Report ARU-11/004

ANNUAL REPORT FOR YEAR ENDED 30 NOVEMBER, 2010
EL 27335 (COPPOCK) AND EL 27336 (CONNOR),
BURT PLAIN PROJECT,
NORTHERN TERRITORY, AUSTRALIA

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INTRODUCTION

Background

The Aileron-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. The Burt Plain project area is proximal to the Aileron-Reynolds project region, lying to the south and southeast of the ranges.

Several companies conducted exploration activities in SEL 23671, 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 % P2O5 and 0.44 lb/t U3O8 [see Goulevitch (2008) for details]. This is encouraging because the Nolans Bore-type REE mineralisation may occur elsewhere in the region.

Elevated levels of phosphate-hosted rare earth elements (REE’s) mineralisation was discovered in the Nolan’s Bore area by PNC Exploration (Australia) Pty Ltd in 1995 (Thevissen, 1995). This occurred during follow-up of an airborne radiometric anomaly as part of that company’s uranium exploration program along the Reynolds Range. Total REE levels of 5-7% were reported from selected grab samples of apatite which crop out sporadically within an area some 1000 x 800 metres in extent around the Bore. A distinct ground-radiometric response correlates closely with this area of apatite development.

The prospective REE host rocks of the Aileron Province within the Burt Plain tenements are almost completely overlain by relatively shallow Tertiary cover and therefore has been essentially overlooked since modern exploration started in the district in the early 1970’s. Therefore different exploration techniques will be required for discovery than those employed at the Nolan’s deposit. The Burt Plain area is located within the western edge of the key northwest-trending structural zone that hosts the Nolan’s deposit and is also transacted by strongly-developed east-northeast-trending shear zones. These structural intersections represent the key prospective targets for the Burt Plain tenements as they represent a similar structural framework as that developed at Nolan’s Bore.

Location and access

The Burt Plain tenement EL 27337 (Sheppard) is located approximately 90km north northwest of Alice Springs along the western side of the Stuart Highway, between 15 and 35km south-southwest of the Aileron Roadhouse, in the central-southern part of the Northern Territory. EL 27336 (Connor) and 27335 (Coppock) lie to the east of EL 27337 and are on the eastern side of the Stuart Highway (Figure 1).

Access to EL’s 27335 and 27336 is poor, restricted to station tracks. EL27335 can be accessed from the Plenty Highway that crosses the southern end of the tenement, approximately 17km from the Stuart Highway turnoff. At 17km along the Plenty Highway is a station track that heads northwest for approximately 15.5km where it joins the old Sandover track. The old Sandover track heads southwest through the central part of EL 27336 and northeast towards the northern end of EL 27335. Some parts of the two tenements are covered in open sand plains and can be accessed by newly forged 4WD tracks, however, common dense vegetation throughout and some calcrete development significantly reduce access by 4WD.
Topography and drainage

Both EL 27335 and 27336 are dominated by flat, undulating, red sandy soil plains with low relief (Figure 1). The dominant topographic feature is Mount Burne which forms a significant hill in the upper northern part of EL 27335 (372,000mE, 7,474,000mN). There are no significant drainage systems within either tenement.

Climate

The climate is characterised by long hot summers and short mild winters. Temperatures regularly exceed 40°C in summer with rare frosts in winter. The average rainfall is about 280 mm, most of which falls between October and March, but both frequency and amount are erratic.

The Aileron-Reynolds project area is part of the Burt Plain Bioregion as defined by Connors (2004). Connors (2004) indicates that the Ranges are broadly classified as “mixed species low open woodlands” which is described as spinifex hummocky grassland with a mixed low open-woodland overstory (principally Eucalyptus and Hakea species). The south slope of most rocky ridges also have characteristic stands of native Pines. The open valley between the Ranges is classified as “tall open scrublands” which is principally *Acacia kempeana* (Witchetty Bush) tall open-scrubland with *Cassia* and *Eremophila* open-scrubland understory, but also includes an unmapped area of *Acacia aneura* (Mulga) tall open-scrubland with *Cassia* and *Eremophila* open-scrubland understory. Major drainages contain good stands of Ricer Red Gums, Bloodwood and lesser Beantree.
TENURE

Mining/Mineral Rights

Exploration Licences EL 27335 (Coppock) and EL 27336 (Connor) are 100% held by Arafura Resources Limited (ACN 080 993 455). EL 27335 (50 sub-blocks, 157.79 km²) and 27336 (37 sub-blocks, 117.05 km²) were granted on 1 December 2009 for a period of six years to expire on 30 November 2016. EL 27335 and EL 27336, together with EL 27337 (Sheppard), form Arafura’s Burt Plain Project (Figure 1).

