FIFTH REPORT ON GEOPHYSICAL INVESTIGATION OF THE BURRA AREA

Note on Interpretation of I.P. Data within Zone "C" - refer pages 3 to 5.

The position of a 2" G.I. waterpipe has been shown on figure 1 (dwg. 65-209) and corresponds with the frequency effect anomalies on lines E, F and G. The intense readings on line E could have arisen from the pipe as it intersects the line twice within 200 feet and runs very close to it over this distance. The water pipe intersects lines F and F at almost right angles and its effect would be much less than that on line E.

Because of the width of the anomalies within Zone "C" on lines E, F and G and the presence of similar and, apparently, correlatable anomalies on lines removed from the influence of the water pipe, it appears that the anomalies on E, F and G are composite, with a broad effect caused by changes in earth resistivity and the presence of polarizable material distorted by the pipe.

In the "Discussion of Results" (page 3 line 23), it can be assumed that the "other source" refers to the water pipe. The recommendations for siting drilling targets on lines E and G (pages 4 and 5) should therefore be cancelled, but an investigation of Zone "C" should be undertaken as recommended in the "Sixth Report on Geophysical Investigation of the Burra Area" Report G.S. No. 3264.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

FIFTH REPORT ON GEOPHYSICAL INVESTIGATION OF THE BURRA AREA.

by

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GEOLOGICAL SURVEY.

CONTENTS

15.3.65

Rept.Bk. 60/50
G.S. 3102
D.M. 240/63

MAP REFERENCE

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65-210	Fig.II	Burra Area - Line 5N Contours of Resistivity and Frequency Effects with 400' DIPOLE Configuration.	200' to 1"
65-211	Fig.III	Burra Area - Line C Contours of Resistivity and Frequency Effects with 200' and 100' Dipole-Dipole Configurations.	200' to 1"
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DEPARTMENT OF MINES
SOUTH AUSTRALIA

FIFTH REPORT ON GEOPHYSICAL INVESTIGATION OF THE BURRA AREA.

ABSTRACT

The area previously surveyed using 400' dipole-dipole configuration Induced Polarization in the "racecourse" area near Burra, was resurveyed using 200' dipole-dipole configuration. This was done to obtain a closer control of the anomalies previousl delineated so that drilling targets could be confirmed or modified. The recent information delineated two sets of anomalies, one associated with the previously mapped zone "C", and another nearer the contact of the IA, IB beds. Drilling targets to test these sets are recommended.

INTRODUCTION

Following recommendations from the Senior Geologist, Metallics Section, detailed Resistivity and Induced Polarization work was carried out across the zone "C" area, near Burra, which was previously delineated by 400' dipole-dipole I.P. survey. It was recommended that lines 5N and 6N be resurveyed using 100' dipoles, and at the discretion of the officer in charge, the dipole distance be changed to obtain optimum information from results.

To obtain a closer control of the zone, three lines were included between 5N and 6N, and another approximately 250' north of 6N. A completely new grid was surveyed to eliminate previous surveying errors and also tie in with greater certainty to the mining grid. The mining grid could not be used, as the lines ran obliquely to the suspected strike of the area, and would prohibit any relationship with previous I.P. work. The lines were named "A", "B", "C" etc., and lines "B", "D" and "F" were coincident with previous I.P. lines 5N, 5.5N and 6N respectively. The work was carried out during December, 1964 and January, 1965.

METHODS USED

Originally, the grid was surveyed using 100' dipole spacin with the I.P. equipment. It was found however, that there was insufficient depth penetration, and the dipole distance was increased to 200'. On completion of a "double set-up" on the centre position of the 100' dipole spread, a "single set-up" was adjoined to each end of the double set-up, so that a complete coverage of the anomalous area, plus some "background," could be obtained.

Two hundred feet dipole measurements were not taken on line B, because of electrical interference caused by the proximity of railway lines and buildings with their associated electrical appliances, which would have made readings unreliable.

An experimental resistivity survey was carried out by J. J. Hussin, using a "Vibroground" resistivity instrument at positions on the new grid. These readings were designed to obtain estimations of the depth of overburden, ~~and~~ resistivity values of overburden and the different outcropping geological beds in this area. Only a limited amount of information was obtained because of the high contact resistance of electrodes to ground. (See docket no. 240/63 for minute on work carried out).

DISCUSSION OF RESULTS

Contours of Frequency Effects and Resistivities for 100', 200' and 400' (400' on lines 5N, 5.5N and 6N) are shown on Figs. II, III, IV, V, VI and VII. A map showing position of lines, both old geophysical, geochemical and new geophysical, and position of anomalies are shown on fig. I.

Resistivity work carried out by J. Hussin (see Docket 249/63) indicated that the depth of overburden is greater than 100ft. and that the average resistivity of the overburden is of the order 25 ohm metres. By assuming that dipole-dipole apparent resistivity values are similar to those calculated from the Schlumberger method used by Hussin, the relative depths of overburden on each line can be ascertained by following the 40 ohm metre contour of the resistivity contours of the 200' dipole-dipole survey. Actual depths cannot be estimated, until the resistivity values are "tied in" with drilling information, but it can be seen that there is a resistivity "trough" on each line within the previously mapped "zone C," which could indicate a deepening of the overburden in this area. This could have been caused by an old river bed, since covered.

