# DEPARTMENT OF NATIONAL RESOURCES

# BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS



RECORD 1977/52



## AN INTERPRETATION OF THE AIRBORNE MAGNETIC AND RADIOMETRIC SURVEY OF COOMPANA NULLARBOR, FOWLER, AND NUYTS (ONSHORE) 1:250 000 SHEET AREAS, S.A. 1972/3

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## SUMMARY

A regional airborne magnetic and radiometric survey of COOMPANA, NULLARBOR, FOWLER, and onshore NUYTS 1:250 000 map areas was made by BMR during the period November 1972 to February 1973.

Qualitative interpretation of the magnetic data consisted of delineating trends, and grouping the intensely anomalous data in west COOMPANA, east NULLARBOR, FOWLER, and NUYTS into broad areas. Intensely anomalous areas delineated in east NULLARBOR, FOWLER, and NUYTS correlate closely with gravity data and have been interpreted as older, denser, relatively high-susceptibility sections within the Gawler Block. Groups of intense negative anomalies in northwest COOMPANA have been interpreted as representing remanently magnetised rocks of possible Tertiary age, tentatively interpreted as being associated with the intra-basement source of a regional negative anomaly in the area.

Quantitative interpretation of the magnetic data involved producing depth to basement contours for east COOMPANA and west NULLARBOR. These revealed the Mallabie Depression as a basement trough linking the Officer Basin to the Continental Shelf. Interpretation of the magnetic data in conjunction with the gravity data suggests that the Gawler Craton may not extend west of the head of the Bight.

The radiometric data are of limited value because of the low count rates recorded. The data have been corrected for non-geological backgound and terrain clearance. The predominant sources of the few localised anomalies recorded have been interpreted from the corrected data. These localised anomalies correlate mainly with drainage features such as clay pans and salt lakes. A general increase in geological background from east to west across NULLARBOR, and to a lesser extend across north FOWLER, appears to be predominantly due to increasing thorium content in the Tertiary limestone of the Nullarbor Plain.

# 1. INTRODUCTION

During the period November 1972 to February 1973, BMR made an airborne magnetic and radiometric survey of the COOMPANA, NULLARBOR, FOWLER, and onshore portion of the NUYTS 1:250 000 areas* (Plate 1) at the request of the South Australian Department of Mines (SADM).

COOMPANA, NULLARBOR, FOWLER, and onshore NUYTS are situated on the extreme west coast of South Australia, and lie within the Mesozoic to Tertiary sediments of the Eucla Basin, and the metamorphic Gawler Block of Carpentarian to Adelaidean age (Plate 2). The Eucla Basin lies beneath the monotonously flat, featureless Nullarbor Plain, whereas extensive dunes of Molineaux Sand, extending southeast, overlie the Gawler Block to the east.

The objectives of the survey were to aid a program of systematic regional geological mapping being carried out by SADM, particularly because of the acute lack of outcrop caused by thin Tertiary cover throughout. The survey was expected also to determine the structure and limits of the Eucla Basin and the underlying intracratonic Mallabie Depression.

The survey, based at Ceduna, was flown in two sections. The onshore portion was covered by east-west flight lines spaced 1.5 km apart at 150 m above ground level, and the offshore section by north-south flight lines spaced 3.0 km apart at 150 m above sea level (Plate 1).

Total magnetic intensity data were measured using a BMR-developed prototype fluxgate magnetometer (MFS7). The radiometric data were measured using a four-channel differential gamma-ray spectrometer. All data were recorded both digitally and on analogue charts using a computer-based acquisition system developed at BMR (Downie, 1973). Doppler navigation was used throughout with periodic position fixing by vertical photography. The equipment systems are specified in Section 8.

*Throughout this Record, names of 1:250 000 Sheet areas are written in upper case.

## 2. GEOLOGY

The survey area lies within two major tectonic units, the Gawler Block and the Eucla Basin, the latter overlying the intracratonic Mallabie Depression near the head of the Great Australian Bight (Plate 2). The 1:250 000 map areas of COOMPANA and west NULLARBOR lie within the Eucla Basin/Mallabie Depression, whereas east NULLARBOR, FOWLER, and NUYTS extend onto the Gawler Block.

Because of the lack of outcrop the geology is generally inferred from scattered borehole and geophysical data. The following account of it is taken largely from Lowry, (1970) and from Thomson, (1970).

The Eucla Basin is filled with a thin layer of Mesozoic to Tertiary sediments covering about 200 000 $km^2$ in South and Western Australia, and is an extreme example of an epeirogenic basin (Lowry, 1970). It lies on the edge of a continent, shows virtually no folding or faulting, and has a very low ratio of maximum thickness to areal extent (0.4 cm per $km^2$) (Lowry, 1970).

The Gawler Block is the outcropping portion of a much more extensive Proterozoic craton, the subsurface extent of which is largely inferred but is thought to underly the entire survey area (Thompson, 1970). Seismic data from nuclear explosions at Emu Plains and Maralinga show that the Gawler Craton has a remarkably uniform thickness of 37 to 40 km (Doyle & Everingham, 1964). This compares with a maximum known depth of 1400 m of sediments in the Mallabie Depression and 300 m in the Eucla Basin and demonstrates the 'mild character' of these basins (Thompson, 1970).

### THE GAWLER BLOCK

The Gawler Block consists of gneissic and schistose rocks overlain by Pleistocene and Recent aeolian sands. The tectonic history of the Gawler Craton is complex and is only known in detail on the south and east Eyre Peninsula. It is generally accepted to have undergone three major tectonic phases: the Kimban Phase, the Charlestonian Phase, and the Wartakan Phase (Fig. 1). Each phase was preceded by sedimentation, terminated with generally acid igneous activity, and followed by a period of erosion. Sediments deposited on the Archean basement during Lower Proterozoic times (2000 m.y.) were subsequently deformed during the Kimban Phase in a period of intense regional metamorphism that produced complexly folded gneisses

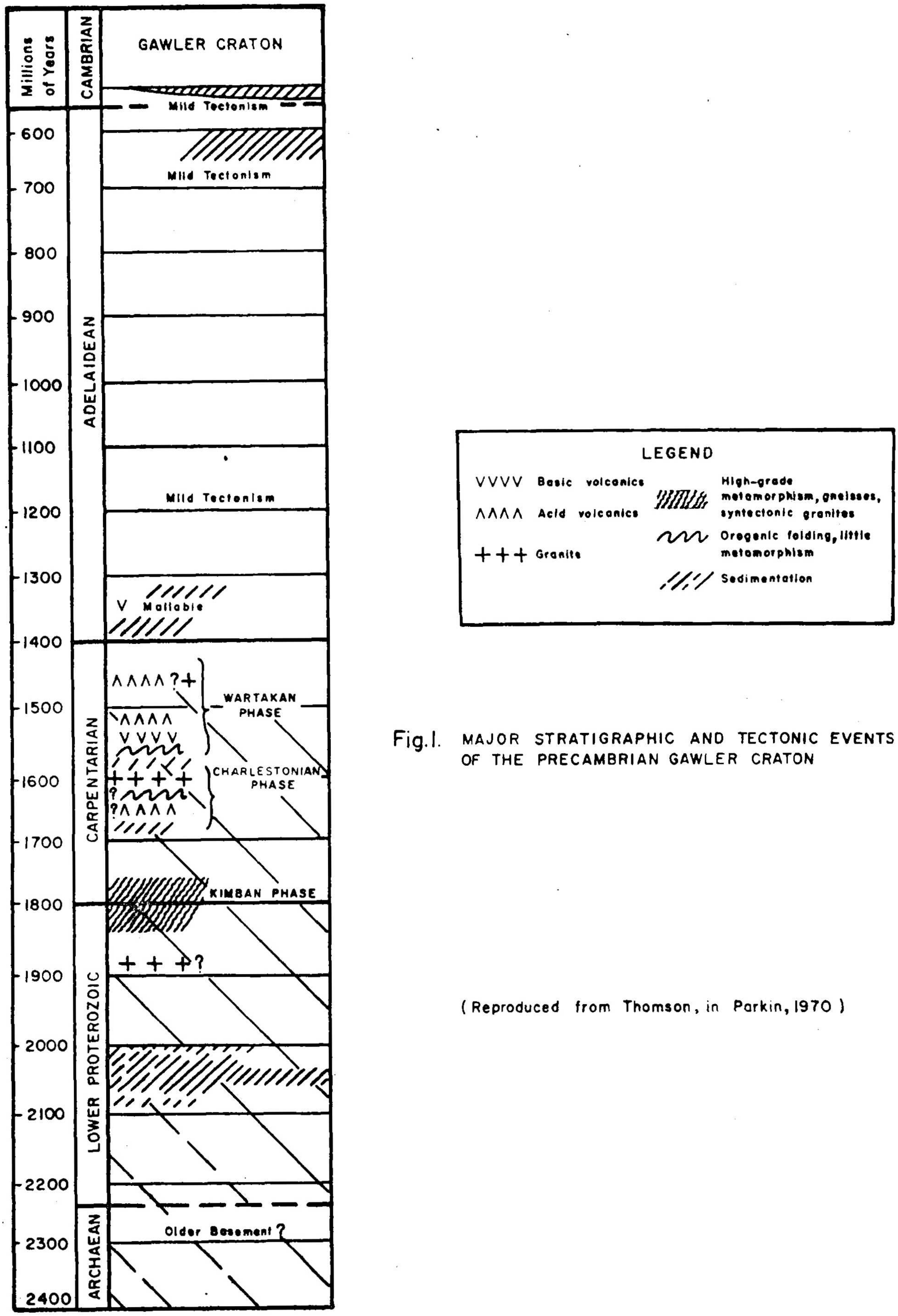



Fig. I. MAJOR STRATIGRAPHIC AND TECTONIC EVENTS OF THE PRECAMBRIAN GAWLER CRATON

(Reproduced from Thomson, in Parkin, 1970) and migmatites. Erosion and sedimentation followed by acid volcanism marked the beginning of the Charlestonian Phase of folding, metamorphism, and granite intrusion. Further erosion of the Gawler Block then occurred with sediments being deposited in intracratonic basins. The Wartaken Phase commenced with the folding of these sediments, and was followed by a period of intense volcanism. The Gawler Range Volcanics (Plate 2) which were extruded during this phase, cover a known area of about 31 000 $km^2$, although originally they possibly covered most of the area of the Block (Thomson, 1970). The porphyry intersected in the Albala Karoo, Guinewarra, and Nullarbor No. 8 bores (Plate 1) is correlated by Thomson with the Gawler Range Volcanics.

Granites outcropping in NUYTS and STREAKY BAY and originally assigned to the Lower Proterozoic/Early Carpentarian (Walker & Botham, 1969) have now been correlated with the Wartakan Phase based on K/Ar dating by Webb (1970).

## THE EUCLA BASIN

The Eucla Basin is a broad structure which probably evolved by subsidence of the Precambrian basement during the Mesozoic era. It is bounded by the Gawler Block to the east, the Yilgarn Block to the west, the Officer Basin to the north, and it extends to the edge of the continental shelf in the Great Australian Bight. Most of the basin is occupied by an arid limestone plateau that slopes gently seawards from about 240 m above sea leavel in the north, to 60-120 m above sea level in the south. Cliff sections show the sediments of the Eucla Basin to be consistently flat in an easterly direction, with dips of less than $1^{\circ}$.

Oldest sediments of the Eucla Basin are Lower Cretaceous sandstone and shale. These are overlain by the Tertiary sequence of Hampton Sandstone, Wilson Bluff limestone, Abrakurrie Limestone, and Nullarbor Limestone. The last three formations are exposed on the coast at Wilson Bluff near Eucla approximately 3 km west of the Survey area.

Near the head of the Bight and to the east, the Bridgewater Formation, an aeolian calcarenite of Pleistocene age, is exposed at and near the coast. Ripon calcrete, and calcrete of the Bakara Soil form hard sheets within and upon this limestone and the Nullarbor Limestone. Woorinen Formation is an aeolian calcareous silt-sand layer farther inland, and brown to orange inland dunes of quartz sand are Molineaux Sand. Semaphore Sand forms prominent coastal dunes of white shell sand to the east of the head of the Bight.

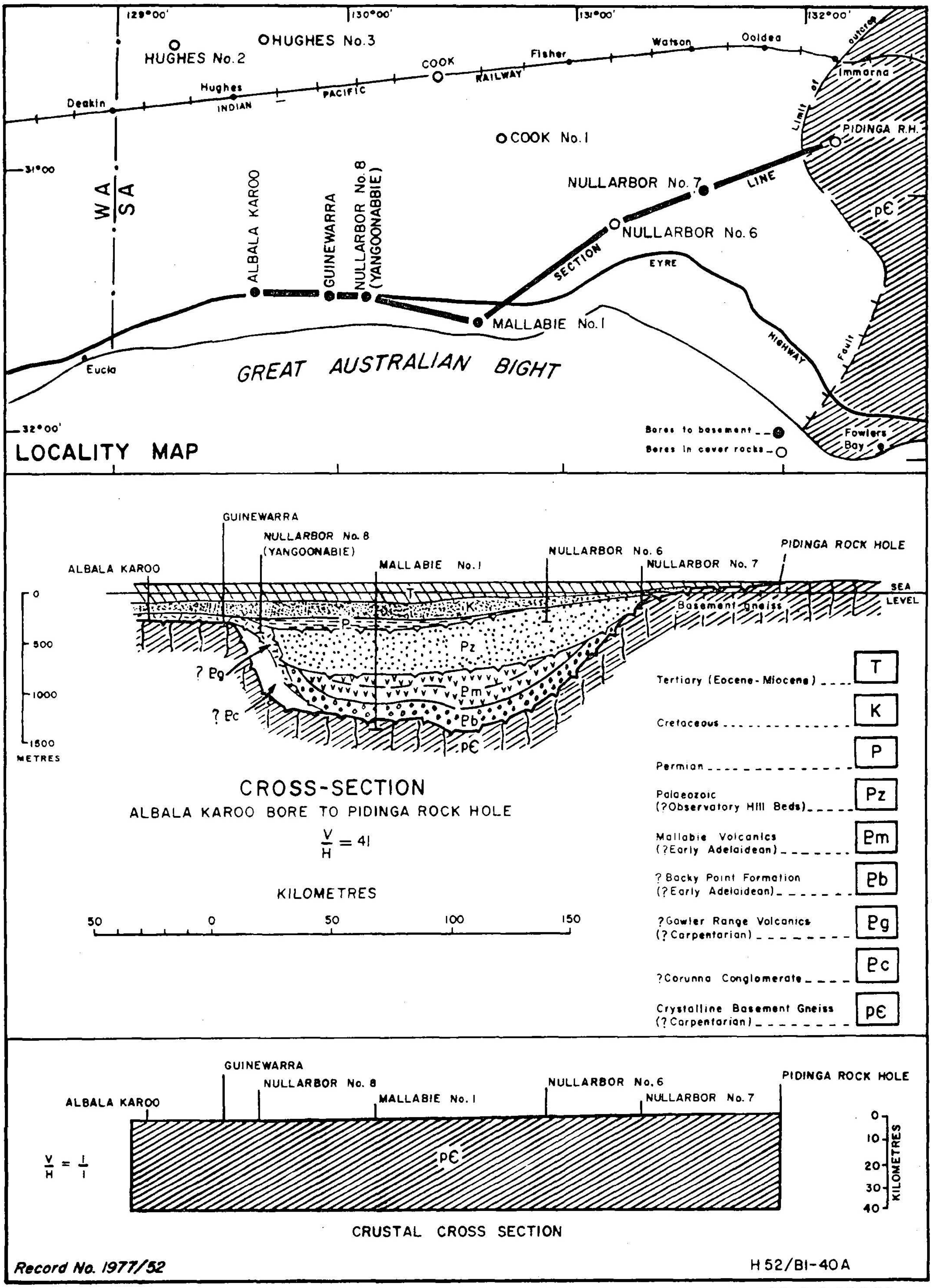
## THE MALLABIE DEPRESSION

The Mallabie Depression has been widely referred to as the 'Denman Basin' after Wopfner (1969) first introduced the name. However, the 'Denman Basin' has since become confused with the Denman Gravity Low and as these two features do not occur in the same place, the name Mallabie Depression has been used in this Record.

