Central Australian Phosphate Ltd
ABN: 91 120 787 859

EL 26376 Mueller Creek

Annual and Final Report
16/04/2008 to 29/04/2013
Operator: Central Australian Phosphate Ltd

Authors: Grant Davey
Date: 3 May 2013

Map Sheets
1:100,000 Alcoota 5752
1:100,000 Bushy Park 5652
1:250,000 Alcoota SF53-10
GDA94, Zone 53

Distribution:
Department of Resources
Central Australian Phosphate Ltd Sydney office
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SUMMARY

This is the fourth Annual Exploration Report for Mueller Creek tenement EL26376 that was granted to NuPower on 16 April 2008.

There are no known mineral occurrences in the area. The nearest are the vermiculite occurrence associated with the Bleechmore Dykes 3km south of the tenement.

The area covered by EL26376 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.

There is little primary uranium potential; basement gneisses and granulites that outcrop sparsely in the eastern part of the area exhibit no airborne uranium radiometric anomalies although there are thorium anomalies associated with these rocks.

The basement of the Aileron region comprises 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 Mueller Creek area 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 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.

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. There is evidence for these here in the regional airborne magnetic data.

Basement rocks of Division 1 are limited to outliers and minor outcrops of the Mt Bleechmore Massif of Precambrian rocks of the Strangways Metamorphic Complex in the eastern part of the tenement comprising sillimanite-garnet-biotite-feldspar-quartz gneiss, garnet-feldspar migmaitite, mafic granulite, plutonic migmaitite and rare calc-silicate rocks of the Mt Bleechmore Gneiss and migmaitic garnet-biotite-feldspar-gneiss, amphibolite, quartzite and calc-silicate rocks of the Chiripee Gneiss. Undifferentiated Pre-Cambrian rocks also include gneiss, schist and mafic granulite. Proterozoic rocks include porphyroblastic gneiss interlayered with schistose biotite-muscovite gneiss of the Langford Gneiss.

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 which the Ti Tree Basin underlies the western part of the license 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’ overlaying 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 Mueller Creek 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 though a minimum of 320m of sediment north west of Mueller Creek, 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 claying and sandy soils that record a complex history of deposition, erosion and redeposition due to climate changes and gentle tilting. The Cainozoic sequence at Mueller Creek is almost completely covered by this 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 during the first year that covered the western half of the tenement as part of a larger survey of NuPower's tenements in the Aileron region, designed to explore for buried palaeochannels at the base of and within the Cainozoic sedimentary package as potential hosts for secondary uranium. A total of 125.8 line kilometres was flown here at 1km line spacing at a nominal terrain clearance of 120m. Concurrently, water from 2 station stock water bores was sampled and assayed for a suite of major and trace elements the results of which were expected to assist with targeting potential sites of uranium accumulation within the palaeochannel systems.

The 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. It indicates that the Ti-Tree Basin infills a deep structural feature developed in two NW-SE trending grabens immediately to the northeast of the Ti-Tree Fault and that part of these structures lies beneath the western part of Mueller Creek. The western part is therefore considered prospective for secondary uranium mineralisation because reduced sediments, required for the precipitation of uranium from groundwater, are likely to be present here. NuPower also contributed to the NTGS Central Australia Gravity Survey (CAGS) over the Central Arunta region that included EL26376 to acquire higher quality data for regional basement interpretation.

There was no on-ground exploration work during Year 2.

In Year 3 airborne radiometric anomalies were traversed and found to be due to probable monazite in outcropping high grade metamorphic rocks and to monazite concentrations in alluvial sand derived from the metamorphics. Magnetic anomalies in the EL were considered as possible targets for rare earth mineralization.

There was no on-ground exploration work during Years 4 and 5. The tenement was relinquished because NuPower is no longer exploring for paleo-channel uranium. The magnetic anomalies in the area are now considered to be almost certainly due to magnetic mafic granulite.
INTRODUCTION

Basement rocks of the Reynolds, Yalyirimbi, Anmatjira and Strangways Ranges contain elevated background levels of uranium and thorium. As far back as 1972 it was recognised that whilst these uraniumiferous 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 Mueller Creek (EL26376), that cover part of the Cainozoic Ti-Tree Basin.

Exploration completed by NuPower on the tenement during the first year of tenure included 125.8 line kilometres of airborne EM surveys (as part of a larger survey in the Aileron Province), the collection of ground water samples from station bores and the contribution 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. In the second year no fieldwork was done. In 2010 ground follow up of radiometric anomalies was carried out. In 2011 - 2012 no fieldwork was done.

LOCATION AND ACCESS

Mueller Creek tenement EL26376 is located approximately 100 kilometres north of Alice Springs within the Alcoota (5752) and Bushy Park (5652) 1:100,000 and Alcoota (SF53-10) 1:250,000 map sheets (Figure 1). The tenement straddles Bushy Park Station (NT Portion 687, PPL 1122) and Aboriginal land owned by the Alcoota Aboriginal Land Corporation (NT Portion 4029).

