TOBERMORY PROJECT

PARTIAL RELINQUISHMENT REPORT
FOR
EXPLORATION LICENCE
EL26928

TOBERMORY

For the period ending 29th July 2011

August 2011

A Chai
SUMMARY

This partial relinquishment report details exploration and project activities completed on the relinquished sub-blocks of Exploration License EL26928.

The Tobermory Project is located on the southern edge of the Georgina Basin, a large Late Proterozoic to Palaeozoic sedimentary intracratonic basin, covering a large part of eastern Northern Territory and extending into northwest Queensland. The tenure was acquired for its potential to host rock phosphate and uranium and base metal mineralisation.

In 2008 Australis was a wholly owned subsidiary of Mineral Securities Ltd (Minsec) which in turn was owned by CopperCo Ltd (CopperCo). CopperCo fell into receivership in November 2008, its assets were finally sold to Cape Lambert Iron Ore (now Cape Lambert Resources Limited) in June 2009. Australis Exploration is now a wholly owned subsidiary of Cape Lambert Resources Limited (Cape Lambert).
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1.0 INTRODUCTION

EL26928 is one of a package of tenements that Australis Exploration Limited (Australis) has in Queensland and the Northern Territory. Australis was a wholly owned subsidiary of Mineral Securities Operations Limited (Minsec) A. C. N. 077 507 521, which merged with CopperCo Limited (“CUO”) in 2008. CUO subsequently entered administration and receivership in November 2008. Cape Lambert Resources purchased the project in June 2009. The tenure is given in Figure 3 with the entire project shown in Figure 5.

The tenure is located in the Barkly Tableland region within the Tennant Creek Mineral Field of the Northern Territory. The tenure was acquired for its potential to host phosphate mineralisation.

**FIGURE 1: LOCATION OF THE GEORGINA BASIN**
1.1 TENURE

The tenure is located on the southern edge of the Georgina Basin within the Tobermorey (SF52-12) 1: 250 000 Geological sheet. Figure 2 showing the relinquished and retained sub blocks and Figure 3 shows the tenure location. Tenure detailed Table 1, 2 and 3.

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<th>Date Granted</th>
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1.2 DETAILS OF SUB BLOCKS

The tenure was of comprised of 318 sub-blocks as detailed in Table 2:

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</tr>
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<td>V</td>
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</tr>
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**Total Sub-block relinquished 159**
1.3 LOCATION, TOPOGRAPHY, CLIMATE AND VEGETATION

The tenure is located on the southern edge of the Georgina Basin some 404 km north-east of Alice Spring and 440km south-east of Tennant Creek and immediately west of the NT-QLD border and vermin proof fence. The tenure is accessed via the Plenty Highway which cuts through the tenement. The Plenty Highway stretches from Boulia in Western Queensland to Alice Springs a distance of 498km and is largely unsealed. The Tobermorey Pastoral Station is located on the north-eastern edge of the tenure with access within the tenure via station and exploration tracks. Currently the Tobermorey Homestead is uninhabited.

The project is located on the northern edge of the Simpson Desert and is characterised by plains and rolling hills with an elevation of 180m in the south-eastern corner to 210m RL in the north-west with minor relief provided by the Tarlton and Toko Ranges to the south.

The climate is arid with hot summers (24-39°C) and mild winters (9-24°C) with 300-400mm of rain falling principally within the summer months.

Vegetation is predominantly Triodia grassland and Acacia tall open-shrub land with occasional large Bluebush (*Chenopodium auricolum*) swamps.

*Figure 4: Typical Acacias around Tarlton Downs*
FIGURE 5: AUSTRALIS PROJECT LOCATION
2.0 REGIONAL GEOLOGY

The tenement is located on the southern edge of the Georgina Basin, a large Late Proterozoic to Palaeozoic sedimentary intracratonic basin, covering a large part of eastern Northern Territory and extending into northwest Queensland. The tenure was acquired for its potential to host rock phosphate and uranium mineralisation. Basement consists of Mesoproterozoic sediments and minor Neoproterozoic sediments, succeeded by marine carbonate and clastic deposits, which accumulated in Cambrian and Ordovician times, overlain by non-marine Silurian to Early Carboniferous successions. The Georgina Basin is bounded by the South Nicholson and McArthur Basins on the north, Tennant Inlier on the west and Arunta Province on the south, and continues eastward into western Queensland to abut the Mt Isa Block. By Middle Cambrian (possibly extending into the Late Cambrian), marine conditions prevailed in the basin and phosphogenesis was widespread with deposits forming in restricted embayments.

Within the Tobermorey area several kilometers of Cambro-Ordovician platform sediments of the Southern Georgina Basin blanket the basement continental block referred to as the Altjawarra Block.

Economic phosphate deposits in Middle Cambrian Georgina Basin are being mined at Incitec-Pivot’s (ex WMC) Phosphate Hill, Duchess Mine in Queensland. The Duchess Mine produces 648,000t of di-ammonium phosphate (“DAP”) and 236,000t of mono-ammonium phosphate (“MAP”) from 2Mt of phosphate rock mined annually from a deposit containing a total resource of 131Mt @ 23.5% P₂O₅.

The Georgina Basin, together with the Wiso, Daly, Amadeus and Ngalia basins, form remnants of the stratigraphically continuous Centralian Superbasin that extended over most of central Australia from the Neoproterozoic to Palaeozoic. Structural dismemberment of the Superbasin during Palaeozoic intraplate orogenic events (400–300 Ma Alice Springs Orogeny) has resulted in the exposure of Palaeoproterozoic to Mesoproterozoic basement between basin fragments in their current configuration (Khan, Ferenczi, Ahmad and Kruse, 2007).

The Georgina Basin is the largest of the intracratonic Neoproterozoic to Palaeozoic basins. It covers a large part of eastern Northern Territory and extending into northwest Queensland, for a total area of about 325,000 km², of which 185,000 km² lies within the Northern Territory. Downfaulted blocks and half-grabens typically contain up to 1.5 km of Neoproterozoic sedimentary rocks. Up to 2.2 km of overlying Palaeozoic succession is preserved in depocentres and synclines. Cambrian platform carbonate rocks dominate the basin fill. Accompanying sandstone and shale were deposited during relative uplift and subsidence, respectively. The Cambrian–Ordovician succession is most complete in the southern portion of the basin. In contrast, the central region contains only a relatively thin Middle Cambrian succession (Khan, Ferenczi, Ahmad and Kruse, 2007).

Basement rocks consist of Mesoproterozoic and minor Neoproterozoic sediments, characterised by shallow marine epicontinental successions of carbonate and marine clastic rocks, evaporite, and fluvial and lacustrine continental sandstone, glaciogenic sediments, shale and siltstone. These sediments were succeeded by marine carbonate and clastic deposits, which accumulated in Cambrian and Ordovician times. Younger, non-marine Silurian to Early Carboniferous successions are restricted in areal extent. In addition, extensive sub-aerial flood basalt (Peaker Piker Volcanics and Antrim Plateau Volcanics) of Early Cambrian age (540 Ma) floor these basins in much of the northern part of the Northern Territory. The volcanics are amygdaloidal and porphyritic tholeiitic basalts and have associated dolerites (McCrow, 2009; Gifford, 2006; Khan, Ferenczi, Ahmad and Kruse, 2007).
The Georgina Basin is bounded by the South Nicholson and McArthur Basins on the north (Figure 6), Tennant Inlier on the west and Arunta Province on the south, and continues eastward into western Queensland to abut the Mt Isa Block (Figure 6). It has been subdivided into several sub-basins that primarily reflect the thickness of Cambrian deposition (Khan, Ferenczi, Ahmad and Kruse, 2007).

In the northern part of the project area, the central Georgina Basin contains a relatively thin stratigraphic succession, up to 450m thick, deposited on a tectonically quiescent platform. Deposition commenced with a marine transgression in the early Middle Cambrian and may have extended into the Late Cambrian (McCrow, 2008). This central platform has been subdivided into an eastern Undilla Sub-basin and a western Barkly Sub-basin, separated by a NNE – SSW striking structural ridge known as the Alexandria-Wonarah Basement High (McCrow, 2008, Gifford, 2006). In the northern tenements, this structural ridge outcrops as two north-east trending Precambrian basement highs as inliers within Georgina Basin sediments, with the Buchanan-Alroy-Alexandria phosphate occurrences occurring nearby. The Mittiebah Range forms the northern Pre-Cambrian inlier, the western end extending into EL26701, while the southern Pre-Cambrian inlier, south of Alexandria homestead and phosphate occurrence, outcrops in the north-east part of EL26310.

By Middle Cambrian, marine conditions prevailed in the basin and phosphogenesis was widespread (McCrow, 2008). The Middle Cambrian succession has been subdivided into two depositional sequences with three discrete phosphogenic episodes. Sequence 1 (early Middle Cambrian) comprises terrigenous siliciclastic rocks, peritidal and shelf carbonate rocks, carbonaceous shale and phosphatic carbonate rocks; sequence 2 (remainder of Middle Cambrian) comprises siliciclastic and carbonate rocks, phosphorite and phosphatic limestone, and carbonaceous shale. Major phosphate deposits are apparently in sequence 2, including the Wonarah, Alexandria and Alroy deposits in the Northern Territory. All three appear to be hosted in the Wonarah Formation, although others have assigned the Wonarah deposit to the Gum Ridge Formation (sequence 1) (Khan, Ferenczi, Ahmad and Kruse, 2007). There have been efforts to correlate sedimentary horizons from one area to another but this has been difficult to achieve, other than in the broadest terms, due to rapid lateral facies changes (McCrow, 2008).

![Figure 6: Simplified geology of the Georgina, Wiso and Daly basins showing the distribution of phosphorite facies depocentres and major phosphate deposits. Source: Khan, M, Ferenczi, PA, Ahmad, M and Kruse, PD (2007)](image-url)
2.1 PROJECT GEOLOGY

The tenement area is underlain principally by Cambro-Ordovician Nimaroo Formation which is overlain by Tertiary Austral Downs Formation and recent sand, silt and mangano-ferricrete. The Nimaroo Formation is composed of Dolstone, limestone and minor quartz sandstone. The Austral Downs Formation represents a former lake sediments which has been extensively silicified to create abundant chalcedony forming resistant caps on hills, the “Chalcedonic Hills” are located south-west of the tenure. The geological legend is given in Appendix 1, the project geology is given in Figure 8 and is taken from the NTGS 1: 250 000 Tobermorey sheet.

The prominent Toko Syncline lies immediately south of the Tenure and is shown in Figure 8. The Toko syncline has been a target for both oil and gas exploration. There are numerous oil/gas shows in or adjacent to the Toko Syncline. Figure 9 represents a stratigraphic succession in the Southern Georgina Basin with the Toko Syncline representing lithologies within the project area, derived primarily from petroleum well drilling. This stratigraphic column indicates that the Nimaroo Formation which is prevalent within the license is therefore Late Cambrian to Early Ordovician. The Arthur Creek Formation which is the target lithology for rock phosphate exploration within the southern edges of the Georgina Basin is at depths of around 1000m (see Owen 2 in 3.0) and unlikely
to outcrop in the target area. The prospectivity of this tenement for phosphate is therefore downgraded.

