NUPOWER RESOURCES LTD
ABN: 91 120 787 859

AILERON PROJECT

EL24548 YALYIRIMBI

ANNUAL REPORT for PERIOD ENDING 30 DECEMBER, 2008

Author: John Higgins
Date: 2 February 2009

Submitted to:
Submitted by:
Accepted by:

Maps
1:250,000 Napperby SF/53-9

Distribution:
Department of Regional Development, Primary Industry, Fisheries and Resources
NuPower Resources Ltd Darwin office
NuPower Resources Ltd Sydney office
Table of Contents

INTRODUCTION .............................................................................................................. 7
  BACKGROUND ........................................................................................................... 7
  LOCATION AND ACCESS .............................................................................................. 7
  CLIMATE AND VEGETATION ...................................................................................... 7
  TOPOGRAPHY AND DRAINAGE ................................................................................... 7
  LOGISTICS .................................................................................................................. 10
  SUMMARY .................................................................................................................... 11
  TENURE ....................................................................................................................... 13
  NATIVE TITLE .............................................................................................................. 15
  GEOLOGY ..................................................................................................................... 16
  REGIONAL SETTING ..................................................................................................... 16
  LOCAL GEOLOGY ......................................................................................................... 17
    Pre-Cambrian-Proterozoic .......................................................................................... 17
    Cainozoic Regional Geology ...................................................................................... 19
    Deposition and Weathering ....................................................................................... 23
  PREVIOUS EXPLORATION ............................................................................................ 25
    Stratigraphic Drilling ............................................................................................... 25
    Bureau of Mineral Resources, Geology & Geophysics (BMR) .................................. 25
    Uranium Exploration ................................................................................................. 25
      Central Pacific Minerals EL 23, 1971-1972 ............................................................... 25
      CSR Minerals & Chemicals Division EL1294, 1976-1979 ............................................ 26
      Central Pacific Minerals N L EL 1317, 1978-1979 ...................................................... 26
      Central Pacific Minerals N L EL1348, 1976-1978 ....................................................... 26
      Central Pacific Minerals N L EL1384, 1976-1978 ....................................................... 26
      Central Pacific Minerals N L EL1411, 1977-1978 ....................................................... 26
      Agip Nucleare Australia Pty Ltd EL 1854, 1978-1981 ................................................ 26
      Agip Nucleare Australia Pty Ltd EL 2066, 1981-1982 ................................................ 27
      C.R.A. Exploration Pty. Ltd. EL 2617, 1970-1971 ....................................................... 27
      PNC Exploration (Australia) Pty Ltd EL 8411, 1994-1996 .......................................... 27
      NTDME Geophysical Surveys, 1997 ........................................................................ 27
    Non-Uranium Exploration .......................................................................................... 27
      BHP Minerals Limited EL3488, 1982-1983 ............................................................... 27
      Colchis Mining Corporation Pty Ltd EL 5511, 1987-1990 ............................................. 27
      Poseidon Gold Limited EL 7345, 1991-1993 ............................................................... 27
      Homestake Gold of Australia Limited, EL9672, 1996-1998 ....................................... 28
      Gutnick Resources N.L. EL10246, EL10248 and EL10251, 2001-2003 .................. 28
  NUPOWER EXPLORATION ACTIVITIES COMPLETED, YEAR 3, 2008 ....................... 29
    AIRBORNE ELECTROMAGNETIC (AEM) SURVEY .................................................. 29
      Introduction ............................................................................................................. 29
      Results of the Survey ............................................................................................... 30
    AIRBORNE REGIONAL GRAVITY SURVEY ............................................................... 36
      Introduction ............................................................................................................. 36
      Results of the Survey ............................................................................................... 36
    STATION BORE WATER SAMPLING ........................................................................ 39
      Introduction ............................................................................................................. 39
      Results ..................................................................................................................... 39
    VEGETATION SAMPLING .......................................................................................... 43
      Introduction ............................................................................................................. 43
    EXPLORATION DRILLING ............................................................................................ 45
      Summary .................................................................................................................. 45
GEOLOGY

Introduction ........................................................................................................................................ 51
Geological Model & Interpretation .................................................................................................... 53
Palaeoproterozoic – Mesoproterozoic ................................................................................................ 53
Neoproterozoic – Palaeozoic ............................................................................................................. 53
Vaughan Springs Quartzite .............................................................................................................. 53
‘?Mt Eclipse Sandstone’ .................................................................................................................. 54
Undifferentiated Ngalia Basin Units ................................................................................................ 55
Cainozoic ........................................................................................................................................... 58
Hale Formation ................................................................................................................................ 58
  • (T3) Tertiary Unit T3 ..................................................................................................................... 58
  • (T2) Tertiary Unit T2 ..................................................................................................................... 59
Waite & Napperby Formations ........................................................................................................ 60
  • (T1) Tertiary Unit 1 ....................................................................................................................... 60
  • (T1l) Lower Member – Waite Formation ...................................................................................... 61
  • (T1lac) Lacustrine Member – Waite Formation ........................................................................... 61
  • (T1m) Middle Member – Napperby Formation .......................................................................... 61
  • (T1u) Upper Member – Napperby Formation ............................................................................. 61
Quaternary - Recent ......................................................................................................................... 62

PALYNOLOGY

Introduction ........................................................................................................................................ 66
Results .............................................................................................................................................. 66

DOWNHOLE GEOPHYSICAL LOGGING ......................................................................................... 68

GEOCHEMISTRY

Drilling & Sample Method .................................................................................................................. 71

RECONNAISSANCE MAPPING – HAEMATITE OUTCROPS .......................................................... 72
Introduction ........................................................................................................................................ 72
Geology ............................................................................................................................................ 72

RECONNAISSANCE MAPPING – HARD ROCK URANIUM ANOMALIES ....................................... 81
Introduction ........................................................................................................................................ 81

EXPENDITURE STATEMENT, YEAR 2, 2008 .................................................................................. 84
GROUND RELINQUISHMENT ........................................................................................................... 84
REFERENCES .................................................................................................................................... 85
Appendices ....................................................................................................................................... 87
Appendix 1 – Fugro Final AEM & Magnetic Survey Data & Logistics Report ............................... 88
Appendix 2 – Standard Operating Procedures, Water Sampling ................................................... 162
Appendix 3 – Compiled Bore Data & Water Assay Results .............................................................. 185
Appendix 4 – Water Sample Laboratory Assay Results .................................................................... 189
Appendix 5a – Drill Hole Summary .................................................................................................... 195
Appendix 5b – Geological Logs (See Enclosed Disc) ........................................................................ 202
Appendix 5c – Geophysical Logs (See Enclosed Disc) ..................................................................... 203
Appendix 5d – Drill Assay Results (See Enclosed Disc) ................................................................... 204
Appendix 5e – NTGS Sample Submissions and Summary ................................................................. 205
Appendix 5f – Standard Operating Procedure, Drillsite Rehabilitation .......................................... 215
Appendix 6 – Expenditure Report ...................................................................................................... 223
Appendix 8 – NTGS Gravity Survey Logistics Report ...................................................................... 228
Appendix 8 – Borehole Wireline Calibration, Verification Report .................................................... 319
Appendix 9 – Biogeochemistry ......................................................................................................... 351
Appendix 10 – Geoscience Australia PFN Tool Calibration & Verification Report ......................... 401
Appendix 11 – Hard Rock Reconnaissance Geology (See Attached Disc for Assay Data) ................. 405
List of Figures

Figure 1 - Yalyirimbi (EL24548) Location ................................................................. 8
Figure 2 – Pastoral leases on Yalyirimbi ................................................................. 13
Figure 3 - Yalyirimbi (EL24548) ................................................................. 14
Figure 4 - Geological Regions of the Northern Territory and EL24548 ........................................ 16
Figure 5 - Geology of the Aileron Region ................................................................. 18
Figure 6 - Tertiary Basins in the Yalyirimbi – Alice Springs area ........................................ 20
Figure 7 - Known uranium occurrences and exploration drilling within the Napperby Region. Note the focus immediately to the north of the E-W trending Stuart Bluff Range, immediately to the north of Lake Lewis. .................................................. 21
Figure 8 - Hale Basin composite stratigraphic column (Senior et al., 1994). ......................... 22
Figure 9 – Yalyirimbi Geological Map ................................................................. 32
Figure 10 - Yalyirimbi (EL24548) Tenements: Extent and vintage of AEM Surveys showing flight line directions .......................................................................................................................... 33
Figure 11 - Yalyirimbi (EL24548) AEM palaeochannel interpretation ........................................ 34
Figure 12 - Preliminary partial basement model showing the outline of the Whitcherry, Mt Wedge and Burt Basins and locations of NUP drillholes ................................................................. 35
Figure 13 - Preliminary image from Central Arunta Gravity Survey conducted by the NTGS showing NUP tenements and infill survey areas ......................................................... 37
Figure 14 - Regional Bouger gravity for the southern NT merged with 2008 CAGS survey data and showing NUP tenements ................................................................. 38
Figure 15 - Location of water samples on Yalyirimbi (EL24548) ........................................ 41
Figure 16 - NUP drillholes on Yalyirimbi showing casing type ........................................ 42
Figure 17 – Vegetation sample locations on Yalyirimbi .................................................. 44
Figure 18 - Yalyirimbi Geological Map overlain by transparent AEM data showing basin development ................................................................................................. 49
Figure 19 - Yalyirimbi (EL24548) AEM data showing NUP drillhole locations and geophysical logging status ................................................................................................................................. 50
Figure 20 - Landsat image of the south-western corner of Yalyirimbi (superimposed over topographic map) showing the location of historical drillholes and the location of outcropping Mt Eclipse Sandstone (Figure 22) ................................................................................................................................. 52
Figure 21 – Conglomerate clasts (largely derived from the Vaughan Springs Quartzite) within the Mount Eclipse Sandstone (western outcrop). Clasts consist of quartzite, chert and distinctively ferruginised ‘spotty’ quartzites .................................................................................................................................................. 55
Figure 22 - Quartzite conglomerates of the Mt Eclipse Sandstone (eastern outcrop) capped by a thin veneer of poorly developed, variably ferruginised, kaolinitic, gritty sandstones of probable Tertiary age ................................................................................................................................. 60
Figure 23 - YR009 cuttings showing interpreted stratigraphy. Note that YR009 was drilled on the flanks of an outcropping Palaeozoic high. As a result, Unit 1 (Middle Member) is conglomeratic (74-90m) whilst the Unit 1 (Lacustrine Member) is absent. Unit T2 and Unit T3 are relatively thin when compared to YR004 (Figure 25). Note the silcrete (Tsi) developed at the redox boundary between Unit T2 and Unit T3. Undifferentiated Ngalia Basin units are given the stratigraphic code ‘?P’ .................................................................................................................................................. 63
Figure 24 - YR009 cuttings showing interpreted stratigraphy ........................................ 64
Figure 25 - YR004 chip trays showing interpreted stratigraphy. Note the greatly increased thickness of the Unit T2 (T2) oxidised and Unit T3 (T3) reduced sands and the silcrete (Tsi) developed at the top of Unit T2. Undifferentiated Ngalia Basin units are given the stratigraphic code ‘?P’ .................................................................................................................................................. 65
Figure 26 - Strongly haematised quartzite breccia (eastern outcrop, waypoint 113) .................. 73
Figure 27 - Varibly fractured and brecciated beds of Vaughan Springs Quartzite showing differential haematisation of beds (Location ~100m south of waypoint 113) ................................................................................................................................. 74
Figure 28 - Bluish grey crystalline haematite impregnation into rock about joint with brown younger haematite infiltration into rock. Ferruginisation process starts with Fe fill of joints and fractures. This then recrystallises to haematite and cracks open up and become refilled until massive haematite has developed ................................................................................................................................. 75
Figure 29 - Haematised granite along fault from above. Locally the haematite becomes quite massive but like the previous case tonnage potential is negligible. .................................................... 75
Figure 30 - Mapped 250K geology on Yalyirimbi showing haematite outcrop in relation to the southern limb of the Patty Hill anticline. ...................................................................................... 76
Figure 31 - Airborne EM image superimposed over regional topographic map showing the east-west trending zone of outcropping haematite in relation to the 'eastern palaeochannel'. ......... 77
Figure 32 - Waypoint and haematite sample locations on Yalyirimbi.............................................. 78
Figure 33 - Massive haematite (western outcrop, waypoint 107). ..................................................... 80
Figure 34 - Haematite replacement of strongly brecciated quartzite matrix (western outcrop, waypoint 101). ..................................................................................................................... 80
Figure 35 – Napperby radiometric map (U channel) showing location of anomalies visited. .......... 82
Figure 36 - Yalyirimbi 1:250,000 Geology showing location of assay samples................................. 83
Figure 37 – Area 1 EM X Component Time Window 1 superimposed over regional DTM image. 151
Figure 38 – Area 1 EM X Component Time Window 1 superimposed over regional DTM image. 152
Figure 39 – Area 1 EM X Component Time Window 5 superimposed over regional DTM image. 153
Figure 40 – Area 1 EM X Component Time Window 10 superimposed over regional DTM image. ... 154
Figure 41 – Area 1 EM X Component Time Window 15 superimposed over regional DTM image. ... 155
Figure 42 – Area 1 EM Z Component Time Window 1 superimposed over regional DTM image. 156
Figure 43 – Area 1 EM Z Component Time Window 5 superimposed over regional DTM image. 157
Figure 44 – Area 1 EM Z Component Time Window 10 superimposed over regional DTM image. ... 158
Figure 45 – Area 1 EM Z Component Time Window 15 superimposed over regional DTM image. ... 159
Figure 46 – Area 1 Magnetics F Map superimposed over regional DTM image. ........................... 160
Figure 47 – Area 1 Magnetics 1VD Map superimposed over regional DTM image. ........................ 161
List of Tables

Table 1 – Casing details for NUP drillholes on Yalyirimbi .......................................................... 40
Table 2 - Drillhole details, Yalyirimbi (EL24548) Tenement ............................................................ 46
Table 3 – Historical drillholes on Yalyirimbi (EL24548) ............................................................... 47
Table 4 – Historical drillhole collars located on Yalyirimbi (EL24548) ......................................... 48
Table 5 - Interpreted Tertiary stratigraphy for Yalyirimbi (EL24548). Italics denote informal nomenclature .............................................................................................................................. 57
Table 6 - Yalyirimbi palynological results ....................................................................................... 67
Table 7 - Drillhole intersections on Yalyirimbi (EL24548). Holes intersecting anomalous gamma are highlighted .................................................................................................................. 68
Table 8 - PFN results for AGIP historical drillhole ............................................................................... 69
Table 9 – PFN log details for anomalous drillholes on Yalyirimbi (EL24548) ............................... 70
Table 10 – Haematite outcrops on Yalyirimbi ................................................................................. 72
Table 11 – Assay results for haematite grab samples on Yalyirimbi .................................................. 79
Table 12 – Yalyirimbi Radiometric Anomalies.................................................................................. 81
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 uraniferous crystalline basement rocks may host primary deposits of uranium, they also provided 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, Arafura Resources applied for and was granted a number of exploration licenses here, including Yalyirimbi (EL24548) that covers part of the Tertiary ‘Whitcherry Basin.’

LOCATION AND ACCESS

The Yalyirimbi (EL24548) Exploration Licence is located 150 kilometres 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 3). Napperby Station lies in the centre of the tenement between the Stuart Highway and Tanami Road.

Access is via the sealed Tanami Road to Tilmouth Well Roadhouse, then north via the unsealed Napperby Creek road for 38km to Napperby Station. Alternatively, access to the tenement is via the sealed Stuart Highway and then west for 85km on the unsealed Napperby Road to Napperby Station. Distance is approximately 180km via the Stuart Highway route and approximately 200km via the Tanami Road. Access to the tenement from Napperby Station is 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 [spinifex] grassland with a sparse acacia [mulga] shrubland overstorey” (Wilson et. al., 1991).

TOPOGRAPHY AND DRAINAGE

The topography of the area is dominated by the NW-SE trending Yalyirimbi Range in the north, where crystalline rocks of the Arunta complex attain elevations ranging 650mASL to 880mASL. In the centre of the tenement, just to the south of the Yalyirimbi Range, sedimentary rocks of the Ngalia Basin comprise the ESE-WNW trending Patty Hill anticline, which forms a crescent-shaped range of hills ranging from 600mASL to 750mASL in height. A low-angle alluvial fan flanks the southern margin of the ranges and the topography slopes gently away to the south, forming relatively flat sand plain (at around 600mASL) dissected by modern drainage lines.
Figure 1 - Yalyirimbi (EL24548) Location.
To the south of the tenement, the Stuart Bluff Range rises abruptly out of the sand plain, attaining heights from 650mASL to 750mASL and marking the southern margin of the Ngalia Basin. Lake Lewis, a playa lake, lies immediately to the south of the Stuart Bluff Range and forms the local drainage sump. Some ponding of the modern drainage is evident on the northern of the Stuart Bluff Range where a series of small clay pans are developed.

