Rept.Bk.No. 70/40
G.S. No. 4427

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

PETROLEUM EXPLORATION DIVISION

STRATIGRAPHIC DRILLING PROGRAMME 1969
WESTERN ARCKARINGA BASIN

by

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GEOLOGIST
PETROLEUM EXPLORATION SECTION

D.M. 551/69

19th March. 1970

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STRATIGRAPHIC DRILLING PROGRAMME

1969 - WESTERN ARCKARINGA BASIN

SUMMARY

Four stratigraphic wells were drilled in the Arckaringa basin during this stratigraphic drilling programme.

The first Karkaro No. 1 was drilled in a gravity and seismically defined depression to verify suspected Permian sediments and to identify a shallow consistent refractor. No refractors were obtained below this shallow event indicating probable basement. Another possibility however was the presence of dense Devonian carbonates as obtained in the South Australian Government Cootanoorina No. 1 well.

The second well Mt. Furner No. 1 was drilled in a depression known as the Murloocoppie gravity depression, almost midway between Karkaro No. 1 and Cootanoonina No. 1. It was drilled to verify the presence of Permian sediments and hence show the continuity of deposition throughout the Arckaringa basin during the Permian.

Wallira Nos. 1 and 2 were drilled on seismic profiles south of the Coober Pedy gravity ridge in the Wallira gravity low to verify suspected Permian and determine the nature of the assumed basement reflector.

A summary of data for each well is listed below and the details listed in the stratigraphic table and the well histories.

KARKARO No. 1 Well

Location	Lat.	28°35'58"S.
	Long.	133°46'27"E.
Elevation	G.L.	675'
	K.B.	678.5'
Total Depth	1579'	
Date Spudded	15.5.69	
Date Completed	1.6.69	

MT. FURNER No. 1

Location	Lat.	28°6'15"S.
	Long.	134°28'00"E.
Elevation	G.L.	613
	K.B.	616.5
Total Depth	1821'	
Date Spudded	6.6.69	
Date Completed	17.6.69	

WALLIRA No. 1		
Location	Lat.	29°27'03"S.
	Long.	134°04'31"E.
Elevation	G.L.	492
	K.B.	495.5
Total Depth	722	
Date Spudded	3.8.69	
Date Completed	8.8.69	
WALLIRA No. 2		
Location	Lat.	29°20'26"S.
	Long.	133°49'42"E.
Elevation	G.L.	548
	K.B.	551.5
Total Depth	1101	
Date Spudded	13.8.69	
Date Completed	23.8.69	

STRATIGRAPHIC TABLE

		KARKARO No. 1 Lat. 28°35'58"S Long. 133°46'27"E. Elev. G.L. 675 K.B. 678.5 T.D. 1579'			MT. FURNER No. 1 Lat. 28°06'15"S Long. 134°28'00"E Elev. G.L. 613 K.B. 616.5 T.D. 1821'			WALLIRA No. 1 Lat. 29°27'03"S Long. 134°04'31"E Elev. G.L.492 K.B.495.5 T.D. 721.6'			WALLIRA No. 2 Lat. 29°20'26"S Long. 133°49'42"E Elev. G.L. 548 K.B. 551.5 T.D. 1101'		
AGE	FORMATION	DEPTH	SUBSEA	THICKNESS	DEPTH	SUBSEA	THICKNESS	DEPTH	SUBSEA	THICKNESS	DEPTH	SUBSEA	THICKNESS
CRETACEOUS	BULLDOG SHALE	SURFACE	+675	100	SURFACE	+613	200	-	-	-	-	-	-
CREATCEOUS	CADNA-OWIE FM	100	+575	130	200	+413	145	SURFACE	+492	185	SURFACE	+548	195
JURASSIC	ALGEBUCKINA SS	-	-	-	345	+268	90	-	-	-	-	-	-
PERMIAN	MT. TOONDINA BEDS	230	+445	760	435	+178	1279	185	+307	275	-	-	-
PERMIAN	UNIT 1	990	-315	340	1714	-1101	88	460	+32	210	195	+353	410
PERMIAN	UNIT 2	1330	-655	220	-	-	-	670	-178	40	605	-57	491
EPERMIAN	BASEMENT	1550	-875	-	1802	-1189	-	710	-218	-	1096	-548	-

KARKARO NO. 1 - WELL HISTORY

General Well Data

Well Name and Number

South Australian Mines, Karkaro No. 1

Location (See fig. 1)

Latitude 28°35'58" S.

Longitude 133°46'27" E.

The well is located about 150 miles NW of Coober Pedy on the Karkaro 1 mile military sheet.

Map References

1:250,000 military sheet : MURLOOCOPPIE

1 inch = 1 mile military sheet : Karkaro

Details of Petroleum Tenement

The well was drilled in an "out of lease" area which has been called the "corridor area" adjacent to OEL's 20 and 21.

Elevation Kelly Bushing 678.5 feet

Ground 675 feet

Total Depth 1579 feet

Date Drilling Commenced 15th May, 1969.

Date Drilling Completed 1st June, 1969

Drilling time to Total Depth 18 days

Date Well Completed 2nd June, 1969

Status Dry and abandoned.

Bit Record Table 1.1

No. of Bits used	Size	Type	Make
1	6¾"	Tricone V2	Varel
1	6¾"	3 Blade insert	Hawthorne
1	4½"	Tricone V3	Varel
6	4½"	Tricone V2	Varel
2	4½"	Tricone V1	Varel
1	4½"	Tricone VH1	Varel
1	4½"	Tricone VH1	Williams M.
3	3.907	Diamond Core Bit	Mindrill

Drilling Fluids

The following is a list of materials used during drilling (Table 2)

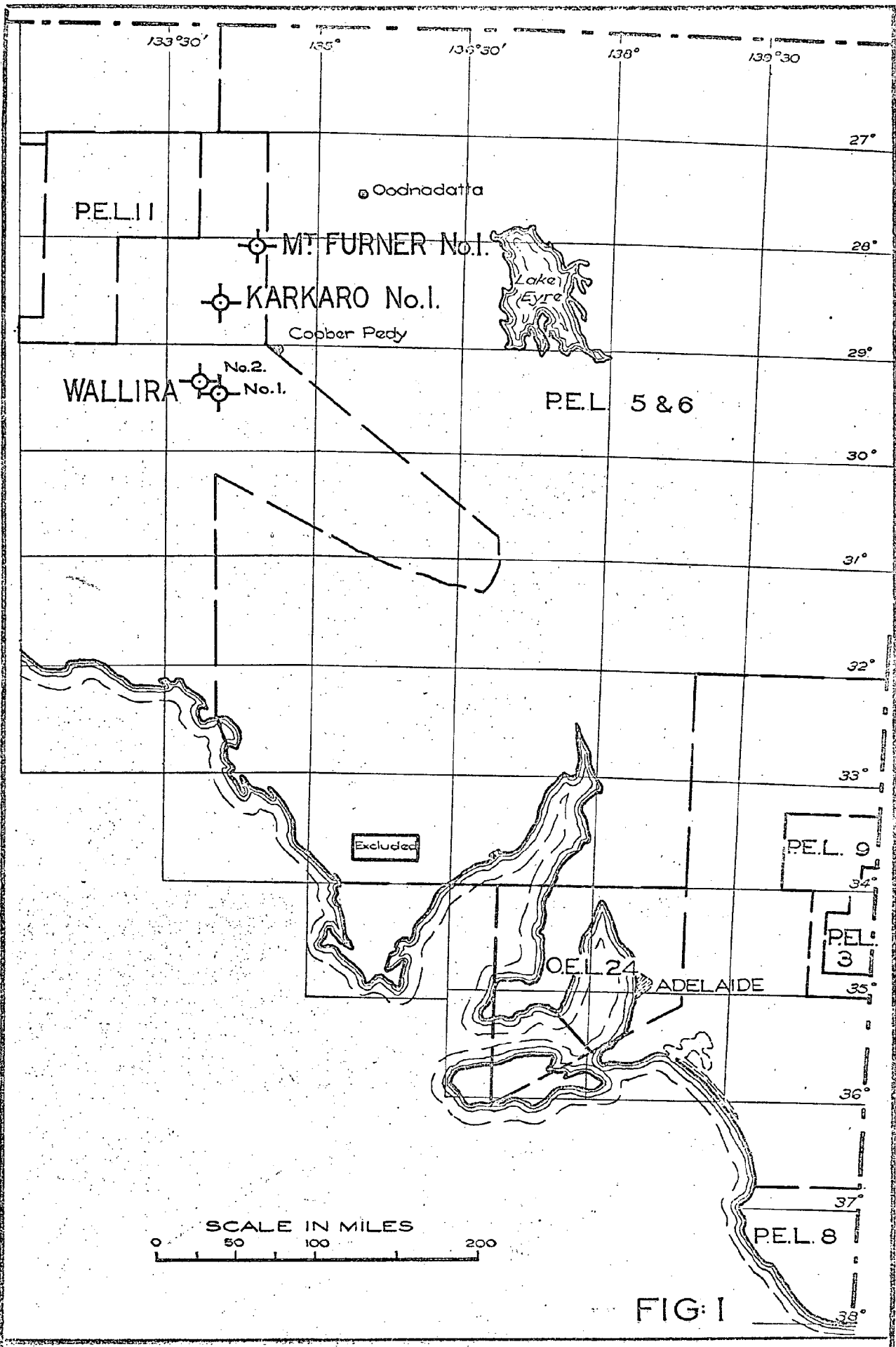
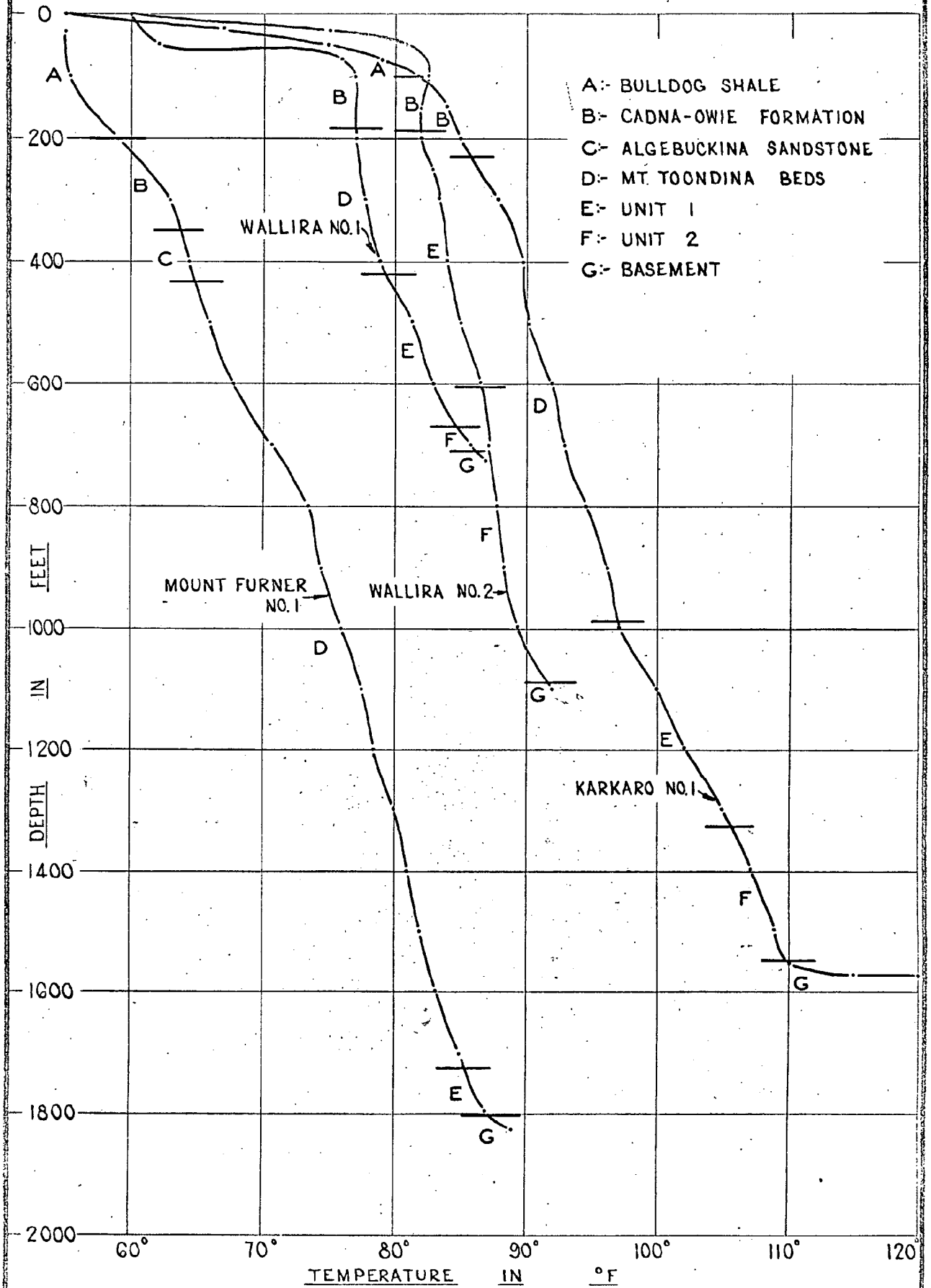


FIG: 1

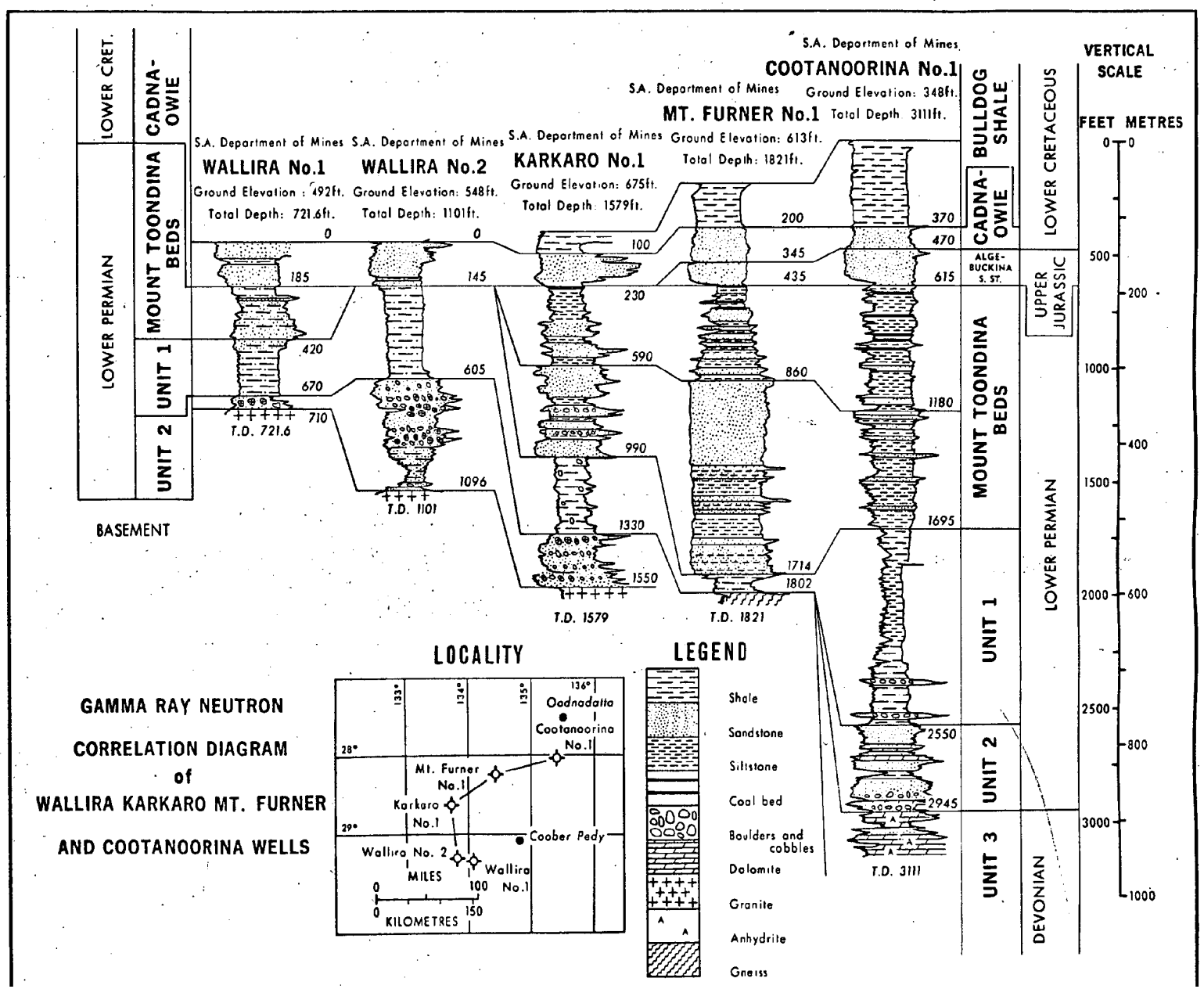
DEPARTMENT OF MINES — SOUTH AUSTRALIA

PETROLEUM SECTION	Drn. I.J.T. / Tcd. AMSD / Ckd. E.B.T. / Exd.	ARCKARINGA BASIN LOCATION MAP OF STRATIGRAPHIC WELLS	SCALE: AS SHOWN S 7587 994-2 DATE: 12 JAN '70



DEPARTMENT OF MINES — SOUTH AUSTRALIA

PETROLEUM SECTION	Drn. I.T. / Tcd. S.v.C. / Ckd. L.V.W.	ARCKARINGA BASIN TEMPERATURE LOGS OF STRATIGRAPHIC WELLS	SCALE: AS SHOWN S 7664 Bab



GAMMA RAY NEUTRON CORRELATION DIAGRAM of WALLIRA KARKARO MT. FURNER AND COOTANOORINA WELLS

FIG. 3 Correlation diagram of the 4 stratigraphic wells with Cootanoorina No.1 Well drilled in the Arckaringa Basin - 1969.

Table 1.2

Material	Quantity
Bentonite	23 sacks
Dextrid	6 "
Caustic	140 lbs
Lovis	5 sacks
C.M.C.	2 "
Cement	30 "
Casting Plaster	3 "

Water Supply

During drilling operations drilling water was obtained from Memory Bore approximately 13 miles from the bore site. Camp water was pumped from a water hole 3 miles north of the Dog Fence on the Mabel Creek - Mt. Willoughby road.

Perforation Record

No perforations were conducted

Plugs None set

Core Record

Six cores were cut. Details of depth and recovery are set out in the following table.

Table 1.3

Core No.	Depth From	Depth to	Depth Cored(ft.)	Recovery ft.	Recovery %	Core Size (inches)
1	231	247	16	5'6"	34.4	2¼
2	1030	1040	10	3'	30.0	2¼
3	1340	1344	14	4'	28.6	2¼
4	1424	1440	16	4'3"	26.6	2¼
5	1553	1561	8	7'10"	97.9	2¼
6	1563	1579	16	15'7"	97.4	2¼
Totals			80	40.2	50.3	

Coring was carried out using a 20 ft. Mindrill stationary inner tube core barrel and Mindrill face discharge bits.

No formation testing was undertaken and as the water bearing sands were cased off, plugging was not required. A metal cap was placed on the casing and the well abandoned.

MOUNT FURNER No. 1 - WELL HISTORY

General Well Data

Well Name and Number

South Australian Mines, Mount Furner No. 1

Location: Latitude 28°6'15" S.

Longitude 134°28'00" E.

The well is located about 5 miles north of Evelyn Downs Homestead on the Gillen 1 mile military sheet (see Fig. 1).

Map References:

1:250,000 military map sheet:MURLOOCOPPIE

1 inch : 1 mile military sheet:Gillen

Details of Petroleum Tenement

The well was drilled in an "out of lease" area which has been called the "corridor area" adjacent to O.E.L. 20 and 21.

Elevation	Kelly Bushing	616.5
	Ground	613

Total Depth

1821 feet

Date Drilling Commenced	6th June, 1969.
Date Drilling Completed	17th June, 1969.
Date Well Completed	18th June, 1969.

Status

Completed as a non-artesian water well.

Bit Record — Table 2.1

No. of Bits Used	Size	Type	Make
1	6¾"	Tricone V2	Varel
3	4½"	Tricone V2	Varel
3	3.907"	Diamond core bit.	Mindrill

Drilling Fluids

The following is a list of materials used during drilling operations.

Table 2.2

Material	Quantity
Bentonite	29 Sacks
Dextrid	18 "
Caustic	112 lbs.
LOVIS	4 sacks.
C.M.C.	1½ "
Cement	44 "

Water Supply

Drilling water was obtained from a bore approximately ½ mile from the site and camp water from a water hole four miles from the Evelyn Downs Homestead.

Perforation Record

Two attempts were made to perforate the 5" casing at 400 feet but in both attempts the primer cord failed to ignite. The casing was then split at 400 feet using 10 lbs of geophex.

Plugs

One cement plug was set in the bottom of the casing and this was duly tested with 3,000 lbs. weight prior to perforating. The top of the plug was located at 431 feet.

Coring Record

Four diamond drill cores were cut the details of which are listed in the following table.

Table 2.3

Core No.	Depth From	To	Depth Cored (ft)	Recovery Ft.	%	Core Size
1	440-	455	15	14.3	95.3	2¼
2	990-	1005	15	0	0	2¼
3	1714-	1726	12	19.5	82.0	2¼
4	1806-	1821	15	15	100	2¼

WALLIRA No. 1 - WELL HISTORY

General Well Data

Well Name and Number

South Australian Mines Wallira No. 1

Location: Latitude 29°27'03" S.

Longitude 134°04'31" E.

The well is located about 50 miles southwest of Coober Pedy and about 20 miles due west of Lake Phillipson. (See fig. 1).

Map References

1:250,000 military sheet : COOBER PEDY

1 inch : 1 mile military sheet : Wallira

Details of Petroleum Tenement

This well was also drilled in an 'out of lease' area.

Elevation	Kelly Bushing	495.5
	Ground	492
Total Depth	722	
Date Drilling Commenced		3rd August, 1969.
Date Drilling Completed		8th August, 1969.
Drilling Time to Total Depth		6 days
Date Well Completed		9th August, 1969
Status		Dry and abandoned.

Bit Record Table 3.1

No. of Bits used	Size	Type	Make
1	6¾"	Tricone V3	Varel
1	4½"	Tricone V3	Varel
2	4½"	Tricone V2	Varel
1	4½"	Tricone V1	Varel
1	4½"	Tricone VH1	Varel
3	3.907"	Diamond core bit	Mindrill

Drilling Fluids

The following is a list of materials used during drilling operations:

Table 3.2.

MATERIAL	QUANTITY
Benonite	8 sacks
Dextrid	7 "
Caustic	140 lbs.
Lovis	5 sacks
C.M.C.	½ bag
Distillate	4 gallons

Water Supply

Drilling water was obtained from Cleanskin swamp bore and drinking water from a bore at Garford outstation.

Perforations

No perforations were conducted.

Plugs

None were set.

Coring record Table 3.3

Core No.	Depth From	To	Recovery Ft.	%	Core Size
1	192	207	12.3	82	2¼
2	620	680	9.2	92	2¼
3	707	717.75	5.75	100	2¼
4	712.75	721.8	8.8	100	2¼

WALLIRA No. 2 - WELL HISTORY

General Well Data

Well Name and Number

South Australian Mines Wallira No. 2.

Location: Latitude 29°20'26" S.

Longitude 133°49'42" E.

The well is located about 65 miles W.S.W. of Coober Pedy on the N. - S. trending dog fence. (see fig. 1).

Map References

1:250,000 military sheet: COOBER PEDY

1 inch : 1 mile military sheet : Wallira

Details of Petroleum Tenement

The well was drilled in an "out of lease" area called the corridor area.

Elevation: Kelly Bushing 551.5

Ground 548

Total Depth 1101 feet.

Date Drilling Commenced 13th August, 1969

Date Drilling Completed 23rd August, 1969

Drilling time to Total Depth 11 days

Date Well Completed 25th August, 1969.

Status Dry and Abandoned.

Bit Record **Table 4.1**

No. of Bits used	Size	Type	Make
1	6¾"	Tricone V3	Varel
1	5 7/8"	Tricone VH1	Varel
3	4½"	Tricone V3	Varel
1	4½"	Tricone V2	Varel
2	4½"	Tricone V1	Varel
3	4½"	Tricone VH1	Varel
1	4½"	Tricone WHW	William
1	4½"	Tricone K7H	William
2	4½"	Tricone W4W	William
1	4½"	Tricone WRW	William
5	3.907"	Diamond Core Bit	Mindrill

The following is a list of materials used during drilling operations.

