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SUMMARY

Wuhua Mining Corporation Pty Ltd (“Wuhua”) acquired BARROW CREEK mineral tenements (EL 29726, EL 29727, and EL 29735) in southern Northern Territory for exploring mineral resources, such as phosphate and metal (e.g., Au, Cu, U) minerals. The EL 29735 was granted on 29 May 2013. These ELs were included in a review of the phosphate, uranium, base metal, tin, tantalite and REE in the Arunta region. The historical exploration tenements in this area were granted to explore for phosphate, metals (e.g., gold, Copper, tin and tantalite) and REE.

The regional geology comprises Cainozoic-Palaeozoic sediments and the basement rocks mainly composed of granites and Gneiss. The tenement (EL 29735) is underlain by basement rocks of the Aileron Province comprising greenschist to granulite facies metamorphic rocks with protolith ages in the range 1865-1710 Ma. It forms part of the North Australian Craton and is geologically continuous with the gold-bearing Tanami and Tennant Regions to the north. This area has the potential to host not only phosphate mineralisation probably accumulated in the sedimentary basin, but also metal (e.g., Au, Cu) mineralisation developed in the granitic and metamorphic rocks of the basement.

Historical exploration in the Barrow Creek region has focussed on the potential of the basement rocks to host phosphate, metals (e.g., gold, Copper, tin and tantalite) and REE. The presence of high grade igneous and metamorphic rocks in this area of the Aileron Province which have given rise to pegmatite intrusions make the area also prospective for Rare Earth Elements (REE). Several companies have also recognised the potential of the Palaeozoic sedimentary sequences for phosphate deposits.

EL 29735 forms part of Wuhua’s Barrow Creek Project (EL 29726, EL 29727, and EL 29735) in the Murray Downs area of the Northern Territory. The area is considered to be prospective for phosphate, gold, copper, tin and tantalite mineralisation.

Exploration during the reporting period comprised ground reconnaissance trip to locate and sample the surface geology and nearby known mineral occurrences. The desktop study of EL 29735 for mineral exploration has been focused the overview and technical proposal of the geological, geophysical and tectonic setting. This preliminary geoscientific study aims to investigate the geophysical and geological expression of structures related to any mineralisation. These studies will assist exploration in the Yambah region and provide fundamental data for increasing knowledge of geological processes and landscape evolution within this region.
1. INTRODUCTION

1.1 Background and Tenure

Wuhua Mining Corporation Pty Ltd (“Wuhua”) acquired three mineral exploration tenements in southern Northern Territory (EL 29726, EL 29727, and EL 29735) in May 2013 and is developing the Barrow Creek Exploration Project (Figure 1.1). The licenses were granted on 29 May 2013 for a period of 6 years. This exploration licence, located near Barrow Creek NT, consists of 241 graticular blocks and forms a total area of 752.56km² (Figure 1.2). The licences are arranged in a north-westerly trending line covering the postulated western margin of the Georgina Basin. Geotectonically, these tenements are located within the Arunta Region of the North Australian Craton, associated with the Aileron Province (see Figure 3.1). The schedule of rent and expenditure for the tenement EL 29735 is summarised in Table 1.1.

Table 1.1 Wuhua Mining Corporation Pty Ltd Tenement EL 29735 Schedule.

<table>
<thead>
<tr>
<th>Tenement ID</th>
<th>Tenement ID</th>
<th>Expires</th>
<th>1st Year Rent</th>
<th>1st Year Expenditure</th>
<th>2nd Year Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 29735</td>
<td>29/05/2013</td>
<td>28/05/2019</td>
<td>$7,712</td>
<td>$46,150</td>
<td>$70,250</td>
</tr>
</tbody>
</table>

1.2 Location, Access and Logistics

EL 29735 is located approximately 220 kilometres north of Alice Springs on Stirling, Neutral Junction Stations and Mt Skinner Stations and 1300 kilometres south of Darwin by the Stuart Highway in the southern part of the Northern Territory of Australia (Figure 1.1).

The tenement is located between 21°54’S to 22°11’S and 133°48’E to 134°19’E (Figure 1.2). The project area occurs within the Stirling pastoral lease, the primary land use being cattle grazing. Access to EL 29735 area from Alice Springs is normally by travelling north via the sealed Stuart Highway to Ti Tree, then via station tracks (Figure 1.1). Most of the station tracks are generally in good condition, but some tracks are badly eroded in places adjacent to drainages. Minor tracks transect the tenement; however the roads in the area are seasonal. The minor tracks provide limited access to the exploration area, and much of the tenement can only be accessed via cross country travel with off road vehicles. During the wet season, between October and March, the area becomes largely unnavigable to vehicular traffic.

Alice Springs (pop. 27,000) is well serviced by road transport and interstate bus services, because of its location mid-way between Adelaide and Darwin. The Stuart Highway and Adelaide-Darwin transcontinental railway corridor, passing through Alice Springs, bisect the area. Alice Springs is also serviced daily by jet aircraft from several Australian capital cities (Sydney, Adelaide, Perth and Darwin) and less regularly from Brisbane, Cairns and Broome. Alice Springs is the closest services centre, 260km by road via the Stuart Highway. The North Australian Railway passes through the northern part of
the licence (Figure 1.1). Access around the licence area is relatively slow with few fence lines and station tracks.