Three main creeks drain southwards from the Yalyirimbi Ranges, through the Patty Hill anticline and out onto the sand plain. Days and Napperby Creeks, in the east and centre of the tenement respectively, run southwest through the tenement before passing though the Stuart Bluff Range and discharging into Lake Lewis. In the west of the tenement, Gidyea Creek skirts the Patty Hill Anticline before petering out onto the sand plain.
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, pass to the east of the tenement whilst the Tanami Road passes to the south.

The natural gas pipeline from the Amadeus Basin (west of Alice Springs) to Darwin passes within 4 kilometres of the eastern edge of the tenement.

Alice Springs is the closest services centre, 180km by road via the Stuart Highway. Napperby Station homestead lies in the centre of the tenement (Figure 2). Fuel and accommodation for the duration of the drilling program were provided by Napperby Station. The Tilmouth Well Roadhouse, located on the Tanami Road, lies 40km south by road of Napperby Station and offers an alternative source of fuel and accommodation.

The nearest medical facilities are located at the Aboriginal community of Laramba (located in the centre of the tenement) or at Alice Springs.
SUMMARY

Yalyirimbi (EL24548), was selected by Arafura Resources NL because of the potential for secondary uranium mineralisation, derived from the erosion of adjacent uraniferous basement granites and gneisses, and hosted by unconsolidated Cainozoic basin sediments of the Whitcherry Basin.

The license was granted on 7 September 2006 and transferred to NuPower Resources Ltd in 14 March 2007 as a result of the demerger of Arafura’s uranium assets into the newly formed company focussed on uranium.

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. 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 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 is far more extensive and better developed than previously thought and indicating that the Whitcherry Basin infills a deep, E-W trending palaeotopographic low developed immediately to the south of the Patty Hill Thrust.

A major E-W trending palaeochannel system was identified within the tenement. Two apparently fault-controlled tributary palaeochannels drain southwards off the Yalyirimbi Range and debouch into the Whitcherry Basin.

Results of the NTGS collaboration regional gravity survey over the Central Arunta region were received. Preliminary images are included in this report.

Seven water samples were taken from station bores, 6 samples water samples were taken from historical drill collars that were open to the water table and a further 91 water samples were taken from NUP drillholes during this period. Assay results have been received for a total of 49 samples. Interpretation of the water geochemistry is in progress.

Thirty, broadly spaced, reconnaissance drillholes were completed on Yalyirimbi during 2008 for a total of 5,354m and an expenditure (to 30 Sep 2008) totalling $922,133.02. Three drillholes intersected uranium mineralisation exceeding 0.01% eU\textsubscript{3}O\textsubscript{8} and indications of anomalous gamma were detected in another six holes. Tertiary sediments were intersected in all holes, thereby validating the airborne EM data. A regionally consistent reduced horizon occurs throughout the tenement and is host to all of the anomalous intervals.

PFN logging was attempted on of all the anomalous drillholes on Yalyirimbi along with three historical holes drilled by Agip in the southwest corner of Yalyirimbi. Difficulties in keeping the drillholes open meant that the PFN was run successfully in only one of these holes. Encouragingly, the PFN confirmed the presence of “uranium mineralisation and indicated that positive geochemical disequilibrium occurred (suggesting deposition in response to actively migrating geochemical cells within permeable sands).

The reconnaissance drilling program indicated that the Tertiary palaeodrainage system on Yalyirimbi was very well developed, regularly reaching thicknesses in excess of 200m. NuPower has been able to establish a preliminary stratigraphic model for the Tertiary Whitcherry Basin on Yalyirimbi. Importantly, all mineralisation intersected by reconnaissance drilling is hosted by a flat-lying, regionally widespread stratigraphic horizon occurs throughout the Whitcherry Basin. Significantly, mineralisation and the positive disequilibrium intersected by the historical Agip holes, are hosted within the same stratigraphic interval. Preliminary palynological results have confirmed a Tertiary (Early – Middle Eocene) age for this horizon.
NuPower’s exploration efforts have validated its exploration model and demonstrated that all the necessary elements for the formation of a sizeable sandstone hosted secondary Uranium deposit (similar to the Four-Mile Deposit in South Australia) occur on the Yalyirimbi tenement.

The program for Year 4 is:

- Compilation of the NuPower drill results with existing open file data and interpretation of the overall structure and stratigraphy of the Burt Basin.
- Interpretation of the borehole and drillhole water chemistry.
- Follow up drilling in the vicinity of holes intersecting anomalous gamma.
- Definition and scout drilling of further palaeochannel targets based on the interpretation of the basin architecture and water geochemistry.
- Limited reconnaissance geological mapping and sampling of basement radiometric anomalies in the northern portions of the license area.
TENURE

Exploration Licence 24548 (Yalyirimbi), which currently comprises 495 graticular blocks covering 1,567 square kilometres (Figure 3), 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 495 blocks were renewed for the second year of the licence.

Scout drilling by NuPower has confirmed the presence of an extensive palaeochannel system on Yalyirimbi (EL24548) which contains a thick Tertiary sedimentary fill prospective for sedimentary uranium mineralisation. Widely spaced reconnaissance drilling has identified a target stratigraphic horizon that occurs across the entire tenement. The entire area therefore remains prospective and it has not been possible to select any areas for relinquishment at the end of Year 3. A Waiver of Reduction was applied for and granted on the 17th of September 2008.

The Expenditure Covenant for the third year of the licence was $200,000. The actual expenditure was $922,133.02 and therefore the covenant was satisfied.

The license occupies the following perpetual pastoral leases (Figure 2):

- NT Portion 703 Aileron Station.
- NT Portion 747 Napperby Station
- NT Portion 748 Napperby Station

Figure 2 – Pastoral leases on Yalyirimbi.
Figure 3 - Yalyrimbi (EL24548)
NATIVE TITLE

NuPower has conducted an inspection of the AAPA register of sacred sites. Numerous recorded sites of cultural significance occur in the ranges on the northern half of Yalyirimbi (EL24548) whilst several recorded sites occurred along creek lines and on the sand plain south of Patty Hill. Exploration activities were planned to avoid these areas.

There are no registered Native Title Applications or Determinations over any portion of the Yalyirimbi (EL24548) tenement, nor are there any registered Indigenous Land Use Agreements.

An Exploration Agreement between the Central Land Council and NuPower Resources that includes the Yalyirimbi (EL24548) license has been negotiated between NuPower and the Central Land Council.

Prior to NuPower commencing fieldwork, representatives of the CLC conducted a survey of the proposed drill sites. No significant cultural sites were found and the proposed sites were approved.
GEOLOGY

REGIONAL SETTING

The Yalyirimbi license EL24548 is situated in the Aileron Province of the Arunta Region in the southern part of the Northern Territory (Figure 4).

Figure 4 - Geological Regions of the Northern Territory and EL24548
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 Archaean 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.

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).

In central Australia, the geographically isolated Ngulia and Amadeus Basins (along with the Officer Basin in SA & WA) represent the fragmented remnants of the ‘Centralian Superbasin’, and together with the Georgina Basin in the east, form part of the North Australian Platform Cover. Unconformably overlying the Palaeoproterozoic Orogenic Belts, their predominantly sedimentary successions are mildly deformed and largely unmetamorphosed. The Yalyirimbi tenement sits astride the northern boundary of the eastern Ngulia Basin where Palaeoproterozoic basement rocks of the Arunta Region have been thrust over the younger sediments of the Ngulia Basin along the Napperby and Yuendumu Thrusts. Thrusting is interpreted to have occurred during the Alice Springs Orogeny and forming an asymmetrical foreland basin south of the thrust belt that was subsequently infilled with Tertiary sediments. Regional geological evidence suggests a significant reactivation of these structures during the Tertiary and may have acted deepen and rejuvenate the basins.

The airborne EM imagery shows a prominent buried fault (the Patty Hill Thrust, to the south of the Patty Hill Anticline.

The geological setting is very similar to the Four-Mile uranium Deposit in the Lake Frome Embayment, South Australia.

**LOCAL GEOLOGY**

**Pre-Cambrian-Proterozoic**

The Yalyirimbi (EL24548) tenement is underlain by basement rocks of the Aileron Province (Figure 5). 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

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.

Middle Proterozoic 'Arunta' crystalline basement on Yalyirimbi consists of the Napperby Gneiss, a medium even-layered granitic gneiss with minor porphyritic granite (which outcrops as the Yalyirimbi Ranges) and granitic gneisses and granites of the Anmatijira Orthogneiss outcropping within the core of the Patty Hill Syncline.

Figure 5 - Geology of the Aileron Region.
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 Yalyirimbi tenement covers portions of the eastern half of the Whitcherry Basin (Figure 6).

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

Water bores on Yalyirimbi are typically <50m depth and provide little stratigraphic information. Limited stratigraphic drilling was undertaken previously in the southern NT region by both the BMR (now Geoscience Australia) and the NTGS and these drilling programs have provided the majority of the information on the Cainozoic succession.

During the 1960’s and 1970’s, the BMR commenced first round regional geological mapping of portions of central Australia. As part of a larger drilling project, seven drillholes (BMR Napperby 1-4, Evans & Nichols, 1970; BMR Napperby 5-7, Wells, 1974) were completed on the Napperby 1:250,000 map sheet in order to obtain subsurface stratigraphic information on the Palaeozoic and Proterozoic sedimentary rocks in the region. BMR Napperby 1 (TD 138m) and BMR Napperby 4 (TD 97m) were drilled in 1968 on Yalyirimbi failed to penetrate basement, instead intersecting only Tertiary sediments.

In the late 1970’s and early 1980’s, numerous exploration companies drilled a large number of holes (Figure 7) in, and to the south and west of the tenement (Henstridge, 1976; Uranerz, 1980; Energy Metals, 1983). The majority of these holes targeted shallow, calcrete hosted uranium mineralisation (Figure 7). Agip (1979; 1980, 1981) targeted Palaeozoic sediments for Bigryli style mineralisation within the Mt Eclipse Sandstone and frequently drilled through considerable thicknesses of Tertiary sediments before intersecting the older Ngalia Basin succession. A number of small uranium prospects were discovered during this phase of exploration but followed up work appears to have never been undertaken.

Due to the poorly known stratigraphy and the strong weathering overprints on the Tertiary and Palaeozoic sedimentary rocks, a great deal of confusion and uncertainty over the stratigraphy are evident in Agip’s reports. In particular, despite a lack of similarity between the reported lithologies at the Bigryli uranium deposit, the term ‘Mt Eclipse Sandstone’ is widely used as a convenient ‘catch-all’ label applied to any undifferentiated clastic sediment.

Agip reports also frequently record intersecting duricrusts (silcretes) in most drillholes. Standard procedure by AGIP appears to have been to terminate drilling upon encountering any hard, siliceous rock unit on the assumption that the hard band was either a silcrete developed at the top of the Mt Eclipse Sandstone, or the basal Vaughan Springs Quartzite. Agip interpret a basin-wide silcrete horizon to be present at the top of the Ngalia Basin succession yet occasional drillholes would break through this silcrete and penetrate into what Agip called the ‘pre-silcrete beds’. However, experience shows that duricrust profiles are characteristically thin (<5m) and, with persistence can usually be penetrated. Drilling by NUP indicates that silcretes, whilst regionally widespread, are thin and typically form indurated horizons marking stratigraphic discontinuities, the most significant of which is associated with Weathering Event C (Figure 8) and the major stratigraphic break between the Palaeogene and Neogene successions. The majority of the Tertiary succession on Yalyirimbi lies beneath this ‘Event C’ silcrete and was therefore only rarely penetrated by Agip’s exploration drilling.
Figure 6 - Tertiary Basins in the Yalyirimbi – Alice Springs area.
Figure 7 - Known uranium occurrences and exploration drilling within the Napperby Region. Note the focus immediately to the north of the E-W trending Stuart Bluff Range, immediately to the north of Lake Lewis.
During the late 1970’s and early 1980’s the relatively small Hale Basin (Figure 6, Figure 8) was explored extensively for coal (lignite) and sedimentary uranium. The Basin can be considered to be the best known Cainozoic basin in the NT.

Senior et al. (1994) 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, and comprises a restricted, fluvial palaeochannel dominated Palaeogene succession.
(Hale Formation) overlain by a more widespread, dominantly lacustrine Neogene succession (Waite Formation).

The stratigraphy of the Hale Basin is summarised in Figure 8. Strong affinities with Eocene palaeochannel sediments in southern Australia suggest that the Hale Formation should be further subdivided into a Upper subdivision (Late Eocene), comprising the Tug Sandstone Member and representing development of a widespread ‘sand sheet’; and a Lower subdivision (Early-Middle Eocene) recording a fining upwards trend from the fluvial Ambalindum Sandstone Member to the paludal Claraville Mudstone and Ulgnamba Lignite Members.

Tertiary sediments in the Whitcherry Basin have been shown to exceed 250m in thickness whilst those in the Ti-Tree Basin to the north regularly exceed 350m in thickness. In comparison, the succession in the Hale Basin is relatively thin (<100m) but it can be considered to represent a generalised Tertiary stratigraphy for the southern NT (Figure 8), 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). Deep weathering was an ongoing process during the Tertiary but was enhanced at particular times during the time by the combination of periods of warm, humid climates, non-deposition and surface exposure. Senior et al. (1995) defined three Palaeogene weathering events which affected Arunta igneous and metamorphic basement rocks and the overlying Tertiary succession. An additional two weathering events have been recognised from the overlying Neogene succession and appear to correlate with similar periods of weathering and exposure evident in southern Australia.

Weathering Event A (Senior et al. 1994, 1995) occurred during the Late Cretaceous to Early Tertiary (Palaeocene). Trizonal weathering profiles were developed in basement rocks over a widespread area of the Arunta Region and at the base of surrounding Tertiary basins. The trizonal profile consists of a basal kaolinitic zone (up to 10 metres thick) that grades into a multicoloured mottled zone (up to 10 metres thick) and is then capped by a ferruginous (or laterite/ferricrete) zone up to 8 metres thick.

Following uplift and partial truncation of the deeply weathered basement rocks, sedimentation in the surrounding Tertiary basins commenced in the Palaeocene with deposition of thick colluvium including fanglomerates flanking the ranges. This was followed by deposition of fluvo-lacustrine sand, silt and clay (locally carbonaceous) and lignite of the Lower Hale Formation in the Ti-Tree and Burt Basins during the Early to Middle Eocene. Locally this includes a basal lacustrine green and grey pyritic mudstone, white mudstone and siltstone, and red iron oxide stained siltstone and siltstone. Fluvial sands of the Ambalindum Sandstone Member fine upwards into the paludal Claraville Mudstone and Ulgnamba Lignite Members.

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

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

Climatic amelioration during the Early Miocene rejuvenated the palaeodrainage systems and led to the deposition of fluvial sands at the base of the Waite Formation. A change from fluvial to lacustrine sedimentation then followed during the Middle to Late Miocene and resulted in the accumulation of over 300 metres of fluvialite and lacustrine limestone, sands, muds, and sandy conglomerate in localised depocentres.
The upper portions of the Waite Formation are regionally extensive and consist largely of clay and
dolomitic clays that reflect the widespread development of broad, shallow evaporitic lakes throughout
southern Australia as the continent drifted further northwards and became progressively more arid and
seasonal. Two cycles grading upwards are commonly observed from clays to dolomitic clays to dolomitic
limestones, suggesting that deposition of the Waite Formation occurred in at least two phases.
Weathering Event D was responsible for the formation of a silcrete within the Waite Formation at the top
of the basal cycle (possibly in the Middle Miocene).

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

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

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. In more
distal locations, the development of aeolian sand plains was widespread. The formation of calcrites,
particularly within drainage channels and atop the Waite Formation, was widespread during the
Quaternary (Weathering Event E).
PREVIOUS EXPLORATION

Records of systematic exploration in the Yalyirimbi Ranges in the northern part of the area and in the Reynolds Range immediately north of the tenement date back as early as 1948 (Thevissen, 1995) but most investigations date from about 1965 (Stewart, 1982). Base metals, tin and tungsten were mainly targeted prior to 1973 when uranium exploration gathered momentum. This commodity dominated the exploration in the area for the next 15 years, both in the metamorphic and granitic rocks of Reynolds Range and also in the sandstones of the Ngalia Basin to the south. Since 1990, with the advent of the BLEG geochemical technique more attention has been directed towards gold exploration though some uranium exploration activity still persisted.