On all lines except line E, weak frequency effect anomalies (approximately 2.13 ratio) have been contoured (in sections of higher resistivity) under these troughs. Therefore it is probable that material within the bedrock is polarizeable, and that clayey material within the overburden is not causing the frequency effect anomaly.

The anomalies referred to above, are:-

Line C at depth between 14W and 20W

Line D at depth between 17W and 23W

Line F at depth between 19W and 26W

Line G at depth between 19W and 24W

The intense frequency effect anomaly between 13W and 20W on line E extends across the resistivity "trough" and into the higher resistivity areas on either side. The values of the frequency effects are exceedingly high and its cause could be situated within the overburden. It is unlikely that clays within the overburden would vary within 250' to give such marked changes in readings between lines, so the origin of the anomaly is considered to arise from some other source.

Each line surveyed exhibits a second anomaly further east, and nearer the IA - IB contact. The anomaly on line C straddles the contact and has the highest frequency effect readings (the maximum is 8.4%). The shape of the frequency effect contours is similar to those obtained across a narrow vertically dipping ore zone in Stirling, Nova Scotia (Hollof, P.H.D. Thesis 1957). On subsequent lines, the anomaly has less definition, is broader and has less frequency effect contrast. If these are correlatable between lines, the zone tends to veer away from the IA-IB contact, into the IA bed.

CONCLUSIONS AND RECOMMENDATIONS

The recent survey over this area near Burra confirms the presence of the correlatable zone previously mapped (3rd report on Burra G.S.2837). The use of shorter distance dipoles has depicted the overburden more precisely and has suggested the presence of an ancient river bed in the approximate position of zone "C". The majority of anomalous frequency effect readings occur in the less conductive material under or near the assumed river-bed. It is therefore considered that a polarizeable substance occurs in the bedding under the overburden. The frequency effect anomaly on line E is extremely large, and is positioned at the bottom of the resistivity low "trough," which is wider and deeper than either of its associated contours or lines D and F, 250ft. away. If this "trough" is an expression of the river-bed only, then it is nearly twice the width and depth of that assumed from line D and F. However, if there were a conductor of similar resistivity near to, but under the overburden, the shape of the resistivity contours could be distorted and the "true" shape of the trough would not be shown.

The presence of clays can cause frequency effect anomalies but as the frequency effects associated with the overburden (which contain the clays) on adjacent lines are very small, it is considered that the high frequency effect readings in line E are caused by materials other than clay.

A series of drill holes to test the cause of the anomaly on line E would be invaluable, as it would also supply information as to the composition of the overburden, and enable resistivity readings to be "tied in" with actual materials.

It is recommended that a series of holes be drilled on line E. Drilling on the series should be stopped once the cause of the anomaly is intersected.

The holes in order of Priority are:-

Line E, (a) at 1800W vertically to 500'
(b) at 2200W vertically to 500'
(c) at 1400W vertically to 500'

Of the less intense but similarly shaped anomalies in the area, line G exhibits the highest frequency effect readings. To test for the cause of this type of anomaly which is similar in shape to all other lines (except line E), it is recommended that this anomaly be drilled. A series of targets of graded priorities is recommended. Drilling of this series should be discontinued once the cause of the anomaly is intersected.

These are:- Line G (a) 2,000W vertically to 500'
(b) 2,100W vertically to 500'
(c) 2,300W vertically to 500'

If drilling proves the presence of mineralization in this area, it is suggested ~~that~~ a resistivity survey be carried out to map the depth of overburden throughout. A relationship between the position of mineralization and the suspected river-bed may hold, and permit the mapping of extensions to this mineralized zone at a faster rate than an I.P. survey.

The anomaly at 5W-7W on line C is by far the most intense and well defined anomaly associated with the IA - IB contact. Frequency effects up to 8.4% have been measured, and contour shape indicates that the cause of the anomaly is steeply dipping and continues to considerable depth.

To test for mineralization as a source of this series of anomalies, it is recommended that a set of holes be drilled on the line.

These are:- Line C. (a) at 625W vertically to 500'
(b) at 540W vertically to 500'
(c) at 700W vertically to 500'

Targets should be drilled in order of priority, and drilling should be discontinued once the cause of the anomaly has been intersected.

