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DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1962/44

WATERHOUSE No. 1 (AREA 65) GEOPHYSICAL SURVEY, NORTHERN TERRITORY 1960

by

A. Douglas

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SUMMARY

This Record describes a geophysical survey at Waterhouse No. 1 (or Area 65) uranium prospect, near Batchelor, Northern Territory. The survey took place in 1960, and extended the area surveyed in 1957. Radiometric, magnetic, electromagnetic, and self-potential methods were used. Some geophysical anomalies were recorded, and recommendations are made for testing them by drilling.

1. INTRODUCTION

Area 65, previously known as Waterhouse No. 1 uranium prospect, lies about 70 miles from Darwin, and about 4 miles south-east of Batchelor township (Plate 1). In 1957, a survey using electromagnetic and self-potential methods was made over the original prospect. The results were described by Daly and Tate (1958).

At the request of Territory Enterprises Pty Ltd, the 1957 survey was extended to the west, to cover an area in which a geochemical survey had given encouraging indications of the presence of nickel mineralization. The survey was performed during July and August 1960 by D.L. Rowston and A. Douglas, geophysicists, assisted by members of the Darwin Uranium Group, using electromagnetic (Turam), magnetic, self-potential, and radiometric methods. The results are described in this Record.

2. TECHNICAL DETAILS

The geology and results of previous investigations in the area, and the principles of the geophysical methods used, are described by Daly and Tate (op. cit.)

The area covered by both surveys is shown on Plate 2. The baseline for the surveys is at 300E. For the 1957 survey, the Turam primary cable was laid out along the zero line, and observations were made between 250E and 1200E. For the 1960 survey, the Turam primary cable was laid out along 900W, and observations were made between 600W and 500E. During the 1957 survey, self-potential measurements were made between 250E and 1200E. No radiometric and magnetic measurements were made. During the present survey, self-potential measurements were made between 600W and 500E, and magnetic and radiometric measurements were made over the whole area from 600W to 1200E.

3. RESULTS

Radiometric method

The results of radiometric measurements are shown as contours on Plate 2. No significant anomalies were obtained, with the exception of the anomaly centred about 150E on Traverse 400S. The existence of this anomaly was known from earlier work (Daly and Tate, op. cit.). The results obtained during the present survey are in substantial agreement with the results of the previous surveys.

Magnetic method

The results of magnetic measurements over part of the survey area are shown as contours of vertical intensity on Plate 5. Over the remainder of the area, no significant variations in magnetic intensity were observed.

Plate 5 shows two areas containing regular anomalies of large amplitude, the boundaries of which may be considered as being defined by the 2000-gamma contour. In addition to these, there are several other well-defined anomalies, smaller in extent and amplitude. Previous experience, from geophysical surveys and drilling, indicates that anomalies of this type in the Rum Jungle district are caused by magnetic amphibolite. It may be asserted with confidence that at least the areas bounded by the 2000-gamma contour between Traverses 0 and 4S, and the large area bounded by the 2000-gamma contour between Traverses 5S and 11S, are underlain by amphibolite. However, it is also known that the magnetic susceptibility of the amphibolite varies between wide limits, and some speciments of the amphibolite are practically non-magnetic. Therefore it cannot be assumed that the boundaries of the magnetic anomalies correspond with the boundaries of the amphibolite. Also, it is not known whether the anomalies of small extent in the north-western portion of Plate 5 are due to separate small bodies of amphibolite, or to relatively small magnetic portions in a large mass of weakly magnetic amphibolite.

Electromagnetic method

The results of the Turam survey are shown as phase difference contours on Plate 3 and ratio contours on Plate 4. Five anomalies are present. Plate 2 shows the approximate positions of the axes of the anomalies, and also of the anomalies discovered during the 1957 survey. The anomalies have been designated by letters A to G, anomalies A and B being the ones previously discovered, and described by Daly and Tate(op.cit.)

The anomalies persist over considerable lengths, with generally northerly strikes, roughly parallel to the strikes of anomalies A and B. However, anomalies C to G are very much weaker than anomalies A and B. Anomalies A and B are both extremely strong, but of the anomalies discovered in the present survey, anomalies C, E, and F attain moderate strengh over limited lengths, and are otherwise weak. Anomalies D and G are consistently weak.

