REGIONAL MAPPING

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
PETROLEUM EXPLORATION DIVISION

YARDINNA No. 1. Stratigraphic Well Completion Report

by

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Rept.Bk.No. 71/70

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

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YARDINNA NO.1 STRATIGRAPHIC WELL COMPLETION REPORT

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DEPARTMENT OF MINES
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YARDINNA NO.1 STRATIGRAPHIC WELL COMPLETION REPORT

ABSTRACT

Yardinna No.1 well, drilled 20 miles N.W. of Oodnadatta township intersected the Lower Cretaceous Oodnadatta Formation and bottomed at 512 feet in Bulldog shale also of early Cretaceous age. Both the Coorikiana Sandstone Member, the basal unit of the Oodnadatta Formation, and the Wooldridge Limestone Member, a younger unit of the same formation were outlined by gamma ray and neutron logs. A correlation of litho-stratigraphic units from Yardinna No.1 situated on the western margin of the Great Artesian Basin, with wells from the deeper basin area is presented. It is suggested that the nomenclature adopted for the Oodnadatta 1:250,000 geological sheet be retained for subsurface units of the Great Artesian Basin for S.A.

INTRODUCTION

The problem of correlating the Queensland Toolebuc Member with a South Australian equivalent has been approached in many ways. Each approach has been stopped by the inability to correlate surface outcrops such as the Coorikiana Sandstone Member (a useful mapping unit) or the Wooldridge Limestone Member with well information near the western margin of the Great Artesian Basin due to the absence of electric and radioactive logs in this area. This led to the drilling of a shallow well near the margin of the Great Artesian Basin.

YARDINNA No.1 well was drilled primarily to locate and log in the subsurface, the Coorikiana Sandstone Member of the Oodnadatta Formation.

It was also hoped that the Wooldridge Limestone Member, a younger unit in the Oodnadatta Formation, would be intersected and that gamma-ray, neutron, and electric logs would define both of these members and enable correlation with the central portion of the Great Artesian Basin.

GENERAL WELL DATA

Well name and number

South Australian Mines YARDINNA NO.1

Location (See fig. 1)

The well is located about 20 miles N.W. of Oodnadatta on the Yardinna 1-mile military sheet.

Latitude 27°20'05"S

Longitude 135°15'32"E

Map References

1:250,000 military sheet: OODNADATTA

1:63,360 " " : YARDINNA

Details of Petroleum Tenement

The well was drilled near the edge of P.E.L.'s 5 and 6 on the western margin of the S.A. portion of the Great Artesian Basin.

Elevation

Kelly Bushing: 484 feet

Ground: 479 feet

Total Depth: 512 feet

Date Drilling commenced: 26.10.70

Date Drilling completed: 2.11.70

Drilling time to Total Depth: 7 days

Date well completed: 3.11.70

Status: Dry, capped and abandoned.

Perforations and plugs

No perforations were conducted and no plugs were set.

Core Record

Three cores were cut. Details of depth and recovery are set out in Table 1.

TABLE 1

Core No.	Depth		Depth cored	Recovery		Core size
	from	to		ft.	%	
1	155	165	10	7.3	73	2¼
2	245.5	255.5	10	9.1	91	2¼
3	492	512	20	20	100	2¼
	TOTALS		40	36.4	91%	

Logging

Well logging was carried out using the South Australian Department of Mines Failing Log Master Unit and included the following:

Spontaneous Potential

Neutron-Neutron

Gamma-Ray

Temperature

Resistivity (1) 16 inch Normal

(2) 64 inch Normal

(3) 6 foot lateral

Gamma-Ray and Neutron logs are included in the Composite log.

Side Wall Coring: None

Storage of Samples and Cores:

All are stored at the core laboratory of the South Australian Department of Mines, Thebarton.

Drilling time log

The time taken to drill each foot, including coring was recorded by the driller and a graphic representation is included on the composite log.

Hydrocarbon Detection

Selected core samples were examined under ultraviolet light for fluorescence indicative of hydrocarbons.

NOMENCLATURE

The term Coorikiana Sandstone Member was proposed by Freytag (1966) to replace the informal name "Beviss Sandstone" used by Wopfner (1957) in initial mapping of the Oodnadatta area on behalf of Santos Limited. The Coorikiana Sandstone Member corresponds to Brunnschweiler's "Terebratella Beds" (see Sprigg et.al., 1958, p.94).

In the Santos well Oodnadatta No.1 (fig. 4) Ludbrook (1966) referred to the same unit as "Unnamed Greensand Member". The Coorikiana Sandstone Member is the basal unit of the Oodnadatta Formation (Freytag, 1966; Wopfner, Freytag and Heath,

1967) and thus separates this formation from the underlying Bulldog Shale. Figure 5 shows the stratigraphic scheme employed in the mapping of the Oodnadatta 1:250,000 map area (Freytag, Heath and Wopfner, 1967) and subsequently proposed for the whole of the Western Great Artesian Basin (Wopfner et.al. 1970). The South Australian nomenclature is also compared with that of Queensland.

GEOLOGY

YARDINNA NO.1 - Well Stratigraphy

The sequence intersected in YARDINNA NO.1 well was a marine Lower Cretaceous sequence which can be separated into the following units and formations.

1. Surface to 330 feet - Oodnadatta Formation. This is a marine shale unit which is fairly homogeneous, dominantly grey and contains minor beds of limestones, silts and fine sands. From the core (core No. 1) it appears that this formation is flat lying or of very low dip. The Wooldridge Limestone Member has been interpreted from the logs between 153 to 215 feet. It is represented by 3 main bands of limestone with shales between them. The shales are fossiliferous and finely micaceous i.e. similar to the shales higher in the sequence.

At the base of the Oodnadatta Formation is the Coorikiana Sandstone Member (302-330 feet) which is a green grey glauconitic fine-grained sandstone to siltstone, parts of which are very calcareous. The environment of deposition of this sandstone appears

to represent a regressive phase within The Great Artesian Basin.

2. 330-512 feet (Total Depth) - Bulldog Shale. This is also a marine shale unit predominantly grey but with a greenish tinge (glauconitic). The shale or claystone contains pockets and lenses of silt to fine sand throughout. The term "glauconite" is used in a morphological sense, as Freytag (1966) has demonstrated that the green mineral beads were in fact iron rich montmorillonite and not true glauconite.

CORRELATION

The recent logging of New Kopperamanna Bore (see fig.2) which gives good definition of the above units facilitates correlation between the western margin and the deeper portion of the Great Artesian Basin. The Wooldridge Limestone Member equivalent can be recognised along with the Coorikiana Sandstone Member in the Oodnadatta Formation. Figure 3 shows a correlation, through four wells, based, on gamma-ray logs and neutron/sonic logs. The wells are Yardinna No.1, Coorikiana No.1 (a shallow well southwest of Oodnadatta), Poonarunna No.1 well and New Kopperamanna Bore. This shows that the Coorikiana Sandstone Member and Wooldridge Limestone Member can be traced in the subsurface over considerable distances of the western Great Artesian Basin. It demonstrates also the need for more of these "near margin" water bores to be logged with radioactivity tools. A recommendation has been made for 3 such wells in the Oodnadatta region to be logged to aid in the present correlation programme.

The Coorikiana Sandstone Member is exposed over a large

area along western margin of the Great Artesian Basin and is an ideal marker bed for mapping the base of the Oodnadatta Formation. As it can be traced in the subsurface for the western portion of the Great Artesian Basin, it is logical the same names be used in the subsurface as were used on the Oodnadatta 1:250,000 geological sheet, rather than adopting the Queensland nomenclature. It appears that in some log interpretation of private companies, both the Coorikiana Sandstone Member and the Wooldridge Limestone Member equivalent have been combined and called the Toolebuc Limestone Member. The true Toolebuc Limestone Member of Queensland is equivalent to the Wooldridge Limestone Member of South Australia (see fig.5). As the equivalents of the Toolebuc Limestone Member do not show up in many of the South Australian central Great Artesian Basin wells, South Australia should retain the names Oodnadatta Formation and Bulldog Shale rather than the Queensland names Allaru Mudstone and Wallumbilla Formation. There is a difference in the two boundaries, but as it is only about 100' stratigraphically, for most purposes, the respective formations in South Australia and Queensland can be considered equivalents.

