COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1962/159

BURNETT AREA AIRBORNE RADIOMETRIC SURVEY, QUEENSLAND 1961

by

J.E.F. Gardener

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CONTENTS

ILLUSTRATION

SUMMARY

During November and December 1961, a Cessna aircraft of the Bureau of Mineral Resources made a low-level airborne radiometric survey in the Burnett area of Queensland.

An area of 1450 square miles was surveyed; no radiometric anomalies were located.

The chances of finding uranium occurrences of economic importance in the Palaeozoic rocks in south-eastern Queensland seem small.

1. INTRODUCTION

This Record describes a low-level airborne radiometric survey for uranium in the Burnett area of south-eastern Queensland. The survey was done in November and December 1961 by the Geophysical Branch of the Bureau of Mineral Resources, using a Cessna 180 aircraft.

The survey was proposed by the Queensland Development and Mines Department to cover the mineralised belt that lies between the heads of the Burnett and Mary Rivers. Several small uranium occurrences have been reported in this area (Brooks, 1958). The area surveyed is shown on Plate 1.

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

2. GEOLOGY

The survey area consists mainly of undifferentiated Lower Palaeozoic rocks and intrusive granite. Some rocks of the Gympie Group crop out in the south-eastern part of the survey area.

Metasediments are traceable northwards almost continuously from Kilkivan for 160 miles (Brooks, Bryan, Cribb, Denmead, and Jones, 1960, p.139). Through this belt the rocks strike in a general northerly direction, with steep dips due to intensive folding. The sedimentary belt is intruded by a granite mass, which is centrally emplaced and extends almost the entire length of the belt. Granite also occurs near Biggenden and between Biggenden and Kilkivan. All these granites are Permian.

Rocks of the Gympie Group crop out in the south-eastern part of the 1961 survey area. The Gympie Group is described by Denmead (1960 p.227-8). It comprises a narrow belt of Permian rocks and has been studied in detail only in the restricted area of the Gympie goldfield. The rocks of this group include limestone, sandstone, shale, conglomerate and tuff which strike uniformly east and are intersected by faults. They also show evidence of intrusive activity. Small copper lodes occur in granite intruding Gympie-Group rocks between Biggenden and Kilkivan.

The country rocks in the Mount Perry mineral field are schist and intrusive granite. The field has been a valuable source of copper, gold, and molybdenite. With few exceptions, the mineral lodes and reefs occur in the granite, which is intersected by a great number of dykes of diorite and porphyry with a prevailing north-west trend (Qld Dept of Mines, 1953).

Brooks (1958) mentions the occurrence of uranium minerals in several localities in the Mount Perry district. These occurrences are in fissure veins in granite, granitic lode, and pegmatite, and 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, 4½ 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 ⅓ 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 barometric altimeter.

The survey party was based at Gayndah, and survey flights totalled 108 hours; 1450 square miles was covered by 6260 flight-line miles. The area covered is shown on Plate 1.

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 as anomalies on aerial photographs, 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 country-rock types the ratemeter output will show considerable fluctuations, and many anomalies will be recorded. Therefore, rock types consistently associated with anomalies are noted, and such anomalies are not usually considered significant.

Anomalies considered to be caused by topography were always re-flown. Many known uranium prospects are on, or close to, the tops of hills or 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.

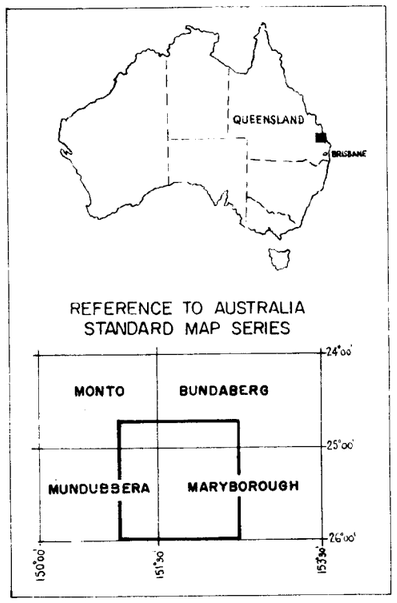
6. RESULTS

No significant anomalies were detected. The known uranium occurrences in the area did not produce detectable anomalies because of their low grades and small surface exposures. The survey has shown no evidence to suggest that the Palaeozoic rocks of south-eastern Queensland might contain uranium occurrences of economic interest.