This is the first year of tenure for these titles.

Land Tenure

The land tenure under EL 27337 is Perpetual Pastoral Lease PPL 1097 (Aileron).

- Aileron Station, PPL 1097 – NT parcel 00703 is owned by Mr Garry Dann of Aileron Station (Waite River Holdings Pty Ltd), (phone 08 8956 9705, fax 08 8956 8535).

Native Title

Arafura Resources has negotiated and executed an Exploration Agreement with the Central Land Council (on behalf of registered Native Title Claimants). EL’s 27335, 27336 and 27337 are not currently subject to this agreement. It is Arafura’s intention to introduce these tenements at the next Exploration Agreement meeting. Preliminary discussions indicate there are likely to be no Native Title impediments to continued exploration on these tenements other than holding appropriate consultations, avoiding activity on identified sacred sites and paying agreed amounts of financial compensation once the Agreement is in place.

In December, 2003, an Introductory Meeting was held at Nolan’s Bore with members of the relevant Native Title groups. A further meeting with CLC officers and relevant Native Title groups was held at Aileron on 31 March, 2006, where a number of Aileron-Reynolds project tenements were confirmed as part of the Exploration Agreement.

Should mining eventuate, a mining compensation agreement will have to be negotiated both with the holder of the pastoral lease in accordance with the Mining Act, and also with the registered Native Title Claimants in accordance with the Right To Negotiate provisions of the Native Title Act. A mining tenement can only be granted where an appropriate Native Title agreement is emplaced.

The terms of the Exploration Agreement provide for continuation of exploration on the area of the proposed mining tenement while the mining agreement is being negotiated with the registered Native Title Claimants.
Site Clearances

Under the terms of the Exploration Agreement, Arafura must provide all relevant details of its proposed exploration activities to be conducted on EL 27337. The CLC must advise if clearances are necessary and then, if required, conduct clearances and provide details of exclusion zones as advised by the Native Title holders. Under the Exploration Agreement, the CLC is required to provide all necessary Scared Site Clearances and details of the exclusion zones to allow exploration activities to progress in a timely manner.

Sensitive Areas

EL 27335 and EL 27336 are close to 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 km² of metamorphic rocks in the southern parts of the NT and has been subdivided into three distinct geological regions by the NTGS, the Aileron, Warumpi and Irindina Provinces (Figure 2). The Arunta Region is unconformably overlain by sediments of the Neoproterozoic to mid-Palaeozoic Ngalia, Georgina, Amadeus and Wiso Basins.

The Aileron Province predominantly consists of Palaeoproterozoic 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., 2008a, 2008b). This event appears to have affected the entire Aileron Province to some degree, as opposed to the Mesoproterozoic 1595-1570 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 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 1740-1690 Ma Strangways Orogeny, with an apparent localised abundance of 1810-1700 Ma igneous activity and deformation in parts. The central-southern parts of the Aileron Province preserves an east-west zone of granulite facies metamorphic rocks 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 tectono-thermal 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 overlie the Arunta Region. Contemporaneous Neoproterozoic 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 (Claoué-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, Claoué-Long 2003, Claoué-Long et al., 2005, Claoué-Long et al., 2008a). 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 (Claoué-Long 2003, Claoué-Long et al., 2005, Claoué-Long et al., 2008a).

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 Calcisilicate 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 calcisilicate 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).

![Figure 3: Generalised geology of the Reynolds Range Region (modified after Stewart, 1981).](image)

Magnetic data indicates that the bulk of the regions covered by recent alluvium are underlain by granite/granitic gneiss (from Hand & Buick 2001).

**Neoproterozoic**

Ngalia Basin rocks were deposited between the Neoproterozoic to the Late Carboniferous (Wells & Moss, 1983). The rocks are an important component of the adjacent EL 24548, 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 a number of undifferentiated granites and gneisses that intrude the Reynolds Range Group (see Stewart and Pillinger 1981).

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 usage 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 these 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).

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). Metapelitic 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.

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

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 sillimanite.

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 zones 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 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

Relatively little historic exploration has been conducted within the broader region of Arafura's Burt Plain Project (EL’s 27335, 27336 and 27337, Figure 7) since serious regional exploration in the central Aileron Province was initiated in the 1960’s. The three tenements are extensively covered by a veneer of Tertiary to recent sediments which has deterred past explorers, however, base metal discoveries (Red Rock Bore, Coles Hill, Native Gap) in outcrop zones peripheral to the tenements indicate at least some geochemical anomalism within basement rocks. No REE mineralisation or alteration has been reported within or surrounding the Burt Plain tenements, however, several prospective structural zones in basement rocks under cover have not been targeted by modern exploration techniques.

