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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1966/101

DARWIN/PINE CREEK CONTRACT AEROMAGNETIC SURVEY, NORTHERN TERRITORY 1963

by

P.E. GOODEVE

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SUMMARY

An aeromagnetic survey covering the Mount Bundey and Burrundie and parts of the Marrakai, Batchelor, Wool Wonga, and Ban Ban 1:63.360 map areas in the Northern Territory, was flown by Adastra Hunting Geophysics Pty Ltd under contract to the Bureau of Mineral Resources as part of a special mineral survey programme in the Northern Territory. The survey data were compiled by the contractor and presented as aeromagnetic maps. This record deals with the interpretation of the survey data.

A large number of old mines and prospects exist in the area and the survey was undertaken with the object of stimulating prospecting generally.

Pronounced magnetic lineations were detected in a generally undisturbed magnetic environment in the northern part of the survey area. These lineations remain unexplained and are the subject of a recommendation for further investigation. In the Mount Bundey, Ban Ban, and Burrundie areas, intense magnetic anomalies occurred adjacent to outcropping acidic intrusives and are considered to result from thermal metamorphism of the intruded sediments. Some magnetic trends are believed to be due to dykes.

1. INTRODUCTION

In 1963, an aeromagnetic survey was flown in the Darwin/Pine Creek area by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources (BMR). The survey data were compiled by the contractor and presented as six maps showing aeromagnetic contours for the 1:63,360 map areas of Marrakai, Mount Bundey, Batchelor, Wool Wonga, Ban Ban, and Burrundie. Plates 4 to 9 are copies of these six maps, their relative positions being indicated in Plate 1. This Record deals with the interpretation of the survey data.

The survey was originally proposed as a general aid and stimulus to mineral prospecting in the Darwin/Pine Creek area. A number of old mines and prospects exist in the survey area, in particular the Mount Harris tinfield in the Ban Ban area, the Union Reefs gold mines in the Burrundie area, and iron ore prospects at Frances Creek in the Ban Ban area and at Mount Bundey.

Previous aeromagnetic surveys by the BMR had covered several areas adjacent to the contract survey and the results have been published in map form in the BMR Geophysical Map Series. Map G71-92A covers the western halves of the Marrakai and Batchelor areas, G245-2 the eastern part of the Wool Wonga area, and G156-2 the western part of the Ban Ban area; G244-2 (Mundogie Hill) is adjacent to Wool Wonga on the eastern side, G159-2 (Burnside) adjacent to Ban Ban on the western side, and G170-2 (Tipperary) adjacent to Burrundie on the western side. Unfortunately all these early aeromagnetic data were collected in the course of airborne radiometric surveys, which took higher priority at the time. The magnetic data were therefore processed only to the stage of 100-gamma contours and is of less value than the 10-gamma contour reduction specified for the contract survey. For this reason the interpretation of the contract survey was not extended to include any of the adjacent survey areas.

From the preliminary results of the contract survey, it was possible to select an area at Mount Bundey for detailed aeromagnetic coverage by a BMR survey in 1964 (Milsom & Finney, 1965) and an area around the Mount Harris tinfield for similar coverage in 1965 (Tipper & Finney, 1966).

2. GEOLOGY

The geology of the area has been mapped, primarily by the Geological Branch of the BMR, at a level generally described as "detailed reconnaissances, numerous traverses". It has been published in the form of printed maps of the Darwin and Pine Creek 1:250,000 map areas with explanatory notes (Malone, 1962a & 1962b), and as six 1-mile sheets. Plates 2 and 3 show the geology of the survey area. Malone (1958) and Dow and Pritchard (1958) have described the geology of the Batchelor, Marrakai, Mount Bundey, and Wool Wonga 1-mile map areas in some detail and Hays (1960) has described the Mount Harris tinfield, which is within the Ban Ban map area.

Where older rocks are exposed, they are mainly sediments or granites of Lower Proterozoic age. The Lower Proterozoic sediments were deposited in the Pine Creek Geosyncline, were intruded by basic sills and then folded, and intruded by granite. The Lower Proterozoic rocks are unconformably overlain by Upper Proterozoic and Palaeozoic sediments, which were deposited in broad shallow basin structures produced by gentle downwarping. A thin veneer of Cretaceous sediments was then laid down; they can be seen over a small area in the north-eastern corner. Cainozoic alluvium now covers about half the survey area, particularly over the northern part.

The Pine Creek Geosyncline, mentioned above, is not marked on Plates 2 and 3, but its axis is approximately along a diagonal line from the north-western to the south-eastern corners of the survey area.

Lower Proterozoic sediments

Mount Partridge Formation. This formation, the oldest in the area, is seen as two small outcrops east of the Mount Bundey Homestead. It consists of platform or shelf-type sediments, including conglomerate and ripple marked sandstone, deposited on the edge of the Pine Creek Geosyncline.

Masson Formation. Distributed through the eastern and northern parts of the area, the Masson Formation extends further into the geosyncline than the Mount Partridge Formation and consists largely of redistributed material originally deposited on the shelf. The type area of the formation is the Mount Harris tinfield, which occupies an extensive area around Mount Harris and is located in the Ban Ban 1-mile map area. Here the formation crops out as the core of a large anticlinorium called the Masson Anticline and the total thickness has been estimated as being between 6000 feet and 12,000 feet (Hays, 1960), although this figure is not applicable to the whole tinfield. Near Mount Masson, three arenaceous divisions and two argillaceous ones have been identified by Hays, each division consisting of interbedded arenaceous and argillaceous sediments. The arenaceous sediments are mostly medium-grained rocks with quartz and feldspars as the main constituents, chlorite and sericite being identified in some specimens. The argillaceous sediments occur as buff or red slate in outcrop and as black graphitic pyritic slate in the unweathered state.

Near the McKinley River a few scattered outcrops of fine-grained sandstone have been mapped as Masson Formation and are thought to mark the flank of a large subsidiary syncline on the western side of the main anticlinorium.

Interbedded with the sediments and about 500 feet stratigraphically above the Mount Partridge Formation is a weathered brown massive rock of doubtful origin, which is porous and contains no clastic grains. Its maximum thickness is about 200 feet. It crops out around the dome that exposes the Mount Partridge Formation and also to the east of the dome. The rock does not show any sedimentary features and is believed to be a weathered basic or intermediate sill (Dow & Pritchard, 1958). Lateritisation and deep weathering have obscured most of the original features and microscopic evidence is inconclusive. The rock now consists of iron and clay minerals.

Golden Dyke Formation. The Masson Formation is overlain conformably by, and intertongued with, the Golden Dyke Formation. Both formations are units of the Goodparla Group, which was derived from the north-east. The lower beds of the Golden Dyke Formation are slate, are rich in iron and manganese oxides and chert, and are very carbonaceous and pyritic. Basic intrusives, thought to be altered quartz-dolerite sills injected during sedimentation, are intimately associated with the basal beds.

There is a rapid transition upwards from the basal beds into slate that contains many thin bands of chert. A gradual transition takes place upwards from the slate with chert into slate without chert, similar to the slate of the Masson and Burrell Creek Formations.

Noltenius Formation and Burrell Creek Formation. The Finnis River Group comprises these formations and is a lateral facies assemblage, derived from a source to the west. The Noltenius Formation crops out over a very small part of the Marrakai area. Here it is probably a lens or tongue of coarse clastic material that has been redistributed basinwards by turbidity currents from the margin of the Pine Creek Geosyncline to the west.

The Burrell Creek Formation, which covers an appreciable proportion of the survey area, is composed mainly of medium to fine-grained greywacke and siltstone.

Upper Proterozoic sediments

The Kombolgie Formation, the oldest of the Upper Proterozoic sediments, crops out in a small region slightly east of the centre of the survey area. It consists of a downfaulted outlier of sandstone and conglomerate unconformably overlying the Lower Proterozoic rocks.

In the south-western corner of the survey area, Buldiva Sandstone crops out. This formation comprises the Depot Creek Sandstone Member and the Stray Creek Sandstone Member, both members representing continuous sedimentation. They consist mainly of quartz sandstone and conglomerate but the Depot Creek Sandstone Member is said also to contain lenses of haematite-rich quartz breccia.

Igneous intrusives

Six large acidic intrusives crop out in the survey area: the Mount Bundey Granite, Mount Goyder Syenite, Cullen Granite, Prices Springs Granite and the McKinley Granite.

The Mount Bundey Granite and Mount Goyder Syenite are a plutonic complex intruding Lower Proterozoic rocks in the western half of the Mount Bundey area. The magmatic origin of the granite and syenite is discussed by Hassan (1958). The Mount Bundey Granite ranges in composition from granite to adamellite, and the Mount Goyder Syenite contains quartz syenite and syenite. Both bodies are intruded by aplitic and syenitic dykes and both contain inclusions, up to three feet long, of metamorphosed country rock near their margins. A large body about 2000 feet long by 40 feet wide composed of haematite pseudomorphs after magnetite crops out near the northern boundary of the granite. Petrological evidence (Dow & Pritchard, 1958) suggests that the granite and syenite complex and the syenite and aplite dykes are similar to, and probably genetically related to, the Cullen Granite, which crops out to the south. The sediments surrounding the complex are little metamorphosed and the metamorphic aureole does not exceed one quarter of a mile in width. The complex is located in a predominantly anticlinal structure in the sediments and was probably emplaced at the time of the folding of the sediments. Small sills and dykes of intermediate composition crop out within a radius of five miles of the complex. They range in width up to about 30 feet and in length up to nearly half a mile. In hand specimens they appear to be basic. The weathered brown rock of doubtful origin mentioned in the description of the Masson Formation was probably a sill of similar composition to these sills and dykes, which are probably related to the Mount Bundey Granite and Mount Goyder Syenite (Dow & Pritchard, 1958).

The Cullen Granite and the Margaret Granite, Prices Springs Granite, and McKinley Granite, which are all related to the Cullen Granite, were intruded into the main trough of the Pine Creek Geosyncline. They are discordant, and faulted boundaries are common in places around the margin of the Cullen Granite. In composition they range from granite to adamellite and are generally coarse-grained massive or gneissic rocks.

The Lower Proterozoic basic intrusives of the Darwin-Katherine area have been investigated by Bryan (1962), who arrived at the following relevant general conclusions concerning them :

1. The rocks were intruded principally as sills or sub-horizontal sheets, prior to the folding of the sediments.

2. The rocks were predominantly dolerites.

3. The dolerites were affected by deuteric alteration and low-grade regional metamorphism.

4. All the dolerites are older than the granite.

5. No genetic link exists between the Lower Proterozoic granites and dolerite.

6. There is no connection between the dolerite and the uranium, gold, silver, copper, tin, or lead mineralisation of the region.

Economic mineralisation

Gold has been the most valuable mineral product, the main producing areas being the Union Reefs, the Burrundie area, and the Brocks Creek area. The principal mines of the Brocks Creek area are outside the survey boundary, but gold mines in the north-western corner of the Burrundie area are usually grouped in this area. Much of the gold was contained in alluvial quartz deposits and auriferous quartz veins.

Tin has also been mined, in the past at Mount Wells in the Burrell Creek Formation and more recently in the Mount Harris-Mount George region in the Masson Formation, where prospecting and development is continuing. Iron-ore deposits are known at Frances Creek in the Masson Formation, and at Mount Bundey, where a martite body occurs in Mount Goyder Syenite. Minor tin and gold workings and prospects exist in various parts of the Burrell Creek and Golden Dyke Formations, and a few copper, lead, and uranium prospects are also known.

