EXPLORATION LICENCES 1341 AND 1342

"STRANGWAYS RANGE" AND "HALE RIVER"

ARUNTA COMPLEX, NORTHERN TERRITORY

FINAL REPORT

OCTOBER, 1977

CR77/139
# CONTENTS

## SUMMARY

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*Figure 1:* Locations of E.L. 1341, Strangways and E.L. 1342, Hale River, and areas selected for investigation. 1:500000

*Figure 2:* E.L.'s 1341 and 1342, Strangways and Hale River, Rock sample locations. 1:125000
SUMMARY

Exploration Licences 1341 and 1342 are composed of Lower/Middle Proterozoic granulite and amphibolite facies metamorphic rocks.

Mineral occurrences and prospects within the Exploration Licence areas were investigated. Although some occurrences could be BIF-associated, stratiform exhalative-type base-metal mineralisation, the extent of outcrop and nature of the mineralisation inspected suggest that no large tonnage mineralisation is present.
1. **TITLE**

Exploration Licence 1341 of 1060 square kilometres and Exploration Licence 1342 of 1245 square kilometres were granted to Dampier Mining Company Limited on 8th November, 1976 for one year. They were surrendered on 15th July, 1977 and 16th September, 1977 respectively.
2. LOCATION AND ACCESS

The Exploration Licences are located 40 to 70 kilometres north of Alice Springs, Northern Territory. (For location see Figure 1).

E.L. 1342 can be reached via the Stuart Highway from Alice Springs and along a good gravel road to "the Garden" Station. The western part of E.L. 1341 can be reached through Yambah Station and the eastern part is accessible through E.L. 1342 along a track running north at Pinnacles Bores. (See Figure 2).

Most of the area forming the Strangways Range is extremely rugged; no roads or tracks exist into the Range.
3. REGIONAL GEOLOGY

Stewart and Warren (1977) set out the BMR's view of the general geology of the Arunta Block of Central Australia. The Strangways Range forms part of the Southern Arunta Block and consists of early Proterozoic volcanic and sedimentary rocks, which were completely deformed and metamorphosed to granulite and amphibolite facies and intruded by granite during Proterozoic (Carpentarian) times. An episode of migmatisation occurred during the late Proterozoic (Adelaidean) and wide-spread thrust-faulting and associated retrogressive metamorphism occurred in the late Palaeozoic (Alice Springs Orogeny).

Recently the BMR completed 1:100000 scale geological mapping of the Burt and Laughlen sheet areas (sheet maps 5651 and 5751), entirely covering both Exploration Licence areas. These geological maps show that the Strangways Range consists essentially of high-grade metamorphic rocks - granulites of mafic, felsic and pelitic compositions, including pyroxene granulites, cordierite granulites, charnockites, anorthosites and migmatites. The metamorphics also include amphibolites, gneisses, schists, marbles, granites, pegmatites and meta-dolerites. A number of rock types are rich in magnesium and aluminium, forming gneisses and granulites containing anthophyllite, cummingtonite, phlogopite, enstatite and sapphire. Common mineral assemblages are quartz-hypersthene-cordierite-biotite-garnet.

Stewart and Warren (1977) believe that stratiform base-metal mineralisation associated with magnetite quartzite, marble, amphibolite and magnesiam/aluminium-rich rocks (so-called "Onagalabi"-type mineralisation) could have a syngenetic origin formed by weathering of pre-existing rock (shale, chert, dolomite) together with simultaneous precipitation of base-metals from groundwater in the weathering profile, rather than a sedimentary/exhalative, igneous or metasomatic origin.

A major north-west gravity lineament (Woolanga lineament) is present in the eastern parts of the licence areas. The Mud Tank carbonatite intrusion just northeast of E.L. 1341 and the ultramafic Mordor Complex to the southeast of E.L. 1342, are both possibly related to this lineament.
4. PREVIOUS EXPLORATION

Within the present Exploration Licence areas the BMR carried out a reconnaissance aeromagnetic/gravity survey during 1965. The N.T. Mines Branch subsequently drilled three diamond drill holes over magnetic anomalies at Red Rock Bore and one diamond drill hole at Harry Creek.