The Adelaide – Darwin Railway lies approximately 15km to the west of the tenement.

Access to the tenement is via the Plenty or Sandover Highways and from there via the network of station roads and tracks linking the water bores.
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 Mueller Creek 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 Mueller Creek tenement occurs in the Burt Plain bioregion. Broad vegetation types 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

Mueller Creek EL26376 is situated in an area of the Ti-Tree Basin that consists of a flat, featureless sand-plain that slopes gently away towards the east. Elevations recorded within the tenement vary from around 613m to 650m ASL. Drainage in the eastern half of the tenement is dominated by Mueller Creek and Edwards Creeks which drain in a north-easterly direction, (Figure 2).
Figure 2 - Mueller Creek (EL26376 – original area) 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 Sandover Highway is 13km west of the tenement, the Plenty Highway is approximately 13km south of the tenement and the Adelaide-Darwin transcontinental railway is located approximately 15km west of EL26376.

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 Yambah, some 26 km SW of the tenement or Alcoota, 23.5 km east of the tenement.

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

TENURE AND RELINQUISHMENT

Exploration Licence 26736 (Mueller Creek), comprising 74 graticular blocks covering 234.4km2 (Figure 3 - Mueller Creek (EL26376) Original Tenement Area and 2010 Relinquished Blocks), was granted to NuPower Resources Ltd (ABN 91 120 787 859) on 16 April, 2008 for a period of 6 years.

An application for a waiver of reduction was submitted on 8th April 2010 but denied on 11th May 2010. Following this a relinquishment of 13 sub-blocks was made (Figure 3).

Upon the end of Year 3 a partial waiver was requested on 1st March 2011. A total of 4 blocks only were offered for relinquishment. This was denied by the Department on 5th May 2011. Ultimately an area reduction of 31 blocks was submitted to the Department on 24th May 2011, (Figure 4).

The name of NuPower Resources Ltd was changed to Central Australian Phosphate Ltd on 31 January 2013.
Figure 3 - Mueller Creek (EL26376) Original Tenement Area and 2010 Relinquished Blocks
Figure 4 - Mueller Creek (EL26376) Tenement Area and 2011 Relinquished Blocks
NATIVE TITLE AND SACRED SITES

An Inspection of the Register of Sacred Sites held by the Aboriginal Areas Protection Authority identified one recorded site within the southern part of the tenement. Exploration activities were planned to avoid this area.

The eastern part of EL26376 overlaps Aboriginal (enhanced freehold) Land owned by the Alcoota Aboriginal Land Corporation (NT Portion 4029).

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

There are no ILUA’s registered against the land.
REGIONAL GEOLOGY

Mueller Creek EL26376 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)”.

The Mueller Creek tenement is underlain by basement rocks of the Aileron Province, (Figure 6).
Figure 6 - Basement Geology of 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.

Exposure is limited to minor outcrops of Pre-Cambrian rocks of the Strangways Metamorphic Complex comprising sillimanite-garnet-biotite-feldspar-quartz gneiss, garnet-feldspar migmatite, mafic granulite, plutonic migmatite and rare calc-silicate rocks of the Mt Bleechmore Gneiss and migmatic garnet-biotite-feldspar-gneiss, amphibolite quartzite and calc-silicate rocks of the Chiripee Gneiss. Undifferentiated Pre-Cambrian rocks also include gneiss, schist and mafic granulite. Proterozoic rocks include porphyroblastic gneiss interlayered with schistose biotite-muscovite gneiss of the Langford Gneiss, (Figure 7).

**Proterozoic-Palaeozoic**

The Arunta Inlier is stratigraphically unconformably overlain by Neoproterozoic and early Palaeozoic sediments of the Ngalia and Georgina Basins.

The Ngalia Basin 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.

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. Tertiary sediments overlying the Ngalia and Georgina Basins also have potential for similar uranium deposits.

These units are unlikely to be present at Mueller Creek.

Outliers of the Georgina Basin may underlie Cainozoic sediments northeast of the tenement. The stratigraphy if 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.
Figure 7 - Local Geology of the Aileron Region
Cainozoic

Pre-Cambrian-Proterozoic basement rocks and Proterozoic-Palaeozoic basinal sediments in the Mueller Creek license are largely covered by unconsolidated Cainozoic sediments derived by weathering of the surrounding basement terrains.

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 by Senior et al., 1995.

The Mueller Creek tenement covers parts of the south-eastern corner of the Ti-Tree Basin (Figure 8), that is known to be one of 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.

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).

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) Weathering Event A occurred during the Late Cretaceous to Early Tertiary (Palaeocene). A trizonal profile was developed in basement rocks over a widespread area of the Arunta Region and at the base of surrounding Tertiary basins. The trizonal profile consists of a basal kaolinitic zone up to 10 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.

