PARTIAL RELINQUISHMENT REPORT

BLACK PLAIN
(EL 27666)

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Contents

Summary .................................................................................................................................................. 3
1. Introduction ......................................................................................................................................... 4
2. History ............................................................................................................................................... 6
3. Geology ............................................................................................................................................. 9
  3.1 Regional Geology ......................................................................................................................... 9
  3.2 Permit Geology ............................................................................................................................... 12
4. Exploration Objectives and Rationale ............................................................................................... 14
5. Exploration Activities carried out on the Relinquished Area ............................................................. 14
6. Reports lodged during the reporting period ....................................................................................... 17
7. Conclusions ....................................................................................................................................... 17
8. Bibliography ..................................................................................................................................... 19

Figures

Figure 1. Location Map of Relinquished Area ...................................................................................... 4
Figure 2. Topographic Map of Relinquished Area ................................................................................. 5
Figure 3. Relinquished Area & Permit Area Map ................................................................................ 6
Figure 4. Sub-block Map of Relinquished Area ................................................................................... 7
Figure 5. Native Title over the Relinquished Area .............................................................................. 8
Figure 6. Cadastral Map of Relinquished Area ................................................................................... 9
Figure 7. Regional Geology Map of the Relinquished Map ................................................................. 10
Figure 8. Stratigraphic Summary of the Georgina Basin .................................................................... 12
Figure 9. Permit Geology Map of the Relinquished Area .................................................................. 13
Figure 10. Historical Tenements over the Relinquished Area ............................................................. 15
Figure 11. Rock Chip Sample location within the Relinquished Area ............................................... 16

Tables

Table 1. Relinquishment Area Sub-block Identification .......................................................................... 6
Table 2. Historical Reports .................................................................................................................... 15
Summary

Section 94 of the *Mineral Titles Act* requires the submission of a Relinquishment Report prepared by the titleholder for each current Exploration Licence. This Partial Relinquishment Report for EL27666 offers a summary of the activities undertaken on the relinquished area for the life of the permit, including any results produced by those activities.

Natural Resources Exploration (‘NRE’) is the sole titleholder and operator of EL27666. NRE was granted EL27666 on 20 May 2010 for a term of six (6) years. NRE was subsequently granted the approval from the Department of Resources to incorporate this tenure into Group Technical Reporting for the project area known by NRE as its ‘Barkly Project’.

The work and expenditure program for EL27666 consisted of a geological and geophysical review of existing data and information towards determining the location of possible phosphate mineralisation within the tenement as well as any possible diamond and uranium potential. NRE carried out a detailed desktop evaluation but also a detailed on-ground geological assessment of EL27666.

NRE conducted two (2) helicopter assisted reconnaissance programs in relation to its Barkly Project area which included an area covered by this Relinquishment Area. NRE also collected various samples during this activity and engaged in geological mapping of the area.

NRE also attended the Darwin Core Library for the purposes of analysing water bore cuttings available within close proximity to EL27666. These water bores were tested by NRE using a portable XRF and where NRE felt appropriate, also sent some samples to ALS Laboratories for confirmation of initial analysis by portable XRF. There were no water bores located within the relinquished area however NRE tested those water bores within the retained area and surrounding tenements in order to gain a better understanding of the region. NRE also carried out regional phosphate horizon modelling of the Barkly Project.
1. Introduction

Natural Resources Exploration’s (‘NRE’) rationale and objectives for EL27666, more commonly known by NRE as its Black Plain Prospect, considered the evaluation of potential phosphate, uranium and diamond mineralisation within the tenement.

NRE also considered the potential for these forms of mineralisation across a broader area being known as NRE’s ‘Barkly Project’ which lies in the Northern Territory’s Barkly Sub-basin within the central Georgina Basin. This tenure forms part of a number of tenures which make up NRE’s Barkly Project. A number of NRE’s Barkly Project tenements are near proven phosphate prospects at Highland Plains, Alexandria, Alroy and Buchanan Dam.

EL27666 was granted to NRE on 20 May 2010, consisting of a total of 52 sub-blocks. EL27666 is located largely on the flat Mitchell grassed plains of the Barkly Tablelands. The tenure is located entirely within the Neoproterozoic-Palaeozoic Georgina Basin, with a thin veneer of Carpentaria Basin rocks (Jurassic-Cretaceous) overlying the Georgina Basin rocks in some parts. Figure 1 identifies the location of the relinquished area subject of this report.

Figure 1. Location Map of Relinquished Area
The Barkly Tableland is a vast terrain of flat to very gently undulating black soil plains. The variation in elevation from the maximum plain level to the drainage is said to be less than 50 meters (Edgoose, 2003).