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BJT:EMD
15.3.65

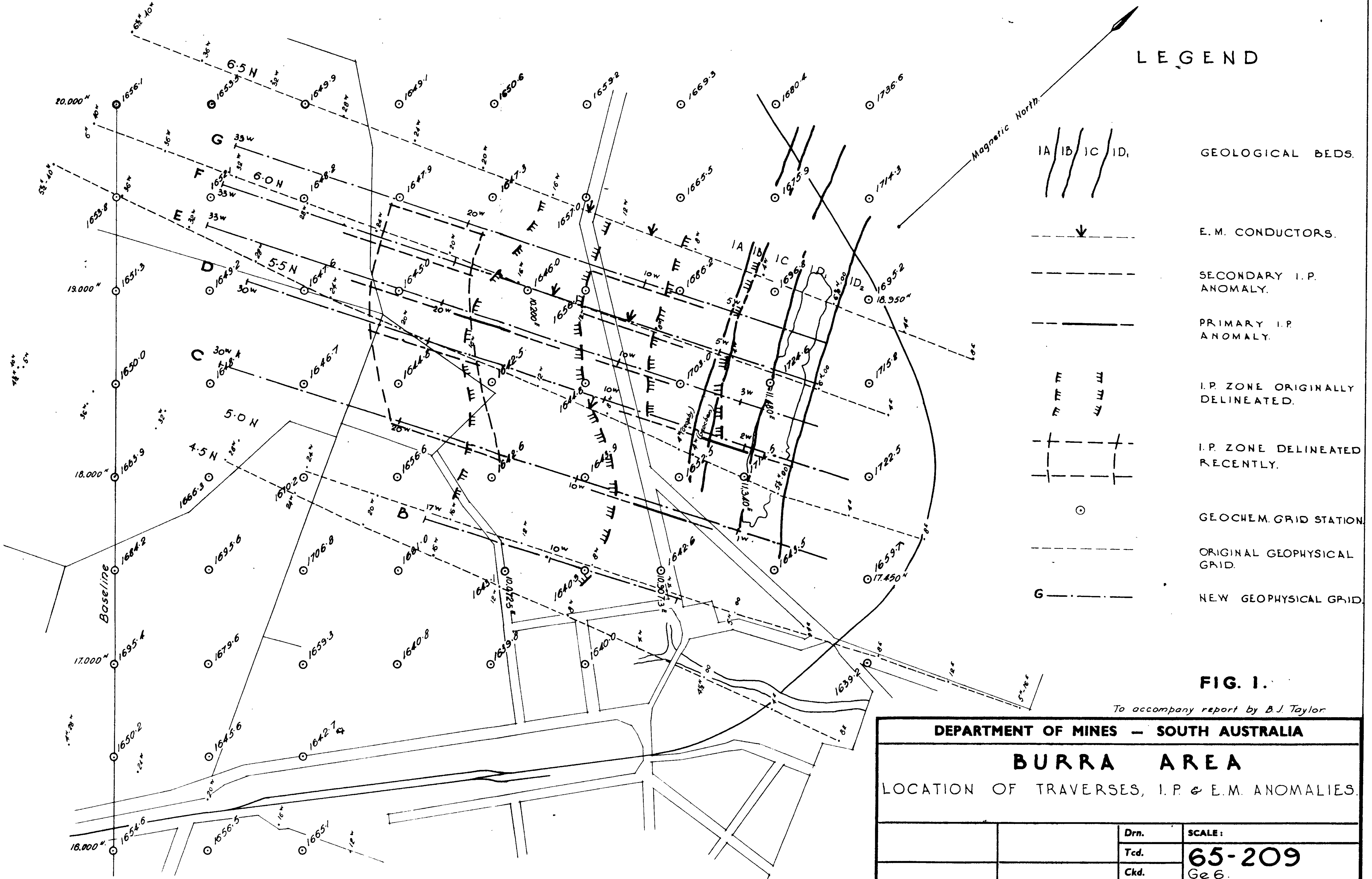

FIG. 1.

To accompany report by B.J. Taylor.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BURRA AREA

LOCATION OF TRAVERSES, I.P. & E.M. ANOMALIES.

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		Tcd.	65-209
		Ckd.	Ge 6.
Director of Mines		Exd.	DATE:

R

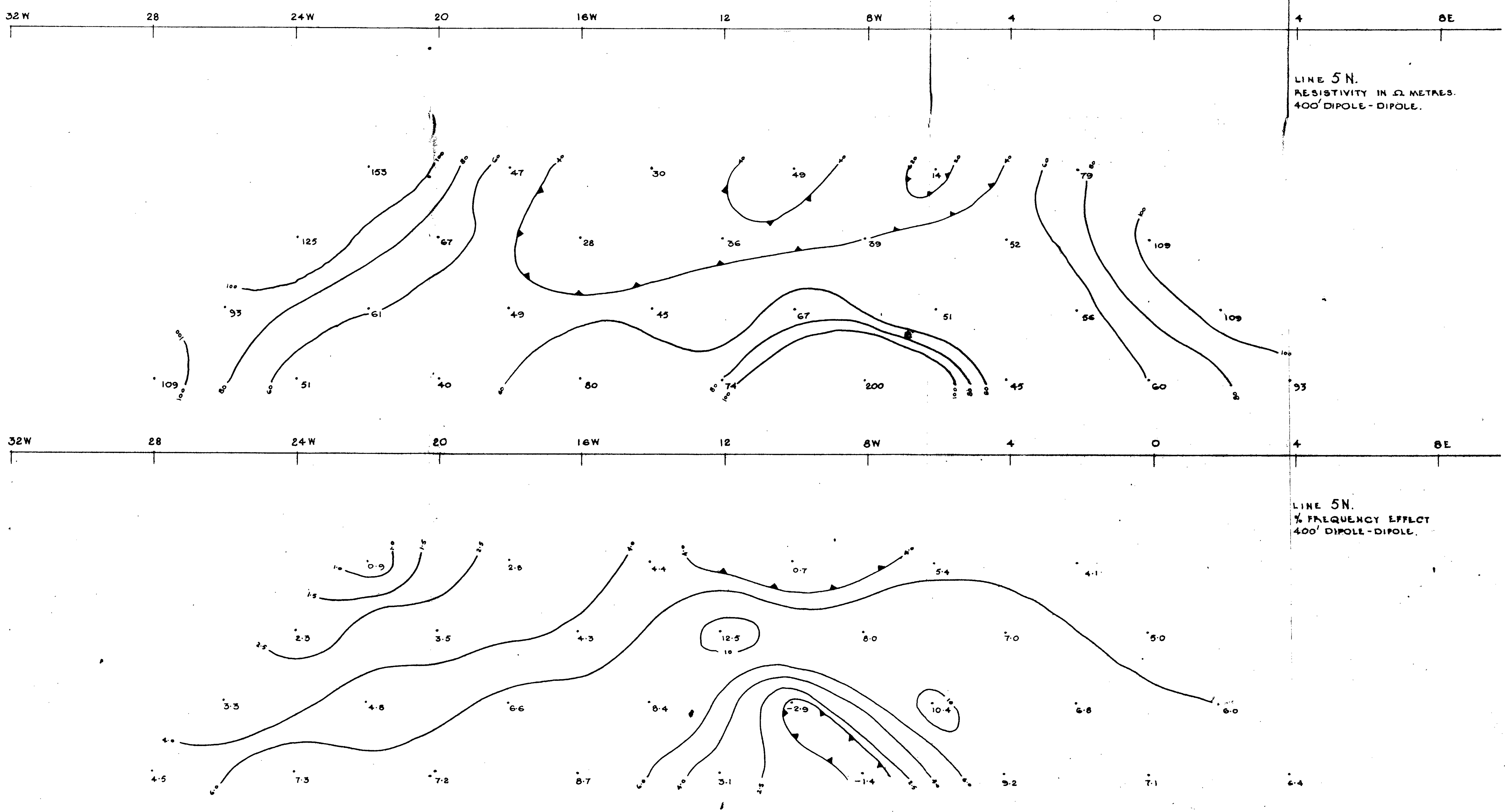
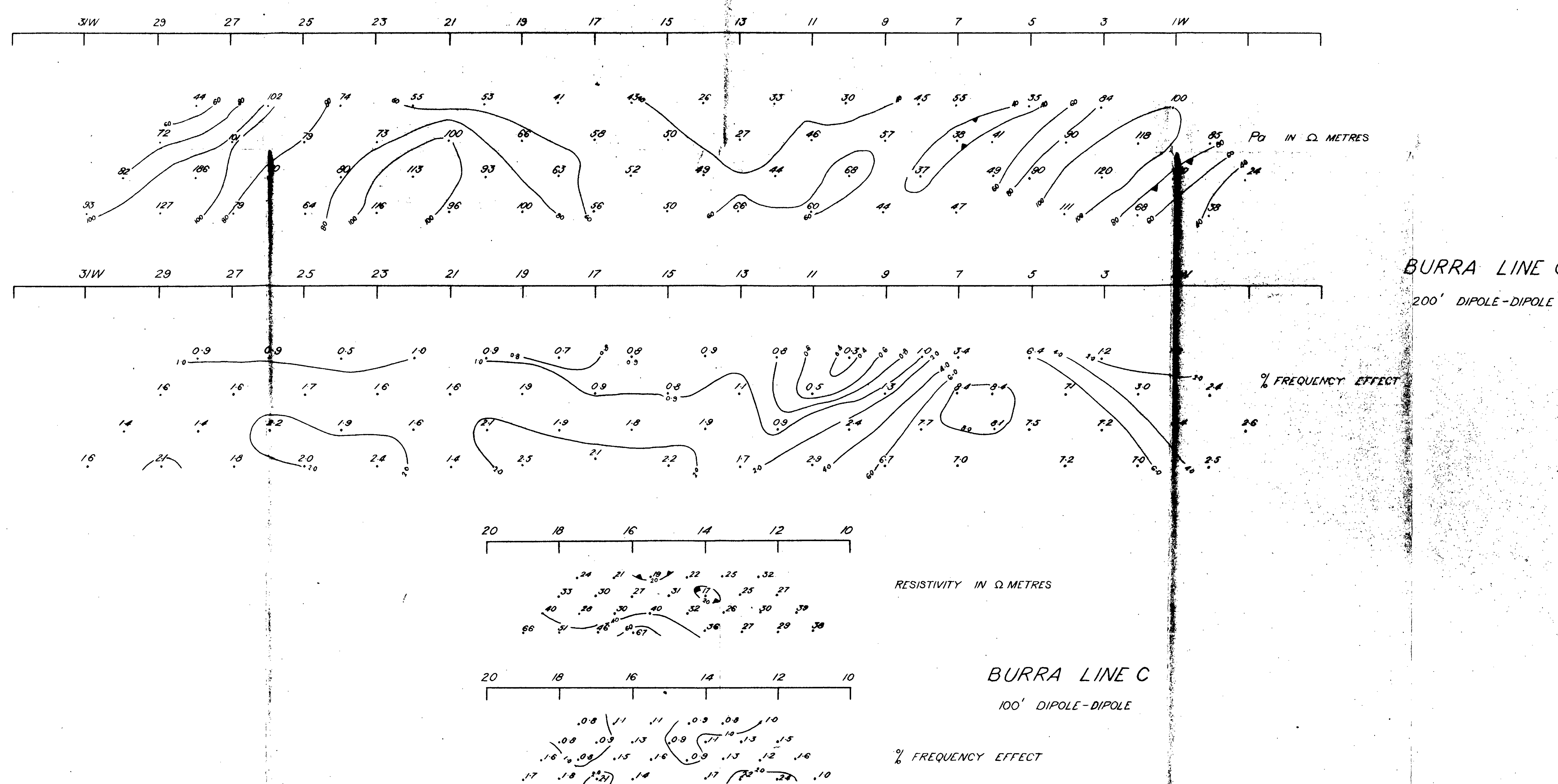


FIG. II

To accompany report by B. J. Taylor.

