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DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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OOLDEA NO. 1 AND REID NOS 1 and 1A WELL COMPLETION REPORTS

GEOLOGICAL SURVEY

By

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CONTENTS

TABLE

FIGURES

APPENDICES

APPENDIX A: Core and Cuttings Descriptions

Lithological Index to Core Descriptions
A1. Ooldea No. 1
A2. Reid No. 1
A3. Reid No. 1A

APPENDIX B: Petrological Reports

APPENDIX C: Biostratigraphy

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ABSTRACT

Three stratigraphic wells (Ooldea No. 1, Reid No. 1, and Reid No. 1A) were drilled by the South Australian Department of Mines and Energy during 1976 in an area that includes margins of the Officer, Arckaringa and Eucla basins. Principal objectives were to test the stratigraphy, and to identify seismic refractors, over mapped Bouguer gravity and magnetic anomalies. Of particular importance was identification of a seismic refractor with a velocity of 3.14 km/sec that was originally interpreted to represent Permian sediments. Subsequent drilling found it to originate within a ?Palaeozoic sandstone, siltstone and dolomite sequence.

Ooldea No. 1 was drilled in an area of relatively high magnetic intensity and low Bouguer gravity. It penetrated 27 metres of Miocene Nullarbor Limestone overlying 2 metres of ?Tertiary claystone, overlying 223 metres of ?early Palaeozoic sandstones, siltstones and dolomites and 35 metres of ?Proterozoic sandstone and quartzite resting on crystalline basement.

Reid Nos. 1 and 1A were drilled in an area of relatively low magnetic intensity and high Bouguer gravity. They penetrated 33 metres of Eocene Wilson Bluff Limestone overlying 14.5 metres of Eocene Pidinga Formation, overlying 175 metres of ?early Palaeozoic sandstones and siltstones.

INTRODUCTION

Ooldea No. 1 and Reid No. 1 were drilled to obtain stratigraphic information in a little known area then thought to include portions of the Eucla, Arckaringa and Officer basins (Figs 1 & 2). Drilling commenced in July 1976 and was completed in October 1976.

The three major objectives in drilling these wells were:

(1) identification of seismic events recorded during a refraction seismic survey (Milton, 1974);

(2) elucidation of geological features related to Bouguer gravity and magnetic anomalies in the area; and

(3) testing possible continuity between Permian sediments of the Denman and Arckaringa basins, and thereby determining economic potential for Permian coal.

Reid No. 1 was drilled to penetrate seismic horizons with refraction velocities of 3.14 and 4.10 km/s (Fig. 3). This well was sited within a gravity anomaly (hereafter termed the Reid Gravity Anomaly) north of the Karari Fault in a region of deep magnetic basement (Figs 4 & 5).

The Reid Gravity Anomaly is a complex feature that possibly results from density changes within basement (Milton, 1974) or from a structural depression containing high-density sediments, akin to the gravity anomaly coincident with the Tallaringa Trough (Milton, 1975).

The northern part of the Reid Gravity Anomaly (Fig. 4) possibly relates to the presence of a thick dolomite sequence, since both gravity and magnetic features there are similar to those in the Tallaringa Trough, where SADME Wilkinson No. 1 intersected 370 m of carbonates and minor shaly sediments overlying at least 140 metres of siltstones with interbedded halites (Lydyard, 1979).

The northwestern edge of the Reid Gravity Anomaly coincides with a northwesterly magnetic trend (Fig. 5) that may signify faulting at depth (west side down). High magnetic intensities east of this interpreted fault possibly define a "basement high", from which sediments thicken westward into the Eucla Basin and eastward into the Tallaringa Trough.

The southern part of the Reid Gravity Anomaly (south of the Karari Fault) covers shallow crystalline basement identified during industry drilling in search of uranium, and therefore probably expresses a density change within "basement" (Teluk, 1974).

Ooldea No. 1 was sited off the Reid Gravity Anomaly, north of the Karari Fault in an area of relatively high total magnetic intensity (Figs 4 & 5). It was drilled to penetrate seismic horizons exhibiting refraction velocities of 3.14 and 5.13 km/s (Fig. 3).

The seismic refractor exhibiting 3.14 km/s velocity in this region was considered as possibly associated with rocks of Permian age (Milton, 1974). Permian sediments were intersected in Wallira West No. 1, northeast of the Ooldea-Reid area in the Tallaringa Trough (Fig. 6). Permian sediments also occur in the Denman Basin, southwest of the Ooldea-Reid area (Harris and Ludbrook, 1966).

Seismic horizons with refraction velocities of 4.10 and 5.13 km/s were considered by Milton (1974) to represent the upper surfaces of rock sequences respectively ?Cambrian and Adelaidean in age.

Both Ooldea No. 1 and Reid No. 1 were drilled as follows:

(1) The upper portion of the hole, through hard cavernous limestones, was air drilled with downhole-hammer bits and then completed with 5" I.D. steel casing.

(2) The intermediate portion, to the top of hard formation suitable for diamond coring, was drilled using mud circulation and rock roller bits and then cased with 3" I.D. steel casing.

(3) The lower portion was drilled to total depth using a Mindrill diamond-drilling rig capable of continuous wireline coring.

Because of lost circulation problems when drilling the intermediate portion of Reid No. 1, and the subsequent lack of cuttings returns between 37.5 m and 55.0 m depths, Reid No. 1A was drilled to core that section.

WELL HISTORY: OOLDEA No. 1

Well Name and Number

South Australian Department of Mines Ooldea No. 1

Location

Latitude: 30°27' 42" S

Longitude: 131°36' 52" E

Ooldea No. 1 is situated 12.0 km east of Watson near the track running parallel to and north of the Trans Australian Railway.

Map Reference

1:250 000 Ooldea

1:100 000 Maralinga (5237)

Elevation

Ground Level: 101 m a.m.s.l.

Total Depth

295.4 m

Drilling Commenced

14th September, 1976

Drilling Completed

14th October, 1976

Actual Drilling Time

22 days (10 hour shift/day, 6 days/week)

Well Completed

16th October, 1976

Rig Released

16th October, 1976

Status

Abandoned

Drilling Contractor

S.A. Department of Mines,
Mechanical and Drilling Branch,
Dalgleish Street,
THEBARTON, S.A., 5031

Drilling Rigs

The upper section, to 58.0 m depth, was drilled using a Mayhew rotary rig. The lower section was drilled by a Mindrill 3000 diamond rig.

Hole Sizes

9 5/8"	to	1.0 m
6 1/2"	to	54.0 m
4 1/2"	to	58.0 m
NQ (2 3/4")	to	140.0 m
BQ (2 3/16")	to	295.4 m

Bit Record

9 5/8"	rock roller	1 used
6 1/2"	T. 6 hammer	1 used
4 1/2"	T. 6 hammer	1 used
NQ (2 3/4")	diamond core	2 used
BQ (2 3/16")	diamond core	2 used

Casing and Cementing Details

Ooldea No. 1 was cased using 5" I.D. steel casing to 54.0 m and 3" I.D. steel casing to 58.0 m. At the completion of the hole the 5" casing was withdrawn.

Water Supplies

Drilling water supplies were obtained from a bore (State No. 5237 000 WW 00034) drilled adjacent to Ooldea No. 1 in July 1976 to 55 metres depth.

Camp water supplies were railed to Watson from Port Augusta.

Formation Sampling

Cuttings were taken for every 1.5 m drilled in the interval surface to 36 m; and every 2.5 m from 36 m to 58 m. Cores were cut

continuously from 58.0 m to 295.4 m. Total core recovery was 237.4 m (99.6%). All cores are stored in the Core Library of the South Australian Department of Mines and Energy, Glenside, Adelaide.

Logging

Logging was carried out by the Department of Mines Failing Log-master unit. Logging depths were measured from ground level:

Log		From (m)	To (m)	Scale
Gamma		296	2	1:500
Neutron-Neutron		malfunctioned		
S.P.:	Run I	240	102	1:500
	Run II	293	252	1:500
Point Resistivity:	Run I	240	102	1:500
	Run II	294	252	1:500
16" Normal Resistivity				
	Run I	239	105	1:500
	Run II	294	246	1:500
64" Normal Resistivity				
	Run I	239	105	1:500
	Run II	294	246	1:500
6' Lateral Resistivity				
	Run I	235	95	1:500
	Run II	294	248	1:500
Temperature		295	1	1:500

WELL HISTORY: REID NOS 1 & 1A

Well Names and Numbers

South Australian Department of Mines Reid No. 1 and South Australian Department of Mines Reid No. 1A.

Location

Latitude: 30°35' 00" S

Longitude: 131°29' 54" E

Reid No. 1 is situated 10.5 km south of Watson near the track to White Well homestead.

Reid No. 1A is situated one metre west of Reid No. 1.

Map Reference

1:250 000 OOLDEA

1:100 000 Reid (5136)

Elevation

Ground Level: 98 m a.m.s.l.

Total Depth

Reid No. 1 : 226.4 m

Reid No. 1A: 53.6 m

Drilling Commenced

Reid No. 1 : 22nd July, 1976

Reid No. 1A: 20th September, 1976

Drilling Completed

Reid No. 1 : 18th September, 1976

Reid No. 1A: 22nd September, 1976

Actual Drilling Times

Reid No. 1 : 8 days (10 hour shift/day)

Reid No. 1A: 3 days (10 hour shift/day)

Well Completed

Reid No. 1 : 18th September, 1976

Reid No. 1A: 23rd September, 1976

Rig Released

Reid No. 1 : 18th September, 1976

Reid No. 1A: 23rd September, 1976

Status

Both wells were abandoned.

Drilling Contractor

S.A. Department of Mines,
Mechanical and Drilling Branch,
Dalgleish Street,
THEBARTON, S.A., 5031

Drilling Rigs

The section in Reid No. 1 from surface to 95.4 m was drilled by a Mayhew 1000 rotary rig. The section from 95.4 m to 226.4 m was drilled by a Mindrill 3000 diamond rig.

Reid No. 1A was drilled by a Mindrill 3000 diamond rig.

Hole Sizes

Reid No. 1 :	6 1/2"	to	49.5 m
	4 3/4"	to	95.4 m
	NQ (2 3/4")	to	144.6 m
	BQ (2 3/16")	to	226.4 m
Reid No. 1A:	4 1/2"	to	0.8 m
	3 1/2"	to	5.5 m
	NQ (2 3/4")	to	21.5 m
	BQ (2 3/16")	to	53.6 m

Bit Record

Reid No. 1	6 1/2"	T. 6 hammer	1 used
	4 3/4"	rock roller	1 used
	NQ (2 3/4")	diamond core	1 used
	BQ (2 3/16")	diamond core	1 used
Reid No. 1A	4 1/2"	diamond core	1 used
	3 1/2"	diamond core	1 used
	NQ (2 3/4")	diamond core	1 used
	BQ (2 3/16")	diamond core	1 used

Casing and Cementing Details

Reid No. 1 was cased using 5" I.D. steel casing to 49.5 m and 3" I.D. steel casing to 95.4 m. On completion of the hole the 5" casing was withdrawn.

Reid No. 1A was not cased.

Water Supplies

Drilling water supplies were obtained from a bore (State No. 5237 000 WW 00034) drilled adjacent to Ooldea No. 1 in July, 1976 to 55 m depth.

Camp water supplies were railed to Watson from Port Augusta.

Formation Sampling

In Reid No. 1 cuttings samples were taken for every 2.5 m drilled in the interval surface to 95.4 m, and cores were cut

continuously from 95.4 m to 226.4 m depths. Total core recovery was 100%.

In Reid No. 1A, cores were cut from 0.8 m to 53.6 m depths. Total recovery was 33.8 m (64%).

All cores are stored in the Core Library of the South Australian Department of Mines and Energy, Glenside, Adelaide.

Logging

Logging was carried out by the Department of Mines Failing Logmaster unit. Logging depths were measured from ground level:

Log	From (m)	To (m)	Scale
Gamma	192	2	1:500
Neutron-Neutron	191	2	1:500
S.P.	189	94	1:500
Point Resistivity	189	36	1:500
16" Normal Resistivity	190	95	1:500
64" Normal Resistivity	190	97	1:500
6' Lateral Resistivity	190	46	1:500
Temperature	193	4	1:500

REGIONAL GEOLOGY

1. Structure

The geological structure of the southwestern portion of South Australia is inferred largely from regional gravity and aeromagnetic surveys together with limited seismic surveys and drilling; Cainozoic sediments blanket almost all of the region.

The main geological feature of the region is the Gawler Block, a crystalline "basement" complex of Proterozoic and Archaean gneisses and gneissic granites. To the west and north respectively are the Mallabie Depression and the Tallaringa Trough (Fig. 6). The Mallabie Depression contains at least 1 300 metres thickness of: ?Proterozoic and ?Cambrian rocks; Permian sediments (of the Denman Basin); and Cretaceous and Cainozoic sediments (of Eucla Basin). All of the above were

intersected in Outback Oil Co. Mallabie No. 1 (Fig. 2) drilled near the deepest part of the onshore depression (Scott and Speer, 1969). The Tallaringa Trough is approximately defined by a depression in magnetic "basement" which is coincident with a Bouguer gravity high. The southeastern margin of this half-graben is bounded by a major fault (the Karari Fault; after Townsend, 1971) with an inferred vertical displacement of about 1 km downthrown to the northwest (Milton, 1975).

2. Stratigraphy

(a) Proterozoic

Mallabie No. 1 intersected 425 metres of ?Proterozoic sandstones and volcanics overlying Proterozoic granitic gneiss. Similar volcanics were encountered in Nullarbor Nos. 3, 4 and 8 (Fig. 2); they are tentatively correlated with the Gawler Range Volcanics of mid-Carpentarian age (Thomson, 1970).

(b) Phanerozoic

Four major phases of Phanerozoic sedimentation have been recognised in the southwestern part of South Australia: ?Cambro-?Devonian phase, within the Officer Basin; Permo-Carboniferous phase, within the Arckaringa and other basins; Cretaceous phase, within the Eucla Basin; and Eocene - Miocene phase, also within the Eucla Basin.

(i) ?Cambro - ?Devonian sedimentation occurred within the Officer Basin, a poorly defined but extensive intracratonic depression exhibiting a maximum depth to magnetic basement of about 5 000 metres, just south of the Musgrave Block. At Observatory Hill (Fig. 2), the nearest outcrop of Officer Basin sediments to the Ooldea-Reid area, the Observatory Hill Beds (Wopfner, 1969) are comprised of red, green and grey siltstones, sandstones and carbonates. These may be Cambrian in age (Gatehouse, 1975). Similar "red-brown" sequences containing carbonate interbeds were intersected in drill

holes in the Maralinga area (Barnes, 1956; Ludbrook, 1961); Mallabie No. 1 (Scott and Speer, 1969); and in Nullabor No. 6 (Youngs, 1974), shown in Figure 2. The wells Hughes Nos. 1, 2 and 3, Denman No. 1, Cook No. 1 and the Cook Railway Siding Bore, all drilled near the railway line west of Ooldea-Reid, terminated in possible equivalents of the Observatory Hill Beds (Ludbrook, 1965, 1966; Outback Oil Co. N.L., 1966).

(ii) Permian sediments occur both southwest and northeast of the Ooldea-Reid area. To the southwest, in the Denman Basin (Fig. 1), Early Permian grey claystones that were deposited in a lagoonal environment have been correlated with Early Permian glacigene sediments of the Boorthanna Formation, in the Arckaringa Basin to the northeast (Harris and Ludbrook, 1966).

(iii) Sands, grits, and claystones of Early Cretaceous age were identified in all holes previously drilled south and southwest of Reid No. 1 (Fig. 6). Such sediments generally thicken toward the Great Australian Bight (Youngs, 1974).

(iv) Tertiary stratigraphy has been studied from outcrop and drilling along the eastern margin of the Eucla Basin and along the southern shoreline (Lindsay and Harris, 1973). The oldest Tertiary sediments are non-marine, lignitic sediments of the middle Eocene Pidinga Formation, deposited near the margins of the basin, and marine calcareous sandstones (the Hampton Sandstone) deposited farther basinward. These are overlain by a thick, widespread succession of middle to late Eocene age marls and limestones (Wilson Bluff Limestone). An episode of emergence during the Oligocene was followed by renewed marine sedimentation during the early Miocene (Nullarbor Limestone).

THE RESULTS OF DRILLING

1. Stratigraphy

Stratigraphic results of recent drilling are summarised in Table 1 and on the composite well logs (Figs 7 and 8). Core and cuttings descriptions and petrological reports are presented in Appendices A and B.

(a) Proterozoic Crystalline "Basement": "Basement" encountered at 287 metres depth in Ooldea No. 1 is a pink, medium grained adamellite gneiss. By Rb-Sr isotopic dating the gneiss probably is less than 1 750 million years old (Appendix A).

(b) ?Proterozoic: ?Proterozoic sediments that overlie crystalline "basement" in Ooldea No. 1 consist of hard, relatively clean, cross-bedded fine grained sandstones. The lack of feldspars, dolomite and ferruginous material, and the presence of abundant quartz overgrowths, contrasts with the overlying ?Palaeozoic sequence and together with an apparently uncomformable relationship suggests a ?Proterozoic age for these rocks. Except in the upper three metres, the unit is generally of low permeability (Appendix A).

A reddish-brown, moderately hard, medium to granular quartz sandstone of Adelaidean or Carpentarian age that occurs below the ?Adelaidean Mallabie Volcanics in Mallabie No. 1 (Thomson, 1970) is descriptively similar to ?Proterozoic sandstones in Ooldea No. 1. Thomson (1970) considered the sandstone in Mallabie No. 1 as a possible equivalent of the Backy Point Formation, which occurs on the Gawler Block to the east (Mason et al., 1978).

(c) ?Early Palaeozoic: The ?Early Palaeozoic section is divisible into three lithologic units (Table 1).

The basal Unit I overlies ?Proterozoic sediments in Ooldea No. 1, and is the unit in which Reid No. 1 terminated. In the upper part of Unit I are interbedded red siltstones and sandstones,

TABLE 1: Stratigraphic Results of Drilling

Formation	Age	OOLDEA NO. 1			REID NO. 1			REID NO. 1A		
		Depth to Fm. Top (m)	Depth (m)	Thick. (m)	Depth to Fm. Top (m)	Depth (m)	Thick. (m)	Depth to Fm. Top (m)	Depth (m)	Thick. (m)
Un-named	Quaternary	0.0	+101.0	0.4	0.0	+98.0	4.0	0.0	+98.0	4.0
Nullarbor Lst.	Miocene	0.4	+100.6	27.1	-	-	-	-	-	-
Wilson Bluff Lst.	Eocene	-	-	-	4.0	+94.0	33.0	4.0	+94.0	33.0
Pidinga Fm.	Eocene	-	-	-	37.0	+61.0	14.5	37.0	+61.0	14.5
Undifferentiated	?Tertiary	27.5	+73.5	2.0	-	-	-	-	-	-
'Unit III'	?Early Palaeozoic	-	-	-	51.5	+46.5	43.0	51.5	+46.5	43.5+
'Unit II'	" "	29.5	+71.5	146.5	94.5	+3.5	94.5			
'Unit I'	" "	176.0	-75.0	76.0	189.0	-91.0	37.5+			
Un-named	?Proterozoic	252.0	-151.0	35.0						
"Crystalline Basement" (Un-named)	Proterozoic	287.0	-186.0	8.4+						

with thin bands and intraformational pebbles of dolomite and shale. The lower part of this unit is 22 metres thick and is comprised of poorly sorted granule to pebble sandstones with rounded quartzite, shale and other lithic fragments.

A one metre thick basal pebble gravel and significant change in lithology accords with an erosional contact with the underlying ?Proterozic rocks.

This lithological unit is tentatively correlated with the Observatory Hill Beds (Wopfner, 1969) that crop out in type section at Observatory Hill (Fig. 2). Both these sequences contain thin flat-bedded dolomites and red feldspathic and micaceous sandstones and silstones, although at Ooldea-Reid no chert nodules or breccias (considered characteristic of the Observatory Hill Beds) have been recognised. Other dolomite and sandstone-shale red beds were recorded in the Hughes, Denman and Cook groups of wells, east of Reid-Ooldea (Fig. 2); in Murnaroo No. 1 to the north; and in Wilkinson No. 1 to the northeast.

Unit II overlies Unit I in both Ooldea No. 1 and Reid No. 1. Unit II is comprised of a pale reddish brown, fine to coarse grained sandstone (partly silty in Ooldea No. 1) exhibiting fewer feldspars, dolomites and intraformational conglomerates than Unit I.

It seems possible that Unit II represents a sandy facies of some portion of the Observatory Hill Beds. Alternatively it may be correlated with the Trainor Hill Sandstone (Kreig, 1973), red feldspathic and micaceous crossbedded sandstones and siltstones of ?Cambrian age that crop out in the northeastern Officer Basin.

Unit III overlies Unit II in Reid No. 1 but is absent in Ooldea No. 1. Unit III is comprised of a pale grey, homogeneous pyritic clayey siltstone, thought at the time of drilling to be Permian in age. Detailed examination of four samples failed

to reveal diagnostic fossils. These sediments lithologically resemble both the Lower Permian Stuart Range Formation of the Arckaringa Basin and the Lower Cretaceous Madura Formation of the Eucla Basin. Those formations invariably contain abundant marine fossils, however, and in consequence Unit III is assigned an ?Early Palaeozoic age.

(d) Tertiary: Two Tertiary limestone sequences, the Nullarbor Limestone and the Wilson Bluff Limestone, are distinguished on the basis of lithology and fossil content. In Ooldea No. 1 hard, cavernous biosparite constitutes the Nullarbor Limestone. In Reid Nos. 1 and 1A the upper part of the penetrated limestone sequence also is largely biosparite but it contains Eocene fossils (Appendix C) and is therefore designated as Wilson Bluff Limestone. Below 31.0 metres depth at Reid, the lower part of the Wilson Bluff Limestone is comprised of a soft glauconitic biosparite with a matrix of finely disseminated clay particles (Appendix B).

The Wilson Bluff Limestone in Reid Nos. 1 and 1A overlies the Pidinga Formation, a sequence of carbonaceous sandstones, claystones, siltstones and coal.

The Miocence Nullarbor Limestone in Ooldea No. 1 overlies two metres of brownish yellow, silty claystone assumed to be of Tertiary age.

(e) Quaternary: Quaternary sediments consist of red sandy soils and, in Reid Nos. 1 and 1A, calcreted Wilson Bluff Limestone.

2. Structure

Regional drilling results show that the ?Early Palaeozoic sequences thin northward from the Karari Fault, near hole PDH-03 to Maralinga No. 7 (Fig. 6). Depths to crystalline "basement" are: at surface (+80 m subsea) in Pin-R-34; 50 m depth (+30 m

subsea) in PDH-03; 257 m depth (-117 m subsea) in Ooldea No. 1; and 525 m depth (-265 m subsea) in Maralinga No. 7. Crystalline "basement" in Ooldea No. 1 is structurally higher than in parts of the Tallaringa Trough, where SADME Wilkinson No. 1 (Figs 4 & 5) intersected 710+ metres of sediment, and than in the Mallabie Depression where Mallabie No. 1 intersected 1 340 metres of "non-crystalline basement" rocks.

3. Relevance to Seismic Interpretation

The approximate relationship between seismic refractors and stratigraphy at Ooldea No. 1 and Reid No. 1 is shown in Figure 3. Although the refraction data are of poor quality, due to the hard cavernous Nullarbor and Wilson Bluff limestones (Milton, 1974), the interpreted refraction profiles do relate to some of the principal geological boundaries known from drilling. For example, a 3.14 km/s refractor apparently is related to the top of Unit II in Reid No. 1 but cannot be related with confidence to the same unit boundary in Ooldea No. 1; and a 4.1 km/s deeper refractor corresponds to the top of Unit I in Reid No. 1 but at that stratigraphic level in Ooldea No. 1 refraction velocities are about 5.13 km/s.

CONCLUSIONS

The drilling of Reid Nos. 1 and 1A and Ooldea No. 1 has aided the interpretation of seismic refraction events. The 3.14 km/s refractor originally postulated to arise from Permian sediments was found to be coincident with the top of an ?Early Palaeozoic sandstone (Unit II) in Reid No. 1. No Permian sediments were identified in these wells, and it seems that no current connection exists between the Arckaringa and Denman basins.

Tentative structural interpretation based on limited drill-holes and geophysical anomalies suggests that Ooldea No. 1 was drilled on a "basement high" downfaulted to the west. Bouguer

gravity anomalies to the east (Tallaringa Trough) and west (Reid Gravity Anomaly) may be the result of a thicker development of dense, ?Early Palaeozoic carbonates than was intersected in Ooldea No. 1. This interpretation is supported by results from the subsequent drilling of Wilkinson No. 1 in the Tallaringa Trough (well completion report in preparation).

Reid No. 1, drilled to the west of Ooldea No. 1 in an area of high Bouguer gravity (the Reid Gravity Anomaly), was abandoned near the top of Unit I which in Ooldea No. 1 contained dolomite beds.

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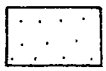
APPENDIX A

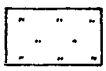
CUTTINGS AND CORE DESCRIPTIONS

LITHOLOGICAL INDEX TO CORE DESCRIPTIONS.

