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

1 : 250 000 GEOLOGICAL SERIES—EXPLANATORY NOTES

PETERMANN RANGES  NORTHERN TERRITORY

SHEET SG/52-7 INTERNATIONAL INDEX

COMPILED BY D. J. FORMAN

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Explanatory Notes on the Petermann Ranges
Geological Sheet

Compiled by D. J. Forman

The Petermann Ranges 1:250 000 Sheet area occupies the southwestern corner of the Northern Territory. It lies between longitudes 129° and 130°E and latitudes 25° and 26°S.

The area is covered by Commonwealth air-photography at an average scale of 1:46 500 flown in May 1957. Maps produced by the Division of National Mapping include 1 : 63 360 scale uncontrolled photo-mosaics of the twelve 1-mile areas within the Sheet area (1957), topographic base maps at photo-scale of the 1-mile areas from air-photographs with astrofixes for control (1959), and a planimetric map of the area at 1:250 000 scale (1966).

The area lies within aboriginal reserve 1028 but there are no permanent inhabitants. Access to the north of the Sheet area is by the vehicle track from Ayers Rock tourist resort to the Docker River Settlement and Giles Meteorological Station. A vehicle track from Mount Olga to Butler Dome in the Olia Chain was established by Planet Metals Ltd in 1967. The southern part of the area is best reached from the graded road between Musgrave Park and Mount Davies in South Australia and Wingellina in Western Australia. The area is undeveloped.

The climate is arid, with an annual rainfall of less than 250 mm. The winter months of May to September are cool and the climate is pleasant, but the summer months, particularly December and January, are hot and unpleasant. Humidity is low and dew forms only after rain.

Geological investigations

Mapping of the area had not been attempted before 1963. A number of exploring and prospecting expeditions have visited the area since Giles in 1872 (Giles, 1889), but few of these contributed substantially to geological knowledge.

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 & George, 1904). In 1905 F. R. George led a South Australian Government prospecting expedition to the Petermann Ranges and Bloods Range, that produced a geological sketch map but found no mineralization apart from a trace of gold at Foster Cliff (645169) (George, 1907). During 1926, H. Basedow and D. Mackay examined the geology of the Petermann Ranges and Basedow published a geological report on the Petermann Ranges (Basedow, 1929). This was followed by Mackay’s aerial survey of the Petermann Ranges in 1930 (Mackay, 1934).

Lasseter’s report of a rich gold reef gave rise to many expeditions in the 1930’s, but the reef is now considered to be mythical. Lasseter is rumoured to have been buried in the Sheet area at the rock hole 4 km north of Mount Phillips. Lasseter Cave is situated at the western end of the Curdie Range. In 1935 the Border Gold
Reef Expedition traversed the Olia Chain and the Petermann Ranges into Western Australia in search of the reef. H. A. Ellis was attached as geologist to another party in 1936 (Ellis, 1937). G. F. Joklik, a geologist of the Bureau of Mineral Resources (BMR), accompanied an expedition in 1951 (Joklik, 1952). Frome-Broken Hill Co. Pty Ltd carried out an extensive survey in the region in 1958 (Gillespie, 1959).

In October 1960, BMR flew an aeromagnetic traverse across the southeastern part of the Sheet area (Goodeve, 1961), and in 1962 a helicopter gravity party visited the area during a reconnaissance gravity survey of the Amadeus Basin (Lonsdale & Flavelle, 1963).

An airborne magnetic and radiometric survey of the Sheet area was flown in 1965 by BMR as part of a regional survey of the Amadeus Basin (Young & Shelley, 1966). An airborne magnetic survey of a part of South Australia by BMR was extended into the southern part of the Petermann Ranges Sheet (Shelley & Downie, 1970).

