



<b>Titleholder</b>	Minemakers Australia Pty Ltd
<b>Operator</b>	Minemakers Australia Pty Ltd
<b>Tenement</b>	EL24607 (Wakaya)
<b>Report Title</b>	Final Report EL24607 3 July 2015 to 15 June 2016
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<b>Corporate author</b>	Minemakers Australia Pty Ltd
<b>Target commodity</b>	Phosphate
<b>Date of report</b>	12 July 2016
<b>Datum/Zone</b>	GDA94, Zone 53
<b>250,000 mapsheet</b>	Alroy and Frew River
<b>100,000 mapsheet</b>	Wonarah and Joildung
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## ABSTRACT

EL24607 is located approximately 215 km ESE of Tennant Creek on the Alroy and Frew River 1: 250,000 and the Wonarah and Joildung 1:100,000 map sheets in the Northern Territory. The tenement occurs within the central western part of the Georgina Basin where flat-lying, phosphate-bearing Cambrian sediments have been deposited. The lower part of this sequence, the Gum Ridge Formation, is considered prospective for phosphate mineralization overlying either carbonates or basalts of the Middle Cambrian. A total of 32 RC drill holes were drilled for a total of 1484 m with the phosphate mineralisation encountered being patchy, low grade or too deep to be of economic interest. Rehabilitation was completed in 2013-2014. The tenement was subject to a compulsory reduction as it had reached the end of its six year grant term. A partial relinquishment of the areas that were deemed to be peripheral to the major Wonarah phosphate depocentres was made in July 2015. The tenement was surrendered on 15 June 2016 on the basis that the costs associated with continuing to maintain an interest in the tenement were no longer justified.

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## **1. INTRODUCTION**

This is a final report and summarises exploration activities on EL24607, part of Minemakers Australia Pty Ltd's (MAPL) Wonarah Project, for the life of the tenement. Technical reporting for this tenement is included in the Wonarah Grouped Report, GR097/09. The reporting year ends on 8 January. No work has been done on the tenement this year.

MAPL is a wholly owned subsidiary of Minemakers Limited which listed on the ASX on 10 October 2006. Exploration is aimed at the discovery of economic phosphate deposits proximal to the Alice Springs-Darwin railway and associated with shallow marginal sediments at the western edge of the Georgina Basin.

## **2. LOCATION**

EL24607 is located approximately 215 km east-southeast of Tennant Creek in the Northern Territory (Figure 1). The tenement lies on the 1:250,000 Alroy SE5315 and Frew River SF5303 and the 1:100,000 Joildung 6157 and Wonarah 6156 map sheets.

Access to the project is via the Barkly Highway, the main paved freight link between Queensland and the Northern Territory. The nearest town is Camooweal in western Queensland, approximately 180 km to the east. Access within the tenement is via a network of dozed tracks suitable for 4WD only through other tenements within the Wonarah project.

## **3. TENURE AND TITLE HISTORY**

EL24607 comprising 45 blocks (95.8 km<sup>2</sup>) was granted on 3 July 2009 to Minemakers Australia Pty Ltd for a period of six years. The tenement was subject to a compulsory reduction as it had reached the end of its six year grant term. A partial relinquishment of the areas that were deemed to be peripheral to the major Wonarah phosphate depocentres was made in July 2015. The tenement was reduced to 22 blocks (66.78 km<sup>2</sup>) and a Partial Relinquishment Report was submitted (Pellatt and Fulton, 2015).

EL24607 is located on NT Portion 3976, Wakaya Aboriginal Land Trust.

Exploration drilling programs were authorised by the Department of Resource Development, Primary Industries, Fisheries & Mines (Mining Management Plan): Wonarah Project Authorisation 0413-01, 0413-02, 0413-03, 0413-04 and 0417-02.

MAPL obtained sacred site clearances through the Central Land Council: Sacred Site Clearance Certificate C2009-003, C2010-032 and C2012-094.