Eighteen former exploration licenses overlay wholly or in part the Yalyirimbi tenement; EL23, EL256, EL257, EL1294, EL1317, EL1348, EL1411, EL1678, EL1854, EL2066, EL 2617, EL3488, EL7345, EL8411, EL10246, EL10248, and EL10251. Of this list, thirteen were held for uranium exploration while the remainder were for gold, other base metals and diamonds. Initially, the major uranium exploration targets were the Mt Eclipse Sandstone and calcite at or near the surface, though later the Tertiary sediments overlying the Mt Eclipse Sandstone received some attention.

Stratigraphic Drilling

Bureau of Mineral Resources, Geology & Geophysics (BMR)

During the 1960’s and 1970’s, the BMR commenced first round regional geological mapping of portions of central Australia. As part of a larger drilling project, seven drillholes were completed on the Napperby 1:250,000 map sheet in order to obtain subsurface stratigraphic information on the Palaeozoic and Proterozoic sedimentary rocks in the region. More by accident than by design, “Cainozoic sediments were…found to be considerably thicker than expected” with over 200m of sediments regularly encountered in drillholes without penetrating the target Palaeozoic or Proterozoic ‘basement’. Two holes were drilled on Yalyirimbi failed to intersect basement instead penetrating only Tertiary sediments.

Uranium Exploration

Central Pacific Minerals EL 23, 1971-1972

This EL overlapped most of the northern half of the NuPower tenement. Central Pacific Minerals sampled water bores and carried out an airborne radiometric survey over the southwest third of the EL, identifying several anomalies. This was followed up with a carborne radiometric survey but none of the anomalies were confirmed. They considered that no potential host rocks for economic mineralisation outcropped in the EL area and the area was surrendered.

Central Pacific Minerals EL 256, 1970-1973

This EL, referred to as Agamba 2, overlapped the southeast corner of Yalyirimbi. Central Pacific targeted uranium in the Mt Eclipse Sandstone and calcite and undertook geological reconnaissance, airborne, carborne and ground radiometry and bore water sampling. The Mt Eclipse Sandstone does not outcrop in this area and they considered that the possibility of finding sufficient thickness of this formation was unlikely due to rapid thinning of basin sediments toward the east. No anomalous calcite was observed and the EL was released.

Central Pacific Minerals EL 257, 1970-1976

Known as Agamba 1, this EL overlapped most of the southern half of Yalyirimbi. Central Pacific again targeted the Mt Eclipse Sandstone for uranium mineralisation following the discovery of uranium in this unit some distance to the east of EL 257. They conducted a program of bore water sampling, carborne radiometric traverses, an airborne radiometric survey, a ground resistivity survey, a track etch survey and 14 holes of auger drilling. Seven of these auger holes were drilled within the core of the Patty Hill Anticline adjacent to outcropping granite. Unsurprisingly these holes failed to encounter any tertiary sediments instead intersecting granite at shallow depth.
One anomaly, located with the track etch survey, was percussion drilled with two drill holes to only shallow depths of 48m and 60m that terminated in unconsolidated gravel. No significant radioactivity was observed and the EL was subsequently released.

**CSR Minerals & Chemicals Division EL1294, 1976-1979**

CSR held this area over the east central portion of Yalyirimbi to explore for uranium and base metals. They carried out an airborne radiometric survey followed by stream sediment, rock chip, soil and heavy mineral concentrate sampling. Forty-nine radiometric anomalies were identified but downgraded using a hand held 4-channel gamma ray spectrometer. There was no drilling and the area was relinquished.

**Central Pacific Minerals N L EL 1317, 1978-1979**

EL 1317 was located over the very north of Yalyirimbi where Central Pacific intended to explore for vein and disseminated uranium, pegmattic types in granitoids and secondary calcrete deposits. They identified a number of anomalies from the BMR radiometric surveys, collected rock chip samples and excavated two trenches. The results were generally unsatisfactory; the area was judged to be of low economic potential for uranium mineralisation and relinquished.

**Central Pacific Minerals N L EL1348, 1976-1978**

This EL largely coincided with EL257 and was considered to be prospective for uranium in Tertiary sediments, the Mt Eclipse Sandstone and the Proterozoic Arunta Complex. Exploration was directed toward the base of the Vaughan Springs Quartzite and the underlying “basement” and to a lesser extent the overlying Cainozoic sediments.

Exploration of the Mt Eclipse Sandstone and Arunta Complex consisted of 184 line kilometres of carborne and 45 line-kilometres of ground radiometrics and geologic mapping. Cainozoic exploration was limited to widely spaced carborne scintillometer traverses. No radioactive mineralisation was detected and the EL was relinquished.

**Central Pacific Minerals N L EL1384, 1976-1978**

Central Pacific held this area over the southeast corner of Yalyirimbi, primarily for base metals with a minor interest in uranium. Ground radiometrics conducted by the B.M.R. were investigated and followed up with further limited ground radiometrics and stream sediment and rock chip geochemistry. Base metal results were disappointing and no anomalous radioactivity was detected. It was determined that there was little likelihood of surface mineralisation and the EL was relinquished.

**Central Pacific Minerals N L EL1411, 1977-1978**

This EL overlapped the northern part of Yalyirimbi and was considered prospective for uranium in the crystalline basement and in the Cainozoic sediments overlying the Ngalia Basin. Central Pacific conducted carborne radiometric surveys totalling 242 line-kilometres followed by airborne radiometrics. No anomalies were found, there was no sampling and the area was surrendered.

**Central Pacific Minerals N L EL 1678, 1978-1980**

Most of this area was previously covered by EL257 and overlapped much of the southern half of Yalyirimbi. Exploration was focused on the central northern edge of the EL which appeared to have potential for uranium within the Mt Eclipse Sandstone. Gravity and magnetic surveys indicated a small basin in the central part of the EL containing Mt Eclipse Sandstone and four drill holes were subsequently drilled, the deepest to 220m without intersecting basement. Up to 138m of uncemented sediments and 32m of sandstone were encountered. No uranium mineralisation was intersected and the area was relinquished.

**Agip Nucleare Australia Pty Ltd EL 1854, 1978-1981**

EL 1854 overlapped the southwest corner of Yalyirimbi. Agip completed a gravity program and limited drilling in their search for uranium mineralisation in both the Mt Eclipse Sandstone and the overlying Tertiary sediments. The drilling intersected up to 80m of Mt Eclipse Sandstone and more than 100m of Tertiary sediments. Although weak uranium mineralisation was encountered the thickness of Mt Eclipse Sandstone was considered insufficient and the EL was relinquished.
Agip Nucleare Australia Pty Ltd EL 2066, 1981-1982
EL 2066 was located in the south central part of Yalyirimbi and extended slightly to the south of the current license. Following a gravity survey they concluded that there was little prospect of uranium mineralisation from the lack of evidence for a sub-basin which could contain Mt. Eclipse Sandstone beneath the Tertiary sediments. The area was relinquished.

C.R.A. Exploration Pty. Ltd. EL 2617, 1970-1971
This EL paralleled the east boundary of Yalyirimbi, barely overlapping its southeast corner. CRAE carried out geological traversing, stream sediment sampling, water bore sampling and an auger drilling program. This identified five uranium anomalies but follow up work was disappointing and no significant mineralisation was found. The EL was relinquished.

PNC Exploration (Australia) Pty Ltd EL 8411, 1994-1996
EL8411 overlapped most of the eastern boundary of Yalyirimbi where PNC concentrated their search on identifying chemical-pelitic metasedimentary sequences near the base of the Proterozoic for Mary Kathleen-style uranium mineralisation in metasomatised calc-silicate gneiss. Airborne radiometric surveys combined with semi-detailed geological mapping, magnetics and radiometrics, rock chip sampling and petrology located numerous secondary uranium occurrences. One hundred and eighty radiometric anomalies were investigated of which 30 contained visible secondary uranium minerals, 22 occurring within the Napperby Gneiss. They discovered the Nolan’s Bore rare earths-uranium-phosphorus prospect and explored in some detail important uranium prospects at Mt Dunkin 22 kilometres west-northwest of Nolan’s Bore, calcere hoste uranium in Gidyea and Napperby Creeks 50 and 60 kilometres west of Nolan’s Bore, and uranium in metasomatised quartz-tourmaline rocks of the Wickstead Creek Beds at Mt Freeling 15 kilometres west of Nolan’s Bore. Secondary uranium mineralisation was also located in Napperby Gneiss adjacent to a major WNW shear some 5km from the Napperby Creek Prospect. PNC also sampled a minor occurrence of ‘apatite’ (reportedly similar to the Nolan’s Bore apatite) hosted by orthogneiss at their MB05 anomaly, 7 kilometres north of Nolan’s Bore. The sample assayed 3.9% P, 1.9% Ba, 2.1% La, 4.6% Ce, and 1.8% Nd but only 1.0% Ca which suggests that monazite rather than apatite hosts the rare earths. They withdrew from the area in early 1996.

NTDME Geophysical Surveys, 1997
Detailed aeromagnetic and radiometric surveys were completed over the Reynolds Range area in 1997 as part of a more extensive survey which 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.

Non-Uranium Exploration

BHP Minerals Limited EL3488, 1982-1983
EL 3488 was taken up primarily to explore for diamonds and base metals. B.M.R. aeromagnetic data was examined for possible kimberlitic type anomalies and reconnaissance loam sampling was undertaken. Results of this work were negative and the area was relinquished.

Colchis Mining Corporation Pty Ltd EL 5511, 1987-1990
Colchis held this EL that overlapped the southeast part of Yalyirimbi targeting gold, base metals and uranium. Known mineral occurrences were investigated, the area was geologically mapped to a scale of 1:25,000 and a program of rock chip sampling was completed. Landsat imagery was used to assist in structural interpretation. Results were not considered encouraging and the area was relinquished.

Poseidon Gold Limited EL 7345, 1991-1993
The EL overlapped the eastern part of Yalyirimbi and was explored for gold and base metals. Rock chip and stream sediment sampling provided no encouraging results and the area was relinquished.
Homestake Gold of Australia Limited, EL9672, 1996-1998
Homestake explored for gold in various parts of the Reynolds Range. Their work comprised mainly regional BLEG stream sediment sampling with some limited geological reconnaissance to follow up one elevated gold value which was not replicated by later sampling. Results of Homestake’s programmes are detailed by Stewart (1997) and Lindsay-Park (1998).

Gutnick Resources N.L. EL10246, EL10248 and EL10251, 2001-2003
Twenty two ELs were included in the gold and base metals Rand Project. Three of these, EL10246, EL10248, and EL10251 overlapped most of Yalyirimbi. The Rand Project was a joint venture between Gutnick Resources N.L. (manager) and Johnson's Well Mining N.L., based on a new genetic interpretation for the Witwatersrand mineralisation in South Africa. These new hydrothermal models suggested that similar and related styles of mineralisation may be present in other sedimentary basins with similar structural and stratigraphic styles to the Witwatersrand. Following a literature and field based review of potential target basins around the world, the Amadeus and Ngalia Basins were selected.

Open file government data was researched, compiled with the results of previous exploration and interpreted. Previous exploration techniques were assessed and results evaluated according to the Witwatersrand exploration model. Geophysical data including Landsat7 TM was reprocessed and modelled to address structural and stratigraphic features within the region and to help identify alteration systems. However the results of geochemical surveys were not satisfactorily encouraging and the ELs’ were relinquished.
NUPOWER EXPLORATION ACTIVITIES COMPLETED, YEAR 3, 2008

AIRBORNE ELECTROMAGNETIC (AEM) SURVEY

Introduction

Recent exploration in South Australia has shown that airborne electromagnetic survey (AEM) systems have been successful in identifying palaeochannel systems as potential host rocks for secondary uranium deposits.

Fugro Airborne Surveys offers a number of AEM time–domain survey systems and aircraft configurations, suitable for a range of mineralisation types. All AEM systems have in common an AEM transmitter, attached or suspended from the aircraft that transmits pulses of electromagnetic energy as it flies regularly spaced lines of a grid system. The primary electromagnetic field induces an electric eddy current in the ground beneath the aircraft and provided that the ground is sufficiently conductive this current generates a secondary electromagnetic field that is measured by an AEM receiver usually suspended below and behind the aircraft in a small bird.

The Fugro Tempest system maps the palaeo-topography of the crystalline basement due to the significant electrical contrast between the younger overlying unconsolidated sediments (conductors) and the crystalline basement units (resistors). Undertaking 1D layered earth inversions of the observed data along a traverse enables an electrical cross section of the earth to be constructed. From this, the thickness of the overlying sediments and conversely the palaeo-topography of the basement are interpreted. Additionally the stratigraphy of the overlying sediments is inferable from its variable conductive nature.

A magnetometer is usually bundled with the EM equipment and run concurrently.

The aircraft records the following data:
- Navigation data including GPS time and heights,
- Streamed EM data (X,Y,Z and I)
- Total field magnetometer data
- Fluxgate magnetometer data
- Gyroscope data
- Radar altimeter data
- Fiducial marks
- Downward looking PAL VHS video

A base station is also set up to record separate GPS and magnetic data for survey correction purposes.

Initial system calibration involves data acquisition at high altitude (nominally 2000ft) that eliminates ground response to determine if the system noise level is acceptable, that the response has not varied significantly from previous sorties and that the sferics level is acceptable. This includes aircraft manoeuvres to ensure that the system is functioning correctly when the position of the towed sensor is varied with respect to the aircraft.

The aircraft also performs a series of manoeuvres to determine compensation coefficients for the magnetometer for each survey and tie line heading.

Positioning is determined using a Real Time Differential GPS and a base station GPS to provide for post-survey differential correction of the flight path that gives accuracy to within 5m horizontally and 9m vertically.
Data processing includes routines to suppress sferic noise, powerline noise, VLF noise, and coil motion noise. The effects of current in the transmitter loop and airframe are also removed. Magnetic data are compensated for aircraft manoeuvre noise and corrected for diurnal variations.

Fugro provide the following standard gridded, located and digital deliverables:

Gridded Products;
- EM Time Constant X and Z component
- EM channels X and Z component (15 channels)
- Total Magnetic Intensity (TMI)
- 1VD of TMI
- Digital Elevation Model

Located and Digital Products;
- Digital flight plan
- Conductivity Depth Image Multiplots and Stacked Sections (X or Z)
- Located ASCII and Oasis GDB of TMI, EM, and DEM data
- Acquisition and Processing Report MS Word digital and hard copy.

The optional Depth to Resistive Basement derivative was also requested.

**Results of the Survey**

The logistics report and final data together with survey time window interpreted and processed images for the 2008 survey are included in Appendix 1.

Survey areas and flight line directions are shown in Figure 10. Data acquired in 2007 have been inverted and processed and are shown in Figure 11 where that shows a well defined buried palaeochannel system. Using preliminary data acquired from additional regional AEM surveying in 2008, this 2007 AEM data has been integrated into a preliminary composite image showing interpreted depth to basement (Figure 12) in which areas of outcropping or shallow basement are shown as white or red whilst deeper areas of thick sediment accumulations are shown in blue.

From the extent and size of the Whitcherry Basin (and its tributaries) in relation to the AEM data in Figure 12 it is clear that the palaeochannels under Yalyirimbi (EL24548) form part of a much more extensive regional palaeodrainage system.

The AEM survey had difficulties in distinguishing between weathered Ngalia Basin sediments and the overlying unconsolidated Tertiary succession.

Examination of the AEM imagery shows that the technique was excellent at defining the resistive Proterozoic crystalline basement, as well as the quartzites of the Neoproterozoic Vaughan Springs Quartzite. The Patty Hill anticline was also well defined by the AEM which indicated that the southern limb has been considerably displaced by faulting.

Two outcrops mapped as Palaeozoic Mt Eclipse Sandstone occur in the southwestern corner of the tenement (Figure 9). Field reconnaissance shows these units to consist of quartzite conglomerates sourced from the Vaughan Spring Quartzites. Distinctive rounded clasts of haematitic ‘spotty’ quartzite observed in outcrop were traced back to the outcrops of haematitic quartzite breccias along the southern side of the Patty Hill Anticline.

