NUPOWER RESOURCES LTD
ABN: 91 120 787 859

STRANGWAYS PROJECT
EL25055 & EL25056

GROUP ANNUAL REPORT FOR PERIOD ENDING 12th JUNE 2012

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Map
1:250,000 Alice Springs SF53-14
1:250 000 Alcoota SF53-11

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Department of Resources
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SUMMARY

Flinders Diamonds Ltd originally applied for exploration licenses in the Strangways region to explore a series of discrete dipolar magnetic anomalies for diamondiferous kimberlitic or lamproitic intrusive pipes. EL10364 Mud Tank was granted on 6th December 2001 and ELs 22443 Strangways, 224446 Alcoota and 22623 Phlogopite were granted on 20th December 2001 all of which were for a term of 4 years. Then in 2005 FDL sold the non-diamond rights to Maximus Resources Ltd (MXR). The 4 original licenses were surrendered on 27th January 2006 in exchange for 2 SELs, 25055 and 25056 that were granted on 13th June 2006 each for a period of 4 years. NuPower then entered into a Joint Venture Agreement with MXR on 31st January 2008 to explore for the energy minerals uranium, thorium and coal, targeting secondary uranium mineralisation and coal in Cainozoic palaeochannels and sedimentary basins and primary uranium-thorium mineralisation in the Proterozoic metamorphic basement rocks of the Arunta Block/Strangways Metamorphic Complex associated with regional radiometric anomalies. However, after further negotiations Maximus Resources have agreed that NuPower will also have the right to explore for all metals (diamonds will be retained by Maximus Resources).

The Strangways region hosts a broad range of mineralizing styles and base metal deposits that include Cu-Pb-Zn deposits at Gecko, Rankins, Gumtree, Utnalanama (Johanssen's Phlogopite Mine), Edwards Creek and Glancroil, Cu-Au deposits at Johnnies Reward, Pinnacles and Turners and vermiculite-REEs deposits at Bleechmore Dykes and Mud Tank. However the region has never been explored systematically for uranium deposits.

Using a model adapted from South Australia, NuPower became interested in the area following successful results of an airborne electromagnetic survey (AEM) in 2007 over its own tenements in the Aileron region that identified palaeochannel and basin structures with considerable thicknesses of unconsolidated Cainozoic sediments. In South Australia secondary uranium deposits have formed in similar Cainozoic sediments of the Frome Embayment by dissolution of uranium under oxidising conditions from basement rocks of the adjacent Flinders Ranges and re-precipitation under reducing conditions that has been responsible for the formation of the very significant sandstone hosted Beverley and Four Mile deposits.

Similarly in central Australia uraniferous basement rocks are widespread in the Arunta Block of the Reynolds and Strangways Ranges. Limited previous exploration of the Cainozoic sediments in surrounding basins had identified locally thick sequences beneath the Burt and Ti Tree Plains that encouraged NuPower to undertake a regional AEM survey to explore them as potential hosts for secondary mineralisation. This successfully located extensive and deep sequences of prospective sediments that accumulated in part as a result of substantial neo-tectonics that has been largely underestimated.

In exploring for Cainozoic sediments in the vicinity of the Strangways Ranges, the northern part of the MXR tenements was targeted for potential southeast extensions of the structures, underlying plains in the headwaters of Mueller and Waite Creeks, controlling the southern margin of the Ti Tree Basin where the Cainozoic succession is over 300m thick in the Woodforde area of NuPower’s ground.

The licenses are underlain predominately by Palaeoproterozoic sedimentary, volcanic and intrusive rocks of the Strangways Metamorphic Complex (SMC), forming part of the eastern Arunta Block that has undergone a prolonged multiphase history of accumulation, metamorphism and deformation through a series of orogenies from the earliest Strangways Orogeny (1780-1720Ma), the Liebig Orogeny (1645Ma), the structural character of which dominates the area and the Chewings Orogeny (1590-1560Ma).

Later, carbonatites were intruded along the NW-trending Woolanga Lineament around 730Ma comprising a series of lenses emplaced along a ductile shear zone consisting of a carbonate core surrounded by mica-rich zones, emplaced into granitoid cataclasites and mafic granulites.
Further significant reworking continued from the Cambrian through to the Carboniferous, commencing with formation of the Harts Range Metamorphic Complex (510-460Ma) and north over south ductile thrusting of the SMC granulites (430-390Ma) when the Wallaby Knob Schist Zone was reactivated. Compressional deformation continued, probably intermittently, until 300Ma, during the Alice Springs Orogeny.

Mapping of the Strangways Ranges has subdivided the rocks into a series of high grade metamorphic units including the Cadney, Hillsoak Bore, Erotonga, Ankala and Sliding Rock Metamorphics and Yambah Granulite consisting of calc-silicate rocks, marbles, sillimanite-biotite, garnet-biotite and quartzofeldspathic gneisses, felsic and mafic granulites, cordierite granulite, migmaites, quartzites and amphibolites. These rocks are cross cut by belts of retrogressed greenstick facies quartzofeldspathic, muscovite-biotite and kyanite schist, quartzite, amphibolite and calc-silicate rocks that include the Southern Cross and West Bore Schist Zones.

In the south these rocks are intruded in the Wuluma Hills and Utanalama Range by two separate felsic bodies-the Wuluma Granitoid containing rafts of sillimanite gneiss and the Utanalama Granulite interlayered with Johansen Metagabbro and Harry Anorthositic Gabbro. A small body of Late Proterozoic Gum Tree Granite is also present here consisting of porphyritic granite with numerous acidic dykes.

North of the Plenty Highway the Mt Bleechmore massif is underlain by Mt Bleechmore Granulite consisting of sillimanite-garnet-biotite quartzofeldspathic gneisses, garnet-K feldspar migmatites, mafic granulites, plutonic migmatites and rare calc-silicates. The massif also contains small bodies of mafic granulite and amphibolite and garnet plutonic migmatite.

Structurally the southern NT forms a ‘basin and range’ province with Proterozoic and Palaeozoic rocks forming prominent ranges separated by broad valleys containing thick sequences of unconsolidated Cainozoic sediments in at least twenty major basins of which the Strangways tenements cover a small area of the most eastern part of the Ti-Tree Basin. However the stratigraphy of the intermontane Cainozoic basins is generally poorly known except for the Hale Basin where exploration for lignite and sedimentary uranium during the late 1970’s and early 1980’s has provided the most knowledge, and although the succession is relatively thin here it is considered to represent a generalised Tertiary stratigraphy for the southern NT. This comprises a broad two-fold stratigraphic subdivision that corresponds well with the observed pattern of Cainozoic sedimentation elsewhere in southern Australia that consists of a restricted, fluvial palaeochannel dominated Palaeogene succession, the Hale Formation, overlain by a more widespread, dominantly lacustrine Neogene succession, the Waite Formation. Historical exploration indicates that the Cainozoic fill of the Burt Basin exceeds 200m, that the Sixteen-Mile Basin contains at least 180m of sediment, that the Whitcherry Basin and Waite Basins contain thicknesses in excess of 250m in thickness and that the sediment in the Ti Tree Basin is in excess of 300m deep. An additional stratigraphic unit, the Napperby Formation has since been recognised by NuPower as overlying the Waite Formation and represents the development of prograding alluvial fans shed from the ranges flanking the Cainozoic Basins. While the Cainozoic stratigraphic units were initially defined in separate, small and isolated Tertiary Basins, these units are now recognised as components of a much larger Tertiary palaeodrainage system, the extent and size of which has until now been vastly underappreciated.

