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COMMONWEALTH OF AUSTRALIA

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DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,  
GEOLOGY AND GEOPHYSICS.

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RECORDS

1959 NO. 57.

PRELIMINARY REPORT OF THE  
GEOPHYSICAL SURVEY AT THE GRAY CREEK CHROMITE PROSPECT  
NEAR GREENVALE STATION, NORTH QUEENSLAND.

by

K. H. TATE.

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## CONTENTS.

	<u>Page</u>
ABSTRACT	
1. INTRODUCTION	1
2. MAGNETIC SURVEY	1
3. GRAVITY SURVEY	1
4. CONCLUSIONS	2

## ILLUSTRATIONS

- PLATE 1. Locality 'A', Magnetic Map (Vertical Intensity  
Contours).
- " 2. Locality 'A', Residual Gravity Profiles.
- " 3. Locality 'A', Residual Gravity Contours.

ABSTRACT.

A geophysical survey of the Gray Creek chromite prospect, near Greenvale Station, North Queensland, was carried out in 1958, using gravity and magnetic methods.

The magnetic survey enabled areas of serpentinite to be distinguished from areas of gabbro but was of no value in locating deposits of chromite directly.

The gravity survey located several small isolated gravity anomalies in areas containing chromite rubble. These anomalies are considered to be due to small lenses of chromite but the total amount of near-surface chromite indicated is estimated to be not more than 20,000 tons.

## 1. INTRODUCTION.

The work described in the present report originated in a suggestion by the Geological Section of the Bureau. During regional mapping of the Clarke River 4-mile map area, several outcrops of chromite were discovered near Gray Creek, at the northern boundary of the area. In view of the lack of known reserves of chromite in Australia, it was desirable that the importance of the discovery be evaluated, and, as outcrop is not plentiful, it was recommended that geophysical methods be tried.

The work was performed from July to September, 1958, by K. H. Tate and E. Sedmik, geophysicists, with the assistance of a surveyor from Department of Interior. Geology was mapped in detail by geologists of New Consolidated Gold-fields (Australia) N.L. which holds an authority to prospect over the area.

Gravity and magnetic methods were used in the survey.

## 2. MAGNETIC SURVEY.

Tests on samples of outcropping rocks collected during regional geological mapping indicated that the magnetic properties of the rocks were generally similar to those of rocks of similar type in other areas. Thus the serpentinite is moderately magnetic, the gabbro very weakly magnetic, and the massive chromite non-magnetic. There was therefore no prospect that a magnetic survey would be of any value in locating deposits of chromite directly. The main purpose which it was expected would be achieved by a magnetic survey was to enable areas of serpentinite to be distinguished from areas of gabbro.

The results are shown as contours of vertical magnetic intensity on Plate 1 attached. Comparison with the geological maps shows that there is a close correspondence between areas of magnetic anomaly and areas of serpentinite. The serpentinite is characterised by disturbed magnetic conditions with positive anomalies. Areas of gabbro, on the other hand, show smooth conditions with few anomalies.

## 3. GRAVITY SURVEY.

It was expected that the gravity method was most likely to lead to the direct detection of chromite bodies. The average densities of the various rock types in the area are as follows (based on measurements on numerous samples).

Serpentinite	2.57
Diorite	2.65
Volcanics	2.78
Gabbro	2.98
Massive Chromite	3.90
Serpentinite with disseminated chromite	3.2 (approximately)

It would therefore be expected that boundaries between serpentinite and gabbro could be detected, and that bodies of massive chromite of an economic size close to the surface would cause well defined anomalies.

The results of the gravity survey are shown as profiles of gravity residuals on Plate 2, and as contours on Plate 3. It is estimated that the accuracy of each reading is  $\pm 0.03$  milligal at worst, and for a number of stations on which readings were repeated several times,  $\pm 0.02$  milligal.

