EL 29045

FIRST ANNUAL REPORT

FOR THE PERIOD

3 Jul 2012 to 2 Jul 2013

By

Company Geologists

Dr Zhiyu Jiang & Dr Jianchun Lu

June 26 2013
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Title Page

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Name of project operator: GRIGM RESOURCES PTY LTD
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Reporting Period: 3 Jul 2012 to 2 Jul 2013
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Date: 26 Jun. 2013
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Related NT 1:100 000 Pine Creek, 5270
Related NT 1:250 000 Pine Creek, SD5208
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Abstract

Exploration title EL29045 was granted to GRIGM RESOURCES PTY LTD on 3 July 2012. During the last year, a detailed review of the previous exploration work has been conducted. The title area is situated in the Cullen Mineral field which lies in the southern central part of the Pine Creek Geosyncline containing Early Proterozoic metasediments of the Namoona, Mount Partridge, South Alligator and Finniss River Groups comprising shale, siltstone, quartz sandstone, conglomerate, greywacke, dolomite, dolarenite, dololutite and tuff. These metasediments were intruded by pre-orogenic sills of Zamu Dolerite and syn-to post-orogenic granitoids of the Cullen Batholith, including granodiorite, several varieties of granite and leucogranite, bodies of monzonite and younger syenite dykes, then deformed and metamorphosed to Greenschist facies. Mineralisations in the Cullen Mineral field include hydrothermal tin, tungsten, gold, silver, lead, zinc and copper deposits. These mineral deposits are mostly in north to northwest-trending shear zones and are confined to Early Proterozoic contact metamorphosed metasediments or synorogenic to postorogenic granitoids. Generally a ore-forming metal zonation occurs from uranium close to granitoid to tungsten, copper, tin, silver-lead and gold with increasing distance from the contact of granitoid. Most of the granitoids are highly fractionated with later stage leuco-granitic phases with anomalous ore-forming metal values and forming cusps connected to the main body at shallow depths.

Outcrops in the title area are dominant granites with a boundary in nearly E-W trend in middle of the title area. A mineral occurrence, alluvial Tin, is present in the boundary area along the Nellie Creek. No primary tin mineralisation had been found in the geological reconnainaces trip. Therefore, GRIGM Resources Pty Ltd would like to reduce the blocks. An isolated meganetic anomaly is also located northeastern corner of the title area. A potential explor for tin and base metal mineralisation exists.
Introduction

Exploration Licence EL29045 was granted to GRIM RESOURCES PTY LTD by NT State DEPARTMENT OF RESOURCES on 3 July 2012 for a period of six years. This report summarises work carried out on EL29045 during the period 3 July 2012 to 2 July 2013.

Tenure details

EL29045, total of 35 units (Table 1), is located about 22km northeast of Pine Creek, accessing by Kakadu Highway and local 4WD tracks (Fig. 1).

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**Table 1** EL29045 units

<table>
<thead>
<tr>
<th>BLOCK NO</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>SD52 1439</td>
<td>M, S, T, U, X, Y, Z</td>
</tr>
<tr>
<td>SD52 1440</td>
<td>L, O, Q, R, S, T, U, V, W, X, Y, Z</td>
</tr>
<tr>
<td>SD52 1510</td>
<td>K</td>
</tr>
<tr>
<td>SD52 1511</td>
<td>C, D, E, F, G, L, M</td>
</tr>
<tr>
<td>SD52 1512</td>
<td>A, B, C, D, E</td>
</tr>
<tr>
<td>SD53 1369</td>
<td>Q, V</td>
</tr>
<tr>
<td>SD53 1441</td>
<td>A</td>
</tr>
</tbody>
</table>

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**Figure 1** EL29045 Location Diagram
Geological Setting

Geologically the area of EL29045 is located in Cullen Mineral Field which lies in the southern central part of the Pine Creek Geosyncline (Fig. 2), containing Early Palaeoproterozoic metasediments of the Namoona, Mount Partridge, Sough Alligator, and Finnis Rier Groups. This metasediments comprises shale, siltstone, quartz sandstone, conglomerate, greywacke, dolomite, dolarenite, dololutite and tuff and was intruded by pre-orogenic sills of Zamu Dolerite. Felsic volcanics (El Sherana and Edith River Groups) overlayers these basement unconformably. Then syn- to post-orogenic granitoids of the Cullen Batholith emplaced with an extensive metamorphosion to greenschist facies. The Cullen Batholith includes granodiorite, several varieties of granite and leucogranite, bodies of monzonite and younger syenite dykes, which could be the major heat source associated with the ore-forming hydrothermal fluid activities in the Cullen Mineral Field.