Examination of the AEM, combined with stratigraphic information provided by drilling suggests that these two outcrops may be surface outcrop of a geological structure similar to the Patty Well Anticline. The outcrops of quartzite conglomerate are likely to be either an intraformational conglomerate horizon within the Vaughan Springs Quartzite or deposited unconformably above the Vaughan Springs Quartzite. This accounts for the resistive character of the units in this area. The AEM suggests that the subsurface
expression of these outcrops is more extensive, particularly to the east of the eastern outcrop appearing to thicken to the east and adopt an arcuate shape to it's northern edge, suggesting that it is the northern limb of and anticline that has been disrupted by faulting (hence the western outcrop).
Figure 9 – Yalyirimbi Geological Map.
Figure 10 - Yalyirimbi (EL24548) Tenements: Extent and vintage of AEM Surveys showing flight line directions.
Figure 11 - Yalyirimbii (EL24548) AEM palaeochannel interpretation.
Figure 12 - Preliminary partial basement model showing the outline of the Whitcherry, Mt Wedge and Burt Basins and locations of NUP drillholes.
AIRBORNE REGIONAL GRAVITY SURVEY

Introduction

During 2008 the NTGS conducted a helicopter-borne regional gravity survey 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. The logistics report outlining survey details is enclosed in Appendix 8.

Results of the Survey

A preliminary image from the Central Arunta Gravity Survey (CAGS) is shown in Figure 13. A preliminary plot of the existing regional data, merged with the newly acquired CAGS data is shown in Figure 14.
Figure 13 - Preliminary image from Central Arunta Gravity Survey conducted by the NTGS showing NUP tenements and infill survey areas.
Figure 14 - Regional Bouger gravity for the southern NT merged with 2008 CAGS survey data and showing NUP tenements.
STATION BORE WATER SAMPLING

Introduction

“Groundwaters are appropriate as geochemical exploration sample media in regions where the products of deep weathering or post-ore successions cover exploration targets to depths such that they are invisible to traditional geochemical and geophysical exploration technologies. An exploration role for groundwaters results from their chemical reactivity with these concealed exploration targets and their physical mobility. Outcomes from these interactions with relevance to exploration include changes to groundwater compositions due to additions or removal of dissolved substances (solute).

Since groundwater-rock contact times in groundwaters are greater than in streams or other surface waters, groundwaters have a better chance of accumulating solutes up to analytically detectable levels than do most surface waters. In particular, slowly seeping groundwaters are optimal for characterising large volumes of rocks that surround and underlie a sample collection site. Groundwaters also penetrate further into the crust than surface waters, an attribute that is uniquely useful for the geochemical detection of mineral deposits which lack a surface or near-surface expression.………

They are interpreted from comprehensive field and laboratory chemical analyses of samples collected, using standardised procedures, from groundwater sources. Field measurements include pH, Eh, salinity, temperature and reduced Fe. Exploration indicators in groundwaters are not restricted to the ore elements. Strategic analytes include major constituents (Ca, Mg, Na, K, Cl, S, and carbonate species), and trace elements that occur at low and sub ppb concentrations” (Giblin, 2001).

Results

NuPower conducted extensive water bore sampling throughout the region of its Aileron Project during 2007 and 2008. Six water samples (plus one control sample) were taken from station bores on Yalyirimbi (EL24548) during the period (Figure 15). Several historical drill collars were located on Yalyirimbi (Table 3). Five were found to be open to the water table and a total of 5 samples (plus one control sample) were also collected.

Whilst initially contaminated by the drilling mud, settling and degradation of the mud, combined with the natural influx of groundwater into the drillhole means that, over a period of time, the fluid within drillholes will gradually revert back to the original ‘formation water’. Ongoing water sampling of the drillholes at approximately one, two, four and eight month intervals aimed to document this change, with the ultimate aim of obtaining uncontaminated samples of formation water from within the Tertiary sediments as a vector to mineralisation.

A total of 88 water samples (plus 3 control samples) were collected at intervals from all 30 of NUP’s exploration drillholes. Assay results have been received for a total of 49 samples (Appendix 3).

One drillhole (YR030) was converted into a station water bore (6” PVC casing, 6m stainless steel screen at 98-104m) at the request of the station owner. A further 10 drillholes had 2” PVC casing inserted in them to below the water table and the remaining 19 drillholes had a short (~2m) 2” PVC surface casing installed to facilitate ongoing water sampling. Casing details are outlined in Table 1 and shown in Figure 16.

Standard Operating Procedures were developed for bore water sampling (Appendix 2). Bore details and water assay results are given in Appendix 3. The original assay sheets from Actlabs Pty Ltd and Careena Holdings Pty Ltd are given in Appendix 4.

Interpretation of the results is in progress in conjunction with results from the surrounding NuPower Aileron Project tenements and was not available at the time of writing.
Table 1 – Casing details for NUP drillholes on Yalyirimbi.

* = converted into water bore.
Figure 15 - Location of water samples on Yalyirimbi (EL24548).
Figure 16 - NUP drillholes on Yalyirimi showing casing type.
VEGETATION SAMPLING

Introduction

NuPower engaged a consultant, Dr Steve Hill from the University of Adelaide, to conduct a trial vegetation sampling program throughout its tenements during 2007. A total of 176 vegetation samples were taken for analysis from Yalyirimbi. Vegetation sample locations on Yalyirimbi are shown in Figure 17 and the vegetation sampling report is included in Appendix 9.
Figure 17 – Vegetation sample locations on Yalyirimbi.
EXPLORATION DRILLING

Summary

NuPower completed thirty rotary mud drillholes for a total of 5,354m on Yalyirimbi (EL24548) during 2008. Drillhole locations are shown in Figure 19 and details are outlined in Table 2. Drilling was based on 3D modelling of the 2007 AEM data and drillholes were designed to confirm the presence of a buried palaeodrainage system and therefore targeted the deeper regions of the interpreted palaeochannel system in order to determine the thickness and character of their Tertiary fill.

Cuttings samples from 16 representative drillholes (a total of 1,588 samples) were submitted to the NTGS core library in Alice Springs and are listed in Appendix 5b.

Ninety five samples from six drillholes were submitted to ALS Chemex in Alice Springs for assay and their results are detailed in Appendix 5d.

All holes were geophysically logged and lithological and geophysical logs are included in Appendix 5b. The tool calibration is report in enclosed in Appendix 8.

One water bore (Corroboree Bore) on Yalyirimbi (EL24548) was found to be open and was gamma logged (Figure 19). Its geophysical log is also included in Appendix 5b.

Reconnaissance work located 11 drillhole collars on Yalyirimbi (EL24548) from previous exploration drilling in the region. Several of these holes were found to be open and NuPower was able to obtain both water samples and a gamma logs from these holes. Their details are outlined in Table 4 and their geophysical logs are included in Appendix 5b. Drillhole locations are shown in Figure 20.

A PFN logging tool became available after the completion of the drilling and attempts were made to log all anomalous holes drilled on Yalyirimbi (EL24548). PFN Logging status is shown in Figure 19 and details are outlined in Table 9. The PFN geophysical logs are included in Appendix 5b and the PFN tool calibration report is included in Appendix 9.
<table>
<thead>
<tr>
<th>Hole ID</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>TD</th>
<th>Date Started</th>
<th>Date Completed</th>
<th>Anomalous Gamma</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR001</td>
<td>273302</td>
<td>7499434</td>
<td>72.0</td>
<td>8-Jun-08</td>
<td>10-Jun-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR002</td>
<td>273330</td>
<td>7498452</td>
<td>89.0</td>
<td>10-Jun-08</td>
<td>11-Jun-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR003</td>
<td>273700</td>
<td>7496996</td>
<td>164.5</td>
<td>11-Jun-08</td>
<td>14-Jun-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR004</td>
<td>267024</td>
<td>7497026</td>
<td>250.0</td>
<td>15-Jun-08</td>
<td>18-Jun-08</td>
<td>Y Weakly anomalous 159.0-160.0, Anomalous 175.5-186.0m.</td>
<td></td>
</tr>
<tr>
<td>YR005</td>
<td>258756</td>
<td>7497657</td>
<td>84.0</td>
<td>18-Jun-08</td>
<td>22-Jun-08</td>
<td>N Hole abandoned due to lost circulation</td>
<td></td>
</tr>
<tr>
<td>YR006</td>
<td>243960</td>
<td>7492013</td>
<td>163.0</td>
<td>22-Jun-08</td>
<td>24-Jun-08</td>
<td>Y Weakly anomalous 107.0-108.0m</td>
<td></td>
</tr>
<tr>
<td>YR007</td>
<td>246450</td>
<td>7492287</td>
<td>174.0</td>
<td>24-Jun-08</td>
<td>24-Jun-08</td>
<td>N Drill through silcrete at 121m into reduced horizon 26Jul08</td>
<td></td>
</tr>
<tr>
<td>YR008</td>
<td>244172</td>
<td>7493273</td>
<td>126.5</td>
<td>25-Jun-08</td>
<td>25-Jun-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR009</td>
<td>245177</td>
<td>7495519</td>
<td>175.5</td>
<td>26-Jun-08</td>
<td>28-Jun-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR010</td>
<td>245987</td>
<td>7500768</td>
<td>319.5</td>
<td>29-Jun-08</td>
<td>1-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR011</td>
<td>246443</td>
<td>7505358</td>
<td>217.0</td>
<td>2-Jul-08</td>
<td>3-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR012</td>
<td>244459</td>
<td>7502441</td>
<td>177.0</td>
<td>5-Jul-08</td>
<td>6-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR013</td>
<td>244292</td>
<td>7501398</td>
<td>204.0</td>
<td>6-Jul-08</td>
<td>8-Jul-08</td>
<td>Y Weakly anomalous 176.5-177.5m</td>
<td></td>
</tr>
<tr>
<td>YR014</td>
<td>251253</td>
<td>7502045</td>
<td>222.0</td>
<td>8-Jul-08</td>
<td>9-Jul-08</td>
<td>Y Weakly anomalous 149.0-150.0m, 163.0-165.5m</td>
<td></td>
</tr>
<tr>
<td>YR015</td>
<td>252145</td>
<td>7501556</td>
<td>156.0</td>
<td>10-Jul-08</td>
<td>11-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR016</td>
<td>253747</td>
<td>7499955</td>
<td>266.0</td>
<td>11-Jul-08</td>
<td>14-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR017</td>
<td>253104</td>
<td>7498563</td>
<td>204.0</td>
<td>14-Jul-08</td>
<td>16-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR018</td>
<td>252499</td>
<td>7497264</td>
<td>90.0</td>
<td>16-Jul-08</td>
<td>18-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR019</td>
<td>249177</td>
<td>7498738</td>
<td>175.0</td>
<td>18-Jul-08</td>
<td>19-Jul-08</td>
<td>Y Weakly anomalous 118.0-120.0m, 124.0-128.0m, 129.0-133.0m, 155.5-159.5m</td>
<td></td>
</tr>
<tr>
<td>YR020</td>
<td>250052</td>
<td>7500373</td>
<td>169.0</td>
<td>19-Jul-08</td>
<td>20-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR021</td>
<td>250547</td>
<td>7501239</td>
<td>187.0</td>
<td>21-Jul-08</td>
<td>22-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR022</td>
<td>249852</td>
<td>7502649</td>
<td>127.0</td>
<td>22-Jul-08</td>
<td>23-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR023</td>
<td>249360</td>
<td>7494998</td>
<td>121.0</td>
<td>24-Jul-08</td>
<td>25-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR024</td>
<td>247748</td>
<td>7500338</td>
<td>236.0</td>
<td>27-Jul-08</td>
<td>27-Jul-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR025</td>
<td>254490</td>
<td>7496956</td>
<td>206.0</td>
<td>28-Jul-08</td>
<td>29-Jul-08</td>
<td>Y Weakly anomalous 156.0-160.0m, 165.0-168.0m</td>
<td></td>
</tr>
<tr>
<td>YR026</td>
<td>244946</td>
<td>7494317</td>
<td>256.0</td>
<td>30-Jul-08</td>
<td>2-Aug-08</td>
<td>Y Weakly anomalous 153.0-157.0m, 159.0-161.0m, 166.0-167.0m</td>
<td></td>
</tr>
<tr>
<td>YR027</td>
<td>247838</td>
<td>7495394</td>
<td>169.0</td>
<td>2-Aug-08</td>
<td>3-Aug-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR028</td>
<td>248392</td>
<td>7497128</td>
<td>169.0</td>
<td>3-Aug-08</td>
<td>4-Aug-08</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>YR029</td>
<td>255002</td>
<td>7503615</td>
<td>162.0</td>
<td>4-Aug-08</td>
<td>5-Aug-08</td>
<td>Y Weakly anomalous 158.5-159.5m</td>
<td></td>
</tr>
<tr>
<td>YR030</td>
<td>257341</td>
<td>7498739</td>
<td>223.0</td>
<td>6-Aug-08</td>
<td>7-Aug-08</td>
<td>Y Hole converted into water bore (screen 98.0-114.0m). Weakly anomalous 120.0-121.0m</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 - Drillhole details, Yalyirimbi (EL24548) Tenement.
<table>
<thead>
<tr>
<th>Company</th>
<th>Hole_ID</th>
<th>Precollar Depth</th>
<th>Final Depth</th>
<th>Perc_Start</th>
<th>Core_Start</th>
<th>Comment</th>
<th>Tenement</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Pacific Minerals</td>
<td>IRD02</td>
<td>138.0</td>
<td>219.5</td>
<td>01-Sep-80</td>
<td>12-Sep-80</td>
<td>Vertical hole intersected unmineralised fine-grained red and grey sandstones of the Mt Eclipse Sandstone.</td>
<td>EL1678</td>
<td>CR19810244</td>
</tr>
<tr>
<td>Central Pacific Minerals</td>
<td>IRH03</td>
<td>16.0</td>
<td></td>
<td>01-Sep-80</td>
<td>12-Sep-80</td>
<td>Vertical hole terminated in Vaughan Springs Quartzite.</td>
<td>EL1678</td>
<td>CR19810244</td>
</tr>
<tr>
<td>Central Pacific Minerals</td>
<td>IRH04</td>
<td>36.0</td>
<td></td>
<td>01-Sep-80</td>
<td>12-Sep-80</td>
<td>Vertical hole terminated in Vaughan Springs Quartzite.</td>
<td>EL1678</td>
<td>CR19810244</td>
</tr>
<tr>
<td>AGIP</td>
<td>W4RD</td>
<td>125.3</td>
<td>127.0</td>
<td>09-Jun-79</td>
<td>15-Jul-79</td>
<td>Mt Eclipse Sandstone / Vaughan Springs Quartzite. Mineralisation not detected.</td>
<td>EL1854</td>
<td>CR19800004</td>
</tr>
<tr>
<td>AGIP</td>
<td>W5RD</td>
<td>137.0</td>
<td>151.0</td>
<td>11-Jun-79</td>
<td>15-Jul-79</td>
<td>Mt Eclipse Sandstone intersected. 137ppm U 113.5-114.5m.</td>
<td>EL1854</td>
<td>CR19800004</td>
</tr>
<tr>
<td>AGIP</td>
<td>W6RD</td>
<td>81.0</td>
<td>85.0</td>
<td>18-Jun-79</td>
<td>24-Jul-79</td>
<td>Hole intersected Vaughan Springs Quartzite only. No U mineralisation.</td>
<td>EL1854</td>
<td>CR19800004</td>
</tr>
<tr>
<td>AGIP</td>
<td>W10R</td>
<td>183.0</td>
<td></td>
<td>01-Jan-81</td>
<td>14-Mar-81</td>
<td>Hole finished in cherty fine sand and siltstone ? Adelaidean. Anomalous radioactivity 109-155m.</td>
<td>EL1854</td>
<td>CR19800207</td>
</tr>
<tr>
<td>AGIP</td>
<td>W12R</td>
<td>168.0</td>
<td></td>
<td>01-Jan-81</td>
<td>14-Mar-81</td>
<td>94-154m assigned to the Tertiary, thereafter assigned to the Adelaidean. Moderate radioactivity 150-153m.</td>
<td>EL1854</td>
<td>CR19800004</td>
</tr>
<tr>
<td>AGIP</td>
<td>W13R</td>
<td>198.0</td>
<td></td>
<td>01-Jan-81</td>
<td>14-Mar-81</td>
<td>Mt Eclipse Sandstone from 92m. No anomalous radioactivity.</td>
<td>EL1854</td>
<td>CR19800004</td>
</tr>
<tr>
<td>AGIP</td>
<td>W14RD</td>
<td>108.6</td>
<td>121.4</td>
<td>14-Mar-81</td>
<td>14-Mar-81</td>
<td>Hole terminated in probable Tertiary sediments. Minor radioactivity near bottom of hole.</td>
<td>EL1854</td>
<td>CR19810188</td>
</tr>
<tr>
<td>AGIP</td>
<td>W15R</td>
<td>132.0</td>
<td></td>
<td>15-Jul-81</td>
<td>14-Mar-81</td>
<td>Hole terminated in Adelaidean quartzite beneath Tertiary sediments. No anomalous radioactivity.</td>
<td>EL1854</td>
<td>CR19810188</td>
</tr>
</tbody>
</table>

