hanger :
- Shoe : 979.3 m
- Casing : K55681b/ft
- Lenght : 906.9 m

BALANCE OF VOLUMES (bbl on m3)

- Initial volume : 70.4 m^3
- ~~Added volume~~ : 604 m^3
- Jetted volume : 492.4 m^3
- Losses in formation : 158 m^3
- Final volume : 24 m^3

JETTED VOL INCLUDES MUD DUMPED AT END.

DRILLING

Drilled (m or ft) from : 238 to : 984.5

duration (date) from : 18 FEB to : 20 FEB

in : 3 days

Footage (m or ~~ft~~) : 746.5 drilling hours : 27.5

Average dllg rate : 27.1 m/hr Losses : 350 m^3

Internal casing vol. : 16 m^3

Pumping rate : 100 spm [3.3 m^3/min]

• MUD CHARACTERISTICS •

		mini	maxi	average
Weight	in flow	1.12	1.14	1.13
	out flow	1.12	1.14	1.13
Viscosity	M.V.	38	50	44
	A.V.	20	24	22
	P.V.	8	8	8
	Y.P.	25	32	27
Gels	0'	10	20	15
	10'	12	25	19
API WL	API	N.C.	N.C.	N.C.
	HP-HT	-	-	-
	Pressure	-	-	-
	T°	-	-	-
	Ph	9.0	9.0	9.0
	Pf	.05	.05	.05
	Pm	-	-	-
	Ca (g/l)	1800	2300	2000
	SO4Ca	-	-	-
	Clna	18500	20000	19000
	CaCl2	-	-	-
	% water	95	96	95
	% oil	-	-	-
	oil/water ratio	-	-	-
	% solids	4	5	5
	Solids density	-	-	-
	% Sand	TRACE	1/4	1/4
	T °C	28	-	28

• CONSUMPTIONS •

CHEMICALS	QUANTITY Total m^3 or T	Kg/ft or m drilled	Kg/m^3	COST Unit Price	Total Cost	%
AQUAGEL	2.95 T	3.95	4.9	14.00	910.00	24
SODA ASH	0.12 T	0.16	0.2	13.88	41.64	1
LIME	2.375 T	3.18	3.9	6.75	641.25	17
MICA	0.57 T	0.76	0.9	12.72	381.60	9
BARITE	9.07 T	12.15	20.1	8.00	1600.00	42
CONDET	0.205 m^3	-	-	258.00	258.00	7
TOTAL	15.29 T				3832.49	

Depth (ft)	Lithology
238 to 930	CLAYSTONE TO LIMESTONE
930 to 984.5	SHALE

Total cost of Interval : AUST $ 3832.49

Total cost of Drilled meter/foot : AUST $ 5.13

Currency :

Conversion rate used :

F3f Bis 2-78

MUD SUMMARY BY INTERVAL

WELL : KYARRA 1A

INTERVAL 12¼" From : 984.5m to : 1280m

Mud type used in this interval : SEAWATER/GEL/POLYMER (SOLTEX DEXTRID)

• USEFUL DATA •

CASINGS

- Diameter : 13 3/8"
- ~~Hanger~~ : —
- Shoe : 979.3m
- Casing :
- Lenght :

BALANCE OF VOLUMES bbl on m3

- Initial volume : $24m^3$
- Added volume : $210m^3$
- Jetted volume : $85m^3$
- Losses in formation : NIL
- Final volume : $149m^3$

DRILLING

Drilled (m or ft) from : 984.5m to : 1280m; duration (date) from : 21 FEB to : 26 FEB

Footage (m or ft) : 295.5m in : 6 DAYS

Average dllg rate 8-7 m/hr drilling hours : 34 HRS.

Internal casing vol. : $71.8m^3$ Losses : $85M^3$

Pumping rate : 60 SPN ($2.0M^3$/MIN)

• MUD CHARACTERISTICS •

		mini	maxi	average
Weight	in flow	1.09	1.10	1.10
	out flow	1.09	1.10	1.10
Viscosity	M.V.	40	50	47
	A.V.	16	23	20
	P.V.	9	12	11
	Y.P.	13	22	19
Gels	0'	12	16	15
	10'	22	28	24
API WL	API	6.3	7.2	6.8
	HP-HT			
	Pressure T°			
Ph		9.5	9.5	9.5
Pf		0.1	0.2	.15
Pm				
Ca⁻ (g l)		60	600	150
SO4Ca				
Clna		14500	16000	15000
CaCl2				
% water		95	96	95
% oil				
oil/water ratio				
% solids		4	5	5
Solids density				
% Sand				
T °C		TRACE	¼	0.1

Depth (ft)	Lithology
984.5-1035	CLAYSTONE
1035-1230	SAND WITH COALS
1230-1280	CLAYSTONE

• CONSUMPTIONS •

CHEMICALS	QUANTITY Total m^3 or T	Kg/ft or m drilled	Kg/m^3	COST Unit Price	Total Cost	%
AQUAGEL	11.2T	37.9	53.4	14.00	3,458.00	16.
CAUSTIC SODA	0.42T	1.4	2	74.70	448.20	2.
SODA ASH	1.32T	4.5	6.3	13.88	458.04	2
BICARBONATE	0.20T	0.7	1.0	16.98	84.90	0
Q.BROXIN	0.25T	0.8	1.2	29.50	295.00	1
SOLTEX	2.02T	6.8	9.6	78.50	6,986.50	33
DEXTRID	1.86T	6.3	8.9	51.60	4,231.20	20
CMC-HV	0.33T	1.1	1.5	48.68	632.84	3
BARITE	22.68	76.8	108	8.00	4,000.00	19
TOTAL	40.3				20,594.68	

Total cost of Interval : AUST $20,594.68

Drilled meter/foot : AUST $69.69

Currency : AUSTRALIAN DOLLARS

Conversion rate used :

WELL : KYARRA 1A

DRILL STRING COMPOSITION AND DEVIATION SURVEYS

F3g Bis 2-78

RUN NUMBER	INTERVAL	DRILL STRING	DRILLING: Weight on bit	DRILLING: R.P.M.	DRILLING: Flow rate	SURVEYS: Number	SURVEYS: Date	SURVEYS: Drilled depth (m or ft)	SURVEYS: Inclination (°)	SURVEYS: Direction (°)
1	26"	26" BIT+FS+1x9½DC+26"STAB+2x9½DC+XO+3x7 3/4DC+BUMPER SUB +3x7 3/4DC+XO+9 HWDP.	0/3	50/70	3000	1	16.2.83	238	½	--
2	17½"	17½"BIT+FX+3x9½DC+XOVER+3x7 3/4DC+7 3/4BUMPER SUB+3x7 3/4 DC+XOVER+1HWDP+HYDRIL SUB+HWDP.	5/20	30/120	3075	2 3	18.2.83 19.2.83	544 985	½ ½	
2U	17½"	17½"BIT+FS+1x9½DC+1x17½STAB+2x9½DC+XOVER+3x7 3/4DC+BUMPER SUB+3x7 3/4DC+XOVER+1HWDP+HYDRIL SUB+8 HWDP	--	--	3000		(CONTROL TRIP ONLY)			
3	12¼"	12¼"BIT+BS+2x7 3/4DC+12¼STAB+6x7 3/4DC+ BUMPER SUB+6x 7-3/4DC+XOVER+FLEX JT+EQ JAR+1HWDP+HYDRIL SUB+8 HWDP.	5/10	60	1800					
4	12¼"	CORE HEAD+CORE BBL+2xXO+2x7 3/4DC+12¼ STAB+2 BUMPER SUBS +6x7 3/4 DC+XO+FLEX JT+EQ JARS+1 HWDP+HYDRIL SUB+8 HWDP	7	80	560	4	22.2.83	1049	1¼	
5	12¼"	BIT+NB REAMER+SHOCK SUB+STAB+1x7 3/4DC+STAB+6x7 3/4DC+ BUMPER SUB+6x7 3/4DC+XO+FLEX JT+EQ JARS+1 HWDP+HYDRIL SUB+8 HWDP	17	80	1680	5	23.2.83	1280	0	

F3g' Bis 2-78

WELL BORE COURSE CALCULATION

WELL : KYARRA 1A

• MEASUREMENTS •					• RESULTS •							
					DEPTHS		RELATIVE COORDINATES			GEOGRAPHIC COORDINATES		Dog - Leg Severity
N°	Type	Measured depth	Inclination (°)	Geographic azimuth	Measured and corrected	Vertical	N.S.	E.W.	Departure	X	Y	
						VERTICAL WELL						

Correction due to drill pipes elongation - This correction is optional - Correct also the vertical depth ?

F3 h Bis 2-78

COMPLETION STATUS

WELL: KYARRA 1A

1) COMPLETION (If carried out by the drilling rig)

yes ☐

no ☒

2) - CASINGS, TUBINGS AND ANNULUS STATUS

ALL DEPTHS RKB

CASING AND TUBING DIAMETER	SHOE DEPTH	HANGER DEPTH	CASING CUT DEPTH (event)	CEMENT TOPS		ANNULUS FLUIDS	
				OD	ID	NATURE	SG
20"	228.5m	71.50m	89m	SEABED		CMT	
13 3/8"	969.5m	72.50m	89m	SEABED		CMT	

Depths of perforations :

Tubing anchoring device and pocker depth(s) :

3) - CEMENT PLUGSAND BRIDGE PLUGS (CP and BP)

CEMENT PLUG (CP) or BRIDGE PLUG (BP)	CP	CP							
FROM (m ~~or ft~~)	1200	180							
TO (m ~~or ft~~)	940	110							
TESTED	☒ yes ☐ no	☐ yes ☒ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes
BY PRESSURE	1000psi								
BY WEIGHT	OK								

4) - WELL HEAD

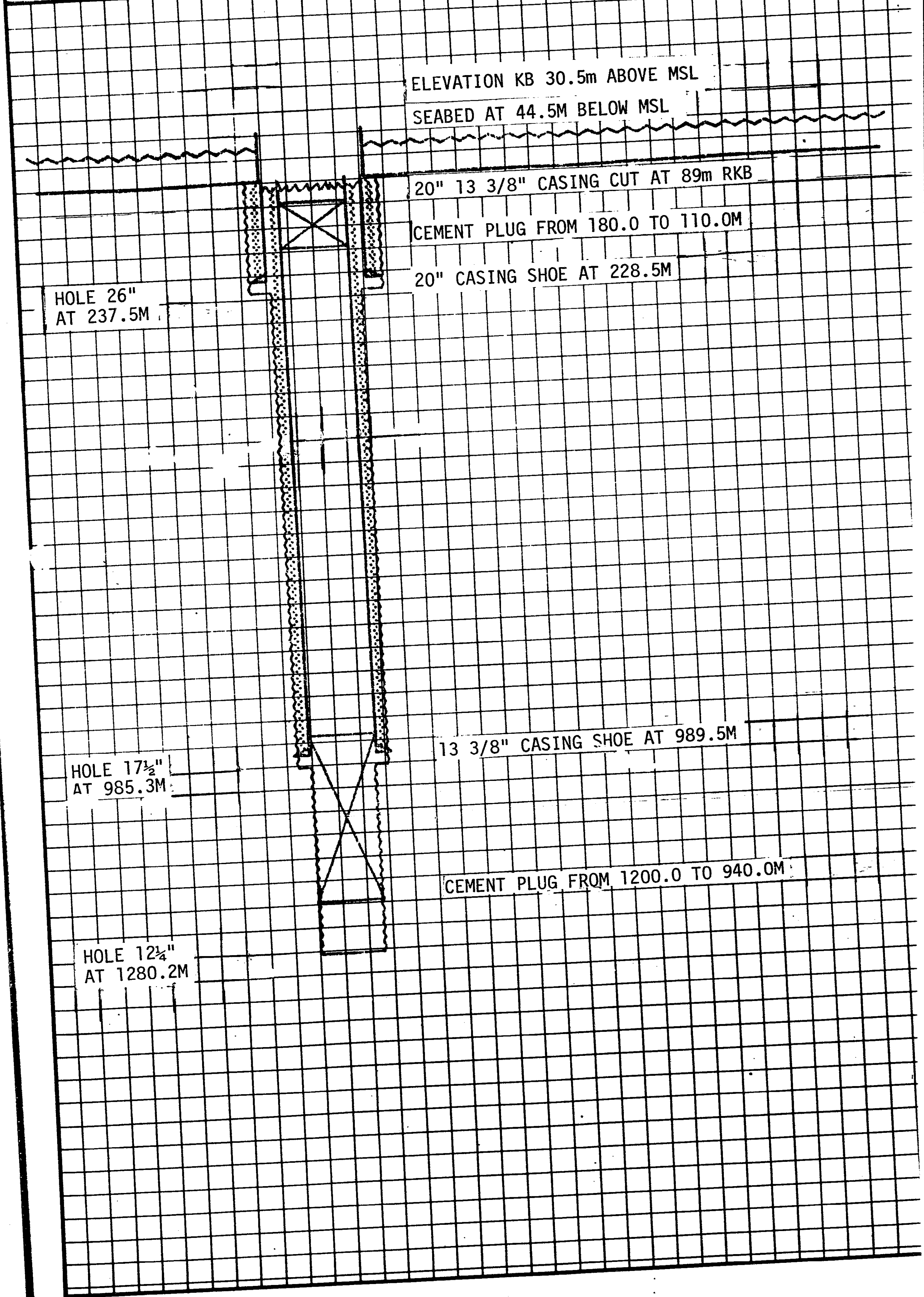
Description of abandonned equipment : ALL EQUIPMENT REMOVED FROM SEABED

NOTE: CP 1200m-940m SET IN 2 STAGES

RELOCALIZATION DEVICE yes ☐ no ☒ TYPE :

Imp. 4996 SNEA(P) RGM 959 004.011

F3h' Bis 2-78 | WELL TECHNICAL SECTION (COMPLETION STATUS) | WELL :



F3 i Bis 2-78	MAIN CONSUMPTIONS OF THE WELL	WELL: KYARRA

ROCK BITS AND CORE BITS

BIT DIAMETER	CONE BITS				DIAMOND BITS			BITS		To b inte
	Tooth tricone bits	Insert tricone bits	Removable center	Bicone bits	Drilling bits	Core bits	Removable center	Drag bits	Special bits	
26"	1									1
17½"	1									1
2¼"	2									3
									TOTAL ⟶	—

CASINGS

Diameter	Weight (lbs/Ft)	Thread	Grade	Length (Ft or m)	Observation:
20"	133	"CC" CONNECTOR (CAMERON)	X56	130.90m	LOST ON KYA I
20"	133	"CC" CONNECTOR (CAMERON)	X56	157.5m	USED ON KYA
13 3/8"	68	BUTTRESS	K55	906.83m	KYA 1A

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F3i' Bis 2-78 — MAIN CONSUMPTIONS OF THE WELL

• CEMENTS •

Class	QUANTITY (T) Casing	Well abandon	Plugging losses	Class	QUANTITY (T) Casing	Well abandon	Plugging losses
KYA1	120T	13T					
KYA1A	72T	57T					

CHEMICALS

CHEMICAL NAME	QUANTITIES ADDED m^3 or T	CHEMICAL NAME	QUANTITIES ADDED m^3 or T
BARITE	55.4T	Q.BROXIN	0.25T
AQUAGEL	50.4T	SOLTEX	2.02T
CAUSTIC	1.5T	DEXTRID	1.86T
SODA ASH	3.0T	CMC HV	0.33T
LIME	3.3T		
*(1) CAL-CHLORIDE	1.65T		
MICA	0.6T		
CONDET	0.205M^3	*(1) FOR CEMENT ONLY	
BICARBONATE	0.20T		

WATER - DIESEL/OIL (not added in mud)

FRESH WATER (m^3)			
DIESEL-OIL (m^3)	*(2) 104T	*(2) FOR THE RIG ONLY	

WELL HEADS, HANGERS (Ø - API working pressure - Type)

CIW 18 3/4" x 20" PILE JOINT 10,000 PSI

CIW DRILLING TEMPLATE (MODIFIED) AND PERM GUIDE BASE

CIW 18 3/4" x 13 3/8" HANGER AND LOW TORQUE SEAL ASSMY 10,000 PSI.