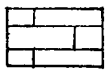
LITHOLOGICAL INDEX TO CORE DESCRIPTIONS

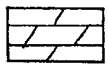
Lithologies


Sandstone

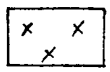

Siltstone


Shale


Limestone


Dolomite


Coal


Gneiss

Accessory Minerals

D	Dolomite
F	Feldspar
Ca	Calcite
Cl	Chlorite
M	Muscovite or Biotite
Py	Pyrite
Li	Lithics

Structures

cross bedded 

Parallel beds dipping 5° 

Lenticular beds dipping 5° 

Irregular bedding

Scour Structure 

Massive 

1. OOLDEA NO. 1
CUTTINGS DESCRIPTIONS

DEPTH (m)	
0-1.5	30% cream calcrete. 70% red sandy silt-topsoil.
1.5-3.0	White to brown recrystallized, dense indurated limestone.
3.0-4.5	White to minor pale red recrystallized limestone a.a.
4.5-6.0	50/50, white/red recrystallized limestone a.a.
6.0-7.5	60/40, white/reddish brown recrystallized limestone a.a.
7.5-9.0	White and minor reddish brown recrystallized limestone a.a.
9.0-10.5	a.a.
10.5-12.0	80/20, white/mottled white and brownish orange recrystallized limestone a.a.
12.0-13.5	White and minor colourless recrystallized limestone a.a.
13.5-15.0	a.a.
15.0-16.5	70% white recrystallized limestone a.a. 30% dark red ferruginous recrystallized limestone.
16.5-18.0	60% white to pale yellow recrystallized limestone a.a. 40% brownish red, ferruginous, calcareous, weakly cemented siltstone.
18.0-19.5	White to pale yellow, recrystallized limestone a.a.
19.5-21.0	70% recrystallized limestone a.a. 30% reddish brown clay with 10% clear, rounded, fine to med. gr. quartz sand.
21.0-22.5	40% white, cream, yellow and red recrystallized limestone a.a. 40% yellow, fine to coarse gr. and silt size calcite frags. 10% clear, subrounded, fine gr., quartz sand 10% red friable siltstone.
22.5-24.0	60% recrystallized limestone a.a. 30% brown and yellow, fine to med. gr. calcarenite 10% clear, rounded, fine to med. gr., quartz sand.

Depth (m)	
24.0-25.5	60% brown and yellow fine to med. gr. calcarenite and minor silt size calcite frags. 30% recrystallized limestone a.a. 10% fine to med. gr. quartz sand a.a.
25.5-27.0	90% brownish yellow, very soft, silty (30%), v. fine gr. sandy (10%) clay. 10% recrystallized limestone a.a.
27.0-28.5	90% silty sand clay a.a. 10% recrystallized limestone a.a.
28.5-30.0	60% greyish brown sl. silty, sl. sandy, (v. fine gr.) clay. 20% black, v. hard ferruginous, v. fine gr., sandstone. 10% grey and yellow, hard, fine gr. sandstone with 10% yellow siliceous cement. 10% recrystallized limestone a.a.
30.0-31.5	80% grey, mod. indurated to friable, well sorted, fine gr. sandstone, 10% grey siliceous matrix. Minor black ferruginous sandstone. 20% grey, silty (20%), clay
31.5-33.0	40% grey sandstone a.a. but v. fine to fine gr. 30% white recrystallized limestone a.a. 20% reddish brown, sl. sandy, recrystallized limestone. 10% grey silty clay a.a.
33.0-34.5	70% sandstone a.a. 20% silty clay a.a. 10% recrystallized limestone a.a.
34.5-36.0	70% sandstone a.a. but med. gr. 20% silty clay a.a. 10% recrystallized limestone a.a.
36.0-38.5	80% med. gr. sandstone a.a. 20% brown silty clay a.a.
38.5-41.0	80% sandstone a.a. 20% grey clay
41.0-43.5	50% greyish brown clay. 50% sandstone a.a.
43.5-46.0	60% sandstone a.a. 40% clay a.a.
46.0-48.5	Fine to med. gr. sandstone a.a.
48.5-51.0	70% sandstone a.a. 30% clay a.a.
51.0-53.5	Sandstone a.a.
53.0-55.0	Sl. reddish brown and grey sandstone a.a.
55.0-58.0	No samples recovered. Cored below this depth.

Core Descriptions

Ooldea No. 1

59.0 m - 295.35 m

DEPARTMENT OF MINES — SOUTH AUSTRALIA

28

CORE DESCRIPTION

WELL OOLDEA #1
LOCATION
LAT. 30°27'42"S.
LONG. 131°36'52"E.
ELEVATION GR. 101 m.
R.T.
DATUM M.S.L.

CORE NO.
DEPTH 59.0 - 75.0 m.
DATE DRILLED 24.9.76
RECOVERY 16.0 m. 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
60				59.0-98.0m. SANDSTONE; Pale reddish brown, micaceous, fine grained, interbedded with pale grey, micaceous, very fine grained sandstone. Grains are subrounded, well sorted with white dolomite cement. Beds are flat.
65				
70				
75				

CORE BARREL TRIPLE TUBE
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START
FINISH
LOGGED BY G.M. MEYER.
DATE 24.8.78.

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 3 | DRG. NO. S 14115

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL OOLDEA #1

LOCATION

LAT. 30°27'42"S

LONG. 131°36'52"E

ELEVATION GR. 101m. DATUM M.S.L.

R.T.

CORE NO

DEPTH 75.0 - 95.0m.

DATE DRILLED 24-25.9.76

RECOVERY 20 m 100 %

FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
75				
80		RS		
85				
90				
95				

CORE BARREL TRIPLE TUBE LOGGED BY G.M. MEYER

CORE BIT S.A.D.M. TUNGSTEN CARBIDE

TIME—START

FINISH

DATE 24.9.76

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

30

WELL OOLDEA #1
LOCATION
LAT. 30°27'42"S
LONG. 131°36'52"E
ELEVATION GR. 101m DATUM M.S.L.
R.T.

CORE NO.
DEPTH 95.0 - 115.0m.
DATE DRILLED 25.9.76.
RECOVERY 20.0 m. 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
95				
		RS 00009		Flat, irregular, pale green sandy dolomite pebbles. 98.0 - 102.0m. SANDSTONE; as above generally darker in colour and coarser grained. Flat regular beds. Some lithic fragments.
100				
		RS 00010		102.0 - 107.0m. SANDSTONE; as above but paler in colour and finer grained. Dolomitic, feldspathic.
105				
				107.0 - 119.0m. SILTY SANDSTONE; dark red, micaceous, very fine grained with 10-20% silt size grains. Generally massive. Minor bluish green dolomite beds.
110				
		RS 00011		
115				

CORE BARREL TRIPLE TUBE LOGGED BY G.M. MEYER
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START DATE 24.8.78.
FINISH

PETROLEUM GEOLOGY SECTION

SHEET 3 OF 13 DRG. NO. S14115b

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

31

WELL OOLDEA #1
LOCATION
LAT. 30° 27' 42" S.
LONG. 131° 36' 52" E
ELEVATION GR. 101m DATUM M.S.L.
R.T.

CORE NO.
DEPTH 115.0 - 135.0 m.
DATE DRILLED 25, 27.9.76
RECOVERY 20.0 m 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
115				119.0 - 173.3m. SANDSTONE; reddish brown, very fine to fine grained. Grains are subrounded. Bedding is generally flat. Dolomitic, feldspathic.
120				
125				
130		RS 00012		
135				

CORE BARREL TRIPLE TUBE LOGGED BY G.M. MEYER
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START
FINISH
DATE 24.8.78.

PETROLEUM GEOLOGY SECTION

SHEET 4 OF 13 DRG. NO. S 14115 c

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

32

WELL OOLDEA #1
LOCATION
LAT. 30°27'42"S
LONG. 131°36'52"E
ELEVATION GR. 101m DATUM M.S.L.
R.T.

CORE NO.
DEPTH 135.0 - 155.0m
DATE DRILLED 27, 28.9.76
RECOVERY 20.0 m 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
135				
140				
145				
130				
155				

CORE BARREL TRIPLE TUBE LOGGED BY G.M. MEYER
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START
FINISH
DATE 24.8.76

PETROLEUM GEOLOGY SECTION

SHEET 5 OF 13 DRG. NO. S14115d

938

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

33

WELL OOLOEA #1
LOCATION
LAT. 30° 27' 42"S
LONG. 131° 36' 52"E
ELEVATION GR. DATUM
R.T.

CORE NO.
DEPTH 155·0 - 175·0m.
DATE DRILLED 28·9·76
RECOVERY 20·0 m. 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
155		RS 00013		
160				
165				
170				
175				173·3 - 177·2m. SANDSTONE; pale reddish brown to grey, medium to coarse grained, minor interbedded fine grained. Feldspathic, dolomitic.

CORE BARREL. TRIPLE TUBE LOGGED BY G.M. MEYER
CORE BIT. S.A.D.M. TUNGSTEN CARBIDE
TIME—START DATE. 24·8·78
FINISH

PETROLEUM GEOLOGY SECTION

SHEET 6 OF 13 DRG. NO. S 14115e

938

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

34

WELL OOLDEA # 1
LOCATION
LAT. 30°27'42"S
LONG. 131°36'52"E
ELEVATION GR.
R.T.
DATUM

CORE NO.
DEPTH 175·0 - 195·0m.
DATE DRILLED 28, 29·9·76
RECOVERY 20·0 m. 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
175		RS 00014		
				177·2 - 190·5 m. SANDY SILTSTONE; reddish brown, very fine to fine grained, lesser silt, micaceous, minor heavy minerals. Minor scattered medium to coarse grains. Generally lenticular beds, minor cross-beds. Feldspathic, dolomitic.
		RS 00015		
180				
185				
190				190·5 - 193·2 m. SANDSTONE; as above but medium to coarse grained in very fine to fine grained matrix. Minor pale green dolomite pebbles.
		RS 00016		193·2 - 194·4 m. SILTY SANDSTONE as above. Dolomite interbed 5cm. thick. Minor lenticular beds of medium to coarse sandstone.
195				194·4 - 196·85 m. SANDSTONE; medium to coarse grained.

CORE BARREL TRIPLE TUBE LOGGED BY G.M MEYER
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START
FINISH
DATE 24·8·76

PETROLEUM GEOLOGY SECTION

SHEET 7 OF 13 DRG. NO. S14115 f

938

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

35

WELL . OOLDEA #1

LOCATION

LAT. 30°27'42"S.

LONG. 131°36'52"E

ELEVATION GR.

R.T.

DATUM

CORE NO.

DEPTH 195·0 - 215·0 m.

DATE DRILLED 29·9·76

RECOVERY 20·0 m. 100 %

FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
195				
				196·85 - 202·57m. SANDSTONE, SILTY SANDSTONE AND DOLOMITE; Reddish brown, very fine grained sandstone and silt interbedded with medium to very coarse sandstone. Dolomite is pale greenish grey.
				RS 00017
200				
				202·57 - 221·30m. SANDY SILTSTONE, SANDSTONE & PEBBLY SANDSTONE. very fine grained sandstone and lesser silt as above with interbedded medium to coarse grained sandstone and pebbly sandstone. Pebbles are flat lying, rounded green dolomite and red siltstone.
205				
				RS 00018
210				
215				

CORE BARREL . TRIPLE TUBE . LOGGED BY G.M. MEYER

CORE BIT . S.A.D.M. TUNGSTEN CARBIDE

TIME—START

FINISH

DATE . 24·8·78

PETROLEUM GEOLOGY SECTION

SHEET 8 OF 13 | DRG. NO. S 14115 g

938

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

36

WELL OOLDEA # 1
LOCATION
LAT. 30° 27' 42"S
LONG. 131° 36' 52"E
ELEVATION GR.
R.T.
DATUM

CORE NO.
DEPTH 215.0 - 235.0m.
DATE DRILLED 29, 30.9.76
RECOVERY 20.0 m. 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
215				
220				221.30 - 232.70 m. SILTSTONE, SANDSTONE & PEBBLY SANDSTONE. Interbedded reddish brown siltstone and medium to coarse grained sandstone and pebbly sandstone as above. Siltstone is massive. Pebbles are matrix supported and comprise greenish grey dolomite and minor red shale.
225				
230				232.70 - 246.87 m. GRANULAR TO PEBBLY SANDSTONE. Quartzite and lesser lithic granules, increasing to 2cm. diam. towards base. Matrix comprises coarse to very coarse sandstone. Cross bedding dipping up to 15° common in upper section.
235		RS 00019		

CORE BARREL TRIPLE TUBE LOGGED BY G.M. Meyer.
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START
FINISH
DATE 24.8.76.

PETROLEUM GEOLOGY SECTION

SHEET 9 OF 13 | DRG. NO. S 14115 h

938

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL OOLDEA #1

LOCATION

LAT. 30°27'42"S

LONG. 131°36'52"E

ELEVATION GR. DATUM

R.T.

CORE NO.

DEPTH 235·0 - 255·0 m.

DATE DRILLED 30·9·76 - 1·10·76

RECOVERY 19.0 m. 95 %

FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
235				
240				
245				
		RS 00020		246·87 - 251·75 m. PEBBLY SANDSTONE; pale red, hard, massive, very fine to fine grained sandstone with <5% flat shale pebbles. Cross bedded in part. Minor shale stringers.
250				251·75 - 252·0 m. SHALE OVERLYING PEBBLE CONGLOMERATE. Shale is red and contains dessication cracks pebbles. Conglomerate comprises rounded quartz.
				252·0 - 253·0 m. CORE LOSS.
		RS 00021		253·0 - 286·7 m. SANDSTONE; reddish brown to white, very fine to fine grained size. Gently undulating to cross bedded. Minor red shale pebbles. Generally hard, low permeability due to abundant Quartz overgrowths. More friable,
255				

CORE BARREL TRIPLE TUBE LOGGED BY G.M. MEYER

CORE BIT S.A.D.M. TUNGSTEN CARBIDE

TIME—START

FINISH DATE 24·9·79

PETROLEUM GEOLOGY SECTION

SHEET 10 OF 13 DRG. NO. S 14115 i

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

38

WELL . OOLOEA #1

LOCATION

LAT. 30°27'42"S.

LONG. 131°36'52"E.

ELEVATION GR.

R.T.

DATUM

CORE NO.

DEPTH 255·0 - 275·0m.

DATE DRILLED 1, 2, 3·10·76

RECOVERY 20·0 m. 100 %

FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
255	////			permeable, feldspathic and ferruginous above approximately 255 metres.
	////			
	////			
260	////			
	////	RS 00022		
	////			
	////			
265	////			
	////			
	////			
	////			
270	////			
	////			
	////			
	////			
275	////			

CORE BARREL . TRIPLE TUBE LOGGED BY G.M.MEYER

CORE BIT . S.A.D.M. TUNGSTEN CARBIDE

TIME—START

FINISH

DATE 24·8·78

PETROLEUM GEOLOGY SECTION

SHEET 11 OF 3

DRG. NO. S 14115j

978

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

39

WELL OOLDEA #1
LOCATION
LAT. 30°27'42"S
LONG. 131°36'52"E
ELEVATION GR.
R.T.
DATUM

CORE NO.
DEPTH 275.0 - 295.0m.
DATE DRILLED 13, 14.10.76
RECOVERY 20 m 100 %
FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
275				
280				
285				286.7 - 295.35m. ADAMELLITE GNEISS.
290				
295				

CORE BARREL TRIPLE TUBE LOGGED BY G.M. MEYER
CORE BIT S.A.D.M. TUNGSTEN CARBIDE
TIME—START
FINISH
DATE 21.8.78

PETROLEUM GEOLOGY SECTION

SHEET 12 OF 13 DRG. NO. S 14115 k

938

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

10

WELL OOLOEA #1

LOCATION

LAT. 30°21'42"S

LONG. 131°36'52"E

ELEVATION GR. DATUM

R.T.

CORE NO.

DEPTH 295.0 - 295.35m

DATE DRILLED 14.10.76

RECOVERY 0.35 m 100 %

FORMATION

DEPTH (METRES)	GRAPHIC LOG	DRILL TIME MINS	RECOVERY LOG	DESCRIPTION
295	X X X T.D 295.35m.			

CORE BARREL. TRIPLE TUBE. LOGGED BY G.M. MEYER

CORE BIT. S.A.D.M. TUNGSTEN CARBIDE.

TIME—START

FINISH

DATE 24.8.78

PETROLEUM GEOLOGY SECTION

SHEET 13 OF 13 | DRG. NO. S 14115 ℓ

Core Descriptions

Reid No. 1

95.55 m - 226.4 m

2. REID NO. 1
CUTTINGS DESCRIPTIONS

DEPTH (m)	
0-2.5	White, cream, indurated, recrystallized limestone with minor solution cavities.
2.5-5.0	Recrystallized limestone a.a. with shell moulds.
5.0-7.5	Recrystallized limestone a.a., but pale reddish brown in part.
7.5-10.0	95% white, cream, recrystallized limestone. 5% bright red, soft, sticky clay.
10.0-12.5	90% red clay a.a. 10% recrystallized limestone a.a.
12.5-15.0	80% pink to pale red clay. 20% recrystallized limestone a.a.
15.0-17.5	60% recrystallized limestone a.a. 40% pale pinkish brown clay.
17.5-20.0	80% white to yellow recrystallized limestone. 20% brown clay.
20.0-22.5	Recrystallized limestone and clay a.a.
22.5-25.0	60% reddish brown clay. 40% recrystallized limestone a.a.
25.0-27.5	80% white, yellow, and minor brown and red recrystallized limestone. 20% pale reddish brown clay.
27.5-30.0	80% white and yellow, poorly sorted, fine to coarse gr. calcarenite with rounded grains and minor silt size, limestone fragments. 20% pale green, minor brown, glauconitic clay.
30.0-32.5	80% calcarenite a.a. 20% pale yellowish brown, minor green clay.
32.5-35.0	90% yellowish brown sandy clay with 30% yellowish brown, fine grained, quartz sand with limonite stained round grains. 10% calcarenite a.a. Minor recrystallized limestone.
35.0-37.5	Pale yellowish brown, soft, sandy clay with 20% pale brown limonite stained, fine grained rounded quartz grains.
37.5-55.0	No samples - lost circulation.
55.0-57.5	Grey, pyritic (5%), very fine gr., unconsolidated, quartzose sand with rounded, clear, quartz grains and minor black, carbonaceous fragments. Minor muscovite.

Depth (m)	
57.5-60.0	Sand a.a. but v. fine gr. and no mica.
60.0-62.5	Pale grey, soft, clayey (30-40%) silt. Minor pyrite and carbonaceous flecks.
62.5-65.0	Clayey silt a.a. but with 5% pyrite.
65.0-67.5	Clayey silt a.a.
67.5-70.0	Clayey silt a.a.
70.0-72.5	Clayey silt a.a.
72.5-75.0	Clayey silt a.a.
75.0-77.5	Clayey silt a.a.
77.5-80.0	Clayey silt a.a.
80.0-82.5	Clayey silt a.a.
82.5-85.0	Clayey silt a.a.
85.0-87.5	Clayey silt a.a. Minor sl. consolidated v. fine gr. quartz sand.
87.5-90.0	Clayey silt and sand a.a.
90.0-92.5	Clayey silt and sand a.a.
92.5-95.0	90% clayey silt a.a. 10% fine gr. quartz sand with minor carbonaceous flecks.
	Hole cored from this depth.

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1 CORE NO.
DEPTH 95·55 - 100. RECOVERY m 100 %
LOGGED BY G. M. Meyer. DATE 17·9·76.

CORE NO.	DEPTH m	GRAPHIC LOG	DRILL TIME min.	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	95·55						
	96					// 0-10°	Interbedded fine to very fine grained sandstone. Pale grey quartzose, hard, porous, well sorted, dominantly fine grained, minor very fine grained sandstone with approx. 30% thin (1-5 mm) interbeds of pale grey, quartzose, semi-friable, porous, medium grained sandstone. Both units contain dominantly clear to translucent, minor yellow ? Fe stained quartz grains and 2% opaques.
	97						
	98						
	99				Ca Fe		3 cm band of indurated calcite cemented fine grained sandstone associated with red ? Fe stained fine grained sandstone with 5% hematite grains near 99.28. Minor thin (0.5-1.0 mm) horizontal solution cavities. No odour or fluorescence.
	100						

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1. CORE NO.
DEPTH 100 - 112·5 m RECOVERY m 100 %
LOGGED BY G. M Meyer DATE 17·9·76.

CORE NO.	DEPTH m	GRAPHIC LOG	DRILL TIME min	RECOV. LOG.	MINERALS	STRUCTURE	DESCRIPTION
	101					111 20°	
	102					~00-5°	Interbedded sandstones as above but generally contains more medium grained sandstone interbeds (40-50% which are thin (1-5 mm) and lenticular. Generally the number and thickness of medium grained sandstone interbeds increases with depth. Cross bedded unit 6·5 cm. thick at 100·4 m. contains interbeds of medium grained sandstone dipping 20°. Rare thin solution cavities as above.
	103						
	104						
	105					111 30°	
	106					0 10-20°	
	107						
	108						
	109						
	110				Py		
	111						
	112						

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1 CORE NO.
DEPTH 112·5 – 125 m RECOVERY m 100 %
LOGGED BY G. M. Meyer. DATE 17·9·76

CORE NO.	DEPTH (m)	GRAPHIC LOG	DRILL TIME (min.)	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	113						
						0-10°	As above but dominantly fine to very fine grained sandstone and minor medium grained sandstone. The medium grained sandstone occurs in thin (<5 mm) lenticular beds and contains dominant clear-translucent, minor yellow-brown and rare blue, opalescent rounded quartz grains and 1-2% dark brown – black opaques. The interbeds dip 0-10°. Generally the number of medium grained beds increase with depth. Gradational contact below.
	114						
	115						
	116						
	117						
	118					0°	As interval 105 – 113·10 m but with more red-brown ? Fe stained fine grained sandstone. The medium grained sandstone is the dominant unit and is pale grey, quartzose feldspathic (<5%) hard, poorly sorted, and occasionally calcite cemented. The interbedded fine grained sandstone is pale grey, yellow, brown, quartzose, Fe stained in part, hard, well sorted, and contains 2% opaques and minor calcite cement. The sandstones are irregularly bedded. Cross-bedding up to 17 cm. thick.
					Fe		
	119						
	120					111 20°	
						0-5°	
					F	111 20°	
	121					0-5°	
						0-5°	
	122						
						111 30°	
						0-5°	
	123						As interval 113·10 – 117·80 but the lenticular interbeds are horizontal. Gradational contact below.
	124						
	125						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REIO 1. CORE NO.
DEPTH 125 – 137.5 m. RECOVERY m 100 %
LOGGED BY G. M. Meyer. DATE 12.9.76.

CORE NO.	DEPTH m	GRAPHIC LOG	DRILL TIME min.	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	125				F		
	126						
	127						
	128						
	129						
	130						
	131						
	132						
						0°	As above but lenticular interbeds increase in dip to 30° at 134.50 m and are horizontal below. Also amount of medium grained feldspathic sandstone interbeds is larger and fine grained sandstone interbeds are less than 5 mm. thick.
	133						
	134					111 30°	
						0-5°	
	135						
	136						
						111 20°	
	137						
						0-5°	

 DRG S 12515 d.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1. CORE NO.
DEPTH 137.5 – 150 m. RECOVERY m 100 %
LOGGED BY G. M. Meyer DATE 19.9.76.

CORE NO.	DEPTH m	GRAPHIC LOG	DRILL TIME min.	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	138				F	111 15-20°	
						0-5°	As above but dominantly fine grained sandstone with minor medium grained lenticular interbeds. Small cut and fill structure at 143.4 m. Gradational contact below.
	139						
	140						
	141						
	142						
	143					0-5°	
	144						As above but dominantly medium grained sandstone interbeds. 5–10% feldspar in the coarser beds.
						0-5°	
	145						
	146						
	147						
					Fe	0-10°	
	148					0-5°	
	149						
	150						

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL
DEPTH 150 - 162·5 m.
LOGGED BY G. M. Meyer.

CORE NO.
RECOVERY m. 100 %
DATE 17·9·76.