Figure 1.1 Regional Location Map showing “Wuhua” Barrow Creek exploration project ELs. EL 29735 is located in the central part of the map.
The region has a semi-arid continental climate, characterised by long hot summers when temperatures regularly exceed 35°C, and short mild winters. The average rainfall is about 280mm, most of which falls between October and March, but both frequency and amount are erratic. There are typically around 30 rainy days per year. The average annual evaporation (as measured at the nearest station in Alice Springs) is 2.9 m. The normal exploration field season runs from April to October.

The majority of the tenement is covered by various thicknesses of regolith cover and acacia trees and bush / grass undergrowth (Figure 1.3). The vegetation ranges from savanna woodland near the creeks, to gidgee and acacia scrub to annual grasslands. The vegetation is consistent with a semi-arid regime. Sand plains are covered by thick grasses, particularly spinifex (Triodia), and sparse low shrubs and trees such as mallee, bloodwood, desert currajong, and witchery bush. Vegetation throughout most of the area consists of
tall mulga open shrubland with a woolybutt open grassland understorey. This gives way in the northwest to hummocky grassland with a tall acacia sparse shrubland overstorey.

Figure 1.3 Photo imagery of EL 29735 showing regolith cover and acacia trees and bush / grass undergrowth.

1.4 Topography and Drainage

The Barrow Creek area is characterised by sandy and alluvial plains with an average height of about 500 metres above sea level, which pass into hilly country and low ranges with a maximum relief rarely exceeding more than 200 m above the surrounding plain. The most important of these include the Davenport, Crawford, Osbourne and Dulcie Ranges. The area of the EL 29735 comprises a flat sandy plain rising gently northeastwards from around 500m ASL to around 700m ASL in the northeastern part of the EL 29735, east of the Adelaide-Darwin transcontinental railway (Figure 1.4). Creeks that rise in the highlands and ranges discharge towards the low land in the EL 29735 area.

Major watercourses such as the Hanson and Sandover Rivers and Taylor Creek are lined by eucalyptus, Grevillea and various low trees and shrubs. Ridges support sparse shrubs, low trees and abundant Spinifex. Stands of mulga and mallee occur in some areas.
Figure 1.4 Landsat ETM7 realistic_274 over DTM imagery showing relationships of landscapes, roads, drainages, and locality and EL 29735.

1.5 Work Done in Year 1

Field Work
A field reconnaissance was undertaken to assess the local geology in the first year of tenure. Most of the tenement areas are covered by Cainozoic sediments, predominantly uncemented aeolian sand plains and dunes; with some outcropping Neoproterozoic to Palaeozoic Georgina Basin sedimentary sequences (Figures 1.3 and 1.4). The base of the valley (creek) floor is largely covered by transported, predominantly colluvial-alluvial material. This cover is probably quite thick in places, but areas were identified where lag sampling was feasible to test for mineralisation in both the valley fill and basement.

Desktop Surveys

A desktop study compiled by Wuhua Mining Corporation Pty Ltd aims to investigate mineral potentials. Office work in the first year of tenure consisted of desktop surveys covering the various topics outlined in this technical report. Primarily „Wuhua“ consisted in examining historical exploration in the area and cross-referencing this where possible with the current thinking on mineral deposition in the area to generate valid exploration targets for follow up in the second year of tenure. These include the review and interpretation of available remote sensing, geophysical and geological data for the licence area, generation of prospects by examination of these. During the first year a broad scale literature survey was conducted on the whole of the Barrow Creek Project area, which consisted of examining previous explorers data as submitted to the Department of Resources as well as current thinking on mineralising systems in the region.

Exploration Targeting

Exploration models target organic-rich carbonate rocks on depositional basin margins where upwelling and favourable palaeogeography would have bought cold phosphate-rich waters onto the shelf. Cancolite Formation takes place close to the sediment-water interface during times of low overall sedimentation and is intimately connected with the dynamics of diagenetic redox fronts.

The investigation of the major structural corridor through the licence area will be a priority, elsewhere this corridor hosts tin, tantalite and wolfram deposits and so will be studied in depth for these deposits here. The Lander Rock Beds also represent an exploration priority as they likely to host a number of gold and base metal deposits throughout the Province. Uranium hosted in Cainozoic palaeovalleys is likely also a potential of exploration.

Recommendations for the comprehensive prospectivity and exploration techniques have been provided. The interpretation of the remote sensing, magnetic, gravity and morphology, based on the current data, thus formed a basis for mineral exploration in the Barrow Creek exploration project area, and further investigation into the geomorphology, geology geochemistry and geophysics of the project area and associated mineralization is necessary.