PALYNOLOGY

The palynologists report is included as Appendix II and his report on samples provided from the 3 cores supports the lithological interpretation of the logs. Harris compares Yardinna No.1 with Santos Oodnadatta No.1 well. The lithological log of Oodnadatta No.1 can be seen in Figure 4.

CONCLUSIONS

Yardinna No.1 well encountered a Lower Cretaceous marine shale sequence. Both the Wooldridge Limestone Member and the Coorikiana Sandstone Member were intersected and these units are clearly outlined by the radioactivity logs. Consequently the Oodnadatta Formation and Bulldog Shale can be recognised in the subsurface through the agency of electric and radioactive logging.

I. J. Townsend.

23.4.1971
IJT:MK

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APPENDIX A

CUTTINGS DESCRIPTIONS

CUTTINGS DESCRIPTIONS

Surface-7'	Surface soil, light yellow brown to buff, very fine grained, silty clayey and highly gypsiferous. White powdery gypsum (kopi) and crystalline gypsum outcrop close to the drill site.
7-20'	100% Claystone - yellow, green, grey silty, v. fine grained. Large Trace Gypsum - transparent crystalline, fibrous in part. Large Trace limonite silty shale - yellow brown colour very fine grained silt cemented by clay and limonite consequently much harder than the claystone.
20-30'	100% Claystone - Grey some yellow to green staining - cuttings apparently harder and less weathered, silty A.A. with only minor silts and gypsum present, both of which may be cavings.
30-40'	100% Claystone - Grey dominantly with some interbeds of yellow clay slightly silty in parts (very fine grained). Cuttings appear as a clayey pulp with only very few harder cuttings present in the sample.
40-50'	100% Claystone - Grey A.A. with perhaps more cuttings present than previous sample. Trace Gypsum.
50-60'	90% Claystone - Grey A.A. 10% Limestone - Or calcareous claystone, grey. cuttings much harder due to calcareous cement - strong reaction with acid. Large Trace Gypsum - crystalline.

60-70' 85% Claystone - Grey A.A.

15% Limestone - Dark grey when wet A.A. (may be calcareous claystone or mudstone).

Trace Buff coloured limestone - Mixture of grey yellow and white mottling to give overall buff appearance.

70-80' 90% Claystone Grey A.A.

10% Limestone Dark grey A.A.

Trace Gypsum

80-90' 95% Claystone A.A. but apparent greenish tinge when wet - grey when dry.

5% Limestone and calcareous siltstone. Grey to pale grey some dark ?biotite or coal specks observed in the siltstone which is also associated with gypsum.

Trace of pyritic siltstone

Trace of Buff siltstone very fine grained.

90-100' 95% Claystone or Mudstone grain size is increasing - almost a siltstone. Grey micaceous, apparent biotite and muscovite - rest is too fine grained to identify.

5% Calcareous siltstone or mudstone. Grey very fine grained gives carbonate reaction to acid. Also small amounts of calcite probably infilling small fissures.

N.B. Columnar structure forming honeycomb pattern at either end of small columns.

100-110' 100% Claystone A.A. almost silt grain size in some of

the cuttings. Probably interbeds of very fine siltstone and claystone.

Trace of limestone A.A.

110-120' 95% Claystone Green grey A.A. very soft micro fine.

5% Siltstone Grey micro micaceous black shiny specks of biotite and white specks of sericite.

Also grey clayey material - non calcareous - Siltstone or silty claystone is harder than the claystone (see penetration log. 5 or 6ft at 25 mins./ft.).

120-130' 95% Claystone Green grey A.A.

5% Siltstone Grey very fine grained micaceous and harder A.A. very clayey.

Formation is probably interbedded shale and fine bands of siltstone.

130-140' 95% Claystone Green grey A.A. plus minor buff coloured claystone.

5% Siltstone Grey A.A. very clayey.

140-150' 95% Claystone Green grey A.A.

5% Siltstone Grey A.A.

CORE 1. 155' 165' RECOVERED 7.3' 29/10/70

CLAYSTONE - Grey very fine grained micromicaceous finely silty brittle, richly fossiliferous, cracks and breaks up on drying.

Mica - Shiny specks of dark and light mica assumed to be biotite and muscovite respectively.

Silt - Fine ?quartz silt in minor small pockets in the claystone.

Pyrite - very fine grained aggregate of pyrite in thin lenses.

Fossils - Calcareous shelly fauna spread throughout the core. Some shells look fibrous in cross section and consist of small calcite needles 1/16th" long which form a honey comb pattern.

Slickensides - occur at irregular intervals in the core forming shiny surfaces at approximately 45-50° to the core and breakages are common at these points.

The silty pockets are absent in the lower half of the core which is a very fine grained homogeneous irregularly fracturing claystone.

Dips appear to be very low or horizontal. Lower portion of inner tube was empty so it is assumed the unrecovered core slipped out of core barrel i.e. bottom section missing.

Porosity negligible.

150-165' No sample collected while coring.

165-170' 100% Claystone Grey as in base of core

170-180' 100% Claystone Grey A.A.

Trace of light grey brown hard limestone (acid reaction). Very fine pyrite appears to be on the surface.

181' Spot Sample - Limestone band - 2" thick penetration very slow - grey to pale grey very calcareous fine grained claystone, or limestone, and some white to yellow translucent ?calcite (strong acid reaction). Probably calcite veins in shale.

180-190' 100% Claystone grey A.A.

Trace of Limestone A.A.

190-200' 100% Claystone grey A.A. but some silty cuttings present assumed to be from small silty lenses

as observed in Core 1.

200-210' 100% Claystone Grey A.A.

Trace of calcareous claystone or limestone.

210-220' 80% Claystone Grey A.A. silty in parts.

20% Very calcareous siltstone, paler grey, or limestone 2' band very hard and slow penetration (Driller).

Very strong acid reaction. Testing shows the material to be almost entirely calcareous with minor very fine clay minerals - micas - others too small to identify, argillaceous limestone is probably the most fitting name. The claystone is also slightly calcareous.

220-230' 90% Claystone Grey A.A.

10% Argillaceous limestone Dark grey hard silty very strong reaction with acid.

230-240' 90% Claystone Grey A.A silty

10% Argillaceous Limestone Dark grey A.A.

240-245'6" 85% Claystone Grey A.A.

15% Argillaceous Limestone A.A. plus some bands of white to yellow calcite - ?veins.

CORE NO.2 245.5' - 255.5' RECOVERED 9.1FT 31/10/70

CLAYSTONE - Green when wet, grey when dry, brittle cracks and breaks up on drying. Claystone is very homogeneous - non silty very little calcareous reaction, fossiliferous, carbonaceous and pyritic micro micaceous - cannot distinguish mica however.

Pyrite - finely disseminated pyrite spread throughout the claystone as both fine pyrite and aggregates.

Carbon - fine black specks (non shiny) spread throughout the core are assumed to be carbonaceous material.

Fossils - white shelly fauna (calcareous) and also calcareous layers of needle like calcite forming the honeycomb pattern as described in previous core. (Inoceramus).

256-260' 100% Claystone Green-grey A.A.

260-270' 100% Claystone Green-grey A.A. very slightly calcareous micaceous ?pyrite.

270-280' 100% Claystone Green-grey A.A.

280-290' 100% Claystone Green-grey A.A.

290-300' 100% Claystone Green-grey A.A.

300-310' 50% Claystone Green-grey A.A.

50% Siltstone Green fine grained clayey, softer and comes up as a paste more green than grey and has light and dark specks which cannot be identified - micaceous. Probably interbeds of claystone and siltstone as contact can be observed on some cuttings.

310-316' Mudstone. Green-grey very silty and fine sandy - Black subrounded grains of opaque material (glauconite). Occasional white subangular grains and mostly silt which cannot be identified but is assumed to be quartz. Micaceous and rare rounded quartz sand size grains and occasional green grains of unknown material.

317' Limestone grey and white - strong acid reaction.

317-320' Mudstone green grey, very silty and fine sandy A.A.

320-330' 100% Mudstone Green-grey when wet pale grey when dry - silty A.A. (some sand size grains).

330-340' 100% Mudstone Green grey A.A.

340-350' 100% Mudstone Green grey A.A. trace of fossils - siltstone and sandstone (very fine) and green. (Interbeds in the mudstone).

