AMALGAMATED ANNUAL TECHNICAL REPORT

GR268/12
(EL25397 & EL27154)

CALVERT PROJECT

FOR PERIOD ENDING: 19 December 2014

Robinson River SE 53-4  1:250,000
Robinson 6365         1:100,000
Calvert River 6465    1:100,000
Selby 6464           1:100,000

Titleholder: Carpentaria Minerals Pty Ltd
(100% owned subsidiary of Spectrum Rare Earths Limited)

Report No. 2015-003
Prepared for Carpentaria Minerals Pty Ltd
By Laura Petrella
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1. SUMMARY

EL25397 and EL27154 are near the southern coast of the Gulf of Carpentaria and the Queensland border; south-east of the township of Borroloola. Carpentaria Minerals is exploring for uranium and base metals, and applied for EL25397 to determine the potential for a wide range of mineralisation styles. In Years 1 to 3 (2007 – 2009) Carpentaria Minerals conducted a number of phases of exploration over EL25397 including stream sediment programs, auger and soil sampling, helicopter reconnaissance and an airborne HYVISTA spectral survey. Results were very promising with geochemical anomalies confirming geophysical and structural targets. In Year 3 EL27154 was granted and exploration was planned in conjunction with EL25397.

In 2010 Carpentaria Minerals applied for, and was awarded, a grant of $100,000 under the NT government's drilling collaborations 'Bringing Forward Discovery' initiative. The collaboration included a proposed program of 8 diamond holes for 800m on EL25397 with an estimated expenditure of $389,000 for the total program. The program was scheduled for September 2010 but despite Carpentaria Minerals' efforts was postponed due to land access issues until the 2011 field season.

In 2011 the original planned access track was modified due to the sighting of an endangered species by the AWC (Australian Wildlife Conservancy). The tracks along the new route were upgraded to allow for rig access and drill pads were established for 4 holes. A diamond rig was mobilised to site but unfortunately was unable to reach the drill pads due to the tracks still being inadequate. Exploration was also postponed on EL27154.

During the year Carpentaria Minerals decided to combine its Calvert River Project (EL25397 and EL27154) with its McArthur River Project (applications EL25383, EL25388, EL25390, EL25392, and EL25394) to form a wholly owned, private company Carpentaria Minerals Ltd Pty to allow increased focus on the excellent potential of the tenement package.

Carpentaria Minerals are keen to test the exploration potential of the breccia pipes located on EL25397 and EL27154 with three holes designed and drill pads/access already prepared. Exploration on EL27154 is planned to be completed in conjunction with diamond drilling on EL25397.
2. LOCATION AND ACCESS

EL25397 and EL27154 are situated approximately 120km SE of Borroloola, near the southern coast of the Gulf of Carpentaria and close to the border with Queensland (Figure 1). Access to the area is via a gravel road linking Borroloola to Doomadgee in Queensland, and the tenement boundaries can only be accessed via four wheel drive or helicopter.

EL25397 runs in a NW-SE orientation and Calvert River and Sandy Creek bisect the tenement and run NE-SW, whilst Skeleton Creek drains the northern boundary of the licence. Topography for most of the tenement is low relief, with some floodplains. The western border of the Licence has higher relief north of Calvert River and south of Sandy Creek. The geomorphic provinces are described as ‘G6’ (almost flat coastal terrace with immature drainage pattern) on the eastern edge of EL25397, and ‘G5’ (gentle erosional slopes on coastward side of sandstone ridges) which covers most of the Licence (Rawlings, 2006). The tenement has numerous creeks which can flood in heavy rains during the wet season.

Topography for EL27154 is hilly along sandstone ridges with flat flood plains and alluvial areas to the east and west of the tenement. The geomorphic provinces are described as ‘G5’ (gentle erosional slopes on coastward side of sandstone ridges) which covers most of the Licence (Rawlings, 2006). The tenement has numerous creeks which can flood in heavy rains during the wet season. Major creeks include the Calvert River to the south of the tenement and Stockyard Creek to the north.
3. TENEMENT STATUS AND OWNERSHIP

In 2012 Carpentaria Minerals decided to combine its Calvert River Project (EL25397 and EL27154) with its McArthur River Project (applications EL25383, EL25388, EL25390, EL25392, and EL25394) to form a wholly owned, private company Carpentaria Minerals Pty Ltd to allow increased focus on the excellent potential of the tenement package. In December 2012 the tenements were granted amalgamation of technical and expenditure reporting.