The drainage is endoheic and flows to several large, shallow lakes in the centre of the region. On the northern margin of the tableland, topographic definition increases northwards toward the drainage divide with the Gull Fall and its northerly flowing drainage. The tableland’s southern margin is encroached upon by extensive Aeolian sand plains. *Figure 2* shows the topography within relinquished area.

**Figure 2.** Topographic Map of Relinquished Area

NRE’s exploration activities for EL27666 and its Barkly Project have included two (2) helicopter assisted reconnaissance programs, soil sampling, geological mapping and associated rock chip sampling, analysis of water bore cuttings on a regional scale as well as regional phosphate horizon modelling.

Currently, office-based exploration activities continue with results confirming the need for follow up work in relation to the remainder of the tenure and overall Barkly Project.
2. History

EL27666 was granted to NRE for six (6) years commencing on 20 May 2010, as the sole titleholder and operator. NRE has recently nominated to relinquish 13 sub-blocks with the remainder of the permit comprising of 39 sub-blocks. Figure 3 below identifies both the retained permit area and the relinquished permit area.

Figure 3. Relinquished Area & Permit Area Map

The relinquished Sub-blocks subject to this report are as listed in Table 1 below.

Table 1. Relinquishment Area Sub-block Identification

<table>
<thead>
<tr>
<th>Block Identification</th>
<th>Sub-block(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2572</td>
<td>Z</td>
</tr>
<tr>
<td>2573</td>
<td>V,W</td>
</tr>
<tr>
<td>2644</td>
<td>E,K,P,U</td>
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<tr>
<td>2654</td>
<td>A,B,F,G,L,M</td>
</tr>
</tbody>
</table>

Figure 4 below illustrates the blocks and sub-blocks which have been nominated for relinquishment.
Native Title

There is currently one Native Claim over the relinquished area, namely, the Dalmore Downs Claim (DC01/30). Figure 5 shows the Native Title Claim over the relinquished area.
Pastoral Leases

Both the relinquished area and retained permit area are located over surface lands that are comprised primarily of Perpetual Pastoral Leases (Figure 6).
3. Geology

3.1 Regional Geology

EL27666 and its surrounding tenures within the Barkly Project sit centrally within the Georgina Basin, straddling the boundary between the Barkly and Undilla Sub-basins (Figure 7). Together with the Wiso and Daly Basins, which lie to the west and northwest respectively, the Georgina Basin constitutes an extensive (360,000 square kilometres remnant of the NeoProterozoic and Palaeozoic, sedimentary sequence that was originally deposited across an intra-continental platform that covered a large part of central Australia.
The Georgina Basin comprises rocks ranging in age from Neoproterozoic to Devonian and covers an area of approximately 325,000 square kilometres. The Basin is elongated north west to south east and regional magnetic data can be used to infer a north west – south east structural grain with ridge and depression sub-basin topography.

**Stratigraphy and sedimentology**

Shergold and Druce (1980) subdivided the Basin sequence into three tectono-stratigraphic units or “tectotopes”.

- **Tectotope 1** is Neoproterozoic to Early Cambrian in age and consists of glacial, siliciclastic sediments overlain by marine and marginal marine or continental siliciclastic sediments.

- **Tectotope 2** is distributed widely across the Basin, is of Middle Cambrian to Ordovician in age and comprises sequences dominated by carbonates with some early siliciclastic units.

- **Tectotope 3** is Ordovician to Devonian in age, dominated by siliciclastic rocks and occurs only in the south.
The significant phosphate deposits of the Georgina Basin occur in the Middle Cambrian and consequently the relevant part of the stratigraphy belongs to tectotopes 1 and 2. The sedimentology across the Basin is complex and consequently the stratigraphy developed by many people working in specific relatively localised areas includes a plethora of units and stratigraphic names.

As Cook (1989) noted that no single stratigraphic column can be provided for the Georgina Basin. **Figure 8** is an attempt to reconcile localised stratigraphic interpretations for the Early and middle Cambrian, which is most relevant to the discussion of phosphate mineralisation. The following outline of the geological history of the Georgina Basin from Neoproterozoic to Late Cambrian times is taken largely from Cook (1989).

Sedimentation in the Georgina Basin was initiated in the Neoproterozoic in grabens formed by regional north east- south west extension. Tholeiitic basalts and felsic volcanic rocks were emplaced in the centre and north during the earliest Cambrian; these lie unconformably on Proterozoic basement and include the Helens Springs and Peaker Piper Volcanics. Elsewhere, the basal units of the Georgina Basin comprise conglomerates, sandstones, shales and glacial and fluvial sediments (e.g. Mount Birnie, Riversdale and Mount Hendry Formations).