The first significant exploration in the area was conducted by CRA Exploration in 1971 around the annular features at Mt Burne, thought to be possible kimberlite or carbonatite intrusive plugs. Five holes were drilled into four annular features encountering silicification and quartz veining but not satisfactorily explaining the features. Planet Mining discovered the Red Rock Bore Cu-Pb-Zn prospect in 1974 using Barrington AIRTRACE multi-element airborne system. The base metal system has similarities to Mt Isa-type deposits, however, the best drilling interval out of three holes was: 33m @ 0.81% Cu, 0.52% Pb, 0.79% Zn and 1 g/t Ag (DDH1). Triako Resources (1979 – 1980) extended the strike extent of the Red Rock Bore prospect using Rapid Reconnaissance Magnetic Induced Polarization, however, follow-up drilling in two holes returned a best intercept of: 9m true width @ 0.42% Cu, 0.47% Pb, 1.69% Zn, 6.3 g/t Ag and 0.03 g/t Au (from 213-224m, DDH4).

An exploration hiatus extended from the early 1980’s until 1994 when Tidegate discovered the Native Gap Ni-Cr prospect hosted within an amphibolite plug close to where the Stuart Highway passes through a gap in the Hann Range. BLEG stream and soil sampling returned anomalous, albeit disappointing results, and the ground was dropped without drilling.

The most recent exploration was conducted by Tanami Gold in joint venture with Teck Caminco and BHP (2003 – 2008) in a search for massive sulphide base metal systems. They flew a series of airborne EM surveys, however, the only conductor identified was too small and too low intensity to warrant follow-up drilling.

Minor uranium exploration was conducted from 2006 by Deep yellow and most recently NuPower Resources, however, no significant anomalism has been detected to date.
### Table 1: Summary of historic exploration.

<table>
<thead>
<tr>
<th>Years</th>
<th>Tenement(s)</th>
<th>Exploration Company</th>
<th>Exploration Targets/Commodities</th>
<th>NT Department of Resources Open File Company Report(s)</th>
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<tbody>
<tr>
<td>1971</td>
<td>AP2435</td>
<td>CRA Exploration</td>
<td>Base metals diamonds</td>
<td>CR1971-0020</td>
</tr>
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<td>Uranium</td>
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<td>Planet Mining</td>
<td>Base metals</td>
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<td>Dampier Mining</td>
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<td>EL5557</td>
<td>Range Resources</td>
<td>Gold</td>
<td>CR1989-0356</td>
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<td>2008</td>
<td>EL10401</td>
<td>Tanami Gold</td>
<td>Gold</td>
<td>CR2008-0321</td>
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</table>
CRA Exploration AP 2435 (CR1971-0020)

Northern quarter of Arafura’s EL 27335. Five circular features with annular structures drew CRA to the area based on the general proximity to a carbonatite occurrence described by the B.M.R. (Crohn and Gellatly, 1969). Reconnaissance field mapping identified north-trending quartz reefs and other siliceous outcrops within circular depressions and soil analyses showed kimberlite affinities with weak Ni, Co, Cr, Ti, Rb, Sr, P and some of the rare earths. Subsequent percussion drilling (Five holes into four of the features for 350m) intersected siliceous rocks only, mostly quartz and quartzite, however, a single hole RD3 intersected a zone of talc and mica schist that contained unusual quantities of tin and cesium. No correlation was observed between surface and subsurface geochemistry, however, the source of the unusual anomalism was attributed to pegmatite which appear at shallow depths in other proximal areas. Annular surface features remained unexplained.

CRA Exploration AP 2710 (CR1971-0026)

CRA carried out exploration on a large tenement that extends from the southern boundaries of Arafura’s tenements EL 27335 and EL 27336 up to 70km SSE. Exploration focused on nickel, primarily a number of strong magnetic anomalies which were revealed by the 1965 BMR airborne survey. Geological reconnaissance investigations were carried out, however, it was concluded that the alluvium-covered magnetic anomalies are magnetic granulites and quartzites similar those exposed in the hills to the east of the tenement. Ultramafic rocks were not found and nickel prospects were discounted.