Tenement status details are given in Table 1:

Table 1: Tenement Status Details

<table>
<thead>
<tr>
<th>Tenement</th>
<th>Group</th>
<th>Project Area</th>
<th>Area (Km²)</th>
<th>Blocks</th>
<th>Date Granted</th>
<th>Expiry</th>
<th>Current Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL25397</td>
<td>GR268-12</td>
<td>Calvert</td>
<td>131.74</td>
<td>40</td>
<td>6/02/2007</td>
<td>5/02/2015</td>
<td>8</td>
</tr>
<tr>
<td>EL27154</td>
<td>GR268-12</td>
<td>Calvert</td>
<td>32.94</td>
<td>10</td>
<td>14/10/2009</td>
<td>14/10/2015</td>
<td>6</td>
</tr>
</tbody>
</table>

EL25397 was reduced to 40 graticular blocks (131.74 sq km) following second year reductions (Figure 1). There are no other mining leases or mineral claims shown within the licence boundaries.

Year 3 non-compulsory relinquishment was completed for EL27154 with only 10 blocks retained.

EL25397 underlying cadastre is all perpetual pastoral lease (PPL)/pastoral lease (PL) stations owned by several parties, including:
- PL 773 (NT Portion 1351) Seven Emu Station, covering the northern part of the Licence, owned by Frank Shadforth;
- PPL 1113 (NT Portion 674) Wollogorang Station, covering most of the Licence, including all area to the southeast;
- PL 774 (NT Portion 1352) Pungalina Station, covering parts of 6 blocks on the southern side of Calvert River and parts of EL27154.

EL27154 underlying cadastre (Figure 1) is all perpetual pastoral lease stations owned by several parties, including:
- PPL 1651 (NT Portion 773) Seven Emu Station, covering the northern part of the licence;
- PPL 1352 (NT Portion 774) Pungalina Station, covering the southwestern corner of the licence.

Areas of EL25397 are located within the Pungalina-Seven Emu Wildlife Sanctuary; an area of significant conservation in the Gulf of Carpentaria. The sanctuary is run by the
Australian Wildlife Conservancy (AWC), also the current owners of Pungalina Station. AAPA certificates have been granted for EL25397 where drilling is planned. Also, an AAPA certificate was granted for EL27154 and showed no RWA areas within the licence.

Landowner approval for drilling was initially gained in early 2010 and a visit was made in June to check the agreed access routes. In September, prior to the commencement of earth works, the Australian Wildlife Conservancy (one of the landowners) informed Carpentaria Minerals that the access route they had originally agreed to was not acceptable as it was close to sightings of an endangered species - the ‘Carpentarian Rock Rat’. Subsequently, Carpentaria Minerals cancelled the earthmoving contractors and returned to the tenement in an attempt to find alternative access routes. The only access route agreeable to all parties crossed numerous creeks and flood areas and the track was not constructed until 2011.

![Figure 1: Tenement Location Map, showing ground retained for GR268-12 at the end of Year 3.](image)
4. GEOLOGY

The project is situated within the tectonically stable Wearyan Shelf, on the south eastern margin of the McArthur Basin. The Wearyan Shelf is defined as a “thick platform cover” succession of mostly unmetamorphosed sedimentary and lesser volcanic rocks deposited on the North Australian Craton (Plumb, 1979). A full description of the geology and stratigraphy of the North Australian Craton can be found in several texts, including Plumb et al., (1990). The 1:250,000 geological series map and notes of Robinson River covers the tenement area (Rawlings, 2006).

The northern, central and western portions of EL25397 and most of EL27154 are covered largely by Cenozoic alluvium and colluvium, whilst the raised western portion of EL25397 and portions of EL27154 are defined by a plateau of sandstone and siltstone of the Tawallah Group (Figure 2). Rawlings (2006) refers to the Tawallah Group as part of ‘Redbank depositional package’ that consists of a regionally extensive platform of shallow marine to fluvialite sediments with bimodal volcanic and high-level intrusive rocks aging 1815-1710Ma. The SE corner of EL25397 has outcrops of Gold Creek Volcanics (Ptg), which is a mixed basalt-sedimentary sequence that has been divided into 7 coherent basalt sheets (Rawlings 2006). Disconformably overlying the Gold Creek Volcanics is the Pungalina Member, which is the basal mudstone, conglomerate and sandstone portion of the Echo Sandstone. Original mapping and sampling within the project by previous workers identified the ‘Masterton Formation’ (part of the Tawallah Group) which is now called the Echo Sandstone. A number of streams drain the plateau and have been the focus of most of the exploration in this area.

East-west faults are also evident in the southern portion of the plateau, which follow mapped syncline and anticlinal structures within the lower Pungalina Member in EL25397. Northwest-trending faults and lineaments in the area are named the ‘Calvert Fault trend’ and can be identified in airborne magnetics and landsat (Rawlings 2006).