Planet Metals Limited held E.L.'s 57 and 58 between 1971-1974 and carried out aeromagnetics and soil, auger and trench geochemistry over selected areas in the western parts of the present tenements (Lyons, M, final report 1975). The prospects at Red Rock Bore and Harry Creek were examined in greater detail. It was recommended that further diamond drilling be carried out but no such work was ever undertaken.

At the Pinnacles Bores district copper has been intermittently mined from shear and vein deposits. The BMR carried out geological investigations and a ground geophysical survey between 1965-1969. Geopeko Limited and Magellan Petroleum (Pty) Limited subsequently drilled a number of diamond and percussion holes including the Johnnies Reward prospect in magnetite quartzite. Results have been disappointing and no more work has been carried out since early 1970.

At Johannsen's Phlogopite Mine, coarse phlogopite was mined around 1940 from calcite-olivine rock within coarse-grained cordierite-feldspar granulite. Lead-zinc-copper mineralisation was also discovered and the N.T. Mines Branch put down three diamond drill holes. Only one intersected significant values, mainly Zn, 3.3%. No further exploration work was carried out.

At the Rankin's and Gheko prospects, Central Pacific Minerals Limited during 1969-1970 carried out percussion drilling of copper-zinc-lead mineralisation associated with banded magnetite-quartzites. Although some analytical results were encouraging, the lodes appeared too small and narrow to warrant further exploration.

Numerous quartz-pyrite veins were mined at the turn of the century in the hills of the Winnecke gold district southwest of "the Garden" Station. The lodes were generally small and produced little payable material (recorded production 37.5 Kg).
In the eastern part of the Licence areas, Stockdale Prospecting Limited held E.L.'s 811 and 812 during 1973-1974, in search of kimberlites. Although one 0.0002 carat diamond was located and the presence of indicator minerals established, no follow-up work was recommended.
5. PRESENT INVESTIGATIONS

5.1 General

A summary of mineral occurrences of the Arunta Complex by Warren, Stewart and Shaw (1975) focussed attention on the occurrence of stratiform copper-lead-zinc mineralisation characterised by a distinct lithological assemblage of forsterite marble, magnetite quartzite amphibolite and rocks rich in magnesium and aluminium, containing anthophyllite, phlogopite, cummingtonite, spinel, enstatite and sapphireine ("Oonagalabi" type mineralisation). To assess the potential of stratiform deposits in the Southern Arunta block, Exploration Licences 1341 and 1342 were taken up.

Colour air photographs of 1:25000 scale of the Burt (5651) and Laughlen (5751) 1:1000000 sheet areas were obtained. These were studied prior to reconnaissance work.

The preliminary issues of the Burt (October 1976) and Laughlen (September 1976) BMR geological maps were used during the reconnaissance. For this report precise locations of samples and localities are given as coordinates of the grid reference of these two maps. Sample locations are also marked on Figure 2.

Within the Exploration Licences specific areas were selected for immediate inspection. These areas are marked on Figure 1.

5.2 Areas Investigated

5.2.1 Marlagara Range

This range, 4-14 km north of Yambah station, is made up predominantly of mafic and felsic granulites. Traversing about 3 km south of Mt. Strangways, massive dark green, medium-grained hornblende two-pyroxene granulite (sample MRL 9247) is composed of plagioclase, augite, hypersthene, brown-green pleochroic hornblende and accessory opaques, including mainly magnetite, minor pyrrhotite and trace of chalcopyrite. Along the south - eastern side of the range a series of sub-parallel faults exist trending approximately
275° (Ref. Burt 5651/830508-803512). Within the granulite, alteration of pyroxene to actinolite occurs, in particular along thin limonite-stained veinlets. Only minor pyrrhotite could be detected (sample MRL 9248). Charnockite is also abundant (sample MLR 9246): grey, medium-grained rock compositionally layered and composed of plagioclase and K-feldspar, with less hypersthene and accessory sphene. Staurolite and sillimanite schists occur locally.