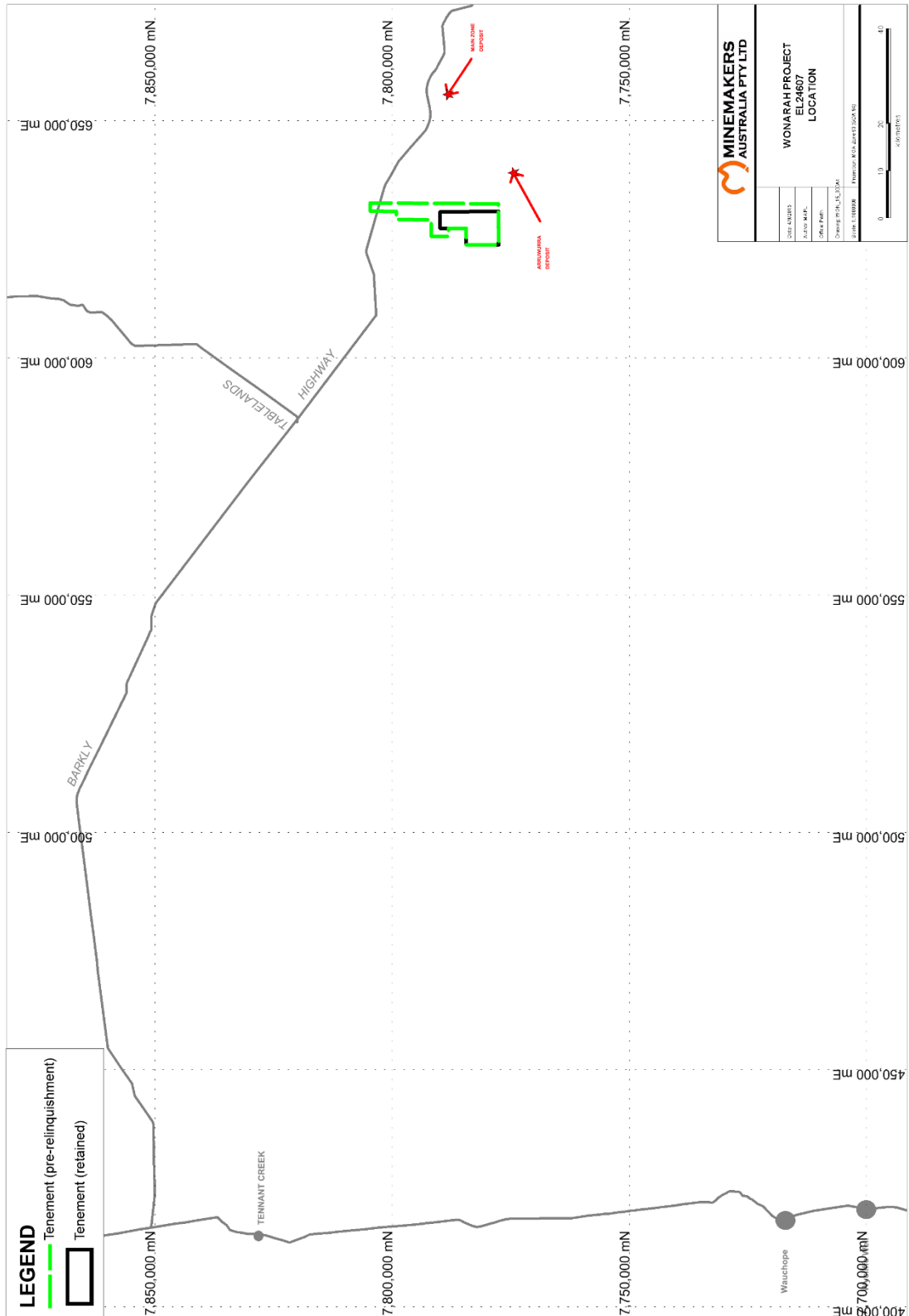


Figure 1: Location of EL24607.

## 4. GEOLOGY

### 4.1 Deposit style and model

Minemakers Australia is seeking to develop a large sedimentary phosphate deposit within the Georgina Basin. The Georgina Basin is an extensive late Proterozoic to early Palaeozoic basin that extends from northwestern Queensland through much of the eastern Northern Territory area and which hosts several large sedimentary phosphate deposits. A map representing the regional geological setting is presented in Figure 2.

Sedimentary phosphate deposits are restricted in their occurrence globally. The model for phosphate deposition requires upwelling, cold phosphate-saturated water depositing phosphate onto the continental shelf where the required narrow pH range is locally present. Co-deposition with carbonate occurs at slightly higher pH values. Carbonate deposition becomes dominant at higher pH. Post-depositional reworking and replacement of carbonate facies by phosphatic mineralisation is probably an important factor in upgrading phosphorite grades to economic levels.

### 4.2 Regional Geology

The Wonarah phosphate project is situated in the central western Georgina Basin, a large late Proterozoic to early Palaeozoic basin that extends from northwestern Queensland through much of the eastern Northern Territory.

