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ANNUAL REPORT FOR YEAR ENDED 7/12/08, EL 23571, REYNOLDS RANGE, NORTHERN TERRITORY, AUSTRALIA

by

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1:100,000 – Reynolds Range 5453, Tea Tree 5553, Aileron 5552
1:250,000 - Napperby SF53-9

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INTRODUCTION

Background

(Modified after McGilvray, 2006)

The Reynolds Range area is prospective for numerous styles of mineralisation with U, Au, As, Sb, Ag, Fe, Sn, Ta, W, Mo, Cu, Pb, Zn, Ni, REE, P, Th and talc occurrences known in the region. Of these, Arafura Resources is principally interested in exploring for economic REE mineralisation. Several companies conducted exploration activities in EL 23671, adjacent to EL 23571, and failed to realise the potential of the world-class Nolans Bore REE deposit, which now has a defined total resource of 30.3 Mt @ 2.8% REO, 12.9 % P_2O_5 and 0.44 lb/t U_3O_8 [see Goulevitch (2008) for details]. This is encouraging because the Nolans Bore style of REE mineralisation may occur elsewhere in the region. Other styles of REE mineralisation may also exist.

EL 23571 is part of a number of tenements in the Aileron-Reynolds Range area including EL 23571 (Reynolds Range), EL 23671 (Aileron), EL 24548 (Yalyirimbi Range) and EL 24741 (Woodforde).

Location and Access

(Modified after McGilvray, 2006)

Exploration Licence 23571 (Reynolds Range) is located 170 kilometres north-northwest of Alice Springs and 50 kilometres west-northwest of Aileron Roadhouse (Figure 1). The Stuart Highway is the main north-south arterial highway through the Northern Territory passing the Aileron Roadhouse about 130 kilometres north of Alice Springs.

The licence area encompasses the central parts of the Reynolds Range, which extends from southeast of Aileron to Coniston Station in the northwest. EL 23571 adjoins SEL 23671, the main part of which is centred on the Nolans Bore deposits and covers the southeast parts of the Reynolds Range. A small portion of SEL 23671 lies to the northwest of EL 23571.

The Range is accessible by several vehicle tracks and fence lines. The main vehicle access heading west from the highway is the unsealed Pine Hill Road which tracks along the northern side of the Range and provides access south into the Range. Vehicle access to the southern side of the Range is via a track running up the valley from the Woodforde River valley and then across the dissected plains to Harverson Pass but this track is rarely used and was in very poor condition in 2005. The southern most part of EL 23571 can be reached by a well used bore track to Boundary Bore.

The east-west trending Yalyirimbi Range passes into to the southwest parts of EL 23571.

Topography and Drainage

(Modified after McGilvray, 2006)

The Reynolds Range in EL 23571 occurs as a southeast-northwest trending spine of high relief mountains and deeply incised valleys with heights between 650 metres and 1100 metres above sea level. Landmark features lie just outside the current EL 23571 boundary and include Mt Thomas (1116 metres) and Harverson Pass, a passable gap through the Ranges, in the northwest, and Mt Dunkin (930 metres) and Mt Freeling (1005 metres) in the southeast. The eastern end of the Yalyirimbi Range in the south joins with the Reynolds Range between Mt Freeling and Mt Dunkin. The Anmatjira Range parallels the Reynolds Range at distance of about 15 kilometres to the north.

Tower Creek, a tributary of Warburton Creek, Napperby Creek and Day Creek drain the southwest flank of the Range in EL 23571, and the Lander River and Hanson River drain the northeast flank. The headwaters of the Woodforde River also commence in the Reynolds Range.

A summary of the vegetation in the Arunta Province was found in Thevissen (1995);

Vegetation is predominantly scattered Mulga scrub in rocky areas but very dense Mulga in areas of sand plain making vehicular access difficult. Major drainages contain stands of Bloodwood eucalypts and lesser Beantree. The southern slope of most rocky ridges have characteristic stands of native Pine, although the main ranges are largely devoid of significant vegetation with only small species of Hakea and Melaleuca. The dominant grass species is spinifex.

An assessment of the conservation values and environmental resources identified in the Burt Plain Bioregion as part of the Northern Territory Parks and Conservation Masterplan (NT Department of Natural Resources, Environment ad the Arts) indicates no flora is vulnerable within the Aileron-Reynolds Range project area. This map indicates that both *Ardeotis australis* (Australian Bustard) and *Dromaius novaehollandiae* (Emu) are vulnerable fauna in the general project area. The Burt Plain Bioregion map also indicates the Reynolds Range is an area of conservation significance but the reason is not specified. The area of Anna's Reservoir Conservation Reserve is excised from the project area in the adjacent SEL 23671.

Climate

(Modified after McGilvray, 2006)

The climate is typical of the central arid zone of inland Australia. Summer seasons are long and the maximum temperature during a typical day commonly exceeds 40°C. Winter seasons are short and the minimum temperature during a typical night can diminish below 0°C, especially in elevated areas. Frosts can occur in winter. The average annual rainfall for the Napperby/Reynolds Range Area, derived from Yuendemu and Alice Springs weather stations, is 250 to 350 millimetres. The heaviest rainfalls occur during the monsoon season from October to March but reasonable falls of rain can occur any time of the year.

SUMMARY

Arafura Resources completed a HyMap hyperspectral survey covering a large part of the Reynolds Range-Aileron project area. This survey covered all existing areas in EL 23571, and parts of SEL 23671 and EL 24741.

A number of Hymap and radiometric anomalies have been identified as regions of exploration interest have been generated and will be followed up during reconnaissance activities in 2009.

Preliminary processing of the HyMap data indicates a number of targets with spectral signatures worthy of follow-up inspection. These include

- areas that have been modelled as argillic alteration in the central-northern parts of EL 23571.
- large regions of epidote have been modelled. While this is not surprising given the presence of calcsilicate rocks, it is possible that at least some of these signatures may be related to REE-bearing epidote (allanite).
- Some of the epidote-rich signatures also appear to have an associated apatite signature but this is more speculative and requires further processing following on-ground investigations.
- localised patches of topaz have been modelled in the dataset.

A number of airborne Th anomalies have also been identified in the NTGS regional geophysical dataset.

TENURE

MINING/MINERAL RIGHTS

Norquest Mines PL applied for EL 23571 on behalf of Arafura Resources NL on the 18 April 2002. The licence was granted on the 8 December 2003 for a period of six years and transferred to Arafura Resources NL (now Arafura Resources Limited) on the 2 April 2004. The tenement was initially granted over 141 blocks (447.70 square kilometres). The tenement was reduced to 71 blocks (225.30 square kilometres) in 2006. Arafura was granted permission to waive reduction in 2007 and again in 2008. EL 23571 is currently 71 blocks (Figure 1).

LAND TENURE

Land tenure under the granted EL 23571 includes Perpetual Pastoral Leases 1096 (Coniston), 1177/1178 (Napperby), 1097 (Aileron), and 1030 (Pine Hill):

- Coniston Station, PPL 1096 – NT parcel 00690, owned by Max and Jacqueline Lines of Coniston Station, (Fax: 89568775).
- Napperby Station, PPL 1177/1178 – NT parcel 00748, owned by Roy Chisolm of Napperby Station (Hiraji Pty. Ltd. (ACN 009591664), (Fax: 89568660).
- Aileron Station, PPL 1097 – NT parcel 00703, owned by Garry Dann of Aileron Station (Waite River Holdings Pty. Ltd), (Fax: 89568535).
- Pine Hill Station, PPL 1030 – NT parcel 00725, owned by Gill Bowman of Pine Hill Station (Northern Territory Land Corporation), (Fax: 89569841).

NATIVE TITLE

Arafura Resources has negotiated and executed an Exploration Agreement with the Central Land Council (on behalf of registered Native Title Claimants). EL 23571 is subject to this agreement. As a result, there are no Native Title impediments to continued exploration on EL 23571 other than holding appropriate consultations, avoiding restricted areas and paying agreed amounts of financial compensation.