Prospect Generation

Phosphorite prospect generation would be dependent on the location of the basin margins (probably using aeromagnetics) in the project area with the next step being examination of radiometric for the location of subtle signatures that may indicate the presence of uranium associated with the phosphate due to substitution for Ca in the...
phosphorite crystal lattice. Follow up work on prospects generated by this model would be direct examination by drilling, working away from the basin margins into deeper areas of sediments.

Hydrothermal prospects will be generated by also studying the aeromagnetics, gravity and radiometric as the pegmatites that occur in this structural corridor may also contain REE and uranium. Geochemistry will also be used as a tool to generate prospects for further investigation.

The granites are multigenerational in this area so may represent sites of reactivation throughout the Proterozoic and in conjunction with the major structural corridors will be significant areas of exploration interest.

Cainozoic palaeovalleys may represent sites of secondary uranium hosted in palaeovalley fills.
2. PREVIOUS EXPLORATION

Previous exploration in the regional area has located a large number of pegmatites, leading to the name the Barrow Creek Mineral Field. There have also been a number of companies exploring for base metals concentrating on the Paleoproterozoic Bullion and Ledan Schists. As the Bullion Schist hosts the mineralisation at the nearby Home of Bullion Mine, the largest producer of copper in the area it has been investigated by several explorers for both copper and gold. Exploration has been hampered by coverings of large areas by Cainozoic sediments, predominantly uncemented Aeolian sands and dunes.

The region comprises an Arunta-wide bedrock geological interpretation and geophysical targeting exercise which identified previously recognised gold anomalism coincident with magnetic targets (Jombwe, 2003). The area was applied for to test the potential for Scheelite (Wolfram) as well as other minerals based on previous work carried out by Kewanee in the early seventies, where up to 5% Scheelite was reported (Cogar et al. 1972). In this region, the old Home of Bullion Mine is a rich polymetallic deposit of small but rich proportions, ringing rocks is considered to have strong potential for Scheelite (Tungsten) based on work carried out by Kewanee.

The diamond explorers have also examined the area in the last decade without success. The area has been prospective for base metals and igneous associated tin, tantalite, and wolfram deposits for a long time as evidenced by the list of exploration titles below. The gold values obtained at the nearby Home of Bullion mine have lead to a systematic search for gold in this area.

Many explorers have previously investigated the area for base metals. Exploration within the area was initiated by Kennecott Exploration in 1966. The main targets were the malachite-bearing grey-green siltstone units that outcrop throughout the area. The NT Department of Mines and Water Resources drilled 4 holes for a total of 662m in 1968 to investigate copper mineralisation at Mt Skinner (GR19680016). CRA explored the area nearby for stratabound base metals and uranium in the late 1970’s. CRA reported uranium rock chip results up to 620 ppm U, and a rock chip sample with 780 ppm W, supposedly within a calc-silicate rock. In 1970, Centamin N.L. followed up on the holes drilled by Department of Mines and Water Resources and selected intervals of core which were assayed for Cu, Pb and Zn but without any significant results (CR19830125). Alcoa of Australia Ltd continued exploration for copper and drilled 4 holes at Mt Skinner in 1981 (CR19820183). In 1983, Alcoa Australia Ltd flew an airborne magnetic survey at 500m line spacing and drilled 4 holes close to previous holes. Operations ceased after re-evaluation of the data led to a down-grading in prospectivity of the area for base metals (CR19830125). In 1995, CRA Exploration Ltd re-logged and assayed the Mt Skinner core drilled in 1968 but did not make any concluding remarks (CR19950562). In the area, Normandy explored for shear hosted gold between 1995 and 2000. No significant drilling has been carried out since 1995. The NTGS re-evaluated the area as part of the Southern Georgina Basin Geology and Resource Potential Report in 2007 and concluded that Mt Skinner remains prospective for base metals (Dunster et al., 2007).

In addition, more historical explorations conducted over and near EL 29735 are reviewed and outlined in Table 2.1 and Figure 2.1.
Uramet /Intercept Minerals (2007-2010) has recognised the potential of the Cainozoic palaeovalley fills possibly host secondary uranium deposits derived by the erosion of the surrounding uraniferous basement rocks.

Table 2.1 Summary of Historical Tenements in and near the EL 29735 Area.

<table>
<thead>
<tr>
<th>Historical Tenement</th>
<th>Company</th>
<th>Granted</th>
<th>Tenure Period</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 10405</td>
<td>Tanami Exploration NL</td>
<td>2003</td>
<td>08/07/2003 – 07/07/2009</td>
<td>Au, base metal</td>
</tr>
<tr>
<td>EL 23651</td>
<td>Tanami Exploration NL</td>
<td>2003</td>
<td>11/04/2003 – 10/03/2004</td>
<td>Au, base metal</td>
</tr>
<tr>
<td>EL 25573</td>
<td>Uramet /Intercept Minerals</td>
<td>2007</td>
<td>30/07/2007 – 02/08/2012</td>
<td>W, Au, base metal</td>
</tr>
</tbody>
</table>
Figure 2.1 Historical exploration licences in and nearby the EL 29735.
3. GEOLOGY