Table 4.2

Material	Quantity
Bentonite	3 sacks
Dextrid	6 "
Caustic	140 lbs.
Lovis	5 sacks
C.M.C.	½ sack
Distillate	8 gallons

Water Supply

Drilling water was obtained from Gordon's bore and drinking water from the Garford outstation.

Perforations

No perforations were conducted.

Plugs

No plugs were set.

Coring record Table 4.3

Core No.	Depth From	Depth to	Depth Core (ft.)	Recovery Ft.	Recovery %	Core Size (inches)
1	200	217	17	6.6	38.8	2¼
2	395	411	16	11.1	69.4	2¼
3	697	701	4	3.5	87.5	2¼
4	739.6	746	6.4	4.2	65.6	2¼
5	746	754	8	2.1	21.0	2¼
6	828	832.5	4.5	4.5	100	2¼
7	1094	1101	7	5.7	81.4	2¼

GENERAL DATA

Logging

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

Log		
Gamma - Ray		
Neutron - neutron		
Spontaneous Potential (S.P.)		
Temperature		
Resistivity	(1)	16 inch normal
	(2)	64 inch normal
	(3)	6 foot lateral

The gamma ray and neutron logs are incorporated in the respective composite logs of the four wells.

Side Wall sampling - none undertaken

Storage of samples and cores - All are stored at the core laboratory of the South Australian Department of Mines, Thebarton.

Velocity Survey A seismic well-velocity survey was conducted for each well using a down the hole geophone consisting of 3H.S.1 seismic geophones. Recording of shots were made with the geophone suspended at 4 or 5 different positions. (Milton 1969).

Drilling time log

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

Hydro-carbon Detection

Appropriate samples and cores were examined under ultraviolet light for fluorescence indicative of hydrocarbons.

Deviation Surveys No survey was undertaken.

GEOLOGY

(1) Previous Work

Glacial sediments of suspected Permian age were first discovered by Reyner (1955) and followed up by Chugg (1956) in the area of the Peake and Denison Ranges. It was not until a study of the old Lake Phillipson Bore was made by Ludbrook who sent samples to Balme (1957) who established these as Permian from plant micro-fossils. Ludbrook (1961) studied seven old water bores between Lake Phillipson and the Peake and Denison Ranges. Of particular significance was the discovery of marine Permian shale in several of these bores.

Wopfner (1964) reviewed the geological data available at the time and proposed the terms Boorthanna Trough and Lake Phillipson Trough to identify deep graben structures situated respectively to the west of the Peake and Denison Ranges and to the west of the Mount Woods high. Freytag (1965) who discovered Permian sediments in a piercement structure at Mount Toondina redefined the term Arckaringa sub Basin previously proposed by Sprigg, (1961) as a Permian infra basin.

Following the Mount Toondina discovery several seismic reflection lines were shot around the Mount Toondina structure. Subsequent surveys investigated the Mount Willoughby trough and Wallira trough areas during successive field seasons.

In 1967 Cootanoorina No. 1 well was drilled by the Department of Mines on a seismically defined anticlinal nose located south of Mount Toondina. This well provided good seismic control and subsurface information, which included the discovery of Devonian dolomites in the area.

A helicopter gravity survey conducted in 1968 covered the whole area and it was on these results that the seismic operations of late 1968 and 1969 were planned. Seismic profiles across a number of gravity lows demonstrated the presence of sediment filled troughs and these sediments were

thought to be Permian.

The four stratigraphic wells were drilled in three different areas of assumed Permian sediments in order to confirm this assumption and to gain seismic control over a strong reflector which extended over much of the area of the Arckaringa Basin.

(2) Stratigraphic Nomenclature

The Mount Toondina Beds were first described by Freytag (1965) and later used by Wopfner and Allchurch (1967). The unit correlates with portion of the Gidgealpa Formation of the Coober basin and is dated by palaeontology as Lower Permian. Names for units below the Mount Toondina Beds have at this stage not been finalised. Ludbrook in her 1961 report used the terms Lake Phillipson Beds and Stuart Range Beds. The term Phillipson Beds however was already in use at the time of proposal so prevents its use for the Arckaringa Basin area. The Stuart Range beds do not correlate with Cootanoorina No. 1 well due to scanty lithological and hence limited palaeontological evidence for the Lake Phillipson well. Also no electric logs exist for the well. Wopfner and Allchurch adopted the terms unit 2 and unit 1 for Cootanoorina No. 1 well and this nomenclature will be continued until the problem is resolved. Both Unit 1 and 2 are of Lower Permian Age. (Harris and McGowran 1967).

The Jurassic and Cretaceous encountered, follow a normal Great Artesian Basin sequence and the nomenclature is the same as that previously used for the southwestern portion of the Great Artesian Basin.

SUMMAR OF STRATIGRAPHIC SEQUENCE

KARKARO No. 1

Bulldog Shale

Age: Aptian to Albian

Depth interval: Surface to 100 feet

Thickness: 100 feet.

The Bulldog Shale is normally a blue grey shale unit with thin siltstones and limestones. In this case the unit is deeply weathered and bleached resulting dominantly in a claystone.

0 - 50 CLAYSTONE. White soft and contains abundant red staining in cracks and fissures. It also contains some white siliceous claystone which is much harder.

50 - 100 CLAYSTONE and silty to sandy claystone

The claystone is as for 0 - 50. The siltstone and sandstone consist of quartz grains generally subangular with some subrounded, many are polished, some are iron-stained to various degrees and appear to be cemented by clay.

CADNA-OWIE FORMATION

Age: Neocomian to Aptian

Depth interval: 100 - 230 feet.

Thickness: 300 feet.

The Canda-owie Formation is generally a sandstone containing sections of siltstone shale and minor coals.

100 - 130 Interbedded sandstone siltstone and claystone, the claystone being restricted to the upper portion and is possibly cavings.

Sandstone, off white, fine to medium grained subangular, iron-stained and poorly sorted.

Siltstone, red, colours range from yellow (bounded with yellow clay) through pink to deep red depending on degree of iron staining.

Claystone, white, similar to bleached Bulldog Shale.

130 - 230 Sandstone. Grey, white fine to medium grained clean subangular quartz sand. Many grains

Little matrix.

Mount Toondina Beds

Age: Artinskian

Depth interval: 230 - 990

Thickness: 760 feet.

The Mount Toondina Beds consist of dominantly a siltstone containing coal bands and shale in the upper unit and dominantly a shaly sandstone in the lower unit.

230 - 590 Siltstone to fine sandstone. Grey, clayey slightly carbonaceous, pyritic and micaceous and contains bands of coal and carbonaceous shale restricted to the upper part of the unit. The siltstone gives way to a silty shale or mudstone at the base of the unit.

590 - 990 Sandstone pebbly, fine to medium grained, very clayey and containing bands of pyritic sandstone. The pebbles include igneous and metamorphic rounded exotic grains ranging from sand to grit size generally with occasional 1cm. pebbles.

Unit 1 - Marine shale sequence

Age: Sakmarian

Depth interval: 990-1330

Thickness: 340 feet.

990 - 1330 Clay shale, grey sandy and silty, plastic when wet and also has a greenish tinge which dulls to grey when dry.

Sand and silt interbeds are present throughout the unit and the grain size ranges up to granule size.

Unit 2

Age: Lower Permian

Depth interval: 1330 - 1550

Thickness: 220 feet

1330 - 1424 Pebbly sandstone consisting of dominantly granite pebbles to boulders up to 1 foot diameter set in a quartz feldspar mica and calcareous matrix. Other pebbles include exotic metamorphic and igneous rocks.

1424 - 1460 Sandstone composition is as above but grain size of pebbles is all of medium sand size and the material is highly porous.

1460 - 1550 Pebbly sandstone as above.

Granite basement

Age: Unknown

Depth drilled: 1550 - 1579 (29 feet)

T.D. 1579

MOUNT FURNER NO. 1

Bulldog Shale: (Aptian to Albian)

Depth interval: Surface to 200 feet.

Thickness: 200 feet.

0 - 40 Dominantly siltstone, pale green, clayey, ?glauconitic and gypsiferous.

40 - 200 Shale, grey silty and clayey carbonaceous, micromicaceous, fissile when dry.

Cadna-owie Formation (Neocomian to Aptian)

Depth interval: 200 - 345

Thickness: 145 feet.

200 - 345 Sandstone grain size varies from fine to coarse, dolomitic matrix generally unconsolidated, trace to abundant feldspar, pyritic bands. Between 210 and 250 oolite bands occur together with dolomitic bands

Algebuckina Sandstone

Age: Upper Jurassic to Lower Cretaceous

Depth interval: 345 - 435

Thickness: 90 feet.

coarse quartz some granule size, sub-rounded to subangular, kaolinitic , no feldspar.

Mount Toondina Beds

Age:	Lower Permian
Depth interval:	435 - 860
Thickness	425 feet
435 - 560	Siltstone, very clayey, grey A.A. carbonaceous, micaceous, quartz is subrounded and polished. This contains interbeds of coal down to 560. Coal black, soft, containing occasional plant fragments. Carbonaceous shale is present with the coal.
560 - 860	Siltstone A.A. to fine sandstone. Sandstone, grey fine grained some medium, subrounded, silty, and clayey, pyritic and carbonaceous.
960 - 1278	Sandstone, clean unconsolidated quartz sand, fine to medium grained, poorly sorted near top grading to fair sorting at 930 and fair to good sorting for the rest. Slightly clayey.
1278 - 1580	Shale, sandy and silty calcareous in part and interbedded with sandstone A.A. also, calacreous and pyritic sandstone.
1580 - 1714	Argillaceous siltstone grading to argillaceous sandstone, carbonaceous, very clayey and contains scarce fine exotic grains. Plastic when wet powdery when dry.

Unit 1 (Lower Permian; Sakmarian)

Depth interval: 1714 - 1802

Thickness: 88 feet.

1714 - 1802 Claystone or clay shale, greenish grey, plastic, when wet; grey, brittle when dry. Contains also minor silt and sand.

1802 - 1821 Basement. Well banded granite gneiss (Appendix F)

T.D. 1821

Wallira No. 1

Cadna-owie Formation (Neocomian to Aptian)

Depth interval: 0 - 185 feet

Thickness: 185 feet.

0 - 80 Sandstone, silty white to off-white variable grain size clayey (grey) and kaolinitic(white). Trace of smokey quartz trace of muscovite.

80 - 100 Very clayey sandstone or sandy clay otherwise the sand is as above.

100 - 185 Sandstone silty, up to 50% silt; sand is as above.

Mount Toondina Beds (Artinskian)

Depth interval: 185 - 420

Thickness: 235

185 - 420 Mudstone grey very fine grained slightly calcareous, finely micaceous and carbonaceous. Also containing blebs of pyrite and pyritic aggregates. Silty and sandy.

Unit 1 (Sakmarian)

Depth interval: 420 - 670.

Thickness: 250

420 - 470 Mudstone or silty claystone, dark grey almost a dark grey silty shale.

470 - 670 Claystone (clayshale). Faint greenish grey

plastic when wet with occasional hard cuttings grey and brittle when dry slightly silty.

Basement

Depth interval: 710 - 721.6

Thickness: 11.6

710 - 721.6 Granodiorite gneiss (Appendix F) This is a quartz plagioclase biotite gneiss, well banded due to good aligning of the mica. The bottom hole core also contains a small band of dense mica schist consisting of brown-black biotite, green to white ?chlorite and minor quartz. All three are very fine grained.

WALLIRA No. 2

Cadna-owie Formation (Neocomian to Aptian)

Depth interval: 0 - 195

Thickness: 195'

0 - 30 Sandstone: gritty to pebbly, the pebbles being dominantly a red fine siltstone. The sand is dominantly subrounded, fine to coarse grained quartz, and contains yellow silcrete pebbles. Matrix is slightly calcareous and slightly clayey.

30 - 195 Sandstone: offwhite to grey varies from fine to medium grained subangular to subrounded, occasional smokey quartz. Only very slightly kaolinitic.

Unit 1 (Sakmarian)

Depth interval: 195 - 605

195 - 605 Claystone: or clay shale, silty to sandy subrounded frosted quartz. The claystone varies from dark grey (wet), light grey (dry) to greenish grey (wet) light grey (dry) towards the base.

Unit 2 (Lower Permian)

Depth interval 605 - 1096

Pebble sandstone to clayey boulder conglomerate (Diamictite).

This unit is dominantly a sandstone consisting of grains of quartz, igneous, metamorphic, and sedimentary rock types ranging from fine sand up to boulders of the order of 1 foot diameter.

Cyclic graded bedding can also be observed in the cores of this unit. The unit is quite clayey in part particularly in the middle portion where the clayey sandstone grades into a grey sandy clay.

Basement (Unknown age)

Depth interval 1096 - 1101

Granite gneiss: well banded. This has been identified by AMDEL as an altered pyroxene granulite. (Appendix F)

Discussion of Plaeozoic Sequence

Unit 2

Unit 2 consists essentially of clastics ranging from medium sand to cobble size with the occasional boulder. In some parts it is quite clayey but in others such as the base of unit 2 there is very little clay in the matrix. However there are thin bands (2-5mm) of clay shale interbedded with the cobble conglomerate. The unit therefore ranges from a cobble conglomerate to a diamictite (Crowell 1967) and is thought to be a marine deposit. The transporting media include both fluviatile and density current transport with deposition into a steep sided graben or trough.

The clastics are generally well rounded and free of glacial striations indicating marine deposition as opposed to glacial deposition. Graded bedding also occurs in Wallira No. 2 showing that turbidity currents occurred in portion of the trough. It also has very little clay in the base of the unit which indicates winnowing of the sequence or removal of the fines. As a glacial deposit is not graded

nor normally free of clays the above is supporting evidence for marine deposition rather than glacial.

The Gawler Range volcanics to the south, appear to have been the major source rocks because this unit contains abundant pebbles of the distinctive Gawler Range porphyry.

Unit 1

This is a marine shale unit consisting dominantly of a clay shale with frosted sand grains scattered throughout.

Unit 1 was deposited in a much lower energy environment than that described for unit 2. The boundary between units 1 and 2 is well defined on both gamma ray and neutron-neutron logs (see composite logs), and also by palaeontological evidence. The upper boundary between unit 1 and the Mount Toondina Beds, is also well defined by electric and radioactivity logs. It is difficult to pick on cuttings however, as the change occurs only gradually. There is a slight darkening of the samples, and a faint greenish tinge can be observed in the wet samples. This dark greenish grey colour fades to pale grey as the sample dries.

Mount Toondina Beds

As previously mentioned most of the upper section of this unit is defined in outcrop at Mount Toondina (Freytag 1965) and the lower section and base are defined by electric logs of the Cootanoorina No. 1 well (Wopfner and Allchurch) 1967.

The unit is a fresh water lacustrine deposit. The upper section where present, contains a number of coal beds which indicate phases of swamp development and the sequence is generally carbonaceous throughout. Pyrite is also scattered through the entire unit indicating prevailing reducing conditions, with the occasional influx of sand and silt forming interbeds of sandstones and siltstones of fluviatile origin.

All units have been dated with the use of palaeontology the detail of which is contained in reports by (Harris and McGowran 1967, 1969).

CONCLUSIONS

The results of the stratigraphic drilling programme have demonstrated that the central Arckaringa Basin is essentially a shallow, platform, covered by a thin Permian sequence which rests directly on crystalline basement. The shallow platform area is edged to the east by the Boorthanna Trough and to the South by the Phillipson or Wallira troughs. These trough developments present either graben or half-graben structures which develope synchronous with early Permian deposition.

The hydro-carbon prospects of the thin sediment blanket covering the shallow crystalline platform is at best marginal, as already indicated by Demaison (1969) and the additional wells drilled since have not produced any evidence which warrants revision of that assessment. Although potential reservoir beds do exist within the Mt. Toondina beds, burial on the whole has been too shallow for the generation and migration of hydrocarbons. The only marginal possibility for hydrocarbon entrapment exists in the porous sands near the base of Unit 2 as for instance the "granite wash" in Karkaro No. 1. If such sands can be located in a draped position over local basement highs, and providing a sufficient thickness of Unit 1 shale are present to form a cap, entrapment of hydrocarbons, generated in deeper parts of the Arckaringa Basin or adjacent basins may occur.

This negative assessment of the shallow platform-cover does not alter the previous evaluation of the petroleum potential of the Boorthanna Trough nor is it an indication of the situation which may be found in the Phillipson - Wallira trend. These later two require much more work to evaluate the potential which cannot be interpreted by the two Wallira wells alone.

Additional seismic surveys are to be carried out by the Departments seismic party during the current field

season. Depending on the results of these surveys, more drilling will be required, before a final assessment of the petroleum potential of these graben structures can be made.

ACKNOWLEDGEMENTS

The writer wishes to thank Dr. H. Wopfner, Supervising Geologist of the Petroleum Exploration Division for his suggestions, aid and supervision of the report with special reference to the conclusions.

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APPENDIX A

KARKARO NO. 1

APPENDIX A

KARKARO No. 1

SAMPLE DESCRIPTIONS

Depth (Feet)		
0 - 10	100% Claystone:	Red, medium hard, lateritic with fragments of amorphous silica.
10 - 20	30% Claystone:	As above(A.A.)
	70% Claystone:	White soft, clay was fouling roller bit penetration rate slow. Pasty on shale shaker.
20 - 30	60% Claystone:	Red A.A. less amorphous silica.
	40% Claystone:	White A.A.
30 - 40	100% Claystone:	White A.A. with abundant red staining in minute cracks and fissures.
40 - 50	100% Claystone:	White, soft with abundant red staining and minor siliceous claystone, much harder.
50 - 60	100% Claystone:	White A.A.
	Tce. Claystone:	Siliceous A.A. (Yellow,White)
	Tce. Siltstone:	Red, med. hard ferruginised.
60 - 70	95% Claystone:	White A.A.
	5% Siltstone:	Red brown to yellow brown ferruginous (appearance of limonite).
70 - 80	90% Claystone:	White A.A.
	10% Siltstone:	Red brown and yellow brown A.A.
80 - 90	90% Claystone:	White A.A. some bands are more silty, harder.
	10% Siltstone:	A.A.
90 - 100	90% Claystone:	A.A.
	10% Siltstone:	A.A.
100 - 110	90% Claystone:	White A.A. Trace sand grains clear, angular with remnants of yellow clay. Assumed to be thin bands of siltstone and sandstone.
	10% Siltstone:	Red A.A.
110 - 120	30% Claystone:	White A.A. (100-110)
	30% Sandstone:	White med. grained subang. poorly sorted.
	40% Siltstone:	Red A.A.
120 - 130	40% Claystone:	White A.A.
	20% Sandstone:	A.A.
	40% Siltstone:	Red, silt size grains, colours range from yellow (bounded with yellow clay) through pink to deep red showing varied staining.

130 - 140	10% Claystone: 15% Sandstone:	White A.A. White medium to coarse grained translucent, subang., polished fair sorting.
	75% Sandstone:	Off white, v.fine grained sandstone subangular, iron stained and cemented with clay.
140 - 150	100% Sandstone:	Off white, v.fine to med. grained some coarse subang. to subround, many well polished many iron stained, poor sorting trace of mica.
150 - 160	100% Sandstone:	Off white, A.A. with less iron staining. Trace muscovite and trace of ?heavy minerals.
160 - 170	100% Sandstone:	Grey fine to medium grained friable subang. to subround, less iron staining many polished, fair sorting.
170 - 180	100% Sandstone:	Grey A.A. (160 - 170)
180 - 190	100% Sandstone:	Grey-white A.A. Little to no iron staining - clean fine to med. grained sand or friable sandstone subang. highly polished on many grains. Little matrix.
190 - 200	100% Sandstone:	White A.A.
200 - 210	100% Sandstone:	A.A.
210 - 220	100% Sandstone:	A.A.
220 - 230	100% Sandstone:	A.A.
230 - 231	100% Coal:	Black (wet) dk. grey when dry. Abundant wood fragments, brittle. Low rank coal.
231 - 247	CORE No. 1 (See Core descriptions)	
247 - 250	90% Sandstone: 10% Coal:	A.A. (Cavings) A.A. N.B. Very few cuttings came over the shale shaker. A grey very sticky mud appeared on the wire gauze. It is assumed the material was grey shale (as in Core 1) and was lost into the drilling mud which gained weight.
250 - 260	100% Shale:	Grey carbonaceous, pyritic. Pyrite grains observed both in cuttings and the core (pyrite band).
260 - 270	100% Shale:	Grey carbonaceous silty. Abundamt sericite and large traces of med. to coarse grained pyrite.
270 - 280	100% Siltstone:	Grey v. fine grained. v. slightly carbonaceous subang. v.fine quartz grains micaceous, Abundant pyrite aggregates.
280 - 290	100% Siltstone:	Grey A.A. v. sandy & clayey (probably 50:50 sand and silt). Abundant pyrite blebs and

		pyritic siltstone.
290 -300	100% Sandstone:	Grey v. fine grained A.A. Some bands of hard pyritic sandstone. The pyrite is also associated with coal or carbonaceous flecks.
300 - 310	100% Sandstone:	Grey fine to v.fine grained round to subround. Micro-micaceous pyritic cement in bands, also blebs of pyrite. Some pink to red, fine rounded grains.
310 - 320	80% Siltstone: 20% Sandstone:	A.A. 270 - 280 A.A. very clayey, plus a trace of pink sand grains.
320 - 330	100% Siltstone:	Very clayey (pasty on shaker) Fine grained quartz silt, micaceous and finely carbonaceous. Also bands of pyritic siltstone.
330 - 340	100% Claystone:	Silty A.A.
340 - 350	100% Claystone:	Silty A.A.
350 - 360	80% Sandstone:	Grey med. grained quartz on the average but occasional coarse grains, subrounded to rounded. Very clayey. Trace of pink sand A.A.
	20% Siltstone:	A.A. (320-330)
360 - 370	90% Sandstone: 10% Siltstone:	A.A. (350-360) sub-rounded. A.A. (350-360)
370 - 380	90% Sandstone: 10% Siltstone:	A.A. A.A.
380 - 390	90% Sandstone: 10% Siltstone:	A.A. (Sandstone finer) A.A.
390 - 400	90% Sandstone: 10% Siltstone:	A.A. (380-390)
400 - 410	80% Sandstone: 20% Siltstone:	A.A. A.A.
410 - 420	90% Sandstone:	White fine to v. fine grained, quartz grains subang. to sub-rounded, some polished pyritic, carbonaceous specks.
	10% Siltstone:	A.A.
420 - 430	90% Sandstone: 10% Siltstone:	White A.A. A.A.
430 - 440	90% Sandstone: 10% Siltstone:	A.A. A.A.
440 - 450	90% Sandstone: 10% Siltstone:	A.A. A.A.
450 - 460	90% Sandstone: 10% Siltstone:	A.A. A.A.
460 - 470	90% Sandstone:	A.A. with abund. pyrite and coal specks.
	10% Siltstone:	A.A.

470 - 480	60% Siltstone:	White, v. fine grained quartz subrounded, polished.
	40% Sandstone:	White A.A. pyritic.
480 - 490	100% Mudstone:	Grey possibly a grey shale slightly silty and sandy.
490 - 500	100% Mudstone:	A.A.
500 - 510	60% Mudstone:	A.A.
	30% Sandstone:	A.A. (410-420)
	10% Pebbles:	Grey black lithics, pink? feldspar coal fragments and pyrite.
510 - 520	20% Mudstone:	A.A.
	70% Sandstone:	A.A.
	10% Pebbles:	A.A.
520 - 530	20% Sandstone:	Calcareous hard subrounded to subangular fine to very fine grained occasional med. grains.
	80% Mudstone:	Grey. A.A.
530 - 540	80% Pebbly Sandstone:	A.A. medium to coarse grained.
	10% Sandstone:	Calcareous A.A.
	10% Mudstone:	A.A.
540 - 550	Same as above.	
550 - 560	100% Sandstone:	Clayey, fine grained quartz sub-rounded clean, clear, polished.
560 - 570	100% Siltstone:	Clayey, v. fine grained quartz, A.A. pyritic.
570 - 580	100% Mudstone:	A.A. some sandy grains. Trace pyrite some red quartz iron stained grains non calcareous.
580 - 590	100% Mudstone:	A.A. some coarse grains.
590 - 600	90% Mudstone:	A.A.
	10% Sandstone:	Calcareous, occurs in bands, trace pyrite.
600 - 610	10% Pebbly sandstone:	A.A.
	90% Sandstone:	Clayey v. fine grained A.A.
610 - 620	100% Sandstone:	A.A. trace pebbles and trace pyrite.
620 - 630	100% Sandstone:	A.A.
630 - 632	100% Sandstone:	Clayey A.A.
632 - 640	100% Sandstone:	Quartz, white fine to v. fine well rounded, clear grains with less clay than above.
640 - 650	100% Sandstone:	White A.A. but some med. grains.
650 - 660	100% Sandstone:	White A.A. Trace pebbles, trace pyrite.
660 - 670	100% Sandstone:	White quartzitic clacareous fine grained rounded and slightly polished, indurated with slightly calcareous matrix. Clayey.
670 - 680	100% Sandstone:	White, fine to very fine grained quartz grains, rounded, clear polished grains slightly calcareous. Trace pyrite. Large trace of pebbles - Coarser than the sandstone. Pink feldspar, green (?volcanics), black lithics, brown siltstone.