Rawlings (2006) noted ‘unusual, circular 20 – 100m diameter sandstone knobs (‘Pungalina pipe set’) during mapping, which was interpreted as the surface expression of pipe-shaped collapse structures. The knobs are ‘untested and represent excellent base metal targets’ and are within EL25397 and the northeast corner of EL27154 (Figure 2).

These circular features are interpreted as the surface expression of a series of breccia pipes, such as those that host mineralisation at the nearby copper mine at Redbank. During Carpentaria Minerals’ exploration, many more such features have been noted, ranging in diameter from 20m to 500m.
A summary of the interpretive geological history of the area is depicted on the diagram in Error! Reference source not found., pictorially demonstrating timing of events relative to the relevant geology and within the basin context.

Figure 2: GR268-12 1:250K Geological Map
5. PREVIOUS EXPLORATION BY CARPENTARIA MINERALS

During the first year (2007-2008) of EL25397 Carpentaria Minerals completed a literature review and data compilation for EL25397, the results were described in the previous annual reports for this tenement. Lists of previous tenure, including the graticular blocks covered within EL25397 and significant reports, were included in previous annual reports (see the Year 1 Annual Report for this region).

During the second year (2008-2009), Carpentaria Minerals conducted an airborne hyper spectral survey over the entire tenement. Details of the survey were reported in the Year 2 Annual Report. The survey assisted in interpretation of numerous circular pipes which had been noted in the area from previous studies & analysis of satellite imagery, pinpointed several new targets further south in the tenement and aided in an ongoing fault interpretation study for the region.

Following the survey, two ground reconnaissance and geophysical survey missions were conducted to investigate the nature of the circular features. To begin with, a broad scale stream sediment sampling program was carried out over much of the tenement. The initial program was then followed up by a more detailed stream sediment sampling program over areas where results from the first trip showed anomalies worth investigating. In addition, soil, rock chips and diamond samples were taken over several of the pipe features. The geochemistry program highlighted several interesting anomalies designated for further investigation. Results of the program were reported in full in the Year 2 Annual Report. Two lines of ground magnetics were also completed, however the results were later considered to be useless due to the orientation of the lines.

During Year 3 (2009-2010), due to allocation of its resources elsewhere within its tenement portfolio and the abundance of work performed during Year 2, Carpentaria Minerals’ exploration on EL25397 was limited to office studies. Data compilation and drill program planning were carried out, fully integrating all data received from work done during Year 2.
6. EXPLORATION DURING 2010

In 2010 Carpentaria Minerals applied for and was awarded a grant of $100,000 under the NT government’s drilling collaborations ‘Bringing Forward Discovery’ initiative. The collaboration included a proposed program of 8 diamond holes for 800m with an estimated expenditure of $389,000 for the total program.

Geological Reinterpretation:

Several NW-trending faults exist in the area, which appear to be associated with the regional “Calvert Fault Trend”, thought to be active from the Paleoproterozoic to the Phanerozoic. Using hyperspectral airborne survey data, Carpentaria Minerals have also mapped a series of basin growth and transform faults in the region, thought to have formed during extensional phases of basin development. Mapping and exploration in EL25397 have identified a number of circular topographical and aerial photo features, some of which occur at the intersection of these growth and transform faults (Figure 3).

![Figure 3: Interpreted breccia pipe at the intersection of growth and transform faults on Carpentaria Minerals lease EL25397.](image)

These circular features are interpreted as the surface expression of a series of breccia pipes, such as those that host mineralisation at the nearby copper mine at Redbank. Rawlings (2006) noted ‘unusual, circular 20 – 100m diameter sandstone knobs (‘Pungalina pipe set’) in the northern part of the current EL25397 tenement during mapping. Though he quoted the knobs as representing “excellent base metal targets”, they remain untested. During Carpentaria Minerals’ exploration, many more such features have been noted, ranging in diameter from 20m to 500m.
After reviewing the geological history of the area (figure 4) Carpentaria Minerals noted that it is possible that any mineralisation discovered within the Carpentaria Minerals project could be from younger events, such as the Robinson Dome base-metal event, rather than the Stanton/Running Creek GCV associated event, perhaps even related to geo-tectonic activity associated with the timing of the Merlin Kimberlite Pipes.

Figure 4: Stratigraphic column and Interpretive Geological History, including stages of known mineralisation.
Exploration Target Models:

The collaboration proposal was to target the following mineralisation models:

A) Breccia-pipe hosted copper mineralisation

![Diagram of Breccia-pipe hosted copper mineralisation]

*Figure 5: Northern EL25397 exploration model; Proterozoic sequence covered terrain.*

B) Diamondiferous Kimberlite Pipes

![Diagram of Diamondiferous Kimberlite Pipes]

*Figure 6: Gravity based diamond exploration model with DIMS evidence.*
C) Alluvial Diamonds

Figure 7: Reworked Beach Diamond Alluvial Exploration Model (based on Namibian Coastal Model); Calvert River.