CORE NO.	DEPTH (m)	GRAPHIC LOG	DRILL TIME (min.)	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	150				F		**Sandstone** above but bedding becomes less regular and the fine grained interbeds are very fine grained and dominantly ferruginous. The coarser interbeds are up to 2cm. thick and consist of pale grey, quartzose, feldspathic, hard, well sorted medium grained sandstone with 90-95% rounded to sub-rounded, dominantly clear, minor yellow-brown quartz. 5% rounded, soft, weathered feldspar and 2% rounded opaques. They occur in short (1-2 cm) irregular, lenticular patches and "wisps." The finer units are less abundant reddish-brown and grey, quartzose, ferruginous, very hard, well sorted, very fine grained sandstones with 95% subrounded-subangular, dominantly yellow and brown (Poss. Fe coated) quartz and 5% rounded opaques. The red colouration forms "wisp" shaped mottles. Amount of colouration increases downwards and cut and fill structures are developed below. about 153 m. Gradational to below.
	151						
	152						
	153					0-5°	
	154						
	155						
	156					0-10°	
	157					0-10°	As above but dominantly very fine grained (80%) and dominantly reddish brown, ferruginous (90% of the finer grained unit). Beds of very fine grained sandstone vary from are 5-10 mm and medium sandstone from 3-4 mm.
	158						
	159						
	160					0-10°	
	161					5-10°	
	162						

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1 CORE NO.
DEPTH 162·5 - 175 m. RECOVERY m 100 %
LOGGED BY G. M. Meyer. DATE 20·9·76

CORE NO.	DEPTH m.	GRAPHIC LOG	DRILL TIME min.	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	163				Fe F		As above but dominantly medium grained sandstone (70%) with minor (30%) interbeds of reddish-brown sandstone approx. 2-4 mm thick. Minor beds less than 5 mm. thick of coarse grained sandstone with 70% well rounded, spheroidal quartz grains in a pale grey fine grained sand-silty matrix. The grains are dominantly clear, opalescent quartz, minor yellow quartz, and 2% dark brown mineral. The medium grained sandstone also has a few scattered coarse grains throughout.
	164						
	165						
	166						
	167						
	168						
	169						
	170						
	171						
	172						
	173						As above but dominantly reddish brown fine grained sandstone (60%).
	174					// 0-15°	As above but dominantly medium grained sandstone interbeds (70%) Coarse grained sand is more abundant.
	175						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1 CORE NO.
DEPTH 175 – 187·5 m. RECOVERY m 100 %.
LOGGED BY G. M. Meyer. DATE 20·9·76

CORE NO.	DEPTH m	GRAPHIC LOG	DRILL TIME min.	RECOV LOG	MINERALS	STRUCTURE	DESCRIPTION
	175				Fe F	SS 0 0-5°	As above but dominantly (80%) reddish brown very fine grained sandstone interbeds 20% medium – coarse grained feldspathic (5-10%) sandstone with regular to irregular lensoid bedding. Conglomeratic near 177·27 m. Subrounded elongated horizontal pebbles of red, hard shale in a medium-coarse grained ferruginous sandstone. Medium sandstone generally dips 0-5° but can be up to 15-20° in some cross beds. At 185·4 m the very fine grained sandstone grades to thin beds of grey siltstone with irregular laminated brown clay.
	176						
	177					≈ // 0-5°	
	178					SS 0 0-5°	
	179					// 0-5° /// 10-15° // 0-5°	
	180					≈	
	181					/// 20°	
	182					≈	
	183					/// 5° ≈	
	184					/// 15° ≈ /// 15° ≈	
	185						
	186						
	187						

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1. CORE NO.
DEPTH 187·5 - 200 m. RECOVERY m 100 %
LOGGED BY G. M. Meyer. DATE 20.9.76

CORE NO.	DEPTH m.	GRAPHIC LOG	DRILL TIME min.	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	188				Fe F		Interbedded fine grained sandstone & medium-coarse grained sandstone overlying pebbly medium-coarse grained sandstone. The fine grained sanastone is pale grey horizontal hard, moderately sorted with 70% clear-translucent quartz, 30% pale yellow quartz grains and <1% black grains. These occur as interbeds up to 5 mm. in pale grey medium to coarse grained sandstone of similar lithology and texture. The pebbly sandstone consists of 10-40% subrounded, elongate, horizontal lying red shale pebbles 2 to 5 mm. long by <1 mm wide in a pale grey medium to coarse grained massive sandstone. The size and abundance of pebbles increases downwards. There are no pebble-pebble contacts.
	189					10°	
	190					5° 0°	Pale brown siltstone overlying fine to coarse grained sandstone and sandy conglomerate. Siltstone is massive micaceous (5%) and contains 5% black & silver grey mineral. The fine sandstone is khaki, brown, reddish-brown, pale brownish grey, with minor small (<1cm) shale pebbles orientated 10° and minor scattered medium sand grains. Cross bedded in part. Sandy conglomerate is medium to coarse grained with 30% elongate, subrounded, flat lying pebbles, up to 8 mm x 1 mm of grey shale and pale grey calcareous shale. Rare pebble contacts.
	191						
	192						
	193						Siltstone with minor sandstone interbeds. Siltstone is dark reddish brown, micaceous (2%) hard, minor, (10%) fine grained sand, massive, laminated in part. Consists of 95% ? Fe coated, subrounded quartz, 5% feldspar and minor red shale granules and pebbles <1 cm long, scattered throughout. Sandstone interbeds are grey, khaki, brownish red, clean to Fe stained, quartzose soft fine-medium grained and well sorted. They can be pebbly (rounded elongate, flat lying, <1 cm x 5 mm. red shale pebbles) micaceous in part, feldspathic in part. 1·5 cm. of dark grey, red, dense, laminated, irregularly bedded shale at 196 m. Pebbles at 196·5 m are pale greyish brown, finely laminated, subangular, generally elongate, up to 4 cm x 4 cm, dolomite or dolomitic shale with no pebble-pebble contacts.
	194						
	195						
	196						
	197						
	198						
	199						
	200						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1. CORE NO.
DEPTH 200 - 212.5 RECOVERY m 100 %
LOGGED BY G. M. Meyer DATE 1.10.76.

CORE NO.	DEPTH m.	GRAPHIC LOG	DRILL TIME min., RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	200			Fe		**Sandy siltstone with siltstone interbeds, fine to medium grained sandstone, pebbly siltstone and pebbly sandstone.** The sandy siltstone is reddish brown, hard, with 20% scattered Fe stained medium to coarse grained, subrounded to rounded quartz grains and 40% thin (2 to 30 mm) well sorted siltstone interbeds. Sandstone is thinly bedded (< 20 cm) grey, reddish brown, quartzose, feldspathic (< 5%) pebbly in part, soft, well sorted and cross bedded. Pebbly siltstone is pale brown - reddish brown, massive with occasional darker siltstone laminae and occasional elongate, flat lying pebbles of red and grey calcareous shale up to 2.5 x 3.5 cm.
	201			F		
				Fe		
	202				0° ↓ 20° 0-5°	
	203				0-5°	*Pebbly Sandstone.* Pale grey, massive, pebbly 30% medium grained sandstone grading to interbedded medium grained and fine grained sandstone below 203.4 m. Pebbles are elongate, flat lying red shale up to (5 x 2 mm.) generally in discrete bands < 5 mm. thick. Occasional thin reddish brown siltstone bands.
	204			Fe		*Siltstone.* Reddish brown siltstone with thin < 6 mm interbeds or clasts of pale green and red calcareous shale. The red coloration occurs as rims < 5 mm wide. Minor red shale pebbles and 5% biotite in a paler colored 1 cm band of siltstone near 204.4 m.
	205					*Interbedded sandstone and siltstone.* sandstone in grey, massive, medium grained with minor red shale pebbles less than 1 cm x 2 mm. Siltstone is reddish brown, massive to irregularly flat bedded and sandy (10% medium grained) micaceous (5% biotite) and feldspathic (10%) in part.
	206					
	207			F		
	208			F		
	209					*Sandy conglomerate.* 60% elongate, flat lying pebbles < 5 x 1 mm of pale grey calcareous shale in pale grey medium grained sandstone.
	210					*Siltstone and pebbly siltstone.* Siltstone is reddish brown with elongate mottles and minor interbeds < 1.5 cm of pale greenish grey, micaceous (< 5% biotite) siltstone. Pebbly siltstone is reddish brown with pebbles up to 5 x 1 mm. Green shale bed, 4 mm thick at 213.3 m.
	211					
	212					

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1 CORE NO.
DEPTH 212·5 - 225 m RECOVERY m 100 %
LOGGED BY G. M. Meyer DATE 6·10·76

CORE NO	DEPTH m	GRAPHIC LOG	DRILL TIME min	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	213						
	214				F		Sandy siltstone grading down to sandstone. Sandy siltstone is reddish brown with 10-20% random medium grained rounded quartz, 5% feldspar, 2% black grains and minor elongate, flat lying red shale pebbles 5x1 mm. Increases in grain size downwards to brown medium grained sandstone.
	215				F		
	216						Siltstone, shale and sandy conglomerate. Siltstone is reddish brown, micaceous with 20% grey fine and medium grained sandstone interbeds < 1 cm in part. Shale is grey, thin (4 mm. and calcareous). Sandy conglomerate consists of red shale pebbles < 1·5 x 1 cm. in 40% medium grained sandstone matrix.
	217						
	218				F		Pebbly sandstone: 30-40%, dominantly red shale, minor green, grey shale pebbles, < 1 cm x 4 mm, in a matrix consisting of pale grey, khaki, reddish-brown, fine-medium grained, feldspathic, moderately sorted, hard.
	219						
	220						
	221				Fe		Siltstone, sandy siltstone, pebbly siltstone and pebbly sandstone. Siltstone is mottled reddish brown/pale grey, reddish brown, with minor scattered fine grained sand and minor greenish grey, grey and red shale pebbles < 3·5 x 1·5 cm. Pebbly sandstone is grey, brown, fine to medium grained, poorly sorted with 20-30% red shale pebbles < 10 x 5 mm.
	222						
	223					20°	Sandstone, pebbly sandstone. Grey, brown, medium grained and red fine grained, moderately sorted, feldspathic (5%) with 10-20% red, pale grey, pebbles < 3·5 x 2 cm. Minor interbedded well sorted very fine grained sandstone.
	224				F	20° 15°	
	225						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1. CORE NO.
DEPTH 225 – 226·4 RECOVERY m 100 %
LOGGED BY G. M. Meyer DATE 7·10·76

CORE NO.	DEPTH (m)	GRAPHIC LOG	DRILL TIME min.	RECOV. LOG	MINERALS	STRUCTURE	DESCRIPTION
	225						
	226						
	226·4 m	TOTAL DEPTH					

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1A
DEPTH 0·80 – 12·5 m.
LOGGED BY G. M. Meyer.

CORE NO.
RECOVERY m %
DATE 23·9·76.

CORE NO	DEPTH (m)	GRAPHIC LOG	PET. SAMPLES	RECOV LOG	STRUCTURE	DESCRIPTION
	0	START OF CORING				
	1					No recovery.
	2					Calcreted recrystallized limestone. Mottled pale brown / white, pale grey; hard, concretionary in part, cavenous in part.
	3					
	4					No recovery.
	5					Biosparite. Recrystallized limestone with numerous solution cavities and minor calcrete concretions. 5% fossil moulds < 5 mm.
	6					
	7					No recovery.
						As above.
	8					No recovery.
	9					As above.
						No recovery.
	10					As above but solution cavities are filled with red slightly sandy silty clay.
	11					No recovery.
						As above but fossil moulds are larger (up to 1·5 cm)
	12					No recovery.

JOB 1438

SHEET 1 OF 5. DRG. NO. S 12496 a

A. 512

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1A CORE NO.
DEPTH 12·5 – 25 m. RECOVERY m %
LOGGED BY G. M. Meyer DATE 23: 9: 76

CORE NO.	DEPTH (m)	GRAPHIC LOG	PET. SAMPLES	RECOV. LOG	ACCESSORY MINERALS	STRUCTURE	DESCRIPTION
	13						As above but larger moulds of gastropods, bivalves and brachiopods up to 2 cm. in size. Gypsum infilling cavities in places. Red silty clay at base.
	14				Gy		
					Gy.		
	15						No recovery.
	16						Biosparite as above. White hard, porous in part recrystallized limestone with fossil moulds up to 2cm. Reddish brown, slightly sandy silty (40%) clay near top and infilling some cavities. Gypsum infilling cavities in part.
	17				Gy		
	18				Gy		
	19				Gy		
	20						No recovery.
	21						Biosparite as above.
							No recovery.
	22						Biosparite as above but with patches of very porous red-brown stained limestone.
							No recovery
	23						Biosparite as above.
	24						No recovery.
							Biosparite as above.
	25						No recovery. Biosparite as above.

SHEET 2 OF 5

DRG. NO. S12496 b

JOB 1438

DEPARTMENT OF MINES - SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID. 1A | CORE NO. | DEPTH 25 - 37.5 m. | RECOVERY m %
LOGGED BY G. M. Meyer. | DATE 24.9.76

CORE NO.	DEPTH (m)	GRAPHIC LOG	PET. SAMPLES	RECOV LOG	ACCESSORY MINERALS	STRUCTURE	DESCRIPTION
	25						Biosparite as above.
							No recovery.
							Porous white biosparite.
	26						Biosparite, khaki, pale brown, recrystallized limestone composed of medium grained crystals of white, yellow and brown sparry calcite. 30-40% irregular cavities and red-stained, mud filled porous limestone. Fossil moulds are rare and < 5 mm. Green silty clay at 26.50 m. with irregular bottom contact is probably infill material. Gradational lower contact.
	27						
	28						
	29						
	30						Clayey Biosparite white, yellow, chalky limestone 30% meaium grained, fossils (gastropods, bivalves, brachiopods and bryozoa) in a fine crystalline matrix. Minor brown rounded clay balls of fine grain size. Generally hard but becomes softer towards base. Vague flat bedding with horizontal fossils. Irregular, lenticular patches of pale grey calcareous clay.
	31		P486/76				
	32						
	33		P487/76				Clayey biosparite occurring above 34.40m. Irregular lenticular patches of darkish brown limestone with 30-40% brown, soft, fine to medium, grained poorly sorted glauconite pellets in a white and yellow sparite matrix. The remaining section is ? flat bedded white, yellow, biosparite with 5-10% brown glauconite pellets.
	34					? ≈ 0	The limestone is generally more porous and less fossiliferous than above. Fossils are medium to coarse grained.
	35		P488/76				No recovery. Clayey sparite but softer, with more glauconite pellets.
	36						No recovery.
	37						Clayey sparite as above. No recovery.

JOB 1438

DRG NO. S 12496

A.514

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1A CORE NO.
DEPTH 37.5 – 50 m. RECOVERY m %
LOGGED BY G. M. Meyer. DATE 24·9·76

CORE NO.	DEPTH (m)	GRAPHIC LOG	PET. SAMPLES	RECOV. LOG	ACCESSORY MINERALS	STRUCTURE	DESCRIPTION
	38						No Recovery.
	39		P489/76				Gritty sandy silt. Brown, soft, massive poorly sorted silt with 30% fine to coarse grained sand and 10% rounded to subrounded, clear, opalescent, quartz grit up to 4 mm.
	40						
	41						No recovery.
	42						
	43				C		Interbedded brown, micaceous silt (10%) and black to dark brown sticky lignitic clay. Siltstone interbeds are lenticular, horizontal and thin (<5 mm.)
	44						No recovery.
	45						Loose fine to medium grained sand. Possibly not in place.
	46				C		Interbedded black lignitic clay and brown micaceous silt. Silt is thinly bedded (<2 mm), flat and increases in abundance downwards. Below 46·30 m the sequence becomes coarser grained to a fine micaceous silty (10%) sand and below 46·55 m fine grained sand. The sequence contains 0–20% black greasy carbonaceous matter. Fine grained sand is dark brown to black.
					C		
	47				C		
							Lignite brown, friable.
	48						No recovery.
					C		Medium grained sand, gritty in part. Sand is dark brown to black, unconsolidated with rounded–subrounded grit (40%) at 48·71 m. Small khaki veinlets of carbonate material at 48·75 m.
					C		
	49						Lignite brown friable with horizontal wood fragments 5 cm. wide.
					Py		Clayey (10%) fine to very fine grained sand. Pyritic near top, carbonaceous, micaceous (5%). Subrounded–subangular.
	50						

SHEET 4 OF 5 DRG NO S 12496 d

JOB 1438

A.515

DEPARTMENT OF MINES – SOUTH AUSTRALIA

CORE DESCRIPTION

WELL REID 1A
DEPTH 50 - 53·60
LOGGED BY G. M. Meyer.

CORE NO.
RECOVERY m. . . %
DATE 24·9·76

CORE NO.	DEPTH (m)	GRAPHIC LOG	PET. SAMPLES	RECOV. LOG	ACCESSORY MINERALS	STRUCTURE	DESCRIPTION
	50						
	51				Py		Pale grey, very fine grained sandstone Soft, well sorted, with minor (<5%) laminae of black pyritic material.
	52				Py		
	53				Py		
		T.D. 53·60					

SHEET 5 OF 5

DRG NO. S12496 e.

JOB 1438

APPENDIX B

PETROLOGICAL REPORTS

CONTENTS:

AMDEL Report	Sample	Borehole	Depth (m)
MP 1327/77	P486/76	Reid 1A	31.26
	P487/76	Reid 1A	33.65
	P488/76	Reid 1A	34.80
	P489/76	Reid 1A	39.70
	P490/76	Reid 1	97.00
	P491/76	Reid 1	117.92
MP 1442/77	P493/76	Reid 1	140.95
	P494/76	Reid 1	173.75
	P495/76	Reid 1	179.40
	P496/76	Reid 1	189.53
	P497/76	Reid 1	191.50
	P498/76	Reid 1	201.20
MP 1424/77	P499/76	Reid 1	204.40
	P500/76	Reid 1	211.22
	P501/76	Reid 1	213.20
Geochron. Ancient Basement Rocks, Gawler Craton, Progress Reports 7 & 8	P505/77	Reid 1	288.06-.16
	P506/77	Reid 1	288.68-.83
	P507/77	Reid 1	289.20-.31
	P508/77	Reid 1	289.83-.95
	P509/77	Reid 1	291.27-.37
	P510/77	Reid 1	293.08-.15
	P511/77	Reid 1	294.00-.09
MP 801/77	P397/76	Reid 1	27.5-30.0
	P398/76	Ooldea 1	10.5-12.0
MP 482/77 11.06.520 Prog. Report 2	P329/76	Ooldea 1	28.5-30.0
	RS00008	Ooldea 1	81.08
	RS00009	Ooldea 1	98.20
	RS00010	Ooldea 1	103.20
	RS00011	Ooldea 1	112.00
	RS00012	Ooldea 1	133.00
	RS00013	Ooldea 1	157.00
	RS00014	Ooldea 1	176.80
	RS00015	Ooldea 1	179.59
	RS00016	Ooldea 1	193.95
	RS00017	Ooldea 1	199.80
	RS00018	Ooldea 1	208.00
	RS00019	Ooldea 1	234.20
	RS00020	Ooldea 1	246.37
	RS00021	Ooldea 1	253.83
	RS00022	Ooldea 1	261.75
	RS00023	Ooldea 1	280.50

amdel
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First Floor, Diamond Place, Thebarton, Sth. Aust.
Phone Adelaide 43 2503
Branch Offices: Perth and Sydney
Associated with: Professional Consultants Australia Pty. Ltd.

Please address all correspondence to Frewville.
In reply quote: MP1/2/0

22nd December, 1976

Department of Mines,
PO Box 151,
EASTWOOD, SA 5063

Attention: Mr G.M. Meyer

REPORT MP 1327/77

YOUR REFERENCE:	Application dated 22-10-76
MATERIAL:	Six drill core samples
LOCALITY:	Reid No.1A and Reid No.1 drill holes
IDENTIFICATION:	P486/76 - P491/76
DATE RECEIVED:	25th October, 1976
WORK REQUIRED:	Petrographic description

Investigation and Report by: R. Cooper

Officer in Charge, Mineralogy/Petrology Section: Dr K.J. Henley

for F.R. Hartley
Director

mhb

PETROGRAPHIC DESCRIPTION OF SIX DRILL CORE SAMPLES FROM THE REID NO.1A AND REID NO.1 DRILL HOLES

1. INTRODUCTION

Six samples, labelled P486/76 to P491/76, were submitted by the South Australian Department of Mines (Mr G.M. Meyer, Petroleum Geology Section) for petrographic description.

2. PETROGRAPHIC DESCRIPTIONS

Sample: P486/76; TSC17091

Location:
Reid No. 1A drill hole, 31.26 metres.

Rock Name:
Friable, pale green-brown clay.

Hand Specimen:
This sample of drill core consists of soft clay material which is pale green or pale brown. The latter colouration which occurs in patches up to a centimetre across is probably caused by goethite-limonite. On extended drying the sample has cracked and largely crumbled away.

X-ray diffraction results:

Bulk Material

Montmorillonite (smectite)	Dominant
Clinoptilolite	Accessory
Calcite	Accessory
Quartz	Accessory

-2 µm fraction (< -2 µm 54%)

Montmorillonite (smectite)	Dominant
Illite	Trace
Clinoptilolite	Trace
Quartz	Trace
Calcite	Trace

Key

Dominant	=	Used for the component apparently most abundant, regardless of its probable percentage level.
Accessory	=	Components judged to be present between the levels of roughly 5 and 20%.
Trace	=	Components judged to be below about 5%,

60

Thin Section:

In the thin section of this material small, corroded grains of quartz are seen dispersed through a finely crystalline matrix. The quartz grains are angular to rounded in shape and up to 0.06 mm in diameter. They are present throughout the sample and do not appear to be aligned or concentrated in any particular way. The matrix material is stained in places with goethite-limonite, has a featureless appearance and contains numerous cracks which appear to have formed as the sample dried. The crystal size of the matrix is sufficiently fine that the clinoptilolite and calcite identified in the X-ray diffraction analysis could not be distinguished.

This sample consists mainly of montmorillonite and in thin section is relatively featureless and no relict textural or mineralogical structures could be identified.

Sample: P487/76; TSC17092

Location:

Reid No. 1A drill hole, 33.65 metres.

Rock Name:

Clayey bioclastic limestone.

Hand Specimen:

This sample of drill core is off-white, faintly and finely bedded and appears to consist of small, broken shell remains in a clayey matrix.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Calcite (mainly shell fragments)	20-40
Quartz	5-15
Matrix (clay, clinoptilolite, etc.,)	50-70

This sample consists of shell fragments (mainly broken) and quartz grains in a finely crystalline clayey matrix. The shell fragments are aligned and this probably creates the impression of faint, fine bedding which is seen in the hand specimen.

The shell fragments range in size up to several millimetres long, are composed of calcite and are thought to be mainly gasteropod remains.

The quartz grains are angular to subrounded in shape, are up to 0.2 mm across and are dispersed throughout the sample. They do not appear to have reacted with the matrix material and their shapes are undoubtedly essentially of primary origin.

The matrix material is generally finely crystalline, pale brown and semi-opaque. It is thought to consist largely of clay but in a few places small, colourless platy crystals are distinguishable and the

zeolite clinoptilolite could well be present in significant amounts.

This is a sample of indurated clayey bioclastic limestone the fossil remains in which appear to be largely those of gasteropods.

Sample: P488/76; TSC17093

Location:
Reid No. 1A drill hole, 34.80 metres.

Rock Name:
Clayey bioclastic limestone.

Hand Specimen:
This sample of drill core is off-white to pale brown, faintly and finely bedded and appears to consist of small comminuted shell fragments in a finely crystalline clayey/limey matrix. There are also a number of dark green flecks the largest of which is 1 mm long and these possibly consist of glauconite or its alteration products.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Calcite (mainly shell fragments)	20-40
Quartz	5-15
Glauconite	?5-15
Matrix (mainly clay)	40-60

This sample consists of broken shell fragments, grains of quartz and pellets/patches of glauconite in a finely crystalline clayey matrix. The shell fragments are aligned and this undoubtedly gives the impression of faint fine bedding which is visible in the hand specimen. This sample is very similar to the previous one, P487/76, but unlike that sample contains minor amounts of glauconite.

The shell fragments are up to several millimetres long, are mainly chambered and are composed of calcite. The phylla to which the shell fragments belong are not as obvious as in the previous sample but there are certainly gasteropod and ?brachiopod remains present.

Angular to subrounded grains of quartz up to 0.2 mm across are dispersed throughout the sample. The angularity of the quartz grains appears to be a primary feature and not to have been enhanced through reaction with the matrix clay.

Pellets and less regularly-shaped patches of a dark green glauconite-like mineral are visible in the hand specimen. However, they have thin sectioned poorly and an adequate description is not possible from microscopic examination. In the piece of drill core the largest patch/pellet of glauconite up to 1 mm across and an X-ray diffraction powder photograph confirmed the identity of the phase as glauconite.

The matrix is finely crystalline and appears to consist largely of clay with minor amounts of calcite and possibly clinoptilolite. In places the matrix is quite heavily stained with limonite.

This is a sample of clayey bioclastic limestone which is very similar to sample P487/76. However, unlike that sample there is a minor amount of glauconite in the form of pellets/patches present in this sample.

Sample: P489/76; TSC17094

Location:
Reid No. 1A drill hole, 39.70 metres.

Rock Name:
Coarse zeolitic sandstone or fine conglomerate.

Hand Specimen:
This sample of drill core is pale brown, friable and appears to consist of grains/pebbles of quartz up to several millimetres across in a finely crystalline clayey matrix.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Quartz (grains/small pebbles)	35-55
?Oxidized/altered clay/ glauconite pellets	2-6
Opaques	1-3
Accessories: zircon, tourmaline	trace-2
Matrix: clinoptilolite and lesser clay	30-50

This sample consists essentially of grains of quartz in a pale brown finely crystalline matrix. Present in minor to trace amounts are opaques, accessory minerals such as zircon and tourmaline and what are thought to be heavily altered clay/glauconite pellets.

The quartz grains are angular to subrounded in shape and range in size from 0.02 mm up to at least 3 mm. The angularity of the quartz grains appears to be a primary feature and not to have been enhanced through reaction with the matrix material. The quartz grains are weakly aligned and there is a tendency for grains of different sizes to be concentrated in particular layers and these features probably give the faint impression of bedding which is visible in the hand specimen. Dispersed through the sample there are a number of patches which consist of finely crystalline clay and limonite. Some of these are ovoid in shape and they are thought to be heavily altered clay/glauconite pellets.

Opaques are present in the rock as small grains which range in size up to 0.3 mm across. It is thought that these opaque grains are detrital in origin and consist of iron and titanium oxides rather than carbonaceous material. There are also a number of small zircon and tourmaline grains present.

The matrix is pale brown and finely crystalline and consists of clinoptilolite and clay. The presence of these minerals in the sample was confirmed with an X-ray diffractometer trace.

This is a sample of coarse zeolitic sandstone or fine conglomerate.

Sample: P490/76; TSC17095

Location:
Reid No. 1 drill hole, 97.00 metres.

Rock Name:
Fine sandstone.

Hand Specimen:
This sample of drill core is grey, fine-grained, homogeneous and faintly and finely bedded. The sample appears to be composed mainly of small quartz grains and is considerably more indurated than the samples from drill hole No. 1A although it can still be chipped with a finger nail.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Quartz	75-90
Feldspar	<10
Dolomite	3-6
Chlorite	trace-3
Opaques	1-3
Accessories: zircon	trace

This sample consists mainly of subangular to well rounded quartz grains which range in size between 0.03 mm and 0.2 mm with a few grains being up to 0.4 mm across. The quartz grains are weakly aligned and there is some concentration of quartz grains of different sizes in different layers and these features undoubtedly create the impression of faint bedding which is visible in the hand specimen.

Feldspar grains including both plagioclase and microcline are present in minor amounts. These grains are of similar size and shape to those of quartz.

