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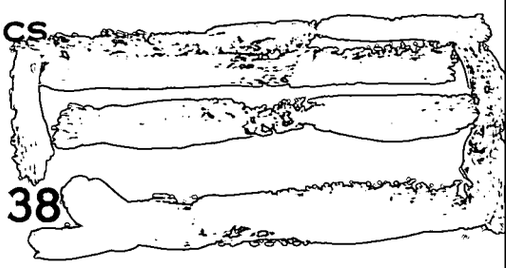

RECORDS 1953, No. 138

GEOPHYSICAL INVESTIGATIONS AT THE YENBERRIE URANIUM PROSPECT, NORTHERN TERRITORY

by

R. J. de GROOT

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1. INTRODUCTION

The Yenberrie uranium prospect is 3⅓ miles east of the Stuart Highway, and 4⅔ miles in a direction 15 degrees east of north from the bridge across the Edith River, which is 33 miles by road northward from Katherine, and 187 miles southward from Darwin. The prospect is 1⅓ miles slightly north of west from the old Yenberrie wolfram and molybdenite mines.

The prospect is reached by leaving the Highway at a point 2⅔ miles north of the Edith River bridge, travelling eastward along the newly formed Wolfram Hill Road for 3¾ miles, and then following a bulldozed track that branches sharply to the west and continues for about 1 mile (see Plate 1). Geophysical investigations at the prospect during 1953 consisted of brief radiometric, self-potential and magnetic surveys.

2. GEOLOGY

The prospect is situated within the Cullen Granite (Noakes, 1949), near its southern extremity. Rocks of the Brocks Creek Group of Lower Proterozoic age occur approximately ⅓ mile to the east.

The uranium mineralization occurs in one of a number of very narrow shear zones in coarse to medium grained granite, the shear zones having a general trend slightly west of north. The prospect has been geologically mapped in detail and a true N - S baseline laid down (Gardner 1953).

3. RADIOMETRIC SURVEY

The instruments used were:

(i) A "Cintel" portable Geiger-Muller ratemeter, Type 1011C, Serial No. 2, fitted with three G24^{H} G.M. tubes. The background reading of this instrument on the sedimentary rocks of the region was taken as 6 microamps on the "C" scale. The scale was assumed to be linear with interscale conversion factors as follows:-

4 times "B" scale reading equivalent to "C" scale reading.
10 " "A" " " " " " "C" " "

(ii) A "Halross" portable scintillometer, Model 939, Serial No. 313. The background reading of this instrument on the sedimentary rocks was taken as 14 counts per second. The scale was assumed to be linear.

These instruments both measure the intensity of the gamma radiation in the immediate vicinity of the probe. The readings taken are quoted as multiples of the background count of the sedimentary rocks of the region, as these give the lowest recorded count of any rocks. Some observers quote results as multiples of the background count of the country rocks in the immediate vicinity of the prospect (Gardner 1953), but in the case of Yenberrie the granite in the area generally gave a reading approximately twice the background reading of the sedimentary rocks. A few granite exposures gave a reading as high as three times background.

It should be noted that due to greater efficiency "times background" with a scintillometer is usually more than three times the "times background" recorded with a G.M. ratemeter.

Readings of gamma ray intensity were taken along 12 traverses varying from 500 to 600 feet long, at intervals varying from 25 feet down to 1 foot where changes in the gamma ray intensity were large. The traverses were surveyed in with tape and compass at right angles to the main geological N-S baseline, and were spaced at 50 or 100 feet intervals over a length of 800 feet. Readings were also taken for 1000 feet along the baseline, for 800 feet along the main shear containing the uranium mineralization and along four short traverses at right angles to this shear.

These readings showed that the radioactive anomalies were of very small extent, and it is difficult to represent them satisfactorily by contours on the standard geological mapping scale of 1 inch = 100 feet. The surface radioactivity was considerably disturbed by the sinking of shallow pits and the scraping of the surface around the anomalies with a bulldozer. Some of the bulldozer debris giving high readings had obviously been spread a considerable distance from its original location. This made a number of the readings unreliable. Consequently the iso-rad contours almost certainly show a much greater area of surface radioactivity than was originally present.