Deposition of Cainozoic sediments was episodic and punctuated by hiatuses during which prolonged periods of weathering resulted in the formation of five well-developed weathered profiles (palaeosols and duricrusts) extending from the late Cretaceous and affecting the basement rocks through to the Quaternary. There are three Palaeogene weathering events which affected Arunta igneous and metamorphic basement rocks and the overlying Tertiary succession and two weathering events from the overlying Neogene succession that appear to correlate with similar periods of weathering and exposure evident in southern Australia.

NuPower Previously completed an AEM survey of the northern parts of both tenements and has received final reprocessed products for that and the infill results from the CAGS gravity survey over
a small part of SEL25055 for the exploration for secondary uranium in palaeochannels. There were 171.8 line kilometers flown for SEL25055 and 385.5 line kilometers for SEL25056. The surveys were conducted at 1000m line spacing at a nominal altitude of 120m. A regional stream sediment sampling program was also completed throughout both areas for primary uranium mineralisation in basement rocks. There were 254 samples from SEL25055 and 85 samples from SEL25056.

The AEM survey identified a deep eastwards trough-like extension of the southern margin of the Ti Tree Basin with excellent potential for thick sequences of unconsolidated sediments as hosts for secondary uranium mineralisation. A significant part of the Strangways Ranges, including areas of anomalous uranium and thorium radiometrics, confirmed by anomalous uranium stream sediment geochemistry, lies within the watershed of creeks draining northwards towards the Trough and therefore this structure is regarded as highly prospective for secondary sandstone-hosted uranium deposits and should be tested with scout rotary mud drilling.

The regional stream sediment sampling identified a number of multi-element (U-Th-Ce-La-P-REE) anomalies, the most important of which is apparently related to a granite with potassic (biotite-magnetite) alteration at Utnalanama. This elemental association suggests the presence of monazite and therefore the potential for alluvial concentrations of this mineral. Further infill steam sediment sampling and reconnaissance mapping and rock chip sampling is recommended to assess their significance as primary multi-commodity exploration targets. Panning of sediment from these anomalies would be a useful way of identifying the heavy minerals present.

2010 – 2011 fieldwork and literature research has shown that the area has potential for both pegmatite and carbonatite hosted rare earth mineralization. Samples from a cluster of pegmatite bodies gave average REE content of 0.45% (0.47% TREO) with a maximum of 0.93% (1.09% TREO). An analysis of previous work in the Bleechmore Dykes area shows this area to have potential for carbonatite hosted mineralization. No indications of significant uranium mineralization were found.

Three phases of work were done in the reporting period. The first phase in mid-2011 was in the Bleechmore Dykes area of EL25056. No indication of carbonatite, alkalic intrusives or of rare earth mineralization was found. The circular magnetic anomaly in this area was interpreted to be due to magnetite in mafic granulites. The second phase of work was done in the pegmatite dyke area of EL25055 in early 2012. No new large areas of pegmatites were found, although many small sills were mapped. Assays of samples of pegmatite were low grade in rare earths. The third phase of work in early 2012 was a brief field visit by a consultant structural geologist. His conclusions were not favourable as to the rare earth prospectivity of the ELs.

NuPower is currently assessing whether any further work is warranted in this project area.
INTRODUCTION
The NuPower Strangways JV Project with Maximus Resources Ltd comprises 2 tenements,

- SEL25055 Strangways (100% Flinders Diamonds Limited)
- SEL25056 Mud Tank-Alcoota (100% Flinders Diamonds Limited)

This group annual report is concerned with both tenements.

NuPower Resources Ltd, through the joint venture originally had the right to explore for the energy minerals uranium, thorium and coal, however after further negotiations Maximus Resources have agreed that NuPower will also have the right to explore for all metals (diamonds will be retained by Maximus Resources).

The exploration target in this reporting period has been rare earths, both carbonatite/alkalic intrusive-hosted and pegmatite styles. However NuPower believes that there is excellent potential for thick sequences of unconsolidated Cainozoic sediments underlying plains in the headwaters of Mueller and Waite Creeks on the eastern margin of the Ti tree Basin as hosts for secondary uranium mineralisation.

BACKGROUND
Flinders Diamonds Ltd (FDL) initially applied for exploration licenses in the Strangways Ranges region to explore discrete regional dipolar magnetic anomalies that were thought to be indicative of diamondiferous kimberlitic or lamproitic pipes. Four licenses were granted in December 2001 for four years.

Exploration for diamonds included regional interpretation, regolith map compilation, ground magnetic surveys, RAB drilling and heavy mineral sampling. Although the results were generally disappointing follow up of the source for indicator minerals from at least 2 samples and sampling of the catchments draining the Woolanga Lineament were recommended.

Exploration of the Bleechmore dykes highlighted the potential for vermiculite and FDL carried out a program of ground magnetic and gravity traverses, hyperspectral TM traverses, excavation of trenches, vacuum bedrock drilling, RAB/aircore drilling and core drilling. A significant vermiculite resource was defined over an area of 400mx50m to a depth of 42m and processing testwork was carried out. Further testwork and marketing studies were recommended.

Teck Cominco-BHP Billiton entered into a JV with FDL to explore for base metals, targeting Broken Hill style massive sulphides associated with the contact of major bimodal volcanic sequences and overlying sediments. The work comprised reviews of historical data, ground magnetic traverses and geological traversing with rock chip sampling. With the exception of the known base metal occurrences the work did not identify any base metal anomalies worth follow up.

In 2005 FDL sold the non-diamond rights to Maximus Resources Ltd (MXR). The original four licenses were surrendered for 2 substitution licenses and MXR intended to explore the base metal potential of the two areas.

NuPower became interested in the area following successful early results of an airborne electromagnetic survey (AEM) in 2007 over its own tenements in the Aileron region that identified palaeochannel and basinal structures that were believed to contain considerable thicknesses of unconsolidated Cainozoic sediments that could act as suitable hosts for secondary uranium deposits. NuPower had adapted as its exploration model one from South Australia where uraniferous basement rocks in the Flinders Ranges are the primary source areas for uranium. During the weathering process this uranium is dissolved in oxidized groundwaters and remobilised into the surrounding Cainozoic basins where it reprecipitates on encountering reducing conditions and has been responsible for the formation of the sandstone hosted Beverley and Four Mile deposits.
In central Australia uraniferous basement rocks are widespread in the Arunta Block of the Reynolds and Strangways Ranges. Limited previous exploration for Cainozoic sediments to host secondary deposits had identified locally thick sequences beneath the Burt and Ti Tree Plains that encouraged NuPower to undertake regional AEM surveys to explore for them as potential hosts for secondary mineralisation. This successfully located extensive and deep sequences of prospective sediments that accumulated in part as a result of substantial neotectonics that has been largely underestimated.

