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SUMMARY
The Ammaroo Phosphate Project is located 240 km southeast of Tennant Creek. The project covers >280 km of strike of the northwestern neck of the highly prospective southern Georgina Basin. The project area contains the Ammaroo Phosphate Deposit, which is currently Australia’s largest JORC phosphate resource, the satellite Ammaroo South resource, the Rockhole prospect, and significant greenfields potential in the east. The pre-feasibility study for the overall Ammaroo Phosphate Project has recently been released. A voluntary partial relinquishment of three (3) sub-blocks from 128 is being made for EL 28403. One of these three blocks covers an area of Enhanced Freehold land which is an Aboriginal Living Area held by the Areyn Aboriginal Corporation. This area was excluded by definition from the EL, but the majority of it is now formally being relinquished. The other two blocks cover several AAPA Sites. No work could be undertaken on the relinquished blocks.
INTRODUCTION
The Ammaroo Phosphate Project tenements are located 280 km northeast of Alice Springs and 240 km southeast of Tennant Creek, on the Barrow Creek SF53-06, Elkedra SF53-07, Bonney Well SF53-02 and Frew River SF53-03 1:250,000 mapsheets. Rum Jungle Resources has been exploring for Cambrian rock phosphate in this area since 2009 resulting in the discovery of Barrow Creek 1 deposit and the Ammaroo South Prospect. Rum Jungle Resources also acquired the Arganara Phosphate deposit, which is contiguous with Barrow Creek 1, by taking over Central Australian Phosphate. The flagship deposits have been combined into Australia’s largest JORC rock phosphate resource now called Ammaroo Phosphate and the satellite Ammaroo South deposit has been elevated to Inferred Resource status.

LOCATION, ACCESS AND LAND USE

Location
EL 28403 is located in the central eastern part of the Ammaroo Phosphate Project, north of the Ammaroo South Resource, on the Elkedra 250K and Sandover 100K sheets.

Access and Logistics
Access to the project area is via the sealed Stuart Highway and the partly sealed Plenty and unsealed Sandover Highways from the south and the Taylors Road / Murray Downs road from the north (Figure 2). Construction of Rum Jungle Resources’ exploration tracks and line clearing are generally done by the local pastoralist or a Tennant Creek based earthmoving contractor. The 20-person Rum Jungle Resources’ Ammaroo base camp and fly-camps are used for exploration. Bores are used for drinking water. A medical clinic is located at the Ampilatwatja Aboriginal Community. Fuel is carted from Alice Springs on an as-needs basis. The nearest
airstrips are at Ampilatwatja and Ali Curung. The Rum Jungle Resources’ Ammaroo base camp has an emergency helipad and JetA1 and AvGas.

![Figure 2. Access to the Ammaroo Project area from Alice Springs in the south and Tennant Creek in the north.](image)

Local access for EL 28403 is very poor. There are no gazetted tracks or roads to, or within, the EL. An old station track follows Andagara Creek but that is off-limits because of an AAPA site. Access to, or through the Aboriginal Living Area, is also restricted. The only way in by vehicle is along a north-south station boundary fence, avoiding the Aboriginal Living Area, and then along an east-west fence to the west.
Climate

The climate is described as arid tropical by Baker et al 2005. The year is notionally divided into two main seasons, a short, hot summer featuring the bulk of the annual rainfall and a longer mild to cold and dry winter. These two dominant seasonal patterns are separated by short (1-2 months) transitional periods. The summer rains are somewhat influenced by the monsoonal rain patterns from the north, particularly cyclones which cross the Western Australian coastline.

Rainfall figures over a 30 year period (1981 – 2010) indicate an annual average rainfall of 383 mm (BOM 2012). However, rainfall is highly variable and unpredictable and annual records range from 86.4 mm to 914 mm. As shown below, much of 2010 and the start of 2011 were atypically wet while the rainfall for 2012 was more typical (Figure 3).

Figure 3. Average rainfall for the project area.

The average monthly relative humidity at 9 am (derived from data from 1988 - 2010) fluctuates between 31 to 52 percent with an average of 42 percent (Figure 4). The average monthly relative humidity at 3 pm is about 11-21 percent lower than the 9 am recorded humidity.

Figure 4. Mean monthly relative humidity (%) at 9am (Green) and 3pm (Orange) at Ali Curung, NT (BOM 2013).

The mean monthly maximum and minimum temperature over a 30 year period (1981 – 2010) indicate that the summer temperatures can fluctuate between 21 and 38 degrees Celsius and the winter temperatures can flux
between 7 and 27 degrees Celsius. Sub-zero temperatures occur occasionally during July and August and there have been instances of surface water freezing at night. Figure 5 shows the mean monthly maximum and minimum temperatures recorded at Ali Curung.

Figure 5. Mean maximum (red) and minimum (blue) monthly temperatures (°C) at Ali Curung, NT (BOM 2013).