3.1 Regional Geology

The Barrow Creek Exploration Project lies at the boundary between Proterozoic-aged basement of the Arunta domain and the younger southern Georgina Basin, along the southern margin of the North Australian Craton, where the Lander Rock Beds have been intruded by granitic and mafic rocks at about 1820 Ma (Hendrickx et al 2000). This remnants of the North Australian Platform Cover (NAPC), is equivalent to the Hatches Creek Group of the Tennant Creek Inlier (Ahmad 2000). The Arunta basement is dominated by folded and faulted Palaeoproterozoic-age felsic gneiss and metasedimentary rocks (biotite schist, quartzite and calc-silicate), intruded by syn- to post tectonic granitoids. Deformed and metamorphosed Palaeoproterozoic orogenic rocks older than 1800 million years crop out as major tectonic units surrounded by younger rocks and essentially form the recognisable and inferred basement to the North Australian Craton.

The basement rocks in the Aileron region comprise part of the Arunta Region, a complex basement inlier in central Australia that has undergone a prolonged history of sedimentation, magmatism and tectonism extending from the Palaeoproterozoic to the Palaeozoic (NTGS the website, December, 2004). The Arunta Region can be subdivided into the three, largely fault bounded terranes with distinct geological histories: the Aileron, Warumpi and Irindina Provinces (Figure 3.1). The basement lithologies include schist, granitic gneiss, amphibolite, muscovite pegmatite veins (locally mined or prospected for muscovite), quartz veins, and variably textured biotite-muscovite granite. Many of the metasedimentary rocks have large, ragged muscovite flakes, which are probably retrogressive. The prevalence of granite and granitic veins, and the general mineralogy of the schists and gneisses (biotite-quartz-feldspar+/retrogressed porphyroblasts) suggest mid- to upper amphibolite facies metamorphic conditions. From an exploration perspective, this metamorphic grade is considered too high to be prospective for orogenic gold.

The project lies along the margin between the Palaeoproterozoic to Mesoproterozoic Tennant Creek Inlier to the north and the Aileron Province to the south. These are overlain by Cambrian to late Palaeozoic sediments of the Georgina and Wiso Basins. The Georgina Basin as a 330,000km$^2$ erosional remnant of a series of originally interconnected central Australian intracratonic basins that range in age from Neoproterozoic to Palaeozoic. In excess of 1.5km of Neoproterozoic sedimentary rocks are preserved in downfaulted blocks and half-grabens on the southern margin of the Georgina Basin in the NT. Depocentres and synclines contain up to 2.2km of Cambrian to Devonian section. The Georgina Basin outcrops as flat to gently dipping tabletop hills and mesas, typically with basement exposed at the base of the hills and in the plains between ranges. The basal sediments in this area are the Neoproterozoic Forster Member of the Central Mount Stuart Formation, and are locally exposed in unconformable contacts with the basement. The Forster Member is overlain by a thick sequence of red beds, the Tops Member, which is in turn overlain by a white quartzite, the Adnera Member, which often forms the resistant cap to the hills. Further south, older Georgina Basin sedimentary units are present beneath the Forster Formation. The Central Mount Stuart Formation ranges between 200 m thick in the northwest and almost 600 m thick in the southeast and are interpreted as deltaic sediments.
EL 29735 is situated primarily in the Aileron Province of the Arunta Region in the southern part of the Northern Territory, and located primarily within the Georgina Basin adjacent to an outcropping section of the Aileron Province (Figure 3.1). It was applied for to cover a section of Georgina Basin margin to allow for exploration for phosphorite occurring in the middle to lower Cambrian Limestones of the Georgina Basin (Figure 3.2). It also contains a major northwest to southeast trending structural corridor which contains the Stirling fault. The Aileron Province is a poly-deformed and metamorphosed basement terrain along the southern margin of the North Australian Craton. It contains metamorphosed clastic sediments, meta volcanic rocks, calc-silicate rocks, dolerite, mafic rocks and granites.

The Proterozoic bedrock in the region comprises the Lower Proterozoic Bullion Schist, which consists of metamorphosed shelf sediments and minor volcanics. These are overlain by Middle Proterozoic sediments, intruded by granites, and subsequently overlain by Late Proterozoic sediments.

![Figure 3.1 Geological Regions of the Northern Territory and “Wuhua” BARROW CREEK project ELs.](image)

To the south, the rocks of the North Australian Craton pass into the Central Australian Mobile Belts of the Proterozoic Orogens of the Arunta Region and Musgrave Block, consisting of granulite and amphibolite facies, metamorphosed sediments and mafic
volcanics intruded by granitoids. In the southern Arunta Province, episodic igneous activity took place between 1880-1050 million years and deformation included a series of major tectonic events, including retrogressive metamorphism in the Proterozoic and Palaeozoic.

