COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORDS 1960 No. 128

KATHERINE - DARWIN REGION CARBORNE RADIOMETRIC SURVEY, N.T. 1956

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ILLUSTRATIONS

ABSTRACT

This Record describes carborne radiometric surveys in the Katherine-Darwin area during 1956. The carborne work was a ground follow-up of anomalies detected during high-level and low-level airborne surveys.

No anomalies worthy of further investigation were discovered.

1. INTRODUCTION

The design and use of vehicle-mounted (carborne) radiometric equipment has been described in previous Records (Barlow, 1956; Langron, 1956). The present report describes the examination by the author of certain anomalies detected by airborne survey in the Katherine-Darwin area. The work was done between June and September 1956. The results did not give any indications of the presence of deposits of uranium minerals in the area examined, and are presented here solely for purposes of record.

2. AREAS COVERED

Surveys were carried out in the following areas:-

(1) An area of about 5 square miles, south-east of Brocks Creek, lying between the Brocks Creek and Fountain Head roads and the North Australian Railway. The purpose of the survey was to assess the value of some weak anomalies detected during the Bureau's 1956 low-level airborne survey conducted by D.F. Livingstone. The position of the area is shown on Plate 1.

(2) Areas on the Mundogie Hill one-mile military map area, covering two groups of anomalies detected by high-level airborne survey (Plate 2). One group of four anomalies (Nos. 27 to 30) is north-east of Coirwong Gorge; the other group of eight anomalies (Nos. 13 to 20) is near a locality known as Black Jungle. The positions of the anomalies are shown on Plate 2.

(3) Areas on the Burnside one-mile military map area, covering anomalies detected by high-level and low-level airborne surveys.

(4) Anomalies detected by high-level airborne survey in the Daly River area.

Surveys under (3) and (4) were done in conjunction with staff of the Darwin office and the results have been reported by Lord (1956). They will therefore not be discussed in this report.

3. TECHNICAL DETAILS

The equipment and method of procedure were the same as those used on previous surveys and described in detail by Barlow (1956) and Langron (1956).

Some difficulty was experienced owing to variations in radioactive background level; this had the character of a diurnal variation. Such effects were observed frequently in the Katherine-Darwin area during 1956, but have not been recorded in later years. Their cause is unknown, but may be connected with nuclear weapon tests which were conducted at Maralinga, South Australia, in 1955 and 1956. A continuous record of gamma-ray intensity was made at the Darwin laboratory during the period of the survey. That record was used in conjunction with frequent readings at a field base station to correct the carborne results for this diurnal variation.

The areas on the Mundogie Hill one-mile military map were found to be less suited to the use of vehicle-mounted equipment than had been expected. The anomalies near Coirwong Gorge occur on sharp ridges which are usually not accessible to a vehicle. The anomalies near Black Jungle occur in flatter country, but much of this country was inaccessible owing to swamps. Also it was found that the access track to the Mundogie Hill area was so rough as to cause damage to the equipment.

Where coverage with the vehicle-mounted equipment was impossible, the positions of the anomalies were located by means of portable Geiger counters.

4. RESULTS

The results may be of interest from two points of view -

(1) assessment of the accuracy of the airborne surveys

(2) assessment of the value of the anomalies as indications of the presence of uranium minerals.

In order to assess the accuracy of an airborne survey, it is necessary to have a complete map of the distribution of radioactivity on the ground. This is then compared with the results of the airborne survey, to see if the anomalies detected by the airborne work are a fair sample of the actual ground radioactivity. As routine coverage of the Mundogie Hill area was impossible for the reasons mentioned earlier, the results obtained in this area do not bear on this problem.

The distribution of radioactivity in the area surveyed near Brocks Creek is shown as a contour plan on Plate 1. It shows only very weak radioactivity, with maxima corresponding roughly in position with the very weak anomalies detected by low-level airborne survey.

As indications of the possible presence of uranium minerals, the results were not encouraging. In the area near Brocks Creek, the strongest radioactivity is associated with a line of old workings extending east from the Zapopan mine. No signs of uranium mineralisation were visible on the dumps, nor would any be expected, as the anomalies are so weak. Samples were taken from the two areas which showed the strongest radioactivity. These were assayed radiometrically in the Darwin laboratory; they showed only extremely weak radioactivity which is attributed to a very small content of thorium.