The Mallabie Depression lies in a basement trough to the west of the Gawler Block. This trough was first indicated by a seismic refraction survey (Kendall, 1965) and subsequently explored by the Mallabie No. 1 well (Plate 1) (Scott & Speer, 1969). This bore penetrated 188 m of Tertiary limestone, clay, and siltstone, 159 m of Cretaceous sediments, 88 m of Permian sandstone and siltstone, 905 m of Cambro-Ordovician sandstone, siltstone, and volcanics, and 34 m of a Proterozoic shale arkose sequence. A granitic gneiss basement was reached at 1300 m. The cross-section in Figure 2 has been adjusted to follow the shape of Kendall's high-speed refractor contours.

Recent isotopic analyses carried out by A.R. Webb for a joint SADM/Australian Mineral Development Laboratories geochronology project have indicated K/Ar radiometric ages of 1177 m.y. for hornblende and 1151 m.y. for biotite from basement gneiss at 1634 m in the Mallabie No 1. well. Unless these ages are due to heating, burial effects, or tectonic overprinting it would appear that:

i) Because of early Carpentarian basement ages (1800 m.y.) for the Gawler Block, the western boundary of the craton does not extend west of the Head of the Bight. The eastern boundary of the Mallabie Depression may coincide with the edge of the craton.




**CROSS-SECTION AND LOCALITY MAP OF MALLABIE DEPRESSION**

Fig. 2 (Reproduced from Thomson, in Parkin, 1970)

ii) Volcanics and the Proterozoic sediments found below the Phanerozoic sediments in the Mallabie No. 1 are younger than originally thought (Thomson, 1970).

ECONOMIC GEOLOGY

The area is generally of low economic potential. The Eucla Basin provides poor-quality artesian water and Nullarbor Limestone for railway ballast. Gypsum and Rock Salt are produced from the Macdonnel Salt Lakes near Penong. Exploration for petroleum has so far been unsuccessful but is being continued by Outback Oil Co. N.L.

## 3. PREVIOUS GEOPHYSICAL WORK

AEROMAGNETIC

Results of reconnaissance traverses flown over the Eucla Basin in 1954 indicated about 2000 m of sediments in COOMPANA and NULLARBOR, and a depth to basement of less than 300 m in FOWLER (Quilty & Goodeve, 1958). A traverse across the Bight indicated basement depths of 600 m and less.

The depth to magnetic basement within the Bight was further investigated in 1966 by Shell Development who flew north-south lines spaced approximately 10 km apart. While this line spacing is too wide to reliably contour data in southwest COOMPANA, south east NULLARBOR and offshore FOWLER, it does clearly delineate the offshore portion of the Mallabie Depression as a trough of sediments up to 1800 m thick extending south of Nullarbor homestead to approximately 31 30'. The depth to basement in southwest COOMPANA is interpreted as approximately 600m, while in south east NULLARBOR, and up to 50 km offshore in FOWLER it is less than 200 m.

Aeromagnetic coverage of COOK, OOLDEA, and BARTON (Waller, Quilty & Lambourn, 1972) was interpreted as delineating three basement depressions, each with a maximum depth to basement of about 2500 m. These were a trough striking north through OOLDEA possibly linking the Officer Basin and the Mallabie Depression, a trough striking north-west in east COOK, and a broad trough striking northwest through central COOK. This latter trough correlates closely with the 'Hughes Gravity Trough' (Pettifer & Fraser, 1974) Several intense negative anomalies trending north-northwest were recorded in west COOK.

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## GRAVITY

Gunson & Van Der Linden (1956) first conducted regional gravity traverses across the Eucla Basin along the Eyre Highway and Transcontinental Railway. They recorded generally low Bouguer anomaly values that they considered to be mainly an expression of density variations in the basement rocks.

Outback Oil (1965) surveyed an area in COOMPANA and NULLARBOR and their data were incorporated in a regional helicopter gravity survey (Pettifer & Fraser, 1974) (Plate 3). Preliminary Bouguer anomalies for these data show the Denman Gravity Low lying between an area of shallower basement in west COOMPANA correlated with the Coompana Gravity High, and a similar area in east NULLARBOR correlated with the Yalata Gravity high. The Denman Gravity Low does not correlate with the Mallabie Depression as suggested by Pettifer & Fraser (1974), although the latter has been referred to as the 'Denman Basin'. This has caused considerable confusion as to the location of the Mallabie Depression.

In east NULLARBOR the Christie Regional Gravity High extends offshore as the D'Entrescasteaux Gravity Ridge marking the west margin of the Gawler Block. These highs correlate with a generally intense, anomalous, magnetic region which Willcox (1974) suggests could be caused by a belt of dense ultrabasic rocks on the periphery of the Gawler Block. Onshore NUYTS and FOWLER are largely occupied by a broad gravity depression, the Wilgena Region Low. This is thought to be caused by a deep-seated mass deficiency arising from an anomalously low density in the upper mantle (Pettifer & Fraser, 1974). The Jellabina Gravity Ridge in the north of FOWLER has been interpreted as representing a belt of older gnessises within the basement by Pettifer & Fraser, while local low Bouguer anomalies are thought to correlate with near-surface, young, intruded granites of lower density than the surrounding material. Such granites have been mapped on the coast in NUYTS and STREAKY BAY (Walker & Botham, 1969).

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SEISMIC

In 1964, SADM carried out a reconnaissance seismic refraction survey (Kendall, 1965) to determine the general shape of the South Australian portion of the Eucla Basin. This survey first revealed the intracratonic Mallabie Depression by the presence of a high-speed refractor of 5.64 - 6.10 km/s. Kendall correlated this refractor with basement granite in the Albala Karoo and Guinewarra bores (Fig. 2). Depth estimates indicated a maximum of about 1800 m near Nullarbor homestead, and Kendall interpreted the Mallabie Depression as a northwest-trending trough plunging to the southeast.

Results from a regional marine seismic reflection survey (Tenneco, (1966) are in general agreement with the aeromagnetic results, but differ in detail. The offshore portion of the Mallabie Depression is shown as a trough extending south of the Head of the Bight to approximately 32o and containing up to 1200 m of sediments. Results from the BMR Continental Margin Survey confirm this general structure (Willcox, 1974). The interpreted basement for the Tenneco survey shows local uplift and faulting trending northwest, but overlying sediments show practically no faulting and little structure even in the deeper areas. Lowry (1970) notes that no definite evidence of faulting exists in the Western Australian part of the Eucla Basin. There are, however, numerous examples of beds wedging out against basement surface, while beds higher in the sequence pass across the contact undisturbed, showing that irregularities cannot have been caused by post-Cretaceous faulting.

Crustal studies have been made using refraction recordings of the nuclear explosions at Emu Plains, 1953, and at Maralinga, 1956/7 (Doyle & Everingham, 1964). Results from the Emu Plains explosions recorded at Tallaringa and Woomera indicated a granitic layer velocity of 6.3 km/s. In 1956, explosion recordings were made at sites extending south from Maralinga to Fowlers Bay and from there to Ceduna. Results showed that 6.3 km/s material was only 1-2 km below the surface. Local refraction surveys at recording sites indicated atP-wave velocity of 5.7-5.9 km/s at depths varying from 0 to 550 m. The increase from 5.8 km/s at shallow depths to 6.3 km/s at 1-2 km is thought to be caused by decreased porosity (Doyle & Everingham, 1964). P wave mantle velocities from the 1957 explosions indicated a value of 8.05 km/s beneath the Gawler Craton, which is significantly lower than 8.21 km/s recorded to the west of Maralinga. These different mantle wave velocities are thought to reflect differences in the upper mantle (Doyle & Everingham, 1964). Pettifer and Fraser (1974) consider these differences to be a 'deep seated mass deficiency' within the central Gawler Block, which would account for the regional Wilgera Gravity Low.

## 4. MAGNETIC INTERPRETATION

The magnetic data are shown in Plates 4 to 9. Plates 4 to 6 show total magnetic intensity contours at a scale of 1:250 000 superimposed upon the topography. Plates 7 to 9 show the total magnetic intensity in three-dimensional form presented from view points that best show the interpreted magnetic trends and particular interpreted anomalous areas.

The interpretation of the magnetic data is shown in Plate 10 at a scale of 1:500 000. This interpretation, with the exception of the depth to basement contours, is also shown superimposed upon the three-dimensional magnetic data in Plates 7 to 9. Qualitative interpretation involved delineating magnetic trends and faults, and grouping the data into broad regions of contrasting anomaly intensity. Such grouping is a useful aid to regional interpretation, especially where the intensely anomalous data precludes the discussion of individual anomalies.

The data in three-dimensional form have been found particularly useful for delineating magnetic trends. This is because trends along the direction of view are enhanced, while those extending at right angles to the line of view are suppressed, thus enabling minor, otherwise obscure trends to be delineated. To avoid emphasising any particular trend direction unduly, each area has been viewed from several different angles. Faults have been interpreted from the colinear terminations of magnetic trends or by abrupt changes in trend direction.

Quantitative interpretation involved the determination of depths to basement by several different methods. Two computer-based depth determination methods were used, viz, Spectral analysis of individual anomalies (Spector, 1968), and a method proposed by Nabighian (1972) that predicts the depths to corners of two-dimensional causative bodies of polygonal cross-section. Spectral analysis proved to be laborious and expensive for use on extended profiles, whereas a semi-automated approach based on Nabighian's method was fast, cheap, and widely applicable. The shape of the upper surface of two magnetic anomaly sources, C and G on Plate 10, have been interpreted by using this latter method of predicting the position and depth of corners of causative bodies. Totally manual methods were used to a minor extent and these included Peters Half-Slope method (Peters, 1949) and the method proposed by Koulomzine, Lamontagne, & Nadeau (1970).

Because of implicit assumptions made, the depth values calculated are generally maxima with associated errors of up to 20%. For this reason individual depth estimates are not shown but rather depth to magnetic basement contours which indicate general depths. There may be local areas that are either shallower or deeper than shown by the contours and this is particularly true in south and west COOMPANA.

The datum to which magnetic basement contours are referred is ground level onshore and sea level offshore. No discontinuity in the contours is observed at the coastline because the average ground elevation shore sea level (60 m) is small compared with the contour interval (500 m).

<u>COOMPANA</u>

The total magnetic intensity contours for COOMPANA (Plate 4) may be divided into two broad regions of relatively intense, short-wavelength anomalies in the west, becoming less intense and broader in the east. These two regions correspond to an increase in depth to basement from west to east. In central and west COOMPANA the basement is within 500 m of the surface, but dips northwards and, to a lesser extent, south. The interpreted basement contours outline a deep trough of sediments in the north of the Sheet area that narrows as it extends northwest into COOK (Waller et al., 1972).

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In COOMPANA there is poor agreement between the interpreted magnetic basement contours, and the gravity data. Generally, however, the shallow basement in central and west COOMPANANcorrelates with the Coompana Gravity High (Plate 3), although the Denman Gravity Low does not appear to be related to any trough within the magnetic basement.

The magnetic contours in the north are dominated by an intense, broad regional negative anomaly, which when interpreted indicates sources at three separate depths within the area. Depth estimates on filtered data show the regional negative has a intra-basement, reversely magnetised triangular source at a maximum depth of 9 km, outlined as Area C (Plate 7 & 10). If the upper surface of this interpreted source were domed, however, it would be considerably shallower. Further depth estimates indicate that' the basement forms a broad trough over this regional negative, and superimposed upon and to the south and west of this trough are groups of further negative anomalies delineated as Areas A1 through A5. Depth estimates on these latter anomalies indicate suprabasement sources of remanently magnetised magnetite-rich material within 200 m of the surface. A1 through A4 may represent plugs or pipes but A5 indicates a thin plate source of similar material, possibly a sill. Associated with these groups of negative anomalies are northwest and northeast negative trends (Plates 7 & 10) that extend north-north-west into COOK (Waller et al., 1973). These negative trends are interpreted as reversely magnetised dykes that have intruded faults or joints in the shallow basement. A common source for these interpreted igneous intrusive features seems likely and they may originate from the interpreted intra-basement source C.

Areas B,D,E and F (Plates 7 & 10) delineate areas of basement of higher-susceptibility than exist in the remainder of COOMPANA. Unlike the close correlation that exists in east NULLARBOR and FOWLER between such areas and the gravity data, no such gravity''highs' are associated with B or the group D,E, and F, although the weak, but extensive, Coompana Gravity High covers much of central and west COOMPANA (Plate 3). This contrast between the east and west of the Survey area suggests that a change in basement type may occur in NULLARBOR.