All the 1:250 000 sheets adjacent to the Petermann Ranges Sheet have been mapped: Rawlinson in 1960 (Wells, Forman, & Ranford, 1964; Forman, 1965a & 1966a); Bloods Range in 1962 (Forman, 1966a, b); Lake Amadeus in 1962 (Ranford et al., 1965); Ayers Rock in 1963 (Forman, 1965b, Forman, 1966a, Wells et al., 1966). The Department of Mines, South Australia, published the Mann Sheet in 1962 and explanatory notes in 1964 (Mirams, 1964). They published the Woodroffe Sheet in 1967. The Western Australian Geological Survey mapped the Cooper Sheet in 1966 and 1967 (Daniels, 1969) and the Scott Sheet in 1966. The Scott Sheet should be published as a first edition map in the near future.

The mapping of the Petermann Ranges Sheet by BMR has been carried out in stages. D. J. Forman and A. J. Stewart mapped a small part of the area in 1962. Most of the northern part of the Sheet area, including the Petermann Ranges and the Olia Chain, was mapped by D. J. Forman and P. M. Hancock in 1963 (Forman, 1966a), and McCarthy (1965) described some of the rocks. J. F. Ivanac mapped the southwestern corner of the Sheet in 1965 and McCarthy (1966) described the rocks he collected. Some detailed mapping of the Pottam Granite Complex in the Lasseter Cave area was carried out by D. J. Forman and R. N. England in 1968, and they also made reconnaissance traverses in the Petermann Ranges and the Olia Chain to establish the grade of metamorphism in the area. The southeastern corner of the Sheet was mapped in reconnaissance by D. J. Forman and R. D. Shaw in 1969. Outcrops in the centre of the Sheet area at Duffield Rocks and Mount Jenkins have not been mapped.

In 1965 Planet Metals took up an authority to prospect covering the Petermann Ranges and the Olia Chain. Their work included an aeromagnetic survey (Woyzbin, 1965); a geochemical survey (Kenneth McMahon & Partners Pty Ltd, 1968); a photogeological survey by Geophoto Resources Consultants (Jorgensen, 1966); and a geological report on the mineral prospects (Wilson, 1966). Diamond drilling for base metals was carried out in an area about 8 km north-northeast of Butler Dome (624164). The mineral prospects were briefly inspected by J. F. Ivanac of BMR in 1966.
Four boreholes were drilled by the South Australian Mines Department in the southwestern part of the Sheet area to test for possible extensions into the Northern Territory of the Claude Hills nickel deposit (Miller & Rowan, 1968).

**DRAINAGE AND TOPOGRAPHY**

The area is mainly sandy desert from which protrude mountains and hills such as the Petermann and Mann Ranges and the Olia Chain (Fig. 1). The Petermann Ranges and Olia Chain are formed by a tough quartzite that is more resistant to erosion than the surrounding rocks; dip slopes and escarpments are common features. The Mann Ranges are less regular, high, rugged areas of high-grade metamorphic rocks and granite standing above the surrounding plain.

![Diagram](image)

**Fig. 1. Physiographic divisions.**

The low ridges and hills are formed over gneiss and granite of low to moderate metamorphic grade and are mainly in the northeastern part of the Sheet area.

The only significant incised drainage has headwaters in the Pottoyu Hills and drains northwards, where it floods out in sand plain.
The sandy desert consists of sand plain, dunes and a few claypans. The desert supports mulga, spinifex, desert poplar, desert oaks, and light scrub. The dunes are up to 12 m high and are of the longitudinal, mesh, and braided type. Low ridges, hills, and peaks of rock occur within the sandy desert.

STRATIGRAPHY

Most of the Sheet area is underlain by Precambrian gneiss and granite intruded by mafic dykes. These are overlain unconformably by metamorphosed Proterozoic sedimentary rocks that are outliers from the Amadeus Basin. Cambrian (?) conglomerate crops out in the northeast, where it appears to unconformably overlie Proterozoic sedimentary rocks of the Amadeus Basin. Flat-lying Ordovician outliers from the Amadeus Basin unconformably overlie gneiss and granite in the northeastern part of the Sheet area. Tertiary and Quaternary sedimentary rocks cover the remainder of the area.

The stratigraphy is summarized in Table 1.