Figure 8: Project Geology

Figure 9: Basement Tectonic Elements- (NTGS-AGES Symposium-2001)
Figure 10: Stratigraphic Column South Georgina Basin (NTGS-AGES Symposium-2001)
3.0 COMPILATION OF HISTORICAL COMPANY REPORTS

The majority of historical hard rock exploration within EL26928 has been carried out for diamond exploration whilst the ground immediately east of the eastern boundary of the tenure has been the subject of Petroleum based exploration. Exploration by 2 companies has been carried out within/abutting EL26928. This is summarised below:

Petroleum Report-1990-0086-Pacific Oil and Gas Limited -1990

Pacific Oil and Gas Limited (POIG) drilled two stratigraphic wells Owen 1 and Owen 2 immediately east of EL26928. The wells were located north of the Toko Syncline and south-west of an interpreted lineament (GM1) defined by gravity and magnetics. GM1 was believed to represent a basement feature which influenced sedimentation during the early to middle Cambrian within the Georgina Basin. These sediments are potential hosts for petroleum. The holes were drilled to target the Thorntonian Limestone. However Owen 1 was abandoned due to the rod string becoming stuck at 135.3m. The well was abandoned and re-drilled 25m north-east at Owen 2. Bituminous shows were evident within the lower Arthur Creek Formation and the Upper Thorntonian Limestone (Middle Cambrian in Age). The drilling confirmed the Stratigraphy detailed in Figure 10 and confirmed the importance of the Middle Cambrian sediments as petroleum hosts. Figures 11-12 detail graphic logs of the two wells.
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<th>CALCIMETRY (%)</th>
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<tr>
<td>LATE CAMBRIAN TO</td>
<td>NINMAROO FM.</td>
<td></td>
<td></td>
<td></td>
<td>Moderate reddish-brown,</td>
</tr>
<tr>
<td>EARLY ORDOVICIAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>very argillaceous silty to very fine sandy silt.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>White to very light grey, silty to very fine sandy LIMESTONE, non-calcareous to slightly dolomitic.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Dark yellowish-brown, very silty, dispersed CLAY.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yellowish-brown to yellowish-brown, very fine to fine grained SAND, with occasional medium to coarse grains. Minor DOLomite and DOLomitic.</td>
</tr>
<tr>
<td>TD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pale to dark yellowish-orange, very fine grained DOLomite. Nannoplankton, eutriplaid, no visible porosity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Thinly interbedded light to medium flinty-grey, microcrystalline to very fine grained LIMESTONE and very fine to fine SAND. Minor to dark yellowish-orange micritic RUTBSTONE.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>SAND with minor DOLomite and DOLomitic, as above.</td>
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<tr>
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<td></td>
<td></td>
<td>Pale to moderate yellowish-orange, very fine grained calcareous SAND.</td>
</tr>
</tbody>
</table>

**KEY TO CALCIMETRY**

- LIMESTONE
- DOLOMITE
- ACID INSOLUBLES

*Figure 11: Owen 1-Graphic Log*
Elkedra Diamonds NL (Elkedra) carried out diamond exploration and some manganese exploration in and around the current tenement EL26928 between 2001 and 2005 on EL22535 which formed part of their Altjawarra Project Area.

Elkedra carried out airborne and ground magnetics, photo-interpretation, RAB Drilling (8 holes for 343m), RC drilling (9 holes for 514m), 195 soil samples, 87 stream samples and 16 rock chip samples and termite mound sampling. In addition helicopter reconnaissance was conducted for manganese exploration. Details of the manganese exploration however are missing from the report. No
significant results were achieved within this exploration and the ground was relinquished. A summary of this exploration relevant to EL26928 is given in Figure 13 which summarises geochemical analysis for P. No significant results were returned for phosphate or uranium. Figure 14 details stream samples with Mn in ppm draining mangano-ferricrete with a maximum Mn value 774ppm, which is not significant.

Figure 13: Historical Exploration carried out by Elkedra Diamonds NL- 2001-2005 within EL26928
3.1 PHOSPHATE EXPLORATION AND OCCURRENCES

Rock phosphate market research into global demand and production, sale prices for the different grades, and operating cost pricing was undertaken (Appendix 3). This investigation involved studying open file research reports and discussions with research analysts in the phosphate and sulphur industry.

While prices for high grade rock phosphate were at an all-time high in 2008, peaking to US$400 per tonne, they subsequently fell to between US$100 and US$120 in early 2009. There is however general consensus that the prices will improve over the next few years and for a sustained rock phosphate sale price of US$150 per tonne (worst case US$100, best case US$200 per tonne).

Operating costs in the order of AUD$125 per tonne for mining have been estimated recently by Krucible Metals (ASX release dated 8th April 2010).
3.2 GEOPHYSICAL INTERPRETATION

Consultant Resource Potentials was contracted to carry out processing of all available geophysical data sets and provide targets for further exploration. A report detailing this work is given in Appendix 2. The report is presented in part only as the report also covered areas to the north of EL26928 which are not part of this report.

The report concluded that the tenement has little opportunity for phosphate development as the Arthur Creek Formation (prospective for rock phosphate) is not located within the tenure. See 3.0 and the stratigraphic log of Owen 2 which indicates a depth of some 1000m to the Arthur Creek Formation. Magnetic and gravity data confirm this.

Elevated uranium responses are evident from the radiometrics however geochemical sampling by Elkedra and others failed to find any significant uranium responses. Resource Potentials believes the tenement is prospective for manganese along a regional structure striking south-east through the southern half of the tenement, however historic stream sampling has failed to provide any evidence of anomalism. Elkedra carried out a helicopter reconnaissance of mangano-ferricrete however this section is missing from their reports.

3.3 PROSPECTIVITY AND VALUATION

Consultant Ravensgate was contracted to carry out a prospectivity and valuation on the Australis Project. A report detailing this work is given in Appendix 2. The report is presented in part only as the report also covered areas to the north of EL26928 which are not part of this report.

The report concluded that the Tobermory Project area is considered to have a low prospectivity for phosphate deposits due to the following:

- Much of the area lies within the deeper portions of the Georgina Basin in less favourable facies for phosphate deposition.
- Any mid Cambrian prospective shallow marine carbonate facies horizons are likely to be at depths that are uneconomic to explore or to mine.
- The project area is distal to the Georgina Basin margin and no basement highs are evident from geophysical data or available geologic mapping.

The potential for base metals deposits is considerate to be moderate. There are not outcropping Proterozoic age rocks within EL26928. However Proterozoic aged rocks are interpreted to form the basement below the Palaeozoic to recent cover. A prominent northwest striking magnetic and gravity linear feature may be worthy of follow up. The depth of cover needs to be determined before any further work is undertaken, but likely to be greater than 100 metres.

For uranium potential, the area represents a continuation of the anomalous radiometric signature covering palaeochannels in the NW area of the Glenormiston Project. Similar surface geology is noted. Anomalous uranium is associated with the Austral Downs Limestone. Further field checking with hand-held scintillometer and regional sampling is recommended over anomalous uranium areas.
4.0 CONCLUSIONS

The consultant reports determined that the western portion of the tenure has the least prospectivity with respect to phosphate and uranium. This area was therefore relinquished.

5.0 REFERENCES


Howard, PF 1990 The distribution of phosphatic facies in the Georgina, Wiso and Daly River Basins, Northern Australia. GEOLOGICAL SOCIETY OF LONDON, SPECIAL PUBLICATIONS; 1990; v. 52; p. 261-272.


NTGS Various Open File Reports


## GEOLOGICAL LEGEND

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**Note:** This table contains the geological legend used for the map. Each code corresponds to a specific geological feature or material. For a complete understanding, refer to the map provided in the document.
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<td>RAVENSGATE-PROSPECTIVITY ASSESSMENT AND VALUATION- JUNE 2010 (EXTRACT ONLY)</td>
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AUSTRALIS EXPLORATION PTY LTD

Northern Territory Tenements:
Geophysical Data Compilation, Processing and Target Generation.

Report No: RP-100515-01
Author: M. Cooper Date: May 2010
Distribution: Kim Bischoff General Manager – Exploration

Original + digital copy

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Resource Potentials were engaged by Australis Exploration Pty Ltd to carry out geophysical data compilation, processing and target generation for rock phosphate, uranium and base metal mineralisation over their Northern Territory tenements from available government and company open
file geophysical datasets. The project covers approximately 25,000sqkm and consists of 15 tenements of which 14 are granted, located in the north east of the Northern Territory, close to the Queensland border.

The tenements cover the central northern region of the Georgina Basin which contains all of the large known phosphate deposits in the north east Northern Territory including Wonarah, Arrawurra, and Highland Plains. The tenements are underlain by Proterozoic sedimentary and volcanic rocks which may also be prospective for base metals and IOCG mineralisation, in addition to phosphate.

The geophysical data coverage is very good over the area with regional to semi-regional government aeromagnetics, radiometrics, gravity, landsat and aster datasets available. The geophysical datasets were compiled, processed and reviewed to determine if a characteristic signature could be detected from known mineralisation, which could then be used as a targeting tool over the tenements. It was found that with the exception of Highland Plains which has a discrete radiometric signature, no other major phosphate occurrences within the central northern region of the Georgina Basin appear to be directly associated a radiometric response. However there are elevated uranium responses within the vicinity (1km) of Alroy.

The tenements have been grouped into 3 sub-projects (North, Central, South) based on their location for the purposes of this exercise.

The Northern project is considered highly prospective for shallow phosphate mineralisation within the outcropping Wonarah Formation and likely extensions of this unit beneath recent cover sediments to the west of the project. Ten target areas which display some elevated uranium anomalism have been selected for priority follow up work, however there remains a number of additional outcrops of Wonarah Formation which should also be systematically sampled for phosphate mineralisation.

Two areas considered anomalous and prospective for base metal mineralisation located in the north of EL26314 and the west of EL26312 have also been selected. The target area within EL26314 is considered to be relatively shallow (200m depth) whereas the target within EL26312 appears quite deep (400m-500m), however modeling of the data is required to validate this.
EXECUTIVE SUMMARY

Some potential for Clinton Style Oolitic iron occurrences may also exist in EL26311, where the outcropping South Nicholson Playford Sandstone contains hematitic siltstones to ironstones. This area should be mapped and sampled to confirm.

The Central project is considered highly prospective for shallow phosphate mineralisation within the western tenements EL26310, EL26702 and EL26309. Wonarah Formation is likely present in the other tenements but at depths not currently considered economic as highlighted in drill hole NTGS01/1. There is some potential for base metals as Phosphate Australia mentioned in their prospectus that Minoil Services Pty Ltd 3m intersected a 3m band of “dark shale” that returned Cu-1500ppm, Pb-8000ppm and Zn-8000ppm and 17% Mn within the Alroy area. As such review of previous explorer’s reports should be undertaken to confirm the potential for SEDEX and manganese mineralisation within the project.

The Southern project has limited prospectivity for manganese mineralisation, as indicated by a number of reportedly stratiform manganese occurrences which are located immediately to the west of the project and are interpreted to be controlled by regional structures evident in the magnetic data which extend into the project. This could be confirmed through completing geological mapping and sampling focussed over the interpreted structural corridor, plus reconnaissance of a mapped manganocrete in the north east of the project tenement.

There remains small potential for uranium mineralisation, within the Austral Downs Limestone or palaeochannels, which could be quickly verified through field checking of stronger uranium responses with a spectrometer to determine the grade and extent of mineralisation.

The project tenement is not considered prospective for phosphate mineralisation due to the perceived depth to the phosphatic host sediments indicated by the mapped geology and geophysical responses, which indicate considerable thickness of younger, overlying sediments cover the area.

Target areas have been defined for each project area along with recommendations for follow up work.

It is believed that the compilation, purchase and processing of geophysical datasets has been successful in providing new information and imagery that has been used to generate target areas prospective for rock phosphate, base metals and uranium.

This report presents a summary of the data compilation, processing and target selection over Australis Exploration Pty Ltd, Northern Territory Projects.
The scope of the work undertaken for this project incorporated:

- Compilation of the available government geophysical survey data over the project area;
- Windowing, merging and processing of the geophysical and satellite data to highlight mineralogy, geology and controlling structures;
- Generation of a suite of imagery to assist in the delineation of target areas for Phosphate, Uranium and Base Metal mineralisation;
- Compile target areas for above commodities within the tenement areas;
- Provide the processed imagery and targets in suitable digital format for incorporation by Australis Exploration Pty Ltd into their GIS software package for interrogation and statutory reporting requirements.

