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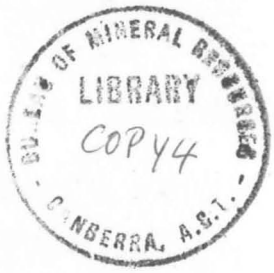

Manton Area Reconnaissance Geophysical Survey, Northern Territory, 1968

by

J. E. F. Gardener

RECORD 1971/23

MANTON AREA RECONNAISSANCE GEOPHYSICAL SURVEY, NORTHERN TERRITORY 1968

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J.E.F. GARDENER

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SUMMARY

Reconnaissance Slingram, surface radiometric, and magnetic surveys were made in the Manton area. The Slingram results reflect the geology; in particular, an amphibolite band could be traced right across the survey area. The amphibolite is not magnetic.

Surface radiometric anomalies have associated subsurface (auger-hole) radiometric anomalies. No significant anomalies were found except possibly in the Crater Formation in the southeast part of the area surveyed.

1. INTRODUCTION

Reconnaissance Slingram, magnetic, and surface radiometric surveys were made in the Manton area with stations 100 feet apart along traverses 1200 feet apart. The Manton area (Plate 1) is immediately west of Manton Dam (approximately 68 kilometres south of Darwin by road), and is between the Acacia Gap Tongue to the north and the Rum Jungle Complex to the south; it contains rocks of the Golden Dyke Formation, Coomalie Dolomite, and Crater Formation. The geological setting is thus similar to the Rum Jungle East area (Dodson & Shatwell, 1965). The reconnaissance surveys (geochemical and geophysical) were made as part of a uranium exploration programme in the Rum Jungle district by the Bureau of Mineral Resources, Geology & Geophysics (BMR).

2. GEOLOGY

The geological succession in the Manton area (Willis, 1969) is a series of slightly metamorphosed Lower Proterozoic sedimentary formations resting unconformably on the Rum Jungle Complex. The metasediments are intruded by amphibolite and quartz-tourmaline veins. The following units, in order of increasing age, were recorded in the area (see Plate 2):

Superficial deposits
Acacia Gap Tongue
Golden Dyke Formation
Coomalie Dolomite
Crater Formation
Rum Jungle Complex

The Rum Jungle Complex has been described by Rhodes (1965) and the other units by Dodson and Shatwell (1965) and Willis (1969).

The regional strike in the Manton area is west.

3. METHODS

The Slingram method is a conventional electromagnetic system which uses a moving source, moving receiver, and horizontal coil. Coil spacing was 200 feet and the frequency used was 1760 Hz.

Harwell type 1368A ratemeters were used in the radiometric survey.

The magnetic survey was made with an Askania vertical-component torsion magnetometer.

4. RESULTS

Slingram and magnetic results

The geological map (Plate 2) and the Slingram results (Plate 3) are closely related.

Weak anomalies, mainly in the imaginary component, occur on the Rum Jungle Complex. These anomalies are due to small resistivity variations, probably variations in weathering. Parts of the profiles over the Crater Formation are disturbed, probably also owing to variations in weathering. Profiles over Coomalie Dolomite are undisturbed in general.

Anomalies occur in the Golden Dyke Formation and in the transition beds between Coomalie Dolomite and the Golden Dyke Formation. Some of the profiles are very irregular, especially over areas mapped as amphibolite. This amphibolite (Plate 2) is the origin of the strong Slingram anomalies which can be followed right across the survey area. An inferred fault on Traverse 28W displaces the amphibolite as shown (Plate 2), and a corresponding displacement occurs on the Slingram profiles (Plate 3). The amphibolite is not mapped on Traverses 136W and 148W on the western end of the surveyed area. However, Willis (1969, p. 5) considers it probable that the amphibolite here is merely obscured by a superficial deposit of fine quartz sand.

The irregular shapes of the Slingram profiles over the amphibolite were thought to be possibly due to magnetic effects. However, a study of the results of an aeromagnetic survey made by BMR in 1952 (Daly, 1957, Plate 1) shows the area to be undisturbed magnetically. A test survey on

Traverse 4W over the amphibolite (Plate 4) showed only minor magnetic effects and it is considered unlikely that magnetic effects have influenced the shape of the Slingram profiles. The origin of Slingram anomalies on amphibolite in the Rum Jungle area was investigated by diamond-drilling in 1964 (Ashley, 1966). DDH 64-1 and DDH 64-4 intersected massive amphibolite and DDH 64-2 intersected amphibolite overlain by black shale. Resistance logs made of the holes (Ashley, 1966, Plate 12, Figures 1, 2 and 4, and Plate 13) show that the resistance of the amphibolite is variable but apparently is usually low, for reasons not determined. The Slingram anomalies are due to tabular bodies of amphibolite of variable but generally high conductivity.

