1964/115
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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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SIMPSON DESERT AEROMAGNETIC SURVEY, NORTHERN TERRITORY 1962

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by

J.H. QUILTY and J.S. MILSOM

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CONTENTS

ILLUSTRATIONS

SUMMARY

An aeromagnetic survey in the Simpson Desert was flown by Aero Service Ltd for the Bureau of Mineral Resources in 1962. This Record describes the Bureau's interpretation of the results of the survey.

In the northern part of the desert, a thin veneer of sediments overlies a strongly lineated magnetic basement rock which closely resembles the Archaean/Lower Proterozoic complex of Harts Range.

The south-western and south-central parts of the survey area are occupied by a magnetic basement rock with lineation resembling rocks of Musgrave Range. The magnetic basement is shallow on the western margin, but forms an embayment in the central-western part of the area. Another embayment occurs on the eastern part of the area.

In the south-eastern corner of the area, a magnetic horizon believed to correspond to partly-metamorphosed rocks or volcanics of the Lower Palaeozoic/Proterozoic constitutes magnetic basement.

With subsidiary embayments, the basement deepens progressively southward to south-eastward, reaching an estimated depth of about 10,000 ft on the south-eastern margin of the survey area. In this area the Mesozoic might attain a thickness of 6000 ft.

1. INTRODUCTION

In July 1962, an airborne magnetometer survey of part of the Simpson Desert was made by Aero Service Limited under contract to the Bureau of Mineral Resources, Geology and Geophysics (BMR). The survey area lies between latitudes 23° 30' and 26° 00' south, and longitudes 135° 00' and 138° 00' east, embracing the following Australia 1:250,000 map areas: Hale River, Simpson Desert North, McDills, Simpson Desert South, and the southern halves of Illogwa Creek and Hay River. A flight-line spacing of five miles was specified with an east-west line orientation, and was adhered to within the limits imposed by difficulty in navigation over the desert. The flight altitude was 2000 ft above sea level.

The Simpson Desert is on the western margin of the Great Artesian Basin. Mesozoic sediments beneath and sand dunes are believed to be underlain by Palaeozoic sediments, which have been penetrated in boreholes south-east of the survey area and crop out west of the desert. Archaean/Proterozoic metamorphic and intrusive rocks mainly comprise the 'basement' rocks of this part of the sedimentary basin. At the present stage of exploration for petroleum in the region, interest has centred largely on the distribution of Permian and older Palaeozoic sediments. The Mesozoic section, which is developed to a thickness of 6000-7000 ft in several boreholes, contains fresh-water and water-wet sediments. It is not considered to be a potential source or reservoir rock.

An airborne magnetometer survey records magnetic field variations (anomalies) produced by the contrasting magnetic properties of igneous and metamorphic rock units in the basement. The interpretation of the anomalies yields the depth to the magnetic basement rock surface and hence the thickness of overlying sediments, and delineates 'basement' rock structures. The magnetic basement may not correspond with the basement of prospective sediments for petroleum exploration. An attempt has been made in the interpretation to ascribe the magnetic basement in each locality to a distinct geological horizon on the basis of characteristic patterns in the magnetic contours and on measurements of the magnetic properties of samples taken from neighbouring boreholes.

Previous geophysical exploration in the area consisted of BMR regional gravity reconnaissance surveys which covered the above-mentioned 1:250,000 areas with the exception of Simpson Desert South and the eastern half of McDills. The eastern half of McDills and western half of Simpson Desert South have been covered by a gravity survey by Geoseismic (Australia) Ltd (Beach Petroleum, 1963). The eastern half of Simpson Desert South area had been covered by a gravity survey by Mines Administration Pty Ltd (Associated Freney Oil Fields, 1961). A seismic survey was made in the region of Andado Station by Geoseismic (Australia) Ltd (Geosurveys, 1963). Part of the area of the Todd River seismic survey by Namco International Inc. (Flamingo Petroleum, 1963) lies within the western boundary of the survey area.

There has been considerable geophysical activity south and east of the survey area. The work undertaken by the principal leaseholders, Delhi Australian Petroleum Ltd. (Aero Service Corp. 1961a and 1961b) and Santos Limited includes aeromagnetic coverage, seismic and gravity surveys, and several deep boreholes, the results of which are referred to in text of this Record. Aero Service Corpn made an aeromagnetic survey west of the survey area (Exoil, 1963).

2. GEOLOGY

The Simpson Desert is characterised by the formation of remarkably regular sand dunes parallel to the direction of the prevailing wind. The dunes, of recent aeolian sediments, are up to 60 ft in height and may extend for more than 100 miles. The interdune spaces are flat, the sand is more compacted, and clay pans are often developed.

Two areas of outcrop are known within the confines of the desert proper, one in the Hale River area about 30 miles north-east of Andado No. 2 bore (Scanvic, 1961 & Delhi, 1960) and the other in the Hay River area (Smith, 1960). Both outcrops are considered to be Mesozoic, the latter being more-definitely identified as Cretaceous. The only surface indication of possible structure is a sand-free lobe intruding the desert near Andado Homestead in the west (Plate 4), which may correspond to an anticlinal fold in the sediments. The Andado No. 2 water bore (Plate 4) at the north-eastern end of this lobe is fed by an aquifer, presumably the Blythesdale (Lower Jurassic) Formation, at a depth of 877 ft. The development of the desert dune system suggests that the topmost strata have been subjected to virtually no folding or dissection.

The outcropping rocks in the Great Artesian Basin are part of a sequence of Mesozoic rocks ranging in age from Cretaceous to Triassic. In areas adjacent to the desert this sequence is known to be conformable with the underlying Permian rocks where present, but a major unconformity occurs at the base of the Permian. The unconformity is ascribed to the uplift of older Palaeozoic and Proterozoic sediments during the Carboniferous period, strong folding in some areas, and erosion. Peneplanation was still incomplete when submergence took place in the Permian. The [illegible] depressions in the old erosion surface were largely filled with Permian marine sediments, and the surface presented to further sedimentation was almost flat. This would account for the remarkably uniform thickness of the Mesozoic sediments in the boreholes situated south-east of the survey area (Plate 1).

The thickness of sediments penetrated in boreholes can be found from the following table:

Borehole	Depth (ft) to surface of: Mesozoic	Permian	Pre-Permian
Betoota No.1 (Delhi-Frome-Santos, 1961a)	120	Not present	5757
Putamurdie No.1 (Delhi, 1963a)	240	Not present	6130
Pandieburra No.1 (Delhi, 1963b)	330	Not present	6970
Innamincka No.1 (Delhi-Frome-Santos, 1961b)	232	6723	7050
Dullingari No.1 (Delhi, 1962)	448	6707	9050
Orientos No.1 (Delhi, 1963b)	302	5964	7288
Naryilco No.1 (Delhi, 1963c)	120	Not present	4739
Gidgealpa No.1 (Delhi, 1964)	748	7690	8690
Purni No.1 (French Petroleum 1964a)	381	4650	5860
Witcherrie No.1 (French Petroleum 1964b)	50	1819	2150

The collars of these boreholes are less than 250 feet above sea level.

