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RECORD No. 1959/9

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AIRBORNE RADIOMETRIC SURVEY OF THE RUM JUNGLE REGION, NORTHERN TERRITORY 1957

by

D.F. LIVINGSTONE

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2. Rum Jungle region (South)- map showing anomalies of gamma-ray intensity detected by airborne scintillograph. G71-173

Record No. 1959/9

ABSTRACT

During the month of June, 1957, an Auster aircraft of the Bureau of Mineral Resources began a low-level airborne radiometric survey of two areas centred on the Rum Jungle uranium mine, in the Northern Territory. The survey was resumed and completed in late October of the same year.

A total area of 425 square miles was surveyed, and 142 anomalies of gamma-ray intensity were located. Many of these were followed up by a co-operating geological party, and some groups were selected for further investigation. The positions of anomalies are plotted on the maps which appear with this report.

A number of ferruginous outcrops on and near Castlemaine Hill and in the vicinity of Mt.Fitch may represent uranium mineralisation of low ore grade.

1. INTRODUCTION

During the month of June, 1957, the Geophysical Section of the Bureau of Mineral Resources began a low-level airborne radiometric survey of an area centred on the Rum Jungle uranium mine, which lies 40 miles S.S.E. of Darwin, in the Northern Territory and is operated by Territory Enterprises Pty. Ltd. The survey was resumed and completed in late October of the same year.

The main area surveyed covers 355 square miles, and is in the form of a rough parallelogram, with its corners lying on Darwin River railway siding, Acacia Gap, Adelaide River township, and the southern portion of the Mt.Tolmer plateau; it will be observed that there are two gaps in the coverage of this area, the northern one representing the Rum Jungle Granite, the southern the Waterhouse Granite.

The geology of this area is well known and need not be discussed in detail here. The Lower Proterozoic formations of particular interest are:-

Brock's Creek Group	(Burrell's Creek Formation (Stapleton Formation (Golden Dyke Formation
Batchelor Group	(Coomalie Creek Dolomite (Crater Formation (Celia Creek Dolomite (Beeston's Creek Formation

Urnaium mineralisation occurs at Rum Jungle in carbonaceous shales of the Golden Dyke Formation, at or near its contact with the underlying Coomalie Creek Dolomite (Matheson, 1953).

The distribution of the Batchelor Group is roughly indicated by prominent arcuate outcrops of the Crater Formation around the intrusive masses of the Rum Jungle and Waterhouse granites. A complication is introduced by the presence of a major NE-SW post-intrusion drag fault, the Giant's Reef, and associated minor faults. Lateral displacement of the country rocks along the Giant's Reef fault has produced an embayment area of sediments in the region of Rum Jungle, bounded by the Rum Jungle Granite and the Giant's Reef fault. The Rum Jungle orebodies occur within this embayment.

The primary object of the airborne survey was to examine the contact between the Coomalie Creek Dolomite and the Golden Dyke Formation: The secondary object was to examine other exposures of geologically interesting formations within the area. In addition, a strip of country between Acacia Gap and a point east of Adelaide River (S.E. of Mt.Foelsche) was flown as a reconnaissance (Plate 1); there were no results of interest in this area.

The survey was directed by D.F. Livingstone (Geophysicsit), assisted by J.E.F. Gardener (Geophysicsit), F.P. Fraser (Geophysical Assistant), A. Crowder (Draftsman) and N.A. Ashmore (Driver). The Bureau's Auster aircraft, VH-RES, was piloted by F/O A.H. Worley (Trans-Australia Airlines). The progress of the survey was materially assisted by the presence in the area of a geological party of the Bureau under O.N. Warin; the close liaison achieved enabled maximum survey efficiency to

be obtained and the airborne work to be followed up without delay; this geological party was unfortunately not in the field during the latter stage of the airborne survey, late in October.

The writer is indebted to C.N. Warin for critical discussion of the survey results, and to D.F. Dyson for information on previous work in the Rum Jungle area.

2. EQUIPMENT

The scintillograph used consisted of a detector head and ratemeter, Austronic Engineering Laboratories type A.S.1, coupled to a Texas Instrument Company dual-recording milliammeter, on one channel of which the ratemeter output was recorded. Operation of the scintillograph was controlled and monitored in flight by a remote control unit.

The detecting element in the scintillograph consists of a thallium-activated sodium iodide crystal, cylindrical in shape, 4½ inches in diameter and 2 inches thick, mounted with its axis vertical. This is optically coupled to a photomultiplier tube, Dumont type 6364. Gamma radiation impinging on the crystal produces scintillations which are converted to electrical impulses in the photomultiplier. These electrical impulses are integrated in the ratemeter, whose output current at any instant, registered on a counting-rate meter, is proportional to the gamma radiation detected over the preceding short interval of time. One channel of the recording milliammeter is in series with the counting-rate meter, and provides a continuous record of gamma radiation detected, on which record the interpretation of results is based.

Because the efficiency of airborne radiometric survey depends to a great extent on the maintaining of a near-constant height above ground level, a radioaltimeter type AN-APN1 was fitted. Divergence from a pre-selected altitude above ground level was indicated to the pilot by a system of limit lights on the aircraft dashboard, and a record of altitude above ground level was made on the second channel of the recording milliammeter.

3. OPERATIONS

The survey was flown at a height of 200 feet above ground level. At this height the land scanned is of the order of 500 feet in width. The major part of the area was flown at a flight-line spacing of 8 to 10 per mile, giving a coverage of at least 80%, but on the southern margin the coverage was decreased to about 50%; on this southern margin formations are Stapleton, Burrell's Creek, and higher. Whenever possible, the aircraft speed was maintained in the region of 80 to 90 m.p.h.

Flight lines and check points were plotted on aerial photographs by the observer during flight. As far as possible these lines were kept straight and approximately at right angles to the strike of the geological formations; however, the arcuate nature of the strike in some localities did not render this always possible, but it was considered that the close spacing of flight lines minimised any possible disadvantage. Anomalies which were deemed significant were re-located whenever possible. The accuracy of positioning was found to be of the order of ± 150 feet.

The response of the scintillograph to a standard flux of gamma radiation was checked before and after each survey

flight by placing a standard radioactive source in a fixed position relative to the detecting element. This was carried out at an altitude of 2,000 feet above ground level, at which height the background due to cosmic rays and contamination effects was also determined. To enable the instrumental performance to be checked more accurately over the period of a survey flight, the standard source was carried in the aircraft, and placed as remote as possible from the detecting element; the increased flux detected was found to be negligible. A confidence check on the performance of the radioaltimeter was carried out at take-off and landing, the aircraft being flown at 200 feet along the runway and the radioaltimeter checked against the barometric altimeter.