Some of the Slingram profiles over the Golden Dyke Formation are fairly smooth but have a noticeably raised real component. Model experiments (Ashley, 1966, p. 3-4 and Plate 3; Duckworth, in preparation) have shown that tabular bodies at depths over 23 metres but less than 75 metres produce these types of profiles, and these Slingram anomalies are considered to be due to beds of conducting shales or beds of amphibolite underlying the shale and schist mapped by Willis (1969); the tops of the beds are between 25 and 75 metres depth.

Radiometric results (Plate 5)

Only minor surface radiometric anomalies were found. The traverses have been auger drilled with holes 200 feet apart and the holes were tested for radioactivity. The subsurface results (Willis, 1969, Plate 5) show a close correlation with the surface results. The highest surface reading was 0.026 mR/hr at 189N/8E and the highest subsurface reading was 0.05 mR/hr in a hole at 188N/8E at a depth of 19 feet (6 metres), in the Crater Formation. Each surface radiometric high has an associated subsurface high.

In general most of the high values occur within the Crater Formation and the Rum Jungle Complex, and to a lesser extent in the Golden Dyke Formation. The Coomalie Dolomite showed radioactivity generally below background. Willis (1969) considers the subsurface anomalies too weak to be significant except the anomalies in the Crater Formation, particularly the Crater Formation in the southeast part of the survey area, where he has recommended auger drilling on traverses 400 feet apart, with holes 200 feet apart. Although it is improbable that a

surface radiometric survey would add useful information to the subsurface results if these drilling recommendations are carried out, nevertheless, because of the small effort required, a surface survey should be made in conjunction with the auger hole programme on the off chance of obtaining useful information.

5. CONCLUSIONS

The Slingram results are closely related to the geology. Slingram anomalies on amphibolite enabled the amphibolite to be traced right across the survey area. The amphibolite is not magnetic.

The survey radiometric anomalies have associated subsurface (auger hole) radiometric anomalies. Willis (1969) recommends follow-up auger drilling of anomalies in the Crater Formation, particularly in the south-eastern part of the survey area. If these recommendations are carried out, a surface radiometric survey should also be made.

Radiometric anomalies in other parts of the survey area are not considered significant.

6. REFERENCES

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PLATE 1
DIAMOND DRILLING
GEOLOGICAL AND
GEOPHYSICAL SURVEYS
1968
RUM JUNGLE AREA
131°00'
131°10'
12°50'
13°00'
DARWIN
ACACIA AREA
8 West
00
336 N
312N
288N
264 N
240 N
216N
192 N
168 N
144 N
120 N
96 N
72 N
48 N
24 N
00
24S
48S
72S
96S
120S
192E
196E
24E
72E
Tie
L4
Z1
L3
Co1
C1
L2
C2
L1
69/3
68/8
68/9
Acacia Creek
MANTON RIVER
ADELAIDE RIVER
MANTON AREA
Manton Dam
Darwin River
RUM JUNGLE
COMPLEX
GIANTS REEF FAULT
Australian Railway
North
560 N
MT FITCH NORTH
500 N
MAGNETIC SURVEY
530 W
492 W
344 W
SLINGRAM, RESISTIVITY AND RADIOMETRIC SURVEYS
GRAVITY SURVEY
220 W
176 W
100 W
70 W
120S
TO 632 W
TO 642 W
MT FITCH
384 N
372 N
MT BURTON AREA
MT BURTON
RUM JUNGLE
BROWNS S-W
254N
RUM JUNGLE TRIANGLE (NORTH)
110E
150E
218 N
AREA 55B
AREA 55
FINNISS RIVER
142N
RUM JUNGLE TRIANGLE (SOUTH)
109E
126N
121E
RUM JUNGLE CREEK SOUTH
BATCHELOR
POWER LINE
Airfield
BATCHELOR LATERITES EXTENDED
48S
72S
L3
67/13
L2
67/12
67/15
68/4
R1
L1
104E
RUM JUNGLE EAST GRID
86E
R2
16E
48E
74E
130W
90W
168S
154W
192S
68E
67/14
68/3
WOODCUTTERS AREA
L5
67/10
166W
68/6
240S
68/5
54E
AREA 44 EXTENDED
260S
R4
288S
58E
HUANDOT
72W
312S
316S
328S
COOMALIE GAP WEST (NORTHERN SECTION)
12E
68/1
68/2
48E
360S
400S
40E
420S
COOMALIE GAP WEST (SOUTHERN SECTION)
12W
00
88W
456S
480S
28E
COOMALIE CREEK
STUART HIGHWAY
132°00'
12°
13°
14°
DARWIN
PINE CREEK
Reference to Australian standard 1:250,000 map series
21 S
GOULD Airfield
509E
GOULD AREA
201 S
68/7
213 S
MT MINZA AREA
WATERHOUSE
GRANITE
WATERHOUSE NO 2 PROSPECT
333 S
ADELAIDE RIVER
(Based on D52/A8/301)
1 0 1 2 MILES
1 0 1 2 3 KILOMETERS
LEGEND
Geochemical Surveys 1968
Geophysical Surveys 1968
Diamond-drill holes completed since October 1967, or in progress October 1968
Areas of rotary- percussion drilling, 1968
TO ACCOMPANY RECORD No. 1969/149 AND RECORD No. 1970/23
AND RECORD No.1971/23
AND RECORD No.1971/20
D52/B7-456-1