350-360' 100% Mudstone Green grey A.A. grain size increasing slightly.

360-370' 100% Mudstone Grey silty only very slightly calcareous A.A. micaceous.

370-380' 100% Mudstone Grey A.A.

380-390' 100% Mudstone Grey A.A. silty but silt becoming finer.

390-400' 100% Grey claystone, silt now absent otherwise A.A. Grain size too fine to make identification.

400-410' 100% Claystone Grey A.A.

410-420' 100% Claystone Grey A.A. only slightly silty. Non calcareous.

420-430' 100% Claystone Green grey A.A. slightly silty slightly calcareous.

430-440' 100% Claystone Green grey A.A.

440-450' 100% Claystone Green grey A.A.

450-460' 100% Mudstone silt is increasing - green grey wet - grey when dry. Slightly calcareous.

460-470' 100% Mudstone A.A.

470' Hard bar (few inches only. Calcareous siltstone to fine sandstone). Some pyrite discerned also.

470-480' 100% Mudstone Grey with green tinge, silt 30% probably interbeds of silt in the mudstone or claystone - calcareous in parts - micaceous, pyritic.

480-490' 100% Mudstone Green grey A.A. pyrite more abundant -

silty to fine sandy - calcareous siltstone traces. Salt and pepper appearance to siltstone or fine sandstone.

CORE NO. 3 492-412' RECOVERED 100% 2/11/70

Dominantly a claystone with abundant interbeds and fine sandstone - pyritic and occasional fossils. Slump structures occur and higher apparent dips due to cross bedding.

Claystone - grey very fine grained micaceous and contains interbeds and pockets of fine sandstone and pockets of pyrite.

Sandstone - fine grained even grained quartz and dark green to black grains of ?glauconite, very little matrix, porosity apparently fair (visual only). It is cross bedded giving apparent dips in the core of 20^{0}.

Slumping is present throughout the core, distorting the bedding.

Pyrite - aggregates in pockets and finely disseminated pyrite occurs in part of the sandstone.

Fossils - near bottom - calcareous white material - may have been a shelly fauna. Otherwise fossils rare.

APPENDIX B

PALNOLOGIST'S REPORT

W.K. Harris

DEPARTMENT OF MINES
SOUTH AUSTRALIA

STRATIGRAPHIC WELL
YARDINNA NO. 1

PALYNOLOGICAL EXAMINATION OF CORES

by

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

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Pal. Rept. 2/71

STRATIGRAPHIC WELL YARDINNA NO. 1

PALYNOLOGICAL EXAMINATION OF CORES

ABSTRACT

A palynological examination of cores from S.A.D.M. Yardinna No. 1 Well (Great Artesian Basin, N.W. of Oodnadatta) indicates that the well passed through the Coorikiana Member (or its correlative) of the Oodnadatta Formation, and at the total depth of 512 feet was in Bulldog Shale. This conclusion is based on comparisons and correlations with a lithologically similar section in SANTOS Oodnadatta No. 1 Well to the south. The biostratigraphic identification of the cores are:

Core 1 - 155 - 165 feet - Tricolpites pannosus Zone, (Microplankton zone of Odontochitina operculata)

Core 2 - 245.5-255.5 feet - Coptospora paradoxa Zone (microplankton zone of Odontochitina operculata)

Core 3 - 492 - 512 feet - Crybelosporites striatus Subzone (Microplankton zone of O operculata/ Muderongia tetracantha).

INTRODUCTION

S.A.D.M. Yardinna No. 1 Well was drilled some 20 miles N.W. of Oodnadatta, at 27°20'05"S and 135°15'32"E, to locate and identify the Coorikiana Member of the Oodnadatta Formation and/or the Toolebuc Member, and to determine the gamma ray and neutron-neutron characteristics for future geophysical log interpretations.

As difficulty was experienced (I.J. Townsend pers.Comm.) in identifying the Coorikiana Member of the Oodnadatta Formation by lithology alone, palynological examination was requested. Townsend (in preparation) has placed the top of the Coorikiana Member at 302 feet and the top of the Bulldog Shale at 330 feet. The particular question to be answered was whether or not the drill has actually passed through the member before total depth at 512 feet. The problem is accentuated by the similarity in lithology of the Oodnadatta Formation and the Bulldog Shale. Accordingly the three cores cut have been examined for their acid insoluble microfossil content.

Recent palynological studies (1,2) cover a similar lithological interval in Santos Oodnadatta No. 1 Well (approximately 10 miles S.E. of Yardinna No. 1) and it was considered likely that a palynological examination would answer the problem. In this well, the Coorikiana Member lies at about 450 feet (3) and within the Coptospora paradoxa Zone (2).

OBSERVATIONS

Table 1 summarises relevant sample data on the three cores. Recovered assemblages were reasonably well preserved and in all cases marine phytoplankton were present. The distribution of selected species in the cores is presented in Table 2.

TABLE 1

DATA ON SAMPLES STUDIED

Depth	Formation	Microplankton Zone	Spore-pollen Zone	Age	Sample No.
Core 1 at 156.1 ft.	Oodnadatta Fm.	O. operculata	T. pannosus	L. Cretaceous	S2179
161.1ft.	" "	"	"	"	S2181
Core 2 at					
245.6 ft.	Oodnadatta Fm.	O. operculata	C. paradoxa	"	S2182
252.5 ft.	" "	"	"	"	S2177
Core 3 at					
495.3 ft.	Bulldog Shale	O.operculata/M.tetracantha	C. striatus	"	S2178
502.1 ft.	" "	" "	"	"	S2183
509.3 ft.	" "	" "	"	"	S2180

TABLE 2

DISTRIBITION OF SELECTED SPECIES

Species	Core 1	Core 2	Core 3
Pollen and Spores: *Araucariacites australis*	x	x	x
Coptospora paradoxa	x	x	
Clavatipollenites sp.	x	x	x
Crybelosporites striatus	x	x	x
Camarozonosporites cf. *C. amplus*	x		
Classopollis sp.	x	x	x
Cicatricosisporites hughesi	x		x
C tripartitus	x		
Appendicisporites distocarinatus	x		
Tricolpites pannosus	x		
Dictyotosporites speciosus			x
Rouseisporites reticulatus			x
Microplankton: *Odontochitina operculata*	x	x	x
Cribroperidinium cf. *C. edwardsii*	x	x	x
Pterospermopsis sp.	x	x	x
Veryhachium sp.	x	x	x
Muderongia tetracantha			x
Diconodinium spinosum	x	x	x

DISCUSSION OF RESULTS AND CONCLUSIONS

The presence of C. paradoxa and T. pannosus in Core 1 identifies the assemblage as the T. pannosus Zone (2). Furthermore, the presence of a microplankton assemblage which includes O.operculata without either M. tetracantha or Ascodinium parvum identifies it with the O.operculata microplankton zone (4,5). Assemblages recovered from Core 2 ~~lack~~ have C. paradoxa but not the angiosperm T. pannosus, allowing identification of the C. paradoxa zone (2). The microplankton assemblage still indicates the presence of the O.operculata zone.

Both C. striatus and D. speciosus are present in assemblages from core 3 and indicate the presence of the C. striatus Sub-zone of the Dictyotosporites speciosus zone (2). Moreover, the microplankton species M. tetracantha is associated with O.operculata, thus identifying the microplankton assemblage with the O.operculata/ M. tetracantha zone (4,5).

In the Oodnadatta No. 1 well the T. pannosus Zone is present between 87 and 167 feet, the C. paradoxa Zone between 248 and 596 feet and the C. striatus sub-zone between 642 and 700 feet.

The boundaries of good biostratigraphic units (Zones, etc.) are essentially time parallel and may therefore cut across lithological (or formation) boundaries if these are diachronous. Thus a biostratigraphic correlation between Yardinna No. 1 and Oodnadatta No. 1 is intended to be a "time" correlation and the Zones can only be used to identify formations if these are assumed to be not diachronous.

If this is assumed and the Formations have been identified on lithological and/or geophysical evidence, then palynology can be used as confirmatory evidence. There is no evidence to suggest that this assumption is unreasonable over the distance of about ten miles.