Basement rocks in this part of the Georgina Basin are comprised of granites of unknown age. They are possibly correlates of the Palaeo-Proterozoic rocks of the Tennant Creek region. Mesoproterozoic sediments and volcanics are overlain by the Early Cambrian Helen Springs Volcanics (formerly Peaker Piker Volcanics). A northeast-southwest trending basement high runs through the Wonarah project area.

Overlying Middle Cambrian sediments are divided into two basin-wide sequences. Sequence One deposited clastics, carbonates, organic shales and minor phosphorites during gradual transgression which was abruptly terminated by rapid regression. In the Wonarah region, basement highs are flanked by onlapping dolomitic rocks equivalent to the Thornton Limestone. An erosional unconformity is represented by the development of a karst surface.

Sequence Two deposited shallow clastics, carbonates, grainstones, peritidal phosphorites and phosphatic limestones in a transgressive tract system. At Wonarah dolostone, mudstone and phosphorite of the lower Middle Cambrian Upper Gum Ridge Formation overlie Sequence One rocks and basement highs. This formation contains major phosphorite mineralisation and is equivalent to the Beetle Creek Formation on the eastern Margin of the basin which hosts Phosphate Hill and Lady Annie-D-Tree phosphate deposits. The overlying Wonarah Beds are Middle Cambrian mudstone, siltstone and dolostones. Silcrete, ferricrete and calcrete regolith are extensively developed and large areas are covered by stabilised aeolian sand.