Table 3 – Historical drillholes on Yalyirimbi (EL24548).
<table>
<thead>
<tr>
<th>Drillhole</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>Downhole Log TD</th>
<th>Hole ID Accuracy</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGIP W4RD</td>
<td>244827</td>
<td>7494063</td>
<td></td>
<td>Hole ID from metal tag on stake at site.</td>
<td>Hole Collapsed</td>
</tr>
<tr>
<td>AGIP W5RD</td>
<td>243948</td>
<td>7491969</td>
<td>128.5</td>
<td>Hole ID from metal tag on stake at site.</td>
<td>Hole open, geophysical log &amp; water sample obtained.</td>
</tr>
<tr>
<td>AGIP W11RD?</td>
<td>243937</td>
<td>7491925</td>
<td>120.0</td>
<td>Inferred hole ID on basis of proximity to AGIP W5RD</td>
<td>Hole open, geophysical log &amp; water sample obtained.</td>
</tr>
<tr>
<td>AGIP W12RD?</td>
<td>246357</td>
<td>7492340</td>
<td></td>
<td>Inferred hole ID on basis of location along track in consideration of AGIP hole location plan</td>
<td>Hole Collapsed.</td>
</tr>
<tr>
<td>AGIP W14RD?</td>
<td>243943</td>
<td>7491877</td>
<td>101.0</td>
<td>Inferred hole ID on basis of proximity to AGIP W5RD</td>
<td>Hole open, geophysical log &amp; water sample obtained.</td>
</tr>
<tr>
<td>AGIP W15RD?</td>
<td>244209</td>
<td>7493693</td>
<td>78.5</td>
<td>Inferred hole ID on basis of location along track in consideration of recorded AGIP hole locations</td>
<td>Hole open, geophysical log &amp; water sample obtained.</td>
</tr>
<tr>
<td>Central IRD02?</td>
<td>243915</td>
<td>7497685</td>
<td></td>
<td>Inferred hole ID on basis of location along track from IRD01</td>
<td>Hole Collapsed.</td>
</tr>
<tr>
<td>Central IRH03?</td>
<td>244484</td>
<td>7497935</td>
<td>15.0</td>
<td>Inferred hole ID on basis of location along track from IRD01</td>
<td>Hole Collapsed, water sample obtained, Geophysical log to 15m.</td>
</tr>
<tr>
<td>Central IRH04?</td>
<td>244180</td>
<td>7497753</td>
<td>32.0</td>
<td>Inferred hole ID on basis of location along track from IRD01</td>
<td>Hole Collapsed, water sample obtained, Geophysical log to 32m.</td>
</tr>
<tr>
<td>Corroboree Bore</td>
<td>248507</td>
<td>7505246</td>
<td></td>
<td>Water Bore</td>
<td>Duplicate Water Bore - steel casing.</td>
</tr>
<tr>
<td>BMR?</td>
<td>258901</td>
<td>7511966</td>
<td></td>
<td>BMR drillhole located at Gidyea Bore Yards.</td>
<td>Bore Open - steel casing with padlocked cap. 'BMR' welded onto top of cap.</td>
</tr>
</tbody>
</table>

Table 4 – Historical drillhole collars located on Yalyirimbi (EL24548).
Figure 18 - Yalyirimbi Geological Map overlain by transparent AEM data showing basin development.
Figure 19 - Yalyirimbi (EL24548) AEM data showing NUP drillhole locations and geophysical logging status.
GEOLOGY

Introduction

NuPower’s Yalyirimbi (EL24548) tenement lies over the geological boundary separating crystalline granitic rocks of the uraniferous Proterozoic Arunta complex from younger Palaeozoic sediments of the Ngalia Basin. Older rocks of the Arunta Complex have been thrust southwards along the Napperby and Patty Hill thrusts, over the top of the younger Ngalia Basin, creating an asymmetrical topographic low to the south of the Ranges.

Sediments of the Tertiary Whitcherry Basin infill the remnant topographic depressions and unconformably overlie both the Arunta Complex and Ngalia Basin sediments (from which they are ultimately derived). Tertiary sediments do not outcrop within the tenement whilst Palaeozoic rocks are largely restricted to outcrops between the Napperby and Patty Hill Thrusts (Figure 18). The overall structural and depositional setting is very similar to that at the Four-Mile Uranium Deposit in South Australia and it is for this reason that the region is considered very prospective for sandstone-hosted secondary Uranium mineralisation.

NuPower’s exploration drilling indicates that the geology of the Yalyirimbi tenement and surrounding areas is more complex than previously thought. Difficulties were experienced in differentiating between the Tertiary and the underlying weathered sediments of the Ngalia Basin. Palynological dating of cuttings samples obtained from NuPower’s exploration drilling was used to assist in determining the stratigraphy and indicated that previous geological interpretations made by other companies working in the Napperby region require substantial revision. A thorough regional geological interpretation is currently still in progress. Preliminary observations from drilling are recorded below and the interpreted stratigraphy is shown in Appendix 5a.

Tertiary sediments are widespread and very well-developed on Yalyirimbi (EL24548), in places exceeding 250m in thickness. The fluvial Hale Formation comprises the majority of the sediments encountered with only minor contributions of the lacustrine Waite Formation. The Napperby Formation (informal name) comprises a previously unrecognised Tertiary alluvial fan unit and conformably interfingers with and overlies the Waite Formation. Silcrete horizons are common within the region frequently making drilling difficult.
Figure 20 - Landsat image of the south-western corner of Yalyirimbi (superimposed over topographic map) showing the location of historical drillholes and the location of outcropping Mt Eclipse Sandstone (Figure 22).
Geological Model & Interpretation

Due to the paucity of drillholes in the region and the lack of interest in the Cainozoic, no stratigraphic model was available for the Yalyirimbi tenement. NuPower’s exploration drilling has allowed a stratigraphic model to be defined. This model was later successfully applied to drilling in the Burt Plain and Ti-Tree Basins where it was further refined and expanded. The stratigraphy is illustrated in Figure 23 to Figure 25, with several rock units being recognised within the region. They comprise:

**Palaeoproterozoic – Mesoproterozoic**

Palaeo- to Mesoproterozoic granites and gneisses of the Arunta Complex outcrop north of the Napperby thrust where they form the Yalyirimbi Ranges. Between the Patty Hill and Napperby Thrusts, granitic gneisses of the Anmatijira Orthogneiss also outcrop within the core of the Patty Hill Anticline.

Drillhole YR022 intersected the granitic Anmatijira Orthogneiss at shallow depth on the northern edge of the Patty Hill Thrust.

**Neoproterozoic – Palaeozoic**

Relatively undeformed rocks of the Neoproterozoic (Adelaidean) to Palaeozoic Ngalia Basin underlie the Tertiary sediments of the Whitcherry Basin. Adelaidean age rocks outcrop extensively within the Patty Hill Anticline. Palaeozoic rocks are restricted to two low outcrops of conglomerate (mapped as Mt Eclipse Sandstone) in the southwest of the tenement (Figure 20). These outcrops bear little affinity to the unconsolidated sediments intersected by drilling.

In the subsurface, numerous weathered, variably indurated sedimentary rock units have been encountered beneath the Tertiary succession. Differentiating between the Tertiary and Palaeozoic units has been complicated by strong weathering and a general similarity to the overlying Tertiary units (from which they are frequently, at least partially, derived).

The stratigraphy of the Ngalia Basin in the Napperby region is poorly understood. Subsurface stratigraphic units are believed to correspond with those mapped on the on the adjacent MOUNT DOREEN 1:250,000 map sheet to the west where comprise the following (in order of increasing age):

- **Mount Eclipse Sandstone** (Devonian – Carboniferous): Coarse arkosic sandstone, conglomeratic sandstone, minor pebble conglomerate and red siltstone.
- **Kerridy Sandstone** (Devonian): red-brown sandstone, minor mudstone.
- **Djagamara Formation** (Ordovician): white to grey sandstone with abundant mud pellets, minor glauconitic sandstone and green to dark grey mudstone; rare trace fossils.
- **Mount Doreen Formation** (Neoproterozoic / Adelaidean): tillite, dololutite, shale, sandstone.
- **Naburula Formation** (Neoproterozoic / Adelaidean): black to dark grey shale, minor siltstone and dololutite, basal tillite.
- **Vaughan Springs Quartzite** (Neoproterozoic / Adelaidean): Thick-bedded quartzite, ferruginous quartzite, granule and pebble conglomerate.

**Vaughan Springs Quartzite**

Outcrops of the Vaughan Springs Quartzite occur north of the Patty Hill Thrust where prominent quartzite ridgelines (with elevations up to 800mASL) comprise the limbs of the Patty Hill Anticline.

The unit comprises thickly-bedded, clean orthoquartzites and ferruginous quartzite, with minor pebbly and conglomeratic horizons. The finer grained Treuer Member consists of white siltstone and thinly bedded, fine sandstone and possible interbedded evaporites.
The unit is variably weathered with distinctive ‘spotty’ quartzites outcropping in the core of the Patty Hill Anticline. ‘Spotty’ quartzites clasts were observed in outcrop north of YR029 and as reworked clasts in an outcrop mapped as Mt Eclipse Sandstone see below (Figure 21).

The Patty Hill Anticline is considerably offset by faulting with its southern limb being truncated in the vicinity of Gidyea Creek, creating the fault-bounded ‘western’ and ‘eastern’ palaeochannels.

Located in the interpreted centre of the fault-bounded ‘western’ palaeochannel, YR011 intersected excellent pink to white quartzites of the Vaughan Springs Quartzite below a thick Tertiary succession. Finer grained, silty sediments intersected at the base of YR029 are interpreted to belong to the Truer Member.

‘Mt Eclipse Sandstone’

The Mt Eclipse Sandstone has been extensively explored for uranium mineralisation at the Bigryli deposit and its stratigraphy is reasonably well known in the Bigryli Region. The unit is described as comprising coarse arkosic sandstone, conglomeratic sandstone, minor pebble conglomerate and red siltstone. However, the term ‘Mt Eclipse Sandstone’ is used widely throughout the region to describe undifferentiated Ngalia Basin sediments.

South of the Patty Hill thrust, outcrop of Ngalia Basin sediments is restricted to two isolated outliers of quartzite conglomerates (Figure 20, Figure 22) that are mapped as Mt Eclipse Sandstone.

These outcrops bear little affinity with the above and published descriptions of the Mt Eclipse Sandstone instead showing a closer affinity to the Vaughan Springs Quartzite. They comprise rounded cobble- to boulder-sized conglomerate clasts of resistant lithologies including quartzite, ‘spotty’ quartzite and lesser sandstone and grey chert, derived largely from the Vaughan Springs Quartzite. Overlying the eastern outcrop is a thin veneer of oxidised kaolinitic gritty sandstones interpreted to be Tertiary Unit T2 (Figure 22).

Outcrops of the Vaughan Springs Quartzite (and granitic crystalline basement) are prominent on the Airborne EM imagery. The exposed quartzite conglomerates are similarly resistive and show up well on the airborne EM with the imagery, suggesting their subsurface occurrence is considerably more extensive to the east where they form a slightly arcuate, roughly east-west trend similar to the Patty Hill Anticline. It is suspected that this resistive trend represents a repetition of the Patty Hill Anticline structure that has been offset by thrust faulting similar to the Patty Hill and Napperby Thrusts. The two conglomerate outcrops are therefore interpreted as either a conglomeratic facies developed either within the Vaughan Springs Quartzite, or at the base of the overlying Palaeozoic Ngalia Basin units.

Whilst two historical drillholes just outside the tenement boundaries intersected similar quartzite conglomerates, NuPower’s exploration drilling failed to intersect these conglomerates in the subsurface. YR009 did however intersect ‘spotty’ quartzite conglomerate clasts within the Tertiary Unit 1 (Middle Member) reworked from the nearby western outcrop (Figure 21).
Figure 21 – Conglomerate clasts (largely derived from the Vaughan Springs Quartzite) within the Mount Eclipse Sandstone (western outcrop). Clasts consist of quartzite, chert and distinctively ferruginised ‘spotty’ quartzites.

Undifferentiated Ngalia Basin Units
Aside from the Vaughan Springs Quartzite, the character and distribution of Ngalia Basin rock units within the tenement is poorly known. Drilling intersected various rocks that are interpreted to be pre-Tertiary in age. The distribution of these rock units appears to follow an east-west linear pattern along the northern margin of the resistive trend marked by the two conglomerate outcrops. Faulting appears to offset the pattern in the far west of the tenement. Undifferentiated Ngalia Basin units are given the stratigraphic code ‘?P’.

Ngalia Basin rocks were variably indurated and variably weathered at their uppermost boundary. Trizonal weathering profiles were observed to be developed at the top of Ngalia Basin rocks in YR027 and YR028. In order of decreasing abundance, Ngalia Basin units encountered on Yalyirimbi include:

- Maroon to purple coloured, haematitic clays and clayey sandstones – YR004, YR006, YR008, YR009, YR010, YR013, YR014, YR017, YR018, YR020, YR021 and YR023.
- Grey cherty clays - YR021 and YR025.
- Silicified kaolinitic sandstone – YR001, YR002 and YR003.
- Black Shales- YR015 and YR024.
- Blueish Grey clayey limestones (‘lutite’) – YR012.

Thickly developed, oxidised brown, purplish-brown to maroon or reddish brown haematitic sandy clays to clayey sandstones are widespread throughout the tenement and comprise ‘basement’ in the majority of the drillholes. These clays contain thinly developed intervals of silicified, white to pink, laminated very fine-grained sands and silts. Similarly widespread, khaki yellow coloured clays and sandy clays are thought to be a less oxidised, limonitic version of the same unit.
These oxidised sediments are tentatively interpreted as the Mt Eclipse Sandstone as they bear a much closer affinity with published descriptions of the Mt Eclipse Sandstone than the mapped ‘Mt Eclipse Sandstone’ discussed above. Where overlain by sands, the contact with the overlying Cainozoic succession is abrupt. However, no distinct stratigraphic break could be discerned in the geophysical log or cuttings samples for YR010 where reduced clayey Tertiary sediments (Unit T3) appeared to grade downwards into oxidised haematitic, maroon clays.

The black shales and grey cherty clays are tentatively interpreted as the Naburula Formation (although Agip historical logs interpret intersections of similar lithologies as Mt Doreen Formation). Blueish grey clayey limestones (lutites) intersected by YR012 are also tentatively correlated with the Naburula Formation. Palynological samples of suitable intervals have been taken to assist in the stratigraphic interpretation but results had not been received at the time of writing.

Drillholes YR001, YR002 and YR003 intersected thick intervals of very hard, kaolinitic clayey sandstones and sandy claystones. These rock units were highly competent and strongly silicified and they are tentatively interpreted as a kaolinitic facies of the Mt Eclipse Sandstone, largely on the basis of their consolidated and lithologically consistent nature. Outcrops of Mt Eclipse Sandstone are mapped to the east of the YR001-YR003 line of drillholes but were unable to be accessed to confirm their provenance.
### Table 5 - Interpreted Tertiary stratigraphy for Yalyirimbi (EL24548). Italics denote informal nomenclature.

<table>
<thead>
<tr>
<th>Formation</th>
<th>Interpreted Age</th>
<th>Strat Unit</th>
<th>Member</th>
<th>Strat Code</th>
<th>Oxidation State</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Quaternary – Recent</td>
<td>Q</td>
<td>-</td>
<td>Qp, Qs, Qa, Qc</td>
<td>Strongly oxidised</td>
<td>Pisolithic or sandy soils. Alluvium, colluvium.</td>
</tr>
<tr>
<td>Napperby Formation</td>
<td>Late Miocene – Early Pliocene</td>
<td>Upper</td>
<td>T1u</td>
<td>Oxidised</td>
<td>Colluvial. Limonite dominated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Middle</td>
<td>T1m</td>
<td></td>
<td>Alluvial palaeosols. Haematite dominated.</td>
<td></td>
</tr>
<tr>
<td>Waite Formation</td>
<td>Early – Middle Miocene</td>
<td>Lower</td>
<td>T1l</td>
<td></td>
<td>Lacustrine clays (dolomitic).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fluvial sands, lag deposit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silcrete</td>
<td>Tsi</td>
<td>Neutral</td>
<td>Duricrust.</td>
<td>Well to moderately developed.</td>
<td></td>
</tr>
<tr>
<td>Hale Formation (Upper)</td>
<td>Late Eocene</td>
<td>-</td>
<td>T2cl, T2sd</td>
<td>Oxidised to neutral</td>
<td>Sand or clay end members. Abundant kaolinite.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Silcrete</td>
<td>Tsi</td>
<td>Neutral</td>
<td>Redox silcrete - variably developed at contact between Unit T2 &amp; T3.</td>
<td></td>
</tr>
<tr>
<td>Hale Formation (Lower)</td>
<td>Early – Middle Eocene</td>
<td>T3cl, T3sd</td>
<td>Reduced – strongly reduced</td>
<td>Sand or clay end members. Moderate to minor kaolinite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T3c, T3lig</td>
<td>Reduced – strongly reduced</td>
<td>Carbonaceous or lignitic facies. Tertiary age confirmed by palynology.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

 Italics denote informal nomenclature.
Cainozoic

The Cainozoic succession (Table 5) can be subdivided into three recognisable units which, in the absence of an existing litho-stratigraphic model, were numbered sequentially from the surface downwards. A major stratigraphic break separates the uppermost oxidised Unit T1 from the neutral Unit T2 and reduced & Unit T3.