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Magnetic trends in central COOMPANA are numerous, vary greatly in length and direction, and indicate a contorted irregular basement structure. Interpreted basement contours in this area show a shallow broad ridge extending to the west and northeast. Discontinuities between the predominantly northeast magnetic trends on the east side of this basement ridge suggest three faults extending north-northeast and northwest (Plates 7 & 10).

In east COOMPANA depth estimates indicate a basement dipping from less than 500 m depth to approximately 1000 m, and then more gradually to the southeast. Magnetic trends become fewer but are still predominantly northeast in direction. A northeast-trending basement trough interpreted in the southeast corner of COOMPANA extends into NULLARBOR forming a pocket of thicker sediments within the Mallabie Depression. These thicker sediments form the deepest part of the Mallabie Depression offshore.

NULLARBOR

The magnetic data in NULLARBOR (Plate 5) shows a marked northeast -trending discontinuity between broad, low amplitude anomalies in the west contrasting with intense, short-wavelength anomalies in the east. This northeast-trending discontinuity marks the western boundary of the Gawler Block and its extension offshore.

Depth estimates in west NULLARBOR indicate a broad basement trough extending from the south, northeast into OOLDEA. Within this broad trough, areas of deeper basement have been interpreted in southwest and central NULLARBOR. In the southwest, a northeast-trending trough more than 1500 m' below sea level extends into NULLARBOR from southwest COOMPANA. A colinear termination of magnetic trends suggests that a rise in basement to the northeast of this trough may be fault-controlled.

In central NULLARBOR the depth to magnetic basement increases again reaching a maximum of 2500 m where a remanently magnetised source within the basement has been interpreted, as outlined by G (Plates 8 & 10). To the north the magnetic basement again rises before deepening in the extreme north. Depth to magnetic basement contours in OOLDEA (Waller et al., 1973) show this trough widening as it extends northwards into the Officer Basin.

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The depth to magnetic basement contours show the Mallabie Depression (Plates 2 & 10) as a broad northeast-trending trough, with pockets of thicker sediments, extending from south of 32$^{o}$, northwards into the Officer Basin. This does not correlate with the Denman Gravity Low shown extending from northeast from east COOMPANA into southwest OOLDEA (Pettifer & Fraser, 1974) (Plate 3). High-speed refractor contours interpreted by Kendall (1965) indicated a north-west-trending trough centred on Nullarbor homestead and plunging to the southeast. However the magnetic data for NULLARBOR suggests the deepest part of this sub-basin lies onshore approximately 20 kms north east of Nullarbor homestead. Offshore basement contours interpreted by Outback Oil N.L. and Shell Development (1966) show good agreement with the present work along the eastern boundary of the Mallabie Depression, but are in poor agreement elsewhere. The pockets of thicker sediments outlined from the present data in southeast COOMPANA/southwest NULLARBOR do not appear in the interpretation of Outback Oil N.L. and Shell Development. However, the near-basement horizon interpreted from marine seismic reflection data recorded by Tenneco (1967) shows a northeast-trending trough with a deeper section, in close agreement with the present work.

Areas H,I, and J in east NULLARBOR outline regions of basement of relatively high susceptibility. Areas in between represent basement less rich in magnetite content, possibly of younger granites, as have been mapped in NUYTS (Walker & Botham, 1969).

Areas H and I correlate with the Yalata Gravity High (Plate 3) while Area J correlates with a smaller gravity high. Model studies on the Yalata Gravity High indicate a block of thickness 4.0 km within the basement, assuming a density contrast of 0.3 gm/cm$^3$ (Fraser, pers. comm.). Depth estimates on magnetic anomalies within Areas H and I and to the immediate west indicate a maximum increase of 2000 m in depth to magnetic basement from east to west. Assuming a density contrast of 0.5 gm/cm$^3$, this thickness of sediments is insufficient to account for the approximately 3 mgal/km gradient recorded across the Yalata Gravity High (Fraser, pers. comm.). This gravity feature probably indicates a belt of more dense magnetite-rich rock within the Craton marking the boundary of the Gawler Block, possibly ultrabasic as suggested by Pettifer & Fraser (1974). It may also reflect a major change in basement type coincident with the west boundary of Areas H, I and J, possibly delineating the western limit of the Gawler Craton.

This latter possiblility is supported by an abrupt change in magnetic trend direction from northeast to northwest in central NULLARBOR coincident with the discontinuity. The more extensive of these trends reflect basement structure trending at right angles to that farther east, whereas the adjacent minor trends of similar direction are attributed to intrusives occupying sedimentary joint structure.

A similar northeast-trending discontinuity, delineated by the Fraser Fault, occurs in Western Australia between the Yilgarn Block and the Albany-Fraser Mobile Belt. Intense magnetic anomalies recorded in southeast NORSEMAN suggest the Fraser Fault may be associated with a high-susceptibility belt of northeast-trending rocks. Gravity data for this area also shows an intense northeast-trending belt of highs. The similarity between the magnetic and gravity data of the east boundary of the Yilgarn Block and the west boundary of the Gawler Block suggests that the Albany-Fraser Mobile Belt may possibly underly the entire Eucla Basin as far east as the Head of the Bight. Recent K/A basement age determinations from Mallabie No. 1 bore hole (Webb 1970) also suggest the Gawler Craton may not extend west of the Head of the Bight.

FOWLER and onshore NUYTS

The magnetic data (Plate 6) have been divided into broad regions of contrasting intensity. This grouping of data is more definite in west FOWLER where the contrast is greatest. These broad regions represent areas of relatively high magnetite content and therefore high-susceptibility basement. There is remarkably close correlation between gravity 'highs' (Plate 3) and these areas of intensely anomalous magnetic relief.

In west FOWLER, Area I and west Area K (Plates 9 & 10) correlate with the northeast extension of the Yalata Gravity High. Minor gravity troughs within the Yalata High correlate with the less intense magnetic relief to the northwest of Area I and between Areas I and K. Pettifer and Fraser (1974) correlate the gravity 'highs' within the 'Christie Regional Gravity High (Plate 3) with older more dense gneissic rocks, and Willcox (1974) interprets the D'Entrecasteaux Regional Gravity Ridge as a belt of' dense ultrabasic rocks marking the boundary of the Gawler Block. The basement in east NULLARBOR and west FOWLER certainly has a higher magnetite content than that in east FOWLER. As suggested by Wilcox (1974) this probably represents a partly assimilated belt of older ultrabasic rocks, and its west boundary may mark a major discontinuity in basement type. A more acidic, younger basement is interpreted for intermediate areas between I and K and in northwest I. Strong magnetic trends extending northeast in west FOWLER may indicate contact metamorphism between the interpreted older and younger basements as these trends are confined to 'contact areas' and do not appear in east NULLARBOR. The area between I and K correlates with the Pintumba Fault (Tectonic Map of Australia and New Guinea, 1971), and the younger acidic basement interpreted for this area may have intruded a major fault in the older basement. Discontinuities between magnetic trends in west FOWLER indicate a secondary northwest-trending fault system.

The contrast in anomaly intensity between interpreted areas of older and younger basement is much less in central and east FOWLER and onshore NUYTS. This suggests a greater degree of assimilation of the older basement with only isolated pockets remaining, such as that interpreted for the intense anomaly in central-east FOWLER.

Younger basement interpreted in intermediate magnetically quiet areas in central northeast, southeast and south FOWLER correlate closely with gravity 'lows' within the Wilgena Regional Gravity Low (Plate 3). Areas of interpreted older more basic basement in onshore NUYTS and central and east FOWLER correlate with local gravity 'highs', and that part of Area K in north FOWLER correlates with the Jellabina Gravity Ridge.

Magnetic trends in north Area K vary in direction from northeast to east but become less extensive and more variable in direction to the south. Assimilation of an older basic basement appears most complete in south FOWLER where the relatively low intensity anomalies and lack of trends indicate a generally more acidic basement. Such areas are probably associated with the granites outcropping in coastal NUYTS and STREAKY BAY (Walker and Botham, 1969). Several arcuate trends on the periphery of magnetically quiet areas may indicate contact metamorphism between an older ultrabasic basement and younger intrusive granites.

## 5. RADIOMETRIC INTERPRETATION

The radiometric data are shown in Plates 11 to 13. These plates show processed Channel 1 data in stacked profile form at a scale of 1:250 000. The data were measured using a 4-channel gamma-ray spectrometer with 3520 cc of sodium iodide crystal detector. The four channels were set as follows:

| Channel | energy in MeV | Common name |
|---|---|---|
| 1 | 0.84 - 3.00 | 'total count' |
| 2 | 1.30 - 1.60 | 'potassium' |
| 3 | 1.60 - 1.90 | 'uranium' |
| 4 | 2.40 - 2.80 | 'thorium' |

The background count rates of non-geological origin were first subtracted from the raw data. These backgrounds were measured at 600 m above ground level at the start and end of each survey flight. The data were then exponentially height corrected using an attenuation coefficient of 0.006560 counts/s/m (Darnley, Bristow, & Donhoffer, 1968). An upper limit of 250 m terrain clearance was set for height correction; data recorded at ground clearances greater than this were deleted. Finally a 15 coefficient Hanning bandpass filter (Fraser, Fuller, & Ward, 1966) from 0.0 to 0.2 c/s was used to smooth the data. The profiles show data sampled at 10-s intervals.

The stacked profile data for Channels 2, 3, and 4 are not shown because of the uniformly low count rates recorded, and because of the lack of information additional to that contained in the Channel 1 Total-count data.

No strict mathematical definition has been used in selection of localised anomalies for discussion, and interpretation of predominant source component. Instead, anomalies have been selected where the Channel 1 peak count rates are greater than 150% of mean geological background (Fig. 3). Such anomalies have been labeled on the stacked profile data, and beneath each label is the chemical symbol of the radio element primarily responsible for the anomaly. These source components have been determined by using approximate stripping ratios (Horsfall & Wilkes, 1975) as follows:

$a = 1.10$, $b = 0.75$, $c = 0.70$, $d = 0.04$

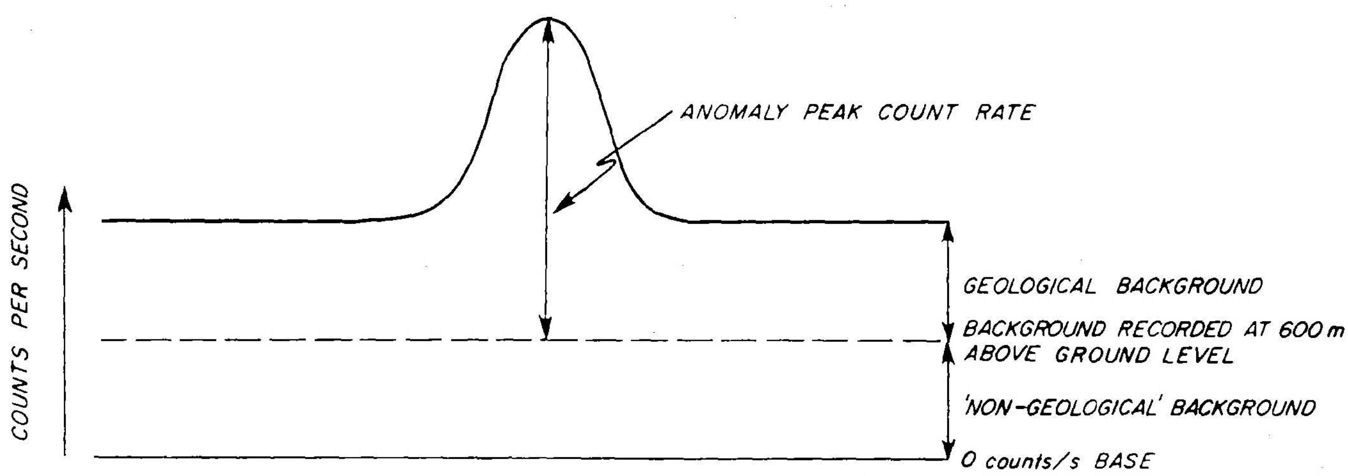


Fig. 3 DIAGRAM DEFINING RADIOMETRIC BACKGROUND LEVELS AND ANOMALY PEAK COUNT RATE.

where the count rates in each channel can be expressed as follows:

$$ch\ 2 = K2 + aU3 + bTh4$$
$$ch\ 3 = U3 + cTh4$$
$$ch\ 4 = Th4 + dU3$$

ch22, ch 3, and ch 4 are the count rates in channels 2, 3, and 4 after removal of non-geological background (Fig. 3) and after height correction to the standard terrain clearance (in this survey 150 m). K2, U3, and Th4 are the component count rates from the source elements potassium, uranium and thorium respectively.

COOMPANA

The Channel 1 data are shown in Plate 11. The mean Channel 1 geological background is approximately 50 counts/second and there are no anomalies, localised or otherwise, with peak count rates greater than twice this number.

The few anomalies, A through D (Plate 11), with peak count rates greater than 150% of geological background correlate with small drainage depressions in the limestone plateau. These depressions are mainly confined to the coastal strip of the Nullarbor Plain because of the higher average rainfall.

The mean geological background count rates for channels 2, 3, and 4 are 15 counts/s, 2 counts/s, and 2 counts/s, respectively.

NULLARBOR

The Channel 1 data are shown in Plate 12. The mean Channel 1 geological background increases from approximately 25 to 50 counts/s from east to west. A similar increase occurs in channels 2,3, and 4 of approximately 10 to 15 counts/s, 1 to 2 counts/s, and 1 to 2 counts/s, respectively. This general increase is mainly due to an increase in thorium which is associated with the limestone of the Nullarbor Plain. Immediately to the north of the Head of the Bight this increase is quite marked as shown in Plate 12. This abrupt increase occurs where the sand dunes overlying the Gawler Block give way to the flat, featureless Nullarbor Plain. In north NULLARBOR the increase in background is more gradual, increasing linearly from east to west. The boundary between the Gawler Block and the Nullarbor Plain is correspondingly less definite. A similar increase in geological background was recorded in BARTON and OOLDEA. (Waller et al., 1972).

