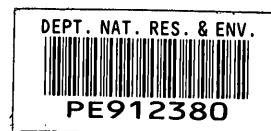


W940A



19 DEC 1986

PETROLEUM DIVISION

912380 001

(Page 1 of 96)

PRELIMINARY
WELL COMPLETION REPORT
FOR 21/86/2:
GUNAMALARY - 2

K ORTH

PETROLEUM DIVISION

DI TR

November 1986

912360 002

ABSTRACT

Gunamalary-2 was drilled as a stratigraphic well to test the Tertiary and pre-Tertiary sequences in this area of the Murray Basin and established as a groundwater observation bore.

Drilling commenced on 24 August 1986 and finished on 16 October 1986 at a total depth of 717.6m.

Wireline logs including gamma, neutron, sonic, density, caliper and electric logs were run on 22 September 1986 and 16 October 1986. Bottom hole temperatures averaged at 41°C 7 1/2 hours after drilling ceased.

The stratigraphy encountered was:

0m - 62m	Parilla Sand
62m - 87m	Bookpurnong Beds
87m - 214m	Duddo Limestone
214m - 250m	Ettrick Marl
250m - 408m	Olney Formation
408m - 487m	Warina Sand
487m - 571m	Late Carboniferous
471m - 717.6m	Undated indurated white sandstone (Devonian)?

Screens were set in the Warina Sand between 430.67m and 440.18m. Preliminary pump tests indicated a yield of 181,840 l/h of fresh water over 30 hours from this aquifer.

ACKNOWLEDGEMENTS

As with all studies this work was not done in isolation. Special thanks go to B.R. Thompson for initiating the project, I. Campbell for her tireless enthusiasm and wealth of information and R. Glenie for his astute observations. Thanks also to D. Whithead, D. Churchill and A. Ford for their help on all drilling matters and the provision of all the drilling data documented in this report. Useful discussions were had with R. Lakey, J. Duran and D. Finlayson of the Salinity and Pollution Unit (DITR), C. Brown of BMR and G. Pettifer (DITR Geophysics Section). J. Duran was the initial well site geologist and provided cutting descriptions of the upper Tertiary units. Gratitude to A. Willocks for his patience and help with the computing of the well data. Many thanks also to A. Ramza for typing the manuscript.

C O N T E N T S

	<u>Page</u>
1. INTRODUCTION	3
2. WELL SUMMARY SHEET	4
3. WELL HISTORY	
3.1 Location	6
3.2 General Data	6
3.3 Drilling Data	
3.3.1 Drilling Rig	6
3.3.2 Construction Details	6
3.3.3 Hole and Drilling Mud Conditions	9
3.4 Formation Sampling and Testing	
3.4.1 Cuttings	9
3.4.2 Cores	9
3.4.3 Pump Test	11
3.5 Logging and Surveys	
3.5.1 Wireline Logging	11
3.5.2 Temperature Measurements	11
4. GEOLOGY	
4.1 Regional Geology	12
4.2 Prognosis	12
4.3 Stratigraphy	
4.3.1 Parilla Sand 0-62m	12
4.3.2 Bookpurnong Beds 62-87m	15
4.3.3 Duddo Limestone 87-214m	15
4.3.4 Ettrick Marl 214-250.5m	15
4.3.5 Olney Formation 250.5-408m	15
4.3.6 Warina Sand 408-487m	16
4.3.7 Late Carboniferous 487-571m	16
4.3.8 Devonian (?) 571-717.6m	16
4.4 Contributions to Geological Knowledge	
4.4.1 Tertiary	17
4.4.2 Pre-Tertiary	17
4.5 Conclusions	20
5. REFERENCES	21
 APPENDICES	
I. Core Descriptions	
II. Cutting Descriptions	
III. Waxed Cores	
 FIGURES	
1. Location Map	7
2. Construction Details	8
3. Map displaying tectonic framework and infrabasins below Murray Basin	13
4. Well Prognosis	14
5. Well locations in the Mallee Area	18

	<u>Page</u>
PHOTOGRAPHS	22
1. Cores 5, 9, 13, 14; Bookpurnong Beds Duddo Limestone Ettrick Marl	23
2. Core 13; Ettrick Marl	23
3. Core 14; Ettrick Marl/Olney Formation Boundary	24
4. Core 19, 20; Olney Formation	24
5. Core 22, 23, 29; Late Carboniferous	25
6. Core 22, 23; Late Carboniferous	25
7. Core 28; Late Carboniferous	26
8. Core 27, 29; Late Carboniferous	26
9. Core 30, 31, 32; Devonian(?)	27
10. Core 30, 31, 32; Devonian(?)	27

ENCLOSURE: Composite Well Log

912880 006

I. INTRODUCTION

Gunamalary-2 was drilled on public land 6kms south of Murrayville, 440kms northwest of Melbourne (figure 1). The reasons for drilling were two-fold:

An elongate northwest trending gravity low occurs in this area and was suspected as representing a pre-Tertiary infrabasin. Similar elongate troughs occur further north in South Australia (SA) and New South Wales (NSW) where they are targets for petroleum and coal exploration. For this reason testing of this anomaly was of interest to the Petroleum Division of the Department of Industry, Technology and Resources (DITR).

This well was the second well drilled as part of the DITR Groundwater Investigation Program in the Mallee, designed to test the deep aquifers and the aquitards of the Tertiary. This work is in part co-ordinated with the Bureau of Mineral Resources (BMR) who are investigating the hydrogeology and salinity problems of the Murray Basin in conjunction with State groundwater authorities. At Underbool 5, some 59kms ENE of Gunamalary 2 and the first well in this program, the aquitards were continuously cored and samples of core waxed for geochemical studies by the BMR. Gunamalary 2 was sampled in a similar manner, and as Underbool 5, established as a groundwater observation bore to monitor the basal Tertiary aquifer - the Warina Sand.

912380 007

BASIN STUDIES SECTION - DEEP WELL SUMMARY SHEET - DM & E WELL

WELL NAME: Gunamalary-2 BASIN: Murray
 STATUS: G/W Observation Bore RIG: 21 CONSEC. NO: 21/86/2
 DATE: Commenced 2408/1986 Completed 16/10/1986 TOTAL DEPTH: 717.60m
 ELEVATION (G.L.) 80m LOCATION: AMG, sheet Danyo (7127)
 PARISH No. 0725 N. 604169 E. 51741

ENGINEERING DATA: (casing, plugs, completion details)

Surface Casing: 0m - 86.36m 8 5/8 diameter (219.075mm)
 Inner Casing: 70m - 440.88m 6 5/8" diameter (168.275mm)
 Screens: 430.67m - 440.18, inner diameter = 158.75mm aperture: 0.02"
 outer diameter = 171.45mm
 Sump: 440.18 - 447m
 Plug: 447 - 468.33m

GEOPHYSICAL LOGS: Logged by Geological Survey B.H.T. (Average = 41.16°C)

85 - 713m Sonic	540 - 713m Self Potential
0 - 597m Gamma (API)	0 - 958m Short Normal
560 - 714m Gamma (API)	540 - 713m Short Normal
0 - 597m Neutron (C/S)	0 - 598m Long Normal
560 - 714m Neutron (C/S)	540 - 713m Long Normal
0 - 713m Long Density	0 - 713m Caliper - needs
0 - 713m Short Density (very poor)	rescaling
0 - 598m Self Potential	

Note:
 Mud Resistivity 0 - 600m = 3.46 OHMM
 600 - 717m = 5 OHMM

CORES: Conventional					CORES:				
No.	From (m)	Thick	Recov.	%	From (m)	Thick	Recov.	%	No.
1	26.93	6.85	0.50	7.3	491.96	0.96	0.5	52	22
2	67.36	6.00	1.05	44.5	510.36	1.56	1.56	100	23
3	69.72	3.64	3.36	92.3	511.72	2.00	2.0	100	24
4	73.36	5.46	5.10	93.4	513.22	0.8	0.57	71.2	25
5	84.38	2.73	2.55	84.2	514.02	2.3	0.9	69.2	26
6	120.74	1.99	1.0	50.2	528.71	1.19	1.16	97.5	26
7	152.99	6.08	6.0	98.7	536.59	0.57	0.40	70.0	28
8	213.04	6.03	0.08	13.3	556.05	3.5	3.15	90	29
9	214.0	4.6	4.15	90.2	578.69	0.97	0.97	100	30
10	222.35	5.62	1.35	24.2	579.08	3.00	2.90	96.7	31
11	229.48	4.13	0.45	10.9	715.50	2.1	1.7	81	32
12	230.39	3.00	1.29	43.0					
13	244.69	2.93	2.63	89.8					
14	247.62	4.56	2.7	59.2					
15	252.18	6.05	3.18	52.6					
16	258.23	2.88	0.10	3.5					
17	261.11	6.44	0.91	14.1					
18	299.83	5.93	3.0	50.6					
19	336.30	1.43	1.43	100					
20	364.25	6.00	5.1	85					
21	400.98	6.00	1.5	25					

912380 008

PALAEONTOLOGY: Foraminifera Det. by
C. Abele

Palynology Det. by
Tertiary: V. Archer
Late Carboniferous Stage I - R. Helby

GROUNDWATER DATA: (T.D.S., screened intervals, S.L., Drawdown, Yield).

Water Intersection: 430 - 440m
Screened Interval: 430.67 - 440.18m
Static Level: 22m
Aircompressor pump set at 180m yielded 181,840 l/h when pumped for 30 hours

STRATIGRAPHY:	Formation	Depth(m)	R.K.	Thick	Comments
	Parilla Sand	0		62.5	
	Bookpurnong Beds	62.50		24.4	
	Duddo Limestone	86.90		127.1	
	Ettrick Marl	214.00		36.5	
	Olney Formation	250.50		157.5	
	Warina Sand	408.00		79.0	
	Late Carboniferous	487.00		84.0	
	Undifferentiated Indurated White Sandstone (?)	571.00		146.60	
	T.D.	717.60			

Nurray Gp
Zenmax Gp

OTHER DATA: (Velocity survey, seismic line, gas/oil show, tests)

DATA SOURCE, REFERENCES, COMMENTS

912380 009

3. WELL HISTORY

3.1 Location (see figure 1)

Co-ordinates:	Latitude: 35° 19' 56" S
	Longitude: 141° 11' 31" E
AMG Map:	Danyo (7127)
AMG Co-ordinates:	WF 51741 E 609169 N
Parish:	Gunamalary (0725)
Shire:	Walpeup
Country:	Weeah

3.2 General Data

Well Name and Number:	Gunamalary-2
Participants:	Pollution & Salinity Unit DITR 140 Bourke Street, Melbourne Petroleum Division DITR 151 Flinders Street, Melbourne
Elevation:	Ground Level: ~ 80m (to be surveyed in) Kelly Bushing: 9' 10" (3.5m)

(all depths refer to ground level unless otherwise stated)

Total Depth:	717.6m
Date Drilling Commenced:	24 August 1986
Date Drilling Finished :	16 October 1986
Status:	Groundwater observation bore

3.3 Drilling Data

3.3.1 Drilling Rig
DITR Drill Rig No. 21 (Rotary) EMSCO GB250T

3.3.2 Construction Details (see figure 2)

Surface Casing
 Size: 8 5/8"
 Cemented to: Surface - 70m

Casing Shoe
 Size: 6 5/8"
 Interval: 86.36m - 430.67m

Screens
 Type: Johnson
 Aperture Size: 0.02"
 Inner Diameter: 158.75mm
 Outer Diameter: 171.45mm
 Interval: 430.67 - 440.18m