Operations in June were conducted from the airstrip at Batchelor. It was usually possible to carry out two flights daily, in the early morning and late afternoon, though the declining sun often made flying in the afternoon difficult; turbulence rendered flying inadvisable in the middle of the day. During June 380 square miles were covered. During October the survey operated from Darwin airport, and morning flights only were possible, owing to build-up of storms towards afternoon; 45 square miles were covered in this period.

The terrain in general presented no difficulties, being comparatively gentle around the Rum Jungle and Waterhouse granites. To the south and east the steep ridges of the Burrell's Creek and higher formations presented more difficulty, but a good measure of altitdue control was achieved. Turbulent conditions occasionally rendered this southern region hazardous and precluded flying there.

The day-to-day direction of the survey was based on survey results to date, weather conditions, and evidence from geological follow-up work. It must again be emphasised that the flow of information from the geological party operating in the area contributed greatly to efficient and concentrated attack by the airborne geophysical party.

4. INTERPRETATION PROCEDURE

The results have been interpreted in terms of anomalies of gamma-ray intensity. This interpretation was carried out by critical inspection of the records of gamma-ray intensity and altitude above ground level, in conjunction with examination of aerial photographs and geological maps (Livingstone, 1957).

The radioaltimeter record was utilised with discretion. For one thing, the varying types of country rock and extent of overburden rendered accurate signal/height relationships difficult to determine and apply; indeed, it was not considered worth while to attempt this, even roughly, to any great extent. For another, the cone of acceptance of the scintillograph detector head does not coincide with the more restricted acceptance figure of the radioaltimeter receiving antenna. In rugged terrain, therefore, it cannot be assumed that the scintillograph is recording gamma radiation from the point, approximately beneath the line of flight, from which the radioaltimeter transmission is reflected. However, where a fluctuation of the record of gamma-ray intensity was such as to evoke suspicion that it was due solely to a decrease in altitude above ground level resulting from topographical elevation or erratic flying, and the radioaltimeter record indicated a decrease in altitude above ground level, this fluctuation in the scintillograph record was disregarded; confirmatory evidence

was obtained, if necessary, by inspection of aerial photographs.

It is considered that this process ensures that only those variations in the record are accepted as anomalies which are due to definite areas of higher radioactivity on the ground. Assessment of the significance of these anomalies is complicated by the following factors.

(1) A considerable part of the area is covered by soil and rubble, the thickness of which there is no means of estimating. This cover would greatly reduce the intensity of the radiation from a source underneath it. It is therefore possible that an important deposit of radio-active minerals would be represented by a very small anomaly.

(2) The area contains a lrage number of outcrops of laterite, which are generally slightly radioactive. The radioactivity of these laterites is no indication of the presence of radioactive minerals in non-outcropping rocks, but is possibly due to the fact that the laterites are a favourable medium for precipitation of uranium carried in solution by ground water (Fisher and Sullivan, 1954.)

5. DISCUSSION OF RESULTS

In all, 142 anomalies were located during the course of the survey. These are plotted on the accompanying maps (Plates 1 and 2). The co-operating geological party followed up 100 of these, located during June 1957 (Warin, 1959). The geological party also examined 5 broad areas where the radioactivity was slightly high; this increased radioactivity was found to be due to the occurrence of lateritic deposits in scattered exposures. The remaining 42 anomalies, including 4 detected during June, had not been followed up by the close of the field season in November, but reasonable inferences as regards the nature of some can be drawn from evidence obtained earlier in the season. It has been mentioned above that no results of significance were obtained on reconnaissance traverse of the eastern area, between Acacia Gap and Mt.Foelsche; accordingly, only the results obtained in the western area, centred on Rum Jungle, will be discussed here.

Geological examination of the anomalies located during June showed that roughly one-third occurred on outcrops of pebble conglomerate in the Crater Formation; a further third occurred on laterite; and of the remainder, the majority occurred on granite, with a few on existing workings or costeans. Three localities of particular interest were recognised: lenticular pebble conglomerate beds near the base of the Crater Formation; the Woodcutters' Anomalies (Nos.36 - 42) and Castlemaine Hill South (No.117). These are discussed below. It is sufficient to comment only briefly on those anomalies which occur elsewhere; more detailed comments will be found in Warin's report (1959).

Several anomalies (Nos.16 - 24, 29 and 30) occurring west of Manton Dam were found on geological follow-up to lie on granite; the lack of anomalies other than these in the strip of country extending westwards from Manton Dam is due to heavy soil cover, shed from a high ridge to the north. In the area between Darwin River and Mt.Fitch, and in the vicinity of Fraser

airstrip, the majority of the anomalies are situated on scattered outcrops of laterite (e.g. Nos. 32 - 35 and Nos. 1-3). While laterites in the area often show high radioactivity, particularly when surrounded by alluvium, the character of the ferruginous outcrops near Castlemaine Hill and Mt.Fitch (see below) renders it advisable to examine all presumed laterites which show high radioactivity, to determine whether or not they are superficial deposits of no significance or ferruginous outcrops similar to those to which attention has been drawn by Warin (1959). South to Batchelor township, scattered anomalies occur along the railway line; two of these (Nos. 136 and 137) represent a uranium prospect, Waterhouse No.2, the majority of remainder are on laterites.

None of the 38 anomalies in the embayment area (Nos. 55 - 70, 98 - 116 and 122 - 124), which was flown in late October, had been followed up by the time the airborne survey party left the field. No definite information regarding these can be given, therefore, but it is a reasonable assumption that some (e.g. Nos. 69 - 70) fall in the Rum Jungle Granite, and that others on the flanks of Castlemaine Hill (Nos. 99 - 114) and south of Mt.Fitch (Nos 55 - 57) occur on outcrops similar to Castlemaine Hill South, described below.

The area covered by the present survey forms part of the area previously covered by high level survey using a DC3 aircraft (Wood and McCarthy 1952). The final results of this survey are shown on B.M.R. Drawing G71:92. The agreement between the two sets of results is reasonably good over most of the area in that groups of anomalies recorded in the present survey coincide with one or more anomalies generally of the first or second order recorded in the high level survey.

