REDUCTION REPORT
YEAR 1 (Non-Compulsory)

EL 29458

SKYFALL SOUTH

FOR PERIOD ENDING: 4 December 2013

Fergusson River  SD 5212  1:250,000
Delamere        SD 5216  1:250,000
Flora           5168    1:100,000
Bowman          5268    1:100,000
Willeroo        5268    1:100,000

Titleholder: Spectrum Rare Earths
(previously TUC Resources Ltd)

Target Commodities: Rare Earth Elements and Uranium

Report No. 2014-007
Prepared for Spectrum Rare Earths Limited
By Laura Petrella
January 2014

This report and its contents are strictly confidential. All rights to the report and its contents, including, without limitation, rights to confidential information and copyright in all works whether at common law or statute (including photographs, diagrams, charts, maps and graphs) comprised in the report, remain the property of Spectrum Rare Earths Limited. No part of this report or the information contained in it may be disclosed to any person without the consent of Spectrum Rare Earths Limited. No part of this report or the information contained in it, may be disclosed, reproduced (including being stored in any form), transmitted, published or used for any other purpose without the prior written consent of Spectrum Rare Earths Limited. As per Regulation 126(3)(a) of the Mineral Titles Regulations the Minister is authorised to copy and distribute the report and associated data.
CONTENTS

1. SUMMARY ....................................................................................................................
2. LOCATION AND ACCESS ..................................................................................
3. TENEMENT STATUS AND OWNERSHIP ..........................................................
4. GEOLOGY ..............................................................................................................
5. PREVIOUS EXPLORATION ..............................................................................
6. EXPLORATION DURING YEAR 1 (2013) ......................................................
7. REFERENCES ......................................................................................................
8. APPENDIX A: Exploration Data ........................................................................

LIST OF FIGURES

Figure 1 EL29458 Location Map with underlying cadastre ..................................
Figure 2 Location Map of EL29458 and Dropped Ground ..................................
Figure 3 Geological Map of EL29458 before reduction ......................................
Figure 4 Uranium results in ppm for Stream (diamond) and Rock (square) samples compiled within and around EL29458.................................

LIST OF TABLES

Table 1 Best results from 11 RC frill holes (CR1994-076) .................................
1. SUMMARY

Skyfall South (EL 29458) is situated approximately 250 km south of Darwin, the Northern Territory. Spectrum Rare Earths Limited (Spectrum) applied for EL 29458 to determine the HREE potential of the area.

The first year non-compulsory reduction was undertaken 94 blocks retained and 63 blocks dropped. This report details exploration carried out by Spectrum on the year 1 relinquished ground for the duration that it was held.

Work during Year 1 of tenure consisted in data compilation from mineralogical reports and a review of available geophysical data which was critical to target prospection priority. Following this desktop study Spectrum undertook a rock and soil sampling program however no sample were taken on the relinquished ground.
2. LOCATION AND ACCESS

EL 26458 falls in the Fergusson River SD52-12 and Delamere (SD52-16) 1:250,000 map sheets. The licence area is situated approximately 250 km south of Darwin in the Northern Territory.

Access to the tenement from Darwin is first via the Stuart Highway, then via the road to Dorisvale Station and finally tracks on Dorisvale station property. Alternatively the tenement can be accessed from Ooloo road and Daly River Crossing then using tracks to the tenement (Figure 1). Most of the tenement can only be accessed via four wheel drive or helicopter.

Topography for the tenement area is low relief, with some floodplains. The Flora River and the Mathison Creek are the main watercourses intersecting the tenement.

![Figure 1 EL29458 Location Map with underlying cadastre](image)
Figure 2 Location Map of EL29458 and Dropped Ground
3. TENEMENT STATUS AND OWNERSHIP

EL 29458 was granted on 5 December 2012 and expires on 4 December 2018. It originally comprised of 157 graticular blocks (505.64 sq km). There are no other mining leases or mineral claims shown within the Licence boundaries.

