COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1962/128

WEST FINNISS GEOPHYSICAL SURVEY, RUM JUNGLE DISTRICT, N.T. 1961

by

A. Douglas

RECORD No. 1962/128

WEST FINNISS GEOPHYSICAL SURVEY,

RUM JUNGLE DISTRICT, N.T. 1961

by

A. Douglas

CONTENTS

ILLUSTRATIONS

SUMMARY

This Record describes the electromagnetic and radiometric surveys made by the Bureau of Mineral Resources over the West Finniss area as part of the 1961 programme of uranium prospecting in the Rum Jungle district.

These surveys outlined five electromagnetic anomalies and a broad, weak radiometric anomaly. Of the electromagnetic anomalies, one is roughly coincident with the radiometric anomaly and therefore should be tested by drilling. Two of the remaining four electromagnetic anomalies warrant testing; they are not obviously related to the lithology and they lie in areas of weak geochemical anomalies.

No recommendations are made for testing the remaining two electromagnetic anomalies. One of these can be related directly to lithology; the significance of the other cannot be assessed until its full extent is outlined. More extensive geophysical surveys are required for this purpose.

1. INTRODUCTION

The West Finniss area lies north of the West Finniss River and about 3¼ miles due east of the Rum Jungle Mine (Plate 1). The vegetation consists mainly of eucalypts, and over parts of the area the undergrowth is very thick. Access to the area is by a rough track leading from the Rum Jungle Siding/Mount Burton road.

The area is one of nine selected for further investigation as part of a programme of uranium prospecting in the Rum Jungle Uranium Field. During 1961, the Bureau of Mineral Resources carried out geophysical and geochemical surveys over the area. The results of the geochemical survey are described by Ruxton and Shields (in preparation); the geophysical results are described below.

Both electromagnetic and radiometric methods were used during the geophysical survey. Descriptions of these methods and a discussion of their limitations and applicability in the search for uranium have been given by Daly (1962).

2. HISTORY, GEOLOGY, AND GEOCHEMICAL RESULTS

Prior to the 1961 surveys, the only geophysical work that had been done in the West Finniss area was an airborne scintillograph survey. This survey outlined a broad radiometric anomaly and drew attention to the area as one where there might be uranium minerals.

During the 1961 geochemical survey, shallow auger-drilling on a 200-ft grid was carried out over the area. The holes were logged radiometrically and samples analysed for copper, lead, and zinc. The samples also provided information on the geology of the area (Plate 2).

The geochemical results outlined two groups of weak geochemical anomalies. One group lies adjacent to the West Finniss River, and the other group occurs near the western edge of the area.

The radiometric logging outlined a zone of very weak (one and a half times background) radioactivity which is coincident with the surface radiometric anomaly (described below).

3. GEOPHYSICAL OPERATIONS AND RESULTS

A grid comprising 15 traverses was surveyed and tied-in to Territory Enterprises Pty Ltd survey pegs. This grid was arranged to have the same co-ordinate system as the Dolerite Ridge area grid (Rowston, 1962). The traverses ranged in length up to 2400 ft and were pegged at 50-ft intervals. The whole area was surveyed with the electromagnetic (Slingram) and radiometric methods.

Electromagnetic results

Five anomalous zones were outlined by the electromagnetic method; these are best shown on the real-component contour plan (Plate 2). These anomalous zones have been labelled A to E for ease of identification.

In the real-component, Anomaly A extends approximately from 79N/188W to 88N/188W and attains its maximum measured intensity of the secondary field on Traverse 84N. To the north of Traverse 88N the anomalous zone reappears but is weaker. In the imaginary-component (Plate 3) results Anomaly A is rather weak south of Traverse 84N; to the north of this traverse the anomaly increases in magnitude and crosses the edge of the survey area near 91N/189W.

Anomaly B extends across the whole area. The real-component results outlined three localised areas of maximum intensity of the secondary field; one extends from 75N/185W to 80N/183W, the second is centred on 82N/183.5W, and the third extends from 85N/182.5W to the northern limit of the area. At the northern limit of the area the axis of the anomaly changes direction markedly from 350 degrees to 127 degrees.

