DEPARTMENT OF MINES
SOUTH AUSTRALIA

SUPPLEMENTARY GRAVITY TRAVERSES OVER BUNGALOW AEROMAGNETIC ANOMALY NEAR COWELL, EYRE PENINSULA.

by

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3 July, 1959.

SUMMARY

Supplementary gravimeter traverses have been run over the Bungalow aeromagnetic anomaly with the idea of further delineating the anomaly. A drilling program has been carried out and in the light of these results it is suggested that the magnetic anomaly is caused by the occurrence of magnetite and that the gravity anomaly can possibly be attributed to the occurrence of bands of more dense rock (with which the magnetite is associated) within the country rock. Profiles of gravity values are given, but no recommendations for further investigations are made.

INTRODUCTION

In January and February 1958, K.R. Seedsman, geophysicist, ran a number of gravity and magnetic traverses over two anomalous areas disclosed by aeromagetic surveys carried out by the Bureau of Mineral Resources in 1953 and Adastra-Hunting Geophysics Ltd. in 1955. On the basis of his results a drilling programme was commenced to test the depth to bedrock, and the densities and magnetic properties of the rocks encountered. This drilling was in progress when the present gravity survey - confined to the more southerly (Bungalow) anomaly - was carried out. This anomaly was preferred because there was good evidence to suggest that the depth of alluvium was considerably less than further north at Minbrie. The traverses on this present survey were placed with the idea of further detailing the anomaly gravimetrically.

Field work occupied about 6 weeks between May and September, 1958. The party consisted of the writer, a surveyor and two chainmen.

PREVIOUS GEOPHYSICAL WORK

The survey conducted by K.R. Seedsman, geophysicist is described in his report No. 46/101. He ran 10 traverses at right angles to the apparent strike of the Bungalow anomaly, and two, at the southern end, at right angles to the trend of the hills. He established stations with both gravimeter (Worden No. 204) and Watts Vertical Force Variometers. The traverses were irregularly spaced being from 1000 to 3000 feet apart and varied in length from 3500 to 7500 feet. Stations were read at 100 foot intervals over the peaks and at 200 foot intervals elsewhere.

Seedsman observed a number of coincident gravity and magnetic peaks on profiles along traverses. He inferred from their coincidence the presence of a large quantity of magnetic rock denser than the surrounding rocks and thus possible iron ore. In Plan 58-48, he shows the computed gravity effects of bodies, horizontal and of infinite extent perpendicular to the plane of section, and having hypothetical cross sections, depth based an analysis of the profiles, and a range of density contrasts with the surrounding country rock. These cases were based on the gravity profile along the A line of Seedsman's grid, where the anomaly is of the order of 3 milligals. There was no geological information available at the time.

GEOLOGY

Drilling logs are filed in DM 1262/58 and comprehensive tables of specific gravity determinations are available.

The thickness of alluvium over the Bungalow anomaly varies from 120 feet to 50 feet, thinning to the south.

No detailed petrological explanation of the genetic relationship between the rock types present in the bedrock has been attempted, but the few reports available provide information as to the possible cause of the mass anomaly. Considering the mass anomaly the rocks examined can be divided into two broad groups, name-ly

(1) alkali-granites, of which there are several examples described in petrological reports numbers P 299/58, P 1232/58 and P 1233/58. The specific gravity of this group is 2.6.

(2) amphibole bearing rocks. This title covers a range of rocks from one containing almost pure anthophyllite (P567/58) to a magnetite quartzitic rock intergrown with thin fibres of amphiboles. Generally this group contains ferruginous material, with quartz (often recrystallized) and amphiboles. The average specific gravity of this group is 3.1 to 3.2 (P298/58, P300/58, P567/58, P568/58, P569/58). The S.G. of the rock appears to depend largely on its content of iron minerals, one specimen (P569/58), with magnetite as a principal constituent, having an

S.G. of 4.86. However generally the magnetite is widely disseminated in a rock of low grade.

METHODS USED

This survey was run on a regular grid using the poing A2600 on the old grid as starting point. From this point which is 15000N 2600E in the new grid, a baseline was laid grid north and south. The traverses, 600 feet apart, extended from 00E to 10000E except in the case of the most southerly lines which were shortened because of the proximity of the hills (see Locality Plan 59-181). Comparison of the two surveys can be made by reference to the respective locality plans which are on the same scale.