The results obtained from the Auster survey are for technical reasons much more precise than those obtained with the DC3 as regards the position of the radioactive sources and in discriminating between weak, widely dispersed sources and those which are stronger and more concentrated and therefore more likely to be significant. This is due to the slower speed and lower flying height of the aircraft which allows greater resolution in individual areas than is possible with the DC3.

Many of the anomalies shown in the earlier DC3 results were not verified by the Auster work and were evidently due to causes other than localised radioactive sources; many were due to uncorrected or imperfectly corrected topographical effects. There is evidence that in certain parts of the Rum Jungle area surface radioactivity varies with climatic conditions (Dyson 1954) 1958); the results of surveys at different seasons may not agree in detail.

6. LOCALITIES OF PARTICULAR INTEREST

During follow-up work by the geological party operating in the area, it was recognised that three localities were of particular interest. It is not known to what extent ground follow-up of the later airborne work in October will add to or extend these localities, but some reasonable inferences can be drawn.

Crater Formation.

A number of strong anomalies (e.g. Nos. 25-28, 74-97, 125-128) were recorded over outcrops of the Crater formation. Geological examination shows that the radioactivity is localised in lenticular beds of coarse pebble conglomerate near the base

of the formation (Warin 1957, 1959).

The radioactivity of the Crater formation in the Bomb Crater and Fettlers Camp areas was discovered in the early stages of investigation at Rum Jungle and later mapping by Rio Tinto Australia Pty. Ltd. has shown that the beds have the same character near Manton Dam, at the north-east margin of the Rum Jungle granite. Radiometric and fluorimetric tests of surface samples have shown that the radioactivity of the outcrops is almost entirely due to thorium, and thorite and monazite have been indentified in samples by Dallwitz (Mackay, 1953). However, the formation in outcrop is thoroughly leached and the possibility was recognised that it may contain uranium in commercial concentrations in the primary zone.

This possibility has been tested by drilling in the Bomb Crater area by the Bureau (Dodd, 1953) and by T.E.P., and in the Manton Dam area by Rio Tinto Australia Pty.Ltd. The drilling in the Bomb Crater area intersected the formation at moderate depths (up to 400 feet) and near Manton Dam an intersection at 800 feet was obtained. The results of this drilling have been uniformly disappointing. Wherever intersected, the formation has always been highly leached and radioactivity is almost entirely due to thorium. It still remains possible that the formation contains uranium minerals in the unweathered zone, but this evidently lies at some considerable depth.

Woodcutters' Anomalies

A group of 7 anomalies occurring in a rough V shape about 3-4 miles south of Manton Dam (Nos. 36-42) has been named the Woodcutters' Anomalies. They lie athwart one of the entries to the Woodcutters' Track, which runs north-west from the Stuart Highway. A further anomaly (No.43), about 2 miles south of these, has been named Woodcutters' South.

The disposition of the main Woodcutters' Anomalies was immediately interesting. In this locality the geological structure is an anticline, pitching to the south, and the anomalies outlined the nose of the fold on a horizon near the base of the Golden Dyke Formation. Geological examination showed that the radioactivity occurred in a pyritised siltstone bed (Warin, 1957). Several costeans were bulldozed, and it was found that the radioactivity was the result of surface enrichment only. Investigations of these anomalies and Woodcutters' South were therefore discontinued.

Castlemaine Hill South and similar localities

One anomaly south of Castlemaine Hill (No.117) was recognised on geological examination as being of particular interest. This anomaly, which may be conveniently termed Castlemaine Hill South, occurs on a ferruginous outcrop which on first inspection appeared to be laterite. However, Warin (1957, 1958 and 1959) considers that this outcrop shows a dipping attitude inconsistent with normal laterites, and that the material might therefore continue down-dip for some distance. If this is so, and the material is of ore grade, even low, then economic possibilities must be considered to exist.

Similar outcrops are the sites of anomalies in the gravel-pit area (west of Batchelor airfield) and north of Mt.Fitch (Nos. 118-121 and 53 respectively). In the area of Castlemaine Hill South and the gravel-pit anomalies it is possible that dispalcement as a result of minor faulting is partly responsible for the scattered distribution of the outcrops.

It is understood that drilling has been carried out by T.E.P. on similar outcrops in the embayment area without favourable results. However, if the dipping attitude of the material were not recognised, it would easily be possible to drill through it into barren country and dismiss it as a superficial deposit of limited extent and no significance.

Embayment area.

The results obtained in the embayment area afford a basis for some tentative correlations with results from the earlier portion of the survey. A number of anomalies (Nos. 99-114) fall on the flanks of Castlemaine Hill, Warin (1958) suggests that these repressnt ferruginous outcrops similar to Castlemaine Hill South. Again, a line of anomalies (Nos. 55-57) along the east bank of the Finniss River south of Mt.Fitch falls in a locality to which attention has been drawn by Warin following his examination of anomalies north of Mt.Fitch. It is not possible at the moment to make suggestions regarding other anomalies in this area; one very large anomaly (No.63) indicates the Rum Jungle mine and mill.

7. CONCLUSIONS AND RECOMMENDATIONS

The recent airborne survey, in conjunction with geological follow-up work, succeeded in covering those formations of geological interest which lie near the Rum Jungle uranium mine, and which might be expected to afford the best chance of further uranium mineralisation in the region. Further follow-up work remains to be done, particularly in the embayment area, but a picture of the possibilities of the area covered by the airborne survey can be obtained to assist to some extent in directing this work.

It is considered that the best locale for further work lies in the furruginous outcrops south of Castlemaine Hill, north of Mt.Fitch, and at localities within the embayment area where similar occurrences are suspected. A programme of drilling along the lines suggested by Warin (1959) appears worth while. It is not within the writer's province to comment on the importance of these occurrences as regards the Rum Jungle mining and milling programme, but it is felt that the presence of ore deposits of even low grade, if they are sufficiently extensive, might be of considerable economic significance, and that investigations should therefore be pressed forward with all speed.