Subsequent drilling on NuPower’s other tenements suggests that Units T2 & T3 are likely to comprise separate facies of the Hale Formation (Early – Late Eocene) whilst Unit T1 consists of the thin and poorly-developed Waite Formation (Early – Middle Miocene) overlaid by thickly developed oxidised colluvial sediments of the Napperby Formation (informal name).

Hale Formation

Senior et al. (1994, 1995) defined four members within the Hale Formation (Figure 8). On Yalyirimbi the Formation can be subdivided into two stratigraphic sub-units (Unit T2 & Unit T3) based on the observed lithologies.

Both units are lithologically similar but are differentiated on the basis of their regionally consistent differing redox states. Unit T2 is typically capped by variably developed silcretes and appears to interfingers with and grade downwards into Unit T3. This redox boundary may be relatively sharp or quite diffuse with a variably developed silcrete typically occurring at the base of Unit T2 rather than the top of Unit T3, suggesting that the silcrete is related to the redox boundary. At the Four-Mile Uranium Deposit in South Australia, a silcrete occurs in a similar position at the base of the oxidised kaolinitic sand succession, immediately above the reduced zones hosting mineralisation.

It is currently unclear as to whether Unit T2 and Unit T3 represent separate depositional members (corresponding to the Tug Sandstone and Ulgnamba Lignite Member), or if they merely represent the same lithostratigraphic unit with a different redox state. Palynological dating of Unit T3 supports a correlation with the Ulgnamba Lignite Member, although oxidised sand interbeds are observed within reduced (T3) sediments in limited portions of the Whitcherry Basin.

- (T3) Tertiary Unit T3

Whilst varying considerably in grainsize and character, the Unit can be sub-divided into sand-prone (T3sd) and clay-prone (T3cl) end members. Unit T3 is lithologically similar to Unit T2 but is characteristically grey and reduced, and contains lesser amounts of kaolinite. Unit T3 also contains minor pyrite and varying amounts of carbonaceous matter and lignite.

The lithology varies considerably from massive, well-developed greasy reduced to black (carbonaceous) clays through to clayey to clean, angular sands and gravels. Well developed, reduced sands occur a short distance south of the Yalyirimbi Fault as a belt parallel with the range front. Similar sands also occur in the south-western corner of Yalyirimbi (EL24548) in the vicinity of outcropping Palaeozoic rocks. Minor amounts of lignite and carbonaceous material were intersected in YR004 and YR026 and were dated as Early-Middle Eocene in age.

Sands within the unit are composed of entirely of white, clear, translucent and grey to bluish grey quartz grains (Toro Energy staff indicate that bluish quartz is a common feature of Arunta Complex granites and gneisses to the south). Historical drilling by Agip in the region frequently encountered this unit (and Unit T2), often considering it to be the Palaeozoic Mt Eclipse Sandstone. However, unlike Unit 1, the lower Tertiary succession (Unit T2-T3) is composed almost entirely of quartz. Discussions with staff at Energy Metals and consultation of published literature indicate that (along with an entirely different stratigraphy) the absence of feldspars is a major difference between Units T2, T3 and the Mt Eclipse Sandstone.
Unit T3 is highly variable in thickness, ranging from 4m in YR003 through to >50m in YR004. The unit unconformably overlies assorted non-Tertiary 'basement' rock units and may be disconformably overlain by, or grade conformably upwards into Unit T2. Interbedding of oxidised (Unit T2) clays and sands was observed within YR014 and YR016 and offers numerous potential redox boundaries for Uranium deposition. Anomalous gamma intersected in YR014 occurred at the contacts between these interbeds.

Lithological and geophysical logging indicates the following depositional environments:

- Braided Fluvial
- Meandering Fluvial
- Deltaic (coarsening upwards delta bar profiles)
- Crevasse Splay
- Possible lacustrine
- Possible shoreface (lacustrine)

Together these facies represent a fairly typical fluvio-deltaic palaeochannel system flowing into and along the topographic low to the south of the Yalyirimbi Range.

YR011 confirmed the presence of reduced and carbonaceous sediments within the western palaeovalley. Intriguingly, a basinward fining trend was noticed from YR012 to YR013 and together with the presence of well-rounded, well-sorted sands of potential shoreface origin and possible pro-delta clays at the same stratigraphic level in YR010, suggests the development of a low angle alluvial fan to fan-delta setting at the mouth of the western palaeovalley. Similar sands were encountered to the east in YR014-YR016 showing clay interbeds and coarsening upwards deltaic profiles suggesting a similar palaeo-environmental setting at the mouth of the eastern palaeovalley.

- **(T2) Tertiary Unit T2**

Like Unit T3, lithology varies considerably within Unit T2 from massive, well-developed, greasy, occasionally micaceous, kaolinitic clays (frequently showing limonite mottling) through to kaolinitic to clean, angular sands and gravels containing prominent kaolinite chips and fragments. Well developed kaolinitic to clean sands occur a short distance south of the Yalyirimbi Fault as a belt parallel with the range front.

The Unit can be also sub-divided into sand-prone (T2sd) and clay-prone (T2cl) members but considerable lithological variation is present. Nonetheless, the, dominantly kaolinitic character of Tertiary Unit T2 its definitive feature and implies acid weathering conditions. The unit is characteristically capped by a variably developed silcrete suggesting a considerable hiatus between deposition of Unit T2 and Unit T1.

Poorly to well-developed limonite mottling (with limonite concretions occurring in some localised intervals) is a frequently observed characteristic of the clay-prone end member. YR015 and YR016 encountered much better developed limonite horizons with the narrow horizons somewhat unusually cemented by limonitic ferricrete.
Figure 22 - Quartzite conglomerates of the Mt Eclipse Sandstone (eastern outcrop) capped by a thin veneer of poorly developed, variably ferruginised, kaolinitic, gritty sandstones of probable Tertiary age.

Unit T2 is typically oxidised to neutral and contains prominent pink to pinkish-red, well-sorted and well-rounded, clean sands in YR012-YR016. Given the continental setting of the region, the sorting and rounding of these sands is unusual and suggests either sands the sands were deposited in a lacustrine shoreline or they have been derived from an older marine or shoreface sandstone. Fining and coarsening upwards profiles observed in the geophysical logs suggest the depositional environments range from braided and meandering fluvial settings through to deltaic and possibly shoreface settings. The presence of common gypsum crystals within sands in YR006-YR008 also suggests an evaporitic (lacustrine?) influence.

A thin veneer of variably ferruginised, poorly-consolidated, gritty and kaolinitic sandstones was observed to overlie Palaeozoic cobble to boulder conglomerates at the eastern outcrop of Mt Eclipse Sandstone (Figure 22). These sandstones were thinly bedded to flaggy and contained minor bioturbation. These sandstones are interpreted to be Tertiary in age and are lithologically similar to sandstones intersected in drilling.

Waite & Napperby Formations

- **(T1) Tertiary Unit 1**

Unit 1 is subdivided into four members that together represent a prograding alluvial fan. The unit is characteristically oxidised and feldspathic and is largely derived from stripping of weathered regolith on the Yalyirimbi and Reynolds Ranges to the north. Similar sediments occur within the Ti-Tree Basin on the northern flank of the Reynolds Range.

The sedimentary succession grades upwards from a variably developed basal lag deposit into mottled, dolomitic lacustrine clays and silts of the Waite Formation. The Waite Formation sediments are abruptly
overlain by, or grade upwards into oxidised alluvial palaeosols and poorly sorted colluvial sediments of the Napperby Formation (informal name).

The relationship between the Waite and Napperby Formations is interpreted to be similar to the relationship between the Namba and Willawortina Formations in the Frome Embayment (South Australia). Together the Formations record the progradation of an alluvial fan into a lacustrine basin in response to a phase of tectonic uplift.

Unit 1 is interpreted to be Late Miocene – Pliocene in age on the basis of strong lithological and genetic similarities between Unit 1 and well dated similar sediments in southern Australia. A limited number of palynological samples have been taken to provide confirmation but results had not been received at the time of writing.

• **(T1l) Lower Member – Waite Formation**
   This Member comprises ferruginous, pisolitic and sandy gravels (with clayey matrix) to pebbly conglomerates. The Member is variably developed (up to 10m thick) and represents a lag deposit developed above the underlying kaolinitic Unit T2 or lithified ‘basement’ rock units of the Ngalla Basin.

   Clasts are composed predominantly (>90%) of ferricrete fragments and lesser ironstone pisoliths, with the remainder composed of resistant lithologies (e.g. silcrete, chert and quartzite). Clean, oxidised sands were seen to overly pisolitic pebbly ferruginous gravel in YR009 (Figure 23) and are considered to be a finer grained facies of this member.

• **(T1lac) Lacustrine Member – Waite Formation**
   Several drillholes situated in more distal locations to the south of Yalyirimbi intersected a thin to moderately thick succession of silty and sandy clays to well-developed plastic lacustrine clays containing minor disseminated carbonaceous material. These clays are typically khaki-green to olive-green in colour and contain prominent white dolomitic clay to silt clasts and fragments. The geophysical logs show small cyclical sequences that are interpreted to grade downwards from dolomites into clays. Similar cycles are commonly observed within the Namba Formation (Frome Embayment, South Australia).

• **(T1m) Middle Member – Napperby Formation**
   Although not always present, this Member represents a distinctive, finer-grained, red, haematite-dominated succession of ferruginous, sandy silts and palaeosols. A poor to moderate degree of ferruginous cementation is common. Like the Upper Member, the sands are feldspathic and typically contain multi-coloured quartz and feldspar grains showing variable degrees of iron staining (including prominent yellow-stained quartz). The Member is typically silty and better sorted than the Upper Member present and shows strong lithological similarities with the Quaternary – Recent soil profiles. Although not always present, this member characteristically grades downwards into the Lower Member.

   Despite being generally finer-grained than the Upper Member, well-developed, rounded conglomeratic intervals (derived from nearby outcropping pebble to cobble conglomerates of the Palaeozoic Mt Eclipse Sandstone) were encountered within this Member in YR009, and together with the palaeosol profiles, indicate deposition of fluvial sediments atop alluvial soils. Given the oxidised nature of these sediments, calcrete development may be associated with this Member.

• **(T1u) Upper Member – Napperby Formation**
   This Member typically comprises a thick package of poorly-sorted, clayey sands and gravels to sandy clays. The Upper Member is characteristically feldspathic and contains clasts, chips and fragments of regolith (silcrete and ferricrete) along with minor gypsum and mica. Sands typically contain multi-coloured quartz and feldspar grains showing variable degrees of iron staining. Isolated fluvial channel
sands (up to 10m thick) and poorly- to moderately-developed palaeosol profiles are common and represent development of sandy distributary channels probably somewhat similar to modern drainage. Minor amounts of gypsum, charcoal and carbonaceous fragments are locally present. The member is typically oxidised and limonite dominated, although pale greenish intervals of mottled, slightly reduced silt and clay are also common.

This member coarsens upwards slightly and represents colluvial material deposited as a series of coalescing alluvial fans along the south of the Yalyirimbi and Reynolds Ranges. Minor to moderate calcrete development occurs at the top of the unit.

**Quaternary - Recent**

The Quaternary to Recent succession comprises strongly oxidised, haematitic aeolian sands and colluvial to alluvial soils that unconformably overlie the Tertiary succession. Variable calcrete development occurs within this unit. The unit is poorly sorted, frequently containing pebbles and fragments of silcrete, ferricrete and weathered rock fragments.
Figure 23 - YR009 cuttings showing interpreted stratigraphy. Note that YR009 was drilled on the flanks of an outcropping Palaeozoic high. As a result, Unit 1 (Middle Member) is conglomeratic (74-90m) whilst the Unit 1 (Lacustrine Member) is absent. Unit T2 and Unit T3 are relatively thin when compared to YR004 (Figure 25). Note the silcrete (Tsi) developed at the redox boundary between Unit T2 and Unit T3. Undifferentiated Ngalia Basin units are given the stratigraphic code ‘?P’.
Figure 24 - YR009 cuttings showing interpreted stratigraphy.
Figure 25 - YR004 chip trays showing interpreted stratigraphy. Note the greatly increased thickness of the Unit T2 (T2) oxidised and Unit T3 (T3) reduced sands and the silcrete (Tsi) developed at the top of Unit T2. Undifferentiated Ngalia Basin units are given the stratigraphic code “?P”
PALYNOLOGY

Introduction
Lignitic and carbonaceous material is moderately widespread in the Tertiary succession and forms useful stratigraphic marker horizons that greatly aid stratigraphic correlations. However, palynological dating is complicated by the strong weathering overprints that degrade the quality of any preserved organic matter. Furthermore, dark coloured (and apparently carbonaceous) clays frequently contain abundant pyrolusite rather than disseminated organic matter, thus making them unsuitable for palynological dating.

Thirty seven samples were taken for palynological analysis from suitably reduced or carbonaceous intervals intersected by drilling on Yalyirimbi (Table 6). Four of these samples were submitted to Liliana Stoian at Primary Industries and Resources, South Australia (PIRSA) for preliminary palynological analysis and the results are also detailed in Table 6.

Correspondence with Liliana Stoian informs indicates that South Australian samples have absolute priority and PIRSA cannot process any further samples from the NT without the collaboration of the NTGS. For this reason, a large number of samples have not been submitted and are currently stored in NuPower’s storage container at the Aileron Roadhouse.

Results
The BMR’s 1968 stratigraphic drilling program on the Napperby 1:250,000 Map Sheet intersected lignite and carbonaceous material within Napperby 1. Wells & Moss (1983; p46) reported that the sample contained abundant Nothofagus pollen indicating a Middle Eocene age (Proteacidites confragosus Zone). The prepared slide appears to be still available at PIRSA [Sample # 2796].

On the basis of its similar lithological description (Evans & Nicholas, 1970), its depth and stratigraphic position (beneath a silcrete), and a Middle Eocene age Wells & Moss (1983), the lignite intersected by BMR Napperby 1 is correlated with the Tertiary Unit T3 horizon defined from NuPower’s reconnaissance drilling. Both units are further correlated with the Ulgnamba Lignite Member of the Hale Formation.

Historical exploration by Agip in the southwestern corner of Yalyirimbi intersected uranium mineralisation in 3 drillholes (Table 4). NuPower’s drillhole YR006 confirmed that this historical intersection is hosted by the Tertiary Unit T3 horizon. YR026, located a short distance to the north intersected lignitic material that returned a Tertiary age. NuPower’s drilling frequently intersected Tertiary Unit T3 sediments beneath well-developed silcretes. Agip historical drilling records either interpret these silcretes as either a silcrete developed at the top of the Palaeozoic Mt Eclipse Sandstone, or as the Proterozoic Vaughan Springs Quartzite.

