FINAL SURRENDER REPORT FOR EL24807

PATMUNGALA

NGALIA REGIONAL PROJECT

14th August 2006 to 9th April 2018

EL24807_2018_S_01.pdf

1:250K Map Sheet: Mount Doreen SF52-12
1:100K Map Sheet: Doreen 5153
Commodities: Uranium, Vanadium

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SUMMARY

Exploration License EL24807 ‘Patmungala’ is part of the Ngalia Regional Project which immediately surrounds the Bigrlyi project (ERL’s 46 to 55 inclusive) located 390 kilometres (by road) northwest of Alice Springs. The Ngalia Regional Project is 100% owned by Energy Metals Limited.

EL24807 was granted on 14th August 2006. A partial reduction (reducing the EL by 6 blocks) was approved on 8th July 2016. A further partial reduction (reducing the EL by 4 blocks) was approved in conjunction with an amalgamation of EL24453 and adjacent titles on 29th March 2018. The amalgamated title EL31821 came into effect on 29th March 2018 and EL24807 ceased on the same date. This is a final report covering exploration activities that occurred on the surrendered areas of former EL24807 during Energy Metals’ period of tenure.

Exploration work over Energy Metals’ period of tenure included historical data compilations, heritage clearances, surface reconnaissance and prospecting, and geophysical (radiometric and magnetic) surveys. No significant uranium anomalies were found on the relinquished ground. A number of historical geological maps originally prepared by Central Pacific Minerals in the mid-1970s and located in Energy Metals’ archive, are provided with this report. The prospectivity of the tenement was assessed in 2015 with parts considered to be non-prospective for uranium voluntarily relinquished in 2016. As part of ongoing tenement refinement Energy Metals undertook a process of tenement reduction, amalgamation and replacement in 2018.

INTRODUCTION

The Ngalia Regional project comprises nine 100% EME owned exploration licences (total area over 3,000 km²) located in the Ngalia Basin and immediate surrounds, between 180 and 350 km northwest of Alice Springs in the Northern Territory (Figure 1). The tenements surround the Bigrlyi joint venture uranium project and include a number of satellite and regional uranium deposits such as the Camel Flat and Walbiri deposits (Figure 2).

EL24807 (initially 16 graticular blocks located southeast of the Bigrlyi resource area) was granted on 14th August 2006 for a term of six years and was subsequently renewed for three periods of two years. The tenement has been subject to two partial relinquishments, the last in conjunction with amalgamation of adjacent title EL24453 with issue of a replacement licence (EL31821). Refer Figure 3 for blocks relinquished.
Figure 1: Location of the Bigryli and Ngalia Regional Projects (NT).

Figure 2: Granted tenements within the Ngalia Regional project area (in blue) and tenement applications (outlined in red). Labeled prospects and deposits are located along the northern margin of the Ngalia Basin with the prospective Mt Eclipse sandstone unit shown in dark green. The Ngalia Basin extent is shown in light green.
Figure 3: Location maps showing the EL24807 areas retained and relinquished in 2016 (top panel) and in March 2018 prior to amalgamation with adjacent title EL24453 (bottom panel). ELRs of the Bigryi deposit shown in red. Access to the tenement is via the main Mount Doreen Station access road through Cusacks Bore.
GEOLOGY & MINERALISATION

The Ngalia Basin is a large 300 km by 70 km east-west elongate intracratonic basin covering an area of 15,000km². The basin contains sediments up to 6000m thick ranging in age from Neoproterozoic to Palaeozoic, which are preserved in an elongate structure that is remnant of a much more extensive, polyphase intracratonic basin (Young et al. 1995).

Within the Ngalia Basin the Neoproterozoic Vaughan Springs Quartzite is the oldest unit and mostly forms ridges along the northern and southern basin margins and contains the Treuer Member, a less-resistant interbedded siltstone and sandstone. The Carboniferous Mount Eclipse Sandstone unconformably overlies the Vaughan Springs Quartzite in the northwest part of the basin and intervening Neoproterozoic and Palaeozoic units, present to the east in the Patmungala Syncline, are missing from the northwest.