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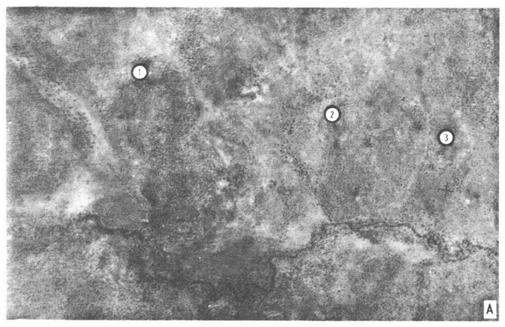

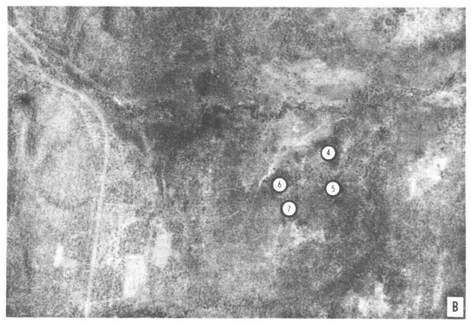

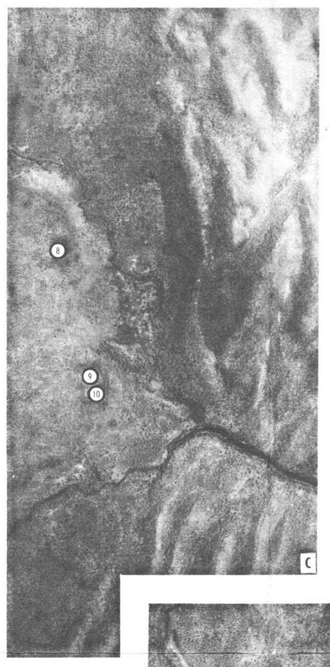

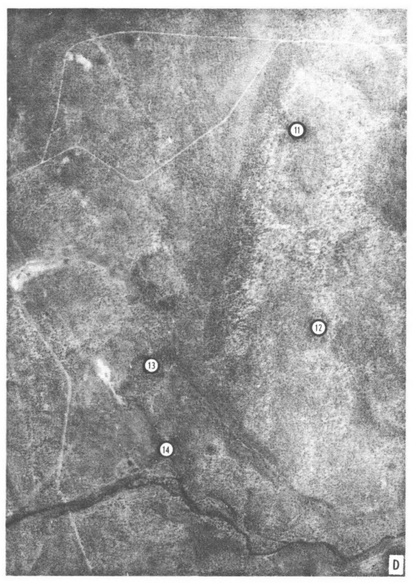

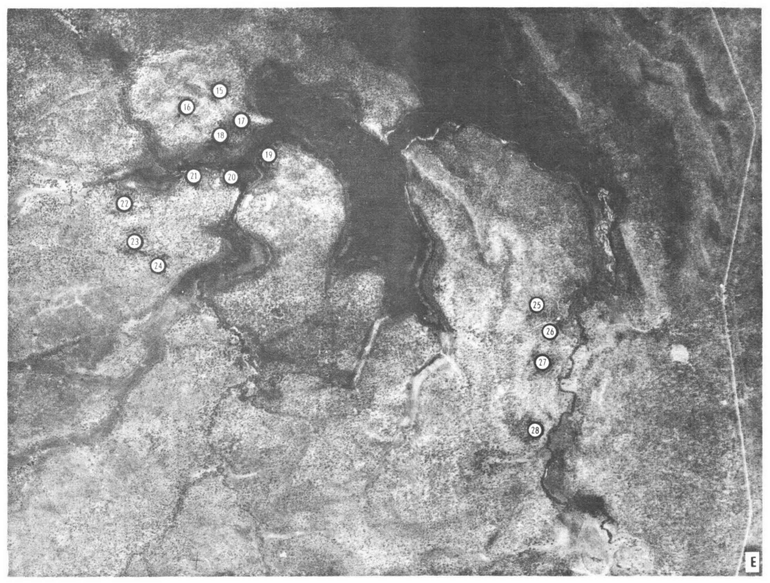

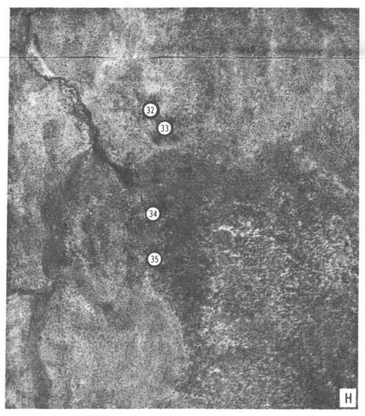

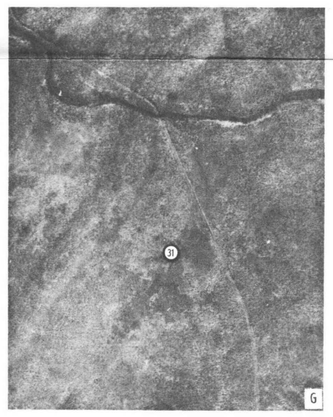

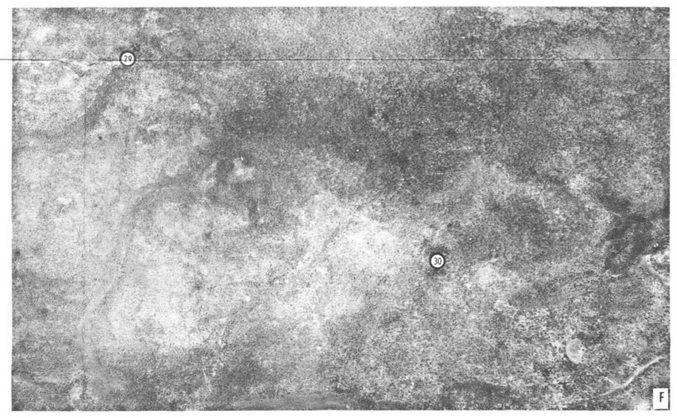

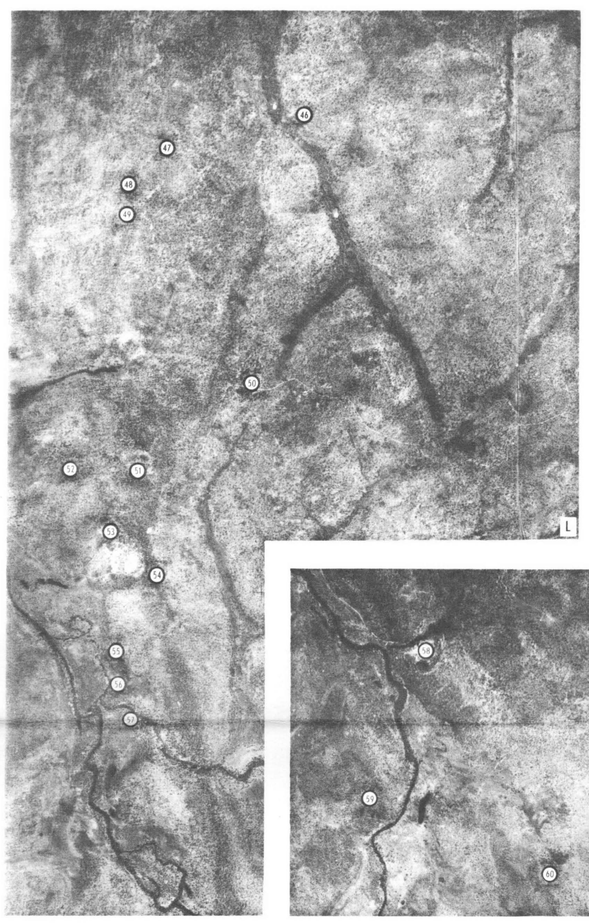

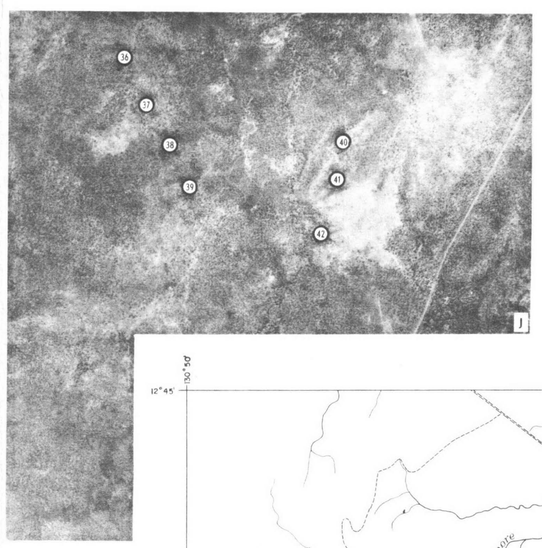

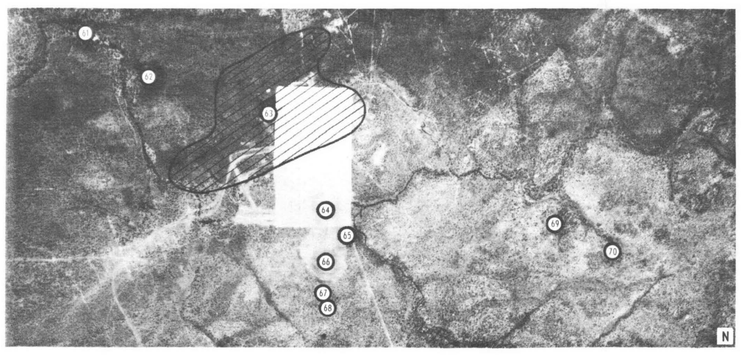

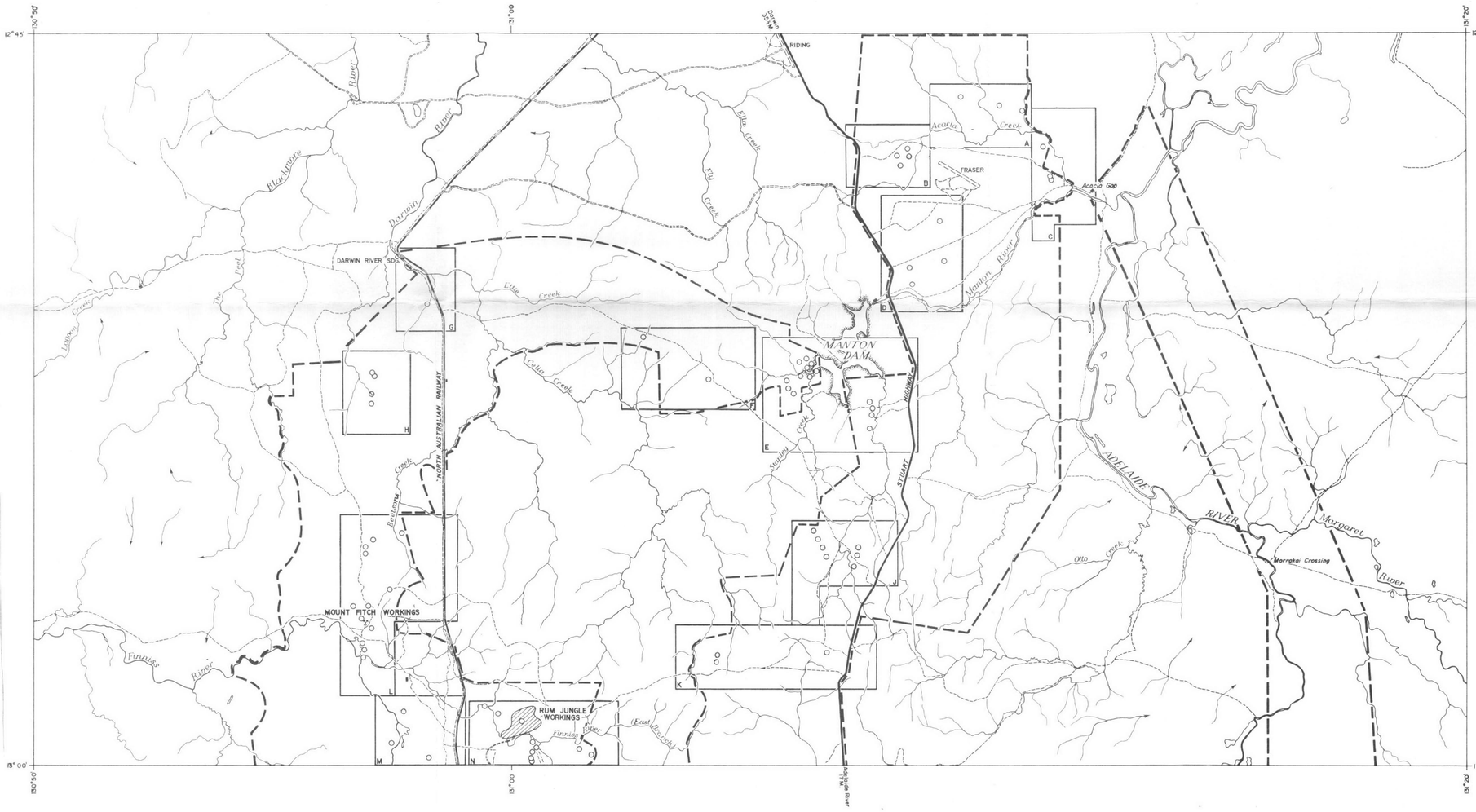

LOCATION DIAGRAM

REFERENCE TO 1-MILE AUSTRALIAN NATIONAL MAP SERIES

INDEX OF AIRBORNE SCINTILLOGRAPH SURVEY MAPS PUBLISHED

- RUM JUNGLE DISTRICT (1952 SURVEY): G 71-92
- BURNSIDE (1953 SURVEY): G 159-2
- REYNOLDS RIVER (1953 SURVEY): G 165-2
- DARWIN-ANSON BAY COASTAL REGION (1954 SURVEY): G 226-2
- RUM JUNGLE REGION (1957 SURVEY): NORTHERN PART (SHEET 1): G 71-172
- RUM JUNGLE REGION (1957 SURVEY): SOUTHERN PART (SHEET 2): G 71-173

LEGEND

TOPOGRAPHICAL DATA

- RIVER OR CREEK
- RAILWAY
- HIGHWAY
- ROAD
- TRACK
- TELEGRAPH LINE
- FENCE
- AERODROME OR LANDING GROUND
- TOWN
- HOMESTEAD
- SHED OR HUT
- TRIG. STATION
- MINE
- STATE BOUNDARY

SCINTILLOGRAPH DATA

- (22) (37) ANOMALY (ANOMALIES ARE NUMBERED FOR REFERENCE ONLY)
- LIMIT OF THE 1957 AIRBORNE SURVEY

SCALE OF PLANIMETRIC MAP

MILES 1 0 2 4 6 8 10 MILES

APPROXIMATE SCALE OF PHOTO MAPS

MILES 1 ½ 0 1 2 MILES

NORTHERN TERRITORY

RUM JUNGLE REGION

NORTHERN PART (SHEET 1)

MAP SHOWING

RADIOMETRIC ANOMALIES

DETECTED BY AIRBORNE SCINTILLOGRAPH

MAY-JUNE, 1957

MAP DATA

PROJECTION: TRANSVERSE MERCATOR AUSTRALIAN SERIES