The magnetic basement rocks in the major part of the survey area are probably those of the Arunta Complex. The Archaean members of the complex are described as gneiss, schist, amphibolite, and quartzite, with intrusions of granite, pegmatite, and dolerite of probable Lower Proterozoic age. They have strong lineation which in the Harts Range is dominantly north-north-west and in the Musgrave Range is mainly east. Isolated outcrops are found on the edge of the desert in the northern part of the Hay River area (B.M.R., 1963). In the south-eastern part of the survey area the folded and partly metamorphosed Lower Palaeozoic or Proterozoic sediments, which were penetrated in the boreholes south-east of the area, may constitute magnetic basement.

3. INTERPRETATION

Three types of magnetic basement rock are recognised in the aeromagnetic maps (Plates 2-7). The first type, designated A, lies in the northern and eastern parts of the survey area and is characterised by intense elongated anomalies with a dominant north-north-west trend. The strong lineation of these magnetic rocks and their proximity to the northern edge of the basin suggest that they are a continuation of the Archaean and Lower Proterozoic rocks of the Arunta Complex which are exposed in the Harts Range.

The horizon which constitutes magnetic basement in the south-western part of the survey area is characterised by intense anomalies of circular form with some of easterly elongation. This horizon is designated B on the maps and correlated with the Archaean rocks of the Musgrave Range. The eastern arm of the outcropping basement rock in the Range is presumed to extend in an east-north-east direction below a thin cover of Mesozoic sediments and enter the western half of the survey area.

The south-eastern corner of the survey area contains a zone of low intensity and roughly circular anomalies that apparently arise from a metamorphic rock type of low magnetic contrast. It is tentatively ascribed to a partly metamorphosed rock of the Lower Palaeozoic/Proterozoic sequence, and is designated C in the map.

The depth estimates to the magnetic basement rocks were obtained from measurements of the horizontal extent of the uniform gradient of selected anomalies in the aeromagnetic map. These measurements were made on the original magnetometer-profile records, corrections being made for the obliquity of flight-line direction to the trend of the gradient indicated on the contour map. The horizontal extent was multiplied by a factor of 1.5 to give the depth. This factor is based on an empirical relation between the horizontal extent of the uniform gradient of an anomaly due to a vertically-sided two-dimensional prismatic body of magnetic material and the distance of the surface of the body below the level of observation. All depth estimates were referred to sea level.

The northern part of the survey area within the Illogwa Creek and Hay River areas is occupied by basement rock type A characterised by distinct magnetic lineation in a north-north-west direction. The depth contours show that the basement rock here is near surface level.

Southward from these areas the depth to basement rock progressively increases, but a prominent structural feature is a nosing of the basement contours commencing on the eastern margin of the Hale River area which is directed south-east across the Simpson Desert North area and enters the northern part of the Simpson Desert South area. The lineation of anomalies due to basement rock type A is distinct in this nose. The Bouguer anomaly map published by BMR (G69-417-3) shows a trend of high gravity values along this structure.

On the western side of the nose, the central and south-eastern parts of the Hale River area are occupied by a basement depression, within which the anomalies are of a more-circular form characteristic of basement type B. The western part of the Hale River area, however, is one of generally linear anomalies except in the extreme south.

The best example of anomalies characterising basement rock type B is to be found on the western part of the McDills area. Here the basement rock is shallowest along a north-east-striking ridge projecting from the western margin which corresponds with a dune-free lobe at the surface (Delhi, 1960). An embayment is formed on the eastern parts of the Hale River and McDills areas, and within it the anomalies appear to be enlarged versions of the anomalies due to type B basement, consistent with an increase in depth to basement rock. The boundary between rock type A and rock type B on the Hale River area is seen to correspond roughly with the margin of the embayment.

A smaller embayment lies east of the south-east trending nose in the Simpson Desert North area, but there is no evidence of change in rock type from the lineated type A bounding this embayment.

The southern part of the Simpson Desert South area contains an anomaly pattern that differs considerably from the linear pattern due to rock type A ascribed to the Arunta complex and the circular pattern of rock type B. The circular and elliptical anomalies due to rock type C are smaller in areal extent, more irregular in form, and less intense than anomalies due to rock type B at equivalent depths below sea level. For these reasons, the basement rock type C is ascribed to a separate geological horizon, probably a slightly metamorphosed sequence of the Lower Palaeozoic/Proterozoic, or interbedded volcanic rocks of that age.

The existence of moderately-magnetic rock types in the Lower Palaeozoic/Proterozoic has been confirmed by measurements of magnetic susceptibility on borehole samples south-east of the survey area (Plate 1). These samples were supplied by Delhi Australian Petroleum Ltd. The susceptibilities of samples taken from Ordovician (or, in one case, possible Proterozoic) formations ranged from 0.00005 to 0.0001 c.g.s. units which could account for observed aeromagnetic anomalies of the order of 10 to 20 gammas from sources buried at depths of the order of 10,000 ft below the surface in the south-east of the survey area.

The question remains as to the likely distribution of sediments within the survey area. As the table on page 2 shows, the Permian south-east of the survey area occupies depressions in the partly peneplaned surface of the pre-Permian. The Mesozoic lies conformably on the Permian where present, or unconformably on the pre-Permian. In the Witcherrie No.1 and Purni No.1 bores, however, an unconformity also occurs between Mesozoic and Permian.

The geological conditions in the south-east of the present survey area are considered to approximate those encountered in the Pandieburra No.1 and Putamurdie No.1 bores. The Mesozoic may attain a maximum thickness of about 6000 ft overlying Permian or directly upon the pre-Permian. The magnetic basement type C corresponds to a geological horizon within the Lower Palaeozoic. The presence of magnetic basement type C and the apparent absence of type A or B basement in this area would lead to the conclusion that a considerable stratigraphic section separates this horizon in the Lower Palaeozoic from the strongly magnetic older Precambrian at depth. If such is not the case, the underlying Precambrian must be non-magnetic.

The absence of basement type C in the northern and western parts of the survey area may be explained by the Lower Palaeozoic rocks being non-magnetic or alternatively the anomalies due to the moderately magnetic Lower Palaeozoic being masked by the strongly magnetic underlying Archaean. The masking would be more complete if the two magnetic horizons are not separated by any considerable vertical distance. The proximity of the two horizons may be partly confirmed by the fact that there is no obvious variation in depth to magnetic basement across the boundaries between zones of type A and C and between zones of type B and C.