Figure 3.2 Geological Regions of the Northern Territory, showing the relationships of geological domains, structures, topography, roads, drainages, and “Wuhua” Barrow Creek project ELs, particularly EL 29735.
Proterozoic-Palaeozoic basins form part of the North Australian Platform Cover and comprise mildly deformed, largely unmetamorphosed predominantly sedimentary successions unconformably overlying the Proterozoic Orogens. This includes the Ngalia and Georgina Basins in the Aileron region (Figure 3.1). Sedimentation associated with the Georgina Basin commenced during the Late Proterozoic with the Amesbury Quartzite and was terminated during the Early Devonian after deposition of the Dulcie Sandstone. The Georgina Basin sequence was mildly affected by the Carboniferous Alice Springs Orogeny.

The post Mesoproterozoic tectonic history is characterized by several phases of uplift and isolated magmatic episodes. Among them, the last significant deformational and metamorphic event was the intracratonic Alice Springs Orogeny active between 400-300Ma.

A long erosional period followed with subsequent deep weathering during the Tertiary produced silcrete and ferricrete horizons. A veneer of Quaternary sands and soils overlays much of the area, except where recent and active alluvial sedimentation is present.

### 3.2 Local (Barrow Creek ELs) Geology

The geology is illustrated by the Barrow Creek - Alcoota 1:250,000 geological mapsheets (Figure 3.3). The area is primarily covered by Quaternary sediments and is surrounded by aeolian plains and dunes, and transported red earth soils (Figure 1.3).

The surface geology has been mapped and described by the Northern Territory Geological Survey (NTGS) in the 1:250 000 scale Barrow Creek and Alcoota mapsheets and explanatory notes. About 30–40 % of the tenement area comprises outcropping Palaeoproterozoic crystalline Arunta basement rocks and Neoproterozoic to Palaeozoic Georgina Basin sedimentary successions. The remaining areas are covered by Cainozoic sediments, predominantly unconsolidated aeolian sand plains and dunes.

The Barrow Creek tenements are underlain by basement rocks of the Aileron Province (Figures 3.1 and 3.2). The Aileron Province comprises greenschist to granulite facies metamorphic rocks with protolith ages in the range 1865 Ma -1710 Ma. It forms part of the North Australian Craton and is geologically continuous with the gold-bearing Tanami and Tennant Regions to the north. In contrast, the Warumpi Province comprises amphibolite to granulite facies rocks with protolith ages in the range 1690 Ma -1600 Ma, and is interpreted to be an exotic terrane that accreted to the southern margin of the North Australian Craton at 1640 Ma. The Irindina Province in the Harts Range region comprises Neoproterozoic to Cambrian metasediments that formed in a major depocentre within the Centralian Superbasin. It underwent high-grade metamorphism and deformation during Ordovician (480 Ma- 450 Ma).

The geology of the project area (Figure 3.2) is dominated by Neoproterozoic and Cambrian clastic sedimentary rocks of the Central Mount Stuart and Octy Formations, and Paleoproterozoic Barrow Creek Granite Complex, with localised occurrences of early to mid Proterozoic Bullion Schist, and Ledan Schist. The latter three units are part of the Arunta Domain, and generally outcrop poorly in comparison with the Central Mt Stuart Formation. The Neoproterozoic Central Mount Stuart Formation covers most of the north-eastern and eastern part of the area. The Cambrian Octy Formation is unconformable on the Neoproterozoic sandstones. The succession is part of a tilted fault block dipping gently
towards a major geophysically defined bounding fault trending NW-SE. The Neoproterozoic sedimentary rocks range in thickness from a veneer at the base of the Cambrian (Dunster et al., 2007) in the north, to an interpreted 1200m depth to the south.
EL 29735 covers the Cambrian outcropping lithologies along the western edge of the Dulcie Syncline in the southwestern margin of the Georgina Basin. In the licence area there is a northwest to southeast outcropping section of the underlying Aileron Province which consists of granite. Lithologies of interest in the region are the middle Cambrian calcareous ones such as the Arthur Creek Formation which occur on the eastern side of the Dulcie Syncline some 75km to the east at Ammaroo, where Rum Jungle Resources have recently located what is a substantial deposit of phosphorite. This licence is in the same approximate stratigraphic location on the western side of the Dulcie Syncline. The Arthur Creek Formation is located stratigraphically below the Arrinhrunga Formation and is of primary interest as indicated earlier. This formation is of middle Cambrian age and demonstrates a facies that would be indicative of mid ramp to outer ramp paleoenvironment. This indicates a eustatic rise as facies are progressing down shelf. Investigation of this area showed that the rocks of interest did not outcrop on the surface.

Strike directions mainly trend NW-SE, sub-parallel to regional faults and shears such as the northwest trending Stirling Fault Zone (Figure 3.3). A secondary set of faults cross-cut the stratigraphy with an east-west strike.

To the north, the Paleoproterozoic Bullion Schist consists of a biotite-muscovite schist of mid-greenschist to lower amphibolite facies. The unit hosts numerous tantalum bearing pegmatites including Millers, Millers South, Horizontal, Halfway, Tommys Show, Jump Up and Ivy. These pegmatites make up the Barrow Creek Pegmatite Field.