DETAIL: PLANIMETRIC DETAIL WAS COMPILED FROM DIVISION OF NATIONAL MAPPING 1:36,680 SCALE SLOTTED TEMPLATE ASSEMBLY AND ROYAL AUSTRALIAN SURVEY CORPS 1:63,360 STANDARD MAPS AND 1:40,000 MAP MANUSCRIPTS

RELIABILITY: RELIABLE

NOTE: IMPERFECTIONS ON AIR PHOTO MAPS ARE DUE TO FAULTS ON ORIGINAL NEGATIVES

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 the naturally occurring radioactive elements, radium and thorium and their decay products, and to a lesser extent potassium.

The scintillograph was carried in an Auster aircraft which was flown at an average altitude of 200 feet above the ground. The scintillograph effectively scanned a strip of ground approximately 500 feet wide.

The gamma-ray intensity over an area may show considerable variations, depending on the geology and topography of the area. Anomalies of gamma-ray intensity have been plotted on the map where the intensity showed a significant and localised increase.

The map shows the general position and grouping of the anomalies. To assist in making investigations on the ground, all the anomalies have been reproduced singly or in small groups on aerial photographs. The positioning of these anomalies is considered to be accurate to within 300 feet.

The higher intensities recorded by the scintillograph are not necessarily due to the presence of uranium deposits. Some of the higher intensities may be due to outcrops of igneous rocks, which contain a slightly higher concentration of the radioactive elements, uranium, thorium and potassium, than other rocks. No claim is made that all the higher intensities correspond to uranium deposits of economic significance.

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.