PRECAMBRIAN

The Musgrave-Mann Metamorphics (Thomson, 1969) indicate the Mann and Musgrave Ranges (Fig. 2). Metamorphic assemblages are listed in Table 1.

Major thrusts marked by mylonite are common in the eastern Mann Ranges. The mylonites appear to separate rocks of different metamorphic grade, but themselves contain assemblages typical of high pressure and temperature conditions. One thrust however is underlain by rocks of much lower metamorphic grade (Fig. 2) than the overlying granulites and high-pressure amphibolites. The deformed rocks beneath the thrust typically contain quartz, microcline, plagioclase, muscovite, biotite, chlorite, and epidote, with accessory iron oxide, sphene, and zircon. These low-grade schistose gneisses are tentatively correlated with the Olia Gneiss.

No isotopic estimates of the age of the Musgrave-Mann Metamorphics in the Sheet area have been made, but Arriens & Lambert (1969) analysed ten granulite-facies gneisses in the Musgrave Ranges by the Rb/Sr method and obtained an isochron of $1380 \pm 120$ m.y. with an initial $\text{Sr}^{*}/\text{Sr}^{*}$ ratio of $0.7072 \pm 0.0025$. They considered this age to be the age of the granulite facies metamorphism.

The Olia Gneiss (Forman, 1966a) is intruded by granite and mafic dykes and is overlain unconformably by the Proterozoic Dean Quartzite.

The Olia Gneiss was metamorphosed twice, once before and once after the Dean Quartzite was deposited. The distribution of metamorphic facies (Fig. 2) shows an increase in metamorphic grade from greenschist facies in the northeast to kyanite-staurolite grade in the Olia Chain. The mineral assemblages in the Olia Gneiss are comparable in metamorphic grade with the mineral assemblages in the Dean Quartzite. This suggests that the present mineralogy developed during the later metamorphism. The original metamorphic grade of the Olia Gneiss in the Petermann Ranges Sheet is unknown. The Olia Gneiss is separated from the Musgrave-Mann Metamorphics by a major thrust, the Woodroffe Thrust (Thomson, 1969).
Fig. 2. Metamorphics in the Petermann Ranges Sheet area.

Granite intrudes the Olia Gneiss near Butler Dome over an area of 9 by 6 km. It is overlain unconformably by the Dean Quartzite to the east. The predominant rock type is a lineated porphyritic coarse-grained gneissic biotite granite. Narrow northerly trending amphibolite layers in the granite represent mafic intrusions that have subsequently been metamorphosed.

A granite 16 km south of Foster Cliff crops out over an area of 16 by 9 km. It is a coarsely porphyritic gneissic biotite granite similar to that at Butler Dome.

Foliated coarse-grained porphyritic granite intrudes the Musgrave-Mann Metamorphics in the eastern Mann Ranges at localities 350, 351, 358, and 362 (619134, 618137, 613137, and 612137). All the granites contain quartz, plagioclase, potash
feldspar, diopside, garnet, biotite, and accessory iron oxide. In addition, that at 351 contains hypersthenes and those at 350 and 362 contain hornblende. The coarse-grained granite at 351 is intruded by a fine-grained granite containing relict hypersthenes rimmed by garnet and clinopyroxene.

The Pottoyu Granite Complex near the Hull River contains at least three types of intrusive granite and a porphyry all intruded by mafic dykes. The granite and mafic dykes are overlain unconformably by the Dean Quartzite. The oldest granite is very coarsely porphyritic and contains large ovoid phenocrysts of microcline. It is intruded by a coarse porphyritic granite with ovoid to subhedral phenocrysts. Both these granite types and a body of quartz-feldspar porphyry are intruded by even-grained granite that may be fine, medium, or coarse-grained. The quartz-feldspar porphyry is in intrusive contact with the coarse porphyritic granite but relative ages are unknown.

