EL 29048

PARTIAL RELINQUIHSMENT REPORT

3 JULY 2012 to 2 JULY 2014

By

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GRIGM RESOURCES PTY LTD

20 August 2014

Target Commodities: Cu

MAP REFERENCE

NT 1:250 000 VICTORIA RIVER DOWNS, SE 5204
NT 1:100 000 KILLARNEY, 5265 & MONTEJINNI 5264

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Abstract

EL29048 locates about 275km southwest of township of Katherine, and is being explored by GRIGM Resources Pty Ltd since granted by NT Department of Mines and Energy on 3 July 2012. In order to meet Mineral Titles Act requirements, 44 blocks of EL29048 were surrendered in July 2014.

EL29048 license area locates in Kalkarindji Continental Flood Basalt Province, within the outcrop area of Kalkarindji Suite. Kalkarindji Continental Flood Basalt is characterised by very low concentration of Platinum Group Elements (PGE). This was considered (Glass et al) to be comparable with that of Siberian Traps Large Ingeous Province at Noril’sk in northern Siberian, which is host to World-class nickel mineralization.

The licensed area is considered to be prospective for Cu, as there are two copper occurrences in the area, Crows on’s Prospect Cu in the south and an unnamed Cu occurrence near Shoe Tool Bore in the north.

Work completed in the relinquished area include:

1. Detailed literature review;
2. General ground inspection and check the mineral occurrences;
3. Ground check stream sediment geochemical anomalies;
4. Ground check the gravity anomalies.

No significant Cu mineral occurrence has been located within the relinquished area.

Weak positive copper stream sediments geochemistry anomalies within the relinquished area are located in the areas where the basalts are in contact with intercalated chert and/or limestone. Copper enrichment could be related to fluid activities along contact zones.

Ni and Pb stream sediments anomalies distributed along a northwest direction, in consistence with that of Cu. This might reflect that Cu-Ni and Pb were enriched during the same and/or closely related mineralization process.

Due to thick Quaternary cover, ground check gravity anomaly has failed to get any meaningful results. Ground geophysical survey may be needed to clarify the anomalies.
Introduction

Exploration Licence EL29048 was granted to GRIGM Resources Pty Ltd by NT Department of Mines and Energy on 3 July 2012 for a period of six years. For the past two years, GRIGM Resources Pty Ltd has been exploring for Cu in the area. This report has been prepared to satisfy Mineral Titles Act requirements over the relinquished area.

Tenure details

EL29048, total of 84 units (Table 1), is located about 275km southwest of township of Katherine, accessing by Buntine Highway, Buchanan Highway, and local 4WD tracks (Figure 1).

<table>
<thead>
<tr>
<th>Table 1 EL29048 units</th>
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<tr>
<td>SD52 355</td>
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Figure 1 EL29048 location diagram
To meet Mineral Titles Act requirement, 44 blocks (listed in table 2, and shown in Figure 1 and Figure 5) were surrendered in July 2014.

**Table 2  Relinquished blocks of EL29048**

| SE52 427 | J, K, O, P, T, U, Y, Z |
| SE52 428 | F, G, L, M, Q, R, V, W |
| SE52 499 | D, E |
| SE52 501 | F, L, Q, V |
| SE52 572 | C, D, E, H, J, K |
| SE52 573 | A, F |

**Geological Setting**

EL29048 license area locates in Kalkarindji Continental Flood Basalt Province, within the outcrop area of Kalkarindji Suite (Figure 2).

During the early Cambrian, a widespread outpouring of sub-aerial basaltic lava covered a large area of northern Australia, central Western Australia, northwestern South Australia and possibly South East Asia that have subsequently been rifted from Australia (Glass, et al, 2013). These include the Antrim Plateau Volcanics, Nutwood Downs Volcanics, Helen Springs Volcanics, et, al. in the Northern Territory and equivalent exposures in Western Australia. Based on geochemical and isotopic similarities, Glass (2002) included all of these
coeval mafic igneous units within a new province and named it Kalkarindji Continental Flood Basalt Province.

Late early Cambrian volcanic units of the Kalkarindji flood basalt province in northern Australia were previously formalized as the Kalkarindji Volcanic Group (Kruse in Rawlings et al 2008), this definition also included various minor intercalated and immediately underlying sedimentary units. However, given the dominance of the igneous component, the formal stratigraphic definition for this province is now redefined as Kalkarindji Suite, so as to include volcanic and intrusive constituents. Minor intercalated sedimentary components of the formal Kalkarindji Volcanic Group are not included within the formal definition of the Kalkarindji Suite, but are included within the constituent formations (Glass et al 2013).

