COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1962/158

MOUNT ISA AREA, AIRBORNE RADIOMETRIC SURVEY, QUEENSLAND 1961

by

J.E.F. Gardener

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SUMMARY

During September and October 1961, a Cessna aircraft of the Bureau of Mineral Resources made a low-level airborne radiometric survey in the Mount Isa area of Queensland.

An area of 1100 square miles was surveyed. Two significant radiometric anomalies were located, but both are associated with known uranium prospects.

The survey will be resumed in 1962.

1. INTRODUCTION

This Record describes a low-level airborne radiometric survey for uranium in the Mount Isa area of Queensland. The survey was done in September and October 1961 by the Geophysical Branch of the Bureau of Mineral Resources, using a Cessna 180 aircraft. This survey is the fourth of a series of airborne radiometric surveys by the Bureau of Mineral Resources designed to cover the Lower Proterozoic Eastern Creek Volcanics and neighbouring rock types in the Mount Isa area. The first of these surveys was in 1958 (Gardener, 1961), the second in 1959 (Mulder, 1961a), and the third in 1960 (Mulder, 1961b). The area surveyed in 1961 is shown on Plate 1.

Brooks (1960) describes the history of exploration for uranium in the Mount Isa area. The first uranium deposit was found in March 1954 twenty miles north of Mount Isa. Mount Isa Mines Ltd immediately followed up this find, and several other deposits were located. All these early discoveries were made in a similar type of sedimentary rock in the Eastern Creek Volcanics, and the Company decided to prospect the Eastern Creek Volcanics as a whole, using an aircraft in conjunction with ground parties. This led to the discovery of many deposits, mostly of very low grade. Prospectors and other mining companies also made surveys, including airborne surveys, in the Mount Isa area in 1954; after 1954, prospecting declined rapidly. Although some of the area covered by the 1961 survey has been fairly well prospected, some other localities are difficult of access and may not have been fully tested.

Those who took part in the survey were J.E.F. Gardener (geophysicist), A. Crowder (drafting officer), and C.I. Parkinson (field assistant) of the Bureau of Mineral Resources, and N.J. Barton (pilot) of Trans-Australia Airlines.

2. GEOLOGY

The geology of the Mount Isa region has been described by Brooks (1960) and Carter & Brooks (1960). In the area surveyed in 1961 the rocks comprise the Lower Proterozoic formations described below :

The Eastern Creek Volcanics consist of meta-basalt with interbedded quartzite, slate, and altered limestone. There are 91 known occurrences of uranium in the formation; of these, only the Calton Hills group is in the 1961 survey area. Most of the deposits consist of very-fine-grained primary uranium mineral in arenaceous sediments that are interbedded with altered basalt.

The Surprise Creek Beds include sandstone, siltstone, quartzite, dolomite, and conglomerate. Four uranium occurrences are known in these Beds; they are probably superficial concentrations and are outside the 1961 survey area.

The Judenan Beds consist of quartzite, argillaceous sandstone, siltstone, shale, and basalt. Two uranium occurrences are known in these Beds, both outside the 1961 survey area. The main occurrence is a low-grade torbernite deposit in shale.

The Myally Beds are described as sandstone, quartzite, siltstone, conglomerate, and volcanics. There are no known uranium occurrences in these Beds.

The Precambrian Ewen Granite crops out in the survey area and is described by Carter & Brooks (1960, p. 45) as a massive to coarse-grained granite that consists of red feldspar, quartz, and chlorite. Brooks (1960, p. 8-9) states that uranium minerals have been found associated with derivatives of Precambrian granite intrusions but are of no economic interest.

3. EQUIPMENT

The scintillation counter used consisted of two units, detector head and ratemeter, both built by Austronic Engineering Laboratories Pty Ltd of Melbourne. The ratemeter output was recorded on one channel of an RD-47A dual-channel recorder; a continuous record of radioactivity was thus provided. Operation of the scintillation counter was controlled and monitored in flight by a remote control unit.

The detecting element in the scintillation counter was a cylindrical, thallium-activated, sodium iodide crystal, $4\frac{1}{2}$ inches in diameter and 2 inches thick, mounted with its axis vertical; this was optically coupled to a photomultiplier tube.

4. OPERATIONS

The survey was flown at a height of 200 ft above ground level; at this height the lane scanned by the scintillation counter was about 500 ft wide. The flight-line spacing was one quarter of a mile and the aircraft speed was about 105 knots.

During flight the operator navigated, and also plotted on aerial photographs, the aircraft's path and check points along the flight-lines. Simultaneously with marking the check points on the photographs, the operator marked the check points on the recorder chart with an electrically operated side pen. Correlation between the recorder chart and the plotted position of the aircraft was thus obtained.

The ratemeter range used was 500 counts per second. The time constant used was $\frac{1}{2}$ second and the recorder-chart speed was 3 inches per minute.

