## CENTRAL AUSTRALIAN PHOSPHATE LTD ABN: 91 120 787 859

# EL 26374 Pine Hill

## ANNUAL and FINAL REPORT

## 16/04/2008 to 29/04/2013

## **Operator: Central Australian Phosphate Ltd**

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Date: 3 May 2013

Map Sheets

1:100,000 Ti Tree 5553 1:250,000 Napperby SF53-09 GDA94, Zone 53

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### SUMMARY

There are no known mineral deposits in the area. The nearest occurrences are of copper and tin at White Yard Hill 30km to the southwest and rare earths at Mt Finnis 40km to the west. The Nolans P-U-Th-REE deposit lies 30km to the southwest.

The area covered by EL26374 was selected by NuPower Resources Limited because of the potential for secondary uranium mineralisation (derived by erosion of adjacent uraniferous basement granites and gneisses) in unconsolidated Tertiary basin sediments of the Ti-Tree Basin.

The Pine Hill 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 that is subdivided into three, largely fault bounded terranes with distinct geological histories; the Aileron, Warumpi and Irindina Provinces. The basement geology of the region 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.

Because of the high grade of metamorphism and the paucity of continuous outcrop across the Arunta Province, a reliable stratigraphy has not yet been constructed for the metasedimentary sequences and instead, the Early–Mid Proterozoic metamorphosed rocks have been subdivided into three Divisions, intruded by granites, on the basis of broad lithological correlations, in which Division 1 is regarded as the oldest and Division 3 as the youngest.

Division I rocks comprise mafic and felsic granulites and minor metapsammite and calcareous lithologies that are typified by granulite facies metamorphic mineral assemblages. They are faulted against rocks of Division 2 or form enclaves surrounded by granite, orthogneiss or granitic gneiss. In the Pine Hill area they probably include the Tyson Creek Granulite, Weldon Metamorphics and Possum Creek Charnockite.

Division 2 comprises mostly metamorphosed pelitic, calcareous, or psammitic rocks and minor maficintermediate meta-igneous rocks. They range from low greenschist to low granulite facies and are usually faulted against Division 1 and overlain with an angular unconformity by Division 3. Units of Division 2 may be present here. Subdivided into 6 units they all appear to be lithological facies of one enormous flood of terrigenous detritus. Perhaps represented here by two lithologies of the Lander Rock Beds they comprise highly folded pelitic and impure metasediments ranging in grade from high amphibolite to low granulite facies that appear to have originated from a granitic terrain.

Division 3 consists of a basal conglomerate or arkose overlain by a mature quartzite followed by metamorphosed pelitic and calcareous rocks. Similar to Division 2 they grade from low greenschist to low granulite. This Division may be represented here by rocks of the Reynolds Range Group, a conformable sequence of quartzite, shale and carbonate.

Eleven intrusive granitic units, Mid Proterozoic in age, have been mapped in the Reynolds Ranges region, grouped into 7 older granitic gneisses and orthogneisses dated at 1500-1600m.y and three younger gneisses and unmetamorphosed porphyritic granite dated at 1350-1400m.y. Five of the older granitic rocks, the Anmatjira, Boothby, Yaningidjara, and Aloolya Orthogneisses and an un-named gneiss may be represented here. The Anmatjira and Aloolya Gneisses, and the un-named gneiss intrude Tyson Creek Granulite and Weldon Metamorphics in the Mt Weldon-Mt Finniss area west of the license where the Anmatjira Gneiss contains a small occurrence of rare earths near Mt Finniss. Boothby Gneiss outcrops in the headwaters of Woodforde River south of the area and is associated with the Nolan's Bore rare earths deposit. Yaningidjara Gneiss underlies the Yaningidjara Hills west of the area. The Orthogneisses are granitic in composition, contain xenoliths of the surrounding metamorphic rocks, locally send dykes into the surrounding country rocks and are therefore interpreted as pre-syn tectonic granites.

The Arunta Block is traversed by a series of WNE-NW trending faults that locally widen into extensive zones of shearing and retrogression comprising muscovite-quartz schist with extensive quartz veins and epidote-bearing rocks. These may pass beneath EL26374.

The southern NT forms a 'basin and range' province in which Proterozoic and Palaeozoic rocks form prominent ranges separated by broad valleys in which at least twenty major Cainozoic sedimentary basins have developed. Of these the Ti Tree Basin completely covers the Pine Hill area. The stratigraphy of these basins is generally poorly known due to a lack of outcrop, strong weathering overprints, the paucity of

drillholes and a lack of attention paid to the 'cover' overlying crystalline basement. Limited stratigraphic drilling by both the BMR and the NTGS during the 1960's and 1970's provides much of the regional stratigraphic information of the Cainozoic Basins.

During the late 1970's and early 1980's the Hale Basin southeast of Pine Hill was explored extensively for coal and sedimentary uranium and has therefore become the best known Cainozoic Basin in the NT and although the succession is relatively thin it is considered to represent a generalised Tertiary stratigraphy for the region. Here a broad two-fold stratigraphic subdivision comprises a restricted, fluvial palaeochannel dominated Palaeogene succession (Hale Formation) overlain by a more widespread, dominantly lacustrine Neogene succession (Waite Formation). Although 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.

Elsewhere historic and recent drilling results indicate that the basins may 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 as exploration drillholes to date by NuPower after drilling through a minimum of 320m of sediment south of Pine Hill, have locally failed to penetrate to basement and thicknesses of 400-500m of sediments are considered to be likely in the deeper portions of the basin.

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 during this time by the combination of periods of warm, humid climates, non-deposition and surface exposure. Three Palaeogene weathering events affecting the Arunta igneous and metamorphic basement rocks and the overlying Tertiary successions and two weathering events affecting the overlying Neogene successions have been recognised.