![Fig. 2 Location of Cullen Mineral Field and EL29045.](image)

Middle Proterozoic, Palaeozoic and Mesozoic strata unconformably overlying on the Early Proterozoic rocks and form tablelands and plains outskirt the mineral field to the southwest and southeast.

Mineralisation

The Pine Creek Orogen is the most productive part of the North Australian Craton, with over 1,000 mineral occurrences. It contains over 20% of the world’s low-cost U resources, has a known resource of about 9 M oz of Au, and produced 3.2 M oz of Au between 1870 and 2007. Considerable
resources of Ni-Co-Pb-Cu, Pb-Zn-Ag, Pt-Pd, Sn-Ta-W, Fe ore, magnesite, phosphate and other commodities also exist in this region.

Mineralisations in the Cullen Mineral field include hydrothermal tin, tungsten, gold, silver, lead, zinc and copper deposits. These mineral deposits are mostly in north to northwest-trending shear zones and are confined to Early Proterozoic contact metamorphosed metasediments or synorogenic to postorogenic granitoids. Generally a ore-forming metal zonation occurs from uranium close to granitoid to tungsten, copper, tin, silver-lead and gold with increasing distance from the contact of granitoid. Most of the granitoids are highly fractionated with later stage leuco-granitic phases with anomalous ore-forming metal values and forming cusps connected to the main body at shallow depths.

The term "Cullen Mineral Field", first used by Needham (1981), defines the group of mineral deposits and occurrences located within the Cullen Batholith and its adjacent contact metamorphic aureole. Over 230 mines and prospects occur in the mineral field. It is also a major centre of metal production in the Northern Territory, specially gold, silver, lead, copper, tin, tungsten and iron with minor amounts of zinc, cadmium, bismuth, arsenic, molybdenum and uranium (Stuart-Smith and other, 1993). Up to June 1989 metal produced in the Cullen Mineral Field is shown in Table 2.

Table 2. Recorded mine production to June 1989 from Cullen Mineral Field

<table>
<thead>
<tr>
<th>Substance</th>
<th>Production (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth</td>
<td>46</td>
</tr>
<tr>
<td>Cadmium</td>
<td>54 (ton)</td>
</tr>
<tr>
<td>Copper concentrate</td>
<td>26,190 (ton)</td>
</tr>
<tr>
<td>Gold</td>
<td>24.8 (ton)</td>
</tr>
<tr>
<td>Iron ore</td>
<td>7,979,202 (ton)</td>
</tr>
<tr>
<td>Manganese ore</td>
<td>250 (ton)</td>
</tr>
<tr>
<td>Molybdenum concentrate</td>
<td>0.1 (ton)</td>
</tr>
<tr>
<td>Silver</td>
<td>61.6 (ton)</td>
</tr>
<tr>
<td>Silver/lead concentrate</td>
<td>7,476 (ton)</td>
</tr>
<tr>
<td>Tin concentrate</td>
<td>4,288 (ton)</td>
</tr>
<tr>
<td>Uranium</td>
<td>440 (lb U3O8)</td>
</tr>
<tr>
<td>Wolfram concentrate</td>
<td>905 (ton)</td>
</tr>
<tr>
<td>Zinc concentrate</td>
<td>6,077 (ton)</td>
</tr>
</tbody>
</table>

From Stuart-Smith and other, 1993

On the basis of the dominant style of mineralisation, metal association, and stratigraphic and structural controls, Stuart-Smith etc. (1993) classified the deposits in the Cullen Mineral Field as follows:

1. hydrothermal veins or stockworks associated with granitoid intrusions (Sn, W, Au, Ag, Pb, Zn, Cd, Cu, Bi, As, U, and Mo);
2. stratabound massive sulphide deposits within the South Alligator Group (Au, Ag, Cu, Pb and Zn);
3. residual massive oxide deposits (Fe and Mn); and
4. alluvial deposits (Au and Sn).

The first style hydrothermal deposits are dominant (over 90%) of mines and prospects, and production within the Cullen Mineral Field. It has been
concluded in the following sketch and sub-classified as follows by Stuart-Smith etc. in 1993.

Fig. 3 Schematic sketch showing setting and major characteristics of hydrothermal deposits in the Cullen Mineral Field (Stuart-Smith etc., 1993).
• gold (with or without silver, copper, lead and zinc);
• tin (with or without copper and tungsten);
• silver-lead (with or without zinc, cadmium and gold);
• copper (with or without silver, lead, gold and bismuth)
• tungsten (with or without copper, molybdenum, bismuth); and
• uranium (with or without copper).

Hydrothermal gold mineralised with quartz veins mostly in a size of 2m wide and 100m long and setting in nearly vertical north to northwest-trend shear zones which are conformable with the regional axial plane S₁ cleavage of the Early Proterozoic metasediments or saddle reefs and en echelon veins within shear zones. The gold is present in disseminated sulphides, such as pyrite and arsenopyrite with minor chalcopyrite, galena, pyrrotite, marcasite, sphalerite, tetrahedrite and native bismuth with typical sericitised, silicified, carbonated and chloritised alterations in the wallrocks.

