EL 25570 DUFFIELD

FINAL REPORT

GEMPART(NT)P/L

66 SMITH ST

ALICE SPRINGS 0870

PETERMANN RANGES

AW MACKIE

November 2017

Commodities: Cu, Pb, Zn, Ag, Au, P, REE, Th, Ni, Co, Cr, Ti, V, PGE, Sn, W, Ta, Li, KCL, FEO

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SUMMARY

EL25570 butts up to the SA border centrally located between the Mann Fault to the south and the Woodroffe Thrust Fault to the north a regionally extensive zone of thrusting of granulite facies rocks to there current cropping out position during the 560-535Ma Petermann Orogeny.

Within the licence area the Mount Charles Thrust has juxtaposed 1550Ma felsic granulite against Giles Complex – aged 1070Ma Angatja Granite over a strike length of 25km trending east north east raising the possibility of Ni-Cu-Cr-PGE-Au-Ag mineralised Giles Complex Ultramafic bodies having also been thrusted into near-surface positions(somewhere along the Mt Charles Thrust front?) during the above 560-535Ma Petermann Orogeny

Available NTGS AMAG/Radiometric ,Landsat ,DTM digital data was acquired imaged processed,modelled and interpreted in search of possible Giles Ultramafic geophysical expression analogues.Unfortunately no prospective Giles Complex geophysical footprints were delineated consequently EL25570 was surrendered.

Figure 1 EL25570 Location Plan.
2. INTRODUCTION

EL25570 butts up to the SA Border located in the south east corner of PETERMANN RANGES 250K map sheet one of three ELs constituting the CLC administered Musgrave Exploration and Mining Agreement negotiated between Gempart(NT)P/L and the Traditional Owners.

3. LOCATION and ACCESS Figure 1&1a

EL25570 is located butting up to SA Border within south east corner of PETERMANN RANGES map sheet. Access is difficult there are no existing roads into the licence area. Access from Yulara is south for 15km until the turnoff to The Olgas is reached turning west along the sealed highway for 35km until a south west trending unsealed bush track turnoff is reached known locally as the ‘Telstra Track’ which continues on for 230km to the SA Border, 60km from The Olgas turnoff Stevensons Peak is reached where there is a turnoff heading south to Butler Dome about 20km away however the track first graded in 1963 by Planet Mining has been washed away in several places and is not recommended. However 30km further on where interpreted south east-trending Woodroffe Thrust crosses the Telstra Track the country opens up to a vista of flat-lying lightly vegetated sand country thus turning south east off Telstra Track, more or less following trend of Woodroffe Thrust for 30km will bring you to the northern boundaries of EL25570 and 25567 allowing access over more flat-lying sandy country to southern licence areas.

4. TENURE

EL25570 was granted 17th November 2016 for 6 years and surrendered on 20th October 2017. It was part of the Musgrave Mining and Exploration Deed signed on behalf of Traditional Owners by CLC and Gempart(NT)P/L under terms and conditions set out in the 1976 Land Rights Act(ALRA). EL25570 was over part of the Petermann Land Trust enacted in 1971 as Aboriginal Freehold Land.

5. PREVIOUS EXPLORATION

The south west margin of the Amadeus Basin was first explored by Giles in 1872 and 1876. The first scientific investigations were made by CA Exploring Expedition in 1889 and Horn Scientific Expedition in 1896. In 1901 and 1903 SA Government prospecting expeditions investigated Musgrave, Mann and Rawlinson Ranges. H Basedow prospected Musgrave Ranges, Mt Olga, Mt Connor and Ayers Rock 1903. In 1905 FR George prospected Petermann and Bloods Ranges producing a sketch map and a trace of gold in quartz near Foster Cliff. In 1926 Basedow and Mackay produced a Geology Report on Bloods Range followed by an aerial survey of Petermann Ranges in 1930.

Lasseter’s report of a rich gold reef gave rise to many expeditions in the 1930s. He is rumoured to be buried at a rock hole 4km north of Mt Phillips on ELA31516. Lasseter’s cave is located at the western end of Curdie Range. The Border Gold Exploration traversed Olia Chain and Petermann Ranges into WA in search of reef in 1935. HA Ellis a geologist was seconded to another party in 1936. GF Joklik accompanied an expedition in 1951. The Frome-Broken Hill Company carried out an extensive survey of the region in 1958.