F3j Bis 2-78

COSTS BREAKDOWN

WELL: KYARRA

	OPERATIONS	BEFORE DRILLING	DRILLING	AFTER DRILL
I	Operation preparation	40,000	--	--
II	Access and drilling site works or sea bottom surveys	28,666	5,240	--
III	Rig mobilization and moving in - COSTS EX SINGAPORE/MOVING DOWN AUST. COAST - APPORTIONED	89,463	722,045	--
	SUB TOTAL	158,129	727,285	--
IV	Drilling Contractor	--	1,560,928	--
V	Consumables	--	595,153	--
VI	Rental and services	--	495,411	--
VII	Operator supervision	--	95,947	--
VIII	Transportation (air - land - sea)	--	575,865	--
IX	Insurances	--	--	--
X	Operating bases	--	46,714	--
	SUB TOTAL	--	3,370,018	--
XI	Rig demobilization and moving out	--	--	--
XII	Finalization of operations	--	--	--
	SUB TOTAL	--	--	--
	TOTAL	A 158,129	B 4,097,303	C --
	TOTAL COST OF WELL: A + B + C		4,255,432	

NOTE: A & B INCLUDE $1,312,824 FOR 5 DAYS DRILLING OF KYA1WHICH WAS ABANDONED AND 14 DAYS DRILLING OF KYA 1A AT A COST OF $2,942,608.

- Drilled footage (meter or feet): 1207 m
- Drilling duration (d): 19 (INCLUDES 5 DAYS KYA
- Cost {per drilled meter B/m: 3394 ; ~~or drilled foot B/ft~~:
- Daily cost B/d: 215,647

Currency:

Conversion rate: --

Imp. 4996 SNEA(P) RGM 959 004 011

F3j' Bis 2-78 | **BREAKDOWN OF CONSUMABLES, RENTAL AND SERVICE COST** | **WELL: KRA**

CONSUMABLES (Item 5)

- Fuel and lubricants A$ 87,917
- Drilling bits A$ 41,692
- Core - Bits A$ --
- Mud chemicals A$ 43,458
- Cements A$ 93,958
- Water A$ 3,489
- Casing and miscellaneous A$260,155
- Wellhead and miscellaneous A$ 42,701
- Bottom hole equipment A$ --
- Surface equipment A$ 16,858
- Offshore or anchoring equipment A$ --
- Anti-pollution products A$ 4,925

TOTAL : A$595,153

RENTAL AND SERVICES (Item 6)

- Electrical logging A$273,816
- Cementing and pumping A$ 30,728
- Fishing A$ 8,243
- Turbodrill A$ 1,531
- Testing A$ 45,591
- Subsea operations (diving) A$73,289
- Welding A$ --
- Oceano-meteorological assistance A$1,834
- Velocity survey A$ --
- Subsea television A$ --
- Positioning A$100,057
- Mud logging A$ 29,691
- Mud services A$ 7,118
- Directional survey A$ --
- Tong service A$ 4,219
- Air drilling A$ --
- Other services A$ --
- Bottom hole equipment rental A$ 9,023
- Surface equipment rental A$ 220
- Wellhead equipment rental A$ 98
- Anti-pollution equipment rental A$ --

TOTAL: A$585,458

F3k Bis 2-78 — MONTHLY METEOROLOGICAL SHEET

WELL: KYARRA

MONTH: MARCH

WELL: KYARRA 1A

YEAR 19__	DAILY MORNING OBSERVATIONS							UNIT MOTIONS			
	Wind		Waves			Current					
DATE	Speed	Direction	Height (Ft or m)	Period (sec.)	Direction	Speed (Knt)	Direction	Roll (°)	Pitch (°)	Heave (Ft or m)	Temperature °C
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11	10	SW	NIL	NIL	NIL			0.1	0.1	--	18
12	0	NIL	NIL	NIL	NIL			0.2	0.2	--	19
13	0	NIL	NIL	NIL	NIL			0.2	0.2	0.4	19
14											
15	2	SW	NIL	NIL	NIL			0.2	0.2	0.2	22
16	35	W	6	6	SW			0.4	0.6	1	19.5
17	5	WSW	NIL	NIL	NIL			0.1	0.1	0.2	19
18	5	SE	NIL	NIL	NIL			0.1	0.1	0.2	18
19	10	E	2	6	E			0.2	0.3	0.2	19.5
20	30	ENE	3.5	5	E			0.6	0.9	0.5	20
21	5	NNE	2.5	4	E			0.6	1.4	0.8	22
22	15	NE	3	6	E			0.5	0.6	0.4	23
23	23	WSW	3	VARIABLE				0.4	0.4	0.5	20
24	18	ESE	3	6	SE			0.2	0.4	0.4	20
25	15	E	2	6	SE			0.3	0.3	0.2	21
26	12	E	2	6	SE			0.3	0.4	0.4	22.
27	30	SE	5	7	SE			1.5	1	--	22
28	24	SE	3.5	7	SE			1	1	--	20
(	20	ESE	1	3	SE			0.5	0.5	--	17
30 (	NOTE:	MARCH	1, '83								
31											

Imp. 4986 SNEA(P) RGM 959.004 011

CASING AND CEMENTING REPORT

F5a

WELL (Country)	RIG (Contractor)	RKB Height: Ground [ ] M.L. [X]	ϕ Casing [X] Liner [ ]	CASING SHOE	Hanger depth (for liners) or changing ϕ casing depth :	OF
KYARRA 1 (AUSTRALIA)	OCEAN DIGGER (ODECO)	74m	20	Measured depth : 202m Vertical depth :		13.

1 - WELL CONDITION

Open hole diameter : 26" Depth { Vertical : Measured : 210m } Deviation { Mini : 0° to Maxi : ½° to

Important caving (location - average diameter..) :

Losses during drilling (levels, extent) DRILLING WITHOUT RISER - (WITHOUT RETURN) - USED SE WATER AND SPUD HT. VIS PILL AT EACH CONNECTION

Reamer runs (number) 4 Reamer at 18m (2 FIRST RUNS) AND 9 m f

Previous casing : Diameter Shoe at

Bo. Ps on well when running in (Type - equipment, test pressure) TEMPORARY GUIDE PLATE CAMERON

MUD CHARACTERISTICS BEFORE INJECTING SLURRY	S.G.	W.L.	P.V.	Y.V.	VISCOSIMETER READINGS Vs R.P.M.				
					600	300			

Observations CEMENT WITH 5" STINGER INSTALLED BELOW RT

2 - GENERAL COMPOSITION OF CASING STRING

ELEMENT	MFG. type	ϕ	Weight (lb/ft) or thickness	Thread or joint type	Grade	Special corrosion ?	Inside volume l/m	Length (m)
SHOE	FLOAT	20" SHOE	133 lb/ft	"CC"CONN	X56		177.8	12.27
COLLAR	FLOAT	JOINT						
JOINT	NKK	20"	133 lb/ft	"CC"CONN	X56		177.8	106.43
PILE JOINT	WITH	24"x18"		"CC"CONN				12.30
18 3/4" HOUSING C/W								
Tripping joint :	HWDP	5"	500 lb/ft	4½"IF			4.56	71.00

Drift diameter in the thickest joint 18"OD IN PILE JOINT TOTAL > 202.00 m

Maximum permissible tension 150T

Theoretical weight of the casing string : WITH PGB+PILE JT. In air 40T in mud :

3 - EQUIPMENT OF CASING STRING

CENTRALIZERS

MGF :
TYPE :
NUMBER :
DEPTH/RKB :

NIL

SCRATCHERS

MGF :
TYPE :
NUMBER :
DEPTH/RKB :

NIL

OTHER EQUIPMENT (Description - Location)

- PERMANENT GUIDE BAS WITH 4 GUIDE POSTS
- 18 3/4" WELLHEAD HO WITH 24" x 3" WALL
- PILE JOINT EXTENSIO LONG.

Imp. 4995 B SNEA(P) · RGM 959.004.013 · F5abis/2.78/11.80

4 - RUNNING CASING

Making-up of joint : CAMERON CONNECTOR TYPE "CC"
Grease type used for threads : NO - OIL
Average torque to make-up the joints N/A
Filling frequency BEFORE RE ENTERING 26" HOLE
Intermediate circulation (duration - depth)
Total running time (with circulations) 5 h average rate -- joints/h
Troubles during running NO TROUBLES
Bottom hole circulation : Duration 1.30 Rate 2000 LIT/MIN Pressure 300 PSI
Reciprocating : Duration Rate Amplitude
M.D. indications after stop of bottom hole circulation : CASING LANDED W/TGB ON TEMPLATE
Observations : WHILE FIRST RUN 20" CSG WAS STUCK AT 134M - WORK CASING UNTIL FREE PULL AND LAY DOWN 20" CSG - RIH WITH BIT TO TD - CONTINUED HOLE - POOH. RUN 20" CASING STRING WITHOUT TROUBLE

5 - SINGLE STAGE OR FIRST STAGE CEMENTING

Service cy DOWELL SCHLUMBERGER
Mixing pump " "
Slurry injection pump " "
Displacement pump(s) DOWELL SCHLUMBERGER

Beginning of slurry making at 1620
End of slurry making at 1714
End of displacement at 1730
Pressure released in casing at 1730

	Nature or class of cements	Sacks or bulk	Cement weight increase %	Water and additives used (nature : quantities)				TONNAGES US
1	G	B	200	FRESHWATER	$(31.8m^3)$ +	2% $CACL_2$		80.5
2								
3								

		S.G.	P.V.	Y.V.	VISCOSIMETER READINGS VS R.P.M. 600	300			
CARACTERISTICS OF SLURRIES	1	1.90							
	2								
	3								
SPACER PLUGS	1	SW HEAD							
	2	SW BEHIND							

Slurry injection rate 1150 LIT/MIN Displacement rate 1275 LIT/MIN
Displacement fluid nature HEAVY MUD Pumped volume $31.8m^3$
Pressure at the beginning of displacement 500 PSI at the end 800 PSI at the surge 0
Estimated losses TOTAL LOSSES AT END OF JOB Result ESTABLISHED CIRCULATION WITH RETURN A
Casing string pressuring up at NO PRESSURE
Residual pressure (eventual) after bleeding off BASE PLATE

6 - SETTING ON SPOOL

M.D. indication at the end of displacement N/A setting tension on spool →
M.D. indication after cement betting N/A h. after the end of displacement
Casing string set on spool Nominal dimensions API WP.
Spool : MFG CASING SET W/PGB ON DRILLING TEMPLATE
Suspension and seal type CASING SET W/PGB ON DRILLING TEMPLATE
Additional seal (type - dimensions) RKB/TOP 18 3/4" HOUSING = 70.1m
Distance between the upper part of the spool and R.K.B. RKB/TOP 18 3/4" HOUSING = 70.1m
cm above the spool
Cut casing

7 - CONTROL

Temperature well logging after h. setting Top cement annulus →
Cementing log after h. setting UPON DISCONNECTING
Result of these logs (or enclose a copy) AFTER 20" CSG CEMENT JOB, UPON DISCONNECTING CEMENT LINES A STRONG AND SUDDEN SUCTION WAS MONITORED, INDICATING CEMENT LOSSES FORMATION HOWEVER, DURING CMT JOB, CIRCULATION RETURN WERE CONSTANTLY MONITORED → LEAKI
Test casing string + B.O.P.(blind and pipe rams) Test pressure ACIW "CC" CONNECTOR
Packer depth : NOTE: AFTER SECONDARY CEMENT JOB, ACIW "CC" CONNECTOR BELOW PILE JOINT WAS FOUND LEAKING - DECISION TO CUT 20" CSG BELOW TH
Test result : CONNECTOR - ABANDON OF THIS WELL

F 5 c Bis 2 - 7

DETAILED COMPOSITION OF THE CASING STRING

Well site	KYARRA 1	Casing diameter	20"	RKB distance above the ground or above the mud-line in off-shore	74m

Equipment joint number	Thickness and grade	Threads	Unit length	Cumulated length	Equipment joint number	Thickness and grade	Threads	Unit length	Cumulate length
DISTANCE RKB/TOP WELLHEAD				71.10m					
WELLHEAD HOUSING + PILE JT			12.30	83.40					
1	133lb/ft	"CC"	11.92	95.32					
2	(X56 GRADE)	"CC"	11.89	107.21					
3	(X56 GRADE)	"CC"	11.89	119.10					
4	(X56 GRADE)	"CC"	11.90	131.00					
5	(X56 GRADE)	"CC"	11.90	142.90					
6	(X56 GRADE)	"CC"	11.89	154.79					
7	(X56 GRADE)	"CC"	11.90	166.69					
8	(X56 GRADE)	"CC"	11.89	178.58					
9	(X56 GRADE)	"CC"	11.67	190.25					
SHOE	(X56 GRADE)	"CC"	11.75	202.00					

***IMPORTANT:** the detailed composition of the casing string should be given from top to bottom. For the upper joint the length RKB will only be considered. So each cumulated length will be the RKB true measured depth of each corresponding joint.*

Imp. 4993 SNEA(P) - RGM 959.004.023

F5a Bi

CASING AND CEMENTING REPORT

WELL (Country)	RIG (Contractor)	RKB Height: Ground ☐ / M.L. ☐	∅ Casing ☐ / Liner ☐	CASING SHOE	Hanger depth (for liners) or changing ∅ casing depth :	OPERA DAT
KYARRA 1A (AUSTRALIA)	OCEAN DIGGER (ODECO)	74m	20"	Measured depth : 229m Vertical depth : 229m		17.2.