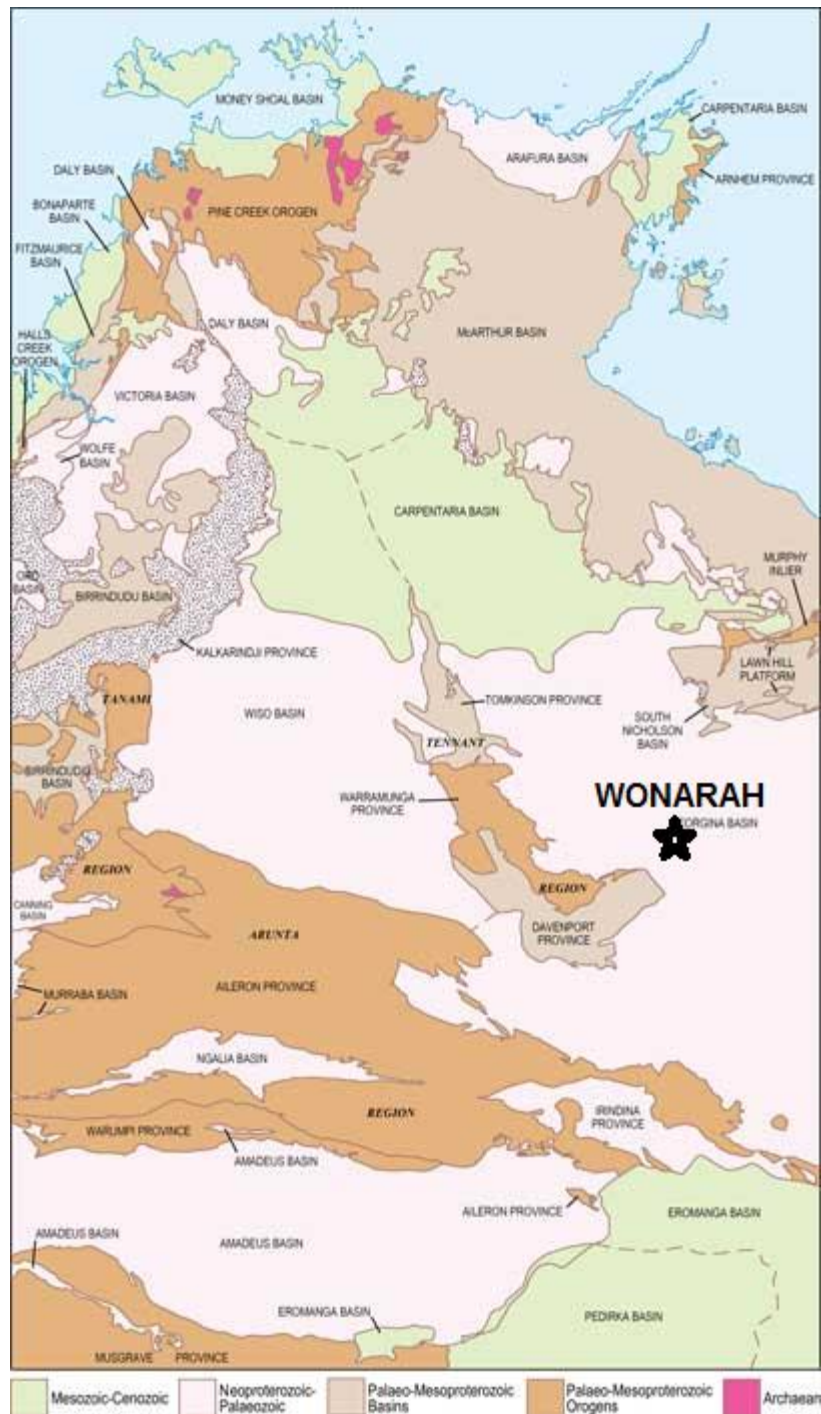


Figure 2: Regional geological setting (from the NTGS)

### 4.3 Local Geology

Basement in the Main Zone area is alkali feldspar granite of possible Palaeo-Proterozoic age. These are overlain by the Helen Springs Volcanics. The top of the basalt is extremely weathered and a ferruginous and manganiferous duricrust is developed locally. Where less weathered, the basalt is vesicular, amygdaloidal and irregularly porphyritic. Dolomitic rocks of the Thornton Limestone equivalent are present above the basalt at the southeastern extremity of the Main Zone. To the east and the south the carbonate rocks are developed extensively.

The overlying phosphate-bearing Upper Gum Ridge Formation is divided into five main units: a basal, indurated high grade phosphorite; muddy to sandy, clay-rich transitional sediments; a chert breccia phosphorites; a mudstone phosphorite; and a convolute mudstone.

The basal Transitional Phosphorite is a laterally discontinuous high grade indurated phosphorite up to 3m thick developed throughout the eastern and southern part of the Main Zone.

The Transition Sediments (TUN) are laterally continuous, 4-6m thick and comprised of clay-rich mudstone and siltstone with minor phosphorite, dolomite, sandstone and basal epiclastic.

The Chert Breccia Phosphorite forms a distinctive, laterally continuous horizon, 1-10 m thick, and comprised of yellow, grey or pink, variably friable or indurated, low to high grade phosphorite with abundant dark grey chert. Chert averages 50-60%.

The Mudstone Phosphorite is the main phosphate-bearing unit at Wonarah and is comprised of 1-10m of yellow and pink mudstone phosphorite with trace to minor dark grey chert. The mineralogy is dominated by (carbonate)-fluorapatite –  $\text{Ca}_5(\text{PO}_4, \text{CO}_3)_3\text{F}$ . The MPH is variably friable or indurated with the indurated phosphorite typically being high to very high grade (30-40%  $\text{P}_2\text{O}_5$ ).

The Convolute Mudstone is a 1-10m thick unit of white, light grey and yellow clay-rich variably convolute mudstone with minor siltstone and fine sandstone interbeds. It generally contains minor (<10%)  $\text{P}_2\text{O}_5$ .

The Wonarah Beds overlie the Convolute Mudstone and are comprised of mudstone and siltstone with minor chert, the Hangingwall Mudstone. The Wonarah Beds thicken towards the east and south away from the basement high that defines the western fringe of the Main Zone. Dolomitic units, the Hangingwall Dolostone, are present east and south of the Main Zone.

Regolith is extensively developed throughout the Main Zone with silcrete and ferricrete present in most holes. Low silcrete ridges are prominent features. Colluvial and alluvial deposits are common and extensive stabilised aeolian deposits cover much of the regolith.

The phosphatic units thin and peter out towards the basement high which trends in a northeast-southwest direction towards Arruwurra. To the east and south the phosphatic units, although still present with grade and thickness, are too deep to be of economic interest at this time.

A stratigraphic column and schematic section are presented in Figure 3 and Figure 4 respectively.