Plate 1 shows iso-rad contours and profiles of surface radioactivity across and along the main shear zone. Bulldozed areas are indicated by cross hatching under the profiles. Only four anomalies (A, B, C, D) were detected in the main shear zone, none of the other shear zones in the area showing any signs of radioactivity.

One day was spent in systematically prospecting the vicinity with a car-borne G.M. ratemeter, but no additional areas of radioactivity were found.

Two shallow shafts were sunk at points A and B (Plate 1). Iso-rad contours of the faces of shaft B in the direction of the strike are shown on Plate 2.

No iso-rad contours could be drawn for shaft A as the radioactivity below a depth of 5 feet was very weak and variations were very slight; above 5 feet the walls had been timbered and filled. In a preliminary pit on site A readings up to 24 times background were observed with the Cintel portable G.M. ratemeter. The much higher readings that were reported (Gardner, 1953) by the discoverers, Messrs. R. Young and S. Mazlin and by R.S. Matheson were not confirmed. This might be due to the removal of specimens containing the bulk of the mineralization.

4. SELF-POTENTIAL SURVEY

Because of the presence of gossanous material in the shear zone containing the uranium mineralization, attempts were made to conduct a self-potential survey of the area in the hope of finding indications of a continuous sulphide ore body under the main shear zone and possibly similar indications in nearby shear zones.

The results of this survey were inconclusive, due mainly to contact potentials and also to the high ground resistivity. Although careful precautions were taken to eliminate as much error as possible due to these causes the resulting S.P. profiles were not reproducible. These precautions consisted of digging three shallow holes about 5 inches deep at each station, each hole being dug so that the electrodes would have good contact with soil rather than rubble. The holes were watered several hours before the readings were taken and in many cases this was done on the previous afternoon. The self-potential at each station was read with the electrode in each hole in turn. Stations were re-occupied and electrodes reversed at frequent intervals. Readings were averaged after neglecting any obviously spurious results due possibly to high resistivity or high contact potentials. The three readings at each station frequently had a scatter of more than 50 millivolts. Plate 3 shows original profiles and repeat readings along some of the traverses. It is not considered that any major S.P. anomalies exist in the area covered. Any small anomalies that may exist would be obscured by the observed contact effects.

5. MAGNETIC SURVEY

The instrument used was an Askania dual-purpose magnetic variometer, Serial No. 321642 with vertical force movement. This instrument measures the local variation of the vertical component of the earth's magnetic field caused by different types of rocks having different magnetic properties.

A magnetic test survey was carried out along traverses 100.S and 200.S, each 700 feet long. The results are shown on Plate 4. Observations were made at 10 feet intervals to test for any anomalies in the narrow shears. No results of any significance were obtained, apart from an anomaly at 300.E on traverse 100.S, due to a narrow dolerite dyke.

6. CONCLUSIONS AND RECOMMENDATIONS

The observed geophysical anomalies are all of such small extent or so uncertain, that no further geophysical work is recommended on this prospect at the present stage.

7. REFERENCES

Gardner, D.E., 1953 Preliminary Report on the Yenberrie Uranium Prospect. Bur. Min. Res. Records 1953, No. 129.

Noakes, L.C., 1949 A Geological Reconnaissance of the Katherine-Darwin Region, Northern Territory. Bur. Min. Res. Bull. No. 10.

(R. J. de Groot)
Geophysicist.

Melbourne
December, 1953.