All the anomalies appear to be caused by relatively narrow conductors. From the relative strength of the anomalies, the conductivity of the bodies causing anomalies C to G must be much lower than that of the bodies causing anomalies A and B. There is therefore little reason to expect that anomalies C to G are associated with conductors containing significant amounts of sulphide mineralization. It is tentatively assumed that they are due to zones of shearing.

Self-potential method

The self-potential survey gave no anomalies, except for the very strong anomalies associated with Turam anomalies A and B, and described by Daly and Tate (op. cit.)

4. CONCLUSIONS AND RECOMMENDATIONS

The results of the survey indicate the presence of five long, narrow, weakly-conducting bodies which are considered to be zones of shearing. Also, the magnetic results show that two areas, the position of which is shown by the 2000-gamma contours on Plate 2, are almost certainly underlain by amphibolite at shallow depth. They are bounded by

Traverses 100N and 400S, and coordinates 200W and 800W also contains magnetic anomalies of small extent, which are probably due to amphibolite. As mentioned earlier, it is impossible to say whether individual magnetic anomalies are due to individual bodies of amphibolite, or to magnetic portions of a single large body.

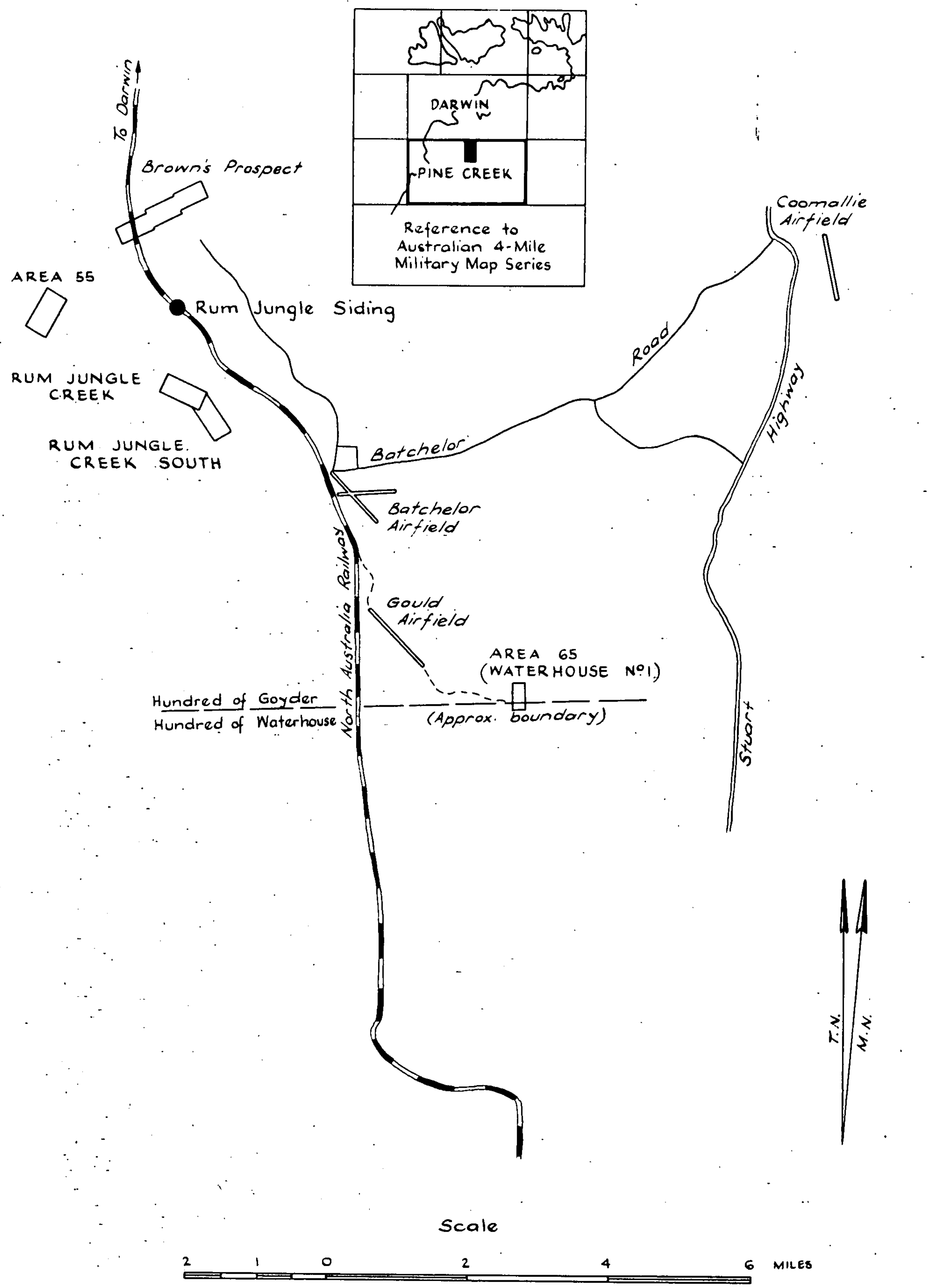
As Turam anomalies C to G are relatively weak, they are considered less likely to be associated with bodies carrying sulphide mineralization than the very strong anomalies A and B. It is considered therefore that no recommendation for testing them by diamond drilling is warranted until the testing of anomalies A and B recommended by Daly and Tate (op.cit.) has been performed. If this testing shows that anomaly B is associated with a body of economic interest, anomaly C, which is almost continuous with it, would be worthy of attention.

