Rept. Bk. No. 717
G.S. No. 3204
S.R. No. 11/5/161
Pal. Rept. 11/65

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

PALAEONTOLOGY SECTION

BEACH PETROLEUM MONASH NO. 1 WELL:
SUBSURFACE STRATIGRAPHY AND MICROPALAEONTOLOGY

by

N. H. Ludbrook
Senior Palaeontologist

23rd July, 1965

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ABSTRACT

Beach Petroleum Monash No. 1 Well was drilled 5 miles north west of Monash, 20 miles south west of Renmark, to a total depth of 3445 feet. The well penetrated a sequence of Tertiary, Cretaceous, and Permian rocks, mostly of marine origin. Cuttings below 3320 feet contained pink sandstone which may be of Devonian age. As no core was taken in this interval it cannot be said with certainty that these were not pebbles contained in Permian glacigenes.

INTRODUCTION

Beach Petroleum Monash No. 1 Well was drilled between 20th October and 23rd November, 1964, on a site 5 miles north west of Monash, 20 miles south west of Renmark, county Hamley, latitude 34°12' 04.5" S, longitude 140°29'56.6"E. Drilling was by South Australian Mines Department Mindrill B5000.

Cuttings were taken at 10-foot intervals and 9 cores between 1500 and 3285 feet.

Palaeontological and palynological examination was carried out at the request of the company. The present report presents stratigraphic information based on the more important foraminifera and on palynological data provided by W.K. Harris. No detailed study of the foraminiferal faunas was attempted. As the well was not electrically logged, formation boundaries are drawn on palaeontological and lithological data.

Some of the Lower Cretaceous foraminifera identified are described in G.S.S.A. Bulletin 40 (in press).

STRATIGRAPHIC SUMMARY

Stratigraphic units intersected in Monash No. 1 are as follows:

	Depth (feet)	Thickness (feet)
Quaternary sand, clay and kunkar	0 - 50	50
Loxton Sands (Lower Pliocene)	50 - 110	60
Bookpurnong Beds (Upper Miocene - Lower Pliocene)	110 - 170	60
Pata Limestone (Miocene)	170 - 220	50
Morgan Limestone (Lower Miocene)	220 - 440	220
Mannum Formation (Lower Miocene)	440 - 520	80
Gambier Limestone (Oligocene)	520 - 630	110
Ettrick Formation (Oligocene)	630 - 810	180
Knight Group (Eocene unit)	810 - 1500	690
Knight Group (Paleocene unit)	1500 - 1760	260
Cretaceous sandstone (? Albian)	1760 - 2300	540
Cretaceous shale and mudstone (Aptian)	2300 - 2930	630
Sandstone and boulder clay (Lower Permian)	2930 - 3320	390
Sandstone or boulder clay (Lower Permian or ?Devonian)	3320 - 3445	125
		3445

QUATERNARY SEDIMENTS
0 - 50 feet

The well first intersected 30 feet of red brown surface sand and kunkar followed by 20 feet of loose coarse quartz sand with green clay and yellow-brown limonitic clay. These sediments are unfossiliferous.

LOXTON SANDS (LOWER PLIOCENE)
50 - 110 feet

Below 50 feet depth a thickness of 60 feet of coarse micaceous quartz sand with some carbonized wood fragments was present. These are a non-marine development of the Loxton Sands.

BOOKPURNONG BEDS (UPPER MIOCENE - LOWER PLIOCENE)

110 - 170 feet

The Bookpurnong Beds are represented by 60 feet of green grey glauconitic sandy siltstone rich in mollusca.

PATA LIMESTONE (MIOCENE)

170 - 220 feet

The upper 20 feet of this unit is a richly fossiliferous marl with abundant mollusca, foraminifera, and other forms, with Ditrupa. Austrotrillina howchini occurs between 180 and 190 feet, and in the lower unit. The lower unit is a glauconitic crystalline limestone with abundant Austrotrillina howchini and Heterolepa victoriensis(= Cibicides victoriensis.)

MORGAN LIMESTONE (LOWER MIOCENE)

220 - 440 feet.

The transition from Morgan to Pata Limestone is marked by 30 feet of marl and silt between 220 and 250 feet where the formation becomes a bryozoal limestone with abundant Operculina. It is considerably recrystallized below 320 feet and passes without perceptible lithological change into the Mannum Formation, the top of which is placed somewhat tentatively on palaeontological grounds at 440 feet.

