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DELHI-SANTOS DULLINGARI NO. 1 WELL SUBSURFACE STRATIGRAPHY AND MICROPALAEONTOLOGICAL STUDY

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Progress Report

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ABSTRACT:

Dullingari No. 1 Well to a depth of 9180 feet has intersected a sedimentary sequence of Tertiary, Mesozoic and Permian rocks, the age of the sediments below 9043 feet being at present uncertain.

After passing through 440 feet of mostly Tertiary sediments the well entered the Winton Formation at 440 feet. Marine Albian (Tambo equivalents) occurred from 2460 to 3540 feet and marine Aptian (Roma equivalents) from 3540 to 4755 feet. Below this level the sequence is entirely non-marine, consisting of Neocomian to Jurassic sandstones (4755-6182 feet), Triassic siltstones and sandstones (6182-6718 feet) and Permian (Upper and Lower) carbonaceous siltstones and sandstones with coal seams from 6718 to 8930 feet. At 8930 feet tillite of probable Sakmarian age occurs. This rests at 9043 feet on steeply dipping grey delomitic state with marcasite, the age of which is considered to be early Pelaeozoic or Proterozoic.

1. INTRODUCTION

Dullingari No. 1 Well was spudded in on 26th March 1962 in continuation of the oil exploration programme by Delhi Australian Petroleum Limited and Santos Limited in the Great Artesian Basin. The well is sited 28 miles southerly from Innamincka, in the north east of South Australia, latitude 28°8'S, longitude 140°52'E.

This report presents lithological data and stratigraphic data based in the Cretaceous section on identification
mainly of mollusca and foraminifera and otherwise on lithological comparison with Innamincha No. 1 Well and with wells on
the western side of the Great Artesian Basin. Both core and
cuttings samples were examined over the whole sequence, and

formation boundaries adjusted to conform with the electric logs.

A micropalaeontological log of the Cretaceous section is included to assist in the study of the faunas of the Great Artesian Basin and their distribution.

2. STRATIGRAPHY

Stratigraphic units in Dullingari No. 1 Well are as follows:-

	Depth (feet)
Quaternary	0 - 160
Tertiary	160 - 440
Winton Formation (Cenomanian) Albian rocks (Tambo equivalents) Aptian rocks (Roma equivalents) Transition beds (Aptian-Neocomian)	440 - 2460 2460 - 3540 3540 - 4492 4492 - 4755
Jurassic Upper Jurassic (Blythesdale Group equivalents) Lower Jurassic (Walloon Coal measures equivalents) Lower Jurassic (basal member - ?Walloon Coal measures lower part)	5710 - 6060 6060 - 6182
Triassic rocks	6182 - 6718
Permian ?Artinskian to Upper Permian freshwater sediments Artinskian-Sakmarian freshwater Sakmarian glacials Palaeozoic or Proterozoic	6718 - 8190 8190 - 8930 8930 - 9043 9043 - 9180

3. QUATERNARY Thickness 160 feet

From the surface to 160 feet the well passed through coarse subangular quartz sand, red and yellow mottled clay and white clay. No direct evidence of the age of the material is present.

4. TERTIARY Thickness 280 feet.

Below 160 feet the sediments consist of brownish carbonaceous sandy clay and quartz sand. Below 330 feet the material is silty with carbonaceous matter, coaly fragments and pyrite. It is characteristic of Tertiary lacustrine sediments but needs further study to determine to which part of the Tertiary it belongs. A lower Tertiary age is suggested.

5. CRETACEOUS

The Cretaceous sequence is similar to that in Innamincka No. 1 Well.

(1) Cenomanian-Winton Formation Thickness 2020 feet

At 440 feet, with an abrupt change in lithology the well entered dolomitic siltstones of the Winton Formation.

The lithology throughout the formation is typical, consisting of a sequence of dolomitic siltstones with abundant plant remains and coaly interbeds; green grey calcareous sandstones with medium quartz grains, goethite, green grey grains, chlorite, and occasional dolomite nodules; grey mudstones and brownish arkosic sandstones; thin coal bands occur near the base. Megaspores were absent in Dullingari No. 1 well, although they are usually common elsewhere in the formation.