Anomaly C with areas of relatively high intensity of the secondary field lying within a generally anomalous zone, resembles Anomaly B. Anomaly C extends southwards from 86N/174W and is still a strong anomaly at 68N/180.75W on the southern limit of the area. The real-component contours outlined two areas of high intensity of the secondary field within this zone; one extends from 81N/176W to 77.5N/177W, and the other extends off the southern limit of the area from 75N/177.5W. A small anomalous zone centred on 84N/173W suggests that the axis of Anomaly C swings to a direction of 127 degrees (cf. Anomaly B). The imaginary-component contours show, in addition to the anomalies corresponding roughly with the real-component anomalies, a parallel group of anomalies lying about 200 ft farther east. All these anomalies are probably related to one conducting zone.

The axis of Anomaly D is slightly curved, extending from 76N/170.5W through 73N/17.4W to 70N/17.5W. The northern and southern limits of this anomaly were not defined. The anomaly has an almost identical form on both real and imaginary contours.

The full extent of Anomaly E was not outlined. The axis has been traced from 96N/179W to 92N/174W on the real component. The axis of the phase anomaly is slightly displaced. This anomaly differs from the others described above in that no readings less than 100 per cent were obtained on the real component. The significance of this will be discussed later.

Radiometric results

A broad, weak radiometric anomaly extending from 68N/188.5W through 78N/182W to 90N/180W is the main feature detected by the radiometric survey (Plate 2). An irregular offshoot of this anomaly extends from approximately 73N/184W to 72N/179.5W and then to the southern limit of the area at 68N/182W. Weak anomalies of small areal extent were outlined at 86N/189.5W and 76N/176.5W.

None of these anomalies exceed two times background intensity, the background for the area being 0.015 mr/hr.

4. DISCUSSION OF RESULTS

Comparison of the electromagnetic results and the geology of the area suggests that the electromagnetic Anomalies B and C are related to lithology rather than to mineralisation. Thus Anomaly C coincides approximately with a band of greywacke and Anomaly B lies close to the junction of the grey shale and siltstone with the chloritic and micaceous phyllite.

However, the main radiometric anomaly, as outlined both by the surface survey and by the drill hole logging, coincides approximately with electromagnetic Anomaly B. Therefore Anomaly B may indicate mineralisation along the boundary of the grey shale and siltstone. This anomaly should be tested by drilling. Anomaly C on the other hand may be related entirely to lithology.

The change in direction of the axes of Anomalies B and C at their northern and southern ends suggests that a line of dislocation (fault or shear zone) crosses the area from 96N/182W to 78N/169W. The general trend of the Slingram real and imaginary component and the radiometric contours supports this. There is, as yet, no geological evidence for such a structure.

Anomaly A cannot be directly related to geology. The anomaly lies within an area of chloritic and micaceous phyllite and, as the imaginary component is weak, the anomaly is apparently related to some geological feature with high conductivity. Therefore the anomaly could indicate mineralisation within the chloritic and micaceous phyllite. This possibility is supported by the disclosure of weak copper and zinc geochemical anomalies close to the axis of Anomaly A, and a small patch of anomalous radioactivity centred on 86N/189.5W. Therefore Anomaly A should be tested by drilling.

No explanation is given of Anomaly D; it appears to be unrelated to the lithological divisions of the area. The conductivity of the feature causing Anomaly D is fairly high in the vicinity of Traverse 74N but appears to decrease as traced southwards; the real-component anomaly remains roughly constant while the imaginary component increases in intensity. The high conductivity, and the fact that this anomaly lies in a region of weak geochemical anomalies, suggest that Anomaly D could indicate mineralisation and should be tested by drilling.

Anomaly E differs from the other anomalies described, in that the real component shows no values less than 100 per cent. Such an anomaly, where all the values are greater than 100 per cent, probably indicates a fairly flat-lying or broad body. The whole of the anomaly was not outlined and its significance is difficult to assess. There are no geochemical and radiometric anomalies associated with Anomaly E.

5. CONCLUSIONS AND RECOMMENDATIONS

The electromagnetic anomalies A, B, and D are the most interesting, and all three warrant testing by drilling. Anomaly C appears to be related entirely to lithology, and the significance of Anomaly E cannot be assessed until its full extent is outlined. Vertical drill holes to a depth of 150 ft are recommended at the following points:

84N/188W

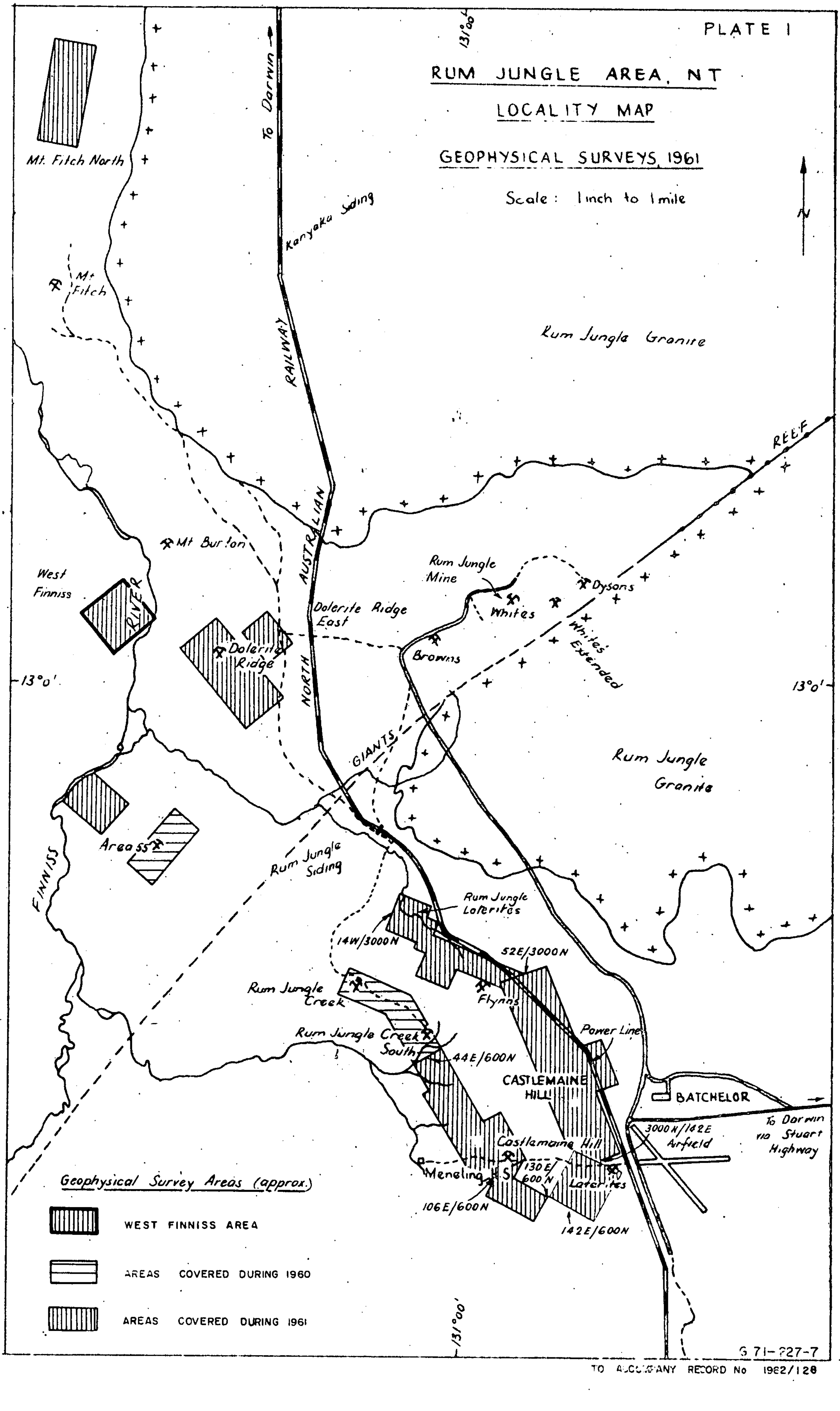
94N/182.25W

74N/173W

The above recommendations should be regarded as tentative. In general, mineralisation in the Rum Jungle district is associated with conducting layers that persist over considerable lengths. The geophysical results suggest that the area of the present survey is structurally complex. It is considered that a complete testing programme could only be recommended after extensive geophysical surveys that would indicate the main trends of conducting layers over a much larger area.

6. REFERENCES

DALY, J.	1962	Rum Jungle district, Northern Territory, introductory report on geophysical surveys 1960-61. Bur. Min. Resour. Aust. Record 1962/27.
ROWSTON, D.L.	1962	Dolerite Ridge geophysical surveys in the Rum Jungle district, N.T. 1961. Bur. Min. Resour. Aust. Record 1962/126
RUXTON, B.P. and SHIELDS, J.W.	-	Geochemical and radiometric surveys, Rum Jungle, N.T. 1961. Bur. Min. Resour. Aust. Record (in preparation).