Cement Plug
 Interval: 447 - 468.33m

Seal: 70m

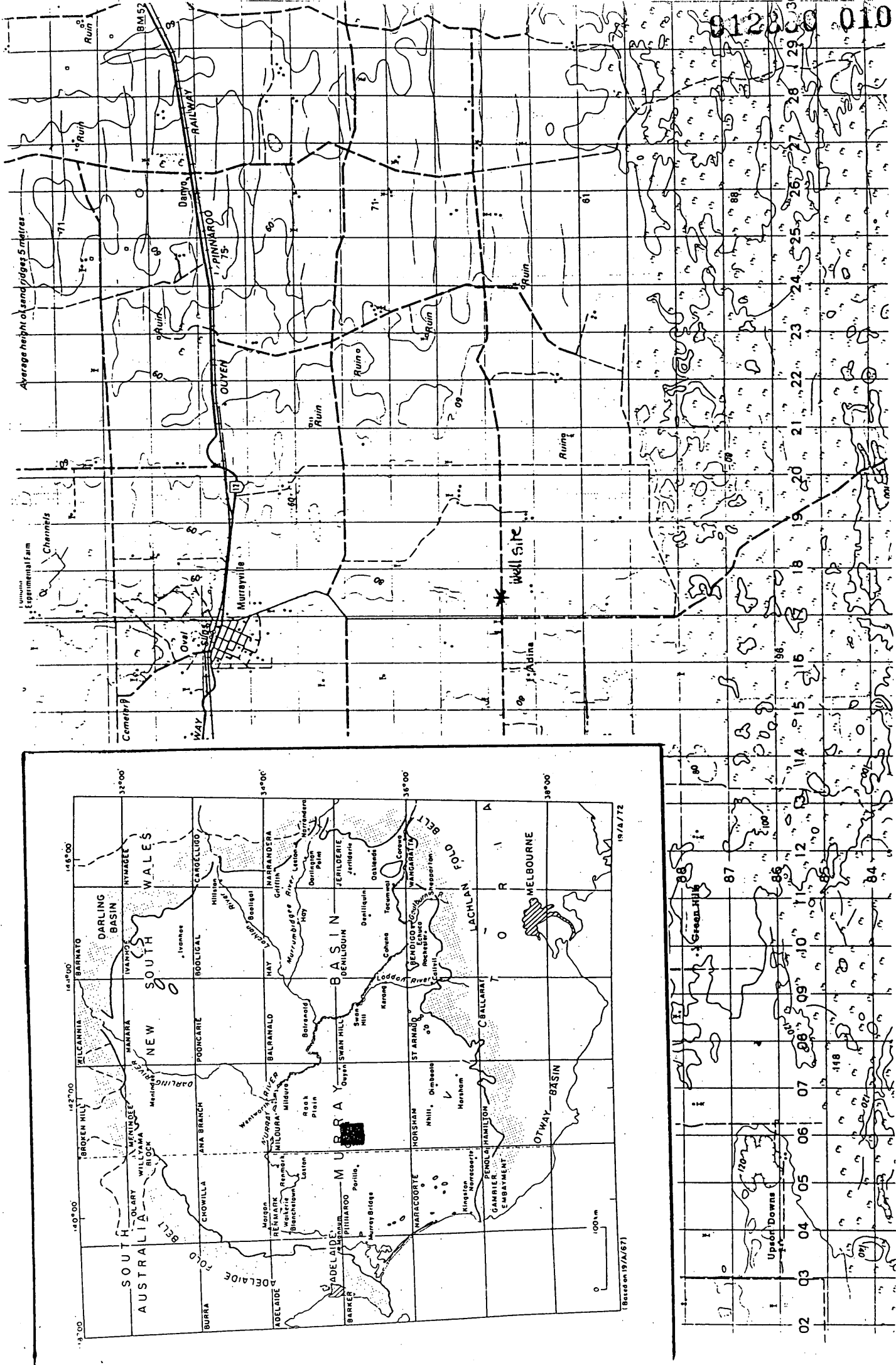


FIGURE 1: Location map showing the regional context in the Murray Basin and specific well location

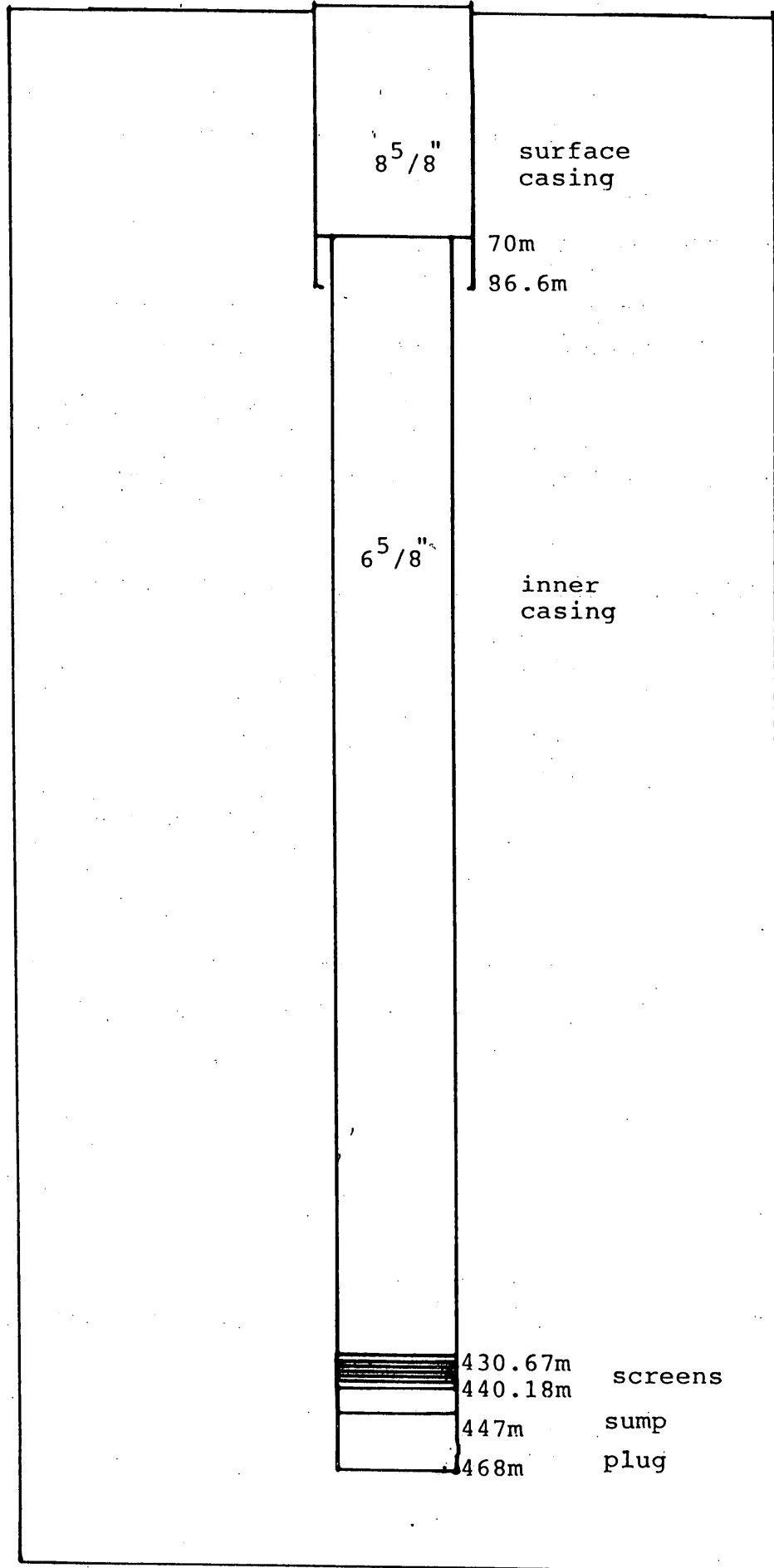


FIGURE 2: Casing and construction details.

3.3.3 Hole and Drilling Mud Conditions

12 1/4" Hole was reamed from 0-89.34m using 8 1/2" pilot and 12 1/4" reamer. Mud weight was maintained at 10 lb/gal and viscosity at 42 seconds. No other measurements were recorded.

9 1/2" 0-473.81m. Mud weights ranged from 8.8 lb/gal to 10.5 lb/gal with viscosity ranging from 38-48 seconds; pH was kept between 7 and 8.

7 7/8" 473.81-717.6m. Mud weights ranged from 9.4 lb/gal to 10.2 lb/gal, viscosity 40-55 seconds and pH was maintained at 7 to 8.

3.4 Formation Sampling and Testing

3.4.1 Cuttings

Cutting samples were collected every 3m between 3m and 717.6m except where coring took place. Each sample was washed, oven dried and stored in labelled polythene bags which were lodged at the DITR core store in Port Melbourne. Descriptions are found in Appendix II.

3.4.2 Cores

Thirty-two conventional cores were taken. Sampling was at 30m intervals in the Tertiary with continuous coring in the Bookpurnong Beds and the Ettrick Marl aquitards. Sampling was more sporadic in the pre-Tertiary where initial sampling was at less than 30m intervals and later sampling at more than 30m intervals (cored intervals along with % recovery are illustrated in the composite log enclosed in the back pocket. A listing is given below and descriptions presented in Appendix I.

912380 013

<u>CORE NO.</u>	<u>DEPTH (m)</u>	<u>RECOVERY (%)</u>	<u>FORMATION</u>
1	26.93 - 33.78	7.3	Parilla Sand
2 G	67.36 - 69.72	44.5	Bookpurnong Beds
3 P(VA)G	69.72 - 73.36	92.3	Bookpurnong Beds
4 FP(VA)G	73.36 - 79.95	93.4	Bookpurnong Beds
5 FP(VA)G	84.38 - 87.11	84.2	Bookpurnong Beds/Duddo LMS
6 F	120.74 - 122.76	50.2	Duddo LMS
7 F	152.99 - 159.07	98.7	Duddo LMS
8 FP(VA)	213.04 - 213.95	13.3	Duddo LMS/Ettrick Marl
9	214.0 - 218.55	90.2	Ettrick Marl
10	222.35 - 224.17	24.2	Ettrick Marl
11	229.48 - 230.39	10.9	Ettrick Marl
12 F	230.39 - 233.39	43.0	Ettrick Marl
13 FP(VA)G	244.69 - 247.62	89.8	Ettrick Marl
14 FG(VA)Top Ettrick G	247.62 - 252.18	59.2	Ettrick Marl/Olney FM
15 Top Olney	252.18 - 258.23	52.6	Olney FM
16	258.23 - 261.11	3.5	Olney FM
17	261.11 - 267.55	14.1	Olney FM
18	299.83 - 305.86	50.6	Olney FM
19 VBP(VA)	336.30 - 337.73	100	Olney FM
20	364.25 - 370.25	85	Olney FM
21	400.98 - 406.98	25	Olney FM
22 P(RH)VBP(VA)	491.96 - 492.92	52	Late Carboniferous
23	570.36 - 511.72	100	Late Carboniferous
24	511.72 - 513.22	100	Late Carboniferous
25	513.22 - 514.02	77.2	Late Carboniferous
26 P(RH)VB	514.02 - 515.32	69.2	Late Carboniferous
27 P(RH)VB	528.71 - 529.90	97.5	Late Carboniferous
28 VB	536.59 - 537.16	70.0	Late Carboniferous
29 VB	556.05 - 559.55	90.0	Late Carboniferous (?)
30	578.69 - 579.65	100	White Indurated SS
31 P(RH)VBL	579.08 - 600.08	96.7	White Indurated SS
32 P(RH)VBL	715.50 - 717.60	81.0	White Indurated SS

P(RH) : Palynology (Robyn Helby)

P(VA) : Palynology (Vivienne Archer)

F : Palaeontology (C. Abele)

V : Vitrinite reflectance data

T : Total organic content

B : Bulk Density Data

G : Geochemistry (BMR) - sample waxed (Appendix III)

PP : Porosity/permeability

L : Petrology data

912380 014

3.4.3 Pump Test
 Interval: 430m - 440m
 Type: Aircompressor test
 Pump set at: 180m
 Yield: 181,840 l/h
 No. hours pumped: 30

3.5 Logging and Surveys

3.5.1 Wireline Logging

Wireline logging was performed by the logging unit of Geophysics DITR. Two major runs were undertaken:

<u>Logs Run</u>	<u>Depths</u>	<u>Mud Resistivities</u>
22/9/1986 No Casing		
Gamma	0m - 597m	3.4 OHMM
Neutron	0m - 597m	
Self Potential	0m - 598m	
Long Normal/Short Normal	0m - 598m	
Singlepoint resistance	0m - 598m	
16/10/1986 Casing (0-86m)		
Gamma	560m - 714m	5.0 OHMM
Neutron	560m - 714m	
Self Potential	540m - 713m	
LN/SN	540m - 714m	
Density (LD/SD)	0m - 713m	
Caliper	0m - 713m	
Sonic	85m - 713m	

(see composite log in pocket for representation of these logs).