In exploring for prospective Cainozoic sediments in the vicinity of the Strangways Ranges the plains in the northern parts of the MXR tenements were targeted for potential southeast extensions of the structures controlling the southern margin of the Ti Tree Basin where the Cainozoic succession is over 300m thick in the Woodforde area of NuPower’s ground.

LOCATION AND ACCESS
The Strangways area is located approximately 90 kilometres northeast of Alice Springs, in the Strangways Ranges region, (Figure 1) covering parts of Bushy Park, Yambah, The Gardens, and Mt Riddock stations and the Alcoota Aboriginal Corporation Station.

The Plenty Highway, that branches east from the Stuart Highway, runs east-west through the northern part of the area and is sealed for the most part. The Airtunga Tourist Drive Road runs east-west across the south and the Pinnacles Road (Binns Track) links the Airtunga Road and Plenty Highway through the eastern side of the area. A good graded road, the Delmore Downs road, provides access to the northeast of the area.

Local vehicle access is provided by a network of pastoral station bore tracks and fence line tracks. These are locally overgrown or eroded and while many tracks are shown on available topographic maps some are no longer accessible and there are some new tracks not shown.

Unsealed airstrips are located at Bushy Park and Mud Tank in the northern part of the area.
TOPOGRAPHY AND DRAINAGE

The southern part of the region, south of the Plenty Highway, is dominated by rugged mountainous terrain of the Strangways and Utnalanama Ranges rising to in excess of 900m ASL and the less mountainous Narbib Range in the southernmost part, (Figure 1). The highest point is Mt Pfitzner at 1066m ASL. North of the Highway the area is mostly flat at around 650m ASL and incised by streams and tributaries of the Edwards, Mueller, Gillen and Anamarra Creeks draining northwards from the ranges. Weathering is more intense here and much of the area is covered by colluvium, sheetwash, silcrete, calcrete and laterite. This is punctuated in the northeast by Mt Bleechmore that rises to over 750m ASL.

In the south the ranges are drained by Harry, Hale and 17 Mile Creeks draining west south and east respectively, and the headwaters of Gillen Creek that drains to the north.
CLIMATE AND VEGETATION

The climate is mainly dry all year round with hot summers and cool to cold winters. Average annual rainfall, based on records from the nearest Bureau of Meteorology stations at Alice Springs and the Territory Grape Farm ranges from 280-305 mm, most of which falls in the October-March period. Average minimum and maximum temperatures in summer range from 21.4-37.6 degrees and from 4-19.7 degrees in winter.

Vegetation is highly variable from the plains to the mountain ranges. On the plains to the west and north tall open Mulga shrubland with open Woolybutt grassland understorey is dominant, giving way eastwards to tall open Mulga shrubland with open Fuchsia shrubland understorey on the high country with low open Ironwood and Whitewood, River Red Gum and Tea Tree woodland with open grassland understorey in the valleys. To the east this is replaced with Witchetty Bush Acacia shrubland with open Cassia (Fuchsia) shrubland understorey and tall sparse Mulga Shrubland with grassland understorey on the ranges.

TENURE

SEL25055 consisted of 375 blocks and covered approximately 1,118 square kilometres. SEL25056 consisted of 173 blocks and covered approximately 520 square kilometres. Both licences were granted to Flinders Diamonds Ltd on 13th June 2006 for a period of four years.

NuPower Resources Ltd, through the joint venture originally had the right to explore for the energy minerals uranium, thorium and coal, however after further negotiations Maximus Resources have agreed that NuPower will also have the right to explore for all metals (diamonds will be retained by Maximus Resources.

Renewals for both SEL25055 and 25056 were applied for 13th May 2010. An email was then received 16th May 2011 advising that for the renewal application to be processed then both tenements must have an area reduction. This reduction was made as shown on Figure 2 with 7 blocks relinquished from 25056 and 50 from 25055.
Figure 2. 2011 Relinquishment
The licenses cover the following perpetual pastoral leases (Figure 3):

**SEL25055:**

NT Portion 4029, PPL 1032, Alcoota Aboriginal Corporation Station
NT Portion 687 PPL 1132, Bushy Park Station
NT Portion 3676 PPL 989, Mt Riddock Station
NT Portion 662 PPL 662, The Garden Station
NT Portion 641 PPL 904, Yambah Station.

The area excludes ELs 23592 and 26440, MCS227 and NT Freehold Land Parcel No. 3559.

**SEL25056:**

NT Portion 4029 PPL 1032, Alcoota Aboriginal Corporation Station
NT Portion 3676 PPL 989, Mt Riddock Station.

The area excludes RO303, MLS165 and FA11 that include the Mud Tank Carbonatite Mine.

DoR approved NuPower’s request on 22nd June 2009 to combine the annual reports of these tenements on 30th June 2009.
Figure 3 - Strangways Project, EL25055 & EL25056, Pastoral Leases
NATIVE TITLE
A joint ILUA and Exploration Agreement for both tenements between the Central Land Council (CLC) and Flinders Diamonds Ltd (FDL), satisfying all Native Title requirements, was executed on 13th November, 2002. Subsequently a Deed of Assumption between CLC, FDL and MXR was executed on 10th October 2006. A Letter of Agency between MXR and NuPower was executed on 19th August 2008.

ABORIGINAL SACRED SITES
Prior to understaking reconnaissance exploration in the area NuPower NuPower applied to the Aboriginal Areas Protection Authority (AAPA) on 09/09/08 for an Inspection of the Register of Sacred Sites that was issued on 01/10/08.

This shows numerous Sacred Sites and Restricted Works Areas throughout both tenements.

REGIONAL GEOLOGY AND MINERALISATION

REGIONAL BASEMENT GEOLOGY
The licenses are underlain predominantly by Palaeoproterozoic sedimentary, volcanic and intrusive rocks of the Strangways Metamorphic Complex (SMC), forming part of the eastern Arunta Block (Figure 4), that has a long accumulation and deformational history, the basal unit of which has been dated at 1810Ma (Claoue–Long et. al., 2005).

Deformation and metamorphism were multi-phase (Maidment et al., 2005). The initial metamorphism and deformation took place around 1780Ma under amphibolite to granulite facies conditions of the Strangways Orogeny referred to as the Early Strangways Event. These rocks were then exhumed and eroded to form the basement on which the Ledan Package (Mendip Metamorphics, Leaden Schist and Utopia Quartzite) was deposited. The rocks of the Ledan Package and the underlying basement were then metamorphosed at amphibolite facies during the Late Strangways Event, at around 1720Ma.

According to Clerk et. al., (2007) the rocks of the SMC were reworked at around 1645Ma during the Liebig Orogeny, the structural character of which dominates the area. Further deformation then took place during the Chewings Orogeny, 1590-1560Ma.

Carbonatites were intruded along the NW-trending Woolanga Lineament around 730Ma. At Mud Tank the carbonatite complex comprises a series of lenses emplaced along a ductile shear zone. Each lens consists of a carbonate core surrounded by mica-rich zones, emplaced into granitoid cataclasites, mafic granulites and rare lenses of aluminous rocks (Currie et. al., 1992).

Further significant reworking took place from the Cambrian through to the Carboniferous, commencing with extensional deformation, mafic magmatism and high-grade metamorphism of the Harts Range Metamorphic Complex in the interval 510–460Ma. Compressional deformation continued, probably intermittently, until 300Ma, during the long-lived Alice Springs Orogeny (Scrimgeour, 2006). North over south ductile thrusting of the SMC granulites occurred around 430-390Ma when the Wallaby Knob Schist Zone, exposed south of Bushy Park homestead, was reactivated, (Goscombe, 1991).