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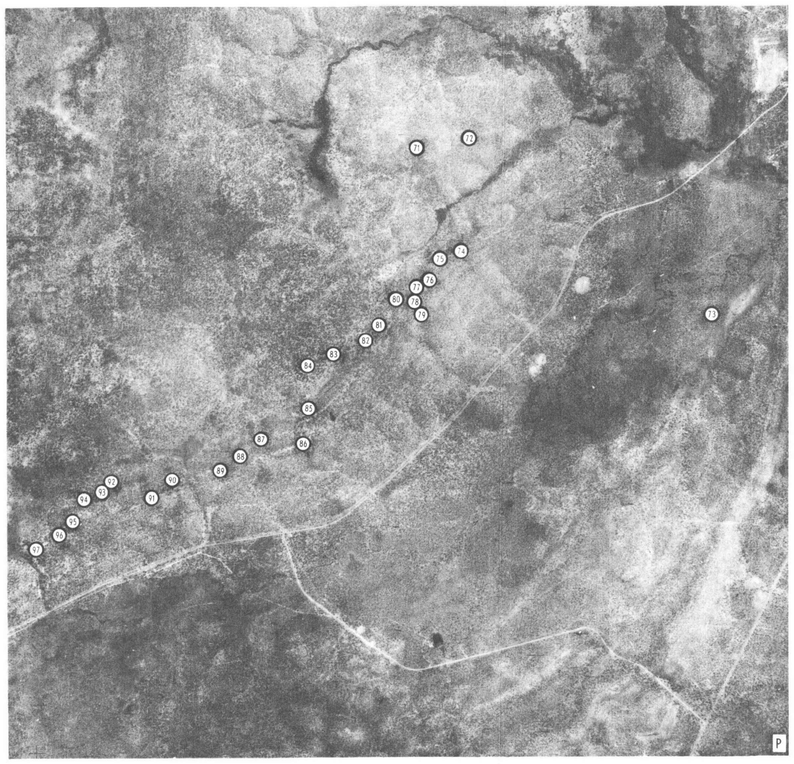
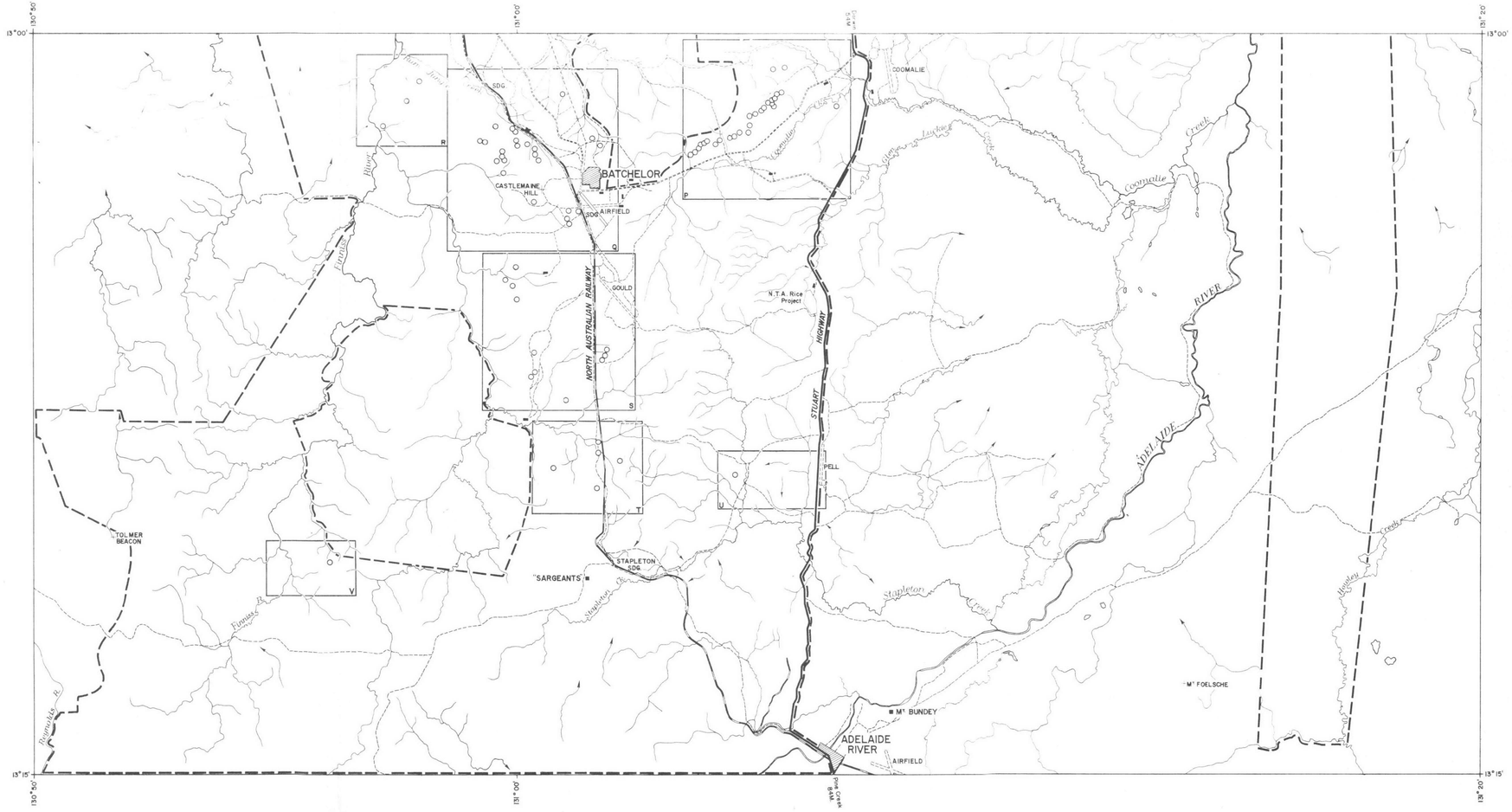
