SUMMARY

The Goomadir River Project is located in Western Arnhem Land, approximately 250km east of Darwin and comprises Exploration Licence EL23035. In June 2007, in accordance with regulations outlined in Sections 26 and 27 of the *Mining Act*, 50% of the tenement was relinquished.

Exploration work conducted during the 3rd and final year of tenure comprised a helicopter-supported outcrop sampling program and general geological reconnaissance, in which thirty-nine outcrop samples were collected (Table 1).

Geological reconnaissance, extrapolation and interpretation has shown that the relinquished land is comprised of Nimbuwah Complex basement rocks (of which there is no outcrop exposure), overlain by Palaeoproterozoic Gumarrirnbang Sandstone and Cretaceous to recent unconsolidated to semi-consolidated sands and sediments.

There have been no significant results returned from the exploration work carried out to date, therefore Cameco Australia surrendered the remaining portion of the Exploration Licence on 22 April 2008.

The eligible expenditure on the Goomadir River tenement for the reporting period was $68,516.

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INTRODUCTION

Goomadir River is a uranium exploration project consisting of Exploration Licence EL23035. The project is managed and operated by Cameco Australia Pty Ltd. Under the statutory requirements of the Mining Act, and since no significant results have been obtained from exploration work conducted in the tenement to date, the remainder of Exploration Licence EL23035 was surrendered on 22nd April 2008. This report describes the exploration work undertaken by Cameco during the reported period.

The objective of exploration was to discover economic ‘unconformity style’ uranium mineralisation in a geological setting similar to the known deposits of the Alligator Rivers Region, NT, and the concealed high-grade deposits of the Athabasca Region, Saskatchewan, Canada.

The Kombolgie Subgroup sandstone and volcanic units outcrop extensively, concealing basement throughout the area. The tenement appears to be underlain by mainly Nimbuwah Complex granites that host known, but thus far minor, uranium mineralisation in the Arnhem Land region. Favourable structures and hydrothermal alteration occur in the region.

Work completed by Cameco Australia during the 3rd year of tenure comprised the following:

- General geological reconnaissance in the southern arm of the tenement;
- Helicopter-supported, follow-up outcrop sampling of tourmaline anomalies identified by the Hyperspectral survey flown over the tenement during the previous year.

Location and Access

EL23035 is located in Western Arnhem Land, Northern Territory on the Millingimbi (SD-5302) 1:250,000 topographic map and the Liverpool (5672) and Goomadeer (5673) 1:100,000 topographic maps. 1:50,000 topographic map coverage is available for Dalabon and Goomadeer River.

The Goomadir River tenement is centred approximately 85 km east of Jabiru (Figure 1). The rugged nature of the sandstone, which overlies most of the licence, means that access is only possible by helicopter and then by foot. Vehicle access into the southern part of the tenement was at one stage possible via exploration tracks on the adjacent EL23462, but these have fallen into disrepair. Helicopter access has been based from Jabiru or from Cameco’s semi-permanent field camp (Myra), located 40 km northeast of Jabiru (Figure 1). Road access to Myra Camp is via the Arnhem Highway to Jabiru and bitumen road to Cahill Crossing, then by dirt road via Oenpelli and Nabarlek.

Figure 1 Location map for EL23035

Tenure

Exploration Licence (EL23035) is located in Western Arnhem Land and covers an area of 177.7 km², comprising 53 blocks. The Department of Primary Industry, Fisheries and Mines (DPIFM) granted the exploration licence on 15 June 2005 to Cameco.
Australia for an initial period of six years. In June 2007, under the requirements of Section 26(1) of the Mining Act, 50% of the original tenement was relinquished, representing 53 blocks or 177.7 km² (Figure 2). In April 2008, following disappointing results from the 2007-2008 field season, the entire project area was surrendered.

Figure 2 Areas relinquished in 2007

The area of land relinquished in June 2007 contained several areas sensitive, or possessing cultural or social significance, to the Traditional Owners, represented as ‘No Go Zones’ or ‘Non-Consent Areas’, as shown on Figure 1. These areas have always been excluded from exploration activities throughout the duration of tenure.

