

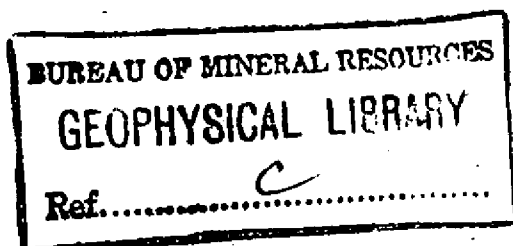
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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS



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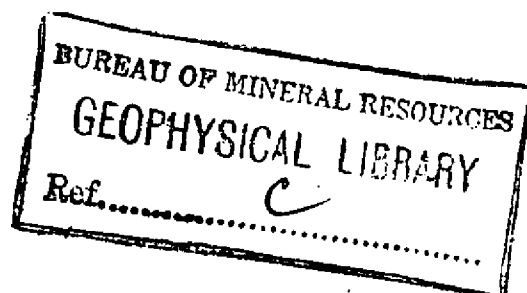
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NEW ENGLAND AIRBORNE RADIOMETRIC SURVEY, N.S.W. 1955-56

by

J.M. Mulder

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## ILLUSTRATIONS

- Plate 1. Reedy Creek, Tenterfield, and Deepwater areas,  
New England; map showing radioactivity contours (G 235-1)
- Plate 2. Carpet Snake and Tenterfield areas, New England;  
map showing radioactivity contours. (G 235-2)

## ABSTRACT

During the later months of 1955 and 1956 low-level airborne radiometric surveys were made in several areas near Tenterfield in northern New England, N.S.W.

The surveys were conducted from a specially equipped light aircraft. The results show that only granite outcrops recorded radioactivity above the general background level and that no radioactive anomalies were located.

## 1. INTRODUCTION

Airborne radiometric surveys in the New England area of N.S.W. were carried out by the Geophysical Branch of the Bureau of Mineral Resources at the request of the N.S.W. Department of Mines.

Two surveys were carried out, the first in November and December 1955 and the second in September and October 1956. Both surveys ended prematurely because of bad flying weather.

These surveys formed part of a search for uranium deposits in N.S.W. which followed the finding of radioactive minerals within the survey area by private prospectors.

The maps, G 235-1 and G 235-2, which show the results of the surveys and appear in this report as Plates 1 and 2, were prepared shortly after the termination of the surveys and were issued in July 1956 and March 1957, respectively.

An Auster Autocar aircraft VH-GVC, fitted with a scintillation counter, was used. The base of operations was Glen Innes.

Those who took part in the surveys were :

1955 - J.M. Mulder (Geophysicist, Party Leader),

K. K. Kern (Geophysical Assistant), and A. Crowder (Draftsman).

1956 - J.M. Mulder (Geophysicist, Party Leader), R. Wells (Assistant Geophysicist), and W. Gerula (Draftsman).

The aircraft was chartered from Southern Airlines Pty. Ltd. and piloted by E. Bartlett.

## 2. GEOLOGY

For information on the geology of the areas surveyed, reference has been made to the Geological Map of the New England Region prepared by the N.S.W. Mines Department (1945).

Granite, in places covered by soil, occupies all of the Tenterfield area and most of the Carpet Snake area. The Permian Lower Marine Series consisting of mudstone, sandstone, and conglomerate, occurs in the extreme north-western portion of the Carpet Snake area adjacent to the Dumaresq River.

Granite also occurs widely in the southern part of the Reedy Creek area but the northern part is occupied by the Permian Lower Marine Series.

The Deepwater area consists mainly of the Permian Lower Marine Series. Tertiary basalt occurs in the western part. In places these rocks are covered by soil.

### 3. EQUIPMENT

During the 1955 survey the aircraft was fitted with a Brownell scintillation counter consisting of two units, a detector head and a ratemeter. During the 1956 survey a scintillation counter consisting of a Chalk River detector head and a ratemeter built in the Bureau's workshops was used.

The output of each ratemeter was fed to an indicating meter calibrated in counts per minute, and to an Esterline-Angus recorder which provided a continuous record of the radioactivity of the ground over which the aircraft was flown.

### 4. OPERATIONS

Survey flights were carried out at 100 to 150 ft above ground level. Most of the surveying was done with flight lines spaced  $\frac{1}{4}$  mile apart, but in parts of the Reedy Creek area the spacing was  $\frac{1}{6}$  to  $\frac{1}{8}$  mile.