680 - 690	90% Sandstone:	White A.A. Clayey.
	10% Sandstone:	Pebbly - coarser grained than the white sandstone. Exotic pebbles include green siltstone, green (volcanics?) grey shale, grey quartzite, brown siltstone, black biotite gneiss and black lithics, pink feldspar (dominant).
690 - 700	80% Sandstone:	White A.A.
	20% Sandstone:	A.A. (containing exotic pebbles)
700 - 710	50% Sandstone:	White A.A.
	50% Sandstone:	Exotic pebbles A.A. The rock appears to be a micro-conglomerate containing much clay (micro-boulder clay).
710 - 720	50% Sandstone:	White A.A.
	50% Sandstone:	Exotic pebbles A.A. - slightly coarser.
720 - 730	50% Sandstone:	White A.A.
	50% Cobble Conglomerate:	Exotic pebbles, very clayey. Almost a Cobble clay.
730 - 740	50% Sandstone:	White A.A.
	50% Conglomerate:	Coloured A.A. (720-730)
740 - 750	50% Sandstone:	White A.A.
	50% Conglomerate:	Coloured A.A. some very coarse pebbles up to 5 mm. Clayey.
750 - 760	50% Sandstone:	White A.A.
	50% Conglomerate:	Coloured A.A. pebbles up to 8 m.m., clayey.
760 - 770	50% Sandstone:	White A.A.
	50% Conglomerate:	Coloured pebbles A.A. Clayey.
770 - 780	60% Sandstone:	White, fine A.A.
	40% Conglomerate:	Coloured pebbles A.A. clayey.
780 - 790	80% Sandstone:	White A.A.
	20% Pebbly Sandstone:	A.A. med to coarse sand size.
790 - 800	80% Sandstone:	A.A. (780-790)
	20% Pebbly Sandstone:	A.A. (780-790)
800 - 810	80% Sandstone:	A.A.
	20% Pebbly Sandstone:	A.A.
810 - 820	70% Sandstone:	A.A. v. fine grained.
	30% Pebbly Sandstone:	A.A. fine to med. grained.
820 - 830	70% Sandstone:	A.A. (810 - 820)
	30/ Pebbly Sandstone:	A.A. (810-820)
830 - 840	70% Sandstone:	A.A.
	30% Pebbly Sandstone:	A.A.
840 - 850	70% Sandstone:	A.A. becoming more sandy and less clayey.
	30% Pebbly	

850 - 860	100% Sandstone:	Grey clay to fine sand size grains of rounded quartz. Approx. 10% exotic sand grains A.A. some grains slightly calcareous (may be dolomite). Clayey.
860 - 870	100% Sandstone:	A.A. with more exotic sand grains.
870 - 880	100% Sandstone:	A.A.
880 - 890	100% Sandstone:	A.A. iron stained quartz grains abundant.
890 - 900	100% Sandstone:	A.A. with abundant exotic sand size pebbles. Biotite quartz gneiss, green & brown shale, brown and grey siltstones, micro granite, green? volcanic rock, pale orange? anhydrite, pyritic sandstone and coal fragments.
897	100% Sandy Clay:	Bit sample shows formation to be a sandy clay (micro pebble clay).
900 - 910	100% Clayey Sandstone:	A.A. (or sandy clay)
910 - 920	100% Clayey Sandstone:	A.A.
920 - 930	100% Clayey Sandstone:	A.A.
930 - 940	100% Clayey Sandstone:	A.A.
940 - 950	100% Sandstone:	Pale grey fine to medium grained rounded to subrounded quartz grains, many polished, others frosty. Coloured grains A.A. med. subangular to subrounded.
950 - 960	100% Sandstone:	A.A. (940-950)
960 - 970	100% Sandstone:	A.A.
970 - 980	100% Sandstone:	A.A. slightly calcareous. Probably calcareous sandstone bars.
980 - 990	100% Sandstone:	A.A. (940-950)
990 - 1000	90% Sandstone: 10% Clay:	A.A. finer grained Grey plastic when wet.
1000 - 1010	75% Sandstone: 25% Clay:	A.A. fine to v. fine grained. Grey plastic when wet. Four pebbles appeared in the tray sample the largest being 1 cm.
1010 - 1020	100% Clay:	Grey plastic when wet. Very fine grained, sandy to silty, quartz grains subangular fair sorting.
1020 - 1030	100% Clay:	A.A. plus minor pebbles, slightly calcareous.
1030 - 1040	CORE No. 2	

1040 - 1050	100% Clay(stone) or shale:	A.A. most of the clay lost in washing samples.
1050 - 1060	100% Clay:	Grey calcareous containing v. fine loose sand and silt quartz grains. Larger grains are rounded, silt grains subangular. Abundant pebbles and pebble fragments.
1060 - 1070	100% Clay:	Grey A.A.
1070 - 1080	100% Clay:	Grey A.A.
1080 - 1090	100% Clay:	Grey A.A. poor sampling - most of the clay being washed away.
1090 - 1100	100% Clay:	A.A. (poor sample)
1100 - 1110	100% Clay:	A.A. (poor sample)
1110 - 1120	100% Clay:	A.A. (poor sample)
1120 - 1130	100% Clay:	Grey containing very fine subrounded to subangular quartz grains and scarce exotic pebbles and pebble fragments.
1130 - 1140	100% Clay:	A.A.
1140 - 1150	100% Clay:	A.A.
1150 - 1160	100% Clay:	A.A.
1160 - 1170	100% Clay:	A.A.
1170 - 1180	100% Clay:	A.A.
1180 - 1190	100% Clay:	A.A.
1190 - 1200	100% Clay:	A.A.
1200 - 1210	100% Clay:	A.A.
1210 - 1220	100% Clay:	A.A.
1220 - 1230	100% Claystone: or shale	A.A. much more sandy and pebbly, quartz fine to med. grained. Pebbles also A.A. plus coal.
1230 - 1240	100% Clay shale:	A.A. (1220 - 1230)
1240 - 1250	100% Clay shale:	A.A.
1250 - 1260	100% Clay shale:	A.A.
1260 - 1270	100% Clay shale:	A.A.
1270 - 1280	100% Shale:	A.A. sandy and calcareous. Abundant shale cuttings now visible.
1280 - 1290	100% Shale:	A.A. becoming harder as more shale cuttings are appearing in the pasty samples. Igneous pebbles are becoming more abundant. (granitic)
1290 - 1300	90% Shale: 10% Sandstone:	A.A. Calcareous, off white, very fine quartz grains subrounded, bound by a calcareous cement.

1300 - 1310	90% Shale: 10% Sandstone:	A.A. A.A.
1310 - 1320	90% Shale: 10% Sandstone:	A.A. A.A.
1320 - 1330	90% Shale: 10% Sandstone:	A.A. A.A.
1330 - 1336	90% Shale: 10% Sandstone:	A.A. A.A.
1336 - 1340	100% Granite:	Pink felspar, black biotite and clear quartz can clearly be observed in the cuttings.
1340 - 1344'8"	CORE NO. 3	
1344'8"-1350	100% Conglomerate:	The cuttings are predominantly granite cuttings. Core No. 3 confirms the observation in that most of the boulders in the core are granitic and range from grit size to 1 ft. in diameter. The matrix is all granitic. Also quartz mica schists, sandstone, shale, green volcanic rock and pyritic sandstone.
1350 - 1360	100% Conglomerate:	A.A. - appears to be a greater proportion of pyritic sandstone, grey shale, black biotite schist and green volcanic rock.
1360 - 1370	100% Conglomerate:	A.A. plus more exotic pebbles such as green siltstone and calcareous sandstone.
1370 - 1380	100% Conglomerate:	A.A. with some soft bands of sandstone. (calcareous).
1380 - 1390	100% Conglomerate:	A.A. (1370 - 1380)
1390 - 1400	100% Conglomerate:	A.A. (1370 - 1380)
1400 - 1410	80% Sandstone: 20% Pebbles:	Calcareous off-white (1310 - 1320) A.A. Still a conglomerate with less boulders and pebbles.
1410 - 1420	80% Sandstone: 20% Pebbles:	Calcareous, off-white, grain size varies from very fine sand to silt quartzitic, felspathic subrounded, semi-polished. Exotic pebbles A.A. but dominated by felspar (probably granitic pebbles).
1420 - 1424	100% Sandstone:	Calcareous quartzitic pebbly felspathic A.A.
1424 - 1440	CORE NO. 4	(see core description)
1440 - 1450	100% Pebbly Sandstone:	Off white, fine to medium grained quartz, subrounded to subangular, very little matrix. which is calcareous (see core 4 description) v. porous. Pebbles

include pyritic sandstone, granite, quartzite green volcanics, grey shale and grain size is from silt to pebble size (i.e. Greywacke).

1450 - 1460	100% Pebbly Sandstone:	A.A.
1460 - 1470	100% Pebbly Sandstone:	A.A. - increase in quantity of pebbles and these include those above plus mica schist.
1470 - 1480	100% Pebbly Sandstone:	A.A.
1480 - 1490	100% Pebbly Sandstone:	A.A.
1490 - 1500	100% Pebbly Sandstone:	A.A. pebbles much more abundant and range from silt size up to ¼ inch.
1500 - 1510	100% Pebbly Sandstone:	Sample consists of boulder cuttings and fragments, pebbles and granules almost entirely. Compositions of the pebbles are as above.
1510 - 1520	100% Pebbly Sandstone:	A.A. Some calcareous sandstone bars as above. Clayey in part.
1520 - 1530	100% Pebbly Sandstone:	A.A.
1530 - 1540	100% Pebbly Sandstone:	A.A. boulders and cuttings are dominantly granitic.
1540 - 1550	100% Pebbly Sandstone:	A.A.
1550 - 1551	Entirely granite cuttings.	Penetration rate very slow.
1551 - 1561	CORE No. 5	Granite boulders.
1561 - 1563	Granite cuttings.	
1563 - 1579	CORE No. 6	Granite basement.
T.D. 1579		

APPENDIX B

MT. FURNER NO. 1

APPENDIX B

M. FURNER No. 1

SAMPLE DESCRIPTIONS

Depth (Feet)		
0 - 4	Surface soil gypsiferous	
4 - 10	95% Siltstone:	Pale green to yellow, salt and pepper appearance, ?smectitic - ?glauconitic. Olive green when dry.
	5% Gypsum:	Platey, transparent, crystals which are quite soft. Sample pasty on shale shaker so quite clayey the clay being lost in washing the samples.
10 - 20	90% Siltstone:	Pale green A.A.
	5% Gypsum:	A.A.
	5% (Tce Shale:	Grey
	(Tce Kaolinite:	White
	(Tce Clay:	The yellow and green colouration is thought to be due to smectite or glauconite.
20 - 30	98% Siltstone:	Pale green A.A. also clayey.
	2% Gypsum:	A.A.
30 - 40	100% Siltstone:	Pale green A.A. sandy in part, clayey, orange to red, green and yellow clays and grey shale.
40 - 50	90% Siltstone:	Pale green A.A.
	10% Shale:	Brown and grey There is obviously less green and yellow clay present and the grey shale is increasing.
50 - 60	95% Shale:	Grey dominantly with black flecks of carbonaceous material silty in parts. Brown subdominant shale also present, Tce yellow to orange clay.
	5% Siltstone:	Pale green A.A.
60 - 70	50% Shale:	A.A.
	50% Siltstone:	A.A. or very fine sandstone.
70 - 80	100% Shale:	Grey A.A. with silty bands. Traces of salt and pepper sand, and gypsum are assumed to be cavings.
80 - 90	100% Shale:	Grey A.A.
90 - 100	100% Shale:	Grey fissile when dry, soft micro micaceous (?muscovite and ?biotite). Silty and clayey. Drilling mud weight and viscosity rose indicating the clay was going into the mud.
100 - 110	100% Shale:	A.A.

110 - 120	100% Shale:	A.A.
120 - 130	100% Shale:	A.A.
130 - 140	100% Shale:	A.A. slightly more silty bands.
140 - 150	100% Shale:	A.A.
150 - 160	100% Shale:	A.A.
160 - 170	100% Shale:	A.A.
170 - 180	100% Shale:	A.A. Much more clayey. Viscosity of mud up, size of samples decrease greatly when washed.
180 - 190	100% Shale:	A.A. clayey.
190 - 200	100% Shale:	A.A. clayey
200 - 210	98% Shale:	A.A. Clayey
	2% Siltstone:	Fine grained subrounded quartz, dolomitic matrix very hard. Trace pyrite. Drillers encountered a hard bar at 207 which is assumed to be the dolomitic siltstone or very fine sandstone.
210 - 220	40% Shale:	A.A.
	20% Sandstone:	Fine grained quartz, subrounded, dolomitic matrix, hard, trace felspar.
	10% Sandstone:	Oolitic, brownish grey dolomitic matrix, sandy. Ooliths are black with concentric structure and measure .3 - .5 mm in diameter clastic grains mainly fine grained subangular subrounded quartz.
	30% Sandstone:	Off white quartz unconsolidated, med. grained, clear semipolished subang. grains. Little to no matrix.
220 - 230	40% Sandstone:	Dolomitic A.A.
	20% Sandstone:	Oolitic A.A.
	35% Sand:	Unconsolidated A.A.
	5% Siltstone:	Dolomitic light grey, micaceous and ?glauconitic.
230 - 240	60% Sandstone:	Tan dolomitic A.A.
	5% Sandstone:	Oolitic A.A.
	6% Siltstone:	A.A.
	30%Sand:	Unconsolidated A.A.
240 - 250	80% Sand:	Unconsolidated med grained to coarse subang. Fair to good sorting, clear to milky quartz Tc felspar white and cream, some red rock fragments.
	20% Sandstone:	Tan dolomitic A.A. Trace Oolite.
250 - 260	100% Sand:	A.A. some very coarse grains. Trace pyritic sandstone and dol. sandstone A.A.
260 - 270	50% Sand:	A.A.

	40% Sand:	Fine grained, offwhite, subrounded to rounded, well sorted.
	10% Sandstone:	Tan dolomitic A.A. Trace of Pyritic sandstone.
270 - 280	100% Sand:	Unconsolidated medium to very coarse grained subang. with some well rounded frosted grains dominantly clear quartz, some milky quartz and rock fragments. Trace felspar.
280 - 290	100% Sand:	A.A.
290 - 300	100% Sand:	Loose, med to very coarse grained, coarse fraction sub ang. (70%), med. fraction well rounded with good sphericity, clear to smoky quartz with abundant felspar grains (microcline) well rounded (estimated 2%). No matrix.
300 - 310	100% Sand:	A.A.
310 - 320	100% Sand:	A.A.
320 - 330	100% Sand:	A.A. (trace Pyritic Sandstone)
330 - 340	100% Sand:	A.A.
340 - 350	90% Sand:	A.A.
	10% Sand:	White, very fine to fine subrounded fair sorting kaolinitic.
350 - 360	90% Sand:	A.A. (Med. to coarse)
	10% Sand:	A.A. (very fine)
360 - 370	90% Sand:	A.A. ranging to granule size.
	10% Sand:	A.A. (very fine)
370 - 380	100% Sand:	Loose med. grained to granule size with some pebbles. Dominantly quartz clear to milky, subang. in coarse fraction, subrounded to round in med. fraction. No. felspar. Tce. Kaolin.
380 - 390	100% Sand:	A.A.
390 - 400	100% Sand:	A.A.
400 - 410	60% Granule conglomerate, with some pebbles subrounded to sub-ang. Quartz grains with pitted surfaces.	
	40% Sand:	Medium grained subrounded quartz grains, fair sorting, large trace of kaolin adhering to grains.
410 - 420	60% Conglomerate:	A.A.
	40% Sand:	A.A.
420 - 430	60% Conglomerate:	A.A.
	40% Sand:	A.A.
430 - 440	80% Conglomerate and sand A.A. (60:40)	
	20% Coal:	Black with brown streak, soft fibrous texture. First coal intersected at 438.
440 - 455	CORE No. 1	

455 - 460	100% Siltstone:	Grey very clayey, dominantly very fine grained quartz subang., micro micaceous (biotite plus other micas) carbonaceous, trace felspar. Plastic when wet. Trace pyrite aggregate.
460 - 470	100% Siltstone:	A.A. but more clayey.
470 - 480	100% Siltstone:	A.A.
480 - 490	100% Siltstone:	A.A. v. fine grained.
490 - 500	100% Siltstone to silty shale:	A.A.
500 - 510	100% Siltstone:	Very clayey, grey A.A. carbonaceous material more abundant and larger grain size, micaceous (chlorite? biotite and light micas). Quartz silt is subrounded and polished (.01 mm.)
510 - 520	100% Siltstone:	A.A. finer grain size.
520 - 530	100% Coal:	Black soft, occasional plant fragments. Coal and carbonaceous shale interbedded.
530 - 540	100% Coal:	A.A.
540 - 550	100% Siltstone:	A.A.
550 - 560	60% Siltstone: 40% Coal:	A.A. (540-550). A.A. Probably interbeds of Coal, carbonaceous shale and silty shale or clayey silt.
560 - 570	100% Siltstone:	Carbonaceous A.A.
570 - 580	100% Siltstone:	A.A. Trace pyrite aggregate.
580 - 590	100% Siltstone:	A.A. (570-580).
590 - 600	100% Siltstone:	A.A. (570-580).
600 - 610	100% Siltstone:	A.A.
610 - 620	100% Siltstone:	A.A. slightly larger grains some almost sand size.
620 - 630	100% Siltstone:	A.A. (600-610).
630 - 640	100% Siltstone:	A.A.
640 - 650	60% Siltstone: 40% Sandstone:	A.A. Quartz fine grained, rounded fair sorting, clay matrix. Probably interbedded clayey silt and clayey sand.
650 - 660	100% Siltstone:	A.A.
660 - 670	20% Sandstone: 80% Siltstone:	Unconsolidated, white quartz fine to v.fine grained, rounded, polished fair sorting v.clayey. ?Kaolinite. A.A.
670 - 680	50% Sandstone: 50% Siltstone:	A.A. white. A.A.

680 - 690	50% Sandstone:	White v.fine even grained almost silt, rounded quartz fair sorting, slightly calcareous cement (hard bar at 688').
	50% Siltstone:	A.A. grey but less clayey. Large traces of pyrite.
690 - 700	100% Siltstone to fine Sandstone:	(grey colour due to clay). Some sand size grains (5%), carbonaceous, micaceous, pyritic, clayey.
700 - 710	100% Siltstone:	A.A.
710 - 720	90% Siltstone:	A.A.
	10% Sandstone:	A.A. white (680-690)
720 - 730	100% Siltstone:	A.A. clayey with sandy interbeds.
730 - 740	100% Siltstone:	A.A. (720-730).
740 - 750	100% Siltstone:	A.A.
750 - 760	100% Sandstone:	Grey v.fine grained some medium quartz grains subrounded silty and clayey, pyritic, carbonaceous.
760 - 770	100% Sandstone:	A.A.
770 - 780	100% Sandstone:	A.A.
780 - 790	100% Sandstone:	A.A.
790 - 800	100% Sandstone:	A.A.
800 - 810	100% Sandstone:	A.A.
810 - 820	100% Sandstone:	A.A.
820 - 830	100% Sandstone:	A.A.
830 - 840	100% Sandstone:	A.A. more clayey and occasional coarser grains (yellowish). Poorly sorted and argillaceous.
840 - 850	100% Sandstone:	A.A. clayey but much fewer coarse grains.
850 - 860	100% Sandstone:	A.A. clayey.
860 - 870	100% Sandstone:	A.A. clayey, some medium quartz grains.
870 - 880	100% Sand:	Clean unconsolidated quartz sand fine to med. grained, poorly sorted with occasional v. coarse quartz.
880 - 890	100% Sand:	A.A.
890 - 900	100% Sand:	A.A.
900 - 910	100% Sand:	A.A.
910 - 920	100% Sand:	A.A.
920 - 930	100% Sand:	A.A.
930 - 940	100% Sand:	Fine grained, better sorted slightly clayey, rounded to subrounded.
940 - 950	100% Sand:	A.A. but some coarser grains.

950 - 960	100% Sand:	A.A. medium grained plus a few exotic granules.
960 - 970	100% Sand:	A.A. fine to medium grained. Very clean.
970 - 980	100% Sand:	A.A. clean.
980 - 990	100% Sand:	Fine grained slightly argillaceous, well sorted.
990 - 1005	CORE No. 2	(See core description)
1005 - 1010	100% Sand:	Dark grey fine grained very argillaceous well sorted, unconsolidated.
1010 - 1020	100% Sand:	Clean med. to coarse, well sorted subrounded with abundant exotic sand size grains (gneiss, greenstone, quartzite).
1020 - 1030	100% Sand:	A.A.
1030 - 1040	100% Sand:	A.A.
1040 - 1050	100% Sand:	A.A. Coarser grained with abundant greenstone granules.
1050 - 1060	100% Sand:	Medium grained, very clean, rounded fairly well sorted, abundant greenstone grains and granules.
1060 - 1070	100% Sand:	Medium to coarse grained, slightly clayey otherwise A.A.
1070 - 1080	100% Sand:	As for 1050 - 1060.
1080 - 1090	100% Sand:	A.A.
1090 - 1100	100% Sand:	A.A.
1100 - 1110	100% Sand:	A.A.
1110 - 1120	100% Sand:	A.A.
1120 - 1130	100% Sand:	A.A.
1130 - 1140	100% Sand:	A.A.
1140 - 1150	100% Sand:	A.A.
1150 - 1160	100% Sand:	A.A.
1160 - 1170	100% Sand:	A.A.
1170 - 1180	100% Sand:	A.A.
1180 - 1190	100% Sand:	Clean loose unconsolidated fine grained, fairly well sorted subrounded pyrite aggregates, exotic grains and traces of white clay.
1190 - 1200	100% Sand:	A.A. (1180 - 1190).
1200 - 1210	100% Sand:	A.A.
1210 - 1220	100% Sand:	A.A.

1230 - 1240	100% Sand:	A.A.
1240 - 1250	100% Sand:	A.A.
1250 - 1260	30% Sandstone:	V. fine grained, pyritic and calcareous, hard, traces of a white clay matrix.
	70% Sand:	A.A.
1260 - 1270	100% Sand:	Fine grained, sorted, subrounded, white clay matrix in parts. Exotic greenstone grains and graunles abundant.
1280 - 1290	100% Sand:	A.A. becoming more clayey. (White clay matrix).
1290 - 1300	100% Sand:	A.A. rounded grains and abundantly clayey. Exotic grains also present.
1300 - 1310	100% Sand:	A.A. (1290 - 1300).
1310 - 1320	100% Sandy Clay:	Greyish white sand fraction same as above.
1320 - 1330	100% Sandy Clay:	A.A.
1330 - 1340	25% Sandy Clay:	A.A.
	75% Sandstone:	Greyish White, friable, calcareous cement, sand, A.A.
1340 - 1350	100% Clay:	Sandy, whitish grey, sand fraction very fine grained to silty, well sorted, subrounded to subangular.
1350 - 1360	100% Clay:	A.A.
1360 - 1370	100% Clay:	A.A.
1370 - 1380	100% Clay:	A.A.
1380 - 1390	100% Clay:	Whitish grey v.silty, calcareous, silt A.A. plus rare specks of carbonaceous matter. V. silty clay or Argillaceous siltstone.
1390 - 1400	100% Clay:	A.A.
1400 - 1410	100% Clay:	A.A.
1410 - 1420	100% Clay:	A.A.
1420 - 1430	100% Clay:	A.A.
1430 - 1440	100% Clay:	A.A.
1440 - 1450	100% Clay:	A.A.
1450 - 1460	100% Clay:	A.A.
1460 - 1470	100% Clay:	A.A.
1470 - 1480	100% Clay:	A.A.
1480 - 1490	100% Clay:	A.A.
1490 - 1500	100% Clay:	A.A.
1500 - 1510	100% Clay:	A.A.

1520 - 1530 100% Clay: A.A.

1530 - 1540 100% Clay: A.A.