LOCAL BASEMENT GEOLOGY
The Strangways Ranges in the southern part of the area consist mostly of units of the Cadney Metamorphics (pЄsc) comprising calc-silicate rocks, marbles, sillimanite-biotite, garnet-biotite and quartzofeldspathic gneisses, felsic and mafic granulites, quartzites and amphibolites. This group also hosts the Southern Cross Schist Zone (Pzr/Prs) of retrogressed greenschist facies muscovite-biotite and kyanite schist with relict bodies of sillimanite quartzofeldspathic gneiss and amphibolite.
Separated from the Cadney Metamorphics by a major fault zone in the northeast are rocks of the Hillsoak Bore Metamorphics (pЄu) that include quartzofeldspathic, biotite and sillimanite gneisses, migmatites, amphibolites, mafic and felsic granulites and calc-silicate rocks. These rocks host the West Bore Schist Zone (Pzr/Prw) that consists of retrogressed greenschist facies biotite, muscovite-biotite and quartzofeldspathic schist, quartzite, amphibolite, and calc-silicates.

The northwestern part of the Strangways Ranges here is composed of various quartzofeldspathic, felsic and mafic granulites and biotite and biotite-garnet gneisses, (pЄsp). Here the Yambah Granulite (pЄsy) also contains migmatites, cordierite granulite, quartzite and magnesian-rich rocks.

In the southwest part of the Strangways Ranges units of the Erotonga Metamorphics (pЄsr\textsuperscript{1,2}) include cordierite gneiss, mafic granulite, and a layered sequence of felsic granulite and cordierite felsic granulite with rare calc-silicates.

Further south in the Wuluma Hills and Utnalanama Range the Erotonga Metamorphics are intruded by two separate felsic bodies. In the Wuluma Hills the Wuluma Granitoid (pЄsw) contains rafts of sillimanite gneiss and in the Utnalanama Range tonalitic-dioritic hypertsthene granofels of the...
Utnalanama Granulite (pЄsu) is interlayered with mafic granulite of the Johanssen Metagabbro (pЄsj) and meta-anorthositic gabbro of the Harry Anorthositic Gabbro (pЄsh).

In the southwestern corner the Nabib Range is underlain by rocks of the Ankala (pЄa) and Sliding Rock Metamorphics (pЄi) comprising hornblende, sillimanite, garnet-biotite, and quartzofeldspathic gneisses, amphibolites, migmatites, calc-silicates and meta-ultramafics. These metamorphics also host retrogressive greenschist facies schist zones (Pzr). A small body of Late Proterozoic Gum Tree Granite (Pgg) is also present here consisting of porphyritic granite with numerous acidic dykes.

North of the Plenty Highway the Mt Bleechmore massif is underlain by Mt Bleechmore Granulite (pЄe) consisting of sillimanite-garnet-boitite quartzofeldspathic gneisses, garnet-K feldspar migmatites, mafic granulites, plutonic migmatites and rare calc-silicates. The massif also contains small bodies of mafic granulite and amphibolite (pЄea) and garnet plutonic migmatite, (pЄeg).

CASINOZOIC REGIONAL GEOLOGY
The southern NT forms a ‘basin and range’ province with Proterozoic and Palaeozoic rocks forming prominent ranges separated by broad valleys. Cainozoic sedimentary basins are widespread and well-developed within these intervening topographic depressions with at least twenty major basins known (Senior et al., 1995). The Strangways Project covers a small area of the most eastern part of the Ti-Tree Basin (Figure 5), and its join with the Waite Basin.
Figure 5 - Strangways Project, Inferred Ti Tree-Waite Cainozoic Basin/Palaeochannel
The stratigraphy of the intermontane Cainozoic basins of the southern NT region is generally poorly known. This is attributed to a lack of outcrop, strong weathering overprints, the paucity of drillholes and a lack of attention paid to the ‘cover’ overlying crystalline basement. Knowledge of the distribution and extent of the Cainozoic has been largely gained through accidental intersections in water bores or in drillholes seeking mineralisation under cover.

Water bores throughout the Alice Springs region provide only limited stratigraphic information on the upper parts of the Cainozoic as they rarely exceed 100m in depth and are typically <50m deep. Limited stratigraphic drilling was undertaken in the southern NT region by both the BMR (now Geoscience Australia) and the NTGS during the 1960’s and 1970’s. These programs have been summarised (Senior et al., 1994) from which a single paper (Senior et al., 1995) was published. These sources provide almost all of the stratigraphic information on the Cainozoic Basins.

Historical exploration in the Ti Tree Basin include a traverse of six drillholes in the western part of the Basin by CRA Exploration that indicated that, in places, the unconsolidated sediments are in excess of 300m deep. During the late 1970’s and early 1980’s the relatively small Hale Basin (Figure 6) was explored extensively for coal (lignite) and sedimentary uranium and is considered to be the best known Cainozoic basin in the NT. The stratigraphy of the Hale Basin is summarised (Figure 7) and although the succession is relatively thin (<100m), it can considered to represent a generalised Tertiary stratigraphy for the southern NT.
Figure 6 – Strangways Project, Geology, Cainozoic Basins
Based upon drilling in the Hale Basin, a broad two-fold stratigraphic subdivision was defined (Senior et al. 1994) that corresponds well with the observed pattern of Cainozoic sedimentation elsewhere in southern Australia. It comprises a restricted, fluvial palaeochannel dominated Palaeogene succession (Hale Formation) overlain by a more widespread, dominantly lacustrine Neogene succession (Waite Formation). An additional stratigraphic unit, the Napperby Formation has since been recognised by NuPower as overlying the Waite Formation and represents the development of prograding alluvial fans shed from the ranges flanking the Cainozoic Basins.

Strong affinities with Eocene palaeochannel sediments in southern Australia suggest that the Hale Formation should be further subdivided into a Upper subdivision (Late Eocene), comprising the Tug Sandstone Member and representing development of a widespread ‘sand sheet’; and a Lower subdivision (Early-Middle Eocene) recording a fining upwards trend from the fluvial Ambalindum Sandstone Member to the paludal Claraville Mudstone and Ulgnamba Lignite Members.

Whilst Cainozoic stratigraphic units were initially defined in separate, small and isolated Tertiary Basins (Senior et al. 1994), these units are now recognised as components of a much larger Tertiary palaeodrainage system, the extent and size of which has until now been vastly underappreciated.

Both historic and recent drilling results indicate that the apparently isolated Tertiary Basins contain very thick sedimentary packages. The Cainozoic fill of the Burt Basin exceeds 200m and the Sixteen-Mile Basin contains at least 180m of sediment. Similarly, the Whitcherry Basin and Waite Basins are known to exceed 250m in thickness in some locations, whilst minor tributaries feeding the Ti-Tree Basin contain up to 140m of sediments. The maximum thickness of the Cainozoic sediments in the Ti-Tree Basin is not currently known but thicknesses of 400-500m of sediments are considered to be likely in the deeper portions of the basin.