ABORIGINAL SACRED SITES

The Aboriginal Areas Protection Authority (AAPA) register regarding EL 23571 was queried in 2002 and updated in 2005 as supplied by Capricorn Mining & Exploration Title Services Pty. Ltd. who had direct access to the AAPA Register.

It is important to note all sites are of a “recorded” type and further investigations and consultations are required prior to the commencement of activities as per Arafura’s Exploration Agreement with the CLC.

SENSITIVE AREAS

Part of EL 23571 is covered by the Ti-Tree Water Control District which is a designated sensitive area. According to the Northern Territory of Australia Water Act as in force at 14th of January, 2004, subsection 7, mining and petroleum activities are permissible as according to the *Mine Management Act*.

GEOLOGICAL SETTING

Regional Geology

The Arunta Region contains more than 200 000 km^2 of metamorphic rocks in the southern parts of the NT and has been subdivided into three distinct geological regions by the NTGS, the Ailerion, Warumpi and Irindina Provinces (Figure 2).

The Aileron Province largely consists of Palaeoproterozoic (1865-1500 Ma) sedimentary and igneous rocks that have undergone greenschist to granulite facies metamorphism. The majority of the preserved metasedimentary and igneous rock units in this region were deposited or emplaced prior to the 1740-1690 Ma Strangways Orogeny (*e.g*. Scrimgeour 2003, Hussey *et al.,* 2005, Claoué-Long *et al.,* in prep a, b). This event appears to have affected the entire Aileron Province to some degree, as opposed to the 1590-1570 Ma Chewings Event that appears to be localised within the central and southern(?) parts of Aileron Province (*e.g.* Hand and Buick, 2001, Fraser, 2004). The 1810-1800 Ma Stafford and 1790-1770 Ma Yambah Events also appear to be present throughout the Aileron Province, with extensive bimodal igneous activity, associated sedimentation and localised Low Pressure-High Temperature metamorphism.

Most of the exposed Aileron Province was metamorphosed to greenschist or lower amphibolite facies conditions during the Strangways Orogeny, with an apparent abundance of 1810-1700 Ma igneous activity and deformation. The central-southern parts of the Aileron Province preserves and east-west zone of granulite facies metamorphism associated with the Strangways Orogeny. Regions of the Aileron Province have also been subject to younger (1640-1500 Ma) periods of magmatism and localised metamorphism.

Current views on the depositional and tectonic setting of the Aileron Province are based on recent geochemical, isotopic and igneous studies and the contained mineral systems. These favour a rifted continental crust or evolving backarc setting in the early parts of the depositional history [*e.g.* Hussey *et al.,* 2005, Hoatson *et al.,* 2005 Matthew Cobb (PhD student, Curtin University) *pers. comm.,* 2005], with a prolonged tectonothermal convergent event in the Strangways Orogeny. Hussey *et al.* (2005) and Hoatson *et al.* (2005) argue for contiguous sedimentation and bimodal igneous activity during Stafford Event. This Event is thought to be responsible for the development of localised(?) deep-marine basins in the Arunta Region, as opposed to contemporaneous subaerial to shallow-water volcanism and sedimentation in the adjacent Davenport Province.

The Aileron Province contains temporal equivalents of the gold-bearing Granites-Tanami and Tennant Creek Regions and regional aeromagnetic data suggest lateral continuity between these Regions. The Aileron Province is therefore regarded as part of the North Australian Craton, however, localised facies variations and differences in sedimentary environments are evident (*e.g.* Hussey *et al.,* 2005).

The Warumpi Province in the south and southeast of the Arunta Region (Figure 2) contains a younger package of metasedimentary and volcanic rock types with protoliths in the range 1690-1600 Ma (Scrimgeour *et al.,* 2003). The Province was variably metamorphosed in the 1640 Ma Leibig Orogeny, 1570 Ma Chewings and the 1150 Ma Teapot Events.

Unmetamorphosed Neoproterozoic to Palaeozoic marine and terrestrial sedimentary rocks of the Georgina, Ngalia and Amadeus Basins surround and unconformably overly the Arunta Region. Contemporaneous Neoproterozic to Cambrian strata of the Harts Range Group (Buick *et al.,* 2001, Maidment *et al.,* 2004, Buick *et al.,* 2005) are also caught up within the eastern parts of the Arunta Region in the newly defined Irindina Province (Scrimgeour, 2003). This revision and reinterpretation of the Arunta Region has significant geological implications and has come about largely as a result of several extensive chronological, metamorphic and metallogenic studies in the eastern Arunta Region (eg Miller *et al.,* 1998, Mawby *et al.,* 1998, 1999, Hand *et al.,*

1999a, b, Buick *et al.,* 2001, Scrimgeour and Raith, 2001, Hussey 2003, Maidment *et al.,* 2004, Buick *et al.*, 2005, Claoué-Long and Hoatson, 2005, Close *et al.*, 2005, Hussey *et al.*, 2005).

Geochronological and metamorphic studies have shown that the rocks of the Harts Range Group in the Irindina Province are variably metamorphosed to transitional granulite facies in the (480-450 Ma) Ordovician Larapinta Event. This high-grade event is followed by lower-grade Devonian to Carboniferous deformation and granite and pegmatite intrusion. Interestingly, the high-grade Larapinta Event appears to have had little influence on the thermal history of the surrounding rocks of the Aileron Province, and apart from rare exceptions appears to be largely restricted to the Irindina Province (Maidment 2004, Close *et al.*, 2005, Hussey *et al*., 2005, Claoué-Long and Hoatson, 2005).

Many of the fault bounded contacts between the various units within the Arunta and surrounding regions are attributed to the (390-300 Ma) Devonian-Carboniferous Alice Springs Orogeny. Most of the fault movements within the adjacent Georgina Basin also appear to be related to the Ordovician Larapinta Event and Devonian-Carboniferous Alice Springs Orogeny.

Localised carbonatite occurs at Mud Tank (730 Ma), Mt Bleechmore and also in the Casey Inlier area in the central and southern parts of the Aileron province. The carbonatite ages the latter two regions are unknown but it is conceivable that both are about 730 Ma. A small potassic alkaline igneous complex, the Mordor Igneous Complex that has lamphyrophyric affinities (Barnes *et al.,* 2008) was emplaced in the southern-central parts of the Aileron Province at 1132 Ma (Clauoe-Long & Hoatson, 2005).

Local Geology
(Modified after McGilvray 2006)

STRATIGRAPHY

Palaeoproterozoic

The Lander Rock beds are the oldest known outcropping rocks in the area. The Lander Rock package is a suite of dominantly quartzose and pelitic sediments with a facies transition in the northwest, to alternating pelites and psammites, in the Mt Stafford Beds. At least some parts of the Lander Rock beds preserve sedimentary structures (Bouma sequences) indicative of sedimentation below storm wave base. Major outcrops occur in the Lander River Valley north of the Reynolds Range and in the vicinity of Harverson Pass (Figure 3). The metamorphic grade varies from lower greenschist facies in the northwest of the Reynolds Range to granulite facies in the southeast. Minor sills or dykes of mafic rocks occur in the package. The timing of deposition of the Lander Rock Package is unclear although 1795-1806 Ma granite intrusives (Worden *et al.,* 2008) and U-Pb SHRIMP detrital zircon ages provide a rough maximum estimate of 1806-1840 Ma (Vry *et al.,* 1996, Claoue-Long 2003, Claoue-Long *et al.,* 2005). It is important to note that recent dating suggests the Lander Rocks beds can be divided into at least two stratigraphic units based on zircon provenance patterns and the presence of a younger zircon population in some areas (Claoue-Long 2003, Claoue-Long *et al.,* 2005).