In the Mundogie Hill area all the anomalies examined, with the exception of the one marked on the map as No. 14, are associated with outcropping rocks which showed slight radioactivity. The rocks are sedimentary, generally silicified, and sometimes brecciated. The highest radioactivity recorded gave a reading of twice background on a portable Geiger counter. No signs of mineralisation were observed. It is considered that the indications were due to very slight radioactivity associated with rocks of a particular type which occur over large areas, and that the recording of discrete anomalies is due to variations of topography.

/...3.

The plotted position of anomaly No. 14 is on an extensive sandy flat without outcrops. No radioactivity could be observed on the ground in this vicinity.

5. CONCLUSIONS

The work described has, in general, confirmed the reliability of the results of airborne surveys, as far as was possible with the limited degree of coverage which could be achieved on the ground. One anomaly (No. 14) on the Mundogie Hill one-mile map could not be accounted for.

None of the anomalies was associated with radioactivity sufficiently strong to warrant further investigation in the search for deposits of uranium minerals.

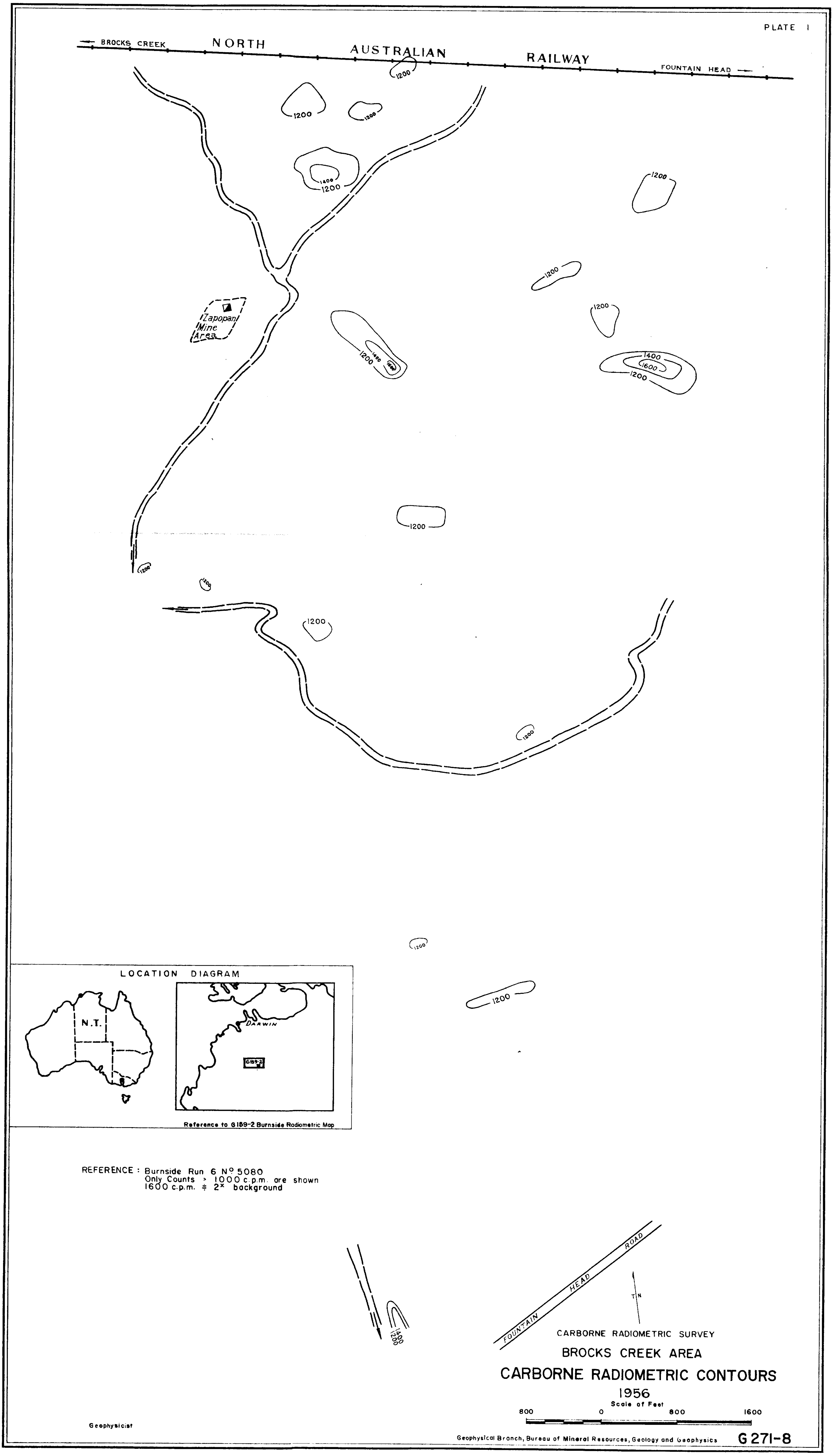
6. REFERENCES

BARLOW, A.J., 1956 - Summary of carborne radiometric surveys 1953-54. Bur. Min. Resour. Aust. Records, 1956/146.