The Mount Eclipse Sandstone has a maximum thickness of more than 3,000m and hosts the majority of the sandstone-uranium mineralisation. It is a medium to coarse-grained feldspathic sandstone, commonly with carbonate cement. Conglomerate, arkose, calcareous sandstone and shale are present as lenses. The rocks are dominantly red (oxidised), although restricted zones of light to dark grey (reduced) sandstone are present mainly near the base of the unit.

Prominent geomorphological features within EL24807 include rugged, sandstone hill country of the Naburlula Hills and alluvial flats associated with the Gum Creek and Annie Springs drainage systems.

On EL24807 outcropping geological units of the Ngalia Basin comprise only folded Mount Eclipse Sandstone sequences of the Patmungala Syncline. The Mount Eclipse Sandstone can be subdivided into separate units, which are generally correlatable with the Bigryli system as mapped by previous explorers Central Pacific Minerals (CPM). The only notable absence is the reduced Unit C (the main host of Bigryli mineralisation), which thins to the east of Bigryli and is absent east of Davis Gap. Seven sub-units of the upper Unit A of the Mount Eclipse Sandstone were recognised and mapped by CPM within the Patmungala Syncline (refer to the Historical Data Compilation section below).

The Patmungala Syncline is an asymmetrically folded structure. The northern limb is gently west plunging and the bedding is commonly vertical or steeply dipping to the south. Towards the nose of the syncline and on the southern limb dips are shallow with some dips as low as 10 degrees being recorded. The synclinal axis is a broad structure, which is overshadowed by a sub parallel feature a short distance to the north, termed the “structural domain boundary” by CPM (1976). This line slightly transects the strike of the beds, and separates the steeply dipping beds to the north from shallow dipping beds to the south. The beds show no dislocation across this line. In contrast to these east-west features are NNE-SSW trending second generation folds which are widely spaced and of low amplitude. Faulting is reasonably common and, although apparent displacements are generally small, some areas are structurally complex.
Mineralisation, occurring as carnotite-impregnated sandstone, is hosted in several different stratigraphic horizons of the Mount Eclipse sandstone on EL24807. The mineralised sequences are stratigraphically younger than those of the Biglyi deposit and Dingo's Rest prospect to the south and lie within the uppermost Unit A.

![Geological map showing the location of EL24807 areas retained and relinquished (2018) on Mount Doreen 250K geology map-sheet background. Mt Eclipse Sandstone outcrop in grey, Vaughan Springs Quartzite in pink.](image)

**Figure 4: Geological map showing the location of EL24807 areas retained and relinquished (2018) on Mount Doreen 250K geology map-sheet background. Mt Eclipse Sandstone outcrop in grey, Vaughan Springs Quartzite in pink.**

**HISTORICAL EXPLORATION**

The northern margin of the Ngalia Basin and the Arunta Inlier basement to the north, have been the focus of substantial regional exploration programs since the discovery of uranium mineralisation in the region in the early 1970s. Exploration for various commodities, including diamonds, gold, base metals as well as uranium, has been undertaken in both the Ngalia Basin sedimentary rocks and the adjacent Arunta Inlier granites and metasediments.