3. GEOPHYSICAL INTERPRETATION

Plates 4 to 9, inclusive, show aeromagnetic contours on the six 1-mile map areas. Plate 10 is a composite map showing contours for the complete survey reduced to a scale of 1:250,000 and thus directly comparable with the geology in Plates 2 and 3 and with Plate 11, which shows interpreted geophysical features.

Several pronounced characteristics are immediately apparent from an examination of the contoured magnetic data. In the northern half of the survey area four lineations, two positive and two negative, extend from the north-western corner in a general south-easterly direction. The two positive lineations are approximately parallel, about 12 miles apart, and strike 28° west of north. The negative pair are also approximately parallel, strike 50° west of north, and are 10 miles apart. Plate 11 shows the lineations, numbered one to four from west to east, numbers one and three being positive and two and four being negative.

It is not clear whether the complete extent of these lineations has been covered by the contract survey as several of them extend to the survey boundary. An early survey of Rum Jungle (BMR map No. G71-92A) adjoins the western border of the Marrakai map area but the Rum Jungle data show no indication of lineations 1 and 2. This is possibly due to the large contour interval (100 gammas) used in presenting the Rum Jungle data. Similarly, lineation 4 is not revealed by the early survey data for Wool Wonga (BMR map No. G245-2) but, again the 100-gamma contour interval of the early data has possibly obscured any extension. Lineation 1 appears to extend southwards across the survey boundary, as revealed by the previous survey of the Burnside map area (BMR map No. G159-2).

Estimates of depth and dip were made on profiles for all the lineations using the method developed by Parker Gay (1963). The depths were also measured using the method of Peters (1949). Agreement between the two estimates of depth was generally good, the distances determined for the vertical separation between the point of measurement and the top of the magnetic body being in agreement within an average of 13%, the largest difference being 26%. The value due to Parker Gay's method is in most cases the greater. The assumption made in both cases was that the sources consist of very thin sheets extending to great depth, thus approximating lines of poles. From the form of many of the profiles across the lineations this assumption appears to be reasonable. A further assumption made in the case of the negative lineations is that the anomaly is primarily due to a remanent vector reversed in direction to the present field of the Earth, thus inverting the polarity of the anomaly.

The estimates of depth and dip were made where the anomalies are well defined and where they appear to be representative of the lineations in general. Estimated depths below ground level for the positive anomalies range from 50 feet to 750 feet and for the negative anomalies from zero to 900 feet. From the magnetic contours it appears that both the positive and negative sources must be very close to the surface in many places. However, the lineations show many irregularities and breaks, which suggest that in places the source is discontinuous. These discontinuities are seen in Plate 11, which also shows the depths and dips of the sources estimated according to the method of Parker Gay.

When the lineations are related to known geology it is apparent that they bear no simple relationship to the outcrops of Lower Proterozoic sediments through which they pass, the strike of the outcropping sediments covering a wide range and in places being at right angles to the lineations. This is so despite the fact that alluvium and soil correspond to about one half of the lineations, as the Lower Proterozoic sediments are sufficiently disturbed to enable the mapping of them to be indicative of the area as a whole. No mine workings or prospects correspond to the lineations, with the exception of the Great Western gold mine in the Batchelor area. The western flank of lineation 1 passes through this mine but a quartz vein is mapped in the vicinity and the deposit might bear no relation to the source of the lineation. There is no evidence of faulting associated with the lineations.

Lineation 4 passes through the Mount Bundey Granite and has been traced in detail through the granite in the course of a detailed aeromagnetic survey at Mount Bundey in 1964 (Milson & Finney, 1965). The detailed survey showed clearly that the source of the lineation post-dates the granite. The north-western end of lineation 4 appears to terminate against a small cross-feature of positive polarity. This cross-feature corresponds to mapped Quartenary alluvium but its direction, which is similar to that of the strike of Golden Dyke Formation sediments that crop out nearby to the south and east, suggests that it is due to a magnetic source in the Golden Dyke Formation beneath the alluvium. A group of anomalies immediately to the north of this cross-feature includes a negative anomaly that could be a continuation of lineation 4 to the northwest. However, a positive anomaly on the northern side of such a continuation indicates that sources additional to a simple thin sheet must be involved. The northern boundary of the survey limits more definite conclusions concerning this group of anomalies.

All the four lineations are considered to be due to dykes, intruded into the Lower Proterozoic sediments, but the fact that no evidence of the cause of the lineations has been geologically mapped is surprising and remains unexplained. Owing to the difference in polarity, lineations 2 and 4 are probably of different age from lineations 1 and 3, a conclusion further substantiated by the common orientation of each pair. There is no clear indication as to which is the older pair but the fact that lineation 3 terminates at its southern end on the line of lineation 2 suggests that lineations 2 and 4 are older.

The anomaly group in the region of the Mount Bundey Granite/Mount Goyder Syenite igneous complex has been adequately explained by the results of the Mount Bundey detailed aeromagnetic survey (Milsom & Finney, 1965).

Owing mainly to its line spacing of one tenth of a mile compared to the half-mile spacing for the contract survey, the detailed survey revealed much more information on the Mount Bundey/Mount Goyder region than could possibly be obtained from the contract survey. Comment on this region will therefore be confined to stating that magnetic data from two surveys showed general agreement, and the detailed survey indicated that the anomalies at Mount Bundey are due primarily to remnants of metamorphosed country rock, not to the granite and syenite. The latter conclusion is of value when considering the granite areas of the Ban Ban and Burrundie areas.

The axis of the Pine Creek Geosyncline is evident in the general magnetic contour pattern in the region north-north-west from Union Reefs into the Wool Wonga and Batchelor areas. However, if the Mount Bundey disturbances and the positive and negative lineations, which were discussed earlier, are ignored then the remaining contour pattern over the Marrakai, Batchelor, Mount Bundey, and Wool Wonga areas is relatively flat and featureless. This is particularly so for Marrakai and Mount Bundey, although about nine miles east of the Annaburroo Homestead, in the Mount Bundey area, the fold pattern about a north-south axis in the Golden Dyke Formation sediments correlates with the magnetic pattern. Here the magnetic troughs correspond to the mapped anticlinal positions, suggesting that the Golden Dyke Formation has a greater susceptibility than the underlying Masson Formation.

In the Burrundie and Ban Ban areas, where the Cullen Granite crops out extensively, the granite has virtually no magnetic expression, the few minor anomalies that are evident being possibly due to small unmapped roof pendants of Lower Proterozoic sediments, as are thought to exist at Mount Bundey. The relatively undisturbed magnetic field over the granite is in marked contrast to the highly disturbed field over much of the sedimentary rocks in these two sheets. It is clear that the traverse spacing is not small enough to allow satisfactory delineation of the smaller anomalies in the disturbed area, as is evident from the numerous anomalies recorded on only one traverse.

In the Ban Ban area, considerable magnetic disturbance exists over part of the Masson Formation particularly in the vicinity of the Cullen Granite. However, at a distance of more than about four miles from the granite on the northern and western sides the disturbance over the Masson Formation is markedly less. Immediately to the west of Mount Masson a belt of relatively undisturbed magnetic field runs from south to north, almostacross the sheet, over the Masson Formation. It continues south into the Burrundie area. An anomalous zone, marked B in Plate 11, is adjacent to this relatively undisturbed field on the western side, but this occurs over the Golden Dyke Formation and in proximity to many dolerite dykes and sills. In the Burrundie area, the magnetic field associated with the Masson Formation is much the same as described above. In the northern part of the Mount Bundey area sills and dykes, described as intermediate in composition, occur in the Masson Formation but have virtually no magnetic expression.

It is thus clear from the disposition of magnetic disturbance over the Masson Formation that granite is associated with the creation of this disturbance. The method of emplacement of the granite is not clear but a process of magnetic stoping, as suggested for the Mount Bundey Granite (Hasan, 1958), would appear to be sufficient to cause thermal metamorphism of the iron-rich components of the sediments and the subsequent imparting of thermo-remanent magnetism to them. Whether the metamorphism is an essential part of this process is debatable, but if not it would probably allow much thicker layers of the sediments to aquire thermo-remanence. However, neither alternative appears to conflict with the magnetic evidence. The iron-rich components could be the weathered rock of doubtful origin (Dow & Pritchard, 1958), the chlorite in the arenaceous divisions, the pyritic slate in the argillaceous divisions, dolerite sills and dykes, or some combination of these.

The above interpretation leads to the conclusion that granite exists beneath all that part of the Masson Formation which is highly disturbed, but is absent from the remainder. Plate 11 shows the region, marked with a letter A, where this buried granite is thought to exist. Most of the anomalies in region A, and particularly in that part of the region remote from granite contact, are due to sources at a depth of at least one thousand feet, indicating that the granite is buried at least this deep. Greater depths to the granite could be expected depending on the thickness of the metamorphic aureole. The magnetic trends in region A follow the strike fairly closely on the western side but in the part east of Jessop's lode and Mount Masson it is the faulting that relates to such magnetic trends as do exist. This gives rise to the hope that the planned detailed aeromagnetic survey of this area will reveal the structure in greater detail than is known at present.* This also applies to the alluvial covered part in the vicinity of the Mary River.

The Golden Dyke Formation exhibits a wide range of magnetic expression, in a somewhat similar way to the Masson Formation. In the northern half of the survey area, and with the exceptions mentioned earlier, the contour pattern is particularly flat. However, in the Ban Ban and Burrundie areas, a highly disturbed pattern is usual, and here the Golden Dyke Formation is always associated with basic intrusives, although individual anomalies do not always correspond to the igneous outcrops. Assuming that the presence of basic intrusives is essential for the creation of magnetic sources it is likely that where the basic outcrops have no magnetic expression a lithological difference, due probably to weathering, is the reason.

The southern part of the anomalous magnetic zone, feature B (Plate 11), shows a correlation with the basal beds of the Golden Dyke Formation, which are rich in pyrite. Although the magnetic maxima along this part of the ridge fall over the Masson Formation, slightly to the east of the Golden Dyke Formation outcrops, the general strike and dip, together with the moderately deep position of the magnetic sources, suggests that the sources are within the Golden Dyke Formation basal beds. The boundary of feature B has been drawn generally through points of inflection in the total magnetic field.

The outcrops of dolerite sills in the Golden Dyke Formation in the western part of the Burrundie area correlate reasonably well with the magnetic trends (which invariably follow the strike) within the limits determined by the aeromagnetic line spacing and the possible effect of weathering on the upper parts of the sills. A similar correlation also occurs in areas Ban Ban (BMR map No. G156-2) and Burnside (BMR map No. G159-2) of the earlier surveys, in the vicinity of the Burnside Granite and Margaret Granite, despite the large contour interval (100 gammas) for these data. The depth of burial of the magnetic sources in the western part of the Burrundie area is usually in the order of several hundred feet and considerably greater than a thousand feet in some cases, assuming sources of a localised nature. It is considered likely that the presence of granite adjacent to or beneath the basic intrusives of Golden Dyke Formation is a factor in producing magnetic sources, but the evidence is not very definite. It would be necessary to postulate a narrow tongue of granite beneath the magnetic ridge of feature B.