A ferruginous vein of quartz and (?) sulphides (none now remaining) was traced up the range for several hundreds of metres, to a col near the top where the vein is about 1 metre thick and dips 80° NE:

Sample MRL 9245: 340 ppm Cu, 20 ppm Pb, 12ppm Zn.

Further traversing in the general area did not reveal any mineralisation.

5.2.2 Area North of Mt. Milton

Gossanous float was found among rubble on the east side of a steep creek 2km north of Mt. Milton, cutting garnet-hypersthene-cordierite granulite (meta-pelites) of this area (samples MRL 9251-9254).

Chemical analysis of the gossanous float (sample MRL 9249) is as follows:

950 ppm Cu, 28ppm Pb, 64 ppm Zn.

The copper is due to finely disseminated grains ( < 30 micron) of chalcopyrite.

The source rock could have been a one metre wide, dark, medium to coarse-grained granulite (sample MRL 9250) near the col of the hill outcropping for about 200 metres and composed of large polysynthetically twinned plagioclase crystals (labradorite) hosting rounded grains of magnetite (up to 5mm). Garnet is abundant and encloses or rims hornblende; symplectic garnet-quartz intergrowths are also abundant. However, no sulphides could be detected during microscopic examination.

This unit is thought to be of igneous origin and occurs as a sill in between the meta-sedimentary units.
5.2.3 Copper Occurrence West of Mt. Milton

Malachite and chrysocolla have been found on the western bank of a creek approximately 3 kilometres west of Mt. Milton (Location Burt 5651 - 851475). A gossanous outcrop, about 10m x 2m marks a small cupferous fault (?) zone or vein within rocks similar to those which were found north of Mt. Milton, and include garnet-hypersthene granulite, cordierite-hypersthene granulite, garnet hypersthene and cordierite-garnet-phlogopite granulite (samples MRL 9258 - 9262).

Further search in the area did not reveal additional mineralisation.

5.2.4 Red Rock Bore Prospect

An inspection was made of the Red Rock Bore prospect on the western fringe of E.L. 1341. The prospect was drilled by the N.T. Mines Branch in 1965, who planned to test at depth a quartz-garnet-hematite-magnetite lens responsible for a distinct magnetic anomaly identified by Tipper (1966). Three holes to a maximum depth of 170 metres were drilled. A summary of this drilling is as follows:

<table>
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<tr>
<th>Hole No.</th>
<th>Interval (m)</th>
<th>Length (m)</th>
<th>Cu%</th>
<th>Pb%</th>
<th>Zn%</th>
<th>Ni%</th>
<th>Ag (gr/t)</th>
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<td>DDH1</td>
<td>65-103</td>
<td>38</td>
<td>0.40</td>
<td>0.51</td>
<td>0.95</td>
<td></td>
<td>0.8</td>
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<td>1.5</td>
<td>0.60</td>
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<td>3.10</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>DDH2</td>
<td>70-85</td>
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<td>0.53</td>
<td>0.22</td>
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<tr>
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<td>DDH3</td>
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<tr>
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<td>1.5</td>
<td>0.67</td>
<td>2.32</td>
<td>9.95</td>
<td>0.40</td>
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The mineralisation intersected consisted of disseminated chalcopyrite, sphalerite, galena, pyrrhotite, pyrite and magnetite. Banded garnet (magnetite) quartzite and biotite (garnet) gneiss are the predominant rock types intersected by the drilling, with lesser pyroxene granulite, anthophyllite gneiss, cordierite-garnet gneiss and amphibolite present.
Planet Metals Ltd. put in five costeans; highest assay for the costeans was 270 ppm Cu and 1100 ppm Pb.