Underlying cadastre (Figure 1) is perpetual pastoral lease (PPL) stations owned by two parties:
- PPL 1066, (NT Portion 01167) Dorisvale Station, covering the northern part of the Licence, owned by Anthony Harrower;
- PPL 1038, (NT Portion 03982) Aroona Station, covering the southern portion of the licence, owned by Western Development PTY LTD (ACN 009 841 829)

Tenement Reductions:

<table>
<thead>
<tr>
<th>Tenement Reduction</th>
<th>Blocks retained</th>
<th>Blocks relinquished</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year Non-Compulsory Reduction</td>
<td>94</td>
<td>63</td>
</tr>
</tbody>
</table>

This report details exploration carried out by Spectrum on the year 1 relinquished ground for the duration that it was held. The relinquished blocks versus the retained blocks are displayed in Figure 2.
4. GEOLOGY

Regional Geology

EL29458 is situated within the Fergusson River (SD52-12) and Delamere (SD52-16) 1:250,000 map sheets. The description of regional geology has been adapted from Pontifex, I.R and Mendum, J.R. (1972) and Beier et al. (2002).

The regional stratigraphy is represented by rocks ranging in age from mid Proterozoic to Cretaceous. The main structural feature of the region is the northwest striking Dorisvale Fault. The Dorisvale Fault marks the boundary between the Victoria Platform to the west (comprising gently folded Lower Cambrian Antrim Plateau Volcanics overlying Proterozoic units of the Banyan and Bynoe Formations) and the Daly River Basin to the east (comprising Middle Cambrian to Ordovician carbonates of the Tindall Limestone and the Jinduckin Formation).

Geological History: Proterozoic sedimentary rocks (Bullita, Auvergne and Tolmer Groups) were laid down in shallow seas. Uplift and erosion preceded the regional extrusion of Early Cambrian flood basalts of the Antrim Plateau Volcanics. An extensive marine transgression in the Middle Cambrian occurred and resulted in the deposition of the Daly River Group. Brief periods of peritidal carbonate deposition resulted in the deposition of Tindall Limestone. A subsequent regression led to the deposition of the Early Ordovician Jinduckin Formation (mixed carbonate-siliciclastic succession). Between the Ordovician and Early Cretaceous, regional sedimentation ceased and large areas were eroded. Mesozoic sandstones, conglomerates, silt and mud of continental and shallow marine origin were subsequently deposited in a thin succession. Cenozoic deposits resulted from a period of erosion, deep weathering and lateritisation.

Local Geology

The description of local geology has been adapted from Pontifex, I.R and Mendum, J.R. (1972). 1:250,000 Geological Series Explanatory Notes, Fergusson River, NT.

The oldest rocks that crop out in the licence area are rocks of the Bullita Group. The Bullita Group is a sequence of Neoproterozoic (Adelaidean or Carpentarian) dolomite and siltstones and only crop out in the central and northern portions of the tenement. The basal unit, the Skull Creek Formation, is not exposed in the tenement. It is conformably overlain by the Bynoe Formation. The Bynoe Formation consists of purple and green siltstone and dolomitic siltstone, which is commonly friable and blockly, and contains minor intercalated dolomite or silty dolomite bands. These bands are flaggy to blocky, and contain halite casts and mud cracks. The Banyan Formation overlies the Bynoe Formation generally conformably but in a few places with a slight unconformity. It consists of a basal calcareous sandstone-dolomite sequence, a middle thick dolomite sequence and an upper siltstone-shale sequence. The middle dolomite sequence contains pink and grey, flaggy to massive, oolitic and stromatolitic dolomite. No other Proterozoic rocks are known to be exposed in the area.

The Lower Cambrian Antrim Plateau Volcanics unconformably overlie the Proterozoic rocks. They consist of massive and vesicular tholeiitic basalt. Prehnite, calcite, zeolites and rarely quartz have filled some vesicles in the basalt. They are known to contain barite and traces of copper and gypsum. In places, grey to reddish brown, blocky, medium grained feldspathic sandstone is interbedded with the basalt.
Unconformable to the Plateau Volcanics is the Daly River Group which consists of a sequence of limestone, sandstone, and siltstone. These sediments are confined to the Daly Basin, the western margin of which is defined by the Dorisvale Fault. The lowest stratigraphic unit, the Tindall Limestone, has limited exposure in the southern portion of the licence area. The Tindall Limestone outcrops in a narrow, discontinuous belt along the margins of the Daly Basin and comprises calcilutite, coarsely crystalline limestone and minor sandstone. Middle Cambrian fossils are present in this unit. The Jinduckin Formation conformably overlies the Tindall Limestone and consists of flaggy, friable, ferruginous sandstone and siltstone with minor limestone and dolomite. Halite pseudomorphs are also common. Lower Ordovician conodonts have been identified within the formation. The Mullaman Beds consist of freshwater and shallow water marine sandstone, siltstone and porcellanite and unconformably overlie all older units. The Mullaman Beds have been extensively laterised; in places the pallid zone of the laterite profile has been silicified and forms a tough cap rock.