Personnel and Contractors

Several Cameco Australia geologists and field personnel have undertaken fieldwork during the history of the project. Contractors and consultants used were:

- Airborne magnetic-radiometric-DTM survey by UTS Geophysics Pty Ltd, Perth;
- Airborne Hyperspectral survey by HyVista Corporation, New South Wales;
- Geochemical analytical services by Northern Territory Analytical Laboratories, Darwin;
- Petrographical services by Pontifex & Associates, Adelaide;
- Helicopter assisted activities by Jayrow Helicopters, Darwin

REGIONAL GEOLOGY

The Goomadir River project area lies on the eastern margin of the Pine Creek Inlier (PCI), roughly on the boundary of the so-called East Alligator and Nimbuwah structural domains (Figure 3). The following text relates largely to this region. Reconnaissance mapping of the PCI has been conducted by the Bureau of Mineral Resources (BMR) since 1946, with more detailed work in the 1950’s and 60’s following the discovery of uranium at Rum Jungle. The Alligator Rivers region was systematically mapped by the BMR during the period 1972 to 1983, resulting principally in the publication of two 1:250,000 scale geological and metallogenic maps (Needham, 1990; Needham et al., 1983) and a detailed report (Needham, 1988). Cobourg Peninsula was also mapped at this time (Hughes 1973). 1:100,000 scale compilation maps were published in colour and/or black & white format. Related publications are numerous (Hughes 1978; Stuart-Smith and Ferguson 1978; Needham, Crick et al. 1980; Stuart-Smith and Needham 1982; Stuart-Smith and Needham 1984; Needham and Stuart-Smith 1985; Warren and Kamprad 1990). In more recent years, the Northern Territory Geological Survey (NTGS) has remapped the central parts of the PCI and the Milingimbi sheet (Ahmad 1998; Carson, Brakel et al. 1999; Ferenczi and Sweet 2004). It has also begun focused geochronological studies aimed at developing a better stratigraphic framework, in collaboration with Geoscience Australia (GA) (Worden, Claoué-Long et al. 2004)

Figure 3 Regional Geology of the Alligator Rivers Region
Regional and deposit-scale metallogenic research, including uranium, has also been carried out in the PCI by a number of organisations, including the BMR (and subsequently AGSO and GA), Queens University, Johns Hopkins University, Bas-Becking Laboratory, Australian National University, CSIRO, USGS and NTGS (Crick, Muir et al. 1980; Ferguson, Ewers et al. 1980; Ferguson and Goleby 1980; Fraser 1980; Needham and Roarty 1980; Needham and Stuart-Smith 1980; Rossiter and Ferguson 1980; Stuart-Smith, Wills et al. 1980; Tucker, Stuart et al. 1980; Crick 1981; Johnston 1984; Ewers, Needham et al. 1985; Needham 1985; Maas and McCulloch 1988; Wilde, Mernagh et al. 1989; Browne 1990; Carville, Leckie et al. 1990; Dunn, Battey et al. 1990; Hancock, Maas et al. 1990; Needham and De Ross 1990; Snelling 1990; Wilde and Noakes 1990; Wyborn 1990; Mernagh 1992; Stuart-Smith, Needham et al. 1993; Solomon and Groves 1994; Raffensperger and Garven 1995; Raffensperger and Garven 1995; Garven and Raffensperger 1996; Ahmad 1998; Sweet 2001; Holk, Kyser et al. 2003).

The oldest rocks exposed in the Alligator Rivers region, belonging to the 2500 Ma (late Archaean) Nanambu Complex, outcrop sparsely in Kakadu National Park and include paragneiss, orthogneiss, migmatite, granite and schist (Needham 1988) (Figure 3). The Archaean complexes form structural domes that are unconformably overlain by metasediments and minor metavolcanics of the Palaeoproterozoic Pine Creek Succession or Supergroup (PCS), which constitutes the Pine Creek Orogen tectonic unit (formerly the Pine Creek Geosyncline). In the Alligator Rivers region, the PCS initiates with meta-psammitic and quartzose rocks of the Mount Howship Gneiss and Kudjumarndi Quartzite (both Kakadu Group). These are laterally equivalent to the Mount Basedow Gneiss and Munmarlary Quartzite respectively (Ferenczi, Sweet et al. 2005). This Group appears to onlap the Archaean basement highs, but gneissic variants are also reported to be transitional into paragneiss of the Nanambu Complex (Needham 1988).