Weathering Event B, 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 Weathering Event C 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 fluvialite 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).
Figure 8 - Tertiary Basins (shown in yellow) in the Sandover – Alice Springs Area
PREVIOUS EXPLORATION

Open file records held by the NTGS indicate that very little exploration has taken place at Mueller Creek. Just one company, Tanami Gold NL, explored the area for Cu/Au deposits in the 2000’s. The only tangible work conducted within EL26376 was the drilling of five aircore holes [ALA001-005].

Historical exploration in the area is further detailed below.

<table>
<thead>
<tr>
<th>Open File Report Number</th>
<th>Dates</th>
<th>Company</th>
<th>Commodity</th>
<th>Tenement</th>
<th>Work Completed</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR2004-0051</td>
<td>23/12/2002 – 22/12/2003</td>
<td>Tanami Gold N.L.</td>
<td>Au, Cu, (Ag, As, Pt, Pd, Pb, Zn)</td>
<td>EL9801, EL9803, EL9805</td>
<td>Aircore Drilling, Rock chips, Lag sampling.</td>
<td>15 aircore holes within EL9803 (ALA001-ALA005 within ELA26376).</td>
</tr>
<tr>
<td>CR2004-0689</td>
<td>23/12/2003 – 22/12/2004</td>
<td>Tanami Gold N.L.</td>
<td>Cu, Au</td>
<td>EL9801-9806, EL9836, EL22924</td>
<td>Geological Review and Interpretation.</td>
<td>No physical exploration work ‘on the ground’ as agreements being negotiated with the CLC.</td>
</tr>
<tr>
<td>CR2005-0590</td>
<td>23/12/2004 – 22/12/2005</td>
<td>Tanami Gold N.L.</td>
<td>Cu, Au</td>
<td>EL9801-9806, EL9836, EL22924</td>
<td>-</td>
<td>No physical exploration work ‘on the ground’</td>
</tr>
</tbody>
</table>

Table 1 - Mueller Creek (EL26376) Historic Exploration

**CR2004-0051 (Alcoota Project – Tenements EL9801-9806, EL9836, EL22916, EL22924)**

Author: Rohde, C. 2004
Company: Tanami Gold NL
Commodity: Cu, Au

Focus on Tanami-style Au, IOCG, and Tennant Creek style Cu-Au.

Regional Assessment,
Rock chip sampling, 77 samples
Lag sampling, 14 samples
Aircore drilling [15 holes for 1327m] within EL9803 – 5 holes ALA001-005 within Mueller Creek EL26376.

Drilling tested Iron-Ore, Copper Gold targets generated from gravity and aeromagnetic data. 15 aircore holes [ALA001-015] were drilled on EL9803 (Alcoota). Five of these holes [ALA001-ALA005] are within and close to the western boundary of the Mueller Creek tenement EL26376. Logs and assays Au, Cu, Ag, As, Pt, Pd, Pb, Zn included in the report.

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

Author: Baines, G. 2005.
Company: Tanami Gold NL
Commodity: Cu, Au

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

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


Exploration completed on Mueller Creek tenement EL26376 during Year 1 included the completion of 125.8 line kilometres of airborne electromagnetic surveys (AEM) over the tenement as part of a larger survey conducted in 2008. In addition, the company contributed 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 EL26376. Results of this work have been reported previously, (Blair, 2009).

Water from two station water bores was sampled and analysed for a suite of major and trace elements, the results of which were reported previously, (ibid).

Results from the geophysical work and the water bore sampling have been previously reported.

YEAR 2 (16/04/09 – 15/04/10)

There was no on-ground exploration of EL26376 during Year 2.

YEAR 3 (16/04/10 – 15/04/11)

Two days were spent traversing vehicle tracks in the area and following up an airborne radiometric thorium anomaly (with a very weak coincident uranium anomaly) in the southern-central part of the tenement. The radiometric anomaly is almost certainly due to elevated concentrations of monazite in the high grade metamorphics and to further concentration of this in active sediments which are derived from the metamorphics.

YEAR 4 (16/04/11 – 15/04/12)

No fieldwork was done on EL26376 in Year 4. Magnetic anomalies in the tenement were thought to be possibly associated with alkalic intrusives or carbonatite with rare earth potential.

YEAR 5 (16/04/12 – RELINQUISHMENT DATE)

No fieldwork was done in this period. From work done in the ELs that adjoin Mueller Creek to the east, the potential of magnetic anomalies in Mueller Creek have been downgraded. They are almost certainly due to magnetite in mafic granulite.

GRANT DAVEY
1 September 2012
REFERENCES


WYCHE S. 1983 Coal and Lignite Occurrences in the Southern part of the Northern Territory. NTGS Tech Report GS83/1.