3  PROJECT AREA

3.1  Location

The project area is located in the north east of the Northern Territory near the Queensland border and covers the central region of the Georgina Basin, figure 1. The project area consists of 15 tenements which cover an approximate area of 25,000 sqkm.

As the project covers a vast area the physiography varies greatly. However, it generally consists of open, grassy, clay rich soil plains, which are flat to gently undulating and are within the range of 200m-240m in elevation. To the south the area is dominated by undulating peneplain/sandplain with dunal systems developed. In the north and north east there are more prominent ridges and deeply incised plateaus where more resistant sandstone lithologies are abundant. tropical savannah grasslands, black soil plains and relatively flat alluvial plains. Some areas have more undulating terrain with low rocky outcrops and hills in others. The annual average rainfall is about 250-350mm, but can vary greatly from year to year, depending on the magnitude of the tropical influence. Stream and drainage channels are typically incised up to 1-2m into the alluvial plains.

3.2  Geology

Geology within the project area has been derived from the published 1:250,000 map sheets, figure 2. A full description of the geology is not provided here, however the project area has good outcrop towards the margins of the Georgina Basin in the north east where it abuts the South Nicholson Basin.
2  SCOPE OF STUDY

Elsewhere outcrop is variable and large portions of the project area are covered by recent tertiary alluvium and colluvium.

Figure 1: Project Location map. Australis NT Tenement outlines in red, Queensland Tenements in black. Outline of Georgina Basin = Dashed Brown line.
Figure 2: Project Geology map. Australis NT Tenement outlines in red, Queensland Tenements in black. Outline of Georgina Basin = Dashed Brown line.
4.1 Airborne Magnetic and Radiometric Data

The project area has been covered by good quality regional aeromagnetic surveys flown by Geoscience Australia (GA) and the Northern Territory Geological Survey (NTGS) generally with a 400m-500m line spacing. The aeromagnetic data was obtained from Geoscience Australia’s Data Delivery System (GADDS) and the NTGS. The aeromagnetic survey coverage is shown as figure 3.

Figure 3: Aeromagnetic Survey Coverage Map.
4.2 Gravity Data

Gravity data consisted of regional surveys from GA and the NTGS. The data was collected on variable station spacings ranging from approximately 10km x 10km to 4km x 4km centres. The data was obtained from Geoscience Australia’s Data Delivery System (GADDs) and supplied corrected to a bouguer density of 2.67g/cc.

Figure 4: Gravity Survey Coverage Map.

4.3 Satellite Data

Landsat 7 ETM+ data were obtained over the entire project area. The Landsat data was obtained from the NTGS and GA. The Landsat consisted of two images showing and aerial photo equivalent and a two composite false colour images. Aster data is available from the NTGS, however it does not provide full coverage. Due to the estimated time it would take to fully compile and process the available scenes over the project area, and considering that no discrete response was found attributable to phosphate mineralisation over the known Queensland occurrences examined within report RP-100315-1, the Aster data has not been used here.

Landsat 7 ETM+ is a thematic mapping instrument that records 7 bands of spectral radiation from visible to short wave infrared (SWIR) and thermal infrared (TIR). Spectral responses from different band can be processed to determine lithological and mineral assemblages and assist in geological mapping and area assessment. Landsat 7 ETM+ data resolution ranges from 15m for the panchromatic band to 90m for the SWIR band 7. Aster data measures the same spectral radiation as Landsat, but with higher discrimination achieved through recording over 14 spectral bands as shown in figure 5 below. Aster has a spatial resolution similar to Landsat with 15m for the VNIR out to 90m for the TIR.
Figure 5: Spectral window comparison for Landsat and Aster.

Shuttle Radar Topography Mission (SRTM) data was obtained over the entire project area and surrounds. SRTM provides high resolution elevation data of the entire globe and is accurate to approximately 10m vertically and 90m horizontally.

5 DATA PROCESSING AND IMAGE GENERATION

5.1 Airborne Magnetic and Radiometric Data

All airborne magnetic and radiometric data were provided or obtained as levelled or finally corrected gridded datasets. The gridded datasets were re-merged at the optimal resolution to provide higher quality final image products. The merged datasets were processed to highlight and better define controlling structures, local lithological variations and anomalous features. Data processing of the magnetic data included calculation of the first vertical and second vertical derivatives, automatic gain control filtering, analytic signal and reduction to the pole and are explained further below;

The first vertical derivative (1VD) is theoretically the rate of change of the magnetic field with increasing height. In practice it has two desirable effects. Firstly it tends to sharpen and separate magnetic anomalies. Secondly it makes the mean background level of the data equal to zero. The second vertical derivative (2VD) is essentially completing the first vertical derivative on the data twice, and is the rate of change of the rate of change of the magnetic field with increasing height. It sharpens and separates anomalies even further and is also symmetric about zero.
Automatic gain control (AGC) was performed on the vertical derivatives in order to enhance magnetic features within the dataset. It is a process whereby magnetic anomalies or features within a dataset are all reduced to similar amplitudes. This is very useful for extracting fine detail from datasets that are otherwise dominated by one or two high amplitude features, as is sometimes the case where magnetite bodies are present.

Analytic signal (AS) processing converts negative portions of magnetic response to be positive, which can be helpful where remnant magnetization is present. Mathematically it is the square root of the sum of the square of each derivative of the magnetic field in its three principal directions (X,Y,Z).

Reduction to the pole (RTP) is the correcting of the magnetic field for the inclination of the earth’s magnetising field in the survey area. It theoretically removes dipolar lows in strongly magnetic bodies and places the positive highs directly over the magnetic bodies. In practice it can result in artifacts, particularly if remanent magnetization is present, however it is recommended that it is always performed on all datasets as it assists in more accurately locating drill targets.

The radiometric data highlights signatures that can be related to surficial cover, regolith and outcrop. The merged radiometric grids were separated into individual radioelement Potassium (K), Thorium (Th) and Uranium (U). Apart from highlighting abundances of the specific radioelements, composites and ratios can delineate lithological variability and further refine anomalous responses. The best image for making geological assessment and interpretation is the Ternary Image which displays Potassium in Red, Thorium in green and Uranium in blue. High responses within individual radio-elements are displayed in their primary colour, and different concentrations of radio-elements are displayed as a combination of the primary colour. Black or very dark areas occur where there is no radioactive response and can occur over silica rich rock or sands, or water bodies.

The subsequent processed magnetic and radiometric grid files were then imported into ERMapper to generate final georeferenced imagery including sun shaded, grey scale, composite and ratioed imagery. In addition to the imagery, contours files of the magnetic and radiometric data where generated to refine the extents of responses and provide actual magnetic and radiometric values. A full list of the generated imagery and vector products have been included in the appendices.

5.2 Gravity Data

Gravity data was obtained as point located data and were imported into the Geosoft geophysical processing software to generate processed grids in geodetic coordinates with GDA94 datum. Data and
image processing of the gravity data included generation of derivatives and utilisation of various sun angle shading in order to highlight basement geology and regional controlling structures.

5.3 Satellite Data

Landsat 7 ETM+ data was obtained as colour balanced, ortho-corrected imagery consisting of a 741,742 and 321RGB ratio image. The 321 RGB represents visible light and provide an “aerial photo” type of image, and the 741 RGB shows Fe rich rocks in red, vegetation green, quartz rich rocks in blue.

The wavelengths measured by the Landsat 7 showing some of the absorption features (which can also be applied to Aster and HYMAP) are displayed in figure 10.

![Figure 6: Landsat 7 ETM+ wavelength positions and spectra of selected surface materials (from Wilford and Creasey, 2002).](image-url)

SRTM products including colour and sun shaded images were generated in ERMapper.
As part of this report a brief review of the geophysical responses from major phosphate, uranium and base metal deposits within the vicinity of the Project area was undertaken to determine if a characteristic response or signature could be detected that could then be applied to the Australis tenements.

The findings are summarized below:

Phosphate Deposits : (Wonarah, Arrawurra, Alroy, Buchanan Dam, Alexandria and Highland Plains)

Nearly all of the current Northern Territory sedimentary phosphate deposits are located distally from the margin of the Georgina Basin with the exception of the Highland Plains deposit, which like the major deposits in Queensland are located close to the Basin margin. All of the deposits are hosted within Middle Cambrian sediments. Highland Plains is locally hosted within the Water Hole Formation, and all the other Northern Territory sedimentary deposits are hosted within the Wonarah Formation, which is equivalent to the Beetle Creek Formation in Queensland. A simplified stratigraphic sequence is provided in table 1. In contrast to the Queensland deposits and with the exception of Highland Plains, there is no strong surficial uranium response associated with any of the deposits. This finding was also highlighted in Khan et al 2007, where it was found during hand held logging that the high grade core from the Wonarah deposit induced only a marginal increase in the scintillometer count. There are also no direct magnetic or gravity signatures associated to the deposits, but they do indicate relative basement depths and both Alroy and Buchanan Dam are located close to magnetic and gravity features.

There does not appear to be a characteristic spectral response for phosphatic horizons in the Landsat imagery obtained, as it has likely been affected by recent processes including weathering, laterisation or erosion that may distort or mask the spectral response. However it is a useful surface mapping tool and appears to have greatly assisted in the NTGS regional mapping compilations.
Uranium Deposits: (None)

There are no significant Uranium deposits or occurrences that have been discovered within the Georgina Basin in the Northern Territory. Elevated uranium responses can be attributed to enrichment from recent process and drainage systems. Below is a summary of the styles of Uranium deposits that may be located within the project area, however the prospectivity for discovery of a uranium mineral deposit is considered to be low.

The different styles are summarised in part below from Australia’s uranium resources, geology and development of deposits by McKay, A.D., and Miezitis, Y., 2001. Geophysical methods can provide a major role in detecting and delineating these styles of mineralisation.

Unconformity related deposits occur immediately below and above major unconformities that separate crystalline basement from overlying clastic sandstones of either Proterozoic or to a lesser extent Phanerozoic age. High grade deposits (1-14% U3O8) occur in clay altered and faulted sandstones immediately above the unconformity. Deposits immediately below the unconformity are usually medium to high grade deposits (0.3-1% U3O8), with mineralisation occurring in fault and
fracture zones of altered metasediments that often contain graphitic. Ranger and Kintyre are examples of unconformity deposits.

Sandstone uranium are usually contained in fluvial or marine margin sandstone. The host rocks are medium to coarse grained, poorly sorted and contain pyritic and organic matter. In this environment uranium is mobile under oxidising conditions and precipitates under reducing conditions. Sandstone uranium deposits can be subdivided into three main types: tabular, roll-front and tectonic-lithologic.

Tabular deposits consist of tabular or elongate lenticular zones of uranium mineralisation within selectively reduced sediments and are orientated parallel to groundwater flow.

Roll-Front deposits are crescent-shaped in cross section and mineralisation cross cuts bedding and extends from the overlying to the underlying impervious mudstone/siltstone layers. Mineralisation usually has a diffuse boundary with reduced sandstone on the down gradient side and sharp contacts with the oxidised sands on the up-gradient side.

Tectonic-Lithologic deposits occur along permeable fault zones which cut the sandstone-mudstone sequence. Mineralisation forms tongue shaped ore zones along the permeable sandstone layers adjacent to the fault, and may form vertically stacked mineralised zones.

Surficial uranium deposits are broadly defined as young (Tertiary to Recent) near surface uranium concentrations in sediment or soils. They usually have secondary cementing minerals including calcite, gypsum, dolomite, ferric oxide and halite. Uranium deposits in calcrete are the largest of the surficial deposits e.g. Yeelirrie and the main mineral is carnotite (hydrated potassium uranium vanadium oxide).