Dispersed through the sample are equant, angular/xenomorphic grains/crystals of dolomite which are typically between 0.03 mm and 0.1 mm across. It is not certain whether this carbonate is of primary detrital origin or not and it has certainly undergone some recrystallization since the rock was deposited. Many of the grains of carbonate appear to have a slightly darker, more turbid centre with an outer, clear rim which looks very much like an overgrowth.

Grains of pale green, pleochroic chlorite are dispersed through the sample. These grains are probably of primary detrital origin although

some have a coarse flaky texture and possibly formed authigenically through the replacement of other phyllosilicate-ferromagnesian phases. Angular to rounded opaque grains between 0.02 and 0.05 mm are present throughout this sample. They are thought to consist mainly of hematite/goethite.

The only accessory mineral identified was zircon which is present as small grains up to 0.03 mm across.

This is a fine-grained well-sorted sandstone which is distinctly different from the samples from the Reid No.1A drill hole.

Sample: P491/76; TSC17096

Location:
Reid No.1 drill hole, 117.92 metres.

Rock Name:
Fine, slightly dolomitic sandstone.

Hand Specimen:
This sample is very similar in appearance to the previous sample, P490/76, and is a fine, grey, bedded sandstone. The bedding laminations range in size from a fraction of a millimetre up to several millimetres and appear to be caused by slight variations in the size of the constituent quartz grains. The sample is relatively indurated but sharp edges can still be chipped with a finger.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Quartz	60-80
Dolomite	10-40
Feldspar	<5
Opaques	1-3
Chlorite/mica	trace-3
Accessories: zircon	trace

This sample consists mainly of quartz grains which are angular to rounded in shape and range in size from less than 0.02 mm up to at least 0.4 mm although many are between 0.04 mm and 0.08 mm. The quartz grains are weakly aligned and there is some segregation of fine quartz grains and coarser quartz grains into different layers and these features undoubtedly create the impression of bedding seen in the hand specimen. The angularity of many of the quartz grains appears to be a primary feature and not to have been enhanced by either compaction coupled with pressure solution or by reaction with the other minerals present, particularly the dolomite.

The dolomite occurs as equant angular/xenomorphic grains/crystals which are typically less than 0.2 mm across. Much of the dolomite appears to occur interstitially between the quartz grains but it is not certain whether this is a primary feature or has occurred since the rock was deposited through the recrystallization of the dolomite. The dolomite was distinguished from other carbonates by its appearance and because

a microchemical staining test for calcite gave negative results.

Minor amounts of feldspar, both plagioclase and microcline, are present and these minerals occur in grains of similar size and shape to those of quartz. Whereas the bulk of the quartz grains are clear the feldspar grains are generally turbid and sieved with minute inclusions.

Opaque grains between 0.02 and 0.05 mm in diameter are present throughout this sample. These opaque grains are thought to consist of hematite and goethite.

Flakes of chlorite, biotite and muscovite are present in trace amounts as are small grains of zircon.

This sample is a fine sandstone which is very similar to the previous sample, P490/76, but contains significantly more dolomite.

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The Director,
Department of Mines,
PO Box 151,
EASTWOOD, SA 5063

1st December, 1976

Attention: G.M. Meyer

REPORT MP 1442/77

YOUR REFERENCE:	Application dated 29-10-76
MATERIAL:	6 drill core specimens
LOCALITY:	Stratigraphic drill hole Reid No.1 12 km east of Watson (Eucla Basin)
IDENTIFICATION:	P493/76 - P498/76
DATE RECEIVED:	1-11-76
WORK REQUIRED:	Petrographic description, identification of heavy minerals and an estimate of porosity

Investigation and Report by: Sylvia Whitehead

Officer in Charge, Mineralogy/Petrology Section: Dr K.J. Henley

for F.R. Hartley
Director

mhb

SUMMARY OF SPECIMENS

P493/76 TSC17155 (140.95 m)	Fine-grained, feldspathic and dolomitic sandstone bordering on siltstone. It contains minor lithic and chloritic grains some derived from basic volcanic rock. Some feldspar and lithic grains were stained by ferric oxide before they were incorporated in this sediment. The presence of interstitial, authigenic, green chlorite indicates the presence of ferrous iron and non-oxidizing conditions during diagenesis.
P494/76 TSC17156 (173.75 m)	Feldspathic and lithic sandstone with traces of interstitial dolomite and calcite. Much of the detrital material is bimodal in that it contains well sorted, larger grains (average 0.3 mm) with finer grained (0.05 mm) detritus in interstices. Layers which have lower proportions of the finer grained detritus are more porous (up to 10-15% locally) but some of this could be a result of leaching of carbonate.
P495/76 TSC17157 (179.40 m)	Feldspathic and lithic sandstone. Detrital grains are now coated with a film of orange to reddish brown, iron oxide-stained clay which lines all interstices. Fine-grained dolomite now fills many interstices and was apparently deposited after the ferric oxide-stained clay.
P496/76 TSC17158 (189.53 m)	Fine-grained, feldspathic and dolomitic sandstone similar to that at 140.95 m, except that there are some pale greenish grey layers in predominantly reddish-brown-stained sediment.
P497/76 TSC17159 (191.50 m)	Fine-grained feldspathic and lithic sandstone cemented mainly by iron oxide-stained clay which surrounds all grains and lines all interstices. There is minor interstitial dolomite.
P498/76 TSC17160 (201.20 m)	A zone (or large clast) of sandy dolomite with an apparently eroded surface is overlain by fine-grained, dolomitic sandstone similar to that from shallower depths. The lower part of the sandy dolomite is pale greenish-grey but the upper part which projects into the sandstone is stained by ferric oxide. This suggests that staining by ferric oxide probably occurred as the sandstone was being deposited.

DESCRIPTION OF SANDSTONES AND SILTSTONES FROM DRILL HOLE REID NO.1 EUCLA BASIN

Sample: 1493/76; TSC17155; PS25172

Location:

Stratigraphic bore hole Reid 1 at 140.95 m. 12 km east of Watson (Eucla Basin).

Hand Specimen:

A slightly pinkish and yellowish-grey, fine-grained rock with some very indistinct layering or bedding which is almost horizontal assuming the drill hole to be vertical.

Thin Section:

A visual estimate of the constituents is as follows:-

	%
Detrital quartz	45-50
Feldspar (microcline and plagioclase)	15-20
Detrital muscovite and biotite	1-2
Lithic and chloritic grains	5-10
Opaque oxide grains and leucoxene	1-2
Zircon	trace
Tourmaline	trace
Apatite	trace
Garnet	minute trace
Dolomite	5-10
Interstitial clay and "sericite"	15-20

A visual estimate of the porosity is less than 5%.

This sediment is composed predominantly of well sorted quartz, feldspar and lithic grains but there is some variation in grain size in different layers some of which are 1 to 4 mm thick. There are no clearly defined bedding planes and throughout parts of the sediment there is very little evidence of bedding or variation in grain size. Throughout much of the area sectioned quartz, feldspar and lithic grains are between 0.05 and 0.1 mm in size with a few up to 0.2 mm, a few coarser grained layers contain some grains 0.2 to 0.4 mm in size and finer grained layers contain grains averaging 0.05 mm in size.

Most of the smaller quartz and feldspar grains are angular to subangular but the larger grains are subrounded with a few well rounded. In general the lithic grains show rather more evidence of rounding than the quartz and feldspar. Some lithic grains and some feldspar grains are turbid and show orange to reddish-brown staining by ferric oxide and probably these were partly oxidized and stained before they were incorporated in this sediment. Many of the lithic grains are composed of very fine-grained sericite, with and without very fine-grained quartz and/or feldspar and in general they are too small for their origin to be determined but there

are a few slightly larger grains which have clearly been derived from volcanic rock. The proportion of iron oxide in some of these volcanic rock fragments suggests that they were derived from basic volcanic material and others are heavily stained by brown iron oxide. There are several grains composed of a fairly bright green chlorite and the origin of these remains undetermined. There are a few grains composed of microcrystalline quartz. There are scattered detrital flakes of muscovite and of partly altered biotite 0.1 to 0.3 mm long and most of these are subparallel to the bedding.

Heavy mineral grains are sparsely scattered throughout the sediment and do not show any evidence of concentration along particular layers. Most of these grains are opaque and in polished section the opaque grains were found to include some composed of a fine intergrowth of hematite and rutile, some composed of hematite, a few of recrystallized leucoxene (?rutile) and a few of oxidized magnetite. There are also traces of interstitial pyrite. One of the larger, rounded grains is now porous and skeletal and was probably titaniferous magnetite. Other heavy mineral grains include a few of tourmaline, zircon and apatite and in the area sectioned one small grain of garnet was also found. Most of these appear at least partly rounded.

The detrital mineral and lithic grains are closely packed but there is very little evidence of interpenetration or of deformation of the grains. A few quartz grains which are in contact have become welded but most of them are separated by films of clay-like mineral some of which may be chlorite. Some interstices contain dolomite and there are also a few grains which are now composed of dolomite but it is not clear whether these represent grains which have been replaced by dolomite or fragments of a dolomitic rock or layer which have been re-worked. Some interstices contain chlorite and locally this shows fine, colloform layering. Films of chlorite, ?clay and sericitic material occur along most of the grain boundaries and this chlorite and sericite is of authigenic origin. There are few if any interstitial voids.

Conclusion:

This is a fine-grained, feldspathic and dolomitic sandstone which also contains a significant proportion of lithic grains some of which were derived from probably basic volcanic rock. The sediment is now cemented by interstitial authigenic chlorite and sericite or clay.

The orange and reddish-brown, ferric oxide staining shown by some of the detrital feldspar and lithic grains indicates that they were exposed to oxidizing conditions before they were incorporated in this sediment. Other grains composed of chlorite do not show evidence of oxidation. The crystallization of green chlorite in interstices indicates the presence of ferrous iron and non-oxidizing conditions during diagenesis.

Sample: P494/76; TSC17156

Location:

Stratigraphic bore hole Reid 1 at 173.75 m. 12 km east of Watson (Eucla Basin).

Hand Specimen:

A pale pinkish-brown sandstone showing some straight and parallel layering with layers 1 to 3 mm thick composed of slightly coarser and slightly finer grained detrital material. The rock tends to split along bedding planes which are flat and parallel. The sandstone is slightly friable and is definitely permeable.

Thin Section:

A visual estimate of the constituents is as follows:-

	%
Detrital quartz	40-45
Detrital feldspar	20-25
Lithic grains	15-20
Detrital muscovite and biotite	trace
Opaque grains and leucoxene	trace
Dolomite	2-3
Interstitial "clay"	10-15
Calcite	trace
Zircon	trace
Tourmaline	trace

The porosity varies in different layers and in some of the coarser grained layers can be as much as 10 to 15% (rough visual estimate). The finer grained layers although definitely permeable have fewer interstitial voids and probably have a porosity of less than 5%.

This is a coarser grained sediment than that from 140.95 m but it contains similar detrital material. Much of the sediment is bimodal in that it contains well sorted grains averaging 0.3 mm in size with some much finer grained, interstitial detrital material with an average grain size of 0.05 mm. There are some layers which contain a higher proportion of the fine-grained detrital material and other thin layers which contain very little of this interstitial, finer grained material. These layers are from 1 to 3 mm thick.

Most of the larger detrital quartz, feldspar and lithic grains are subrounded to well rounded with a few subangular, cleavage fragments of feldspar. Elongate fragments tend to lie with the long direction parallel to the bedding. Feldspar grains include both plagioclase and microcline and lithic grains include many which have clearly been derived from volcanic rock and some which have probably come from fine-grained metasediments composed of quartz and fine-grained mica. There are some orange to brown-stained grains of acid volcanic rock and there are some darker grains of either basaltic or andesitic rock. Some of these have been stained by iron oxide before they were incorporated in this sediment. The section contains one fragment 0.5 mm long composed of subparallel shreds of translucent orange to reddish-brown material which is almost completely isotropic. These are separated by thin zones containing some extremely fine-grained opaque material. This shows some similarities to compacted

plant material but would require more detailed investigation to determine its exact origin.

Heavy mineral grains are sparsely scattered through the rock and include opaque oxide and leucoxene, tourmaline and very few of zircon. They are not concentrated in particular layers. There are a few small grains composed of a bluish-green phyllosilicate similar to some grains found in the previous specimen.

The detrital grains are moderately closely packed but in general they have not become welded and there is very little if any evidence of interpenetration and deformation. Most of the grains are surrounded by a thin film of phyllosilicate which is now slightly stained by orange to reddish-brown iron oxide. These films are less than 0.005 mm thick and the mineral cannot be positively identified by microscopic examination. It could be a chlorite or a clay mineral. Some interstices contain this very fine-grained clay-like mineral, some contain dolomite, very few contain traces of secondary, microcrystalline ?quartz and in some layers where there is very little of the finer grained detrital material some interstices contain calcite. In some of the calcite-bearing layers there are more numerous interstitial voids but it is not clear whether these voids have never been filled or are the result of leaching of an interstitial mineral such as calcite.

Conclusion:

This is a feldspathic and lithic sandstone in which much of the detrital material is bimodal. Some layers which contain only the coarser grained fraction of the detrital material contain more abundant interstitial carbonate and also have a greater porosity but it is possible that this porosity is due at least in part to leaching of some of the carbonate.

Because of the coarser grain size lithic grains are more easily recognized than in the sample from 140.95 m and a large proportion of these lithic grains have clearly been derived from volcanic rock. Some of this was of acid volcanic rock and some of andesitic or basaltic rock.

Sample: P495/76; TSC17157

Location:

Stratigraphic bore hole Reid 1 at 179.40 m. 12 km east of Watson (Eucla Basin).

Hand Specimen:

A brownish-red sandstone showing some evidence of layering as in the two previous specimens. Much of the specimen has an apparently uniform composition and grain size but there are a few thin layers 1 to 2 mm thick which contain coarser grained detrital material.

Thin Section:

A visual estimate of the constituents is as follows:-

	%
Quartz	40-45
Detrital feldspar	15-20
Lithic grains	15-20
Detrital muscovite	trace
Opaque grains and leucoxene	1-2
Tourmaline	trace
Zircon	trace
Dolomite	10-15
Iron oxide-stained clay	10-15

Throughout much of the section the porosity is low probably less than 5% but in coarser grained layers and in zones from which carbonate has probably been leached the porosity is higher and may be 10 to 15%. These are visual estimates only and subject to error as many parts of the section were plucked out during preparation.

This contains similar detrital material to the two previous samples but in general it is not as well sorted. The coarser grained layers are bimodal in that they contain a scattering of large, well rounded grains 0.5 to 1 mm in size in a matrix of the finer grained sediment which is similar to that throughout the remainder of the rock. Many of the smaller detrital grains are between 0.05 and 0.2 mm in size, subangular to subrounded and elongate fragments show a preferred orientation parallel to the bedding. Lithic grains are similar to those in the previous specimen and have been derived mainly from volcanic rock. They are subrounded with a few well rounded and some have been stained by iron oxide probably during weathering before they were incorporated in this sediment. Heavy mineral grains are similar to those in other specimens and are mainly opaque oxide and leucoxene with a few grains of tourmaline and zircon, very few of apatite and a few small grains composed of a green phyllosilicate. There are a few grains of microcrystalline quartz. Feldspar grains include some of plagioclase and some of microcline.

The detrital grains are moderately closely packed but in general they have not been welded and there is little or no evidence of deformation. Most of the detrital grains are now surrounded by a film of orange to reddish-brown, iron oxide-stained clay. Where the rock is well cemented the interstices have been filled by very fine-grained dolomite with an average crystal size of less than 0.02 mm and this was apparently deposited after the iron oxide-stained clay. The proportion of dolomite varies in different parts of the rock but it is not clear whether this has been due to leaching or to difficulty in preparation of the thin section.

Conclusion:

This is a feldspathic and lithic sandstone in which some of the detrital material is not as well sorted as in the previous two specimens and some is bimodal. The reddish-brown colour is due to the presence of a film of orange to reddish-brown, iron oxide-stained clay on the surface of all detrital mineral grains and this film lines all interstices. Interstitial dolomite was deposited in interstices apparently after the film of iron oxide-stained clay.

Sample: P496/76; TSC17158; PS25173

Location:

Stratigraphic bore hole Reid 1 at 189.53 m. 12 km east of Watson (Eucla Basin).

Hand Specimen:

A fine-grained sediment most of which is stained a dull reddish-brown but there are a few pale, slightly greenish-grey layers 2 to 3 mm thick.

Thin Section:

A visual estimate of the constituents is as follows:-

	%
Quartz	50-55
Feldspar	15-20
Lithic and chloritic grains	5-10
Muscovite and biotite flakes	trace-1
Dolomite	10-15
Opaque grains	1-2
Zircon	trace
Tourmaline	trace
Interstitial clay/chlorite stained by iron oxide	5-10

This specimen is very similar to that from 140.95 m in that it is composed predominantly of well sorted quartz, feldspar and lithic grains 0.05 to 0.15 mm in size with a sprinkling of heavy mineral grains and a few flakes of mica. Feldspar grains include both plagioclase and potash feldspar and the lithic grains are similar to those in other specimens in that they include some of fine-grained quartz-sericite metasediment and some derived from volcanic rock. Quartz and feldspar grains are subangular and many elongate grains and mica flakes show a preferred orientation parallel to the bedding. Some of the lithic grains show rather more evidence of rounding but the smaller ones are also angular to subangular.

Most of the heavy minerals grains scattered throughout the rock are of opaque oxide with a few of tourmaline and zircon and a few small grains of a fine-grained, green phyllosilicate. In polished section the opaque grains are small and consist mainly of fine-grained hematite with and without visible, fine-grained rutile. A few show relict textures suggesting that they may represent altered ?titaniferous magnetite but these are not very clear.

The detrital grains are closely packed and throughout most of the rock they are coated with a thin film of orange-stained clay similar to that in the previous specimen but the iron oxide staining is not as intense. Some interstices contain dolomite and a few have been filled by the iron oxide-stained clay. The greenish-grey layer was not included in the section and therefore portion of this was removed and examined separately in a temporary oil mount. This is essentially similar to the remainder of the specimen except that interstitial clay is not stained by ferric oxide. Some of the detrital grains show pale orange to brown staining indicating that they were exposed to oxidizing conditions during weathering and transport and were probably stained before they were incorporated in the sediment. There is insufficient evidence to determine whether or not the interstitial clay was ever stained by ferric oxide and later exposed to reducing conditions or whether, in this layer the interstitial clay was never stained by ferric oxide. It is possible that this layer may originally have contained traces of iron sulphide but this suggestion is very tentative.

Conclusion:

This is a fine-grained, feldspathic and dolomitic sandstone similar to that at 140.95 m except that the interstitial clay is lightly stained by ferric oxide. The few, pale greenish-grey layers do not show this ferric oxide staining but are otherwise similar.

Sample: P497/76; TSC17159; PS25174

Location:

Stratigraphic bore hole Reid 1 at 191.50 m. 12 km east of Watson (Eucla Basin).

Hand Specimen:

A reddish-brown, fine-grained sediment with a suggestion of layering defined by slight variations in colour. The rock tends to split along some planes parallel to the bedding.

Thin Section:

A visual estimate of the constituents is as follows:-

	%
Quartz	50-55
Detrital feldspar	15-20
Lithic and chloritic grains	10-15
Muscovite and biotite flakes	trace
Opaque grains	1-2
Tourmaline	trace
Zircon	trace
Dolomite	3-5
Iron oxide-stained clay	10-15

Because minerals have tended to pluck-out during preparation of the section porosity is difficult to determine but in zones where no plucking has occurred it appears to be less than 5%. The rock is permeable. This is essentially very similar to sediments from shallower depths in that it is composed of well sorted detrital quartz, feldspar and lithic grains with a few mica flakes and a few heavy mineral grains. Most of the detrital grains are between 0.05 and 0.1 mm in size with a few up to 0.2 mm. The detrital material is similar to that comprising

the other samples and a full description would involve needless repetition. Some of the lithic grains and also a few feldspar grains are stained probably due to weathering before they were incorporated in this sediment but the small grains of bright green phyllosilicate do not generally show any evidence of oxidation.

Heavy mineral grains are similar to those in other specimens and include opaque iron-titanium oxide, tourmaline and zircon. In polished section the opaque grains are mainly of hematite and of dark rutile. A few show fine intergrowths of hematite and rutile and a few are clearly of martite (oxidized magnetite).

The detrital grains are closely packed and are all surrounded by a film of reddish-brown, iron oxide-stained clay. Some interstices have been completely filled by this clay. Minor amounts of fine to slightly coarser grained dolomite are scattered through the rock occurring mainly in interstices but it is of interest to note that in this specimen as in most of the other specimens already described some of the dolomite now occurs as well rounded grains which are surrounded by a film of reddish-brown iron oxide and then a thin overgrowth of dolomite. In some places this overgrowth of dolomite completely fills the interstice. Two interpretations are possible - the rounded grains may represent clastic detrital grains derived from a dolomitic rock or they may represent detrital grains which have been completely replaced by dolomite. From the general appearance the former appears to be more probable as no grains partly replaced by dolomite have been found. In the areas in the thin section where plucking has not occurred there are very few interstitial voids which have not been filled either by iron oxide-stained clay or by dolomite.

Conclusion:

This is a fine-grained, feldspathic and lithic sandstone which is cemented mainly by iron oxide-stained clay which forms a film surrounding all detrital grains and lining all interstices. There are minor amounts of interstitial dolomite which have crystallized in interstices after the iron oxide-stained clay.

Sample: P498/76; TSC17160

Location:

Stratigraphic bore hole Reid 1 at 201.20 m. 12 km east of Watson (Eucla Basin).

Hand Specimen:

At the bottom of the length of drill core there is a zone about 1 cm thick containing a very fine-grained, pale greyish-green rock found in thin section to be sandy dolomite. This has been invaded by or contains a small pocket of medium-grained sand. The dolomite shows a rather irregular and apparently eroded surface which projects up into the overlying, pale reddish-brown-stained, fine-grained sandstone which is similar to that in specimens from shallower depths. The portion of dolomite which projects up into the overlying sandstone is stained reddish-brown by iron oxide.

Thin Section;

A visual estimate of the minerals present in the dolomitic zone is as follows:-

	%
Dolomite	>75
Quartz	5-10
Feldspar	2-3
Muscovite	1-2
Biotite	2-3
Lithic grains	1-2
Opaque grains	trace
Tourmaline	trace
?Sphene	minute trace

The overlying sandstone has a composition similar to that in the specimens from shallower depths and this will not be repeated.

Portions of the section where plucking has not occurred show very little evidence of porosity and this would be less than 5%. The rock however is permeable probably because of small capillaries along grain boundaries.

The pale, greyish-green dolomite contains scattered detrital quartz and feldspar grains averaging slightly more than 0.05 mm in size, a few lithic grains of similar size and numerous flakes of muscovite and biotite 0.1 to 0.3 mm long in a matrix composed almost entirely of fine-grained dolomite. Most of the mica flakes are parallel to the direction of bedding. There are a few heavy mineral grains, a few very small grains composed of bright green phyllosilicate and traces of extremely fine-grained, black opaque material some of which could be carbonaceous but this could not be confirmed. The portion of dolomite included in the thin section contains one lenticular layer of sand containing quartz, feldspar and lithic grains 0.05 to 0.2 mm in size, a few mica flakes and relatively minor interstitial dolomite. At one end of this zone of dolomite the flakes of muscovite and biotite curve round and for a distance of up to 5 mm they are in an almost vertical position assuming the drill hole is also vertical. As these subparallel mica flakes almost certainly define the direction of original bedding this change in the direction of orientation of the mica flakes suggests some deformation of the sandy dolomite before the overlying sandstone was deposited. As only a portion 2 to 3 cm in size of sandy dolomite is exposed in this drill core specimen it is possible that this may be portion of a fragment of a disrupted layer of sandy dolomite.

The upper 6 mm of sandy dolomite which projects into the overlying sandstone contains a slightly lower proportion of detrital quartz and muscovite and this is also finer grained. The dolomite in this zone is heavily stained reddish-brown by iron oxide and it may contain some iron oxide-stained clay included in, and obscured by the dolomite. The contact between this iron oxide-stained dolomite and the overlying sandstone is sharply defined but it cuts across the bedding in portion of the dolomite as defined by the direction of orientation of the mica flakes. It is therefore clear that the dolomite has been subjected to some form of erosion.

The overlying sandstone is similar to that described in previous samples in that it is composed of well sorted quartz, feldspar and lithic grains and is cemented mainly by a film of iron oxide-stained clay with some interstitial dolomite. Most of the grains in this sandstone are between 0.05 and 0.1 mm.

Although the sandstone is permeable the appearance in thin section indicates that it has a very low porosity probably less than 5%. Interstices are lined by iron oxide-stained clay, some have been completely filled by this material and some have been filled by dolomite. A few remain as open voids but it is not absolutely certain whether or not these once contained dolomite which has been plucked-out during preparation of the thin section.

Heavy mineral grains in the sandstone are mainly opaque oxide (1 to 2%) with a few of tourmaline, apatite and zircon and also a few composed of green phyllosilicate. There is a concentration of heavy mineral grains along one part of the contact between the sandstone and the underlying, iron oxide-stained, sandy dolomite. This concentration could be on the lee side of the protruding lump of sandy dolomite which projects up into this sandstone.

It is of interest to note that the rather diffuse boundary between greenish-grey, non-oxidized dolomite and reddish-brown, iron oxide-stained dolomite is at the base of the projecting lump of dolomite and continues more or less in line with the base of the layer of sandstone disregarding the projection of dolomite. This would suggest that staining by ferric oxide occurred as the sandstone was being deposited.