In the western part of Wool Wonga, intermediate intrusives have been mapped in the Burrell Creek Formation. Here there is no definite magnetic effect associated with the intrusives, but in the region of the North Ringwood and South Ringwood mines a trend, marked C in Plate 11, is seen passing close to both groups of mines. This trend might be brought about by a lithological change at shallow depth within the Burrell Creek Formation, but it seems more likely that it derives from a very deep source possibly outside the formation. A similar situation exists in the Batchelor area, where, excepting the lineations, the contour pattern appears to be derived from a deep magnetic basement underneath the Burrell Creek Formation.

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* Editor's note. The results of this detailed survey have recently been published (Tipper & Finney, 1966).

It is in the Pine Creek Geosyncline, in the Ban Ban and Burrundie areas, that the magnetic pattern over the Burrell Creek Formation is the most complex. Anomalies are common in the Burrell Creek Formation near the contact with the Cullen Granite but not near the contact with the McKinlay Granite. However, the line of anomalies at the contact east of Union Reefs continues in a north-north-westerly direction away from the Cullen Granite, reaching an established fault near Burrundie. This line, marked D in Plate 11, could be due to a dyke, possibly intruding a fault plane and creating magnetic sources at various depths. These sources are several hundreds of feet deep to the east of Union Reefs, very close to the surface to the east of Spring Hill, and very deep to the east of Burrundie, although at the latter position there is evidence of a faulted block. A second line, marked E in Plate 11, ends close to an established fault (with which it is collinear) at a point south of Spring Hill. Magnetic sources on this line are mostly many hundreds of feet deep. No faults or shear zones are mapped along these two lines although many shear zones are known in the region north and south of Union Reefs.

4. CONCLUSIONS AND RECOMMENDATIONS

The most interesting result of the survey is the detection of four pronounced magnetic lineations of considerable length, which have been interpreted as due to steeply dipping dykes, two being negatively polarised. There does not appear to be previous evidence for the existence of these structures and their origin remains unexplained. It is recommended that a more detailed geological examination be made at points where the postulated dykes are thought to be shallow and the older rocks are not soil covered. Geochemical traversing might indicate whether economical minerals are present should geological examination be unsuccessful. If it becomes desirable to test the dykes by drilling, it is recommended that detailed magnetic surveying be done to enable drill holes to be accurately positioned.

In the Burrundie and Ban Ban areas, extensive magnetic disturbance over the Masson Formation is believed to have been brought about by the presence of granite beneath the formation acting on the iron-rich components within it.

The Golden Dyke Formation exhibits a wide range of magnetic expression and in the Ban Ban and Burrundie areas it appears to be invariably associated with basic intrusives. In the western part of Burrundie, it is considered that granite in the vicinity of the basic intrusives might be a contributing factor in producing magnetic sources.

The magnetic pattern over the Burrell Creek Formation in the Ban Ban and Burrundie areas is most complex in the Pine Creek Geosyncline. Anomalies in this formation are common near the contact with the Cullen Granite but not near the contact with the McKinlay Granite. Two lines of anomalies in the Burrundie area are thought to be due to dykes.

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APPENDIX

Operational Details

Contractor : Adastra Hunting Geophysics Pty Ltd, Sydney

Specifications :

Height : Nominally 500 feet above ground level

Line spacing : Nominally 0.5 mile

Traverse direction : East-west

Magnetometer sensitivity : 600 gammas f.s.d.

Magnetometer chart speed : 6 inches per minute

Radio altimeter sensitivity : 800 feet f.s.d.

Radio altimeter chart speed : 3 inches per minute

Storm warning detector sensitivity : 250 gammas f.s.d.

Storm warning detector and diurnal monitor acceptance criterion : 5 gammas change in 5 minutes

Storm warning detector chart speed : 1.5 inches per minute when flying in progress

1.5 incher per hour at other times

Equipment :

Magnetometer : Gulf Mark 3, with tail boom installation

Recorder : Gulf, 10-inch chart

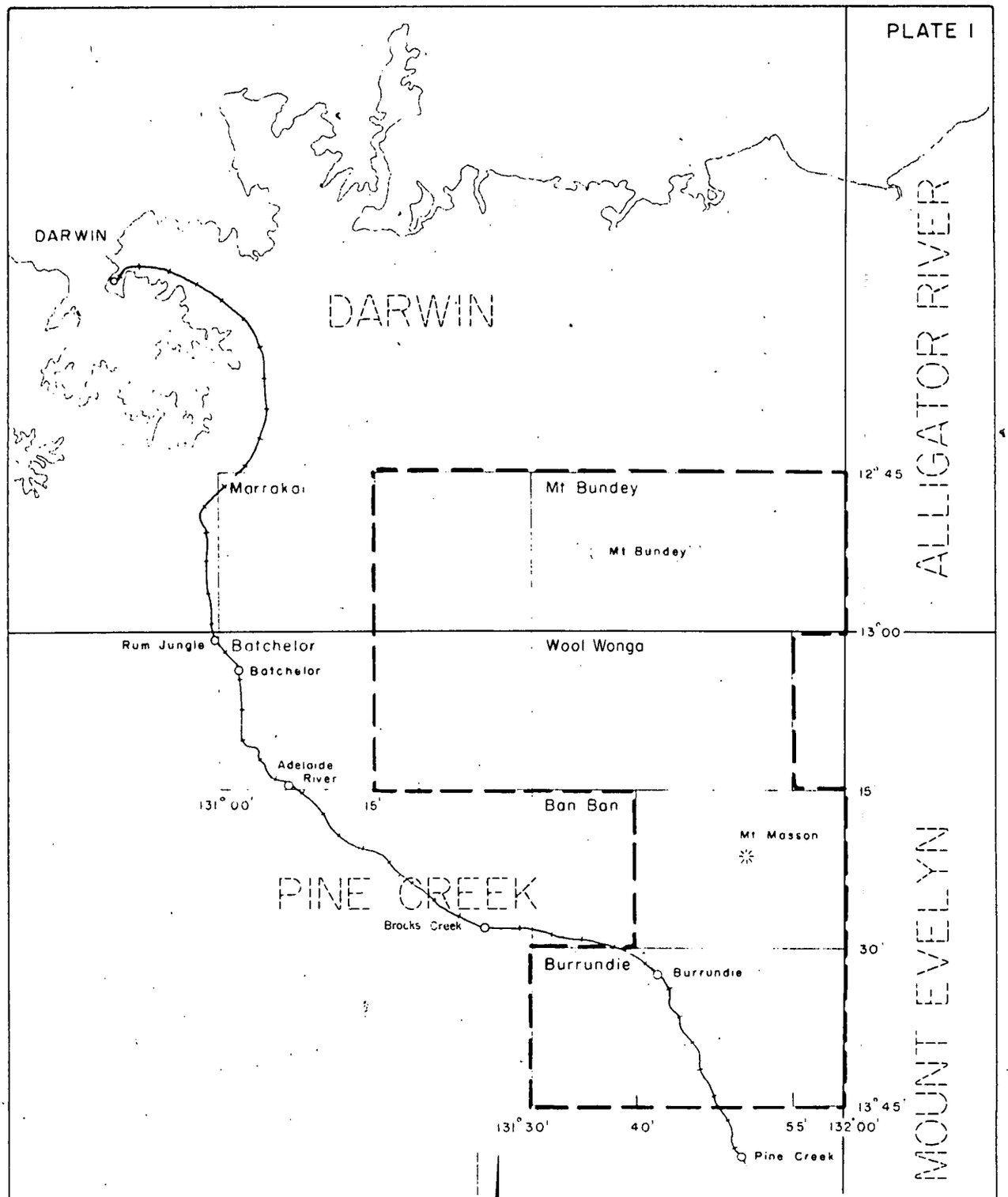
Radio Altimeter : APNI, with Esterline Angus recorder

Camera : de Havilland, 35 mm., frame type

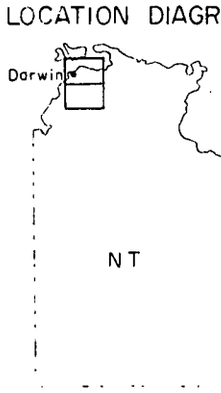
Storm warning detector and diurnal monitor : Gulf, with Esterline Angus recorder

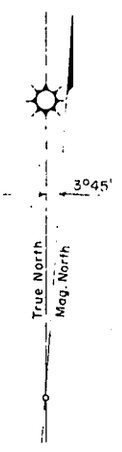
Aircraft : Aero Commander

PLATE I



LOCATION DIAGRAM





LEGEND

- Railway
- Named place
- Boundary of 1:250,000 map area
- Boundary of 1:63,360 map area
- Survey boundary

CONTRACT AEROMAGNETIC SURVEY, 1963

DARWIN - PINE CREEK

NORTHERN TERRITORY

LOCALITY MAP

10 0 10 20 30 40 50 MILES

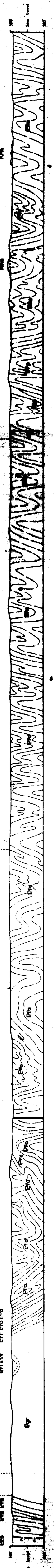
10 0 10 20 30 40 50 60 70 80 KILOMETRES

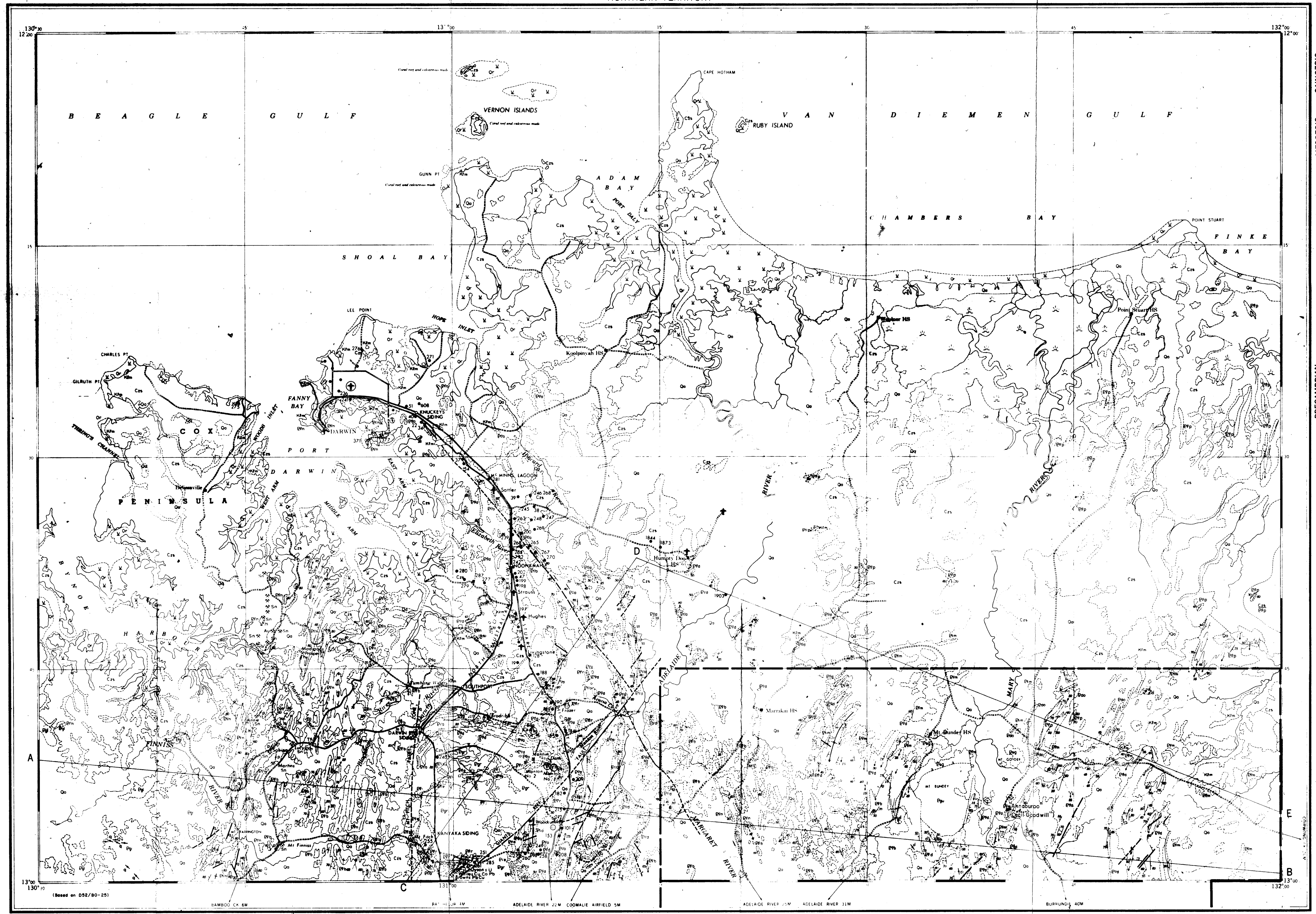
Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics D52/BI-29