To the south of the McDills area, the Witcherrie No.1 and Purnie No.1 bores struck pre-Permain rocks at 2150 and 5860 ft respectively after passing through several hundred feet of Permian. On the northern boundary of McDills area, shallow bores have been sunk on Andado Station. Complete logs of these bores are not available, but Casey (pers. comm.) advises that the logs of two bores, Malcolms and Birthday, show several hundred feet of Mesozoic sediments underlain (in Malcolms bore) by about 1000 ft of Permian to the total depth of 1844 ft. On the evidence of Witcherrie and Purnie bores, it is likely that the pre-Permian is represented in the south-western corner of the survey area, overlain by Mesozoic or Permian or both.

In the northern part of the survey area, the estimated depths to magnetic basement rock (ascribed to the Archaean) would allow only thin veneers of Mesozoic and Permian, or Mesozoic and pre-Permian.

4. CONCLUSIONS

Within the aeromagnetic survey area of the Simpson Desert, the structure interpreted from the magnetic data may be summarised as follows:

The northern part of the area lies on the margin of the sedimentary basin with basement rock overlain by a thin veneer of sediments. The basement rock is strongly lineated and closely resembles the character of Archaean/Lower Proterozoic outcrops in the Harts Range. A prominent nose of this basement rock projects from the central northern part of the survey area into the basin, the nosing being directed in a south-easterly direction.

The south-western and south-central parts of the survey area are occupied by a strongly magnetic basement rock with lineation resembling that of Archaean rock types in the Musgrave Range. The basement is shallow on the western margin but forms an embayment over most of the western and central parts of the survey area.

In the eastern part of the survey area another embayment is formed within lineated rock types of the Arunta Complex. In the south-eastern corner of the area, a magnetic horizon corresponding probably to a slightly metamorphosed sequence of the Lower Palaeozoic/ Proterozoic or interbedded volcanic rocks of that age constitutes basement.

The south-central and south-eastern parts of the survey area show indications of the basement progressively deepening along an east-north-east front.

In the northern and western parts of the survey area, Middle and Upper Palaeozoic and Mesozoic sediments comprising the non-magnetic sedimentary section lie directly on the strongly magnetic Precambrian basement rock, or upon a proximate magnetic horizon within the Lower Palaeozoic/Proterozoic whose magnetic effect is masked in the observed magnetic data. The relative distribution of Mesozoic and Palaeozoic sediments cannot be assessed from the magnetic map, but the Mesozoic section is presumed to thin considerably toward the edges of the basin.

In the south-eastern part of the area, Lower Palaeozoic or Proterozoic rocks comprising magnetic basement overlie the strongly magnetic Precambrian at great depth or a Precambrian formation of a non-magnetic character. The overlying non-magnetic sedimentary section consists of Middle and Upper Palaeozoic and Mesozoic sediments. The Mesozoic sediments might attain a maximum thickness in the south-east equal to that penetrated in neighbouring boreholes, viz. of the order of 6000 ft.

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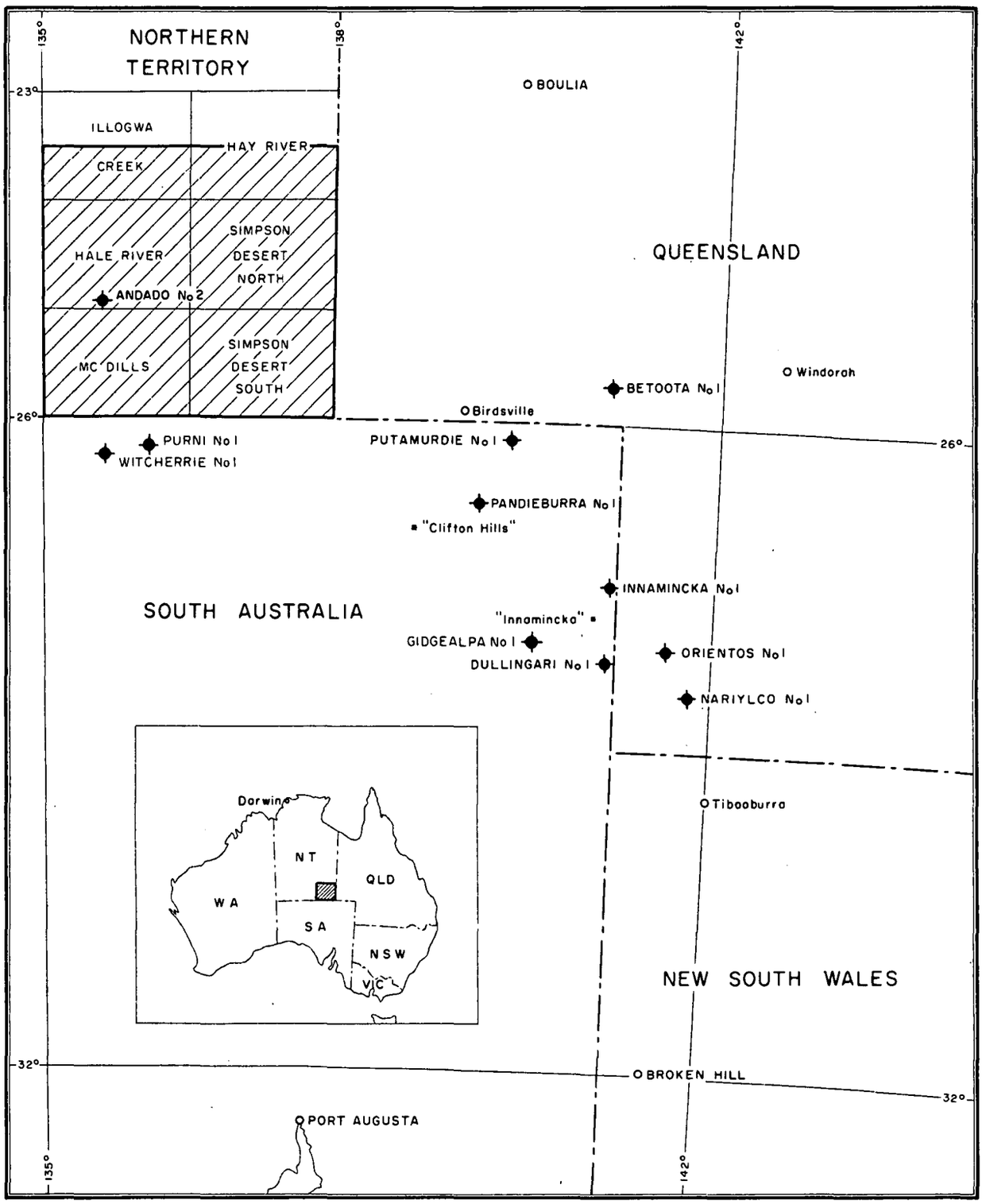
* Unpublished Report on Commonwealth-subsidised operation