S.A. DEPT. OF MINES

Amendment	Exd.	Date	Req. No. / D.M. / Compiled from	BURRA AREA LINE 5 N. CONTOURS OF RESISTIVITY AND FREQUENCY EFFECTS WITH 400' DIPOLE - DIPOLE CONFIGURATION	Approved	Passed	Drn. / Tcd. / Ckd. / Exd.	Scale: 65-210 Ge 6. Date
					Director of Mines			



To accompany report by B.J. Taylor

S.A. DEPT. OF MINES

BURRA AREA LINE C

CONTOURS OF RESISTIVITY & FREQUENCY EFFECTS
WITH 200' & 100' DIPOLE-DIPOLE CONFIGURATION

Associated Drawing	No.	No.	Amendment	Exd.	Date

Req. No.
D.M.
Compiled from

Approved	Passed
Director of Mines	

Drn.
Tcd. R.H.
Ckd.
Exd.

Scale :
65-211
Ge6
Date 2·6·65

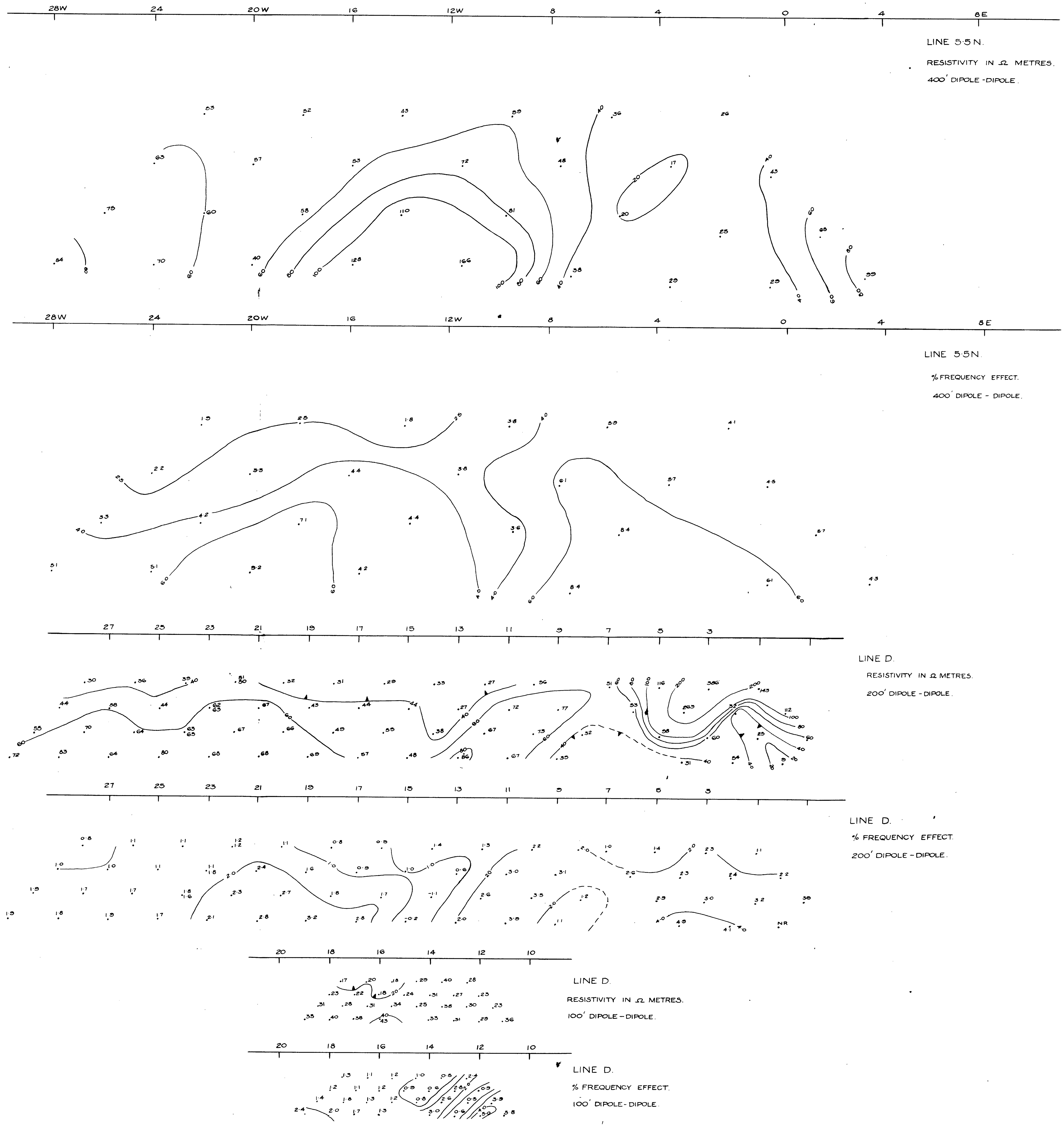


FIG. IV

To accompany report by B.J. Taylor.