It is considered, however, that the presence of a well-marked geochemical indication of nickel, the position of which is shown on Plate 2, adds to the significance of some of the results. Nickel mineralization is typically associated with basic rocks. The fact that the geochemical nickel anomaly overlaps one of the areas which, from the magnetic results, is underlain by amphibolite, suggests that this portion of the amphibolite should be tested for nickel. Also the anomaly E attains its maximum strength between Traverses 0 and 300S, in an area containing some small magnetic anomalies probably due to amphibolite. As mentioned earlier, the possibility cannot be ruled out that this area also is underlain by amphibolite that is only weakly magnetic. If the anomaly indicates the presence of a sheared portion of the amphibolite, this shear also would be worth testing for nickel. The testing should take the form, in the first instance, of percussion-drill holes to solid rock on a regular pattern, with systematic testing of cuttings for nickel.

5. REFERENCES

DALY J. and TATE K.H. 1958 Geophysical survey at Waterhouse No. 1 uranium prospect, N.T.(1957) Bur. Min. Resour. Aust. Rec. 1958/81.

PLATE I



LOCALITY MAP

RUM JUNGLE CREEK, RUM JUNGLE CREEK SOUTH PROSPECTS

AREA 55 - AREA 65

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA, N.T. 1960.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS,
DARWIN SEPTEMBER 1960.

(BASED ON G71-201)

TO ACCOMPANY RECORD No 1962/44 G 323-22

PLATE 2

Reference

Alluvium		Quaternary
Shale		
Quartzite (silicified shale)		Precambrian Brocks Creek Group
Siltstone		
Limonite pseudomorphs after pyrite		

- Geological boundary
- Bedding
- Cleavage
- Inferred fault
- Outline of magnetic anomaly (2000-γ contour)
- Geochemical nickel anomaly > 200 p.p.m.
- Geochemical copper anomaly > 200 p.p.m.
- Radiometric contour (1960) mr/h
- Water course
- Costean
- Steel stake on baseline

TURAM ANOMALY

- Weak
- Moderately Strong
- Very Strong

GEOLOGY, GEOCHEMISTRY AND MAIN GEOPHYSICAL INDICATIONS

AREA 65 (WATERHOUSE NO. 1 PROSPECT)

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA N.T., 1960 & 1957

GEOLOGY AFTER ROSENHAIN AND ALLE, 1953.