To Accompany Record No. 1966/101

AUSTRALIA 1: 250.000

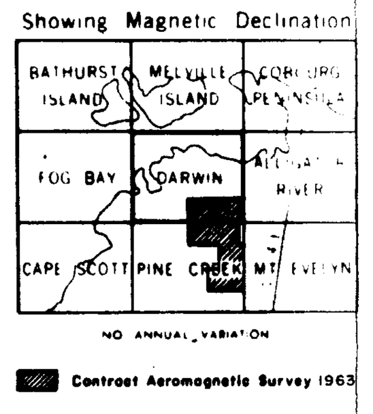
DARWIN
NORTHERN TERRITORY





Geological and planimetric mapping from 1:250,000 Scale Geological Series Sheet SD52-4, First Edition 1961.
Bureau of Mineral Resources, Geology and Geophysics.
Transverse Mercator Projection.

INDEX TO ADJOINING SHEETS
Showing Magnetic Declination



Contract Aeromagnetic Survey 1963

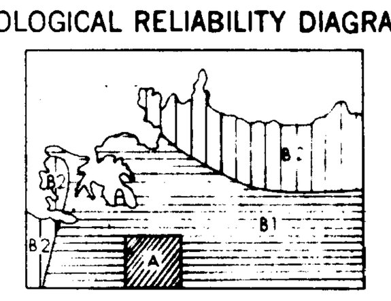
CONTRACT AEROMAGNETIC SURVEY, 1963

GEOLOGY

5 0 5 10 15 MILES

5 0 5 10 15 20 KILOMETRES

GEOLOGICAL RELIABILITY DIAGRAM



A. Detailed Mapping
B1. Detailed reconnaissance; numerous traverses
B2. Air-photo interpretation and traverses

Reference

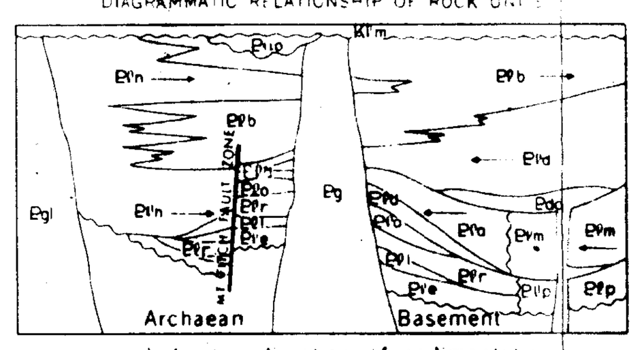
Era	Period	Unit	Symbol	Description
CAINOZOIC	QUATERNARY		Qr	Coastal sediments
			Qa	Alluvium, soil; Swamp
	UNDIFFERENTIATED		Czs	Ferruginous gravel, residual sand and laterite. Ferruginous cemented detritus
MESOZOIC	LOWER CRETACEOUS	Mullaman Beds	Klm	Mainly marine sediments. Sandstone, conglomerate, radiolarian shale, porcellanite
PRECAMBRIAN	UPPER PROTEROZOIC	Tolmer Group: Buldiva Sandstone, Depot Creek Sandstone Member	Buo	Pink quartz sandstone, ripple-marked in places, with lenses of hematite-rich breccia and quartz pebble conglomerate
	LOWER PROTEROZOIC (AGICONDIAN SYSTEM)	Rum Jungle Granite	Bgr	Biotite granite
		Mt Bundey Granite	Bgu	Biotite-hornblende granite, adamellite
		Litchfield Complex	Bgl	Garnetiferous granite and granodiorite, muscovite-biotite granite
		Roberts Creek Granite	Bgo	Garnetiferous granite
		Goyder Syenite	Bsg	Quartz syenite and syenite
			Bdo	Dolerite sill and dykes
		Finniss River Group: Burrell Creek Formation	Blb	Siltstone, greywacke siltstone, greywacke
		Finniss River Group: Noltenius Formation	Bln	Quartz greywacke, quartz pebble conglomerate, greywacke, siltstone
		Goodparla Group: Golden Dyke Formation	Bld	Quartz siltstone and carbonaceous siltstone in places pyritic, thin bedded siltstone; marl and dolomite; bedded, nodular and massive chert. Dolomitic slump breccia, silicified in places. Pyritic, carbonaceous dolomitic marl, in places slumped and brecciated and containing chert lenses, bands and nodules.
		Goodparla Group: Masson Formation	Blm	Quartz greywacke, quartz sandstone, pyritic carbonaceous siltstone, minor carbonaceous siltstone with chert nodules, quartz pebble conglomerate
		Goodparla Group: Acacia Gap Tongue	Bla	Quartz greywacke, quartz sandstone, pyritic and silicified in places, pyritic carbonaceous siltstone and siltstone
		Goodparla Group: Mt Partridge Formation	Blp	Quartz sandstone, siltstone, pebble conglomerate
		Batchelor Group: Coomalie Dolomite	Blo	Silicified and metamorphosed dolomite, minor algal bioherms, calcilutite, siltstone, tremolite schist
		Batchelor Group: Crater Formation	Blr	Quartz greywacke, greywacke, arkose, fine and pebble conglomerate, siltstone, pyritic carbonaceous dolomitic marl, in places slumped and brecciated and containing chert lenses, bands and nodules
		Batchelor Group: Celia Dolomite	Bll	Algal dolomite, in places silicified and metamorphosed, silicified dolomitic breccia, tremolite schist
		Batchelor Group: Beestons Formation	Ble	Arkose, greywacke, siltstone, conglomerate, arkosic conglomerate

- Geological boundary
- Syncline, showing plunge
- Fault (q indicates quartz filling)
- Where location of boundaries, folds and faults is approximate, line is broken, where inferred, queried, where concealed, boundaries and folds are dotted, faults are shown by short dashes
- Strike and dip of beds
- Vertical beds
- Trend of bedding, showing direction of dip
- Dyke or vein q — quartz; p — pegmatite, d — dolerite
- Mine or prospect
- Au Gold
- Co Cobalt
- Cu Copper
- Pb Lead
- Sn Tin
- Th Thorium
- U Uranium

Circle around mineral symbol indicates unexploited deposit

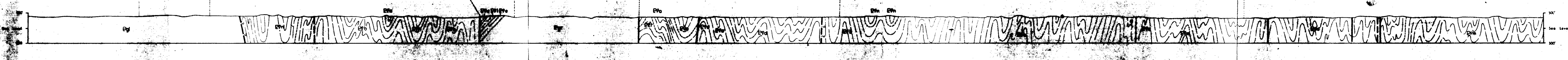
- ● 185 Successful water bore showing reference number
- Salt water bore
- Unsuccessful bore for water
- Bore(s) for water Darwin Area — for detail see Explanatory Notes, Plate 3
- Mangroves
- Seaward limit of tidal swamps
- Homestead
- Railway
- Highway
- Vehicle track
- Airport
- Landing Ground
- Contract survey boundary

