NUPOWER RESOURCES LTD

ABN: 91 120 787 859

AILERON PROJECT

EL24956 BURT PLAIN

Final Report

and

Annual Report For Period Ending 6th September 2012

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Date: 3/9/12

1:250,000 Napperby SF/53-9
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Distribution:
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SUMMARY
The license, EL24956, was granted on 7 September 2006 and transferred to NuPower Resources Ltd on 14th March 2007 as a result of the demerger of Arafura’s uranium assets into the newly formed company focussed on uranium.

There are no known mineral occurrences or prospects within the area.

EL24956, Burt Plain, was selected by Arafura Resources NL because of the potential for secondary sandstone hosted type uranium mineralisation in unconsolidated Cainozoic basin sediments of the Burt Basin, derived by erosion of adjacent uraniferous basement granites and gneisses.

The basement of the Burt Plain 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 Burt Plain comprises units of the Aileron Province consisting of gneiss 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.

Burt Plain is underlain by Division I rocks comprising mafic and felsic granulites, cordierite granulite quartzofeldspathic gneisses and amphibolites of the Narwietooma and Strangways Metamorphic Complexes, intruded by 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 are evident in the regional airborne magnetic data.

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 Burt Basin underlies the Burt Plain license area throughout. 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 east of Burt Plain 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.

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 formation of calcrites, particularly within drainage channels overlying the Waite Formation, was also widespread during the Quaternary.

NuPower carried out an airborne electromagnetic (AEM) survey in June-July 2007 over the entire area 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. Concurrently, water from 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.

AEM survey results indicated that the technique was very successful, revealing that the Tertiary palaeodrainage beneath Burt Plain is far more extensive and better developed than previously thought and forms part of an extensive regional palaeodrainage system, bounded by basement highs of the Hann Range to the north, the Strangways Ranges to the east and the MacDonnell Ranges to the south. Palaeochannels are shallow in the southeast and eastern portions of the tenement and the Sixteen Mile Basin may be entirely separate from the Burt Basin. The western part of the tenement however overlies the deeper regions of the Burt Basin which continues to deepen to the west as was supported by the results of six scout drill holes by NuPower in 2008. Tertiary sediments were intersected in all holes, with reduced horizons in the deeper portions of the Burt Basin to the west with indications of anomalous gamma radiation activity.

Burt Plain was also included in the NTGS collaboration regional gravity survey over the Central Arunta region to provide data for basement structural interpretation.

Exploration in 2009 consisted of progressive sampling of groundwaters from the exploration drill holes, some results of which were previously reported, and rehabilitation of the drill access tracks, drill sites, and drill holes.

Results of an orientation study of the use of uranium biogeochemistry to express underlying mineralisation particularly in the absence of access to ground waters were also reported in 2009 and showed the potential of this as an exploration tool but required further validation.

There was no on-ground exploration carried out in the current period. However the results of the re-assay of the station bore groundwaters and waters form the final round of sampling of the NuPower rotary mud drill holes (before they were rehabilitated) are reported here. They show that groundwater beneath Burt Plain contain a broad range of elevated geochemistry. Elevated La, Ce, Nd, and Th is thought to be derived from detrital monazite in the Cainozoic sediments and/or accessory monazite in basement rocks. Elevated Cu and Pb may be derived from base metal mineralisation in the basement. Uranium is not anomalous in these groundwaters.
No fieldwork was done in Year 5. Some expenditure this period was made for the water sample re-assaying and for geophysical images for the relinquishment report and for database management.

No fieldwork was done in Year 6. The tenement has been relinquished because NuPower is focussing on phosphate exploration and does not have the funds to explore this area for uranium.

INTRODUCTION

BACKGROUND

Basement rocks of the Reynolds, Yalyirimbi and Strangways Ranges contain elevated background levels of uranium and thorium and have been explored for gold, base metals, rare earth elements and uranium. 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.

As far back as 1972 it was recognised that while these rocks may host primary deposits of uranium, they also provided a potential source of uranium for secondary uranium deposits. The products of the weathering and erosion of these rocks throughout the Cainozoic have accumulated in flanking basins as thick sequences of unconsolidated material and provided a potential host for the precipitation of uranium from solution in meteoric groundwaters sourced from the upstanding ranges and percolating through these basinal sediments.

