ANNUAL and FINAL TECHNICAL REPORT

EL25397

CALVERT PROJECT

FOR PERIOD ENDING: 02 February 2015

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)

Prepared for Carpentaria Minerals Pty Ltd
By Laura Petrella
March 2015
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1 SUMMARY

EL25397 is located 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. The tenement has now ceased to be in force since the 5th of February 2015. This report details the work completed on EL25397.

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 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, it 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.

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 Ltd Pty to allow increased focus on the excellent potential of the tenement package.

From 2013 to 2015, no work was done within EL25397. The 5th of February 2015 the tenement ceased to be in force.
2 LOCATION AND ACCESS

EL25397 is 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.

Figure 1: Tenement Location Map, showing ground retained for EL25397 at the end of Year 9.

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>9</td>
</tr>
</tbody>
</table>

There are no other mining leases or mineral claims shown within the licence boundaries.

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.

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 was planned.

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.
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 are covered largely by Cenozoic alluvium and colluvium, whilst the raised western portion of EL25397 is 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 fluviatile 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 (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 Figure 13, pictorially demonstrating timing of events relative to the relevant geology and within the basin context.

Figure 2: EL25397 1:250K Geological Map. Blue shapes are EL25397 in Year 9.
4  EXPLORATION DURING 2007

During the first year 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. Appendix A contains a list of previous tenure, including the graticular blocks covered within EL25397 and significant information found in the reports. Appendix A contains also historic data compiled by Carpentaria minerals.

In summary, the data compilation work shows;

a) Exploration has mainly consisted of several campaigns of regional stream sediment sampling, mostly from helicopter reconnaissance

b) Most of the exploration focussed on the Stanton/Running Creek prospects outside of EL25397. Most exploration within EL25397 was on the southern portion of the tenement

c) CRA has been the main explorer; holding tenure from 1983 to 1998, but most of this time was spent further south (with a little time on the SE section)

d) The work done by CRA over the main section consisted mainly of stream sediment sampling which outlined the Barra, Archer and Calvert 1 anomalies. The work done in Year 2 did not give anomalous results BUT it is worth noting that;

- there was no replicate sampling at sites of anomalies ('infill’ samples were taken from other areas).
- Soil sampling was done over the area of the stream sed anomalies. This was probably ‘overbank’ sampling and did not give significant results.
- 2 different labs were used (Analabs in the first year which gave anomalies; Assaycorp in the second year with flat results). There doesn’t seem to be any checking between labs.
- Coordinates of sample sites in CRA’s sample ledgers do not match the coordinates of the sample sites on the maps. The coordinates from digitising maps is taken as correct as this corresponds to actual map locations as well as map delineations of anomalous sample areas. This discrepancy in coordinates may have led to problems with Year 2 follow-up work if coordinates were taken from the sample database rather than map coordinates.

e) There is no regolith mapping in the area, and regolith mapping does not appear to have been taken into consideration when planning surface geochemical sampling.

f) A description of some of the stream sediment sample sites indicated some rather large drainage systems were sampled – the sample sizes for large drainages
with large seasonal volumes of water may have been too small for representative samples.

g) Reviewing the images created from the airborne geophysics shows the main radiometric anomaly has not been tested.

h) Reviewing the geophysical interpretations made by previous explorers shows the main structures in the area are aligned EW and NW-SE but have not been used to focus exploration.

i) the ‘Pungalina pipe-set’ identified as an ‘excellent base metal target’ remains untested.

j) NTGS mapping (Rawlings 2006) indicates that breccia pipes (which host base metal mineralisation at Running Creek) are:
   - Circular, trapezoidal or elliptical in plan.
   - Diameter often <100m.
   - Some pipes obscured by younger deposits or associated faults are difficult to recognise in the field.
   - At Stanton, the major brecciation and stratigraphic offset is a pipe-shaped body plunging 40° to NW.
   - Stratigraphy has been modified by structural repetitions and truncations of faults dipping 35° to NW.
   - The structural event that formed the breccia pipes at Running Creek is considered to be contemporaneous with the folding of the Gold Creek Volcanics and before deposition of the Pungalina Member.
   - High-grade Co-Ni mineralisation at Stanton is associated with dark brown or lesser dark green altered mudstone of the ‘target unit’ within the Gold Creek Volcanics.

k) A summary of the mineralisation model proposed by Rawlings (2006) for breccia pipe-hosted mineralisation is as follows:
   - Uplift, folding and faulting in late Tawallah Group time, creating breccia pipes and allowing cross-stratal fluid flow of reduced hydrocarbon-bearing fluids from Wollogorang Fm into oxidised Gold Creek Volcanics.
   - Movement of reduced hydrocarbon-bearing fluids probably driven by emplacement of felsic or mafic intrusions.