The Cahill Formation and Masson Formation of the Namoona Group (Ferenczi, Sweet et al. 2005) conformably overlie the Munmarlary Quartzite, the Cahill Formation being informally mapped as two subunits or members (Needham 1988). The Lower Cahill Formation hosts the main uranium ore bodies in the region (e.g. Nabarlek, Ranger and Jabiluka; Figure 3) and consists of a basal calcareous marble and calc-silicate gneiss unit that is overlain by pyritic, garnetiferous and carbonaceous schist (meta-pelite), quartz-feldspar-mica gneiss (meta-arkose) and minor amphibolite. The Upper Cahill Formation is more psammitic, comprising feldspar-quartz schist (meta-arkose) and quartzite, lesser mica-feldspar-quartz-magnetite schist (meta-pelite), and minor conglomerate and amphibolite. It also contains the mafic to intermediate Stag Creek Volcanics, which have a SHRIMP U-Pb age of 2048±13 (Ferenczi, Sweet et al. 2005). The Cahill Formation is notably magnetic, in particular the base of upper psammitic unit (also known as the ‘hanging wall sequence’), due to the presence of mafic sills and/or magnetite, providing a means of spatially distinguishing it from underlying and overlying less magnetic formations (Kendall 1990). The Masson Formation is generally considered to be the lower grade metamorphic equivalent of the Cahill Formation.

The unconformably overlying Nourlangie Schist is a monotonous succession of argillaceous to quartzose phyllite and quartz-mica schist that locally contains garnet and staurolite. Nourlangie Schist is interpreted to be the eastern temporal correlative of the combined interval – Mundogie Sandstone and Wildman Siltstone (Mount Partridge Group), and Koolpin Formation, Gerowie Tuff and Mount Bonnie Formation (all South Alligator Group) (Needham 1988). Some authors argue that temporal equivalents of the Mundogie Sandstone
are absent east of the South Alligator River (Ferenczi, Sweet et al. 2005), but it may not be possible to distinguish facies variants at the Cahill Formation-Nourlangie Schist level. Wildman Siltstone is characteristically composed of silty carbonaceous phyllite, sandy ferruginous siltstone and shale, consistent with a Nourlangie Schist ‘protolith’.

Early stratigraphic columns also included the Kapalga Formation as a lateral equivalent of the Nourlangie Schist (Needham, Smart et al. 1983), however, outcrops formerly mapped as this unit in the Mount Evelyn sheet are now re-assigned to South Alligator Group (Ferenczi and Sweet 2004). As a result, the name Kapalga Formation will probably be abandoned and various outcrops throughout the eastern PCI re-assigned to other units. Lithological descriptions of the Kapalga Formation (Needham, Smart et al. 1983) – ferruginous, pyritic and carbonaceous chert-banded metasiltstone (slate/phyllite) or biotite schist, garnetiferous schist and quartzite – are consistent with the lower metamorphic grade Koolpin Formation, which hosts a number of gold prospects and deposits in the central PCI (Ahmad 1998). However, calcareous and dolomitic lithologies (including stromatolites) and banded iron formation that are also common in the Koolpin Formation are not documented in the Kapalga Formation. The overlying Gerowie Tuff and Mount Bonnie Formation in the central PCI comprise variously interbedded massive silicic-potassic tuffaceous chert, carbonaceous clayey siltstone, coarse ‘greywacke’ and lithic sandstone. Metamorphosed equivalents of these lithologies have not yet been recognised in the Nourlangie Schist, suggesting either facies variation, onlap/pinchout, erosional removal or a lack of definitive exposure in the east.

The age of the Nourlangie Schist is only constrained by its inferred correlatives. The Wildman Siltstone is about 2025 Ma and the Gerowie Tuff is 1863±2 Ma, based on SHRIMP U-Pb zircon dating (Worden, Claoué-Long et al. 2004). Large time breaks are obviously present in the succession.

Mafic sills and dykes including the Goodparla and Zamu Dolerites intrude the PCS, with the former common in the upper Cahill Formation and the latter prolific in the South Alligator Group (Warren and Kamprad 1990). Lower metamorphic grade rocks have typical dolerite textures, but in the Alligator Rivers region, they are generally amphibolite sensu stricto. Regardless, these dykes impart a magnetic signature to their respective hosts where they contain residual magnetic phases.