SIMPSON DESERT AEROMAGNETIC SURVEY,
NT 1962

LOCALITY MAP

SCALE

100 50 0 100 200 MILES

Aeromagnetic Survey Area

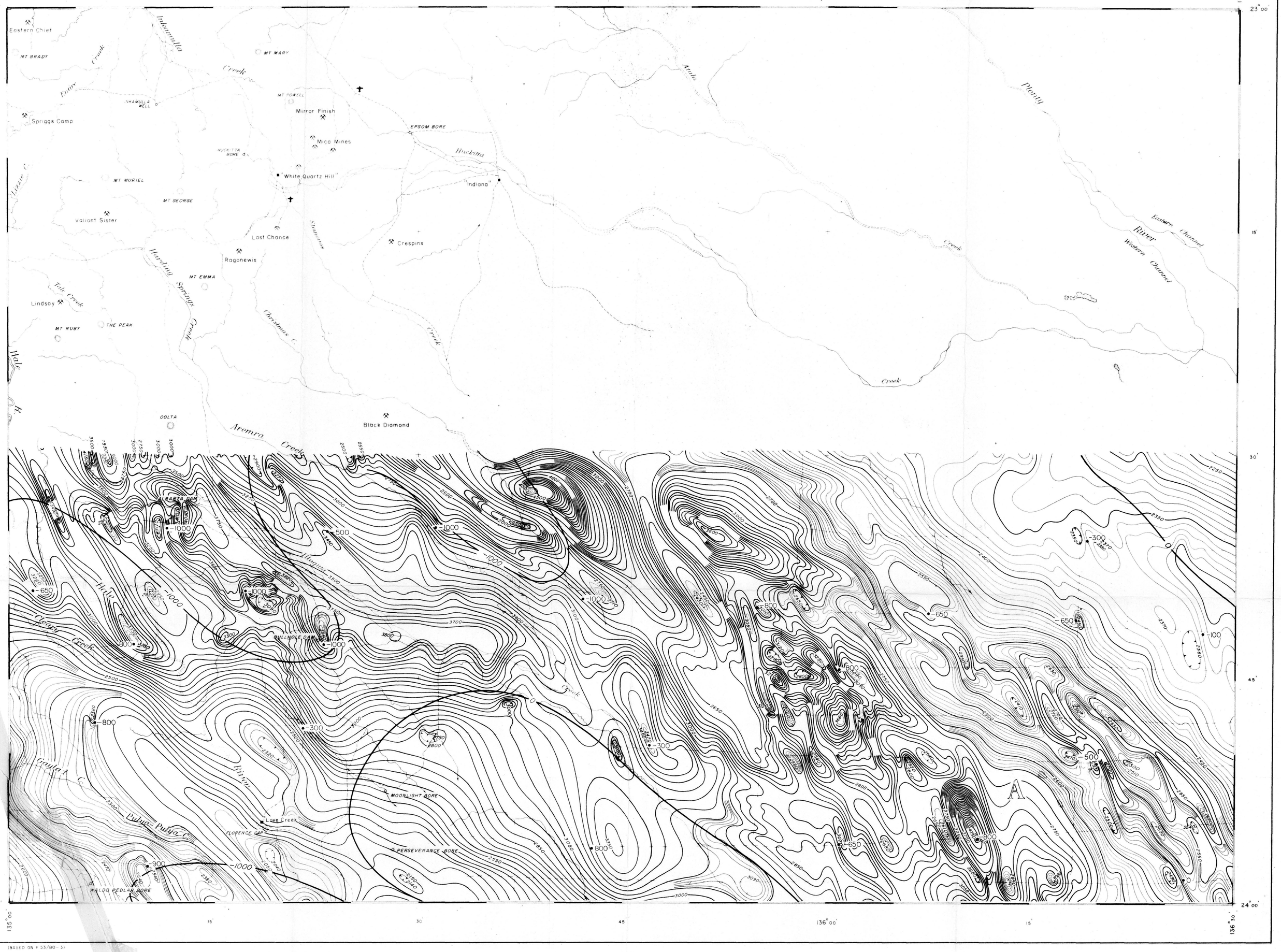
Borehole

TO ACCOMPANY RECORD NO 1964/115
Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. G53/BI-23

AUSTRALIA 1:250,000

ILLOGWA CREEK
NORTHERN TERRITORY

PLATE 2



(BASED ON F 53/80-3)

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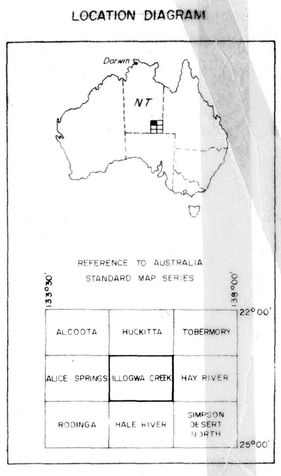


DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CONTOURS COMPILED AND DRAWN BY AERO SERVICE LTD.

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Division of National Mapping 1:250,000 series SF/53-15 provisional planimetric map of the same area*

FLIGHT-LINES:- *Error in position generally less than 100 yards*

NOTE:- *Area mainly covered by sand dunes bearing approximately 336° True North*

5°10'

M.N.
T.N.

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

AND

BASEMENT CONTOURS

INTERPRETED FROM MAGNETIC DATA

MILES 5 0 5 10 15 20 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

MAGNETIC BASEMENT CONTOUR INTERVAL 1000 FEET

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Road or track
- Homestead
- Aerodrome or Landing ground
- Mine
- Hill feature
- Saltpan or claypan
- Swamp

MAGNETIC DATA

- 2750 — Magnetic Contours
- Magnetic "Low"
- Contour / Flight-line intersections
- • 4000 — Basement Depth Estimate (in feet) Below Sea Level
- • -1000 — Basement Depth Estimate (in feet) Above Sea Level
- —7000— Basement Depth Contour
- Basement Zone Boundary
- A — Zone Symbol

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey of part of the Simpson Desert made in 1962 by Aero Service Limited, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the depth, structure, and composition of rocks to aid oil exploration and geological mapping.

The survey was made with a DC-3 aircraft at an altitude of 2000 feet above sea level along lines spaced five miles apart. The distance from aircraft to ground was measured with a continuously recording radio altimeter. Aerial photographs were used for navigation, and the track of the aircraft was recorded by a 35-mm camera.