The formation passes without apparent stratigraphic break into the Albian of the Tambo Formation and its equivalents at 2460 feet.

(2) Upper Albian Thickness 560 feet

The section regarded as Upper Albian in Innamincka is represented in Dullingari between 2460 and 3020 feet. It consists of grey calcareous siltstones, sandstones and carbonaceous mudstones with arenaceous foraminifera, <u>Inoceramus</u> prisms, fish teeth, bones and other fragments, and megaspores including <u>Pyrobolospora</u> reticulata.

(3) Middle Albian Thickness 420 feet.

The sequence of grey limestones, glauconitic siltstones and mudstones are pyritic mudstones between 3020 and 3540 are regarded as of Middle Albian age on the presence of Falciferella. The fauna is similar to that at the same level in Innamincka No. 1, containing calcareous foraminifera including "Globigerina" sp. 4, Pseudavicula alata, Aucellina hughendenensis, abundant Nuculana sp., belemnites, Falciferella breadeni, radiolaria and fish vertebrae and scales, which are present in Core 3 at 3500-3510 feet.

(4) Lower Albian

The presence of the Lower Albian cannot be identified with certainty as the glauconitic zone with brachiopods is not present in either Dullingari or Innamincka wells.

The Upper and Middle Albian are equivalent in part at least to the Tambo Formation.

(5) Aptian Roma Formation equivalents. Thickness 952 feet.

The top of the Aptian is interpreted at 3540 feet where the well passed into green-grey glauconitic siltstones. The foraminifera at this level are much recrystallized and very heavily stained with brown. Cuttings at 3600-3610 feet contain numerous pyrite filled narrow burrows. The glauconitic siltstones give way downwards to dark grey mudstones with green glauconitic siltstone pockets.

Foraminifera are the principal constituents of the fauna, and although they are not numerous, they follow the normal sequence for the Artesian Basin reasonably well.

(6) Aptian-Neocomian Transitional Beds Thickness 263 feet

These consist of green grey mudstones with very fine muscovite carbonaceous matter, glauconite and abundant pyrite interlaminated with green grey arkosic fine sandstone with coalified plant remains. They occur between 4492-4755 feet.

6. JURASSIC

(1) <u>Upper Jurassic</u> - Blythesdale Group equivalents
Thickness 955 feet.

The non marine carbonaceous sandstone and siltstone sequence between 4755 and 5710 feet is equivalent to part of the Blythesdale Group, probably the Mooga Sandstone. The "Fossil Wood Beds" and Gubberamunda Sandstone are not recognizable as such in Dullingari as they were in Betoota No. 1.

The sediments consist of dark grey very carbonaceous hard finely micaceous sandstone and siltstone, irregularly bedded and light grey irregularly laminated micaceous arkosic sandstone with carbonaceous laminae and coaly material.

Towards the base the formation becomes gritty, with buff gritty arkosic sandstones with occasional polished pebbles and bands of coarse grit showing in Core 8 near the bottom of the core at 5510 feet and in cuttings from 5690 to 5700 feet.

The grits are, however, not so coarse as in Innamincka at the same stratigraphic level.

(2) <u>Lower Jurassic</u>. Equivalents of Walloon Coal Measures,
Thickness 472 feet.

eous sandstone interlaminated with carbonaceous siltstone carrying coalified plant remains is to be correlated with the Walloon Coal Measures. The lower member from 6060 to 6182 feet was intersected in Innamincka No. 1 well between 5490 and 5920 feet and tentatively correlated with the Marburg Formation as described by Whitehouse (Ludbrook, 1961b, p. 26). However the redescription of the Marburg Formation (V.G. Swindon, in Hill & Denmead ed. 1960, p. 289) makes it obvious that the name should not be applied to the bed at the base of the Jurassic in either Innamincka or Dullingari Wells.

7. TRIASSIC ?Equivalents of Moolayember Formation Thickness 536 feet.

Below 6182 feet light grey finely laminated siltstone with carbonized plant fragments scattered on the laminae and fine to coarse sericitic sandstone with dolomite nodules pass downwards into red and grey dense mottled siltstone with quartz and dolomite grains scattered in a fine sericitic siliceous matrix.