Conclusion:

The sample contains a zone of silty dolomite which shows some evidence of contemporaneous erosion. Portion of this dolomite projects into the overlying dolomitic sandstone which is cemented mainly by iron oxide-stained clay with minor dolomite. The portion of sandy dolomite which projects up into the sandstone is also stained by reddish-brown ferric oxide suggesting that staining by this ferric oxide occurred as the sandstone was being deposited.

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In reply quote: MP1/10/0

18th November, 1976

The Director,
Department of Mines,
PO Box 151,
EASTWOOD, SA 5063

Attention: Dr B.J. Cooper

REPORT MP 1424/77

YOUR REFERENCE:	Application dated 29-10-76
MATERIAL:	3 bore hole samples
LOCALITY:	Reid No.1, Northern Eucla Basin
IDENTIFICATION:	P499/76-P501/76
DATE RECEIVED:	1-11-76
WORK REQUIRED:	Separation of possible conodonts - as per instructions

Investigation and Report by: Dr P.C. Moeskops

Officer in Charge, Mineralogy/Petrology Section: Dr K.J. Henley

for F.R. Hartley
Director

mhb

SEPARATION OF POSSIBLE CONODONTS IN THREE ROCK SAMPLES

1. INTRODUCTION

Three, possible conodont-bearing, sandy siltstone samples were submitted for conodont separation.

2. PROCEDURE

The following work was carried out as instructed by the client:-

(a) Each sample was broken into 25 mm sized lumps using a hammer and tungsten carbide block

(b) Weighed (140 to 200+ g) aliquots of the crushed samples (did not include 'fines' produced by crushing) were placed in clear polythene bowls and were 'reacted' with sufficient '100 volumes' hydrogen peroxide for a period of nine days, to produce a reasonable amount of residue material

(c) The residues were wet sieved at 16 and 150# and the three fractions (i.e. -150#, -16+150# and +16#) were retained, dried and weighed. The -16+150# fractions were split into 'magnetics and 'non-magnetics' using a Frantz Isodynamic Separator (set at 20^{o} forward slope, 10^{o} side slope, 1.5A and 3.5 vibrator setting) and both products were weighed.

3. RESULTS

The results are listed below:-

ple	Initial weight (g)	Product weights (g) and % ages of original weight				
		+16#	-16+150# Mags	-16+150# Non-mags	-150#	Weight Loss (g),%
9/76	140.81	98.15 (69.7)	18.60 (13.2)	5.14 (3.7)	9.71 (6.9)	9.21 (6.5
0/76	190.40	184.60 (97.0)	3.66 (1.9)	0.02 (0.01)	1.17 (0.6)	0.95 (0.5
1/76	209.98	169.64 (80.8)	25.45 (12.1)	0.78 (0.4)	13.04 (6.2)	1.07 (0.5

4. COMMENTS

Clearly in order to produce reasonable amounts of potential conodont-bearing material (i.e. the non-magnetic, -16+300# fraction) large initial weights are required and these must be 'reacted' with hydrogen peroxide for quite a long period of time.

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30

NATA CERTIFICATE August 1977

The Director
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THE GEOCHRONOLOGY OF THE ANCIENT BASEMENT ROCKS OF THE GAWLER CRATON

Progress Report No 7

by

Dr A.W. Webb &
S. Whitehead

Petrography by: Sylvia Whitehead

Geochronology by: Dr A. W. Webb

Manager, Analytical Division: D. K. Rowley

D. K. Rowley

for Brian S. Hickman
Acting Managing Director

hjj

Samples: P505/77 to P511/77
TS: 38296 to 38302
Location: Ooldea No 1 Stratigraphic Diamond Drill Hole
Depths from 288.06 - 294.09 m

Hand Specimen: These samples are all of very similar, pink, medium grained gneiss in which the foliation is defined by sub-parallel elongate aggregates of quartz and also of feldspar. Most of these samples also contain a few porphyroblasts of potash feldspar and the elongate aggregates of quartz and plagioclase tend to curve around these locally forming small scale, augen textures.

Staining tests show that these rocks contains both potash feldspar and plagioclase in approximatly equal proportions but in some potash feldspar is slightly more abundant that plagioclase and other the plagioclase is slightly more abundant than potash feldspar. It is felt that these differences in the relative proportions of potash feldspar and plagioclase are of no great significance.

Some of the rocks contain fractured garnet crystals which are visible in the hand specimen and all of them were found to contain garnet in thin section.

Thin Section: These rocks are all very similar and therefore one general description will be given followed by a summary of some special features found in some of the rocks.
A visual estimate of the minerals present in these samples is as follows:

	%
Quartz	30 - 40
Feldspar (potash feldspar and Plagioclase in approximately equal proportions)	50 - 70
Biotite	trace - 2
Muscovite	trace - 1
Opaque oxide	trace - 1
Garnet	1 - 15
Zircon	trace
Chlorite	trace - 1
Monazite (?)	minute trace
Altered cordierite (P510/77 only)	3 - 5
Sillimanite (P510/77 only)	trace

These are deformed or sheared gneissic rocks which contain sub-parallel elongate streaks or aggregates of quartz, many of which are between 0.4 and 2 mm thick and several millimeters long. In most of the specimens these are separated by much finer grained granulated feldspar and quartz much of which has a common grain size of about 0.1 - 0.3 mm. In some of these elongate aggregates of finely granulated material there are minor amounts of fine grained, brown biotite which, in some of the specimens, has been replaced by chlorite.

In most of these specimens there are a few remnants of coarser grained feldspar generally about 1 - 2 mm in grain size and the streaks or aggregates of quartz and also of fine grained, granulated material, tend to curve around these larger remnants. Twin planes in the larger plagioclase remnants have been deformed.

These samples contain varying but generally minor proportions of garnet which occur as very poikilitic crystals and aggregates most of which have been extensively fractured and veined by secondary, fine-grained white mica.

Some of the larger garnet crystals contain inclusions of, or are intergrown with, opaque oxide. There are a few very small grains of zircon less than 0.1 mm in size and one or two small grains which may be monazite.

Special Features:

Sample P505/77

A large proportion of the plagioclase has been extensively replaced by sericite and in general there are only a few very small remnants of plagioclase. Some of the biotite (possibly about 50%) has been replaced by fine-grained, white mica associated with very fine grained iron oxide and possibly titanium oxide. Garnet has been veined and replaced by fine grained secondary mica to the extent of about 40 - 50%.

The fine grained, granulated material contains moderately abundant sericitised feldspar and it is stained by concentrations of fine grained, iron oxide.

Sample P506/77

Most of the plagioclase shows practically no alteration to sericite and in this sample sericite tends to occurs only along a few very small fratures. Most of the biotite has been at least partly chloritised and stained by iron oxide, and probably less than 20% of the biotite is unaltered.

The finely granulated material is not as heavily stained by iron oxide as in sample P505/77.

Sample P507/77

This contains a highly proportion of garnet (about 15%) than the other samples, and some of these porphyritic garnet crystals are up to 5 mm in size. The garnet is intergrown with opaque oxide.

This sample contains practically no mica except for the minor amounts of secondary white mica and a minute trace of chlorite in the veined and slightly altered garnet. There are also traces of chlorite included in some quartz, adjacent to the garnet. There is a trace of monazite (?).

Plagioclase in this sample shows little or no evidence of sericitisation.

Sample P508/77

The rock contains about 2% of biotite and much of this shows minor or incipient alteration to chlorite and iron oxide. Garnet has been altered to fine grained secon dary mica to the extent of about 60 - 70%. Plagioclase shows pratically no evidence of alteration to sericite.

Sample P509/77

Practically all of the biotite (1 - 2%) has been altered to chlorite and iron/titanium oxide. Plagioclase shows minor alteration to sericite.

This is similar to sample P505/77, in that the finely granulated material and also most of the feldspar, are curved and stained by extremely fine grained iron oxide.

Sample P510/77

This differs from the other samples in that some zones or layers contain altered cordierite (?) crystals which were up to about 2 mm long. These have been replaced by fine grained, micacious alterations products and some serpentine-like material, but the general appearance and relic textures are similar to those commonly found in altered cordierite. Associated with some

of these altered crystals there are concentrations of fine grained sillimanite intergrown with minor amounts of green chlorite and these minerals occur mainly along the boundaries of some of the altered cordierite (?) grains. One string of small sillimanite crystals however, passes through a fractured and deformed garnet crystal and another deformed garnet crystal is also closely associated with some sillimanite.

Plagioclase in this sample shows minor alteration to sericite but most of it is slightly turbid and stained by very fine grained iron oxide. The section does not contain mica.

Sample P511/77

It contains about 1% of biotite most of which has been partly chloritised. Plagioclase shows little evidence of alteration to sericite but most of it is turbid and stained by very fine grained iron oxide.

CONCLUSION

Samples P506/77 to P511/77 are all related but the proportions of the constituent minerals vary slightly, and some altered cordierite (?) and sillimanite were found in sample P510/77.

Sample P505/77 would probably be unsuitable for geochronology because of extensive sericitisation of practically all of the plagioclase and alteration of the biotite.

Samples P506/77; P507/77; P508/77; P509/77 and P511/77 would probably be suitable for whole-rock geochronology but they all contain minor amounts (up to 2%) of chloritised or partly chloritised biotite, and in most of these samples much of the finely granulated material and plagioclase are stained by very fine grained iron oxide.

Sample P510/77 contains a few percent of completely altered cordierite (?) and the effect of this on age dating is uncertain.

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NATA CERTIFICATE 15 September 1977

THE GEOCHRONOLOGY OF THE ANCIENT BASEMENT ROCKS OF THE GAWLER CRATON

Progress Report No 8

by A. W. Webb

Investigation and Report by: Dr A. W. Webb

D. K. Rowley
Manager
Analytical Chemistry Division

for Brian S. Hickman
Acting Managing Director

hii

THE GEOCHRONOLOGY OF THE ANCIENT BASEMENT ROCKS OF THE GAWLER CRATON

1 REVIEW OF PROGRESS

Rb-Sr analyses of five samples of gneiss from Ooldea Stratigraphic Hole No. 1 have been completed and the results are discussed in the following sections.

Work currently in progress includes a re-examination of drill core of basement rocks from Wallira Nos 1 and 2, augen gneiss from Lake Bring (P548/77 to P553/77) and granite from Malbooma (P554/77 to P561/77).

2 GEOCHRONOLOGY

The 5 Rb-Sr total rock analyses are listed in Table 1. The variation in Rb/Sr ratio between these samples is small and therefore they cannot be expected to produce a precise isochron. However, one of the main aims of this investigation was to determine whether these quartzo-feldspathic gneisses were related in age to the belt of Archaean gneiss to the northeast, between Mt Christie and Coober Pedy. In this respect, the current investigation was successful; the gneisses from Ooldea No. 1 are significantly younger than Archaean and are therefore not related to the Mt Christie gneisses.

The analytical data have not been regressed because of the restricted range in Rb/Sr ratios and a non-linear scatter greater than that expected from normal analytical error. However, from the Sr^{87}/Sr^{86} ratios it seems unlikely that the gneisses can be older than 1750 Ma.

TABLE 1

Rb-Sr Analyses of Ooldea No 1 Gneisses

SAMPLE NUMBER	Rb/Sr	Rb^{87}/Sr^{86}	$\#Sr^{87}/Sr^{86}$
P506/77	1.358	3.9583	0.8042
P507/77	1.436	4.1874	0.8083
P508/77	1.411	4.1145	0.8083
P509/77	1.231	3.5844	0.7935
P510/77	1.526	4.4509	0.8108

\# Ratios normalised to $Sr^{88}/Sr^{86} = 8.3752$

Constants used: $Rb^{85}/Rb^{87} = 2.600$

$\lambda\ Rb^{87} = 1.42 \times 10^{-11}\ y^{-1}$

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5th October, 1976

The Director,
Department of Mines,
PO Box 151,
EASTWOOD, SA 5063

Attention: Mr G.M. Meyer,
Petroleum Geology Section

REPORT MP 801/77

YOUR REFERENCE:	Application for service work dated 13-9-76
MATERIAL:	Two hand specimens
LOCALITY:	Near Watson on the Trans-Australia Railway line
IDENTIFICATION:	P397/76 and P398/76
DATE RECEIVED:	14-9-76
WORK REQUIRED:	Petrographic description

Investigation and Report by: R. Cooper

Officer in Charge, Mineralogy/Petrology Section: Dr K.J. Henley

K.J. Henley

for F.R. Hartley
Director

mhb

PETROGRAPHIC DESCRIPTIONS OF TWO DRILL HOLE SAMPLES FROM NEAR WATSON ON THE TRANS-AUSTRALIA RAILWAY LINE, (OOLDEA 1:250,000 SHEET AREA)

1. INTRODUCTION

Two samples, labelled P397/76 and P398/76, were submitted by the South Australian Department of Mines (Mr G.M. Meyer, Petroleum Geology Section) for petrographic description.

2. PETROGRAPHIC DESCRIPTIONS

Sample: P397/76; TSC16921

Location:

Reid No.1 drill hole, 27.5-30 metres. The drill hole is located 12 km east of Watson on the Trans Australia Railway Line.

Rock Name:

Poorly consolidated, zeolitic, bioclastic limestone.

Hand Specimen:

This sample consists of pale yellow, apparently finely crystalline friable material. The largest coherent lumps are up to 5 mm across but much of the sample consists of powder.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Calcite	70-90
Clinoptilolite	5-15
Altered glauconite/clay	3-6
Quartz	<5

This sample consists of broken shell fragments, some of which are several millimetres across, seated in a finely crystalline matrix which is composed predominantly of calcite with lesser amounts of the zeolite clinoptilolite. Also present in minor to trace amounts are grains of quartz and patches of a pale yellow-green, finely crystalline substance which is thought to be composed of altered glauconite, clay and limonite.

That the shell fragments are composed only of calcite was determined by a microchemical staining test and by an X-ray diffractometer trace. Although the shell fragments are up to several millimetres long all appear broken and some have partially recrystallized. Whereas the original carbonate in the shell fragments is generally finely crystalline and slightly turbid either because of its fine crystal size or because of the presence of minute opaque particles the authigenic/recrystallized calcite forms crystals up to 0.2 mm across which are clear and limpid

The matrix carbonate is finely crystalline (micritic) with a crystal size of 0.01 mm or less. The zeolite clinoptilolite $(Na,K)_4CaAl_6Si_{30}O_{70}.24H_2O$ is colourless and like the matrix carbonate is finely crystalline with crystals generally being less than 0.01 mm across and in a few places being up to 0.05 mm across. The coarser crystals of clinoptilolite are most commonly found infilling voids/chambers in some of the shell fragments.

Quartz grains range in size up to 0.2 mm across and are mostly angular in shape. Although there appears to have been some reaction between the quartz grains and the matrix carbonate and zeolite the angularity of the quartz grains is probably largely a primary feature.

The patches of yellow-green altered glauconite-clay-limonite are up to 0.4 mm across and where ovoid in shape are very likely faecal pellets. However, many are closely associated with shell fragments where they generally occur infilling chambers/voids. The freshest-looking patches are quite greenish in colour and are finely crystalline and weakly birefringent although the birefringence is largely masked by the colour of the substance. The more altered-looking patches are yellow-brown to brown in colour and generally have a significant amount of limonite associated with them.

This is a sample of bioclastic limestone which has a significant amount of clinoptilolite associated with it. A similar association is found in the Port Willunga Beds within the Willunga Basin.

Sample: P398/76; TSC16922

Location:

Ooldea No.1 bore, interval 10.5-12 metres. This bore-hole is situated 11 kms south of Watson.

Rock Name:

Partially recrystallized bioclastic limestone.

Hand Specimen:

This sample consists of one chip of rock which is approximately 3 cm across and is off-white-pale brown in colour and composed of carbonate.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Calcite	>95
Quartz	1-2
Opaline silica	trace

This sample is composed predominantly of calcite with trace amounts of quartz and opaline silica and possibly trace amounts of zeolite. Much of the calcite is present as shell fragments and in these the carbonate is finely crystalline and turbid. This turbidity is caused either by the finely crystalline nature of the carbonate or because of the presence of minute opaque particles. In many of the shells or fragments, some of which are up to 1 mm across, very fine textural features can be distinguishe The fragments include foraminifera, small multi-chambered mollusca, bryozoa and less distinctive remains. Forming a matrix and in places partially replacing the fossil fragments is more coarsely crystalline, clear, limpid calcite which typically forms crystals between 0.04 mm and 0.15 mm in diameter. A microchemical staining test was used to confirm that this matrix carbonate as well as the carbonate in the shell fragments was calcite

Dispersed through the carbonate are a few quartz grains the largest of which are 0.2 mm across. These range in shape from angular to subrounded and in some, but not all, cases appear to have been partially replaced by the carbona One patch of opaline silica approximately 0.6 mm x 0.3 mm in size was noted This silica is pale brown in colour and intimately intergrown with small patches/inclusions of calcite. There are a few patches of a finely crystall colourless, low relief and low birefringent mineral which is probably a zeolite such as clinoptilolite. The largest of these patches is 0.5 mm across and intimately intergrown with calcite.

This is a sample of partially recrystallized bioclastic limestone.

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27th September, 1976

The Director,
Department of Mines,
PO Box 151,
EASTWOOD, SA 5063

Attention: Mr G.M. Meyer,
Petroleum Section

REPORT MP 482/77

YOUR REFERENCE:	Application for service work dated 12th August 1976
MATERIAL:	One sample of bore hole cuttings
LOCALITY:	Bore hole located 11 miles west of Ooldea on the Trans-Australia Railway, depth 28.5 to 30 metres
IDENTIFICATION:	P329/76
DATE RECEIVED:	12th August 1976
WORK REQUIRED:	Petrographic description

Investigation and Report by: R. Cooper

Officer in Charge, Mineralogy/Petrology Section: Dr K.J. Henley

for F.R. Hartley
Director

mhb

PETROGRAPHIC DESCRIPTION OF A SELECTION OF CHIPS FROM A DRILL HOLE LOCATED NEAR OOLDEA ON THE TRANS-AUSTRALIA RAILWAY

1. INTRODUCTION & SUMMARY

One sample, labelled P329/76, was submitted by the South Australian Department of Mines (Mr G.M. Meyer, Petroleum Section) for petrographic description. The sample consisted of chippings from the interval 28.5 to 30 metres in a drill hole situated 11 miles west of Ooldea on the Trans-Australia railway.

The following rock types were included among the chips:

a. ferruginous sandstone
b. silty sandstone
c. calcareous sandstone
d. sandy fossiliferous limestone
e. sandy pelletal limestone (?calcrete)

The ferruginous sandstone is texturally very similar to the silty sandstone and has probably formed from the latter by processes of weathering and replacement. The carbonate rock types c. and d. are also fairly similar and are distinct from the sandy pelletal limestone, (category e). Sandstone rock chips slightly predominate over those containing mainly carbonate, Ferruginous sandstone chips are present in approximately equal amounts to those consisting of silty sandstone.

2. PETROGRAPHIC DESCRIPTION

Sample: Ooldea 28.5-30, P329/76; TSC16843

Location:

Cuttings collected from the interval 28.5-30 metres in a bore hole located 11 miles west of Ooldea on the Trans-Australia railway.

Rock Name:

Bore hole chippings composed of various rock types including ferruginous sandstone, silty sandstone, calcareous sandstone, sandy fossiliferous limestone and sandy pelletal limestone.

Hand Specimen:

The material in this sample ranges in size from fine sand up to angular chips 1 cm across. The colour of the chips varies from light brown to dark brown with the lighter coloured chips appearing to be composed of either quartz or carbonate and the dark coloured chips being highly ferruginous.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
a. Ferruginous sandstone	
Quartz	20-30
Feldspar	<5
Goethite-limonite	60-70
b. Silty sandstone	
Quartz	40-50
Interstitial clay/ phyllosilicates	25-35
Opaques	1-5
Feldspar	<5
Glauconite-chlorite	trace-2
Accessories: zircon	trace
c. Calcareous sandstone	
Quartz	40-50
Calcite	40-50
Opaques	2-4
d. Sandy fossiliferous limestone	
Quartz	2-10
Calcite	85-95
Opaques	trace-2
e. Sandy ?pelletal limestone (?calcrete)	
Quartz	10-20
Calcite	80-90
?Clay-?phyllosilicates	2-6

The sandstone samples (categories a. and b.) consist of angular to subrounded grains of quartz seated in a matrix composed of either ferruginous material or of clay and phyllosilicates.

The quartz grains range in size from 0.03 mm to 0.2 mm and are generally clear (free of inclusions) and extinguish evenly. The angularity of the quartz grains appears to be a primary feature and not to have been enhanced through reaction with the matrix minerals.

Grains of plagioclase and potash feldspar are present in minor to trace amounts. These grains are of similar size and habit to those of quartz and when untwinned are sometimes difficult to distinguish. However, many of the feldspar grains, especially those composed of plagioclase, are sieved with minute granules of opaque material. There are a few heavy mineral grains mainly opaque oxide.

Most of the quartz and feldspar grains are portions of single crystals but there are also polycrystalline grains of chalcedony and quartz-sericite (altered acid ?volcanic detritus) present in minor to trace amounts.

The ferruginous sandstone grains have a semi-opaque to opaque matrix which appears to consist of goethite and limonite. The silty sandstone fragments have a pale brown finely crystalline matrix which is believed to be composed of sericite and clay.

Present in the silty sandstone chips and presumably the ferruginous siltstone chips, are opaque grains up to 0.1 mm across and dispersed through all the chips in trace amounts are a few grains of zircon and blue-green tourmaline.

The calcareous sandstone consists of grains of quartz and opaques seated in a matrix of calcite. The quartz grains are of two distinct sizes; the bulk are between 0.05 mm and 0.15 mm in diameter and are typically subangular to subrounded in shape but there are also a few larger grains between 0.3 and 0.5 mm in diameter which are subrounded to well rounded in shape. The opaque grains range in size from 0.05 mm to 0.1 mm and are subrounded to well rounded in shape and composed of iron oxides, ?hematite and goethite. The matrix calcite occurs as irregularly shaped crystals the largest of which are at least 0.5 mm across and generally enclose a number of quartz and opaque grains.

The sandy fossiliferous limestone (category d.) consists essentially of calcite with a minor amount of quartz. The quartz grains are between 0.1 and 0.2 mm in diameter and are generally subrounded to well rounded in shape. The quartz grains are dispersed through a matrix of calcite which contains crystals up to 0.5 mm across. In several of the limestone chips, because of variations in the crystal size of the calcite and possibly because of the presence of minute opaque inclusions, the outlines of shell fragments and less distinct forms, possibly including faecal pellets etc., are visible. The calcite in the fossils is invariably more finely crystalline than that in the bulk of the chips and generally appears slightly turbid.

The sandy limestone (?calcrete) (category e.) consists predominantly of ovoid carbonate bodies and grains of quartz. The grains of quartz range in size from 0.03 mm to 0.25 mm and are subangular to well rounded in shape. Many of the quartz grains are coated with calcite and possibly the carbonate ?pellets have formed through the engulfing and replacement of quartz grains. The carbonate ?pellets are up to 0.5 mm across and the carbonate (calcite) of which they are composed is generally extremely fine-grained (micritic) and semi-opaque in appearance. The opacity is probably partly due to the fine crystal size of the carbonate and possibly also caused to some extent by the presence of minute opaque particles. The interstices between the quartz grains and the carbonate ?pellets has been partially but not completely infilled by more finely crystalline calcite and possibly some clay-like material as well. It is possible that this material is calcrete.

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STRATIGRAPHIC DRILLING

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meo/23

STRATIGRAPHIC DRILLING

1. INTRODUCTION

This progress report contains petrographic descriptions of core samples from Ooldea No. 1 (81 metres to 280 metres, approximately). Porosity and permeability determinations have also been made.

Sample: 81.08 m; TS41054

Location:
Ooldea No. 1

Rock Name:
Fine-grained sandstone, in part dolomitic

Hand Specimen:
This is a finely granular brown to grey sandstone. One bed approximately 8 mm in width is harder and paler than the bulk of the rock.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	50-80
Dolomite	2-30
Iron oxide/clay	10-15
Feldspar	5
Opaques	2
Mica	Trace-1
Zircon	Trace
Tourmaline	Trace
Green clay	Trace

The wide range of abundance of dolomite is an indication of the variability in the amount of this material from place to place in the rock, and this is matched by commensurate changes in the overall proportion of quartz. In brief, there is one bed in which the material is essentially completely cemented by medium- to fine-grained dolomite but elsewhere dolomite is present as rather scattered crystals and the material is rather poorly cemented by iron-stained clay.

The detrital fraction consists principally of single crystals of quartz present as subangular to subround grains which have an average size of approximately 0.1 to 0.15 mm. The grains generally have tangential contacts and the angularity appears to be a result of the immaturity of the detrital material. Despite this, the grains appear to have been fairly well-sorted. Feldspar is present both as fresh and rather altered grains but polysynthetically twinned plagioclase and cross-hatch twinned microcline could both be identified. Some of the microcline grains are particularly clear and fresh.

The grains form a framework in those parts of the rock where they are cemented by a brown, stained clay but there may have been some replacement of the material where the cementing material is dolomite since this latter mineral forms a virtually contiguous intergranular aggregate of anhedral crystals up to about 0.02 mm in size.

The rock contains a small amount of detrital biotite, muscovite, zircon, tourmaline and opaques and one or two rounded patches of a bright green clay mineral. As in other rocks in this collection, it has not been possible to indicate the exact nature of this clay but it is an unusually bright apple green, rather different from the more turbid and darker colours commonly associated with glauconite.

Sample: 98.2 m; TS41055

Location:
Ooldea No. 1

Rock Name:
Feldspathic and lithic sandstone

Hand Specimen:
A buff coloured, friable sandstone which has a fine-grained texture.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	55
Lithic fragments	15-20
Feldspar	10-15
Clay/limonite	7-10
Dolomite	3-10
Tourmaline	Trace
Opaques	Trace

This is a somewhat heterogeneous sandstone and the proportions given above indicate the overall composition of the rock. In some places cementation is a result largely of the growth of authigenic dolomite but elsewhere there is more iron-stained clay material. The sample is probably characterized by the wide variety of sand-grade grains.

