Report Records

Rept. Bk. No. 60/124
G.S. No. 3171
D.M. 1225/60

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

EXPLORATION GEOPHYSICS SECTION

REPORT OF RECONNAISSANCE RESISTIVITY SURVEYS SOUTHERN YORKE PENINSULA

by

J. J. Hussin
Geophysicist

16th June, 1965

D.M. 1225/60

DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT ON RECONNAISSANCE RESISTIVITY SURVEYS SOUTHERN YORKE PENINSULA

by

J. J. Hussain
Geophysicist
EXPLORATION GEOPHYSICS SECTION
GEOLOGICAL SURVEY

CONTENTS

PLAN REFERENCES

Figure	Title	Plan No.
1	Southern Yorke Peninsula	65-646
2	Electrical Soundings near Warooka Supply Bore	65-647
3	Warooka Water Supply Bore Log and Interpretation	S 4399
4	Comparison of Electrical Sounding Graphs	65-648

Rept. Bk. No. 60/124
G.S. No. 3171
D.M. 1225/60

16th June, 1965

Rept. Bk. No. 60/124
G.S. No. 3171
D.M. 1225/60

DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT OF RECONNAISSANCE RESISTIVITY SURVEYS SOUTHERN YORKE PENINSULA

ABSTRACT

In September 1964 and June 1965 an exploratory survey found good hydrological - geophysical correlation for the sedimentary formations in Southern Yorke Peninsula. Further work is warranted to delimit the boundaries of the aquifers and the extent of sea water ingression.

INTRODUCTION

The Hydrology Section requested an exploratory survey to determine the degree of correlation possible between the hydrogeology and geophysical results in Southern Yorke Peninsula. If positive results could be obtained, future geophysical surveys would accelerate solutions to groundwater problems.

GEOLOGY

The sediments in the area consist mainly of aeolianite, generally about eighty feet thick, and usually with a kunkar crust. Loose, unconsolidated sand dunes occupy considerable areas along the west coast. Underlying the aeolianite in places is a blue-grey clay of Permian age. Over most of the southern peninsula, drilling has shown the bedrock to be granite or schist.

METHODS AND EQUIPMENT

The S.I.E.P. 19 refraction seismic equipment was used for one day in an effort to determine the depth to bedrock.

The results were inconclusive because of the resistant, high velocity, limestone layers intercalated with the aeolianite and occurring near the surface.

During September, 1964, the Vibroground resistivity meter was employed for obtaining 141 electrical soundings. Because of its limited power output, depth of penetration was inadequate, especially when clay or saline horizons were encountered. However, moderate success was achieved when a dry or fresh water aquifer to a depth of forty feet was present. These results were confirmed by later drilling.

In June, 1965, the Geoscience I.P. transmitter capable of two amperes output was used in conjunction with a Hewlett Packard voltmeter and filter. The resistivity depth probing technique used was the Schlumberger electrical sounding method with the current electrode spacing expanding from six to six hundred feet . The majority of the 29 electrical soundings obtained with the method penetrated bedrock.

INTERPRETATION

Electrical soundings were carried out at 0.3 mile intervals along an east-west road near the Warooka Town Supply Bore which is 13 miles west of Warooka. As can be seen in Figure 2, the resulting electrical sounding graphs show much similarity. In Figure 3, the Warooka Town Supply Bore log is compared to the interpretation of the electrical sounding. There is excellent agreement between them. By varying the resistivity parameters and depths, the graphs in Figure 2 should give a clear picture of the hydrogeological conditions of the basin at these points.

Comparison of the electrical sounding graphs in Figure 4 shows that both the presence or absence of an aquifer and the general salinity of groundwater in an aquifer can be determined readily. ES 2 indicates fresh water sands overlying basement clays whereas ES 4 indicates only clays overlying bedrock. ES 13

indicates fresh water sands at least 80 feet thick whereas ES 7 indicates saline water at a depth of 30 feet underlying the fresh water sands.

CONCLUSIONS AND RECOMMENDATIONS

Preliminary interpretation of the 29 electrical soundings performed during June, 1965, shows that good correlation is available between the resistivities of the subsurface formations and hydrogeological conditions.

Further field work and more refined methods of interpretation are recommended in order to delimit the basin areas and sea water ingression of the Southern Yorke Peninsula.