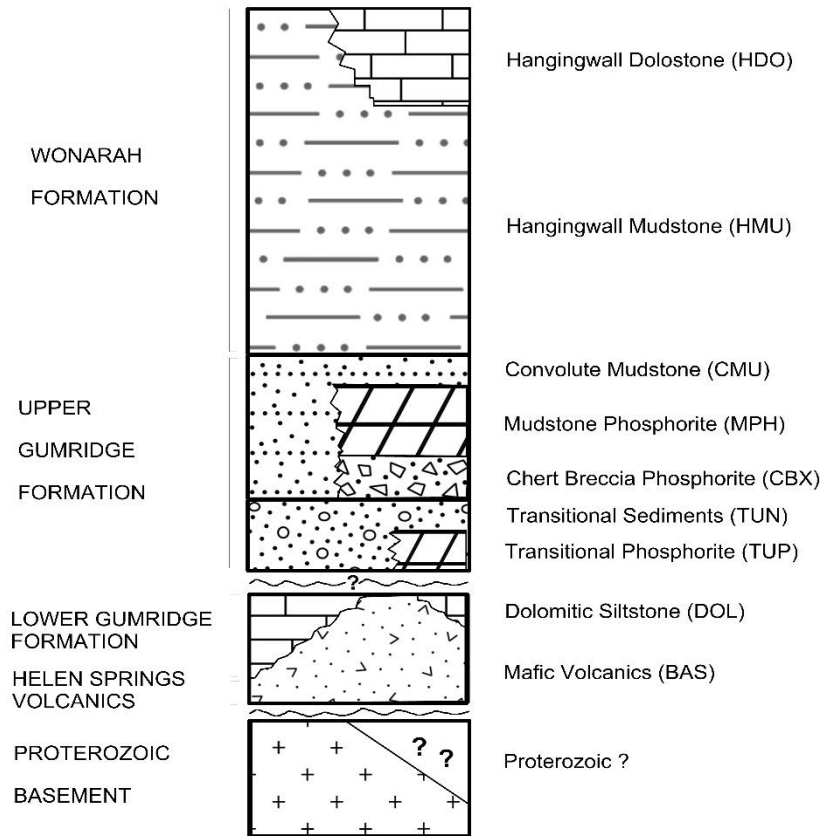


Figure 3: Regional Stratigraphic Column

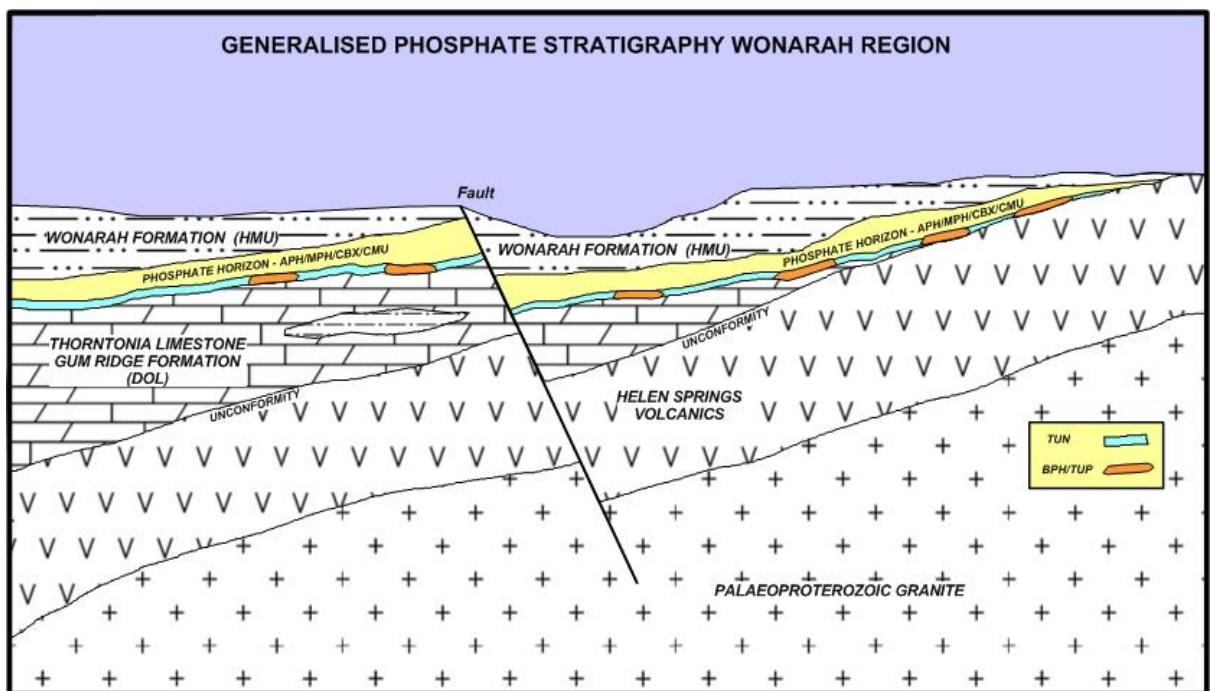


Figure 4: Schematic Regional Geology Section

## 5. WORK COMPLETED

Minemakers commenced fieldwork in 2010 and work is reported as part of the Group Report, GR97-09, as part of the Wonarah Project, with a reporting date of 8 January (Figure 2). Previous work is detailed in Fulton et al (2011) and Pellatt and Fulton (2013-2015).