Correlation of these zones with Oodnadatta No. 1 Well indicates that core 1 most probably lies within the Oodnadatta Formation and near the top of this unit, core 2 is biostratigraphically either low in the Oodnadatta Fm. or high in the Bulldog Shale, but is in the former on lithological evidence, and Core 3 is certainly high in the Bulldog Shale. The weight of palynological evidence thus shows that the well had passed through the Coorikiana Member or its correlative and that at total depth, the well was in Bulldog Shale. There is no evidence to suggest that the Coorikiana Member is absent through non-deposition or erosion.

WKH:CMH
25/3/1971.

W.K. HARRIS
ASSISTANT SENIOR PALYNOLOGIST

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APPENDIX C

CORE DESCRIPTIONS

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . YARDINNA Nº1 . . . . CORE NO. 1

LOCATION 20 MILES N.W. OODNADATTA . DEPTH 155'- 165'

LAT. 27° 20' 05" S . . . . DATE DRILLED 29-10-70

LONG. 135° 15' 32" E . . . . RECOVERY 7.3 FT. 73 %

ELEVATION GR. 479' DATUM S.L. FORMATION OODNADATTA

R.T. 484'

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
155			
156		10	
157		8	
158		15	
159		14	
160		11	
161		12	
162		15	

155'- 162.3'

CLAYSTONE : Grey very fine grained micromicaceous finely silty brittle, richly fossiliferous, cracks and breaks up on drying with conchoidal fractures.

mica: Shiny specks of dark and light mica assumed to be biotite and muscovite respectively.

silt: Very fine ?quartz silt in minor small pockets in the claystone.

pyrite: Very fine grained small aggregates of pyrite in thin lenses through the core but by no means abundant.

Fossils: Abundant calcareous shelly fauna spread throughout the core. Some of the shells look fibrous or prismatic in cross section and consist of small calcite needles or polygonal prisms. This was later identified as inoceramus.

slicken-sides: Occur at irregular intervals in the core forming shiny surfaces (mineral could not be identified) at approx: 45°-50° to the core and breakages are common at these points.

The silty pockets are absent in the lower half of the core which is a very fine grained homogeneous claystone (fractures irregularly). Dips appear to be very low to horizontal.

porosity: Negligible

CORE BARREL . MINDRILL

CORE BIT . DIAMOND

TIME—START . 0910 Hrs.

FINISH . 1105 Hrs.

LOGGED BY . I.J. TOWNSEND

DATE . 29-10-70

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 2

DRG. NO. S9129 Bd

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . YARDINNA . Nº1

LOCATION 20 MILES NW OODNADATTA

LAT. 27° 20' 05" S

LONG. 135° 15' 32" E

ELEVATION GR. 479 DATUM SL

R.T. 484

CORE NO. 1

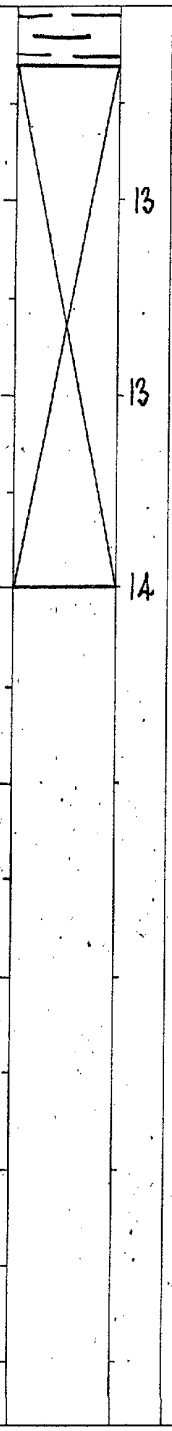
DEPTH 155' - 165'

DATE DRILLED 29-10-70

RECOVERY 7·3 FT. 73 %

FORMATION OODNADATTA

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
162			
163		13	
164		13	
165		14	



162·3' - 165' NO RECOVERY

Lower portion of core barrel was empty and core was broken. It is thus assumed that lower portion of core is the missing section due to it slipping out of barrel

CORE BARREL . MINDRILL

CORE BIT . DIAMOND

TIME—START . 0910 Hrs.

FINISH . 1105 Hrs.

LOGGED BY . I.J. TOWNSEND

DATE. 29-10-70

PETROLEUM GEOLOGY SECTION

SHEET 2 OF 2

DRG. NO. S9129a Bd

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL YARDINNA Nº1
LOCATION 20 miles N.W. OODNADATTA
LAT. 27° 20' 05" S
LONG. 135° 15' 32" E
ELEVATION GR. 479 DATUM S.L.
R.T. 484'

CORE NO. 2
DEPTH 245·5' - 255·5'
DATE DRILLED 31/10/70
RECOVERY 9·1 FT. 91 %
FORMATION OODNADATTA

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
245·5			
246		9	
247		39	CLAYSTONE Green-grey when wet, grey when dry. Brittle and breaks up on drying. Homogeneous -very fine grained non silty -very slightly calcareous, fossiliferous, pyritic, ? carbonaceous micromicaceous.
248		22	pyrite: Occurs as both aggregates and finely disseminated throughout the core.
249		23	?carbon: Fine black specks (apparently non shiny) spread throughout the core, is assumed to be carbon -possibly biotite but fineness prohibits full identification.
250		21	fossils: White calcareous shelly fauna (pelecypods) the prismatic layers of which are common through the core. This was later identified as inoceramus.
251		18	bedding: Horizontal.
			porosity: Negligible.
252		22	

CORE BARREL MINDRILL
CORE BIT DIAMOND
TIME-START 0745 Hrs.
FINISH 1117 Hrs.

LOGGED BY I.J. TOWNSEND
DATE 31-10-70

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 2 DRG. NO. S9130 Bd

P.F. Nº S6004 MD

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL YARDINNA Nº1

LOCATION 20 miles N.W. OODNADATTA

LAT. 27° 20' 05" S

LONG. 135° 15' 32" E

ELEVATION GR. 479 DATUM S.L.

R.T. 484

CORE NO. 2

DEPTH 245·5' - 255·5'

DATE DRILLED 31-10-70

RECOVERY 9·1 FT. 91 %

FORMATION OODNADATTA

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
252		22	
253		22	
254		21	
255			NO RECOVERY
255·5		24	

CORE BARREL MINDRILL

CORE BIT DIAMOND

TIME—START 0745 Hrs.

FINISH 1117 Hrs.

LOGGED BY I.J. TOWNSEND

DATE 31-10-70

PETROLEUM GEOLOGY SECTION

SHEET 2 OF 2

DRG. NO. S9130a Bd

P.F. Nº S6004 MD

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL YARDINNA Nº1

LOCATION 20 miles N.W. OODNADATTA

LAT. 27° 20' 05" S

LONG. 135° 15' 32" E

ELEVATION GR. 479 DATUM S.L.

R.T. 484

CORE NO. 3

DEPTH 492 - 512

DATE DRILLED 2-11-70

RECOVERY 20 FT. 100 %

FORMATION BULLDOG SHALE

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
492		0	492' - 512'
493		15	CLAYSTONE dominantly with abundant interbeds of cross-bedded grey green siltstone and fine sandstone, pyritic and occasionally fossiliferous. Bedding is horizontal but slump structures and cross-bedding give high apparent dips.
494		11	CLAYSTONE: Grey, very fine grained, micaceous and contains interbeds and pockets of fine green glauconitic sandstone and pockets of pyrite.
495		12	SANDSTONE (and SILTSTONE) Fine even grained quartz and dark green to almost black ovoids of glauconite. There is very little matrix, porosity fair (visual only). It is cross-bedded giving apparent dips in the core of ~20°.
496		14	Slumping is present throughout the core distorting the bedding.
497		13	pyrite: Aggregates occur in pockets in the sandstone and also finely disseminated pyrite in some parts of the fine sandstone.
498		13	fossils: Calcareous? Shelly fauna observed near the bottom of the core, otherwise rare.
499		12	No fluorescence observed.

CORE BARREL MINDRILL

CORE BIT DIAMOND

TIME—START 0900 Hrs.

FINISH 1553 Hrs.

LOGGED BY I.J. TOWNSEND

DATE 2-11-70

PETROLEUM GEOLOGY SECTION

DRG. NO. S9131 Bd

P.F. Nº S6004 MD

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . YARDINNA Nº1

LOCATION 20 miles N.W. OODNADATTA

LAT. 27° 20' 05"S

LONG. 135° 15' 32" E

ELEVATION GR. 479 DATUM S.L.