MANNUM FORMATION (LOWER MIOCENE)

440 - 520 feet

The Mannum Formation consists of recrystallized bryozoal limestone and some saccharoidal limestone Echinoids including Fibularia gregata, and brachiopoda are common.

GAMBIER LIMESTONE (UPPER OLIGOCENE)

520 - 630 feet

Grey saccharoidal and glauconitic limestone with flint-like areas of recrystallized calcite occurring between 520 and 630 feet is equivalent to the Upper Oligocene (Janjukian)

part of the Gambier Limestone. Victoriella conoidea occurs between 590 and 610 feet.

ETTRICK FORMATION (OLIGOCENE)

630 - 810 feet

Two units occur within this interval. The upper unit of grey glauconitic marl and limestone with abundant mid-green glauconitic ovoids contains also Massilina torquayensis. The lower unit of brown glauconitic sandy limestone and pyrite quartz aggregates, with carbonized wood fragments is presumed also to belong to the Ettrick Formation, but its correlation is subject to revision as more information on the Formation and the Buccleuch Group is obtained.

KNIGHT GROUP (EOCENE AND PALEOCENE)

810 - 1760 feet

This paralic or non-marine sequence is to be divided into two units, mainly on palynological evidence. The upper unit of earthy lignite and carbonaceous silt and clay is of Eocene age. Below 1500 feet brown dense carbonaceous limestone with pyrite flecks and interbedded clay and sand is determined by W.K. Harris in the accompanying Palynological Report (9/65) as of Paleocene age. This lower unit is equivalent to the Dartmoor Formation.

CRETACEOUS SANDSTONE AND SILTSTONE

1760 - 2300 feet

At 1760 feet the well passed into Lower Cretaceous green grey fine-grained feldspathic sandstone, with chlorite, green-grey grains and some carbonaceous matter. Arcellites (= Pyrobolospora) megaspores are present. An Albian age is at present assumed for these sediments which are non-marine in origin.

CRETACEOUS SHALE AND MUDSTONE

2300 - 2930 feet

This unit consists of grey carbonaceous mudstone with pyrite and some dolomite. A few foraminifera are present in all samples, the presence of Textularia anacooraensis and Trochammina raggatti indicating equivalence with the zone low in the Aptian of the Great Artesian Basin.

LOWER PERMIAN SANDSTONE AND CLAY

2930 - 3320 feet

The sediments between 2930 and 3320 feet are sandstones and clay with abundant granite grains, some pyrite and feldspar. A few foraminifera, mostly Hyperammina hebdenensis and Hippocrepinella biaperta are present. The formation is conglomeratic at 3285 feet where Core 9 was taken.

SANDSTONE OR BOULDER CLAY (? L. PERMIAN, or ? DEVONIAN)

3320 - 3445 feet

Below 3320 cuttings contain much pink coarse quartz sandstone and occasional red siltstone grains. This material tends to resemble Devonian sediments in the Great Artesian Basin. As no core was cut in the interval it is not possible to determine whether the sandstone is in the form of conglomerate or boulder clay or whether in fact the well did pass through the Permian into sandstone of Devonian or older age. Foraminifera recovered from the interval may be cavings.

DESCRIPTION OF THE SAMPLES

Depth (feet)	
10 - 30	Red brown surface sand and kunkar.
30 - 50	Loose quartz sand with green clay and yellow-brown limonitic clay.
50 - 100	Sand with coarse subangular to subrounded polished quartz grains.
100 - 110	As above, with abundant muscovite and carbonized wood fragments.