3.5.2 Temperature Measurements

<u>Time</u>	<u>Temperatures</u>	<u>Average</u>
16/10/1986		
5.15pm	33.5°C, 34.5°C, 34.5°C	34.16°C
7.10pm	35°C, 33°C, 40°C	36°C
9.35pm	36°C, 43°C, 52.5°C	40.5°C
11.55pm	44°C, 36°C, 43.5°C	41.16°C
Drilling ended at 4.20pm		

912360 015

4. GEOLOGY

4.1 Regional Geology

Gunamalary-2 is located in the Murray Basin (figure 1). This is a roughly circular Tertiary basin covering approximately 320,000km² of South Australia (SA), New South Wales (NSW) and Victoria. Sediments have accumulated to a maximum thickness of 500m in this basin since its initiation in the late Palaeocene, some 55 my ago.

The basin overlaps Proterozoic in most of SA and blankets late Proterozoic (?) and Palaeozoic under Victoria and NSW. In Victoria basement trends run north west and swing around to north east in NSW. The axis of these arcuate basement trends is approximately coincident with the path of the Murray River (figure 3).

Devonian to Cretaceous sediments occur in narrow troughs or infrabasins which follow basement trends below the Tertiary sequences. Several of these troughs have been drilled in SA and NSW. These include the Menindee/Tararra/Renmark Trough, Willandra Trough, Ivanhoe Trough and Oaklands Basin. A few have also been identified in Victoria including parts of the Ovens Graben, Numurkah Trough and Balranald Trough. This drillhole proves the presence of the Netherby Trough, previously speculated on by O'Brien (1981; figure 3).

4.2 Prognosis

The well prognosis for Gunamalary-2 (figure 4) was drawn up on the basis of cross-sections to the north of the Murrayville area on the Ouyen 1:250,000 geology sheet (1973) and on limited seismic reflection carried out by the DITR Geophysics Section in the Danyo area.

4.3 Stratigraphy

4.3.1 Parilla Sand 0-62cm

This unit is mainly composed of medium quartz sand with some calcareous and minor carbonaceous material. In the upper 36m the sands are yellow and red in colour, often mottled, with some calcrete bands and ferruginised layers. Grains in this upper portion are subrounded to rounded and moderately to well sorted. At 36m the colour of the sand changes to grey, grains become angular to subangular, sorting is poor and mica and pyrite are present. The presence of pyrite suggests that this lower unit was not oxidised as the upper 36m have been. A coarse grey basal quartz sand occurs between 54m and 62m.

912330 016

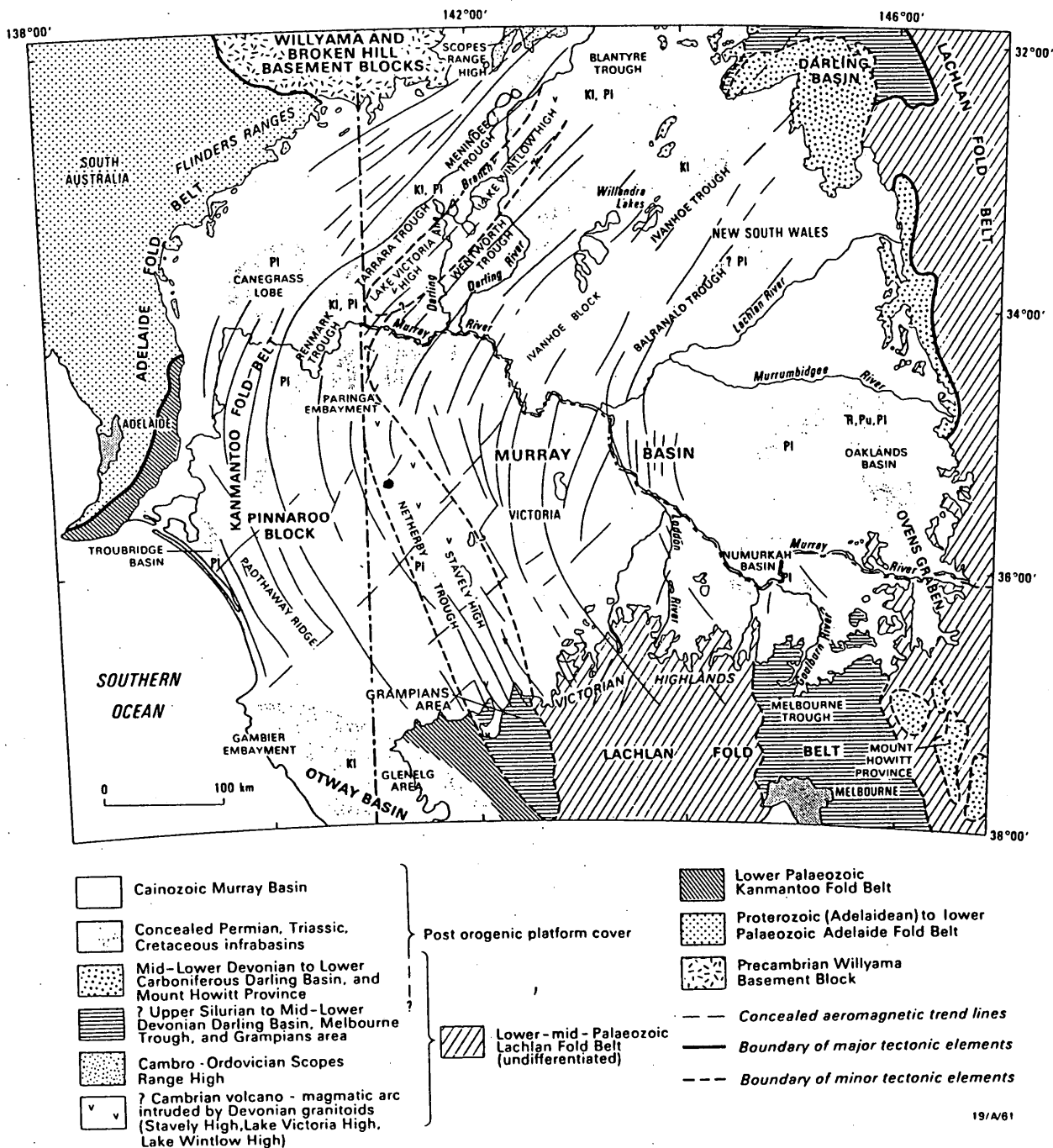


Figure 3: Basement tectonic elements and underlying infrabasins of the Murray Basin. (taken from Brown and Stephenson, 1986)

912380 017

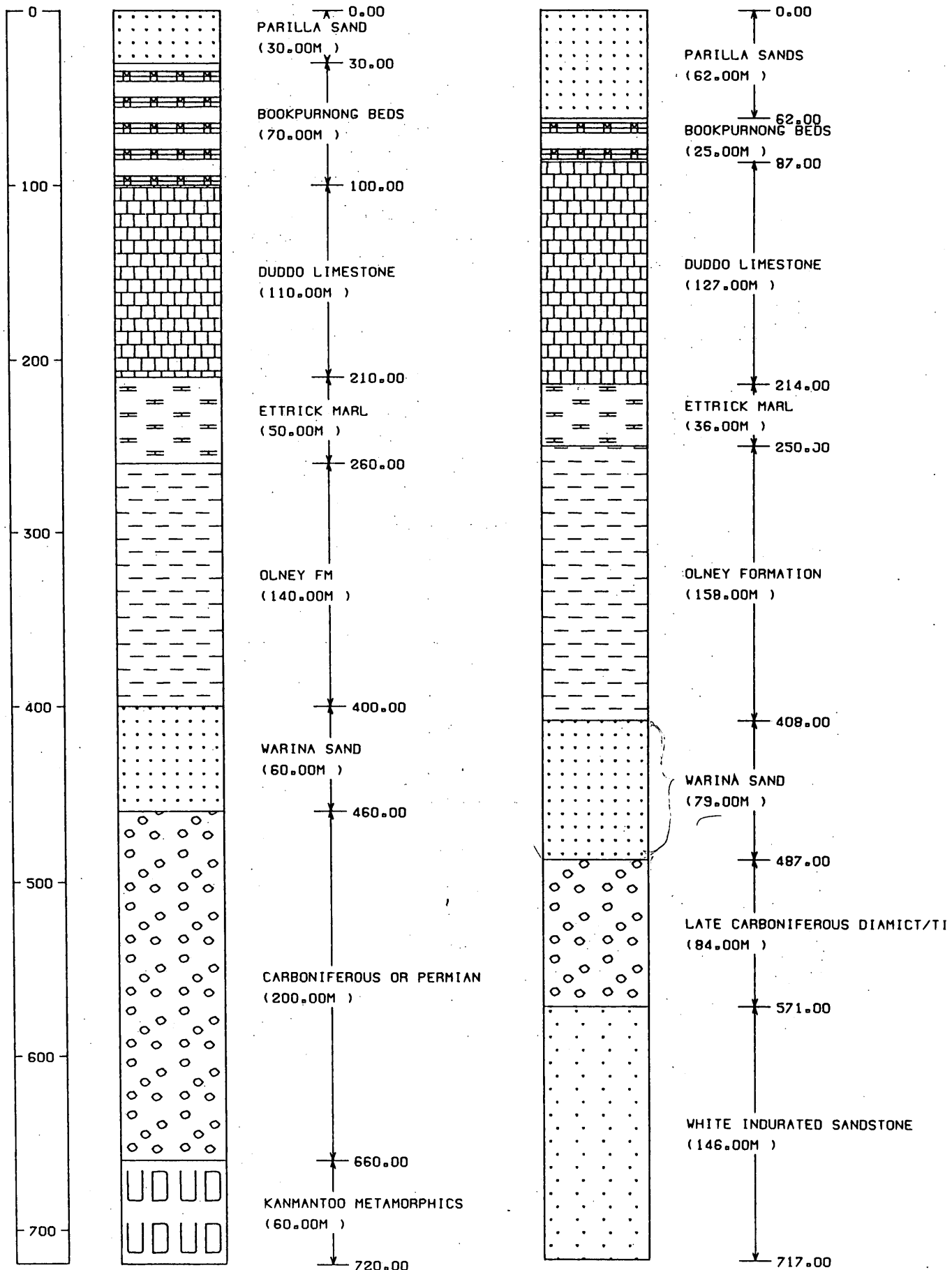


FIGURE 4: Well prognosis showing the predicted and the actual section encountered.

912330 018

4.3.2 Bookpurnong Beds 62-87m

This unit is composed mainly of friable green to grey glauconitic marls (photo 1). Minor thin compact clay layers are also present. Whole and fragmented fossils occur throughout. These include large oysters and other shells such as gastropods, pelecypods, foraminifera and fish bones. The glauconite present is commonly in pellet-like form often giving a unit a sand or silt-like appearance. Micas are present in these layers. Calcrete nodules, probably from burrows are common around 79m.

4.3.3 Duddo Limestone 87-214m

Most of this limestone is composed of grey to white bryozoal calcarenite. In the top 13m (87m - 100m) there is a high glauconite content and sandy limestones, minor marls and scattered fossil fragment occur. Below 100m the unit becomes very fossiliferous with the major consistents being bryozoa ($\leq 95\%$), coral fragments, foraminifera, echinoid plates and shell fragments. Minor lenses of glauconite and layers of marl are scattered throughout this sequence (photo 1). Mica appears in the lower 20m where white calcilutite and calcarenite are dotted with dark grey and light grey calcrete and chert lenses, probably from burrows.

4.3.4 Ettrick Marl 214-250.5m

A wide variety of lithologies occur in this transitional unit. The upper portion still contains white fine to medium grained calcarenite diffusely interbedded with layers of calcareous siltstone, diffuse glauconite rich bands and calcreted chalky limestones. Most of these contain dispersed fossils (photo 1 & 2). Lower down in the unit brown to olive-grey marls predominate with grey calcrete and chert nodules present. These marls are interbedded with thin micaceous silts rich in plant debris and bioturbated. A basal 1m glauconitic sand occurs with glauconite pellets infilling cracks and burrows in the top of the Olney Formation (photo 3).

4.3.5 Olney Formation 250.5 - 408m

The top of the formation is characterised by laminated fine sand, silt and clay. The fine sand and silt appear light grey in colour and composed of subrounded quartz with mica and minor calcareous fragments. The clay generally brown and lignitic with abundant plant debris. Minor pyrite is present as nodules or disseminated in thin lenses. A sand layer is indicated by wireline log responses between 300m and 320m. However core taken from this interval indicates the presence of at least some interlaminated lignitic clay, lignite and grey micaceous silt. Brown coal seams of 1-5m thickness are present at 335m and around 395m. Between these two seams are very fine sand and silt layers interbedded with very thin brown clay and lignite beds (photo 4). Below the second coal seam brown sand and fine micaceous yellow sand with a strong H₂S smell comprise the basal sequence.