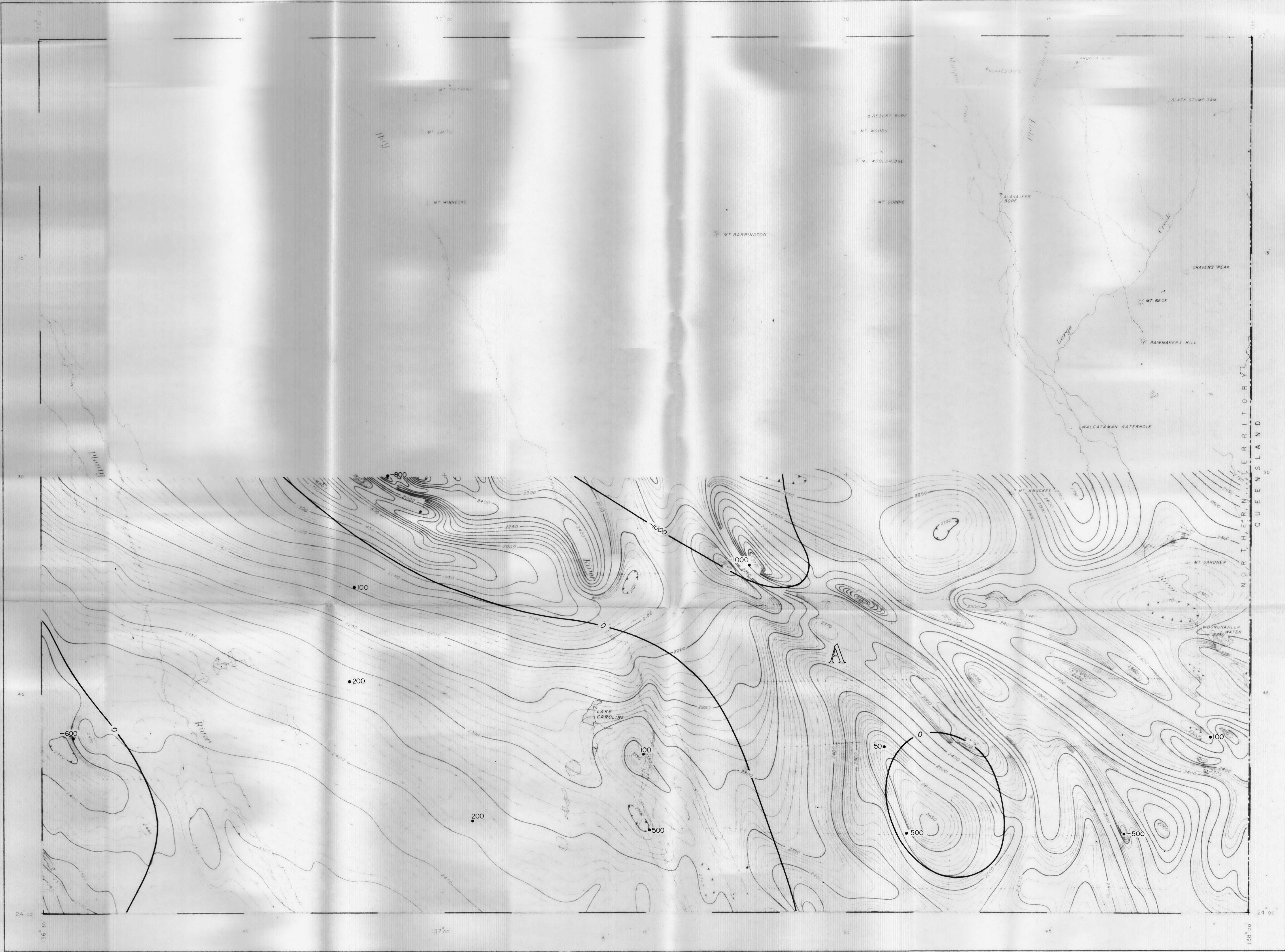
The total magnetic intensity was continuously recorded by an airborne magnetometer and has been corrected for a regional gradient in total magnetic field of 9.5 gammas per mile in a direction S.7°W.

TO ACCOMPANY RECORD No 1964/115 F53/BI-7-1A

AUSTRALIA 1:250,000

HAY RIVER
NORTHERN TERRITORY

PLATE 3



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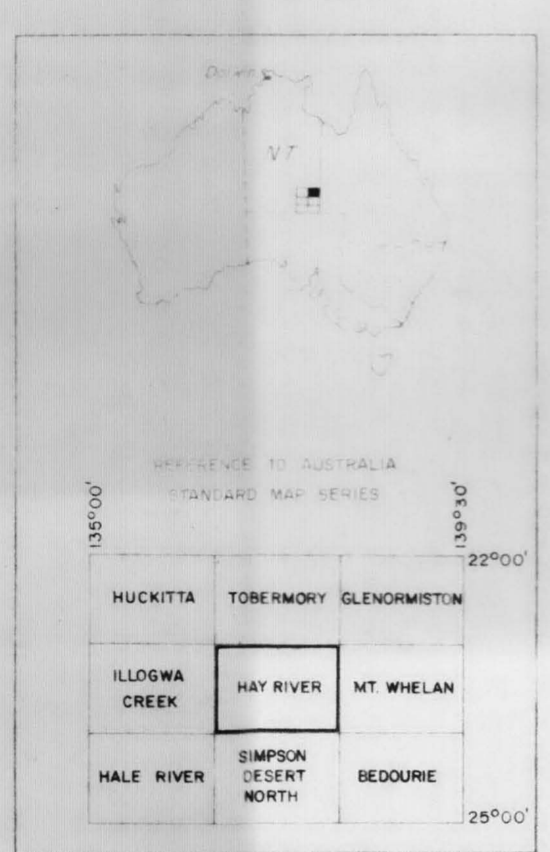
LOCATION DIAGRAM



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CONTOURS COMPILED AND DRAWN BY AERO SERVICE LTD.

MAP DATA

PROJECTION:- Transverse Mercator Australia Series

PLANIMETRY:- *After the Division of National Mapping planimetric compilation of the same area.*

FLIGHT-LINES:- Error in position generally less than 100 yards

NOTE:- Area mainly covered by sand dunes bearing approximately 335° True North

5°30'