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. The Cainozoic sequence at Pine Hill is completely covered by this Quaternary material. The formation of calcretes, particularly within drainage channels overlying the Waite Formation, was also widespread during the Quaternary.

NuPower carried out an airborne electromagnetic (AEM) survey in 2008 over the area as part of a larger survey of NuPower's tenements in the Aileron region. The survey was designed to explore for buried palaeochannels within the Cainozoic sedimentary package as potential hosts for secondary uranium. Concurrently, water from station stock water bores in the vicinity of Pine Hill was sampled and assayed for a suite of major and trace elements the results of which are expected to assist with targeting potential sites of uranium accumulation within the palaeochannel systems. AEM survey results indicated that the technique was very successful; revealing that the Tertiary palaeodrainage system is far more extensive and better developed than previously thought. The Ti-Tree Basin infills a deep structural feature developed in two NW-SE trending grabens immediately to the north of the Ti-Tree Fault, where EL26374 is located.

NuPower also contributed to the NTGS Central Australia Gravity Survey over the Central Arunta region to acquire higher quality data for regional basement interpretation that confirmed the crustal significance of the Ti-Tree Fault. There were no infill stations on Pine Hill.

There was no on-ground exploration work during Year 2 or Year 3

ELA28475, Gilbeanie Bore, was applied for by NuPower on the 29<sup>th</sup> November 2010 to cover a prominent basement circular structure, immediately adjacent to EL26374. Together EL's 26374 and 28475 cover a basement structure of interest to NuPower for potential rare earth mineralisation.

There has been no work done on the tenement since the last annual report. It was decided not to proceed with exploration of the basement structure (magnetic anomaly) due to lack of funds and the probability that the anomaly just reflects magnetite content of mafic granulite.

## INTRODUCTION

Basement rocks of the Reynolds and Anmatjira Ranges contain elevated background levels of uranium and thorium. As far back as 1972 it was recognised that whilst these uraniferous crystalline basement rocks may host primary deposits of uranium, they also provide a potential source of uranium for secondary uranium mineralisation derived from weathering and dissolution of the uranium by meteoric groundwaters.

The products of the weathering and erosion of the crystalline basement throughout the Cainozoic have accumulated as thick sequences of unconsolidated material in flanking Cainozoic depocentres where they have the potential to host sedimentary uranium mineralisation.

Recognising this potential, NuPower Resources applied for and was granted a number of exploration licenses, including Pine Hill (EL26374) that cover part of the Cainozoic Ti-Tree Basin.

Exploration completed on tenement EL26374 during the first year of tenure included 58 line kilometres of airborne electromagnetic (AEM) surveys (as part of a larger survey in the Aileron Province). In addition to this, NuPower contributed to the NTGS helicopter-borne regional gravity survey (CAGS) over the central Arunta Region in order to obtain more detailed, 2km spaced data, over its Aileron Project tenements, but there were no infill stations on Pine Hill.

Concurrent with the AEM survey ground waters were sampled from stations bores in the region and assayed for a broad range of major and trace elements. However, there were no bores on Pine Hill.

#### LOCATION AND ACCESS

Pine Hill tenement EL26374 is located approximately 160 kilometres north northwest of Alice Springs within the Ti Tree (5553) 1:100,000 and Napperby (SF53-09) 1:250,000 map sheets (Figure 1). The tenement occurs within Pine Hill Station (NT Portion 725, PPL 1030) and straddles the Stuart Highway midway between the Ti-Tree Roadhouse and Aileron Roadhouses (approximately 30km from either).

The Amadeus Basin – Darwin gas pipeline passes through the tenement, whilst the Adelaide – Darwin Railway lies approximately 42km to the east.

Access to the tenement is via the Stuart Highway and from there via the network of station roads and tracks linking the water bores. It is also possible for light vehicles to access the tenement via the service road alongside the NT Gas pipeline; however a permit must be obtained from NT Gas before using this road.

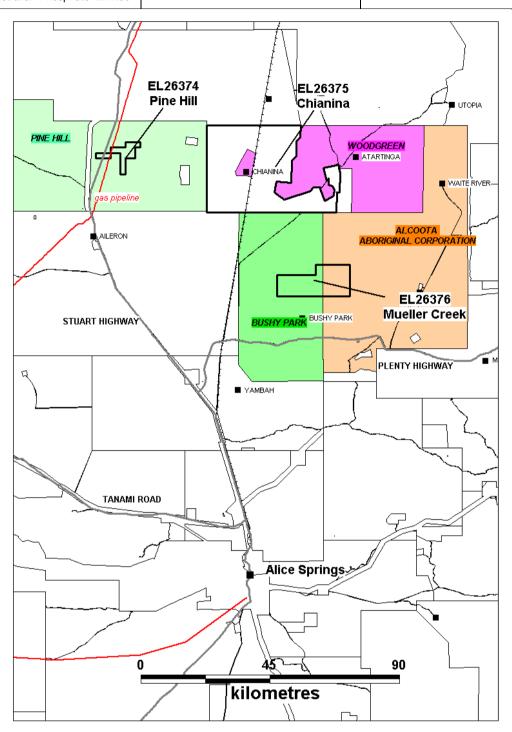


Figure 1 - Pine Hill (EL26374) Tenement Location and Pastoral Lease Plan

## 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 Pine Hill 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.

The Pine Hill tenement occurs in the Burt Plain (BRT) bioregion. Broad vegetation types within the Burt Plain bioregion include Eucalyptus low woodland with tussock grass understorey, Eucalyptus woodland with hummock grass understorey, Acacia woodland, hummock grassland and tussock grassland (Wilson *et. al.* 1991 as cited by Baker *et al.*, 2005).

#### TOPOGRAPHY AND DRAINAGE

Pine Hill EL26374 is situated to the north east of the NW-SE trending Ti-Tree Fault where the landscape over the Ti-Tree Basin consists of a flat, featureless sand-plain that slopes gently away from the ranges at elevations of around 575m to 605m ASL. The sand plain is mostly devoid of drainage, (Figure 2).