CRA Exploration AP 3382 and EL 441 (CR1972-0067)

AP 3382 and EL 441 occupied a triangular area immediately south of Arafura’s three Burt Plain tenements with only a very small fraction of the ground occupying the southwest of EL27335. The Tertiary and (?)Mesozoic sediments of the Burt Plain basin were explored to test the uranium potential of the basin. Work included seismic traverses to indicate the depth to basement around the edges of the basin, water bore sampling and ground-based radiometric traverses were conducted along station tracks. Weak radioactive anomalism was identified and is associated with scattered travertine outcrops, however, results showed no encouragement for further work.

CRA Exploration AP 2710 (CR1973-0002)

AP 2710 was adjacent and east of CRA’s tenements AP 3382 and EL 441 and extended from the southern limits of Arafura’s tenements EL 27335 and 27336 extending over 40 km south along the railway. Similar activity was carried out by CRA as on AP3382 and EL 441 (i.e. bore hole water sampling and radiometric sampling of station tracks and sporadic outcrops). No anomalous material was encountered and the tenement was dropped.

CRA Exploration AP 3447 (CR1973-0031)

This AP covers almost all of Arafura’s tenement EL 27337 and extends a further 20km west of EL27337’s western boundary. CRA conducted reconnaissance geological mapping around Mount Harris and southwest of Sheppard’s Bore where several outcrops zones exist. CRA also flew a single line airborne radiometric survey immediately west of Mount Harris. Radiation levels were generally low but Mount Harris and Sheppard Bore granites were about twice background levels.

Mapping southwest of Sheppard Bore identified dominantly foliated granite and felsic gneiss with only minor non- foliated pink granite in a single outcrop. Quartz – hematite +/- pyrite veins are common, however, anomalous radioactivity is associated with the granite, not the veins. No assay data for the
veins was available at time of writing the report. The report has a good outcrop map of the Sheppard Bore area.

**CRA Exploration EL 753 (CR1973-0121)**

This EL covers exactly the same area as CRA’s AP 3447 and the report is effectively the same as well except that it presents results of rock chip samples collected during outcrop mapping. The report only presents U and Th results and it appears as though quartz – hematite +/- pyrite veins were not assayed for any other elements.

**Planet Mining  EL 58 (CR1974-0078)**

EL 58 is a small NE-trending rectangular box that touches the southeastern corner of Arafura’s EL 27335. Planet flew a Barrington AIRTRACE multi-element airborne system over an area of 340 km² and detected several geochemical anomalies associated with magnetic features. It is unclear from the report what they were attempting to discover and only covered a small area southeast of Arafura’s EL 27335. The surveys successfully identified Cu, Pb and Zn anomalies at the Red Rock Bore Prospect.

**Planet Mining  EL 58 (CR1975-0033)**

Planet Mining undertook extensive work at the Red Rock Bore base metal prospect including geological mapping, soil sampling, ground magnetic, IP and diamond drilling. Mapping identified mostly soil cover but scattered outcrops of felsic and mafic gneisses, schists and amphibolites. Soil sampling identified Cu, Pb and Zn anomalies that broadly correlated well with the airborne magnetic anomaly and 5 costeans were dug to assist more detailed mapping and soil sampling. Ground magnetic confirmed the elliptical shape identified by the regional airborne survey. The IP survey revealed a system of chargeability and resistivity axes along the southern flank of which there occur strong magnetic, chargeability and resistivity gradients, probably related to the contact between mafic granulites and quartz-biotite-sillimanite gneisses. Three diamond holes were drilled and all intersected broad, low-grade Cu, Pb and Zn zones including:

- DDH1: 100 feet @ 0.81% Cu, 0.52% Pb, 0.79% Zn and 1.07 dwts / Ag
- DDH2: 40 feet @ 0.41% Cu, 0.67% Pb, 0.53% Zn, 0.22% Ni and 3.63 dwts / ton Ag
- DDH3: 60 feet @ 0.23% Cu, 0.51% Pb, 1.22% Zn, 0.2% Ni and 2.73 dwts / ton Ag

Mineralization of sphalerite, chalcopyrite and galena is closely associated with quartz, clinopyroxene and garnet-rich rocks which are products of high-grade metamorphism of calcareous pre-cursors. Four additional holes were recommended based on a correlation between an IP positive axis and Cu, Pb and Zn anomalies. However, given this is the final report it remains unclear if these holes were ever drilled.