The rock contains grains commonly ranging in size from 0.05 mm to 0.3 mm and it is possible that the rock has a bimodal grain size distribution. Sand-grade grains are considerably more abundant than those of silt-grade. These larger grains consist partly of single crystals of quartz and feldspar but there are also a large number of lithic grains. The grains in this size range are well sorted and commonly well rounded. Some lithic grains are clearly acid or feldspathic, fine-grained, igneous rocks and others are secondary quartz or chalcedonic material. Other lithic grains are dark and fine-grained and it is rather difficult to provide an unambiguous identification of these. Detrital, sand-grade feldspar is commonly microcline and this and the presence of common or plutonic quartz suggests a granitic provenance in part.

Finer-grained material tends to be richer in quartz and the grains are somewhat more angular than the sand-grade material. The presence of both large and small grains has resulted in only a little intergranular space being available in the rock.

This space is occupied in some places virtually entirely by authigenic fine-grained dolomite, and in other places largely by a film of dark, argillaceous material around the grains. It is possible that both of these components are of authigenic origin and the dolomite certainly is.

The sample contains only a small proportion of detrital heavy minerals, principally opaques and tourmaline.

This is an unusual sandstone in that it apparently has a bimodal grain size distribution and the grains themselves are commonly well rounded. In

addition to this, the rock contains a considerable proportion of apparently labile detrital components, especially lithic fragments and feldspar. The sample has been cemented partly by the development of authigenic dolomite and partly by the growth of goethite/limonite associated with clay.

Sample: 103.2 m; TS41047

Location:
Ooldea No.1

Rock Name:
Sandy siltstone

Hand Specimen:
This is a buff coloured, slightly friable rock which is massive.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	65-70
Feldspar	10-20
Iron-stained matrix	15
Dolomite	3-5
Opaques	2
Mica	Trace
Tourmaline	Trace

This is a feldspathic sandy siltstone which is fairly homogeneous. It is rather difficult to estimate the total proportion of feldspar in the rock because of alteration and staining by ferruginous material but it could well be as high as 20%. A slab of the rock certainly gives an even yellow stain with sodium cobaltinitrite.

There are some deterital grains 0.15 to 0.25 mm in size and these tend to be fairly widely dispersed throughout the section and occupy possibly as much as 5% of the rock. Most of these grains are single quartz crystals but some are rather altered feldspars (both potassic and sodic). The grains are generally fairly well-rounded. The bulk of the rock consists of detrital material having an average size of about 0.05 mm and hence this is a siltstone with a somewhat bimodal grain size distribution due to the presence of the sandy material described immediately above. The silt-grade grains are generally equant but subangular in shape and there appears to be a considerable amount of detrital feldspar. Some of this is clear but there are turbid and altered grains many of which can be interpreted as feldspar with some confidence. Other detrital components of the rock are flakes of mica which are generally extremely small and consist largely of muscovite, and there are a few grains of angular tourmaline and opaques. The rock also contains a small amount of lithic material which is rather difficult to classify. Some lithic grains consist of chalcedonic material and others consist of finely intergrown quartz and feldspar possibly derived from volcanic rocks. In many places it is difficult to distinguish fine-grained, possibly lithic material, from the matrix.

The intergranular material is dark in plane polarized light and between crossed nicols and probably consists largely of iron-stained clay. In some places the rock may well be cemented essentially by films of goethitic material but in general it seems that there are pools of rather turbid and altered clay also. The rock contains a little scattered dolomitic material mostly present as equant but irregular crystals of the order of 0.1 mm in size. Some dolomite grains are subhedral and a few are fairly

well-formed rhombs. The dolomite is undoubtedly authigenic and crystallized probably after the bulk of the lithification of the rock.

The sample is a somewhat argillaceous feldspathic siltstone containing, in addition, a small proportion of well-rounded, sand-grade grains. The rock was probably deposited in a fairly low energy environment not sufficient to sort material of two different size ranges, probably from two different provenances.

Sample: 112.0 m; TS41051

Location:
Ooldea No. 1

Rock Name:
Dolomitic sandstone

Hand Specimen:
This is a fine-grained, granular rock which is slightly friable in the hand. The rock is characterized by an even buff colour.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	65
Feldspar	15
Dolomite	20
Opaques and semi-opaques	1
Opaque grains	1
Tourmaline	Trace
Garnet	Trace
Zircon	Trace
Green clay	Trace

This is a fairly homogeneous rock and it is a fine-grained feldspathic sandstone cemented by authigenic dolomite and minor amounts of opaque and semi-opaque secondary goethite/limonite. There are detrital grains as much as 0.3 mm in size but these are not very abundant and there appears to be a fairly even size distribution down to material which has an average grain size probably of about 0.1 mm. Quartz and feldspar grains and generally subround in shape and there appears to have been little modification of the grains during compaction and lithification of the rock. Both plagioclase and potassium feldspar were identified but the latter appears to be somewhat more abundant. Some of the plagioclase grains show marked alteration and sericitization but some of the plagioclase and virtually all of the potassium feldspar is clear.

Minor detrital components in the rock consist of small, angular grains of heavy minerals; zircon, tourmaline, opaques and garnet were all identified and they appear to be randomly distributed throughout the area of the thin section.

The rock has been cemented essentially by an aggregate of fairly fine-grained dolomitic material. Individual crystals of dolomite are less than 0.06 mm in size and in many small cavities between the grains are much smaller than this again. Dolomite appears to be an authigenic cement and it is not possible to distinguish whether it has replaced a pre-existing mineral or filled cavities within the rock. The shape of the dolomite crystals is essentially anhedral and there appears to be no development of rational crystal faces of this mineral.

The sample is a fairly ill-sorted but homogeneous fine-grained sandstone containing a significant proportion of detrital feldspar. The rock has been cemented essentially by authigenic dolomite.

Sample: 133 m; TS41053

Location:
Ooldea No. 1

Rock Name:
Dolomitic sandstone/siltstone

Hand Specimen:
This is a somewhat banded rock which is fine-grained and has a buff colour.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	70
Dolomite	15
Clay	>5
Feldspar	3-5
Mica	2
Opaques	2
Green clay	Trace

The average crystal size of this rock is about 0.06 mm to 0.08 mm and hence the sample is near the commonly accepted borderline between a siltstone and a sandstone. The rock is well-sorted and most of the detrital material consists of single crystals of quartz or potassium feldspar. The crystals are generally angular to subangular and some are notably elongate so that although the sample is well-sorted there is a suggestion of immaturity in the shape of the grains. It is difficult to estimate the amount of feldspar with precision but it seems to be a little smaller than in many other rocks in this collection; there are rather turbid, altered grains and these possibly consist of extremely altered plagioclase grains. Minor detrital components of the rock consist of flakes of muscovite and more equant grains of opaques and a green clay. The latter has a notably bright colour which masks the birefringence and the material does not, superficially, appear to be glauconite.

The material is cemented essentially by two phases: dolomite and iron-stained clay. The dolomite is distinctly authigenic and forms irregular, rather cuspate crystals as much as 0.15 mm in size and commonly at least 0.08 mm in size. In one or two places the dolomite appears to form optically continuous overgrowths over original dolomite grains which are now marked by a rim of dark semi-opaque material. Throughout the whole of the thin section the dolomite occurs with the other cementing material which is a brown clay. This is generally rather indeterminate but it appears to form both a thin skin on many grains and also fills some small, cuspate, intergranular patches.

The sample is a fairly well-sorted sandstone/siltstone containing moderate amounts of authigenic dolomite and intergranular iron-stained clay.

Sample: 157.0 m; TS41041

Location:
Ooldea No. 1

Rock Name:
Feldspathic and dolomitic siltstone

Hand Specimen:
A medium to dark brown rock which is fine-grained and homogeneous.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	60
Opaques and semi-opaques	15
Dolomite	10
Feldspar	10
Lithic fragments	2
Mica/chlorite	1
Opaques	1
Tourmaline	Trace
Green clay	Trace

This is a fairly well-sorted siltstone containing abundant detrital feldspar and a moderate amount of authigenic dolomite. The sample contains no sand-grade material but otherwise is distinctly similar to the sample from, for example, 193.95 m.

The largest grains intersected in the thin section are about 0.15 mm in size but these are exceptional and comprise less than 2% of the volume of the rock. The remainder of the sample consists of well-sorted silt-grade material having an average size of about 0.07 mm. Both the large grains and the small are characterized by the relative abundance of feldspar and the presence both of sodic and potassic types. Both feldspars show a range of alteration and plagioclase, particularly, is heavily sericitized. In contrast, there are water-clear crystals of twinned microcline. The grains tend to be angular in outline, tending towards subangular and subround shapes particularly amongst the coarser grain size population. These larger grains tend to be concentrated in lenticular patches in the thin section and there are many fields of view which contain simply well-sorted, silt-grade material. Lithic fragments in the list above refers to a few small, subround, clay aggregates, probably of detrital origin.

Intergranular material is generally brown in colour and represents either simply goethite/limonite cavity in-fillings or, more likely, iron-stained clay. Dolomite is present as equant, subhedral to anhedral crystals which are clearly of authigenic origin and possibly post-date the clay.

Minor constituents of the rock are rather angular but equant grains of green tourmaline and distorted small flakes of rather diffuse mica, some of which may well be chloritized.

In summary, therefore, the sample is a somewhat bimodal siltstone characterized by excellent sorting. The matrix consists of iron-stained clays but there is a considerable amount of authigenic dolomite also.

Sample: 176.8 m; TS41042

Location:
Ooldea No. 1

Rock Name:
Ill-sorted, feldspathic sandstone

Hand Specimen:
A friable, dark brown rock which is generally fine-grained and contains a speckling of clear, sand-grade grains.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	60
Feldspar	15-20
Opaque and semi-opaque matrix	10
Dolomite	5-10
Lithic fragments	3
Zircon	Trace
Mica/chlorite	Trace
Opaques	Trace
Tourmaline	Trace

This is a rather unusual sandstone in that it has a wide grain size distribution but many of the sand-grade grains show exceptional rounding. There appears not to be a specifically bimodal grain size distribution but simply a very wide range of all sizes from less than 0.05 mm to about 0.6 mm. The relative proportions of the different sizes are a little difficult to estimate because some of the fine-grained material has been removed from the section as a result of the poor cementation of the sample, but it seems likely that the rock contains more than 50% of grains greater than 0.2 mm in size (and commonly up to 0.5 mm) and a similar amount of material finer than about 0.04 mm. The finer-grained material generally is present as subangular to subround grains. The rock contains a considerable amount of detrital feldspar present as both plagioclase and rather altered and poorly twinned potassium feldspar. There are sub-equal amounts of both types of feldspar in all of the grain size range as far as can be determined by visual observation.

The rock has been cemented by a thin film of goethite/limonite surrounding the grains and, since there is a wide grain size range, there is only a limited amount of intergranular space. Whether some of this dark material obscures clay is difficult to tell, but in this rock it could well be that there is simply a thin film of goethite/limonite. The rock contains a small amount of authigenic dolomite present as equant anhedral grains about 0.1 mm in size.

Lithic fragments are represented by aggregates of detrital clay which are generally rather small, as well as larger, clay-rich and quartz-rich grains derived from sedimentary and granitic terrains respectively.

This is an unusual sandstone containing well-rounded but ill-sorted grains; this may be interpreted as being due to the derivation of detrital material from more than one source and its deposition in a low energy environment in which efficient sorting was not possible.

Sample: 179.59 m; TS41046

Location:
Ooldea No. 1

Rock Name:
Heterogeneous, feldspathic sandstone

Hand Specimen:
A laminar-banded, dark brown sandstone containing, in certain bands, grains of sand-grade but apparently otherwise consisting of silty material.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	70
Feldspar	10-15
Opaques and semi-opaques	2-5
Clay	5
Lithic fragments	5
Dolomite	3-5
Tourmaline	Trace
Opaques	Trace
Mica	Trace

In some places in the thin section this sample closely resembles others in this collection, particularly in that it contains fairly well-rounded and large sand-grade grains in finer-grained silty material. Elsewhere, however, the rock is somewhat finer-grained and contains a little more intergranular clay and less well-defined goethitic material.

In some places there are detrital grains (mainly quartz) as much as 0.5 mm in size. These grains are commonly well-rounded. In the rock as a whole, however, such grains are distinctly rare and the average grain size is about 0.1 mm. In these parts of the rock the grains are subangular to subround in shape and there is evidence of a little compaction and modification of the grains. Feldspars are relatively abundant and both plagioclase and potassium feldspar can readily be identified. It seems likely that there is rather more potassium feldspar than plagioclase but the proportion is probably not greater than 2 to 1. In most parts of the rock the grains are cemented by thin films of clay, stained in some places with goethitic material. The range of proportions of opaques and semi-opaques given above indicates the variability in the amount of this material. The sample is much less of a dense red colour in thin section than are many other sandstones and siltstones in this collection. 'Lithic fragments' refers to a few granitic and possibly volcanic fragments and the rock contains a minor amount of authigenic, granular dolomite and traces of fine-grained detrital tourmaline and mica. One or two grains of tourmaline are relatively large and fairly well-rounded. The tourmaline is a fairly common green variety.

This is a heterogeneous sandstone containing, in places, a population of relatively large, well-rounded, grains. The sample is feldspathic and it has been cemented by rather more clay material (and less limonite) than many other sediments in this collection.

Sample: 193.95 m; TS41040

Location:
Ooldea No. 1

Rock Name:
Sandy, feldspathic siltstone

Hand Specimen:
A rather dark reddish-brown rock which is massive and fairly compact. Most of the material appears to be ferruginous but there are a few patches of paler grey material also.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	65
Feldspar	>10
Opaque and semi-opaque matrix material	10-15
Dolomite	5-10
Opaques	1
Tourmaline	Trace
Green clay	Trace
Biotite	Trace

The sample is a homogeneous siltstone, probably characterized by the presence of authigenic dolomite and by a small population of sand-grade grains.

The larger grains occupy about 10-15% of the volume of the rock and consist of quartz, potassium feldspar and plagioclase. The grains are equant and range from sub-round to round in shape. There is a slight tendency for these grains to be concentrated in particular bands but they are present in most fields of view also. The feldspars tend towards slightly tabular shapes but the quartz grains are distinctly equant. There are one or two polycrystalline quartz grains possibly derived from a granitic type of rock.

Most of the grains in the rock are of silt-grade and range in size from about 0.03 mm up to 0.08 mm. Sorting of this material is excellent but most of the grains are subangular in outline. The proportions of quartz and feldspar amongst the finer grains is the same as among the coarser grains as far as can be distinguished from optical examination. Most of the feldspars show a little alteration and turbidity but this is rarely sufficient to obscure, for example, polysynthetic twinning of plagioclase and it is thought likely that this mineral is at least as abundant as potassium feldspar. These grains rest in a matrix containing abundant dolomite and opaque and semi-opaque brown material. It is not clear to what extent the latter represents simply goethite/limonite material or iron-stained clays and it is thought likely that the rock does, in fact, contain a considerable proportion of clay obscured by this iron-staining. This material mantles most of the grains and may have partly replaced some silicate material also. Dolomite tends to form rather well-defined crystals which are equant but irregular in shape. They are as much as 0.1 mm in size and some show a tendency towards subhedral shapes.

The dolomite is distinctly of authigenic origin and may well be later than the iron-stained material.

The rock contains minor detrital biotite and equant but irregular specks of opaques which are also probably detrital. There are one or two grains of blue tourmaline and a rather dark mineral which may be fine-grained zircon. Green clay in the listing above refers to one or two patches of a relatively bright green material which may be ?glauconite.

This is a bimodal sandstone/siltstone containing relatively abundant potassium and sodic feldspar. Each individual grain size population is well sorted and the larger grains are generally subround in outline.

Sample: 199.8 m; TS41049

Location:
Ooldea No. 1

Rock Name:
Interbedded micaceous and feldspathic siltstones and sandstones

Hand Specimen:
This is a purple to brown coloured rock which is generally fine-grained. The sample does show, however, thin laminar banding at right angles to the core length and this apparently defines slightly different sediments.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	55
Dolomite	15-20
Clay	10
Feldspar	10
Mica	2-10
Opaques and semi-opaques	2
Opaque grains	Trace
Tourmaline	Trace
Garnet	Trace
Chert	Trace

The section in fact contains several different lithologies and each will be described briefly.

The coarsest rock in the thin section is a sandstone containing a moderate proportion of grains larger than 0.2 mm and ranging commonly up to about 0.5 mm in size. Many of these larger grains are subround in outline. The grains occur in a siltstone matrix in which the grains are generally not more than about 0.8 mm. In both the sandy and silty material there is a considerable proportion of detrital feldspar. Grains of the latter are commonly fresh and both plagioclase and microcline (including microcline perthite) were identified. There is a small amount of detrital mica and a considerable proportion of authigenic dolomite. The material is generally relatively free from goethite/limonite and it is difficult to see much matrix material although the sample is probably cemented by slightly stained clay.

Other lithologies are finer-grained and more micaceous than the sandy siltston described above. One relatively thin bed, for example, contains abundant detrital biotite and muscovite and these two minerals together probably compri about 15% of this part of the rock. There is considerable authigenic dolomite here also so that this lithology is defficient in detrital quartz and feldspar. The average length of the flakes of mica is about 0.15 mm and the flakes are generally straight and very thin.

The most abundant lithology is probably best described as a dolomitic and feldspathic siltstone. This contains little detrital material coarser than about 0.1 mm and probably of the order of about 25% of authigenic dolomite present as equant but irregular crystals up to about 0.08 mm in size. There is a minor amount of detrital biotite and muscovite and probably

approximately 10-15% of detrital feldspar.

In one place in the thin section there is a distinctly ferruginous, fine-grained lithology which is probably a thin bed of limonitic shale or claystone. This bed is only about 0.15 mm in width.

The sample therefore contains several lithologies, most of which are represented in other rocks in this collection. The most abundant lithology present is a dolomitic siltstone containing detrital feldspar and mica but there is also a somewhat similar rock but having a significant sand-grade fraction. Other lithologies are both more micaceous and more ferruginous.

Sample: 208 m; TS41045

Location:
Ooldea No. 1

Rock Name:
Ill-sorted sandstone with shaly clasts

Hand Specimen:
This is a rather heterogeneous, brown sandstone and the thin section has been cut from a part of the hand specimen which contains aphanitic, brown fragments generally several millimetres in size. The remainder of the rock is a medium-grained, friable sandstone which appears to be fairly massive.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	45
Feldspar	10-15
Opaques and semi-opaques	5-7
Dolomite	5
Lithic fragments	5
Opaques	1
Garnet	Trace
Green clay	Trace
Iron-stained patches	30

In the listing above, 'iron-stained patches' refers to rather irregular, fine-grained patches of ferruginous material, clays and micas tentatively interpreted as being clasts of a shaly sediment. These occur in a rather heterogeneous, feldspathic sandstone similar to several others in this collection.

In the sandstone there are numerous round to sub-round grains of quartz and feldspar more than 0.2 mm in size and commonly of the order of 0.3 to 0.5 mm. Between these is somewhat finer-grained material and quartz and feldspar grains here are generally less than 0.1 mm in size. The sample has been lithified by the development of ferruginous skins on these grains and by the close intergrowth of both large and small grains. In addition, there is a considerable amount of authigenic dolomite. Feldspar grains are fairly abundant and some occur as large single crystals but there is also a considerable amount of feldspar in fairly coarse-grained and simple grains apparently derived from original granitic rock. It is possible that potassium feldspar is somewhat more abundant in this rock than plagioclase, although the latter does occur as a few relatively large grains somewhat obscured by abundant sericitization. As indicated above, lithic fragments tend to be quartzo-feldspathic and medium- to coarse-grained and fine-grained clay lithic fragments are distinctly less abundant.

The intergranular material consists virtually entirely of goethite/limonite and authigenic dolomite, as indicated above, and the rock is characterized partly by the tendency of the dolomite to form subhedral rhombs in many places. In one or two other places in the thin section some dolomite occurs as sub-angular, polycrystalline aggregates and these may be of detrital origin. The sandstone is therefore ill-sorted and rather heterogeneous but is notably

feldspathic and contains many round or subround grains which may have been derived from a previous cycle of sedimentation.

The brown patches are elongate but rather irregular in shape and consist principally of translucent opaque and semi-opaque ferruginous material within which are small oriented flakes of colourless mica and clay, together with small grains of angular quartz. It seems likely that these are fragments of a pre-existing (probably soft) sediment caught up in the sandstone. They have been somewhat deformed by compaction against the more rigid sandy material.

Sample: 234.2 m; TS41043

Location:
Ooldea No. 1

Rock Name:
Ill-sorted, feldspathic and lithic sandstone

Hand Specimen:
This is a somewhat purple, rather friable sandstone containing fragments up to about 3 mm in size.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	40
Lithic fragments	25
Dolomite	15
Feldspar	10
Opaques and semi-opaques	7
Clay	3

This sandstone contains less silty material than many others in this collection but, even so, it shows rather poor sorting. In addition, the grains are generally subangular to distinctly round in shape and the rock shows a rather characteristic textural inversion probably indicating derivation of the detrital material from several different provenances; deposition was in a low-energy environment.

The detrital grains range in size from about 0.02 mm to 0.8 mm but most commonly from 0.1 to 0.6 mm. All the grains are fairly equant and many of the large grains tend to be subround or round in outline whereas the smaller grains show more tendency towards subangular shapes. As far as can be determined the proportions of the quartz and feldspar are similar in the different size fractions. In the listing above 'lithic fragments' refers to many different types of grains, most of which contain largely quartz and potassium feldspar. Some of the grains are psammitic metamorphic rocks showing excellent mortar textures; others are more heterogeneous rocks, possibly derived from granitic gneisses or coarse-grained schists. One fragment consists of secondary silica/chalcedony and there is one granophyric grain clearly indicating some igneous material in part of the provenance. As well as quartz and feldspar in lithic fragments these minerals also occur as discrete grains and there are approximately equal amounts of potassic and sodic feldspar; these minerals show a wide range of alteration.

Intergranular material consists of authigenic dolomite and an unusual intergrowth of opaques and semi-opaques and clay. These intergrowths are almost submicroscopic but they show almost vermicular aggregates of the opaques. Elsewhere there is featureless goethitic material around the grains and this has contributed to cementation.

Heavy minerals are rare, but a few garnet grains were noted.

Sample: 246.37 m; TS41048

Location:
Ooldea No. 1

Rock Name:
Ill-sorted quartz sandstone

Hand Specimen:
This is a buff to brown coloured sandstone which contains quartz grains up to 1 cm in size. Most of the sample is, however, merely a somewhat coarse-grained sand or possibly conglomerate.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	98
Opaques and semi-opaques	1
Rutile	Trace
Zircon	Trace

In thin section the sample consists virtually entirely of quartz despite the distinctly brown appearance of the hand specimen. Ferruginous material appears to be confined to very thin intergranular films and one or two patches of opaques associated with relatively fine-grained material. The sample is a distinctly ill-sorted sand cemented by the ferruginous material and partly by deformation of some of the quartz grains and their partial solution.

The thin section contains parts of a few large grains and crystals and these consist entirely of quartz. Single quartz crystals occur as grains up to about 1.5 mm in size but larger grains are generally polycrystalline and the examples in the thin section have a granular interlocked texture and an average crystal size of about 0.7 mm. Apart from these the grains generally consist of single quartz crystals and this may indicate that the rock has been derived from a sedimentary provenance, particularly in the light of the abundance of feldspar in many other samples in this collection. The feldspar suggests that the sediment has not been subjected to extreme abrasion and corrosion of the detrital material, yet this present sample consists almost entirely of quartz.

The average grain size of the rock is somewhat difficult to estimate but in many fields of view it appears to be of the order of 0.6 to 0.9 mm. Finer grains are equant and anhedral and range in shape from subangular to occasional round grains. The very large grains intersected in the thin section are generally subround in outline. There is some evidence of pressure solution of the grains particularly in parts of the thin section where there is abundant relatively fine-grained material (i.e. most grains less than 0.4 mm). There is a tendency here towards the development of long grain contacts. Intergranular space has therefore been reduced and is generally present in the thin section as pores but it is not possible to tell whether these are an integral part of the rock or not; it is at least a possibility that the rock contained a little clay which has been so soft that it has been removed during the preparation of the thin section. One or two quartz grains show optically continuous overgrowths but these are by no means abundant and probably contributed only a small extent towards the lithification of the rock. The sample contains traces of relatively fine-grained and angular zircon and rutile.

Sample: 253.83 m; TS41044

Location:
Ooldea No. 1

Rock Name:
Quartz sandstone

Hand Specimen:
This is a friable, somewhat granular rock which is a medium brown colour. The rocks shows a little banding on a fairly large scale.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	90
Clay	5
Opaques and semi-opaques	2-3
Feldspar	<3
Opaques	1
Tourmaline	Trace
Zircon	Trace
Mica	Trace

Despite the brown colour of this rock in hand specimen, it contains much less intergranular goethite/limonite and consists principally of quartz grains which are single crystals. These have been locally dissolved during compaction and the rock is characterized by long and concavo-convex boundaries and it is this modification of the original granular texture which has resulted in the lithification of the rock.