Glass et al (2013) state that the Kalkarindji basalts consist of a series of 20-250m thick lava flows of mostly fine-grained massive basalt with conspicuous vesicular flow tops and less common plagioclase-phyric basalt. The basalt mineral assemblage comprises plagioclase, clinopyroxene (augite or pigeonite), rare orthopyroxene with lesser ilmenite, titanomagnetite, primary and secondary quartz and K-feldspar. Olivine, mica and hornblende are accessory components. Glass (2002) described the petrology of the Kalkarindji basalts in detail and this is cited here. Texturally the basalts vary from extremely fine-grained aphanitic rocks to porphyritic and coarse-grained rocks approaching doleritic textures. The primary phenocryst and microphenocryst phases are subhedral clinopyroxene, near-euhedral plagioclase feldspar and, in the most evolved rocks, abundant quartz. Secondary phases include chlorite, albite, K-feldspar, quartz and titanite. Rocks that have undergone hydrothermal alteration are commonly chloritic and haematitic, and have amygdales filled with secondary prehnite, malachite, calcite and silica. Groundmass phases are mostly coarse to medium-grained, ophitic to granular and intergranular (euhedral plagioclase laths and subhedral pyroxene).

Geochemical features for the Kalkarindji Province basalts were described in detail by Glass (2002) and Glass and Phillips (2006). The Most distinctive feature for the Kalkarindji Province basalt is the overall geochemical homogeneity across the entire province. The basalts are low-Ti tholeiites, MgO wt% values are variable and range from ca 9 to 3 wt% with a mean of ca 6 wt%. Mg# (molar100*Mg/(Mg+Fe2+) for Fe2O3/FeO=0.15) varies from 72 to 34; however, values for most basalts cluster between 65 and 50. The Kalkarindji basalts are distinguished by low high-field-strength element (HFSE) abundances, eg low elemental abundances of Ta, P, Ti and Nb relative to the incompatible elements. The basalts and dolerites further show extreme enrichment in the most incompatible elements, such as Th, U and Light Rare Earth Elements (LREE), far removed from normal basaltic compositions and more similar to continental crustal compositions. These distinctive geochemical characteristics serve to distinguish the Kalkarindji basalts from all other large igneous provinces worldwide (Glass et al 2013).

Platinum Group Elements (PGE) abundances are extremely low, in most cases below the detection limit (Glass 2002) and may indicate sulphide saturation at some stage in the basalt petrogenesis. Depletion in the PGE may indicate sulphide segregation associated with crustal contamination, which would have resulted in the sequestering of chalcophile elements; this has implication for nickel prospectivity for the Kalkarindji Suite (Glass et al 2013). Similar depletions in PGE patterns to Kalkarindji volcanic rock occur in Siberian Traps Large Igneous Province at Noril’sk in northern Siberian (eg Brugmann et al 1993), which is host to World-class nickel mineralization.
Figure 3 Location of BMR stratigraphic drillholes (drill log shown in Figure 4) (from Glass et al 2013)

Figure 4 Lithological logs of stratigraphic drillholes in Victoria River region. TD= Total Depth (from Glass et al 2013)
In and around EL29048 area, thickness of the flood basalts is up to 243 meters. BMR drilling project in the Victoria River region resulted in nine stratigraphic drillholes (Bultitude 1971). Three drillholes locate in and in the immediate vicinity of EL29048 licensed area (Vitoria River Downs 1, 2, and three in Figure 3, and VR1, 2 and 3 in Figure 4). Lithological drill logs are shown in Figure 4. Drillhole Victoria River Downs 2 encountered 243.8 meters of basalt (VR2 in Figure 4).

In southern part of EL29048 licensed area, Kalkarindji basalts are unconformably overlain by early middle Cambrian Montejinni Limestone of Wiso Basin (Randal and Brown 1967). Kruse and Munson (2013) described Montejinni Limestone as limestone and dolostone, include maroon-green siltstone, minor dolomitic quartz sandstone and local basal polymict breccia.

Mineral resources

The recorded mineral resources within Kalkarindji Province include copper and nickel.