Base Metal Deposits: (MacArthur River, Mt Isa, Cannington, Century, Ernest Henry)

There are only a small number of known base metal occurrences within the Georgina Basin. In general these can be usually grouped into either Iron Oxide Copper Gold (IOCG) or Broken Hill Type (SEDEX) Lead-Zinc-Silver style deposits. Both styles of deposit generally display coincident magnetic and gravity anomalies and may have associated electromagnetic and electrical signatures. A number of papers exist on the geophysical signatures of some of the major deposits which go into further detail about the geophysical responses, and limitations. Of these the following are suggested for further reading (Anderson 1992 Osborne, Brescianini 1992 - Eloise, Fallon 1992 - Mt Isa, Webb 1995 - Ernest Henry, Christensen 2001- Cannington and Thomas 1992 - Century).

Phosphate Australia have noted in their prospectus that Minoil Services Pty Ltd explored for both phosphate and sedimentary base metal mineralisation in the Alroy area and noted that one hole
contained a 3m intersection of “dark shale” that returned Cu-1500ppm, Pb-8000ppm and Zn-8000ppm. This interval also contained 17%Mn and may suggest that the region could also be prospective for Mn mineralisation.

Other Occurrences
Clinton Style Oolitic Iron Ore

Iron Ore occurrences of the Clinton Oolitic Style are located within the South Nicholson Basin which abuts the Georgina Basin in the north east of the Northern Territory. They are Proterozoic to Cretaceous in age and formed in shallow marine environments and accumulated along passive continental margins during times of quiescence, extension and global sea level change (Ferenczi, 2001). Several ironstone beds up to 20m thick within the Mullera Formation containing hematite and goethite have been reported by Sweet 1984. The largest occurrence of this type is located in the Constance Ranges area in Queensland containing approximately 360Mt of 51% iron ore (Harms 1965). The occurrences are associated with narrow, strike extensive weak to moderate magnetic responses, and also have a discrete uranium signature.

Manganese

The major manganese occurrences and deposits of the Northern Territory have been summarized by Ferenczi NTGS Report 13, 2001. The main styles are sedimentary (Grooyte Eylandt), hydrothermal (Bootu Creek) and surficial. A number of manganese occurrences have been reported by the NTGS to be located within or close to the margins of the Georgina Basin e.g. Camp No 1 and Lucy Creek. In addition there may be further manganese mineralisation discovered through review of previous explorers open file reports as highlighted in the previous sections. Geophysics can be an import tool in detecting manganese mineralisation, with particular success shown by the application of both high resolution gravity, electrical methods and airborne electromagnetics. The airborne electromagnetic techniques has proven particularly successful at both the Bootu Creek and Grooyte Eylandt manganese deposits (OMH 2008 and Irvine 2001 respectively) in detecting mineralisation or the marker beds immediately adjacent to mineralisation.
7.3 Southern Project

Tenements EL26928

Geophysical data coverage includes full magnetics, radiometrics, gravity, and Landsat.

The project comprises of single tenement application EL26928 and is located along the Northern Territory - Queensland border approximately 55km to the north of the southern margin of the Georgina Basin. The geology mainly consists of mapped Austral Downs Limestone, Cenozoic regolith and drainage systems, with some mapped outcrops of Nimaroo Formation, figure 22. The Nimaroo Formation is Late Cambrian-Early Ordovician in age and lies stratigraphically above the phosphorite beds within the Wonarah (NT) and Beetle Creek (QLD) formations. At Phosphate Hill the Nimaroo Formation has been estimated to be 150m (Russell and Trueman 1971).

The project does not contain any phosphate occurrences, mapped Wonarah Formation or Arthur Creek Formation (which is the phosphorite member in the South Georgina Basin as per figure 7). A number of phosphate occurrences are however located at the mapped basin margin approximately 55km to the south.

Based on the mapped geology and location of Arthur Creek Formation some distance to the south, it is highly likely that the prospective phosphate enriched formations are at considerable depth and as such this area is believed to have little potential to host an economic phosphate deposit.

This is confirmed by the wavelength of responses in the magnetic and gravity data which indicate that the depth to basement or basin sediment thickness is considerable, figures 23 and 24. The fabric of the magnetic responses to the south and west of the tenement suggest a probable granitic basement exists here rather than volcanics. This may have implications on the prospectivity for other mineral deposits in the region, which have not been fully investigated here.

The tenement contains elevated uranium responses, which may have been the original reason for making the application, figure 25. These are located within mapped Austral Downs Limestone which are incised by numerous drainages, as highlighted in the landsat imagery figure 26. The trend of elevated uranium responses extend across the border into QLD and become part of the anomalous feature which is contained with Australis’s Queensland tenements EPM17780, 17781, 17482 and 17483. Similarly to the recommendation made over the Queensland tenements i.e. the strongest responses should be field checked with a spectrometer to determine the grade and extent of mineralisation, should also be adopted here.
The area may have potential for manganese as a number (7) of small stratiform occurrences have been defined to the west of the tenement. These appear to be preferentially located along or closely related to regional structures evident in the magnetic data which can be traced into the tenement, figure 23. In addition a small outcrop of ferricrete/manganocrete has been defined in the 1:250,000 geology in the north east of the tenement which warrants further investigation.

The project is not considered prospective for shallow phosphate mineralisation, but their remains some potential for manganese and possibly uranium hosted in palaeochannels or the Tertiary Austral Downs Limestone.

Figure 22: Southern Project Geology and Mineral Occurrences.
Figure 23: Southern Project Magnetic Image. Interpreted Major Structures as dashed white lines.
Figure 24: Southern Project Gravity Image. Interpreted Major Structures as dashed white lines.
Figure 25: Southern Project Uranium Image.
Figure 26: Southern Project Landsat Image.
8 PROSPECTIVITY AND TARGETS

8.1 Northern Project

This project is considered highly prospective for shallow phosphate mineralisation within the outcropping Wonarah Formation and likely extensions of this unit beneath recent cover sediments to the west of the project. Only a few target areas which display some elevated uranium anomalism have been selected, figure 11, and there remains a number of Wonarah Formation outcrops which should be systematically sampled for phosphate mineralisation.

Areas considered anomalous and prospective for base metal mineralisation located in the north of EL26314 and the west of EL26312 have also been selected, figures 13 and 14. The target area within EL26314 is considered to be relatively shallow (200m depth) whereas the target within EL26312 appears quite deep (400m-500m), however modeling of the data is required to validate this.

Some potential for Clinton Style Oolitic iron occurrences may exist in EL26311, where the outcropping South Nicholson Playford Sandstone contains hematitic siltstones to ironstones. This area should be mapped and sampled to confirm.

The area is not considered prospective for significant uranium mineralisation.

8.2 Central Project

The project is considered highly prospective for shallow phosphate mineralisation within the western tenements EL26310, EL26702 and EL26309. Wonarah Formation is likely present in the other tenements but at depths not currently considered economic as highlighted in drill hole NTGS01/1. Review of previous explorers reports should be undertaken to confirm the potential for SEDEX and manganese mineralisation within the project.

Figure 21 shows the high priority target areas for phosphate mineralisation and highlights mapped outcrop of the Wonarah Formation.

8.3 Southern Project

This project is has limited prospectivity for manganese mineralisation, as indicated by a number of reportedly stratiform manganese occurrences which are located immediately to the west of the project and are interpreted to be controlled by regional structures evident in the magnetic data which extend into the project, figures 23 and 24. This could be confirmed through completing geological mapping
and sampling focussed over the interpreted structural corridor, plus reconnaissance of a mapped manganocrete in the north east of the project tenement.

There remains small potential for uranium mineralisation, within the Austral Downs Limestone or palaeochannels, which could be quickly verified through field checking of stronger uranium responses with a spectrometer to determine the grade and extent of mineralisation.

The project tenement is not considered prospective for phosphate mineralisation due to the perceived depth to the phosphatic host sediments indicated by the mapped geology and geophysical responses, which indicate considerable thickness of younger, overlying sediments cover the area.

Target areas are summarised in table 1.
Table 1: Target Summary.

9 CONCLUSIONS AND RECOMMENDATIONS

The compilation, purchase and processing of geophysical datasets has been successful in providing new information and imagery that has been used to generate target areas prospective for phosphate, base metals and uranium. The Northern and Central Projects are considered highly prospective for phosphate mineralisation, as the projects contain considerable outcrop of Wonarah Formation which host most of the major phosphate deposits within the central Georgina Basin. There exists some prospectivity for Clinton Style Oolitic iron in the northern Project and base metal minerals within all projects.

The base metal targets are all expected to be located under variably deep cover. Further work is necessary to estimate this depth, so that it can be determined if they represent economically viable targets prior to committing to potentially expensive exploration programs.

Recommendations for future work include:

✦ Completion of a full literature search and compilation of results from previous exploration activities.

✦ Complete depth to basement modeling over all areas prospective for base metals.

✦ Based on these results propose further geophysical programs to better define/model the depth to basement or potentially directly target mineralisation (IP /EM techniques).

✦ Field reconnaissance, mapping and sampling of all elevated uranium anomalies to determine their source and concentration, taking spectrometer readings as a precursor to potential drilling programs.

✦ Systematic geochemical sampling of target areas and known outcrops of Wonarah Formation, in conjunction with field mapping and drilling where appropriate.
This information should be used as an adjunct to any other information from the area that may be available to Australis Exploration to provide further indications of the mineral potential.

10 REFERENCES


Phosphate Australia Prospectus 2008


APPENDIX 1

List of Georeferenced Images and Vector Files Supplied
**Image Files**

**Magnetics**
- NT_tmi1vd_g
- NT_tmi2vd_g
- NT_tmi_1vd_nesun_HSI
- NT_tmi1vdg_e_g
- NT_tmi1vdagc_rbw
- NT_tmi2vdagc_g
- NT_tmi_nesun_he_rbw
- NT_tmi_nesun_HSI
- NT_tmi1vdrtp_over_2vdagertp_psc
- NT_tmi2vdagertp_g
- NT_tmiAS_nesun_psc
- NT_tmi_nesun_psc
- NT_tmirtp_over_1vdagertp_nesun_psc

**Radiometrics**
- NT_K_nwsun_psc
- NT_K_psc
- NT_RADRGB_99
- NT_RADRGB_he_
- NT_Th_nwsun_psc
- NT_Th_psc
- NT_Ur_nwsun_psc
- NT_Ur2Th_psc
- NT_Ur_psc
- NT_ternary
- NT_ternary_he

**Gravity**
- NT_BG_nesun_rbw
- NT_BG1VD_nesun_rbw

**Landsat**
- NT_Landsat_742

**SRTM**
- NT_SRTM_nesun_rbw
- NT_SRTM_rbw
Vector Files

Geology
NT_250K_Geology

Interpretation
NT_Australis_Target_Outlines

Processed Imagery Filename Structure:

tmi = total magnetic intensity
DTM = digital terrain model
AHD = Australian Height Datum
RAD = radiometric image
K/Th/Ur = Potassium/Thorium/Uranium Image
Grav/BG267 = Bouguer Gravity 2.67gcc (220 = 2.20 etc)
SRTM = Shuttle Radar Topography Mission (DTM)
L7 = Landsat7 ETM+

1vd = 1st vertical derivative
2vd = 2nd vertical derivative
agc = automatic gain control filter
rtp = reduced to the magnetic pole
as = analytic signal
TD = tilt derivative
HD_TD = horizontal derivative of the tilt derivative
text57 = texture filtered with 5,7 filter variables
nesun = north east sun angle shading
nwsun = north west sun angle shading
resid = residual
pct = percentage concentration
ppm = equivalent concentration ppm
Brovey = brovey transformation

RGB = Red, Green, Blue radiometric ternary image (Potassium/Thorium/Uranium)
lin = linear histogram stretch
he = histogram equalised
99clip = histogram 99% clipped
psc/50 = pseudocolour image/50% transparency
rbw/50 = rainbow colour image/50% transparency
g = greyscale image
wet = wetlook (HSI)

m52 = GDA94 Datum and MGA Zone 52 projection
gll = GDA94 Datum Lat/Long Coordinates

e.g. tmi1vdagcrtp_g_m52 = magnetics, 1st vertical derivative, agc filtered, reduced to the magnetic pole,
grey scale image, GDA94 Datum and MGA Zone 52 projection coordinates
PROSPECTIVITY ASSESSMENT

on the
Regional Tenement Holdings
in
Queensland and the Northern Territory
for

AUSTRALIS EXPLORATION LIMITED AND MOJO MINING PTY LIMITED

30 June 2010
PROSPECTIVITY ASSESSMENT

Prepared by RAVENSGATE on behalf of:

Australis Exploration Limited and Mojo Mining Pty Ltd

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1. EXECUTIVE SUMMARY

Ravensgate has been commissioned by Australis Exploration Limited (Australis) to provide a review of their phosphate, uranium and base metal projects in Queensland and the Northern Territory; assess their prospectivity, analyse previous work, and make recommendations on tenement holding strategies and future exploration programs and budgets.