Drainage in the area is dominated by the headwaters of Woodforde River draining north-eastwards from the Reynolds Range west of EL26374.

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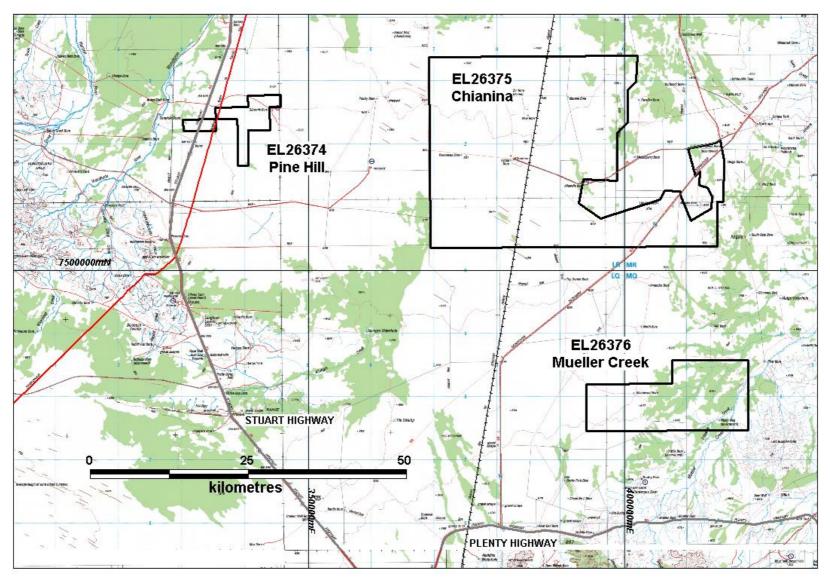


Figure 2 - Pine Hill (EL26374, pre-relinquishment) Topography

## 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, is located approximately 42km east of EL26374. The Stuart Highway and the natural gas pipeline from the Amadeus Basin (west of Alice Springs) to Darwin both transect the western side of the licence.

Service station and accommodation facilities are at the Aileron Roadhouse or the small township of Ti-Tree where there is a medical centre, school and police station. The nearest station homesteads are Aileron adjacent to the Aileron Roadhouse and Pine Hill located just to the west of the area.

The nearest medical facilities are located at Ti-Tree and Alice Springs.

#### TENURE AND RELINQUISHMENT

Exploration Licence 26734 (Pine Hill), comprising 17 graticular blocks covering 53.98km<sup>2</sup>, was applied for on 13<sup>th</sup> August 2007, (Figure 3) and granted to NuPower on 16 April, 2008 for a period of 6 years. On 31 January 2013 the name of the company was changed from NuPower Resources Ltd to Central Australian Phosphate Ltd.

An application for a partial waiver of reduction of 3 blocks was submitted on 8<sup>th</sup> April 2010. That was confirmed on 25<sup>th</sup> August 2010.

A further request for partial waiver of reduction was submitted on 9<sup>th</sup> March 2011, this was denied by the Department 24<sup>th</sup> May 2011 and a request to reduce the tenement by 50% was made. NuPower reviewed the area again and was able to recommend 7 blocks for relinquishment representing the requested 50% (Figure 4).