Rock types within the costeans were examined; they are mainly weathered quartz-garnet-hematite rock, acid and basic granulite and acid gneiss. Samples were collected from the costeans and outcropping quartz-magnetite lens. Selected samples were analysed:

MRL 9255 (qtz magn. rock) 800 ppm Cu, 2000 ppm Pb, 270 ppm Zn.
MRL 9256 (Costean 2) 210 ppm Cu, 950 ppm Pb, 1600 ppm Zn.
MRL 9257 (Costean 1) 1000 ppm Cu, 1250 ppm Pb, 470 ppm Zn.
MRL 9256 garnet-biotite gneiss.
MRL 9257 sillimanite-cordierite-biotite gneiss + magnetite.

Within the immediate area there is no further outcrop.

5.2.4 Lead and Copper Occurrence South of Woolanga Bore (Location Laughlen 5751 - 187471).

To the eastern part of E.L. 1341 about 5km south-southeast of Woolanga Bore and about 2km west of Gillen Creek, a small knoll (40m x 50m) on the edge of an extensive flood plain is composed of forsterite-spinel marble, sheared quartztite gneiss and darker diopside rock (Samples MRL 9262-64). Galena occurs in the forsterite marble along narrow zones (less than 20 cm), apparently strongly contorted SW shears. Pegmatitic quartz-feldspar veins are abundant and show minor malachite staining. Individual rock types pinch out and can not be traced.

Rocks immediately to the east of the marbles are highly sheared metapelites and mafic metavolcanics. These rocks may form part of the major Woolanga fault zone with abundant marbles and calc-silicate rock in the general Woolanga - Southern Cross Bore - Pinnacles region.
5.2.5 Copper in aluminous granulite

(Laughlen 5751 - 158463)

Approximately four kilometres west-southwest from the previous lead-copper occurrence, a traverse was made through hilly country. Major rock types forming these hills are calc-silicates at the base followed by felsic and mafic granulites. In a valley composed predominantly of highly aluminous meta-sediments (now sillimanite gneiss and granulite with or without biotite, pyroxene, feldspar and quartz - samples MNL 9266 - 70), a small outcrop of schistose garnet-pyroxene-magnetic rock (MRL 9266) shows minor malachite staining. The outcrop measures 1m x 0.2m and is adjacent to a corundum-feldspar-magnetite zone, separating the normal sillimanite granulite from narrow bands of two-pyroxene granulite, which could have been original lava flows. Extensive searching did not reveal further copper mineralisation; perhaps minor copper originated from the pyroxene granulite.

Elsewhere the sillimanite granulite contains large prismatic crystals (up to 10cm) of kornerupine, a boro aluminium silicate that is stable under granulite facies of metamorphism. (Samples MRL 9267, 9269, 9270). The ground mass is fine-grained recrystallised plagioclase and quartz in which megacrysts (up to 0.5 cm) of perthite occur.

5.2.6 Pinnacles Bores District

The geology of the individual deposits of the Pinnacles Bores copper district has been described by Shaw (1970). Within this area the Arunta Complex consists largely of calcareous rocks with subordinate arenaceous and argillaceous rocks that have been metamorphosed to upper amphibolite facies. Quartz veins, pegmatites and small granite dykes have been intruded along north-trending shear zones aligned roughly parallel to foliation.

A number of small copper prospects occur 2km north east and east of Southern Cross bores. These include Centralian No.1's 9 and 2. Johanssen's shaft, Ciccones shaft and Ophir. Here, the copper mineralisation is mainly concentrated in fractures in quartz veins,
which are usually less than 1 metre wide and rarely economic. The copper content of the veins is up to 30% in rich pockets with traces of gold, silver and bismuth. The grade was richest at the surface, possibly due to enrichment. Copper minerals identified are malachite, azurite, chrysocolla, chalcocite, bornite and chalcopyrite. At the Centralian No. 2 prospect mineralisation occurs in narrow shears near contacts between marble and schist. Rock types include phlogopite marble, chlorite-muscovite schist, micaceous calc-silicate rock. (Samples MRL 9160 A - M).