These are considered to be stratigraphic equivalents of the Moolayember Formation. They were correlated partly with the Bundanba Group and partly with the Moolayember in Innamincka Well (Ludbrook, 1961b, p. 26).

However, Upper Triassic shales such as occur in South Australia in the Leigh Creek Coal Measures and in the Spring-field Basin are not present in either Dullingari or Innamincka Wells and the Triassic red bed sequence which occurs in these two wells is not to be correlated with rocks of known Upper Triassic age in South Australia.

Correlation in part at least with the Lower Triassic Moolayember, for want of geographically closer correlation, is therefore reasonable.

8. PERMIAN Upper to Lower. Thickness 2212 feet.

A thickness of 2212 feet of continental Permian rocks was intersected between 6718 and 8930 feet.

The upper member consists of dark grey irregularly laminated micaceous siltstone and buff grey dark fine grained sandstone with carbonaceous micaceous patches. Coal seams occur at 6850-6853 and 6858-6861. Cuttings between 6850 and 6990 are mostly coal.

This material may be compared with the Upper Permian sandstone and siltstone with coal intersected in Innamincka
No. 1 between 6750 and 7010 feet. It was regarded by B.E.
Balme as of Kungurian-Kazanian age (Ludbrook, 1961b, p. 26).

Below 7200 the sediments consist almost entirely of dark grey carbonaceous siltstone, irregularly laminated, with coal and thin sandstone interbeds above 7300 and below 7515 feet.

At 8190 feet a coal measures sequence of buff arkosic sandstones with siltstone interbeds and coal seams occurs.

If these are to be correlated with the coal measures of the western margin of the Great Artesian Basin (Balme, 1957; Ludbrook, 1961a) they are of Lower Artinskian and Sakmarian age. No marine rocks were present in the Permian section, and palynological studies will need to be made to determine to what extent the Sakmarian is represented.

9. PERMIAN LOWER SAKMARIAN TILLITE. Thickness 113 feet

At 8930 the well passed into dark grey dense tillite with pebbles and boulders of various kinds, mostly grey quartzite, and white quartz. Small boulders are well faceted and striated and at 9000 feet in Core 25 the striations on one faceted boulder are reflected in the matrix. The matrix consists of dark grey siltstone with illsorted subrounded grains of quartz scattered throughout.

Correlating this tillite with Permian glacigenes on the western margin of the Great Artesian Basin (Ludbrook, 1961a) gives the age as lowermost Sakmarian.

10. PALAEOZOIC or PROTEROZOIC SLATE

The tillite rests at 9043 feet on grey dolomitic sericitic slate of uniform texture with occasional splashes of marcasite. The age has not yet been determined, but is early Palaeozoic or Proterozoic? The formation is steeply dipping. Drilling was proceeding in the formation at 9691 feet at the time of writing.

11.	DES	CRIPTIONS	OF THE CORES AND CUTTINGS
Cutti Depti			
10	_	30	Coarse subangular quartz sand, with some calcite
30	<u>.</u>	41	Coarse subangular quartz sand, buff clay and
	•	•	gypsum.
40		60	Yellow and red mottled clay, some gypsum and
			quartz as above.
60		70	Coarse quartz sand as above, buff clay, some
•			gypsum•
70		80	Red and yellow brown mottled clay with quartz
			sand.
. 80	-	90	Medium quartz sand with buff clay and gypsum.
90	-	98	Red and white ironstained clay.
98		130	White clay mottled with red.
130	-	150	Grey brown clay.
150		160	Mottled red and buff clay.
160	-	190	Brown carbonaceous sandy clay.
190	-	200	Light brown sandy clay with dark carbonaceous
			patches.
200	_	210	Brownish sandy clay.
210	-	220	Brown sandy clay; illsorted angular quartz,
			kaolinitic and ferruginous material.
220	-	230	Brown sandy clay, some coarse quartz sand.
230) - -	240	Coarse quartz sand, some clay.
240) –	250	Medium to coarse subangular quartz sand.
250) _. –	260	As above, with carbonaceous clay.
260) -	270	Yellow and cream coarse subangular quartz
			with scattered yellow and red ironstained
			grains.
270) -	280	As above; some grit size grains.
280) –	300	Medium, red buff quartz sand with some clay.
300	–	310	Medium to coarse subangular quartz sand.
310) -	330	Grey sand.