Because the AN/APN-1 radio-altimeter in the aircraft was not working reliably, the aircraft's height above ground level had to be estimated by the pilot during survey flights. He obtained experience at estimating 200 ft by flying the aircraft in the aerodrome circuit area using the aircraft's barometric altimeter.

The survey party was based at Mount Isa in September and at Kamileroi in October. Survey flights totalled 94 hours, and 1100 square miles was covered by 4300 flight-line miles.

Delays due to aircraft maintenance and equipment failures were negligible but some survey time was lost owing to bad weather.

5. METHOD OF INTERPRETATION

After each survey flight, anomalies were selected by a critical examination of the record of radioactivity. The positions of increases in radioactivity above the background radioactivity were plotted on aerial photographs as anomalies, and the geology and topography of each position were noted.

Anomalies were discarded if they were considered to be associated with weakly radioactive materials disseminated over a large area or if they were considered to be caused by outcrops of rock types known to be more radioactive than nearby rock types. Most rock types show some radioactivity due to the inclusion of disseminated radioactive minerals, and there is a wide range of radioactivity among such rock types even though none of them contains useful concentrations of radioactive minerals: in addition, a cover of only a few inches of overburden is sufficient to absorb the greater part of any radioactivity originating below. Consequently, as the aircraft passes over different rock types the ratemeter output will show considerable fluctuations, and many anomalies will be recorded. Rock types consistently associated with anomalies are therefore noted, and such anomalies are not usually considered important.

Anomalies considered to be due to topography were always re-flown. Many known uranium prospects are on, or close to, the tops of hills and ridges, and a careful examination of geological and radiometric data must be made before an anomaly is discarded because of topography alone.

A final assessment of the anomalies not discarded was made during re-flying. Experience, and the extent of geological information available in the area surveyed, were important factors in assessing anomalies.

6. RESULTS

Only two significant anomalies were detected during the survey and both were located on known uranium prospects, viz. the Queen's Gift and the Duke. Both of these prospects lie in the Eastern Creek Volcanics. Several other uranium prospects are known in the area surveyed but none was detected, presumably because of low grade or small surface exposure.

7. CONCLUSIONS

The survey revealed no anomalies that could be recommended for ground investigation. The results suggest that, in the area surveyed, the chances of finding new uranium occurrences of economic interest are not good. However, in order to complete the originally proposed programme of low-level scintillograph surveys in the Mount Isa region, the survey will be continued during 1962 and extended northwards from the 1961 area to the limit of the outcropping Lower Proterozoic rocks.

8. REFERENCES

BROOKS, J.H. 1960 The uranium deposits of north-western Queensland. Publ. geol. Surv. Qld 297

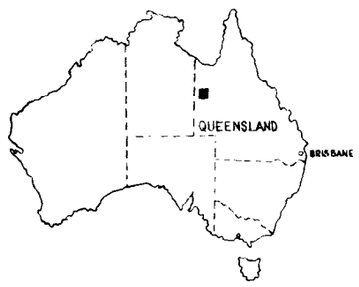
CARTER, E.K., and BROOKS, J.H. 1960 North-western Queensland. THE GEOLOGY OF QUEENSLAND. Melbourne, Univ. Press.

GARDENER, J.E.F. 1961 Mt. Isa area airborne radiometric survey, Queensland 1958. Bur. Min. Resour. Aust. Rec. 1961/21

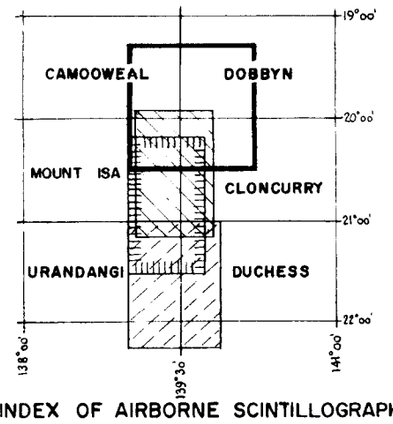
MULDER, J.M. 1961a Mt. Isa area airborne radiometric survey, Queensland 1959. Bur. Min. Resour. Aust. Rec. 1961/74

MULDER, J.M. 1961b Mt. Isa area airborne radiometric survey, Queensland 1960. Bur. Min. Resour. Aust. Rec. 1961/77

LOCATION DIAGRAM



REFERENCE TO AUSTRALIA STANDARD MAP SERIES



INDEX OF AIRBORNE SCINTILLOGRAPH SURVEY MAPS PUBLISHED

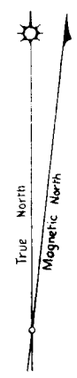
- Mt Isa Region (1958) G 181-6
- Mt Isa Region (1959) G 181-10
- Mt Isa Region (1960) G181-14
- Mt Isa Region (1961)