Two specimens of granite from the Pottoyu Granite Complex were dated by P. J. Leggo, BMR (pers. comm.):

\[ \text{Rb/Sr Age Determinations} \]

(Apparent ages in millions of years)

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<td>570</td>
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<tr>
<td>Microcline</td>
<td>600</td>
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</table>

1. Coarse, porphyritic gneissic granite, 4 km southwest of Katamala Cone (PRG1) (611193).

2. Leucocratic medium-grained granite, 11 km south-southwest of Mount McCulloch (PRG3) (594207).

The total rock age probably represents the date of emplacement of the granite whereas the mineral ages give the date of subsequent metamorphism during the Petermann Ranges Orogeny.

Mafic rocks intrude the Musgrave-Mann Metamorphics. The majority of the mafic dykes appear to be intruded by granite and to have suffered high-grade regional metamorphism. Mafic dykes intrude granite in at least one locality where there is no clear evidence of their metamorphism. The dykes are predominantly olivine gabbro and norite. Many dykes contain reaction rims between olivine and plagioclase and orthopyroxene and plagioclase (Fig. 2), indicating high-pressure metamorphism in the granulite facies (Kushiro & Yoder, 1966). Other dykes in the Musgrave-Mann Metamorphics have been metamorphosed under more hydrous conditions or at lower temperatures and these contain amphibole. The dykes terminate against mylonite zones. Flat-lying dykes are folded into a synform at the eastern end of the Mann Ranges.
**Ultramafic** rock crops out at locality 17/50/6 (521135) on the border of the Sheet near the southwestern corner. The pyroxenite there is an extension of the Claude Hills ultrabasic body (Miller & Rowan, 1968).

Mafic rocks intruded the Pottoyu Granite Complex and the granite near Butler Dome. The dykes are folded and metamorphosed. Part of the original mineralogy is still visible at locality 129 (521231). The rock is an altered olivine gabbro. The metamorphosed dykes such as at localities 127 (531230) and 128 (523230) contain a pale green amphibole, altered plagioclase, quartz, biotite, chlorite, and iron oxide. At localities 129 (521231) and 178 (537236) the mafic rocks contain garnet. Rilled garnets occur at locality 178 in association with muscovite, chlorite, biotite, quartz, and iron oxide.

The **Bloods Range Beds** (Forman, 1966a) crop out poorly in a small area near Giles Creek in the northwest. Their contact with the Pottoyu Granite Complex is not exposed in the Sheet area, but they are believed to rest unconformably on the Complex and Olia Gneiss.

**Proterozoic**

The **Dean Quartzite** (Forman, 1966a; Wells et al., 1964) and Pinyinna Beds crop out along the Petermann Ranges and Olia Chain and on the eastern side of the Sheet, where they are infolded with the Precambrian basement rocks and metamorphosed. The two units are respectively correlated with the Heavitree Quartzite and the Bitter Springs Formation of the Amadeus Basin.

Kyanite and staurolite localities in the Dean Quartzite are shown on Figure 2. Kyanite-muscovite-pyrophyllite-quartz schist crops out in the Curdie Range (pyrophyllite was identified by X-ray, G. H. Berryman, pers. comm., and electron probe, R. N. England, pers. comm.). The metamorphic grade of the quartzite increases from northeast to southwest.

Lenses of conglomerate at the base of the quartzite in the Curdie Range contain boulders rich in kyanite. Elongate pebbles occur at the base of the Dean Quartzite in the nose of an isoclinal fold 5 km north of Mount Phillips (587212).

The **Pinyinna Beds** (Forman, 1966a) conformably overlie the Dean Quartzite. Talc and chlorite have developed in the carbonate rocks near Chirnside Creek, and mafic rock from the same locality has the assemblage quartz-biotite-chlorite-epidote-actinolite.

White sandstone and yellow and yellowish brown siltstone within the Amadeus Basin in the extreme northeastern corner of the Sheet area are correlated with the **Inindia Beds** (Ranford et al., 1965). The beds are unconformably overlain by the Mount Currie Conglomerate to the south.