Agip’s interpretation of the historical mineralisation occurring in the Palaeozoic Mt Eclipse Sandstone therefore requires revision, and questions are raised about the accuracy of Agip’s stratigraphic interpretation throughout the region. It seems likely that some, if not most of the indications of uranium mineralisation discovered by Agip in the eastern half of the Ngalia Basin are likely to be hosted by Tertiary sediments. In light of this, the prospectivity of the Tertiary Basins in the region is considerably enhanced.
<table>
<thead>
<tr>
<th>Drillhole</th>
<th>Depth (m)</th>
<th>Spore/Pollen Zone</th>
<th>Age</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR003</td>
<td>34.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR003</td>
<td>64.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR003</td>
<td>86.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR004</td>
<td>178.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR004</td>
<td>214.0</td>
<td>Lower <em>Nothofagidites asperus</em> Zone</td>
<td>Early-Middle Eocene</td>
<td>Rare dinoflagellate cysts (weak marine influence?)</td>
</tr>
<tr>
<td>YR006</td>
<td>126.0</td>
<td></td>
<td></td>
<td>Barren</td>
</tr>
<tr>
<td>YR007</td>
<td>68.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR007</td>
<td>74.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR007</td>
<td>126.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR009</td>
<td>44.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR009</td>
<td>136.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR009</td>
<td>168.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR010</td>
<td>44.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR010</td>
<td>174.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR011</td>
<td>118.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR011</td>
<td>130.0</td>
<td></td>
<td></td>
<td>Barren</td>
</tr>
<tr>
<td>YR011</td>
<td>130.0</td>
<td></td>
<td></td>
<td>Amorphous organic matter present</td>
</tr>
<tr>
<td>YR012</td>
<td>132.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR012</td>
<td>140.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR012</td>
<td>144.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR012</td>
<td>150.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR015</td>
<td>138.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR015</td>
<td>140.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR015</td>
<td>146.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR019</td>
<td>128.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR019</td>
<td>130.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR023</td>
<td>32.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR023</td>
<td>34.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR024</td>
<td>72.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR024</td>
<td>94.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR024</td>
<td>132.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR024</td>
<td>154.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR024</td>
<td>208.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR026</td>
<td>144.0</td>
<td></td>
<td></td>
<td>Almost barren. Just a single pollen grain of <em>Crotonipollis</em> sp. (a Tertiary genera)</td>
</tr>
<tr>
<td>YR026</td>
<td>190.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR027</td>
<td>112.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR027</td>
<td>102.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
<tr>
<td>YR027</td>
<td>160.0</td>
<td></td>
<td></td>
<td>Not submitted</td>
</tr>
</tbody>
</table>

Table 6 - Yalyirimbi palynological results.
# Downhole Geophysical Logging

<table>
<thead>
<tr>
<th>Hole ID</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>TD</th>
<th>Depth (m)</th>
<th>Thickness (m)</th>
<th>Grade (%\text{U}_3\text{O}_8)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR001</td>
<td>273302</td>
<td>7499434</td>
<td>72.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR002</td>
<td>273330</td>
<td>7498452</td>
<td>89.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR003</td>
<td>273700</td>
<td>7496996</td>
<td>164.5</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR004</td>
<td>267024</td>
<td>7497026</td>
<td>250.0</td>
<td>181.0 - 185.5</td>
<td>4.5</td>
<td>0.012</td>
<td>-</td>
</tr>
<tr>
<td>YR005</td>
<td>258756</td>
<td>7497657</td>
<td>84.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>Lost circulation, hole abandoned</td>
</tr>
<tr>
<td>YR006</td>
<td>243960</td>
<td>7492013</td>
<td>163.0</td>
<td>107.0 - 108.0</td>
<td>1.0</td>
<td>N/A</td>
<td>Anomalous gamma</td>
</tr>
<tr>
<td>YR007</td>
<td>246450</td>
<td>7492287</td>
<td>174.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR008</td>
<td>244172</td>
<td>7493273</td>
<td>126.5</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR009</td>
<td>245177</td>
<td>7495519</td>
<td>175.5</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR010</td>
<td>245987</td>
<td>7500768</td>
<td>319.5</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR011</td>
<td>246443</td>
<td>7505358</td>
<td>217.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR012</td>
<td>244459</td>
<td>7502441</td>
<td>177.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR013</td>
<td>244292</td>
<td>7501398</td>
<td>204.0</td>
<td>176.5 - 177.5</td>
<td>1.0</td>
<td>N/A</td>
<td>Anomalous gamma</td>
</tr>
<tr>
<td>YR014</td>
<td>251253</td>
<td>7502045</td>
<td>222.0</td>
<td>149.0 - 150.0</td>
<td>1.0</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td>YR015</td>
<td>252145</td>
<td>7501556</td>
<td>156.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR016</td>
<td>253747</td>
<td>7499955</td>
<td>266.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR017</td>
<td>253104</td>
<td>7498563</td>
<td>204.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR018</td>
<td>252499</td>
<td>7497264</td>
<td>90.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR019</td>
<td>249177</td>
<td>7498738</td>
<td>175.0</td>
<td>124.0 - 133.0</td>
<td>9.0</td>
<td>N/A</td>
<td>Anomalous gamma</td>
</tr>
<tr>
<td>YR020</td>
<td>250052</td>
<td>7500373</td>
<td>169.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR021</td>
<td>250547</td>
<td>7501239</td>
<td>187.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR022</td>
<td>249852</td>
<td>7502649</td>
<td>127.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR023</td>
<td>249360</td>
<td>7494998</td>
<td>121.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR024</td>
<td>247748</td>
<td>7500338</td>
<td>236.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR025</td>
<td>264490</td>
<td>7496956</td>
<td>206.0</td>
<td>156.0 - 157.0</td>
<td>1.0</td>
<td>0.010</td>
<td>-</td>
</tr>
<tr>
<td>YR026</td>
<td>244946</td>
<td>7494317</td>
<td>256.0</td>
<td>153.0 - 157.0</td>
<td>4.0</td>
<td>N/A</td>
<td>Anomalous Gamma</td>
</tr>
<tr>
<td>YR027</td>
<td>247838</td>
<td>7495394</td>
<td>169.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR028</td>
<td>248392</td>
<td>7497128</td>
<td>169.0</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YR029</td>
<td>255002</td>
<td>7503615</td>
<td>162.0</td>
<td>158.5 - 159.5</td>
<td>1.0</td>
<td>N/A</td>
<td>Anomalous Gamma</td>
</tr>
<tr>
<td>YR030</td>
<td>257341</td>
<td>7498739</td>
<td>223.0</td>
<td>120.0 - 121.0</td>
<td>1.0</td>
<td>N/A</td>
<td>Anomalous Gamma</td>
</tr>
</tbody>
</table>

Table 7 - Drillhole intersections on Yalyirimbi (EL24548). Holes intersecting anomalous gamma are highlighted.
All holes were geophysically logged for natural gamma (GAMMA), self potential (SP) and resistivity (LLS Laterolog Shallow & LLD - Laterolog Deep). Drillhole and geophysical logs are included in Appendix 5.

Six drillholes on Yalyirimbi (EL24548) intersected minor indications of anomalous gamma within sediments interpreted as Hale Formation (Table 7) but estimated grades were <0.01% eU₃O₈. A further three drillholes intersected uranium mineralisation >0.01% eU₃O₈ as determined by standard downhole gamma logging techniques.

A PFN logging tool became available in late August and attempts were made to log eight of the anomalous holes drilled on Yalyirimbi (no attempt was made on drillhole YR030 as it had been converted into a water bore). Unfortunately, due to the period of time elapsed since completion of the drilling program on the Yalyirimbi tenement (on 07Aug08) all of NUP’s holes had closed over above the anomalous intervals and could not be logged. PFN logging details are outlined in Table 9 and drillhole status is shown in Figure 19.

PFN runs were conducted on six of these eight holes and were unable to be run on the final two drillholes (YR004 and YR025) due to equipment failure. All of NUP’s drillholes were found to have closed over at depths above the anomalous zones.

<table>
<thead>
<tr>
<th>Drillhole</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>Depth From</th>
<th>To (m)</th>
<th>Thickness (m)</th>
<th>eU₃O₈ %</th>
<th>ppm</th>
<th>pU₃O₈ %</th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGIP W11RD?</td>
<td>243937</td>
<td>7491925</td>
<td>111.0</td>
<td>113.0</td>
<td>2.0</td>
<td>0.0174</td>
<td>174</td>
<td>0.0238</td>
<td>238</td>
</tr>
<tr>
<td>114.0</td>
<td>116.0</td>
<td>2.0</td>
<td>0.0191</td>
<td>191</td>
<td>0.0386</td>
<td>386</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 - PFN results for AGIP historical drillhole.

PFN logging was also attempted on three cased historical holes drilled by Agip in the southwest corner on Yalyirimbi. Previous gamma logging indicated these holes were partially open at depth and intersected anomalous gamma. Logging was successfully completed over two anomalous intervals in the one drillhole and the results (Table 8) encouragingly indicated the presence of positive disequilibrium associated with confirmed Uranium mineralisation. The disequilibrium implies that the mineralisation is relatively young (<1Ma) and suggests deposition in response to actively migrating geochemical cells within permeable sands of the Hale Formation.
<table>
<thead>
<tr>
<th>Hole ID</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>TD</th>
<th>Dip</th>
<th>Azi</th>
<th>Date Completed</th>
<th>Comments</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR004</td>
<td>267024</td>
<td>7497026</td>
<td>250.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>18-Jun-08</td>
<td>Weakly anomalous 159.0-160.0, Anomalous 175.5-186.0m</td>
<td>Unable to log due to winch failure</td>
</tr>
<tr>
<td>YR006</td>
<td>243960</td>
<td>7492013</td>
<td>163.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>24-Jun-08</td>
<td>Weakly anomalous 107.0-108.0m</td>
<td>Blocked @ 77.31m</td>
</tr>
<tr>
<td>YR013</td>
<td>244292</td>
<td>7501398</td>
<td>204.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>8-Jul-08</td>
<td>Weakly anomalous 176.5-177.5m</td>
<td>Blocked @ 133.15m</td>
</tr>
<tr>
<td>YR014</td>
<td>251253</td>
<td>7502045</td>
<td>222.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>9-Jul-08</td>
<td>Weakly anomalous 149.0-150.0m, 163.0-165.5m</td>
<td>Blocked @ 89.47m</td>
</tr>
<tr>
<td>YR019</td>
<td>249177</td>
<td>7498738</td>
<td>175.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>19-Jul-08</td>
<td>Weakly anomalous 118.0-120.0m, 124.0-128.0m, 129.0-133.0m, 155.5-159.5m</td>
<td>Blocked @ 95.42m</td>
</tr>
<tr>
<td>YR025</td>
<td>264490</td>
<td>7496956</td>
<td>206.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>29-Jul-08</td>
<td>Weakly anomalous 156.0-160.0m, 165.0-168.0m</td>
<td>Unable to log due to winch failure</td>
</tr>
<tr>
<td>YR026</td>
<td>244946</td>
<td>7494317</td>
<td>256.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>2-Aug-08</td>
<td>Weakly anomalous 153.0-159.0m, 166.0-167.0m</td>
<td>Blocked @ 100.05m</td>
</tr>
<tr>
<td>YR029</td>
<td>255002</td>
<td>7503615</td>
<td>162.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>5-Aug-08</td>
<td>Weakly anomalous 158.5-159.5m</td>
<td>Blocked @ 74.12m</td>
</tr>
<tr>
<td>YR030</td>
<td>257341</td>
<td>7498739</td>
<td>223.0</td>
<td>-90.0</td>
<td>0.0</td>
<td>7-Aug-08</td>
<td>Weakly anomalous 120.0-121.0m</td>
<td>Unable to PFN due to water bore installation (screen 98-104m) above weakly anomalous zone</td>
</tr>
<tr>
<td>AGIP W5RD</td>
<td>243948</td>
<td>7491969</td>
<td></td>
<td>-90.0</td>
<td>0.0</td>
<td>July 1979</td>
<td>Anomalous historical drillhole. Historical U assay of 137ppm from 113.5-114.5m</td>
<td>PFN Log 100.0-114.2m</td>
</tr>
<tr>
<td>AGIP W11RD?</td>
<td>243937</td>
<td>7491925</td>
<td></td>
<td>-90.0</td>
<td>0.0</td>
<td>January 1980</td>
<td>Anomalous historical drillhole. AGIP Reported anomalous gamma 109.0-155.0m</td>
<td>PFN Log 100.0-121.93m</td>
</tr>
<tr>
<td>AGIP W14RD?</td>
<td>243943</td>
<td>7491877</td>
<td></td>
<td>-90.0</td>
<td>0.0</td>
<td>March 1981</td>
<td>Anomalous historical drillhole. AGIP reported minor anomalous gamma at EOH (121.5m)</td>
<td>PFN Log 92.3-101.0m. Unable to get PFN down to anomalous zone.</td>
</tr>
</tbody>
</table>

Table 9 – PFN log details for anomalous drillholes on Yalyirimbi (EL24548).
GEOCHEMISTRY

Drilling & Sample Method
NuPower Resources conducted its 2008 reconnaissance drilling using a rotary mud drill rig supplied by Watson Drilling. This drilling method utilises a recirculating stream of liquid mud to facilitate drill penetration and to carry the drill cuttings to the surface for sampling. Mud is pumped from the sump, down the inside of drill stem to the drill bit, from where it returns outside the drill stem to the surface and back into the sump via a run in channel. Cuttings are considered to be representative of a broader zone due to the delay in sample return and the potential for mixing in the mud column.

Representative cuttings samples were collected at 2m intervals from a sump in the run in channel and then laid out in 30m rows on the ground in a suitable area adjacent to the drilling rig. Figure 23 provides an illustration of the layout of the cuttings. Cuttings and chip tray photographs of each drillhole are included in Appendix 5b. Samples were taken from each 2m cuttings pile from zones containing anomalous gamma (Table 7) from 5 drillholes. Assay samples were also taken from the bottom of YR022 in order to ascertain if any anomalous geochemistry was present in the underlying granitic basement.

A total of 95 drill cuttings samples were submitted to ALS Chemex in Alice Springs. Assay results are enclosed in Appendix 5d. A detailed analysis has not yet been completed.
RECONNAISSANCE MAPPING – HAEMATITE OUTCROPS

Introduction
Several outcrops of haematite occur within the Vaughan Springs Quartzite as an east-west trending zone running roughly parallel with the Napperby-Pulardi road, and separating Patty Hill from the .691 feature (Figure 30). The .691 feature is considered to be the western extension of the southern limb of the Patty Hill anticline (developed in the Vaughan Springs Quartzite) that has been displaced by faulting.

Examination of the Figure 31 shows that the Patty Hill and the .691 feature are separated by what is interpreted to be a fault-bounded EM trough referred to as the ‘eastern palaeochannel’. Drillhole YR029 confirmed the presence of this trough, encountering >100m of Tertiary palaeochannel sediments overlying Vaughan Springs Quartzite at 126m.

Reconnaissance mapping visited an eastern outcrop located on the northern side of Patty Hill, a western outcrop located to the south of the .691 feature, and a possible extension of this outcrop to the west. Outcrop localities are detailed in Table 10 and shown in Figure 30, Figure 31 and Figure 32.

Geology
Geological mapping of the three outcrops suggest that the outcropping haematite infills an east-west trending brecciated zone within the Vaughan Springs Quartzite. Brecciated granites are encountered along strike to the east (Figure 29). This zone is interpreted as a fault zone displacing the southern limb of the Patty Hill anticline and forming the structural low infilled by the ‘eastern palaeochannel.’

The outcrops of consist of brecciated Vaughan Springs Quartzite with variable replacement by haematite. Haematite is interpreted to have precipitated from iron rich fluid movement through the brecciated quartzites and has subsequently been enhanced by development of a surface ironstone in response to weathering. Ten grab samples were taken from three separate outcrops and seven samples were submitted for assay. Silicification of the rock units is evident and overall silica contents, although not assayed, are likely to be high. Assay results are outlined in Table 11 and included in Appendix 5d.

<table>
<thead>
<tr>
<th>Waypoint</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>Altitude</th>
<th>NUP Sample #</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>255190</td>
<td>7504173</td>
<td>627m</td>
<td>12101</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>102</td>
<td>255289</td>
<td>7504187</td>
<td>622m</td>
<td>12102</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>103</td>
<td>255131</td>
<td>7504242</td>
<td>628m</td>
<td>12103</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>104</td>
<td>255024</td>
<td>7504177</td>
<td>628m</td>
<td>12104</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>105</td>
<td>255154</td>
<td>7504089</td>
<td>626m</td>
<td>12105</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>106</td>
<td>255256</td>
<td>7504082</td>
<td>626m</td>
<td>12106</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>107</td>
<td>255052</td>
<td>7504107</td>
<td>621m</td>
<td>12107</td>
<td>Haematite Outcrop 1</td>
</tr>
<tr>
<td>108</td>
<td>254395</td>
<td>7504045</td>
<td>622m</td>
<td>NA</td>
<td>Haematite Outcrop 1 -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Extension</td>
</tr>
<tr>
<td>112</td>
<td>258091</td>
<td>7504688</td>
<td>628m</td>
<td>NA</td>
<td>Haematite Outcrop 2</td>
</tr>
<tr>
<td>113</td>
<td>258083</td>
<td>7504677</td>
<td>639m</td>
<td>NA</td>
<td>Haematite Outcrop 2</td>
</tr>
</tbody>
</table>

Table 10 – Haematite outcrops on Yalyirimi.

