EL 28543 MT LUCY

FINAL REPORT

4 November 2011 to 4 November 2013

Operator: CENTRAL AUSTRALIAN PHOSPHATE Ltd

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Maps:

1:250,000 Napperby SF53-09
1:250,000 Alcoota SF53-10
1:100,000 Bushy Park 6552
1:100,000 Aileron 5552
MGA GDA94 Zone 53

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SUMMARY

Mt Lucy (EL28543) was granted to NuPower Resources Ltd on 4 November 2012. The name of the company was changed to Central Australian Phosphate (CEN) in early 2013. Also in early 2013 Rum Jungle Resources made a takeover bid for CEN, in late November 2013 they had obtained more than 90% of the shares.

There no known mineral occurrences or prospects in the area; one of the closest and the most relevant to exploration at Mt Lucy is the Nolans Bore rare earth deposit some 30km to the northwest. The area was selected by NuPower on the basis that it is considered highly prospective for Rare Earth-P-U-Th mineralization similar to that at Nolans Bore.

The Mt Lucy region is underlain by rocks of the Arunta Region, a complex basement inlier in central Australia that has undergone a prolonged history of sedimentation, magmatism and tectonism extending from the Palaeoproterozoic to the Palaeozoic. It is subdivided into three, largely fault bounded terranes with distinct geological histories; the Aileron, Warumpi and Irindina Provinces. The basement geology of Mt Lucy comprises units of the Aileron Province consisting of greenschist to granulite facies metamorphic rocks with protolith ages in the range 1865-1710 Ma. It forms part of the North Australian Craton and is geologically continuous with the gold-bearing Tanami and Tennant Regions to the north.

No fieldwork has been done by the holders on this license. This was due to budget constraints and the takeover by Rum Jungle Resources.
INTRODUCTION

BACKGROUND

Basement rocks of the Reynolds and Anmatjira Ranges contain elevated background levels of uranium and thorium and have been explored for gold, base metals, rare earth elements and uranium. Exploration success came with the discovery of elevated levels of rare earth elements hosted by massive fluorapatite 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.

The Mt Lucy area is located approximately 30km southeast of Nolans Bore in similar geology, and the area was applied for to allow exploration for rare earth mineralization with similarities to this deposit.

LOCATION AND ACCESS

The Mt Lucy Exploration Licence is located approximately 100 kilometres north of Alice Springs along the Stuart Highway (Figure 1). The southwest corner of the license is just 5km east of the Stuart Highway. The Aileron Roadhouse is about 15km to the west of the tenement. There are several station tracks which provide access into the area. The southern part of the tenement is best accessed along a fence line which leads off the Stuart Highway.

The tenement is entirely within the Aileron Station.

CLIMATE AND VEGETATION

The region has a semi-arid continental climate, characterised by long hot summers when temperatures regularly exceed 40°C, and short mild winters. Average annual rainfall for the Mt Lucy region taken from the Territory Grape Farm Bureau of Meteorology weather station is 305.4mm, most of which falls in the November to February period. Average minimum and maximum temperatures in summer are 21.7°C and 37.6°C while the corresponding winter average temperatures are 4.9°C and 22.3°C.

Vegetation in the license area comprises hummocky spinifex grassland and large areas of tall open or thicket mulga shrubland with woolybutt grassland understory.

TOPOGRAPHY AND DRAINAGE

The Mt Lucy tenement is situated in a ‘basin and range’ province where the Ti-Tree Basin to the northeast is separated from the Reynolds & Anmatjira Ranges to the southwest by the NW-SE trending Ti-Tree Fault.

The coalesced Yalyrimbi and Reynolds ranges essentially terminate just within the central western edge of the tenement. Here elevations reach 698m above sea level. There are some isolated hills to the east of here, reaching 669m. Towards the northern edge of the tenement, and south of the range termination, the area is flat and covered with mulga. The southern part of the tenement covers the eastern end of the Hann Range, an asymmetric narrow ridge of Vaughan Springs Quartzite that dips shallowly northwards, rising locally to 803m at Mt Ewart. Allungra Creek, trending ENE, and its tributaries drain the central region. There is one waterhole, Allungra Waterhole, in the eastern part of the area where the creek merges with the Ti-Tree Basin Plain.
Figure 1 – Mt Lucy (EL28543) Location.
LOGISTICS

Alice Springs (pop. 27,000) is serviced daily by jet aircraft from several Australian capital cities (Sydney, Adelaide, Perth and Darwin) and less regularly from Brisbane, Cairns and Broome. Because of its location mid-way between Adelaide and Darwin the town is also well serviced by road transport and interstate bus services.