1540 - 1550 100% Clay: A.A.

1550 - 1560 100% Clay: Whitish grey v. silty, calcareous, silt A.A. plus rare specks of carbonaceous matter. V.silty clay or Argillaceous siltstone.

1560 - 1570 100% Clay: A.A.

1570 - 1580 100% Clay: A.A.

1580 - 1590 100% Clay: A.A.

1590 - 1600 100% Clay: A.A.

1600 - 1610 100% Clay: A.A. or Argillaceous siltstone pale whitish grey plastic when wet, powdery when dry, scarce fine exotic grains (greenstone) fairly common carbonaceous specks. Scarce pyrite aggregates.

1610 - 1620 100% Argillaceous Siltstone: A.A. coarser grained.

1620 - 1630 100% Argillaceous Siltstone: A.A. (1610 - 1620)

1630 - 1640 100% Argillaceous Siltstone: A.A.

1640 - 1650 100% Argillaceous Siltstone: A.A.

1650 - 1660 100% Argillaceous Siltstone: A.A.

1660 - 1670 100% Argillaceous Sandatone: V. fine grained, otherwise A.A.

1670 - 1680 100% Argillaceous Sandstone: A.A.

1680 - 1690 100% Argillaceous Sandstone: A.A. Also pink garnet grains and carbonaceous specks.

1690 - 1700 100% Argillaceous Sandstone: (1660-1670).

1700 - 1710 100% Argillaceous Sandstone: Medium grained. Grain size about .4 mm. One 1 cm. pebble of granite observed.

1710 - 1714 Same as above plus first appearance of green grey shale on shale shaker. Drilling rate slowed down and shale observed by driller.

1714 - 1726 CORE No. 3 (See core descriptions)
Ditch sample: greenish grey shale, waxy splintery plus loose coarse sand grains.

1726 - 1730 90% Green Claystone: as in core No. 3
5% Coarse quartz grains.
5% White siltstone.

1730 - 1740 Same as above.

1740 - 1750 100% Greenish grey claystones as above plastic when wet (sample very plastic and hard to wash).

1750 - 1760 100% Greenish grey claystone: A.A.
Trace white siltstone.
Trace coarse sand grains.

1760 - 1770 95% Claystone grey A.A. (green colour only very faint).
5% Sand and silty grains.

1770 - 1780 Same as above

1780 - 1790 100% Grey Claystone: A.A.

1790 - 1800 95% Grey Claystone: A.A.
5% Silt grains.

1802 - 1805 Granite Cuttings.

1805 - 1821 CORE NO. 4 Bottom Hole Core

T.D. 1821

APPENDIX C

WALLIRA No. 1

APPENDIX C

WALLIRA No. 1

SAMPLE DESCRIPTIONS

Depth (Feet)		
0 - 7	Surface soil:	Red, sandy to silty calcareous matrix, abundant iron staining.
7 - 20	95% Siltstone:	Red, silt to sand size grains very calcareous lighter coloured matrix (cream to white).
	5% Sandstone:	White, fine to medium grained quartz sand, subangular to sub-rounded clear to frosted kaolinitic (white clay adhering to grains), non calcareous.
20 - 30	90% Sandstone:	White, fine to medium grained quartzitic sand, subangular dominantly clear to frosted grains with occasional yellowish to reddish iron stained grains, clayey, white kaolinitic clay abundant and rare yellow clay adhering to grains.
	10% Siltstone:	Red A.A.
30 - 40	100% Sandstone:	White medium to coarse grained subangular clear to frosted quartz grains dominant, occasional yellow and red to brown (limonitic) iron stained grains and red non calcareous siltstone grains. Kaolinitic and yellow clay on grains.
40 - 50	100% Sandstone:	White medium to coarse with some very coarse grains and occasional silty grains bound with a kaolinitic matrix. Subangular to subrounded quartz and siltstone grains as above. Poorly sorted plus smokey quartz grains.
50 - 60	100% Sandstone:	White A.A. less siltstone grains.
60 - 70	100% Sandstone:	White A.A. but grain size ranging to grit size (¼") and red siltstone grains much more abundant. Poorly sorted.
70 - 80	100% Sandstone:	White as for 50-60 ft.
80 - 90	100% Sandstone:	Off white dominant fine grained quartz fraction subangular and a medium to very coarse subangular to subrounded fraction A.A. Micaceous, very clayey kaolinitic and some grey clay. More clay than in previous samples.
90 - 100	100% Sandstone:	Very clayey, grey, grain size ranges

		from silt to coarse sand size A.A. Very clayey but the grey clay dominates the Kaolinitic clay.
100 - 110	100% Sandstone:	Light grey fine to very coarse grained subrounded, clear quartz, frosted white and trace smokey quartz. Occasional iron stained grains, kaolinitic, trace of muscovite?
110 - 120	100% Sandstone:	Light grey A.A. perhaps more smokey quartz, fine to coarse grained.
120 - 130	100% Sandstone:	Light grey A.A.
130 - 140	100% Sandstone:	Light grey A.A. with less clay.
140 - 150	100% Sandstone:	Light grey A.A. (130-140)
150 - 160	90% Sandstone:	Light grey A.A. (130-140) less clay.
	10% Siltstone:	Grey, very fine grained with trace pyrite aggregate.
160 - 170	90% Sandstone:	Light grey A.A. but more smokey grains and a few very coarse grains.
	10% Siltstone:	Grey A.A.
170 - 180	60% Siltstone:	Grey to light brown, very fine grained pyritic.
	40% Sandstone:	Light grey A.A.
180 - 190	50% Siltstone:	Grey, light brown A.A.
	50% Sandstone:	Light grey A.A.
190 - 192	Same as for 180 - 190	
192 - 207	CORE No. 1 (Cored 15' rec.12.3) 4/8/69	
	Mudstone:	Grey to dark grey, extremely fine grained, only very slightly calcareous, slightly carbonaceous (very fine black specks scattered sparsely through the grey mudstone), finely micaceous. Also contains blebs of pyrite aggregates (blebs up to ¼" in size). Little to no porosity.
		The mudstone contains interbeds of white very fine grained siltstone, quartzose subrounded, fair sorting.
207 - 210	As in Core No. 1	
210 - 220	100% Mudstone:	Grey as in core. Silty and sandy. The sand is possibly cavings.
220 - 230	100% Mudstone:	Grey A.A. silty and sandy. Sand possibly cavings.
230 - 240	100% Mudstone:	Grey A.A. silty and sandy, sand same as in above sandstone - cavings caused by inserting casing.
240 - 250	100% Mudstone:	Grey, silty but very little sand

		(cavings now removed). Same as in Core No. 1
250 - 260	100% Mudstone:	Grey A.A. (240-250)
260 - 270	100% Mudstone:	Grey A.A.
270 - 280	100% Mudstone:	Grey A.A.
280 - 290	100% Mudstone:	Grey A.A.
290 - 300	100% Mudstone:	Grey A.A.
300 - 310	100% Mudstone:	Grey occasional white silty aggregates and silty grains present throughout the plastic mudstone. Occasional medium to coarse subrounded quartz grains. Assume identical to core i.e. micaceous and carbonaceous.
310 - 320	Mudstone:	A.A.
320 - 330	Mudstone:	A.A. silty to fine sandy.
330 - 340	Mudstone:	A.A. (320 - 330)
340 - 350	Mudstone:	A.A.
350 - 360	Mudstone:	A.A.
360 - 370	Mudstone:	A.A.
370 - 380	100% Mudstone:	A.A., more silty.
380 - 390	100% Mudstone:	A.A. Silt interbeds increasing but still dominantly a plastic clay.
390 - 400	90% Mudstone: 10% Sandstone:	A.A. but more silty. Buff, very fine sandstone or siltstone, calcareous matrix subangular to subrounded quartz grains - hard bar, (396-398) penetration slow.
400 - 410	100% Mudstone:	Grey, silty, slightly carbonaceous, micaceous, quartz silt is subangular to subrounded, clear and fairly well polished. This sample contains?cavings of the above calcareous sandstone.
410 - 420	100% Mudstone:	Grey A.A. plus calcareous sandstone, assumed to be cavings.
420 - 430	100% Mudstone:	Grey A.A. (410-420)
430 - 440	100% Mudstone:	Grey A.A. plus occasional pale pink ?felspar grains.
440 - 450	100% Mudstone:	Grey A.A. grain size of silt approaching a very fine sand -.02mm.
450 - 460	100% Mudstone:	A.A.
460 - 470	100% Mudstone:	A.A.

470 - 480	100% Mudstone:	A.A. finer grained (no sand).
480 - 490	100% Mudstone:	A.A. plus hard bar ?sandstone.
490 - 500	100% Mudstone:	A.A. very fine grained and appears to be darker - almost a dark grey clay or shale.
500 - 510	100% Mudstone:	A.A. very fine grained drk. grey when wet (and plastic), pale grey (and brittle) when dry i.e. mudstone or claystone. Occasional silt grains.
510 - 520	100% Claystone:	Grey A.A. (500 - 510) sl. silty. Occasional hard cuttings and colour almost a faint greenish grey.
		Trace calcite possibly veins filling fissures in the claystone.
520 - 530	100% Claystone:	Grey A.A. (faint greenish grey).
530 - 540	100% Claystone:	Grey A.A.
540 - 550	100% Claystone:	Grey A.A.
550 - 560	100% Claystone:	Grey A.A.
560 - 570	100% Claystone:	Grey A.A.
570 - 580	100% Claystone:	A.A.
580 - 590	100% Claystone:	A.A.
590 - 600	100% Claystone:	A.A.
600 - 610	100% Claystone:	A.A.
610 - 620	100% Claystone:	A.A. slightly more silty.
620 - 630	100% Claystone:	A.A.
630 - 640	100% Claystone:	A.A. less silt or fine sand.
640 - 650	100% Claystone:	A.A. very fine grained.
650 - 660	100% Claystone:	A.A.
660 - 670	100% Claystone:	A.A.

CORE NO. 2. 670 - 680 feet.

Sandstone:	Dark green to grey, silt size to medium grained quartz, sub-rounded and subangular. Grains poorly sorted, micaceous, brown to greenish yellow. Some hard lenses of white sandstone, the sand being as above.
	Porosity very low. Occasional very coarse grains or pebbles. The sandstone also contains many pebbles and boulders lower in the core. These pebbles range from coarse sand size to 12 inch boulders. The lithologies include quartz, quartzite, quartz mica schist, felspar, granite-gneiss, granite,

This is particularly noticeable in the felspars weathering to ?kaolin a white soft powdery clay.

Towards the base of the core the sandstone is grey and becomes more even grained with some coarse grains. Quartz subrounded, many grains polished, micaceous, trace of calcareous matrix, fairly porous.

680 - 690 100% Boulder Sandstone: The cuttings are predominantly calcareous sandstone (very fine grained) or calcareous siltstone, subrounded quartz clear to frosted and contains biotite. The matrix is calcareous. Others include, quartz, mica, gneiss and schist, granite, grey shale, and quartzite.

690 - 700 100% Boulder Sandstone: The lithologies are basically as above but mica gneiss dominates this sample.

700 - 707 100% Quarts mica gneiss or granite gneiss as above.

707 - 713 CORE No. 3 707-712'9" Rec 100% (8/8/69)

Granite gneiss: Consists of quartz, clear to white, felspar, pink to white and black biotite. Banding only very slight. There are fine calcite filled fractures throughout the core. Grain size varies from micro granite to pegmatite size. At the base of the core the granite gives way to dense hard mica schist.

Mica Schist: Dominantly brown to black mica (biotite) showing strong preferred orientation very fine grained size.

Minor quartz and felspar in occasional stringers with the same orientation as the mica.

Large trace of fine grained pyrite spread throughout.

CORE NO. 4 712'9" - 721'8" (8/8/69)

(Continues straight on from Core 3)

The mica schist continues A.A. ie. mica schist or gneiss (well banded). Next is a small band of hard mica schist. Mica includes brown black biotite and pale green to white ?chlorite, minor quartz is also present; all are fine grained.

Separated by a second fracture from the mica schist is a quartz mica gneiss which continues to the bottom of the core. It is an overall grey colour with white quartz and felspar and brown-black biotite. The Gneiss is well banded.

TOTAL DEPTH 712'8"

APPENDIX D

WALLIRA NO. 2

APPENDIX D

WALLIRA No. 2

SAMPLE DESCRIPTIONS

Depth (Feet)		
0 - 10	0 - 2	Surface soil red ferruginised quartz sand to fine soil.
	2 - 10	100% Calcareous gritty sandstone or conglomerate. The pebbles include dominantly a red, micro-fine grained, siltstone, quartz sand, subrounded, fine to coarse grained and yellow micro-fine siltstone or silcrete type pebble cuttings. The conglomerate is kunkarised or cemented with calcareous cement.
10 - 20		100% Calcareous gritty Sandstone: A.A. (2-10)
20 - 30		100% Gritty Sandstone: A.A. the pebbles being slightly larger and sand more ferruginised. Also more silcrete. The matrix is slightly clayey and only slightly calcareous.
30 - 40		50% Gritty Sandstone: A.A. 50% Sandstone: White kaolinitic quartz sand fine to coarse grained subrounded to subangular.
40 - 50		100% Sandstone: A.A. (kaolinitic)
50 - 60		100% Sandstone: White v. fine grained with occasional med. grained quartz grains (may be cavings). V. Kaolinitic (white clay). Trace of pink silty clay.
60 - 70		100% Sandstone: White v. fine grained A.A. almost a kaolinitic siltstone.
70 - 80		100% Sandstone: White fine-grained, subangular quartz; occasional iron stained grains and occasional coarse smokey quartz grains. Less kaolinitic cement but grains are bound together more strongly.
80 - 90		100% Sandstone: White, med. to coarse grained subangular, occ. sub-rounded clear quartz, some smokey and milky quartz. Only slightly kaolinitic.
90 - 100		100% Sandstone: White, fine grained A.A. (70-80)
100 - 110		100% Sandstone: White fine to med. grained with occasional coarse grains of quartz as in 80 - 90. Slightly kaolinitic.

110 - 120	100% Sandstone:	A.A. with occasional blue white milky quartz and smokey quartz.
120 - 130	100% Sandstone:	A.A. with more abundant smokey quartz giving it an off-white to grey colour.
130 - 140	100% Sandstone:	Grey quartz grains as above, with more smokey quartz and abundant stained quartz. Staining includes yellow clay, pink to red iron and purple to almost black surface stains. Slightly kaolinitic.
140 - 150	100% Sandstone:	Light grey, A.A.
150 - 160	100% Sandstone:	Light grey, A.A.
160 - 170	100% Sandstone:	Light grey A.A. with less clay and stained quartz.
170 - 180	100% Sandstone:	Grey, clayey fine to coarse grained subangular to subrounded, fair abundance of smokey quartz, occasional iron stained, poorly sorted.
180 - 190	100% Sandstone:	Grey A.A. perhaps coarser than 170 - 180.
190 - 195	100% Sandstone:	A.A.
195 - 200	100% Claystone:	Grey v. silty and sandy (sand probably cavings).
200 - 217	CORE No. 1 Mudstone or Claystone:	(14.8.69) Grey slightly silty (quartz). The quartz is very fine grained (.005mm) v. clayey and micaceous. The mica appears to be muscovite (light mica grain size 0.1 mm). The overall colour appears to be a dark sl. greenish grey when wet and light grey when dry. Plastic when wet, brittle when dry.
217 - 220	100% Claystone:	A.A. in core.
220 - 230	100% Claystone:	A.A. but contains abundant sand assumed to be cavings caused by the setting of the casing.
230 - 240	100% Claystone:	A.A. but less sand.
240 - 250	100% Claystone:	A.A. sandy med. subangular quartz cavings? Trace kaolinite.
250 - 260	100% Claystone:	A.A.
260 - 270	100% Claystone:	A.A. cavings almost all removed at this stage and sample is as for 217 - 220.
270 - 280	100% Claystone:	A.A. silty.
280 - 290	100% Claystone:	A.A. silty.
290 - 300	100% Claystone:	A.A. silty

300 - 310	100% Claystone:	A.A. silty, to fine sandy.
310 - 320	100% Claystone:	A.A. silty, to fine sandy.
320 - 330	100% Claystone:	A.A. silty.
330 - 340	100% Claystone:	A.A. v. fine grained silt and becoming slightly greener and harder; almost a shale.
340 - 350	100% Claystone:	A.A. (330 - 340).
350 - 360	100% Claystone:	A.A. (330 - 340)
360 - 370	100% Claystone:	A.A.
370 - 380	100% Claystone:	A.A.
380 - 390	100% Claystone:	A.A.
390 - 395	100% Claystone:	A.A.
395 - 411	CORE No. 2 Claystone or Shale:	Greenish grey when wet, pale grey when dry, very fine grained micro-micaceous; silty white pockets of quartz silt to fine sand, subrounded frosted (up to 0.1 mm). Core is homogeneous, v. low porosity. Mica appears to be muscovite, may be chlorite present as well. Occasional bands in the core are more clayey or shaley.
411 - 420	100% Clay Shale:	Greenish grey wet and pale grey when dry, A.A.
420 - 430	100% Clay Shale:	A.A. occasional cuttings present instead of the clay paste coming over the shaker.
430 - 440	100% Clay Shale:	A.A. shale becoming more compact and cuttings increasing.
440 - 450	100% Clay Shale:	A.A.
450 - 460	100% Clay Shale:	A.A.
460 - 470	100% Clay Shale:	A.A. with a band of calcareous shale about 1 foot thick at 462.
470 - 480	100% Clay Shale:	A.A. (450 - 460), cuttings of calcareous shale present are assumed to be cavings.
480 - 490	100% Clay Shale:	A.A.
490 - 500	100% Clay Shale:	A.A.
500 - 510	100% Clay Shale:	A.A.
510 - 520	100% Clay Shale:	A.A.
520 - 530	100% Clay Shale:	A.A.
530 - 540	100% Clay Shale:	A.A.
540 - 550	100% Clay Shale:	A.A.

560 - 570 100% Clay Shale: A.A.

570 - 580 50% Clay Shale: A.A.
50% Clay: Pale grey sandy, quartz silt to medium sand size grains, subrounded, includes also exotic pebbles such as shale, pyritic sandstone, felspar and ?granite.

580 - 590 100% Clay: Pale grey A.A.

590 - 600 100% Clay: Pale grey A.A.

600 - 610 100% Clay: Pale grey A.A. with quantity of sandy pebbles increasing.

610 - 620 100% Clay: Pale grey A.A.

620 - 630 100% Clay: Pale grey, gritty; both size and amount of gritty pebbles have increased.
Abundant pyrite aggregates in cutting form and spheroids.
Pebbles include dark grey shale, felspar, quartz sand v. fine to med. grained.

630 - 640 50% Clay and 50% Sand, A.A.

640 - 650 75% Sand and gritty pebbles.
25% Clay:
i.e. Now formation is a clayey pebble conglomerate or a pebble clay.
The exotic pebbles include the following:

(1) Quartz sandstone, friable; quartz well rounded and good sphericity, fine to medium grained, also abundant free quartz of the same nature.

(2) Quartz and Quartzite, milky subangular, med. to coarse grained.

(3) Pyritic siltstone, cuttings and spheroids.

(4) Granite, pink felspar, black biotite and clear quartz occurring as rounded pebbles and angular cuttings.

(5) Quartz mica gneiss and schist.

(6) Aplite.

(7) Green ?epidote pebbles.

(8) Honey quartz.

(9) Green ?igneous, ?volcanic rock.

(10) Brown siltstone.

(11) Grey siltstone.

(12) Grey shale.

650 - 660 Pebble conglomerate: Clayey A.A.

660 - 670 Pebble conglomerate: A.A.

670 - 680 Pebble conglomerate: A.A. pebbles range up to 1 cm.

680 - 690 Pebble conglomerate: A.A.

690 - 697 Pebble conglomerate: A.A.

697 - 701 CORE No. 3 Rec. (4') 100% (18.8.69)
BOULDER CONGLOMERATE

The core consists entirely of sand and boulders in a clay matrix; the grain size varies from silt size up to 6 inches (15 cms.). The composition of the pebbles and boulder include all those listed above, plus red quartz felspar porphyry pebbles.

The matrix consists of an off-white non-calcareous clay making porosity low. All grains and boulders appear to be sub-rounded to well rounded but the formation is poorly sorted.

701 - 710 Boulder Conglomerate, as in core 3.

710 - 720 Boulder Conglomerate: A.A.

720 - 730 Boulder Conglomerate: A.A.

730 - 740 Boulder Conglomerate: A.A.

739'7" CORE No. 4 and 5 739'7" - 754'3" $\frac{18}{19}$.8.1969

CORE No. 4 739'7" - 746'3" (Rec. 4'3")

CORE No. 5 746'3" - 754'3" (Rec. 2'1")

Core No. 4 Description 18.8.1969

The top 7 inches of core is a granite or granodiorite boulder with faint banding, the next 2 feet is boulder sandstone or conglomerate with many varied exotic pebbles and boulders (sub-rounded) as intersected in previous core.

The bottom section of core consists of a fairly uniform friable sandstone grain size fine to med. with occ. coarser grains. It is dominantly quartz and felspar subangular with abundant sand size pebbles (exotic), as intersected throughout this formation. Sand is quite clayey; non-porous.

Core No. 5 Description 19.8.1969

This core carried straight on from core No. 4 as a boulder jammed in the core barrel preventing further recovery. The core barrel was put straight back and coring continued in the boulder sandstone. This sandstone is the same as that in core 4 with two small bands of the fine grained sandstone intersected in the lower portion of core 4.

754'3" - 760 Boulder sandstone: A.A.

760 - 770 Boulder Sandstone: A.A. no apparent large boulders.

770 - 780 Boulder Sandstone: A.A.

780 - 790 Boulder Sandstone: A.A.

790 - 800 Boulder Sandstone: A.A.

800 - 810 Boulder Sandstone: A.A.

810 - 820 Boulder Sandstone: A.A.

820 - 828	Boulder Sandstone:	A.A. but entered large boulder at 828 feet. Penetration rate reduced greatly and core was taken in order to penetrate boulder.

828 - 832'5" CORE NO. 6 (Rec. 4'5") 20.8.1969

The first four inches is the lower portion of a dense boulder encountered just above the core (granite).

The next section is boulder sandstone with small shale bands near the bottom of the core.

A metamorphic rock boulder appears in the base of the core and measures approx. 8".

832 - 840	Boulder sandstone:	Grey fine to medium grained, occasional coarse sub-rounded grains of quartz and exotic igneous and metamorphic pebbles. Slightly clayey and abundant cuttings present assumed to be cuttings of boulders as observed in the core.
840 - 850	Boulder Sandstone:	A.A. clayey.
850 - 860	Boulder Sandstone:	A.A. but quartz mica gneiss dominates.
860 - 870	Boulder Sandstone:	A.A. (840 - 850). Abundant pyrite present.
870 - 880	Boulder Sandstone:	A.A. (840 - 850).
880 - 890	Boulder Sandstone:	A.A. (840 - 850)
890 - 900	Boulder Sandstone:	A.A. appears to be less cuttings and more sandy.
900 - 910	Sandstone:	Grey buff, coloured v. clayey, fine to coarse grained, sub-rounded to subangular, poorly sorted mixture of quartz, felspar and exotic sandy pebbles as above. No poroosity due to clay.
910 - 920	Sandstone:	A.A. buff but more clayey than above.
920 - 940	Sandstone:	A.A. grey.
940 - 950	Sandstone:	A.A. grey with occ. calcareous grains.
950 - 960	Sandstone:	A.A. grey.
960 - 970	Sandstone:	A.A., but less clayey.
970 - 980	Sandstone:	A.A. grey v. clayey and buff siltstone cuttings.
980 - 990	Sandstone:	Grey clayey A.A. (970 - 980)
990 - 1000	Sandstone:	Grey clayey A.A.
1000 - 1010	Sandstone:	Grey clayey A.A. almost a sandy clay. Mottled grey and black

1010 - 1020 Clay: Grey plastic A.A. with abundant sand grains A.A. plus occasional dolomite chippings.

1020 - 1030 Clay: Grey sandy with pinkish tinge, A.A. (1010-1020) (probably due to mud colour).

1030 - 1040 Clay: Grey and sandy A.A.

1040 - 1050 Clay: Grey, sandy A.A.

1050 - 1060 90% Clay: Grey sandy but sand becoming much finer and decreasing.
10% Dolomite: Pink chips present. Off-white to pink, v.fine grained and very hard. Slightly calcareous.

1060 - 1070 70% Clay: Grey A.A., with fine sand and abundant dolomite.
30% Dolomite: A.A., and this gives the pink colour to the otherwise grey clay.

