PROSPECTING AUTHORITIES NOS. 1435 & 1546

PETERMANN RANGES, NORTHERN TERRITORY

OPEN FILE

FINAL REPORT

PLANET METALS LTD.

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Chief Minerals Geologist

June, 1969.
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CONCLUSIONS

REFERENCES

Report previously forwarded to the Department of Mines.

(ii) Other Reports.

DRAWINGS

Fig. 1: Location Map P.A's 1435 and 1546 Scale 1:1,000,000

Fig. 2: Aeromagnetic Survey Subdivisions Petermann Ranges, N.T. Not to Scale
INTRODUCTION

Prospecting Authority No. 1435 was originally granted on 7th October 1965, over an area of 3,745 square miles. On 11th May 1966, Prospecting Authority No. 1546, over an area of 336 square miles, was granted, giving a total coverage of 4,081 square miles.

LOCATION AND ACCESS

The prospect areas are located in the south-western corner of the Northern Territory on the edge of the Amadeus Basin. They lie wholly within a Northern Territory Aboriginal Reserve and permission to enter was obtained from the Welfare Branch of the Northern Territory Administration. The adjoining areas to the east, south and west are likewise within aboriginal reserves or the Weapons Research Establishment and permission to enter was obtained from the appropriate Government agency.

The location of the areas is shown in Figure 1.

There are no towns or cattle stations within the Authorities. The Giles Meteorological Station is located close by in Western Australia at approximate latitude 25° 00' S, longitude 128° 15' E. A passable road connects the Giles Meteorological Station with Adelaide (1,900 miles) and Alice Springs (570 miles) and the road passes close to Ayers Rock.

Much of the area can be traversed by four-wheel drive vehicles and helicopters can land at practically any point. The area is undeveloped except at Livingstone Pass, where several bores have been drilled for water.

The climate is arid with an annual rainfall of 8 to 10 inches, most of which falls during the summer months. The winter months of May to September inclusive are cool but the summer months, particularly December and January, are hot. Humidity is low and dew forms only after rain.
PHYSIOGRAPHY

The area is one of sandy desert with older and more resistant rocks forming low-lying ranges which rise above the surface of the plain in the south. The mountain ranges and hills stand up to 3,300' above sea-level and 1,300' above the surrounding plain. In the north salt lakes abound and the drainage is internal.

There is a paucity of vegetation, although spinifex and light scrub appear on sand dunes and in some of the larger drainage channels desert oaks may be found.

REGIONAL GEOLOGY

The geology of the prospect area has been investigated by numerous parties; geological maps compiled by the Bureau of Mineral Resources, Geology and Geophysics are available for the area, although not all in final published form.

Details of the geology in the Hoods Range Area are well presented in the "Explanatory Notes" which accompany the published B.M.R. map.
To date, no "Explanatory Notes" are available for the Petermann Ranges map.
However, full details of the geology are covered in numerous reports, several of which are included in the reference index of this report.
PREVIOUS EXPLORATION

The south-west margin of the Amadeus Basin was first explored by Giles in 1872-1874 and 1876 (Giles, 1889). The first scientific investigations in the area were made by the Central Australian Exploring Expedition in 1889 (Tietkens, 1891) followed by the Horn Scientific Expedition in 1896 (Tate and Watt, 1896). In 1901 two South Australian Government prospecting expeditions investigated the Musgrave, Mann and Rawlinson Ranges (Wells, 1904) and a further expedition investigated the Musgrave, Mann and Tomkinson Ranges in 1903 (Wells and George, 1904). H. Basedow led a prospecting and geological expedition to the area in 1903 and recorded geological observations in the Musgrave Ranges, Mount Olga, Mount Conner and Ayers Rock (Basedow, 1905). In 1905 F.R. George led a South Australian Government prospecting expedition to the Petermann Ranges and Elocks Range, and produced a geological sketch map but found no mineralisation apart from a trace of gold in a float of quartz at Foster Cliff (George, 1907). During 1926, Basedow and Mackay examined the geology of the Elocks Range and Petermann Ranges and produced a geological report on the latter (Basedow, 1929). This was followed by Mackay's aerial survey of the Petermann Ranges in 1930 (Mackay, 1934).