The Adelaide-Darwin transcontinental railway, passing through Alice Springs, passes to within 20km of the east of the license. The natural gas pipeline from the Amadeus Basin (west of Alice Springs) to Darwin runs close to Aileron.

The nearest service station and accommodation is at the Aileron Roadhouse just west of the license.

The nearest station homestead is Aileron, adjacent to the Aileron Roadhouse.

TENURE

Exploration Licence 28543 (Mt Lucy), comprising 183.74km² and 58 graticular blocks (Figure 2) was granted to NuPower Resources Ltd (ABN 91 120 787 859) on 4 November 2011 for a period of 6 years.

The expenditure covenant for the first year of the licence was $100,000, this was not met and a variation of covenant was submitted.

The license is entirely within the perpetual pastoral lease of Aileron Station, NT Portion 703.
NATIVE TITLE

There is no Exploration Agreement in place between NuPower Resources Ltd and the CLC on behalf of Traditional Owners.

There are no registered Native Title Claims over the area.

In the absence of an Exploration Agreement, Native Title issues are considered according to Item 18 of the Schedule 2 Conditions provided during the grant process for EL 28543 Mt Lucy. Article 6a requires NuPower to convene a meeting with registered Native Title Claimants before commencing exploration activities unless the activity is of a reconnaissance nature. In the absence of any Native Title Claimants no such meeting has been held.

ABORIGINAL SACRED SITES

An inspection of the AAPA Register of Sacred Sites shows two unconfirmed recorded sites in the central eastern part of the area, three recorded sites in the Hann Range and an exclusion zone in the central western part.
GEOLOGY

REGIONAL SETTING

The Mt Lucy license EL28543 is situated in the Aileron Province of the Arunta Region in the southern part of the Northern Territory (Figure 3).

Figure 3 - Geological Regions of the Northern Territory and EL28543 approximate location
Deformed and metamorphosed Palaeoproterozoic orogenic rocks older than 1800 million years crop out as major tectonic units surrounded by younger rocks and essentially form the recognisable and inferred basement to the North Australian Craton. These Palaeoproterozoic rocks form the Pine Creek Orogen, Tanami Region, northern Arunta Province, and Tennant, Murphy and Arnhem Inliers. They include remnants of Achaean rocks, which have been dated at 2500 million years.

To the south, the rocks of the North Australian Craton pass into the Central Australian Mobile Belts of the Proterozoic Orogens of the Arunta Region and Musgrave Block, consisting of granulite and amphibolite facies, metamorphosed sediments and mafic volcanics intruded by granitoids. In the southern Arunta Province, episodic igneous activity took place between 1880-1050 million years and deformation included a series of major tectonic events, including retrogressive metamorphism in the Proterozoic and Palaeozoic. These basement rocks are exposed in the northern part of the area.

Proterozoic-Palaeozoic basins form part of the North Australian Platform Cover and comprise mildly deformed, largely unmetamorphosed predominantly sedimentary successions unconformably overlying the Proterozoic Orogens. This includes the Ngalia and Georgina Basins in the Aileron region, of which the Ngalia Basin is exposed in the southern part of the area.

A system of major west-northwest trending and north-northeast dipping thrust faults and shear zones affects the Arunta Region and northern margin of the Ngalia Basin. The associated shear zones can be up to hundreds of meters in width, extend for several kilometres, and are thought to have formed during the 400-300 Ma Alice Springs Orogeny (Cartwright et al., 1999). The Palaeoproterozoic basement rocks of the Arunta Region have been thrust over the younger sediments of the Ngalia Basin along the Napperby and Yuendumu Thrusts.

**LOCAL GEOLOGY**

**Pre-Cambrian-Proterozoic**

According to the web-site of the NTGS (December, 2004) basement rocks in the Aileron region comprise part of:

“… the Arunta Region, a complex basement inlier in central Australia that has undergone a prolonged history of sedimentation, magmatism and tectonism extending from the Palaeoproterozoic to the Palaeozoic. The Arunta Region can be subdivided into the three, largely fault bounded terranes with distinct geological histories: the Aileron, Warumpi and Irindina Provinces.

The Aileron Province comprises greenschist to granulite facies metamorphic rocks with protolith ages in the range 1865-1710 Ma. It forms part of the North Australian Craton and is geologically continuous with the gold-bearing Tanami and Tennant Regions to the north.