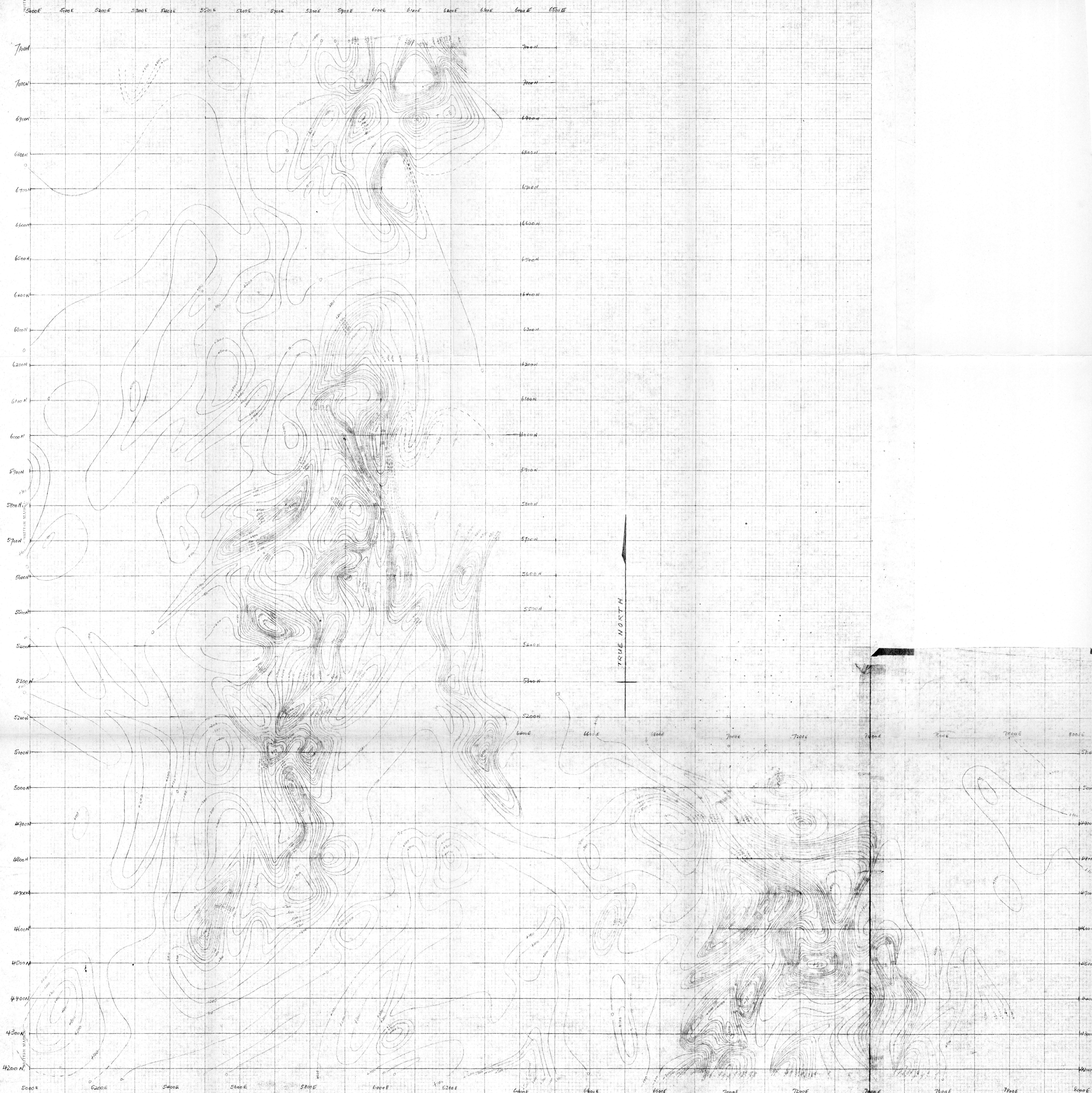
The anomalies can be divided into two classes.

- (1) Anomalies extending over several stations. A number of these appears on the profiles. They are all associated with bands of gabbro, and it is considered that the higher density of the gabbro as compared with the serpentinite is sufficient to account for them. However, it is possible that some may be partly due to chromite bodies, and it is recommended that this possibility be checked on the ground. The anomalies considered most promising in this regard are those centred at 6800N/5850E, 5650N/5750E, 5300N/5050E, and 4500N/6900E.
- (2) Small isolated anomalies, not persisting in strike, and generally confined to one station. The amplitude of these anomalies is not much greater than the accuracy of measurement. Four of these considered to be the most definite have been marked on the plan. These occur in areas containing chromite rubble, and it is considered that they may be due to small lenses of chromite. Their size enables an upper limit to be calculated to the amount of near surface chromite represented by outcrop and rubble. The total amount could not exceed 20,000 tons.

#### 4. CONCLUSIONS.

The results of the survey show that the outcrops and rubble covered areas represent only a very small tonnage of chromite.

The only possibility of larger bodies of chromite being present would be if any of the anomalies described under (1) above and attributed to gabbro, are actually due to chromite. This possibility is considered as remote. It is recommended that some ground investigation be made at the four localities indicated as most promising.