Ongoing extension and subsidence were accompanied by a marine transgression and by the Middle Cambrian, the Basin was covered by a shallow intra-continental sea, rich in marine life. Extensive limestone and dolomitic sequences (e.g. Thorntonia Limestone and Gum Ridge Formation) were deposited. These also contain evidence for shallow, intertidal and highly saline conditions (e.g. algal structures and pseudomorphs of halite and gypsum crystals).

Following a short break in sedimentation, subsidence continued with the deposition of a sequence of siltstone and sandstones around the Basin margins and carbonate shoals in deeper water. Cook (1989) noted that this was a time when the Basin was characterised by a complex interplay of sedimentary environments, ranging from shallow marine, through intertidal and estuarine to lagoonal. It was also the time when the major phosphatic units (e.g. the Beetle Creek and Wonarah Formations and Anthony Lagoon and Burton Beds) and the phosphorites were deposited.
Formation of the phosphatic units of the Georgina Basin was followed by deposition of black organic-rich shales (Inca Formation) in near shore areas and shallow carbonates throughout most of the Basin. Carbonate sedimentation continued until uplift and erosion associated with the Delemarian Orogeny occurred in the Late Cambrian.

Howard (1990) used bore hole and drillhole, aeromagnetic and gravity data to define a phosphatic lithofacies within the Middle Cambrian of the Georgina, Wiso and Day Basins. The phosphatic horizon has an average width of 32 km and a thickness of between 10 and 190 metres. The strike length exceeds 2000 km. The phosphate deposits in the southeast are slightly younger than those found elsewhere. The dominant lithology of the phosphatic lithofacies is siltstone and the phosphatic horizon occurs either at basin margins, adjacent to Proterozoic basement (e.g. in the eastern Undilla sub-basin and Burke River outlier) or above structural basement highs (e.g. Barkly sub-basin).

### 3.2 Permit Geology

The permit / local geology within the area subject of relinquishment consists of units which have been mapped and interpreted across the Alroy, Mt Drummond, Brunette Downs and Ranken 1:250K geological sheets by government geologists. The Alroy, Mt Drummond and Brunette Downs geological sheets have been mapped re-mapped as recently as 2011.
Ranken 1:250K geological sheet was last updated in 2005. Within the Barkly Project, lithologies have been interpreted as belonging largely to the Barkly Group. The permit geology is illustrated in **Figure 9**.

**Figure 9. Permit Geology Map of the Relinquished Area**

The Barkly Tableland coincides closely with the north-central and northern parts of the Neoproterozoic to Palaeozoic Georgina Basin. Exposures of the basinal sediments in the area are rare, but where present, are typically composed of weakly deformed middle Cambrian carbonate sedimentary rocks. Locally overlying the Palaeozoic rocks are thin deposits of flat lying late Palaeogene limestone. Thin deposits of Cretaceous marine sediments also locally occur in the northern margin of the Barkly Tableland.

The Barkly Group is only limitedly exposes through the Barkly Project where centrally located licences appear to have more Barkly Group exposer than those licences to the west and east.
4. **Exploration Objectives and Rationale**

The objective of NRE’s exploration program on EL27666 and adjoining tenures is to consider and evaluate the potential for phosphate, uranium and diamond mineralisation in the region. The project was also considered for other targets such as uranium and diamonds during the early phases of exploration. Investigations were primarily aimed towards locating any outcropping of mineralisation and any indicators of possible subsurface mineralisation across the project area.

5. **Exploration Activities carried out on the Relinquished Area**

NRE’s exploration activities during the term of the permit and in particular, of the relinquished area, consisted of both office-based and field activities. An initial regional assessment of the areas within NRE’s Barkly Project for phosphate and other commodities was conducted during the initial term.

The targets areas were identified based on desktop research of regional geological and geophysical data, augmented with compilation and assessment of all previous exploration results. The aim of work has been to carry out a field assessment of the prospects in order to identify target characteristics and define the next phase of exploration.

An array of material was assessed prior to field work, to assist with optimal target generation. This material included an extensive review of historic exploration conducted over the relinquished area. There has been a number of previous exploration tenements over the subject relinquished area (**Figure 10** below).
Figure 10. Historical Tenements over the Relinquished Area

There has been exploration for a variety of commodities across the relinquished area targeting phosphate and diamond exploration with some uranium exploration. The Barkly region was part of the Australian Diamond Exploration Joint Venture regional programme to search for kimberlitic pipes. Results varied across the region with microdiamonds recovered, and intrusive pipes located. Recent exploration has favoured base metal mineralisation. A list of the previous exploration reports in relation to the relinquished area is shown in Table 2 below.