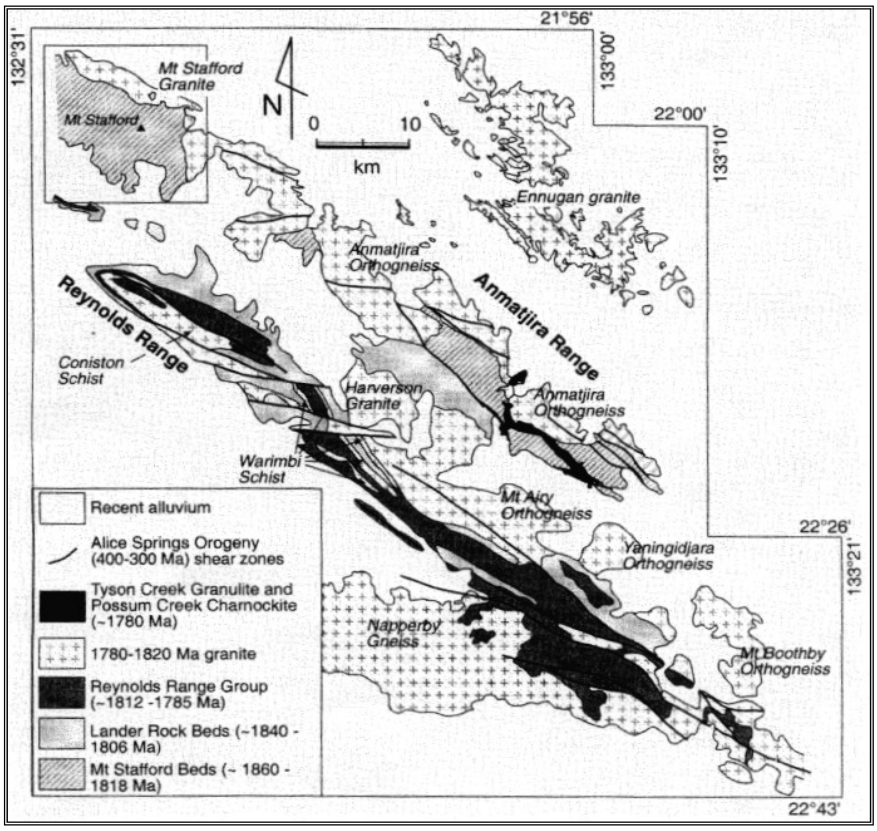

Figure 3: Generalised geology of the Reynolds-Anmatjira region (modified after Stewart, 1981). Magnetic data indicates that the bulk of the regions covered by recent alluvium are underlain by granite/granitic gneiss (*from* Hand & Buick 2001).

The Reynolds Range Group is sub-divided into four stratigraphic units (Buick *et al.* 1999). The basal Quartzite Unit, the Mt. Thomas Quartzite, is a mature orthoquartzite that unconformably overlies the Lander Rock Package in the northwest of the Reynolds Range (Figure 3). The unit varies in thickness from ~200 metres to 550 metres cropping out along the length of the range. The lower units are predominantly conglomeratic with minor pebbly arkose rocks. The upper intervals are pelitic and generally ferruginous. A lateral facies change occurs from the northeast to the southwest across the range from basal conglomerates into homogenous pelitic rocks. Relict sedimentary structures indicate a high-energy, intertidal depositional environment (Buick *et al.*, 1999).

The Lower Calcsilicate Unit forms the basal unit of the group in the southern margin of the Reynolds Range. This unit can be age constrained as an equivalent to the Mt Thomas Quartzite and by the intruding Napperby Gneiss (metagranitoid). The unit is composed of finely layered, carbonate-poor calcsilicate rocks rich in clinopyroxene, plagioclase and grossular-andradite garnet locally interlayered with white quartzites and rare marbles. The unit is strongly metamorphosed and intensely deformed lacking sedimentary structures (Buick *et al.*, 1999).

The Pelite Unit which was previously part of the Pine Hill Formation achieves a minimum thickness of 500 metres to 600 metres. Pelitic rocks are interlayered with thin sheets of fine grained siltstone and sandstone interpreted as storm deposits (Buick *et al.* 1999).

The Upper Calcsilicate Unit encompasses the previously defined Algamba Dolomite Member and the Woodforde River Beds. The unit achieves a maximum thickness of about 250 metres to 300 metres along the

length of the Reynolds Range except in the central part where the maximum thickness is only 20 metres. The unit occurs as a series of lenses within the Pelite Unit dominated by interlayered limestone and dolomite locally intercalated with pelites and psammites. Stromatolites and sedimentary structures, *i.e.* climbing ripples, are preserved where rocks are metamorphosed at a regional low grade (Buick *et al.*, 1999).

Neoproterozoic

Ngalia Basin rocks were deposited between the Neoproterozoic to the Late Carboniferous (Wells & Moss, 1983). The rocks are an important component of the Arunta Region but do not occur in EL 23571.

Tertiary

Cainozoic sediments occur in sedimentary basins outside of EL 23571 and will not be discussed in this report.

Geological research in Tertiary basins, (Senior *et al.*, 1995), has defined three weathering events which affected Arunta igneous and metamorphic basement rocks and lacustrine and fluviatile Tertiary sedimentary rocks. The weathering events will be discussed herein.

Weathering Event A occurred during the Late Cretaceous to Early Tertiary (Palaeocene). A trizonal profile was developed in basement rocks over a widespread area of the Arunta Region and at the base of surrounding Tertiary Basins. The trizonal profile consists of a basal kaolinitic zone up to 10 metres thick that grades into a multicoloured mottled zone up to 10 metres thick. The mottled zone is overlain by a ferruginous zone up to 8 metres thick (Senior *et al.*, 1995). The weathering profile is developed in basement rocks and the Mesozoic Hooray Sandstone, and is overlain by Palaeocene sediments in Tertiary basins.

Weathering Event B affects the upper part of the Ambalindum Sandstone Member immediately beneath the Delaney Mudstone Member in the Hale Basin, located in the eastern part of the NTGS Alice Springs 1:250,000 Geology Map Sheet. The upper part of the Ambalindum Sandstone Member is friable and yellow, having a mottled appearance in parts. The weathering event occurred prior to the Middle Eocene. Little evidence exists outside of the Hale Basin for this weathering event (Senior *et al.*, 1995).

Weathering Event C affects the upper part of the Tug Sandstone Member of the Hale Formation in the Hale Basin. The weathering event preceded deposition of the Waite Formation in the Waite Basin, or equivalents of the Waite Formation.

Quaternary

Further uplift in the Reynolds Region, and northern Arunta Region has resulted in deposition of red earth and alluvium from uplifted areas and continued movement of colluvium down present-day hill-slopes. Calcrete has precipitated along stream channels, evaporites have formed in playa lakes, and sand plains and Aeolian dunes have developed in low lying areas (Stewart, 1981).

IGNEOUS ROCKS

Palaeoproterozoic

Based on recent high precision SHRIMP U-Pb dating of zircons in igneous rocks by the NTGS (Worden *et al.*, 2008), granitic rocks of the Reynolds Range region can be subdivided into two age-related suites. The existence of two igneous suites requires:

1. emplacement of the first granitic suite into the Lander Rock package,
2. uplift and erosion,
3. deposition of the Reynolds Range Group, and
4. emplacement of the second igneous suite

The emplacement age of the first igneous suite is now well constrained at about 1795-1805 Ma (Worden *et al.*, 2008). This suite crops out on the northern side of the Reynolds Range, is contemporaneous with LP/HT metamorphism and partial melts at Mount Strafford (the Stafford Event) and provides localised evidence for bimodal magmatism (in the Anmatjira Orthogneiss).

From southeast to northwest, the first granitic suite includes the Boothby Orthogneiss (1806 ±4 Ma, Worden *et al.*, 2008), Yaningidjara Orthogneiss [1798 ± 4 Ma, Worden *et al.*, 2008 which is within error of the 1806 ± 6 Ma age by Vry *et al.*, (1996)], Mount Airy Orthogneiss (1799 ±3 Ma, Worden *et al.*, 2008) Harverson Granite (1799 ±3 Ma, Worden *et al.*, 2008), Anmatjira Orthogneiss [1798 ±3 Ma by Worden *et al.*, 2008 and 1802 ±3 Ma by Rubatto *et al.*, (2006) about 15 kilometres north of the first location near Mount Stafford]. Early SHRIMP U-Pb determinations on zircon from these igneous rocks by Collins & Williams (1995) are much less precise and are discounted in favour of more recent CL-assisted SHRIMP U-Pb dating by Worden *et al.*, (2008) and Rubatto *et al.*, (2006). Rubatto *et al.*, (2006) also determined that the LP/HT metamorphism at Mount Stafford occurred between ~1795 and 1805 Ma.