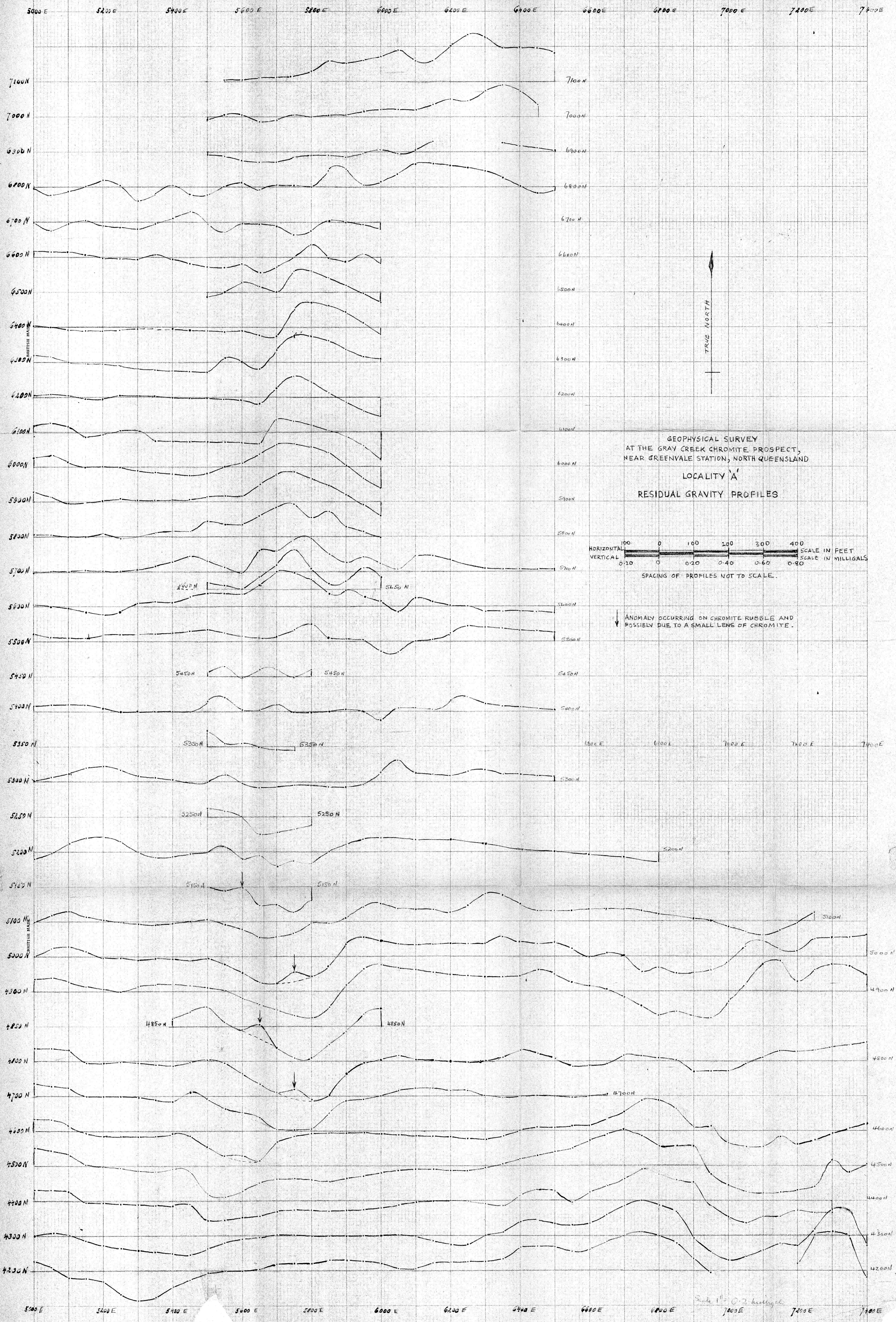
SCALE IN FEET  
100 200 300 400  
CONTOUR INTERVAL = 100 GAMMAS

GEOPHYSICAL SURVEY AT THE GRAY CREEK CHROMITE PROSPECT,  
NEAR GREENVALE STATION, NORTH QUEENSLAND.

LOCALITY "A"

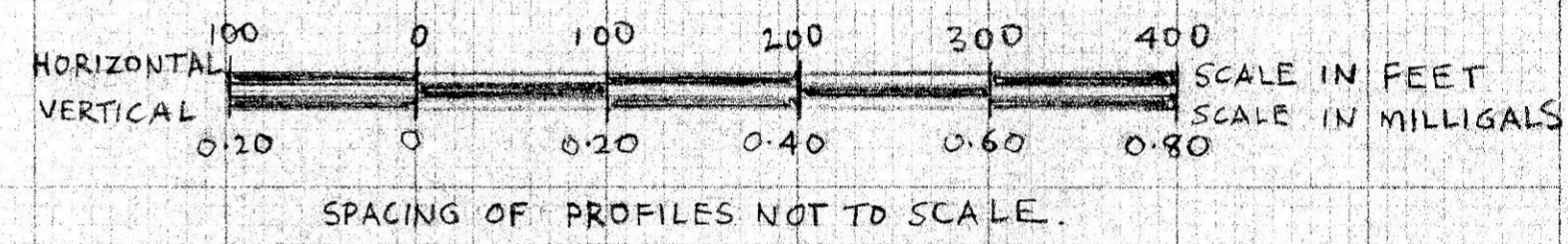
VERTICAL FORCE MAGNETIC CONTOURS

Geophysical Section Bureau of Mineral Resources, Geology and Geophysics G342-1



GEOPHYSICAL SURVEY  
AT THE GRAY CREEK CHROMITE PROSPECT,  
NEAR GREENVALE STATION, NORTH QUEENSLAND

LOCALITY 'A'  
RESIDUAL GRAVITY PROFILES



ANOMALY OCCURRING ON CHROMITE RUBBLE AND  
POSSIBLY DUE TO A SMALL LENS OF CHROMITE.