**Palaeozoic**

The **Mount Currie Conglomerate** (Forman, 1966a) overlies the Inindia Beds unconformably. The conglomerate contains phenoclasts of metamorphic, igneous, and sedimentary rocks derived from the underlying formations after the Petermann Ranges Orogeny. Specimens of the same conglomerate from Mount Olga on the Ayers Rock Sheet area appear to have been metamorphosed and contain the lower greenschist assemblage quartz-albite-epidote-chlorite-actinolite.
The *Ordovician* at specimen locality (606222) PR25 consists of 13 m of flat-lying sandstone. A basal thin bed of poorly sorted pebbly sandstone is succeeded by silicified yellowish brown sandstone and gritty sandstone, which contains both a medium-grained well rounded fraction and a coarse-grained poorly sorted and angular fraction. The sandstone is thin and medium-bedded and contains poorly exposed interbeds of siltstone. Higher in the sequence the sandstone is better sorted and the grains more rounded and thin beds with bedding plane markings and vertical worm tubes are present. The outcrop is capped by a pale yellowish brown medium-grained sandstone which contains abundant *Diplocraterion*.

Similar outliers to the north in the Bloods Range Sheet area contain fragmentary molluscs and trilobites indicating an Ordovician age (Forman, 1966a; Joyce Gilbert-Tomlinson, BMR, pers. comm.).

**Cainozoic**

Gently dipping coarse-grained *Tertiary?* sandstone, about 6 m thick, crops out at locality PR78 (570223) near Shaw Creek. Casts of vascular plants and some silicified wood with vascular bundles and traces of vertical worm tubes found in the sandstone indicate a late Palaeozoic to Recent age.

Flat-lying beds of sandstone occur beneath the *Tertiary conglomerate* near Foster Cliff (645169). The conglomerate was deposited on the scoured surface of the sandstone without angular discordance. Benches are cut into the Dean Quartzite in the Petermann Ranges about 100 m above the present level of the sand plain. The Tertiary conglomerate occurs on the sides of the ranges up to and actually resting on the benches but is not found higher up the ranges.

The tops of the Pottoy Hills are peneplaned at about the same level, suggesting that the sandstone and conglomerate were deposited in large Tertiary lakes in which the Petermann Ranges and Olia Chain formed islands and peninsulas. It is probable that one large lake spread between the Petermann Ranges in the north and the Mann Ranges in the south. Many low outcrops in this area have been photo-interpreted as probably Tertiary, although some outcrops of *travertine* adjacent to claypans may be Pleistocene or Recent.

**STRUCTURE AND GEOLOGICAL HISTORY**

The Musgrave-Mann Metamorphics and the Olia Gneiss probably have a long history of deformation and metamorphism. Mafic dykes and granite were intruded into the Musgrave-Mann Metamorphics while they were still at high pressure and temperature deep in the crust. The reaction between orthopyroxene and plagioclase to give clinopyroxene and garnet indicates that next there was either a pressure increase or an isobaric drop in temperature. During this metamorphism the mafic dykes were deformed into an easterly trending synform in the Mann Ranges and deep-seated crush zones with a northerly trending lineation developed.
The Olia Gneiss was metamorphosed and then intruded by granite about 1170 m.y. ago. The gneiss and granite were subsequently intruded by mafic dykes. Mafic dykes may also have been intruded into the Musgrave-Mann Metamorphics and intrusive granites at the same time. Regional volcanic activity is indicated by the volcanic rocks in the Mount Harris Basalt and Bloods Range Beds on the adjacent Scott, Rawlinson, and Bloods Range Sheet areas. The presence of the Bloods Range Beds in the northwest of the Sheet area suggests that at least part of one caldera developed in the Petermann Ranges Sheet area. Many volcanic rocks in the Bloods Range Sheet area to the north were probably tectonically transported from the Petermann Ranges Sheet area.