Arafura Resources, with this target model, also recognised the potential of the Cainozoic basins in the Alleron region on the flanks of the uraniferous basement rocks for secondary sandstone-hosted uranium deposits and applied for and was granted a number of exploration licenses here, including EL24956, Burt Plain that covers part of the Burt Basin.

LOCATION AND ACCESS

The Burt Plain Exploration Licence is located 60 kilometres north-northwest of Alice Springs and 1200 kilometres south-southeast of Darwin by the Stuart Highway in the southern part of the Northern Territory of Australia (Figure 1). It lies between the Sandover Highway and Tanami Roads 25 kilometres northwest of their junction. Access is usually from the Tanami Road, via the network of station roads and tracks linking the water bores.

CLIMATE AND VEGETATION

The region has a semi-arid continental climate. This following description is drawn from Stewart (1982):

“The climate is characterised by long hot summers when temperatures regularly exceed 40°C, and short mild winters. The average rainfall is about 280mm, most of which falls between October and March, but both frequency and amount are erratic.” (Stewart, 1982)

Vegetation throughout most of the area consists of tall mulga open shrubland with a woolybutt open grassland understorey. This gives way in the northwest to hummocky grassland with a tall acacia sparse shrubland overstorey”. (Wilson et. al. 1991)

TOPOGRAPHY AND DRAINAGE

Much of the area comprises a flat sandy plain rising gently eastwards from 610m to 680m ASL. Creeks rising in the Strangways Ranges to the east discharge into the eastern part of the license area. Sixteen Mile Creek drains the area from the southeast.
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 Stuart Highway and Adelaide-Darwin transcontinental railway corridor, passing through Alice Springs, passes the area immediately to the east.

The natural gas pipeline from the Amadeus Basin (west of Alice Springs) to Darwin passes within 25 kilometres of the northwest corner of the area.

Alice Springs is the closest services centre, 100km by road via the Stuart Highway. The Aileron Roadhouse, located on the Stuart Highway with fuel and accommodation, lies 70km by road north of the license area. The nearest medical facilities are located Alice Springs and at the small township of Ti-Tree which lies 60 kilometres north by road from Aileron where there is a medical centre, school and police station.

The nearest station homesteads (Figure 1) are Amburla, north of the Tanamai Road, Yambah, accessed from the Stuart Highway and Aileron, adjacent to the Aileron Roadhouse.

TENURE
Exploration Licence 24956 Burt Plain, which currently comprises 500 graticular blocks covering 1576 square kilometres (Figure 2), was granted to Arafura Resources NL (ABN 22 080 933 455) on 7 September, 2006 for a period of 6 years. It was transferred to NuPower Resources Ltd (ABN 91 120 787 859) on 14 March 2007 as a result of the demerger of the uranium assets from Arafura to NuPower.

Since the licence was not subject to reduction at the end of Year 1, no blocks were relinquished and all 500 blocks were renewed for the second year of the licence.

Scout drilling by NuPower has identified an extensive palaeochannel system prospective for uranium on Burt Plain. Drilling is incomplete, the entire area remains prospective and it was not possible to select any areas for relinquishment at the end of Year 2. A Waiver of Reduction was applied for and granted on the 17th of September 2008.

Since there was no drilling during Year 3 and it has not been possible to identify any blocks for relinquishment a further request for waiver of reduction was made on 10th August 2009 which was granted on 1st September 2009. As no on-ground exploration was completed in Year 4, NuPower remains in a position of not being able to identify blocks for relinquishment and submitted a request to waive reduction on 9th August 2010, of which approval is still awaited.

The Expenditure Covenant for the fourth year of the licence was $80,000. The actual expenditure was $7,611.45 and therefore the covenant was not satisfied and a letter requesting variation of covenant was submitted along with this report.