Whenever conditions permitted, two flights per day were made. In reasonably flat country successive flight lines were made in opposite directions and 25 to 30 square miles could be covered in one flight. In rugged country flight lines were made in one direction only, usually from the top of a ridge into a valley.

Aerial photographs were used for navigation, and the flight lines were drawn on them by the observer, who was seated next to the pilot. Features such as rivers, creeks, power lines, roads, and tracks were used as the start and end of lines and as check points along the lines. The photographs with the flight lines plotted on them were then used together with the record of radioactivity to prepare the final radiometric map.

The performance of the scintillation counter was checked before and after use on every survey flight. This was done by placing a standard radioactive source at a set calibrating distance from the detector head. These tests were made at 2000 ft above ground level; at this height the radiation from the ground is virtually zero and the increase in count rate due to the source becomes a measure of the equipment's performance.

### 5. RESULTS

The results do not reveal any significant radioactive anomalies. It is also evident from the contours on Plates 1 and 2 that the gradients are everywhere moderate. It appears, however, that these contours follow the geology to some extent and that most of the areas of higher radioactivity are areas in which granite outcrops occur.

The contours were constructed on an arbitrary basis. The zero isorad was taken as the background count at 2000 ft above ground level plus the increase in count due to the standard source in its calibrating position; the contour intervals are multiples of this increase. Flight line profiles were then scaled for these contour values and the points of intersection plotted. Isorads were then drawn through points of equal intensity.

The areas surveyed are discussed below:

Reedy Creek (Plate 1).

Some areas of high radioactivity were recorded north-west of Mt. Sugarloaf. Most of these are either due to exposed granites or to topographic effects in hilly areas.

The area shown as having a contour value of less than 2 corresponds generally with the Permian Lower Marine Series, which has a low radioactive content.

Tenterfield (Plate 1).

The radioactive intensity of the two areas did not exceed level 2. No significance can be attached to the contours since in each case the increase was gradual and can be attributed to granite rocks which occur close to the surface.

Deepwater (Plate 1).

The small area surveyed west of Deepwater is extensively covered by Recent deposits, and no count rates above the general background were recorded.

Carpet Snake (Plate 2).

The radioactivity in most of the area was higher than normal, with isolated spots where the radioactivity exceeded level 3. The highest levels were found west of Black Creek; however, no sharp anomalies that could be associated with the presence of radioactive minerals were located.

Tenterfield (Plate 2).

This area showed no results of interest.