DEPOSITION AND WEATHERING

Deposition of Cainozoic sediments was episodic and punctuated by hiatuses during which prolonged periods of weathering resulted in the formation of well-developed weathered profiles (palaeosols and duricrusts). Deep weathering was an ongoing process during the Tertiary but was enhanced at particular times by the combination of periods of warm, humid climates, non-deposition and surface exposure. Three Palaeogene weathering events have been defined (Senior et al. 1995) which affected Arunta igneous and metamorphic basement rocks and the overlying Tertiary succession. An additional two weathering events have been recognised from the overlying Neogene succession and appear to correlate with similar periods of weathering and exposure evident in southern Australia.

Weathering Event A (Senior et al. 1994, 1995) occurred during the Late Cretaceous to Early Tertiary (Palaeocene). Trizonal weathering profiles were 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 meters thick) that grades into a multicoloured mottled zone (up to 10 meters thick) and is then capped by a ferruginous or (laterite/ferricrete) zone up to 8 meters thick.
Following uplift and partial truncation of the deeply weathered basement rocks, sedimentation in the surrounding Tertiary basins began in the Palaeocene with deposition of thick colluvium including fanglomerates flanking the ranges. This was followed by deposition of fluvio-lacustrine sand, silt and clay (locally carbonaceous) and lignite of the Lower Hale Formation in the Ti-Tree and Burt Basins during the Early to Middle Eocene. Locally this includes a basal lacustrine green and grey pyritic mudstone, white mudstone and siltstone, and red iron oxide stained siltstone and siltstone. Fluvial sands of the Ambalindum Sandstone Member fine upwards into the paludal Claraville Mudstone and Ulgnamba Lignite Members.
Weathering Event B, recorded in the Hale Basin, occurred prior to the Middle Eocene, although there is little evidence elsewhere for this weathering event (Senior et al., 1995). This resulted in lithification and formation of a second ferricrete profile.

Deposition of sandstones of the Upper Hale Formation took place during the Late Eocene and these sediments were subsequently overprinted by Weathering Event C marking widespread exposure and surficial weathering in response to a prolonged period of non-deposition during the Oligocene.

Climatic amelioration during the Early Miocene rejuvenated the palaeodrainage systems and led to the deposition of fluvial sands at the base of the Waite Formation. A change from fluvial to lacustrine sedimentation then followed during the Middle to Late Miocene and resulted in the accumulation of over 300 meters of fluvialite and lacustrine limestone, sands, muds, and sandy conglomerate in localised depocentres.

The upper portions of the Waite Formation are regionally extensive and consist largely of clay and dolomitic clays that reflect the widespread development of broad, shallow evaporitic lakes throughout southern Australia as the continent drifted further northwards and became progressively more arid and seasonal. Two gradational upwards cycles from clays to dolomitic clays to dolomitic limestones (often capped by chalcedonic limestones and silcretes) are commonly observed, suggesting that deposition of the Waite Formation occurred in at least two phases. Weathering Event D was responsible for the formation of the inter-Waite Formation silcrete (possibly in the Middle Miocene).

Outcrops of the Waite Formation are frequently capped by calcretised limestones and distinctive chalcedonic silcretes that form regionally widespread stratigraphic markers. Development of these more variable duricrusts occurred in response to Weathering Event E.

In proximal locations, the Waite Formation interfingers with, and is conformably overlain by a moderately thick (<60m) succession of oxidised colluvial material shed off the Woodforde and Reynolds Ranges in response to neotectonism during the (? Late) Pliocene. This material can be recognised throughout the region and represents a broadly coarsening upwards alluvial fan which can be subdivided into an Upper, Middle and Lower Members. This unit is informally referred to as the Napperby Formation and comprises a succession of oxidised and haematitic, clayey sands, sandy clays and minor conglomerates. Ferruginised, haematitic alluvial palaeosols (bearing a strong resemblance to modern soils) are a characteristic feature of the Middle Member with palaeosol development potentially corresponding to Weathering Event E (or recording another period of enhanced weathering). The unit is probably also present in the Strangways area.

Overlying these sediments are unconsolidated Quaternary sediments including quartz sands, silts, red earths and clayey and sandy soils that record a complex history of deposition, erosion and redeposition due to climate changes and gentle tilting. Large outwash fans from the Strangways Ranges have formed alluvial plains and overbank deposits alongside sandy drainage channels. In more distal locations, the development of aeolian sand plains was widespread. The formation of calcretes, particularly within drainage channels and atop the Waite Formation, was widespread during the Quaternary (Weathering Event E).
MINERALISATION AND PROSPECTS

The Strangways region hosts a broad range of mineralizing styles and base metal deposits that include, (Figure 8):

- Cu-Pb-Zn deposits at Gecko, Rankins Gumtree, Utnalanama (Johanssen’s Phlogopite Mine), Edwards Creek and Glancroil.
- Cu-Au deposits at Johnnies Reward, Pinnacles and Turners.
- Vermiculite-REEs at Bleechmore Dykes and Mud Tank.
- Au in the Arltunga-Winnecke Goldfields.

Base metal and gold mineralisation deposits in the SMC deposits discovered to date are currently uneconomic with the maximum combined Zn+Cu+Pb content at around 4%, (Hussey et al., 2006). The base metal deposits are interpreted as syngenetic massive sulphide stratabound deposits of Broken Hill type of Palaeoproterozoic age.

The Cu-Au deposits are interpreted to be of epigenetic fault-related origin, or possibly metamorphosed iron oxide-Cu-Au deposits, but still of Palaeoproterozoic age.

A vermiculite prospect at Mt Bleechmore located in SEL25056 13km NNW of Gemtree was explored extensively and drilled by FDL in 2002-2003.

The Arltunga-Winnecke Goldfields mineralisation is controlled by Palaeozoic structures as either retrograde shear zones or faults and breccias.
Other mineralisation is considered to be related to deformation and fluid flow during the Alice Springs Orogeny. According to Scrimgeour (2006) during the latter stages of the Alice Springs Orogeny, in the Carboniferous, significant amounts of fluid were mobilised along shear zones in a belt that trends southeast from the Napperby region through to Arltunga, resulting in significant mobilisation and deposit of gold.
This includes the Winnecke-Arltunga goldfield that straddles the boundary between the SMC and the Neoproterozoic Amadeus Basin, where mineralisation is hosted by retrograde greenschist zones (Swarnecki, 2004).

The Bruce’s Cu-Au prospect (in the Harts Range Metamorphic Complex) and much of the uranium and rare-earth mineralisation in the eastern Arunta can also be attributed to large-scale Paleozoic fluid-flow events including Arafura Resources’ Nolan’s Bore REE-phosphate-uranium deposit. This deposit, hosted by the Boothby Gneiss is located approximately 100 kilometres WNW of the Strangways licenses.

In addition to base metals and gold prospects there are several mica occurrences. A small quantity of phlogopite was mined during the 1940s from Johanssen’s phlogopite mine, in SEL25055 north of the Arltunga Road. Vermiculite is currently being mined from the Mud Tank carbonatite by Australian Vermiculite Industries and there is a vermiculite/phlogopite prospect about 15km NNW of Gemtree.

PREVIOUS WORK

There has been considerable exploration for gold and base metals in the region.