Superficial deposits overlying the above strata are the Cainozoic sediments, which are widespread across the licence area consisting of pisolitic laterite and ferruginous rubble and alluvium. The lateritic profile, associated with the claystones of the Mullaman Beds, have a maximum thickness of thirty metres.

Exploration Licence 29458 contains two major structural units, the Victoria Platform and the Daly Basin. The Carpentarian and Adelaidean sediments and the Antrim Plateau Volcanics belong to the Victoria Platform and are gently folded. The platform is bounded to the east by the Dorisvale Fault and contains small-scale normal faults. The Daly Basin consists of a sequence of gently dipping sediments and shows little faulting or folding.
Figure 3 Geological Map of EL29458 before reduction
5. PREVIOUS EXPLORATION

Work completed on EL 29458 by Spectrum for this year included a literature review and GIS data compilation. Appendix A contains the list of previous tenures and a of previous mineral exploration reports within the EL29458. The list of reports includes summary of each report.

The region has previously been explored for a variety of commodities including diamonds, base metals, barite, phosphate, bauxite and limestone.

Exploration details of the historic tenements intersecting and contained with EL 29458 are summarised below:

**EL27525 and EL27441**
Location: Covers entire southern and northern portion of EL29458.
Crosland’s Mines Pty limited considered the ground prospective for vein style and unconformity related uranium deposits due to the presence of the Dorisvale Fault and Mid-Proterozoic rocks which they considered correlatable with the Tolmer Group. However, no field work was undertaken due to financial and Traditional Owner constraints. The area was relinquished.

**EL25534 CR2008-0369 and CR2009-0407**
Location: Covering central portion and outside area to south-west
Kettle Rose Pty Ltd carried out a review of literature in the exploration for Pb, Zn, Ag, Cu and diamonds. No field based work was undertaken due to a lack of staff and no possible exploration targets were identified from the desk study. The area was relinquished.

**EL25807 CR2008-806**
Location: Covering southern portion of EL29458 and outside area to south
Imperial Granite and Minerals Pty Ltd collected 12 rock chip samples from ironstone and gossanous outcrop with promising results: Fe 51.3%, Ni 294ppm, Pb 405ppm, Ti 3440ppm, U 43.6ppm, V 870ppm, Zn 1000ppm. The anomalism appears to occur over a fairly wide area. Unfortunately, due to economic circumstances at that time Imperial has surrendered the EL.

**EL9628 CR1998-0034,CR1998-0744**
Location: Covering northern portion of EL29458 and large outside area to north
Stockdale Prospecting Ltd undertook aeromagnetic and reconnaissance sampling survey in their exploration for diamonds. 52 heavy mineral samples were collected but no diamonds or kimberlitic indicator minerals were recovered. No features of interest were observed from the aeromagnetic survey. The area was relinquished.

**EL8868 CR1997-0053,CR1997-0168**
Location: Covering majority of EL29458.
NT Gold Pty. Ltd. prospected for barite reefs – high grade barite (BaSO₄) and outcrops vary in width from one to six metres. The wall rocks are basalt of the Antrim Plateau Volcanics. However no field work was carried out and the area was relinquished due to the low price of barite.

**EL8790 CR1995-0769,CR1996-0467**
Location: Covering small amount of the central portion of EL29458 and area outside to west.
Stockdale Prospecting Ltd were exploring for diamonds. After carrying out an aerial magnetic and reconnaissance sampling survey the area was considered to have little potential to host an economic diamondiferous source rock. The aerial data failed to highlight any kimberlitic source rocks.

**EL6633 & EL6881**


Location: Covering most southern portion of EL29458 and area outside to south. Stockdale Prospecting Ltd undertook a programme of reconnaissance heavy mineral stream sediment and geochemical sampling to determine the diamond prospectivity of the area. Positive results were obtained from the 1990 reconnaissance diamond sampling and were subsequently followed up. The chromites observed were believed to have been derived from Antrim Plateau Volcanics. The garnets and ilmenites were non-repeatable in subsequent sampling. The tenements were relinquished.