J. J. Hussin
per B.E.O.M.

J. J. Hussin
Geophysicist
EXPLORATION GEOPHYSICS SECTION

JJH:AGK
16/6/65

LEGEND

Recent – Pleistocene

Unconsolidated coastal dunes

Calcareous aeolianite, travertine & saline swamps.

Permian

P P P Glacial till

Archaean

Undifferentiated gneisses, schists & granite

12 ● 65' (depth in feet) 27' (water level) 500 salinity p.p.m. 1000 supply in galls/hr. } Completed bore.

5 A ● Abandoned bores

× Electrical Soundings

Corny Pt.

Pt. Turton

CARRIBIE

PARA WURLIE

COONARIE

WARRENBEN

Point Davenport

Stenhouse Bay

Cape Spencer

N

SCALE

Miles 2 1 0 2 4 6 8 10 Miles

FIG. 1

SOUTHERN YORKE PENINSULA

RESISTIVITY SURVEYS

To accompany report by J.J. Hussin

65-646

Gh 10/11 + 14/15

APPARENT RESISTIVITY IN OHM-METRES

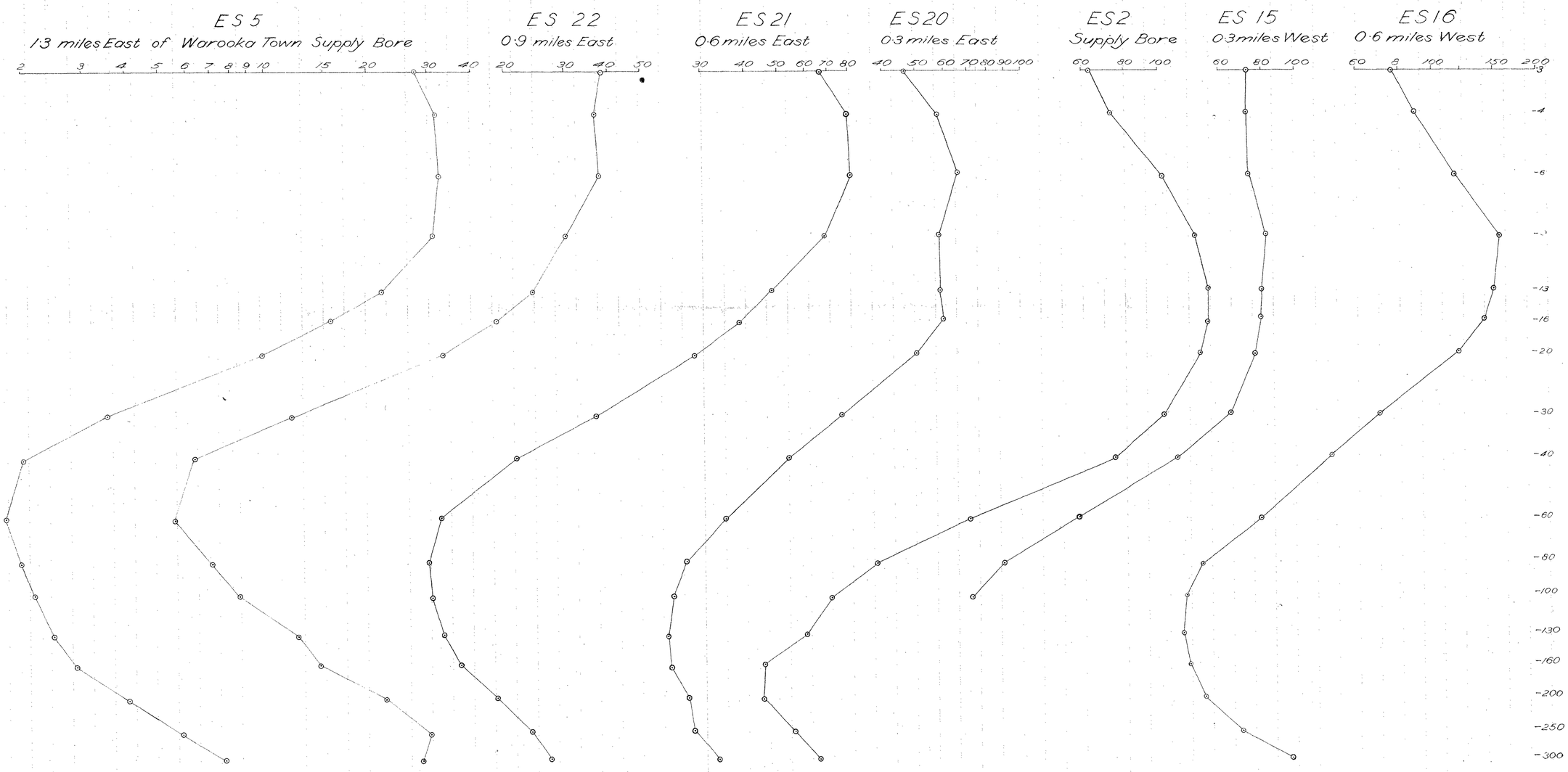


FIG.2

To accompany report by J.J. Hussin

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
ELECTRICAL SOUNDINGS NEAR WAROOKA SUPPLY BORE SOUTHERN YORKE PENINSULA			
		Drn.	SCALE:
		Tcd. G.M.	65-647
		Ckd.	Gh 10/11 + 14/15.
Director of Mines		Exd.	DATE: 21·6·65