In the 1930's Lasseter's report of a rich gold reef in the area gave rise to many expeditions to find the reef which is now considered to be non-existent. In 1935 the Border Gold Reef Expedition traversed along the Olga Chain and the Petermann Ranges into Western Australia in search of the reef. H.A. Ellis was attached as geologist to a further search in 1936 (Ellis, 1937). Faith in the possible existence of Lasseter's Reef was still strong enough in certain quarters for a further expedition to be financed in 1951. G.F. Joklik of the Bureau of Mineral Resources accompanied this expedition
and recorded his geological observations (Joklik, 1952). Frome-Broken Hill Co. Pty. Ltd. carried out an extensive survey in the area in 1958 (Gillespie, 1959).

During October 1960, the Bureau of Mineral Resources flew an aeromagnetic traverse from Alice Springs to Giles (Goodeve, 1961) and in 1962 a helicopter gravity party covered the southern margin of the Amadeus Basin as part of a larger reconnaissance gravity survey (Lonsdale and Flavelle, 1963).

The geological mapping of the southern margin of the Amadeus Basin has been undertaken by the Bureau of Mineral Resources in the following stages. Rawlinson and Macdonald Sheet areas in 1960 (Wells, Forman and Ranford, 1961); Bloods Range Sheet area in 1962 (Forman, 1963); the Petermann Ranges Sheet Area apart from the southern margin, the Ayers Rock Sheet area apart from the north-east portion and parts of the Rawlinson and Scott Sheet area (Forman and Hancock, 1964). The north-east portion of the Ayers Rock Sheet area and the Kulgera Sheet area were mapped in 1963 (Wells, Stewart and Skwarko, 1964).
PLANT INVESTIGATIONS

Due to the size and complexity of investigations undertaken, a brief summary only of the work carried out is included in this report. Full details are contained in reports of which copies have been forwarded to the Mines Department. A reference list of these reports is included herein.

1. Project "A"

Ralph N. Freeman - October, 1965

For the purpose of delineating areas where metalliferous deposits in commercial quantities might be found, a review of literature was made by Freeman for the area which includes and adjoins the western end of the so-called "Musgrave Block".

An attempt was made to integrate the known geology of various parts of the area into a common lithologically cohesive unit.

Freeman considered that areas where metalliferous ores might be most logically expected were:

- The Warburton Ranges; where copper, carbonates, silicates and oxides are known to occur.
- The Giles basic complex; where nickeliferous ochre is known to be present, with traces of chromium.
- The area west of the Blackstone Range; where copper is known to occur.
- The area immediately south of the Giles meteorological station; where copper is found in association with basalt.
- The area of the overturned recumbent fold in the Petermann Ranges - Floods Range area; where copper, lead, silver and gold are known to occur.
The area of near coincidence between the gravity minimal trend and a major lineamental direction of continental scope which passes north-east to south-west through the Musgrave Ranges.

The report contains a Geological Map of the Petermann Ranges on a scale of 1:500,000.

   Prof. A.F. Wilson - November, 1965

This report was prepared to comment on and amplify the report (October, 1965) by R.N. Freeman on Project "A".

Wilson does this by commenting on Freeman's report page by page, and on his map. In his own geological assessment Wilson concludes that there are no obvious metalliferous zones of economic significance owing to the general high grade of metamorphism and deep level of erosion of the Musgrave, Mann and Tomkinson Ranges.

However, he points out that some areas of lower metamorphic grade have attracted some attention and suggests the use of geological and geophysical techniques in an attempt to predict metallic ores unsuspected by earlier workers.


This report is general in its undertakings but is very comprehensive in its coverage of structures and mineral prospects. As part of the introduction Wilson covers the history of operations by Planet:

"In December 1965 Geologist G. Brown and Mining Engineer C. Creelman carried out reconnaissance sampling of the area within the Northern Territory. Several important gossans, the iron-rich cappings of mineralised bodies, were discovered in one widespread sedimentary formation, and significant base metal values were found associated with metamorphosed basalts.

During an air magnetic survey done in April 1966, strong positive anomalies were found to coincide with the gossans and with other areas of no outcrop.

