COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1968 / 76

Acacia Area Reconnaissance Geophysical Survey, Rum Jungle, Northern Territory 1967

by

K. DUCKWORTH

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CONTENTS

ILLUSTRATIONS

SUMMARY

In 1967 the Acacia Area was covered by reconnaissance electromagnetic and radiometric ground surveys.

The geophysical results indicate the boundary between Coomalie Dolomite and Golden Dyke Formation rocks in this area. The presence of extensive outcrops of amphibolite is also shown clearly in the electromagnetic results.

Nothing else of interest was found and no further work is recommended.

INTRODUCTION

The Acacia Area lies about forty miles to the south of Darwin just to the east of the Stuart Highway. It is a continuation to the north of the Rum Jungle East Area. The locality map is shown in Plate 1. The area is bounded in the west and east by two prominent ridges which trend almost due north and which are closer together at the southern end of the area. The survey area is approximately nine miles long and three miles wide.

The area includes a wide outcrop of Coomalie Dolomite and some Crater Formation beds, which occupy the centre of the area and are flanked by Golden Dyke shales and the two ridges which are of Acacia Gap Tongue. The structure is basically anticlinal; one major fault is evident, the Giants Reef Fault, which cuts the area at the southern end along a north-east trend.

The geophysical work in this area was done in August and September 1967 and included measurements by Slingram and radiometric equipment. Readings were taken every hundred feet along traverses 2400 feet apart. The geophysical field party consisted of K. Duckworth (geophysicist), W. Fraser (geophysical assistant), and P. Maylor (field assistant).

A geochemical survey was also made over the area in 1967 and has been described by Semple (1968).

2. DISCUSSION OF RESULTS

Slingram

These results are shown in the form of profiles of real and imaginary components in Plates 2 to 4. The most noticeable feature of these profiles is the large area of little or no disturbance in the southern half of the area. This is typical of the response of Coomalie Dolomite, and the boundaries of this area agree well with the mapped boundary of this outcrop. There is a suggestion of a continuation of this undisturbed zone into the northern half of the area. This probably corresponds to minor cropping out of the Coomalie Dolomite as the anticline plunges to the north.

Outside the undisturbed zone the response is typical of Golden Dyke Formation rocks with a considerable amount of amphibolite cropping out in the Golden Dyke Formation. The Golden Dyke Formation is predominantly conductive black shale, which acts as a broad horizontal conductor, thereby generally elevating the real component profiles where weathering depth exceeds seventy feet. The imaginary component is not greatly affected by the shales, but when amphibolite is present a characteristically strong negative imaginary effect occurs. This type of response is evident throughout the disturbed areas but especially on line 336N, which cuts across several outcrops of amphibolite. Trends of strong negative imaginary effect are located along each side of the area and follow the probable bedding trend, so that it seems possible that amphibolite is interbedded with the shales.

The Giants Reef Fault is shown on lines 72S to 120S where Coomalie Dolomite has been thrown against amphibolites.

None of the electromagnetic features of this area is considered to be worth further investigation.

The amphibolite is often strongly magnetic and outcrops of it might be more readily defined by a magnetic survey. Model tests have indicated that such magnetic bodies produce characteristic Slingram responses.

Radiometric

The radiometric results are presented as profiles in Plate 5. The anomaly at the western ends of traverses 120N to 168N has been investigated previously by costeaning (Crank, 1953).

The anomaliesbetween 52E and 56E on lines 24N to 96N coincide with an outcrop of the Crater Formation and are due to a thorium-bearing quartz breccia bed in that outcrop. Similarly the feature between 64E and 76E on line 240N is possibly due to thorium in the Crater Formation although the outcrop is mapped just to the east of this anomaly.

Two other radiometric 'highs' are located at 240N/112E and 24N/16E. However, radiometric probing of auger holes drilled along these traverses indicated nothing of significance and no further work is recommended.

3. CONCLUSION

The Acacia Area contains no geophysical evidence to warrant further investigation.

4. REFERENCES

CRANK, K.A.M. 1953 Preliminary report on the Frazer Prospect, Brodnibb area, Northern Territory. Bur. Min. Resour. Aust. Rec. 1953/107

SEMPLE, D.G. 1968 Geochemical and Radiometric Investigations, Acacia Area, NT 1967. Ibid. 1968/8.