Traverses were laid out using theodolite and tape, with stations every 200 feet, and elevations were obtained using level and staff. The station A2600 on the old grid was also used as the elevation tie.

The gravimeter used was Worden No. 204 and drift was determined by repeating one station at intervals not greater than 1 hour.

When all the W-E traverses had been read, N-S tie traverses were run across the grid, readings being taken at the most accessible station near each end of every line. Closures thus obtained were excellent and no corrections were warranted.

RESULTS

Profiles of Bouguer anomaly are shown in plans 59-163 and 59-164. The extent of the traverses is shown in the locality plan 59-181. The gravity values have been derived using a tie to Seedsman's station A2600 (15000N 2600E) - which was in turn tied to C. Kerr Grant's Cowell pendulum Station - and a combined Bouguer and free air correction of 0.6 gravity units per foot. This corresponds to a density of 2.67 gms/cc for rocks above sea level.

A latitude correction of 1.25 milligals per mile has been applies.

INTERPRETATION

It appears that the mass anomaly is due to a zone of rocks in which the granites are associated with the more dense magnetite-quartzite-amphibolite group. The occurrence of the amphibolite group in the granite, which for the purpose of calculation of gravity effect is assumed to be the country rock in the undisturbed area, is very irregular, and it is thus impossible to regard it as a discrete mass of density, 3.1 gms/c.c. in a medium of density 2.6 gms/c.c. Rather is there a zone in which the two types are associated providing a density contrast with the pure granite. This density contrast is of the order of 0.2 - 0.3 gms/c.c. and calculation, using the method described by K.R. Seedsman in his report, has shown that provided the zone is of sufficient width extent (that is of width extent comparable with that of the magnetic disturbance) then these conditions could possibly give rise to the observed gravity anomaly.

CONCLUSIONS

It is concluded, considering all the new evidence available that there is in the Bungalow anomaly area a zone in which granitic rocks are irregularly banded by amphibolite-quartzite rocks containing magnetite, but generally of low grade, and that these conditions are a possible cause of the gravity anomaly.

I.H. McMutrie

Geophysicist.

IHMcM:AGK
3/7/59

N

HD MILTALIE

HD HAWKER

HD MINBRIE

HD PLAYFORD

1E

1D

1C

1B

23400 N

0 E

15000 N (A Line)

10000 E

To Kimba

4200 N

80

81

79

78

77

71

72

73

74

75

66A

67N

65

66

67S

68

64

63

51

50

49

48

42

To Cowell

To accompany report by I. Mc Mutrie

S.A. DEPARTMENT OF MINES

BUNGALOW ANOMALY - COWELL LOCALITY PLAN Showing GRAVITY TRAVERSES

Amendment	Exd.	Date

Approved	Passed		Scale : 40 ch. - 1 in.
		Drn.	59 - 181
		Tcd. J.E.	DM 14 + 21
		Ckd. R.R.	
Director		Exd.	Date 17-6-59

To accompany report by I.H.McMutrie.

S.A. DEPT. OF MINES

200—10.57 6987

COWELL DISTRICT — BUNGALOW ANOMALY
SUPPLEMENTARY GRAVITY PROFILES
4200N TO 13800N

Associated Drawing	No.	No.	Amendment	Exd.	Date

Req. No.
D.M.
Compiled from

Approved	Passed		
		Drn. I.H.McM.	Scale Hor. 1000'to1" Vert. 2mg. to 1"
		Tcd. M.B.L.	59-163
Director of Mines		Ckd.	1 of 2 Sheets
		Exd.	Date 25-5-59 ?

S.A. DEPT. OF MINES

COWELL DISTRICT — BUNGALOW ANOMALY

SUPPLEMENTARY GRAVITY PROFILES

14400N TO 23400N

To accompany report by I.H.McMurrie.

Associated Drawing No.	No.	Amendment	Exd.	Date

Req. No.
D.M.
Compiled from

Director of Mines | Approved | Passed

Drn. I.H.M^cM.
Tcd. M.B.L.
Ckd.
Exd.

