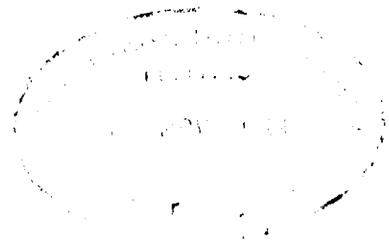
COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1963/127

ZETA AREA GEOPHYSICAL SURVEY, RUM JUNGLE, NORTHERN TERRITORY 1962



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ILLUSTRATIONS

SUMMARY

Radiometric and electromagnetic surveys were made over a part of the Rum Jungle uranium field extending from Castlemaine Hill north-westwards towards the Giants Reef Fault.

The radiometric survey was requested by a Bureau of Mineral Resources geological party to help in the search for phosphate, which is commonly associated with radioactive material. For this purpose the survey was of little use; apart from a radiometric anomaly previously recorded by Territory Enterprises Pty Ltd surveys and known as 'Zeta', the radiometric results were almost featureless.

The electromagnetic surveys were made to complete the network of geophysical surveys around Castlemaine Hill; the electromagnetic results indicate the position of the Giants Reef Fault and give some correlation with the lithology.

1. INTRODUCTION

During the 1962 field season a Bureau of Mineral Resources (BMR) geological party investigated the occurrence of phosphate in the Rum Jungle area on the eastern side of Castlemaine Hill.

Phosphate is commonly associated with radioactive material, and the BMR geological party therefore requested a radiometric survey to aid the search for more phosphate in the area between Castlemaine Hill and the Giants Reef Fault. Accordingly, the grids of two BMR prospects, Rum Jungle Creek and Flynns, were extended towards the Giants Reef Fault, and the whole of the area, roughly 3000 ft x 7000 ft (see Plate 1), was investigated with the radiometric method.

Electromagnetic surveys were also made over this area to complete the electromagnetic network around Castlemaine Hill.

The topographical and geophysical surveys were made by the geophysical staff of the BMR Darwin office during the 1962 field season.

The principles of the radiometric and electromagnetic methods and the basis of their application in the search for uranium in the Rum Jungle district have been discussed by Daly (1962).

Before the present survey, Territory Enterprises Pty Ltd (TEP) recorded a radiometric anomaly in the area to be surveyed; this anomaly is called 'Zeta' and this name is used to designate the area of the survey described in this Record. TEP investigated the radiometric anomaly for uranium by means of eight costeans and two drill holes; viz. a diamond-drill hole (174 ft deep) and a churn-drill hole (209 ft deep). No profitable uranium was revealed at depth; the richest value was about 0.3 lb U_3O_8/ton in the diamond-drill hole.

During the 1962 field season, the BMR geological party auger-drilled the area, but the results are not yet available.

2. TECHNICAL DETAILS

Surveying

The Rum Jungle Creek (RJC) baseline (Daly and Rowston, 1962) was extended from 10W to 36W and a new baseline (20N) was surveyed from 38W to 82W. Traverses were surveyed at right angles to these baselines at 200-ft intervals and pegged at 50-ft intervals. Traverses 12W to 32W ranged in length from 1000 ft to 1500 ft; Traverses 34W to 82W were 3000 ft long.

The eastern part of the area was covered by the extension of Flynns grid. The baseline 30N (Douglas, 1962) was extended to 44W and traverses at 200-ft intervals were surveyed at right angles to the baseline, toward Castlemaine Hill, and pegged every 50 ft. The traverses ranged in length from 1000 ft to 1500 ft.

The RJC and the Flynns baselines converge, the angle between them being $9^{\circ}8'$ (see Plates 2, 3, and 4).

Radiometric

The survey was made with a field ratemeter, Harwell-type 1292A, made by Ericsson Telephones. Some difficulties were experienced because of instrument's drift; drift controls had to be observed at intervals during the day. The radiometric contours are shown on Plate 2.

Electromagnetic

ABEM Slingram equipment was used for the electromagnetic survey. The measurements were made at 50-ft intervals with 200-ft coil-separation, using a frequency of 1760 c/s; the results are shown on Plate 3 (real-component contours) and Plate 4 (imaginary-component contours). The locations of the principal anomalies are marked on Plate 5.