At Jill's Penny prospect, 4 kilometres south of Southern Cross bore, garnet-biotite-quartz schist and calc-silicate marble rock contain pegmatite and tourmaline-quartz veins roughly parallel to the foliation (350° E, 75 - 80° E). Mineralisation within the quartz vein is chalcocite, bornite and malachite; meta-volcanic in contact with the quartz vein is strongly hydrothermally weathered and shows copper impregnation. (Sample MRL 9261).

Magnetite quartzite and amphibolite occur 200 metres further north and northwest of the prospect, but no mineralisation appears to be associated with these rock types.

The Johnnies' Reward prospect is situated 1 kilometre north of Southern Cross bore; it is different from the shear and vein deposits of the Pinnacles district in that the mineralisation is stratiform and associated with magnetite quartzite and anthophyllite rock. The mineralisation has been described as Oonagalabi-type mineralisation (Stewart and Warren, 1977).

At the surface three small discontinuous exposures occur over a distance of about 180 metres in a north-south direction. The most southern outcrop is a ridge forming part of a northeast dipping fold nose. Rocks east of the prospect are felsic gneiss and biotite-sericite schist, showing evidence of mylonitisation (Sample MRL 9237). Surface copper staining (malachite) is observed on magnetite quartzite with or without biotite/chlorite and minor anthophyllite (Samples MRL 9239 and 9240). Other rock types include hypersthene - plagioclase granulite containing magnetite and minor amphibole (Sample MRL 9238) and calc-silicate composed of diopside, anthophyllite and magnetite with variable amounts of calcite (Sample MRL 9242). To the west of the prospect the country rock is garnet-biotite - quartz gneiss (Sample MRL 9244).
Further traversing in the neighbourhood of the prospect shows pegmatite, marble and calc-silicate rock, but banded felsic gneiss is more prominent.

Shallow percussion drilling into the lode by Magellan Petroleum showed maximum values of 1.6% Cu, 1.7% Pb and 2.0% Zn (No Ag, Au or Ni detected). Diamond drilling by Magellan Petroleum at the southern end of the prospect intersected only traces of base metals, but the hole probably undercut the lode. At the northern end, Geopeko diamond drilled the prospect and intersected the lode between 40 and 80 metres. The lode is up to 30 metres thick, but averaged only 0.18% Cu and 0.2 gm/tonnes Au.

A geophysical survey of the prospect by the BMR (Haigh 1971) indicates that the magnetic body has an extent of 300 metres; IP and self potential indicate a shallow ellipsoidal body that lies largely above the Geopeko hole.

The evidence from diamond drilling and geophysics is that the mineralisation is of limited size and of no further economic interest.

5.2.7 Johannsen's Phlogopite Mine

A short description of Johannsen's Phlogopite Mine is given by Stewart et al (1976). The abandoned mine occurs in rugged country on the southern part of the Strangways Range. The mine was worked about 1943 to mine lensoid masses of coarse-grained phlogopite at a contact zone against coarse-grained garnet-cordierite-quartz-feldspar granulite, that also contains pods of mafic granulite. Although the phlogopite occurred in large-sized crystals only 3.5 tonnes of phlogopite was produced (Hudson and Wilson, 1966).

The phlogopite is associated with calcite-olivine rock with magnetite, spinel and copper-lead-zinc sulphides (coarse-grained galena, sphalerite and chalcopyrite, minor covellite, sample MRL 9176). Originally the olivine rock was thought to be an ultramafic intrusive but is now considered to be the alteration product of a magnesium-rich sediment. Analysis of the olivine established that nickel, chromium and vanadium are virtually absent and the deposit is now referred to as "Oonaga1abi-type" mineralisation (Stewart and Warren, 1977).
The structure at the mine appears to be a tightly folded synform disrupted by a later fault filled by pegmatite. The olivine rock has since been shown to be part of a more extensive unit containing lenses of magnetite and magnesium/aluminium rich rock containing sapphirine, spinel, phlogopite, hypersthene, gedrite, anthophyllite and cordierite (Hudson and Wilson, 1976).