Distribution

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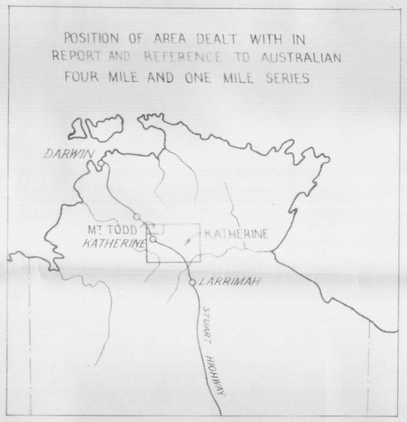
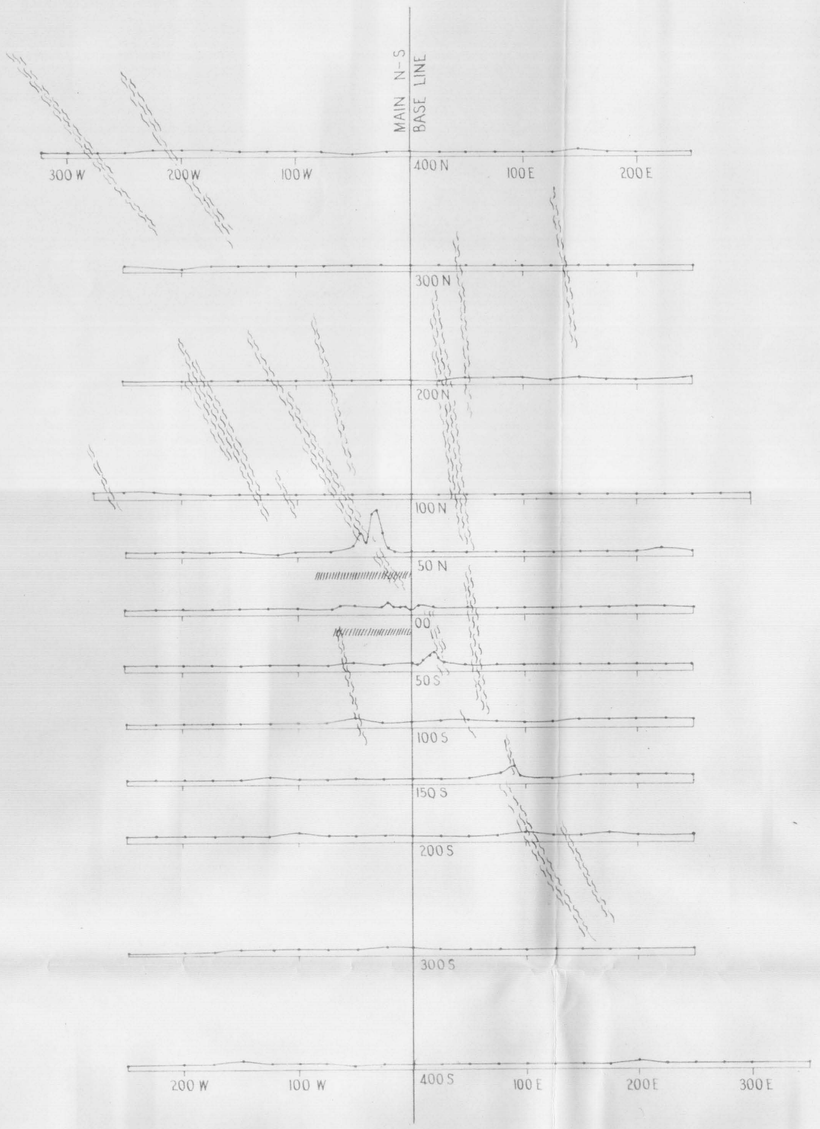
PLATE I.