1 - WELL CONDITION

Open hole diameter : 26" Depth { Vertical : 240m / Measured : 240m } Deviation { Mini : 0 to / Maxi : ½ 0 to 24(}

Important caving (location - average diameter..) :

Losses during drilling (levels, extent) DRILLING WITH RETURNS TO SEA BED

Reamer at 3 m from

Reamer runs (number) 2 Shoe at

Previous casing : Diameter NONE

Bo. Ps on well when running in (Type - equipment, test pressure) NONE SURFACE CSG.

MUD CHARACTERISTICS BEFORE INJECTING SLURRY	S.G.	W.L.	P.V.	Y.V.	VISCOSIMETER READINGS Vs R.P.M. 600	300			
	1.03								

Observations HI VIS SPUD MUD IN HOLE

2 - GENERAL COMPOSITION OF CASING STRING

ELEMENT	MFG. type	∅	Weight (lb/ft) or thickness	Thread or joint type	Grade	Special corrosion ?	Inside volume l/m	Length (m)
SHOE	FLOAT TRISTATE	20"	SHOE JT	"CC"	X56	NO		12.30
COLLAR	FLOAT	20"		"CC"	X56	NO	177.8	130.87
CASING	NKK					NO		13.83
PILE JT	CIW	24"x20"		"CC"				71.50
	5"HWDP+7 3/4"		BUMPER SUB					
							TOTAL >	228.50 m

Tripping joint :

Drift diameter in the thickest joint 118.2m

Maximum permissible tension 143T In air 37T in mud : 3

Theoretical weight of the casing string :

3 - EQUIPMENT OF CASING STRING

CENTRALIZERS
MGF : NONE
TYPE :
NUMBER :
DEPTH/RKB :

SCRATCHERS
MGF :
TYPE :
NUMBER :
DEPTH/RKB :

OTHER EQUIPMENT (Description - Location)

Imp. 4995 B SNEA(P) - RGM 959.004.013 - F5abis/2.78/11-80

4 - RUNNING CASING

Making-up of joint : CAMERON CC CONN
Grease type used for threads : OIL
Average torque to make-up the joints N/A
Filling frequency
Intermediate circulation (duration - depth) NONE
Total running time (with circulations) 5 h average rate 15 min/lt joints/h
Troubles during running NONE
Pressure 250 psi
Bottom hole circulation : Duration 30min Rate Amplitude
Reciprocating : Duration Rate
M.D. indications after stop of bottom hole circulation : N/A
Observations : * 5 HRS INCLUDES TIME TO RIG PILE JT AND RUN 5 STD. STINGER INSIDE CSG LAND WITH 5" HWDP

5 - SINGLE STAGE OR FIRST STAGE CEMENTING

Service cy DOWELL SCHLUMBERGER
Mixing pump DOW SCHLUM. 2"x3"x11 CENT.
Slurry injection pump DOW SCHLUM 4½"x3 3/4"
Displacement pump(s) DOW SCHLUM 4½"x3 3/4"

Beginning of slurry making at 15:56HRS
End of slurry making at 16:25HRS
End of displacement at 16:31HRS
Pressure released in casing at 16:33HRS

	Nature or class of cements	Sacks or bulk	Cement weight increase %	Water and additives used (nature : quantities)				TONNAGES
1	"G"	565		3.79% PREHYDRATED GEL 2% $CACL_2$				24
2	"G"	200		THIXOTROPIC A+B COMPONENTS				8.54
3								

CARACTERISTICS OF SLURRIES	S.G.	P.V.	Y.V.	VISCOSIMETER READINGS VS R.P.M. 600	300			
1	1.52							
2	1.68							
3								
SPACER PLUGS 1								
SPACER PLUGS 2								

Slurry injection rate 7 bbl/min Displacement rate 5 bbl/min
Displacement fluid nature SEA WATER Pumped volume 27 bbls
Pressure at the beginning of displacement 250 at the end 275-300 at the surge 300
Estimated losses ? Result OK
Casing string pressuring up at 500 psi
Residual pressure (eventual) after bleeding off

6 - SETTING ON SPOOL

M.D. indication at the end of displacement setting tension on spool →
M.D. indication after cement betting h. after the end of displacement
Casing string set on spool Nominal dimensions API WP
Spool : MFG
Suspension and seal type
Additional seal (type - dimensions)
Distance between the upper part of the spool and R.K.B. TOP 18 3/4 WELLHEAD AT 71.50M
Cut casing cm above the spool

7 - CONTROL

Temperature well logging after h. setting Top cement annulus → SEA B
Cementing log after h. setting
Result of these logs (or enclose a copy) DIVERS OBSERVED CEMENT AT SEA BED → 500
Test casing string + B.O.P. (blind and pipe rams) Test pressure
Packer depth :
Test result :

DETAILED COMPOSITION OF THE CASING STRING

Well site	KYARRA 1A	Casing diameter	20"	RKB distance above the ground or above the mud-line in off-shore	74m

Equipment joint number	Thickness and grade	Threads	Unit length	Cumulated length	Equipment joint number	Thickness and grade	Threads	Unit length	Cumulated length
				71.5					
RKB TO 18 3/4" WELLHEAD									
1	X56-133lb/ft "CC"		13.83	85.33					
2	X56-133lb/ft "CC"		11.91	97.24					
3	X56-133lb/ft "CC"		11.91	1091.15					
4	X56-133lb/ft "CC"		11.87	121.02					
5	X56-133lb/ft "CC"		11.89	132.91					
6	X56-133lb/ft "CC"		11.90	144.81					
7	X56-133lb/ft "CC"		11.89	156.70					
8	X56-133lb/ft "CC"		11.90	168.60					
9	X56-133lb/ft "CC"		11.90	180.50					
10	X56-133lb/ft "CC"		11.89	192.39					
11	X56-133lb/ft "CC"		11.89	204.28					
12	X56-133lb/ft "CC"		11.92	216.20					
13	SHOE AT		13.00	229.00					

***IMPORTANT:** the detailed composition of the casing string should be given from top to bottom. For the upper joint the leng RKB will only be considered. So each cumulated length will be the RKB true measured depth of each corresponding joint.*

Imp. 4993 SNEA(P) - RGM 959.004.023

CASING AND CEMENTING REPORT

F5a

WELL (Country)	RIG (Contractor)	RKB Height: Ground ☐ M.L. ☒	∅ Casing ☒ Liner ☐	CASING SHOE	Hanger depth (for liners) or changing ∅ casing depth :	OPE D
KYA 1A (AUSTRALIA)	OCEAN DIGGER (ODECO)	73.44	13 3/8"	Measured depth : 979.56 Vertical depth : 979.56		19.2

1 - WELL CONDITION

Open hole diameter : 17½" Depth { Vertical : 985.0m Measured : 985.0m } Deviation { Mini : 1.50 ° to 98 Maxi 1.50 ° to 98 }

Important caving (location - average diameter..):

Losses during drilling (levels, extent) CONSTANT LOSS OF 2-3m³ PER HOUR

Reamer runs (number) 2 Reamer at 10 m fro

Previous casing : Diameter 20" Shoe at

Bo. Ps on well when running In (Type - equipment, test pressure)

MUD CHARACTERISTICS BEFORE INJECTING SLURRY	S.G.	W.L.	P.V.	Y.V.	VISCOSIMETER READINGS Vs R.P.M. 600	300			
	1.10	NC	9	13					

Observations 17½" HOLE DRILLED WITH SEA WATER - NATURAL CLAY - LIME - MUD.

2 - GENERAL COMPOSITION OF CASING STRING

ELEMENT	MFG. type	∅	Weight (lb/ft) or thickness	Thread or joint type	Grade	Special corrosion ?	Inside volume l/m	Length (m)
SHOE		SEE ATTACHED CASING TALLY						
COLLAR								
Tripping joint :								

TOTAL > m

Drift diameter in the thickest joint

Maximum permissible tension

Theoretical weight of the casing string : In air in mud :

3 - EQUIPMENT OF CASING STRING

CENTRALIZERS

MGF :

TYPE :

NUMBER :

DEPTH/RKB :

SCRATCHERS

MGF :

TYPE :

NUMBER :

DEPTH/RKB :

OTHER EQUIPMENT

(Description - Location)

Imp. 4995 B SNEA(P) - RGM 959.004.013 - F5abis/2-78/11-80

4 - RUNNING CASING

Making-up of joint : TO TRIANGLE WITH WEATHERFORD HYDRAULIC TONGS
Grease type used for threads : WEATHERFORD LUBE SEAL
Average torque to make-up the joints 16,000 FT POUNDS
Filling frequency COMPLETE FILL UP EVERY 5 JTS.
Intermediate circulation (duration - depth) NONE

Total running time (with circulations) 6 h 30min average rate 11.5 joints/h
Troubles during running

Bottom hole circulation : Duration 1hr 30 min Rate 5 bbl min Pressure 500 psi
Reciprocating : Duration NONE Rate Amplitude
M.D. indications after stop of bottom hole circulation :
Observations : HELD HANGER .5 METER FROM LANDING DURING CEMENTATION

5 - SINGLE STAGE OR FIRST STAGE CEMENTING

Service cy DOWELL SCHLUMBERGER
Mixing pump DOWELL SCHLUMBERGER
Slurry injection pump DOWELL SCHLUMBERGER
Displacement pump(s) DOWELL SCHLUMBERGER

Beginning of slurry making at 0714 hrs
End of slurry making at 0800 hrs
End of displacement at 0947 hrs
Pressure released in casing at 0951 hrs

	Nature or class of cements	Sacks or bulk	Cement weight increase %	Water and additives used (nature : quantities)				TONNAGE
1	G	615		3.97% PREHYDRATED GEL FRESHWATER				26.2
2	G	300		NEAT WITH FRESHWATER				12.8
3								39.0

CARACTERISTICS OF SLURRIES		S.G.	P.V.	Y.V.	VISCOSIMETER READINGS VS R.P.M. 600	300			
	1	1.45							
	2	1.89							
	3								
SPACER PLUGS	1								
	2								

Slurry injection rate 5 BBL MIN Displacement rate 4 BBL MIN

Displacement fluid nature MUD S.G. - 1.06 Pumped volume 433 + 5 BBLS
Pressure at the beginning of displacement 500 at the end 1250PSI at the surge 1250PSI
Estimated losses
Casing string pressuring up at Result DID NOT BUMP PLUG
Residual pressure (eventual) after bleeding off NONE

6 - SETTING ON SPOOL

M.D. indication at the end of displacement
M.D. indication after cement betting setting tension on spool → N/A
Casing string set on spool h. after the end of displacement
Spool : MFG Nominal dimensions API WP
Suspension and seal type
Additional seal (type - dimensions)
Distance between the upper part of the spool and R.K.B.
Cut casing cm above the spool

7 - CONTROL

Temperature well logging after h. setting
Cementing log after h. setting Top cement annulus → MUD LI
Result of these logs (or enclose a copy)
CMT IN RETURNS WHEN JETTING WELLHEAD

Test casing string + B.O.P.(blind and pipe rams) Test pressure → 2000 P
Packer depth :
Test result : HELD 2000 PSI 15 MIN OK

AUSTRALIAN AQUITAINE KYARRA 1A 19.2.83

CASING LIST

CASING SIZE: 13.375" TYPE: K55 WEIGHT (lbs/ft): 68

CASING LENGTH: 906.83
SHOE DEPTH: 980.26

JT. NO.	LENGTH	TOTAL LENGTH	DEPTH FROM KB	REMARKS
	0.70	0.70	979.56	SHOE
1	11.77	12.47	967.80	
2	12.07	24.54	955.73	
	0.70	25.24	955.03	FLOAT COLLAR
3	12.08	37.31	942.95	
4	11.85	49.16	931.10	
5	12.08	61.24	919.03	
6	12.07	73.30	906.96	
7	11.94	85.24	895.02	
8	12.01	97.25	883.01	
9	12.08	109.33	870.93	
10	11.90	121.23	859.03	
11	12.08	133.31	846.95	
12	11.83	145.14	835.12	
13	12.08	157.22	823.05	
14	11.92	169.14	811.13	
15	12.06	181.20	799.07	
16	11.95	193.15	787.12	
17	11.99	205.13	775.13	
18	11.95	217.08	763.18	
19	12.07	229.15	751.11	
20	12.07	241.22	739.04	
21	12.08	253.30	726.97	
22	12.06	265.35	714.91	
23	11.92	277.27	702.99	
24	11.85	289.12	691.14	
25	12.05	301.17	679.09	
26	12.08	313.25	667.02	
27	12.07	325.32	654.95	
28	11.87	337.19	643.08	
29	12.08	349.26	631.00	
30	12.06	361.32	618.95	
31	11.98	373.29	606.97	
32	12.04	385.33	594.94	
33	11.91	397.24	583.03	
34	11.70	408.93	571.33	
35	12.07	421.00	559.26	
36	12.07	433.07	547.19	
37	11.85	444.92	535.34	
38	11.93	456.85	523.41	
39	11.82	468.67	511.59	
40	12.65	481.32	498.94	
41	12.20	493.52	486.74	
42	11.46	504.98	475.28	
43	12.60	517.58	462.68	
44	11.93	529.51	450.75	
45	12.40	541.91	438.35	
46	11.92	553.83	426.44	
47	11.57	565.40	414.87	
48	12.65	578.05	402.22	