The sedimentary and igneous rocks of the PCS are structurally complex, having undergone at least three recognisable phases of deformation (Thomas 2002) related to Top End Orogeny (1880 to 1780 Ma). They have also undergone high-temperature low-pressure prograde metamorphism, including local migmatisation and remobilisation, during the ~1850-1860 Ma Nimbuwah Event of the Barramundi Orogeny (Page and Williams 1988). The intensity of metamorphism and deformation varies across the region, with the western and eastern margins of the Pine Creek Inlier (Litchfield Province and Nimbuwah Domain respectively) showing the most pronounced effects. In the Nimbuwah Domain or Alligator Rivers region, there is a broad trend of increasing grade from southwest to northeast. This gradient clearly reflects synchronous emplacement of the 1865 Ma Nimbuwah Complex granitoids in that area. Distinctions based on metamorphic grade and protolith type have been made on regional maps (Needham 1988) and are summarised below.

Greenschist to amphibolite facies metasedimentary rocks in the southwest can generally be distinguished stratigraphically and are assigned to specific formations and groups.
Amphibolite to granulite facies metasedimentary rocks that lie between the Nimbuwah Complex in the northeast and the areas of better-defined stratigraphy in the southwest are mapped as Myra Falls Metamorphics. They incorporate outcrop that cannot be distinguished from the Zamu Dolerite and Kakadu, Mount Partridge, Namoona or South Alligator Groups, but where a sedimentary precursor can be demonstrated (Needham 1988). Rocks with a likely felsic igneous protolith are assigned to the Nimbuwah Complex (see below).

Magmatic rocks (mostly I type granodiorite) and felsic to intermediate migmatite and granulite in the northeast are distinguished as the Nimbuwah Complex. These rocks have a relatively simple isotopic character (Page and Williams 1988) that suggests an entirely igneous protolith. However, there is some doubt about this distinction, as much of the mapped Nimbuwah Complex around King River appears to have a sedimentary protolith (e.g. lit par lit zones).

Metamorphic, igneous and sedimentary rocks of the PCS have been intruded by later Palaeoproterozoic ‘post-orogenic’ granites of the Cullen Batholith, including the Jim Jim and Mount Bundey Granites (Jagodzinski and Wyborn 1997) (Figure 3).

The PCS and Cullen Batholith are locally overlain by felsic volcanic rocks belonging to the Edith River and El Sherana Groups, which are comagmatic with the Cullen Batholith (Jagodzinski 1992). These units are thickest in the south in the South Alligator Fault Zone and are generally absent in the Alligator River region due to Palaeoproterozoic erosion.

The various basement units are unconformably overlain by the Kombolgie Subgroup, the basal unit of the late Palaeoproterozoic Katherine River Group, McArthur Basin (Sweet, Brakel et al. 1999; Sweet, Brakel et al. 1999) (Figure 3). This subgroup consists of a series of sandstone formations (Mamadawerre, Gumarribang and Marlgowa Sandstones), which are divided by thin basaltic units (Nungbalgarri and Gilruth Volcanics). The minimum age of the Mamadawerre Sandstone is 1725 Ma based on geochronology of the Oenpelli Dolerite (see below). Detrital zircon SHRIMP data from the GA OZCRON database constrain the maximum age as ~1810 Ma. The true age is probably close to 1800 Ma (Rawlings 2002). The sandstones form a flat-lying or shallow southeast-dipping strongly jointed platform, called the Arnhem Land Plateau. The eroded edge of the Mamadawerre Sandstone forms the characteristic Arnhem Land escarpment and the isolated sandstone mesas and ranges on the coastal plain. The middle to upper part of the Katherine River Group is exposed ~50 km further to the southeast near Mount Marumba (Sweet, Brakel et al. 1999).