## 6. CONCLUSIONS

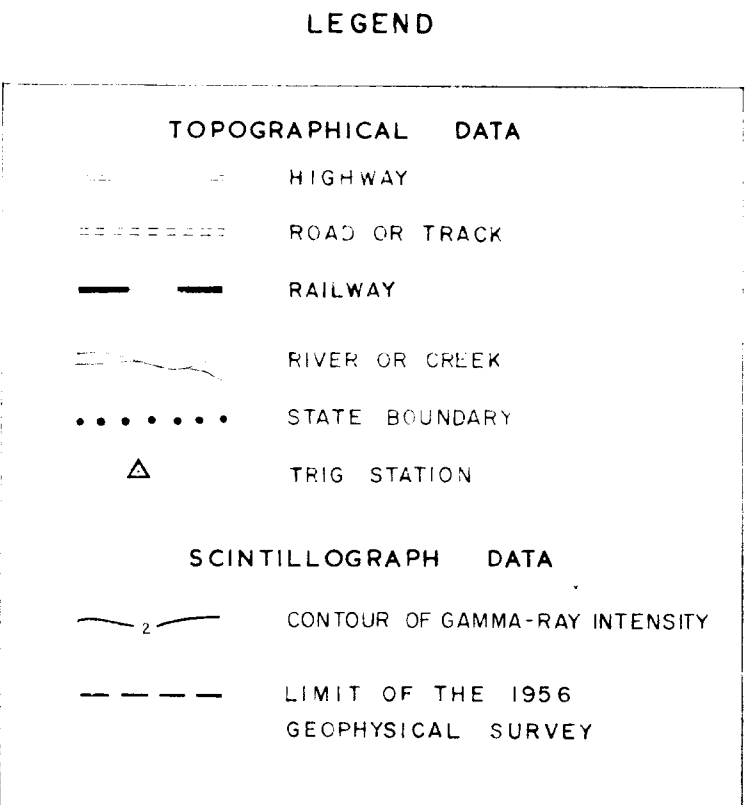
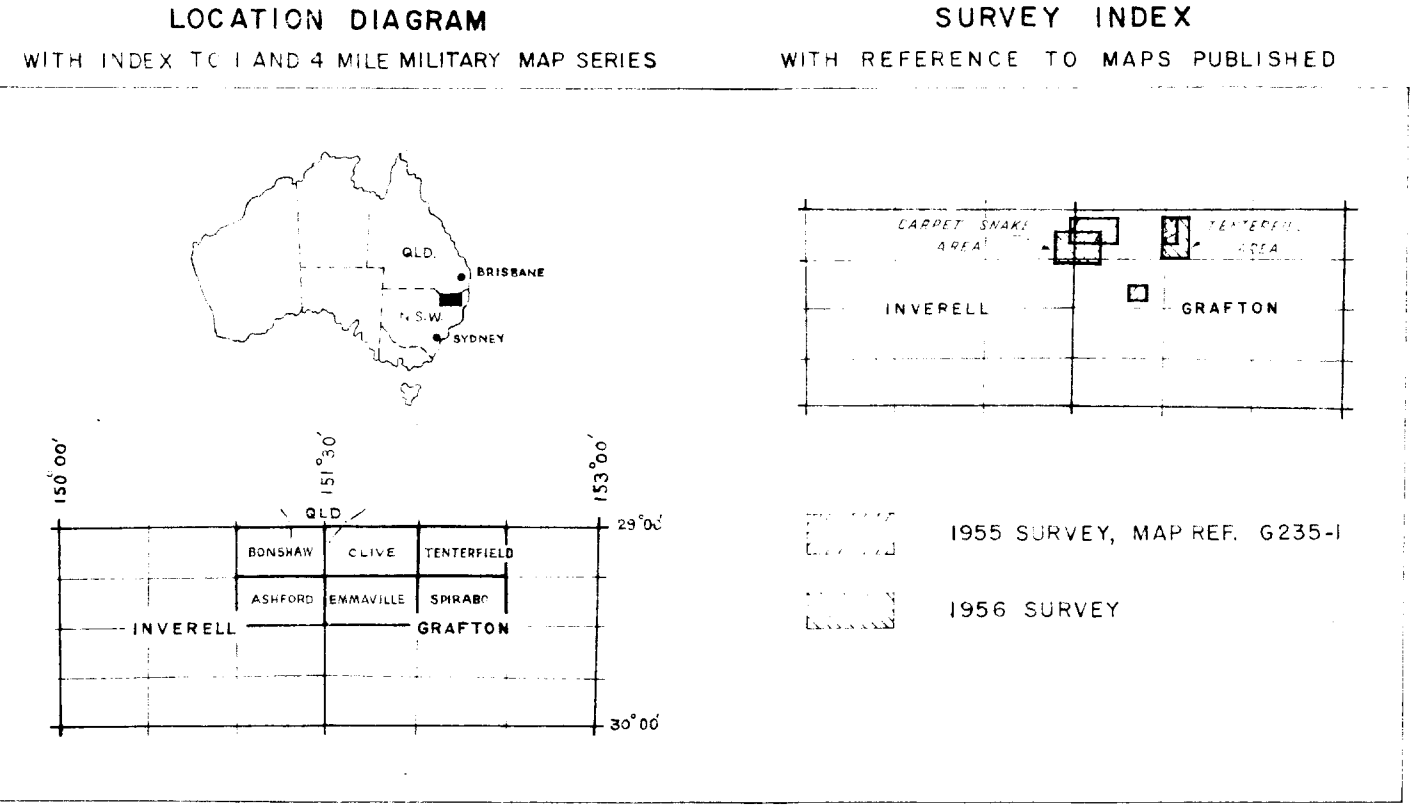
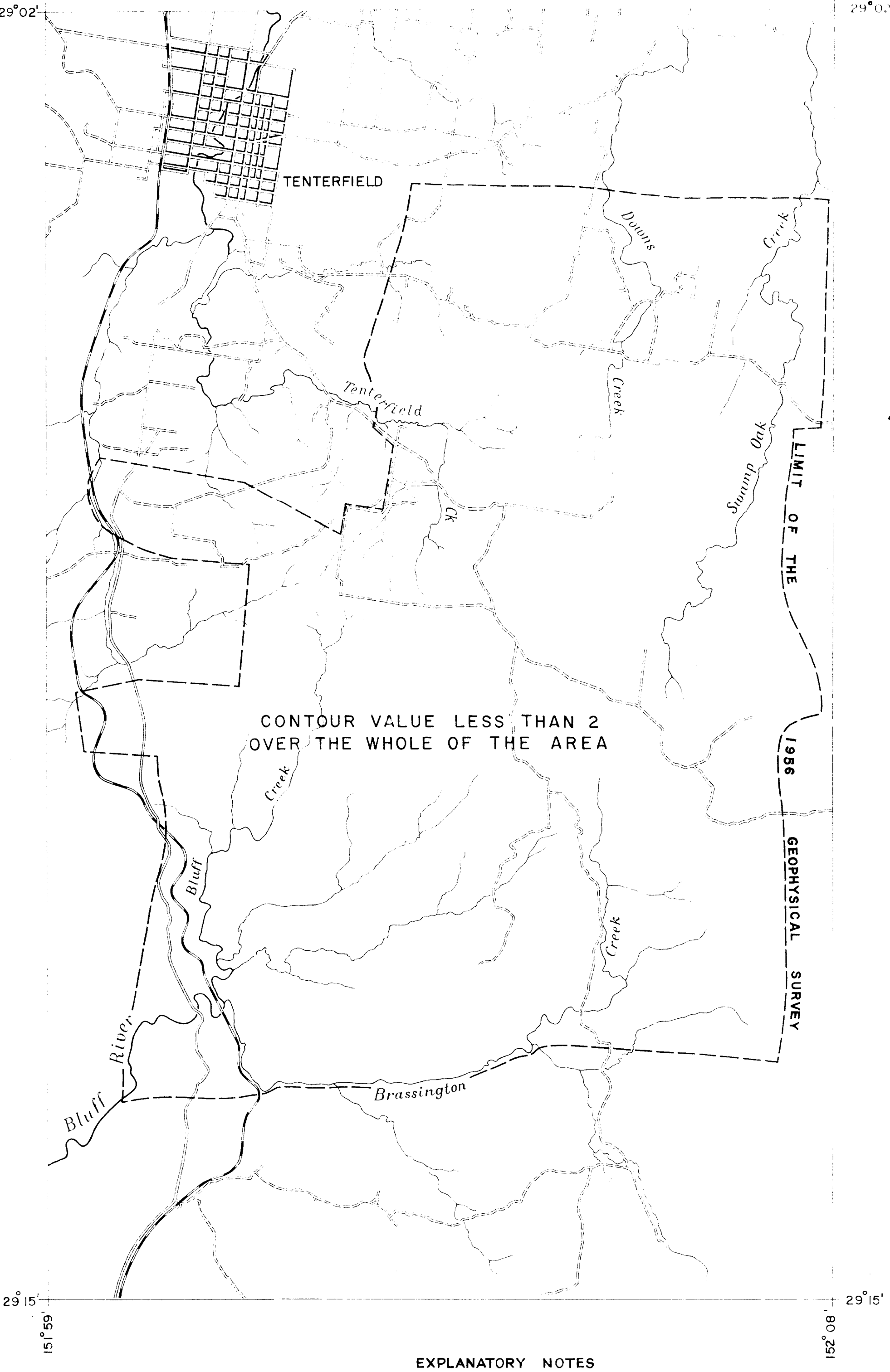
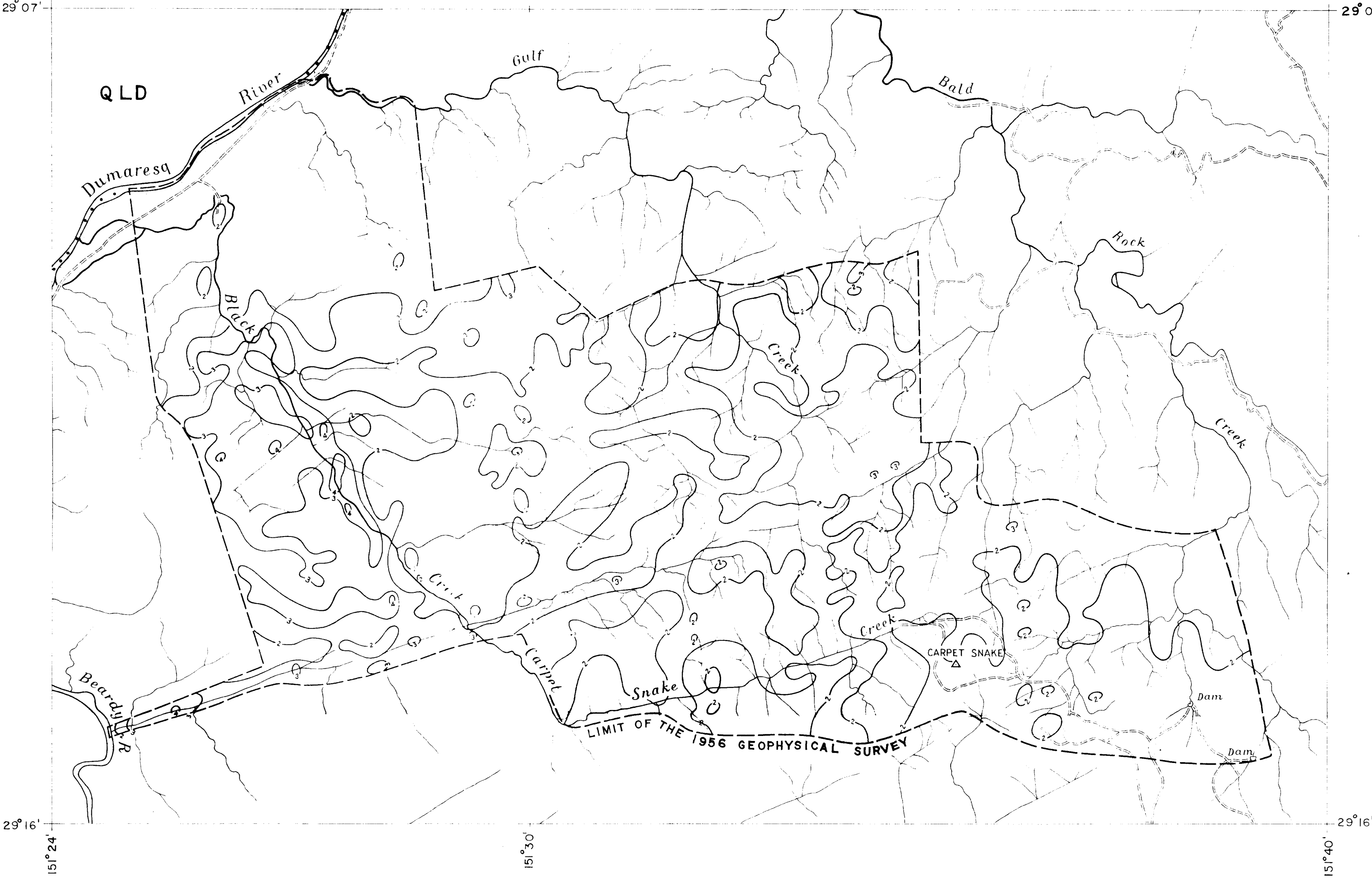
The survey results show that the radioactivity in the western areas is generally higher than in the eastern areas. The radioactivity is attributed to the presence of radioactive minerals in the granite that has intruded most of the region. However, there is no apparent reason why the granite in the western areas should have a higher concentration of radioactive minerals than that in the eastern areas. No significant anomalies were detected.