Depth (feet)	
110 - 150	Green-grey sandy siltstone, shelly, rich in glauconite, muscovite, mollusca, foraminifera, fish fragments.
150 - 170	As above, highly glauconitic, with ostracodes.
170 - 190	Grey marl with Ditrupa, corals, remains of crabs and fish, ostracodes.
190 - 230	Light grey crystalline limestone with abundant dark-green glauconite ovoids, abundant foraminifera, bryozoa, echinoids.
230 - 250	Grey marl and silt with Carpenteria rotaliformis.
250 - 300	Grey bryozoal limestone with Operculina victoriensis, Carpenteria proteiformis, Parrellina reticuliformis.
300 - 310	Grey bryozoal limestone with Lepidocyclina howchini.
310 - 440	Grey recrystallized bryozoal limestone, Gypsina howchini common between 390 and 410 feet.
440 - 520	Grey recrystallized bryozoal limestone with some mid-green glauconite, some saccharoidal limestone, abundant echinoids 440-450 feet.
520 - 630	Grey saccharoidal and glauconitic limestone with recrystallized flint-like areas of calcite.
630 - 742	Grey glauconitic marl and limestone with mid-green glauconite ovoids.
742 - 800	Brown glauconitic sandy limestone and pyrite-quartz aggregates.
800 - 810	As above, with carbonized wood fragments.
810 - 830	Dark brown-grey carbonaceous pyritic sand with fine quartz grains and carbonized plant fragments.
830 - 850	Earthy lignite.
850 - 870	Earthy lignite and coarse quartz grains.
870 - 900	Carbonaceous sand with grains of grey and opaline quartz and siliceous sandstone ("duricrust").
900 - 910	Quartz grit.
910 - 950	Carbonaceous quartz sand, silt, and clay.
950 - 960	Earthy lignite
960 - 980	Sandy carbonaceous clay
980 - 1000	As above, with fine-grained quartz.
1000 - 1030	Coarse pyritic clayey sand.
1030 - 1180	Coarse quartz sand.
1180 - 1190	Carbonaceous sandy clay.

Depth (feet)	
1190 - 1500	Quartz sand.
1500 - 1543	Brown dense carbonaceous limestone with fine pyrite flecks, streaks of carbonized plant remains, scattered fine quartz grains.
1543 - 1553	Core 1. Recovered 2 feet. Interbedded clay and sand. Washings consist of fine angular quartz, muscovite, talcose mineral, grey grains, carbonaceous matter.
1553 - 1610	As above, lignitic 1570 - 1600 feet.
1610 - 1763	Brown shale, carbonaceous pyritic siltstone.
1763'6" - 1764	Core 2. Recovered 6 inches. Green-grey fine grained sandstone, feldspathic, with chlorite, green and grey grains, little carbonaceous matter and clay material.
1764 - 1774	Core 3. Recovered 10 feet. Sandstone as Core 2.
1774 - 1850	Cuttings heavily contaminated with cement.
1850 - 1865	As for Core 2.
1865 - 1879	Core 4. Recovered 6 feet Sandstone as above.
1879 - 1900	Sandstone as above.
1900 - 1930	Hard feldspathic sandstone with green-grey grains, tourmaline, ?goethite, silty matrix.
1930 - 1960	As above, with dolomite globules and Arcellites reticulatus.
1960 - 2150	Sandstone as above and siltstone, with graphite, Arcellites reticulatus.
2150 - 2160	As above, with fish bones.
2160 - 2300	Carbonaceous feldspathic sandstone and siltstone with abundant plant remains.
2300 - 2330	Grey carbonaceous mudstone with pyrite, abundant angular grey-green grains. Arcellites, fish tooth, Trochammina minuta.
2330 - 2380	Mudstone as above, with calcareous foraminifera.
2380 - 2383'6"	Core 5. Recovered 3'6". Grey carbonaceous mudstone.
2383 - 2440	Grey mudstone with some limestone (? nodules).
2440 - 2470	Grey mudstone and sandstone.
2470 - 2880	Grey mudstone and limestone, abundant dolomite globules 2890 - 2900 feet.
2880 - 2885	Core 6. Recovered 5 feet Interbedded shale and sandstone.
2885 - 2930	Shale and sandstone as above.

Depth (feet)	
2930 - 2970	Interbedded sandstone and shale with coarse quartz grains having angular and fitted faces, pyrite, feldspar.
2970 - 3010	Grey sandstone with interlocking grains of angular quartz in a feldspathic matrix with mica, opaque minerals, garnet, carbonized wood.
3010 - 3059	As above, with abundant grains of granite with pink feldspar.
3059 - 3069	Core 7. Recovered 2'3" Grey sandstone with coarse quartz grains, abundant garnet, lithic grains.
3069 - 3080	Sandstone as above, with grains of various igneous rocks, pink garnet.
3080 - 3200	Cuttings heavily contaminated with cement.
3200 - 3240	Sandstone as above, with occasional foraminifera.
3240 - 3250	Cuttings are mostly granite grains and chips.
3250 - 3280	Sandstone.
3280 - 3283	Core 8. Recovered 3 feet. Interlaminated sandstone siltstone and shale rich in chlorite and other micas, ? dolomite.
3283 - 3310	As above.
3310 - 3320	Blue-grey clay with a few foraminifera.
3320 - 3370	Pink coarse quartz sandstone with unworn crystal grains, some angular, some rounded with pitted surfaces, little siliceous cement; red siltstone grains, some lithic grains.
3370 - 3380	Clay with lithic grains and pink sandstone as above.
3380 - 3390	Sandstone as above, granite grains.
3445	Pink and greenish sandstone with coarse angular quartz grains, some pale green mineral grains, fine chloritic matrix, some feldspar.

