ANNUAL/FINAL TECHNICAL RELINQUISHMENT REPORT

EL29026

HREE District

RELINQUISHMENT DATE: 14 April 2014

YEAR 2 END DATE: 12 April 2014

Titleholder: Spectrum Rare Earths
(previously TUC Resources Ltd)

Target Commodities: Rare Earth Elements and Uranium

PINE CREEK SD5208 1:250,000
Daly River 5070 1:100,000

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Prepared for Spectrum Rare Earths Limited
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1. SUMMARY

EL29026 is located approximately 140km south of Darwin. EL29026 was granted to Spectrum Rare Earths on 13 April 2012 and was due to expire on 12 April 2018. It comprised of 17 graticular blocks (56.7sq km). Spectrum Rare Earths decided to voluntarily relinquish this tenement in full on 14 April 2014. During the two years that Spectrum held this tenement a historical data compilation work was done however no field exploration work has been undertaken.
2. LOCATION AND ACCESS

EL29026 is accessed from Darwin via the Stuart Highway onto Dorat Road (from Adelaide River) then west onto the Daly River Road, see Figure 1. Tracks extend west and south of Tipperary Station, with the southern track accessing the Daly River at Beeboom Crossing. Access is only possible in the dry season at Beeboom Crossing; smaller tracks to the west are impassable after rains. The southern boundary of the Licence is defined by the Daly River, while Green Ant Creek roughly marks the eastern boundary. Most of the ground is open and with low relief and numerous sinkholes.

![Figure 1: EL29026 location](image-url)
3. TENEMENT STATUS AND OWNERSHIP

EL29026 was granted on 13 April 2012 and was due to expire on 12 April 2018. It comprised of 17 graticular blocks (56.7sq km). Spectrum Rare Earths decided to voluntarily relinquish this tenement in full on 14 April 2014.

This report details exploration carried out by Spectrum during the 2 year life of this tenement.
4. GEOLOGY

EL29026 is situated near the western margin of the Pine Creek Orogen (Figure 2). Descriptions of the regional geology can be found in several texts, including Ahmad et al., 1993; Ahmad, 1998; Pontifex & Mendum, 1972; Dundas et al., 1987; and Edgoose et al., 1989.

Middle Proterozoic sediments of the Tolmer Group are mapped as overlying the western portion of EL29026. The Tolmer Group is a sequence of arenite, siltstone and dolomite up to 1600m thick unconformably overlying Early Proterozoic Finniss River Group sediments. The Stray Creek Sandstone and Hinde Dolomite are the most common stratigraphic units of the Tolmer Group. Fault splays from the Giants Reef Fault to the west offset and thrust blocks of Stray Creek Sandstone adjacent to Hinde Dolomite.

The Cambrian Antrim Plateau Volcanics is mapped as overlying portions of the Tolmer Group. Further east, limestones and quartzarenites of the Cambro-Ordovician Daly River Group (comprising Tindall Limestone and Jinduckin Formation) form the Daly Basin.

Simplified stratigraphic components and geological relationships are described as follows:

- Early Proterozoic folded (NW trending axial plane - doubly plunging) South Alligator Group (iron and carbonate rich siltstones, shales, tuffs and greywackes) and Burrell Creek Formation (Finniss River Group sediments) have been intruded by a later, Early Proterozoic granitoid suite.
- These rocks are unconformably overlain by Early to Mid Proterozoic, westerly dipping shallow marine sandstones known as Depot Creek and Stray Creek Formations.
- These rocks are further unconformably overlain by a Mid to Late Proterozoic, semi concordant, limestone sequence (known as the Daly River Group (Tindal Limestone, Jinduckin Formation and Oolitic Dolomite).
- These rocks are disconformantly overlain by a Jurassic and Cretaceous sequence of sands and silts.
- Multiple periods of erosion show many sequences onlapping onto different aged rock groups. A number of NW trending faults are interpreted to offset the geology.
Figure 2: Fergusson River Regional Geology (AGSO 250K Geology map)
5. PREVIOUS EXPLORATION

A portion of the work done on EL29026 consists of a literature review and data compilation. The results are presented in the section below. Exploration ranged from airborne geophysics to drilling exploring for phosphate, and base metals, geochemical exploration was also undertaken for diamonds, uranium and nickel.

AP 1996 covers few blocks on the eastern portion of EL29026. Tipperary Land Corporation found ferruginous, gossanous material in small fractures in an outcrop of Hinde Dolomite (then called Waterbag Creek Formation) at Goose Lagoon. Assays by a prospector returned 65ppm Ni, 5ppm Co, 0.85% Pb, 0.19% Zn and 6 dwts/short ton Ag. Follow-up work did not show extensive gossans or other signs of mineralisation, with phosphate testing on nearby Tindall Limestone returning negative results.

Suttons Motors explored EL 1357 in conjunction with 5 other Licences in the area. EL 1357 covered the all tenement. Initial work included a preliminary assessment of the uranium potential, with the Company concluding that the potential for large deposits is low, but small uranium deposits may exist. Radiometric anomalies exist in both the Cambrian and Upper Proterozoic sequences, but were not considered 'attractive exploration targets'.