Meanwhile Geophoto Resources Consultants had begun a structural interpretation of the Prospecting Authorities to try to determine the structural setting of the gossans and to give a basis for Wilson's geological appraisal of the area. In May 1966, Wilson made a helicopter and fixed-wing reconnaissance of the area, and the gossans found by Brown and Creelman, and several other gossans, were sampled. Although there was little time for other work, some samples were taken of the copper-bearing basalts and some of one of the important granites.

The samples were assayed by Geochemical and Mineralogical Laboratories Pty. Ltd. (Sydney) and some check assays were done by Matthey Garrett Pty. Ltd. of Sydney and Australian Mineral Development Laboratories of Adelaide."
Conclusions reached in the report were:

(a) The metal content of gossans developed in the Pinyinna Beds in the Opera House Structure and in the Kay Valley in the Petermann Ranges, is low and uneconomic, yet the gossans indicate sulphide mineralisation. Although the strongly leached surface outcrops show no copper stains, they all have high "trace" amounts of copper, zinc, lead, cobalt, antimony, silver and a little palladium.

(b) Strong positive magnetic anomalies occur over the gossans and the anomalies extend along the Pinyinna Beds for several miles beyond the gossan. Moreover, other strips of the Pinyinna Beds exhibit strong anomalies.

(c) The type of mineralisation in the Pinyinna Beds is thought to be a syngenetic fine-bedded sulphide body wherein narrow beds of chalcopyrite, sphalerite, galena and pyrite alternate in varying combinations. Similar sulphides comprise the ore at Mt. Isa.

(d) Although the main mineralisation in the Pinyinna Beds is thought to be syngenetic it is probable that concentration of disseminated or low grade metals could have taken place due to deep burial metamorphism or igneous activity.

(e) The copper-bearing Mt. Harris Basalt has been metamorphosed regionally as well as locally so copper and other metals moved during metamorphism may have become concentrated.

(f) Although the granites are of several types and ages, they were all either emplaced or profoundly affected by the Petermann Ranges Folding which took place about 600 million years ago. Strong magnetic anomalies have been recorded over some of the granites but no attempt has been made to evaluate these.
(g) No commercial ore bodies have yet been found. However, sufficient work has been done to show that several good prospects are present. The prospect that is likely to develop most quickly is the Opera House Structure in which there are several gossans.

Maps and Sections included in the report are as follows:

1. Areal Geology and Structural Interpretation map of Project A. Scale: 1" = 1 mile

2. Areal Geology and Structural Interpretation map of Project A, showing exploration targets. Scale: 1" = 1 mile

3. Regional diagrammatic cross-sections which refer to the areal geology maps. Scale: 1" = 1 mile

4. Regional diagrammatic cross-sections showing exploration targets. Scale: 1" = 1 mile

5. Special cross-sections which refer to specific map Sheets. All are on Scale: 1" = 1 mile.

Sheet 1: Faulted recumbent folding within Floods Range.
Sheet 4: Tight faulted folds near south-east end of Petermann Ranges.
Sheet 4: Thick synclinal section of Pinyinna Beds, Petermann Ranges.
Sheet 6: Synclinal section of Pinyinna Beds near Butler Dome (Opera House Structure).

The purpose of the evaluation was to provide detailed structural information, re-evaluate the structural framework of the region and to determine the outcrop distribution of the mineralised Upper Proterozoic Pinyinna Beds.

Conclusions were :-

1. Prior to the Petermann Ranges Orogeny near the end of Upper Proterozoic time, the stratigraphic sequence of Proterozoic formations was, in ascending order, Mt. Harris Basalt, Bloods Range Beds, Dean Quartzite, Pinyinna Beds and Winnell Beds. Rocks older than the Mt. Harris Basalt may have originally been present but cannot now be conclusively recognized.

2. During the Petermann Ranges Orogeny the original Mt. Harris Basalt and Bloods Range Beds were intruded by plutonic granite and porphyritic rocks which partly assimilated, granitised and metamorphosed these formations. The Munnanana Porphyry and Olia Gneiss are, at least in part, metamorphic equivalents of the original Mt. Harris Basalt and Bloods Range Beds.