1070 - 1080 70% Clay: Grey A.A. with med. sand A.A.
30% Dolomite: Pink to white, A.A.

1080 - 1090 90% Sandstone: (Greywacke?), sl.clayey. Complete mixture of igneous metamorphic and sedimentary sand grains and cuttings, possibly a boulder greywacke.

10% Dolomite: Pink* and white with greenish tinge A.A.

*the pink dolomite reacts with acid more quickly than the green white dolomite so may be an impure limestone.
Hard bars are present from 1087.

1090 - 1094 Drilling very slow. Igneous and metamorphic rock cuttings. Hard dense boulder greywacke A.A. clay was thought to be from above.

1094 - 1101 CORE No. 7

The top 1 ft. 5 inches is a boulder sandstone consisting of igneous and metamorphic boulders ranging from about 2" in diam. down to sand and silt size grains. It is well indurated and bound by silt and clay cement.

N.B. also colourless soft platey mineral with fibrous appearance.

From 1'5" to 2'5" the boulder sandstone grades into a grey pebbly siltstone or very fine calcareous sandstone well indurated, dense and hard and this sandstone is sitting directly on pink granite gneiss consisting of quartz, pink felspar (K.felspar) and black mica which is well orientated giving a fairly prominent banding.

The granite gneiss is continuous to the base of the core and shows consistently orientated banding across green chlorite? filled fractures.

T.D. 1101

APPENDIX E

CORE DESCRIPTIONS

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1
LOCATION 45 m. N.W. Mabel Creek
LAT. 28°35'58"S
LONG. 133°46'27"E
ELEVATION GR. 675 ft. DATUM
R.T. 678.5

CORE NO. 1
DEPTH 231 - 246
DATE DRILLED 16-5-69
RECOVERY 4.9 FT. 32.7 %
FORMATION MT. TOONDINA BEDS

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
231			231-236' SILTSTONE Coal and shale Interbedded siltstone grey to dk. grey, argillaceous finely carbonaceous, banded with small bands of white very fine quartz silt subangular. Also traces of pyrite aggregates and pyritic siltstone. The coal fragments appear to aid in cementing.
232		5	Siltstone Grey unlaminated, only slightly carbonaceous; quartz grains and clear, well polished, subangular and of uniform grain size. The siltstone is friable and cores badly. It also contains some pyrite bands up to ½ inch in width.
233		8	
234		2	Coal Dark grey to black, soft but cores well, contains abundant fiberous woody structures at breaks in the core.
			Shale grey carbonaceous, silty, abundantly micaceous; the mica acts as a binding material resulting in better core recovery.
235		1	236-246" (10 ft) No recovery
			No porosity
			No stain odour or Fluorescence
236		2	
237		7	
238		9	
239		9	
240		5	
241		3	

CORE BARREL. Mindrill
CORE BIT. Diamond
TIME START 10.0h. pm

LOGGED BY I.J. Townsend

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1

LOCATION 45m. NW Mabel Ck.

LAT. 28°35'58"S

LONG. 133°46'27"E

ELEVATION GR. 675' DATUM

R.T. 678.5'

CORE NO. 1

DEPTH 231-246

DATE DRILLED 16.5.69

RECOVERY 4.9 FT. 32.7 %

FORMATION MT. TOONDINA BEDS

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
241		7	
242		9	
243		9	No Recovery
244		12	
245		13	
246		17	No stain odour or fluorescence

CORE BARREL Mindrill.

CORE BIT Diamond

TIME START 10.04 p.m.

LOGGED BY I.J.TOWNSEND

DATE 17.5.69

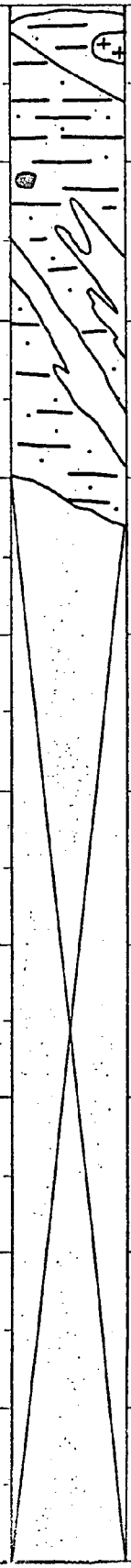
PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1
LOCATION 45m. N.W. Mabel Creek
LAT. 28° 35' 58"S
LONG. 133° 46' 27"
ELEVATION GR. 675 DATUM
R.T. 678.5

CORE NO. 2
DEPTH 1030-1040
DATE DRILLED 21/5/69
RECOVERY 3 FT. 30 %
FORMATION Lower Permian

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1030			1030'-1033' Claystone, grey (greenish grey when taken out of core barrel), compact, medium hard, becomes plastic when crushed and wetted. No bedding planes apparent. Breaks in irregular fragments with near conchoidal fractures.
1031		14	
			Numerous scattered fine to very fine quartz grains, rounded translucent, some frosted.
1032		21	At top of core one pebble of dark grey fine grained igneous rock is shown in section.
			In bottom half of core, several calcite filled fractures dipping about 50°.
1033		25	In top half of core: closed slickensided fracture dipping about 45°.
1034		25	
1035		20	Remark- Recovery was probably good but most of the core slipped out of core barrel when still in the hole.
1036		23	
1037		20	1033-1040 No Recovery
1038		22	No stain odour or fluorescence
1039		22	
1040		20	

CORE BARREL. Mindrill
CORE BIT. diamond
TIME-START 8.14. pm
FINISH 11.32 pm

LOGGED BY G.J.D., I.J.T.
DATE. 21/5/69.

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1
LOCATION 45 M N.W. of Mabel Ck
LAT. 28° 35' 58"S
LONG. 133° 46' 27"E
ELEVATION GR. 675
R.T. 678.5
DATUM

CORE NO. 3
DEPTH 1340-1344'8"
DATE DRILLED 25/5/69
RECOVERY 4'4" FT. 93 %
FORMATION Conglom., sandstone

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1340			1340-1344 Boulder Sandstone Igneous and metamorphic pebbles and boulders in an arkosic (quartz and felspar) coarse grained matrix Pebbles vary from 1½" diam. down to sand size, rounded (waterworn) and of varied composition. Mainly granite felspar and quartz with granite gneiss biotite gneiss, siltstones, and greenstone.
1341		15	
1342		15	1341.3-1342 Large granite boulder - coarse grained quartz, clear pink felspar (potassium felspar) and black mica showing very faint banding - ie. gneissic granite
1343		13	
1344		7	1344-1344.3 The lowermost part of the core has the appearance of a highly weathered felspar biotite schist. The felspar is almost entirely kaolinised and the mica appears to be altered to ?chlorite.
1344.4			1344.3-1344.7 No recovery No stain odour or fluorescence

CORE BARREL Mindrill
CORE BIT Diamond
TIME—START 630 am.
FINISH 8.20 pm

LOGGED BY I.J. Townsend
DATE 25/5/69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1

LOCATION 45 M. N.W. of Mabel Ck.

LAT. 28°35'58"

LONG. 133°46'27"

ELEVATION GR. 675 DATUM

R.T. 678.5

CORE NO. 4

DEPTH 1424-1440

DATE DRILLED 26/5/69

RECOVERY 44 FT. 27.5 %

FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1424			1424-1428.4 Sandstone grey homogeneous felspathic sandstone 95% quartz med. grained occasional coarse grains subrounded semi polished. 5%pebbles - these include a small % of felspar and igneous rock grains. There is very little matrix. Sandstone is very porous (and permeable). Matrix is calcareous and slightly kaolinitic. Sandstone is very friable and was completely invaded by the drilling mud, giving the core a brown appearance. Probably a grey or offwhite friable porous sandstone.
1425		3	
1426		2	
1427		4	
1428		4	1428.4 - 1440 No recovery
1429		4	
1430		5	
1431		6	No stain odour or Fluorecence
1432			
1433			
1434			

CORE BARREL Mindrill

CORE BIT Diamond

TIME—START 1.27 pm

LOGGED BY I.J. Townsend

DATE 26/5/69

PETROLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1
LOCATION 45 Mo N.W. of Mabel Ck
LAT. 28° 35' 58"
LONG. 133° 46' 27"
ELEVATION GR. 675. DATUM
R.T. 678.5

CORE NO. 4.
DEPTH 1424-1440
DATE DRILLED 26/5/69.
RECOVERY 44. FT. 27.5. %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1434			
1435			
1436			
1437			
1438			
1439			
1440			

CORE BARREL. Mindrill
CORE BIT. Diamond
TIME—START 1.27 pm

LOGGED BY I.J. Townsend
DATE 26/5/69.

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1
LOCATION 45 M. N.W. of Mabel Ck
LAT. 28°35'58"
LONG. 133°46'27"
ELEVATION GR. 675 DATUM
R.T. 678.5

CORE NO. 5
DEPTH 1553-1561
DATE DRILLED 28/5/69
RECOVERY 7.7 FT. 96.25 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1553			1553-1560.7 Granite Boulders and Sandstone Sandstone v.f.gr. with some c.grns. pale grn. subang. fair sorting qtz. dom., subdom. felsp wh. and tan. rare coarser grns. of igneous rocks med. hd. semi friable little matrix. Clay v.sl. dol. Tce. biotite
1554		14	Bedding fair with approx. 10° dip parallel to upper surface of granite boulder (drape)
1555		26	Some stringers of medium grained sandstone
1556		33	Granite boulder biotite granite, tan to pink fine and even grained with wh. & tan. felspars, fresh with band of coarse granite between 1557.7 and 1578 feet. Massive with rare hair joints. Joint at top of boulder healed by calcite and (?) chlorite.
1557		34	
1558		43	
1559		40	
1569		57	Sandstone fine gr. w/some c. grains v. pale grn. less sorted matrix, silty and clayey more friable otherwise as above.
1561			NOT RECOVERED

CORE BARREL Mindrill
CORE BIT. Diamond
TIME—START 2.30 pm

LOGGED BY H.W. I.J.T.
DATE 29/5/69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1
LOCATION 45 m N.W. Mabel Ck.
LAT. 28°35'58"
LONG 133°46'27"
ELEVATION GR. 675 DATUM
R.T. 678.5

CORE NO. 6
DEPTH 1563-1579
DATE DRILLED 29/5/69
RECOVERY 15.3 FT. 95.6 %
FORMATION Basement

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1563			GRANITE Continuous granite core varying gradually in grain size from a fine to medium grained granite to a coarse grained granite.
1564		21	The granite has an obvious slight gneissic nature and numerous fractures or fissures healed by calcite (see 1564–1565)
1565		29	At 1571.3 there is a ½ inch band of pale green sandstone fine grained low porosity homogeneous
1566		27	This is assumed to be a sand filled fissure in a granite wash type horizon sitting on basement.
1567		32	
1568		30	
1569		31	
1570		38	
1571		47	
1572		50	
1573		55	

CORE BARREL Mindrill
CORE BIT Diamond

LOGGED BY I.J. Townsend

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL KARKARO NO. 1

LOCATION M. N.W. Mabel Creek.

LAT. 28° 35' 58"

LONG. 133° 46' 27"

ELEVATION GR. 675 DATUM

R.T. 678.5

CORE NO. 6

DEPTH 1563-1579

DATE DRILLED 29/5/69

RECOVERY 15.3 FT. 95.6 %

FORMATION Basement

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1573		53	
1574		44	
1575		40	
1576		48	
1577		45	
1578		57	
1579		83	Not recovered
T.D.			

CORE BARREL. Mindrill

CORE BIT. Diamond

TIME—START 1.55 am

LOGGED BY I.J. Townsend

DATE 29/5/69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL MOUNT FURNER NO.1
LOCATION 4 MILES N. EVELYN DOWNS
LAT. 28°6'15"
LONG. 134°28'00"
ELEVATION GR. 613 DATUM
R.T. 616.5'

CORE NO. 1
DEPTH 440 - 455
DATE DRILLED 7.6.69
RECOVERY 14.3 FT. 95.3 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
440			440-441.8 Coal. Dark brownish grey to black. Abundant woody fragments. Brittle when dry.
441		13	
		16	441.8-443.2 Shale, black carbonaceous with abundant plant fragments. Slightly micaceous with lenticles of silt, massive, medium hard.
442			
443		19	
444		13	443.2-454.3 Siltstone to very fine grained sandstone. Pale greenish grey, mainly quartz subangular to angular, slightly micaceous, trace felspar. Weak trace biotite, fair sorting but with abundant clayey (kaolinitic) cement. Bedding ill-defined to massive. Porosity 2-3% soft friable.
445		11	
446		11	
447		13	
448		11	
449		13	No stains odour or fluorescence
450		12	

CORE BARREL. MINDRILL
CORE BIT. DIAMOND
TIME—START 3.05 pm
FINISH 5.10 pm

LOGGED BY I.J.T., H.W.
DATE. 8.6.69

PETROLEUM GEOLOGY SECTION

DRG. 9

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . MOUNT FURNER NO.1 . . . .
LOCATION 4 MILES N., EVELYN DOWNS
LAT. 28°6'15" . . . . . .
LONG. 134°28'100' . . . . . .
ELEVATION GR. 613 . . DATUM . . .
R.T. 616.5 .

CORE NO. 1 . . . . .
DEPTH 440-455 . . . .
DATE DRILLED . 7.6.69 . . .
RECOVERY 14.3 . . FT. 95.3 . . %
FORMATION . LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
450			
451		10	
452		10	
453		9	
454		15	NO RECOVERY
455		9	

CORE BARREL . MINDRILL . .
CORE BIT . DIAMOND . . .
TIME—START . 3.05. p.m.

LOGGED BY I.J.T., H.W.
DATE 8.6.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL MOUNT FURNER NO. 1
LOCATION 4 MILES N., EVELYN DOWNS
LAT. 28°6'15"
LONG. 134°28'00"
ELEVATION GR. 613 DATUM
R.T. 616.5

CORE NO. 2
DEPTH 990-1005
DATE DRILLED 12.6.69
RECOVERY Nil. FT. 0. %
FORMATION LOWER PERMIAN.

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
990			
991		4	
992		2	
993		3	
994		2	
995		2	No recovery. Friable sandstone as seen in cuttings.
996		3	
997		2	
998		5	
999		6	
1000		5	
1001		4	
1002		6	
1003		7	
1004		7	
1005		6	

CORE BARREL. MINDRILL
CORE BIT. DIAMOND
TIME—START 2.46 PM
FINISH 3.50 PM

LOGGED BY G. J. DEMAISON
DATE. 13.6.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL MOUNT FURNER NO.1
LOCATION 4 MILES N. EVELYN DOWNS
LAT. 28°6'15"
LONG. 134°28'00"
ELEVATION GR. 613 DATUM
R.T. 616.5

CORE NO. 3
DEPTH 1714-1726
DATE DRILLED 14.6.69
RECOVERY 10.5 FT. 82 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1714		0	1714-1719 Claystone greenish-grey, splinters in all directions, conchoidal fractures. Scarce scattered well rounded frosted quartz grains throughout. Very scarce scattered pyrite. Small highly irregular little lenses of white siltstone. Contact with siltstones very irregular, wavy can dip to 40°.
1715		24	
1716		43	
1717		27	
1718		38	
1719		34	1719-1720 Siltstone, white with very thin irregular green clay streaks. Evidence of intraformational slumping.
1720		27	1720-1724 Sandstone, quartzose, well rounded, medium grain size about 1 mm. Matrix is a white argillaceous silt. Exotics ranging from 5 mm. to 50 mm: (microgranite, mica schist, gneiss, brown shale). Pyritic. Porosity (visual) mediocre to nil. No stain, odour or fluorescence. Salty taste.
1721		11	
1722		3	
1723		8	
1724		7	

CORE BARREL MINDRILL
CORE BIT DIAMOND
TIME—START 12.33

LOGGED BY G.J. DEMAISON
DATE 15.6.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL MOUNT FURNER NO. 1
LOCATION 4 MILES N. EVELYN DOWNS
LAT. 28°6'15"
LONG. 134°28'00"
ELEVATION GR. 613
R.T. 6.6.5
DATUM

CORE NO. 3
DEPTH 1714-1726
DATE DRILLED 14.6.69
RECOVERY 10.5 FT. 82 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1724		7	1724-1724.5 Greenish grey claystone as between 1714 and 1719. Lost part of core is presumably bottom section.
1724.5			
1725		15	
1726		35	

CORE BARREL, MINDRILL
CORE BIT, DIAMOND
TIME—START 12.33
FINISH 5.15

LOGGED BY G.J. DEMAISON
DATE 15.6.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL MOUNT FURNER NO. 1
LOCATION 4 MILES N. EVELYN DOWNS
LAT. 28°6'15"
LONG. 134°28'00"
ELEVATION GR. 613 DATUM
R.T. 615.5

CORE NO. 4
DEPTH 1805'4" 1821
DATE DRILLED 16.6.69
RECOVERY 15'7" FT. 1000 %
FORMATION BASEMENT

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1805		0	
		0	1805.3-1821
			Metamorphic rock.
			Banded gneiss.
1806		15	Mineralogical composition: essentially orthose feldspar and biotite mica.
1807		23	
1808		23	
1809		21	
1810		24	
1811		23	
1812		26	
1813		25	
1814		26	
1815		25	

CORE BARREL. MINDRILL
CORE BIT. DIAMOND
TIME—START 8.17 am
FINISH 2.57 pm

LOGGED BY G.J. DEMAISON
DATE. 17.6.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . MOUNT FURNER NO. 1

LOCATION 4. MILES N. EVELYN DOWNS

LAT. 28°6'15"

LONG. 134°28'00"

ELEVATION GR. 613 DATUM

R.T. 615.5

CORE NO. 4

DEPTH 1805'4" 1821

DATE DRILLED 16.6.69

RECOVERY 15'7" FT. 1000 %

FORMATION

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1815		25	
1816		26	
1817		26	
1818		28	
1819		29	Subvertical filled fracture between 1819-1820
1820		28	
1821		32	

CORE BARREL . MINDRILL.

CORE BIT . DIAMOND

TIME—START . 8.17 a.m.

FINISH . 2.57 pm.

LOGGED BY G.J. DEMAISON

DATE. 17.6.69

PETROLEUM GEOLOGY SECTION

DRG. S

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO.1.
LOCATION 40 MILES S.W. MABEL CREEK
LAT. 29° 27' 03.S.
LONG. 134° 04' 31" E
ELEVATION GR. 492 DATUM
R.T. 495.

CORE NO. 1
DEPTH 192 - 207
DATE DRILLED 4.8.69.
RECOVERY 13. FT. 87.6 %
FORMATION LOWER PERMIAN
MT. TOONDINA BEDS

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
192			192-205
193		13	Mudstone. grey to dark grey extremely fine grained, only very slightly calcareous, slightly carbonaceous (very fine black specks scattered sparsely through the grey mudstone), finely micaceous. It also contains blebs of pyrite up to ¼" in size. Visual porosity nil. The mudstone contains interbeds of white very fine grained siltstone, quartzose subrounded fair sorting.
194		10	
195		10	
196		7	
197		7	
198		9	
199		4	
200		2	
201		3	
202		7	

CORE BARREL MINDRILL
CORE BIT DIAMOND.
TIME—START 8.53 am.
FINISH 10.50 am

LOGGED BY I.J.TOWNSEND
DATE 4.8.69.

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO.1

LOCATION 40 MILES S.W. MABEL CREEK

LAT. 29° 27' 03.S

LONG. 134° 04' 31" E.

ELEVATION GR. 492 DATUM

R.T. 495

CORE NO. 1.

DEPTH 192 - 207

DATE DRILLED 4.8.69.

RECOVERY 13. FT. 87.6. %

FORMATION LOWER PERMIAN
MT. TOONDINA BEDS

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
202			
203		9	
204		8	
205		10	
206		10	205 - 207 Not Recovered.
207		8	

CORE BARREL. MINDRILL

CORE BIT. DIAMOND

TIME—START 8.53 am

LOGGED BY I.J. TOWNSEND

DATE. 4/8/69.

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. I
LOCATION 40 MILES S.W. MABEL CREEK
LAT. 29° 27' 03" S
LONG. 134° 04' 31" E
ELEVATION GR. 492 DATUM
R.T. 495.5

CORE NO. 2
DEPTH 670-680
DATE DRILLED 7.8.69
RECOVERY 9.2 FT. 92 %
FORMATION LOWER PERMAIN OR UNIT 2

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
670			670-679.2
671		5	Sandstone. Dark green to grey silt size to med-grained quartz subrounded and subangular, poorly sorted, micaceous; some hard lenses of white sandstone. Porosity very low.
672		6	The sandstone contains very coarse pebbles ranging up to 12 inch boulders in the core (from 5" on) and the pebble lithologics are many and varied ie quartz, felspar, granite, gneiss, schist. A number appear to be highly weathered, the felspars resulting in kaolin, a white, soft, powdery clay.
673		14	Towards the base of the core the sand becomes grey and more even grained with a slightly calcareous matrix.
674		21	
675		12	
676		13	
677		6	
678		7	
679		6	
680		5	No Recovery

CORE BARREL. Mindrill
CORE BIT. Diamond
TIME—START 6.34 am
FINISH

LOGGED BY I.J. Townsend
DATE. 7.8.69.

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. I
LOCATION 40 miles S.W. Mabel Creek
LAT. 29° 27' 03" S.
LONG. 134° 04' 31" E
ELEVATION GR. 492 DATUM
R.T. 495.5

CORE NO. 3
DEPTH 707 - 712.75
DATE DRILLED 8.8.69
RECOVERY 5.75 FT. 100 %
FORMATION Basement

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
707			707 - 711.5
			GRANITE GNEISS - This consists of quartz clear to white, felspar pink to white and black biotite. The banding is only very slight. There are fine calcite filled fractures throughout the core. The grain size varies from micro granite to pegmatite size and at the base of the core the granite gives way to dense hard mica schist. Dark green to grey, dominantly biotite. Minor quartz and felspar in occasional stringers with same orientation as the mica.
708			Fine grained pyrite spread throughout.
709			
710			
711			
712			
712'9"			
713		65	

CORE BARREL Mindrill
CORE BIT Diamond
TIME—START 11.58 pm
FINISH 5.15 pm

LOGGED BY I.J. Townsend
DATE 8.8.69

PETROLEUM GEOLOGY SECTION

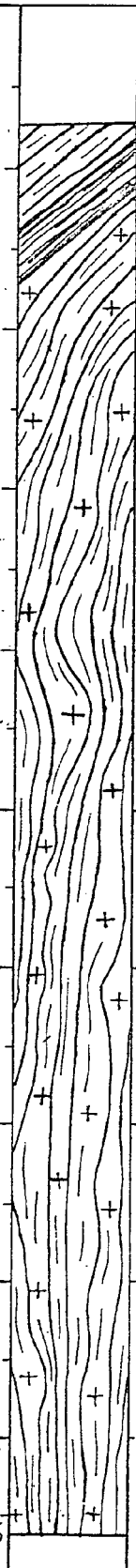
DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. I
LOCATION 40 Miles S.W. MABEL CREEK
LAT. 29° 27' 03" S
LONG. 134° 04' 31" E
ELEVATION GR. 492 DATUM
R.T. 495.5

CORE NO. 4
DEPTH 712.75 – 721.6
DATE DRILLED 8.8.69
RECOVERY 8.8 FT. 100 %
FORMATION Basement

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
712			
713		90	
714		34	
715		41	
716		39	
717		50	
718		41	
719		39	
720		36	
721		25	
.6			



712.75 – 713
Mica schist as in base of previous core.

713 – 713.2 Mica schist a small band of steeply dipping greenish hard biotite and chlorite schist.

713.2 – 721.6
Quartz felspar biotite gneiss
(Granodiorite gneiss)

The quartz and felspar are white and the mica is brown to black with strong separation and preferred orientation.

The prominant banding is dipping steeply in the top of the core and vertical in the base.

CORE BARREL. Mindrill
CORE BIT. Diamond
TIME—START 8.35 am
FINISH 3.10 pm

LOGGED BY I. J. TOWNSEND
DATE. 8.8.69.

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . WALLIRA. NO.2. . . . . .
LOCATION 40m. S.W. MABEL CREEK .
LAT. 29°20'26"S. . . . . .
LONG. 133°49'42"E. . . . . .
ELEVATION GR. . 548 . . DATUM . . .
R.T. . 551.5 .

