DEPARTMENT OF MINES
SOUTH AUSTRALIA

KOPPERAMANNA BORE

- Palaeontological Report -

RECENT TO PLEISTOCENE

From the surface down to 28 feet the sand and clays may be of Recent to Pleistocene age.

OLIGOCENE:

Material from 28 feet down to 224 feet consists of sandstor sandy shale, carbonaceous matter white and brown clay with quartzite boulders. It is apparently a fresh water formation containing few, poorly preserved plant remains, but no other fossils are distinguishable. This is the Eyrian Series which is possibly basal Miocene but more likely Lower Oligocene.

UPPER CRETACEOUS:

From 224' to 1144' the material consists of greenish grey shale clay, mudstones and carbonaceous matter. No marine fossils were noted. Thes may represent the Winton Series.

LOWER CRETACEOUS:

From 1144' down to 2850' the material consists of dark grey shale, carbonaceous matter, sands and sandstones, containing fragments of marine shells in certain beds. Small pieces of shell, very friable and difficult to identify were particularly noted at the following depths:
1144'-1168', 1149'-1470', 1510'-1520', 1570'-, 1630'-1640', 1740'-1750, 1820', 1903'-1911', 1930'. They are represented by fragments of the following marine species. Pelecypoda Macoyella barkleyi, Fissilunula clarkei Nucula truncata, Modiola eyrensis, Cyremopsis opallites, Inoceramus sp. (Nacreous). Echinoidea, Cidaris sp. Brachiopods. At 2740'-2770' further unidentifiable fossil shell fragments occur, of a marine type. At 2800' there are no shell remains, the material is very hard and may be a deep water deposit. At 2806' there is a thin pebble bed. This is the Rolling Down Series.

JURASSIC:

The next layer from 2850'-2992' consists of sand, coarse

grit and gravel. This may be a transition series (Blysdale). From 2992' down to 3256' shale, coarse grit, fine white sandstone coal and carbonaceous matter is found. This may represent the top portion of the Jurassic Walloon Series.

The bore finished at 3256' in the Jurassic. It is likely in this area, that the Permian and Archaean Gneiss and Schists are found beneath.

REMARKS:

The bore passes through Recent, Pleistocene, Oligocene, Upper and Lower Cretaceous and ends in the Jurassic. The Cretaceous is here represented by about 2500' of carbonaceous matter associated with marine fossils. Departmental Palaeontologist. 4/3/49. B.C. Cotton.

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KOPPERAMANNA BORE

Depth	Description
0 - 8'6"	Sandy clay with gypsum and boulders of quartzite.
8'6"- 13'6"	Hard boulder
13'6"- 21'6"	Hard siliceous sandstone with quartzite boulders.
21'6"- 28'	Hard siliceous sandstone with small boulders.
28' - 63'4"	White pipe clay.
63'4"- 79'	White pipe clay.
79' - 145'	Brown clay
145' - 164'	Consolidated grey sand.
164' - 223'6"	Sandy shale with carbonaceous material.
223'6"- 224'	Cemented sand.
224' - 233'6"	Sandy shale with carbonaceous material.
233'6"- 308'	Sandy shale with hard bands.
308'6"- 338'	Sandy shale (grey).
338' - 338'6"	Hard shell.
338'6"- 406'	Grey sandy shale with thin hard bands.
406' - 426'	Sticky shale (grey)
426' - 507'1"	Greenish mudstone with carbonaceous bands.
507'1"-1040'	Green-grey shale - sandy in parts, occasional calcareous clay, traces of lignite. At 509'-510½' Pyritic band 952½'-954½' Hard Sandstone.
1040' -1054'	Fine green-grey sand and grey shale. Salt water in bore at 1040ft.
1054' -1060'	Grey shale -carbonaceous in part, fair amount quartz gravel (fine)
1060' -1070'	Grey shale.
1070' -1080'	Grey shale. With some gravel (fine)
1080' -1110'	Grey shale.
1110' -1112'	Grey shale - considerable carbonaceous material.
1112' -1144'	Fine green-grey sand - possibly with water.
1144' -1168'	Fine green-grey sand. Occasional shale parting becoming shaley at 1166' on, and at 1156' shell fragments.
1168' -1191'	Grey sandy shale -fair amount carbonaceous matter - fine flecks white mineral common (Mica?)