Australis Exploration Limited and Mojo Mining Pty Limited have acquired a very large holding of exploration licenses and license applications comprising some 70 tenements covering 45,149 km² of Queensland and the Northern Territory. Of this 31 tenements (25,124 km²) are granted with the remainder applications in Queensland that are at varying stages of the title application process.

Australis’ and Mojo’s licenses are centred on the Georgina Basin, an extensive sedimentary basin infilled with predominantly Cambrian age marine carbonate rocks. Elsewhere in the basin these Mid-Cambrian carbonates host large sedimentary phosphate deposits including Phosphate Hill, D Tree, Wonarah and Highland Plains. Forming the basement to the Georgina Basin is a sequence of Proterozoic rocks including interpreted extensions of the highly mineralised Mount Isa Inlier which hosts several world class Zn-Pb-Ag and Cu deposits including Mt Isa, Hilton and Century.

This large tenement holding has been grouped into ten geographic project areas. Five project areas lie in the eastern Northern Territory (Mittiebah, Desert Creek, Ranken, Tablelands, Tobermorey) and five lie in northwest Queensland (Mojo, Camooweal, West Isa, Glenormiston, Boulia)

Ravensgate has completed an extensive review of the geology, previous exploration and prospectivity of these project areas and collated and identified exploration targets focussing on phosphate, base metal and uranium. The projects generally have had little in the way of modern exploration. The identified targets and have been categorized as "grass roots" or conceptual nature, with most having been generated from regional geophysical data-sets. These targets have been rated and ranked using various geological and economic parameters to aid in assessing prospectivity, developing exploration programs and associated high-level exploration operational budgets.

Of note is that a review of the scant amounts of historic government sponsored drilling and drilling by previous explorers has not identified any phosphate assays of potentially economic grades (however most drill holes were not assayed for phosphate). In addition most of all of the identified base metal targets lie below substantial cover (>200m) which means direct detection of mineralisation is difficult with exploration relying on conceptual geological and geophysical targeting along with relatively expensive deep drilling to assess targets.

Australis’ and Mojo’s large landholding has very substantial annual financial commitments particularly on the Queensland holdings (in excess of $12M pa if all tenements are granted). This vast tenement package also presents challenges to exploring in a cost effective and systematic manner and indeed in raising this amount of funding to meet expenditure requirements.

Australis is aware there is need to rationalise the tenement holdings and develop a strategy for extracting the best value from the properties. Following extensive review of the geology, geophysics and previous work Ravensgate suggests the following approach:

Phosphate Prospectivity:

- The best phosphate targets lie in the Camooweal Project area in close proximity to the Sherrin Creek and Lily Creek Deposits. Ravensgate recommends accepting grant of the majority of the tenements in that project area (those which lie on the Georgina Basin margin)
- Hold the Mittiebah, Ranken, and Desert Creek projects in the NT. These are in close proximity to other known deposits such as Alroy, Wonarah and Alexandria. The holding costs of these tenements are less onerous than in Queensland and they have good potential and are strategic benefit.
• Complete an exploration program which would entail data compilation, field verification, sampling and mapping, followed by a scout drilling program in year one. Year two would be focussed on follow up drilling and testing lower order targets.

• Drop the Tablelands Project tenements (no targets)

Base Metal Prospectivity:

• The best targets for identifying a Mount Isa style Pb-Zn or Cu deposit lies within the Mojo project area under deep cover (>300m), where the same stratigraphic sequence that hosts Mount Isa style mineralization may be likely to be at depth. Ravensgate recommends holding these tenements and carrying out a detailed geophysics and selected deep drilling on priority targets. As these targets are primarily geophysical, Ravensgate recommends a geophysist be intimately involved in all stages of program design and targeting. Of note is that these tenements have over $5Million in expenditure commitments to 2011. A reduction in land holding may be advantageous to reduce this commitment. In this case Ravensgate recommends dropping the western portion on the project area which in Ravensgate’s opinion appears to be less prospective (i.e. over the interpreted Syabella Granite) and/or dropping areas where cover is deep (i.e. >500m). It may also be worthwhile looking at joint venture options for this package.

• Base metal targets have been identified within Boulia, West Isa, and Glenormiston Project areas. All of these targets are under deep cover (>200m) and lie within an inferred Proterozoic basement areas. To explore will require detailed geophysics and deep drilling to evaluate target areas (i.e. expensive exploration). These tenements are all applications. Australis need to decide whether they accept grant of the tenements with the view to completing deep exploration, or alternately withdraw applications. Alternately reducing application areas to cover the immediate target areas may be an option or looking at joint venturing some or all of these projects.

• Ravensgate suggests applying for a Queensland Government Collaborative Drilling Initiative Grant (the next round opens on the 1st of July, 2010) to test some of these targets, particularly those in the Mojo area. Of note is that Mojo Mining Pty previously had applied for one of these grants and was successful, but the grant expired before any drilling could be completed.

Uranium Prospectivity:

• Surficial uranium targets have been identified within the Tobermorey Project in the NT which is a granted tenement. These require ground “truthing” and sampling. Should these targets be of merit then Ravensgate recommends a systematic exploration program involving surface sampling, mapping followed up by drilling.

• Surficial uranium targets have also been identified within the West Isa and Glenormiston project area in Queensland. The Glenormiston and Tobermorey targets represent a continuation of the same paleochannel from QLD to NT. These licences are all tenements in application. Queensland currently does not allow uranium mining which means any exploration completed would be with a view to this legislation possibly being changed in the near to medium term future. Australis has two options, either to complete exploration of this area further or to reject the grant of tenements. Ravensgate notes that the QLD tenements covered by these surficial uranium targets have no other prospective mineral targets (e.g. base metal or phosphate) and would need to be warranted necessary for tenement holdings solely on exploration targets for uranium.

• Surficial / Sandstone targets have been historically identified within the Longsight Sandstone and equivalents. These targets occur within the Boulia, Glenormiston and Mojo Projects. Current geological and geophysical information suggests a fairly low prospectivity however it is suggested that any exploration work carried out for deep-cover base metal targets also considers more shallow-surface overlying uranium mineralisation e.g. examination of drill core targeting base metals
2. TERMS OF REFERENCE

2.1 Introduction and Scope of Work
Ravensgate has been commissioned by Australis Exploration Limited (Australis) to provide a review of the phosphate, uranium and base metal prospectivity of their Queensland and Northern Territory exploration leases. Ravensgate understands the exploration tenements are held by Australis Exploration Ltd and by Mojo Mining Pty Ltd (Mojo). Ravensgate makes no other assertion as to the legal title of tenements and is not qualified to do so.

The scope of works outlined by Australis was to:
- Review previous work that has been completed within the tenement areas;
- Systematically assess exploration targets that have been identified by other workers and identify additional targets;
- Review and rank targets and identify targets for follow up;
- Make recommendations or suggestions on where further work required and provide an estimate of high level year 1 and 2 exploration budgets required to advance the projects;
- Make recommendations on tenement holdings and ground for relinquishment or refusal of grant (for tenements in application).

2.2 Terms of Reference
The objective of this report is to provide a fair assessment of the geological prospectivity of the various NT and QLD Exploration Projects held by Australis and Mojo. Consent has been given for the internal distribution of this report in the form and context in which it appears.

2.3 Disclaimer
Australis Exploration Limited and Mojo Mining Pty Limited are understood to be the beneficial owner of the tenements in Table 1. Ravensgate is not qualified to make any statement or comments whatsoever regarding the legal tenure of the mining properties.

All work conducted during this study is based on information provided by the understood title holders of the project, along with technical reports by other consultants, associated contractors, previous tenement holders, and other relevant published and unpublished data specified for the project areas concerned.

2.4 Principal Sources of Information
The principal sources of information used to compile this report comprise technical reports and data variously compiled by Australis or Mojo and their consultants, publically available information such as ASX releases, and discussions with Australis technical and corporate management. A listing of the principal sources of information is included in the references.

No site visits were undertaken to the exploration projects as they are generally at an early stage of development. Ravensgate is of the opinion that no significant additional benefit would have been gained through site visits.

All reasonable enquiries have been made to confirm the authenticity and completeness of the technical data upon which this report is based. A final draft of this report was also provided to Australis or Mojo, along with a request to identify any material errors or omissions prior to final submission.
2.4.1 Qualifications and Technical Experience of Author

Author: Don Maclean - Principal Consultant - Geology
MSc Geology, MAIG, MSEG
Don is a geologist with over fifteen years experience in exploration geology, mine geology, resource modelling and project management throughout Australasia, Africa, Central Asia and Europe. He has worked in a variety of commodities, including gold, precious and base metals. Prior to joining Ravensgate, Don was the Chief Geologist for Ironbark Zinc where he was responsible for managing exploration and resource development work at the Citronen Fjord Zinc project in Greenland. Prior to this, Don worked for Newmont and Normandy throughout Australasia in a variety of senior exploration and mine based roles. Don was instrumental in the discovery and development of the 1.5 Million ounce Westside Gold Deposit at Nimary-Jundee in Western Australia. Don has a broad skill base, having worked in regional and near mine exploration, resource development, open pit and underground geology as well as senior company management roles. He has extensive experience in planning and managing large exploration projects, working on feasibility teams, technical audits, resource generation, and exploration target generation. He has worked in a variety of geological terranes ranging from the high Arctic to the arid deserts of Australia. Mr. Maclean holds the relevant qualifications and professional associations required by the ASX, JORC and ValMin Codes in Australia.

Co Author: Craig Allison, Principal Consultant.
BAppSci (Hons) Geology, Member of Australasian Institute of Mining and Metallurgy.
Craig Allison is employed by Ravensgate Consulting as a Principal Consultant where he carries out work for Mineral Resource estimations, Independent Technical Valuations, Independent Geologist Report’s and Formal Technical Project reviews. He has over 15 years mining industry experience in operational project exploration, grade control and resource estimation. Craig has worked for both junior and larger ASX listed companies, encompassing open-cut/underground base and precious metal operations and uranium resource evaluation. Competent Person sign-off was undertaken for BHP Billiton’s Mt Keith nickel resource and other projects surrounding the mine in 2007. A Post Graduate course in Geostatistics was completed in 2006. Craig Allison holds the relevant qualifications and professional associations required by the ASX, JORC and ValMin Codes in Australia. He is a Qualified Person under the rules of the CIMM and NI43-101.