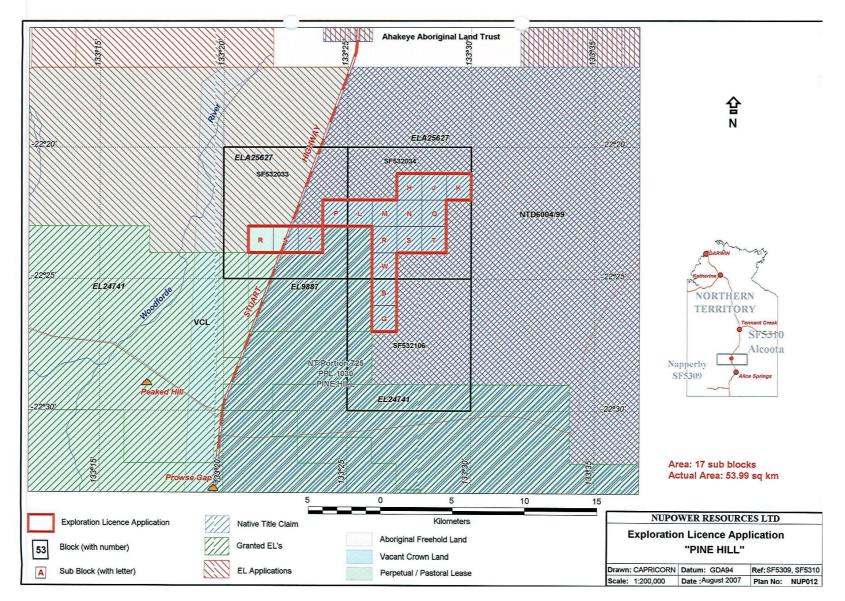


Figure 3 - Pine Hill (EL26374) Granted Area

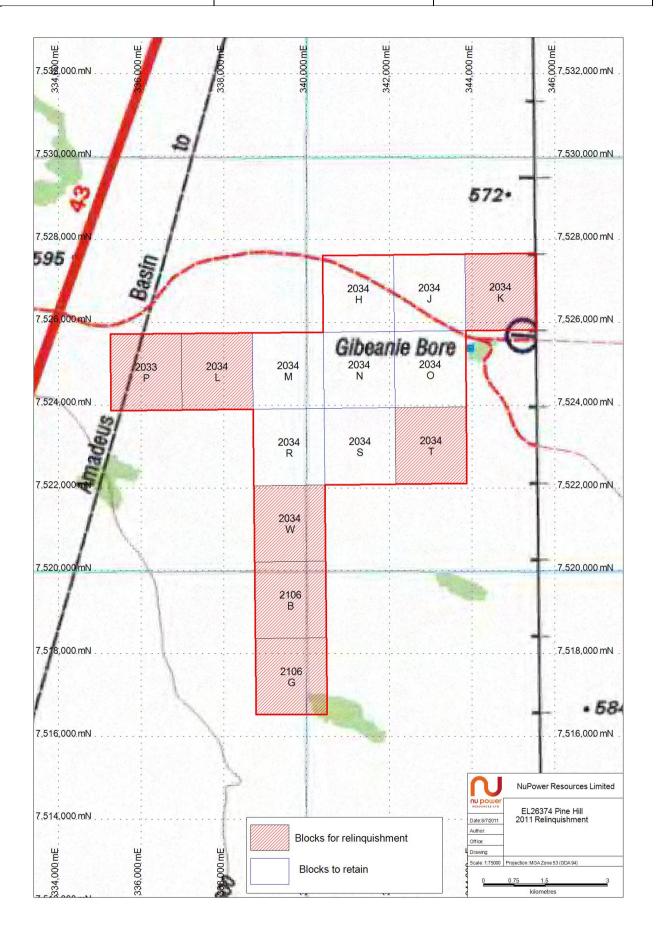


Figure 4 - EL26374, Pine Hill, Partial Reduction 2011

#### NATIVE TITLE AND SACRED SITES

NuPower requested an Inspection of the Register held by the Aboriginal Areas Protection Authority (AAPA) for registered or recorded sites for Pine Hill. AAPA have advised that there are no sites of cultural significance registered.

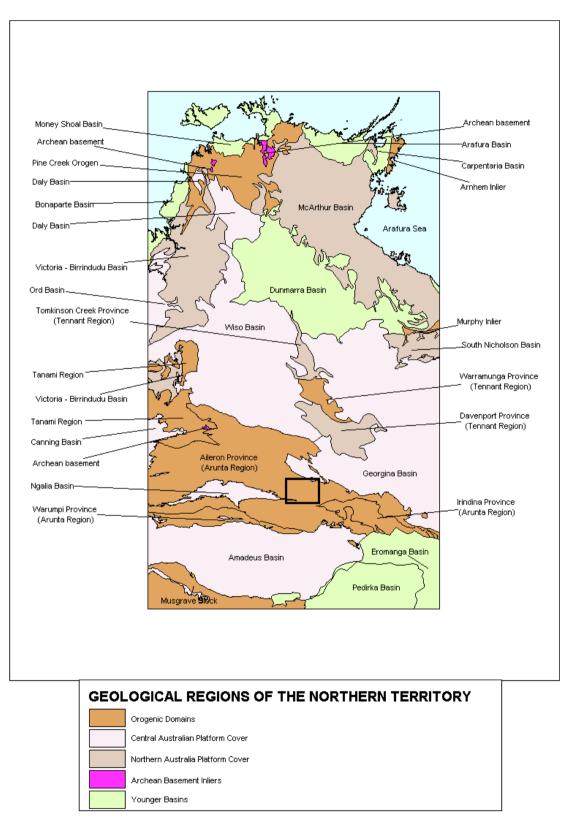
There is a registered Indigenous Land Use Agreement, DI2006/003, in the name of the Department of Planning and Infrastructure, called Pine Hill CLA ILUA, registered on 16/11/2007 that covers most of the license.

There is no Exploration Agreement in place between NuPower and the Central Land Council on behalf of the Traditional Owners.

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### **REGIONAL GEOLOGY**

Pine Hill EL26374 is situated in the Aileron Province of the Arunta Region in the southern part of the Northern Territory (Figure 5).





Deformed and metamorphosed Palaeoproterozoic orogenic rocks older than 1800 million years outcrop 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.

A system of major WNW-ENE trending and north-northeast dipping thrust and reverse faults and shear zones affects the Arunta Region and southern margin of the Ti Tree Basin. The associated shear zones can be up to hundreds of meters in width and extend for several kilometres, and are thought to have formed during the 400-300 Ma Alice Springs Orogeny (Cartwright et al., 1999). A major fault, informally referred to as the Ti-Tree Fault, runs along the northern boundary of the Reynolds Range (and it's continuation to the southeast) and forms part of this set of structures.

Cainozoic palaeodrainage systems are interpreted to be the remnants of the Mesozoic drainage system that once flowed into the Eromanga Basin in the southeast of the Northern Territory. Whilst the modern drainage flows north off the Reynolds Range, geological evidence strongly suggests that the Cainozoic palaeodrainage systems generally flowed towards the south and southeast. Evidence suggests a significant reactivation of structures created during Alice Springs Orogeny occurred during the early Tertiary and acted to deepen and create and rejuvenate the Cainozoic palaeodrainage systems. Southwards flowing palaeodrainage systems appear to have been dammed, diverted (generally to the east) and even reversed by this neotectonic event that also affected the MacDonnell Ranges to the south. This event is also interpreted to have been responsible for incision of meandering drainage systems through the MacDonnell (and other) Ranges. Similar drainage incision in response to early Tertiary neotectonism is also found in the Neoproterozoic Flinders Ranges (South Australia). In the Ti-Tree region, the creation of a minimum of 320m of structural relief (accommodation space) is indicated by the thickness of the preserved Cainozoic sedimentary package within the Ti-Tree Basin.

## 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 and underwent high-grade metamorphism and deformation during Ordovician (480 - 450 Ma)".

Pine Hill EL26374, is probably underlain by basement rocks of the Aileron Province (Figure 6).