The Dean Quartzite was deposited during a major marine transgression over central Australia probably about 1000 m.y. ago. Basal conglomerates were deposited as valley fills on the uneven surface of the unconformity. The main body of the thick orthoquartzite probably represents sand transported from the strandline of a platform or stable shelf environment into a deeper-water environment. Clay and carbonate (Pinyinna Beds) were then laid down conformably over the Dean Quartzite. The Inindia Beds were deposited in a partly marine trough that developed along the southern margin of the Amadeus Basin. After some folding and erosion during the Souths Range Movement (Forman in Wells et al., 1971), further sediments accumulated in this trough.

The area was then subject to the Petermann Ranges Orogeny (Forman, 1966a) late in Precambrian or early in Cambrian times (about 600 m.y. ago). During the orogeny a major fracture developed in the crust and the granulites of the Musgrave-Mann Metamorphics were uplifted and transported northwards along the Woodroffe Thrust. The precise position of this thrust across the Petermann Ranges Sheet is unknown, but an approximate position is shown on the map. A major nappe involving basement and cover rocks developed below the thrust (see sections on geological map). The infolded and overthrust cover rocks were metamorphosed up to the staurolite isograd and the Olia Gneiss northwards of the thrust was deformed and retrogressively metamorphosed. The deformed zone containing the Woodroffe Thrust, the Petermann Ranges Nappe, and the retrograded Olia Gneiss, trends east-west along the southern margin of the Amadeus Basin.

The Dean Quartzite and Pinyinna Beds are complexly deformed within the Petermann Ranges Nappe and the history of folding is uncertain. In the Petermann Ranges themselves the most prominent structure is a northerly trending mineral elongation and streaking parallel to the axes of isoclinal folds. These folds and the lineation are refolded by east-southeast-trending folds developed in the Curdie Range and at Mounts Fagan, Miller, Phillips, and McCulloch (594207). The folds are typically tight and overturned with axial surfaces dipping south at moderate to steep angles. The folding has produced a weak schistosity parallel to the axial surfaces and a lineation parallel to the b-axes of the folds. Folds like these in the Olia Chain are refolded about northeasterly to north-northeasterly axes. These latest folds are tight and overturned, with axial surfaces dipping moderately to the east. An axial-plane schistosity and a lineation parallel to the b-axes of the folds is prominent in this area. At Butler Dome earlier east-southeasterly folds are refolded about a north-northeasterly syncline. The Olia Gneiss, granite and mafic
dykes were deformed in the autochthon and in the allochthon. The mafic dykes in the autochthon are folded. The dykes, the granite, and the gneiss are schistose and new minerals have developed during the deformation.

As the Petermann Ranges Nappe developed the more competent Inindia Beds and other overlying Proterozoic sedimentary rocks were detached from the Pinyinna Beds and slid northwards on a décollement surface within the Bitter Springs Formation (correlative of the Pinyinna Beds). Their folding is of the Jura type. Erosion of the southwestern margin commenced during the Petermann Ranges Orogeny and continued afterwards owing to isostatic uplift. The Mount Currie Conglomerate was deposited in the Amadeus Basin probably during the Cambrian in a continental environment on the flanks of the uplifted area.

In the Ordovician a shallow sea transgressed from the Amadeus Basin over the eroded Petermann Range Nappe.

Extensive lakes covered much of the area in the Tertiary. Platforms were bevelled in the ranges and on the Pottoyu Hills while sands and piedmont gravels were deposited adjacent to the ranges. Some ferruginous cappings over the Pinyinna Beds probably developed at this stage. The lakes were drained and the area alluviated before the sand dunes accumulated in an arid environment.

Alluvial deposits are still forming along the river beds and some movement of the sand dunes by wind is visible after heavy rain.

**ECONOMIC GEOLOGY**

*Kyanite*

Large reserves of low-grade disseminated kyanite occur in valley fills at the base of the Dean Quartzite. The deposits are too far from markets to be economic.