DIAGRAMMATIC RELATIONSHIP OF ROCK UNITS

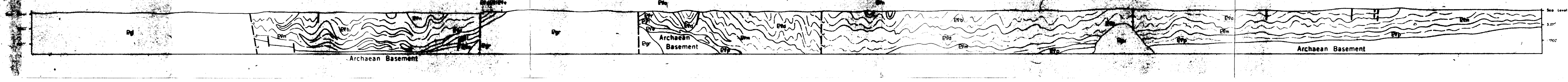


Indicates direction of sedimentation
Unconformity

Section A - B
(Folding partly diagrammatic)
SCALE: V/H = 10



Diagrammatic Section A-B
SCALE V/H = 1

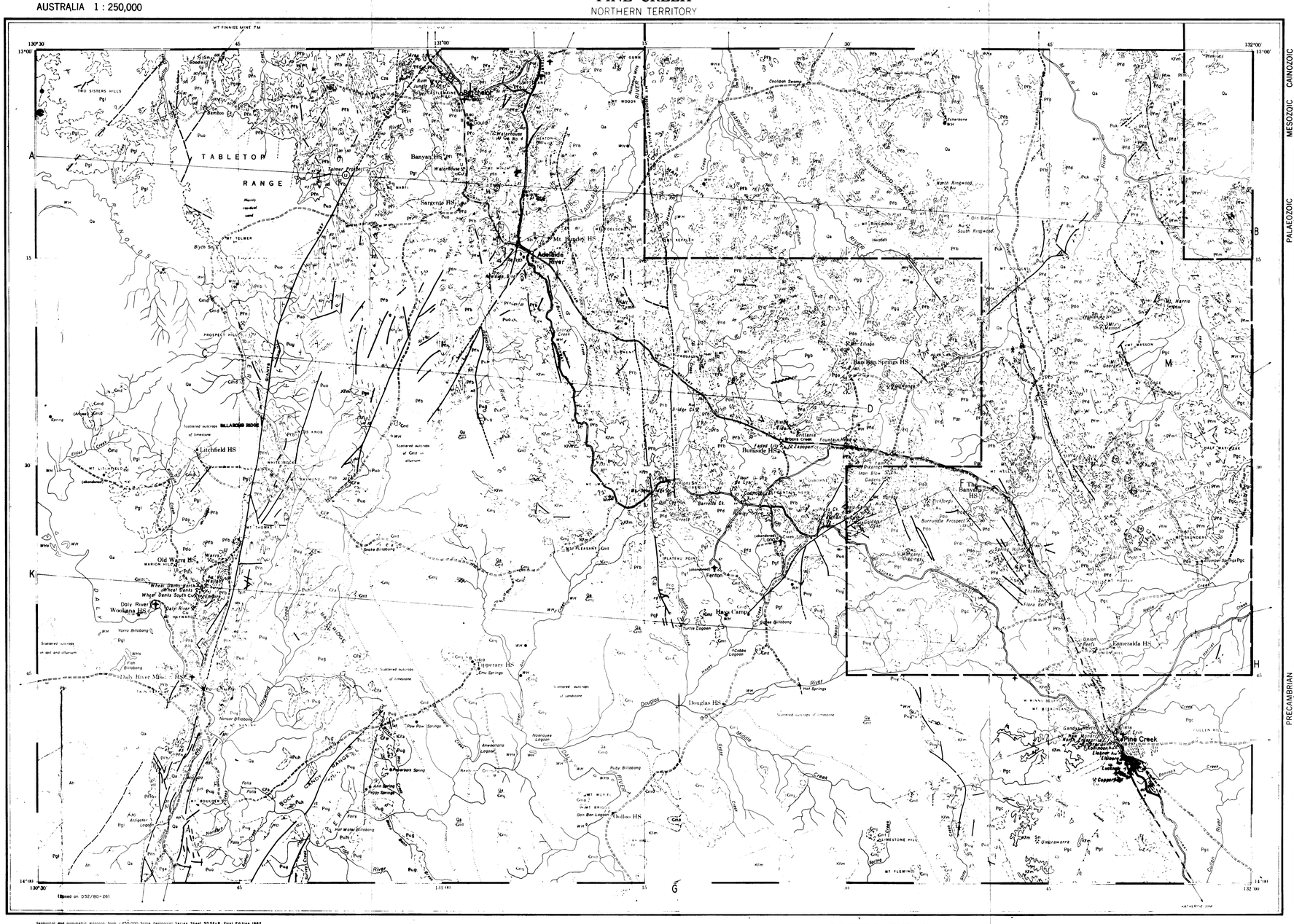


AUSTRALIA 1 : 250,000

PINE CREEK

NORTHERN TERRITORY

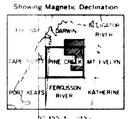
PLATE 3



Geological and planimetric mapping from 1:250,000 Scale Geological Series Sheet SD52-8, First Edition 1962.
Bureau of Mineral Resources, Geology and Geophysics.
Transverse Mercator Projection

INDEX TO ADJOINING SHEETS

Showing Magnetic Declination



CONTRACT AEROMAGNETIC SURVEY, 1963

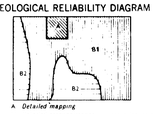
GEOLOGY

Sections

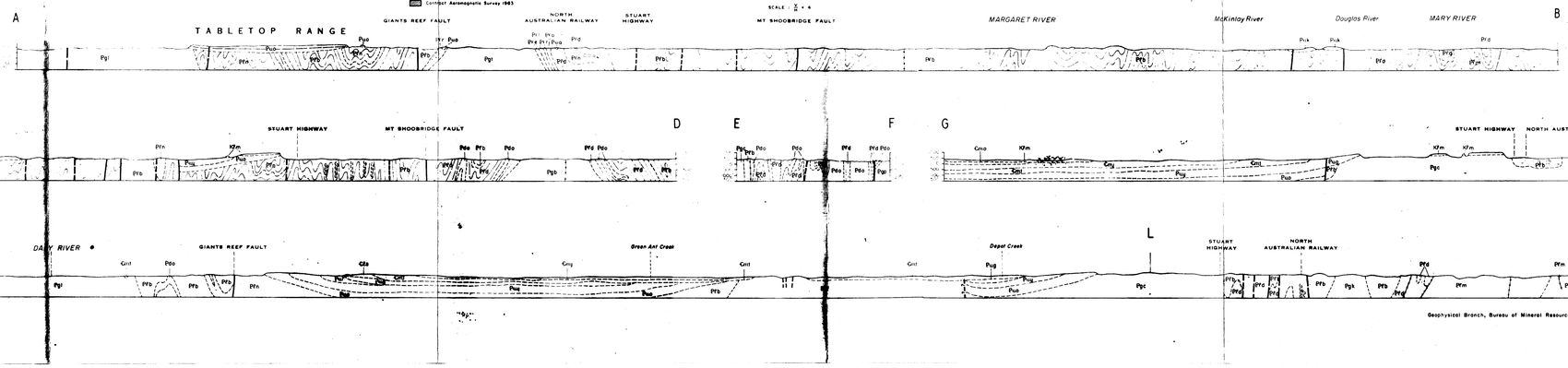
(Folding partly diagrammatic)

SCALE 1 : 4

GEOLOGICAL RELIABILITY DIAGRAM



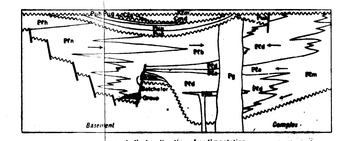
A Detailed mapping.
B1 Detailed reconnaissance numerous traverses
B2 Air-photo interpretation and traverses



Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. D52/BI-21

TO ACCOMPANY RECORD No. 1966/101

DIAGRAMMATIC RELATIONSHIP OF ROCK UNITS



Indicates direction of sedimentation

unconformity

Reference

CAINOZOIC	QUATERNARY	Qa	Alluvium, soil, sand and ferruginous gravel
		Czs	Ferruginous cemented detritus
MESOZOIC	LOWER CRETACEOUS	Mullaman Beds Klm	Undifferentiated freshwater and marine sandstone, siltstone and conglomerate
PALAEOZOIC	MIDDLE CAMBRIAN	Daly River Group Cmd	Undifferentiated
		Cmo Oolloo Limestone	Silicified limestone, in places containing algae
		Cmj Jinduckin Formation	Medium and fine-grained sandstone with halite casts, some limestone lenses
		Cmt Tindall Limestone	Fossiliferous limestone with chert lenses and nodules
	LOWER CAMBRIAN	Cantrim Plateau Volcanics Cfa	Mainly basalt with some tuffaceous sandstone
		Witch Wai Conglomerate Cfw	Boulder and pebble conglomerate and some sandstone
	UPPER PROTEROZOIC	Tolmer Group: Waterbag Creek Formation Pug	Ferruginous sandstone and siltstone with halite casts; limestone lenses
		Hinde Dolomite Puh	Dolomite with algal reefs
		Bulldwa Sandstone: Stray Creek Sandstone Member Pus	Flaggy quartz sandstone and colour banded siltstone
		Depot Creek Sandstone Member Pud	Pink ripple-marked quartz sandstone containing lenses of hematite-rich, silicified siltstone breccia and quartz pebble conglomerate
		Katherine River Group: Kombolgie Formation Puk	Quartz sandstone, current-bedded and ripple-marked in places; quartz greywacke, quartz pebble and cobble conglomerate
		Allia Granite Pga	Coarse, porphyritic biotite-hornblende granite
		Burnside Granite Pgb	Muscovite-biotite adamellite
		Cullen Granite Pgc	Composite batholith ranging from adamellite to granite, with syenite differentiates
		Reynolds River Granite Pgr	Pink coarse-grained leucocratic granite
		Fenton Granite Pgf	Biotite granite
		Margaret Granite Pgg	Biotite adamellite
		Shoobridge Granite Pgh	Fine to medium-grained adamellite
		McKinlay Granite Pgk	Biotite granite
		Prices Springs Granite Pgp	Biotite-hornblende granite
		Rum Jungle Granite Pgr	Biotite granite
		Waterhouse Granite Pgt	Porphyritic granite and adamellite
		Roberts Creek Granite Pgo	Garnetiferous granite
		Litchfield Complex Pgl	Garnetiferous granite and granodiorite, two-mica granite, epidiorite, amphibolite. May contain some metamorphosed Archaean rocks
		Pdo	Diorite, epidiorite, amphibolite
		Finniss River Group: Chilling Sandstone Pfh	Quartz sandstone, ripple-marked in places, and quartz greywacke
		Burrell Creek Formation Pfb	Siltstone, greywacke-siltstone and greywacke. Silicified calcareous greywacke. Mica schist and andalusite-mica schist
		Noltenius Formation Pfn	Quartz greywacke, greywacke, quartz pebble conglomerate, siltstone. Mica schist and andalusite-mica schist
		Goodparla Group: Golden Dyke Formation Pfd	Quartz siltstone, pyritic carbonaceous siltstone, in places slumped and brecciated and containing chert lenses; minor thin-bedded siltstone, dolomite, massive, bedded and nodular chert, silicified dolomitic slump breccia
		Masson Formation Pfm	Quartz greywacke, quartz sandstone and siltstone. Pyritic carbonaceous siltstone partly slumped and brecciated and containing chert lenses. Pyritic siltstone in places capped by iron ore
		Acacia Gap Tongue Pfa	Quartz greywacke and quartz sandstone, pyritic and silicified in places. Siltstone and pyritic carbonaceous siltstone
		Batchelor Group: Coomalie Dolomite Pfo	Silicified and metamorphosed dolomite, in places containing algal bioherms. Calcilutite, siltstone, tremolite schist. Dolomitic slump breccia
		Crater Formation Pfr	Quartz greywacke, greywacke, arkose, fine- and pebble conglomerate, siltstone. Pyritic carbonaceous, dolomitic marl, in places slumped and brecciated, and containing chert lenses and nodules
		Celia Dolomite Pfi	Silicified dolomite, in places with "Collenia" tremolite schist
		Beestons Formation Pfe	Arkose, greywacke, conglomerate, siltstone, quartz sandstone
	ARCHAEAN	Hermit Creek Metamorphics Ah	Migmatite, quartzite, banded granulite, schist. Some undifferentiated Lower Proterozoic intrusives

Geological boundary

Fault

Where location of boundaries and faults is approximate, line is broken; where inferred, dashed; where concealed, boundaries are dotted. Faults are indicated by short dashes

Strike and dip of strata

Vertical strata

Dip <15°

Joint pattern (air-photo interpretation)

Trend of bedding showing direction of dip

Plunge of fold

Strike and dip of foliation

Trends in Archaean metamorphics

Shear zone

Dyke or vein: q quartz, p pegmatite, d diorite

Mineralised locality

Mine

Ag Silver
Au Gold
Cu Copper
Fe Iron
Mn Manganese
Pb Lead
Sn Tin
U Uranium
Zn Zinc

Circle around mineral symbol indicates unexploited deposit

Highway

Road

Vehicle track

Railway

Telegraph line

Homestead

Water bore (numbers refer to Wells Inventory record)

Height in feet, barometric, datum mean sea level

Landing ground

WH Waterhole

Yard

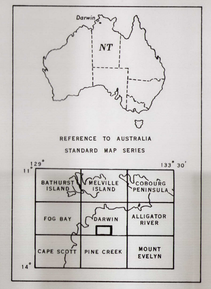
Contract Survey boundary

AUSTRALIA 1:63,360

MARRAKAI
NORTHERN TERRITORY

12° 45' 33 73 846yN
13° 00' 400 000yE
459 382yE 13° 15' 0
12° 45' 33 73 789yN
33 43 601yN 13° 00' 400 000yE
459 325yE 13° 15' 0
33 43 543yN 13° 00'

LOCATION DIAGRAM



REFERENCE TO AUSTRALIA STANDARD MAP SERIES

DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Royal Australian Survey Corps planimetric compilations of the same area*

FLIGHT-LINES:- *Error in position generally less than $\frac{1}{10}$th mile*

NOTE:- *A one mile = one inch map of Rum Jungle District showing total magnetic intensity in the western part of Marrakai was previously issued by the Bureau of Mineral Resources (No G 71-92A)*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

MILES 1 0 1 2 3 4 5 MILES

KILOMETRES 1 0 1 2 3 4 5 KILOMETRES

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Highway or main road
- Secondary road
- Road or track
- Railway and siding
- Built up area
- Named place
- Homestead
- Mine
- Aerodrome or landing ground
- Hill feature
- Swamp

MAGNETIC DATA

- Magnetic contours
- Magnetic "low"
- Contour flight-line intersections

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey made in 1963 by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the structure and composition of rocks to aid mineral exploration and geological mapping.