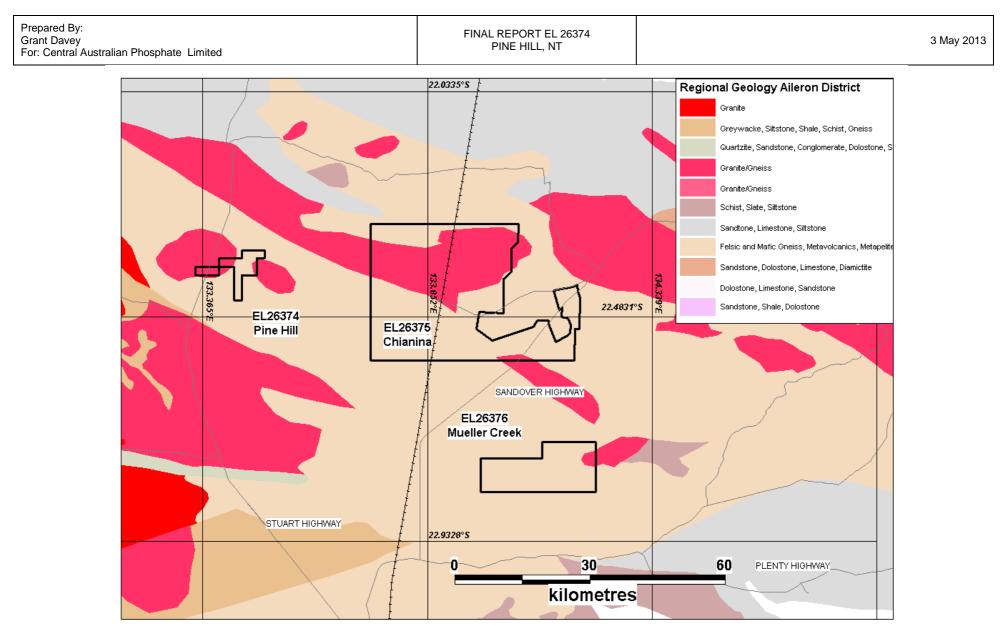


Figure 6 - Basement Geology, Aileron Region

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 Early–Mid Proterozoic 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. The rock units within each division may be chronostratigraphic correlatives but there is no evidence yet to support this.

Division 1 Palaeoproterozoic rocks comprise the Aileron Metamorphics consisting of pelitic, semi-pelitic, psammitic and calc-silicate gneisses and granulites, meta-gabbro, dolerite and mafic granulite. These rocks outcrop in the Anmatjira Ranges northwest of Pine Hill where they are intruded by Proterozoic granites, gneisses and orthogneisses, of the Arunta Block and are therefore inferred to underlie the area at depth beneath cover.

#### Proterozoic-Palaeozoic

North of Pine Hill the Arunta Inlier is stratigraphically unconformably overlain by outliers of Neoproterozoic and early Palaeozoic sediments of the Georgina Basin that may also underlie Pine Hill at depth. The stratigraphy of this basin comprises basal quartz sandstones, quartzites and conglomerates of the Grant Bluff Formation overlain by transitional marine/continental and glacial red and white sandstones and siltstones, quartzite, arkose, shale, conglomerate with basal tillites, boulder beds and ferruginous pebbly sandstones of the Central Mount Stuart Formation. These in turn are unconformably overlain by Cambrian and Ordovician sandstones, siltstones dolomite and chert of the Tomahawk Beds. The youngest rocks in the basin are of Devonian age and consist of cross-bedded sandstone, siltstone and conglomerate of the Dulcie Sandstone.

#### Cainozoic

Basement and Georgina Basin sediments in the Pine Hill area are covered by unconsolidated Cainozoic sediments derived by weathering of the surrounding basement terrains, (Figure 7).

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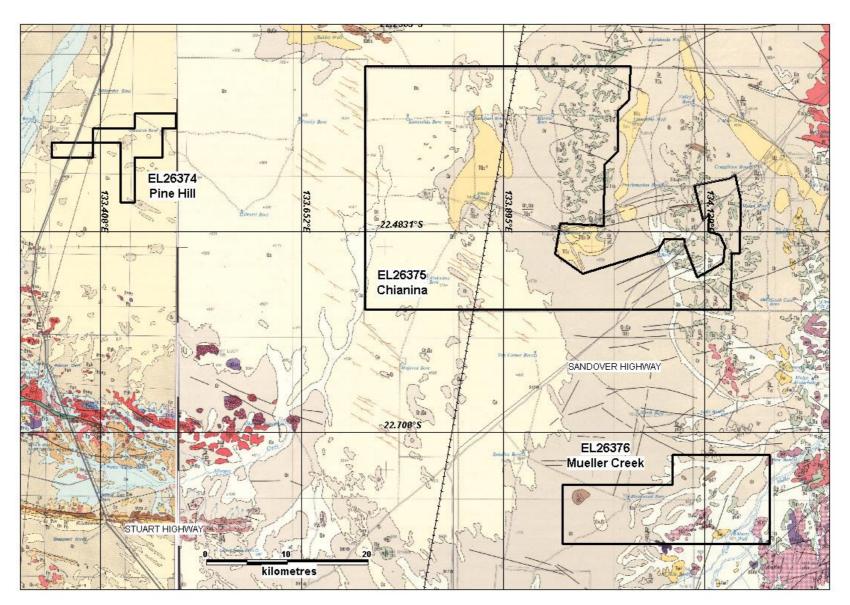


Figure 7 - Local Geology of the Pine Hill Region

The southern NT forms a 'basin and range' province with Proterozoic and Palaeozoic forming prominent mountain ranges separated by broad valleys. Cainozoic sedimentary basins are widespread and well-developed within these intervening topographic depressions with at least twenty major basins outlined, (Senior *et al.*, 1995).

The Pine Hill tenement is located in the southern part of the Ti-Tree Basin (Figure 7), which is known to be one of the best developed Cainozoic basins 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.

The stratigraphy of the intermontane Cainozoic basins of the southern NT region is generally poorly known. This can be attributed to a lack of outcrop and strong weathering overprints, paucity of drillholes and a lack of attention paid to the 'cover' overlying crystalline basement and 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.