WAROOKA WATER SUPPLY BORE

BORE LOG GEOPHYSICAL INTERPRETATION

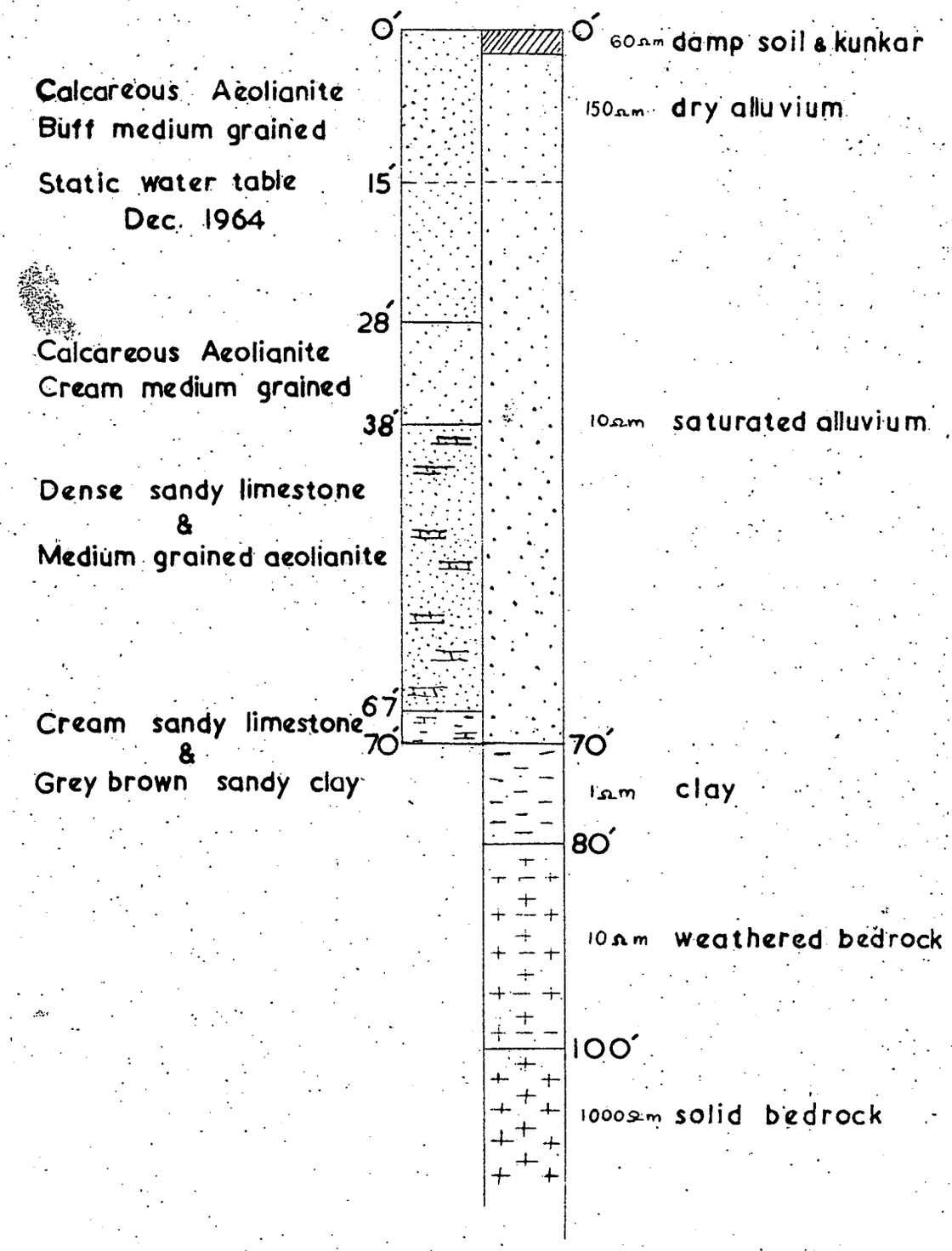


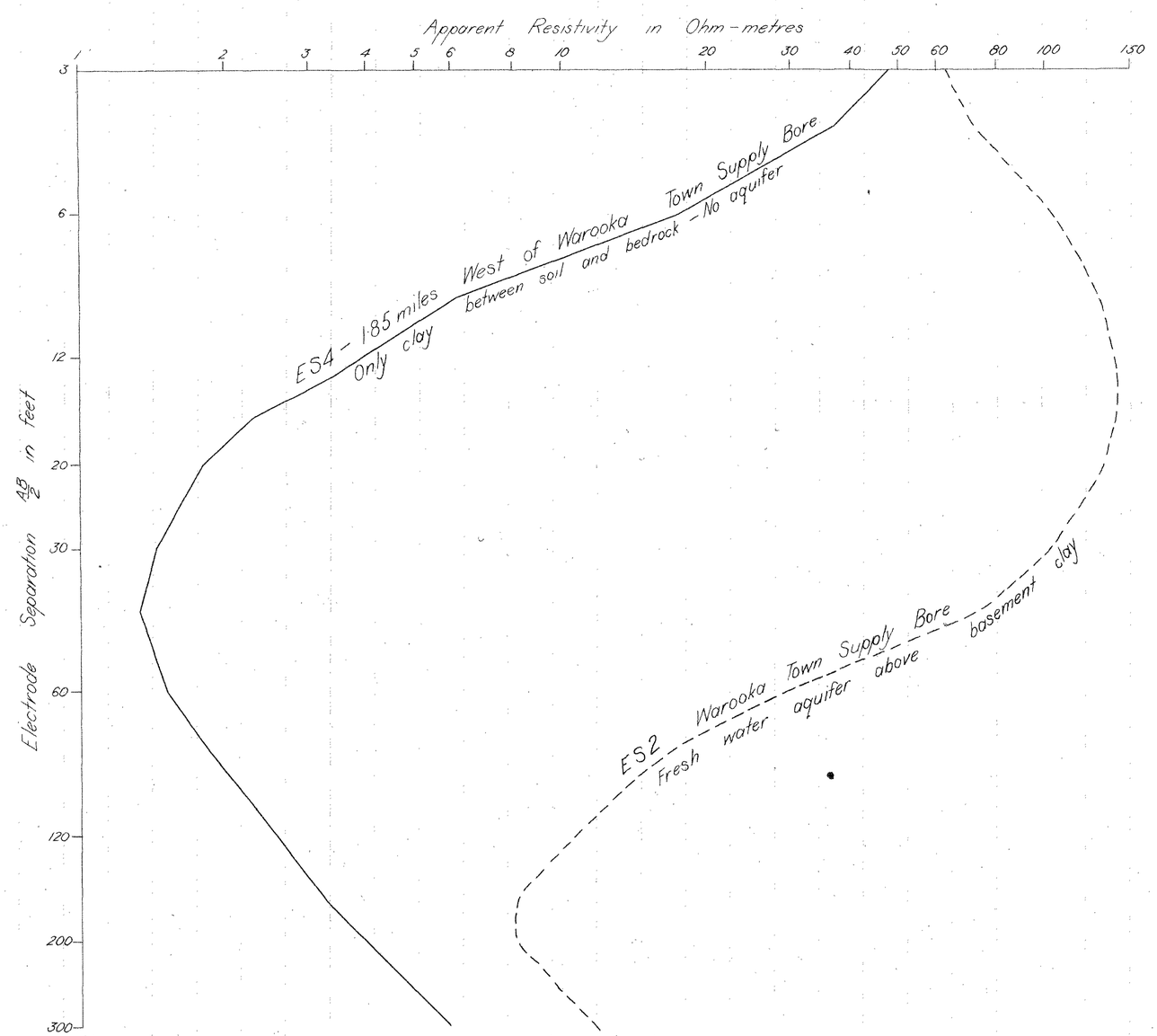
Fig 3.