Medium to coarse quartz sand with carbonaceous

silty fragments and pyrite.

330 - 340

Cuttings Depth(feet)	Core No.	
340 - 360		Grey carbonaceous clay with coal fragments.
360 – 370		Light grey somewhat sandy clay
370 – 380		Brown grey carbonaceous clay with some quartz.
380 - 390		No sample.
390 - 400		Clay as above with coaly material.
400 - 410	ı	Light grey pyritic sand with medium to coarse
		subangular to subrounded quartz grains and
		some grey quartz.
410 - 440	ı	Off white coarse subangular to subrounded
		quartz sand.
440 - 450	ı	Green grey dolomitic siltstone with abundant
		dolomite nodules, pyrite, chlorite, carbon-
		ized plant fragments.
450 - 500)	Green grey dolomitic siltstone with abundant
		pyrite and dolomite nodules.
500 - 560		Green grey siltstone with abundant carbonaceous
		\mathtt{matter}_{ullet}
560 - 870		Green grey siltstone as above.
870 - 910)	Green grey sandstone with medium quartz grains,
		green grey grains, kaolinitic matter, coal
		fragments.
910 - 1300		Green grey siltstone as above with sandstone
		interbeds.
1300 - 1350)	Green grey calcareous arkosic sandstone with
		medium quartz grains, brick red grains
		(?goethite), green-grey grains, chlorite,
		occasional dolomite nodules.
1350 - 1360)	Coal, sandstone with medium angular quartz
		grains, green grains, fragments of carbon-
		aceous mudstone, lycopod megaspore.
1360 - 140)	Sandstone as above and carbonaceous mudstone.
1400 - 141	0 1	Recovered 10 feet.
		Greenish grey very fine arkosic sandstone with

abundant plant remains, green grey siltstone

Cuttings Core
Depth(feet) No.

1400 - 1410 1 (Contd.)

with

with abundant fine carbonized plant remains scattered throughout. Leaf remains, "scales".

- 1410 1500 Grey mudstone with green grey grains, chlorite carbonaceous matter. Some interbedded sandstone.
- 1500 1560 Green grey calcareous sandstone with quartz
 and green grains in a kaolinitic calcareous
 matrix, grey grains, limonite pellets;
 mudstone and coal interbeds.
- 1560 1750 Grey arenaceous limestone, fine grained with carbonaceous specks and abundant coal fragments, interbedded with grey carbonaceous mudstone.
- 1750 1800 Brown mudstone and green-grey carbonaceous sandstone.
- 1800 1850 Green grey carbonaceous calcareous sandstone and mudstone with red grains (?goethite), some glauconite.
- 1850 2010 Brown calcareous siltstone interbedded with grey carbonaceous mudstone and calcareous sandstone.
- 2010 2110 As above, with bands of coal.
- 2110 2200 Carbonaceous mudstone, with coal.
- 2200 2250 Green grey arkosic sandstone, interbedded with mudstone and coal.
- 2250 2300 Green grey sandstone, arkosic, with some mudstone and coal, pyrite.
- 2300 2460 Brown mudstone with brown arkosic sandstone as above, coaly material, carbonized plant fragments.
- 2460 2500 Green grey siltstone with rare arenaceous foraminifera.

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Cuttings Core Depth(feet) No.
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2500 - 2510 2 Recovered 5 feet

3 feet grey carbonaceous mudstone

2 feet grey siltstone and sandstone.

The mudstone is irregularly interbedded with coarse siltstone with bright green glauconite pyrite, abundant plant remains. The siltstone contains muscovite, biotite, fine pale green glauconite, abundant pyrite chlorite.

Inoceramus prisms, <u>Pyrobolospora reticulata</u>
and lycopod megaspores present

2510 - 2560 Brownish calcareous sandstone with <u>Inoceramus</u>
prisms and calcite vein.

2560 - 2580 Grey arkosic siltstone and mudstone with

microscopic pyrite veins. Textularia sp.,

fish bone.

2580 - 2620 Grey calcareous sandstone and siltstone with

Pyrobolcspora hexapartita; fine angular quartz;

felspar, abundant glauconite, biotite,

carbonaceous matter.