As in COOMPANA, the more anomalous data in NULLARBOR occurs nearer the coast. Anomalies A and B (Plate 12) are associated with drainage depressions but C is apparently directly related to the exposed limestone cliff face. Anomaly D was recorded just offshore; the cause of the anomaly is not known. It is unlikely to be due to instrument malfunction as it was recorded in channels 1, 2, and 3. However, height correction has added to anomaly amplitude. No other such anomalies were recorded during the offshore flying. Anomalies E and F correlate with large coastal sand dunes and are mainly due to uranium. Anomaly G, predominantly due to uranium, occurs over Yalata Mission where a large area of vegetation has been cleared.

## FOWLER AND NUYTS

The Channel 1 data are shown in Plate 13. In south FOWLER and NUYTS the mean geological background count rates in channels 1, 2, 3, and 4 are 25 counts/s, 10 counts/s, 1 count/s, and 1 count/s. In central and north FOWLER there is a slight increase in these count rates from east to west of 15 to 25 counts/s, 5 to 10 counts/s, and from less than 1 count/s to approximately 1 count/s for channels 3 and 4. The area of lowest background in northeast FOWLER is covered by extensive northwest-trending dunes of Molineaux Sand.

Anomaly A (Plate 13) was the most intense recorded during the survey and is predominantly due to uranium. The channel 3 peak count rate is approximately 4 times greater than geological background. This anomaly occurs over Lake Tallacootra, and is highly localised as the anomaly only appears on 3 of the 5 flight lines that cross the lake.

Anomalies B and C correlate with drainage areas and are mainly due to potassium, in contrast to other 'drainage' anomalies such as D and E which are due mainly to uranium. Anomaly D occurs over the Chundie' Swamps. Anomalies G and H are associated with granite outcrops at Point Sinclair and at Point James, respectively. These anomalies are predominantly due to potassium.

No radiometric anomalies are associated with the Macdonnel Salt Lakes in southeast FOWLER, in contrast to the radiometric response of salt lakes in the north, and in BARTON (Waller et al., 1972).

## 6. CONCLUSIONS

The magnetic data have outlined the Mallabie Depression as a basement trough linking the Officer Basin to the Continental Shelf. Depth estimates indicate that the deepest part of this infrabasin occurs onshore rather than in the Bight. The Mallabie Depression has been widely referred to as the Denman Basin but this should not be confused with the Denman Gravity Low, as these two features do not occur in the same place. For this reason the original name, Mallabie Depression, should be used in the future.

The magnetic data show a major discontinuity trending northeast in east NULLARBOR that may possibly mark the western limit of the Gawler Craton. Predominantly northwest magnetic trends abut this discontinuity from the west, indicating a change in basement structure. The difference in intensity of the magnetic data and gravity data recorded across this discontinuity suggests there is also an associated change in basement lithology. The Bouguer anomaly 'highs' cannot be accounted for by an increase in depth to basement and represent a belt of more dense, relatively high-susceptibility rock on the periphery of the Gawler Block.

Several intense negative anomalies recorded in northwest COOMPANA have been interpreted as volcanic features. However, recent volcanic activity is unknown in this area.

The correlation between gravity and magnetic data in east NULLARBOR and FOWLER indicates that rocks just beneathtthe shallow Tertiary cover extend to great depth (about 5 km). Mapping and dating of outcrop or shallow cores will therefore apply to deeper sections of the Gawler Block and should be of value in further determining the tectonic history. Mapping is also required to investigate the interpreted acidic granitic basement and associated peripheral areas of possible contact metamorphism in FOWLER and onshore NUYTS.

The radiometric data are of uniformly low count rate with few significant anomalies. The general increase in geological background count rates, in all channels, from east to west is predominantly due to thorium content in the Tertiary limestone of the Nullarbor Plain. Radiometric count rates over the dune-covered granites and gneisses of the Gawler Block were the lowest recorded.

Most of the significant anomalies recorded correlate with drainage features, although the radiometric response over extensive drainage areas such as Lake Tallacootra is highly localised and unpredictable. A similar effect was noted with the numerous salt lakes in northeast BARTON (Waller et al., 1972). Drainage appears to be the means of leaching and concentrating the radioactive elements, although it is unclear why drainage features within a region do not have a more uniform radiometric response.

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## 8.OPERATIONAL DETAILS

### Staff

| | |
|---|---|
| S.S. Lambourn | Party Leader |
| D.N. Downie | Geophysicist (part-time) |
| P.G. Wilkes | Geophysicist (part-time) |
| J.E. Olsen | Geophysicist (part-time) |
| R. Curtis-Nuthall | Technical Officer |
| K.A. Mort | Technical Assistant |
| R. Enders | Technical Assistant (part-time) |
| I.G. Haigh | First Officer) |
| R.P. Mansfield | First Officer) TAA pilots |

### Equipment

| | |
|---|---|
| Aircraft: | DH6 Twin Otter VH-BMG |
| Data acquisition system: | Hewlett Packard 2114B 8K computer linked of Kennedy 1600 incremental tape recorder. BMR software. |
| Magnetometers: | Airborne - BMR prototype MFS7 Fluxgate magnetometer with ASQ-10 tail boom installation. (Recorded at 1-s intervals) Ground - BMR MNS2 proton precession magnetometer (Recorded at 30-s intervals) |
| Gamma-ray Spectrometer: | Hamner Harshaw 4-channel system, stabilization by Cs 137 source, NaI (Tl) detector crystal volume 220 in3. (Recorded at 1-s intervals) |
| Timer unit: | BMR prototype NZA1 (includes doppler and altimeter digital scalars and camera control). |

| | |
|---|---|
| Doppler Navigation system: | Marconi AD560 (Recorded at 10-s intervals) |
| Radar Altimeter: | Bonzer TRN-70 (Recorded at 1-s intervals) |
| Tracking camera: | BMR modified Vinten 35 mm strip camera. |
| Analogue Recorders: | Mosely 7100 2-channel 10-inch chart recorder monitoring the airborne magnetometer (250 gammas/inch, 500 gammas/inch) Esterline Angus recorder monitoring the ground magnetometer. (100 gammas FSD). Two Speedomax 3-channel 5-inch recorders monitoring the gamma-ray spectrometer and altimeter.<br>Channel 1 ("Total") 1000 cps FSD<br>Channel 2 ("Potassium") 250 cps FSD<br>Channel 3 ("Uranium") 100 cps FSD<br>Channel 4 ("Thorium") 100 cps FSD<br>Altimeter 500 m FSD |

Survey Specification

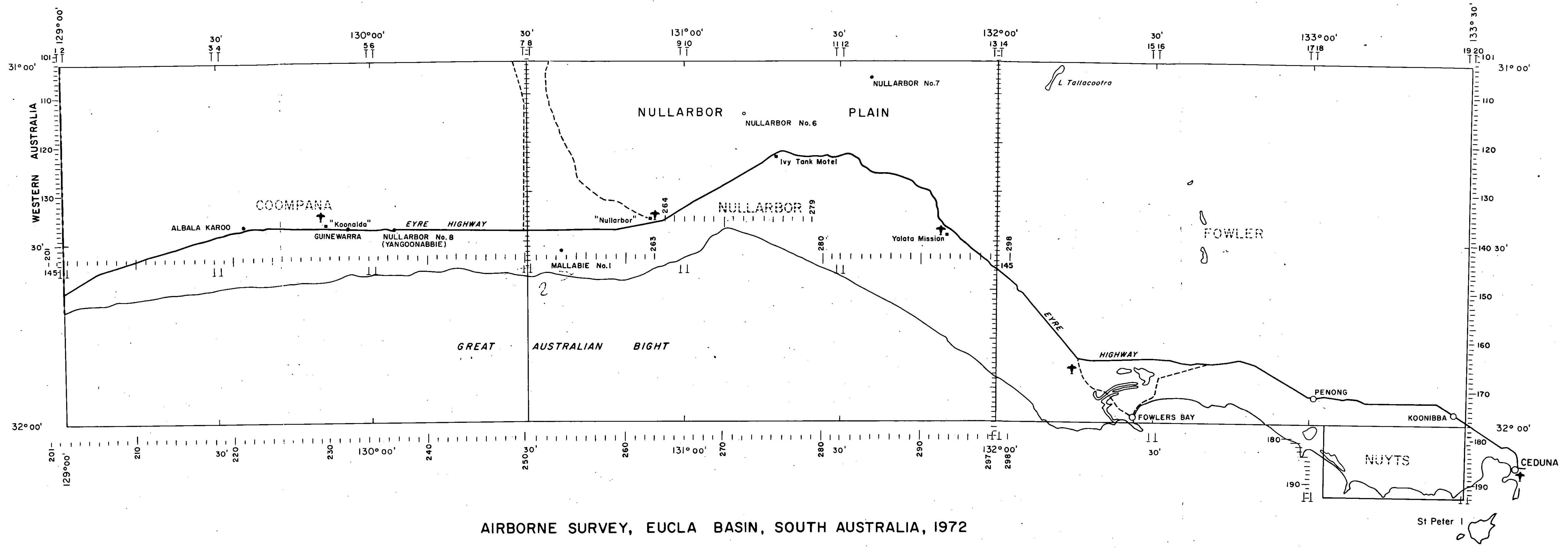
| | Onshore Block | Offshore Block |
|---|---|---|
| Altitude | 150 m above ground level | 150 m above sea level |
| Line spacing | 1.5 km | 3.0 km |
| Line direction | East-west | North-south |
| Tie system | Double lines (north-south) spaced approx. 45 km between each pair. | Onshore east-west lines used to tie offshore data. |
| Ground speed | 100 knots | 130 knots |

Gamma-ray spectrometer channel energies

| | |
|---|---|
| Channel 1 ("Total") | 0.84-3.0 MeV |
| Channel 2 ("Potassium") | 1.3 -1.6 MeV |
| Channel 3 ("Uranium") | 1.6-1.8 MeV |
| Channel 4 ("Thorium") | 2.4-2.8 MeV |

Datum for magnetic basement contours: Ground level Sea level

31




# AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA, 1972

## LOCALITY MAP

## FLIGHT-LINE AND TIE-LINE SYSTEM

LEGEND

- • BORES TO BASEMENT
- o BORES IN COVER ROCKS

LOCATION DIAGRAM



10 0 10 20 30 40 50 60 70 80 90 KILOMETRES

10 0 10 20 30 40 50 MILES

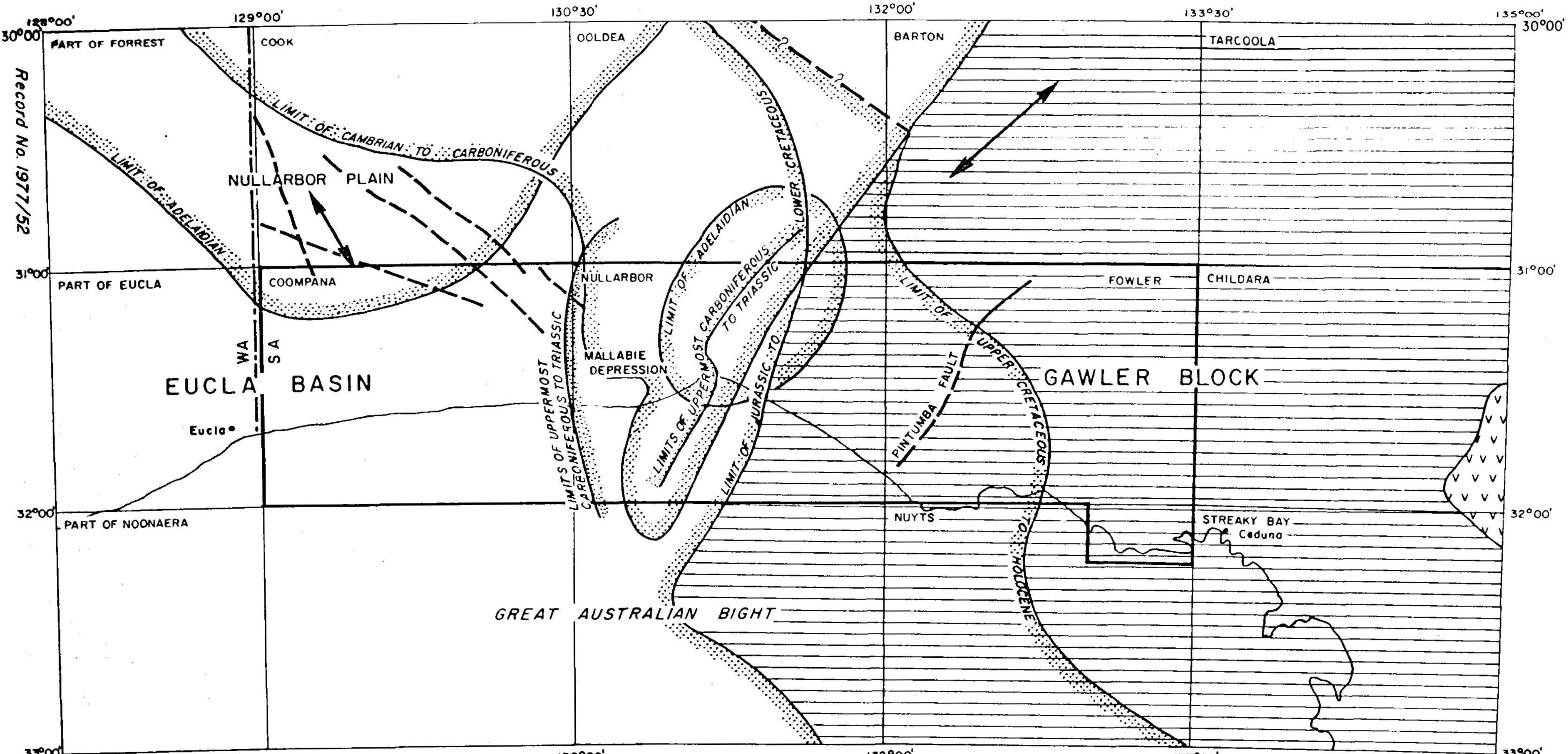
REFERERENCE TO 1:250,000 MAP SERIES

| | | | | |
|---|---|---|---|---|
| FORREST | COOK | OOLDEA | BARTON | TARCOOLA |
| EUCLA | COOMPANA | NULLARBOR | FOWLER | CHILDARA |
| NOONAERA | | | NUYTS | STREAKY BAY |

(BASED ON H52/BI-21)

Record No. 1977/52

H 52/BI-22




After Geological Society of Australia, 1971. Tectonic map of Australia and New Guinea, 1:5 000 000, Sydney