In October 1960 BMR flew an AMAG traverse across south east PETERMANN RANGES. In 1962 a helicopter gravity party visited the area as part of the Amadeus Basin reconnaissance gravity survey. An AMAG/Radiometric survey of the sheet area was flown by BMR in 1965. RAWLINSON was
mapped in 1960, BLOODS RANGE in 1967, AYERS ROCK in 1963. SA Department of Mines published MANN in 1962 and explanatory notes in 1964 and WOODROFFE in 1967. PETERMANN RANGES mapping was carried out in stages. The northern part by Forman and Hancock in 1963. JF Ivanac mapped south west corner in 1965 and McCarthy described the rocks he collected. Detailed mapping of Potttoyu Granite around Lasseters Cave was carried out by Forman and England in 1968. The south east corner of the sheet was mapped by Forman and Shaw in 1969.

In May 1966 SA Department of Mines carried out geological mapping, gravity traversing and percussion drill testing of possible extensions of the Claude Hills nickeliferous ochre occurrence across the border into the NT. Two gravity lows were detected namely Zone C commencing in SA and Zone D located entirely in NT. Two percussion drill holes were collared over each zone for a best result of 46.63m averaging 0.5% Nickel in DH NC 20 on line 12800E. The Claude Hills are a long narrow east west trending zone of discontinuous ultrabasic outcrops comprising norite and pyroxenite. The intrusion swings east north east crossing into the NT with the development of a second cropping out ultrabasic band south of the main one. The elongated intrusion is bounded to south by acid granulite mainly concordant with granulite trends. The nickeliferous ochres overly the centre of intrusion bounded by norites and pyroxenites intimately associated with jasper and magnesite underlain by serpentinite forming core of intrusion. The ochres are residual goethite type formed by leaching of iron rich ultrabasic rocks with subsequent enrichment of primary nickel. The goethitic ochre is a yellow brown cellular hydrated iron oxide often with well preserved relict textures after olivine and pyroxenite. Nickel content ranges from 0.2 to 2.2% Ni with higher values occurring at base of ochre zone. Under a high rainfall climate regime silica and magnesium are leached from ultrabasic rocks or there serpentinised equivalents. Iron is left as goethite while nickel averaging 0.2% in original rock is concentrated several fold by residual and supergene enrichment. Silica as jasper and magnesium as magnesite remain at base of weathering profile. Nickel is intimately associated with cobalt and manganese probably as an oxide. The nickel silicate garnierite occurs sporadically generally well below the main ochre zone. The primary source of nickel is from olivine containing up to 0.22% Nickel whereas pyroxenes contain negligible amounts thus nickeliferous ochres are only derived from olivine-rich rocks. The removal of silica and magnesium during leaching lowers SG 3.2 for ultrabasic rocks down to 1.6 for ochres thus above density contrast allows successful application of gravity methods to define sub surface ochre zones ie South Australian Department of Mines commenced a gravity survey over Claude Hills in 1960 with further extensions in 1965. Test drilling was carried out over new low density zones (12 dhs) 8229.6m of detailed gravity work was carried out over NT including a 7242m gravity traverse to check veracity of postulated ultrabasic intrusions.

In 1965 Planet Metals applied for AP1435 and 1546 over Petermann Ranges and Olia Chain conducting a regional AMAG survey (Woyzbum 1968) geochemical survey (Kenneth McMahon 1968) photogeological interpretation (Jorgensen 1966) and mineralisation (Wilson 1966). Ferruginous cappings developed over Neoproterozoic Pinyinna Beds during Tertiary were extensively sampled recording anomalous Pb, Zn, Co values. Four prospects were inspected by JF Ivanac in 1966 namely Butler Dome, Stevenson Peak, Katamala Cone and Chirnside Creek. At Butler Dome three groups of steeply dipping manganiferous /siliceous gossans and collapse breccias extend over a strike length of 2134m. Each group is about is about 305m long of highly folded / contorted carbonaceous/dolomitic Pinyinna Beds. The main gossan is about 14m wide and stands out as a blue-black outcrop. A 12m shaft has been sunk in footwall of gossan to access quartz veins which cut it
The gossans contain boxworks and limonite after sulphides while surrounding sediments show extensive iron oxide – muscovite alteration.