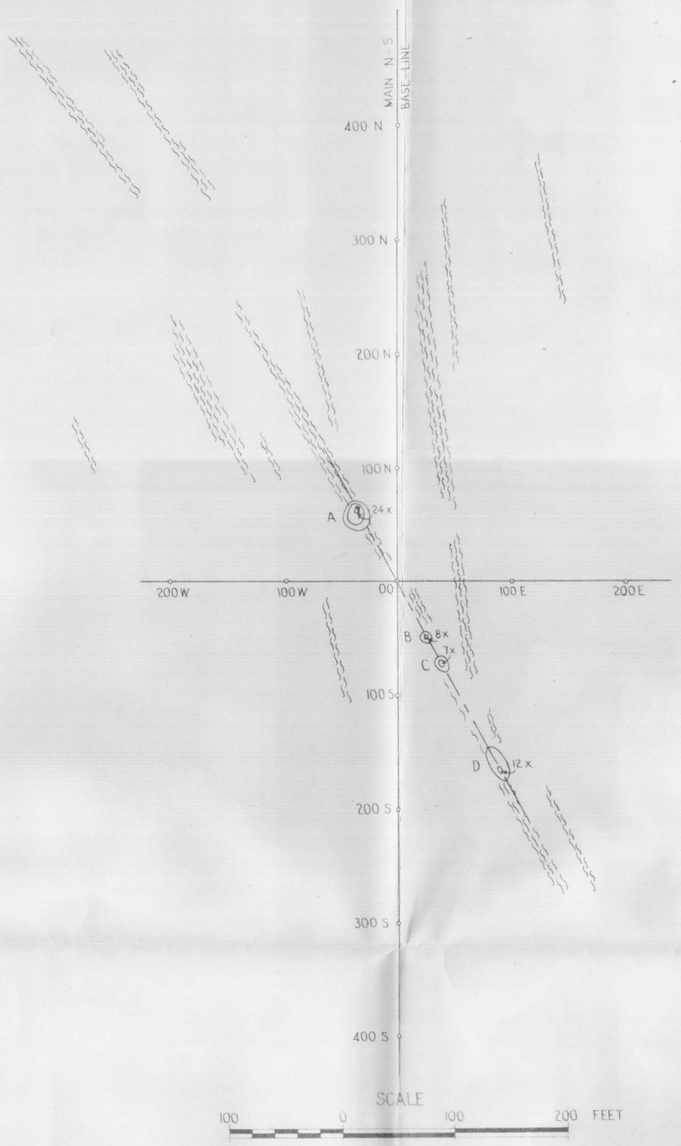


SCALES

HORIZONTAL 100 0 100 200 FEET

VERTICAL 20× 10× 0 20× 40 TIMES BACKGROUND COUNTS (APPROX.)