PLATE 2

RUM JUNGLE (MANTON AREA) NT

GEOLOGY (AFTER WILLIS, 1969)

SCALE

1000 0 1000 2000 3000 4000 FEET

250 0 250 500 750 1000 METRES

MANTON DAM

BASE LINE

DARWIN

WOODCUTTERS NORTH-WEST TRACK

STUART HWY Manton 6M

BMR DDH

RIO TINTO DDHs

Manton No.1 prospect

ferruginous sandstone

silicified shale

laterite with silicified shale fragments

highly sheared

laterite

flaggy quartzite

granite

quartzite

spring

Qtz

Czs

Pla

Pld

Plo/Pld

Plo

Plr

Pgr

LEGEND

GENERAL

- Vehicle track
- Stream - flowing
- Stream - non-flowing
- Billabong
- Swamp
- Traverse line

GEOLOGY

BOUNDARIES

- Formation boundary - outcropping
- Formation boundary - non-outcropping
- Outcropping boundary
- Non-outcropping boundary

GENERAL

- Inferred fault
- Quartz vein
- C1 Costean
- M2 Diamond-drill hole
- Anticlinal axis

CAINOZOIC

- Czs — Undifferentiated ferruginous quartz sand
- Laterite

LOWER PROTEROZOIC

Pld — GOLDEN DYKE FORMATION

- Undifferentiated shale and schist (non-outcropping)
- Mica schist
- Amphibolite

Pla — ACACIA GAP TONGUE

- Quartz sandstone

Plo — COOMALIE DOLOMITE

Plo/Pld — TRANSITION BEDS

- Undifferentiated (non-outcropping)
- Black calcilutite

Plo — Undifferentiated quartz sand (non-outcropping)

- Quartz ironstone breccia
- Massive quartzite

Plr — CRATER FORMATION

- Undifferentiated (non-outcropping)
- Flaggy quartzite
- Quartz pebble conglomerate
- Sheared greywacke
- Quartz mica schist
- Sheared quartzite