The Claude Hills nickeliferous ochre deposit was further delineated by METALSX from 2008-2011 completing 264 drill holes (16514m) over a strike length of 11.5km. A geological block model was completed and a maiden resource defined namely 33MT averaging 0.81% Nickel and 0.07% Cobalt, 39% Fe2O3 containing 270000 tonnes of nickel and 23000 tonnes of cobalt.

EL25570 covers 707 sqkm of the PETERMANN RANGES 250k Geology mapsheet is located within south west corner of the NT assigned to Mesoproterozoic Musgrave Province a crystalline basement terrain extending across common borders of SA,WA and NT.covering a total of 120000sqkm.

During 1220-1120Ma province wide Musgravian Orogeny large volumes of felsic magma were intruded and assigned to Pitjantjatjara Supersuite quickly followed by 1085-1040Ma Giles Event ie part of the Warakurna Large Igneous Province which affected much of central and western Australia including the variably deformed mafic-ultramafic layered intrusions of the Giles Complex and the associated bimodal volcanics and rift sequences of Tjauwata Group.

The 560-530Ma Petermann Orogeny a major intracratonic event resulted in reactivation of several crustal scale east west trending shears/faults/thrusts and development of widespread mylonitic shear fabrics resulting in the final exhumation of Musgrave Province from beneath Centralian Superbasin.

No clear evidence of 400-300Ma ASO is documented from eastern Musgrave Province apart from some minor quartz-epidote alteration following which Musgrave Province underwent at least one phase of intense deep weathering and erosion prior to deposition of Mesozoic clastic sediments along its eastern margin.Intense chemical weathering of sediments and basement alike have resulted in a deep weathering profile persisting up to 90m below the present day surface.The typically composite weathering profile are characterised by kaolinisation, mottled, pallid, ferruginous or siliceous zones ie the post Mesozoic widespread formation of silcrete and ferruginous duricrust.

During Quaternary the onset of aridity with episodes of alluvial and aeolian activity resulting in todays landscape of alluvial plains, sand plains, aeolian dunes and dunefields.

UMUTJU GRANITE SUITE

The Umutju Granite suite dominates cropping out basement on GR461 south of the Woodroffe Thrust divided into 4 main granite types.

Pgw Walytjatjata Granite; porphyritic granite dominates western Mann Ranges and low outcrops north of Mt Le Hunt and Mt Samuel. The most common lithology is coarsely porphyritic clinopyroxene –bearing granite with distinctive large round blue grey phenocrysts of K-feldspar constituting up to 40% of the rock. Mafic minerals can make up to 20% of rock forming elongated aggregates The primary igneous mineral assemblage contains clinopyroxene and ilmenite largely consumed by a secondary mineral assemblage associated with development of mylonitic fabrics. A granite with coarse grey blue phenocrysts near Mt Cockburn gave a Pb-Pb zircon age of 1175Ma.

Pgum Mantapayika Granite; occurs as scattered outcrops north of Mann Ranges ranging from undeformed granite to migmatite. Typically porphyritic with rounded blue grey K-feldspar and/or plagioclase phenocrysts. On the Wingellina-Alkata –Docker road is scattered white equigranular hornblende granite recognised in field by white color, lack of large phenocrysts and spotty appearance. Mafic mineralogy comprises hornblende, garnet, ilmenite and biotite forming discrete clusters. It has a Pb Pb age of 1120Ma.
At Border Hill Mantapayika Granite is weakly porphyritic with mafic mineralogy recrystallised to a garnet-clinopyroxene-ilmenite-minor biotite assemblage.

Discrete zones of Mantapayika Granite have undergone partial melting during high strain forming migmatite containing obstensively gneissic layering.