AUSTRALIAN AQUITAINE

KYARRA 1A

CASING LIST

CASING SIZE: 13.375"   TYPE: K55   WEIGHT (LBS/FT): 68

CASING LENGTH: 906.83
SHOE DEPTH: 980.26

JT NO.	LENGTH	TOTAL LENGTH	DEPTH FROM KB	REMARKS
49	12.60	590.65	389.62	
50	12.70	603.35	376.92	
51	11.79	615.13	365.13	
52	11.73	626.86	353.40	
53	12.40	639.26	341.00	
54	12.70	651.96	328.30	
55	12.75	664.71	315.55	
56	12.12	676.83	303.43	
57	11.79	688.62	291.64	
58	12.40	701.02	279.24	
59	12.76	713.78	266.48	
60	11.99	725.77	254.49	
61	11.89	737.66	242.60	
62	11.71	749.37	230.89	
63	11.98	761.35	218.91	
64	11.54	772.89	207.37	
65	11.47	784.36	195.90	
66	12.72	797.08	183.18	
67	12.70	809.78	170.48	
68	11.89	821.67	158.59	
69	11.85	833.52	146.74	
70	11.96	845.48	134.78	
71	11.68	857.16	123.10	
72	11.88	869.04	111.22	
73	12.26	881.30	98.96	
74	12.75	894.05	86.21	
75	12.07	906.12	74.15	
	0.71	906.83	73.44	HANGER

elf aquitaine

TIME DISTRIBUTION

F6 bis/

OPERATOR	COUNTRY	WELL	RIG	CONTRACTOR	MON
AAP	AUSTRALIA	KYARRA 1A	OCEAN DIGGER	ODECO	FEBRUA

DAY	Number of day from start drilling	D			F DRILLING CASING				G FORMATION SURVEYS				A INTERRUPTION OF OPERATIONS UNDER F or G				COMPLE PLUG	
		D_1	D_2	D_3	F_1	F_2	F_3	F_4	G_1	G_2	G_3	G_4	A_1	A_2	A_3	A_4	C_1	C_2
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16	1	5			13	2.5	1.5	1		26" PHASE					1			
17	2				0.5			20							1.5	2		
18	3				9.5	2	3	9								0.5		
19	4				18		0.5		17½" PHASE			5.5						
20	5							14				10						
21	6					4	1.5	18.5										
22	7				5.5	4	1	1		12.5								
23	8				18.5		2									3.5		
24	9											22.5				1.5		
25	10											23				1		
26	11					C PHASE						18						6
27	12																	24
28	13	23				D PHASE												1
29		8.5		10			(MARCH 1, 1983)											
30																		
31																		
TOTAL																		

TIME OF SIDE-TRACK DRILLING

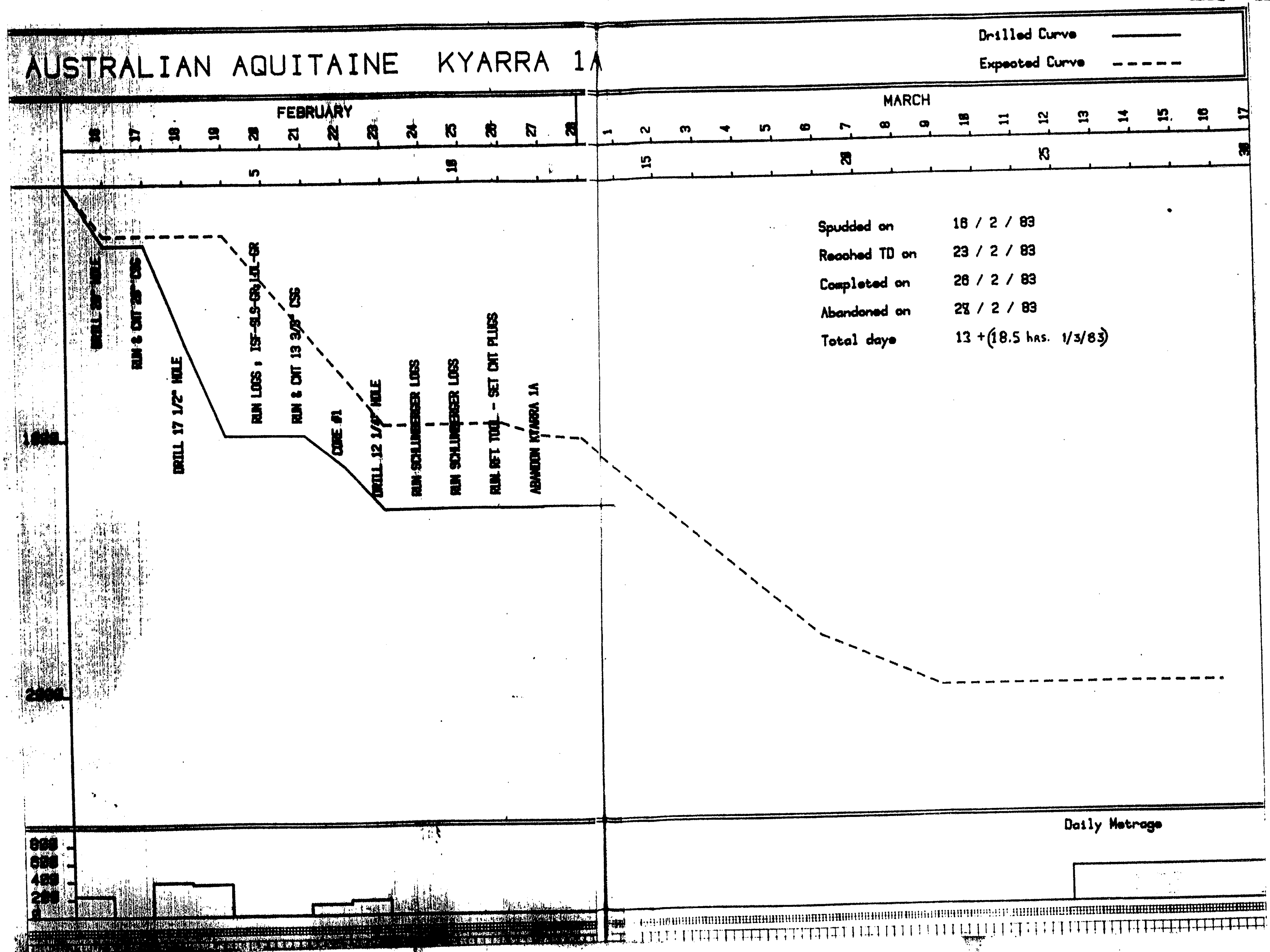
TIME OF LOGGING BY A FISHING JOB

Causes of side-track:
- Fishing job unsolved
- Accidental on Plug
- Correction of drill-path

N.B. : *1) Add an asterisk to each following day times :*
- *Time spent on F1, F2, F3 for technical side-tracks, until the initial depth of the old hole is reached.*
- *Time spent on G4 for logging necessitaded by a fishing job.*

2) Side-track drilling further to a change in the geological target is considered as a new-hole, whose the name changes (add .G to the old
A new form is open up from the first day of the side track.

Imp. 4807 A SNEA(P) - 959.004.007



AUSTRALIAN AQUITAINE KYARRA 1A
Drilled Curve
Expected Curve
FEBRUARY
MARCH
Spudded on 16 / 2 / 83
Reached TD on 23 / 2 / 83
Completed on 28 / 2 / 83
Abandoned on 28 / 2 / 83
Total days 13 + (18.5 hrs. 1/3/83)
RUN & CMT 20" CSG
DRILL 17 1/2" HOLE
RUN LOGS , ISF-SLS-GR, LDL-GR
RUN & CMT 13 3/8" CSG
CORE #1
DRILL 12 1/4" HOLE
RUN SCHLUMBERGER LOGS
RUN SCHLUMBERGER LOGS
RUN RFT TOOL - SET CMT PLUGS
ABANDON KYARRA 1A
1000
2000
Daily Metrage

GENERAL DATA			DRILLING BIT								PERFORMANCES					PARAMETERS				MUD				DULL BIT CONDITION						TURBODRILLED			
								Nozzles																									
Run number	Operation	Drive	Bit type	Bit Diameter	Manufacturer	Code IADC	Serial number	1 /32	2 /32	3 /32	Operation starting depth	Footage in this operation	Drilling time (hours)	Drilling rate	Déviation	Weight on bit	R.P.M.	Flow rate	Pressure	Density (mud weight)	Plastic Viscosity (cp)	Solid content (%)	Water loss (cc)	T	B	G	Observations on grading	GEOLOGICAL FORMATION	Reason for tripping	Type of turbodrill	Turbodrill diameter	Turbodrilled footage	Total time (hours)
1R	F	R	T	26"	SMI	DSJ	SAS248	18	18	18	74	166	1.35		½	0/3	50/70	3000	1200	SEA W/HI	WATER VIS	PILLS		1	1	1	RETURN TO SEA BED						
2U	F	R	T	17½"	HTC	OWVJ	124WR	18	18	18	240	745	27.5		1½	5/20	130	3075	1600	1.12	7	4	NC	4	4	I		CM					
3	RA	R	T	12¼"	SMI	FDGH	XA6634	13	13	13	905	75	2.5			5/10	60	1800	1825	1.06	9	4	6.3		INC			CMT					
3	F	R	T	12¼"	SMI	FDGH	XA6634	13	13	13	985	64	3.5		1¼	20	80	1800	1825	1.09	11	4	6.3		2	2	I	C					
1KU	K	R	C	8½"	CHR	RC3	82B092	WATER COURSE			1049	18	0.5			7	80	560	300	1.09	11	4	6.3		MED COND.			S					
4	RA	R	T	12¼"	REED	HS51	948488	14	14	14	1049	18	1		1¼	2/7	65	1650	1100	1.09	11	4	6.3		INC			S					
4	F	R	T	12¼"	REED	HS51	948488	14	14	14	1067	213	20.5		0	13/23	60/100	1600	1150	1.10	11	5	6.8	2	2	I		SK					
											1280	T.D.																					

OPERATION
F – Drilling
K – Coring
RA { – Redrilling (formation or cement) / – Reaming and control trip
P – Pilot hole drilling
E – Hole opening
PE – Simultaneous piloting and hole opening

Note: Use one line for each operation

Ex.: Redrilling followed by drilling ...

DRIVE
R – Rotary
T – Turbine
M – Bottom hole motor other than turbine

BIT DESIGN
T – Tricones (rock bits)
B – Bicones
M – Other cone rock bits
F – Mill
D – Diamond bit
C – Diamond core head
A – Rock bit w/removable center
E – Diamond bit w/removable center

MANUFACTURER
The code constitute the first three letters of the manufacturer name
HUG – Hughes
SMI – Smith
REE – Reed
SEC – Security
SMF – SMF
DIA – Diamond boart
DRI – Drilling service
CHR – Christensen

CODE
IADC code for rock bits (SEE Formulaire ...

– DULL BIT CONDITION
T1 - Teeth hight 1/8 gone
T2 - Teeth hight 1/4 gone
T3 - Teeth hight 3/8 gone
T4 - Teeth hight 1/2 gone
T5 - Teeth hight 5/8 gone
T6 - Teeth hight 3/4 gone
T7 - Teeth hight 7/8 gone
T8 - Teeth hight all gone

Bearing wear B1 to B8

OBSERVATION ON GRADING :

Teeth and cones
CT – Chipped teeth
ET – Eroded teeth or inserts
BT – Broken teeth or inserts
BU – Bit balled up
RG – Rounded gauge teeth or inserts
WG – Worn or lost gauge teeth or inserts
FC – Flat crested
EC – Eroded cone shell
BS – Broken, worn or lost spear point

Bearings
CL – Cone(s) locked
BF – Bearing failure
SF – Seal failure
LC – Lost cone(s)
BP – Broken bearing pins or journals

Bit body
BL – Bent legs - Pinched
PN – Plugged nozzle(s)
EN – Eroded nozzle(s)
LN – Lost nozzle(s)

– FORMATION
A – Clay
C – Limestone of dolomite
M – Marl or shale
D – Chalk
S – Sand
G – Sandstone
Q – Quartz
V – Chert
X – Granite
K – Conglomerate
I – Gypsum - Anhydrite
L – Saltz

Additif accessory: a small letter showing the formation characte-

The lithology drilled in the previous 24 Hrs will be defined by the codes of the last formations drilled, with a maximum of three placed in order of relative importance.

Ex. (1) Ap : Plastic clay
(2) AS : Clay and sand
(3) Mct : Marl and solft limestone
(4) MChv: Marl and tight dolomite w/Chert

– REASON FOR TRIPPING
A – Penetration slowing down
B – Increasing torque
C – Hydraulic problems
D – Bit drill maximum hours allowed
E – Reason other than bit problems

Ex. (1) Drillstring modification
(2) Casing
(3) Test
etc...

81 SNEA(P) RGM 959.004.015

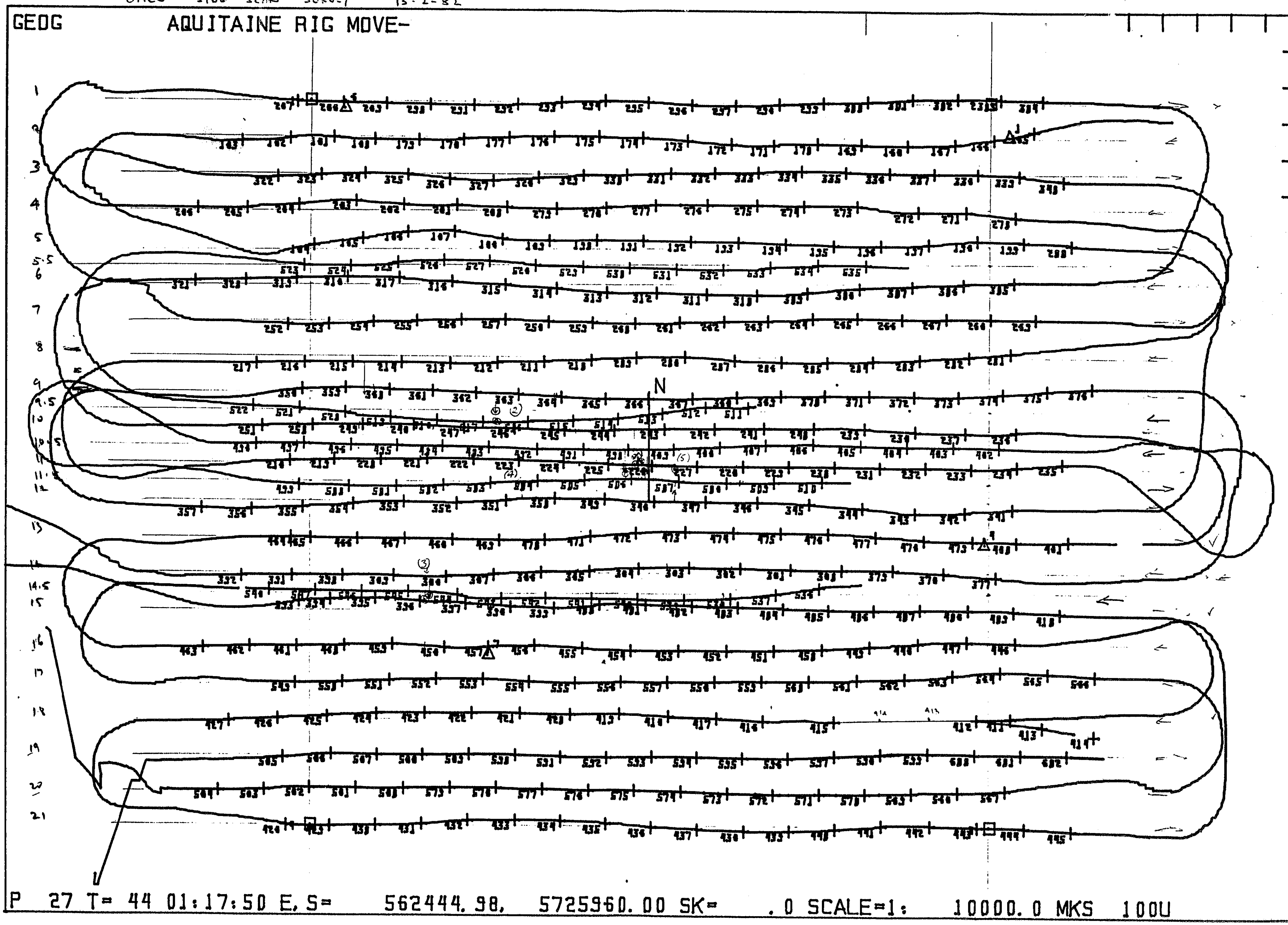
APPENDIX 11

RIG POSITIONING REPORT

BY: RACAL-DECCA

OMEO SIDE SCAN SURVEY 13-2-82

OMEO - 1 POST DRILLING SIDESCAN SONAR SURVEY. "G".