Explored for gold and base metals. Small remnants of lateritized sandstone of probably Tertiary age are preserved in the central part of the area about Sliding Rock. Prospect is low grade lead-zinc with minor copper. Exploration consisted of geological mapping, stream sediment sampling and testing for radioactivity using scintillometers.

Exploration was for carbonatites and base metals. Results of air photo mosaics, auger drilling, stream sediment sampling and on air ‘survey’ were unsatisfactory and the tenement was dropped.

CR19720084, AP3427 and AP3428, ASARCO Australia Pty Ltd, 1971-1972
Exploration was for base metals and consisted of stream sediment sampling, geological traversing and aerial reconnaissance. Results were not encouraging and the tenements were dropped.

CR19740102, ELs 110, 154, 183, 283, 346, Russgar Minerals NL, 10972-1975
Results of stream sediment, rock chip and air photo interpretation were disappointing.

CR19740097, CR19740098, Stockdale Prospecting Ltd, 1973-1974
IP was flown, but there is no relevant data.

CR19770139, EL1341 and EL1342, Dampier Mining Co Ltd, 1976-1977
These two tenements appear to mostly lie over basement outcrop. Exploration was for stratiform copper-lead-zinc mineralization.

Exploration was for gem stones and base metals. Work included stream sediment sampling, stream gravel sampling, rock chip and geologic investigations.

CR19800125, CR19810178, EL1802, Alcoa of Australia Ltd, 1979-1983
Exploration was for uranium and included 52 rotary drill holes. The report included gamma logs, cross sections and drill hole logs.
CR19800192, EL2074, Otter Exploration NL, 1979-1982
Exploration was initially for diamonds, then changed to gold and base metals. Work included stream sediment sampling, rock chip sampling, and geological reconnaissance. Initially encouraging anomalies were eliminated after follow up.

CR19830169, EL 3026, Alcoa Australia Ltd, 1982-1988
Exploration was for gold and base metals and included five diamond core drill holes with limited sampling. Results were unsatisfactory.

CR19830228, EL3501, CRA Exploration Pty Ltd, 1982-1983
The sampling results were negative for kimberlite, carbonatite, base metals and micro diamonds.

CR19890356, EL4326, Range Resources Ltd, 1983-1988
Exploration focused on gold and base metals. A ground magnetometer survey was followed by 18 reverse circulation rotary percussion holes and 13 trenches. Mineralisation was judged to be too small, too low grade and hence sub-economical.

CR19890356, EL5545, Range Resources Ltd, 1987-1988
The company was exploring for gold and base metals. Their report concerns literature research only.

CR19870287, EL4528, Kinex Pty Ltd, 1984-1990
This report is concerned with an apparently sub-economic gold prospect.

CR19980258, EL4959, EL5079, EL5081, Conapaira Metals Pty Ltd, 1988-1989
Exploration was for gold. The area was dropped due to the depth of sediments in EL4959. Uneconomic presumably for the others.

CR19880301, EL 5280, Tectonic Systems Pty Ltd, 1987-1989
Interest was in gold. This report contains a literature search and soil samples. No conclusions and no follow up report. Contains a compilation of all previous work, grades and reserves and proposes future drilling. Johnnies Reward is a volcanic-exhalative gold deposit. This report details exploration history of the prospect.

CR19880205, EL5283, McMahon Construction Pty Ltd, 1987-1988
Gold and base metals. Literature research and a few samples. No follow up work.

CR19930494, EL6013, G K Bogie, 1988-1993
Stream sediment and rock chip sampling. Exploration was for gold, base metals and rare earths.

CR19900305, EL6372, Carrington Holdings Pty Ltd, 1989-1990
Concerned with potential for zircon in the Mud Tank Carbonatite. Review of published literature and company reports, study of aerial photography, stream sediment sampling with follow up sampling.

CR19950511, EL6662, G K Bogie, 1989-1995
Gold and base metals. Stream sediment and rock chip sampling. Shallow RAB drilling.

The company carried out work over the Winnecke Goldfield with geologic mapping, drilling (one hole) and trench sampling. A regional bulk cyanide leach stream sediment survey yielded one unexplained anomaly of 1.3 ppb gold. Photo-mapping failed to locate any structural targets. Detailed chip sampling of quartz veining at Golden Goose gave disappointing gold values.
CR19920478, Saturn Resources Pty Ltd, 1990-1993
Results of stream sediment and soil sampling for diamonds gave unsatisfactory results.

CR19920438, EL6941, Clarence River Finance Group Pty Ltd.
Exploration targeted any economic mineralization but specifically mentioned gold, copper and garnet. They carried out rock chip and grab sampling and rock chip and stream sediment sampling in areas of known mineralization but failed to highlight any economic resource. Subsequently the tenement was examined for its garnet sand potential.

CR19930464, EL7571, Stockdale Prospecting Ltd, 1992-1993
Exploration was for gold and base metals. Work consisted of stream sediment, soil, BLEG and rock chip sampling.

CR19940277, EL7932, Normandy Exploration Ltd, 1993-1994
53 heavy media stream sediment samples were collected. No kimberlitic indicators were observed.

CR20002037, EL8164, Tanami Gold NL, 1993-2001
Extensive exploration programs over 8 years including geological mapping, stream sediment sampling, rock chip sampling, RAB drilling, diamond core drilling, aeromagnetic surveying, satellite imagery. Results included widespread, high grade but sporadic gold mineralisation. An RC drill program totaling 7 holes for 1,254m was completed testing a "structural corridor" that was derived from the mapping program. Extensive zones of quartz veining were intersected, but no significant gold values were returned from the assaying of 316 samples. The company considered that the tenement has been adequately tested and relinquished the ground.

CR20020101, EL8489, Flinders Diamonds Ltd., 1995-2001
Exploration was for gold and copper and included aeromagnetic surveys, ground magnetic and self-potential geophysics, percussion drilling, rock chip sampling and diamond core drilling. Evaluated as sub-economic.

CR19980318, Pasminco Exploration, 1995-1997
Literature search, stream sediment sampling geological reconnaissance and rock chip sampling.

CR19980043, EL9364, Pasminco Exploration, 1996-1997
Infill sampling was completed in the vicinity of anomalies identified from analyzing historical results. Results were discouraging. Mapping located a previously unknown copper-gold Pinnacles style associated silica-garnet alteration.

CR20020225, EL22292, Oneva Exploration Pty Ltd, 2001-2003
Exploration was for copper/gold. Literature research, geologic reconnaissance and traversing, soil and rock chip sampling, geological mapping. Results showed that Cu-Au mineralisation is overall patchy, and controlled by major structural faults. A number of new Au-Cu discoveries were made along the Cadney Fault. Shallow drilling was inconclusive due to shallow water table.

CR20040663, EL9528, Tanami Exploration NL, 1996-2004
Reworking of previous gold and base metals prospect.

CR2004238, EL 23184, Tanami Exploration NL, 2003-2004
Reworking of previous gold and base metals prospect.
NUPOWER EXPLORATION WORK, YEAR 2, 2008
During Year 2, NuPower carried out a bore ground water sampling program as part of its exploration for secondary uranium deposits, that was reported previously, (Rafferty, 2008a, b).