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 the 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.

Broadly speaking the Cainozoic can be subdivided into a restricted, fluvial palaeochannel dominated Palaeogene succession (Hale Formation) and a more widespread, dominantly lacustrine Neogene succession (Waite Formation).



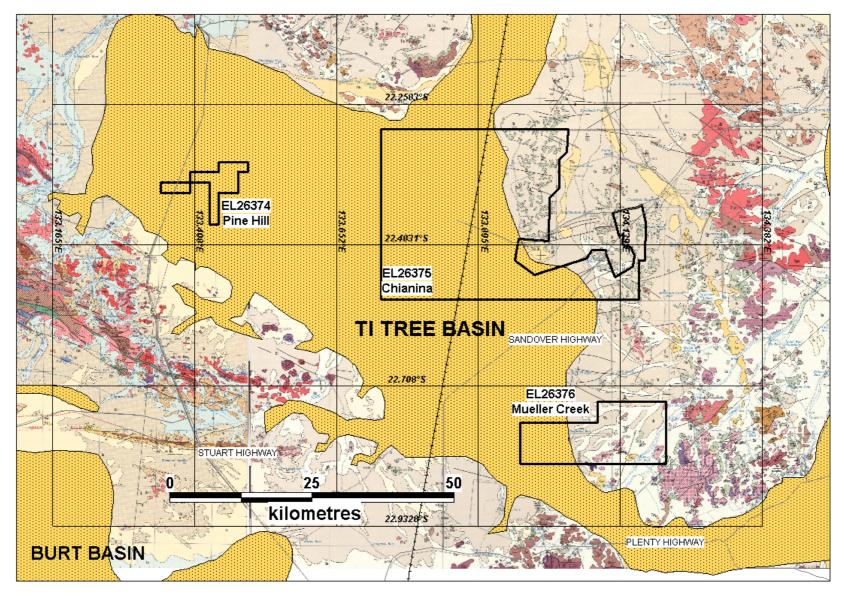


Figure 8 - Tertiary Ti Tree Basin

The Hale Basin was explored extensively for coal (lignite) and sedimentary uranium during the late 1970's and early 1980's and is considered to be the best known Cainozoic in the NT. Whilst initially defined in individual Tertiary Basins, the Hale and Waite Formations are components of a much larger Tertiary palaeodrainage system, the extent and size of which has until now been vastly underappreciated. The Waite Basin forms a tributary to the Ti-Tree Basin whilst the Hale Basin can essentially be considered to be an isolated outlier of the Ti-Tree Basin that lies further to the southeast along the extension of the Ti-Tree Fault (informal name). Application of these formation names is particularly useful in understanding the regional geological framework.

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). Senior *et al.* (1995) defined three weathering events which affected Arunta igneous and metamorphic basement rocks and the overlying Tertiary succession:

Senior *et al.*'s (1995) <u>Weathering Event A</u> 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 meters thick that grades into a multicoloured mottled zone up to 10 meters thick. The mottled zone is overlain by a ferruginous (ferricrete) zone up to 8 meters thick (Senior et al., 1995).

Following uplift and partial truncation of the deeply weathered basement rocks, sedimentation began in the surrounding Tertiary basins in the Palaeocene with thick colluvium including fanglomerates flanking the ranges, followed by deposition during the Early to Middle Eocene of alluvial and lacustrine sand, silt and clay (locally carbonaceous) and lignite of the Lower Hale Formation in the Ti-Tree and Burt Basins. Locally this includes a basal lacustrine green and grey pyritic mudstone, white mudstone and siltstone, and red iron oxide stained siltstone and siltstone.

<u>Weathering Event B</u>, recorded in the Hale Basin in the eastern part of the ALICE SPRINGS 1:250,000 Geology Map Sheet, occurred prior to the Middle Eocene, although there is little evidence elsewhere for this weathering event (Senior et al., 1995). This resulted in formation of a second ferricrete and lithification of colluvium to fanglomerate.

Deposition of sandstones of the Upper Hale Formation took place during the Late Eocene and these sediments were subsequently overprinted by <u>Weathering Event C</u> which 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 followed during the Middle to Late Miocene and resulted in the accumulations of over 300 meters of fluviatile and lacustrine chalcedonic limestone, sands, muds, and sandy conglomerate in localised depocentres.

The upper portions of the Waite Formation are dominated by regionally widespread dolomitic clays and clays that reflect the extensive development of broad, shallow evaporitic lakes throughout southern Australia as the continent drifted further northwards and became progressively more arid and seasonal.

The Waite Formation interfingers with and is conformably overlain by a moderately thick (<60m) succession of oxidised colluvial material shed of the ranges in response to neotectonism during the (?Late) Pliocene. A broadly coarsening upwards alluvial fan succession was eroded off the rejuvenated ranges and can be recognised throughout the region. 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.

The Napperby Formation is capped by Quaternary red earth, alluvial sands and gravels and aeolian sand accumulated downslope from the uplifted areas. Calcrete precipitated along stream channels, evaporites formed in playa lakes, and sand plains and aeolian dunes developed in low lying areas (Stewart, 1981).

Quaternary sediments completely cover Pine Hill, (Figure 8).