912360 019

4.3.6 Warina Sand 408-487m

The lack of lignitic bands and an increase in the grainsize of the quartz -mica sand to medium, typifies this unit and distinguishes it from the overlying Olney Formation. The quartz grains are generally rounded and the sands contain abundant pyrite. Most of this unit is uniform, with a slightly coarser sand between 435-440m. The basal 15m contains more abundant organic debris and a higher proportion of coarse quartz grains than the overlying material.

4.3.7 Late Carboniferous 487-571

The upper 30m of this unit are made up of interbedded green to red/brown shales, claystone and diamictite (photo 5 & 6). The diamictite is made up of a scattering of angular quartz grains and mudclasts in a red/brown clay matrix. Pyrite and sand lenses occur in the green claystones (photo 6). The lithology changes at about 517m and from here to 534m is made up of pebbles from a wide variety of sources scattered in open framework arrangement in a green clay matrix. Pebble sources include white granite, pink granite, pegmatite, hornfels, grey slate, phyllite, mica schists, biotite-quartz gneiss minor altered volcanics, quartzite and angular quartz grains (photo 8). Thin beds of green claystone punctuate these units. A sequence of varvelike shales and siltstones were intersected at 536m and probably occur until 546m (photo 7). At 547m a pink claystone/mudstone with a slight mica sheen occurs along with well cemented siltstone and sandstone. A red to green sandy open framework conglomerate occurs between 555m and 568m. This also contains pebbles and occasional cobbles from a wide variety of sources (see above) embedded in a quartz sand with minor clay matrix. These appear to be interbedded with well cemented siltstones, sandstones and gritstones (photo 8). Red and green shales are present in the basal 2m of the unit to 571m.

4.3.8 (?) Devonian 571-718

Most of this 147m of Devonian(?) is composed of white indurated well-sorted quartz sandstone. The grainsize varies from medium-fine to coarse-medium and much of the sandstone appears bimodal. Grains are subangular to rounded. Patches are ferruginised and red in colour (photo 9). Portions of the cores appear massive, but most display large and small scale current bedding features, such as cross-bedding (photo 10). Overall bedding lies at 5° - 15° to the horizontal suggesting some tilting of these units.

912380 020

4.4 Contributions to Geological Knowledge

4.4.1 Tertiary

Gunamalary-2 intersected one of the thickest Tertiary sections found in the Murray Basin Victoria. Distinct lithologies are present, readily correlateable with nearby drillholes such as Underbool 5 (Finlayson, 1986) Pinneroo 1 (SA) and the Mildura West (Suttill, 1983a,b) boreholes (figure 5). The upper carbonate deposits, accumulating since the mid-Oligocene, have a fairly similar thickness to those found in these other wells, but the Warina Sand and Olney Formation are thicker. This thickening could have been caused by fault movement in the Murrayville area contemporaneous with Palaeocene (55my BP) to Oligocene (35my BP) sedimentation.

Movement may have occurred along two significant faults in the Murrayville area. The northwest trending Murrayville fault is a significant structure in the basin and is identified in several cross sections constructed by Brown and Stephenson (1:1,000,000 1985) of the BMR. The other is the Danyo Fault, a cross-cutting northeast trending fault may be younger than the Murrayville Fault. This is depicted on the Ouyen 1:250,000 geological sheet (Lawrence, 1973).

Preliminary results on the palaeontology of cores from Gunamalary-2 suggest that it has a standard biostratigraphy. One point of interest, however, is that the basal Ettrick Marl of Olney-1 in northwestern Victoria (Abele pers. com.).

Development of the drillhole to an observation bore indicate the presence of a good freshwater aquifer in the Warina Sand with a much lower salt content than found in the same aquifer at Underbool 5. More specific geochemistry and pump testing need to be carried out so that accurate assessments can be made of this resource.

4.4.2 Pre-Tertiary

The presence of sedimentary rocks below the Tertiary in Gunamalary-2 proves the existence of an infrabasin similar to those found in New South Wales and South Australia. This is a significant discovery which improves the likelihood of more infrabasins occurring beneath the Murray Basin in Victoria. It also raises the prospectivity of the Mallee area for oil, gas and possibly coal exploration.

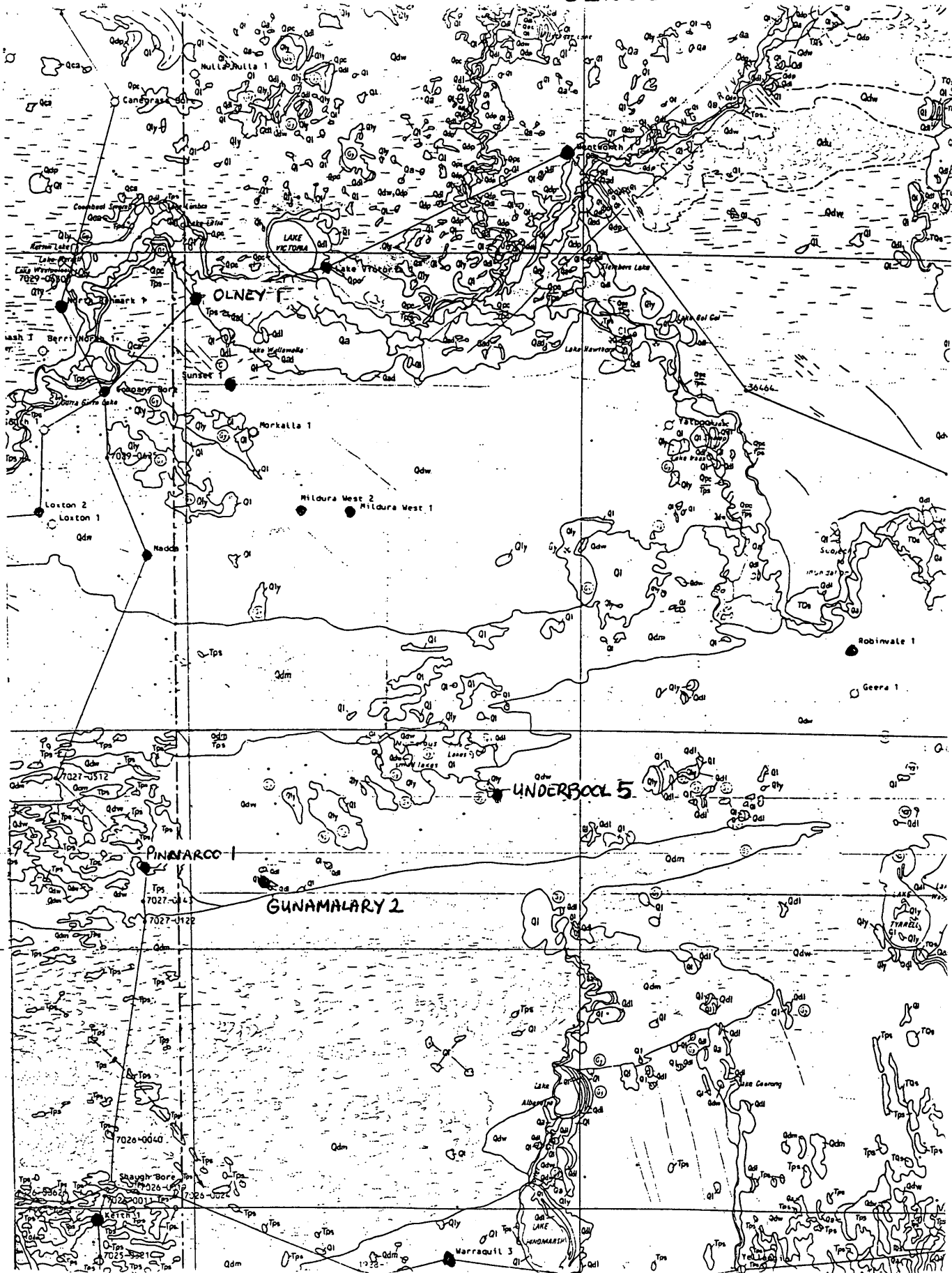


FIGURE 5: MAP SHOWING THE LOCATION OF WELLS DISCUSSED IN THE TEXT AND OTHER IMPORTANT WELLS IN THE AREA.

912360 022

Palynology on a number of cores suggest that they are Late Carboniferous or Stage 1 in age. These preliminary results indicate that the material preserved in this trough is older than similar sediments found in the other infrabasins in the north which are Late Carboniferous to Permian, Stages 2 and 3 (O'Brien, 1986). Permian(?) sediments intersected in drillholes further south (Netherby wells, Warraquil-3) remain undated as do outcropping glacial deposits near Casterton further south. Further work is required on these sequences to fully understand these age relationships.

A pebbly sandstone at the base of the Late Carboniferous (core 29, photo 8) may have some affinities with the Devonian(?) sequence. It is more strongly cemented than the overlying sequence and has similar gamma and soniclog properties to the Devonian(?). This would move the Carboniferous/Devonian(?) boundary from 571m to 550m. At present the pebbly sandstone is classified as Late Carboniferous because it has a different lithology to the monotonous quartz sandstones and due to the presence of intervening shaley units between it and the indurated white quartz sandstone.

Devonian(?)

The age of the indurated white quartz sandstone found below the Late Carboniferous is presently unknown. Its presence in the infrabasin suggests that it may be related to the Upper Devonian(?) sandstones found in similar troughs in New South Wales and broadly grouped into the Mulga Downs Group (Sniffen, 1985). Outcropping on trend with this trough to the south is the Grampians Group which have a similar lithological character. They are dated by granites which intrude the sequence as Silurian - Early Devonian (Spencer-Jones, 1975). The lack of fossils may mean that this unit remains enigmatic for some time. Re-examination of the Grampians Group and structural work along the trough in the future may provide some insights into this problem.

912380 023

4.5 Conclusions

Gunamalary-2 reached a total depth of 717.6m. It proved the existence of a pre-Tertiary infrabasin - the Netherby Trough - previously speculated upon by O'Brien (1981). More of these infrabasins are likely under the Victorian portions of the Murray Basin, increasing the prospectivity of the area for oil, gas and coal exploration.

It also intersected a thick Tertiary sequence with a thicker Olney Formation and Warina Sand than encountered in the surrounding wells. This thickening was probably caused by fault movement contemporaneous with sedimentation. The Murrayville fault which trends northwest coincidental with basement trends and may be part of the edge of the pre-Tertiary infrabasin probably became active again during the Tertiary causing river formation and ponding in its vicinity.

The thick Warina Sand forms a good aquifer in the Murrayville area containing fresh water, which may in future prove a valuable resource.

912360 024

5. REFERENCES

- BROWN C.M. and STEPHENSON A.E., 1985
Geology of the Murray Basin 1:1,000,000 sheet, preliminary edition Bur. Min. Res. Geol. & Geophys.
- BROWN C.M. and STEPHENSON A.E., 1986
Murray Basin, southeastern Australia: subsurface stratigraphic database. Bur. Min. Res. Geol. & Geophys. Rept. 262, 60pp.
- FINLAYSON D., 1986
Preliminary completion report for Underbool 21/86/1: The Tertiary Sequence Vic. Geol. Surv. Unpubl. Rept. 1986/30, 13pp.
- LAWRENCE C.R., 1973
OUYEN 1:250,000 geological sheet (S1 54-15). Geol. Surv. Vict.
- O'BRIEN P.E., 1981
Permian sediments beneath the Murray Basin. Bur. Min. Res. Geol. & Geophys. Rec. 1981/60.
- O'BRIEN P.E., 1986
Stratigraphy and sedimentology of Late Palaeozoic glaciomarine sediments beneath the Murray Basin, and their palaeogeographic and palaeoclimatic significance. BMR J. Aust. Geol. & Geophys. 10, 53-63.
- SNIFFEN M.J., 1985
Petroleum Data Package: Murray Basin, New South Wales. NSW Geol. Surv. Rept. GS 1985/008, 122pp.
- SPENCER-JONES D., 1975
Grampians Group of Western Victoria in J.G. Douglas and J.A. Ferguson (ed), Geology of Victoria. Geol. Soc. Aust. sp. publ. 5, pp.71-76.
- SUTTILL R.J., 1983a
Well completion report: Mildura West-1 SAO & G Co. Pty Ltd - Comserv (779), DITR Pet. Div. Files.
- SUTTILL R.J., 1983b
Well completion report: Mildura West-2 SAO & G Co. Pty Ltd - Comserv (779), DITR Pet. Div. Files.