3. The Pottoyn Granite Complex (pGo) and the undifferentiated granite map units (pGg, pGg2) are considered in this evaluation to be lateral facies variations of the same original plutonic granite mass. In some areas the granite is in gradational contact with the overlying Dean Quartzite. The Dean Quartzite acted as a barrier to the mobile granite as it did not penetrate the quartzite. The Dean Quartzite is not known to be mineralised. However, the overlying Pinyinna Beds are known to contain mineralised gossans.
4. In this evaluation the hypothesis of regional folding by the intrusion of deep seated plutonic granites is favoured over the regional recumbent fold or nappe structural concept as presented by Forman (1963) and Forman and Hancock (1964). There is no subsurface information in the region to substantiate or disprove either concept. Regional helicopter gravity traverses were conducted by the Bureau of Mineral Resources in 1962 throughout the southern part of the Amadeus Basin. More recently Planet Mining Company Pty. Ltd. has conducted more detailed helicopter gravity work within selected parts of the project area. These surveys may provide the necessary clues to reconstruct the actual type of regional folding present along the south rim of the Amadeus Basin.

5. Within the project area the greatest thickness of Pinyinna Beds occurs within the major syncline between the Dean - Mannanana - Curdie - Pottoyu Hills and the Piultarana Range. This syncline extends from Docker River south-eastward nearly to Armstrong Creek.

A considerable thickness of Pinyinna Beds is preserved in a large tightly folded syncline along the north-central part of the Piultarana Range. Elsewhere within this range lesser but still significant thicknesses of Pinyinna Beds are preserved along the cores of tightly folded, recumbent synclines.

At Mt. Harris in the Bloods Range the Pinyinna Beds are preserved in the core of a relatively large horizontally inclined recumbent fold.

In the Pinyinna Range only the basal 700' of Pinyinna Beds is exposed along the north side of the range.
The lower part of the Pinyinna Beds is preserved in a tight, partly overturned syncline at the west end of the McNichol Range.

A short distance north of Butler Dome a considerable thickness of Pinyinna Beds crops out along a tightly folded, northeasterly plunging syncline. Mineralised gossans crop out within the Pinyinna Beds along the synclinal axis.

To the immediate east and north-west of Foster Cliff a considerable thickness of Pinyinna Beds occurs in tightly folded synclines. Of these two outcrop areas the one north-west of Foster Cliff is probably the more significant. Here the thickness of Pinyinna Beds is probably thicker than that north of Butler Dome.

The Pinyinna Beds are not present within the main part of the Ilyaralona Range except near its western end where minor thicknesses of basal Pinyinna Beds crop out within very tight recumbent synclines. Between the western end of the Ilyaralona Range and the western project boundary minor thicknesses of basal Pinyinna Beds occur in the cores of extremely tight recumbent synclines.

6. A major regional structural high is present between the Blooms Range and Petermann Ranges. As presently interpreted, this structure is at least 12 miles wide south of Mt. Harris. The axis of this feature extends eastward from a point five miles east of Docker River for a distance of approximately thirty-six miles to a point along longitude 129°40'. The central part of this regional anticline is well expressed south of Mt. Harris in north-west to south-west dipping Mt. Harris Basalt. East of longitude 129°40' this regional structural high probably extends into a much more poorly
defined regional structural high located 5 miles south of the McNichol Range. At this locality Ordovician sediments form the only surface outcrops except for one isolated outcrop of Mt. Harris Basalt. The Ordovician rocks are considered to have been deposited on probably undifferentiated granite and Mt. Harris Basalt within the eroded core of the regional fold.

7. A large but poorly defined structural high is present between synclinal roots of the McNichol and Pinyinna Ranges. This feature is approximately 4 miles wide and at least 12 miles long. The anticline is probably underlain by undifferentiated Precambrian granite and the Mt. Harris Basalt.

8. Several large recumbent anticlines occur within the Piultarana Range, between the Piultarana and Ilyaralona Ranges and immediately north of the Ilyaralona Range. The limbs of these folds are defined by outcrops of the Dean Quartzite. The cores are of undifferentiated Precambrian granite.

9. Within the project area the Pinyinna Beds are not capped by an impervious younger caprock except at one locality within the Bloods Range 3 miles east of Hull River. Here the Pinyinna Beds are enclosed by the Dean Quartzite within a horizontally recumbent syncline.