R.T. 484

CORE NO. 3

DEPTH 492'-512'

DATE DRILLED 2-11-70

RECOVERY 20 FT. 100 %

FORMATION BULLDOG SHALE

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
499		12	
500		20	
501		13	
502		12	
503		13	
504		12	
505		15	
506		15	

CORE BARREL . MINDRILL

CORE BIT . DIAMOND

TIME—START . 0900 Hrs.

FINISH . 1553 Hrs.

LOGGED BY . I.J. TOWNSEND

DATE . 2-11-70

PETROLEUM GEOLOGY SECTION

SHEET 2 OF 3

DRG. NO. G9131a Bd

P.F. Nº S6004 MD

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL YARDINNA Nº1

LOCATION 20 miles N.W. OODNADATTA

LAT. 27° 20' 05"S

LONG. 135° 15' 32"E

ELEVATION GR. 479 DATUM S.L.

R.T. 484

CORE NO. 3

DEPTH 492'-512'

DATE DRILLED 2-11-70

RECOVERY 20 FT. 100 %

FORMATION BULLDOG SHALE

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
506		15	
507		12	
508		14	
509		16	
510		18	
511		13	
512		20	TOTAL DEPTH

CORE BARREL. MINDRILL

CORE BIT. DIAMOND

TIME—START 0900 Hrs.

FINISH 1553 Hrs.

LOGGED BY

I.J. TOWNSEND

DATE. 2-11-70

PETROLEUM GEOLOGY SECTION

SHEET 3 OF 3

DRG. NO. S9131b Bd

P.F.Nº S6004 MD

APPENDIX D

TECHNICAL DATA

TECHNICAL DATA

DRILLING OPERATOR

The South Australian Department of Mines Mechanical and Drilling Branch, Dalgleish Street, West Thebarton, South Australia.

Drilling Rig

Make	:	Failing 1500
Type	:	Rotary drill
Rated capacity	:	1500 ft. with 2 3/8" drill pipe.
Motor	:	Cummins diesel
H.P. rating	:	185 B.H.P. at 1800 R.P.M.

Mast

Make	:	Failing 1500
Type	:	Open Front.
Rated Capacity	:	24,000 lbs

Pumps 2

Make	:	Gardner Denver
Type	:	FGFXG
Size	:	5" x 6"
Motor	:	Cummins deisel
H.P. rating	:	42.5 B.H.P.

Hole Sizes and Casing Details (Conductor pipe only)

Casing size	6" OD
Weight	10 lbs/ft.
Grade	Water bore (Stewart & Lloyd)
Guide shoe	none
Centralisers	not used
Method used	Cemented between conductor pipe and drill hole.

The following is a table of bits used during drilling with the Failing 1500 Truck mounted Rig.

Table 1

No. of Bits	Size	Type	Make
1	7½"	Tricone V3	Varel
1	5 5/8"	3 Blade Insert	Hawthorne
1	4¾"	Tricone V3	Varel
1	3.907"	Diamond face discharge core bit.	Mindrill

Drilling Fluids

A normal bentonite mud was used with caustic soda and dextrid to control mud properties. No serious mud losses occurred during the drilling operations but shales and clays added to mud weight and viscosity, requiring thinning of the mud and occasional replacement with fresh mud. The following is a list of materials used.

Material	Quantity
Bentonite	9 sacks
Cement	2 sacks
Dextrid	5 sacks
Quik Trol	20 lbs
Myrtan	1 sack
Caustic	28 lbs
Barafloc	2 lbs

COMPOSITE WELL LOG

SOUTH AUSTRALIAN DEPARTMENT OF MINES

STRATIGRAPHIC WELL

YARDINNA Nº1

STATE: SOUTH AUSTRALIA. PETROLEUM TENEMENT: P.E.L. 5 & 6 4 MILE SHEET: OODNADATTA BASIN: Western Great Artesian Basin

WELL STATUS: Dry and Abandoned

LOCATION: Lat. 27° 20' 05"S
Long. 135° 15' 32"E

ELEVATION: G.R. 479
R.T. 484

DATE SPUDDED: Oct. 26 1970
DATE DRILLING STOPPED: Nov. 2 1970
DATE RIG RELEASED: Nov. 3 1970
TOTAL DEPTH: 512 ft.

HOLE SIZE:

INCHES	FROM	TO
7½"	0	26
5⅝"	26	54
4¾"	54	512

CASING:

INCHES	DEPTH	CEMENTED TO
6	24	Bottom (26')

CEMENT PLUGS: None set. Metal cap screwed onto well head.

TYPE OF LOG	16. IN. NORMAL	64. IN. NORMAL	6 FT. LATERAL	S.P.	NEUTRON	GAMMA RAY
DATE OF RUN	2 Nov. 1970	2 Nov. 1970	2 Nov. 1970	2 Nov. 1970	2 Nov. 1970	2 Nov. 1970
FIRST READING	512	512	512	512	512	512
LAST READING	4.0	4.0	18	20	10	5
INTERVAL MEASURED	472	472	494	492	502	507
CASING-LOGGER	24	24	24	24	24	24
CASING-DRILLER	24	24	24	24	24	24
DEPTH REACHED	512	512	512	512	512	512
BOTTOM-DRILLER	512	512	512	512	512	512
MUD TYPE	Water base	Water base	Water base	Water base	Water base	Water base
DENSITY/ VISCOSITY	9·3/50	9·3/50	9·3/50	9·3/50	9·3/50	9·3/50
PH/ FLUID LOSS	11/3	11/3	11/3	11/3	11/3	11/3
MUD RESISTIVITY	Not Measured	—	—	—	—	—
RECORDED BY	L.K. West	L.K. West	L.K. West	L.K. West	L.K. West	L.K. West
WITNESSED BY	I.J. Townsend	I.J. Townsend	I.J. Townsend	I.J. Townsend	I.J. Townsend	I.J. Townsend

OTHER SURVEYS:

TYPE	FROM	TO
Temp Log	20'	512'
Point. Resist.	512'	15'

DRILLED BY: S.A. DEPARTMENT OF MINES.
DRILLING METHOD: ROTARY.
LOGGED BY: S.A. DEPARTMENT OF MINES.