The Oenpelli Dolerite is the most pervasive mafic intrusive suite to affect the Alligator Rivers region and is the youngest Precambrian rock unit exposed. It intrudes various levels of the stratigraphy, including the PCS and Kombolgie Subgroup (Figure 3), forming highly magnetic sills, dykes, lopoliths and laccoliths. Intrusions can be either concordant or discordant with Palaeoproterozoic stratigraphy. This unit is currently constrained by a SHRIMP baddeleyite date of 1723±6 Ma (Ferenczi, Sweet et al. 2005), however, geochemical and geophysical data suggest several phases of intrusion throughout the region. At least one phase correlates with emplacement of the Nungbalgarri Volcanics at about 1780 Ma (Rawlings 2002). These intrusive events had a pronounced thermal effect within the Kombolgie Subgroup, with the promotion of fluid flow and aquifer/aquitard modification. Localised effects in the sandstone include silicification, desilicification and introduction of chlorite, muscovite and pyrophyllite in active aquifer systems. A characteristic mineral
assemblage of prehnite-pumpellyite-epidote has formed in the quartzofeldspathic basement rocks adjacent to the intrusions.

Field evidence for the age of the Nabarlek and Tin Camp Creek Granites is inconclusive, with both pre- and post-sandstone interpretations being valid. The Tin Camp Granite has been traditionally interpreted as unconformably overlain by Mamadawerre Sandstone along Tin Camp Creek, however, pervasive silicification and up doming of the cover sequence above this granite is also consistent with emplacement as a sill at the basement-sandstone unconformity and subsequent thermal metamorphism of the sandstone. The pre-sandstone explanation of these observations involves long-lasting radiogenic-driven fluid flow and silicification above the granites and structural displacement of the granite (i.e. solid state diapirism).

Deformation since deposition of the Katherine River Group includes transpressional movement along steep regional-scale strike-slip faults and possibly some shallow thrusting. These regional faults follow a pattern of predominantly north, northwest, north-northwest and northeast strikes, giving rise to the characteristic linearly dissected landform pattern of the Kombolgie plateau (Figure 3). Another significant set trends east west and includes both the Ranger and Beatrice Faults. The Bulman Fault Zone is a principal regional feature and is considered to represent a long-lived deep crustal structure, with a large lateral component in rocks of the PCS. However, it is clear that post-Kombolgie displacements along this and other faults have not been great, because the Arnhem Land Plateau is essentially coherent and offsets along lineaments are generally minor. Field investigations of many interpreted ‘faults’, including those with a marked geomorphic expression, show no displacement, and are best described as joints or lineaments (Thomas 2002).

Erosional remnants of flat-lying Palaeozoic Arafura Basin and Cretaceous Carpentaria Basin are present as a veneer throughout the coastal zone of the Top End. Various regolith components are also recognised in the region.

**The Geology of Exploration Licence EL23035**

EL23035 encompasses the western margin of the Kombolgie Plateau and comprises Palaeoproterozoic sedimentary and volcanic rocks of the Kombolgie Subgroup of the McArthur Basin and minor Oenpelli Dolerite. Although basement rocks are not exposed, and there is no existing drilling in the tenement, geological extrapolation, from adjacent tenements EL23462 and ELA24992 suggests that basement may be Nimbuwah Complex granites. There is also the possibility of other basement units, such as stratigraphic equivalents of Archaean Nanambu Complex and Palaeoproterozoic Myra Falls Metamorphics, Edith River Group, Cullen granite suite and Tin Camp Granite. Depth to basement, based on the surface geology, is likely to be in the range 300-800 m.

The Mamadawerre Sandstone, the oldest formation of the Kombolgie Subgroup (Sweet, Brakel et al. 1999), occupies only a small fault-bounded inlier in the northern part of the tenement, called the Tibet-Nepal horst. It is composed of generally fine- to medium-grained quartzose sandstone, with a basal 20-30 m of pebbly sandstone facies. Planar bedding, ripples and trough cross-beds dominate, but there are local planar cross-beds. The unconformably overlying Nungbalgarri Volcanics are exposed in the western part
of the tenement. The basal contact is expressed locally as 100-500 m diameter subcircular depressions (‘dome and basins’), with the upper sandstone surface interpreted to represent the palaeotopographic surface of giant lunate current ripples or aeolian sand dunes with the volcanics draped over the top (Nott and Ryan 1996). It may also represent large dewatering structures formed as a result of hot volcanic rocks draped over water-saturated sediments, which were deposited in estuarine conditions (Needham 1978). The Nungbalgarri Volcanics consist of multiple vesicular and amygdaloidal basaltic flows. Regionally, the stratigraphic thickness of the volcanic unit is quite variable between 50 m and 200 m.