Physiography, Land Systems, Flora and Fauna

Figure 1 (previous) shows the physiography. The project is located in the Tanami Bioregion south of the Davenport Ranges. This bioregion is comprised mainly of red sand plains with underlying rock strata occasionally exposed as hills and ranges. The sand plains are vegetated with mixed shrublands of Acacia, Eucalyptus or Hakea over Triodia hummock grasslands. On the ranges, Acacia shrublands occur over hummock grasses. This bioregion contains many plant taxa that are endemic to the region or the Northern Territory and several flora and fauna species that are of conservation significance.

Using the system devised by Perry, the area contains two major land systems; the Alinga and Singleton. The Alinga Land System can generally be described as a system of undulating plains interspersed by low rounded ridges with shallow stony soils, red earths and red clayey sands. The land system is dominated by *Acacia aneura* (Mulga) or *Acacia georginae* (Gidgee) woodlands over short grasses and forbs. On shallow stony soils, sparse shrublands occur over *Triodia sp* (Spinifex). The Singleton land system includes red sands forming undulating plains and sand rises, separated by moderately wide, flat swales. Alluvial flats and drainage floors may also be present. Vegetation is dominated by sparse shrublands over Triodia (Spinifex), with Acacia woodlands also being present.

The project area has been the subject of several baseline fauna and flora surveys commissioned by Rum Jungle Resources. These, a Threatened Species Report, and a report on weed species have been provided with MMPs and are not repeated here. These topics are dealt with even more comprehensively in the NOI.

Land Use

The area is sparsely settled. The largest permanent habitations are the indigenous communities at Ampilatwatja (population approx. 500) and Ali Curung (population quoted variously as 960 or 535 of which over 95% are Indigenous persons). The dominant Aboriginal languages spoken are Warlpiri and Alyawarr with English as a second or third language. It is not known if any people live permanently, or otherwise, on the Areyn Living Area being relinquished.

The relinquished blocks are all on Derry Downs Pastoral Lease. The area supports an active beef cattle industry and stocking numbers vary seasonally. Cattle are generally not seen near the Ammaroo Phosphate Resource
because of a lack of both surface and ground water. In contrast, Ali Curung has irrigated market gardens using the plentiful groundwater there.

**Aboriginal Sites of Significance**
An AAPA register search identified numerous sites of significance on EL 28403. Rum Jungle Resources does not have an Agreement with the CLC over EL 28403 and consequently has done almost no work on the ground.

The areas being surrendered are a gazetted Aboriginal Living Area and a cluster of AAPA sites that sterilise these sub-blocks from on-ground work.

**Heritage Sites**
A search of the NT Heritage Register held by NRETAS shows no Declared Heritage Sites in the area covered by this report.

**Mineral Titles Act**
EL 28403 is part of reporting group GR114 under the Mineral Titles Act.

**Mining Management Act**
The NT Mining Management Act (MMA) allows for different reporting groups to the Mineral Titles Act (MTA). Under the MMA, EL 28403 is part of the amended Ammaroo Authorisation 609-04. The most recent version was approved by DME in Alice Springs during June 2014.

**WorkSafe**
As part of an NT-wide move by Worksafe to improve its monitoring and inspections of exploration and mining projects, Worksafe required Rum Jungle Resources to redo its Safety Management System and update its Risk Management Plans for each project including Ammaroo. Consultants Switched on to Safety were engaged to completely update Rum Jungle Resources WHS&E. The most recent Worksafe inspection of the Ammaroo project was undertaken in March 2014.

**HISTORY OF TENURE**
EL 28403 was applied for on 09/11/2010 and granted to Rum Jungle Resources on 20/06/2011 to expire on 19/06/2017. It covered 128 sub-blocks or 408.84 km². Three sub-blocks are being voluntarily relinquished in this report. This is the first and only reduction to date. The relinquishment was applied for on 06/10/2014, but not actioned in TIS until 29/10/2014, backdated to 28/10/2014.

EL 28403 is contiguous with other ELs in Rum Jungle Resources’ Ammaroo Project and remains so even after this partial relinquishment.

**EXPLORATION AND PROJECT RATIONALE**
The Ammaroo Project is being explored for rock phosphate, principally within the Arthur Creek Formation which hosts the Ammaroo Phosphate Resource and the Ammaroo South deposit. Exploration is directed at locating phosphate where it is shallow (low strip ratios), not entirely weathered (predictable rock properties amenable to mining), and highest grade and thickest (palaeo-coast and potentially draped over palaeo-highs). Rum Jungle Resources’ approach, which has worked successfully to date, is to initially undertake reconnaissance RC or air core drilling on existing tracks and fences. Samples are analysed in the field with a handheld XRF and potential phosphate is sent for laboratory analysis. Depending on success, follow-up drilling usually involves cleared drill lines and/or grid RC drilling.
Since the discovery of economic grades of phosphate in 2010, Rum Jungle Resources has moved to rapidly prove them up to JORC 2012 standard including a significant component in the Measured category. The company has also completed Scoping Study and Pre-feasibility Studies.