912380 025

PHOTOGRAPHS

OF

CORES

GUNAMALARY - 2

912330 026

Photo 1: Some cores from the calcareous upper units intersected in Gunamalary-2: Leftmost is a tray with basal Bookpurnong Beds (core 5). The next tray left contains Duddo Limestone (core 9). Ettrick Marl occurs in the next tray left (core 13) and the contact between the Ettrick Marl and Olney Formation in Core 14 is present in the rightmost tray.



Photo 2: Detail of scattered fossils in the Ettrick Marl (core 13).

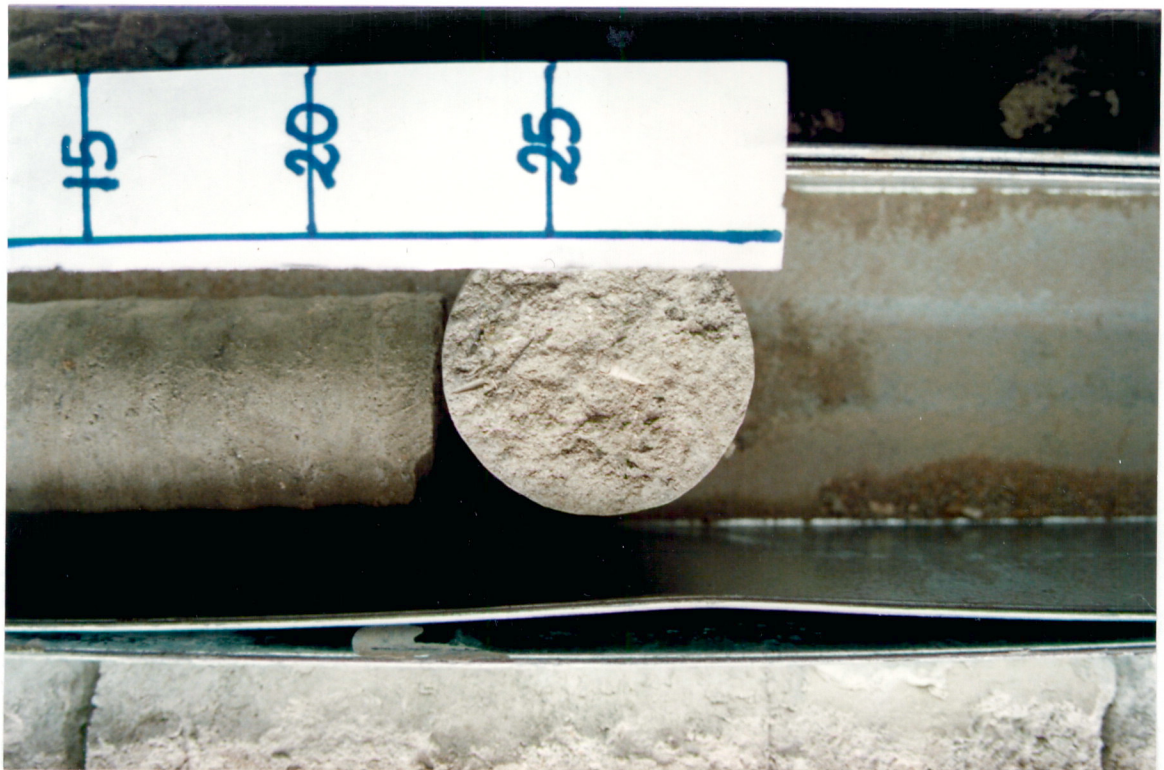




Photo 3: Detail of near the base of core 14 where the Ettrick Marl overlies the Olney Formation. Note the presence of ripped up Olney Formation in the basal Ettrick Marl and the burrows in the Olney Formation infilled with green glauconitic sand.



Photo 4: Detail of portions of cores 19 (lower) and 20 from the Olney Formation. Note abundant fine scale current bedding features and thin bed size.

Photo 5: Three different cores from the Late Carboniferous. Leftmost core is the uppermost core a green, pyrite bearing talc/claystone (core 22). The middle core is from No. 23 and is green-red diamictite displaying well developed jointing. The rightmost tray contains a pebbly sandstone from core 29.

912360 028



Photo 6: Detailed view of claystone and diamictite from core 22 and 23.

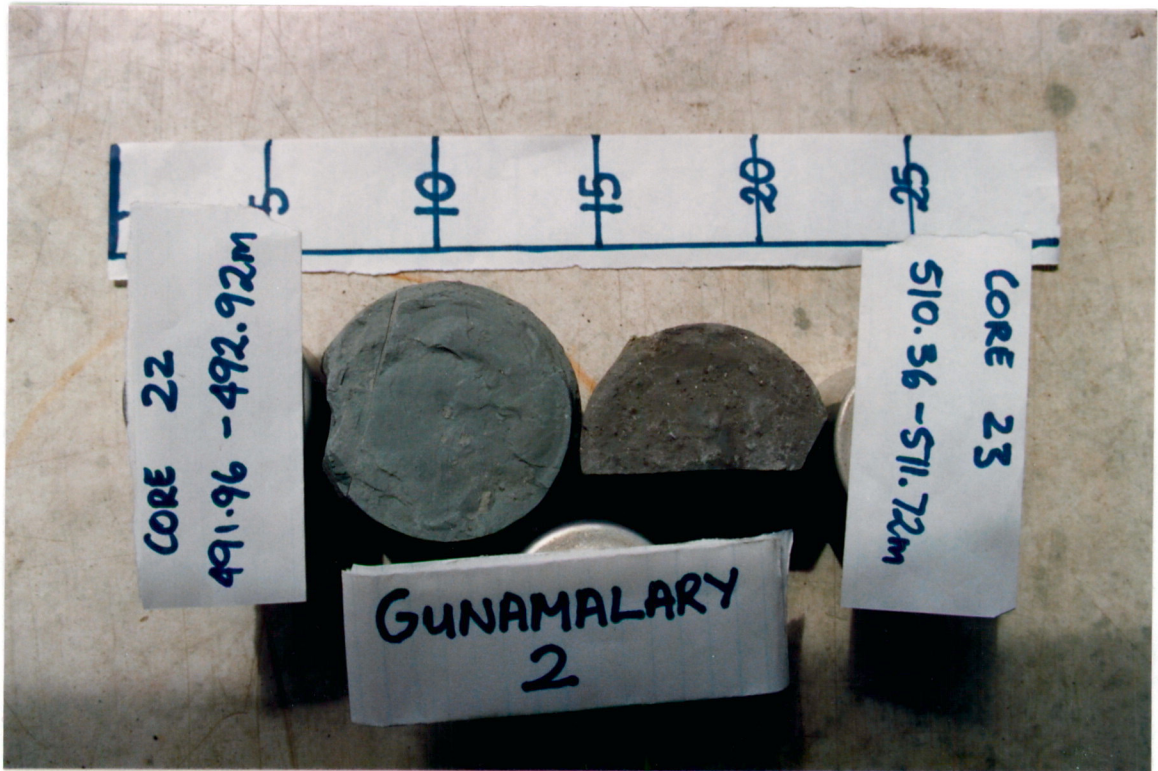




Photo 7: Section of varvelike core in the Late Carboniferous displaying the thin sand and silt bands and the shales. Note also abundant fractures.



912330 029

Photo 8: Cobbles and pebbles in open framework in clay matrix from core 27 and in a sand matrix from core 29. The basal interbedded silts and sandstones from core 29 are present in the rightmost tray.

Photo 9: Devonian(?) sequence found in core 30, 31 and 32.

912360 030



Photo 10: Detail of Devonian(?) display cross-bedding and iron staining.



912380 031

APPENDICES

APPENDIX I

912360 032

GUNAMALARY-2
CORE DESCRIPTIONS

Core No.	Depth (m)	Recovery (m)	Descriptions
1	26.93-33.78	0.05	Sand: red to yellow, friable, medium sub-rounded to rounded, moderate to well sorted quartz grains, minor iron rich clays, minor foraminifera.
2	67.36-69.72	1.05	Silt/Sand/Clay: blue to green, friable coarser fraction, pellets of glauconite (?) predominant some mica, bryozoa, foraminifera and shell fragments <5cm sporadically scattered throughout. Calcareous in places, plant debris present.
3	69.72-73.36	3.36	Sand: "salt and pepperlike" friable fine to medium, glauconite pellets, quartz, fossil fragments including brachiopod, gastropods pelecypods, fishbones. Oysterlike shells and foraminifera commonly whole.
4	73.99-79.45	5.10	Marl/Calcareous silt: green/grey, friable to compact depending on clay content, glauconite pellets complete shells including brachiopods, pelecypods and foraminifera and bryozoa. Some solid calcrete material in beds.
5	84.38-87.11	2.55	Marl: dark green, glauconite pellets and abundant fossil fragments including small shell fragments echinoid spines, foraminifera. Large pelecypod and bryozoan fragments increasing in abundance towards the top of the core (photo 1) Limestone: hard, cemented fossiliferous at base of core.
6	120.77-122.76	1.0	Limestone: light grey, fine grained with minor thin calcarenite bands. Marly portion near top of core, glauconite patches. Calcarenite bands composed of largely bryozoa fragments.
7	152.99-159.07	6.0	Limestone: white, friable, fossiliferous lenses and pockets of glauconite. Bryozoa fragments make up 95% of rock with minor foraminifera, echinoid and shell fragments.
8	207.92-213.95	0.08	Limestone/Marl: white fine grained limestone with grey lens shaped calcrete and silcrete modules - possibly burrow infilling. Fine silty marl at base of core.

GUNAMALARY-2
CORE DESCRIPTIONS

912380 033

Core No.	Depth (m)	Recovery (m)	Descriptions
9	213.95-218.55	4.14	Siltstone/limestone: green to white, brown, friable, fine to medium calcarenite and calcareous siltstone, layers rich in glauconite pellets bryozoa and other minor fossil fragments scattered throughout (photo 1)
10	218.55-224.17	1.35	Limestone: white, friable, bryozoal, minor calcrete.
11	226.26-230.39	0.45	Marl: grey, Basal band of hard fine grained chalky limestone.
12	230.39-233.39	1.29	Limestone/Marl: interbeds of fine white chalky limestone with lenses of cemented grey (marl up to cobble size) and grey laminated and often burrowed marl.
13	244.69-247.62	2.3	Silty marls/marly mud/green glauconitic sand: Silty marl at top: abundant burrows and fossil fragments including gastropods, pelecypods, some quartz and glauconite. Core becoming muddier towards base. Dark brown clay rich material with burrows infilled by coarser material, quartz, glauconite, fossil fragments and plant spores. At base there is a band of dark green glauconite sand with fossil fragments and dark plant spores present (photo 1, 2).
14	247.62-252.18	2.70	Glauconite sand: green, clay rich in places - clay matrix, dark (possibly plant spores) organics present, minor quartz shell fragments scattered throughout cracked boundary between this and underlying brown lignitic clay and fine white micaceous silts (photo 1, 3).
15	252.18-258.23	3.18	Mudstone: brown lignitic clay interlaminated and bedded with fine grey micaceous silt. Some crossbedding noted.
16	258.23-261.11	0.1	Mudstone: (poor recovery) - laminated brown ligneous clay and quartz - mica sand.
17	251.11-267.55	0.91	Quartz Sand: grey fine, subrounded to subangular, well sorted, some silt fraction matrix.
18	299.93-305.86	3.0	Clay, Coal, Sand: brown lignitic clay and brown coal interlaminated by some fine grained quartz-mica silt and fine sand.