## PREVIOUS EXPLORATION

Open File Report Number	Dates	Company	Commodity	Tenement	Work Completed	Comments
CR1973- 0026	May June 1972	CRA Exploration Pty Ltd	U	AP3360	Ground radiometrics	
CR1973- 0183		CRA Exploration Pty Ltd	U	EL752	Stratigraphic Diamond Drilling, Downhole gamma logging, Airborne radiometrics, Seismic Palynology	Six diamond drill holes [TT1-TT6]. Lithology not favourable for sed. Uranium. Palaeochannels may contain concentrations of sedimentary uranium. Further investigation warranted.
CR1973- 0269	Feb 1973	CRA Exploration	U	EL752	Seismic survey	Contains seismic traces, no raw data nor interpretation.
CR1984- 0117	June 1983 – June 1984	BHP Minerals	Base Metals	EL4188	Ground mags, Gravity, Drilling	Over BMR TMI bulls eye anomaly. Drilling intersected weakly magnetic gneiss. No significant assays,(base metals).
CR2004- 0689	23/12/2003 - 22/12/2004	Tanami Gold NL	Cu, Au	EL9801- 9806, EL9836, EL22924	Geological Review and Interpretation.	No physical exploration work 'on the ground' as agreements being negotiated with the CLC.
CR2005- 0378	28/07/2003 - 27/07/2005	Tanami Exploration N.L.	Cu, Au (Ag, As, Au, Cu, Pb, Zn assays)	EL9801, EL9802, EL9805	Regional assessment, Rock chip sampling	EL9801 – 10 Rock Chip samples [ALK001-010] EL9805 – 16 Rock Chip samples [ALK011-026] No significant assays
CR2005- 0590	23/12/2004 - 22/12/2005	Tanami Gold N.L.	Cu, Au	EL9801- 9806, EL9836, EL22924	-	No physical exploration work 'on the ground'

Open file records held by the NTGS indicate that three companies have conducted exploration over Pine Hill tenement area in the past. Tanami Gold NL explored for Cu/Au deposits in the 2000's, BHP conducted base metals exploration in the early 1980's, and prior to this CRA conducted uranium exploration in the early 1970's.

CRA's efforts included radiometric and seismic surveys and they drilled five stratigraphic diamond holes TT1-TT5 within EL26374. It was recognised that palaeochannels could exist in the area. Seismic surveys are said to have indicated basement topography and a subsurface valley structure has been indicated, but the tenement was subsequently relinquished in 1973.

Individual open file reports are detailed further, below.

CR1973-0026 (Ti Tree Area - Tenements AP3360 / EL3360)

Author: Hughes, R. E, O'Sullivan, K.N., 1972. Company: CRA Exploration Pty Ltd Commodity: U Dates: May-June 1972

EL3360 overlapped the middle and southeast of Woodforde EL24741, encompassed the whole of Pine Hill EL26374 and extended further north and east of the present tenement. A literature search was undertaken and the presence of anomalous analyses for uranium in local water bores was noted.

Fifty-eight water bores were then sampled and 46 gamma logs were run on all open bores. Many of the bores had been idle for several years and this may have affected the analytical results. Continuous ground radiometric traverses were also run. Sediments in the valley of the Kerosene Camp Creek and Woodforde River were sampled by 46 shallow auger drill holes. Additional work was recommended, however this was the final report and the tenement was relinquished in 1972.

#### CR1973-0183 (Ti Tree Area – Tenement EL752)

Author: O'Sullivan, K.N., 1973. Company: CRA Exploration Pty Ltd Commodity: U Dates: May-June 1972

EL752 overlaps the majority of Pine Hill EL26374 and extends further north. The southwest corner of EL752 just overlaps a small portion of Woodford EL24741

Based on earlier work in the tenement area, six stratigraphic HQ diamond drill holes totalling 1277.79m were drilled at 5km intervals across EL752. The sediments intersected were not considered favourable for uranium deposition due to poor permeability, fine grain size and fair to good sorting. Report contains geological logs, downhole gamma logs and cross sections.

Five of these holes, TT1-TT5, are within EL26374, whilst the sixth, TT6 occurs within Woodford tenement EL24741. It was recognised that palaeochannels could exist and three seismic lines were run using the reflection method. The reflection seismic method appears to have successfully indicated basement topography and a subsurface valley structure has been indicated, but the tenement was subsequently relinquished in 1973.

Palynological examination of lignite from TT6 suggested age is probably middle Miocene, "certainly not Pliocene nor Upper Eocene" and may correlate with lower units of the Etadunna Formation in the Lake Frome area where sandy units of the formation host uranium mineralization.

#### CR1973-0269 (Ti Tree Area – Tenement EL752)

Author: Thomas Johnson, B. 1973 Company: CRA Exploration Pty Ltd Commodity: U Dates: February 1973

Seismic reflection survey. Report contains traces but no raw data, and no interpretation.

#### CR1984-0117 (Old Gilbeanie – Tenement EL4188)

Company: BHP Minerals Ltd Commodity: U, Base Metals Dates: June 1983 – June 1984

This tenement just overlapped Woodforde EL24741 at the east central boundary and extended to the north and east, also overlapping the westernmost quarter of Pine Hill tenement EL26374. Exploration was for base metals.

A combined aeromagnetic/radiometric survey was flown over the tenement in May 1983 and two gravity traverses were carried out. The resulting magnetic intensity contour map of the area revealed a "bull's-eye" shaped anomaly, however, subsequent evaluation of the anomaly gave no significant values. One percussion hole, drilled 256m, passed through 94m of Tertiary sediments before intersecting crystalline basement. It was concluded that a unit within the Arunta Complex was the source of the anomaly and geochemical analyses of drill samples for base metals revealed no significant values.

#### CR2004-0689 (Alcoota Project – Tenements EL9801-9806, EL9836, EL22924)

Author: Baines, G. 2005.

Company: Tanami Gold NL Commodity: Cu, Au Dates: 23/12/2003 – 22/12/2004

Annual Report by way of letter only. Geological review and interpretation was undertaken although outcomes are not mentioned. No on the ground exploration was undertaken due to protracted negotiations and failure to reach agreements with the CLC.

Reference to rock chip sampling having been undertaken on EL22924 in November 2003, although no results are included.

#### CR2005-0378 (Alcoota Project – Tenements EL9801, EL9802, EL-9805)

Author: Rhodes, C. 2005. Company: Tanami Exploration NL Commodity: Cu, Au Dates: 28/07/2003 – 27/07/2005

Final Report EL9801 and EL9805. Second Year Partial Relinquishment Report EL9802.