2620 - 2660 Grey carbonaceous mudstone with <u>Pyrobolospora</u> nuda.

2660 - 2720 Greenish grey fine siltstone with muscovite,
biotite, fine pale green glauconite, abundant
pyrite, chlorite.

2720 - 2850 Green grey carbonaceous pyritic mudstone with abundant <u>Inoceramus</u> and occasional coalified megaspores.

2850 - 2870 Green grey siltstone as above.

2870 - 2890 Brown mudstone.

2890 - 2920 Green grey limestone.

2920 - 2960 Brown mudstone with fish fragments.

2960 - 2980 Green-grey calcareous mudstone with abundant calcareous foraminifera.

Cuttings Depth(feet)	Core No.	
2980 - 2990		Green-grey glauconitic and pyritic siltstone
		with abundant foraminifera.
2990 - 3000		Pyritic mudstone with pyritized radiolaria.
3000 - 3020		Green-grey pyritic and glauconitic silstone
		with abundant pale green glauconite,
		"Globigerina" sp. 4
3020 - 3030		Grey limestone and mudstone with Aucellina.
3030 - 3040		Glauconitic mudstone rich in pale green
		glauconite.
3040 - 3070		Pyritic and glauconitic siltstone with
•		belemnites, mollusca include small gastropod
		remains.
3070 - 3200		Grey limestone and glauconitic mudstone with
		Aucellina and calcareous foraminifera.
3200 - 3250		Brown pyritic mudstone with "Globigerina" sp. 4
3250 - 3280		Grey limestone, mudstone and calcareous silt-
		stone.
3280 - 3290		Green-grey pyritic and glauconitic silstone
		with abundant plant remains.
3290 - 3360		Brown carbonaceous mudstone with coal fragments;
		pyritized radiolaria.
3360 - 3500		Grey siltstone with angular quartz, kaolin,
		glauconite, biotite, pyrite, carbonaceous
		matter, abundant pale green glauconite grains,
		mollusca including <u>Inoceramus</u> , pyritized
		radiolaria.
3500 - 3510	3	Recovered 5 feet.
		4 feet grey mudstone with Aucellina hughenden-
		, .

ensis, Nuculana sp. (abundant), Pseudavicula alata, Falciferella breadeni, belemnites, fish vertebra and scla.e

1'2" Green-grey siltstone with kaolinitic

material, fine angular quartz, coalified plant fragments, <u>Aucellina</u> <u>hughendenensis</u>, fish vertebra.

Cuttings Depth(feet)	Core No.	
3510 - 3600		Mudstone and siltstone as above.
3600 - 3610		Green grey glauconitic siltstone with fine
		angular quartz, kaolinitic matter, pale green
• •		glauconite, pyrite, carbonaceous matter.
		Pyrite infilled burrows.
3610 - 3700		Green grey glauconitic siltstone and carbonaceou
•		mudstone.
3700 - 3750		Dark grey mudstone with abundant foraminifera
		including Haplophragmoides chapmani.
3750 - 3800		Grey brown carbonaceous mudstone and calcareous
		siltstone, cone-in-cone calcite.
3800 - 3900		Brownish highly carbonaceous siltstone and
		calcareous siltstone with Haplophragmoides
		locblichae, Verncuilina howchini and
		Ammodiscus.
3900 - 3962		Grey glauconitic siltstone even-grained with
	•	quartz, kaolinitic material, pale green
		glauconite, pyrite, few foraminifera, mollusca
, ,		radiolaria.
3962 – 3972	4	Recovered 10 feet.
		Dark grey irregularly interlaminated mudstone
		and glauconitic siltstone with pyrite
		filled trails and streaks. Siltstone consists
		of abundant fine pale green glauconite,
		abundant biotite and muscovite, plant remains,
•		kaolinitic material, chlorite, pyrite.
3972 - 4500		Dark grey mudstone and siltstone as Core 4.
4500 - 4510	5	Recovered 2'6".
		Green grey mudstone with very fine muscovite,
• .		carbonaceous matter, glauconite, pyrite.
4510 - 4520	6	Recovered

Green grey orkosic fine sandstone with inter-

laminae of carbonaceous siltstone; abundant

coalified plant remains on laminae; sandstone

Cuttings Core Depth(feet) No.