LANGRON, W.J., 1956 - Summary of carborne radiometric investigations in the Northern Territory 1955. Bur. Min. Resour. Aust. Records 1956/147.

LORD, J.H., 1956 - Monthly report Darwin Uranium Group. Activities for July, August and September 1956. Bur. Min. Resour. Aust. (Unpublished).

PLATE 1



REFERENCE : Burnside Run 6 Nº 5080
Only Counts > 1000 c.p.m. are shown
1600 c.p.m. ÷ 2ˣ background

CARBORNE RADIOMETRIC SURVEY

BROCKS CREEK AREA

CARBORNE RADIOMETRIC CONTOURS

1956

Geophysicist

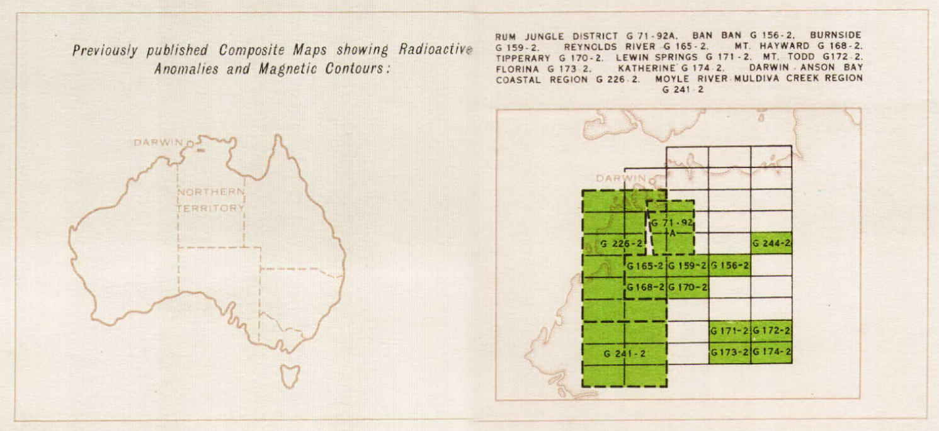
Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics G 271-8

AUSTRALIA 1:63,360

NORTHERN TERRITORY
MUNDOGIE HILL

Nº 56 ZONE 4
SHEET D / 53 / 5 / 56

LOCATION DIAGRAM



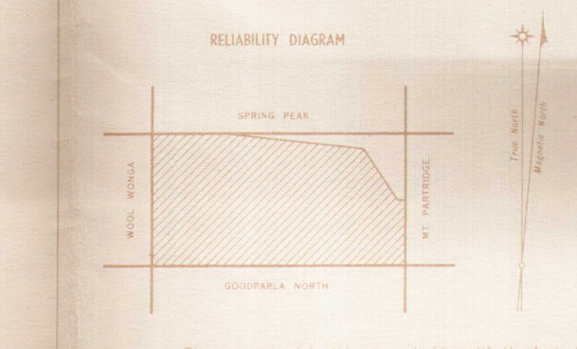
Previously published Composite Maps showing Radioactive Anomalies and Magnetic Contours:

RUM JUNGLE DISTRICT G 71-92A. BAN BAN G 156-2. BURNSIDE G 159-2. REYNOLDS RIVER G 165-2. MT. HAYWARD G 168-2. TIPPERARY G 170-2. LEWIN SPRINGS G 171-2. MT. TODD G172 2. FLORINA G 173 2. KATHERINE G 174 2. DARWIN ANSON BAY COASTAL REGION G 226 2. MOYLE RIVER-MULDIVA CREEK REGION G 241 2

GEOPHYSICAL SECTION, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
DIVISION OF NATIONAL MAPPING, DEPARTMENT OF NATIONAL DEVELOPMENT

MAP DATA

RELIABILITY DIAGRAM



PROJECTION:	*Transverse Mercator, Australian Series.*
CONTROL:	*AN-APN/3, AN-CPN/2 Shoran beacon control system operated by the Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics. The beacons were ranged into existing trigonometrical survey stations.*
DETAIL:	*Planimetric detail was compiled by the National Mapping Section, Department of the Interior, from a Shoran-controlled slotted template photogrammetric assembly.* *Geophysical data were plotted from Shoran-directed traverses at approximately one-fifth of a mile separation. Plotting and reproduction drawing of these data and completion of base map were carried out by the Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics.*
RELIABILITY:	*Planimetric detail: reliable, within ± 75 yards.* *Geophysical data: reliability of plotted position of aircraft, within ± 75 yards.*

The area covered by this map coincides with the Australian One Mile Topographical Series Map of the same name.