RIG MOVE REPORT
OASIS AND JMR POSITIONING
AT
KYARRA-1A LOCATION
FOR
AUSTRALIAN AQUITAINE PETROLEUM PTY.LTD

Prepared by:

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DSA 1115

1 December 1982- 18 February 1983

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APPENDICES

A AREA OF OPERATIONS

B PERSONNEL LIST AND SUMMARY OF PROJECT DIARY (3)

C "CHRISTMAS CREEK" OFFSET DATA

D FINAL OASIS TRANSIT FIX

E 3D SATELLITE/DOPPLER FIX - SCATTER PLOT.

F TRACKPLOT OF PRE-DRILLING SIDESCAN SONAR SURVEY KYARRA-1.

G TRACKPLOT OF POST-DRILLING SIDESCAN SONAR SURVEY OMEO-1.

ABSTRACT

The following report gives details of the survey operations involved in moving the drilling rig " OCEAN DIGGER" onto the KYARRA location in the GIPPSLAND BASIN VIC P17, carried out by Racal Decca Survey Australia on behalf of Australian Aquitaine Petroleum Pty. Ltd.

The project commenced on 1st December when the survey party were mobilised to Welshpool to prepare for the rig move to Kyarra-1. However due to the drilling program of "OCEAN DIGGER" at the OMEO-1 site being extended and the survey vessel "Christmas Creek" being required for rig duties, the calibration of the new transponder net at Kyarra Location was deferred and the personnel demobilised on 8 December.

The calibration of the OASIS Net and pre drilling Side Scan Sonar survey of the site was completed during the period 17 January to 23 January.

The rig move finally took place on 10 February. On 15 February drilling problems forced the rig to move within the anchor pattern to spud in Kyarra 1A.

Laying of location marker buoys and provisional positioning of the "OCEAN DIGGER" was by means of the Decca OASIS system. The final position was determined by independent 3D Satellite/ Doppler observations by a JMR-4A Satellite/Receiver.

1 REQUIREMENTS

The Kyarra-1 location co-ordinates were supplied by Australian Aquitaine Petroleum Pty. Ltd by telex No. 1810 on 19 November 1982.

The co-ordinates were as follows:

Latitude	38^{o}	40'	51".9	South
Longitude	147^{o}	11'	12".4	East

AUSTRALIAN GEODETIC DATUM.

A.M.G., Zone 55, Central Meridian 147^{o} East

Easting 516246 Northing 5718581

The requirements of the project were as follows:

a) To lay and calibrate a pattern of acoustic transponders to be used as the position fixing system.

b) To carry out a Sidescan Sonar Survey of the drilling site seabed with the purpose of establishing the presence or absence of any debris on the seabed.

c) To lay location and anchor position marker buoys to guide the "OCEAN DIGGER" on to location.

d) To provide provisional positioning co-ordinates for the "OCEAN DIGGER" prior to the commencement of drilling operations.

e) To carry out a 3D satellite doppler fix on the "OCEAN DIGGER" for final positioning co-ordinates.

f) To carry out a Sidescan Sonar Survey of the OMEO-1 location following the departure of the drilling rig from the site, to establish the presence or absence of any debris on the seabed attributable to the drilling operation at OMEO-1

2. Summary of Events

1-12-82	-	Fit Christmas Creek with OASIS and Side Scan Sonar equipment.
3-12-82	-	Lay Seabed transponder netat Kyarra Location. Commence calibration
6-12-82	-	Crew change at Port Welshpool.
7-12-82	-	Defer calibration due to change of drilling program. Personnel demobilised.
17-1-83	-	Re-mobilise to Welshpool
21-1-83	-	Calibration completed.
23-1-83	-	Site surveys completed - Operators demobilised.
6-2-83	-	Operators re-mobilised
10-2-83	-	Lay marker buoys - OCEAN DIGGER on site.
12-2-82	-	OMEO-1 Post drilling sidescan sonar survey.
15-2-83	-	Move OCEAN DIGGER to KYARRA-1A.
18-2-83	-	JMR-4A Confirmation Fix at KYARRA-1A completed. Demobilise.

3. THE RACAL-DECCA SURVEY OASIS SYSTEM

OASIS is an integrated satellite/acoustic navigation and position fixing system, it is independent of shore based radio navigation aids and is capable of the following operations.

a) Navigation of a vessel to a particular location using Satellite Navigation and Gyro data, with manual inputs of speed and drift.

b) Precise calibration (Geographical Positioning) of an acoustic net of up to 5 sea-bed transponders.

c) Accurate tracking of a vessel's position within coverage of the acoustic net.

d) In the "relay" mode, accurate remote tracking of up to two further vehicles within coverage of the net.

4. OPERATING PROCEDURES

4.1 NAVIGATION TO LOCATION AND REFERENCE BUOY POSITION

This is undertaken using single-pass solutions from consecutive acceptable satellite passes using gyro data input for heading information and a manual input of ships speed based either on the ships log, or distance and time between satellite fixes. Given a reasonable frequency of acceptable satellite passes, by the time the vessel arrives at location its position should be known accurately enough to enable a reference buoy to be dropped within range of the proposed acoustic net. The vessel can then be either anchored or hove-to alongside this buoy and further satellite positions taken until a satisfactory fix is obtained. Once this has been accomplished the acoustic transponders may be approximately positioned relative to this buoy.

4.2 CALIBRATION OF ACOUSTIC NET

This takes place in 3 phases:

4.2.1 PHASE 1 NET RELATIVE GEOMETRY

This is achieved by navigating through the acoustic net collecting a series of 140 good range sets. The quality of these range sets is ensured by a rigid system of range checking whereby each accepted set is preceded by six correctly predicted sets, the accepted set then must also fall in the predicted "box". The range sets are alternately divided into two groups, the groups are processed and a direct solution for each is found. The operator compares the two results and if acceptable, a least squares solution for each group is generated with a third result being the mean of the two least squares solutions. If this result is accepted by the operator then this mean solution becomes the relative geometry solution - which remains throughout the calibration.

The results are in the form of X-Y co-ordinates based on a line from transponder A to transponder B as the X-axis with A as origin. Values are in metres.

The time needed for this phase is dependent on the number of transponders involved, and the sea-state.

However, with a 5 transponder net and reasonable weather this phase may take up to six hours.

4.2.2 ORIENTATION PHASE 1A

This phase comprises navigating three legs on as constant headings as possible within coverage of all transponders. The legs should be at 90^{o}-120^{o} to each other but need not be at any particular orientation with respect to the net.

Using three legs reduces errors due to ship's drift.

The result of this phase is the orientation of the perpendicular to the line drawn from transponder A to transponder B with respect to true north.

The orientation result is based on the gyro and is progressively modified during repositioning Phase 2.

This phase may be expected to take up to 1 hour,

4.2.3 REPOSITIONING PHASE 2

Having completed the geometry and orientation phases, the system now automatically enters the satellite repositioning phase.

At this stage the ship's track may be displayed on the plotter, however the ship's position will be based on the results of the relative geometry, and orientation, with the operator's original estimate of the position of transponder A. Repositioning of the net takes place after the second and subsequent successful satellite passes. Each result is in the form of a block shift of the net in metres and a change of orientation in degrees.

The new positions of all transponders with the new orientation are output after each successful pass.

At pass 15 the programme reconsiders the previous pass information and edits out any passes which appear to be contributing unreasonable errors.

The absolute accuracy of the geographical positions of the transponders depends on the number of passes processed. After twenty passes ± 25 metres is reasonable and after 30 passes ± 10 metres.

This phase of the calibration may take up to 72 hours depending on the frequency and quality of satellite passes.

4.3 ACOUSTIC TRACKING OF VESSELS POSITION

Once the positions of the sea-bed transponders have been established to the degree of accuracy required, the programme may be run in the "Navigate" mode, once this has been done any further satellite data is ignored.

The tracking programme enables the vessels position to be continuously monitored on the plotter, and manual, distance, or time initiated fixes to be generated, with a fix relay closure for automatic marking of echo sounder or sonar records which may be required for a site-survey.

4.4 "RELAY" MODE TRACKING"

Although outside the scope of this report and not used during this operation, the relay mode enables remote acoustic tracking on the survey vessel, of up to two further relay transponders which may be attached to other vehicles, working in the same area.

4.5 OPERATOR INPUTS TO THE OASIS SYSTEM

4.5.1 SPHEROID AND DATUM TRANSFORMATION CONSTANTS

The following spheroid data, and datum transformation constants from WGS72 to A.G.D were input during the initialisation of the programme.

Note that the $\Delta X, \Delta Y, \Delta Z$, signs are reversed from normal convention for datum transformations from WGS72 to A.G.D, this is a programme requirement.

$a = 6378160 \quad 1/f = 298.25$

$\Delta X = -122, \ \Delta Y = -41, \ \Delta Z = 146$

4.5.2. TIDAL INFORMATION

The programme requires an input of variation of height of tide from mean sea level, this is needed both for the satellite programme antenna height and for the acoustic programme slant range correction.

At the Kyarra Location the tidal range is less than two metres and therefore not significant to the OASIS System.

4.5.3. VELOCITY PROFILE

An important input to the programme is velocity of sound in seawater. This was measured frequently using an MC5 Temperature/Salinity bridge, taking readings at ten metre intervals from the sea surface to the seabed. The programme used these results to compute a velocity profile.

4.5.4 SAT/DOP TROPOSPHERIC CORRECTION

This is calculated by the programme based on operator inputs of temperature, pressure and relative humidity. These were measured at regular intervals using an Aspirated Hygrometer and a "Baromec M1915" barometer.

4.5.5. OFFSET BETWEEN TOWFISH AND SAT NAV ANTENNA

During the calibration of the net the offset between the towfish and the satellite Navigation Antenna must be entered in the programme, thus the position plotted at this stage refers to the Antenna position.
Prior to the final transit fix on the "OCEAN DIGGER" the offsets were changed to plot the wheelhouse position, from where the transit fixes were observed. Measured offsets can be found at the end of this report.

5 NET CALIBRATION RESULTS

5.1 RELATIVE GEOMETRY, PHASE 1

The results are in form of X-Y co-ordinates based on a line between transponder A and transponder B with A as origin. Values are in metres.

	X	Y	Depth
A	0.0	0.0	43.0
B	1204.25	0.0	43.0
C	1764.69	1258.73	43.0
D	386.64	2047.68	43.0
E	-550.03	1062.73	43.0

Discrepancy = 1.7

The discrepancy is a measure of the agreement between the two least squares solutions used to produce the final mean solution.

A value less than five is considered satisfactory.

5.2 ORIENTATION PHASE 1A

The result is the orientation of the perpendicular to the line joining transponder A and tranponder B, this is later modified during the satellite repositioning phase.

ORIENTATION = 40.5

5.3 REPOSITIONING PHASE 2

The end result of an oasis ca ibration is a set of Grid or Geographical co-ordinates or each transponder and the net orientation.

TRANSPONDER FINAL POSITIONS A.M.G. ZONE 53

	Easting	Northing	Depth
A	515085	5718112	43
B	516039	5717378	43
C	517250	5718034	43
D	516639	5719499	43
E	515297	5719289	43

ORIENTATION = $37^{\circ}.45$

Using 25 Passes R.M.S. = 29.60

An indication of the probable error in position of the acoustic net can be obtained from the R.M.S value and the number of passes used:

$$\text{PROBABLE ERROR} = \sqrt{\frac{\text{R.M.S.}^2}{\text{NO OF PASSES USED}}} = 6 \text{ metres}$$

5.4 TRANSPONDERS

The five transponders used had the following channel numbers, codes and serial numbers;

A	Channel 1	Code A12345	Serial No. 277
B	Channel 3	Code AC 345	Serial No. 267
C	Channel 4	Code A 4	Serial No. 190
D	Channel 6	Code AC1235	Serial No. 315
E	Channel 7	Code AC 2	Serial No. 348

6. MARKER BUOYS

A fix was taken on the position of all buoys prior to the arrival on location of the "OCEAN DIGGER" and information regarding the "set" of the buoys passed to the drillship.

Marker buoys were supplied by Australian Aquitaine Petroleum and were laid as follows:

6.1 LOCATION BUOY

On location.

6.2 HEADING BUOY

914 Metres (3000 feet) from location on rig heading of 260^{o}.

6.3 ANCHOR BUOYS

No's 3, 4, 8, and 9.

7 DRILLING SITE SEABED SURVEYS

Prior to the arrival of the Drilling Rig on a location a Sidescan Sonar Survey is carried out covering an area of 2.0. km x 2.0 km centred on the proposed location with the purpose of establishing the presence or absence of any debris on the seabed.

A similar sidescan sonar survey of the drilling site is made following the departure of the rig from any one of the drilling sites to establish the location of any debris resulting from the drilling operation and/or to document the absence of oilfield debris.

The survey at the KYARRA Location was commenced at 0225 on 21st January and was completed at 0105 on 22nd January Survey Lines at 100 metre intervals were run with a Klein dual channel sidescan sonar operating at 150 metre range scale to ensure 100% overlap of the entire area. The seabed at the location proved to be flat and featureless. No anomalies were detected.

The final post drilling sidescan sonar survey at OMEO-1 drilling site was carried out between 1845 on 12 February and 1900 on 13 February. No significant debris was detected except what appears to be the remains of No 3 Anchor Marker Buoy located at:- Easting 561785 Northing 571 8571. A track plot of the survey lines run is enclosed as Appendix G.