The quartz grains commonly range in size from about 0.08 mm to 0.25 mm and the average size is approximately 0.15 mm. Most of the grains are equant but rounding varies somewhat from subangular to round. In general, the larger grains appear to be somewhat rounder than the smaller ones. There is a little potassium feldspar which is present as clear, twinned grains of microcline and only one or two grains of rather altered plagioclase were specifically identified. Other minor constituents of the rock are rather angular, small, equant grains of tourmaline and zircon and widely distributed, rather rounded grains of opaques. There are a few distorted flakes of mica, mostly of altered material, but in one or two cases, of fresh biotite. In general, the rock is homogeneous but there are one or two places in which the sample appears to be somewhat more tightly compacted and a little finer than in the bulk of the material described immediately above.

Intergranular material is not abundant at all, although there are a few patches of illitic or sericitic clay. These could be distorted lithic fragments but the material is homogeneous and is thought to represent a small amount of original clay matrix. Most grains have a thin film of ferruginous material but this is by no means as abundant as in other rocks in this collection.

This is a fairly well-sorted, pure quartz sandstone lithified largely by modification of the original quartz grains.

Sample: 261.75 m; TS41052

Location:
Ooldea No. 1

Rock Name:
Compact pure quartz sandstone

Hand Specimen:
This is a massive and compact brown to buff coloured rock containing a few grains possibly up to 1 mm in size but otherwise fine-grained.

Thin Section:
The rock contains trace amounts of detrital tourmaline, zircon and opaques and some grains have a thin film of clay and/or limonitic material but fully 98% of the volume of the rock consists of quartz. The quartz grains show abundant evidence of having been compressed together and distorted and the rock has clearly been lithified by modification of the detrital quartz. The rock is clearly very different from many other dolomitic, feldspathic and argillaceous sediments in this collection.

The quartz crystals are clearly derived from original grains although few show much evidence of complete grain outlines. Concavo-convex and sutured boundaries are common in all fields of view but there are places where there are somewhat less complex textures and these suggest that the original grains were probably subround in outline, on average. The average size of the crystals now present is about 0.3 mm and it seems likely that the original sediment had a similar average size and was probably fairly well-sorted. One or two of the quartz grains appear to be markedly strained but most are of the common or plutonic variety. The rock now has essentially a granular texture, as indicated above, and most fields of view contain many sutured grain/crystal boundaries. These are less common where the quartz crystals have a thin film of clay. This is generally more more less pale brown material but birefringence can be seen in it and it seems likely that this is essentially clay material slightly stained by iron oxide/hydroxide. Such material occurs even in distorted and sutured grain contacts and it may therefore be a relatively late addition to the rock.

The detrital heavy minerals are generally fine-grained and form subround to subangular grains. Tourmaline is a rather distinctive pale grey to blue/green colour.

The sample is a markedly compacted pure quartz sandstone.

Sample: 280.5 m; TS41050

Location:
Ooldea No. 1

Rock Name:
Quartz sandstone

Hand Specimen:
This is a brown, friable rock which appears to have a medium-grained granular texture.

Thin Section:
Since the rock is very friable the thin section contains very largely quartz grains with little evidence of the intergranular material; however, there are a few places where there are a few pores and from these it appears that the sample probably contains only a very small proportion of intergranular space - probably less than 5%. The thin section now consists of about 95% of quartz, less than 5% of dolomite and a trace of detrital mica.

Dolomite occurs in one or two places in the thin section where it occupies virtually the whole of the intergranular space. Individual dolomite crystals are as much as 0.15 mm in size and are equant anhedral. One or two of the crystals have inclusions of quartz and it appears likely therefore that the dolomite has partially replaced some of the detrital silicates. Elsewhere in the thin section the material simply consists of quartz grains and these range in size commonly from about 0.1 mm to 0.45 mm with an average size of about 0.25 mm. Many of the larger grains are subround to round in shape but the smaller grains tend to be subangular to subround. In many places there is evidence of the grains having been partially dissolved during pressure solution and there are some long and concavo-convex grain margins. The presence of these indicates that cementation and lithification of the rock probably occurred by the development of a more granular and interlocked texture during compaction of the sandstone. There are one or two mica flakes (principally biotite) and these show some distortion as a result of these processes.

The sample appears to be a relatively pure quartz sandstone with a little authigenic dolomite but probably little or no intergranular matrix. The sample has been lithified by pressure solution effects on the quartz grains.

3. PETROPHYSICAL MEASURMENTS

The results are as follows:

Sample depth (m)	Porosity (%)	Gas Permeability (md)
81.08	16.7	126
98.2	12.7	225
103.2	23.7	300
112.0	22.5	160
133.0	23.2	155
157.0	17.8	140
176.8	16.9	112
179.59	16.6	<0.5
193.95	15.5	3.6
208.0	17.5	105
234.26	15.1	<0.5
246.37	18.2	250
253.83	18.1	185
261.75	12.6	<0.5

APPENDIX C

BIOSTRATIGRAPHY,

OOLDEA No. 1 and REID No. 1

Palaeontological examination of samples from Ooldea-1

Sludge samples were submitted from depth of

24.0 - 25.5 m - mostly recrystallised limestone;

25.5 - 27.0 m - recrystallised limestone and quartz sand;

28.5 - 30.0 m - mostly quartz sand and sandstone, partly ferruginised.

Core from 30.0 m - quartz sandstone, mottled ferruginous.

Fossils were found only in the sample from 25.5 - 27.0 m, in which only two specimens of foraminfera were recovered. These are recrystallised and badly preserved specimens of Discorbis sp., and their origin is more likely Nullarbor Limestone than Wilson Bluff Limestone.

Some glauconite was noted in each of the three sludge samples.

J.M. Lindsay
Palaeontology Section
Biostratigraphy Division

Palaeontology Report: Reid No. 1

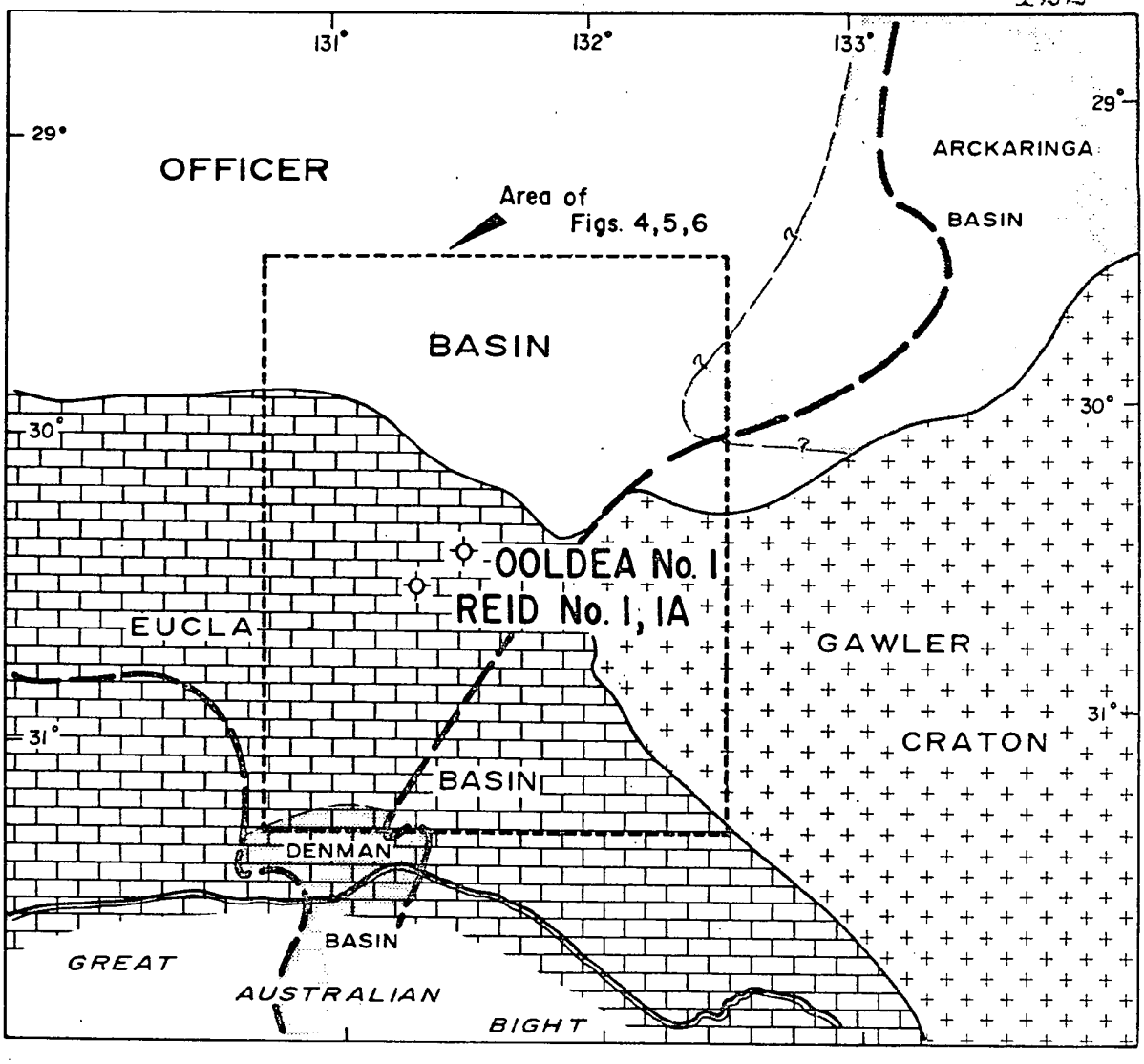
(1) CAINOZOIC STRATA

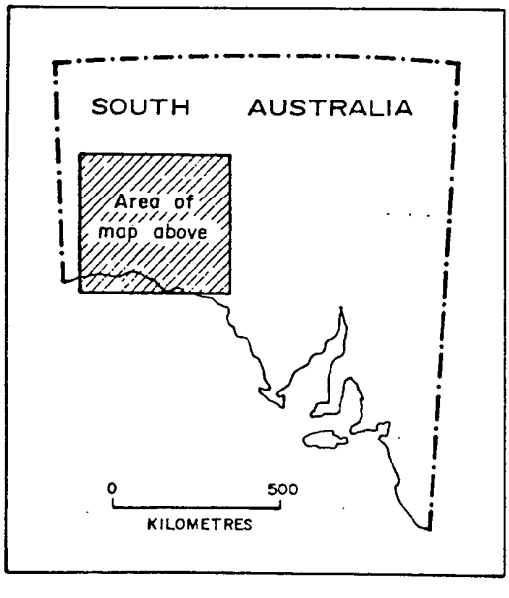
Seven carbonate samples collected from 16.54 m, 25.74 m, 27.91 m, 31.23 m, 31.44 m, 33.75 m and 35.18 m in the hole are all of Eocene age and belong to the Wilson Bluff Limestone. All samples were cemented and recrystallised - fossils were only separated and recognised with difficulty. The Eocene age is based on the presence of Maslinella chapmani Glaessner and Wade which is restricted to the Eocene in South Australia. The samples processed from 16.54 m, 31.44 m and 35.18 m yielded this diagnostic foraminfera.

(2) PALAEOZOIC(?) STRATA

Three samples collected from a depth of 204.40 m, 211.22 m and 213.20 m in Reid 1 were processed. As neither boiling in water or detergent nor acid dissolution would achieve breakdown, dissaggregation was attempted using Hydrogen perozide with partially successful results. Separation of the residue was achieved with a Frantz Isodynamic Separator. No fossils of any sort were recovered from the residues hence no age assignments were possible.

Barry. J. Cooper
PALAEONTOLOGY SECTION





TERTIARY – Eucla Basin.

PERMIAN – Arckaringa & Denman Basins.

(?) CAMBRIAN – Officer Basin Margin, – speculative.

Crystalline Basement

FIG. 1

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE AS SHOWN
COMPILED G. Meyer	SOUTH EASTERN OFFICER BASIN	DATE MAY 1979
DRN M.R. CKD	LOCALITY PLAN	PLAN NUMBER
	OOLDEA No 1 & REID No. 1 STRATIGRAPHIC WELLS	S 14097

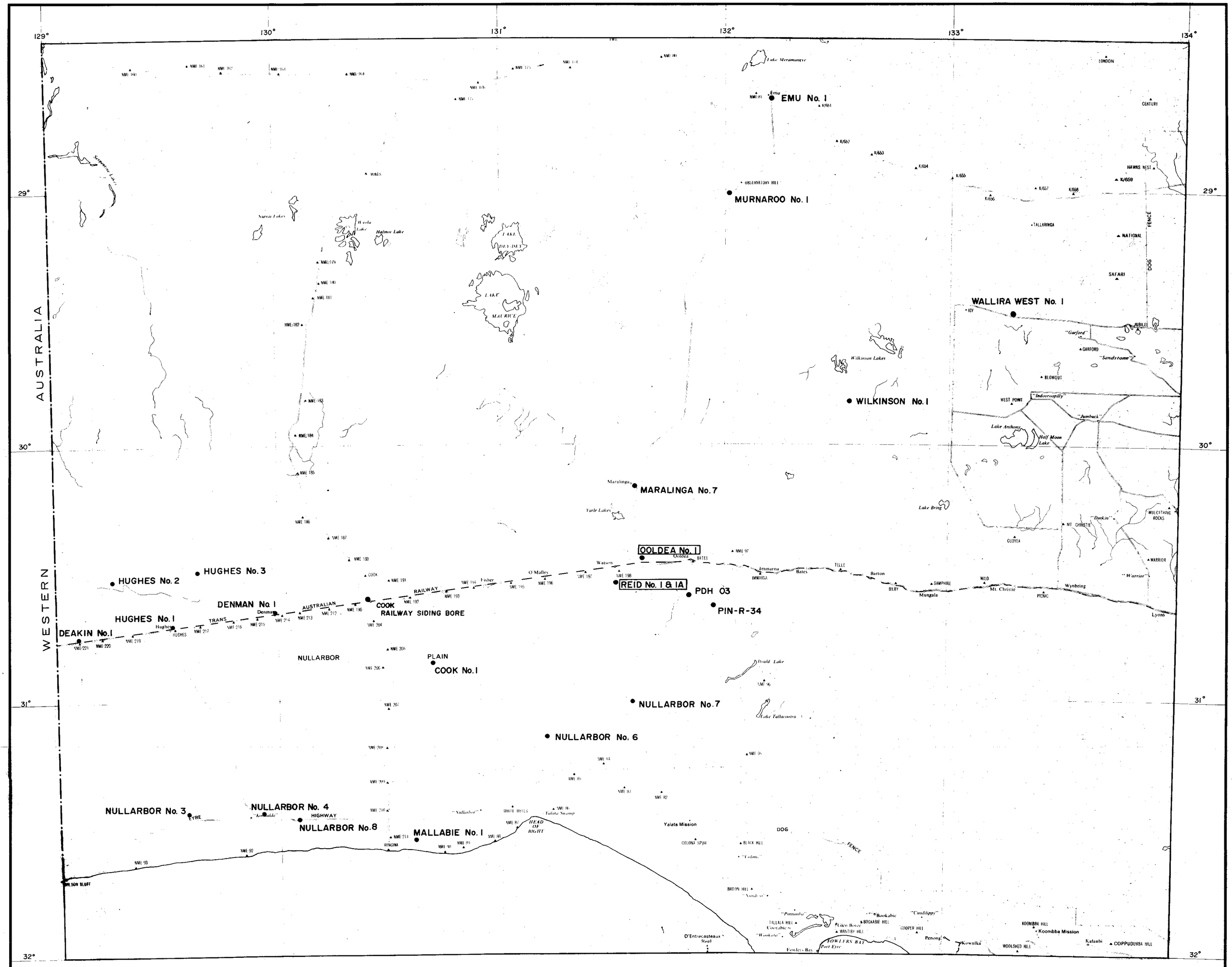
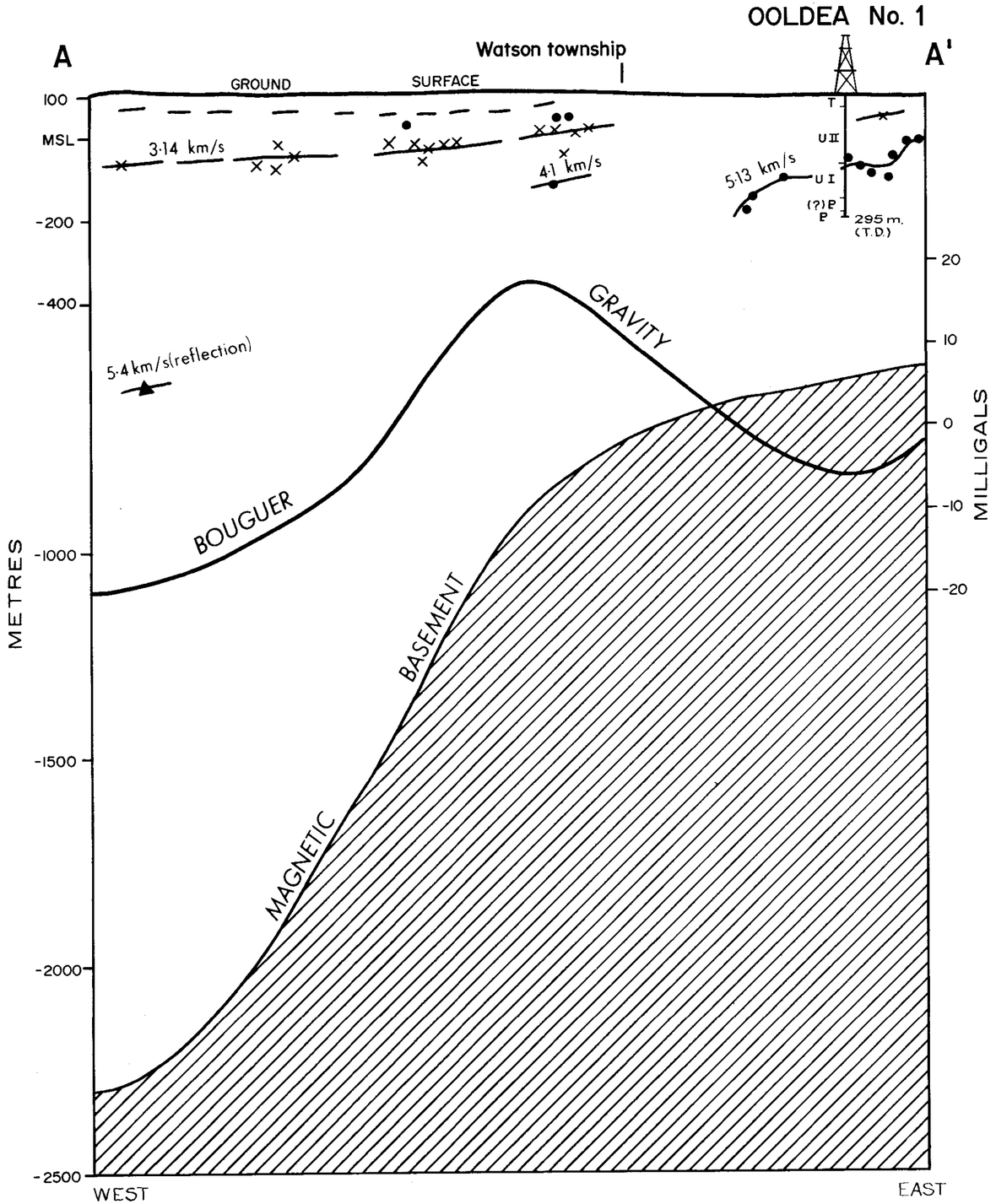
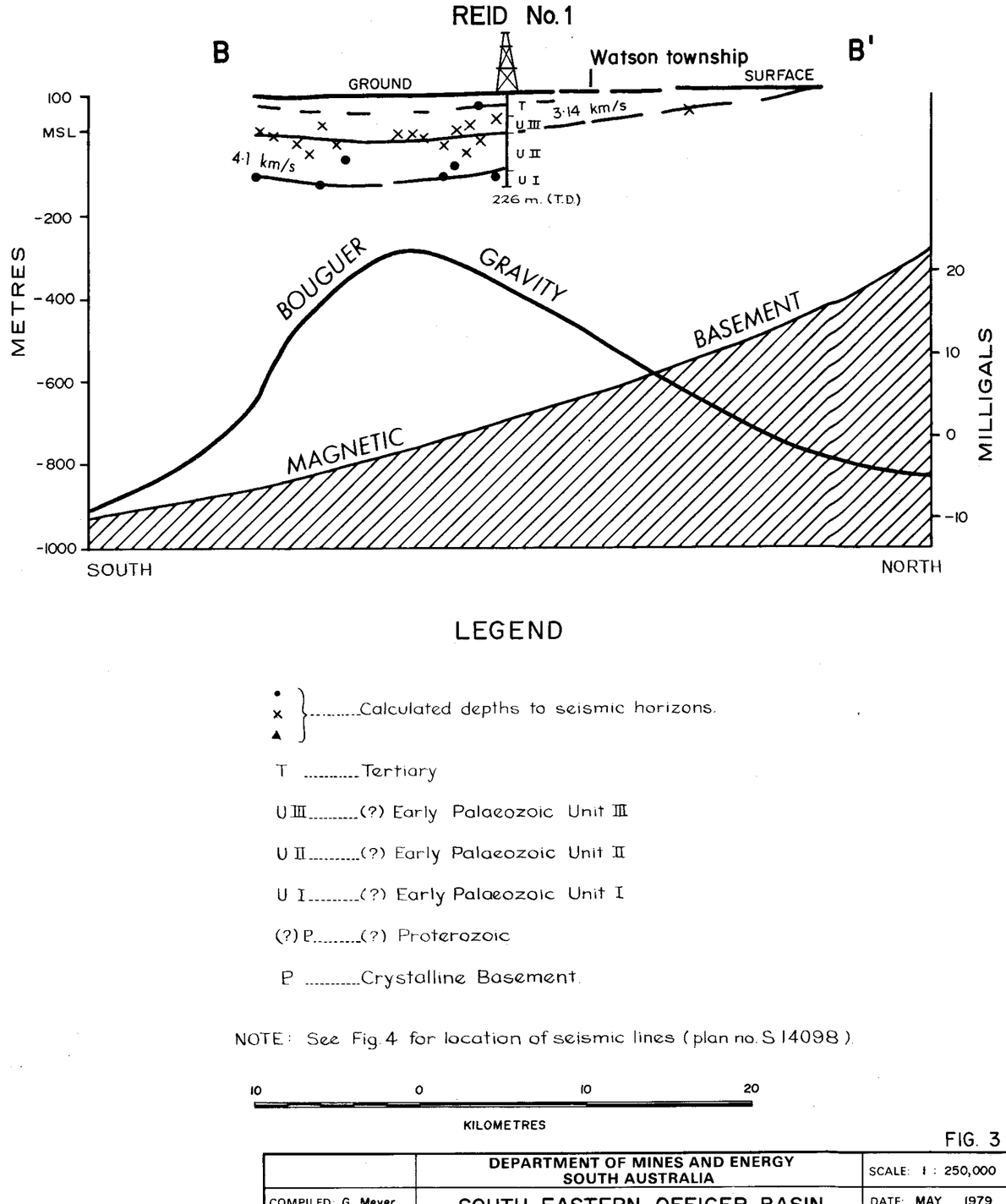


FIG. 2

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1 : 1,000,000
COMPILED: G. Meyer	SOUTH EASTERN OFFICER BASIN	DATE: JUNE 1979
DRN: M.R. CKD:	REGIONAL DRILLHOLE LOCATION PLAN	PLAN NUMBER 79-438





LEGEND

•
×
▲ } ..... Calculated depths to seismic horizons.

T ..... Tertiary

U III ..... (?) Early Palaeozoic Unit III

U II ..... (?) Early Palaeozoic Unit II

U I ..... (?) Early Palaeozoic Unit I

(?) P ..... (?) Proterozoic

P ..... Crystalline Basement.

NOTE: See Fig. 4 for location of seismic lines (plan no. S 14098).

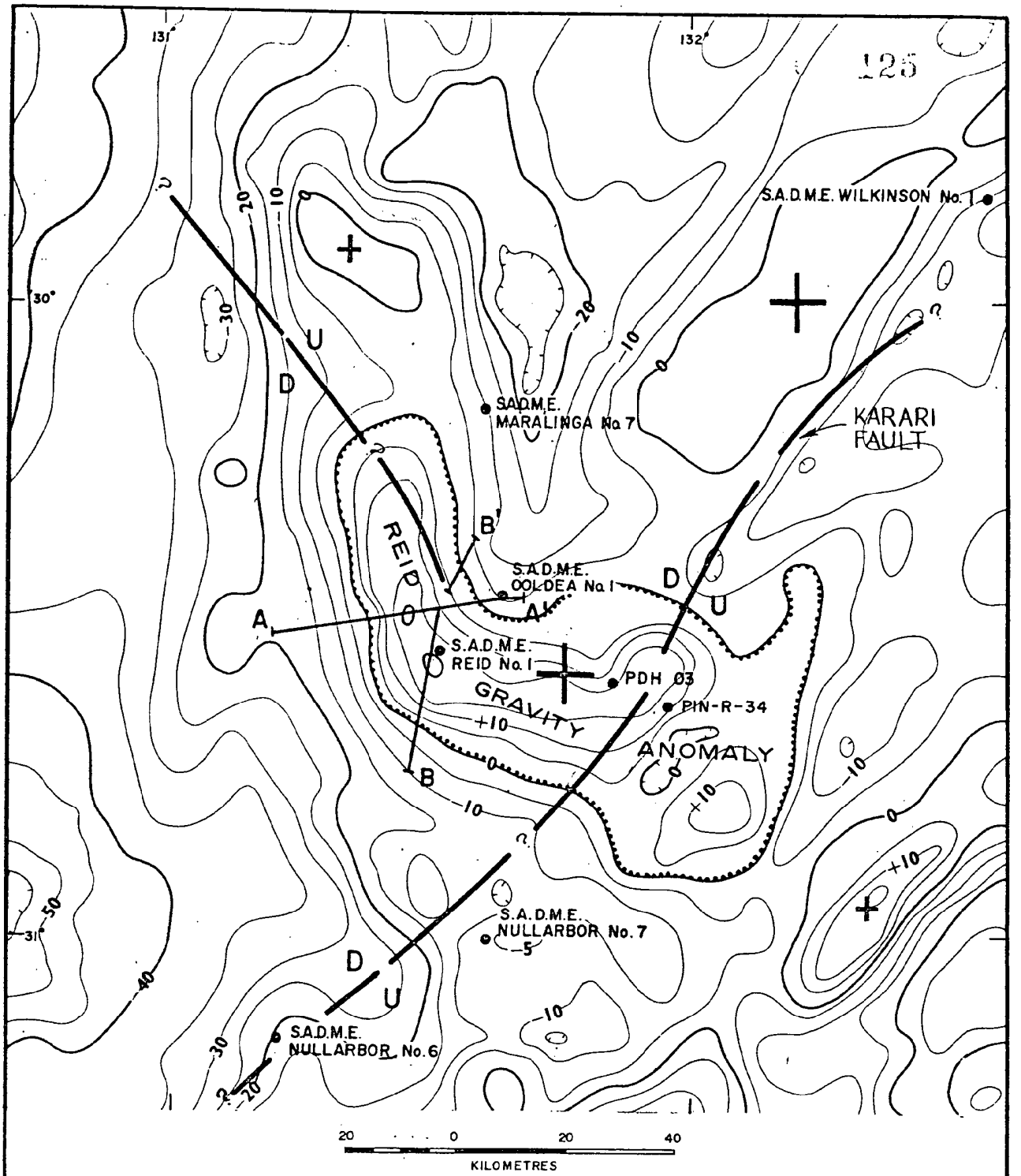
10 0 10 20

KILOMETRES

FIG. 3

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1 : 250,000
COMPILED: G. Meyer	SOUTH EASTERN OFFICER BASIN	DATE: MAY 1979
DRN: M.R. CKD:	SEISMIC SECTIONS A-A', B-B'	PLAN NUMBER 79-439

1413



Bouguer gravity (milligals).