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

AND

BASEMENT CONTOURS

INTERPRETED FROM MAGNETIC DATA

MILES 5 0 5 10 15 20 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

MAGNETIC BASEMENT CONTOUR INTERVAL 1000 FEET

LEGEND

TOPOGRAPHICAL DATA

River or creek

Road or track

Homestead

Aerodrome or Landing ground

Bore

Hill feature

Saltpan or claypan

Swamp

MAGNETIC DATA

2750 — Magnetic Contour

Magnetic Low

Contour / Flight-line intersections

• 4000 — *Basement Depth Estimate (in feet) Below Sea Level*

• -1000 — *Basement Depth Estimate (in feet) Above Sea Level*

— 7000 — *Basement Depth Contour*

— *Basement Zone Boundary*

A — *Zone Symbol*

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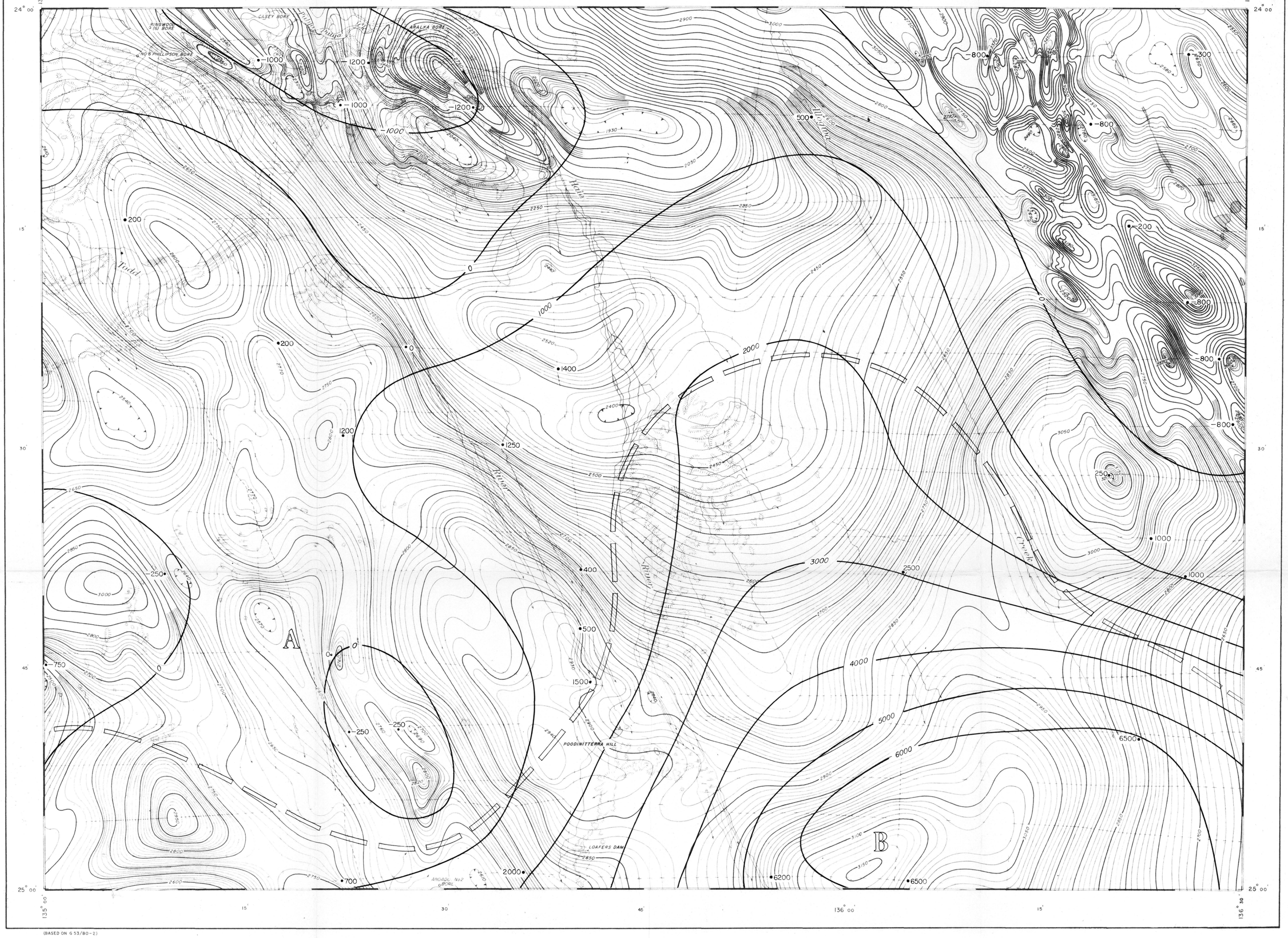
The total magnetic intensity was continuously recorded by an airborne magnetometer and has been corrected for a regional gradient in total magnetic field of 9.5 gammas per mile in a direction S 7°W.

TO ACCOMPANY RECORD No 1964/115 F53/B1-8-1A

AUSTRALIA 1:250,000

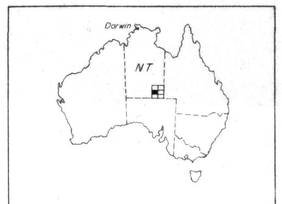
HALE RIVER
NORTHERN TERRITORY

PLATE 4



(BASED ON G 53/80-2)

LOCATION DIAGRAM



REFERENCE TO AUSTRALIA STANDARD MAP SERIES

ALICE SPRINGS	ILLOGWA CREEK	HAY RIVER
RODINGA	HALE RIVER	SIMPSON DESERT NORTH
FINKE	MC DILLS	SIMPSON DESERT SOUTH

135°30' 138°00' 23°00' 26°00'

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Division of National Mapping 1:250,000 series SG/53-3 provisional planimetric map of the same area*

FLIGHT-LINES:- *Error in position generally less than 100 yards*

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5°15'

M.N. T.N.

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

AND

BASEMENT CONTOURS

INTERPRETED FROM MAGNETIC DATA

MILES 5 4 3 2 1 0 5 10 15 20 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

MAGNETIC BASEMENT CONTOUR INTERVAL 1000 FEET

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Road or track
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- Swamp

MAGNETIC DATA

- 2750 — Magnetic Contours
- Magnetic "Low"
- Contour / Flight-line intersections
- •4000 — Basement Depth Estimate (in feet) Below Sea Level
- •-1000 — Basement Depth Estimate (in feet) Above Sea Level
- —7000— Basement Depth Contour
- Basement Zone Boundary
- A — Zone Symbol

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey of part of the Simpson Desert made in 1962 by Aero Service Limited, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the depth, structure, and composition of rocks to aid oil exploration and geological mapping.

The survey was made with a DC-3 aircraft at an altitude of 2000 feet above sea level along lines spaced five miles apart. The distance from aircraft to ground was measured with a continuously-recording radio altimeter. Aerial photographs were used for navigation, and the track of the aircraft was recorded by a 35-mm camera.

The total magnetic intensity was continuously recorded by an airborne magnetometer and has been corrected for a regional gradient in total magnetic field of 9.5 gammas per mile in a direction S. 7°W.

DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CONTOURS COMPILED AND DRAWN BY AERO SERVICE LTD.