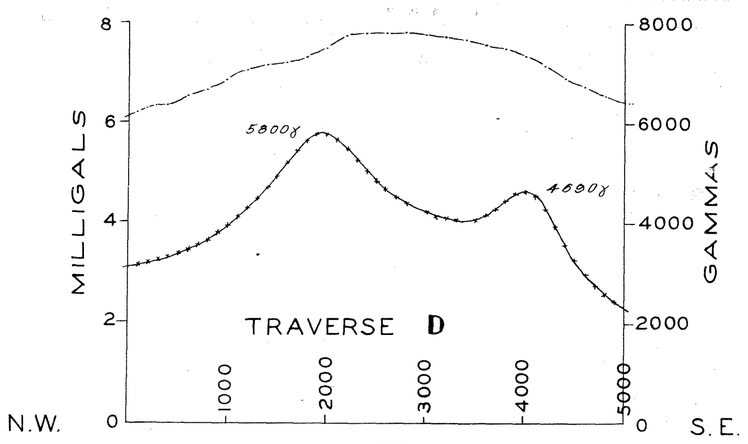
Scale Hor. 1000 to 1" Vert. 2 mg. to 1"

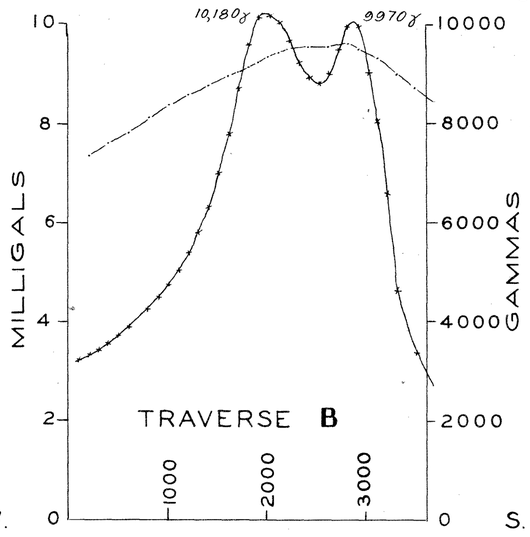
2 of 2 sheets.