Exploration focussed on Tanami style gold only, iron oxide copper-gold and Tennant Creek style copper gold. Exploration consisted of a regional assessment and a single field reconnaissance trio in November – December 2003.

EL9801 – 10 rock chip samples EL9805 – 16 rock chip samples

No significant assays returned and ground was dropped. No physical exploration undertaken on the portion of EL9802 relinquished.

#### CR2005-0590 (Alcoota Project – Tenements EL9801-9806, EL9836, EL22924)

Author: Graham, A. 2006. Company: Tanami Gold NL Commodity: Cu, Au Dates: 23/12/2004 – 22/12/2005

Annual Report by way of letter only. EL9801, 9803 and 9805 dropped during the year and substantial portions of EL9802, EL9804 and EL9836 were surrendered in July/October 2005. No field work was undertaken during the year.

## EXPLORATION BY NUPOWER

## YEAR 1 (16/4/2008 – 15/4/2009)

Exploration completed on Pine Hill tenement EL26374 during Year 1 included the completion of 58 line kms of airborne electromagnetic surveys (AEM) over the tenement as part of a larger survey conducted in 2008, contribution to a helicopter-borne regional gravity survey (CAGS) conducted by the NTGS over the central Arunta Region in order to obtain more detailed, 2km spaced data, over its Aileron Project tenements, including EL26374, and ground water sampling form station bores in the region. The results of this work have been reported previously, (Blair, 2009).

#### AIRBORNE ELECTROMAGNETIC (AEM) SURVEY

A total of 58 line kms of AEM was flown at 1.0km line spacings over Pine Hill tenement EL26374 as part of the 2008 survey.

The tenement lies within the southern part of the Ti Tree Basin. The AEM survey showed that the basement is buried deeply beneath a thick sequence of Cainozoic sediments, confirmed by NuPower's drilling on EL24741 nearby. With good potential for reduced sediments necessary for uranium precipitation from ground waters the tenement is regarded as highly prospective.

## AIRBORNE REGIONAL GRAVITY SURVEY

During 2008 the NTGS conducted a helicopter-borne regional gravity survey (CAGS) over the central Arunta Region with survey points spaced 4km apart. NuPower contributed to the program in order to obtain more detailed, 2km spaced data, over its Aileron Project tenements.

There were no infill stations on EL26374.

The results of this survey will be useful in modelling of the basement and the exploration for structurally controlled mineralisation under the Cainozoic Basin fill.

## STATION BORE GROUND WATER SAMPLING

Concurrent with the AEM survey NuPower collected ground water samples from station bores in the region and assayed them for a broad range of major and trace elements. The results are intended to assist with the exploration for secondary uranium mineralisation in the Cainozoic succession. There were no bores to sample on EL26374.

## YEAR 2 (16/4/2009 – 15/4/2010)

There was no on-ground exploration during Year 2.

### YEAR 3 (16/4/2010 – 15/4/2011)

There was no on-ground exploration during Year 3. Open file data was compiled and a drill plan was prepared for 2011, subject to funding. EL26374 abuts ELA28475 and together these tenements cover a prominent basement magnetic circular structure of interest to NuPower for potential rare earths mineralisation, (Figure 9).

#### YEAR 4 (16/4/2011 - 15/4/2012)

There was no on-ground exploration during Year 4. It was being decided how to approach exploration of the basement circular structure on the Pine Hill and Gilbeanie Bore tenements.

## YEAR 5 (16/4/2012 – RELINQUISHMENT DATE)

No work was done during this time. It was decided not to proceed with exploration of the magnetic anomaly due to lack of funds and the realization that the anomaly is most likely due to the magnetite content of underlying mafic granulite.

Jhly

GRANT DAVEY BSc 3 May 2013

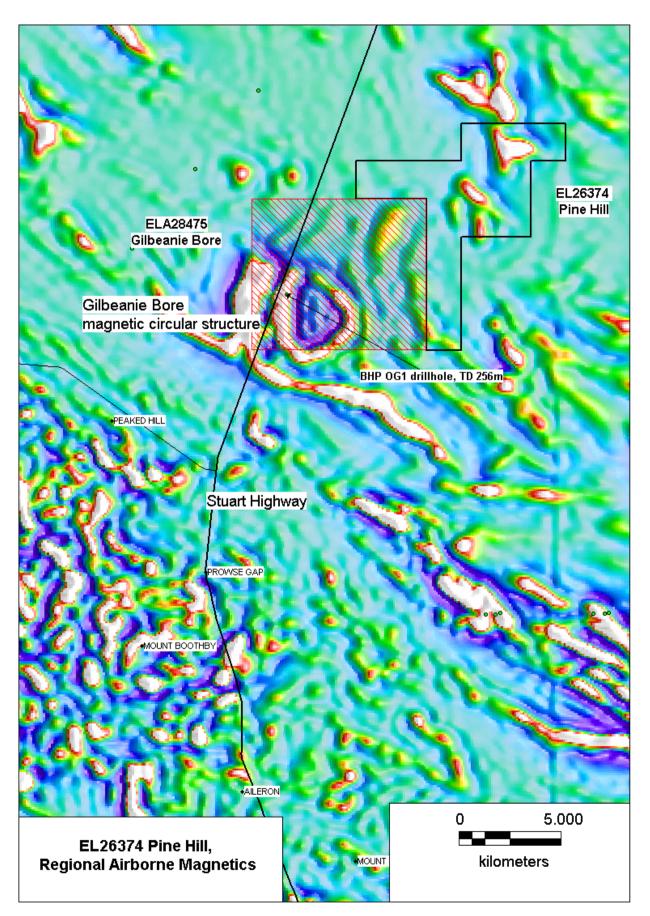


Figure 9 - EL26374, Pine Hill, Airborne Magnetics

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