A request to waive reduction for Year 5 was submitted on 9th August 2010. The Department of Resources declined NuPower's request for a waiver of reduction in December 2010 for the anniversary ending in 2010, and a further denial of a 14% reduction was received March 2011. Following this denial, 124 blocks, representing 25% of the granted area were recommended for relinquishment in late April and approved on 23rd June 2011. A further 187 blocks were relinquished in late 2011.
The license occupies the following perpetual pastoral leases:

- NT Portion 703 Aileron Station.
- NT Portion 641 Yambah Station
- NT Portion 4443 Amburla Station
- NT Portion 4423 Hamilton Downs.
Figure 2 - EL24956, Burt Plain Application Area
Figure 3 - EL24956, Burt Plain, Relinquished Areas Period Ending 2010
Figure 4. EL24956, Burt Plain, Relinquished Areas Period Ending 2011
NATIVE TITLE

NuPower has conducted an inspection of the AAPA register of sacred sites. Only one recorded site of cultural significance occurs on the Burt Plain tenement.

There are no registered Native Title Applications or Determinations over any portion of the Burt Plain tenement, nor are there any registered Indigenous Land Use Agreements.

An Exploration Agreement between the Central Land Council and NuPower Resources that includes the Burt Plain license has been negotiated between NuPower and the Central Land Council.
GEOLOGY

REGIONAL SETTING

The Burt Plain license EL24956 is situated in the Aileron Province of the Arunta Region in the southern part of the Northern Territory (Figure 5).

Figure 5 - Geological Regions of the Northern Territory and EL24956
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 Archean 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 northeast corner of the license and immediately to the southwest 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. These rocks are absent here.

A system of major west-northwest trending and north-northeast dipping thrust faults and shear zones affects the Arunta Region. The associated shear zones can be up to hundreds of metres 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). 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**

The Burt Plain tenement is underlain by basement rocks of the Aileron Province (Figure 6). 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 Arunta Basement in this region is further subdivided into the Central and Southern Provinces by the Redbank Thrust Zone, a major north dipping crustal-scale northwest trending structure. The oldest rocks of the Central Province that underlies Burt Plain are mafic and felsic granulites of the Strangways and Narwietooma Metamorphic Complexes that were deformed, metamorphosed and intruded by megacrystic syntectonic granites during the Strangways Orogeny around 1760-1750Ma. Rocks of the Narwietooma Complex are more widespread comprising mafic granulites of
the Mt Hay Granulite of the Mt Hay Massif immediately south of Burt Plain giving way north and westwards to felsic to mafic granulites, gneiss, gneissic granite and metasediments of the Mt Chapple Metamorphics of the Mt Chapple Massif. These grade laterally into an unnamed unit of mainly sedimentary rocks to the north forming isolated low hills with the western part of Burt Plain. Geophysical evidence suggests that the metamorphic rocks of the Narwietooma Complex extend northwards to underlie the Lander Rock Beds. Interlayered mafic granulite and garnet gneiss of the Adla Granulite, intruded by granite and belonging to the Strangways Metamorphic Complex outcrop as isolated low hills in the eastern part of Burt Plain, and to the south of the license.

![Figure 6 - Geology of Aileron Region](attachment:image)

**CAINOZOIC**

**REGIONAL GEOLOGY**

The southern NT forms a ‘basin and range’ province with Proterozoic and Palaeozoic rocks forming prominent ranges separated by broad valleys. Cainozoic sedimentary basins are widespread and well-developed within these intervening topographic depressions with at least twenty major basins known (Senior *et al.*, 1995). The Burt Plain tenement covers portions of the eastern half of the Burt Basin (Figure 7).
The Burt Plain is an extensive flat feature roughly 50km by 25km in size that is the modern day expression of the Late Tertiary landsurface developed on Tertiary lacustrine sediments of the Burt Basin.

Neoproterozoic-Palaeozoic Ngalia Basin sediments are thought to be absent beneath Burt Plain, and the basin is thought to rest directly on crystalline basement of the Arunta Complex.

The stratigraphy of the intermontane Cainozoic basins of the southern NT region is generally poorly known. This is attributed to a lack of outcrop and strong weathering overprints, the paucity of drillholes and a lack of attention paid to the ‘cover’ overlying crystalline basement. Knowledge of the distribution and extent of the Cainozoic has been largely gained through accidental intersections in water bores or in drillholes seeking mineralisation under cover.