CORE NO. . . 1 . . . .
DEPTH . 200-217 . . .
DATE DRILLED . 14.8.69 . .
RECOVERY 6'7" (6.6) FT. 38.8 . . %
FORMATION MT. TOONDINA BEDS

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
200			200-206.6
			MUDSTONE OR CLAYSTONE
201		10	Grey, slightly silty quartzose. The quartz is very fine grained (.005 m.m.) very clayey and micaceous.
202		9	The mica appears to be muscovite, a light mica, grain size .01 m.m.
203		9	The overall colour of the claystone is a dark grey (slightly greenish) and plastic when wet; pale grey and brittle when dry. Porosity nil.
204		9	
205		8	
206		7	
207		7	
			206.6 - 217
208		13	No recovery.
209		10	No stain odour or fluorscence
		5	

CORE BARREL . MINDRILL . .
CORE BIT . . DIAMOND . . .
TIME—START . 2.43 p.m. .
FINISH . 4.45 p.m. .

LOGGED BY
I.J. TOWNSEND .
DATE. 14.8.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. 2
LOCATION 40m. S.W. MABEL CREEK
LAT. 29°20'26"S.
LONG. 133°49'42"E.
ELEVATION GR. 548 DATUM
R.T. 551.5

CORE NO. 1
DEPTH 200-217
DATE DRILLED 14.8.69
RECOVERY 6'7"(6.6)FT. 38.8 %
FORMATION MT. TOONDINA BEDS

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
210		5	
211		6	
212		6	
213		5	
214		3	
215		4	
216		4	
217		7	

CORE BARREL. MINDRILL
CORE BIT. DIAMOND
TIME—START. 2.43 p.m.
FINISH 4.45 p.m.

LOGGED BY I.J. TOWNSEND
DATE. 14.8.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. 2
LOCATION 40m. S.W. MABEL CREEK
LAT. 29°20'26"S.
LONG. 133°49'42"E.
ELEVATION GR. 548. DATUM
R.T. 551.5

CORE NO. 2
DEPTH 395-411
DATE DRILLED 16.8.69
RECOVERY 11.1 FT. 59.4 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
395			
396		18	
397		14	
398		16	
399		14	
400		13	
401		15	
402		15	
403		25	
404		12	
405		14	

395 - 406.1

CLAYSTONE

Greenish grey (wet); pale grey when dry, very fine grained, micro micaceous, silty. White pockets of quartz silt to very fine sand, subrounded and frosted. (.01mm.). The mica appears to be muscovite and possibly minor chlorite. Occasional bands in the core are more clayey.

CORE BARREL. MINDRILL
CORE BIT. DIAMOND
TIME START 11.00 a.m.
FINISH 3.15 p.m.

LOGGED BY I.J. TOWNSEND
DATE 16.8.69

PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . WALLIRA NO 2
LOCATION 40 m S.W. MABEL CREEK
LAT. 29°20'26"S
LONG. 133°49'42"E
ELEVATION GR. 548 DATUM
R.T. 551.5

CORE NO. 2
DEPTH 395 - 411
DATE DRILLED 16-8-69
RECOVERY 11.1 FT. 59.4 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
406		15	
407		13	406.1- 411
408		15	No Recovery
409		15	
410		16	
411		25	No stain odour or Fluorescence

CORE BARREL . MINDRILL
CORE BIT . DIAMOND
TIME—START . 11.0. a.m.
FINISH . 3.15. p.m.

LOGGED BY I.J. TOWNSEND
DATE . 16.8.69

PETROLEUM GEOLOGY SECTION

DRG. 0

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . WALLIRA NO. 2
LOCATION 40 M S.W. MABEL CREEK
LAT. 29°20'26"S
LONG. 133°49'42"E
ELEVATION GR. 548 DATUM
R.T. 551.5

CORE NO. 3
DEPTH 697 - 701
DATE DRILLED 17-8-69
RECOVERY 3.6' FT. 90 %
FORMATION LOWERMOST PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
697			697 - 700.5
			BOULDER CONCLOMERATE (Diamictite)
698		20	The core consists entirely of sand and boulders in a clay matrix. The grain size varies from silt size up to 6 inches and composition of the grains is greatly varied. This includes igneous metamorphic and sedimentary pebbles all of which appear to be subrounded. The conglomerate has little to no porosity.
699		26	
700		46	
701		57	700.5 - 701
			No Recovery.
			No stain odour or fluorescence.

CORE BARREL . MINDRILL
CORE BIT . DIAMOND
TIME—START . 9.18 a.m.
FINISH . 11.47 a.m.

LOGGED BY
I.J.TOWNSEND
DATE. 17.8.69

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 1 DRG. S

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA No. 2
LOCATION 40 M S.W. MABEL CREEK
LAT. 29°20'26"S.
LONG. 133°49'42"E
ELEVATION GR. 548 DATUM
R.T. 551.5

CORE NO. 4
DEPTH 739'7" - 746'3"
DATE DRILLED 17-8-69
RECOVERY 4'5" FT. %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
739			
739'7"	+ + +	0	TOP
740	+ +	13	
741		10	
742		15	
743		2	
744		5	
745		19	
746		11	
746'3"		15	

739.6 - 740.2

GRANODIORITE GNEISS (boulder)

Quartz plagioclase and biotite; coarse grained only faintly banded.

740.2 - 742.1

BOULDER CONGLOMERATE

As in previous core.

742.1 - 743.8

SANDSTONE Grey, brown uniform friable sandstone consisting of quartz and felspar. Fine to med. grained with occasional coarse grains subangular. Also it contains a number of exotic grains as mentioned in core 3 and sample descriptions. The Sandstone is quite clayey and hence non porous.

743.8 0 746.25

No Recovery.

No stain odour or fluorscence

CORE BARREL MINDRILL
CORE BIT DIAMOND
TIME—START 8.55 p.m.
FINISH 10.25 p.m

LOGGED BY I.J.TOWNSEND
DATE 18.8.69

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 1 DRG. NO. S

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. 2
LOCATION 40 M. S.W. MABLE CREEK
LAT. 29°20'26"S
LONG. 133°49'42"E
ELEVATION GR. 548 DATUM
R.T. 551.5

CORE NO. 5
DEPTH 746'3" - 754'3"
DATE DRILLED 20-8-69
RECOVERY 2.1 FT. 26.3 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
746			
746'3"		0	Bottom of core 4 and top of core 5.
			746.25 - 748.35
747		10	Boulder conglomerate and sandstone, friable, as for core 4 and assume friability is the reason for poor recovery.
748		12	
749		15	748.35' - 354.25'
			No Recovery.
750		16	
751		15	
752		15	
753		13	
754		22	
754'3"		27	

CORE BARREL MINDRILL
CORE BIT DIAMOND
TIME—START 1.58 a.m.
FINISH 4.15 a.m.

LOGGED BY I.J.TOWNSEND
DATE 20-8-69

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 1 DRG. NO. S

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL WALLIRA NO. 2
LOCATION 40 M S.W. MABLE CREEK
LAT. 29°20'26"S
LONG. 133°49'42"E
ELEVATION GR. 548 DATUM
R.T. 551.5

CORE NO. 6
DEPTH 828 - 832.5
DATE DRILLED 20-3-69
RECOVERY 4.5 FT. 100 %
FORMATION LOWER PERMIAN

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
828			828 - 828.4 .
			GRANITE BOULDER
829		45	828.4 - 831.8
			Boulder CONGLOMERATE
			As in previous cores.
830		34	
831		15	
832		15	831.8 - 832.5
832.5		5	GRANITE BOULDER

CORE BARREL. MINDRILL
CORE BIT. DIAMOND
TIME—START 3.48 a.m.
FINISH 5.32 p.m.

LOGGED BY I.J.TOWNSEND
DATE. 20-8-69

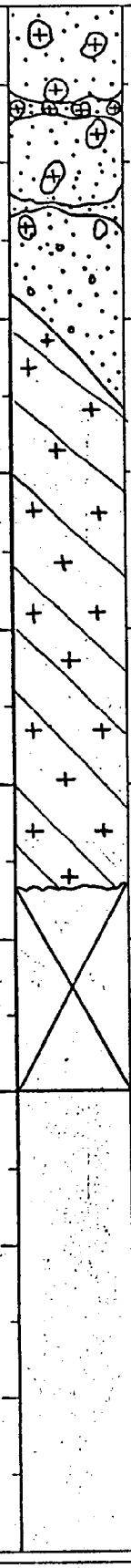
PETROLEUM GEOLOGY SECTION

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CORE DESCRIPTION

WELL . WALLIRA No. 2 .
LOCATION 40 m. S.W. MABLE CREEK .
LAT. 29°20'26"S .
LONG. 133°49'42"E .
ELEVATION GR. 548 . DATUM .
R.T. 551.5 .

CORE NO. 7 (FINAL CORE)
DEPTH . 1094 - 1101 .
DATE DRILLED . 23-8-69 .
RECOVERY 5'8" . FT. 81.4 . %
FORMATION LOWER PERMIAN AND BASEMENT

DEPTH IN FEET	GRAPHIC LOG	DRILL TIME MINS	DESCRIPTION
1094			1094 - 1095.3
			Boulder sandstone friable, subrounded pebbles of varied composition, and size with a clay matrix.
1095		26	1095.3 - 1096
			Buff Pebbly Siltstone or fine sandstone. Very hard, angular grains, has appearance of a tillite.
1096		38	
			UNCONFORMITY - irregular surface
1097		58	1096 - 1099.7
			Granite Gneiss - red brown consists of pink felspar black mica and clear quartz, the mica (?biotite) shows a preferred orientation.
1098		58	
1099		42	
1100		90	1099.7 - 1101
			Not Recovered - It is assumed however that the portion lost was from the upper sandstone of the core and not from the granite gneiss.

CORE BARREL MINDRILL
CORE BIT . DIAMOND
TIME—START . 624 p.m.
FINISH . 11.30 p.m.

LOGGED BY I.J.TOWNSEND
DATE. 23-8-69

PETROLEUM GEOLOGY SECTION

SHEET 1 OF 1 | DRG. S

APPENDIX F (1)

(1) PETROGRAPHY OF UNIT 2, AND BASEMENT ROCKS OF THE FOUR STRATIGRAPHIC WELLS IN THE ARCKARINGA BASIN

Nine samples were selected from the four wells and sent to the Australian Mineral Development Laboratories, Conyngham Street, Frewville, South Australia for petrographic description and these were carried out and reported by P.J. Simpson.

The T.S. numbers are thin sections reference numbers given by Amdel and the slides are stored in the Amdel library. "P" numbers are Mines Department reference numbers.

INTRODUCTION

The rocks examined from Karkaro No. 1 and Mt. Furner No. 1 (P251/69 - P/253/69) are similar in that they all contain more than 60% of reddened potassium felspar, about 20% quartz and minor amounts of plagioclase. Accessory minerals are zircon, biotite and opaques. All have igneous textures P253/69 is characterized by late stage, coarse grained muscovite. It is probable that these rocks are variants of one granite type.

The two sediments in this suite, P254/69 and P258/69 from Wallira No. 1 and No. 2 respectively are similar in that they are essentially carbonate cemented arenites which contain large fragments of basement rocks, in particular quartz-felspar-biotite gneiss. Red volcanic fragments were not observed from Wallira No. 1 but these fragments are relatively abundant in Wallira No. 2. (Four rocks from this well are described in Amdel Report MP 1135-70). The similarity of these red fragments to material from the Gawler Range Volcanics if reiterated.

P257/69, a porphyritic microgranite from Wallira No.2 has affinities with the Gawler Range Volcanics. Field evidence suggests that this is a block in sediments. The similarity of mineral proportions in this rock to the granitic rocks P251/69 - P253/69 and the red colouration of the potassium felspars in all rocks possibly suggests a similar origin for the granites and microgranites.

The basement rocks are high grade regional metamorphic rocks, one P259/69 has been metamorphosed to granulite grade and subsequently altered (?retrogressive metamopphism) while the others (P253/69, P255/69, P256/69) are probably amphibolite grade being feldspar-quartz-biotite-(garnet) gneisses.

1. Location:
   Karkaro No. 1 Well. Core 5. 1560 feet. Basement and Unit 2.

Sample: P251/69 HW 179: TS 23696

Rock Name:
Biotite granite with quartzite

Hand Specimen:

Granitic rock has reddened felspar, greyish quartz and white plagioclase intergrown in a equigranular mosaic. Biotite is scattered through the rock. The sediment is a silty sandstone with siliceous framework set in a brown clay. Occasional larger fragments of granite are observed. The contact between the two rock types appears to be an erosional one.

Thin Section

An optical estimate of the constituents gives the following:

Biotite granite	%	Quartzite	%
Microcline	75	Quartz	80
Quartz	20	Clay	10
Plagioclase	5	Plagioclase	Trace
Biotite	1	K-Felspar	Trace
Opaques	Trace	Garnet	Trace
Zircon	Trace	Opaques	Trace
		Biotite	Trace
		Metamorphic fragments	Trace
		Chert	Trace
		Granitic fragments	1

Biotite Granite:

The rock is composed mainly of an equigranular intergrowth of quartz and potassium felspar with minor amounts of plagioclase and biotite. Grain size is about 1 to 1.5 mm.

Quartz if fresh and clear with smooth grain boundaries and undulose extinction. The grains have few inclusions. These, where present, are felspathic. Grain boundaries are emphasized by clay minerals and fractures in grains by linings of micaceous products.

K-felspar is a microcline perthite of the patch type. The distinctive twinning of microcline is not well developed and seldom covers whole grains. Inclusions are quartz, mica, opaques and zircon. Alteration is mainly confined to areas close to grain boundaries or fractures and the dominant alteration product is fine, dusty clay.

Plagioclase is highly saussuritized and determination of composition by twin extinction methods and refractive index were not possible. The mineral has a high 2V and is either optically positive or negative, this indicates that it is oligoclase. The grains are anhedral and only small patches of relict twinning remain. Patches of sympletic intergrowth (myrmekite) or plagioclase and quartz occur at the junctions of these minerals.

Biotite is pleochroic from straw coloured to dark brown and is in many cases altered to chlorite and clinozoisite. Opaques are oriented on the biotite cleavage in some grains and are themselves partly altered to goethite. Alteration of plagioclase is deuteric and alteration of K-feldspar, biotite and opaques is probably a weathering phenomenon.

Quartzite:

The framework grains are subangular to subrounded with a maximum size of approximately 0.6 mm for simple grains. Mineralogically complex grains are larger, to about 4mm. Laminations are produced by size sorting, however, there is no evidence of rythmic layering or graded bedding. Scour and fill structures are observed. One fragment resembles the biotite granite described above, this fragment is angular and about 4mm across.

The sediment is dominated by quartz grains which are moderately to loosely dispersed in a clay matrix. Quartz grains have undulose to uniform extinction and while some may be derived from the biotite granite, others, particularly those with uniform extinction, are not.

Both plagioclase and microcline perthite are present, both are strongly weathered. These may be derived from the basement rocks, it is noted that their proportions are significantly different to those found in the biotite granite. The small amount of detrital biotite is similar, in its alteration to chlorite, to the biotite in the granite.

The metamorphic rock fragments are composed of quartz and oriented biotite, these fragments are of a size comparable to that of the quartz.

A few rounded grains of chert are observed, this indicates a third provenance.

The contact between granite and quartzite is marked by a fine line of clay (approximately 0.01 mm thick). The basement rock is not noticeably more weathered nearer the contact than several centimetres from it. Many small depressions in the granite contain fine grained variants of quartzite and this contact is thought to be erosional phenomenon. Relatively fast moving water prior to and during sediment deposition would explain the clear surface of the granite and the relatively coarse grain size of the sediment. The scour and fill structures noted in the sediment also indicate relatively fast currents.

2. Location:

Karkaro No. 1 Well. Core 5. 1577 feet 8 inches. Basement.

Sample: P252/69 HW 180: TS 23697

Rock Name:

Biotite granite

Hand Specimen:

An equigranular mosaic of reddened K-felspar, grey quartz and white plagioclase with biotite disseminated throughout. The rock is massive with a grain size of about 1 to 2 mm.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Microcline perthite	70
Quartz	20
Plagioclase	10
Biotite	1-2
Opaques	Trace
Zircon	Trace
Replaced ferromagnesian	Trace

The rock is equigranular with a grain size of up to 2.5 mm but mostly about 1mm. Quartz, K-felspar and plagioclase are intergrown to form an interlocking allotriomorphic mosaic with dispersed biotite and accessory minerals.

Quartz forms clear anhedral grains in which the extinction varies from undulose to nearly uniform. (The latter is predominant.) It has inclusions of the felspar and of biotite.

K-felspar is the most abundant mineral, it forms anhedral grains which have a pinkish tinge due possibly to clay mineral formation. This is most marked on fractures and at grain boundaries. The perthite is a ribbon type predominantly, however, some patch type is observed. Carlsbad twins occur in some grains while others have microcline cross hatching Most grains are untwinned. Inclusions are quartz, plagioclase and biotite.

Plagioclase is highly saussauritized and is now composed dominantly of sericitic micas. In a few cases relict twins on the albite rule remain. Optically this mineral is negative with a high 2V, this indicates an abiteoligoclase composition. (The higher calcium labradorite-andesine was discounted because the characteristic yellow birefringence colours of high calcium is indicated for P251/69, a similar rock.) A few small patches of a symplectic intergrowth of quartz and plagioclase (myrmekite) are observed at the junctions of these minerals.

Biotite is pleochroic from orange to green. It has inclusions of opaques and many flakes are partly or wholly converted to green chlorite (identified by its anomalous interference tints). The opaque inclusions are retained on alteration.

There are accessory amounts of a prismatic mineral, possibly an amphibole, which is largely replaced by an emerald green, slightly pleochroic amphibole. Opaque grains are most abundant in the vicinity of these replaced grains and are themselves partly converted to geothite.

Much of the alteration in this rock is deuteric, but K-felspar alteration may be due to weathering.

3. Location:

Mt. Furner No. 1 Well. Total Depth. Basement.

Sample: P253/69 Hw 181: TS23698

Rock Name:

Leucogranite with quartz-biotite-garnet-gneiss

Hand Specimen:

The rock consists of coarse grained pink to red K-felspar intergrown with greyish coloured quartz. The rock is massive. It is adjoined by a dark grey siliceous rock containing abundant biotite and patches of red garnet. This rock is foliated in a direction almost parallel to the core angle.

Thin Section:

An optical estimate of the constituents gives the following:

Leucogranite	%	Gneiss	%
Microcline perthite	77	Quartz	60
Quartz	20	Biotite	25
Muscovite	3	Garnet	15
Biotite	Trace	Muscovite	1 - 2
Plagioclase	Trace - 1	Carbonate	Trace
Zircon	Trace		

Leucogranite:

This consists of a coarse grained quartz and microcline perthite intergrowth. Some grains are over 5 mm but most are approximately 2mm. The rock is allotriomorphic.

Perthite is coarse, it is observable under low magnification and is a ribbon type. Twinning on the albite rule is noted in the plagioclase lamellae. This mineral forms about 2% of the grains. Carlsbad twins are observed in several grains but microcline cross hatchuring is the dominant type of twinning.

Quartz has undulose to uniform extinction, it encloses some perthite grains and adopts interstitial positions.

Plagioclase grains are significantly smaller than perthite (being less than 0.5 mm) they are saussuritized and rimmed by K-feldspar.

Only a few small flakes of chloritized biotite were observed. Opaques are rare. The most abundant mica is coarse grained (up to 2-3 mm) muscovite which partly enclosed perthite and quartzite grains. Other small flakes form aggregates which fill fissures in the rock. Muscovite penetrates into both quartz and perthite and is thought to be a late stage mineral.

Quartz-biotite-garnet gneiss:

This rock consists of very coarse grained quartz with strings and clumps of biotite and muscovite and porphyroblastic garnet. Inclusions of the leucogranite are readily distinguished by their perthite content, and their finer grain size.

Quartz boundaries in the gneiss are sutured, the grains are approximately equant and contain thin plates of similarly oriented biotite.

The garnets are large (over 2 cm) and have a pink colouration plane polarized light. Fractures in this mineral are filled with carbonate.

Biotite which is pleochroic from straw coloured to brownish green forms plates which are well terminated and fresh with few inclusions, mainly apatite. It is intergrown with

and apparently stable with clear plates of muscovite. The plates of mica reached about 2.5 mm. Biotite is also stable with garnet.

This is a regional metamoprhic rock of the upper greenschist facies. Contact relationships suggest that the granite intrudes the basement gneiss. There is little change in the gneiss as a result of this invasion. It is not known whether this sample represents true basement or if this is a xenolith of the basement.

4. Location:

Wallira No. 1 Well. Cor 2. 673 feet 6 inches. Unit 2

Sample P254/69 HW 182: TS 23699

Rock Name:

Conglomeratic quartz greywacke

Hank Specimen:

The rock consists of fine grained grey clay with siliceous, sand sized particles and large (several centimetres) rock fragments. Some fragments are rounded while others are angular. The rock is not laminated.

Thin Section:

Proportions are not given as the rock is inhomogeneous, and the slide examined is not representative of the whole rock.

The main rock type consists of quartz, plagioclase and rock fragments set in a matrix of carbonate, mica and quartz. The framework is loosely dispersed and poorly sorted.

Framework quartz grains are mainly single crystals and are well rounded but very variable in size ranging from 1.5 mm to a few microns. Some are aggregates of quartz with sutured boundaries. The extinction in the grains is undulose to uniform.

Felspar grains include both plagioclase and microcline, they are of a similar size to quartz and are fresh. They are uncommon.

Metamorphic rock fragments consist of fine grained streaky quartz with varying proportions of muscovite and biotite. The overall size of the grains is significantly larger than most monomineralic grains. The grain boundaries of some are diffuse being intergrown with the carbonate matrix, but most are sharp and rounded to subangular.

One large fragment contains porphyroblasts of perthite (ribbon type) and plagioclase (oligoclase) set in streaky, sutured quartz. A little white mica is present as well as a few flakes of chloritized biotite. Opaques are rare. The fragment has sharp, straight boundaries but carbonate from the matrix has invaded it along fractures and some internal grain boundaries. It is very similar to P255/70 HW 183.

The carbonate matrix is fine grained and composed of interlocking grains.

The poor sorting and advanced abrasion of the fragments indicate relatively strong current. Most fine particles have been removed and a chemically precipitated carbonate cement may indicate warm shallow water.

5. Location:

Wallira No.1 Well. Core 3. 707 feet 4 inches.Basement.

Sample: P255/69 HW 183: TS 23700

Rock Name:

Felspar-quartz-biotite gneiss (deformed and partially recrystallized granite)

Hand Specimen:

Large rounded grains of white quartz and pink and white felspar up to 1 cm long are set in a fine grained grey groundmass. The rock is veined by carbonate. A weak foliation is produced by parallelism of biotite.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Perthite	40
Quartz	40
Plagioclase	15
Biotite	2
Muscovite	1
Carbonate	1
Opaques	Trace

The rock texture can be ascribed to a metamorphic (gneissic) or deformation (cataclastic) origin. It consists of porphyroclasts of perthite and plagioclase set in a streaky groundmass of sutured quartz.

Plagioclase is saussuritized, less than 3 mm across and forms anhedral grains. The composition is oligoclase and albite law twins are well developed with pericline twins rarely developed. The crystal boundaries are highly irregular.

Perthite is a ribbon type and microcline cross hatch twins occur in some grains. Alteration of the K-felspar laminae is slight but advanced in the plagioclase laminae. Grain boundaries are highly irregular and the grains have inclusions of quartz. Grains are of a similar size to plagioclase.

Quartz grains are elongated and are dimensionally oriented around the felspar porphyroblasts. In many cases the boundary between quartz and felspar is marked by a few microns of heavily altered felspar. The quartz grain boundaries are complexly sutured and the extinction of individual grains is undulose.

The micas are weakly foliated and have grown in the plane of the quartz orientation. Most biotite is partly chloritized. A secondary biotite has a greenish tint and is nucleated on an older brown biotite. Muscovite forms clear plates of a size comparable to biotite (less than 0.5 mm).

Carbonate forms veins approximately 1 mm diameter which parallel the foliation of quartz elongation and mica orientation.

This rock is situated twelve (12) feet above a gneissic rock which shows no sign of deformation. Sample P255/69 could be related to the gneiss.

This rock has not experienced regional metamorphism of a sufficient grade to produce perthites (i.e. granulite grades) and the perthite is considered to have an igneous

6. Location:

Wallira No.1 Well. Core 4. 719 feet. Basement.

Sample: P256/69 HW 184: TS 23701

Rock Name:

Felspar-quartz-biotite gneiss

Hand Specimen:

A dark grey, fine grained foliated rock composed of quartz, felspar and biotite. A surface oblique to the foliation has green ?biotite grown on it and is possibly slickensided.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Plagioclase	45
Quartz	35
Biotite	15
K-felspar	5
Apatite	Trace
Opaques	Trace

The rock has a marked foliation caused by the parallelism of biotite. The rest of the rock is composed of equant plagioclase intergrown with quartz and, in particular bands, with K-felspar. The core to foliation angle is approximately 25-30°.