In the 1970s Central Pacific Minerals (CPM) conducted reconnaissance geological mapping and radiometric traversing east of Davis Gap and across the Patmungala Syncline on EL402 (“Djuburula West”) and EL605 (“Yuendumu”) in order to prospect the area between the Biglyi, Little Cone and Dingo’s Rest prospects. Results of these surveys indicate that the favourable grey sandstone unit at Biglyi (Unit C) was found to be absent east of Davis Gap. In the Little Cone area where the basal Mount Eclipse Sandstone is well exposed, no radiometric anomalies indicative of mineralisation were found in these sequences of the Patmungala Syncline.
The following information summarises the more significant exploration programs for uranium and other commodities near or along the northern margin of the Ngalia Basin:

In 1979 Afmeco Pty Ltd carried out a program to test the extent of uranium mineralisation in the basal unit of the Mount Eclipse Sandstone at the Dingo’s Rest North and Dingo’s Rest South uranium prospect (French & McPhee, 1978). Dingo’s Rest is located immediately south of EL24807 and extends over a three kilometre north-south striking basal section of the Mount Eclipse Sandstone. Afmeco drilled eight percussion holes (for 2,504.1 m) and nine diamond core holes (for 4,153.1 m) within an area three kilometres by six kilometres, to the west and down-dip from Dingo’s Rest prospect. The best result recorded by Afmeco was in hole DIN12 where from 312.8m to 313.4m a mineralised sediment assayed 1,760ppm uranium and 1,130 ppm vanadium.

In 1990 Lachlan Resources Limited carried out a drainage geochemical survey of 313 samples over the basal sector of the Ngalia Basin and immediately underlying Arunta Inlier rocks from the Dingo’s Rest location north and west to Waite Creek, a distance of approximately 100 kilometres. Samples were analysed for copper, lead, zinc, arsenic, silver and gold. Four weakly anomalous areas were located.

In 1999 Rio Tinto Exploration reported on the results of a three year program on EL1307 (“Annie Spring”), which covered the northern flank of the Ngalia Basin and extended over the Arunta Inlier to the north (Davies, 1999). The tenement covered the Bigryli project and the Dingo’s Rest prospect.

Rio Tinto carried out programs of airborne radiometric and magnetic surveying with ground follow-up, soil and rock geochemistry, magnetics and gravity surveys (Davies & McCoy, 1998). Rio Tinto drilled seven RC holes (for 528m) and two diamond core holes, testing potential kimberlite diatremes by RC drilling and magnetic targets by core drilling, without success.

The radiometric survey identified four broad zones of anomalism including the Bigryli project area and the outcropping Mount Eclipse Sandstone of the Patmungala Syncline (Area 1) and Proterozoic basement hosting the Patmangala beds (Area 2). Rio Tinto’s Anomaly 26 (Area 1) corresponds with the P2 prospect on EL24807 and was the strongest Ngalia Basin sandstone-hosted anomaly identified outside of the Bigryli area. Area 3 was associated with a late megacrystic granite 10 kilometres north of the Patmungala Syncline. In the fourth zone (Area 4) the strongest anomalies were located in an area where the eastern closure of the Patmungala Syncline is in contact with the strongly faulted and quartz veined, uranium enriched, young megacrystic granite, the Yarungayi Granite (today’s Crystal Creek prospect). Fifteen anomalies were identified and six were followed up by ground investigations.

Rio Tinto’s Anomaly 44 in Area 4 (the western part of today’s Crystal Creek prospect) contained visible secondary uranium mineralisation as torbernite, which was concentrated along the contact between granite and a quartz vein, with a semi-continuous anomalous zone over one kilometre long. Sampling of the sporadic high grade zones returned a maximum of 3,950 ppm uranium. Rio Tinto concluded that the potential for a large, high-grade, continuous zone of mineralisation was low.
SUMMARY OF ENERGY METALS EXPLORATION ACTIVITIES (2006-2018)

EL24807 contains outcrop of the prospective Mount Eclipse Sandstone, which is the main host of uranium mineralisation in the northern Ngalia Basin including the Bigrlyi deposit. Exploration on EL24807 was aimed at locating extensions of Bigrlyi style mineralization within folded Mt Eclipse Sandstone of the Patmungala Syncline (Figures 2-4). The eastern part of the tenement, on which the most prospective anomalies lie, comprises rugged country of the Narburula Hills where access is difficult; the western part of the tenement is accessible via a fenceline track running north from Cusack’s Bore (Figures 3-4).