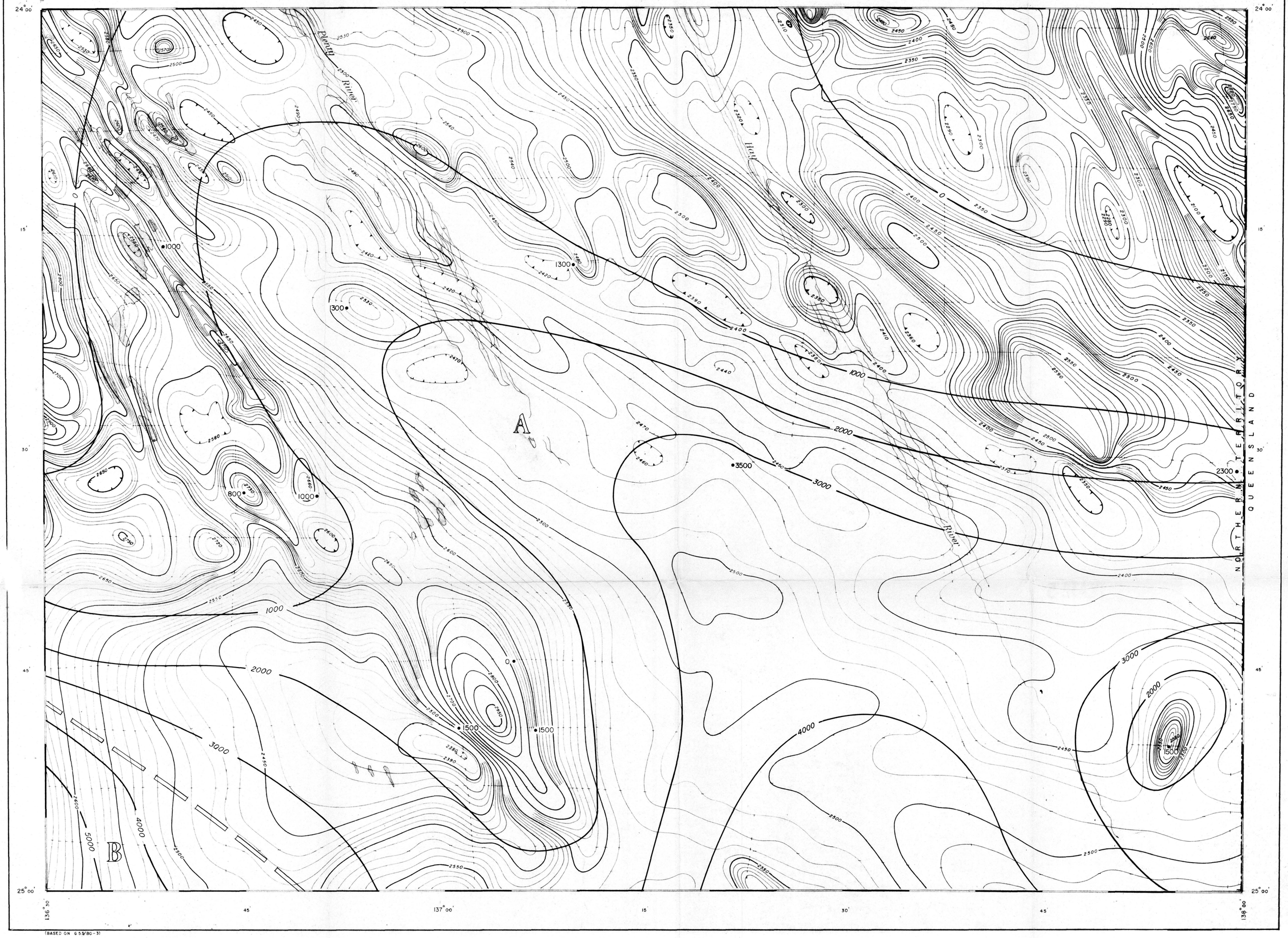
TO ACCOMPANY RECORD No 1964/115 G53/81-19-1A

AUSTRALIA 1:250,000

SIMPSON DESERT NORTH

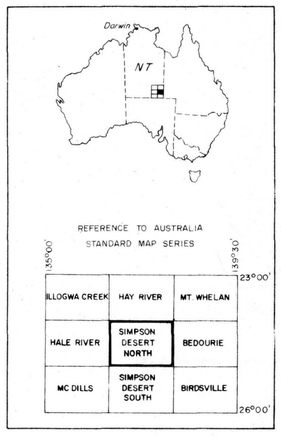
NORTHERN TERRITORY

PLATE 5



(BASED ON G 53/80-3)

LOCATION DIAGRAM



DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CONTOURS COMPILED AND DRAWN BY AERO SERVICE LTD.

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Division of National Mapping 1:250,000 series SG/53-4 provisional planimetric map of the same area*

FLIGHT-LINES:- *Error in position generally less than 100 yards*

NOTE:- *Area mainly covered by sand dunes bearing approximately 335° True North*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

AND

BASEMENT CONTOURS

INTERPRETED FROM MAGNETIC DATA

MILES 5 0 5 10 15 20 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

MAGNETIC BASEMENT CONTOUR INTERVAL 1000 FEET

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Road or track
- Homestead
- Aerodrome or Landing ground
- Mine
- Hill feature
- Saltpan or claypan
- Swamp

MAGNETIC DATA

- 2750 — Magnetic Contours
- Magnetic "Low"
- Contour / Flight-line intersections
- •4000 — Basement Depth Estimate (in feet) Below Sea Level
- •-1000 — Basement Depth Estimate (in feet) Above Sea Level
- 7000 — Basement Depth Contour
- Basement Zone Boundary
- A — Zone Symbol

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey of part of the Simpson Desert made in 1962 by Aero Service Limited, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the depth, structure, and composition of rocks to aid oil exploration and geological mapping.

The survey was made with a DC-3 aircraft at an altitude of 2000 feet above sea level along lines spaced five miles apart. The distance from aircraft to ground was measured with a continuously - recording radio altimeter. Aerial photographs were used for navigation, and the track of the aircraft was recorded by a 35-mm camera.

The total magnetic intensity was continuously recorded by an airborne magnetometer and has been corrected for a regional gradient in total magnetic field of 9.5 gammas per mile in a direction S.7°W.