**Dampier Mining  EL 1341 (CR1977-0139)**

The upper northwest corner of EL 1341 only just overlaps the southeast corner of Arafura’s EL 27335 and extends approximately 50km east and 18km south. A number of base metal occurrences are associated with small lenses of banded magnetite quartzites within units of highly metamorphosed granulite / amphibolites facies rocks. Rocks include meta-igneous, now mafic granulite of variable thicknesses and magnesite / aluminium-rich rocks, possibly of sedimentary parentage. The origin of the strataform magnetite quartzite associated mineralization was thought to be sedimentary / exhalative or could have been remobilized and concentrated during various stages of folding and metamorphism from igneous rocks. All mineralization encountered was low grade and of limited areal...
extent.

**Triako Resources EL 1889 (CR1979-0057)**

Triako’s tenement EL 1889 is approximately the same size and shape as EL 1341 (Dampier Mining) except was located approximately 10km north and so it's northwestern corner occupies the lower third of Arafura’s EL 27335. Triako pegged this ground in order to follow-up Planet Mining results at Red Rock Bore. Triako assigned the base metal mineralization to the Oonagalabi-type (i.e. Mt Isa, Broken Hill, Einasleigh – Georgetown etc) and considered a 100mT @ 10% combined Cu, Pb, Zn as a best-case discovery scenario. Obviously deposit classification has progressed significantly since the 1970’s and these deposits would be separated into different deposit classes (i.e. Broken Hill-type, Sedex / Mt Isa-type etc). Triako undertook data review and compilation and recommended further work including deepening and extending costeans, detailed mapping, shallow percussion drilling, ground magnetic and an IP survey.

**Triako Resources EL 1889 (CR1979-0161)**

At Red Rock Bore Triako extended RRMIP (Rapid Reconnaissance Magnetic Induced Polarization) surveys past those conducted by Planet Mining, demonstrating that IP anomalism exists over and along strike from known strataform mineralization. Significant new anomalous zones were intersected and shallow percussion, possibly deeper diamond drilling was proposed to test new anomalies.

**Triako Resources EL 1889 (CR1980-0009)**

Further extensions to the IP and ground magnetic grid were conducted including 12.25 line kilometres of IP (25m readings on 100m spaced lines) and 10.6 line kilometres of proton precision magnetometer. Results indicate a strongly magnetic, poorly polarised conductor, 200m wide, extends for at least 700m in an east-west direction. Flanking this conductor to the north and south are strongly chareable, relatively resistive and weakly magnetic zones up to 150m wide.

Mapping indicates that the major conductor lies under or within a sequence of vertically foliated biotite-sillimanite-quartz-feldspar gneiss. A deep magnetic body is envisaged. A total of 156 soil and bedrock chip channel samples have been collected at the prospect to date with the maximum 2m bedrock assay of 385 cu, 1538 Pb and 1160 Zn.

**Triako Resources EL 1889 (CR1980-0161)**

Two diamond drillholes were completed to test the interpreted deep magnetic target (DDH4, 300m) and lateral strike continuation (DDH5, 150m). DDH4 intersected low-grade mineralization between 213 – 224m (9m true width @ 0.42% Cu, 0.47% Pb, 1.69% Zn, 6.3 g/t Ag and 0.03 g/t Au). DDH5 failed to intersect any mineralization but did successfully demonstrate that the IP anomaly is related to disseminated mineralization.

**CRA Exploration EL 3502 (CR1983-0152)**

EL 3502 occupied a rectangular box that terminates against the southern boundaries of Arafura’s tenements EL27335 and EL27336 and extends 15km south (no overlap with Arafura’s tenements). CRA conducted a close-spaced (300m) airborne magnetometry survey to better define prominent
magnetic response in the extreme NW section of the Alice Springs 1:250,000 map sheet. Modelling indicated high amplitude response have a dipolar wave length in excess of 1,000m and more typical of magnetite-bearing granulites than carbonatite as previously suspected. Modelling and review of water bore data indicate a source greater than 100m deep and CRA subsequently relinquished this ground.

Range Resources EL 5557 (CR1989-0356)

EL5557 is a long, skinny E-W trending tenement that runs through the top quarter of Arafura’s EL 27337 to the top fifth of EL 27335. Range Resources acquired the ground to explore for gold, thought to be hosted within hematitic quartz reefs. Veins cut both the granitic basement and the overlying Vaughan Springs Quartzite along the southern side of the Stuart Bluff Range and the Hann Range. Gold had been reported in reefs back to 1954, however, subsequent exploration in 1965 revealed pyrite and specular hematite at depth and some minor fluorite but no gold or base metals. Central Pacific Minerals drilled six holes in pyritic quartz-hematite breccias with associated IP and / or magnetic responses in the Stuart Bluff Range, but detected no gold or anomalous copper. It appears as if Range did not complete any field work.