*Rutile and zircon*

Rutile and zircon are common accessory minerals in the high-grade metamorphic rocks in the south of the Sheet area. One specimen of a mafic dyke collected near locality 16/10/9 (202131) about 10 km west of Mount Samuel contains an estimated 1 to 2 percent of rutile. The Quaternary and Tertiary rocks in the south of the Sheet area may be worth prospecting for economic concentrations of rutile and zircon. Rutile and zircon occur in very small amounts as accessory minerals in the Dean Quartzite.

*Nickel*

Nickeliferous ochre occurs in the Claude Hills of South Australia and extends into the Petermann Ranges Sheet area. In South Australia the nickeliferous ochre overlies the centre of an ultramafic intrusion bounded by norite and pyroxenite. The ochre is intimately associated with jasper and magnesite, and is underlain by serpentinite. The South Australian Mines Department drilled 4 boreholes to test possible extensions of this deposit into the Northern Territory (Miller & Rowan, 1968). Three found no evidence of ochre or deep chemical weathering, and the fourth encountered low-grade siliceous ochre beneath 12.2 m of Quaternary sediments. Average grade of the ochre profile was 0.51 percent nickel over a depth of about 47 m. There are no other records of significant or anomalous nickel values in the Sheet area.
Ferruginous cappings

Ferruginous cappings developed over the Pinyinna Beds during the Tertiary. Dissected remnants of these cappings were found to contain anomalous lead, zinc, and cobalt values by Planet Mining Company Pty Ltd in 1965. They initiated an extensive prospecting programme (Wilson, 1966; Jorgenson, 1966; Woyzbun, 1968; and Kenneth McMahon & Partners, 1968). A rotary drilling programme by Planet Metals Ltd in the Butler Dome area failed to intersect significant base-metal concentrations beneath the cappings.

Several cappings of hematite also occur over the Olia Gneiss at locality 582188.

Underground water

There are no water bores in the Sheet area. Water should be easily obtained by drilling along the major creeks and rivers. A large body of water is probably trapped in the alluvial basin near the Hull River west of Lasseter Cave (Fig. 1) and similar traps for water occur south of the Petermann Ranges near the Chirside, Shaw, and Irving Creeks.

A large Cainozoic basin exists between the Petermann Ranges and the Mann Ranges. This basin extends into the Scott Sheet area in Western Australia, where Farbridge (1968) has reported that drilling results suggest that it is a potentially important groundwater source.
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<td>Description</td>
<td>Intrusive Contact</td>
<td>Overlain Contact</td>
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<tr>
<td>Blucks Range Beds pCb</td>
<td>? Muscovite-quartz schist, quartz-muscovite schist</td>
<td>Intrudes Oelia Gneiss and Musgrave-Mann Metamorphics. Also shown on map as dykes. Several ages suspected in south.</td>
<td></td>
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<tr>
<td>pCu</td>
<td>Mafic and ultramafic rocks. Metamorphosed to greenschist facies in north and to granulite facies in south.</td>
<td>Some granite intrudes older mafic dykes in Musgrave-Mann Metamorphics. Some dykes intrude the granite.</td>
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<tr>
<td>pCg</td>
<td>Granite metamorphosed in Oelia Gneiss to quartz-feldspathic schist and gneiss. Some charnockite granite in south.</td>
<td>Some granite intrudes older mafic dykes in Musgrave-Mann Metamorphics. Some dykes intrude the granite.</td>
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<tr>
<td>Pottoyu Granite Complex pCo</td>
<td>Very coarse porphyritic granite, coarse porphyritic granite, fine, medium and coarse even-grained granite and quartz feldspar porphyry. Metamorphosed to schist and gneiss.</td>
<td>Very coarse porphyritic granite intruded by coarse porphyritic granite which is in turn intruded by even-grained granite. Intruded by mafic dykes. Overlain unconformably by Dean Quartzite.</td>
<td></td>
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</tbody>
</table>
REFERENCES


JORGENSEN, JON T., 1966—Photogeologic evaluation of project “A” southwest Northern Territory prospecting numbers 1435 and 1546, Private company report by Geophoto Resources Consultants for Plant Mining Company Pty Ltd.

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