The survey was made at an altitude of 500 feet above ground level along lines spaced a ½ mile 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 12.0 gammas per mile in a direction S. 10° W.

MARRAKAI, NT

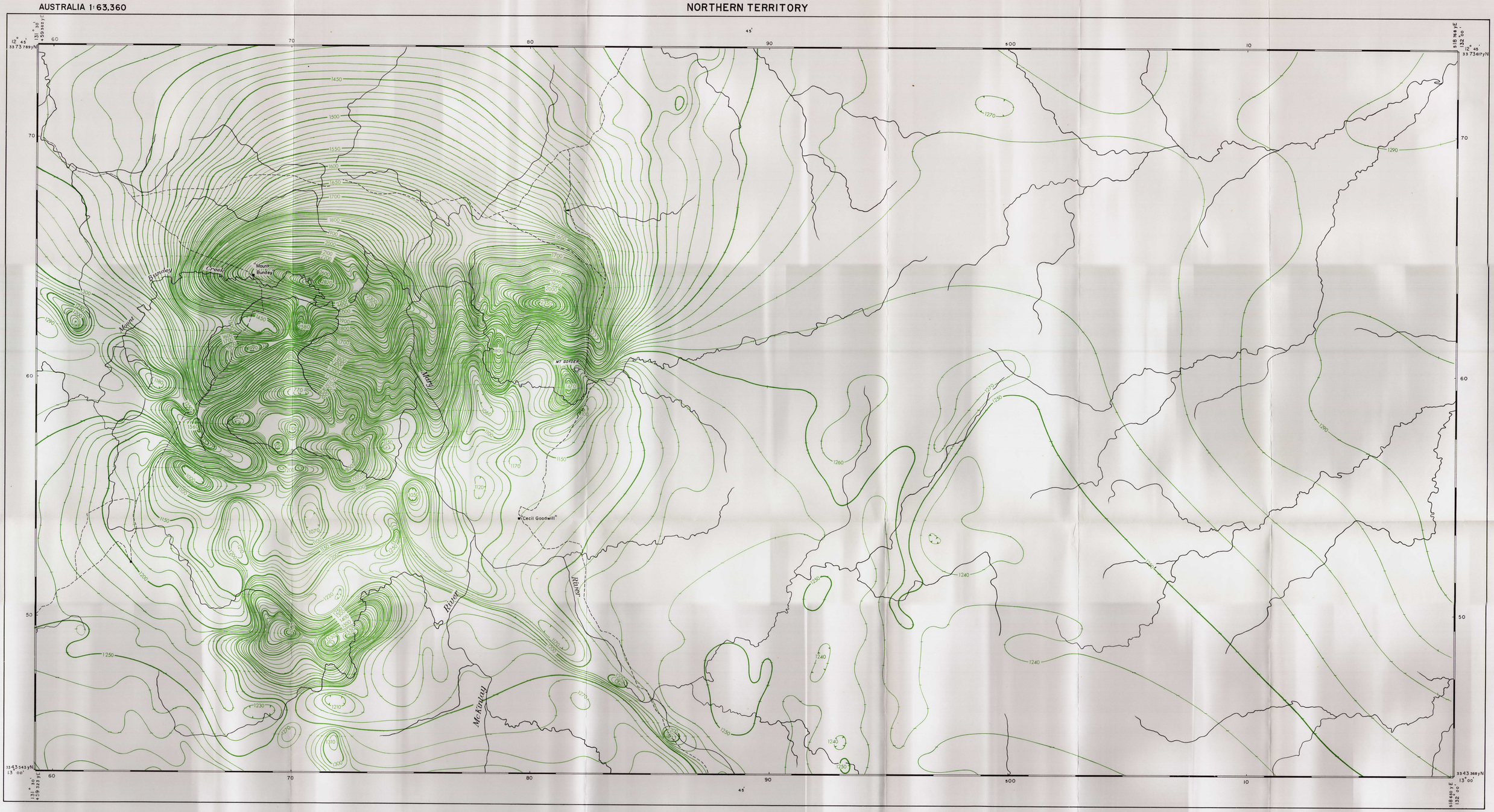
REFER TO THIS MAP AS: D 52/B1-14

1964

PLATE 5

MOUNT BUNDEY
NORTHERN TERRITORY

AUSTRALIA 1:63,360

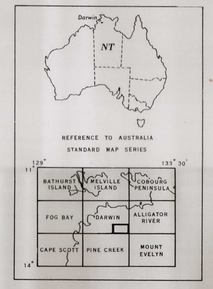


12° 45' 33 73 787 yN
131° 30' 459 322 yE
12° 45' 33 73 617 yN
318 760 yE 132° 00'
33 43 543 yN 13° 00'
131° 30' 459 323 yE
33 43 368 yN 13° 00'
318 650 yE 132° 00'

60 70 80 90 500 10 45'

50 60 70

LOCATION DIAGRAM



DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CONTOURS COMPILED AND DRAWN BY ADASTRA HUNTING GEOPHYSICS PTY LTD

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Royal Australian Survey Corps planimetric compilations of the same area*

FLIGHT-LINES:- *Error in position generally less than $\frac{1}{10}$th mile*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Highway or main road
- Secondary road
- Road or track
- Railway and siding
- Built up area
- Named place
- Homestead
- Mine
- Aerodrome or landing ground
- Hill feature
- Swamp

MAGNETIC DATA

- Magnetic contours
- Magnetic 'low'
- Contour / flight-line intersections

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey made in 1963 by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the structure and composition of rocks to aid mineral exploration and geological mapping.

The survey was made at an altitude of 500 feet above ground level along lines spaced at 2 mile 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 12.0 gammas per mile in a direction S. 10° W.

MOUNT BUNDEY, NT

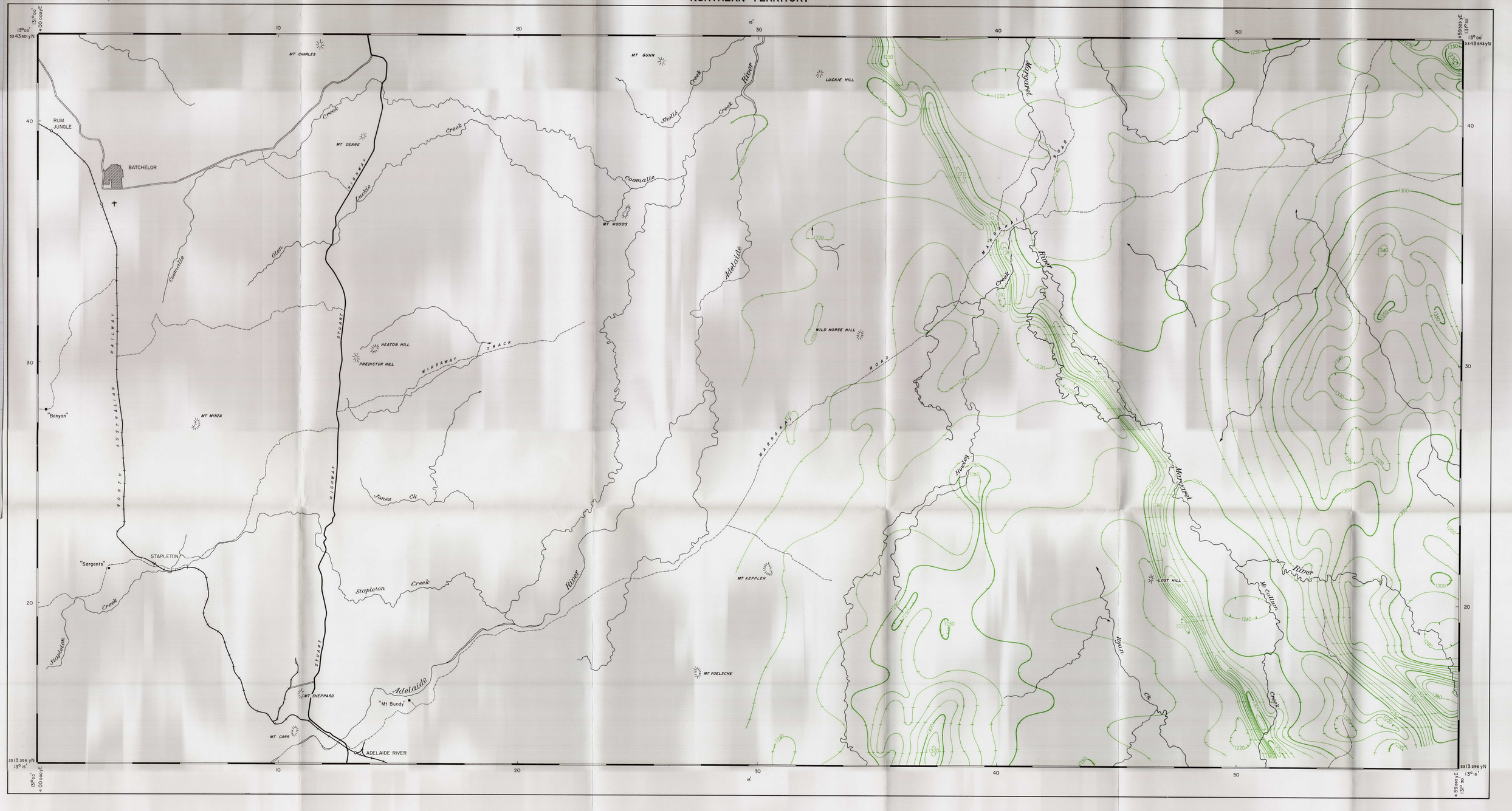
REFER TO THIS MAP AS: D 52 B1 - 16

1964

PLATE 6

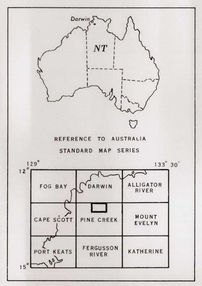
AUSTRALIA 1:63,360

BATCHELOR
NORTHERN TERRITORY



13°00' 400 000mE 33 43 601 mN
13°00' 459 323 mE 33 43 543 mN
13° 15' 33 13 356 mN 400 000 mE
13° 15' 33 13 296 mN 459 323 mE

LOCATION DIAGRAM



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CONTOURS COMPILED AND DRAWN BY ADASTRA HUNTING GEOPHYSICS PTY LTD
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MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Royal Australian Survey Corps planimetric compilations of the same area*

FLIGHT-LINES:- *Error in position generally less than $\frac{1}{4}^{th}$ mile*

NOTE:- *A one mile = one inch map of Rum Jungle District showing total magnetic intensity in the western part of Batchelor was previously issued by the Bureau of Mineral Resources (No G 71-92A)*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Highway or main road
- Secondary road
- Road or track
- Railway and siding
- Built up area
- Named place
- Homestead
- Mine
- Aerodrome or landing ground
- Hill feature
- Swamp

MAGNETIC DATA

- Magnetic contours
- Magnetic 'low'
- Contour/flight-line intersections

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey made in 1963 by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the structure and composition of rocks to aid mineral exploration and geological mapping.