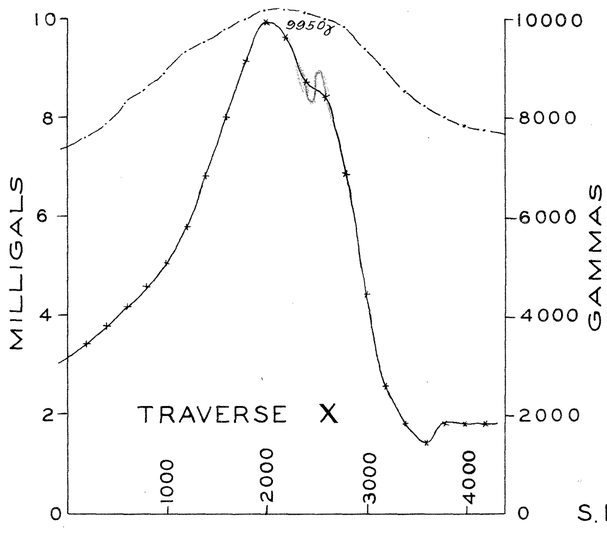
Date 25 - 5 - 59

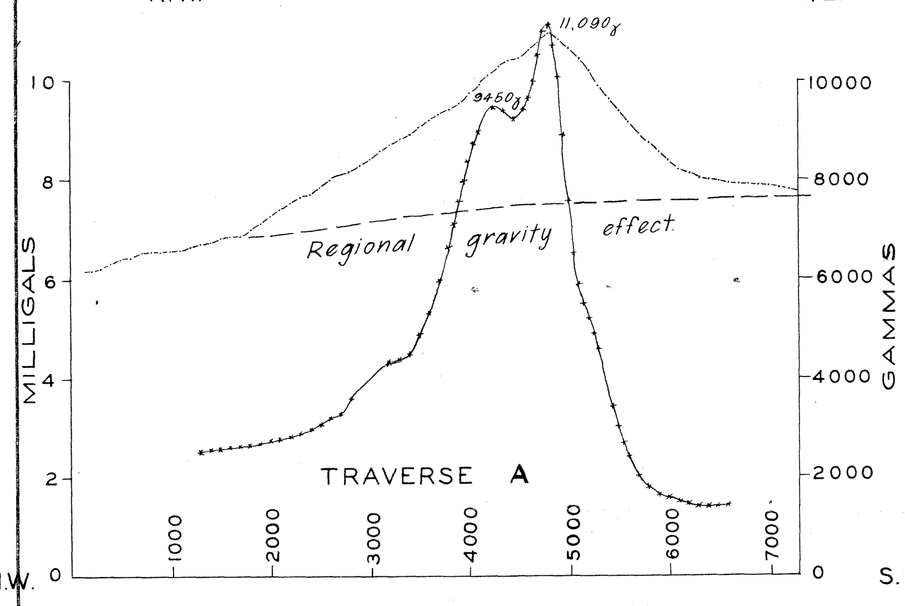
59 - 164

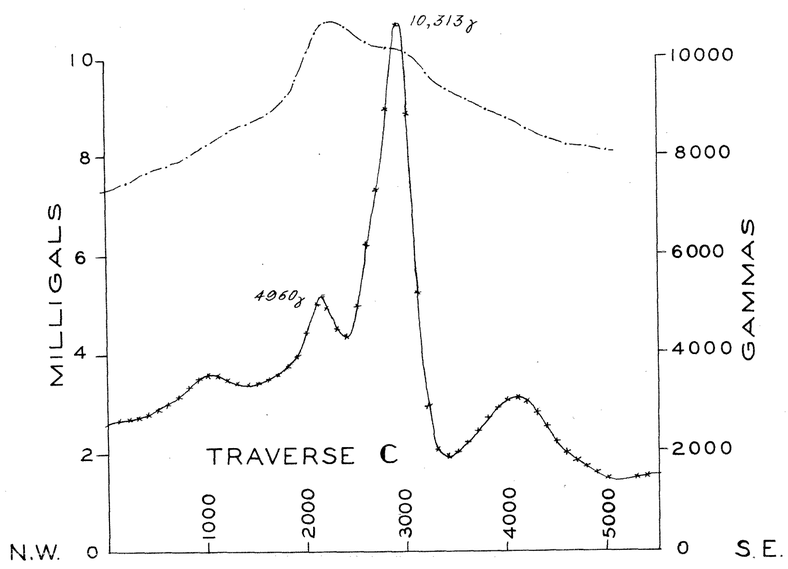
200—10.57 6967

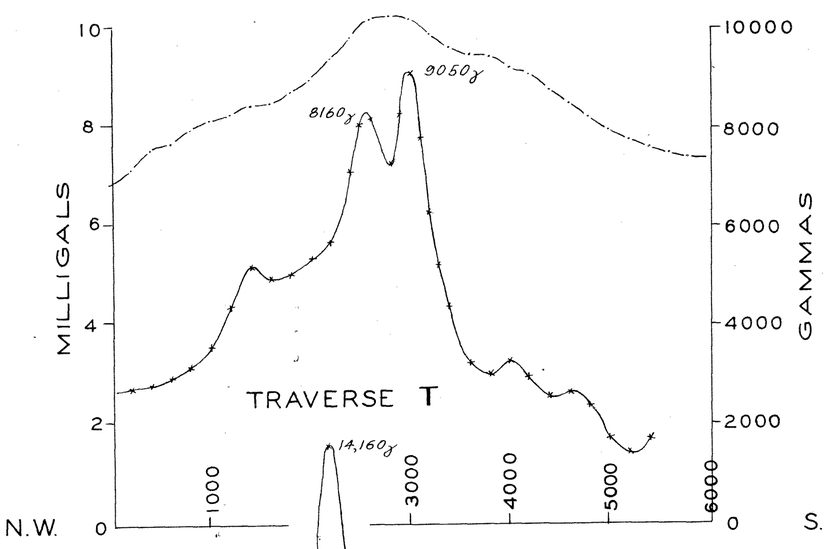


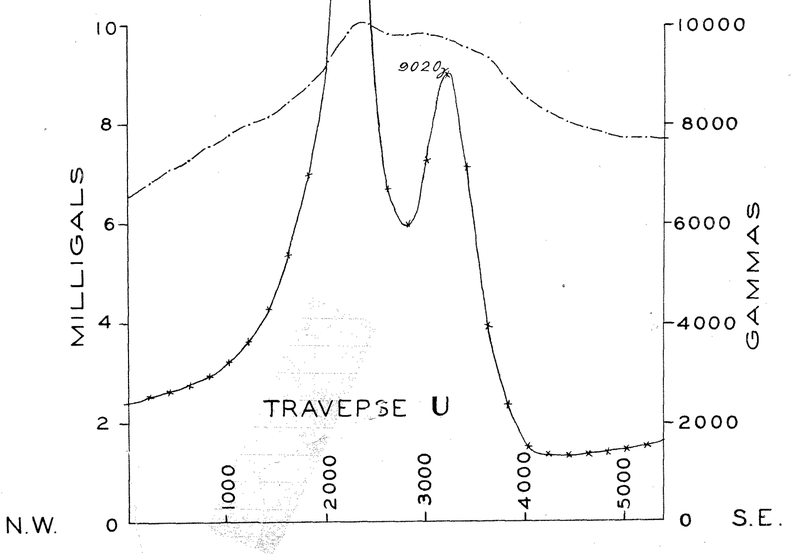