Tidegate PTY LTD  EL 8117 (CR1994-0589)

EL 8177 covers almost all of EL 27336, the northeast corner of EL 27337 and extends up to the southeastern extension of the Nolan’s Bore shear. Tidegate explored Native Gap (Ni, Cr), Harry’s yard amphibolites, Aileron shear zone and Aileron gold reefs.

The Native Gap Ni-Cr prospect is located about 2.5km east of the Stuart Highway, approximately 20km south of Aileron. The prospect was discovered in the 1960’s and further explored by NTGS geologist Jim Morlock in 1973. Assays of rock chip samples collected by Morlock showed highly anomalous Ni and Cr values in a circular body of amphibolite (500m diameter) intruded by pegmatite (no gold assaying was done). Interpretation of AGSO (BMR) regional airborne magnetic data speculates that the amphibolite is part of a large ultramafic intrusion on the southern side of the Hann Range. Tidegate collected nine loam BLEG samples, nine soil / sediment samples and five rock chip samples from the amphibolites exposure and surrounding contacts. Gold values in BLEG ranged up to 1.05ppb Au with moderately anomalous Ni and Cr values. Tidegate dropped the ground after these disappointing results.

Harry’s Yard amphibolites body was found to be mainly sheared and altered meta-gabbro with possible komatiite “Spinifex” textures, intruded by pegmatite and quartz veins on the perimeter. Nineteen loam BLEG, nineteen soil / sediment samples and three rock chip samples were collected on the intrusion, however, gold values were considered not to be anomalous and no further work was recommended.

The Aileron shear zone was discovered in 1939 and prospecting was abandoned in 1940 after the recovery of a single ounce (approx 6 g/t Au dirt) from quartz-pyrite veins. Veins form lenticular bodies up to 30m long and 1.5m wide. McMahon Construction Pty Ltd and Lindsay Johannsen in 1990 briefly explored the prospect who sent a small consignment to Tennant Creek for processing (no data for gold grades or recovery). Tidegate collected four grab samples in January, 1994 from quartz vein and sheared granite with fresh sulphides, however, all gold results were below detection (0.008ppm Au) and no significant As, Ag or base metal values were detected (except Co, up to 104ppm). A reconnaissance BLEG loam and drainage survey was carried out along the shear zone westerly from Stuart Highway. Results were below level of interest in reasonably well-exposed country and the land was dropped.
Roebuck Resources EL8320 (CR1994-0827)

This tenement is very small and lies adjacent to the southern boundary of EL 27335. Roebuck acquired the ground because it thought that it represented a fold repetition of the strata that hosts the Red Rock Bore strataform base metal deposit. Geochemical sampling along the accessible southern boundary zone of EL 8320 returned anomalous Pb, C, As and Sn in soils transported from a more northerly source. Bedrock geochemical sampling was recommended to test subsurface stratigraphy for base metal and gold anomalism.

Roebuck Resources EL 8320 (CR1996-0201)

Roebuck entered into a JV arrangement with Pasminco Australia Limited whereby Pasminco became the project operator. Pasminco completed data review during the year and proposed ground magnetic and soil sampling over the Coles Hill North zone.

Gutnick Resources EL 10253 EL 10252 (CR2003-0064)

EL10253 occupies almost all of EL 27335 and extends west to, but doesn’t cover EL 27336. EL 10252 extends to cover all of EL 27336 and EL 27335. Gutnick Resources completed an orientation geochemical survey to determine the best method of sample collection and analysis. Also completed was a broad spaced stream sediment programme of 510 samples evening out to approximately 1 sample per 5 square kilometres. 21 samples returned gold values of >1ppb to a maximum of 6.15ppb Au and 12 samples contain >0.1ppm Ag with a maximum of 0.25ppm Ag. The exploration model was that of a hydrothermal style of Witwatersrand deposits. Reconnaissance rock chip sampling returned best gold and silver values of 25ppb and 5ppm respectively.

Tanami Exploration NL EL 22923 (CR2003-0335)

This tenement is quite large and covers the ground immediately east of EL 27335 and south of EL 27335 and EL 27336, however, no ground overlaps. Tanami were exploring in joint venture with Teck Cominco and BHP for polymetallic metamorphosed massive sulphide deposits developed at or near the contact of major bimodal volcanic sequences and overlying dominantly pelitic to calcareous sediments. In early 2002 the tenement was included in an Arunta-wide bedrock geological interpretation and geophysical targeting exercise conducted by consultant geophysicist Dr Jayson Myers. The exercise drew analogies between the Central Arunta region and the Eastern Succession of the Mt Isa region. Further to this study it was recognised that the tenement may potentially host IOCG deposits.