GUNAMALARY-2
CORE DESCRIPTIONS

Core No.	Depth (m)	Recovery (m)	Descriptions
19	336.30-337.73	1.5	Interlaminated crossbedded lignitic clay, coals and micaceous white silts. Flaser bedding, trough cross-beds, fine laminations present amongst these units. Brown coal at the base of the core (photo 4).
20	364.25-370.25	5.1	Ligneous clay/sands/silts: brown clays (<5cm thick bands) interlaminated with yellow to white fine grained quartz-mica sand and silt. Ripple structures, trough cross-bedding and some disruption of bedding (photo 4).
21	400.98-406.98	1.5	Sand: (poor recovery) brown to yellow fine to medium quartz rich sand. H ₂ S smell strong.
22	491.96-492.92	0.5	Talcstone/Claystone: green fissile patches and lenses of sand and pyrite. Cut by flat vertical planes - covered in minor pynite. One large piece of quartz (grain 1.5cm diam) present (photo 5, 6).
23	510.16-571.72	1.6	Diamictite: green/brown, fissile, clay with scattered quartz, chert, quartzite granules and sand size grains along with clay clasts scattered throughout. Material tends to break up along joint planes.
24	511.72-573.22	1.80	Disrupted core of blocks of claystone and diamictite. Mainly brown with some green patches.
25	513.22-514.02	0.57	Disrupted core at top of red/green mudstone. All base have a brown fissile claystone.
26	514.02-515.32	0.9	Claystone/diamictite: green to brown scattered subangular quartz grains, mica and white quartzite fragments along with elongate mud clasts also present. Lenses of medium grained sandstone also present. Base of core is a yellow green claystone. All of core is fractured throughout.
27	528.71-529.90	1.16	Diamictite/tillite: most of core composed of sand, pebbles and cobbles of a diverse range of rock types set in a green clay matrix. Large clasts in open framework composed of mica schis white granite, pink granite, white quartzite, black metamorphics, green volcanics, gneiss and hornfels. Green coloured shaley layer 20cm thick at base (photo 8).

GUNAMALARY-2
CORE DESCRIPTIONS

Core No.	Depth (m)	Recovery (m)	Descriptions
28	536.59-537.16	0.40	Mudstone: red to green sequence of fissile claystone interlaminated with very thin layers and lenses of silt and quartz rich sand. Most cycles are about 2.5cm thick. Small step faults are present and overall larger fractures filled with thin quartz veinlets. Alteration halos, green in colour occur in this red mudstone (photo 7).
29	556.05-559.55	3.15	Pebbly sandstone(?): Pebbles and cobbles of a diverse range of rock types form the open framework material set in a sandy matrix. framework grains are subangular to rounded and are made of white and pink granite, black schist, black gneiss, chert, hornfels, grey siltstone, red mudstone, chloritised fragments, quartzite. Dropstone into lower layers noted. The material at the base of the core is silicified siltstone interbedded with coarse sandstone and gritstones (photo 5, 8).
30	578.69-579.66	0.97	Indurated Sandstone: White with red patches of sugary well sorted medium sandstone. Some larger rounded quartz grains scattered throughout. Ferruginised in places, but largely silica cement. Reasonably porous (photo 9, 10)
31	597.08-600.08	2.9	Indurated Sandstone: White, sugary well sorted quartz sandstone thinly bedded and cross-bedded material silica cement, reasonably porous (photo 9, 10).
32	715.5-717.6	1.7	Indurated Sandstone: white, sugary well-sorted texture fine to medium sandstone. Bands and patches red with ferruginous cement picks out ripples and bedding. Some crossbedding - less porous than core 30 & 31 (photo 9, 10).

912330 036

APPENDIX II

CUTTING DESCRIPTIONS

1

BORE HOLE LITHOLOGICAL LOG

912300 037

PARISH NAME _____ AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/2/86
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE Rotary
 POSITION Hill RD

Logged by J. D. M. A. N. Date 2/4/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	red-brown fine-medium sandy clay. small calccrete fragments	0	3	
	grey fine-medium sandy clay. small calccrete fragments	3	6	
	light grey clay abundant calccrete fragments	9	12	
	light brown fine-medium clayey sand. minor calccrete fragments.	12	15	
	ferruginised? yellow brown sub-rounded quartz sand.	15	18	
	ferruginised? yellow brown angular-sub rounded quartz sand	18	21	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
	CASING			

- 1. _____ to _____
- 2. _____ to _____
- 3. _____ to _____
- 4. _____ to _____
- 5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912360 038

PARISH NAME _____ AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/2/86
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE _____
 POSITION _____

Logged by J. ARAN Date 3/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
	yellow-brown medium-coarse angular quartz sand. commonly ferruginised.	(21)	24		
	red-brown coarse well sorted angular quartz sand commonly ferruginised.	(24)	27		
	yellow coarse well sorted angular quartz sand	(27)	30		
	grey coarse-very coarse moderately sorted angular quartz sand. occasional pyrite.	(36)	39		
	light grey coarse-very coarse partly sorted angular quartz sand.	(39)	42		
	light grey coarse-very coarse partly sorted angular quartz sand.	(42)	45		
WATER STRUCK		YIELD (l.s.)	STANDING AT	DRAWDOWN	CASING

well sorted

sorted

CORE # 1 *

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

3

BORE HOLE LITHOLOGICAL LOG

PARISH NAME _____ AUTHORITY 21/2/86
 PARISH NUMBER _____ SEQUENCE No. 912380 039
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE _____
 POSITION _____

Logged by J. Anan Date 3/9/86

medium sands

54

coarse-med
sands

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	grey very coarse angular well sorted quartz sand	45	48	
	grey coarse-very coarse moderately sorted angular quartz sand. occasional mica.	48	51	
	light grey coarse-very coarse poorly sorted angular quartz sand. occasional mica.	51	54	
	light grey granular moderately - well sorted angular quartz sand. mica content increasing. Note coarse sand	54	57	
	light grey micaceous ^{coarse-very} medium coarse poorly sorted angular quartz sand. commonly micaceous (muscovite)	57	60	
WATER STRUCK		YIELD (l/s)		STANDING AT
DRAWDOWN		CASING		

1. _____ to _____ to _____
2. _____ to _____ to _____
3. _____ to _____ to _____
4. _____ to _____ to _____
5. _____ to _____ to _____

4

BORE HOLE LITHOLOGICAL LOG

912380 040

PARISH NAME _____ AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/56/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by J. Duran Date 3/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
	light grey very coarse - granular poorly sorted angular quartz sand. commonly micaceous.	60	63		
	white limestone. abundant glauconite and minor sand	87	90		
	grey white sandy limestone abundant glauconite	90	93		
	grey-green white limestone abundant glauconite minor sand	93	96		
	grey-green white fine hard limestone. abundant glauconite. minor sand.	96	99		
	sandy grey limestone. abundant shelly fragments. minor sand sand glauconite.	99	102		
WATER STRUCK		YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN	CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

Series #2 *
 #3
 #4
 #5

DEPARTMENT OF MINERALS AND ENERGY

5

BORE HOLE LITHOLOGICAL LOG

PARISH NAME _____ AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE _____
 POSITION _____

912300 041

Logged by J. Duran Date 9/3/80

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
	light grey limestone. minor sand.	102	105		
	white				
	light grey limestone. abundant fossil fragments. very minor sand. (bryozoa, brach.)	105	108		
	white				
	light grey limestone. abundant fossil shelly fragments. (bry + brach.)	108	111		
	white				
	light grey limestone abundant fossil fragments. (bry, brach.)	111	114		
	white limestone. abundant fossil fragments. (bryozoa)	114	117		
	light grey limestone. abundant fossil fragments (bry, brach). minor glauconite. (finer grained fossil fragments 40-200 than at 114)	123	126		
	whitish-grey limestone. abundant fossil fragments (bry, brach).	126	129		
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING

core # 6 *

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

(6)

BORE HOLE LITHOLOGICAL LOG

PARISH NAME _____
PARISH NUMBER _____
BORE NUMBER _____
CADASTRAL PLAN _____
POSITION _____

AUTHORITY _____
SEQUENCE No. 21/86/2
SURFACE R.L. _____
TYPE OF HOLE ROTARY

912330 042

Logged by J. Duran Date 3/4/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	greyish white limestone abundant fossils (bry, foram)	129	132	
	greyish-white limestone. abundant fossils (bry, foram) minor sand + glauconite.	132	135	
	greyish-white limestone (silty?) abundant foss. (bry, foram)	135	138	
	light grey silty limestone abundant foss. (bry, foram) minor sand.	138	141	
	greyish white silty limestone minor foss. (bry, foram) minor sand + glauconite	141	144	
	greyish-white limestone ab. foss. (foram, bry.) minor sand.	144	147	
WATER STRUCK		YIELD (l s)	STANDING AT	DRAWDOWN
CASING				

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

(7)

PARISH NAME _____ AUTHORITY _____
PARISH NUMBER _____ SEQUENCE No. 21/86/2
BORE NUMBER _____ SURFACE R.L. _____
CADASTRAL PLAN _____ TYPE OF HOLE Res Army
POSITION _____

912380 043

Logged by J. Aran

Date 3/9/8

Core # 7 ★

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	grey limestone ab foss (bry, for) minor glauconites + some black fossil fragments (bry)	147	150	
	greyish white limestone ab foss (bry, for) minor sand.	150	153	
	greyish white sandy limestone, ab foss (bry, for) minor glauconite + mica	162	165 (as below)	
	white limestone ab foss. (bry, for) minor sand.	165	168	
	white limestone ab foss. (bry) minor glauconite	168	171	
	white limestone ab foss. (bry) minor glauconite	171	174	
WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING

- 1. _____ to _____
- 2. _____ to _____
- 3. _____ to _____
- 4. _____ to _____
- 5. _____ to _____

8

BORE HOLE LITHOLOGICAL LOG

912300 044

PARISH NAME _____ AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by J. DUNN Date 3/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	greyish-white limestone. abundant foss (bry, br) minor sand.	174	177	
	greyish-white sandy limestone. ab. foss. (bry. br)	177	180	
	greyish-white limestone ab. foss. (bry. br.) minor sand + glau.	180	183	
	greyish-white limestone abundant fossils (bry, bram, gastropods), minor sand	183	186	
	greyish-white limestone abundant fossils (bry bram).	186	189	
	greyish-white limestone abundant fossils minor sand.	189	192	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
	CASING			

7/9/86

- 1. _____ to _____
- 2. _____ to _____
- 3. _____ to _____
- 4. _____ to _____
- 5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912300 045 (9)

PARISH NAME _____ AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE POSTHOLE
 POSITION _____

Logged by J. Moran Date 7/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)					
	greyish white limestone abundant fossils (brg, brn) minor sand + chertite	192	195						
	greyish-white limestone abundant fossils (brg, brn) minor sand (fossils 95% brg) Some angular of 3rd fld. 3-4% forams 1% Echinoid plates + spines	195	198						
	greyish-white limestone abundant fossils (brg, brn) minor mica	198	201						
	greyish-white limestone abundant fossils brg, brn calcite fragments minor mica and sand	201	204						
	greyish-white limestone abundant fossils (brg, brn) minor calcite fragments and mica	204	207						
<table border="1"> <tr> <td>WATER STRUCK</td> <td>YIELD (l/s)</td> <td>STANDING AT</td> <td>DRAWDOWN</td> <td>CASING</td> </tr> </table>					WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING
WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING					

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912300 046

PARISH NAME GUNAMALTY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE PROBARY
 POSITION _____

Logged by J. O'Connell Date 7/9/80

ONES #8
 9
 *10
 11
 12

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	greyish-white limestone abundant fossils (brn, tan) minor calcite fragments mica and sand.	207	210	
	light grey greyish white silty limestone? calcite fragments minor sand.	230	234	
	olive grey fine sandy marl. much mica and glauconite.	234	237	
	olive grey silty marl abundant glauconite minor mica	237	240	
	olive-grey grey marl abundant glauconite minor mica	240	243	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912360 047

PARISH NAME UNAKAPIMAN AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE RESEARCH
 POSITION _____

Logged by J. DURAN Date 7/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
	light grey coarse angular - sub-angled calcareous silty sand. abundant glauconite and mica - minor pyrite	270	273		
	Grey coarse sub-angled silt poorly - moderately sorted silty sand. abundant calcareous material, mica and glauconite.	273	276		
	light Grey coarse angular - sub-angled poorly sorted silty sand. abundant calcareous material, mica. minor glauconite.	276	279		
	light grey fine silts. Minor glauconite with mica - sand size particles. Minor lignitic - dark plant debris - material. Minor calcareous fragments (may have fallen down the hole?)	279	282		
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912380 053

PARISH NAME Gunamalary AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE Rotary
 POSITION _____

Logged by K. ORTH. Date 8/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Dark brown lignitic material with angular quartz grains. Minor qtz-mica sand. Coals.	336	339	
		core here 336-30		337.73
	Medium grained-coarse sand. Angular qtz grains. Minor mica, minor lignitic fragments.	339	342	
	Fine grey silts, medium grained micaceous qtz sands, coal pieces. Very coarse ≤ 1 cm across quartz fragments, subrounded scattered through sample.	342	345	
	Medium qtz mica sand, very fine grey qtz sand, fine grey silts and black muds and plant debris. Minor coaly pieces.	345	348	
	Brown clays. Qtz-mica silts. Some fragments display laminations	348	351	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