Figure 8: Cross Section of Carpentaria Minerals' Calvert alluvial Diamond Model. Location of Cross Section indicated in historical data map.
The program was scheduled for September 2010 but despite Carpentaria Minerals’ efforts was postponed due to land access issues until the 2011 field season.

During one of the visits to assess access tracks and visit landowners 4 soil and 6 rock chip samples were taken from EL25397. Anomalous copper was returned from 1 sample (750ppm Cu) and high iron from another (~60%). Figure 9 shows the locations and anomalous results and Figure 10 shows sample numbers and locations. Helicopter reconnaissance was completed over EL27154 to assess ground access conditions for subsequent visits and a number of sites were geologically reviewed to check stratigraphic settings and test for anomalous uranium readings with a handheld spectrometer. No significant results were measured, no samples were taken.
Figure 9: Anomalous results from geochemical sampling in 2010, Year 4.
Figure 10: Sample Locations, Year 4.
7. EXPLORATION DURING 2011

Landowner approval for drilling was initially gained in early 2010 and a visit was made in June to check the agreed access routes. In September, prior to the commencement of earth works, the Australian Wildlife Conservancy (one of the landowners) informed Carpentaria Minerals that the access route they had originally agreed to was not acceptable as it was close to sightings of an endangered species - the ‘Carpentarian Rock Rat’. Subsequently, Carpentaria Minerals cancelled the earthmoving contractors and returned to the tenement in an attempt to find alternative access routes. The only access route agreeable to all parties crossed numerous creeks and flood areas and the track was not constructed until 2011. The rig was mobilised late 2011 but the track was found to still be inadequate and was not able to reach the drill sites.

A total of 15.3km of access tracks and 4 diamond drill pads were constructed but exploration on EL27154 was cancelled for the year after the postponing of the drill program on EL25397.

![Figure 11: 2012 access tracks and drill pads prepared for drilling.](image)
8. EXPLORATION DURING 2012

During 2012 Carpentaria Minerals decided to combine its Calvert River Project (EL25397 and EL27154) with its McArthur River Project (applications EL25383, EL25388, EL25390, EL25392, and EL25394) to form a wholly owned, private company, Carpentaria Minerals Ltd Pty to allow increased focus on the excellent potential of the tenement package. Carpentaria Minerals is in the process of preparing an application for amalgamation of technical and expenditure reporting for the two tenements (EL25397 and EL27154).

Geochemical sampling and reconnaissance mapping was intended to be completed on EL27154 in conjunction with the planned drilling on EL25397 (whilst exploration crews were operating in the area). Unfortunately, the drill program has now been delayed over 2 years, initially based on the identification of an endangered species along the main proposed access route, and then by the rig access route chosen by the drill contractor, from the new main access, being found to be impassable.

9. EXPLORATION DURING 2013

No work was done on either EL27154 or EL25937 in 2013. EL25937 had 68 blocks voluntarily relinquished as a review of a desktop prioritisation exercise.

10. EXPLORATION DURING 2014

No work was done on either EL27154 or EL25937 in 2014. EL27154 had 10 blocks voluntarily relinquished as a review of a desktop prioritisation exercise.

11. PLANNED EXPLORATION 2015

Planned work for the coming year includes geological mapping and minor rock chip sampling around drill sites on EL25397 to strengthen future drill targeting (see Figure 11 for drill target location map). Maintenance of existing drill tracks is planned for approximately 10km length of track (Figure 11). Office studies will be carried out including drawing up maps and sections to aid in further planning for the future drill program.

Reconnaissance geological mapping and geochemical sampling is planned for EL27154 with post-activity analysis of fieldwork and development of model applicable over the GR268-12 group.
Figure 12: Map of EL25397 illustrating areas to be mapped around drill targets (Points 3 and 8 will be the focus) and drill tracks to be maintained.
12. CONCLUSIONS AND RECOMMENDATIONS

In the next two years Carpentaria Minerals is keen to test the exploration potential of the breccia pipes located on EL25397 and EL27154. Drilling is still planned to test the circular features on EL25397. Three holes planned for 2013 have been delayed. Although holes have been designed and drill pads/access already prepared, field work in 2015 is scheduled to optimise drilling plans at these locations. Exploration on EL27154 is planned to be completed in conjunction with the future drilling on EL25397 (the trend of circular features being tested on EL25397 continues onto EL27154).

13. CONFIDENTIALITY STATEMENT

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14. REFERENCES