NUPOWER EXPLORATION WORK, YEAR 3, 2009
During Year 3 the company, carried out and received final reprocessed products of an airborne electromagnetic (AEM) survey over areas of flat sandy plains in the northern parts of both areas targeting the potential for buried palaeochannels of which the results, report, data and images were reported previously (Rafferty, Keeley & Triffit, 2009)

The Company also planned and contributed to a regional gravity survey (CAGS) to assist with structural interpretation of the basement. The survey acquisition report containing survey details, data and figures were reported previously, (ibid).

NuPower also undertook negotiations with the CLC to gain access for reconnaissance exploration work of the numerous uranium and thorium airborne radiometric anomalies identified by NTGS surveys, and completed a regional stream sediment sampling program throughout both areas for primary uranium mineralisation in basement rocks.

Three hundred and twenty three sieved stream sediment samples were collected from sites in the 2 licenses that were accessible by vehicle and scintillometer readings were also taken of the stream sediment at each sample site and recorded. Fifteen rock samples and 1 soil sample were collected and submitted to ALS-Chemex in Alice Springs for analysis also. The geochemical data and assays were reported previously, (ibid).

NUPOWER EXPLORATION WORK, YEAR 4, 2010
Although there was minimal on-ground field work carried out in Year 4, NuPower prepared various maps and studied the historical data including data provided by Maximus Resources in preparation for Year 5 exploration work.

NuPower also compiled the geochemistry from the previous year rating the anomalies for follow up work in Year 5.

A short on-ground reconnaissance work program was conducted finding that a large (3km) radiometric anomaly within the central part of the Strangways project which is underlain by extensive pegmatite that had elevated radiometric anomalies (probably uranium and thorium), which gives the rise to the possibly other metals.

Therefore it was recommended to renegotiate our agreement to include such metals as NuPower, through the joint venture, originally had the right to explore for the energy minerals uranium, thorium and coal, however after further negotiations Maximus Resources have agreed that NuPower will also have the right to explore for all metals (diamonds are be retained by Flinders Diamonds Ltd).

NUPOWER EXPLORATION WORK, YEAR 5, 2011
Year 5 exploration is fully reported in the 2011 Annual. Approximately 3 weeks of fieldwork was done to follow up, with field mapping and sampling, airborne radiometric anomalies and stream sediment geochemical anomalies. The most significant outcome of this work was the discovery of quite extensive pegmatite bodies with highly elevated rare earth content.
NUPOWER EXPLORATION WORK, YEAR 6, 2012

Phase 1 – EL25056 Targets

Several targets were followed up during this phase of work (see Figure 9):

1. Two airborne magnetic anomalies west and northwest of the Mud Tank carbonatite and vermiculite mine. The carbonatite has a coincident magnetic anomaly and it appears that these two anomalies, which could be analogues of Mud Tank, have not been adequately followed up in the past.

2. An occurrence of monzonite described in 2002 Flinders Diamonds RAB holes about 12km northeast of the Mud Tank carbonatite. Monzonite commonly occurs in alkalic intrusive complexes which may have associated rare earths. Verification of this rock type in the area would add to the REE prospectivity.

3. The large (approximately 14 x 10km) ovoid doughnut shaped magnetic anomaly in the Mt Bleechmore area. Flinders Diamonds postulated that this could be due to an alkalic intrusive complex which the Bleechmore Dykes vermiculite deposit could be associated with. This anomaly is mainly within SEL 25056 but extends to the north into a recent EL application.

4. The area of the above vermiculite deposit where several previously drilled holes had returned anomalous Ce and La results.

5. A small magnetic anomaly, within a more extensive slightly arcuate N-S elevated magnetic ridge, about 2km to the east of the northeastern edge of the Bleechmore magnetic anomaly.

Prior to this work familiarization with the Mud Tank carbonatite was done – there is a lot of outcrop and subcrop in the fossicking area immediately adjacent to the vermiculite mine, and waste dumps in places extend right up to the fossicking area. Carbonatite (calcite – biotite rock) and magnetite, apatite and quartz vein outcrop, subcrop and float is quite abundant.

Twelve samples were taken for assay.
Figure 9. Fieldwork locations on airborne magnetics
Results

Results from work in the above areas are described below.

1. Magnetic anomalies near Mud Tank

The first of these is west of the vermiculite mine and is about 6x2km in extent, it is elongated NW - SE. Most of it is within SEL 25056 with the southeast end within the mining license/fossicking area. Outcrop of felsic and mafic granulite with a NW strike occurs in the southwestern part of the area. The latter lithology is weakly to moderately magnetic (swing magnet). It appears that the anomaly is most likely associated with the mafic granulite, however there is no outcrop in most of the anomaly area – which is very flat and has considerable quartz float.

The other anomaly is about 1.5km northeast of this and is a small area of relatively intense anomaly on a lower order northwest trending ridge. No outcrop was found here, the area is very flat with quartz float.

It appears likely that these anomalies are associated with mafic granulite.

2. Monzonite occurrence

Very little outcrop occurs in this area, most of this was mafic and felsic granulite, but one outcrop of intermediate igneous rock was found and chips of probable diorite (monzonite??) were found at one drill site.

The occurrence of monzonite in this area was not verified.

3. Bleechmore magnetic anomaly

The Alcoota 1:250,000 sheet shows outcrop of Mt Bleechmore Granulite (generally felsic) in the eastern and northern parts of the anomaly with mafic granulite and outcrops of mafic granulite and plutonic granulite in the general area. No outcrop is shown on the western side of the anomaly.

A number of traverses were made through the anomaly with considerable outcrop of felsic and mafic granulite found in the eastern and northern parts. Felsic and mafic lithologies are approximately sub-equal in volume with intercalations usually between a few metres and a few tens of metres in width. The mafic lithologies are usually weakly to moderately magnetic (swing magnet) and the felsic lithologies only rarely so. Strike of the lithological units and the foliation is predominantly NNE to NE with dips generally eastward. There is minor outcrop of a meta-porphyritic granite, similar to the “ortho-gneisses” in the Aileron area and rare outcrop of very felsic pegmatite and quartz veins. No outcrop of any later intrusives, alkalic or otherwise, was seen and no evidence of retrograde metamorphism was mapped.

Some outcrop of felsic and mafic granulite was also found near the SW end of the magnetic anomaly.

If the magnetic anomaly was due to mafic granulite, it might be expected that mafic units would be folded coincident with it. However this does not appear to be the case. But the mafic granulite still appears to be the most likely cause of the anomaly, perhaps there are larger dolerite intrusions at depth – the precursor lithology to the mafic granulite appears most likely to be a dolerite.

4. Vicinity of the FDL vermiculite deposit

The deposit area was traversed in detail and approximately 500m spaced E-W traverses were made across the area of subdued magnetics within the doughnut magnetic anomaly.
There is essentially no outcrop within or in the immediate vicinity of the vermiculite deposit. However material from infilled trenches consists mainly of massive quite coarse grained biotite rock – not dissimilar to some seen at Mud Tank. No carbonatite was seen. Between about 130 and 300m to the south of the deposit there is quite considerable amounts of massive magnetite float.