Work carried out by BMR in 1950s and 1960s, and later by the Northern Territory Geological Survey identified widespread, but not economically significant copper mineralization in the upper most units of the Antrim Plateau Volcanics, near and along the contact with the overlying limestone. A total of 19 recorded occurrences are known in Northern Territory (NTGS MODAT record, Glass et al. 2013). Extensive exploration for copper was conducted in the Northern Territory by a joint venture led by Metals Exploration NL. Glass summarized the various style of copper mineralization distinguished in early studies (Erskine et al 1970, Burt et al 1970, Miguel 1974) as follows:

* Structurally controlled copper mineralization in fault and shear zones (eg malachite and chalcocite associated with fault and shear zones at the Cave prospect)
* Copper mineralization in the basal three metres of the overlying Headleys Limestone (chalcocite, malachite and azurite).
* Copper mineralization associated with secondary vesicle infills in basaltic flow tops, or disseminated in massive basalt in the upper Antrim Plateau Volcanics (native copper, chalcopyrite, cuprite, chalcocite and malachite).
* Copper mineralization associated with agglomerate (chalcocite, malachite associated with barite veins).
* Finely disseminated native copper and chalcopyrite in massive basalt flows (eg at Blackfella Rockhole, about 12km southwest of Mount Barton in LIMBUNYA).
* Copper mineralization linked with black manganiferous limestone mounds of possible fumarolic origin (hot seeps).

The Kalkarindji flood basalts have been considered analogous to continental flood basalts in other parts of the world, most importantly the basalts at Noril’sk in Russia, which are host to large Ni-Cu-PGE deposits. Drilling to date has failed to find any economically significant deposit.

EL29048 licensed area is considered to be prospective for Cu, as there are two copper occurrences in the area, Crowson’s Prospect Cu in the south and an unnamed Cu occurrence near Shoe Tool Bore in the north (Figure 5).
Work completed (July 3, 2012 to July 2, 2014)

Work completed in the area includes:

1. A detailed review of the previous exploration work;
2. Analyse the existing aero-geophysical images of the area;
3. General ground inspection and check the mineral occurrences within the licensed area;
4. Ground check stream sediment geochemical anomalies;
5. Ground check the gravity anomalies in and around the licensed area.
Results

Ground check copper mineral occurrences

Two copper mineral occurrences were reported in the license area, Crowson’s Prospect in the south and an Unnamed Cu prospect in the north. No Cu occurrences located within the relinquished area.

Ground check stream sediment geochemistry anomalies

Existing stream sediments geochemistry survey results of the EL29048 and surrounding area by previous exploration companies have been extracted from the Northern Territory Geological Survey Database and displayed as Figure 6. Ground check throughout the EL29048 licensed area has been carried out.

Figure 6 Cu, Ni, Pb, and Zn stream sediments geochemistry survey results
Weak positive Cu anomalies located in the north part of the relinquished area (Figure 6), where intercalated chert and/limestone are in contact with basalt. This could be indicative of fluid activity along contact zone between basalt and chert/limestone. Distribution of Ni and Pb anomalies are in consistence with that of Cu, this may reflect that enrichment of these elements is in the same or very closely related mineralization process.

**Ground check gravity anomalies**

![Figure 7 Regional Aero-gravity image around EL29048](From NTGS Web-page, STRIKE)

Figure 7 is regional aero-gravity image around EL29048 area. A very gentle positive gravity anomaly extending northwest pass through relinquished area. This could indicate existence of mafic dykes. Ground check has failed to get any meaningful result as the Quaternary cover is thick in the area.
**Conclusion and recommendation**

1. No significant Cu mineral occurrences located within the relinquished area in EL29048;

2. Weak positive copper stream sediments geochemistry anomalies within the relinquished area locate the areas where basalts are in contact with intercalated chert and/or limestone. Copper enrichment could be related to fluid activities along contact zones.

3. Ni and Pb stream sediments anomalies distributed along a northwest direction, in consistence with that of Cu. This might reflect that Cu-Ni and Pb were enriched during the same and/or closely related mineralization process.

Due to thick Quaternary cover, ground check gravity anomaly has failed to get any meaningful results. Ground geophysical survey may be needed to clarify the anomalies.

Following works have been recommended for the next stage exploration:

1. Small scale mapping in the areas near contact zone between basalt and chert/limestone;

2. Ground geophysical survey to clarify the gravity anomalies.

To meet NT Mining Act requirement, 44 blocks, as described here, were surrendered in July 2014. GRIGM Resources Pty Ltd will continue its exploration project in the retained area within EL29048.

**References**