10. The Dean Quartzite undoubtedly contains many tight recumbent folds and bedding plane faults in addition to those mapped in this evaluation. Recognition of these structural features was largely hindered by the inadequate scale of the air photographs."
Illustrations and maps included in the report are as follows:

Photogeologic Evaluation - Regional Location Map
Scale: 1" = 400 miles (approx.)

Regional Structure
Scale: 1:1,000,000

Diagrammatic Regional Cross-Sections
Scale: 1" = 1 mile

Composite Photomap of the Project Area excluding the extreme south end
Scale: 1" = 5 miles

Special Cross-Sections - All on Scale: 1" = 1 mile

Faulted recumbent folding within Bloods Range
Thick synclinal section of Pinyinna Beds, Petermann Ranges
Tight faulted folds near south-east end of Petermann Ranges
Synclinal section of Pinyinna Beds near Butler Dome
Recumbent fold within Bloods Range
5. Geochemical Exploration in Selected Areas of Planet Metals Ltd.


A limited investigation was carried out on the Butler Dome Area, Petermann Ranges, to assess the possible role of geochemistry in the exploration programme.

One day only was spent in the area and in view of the limited time devoted to the investigations, the comments were intended as a general guide and in no way constituted a comprehensive study.

In order to establish the feasibility of locating sub-outcropping horizons similar to the gossans exposed in the Opera House structure, a soil traverse was run across the extension of the gossan, extending 1,350 feet over the Pinyinna Beds. The ends of the traverses were located over Dean Quartzite on either side of the syncline. Samples of the overburden were collected at depths of 9-12 ins. The minus 80 mesh fraction was analysed for Ag, Bi, Co, Cr, Cu, Fe₂O₃, Ga, Mn, Mo, Ni, Pb, Sn, Ti, V and Zn using an emission spectrographic procedure. The analytical precision was ± 35% at the 95% confidence level.

The results of the analyses revealed the existence of anomalous zones of a number of metals associated with the gossan horizons, although the absolute level of metals in the overburden was relatively low. Anomalous contents of copper extended over a minimum width of 500' with peak values of 50 ppm relative to a local threshold of 15 ppm. Anomalous lead contents similarly extended for a minimum width of 450' with peak values of 60 ppm relative to a local threshold of 20 ppm. More restricted anomalous zones were shown by the distribution of Co, Cr, Ni and V with maximum contrast between anomaly peak and threshold being displayed by Mn.
The analytical results of the soil traverse indicated the feasibility of geochemical soil sampling procedures as a means of detecting sub-outcropping mineralised horizons in the area of Butler Dome, but, as Nichol pointed out, the economic significance of the latter would still need to be determined.
6. **Report to Accompany Geological Maps, Sections and Block Diagrams of the Butler Dome Area, Gnia Chain, Northern Territory.**

**Dr. S.E. Shaw and P.F. Williams - January, 1967**

The geology of the Butler Dome Area was examined with a view to further evaluation of the Prospect and to recommend drill sites if warranted.

S.E. Shaw was employed to produce a geological fact map of the area, to carry out petrological investigations and run a ground magnetometer survey.

P.F. Williams was employed to interpret the geological structure and to produce suitable block and section diagrams.

The structure of the Opera House Valley was interpreted as an antiform plunging at a low angle to the south. An antiform was suggested rather than an anticline since basement Gneiss overlies successively younger Pinyinna Beds and Dean Quartzite.

The gossans present within the folded Pinyinna Beds were interpreted as concordant lenses. The significance of the above is that the potential ore-bearing rock is far greater than would result from the alternative synclinal structure postulated by Geophysical Resources Consultants. Further, the structure as suggested here is in agreement with the regional synthesis of the southern margin of the Amadeus Basin given by Forman and Hancock (1964).

Detailed ground magnetometer traverses failed to produce meaningful results across positive anomalies which were known to exist over several gossans of the Opera House Valley. The instrument provided by Wongala Geophysical Pty. Ltd. was later shown by them to be suspect.
Because of the apparent structural homogeneity throughout the area, the subsurface geology was believed to be as reliable as is possible in any complexly folded area. On this basis and on the assumption that the gossans or their sulphide equivalents persist down plunge, drilling targets were nominated.