The area of interest occurs within and adjacent to the boundary of the Georgina Basin. The Arthur Creek Formation is the target rock unit in this locality as it represents the calcareous unit deposited in the Cambrian. This Formation has a lower anaerobic limestone and an upper aerobic limestone which represents near shore conditions. This aerobic limestone unit is fossiliferous with phosphatic occurrences throughout the region. The presence of high grade igneous and metamorphic rocks in this area of the Aileron Province which have given rise to pegmatite intrusions make the area prospective for Rare Earth Elements (REE).
4. **MINERALISATION**

Significantly, the Aileron Province hosts a variety of other commodities including:
- metamorphosed volcanogenic massive sulphide and carbonate replacement lead-zinc-copper
- iron-oxide copper-gold
- orogenic gold
- tungsten
- tin and tantalum,
- mafic hosted nickel-copper
- hypothermal uranium
- mafic-hosted vanadiferous magnetite
- Cambrian to Palaeozoic sediments of the Georgina and Wiso Basins being prospective for phosphate.

The Paleoproterozoic Bullion Schist, consisting of a biotite-muscovite schist of mid-greenschist to lower amphibolite facies, hosts numerous tin-tantalum bearing pegmatites including Millers, Millers South, Horizontal, Halfway, Tommys Show, Jump Up and Ivy. These pegmatites make up the Barrow Creek Pegmatite Field. The presence of high grade igneous and metamorphic rocks in this area of the Aileron Province which have given rise to pegmatite intrusions make the area prospective for Rare Earth Elements (REE). The region also includes some small-scale abandoned tantalite workings (Millers, Millers South). The Millers workings occur on pegmatite/quartz veins discovered by AV Miller in 1978. The area is largely covered by soil, with quartz float present at the surface. Mineralisation occurs in quartz reef veins and in eluvium.

The Palaeozoic Arumbera Sandstone and other lithic sediments for part of the stratigraphic sequence of the Georgina Basin are „Wuhua” target sequences for the discovery of phosphorite deposits. The Arthur Creek Formation is the target rock unit in this locality as it represents the calcareous unit deposited in the Cambrian. This Formation has a lower anaerobic limestone and an upper aerobic limestone which represents near shore conditions. This aerobic limestone unit is fossiliferous with phosphatic occurrences throughout the region.

Barrow Creek Project is located on the edge of the Georgina and Wiso Basins (Figures 3.1 and 3.2). Numerous phosphate deposits have been found along the basin margins (Lucy Creek, Ammaroo) where Middle Cambrian sediments occur at shallow depths. Tenements are positioned in locations at the edge of the Georgina and Wiso basins which are highly prospective for phosphate occurring at shallow depths. 250k Geological maps of the area show Middle Cambrian units outcropping in some areas within tenements or beneath shallow cover. Regional structures cut the area and may uplift sections of Middle Cambrian sediments.

The South Georgina Basin is targeted for stratiform Cu mineralisation and epigenetic stratabound Pb-Zn. Both these styles of mineralisation have been reported in southern Georgina Basin sediments approximately 5-10 km to the south of EL 29735, near the Mount Skinner homestead:
- Cu mineralisation is recognised in a thin horizon of reduced-facies greenish-grey beds within a package of outcropping Tops Member red beds. This style of
stratiform Cu mineralisation has analogies to the Zambian Copper belt and it was postulated that continuity stratiform mineralisation may be present in the Tops Member red beds within the tenement areas.

- Pb-Zn mineralisation and associated carbonate and fluorite alteration capped by a thin limestone bed has been recognised in a drillhole in the southern Georgina Basin at approximately 250 m depth. This style of mineralisation has analogies with stratabound Irishand Mississippi Valley-type base metal mineralisation.

The style of mineralisation being targeted is quartz vein-hosted tungsten (scheelite/wolframite). At the historical Millionaires Well workings near the tenement EL 29726 a WSW-trending quartz-carbonate vein set hosts the tungsten mineralisation. The vein system occurs near a contact between Barrow Creek Granite and what is interpreted to be Bullion Schist. Other tourmaline-rich vein sets appear to be barren. The project region is also interpreted as prospective for tantalite mineralization. Small-scale historic workings in the north of the lease area exploited mineralization including high-grade coarse tantalite ore. Much of the area is concealed by Cainozoic alluvium and other sediments. The project area may also be prospective for calc-silicate-skarn-hosted tungsten, stratabound base metals, and for shear-zone-hosted gold.

Tenements are easily accessed from the Stuart highway with a number of station tracks outlined on the 250 Topography allow access to a number of areas. The presence of high grade igneous and metamorphic rocks in this area of the Aileron Province which have given rise to pegmatite intrusions make the area prospective for Rare Earth Elements (REE). A number of mineral occurrences are located in the south and southwest of the EL 29735 (Figure 3.3). The historic „Home of Bullion” Cu mine is also closed to the project area. In addition to copper, it is enriched in Pb, Zn, Ag and Au and has the largest recorded production of copper in the Barrow Creek area, with “6100 tonnes of high-grade copper ore mined between 1923 and 1951” (Haines et al., 1991). Other mineral occurrences in the Barrow Creek Project area have Ta, W and mica as major commodities.