During the year ended January 2011 the following work was carried out:

- In July-August 2010, a total of 21 reconnaissance exploration RC holes for 952 m. The primary purposes of the 2010 program were to test the potential for shallow economic phosphate rock deposits along the western and northern portions of the combined Wonarah project area. This drilling was carried out by Well Drilled Pty Ltd, Townsville using Warman Investigator Mk IV with 1050 cfm x 350 psi, deck mounted on a 4 x 4 Isuzu truck. A support truck with 600 psi booster was available. Assays were submitted to Amdel, Mt Isa and dried at 105-110<sup>o</sup> C then crushed in a Boyd crusher. A nominal 100 g sample was rotary split from the bulk then pulverised in a tungsten-carbide mill to minimise iron contamination. A sub-sample of the analytical pulp was fused with lithium metaborate to form a glass disc which was then analysed by XRF for the following oxides: P<sub>2</sub>O<sub>5</sub>, Al<sub>2</sub>O<sub>3</sub>, CaO, K<sub>2</sub>O, Total Fe as Fe<sub>2</sub>O<sub>3</sub>, MgO, MnO, Na<sub>2</sub>O, SiO<sub>2</sub>, TiO<sub>2</sub> (Lower detection limit of 0.01% for each.) A minimum laboratory repeat rate from the pulp sample of 1 in 20 samples is carried out. All RC samples were measured for radioactivity using a RadEye PRD device. The device measures gamma radiation and the purpose of the exercise was to detect potential high uranium samples and to help with geological logging.

During the year ended January 2012 the following work was carried out:

- Coffey Environments Australia Pty Ltd, Darwin was commissioned to provide an Exploration Activities Site Audit to satisfy requirements specified in the Exploration Operations Management Plan (EOMP) and to assess the effectiveness of the environmental management of the Wonarah project.

During the year ended January 2013 the following work was carried out:

- A total of 11 RC holes for 532 m were drilled. The drilling was carried out by Kennedy Drilling, Kalgoorlie using a KD 150 RCA rig mounted on a MAN 6 x 6 truck with a Sullair 1150 cfm x 350 psi auxiliary compressor and a 1400 cfm x 700 psi Hurricane 636-41B booster. The hole diameter was 4 ¾" diameter. Assays were submitted to Amdel, Mt Isa as per the 2010 program.

During the year ended January 2014 the following work was carried out:

- Rehabilitation of all 2010 and 2012 RC drill sites by TGS Indigenous Mining Services (TGSIMS), a company wholly-owned by a traditional owner. TGSIMS supplied and operated a 1.7 t rubber-tracked excavator (transportable by trailer) for cleaning up RC sites, including burial of RC material, and other smaller rehabilitation jobs. The machine has a very low impact on the environment and is able to access old tracks with vegetation regrowth with a minimum of damage. For rehabilitation of access tracks that had sustained erosional damage, TGSIMS used a 5.5 t Kubota excavator, with blade, and a 12 t Kenworth tipper.

During the year ended January 2015 the following work was carried out:

- Rehabilitation focusing on closing off drill access tracks and repairing damaged tracks.



## 6. CONCLUSION AND RECOMMENDATIONS

The exploration work carried out on EL24607 has demonstrated that there is potentially significant phosphate mineralisation within the tenement. However, the mineralisation is at the periphery of the very large Wonarah phosphate deposit and does not warrant further exploration by Minemakers at this time, given the abundance of better phosphate mineralisation present on the nearby Wonarah mining lease. In the light of decreasing availability of funds, Minemakers considered that the costs associated with maintaining an interest in the tenement, including government tenement rental fees, minimum exploration expenditures and land access costs, were no longer justified and the tenement has been surrendered.

Minemakers will continue monitoring of environmental rehabilitation to ensure that the following goals are met:

- ensure long term stability of all landforms
- return disturbed areas to natural vegetation to be managed by the Aboriginal Traditional Owners.

There are no further recommendations in regard to this title.

## 7. REFERENCES

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