Exploration completed in 2002 consisted of moving-loop EM survey (23 line kilometres, 100m moving loop) over several magnetic targets. The moving-loop EM survey detected a weak conductor over one target which is interpreted as possibly representing a bedrock source, however, the intensity and size of the anomaly did not warrant follow-up drilling. The weak conductor is located immediately south of the EL 27335 tenement boundary.

Tanami Exploration EL 22922 (CR2004-0084)

Very large rectangular tenement south of EL 27337 and southwest of EL27336. The ground was acquired for the same reasons as EL 22923, however, review of MODAT or NTGS occurrence maps revealed nothing. No fieldwork was conducted and the full 185 blocks were considered unprospective for gold and were relinquished by the end of the first year.

EL 22922 and EL 22923 are large rectangular tenements that border the southern boundaries of all three of Arafura’s Burt Plain tenements. Tanami held the ground from 2002 until 2008 with the hope of discovering a large tonnage base metal deposit at the Red Rock Bore and/or Coles Hill systems. Very little exploration was conducted with the collection of 20 rock chip samples representing the sum of field work. In 2005/2006 Tanami joint ventured the ground out to Deep Yellow for sedimentary-hosted uranium exploration, however, Deep Yellow did not conduct any field activities. The ground was relinquished in 2008.
EXPLORATION ACTIVITIES COMPLETED IN 2010

Comprehensive GIS data review

A full GIS review of all three Burt Plain tenements (EL’s 27335, 27336 and 27337) was completed using digital terrain model (Figure 1), geology (Figure 7) Landsat 321, Ternary radiometrics (Figure 8), gravity (Figure 9) and RTP magnetic data (Figure 10) and results are summarized in Dow (2010).

Ternary radiometric data confirm Landsat and 1:250,000 scale geological mapping showing almost complete cover over EL’s 27335 and 27336 (speckled light blue-green colours). There is a subtle, discrete, circular, deep blue, low radiometric anomaly that covers Mount Burne, possibly one of the only outcrop areas in the two tenements.

Depth to basement of the Burt Plain project tenements was assessed by evaluating water bores. Twenty six water bores have been drilled within and in close proximity to Arafura’s Burt Plain tenements (Table 2). Water bore use is mainly for stock on the Aileron Station but have also been drilled by railway and road companies, the BMR and the Army. Lithological logs have only been completed for 18 of the 26 bores, but this is enough to get a rough guide to depth of cover sequences (average of 38.9m) and basement characteristics (mostly granite with subordinate gneiss and schist). Water bore lithological data is effectively restricted to the southern half of EL 27336 and holes within and to the east of EL 27335 (Figure 1). Where information has been recorded, basement depths are variable over short distances. Depths to basement are typically shallow (0-20m) or relatively deep (50-100m) and so the average of 38.9m is possibly not representative. There doesn’t appear to be any relationship between depth to basement and basement lithology.

The Burt Plain tenements are located on the northern boundary of a substantial gravity high, thought to represent a major crustal feature, possibly a deep-seated mafic- to ultramafic intrusive complex (Figure 8). The abrupt northern edge to this anomaly is marked by the Hann Range that outcrops in the northern part of EL 27337 and extends east to just north of EL 27336. Analysis of airborne magnetic data indicates that two major structural systems (northwest- and east-northeast-trending) cut through several terrains indicating extensive development and probable old and deep origins of these structures (Figure 9). It is possible that these structures are reactivated normal and transverse structures active during extension to form the Irindina Basin (northwest and east-northeast-trending respectively).

The northwest-trending system that defines the eastern edge of the gravity anomaly extends northwest into the Reynolds Range and is thought to be the primary structural control on the possible carbonatite intrusive thought to be responsible for the Nolan’s Bore deposit. This structural zone possible extends through the northeast quarter of EL 27336 and the central half of EL 27335 (Figure 9). The appearance of carbonatites along this structural zone indicates that it has sampled the upper mantle / lithospheric mantle (i.e. very deep). Two other northwest-trending structures are identified west of Nolan’s, however, these are not as well-developed and are not laterally continuous (they appear to be cut by the east-and east-northeast-trending structures). At this stage it is unclear if these structures have the potential to host carbonatites (i.e. tapped the upper mantle).
Table 2: Downhole information for water bores within and close to Arafura’s Burt Plain tenements.