Three diamond drill holes were put down by the N.T. Mines Branch. Two undercut the structure; only the third hole intersected sulphide minerals, mainly in the oxidised zone, and yielded a maximum value of 3.3% Zn, but neither copper nor lead exceeded 0.2%. Nickel and cobalt were low; 1.5 gm/t. Gold was the most encouraging result (Morlock 1971).

The structure is too small to warrant further exploration.

Country rock near the mine is principally light grey, medium-grained "spotted" hypersthene-cordierite granulite. Dark hypersthene and pink garnet occur as large (1-5 cm) poikiloblastic porphyroblasts (MRL 9190). Other rock types identified are: hornblende-epidote-plagioclase granulite (MRL 9789), coarse-grained clinohumite-hypersthene-gedrite-spinel-garnet granulite (MRL 9188).

At the mine dump, rock outcrop of coarse-grained olivine-calcite-spinel-magnetite with or without phlogopite occurs. Material from the dump contains galena, sphalerite and chalcopyrite. (Samples MLR 9169 - 9176).

At the mine near the old shaft, the granulite country rock varies in mineral composition. The following mineral assemblages occur:

hypersthene-biotite-plagioclase-sapphirine-cordierite (MRL 9179).
biotite-chlorite-spinel-cordierite-hög bomite-magnetite (MRL 9180).
coarse-grained brown cordierite-phlogopite-sphene (MRL 9181).
spinel-gedrite-hypersthene-phlogopite-sapphirine (MRL 9182, MRL 9183).
hypersthene-gedrite-spinel (MRL 9184).
Traversing through hilly country approximately 500 metres to the east of the old shaft a ridge composed of magnetite quartzite occurs. The ridge is 150 metres long and 30 metres wide. Perhaps the structure is again a tight near-vertical synform, striking 35°E and synclinal axis dipping NE. Hypersthene-cordierite granulite can be traced north, west and south of the ridge. The banded magnetite quartzite (composition magnetite 40%, quartz 60%, sample MLR 9185) displays a distinct foliation caused by elongate masses of magnetite (partly altered to goethite and hematite) in between which granoblastic quartz occurs. The magnetite quartzite is a BIF, perhaps of exhalative/sedimentary origin. Weak copper (malachite) mineralisation is exposed in a small pit along a narrow shear zone 20 - 50 cm wide, in pyroxene granulite. The mineralisation extends no further than 10 metres and does not warrant further examination.

5.2.8 Radiating "lineaments" South of Johannsen's Phlogopite Mine

The aerial photographs south of Johannsen's phlogopite mine at the turn-off point from the road to "the Garden" Station (Photograph Laughlen Run 7, No. 3279) shows a conspicuous semi-circular structure about 700 metres across, from which several "lineaments" radiate. These lineaments appear to be faults and meta-dolerite dykes (now hornblende two-pyroxene granulite). The possibility that these could be the result of deep-seated explosive/intrusive activity (perhaps during more than one event) was considered. The area was traversed for kimberlitic evidence but no such evidence could be found.

Traversing the hills reveals the following rock types:

Anorthosite or meta-gabbro (Samples MLR 9191, 9196, 9197, 9200, 9205) forms a large proportion of these hills; the rock is composed essentially of medium-grained plagioclase, pyroxene and brown hornblende. The pyroxene is often partly or totally altered to blue-green pleochroic amphibole, which in turn shows alteration to biotite and chlorite. Microcline is often present, apparently replacing plagioclase whereby muscovite has been formed. Accessory magnetite occurs.
Mylonitic rocks: Evidence for K-metasomatism is observed in a deformed zone of mylonitic rocks that can be followed along the whole of the semi-circular structure. The mylonite is up to 20 metres thick and composed of fine to medium grained granoblastically intergrown microcline and quartz, orientated biotite and muscovite flakes. Microcline clasts up to 20cm across are plentiful; clasts of quartz are also abundant (Samples MRL 9198 A, B, 9201, 9208, 9209).