l) Reduced fluids partially reduced ‘redbeds’ in the ‘target unit’ of the GCV;
   - Oxidised metalliferous fluids (perhaps from volcanic rocks) mixed with reduced fluids in the main dilation zones of breccia pipes, resulting in siegenite & chalcopyrite deposition.
   - Sulphide precipitation mainly in upper part of breccia zone and in the ‘target unit’, rather than the main breccia body.
5 EXPLORATION DURING 2008

During the second year, Carpentaria Minerals conducted an airborne hyper spectral survey over the entire tenement. Details of the survey were reported below and georeferenced images are in Appendix B. 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 (reported in Appendix B).

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 (a total of 195 geochemical samples in Appendix C). The geochemistry program highlighted several interesting anomalies designated for further investigation. Two lines of ground magnetics were also completed, however the results were later considered to be useless due to the orientation of the lines.

At the end of the year 2134 blocks were retained, whilst 65 blocks were relinquished.

6.1 Airborne Hyper Spectral Remote Sensing Survey

During Year 2 of tenure Territory Uranium flew a hyper Spectral remote sensing survey over the entire Calvert River tenement (Appendix B and Figure 3). The survey consisted of a total flight length of 123kms at a height of 1400m, with a line spacing of 1300m. The main purpose of the flight was to differentiate the numerous 20-100m diameter circular pipes in the area. The survey was also able to identify new targets further south in the tenement, as well as identifying linear features which have been interpreted as faults (Figure 3).

A more detailed view (Figure 4) of the hyper spectral survey shows the circular nature of the pipes as well as showing other geological elements such as silica alteration, rock types and fault patterns.
Figure 3: Hyper Spectral colour composite image highlighting geological boundaries, some circular features and area of detailed stream geochemical survey program.
Figure 4: Hyper Spectral colour composite image highlighting newly defined Calvert River base metal and gold targets, and the circular nature of these features.

6.2 Geochemical Sampling

Two field trips were conducted to the Calvert River tenement during the year, with the aim of completing a broad scale stream sediment sampling program over the tenement. The second trip also involved a more detailed stream sediment program over areas where the results from the first trip showed anomalies worth investigating. In addition to this, the second trip also focused on soil sampling over some of the pipe features which were differentiated in the hyper spectral remote sensing survey. In total 195 samples were collected, consisting of 121 Stream Sediment Samples, 41 Auger/Soil Samples, 27 Rock Chip Samples and 6 Diamond Samples.

Stream Sediment Sampling

During 2008 a total of 121 stream sediment samples were taken in a broad scale sampling program covering almost the entire Calvert River tenement. In some areas, which known circular pipes occurred, a more detailed stream sampling program was also conducted. The results are attached in Appendix C. The sampling program identified some of the pipe features as being prospective Gold and Base metal targets (Figure 5, Figure 6 and Figure 7).
Figure 5: The Northwest Calvert River region showing Copper results from the stream sediment sampling program.

Figure 6: The Northwest Calvert River region showing Zinc results from the stream sediment sampling program.
Auger/Soil Sampling

A Number of auger lines were run across high priority targets identified using the hyper spectral survey to help confirm the presence of mineralisation. Figure 8 shows elevated values for a number of differing elements plotted against auger sample locations on one of the interpreted breccia pipe structures. The diagram shows an elemental zoning with increased in nickel, cobalt and lead values towards the centre of the circular feature. Gold is relatively depleted in the centre of the pipe like feature and elevated (16-20ppb Au) nearer the margins. This elemental zoning further strengthens the argument for their being a mineralised system beneath the surface.
Figure 8: Soil auger geochemistry results plotted on aerial photography of an interpreted volcanic breccia pipe feature at Calvert River.