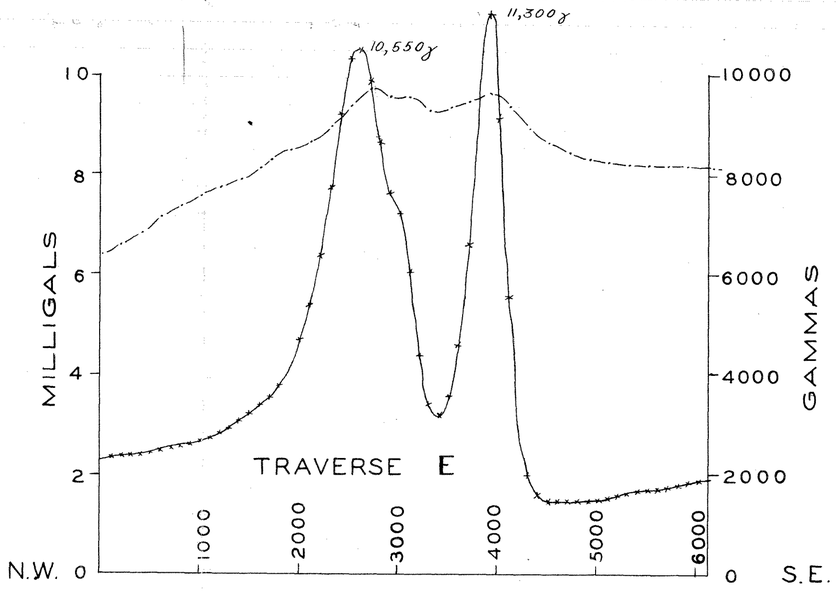


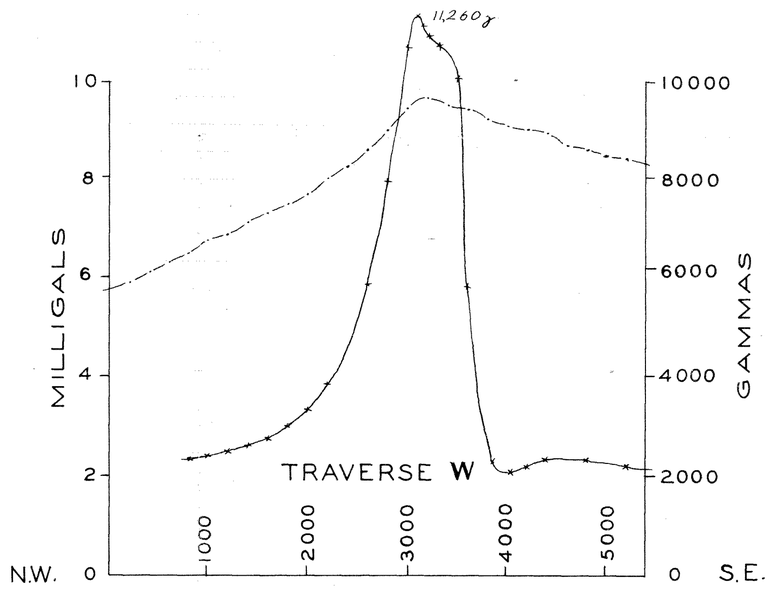


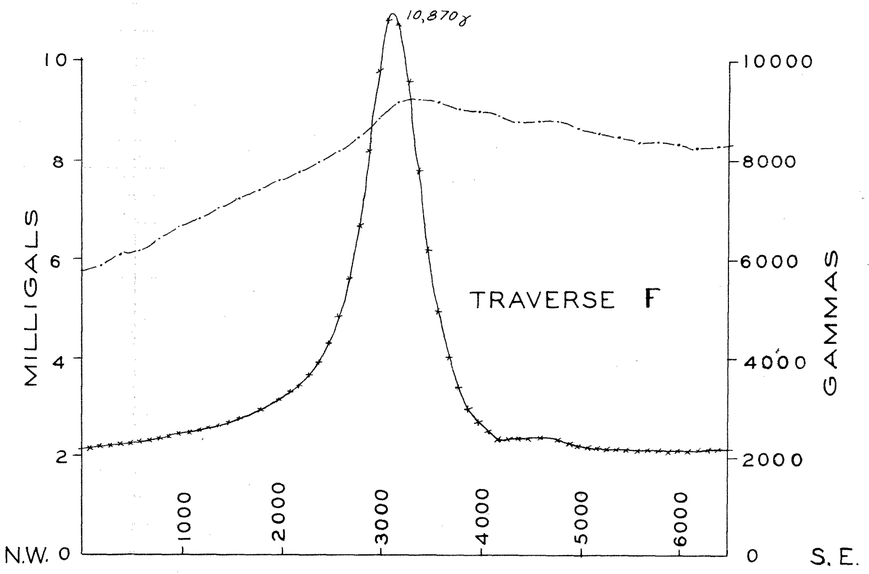


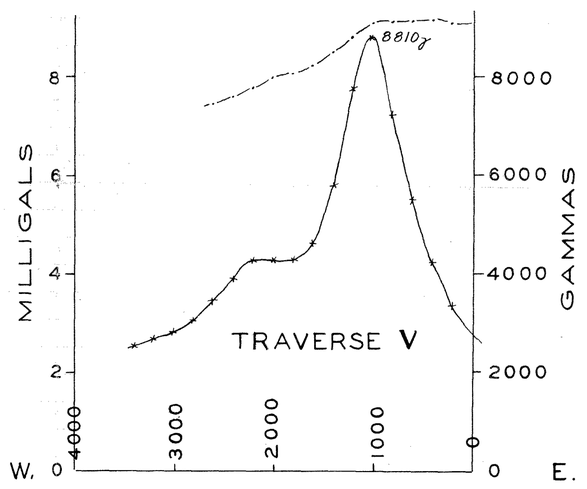


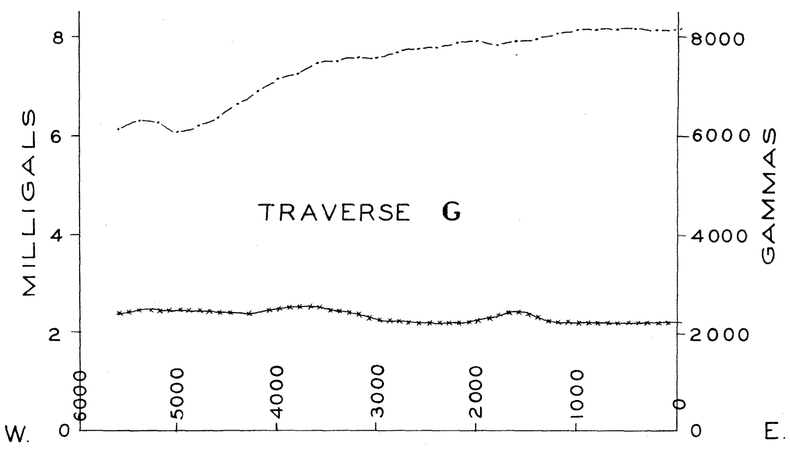


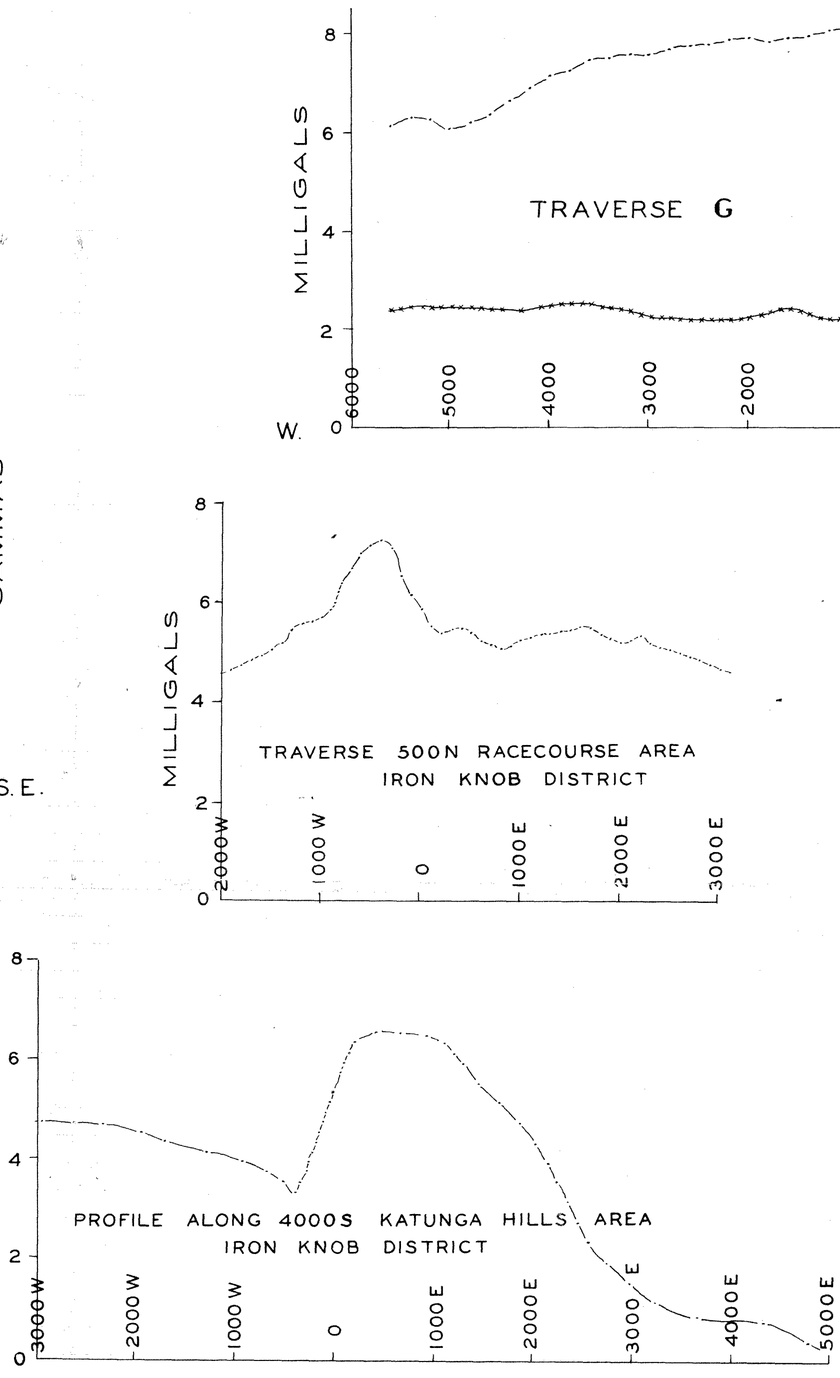