Early (1933) drilling of Sixteen Mile Bore in what became known as the Sixteen Mile Basin (Figure 7) to the southeast of the tenement indicated considerable thicknesses of probable Tertiary sediments including carbonaceous shales (Hossfeld, 1954). Subsequent drilling around Sixteen Mile Bore in 1950, 1966 identified approximately 17m of clay with thin lignite seams from 145m (Edworthy, 1967). The presence of analcite suggests a shallow lacustrine environment, possibly a playa lake.

Limited stratigraphic drilling was 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 and these drilling programs have provided the majority of the information on the Cainozoic succession. The NTGS drilled 3 cored holes in the region around Sixteen Mile Bore in 1978, and 1981 that encountered carbonaceous material with one hole intersecting 51m of carbonaceous clay and thin lignite seams from 126m.
Figure 7 - Tertiary Basins in the Burt Plain - Alice Springs Area
The relatively small Hale Basin (Figure 7) 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 stratigraphy in the NT.

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) overlaying by a more widespread, dominantly lacustrine Neogene succession (Waite Formation). (Figure 8).

Figure 8 - Hale Basin Composite Stratigraphic Column (Senior et al. 1994)
Whilst the succession in the Hale Basin is relatively thin (<100m), it is still considered to represent a generalised Tertiary stratigraphy for the southern NT, and despite being initially defined in separate, small and isolated Tertiary basins, these formations are components of a much larger Tertiary palaeodrainage system, the extent and size of which has until now been vastly underappreciated.

**Deposition and Weathering**

Deposition of Cainozoic sediments was episodic and punctuated by hiatuses during which prolonged periods of weathering resulted in the formation of well-developed weathered profiles (palaeosols and duricrusts). Senior et al. (1995) defined three weathering events which affected Arunta igneous and metamorphic basement rocks and the overlying Tertiary succession.

**Weathering Event A** (Senior et al. 1994, 1995) 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.

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

**Weathering Event B**, recorded in the Hale Basin, occurred prior to the Middle Eocene, although there is little evidence elsewhere for this weathering event (Senior et al., 1995). This resulted in lithification and formation of a second ferricrete profile.

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

Climatic amelioration during the Early Miocene rejuvenated the palaeodrainage systems and led to the deposition of fluvial sands at the base of the Waite Formation. A change from fluvial to lacustrine sedimentation then followed during the Middle to Late Miocene and resulted in the 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 clay and dolomitic 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. These sediments are frequently capped by distinctive chalcedonic silcretes.

Towards the ranges, the Waite Formation interfingers with, and is conformably overlain by a moderately thick (<60m) succession of oxidised colluvial material shed from the ranges in response to neotectonism during the (?Late) Pliocene. A broadly coarsening upwards alluvial fan succession 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.

Overlying these sediments are unconsolidated Quaternary sediments including quartz sands, silts, red earths and clayey and sandy soils that record a complex history of deposition, erosion and
redeposition due to climate changes and gentle tilting. Large outwash fans from the northern side of the MacDonnell Ranges have formed alluvial plains and overbank deposits alongside sandy drainage channels. The Formation of calcretes, particularly within drainage channels and atop the Waite Formation, was widespread during the Quaternary.

PREVIOUS EXPLORATION

Previous exploration in the Burt Plain region has focussed on the potential of the basement rocks to host layered mafic-ultramafic intrusions with Ni-Cu-Co and platinoid (Pt-Pd) mineralisation, exposed in the Chapple and Hay Massifs, concealed beneath Burt Basin cover and first identified in airborne magnetic surveys by the BMR and NTGS. Several companies have also recognised the potential of the Cainozoic sedimentary sequences for secondary uranium deposits derived by the erosion of the surrounding uraniferous basement rocks.