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<tr>
<th>Bore Name</th>
<th>Bore #</th>
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<th>Hole Depth</th>
<th>Depth to basement</th>
<th>Basement Lithology</th>
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<td>47</td>
<td>Clay</td>
</tr>
<tr>
<td>Roads Cased Bore</td>
<td>RN015237</td>
<td>354957</td>
<td>7455958</td>
<td>46</td>
<td>9</td>
<td>Granite and broken quartz</td>
</tr>
<tr>
<td>CDA Bore</td>
<td>RN013316</td>
<td>356827</td>
<td>7453727</td>
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<tr>
<td>Railway Cased</td>
<td>RN013740</td>
<td>376018</td>
<td>7463123</td>
<td>70.1</td>
<td>9</td>
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<tr>
<td>Roads 80m Dry</td>
<td>RN015236</td>
<td>338128</td>
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<td>Schist</td>
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<td>Stock Bore Aileron #2</td>
<td>RN017892</td>
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<td>7459570</td>
<td>66</td>
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<td>Army Bore</td>
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<td>Ghost Gum</td>
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<td>Musc biot fspar qtz rich schist and minor gneiss</td>
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<td>368789</td>
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<td>380642</td>
<td>7471315</td>
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<td>120</td>
<td>Musc biot qtz fspar gneiss (fragments only)</td>
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<td>RN011393</td>
<td>380617</td>
<td>7467661</td>
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<td>10</td>
<td>(sill-chl) biot qtz gneiss, biot and fspar gneiss</td>
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<td>BMR Alcoota #10</td>
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<td>379679</td>
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<td>6.1</td>
<td>4.6</td>
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<td>85</td>
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</table>
2010 Field Activities

Field activities included two days of reconnaissance field work and the collection of 2 rock chip samples. GIS review indicated that the only basement outcropping zone on both ELs 27335 and 27336 is the Mount Burne area. Mount Burne was also described by CRA geologists in 1971 as showing several annular features that might represent kimberlite or carbonatite and so assessing this area became the top field priority. A day was spent on the combined tenements identifying all access tracks, assessing the distribution of potential calcrete outcrops and the relative density of vegetation.

Both the Old Sandover track and the Plenty Highway were driven as were all station tracks. Several, extensive calcrete zones were identified and it was clear that dense vegetation covers most of the two tenements, significantly restricting 4WD vehicle access. A day was spent walking around the hills at Mount Burne. Mount Burne is characterized by three extensive, north-trending, milky quartz veins (up to 50 metres wide and several hundred metres long) that cut variably deformed orthogneiss. A single rock chip was collected near the Trig Point at Mount Burne, however, assay results indicated no anomalous geochemistry (Appendix 1). There appears to be a vegetation anomaly at the break in slope surrounding the base of Mount Burne and the hills immediately to the north, possibly reflecting nutrient deficient soils. A series of minor pegmatites, to the north near the break of slope, were sampled because of the presence of moderate sericite alteration, however, these rocks were also devoid of anomalous (total of two rock chips on EL27335).

FORWARD PROGRAM 2011

GIS review indicates that the southeast extension of the northwest-trending Nolan's structure potentially cuts through the northeast quarter of EL 27336 and the central portion of EL 27335 (Dow 2010). Structural intersection between this zone and several northeast-trending structures represent the key exploration targets on ELs 27335 and 27336.

A detailed airborne geophysical survey is planned to facilitate robust geological interpretation of the region. It is anticipated that this will generate REE exploration targets.

Biogeochemical sampling has proven effective on EL 27337 and at the Nolan's Bore deposit. Dense vegetation and extensive recent covers over the Burt Plain tenements suggests this could be the most effective geochemical testing tool.

In addition to the airborne geophysical survey, planned exploration activities for 2011 includes:

1. 6, 1500m biogeochem traverses with 50m spaced samples on EL 27335 (180 samples)
2. 8, 1500m biogeochem traverses with 50m spaced samples on EL 27336 (240 samples)

SUMMARY

Historic exploration is extremely limited on ELs 27335 and 27336 due to the absence of significant outcrop, widespread, dense vegetation and potentially large patches of +30m Tertiary to recent cover. Reconnaissance mapping at Mount Burne has downgraded the potential of the exposed quartz vein systems and no further field activities are required in this part of the tenement.

It has been interpreted that the southeast extension of the main northwest-trending structure at the Nolan’s Bore deposit extends through both EL 27335 and 27336. Several structural target zones have been selected on both tenements for reconnaissance biochemical traverses in the 2011 field season. Detailed geophysical surveys are warranted.
REFERENCES/SOURCES OF INFORMATION


Andrew Drummond and Associates, Independent Consulting Geologists Report for Arafura Resources NL.