7. REFERENCES

BROOKS, J.H.	1958	The occurrence of uranium in Queensland. AUSTRALIAN ATOMIC ENERGY SYMPOSIUM. Melbourne, Univ. Press, 24,
BROOKS, J.H., BRYAN, W.H., CRIBB, H.G.S., DENMEAD, A.K., and JONES, O.A.	1960	South-eastern Queensland - The Neranleigh-Fernvale Group. THE GEOLOGY OF QUEENSLAND. Melbourne, Univ. Press
DENMEAD, A.K.	1960	Gympie. Ibid.
QUEENSLAND DEPARTMENT OF MINES	1953	Mount Perry copper mines. GEOLOGY OF AUSTRALIAN ORE DEPOSITS 5th Emp. Min. Metall. Congr. 1., 759-762. Melbourne, AIMM

LOCATION DIAGRAM

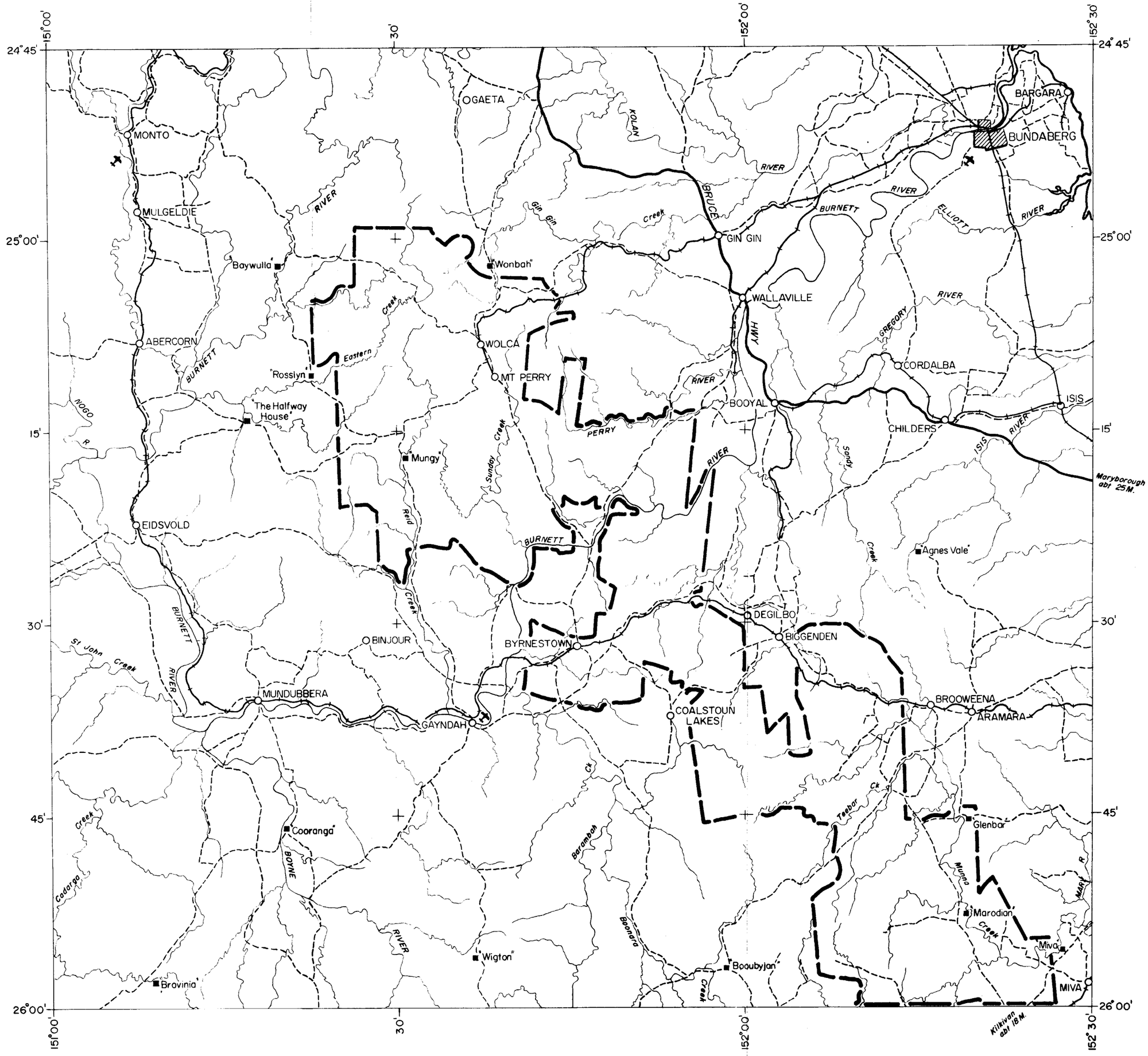


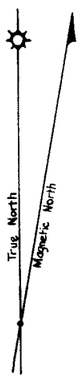
MAP DATA

PROJECTION: Transverse Mercator

DETAIL: Planimetric detail after 4-mile maps of Monto, Bundaberg, Mundubbera and Maryborough compiled by Royal Australian Survey Corps

RELIABILITY: Sketch only





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

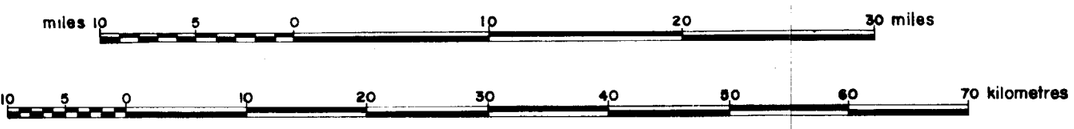
QUEENSLAND

BURNETT REGION

AIRBORNE SCINTILLOGRAPH SURVEY

NOV. - DEC. 1961

SCALES



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