**EL5359**


Location: Covering small amount of the central portion of EL29458 and area outside to west.

CR1989-0235, CR1990-0270, and CR1990-0324: Stockdale Prospecting Limited carried out stream and gravel sampling in their exploration for kimberlites. Two samples produced abundant, possible kimberlitic, chromite grains but it was concluded that these were derived from overbank sedimentation from the river and the area was considered to have a low potential for diamonds.

In March 1991 Stockdale Prospecting Ltd transferred EL5359 to Poseidon Exploration. Poseidon Exploration Ltd & Stockdale Prospecting Ltd explored for diamond and base metals in the following reports:

CR1991-0557: Anomalous Pb values within the creeks draining the Tindall Limestone and Jinduckin Formation in the vicinity of the Dorisvale Fault were reported. The known barite veins in the SW corner of EL 5359 were visited and sampled to determine their potential. The creek which drains the large barite veins and Antrim Plateau Volcanics contain high background Cu, Fe, Mn, P, V, Zn.

CR1992-0463 & CR1993-0359: Stream sediment and rock chip sampling as well as an airborne magnetic and radiometric survey were undertaken. Sampling did not produce targets requiring follow up and a portion of EL5359 was relinquished.

CR1992-0231 & CR1993-0308: A grid soil and rock chip sampling survey to investigate carbonate hosted Pb/Zn/Ag potential in the inferred prolongation of Dorisvale Fault was carried out. Results revealed strongly anomalous Pb values (to 6100 ppm), Zn (660 ppm), Ag (1.3ppm), Ba (1.49%) and P (but U highest value is 14 ppm). The metals anomalies seem to be related to a highly siliceous, sometimes brecciated and/or ferruginous rock with common barite clasts and minor veins. The silica rock appears to be an epithermal replacement of a grey limestone and occasionally contains vughs of drusy quartz and botryoidal hematite.

Interpretation of airborne magnetics and radiometric data revealed NW trending features/faults coincident with the anomalous geochemistry. This feature is interpreted to be the southern extension of the Dorisvale Fault.

CR1994-0376: Normandy Exploration Limited & Stockdale Prospecting Limited undertook a detailed mapping of the silica rock unit which includes ferruginous
zones, barite breccias, barite veins with minor galena and silicified limestone with brachiopod moulds. They have little vertical and lateral extent and appear to be erosion remnants of hydrothermally silicified/altered Tindall Limestone.

11 RC Drill hole targets were delineated from soil and rock chip sampling which outlined a significant geochemical zone of Pb, with lesser but supporting Zn, Ag, Ba, As, Sb and U, associated with interpreted epithermal silica replacement of Tindall Limestone (CR1993-0308). The drilling intersected promising mineralisation, outlined in Table 1. The highest barite values obtained was from WRC4: 12-16m at 149000ppm) and 16-20m at 229000ppm Ba. However, the base (Antrim volcanics) of the Daly basin sediment was reached around 40 m, therefore it is concluded that most of the licence contains only a thin veneer (<50m) of basal Daly Basin sediments, including Tindall Limestone. The prospectivity of the licence was consequently downgraded and the tenement was allowed to expire.

Table 1 Best results from 11 RC frill holes (CR1994-076)

<table>
<thead>
<tr>
<th>Hole</th>
<th>From</th>
<th>To</th>
<th>m @ % Pb</th>
<th>Lithology</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRC4</td>
<td>0</td>
<td>4</td>
<td>4m @ 1.82 % Pb</td>
<td>Sap with mod sil + chalk (ex Lst)</td>
</tr>
<tr>
<td>WRC4</td>
<td>4</td>
<td>8</td>
<td>4m @ 5.82 % Pb</td>
<td>Sap with minor-mod sil rock</td>
</tr>
<tr>
<td>WRC5</td>
<td>8</td>
<td>12</td>
<td>4m @ 1.19% Pb</td>
<td>Sap with minor sil + Ba</td>
</tr>
<tr>
<td>Re-splits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WRC4</td>
<td>2</td>
<td>8</td>
<td>6m @ 3.63% Pb</td>
<td>Sap with mod sil + Ba</td>
</tr>
<tr>
<td>WRC4</td>
<td>8</td>
<td>9</td>
<td>1m @ 1.28% Pb</td>
<td>Sap with minor-mod sil rock</td>
</tr>
<tr>
<td>WRC3</td>
<td>2</td>
<td>7</td>
<td>5m @ 1.16% Pb</td>
<td>Clay-sap + chalc</td>
</tr>
</tbody>
</table>

EL7022 CR1992-0058
Location: Covering large area of EL29458.
Pancontinental Mining Ltd. prospected for Pb/Zn MVT type mineralisation and barite, they found few anomalous sample sites warranting a follow-up programme.

