Titleholder: Rum Jungle Resources Ltd
Operator: Rum Jungle Resources Ltd
Tenement Manager: Complete Tenement Management
Tenement: EL 25080
Project Name: Karinga Lakes Potash
Report Title: Partial relinquishment report for EL 25080, Karinga Lakes Potash Brine Project
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250K map sheet: Ayers Rock SG5205, Kulgera SG5305
100K map sheet: Curtin 5247, Angus 5347
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SUMMARY

EL 25080 is one of several substantially contiguous ELs in Rum Jungle Resources Ltd’s Karinga Lakes Potash Project. Exploration targeted potassium- and magnesium- sulfate-salts in subsurface salt lake brine to produce potassium sulfate (SOP) and/or potassium magnesium sulfate (schoenite) fertiliser probably using solar evaporation ponds and flotation. The project has a JORC resource of potash brine and has advanced beyond exploration. A scoping study of the Karinga Lakes Project has been undertaken by CICCC and GHD. EL 25080 is one of the oldest titles in the project and contains a substantial portion of the resource. Twenty-one blocks are being voluntarily relinquished from EL 25080. There has been no on-ground work on the relinquished blocks and there is no expectation of potash brine being present in the areas relinquished.
LOCATION, ACCESS AND LAND USE

EL 25080, is in two parts, located 210 km southwest of Alice Springs on the Kulgera and Ayers Rock 1:250 000 map sheets.

![Figure 1. Location map of EL 25080 in two parts along with other contiguous potash tenements to the north, east and west. The JORC brine resource is outlined in pink. The lake outside the titles in the gap in EL 25080 contains sacred sites.](image)

The GDA94 52/53 zone boundary runs through the eastern portion of the EL.

Access is from the Lasseter Highway which runs east-west through the project area and crosses eastern central EL 25080 (Figure 1). The EL is also serviced by numerous station tracks (Figure 2). Curtin Springs Station and roadhouse have been used as a logistic base. During 2012, rental camper vans were also used as site accommodation. A transportable “donga” camp was established in 2013 and removed again in 2014.

Access on the salt lakes themselves requires specialist equipment. Quad bikes were not successful and it was necessary to purchase tracked AWD amphibious vehicles and a trailer with a ground footprint of less than one psi. Drilling contractors used hovercraft to move personnel. Helicopter support and equipment lift have also been used extensively throughout the duration of the project.

EL 25080 is mainly on Curtin Springs and Lyndavale Stations which run cattle. Stocking rates vary seasonally but are generally low due to the arid environment. Curtin Springs also has a tourism venture based around some of the salt lakes. A small northern portion of EL 25080 is within aboriginal-owned Angas Downs Station (Figure 2).

Temperatures can reach extremes of freezing cold nights in winter and days above 40°C in summer. Rain is infrequent and largely unpredictable.
HISTORY OF TENURE AND JOINT VENTURES

EL 25080 is one of several substantially contiguous ELs in Rum Jungle Resources’ Karinga Lakes Potash Project which previously included a JV under Rum Jungle Resources’ operatorship as well as ELs held and operated wholly by Rum Jungle Resources. The JV no longer exists and all ELs (including EL 25080) in the project area are owned and operated by Rum Jungle Resources.

EL 25080 was applied for on 01/12/2005 and was granted to Tyson Resources Pty Ltd for a period of six years on 09/10/2006. Tyson Resources is a subsidiary of Reward Minerals which was a JV partner with Rum Jungle Resources in this project. During the fourth year of tenure, a deal between (then) Rum Jungle Uranium Ltd and Tyson Resources gave Rum Jungle Resources the rights to operate the tenement. Tyson Resources / Reward Minerals elected not to contribute financially and their share was diluted to 10% in 2014, at which time Rum Jungle Resources acquired the project entirely. The transfer of titles was held up by the Territory Revenue Office and Stamp Duty.

In September 2009, a reduction of 132 blocks was completed, leaving an area of 888.63 km\(^2\). On 11/10/2011, the EL was further reduced to 699 km\(^2\) or 225 blocks. Most of this area is part of the JORC resource. Renewal for a further two years was granted 09/04/2013 and again on 29/01/2015 to expire 08/10/2016.

Another voluntary partial relinquishment of a further 21 blocks being reported here reduces EL 25080 to 204 blocks. Almost all this area is JORC resource or peripheral to it.

In practical terms, Rum Jungle Resources works the Karinga Lakes as sole operator of a single project. Clearly, individual lakes and the brine resource extend over many ELs and the company’s work straddles EL boundaries.

EXPLORATION AND PROJECT RATIONALE

EL 25080’s salt lakes and sub-surface aquifers were explored for potassium- and magnesium-rich sulfate brines as part of Rum Jungle Resources’ Karinga Lakes Potash project. The project has advanced beyond exploration with an established resource. It is hoped to produce potash and/or schoenite fertiliser by simple solar evaporation and/or
other onsite treatments such as flotation. Australia has no producing potash mines. Around 350,000 tonnes of potash is imported into Australia annually from Canada and is worth around $200 million. Potash of sulfate and schoenite are utilised as high-end fertiliser products globally, as they have a lower salt index than muriate of potash and are often preferred in crops sensitive to chloride or susceptible to fertiliser burn. Sulfate of potash and schoenite attract premium pricing in comparison to the more common muriate of potash. The Karinga Lakes Potash Project is strategically well located adjacent to the Lasseter Highway and within close proximity of the Central Australian Railway line, providing access north to the port of Darwin and proximity to Asian markets and south to domestic markets.