The second slightly younger igneous suite appears to be about 1770-1785 Ma and probably reflects the Yambah Event in this region. The suite mainly outcrops the Reynolds Range and further south, although the Possum Creek Charnokite [1774 ± 6 Ma, Collins and Williams (1995)] and the Tyson Creek Granulites in the Anmatjira Range are similar age. The age of second igneous suite is typically poorly constrained with larger errors, particularly those in the Reynolds Ranges. These are all high level granites that contain metasedimentary enclaves and have a peraluminous geochemical signature. The assimilation of sedimentary units causes significant zircon inheritance issues making interpretation of magmatic zircon ages difficult (eg Smith 2001). The differentiation of some granitic units is unclear based on current published maps and careful remapping is needed.

The second igneous suite includes the Warimbi Schist [1785 ± 22 Ma, Collins & Williams (1995)], Coniston Schist [1780 ± 10 Ma, Smith (2001)] and Napperby Gneiss [1780 ± 10 Ma, Collins & Williams (1995)]. The Yakalibadgi Microgranite probably also belongs in this suite as do undifferentiated granites and gneisses that intrude the Reynolds Range Group.

METAMORPHISM & STRUCTURAL GEOLOGY

The Arunta Region was shaped by two major intervals of tectonism. The first major tectonic interval occurred during the Palaeo- to Mesoproterozoic, 1850-1560 Ma, and was associated with multiple episodes of regional medium to high temperature metamorphism and magmatism (Hand & Buick, 2001). The second major tectonic interval occurred in the early to mid-Palaeozoic, about 490 to 300 Ma, and was associated with north-south intraplate extension and subsequent north-south convergent deformation (Hand & Buick, 2001). Regional structures produced during each period of tectonism in the Reynolds Range Region are discussed by Hand & Buick (2001).

The first tectonic interval is defined by three main tectonic events, the 1805-1795 Ma Stafford Event, the 1785-1770 Ma Yambah Event, and the 1595-1560 Ma. Chewings Orogeny. There has been significant debate about the Strangways Orogeny in the Reynolds and Anmatjira Ranges. Historically the Strangways Orogeny was about 1780-1720 Ma however recent revision by the NTGS identifies the Yambah Event (1785-1770 Ma) and the Stangways Orogeny (about 1740-1690 Ma). All published literature still refers to the historic usuage of Strangways Orogeny. The Yambah Event occurs in the Reynolds Range region and the affect of the Strangways Orogeny as newly defined needs to be resolved.

The Stafford Event is based on LP/HT metamorphism and igneous relationships in the Mount Stafford area. The first igneous suite noted above is coincident with the Stafford Event and includes the Harverson Granite highlighted in Figure 4. The Lander Rock Package around the Harverson Granite is characterised by the growth of andalusite and cordierite (Dirks *et al.*, 1991; Vry & Cartwright, 1998). The contact metamorphic porphyroblasts overprint a biotite-quartz-muscovite foliation which indicates prior regional deformation to granite emplacement. In other parts of the northwest Reynolds Range, muscovite±biotite bearing greenschist assemblages, (Dirks *et al.*, 1991), define a sub-vertical northwest-southeast trending foliation, (Stewart, 1981; Dirks & Wilson, 1990). Fold structures are truncated to the overlying Reynolds Range Group in an unconformity that dies to the southeast, indicating the Stafford Tectonic Event may have been localised in the northwestern part of the Reynolds Range, and Anmatjira Range, region (Hand & Buick, 2001).

Contact metamorphic assemblages formed in the Reynolds Range Group around the granitic precursors of the Warimbi and Coniston Schists during intrusion of the second igneous suite at around 1785-1770 Ma (Collins & Williams 1995). Contact aureoles in meta-pelites adjacent to the Warimbi Scist are andalusite and cordierite bearing. The stability of assemblages indicate maximum P-T conditions of 550°C and 3.5 kilobars (Xu *et al.*, 1994; Mahar *et al.*, 1997). Scapolite porphyroblasts in anorthite-bearing marbles adjacent to the Coniston Schist also give maximum temperatures of 550°C (Buick & Cartwright, 1994). Contact metamorphic blasts surrounding the Warimbi Schist contain straight or gently curved internal foliations defined by muscovite-quartz±biotite. Curved inclusion trails indicate the growth of the contact metamorphic assemblages occurred during deformation. Inclusion trails are reported to show systematic changes in orientation defining gentle folds. The orientation of folding is not clear but has been postulated as a southeast trending foliation based on findings in other parts of the Arunta Inlier (Hand & Buick, 2001; Goscombe, 1991; Collins & Sawyer, 1996).

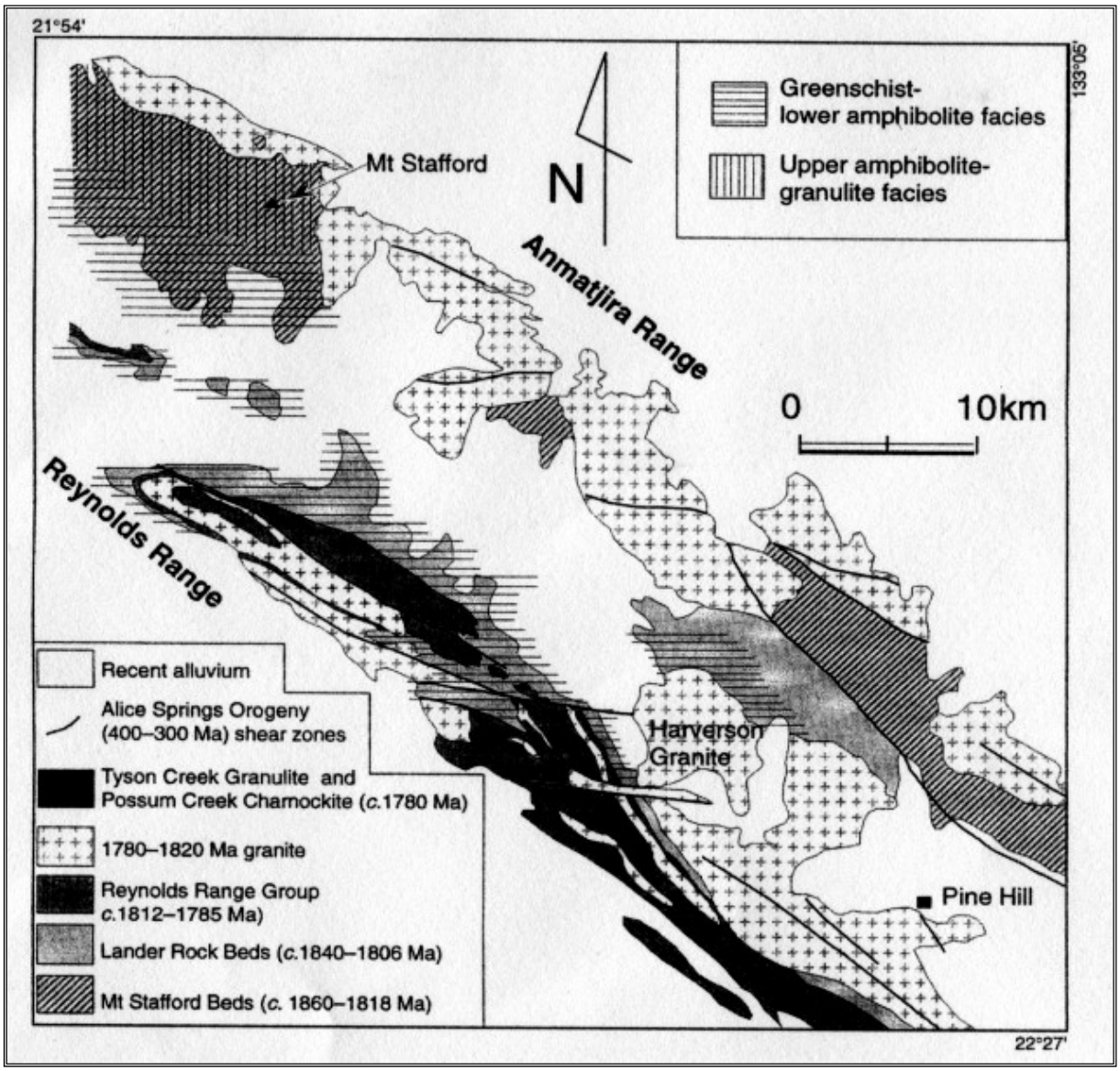

Figure 4: Regional distribution of metamorphism inferred to be associated with the Stafford Event (*from* Hand & Buick, 2001).