Most of the eluvial and alluvial gold mines are adjacent to the lode gold mines, for instance North Ringwood 4, DrtJil'e/dZ05, unrandl'e 178, FounUll.n Head. 74, and along the Howley lineoflodes 41, 4Z&46.

Tin firstly has been discovered at Mount Wells in the Cullen Mineral Field in 1879. Over 4,288 ton tin concentrate had been produced majorly from Mount Wells with minor from other adjacent twenty seven mines. Most production was between 1900 and 1934 with a peak time between 1906 and 1910 at over 200t tin concentrate p.a. following a spate of discoveries including the Horseshoe group of mines and the Umbrawarra alluvial deposits. Following twenty years tin mining in the area is low or nil production until a number of new tin discoveries in the Mount Masson area and resulted in minor tin production between 1956 and 1965. A small increase in tin production in the area is in 1980-1981, mainly from the Horners Creek alluvial deposit.

Alluvial tin is also played an important role in tin production in the Cullen Mineral Field, such as Barrets 59, Snaddens Creek 122, Jimmy's Knob 111, Mundic 109, Emerald Creek 204, Morris 208 & 212, Shamrock 213, MaryRiver Camp 176, and the Mount Well5 92 area where more recently the Horners Creek 93 deposits which associated with tin lode. Some of the alluvial tin occurrences are not associated with lode tin deposits, for instance the Umbrawarra 150, Stray Creek 149 and Douglas River 124 mines, and an unnamed prospect 203 on the Wandie Granite. All of these mines are located within the granitoid terranes where the tin source is probably small zones of disseminated cassiterite within greisen zones.

Mineral occurrence in the EL29045 title area is Nellie Creek 105 alluvial mine.

**Field Reconnaissance Works**

First field reconnaissance trip had been carried out in October 2012 with chief and senior geologists from China. These geologists have decades of experience in exploration in tin mineralisation associated with granite.
Granite is the dominant outcrop of the rocks in the title area. Mostly the granite is coarse grain and pinkish in colour with quartz and K-feldspar phenocrysts (Photo1). Alteration of chlorite and epidote are also present in the rocks. At south of the Nellie Creek alluvial tin mine, the granite is light colour with fine to medium-grained. Although the Nellie Creek and its sediments covers the boundary between the two rocks, the different mineral compositions and texture without gradational contacts between the two rocks suggests that they are two granites. It is also supported by the aero-magnetic images showing different characteristics (Fig. 4). A number of quartz veins have been found in the granites (photo 2). Unfortunately, no cassiterite has been found in the veins. It has been expected to find greisen associated with tin mineralisation in the EL29045 area. During the reconnaissance trip we have failed to find significant greisen from the Nellie Creek to south and left more inspection to north in next trip.

Photo 1 Granite hand specimen from EL29045

Photo 2 Quartz veins with fine-grain cassiterite from EL29045
Geophysical Images

Aero-geophysical images have also been reviewed in the last exploration year. Aero-gravity image shows a negative anomaly for the central granites in the EL29045 (Fig. 5).

Fig. 4 Images of aero-magnetic showing two granites in EL29045.

Fig. 5 Image of aero-gravity showing two granites in EL29045.
Aero-magnetic images show two interesting areas (Fig. 4). An isolated positive anomaly is located at northeast of the EL29045. At northwest it is likely that there is a contact zone between the granite and metasedimentary rocks with a number of mineral occurrences at north. There two areas are most interesting spots to target ores in next exploration year.

**Conclusion**

A field inspection did not found primary tin mineralisation in the EL29045. A review of the aero-geophysical images shows two interesting spots. More detail geological inspection needs to be carried out in the two area and along the creek at west. As no mineralisation had been identified in the southern area of EL29045, the blocks need to be reduced.

**Recommendation**

Following works have been recommended for the next 12 months:

1. Finishing the remote sensing and retrieve aero-geophysical data in detail, especially for the area close to EL29045 northern boundary and along the Nellie Creek at west;
2. Geological field investigation for the above interesting areas;
3. Detail mapping and rock chip sampling at the identified spots; and
4. Geochemical sampling at the interesting area.

**Block Reduce**

Total of 17 blocks are needed to be reduced and shown in Table 3 and retaining blocks shown in Table 4 as follows (Fig. 6).

<table>
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<tbody>
<tr>
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<table>
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<tr>
<th>Table 4  EL29045 Retain Blocks</th>
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<td>SD52 1440</td>
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</tbody>
</table>
Fig. 6 Showing retaining and reducing blocks in EL29045.

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