Rock Chip Samples
In total 27 Rock Chips were analysed during the year. The majority of these were taken from within the circular features were rocks were found to be outcropping. The results are attached in Appendix C. Samples location is illustrated in Figure 9.
Figure 9: Location of geochemistry samples taken in 2008.
Diamond Samples
Some of the pipes identified in the hyper spectral survey were considered to be possible hosts for diamonds. To test this possibility 6 large (~20kg) samples were collected and sent for analysis at Diamond Recovery Services in Perth. Unfortunately all 6 samples came back negative for diamonds and other trace elements. The location the samples collected is listed below:

<table>
<thead>
<tr>
<th>Date</th>
<th>Sample_id</th>
<th>Northing</th>
<th>Easting</th>
<th>Sample Type</th>
<th>Sample Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/10/2008</td>
<td>1000137B</td>
<td>8167124</td>
<td>790185</td>
<td>Soil</td>
<td>Bucket</td>
<td>Sample taken at N1 circular feature</td>
</tr>
<tr>
<td>8/10/2008</td>
<td>1000138B</td>
<td>8169800</td>
<td>786799</td>
<td>Soil</td>
<td>Bucket</td>
<td>Sample taken at N4 circular feature</td>
</tr>
<tr>
<td>10/10/2008</td>
<td>1000146B</td>
<td>8182550</td>
<td>765271</td>
<td>Soil</td>
<td>Bucket</td>
<td>Sample taken at large 500m feature</td>
</tr>
<tr>
<td>12/10/2008</td>
<td>1000154B</td>
<td>8172799</td>
<td>772569</td>
<td>Soil</td>
<td>Bucket</td>
<td>Sample taken at N2 circular feature</td>
</tr>
<tr>
<td>12/10/2008</td>
<td>1000155B</td>
<td>8168030</td>
<td>790480</td>
<td>Stream</td>
<td>Bucket</td>
<td>Sample taken downstream of N1 feature</td>
</tr>
<tr>
<td>12/10/2008</td>
<td>1000156B</td>
<td>8168087</td>
<td>790464</td>
<td>Stream</td>
<td>Bucket</td>
<td>Sample taken downstream of N1 feature</td>
</tr>
</tbody>
</table>

6.3 Ground Magnetics
Two lines of ground magnetics were done. The first line was at 8182550N over a 500m large wide circular depression (Figure 10). The second lines was completed at 8167150N over a 200m wide circular depression called N1 (Figure 11), identified through the hyper spectral survey as a nontronite anomaly. The lines were later considered useless due to the East-West orientation of the lines. It has been noted that all future ground magnetic surveys should be done with a North-South orientation.
Figure 10: A ground magnetic survey over a large wide circular depression.
Figure 11: A ground magnetic survey over a wide circular depression named N1.
6 EXPLORATION DURING 2009

During Year 3, 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.

7 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 geology interpretation work thoroughly done by Carpentaria Minerals is detailed below.

7.1 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 12).

![Figure 12: 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 13) 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 13: Stratigraphic column and Interpretive Geological History, including stages of known mineralisation.](image-url)
7.2 Exploration Target Models:

The collaboration proposal was to target the following mineralisation models:

**Breccia-pipe hosted copper mineralisation**

![Breccia-pipe model](image)

*Figure 14: Northern EL25397 exploration model; Proterozoic sequence covered terrain.*

**Diamondiferous Kimberlite Pipes**

![Diamondiferous Kimberlite Pipes](image)

*Figure 15: Gravity based diamond exploration model with DIMS evidence.*
Alluvial Diamonds

Figure 16: Reworked Beach Diamond Alluvial Exploration Model (based on Namibian Coastal Model); Calvert River.
During one of the visits to assess access tracks and visit landowners 4 soil and 6 rock chip samples were taken from EL25397. Results and location are in Appendix D. Anomalous copper was returned from 1 sample (750ppm Cu) and high iron from another (~60%). Figure 18 shows the locations and anomalous results.

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 18: Sample Locations, Year 4.
8 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 19).

![Figure 19: 2012 access tracks and drill pads prepared for drilling.](image)
9 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.

Geochemical sampling and drilling was planned on EL25397 for 2012. Unfortunately, the drill program was delayed due to the identification of an endangered species along the main proposed access route. A second access route was chosen but was being found to be impassable due to too many creek crossing.

10 EXPLORATION DURING 2013

No work was done on EL25397 in 2013. EL25397 had 26 blocks voluntary relinquished as a review of a desktop prioritisation exercise.

11 EXPLORATION DURING 2014

No work was done on EL25397 in 2014. EL25397 had 68 blocks voluntary relinquished as a review of a desktop prioritisation exercise.

12 EXPLORATION DURING 2015

No work was done on EL25397 in 2015 and EL25397 expired on the 5th of February 2015.
13 CONCLUSIONS

EL25397 has the potential for a wide range of mineralisation styles. 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. Moreover 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 ranging in diameter from 20m to 500m, some of which occur at the intersection of these growth and transform faults. 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. Carpentaria thinks that they represent excellent base metal targets and they remain untested.

14 CONFIDENTIALITY STATEMENT

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15 REFERENCES