LOCALITY MAP

GEOPHYSICAL & GEOCHEMICAL SURVEYS

1967

RUM JUNGLE AREA

ACACIA AREA

WOODCUTTERS AREA

COOMALIE GAP WEST

COOMALIE GAP WEST

GOULD AREA

MT. MINZA AREA

WATERHOUSE GRANITE

RUM JUNGLE COMPLEX

Darwin

Darwin River

North Australian Railway

Darwin

Acacia Creek

Marrara River

Adelaide River

Manton Dam

Grants reef fault

Rum Jungle

Finniss River

Batchelor

Airfield

Gould Airfield

WATERHOUSE No.2 PROSPECT

A/River

Adelaide River

Pine Creek

Reference to Australian Standard Army Map Series

Geochemical Surveys 1967.

Geophysical Surveys 1967.

Scale: 2 mile to an inch.

Plo Coomalie Dolomite boundary

Slingram anomaly axis

Self-potential anomaly

Self-potential axis

Surface radiometric anomaly

L2 Axis of geochemical anomaly

L1 Area of geochemical anomaly

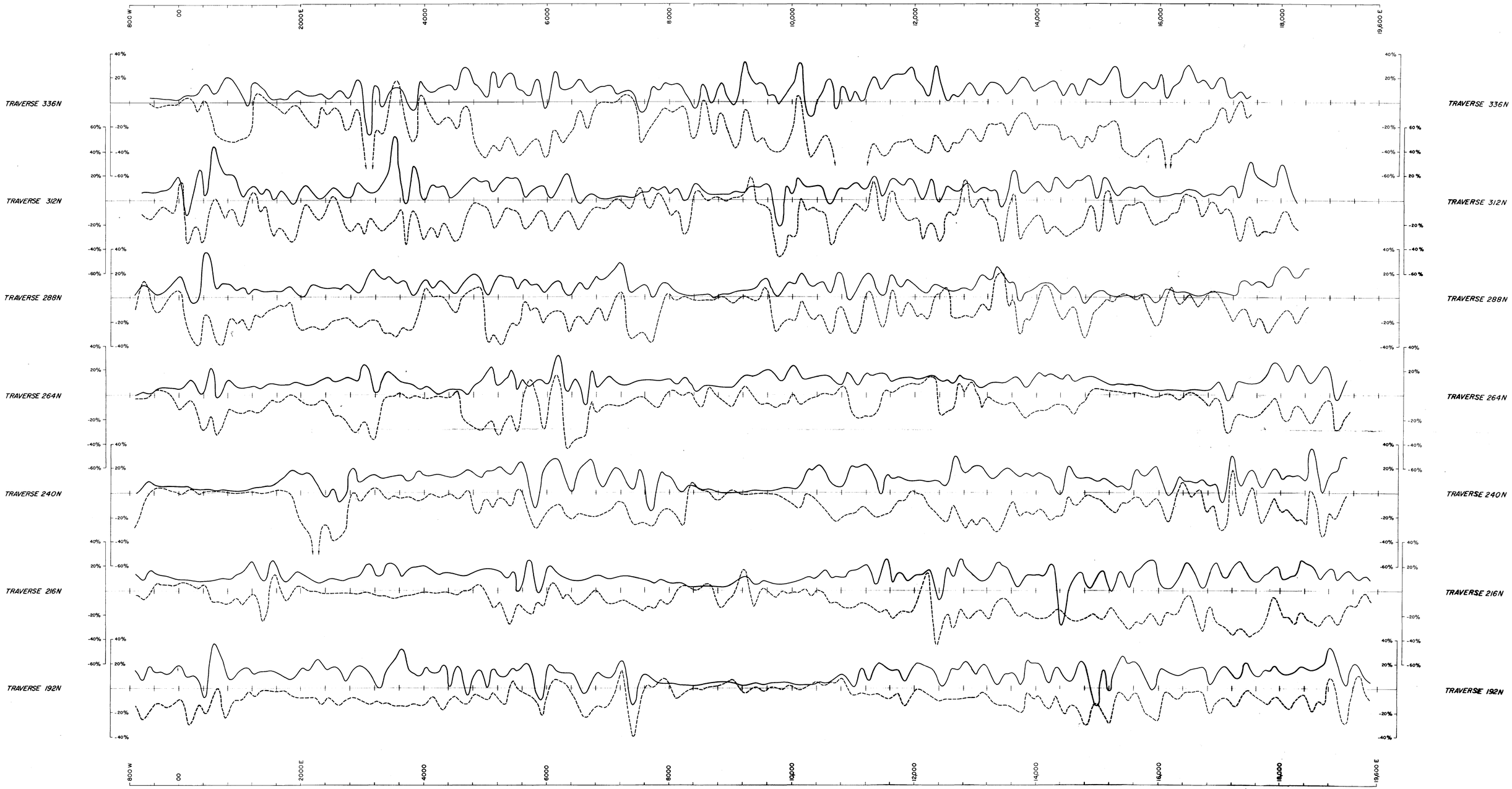
Gravity traverse

PLATE I

TO ACCOMPANY RECORD NO. 1967/141 and 1968/76

D52/B7-360

B.M.R. Darwin Oct. 1967.