To Accompany report by J. J. Hussin

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn.	WAROOKA	D.M.	Scale ——
		Tcd. R.L.T.	WATER SUPPLY BORE	Reg.	S 4399
		Ckd.	LOG & INTERPRETATION		Gh 10/11+14/5
Director		Exd.			Date 22·6·65

400— 6.63 1423



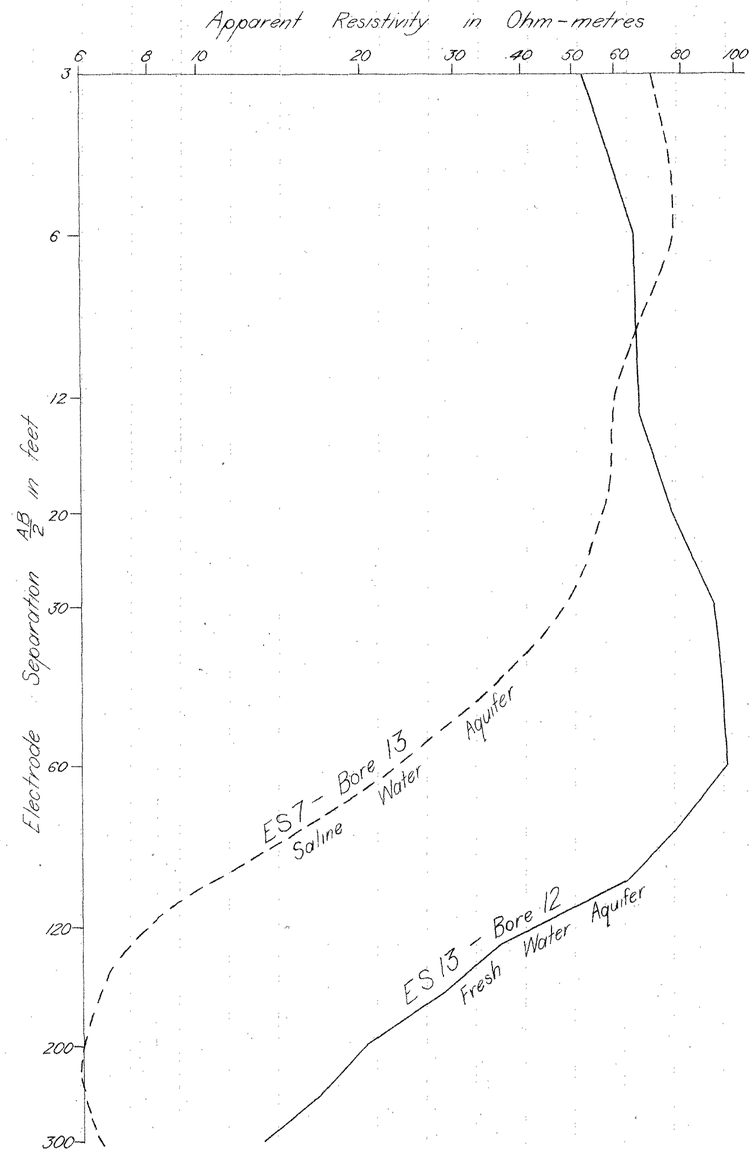


FIG. 4

To accompany report by J.J. Hussin

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
COMPARISON OF ELECTRICAL SOUNDING GRAPHS (WAROOKA TOWN SUPPLY BORE)			
		Drn.	SCALE:
		Tcd. R.H	65-648
		Ckd.	Gh10/11+14/15
Director of Mines		Exd.	DATE: 17·6·65