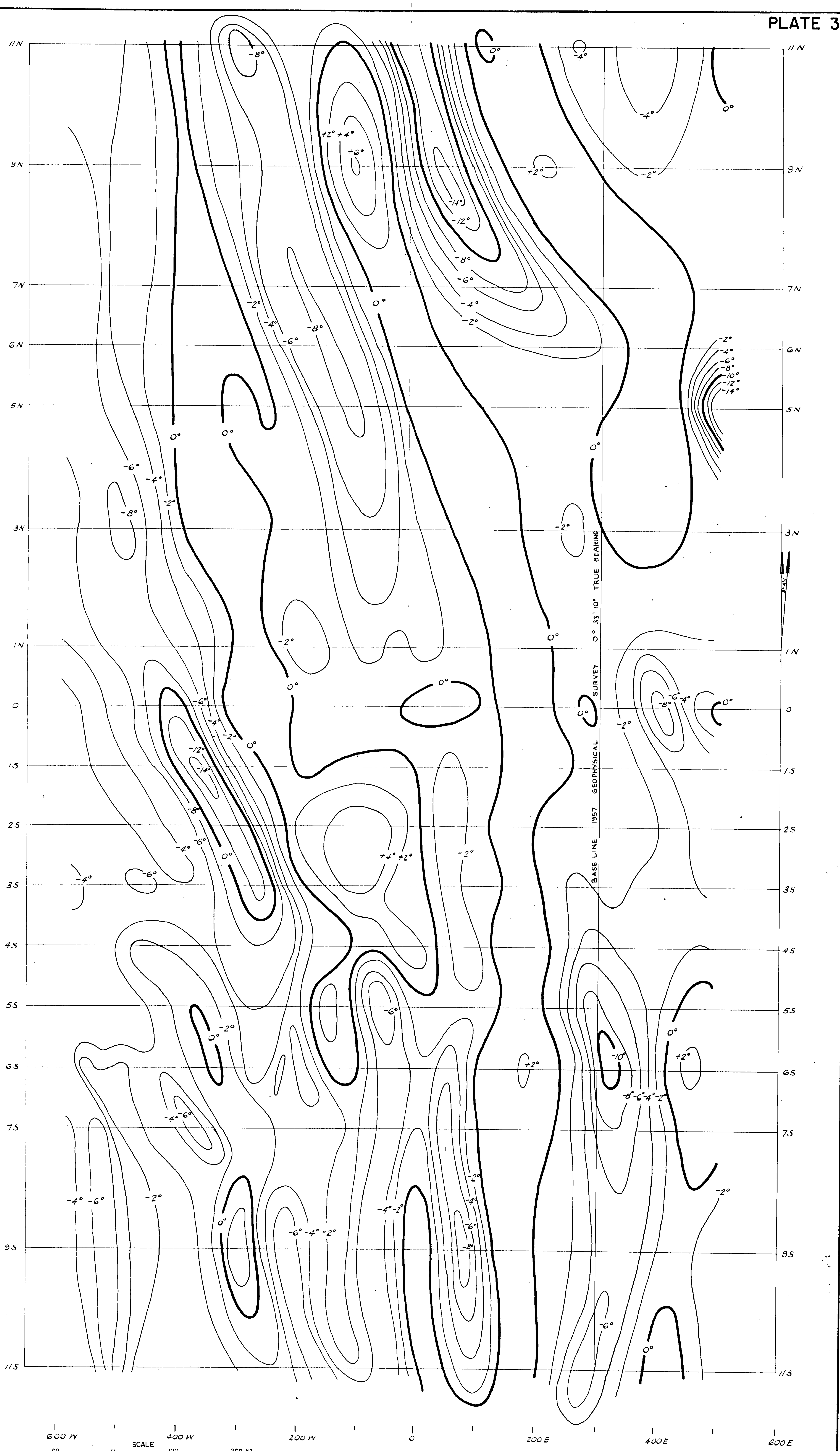
Scale

100 0 100 200 FT.

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

TO ACCOMPANY RECORD No 1962/44 G 323-18

PLATE 3



SCALE

100 0 100 200 FT

CONTOUR INTERVAL 2 DEGREES

FREQUENCY 440 C/S

COIL SEPARATION 50 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, DARWIN N.T. DECEMBER 1960