SLINGRAM REAL AND IMAGINARY COMPONENT PROFILES

SCALE

HORIZONTAL 400 0 400 800 1200 1600 2000 FEET

VERTICAL 20 0 20 40 60 80 100 PERCENT

TRAVERSE SPACING NOT TO SCALE

LEGEND

——— Real

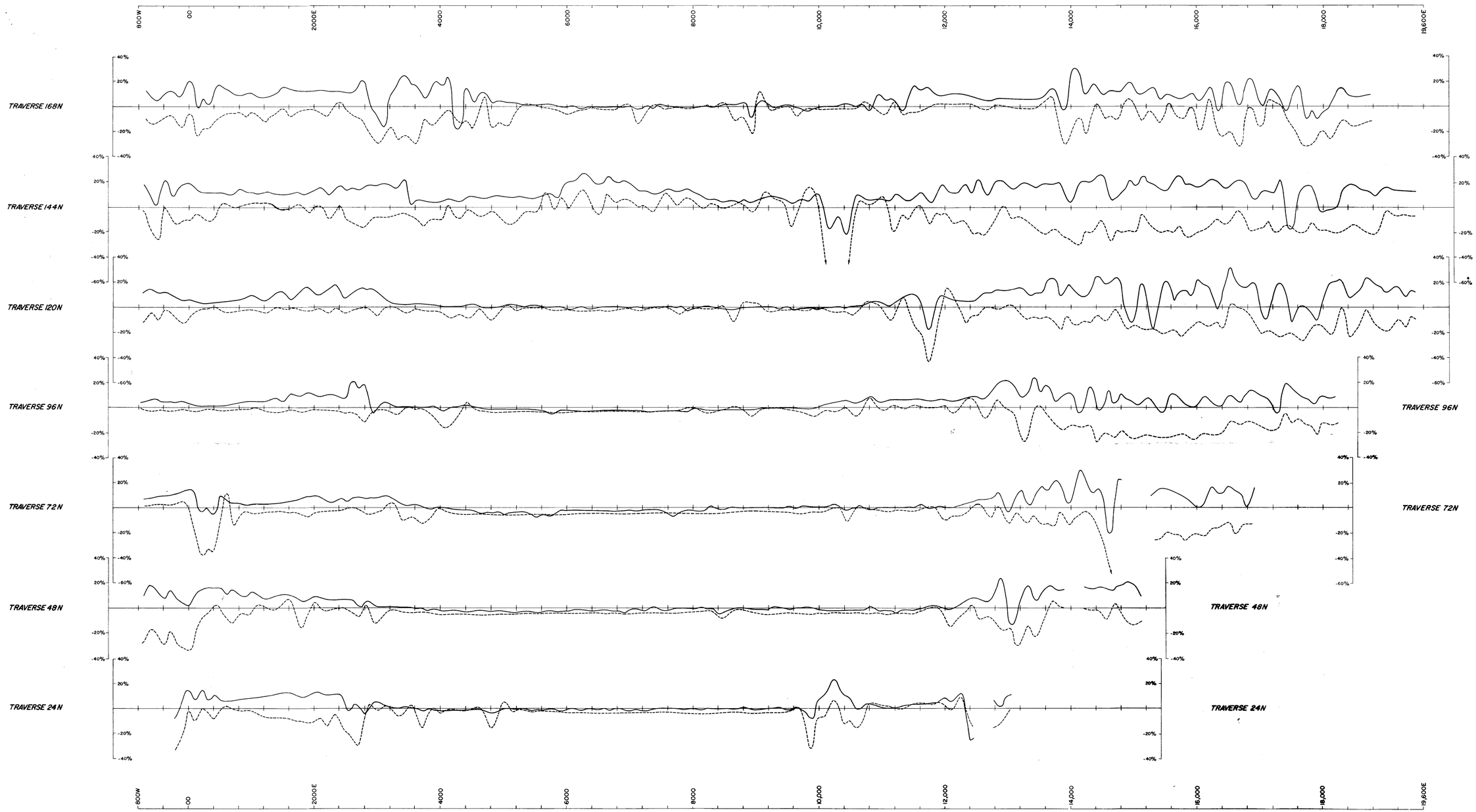
- - - - - - Imaginary

Frequency 1760 c/s

Coil separation 200 ft

TO ACCOMPANY RECORD NO. 1968/76

D52/B7-376



SLINGRAM REAL AND IMAGINARY COMPONENT PROFILES

SCALE