PROFILES OF SURFACE GAMMA RAY INTENSITY

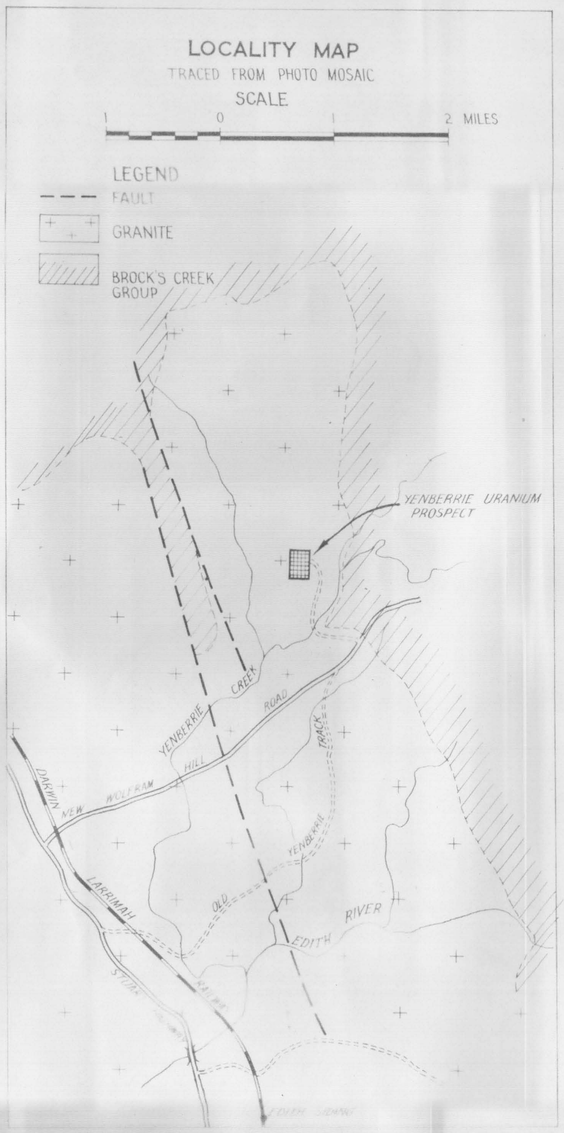


SCALE

100 0 100 200 FEET

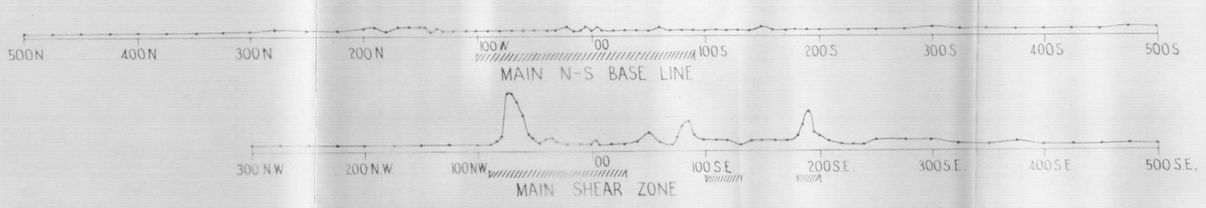
ISORAD CONTOURS OF SURFACE GAMMA RAY INTENSITY

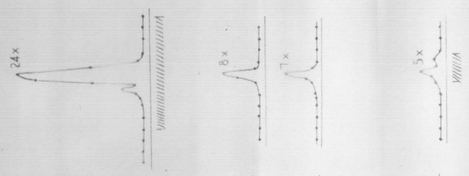
CONTOUR INTERVAL = 3 TIMES BACKGROUND



INDICATES SURFACE DISTURBED BY BULLDOZER OR DIGGING AND PROFILES AND CONTOURS PROBABLY SPURIOUS.

SHEAR ZONE IN GRANITE





PROFILES ACROSS MAIN SHEAR ZONE AT 67' N.W. 51' S.E. 83' S.E. 185' S.E.

GEOPHYSICIST

GEOPHYSICAL SURVEY

EDITH RIVER AREA, NORTHERN TERRITORY.