The Barrow Creek mineral tenements were applied by Wuhua Mining Corporation Pty for to test the potential for Ta, Sn, W, Mo, Au, Cu, REE, and phosphate as well as all other minerals (e.g., Pb, Zn, U), such as orogenic gold mineralisation in the Bullion and Ledan Schists, sedimentary-hosted base metals (Pb, Cu) in the Neoproterozoic sequence and quartz vein-hosted tungsten (scheelite/wolframite) in the Arunta basement, stratiform Cu mineralisation in the Tops Member red beds, phosphate and epigenetic stratabound base metals mineralisation in the Georgina Basin sedimentary succession, tungsten hosted in quartz vein, REE in pegmatite intrusions, and secondary uranium in Cainozoic palaeovalleys.
5. INTERPRETATION AND MINERAL PROSPECTIVITY

An assessment of the Barrow Creek project for exploring mineral deposits was to undertake a compilation of geological, geophysical, topographical and historical open file data over the tenement areas and provide initial recommendations for ongoing exploration.

The current interpretation and discussion are mainly based on the associated public domain geophysical and geological data including aeromagnetics, gravity, and DEM, surface and solid geologies for the project area was acquired from the NTGS. Reprocessing of the digital data has enhanced all of the geophysical and geological signatures and has also outlined a number of other subtle features.

Available exploration data comprised open file reports of past exploration activity, NTGS and company open file airborne geophysical survey data and Landsat 7 thematic mapper (TM) data. The usefulness of available geophysical data should be assessed and more detailed surveys could be considered.

5.1 Methodology

Topography (digital elevation models) and Landsat images, magnetic, and gravity methods are integrated into this phase on the basis of GIS for an attempt to correlate the features observed from geological maps. This interpreted result derived from the integrated datasets will be tested and improved by application of new drillholes.

All coordinates listed in this report are in map projection MGA94, Zone 53 (GDA94). The targeting process was undertaken as follows:

- Import of the above into ArcGis and sub-setting into different sample types and grade ranges for presentation and analysis.
- Examination of fact geology and surface geology and to provide geological information for targeting.
- Identification of available airborne geophysical and remote sensing data.
- Review of all data mentioned above to identify uranium targets.
- Identification targets with the potential to contain significant mineralisation.
- Recommendation of effective methods for exploring mineral deposits in the project area [Some useful methods (e.g., for mapping palaeovalleys) will be recommended].

Topography – Digital Elevation Model (DEM)

Topography over the tenement EL 29735 is relatively low and flat in the southwest and hilly in the northeast, with some creek systems in the northeastern part of EL 29735 (Figure 5.1). The landscape becomes higher towards the northeast. Except secondary set of faults (Figure 3.3), no main fault occurs within the exploration licence EL 29735 (Figure 5.1).
Figure 5.1 Digital Elevation Model (DEM) over surface geology.

Generally, DEM is very effective in the recognition of young (e.g., Cenozoic and/or Mesozoic) potential palaeochannel areas, as the lower topographic zones can reflect areas where some of the softer sediments have been eroded away. Therefore, DEMs can be used
as surrogates for mapping the palaeovalleys and related features when the modern and palaeo-geomorphologies are related spatially and genetically. This scenario should be confirmed by combining other methods, such as night-time thermal imagery, AEM/TEM and drilling. If the presence of potential palaeochannels can be determined, some segments of the palaeo-channels here should be favourable for exploring sandstone-hosted and/or calcrete style uranium deposits.

*Landsat TM*
The DEM and Landsat images of Figures 5.1 and 5.2 highlight the variable geomorphology of the area. The topography is generally dominated by the hills of the outcropping bedrocks represented as dark brown in the Landsat image. Sand-plains usually show as light brown in the image. Sand dunes, alluvial plain, channels and clay pans occurring in the low landscapes or creeks, being the drainage system in the area, can be seen in the images.

Landsat TM image is useful in defining spectrally anomalous zones or regions when appropriately draped over DEM to enhance terrain visualisations (Figure 5.2). This can be used to figure out the relationship between the U-source rocks and in-situ uranium or U/Th anomalies, which is helpful in exploring for metasomatite uranium mineralisation.

**Total Magnetic Intensity (TMI)**

Magnetic low and moderate features dominate in the most area of the EL 29735 with relatively magnetic high features occurring along the southeastern edge of the EL 29735 (Figures 5.3). Non-magnetic and low density granite may be responsible for the magnetic quiet area in this area rather than a thick sequence of southern Georgina Basin sediments. Generally, the magnetic high features show the magnetic rocks of the Arunta Domain as generally having a much stronger magnetic signal than the sediments of the Georgina Basin (Figure 5.3).