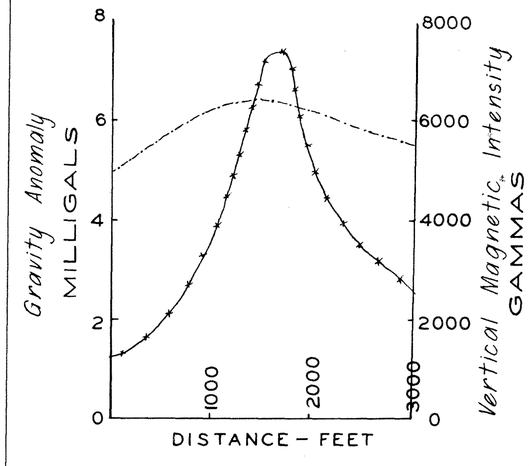








LEGEND



Magnetic Profile

Gravity Profile

SCALES

Horiz.: 1" = 1000 feet.
Vert.: 1" = 2 milligals
1" = 2000 gammas.

COWELL DISTRICT
BUNGALOW ANOMALY
GRAVITY AND MAGNETIC PROFILES

S.A. DEPT. OF MINES

To accompany report by K.R. Seedsman. Geophysicist.

Associated Drawing No.	No.	Amendment	Exd.	Date

Req. No.
D.M.
Compiled from

Director of Mines — Approved — Passed

Drn. K.R.S.
Tcd. B.F.
Ckd. K.R.
Exd.

Scale As shown.

58-49
Dm 21+14

Date 19.3.58