4510 - 4520 6 (Contd.)

consists of tightly packed quartz, kaolinitic matter, glauconite, biotite, carbonaceous silt, muscovite.

4520 - 4755 As above.

4755 - 4956 Grey micaceous sandstone and carbonaceous siltstone.

4956 - 4966 7 Recovered 7 feet.

Dark grey very carbonaceous hard finely
micaceous siltstone irregularly banded with
light dirty grey micaceous sandstone.

4966 - 5500 As above.

5500 - 5510 8 Recovered 9 feet

3 feet Light grey micaceous arkosic sandstone.

1 foot As above, with coal.

2 feet Buff gritty arkosic sandstone with occasional polished pebbles and bands of coarse grit to the bottom of the core.

5510 - 5814 Sandstone as above, gritty 5690 - 5700 feet.

5800 - 5809 9 No recovery.

5814 - 5824 10 Recovered 8 feet.

3 feet. Fine grained light grey micaceous sandstone interlaminated with carbon-aceous siltstone with coalified plant remains.

5 feet. Light grey medium grained arkosic sandstone with irregular carbonaceous siltstone bands.

5824 - 6060 As above.

6060 - 6091 Fine grained light grey to buff arkosic sandstone, loosely cemented with angular medium grains and occasional coarse grains.

Cuttings Core Depth(feet) No.

6091 - 6101 11 Recovered 10 feet.

- 1 fcot. Fine grained medium grey arkosic sandstone grading to siltstone; interbeds of dark grey carbonaceous micaceous siltstone.
- 2 feet. Mainly dark grey interbedded with light grey siltstone.
- 4 feet. Mainly very fine grey sandstone with irregular bands of carbonaceous siltstone.
- 3 feet. Dark grey carbonaceous siltstone with thin sandstone bands.

6101 - 6182 As above.

6182 - 6277 Grey finely laminated siltstone.

6277 - 6286'612 Recovered 9'6"

3'6" Grey finely laminated siltstone with coaly fragments.

2'6" Buff grey fine to coarse sandstone, sericitic, with dolomite nodules.

6286'6-6590 As above.

6590 - 6592 13 Recovered 1 foot.

Red and dark grey tight mottled siltstone with quartz and dolomite grains scattered in a fine sericitic siliceous matrix.

6592 - 6598 14 Recovered 6 feet.

- 3 feet. Grey dense hard massive siltstone grading to light grey sericitic sandstone with occasional slump structures.
- 3 feet Grey fine grained sandstone as above with 3" siltstone band at 1' and 3" at bottom of core.

6598 - 6718 Siltstone and sandstone as above.

Cuttings Core Depth(feet) No.

6718 - 6900 Grey fine-grained sandstone with angular

quartz grains and finely micaceous carbonaceous siltstone. Coal at 6850-6853 feet
and 6858-6861 feet. Cuttings 6850-6900
are mostly coal.

6900 - 6901 15 No recovery.

6901 - 6911 16 Recovered 6 feet.

Dark grey irregularly laminated carbonaceous siltstone bottom 1 foot buff grey fine-grained sandstone with carbonaceous micaceous siltstone patches.

6911 - 7200 Carbonaceous siltstone as above.

7200 - 7210 17 Recovered 7 feet.

Dark grey irregularly laminated carbonaceous siltstone.

7210 - 7220 As above.

7220 - 7230 Coal.

7230 - 7240 Coal and light grey fine grained sandstone.

7240 - 7250 Coal, some sandstone.

7250 - 7300 Grey fine grained sandstone and siltstone as above.

7300 - 7474 Dark grey to black carbonaceous siltstone, micaceous, of uniform texture.

7474 - 7484 18 Recovered 9 feet.

Dark grey irregularly laminated carbonaceous siltstone.

7484 - 7515 Siltstone as above.

7515 - 7549 Light grey sandstone with medium subangular quartz, kaclinitic cement, interbeds of siltstone and coal.

7549 - 7607 Siltstone with sandstone interbeds.

7607 - 7617 19 Recovered 9 feet.

Dark grey irregularly laminated highly carbonaceous siltstene with abundant coal fragments.

Cuttings Core
Depth(feet) No.

7617 - 7900 Siltstone with fine sandstone laminae as above.