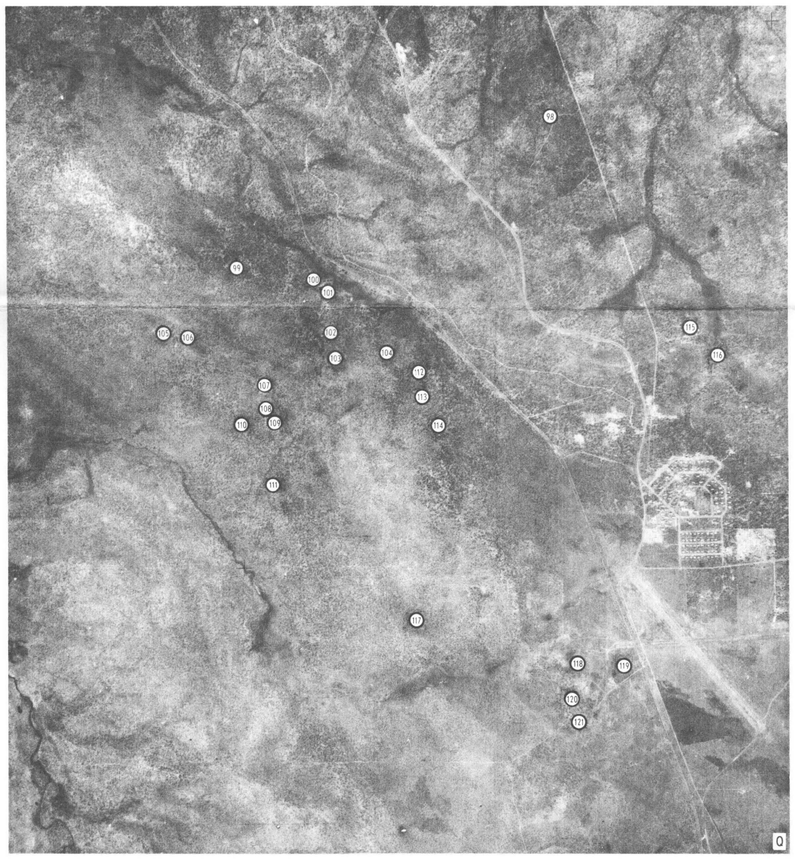
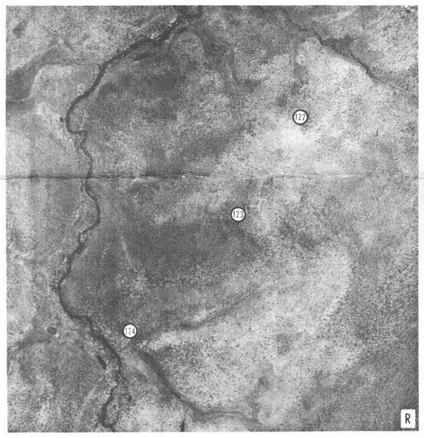
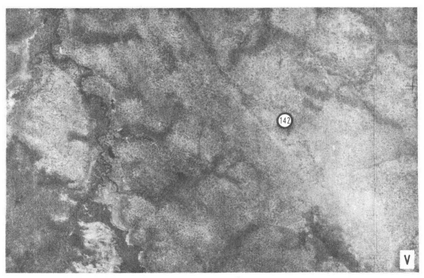
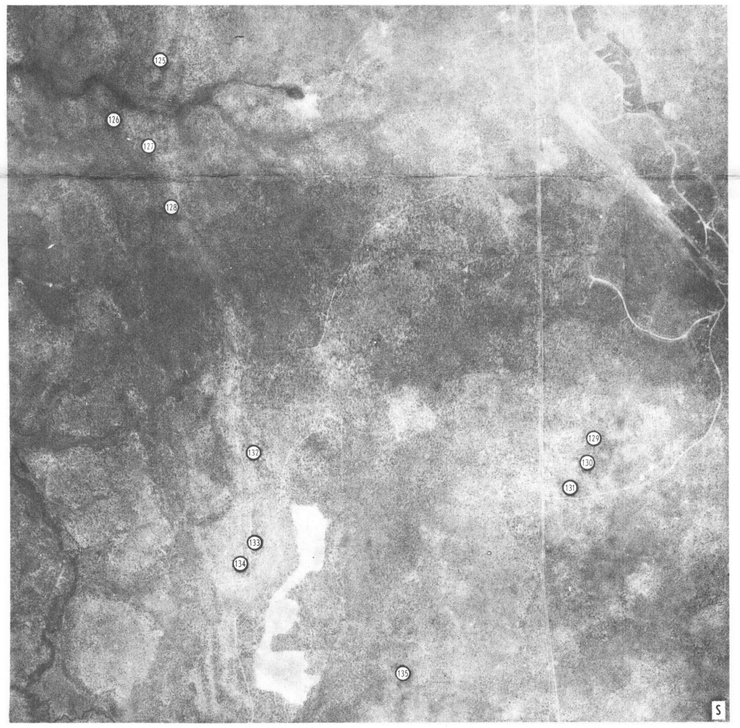