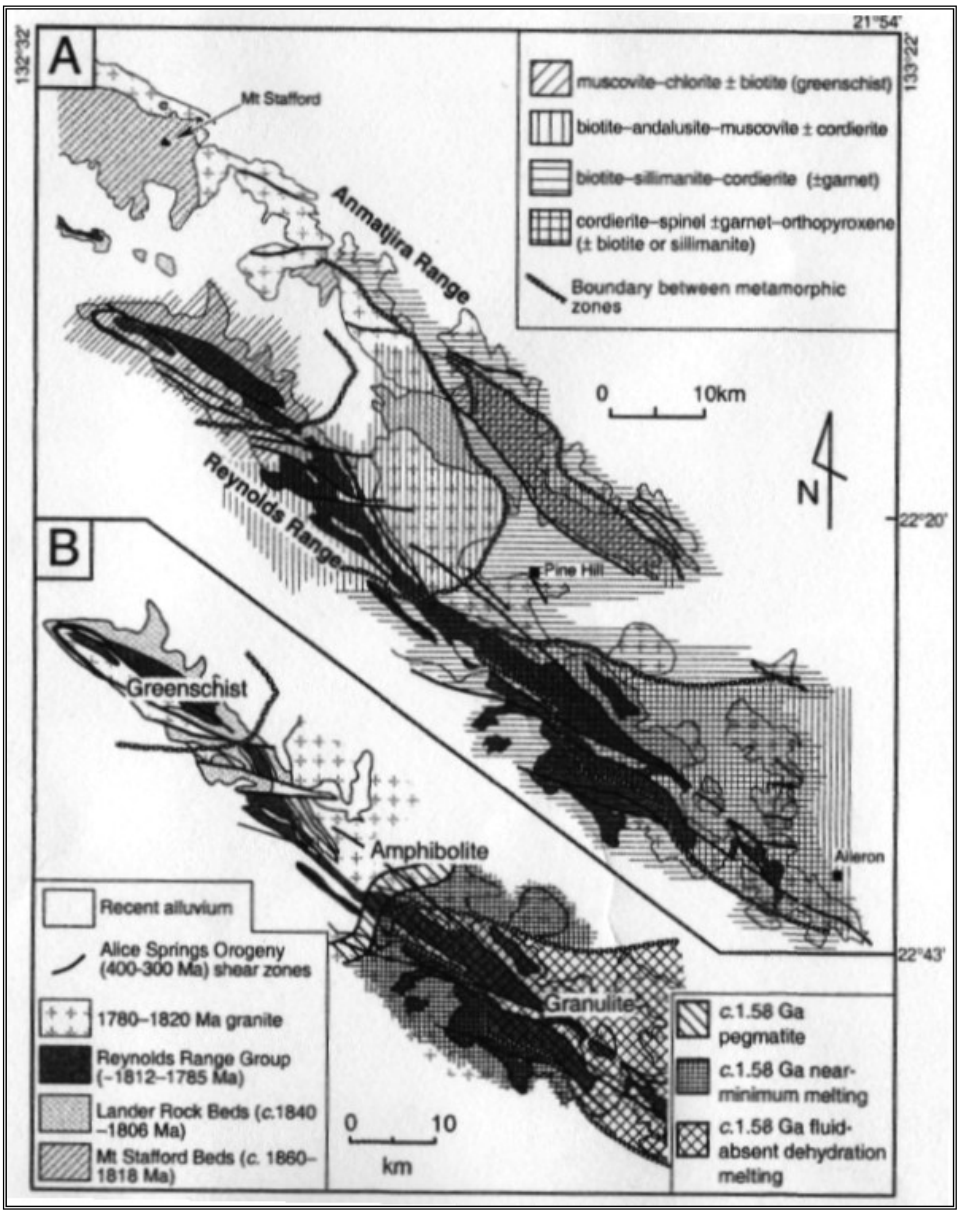

Figure 5: (a) Simplified geological map of the Reynolds-Anmatjira Range region showing the metamorphic zones associated with the approximate 1580 Ma Chewings Orogeny. (b) Metamorphic zones in the Reynolds Range defined by the assemblages produced during partial melting. Assemblages in the near minimum melting zone include ilmenite-magnetite-bearing leucosomes in migmatised granite. In the granulite zone, leucosomes contain cordierite ± garnet ± orthopyroxene (*from* Hand & Buick, 2001).

The Chewings Orogeny produced a nearly continuous northeast-southwest transition in metamorphic grade from greenschist to granulite facies along the length of the Reynolds Range (Figure 5). Meta-pelitic rocks of the Reynolds Range Group are transformed from phyllites to andalusite±cordierite-bearing schists to migmatitic granulites (Dirks *et al,*. 1991; Hand & Dirks, 1992; Williams *et al.*, 1996 & Buick *et al.*, 1998). The metamorphic field gradient is summarised by Hand and Buick (2001) by the metamorphic zones: muscovite-chlorite±biotite; texturally stable Strangways Orogeny andalusite and cordierite; first appearance of sillimanite and; stable co-existence of cordierite-spinel assemblages.

The higher grade regions of the Reynolds Range are further sub-divided by Hand and Buick (2001) based on the leucosome assemblages that formed during partial melting. Upper amphibolite regions show immediate upgrade of the sillimanite isograd, and volumetrically minor leucosomes are pegmatitic in character with simple mineralogies that reflect water-saturated melt (Buick *et al.,* 1998). At slightly higher grades leucosomes contain ilmenite-magnetite intergrowths that form via breakdown of biotite (Hand & Dirks, 1992). The highest grade granulite leucosomes contain cordierite and/or garnet or orthopyroxene and formed during fluid-absent dehydration reactions that consumed biotite and sillimimanite.

Partial melting assemblages overprint the gneissose layering suggesting high temperature metamorphism outlasted pervasive deformation (Hand & Buick, 2001). Granulite and upper amphibolite assemblages are aligned parallel to the axial surface of the regional, upright, southeast-trending, isoclinal folds (Hand & Buick, 2001). The upright folds reflect around 50% shortening and can be traced along the length of the Reynolds Range (Dirks & Wilson, 1990). Many of the macro-scale folds within northwest-southeast regional folds are doubly plunging, (Stewart *et al.,* 1980; Dirks & Wilson, 1990), which represents significant vertical extension (Hand & Buick, 2001). In the lower grade northwestern Reynolds Range, the axial surface fabric overprints approximately 1785 Ma contact metamorphic minerals.

In the Reynolds Range, the regional fabric has been deformed on all scales by conjugate, steeply-dipping shear and crenulation bands that, in geometry, represent conjugate kink bands (Dirks & Wilson, 1990; Hand & Dirks, 1992). The dominant kink set trends approximately east-west plunging between 0° and 70° east. The subordinate kink set trends approximately north-south and plunges to the north (Hand & Buick, 2001). Zircons from leucosomes within the crenulation bands have been aged at 1570 Ma (Hand *et al.,* 1995; Williams *et al.,* 1996), which confirms development of structures during the Chewings Orogeny (Hand & Buick, 2001).