8. PROVISIONAL DERRICK CO-ORDINATES

OCEAN DIGGER arrived on the location at 1300 on 10th February. Final OASIS Transit fixes taken at 0200 on 11 Feb and JMR-4A observations, gave the position of the rig 15 metres 134^{o} from the proposed location.

On 15 February drilling difficulties necessitated the rig moving 20 to 25 metres in the direction of 230^{o} to spud in Kyarra 1A. This move within the anchor pattern was monitored by the OASIS system and was completed by 1030 on 16 February.

Co-ordinates for this position were calculated and passed to the OCEAN DIGGER as provsional drillstem co-ordinates of KYARRA 1A.

PROVISIONAL DERRICK CO-ORDINATES FOR KYARRA-1A.

Latitude	Longitude
38^{o} 40' 52".24 South	147^{o} 11' 12".41 East

A.M.G. co-ordinates, Zone 55, Central Meridian 147^{o} E

Easting 516246	Northing 5718571

Heading of Rig 258^{o} (T)

9 JMR-4A SATELLITE DOPPLER FIX AT KYARRA 1A LOCATION

JMR-4A Satellite Doppler observations were taken on board the "OCEAN DIGGER" to confirm the location of KYARRA-1A well head which had been positioned by the "OASIS" System.

The JMR-4A contains its own microprocessor for processing of doppler count data obtained from the U.S Navy Transit Satellite System. Using frequencies transmitted from these satellites it extracts timing information, satellite ephemeris and doppler shift data to provide an accurate position fix anywhere on the earth's surface.

The raw data was recorded on JMR-1 certified cassette tapes and processed using the JMR-4A programme.
The following criteria were used for the computations:

a)	Tropospheric Constant	: 0.00020
b)	Atmospheric Pressure	: 1013
c)	Doppler Edit	: tight
d)	Pass elevation low angle cut off	: 20^{o}
e)	Pass elevation high angle cut off	: 78^{o}
f)	Drill rig heading	: 258^{o}
g)	Offset antenna to drill stem	: brg. $079^{o}.5$
		: Dist. 34.7m
h)	Co-ordinate transformation constants WGS -72 to A.G.D.	: ΔX + 0.122 km
		: ΔY + 0.41 km
		: ΔZ - 0.146 km
i)	Australian National Spheroid	: a = 6378160
		: $f = \frac{1}{298.25}$

10. SUMMARY OF RESULTS

Final position of KYARRA-1A derived from 3D Satellite/ Doppler Observations. 24 Acceptable passes.

Australian Geodetic Datum: - (1966) (A.G.D.)

Latitude	38^{o}	40'	52".532	South
Longitude	147^{o}	11'	12".288	East

Australian Map Grid Co-ordinates, Zone 55, Central Meridian 147^{o} East.

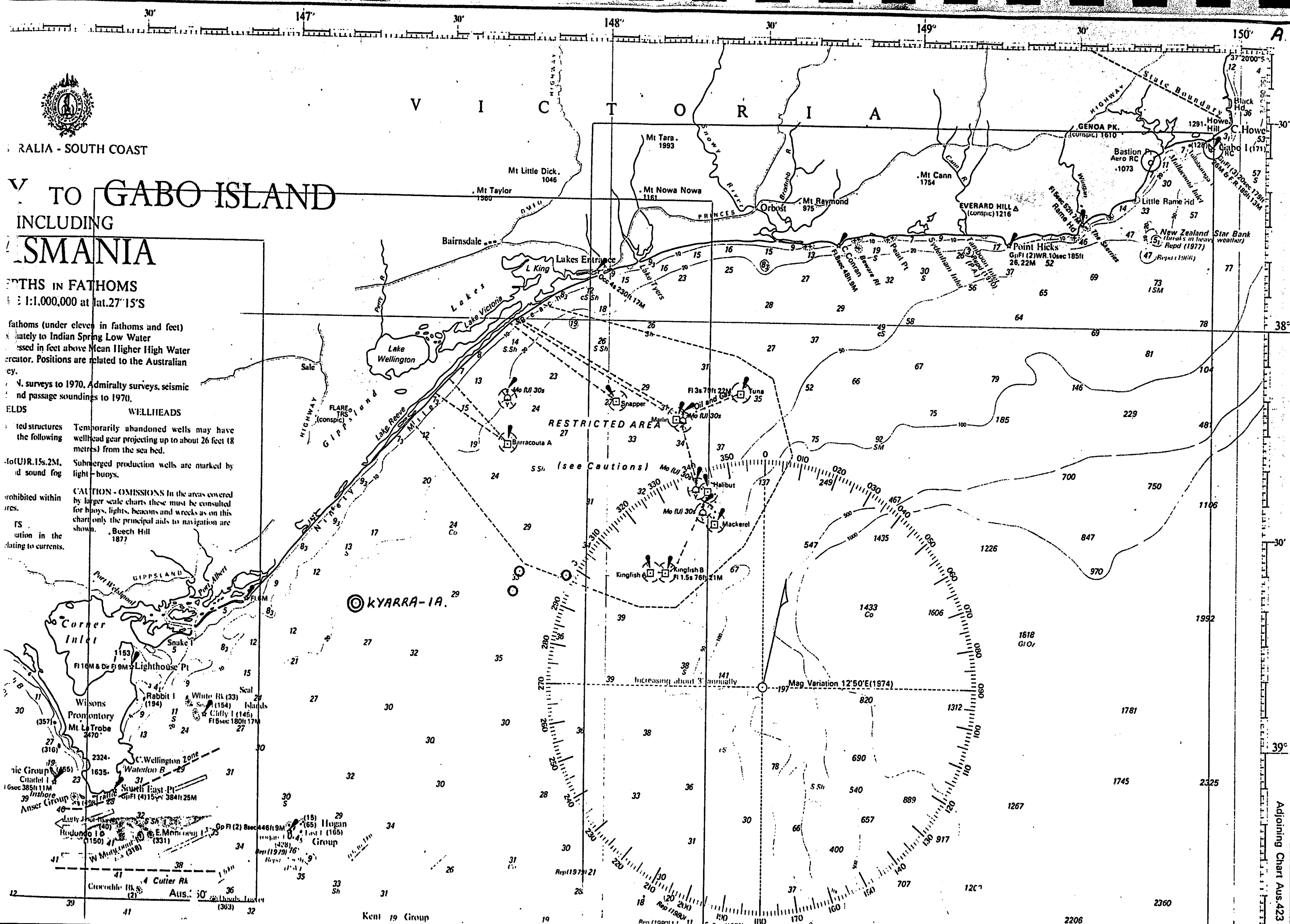
Eastings 516243
Northings 5718562

Proposed Location →	JMR-4A Final Location	19 metres.
Proposed Location →	OASIS Prov. Co-Ords	10 metres.
OASIS Prov. Co-Ords →	JMR-4A Final Location	9 metres

N. L. Sanderson.

Approved N.L. Sanderson O.B.E. Assoc. I.S. Aust.

Chief Surveyor
RACAL-DECCA MARINE AUSTRALIA



RALIA - SOUTH COAST
Y TO GABO ISLAND
INCLUDING
SMANIA
PTHS IN FATHOMS
1:1,000,000 at lat.27°15′S
fathoms (under eleven in fathoms and feet)
ately to Indian Spring Low Water
ssed in feet above Mean Higher High Water
rcator. Positions are related to the Australian
ey.
N. surveys to 1970. Admiralty surveys, seismic
nd passage soundings to 1970.
ELDS
WELLHEADS
ted structures the following
Temporarily abandoned wells may have wellhead gear projecting up to about 26 feet (8 metres) from the sea bed.
Submerged production wells are marked by light-buoys.
CAUTION - OMISSIONS In the areas covered by larger scale charts these must be consulted for buoys, lights, beacons and wrecks as on this chart only the principal aids to navigation are shown.
V I C T O R I A
RESTRICTED AREA
(see Cautions)
Mag Variation 12°50′E(1974)
Increasing about 3′ annually
KYARRA-1A.
Lakes Entrance
Bairnsdale
Lake Wellington
Lake Victoria
L King
Sale
Orbost
Mt Little Dick 1046
Mt Taylor 1560
Mt Tara 1993
Mt Nowa Nowa 1161
Mt Raymond 975
Mt Cann 1754
EVERARD HILL (conspic) 1216
GENOA PK. (conspic) 1610
Point Hicks
Little Rame Hd
New Zealand Star Bank
C. Howe
Gabo I
Snapper
Tuna
Marlin
Barracouta A
Halibut
Mackerel
Kingfish A
Kingfish B
Corner Inlet
Wilsons Promontory
Mt La Trobe 2470
Lighthouse Pt
Snake I
Rabbit I
Seal Islands
South East Pt
Hogan Group
Kent Group
Crocodile Rk
Cutler Rk
Aus.350
Adjoining Chart Aus.423
147°
148°
149°
150°
38°
39°

PERSONNEL LIST AND SUMMARY OF PROJECT DIARY

Personnel List

30:11:82 to 8:12:82

T. Crawford	OASIS Engineer	R-DSA Perth
W. Bateman	U.W. Engineer	R-DS Great Yarmouth

17: 1:83 to 23: 1:83

T. Crawford	OASIS Engineer	R-DSA Perth
A. Peart	U.W. Engineer	R-DSA Perth

6: 2:83 to 18: 2:83

I.A. Freeman	B. Surv. M.I.S. Aust Senior Surveyor	R-DSA Sydney
A. Peart	U.W Engineer	R-DSA Perth

Summary of Project Diary

1.12.82 - Fit "Christmas Creek" with OASIS and Side Scan Sonar equipment.

2.12.82 - Sail from Port Welshpool for Kyarra-1 Location.

3.12.82 - Lay seabed transponder net. Commence calibration.

4.12.82 - Relative geometry and orientation completed - commence Phase II repositioning.

5.12.82 - Continue calibration.

6.12.82 - Crew change at Port Welshpool.

7.12.82 - Instructed to defer calibration and sidescan sonar survey due to change in drilling program.

8.12.82 - Demobilise to Perth.

17.1.83 - Personnel remobilised to Port Welshpool.

18.1.83 - At Kyarra Location - complete calibration of OASIS sea-bed transponders.

20.1.83 - Calibration completed 30 Passes - editing procedure uses 25 passes.

21.1.83 - Commence site survey at Kyarra.

22.1.83 - Complete S.S.S. site survey.
Proceed to Edina-1 Location to recover 5 transponders
After recovery proceed to Port Welshpool.

23.1.83 - Unrigged vessel. Personnel demobilised to Perth.

6.2.83 - Personnel mobilised for rig move.

7.2.83 - Departed for location

8.2.83 - Check sea-bed transponders - OK.
Shelter at Sealers Cove due to weather.

9.2.83 - On location - Stand by.

10.2.83 - 0700 - Lay location buoys.
1300 - OCEAN DIGGER on location - running anchors
2020 - Transit fix positions OCEAN DIGGER 8 metres north of location - Ballast down.

11.2.83 - 0230 - Final acoustic fix at Kyarra-1
Easting 516261 Northing 5718582 Heading 259°
1020 - Set up JMR-4A on OCEAN DIGGER for confirmation fix.

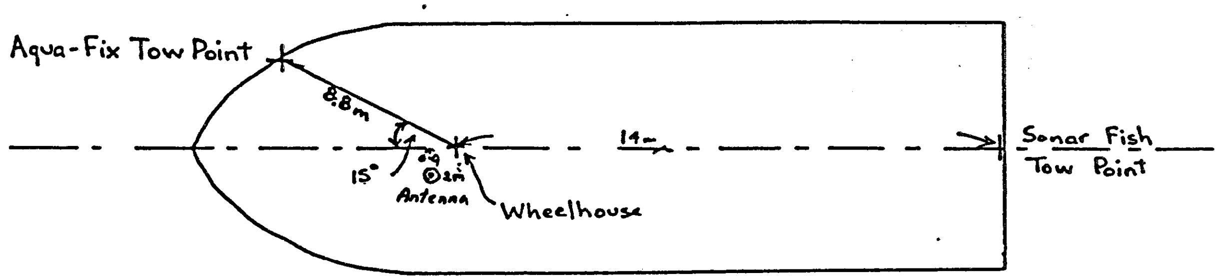
12.2.83 - Collecting satellite passes for JMR-4A Fix.
1430 - "Christmas Creek" proceed to OMEO-1 Location for post drilling Sidescan sonar survey.
1845 - Commence Side Scan Sonar Survey at OMEO-1 Location.

13.2.83 - 1900 - Complete post drilling side scan sonar survey at OMEO Location - return to OCEAN DIGGER at KYARRA.

14.2.83 - JMR-4A Observations at Kyarra-1 continue-after 20 passes
Latitude 38° 40' 52".259 S. Longitude 147° 11' 12".864 E.
or 15 metres from the proposed location.

15.2.83	-	Due to drilling problems OCEAN DIGGER to move 20 to 25 metres 230^{o} to spud in Kyarra 1A.
16.2.83	-	0130 - OCEAN DIGGER moved to new location. OASIS transit fixes give new location as Easting 516246 Northing 5718571 Heading 258^{o}.
		0315 Re-initalise JMR-4A to commence confirmation fix at KYARRA-1A.
18.2.83	-	0600 - 22 Successful JMR-4A passes received.
		0700 - Christmas Creek and personnel return to Port Welshpool - Demobilise.

"CHRISTMAS CREEK" OFFSETS



TOWFISH TO SAT NAV ANTENNA

L = 17 metres H = 3.5 metres B = 28° D = 7.3 metres

TOWFISH TO WHEELHOUSE

L = 17 metres H = 3.5 metres B = 15° D = 8.3 metres

Sonar fish towpoint to wheelhouse datum = 14 metres

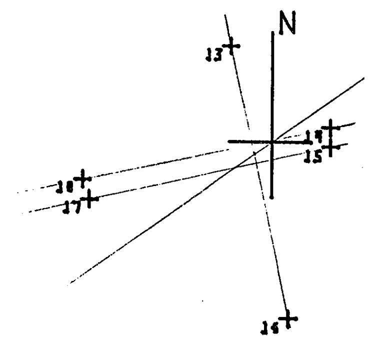
L = Length of tow cable
H = Height of tow point above water line
B = bearing of tow point w.r.t. ships head
D = distance of tow point from ships datum

16·2·83

TRANSIT FIX

D

GEOG AQUITAINE RIG MOVE- KYARRA I A.