The overlying Gumarrinbang Sandstone occupies most of the eastern portion of the tenement, where it forms the deeply dissected plateau surface. This area is composed largely of bare rock with sparse areas of shallow sandy soil supporting Spinifex and scrub. The Gumarrinbang Sandstone comprises fine to coarse-grained quartz arenite with scattered pebbly units. Sedimentary structures include planar and trough cross-stratification, ripples and horizontal planar stratification, suggesting a proximal to distal fluvial braided stream and estuarine depositional environment.

The Gilruth Volcanic Member is a thin marker unit that has a distinctive aerial photographic pattern of parallel rills preserved at its lower contact (relict dunes?) and dark ferruginous deposits. The actual unit is very poorly exposed, but in drill core to the southwest, it is made up of basalt and siltstone. It is overlain conformably by Marlgow Sandstone, which exhibits similar fine-grained quartzose sandstone facies to the underlying Gumarrinbang Sandstone. Sandstone above and below the volcanic marker is notably highly silicified.

Oenpelli Dolerite intrudes the Kombolgie Subgroup as sills and dykes, mainly along the curvilinear Kukalak Valley, which impinges on the southern part of the tenement. This discordant part of the Oenpelli Dolerite may be partly fault controlled, and this valley is currently interpreted to mark the eastern-most extent of Oenpelli Dolerite in central Arnhem Land. Drilling or geophysics has not validated this theory. Dolerite is coarse, fresh and locally porphyritic near the intrusive margins.

Undifferentiated Cretaceous rocks have been mapped on the edges of the tenement (Carson, Brakel et al. 1999). The rocks are exposed as weathered outcrops of lateritised sandstone and siltstone forming resistant mesa-like ridges. Thick sand cover is present through the middle of the tenement.

The most visibly obvious structures in the tenement are the ENE-trending Ranger Fault and N-trending Tibet Fault (new informal name used herein). There are numerous other linear structures with variable lateral extent that crosscut the plateau country as incised valleys and creeks. Most appear to have little or no displacement and probably represent joints or dykes, but some appear to have minor lateral displacement, such as the Manggabor Fault (new informal name used herein). Also present in EL23035 is the southern termination of a deeply incised curvilinear feature, informally termed the Kukalak Valley, which extends from the adjacent EL23462. This feature has previously been inferred to be a shallow southwest-dipping reverse fault, the ‘Goomadeer Thrust’ (Rippert 1992; Taylor 1999; Thomas 2002; Otto, O'Connor et al. 2003). It is overall northwest to southeast oriented, and in part traces the Goomadeer River. It is now
thought to represent the margin of an uplifted block of sandstone above a dolerite sill or laccolith.

PREVIOUS EXPLORATION

In 1969-1971 Geopeko and a joint venture lead by Electrolytic Zinc Company of Australia/Asia conducted a rapid photo-interpretation followed by an airborne radiometric and magnetic survey over the then named AP 2364 tenement, now the western section of the current EL23035 tenement (Figure 4). The purpose was to locate Westmoreland-type uranium deposits. The radiometric survey failed to locate significant radiometric anomalies other than a 700 cp U high associated with a muddy radon spring approximately 34km west of EL23035. The radiometric highs that fall over the current tenement are listed in Table 2.

With the discovery of the unconformity-style uranium deposits of Nabarlek and Ranger 1, the joint venture downgraded the potential of the area to host Westmoreland deposits and redirected their efforts to search for large-scale uranium deposits in basement. When a review of aerial photographs failed to locate outcropping basement through “Windows” (Maynard 1971) in the Kombolgie Subgroup the area was relinquished in 1971.

Figure 4 Historical exploration over EL23035

Table 2 Radiometric highs recorded in 1971 over AP2364

<table>
<thead>
<tr>
<th>U High No.</th>
<th>Flight lines</th>
<th>Counts (cps)</th>
<th>Lithology</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>AY</td>
<td>300-450</td>
<td>Cretaceous (Mullaman Beds (Klm))</td>
</tr>
<tr>
<td>25</td>
<td>AY</td>
<td>300-450</td>
<td>Volcanics (Phn)</td>
</tr>
<tr>
<td>26</td>
<td>AY</td>
<td>310</td>
<td>Volcanics (Phn)</td>
</tr>
<tr>
<td>27</td>
<td>AY</td>
<td>300-390</td>
<td>Unassigned</td>
</tr>
<tr>
<td>28</td>
<td>AX</td>
<td>320</td>
<td>Unassigned</td>
</tr>
<tr>
<td>29</td>
<td>AX</td>
<td>270-420</td>
<td>Volcanics</td>
</tr>
<tr>
<td>30</td>
<td>AX</td>
<td>420</td>
<td>Cretaceous (Mullaman Beds (Klm))</td>
</tr>
</tbody>
</table>