Inferred fault

A — A' Seismic section - See Fig. 3

• PDH 03 Chevron Expl. Corporation drillhole (Teluk 1974)

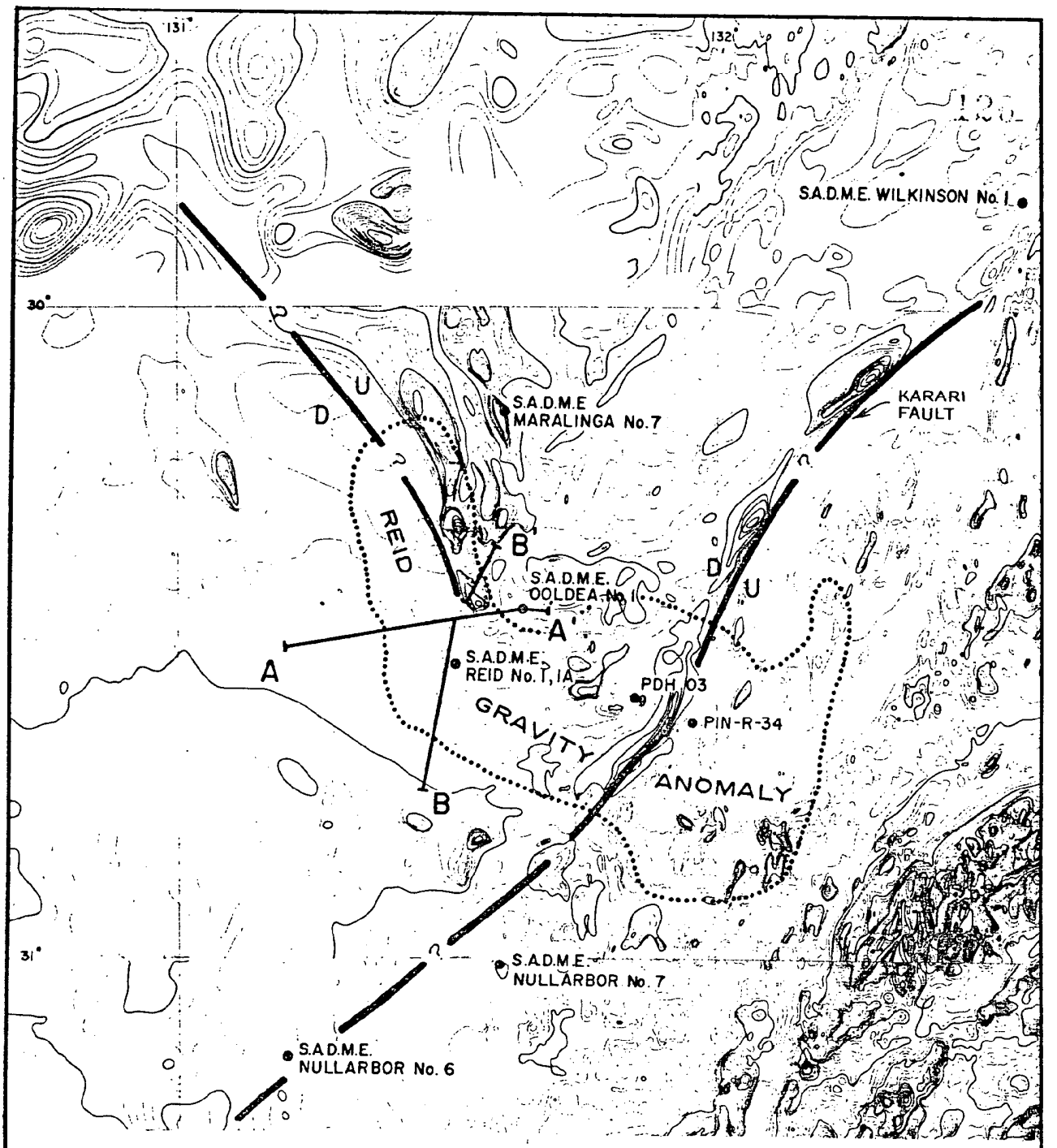
• PIN-R-34 Aust. Mining Corporation drillhole (Smith 1971)

• S.A.D.M.E. REID No.1 Dept. Mines & Energy - Sth. Aust drillhole

FIG. 4

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE 1 : 1,000,000
COMPILED G. Meyer	SOUTH EASTERN OFFICER BASIN	DATE JUNE 1979
DRN. M.R. CKD.	BOUGUER GRAVITY	PLAN NUMBER S 14098

1413



Bouguer gravity contour

Inferred fault

A — A' Seismic section.- see Fig. 3

● PDH 03 Chevron Expl. Corporation drillhole (Telak, 1974).

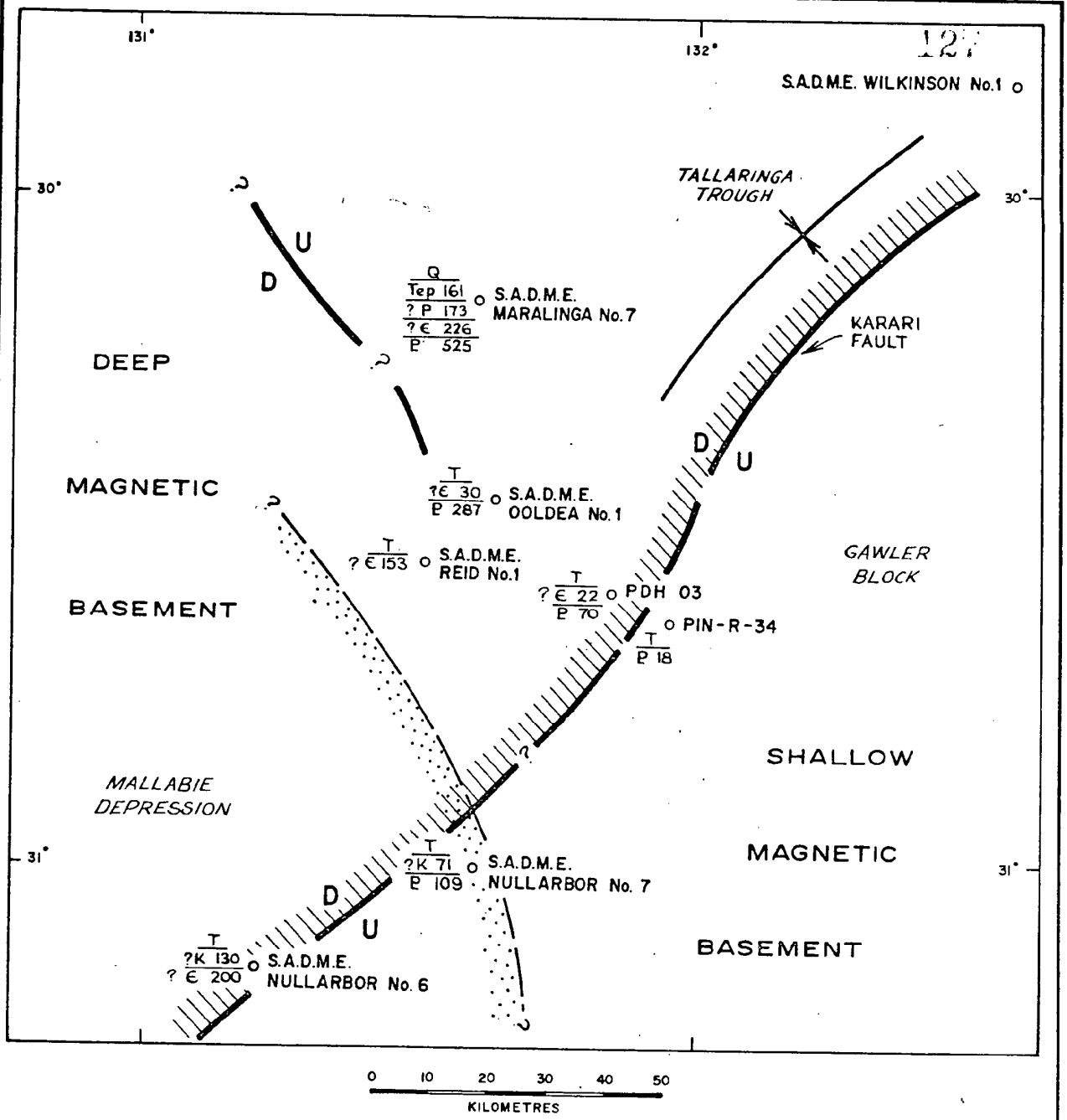
● PIN-R-34 Aust. Mining Corporation drillhole (Smith, 1971).

● S.A.D.M.E. REID No.1 Dept. of Mines & Energy - Sth. Aust. drillhole.

FIG. 5

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE 1 : 1,000,000
COMPILED. G. Meyer	SOUTH EASTERN OFFICER BASIN	DATE MAY 1979
DRN: M.R. CKD.	TOTAL MAGNETIC INTENSITY	PLAN NUMBER S 14099

1413



Probable limit of Cretaceous

Limit of Officer Basin - speculative

Inferred fault.

Trough

PDH 03 — Chevron drillhole

PIN-R-34 — Aust. M.C. drillhole

S.A.D.M.E. REID No.1 — Sth. Aust. Dept of Mines & Energy drillhole.

T ..... Tertiary
K ..... Cretaceous
P ..... Permian
€ ..... Cambrian
P ..... Proterozoic

Depth shown to top of unit in metres

FIG. 6

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE 1 : 1,000,000
COMPILED G. Meyer	SOUTH EASTERN OFFICER BASIN	DATE MAY 1979
DRN. M. R. CKD	SUMMARY OF DRILLHOLE DATA	PLAN NUMBER S 14100

1413

COMPOSITE WELL LOG

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

REID No. 1 & 1A

STATE: SOUTH AUSTRALIA PETROLEUM TENEMENT: OUT OF 1:250000 MILE SHEET: OOLDEA BASIN: EUCLA / OFFICER

WELL STATUS: ABANDONED

UNIT No. 5136000SW00007

LOCATION: LAT: 30° 35' 00" S
LONG: 131° 29' 54" E

ELEVATION: 98 m M.S.L.

	REID No. 1 Mayhew	REID No. 1 Diamond	REID No. 1A
DATE SPUDDED:	22-7-76	14-9-76	20-9-76
DATE DRILLING STOPPED:	24-7-76	18-9-76	22-9-76
DATE RIG RELEASED:	25-7-76	18-9-76	23-9-76
TOTAL DEPTH:	95·4 m.	226·4 m.	53·6 m.

HOLE SIZE:

	INCHES	FROM (m)	TO (m)
REID No. 1	6½	0	49·5
	4¾	49·5	95·4
	NQ	95·4	144·6
	BQ	144·6	226·4
REID No. 1A	4½	0	0·8
	3½	0·8	5·45
	NQ	5·45	21·5
	BQ	21·5	53·6

CASING:

	INCHES	DEPTH	CEMENTED TO	FROM
REID No. 1	5 I.D.	49·5 m.		
	3 I.D.	95·4 m.		

CEMENT PLUGS: NONE

TYPE OF LOG	16. IN. NORMAL	64. IN. NORMAL	6 FT. LATERAL	S.P	NEUTRON	GAMMA RAY
DATE OF RUN	←		22-9-76			→
FIRST READING						
LAST READING						
INTERVAL MEASURED	95 – 190 m.	97 – 190 m.	46 – 190 m.	94 – 189 m.	2 – 191 m.	2 – 191 m.
CASING: LOGGER	95 m.	97 m.	98 m.	94 m.	96 m.	97 m.
CASING: DRILLER						
DEPTH REACHED						
BOTTOM: DRILLER						
MUD TYPE	←		Salt water	base		→
DENSITY/ VISCOSITY						
Ph/ FLUID LOSS c.c.						
MUD RESISTIVITY						
RECORDED BY	←		R. Turner			→
WITNESSED BY	←		G. M. Meyer			→

OTHER SURVEYS:

TYPE	FROM	TO
Point Resistivity	36	189 m.
Temperature	4	193 m.

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
- Calcite
- Dolomite
- Coal
- Quartzite
- Q — Quartz grains
- Sandstone
- Granular
- o — Pebble
- Li — Lithic
- A — Anhydrite
- Py — Pyrite
- V — Micaceous
- ✓ — Carbonaceous
- Fe — Ferruginous
- Ca — Carbonate Fragments
- K — Kaolinitic
- V — Glauconitic
- G — Garnet
- Cl — Calcareous
- Z — Dolomitic
- O — Oolitic
- F — Fossiliferous Fragmental or Indeterminate
- f — Feldspathic
- Gy — Gypsum Gypsiferous
- Mn — Manganese

WELL SYMBOLS

- No. 3 — CORE INTERVAL AND NUMBER
- PLUGGED INTERVAL
- CASING SHOE
- Fl — FLUORESCENCE
- * — CUT WITH CCl_4

LITHOLOGY BY: G. Meyer
COMPILED BY: G. Meyer
DRAFTED BY: M. Ross
DRAWING NUMBER: 79-441

BIT RECORD REID No. 1: 6½" T. 6 Hammer; 4¾" Rock Roller; NQ Core Bit; BQ Core Bit

DRILLING RATE REID No. 1 — MINUTES / METRE (0 2 4 6 8)

LITHOLOGY % OF CUTTINGS REID No. 1 — TRACE

HYDROCARBONS

LITHOLOGICAL DESCRIPTION

0·0 – 0·8 m. TOPSOIL
0·8 – 4·0 m. CALICHE, Mottled pale brown, white, pale grey, hard, concretionary.

4·0 – 31·0 m. BIOSPARITE, White, becoming pale brown & clayey with depth, hard, fossiliferous, (gastropod, bivalve & brachiopod moulds), numerous cavities filled with red, ferruginous, silty clays and gypsum.

31·0 – 37·0 m. CLAYEY BIOSPARITE, Yellow, minor dark brown, hard, becoming softer with depth. Comprises broken bryozoa and minor gastropod remains in a soft, ferruginous, clayey and finely crystalline calcite matrix. Minor glauconite and intraclasts near base. Minor dispersed sand grains.

37·0 – 41·0 m. GRITTY, SANDY SILTSTONE, Brown, soft, poorly sorted. Comprises fine to grit size qtz. grns. in a finely crystalline zeolite & lesser clay matrix. Minor zircon, tourmaline and opaques.

41·0 – 51·5 m. Interbedded CARBONACEOUS SANDSTONE, CLAYSTONE, SILTSTONE, & COAL. Sandstone is brown, med. gr, clayey & gritty in part, pyritic and micaceous in part. Claystone is sticky with thin lenticular interbeds of micaceous siltstone. Coal is brown, friable.

51·5 – 94·5 m. SANDSTONE overlying CLAYEY SILTSTONE, Sandstone is pale grey, soft, well sorted, very fine grained, with minor pyrite. Siltstone is pale grey, with minor pyrite.

94·5 – 189·0 m. SANDSTONE, Pale grey, reddish brown, hard, porous, well sorted, iron stained sandstone comprising thinly interbedded very fine and medium grained with minor coarse grained sand. Minor feldspar, volcanic lithic grains. The grains are cemented by iron stained clay, chlorite and dolomite. Bedding is flat to gently dipping (< 10°), dominantly parallel or lenticular. Cross-bedding is common.

189·0 – 226·4 m. (T.D.), PEBBLY SILTSTONES & SANDSTONES, Reddish brown, hard, porous, pebbly in places. Comprises silt to very fine grain size qtz., lithics and feldspars with iron stained and pale green dolomites. The siltstone is generally massive or thinly interbedded with sandstones.

Loss of Circulation

95·0 m.

DEPTH (METRES): 0, 50, 100, 150, 200

GAMMA RAY (c.p.s.): 0 10 20 30 40 50
S.P. (m.V.): 0 10

Gamma Ray 2 cm = 10 c.p.s.
S.P. 2 cm = 10 m.V.

CORES (RECOVERIES & DIPS) CASING

5" I.D.
53·6 End of REID No. 1A
3" I.D.
226·4 m.

LITHOLOGY

PETROGRAPHIC SAMPLES

P486/76
P487/76
P488/76
S.A.D.M.E. Palaeontology P489/76
SADME Palaeo.
S.A.D.M.E Palaeo
S.A.D.M.E Palaeo.
P490/76
P491/76
P493/76
P494/76
P495/76
P496/76
P497/76
P498/76
P499/76
P500/76
P501/76

NEUTRON – NEUTRON (c.p.s.): 0 25 50 100 125 150
0 500 1000 1500 2000 2500 3000
POINT RESISTIVITY ohm-metres: 0 5 10 15 20 25 30

Neutron - Neutron 2 cm = 500 cps.
Neutron - Neutron 2 cm = 25 c.p.s.
Point Resistivity 2 cm = 5 ohm-metres

STRATIGRAPHIC COLUMN

QUATERNARY
WILSON BLUFF LIMESTONE
PIDINGA FMN.
EOCENE
UNIT III
UNIT II
UNIT I
EARLY PALAEOZOIC (?)

JOB No. 443 79-441

FIG. 8

COMPOSITE WELL LOG

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

OOLDEA No. 1

STATE: SOUTH AUSTRALIA PETROLEUM TENEMENT: OUT OF 1:250000 MILE SHEET: OOLDEA BASIN: EUCLA / OFFICER

WELL STATUS: ABANDONED

UNIT No. 5237000SW00032

LOCATION: LAT. 30°27'42" S
LONG. 131° 36'52" E

ELEVATION: 110 m. above M.S.L.

	Rotary	Diamond
DATE SPUDDED:	14-7-76	24-9-76
DATE DRILLING STOPPED:	17-7-76	14-10-76
DATE RIG RELEASED:	17-7-76	16-10-76
TOTAL DEPTH:	58·0 m.	295·35 m.

HOLE SIZE:

INCHES	FROM(m)	TO(m)
9⅝	0	1·0
6½	1·0	54·0
4½	54·0	58·0
NQ	59·8	139·95
BQ	139·95	295·35

CASING:

INCHES	DEPTH	CEMENTED TO	FROM
5 ID	54·0 m.		
3 ID	58·0 m.		

CEMENT PLUGS: NONE

TYPE OF LOG	16. IN. NORMAL	64. IN. NORMAL	6 FT. LATERAL	S.P	NEUTRON	GAMMA RAY
DATE OF RUN	←		15-10-76	→		15-10-76
FIRST READING						
LAST READING						
INTERVAL MEASURED	105 - 239 246 - 294	105 - 239 246 - 294	95 - 235 248 - 294	102 - 240 252 - 293		2 - 296
CASING: LOGGER						57 m
CASING: DRILLER	←		58 m	→		58 m
DEPTH REACHED						
BOTTOM: DRILLER						
MUD TYPE	←		Salt water based	→		Salt water based
DENSITY/ VISCOSITY						
Ph/ FLUID LOSS c.c.						
MUD RESISTIVITY						
RECORDED BY	←		B.P. Taylor	→		B.P. Taylor
WITNESSED BY						

OTHER SURVEYS:

TYPE	FROM	TO
Temperature	1	295 m.
Point Resistivity	102 & 252	240 m. & 294 m.

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
- Calcite
- Dolomite
- Coal
- Quartzite
- Q — Quartz grains
- Sandstone
- Granular
- o — Pebble
- Li — Lithic
- A — Anhydrite
- Py — Pyrite
- V — Micaceous
- Carbonaceous
- Fe — Ferruginous
- Ca — Carbonate Fragments
- K — Kaolinitic
- V — Glauconitic
- G — Garnet
- Ŧ — Calcareous
- Ƶ — Dolomitic
- O — Oolitic
- F — Fossiliferous Fragmental or Indeterminate
- f — Feldspathic
- Gy — Gypsum Gypsiferous
- Mn — Manganese

WELL SYMBOLS

- No. 3 — CORE INTERVAL AND NUMBER
- PLUGGED INTERVAL
- CASING SHOE
- FI — FLUORESCENCE
- * — CUT WITH CCl_4

LITHOLOGY BY: G. Meyer
COMPILED BY: G. Meyer
DRAFTED BY: M. Ross
DRAWING NUMBER: 79-440

BIT RECORD: 6½" T6 Hammer; 4½" T6 Hammer; NQWL (1); NQWL (2); BQWL (1); BQWL (2); BQWL (3)

DRILLING RATE — MINUTES / METRE (0 2 4 6 8)

LITHOLOGY % OF CUTTINGS — TRACE

HYDROCARBONS

LITHOLOGICAL DESCRIPTION

0·0 - 0·4 m. TOPSOIL

0·4 - 27·5 m. BIOSPARITE, White, yellow red, hard with clay and silt filled cavities near base.

27·5 - 29·5 m. SILTY CLAYSTONE, greyish brown, soft.

29·5 - 102·0 m. SANDSTONE, grey, becoming brown - red near base, micaceous, dolomitic, feldspathic, ferruginous at top, very fine to medium grained, generally increasing in grain size towards base.

No Samples

58·0 m

102·0 - 176·0 m. SILTY SANDSTONE, grading to SANDY SILTSTONE. Silty sandstone is dark red, micaceous, dolomitic, feldspathic, very fine grained to fine grained, medium to coarse grained near base, generally flat bedded.

176·0 - 233·5 m. Interbedded SILTSTONES, SANDSTONES & DOLOMITES. Siltstones are reddish brown, sandy, (very fine to fine grained), dolomitic, feldspathic and micaceous. Sandstones are reddish brown, silty, medium grained to coarse grained with minor dolomite, red siltstone and shale pebbles. Generally lenticular beds, some cross-beds. Dolomites are pale green, silty and generally less than 20 cm. thick.

233·5 - 255·5 m. GRANULAR TO PEBBLY SANDSTONE, Quartzite, shale and lithic granules increasing to 2 cm. diam. near base. Matrix of dolomitic, feldspathic coarse to very coarse grained sandstone above 246·5 m. and relatively clean very fine to fine grained sandstone below. 1 m. thick quartzite at base. Cross bedding common in upper part.

252·0 - 287·0 m. SANDSTONE, Pale, reddish brown to white, compact, clean, very fine to fine grained. Gently undulating beds to cross-bedded. Minor red shale pebbles. Larger gneiss boulders at base. Quartz grains show evidence of pressure solution. Low permeability.

287·0 - 295·4 m. ADAMELLITE GNEISS, pink, medium grained.

TOTAL DEPTH 295·4 metres

DEPTH (METRES): 0, 50, 100, 150, 200, 250, 300

GAMMA RAY (c.p.s) 0 10 20 30 40 50 — Gamma Ray 2 cm = 10 c.p.s.

S.P. (mV) 0 10 0 5 — S.P. 2 cm = 10 m.V. — S.P. 2 cm = 5 m.V. — Base shift — Base Shift

RUN II — RUN I

CORES (RECOVERIES & DIPS) CASING: 5" ID, 3" ID

LITHOLOGY: Fe; f; T.D. 295·4 m.

PETROGRAPHIC SAMPLES: P 398/76; S.A.D.M.E. Palaeontological Samples; P 329/76; RS 00008; RS 00009; RS 00010; RS 00011; RS 00012; RS 00013; RS 00014; RS 00015; RS 00016; RS 00017; RS 00018; RS 00019; RS 00020; RS 00021; RS 00022; RS 00023; P 505/77 to P 511/77

POINT RESISTIVITY (Ohm-metres) 0 5 0 10 0 25 — Point Resistivity 2 cm. = 10 Ohm-metres — RUN II — Point Resistivity 2 cm. = 5 Ohm-metres — Point Resistivity 2 cm. = 25 Ohm-metres — RUN I

STRATIGRAPHIC COLUMN

QUATERNARY	EARLY PALAEOZOIC (?)
NULLARBOR LIMESTONE	MIOCENE
C.	C.
"UNIT II"	
"UNIT I"	(?)PROTEROZOIC
UN-NAMED	
BASEMENT	PROT.

79-440 Rev

JOB No. 1413

FIG. 7