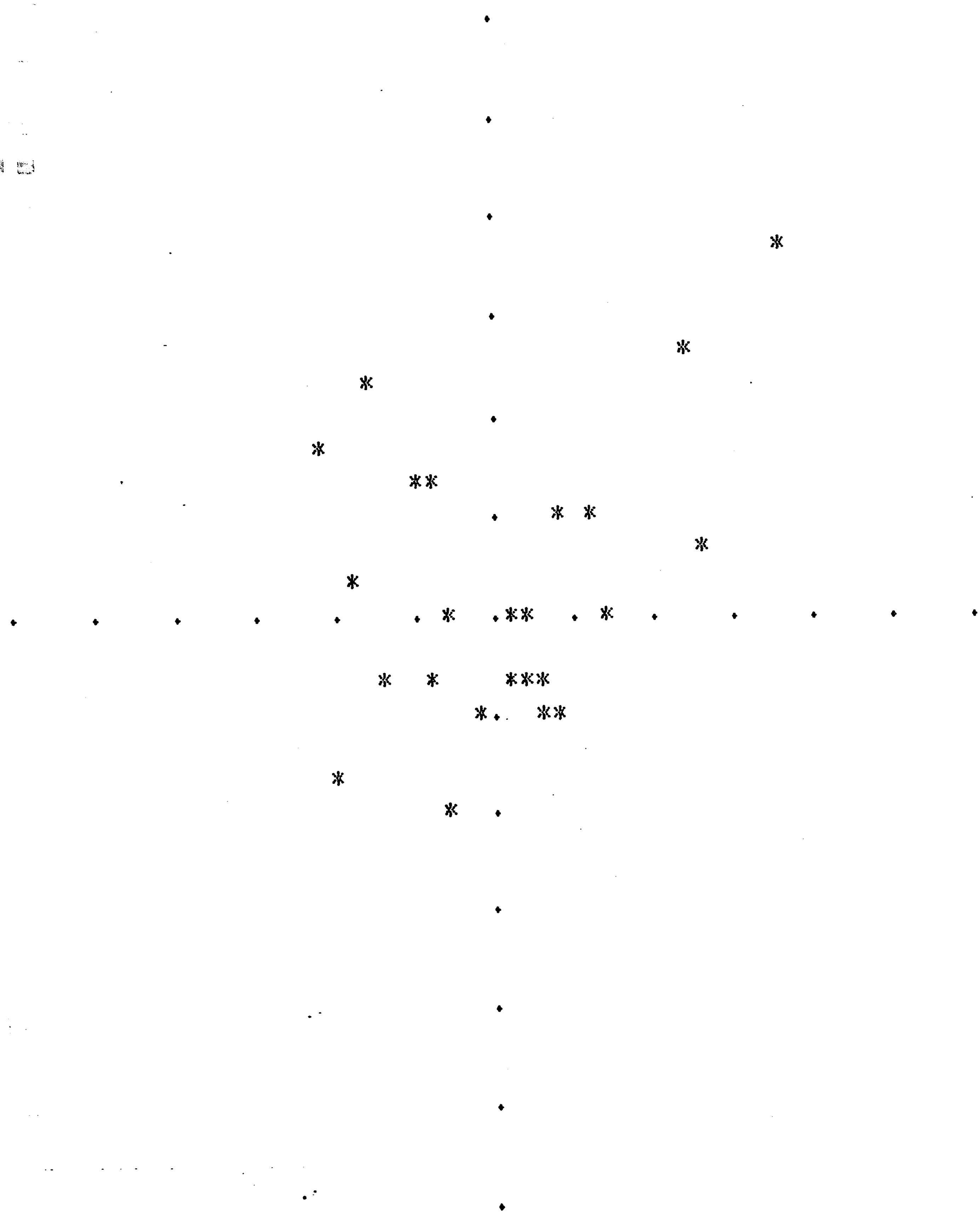


P 4 T= 47 00:52:49 E,S= 516260.98, 5718582.00 SK= .0 SCALE=1: 5000.0 MKS 90U

FOLD

KYARRA-1A. ANTENNA · SCATTER · PLOT.

--> . .< -- 10 METERS   N O R T H



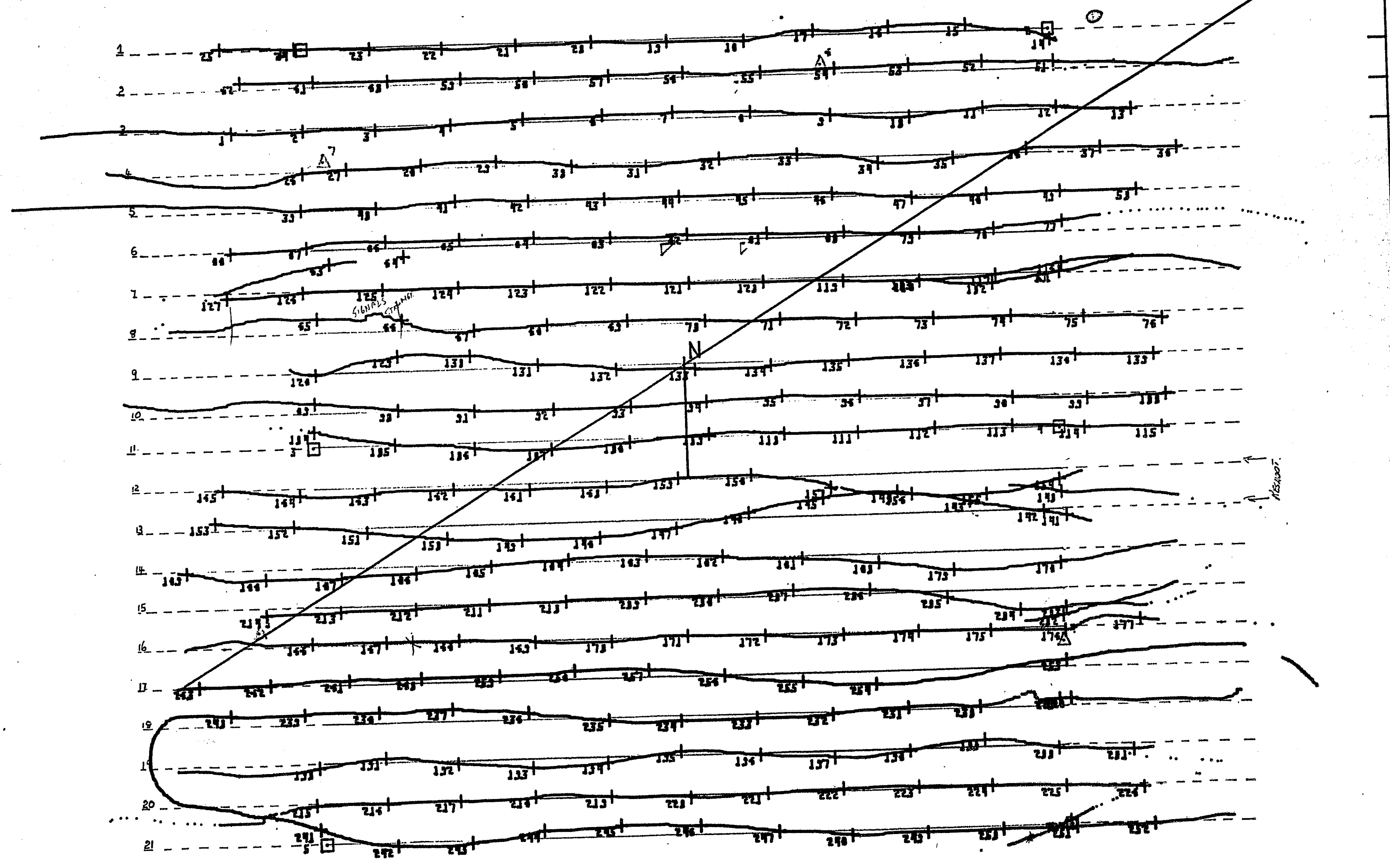
:ARING OFFSET= 0.0000

STANCE OFFSET= 0.0000

"F(1)"

KYARRA-1 Pre-Drilling Sidescan Sonar Survey.

GEOG OCEAN DIGGER RIG MOVE KYARRA 1



P 4 T= 19 14:54:26 E,S= 516245.83, 5718581.54 SK= .0 SCALE=1: 10000.0 MKS 100U

FOLD

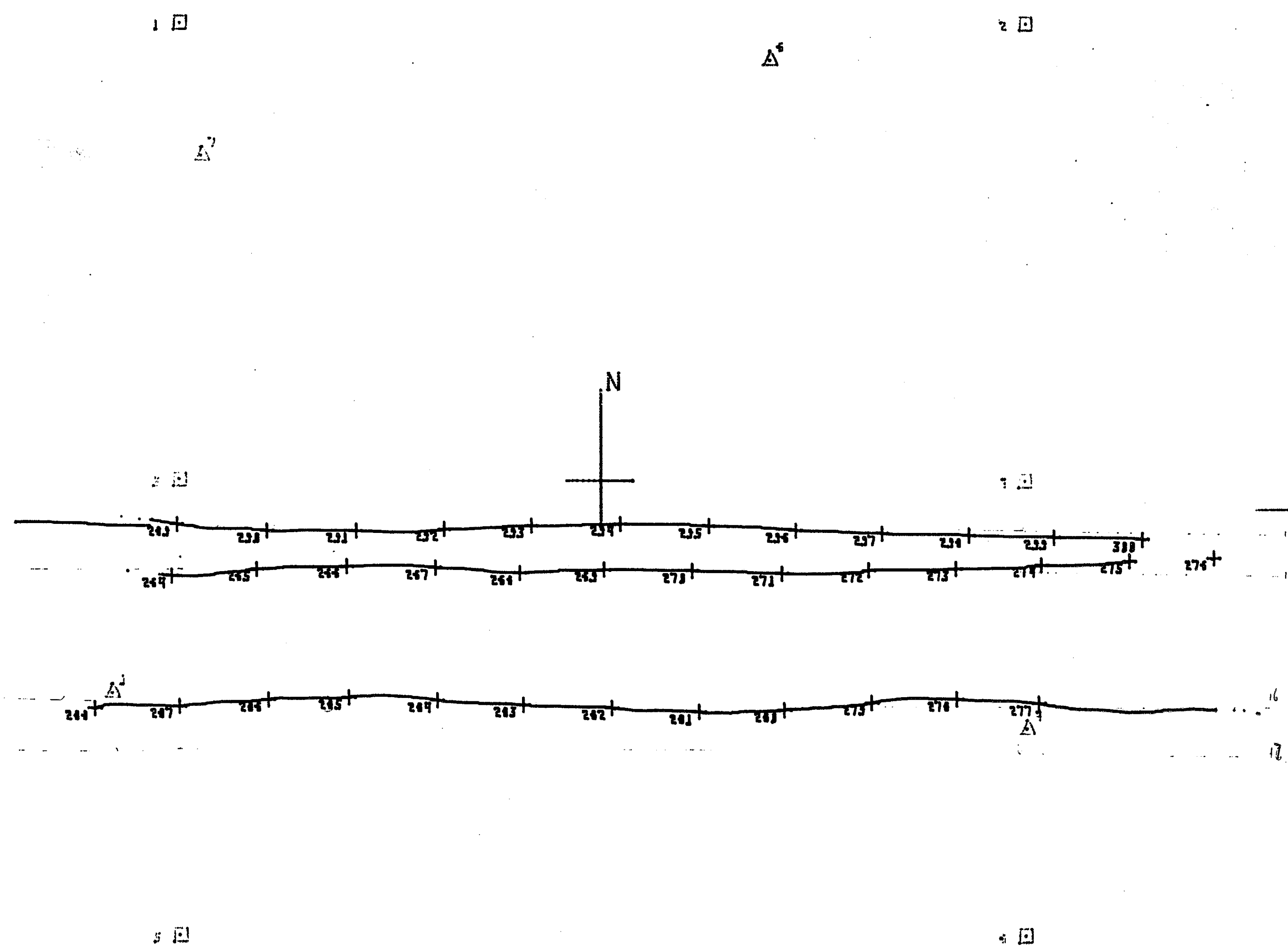
HEWLETT-PACKARD 9280-0180
FOR USE ON HEWLETT-PACKARD RECORDERS

FOLD

Pre-Drilling S.S.S. Survey Sheet 2.

F(2)

GEOG OCEAN DIGGER RIG MOVE KYARRA 1



P 9 T= 21 09:54:28 E,S= 516245.83, 5718581.54 SK= .0 SCALE=1: 10000.0 MKS 100U

APPENDIX 12

OPERATIONAL REPORT OF SIDESCAN SONAR

SEABED CLEARANCE SURVEY

BY: RACAL-DECCA

Copy No 4.

GIPPSLAND BASIN
SIDESCAN SONAR SEABED CLEARANCE SURVEYS
OF
DRILLING SITES IN VIC P17

FOR
AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

PREPARED BY
RACAL-DECCA SURVEY AUSTRALIA

47 Talavera Road
North Ryde, NSW 2113
PO Box 368, North Ryde

Ph: (02) 888 2233
Tlx: AA 20365

Cnr. Stock & Stockdale Roads
PO Box 261
Hamilton Hill, WA 6163

Ph: (09) 331 1199
Tlx: AA 94341

R-DSA 1155

October 1982 - April 1983

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1-	REQUIREMENTS	2
2-	SUMMARY OF EVENTS	3
3-	WELLHEAD LOCATIONS	4
4-	DRILLING SITE SEABED SURVEYS	5
5-	SUMMARY OF RESULTS	6

APPENDICES

A- AREA OF OPERATIONS

B- TRACK PLOTS OF POST DRILL SURVEYS (5)

ABSTRACT

The following report gives details of the Sidescan Sonar Seabed Clearance Surveys carried out at the EDINA, OMEO, KYARRA and TARRA drilling locations during the Australian Aquitaine Petroleum drilling program in the Gippsland Basin Vic P17 between September 1982 and April 1983.

1- REQUIREMENTS

To conduct pre and post drilling Sidescan Sonar Surveys covering an area 2.0 km by 2.0 km centred around the drilling locations with the purpose of establishing the presence or absence of any debris on the seabed.