18
912380 054

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAMARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 8/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)					
	Grey fine to medium sand Abundant black to brown clay, commonly interlaminated with thin beds of micaceous silt. Some very coarse qtz and lithic grains. Common fine grained pyrite.	351	354						
	Medium to fine grey sands and silts. Plant debris abundant. Dark mud chips Qtz major constituent along with mica and pyrite.	354	357						
	Red brown claystone. Minor silty layers.	357	360						
	Grey to brown fine grained micaceous sands and silts. Brown lignitic clays Some calcareous material present.	360	363						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">WATER STRUCK</td> <td style="width: 20%;">YIELD (l/s)</td> <td style="width: 20%;">STANDING AT</td> <td style="width: 20%;">DRAWDOWN</td> <td style="width: 20%;">CASING</td> </tr> </table>					WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING
WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING					

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912380 055

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21186/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE _____
 POSITION _____

Logged by K. ORTH Date 8/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Grey brown micaceous silt and fine sandstone. Minor lignite and brown clay. Pyritic.	360	363	
	Brown clay units interlamin with micaceous silts and very fine sands. Some calcareous material present (reacts w HCl.) Interbedded calcareous lenses (not sure if these are nodular or not? -Microscope)	363	366	
	 CORE: Fine grained to medium grained yellow to white micaceous sands interlamin with brown lignitic coal layers. (H ₂ S smell).	364.25	369.25	
WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH (geol) Date 8/9/1986

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	occasional coarse grains. Medium to fine light coloured sand. Salt/pepper appearance. Qtz grains, pyrite (minor), mica. Black plant debris. Calcite is cement common. Qtz grains subangular to subrounded. Variable shape, some frosted, some clear.	381	384	
	Grey coloured fine grained micaceous silt. Calcareous material present (strong react ⁿ to HCl). Fine laminations noted. Minor pyrite and plant debris. Minor (<10%) fossil fragments (uncure of their nature as very fine grained).	384	387	
	Grey silt, micaceous and calcareous	387	390	
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
1.	to			to
2.	to			to
3.	to			to
4.	to			to
5.	to			to

BORE HOLE LITHOLOGICAL LOG

912380 058

PARISH NAME GUNAMALARY 2 AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH (geol.) Date 8/9/1986

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Grey brown silt and mixed sand with minor coal and brown and grey clay. Some medium sand size qtz grains present. Minor mica. Calcareous cement present & minor limestone fragments.	390	393	
	Mixture of brown lignite and fine to medium grained qtz-mica sands. Calcareous cement present loosely binding the sediment. Occasional coarse qtz fragments (50.5 cm) and limestone fragments. Pyrite present.	393	396	
	ditto	396	399	
	ditto - slightly more limestone fragments.	399	402	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

- 1. to _____ to _____
- 2. to _____ to _____
- 3. to _____ to _____
- 4. to _____ to _____
- 5. to _____ to _____

912360 059

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAMALARY 2 AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH (geol) Date 8/9/86.

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<u>CORE: Brown sand at top.</u>	<u>400.98</u>	<u>406.98</u>	
	<u>Fine micaceous yellow sand with H_2S smell. <u>Not</u> calcareous</u>			
	<u>Mixed sample with mostly material ^{from} throughout the drilled sequence - medium gr. mica sand, limestone and marl fragments, plant debris, pyrite</u>	<u>408</u>	<u>411</u>	
	<u>ditto, slightly less limestone contamination more gr. medium to fine white micaceous sand. A percentage of very coarse gr. grains. Fragments of pyrite (fine granular pyrite). Plant debris. Some marly fragments</u>	<u>411</u>	<u>414</u>	
	<u>Medium grained well sorted gr. sand. Grains generally well rounded. Some mica, pyrite. Contamination from limestone</u>	<u>414</u>	<u>417</u>	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
1.	to			to
2.	to			to
3.	to			to
4.	to			to
5.	to			to

DEPARTMENT OF MINERALS AND ENERGY

912360 061

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAMAARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH (geol.) Date 8/9/86

LDG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Grey coloured fine sand composed of qtz & 15% mica. Some brown clay inter laminated with silty material. Mica very coarse qtz grains (may have been from higher up in sequence?)	426	429	
	light sand with dark lithic and qtz medium sand size grains. Rounded to subangular grains. Mica present along with mica plant debris.	429	432	
	ditto	432	435	
	light coloured sand. Some mica and pyrite. Subangular to rounded, fine to coarse grains.	435	438	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

- 1. _____ to _____
- 2. _____ to _____
- 3. _____ to _____
- 4. _____ to _____
- 5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912380 062

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by KARIN DETH Date 9/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
<u>11/6</u>	<u>CORED: No recovery => Sands</u>	<u>437.64</u>	<u>443.63</u>	
	<u>light qtz medium sand. Sub-angular to rounded grains. These vary in colour. A few clear, some frosted & white, some yellow and others smoky. This suggests a varied provenance. Minor mica and pyrite present. Some plant debris present. Minor fine sand component and several coarse qtz grains, but generally well sorted.</u>	<u>438</u>	<u>441</u>	
	<u>ditto (slightly higher coarse fraction % and some very brown lignitic clay and plant debris)</u>	<u>441</u>	<u>444</u>	
	<u>Mixture of coarse to fine qtz sand (as above) Some dark organic debris. Pyrite</u>	<u>444</u>	<u>447</u>	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

27

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAMUARTY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 9/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<i>ditto</i> <i>(abundant fine grained organic debris and mica appears more abundant)</i>	<u>447</u>	450	
	<i>light coloured medium qtz sand. Subrounded to rounded grains. Some mica, pyrite and little grains. Minor plant debris (cleaner than last 6m interval) small dark appearance</i>	<u>450</u>	453	
	<i>Medium qtz sand with some coarser qtz grains present. Micas and minor pyrite present. More abundant dark organic material present. This also coats many of the sand grains giving the sample a darker appearance than above samples as per 450-453.</i>	<u>453</u>	456	
	<i>ditto (More dark organic muddy material)</i>	<u>456</u>	459	
	WATER STRUCK	YIELD (l s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912380 064

PARISH NAME GUNAWALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/96/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 9/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Clean light coloured medium qtz sand. Subangular to rounded grains. V. Minor mica, pyrite and lithic fragments. Some ^{minor} dark organic material is present - minor component.	459	462	
	ditto (slightly higher coarse grain content.)	462	465	
	ditto (red stained qtz grains present. Slightly higher organic content.)	465	468	
	ditto to (462-465)	468	471	
	Medium to coarse qtz sand. Subangular to rounded grains. Abundant lithic fragments + pyrite.	471	474	
WATER STRUCK		YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
CASING				

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912380 066

PARISH NAME GUNAWALAY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by KORTH Date 9/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
	White to light green clay present and small chips of greenish shale. (Qtz sand fallen downhole into sample) Fissile shale.	489	492?		
	CORED INTERVAL Greenish-blue clay at top. Dry talcstone with pyrite at bottom. Fissile (some talc/chlorite content?). Cut with vert. fractures	491.98	492.92		
	Greenish to light grey clays - probably talc.	495	498		
	ditto (more solid talcstone/claystone pyritic chips)	498	501		
	and Some brown shale chips noted amongst green talcstone chips. Some chips display both colours. This suggests a change in rock type	501	504		
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN	CASING

1. _____ to _____ to _____
2. _____ to _____ to _____
3. _____ to _____ to _____
4. _____ to _____ to _____
5. _____ to _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912380 067

PARISH NAME GLINAMALARKY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 9/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Chips of green talc/claystone and red brown shale present in shaker. Some clay -> probably due to expansion when in contact with water.	509	507	
	Red and green chips of mudstone and claystone	508	510	
	ditto slightly higher clay content.	510		
	CORED INTERVAL: Brown mudstone, finely bedded with patches of green mudstone present as mud intraclasts and angular quartz grains scattered in open flow arrangement throughout rock. Diamicite	510.36	511.72	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____




DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912380 068

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE _____
 POSITION _____

Logged by K. ORTH Date 10/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<p>CORED INTERVAL:</p> <p>Green clay with rounded pebbles of quartzite and qtz and shale grains scattered throughout - poorly sorted DIAMICTITE.</p>	511.72	513.22	
	<p>CORED INTERVAL:</p> <p>Brown mudstone. Very little in the way of qtz sand grains present in this core. Much of the top contains disrupted shaley material - material which has fallen down the hole.</p>	513.22	514.02	
	<p>CORED INTERVAL: Green to brown mudstone base overlain by a thick sequence of claystone with qtz grains & mud intraclasts in open flow</p>	514.02	515.32	
WATER STRUCK		YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
CASING				

1. _____ to _____ in _____
2. _____ to _____ to _____
3. _____ to _____ to _____
4. _____ to _____ to _____
5. _____ to _____ to _____

BORE HOLE LITHOLOGICAL LOG

912380 069

PARISH NAME GUNAMALAY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 16/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<p>fragments of red and green fissile claystone, some green fragments contains scattered qtz grains. Some angular clear and reddish coloured qtz grains (med-coarse ss size) in the sample. Yellowish sandstone fragment and some pegmatitic fragments (qtz feld mus.) Slight fizz of yellow ss fragment when HCl added.</p>	516		
	<p>Material as above with a higher % of sand size (coarse and medium grains). Some fragments from: feldspar rich volcanics, red granite, pegmatite, very dark rock (hornfels?), fine grained sugary textured rock -> microgranite (finess?) Altered qtz + hb(?) rock, vein pyrite.</p>	519		
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____ to _____
2. _____ to _____ to _____
3. _____ to _____ to _____
4. _____ to _____ to _____
5. _____ to _____ to _____

34

912300 070

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAWALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH. Date 16/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Specimen contains abundant chips of green shaley material (as above) some with coarse qtz grains scattered in it. Abundant grey to white fine-med grained ss with abundant qtz & feld(?) fragments - arkosic.	522		
	Mica schist fragments, dark gneissic fragments, volcanic rounded granitic, pink quartz. Some material looks like irregular, poorly sorted ss with possible calcite cement (or is is weathered aplite??). Some vein material.			
	ditto	525		
	Qtz - bio - feld rocks abundant Schist, phyllite, qtz fragments white ss, anatite frags.			
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912300 073

PARISH NAME GUNTMALART AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/66/2
 BORE NUMBER _____ SURFACE R.L. 1
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 18/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	CORED INTERVAL: Recovered brown to green thinly bedded mudstone/claystone with very thin white qtz ss interlaminae and lenses. Cut with faults. (VARVE LIKE APPEARANCE).	536.59	537.16	
	Cuttings of mainly shaly red mudstone - well compacted with bands of qtz-mica sand and thin qtz veinlets. Fragments of varied basement type rocks also present - Probably as in core with some thin coarser sand bands. Note rippled + x-rippled ms. Slight grading of ss → silts → ms noted. <i>Some green cl. arg. etc. like.</i>	540.		
	Mainly chips of green veined shale and brown mudstone with some qtz ss layers. Black coaly fragments scattered through sample. (Much as in core + 540 + coal) <i>minor</i>	543.		
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
1.	to			
2.	to			
3.	to			
4.	to			
5.	to			

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912300 075

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 19/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Chips of pink mudstone. Slight mica sheen. Well cemented pink siltstone. Sandst present - cemented poorly sorted qtz ss - subrounded to well rounded grains. Coal fragments. Much of the silt and mudstone contains scattered ^{fine} med. qtz grains which vary from subangular to sub rounded. One white feldspathic chip. Granitic material minor.	552		
	More abundant sandstone chips in this material. Well cemented white siltstone, poorly sorted white sandstones - coarse - medium qtz + lithic grains in well sorted white fine ss - silt matrix. Grey shale with med. scattered qtz grains. Coarse-med qtz subrounded to well rounded. Lithics of granite. Minor coal.	555		
	WATER STRUCK	YIELD (l s)	STANDING AT	DRAWDOWN
1.	to			
2.	to			
3.	to			
4.	to			
5.	to			