EL6066 CR1989-0581, CR1990-0209
Location: Covering the north and central portions of EL29458 and outside area to the W.
Billiton Australia explored for “epithermal” gold mineralisation (based on the presence of such mineralisation at the Tolmer prospect, along the Dorisvale Fault to the north) and carbonate-hosted (MVT) Pb-Zn mineralisation. They relinquished the area after receiving poor results from a programme of stream sediment and rock-chip sampling.

EL5852 CR1989-0272
Location: Covering most north eastern portion and outside area to north
Eupene Exploration Enterprises Pty Ltd investigated for base metals, gold, silver and barite along Dorisvale Fault. Rock chip and stream sampling results only showed few anomalous values in Zn along the fault. Barite mineralisation is common along the fault zone. On EL5852, “a barite mine occurs at Pony Pocket Creek while southeast along strike of the fault, a similar barite occurrence has been identified at Matheson Creek (Fisher, 1971) off the licence. Pods of barite also occur at Thompsons Pocket Creek and Scissors Creek, southwest and south of the licence respectively”.

EL4419 & EL4418 CR1986-0129
No exploration done by Eurabla Mining Ltd.

EL4322 CR1984-0221, CR1985-0128
Location: Covering most central southern portion of EL29458 and outside area to the west
BHP Minerals Ltd. undertook stream sampling in the exploration for diamonds. One micro diamond was located in the first year of tenure however this was not repeated during follow up sampling.

**EL3576 & EL3567**  
Location: Covering most SW tip and central portion of EL29458.  
Freeport of Australia Incorporated undertook exploration for diamonds but no kimberlitic indicator minerals were found and the licences were relinquished.

**EL2034 CR1981-0234, CR1982-0399**  
Location: Covering a very small area in the southern portion of EL29458.  
Ashton Mining Ltd. undertook base metal and diamond investigation. A reconnaissance program for Pb-Zn and U anomalies was undertaken but no significant results were obtained. Results concluded that there was little likelihood of finding either kimberlites or sulphide mineralisation.

**EL2847 CR1982-0028, CR1982-0186**  
Location: Covering very small area in the central portion of EL29458.  
Mineral Deposits Ltd undertook exploration for diamonds and base metals. A regional gravel sampling survey was undertaken but only one indicator mineral was detected interpreted to be non-kimberlitic. Stream geochemistry was also carried out but only returned background levels of Cu, Pb, Zn, Ni, Ba, U and Au. The area was relinquished.

**AP2323 CR1971-0030**  
Location: Covering small area in the south of EL29458 and outside area to the east.  
Euralba Mining N.L. prospected for barite lodes. They have found and mapped several occurrences of barite lodes. “The lodes are restricted to an andesite dominant member of the Antrim Plateau Volcanics and do not penetrate the overlying sedimentary member. The barite has been emplaced in the lodes; most probably by circulating groundwater solutions reacting to precipitate BaSO$_4$, but possibly through hydrothermal replacement.” The lodes have an overall NW trend with vertical dip. The lodes were sampled giving up to 96.3% BaSO$_4$; however the locations of the samples are not given.

From thin work Spectrum discovered that base metal mineralisation has been found locally as disseminated galena in altered and brecciated barite-rich veins within carbonate rocks in close proximity to the Dorisvale fault. Moreover Spectrum compiled rock chips, stream sediments and soil samples base metals and U results illustrated on
Figure 4 Uranium results in ppm for Stream (diamond) and Rock (square) samples compiled within and around EL29458.
6. EXPLORATION DURING YEAR 1 (2013)

Spectrum undertook a soil and rock sampling reconnaissance program however none were taken on the relinquished ground.
7. REFERENCES


8. APPENDIX A: Exploration Data

Files include:

- List of previous tenures
- List of previous Mineral Exploration Reports