3. GEOPHYSICAL RESULTS

Radiometric

One radiometric anomaly was detected between 34W/15N and 38W/17N (RJC grid). Although this coincides in position with the TEP radiometric anomaly 'Zeta', there are some differences in the radiometric values; the highest value recorded in the BMR survey was about three times background, near the costean No. 1, whereas the TEP survey showed radioactivity as high as seven times background. These discrepancies are probably due to the different detectors used by TEP and BMR; furthermore some of the high radiometric values detected by the TEP survey could have been missed by the BMR survey because the BMR traverses are more widely spaced than those used by TEP.

In the remainder of the area, radioactivity does not exceed twice background and the radiometric results do not warrant any further discussion.

Electromagnetic

The results show the following features:

(a) a zone of weak anomalies indicating generally poor conductivity extending from the eastern limits of the survey to an arc passing through 36W/1N, 48W/8N, 54W/12N, 56W/17N, and 62W/26N,

(b) a zone of no anomalies between this arc and Traverse 66W,

(c) a linear feature striking north from about 12N on Traverses 68W and 70W. This is well shown by the axis of the imaginary-component anomaly and by the 120-percent contours of the real component. The trend of the imaginary-component axis is broken at about 70W/10N and continues again from 72W/8N southwards with a different strike. The conductivity in this zone is generally higher than in (a) and (b), and

(d) the zone occupying the western part of the area where the anomalies are fairly well defined in the imaginary component but show no regular pattern.

4. DISCUSSION OF RESULTS

The main geological feature revealed by the electromagnetic survey is the Giants Reef Fault (see Plate 5); its position is well marked by the anomalies along the Traverses 68W to 72W. Near the southern end of the Fault, the change in strike is probably due to a break in the faulting system; this hypothesis is supported by the aerial photos, which show a rather confused pattern in the same area. The increase in conductivity in the broad zone along the Fault can be explained by shearing of carbonaceous material within the Fault itself.

In the eastern part of the area, shears in calcareous shales seem to cause the weak imaginary-component anomalies; their axis, elongated east-west, end in an arc which is interpreted as the result of a drag of rocks against the Giants Reef Fault. Similar drag has been inferred from geological evidence elsewhere along the Fault.

The area of no anomalies on the eastern side of the Fault is underlain by dolomite.

The anomalies west of the fault zone could indicate conducting bodies at rather shallow depth. Calcareous shales, sheared in different directions, probably underlie the axis of the imaginary-component anomalies.

5. CONCLUSIONS

The only radiometric anomaly outlined is the 'Zeta' anomaly, which had been already investigated by TEP for uranium mineralisation before the 1962 radiometric survey.

The electromagnetic results indicated the position of the Giants Reef Fault and the drag of the rocks against the Fault, and showed some correlation with the lithology. These considerations can be checked when the auger-drilling results become available. The electromagnetic survey did not reveal any highly-conductive bodies that could be of interest as possible important deposits of sulphide minerals and no targets can be recommended for testing either for uranium or for base metals.

6. REFERENCES

DALY, J. 1962 Rum Jungle district, Northern Territory, introductory report on geophysical surveys 1960-61 Bur. Min. Resour. Aust. Rec. 1962/27 (unpubl.).

DALY J. and ROWSTON D.L. 1962 Rum Jungle Creek and Rum Jungle Creek South prospects geophysical surveys, NT 1960 Bur. Min. Resour. Aust. Rec. 1962/28 (unpubl.).