The survey was made at an altitude of 500 feet above ground level along lines spaced a ½ mile 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.

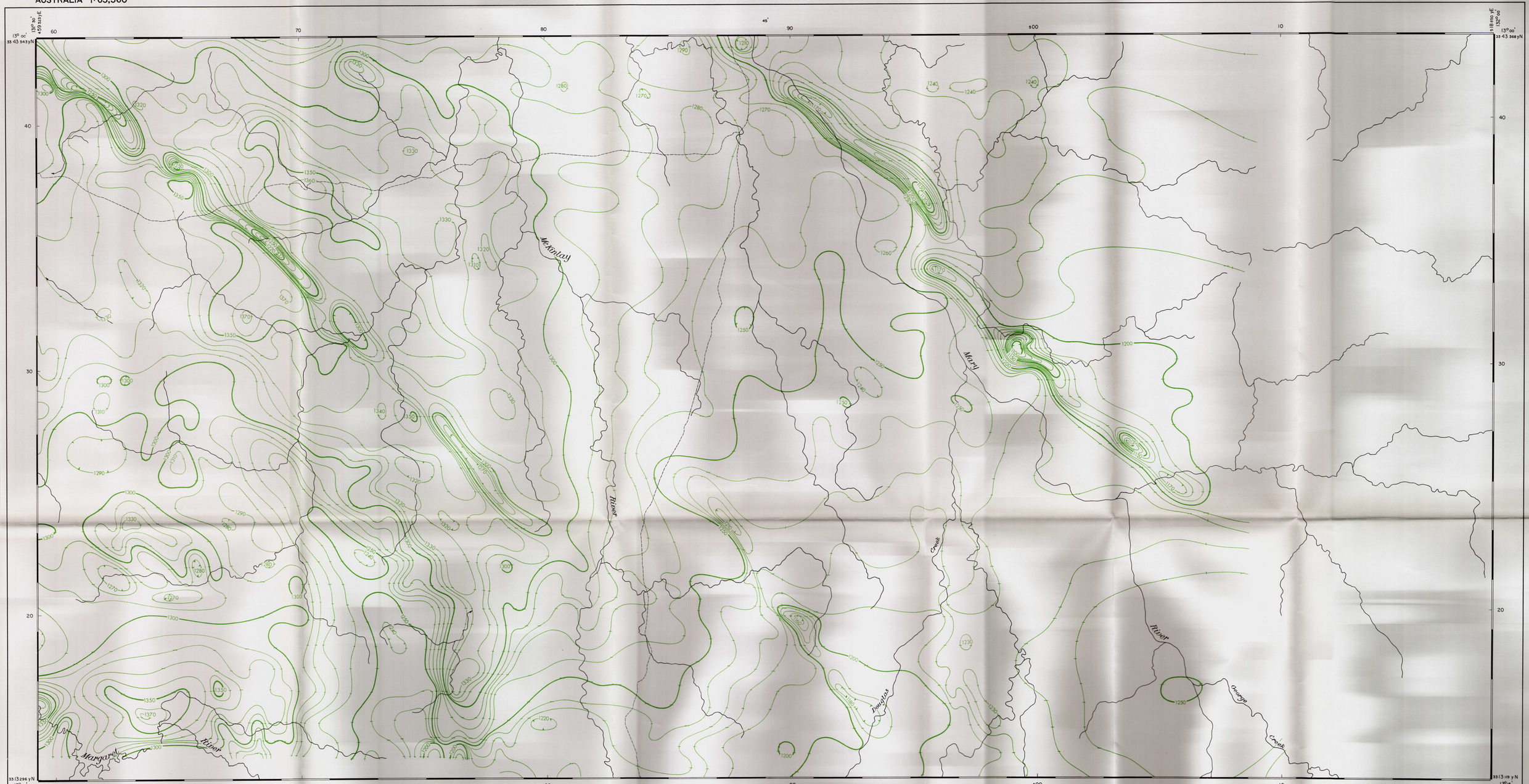
The total magnetic intensity was continuously recorded by an airborne magnetometer, and has been corrected for a regional gradient in total magnetic field of 12.0 gammas per mile in a direction S. 10° W.

BATCHELOR, NT
REFER TO THIS MAP AS: D 52/B1 - 15
1964

PLATE 7

WOOLWONGA
NORTHERN TERRITORY

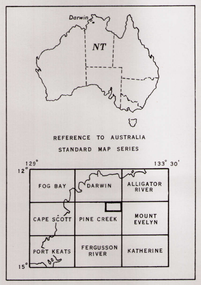
AUSTRALIA 1:63,360



33 13 296 y N
13° 15'
458 280 mE
13° 30' 459 323 mE
13° 00' 33 43 543 y N
518 650 mE
132° 00'
13° 00' 33 43 368 y N
33 13 119 y N
13° 15'

60 70 80 45' 90 500 10

LOCATION DIAGRAM



DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Royal Australian Survey Corps planimetric compilations of the same area*

FLIGHT-LINES:- *Error in position generally less than $\frac{1}{4}$ mile*

NOTE:- *A one mile = one inch map of Woolwonga showing total magnetic intensity in the western part was previously issued by the Bureau of Mineral Resources (No G 245-2)*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Highway or main road
- Secondary road
- Road or track
- Railway and siding
- Built up area
- Named place
- Homestead
- Mine
- Aerodrome or landing ground
- Hill feature
- Swamp

MAGNETIC DATA

- Magnetic contours
- Magnetic 'low'
- Contour/flight-line intersections

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey made in 1963 by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the structure and composition of rocks to aid mineral exploration and geological mapping.

The survey was made at an altitude of 500 feet above ground level along lines spaced a 2 mile 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 12.0 gammas per mile in a direction 5. 10° W.

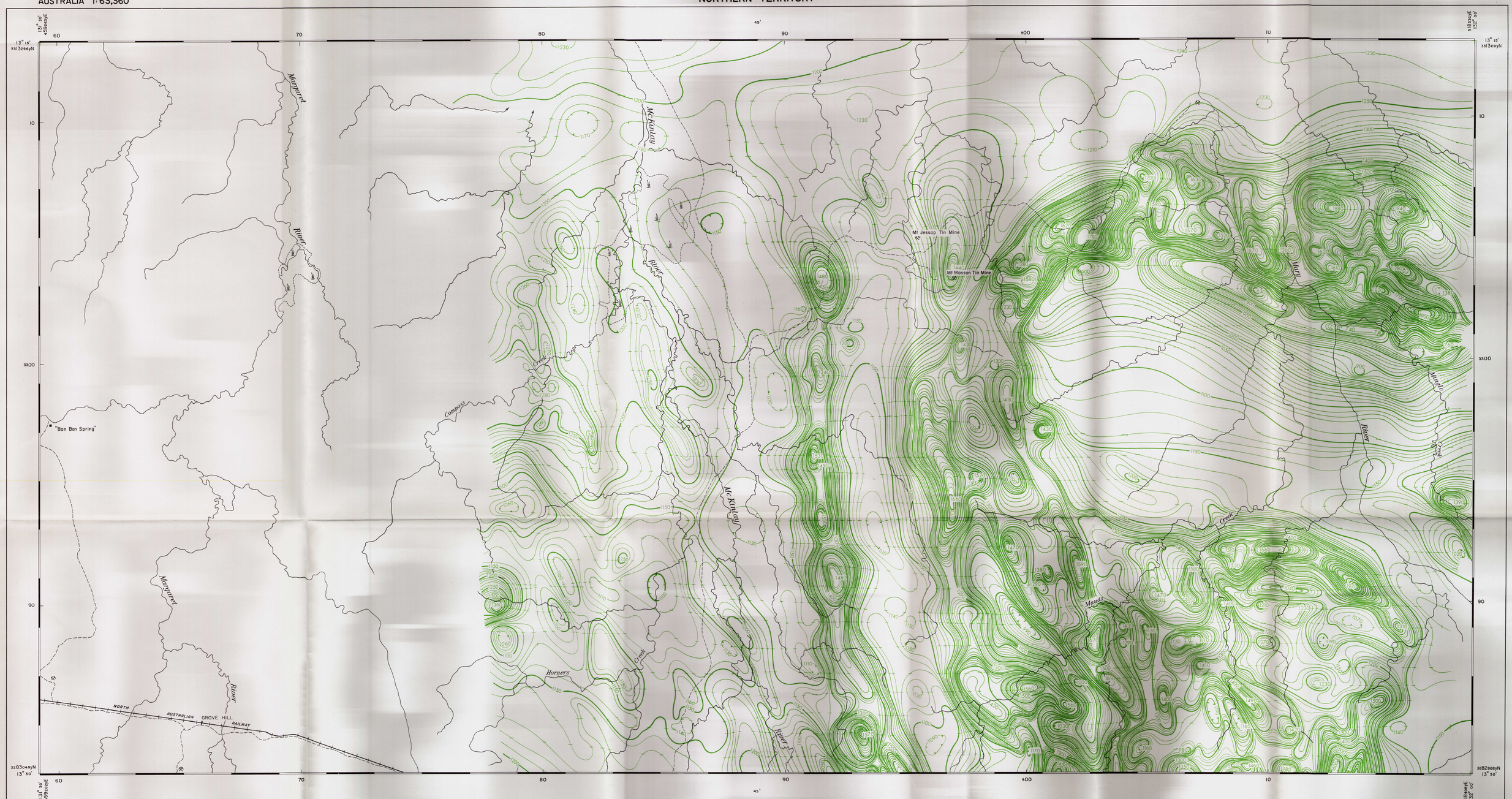
WOOLWONGA, NT

REFER TO THIS MAP AS: D 52/B1 - 17

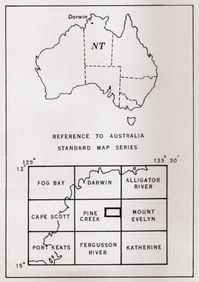
1964

BAN BAN
NORTHERN TERRITORY

AUSTRALIA 1:63,360



LOCATION DIAGRAM



DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CONTOURS COMPILED AND DRAWN BY ADASTRA HUNTING GEOPHYSICS PTY LTD

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Royal Australian Survey Corps planimetric compilations of the same area*

FLIGHT-LINES:- *Error in position generally less than $\frac{1}{16}$ mile*

NOTE:- *A one mile-one inch map of Ban Ban showing total magnetic intensity in the western part was previously issued by the Bureau of Mineral Resources (Nt-G 156-2)*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Highway or main road
- Secondary road
- Road or track
- Railway and siding
- Built up area
- Named place
- Homestead
- Mine
- Aerodrome or landing ground
- Hill feature
- Swamp

MAGNETIC DATA

- Magnetic contours
- Magnetic "low"
- Contour flight-line intersections

EXPLANATORY NOTES

This map was compiled from an airborne magnetic survey made in 1963 by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the structure and composition of rocks to aid mineral exploration and geological mapping.