Maps included in this report are:

- Topographical Map of Butler Dome Area, Northern Territory
  Scale: 1" = 200'
- Geological Map of Butler Dome
  Scale: 1" = 200'
- Topographical Map of Butler Dome
  Scale: 1" = 200'
- Overlay to accompany General Section Butler Dome
  Scale: 1" = 200'
- Geological Section of Butler Dome Area
  Scale: 1" = 200'
- Geological Map of Butler Dome Area, showing Drill Hole Locations
  Scale: 1" = 200'
- Block Diagrams of Butler Dome Area
  Scale: 1" = 2,000'
- Butler Dome Geological Map
  Scale: 1" = 200'
- Topographical Map of Butler Dome
  Scale: 1" = 200'
Within the Butler Dome Area of the Petermann Ranges in the Northern Territory some 5,000' of shallow rotary drilling was carried out to determine the nature of the down-dip extensions of a number of copper-enriched ironstone cappings in two areas over a total strike length of 2,000'.

A geological and geochemical appraisal of the chip samples recovered down to depths of 360' clarified a sequence of sedimentary rocks in which there was a distinct enrichment in values of copper and, to a lesser extent, lead and zinc, over the sediments above and below the favourable horizon.

The presence of such metallic enrichment along with the recognition of interlayered volcanic rocks and bands of carbon-rich sediment creates an environment similar to that in which deposits such as Mount Isa and the MacArthur River have been located.

On the results of this drilling programme it was felt that an expanded programme of exploration along the whole line of favourable horizon represented by the Pinyinna Beds was justified.

Sections showing the subsurface rock type distribution compiled from rotary drill logs are included for each drill-hole.

In addition, the report contains:

Table showing relationship of rock type to metal distribution.
Appendices for assay data and geological drill logs.
Graphs indicating sub-surface geochemical distribution patterns.


In this report Wilson compares his own observations with those of Shaw and Williams (January, 1967).

Shaw and Williams interpreted the structure of the Opera House Valley and Butler Dome as an antiform syncline and believed that this concept was in keeping with the regional tectonics of the Petermann Ranges as shown by the geologists of the Bureau of Mineral Resources.

Wilson’s (August, 1966) and the report of Geophoto Resources Consultants (August, 1966) favoured the view that the structure was a “normal” syncline and that the closure at Butler Dome was due to cross-folding. These conclusions however, were based entirely on air-photograph interpretation.

Upon further consideration Wilson maintained that a plunge reversal of near 180°, together with adequate “plasticity” of the rocks and appropriate local shears could produce the closure of the structure. However, until adequate detailed structural study of the region could be done he believed that an adequate structural solution of the Valley could not be reached.

The antiform concept was attractive in some regions, but elsewhere he felt that a synclinal (duly modified) seemed more likely.

The report contains 18 schematic generalised cross-sections of localities based on the grid reference of the map by Shaw and Williams.
Bradberry Associates - April, 1968

The purpose of this study was to carry out a preliminary and rapid evaluation of possible water-bearing localities in the Schwerin Mural Crescent Area and Prospecting Authorities Nos. 1435 and 1546 held in Central Australia.

The presence of potable water in the prospect area was established by wells drilled in the alluvium at two localities. Several other localities, similar geologically to these, were found and it was thought that they should produce an equal or greater amount of water.

Based on a number of assumptions at a typical locality, at which ten bores for water had been drilled to depths of 100' - 200' in alluvial deposits, it was estimated that roughly 400,000 Imperial gallons of water might be produced per day without exceeding the recharge rate. If the water was mined over a ten year period and all possible water recovered from the aquifer, the producing rate could possibly be 8 million Imperial gallons per day or 5,500 gallons per minute.

**Geophysical Resources Development Company - May, 1968**

An airborne magnetometer survey was carried out by the above company over two sections known respectively as Opera House Area and Petermann Ranges Area.

In the interpretation of the results of the survey, examination of and comments on all zones of the Pinyimna Beds and specific comments relative to strike anomalies and cross-features such as those brought by structural disruption of these beds were made.

The delineation of any possible continuities of the Pinyimna Beds or associated structural phenomena that may extend beneath the alluvium was also made.