Pgr — RUM JUNGLE GRANITE

- Granite
- Quartz tourmaline

PLATE 3

92N 100 108 116 124 132 140 148 156 164 172 180 188 196 204 212 220 228 236 244 252 260 268 276 284 292N

148W

Pgr Plr Pgr

136W

124W

112W

100W

88W

76W

64W

52W

40W

28W

16W

4W

8E

20E

32E

40E

LEGEND

HORIZONTAL SCALE

800 0 800 1600 2400 3200 FEET

200 0 200 400 600 800 METRES

Distances between traverses are not to scale

RUM JUNGLE (MANTON AREA) NT

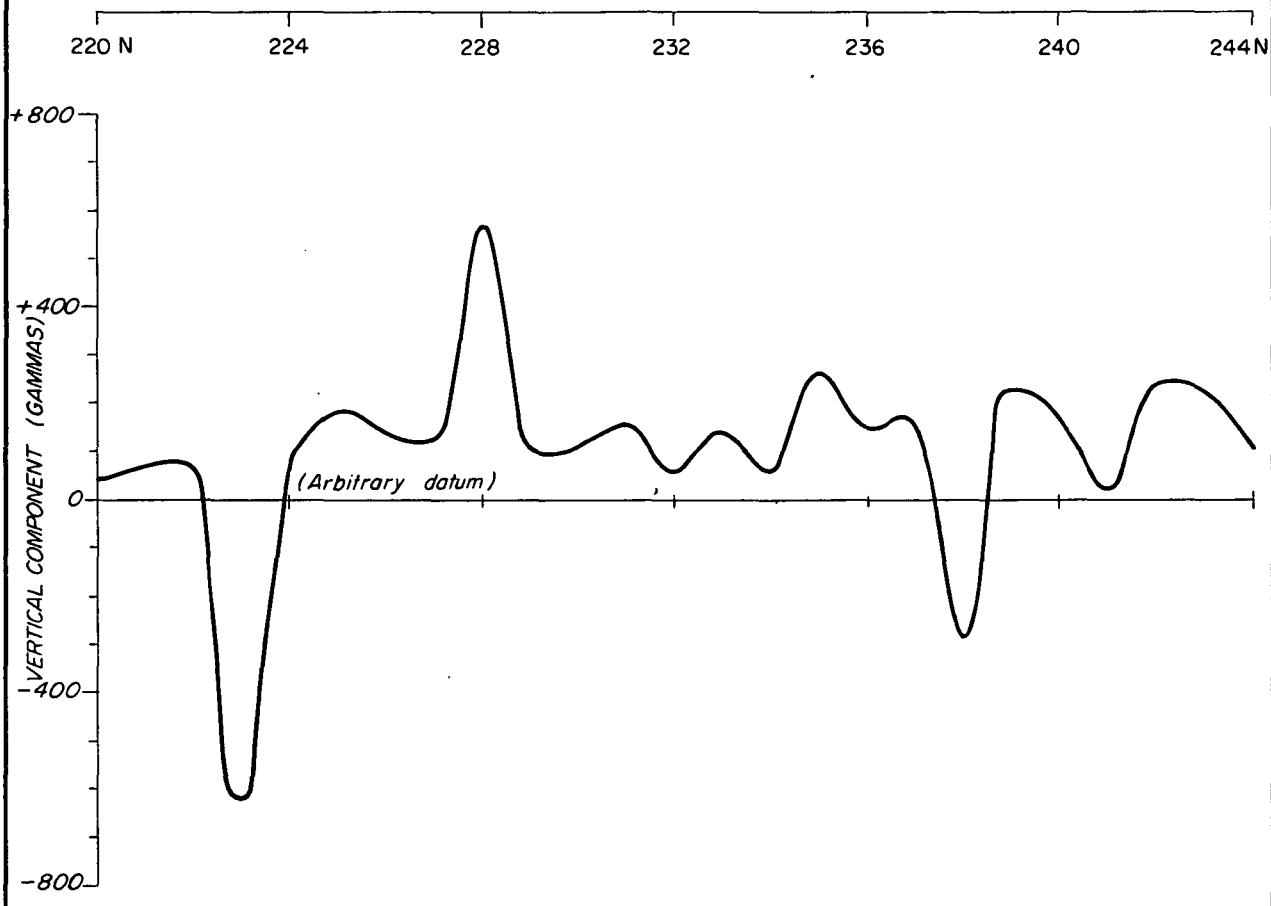
SLINGRAM PROFILES

92N 100 108 116 124 132 140 148 156 164 172 180 188 196 204 212 220 228 236 244 252 260 268 276 284 292N

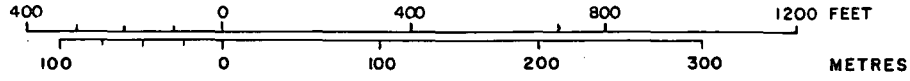
TO ACCOMPANY RECORD NO 1971/23