Proterozoic structures in the Reynolds Range are heavily dissected by southeast and east trending shear zones associated with the 400-300 Ma Alice Springs Orogeny (Hand & Buick, 2001). Micaceous greenschist to lower amphibolite assemblages are dated to 330-300 Ma (Cartwright *et al.,* 1999).

Collins and Teyssier (1989), interpret the overall geometry of the Reynolds-Anmatjira Ranges to have formed in a transpressional setting with a northeast-plunging lineation representing a component of sinistral movement during the Alice Springs Orogeny, resulting in juxtaposition of granulites against lower grade rocks in the southwestern Reynolds Range (Dirks *et al,.* 1991).

The metamorphic grade of Alice Springs Orogeny structures increases to the southwest (Figure 6) such that shear zones in the southwest of the Reynolds Range contain kyanite, staurolite and sillimanite-bearing assemblages in metapelite, (Dirks *et al.,* 1991) with P-T conditions of 5-5.5 kilobars and 550-600°C. In the southeastern Anmatjira Ranges, the shear zones contain andalusite and staurolite assemblages in meta-pelite, with P-T conditions of 4 kilobars and 580°C (Xu *et al.,* 1994). In the central and northwest Reynolds Range the shear zoneas are associated with greenschist or lower-grade metamorphism (Dirks *et al.,* 1991). Accompanying the increase in metamorphic grade is an increase in the number and width of the shear zones, with zones in the southeastern Reynolds Range up to 300m wide (Hand & Buick 2001).

Episodic mild uplift and warping consisting of limited upward doming of ranges and minor tilting continued through the Palaeozoic and Cainozoic to present day (Senior *et al.,* 1995).

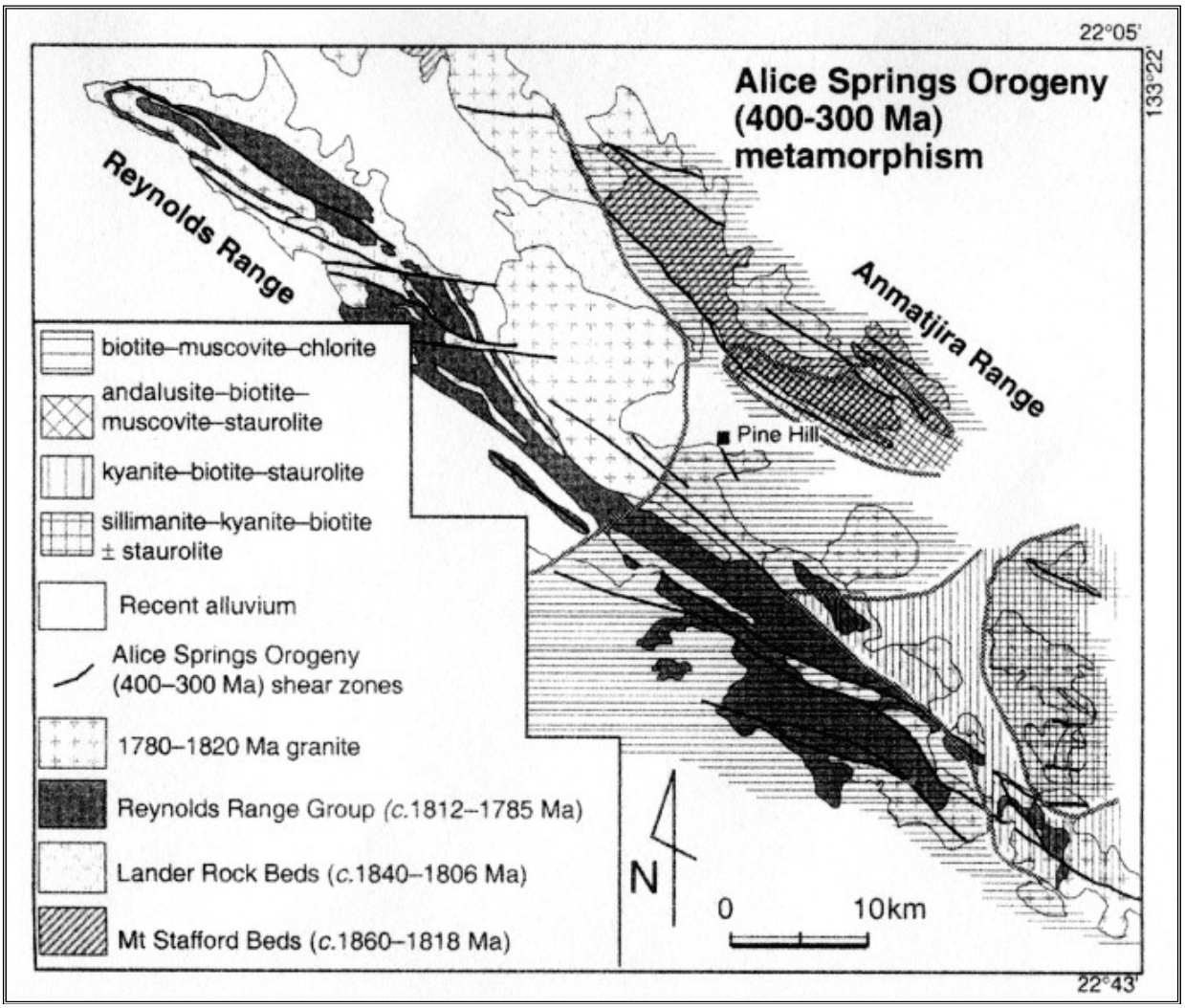

Figure 6: Metamorphic zones defined by mid-Palaeozoic metapelitic shear zone assemblages in the Reynolds-Anmatjira Range region (*from* Hand & Buick 2001).

MINERALISATION

Relevant company reports and descriptions of the Reynolds Range region by the NTGS describe numerous occurrences of mineralisation. These include copper-lead-zinc, gold, tungsten, tin, tantalum, rare earth elements, mica, nickel, chromium, semi-precious stones, talc, iron and uranium. A variety of mineralisation styles have potential in the Reynolds Range region but few mineralisation styles have proven prospective.

Prospective deposits known to present day include the Nolans Bore Rare Earth Element- Phosphate-Uranium deposit currently being investigated at the feasibility stage of activities by Arafura Resources within EL 23671 Aileron (Hallenstein and Goulevitch, 2008). In addition, Poseidon Gold discovered a zone of gold-arsenic-antimony mineralisation called the Sabre Prospect, located north of Mount Thomas. Further details of Poseidon Gold's findings and activities are contained in the 'Previous Investigations' section.

PREVIOUS INVESTIGATIONS

EXPLORATION PRIOR TO 1996

(*After* Drummond 2003)

Reference is made to historic EL 9672 Dragons Lair and contemporary ELs 23671 Aileron, 23571 Reynolds Range and 24548 Yalyirimbi Range in the following exploration summaries. EL 9672 Dragons Lair covered most of the area of EL 23571 Reynolds Range and also covered the head water areas of the Lander and Hanson Rivers. EL 23671 Aileron was mostly covered by EL 9672 Dragons Lair. EL 24548 Yalyirimbi Range is 15-20 kilometres south of EL 23571 Reynolds Range, and hence outside of EL 9672 Dragons Lair, and is not relevent to this report. Included historic exploration summaries may not be explicitly associated with EL 23571 Reynolds Range but are relevent when considering regional prospectivity.

CSR minerals (1977-1978) EL 1294. CR1979-0198

The licence covered most of EL 23571 Aileron and the north central portion of EL 24548 Yalyirimbi Range. The historic licence area was considered prospective for base metals, tungsten and uranium. An airborne radiometric survey was flown in 1977. Thirty seven airborne radiometric anomalies were checked along with stream sediment sampling and rock chip sampling. None of the anomalies were considered prospective.