Outcrops to the east and south of the deposit are basically identical to those within the magnetic anomaly – intercalations of felsic and mafic granulite with approximately equal amounts of each lithology. Strike of lithology and foliation is also the same – NNE to NE. The mafic units are similarly magnetic. About 2km south of the vermiculite deposit there are intercalations of sillimanite (+quartz, feldspar and ± garnet) schist.

Stretching from at least 400m north of the vermiculite and extending at least 3km to the south and 1.2km to the east is an ovoid zone of partial retrogressive metamorphism. Narrow (few metres thick) zones of quartz-feldspar-biotite±garnet schist occur within felsic and mafic granulite which isn’t noticeably retrogressed. In places this schist is clearly after felsic granulite, and it appears to be preferentially developed on the margins of mafic bodies. In some places it appears to be after sillimanite schist. There are minor amounts of thin quartz veins and small quartz blow in within this retrogressive area and perhaps a little more pegmatite than is seen within the magnetic anomaly.

This retrogressive zone forms a core in the centre of the magnetic anomaly and suggests the possibility that the anomaly is due more to destruction of magnetite in the centre of it rather than to enhanced concentrations within it. However the obviously magnetic mafic granulite within the central area does not appear to bear this out.

Results of this work were disappointing, it was hoped that the seemingly carbonatite associated vermiculite occurrence and the elevated rare earth results in drill holes might indicate that there might be something more substantial in the area – perhaps a carbonatite hosted REE deposit. This was particularly so considering that there did not appear to have been a lot of surface work done in this area – the area surrounding the vermiculite deposit doesn’t seem to have been mapped before nor has there been any proper soil geochemistry or systematic RAB drilling done. The only possible indication of mineralization seen in the area was the retrograde metamorphism – an indication that there had been some fluids entering the area post the prograde granulite metamorphism. In general outcrop here is quite good and it is a little difficult to envisage a completely blind REE deposit occurring here. Rock sample results were disappointing with no significant REE content - see table of selected results below and Figure 10 for locations.

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<th>Th (ppm)</th>
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<th>Nd (ppm)</th>
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5. Magnetic anomaly east of the Bleechmore anomaly

This anomaly seems clearly due to N-S striking mafic granulite within an area dominated by felsic granulite.

Phase 2 – pegmatite exploration, EL25055

Several days were spent mapping and sampling that part of the large airborne radiometric thorium anomaly which hadn’t been previously traversed – see 2011 annual report. Ten samples were taken for assay.

Results

The area was found to be underlain mainly by felsic granulites, with a variable gneissic foliation - generally E to SE striking, N to NE dipping. Biotite and garnet are quite common in these rocks and there is minor migmatite. In the western part of the area calc-silicate gneiss commonly outcrops, this characteristically contains epidote. The outcrop distribution of this lithology does not seem to be very accurate on the published 1:100,000 geological map – although the traversing done in 2012 was not sufficient to properly define it. Rare outcrops of porphyritic granite, mafic granulite, and biotite schist were found. Quartz veins are quite common and there is some magnetite float, probably derived from magnetite veins. In the southern part of the area traverses crossed the Harry Creek Deformed Zone. This is a broad seemingly complicated zone with amphibolites (the main lithology south of the zone) juxtaposed against granulites.

Intruding the rocks as described above are numerous quartz – feldspar – biotite pegmatites. These are commonly a metre to several metres in thickness and can be followed for at least tens of metres. They are generally parallel to the strike of the host rocks, but vary up to right angles to this. In only two locations would they be of conceivable economic interest – given the rare earth grades from these rocks from earlier samples. The first area was mapped in some detail in 2010, and is centred on 415,500E, 7,433,000 N. The second area was also found in 2010, this is centred on approximately 414,200E, 7,433,000N – it has not been mapped in detail. In both areas the pegmatite occurs as large amorphous blobs. Outside these areas the largest pegmatite body found
was approximately 30m thick – however in this location a sample only had low levels of rare earths.

The pegmatite bodies are strongly radiometrically anomalous, often to >1000cps. Radiometric background in the area is quite high, often around 500cps. The intense airborne radiometric thorium anomaly in the area seems clearly due mainly to the pegmatite dykes, and to the eroded remnants of them.

Highlights of the ten samples are given in the table below with locations on Figure 11.

<table>
<thead>
<tr>
<th>Sample</th>
<th>East</th>
<th>North</th>
<th>Sample Description</th>
<th>Ce</th>
<th>La</th>
<th>Nd</th>
<th>Th</th>
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Ce, La and Nd are by far the most abundant rare earth elements. However these assays are too low to be of economic interest. Average Ce, La and Nd assays from 2012 sampling were approximately 70% of the average from 2010 samples. 2010 samples averaged 0.45% REE.

Figure 11. Pegmatite area sample locations on airborne radiometric thorium

Conclusions and Recommendations

- The radiometric anomaly is due to mainly strike parallel pegmatite veins which are generally a few metres thick.
• No further large areas of pegmatite were found.
• Rare earth content of these veins is too low to be of economic interest, and in most places the size of the veins is much too small to be of interest.
• The large blob shaped outcrops of pegmatite are not likely to persist to depth; in 3d they are likely to have the same irregular shape as they do in 2d.
• No further work is required.

Phase 3 consultant visit to Bleechmore and pegmatite areas, EL25055, EL25056

Three days were spent by the Structural and Economic Geology Consultant Dr. Roger Marjoribanks on field visits to these areas. His conclusions were:

1. In the Mt Bleechmore area, a 15km x 8km elliptic magnetic anomaly is interpreted as being caused by a magnetite-bearing mafic gneiss that is folded into a complex domal or basinal shape as the result of the interference of an upright, N-trending regional F1 fold with a NE-trending, upright F2 fold.

2. At Mt Bleechmore, narrow lenses of vermiculite occur within a wide north-trending zone of biotite-rich retrograde rocks. Low but anomalous REE values are reported. The prospects have been exhaustively explored by many previous explorers and are considered to have little remaining potential for discovery of economic REE mineralisation.

3. In the Southern Pegmatites prospect area, monazite-bearing pegmatite (a probable partial melt) is well exposed over at least 1,200m2. Rock-chip sampling has yielded anomalous REE values. The “pegmatites” are fresh and are well exposed over a significant vertical relief. Surface chip-sampling therefore provides an accurate measure of the distribution and tenor of REE content. There is no indication that zones of economic grade REE may be present either along strike or at depth. No further work is justified.

4. There are no outstanding targets for the discovery of economic concentrations of REE mineralisation within the tenements held by NuPower Resources.

CONCLUSIONS AND RECOMMENDATIONS

Rare earth targets in the area have been downgraded:

• The magnetic anomaly in the Mt Bleechmore area is almost certainly due to folded mafic granulites and not to an alkalic intrusive complex.
• There is no evidence of significant rare earth mineralization in the vicinity of the Bleechmore Dykes vermiculite prospect. It appears likely that the vermiculite at Bleechmore is due to retrograde metamorphism of granulites and is not associated with a carbonatite.
• The pegmatites are both too low grade and too restricted in distribution to represent a valid exploration target.

Given the above, NuPower is currently reassessing whether any further exploration of the area is warranted.

EXPENDITURE STATEMENT

PROPOSED PROGRAM YEAR 7, 2012

Currently it is being decided whether NuPower will continue in this joint venture to explore these tenements.
REFERENCES