The original plan was to survey all the mineralised areas in the Emmaville district. However, surveying was suspended by bad weather before these areas could be completed. As the results of the surveys were not encouraging, priority has not been given to the completion of the New England region.



# CARPET SNAKE AREA

# TENTERFIELD AREA



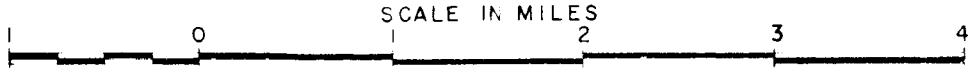
## MAP DATA

PROJECTION : TRANSVERSE MERCATOR, AUSTRALIAN NATIONAL SERIES

DETAIL : PLANIMETRIC DETAIL FOR CARPET SNAKE AREA WAS COMPILED FROM EXISTING 1 MILE MILITARY MAP OF CLIVE, N.S.W. AND WEST OF 151°30' E LONGITUDE, FROM EXISTING 1 MILE AERIAL PHOTO MOSAIC OF BONSHAW, N.S.W. PLANIMETRIC DETAIL FOR TENTERFIELD AREA WAS COMPILED FROM EXISTING 1 MILE MILITARY MAPS OF TENTERFIELD AND CLIVE, N.S.W.

ACCURACY : DETAIL TRACED FROM MAPS : ACCURATE  
DETAIL RECTIFIED FROM MOSAICS: RELIABLE SKETCH

## CARPET SNAKE & TENTERFIELD AREAS NEW ENGLAND REGION N.S.W. MAP SHOWING CONTOURS OF GAMMA-RAY INTENSITY DETERMINED BY AIRBORNE SCINTILLOGRAPH ( September, 1956 )



## EXPLANATORY NOTES

THE AIRBORNE SCINTILLOGRAPH RECORDS CONTINUOUSLY THE INTENSITY OF GAMMA RADIATION FROM THE GROUND OVER WHICH THE AIRCRAFT FLIES. THIS RADIATION IS DUE TO THE PRESENCE OF NATURALLY OCCURRING RADIOACTIVE ELEMENTS, URANIUM AND THORIUM AND THEIR DECAY PRODUCTS, AND TO A LESSER EXTENT POTASSIUM.

THE SCINTILLOGRAPH WAS CARRIED IN AN AUSTRALIAN AIRCRAFT WHICH WAS FLOWN AT A CONSTANT ALTITUDE ABOVE THE GROUND WHERE POSSIBLE. THIS ALTITUDE WAS USUALLY ABOUT 100 FEET BUT MAY HAVE BEEN AS MUCH AS 150 FEET. ON THE AVERAGE, THE SCINTILLOGRAPH EFFECTIVELY SCANNED A STRIP OF GROUND APPROXIMATELY 100 TO 150 YARDS WIDE, EXCEPT WHEN FLYING OVER RIDGES OR GORGES OR OTHER AREAS OF SHARP RELIEF. UNDER THESE CONDITIONS THE COVERAGE MIGHT BE LESS. THE RECORDED GAMMA-RAY INTENSITY THEREFORE REPRESENTS THE AVERAGE INTENSITY WITHIN A RADIUS OF 50 TO 75 YARDS OF THE AIRCRAFT.

THE GAMMA-RAY INTENSITY OVER AN AREA IS GENERALLY UNIFORM BUT SHOWS VARIATIONS ABOVE AND BELOW AN AVERAGE VALUE. WHERE THE RADIOACTIVITY WAS SUBSTANTIALLY GREATER THAN THE AVERAGE, CONTOURS HAVE BEEN DRAWN ON THE MAP TO REPRESENT RADIATION LEVELS AS MULTIPLES OF AN ARBITRARY UNIT.

THE HIGHER INTENSITIES RECORDED BY THE SCINTILLOGRAPH ARE NOT NECESSARILY DUE TO THE PRESENCE OF URANIUM DEPOSITS. MANY OF THE HIGH INTENSITIES MAY BE DUE TO OUTCROPS OF IGNEOUS ROCKS, PARTICULARLY GRANITE, WHICH CONTAIN A SLIGHTLY HIGHER CONCENTRATION OF THE RADIOACTIVE ELEMENTS, URANIUM, THORIUM AND POTASSIUM, THAN OTHER ROCKS. NO CLAIM IS MADE THAT ALL, OR EVEN ANY, OF THE HIGH INTENSITIES CORRESPOND TO URANIUM DEPOSITS OF ECONOMIC SIGNIFICANCE, BUT IT IS POSSIBLE THAT SOME DO.

IT SHOULD BE NOTED THAT IT IS VIRTUALLY ONLY THE RADIOACTIVITY OF THE SURFACE OF THE GROUND THAT HAS BEEN RECORDED BECAUSE THE RADIATION FROM ANY BURIED DEPOSIT IS SUBSTANTIALLY REDUCED BY A FEW INCHES OF SOIL OR ROCK COVER.