General notes of interest from this report include:

- Total Count from the BMR radiometric data reflect lithology; Tolmer Group sediments and Antrim Plateau Volcanics all give lows, the Litchfield Complex a high and Burrell Creek Fm seds are intermediate with local highs.
- Litchfield Complex has an irregular but high background of 5-17cps U, with possibly 1 or 2 U anomalies
- U count of 5-6cps in Burrell Ck Fm seds; higher values associated with faulting. U anomalies are small; only 1 – 2.5x bkgnd. Some variation in regional background which may reflect gradual facies changes; U channel response also affected by weathering and superficial cover

The report considered that Upper Proterozoic sediments had limited prospectivity because they were deposited after the last major phase of uranium mobilisation and concentration, although recent isotopic data indicates several episodes of uranium mineralisation between 1740 and 500Ma (Ahmad 1998) which negates this conclusion.

Suttons Motors also commissioned a report on the mineral potential of their Licences by Robertson Research. The Tindall Limestone was considered prospective for MVT-style base metal mineralisation. Minor copper mineralisation was known on the unconformity between the Antrim Plateau Volcanics with the underlying Proterozoic Waterbag Creek Formation (now Stray Creek Sandstone?). The sandstone-siltstone facies at the base of the Depot Creek Sandstone is considered prospective for uranium. Only the Jinduckin Formation could be considered a host for U mineralisation within the Daly River Group sediments as it contains sandstone and siltstone sequences that may act as permeability traps.

Exploration work for base metal mineralisation consisted of a 170 line km EM survey; a ground IP survey and limited ground mag survey plus geochemical sampling. There was no indication of massive sulphides in the vicinity of surficial massive barites and stratiform barite-fluorite mineralisation, but there were some anomalous Pb-Zn geochemistry in calcareous fine-grained clastics in the Tindall Limestone. Some primary lead sulphides (galena) were identified in think restricted silicified black shales.
Peko Wallsend explored **EL’s 3010 and 3011** for diamonds, but did not find any indication of alluvial diamonds or kimberlites. The Licences are covering respectively the south and the east of the EL. There is mention of ‘gossanous outcrops on the southern boundary of the Licence may have significance for base metal potential’ and although the area wasn’t specified, the probable area has been captured (Possible_Gossanous_Area_CR19820351.tab).

BHP held **EL 4162** which covers the all EL. Exploration consisted of stream sediment samples for base metals and heavy mineral concentrates (diamonds). The stream sediment samples were not assayed for gold or for uranium. No notable results were found on EL 4162 and the ground was dropped after a year.

A JV between Total Mining Australia and PNC Exploration explored **ELs 4858 and 4870, 5586** (southern and western portions of EL25222) for uranium by locating favourable lithologies using ground radiometrics and geological traversing combined with interpretation of geophysical and spectrometric data. Thermoluminescence studies were carried out on the basal Tolmer Formation sediments. The theory is that if sufficient amounts of uranium (>10ppm U) have resided in the sandstone over a sufficient amount of time (>100Ma) then the quartz lattice will be damaged. Artificial thermoluminescence will detect paleoradiation or cumulative radiation effects in the quartz grains of the sandstone. No details of results were presented in the reports. An INPUT survey did not indicate occurrences of graphitic schist beneath sandstone cover.

The Tipperary JV consisted of Normandy exploring for base metals and Stockdale exploring for diamonds over a series of tenements covering the Daly River area. Normandy drilled 8 RC holes targeting MVT-style mineralisation within NNW-trending Tindall Limestone units in the Buldiva Creek area of **EL 6649** (covers all EL). The holes targeted a 2km x 0.7km soil anomaly with maximum rock chip samples to 1.8% Pb, 23ppm Ag and 19.2% Ba. Results from drilling indicated the outcropping galena / barite mineralisation to be of limited extent with a maximum result of 4m @ 4% Pb in FRC1 over the outcropping mineralisation, with several other results of +1000ppm Pb and Zn.

**EL 8331** covers the all EL. North Exploration carried out exploration for sediment-hosted stratiform base metals in a dolomitic shale unit near the base of the Hinde Dolomite. Work carried out included a QUESTEM Survey at 250m line spacings over the whole of **EL 8331**, with follow-up soil sampling and drilling targeting conductive units from the QUESTEM survey. The Hinde Dolomite is regionally elevated in Zn and sometimes Pb but with little variation in thickness or grade over a large area. Average grade is around 54m @ 345ppm Zn in the Hinde Dolomite and a maximum value of 3m @ 2690ppm Zn ad 1190ppm Zn was recorded in the Cambrian limestone. North concluded that the area had ‘been adequately tested for base metal mineralisation’ and dropped the Licence.
6. EXPLORATION DURING YEAR 1 (2012)

Historical work review was done however no field exploration has been undertaken by Spectrum on EL29026 during year 1.

7. EXPLORATION DURING YEAR 2 (2013)

No exploration has been undertaken by Spectrum on EL29026 during year 2.
8. REFERENCES


9. CONFIDENTIALITY STATEMENT

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