In contrast, the Warumpi Province comprises amphibolite to granulite facies rocks with protolith ages in the range 1690-1600 Ma, and is interpreted to be an exotic terrane that accreted to the southern margin of the North Australian Craton at 1640 Ma. The Irindina Province in the Harts Range region comprises Neoproterozoic to Cambrian metasediments that formed in a major depocentre within the Centralian Superbasin. It underwent high-grade metamorphism and deformation during Ordovician (480 - 450 Ma)”.

The Mt Lucy tenement is underlain by basement rocks of the Aileron Province (Figure 4). Because of the high grade of metamorphism and the relative paucity of continuous outcrop across the Arunta Province, a reliable stratigraphy has not yet been constructed for the metasedimentary sequences. Instead, the metamorphosed rocks of the area have been subdivided by Stewart (1981) into three “Divisions”, intruded by granites, on the basis of “broad lithological correlations”, Division 1 being regarded as the oldest and Division 3 as the youngest. Only rocks of the Aileron Metamorphics of Division 1 are preserved here.

The oldest rocks are Pre-Cambrian orthogneiss (pЄg) exposed beneath units of the Ngalia Basin in the south. Palaeoproterozoic rocks of the Aileron Metamorphics (pЄi, pЄia) consisting of pelitic, semi-pelitic, psammitic and calc-silicate gneisses and granulites and rare diopsidic and forsteritic marbles, meta-gabbro, dolerite, amphibolite and mafic granulite crop out in the northern part of the license, north of Allungra Creek. They are intruded by Proterozoic gneissic biotite granite (Pgb).
Proterozoic-Palaeozoic

South of Allungra Creek the Arunta Inlier is stratigraphically unconformably overlain, though, because of thrusting, structurally underlain by Neoproterozoic and early Palaeozoic sediments of the Ngalia Basin. This is an east- trending intracratonic basin, that covers an area of 15,000 km² and contains about 6,000 metres of Palaeozoic and Neoproterozoic sediments, which are thickest near its northern margin. The succession consists of Neoproterozoic to Ordovician shallow marine and fluvo-glacial clastic, carbonate and evaporitic rocks, overlain by Devonian and Carboniferous fluvial to continental sandstone, greywacke and siltstone. The basin was moderately deformed by Neoproterozoic and Carboniferous orogenies.

Only the lower units are exposed here in the Hann Range consisting of the Vaughan Springs Quartzite (Puv) composed of a thickly bedded quartzite and conglomerate. (Freeman et al., 1990), and containing the Truer Member (Put) consisting of thin bedded fine sandstone siltstone and possible evaporites.

The Ngalia Basin is an under-explored greenfields basin with significant sandstone hosted uranium potential. The largest known uranium deposit is at Bigrlyi, where a uranium-vanadium resource has been defined within steeply dipping carbonaceous sandstone of the Mount Eclipse Sandstone. The mineralisation is stratiform and tabular, and is likely to be controlled by the presence of reducing organic matter in the sandstone. A number of similar occurrences occur, mainly close to the northern margin of the basin.

Cainozoic

Structurally the southern NT forms a “basin and range” province with Proterozoic and Palaeozoic rocks forming prominent mountain ranges separated by broad valleys. Cainozoic basins of unconsolidated sediments are widespread and well-developed within these intervening topographic depressions with at least twenty major basins outlined, (Senior et al., 1995).

The Mt Lucy tenement straddles the southern margin of the Ti-Tree Basin that is known to be the best developed Cainozoic basin in the southern NT containing a sedimentary fill in excess of 300m thick, according to work carried out by NT Department of Water Resources/NRETA, and includes part of a major east-west trending palaeochannel draining eastwards into the basin.

The stratigraphy of the intermontane Cainozoic basins of the southern NT region is generally poorly known due to the lack of outcrop, strong weathering overprints, paucity of drillholes and a lack of attention paid to the “cover” overlying crystalline basement. Limited stratigraphic drilling undertaken in the southern NT region by both the BMR (now Geoscience Australia) and the NTGS during the late 1970’s and early 1980’s has provided the majority of stratigraphic information on the Cainozoic succession. Senior et al. (1995) compiled a summary of the available information and defined a two-fold stratigraphic subdivision that broadly corresponds with the observed pattern of Cainozoic sedimentation elsewhere in southern Australia comprising a restricted, fluvial palaeochannel dominated Palaeogene succession (Hale Formation) and a more widespread, dominantly lacustrine Neogene succession (Waite Formation).
Figure 4. Mt Lucy geology (Napperby SF53-9, Alcoota SF53-101:250,000 Sheets)
MINERALISATION

There are no reported mineral occurrences here. The most significant resource discovered to date in the general area is the Nolan’s Bore Phosphate-Rare Earth Element-Uranium deposit currently being investigated by Arafura Resources NL 30km NW of here.