LITHOLOGICAL REFERENCE

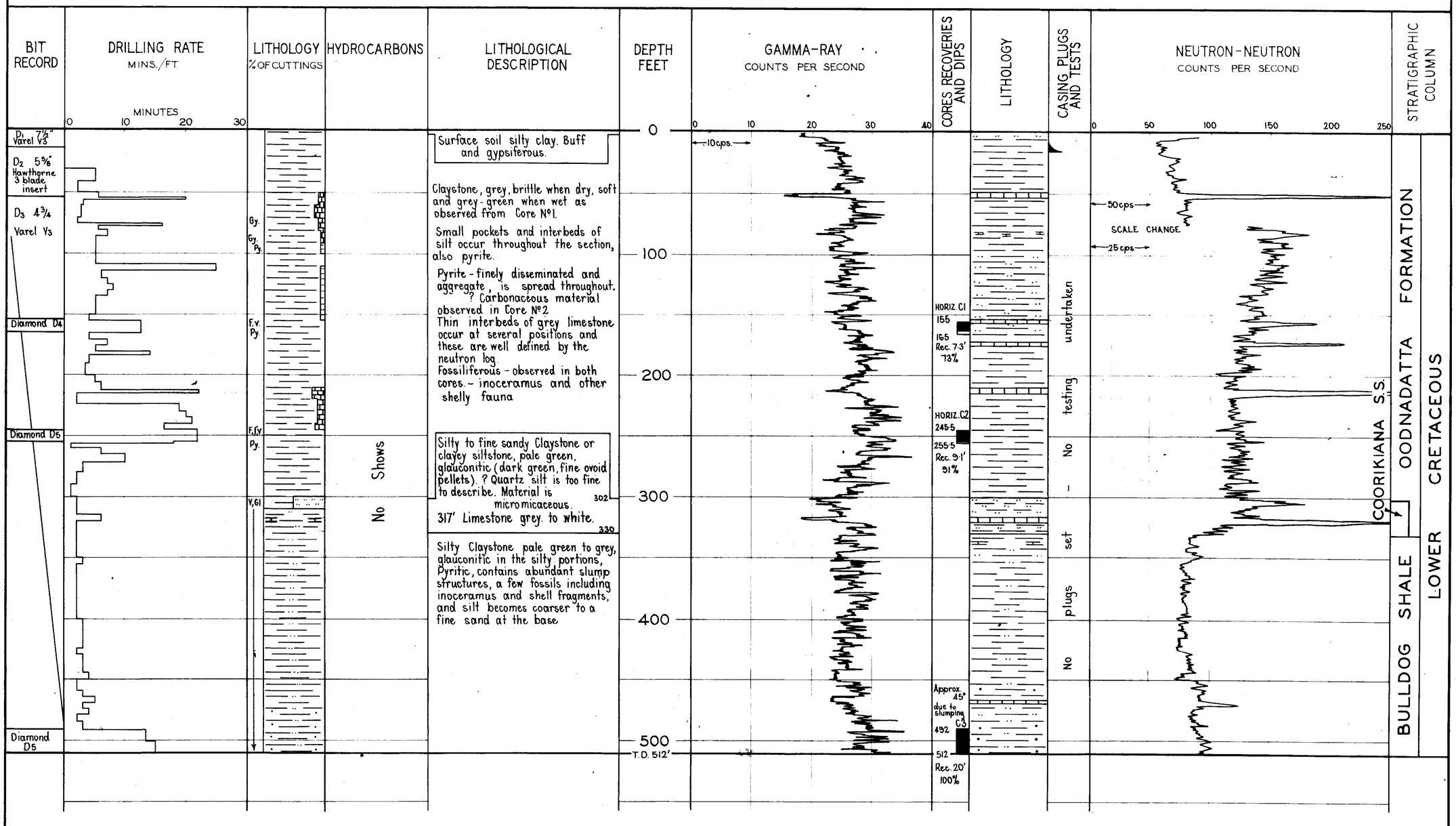
- Shale claystone
- Sandy shale
- Silty shale
- Siltstone
- Argillaceous siltstone
- Sandy* siltstone
- Limestone
- Dolomite
- Coal
- Sandstone
- Granular
- Pebble
- Lithic
- Anhydrite
- Pyrite
- Micaceous
- Carbonaceous
- Ferruginous
- Kaolinitic
- Glauconitic
- Garnet
- Calcareous
- Dolomitic
- Oolitic
- Fossiliferous Fragmental or Indeterminate
- Feldspathic
- Gypsum Gypsiferous

WELL SYMBOLS

- CORE INTERVAL AND NUMBER
- PLUGGED INTERVAL
- CASING SHOE
- FLUORESCENCE
- CUT WITH CCl_4

LITHOLOGY BY: I.J. Townsend
COMPILED BY: I.J. Townsend
DRAFTED BY: R. Herraman
DRAWING NUMBER: 70-1101 Bd

DEPARTMENT OF MINES — SOUTH AUSTRALIA
YARDINNA Nº1 WELL
OODNADATTA 1:250000
COMPOSITE WELL LOG
PETROLEUM SECTION
I.J. Townsend GEOLOGIST
DRN. I.J.T. TCD. R.H.
SCALE: As shown
70-1101 Bd
CKD.
SEN. GEOLOGIST
EXD.
DATE: 18 Nov 1970



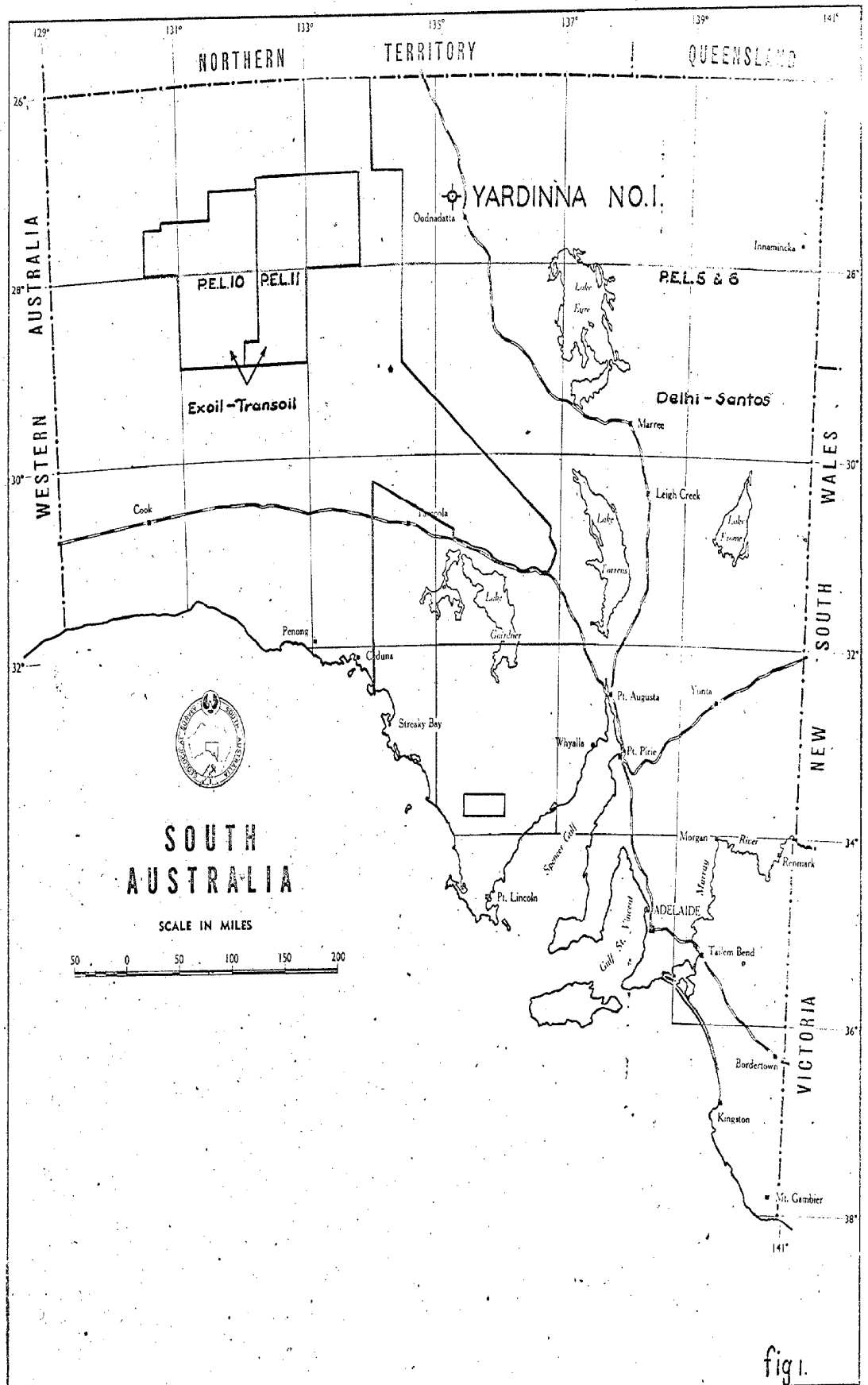
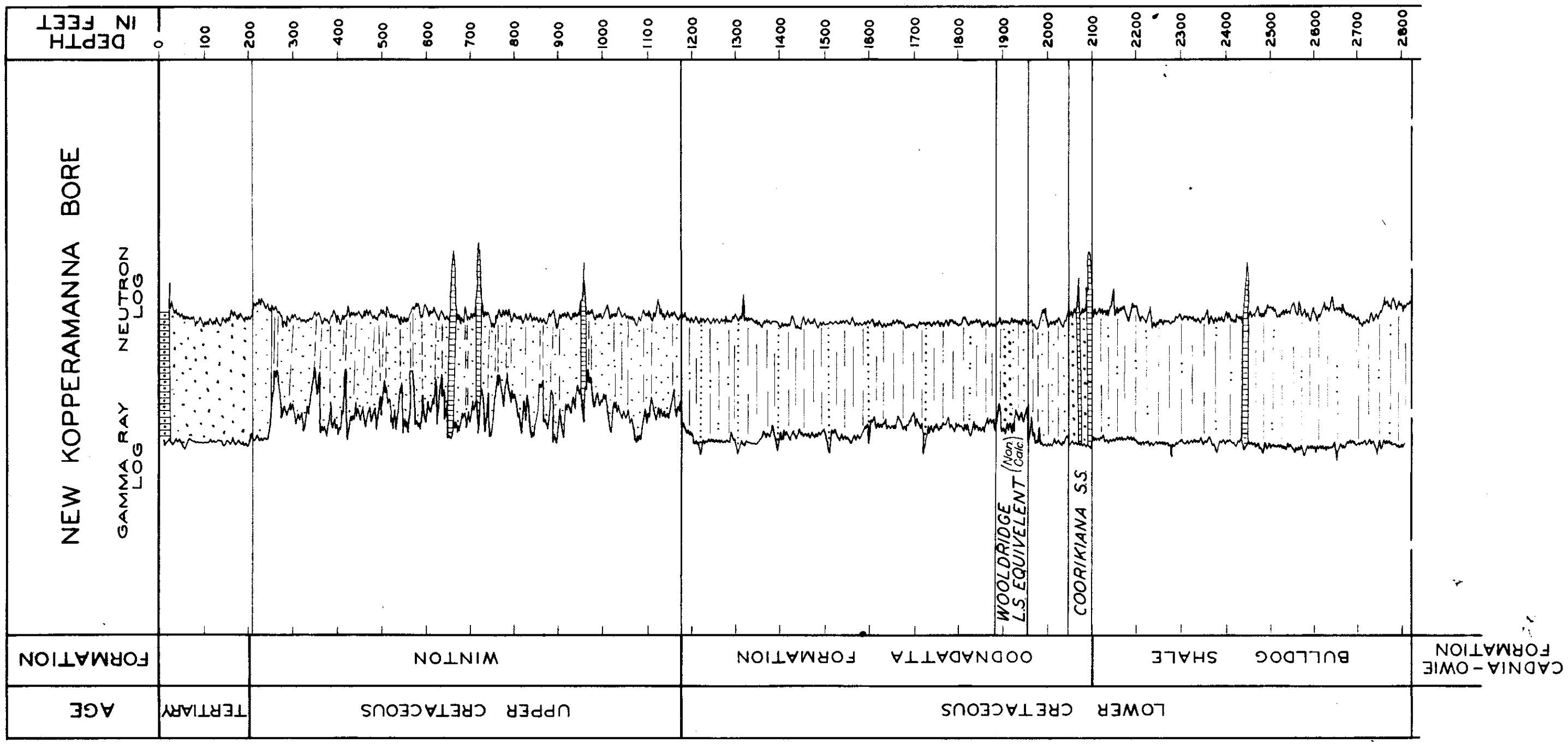