K-felspar is concentrated in bands parallel to biotite orientation, it is saussuritized but some grains have relict microcline twins.

Plagioclase composition is andesine, it is well twinned on the albite law with some minor pericline twins erratically developed. Inclusions are quartz, biotite and idioblastic apatite as well as secondary white, sericitic micas. The plagioclase grains are subidioblastic to xenoblastic and many are equant and approximately 0.5 mm.

Quartz forms clear xenoblastic grains in which the grain boundaries are highly irregular, internal ones are sutured, and the extinction is highly undulose. The grains are smaller than plagioclase, approximately 0.3 mm.

Biotite is pleochroic in straw coloured to brown and has inclusions of opaques, zircon, sphene and apatite, although none of these are particularly abundant. The flakes are broad and in places are intergrown with fibrous carbonate. Carbonate veins are parallel to biotite foliation.

The rock corresponding to the ?slickensides observed in hand specimen has a significantly smaller grain size, biotite is less coloured, possibly due to leaching and chloritization and felspar grain boundaries are irregular. The quartz in this area appears to have recrystallized.

Regional metamorphism of moderately high grade (possibly amphibolite facies) is required to account for the high calcium content (andesine) of the plagioclase. The parental material may be ofintermediate igneous or sedimentary origin.

7. Location:

Wallira No. 2 Well. Core 3. 698 feet. Boulder of Unit 2.

Sample P257/69 HW 185: TS 23702

Rock Name:

Porphyritic microgranite

Hand Specimen:

This rock has pink felspar, white felspar and greyish quartz phenocrysts to about 5 mm set in a fine grained red-brown groundmass. The rock is not foliated.

Thin Section:

An optical estimate of the constituents gives the following:

Phenocrysts	%	Groundmass	%
Plagioclase	55	K-felspar	55
Perthite	30	Quartz	40
Quartz	10	Ferromagnesians	3
Ferromagnesians	5	Plagioclase	2
Opaques	Trace	Opaques	Trace

Phenocrysts from about 35% of the rock and are euhedral to subhedral, variable in size to over 5 mm and are set in a fine grained equigranular groundmass of quartz and felspar.

Plagioclase phenocrysts are euhedral and slightly corroded at their margins with the groundmass. They are well twinned on the albite law with a weaker seldom developed pericline set. The composition is oligoclase; potassium felspar and chlorite inclusions in some grains are controlled by twin and cleavage directions of plagioclase.

Perthite grains are a patch type but they appear to be exsolution type rather than replacement. There are some plagioclase inclusions which do not appear to be products of exsolution. The embayments in square cross section quartz are filled by groundmall material.

Chlorite is the major ferromagnesian mineral, it appears to replace other ferromagnesians, for example biotite but other areas are irregular or round in shape and enclose groundmass grains, particularly quartz.

The groundmass is dominated by quartz and red tinted K-felspar in an equigranular intergrowth. Plagioclase is not abundant and forms small laths. Groundmass grain size is approximately 0.50 mm.

There is no evidence for a tuffaceous origin and this rock could be either volcanic or hyperbyssal. Field evidence is that this is a block in sediments. In many features, particularly in the red colouration of potassium felspars and mineralogically it is similar to the igneous rocks of Karkaro No. 1 Well. Mineralogically and texturally it resembles examples of the Gawler Range Volcanics. It is suggested that this block could be derived from this petrographic province.

8. Location:

Wallira No. 2 Well. Core 4. 740 feet 5 inches. Unit 2.

Sample: P258/69 HW 186: TS 23703

Rock Name:

Conglomeratic quartz greywacke

Hand Specimen:

The rock is a sand sized sediment with mainly siliceous fragments in a light brown to grey matrix. Some very large (several centimetres) siliceous and metamorphic rock fragments occur as well as red volcanic ones. The latter are rounded whilst the former tend to be angular.

Thin Section:

Proportions are not given as the rock is clearly inhomogeneous and the slides examined are not representative of the whole rock.

Large (several centimetres) fragments which are polymineralic are supported in a matrix of smaller fragments (some but not all monomineralic) which are in turn supported in a clay and dolomite matrix.

The smaller grains are generally less than 0.8 mm in diameter and are well rounded but poorly sorted. They are dominated by quartz but small amounts of plagioclase, microcline, garnet, garnet and chlorite occur. They are moderately dispersed and poorly size sorted in a matrix dominated by fine grained clay but with small patches of fine grained, possibly authigenic dolomite. In places opaque minerals act as a cement.

Some of the larger fragments are composed of altered plagioclase and K-felspar intergrown with quartz, a little zircon and a bright emerald green ferromagnesian mineral. The grains are well rounded and resemble the igneous rocks of Karkaro No. 1 Well (P251/69, P252/69). One fragment resembles the porphyritic microgranite (P257/69).

Other fragments have a metamorphic aspect, some are composed of quartz, felspar biotite and opaques in which foliation, usually marked by biotite ranges from strong to weak. These are rather similar to P255/69, P256/69 (felspar-quartz-biotite gneiss). One large fragment has porphyroblasts of plagioclase (oligoclase-andesine) and quartz set in a cataclastically deformed groundmass of streaky quartz with similarly oriented biotite. This fragment has strong affinities to P255/69 both texturally and mineralogically.

The framework components of this rock come from various sources, however, there is evidence that the metamorphic fragments are similar to the basement rocks of other holes (particularly Wallira No. 1) and that the igneous fragments have affinities with the Gawler Range Volcanic province.

There is no trace of gypsum located further down Wallira No. 2 Well and reported in Amdel Report MP 1135/70. The sedimentary environment for this rock appears to have been one of high energy.

9. Location:

Wallira No. 2 Well. Core 7. 1098 feet 6 inches. Basement.

Sample: P259/69 HW 187: TS 23704

Rock Name:

Altered pyroxene granulite

Hand Specimen:

This is a fine grained, pink to grey siliceous rock with prominant bands of dark silicates.

Thin Section:

An opticaly estimate of the constituents gives the following:

	%
K-feldspar	40
Quartz	30
Plagioclase	20
Replaced pyroxene	10
Biotite	1
Opaques	Trace

The rock is composed of an equant polygonal mosaic of granoblastic quartz and feldspar with bands of biotite and replaced pyroxene. Grain size is approximately 1 mm or less. Feldspar grains are equant and some quartz is slightly elongated paralled to the ferromagnesian bands. Grain boundaries are smooth.

Albite law twins are well developed in plagioclase and there is a second, weaker pericline set. Both sets are tapered. The composition of plagioclase is oligoclase.

Perthite structure of K-feldspar is visible under low magnification and it is rod to bead type, and appears to be an exsolution type. Bands rich in perthite are parallel to mafic bands.

The mafic bands now consist of chlorite and carbonate pseudomorphing pyroxene. Biotite appears to have been stable with pyroxene and it is stable with pyroxene alteration products. It is strongly pleochroic from almost colourless to orange-brown. The opaque minerals are located in the mafic bands.

Other alteration is slight, being confined to light sericitization of the felspars.

The granoblastic texture, the tendency for elongation (or ribboning) of quartz, the perthitic nature of K-felspar and the former presence of pyroxene all indicate a high grade regional metamoprhic (granulite grade) origin for this rock.

Alteration of pyroxene is a retrogressive effect and could be accomplished under low grade regional metamorphic conditions or as a result of metasomatic alteration.

APPENDIX F

(2) PETROGRAPHY AND CLAY MINERALOGY OF 4 ROCKS FROM WALLIRA NO. 2

APPENDIX F

(2) PETROGRAPHY AND CLAY MINERALOGY OF 4 ROCKS FROM WALLIRA No. 2

1. INTRODUCTION

These four rocks have rather similar mineralogy. All are characterized by having red volcanic fragments similar to volcanics found in the Gawler Ranges. Another consistent source rock is high grade metamoprhic terrain. At least some is believed to be of the almandine subfacies of the amphibolite facies in grade. The occurrence of chert may indicate sedimentary terrains and the abundance of relatively coarse quartz (coarser than in any rock fragments) indicates possible igneous terrains as well.

The major variables are in grain size and in cement or matrix content; both these are deposition characteristics. Two rocks have gypsum cements (P 283/69 and P284/69). Gypsum usually indicates hypersaline conditions. Another variable is the clay mineralogy; in two of the three available analyses (P 282/69 and P 283/69) illite is of minor importance to montmorillonite and kaolin. However, in P285/69 illite exceeds kaolin. The presence of illite may indicate semi-arid weathering whereas kaolin indicates intense weathering and removal of potassium.

Post consolidational metamorphism of these rocks is not obvious.

Terminology and significance of clay mineralogy are adapted from Folk, R.L., (1965) Petrology of Sedimentary Rocks. Hemphill's, Austin, Texas.

2. CLAY MINERALOGY

2.1 Treatment

Portion of each sample was ground to pass a 100 mesh sieve, dispersed in water and allowed to sediment for separation of the clay fraction. Part of the resulting clay suspension was centrifuged to yield material for an X-ray diffraction photograph and part was oriented on a ceramic plate for study on the X-ray diffractometer.

2.2 Results

All four samples yielded only very small amounts of clay material; in fact P284/69 gave no useable amounts of clay and no results can be given for it.

P282/69 Clays present are kaolin (well crystallised) and montmorillonite, with a small trace only of illite (illite/kaolinite = .04 approximately). Non-clays found were quartz and siderite,

283/69 Clays present are montmorillonite and kaolin (ordinary disordered type), with a little illite (illite/kaolin = 0.1). Quartz was the only non-clay mineral found.

P284/69 No clay fraction found (q.v.).

P285/69 Clays found were montmorillonite, illite and kaolin (illite/kaolin =1.3). The non-clays were quartz, dolomite and siderite.

3. DETAILED PETROGRAPHY

Sample: P282/69 H.W. 181: TS 23759

Location:

Wallira No. 2. Core 5. 746.5 feet.

Rock Name:

Quartzose volcanic greywacke.

Hand Specimen:

This is a friable, sand sized sediment without laminations. Red fragments are conspicuous. Sorting and rounding are apparently moderate.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Framework:	
Quartz	55
Rock fragments	35
Plagioclase	5
Matrix:	5

The rock has a moderately compacted framework which is composed of quartz, plagioclase and rock fragments, moderately sorted and rounded set in a matrix of fine clay and subordinate calcite. There are no laminations. The grainsize averages about 0.4 mm but the range is from 0.8 to 0.08 mm.

Monomineralic grains are slightly smaller than polymineralic ones. Those composed only of quartz are of two kinds; firstly single crystals, in these extinction varies from undulose to uniform and the grains are subangular to subrounded. Secondly, polygranular aggregates of quartz; in these grain boundaries are sutured, the grains are subrounded and are probably of metamorphic derivation.

The most abundant, and most conspicuous rock fragments are those tinted red. These are composed of fine grained feldspathic intergrowths, some have quartz phenocrysts. Others are composed of a symplectic intergrowth of quartz and reddened felspar. Secondary growth of chlorite (pleochroic from pale green to emerald green with anomalous purple interference tints)

is thought to have occurred before these fragments were incorporated into this sediment as this mineral does not transect grain boundaries. The mineralogy and colouration of these volcanic fragments is similar to these features of the Gawler Range Volcanics.

Metamorphic terrains are indicated by many composite grains as well as the quartz grains mentioned above. Intergrowths of quartz, feldspar, biotite and white mica, in which the micas have a preferred orientation and quartz is elongated and sutured are the most abundant. Garnet in some of these fragments indicates the almandine subfacies of the amphibolite facies as the grade of metamorphism. Microcline, quartz and plagioclase intergrowths also indicate high grade metamoprhic or igneous terrains.

Heavy minerals include zircon.

Plagioclase felspars are mainly altered to clays or sericitic micas, the composition of these grains is variable.

Coarse chert or fine metaquartzite fragments form a minor component, they are detrital.

The matrix is dominantly fine grained yellowish clay with locally important calcite. The latter is fine grained but in some cases small rhombs are distinguishable.

There is no evidence in this rock of major in situ growth of any mineral phase other than calcite. No overgrowths were observed on the framework grains and there is no evidence of the clay matrix being recrystallized into coarser micas.

The presence of kaolin and montmorillonite as the dominant clays also suggest that the rock is substantially unmetamorphosed.

The source rocks include volcanic, metamorphic and igneous varieties.

The rock is mineralogically immature, that is it contains a high proportion of rock fragments; texturally it is border line immature-submature as it has about 5% clay matrix and moderate sorting and rounding.

Sample: P283/69 H.W. 198: TS 23760

Location:

Wallira No. 2, Core 6, 831.3 feet.

Rock Name:

Quartzose, volcanic greywacke

Hand Specimen:

This is an indurated, sand sized sediment, light grey in colour with conspicuous red fragments. The framework grains are moderately rounded and sorted. No laminations are noted in the bulk of the rock except for one siltstone layer.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Framework:	
Quartz	60
Rock fragments	40
Felspar	5
Matrix	
Clay	3
Carbonate	2

The framework grains of this rock are moderately well size sorted, subangular to subrounded and loosely compacted with a matrix of clay and carbonate. There are no laminations. Average grain size is about 0.5 mm although some grains exceed 1 mm.

The most abundant framework grains are quartz, these tend to have irregular shapes and are mainly subangular. Extinction is in many cases uniform but some have undulose extinction. A few grains consist of equant subgrains sutured together but more commonly the subgrains are irregular in shape. Chert fragments are generally angular and are not abundant. Their high colour may be due to goethite or tourmaline mixed in with the quartz.

Plagioclase framework grains are altered and there are a few microcline grains. The felspars are most abundant in composite grains, consisting of an intergrowth of felspars with quartz. Many of these grains have metamorphic textures - some have similarly oriented micas and others have sutured quartz. A few scattered garnets indicate high grade regional metamorphic terrains.

The most abundant rock fragment consists of a fine grained feldspathic groundmass with some small quartz phenocrysts and acicular felspar phenocrysts. These are coloured red and are similar to the volcanics in the Gawler Range area. Some have chlorite as a secondary product.

The matrix consists of fine grained yellow coloured clay with carbonate. This carbonate does not stain for calcite and its rhombic shape suggests that it is dolomite. As much of the matrix stains for calcium it is probable that calcite or gypsum is present in submicroscopic particles mixed with clay. In part of the rock gypsum forms the cement, enveloping several grains in a single crystal. An opaque mineral forms a conspicuous cement in one part of the slide in an area 1.5 by 1.0 mm in extent.

This rock is very similar to P282/69 with some slight differences. The most important one is the decline in abundance of metamorphic rock fragments, this indicates a slight change in provenance. Fragments possibly from the Gawler Range Volcanics dominate the rock fragment suite.

Again no metamoprhism is indicated in this sediment, however, more complicated diagenetic processes are indicated.

Firstly carbonate is relatively more abundant in this rock. This may mean that the rock was deposited under slightly different conditions, particularly non precipitation of clay and gypsum is present in small quantities. The mineralogical maturity of both rocks is similar and no violent changes in transportation, source area climate and depositional characteristics are envisaged. Precipitation of gypsum is

Sample: P284/69 H.W.190: TS 23761

Location:

Wallira No. 2, Core 7, 1095 feet.

Rock Name:

Conglomerate

Hand Specimen:

Large (to several centimetres) pebbles of siliceous material, red volcanic fragments and other fragments are in part cemented by quartz and in part by clay.

Thin Section:

Proportions are not given as the slide is not representative of the whole rock.

The framework grains are poorly sorted and well rounded. Mineralogically they are immature, consisting primarily of rock fragments, although a few of the smaller fragments (less than 0.5 mm) are monomineralic quartz.

The cement consists of some small areas of clay but carbonate, both dolomite and calcite, and gypsum are most abundant. The cement content varies but is overall about 15-20% being dominantly gypsum. The sediment as a whole is loosely compacted.

The most conspicuous fragments are those coloured red. They consist of phenocrysts of quartz and felspars set in a fine grained felspathic groundmass. These are similar to the volcanics from the Gawler Ranges.

Intergrowths of quartz, felspar and biotite are possibly igneous but a few have preferred orientation of mica and suturing the elongation of quartz which indicate a metamorphic origin. The presence of some garnet as a heavy mineral, smaller than most pebbles emphasizes the metamorphic (high grade regional) terrain.

The gypsum cement stains lightly for calcium and it is polysynthetically twinned. Clacite, fine grained aggregates and also a few rhombs absorbs the stain to a greater degree than gypsum. Dolomite rhombs do not stain. Calcite and dolomite are wrapped in gypsum which also envelops the framework grains.

A similar provenance to P282/69 and P283/69 is envisaged for this rock. They all have the red volcanic fragments possibly derived from the Gawler Range Volcanics, in this example chlorite is not observed. High grade metamorphic terrains are common to all three rocks.

Different depositional environments are indicated by the coarseness of this sediment. However, the hypersaline conditions pointed to in P283/69 are well illustrated in this rock.

Sample: P285/69 H.W.191: TS 23762

Location:

Wallira No. 2 Core 7. 1096 feet.

Rock Name:

Arenaceous dolomite

Hand Specimen:

A sand sized sediment light grey in colour with some larger quartz, red volcanic fragments and shaly fragments set in a clay matrix. Framework grains are rounded and poorly sorted.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Framework:	
Quartz	30
Rock fragments	25
felspar	5
Cement:	
Dolomite)	40
Clay)	

The framework grains vary in size from over 10 mm to 0.06 mm, the larger grains tend to have complex mineralogy while the smaller grains (generally less than 0.4 mm) are monomineralic. There are no laminations, the grains are subangular to subrounded, some larger ones are well rounded, and sorting is poor. The matrix consists of fine grained carbonate, probably dolomite as it does not stain.

Only one or two fragments with affinities with the Gawler Range Volcanics are noted in this rock. Most of the rock fragments are either polygonal quartz aggregates of quartz, felspar biotite intergrowths with textures probably produced by metamorphism. Single crystal quartz grains have extinction types which range from uniform to undulose.

The carbonate is in places coarsely crystalline and is in places nucleated on the framework grains. A similar provance is implied for this rock as for other rocks from this hole. The major variable in this suite is apparently depositional characteristics.

APPENDIX G

TECHNICAL DATA

APPENDIX G

TECHNICAL DATA

DRILLING OPERATOR

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

Drilling Rig

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

Mast

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

Pumps 2

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

Hole Sizes and Casing Details

Casing size	5" OD	
Weight	10 lbs/ft.	
Grade	Water bore (Stewart & Lloid	
Guide shoe	none	
Centralisers	non used	
Rise of cement) Method used)	KARKARO No. 1 and MT. FURNER No. 1	To surface displacement
Method used)	Wallira Wells	Cemented between conductor pipe and casing near surface only for removal of casing on completion

Drilling Fluids

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

Fishing Operations

No fishing operations were required in any of the 4 wells.

Plugs — No plugs were set in Karkaro No. 1, Wallira No. 1 or Wallira No. 2. See Mt. Furner Well history for details on plugs and testing.

Testing — The Algebuckina Sandstone in Mt. Furner No. 1 well was tested for water production (see Well History). No testing was conducted on the other three wells.

Sampling — Samples were collected over ten ft. intervals from surface to total depth for each well. These samples were examined and described with the aid of a binocular microscope and appropriate samples examined under ultra violet light for traces of hydrocarbons. No hydrocarbons were detected.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

COMPOSITE WELL LOG

SOUTH AUSTRALIAN DEPARTMENT OF MINES

KARKARO No. 1.

STATE: SOUTH AUSTRALIA.

PETROLEUM TENEMENT: Out of Lease Areas

4 MILE SHEET: Murloocoppie

BASIN: Arckaringa

WELL STATUS: Plugged and Abandoned.

LOCATION: Lat. 28°35′58″S
Long. 133°46′27″E

ELEVATION: G.R. 675
R.T. 678·5

DATE SPUDDED: 15 May 1969
DATE DRILLING STOPPED: 1 June 1969
DATE RIG RELEASED: 3 June 1969
TOTAL DEPTH: 1579 FT

HOLE SIZE:

INCHES	FROM	TO
6¾	0	270
4½	270	1579

CASING:

INCHES	DEPTH	CEMENTED TO
5	266	Surface

CEMENT PLUGS: At bottom of 5″ casing.

TYPE OF LOG	16. IN. NORMAL	64. IN. NORMAL	6 FT. LATERAL	S.P.	NEUTRON	GAMMA RAY
DATE OF RUN	1 June '69	31 May '69	31 May '69	31 May '69	31 May '69	31 May '69
FIRST READING	1580	1580	1580	1580	1580	1580
LAST READING	268	268	268	268	5	3
INTERVAL MEASURED	1312	1575	1312	1312	1575	1577
CASING-LOGGER	268	268	268	268	268	268
CASING-DRILLER	266	266	266	266	266	266
DEPTH REACHED	1580	1580	1580	1580	1580	1580
BOTTOM-DRILLER	1579	1579	1579	1579	1579	1579
MUD TYPE	Water base	Water base	Water base	Water base	Water base	Water base
DENSITY/ VISCOSITY	9·5/45	9·5/45	9·5/45	9·5/45	9·5/45	9·5/45
Ph/ FLUID LOSS	10/4·5	10/4·5	10/4·5	10/4·5	10/4·5	10/4·5
MUD RESISTIVITY	2·2 at 64°F	2·2 at 64°F	2·2 at 64°F	2·2 at 64°F	2·2 at 64°F	2·2 at 64°F
RECORDED BY	B.P. Taylor	B. P. Taylor	B.P. Taylor	B.P. Taylor	B.P. Taylor	B. P. Taylor
WITNESSED BY	H. Wopfner	H. Wopfner	H. Wopfner	H. Wopfner	H. Wopfner	H. Wopfner

OTHER SURVEYS:

TYPE	FROM	TO
Temp. Log	Surface	1580′

LITHOLOGICAL REFERENCE

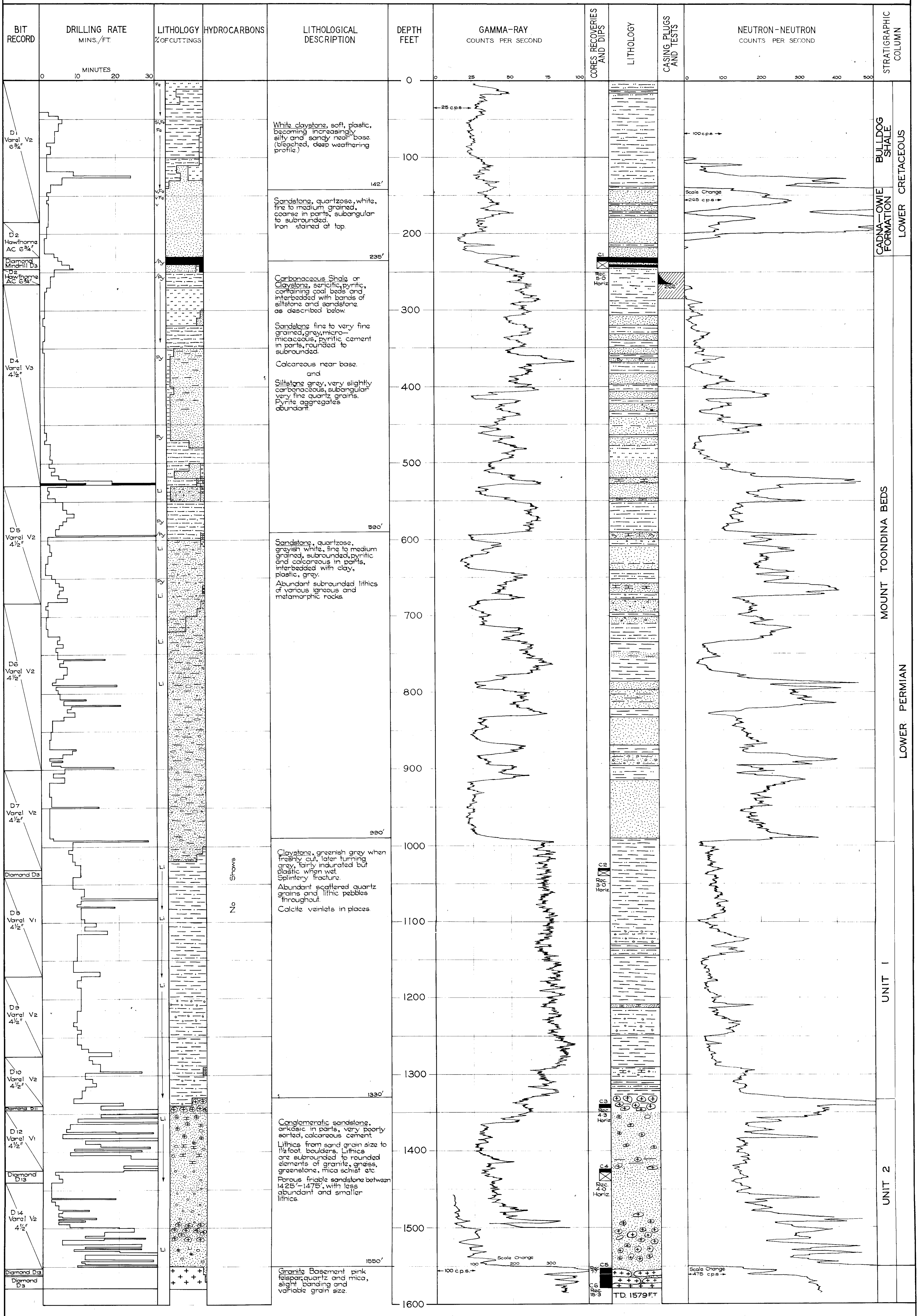
- Shale claystone
- Sandy shale
- Silty shale
- Siltstone
- Argillaceous siltstone
- Sandy siltstone
- Limestone
- Dolomite
- Coal
- Granite
- Sandstone
- Granule
- Pebble
- Li — Lithic
- Anhydrite
- Py — Pyrite
- v — Micaceous
- Carbonaceous
- Fe — Ferruginous
- k — Kaolinitic
- Gl — Glauconitic
- G — Garnet
- Calcareous
- Dolomitic
- Oolitic
- F — Fossiliferous Fragmental or Indeterminate
- f — Feldspathic
- Gy — Gypsum, Gypsiferous

WELL SYMBOLS

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

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

LITHOLOGY BY: I.J. Townsend, G. Demaison, H. Wopfner.
COMPILED BY: I.J. Townsend.
DRAFTED BY: A. McDonald.
DRAWING NUMBER: L69-63



DEPARTMENT OF MINES — SOUTH AUSTRALIA
KARKARO No. 1.
COMPOSITE WELL LOG

PETROLEUM SECTION	GEOLOGIST	DRN. I.J.T.	SCALE: 1 INCH = 50 FEET.
		TCD. A.McD	L69-63 Bo
	SEN. GEOLOGIST	CKD. B.S.G.	
		EXD.	DATE: 3 Dec. '69

DEPARTMENT OF MINES — SOUTH AUSTRALIA

MT. FURNER No. I.
COMPOSITE WELL LOG

PETROLEUM SECTION	GEOLOGIST	DRN. I.J.T.	SCALE: 1 INCH = 50 FEET
		TCD. A.McD	L69-64 Ba
		CKD. L.V.W.	
	SEN. GEOLOGIST	EXD	DATE: 11 Dec. '69

COMPOSITE WELL LOG

SOUTH AUSTRALIAN DEPARTMENT OF MINES

MT. FURNER No. I.