Co Author: H. Kate Holdsworth, Senior GIS Geologist
BSc (Hons) Geology, MAusIMM
H. Kate Holdsworth is a senior GIS geologist with over 17 years GIS experience who joined the Ravensgate team in September 2006. During her tenure at Ravensgate, she has contributed to the compilation of numerous Independent Geologists Reports, Valuation Reports, GIS projects as well as having assisted clients with their exploration reporting requirements and QA/QC investigations into client’s data quality.
Prior to joining Ravensgate, she worked for Giscoe Pty Ltd, a GIS company in Johannesburg, for ten years, where she was involved in diverse GIS projects, including database creation, database population and data validation. Kate has four years experience in GIS with the Geological Survey of South Africa, where she was a member of their GIS database design team.

Reviewer: Stephen Hyland, Principal Consultant, Ravensgate.
Bachelor of Science (Geol). MAusIMM, CIM & GAA.
Stephen Hyland has had extensive experience of over 20 years in exploration geology and resource modelling and has worked extensively within Australia as well as offshore in Africa, Eastern and Western Europe, Central and South East Asia modelling base metals, Phosphate, precious metals and industrial minerals. Stephen’s extensive resource modelling experience...
commenced whilst working with Eagle Mining Corporation NL in the diverse and complex Yandal Phosphate Province where for three and half years he was their Principal Resource Geologist. The majority of his time there was spent developing the historically successful Nimary Mine. He also, however assisted the regional exploration group with preliminary resource assessment of Eagle’s numerous exploration and mining leases. Since 1997, Stephen has been a full time consultant with the minerals consulting firm Ravensgate where he is responsible for all geological modelling and reviews, mineral deposit evaluation, computational modelling, resource estimation, resource reporting for ASX / JORC and other regulatory compliance areas. Primarily, Stephen specialises in Geological and Resource Block Modelling generally with the widely used Medsystem / Minesight 3-D mine-evaluation and design software. Stephen Hyland holds the relevant qualifications and professional associations required by the ASX, JORC and ValMin Codes in Australia. He is a Qualified Person under the rules for NI43-101 reporting and compliance requirements.

Reviewer: Richard Hyde, Associate Consultant.

Bachelor of Science, Geology and Geophysics, Member of Australasian Institute of Mining and Metallurgy.

Mr Richard Hyde is a geologist with more than 14 years experience in the minerals industry including over five years experience operating in exclusively West Africa. Richard has worked in a number of different geological environments in Australia, Africa and Eastern Europe. He has managed large exploration projects and worked extensively within the minerals industry as a consulting geologist. He is an Associate Consultant of Ravensgate and a Member of the AusIMM, and has the appropriate qualifications, experience and independence to satisfy the requirements as an “Expert” as defined under the ValMin code.
3. BACKGROUND

3.1 Project Area Overview

Australis Exploration Limited and Mojo Mining Pty Limited have acquired a very large holding of exploration licenses and license applications throughout northwest Queensland and the eastern Northern Territory (Figure 1). The licenses are centred on the marine carbonates of the Georgina Basin and the basement Proterozoic rocks of the Mount Isa group and correlates. The tenement package is primarily prospective for phosphate, base metal and uranium mineralisation.

This large tenement holding has been grouped into nine geographic project areas to aid in description and evaluation (Figure 1):

- Mittiebah Project (NT)
- Desert Creek Project (NT)
- Ranken Project (NT)
- Tablelands Project (NT)
- Tobermorey Project (NT)
- Mojo Project (QLD)
- Camooweal Project (QLD)
- West Isa Project (QLD)
- Glenormiston Project (QLD)
- Boulia Project (QLD)
Note Georgina Basin (pale blue) covers much of the exploration license areas.
3.2 TENURE

Australis Exploration and Mojo Mining’s tenure comprises some 70 tenements covering 45,149 km² of Queensland and the Northern Territory. Of this 31 tenements (25,124 km²) are granted with the remainder applications in Queensland that are at varying stages of the title application process. Tenement details are summarised in Table 1.

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### Table 1  Australis Exploration and Mojo Mining Pty Limited Tenement Schedule

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3.3 Sources of information and methodology

Australis Exploration provided Ravensgate an extensive array of data on the projects which included:

- Geophysics (Magnetics, Radiometrics, Gravity);
- Government Geological Mapping;
- Historical Reports;
- Various internal company reports.

Of note is that Australis commissioned M Cooper of Resource Potentials to undertake compilation and geophysical target identification of their geophysical data sets and provided these reports to Ravensgate. This work is of excellent standard and Ravensgate has drawn on the targets identified in this work and attempted to put them into geological context. In addition there has also been good prospectivity work done on the Mojo Project area by Groves (2008) and Mclean et al (2008) which Ravensgate has also used and acknowledges.

Ravensgate methodology was to systematically review the geological and geophysical data sets for each project area and review previous work. Extensive searches of historic tenement reports were carried out as the set of reports provided by Australis was incomplete. In addition historic drilling information for mineral exploration and waterbores was obtained from the relevant Northern Territory and Queensland authorities. Unfortunately none of these drilling data sets appear to have any sampling for phosphate, base metals or uranium within the project areas.

Targets were reviewed and ranked using a set of subjective geological and economic criteria. Using these ratings and rankings the prospectivity of each project area was evaluated, and on this basis recommendations for tenement holding strategy and future exploration work are based. This information, along with relevant comparable transactions was used to estimate valuations for the projects.
4. REGIONAL GEOLOGICAL SETTING

The regional geologic settings of Australis’ and Mojo’s tenement holdings are dominated by a sequence of extensive marine carbonates and sediments of the Palaeozoic Georgina Basin (Figure 1). These are underlain by Proterozoic sediments, volcanics and granitoids of the Mount Isa Inlier and South Nicholson Basin.

The Mount Isa Inlier outcrops over some 50,000 km² of North Queensland (Blake et al., 1990) and consists of Early and Middle Proterozoic rocks which can be grouped into three broad tectonic belts; the Western Fold Belt, the Kalkadoon-Ewen Province and Eastern Fold Belt (Figure 2).

The Western Fold belt is further subdivided into three main units the Lawn Hill sub-province, the Mt Gordon Fault Zone and the Leichardt River sub-province. The Eastern fold belt is subdivided into the Mary Kathleen, Quamby-Malbon and Cloncurry-Selwyn zones (Blake et al., 1990).

The oldest Proterozoic basement metamorphic rocks are dated around 1890-1870 Ma (Blake et al., 1990). Three Proterozoic cover rock sequences of shallow marine and sub aerial volcanics have been identified with ages ranging from 1870 to 1670 Ma. Regional deformation, compression and metamorphism up to amphibolite facies occurred around 1620 to 1550 Ma. Granitoids and mafic intrusions have been emplaced at various times before 1100 Ma with those older than 1550 variably deformed and metamorphosed (Blake et al., 1990). Of note is the Syabella Granite, which is interpreted to underlie parts of the Mojo project area, which has been dated at 1670 Ma.

The Western Fold belt outcrops in the eastern part of the Camooweal project area and is interpreted to form the basement to the Mojo and Boulia project areas. The belt is comprised of a sequence of felsic volcanics and coarse conglomerates (Bottle Tree Formation) overlain by the sandstones/siltstones/quartzites, mafic volcanic (Eastern Creek Volcanics) and carbonates of the Haslingden Group. These units are overlain by felsic/silicic volcanics and the shales and siltstones of the Mount Isa and McNamara Group rocks.

The Mount Isa Inlier is a highly mineralized province with four major styles of mineralization recognized (Queensland Minerals ref):

- **Sediment hosted Zn-Pb-Ag**: these are found within metamorphosed pyritic and dolomitic shales of the sedimentary successions of the Western Fold Belt. Notable deposits including Mount Isa Pb-Zn, Century, George Fisher, Hilton, Dugald River and Lady Loretta.

- **Brecciated Sediment Hosted Cu**: brecciated sediment hosted Cu deposits occur within the brecciated sediments proximal to fault zones within the Western Folds Belt. Notable examples are the Mount Isa, Esparanza/Mammoth and Lady Annie.

- **Iron-oxide Cu-Au**: these styles occur within high metamorphic grade rocks of the Eastern Fold belt with examples including Ernest Henry, Selwyn and Osbourne. Mineralisation is typically chalcopyrite-pyrite-magnetite.

- **Broken Hill Type Ag-Pb-Zn**: this style of mineralisation occurs within high metamorphic grade rocks of the Eastern Fold Belt with the Cannington being the only major example.

Unconformably overlying the Western Fold belt are Proterozoic age rocks of the South Nicholson Basin. These are comprised of sandstones, siltstones and shales of the South Nicholson Group. These rocks outcrop in the northeast of the Mittiebah project area and are interpreted to form basement to much of Australis’ Northern Territory and western Queensland project areas. Of note is that little mineralisation of economic significance (aside from sedimentary ironstone deposits) has been identified within these rocks to date.
Figure 2  Geological Setting of North Queensland Proterozoic Basement and major deposits (after Queensland Geological Survey)
The majority of Australis” and Mojo’s tenement holdings are held within the Georgina basin which is Cyrogenian (Neoproterozoic) to Devonian in age. This extensive basin has an area of over 325,000km² (Khan, 2007). Basin thickness ranges from tens of metres on basin margins and highs up to 2km in the deepest parts. The basin fill is dominated by Cambrian marine carbonate platform sediments.

The Basin has been subdivided into several smaller sub-basins (Figure 3) which reflect the thickness of fill (Khan, 2007). Australis” projects are generally on the margins of the Barkly and Undilla sub-basins.

The stratigraphic sequence within the basin consists of a basal sequence of terrigenous sediments overlain by Early Cambrian flood basalts (Helen Creek Volcanics and equivalents). These are overlain by marine arenaceous rocks that grade upwards into marine carbonates as the basin deepened (Thortonian Limestone) and siltstone-shale-cholet sequences (Gum Ridge Formation). At this time the sedimentary lateral facies trends of arenites, lutites, clastic and chemical carbonates and chert was established and deposition of phosphate began (Howard, 1986).

A marine regression and transgression followed in the Mid Cambrian and in the Undillan sub-basin the major deposition of phosphorite within the silt-shale-cholet-carbonate facies of the Beetle Creek, Border Waterhole, Wonarah and Burton beds began (Howard, 1986). These are overlain and interdigitated with marine carbonates (Camoweal Dolomite). In deeper parts of the basin these grade upwards into deeper marine siltstones and sandstones (Ninmaroo Formation).

A number of major phosphate deposits are hosted within the mid Cambrian carbonates of the Georgina Basin which Howard (1986) groups into three distinctive depositional regimes:

- open marine shelf - deposition of phosphorites on the marine shelf on the seaward flank of the margins of the basin (eg Duchess);
- shallow marine epicontinental basin – deposition of phosphorites in hypersaline carbonate banks on the margins of channels within lagoons and estuaries (eg D-Tree, Lady Annie);
- epicontinental basin high – deposition of phosphates on the crest and margin of a submarine ridge within an area dominated by red beds (eg Wonarah, Alroy).

Overlying the Georgina Basin Cambrian-Ordovician rocks are a sequence of Jurassic Cretaceous shales, siltstones and sandstones and carbonates related to the Carpenteria Basin, formed in an extensive shallow marine basin (Longsight Sandstone, Poland Waterhole Shale).