Following grant of the tenement in 2006, activities during the first two years included camp establishment and access works at Bigrlyi, land access negotiations, and validation-digitisation of extensive historic exploration data.

In Years 3-6 activities principally involved heritage surveys, geological mapping & reconnaissance, review of Quickbird imagery, geophysical surveys (magnetic and radiometric survey flown in 2007). The EL was also part of the joint CSIRO-NTGS-Company Ngalia Basin mineral systems study which ran from 2010 to 2011 (Schmid et al., 2012).

Negotiations with traditional owners to gain access to heritage areas had been ongoing since grant, and in mid-2012 were successful, allowing non-ground disturbing exploration work to take place in some areas for the first time.

Priority radiometric anomalies P2 and P3, identified from the 2007 aerial radiometric survey, were investigated on the ground and a detailed ground radiometric survey was completed in 2012.

Following assessment in 2015, parts of EL24807 were considered to be non-prospective for uranium and were nominated for relinquishment. In 2016 six blocks were voluntarily relinquished.

In 2017 a sacred site survey was completed on EL24807 by the Aboriginal Areas Protection Authority (AAPA) and Energy Metals was issued with an Authority Certificate.

As part of ongoing tenement refinement EME systematically went through a process of tenement reduction, amalgamation and replacement in 2018. Four blocks of EL24807 deemed to be non-prospective were relinquished in conjunction with the remaining six blocks of EL24807 to be amalgamated with EL24453 and a replacement title (EL31821) issued.

Refer to the sections below for additional details on the works completed during Energy Metals’ tenure.

Historical Data Compilation – Patmungala Syncline Mapping

Central Pacific Minerals undertook mapping programs in the Patmungala Syncline in the mid-1970s (CPM, 1976). CPM sub-divided and described various internal sub-
units of the Mount Eclipse Sandstone. Seven sub-units of the upper Unit A of the Mount Eclipse Sandstone and two sub-units of Unit B were recognised as mappable units by CPM in the Patmungala Syncline (refer to the historical map legend in Figure 5).

Figure 5: Map legend from CPM’s Patmungala Syncline mapping project (CPM, 1976) with Mt Eclipse Sandstone sub-unit descriptions and other stratigraphic unit descriptions.

Figure 6: Plan showing historical CPM geological map-sheet boundaries relevant to EL24807 (green hatch); background 1:250K Mt Doreen geology. The digitally scanned and georeferenced maps are provided with this report.
As part of Energy Metals’ historical data compilation, several archived CPM geological maps, which include radiometric data from numerous scintillometer traverses, were digitally scanned and georeferenced. Several relevant to EL24807 (see Figure 6 plan) are provided with this report (refer Digital Data Appendix; EL24807_2018_S_03_ReconnaissanceGeology.zip).

**Geophysical Survey 2007**

An airborne geophysical survey, providing radiometric, magnetic and topographic data, was conducted over Energy Metals’ Ngalia Regional tenements in September 2007 by GPX Airborne (Saul, 2008). A total of 14,932 line kilometres was flown. The data were processed by Southern Geoscience Consultants (SGC), who meshed the new data with previous company survey data. SGC were subsequently contracted to interpret the imagery in terms of structural and radiometric features (Burn, 2009).

Radiometric imagery is shown in Figure 7 (uranium channel) and has previously been discussed by Taylor (2016) for EL24807. A feature of note is the generally weak response of the Mt Eclipse Sandstone, particularly in the eastern part of the tenement, which is subject to the present partial relinquishment. Two uranium-specific anomalies, the Patmungala prospects (P2 and P3) and an associated slightly anomalous stratigraphic horizon on the southern limb of the Patmungala Syncline occur on retained ground of EL24807.