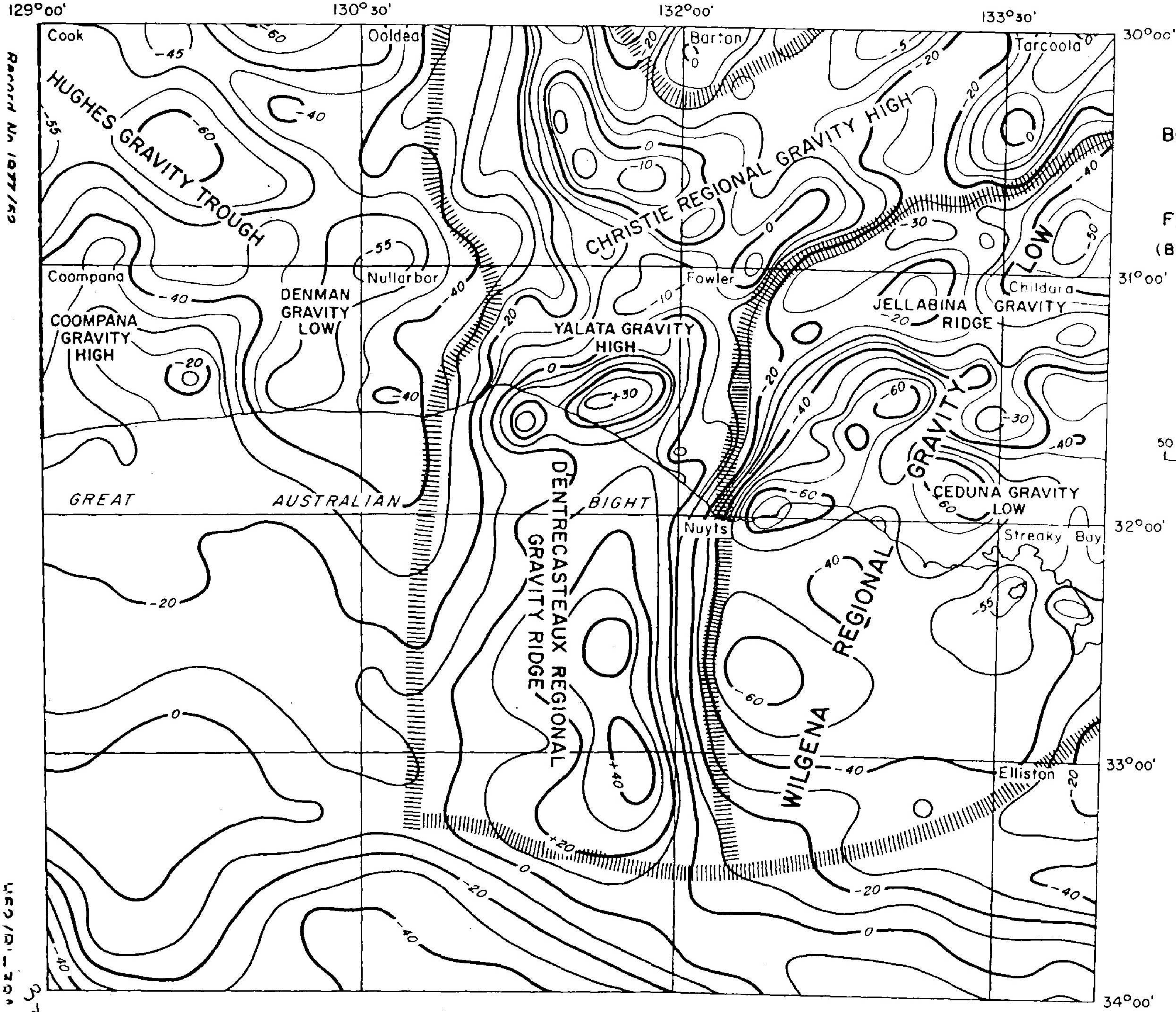
## TECTONICS

SCALE 1:2 500 000
KILOMETRES
50 0 50 100 150

Precambrian gneissic basement
Mainly acid extrusives (Gawler range volcanics)
Fault
Structural trend
Boundary of survey area

PLATE 2

H52/B1-37A




# GRAVITY MAP

BOUGUER ANOMALIES ONSHORE
(Density 2·67 $t/m^{-3}$)
AND
FREE AIR ANOMALIES OFFSHORE
(Based on Gravity Map of Australia 1976)

50 0 50 100 km

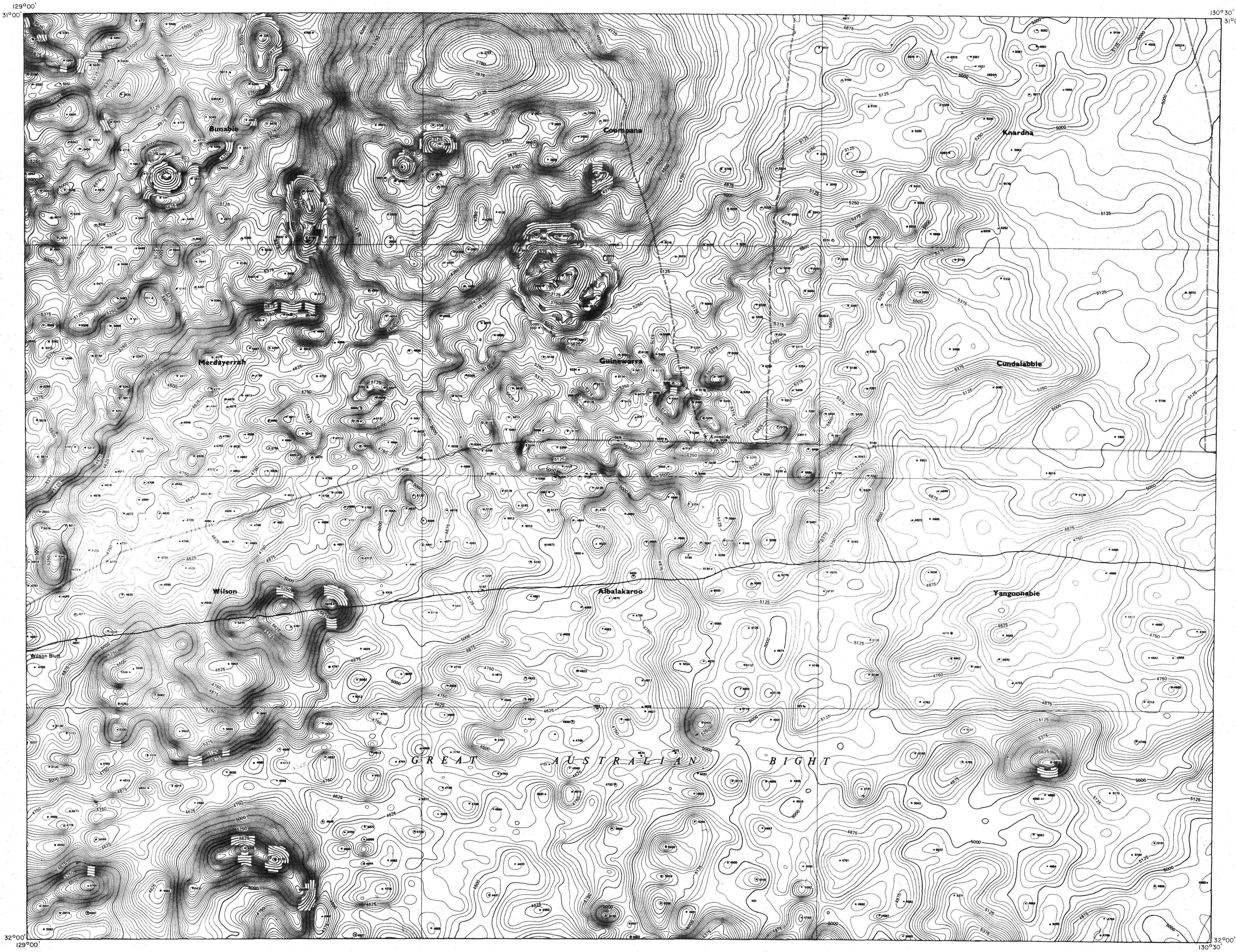
Province boundary

Contour interval 5 milligals onshore, 10 milligals offshore


Record No 1977/53

PLATE 3

# COOMPANA




### DATA ACQUISITION

Operator .................... *BMR*
Date of survey .................... *1972–73*
Line spacing .................... *1·5 km onshore 3 km offshore*
Altitude .................... *150 m surface clearance*
Sampling interval .................... *55 m*
Instrument .................... *fluxgate magnetometer*

### DATA PROCESSING AND PRESENTATION

Along line sampling .................... *880 m*
Regional gradient removed at ..... *1965 IGRF*
Contour interval .................... *25 nT*
Magnetic value .................... 4725

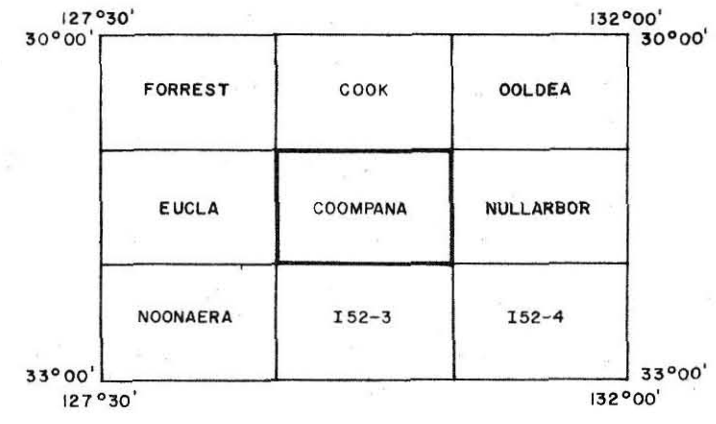
## TOTAL MAGNETIC INTENSITY

SCALE 1:250 000

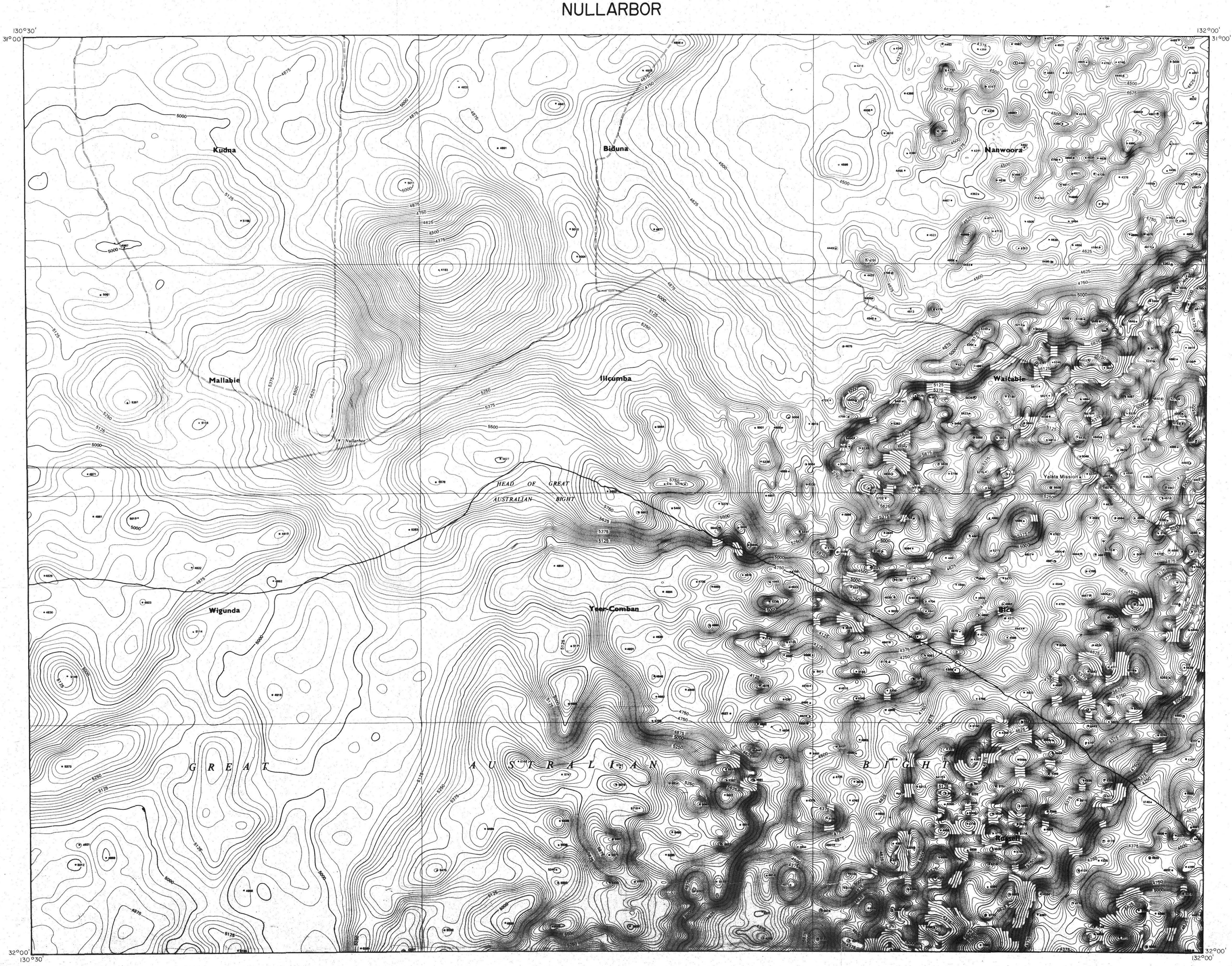
Kilometres 5 0 5 10 15 20 25 30 Kilometres

*The topography and total magnetic intensity data are based on Coompana 1:250 000 scale map published in 1975 by the Geological Survey of South Australia, Department of Mines.*

### REFERENCE TO AUSTRALIA 1:250 000 STANDARD MAP SERIES



NULLARBOR




## DATA ACQUISITION

Operator .................... *BMR*
Date of survey .................... *1972–73*
Line spacing .................... *1·5km onshore 3km offshore*
Altitude .................... *150 m surface clearance*
Sampling interval .................... *55 m*
Instrument .................... *fluxgate magnetometer*