The hills on the eastern side of the structure are composed of two-pyroxene (-garnet) granulite (Samples MRL 9211 - 9213). Strongly deformed siliceous garnet-tremolite-biotite schist, enclosing clots of garnet up to several cm in size are not uncommon (MRL 9214, 9215).

Intercalations of amphibolite (MRL 9199) and feldspar pegmatite (MRL 9195) occur sporadically.

The enclosed central flat was traversed for Kimberlitic evidence; it is largely covered with alluvium, but several outcrops of hypersthene-hornblende-plagioclase (biotite) granulite with or without accessory magnetite (MRL 9216, 9217) were found. Outcrop of pegmatite and quartz veins also occur. A narrow post-tectonic dolomite dyke occurs near the turn-off to the phlogopite mine (MRL 9192).

It is concluded that the semi-circular structure was formed through erosional processes of a low-angle overthrust zone (now deformed mylonite zone traceable approximately east-west for over seven kilometres (see Laughlen 1:100000 geological map) and that no kimberlite exists within the area.

5.2.9

Harry Creek Prospect

Malachite staining and gossanous limonite/hematite rock occur along almost the whole length of a ridge 5km northwest of Harry Bore. The ridge protrudes from an alluvium-covered plain and is about 30 metres high and 400 metres long with a maximum width of 70 metres. The hill is composed largely of magnetite-hematite quartzite associated with coarse-grained (often micro-folded) anthophyllite (-pyroxene) rock (Samples MRL 9158 A-E). General strike 310°E.
Galena has been found at several places associated with actinolite rock. The general country rock is basic granulite, in which minor amphibolite occurs.

The prospect was covered by the 1965 BMR aeromagnetic survey (Tipper 1966). Interpretation of the data from this survey identified a magnetic body 600 metres long and 130 metres wide midway between positive and negative trends.

The N.T. Mines Branch completed a 98 metre deep diamond drill hole in 1966 to test the aeromagnetic anomaly. Sulphides were intersected in hematite-magnetite-anthophyllite rock, between 39 and 43 metres. Results: 0.21% Cu, 0.27% Pb, 1.8% Zn.

The area has been investigated by Planet Metals Ltd. who carried out soil sampling, ground magnetics and an IP survey. Maximum assay values of 0.33% Copper and 1% for Lead and Zinc were obtained from the soil sampling. The IP survey indicated that all axis (conductive, magnetic) are interrupted near the centre of the surveyed area, which is interpreted as being due to a fault or shear zone. No further drilling was carried out.

5.2.10

Rankins and Cheko Prospects

These prospects are located respectively 3km west and 3km south of Bald Hill. This range is composed of infolded Heavitree quartzite within the Arunta Complex. Both prospects were investigated by Central Pacific Minerals within their Prospecting Authority 1721.

At Rankins, two separate mineralised locations occur, approximately 200 metres apart, which are considered to be the same stratigraphic level within a steeply plunging S-shaped fold. They are both small lenses (60 metres maximum length, less than 10 metres wide) adjacent to banded magnetite-quartz rock and amphibolite. Both lenses have been drilled but no information of the results are at hand.

At the most southern lens copper staining (malachite, chrysocolla) occurs in quartzose (+ martite after magnetite), granular, gossanous rock and weathered coarse anthophyllite quartzite (+ magnetite) (Samples MRL 9218-9221). In a pit about 3 metres deep the anthophyllite rock strikes 330°E, vert.; Much of the amphibole has been altered to chlorite and biotite. The general country rock further west and east
includes hornblende-magnetite-plagioclase granulite and biotite-garnet schist (Samples MRL 9223 - 9224).