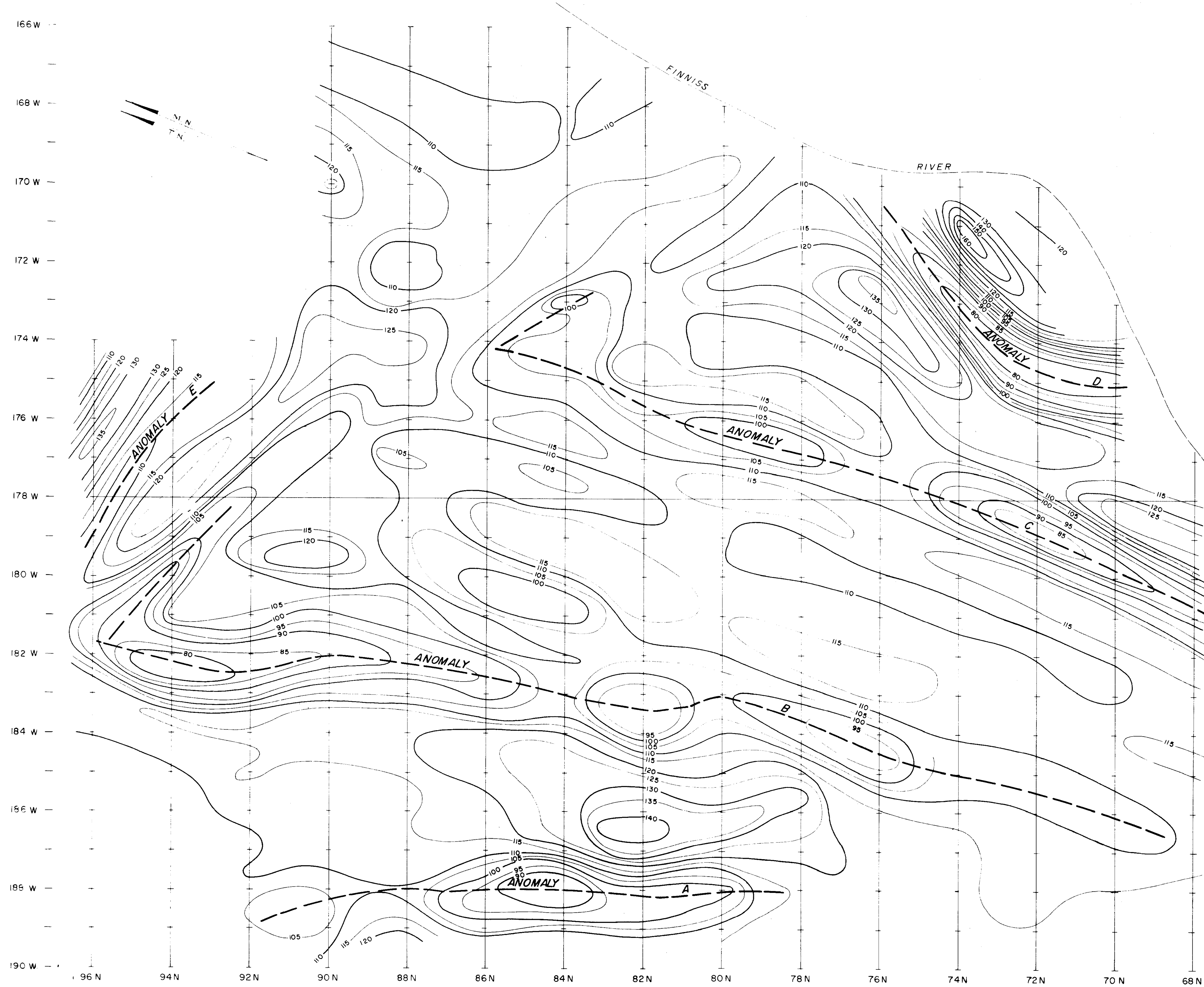


TO ACCOMPANY RECORD No 1962/128

Ex 71-227

Batchelor Laterites

PLATE 2



GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA, N.T., 1961

WEST FINNISS AREA

SLINGRAM REAL-COMPONENT CONTOURS

FREQUENCY 1760 c/s COIL SEPARATION 200 FT
CONTOUR INTERVAL 5%

LEGEND

95 Real - Component contour

Axis of anomaly

SCALE IN FEET

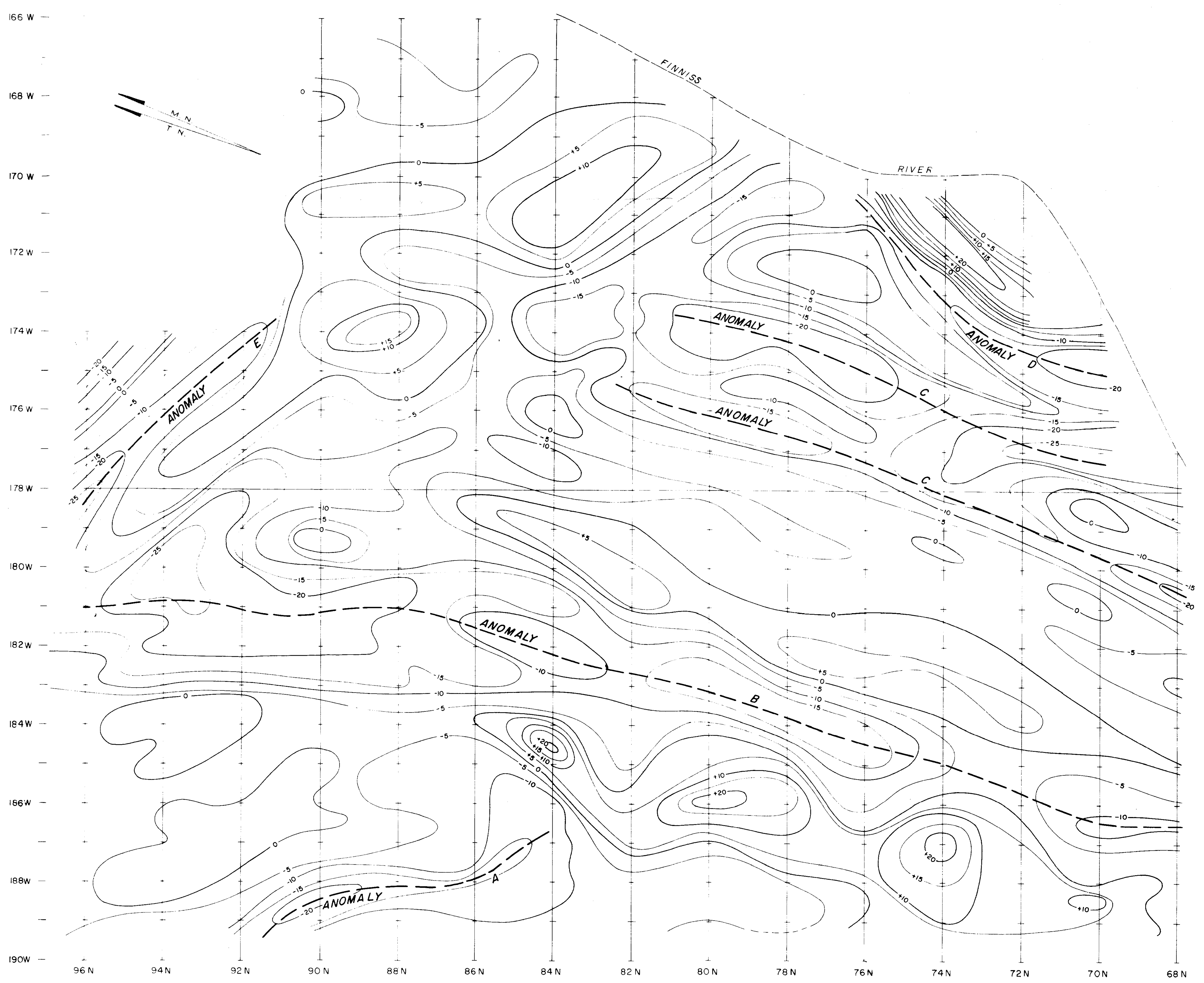
200 100 0 200 400 600