Depth	Description
1191' - 1213'	Grey sandy shale, becoming more sandy and laminated with depth - bedding horizontal - current.
1213' - 1307'	Dark grey clay - shale; from 1260' onwards occasional trace shell fragments.
1307' - 1317'	(Core) Dark grey shale - occasional sandy layer fair amount of carbonaceous material; considerable number of shells.
1390' - 2080'	Dark grey shale - considerable carbonaceous material.
	Possible shell fragments at:
	1440-1470, 1510-1520?, 1570, 1630-1640, 1740-1750, 1820, 1903-1911 (fair number of small shells in core), 1930.
2080' - 2100'	Shale - considerable greenish sand.
2100' - 2117'	Mainly grey-green sand (fine); some shale - considerable carbonaceous matter.
	At 2100-2108 fair number of shells.
2117' - 2278'	Dark shale - considerable carbonaceous matter. Fair amount white calcareous fragments.
2278' - 2295' Core	Dark shale - some carbonaceous matter.
	Shell fragments at: 2370, 2410, 2460.
2295' - 2700'	Dark shale - some carbonaceous matter.
	At 2460' - 6" very hard sandstone.
2700' - 2850'	Dark shale - considerable carbonaceous matter; occasional white calcareous fragments.
	At 2740-2770' possible shell fragments.
	At 2601½-2606½ mixture green-grey sand and dark shale sand shale.
	At 2800 - 2813' Mixture green-grey sand and dark shale sand. Fair number flakes white mica(?).
	At 2813'- 2865' Dark grey shale - sandy in parts.
	At 2857' Water flowing between 8⅝" and 6" casing (after attempting to seal off) Approx. 160 g.p.h. - taste fresh.
0 - 500.	No core (taken from driller's log)

KOPPERAMANNA BORE

APPENDUM

2865' - 2894'	Dark shale with numerous thin sandy layers. Bedding mainly flat. At 2866' drag fold bedding 45°
2894' - 2907'10"	Dark grey shale - thin bands of medium-coarse quartz sand (cemented) fairly common. Bedding mainly flat but at 1984'. 45° 2905' - 2907' drag folding.
2907' 10" - 2929½'	Fine grey-white sandstone with numerous shale partings - considerable carbonaceous matter and mica. At 2909' 2" coarse sandy grit. At 2922' 6" coarse sandy grit with fine quartz gravel. At 2929' 3" coarse sandy grit.
2929' - 2949'	No core.
2949' - 2955'	(only ½ ft. core) white sandstone (fine)
2955' - 2992'	(15ft. core) mainly dark shale - occasional sandy layer. At 2975? 3" coarse sandy grit.
2992' - 3001'	Grey sandstone (fine-grained) occasional shale parting. At 2992½ 2" coarse grit.
3011' - 3160'	Sludge - mainly white sandstone.
3081 - 3089'	Core coarse white grit - felspathic?
3160' - 3169'	No core or sludge.
3160' - 3180'	(2ft. of core) white sandstone (fine) micaceous
3180' - 3190'	No core or sludge.
3190' - 3210'	Sludge, dark shale.
3210' - 3256'6"	Sludge, mainly white grit (fine) and some shale.

End of Bore at 3256'6"

22.2.49

T. A. BARNES,
SENIOR GEOLOGIST.

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PETROGRAPHIC ANALYSIS OF SELECTED PORTIONS OF THE KOPPERAMANNA DRILL HOLE

The samples were selected, after consultation with Mr. T. A. Barnes, from the arenaceous portions of the drill core.

The majority of the samples are more or less felspathic sandstones, as described in the log, but several extra comments may be added.

(1) Samples from 1134'; 1156'; 1168'6"; 1183'; 1193'; 1306'; 2100'-2110'. These rocks are dark grey-green in colour and of fine even grained texture. Although they contain a considerable amount of quartz the presence of abundant plagioclase (andesine or labradorite) in them, places them in the category of greywacke rather than sandstone.

(2) Samples from 2809'; 2905'-2906'; 2925'-2929'6": These rocks are cemented by secondary calcite in optical continuity over large areas, thus may be regarded as "Fontainbleau Sandstones."