HORIZONTAL 400 0 400 800 1200 1600 2000 FEET

VERTICAL 20 0 20 40 60 80 100 PERCENT

TRAVERSE SPACING NOT TO SCALE

LEGEND

Real

Imaginary

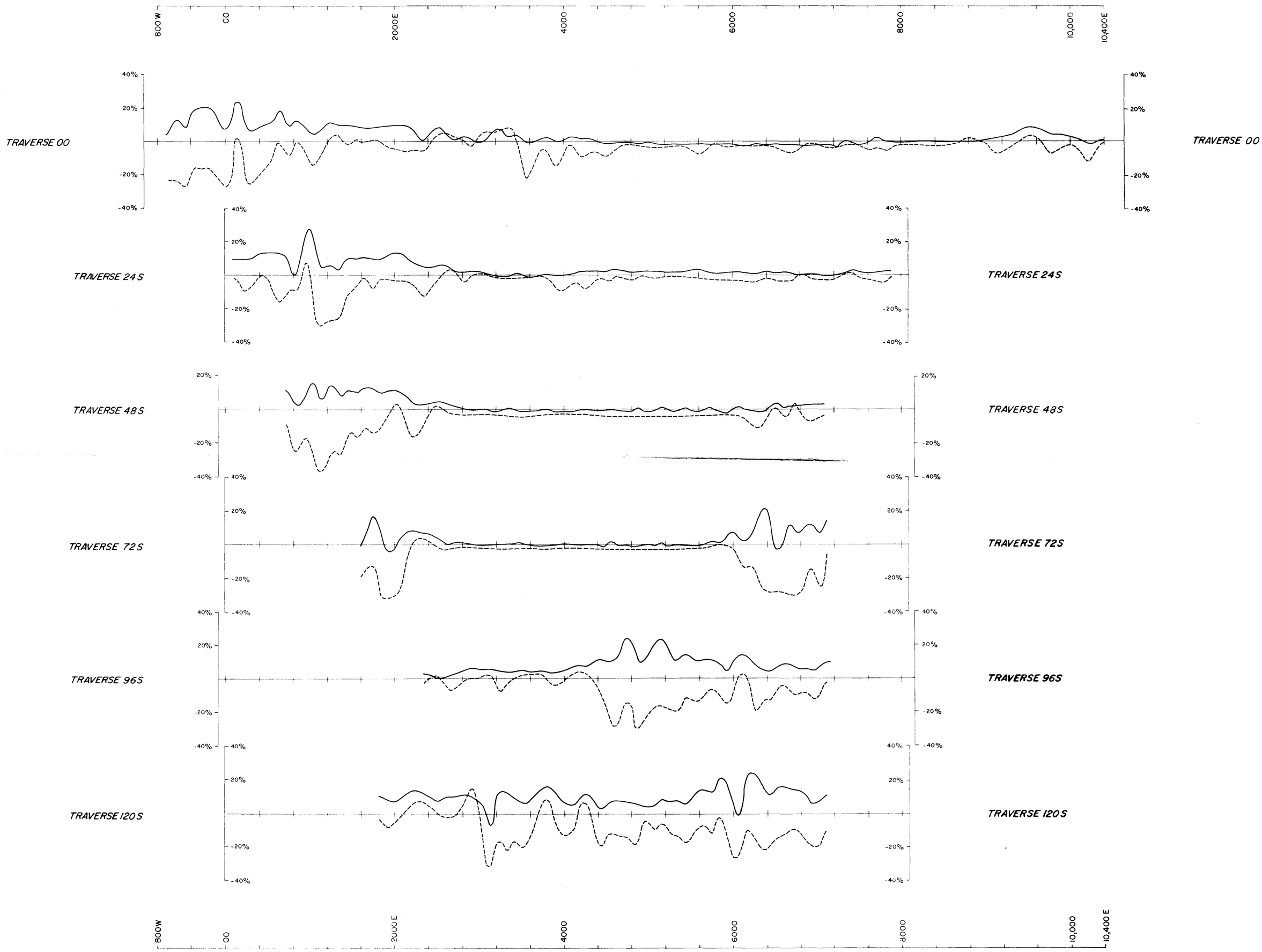
Frequency 1760 c/s

Coil separation 200ft

TO ACCOMPANY RECORD NO. 1968/76

D52/B7-377

MACHU AREA, RUM JUNGLE N.T. 1967



SLINGRAM REAL AND IMAGINARY COMPONENT PROFILES

SCALE

HORIZONTAL 400 0 400 800 1200 FEET