Horizon Explorations Ltd EL 7, 1972

Horizon explored this area, which overlapped with most of the southern part of the Burt Plain tenement, for sediment hosted roll front type uranium in the Cainozoic sequence. The area was selected on the basis of having a suitable sedimentary basin on the flanks of basement rocks with elevated uranium contents. Anomalous uranium in bore water samples (assays up to 30ppb U3O8) was thought to be sufficient for the formation of a secondary deposit, ultimately derived from Arunta basement rocks to the southeast. Ten holes were drilled, sampled and gamma logged. The Cainozoic sequence varies from 6-120m thick and was thought to comprise sediments unsuitable for a secondary uranium deposit. Gamma counts were low and there were no anomalous assays from the drill hole samples. The area was relinquished.

CRA Exploration Pty Ltd A-P 2716, 2710, 1971, 1972

CRA acquired the A-P2716, immediately south of the Burt Plain license, to explore for Ni in ultramafic rocks on the basis of a BMR magnetic anomaly. They carried out a helicopter stream sediment sampling program, collected a small number of rock chip samples and assayed bore waters in the region for uranium. They also drilled a number of shallow holes targeting uranium in the Tertiary sediments. Elevated Ni, Cu, Co, Cr results from the Mt Hay area were attributed to higher background values from basic granulite. The bore waters were not anomalous in uranium. A-P2710, that straddled the Stuart Highway and covered part of the eastern end of Burt Plain License, was acquired for similar reasons. Reconnaissance mapping and stream sediment sampling in the exposed eastern part of the area showed that magnetic anomalies here were derived from magnetic granulites and quartzites and there was no anomalous geochemistry. A ground magnetic survey was used to locate the better magnetic anomalies to the west under cover and three were tested by shallow drilling. After passing through Tertiary sediments most of the holes were terminated in pyroxene-magnetite granulite. No ultramafic rocks were found and the Ni potential was discounted.

Bore waters were sampled for uranium and radon returning assays from <1-64ppb U. Four samples above 30ppb U, considered anomalous, were located close to basement in the southern and eastern parts of the area. Gamma logs from some of the accessible bores gave mostly low radioactivity except for a small anomaly from Canteen Bore. Carborne scintillometer traverses along the roads and tracks recorded minor anomalies over calcrete around Spinifex Bore and near basement outcrop or within drainages originating from basement areas. CRA considered these results to be disappointing.

CRA Exploration Pty Ltd A-P 3384, EL 440, 1972

A-P3384, superseded by EL 440, lay immediately south of Burt Plain license and partly overlapped with it. It included part of the Mt Hay Massif. CRA recognised the potential for uranium in the Tertiary Burt Basin sediments derived from uraniferous basement rocks and carried out regional geochemical sampling of the basement rocks for elements including uranium, seismic traverses
around the margins of the basin, carborne scintillometer traverses along roads and tracks, bore water sampling and gamma logging and limited drilling.

The seismic work identified the basement and cover sequences and showed that the basement surface dips gently north here. The radiometric traverses showed generally low results except in the vicinity of the basement that is generally more radioactive. uranium in the waters was in the range of 1-5ppb U with one result of 12ppb U. It was noted that water taken from supply tanks compared to that taken directly from the bore and water from stagnant inoperative bores were invariably low in U and Rn. The gamma logs gave low variable gamma activity and without detailed geological logs no correlation was possible. The assay results from 3 shallow drill holes were disappointing and the area was relinquished.

CRA Exploration Pty Ltd A-P 3382, EL 441, 1972
CRA carried out a similar uranium exploration program over these tenements located adjacent to the Burt Plain license in the search for secondary Tertiary basin sandstone hosted uranium.

Kewanee Australia Pty Ltd EL 805, 1973
Kewanee explored this area, immediately east that partly overlapped with the Burt Plain tenement, for Cu, Pb, Zn and any other economic mineralisation. They carried out a program of stream sediment sampling, undertook close-spaced geological traverse mapping and scintillometry and drilled a series of auger holes along the Stuart Highway from Burt Creek to Ambalindum Station turnoff. The results were not significant and the company relinquished the area considering that this type of exploration was not economic.