fig 1.

	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: As shown.
Compiled: I.J.T.	YARDINNA Nº 1	Date: 2 Feb 1971
Drn: J.M.B. Ckd: L.V.W.	LOCALITY MAP	Drg. No. S9151 Bd

P.F. Nº S5850 994-2



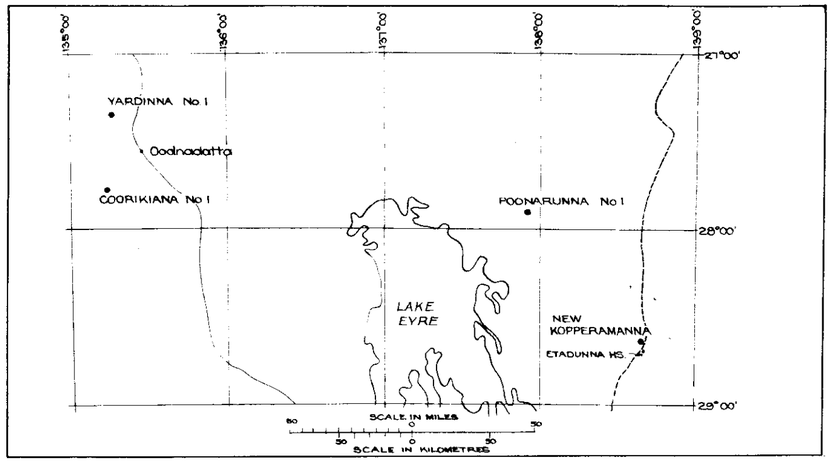
TOTAL DEPTH OF WELL IS 3256.5 FEET BUT PROBES COULD NOT PENETRATE BELOW 2800 FEET.

FIG. 2

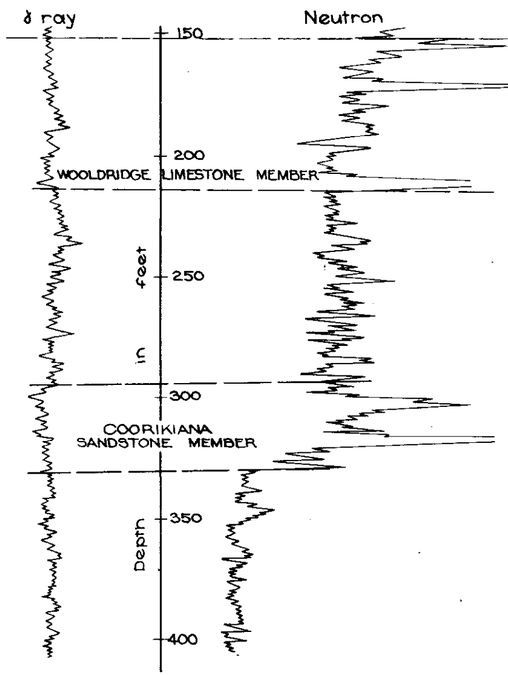
PETROLEUM SECTION	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: AS SHOWN
Compiled: I.T.	NEW KOPPERAMANNA BORE	Date: 23 MARCH 1971
Drn. A.R. | Ckd. L.V.W.	LITHOLOGICAL INTERPRETATION FROM GAMMA RAY AND NEUTRON LOGS	Drg. No. 71-242 Ca