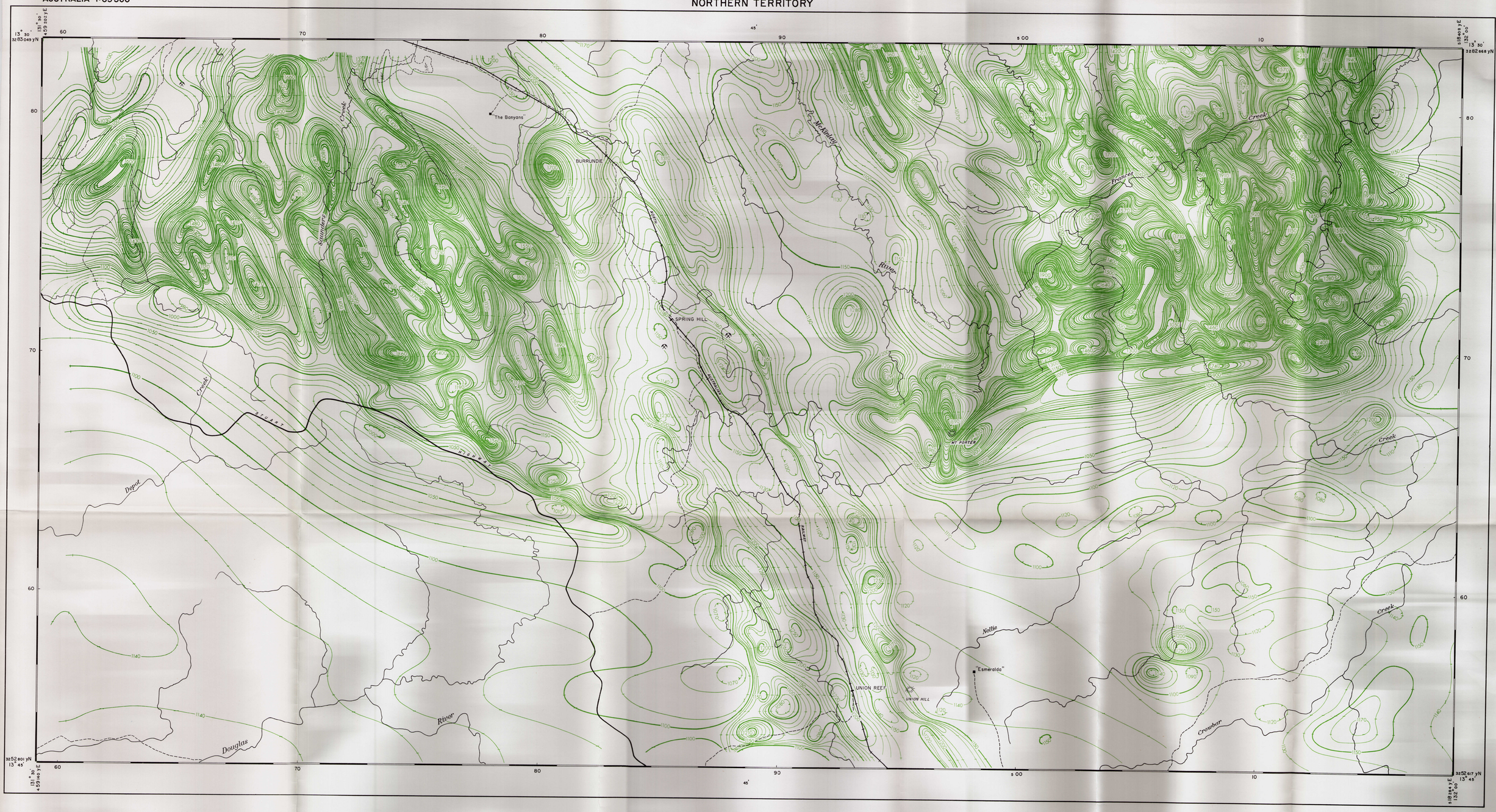
The survey was made at an altitude of 500 feet above ground level along lines spaced a 2 mile apart. The distance from aircraft to ground was measured with a continuously-recording radio altimeter. Aerial photographs were used for navigation, and the track of the aircraft was recorded by a 35-mm camera.

The total magnetic intensity was continuously recorded by an airborne magnetometer, and has been corrected for a regional gradient in total magnetic field of 12.0 gammas per mile in a direction S. 80° W.

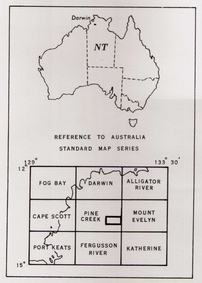
BAN BAN, NT
REFER TO THIS MAP AS: D52/B1-18
1964

AUSTRALIA 1:63360

BURRUNDIE
NORTHERN TERRITORY



LOCATION DIAGRAM



DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CONTOURS COMPILED AND DRAWN BY ADASTRA HUNTING GEOPHYSICS PTY LTD

MAP DATA

PROJECTION:- *Transverse Mercator Australia Series*

PLANIMETRY:- *After Royal Australian Survey Corps planimetric compilations of the same area*

FLIGHT-LINES:- *Error in position generally less than $\frac{1}{4}$th mile*

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE MAGNETOMETER

MAGNETIC CONTOUR INTERVAL 10 GAMMAS

LEGEND

TOPOGRAPHICAL DATA

- River or creek
- Highway or main road
- Secondary road
- Road or track
- Railway and siding
- Built up area
- Named place
- Homestead
- Mine
- Aerodrome or landing ground
- Hill feature
- Swamp

MAGNETIC DATA

- Magnetic contours
- Magnetic 'low'
- Contour/flight-line intersections

EXPLANATORY NOTES

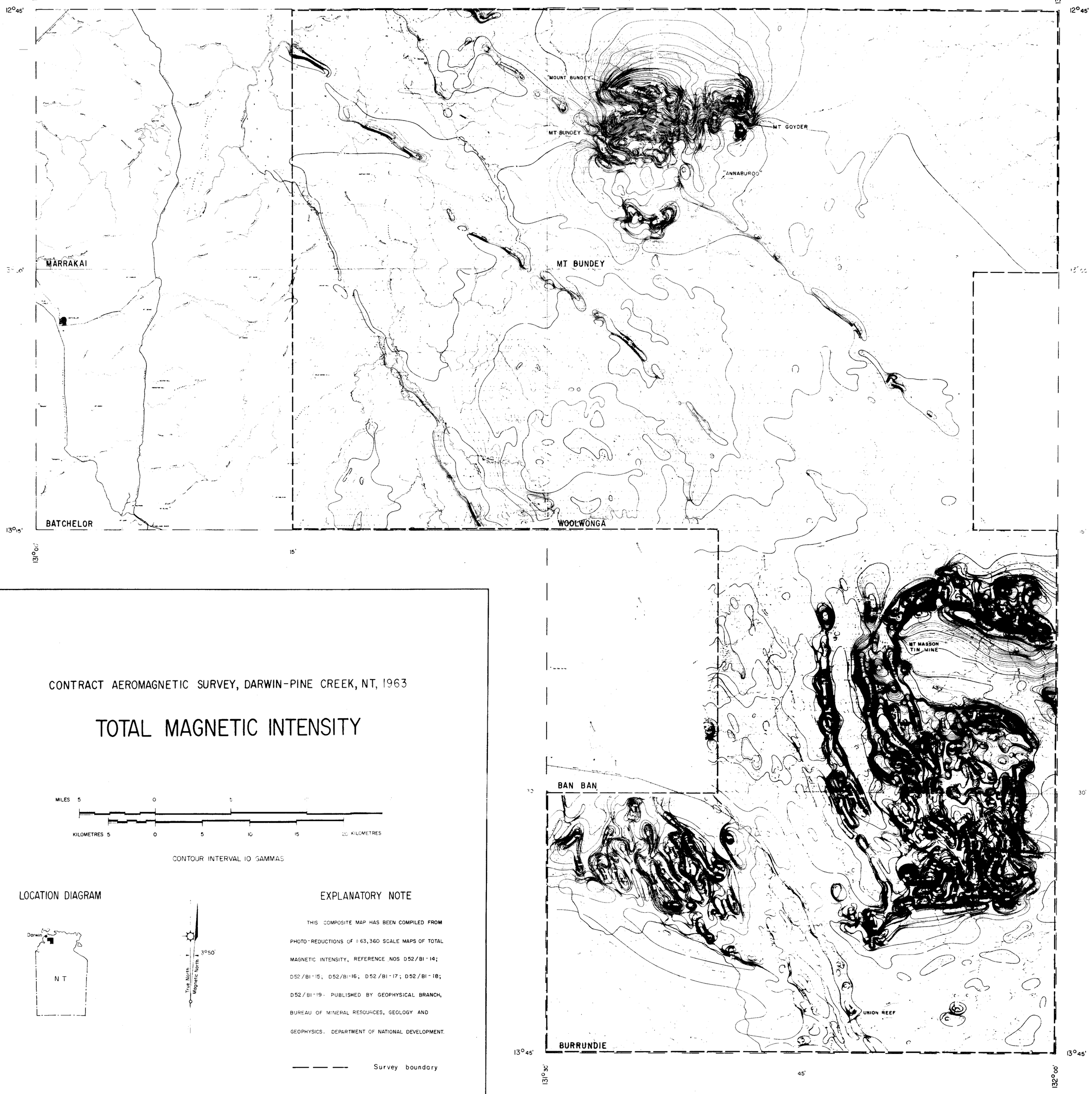
This map was compiled from an airborne magnetic survey made in 1963 by Adastra Hunting Geophysics Pty Ltd, under contract to the Bureau of Mineral Resources. The purpose of the survey was to obtain information on the structure and composition of rocks to aid mineral exploration and geological mapping.

The survey was made at an altitude of 500 feet above ground level along lines spaced a 3 mile 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 12.0 gammas per mile in a direction S. 10° W.

BURRUNDIE, NT
REFER TO THIS MAP AS: D 52/B1 - 19
1964

PLATE 10



CONTRACT AEROMAGNETIC SURVEY, DARWIN-PINE CREEK, NT, 1963

TOTAL MAGNETIC INTENSITY

MILES 5 0 5

KILOMETRES 5 0 5 10 15 20 KILOMETRES

CONTOUR INTERVAL 10 GAMMAS

LOCATION DIAGRAM

EXPLANATORY NOTE

THIS COMPOSITE MAP HAS BEEN COMPILED FROM PHOTO-REDUCTIONS OF 1:63,360 SCALE MAPS OF TOTAL MAGNETIC INTENSITY, REFERENCE NOS D52/BI-14; D52/BI-15; D52/BI-16; D52/BI-17; D52/BI-18; D52/BI-19. PUBLISHED BY GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS. DEPARTMENT OF NATIONAL DEVELOPMENT.

——— ——— ——— Survey boundary

TO ACCOMPANY RECORD No 1966/101

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. D52/BI-33

PLATE II

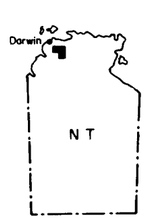
CONTRACT AEROMAGNETIC SURVEY, DARWIN-PINE CREEK, NT, 1963

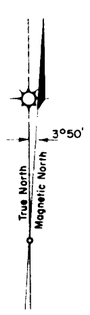
GEOPHYSICAL INTERPRETATION

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 KILOMETRES

LOCATION DIAGRAM





GEOPHYSICAL LEGEND

- 2 — Magnetic lineation
- 250' 80° — Depth and dip estimate
- B — Zone boundary
- D — Magnetic feature
- Survey boundary

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. D52/BI-34-1

TO ACCOMPANY RECORD No 1966/101