YENBERRIE URANIUM PROSPECT

RADIOMETRIC INVESTIGATIONS

MEASUREMENTS TAKEN WITH CINTEL PORTABLE GEIGER-MULLER RATEMETER TYPE 1011C SERIAL Nº2 USING TYPE G24H TUBES

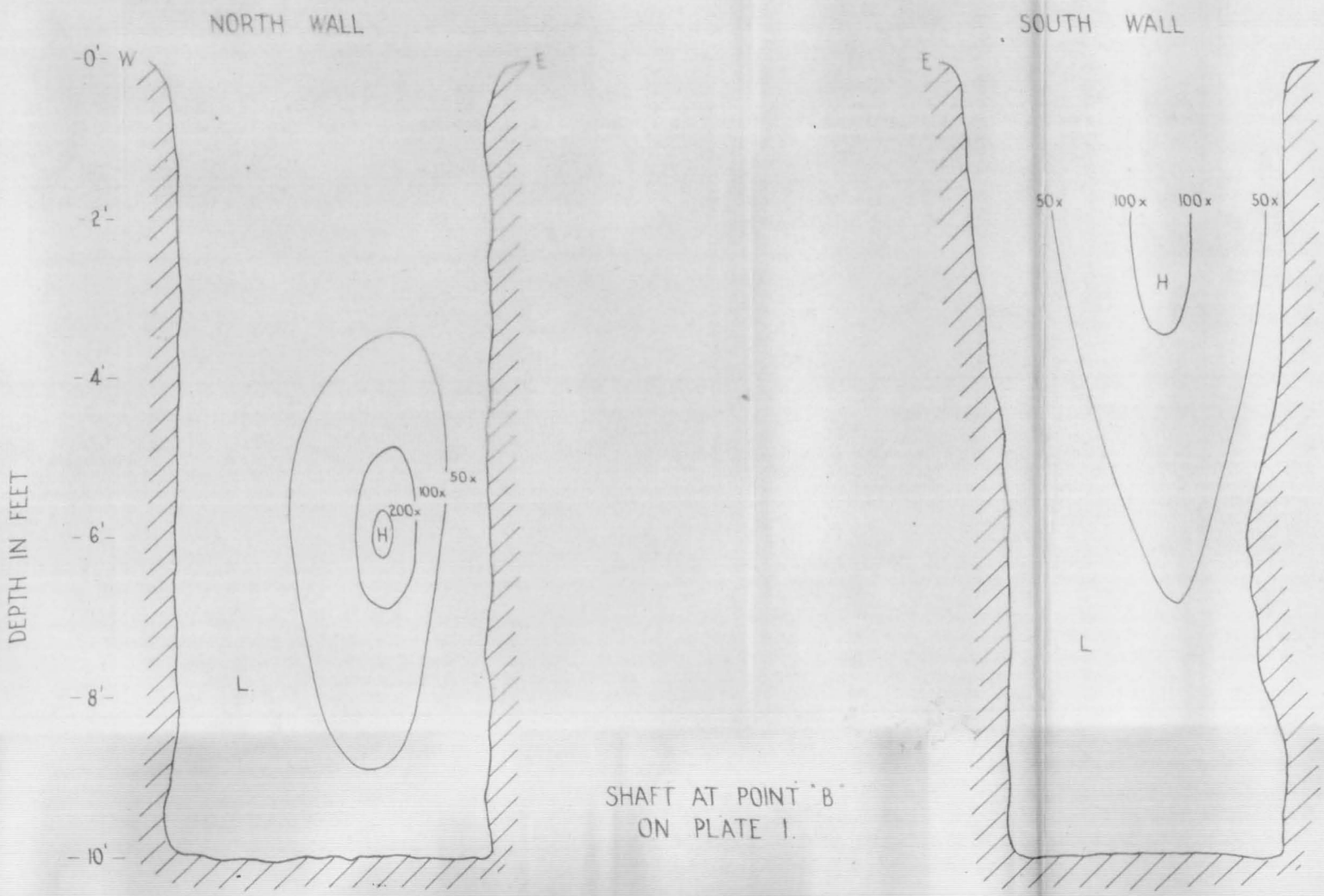
BACKGROUND TAKEN AS 6 MICROAMPS ON "C" SCALE

EQUIVALENT TO READING ON SEDIMENTARY ROCKS

(SURVEY MADE IN JUNE, JULY 1953)

Geophysical Section, Bureau of Mineral Resources, Geology & Geophysics G121-4

PLATE 2.