In the analysis of the specimens the following procedure was adopted.

Large representative portions of rock were carefully disintegrated so as to preserve the original grain size, thoroughly mixed and a 5 gram sample taken.

This 5 gram of sand was subjected to a weak acid digest to remove calcareous and ferruginous materials. The residue was then separated in a bromoform battery and the heavy and light fractions examined for mineral contents.

The results are set out in the accompanying table.

In most cases the grains were found to be well rounded, although tourmaline and zircon generally retain their crystalline outline to a large extent. Details of granular shape are available if desired.

A. W. G. WHITTLE,
PETROLOGIST.

3.6.49.

Sample Taken From	Light Fraction	Soluble Calcareous Ferruginous Matter	Heavy Fraction	COMPONENTS OF THE HEAVY FRACTION (in order of abundance)
1134'	82.3% 60% Kaolinized felspar 35% colorless quartz 5% carbonaceous matter Av. grain size // .2 mm	17.1%	0.6%	Principal - Magnetite, ilmenite, leucoxene Minor - Biotite, muscovite, zircon, sphene, garnet, edpidote Av. garin size // .2mm.
1156'	84.2% 65% Kaolinized felspar (labradorite) 30% colorless quartz. 5% carbonaceous matter Av. grain size // .2 mm.	15.2%	0.6%	Principal - Magnetite, ilmenite, leucoxene. Minor - Epidote, biotite, zircon, garnet, rutile. Ave. grain size // .2 mm.
1168'6"	84.6% 65% kaolinized felspar (labradorite) 30% colorless quartz 5% carbonaceous matter Chlorite. Av. grain size // .2 mm.	15.2%	0.2%	Principal - Magnetite, ilmenite, leucoxene. Minor - Epidote, biotite, zircon, tourmaline. Av. grain size // .1 mm.
1183'	72.0% 65% Kaolinized felspar (Andesine) 30% colorless quartz 5% carbonaceous matter chlorite mica. Av. grain size // .2 mm.	27.9% (Mainly calcareous)	0.1%	Principal - Magnetite, ilmenite, leucoxene, epidote. Minor - zircon, tourmaline, garnet Av. grain size // .1 mm. iron ore // .3 mm.
1193'	77.4% 80% kaolinized felspar 15% colorless quartz 5% carbonaceous matter Av. grain size // .1 mm.	22.5% (mainly calcareous)	0.1%	Principal - magnetite, ilmenite, leucoxene. Minor - tourmaline, zircon Av. grain size // .1 mm.
1306'	47.7% 80% kaolinized felspar 15% colorless quartz 5% carbonaceous matter Av. grain size // .1 mm	52.2% (mainly calcareous)	0.1%	Principal - Zircon, magnetite, ilmenite, leucoxene. Minor - tourmaline Av. grain size // .1 mm.
Average material between 2100' - 2110'	83.0% 80% kaolinized felspar (Andesine) 18% colorless quartz 2% carbonaceous matter Av. grain size // .3 mm	16.9%	0.1%	Principal - Magnetite, ilmenite, leucoxene, biotite, zircon. Minor - Muscobite, tourmaline, garnet. Av. grain size // .2 mm.
2809'	77.8% 80% Kaolinized felspar 20% colorless quartz Av. grain size // .5 mm	22.1% (mainly calcareous)	0.1%	Principal - Zircon, Leucoxene, ilmenite, magnetite Minor - Muscobite, tourmaline, garnet, chlorite, biotite Av. grain size // .2 mm.
2902'	92.7% Principally rounded quartz grains with a little kaolin powder Av. grain size // .1 mm	7% (mainly ferruginous	0.3%	Principal - Muscovite, leucoxene, zircon. Minor - Tourmaline, Spinel, garnet Av. grain size // .2 mm. (muscovite // .5 mm)
2905' - 2906'	74.6% 95% colorless quartz8 5% kaolinized felspar ~~bonaceous matter~~ Av. grain size // 1.5 mm	25.1% (mainly calcareous)	0.3%	Principal - Laucoxene, tourmaline Minor - Garnet, chlorite, muscovite, zircon, spinal. Av. grain size - tourmaline // .6 mm. leucoxene // .4 mm garnet // .4 mm remainder // .2 mm