White Range applied for this area, that straddled the Stuart Highway and overlapped with the western part of the Burt Plain tenement, to explore a series of magnetic anomalies (the most intense with an amplitude of 4000nT), identified by the BMR 1965 and 1967 aeromagnetic surveys, for carbonatites similar to the Mt Weld carbonatite in Western Australia and the Mud tank carbonatite nearby in the Strangways Ranges. The anomalies were thought to be compatible with a carbonatite source or sources and comparisons were drawn with some Canadian carbonatites and the Palabora Complex in South Africa. Outcrop is limited to granite, mafic granulite and garnet gneiss at Boen Hill while the rest of the area is underlain by Cainozoic sediments. The most intense anomaly, crossing the Stuart Highway was ground located with ground magnetics and tested with 5 shallow drill holes. These penetrated 70-80m of Cainozoic sediments before intersecting magnetite bearing granulite with accessoryapatite and zircon. Rare earth levels were elevated and the magnetite content was sufficient to explain the anomaly.

Roebuck Resources NL EL8126, 1995
Roebuck acquired this area, located west of the Stuart Highway that overlapped with the southeastern part of the Burt Plain license, to explore a cluster of high amplitude magnetic anomalies identified by the BMR 1965 survey. This was virtually the same ground explored by White Range NL in 1990. The area is largely underlain by Cainozoic sediments with minor isolated basement outcrops. The anomalies are coincident with a regional gravity high and it was thought that the causative bodies could be mafic granulites, mafic-ultramafic intrusives (with potential for Ni, Cu, Co, Cr and platinoid mineralisation), or magnetite-haematite rich gneiss or schist.

Aerial photograph interpretation identified a series of circular structures interpreted as possible carbonatite or kimberlite pipes on the margins of the magnetic anomaly cluster. Carbonatites are known from the Mud tank area and analogies were drawn with the magnetic anomaly associated with the Mordor Complex to the east (a differentiated potassic igneous intrusive complex) and the Palabora Carbonatite Complex in South Africa. It was therefore thought that the cluster of magnetic anomalies could represent a group of potassic intrusives similar to the Mordor structure.
CRAE farmed into the tenement as manager and flew a close-spaced magnetic-radiometric survey of the BMR anomalies.

**NTDME Geophysical Surveys, 1997**

Detailed aeromagnetic and radiometric surveys were completed in 1997 that included all of the Napperby 1:250,000 Sheet area as well as the northern half of the adjacent Hermannsburg 1:250,000 Sheet to the south. The survey was flown at a line spacing of 400 metres and a mean terrain clearance of 60 metres. All primary data and gridded data as well as some plotted products from this survey are available freely from the Department.

**Rio Tinto Exploration Pty Ltd. ELs 9565, 9566, 8126, 8988, 1997**

This group of licenses covered most of the southern part of the Burt Plain license and was the most comprehensive exploration here for layered igneous intrusive hosted Ni-Cu-PGE deposits. RTZ carried out geological mapping, a depth to basement compilation from existing borehole data (that identified lignite in two places of concern to deep EM surveys), rock chip geochemical and petrological sampling, airborne magnetic, radiometric and EM surveys, soil geochemistry, ground magnetic and EM surveys, RAB, core and RC drilling, and downhole conductivity and magnetic susceptibility logging.

Preliminary fieldwork of the Mt Hay Massif identified relict igneous textures and primary igneous layering in outcropping anorthosite that together with petrology confirmed the mafic igneous precursor. From this it was inferred that the stratigraphically lower and potentially mineralised parts of the complex lay below Cainozoic cover to the north. Mapping of the Mt Hay Massif found mostly mafic granulites, meta-gabbros and lesser garnet gneisses and anorthosite.

The airborne surveys identified major east-west thrust zones and discontinuities indicative of extensive deformation. Strong magnetic banding (though to represent igneous layering) was evident between the Mt Hay Massif and a cluster of intense magnetic anomalies at Sixteen Mile, originally thought to represent the basal parts of a very large igneous complex. Ground magnetics located two of the more intense anomalies at Sixteen Mile and one of the anomalies was drilled. This hole encountered magnetite-rich gneisses and petrology identified the precursor as diorite. Minor pyrite and chalcopyrite were seen but there were no significant assays. The second magnetic anomaly had been drilled previously by White Range encountering magnetite-rich mafic granulites with no significant assays. The anomalies were explained by the high magnetite content and reinterpreted as isolated igneous intrusions instead of being the basal parts of a layered igneous complex.