GEOPHYSICAL SURVEY

EDITH RIVER AREA NORTHERN TERRITORY

YENBERRIE URANIUM PROSPECT

ISORAD CONTOURS OF GAMMA RAY INTENSITY AS ON 18-8-53

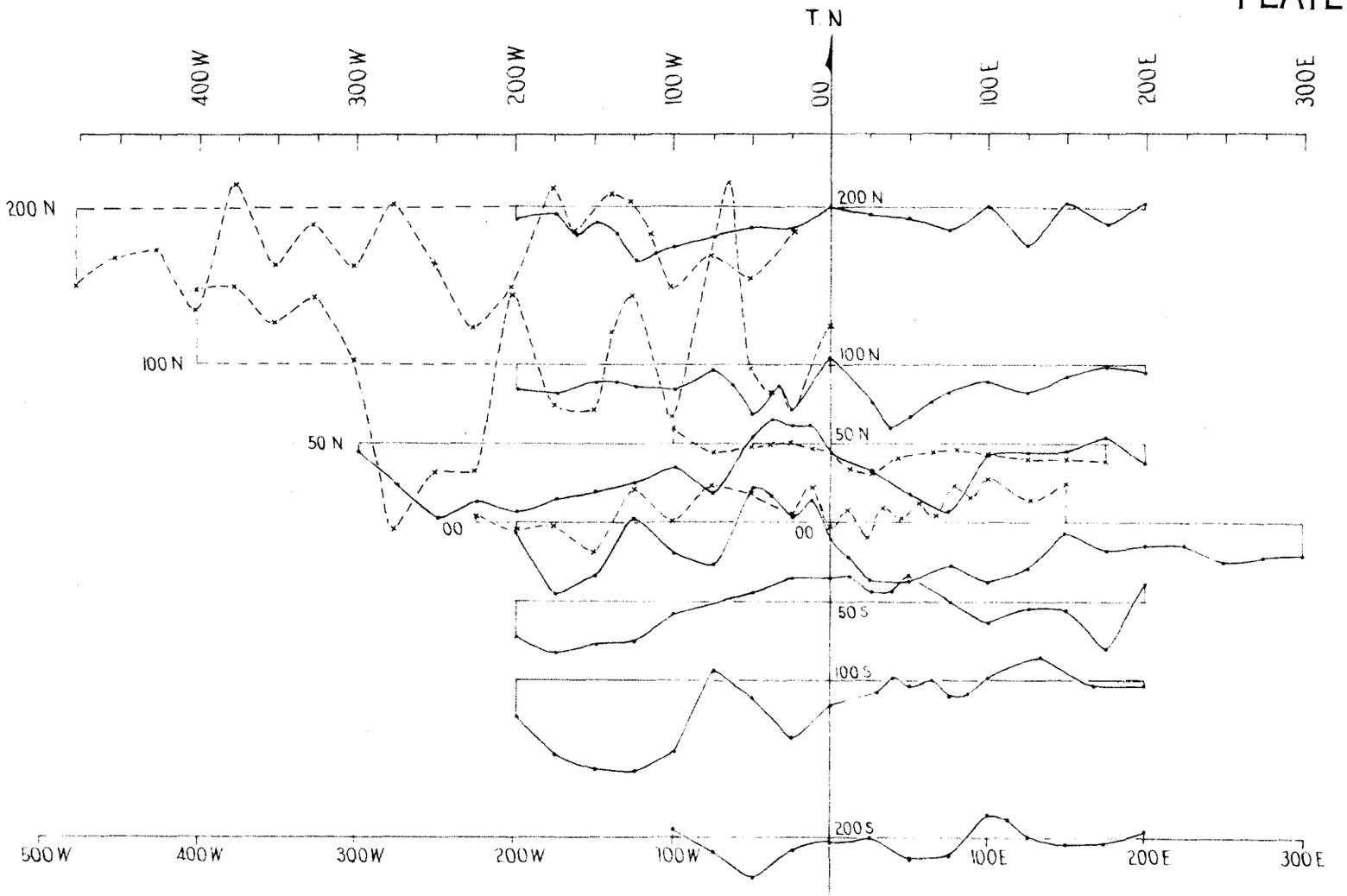
MEASUREMENTS TAKEN WITH HALROSS SCINTILLOMETER MODEL 939 SERIAL Nº 313
BACKGROUND TAKEN AS 14 COUNTS PER SECOND EQUIVALENT TO READING ON SEDIMENTS.

Rde Brock

GEOPHYSICIST.

Geophysical Section, Bureau of Mineral Resources, Geology & Geophysics. G121-5

PLATE 3.