**JORC RESOURCE**

*EL 25080 is part of a JORC 2012 Brine Resource of 8,400,000 tonnes of $K_2SO_4$ (potash) with an average grade of 4,760 mg/L. Of this resource, 5.8MT is in the Measured category.*

**GEOLOGICAL AND HYDROLOGICAL SETTING**

EL 25080 overlies the southwestern sector of the Amadeus Basin in the Northern Territory. The Amadeus Basin covers approximately 150,000 km$^2$ and extends into Western Australia. It is comprised of a Neoproterozoic to mid-Palaeozoic succession of predominantly shallow marine sedimentary rocks and attains a thickness of up to 14,000 m. The siltstones of the central Amadeus Basin have weathered into a modern topographic low. This depression contains a chain of Cenozoic playa salt lakes. Quaternary sand dunes, up to 30 m high, encroach onto the depression. The dunes are mostly vegetated and stable. The playas presently occupy only the lowermost topographic depressions in swales between dunes. Quaternary calcrite and silcrete duricrusts (of vadose origin) are characteristically superimposed on Amadeus Basin outcrops, forming escarpments, several metres high along the margins of some of the playa lakes. Low-relief gypsum-sand “islands” are also present in some of the playas.

The sediments in the modern playa lakes and their palaeo-drainages (Strat 1) contain brines formed by the evaporation of surface and near-surface water from infrequent and largely unpredictable rain and flooding events and, most importantly, from groundwater discharge in the Central Australian Groundwater Discharge Zone as described below.

![Figure 3. Regional view of the Central Australian Groundwater Discharge Zone (outlined in light blue) running from Lake Hopkins in WA through to Karinga Lakes, nearest the railway. The blue arrows indicate sub-surface flow.](image-url)
Figure 4. Schematic diagram of how the Central Australian Groundwater Discharge Zone works.

The Devonian Horseshoe Bend Shale (Strat 2) forms low mesas around many of the lakes and constitutes the lake “floor”. Where it is fractured and/or deeply weathered, the Horseshoe Bend Shale is a brine aquifer in its own right; being the local discharge point for the Central Australian Groundwater Discharge Zone. It is hydraulically connected to the brine in the modern lake sediments, so effectively there is a single aquifer which extends across both basement and the modern lake sediments. The basement Horseshoe Bend Shale was/is evaporitic, containing sulfate and chloride evaporites. It also contains locally abundant detrital biotite. The evaporites have been leached out over geological time and have almost certainly contributed to the brine, both within the shale and within the lake sediments. These migrating brines have also liberated additional potassium from the weathering biotite.

WORK BY PREVIOUS OPERATORS

Local pastoralists have exploited surface salt on a few of the Karinga Lakes (eg Swansons Lake) as a source of NaCl for cattle licks since the 1940s and there was some local exploitation of gypsum for domestic and commercial use. Small-scale commercial salt-crust scraping operations have operated sporadically over the decades, notably at Lake Suzi. There has been no exploitation of the subsurface lake brines except for road crews who dug pits and pumped brine for use in road works. The possibility of commercial exploitation was examined in 1960s and again by NT Evaporites during the late 1980’s and early 1990’s. In 1988, NT Evaporites and the Northern Territory Department of Industry and Development created a geological data base to assess the industrial mineral resources in the license areas. The investigation involved field mapping, sediment sampling and water sample collection. This work identified a variety of industrial minerals and brine resources including industrial clays, zeolites and evaporites. In 1992, Geo-Processors Pty Ltd conducted an assessment of resources and feasibility study of the Karinga Lakes area and concluded that the site was suitable for a commercial operation and technically feasible. These studies, and the reasons for their lack of success, have been summarised in previous reports and are not reproduced here.

WORK BY RUM JUNGLE RESOURCES ON RELINQUISHED PORTION

Only desk-top studies and remote-sensing based on publically available data have been undertaken on the blocks being relinquished (see Figure 5). The blocks being relinquished have not been sampled or tested by drilling. However, there is no expectation that potash brine would be present in the areas being relinquished.
AREA BEING RELINQUISHED

The twenty-one blocks that are being voluntarily relinquished from EL 25080 are shown below. Note that no sampling or drilling plots in the areas being relinquished.

![Map of the blocks being relinquished](image.png)

Figure 5. Map of the blocks being relinquished (shown in pink) plotted on a satellite image. All drilling and sampling to date is plotted.

CONCLUSION AND RECOMMENDATIONS

Remote sensing studies and desk-top studies failed to identify any potential for potash brine in the areas of EL 25080 being relinquished.