Mesozoic and/or Cainozoic paleovalleys are not usually visible on regional magnetic data (Figure 5.4), as they are relatively shallow features, but the magnetic high features in the EL 29735 indicate potentials of hard rock mineralisation, such as copper, gold, nickel, lead and zinc, which need detailed surveys assist in locating relative deposits.
Figure 5.3 Regional (400m line spaced) Total Magnetic Intensity (TMI, NT data) of the EL 29735 area.
Figure 5.4 Total Magnetic Intensity (TMI, GA data) of the EL 29735 area.

**Gravity**

Relative low gravity feature occurs in the most parts of the EL 29735 area, whereas part of the northern area of the EL 29735 shows a relative moderate gravity feature (Figure
5.5). Because of normally small scales of palaeovalleys, gravity method should use high resolution survey, especially when it used with DEM, Landsat, NOAA, or AEM images.

Figure 5.5 Regional (4km spaced stations) bouguer gravity image of the EL 29735 area.
The gravity data (Figure 5.5) is useful for regional interpretation, but being too coarse (4km spaced stations) to be of use for the local, detailed interpretation.

### 5.2 Mineral Prospectivity

Regionally, the style of mineralisation within the Aileron Province, Arunta Block gneisses and metamorphic sequences is represented by tin-tantalum bearing pegmatites style mineralisation (Sn-Ta-W) and the Nolans Bore metasomatite flour-apatite style mineralisation (REE-P-U). The region is interpreted as prospective for tantalite mineralization. Cambrian to Palaeozoic sediments of the Georgina and Wiso Basins are prospective for phosphate. Project tenements are positioned in locations at the edge of the Georgina and Wiso basins which are highly prospective for phosphate occurring at shallow depths.

The presence of high grade igneous and metamorphic rocks in this area of the Aileron Province which have given rise to pegmatite intrusions make the area prospective for Rare Earth Elements (REE).

It is also considered prospective for palaeovalley sandstone-hosted and calcrete style uranium mineralisation, similar to those found within the Palaeozoic continental clastic successions of the Kerridy Sandstone Formation and Mount Eclipse Formation.
6. CONCLUSIONS AND RECOMMENDATIONS

EL29735 remains highly prospective for tin-tantalum bearing pegmatites style mineralisation (Sn-Ta-W), Rare Earth Elements (REE) in pegmatite intrusions, phosphate hosed in palaeozoic sedimentary basins, and uranium hosted in Cainozoic palaeovalleys.

Magnetic and gravity, shallow seismic, AEM/TEM, and test drilling, where necessary, are important media that can be used in subsurface structure delineation. The combination of DEM, AEM, and night-time thermal remotely-sensed imagery in GIS mode represent by far the best method for palaeovalley-related uranium exploration in the area. The detector and orbital configuration of NOAA-AVHRR (1.1 km pixel) and ASTER (90 m pixel) night time data could make it a very useful remote-sensing method in that it detects temperature variations in palaeochannel sediments related to the elevated moisture content of the channel.

It is recommended that the exploration program in the next step should be designed to test the tenements for the mineral targets described above. In summary, the following conclusions can be made regarding the geophysical and geological methods for locating potential mineralisation sites:

- Acquires and interprets detailed magnetic, radiometrics, and gravity for the licence area, generation of prospects by examination of these.
- Night-time thermal image, or airborne electromagnetic survey (AEM) are recommended second as results may define smaller target areas (e.g., palaeovalleys) and aid in orientating traverse lines correctly.
- If necessary, carries out ground gravity traverses over the magnetic anomalies with the generation of geology maps.
- Compiles a detailed structural map and analysis of all priority magnetic and radiometric anomalies to determine the controls and disposition of any mineralisation potential.
- Look for signs of channels and intrusives at depth or zones of high physical contrasts along shear zones and or contacts that might mark high redox potential.
- To determine survey line orientation, lithology strike and dip needs to be determined for the palaeovalley and underlying basement.
- Test drilling should traverse across or along the interpreted signatures, and particularly high priority zones selected. When these predictions prove wrong, the information should be used to revise and update the 3D models.
- Conduct a small RAB/RC/diamond drill program targeted at down dip and down plunge extensions to the any mineralisation intersected and to test the source of the mineral conductors located by geophysical survey.
- RC drilling. The cost of drilling possibly 10-100m deep holes to reach the basement means a palaeovalley-related (sandstone and surficial-style) uranium deposit would need to be found.
- Sample water from aquifers intercepted by station bores to map U distribution.
- Any trace of valuable minerals within the basinal sediments or bedrocks (e.g., gold, uranium) is of interest as a guide to the location of basement mineralisation.
• Field activities in this area will be conducted in conjunction with operations on the adjacent exploration licences of the Barrow Creek Project.

The area of EL29735 has had no further work carried out, as in house studies and field examinations indicated low prospectivity and all efforts have been concentrated on EL29202 and the Yambah exploration project retained area (i.e., EL29556 and EL29575)
KEY REFERENCES

AGES, 2003. Annual Geoscience Exploration Seminar, NTGS.