## DATA PROCESSING AND PRESENTATION

Along line sampling .................... *880 m*
Regional gradient removed at ..... *1965 IGRF*
Contour interval .................... *25 nT*
Magnetic value .................... •4725

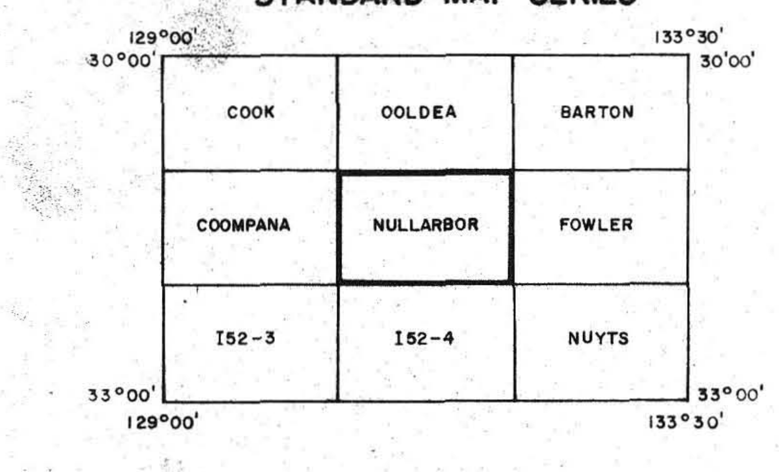
# TOTAL MAGNETIC INTENSITY

SCALE 1:250 000

Kilometres 5 0 5 10 15 20 25 30 Kilometres

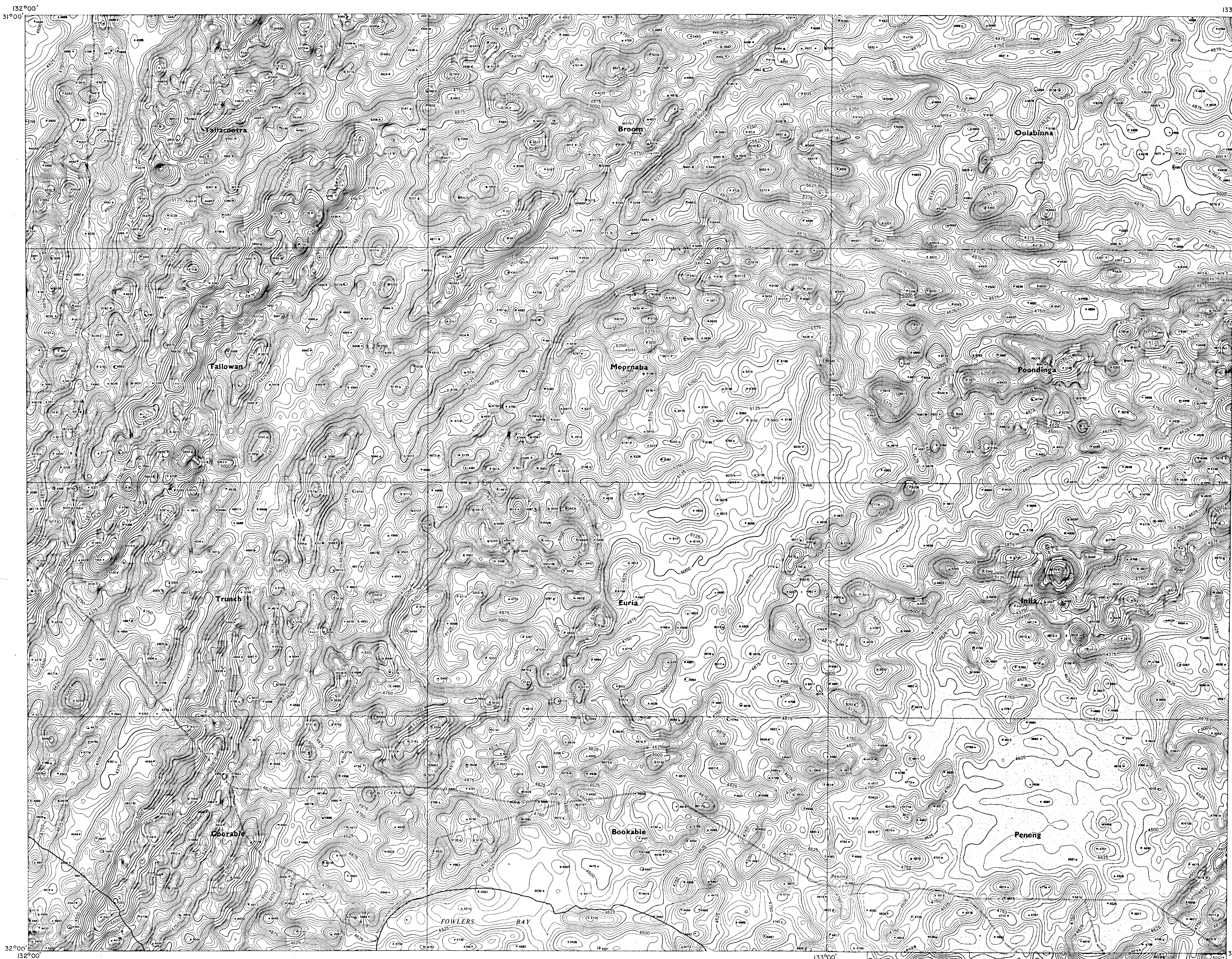
*The topography and total magnetic intensity data are based on Nullarbor 1:250 000 scale map published in 1975 by the Geological Survey of South Australia, Department of Mines.*

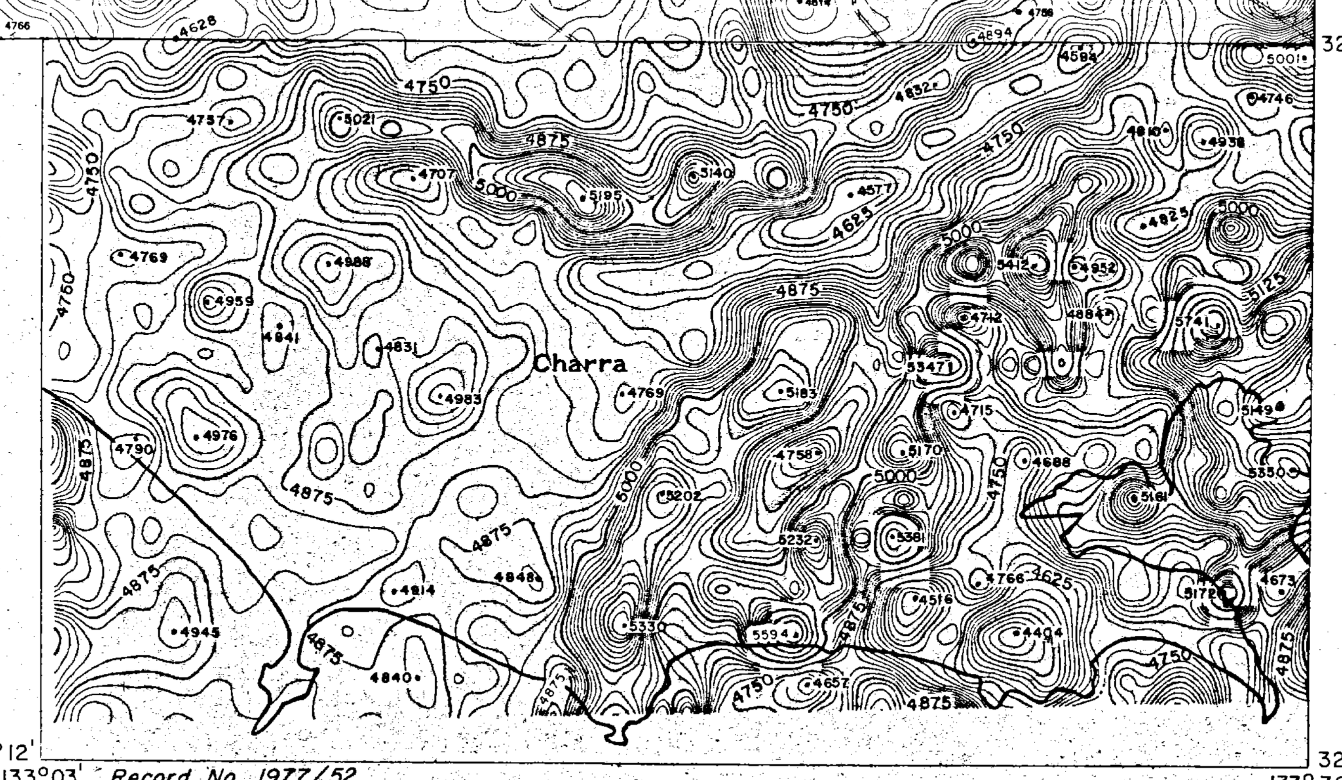
## REFERENCE TO AUSTRALIA 1:250 000 STANDARD MAP SERIES




*Record No.1977/52* NULLARBOR, SA H52/B1-33

# FOWLER-NUYTS



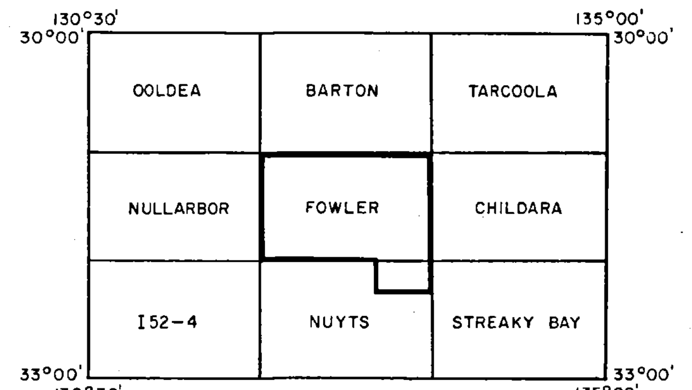

## DATA ACQUISITION

Operator ........ *BMR*
Date of survey ........ *1972–73*
Line spacing ........ *1·6 km*
Altitude ........ *150 m surface clearance*
Sampling interval ........ *55 m*
Instrument ........ *fluxgate magnetometer*

## DATA PROCESSING AND PRESENTATION

Along line sampling ........ *880 m*
Regional gradient removed at ........ *1965 IGRF*
Contour interval ........ *25 nT*
Magnetic value ........ • 4725

## REFERENCE TO AUSTRALIA 1:250 000 STANDARD MAP SERIES




# TOTAL MAGNETIC INTENSITY

SCALE 1:250 000

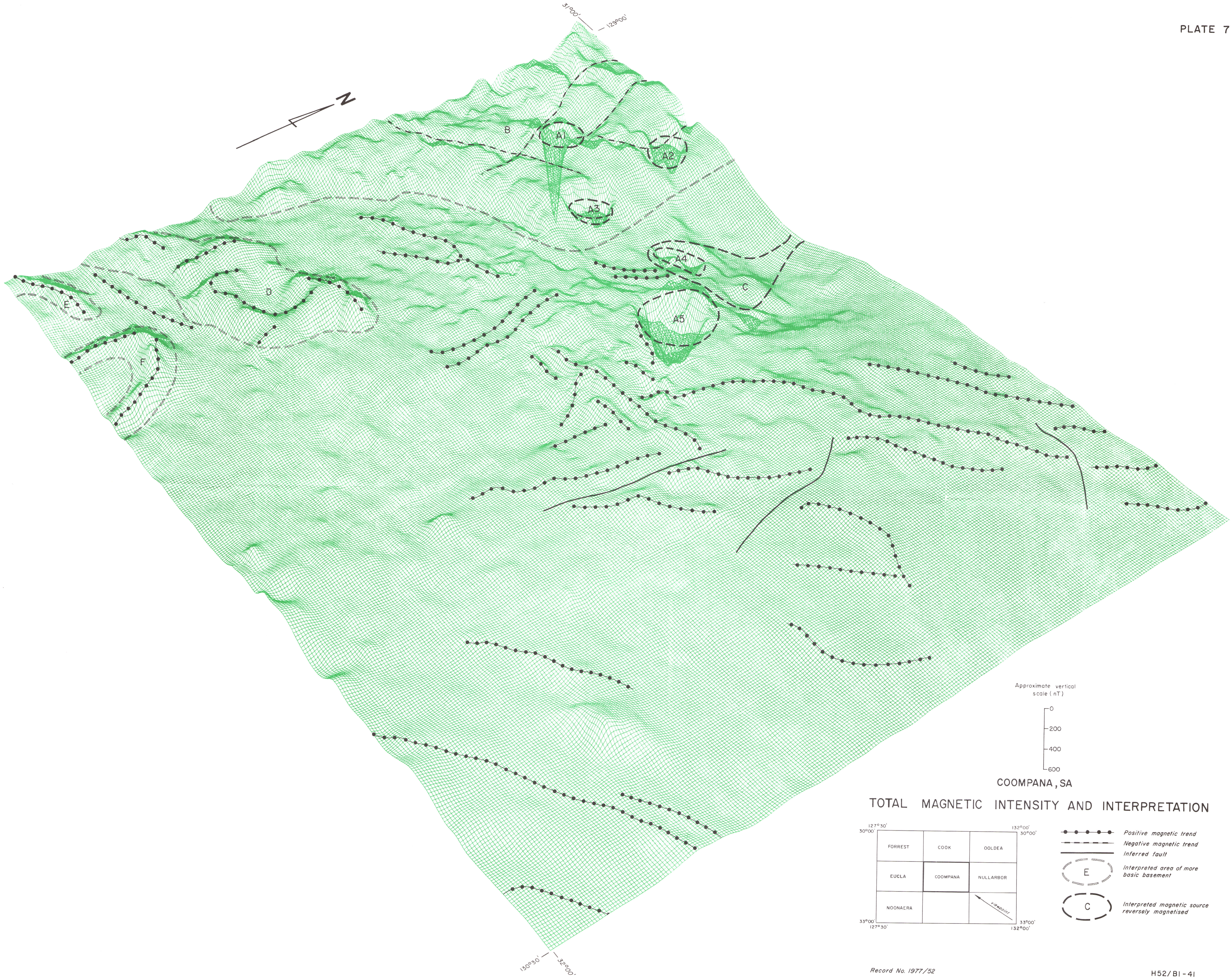
Kilometres 5 0 5 10 15 20 25 30 Kilometres