Bureau of Mineral Resources, Geology and Geophysics, Darwin, N.T., November 1961

G71-254

TO ACCOMPANY RECORD No 1962/128

S96-GP



GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA, N.T., 1961

WEST FINNISS AREA

SLINGRAM IMAGINARY-COMPONENT CONTOURS

FREQUENCY 1760 c/s COIL SEPARATION 200 FT

CONTOUR INTERVAL 5%

LEGEND

—— -5 —— Imaginary - Component contour

— — — — Axis of anomaly

SCALE IN FEET

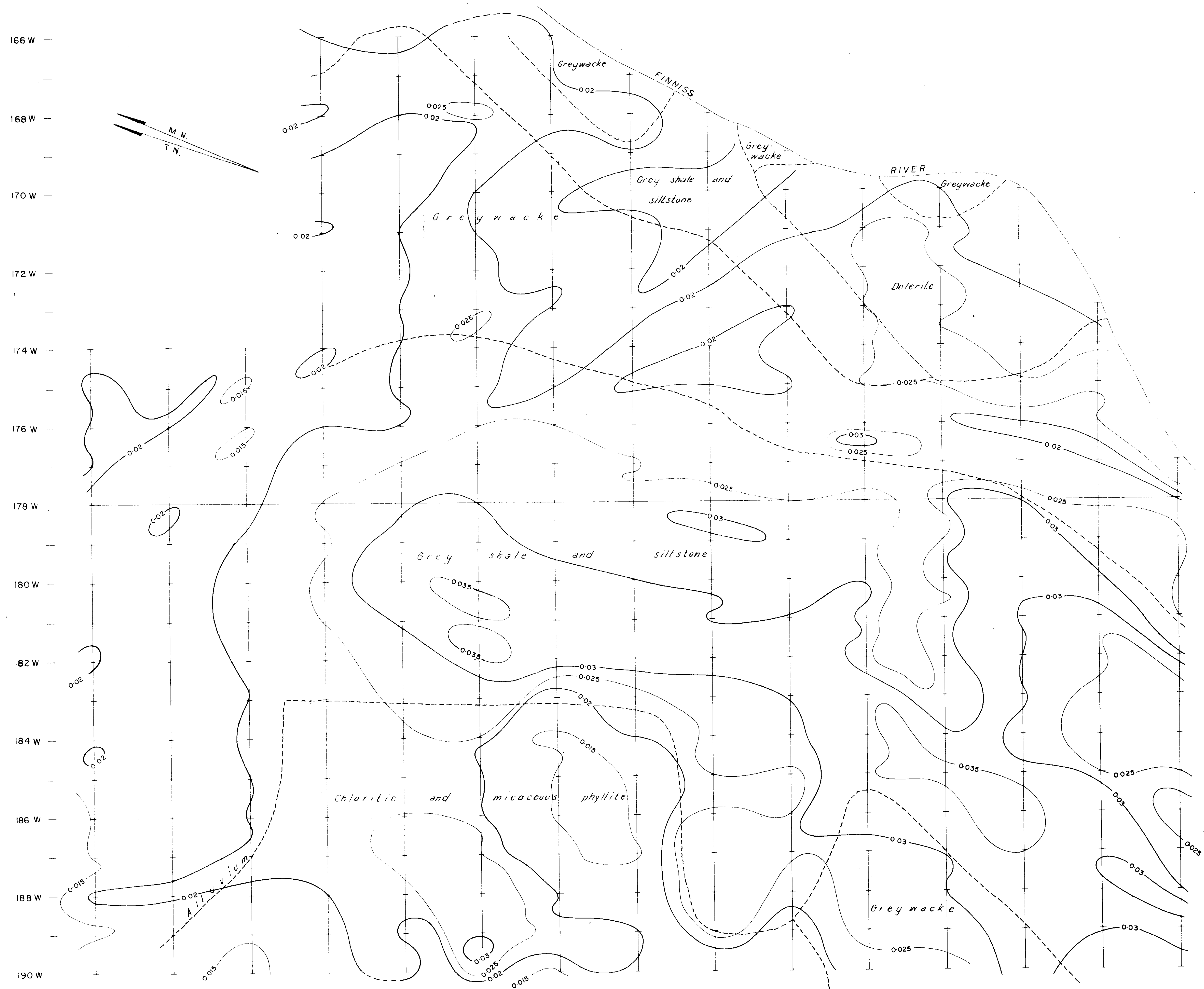
200 100 0 200 400 600

Bureau of Mineral Resources, Geology and Geophysics. Darwin, N.T., November 1961

G71-255

TO ACCOMPANY RECORD No 1962/128

S97-GP



GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA, N.T. 1961

WEST FINNISS AREA

RADIOMETRIC CONTOURS

CONTOUR INTERVAL 0·005 mr/hr
GENERAL BACKGROUND 0·015 mr/hr

SCALE IN FEET

200 100 0 200 400 600

Bureau of Mineral Resources, Geology and Geophysics, Darwin, N.T., November 1961

G71-253

TO ACCOMPANY RECORD No 1962/128

595·GP