![Figure 7: Outline of original EL24807 (red) in relation to uranium channel radiometric image showing uranium anomalies P2 and P3 on retained ground; note absence of any similar anomalies on relinquished ground. Green dots = historical drillholes.](image-url)
**Negotiations with Traditional Owners 2012**

Approximately 60% of the original EL24807 area is covered by a large Aboriginal heritage zone (Figure 8) where access was restricted due to the sensitive nature of sacred sites in this area; the heritage zone limited exploration work on EL24807 during the earlier term of the licence.

Negotiations with traditional owners to gain access to the heritage zone were ongoing since grant, and in 2012 were successful, allowing non-ground disturbing exploration work to take place in some areas for the first time.

![Figure 8: Outline of EL24807 (red) showing retained/relinquished ground, topographic features, historical drill holes (green dots), heritage areas in green shading and the location of anomalies P2 and P3.](image)

**Geological Reconnaissance and Ground Radiometric Survey 2012**

Priority radiometric anomalies P2 and P3 (Figure 7,8), identified from the 2007 aerial radiometric survey, were investigated on the ground in 2012. These anomalies are located in the Narburula Hills region of the Patmungala Syncline and host uranium mineralisation in the Unit A stratigraphic horizon of the Mt Eclipse Sandstone. A 50m spaced ground radiometric survey was conducted over the anomalies in 2012. As P2 and P3 are located on retained ground, now part of amalgamated title EL31821, this work is not reportable at present. No on-ground fieldwork or ground geophysical surveys were conducted on the relinquished portions of EL24807 shown in Figure 8.
Project Review 2015

During 2015, the project area was reviewed to identify areas of low uranium prospectivity with a view to surrender of non-prospective ground (Kerr & Liu, 2015). An area of six blocks in the western part of the tenement was recommended for relinquishment on EL24807 (refer Taylor, 2016).

Partial Relinquishment 2016

A partial reduction (reducing the EL by 6 blocks or 38% of the original area) was approved on 8th July 2016 (Taylor, 2016). Refer to Figure 3.

AAPA Sacred Site and Heritage Clearances 2017

In October 2017 a sacred site survey was completed on parts of EL24807 by the Aboriginal Areas Protection Authority (AAPA), the NT Government agency responsible for sacred site and heritage clearances. Energy Metals was issued with an Authority Certificate, the conditions of which permit drilling works on retained ground assisting Energy Metals to progress its future exploration campaigns.

Partial Relinquishment, Amalgamation and Tenement Replacement 2018

In late March 2018, following a further review, Energy Metals elected to relinquish four eastern blocks of the tenement (Figure 3) deemed to be non-prospective due to the weak radiometric response of the area, despite excellent outcrop of Mount Eclipse Sandstone, and the absence of any significant radiometric anomalies (Figure 7). Those parts of the tenement that include the Patmungala anomalies and the associated prospective horizon were retained. Following the partial relinquishment of EL24807 the tenement was amalgamated with EL24453 and parts of EL30004, and a replacement title (EL31821) was issued (Figure 9).

Figure 9: EL24807 and EL30004 blocks amalgamated to form replacement title EL31821.
CONCLUSIONS

Since grant of EL24807 in 2006, Energy Metals has conducted aerial geophysical surveys and various on-ground exploration and prospecting programs. Exploration activity was limited prior to 2012 due to restricted land access. Work since 2012 has helped refine and prioritise exploration areas to include the most prospective ground. The tenement was subject to two rounds of partial relinquishments. Six western blocks of EL24807 judged to be non-prospective for uranium were relinquished in 2016 (Figure 3). In late March 2018, following a further review, Energy Metals elected to relinquish four eastern blocks deemed to be non-prospective. Six blocks of the original tenement including the Patmungala anomalies and an associated prospective horizon were retained. The retained blocks of EL24807 were amalgamated with EL24453 and a replacement title (EL31821) issued.

REFERENCES


DIGITAL DATA APPENDIX

EL24807_2018_S_02_ReconnaissanceGeology.zip
EL24807_2018_S_03_FileListing.txt