In the Tertiary uplift and erosion resulted in formation of ferruginous duricrust and weathered leached kaolonitised rocks throughout many areas. In the Miocene transgression resulted in the formation of extensive lacustrine or shallow marine carbonates (Austral Downs Limestone, Brunette Limestone). Uplift and erosion from the Pliocene to present has resulted in the development of nodular ferricrete, residual soils, colluvium and alluvial material related to the development of drainages systems.
Figure 3  Georgina Basin and major phosphate deposits

Note: deposits lie on the margins of the basin or on a major basin high (the Wonarah-Alexandria basement high) (after Khan, 2007)
5. **TARGET MINERALISATION STYLES AND EXPLORATION CRITERIA**

5.1 **Phosphate**

5.1.1 **Geology**

Phosphate deposits can be classified into three types. The most economically significant are marine sedimentary deposits, termed phosphorites, which are typically argillaceous to sandy sediments containing stratified concentrations of calcium phosphate, mainly as apatite. Phosphate mineralisation within the Georgina Basin is typical of this type of deposit. Other deposit types are apatite-rich igneous rocks, and modern and ancient guano accumulations.

The generally accepted genetic model for marine phosphate deposits relates to upwelling deep ocean currents feeding phosphate onto shallow marine platforms. The $P_2O_5$ concentration of marine waters is at a maximum at between 30 and 500m. Above this depth dissolved phosphorous is consumed by phytoplankton. Below 500m saturation of the water with respect to apatite is prevented by the increasing fugacity of CO$_2$ with depth. Precipitation of solid phosphate can thus occur between these extremes typically at a depth of 50 to 200m. Phosphorites generally form beds a few centimetres to tens of metres thick that are composed of grains of cryptocrystalline carbonate fluorapatite, which is often referred to as collophane, along with other detritus. Collophane grains were often carbonate grains, oolites or nodules that were phosphatised during diagenesis.

Many phosphorite deposits strongly resemble limestones and in fact contain bioclasts and ooliths in all stages of replacement by phosphate species. This is evidence that phosphate metasomatism is certainly an active process. This, however, does not constitute proof that the entire rock is a replacement product (Blatt et. al., 1980).

Ancient phosphate deposits are nearly all of shallow marine origin. This can be seen from the presence of shelf dwelling organisms, reef building algae and shallow water sedimentary structures. The phosphatic component occurs in the phosphorites as a cement; oolitic and pelletiferous grains, bioclastic fragments and intraclastic debris (Blatt, 1980). Paleobathymetry is thought to play an important role on the deposition and distribution of phosphorite facies sediments.

Phosphate nodules vary in size, up to several centimetres in diameter as well as in composition. Some nodules are composed mainly of collophane while some nodules are partially silt and clay i.e. terrigenous material in a collophane matrix. Nodules are also layered with some being concentrically banded. Many nodules are composed of smaller fragments and have a brecciated or conglomeratic texture. Nodular phosphorites are most common with platform style deposits; they are also a relict feature of many disconformity and unconformity surfaces.

5.1.2 **Economic Criteria**

Phosphate content of phosphate rock is generally quoted at $%P2O5$ or as $%BPL$ (bone phosphate of lime) which equates to $2.1853 \times %P2O5$. Sedimentary phosphate rock mined at present usually grades between 20 – 30$% P_2O_5$). Treatment is required to remove contaminants and to increase the grade of $P_2O_5$ to 30 – 40%. Figure 4 illustrates the grades of processed concentrates from various global phosphate producers (after Van Kauwenbergh, 2002). Treatment takes the form of either flotation or calcination. The beneficiated phosphate is treated with sulphuric acid to produce phosphoric acid, which is the feedstock for ammonium fertilizer. Superphosphate and triple superphosphate are the feedstock for higher-grade fertilisers.

Australia’s largest phosphate deposits are found in Middle Cambrian phosphorites of the Georgina Basin in Queensland, and include the Phosphate Hill deposit which is being mined by open-cut methods by Incitec Pivot Limited. Phosphate rock at Phosphate Hill is converted into high-quality ammonium phosphate fertiliser for domestic and export markets in a vertically integrated operation that includes the mine, a phosphoric acid facility and ammonia and granulation plants at Phosphate Hill, a sulphuric acid plant at Mount Isa, and storage and port facilities at Townsville. Approximately 2.1 Mt of phosphate rock is mined annually and used to manufacture di-ammonium phosphate fertiliser, mono-ammonium phosphate (MAP) and sulphur-impregnated...
MAP (MAP-S) products. The operation is Queensland’s most significant industrial mineral in terms of production value and in 2006-07 the company reported production of 961,000 tonnes of ammonium phosphate fertiliser.

**Figure 4** Phosphate grades of processed concentrates of sedimentary phosphate deposits (After Van Kauwenbergh (2002))

![Phosphate grades of processed concentrates of sedimentary phosphate deposits](image)

5.1.3 **Exploration Criteria**

Phosphate deposits within the Georgina Basin area exhibit a number of key geological features. All deposits are shallow marine and are either within 20 kilometres of the margins of the basin or lie on a major structural high within the basin (Figure 3). The depth at which phosphate precipitates out of solution is generally accepted to be in the range of 30 to 200 metres below surface, with most Georgina Basin deposits likely to be at the shallower end of this range.

The depositional environment bathymetry and sedimentary facies distribution play major roles in phosphate deposition and concentration. In particular embayments in the basin margin (i.e. lagoonal or estuarine environments) appear to often have been important sites for phosphate deposition. Understanding the depositional environment is very important to identify areas that have potential for accumulation of phosphate at economic grades at thicknesses.

In addition all known major deposits in the basin are of Middle Cambrian age and occur within the Beetle Creek and Wonarah Formations or equivalents. It appears that at this time the paleoclimatic and oceanic chemical conditions were the most favourable for deposition of phosphate.

Geophysical datasets are useful in aiding in the identification of outcropping phosphate occurrences asapatite within the phosphate beds may have a radioactive signature (Cooper, 2010). This appears to be the case with other Queensland phosphate deposits however Cooper (2010) notes Northern Territory deposits such as Wonarah, have no or minimal radioactive signatures. Cooper (2010) reviewed the geophysical characteristics of Georgina Basin phosphate deposits and concludes that they have no spectral signature (i.e. Landsat, Aster, Hymap), have no discrete magnetic or gravity signature, but that gravity and magnetic are useful in identifying basement highs or margin embayments that have potential for phosphate deposition.
5.2 Uranium Mineralisation Styles

Different styles of uranium mineralisation occur throughout the world, and those which are relevant to projects discussed in this report are noted here. Information regarding various deposit styles has largely been compiled from McKay & Miezitis, 2001. Uranium deposition has been proven to occur in a variety of environments of many different origins and as many diverse ore types. Economic uranium deposits occur in a variety of geological environments which include:

- **Vein-related** e.g. Jachymov (Czech Republic) and Shinkolobwe (DRC);
- **Primary magmatic intrusion** e.g. Rossing-alaskite (Namibia), Olympic Dam (Australia) and skarns;
- **Ancient placers** e.g. Elliot Lake (Canada), Witwatersrand (South Africa);
- **Unconformity-related** e.g. Athabaska (Canada), Alligator River (Australia);
- **Sandstone-hosted „roll front”** e.g. Grants Mineral Field (New Mexico, USA);
- **Calcrete drainage and playa lake** e.g. Yeelirrie (Australia).

**Unconformity-related deposits** - Unconformity deposits are typically Proterozoic in age and are developed in association with major structural dislocation and thrusting on the margins of basement ridges. Reactive metasedimentary rocks such as marble, calc silicate, graphitic schists, within and proximal to thrust zones, are preferred host lithologies especially where overlain unconformably by sheet sandstone sequences. The uranium is considered to be eroded initially from the high background basement and deposited in the overlying porous sandstone sequence. Subsequent fluid flow dissolves the uranium and transports it to suitable chemical and physical trap sites at the unconformable base of the sandstone and within underlying basement structures. Accompanying the uranium mineralisation is chlorite and hematite alteration which destroys magnetite and associated magnetic response. Unconformity deposits can be of relatively high grade and of significant tonnage. Examples of unconformity related deposits are Ranger, Nabarlec, Koongara and Rum Jungle in the Pine Creek Geosyncline of Australia and Cigar Lake, Gaertner and Midwest Lake in the Athabasca region of Canada.

**Sandstone deposits** - Sandstone uranium deposits occur in medium to coarse-grained sandstones deposited in a continental fluvial or marginal marine sedimentary environment. Impermeable shale/mudstone units are interbedded in the sedimentary sequence and often occur immediately above and below the mineralised sandstone. Uranium is precipitated under reducing conditions caused by a variety of reducing agents within the sandstone including: carbonaceous material (detrital plant debris, amorphous humate, marine algae); sulphides (pyrite, H2S); hydrocarbons (petroleum); and interbedded basic volcanics with abundant ferromagnesian minerals (e.g. chlorite).

There are three main types of sandstone deposits:

- **Rollfront deposits**, which are arcuate bodies of mineralisation that crosscut sandstone bedding;
- **Tabular deposits** are irregular, elongate lenticular bodies parallel to the depositional trend which commonly occur in palaeochannels incised into underlying basement rocks; and
- **Tectonic/lithologic deposits** which occur in sandstones adjacent to a permeable fault zone.

Sandstone deposits constitute about 18% of world uranium Exploration. Ore bodies of this type are commonly low to medium grade (0.05 - 0.4% U3O8) and individual ore bodies are small to medium in size (ranging up to a maximum of 50 000 tonnes U3O8). The main primary uranium minerals are uraninite and coffinite. Conventional mining/milling operations of sandstone deposits have been progressively undercut by cheaper in situ leach mining methods. Some of the largest known uranium deposits are of a sedimentary origin and in particular, from roll front deposition. The roll front deposition mechanism depends upon the geochemical cycle of uranium. At low temperature and pressures, uranium in rocks and minerals undergoing weathering and leaching is oxidised from $U^{IV}$ to $U^{VI}$. This is then soluble in ground waters as the $(UO_2)^{2+}$ ion. As long as the ground water remains oxidizing, the uranium ions remain mobile; when the water...
percolates through a reducing environment the uranyl ions are reduced and uranium is re-
precipitated as crystalline uraninite, as coliform bands or pitchblende, or in some cases as the
silicate coffinite. The uranium may also bond with vanadium to produce uranium /vanadium
minerals.

Roll front deposits form in porous sandstone units confined between impervious clay layers in arid
continental environments. They are Tertiary to Recent in age and typically occur in clusters. This
style of uranium deposit was the major source of uranium for the USA from 1950 to the 1970’s.
Other examples of roll front deposits are the Beverley Mine in South Australia the Manyingeec
deposit, Western Australia and the Kayelekera deposit in Malawi. They generally require easily
weathered tuffs or other uranium-rich source rocks in outcrop which are actively undergoing
oxidation and leaching. The ground waters become reduced and the uranium and associated elements drop out of solution
and form a roll front deposit. Such deposits may develop into tabular ore bodies or develop
lobes around the progressive roll front as it migrates forward with the ground water flow

**Surficial deposits** - Surficial uranium deposits are broadly defined as young (Tertiary to Recent)
near-surface uranium concentrations in sediments or soils. These deposits usually have secondary
cementing minerals including calcite, gypsum, dolomite, ferric oxide, and halite. Uranium
deposits in calcrite are the largest of the surficial deposits. Uranium mineralisation is in fine-
grained surficial sand and clay, cemented by calcium and magnesium carbonates. Surficial
deposits comprise about 4% of world uranium exploration. They are formed where uranium-rich
granes were deeply weathered in a semi-arid to arid climate. The Yeelirrie deposit in Western
Australia is by far the world's largest surficial deposit. Other significant deposits in Western
Australia include Lake Way, Centipede, Thatcher Soak, and Lake Maitland. In Western Australia,
the calcrite uranium deposits occur in valley-fill sediments along Tertiary drainage channels and
in playa lake sediments. These deposits overlie Archaean granite and greenstone basement of the
northern portion of the Yilgarn Craton. The uranium mineralisation is often comprised of
carnotite (hydrated potassium uranium vanadium oxide).