The northern lens is located on a ridge composed of banded anthophyllite-tremolite-magnetite quartzite, striking 260°E, vert. (Samples MRL 9225-9226). Malachite occurs at various places but reported galena in associated marble was not found during the inspection. A small pit is dug on a copper-stained gossanous calc-silicate outcrop, composed of schistose biotite-chlorite-muscovite-carbonate-quartz rock. (Samples MRL 9227-9228). Other associated lithologies further north and south include strongly sheared garnet-chlorite-sericite schist and hornblende-epidote-biotite (-chlorite)-plagioclase granulite (Samples MRL 9233-9236).

The Gheko prospect was located by Central Pacific Minerals and is perhaps within the same stratigraphic unit as Rankins. Lithologies are quite similar: quartz-magnetite bodies showing malachite staining are associated with amphibolite, hornblende schist and quartz-feldspar gneiss. A four-hole percussion programme was carried out which intersected low grade zinc mineralisation and several zones of disseminated pyrite.

Best analytical results were as follows:

<table>
<thead>
<tr>
<th>Perc. Hole</th>
<th>From</th>
<th>To</th>
<th>Apparent Width</th>
<th>True Width</th>
<th>% Cu</th>
<th>% Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>105'</td>
<td>110'</td>
<td>5</td>
<td>3</td>
<td>0.4</td>
<td>1.6</td>
</tr>
<tr>
<td>2</td>
<td>130'</td>
<td>155'</td>
<td>25</td>
<td>12</td>
<td>0.3</td>
<td>3.0</td>
</tr>
<tr>
<td>3</td>
<td>70'</td>
<td>85'</td>
<td>15</td>
<td>8</td>
<td>0.2</td>
<td>1.8</td>
</tr>
<tr>
<td>4</td>
<td>190'</td>
<td>205'</td>
<td>15</td>
<td>8</td>
<td>0.2</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Further drilling was recommended but not carried out.

Although the results are reasonably encouraging, the narrow width of mineralisation and limited strike length of mineralised lithologies do not warrant further examination.
6. CONCLUSIONS

Exploration Licences 1341 and 1342 were taken out to investigate the potential of reported stratiform copper - lead - zinc mineralisation.

Within the Licence areas a number of base-metal occurrences are associated with small lenses of banded magnetite quartzites within units of highly metamorphosed granulite/amphibolite facies rocks. These include meta-igneous rocks, now mafic granulites of variable thicknesses and magnesium/aluminium-rich rocks possibly of sedimentary parentage.

The origin of the stratiform magnetite quartzite associated mineralisation is thought to be sedimentary/exhalative or could in some cases have been remobilised and concentrated during various stages of folding and metamorphism from igneous units.

In all cases mineralisation investigated is low grade and appears very small in size. No further work is warranted.
7. **EXPENDITURES**

Expenditures incurred on E.L.'s 1341 and 1342 were:

<table>
<thead>
<tr>
<th></th>
<th>E.L. 1341</th>
<th>E.L. 1342</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages and Salaries</td>
<td>$5379</td>
<td>$3958</td>
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<tr>
<td>Messing and Accommodation</td>
<td>675</td>
<td>669</td>
</tr>
<tr>
<td>Fares and Mobilisation</td>
<td>542</td>
<td>589</td>
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<td>Transport</td>
<td>205</td>
<td>201</td>
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<td>Air Photographs</td>
<td>960</td>
<td>960</td>
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<tr>
<td>Consultants</td>
<td>1200</td>
<td>1609</td>
</tr>
<tr>
<td>Sample Analysis</td>
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<td>139</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$9100</strong></td>
<td><strong>$8125</strong></td>
</tr>
</tbody>
</table>

This report is submitted to the Mines Branch as required by Condition 6 of Exploration Licence 1341 and 1342.
8. REFERENCES

Fruzzetti, O. 1969 - "Geological notes on the Coles Hill copper prospect, Strangways Range, N.T."

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