Otter Exploration (1977-1979) EL 1444. CR1979-0021, 1980-0056, 1980-0252

EL 1444 was located 2 kilometres north of the central portion of EL 23571 Reynolds Range and covered the northern portion of EL 23671 Aileron. The area was considered prospective for skarn-hosted base metal and tin-tungsten deposits. Additionally the Reynolds Range, Lander River valley and Anmatjira Range were prospective for hydrothermal skarn uranium deposits. Otter Exploration commissioned an airborne radiometric survey and identified eighteen radiometric anomalies worth further investigation. Ground truthing of radiometric anomalies was carried out using a scintillometer along traverses. Bore waters in the licence area were analysed for uranium. Several enriched uranium and Rare Earth Element (REE) occurrences were located but the extent was small. Both leases were relinquished.

BHP Exploration (1981-1983) ELs 2942, 3075, 3084 and 3088s. CR1983-0015, 1983-0289

The tenements were taken up principally in a diamond search, with base metals a secondary consideration. BHP withdrew in the light of negative results. Two stream sediment samples were anomalous for cerium (Ce) and lanthanum (La): they drained an area near Mt Finniss in the north-west corner of EL 23671 Aileron, and which hosts a mapped REE-(U) prospect. This demonstrates the ability to use stream geochemistry in a search for further REE deposits in Arafura's tenements.

J Weir (1982-1983) EL3506. CR1983-216

Via a scintillometer search, Weir located an allanite-bearing pegmatite vein near Mt Boothby, which is 5 km north-east of Nolans Bore and within EL23671 Aileron. The pegmatite is of limited extent and assayed: Ce 4250 ppm, La 3100 ppm and Yttrium (Y) 70 ppm.

BHP Exploration (1983-1984) EL4188. CR1984-117

The western half of that tenement lay within the eastern margin of EL 23671 Aileron. BHP reviewed the BMR 1:250 000 total magnetic intensity contour map for the Napperby Sheet and identified a "bullseye" shaped anomaly of nearly 1 000 nT, the source of which was considered to be a possible carbonatite. It lies just north-east of EL 23671 Aileron, with a possible repetition inside Arafura's licence. Without any outcrop to explain it, the area was applied for and BHP carried out an aeromagnetic survey and follow-up ground magnetometer and

gravity traverses. These confirmed the size and location of the anomaly and identified a five to six milligal gravity anomaly. The geophysical anomalies were drill tested by hole OG-1 (total depth 256 metres) which intersected non-magnetic "basement" rocks at 94 metres, and weakly magnetic hornblende-quartz-feldspar gneiss at 213 metres. It was considered that these rocks belonged to the Arunta Complex and were the source of the geophysical anomaly. Analysis for base metals proved negative.

Colchis Mining Corporation Pty Ltd (1987-1990) EL5511. CR1989-020, 1990-366

This tenement occupied the western part of EL 23671 Aileron. Colchis targeted both Au and base metal mineralisation. It undertook a review of previous data, interpreted aerial photography and Landsat imagery, and carried out an intensive mapping programme. Rock chip samples (45) and stream sediment sampling (210 samples, not BLEG Au) did not indicate any anomalism warranting Colchis' further work.

Track Minerals Pty Ltd (1988-1989) EL5901. CR1989-704

EL5901 occupied the south-eastern part of EL9672 Dragons Lair and subsequently EL 23671 Aileron. Track searched for Au in the Aileron Metamorphics, which there consist of a calc-silicate, meta carbonate and meta arenite suite. It focused on areas proximal to granitic intrusions, thrust faulting and shearing. Stream sediment sampling with BLEG Au and base metal analysis, geological traverses and rock-chip geochemistry did not provide any encouragement. However, Drummond considers that its 27 sample stream geochemical programme could not be considered an adequate test of the ±300 sq km that Track endeavoured to evaluate.

Poseidon Gold Ltd and Exodus Minerals N L (1993 - 1999) EL7343:Relinquished Section. CR1999-225

The original large tenement was centred on the Lander River Valley, and almost all of it lay well north to north-west of EL23571 Reynolds Range near the Harverson Pass. The target was structurally controlled Au and base metal mineralisation. Open File records only relate to the data gathered on areas subsequently relinquished. Strong programmes were undertaken, including airborne geophysical surveys, stream and lag sampling, RAB drilling and geomorphological interpretation, and successive statutory partial relinquishments of the tenement were made. Although Posgold considered that no anomalous geochemical systems had been defined, Exodus states that "… the relinquished portion … is not unprospective…": this comment, presumably, being applicable to the Harverson Pass area.

Tidegate Pty Ltd (1993-1994) EL8117. CR1994-589

Aileron roadhouse lies in the north-west part of this tenement, which covered the eastern part of EL9672 Dragons Lair and the southerly lobe of EL 23671 Aileron. Work consisted of taking BLEG Au samples, soil samples and rock chip samples near a known nickel (Ni)-chrome (Cr) prospect, and the amphibolite at Harry's Yard (both of these lie to the south-east of Arafura's tenements). Exploration target was Au in greenstones but results were discouraging.

Aberfoyle Resources Ltd (1995-1998) EL9146. CR1996-692, 1997-688

This tenement covered the south-eastern portion of EL 23671 Aileron. Aberfoyle considered that the poorly outcropping sequences in the tenement could host Granites-Tanami style Au mineralisation, and that the latter may be associated with magnetic anomalies. An early RAB drill programme (6 holes, 299 metres) established that Cainozoic cover thickness was not prohibitive (between 12 and 38 metres). A detailed aeromagnetic survey was flown and several magnetic anomalies located which Aberfoyle considered worthy of follow-up. Apparently this was not undertaken, and the tenement was relinquished.

PNC Exploration (Australia) Pty Ltd (1994-1996) EL8411. CR1995-266, 1996-187

PNC acquired EL8411 so that it could seek uranium. It covered Arafura's relinquished tenement EL9672 Dragons Lair and extended north-westerly well beyond it along the Reynolds Range, now EL 23571 Reynolds Range and EL 23671 Aileron. In its exploration PNC discovered the Nolans Bore apatite-REE deposit. Via regional reconnaissance, airborne radiometrics and ground traversing, PNC found numerous prospects, many of which it considered were of Mary Kathleen or East Alligator style. However, they were apparently too small to justify more detailed work. Despite the discovery of Nolans Bore, PNC relinquished the tenement.

EXPLORATION BY ARAFURA RESOURCES NL FROM 1996 TO 2004

(*After* Drummond 2003)

Homestake Gold of Australia Pty. Ltd. (1996 – 1998) EL 9672.

EL 9672 Dragons Lair was granted on the 25-11-1996 and farmed out to Homestake Gold of Australia Ltd. Homestake perceived potential for Granites-Tanami style mineralisation associated with a major fluid pathway, the Trans-Tanami structural zone. It was encouraged by the small Au and Cu prospects in the tenement, and by the proximity to the Sabre Province (Cu-Ag & Cu-Pb-Zn).

The ±1500 sq km of the tenement were covered by 235 BLEG Au samples. Results were disappointing, with only 15 samples attaining 0.1 ppb or better. Six of those were clustered near the Harverson Pass, with a maximum value of 34.6 ppb and three others attaining 0.3 ppb or better. The anomalous area was followed up with detailed stream BLEG sampling (114 samples) and 10 chip samples of rocks with encouraging appearance. Essentially all BLEG samples recorded results below the level of detection. Homestake then withdrew, apparently unaware of PNC's Nolans Bore discovery. Drummond (2003) considered a minus 4mm fraction BLEG program, and a follow-up minus 2mm fraction BLEG program was ineffective, accounting for poor duplication in results.

Ironstone occurrences were investigated in the Harverson Pass and upper Woodforde River areas by Lindsay-Park (1998) and Goulevitch (1999). Lindsay-Park (1998) described haematitic beds in a zone 50-100 metres wide at a stratigraphic change from arenitic units (now mica schist) to coarser arenitic units (now quartzite) in the Harverson Pass area. The highest assay result for iron was 21.4%. Goulevitch (1999) investigated goethitic ironstone occurrences in the upper Woodforde River area that were superficial developments in a major marble/limestone unit of the Woodforde River Beds (upper Reynolds Range Group). Assay of the grab samples yielded 46.10% Fe, and slightly elevated base metals.