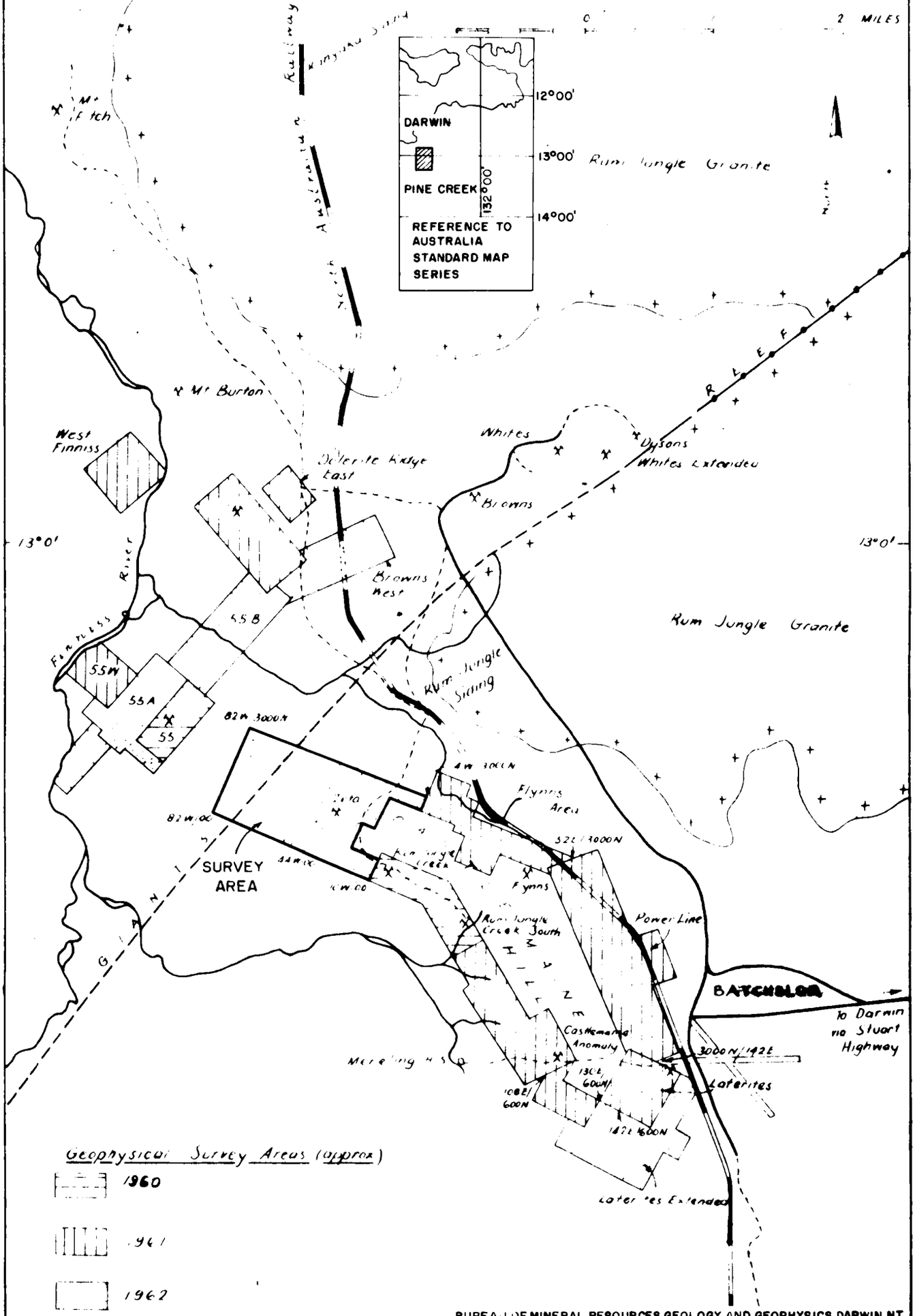
DOUGLAS, A. 1962 Flynns area geophysical survey, near Rum Jungle NT 1961 Bur. Min. Resour. Aust. Rec. 1962/122 (unpubl.).

PLATE 1

RUM JUNGLE AREA, N.T.