Pug Giles Complex 1078Ma; The Giles Complex is a suite of massive layered mafic to ultramafic intrusions emplaced within granulite terrain of central to western Musgrave Block However on PETERMANN RANGES within EL31383 a medium to coarse grain pyroxenite with minor gabbro crops out on a hill on SA border forming north east extension of Claude Hills peridotite-gabbro intrusion currently hosting 33 million tonnes averaging 0.81%Ni, 0.07%Co and 39% Fe2O3 of nickeliferous ochre. The pyroxenite is entirely comprised of orthopyroxene and clinopyroxene with minor plagioclase at base of eastern hill. There is no obvious fabric present but pseudotachylites present throughout rock indicate it has been deformed. The ultramafic unit is capped by calcrete, laterite, chalcedony and pale brown jasper interestingly there is a chrysoprase deposit 5km to west south west in South Australia where veins of chrysoprase occur within nickeliferous ochre and jasper deposits.

EL25570 is centrally located between the Woodroffe Thrust to the north and (albeit in SA) the Mann Fault to the south. North of Woodroffe Thrust amphibolite facies metamorphism prevails while the Mann Fault marks the northern most extent of 1078Ma Giles Ultramafic Complex intrusive rocks?

The northern two thirds of licence area is flatlying sand plain while the southern third butting up to SA Border is dominated by, Mt Charles thrusted into position during 560-535Ma Petermann Orogeny, an east-west trending cropping out massif some 20 long x 5km wide of 1550Ma Musgravian felsic granulite juxtaposed against (along its northern thrust faulted contact zone) 1070Ma Angatja Granite intruded by extensively cropping out (metamorphosed to amphibolite and/or garnet granulite) 1078Ma Alcurra and 820Ma Amata dyke swarm dolerite deemed possibly prospective for Ni-Cu-Co-V-magnetite-PGEs.
7. EXPLORATION PROGRAM 2017 Figures 5a, 5b, 5c, 5d, 5e, 5f, 5g.

A program of acquisition, image processing, modelling and interpretation of available NTGS 500m l.s. located digital AMAG and Radiometric data was undertaken to delineate areas of apparent airborne geophysical survey anomalism. An area immediately north of the Pgn1 massif where cropping out Giles Complex-aged dolerite/gabbro potentially prospective for magmatic nickel sulphides, stratiform chromite cumulates, stratiform titaniferous magnetite cumulates, stratiform vanadiferous magnetite cumulates was identified by NTGS mapping however its AMAG footprint is deemed too small to be of economic interest.

8. EXPENDITURE

1. Regional reconnaissance /map checking.................................................................$2500.00

2. Consultant Geophysicist: acquisition, image processing, modelling, interpretation NTGS 1986 500m l.s. geophysical survey located, digital AMAG/Radiometric data delineating Areas of apparent anomalism possibly indicative economic magmatic nickel sulphides......$8500.00

3. Review results/Reporting.................................................................$2000.00

4. Administration........................................................................$1000.00

TOTAL........................................................................................................$13000.00
9. CONCLUSIONS and RECOMMENDATIONS

Available NTGS AMAG, Radiometric geophysical survey located digital data combined with acquired 2017 LANDSAT and DTM data sets were image processed, modelled and interpreted in search of possible 1078MA Giles Ultramafic Complex magmatic Ni-Cu-PGE mineralised analogues.

An area of extensively cropping out Giles Complex age, potentially prospective dolerite/gabbro adjacent to a thrusted felsic granulite massif geophysical AMAG footprint was deemed too small to be of economic interest. Consequently EL 25570 was surrendered on 20th October 2017.

10. REFERENCES

Forman, D.J., 1972. PETERMANN RANGES 250k Geology BMR Explanatory Notes SG52 7
Scrimegour, I., 1999. PETERMANN RANGES 250k Geology NTGS Explanatory Notes SG52 7
McMahon and Partners, 1968. Geochemical Survey of Petermann Ranges NTDME CR68/43
Woyzbun, P., Report on AMAG Survey Petermann Ranges. NTDME CR68/44
Figure 3a

EL25570,25567 Final ATR - GEOLOGY (NTGS 250k)

Figure 3b
EL25570,25567 FINAL ATR - INTERPRETED (AMAG) GEOLOGY(NTGS)

Figure 3c
EL25570, 25567 Final Report - TMI RTP (2)

Figure 5c

EL25570, 25567 Final Report - Potassium - Thorium - Uranium.

Figure 5e
Figure 5d,
Figure 5f

EL25570,25567 Final Report - Thorium Count

Figure 5g

EL25570,25567 Final Report - RADS Total Count