*The topography and total magnetic intensity data are based on FOWLER 1:250 000 scale map published in 1975 by the Geological Survey of South Australia, Department of Mines. Portion of NUYTS 1:250 000 scale map was produced by the Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics, Department of National Resources, except for the flight path recovery which was compiled by the Geophysical Services Section of the South Australian Department of Mines.*

*Record No. 1977/52*

FOWLER-NUYTS, SA

H53/B1-72



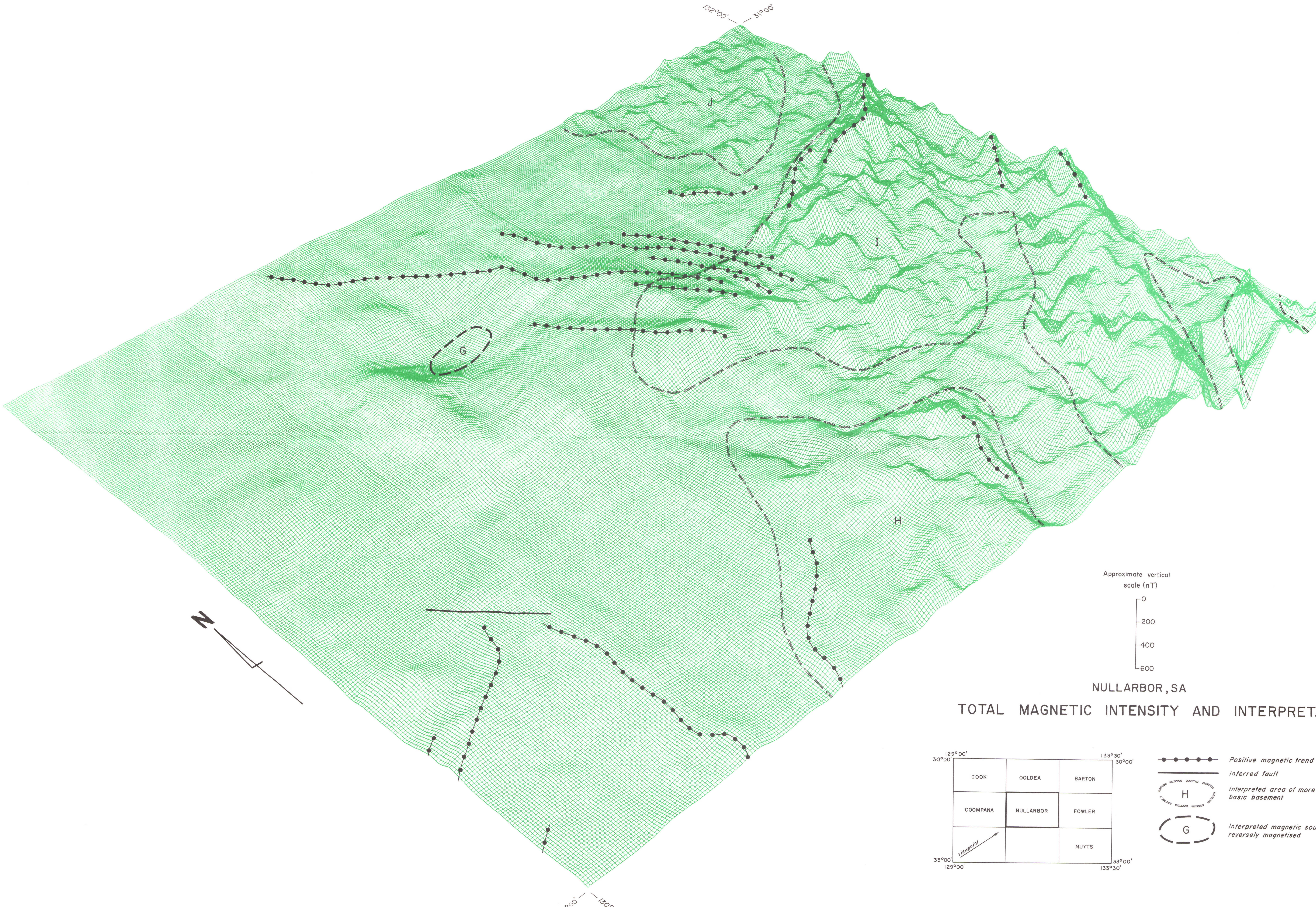

COOMPANA, SA

# TOTAL MAGNETIC INTENSITY AND INTERPRETATION

Record No. 1977/52

H52/B1-41

PLATE 8




NULLARBOR, SA

## TOTAL MAGNETIC INTENSITY AND INTERPRETATION

*Positive magnetic trend*

*Inferred fault*

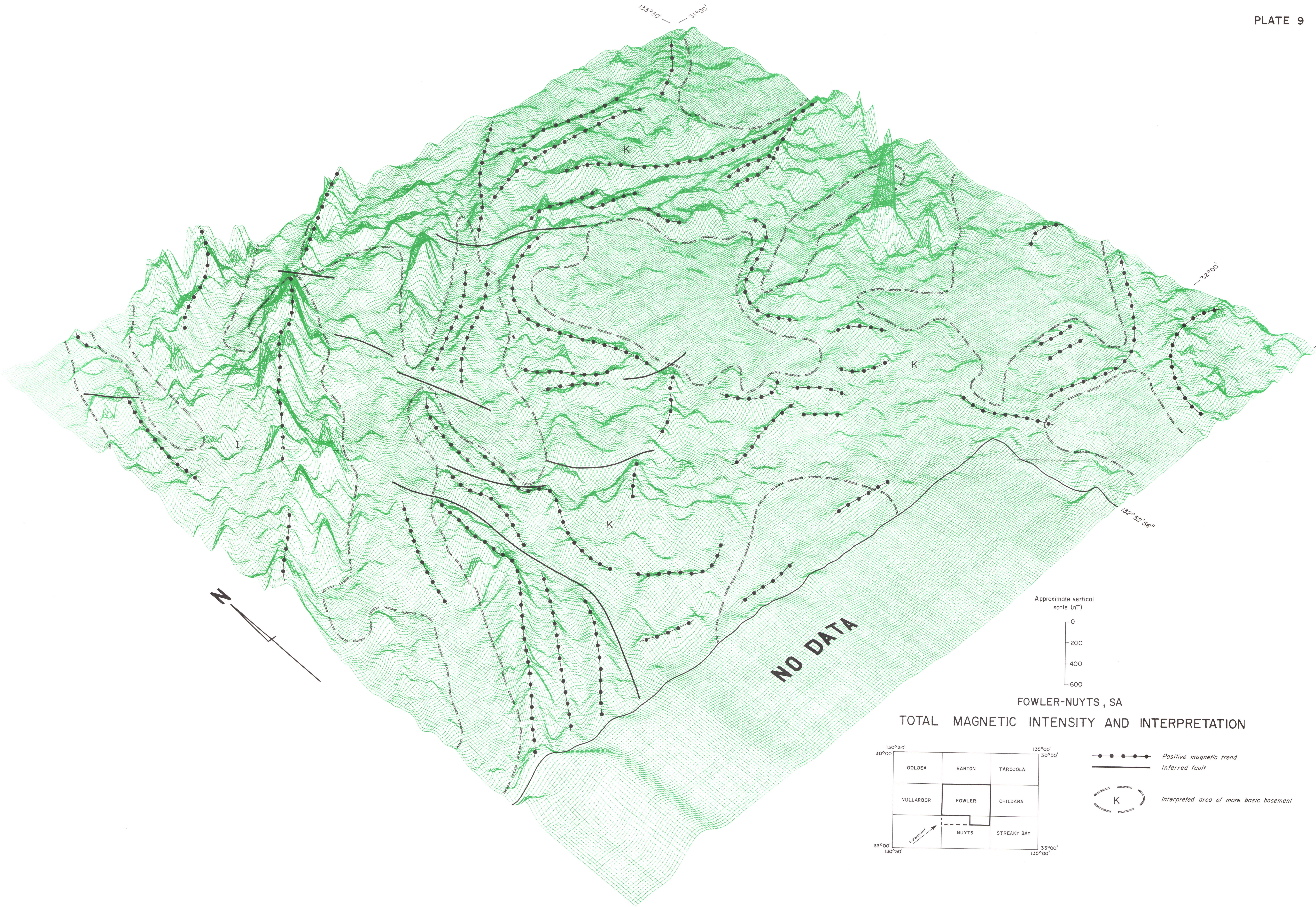
H *Interpreted area of more basic basement*

G *Interpreted magnetic source reversely magnetised*

*Record No. 1977/52*

H52/B1-42

PLATE 9




FOWLER-NUYTS, SA

TOTAL MAGNETIC INTENSITY AND INTERPRETATION

*Positive magnetic trend*

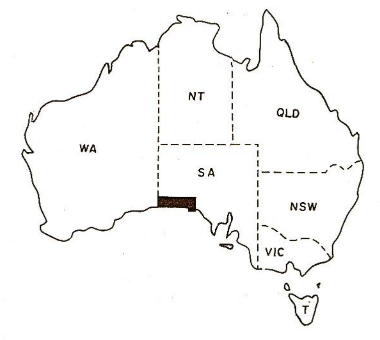
*Inferred fault*

K *Interpreted area of more basic basement*

*Record No. 1977/52*

H53/B1-74


LOCATION DIAGRAM




REFERENCE TO 1:250 000 MAP SERIES

| | | | | |
|---|---|---|---|---|
| FORREST | COOK | OOLDEA | BARTON | TARCOOLA |
| EUCLA | COOMPANA | NULLARBOR | FOWLER | CHILDARA |
| NOONAERA | | | NUYTS | STREAKY BAY |

# MAGNETIC INTERPRETATION

SCALE 1:500 000

10 0 10 20 30 40 50 60 70 80 90 Kilometres

## LEGEND

### MAGNETIC

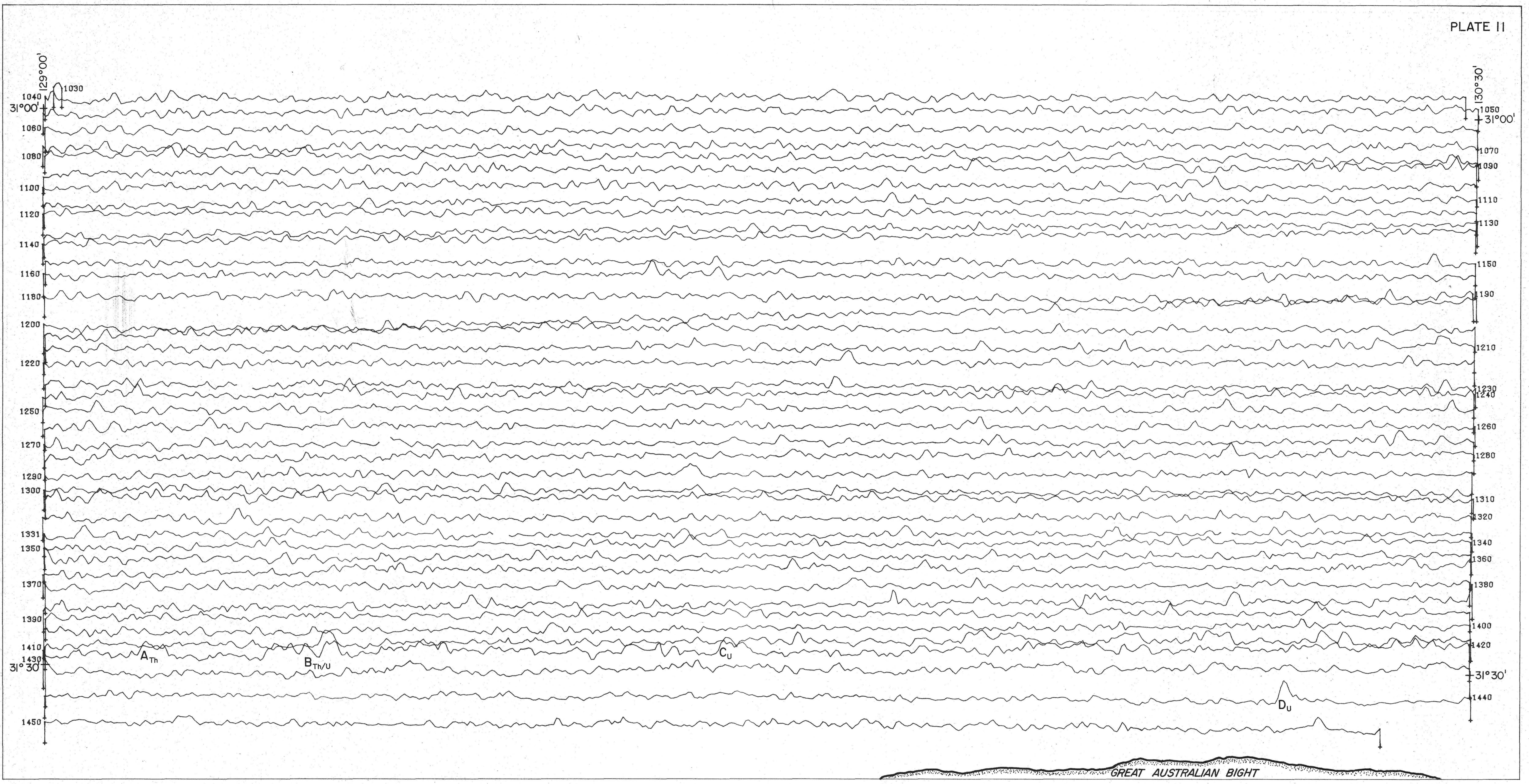
- Positive magnetic trend
- Negative magnetic trend
- Inferred fault
- 500 Basement contour (metres). Datum ground level onshore, sea level offshore
- H Interpreted area of more basic basement
- G Interpreted magnetic anomaly source reversely magnetised

### TOPOGRAPHY

- Highway or main road
- Road or track
- Shoreline
- Lake
- Well or borehole
- Building(s)
- Named place
- "Nullarbor" Homestead
- Airport or airfield

Record No. 1977/52

H52/B1-36




## DATA ACQUISITION

Operator: BMR
Date of survey: 1972–73
Line spacing: 1·5 km
Altitude: 150 m
Sampling interval: 50 m
Instrument: 4 channel differential spectrometer detector volume 3700 $cm^3$
Spectrometer channels: 0·84 — 3·00 MeV (Total Count)
1·30 — 1·60 MeV (Potassium)
1·60 — 1·90 MeV (Uranium)
2·40 — 2·80 MeV (Thorium)