PREVIOUS EXPLORATION

CRA Exploration Pty Ltd A-P 3360, CR19730026, (EL 723, 1973)

AP3360 covered the northern part of Mt Lucy and extended as far north as Ti-Tree. Drilling by NTA Water Resources in 1966 in the Ti-Tree Basin (Edworthy 1966, 1967) to examine the aquifer potential identified anomalous uranium and radon in the ground waters of the basin, particularly those waters close to the Reynolds Range. In 1972 CRA recognised the potential of the basement rocks surrounding the basin as a source for secondary uranium deposits within the basin, compiled available data, assayed small samples of the available cuttings from the Water Resources bores, resampled the waters from various station and Water Resources bores and carried out a ground scintillometer survey along accessible roads in that part of the basin immediately north of the Allungra Creek tenement. This showed higher radioactivity in the vicinity of all basement outcrops waning towards the centre of the basin and along the stream banks.

Previous drilling showed that the basin comprises up to 30 meters of Quaternary silts, sands and rare conglomerates overlying up to 80 meters of Tertiary arenaceous and argillaceous sediments. This generally overlies highly weathered basement rocks. In the deeper parts of the basin the Tertiary sediments are overlain by argillaceous grey-green claystones, and pyritic carbonaceous shales of upper Cretaceous-Tertiary age. Locally the Ti-Tree Basin sediments exceed 300 meters in thickness. The lowermost carbonate shale unit was considered the most prospective for uranium mineralisation and of the cuttings assayed the highest uranium assays were from this unit.

Uranium results from the bore waters were highest from the bores in the southern part of the basin, closest to the Reynolds Range. Eh values were all positive indicative of oxidising conditions and pH showed the waters to be mildly alkaline. Some of the bores were surveyed with a gamma logger that showed that the gamma activity was about twice that from a similar survey in the Burt Basin. Sediments from Kerosene Camp Creek and Woodforde River that feed into the basin from the south (including the Nolan’s Bore deposit) were sampled by shallow auger and assayed.

Six cored stratigraphic holes were drilled to test the most prospective sediments. A number of deep drill holes were recommended but this was not carried out.

Range Resources Ltd, EL5557, CR19890356

Range Resources held EL5557 over the eastern part of the Hann Range that overlapped the southern part of Mt Lucy. Work was confined to literature studies and they reported that: “Numerous hematitic quartz reefs cut both the granitic basement and the overlying Vaughan Springs Quartzite over a distance of about 50km along the southern side of the Stuart Bluff Range, and gold has been reported several times from these reefs in 1954. However, subsequent Investigation, reported in 1965 (including assays), 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 induced polarization and/or magnetic responses in the Stuart Bluff Range, but detected no gold or anomalous copper. No gold was detected in chip samples from numerous other pyritic quartz—specular hematite breccia reefs, including the occurrence east of Petty Well, in the Reaphook Hills, and a breccia within a mylonite zone in gneiss south of the Hann Range, 5km west of the Stuart Highway.” They relinquished the ground.

Track Minerals Pty Ltd, EL5901, CR19890704

This license covered all of Mt Lucy, extending westwards beyond the Stuart Highway. Track was exploring for gold associated with magnetite-rich units of the Aileron Metamorphics, granites and the regional Aileron Shear Zone (where gold has been reported 24km WNW of here at the Aileron Quartz Reefs Prospect), Napperby Thrust and Hann Range Thrust. They completed stream sediment sampling, reconnaissance mapping and rock chip sampling. Three stream sediment samples assayed by the Bulk Leach method for Au, Ag, and Cu from Allungra Creek returned best values of 0.1ppb Au and 0.1ppm Cu. Three rock chip
samples of quartz-biotite gneiss and quartz veins assayed for base metals, Au, As, Ag were not anomalous. The overall results were disappointing and the tenement was relinquished.

**Tidegate Pty Ltd, EL8117, CR19940589,**

EL8117 covered the western part of Mt Lucy and country to the west of it. Tidegate was exploring for gold and platinum mineralisation associated with possible ultramafic rocks at Native Gap Ni, Cr Prospect, Harry’s Yard Amphibolite and in quartz veins at Aileron Gold Reefs Prospect all west of Mt Lucy. A traverse of BLEG loam and drainage samples was collected across the extension of the Aileron Shear Zone the easternmost 4 of which were taken from Mt Lucy. Assayed for Au, Ag and base metals the highest value was 0.16ppb Au while the base metals were not anomalous. The Aileron Gold Reefs working was located. Dump material of pyritic, quartz veined granite assayed 0.001ppm Au (although an old report of a crushing assayed of 4dwt/ton.) Results were disappointing for Tidegate and the area was relinquished.