RAB drilling of a ground magnetic traverse to better define the magnetic layering and to provide basement geochemistry for mineralisation vectoring intersected thicker sequences of Cainozoic cover than expected and only three holes reached basement. This comprised meta-gabbro and garnet gneiss, with no significant assays.

The airborne EM survey over the layered magnetic sequence located several conductors, two of which were followed up with ground EM near Coles Dam and Little Amburla Dam. They were modelled as thin sub-horizontal conductive sheets at shallow depth (30-50m). Drilling and downhole conductivity logging confirmed these as conductive layers in the Cainozoic cover. Basement here included garnet gneiss and granulite with no significant assays. Palaeochannels were also evident in the EM survey as moderately conductive dendritic responses draining to the north from a basement ridge orientated east-west just north of the Tanami Road. A deep sub basin in the Tertiary cover (with lignite) was also evident as a highly conductive response in the southeast of the area.
Although the work successfully identified a highly deformed and metamorphosed layered igneous complex, no sulphide mineralisation was encountered, no vectors to mineralisation were recognisable and the area was relinquished.

**BHP Billiton Minerals Pty Ltd-Mithril Resources Ltd JV ELs 22631, 22632, 2002**

These areas held by BHPB straddled the Stuart Highway and overlapped with the western part of the Burt Plain license. They were targeting polymetallic Ni-Cu-Co magmatic sulphide mineralisation of Voiseys Bay, Norilsk affinities, associated with mafic-ultramafic intrusions under thin Cainozoic cover. Following a review of previous exploration and reprocessing of available geophysical data they identified and drill tested a combined magnetic/EM target that was interpreted to represent a possible feeder dyke to a large body of magnetic granite defined from previous drilling. The shallow GEOTEM feature coincident with the magnetic anomaly was interpreted to be due to conductive Tertiary clays. This was substantiated by drilling. The hole intersected 41m of Tertiary sediments, comprising clay, lateritic material and clayey gravel, overlying basement of coarse biotite–garnet granodiorite. The granodiorite contained primary magnetite and secondary magnetite associated with silica alteration. There was no further work and the area was relinquished.

**Tanami Exploration NL EL 22922, 2003**

EL 22922, largely coincident with the western part of the Burt Plain license was held by Tanami Exploration for gold. Consultants carrying out geological interpretation and geophysical targeting, identified several targets. Broad spaced regolith-bedrock drilling was proposed but not carried out and the area was relinquished.

**Gutnick Resources NL EL 10252, 10264, 2003**

Gutnick Resources took up a large number of tenements over the Amadeus and Ngalia Basins based on a new genetic interpretation for the Witwatersrand deposits in South Africa. The Witwatersrand ore bodies are typically inferred to be fossil placers but recent studies funded by several major South African producers have demonstrated hydrothermal controls on the mineralisation. These new hydrothermal models suggest that similar and related styles of mineralisation may be present in other sedimentary basins with similar structural and stratigraphic styles to the Witwatersrand. These two licenses lay immediately north and south of the Burt Plain license. They reprocessed geophysical and remote sensing data available from the NTGS and compiled previous exploration data. Following an orientation sampling exercise they completed a regional stream sediment and rock chip sampling program that however excluded these areas. The areas were relinquished.

**BHP Billiton Minerals Pty Ltd-Mithril Resources Ltd JV ELs 22615, 22616, 2003**

These areas that partially overlapped with the Burt Plain tenement and covering the Mt Hay and Mt Chapple Massifs were acquired as part of the BHPB-Mithril alliance for Ni exploration in Australia, targeting polymetallic Ni-Cu magmatic sulphide mineralisation of Voiseys Bay, Norilis’ affinities, associated with Proterozoic stratigraphy under thin Cainozoic cover. Recently completed incompatible element discrimination work identified the Western Arunta Intrusions as sulphur enriched (300-1200 ppm sulphur) and demonstrated they have potential for orthomagmatic Ni-Cu-Co sulphide associations. BHPB and Mithril both completed reviews of the open-file data, re-processing of historical geophysical data and geological and geophysical interpretations. No high-priority targets were identified and the ground was relinquished without fieldwork.