1M—2.70 A1811

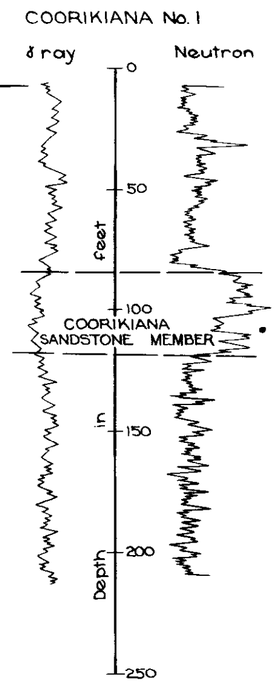
LOCALITY PLAN



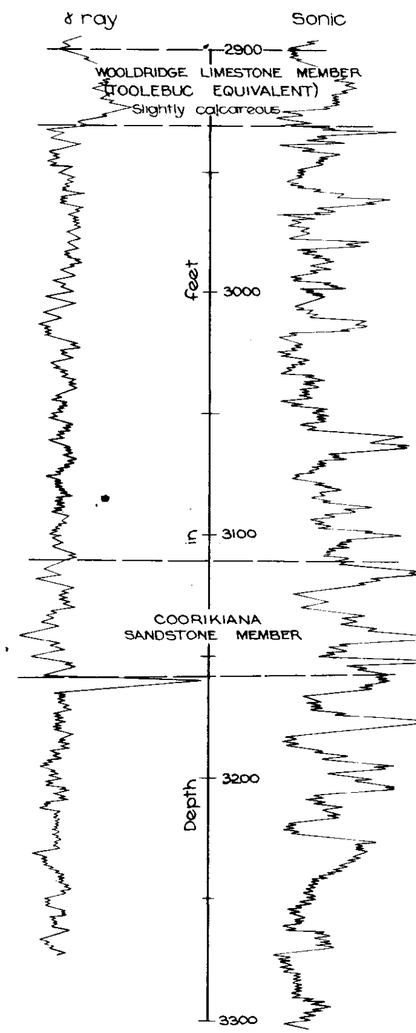
YARDINNA No. 1



COORIKIANA No. 1



POONARUNNA No 1



NEW KOPPERAMANNA

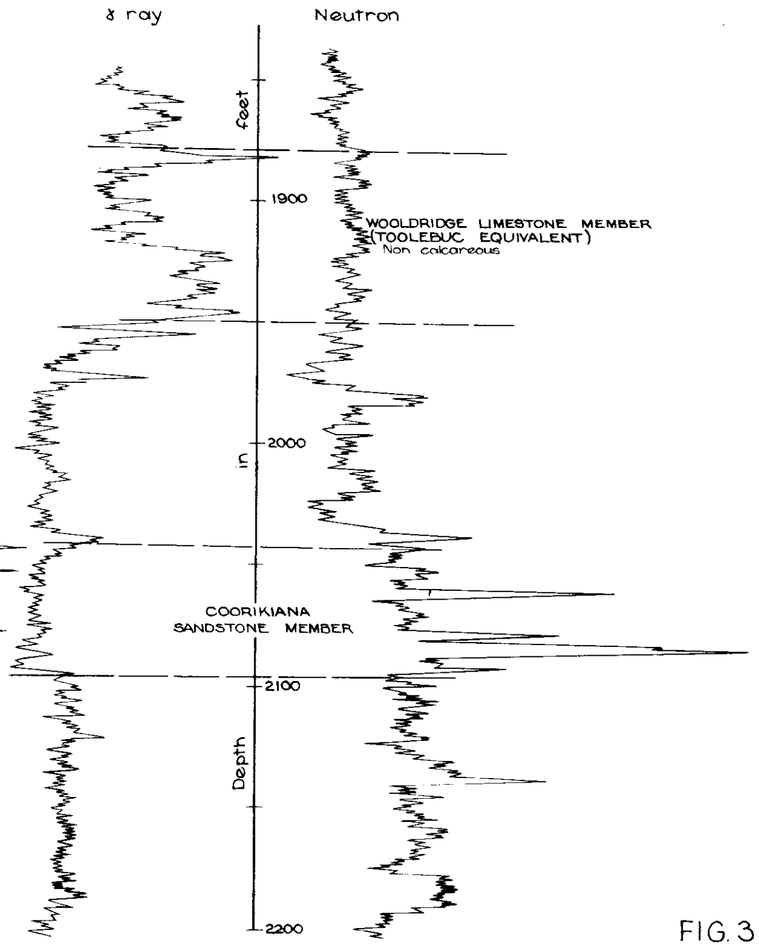
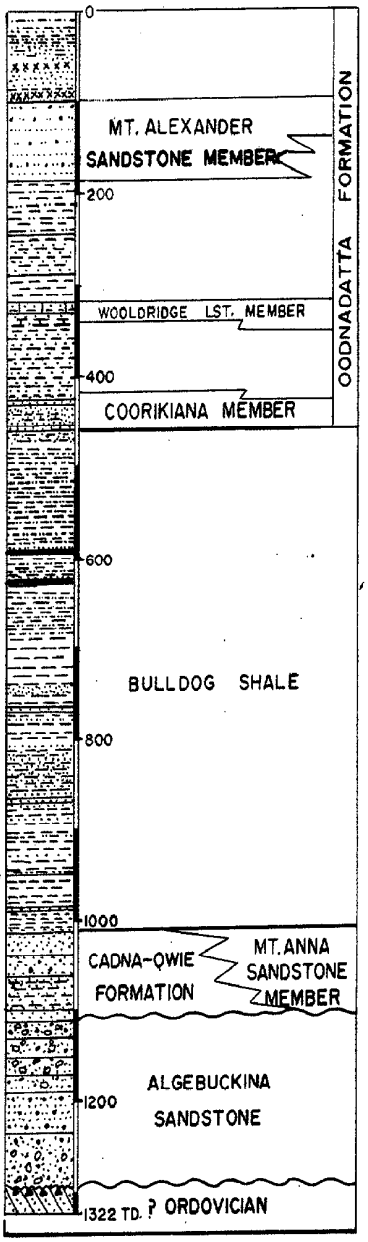


FIG. 3

PETROLEUM SECTION	**DEPARTMENT OF MINES — SOUTH AUSTRALIA**	Scale: As shown
Compiled: I.T.	GAMMA RAY & NEUTRON/SONIC CORRELATION DIAGRAM OF FOUR WESTERN GREAT ARTESIAN BASIN WELLS	Date: 19 March '71
Drn. SLT | Ckd. L.V.W.		Drg. No. 71-243 BC

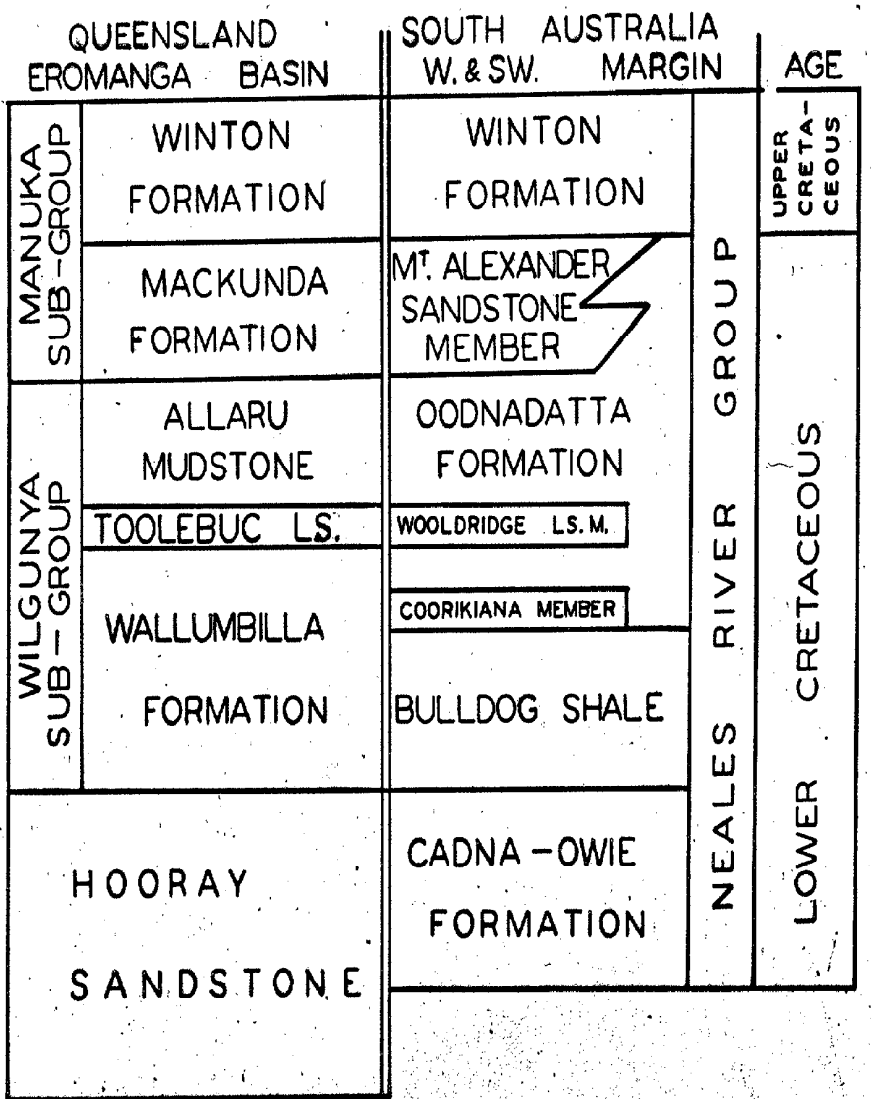


After H. WOPFNER 1970

FIG. 4.

PETROLEUM SECTION	**DEPARTMENT OF MINES – SOUTH AUSTRALIA**	Scale: Depths in feet.
Compiled: I.J.T.	GREAT AUSTRALIAN ARTESIAN BASIN WESTERN PORTION	Date: 31 March 1971
Drn. J.M.B. Ckd. L.V.W.	STRATIGRAPHIC UNITS AND LITHOLOGICAL LOG OF SANTOS OODNADATTA No.1. WELL	Drg. No. S9199 Bd.

1M—2,70 A1810



AFTER H. WOPFNER IN
HANDBOOK OF SOUTH AUSTRALIAN GEOLOGY P. 141.

FIG. 5

PETROLEUM SECTION	DEPARTMENT OF MINES – SOUTH AUSTRALIA	
Compiled: L. Townsend.		Date: 14th April 1971.
Drn. D.J.M. Ckd. L.V.W.	GREAT AUSTRALIAN ARTESIAN BASIN	Drg. No. S9257
	NOMENCLATURE AND CORRELATION DIAGRAM	BC

1M—2.70 A1610