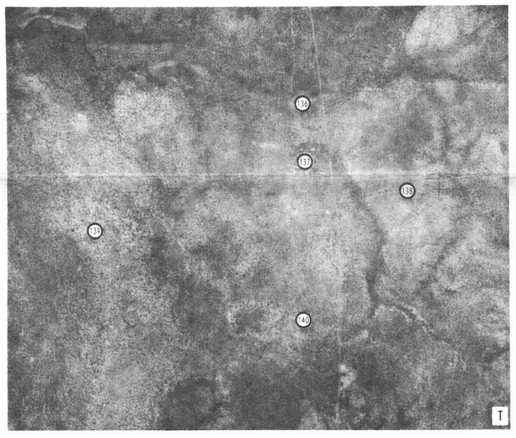


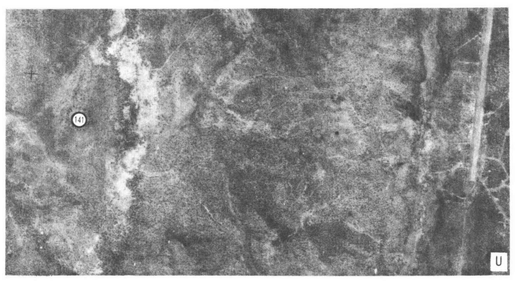




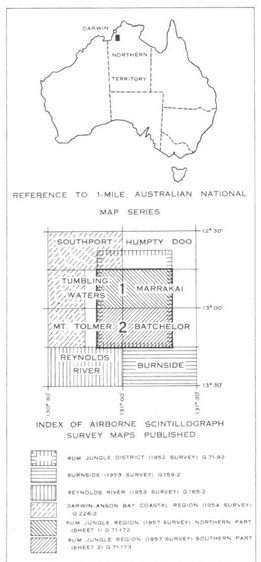








LOCATION DIAGRAM



LEGEND

TOPOGRAPHICAL DATA

- RIVER OR CREEK
- RAILWAY
- HIGHWAY
- ROAD
- TRACK
- TELEGRAPH LINE
- FENCE
- AERODROME OR LANDING GROUND
- TOWN
- HOMESTEAD
- SHED OR HUT
- TRIG. STATION
- MINE
- STATE BOUNDARY

SCINTILLOGRAPH DATA

- ANOMALY (ANOMALIES ARE NUMBERED FOR REFERENCE ONLY)
- LIMIT OF THE 1957 AIRBORNE SURVEY

TRUE NORTH MAGNETIC NORTH

NORTHERN TERRITORY

RUM JUNGLE REGION

SOUTHERN PART (SHEET 2)

MAP SHOWING

RADIOMETRIC ANOMALIES

DETECTED BY AIRBORNE SCINTILLOGRAPH

MAY-JUNE, 1957

SCALE OF PLANIMETRIC MAP

MILES 1 0 2 4 6 8 10 MILES

APPROXIMATE SCALE OF PHOTO MAPS

MILES 1 ½ 0 1 2 MILES

MAP DATA

PROJECTION: TRANSVERSE MERCATOR. AUSTRALIAN SERIES

DETAIL: PLANIMETRIC DETAIL WAS COMPILED FROM DIVISION OF NATIONAL MAPPING 1:36 680 SCALE SLOTTED TEMPLATE ASSEMBLY AND ROYAL AUSTRALIAN SURVEY CORPS 1:63,360 STANDARD MAPS AND 1:40,000 MAP MANUSCRIPTS.

RELIABILITY: RELIABLE

NOTE: IMPERFECTIONS ON AIR PHOTO MAPS ARE DUE TO FAULTS ON ORIGINAL NEGATIVES.

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 the naturally occurring radioactive elements, radium and thorium and their decay products, and to a lesser extent potassium.

The scintillograph was carried in an Auster aircraft which was flown at an average altitude of 200 feet above the ground. The scintillograph effectively scanned a strip of ground approximately 500 feet wide.

The gamma-ray intensity over an area may show considerable variations, depending on the geology and topography of the area. Anomalies of gamma-ray intensity have been plotted on the map where the intensity showed a significant and localised increase.

The map shows the general position and grouping of the anomalies. To assist in making investigations on the ground, all the anomalies have been reproduced singly or in small groups on aerial photographs. The positioning of these anomalies is considered to be accurate to within 300 feet.

The higher intensities recorded by the scintillograph are not necessarily due to the presence of uranium deposits. Some of the higher intensities may be due to outcrops of igneous rocks, 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 higher 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.

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