GEOLOGICAL SETTING

Regional Geology

The Ammaroo Project is located in the Georgina Basin which contains the largest sedimentary rock phosphate deposits in Australia. The Georgina Basin includes rocks of Neoproterozoic to Devonian age, with Cambrian platform carbonate rocks dominating basin fill. The southern Georgina Basin is contiguous with the Wiso Basin to the west (Figure 6).

![Figure 6. Rum Jungle Resources and subsiduaries phosphate holdings. The regional geological setting shows the Ammaroo Phosphate deposit on the northern “shore” of the connection between the southern Georgina Basin in NT and the Wiso Basin. Rum Jungle Resources has no holdings in Queensland portion of the Georgina Basin (not shown).](image)

The southern Georgina Basin includes a thick sequence of Cambrian-Ordovician sediments, deposited within the Dulcie Trough and on the adjoining Elkedra Shelf. Work by previous explorers and NTGS identified an extensive area of shelf-facies marine carbonate and clastic sediments of the Middle Cambrian Arthur Creek Formation within the southern Georgina Basin (Figure 7, 8). This area is prospective for sedimentary phosphate mineralisation.
Cambrian sediment outcrop is generally restricted to the north of the project area, along the flanks of the Davenport Range. Several formations contain very similar carbonate and recessive shale units that can be very difficult to tell apart without palaeontology and some published maps show incorrect formation assignation. Indeed, the outdated Elkedra published 250K map shows the Arthur Creek Formation as being partially laterally equivalent to the Chabalowe Formation and partially underlying it, whereas the actual Chabalowe Formation is laterally equivalent to the younger Arrinthrunga Formation not the Arthur Creek Formation. The Chabalowe Formation can directly and conformably overlie the Arthur Creek Formation, but they are distinctly different ages, and this should be the relationship on the Elkedra mapsheet. The former Errarra Formation shown on published maps is now recognised as Red Heart Dolostone. In addition, it has recently been recognised that the so-called Thorntonia Limestone mapped over large areas of the Northern Territory is
actually the older Hay River Formation and the former name should be restricted to its type area in Queensland. This change is yet to be reflected on any NT maps or publications.

Alluvial, aeolian and residual sediments of Cenozoic age blanket most of the remaining project area

**Local Geology and Prospectivity**

Within the overall project area, the Cambrian lithostratigraphy of the southern Georgina Basin includes units of the Shadow and Narpa Groups, of which two units are known to be phosphatic:

- mid-Cambrian Thorntonia Limestone (now Hay River Formation) – a limestone and dolostone unit (rarely containing a localised black shale) with phosphorite beds
- mid-Cambrian Arthur Creek Formation – deep-water anoxic organic-rich shales overlain by shallow-water aerobic calc- and dolo-siltstones with phosphorite beds

To date, the Thorntonia Limestone (Hay River Formation) phosphorite in the study area is thought to be inferior to that in the Arthur Creek Formation in Rum Jungle Resources’ project area. In the opinion of Rum Jungle Resources, reports of phosphate in the Chabalowe Formation are erroneous and reflect the mismapping on published maps (see discussion above).

Drilling within the project area indicates that the Arthur Creek Formation target stratigraphy generally contains two distinct facies:

- an upper aerobic facies consisting of grey to brown siltstones, with minor brown chert bands or lenses; and
- a lower anaerobic facies consisting of dark green to black siltstones, with minor black chert bands or lenses.

The upper facies is the phosphate target and, where it is present, the lower facies serves as economic basement.

EL 28403 has mapped Arthur Creek Formation in outcrop. However, it is typically obscured by a locally-thick duricrust.

**RESOURCES**

*Main Ammaroo Resource*

The March 2014 JORC 2012 resource for the main Ammaroo Project is over a billion tonnes at 14% P₂O₅ using a 10% cut-off.

*Ammaroo South Resource*

Ammaroo South is a satellite resource on EL 25185 approximately 70 km southeast of the main Ammaroo deposit. It is a JORC 2012 Inferred phosphate resource estimated at 70 Mt at 13% P₂O₅ using a 10% cut-off.

**SUB-BLOCKS RELINQUISHED**

This partial relinquishment is dropping three sub-blocks from 128, reducing EL 28403 to 125.
Figure 9. Sub-block map showing the three sub-blocks being dropped from EL 28403, outlined in red.

WORK ON RELINQUISHED AREA
There has been no on-ground work what-so-ever on the three sub-blocks being relinquished.

CONCLUSION AND RECOMMENDATIONS
The relinquished blocks cover an Aboriginal Living Area and a cluster of AAPA sites of significance. These areas would not be available for exploration.