The main conclusions of the survey were:

(i) Pinyimna Beds do not exhibit any characteristic magnetic pattern leading to an easy recognition of areas containing these beds.

(ii) The Pinyimna Beds within the Opera House Area are thought to be quite thin.

(iii) Of the zones indicated for Pinyimna Bed follow-up, the northern-most belt is thought to be most promising.

(iv) Precambrian granite in the extreme south-east corner of the area does not show normal granite-type responses and this could represent locally contained zones of magnetite and/or pyrrhotite.

(v) Many anomalous zones exhibit a magnetic pattern which is quite different from that prevailing in their neighbourhood and indicate local enrichment in magnetite.
Maps included in the report are:

6 maps of Total Magnetic Intensity in the areas shown in Fig. 2  Scale 1:63,360

Total Magnetic Intensity, Petermann Ranges Area  Scale 1:100,000

Total Magnetic Intensity, Petermann Ranges Opera House Area  Scale 1:100,000
ii. Geochemical Survey of the Petermann Ranges
South-West Northern Territory


An extensive geochemical survey of the Petermann Ranges was carried out by Kenneth McMahon and Partners Pty. Ltd. Preliminary geochemical studies of the Pinyima Beds in the Butler Dome area gave significant results. These led to the pursuit of a rotary drilling programme that failed to intersect significant base metal concentrations.

Since the Butler Dome area represents only a few percent of the total Pinyima Beds exposure, a geochemical programme was undertaken to locate all other anomalous metal horizons that could not be explained by the surface enrichment of iron sediments.

A programme was initiated to cover both a geological and geochemical reconnaissance of the Pinyima Beds over a total strike length of 150 miles. At the same time other intersecting rock units in the area were studied. Two such units were the Bloods Range Beds and the Mount Harris Basalts. The former is made up of interbedded sediments and basalts, while the latter is dominantly basaltic.

With the aid of the 1:63,360 maps prepared by Geophoto Resources Consultants an aerial reconnaissance was made of all mapped exposures of the Pinyima Beds. Where favourable outcrop was located, mapping and sampling were carried out along traverses spaced at approximately one mile, depending on rock exposure.

A total of 83 traverses was completed. Along each, where possible, at 50° intervals or at significant changes in lithology, samples were taken.
Major areas of the Blooms Range Beds and Mount Harris Basalts were flown by helicopter, and the follow-up ground traverses were made across the better exposed outcrops.

Conclusions reached as a result of this survey were:

(i) Anomalous values of copper, lead and zinc detected in the Pinyinna Beds result principally from weathering or oxidation phenomena, and do not indicate the presence of significant anomalies at depth.

(ii) The Pinyinna Beds possess little or no potential for base metal concentration.

(iii) The Blooms Range Beds and Mount Harris Basalts possess a low potential for base metal concentration.

Traverse locations are illustrated by means of four sheets based on the same regional divisions as was done in the report by Geophysical Resources Development Company (May, 1968) on a scale of 1" = 2 miles (see Fig. 2).
CONCLUSIONS

An assessment of all available information led to the conclusion that anomalous values of copper, lead and zinc detected in the Pinyinna Beds result principally from secondary concentrating phenomena and do not indicate the presence of concentrations of metal sulphide at depth. The Pinyinna Beds therefore could no longer be considered as a favourable horizon for the location of conformable sulphide deposits.

The scarcity of volcanics in the Floods Range Beds negates the possibility of copper concentrations in this group and the Mount Harris Basalts do not display any criteria that would indicate they represent a favourable location for copper deposits.

In view of the assessment of all data available from both the sediments and volcanics within Prospecting Authority No. 1435 and following visits by senior Planet personnel to the Petermann Ranges early in 1968 and examination of the reports on the exploratory work there, it was decided that no further work was justified and that the Prospecting Authorities should be relinquished.
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FIG. 1.

PLANET METALS LTD.

LOCATION MAP
P.As. 1435 & 1546
PETERMANN RANGES, N.T.

Scale of Miles

16 8 0 16 32
Diagram — Not to scale.

FIG. 2.

PLANET METALS LTD.

AEROMAGNETIC SURVEY
SUBDIVISION
PETERMANN RANGES, N.T.

Taken from Planet Report No: 748.