**Norquest Mines Pty Ltd EL 23144, 2004**

Norquest acquired this area immediately south of the Burt Plain tenement on the basis of the NTGS aeromagnetic data that showed the likely presence of a major layered mafic igneous intrusion with potential for Ni-Cu-Co and platinoid (Pt-Pd) mineralisation. (All of the layered granulites have previously been interpreted as part of a very large igneous intrusion—the "Capricorn Layered Igneous Intrusion ", recognised by RTZ who held the ground in the mid nineties under ELs 9565,and 8126.). This is better exposed southwest of the license in ground held at that time by
BHPB-Mithril and mapped as Mt Hay Granulite (part of the Narwietooma Metamorphic Complex) and Amburla Anorthosite, but largely covered by Cainozoic material in the Norquest ground. Norquest thought from the aeromagnetic signature of the limited outcrop mapped here as Adla Granulite of the Strangways Complex that this was in fact part of the Mt Hay Granulite instead. Norquest also thought from the aeromagnetic patterns that two superimposed mafic layered intrusive complexes were present. Norquest sampled outcrops of the Adla Granulite for petrological study that showed that the mineralogy is consistent with a layered intrusion. They examined the nature of the Cainozoic cover, some of which was interpreted as saprolitic basement instead. There was no further work.

NUPOWER EXPLORATION ACTIVITIES COMPLETED, YEARS 1-3, 2006 - 2009

Airborne EM Survey
NuPower carried out an airborne electromagnetic (AEM) survey in June-July 2007 over the entire area 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. AEM survey results indicated that the technique was very successful, revealing that the Tertiary palaeodrainage is far more extensive and better developed than previously thought. Several palaeochannels have been identified within the tenement; shallow palaeochannels draining northwards off the MacDonnell Ranges occur in the eastern part of the tenement, whilst more substantial palaeochannels occur in the west of the tenement and form part of the eastern half of the Burt Basin (Rafferty, 2007).

STATION BORE WATER SAMPLING
NuPower conducted extensive water bore sampling throughout the region of its Aileron Project during 2007 and 2008 that have been reported previously (Higgins, 2008). Water samples were also taken progressively over a period of time from all six of NUP’s exploration drillholes and the results, including bore details and water assay results were reported previously (Rafferty, 2009).

VEGETATION SAMPLING
Of a total of 266 plant samples collected regionally, 4 samples of Mulga were collected from EL24956 and assayed for a wide range of elements. Sample details and assay results were previously reported (ibid).

The work showed;

- the potential for biogeochemical U concentration and U:Th to express underlying U in geological substrates,
- that plant species variations influence U biogeochemistry results
- biogeochemistry results support some of the elevated U analyses from the bore ground water sampling work,
- plant biogeochemistry has potential application in U exploration programs in this region.

NUPOWER EXPLORATION ACTIVITIES COMPLETED, YEAR 4, 2010

No on-ground exploration work was completed on EL24956 during this period.

Water sample assay results reported previously appear to be spurious and the laboratory was requested to re-assay all the station and NuPower drill hole groundwater samples. These results were reported in the 2010 annual report.

They show that groundwaters from both the NuPower drill holes and the station bores are elevated for a broad range of elements. Elevated La, Ce, Th, Nd suggest the influence of either detrital monazite in Cainozoic sediments and/or accessory monazite in basement rocks.

Elevated Co, Ni, V are probably derived from mafic basement rocks. Interestingly Cu and Pb are also elevated perhaps indicative of basemetal mineralisation in the basement. Flourine is influenced by granites. Uranium is not anomalous in these groundwaters.
Figure 9 - EL24956, Burt Plain, NuPower Rotary Mud Drill Holes, Station Bores, Groundwater Samples
NUPOWER EXPLORATION ACTIVITIES COMPLETED, YEAR 5, 2011

No fieldwork was done in this period with expenditure having been made for bore water re-assaying, geophysical images for the relinquishment report, and for database management.

NUPOWER EXPLORATION ACTIVITIES COMPLETED, YEAR 6, 2012

No fieldwork was done during this period.

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2 April 2013
REFERENCES


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