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GEOLOGICAL RECONNAISSANCE FOR LONG RANGE WEAPONS ESTABLISHMENT

Mt. Vivian, Parakylia and Bon Bon Pastoral Area

by

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G.S. 385

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INTRODUCTION

A geological survey was undertaken during the period October 11th - 20th, 1955 in company with L. Beadell, Range Reconnaissance Officer, to report on the strata underlying an area situated along the centreline between points 30 m. and 60 m. and for ten miles on each side of that line.

The area examined covers parts of Mt. Vivian, Parakylia, and Bon Bon Pastoral Stations. Rock exposures were mapped and the spoil from all wells and Bores in the locality was examined. The area is readily accessible along the newly constructed road which follows the Woomera - Mt. Eba Telephone line and by unimproved station tracks; even timbered and sand-dune covered terrain can be fairly readily traversed by 4-wheel drive vehicles.

Available bore logs are appended.

PLANS

Accompanying this report are a locality plan and a plan on air photo scale of approximately 1.35 inches to the mile. The larger plan shows the area surveyed, access tracks, rock outcrops, sand dunes, bores and wells. The generalised section depicts strata underlying the centreline.

PHYSIOGRAPHY

Topographically the area is almost featureless, the terrain being flat to gently undulating the monotony of which is broken by low sand dune ridges which rise to 5 - 30 feet above the general level. Low tablelands and scarp forming features owe their preservation to differential erosion of the underlying rocks due to a siliceous capping in those areas. The most prominent tableland is that containing Wingilpin Bluff; this and other scarps are indicated on the plan.

Lakes Wingilpin, Parakylia and Reynolds, are depression within the tableland country which drain surface runoff of small areas about their margins by a system of short, steep sided

gullies. Elsewhere drainage of surface waters takes place into the porous underlying sediments by way of small crabholes, cane-grass depressions and swamps. Short water courses dissect the tableland scarps but elsewhere drainage channels are absent.

GEOLOGY

Quaternary soils, sand dunes and limestones form a superficial cover to loosely consolidated shales, sandstones, grits and gravels which are probably of Jurassic age and overlie Cambrian siltstones, quartzites and shales. Rock outcrops are confined to scarp edges, lake margins and to isolated occurrences on the plains proper where the mantle of soil and sand is thin or absent. The various units are described in some detail below.

Quaternary

(1) Soils. Soils derived from break down of pre-existing formations are generally shallow and variable in depth from 0 - 10 feet. They consist of red brown clays, often sandy. A surface mantle of porcellanite gibbers is common with occasional quartzite boulders.

(2) Sand Dunes. Sands derived chiefly from the underlying Jurassic sandstones during the Arid Recent period have been blown into east-west trending dunes in the lower country surrounding the tablelands. They are loose and unconsolidated though may have been 'fixed' by the growth of vegetation. The height and spacing of the dunes is variable. In the northern part of the area the dunes rise to 10 - 15 feet above the general level and are usually dispersed while in the southern-most part of the area the dunes attain to a height of 30 feet. The flats between them are sandy if the dunes are close together but if they are scattered the inter-dune flats consist of gibber strewn clay soils.

(3) Limestone. Nodular to massive or sheeted varieties of moderately hard limestone occur in some areas under a shallow cover of soil. Its thickness is probably variable up to about 20 feet. It is not possible to

define the areal extent of this horizon.

(4) Gibber. The gibbers of the present land surface are remnants of a siliceous capping formed during the Pliocene period when silicification of the surface rock exposures took place and these were converted into a very hard, grey, dense porcellanite. Shales, sandstones, grits etc. alike were affected to a depth of less than two feet. Desiccation of this formation is advanced.

(?) Jurassic

(?) Jurassic sediments underlie the whole area mapped except for a small portion in the eastern sector about Lake Parakylia where these beds are absent. As outcrops are isolated and infrequent, attention was paid to bore logs and sludges and well spoil.

Deposits of this age are generally poorly sorted lacustrine sediments in which the principal constituents are quartz and Kaolin. Rapid variations in depositional environment are reflected in frequent alterations of fine shales and coarse grits. Cross bedding structures and pronounced lensing of strata are common features. Outcrops at highest elevations in the area are of white clay shales compact though very soft. Bores and wells indicate a thickness of at least 150 feet of sands and grits, all rich in Kaolin, with fine grained white, grey and brown shales and coarse boulder gravels. The sediments appear to be only loosely consolidated but carry thin hard bars of quartzite or cemented grit. Sandstones are dominant and show all variations in grain size to coarse grits and poorly sorted gravels. Fine grained mica is a common constituent.

Examination of bore logs suggests heterogeneity of grade and marked lensing of strata; this is indicated on the accompanying generalised section.