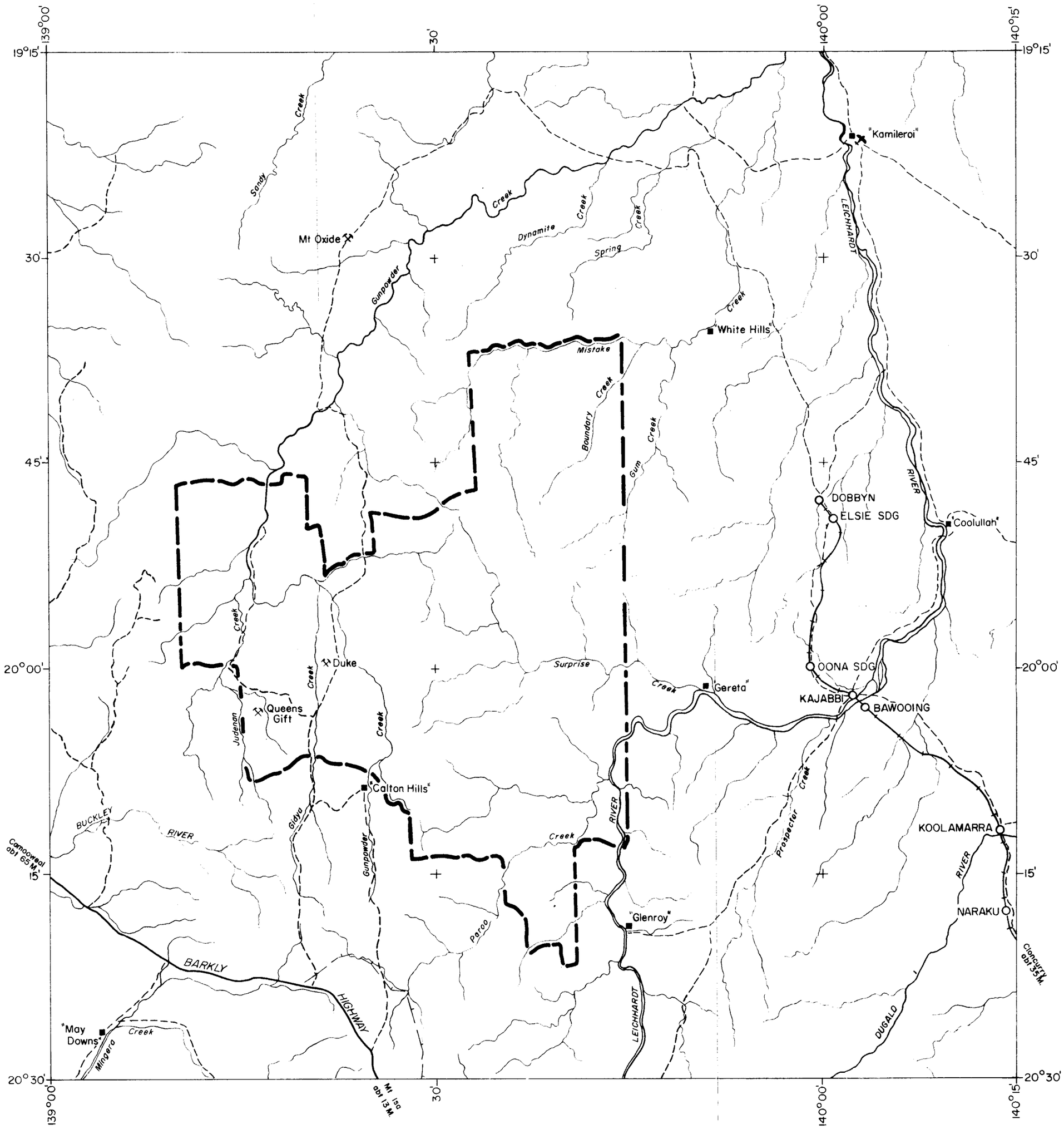
MAP DATA

PROJECTION: Transverse Mercator

DETAIL: Planimetric detail after 4-mile maps of Camooweal, Dobbyn, Mt. Isa and Cloncurry compiled by Division of National Mapping, Department of National Development

RELIABILITY: Reliable sketch





LEGEND

- River or creek
- Railway
- Highway
- Road or track
- Telegraph line
- Named place
- Aerodrome or landing ground
- Homestead
- Mine or prospect
- Limit of 1961 airborne survey

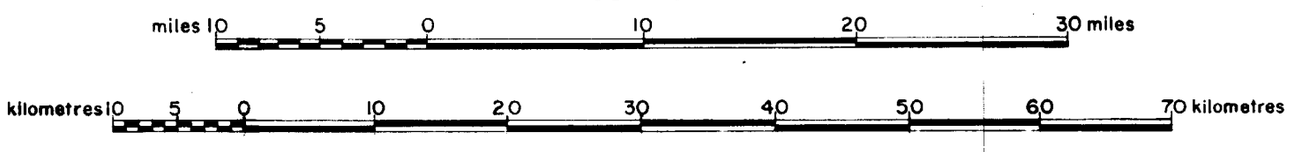
QUEENSLAND

MOUNT ISA REGION

AIRBORNE SCINTILLOGRAPH SURVEY

SEPT.-OCT. 1961

SCALES



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