VERTICAL 20 0 20 40 60 PERCENT

TRAVERSE SPACING NOT TO SCALE

LEGEND

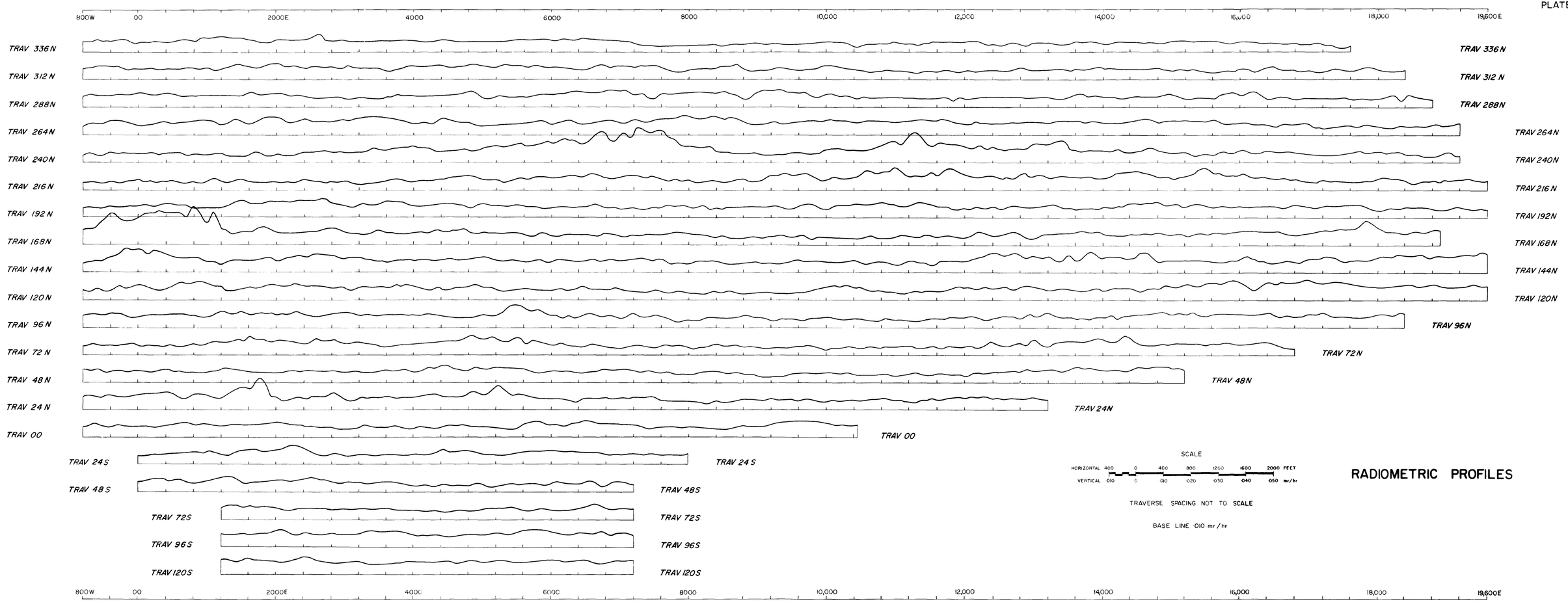
——— Real

------- Imaginary

Frequency 1760c/s

Coil separation 200ft

PLATE 5



SCALE

HORIZONTAL 400 0 400 800 1200 1600 2000 FEET

VERTICAL .010 0 .010 .020 .030 .040 .050 mr/hr

RADIOMETRIC PROFILES

TRAVERSE SPACING NOT TO SCALE

BASE LINE .010 mr/hr

TO ACCOMPANY RECORD NO. 1968/76

D52/B7-379