**Aberfoyle Resources Ltd, EL9146, CR19960692,**

EL9146 covered the northernmost part of Mt Lucy. Aberfoyle Resources were targeting the gold potential of the Early Proterozoic sequences present on the license and thought to host mineralisation of the type developed to the west in the Granites/Tanami Inlier.

BMR regional airborne magnetic data were acquired and processed along with results from the magnetic survey contracted to World Geoscience Corporation. The aeromagnetic surveys revealed numerous magnetic anomalies. The aerial surveys were followed up with ground magnetic surveys and 6 RAB holes (299m total drilling) drilled in two lines to determine the thickness of cover. Four holes successfully reach basement, ignoring the cover. Lithologies intersected were generally granitic and no significant geochemical values were obtained. The tenement was relinquished in 1999.

**Homestake Gold of Australia Ltd, EL9672, CR19970791,**

EL9672 covered the Reynolds Ranges and the western edge of Allungra Creek. They carried out regional stream sediment BLEG sampling for gold of the Granites Tanami style associated with regional shear zones. The easternmost sample from Allungra Creek assayed <0.1ppb Au and much of the area was relinquished.

**Tanami Exploration NL Exploration EL9801, CR20040051, CR20050378,**

In 1997, Tanami Exploration NL identified the potential for Tanami-style gold-only, iron oxide copper-gold and Tennant Creek-style copper-gold mineralisation in the Alcoota district of the Arunta region from the NTDME surveys. They acquired a significant tenement package to form the Alcoota Project. EL9801 of 1585km², covered part of Allungra Creek license. Exploration consisted of a regional desk top study of the project area that suggested that the westernmost area was either granitic or sediments of the Ngalia Basin, based on a subdued magnetic signature. The rest of EL9801 was interpreted as Lander Rock Bed equivalents of low metamorphic grade, under cover. Field examination however supported the NTGS mapping where outcrop in the southwestern part of the tenement is invariably granitic or relatively high-grade metasedimentary lithologies, at odds with the magnetic signature. Ten rock chip samples of quartz veins were taken on EL 9801 during a brief reconnaissance trip but based on the regional assessment and the assay results EL 9801 was relinquished.

**Gutnick Resources N.L. EL10252-53, CR20040166,**

Gutnick’s gold-base metals Rand Project contained 22 ELs one of which, EL10252, overlapped part of Mt Lucy. The Project was based on a new genetic interpretation for the Witwatersrand mineralization in South Africa and the idea that similar and related styles of mineralization may be present in other sedimentary basins with similar structural and stratigraphic styles to the Witwatersrand. Following a literature and field based review of potential target basins around the world, the Amadeus and Ngalia Basins were selected. Open file data were compiled and interpreted, previous exploration techniques were assessed and results evaluated according to the Witwatersrand exploration model. Geophysical data including Landsat7 TM were reprocessed and modeled for structural and stratigraphic interpretation and to help identify alteration systems. An orientation sampling program of 510 stream sediments, 70 rock chips and 14 base of slope samples was completed but no samples were taken from the area of Mt Lucy. Multi-element gold and base metal anomalies were detected elsewhere.
Matilda Resources EL 26103 (JV with NuPower Resources)

Work done under this JV included literature research, an AEM survey (covering most of the area), and reconnaissance mapping and rock sampling. A paleo-channel was identified from the AEM, but was not followed up with drilling. No significant results were obtained from the sampling, however the area was thought to retain some prospectivity for rare earths, particularly as a large part of the area has no outcrop and is close to Nolans Bore.


No fieldwork was done due to funding constraints – available funds had to be used on the company’s phosphate exploration. Previous work was reviewed in a reassessment of NuPower’s landholdings, following which a number of exploration licenses were relinquished. However it was decided to retain Mt Lucy, partly because of its proximity to Nolans Bore and similar geology to this prospect.

EXPLORATION ACTIVITIES BY NUPOWER COMPLETED IN YEAR 2 (4/11/2012 – 3/11/2013)

Again no fieldwork was done due to funding constraints and uncertainty due to the Rum Jungle Resources takeover.

CONCLUSIONS

It is still regarded that this area has potential for rare earth mineralization similar to that at Nolans Bore. However this is now outside the scope of Central Australian Phosphates interests.
REFERENCES