SCALES

HORIZONTAL 100 0 100 200 FEET

VERTICAL 200 0 200 400 MILLIVOLTS

GEOPHYSICAL SURVEY

EDITH RIVER AREA NORTHERN TERRITORY

YENBERRIE URANIUM PROSPECT

SELF-POTENTIAL PROFILES

AS AT SEPTEMBER 1953

ORIGINAL PROFILES

RE-RUN PROFILES

GEOPHYSICIST

G121-6

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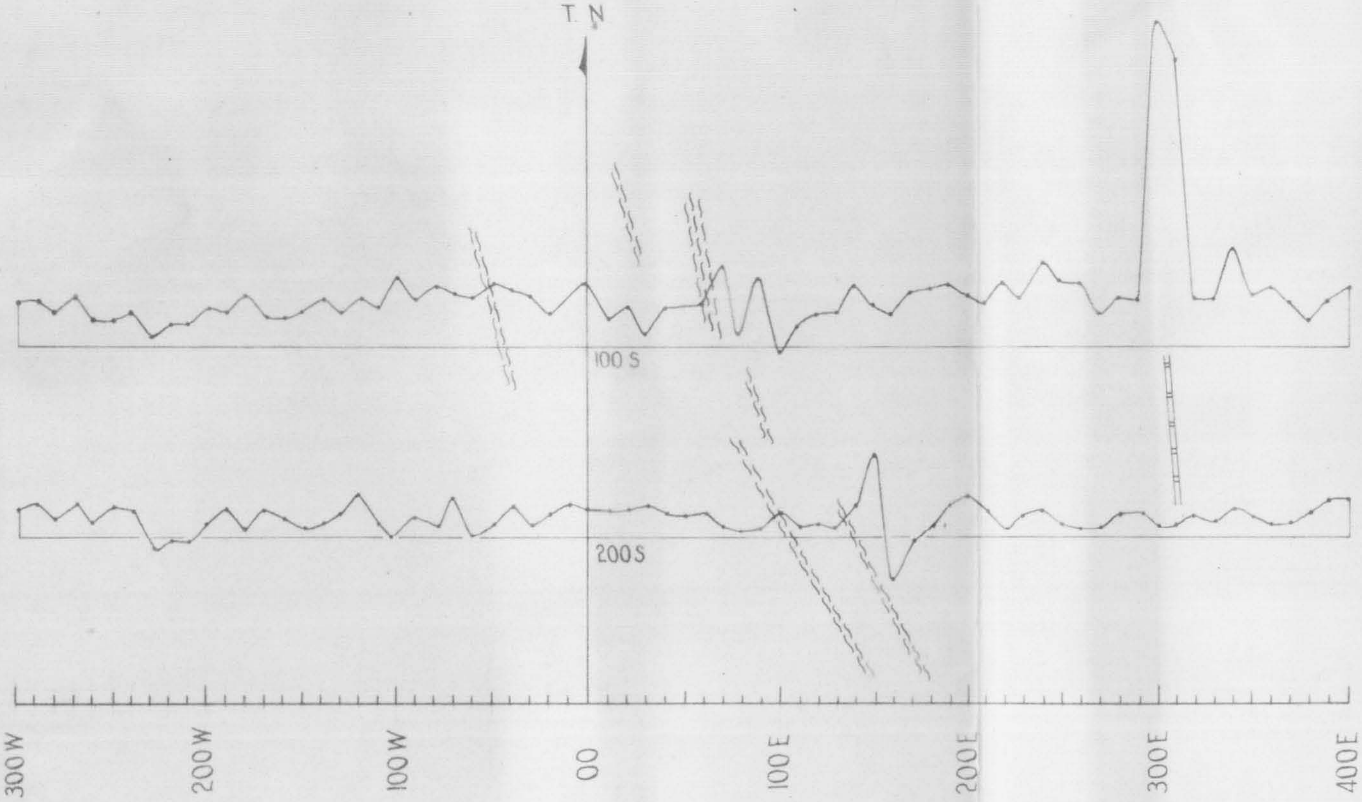
PLATE 4.



SCALES

DOLERITE	HORIZONTAL	100 0 100 200 FEET
SHEARS IN GRANITE	VERTICAL	100 0 100 200 GAMMAS

GEOPHYSICAL SURVEY

EDITH RIVER AREA, NORTHERN TERRITORY.

YENBERRIE URANIUM PROSPECT, MAGNETIC INVESTIGATIONS

ASKANIA VERTICAL MAGNETOMETER N° 521642

SCALE VALUE 11·18/DIV.

OCTOBER 1953

R de Groot

GEOPHYSICIST

Geophysical Section, Bureau of Mineral Resources, Geology & Geophysics. G121-7