STATE: SOUTH AUSTRALIA.   PETROLEUM TENEMENT: Out of Lease Areas   4 MILE SHEET: Murloocoppie   BASIN: Arckaringa.

WELL STATUS: Plugged and Abandoned

LOCATION: Lat. 28° 6' 15" S
Long. 134° 28' 00" E

ELEVATION: G.R. 613
R.T. 616·5

DATE SPUDDED: June 6 1969
DATE DRILLING STOPPED: June 17 1969
DATE RIG RELEASED: June 19 1969
TOTAL DEPTH: 1821 FT.

HOLE SIZE:

INCHES	FROM	TO
6¾	0	455
4½	455	1821

CASING:

INCHES	DEPTH	CEMENTED TO
5	452	Surface

CEMENT PLUGS: Cemented at bottom of 5" casing.

TYPE OF LOG	16. IN. NORMAL	64 IN. NORMAL	6 FT. LATERAL	S.P.	NEUTRON	GAMMA RAY
DATE OF RUN	18 June '69	18 June '69	18 June '69	18 June '69	18 June '69	18 June '69
FIRST READING	1805	1809	1809	1803	1820	1820
LAST READING	450	450	450	450	5	5
INTERVAL MEASURED	1355	1359	1359	1353	1815	1815
CASING-LOGGER	450	450	450	450	450	450
CASING-DRILLER	453	453	453	453	453	453
DEPTH REACHED	1805	1809	1809	1803	1820	1820
BOTTOM-DRILLER	1821	1821	1821	1821	1821	1821
MUD TYPE	Water base	Water base	Water base	Water base	Water base	Water base
DENSITY/ VISCOSITY	9·5/45	9·5/45	9·5/45	9·5/45	9·5/45	9·5/45
Ph/ FLUID LOSS	10/4·5	10/4·5	10/4·5	10/4·5	10/4·5	10/4·5
MUD RESISTIVITY	1·8 at 57°F	1·8 at 57°F	1·8 at 57°F	1·8 at 57°F	1·8 at 57°F	1·8 at 57°F
RECORDED BY	B.P. Taylor	B.P. Taylor	B.P. Taylor	B.P. Taylor	B.P. Taylor	B.P. Taylor
WITNESSED BY	I.J. Townsend	I.J. Townsend	I.J. Townsend	I.J. Townsend	I.J. Townsend	I.J. Townsend

OTHER SURVEYS:

TYPE	FROM	TO
Temp. Log	20	1821
Point Resis.	450	1803

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

LITHOLOGICAL REFERENCE

Shale claystone · Sandy shale · Silty shale · Siltstone · Argillaceous siltstone · Sandy siltstone · Limestone · Dolomite · Coal · Granite

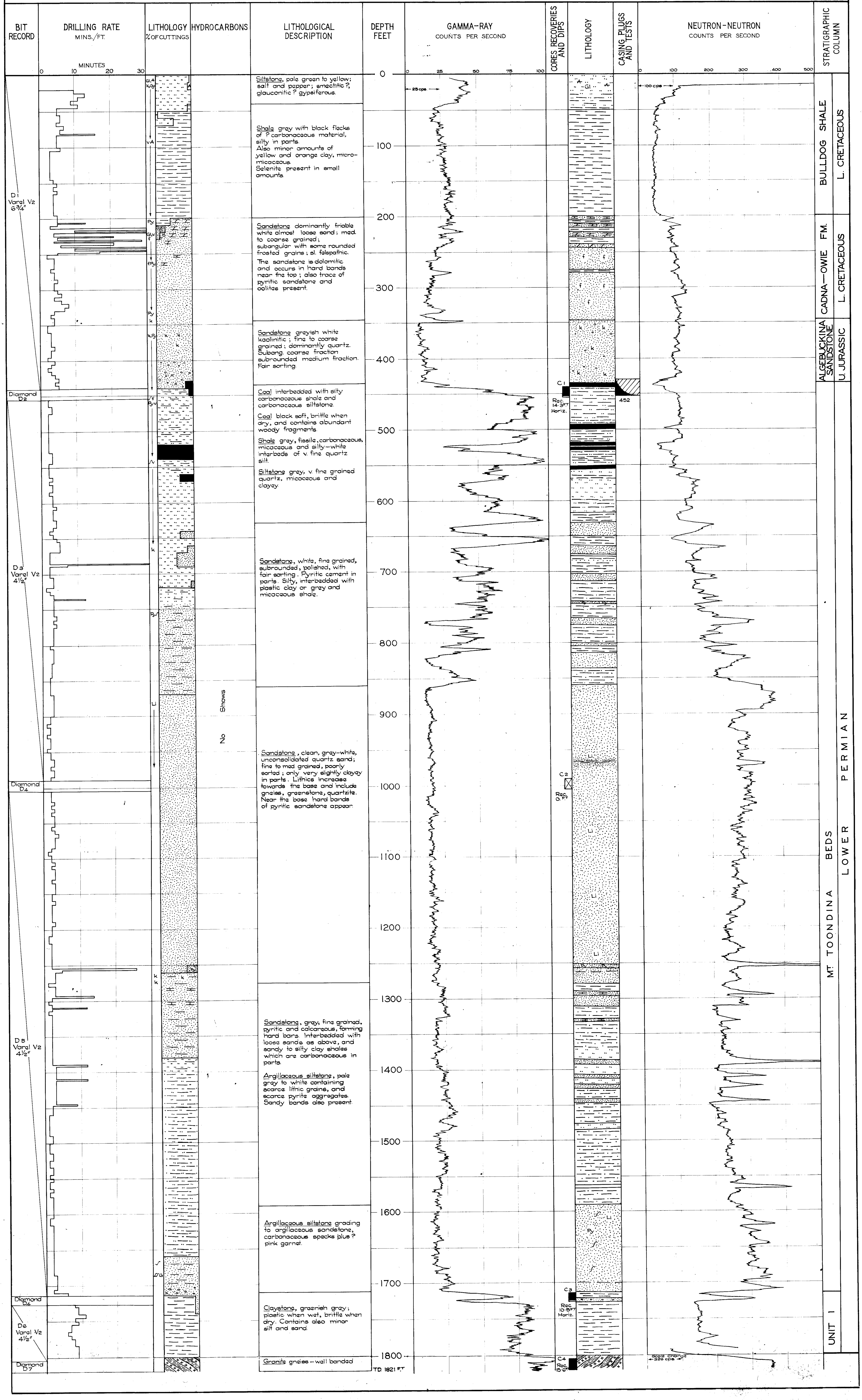
Sandstone · Granular · Pebble · Li Lithic · Anhydrite · Py Pyrite · Micaceous · Carbonaceous · Fe Ferruginous

k Kaolinitic · Gl Glauconitic · G Garnet · Calcareous · Dolomitic · Oolitic · F Fossiliferous Fragmental or Indeterminate · f Feldspathic · Gy Gypsum Gypsiferous

WELL SYMBOLS

CORE INTERVAL AND NUMBER · PLUGGED INTERVAL · CASING SHOE · Fl FLUORESCENCE · * CUT WITH CCl_4

LITHOLOGY BY: I.J. Townsend, G. Demaison, H. Wopfner.
COMPILED BY: I.J. Townsend.
DRAFTED BY: A.J. McDonald.
DRAWING NUMBER: L69-64



LITHOLOGICAL DESCRIPTION

Siltstone, pale green to yellow; salt and pepper; smectitic ?, glauconitic ? gypsiferous.

Shale grey with black flecks of ? carbonaceous material, silty in parts. Also minor amounts of yellow and orange clay, micromicaceous. Selenite present in small amounts.

Sandstone dominantly friable white almost loose sand; med. to coarse grained; subangular with some rounded frosted grains; sl. felspathic. The sandstone is dolomitic and occurs in hard bands near the top; also trace of pyritic sandstone and oolites present.

Sandstone greyish white kaolinitic; fine to coarse grained; dominantly quartz. Subang. coarse fraction subrounded medium fraction. Fair sorting.

Coal interbedded with silty carbonaceous shale and carbonaceous siltstone.
Coal black soft, brittle when dry, and contains abundant woody fragments.
Shale grey, fissile, carbonaceous, micaceous and silty-white interbeds of v. fine quartz silt.
Siltstone grey, v. fine grained quartz, micaceous and clayey.

Sandstone, white, fine grained, subrounded, polished, with fair sorting. Pyritic cement in parts. Silty, interbedded with plastic clay or grey and micaceous shale.

Sandstone, clean, grey-white, unconsolidated quartz sand; fine to med. grained, poorly sorted; only very slightly clayey in parts. Lithics increase towards the base and include gneiss, greenstone, quartzite. Near the base hard bands of pyritic sandstone appear.

Sandstone, grey, fine grained, pyritic and calcareous, forming hard bars. Interbedded with loose sands as above, and sandy to silty clay shales which are carbonaceous in parts.
Argillaceous siltstone, pale grey to white containing scarce lithic grains, and scarce pyrite aggregates. Sandy bands also present.

Argillaceous siltstone grading to argillaceous sandstone, carbonaceous specks plus ? pink garnet.

Claystone, greenish grey; plastic when wet, brittle when dry. Contains also minor silt and sand.

Granite gneiss - well banded

COMPOSITE WELL LOG

SOUTH AUSTRALIAN DEPARTMENT OF MINES

WALLIRA No.1.

STATE: SOUTH AUSTRALIA.

PETROLEUM TENEMENT: Out of Lease Areas

4 MILE SHEET: Coober Pedy

BASIN: Arckaringa

WELL STATUS: Dry and Abandoned.

LOCATION: Lat. 29° 27' 03"S
Long. 134° 04' 31" E

ELEVATION: G.R. 492
R.T. 495·5

DATE SPUDDED: Aug. 3 1969
DATE DRILLING STOPPED: Aug 8 1969
DATE RIG RELEASED: Aug 10 1969
TOTAL DEPTH: 721·6'

HOLE SIZE:

INCHES	FROM	TO
6¾	0	238
4½	238	721·6

CASING:

INCHES	DEPTH	CEMENTED TO
5	236	10 FT only

Casing was removed on completion of well.

TYPE OF LOG	16. IN. NORMAL	64. IN. NORMAL	6 FT. LATERAL	S.P.	NEUTRON	GAMMA RAY
DATE OF RUN	20/25 Aug '69	20/25 Aug '69	20/25 Aug '69	20/25 Aug '69	20/25 Aug '69	20/25 Aug. '69
FIRST READING	718/250	713/252	717/252	720/250	723	723
LAST READING	233/43	233/45	233/45	233/40	60	5
INTERVAL MEASURED	485/207	480/207	484/207	487/210	663	718
CASING-LOGGER	233	233	233	233	233	233
CASING-DRILLER	236	236	236	236	236	236
DEPTH REACHED	718	713	717	720	723	723
BOTTOM-DRILLER	721·6	721·6	721·6	721·6	721·6	721·6
MUD TYPE	Water base	Water base	Water base	Water base	Water base	Water base
DENSITY/ VISCOSITY	9·4/42	9·4/42	9·4/42	9·4/42	9·4/42	9·4/42
Ph/ FLUID LOSS	10/3	10/3	10/3	10/3	10/3	10/3
MUD RESISTIVITY	1·39 at 75°F	1·39 at 75° F	1·39 at 75°F	1·39 at 75°F	1·39 at 75°F	1·39 at 75°F
RECORDED BY	B. P. Taylor	B P. Taylor	B P. Taylor	B P. Taylor	B P Taylor	B P Taylor
WITNESSED BY	I. J Townsend	I. J. Townsend	I. J Townsend	I. J Townsend	I. J. Townsend	I. J Townsend

CEMENT PLUGS: None set: Metal plate welded to well head.

OTHER SURVEYS:

TYPE	FROM	TO
Temp. Log	5	723

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

LITHOLOGICAL REFERENCE

- Shale claystone
- Sandy shale
- Silty shale
- Siltstone
- Argillaceous siltstone
- Sandy siltstone
- Limestone
- Dolomite
- Coal
- Sandstone
- Granular
- Pebble
- Li Lithic
- A Anhydrite
- Py Pyrite
- V Micaceous
- Carbonaceous
- Fe Ferruginous
- k Kaolinitic
- Gl Glauconitic
- G Garnet
- Ca Calcareous
- Dolomitic
- Oolitic
- F Fossiliferous Fragmental or Indeterminate
- f Feldspathic
- Gy Gypsum Gypsiferous

WELL SYMBOLS

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

LITHOLOGY BY: I.J. Townsend
COMPILED BY: I.J Townsend
DRAFTED BY: A. Mc Donald
DRAWING NUMBER: L 70-1

DEPARTMENT OF MINES — SOUTH AUSTRALIA
PETROLEUM SECTION
WALLIRA No. 1.
COMPOSITE WELL LOG
GEOLOGIST: SEN. GEOLOGIST
DRN. I.J.T. TCD. AMcD CKD EXD.
SCALE: 1 INCH = 50 FEET
L 70 — 1 Bb
DATE: 7 JAN '70

BIT RECORD: Dt. Varel V3 6¾" | Diamond D2. | D1. | D3. Varel V2 4½" | D4. Varel V3 | Diamond D2 | D5. Varel V2 | D6 Varel V1 | D7 Varel V1 | Diamond D2 | Diamond D2

DRILLING RATE MINS./FT. — MINUTES 0 10 20 30

LITHOLOGY % OF CUTTINGS — K; K,V Fe,k; Py K Py; V, Py; f V; Cal.; Li, V f; V. f.

HYDROCARBONS — No Shows

LITHOLOGICAL DESCRIPTION

Surface sandy to silty calcareous soil.

Sandstone, fine to coarse grained quartz, subangular to subrounded and kaolinitic. Kaolin is dominant to yellow clay occasionally adhering to grains. In one section the clay dominates, ie. a sandy clay 80'–100'.

185

Mudstone silty and sandy bands slightly calcareous grey. Quartz subangular with some subrounded grains, clear some well polished, micaceous. Some harder calcareous sandstone bands were intersected. Generally however this is a sandy clay sequence.

420

Claystone. Very fine grained dk. greenish grey and plastic when wet, pale grey and brittle when dry. The claystone is slightly silty in places (fine silt interbeds in the clay shale or clay stone.)

670

Boulder sandstone (diamictite) green and grey, fine to V. coarse including boulders, poorly sorted many varied lithologies are represented.

710

Gneissic Basement.

DEPTH FEET: 0, 100, 200, 300, 400, 500, 600, 700

TD. 721·6 FT

GAMMA-RAY COUNTS PER SECOND: 0 25 50 75 100

CORES RECOVERIES AND DIPS

C1 192 207 Rec. 13 FT Horiz.

C2 670 680 Rec. 9·2' Horiz.

C3 707 713 721·6

C4 Almost Vertical

TD. 721·6 FT

LITHOLOGY

Casing Removed after completion. 236'

NEUTRON-NEUTRON COUNTS PER SECOND: 0 100 200 300 400 500

height of mud

Scale Change ← 500cps

STRATIGRAPHIC COLUMN

CADNA-OWIE F.M. — LOWER CRETACEOUS

MT. TOONDINA BEDS — LOWER PERMIAN

UNIT 1

UNIT 2

BASEMENT

COMPOSITE WELL LOG

SOUTH AUSTRALIAN DEPARTMENT OF MINES

WALLIRA No. 2

STATE: SOUTH AUSTRALIA.

PETROLEUM TENEMENT: Out of Lease Areas

4 MILE SHEET: Coober Pedy

BASIN: Arckaringa

WELL STATUS: Dry and Abandoned

LOCATION: Lat. 29° 20' 26" S
Long. 133° 49' 42" E

ELEVATION: G.R. 548
R.T. 551·5

DATE SPUDDED: Aug. 13 1969
DATE DRILLING STOPPED: Aug 23 1969
DATE RIG RELEASED: Aug. 25 1969
TOTAL DEPTH: 1101

HOLE SIZE:

INCHES	FROM	TO
6¾	0	222
4½	222	1101

CASING:

INCHES	DEPTH	CEMENTED TO
5	222	10 FT. ONLY

Casing was removed on completion of well.

CEMENT PLUGS: None set. Metal plate welded to well head

TYPE OF LOG	16. IN. NORMAL	64. IN. NORMAL	6 FT. LATERAL	S.P.	NEUTRON	GAMMA RAY
DATE OF RUN	23/24 Aug. '69	23/24 Aug. '69	23/24 Aug '69	23/24 Aug '69	23 Aug. '69	23 Aug '69
FIRST READING	1101/250	1098/250	1098/250	1101/250	1101	1101
LAST READING	225/45	225/48	225/48	225/40	5	5
INTERVAL MEASURED	876/205	873/202	873/202	876/210	996	996
CASING-LOGGER	220	220	220	220	220	220
CASING-DRILLER	220	220	220	220	220	220
DEPTH REACHED	1101	1101	1101	1101	1101	1101
BOTTOM-DRILLER	1101	1101	1101	1101	1101	1101
MUD TYPE	Water base	Water base	Water base	Water base	Water base	Water base
DENSITY/ VISCOSITY	9·6/40	9·6/40	9·6/40	9·6/40	9·6/40	9·6/40
PH/ FLUID LOSS	10/4·5	10/4·5	10/4·5	10/4·5	10/4·5	10/4·5
MUD RESISTIVITY	1·11 at 78° F	1·11 at 78° F	1·11 at 78° F	1·11 at 78° F	1·11 at 78° F	1·11 at 78° F
RECORDED BY	B. P. Taylor	B. P. Taylor	B. P. Taylor	B. P. Taylor	B. P. Taylor	B. P. Taylor
WITNESSED BY	I. J. Townsend	I. J. Townsend	I. J. Townsend	I. J. Townsend	I. J. Townsend	I. J. Townsend

OTHER SURVEYS:

TYPE	FROM	TO
Temp. Log	5	1101

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

LITHOLOGICAL REFERENCE

- Shale claystone
- Sandy shale
- Silty shale
- Siltstone
- Argillaceous siltstone
- Sandy siltstone
- Limestone
- Dolomite
- Coal
- Granite gneiss
- Sandstone
- Granular
- Pebble
- Li Lithic
- A Anhydrite
- Py Pyritz
- V Micaceous
- Carbonaceous
- Fe Ferruginous
- Si Siliceous
- K Kaolinitic
- Gl Glauconitic
- G Garnet
- Ca Calcareous
- D Dolomitic
- O Oolitic
- F Fossiliferous Fragmental or Indeterminate
- f Feldspathic
- Gy Gypsum Gypsiferous

WELL SYMBOLS

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

LITHOLOGY BY: I. J. Townsend
COMPILED BY: I. J. Townsend
DRAFTED BY: B. S. Glasgow
DRAWING NUMBER: L 70 - 3

DEPARTMENT OF MINES — SOUTH AUSTRALIA

WALLIRA No. 2
COMPOSITE WELL LOG

PETROLEUM SECTION | GEOLOGIST | SEN. GEOLOGIST | DRN. I.J.T | TCD. B.S.G. | CKD. | EXD. | SCALE: 1 INCH = 50 FEET | L 70 - 3 | DATE: 11 JAN 70

BIT RECORD: D1 Varel V3 6¾"; Diamond D2; D3 Varel VH 5⅞"; D4 Varel V3 4½"; D5 Varel V3; Diamond D6; D7 Varel V2 4½"; D8 Varel V3 4½"; D9 Varel V. Diamond D10; D11 WHW 502 4½"; Diamond D12; Varel VH1 D13; D14 Varel VH1 4½"; D16 William K 7 H 4½"; D17 William W 4 W 4½"; D18 William W 4 W 4½"; William W4W D19; Diamond D20

DRILLING RATE MINS./FT. — MINUTES 0 10 20 30

LITHOLOGY % OF CUTTINGS — Si, k, V, Py, H

HYDROCARBONS — No shows

LITHOLOGICAL DESCRIPTION

- Surface soil and calcareous gritty sandstone
- Silcrete hard indurated 5% calcareous
- Sandstone, white ranges from fine to coarse grained quartz subangular to subrounded. Occasional iron staining, some smokey grains kaolinitic which acts as a cement. The kaolinite is gradually replaced by grey clay towards the base.
- Claystone grey, slightly silty. The quartz is very fine grained (·005 mm.) Also micro micaceous (? muscovite ·01 mm) The claystone is a dark greenish grey and plastic when wet and was brittle and pale grey when dry.
- Pebbly to sandy clay similar to above but a significant increase in grain size.
- Boulder Conglomerate diamictite — Silt to Boulder grain size in a clay matrix. All grains and boulders appear to be dominantly subrounded, no grading of bedding indicating poor sorting. The lithologies of the boulders are many and varied including igneous metamorphic and sedimentary pebbles. A few pyritic sandstone bands were encountered also - hard very fine grained quartz grains bound by pyritic cement
- Sandstone grey clayey sand is fine to coarse grained subangular to subround - poorly sorted mixture of quartz felspar and many varied pebbles as mentioned above.
- Clay grey sandy to silty. This includes also bands of dolomite and dolomitic sandstone.
- Boulder sandstone as described above
- Granite gneiss

DEPTH FEET: 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100

GAMMA-RAY COUNTS PER SECOND

CORES RECOVERIES AND DIPS: C1 200 217 Rec 6·6 ft; C2 395 411 Rec 11·1; C3 697 701 Rec. 3·5; C4 740 746 754; C5 Rec 4·5 & Rec 2·1; C6 828 832·5 Rec. 4·5; C7 1094 1101 Rec 5·7

LITHOLOGY

CASING PLUGS AND TESTS: Removed casing after drilling completed

NEUTRON-NEUTRON COUNTS PER SECOND — 412 c.p.s.; 412 c.p.s.; 412 c.p.s.; 700 c.p.s.

STRATIGRAPHIC COLUMN: CADNA-OWIE FORMATION — LOWER CRETACEOUS; UNIT 1 — LOWER PERMIAN; UNIT 2 — LOWER PERMIAN; BASEMENT