LOCALITY MAP

GEOPHYSICAL SURVEYS, 1960-62



Geophysical Survey Areas (approx)

- 1960
- 1961
- 1962

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D52/B7-42-2

PLATE 2

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA N.T. 1962

ZETA AREA
RADIOMETRIC CONTOURS

Contour Interval 0·005 mr/hr

● T.E.P. Diamond-Drill Hole

⊙ T.E.P. Chern-Drill Hole

T.E.P. Costean over 'Z' Anomaly

Scale

200 0 200 400 600 FT

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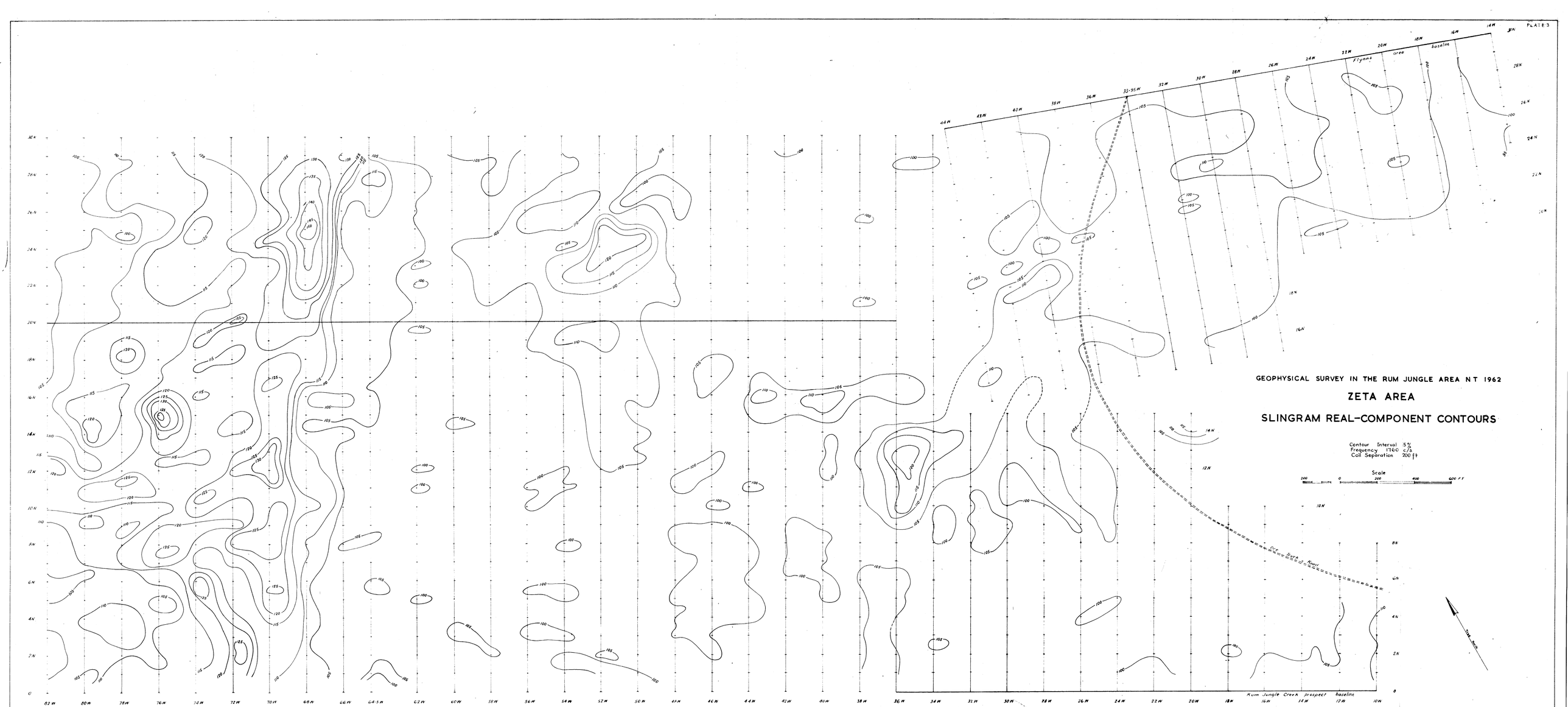
PLATE 3



GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA N T 1962

ZETA AREA

SLINGRAM REAL-COMPONENT CONTOURS

Contour Interval 5%
Frequency 1760 c/s
Coil Separation 200 ft

Scale
200 0 200 400 600 FT

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PLATE 4

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA N T 1962

ZETA AREA

SLINGRAM IMAGINARY-COMPONENT CONTOURS

Contour Interval 5 %
Frequency 1760 c/s
Coil Separation 200 ft

Scale
200 0 200 400 600 FT

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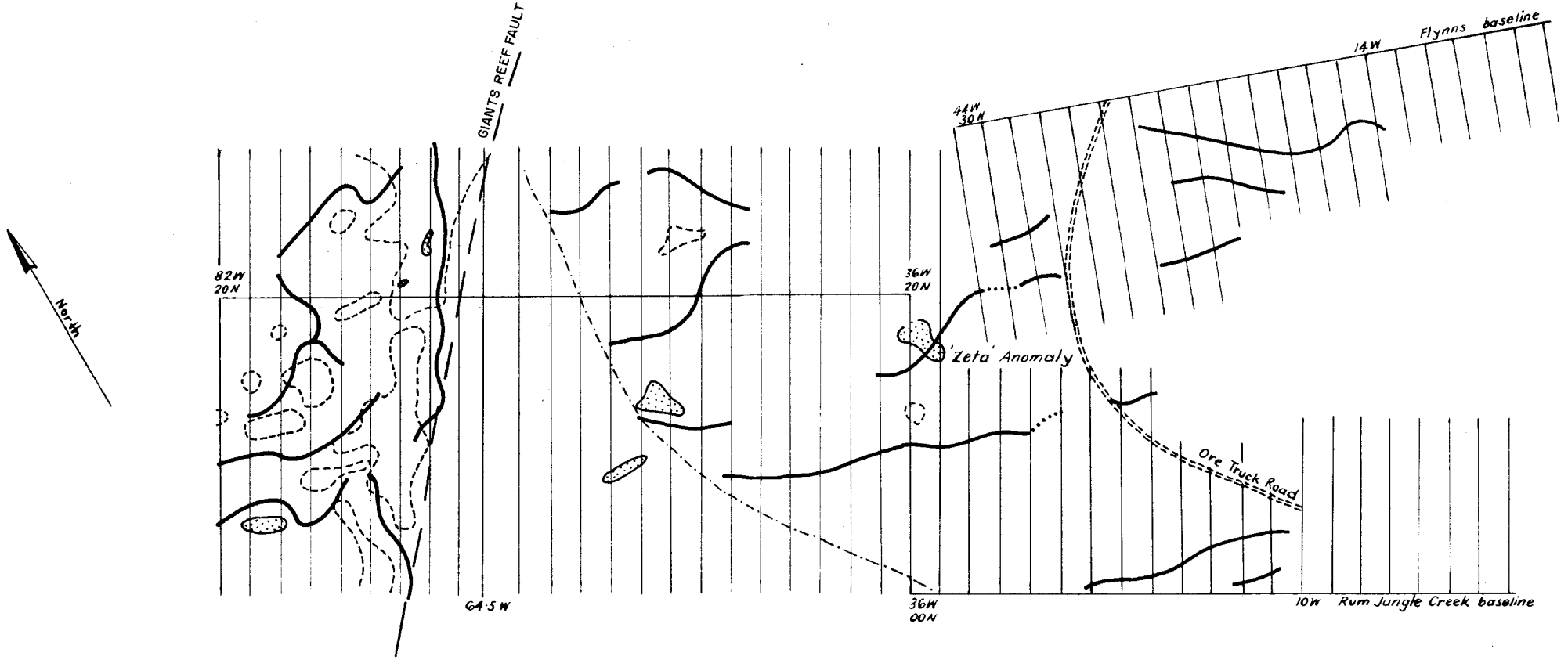

Reference

- Slingram imaginary-comp. axes
- Slingram real-comp. 120% contours
- Radiometric anomaly 0·030 mr/hr contours
- Drag of rocks (inferred)

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA N T 1962

ZETA AREA

GEOPHYSICAL INDICATIONS

Scale

1000 0 1000 2000 3000 FT

PLATE 5

D52/B7-43

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