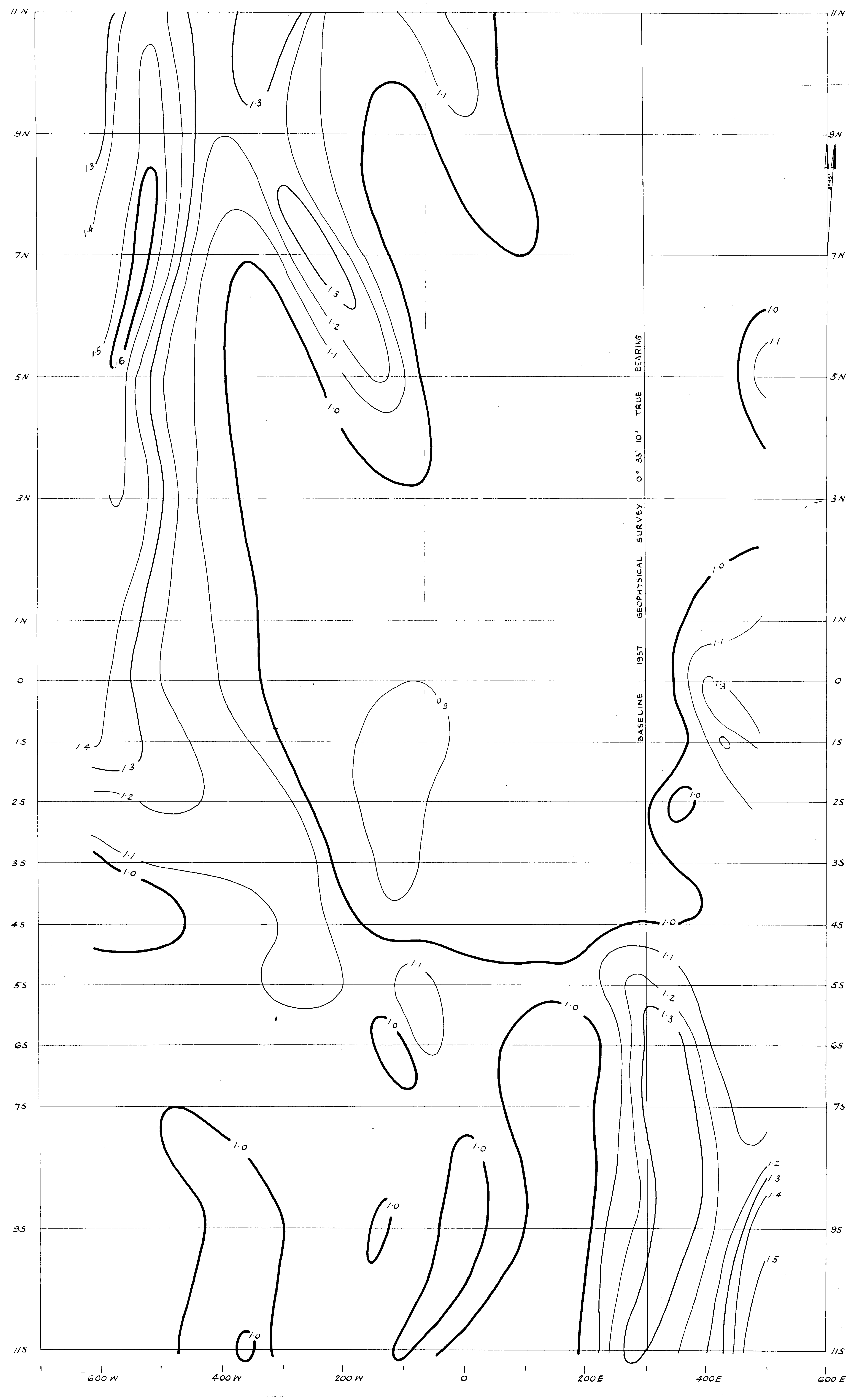
TURAM PHASE CONTOURS

AREA 65, (WATERHOUSE No. 1 PROSPECT)

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA N.T., 1960

TO ACCOMPANY RECORD No 1962/44 G 323-19

PLATE 4



SCALE
100 0 100 200 FT

TURAM RATIO CONTOURS

AREA 65 (WATERHOUSE No. 1 PROSPECT)