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

40

BORE HOLE LITHOLOGICAL LOG

912360 077

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 22/9/1986

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Chips of sandstone predominate Fine med sugary white sand matrix with larger clasts of subangular - rounded qtz and minor lithic clasts. Fragments of granite, quartzite, qtz-feld gneiss, diorite. Greenish shale fragments with silty bands, large angular qtz grains.	561		
	ditto some qtz yellow sand.	564		
	Pieces of qtz sandstone as above. However most of the qtz is stained ^{red} yellow. Fragments of laminated shale. Clasts of gneiss, granite, qtz, feldspar, shale. Abundant separated sand size grains	567		
	thin yellow poorly sorted qtz - lithic ss. Abundant faulted shale. ^{and} Some coal. Shaly	570		
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
1.	to			
2.	to			
3.	to			
4.	to			
5.	to			

42

BORE HOLE LITHOLOGICAL LOG

912300 080

PARISH NAME GUNAMALAY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 22/9/1986

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Dominated by qtz sandstone with sugary texture. Some white qtz sands. In both cases this material is highly indurated and laminated with ^{large, coarse} qtz grains and fine grained matrix.	582		
	White qtz sandstone major component. Some red sandst. as above. Medium sand grains form framework with fine sand matrix → bimodal. Also silica cement. Rounded qtz grains. Minor coal.	585		
	ditto less reddish sandstone.	588		
	White sandstone and fawn colour sands. Sugary texture.	591		
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

43

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GINAMUARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

912380 081

Logged by K. ORTH Date 22/9/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<i>Varied medium sandstones - most even. Spores present within the qtz sand.</i>	591		
	<i>White and red sugary textured medium grained sandstones. Grains subangular to well rounded. Matrix grains in some bimodal sands are fine grained with large coarse qtz grains.</i>	594		
	<i>ditto</i>	597		
	<i>Some red qtz sandstone material also present.</i>			
	<i>CORED INTERVAL: 9 trays of what appears to be cross-bedded quartz sandstone well indurated - possibly qtz overgrowths. Essentially rounded qtz grains.</i>	597.08	600.08m	
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

44

BORE HOLE LITHOLOGICAL LOG

912300 082

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 3/10/1986

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Mainly chips of well sorted medium qtz sand. Some fragments of green and red mudstone/diamictite and vein qtz fragments (This material has probably fallen down the hole). Some pyrite	603		
	Sandstone chips, less shale fragments than higher up. Some pyrite + coaly material (probably come down hole) Quartz grains rounded to subangular + well sorted. Some calcite cement present in some chips. Some sands with clay present - Pink material - calcic.	606		
	ditto	609		
	Noted presence of white calcareous shale. Chips of white non-calcareous material? Silty material w larger qtz grains present py.			
	WATER STRUCK	YIELD (l s)	STANDING AT	DRAWDOWN
	CASING			

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912330 083

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 2186/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 4/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
	White quartz sandstone - as above Very little in the way of contaminants. Medium subrounded to rounded quartz grains, strong white siliceous cement. Generally well sorted. Some very white coloured components - milky qtz? or feldspar.	612			
	ditto	615			
	Also some very fine grained sands with occasional larger quartz grains present. Red iron stained fragments also common ~ 8-10% of sample. Very minor calcite.				
	ditto	618			
	Fragments of white material -> some feldspathic material? Minor calcareous cement - more siliceous cement noted.				
	WATER STRUCK	YIELD (l s)	STANDING AT	DRAWDOWN	CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912300 084

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 5/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Note: Bit was checked at 620	621		
	⇒ some material fallen in the hole.			
	White well sorted medium to fine sandstone. Some chips of black coal, red shale and grey shale/diamictite.			
	Mainly composed of chips of white quartz sandstone. Moderate sorting with coarse-med framework grains and some finer interstitial qtz grains. Clear qtz subangular, Rounded - frosted qtz grains. Some ^{some feldspar grains} fine ss with occasional med - qtz grains present. ^{minor calcareous/cement} Very minor shale fragments. Some bimodal sandstone chips.	624		
	ditto	627		
	Some chips of red stained SS. More finess.			
	WATER STRUCK	YIELD (l s)	STANDING AT	DRAWDOWN
1.	to			
2.	to			
3.	to			
4.	to			
5.	to			

- 1. _____ to _____
- 2. _____ to _____
- 3. _____ to _____
- 4. _____ to _____
- 5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

812380 085

PARISH NAME QUANAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. CRTH Date 6/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<i>ditto</i>	<u>630</u>		
	<i>Abundant chips of red ss. Staining not pervasive and often patchy. Some qtz-bio-feldspar material (not sure if rubble or part of a ss?)</i>			
	<i>Qtz-feld med ss abundant. Some fine grained. Red ss - note only qtz grains stained - not feldspars. ^{minor} Green siliceous rock</i>			
	<i>Chips of qtz sandstone.</i>	<u>633</u>		
	<i>Medium to fine grained with some calcareous cement. Bimodal, med sorting and fine g ss with ^{med} qtz grains present. Red stained material minor - some red cement. Minor shaley (green) chips.</i>			
	<i>ditto.</i>	<u>636</u>		
	<i>Very minor red staining. Fine white feldsp. in ss.</i>			
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
1.	to			to
2.	to			to
3.	to			to
4.	to			to
5.	to			to

77

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

312300 086

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by IC-ORTH Date 6/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<i>ditto</i>	<i>639</i>		
	<i>Nodule of black mineral (markasite?) Well sorted and moderately sorted qtz sandstone (Some bimodal to fine grained fs??) Minor dark grains present (tourmaline??)</i>			
	<i>ditto</i>	<i>642</i>		
	<i>Some more red stained chips of sandstone. Some grains display grading from fine to medium sandstone.</i>			
	<i>ditto</i>	<i>645</i>		
	<i>Fragments of vein qtz and silicified sandstone present.</i>			
	<i>ditto</i>	<i>648</i>		
	<i>Higher abundance of red stained sandstone fragments. V. minor coal shale fragments.</i>			
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
				CASING

- 1. _____ to _____
- 2. _____ to _____
- 3. _____ to _____
- 4. _____ to _____
- 5. _____ to _____

(49)

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAMARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

912380 087

Logged by K. ORTH Date 7/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<i>ditto</i>	<i>657</i>		
	<i>lower % red stained qtz Sandstone.</i>			
	<i>Abundant chips of quartz sandstone with well - mod sorted material. Some bimodal ss - coarse - med. framework with fine grained interstitial quartz & some feld. Some fine ss w. very minor red sand grains. Bedding present in some units.</i>	<i>654</i>		
	<i>ditto</i>	<i>657</i>		
	<i>minor fragment (→ may be heavy fish plate) found. Red stained ss present ~10%. Minor shales present in sample.</i>			
	<i>ditto minor coal. less red staining - more pink coloured fragments. Feld, py, red-qtz, black-qtz</i>	<i>660</i>		
	WATER STRUCK	YIELD (l/s)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

912330 088

BORE HOLE LITHOLOGICAL LOG

PARISH NAME GUNAWAARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 2/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K.ORTH Date 7/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
M	Sample dominated by white argay qtz sandstone. Some coal fragments (dh?) Some shales (green + brown dh?) White fragments - very minor red stained sandstone (~5% dh?)	663		
	ditto	666		
	Higher % (~15%) red stained sandstone present.	669		
	white sandstone. again - as at 663.	672		
	Well sorted, even grained medium white qtz sandstone with minor dark grains (~1%) Rounded and frosted grains. Occasional bimodal chips with larger clear to frosted ofw subrounded qtz grains with m-f qtz matrix.	675		
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912360 089

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 2186/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by IC. ORTH Date 15/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	Bright pink staining on some parts of sample			
	Chips of grey green claystone, brown shale, pyrite. Qtz sandstone as above present. Some displays crude bedding with gradational bedding (M-F sand size grains). Some dark grains present (? not sure what these are). [Many of these fragments may have fallen down the hole.]	678m		
	Predominated by white indurated qtz sandstone. F-M. Subangular - rounded. Most frosted grains, minor cleav. Generally well sorted, some bimodal. This bedding apparent in some chips. Platlike chips ≤ 1.5 cm	681		
	WATER STRUCK	YIELD (l s)	STANDING AT	DRAWDOWN
1.	to			to
2.	to			to
3.	to			to
4.	to			to
5.	to			to

BORE HOLE LITHOLOGICAL LOG

912380 090

PARISH NAME GUNAWALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 15/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)	
Chloroform test	Finer chips - not platelike. Mainly white qtz sandstone. Minor calcareous cement. Some ss bimodal, some well sorted. Coarse-med. grains rounded. cfw w fine qtz interstitial. More bimodal qtz ss in this sample than in 681m.	684m			
	More platelike fragments of white qtz ss. Fine grained sugary textured fragments with scattered m-c rounded grains in cfw within it - lag like (?) Other layers of m sand cfw with minor f interstitial grains. Black stain as cementing material in places - limonitic? looking in other areas (yellow-rust colour) irregular patches. Yellow staining present. Some black	687m			
WATER STRUCK		WELD (I S)	STANDING AT	DRAWDOWN	CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

DEPARTMENT OF MINERALS AND ENERGY

BORE HOLE LITHOLOGICAL LOG

912360 091

PARISH NAME GUNAMALARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. O'ROTH Date 15/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	to red minerals present (? unsure what these are - zircon? sphene? ilmenite? etc?) Fragments of grey/green shale with similar brown stained material present.			
	White ditto qtz sandst. less bimodal white ss. More evengrained material (~2% red stained.) Some chips display patchy reddish staining.	690		
	Ditto Abundant bimodal sand Abundant red stained chips with varying degrees of staining from orange to dark red colour. Patchy development on some chips. Some medium qtz - recryst.	693		
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

BORE HOLE LITHOLOGICAL LOG

912300 093

PARISH NAME GUNAMACARY AUTHORITY _____
 PARISH NUMBER _____ SEQUENCE No. 21/86/2
 BORE NUMBER _____ SURFACE R.L. _____
 CADASTRAL PLAN _____ TYPE OF HOLE ROTARY
 POSITION _____

Logged by K. ORTH Date 16/10/86

LOG	DESCRIPTION	FROM (metres)	TO (metres)	THICKNESS (metres)
	<i>ditto</i> <i>($< 2\%$ red chips)</i>	<i>708.</i>		
	<i>ditto</i> <i>Higher % red stained material ($\approx 15\%$). Minor coal and shale fragments (? fallen downhole).</i>	<i>711</i>		
	<i>Mainly white qtz ss as described above $\approx 2\%$ red staining, often patchy.</i>	<i>714.</i>		
	<i>CORED INTERVAL: Bedded and crossbedded indurated qtz sandstone with thin red bands. Often red staining follows bedding, sometimes irregular. Sandstone bimodal - to</i>	<i>715.50 - 717.60 m.</i>		
	WATER STRUCK	YIELD (l s ⁻¹)	STANDING AT	DRAWDOWN
				CASING

1. _____ to _____
2. _____ to _____
3. _____ to _____
4. _____ to _____
5. _____ to _____

APPENDIX III

WAXED CORE

A number of approximately 50cm lengths of core were sealed in aluminium foil and waxed in preparation for geochemistry and isotope studies by the BMR on some of Murray Basin aquitards. Depth intervals of these waxed samples are listed below:

<u>Core No.</u>	<u>Waxed Interval</u>	<u>Unit</u>
2	67.97-68.38m	Bookpurnong Beds
3	72.66-73.12m	Bookpurnong Beds
4	76.88-77.45m	Bookpurnong Beds
5	85.55-86.02m	Bookpurnong Beds
13	246.87-247.35m	Ettrick Marl
14	250.65-251.27m	Top Olney Fm.

912380 096

PE611327

This is an enclosure indicator page.
The enclosure PE611327 is enclosed within the
container PE912380 at this location in this
document.

The enclosure PE611327 has the following characteristics:

ITEM_BARCODE = PE611327
CONTAINER_BARCODE = PE912380
 NAME = Composite Well logs, Gunamalary-2
 BASIN = MURRAY
 OFFSHORE? = Y
 DATA_TYPE = MONTAGE_LOG
 DATA_SUB_TYPE = HARDCOPY-PAPER
 DESCRIPTION =
 REMARKS =
 DATE_WRITTEN =
DATE_PROCESSED = Petroleum Development Unit - Government
 of Victoria
DATE_RECEIVED =
RECEIVED_FROM = 19-DEC-1986
 WELL_NAME = 717.6
 CONTRACTOR =
 AUTHOR =
 ORIGINATOR = HW00_SW
 TOP_DEPTH =
 BOTTOM_DEPTH =
ROW_CREATED_BY =

(Inserted by DNRE - Vic Govt Mines Dept)