Table 2. Historical Reports

<table>
<thead>
<tr>
<th>TENURE</th>
<th>PERIOD</th>
<th>COMPANY REPORTS</th>
<th>COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 22982</td>
<td>2002-2003</td>
<td>CR2004-0044</td>
<td>De Beers Exploration</td>
</tr>
<tr>
<td>EL 3536</td>
<td>1982-1988</td>
<td>CR1983-0151</td>
<td>CRA Exploration</td>
</tr>
<tr>
<td>AP 1801</td>
<td>1967-1968</td>
<td>CR1968-0030</td>
<td>IMC Development</td>
</tr>
</tbody>
</table>
NRE completed two (2) reconnaissance helicopter assisted field trips of the Barkly Project, one in July 2010 and the other in October 2010. NRE introduced themselves to local landholders, assessed a number of field targets across the tenement and carried out geological mapping of the project area. The field trips proved successful in evaluating the tenements in the most effective and timely manner possible.

Geological characteristics were recorded at each site and bulk surface samples were collected. Two (2) samples were collected from within the relinquished area. Figure 11 below identifies the location of these samples. Appendix I contains the full assay results.

Figure 11. Rock Chip Sample location within the Relinquished Area

NRE also engaged Terra Search Pty. Ltd. to attend the Northern Territory’s Darwin Core Facility to analyse a number of cuttings available from historically drilled water bores within its project areas. There were no water bores located within the relinquished area however NRE tested those water bores within the retained area and surrounding tenements in order to gain a better understanding of the region.

NRE lodged an Exploration Report with the Northern Territory Department of Resources’ Geoscience Division on 7 June 2011. This report was required in respect of the XRF assaying
of water bore chips at the Darwin Core Facility. The Exploration Report was titled ‘XRF & ALS Assaying of Water Bore Chips – Core Facility: Darwin’.

NRE also engaged specialists to conduct a study into the phosphate potential of the Barkly region and to prepare a model of NRE’s tenements speculating the depth and extent of the phosphate horizon. The aims of the study were to:

- Integrate and collate all available geological, geophysical and drill and bore hole data and thereby characterise the stratigraphic relationships pertaining to phosphate mineralisation;
- Establish the sedimentological and structural controls constraining phosphate deposition;
- Use the sedimentological, stratigraphic and structural models to assess the phosphate potential of the areas held by NRE.
- Develop a proposal for a limited drilling program to better constrain prospective targets within NRE’s tenements.

Available geological information, subsurface drill and bore hole information and geophysical data including airborne magnetics, gravity and radiometrics was collated for the Barkly Project and evaluated in the context of published models for the formation of phosphate in shallow marine shelf environments.

6. **Reports lodged during the reporting period**

NRE lodged an Exploration Report with the Northern Territory Department of Resources’ Geoscience Division on 7 June, 2011. This report was required in respect of the XRF and ALS Assaying of Water Bore Chips at the Darwin Core Facility. The Exploration Report was titled ‘XRF & ALS Assaying of Water Bore Chips – Core Facility: Darwin’.

NRE also lodged its Year 2 Group Annual Technical Report with the Northern Territory Department of Resources on 19 July 2012, the report of which covered a number of tenures forming NRE’s ‘Barkly Project’.

7. **Conclusions**

Natural Resources Exploration’s exploration activities focused on delineating surface targets within the relinquished area with the aim of identifying any phosphate, uranium and diamond mineralisation in the region.
NRE conducted both office-based studies and field operations on EL27666 during the term of this tenure. NRE carried out a detailed geological assessment of the relinquished area which included considerable research prior to two (2) helicopter reconnaissance programs evaluating the area. Research included review and compilation of the data in the Northern Territory Geological Services’ (NTGS) open file reports, air photo imagery and examination of the latest geological maps.

During NRE’s helicopter reconnaissance programs over the area, NRE targeted areas for ground evaluation on the basis of previous geophysical surveys, in particular aeromagnetics and radiometrics. Sites were tested using a scintillometer and by the taking of soil and rock samples. Geological observations were also recorded at each site. NRE also carried out XRF analysis of water bore cuttings across the broader area known as NRE’s ‘Barkly Project’, held at the Darwin Core Library and regional phosphate horizon modelling.

NRE has been able to successfully analyse the work conducted in the first term and integrate and collate the results of the specialised phosphate study with all available geological, geophysical and drill and bore hole data and was able to characterise the stratigraphic relationships pertaining to phosphate mineralisation to identify the most prospective areas within its Barkly Project tenures.

In relation to the relinquished area, NRE has concluded that the potential for mineralisation within this area is much lower than the remaining tenement area. NRE has delineated this area and nominated same after its extensive review of all previous exploration data and its newly acquired data in relation to this ground.
8. Bibliography


Note these (and many more) references are also located in the References section of the Mt Drummond 1:250,000 geological map series explanatory notes.
Appendix I

Rock Chip XRF Assay Results