7900 - 7910 20 Recovered 9 feet.

Dark grey carbonaceous siltstone with fine sandstone at 2'6".

7910 - 7930 Siltstone as above.

7930 - 7960 Grey fine sandstone.

7960 - 7970 Dark grey siltstone.

7970 - 7976 21 Recovered $4\frac{1}{2}$ feet.

Grey fine to medium carbonaceous sandstone with uniform fine texture, interlaminated with fine siltstone. 6" siltstone at 7972-7272.

7976 - 8070 Dark grey carbonaceous siltstone.

8070 - 8080 Interlaminated sandstone and siltstone.

8080 - 8190 Interlaminated sandstone, siltstone and coal.

8190 - 8220 Buff to brownish grey sandstone with medium angular quartz, kaolinitic cement, coal,

siltstone interbeds.

8220 - 8230 Dark grey carbonaceous siltstone.

8230 - 8276 Interlaminated sandstone and highly carbonaceous siltstone.

8276 - 8286 22 Recovered 3 feet.

5" Buff gritty sandstone.

7" Dark grey to black carbonaceous siltstone, with slump structures.

12" Dirty grey micaceous sandstone showing some cross bedding.

8286 - 8313 Sandstone and siltstone as above.

8313 - 8317 Coal.

8317 - 8360 Coarse angular quartz sandstone, finer-grained buff grey interbeds, and siltstone interbeds.

8360 - 8370 Coal.

8370 - 8450 Sandstone as above and coal.

8450 - 8480 Interbedded siltstone and sandstone; coal.

Cuttings Core Depth(feet) No.

8480 - 8505 Grey sandstone with coarse angular, wellpacked quartz grains in a little kaolinitic

8505 - 8515 23 Recovered 10 feet.

Dirty grey fine to medium-grained sandstone
with angular quartz grains, tightly packed
with kaolin cement. Finely cross-bedded
with interlaminae of carbonaceous micaceous
siltstone.

8515 - 8530 As above.

8530 - 8550 Coal.

8550 - 8560 Sandstone as above.

8560 - 8605 Dark grey carbonaceous and micaceous siltstone and sandstone. Coal at 8590-8593 feet.

8605 - 8630 Sandstone, siltstone and coal as above.

Coal at 8610-8627, 8643-8645, 8664-8675 feet.

8630 - 8700 Sandstone, siltstone and coal as above.

8700 - 8790 Grey sandstone with thin bands of coal.

8790 - 8820 Highly carbonaceous siltstone.

8820 - 8877 Interlaminated sandstone and siltstone.

8877 - 8887. 24 Recovered 10 feet

Dirty buff-grey medium to coarse sandstone with thin carbonaceous bands.

½" band at 8884 feet; 2 feet coal at 8885-8887.

8887 - 8900 Sandstone with coal as above.

8900 - 8910 Dirty buff grey sandstone as above.

8910 - 8920 Interbedded coal and sandstone.

8920 - 8930 Highly carbonaceous shale and coal.

8930 - 9000 Tillite.

Cuttings Core Depth(feet) No.

9000 - 9010 25 Recovered 10 feet.

Dark grey tillite, with pebbles and small boulders well facetted and striated.

At 9000 feet striations on large pebbles are reflected in the matrix; pebbles are of grey quartzite and white quartz for the most part, but various lithologies and represented; matrix consists of dark grey siltstone with illsorted subrounded grains of quartz scattered throughout.

9010 - 9043 Tillite as above.

9043 - 9191 Grey calcareous (or dolomitic) sericitic slate, dense, of uniform texture with occasional splashes of marcasite.

9191 - 9211 26 Recovered 20 feet.

Dark grey dolomitic slate with apparently low grade metamorphism as slump structures and laminae well preserved. Splashes of marcastite. Unfossiliferous. Dip 60°

9211 - 9496 Dark grey dolomitic slate as above.

9496 - 9506 27 Recovered 10 feet.

Dark grey dolomitic slate with marcasite.

Dip (from geologist's log) 440.

9506 - 9668 Slate as above.

9668 - 9678 28 Recovered 10 feet.

Dark grey dolomitic slate as above.

9678 - 9691 As above.

Well in progress 27/8/62.

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