SCALE

MAGNETIC CONTOUR INTERVAL 100 GAMMAS

MAP SHOWING

RADIOACTIVE ANOMALIES
DETECTED BY AIRBORNE SCINTILLOGRAPH

AND

TOTAL MAGNETIC INTENSITY
MEASURED BY AIRBORNE MAGNETOMETER

LEGEND

● Anomalies Discussed In This Report.

TOPOGRAPHICAL DATA

River or Creek
Creek or Watercourse
Railway
Highway
Minor Road
Track (vehicular)
Track (foot or pack)
Bridge
Culvert
Mine
Airstrip

SCINTILLOGRAPH ANOMALY DATA

● *1st. Order Anomaly*
◉ *2nd. Order Anomaly*
• *3rd. Order Anomaly*

An anomaly occurs where the intensity of radioactivity is considerably above the average intensity of the area in which it occurs. An anomaly is graded as 1st, 2nd or 3rd order depending on whether the above difference of intensity is Nine, Six or Three times the random variations of intensity.

⁙ *Anomaly Sharp along Line of Flight*

┬┬┬┬ *Intensity change A*
┬┬ ┬┬ *Intensity change B*
┬ ┬ ┬ *Intensity change C*

These symbols indicate a change in average intensity of radioactivity in passing from one area to another; the short hachured lines point to the area with the lower average intensity. The magnitude of the change is graded as A, B or C depending whether it is Nine, Six or Three times the random variation of intensity of the area with the lower average intensity.

MAGNETIC DATA

Magnetic Contours Showing Flight-line Intersections
Magnetic Low

EXPLANATORY NOTES

The airborne scintillograph records continuously the intensity of gamma radiation from the ground over which the aircraft flies. The intensity over any area is generally uniform but shows random variations above and below an average value. Anomalies are marked where the increase in intensity is substantially greater than the random variations. Anomalies are classified as first, second and third in decreasing order of magnitude. The sources of the anomalies may range from small areas of high radioactivity to large areas of lesser activity. Some sources of radioactivity may not be detected because the intensity of gamma radiation from them may be too low to give an anomaly.

Some anomalies are sharper and of more restricted length along the lines of flight than others and are marked thus ⁙ on the map. They are probably due to localised sources close to the line of flight. Similar sources remote from the line of flight would give anomalies of lower relative intensity.

The average intensity may change from area to area and where such a significant change occurs it is indicated by a symbol which shows the magnitude and direction of the change.

The scintillograph was flown, where practicable, at a constant height of 500 feet above the ground. At this height it effectively scanned a strip of ground 200 to 250 yards wide. Therefore, at the closest practical flight line spacing of one-fifth of a mile, used in this survey, complete coverage was not obtained. Under these circumstances some anomalies that do exist may not have been detected. Also, the source or sources of any anomaly may lie anywhere within a radius of 100 to 125 yards of the position of the aircraft. The height of the aircraft was controlled by radio-altimeter and the position by radar (Shoran) navigation aids. Although the scintillograph was flown for the most part at 500 feet above the ground, local topographical features, e.g. hills, were crossed at a lower height above ground level. Such topographical features could be responsible for some increase in measured radioactivity and in such cases a correction has been made for altitude.

It should be noted that it is only the radioactivity of the ground surface that has been measured because radiation may be completely screened or substantially reduced in magnitude by a few inches of soil. For this reason, and also because the strength of the anomaly depends upon the distance between the scintillograph and the source, some third order anomalies may be as significant as first order ones. No claim is made that all or even any of the anomalies correspond to uranium deposits of economic importance but it is possible that some do. Subsequent investigation on the ground is necessary to determine their significance and possible economic importance.

The total magnetic intensity was continuously recorded by an AN-ASQ/1 airborne magnetometer operating simultaneously with the scintillograph. The data remain uncorrected for a regional gradient in total magnetic field of 11 gammas per mile in a direction S 4·5° W. Every third flight-line only was used in compiling the magnetic data.

G 244-2
JULY 1956