S.A. DEPT. OF MINES

ated Drawing	No.	No.	Amendment	Exd.	Date	Req. No. D.M. Compiled from

BURRA AREA LINES 5·5N & D

CONTOURS OF RESISTIVITY AND FREQUENCY EFFECTS WITH 400', 200' & 100' DIPOLE-DIPOLE CONFIGURATION

Approved	Passed		Scale:
Director of Mines		Drn. B.J.T. Tcd. T.P.S. Ckd. Exd.	65-212 Ge 6. Date

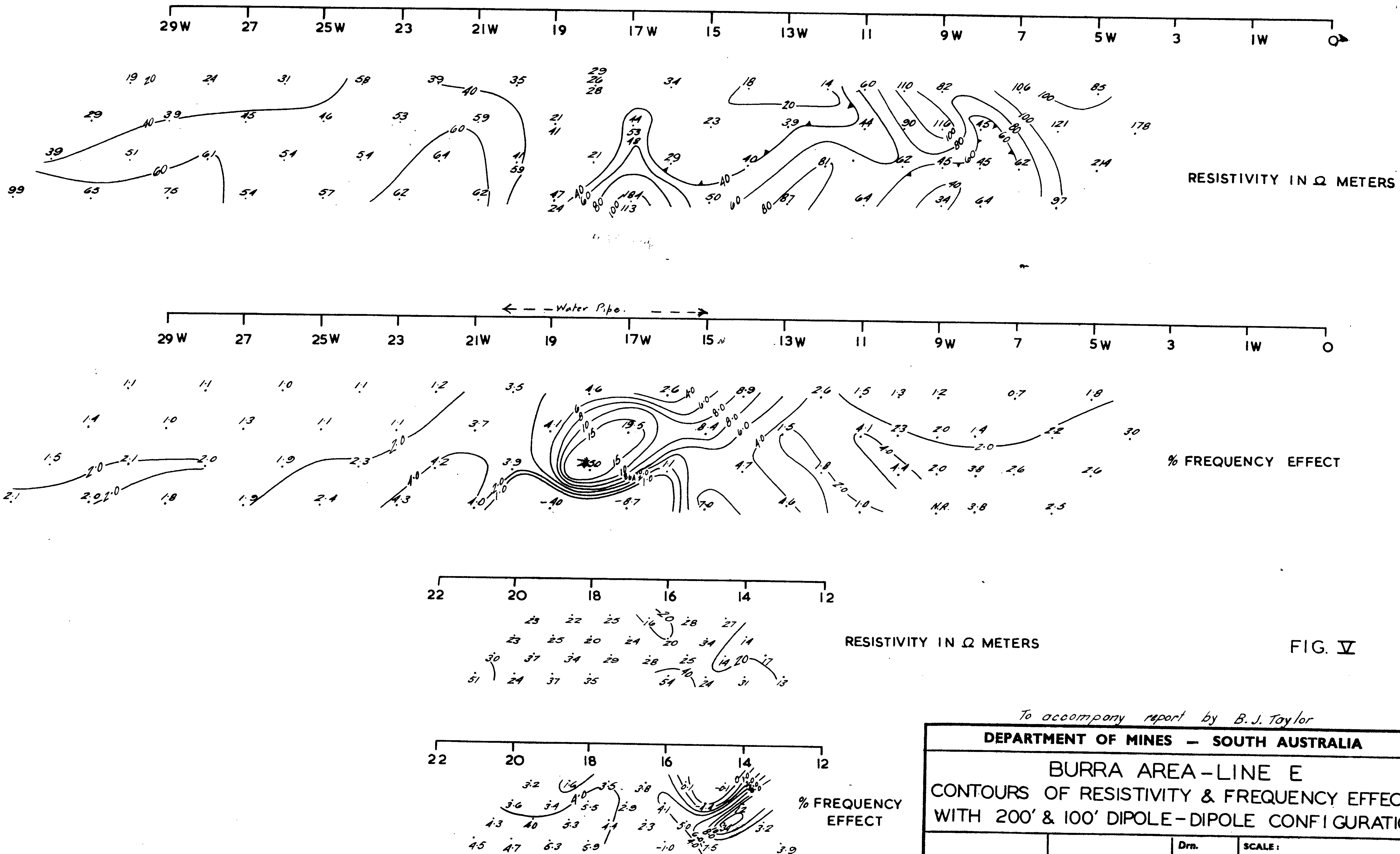


FIG. V

To accompany report by B. J. Taylor

DEPARTMENT OF MINES — SOUTH AUSTRALIA

BURRA AREA – LINE E

CONTOURS OF RESISTIVITY & FREQUENCY EFFECTS WITH 200′ & 100′ DIPOLE-DIPOLE CONFIGURATION

		Drn.	SCALE:
		Tcd. B.L.S.	65–213
		Ckd.	
Director of Mines		Exd.	DATE: 13-4-65

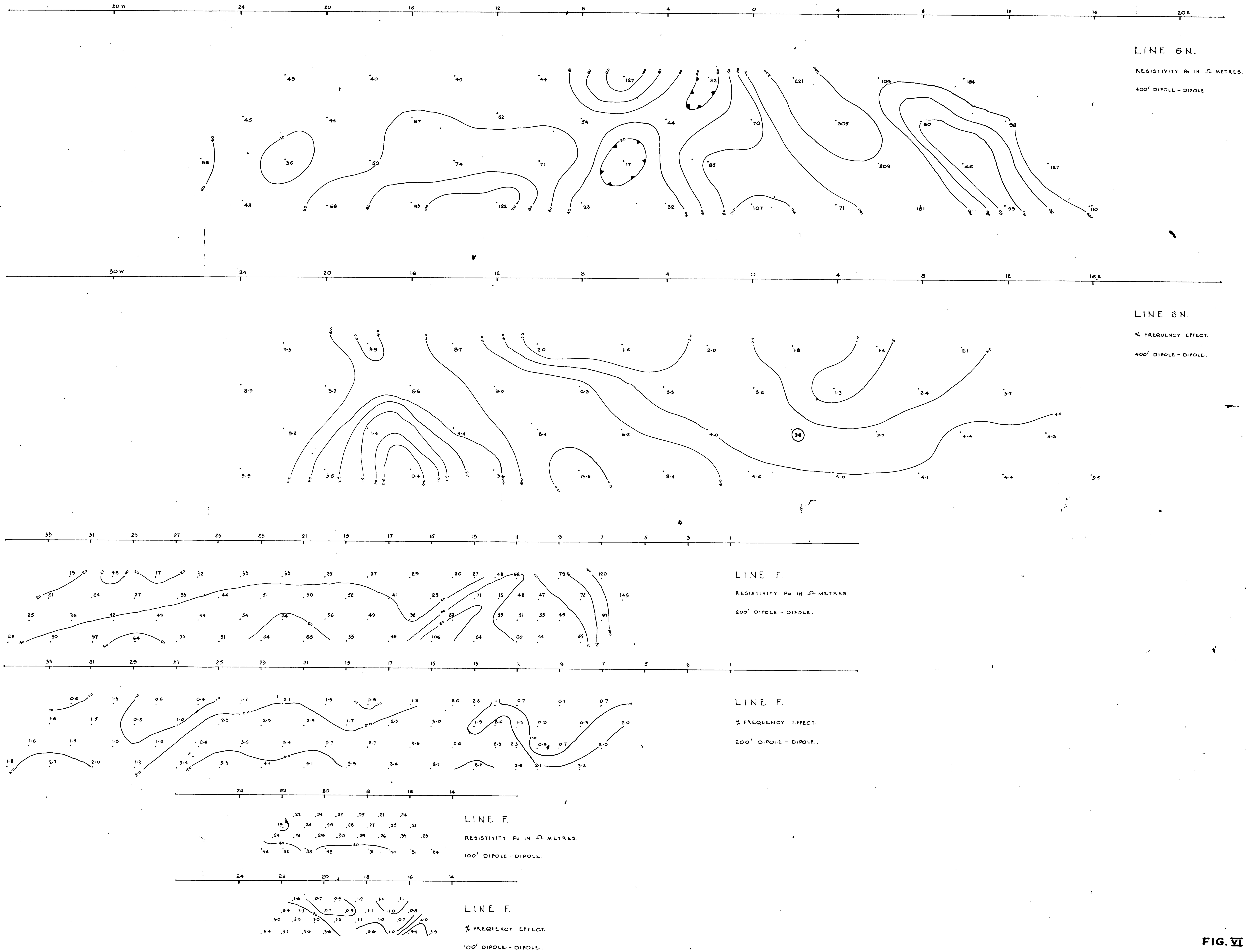


FIG. VI

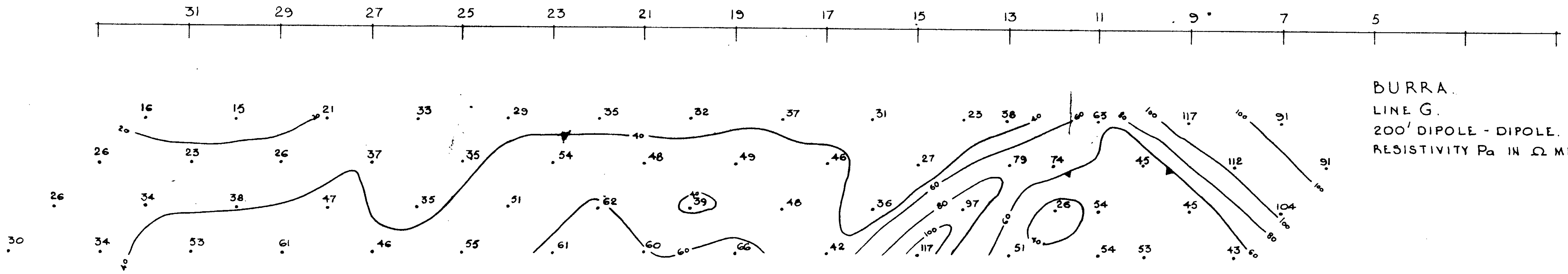
To accompany report by B. J. Taylor

S.A. DEPT. OF MINES

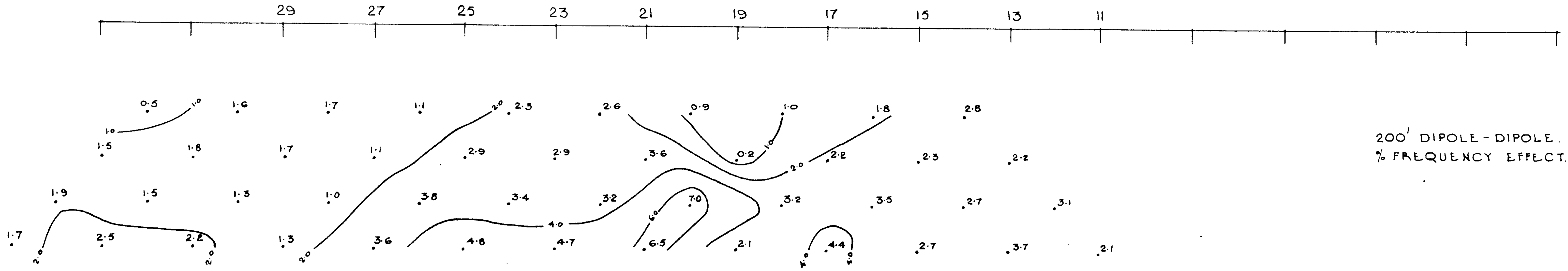
BURRA AREA — LINES 6N & F.

CONTOURS OF RESISTIVITY AND FREQUENCY EFFECTS WITH 400', 200' & 100' DIPOLE-DIPOLE CONFIGURATION.

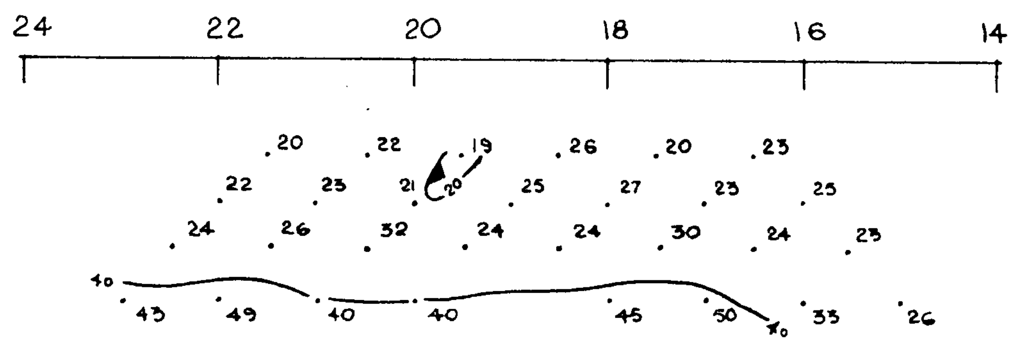
Associated Drawing	No.	Req. No.	D.M.	Compiled from	Approved	Passed	Drn.	Tcd.	Ckd.	Exd.	Scale	Date
					Director of Mines						65-214 Ge 6.	