NORTHERN TERRITORY GEOLOGICAL SURVEY

Regional airborne radiometric and magnetic surveys were acquired over the Napperby-Hermannsberg 1:250,000 map sheet areas in late 1997 by the Northern Territory Geological Survey (NTGS). Flight line spacings were 400 metres on a north-south line orientation. Readings were taken at about 70 metre intervals for radiometrics and about 7 metre intervals for magnetics. The survey was navigated using Differential GPS at an average terrain clearance of 60 metres. Data was collected by the World Geoscience Corporation.

WORK COMPLETED BY ARAFURA RESOURCES 2005-2007

Reprocessing NTGS geophysical database

Southern Geoscience Consultants (SGC) reprocessed the Napperby/Hermannsberg and Alice Springs/Alcoota geophysical surveys to assist regional geological interpretations.

Geological reconnaissance

Helicopter-borne reconnaissance exploration was carried out in October 2005 in EL 23571. Outcropping haematite occurrences in haematitic quartzite units of the Mount Thomas Quartzite and Pine Hill Formation of the Reynolds Range Group were located and sampled. Reconnaissance was guided by published geological maps and aeromagnetic signatures in NTGS geophysical data reprocessed by SGC. The additional objective was to reconnoitre weak but discrete uranium anomalies identified in the SGC reprocessed data in the headwaters of Napperby Creek. The results of 10 grab samples are presented in McGilvray (2006).

No on-ground work was conducted by Arafura in the 2006 and 2007 exploration years on EL 23571. Work concentrated on resource drilling at the Nolans Bore deposit in the adjacent SEL 23671.

The CLC rejected Arafura's request to undertake reconnaissance exploration activities in El 23571 without completing extensive clearances and hence no on-ground activity was possible in 2006/07. Arafura therefore decided to acquire HyMap hyperspectral imagery of EL 23571, SEL 23671 and EL 24741 to try and refine areas of exploration interest in the Reynolds Range.

WORK COMPLETED IN 2008

Airborne magnetic / radiometric data

Arafura commissioned a detailed low-level airborne magnetic/radiometric survey in June-July 2008 over the central portion of the adjacent SEL 23671, and parts of EL 24741 immediately to the north (Hallenstein and Goulevitch, 2009). This survey covers an area of approximately 550 km^2, with the Nolans Bore deposit located in the central southern part of the survey. The aim of the survey was twofold:

1. To provide a baseline radiometric response of the district for future environmental monitoring; and
2. To generate additional apatite-hosted REE exploration targets.

The newly acquired airborne geophysical dataset was reprocessed by SGC, incorporating existing open file NTGS data, to produce a library of standard geophysical images for the greater Aileron-Reynolds Range region a 50 m pixel size (Appendix 1).

A number of airborne Th radiometric targets are highlighted in the reprocessed imagery in EL 23571. Figure 7 shows the airborne Th radiometric signature of EL 23571 with elevated Th portrayed in red/white. The overall intensity of the Th radiometric signature is clearly reduced and less dominant in EL 23571 compared to adjacent tenements suggesting EL 23571 contains lower priority Th targets at the surface.

The highest Th anomaly in EL 23571 forms a segmented linear feature about 2.6 km long near 286850E 7512270N with another slightly less prominent Th feature at 303350E 7497550N. Both of these Th anomalies coincide with outcropping units, mapped as faulted/sheared Napperby Gneiss, and alluvium.

The only other major Th anomaly in EL 23571 forms a 15 kilometre-long elongate segmented zone of low-moderate Th anomalism between 299200E 7511300N and 285200E 7518600N. The northern parts of this feature are locally more Th enriched whereas the southeast parts tend to be more potassic in the ternary radiometric images (not shown). This feature coincides with mapped Napperby Gneiss and undifferentiated granitic gneiss with Reynolds Range Group metasediments.

Gravity surveys

During the reporting period, two ground gravity programs were completed over the Aileron-Reynolds Range region:

1. A semi-regional 4 x 4 km-spaced survey, commissioned by the NT Geological Survey and Geoscience Australia, with Arafura participating in a cost-sharing arrangement to infill the government coverage to 2 x 2 km over SEL 23671, EL 23571 and EL 24741; and
2. Three detailed prospect-scale traverses centred on the Nolans deposit (see Hallenstein and Goulevitch 2009 for details).

The purpose of the former gravity program is to provide increased spatial resolution of fundamental geological structures over Arafura's strategic land holdings in the Aileron-Reynolds Range region. The location and character of these structures may assist in prioritising target zones generated through other recently acquired data sets (hyperspectral, radiometric, magnetic).

Data from this survey are included as point located CSV files, and as standard (ER Mapper ERS and TIFF) images in Appendix 2. The gravity contractor's logistics report is also included in Appendix 2.

Airborne hyperspectral survey.

Arafura Resources commissioned HyVista Corporation to acquire and process HyMap airborne hyperspectral scanner imagery over the Aileron-Reynolds Range region during the reporting period. The survey encompasses outcropping Proterozoic rocks at a scale suitable to regional exploration (nominal pixel size is about 4.6 x 4.6 metres) and covers parts of SEL 23671 and EL 24741 and all of EL 23571. The purpose of this HyMap survey and imagery was to:

- characterise the HyMap hyperspectral signature of the Nolans Bore deposit and its country rocks;
- generate exploration targets using HyMap mineral maps based on characteristic minerals from Nolans Bore;
- generate exploration targets using a standard suite of HyMap mineral maps; and
- assist regional geological interpretations and reconnaissance mapping/sampling.

The HyMap survey was acquired 8 April 2008. An acquisition attempt was made in March 2008 however inclement weather conditions prevented the completion of the initial survey. Details of all HyMap survey data and processing report are included digitally as Appendix 3 in this report.

HyVista presented the processed HyMap data and imagery to Arafura (Hussey) at a 3 day workshop held in Darwin in August 2008. HyVista demonstrated interpretations with the following diagnostic maps:

1. Standard HyMap imagery, such as Visible, False colour, Decorrelation and MNF images
2. Kaolin and kaolinite group minerals
3. Fe oxides and hydroxides
4. Carbonates
5. Epidote +/- apatite
6. Topaz
7. Argillic alteration mineral assemblages
8. Chlorite
9. Amphibole
10. Mica

Within EL 23571, the processed HyMaP data reveals significant areas of epidote are present. This is not surprising given the mapped calcsilicate lithologies. Epidote is considered interesting as the REE-enriched epidote (allanite) may or may not be present. Some of the epidote rich areas also have apparent apatite signatures, but these are probably more speculative. Additional processing and ground-truthing is planned to further evaluate this aspect. The HyMap dataset also revealed numerous areas of contiguous pixels with signatures that match argillic alteration mineral assemblages amongst areas of known kaolin and deeply weathered/intensely altered rocks (Figure 8). Note additional areas of with modelled argillic alteration signatures are present however Figure 8 shows only those areas with the highest probability. HyVista also demonstrated signatures characteristic of argillic alteration minerals such as alunite and dickite are locally present.

The potential use of monazite and REE mineral maps were investigated within the HyMap dataset during the workshop to varying degrees of success. It was decided that an additional workshop with HyVista should occur in 2009 to further evaluate and develop specific mineral maps such as:

1) apatite
2) apatite-epidote (allanite)

3) kaolinite
4) monazite
5) REE mineral assemblages.
6) argillic alteration assemblages

Arafura plans to commence on-ground evaluations and ground-truthing of these HyMap signatures in 2009.

Figure 9 shows the main regions of exploration interest in EL 23571. Arafura plans to undertake reconnaissance exploration activities of selected Hymap and radiometric targets within these regions in EL 23571 in 2009.

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13 February 2009

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