## DATA PROCESSING AND PRESENTATION

Background subtraction: applied
Height correction: applied
Energy stripping: not applicable
Filtering: applied
Vertical scale: 50 counts/s/cm
Sampling interval: 500 m
Baseline: best fit flight path
Base value: 0 counts/s
Flight-line number 1450
Profile base

*Note: 1. The profiles may be positioned by reference to flight path map.*

*2. Where there are gaps along profiles the data has been suppressed because of excessive deviation of the aircraft from nominal ground clearance, or count rates less than background.*

*3. The height-correction coefficients employed correspond to a broad source.*

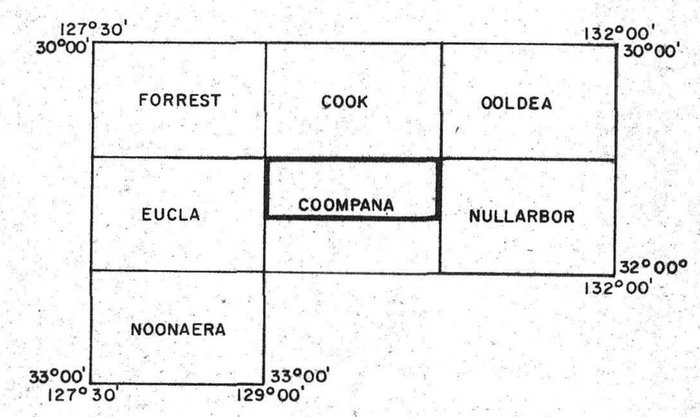
AIRBORNE SURVEY, EUCLA BASIN, S A 1972–73

# RADIOMETRIC PROFILES
# TOTAL COUNT

SCALE 1:250 000

Kilometres 5 0 5 10 15 20 25 30 Kilometres

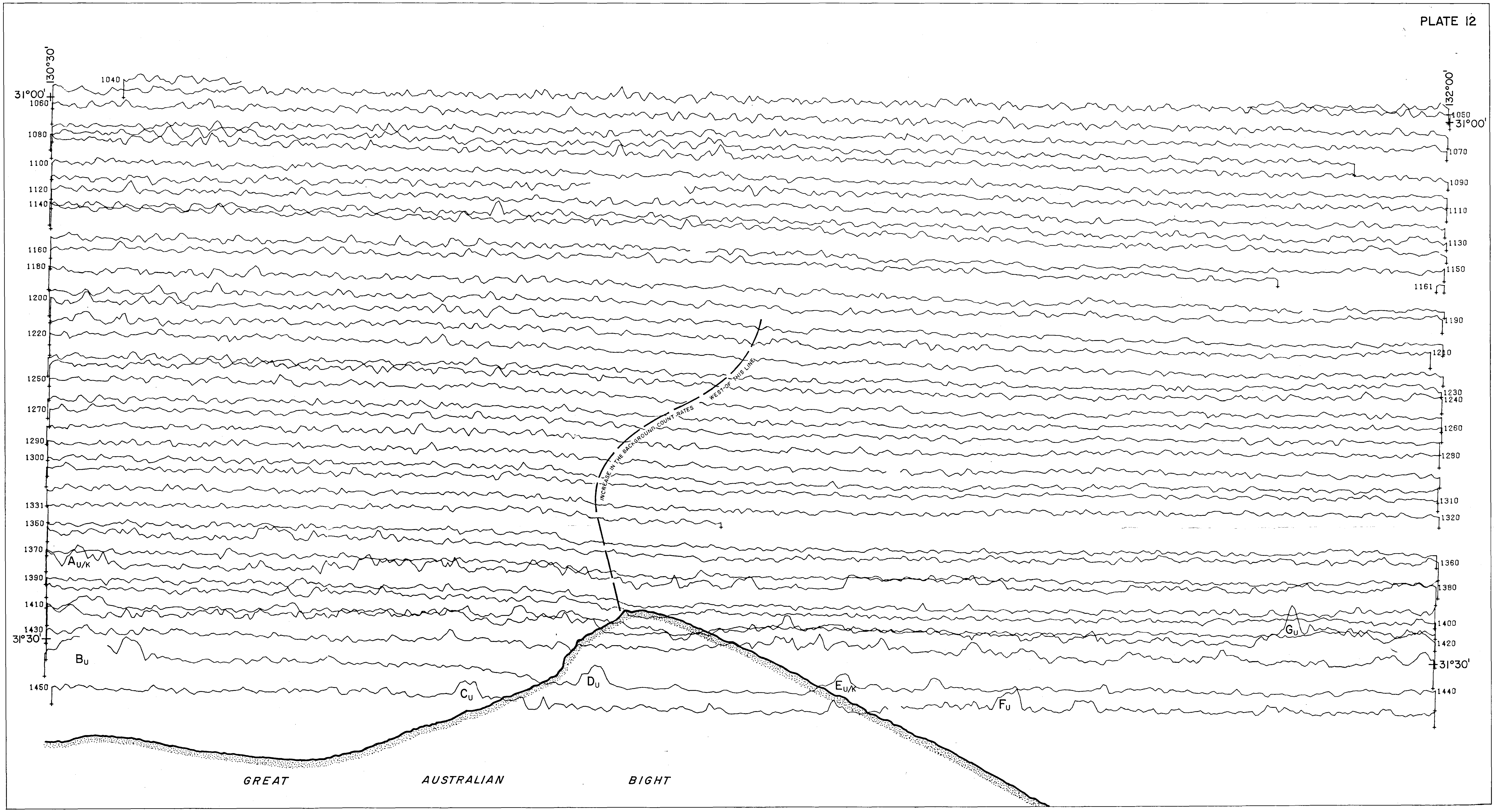
REFERENCE TO AUSTRALIA 1:250 000 STANDARD MAP SERIES




Record No. 1977/52

COOMPANA, SA

H52/B1-29-1




## DATA ACQUISITION

Operator: BMR
Date of survey: 1972–73
Line spacing: 1·5 km
Altitude: 150 m
Sampling interval: 50 m
Instrument: 4 channel differential spectrometer detector volume 3700 $cm^3$
Spectrometer channels: 0·84 – 3·00 MeV (Total Count)
1·30 – 1·60 MeV (Potassium)
1·60 – 1·90 MeV (Uranium)
2·40 – 2·80 MeV (Thorium)

## DATA PROCESSING AND PRESENTATION

Background subtraction: applied
Height correction: applied
Energy stripping: not applicable
Filtering: applied
Vertical scale: 50 counts/s/cm
Sampling interval: 500 m
Baseline: best fit flight path
Base value: 0 counts/s
Flight-line number: 1450
Profile base

*Note:* 1. *The profiles may be positioned by reference to flight path map*

2. *Where there are gaps along profiles the data has been suppressed because of excessive deviation of the aircraft from nominal ground clearance, or count rates less than background.*

3. *The height-correction coefficients employed correspond to a broad source.*

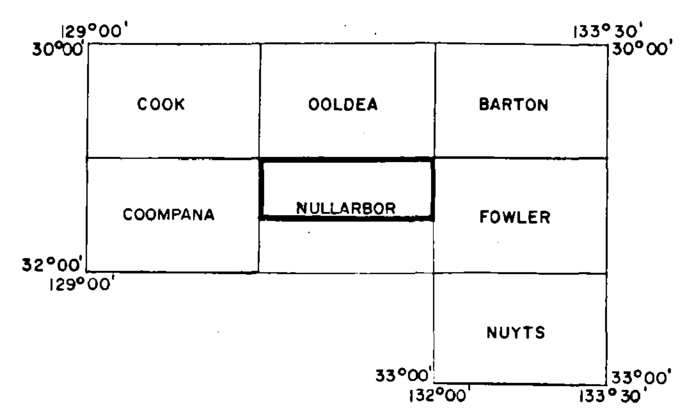
AIRBORNE SURVEY, EUCLA BASIN, S A 1972–73

# RADIOMETRIC PROFILES TOTAL COUNT

SCALE 1:250 000

Kilometres 5 0 5 10 15 20 25 30 Kilometres

REFERENCE TO AUSTRALIA 1:250 000 STANDARD MAP SERIES

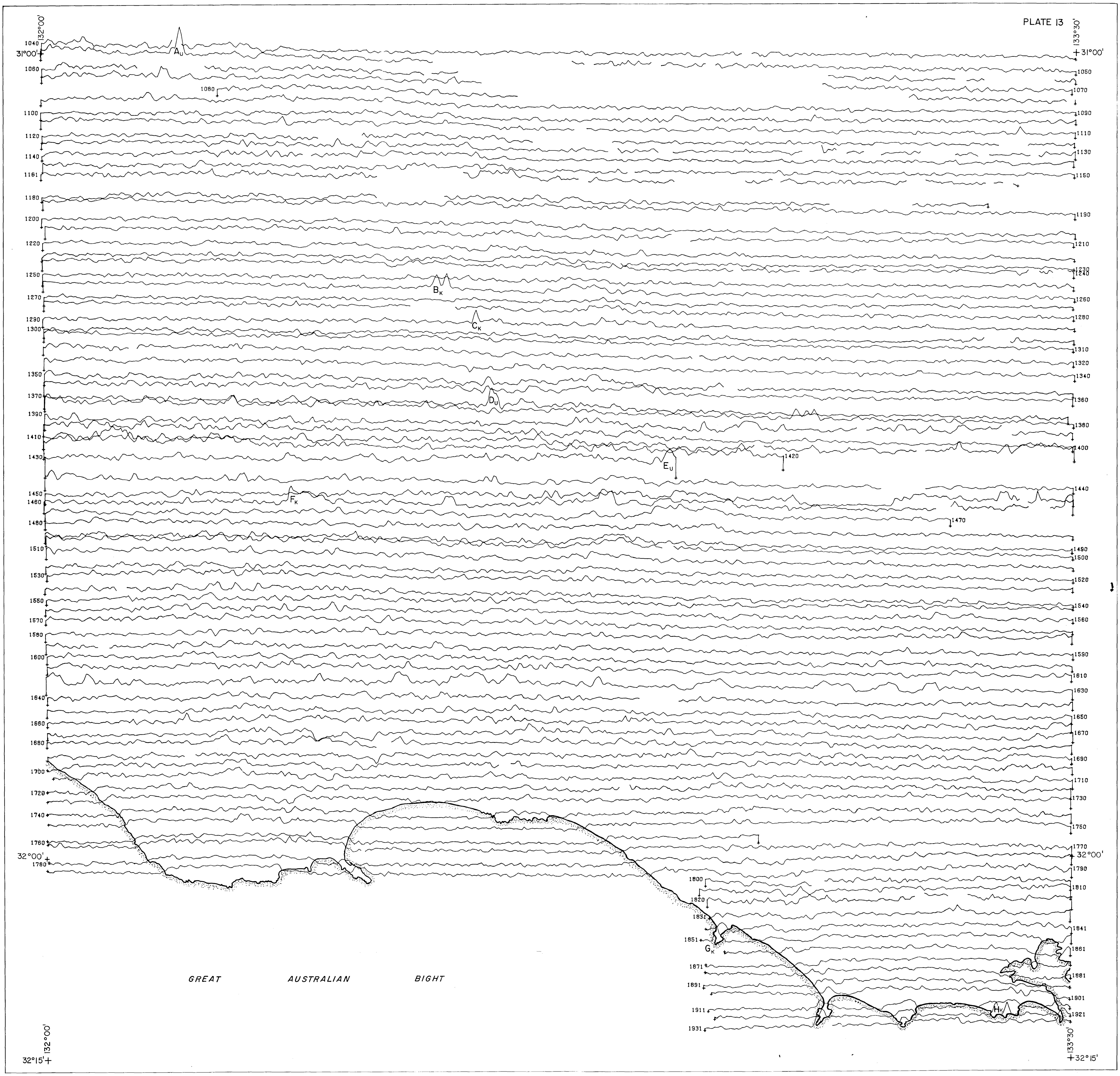



*Record No. 1977/52*

NULLARBOR, SA

H52/B1-30-1

FOWLER–NUYTS




## AIRBORNE SURVEY, EUCLA BASIN, S A 1972–73

# RADIOMETRIC PROFILES
# TOTAL COUNT

SCALE 1:250 000

Kilometres 5 0 5 10 15 20 25 30 Kilometres

### DATA ACQUISITION

Operator: BMR
Date of survey: 1972–73
Line spacing: 1·5 km
Altitude: 150 m
Sampling interval: 50 m
Instrument: 4 channel differential spectrometer detector volume 3700 cm³
Spectrometer channels: 0·84 — 3·00 MeV (Total Count)
1·30 — 1·60 MeV (Potassium)
1·60 — 1·90 MeV (Uranium)
2·40 — 2·80 MeV (Thorium)

### DATA PROCESSING AND PRESENTATION

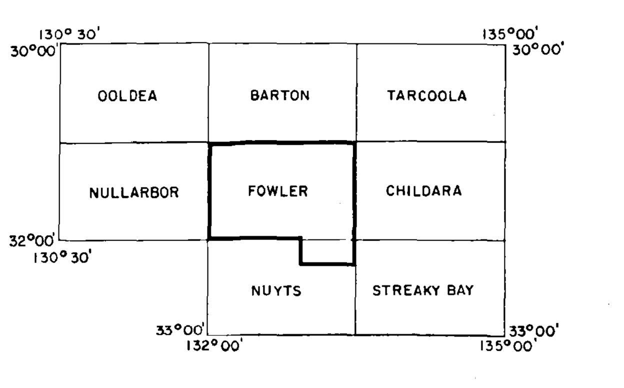
Background subtraction: applied
Height correction: applied
Energy stripping: not applicable
Filtering: applied
Vertical scale: 50 counts/s/cm
Sampling interval: 500 m
Baseline: best fit flight path
Base value: 0 counts/s
Flight-line number: 1200
Profile base

*Note: 1. The profiles may be positioned by reference to flight path map.*

*2. Where there are gaps along profiles the data has been suppressed because of excessive deviation of the aircraft from nominal ground clearance, or count rates less than background.*

*3. The height-correction coefficients employed correspond to a broad source.*

### REFERENCE TO AUSTRALIA 1:250 000 STANDARD MAP SERIES




*Record No. 1977/52*

FOWLER–NUYTS, SA H53/B1-71-1