Cambrian

Flat bedded siltstones, flaggy quartzites and green-

brown shales of this age outcrop round the western and southern shores of Lake Parakylia. They were encountered in north Lectm and Butchers' Wells under a cover of approximately 150 feet of ? Jurassic sandstones. In general these sediments are much harder and more uniform in texture than the overlying younger sediments.

CONCLUSIONS

The geological succession comprises flat lying hard Cambrian siltstones and quartzites overlain by softer (?) Jurassic Kaolinitic sandstones, shales, grits and gravels, tertiary remnants and Quaternary soils and sand dunes.

The seismic characteristics of these sediments have been discussed with C. Kerr Grant, Senior Geophysicist. The loose nature of the surface sand dunes and the poorly sorted subsurface sandstones, grits, shales and gravels, their lenticular and heterogeneous nature, and the occurrence in them of thin discontinuous hard bands are features not conducive to regular transmission of seismic waves. The velocity of transmission in loose sands and gravels is 1500 - 2000 feet/second, in compact shales up to 8,000 ft./sec. and in dense quartzites to 15,000 ft./sec.

For the detection of point and time of impact it is possible that geophones would need to be spaced at not more than 1,000 ft. centres. These factors are determinable only by trial and are dependent on the energy of impact.

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Mt. Vivian Well Bore

Red Clay	0 - 1 ft.
Limestone	- 25
White chalky sandstone	- 55
White, yellow, purple sandstone	- 101
Hard yellow sandstone	- 165
Loose sand	- 173
Hard sandstone bar	- 175
Coarse grit, sand	- 185

cased to 182 ft.

Kibore Bore

Red clay	0 - 4 ft.
Limestone	- 25
Grit	- 60
Yellow brown sandstone	- 86
Yellow shale	- 145
Blue grey shale	- 342
Hard bar	- 344
Brown shale	- 354
Grey sandy shale	- 362
Hard bar	- 368
Fine sand	- 380

Bluff Bore

Red clay	0 - 3 ft.
White, yellow, red sandy chalk	- 70
Sandstone	- 79
Fine sand	- 92

cased to 92 ft.

Sandhill Bore

Sand	0 - 3 ft.
Red clay	- 9
Gravel, sand, grit	- 29
Sandstone	- 34
Gravel, grit, sand	- 50
White sandstone	- 64
Gravel, sandstone	- 137
Grey sandstone	- 140
Loose sand	- 184
Sandstone	- 195

Fisher's Bore

Clay	0 - 3 ft.
Limestone	- 7
Hard sandstone	- 16
White sandstone	- 40
Gravel in sandstone	- 47
* Coarse boulder gravel	- 53

* Contains boulders of Gawler Range porphyry

Karana Bore

Red clay	0 - 4 ft.
White sandstone	- 64
Coarse boulder gravel	- 91

Woolshed Bore

Red Clay	0 - 4	ft.
Hard sandstone	- 14	
White sandstone	- 32	
Brown shale	- 54	
Hard sandstone	- 59	
Brown sandstone	- 62	
Loose sand	- 64	

McCarthy's Bore

Red clay	0 - 4	ft.
Hard sandstone	- 16	
Sand	- 30	
Hard Sandstone	- 32	
White sandy chalk	- 90	
Sandstone	- 117	
Hard brown sandstone	- 124	
Sandstone	- 181	
Hard sandstone	- 184	
Sand	- 185	
Hard brown sandstone	- 188	
Quartzite	- 197	
Sandstone	- 200	

Homestead Bore

Red clay	0 - 4	ft.
Clay and limestone	- 15	
Coarse boulder gravel	- 25	
Gravel, sandstone	- 55	
White sandstone	- 61	
Hard sandstone	- 62	
Loose sand	- 76	
Hard sandstone	- 78	
Brown sandstone	- 91	
Hard sandstone	- 95	
White sandstone	- 101	

Swamp Well

White chalk	0 - 23	ft.
Yellow, brown shales	- 80	
Sandstone	- 103	
Loose sand, grit	- 108	

Lake Yinciinin Bore

Red Clay	0 - 2	ft.
White chalk	- 41	
Brown, purple sandstone	- 61	
Hard sandstone	- 63	
Sandstone	- 70	
Coarse boulder gravel	- 71	
Brown clay	- 200	

Tableland Bore No. 1

Red clay	0 - 2	ft.
Limestone	- 21	
White chalk	- 35	
White, yellow, brown sandstone	- 258	

Mt. Ebo Road Bore.

Brown clay	0 - 1	ft.
Limestone	- 18	
Hard bar	- 20	
White, yellow, brown sandy clays	- 65	
White yellow, brown sandstone	- 265	

Tableland Bore No. 2.

Brown clay	0 - 5	ft.
White sandstone	- 88	
Hard Quartzite	- 91	
Yellow sandstone	- 145	
* Blue shale	- 230	

* Gawler Range porphyry pebble recovered from this horizon.