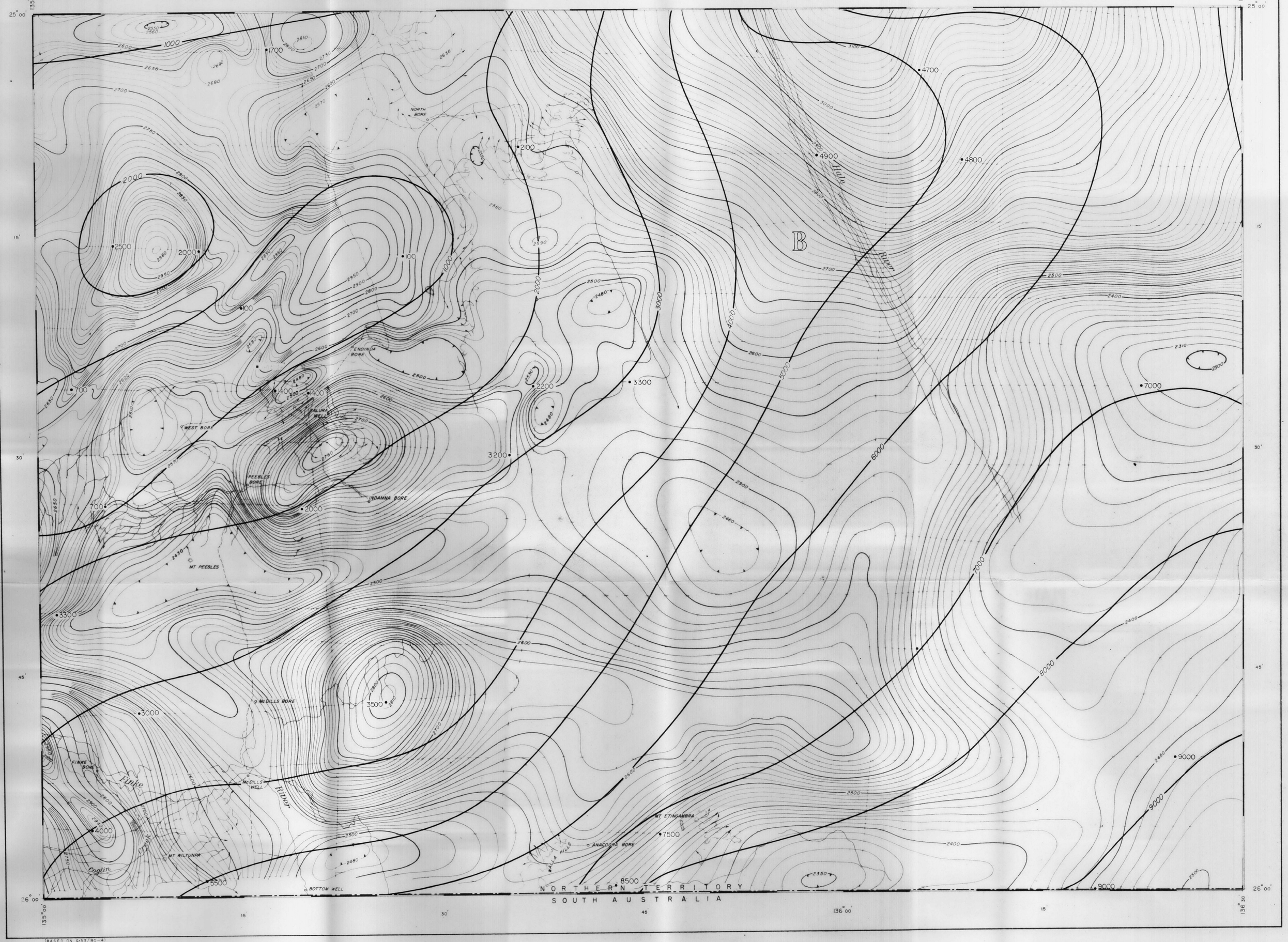
TO ACCOMPANY RECORD No 1964/115 G53 / BI-20-1A

AUSTRALIA 1:250,000

MC DILLS

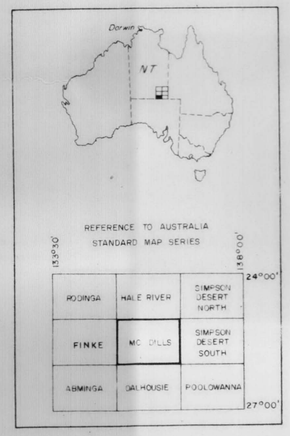
NORTHERN TERRITORY

PLATE 6



(BASED ON G-53/80-4)

LOCATION DIAGRAM



MAP DATA

PROJECTION:- Transverse Mercator Australia Series

PLANIMETRY:- After Division of National Mapping 1:250,000 series SG/53-7 provisional planimetric map of the same area

FLIGHT-LINES:- Error in position generally less than 100 yards

NOTE:- Area mainly covered by sand dunes bearing approximately 335° True North

5°15'

M.N. T.N.

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

AND

BASEMENT CONTOURS

INTERPRETED FROM MAGNETIC DATA

MILES 5 0 5 10 15 20 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

MAGNETIC BASEMENT CONTOUR INTERVAL 1000 FEET

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Road or track
- Homestead
- Aerodrome or Landing ground
- Mine
- Hill feature
- Saltpan or claypan
- Swamp

MAGNETIC DATA

- 2750 — Magnetic Contours
- Magnetic "Low"
- Contour/Flight-line intersections
- • 4000 — Basement Depth Estimate (in feet) Below Sea Level
- • -1000 — Basement Depth Estimate (in feet) Above Sea Level
- 7000 — Basement Depth Contour
- Basement Zone Boundary
- A — Zone Symbol

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey as part of the Simpson Desert made in 1962 by Aero Service Limited, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the depth, structure, and composition of rocks to aid oil exploration and geological mapping.

The survey was made with a DC-3 aircraft at an altitude of 2000 feet above sea level along lines spaced five miles apart. The distance from aircraft to ground was measured with a continuously - recording radio altimeter. Aerial photographs were used for navigation, and the track of the aircraft was recorded by a 35-mm camera.

The total magnetic intensity was continuously recorded by an airborne magnetometer and has been corrected for a regional gradient in total magnetic field of 9.5 gammas per mile in a direction S.7°W.

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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TO ACCOMPANY RECORD No 1964/ 5 G53/BI-21-1A

SIMPSON DESERT SOUTH

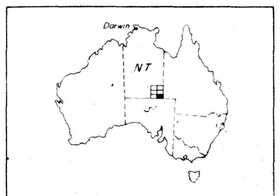
NORTHERN TERRITORY

AUSTRALIA 1:250,000

PLATE 7

(BASED ON G53/80-5)

LOCATION DIAGRAM



REFERENCE TO AUSTRALIA STANDARD MAP SERIES

135°00'		139°30'
HALE RIVER	SIMPSON DESERT NORTH	BEDOURIE 24°00'
MC DILLS	SIMPSON DESERT SOUTH	BIRDSVILLE
DALHOUSIE	POOLOWANNA	PANDIE PANDIE 27°00'

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

CONTOURS COMPILED AND DRAWN BY AERO SERVICE LTD.

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Division of National Mapping 1:250,000 series* **SG/53-8** *provisional planimetric map of the same area*

FLIGHT-LINES:- *Error in position generally less than 100 yards*

NOTE:- *Area mainly covered by sand dunes bearing approximately 335° True North*

5°45'

M.N. T.N.

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

AND

BASEMENT CONTOURS

INTERPRETED FROM MAGNETIC DATA

MILES 5 0 5 10 15 20 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

MAGNETIC BASEMENT CONTOUR INTERVAL 1000 FEET

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Road or track
- Homestead
- Aerodrome or Landing ground
- Mine
- Hill feature
- Saltpan or claypan
- Swamp

MAGNETIC DATA

- 2750 — Magnetic Contours
- Magnetic "Low"
- Contour/Flight-line intersections
- •4000 — Basement Depth Estimate (in feet) Below Sea Level
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EXPLANATORY NOTES

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TO ACCOMPANY RECORD No 1964/115 G53/BI-22-1