**Intrusive deposits** - included in this type are those associated with intrusive rocks including
alaskite, granite, pegmatite, and monzonites. Major world deposits include Rossing (Namibia),
Ilmaussaq (Greenland) and Palaborwa (South Africa). In Australia, the main locations are Radium
Hill (South Australia) which was mined from 1954-62 (mineralisation was mostly davidite) and the
larger ore bodies of low grade mineralisation known are at locations such as Crocker Well and
Mount Victoria in the Olary Province, South Australia.

**Phosphorite deposits** – Cambrian phosphorites at the Duchess deposit in north-west Queensland
feature an average grade of 0.0126% U_3O_8 (126ppm) in phosphate ore. Uranium concentrations
are generally noted as 0.01 to 0.0015% U_3O_8 within secondary phosphorites which may contain low
concentrations of uranium in fine-grained apatite.

### 5.2.1 Base Metals

### 5.2.2 Geology

There are many different styles of base metals mineralisation however only those types that are
relevant to the project area are discussed here.

**Mount Isa style Sediment hosted Zn-Pb-Ag;** these are found within metamorphosed pyritic and
dolomitic shales of the sedimentary successions of the Western Fold Belt. Mineralisation typically
occurs as tabular bedding parallel massive sulphide beds ranging from several mm up to 1m in
thickness. The major sulphide minerals are galena, sphalerite, pyrite and pyrrhotite. There is
some debate as whether the deposits are synsedimentary (sedimentary exhalative (SEDEX)) or
epirogenic in origin, with current consensus favoring the later. Notable deposits include Mount Isa

**Brecciated Sediment Hosted Cu;** brecciated sediment hosted Cu deposits occur within the
brecciated „silica-dolomite” host sediments proximal to fault zones within the Western Folds Belt.
Sulphides are typically chalcopyrite and pyrite. Deposits show a strong structural control and are often intimately associated with sediment hosted Pb-Zn mineralisation. Notable examples are the Mount Isa, Esparanza/Mammoth and Lady Annie.

Iron-oxide Cu-Au; these styles occur within high metamorphic grade rocks of the Eastern Fold belt with examples including Ernest Henry, Selwyn and Osbourne. This style of deposit typically occurs at the margins of large igneous bodies that intrude into sedimentary strata and typically occurs as pipes and breccias. Mineralisation is typically chalcopyrite-pyrite-magnetite.

Broken Hill Type Ag-Pb-Zn; this style of mineralization occurs within high metamorphic grade rocks of the Eastern Fold Belt with the Cannington being the only major example. Broken Hill type ore bodies are generally accepted as being SEDEX style deposits that have been extensively reworked and modified by metamorphism and shearing.

Mississippi Valley Type Pb-Zn (MVT); this style of mineralisation occurs in carbonate rocks where low temperature metal rich diagenetic fluids migrate into and are trapped in stratigraphic highs (typically folds, faults on sedimentary basin margins and graben structures). Mineralisation often occurs as massive sulphides with galena and sphalerite the main sulphide minerals and often forms pipe like bodies. Several explorers have explored for MVT deposits within the Georgina Basin carbonate rocks in the past, but to date no mineralization of this style has been identified.
10. TOBERMOREY PROJECT, NORTHERN TERRITORY

10.1 Introduction
The Tobermorey project consists of one granted tenement (EL26928) adjacent to the Queensland / Northern Territory border (Figure 11). Cape Lambert acquired 100% ownership of the tenements (into Australis) as part of the purchase of CopperCo assets in June 2009. The granted exploration tenement area covers 1,004.08km² and is located nearby to the Glenormiston Project in Queensland to the east. The Plenty Highway provides access to the area. The Tobermorey Project can be classified as an „Exploration Area“ mineral asset.

10.2 Geology
The geology of the Tobermorey project area is dominated by the basin fill sediments of the Cambrian to Mid Ordovician Georgina Basin, predominantly the Ordovician Ninmaroo Formation (Figure 10). The Cambrian and Early Ordovician rocks are predominantly marine carbonate rocks with minor sandstone and siltstone, and the Middle Cambrian rocks are mostly siltstone and sandstone. Much of the project area is overlain by recent cover rocks and alluvial material.

10.3 Previous Exploration
The Tobermorey Project area has been explored by previous workers. The details of this and the work that was completed are presented in Table 13.

<table>
<thead>
<tr>
<th>Table 13 Tobermorey Project - Previous Exploration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>1984-1990</td>
</tr>
<tr>
<td>2001-2005</td>
</tr>
</tbody>
</table>
Figure 11  Tobermorey Project Area Geology
10.4  Tenement Exploration Potential and Targets

10.4.1  Phosphate

The Tobermorey project area is considered to have a low prospectivity for phosphate deposits due to the following:

- Much of the area lies within the deeper portions of the Georgina basin in less favourable facies for phosphate deposition;
- Any mid Cambrian prospective shallow marine carbonate facies horizons are likely to be at depths that are uneconomic to explore for or mine;
- The project area is distal to the Georgina Basin margin and no obvious basement highs are evident from geophysical data or available geologic mapping.

10.4.2  Base Metals

The potential for base metal deposits within the project area is considered to be moderate. There are no outcropping Proterozoic age rocks within the project area. However Proterozoic aged rocks are interpreted to form the basement below the Palaeozoic to recent cover. A prominent northwest striking magnetic and gravity linear feature may be worthy of follow up.
The depth of cover needs to be determined before any further work is undertaken, but it is likely to be greater than 100 metres.

10.4.3 Uranium

The project represents a continuation of the anomalous radiometric signature covering paleochannels in the NW area of the Glenormiston Project. Similar surface geology is noted, although a brief search for historical reports found little of relevance. Anomalous uranium is associated with the Austral Downs Limestone. A relative prospectivity analysis with an overall rating factor of 20.5 is included below (Table 14). Further field checking with a hand-held scintillometer and regional sampling is recommended over anomalous uranium areas (Figure 12).

10.5 Recommended Exploration Program and Budget

A number of targets prospectivity for uranium has been identified from desktop geological and geophysical studies. Ravensgate recommends holding all the tenements within the project areas. A work program is proposed as follows:

Year One
- Compilation of all other appropriate geological and geophysical data to aid in target refining;
- Ground truthing of anomalies identified (i.e. to identify regolith regimes, assess outcrop and sample any prospective horizons);
- Mapping and appropriate surface geochemistry programs.

Year Two
- Drilling – systematic drill testing of anomalies defined in year one.
<table>
<thead>
<tr>
<th>Anomaly Name</th>
<th>Reference</th>
<th>Uranium</th>
<th>East MGA</th>
<th>North MGA</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper, 2010</td>
<td>Uranium</td>
<td>800,000</td>
<td>7,530,000</td>
<td>Limestone</td>
<td>Elevated surficial radiometric Uranium anomaly associated with Austral Downs from QLD projects. PIenty Highway runs through area.</td>
</tr>
</tbody>
</table>

Table 14 Tobermorey Uranium Targets
Rising Fertiliser Demand

- Pressure from
  - Population growth
    - 19% growth by 2025
  - Changing diets
    - Increasing in GDP/capita – increases demand for higher protein food
    - 1t beef requires 7t grain
    - 1980 Chinese meat consumption 15kg per person p.a.
    - 2003 Chinese meat consumption 55kg per person p.a.
  - Biofuels
    - Grain consumption for biofuel – around 5% of world demand

- Agricultural land is a depleting resource and fertilisers are necessary to increase yields.

### World Phosphate Rock Consumption by Region (Mt)

<table>
<thead>
<tr>
<th>Region</th>
<th>2006</th>
<th>2007</th>
<th>2008(e)</th>
<th>Change 06-07</th>
<th>Change 07-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Total</td>
<td>170.0</td>
<td>177.0</td>
<td>181.5</td>
<td>7.0</td>
<td>4.5</td>
</tr>
<tr>
<td>West Europe</td>
<td>6.4</td>
<td>6.8</td>
<td>6.8</td>
<td>0.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Central Europe</td>
<td>2.9</td>
<td>2.9</td>
<td>2.7</td>
<td>0.1</td>
<td>-0.2</td>
</tr>
<tr>
<td>FSU</td>
<td>11.8</td>
<td>12.8</td>
<td>13.4</td>
<td>1.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Africa</td>
<td>24.0</td>
<td>24.5</td>
<td>26.4</td>
<td>0.5</td>
<td>1.9</td>
</tr>
<tr>
<td>North America</td>
<td>34.0</td>
<td>34.8</td>
<td>34.4</td>
<td>0.8</td>
<td>-0.4</td>
</tr>
<tr>
<td>Central America</td>
<td>0.9</td>
<td>0.9</td>
<td>1.8</td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td>South America</td>
<td>8.1</td>
<td>9.1</td>
<td>9.4</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Middle East</td>
<td>7.0</td>
<td>6.7</td>
<td>6.7</td>
<td>-0.3</td>
<td>0.0</td>
</tr>
<tr>
<td>South Asia</td>
<td>7.4</td>
<td>7.0</td>
<td>7.4</td>
<td>-0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>South East Asia</td>
<td>3.9</td>
<td>3.8</td>
<td>4.0</td>
<td>-0.1</td>
<td>0.2</td>
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<tr>
<td>East Asia</td>
<td>60.5</td>
<td>64.4</td>
<td>65.0</td>
<td>3.9</td>
<td>0.6</td>
</tr>
<tr>
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<td>3.1</td>
<td>3.3</td>
<td>3.3</td>
<td>0.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Supply

- Global Phosphate production grew by 5.9Mt to an estimated 176.7Mt in 2007 and expected to increase to 182.1Mt in 2008.
- Growth in China accounted for the bulk of the increase, but this is expected to flatten.
- Record high prices has resulted in a number of new project announcements in Australia, Russia, Kazakhstan, Algeria, Egypt and Peru, although lead times can be up to 5 years.
- CRU expects that it is unlikely we will see a supply glut.

<table>
<thead>
<tr>
<th>Region</th>
<th>2006</th>
<th>2007</th>
<th>2008(e)</th>
<th>Change 06–07</th>
<th>Change 07–08</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Total</td>
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<td>31.0</td>
<td>30.4</td>
<td>1.4</td>
<td>-0.6</td>
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<tr>
<td>West Europe</td>
<td>5.6</td>
<td>6.0</td>
<td>6.0</td>
<td>0.4</td>
<td>0.0</td>
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<tr>
<td>Central Europe</td>
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<td>2.9</td>
<td>2.7</td>
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<td>-0.2</td>
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<tr>
<td>FSU</td>
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<td>0.1</td>
<td>0.1</td>
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<tr>
<td>South America</td>
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<td>Middle East</td>
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<tr>
<td>South Asia</td>
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<td>5.7</td>
<td>5.6</td>
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<td>South East Asia</td>
<td>2.8</td>
<td>2.8</td>
<td>2.5</td>
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<td>-0.3</td>
</tr>
<tr>
<td>East Asia</td>
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<td>0.1</td>
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<tr>
<td>Oceania</td>
<td>1.3</td>
<td>1.5</td>
<td>1.3</td>
<td>0.2</td>
<td>-0.2</td>
</tr>
</tbody>
</table>
Average operating costs US$40/t for mining and beneficiation to DSO grade. Lowest cost producers ~ US$30/t.

- Unit costs vary with:
  - Head grade
  - Strip ratio
  - Recovery
  - Mining ratio

- Capital Costs depended on the deleterious elements and grade – the more contaminated the ore – the more expensive it will be to beneficiate.

- Beneficiation costs vary depending on:
  - Dry vs wet separation
  - Dry wash screen vs flotation/magnetic separation.

- In Australia the first mover will have an advantage – establishing infrastructure access and placing sales contracts.