2- SUMMARY OF EVENTS

25/9/82 -	Drilling Rig 'OCEAN DIGGER' positioned at EDINA location
18/10/82 -	Sidescan Sonar equipment mobilised and installed in survey vessel MV 'CHRISTMAS CREEK'
28/10/82 -	OMEO pre-drill seabed survey
2/11/82 -	'OCEAN DIGGER' positioned at OMEO location
5-6/11/82 -	EDINA post-drill seabed survey
21-22/1/83 -	KYARRA pre-drill seabed survey
11/2/83 -	'OCEAN DIGGER' positioned at KYARRA location
12-13/2/83 -	OMEO post-drill seabed survey
27/2/83 -	TARRA pre-drill seabed survey
2/3/83 -	'OCEAN DIGGER' positioned at TARRA location
7/3/83 -	OMEO site re-runs to check anomaly
8-10/3/83 -	KYARRA post-drill seabed survey
23-24/4/83 -	TARRA post-drill seabed survey

3- WELLHEAD LOCATIONS

Australian Geodetic Datum - A.M.G. Zone 55

3.1 EDINA-1

Latitude 38° 36' 22".539 south
Longitude 147° 52' 41".949 east

Easting 576476 Northing 5726535

3.2 OMEO-1

Latitude 38° 36' 45".006 south
Longitude 147° 43' 02".245 east

Easting 562449 Northing 5725964

3.3 KYARRA-1A

Latitude 38° 40' 52".532 south
Longitude 147° 11' 12".288 east

Easting 516243 Northing 5718562

3.4 TARRA-1

Latitude 38° 38' 37".150 south
Longitude 147° 42' 08".207 east

Easting 561116 Northing 5722518

4- DRILLING SITE SEABED SURVEYS

Prior to the arrival of the drilling rig at a location a sidescan sonar survey was carried out covering an area 2.0 km x 2.0 km centred on the proposed location with the purpose of establishing the presence or absence of any debris on the seabed.

A similar sidescan sonar survey of each drilling site was made following the departure of the rig from the location to locate any debris resulting from the drilling operation and/or document the absence of oil-field debris.

A Klein Hydroscan 420 Dual Channel Sidescan Sonar was fitted in the Aquitaine survey/standby vessel MV 'CHRISTMAS CREEK' to carry out the surveys. Positioning of the survey vessel was by the RACAL-DECCA OASIS system which was also used to position the drilling rig 'OCEAN DIGGER' at each location. The OASIS system, an integrated satellite/acoustic navigation and position fixing system is fully described in the Rig Move Reports, together with details of the Acoustic Net Calibration at each site.

Survey lines at 100 metre intervals were run with the dual channel sidescan sonar operating at 100m or 150m range scale to ensure 100% overlap of the entire area. Any anomalies detected were examined by running interlines on an expanded range scale.

5- SUMMARY OF RESULTS

Generally the seabed proved to be flat and featureless.
No significant debris was detected at any of the sites except what appears to be the remains of No.3 anchor marker buoy at the OMEO-1 location.

A.M.G. Co-ordinates of this anomaly are:

Easting 561785 Northing 5725595

It was detected on the original OMEO survey and confirmed during re-runs in the area on 7/3/83. If it is a sunken marker buoy the rope mooring will eventually part releasing the buoy.

Track plots of the survey lines run at each location are enclosed as appendices.

N.L. Sanderson

N.L. Sanderson O.B.E. Assoc. I.S. Aust.
Racal-Decca Survey Australia

PE906068

This is an enclosure indicator page.
The enclosure PE906068 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906068 has the following characteristics:

ITEM_BARCODE =	PE906068
CONTAINER_BARCODE =	PE902584
NAME =	Location Map
BASIN =	GIPPSLAND
PERMIT =	VIC/P17
TYPE =	GENERAL
SUBTYPE =	SRVY_MAP
DESCRIPTION =	Locality Map showing Aquitaine drill holes
REMARKS =	
DATE_CREATED =	30/04/83
DATE_RECEIVED =	21/10/83
W_NO =	W804
WELL_NAME =	KYARRA-1A
CONTRACTOR =	RACAL-DECCA SURVEY AUSTRALIA
CLIENT_OP_CO =	AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PE906069

This is an enclosure indicator page.
The enclosure PE906069 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906069 has the following characteristics:

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CONTAINER_BARCODE = PE902584
NAME = Sonar Survey - Edina-1
BASIN = GIPPSLAND
PERMIT = VIC/P17
TYPE = GENERAL
SUBTYPE = SRVY_MAP
DESCRIPTION = Post drilling side-scan sonar debris survey of Edina-1
REMARKS =
DATE_CREATED = 30/04/83
DATE_RECEIVED = 21/10/83
W_NO = W804
WELL_NAME = KYARRA-1A
CONTRACTOR = RACAL-DECCA SURVEY AUSTRALIA
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PE906070

This is an enclosure indicator page.
The enclosure PE906070 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906070 has the following characteristics:

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CONTAINER_BARCODE = PE902584
NAME = Sonar Survey - Omeo-1
BASIN = GIPPSLAND
PERMIT = VIC/P17
TYPE = GENERAL
SUBTYPE = SRVY_MAP
DESCRIPTION = Post drilling side-scan sonar debris survey of Omeo-1
REMARKS =
DATE_CREATED = 30/04/83
DATE_RECEIVED = 21/10/83
W_NO = W804
WELL_NAME = KYARRA-1A
CONTRACTOR = RACAL-DECCA SURVEY AUSTRALIA
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PE906071

This is an enclosure indicator page.
The enclosure PE906071 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906071 has the following characteristics:

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CONTAINER_BARCODE = PE902584
NAME = Sonar Survey - Omeo-1 rerun
BASIN = GIPPSLAND
PERMIT = VIC/P17
TYPE = GENERAL
SUBTYPE = SRVY_MAP
DESCRIPTION = Post drilling side-scan sonar debris survey of Omeo-1 rerun
REMARKS =
DATE_CREATED = 30/04/83
DATE_RECEIVED = 21/10/83
W_NO = W804
WELL_NAME = KYARRA-1A
CONTRACTOR = RACAL-DECCA SURVEY AUSTRALIA
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PE906072

This is an enclosure indicator page.
The enclosure PE906072 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906072 has the following characteristics:

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NAME =	Sonar Survey - Kyarra-1A
BASIN =	GIPPSLAND
PERMIT =	VIC/P17
TYPE =	GENERAL
SUBTYPE =	SRVY_MAP
DESCRIPTION =	Post drilling side-scan sonar debris survey of Kyarra-1A
REMARKS =	
DATE_CREATED =	30/04/83
DATE_RECEIVED =	21/10/83
W_NO =	W804
WELL_NAME =	KYARRA-1A
CONTRACTOR =	RACAL-DECCA SURVEY AUSTRALIA
CLIENT_OP_CO =	AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PE906073

This is an enclosure indicator page.
The enclosure PE906073 is enclosed within the container PE902584 at this location in this document.

The enclosure PE906073 has the following characteristics:

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CONTAINER_BARCODE =	PE902584
NAME =	Sonar Survey - Tarra-1
BASIN =	GIPPSLAND
PERMIT =	VIC/P17
TYPE =	GENERAL
SUBTYPE =	SRVY_MAP
DESCRIPTION =	Post drilling side-scan sonar debris survey of Tarra-1
REMARKS =	
DATE_CREATED =	30/04/83
DATE_RECEIVED =	21/10/83
W_NO =	W804
WELL_NAME =	KYARRA-1A
CONTRACTOR =	RACAL-DECCA SURVEY AUSTRALIA
CLIENT_OP_CO =	AUSTRALIAN AQUITAINE PETROLEUM

(Inserted by DNRE - Vic Govt Mines Dept)

PE601304

This is an enclosure indicator page.
The enclosure PE601304 is enclosed within the container PE902584 at this location in this document.

The enclosure PE601304 has the following characteristics:

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CONTAINER_BARCODE =	PE902584
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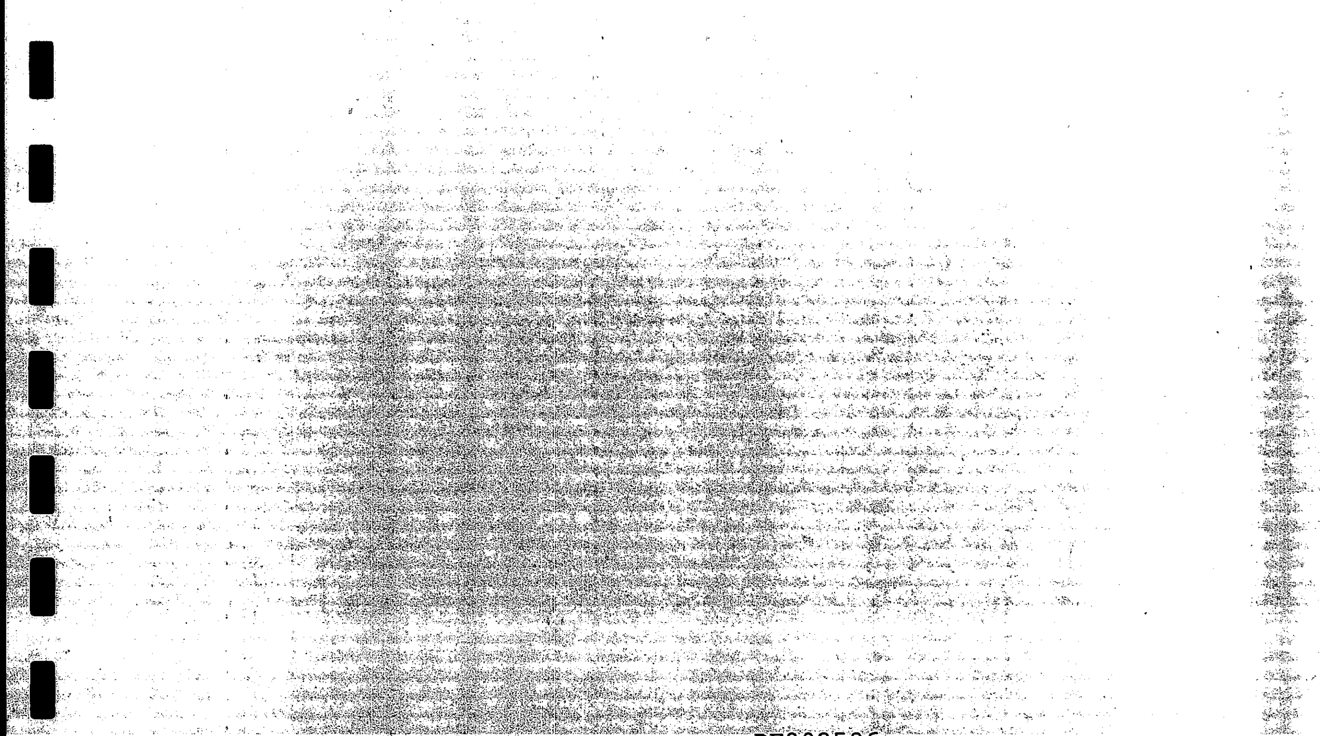
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	COMPOSITE_LOG
DESCRIPTION =	Composite Log
REMARKS =	
DATE_CREATED =	1/06/83
DATE_RECEIVED =	21/10/83
W_NO =	W804
WELL_NAME =	Kyarra-1A
CONTRACTOR =	Australian Aquitane Petrol
CLIENT_OP_CO =	Australian Aquitane Petrol

(Inserted by DNRE - Vic Govt Mines Dept)



PE902586

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CONTAINER_BARCODE = PE902584
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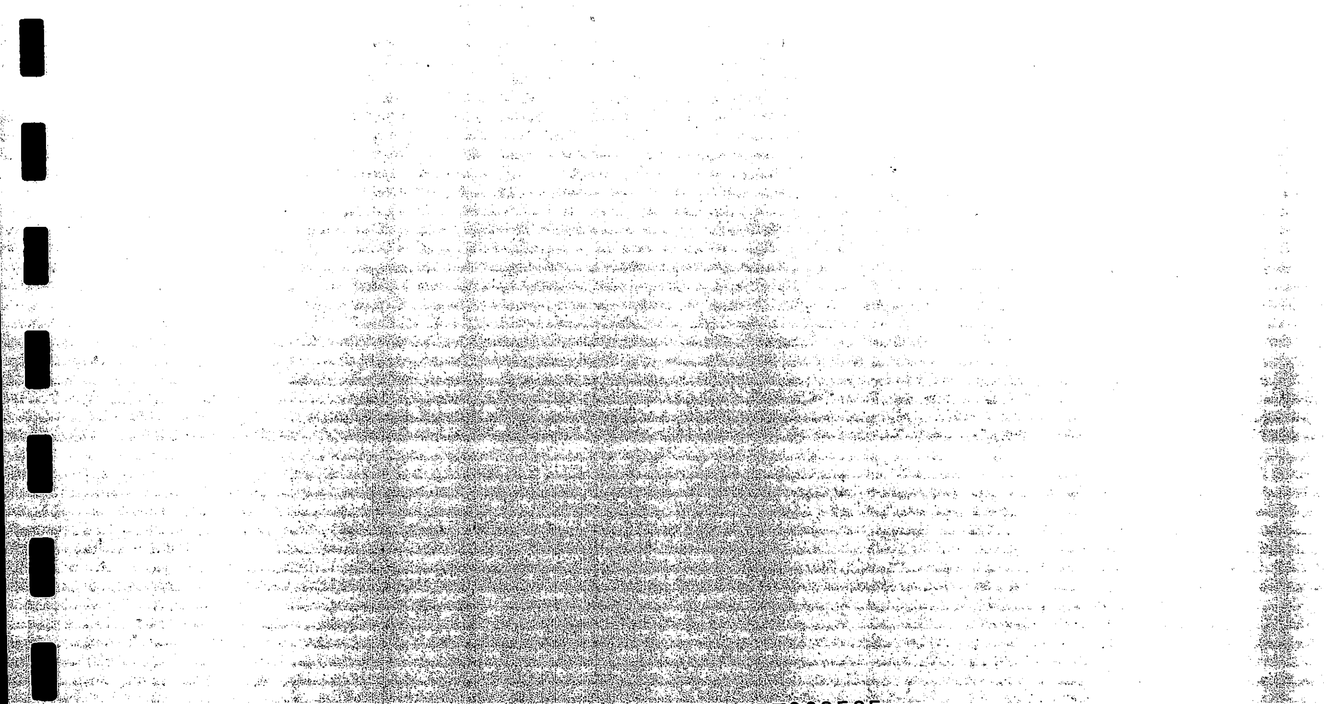
BASIN = GIPPSLAND
PERMIT =
TYPE = SEISMIC
SUBTYPE = SECTION
DESCRIPTION = Seismic Line GA81-84
REMARKS =
DATE_CREATED = 1/01/82
DATE_RECEIVED = 21/10/83
W_NO = W804
WELL_NAME = Kyarra-1A
CONTRACTOR = WESTERN GEOPHYSICAL
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROL

(Inserted by DNRE - Vic Govt Mines Dept)



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BASIN = GIPPSLAND
PERMIT =
TYPE = SEISMIC
SUBTYPE = SECTION
DESCRIPTION = Seismic Line GA81-67
REMARKS =
DATE_CREATED = 1/01/82
DATE_RECEIVED = 21/10/83
W_NO = W804
WELL_NAME = Kyarra-1A
CONTRACTOR = WESTERN GEOPHYSICAL
CLIENT_OP_CO = AUSTRALIAN AQUITAINE PETROL

(Inserted by DNRE - Vic Govt Mines Dept)