D52/B7-507

PLATE 4



HORIZONTAL SCALE



RUM JUNGLE (MANTON AREA) NT 1968

TRAVERSE 4W

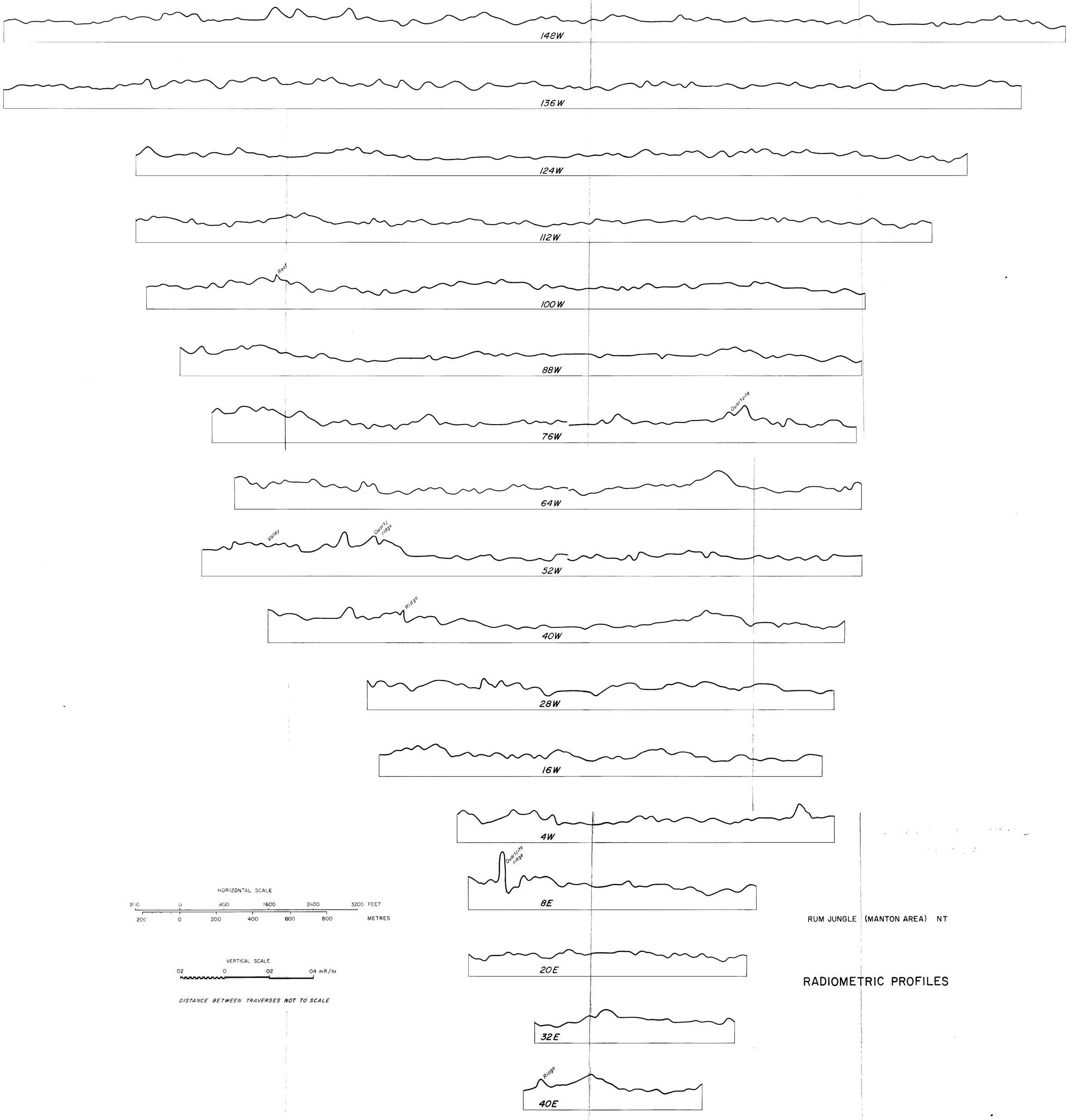
MAGNETIC PROFILE

TO ACCOMPANY RECORD NO 1971/23

D52/B7-506A

PLATE 5

100N 108 116 124 132 140 148 156 164 172 180 188 196 204 212 220 228 236 244 252 260 268 276 284 292N



HORIZONTAL SCALE

800 0 800 1600 2400 3200 FEET

200 0 200 400 600 800 METRES

VERTICAL SCALE

·02 0 ·02 ·04 mR/hr

DISTANCE BETWEEN TRAVERSES NOT TO SCALE

RUM JUNGLE (MANTON AREA) NT

RADIOMETRIC PROFILES

100N 108 116 124 132 140 148 156 164 172 180 188 196 204 212 220 228 236 244 252 260 268 276 284 292N

TO ACCOMPANY RECORD NO. 1971/23

D52/B7—503