N. H. Ludbrook
Senior Palaeontologist

NHL:AGK
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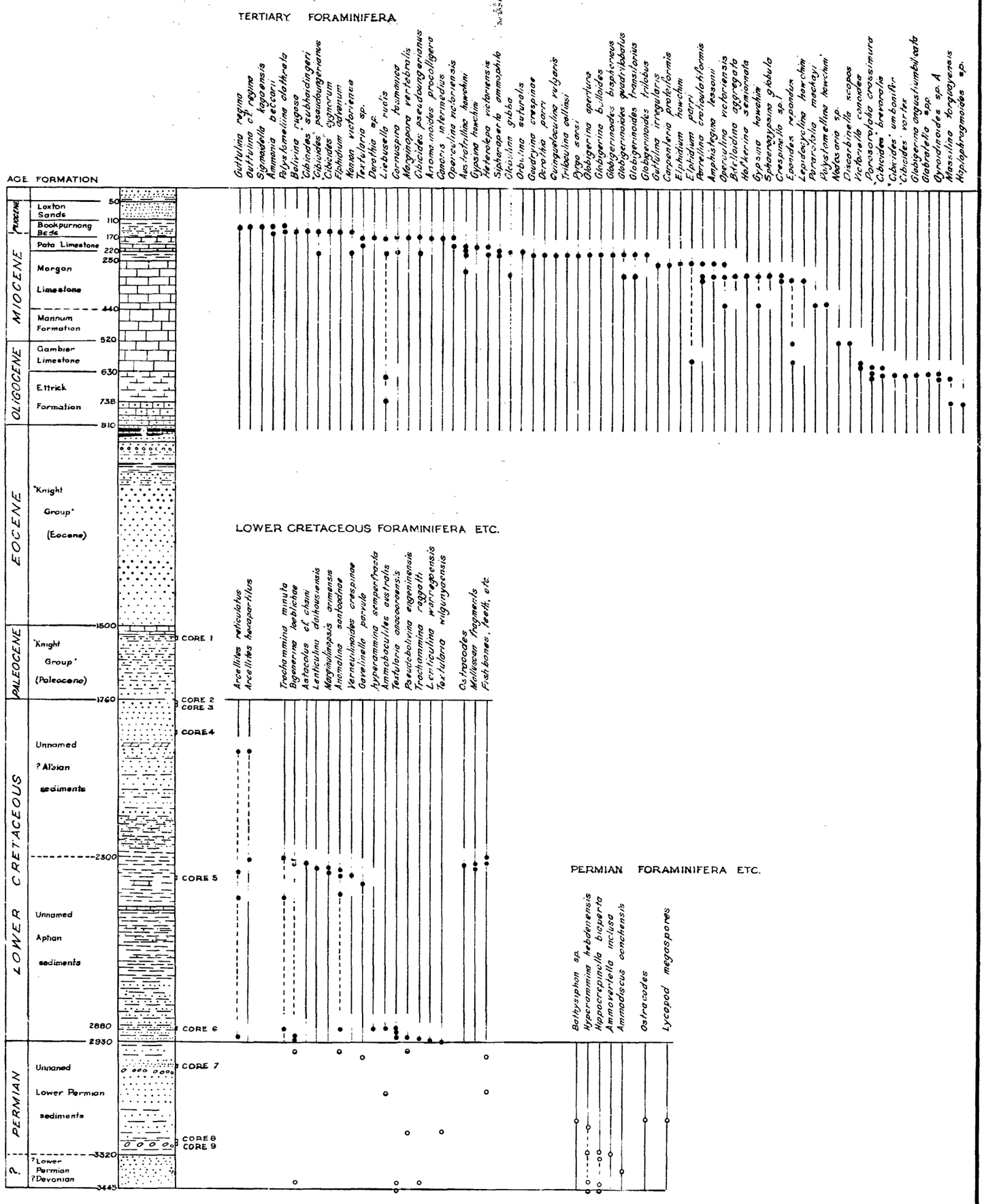
BEACH PETROLEUM MONASH N°1 WELL
COLUMNAR SECTION AND MICROPALAEONTOLOGICAL LOG



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To accompany palaeontological report 11/66
by N. H. Ludbrook.

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