Sample taken From	Light Fraction	Soluble Calcareous Ferruginous matter	Heavy Fraction	COMPONENTS OF THE HEAVY FRACTION (in order of abundance)
2922' (coarse material)	76.0% 98% colorless quartz 2% Kaolin Av. grain size ⁄ .5 mm	23.7% (mainly calcareous)	0.3%	Principal - Ilmenite, leucoxene, magnetite, tourmaline, zircon Minor - Garnet, rutile, spinel, sphene, hornblende Av. grain size - principal constituents ⁄ .4 mm. minor constituents ⁄ .2 mm.
2922' (fine material)	95.5% 90% colorless quartz 10% Kaolin and carbonaceous matter Av. grain size ⁄ .1 mm	3.6%	0.9%	Principal - Ilmenite, leucoxene, magnetite, zircon, muscovite Minor - tourmaline, rutile Av. grain size ⁄ .2 mm.
2925' - 2929'6" (coarse material)	90.0% 90% colorless quartz 10% Kaolinized felspar Av. grain size = 1.5 mm	10.0% (mainly calcareous)	0.1%	Principal - Leucoxene, zircon, muscovite, garnet. Minor - tourmaline, iron ore, apatite, rutile Av. grain size ⁄ .3 mm.
2925' - 2929'6" (fine material)	96.6% 80% colorless quartz 20% kaolinized felspar Av. grain size ⁄ .2 mm	2.0%	1.4%	Principal - Zircon, leucoxene Minor - Muscovite, tourmaline, chloritem iron ore, garnet Av. grain size - musvocite ⁄ .4 mm. remainder ⁄ . 15 mm
2949' - 2955' (average material)	97.0% 95% colorless quartz 5% kaolinized felspar Av. grain size ± .1 mm	2.0%	1.0%	Principal - Leucoxene, muscovite Minor - Zircon, tourmaline, epidote. Av. grain size - muscovite ⁄ .4 mm. remainder ⁄ .1 mm.
2963' - 2982' (coarse material)	97.7% colorless quartz Av. grain size = 1.0 mm	2.0%	0.3%	Principal - Leucoxene, muscovite, zircon Minor - Tourmaline, sphene, spinel, garnet, apatite.
2963 - 2982' (fine material)	98.4% 90% colorless quartz 10% kaolinised felspar Av. grain size 0.4 mm	1.0%	0.6%	Principal - Leucoxene, zircon, muscovite Minor - tourmaline, spinel, garnet, chlorite Av. grain size - muscobite = ⁄ .3mm. remainder ⁄ .1mm.
2992' - 3001' (fine material)	95.8% 70% colorless quartz 30% kaolinized felspar Av. grain size ⁄ .5 mm	2.5%	1.7%	Principal ¾ Muscovite, zircon, tourmaline, leucoxene. Minor - Chlorite, rutile, epidote. Av. grain size - muscovite = 1.5 mm remainder⁄ 0.5 mm.
3081' - 3089' (coarse material)	99.0% 90% colorless quartz 10% Kaolinized felspar Av. grain size⁄ 2.0 mm	1.0%	Trace	Mainly Muscovite and leucoxene Av. grain size⁄ 0.5 mm.
3081' - 3089' (fine material)	96.0% 90% colorless quartz 10% Kaolinized felspar Av. grain size = 0.1	2.5%	1.4%	Principal - Muscovite, leucoxene, zircon Minor - Tourmaline, iron ore, chlorite, rutile, epidote. Av. grain size ⁄ .5 mm
3169' - 3180' (coarse material)	99.9% 80% colorless quartz 20% Kaolinized felspar Av. grain size⁄ 2.0 mm.	-	0.1%	Mainly leucoxene and zircon. Av. grain size ⁄ 0.5 mm
3169' - 318-' (fine material)	97.6% 80% colorless quartz 20% Kalonised felspar Av. grain size ⁄ 0.5 mm	1.0%	1.4%	Principal - Muscovite, leucoxene, zircon. Minor - Garnet, tourmaline, iron ore, spinel Av. grain size⁄ 0.5 mm.