Although mantled by scree and Quaternary sediments, the extent of the western outcrop is approximately 200 x 400m in size with a subcropping possible extension occurring at waypoint 108, a further 600m to the west along the road. Replacement of the original rock is quite pronounced within the centre of the occurrence, with massive specular haematite in abundance (Figure 33). In this area the original sedimentary character of the rock is difficult to discern but becomes more visible towards less deformed quartzites to the north as you move into. Distinctive outcrops of ‘spotted’ quartzite occur in this location. Transported, rounded conglomerate clasts of the same ‘spotty’ quartzites occur at the western outcrop of the conglomeratic Mt Eclipse Sandstone (Figure 21) and in drillhole YR009.
The western outcrop disappears under scree and alluvium to west, south and east and appears to pass northwards into progressively less deformed Vaughan Springs Quartzite. Little can be said of the outcrop’s western extension as it takes the form of a low rise covered in haematitic soil and blanketed by colluvial and alluvial sediments.

A more extensive outcrop occurs in the east on the northern side of Patty Hill but haematite replacement is less pronounced and the original sedimentary bedding is well-developed. Again the haematite infills preferentially brecciated zones within the quartzites (Figure 26, Figure 27). The faulted margin of the quartzites passes along strike into haematised granitic breccia (Figure 29). Locally the haematite becomes quite massive but like the previous case tonnage potential is negligible.

Figure 26 - Strongly haematised quartzite breccia (eastern outcrop, waypoint 113).
Figure 27 - Variably fractured and brecciated beds of Vaughan Springs Quartzite showing differential haematisation of beds (Location ~100m south of waypoint 113).

A brief inspection was made to determine the origin and character of the eastern outcrop by a consultant geologist, Mr Neil Rutherford. An excerpt of his report is included below and the original report included in Appendix 11.

“The outcrop in a quartzite unit is typical of ironstones that develop in areas of intense ferruginisation. The massive haematite is a result of ongoing weathering and addition and recrystallisation of the iron from groundwater transport of iron oxides up the faults and fracture zones depositing it along the line of the fault zone. Silicification also serves to create positive relief of the zone of intense haematite precipitation. The haematite is confined to the upper sections of the ridge, giving way to ferruginised joints lower down the slope. There is no tonnage potential for exploitation.

A similar process is envisaged for the massive haematite occurrence along strike where the fault intersects granite (Figure 29). Such settings fall into the general category of “false gossans” and these are intensely leached and generally barren of most metals of interest. Minor Zn, Mn and perhaps As may concentrate but are generally not significantly elevated.

In the Tennant Creek area massive haematite (or better martite after magnetite) is an indicator of Cu-Au-Bi mineralisation. However this is generally accompanied by evidence of other alteration, notably pervasive chloritisation and intense local deformation. This situation does not occur in the Yalyirimbi area.

There is no potential associated with the occurrence of hematite developed along the fault zone. This is superficial and related to weathering processes.”
Figure 28 - Bluish grey crystalline haematite impregnation into rock about joint with brown younger haematite infiltration into rock. Ferruginisation process starts with Fe fill of joints and fractures. This then recrystallises to haematite and cracks open up and become refilled until massive haematite has developed.

Figure 29 - Haematised granite along fault from above. Locally the haematite becomes quite massive but like the previous case tonnage potential is negligible.
Figure 30 - Mapped 250K geology on Yalyirimbi showing haematite outcrop in relation to the southern limb of the Patty Hill anticline.
Figure 31 - Airborne EM image superimposed over regional topographic map showing the east-west trending zone of outcropping haematite in relation to the 'eastern palaeochannel'.
Figure 32 - Waypoint and haematite sample locations on Yalyirimi.
<table>
<thead>
<tr>
<th>Sample ID</th>
<th>12101</th>
<th>12102</th>
<th>12103</th>
<th>12104</th>
<th>12105</th>
<th>12106</th>
<th>12107</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDA94_E</td>
<td>255190</td>
<td>255289</td>
<td>255131</td>
<td>255024</td>
<td>255154</td>
<td>255256</td>
<td>255052</td>
</tr>
<tr>
<td>GDA94_N</td>
<td>7504173</td>
<td>7504187</td>
<td>7504242</td>
<td>7504177</td>
<td>7504089</td>
<td>7504082</td>
<td>7504107</td>
</tr>
<tr>
<td>Ag (ppm)</td>
<td>0.06</td>
<td>0.05</td>
<td>0.16</td>
<td>0.05</td>
<td>0.04</td>
<td>0.12</td>
<td>0.09</td>
</tr>
<tr>
<td>Al %</td>
<td>0.17</td>
<td>0.22</td>
<td>0.53</td>
<td>0.1</td>
<td>0.06</td>
<td>0.37</td>
<td>0.12</td>
</tr>
<tr>
<td>As (ppm)</td>
<td>2</td>
<td>2.2</td>
<td>9.9</td>
<td>1.5</td>
<td>1.4</td>
<td>4.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Ba (ppm)</td>
<td>80</td>
<td>80</td>
<td>2010</td>
<td>850</td>
<td>100</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>Be (ppm)</td>
<td>0.34</td>
<td>0.23</td>
<td>1.76</td>
<td>0.33</td>
<td>0.16</td>
<td>0.82</td>
<td>1.39</td>
</tr>
<tr>
<td>Bi (ppm)</td>
<td>1.2</td>
<td>2.43</td>
<td>2.3</td>
<td>3.32</td>
<td>1.16</td>
<td>2.94</td>
<td>17.6</td>
</tr>
<tr>
<td>Ca %</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>Cd (ppm)</td>
<td>1.79</td>
<td>2.11</td>
<td>2.67</td>
<td>3.34</td>
<td>0.69</td>
<td>3.43</td>
<td>2.12</td>
</tr>
<tr>
<td>Co (ppm)</td>
<td>2.1</td>
<td>3.2</td>
<td>1.2</td>
<td>1</td>
<td>2.2</td>
<td>4</td>
<td>8.5</td>
</tr>
<tr>
<td>Cr (ppm)</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Cs (ppm)</td>
<td>0.1</td>
<td>0.14</td>
<td>0.14</td>
<td>0.11</td>
<td>0.1</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Cu (ppm)</td>
<td>3.5</td>
<td>3.2</td>
<td>4.5</td>
<td>7.7</td>
<td>2.2</td>
<td>23.9</td>
<td>22.7</td>
</tr>
<tr>
<td>Fe %</td>
<td>35.2</td>
<td>34.2</td>
<td>&gt;50</td>
<td>42.1</td>
<td>33.3</td>
<td>42</td>
<td>40.9</td>
</tr>
<tr>
<td>Ga (ppm)</td>
<td>5.23</td>
<td>5.67</td>
<td>4.42</td>
<td>6.26</td>
<td>4.96</td>
<td>9.47</td>
<td>7.87</td>
</tr>
<tr>
<td>Ge (ppm)</td>
<td>0.36</td>
<td>0.33</td>
<td>0.67</td>
<td>0.38</td>
<td>0.31</td>
<td>0.4</td>
<td>0.42</td>
</tr>
<tr>
<td>Hf (ppm)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.5</td>
<td>0.1</td>
<td>0.1</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>In (ppm)</td>
<td>0.032</td>
<td>0.018</td>
<td>0.066</td>
<td>0.061</td>
<td>0.017</td>
<td>0.078</td>
<td>0.076</td>
</tr>
<tr>
<td>K %</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>La (ppm)</td>
<td>0.7</td>
<td>0.9</td>
<td>1.4</td>
<td>0.9</td>
<td>&lt;0.5</td>
<td>3.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Li (ppm)</td>
<td>1.9</td>
<td>1.4</td>
<td>0.9</td>
<td>1.5</td>
<td>1.4</td>
<td>1.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Mg %</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Mn (ppm)</td>
<td>65</td>
<td>50</td>
<td>380</td>
<td>69</td>
<td>37</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>Mo (ppm)</td>
<td>5.03</td>
<td>4.1</td>
<td>1.29</td>
<td>6.37</td>
<td>2.16</td>
<td>10.15</td>
<td>6.13</td>
</tr>
<tr>
<td>Na %</td>
<td>0.01</td>
<td>0.02</td>
<td>0.08</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Nb (ppm)</td>
<td>0.8</td>
<td>0.6</td>
<td>1.7</td>
<td>0.6</td>
<td>0.6</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Ni (ppm)</td>
<td>1.4</td>
<td>2</td>
<td>2.4</td>
<td>1.1</td>
<td>1.2</td>
<td>3.8</td>
<td>1.4</td>
</tr>
<tr>
<td>P (ppm)</td>
<td>20</td>
<td>20</td>
<td>100</td>
<td>70</td>
<td>30</td>
<td>90</td>
<td>60</td>
</tr>
<tr>
<td>Pb (ppm)</td>
<td>1.3</td>
<td>1.4</td>
<td>8.6</td>
<td>1.9</td>
<td>0.8</td>
<td>3.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Rb (ppm)</td>
<td>0.8</td>
<td>1.7</td>
<td>1.3</td>
<td>0.3</td>
<td>0.6</td>
<td>5.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Re (ppm)</td>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
</tr>
<tr>
<td>S %</td>
<td>0.01</td>
<td>0.01</td>
<td>0.07</td>
<td>0.03</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Sb (ppm)</td>
<td>0.27</td>
<td>0.23</td>
<td>1.78</td>
<td>0.21</td>
<td>0.19</td>
<td>0.4</td>
<td>0.35</td>
</tr>
<tr>
<td>Sc (ppm)</td>
<td>1</td>
<td>0.7</td>
<td>2</td>
<td>0.8</td>
<td>0.7</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Se (ppm)</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>1</td>
</tr>
<tr>
<td>Sn (ppm)</td>
<td>8.6</td>
<td>13.9</td>
<td>3.1</td>
<td>6.4</td>
<td>37.1</td>
<td>8.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Sr (ppm)</td>
<td>3.1</td>
<td>3.6</td>
<td>15.1</td>
<td>4.5</td>
<td>1.4</td>
<td>4</td>
<td>3.3</td>
</tr>
<tr>
<td>Ta (ppm)</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>0.08</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Te (ppm)</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Th (ppm)</td>
<td>0.7</td>
<td>0.5</td>
<td>3.2</td>
<td>0.4</td>
<td>0.4</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>Ti %</td>
<td>0.008</td>
<td>0.01</td>
<td>0.025</td>
<td>0.006</td>
<td>0.007</td>
<td>0.017</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Tl (ppm)</td>
<td>0.06</td>
<td>0.03</td>
<td>0.08</td>
<td>0.05</td>
<td>0.03</td>
<td>0.08</td>
<td>0.15</td>
</tr>
<tr>
<td>U (ppm)</td>
<td>2</td>
<td>2.3</td>
<td>0.8</td>
<td>3</td>
<td>2</td>
<td>3.2</td>
<td>3.3</td>
</tr>
<tr>
<td>V (ppm)</td>
<td>10</td>
<td>12</td>
<td>28</td>
<td>3</td>
<td>24</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>W (ppm)</td>
<td>133.5</td>
<td>134.5</td>
<td>33.2</td>
<td>147</td>
<td>107.5</td>
<td>131</td>
<td>187</td>
</tr>
<tr>
<td>Y (ppm)</td>
<td>1.2</td>
<td>0.8</td>
<td>1</td>
<td>1.3</td>
<td>0.5</td>
<td>1.9</td>
<td>3</td>
</tr>
<tr>
<td>Zn (ppm)</td>
<td>&lt;2</td>
<td>&lt;2</td>
<td>7</td>
<td>&lt;2</td>
<td>&lt;2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Zr (ppm)</td>
<td>3.7</td>
<td>2.7</td>
<td>13.2</td>
<td>3.4</td>
<td>2.6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Au (ppm)</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Table 11 – Assay results for haematite grab samples on Yalyirimbi.
Figure 33 - Massive haematite (western outcrop, waypoint 107).

Figure 34 - Haematite replacement of strongly brecciated quartzite matrix (western outcrop, waypoint 101).
RECONNAISSANCE MAPPING – HARD ROCK URANIUM ANOMALIES

Introduction
Thirty nine hard rock radiometric anomalies in the northern part of the tenement were investigated by a consultant geologist, Mr Ian Splatt, during the reporting period. A final report had not been received by the tenement anniversary date. The location of the radiometric anomalies visited are listed in Table 12 and shown in Figure 35 & Figure 36.

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>GDA94_E</th>
<th>GDA94_N</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day Creek</td>
<td>290,409</td>
<td>7,511,469</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>DC02</td>
<td>283,114</td>
<td>7,507,643</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>DC09</td>
<td>279,869</td>
<td>7,513,989</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>DC16</td>
<td>289,174</td>
<td>7,505,259</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Gidyea Creek</td>
<td>263,274</td>
<td>7,515,434</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Gidyea Creek</td>
<td>263,154</td>
<td>7,515,475</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Gidyea Creek South</td>
<td>264,399</td>
<td>7,515,314</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Haematite</td>
<td>252,300</td>
<td>7,523,165</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD01</td>
<td>252,344</td>
<td>7,522,709</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD02</td>
<td>259,109</td>
<td>7,520,299</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD06</td>
<td>253,379</td>
<td>7,522,249</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD07</td>
<td>261,079</td>
<td>7,519,329</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD07</td>
<td>253,154</td>
<td>7,522,539</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD12</td>
<td>254,689</td>
<td>7,521,819</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>MD14</td>
<td>256,209</td>
<td>7,520,964</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Mt Freeling</td>
<td>304,489</td>
<td>7,501,329</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Napperby (NA02782)</td>
<td>263,929</td>
<td>7,516,869</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Napperby Creek</td>
<td>271,379</td>
<td>7,516,819</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>Napperby South</td>
<td>272,011</td>
<td>7,515,622</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC01</td>
<td>262,974</td>
<td>7,516,279</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC04</td>
<td>261,229</td>
<td>7,522,654</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC05</td>
<td>260,279</td>
<td>7,519,889</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC12</td>
<td>264,899</td>
<td>7,516,354</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC18</td>
<td>272,189</td>
<td>7,515,229</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC20</td>
<td>272,764</td>
<td>7,516,953</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC21</td>
<td>273,729</td>
<td>7,517,429</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>NC26</td>
<td>262,889</td>
<td>7,516,639</td>
<td>PNC Radiometric Anomaly</td>
</tr>
<tr>
<td>X001</td>
<td>244,715</td>
<td>7,519,885</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X002</td>
<td>260,965</td>
<td>7,518,827</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X003</td>
<td>258,850</td>
<td>7,519,507</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X004</td>
<td>261,950</td>
<td>7,510,515</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X005</td>
<td>265,275</td>
<td>7,509,760</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X009</td>
<td>266,558</td>
<td>7,503,410</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X010</td>
<td>261,345</td>
<td>7,506,960</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X014</td>
<td>269,620</td>
<td>7,515,728</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X015</td>
<td>263,875</td>
<td>7,513,690</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X017</td>
<td>257,110</td>
<td>7,525,062</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X018</td>
<td>255,562</td>
<td>7,520,452</td>
<td>NUP Radiometric Anomaly</td>
</tr>
<tr>
<td>X019</td>
<td>253,295</td>
<td>7,521,548</td>
<td>NUP Radiometric Anomaly</td>
</tr>
</tbody>
</table>

Table 12 – Yalyirimbi Radiometric Anomalies.

A total of 81 rock samples were submitted for assay and their results, along with a brief summary of the observed geology are included in Appendix 11.
Figure 35 – Napperby radiometric map (U channel) showing location of anomalies visited.
Figure 36 - Yalyirimbi 1:250,000 Geology showing location of assay samples.
EXPENDITURE STATEMENT, YEAR 2, 2008

Expenditure details for Year 3, 2008 and the covenant and proposed exploration activities for Year 4, 2009 are given as an attachment in Appendix 6.

The Expenditure Covenant for Year 3 was $200,000. Expenditure up until the 30th December 2008 was $922,133.02 and therefore the covenant was satisfied. Note that this expenditure does not include direct drilling costs as the relevant invoices had not been submitted to NuPower by this date.

GROUND RELINQUISHMENT

EL24548 (Yalyirimbi), comprises 495 blocks. NuPower was requested to relinquish up to 50% of the tenement at the end of Year 3. This has not been feasible due to the prospectivity of the tenement and NuPower has applied for a Waiver of Reduction which was granted on 17th September 2008.

JOHN HIGGINS
BSc(Hons), GCPGG
2 February 2009
REFERENCES


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