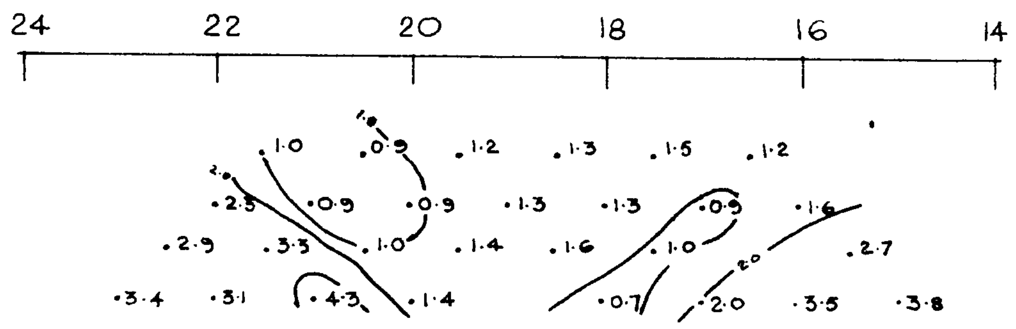
BURRA.
LINE G.
200' DIPOLE - DIPOLE.
RESISTIVITY Pa IN Ω METRES.



200' DIPOLE - DIPOLE.
% FREQUENCY EFFECT.



BURRA
LINE G.
100' DIPOLE - DIPOLE.
RESISTIVITY Pa IN METRES.



% FREQUENCY EFFECT.

FIG. VII

To accompany report by B.J. Taylor.

S.A. DEPT. OF MINES

Req. No.	
D.M.	
Compiled from	
Exd.	Date

BURRA AREA LINE G

CONTOURS OF RESISTIVITY AND FREQUENCY EFFECTS WITH 200' AND 100' DIPOLE-DIPOLE CONFIGURATION.

Approved	Passed		Scale :
		Drn.	65-215
		Tcd.	
		Ckd.	Ge6.
Director of Mines		Exd.	Date