GEOPHYSICAL SURVEY IN THE RUM JUNGLE AREA, N.T. 1960

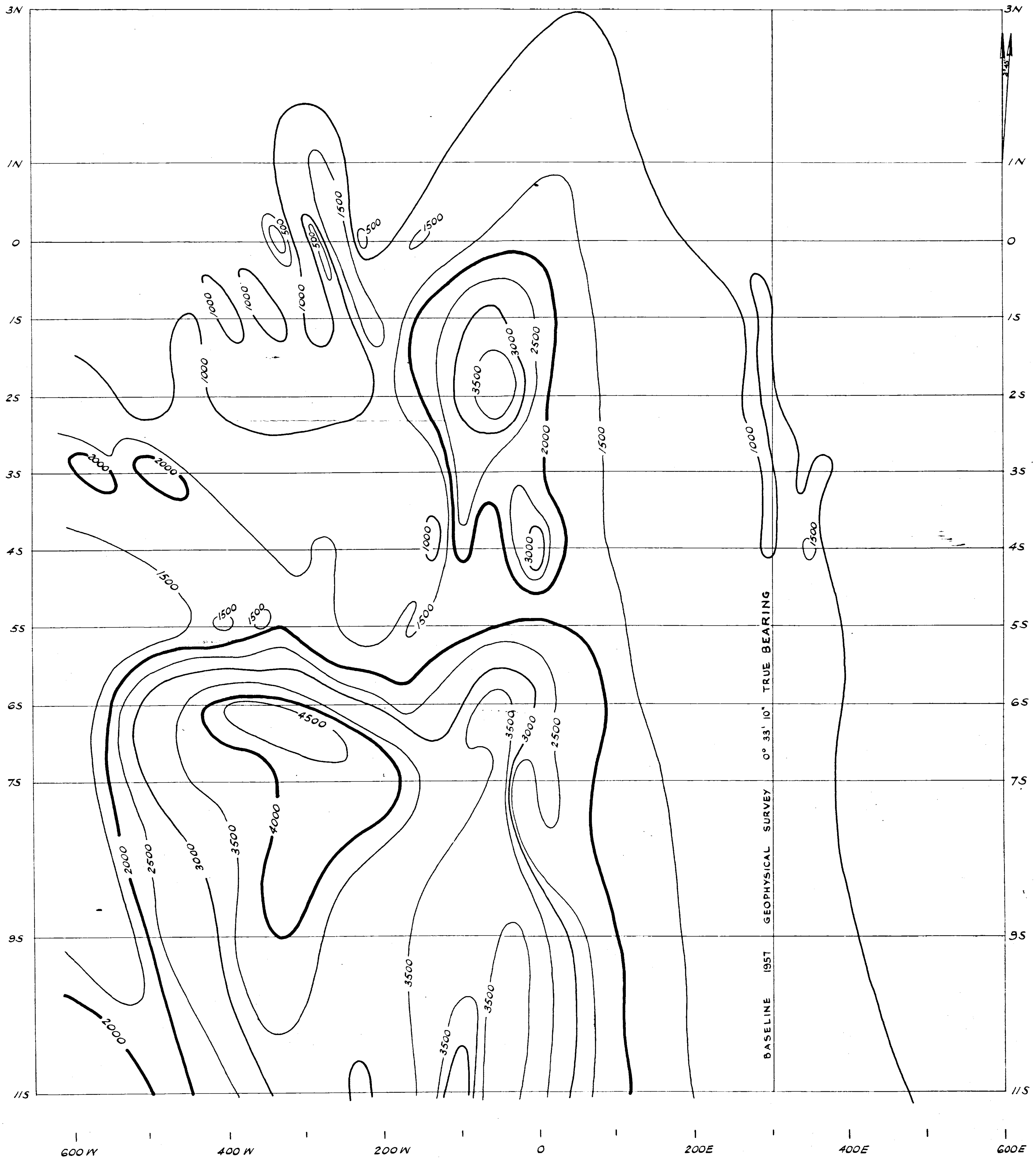
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
DARWIN, N.T. DECEMBER 1960.

CONTOUR INTERVAL 0·1
FREQUENCY 440 c/s
COIL SEPARATION 50 FEET

TO ACCOMPANY RECORD No 1962/44

G 323-20

PLATE 5



VERTICAL MAGNETIC FORCE CONTOURS

AREA 65 (WATERHOUSE No. 1 PROSPECT)

GEOPHYSICAL SURVEY - IN THE RUM JUNGLE AREA, N.T. 1960

CONTOUR INTERVAL 500 γ

Scale

100 0 100 200 FT.

Geophysicist: A. Douglas

Bureau of Mineral Resources, Geology and Geophysics
Darwin N.T. December 1960

TO ACCOMPANY RECORD No 1962 /44 G 323-21