Kombolgie Sandstone background 200 cps

Uranerz Australia, Afmeco Mining and Exploration (AFMEX) and Cameco Australia have been exploring for uranium periodically on adjacent tenements (now EL23462 and ELA24992) since about 1986. The Northern Territory Geological Survey undertook geological mapping in the area as part of a regional program to map the Milingimbi 1:250,000 sheet (Carson, Brakel et al. 1999). No prospects are known within the tenement.
EXPLORATION TARGET

The focus of the Cameco exploration strategy is the discovery of ‘unconformity-style’ uranium deposits. The nearby economic deposits at Ranger, Jabiluka, Koongarra and Nabarlek serve as exploration models. The gold, palladium and platinum-rich Coronation Hill-style deposits of the South Alligator Valley are also a valid exploration target.

Given that there are local variations in geological setting (structure, host rock, element association), the deposits appear to have a common position relative to the base of the Kombolgie Subgroup, i.e. the Palaeoproterozoic unconformity, or to its related erosional margin. In several examples, down-faulted blocks of Kombolgie Sandstone (reverse faulting) are juxtaposed adjacent to the mineralisation, as at Ranger No. 3 orebody and the Hades Flat Prospect between Ranger and Jabiluka. These and other recognised features are considered to be indicative of a favourable setting for the concentration of mineralising fluids within a structurally disrupted unconformity setting.

The deposits of the South Alligator Valley (SAV) and the Rum Jungle-Waterhouse region also exhibit a spatial relationship to Palaeoproterozoic unconformities. The SAV deposits are ‘capped’ by the Kombolgie Subgroup sandstone and have an igneous affiliation (sub-volcanic intrusive). They tend to be more gold-enriched and are characterised by the presence of palladium and platinum selenides. The Sargeants and Kylie styles of mineralisation, located south of the Rum Jungle on the fringe of the Archaean Waterhouse Complex, have some similarities to the SAV with Au-PGE enrichments in association with uranium. The Depot Creek Sandstone, the basal unit of the Tolmer Group, unconformably overlies these deposits, which are hosted in a carbonate-carbonaceous schist sequence.

Although no ground-based exploration was conducted in the Goomadir River tenement prior to 2006, the area was considered prospective for unconformity related uranium-gold-PGE mineralisation based upon the following observations from adjacent tenements EL23462 and ELA24992:

- proximity to the unconformity between metasedimentary packages and overlying Kombolgie Sandstone (300-800m);
- favourable reported lithologies and uranium prospects in adjacent tenements;
- regional structures that have established mineralisation along them to the west (e.g. Ranger Fault).

EXPLORATION METHODOLOGY FOR 2007-2008

Exploration on EL23035 during the reported period consisted of general geological reconnaissance and a helicopter-assisted outcrop sampling program targeting a number of tourmaline anomalies identified by the airborne Hyperspectral survey flown in 2006 (Bentley et.al., 2007).
Outcrop Sampling and Geophysical Follow-up

Hyperspectral Anomaly Sampling

In early August 2007, a helicopter-assisted sampling program was undertaken in the southern part of the tenement, in order to investigate several illite and tourmaline alteration anomalies that had been identified in association with a northeast-trending fault zone in the immediate area.

A total of 39 spot samples were collected from the southwestern sector of EL23035 (Figure 5).

All outcrop samples collected underwent Short-Wave Infra-Red analysis (SWIR) using a Portable Infra-red Mineral Analyser or PIMA (Appendix 1). The raw and interpreted data for the 2007 samples are submitted as Appendices to this report. Procedures followed for outcrop sampling and sample preparation, as well as analytical techniques, such as the analysis of samples by NTEL Laboratories, are also provided as the Appendices to this report (Appendix 2 – Appendix 7).

EXPLORATION RESULTS FOR 2007-2008

Hyperspectral Anomaly Follow-Up Sampling

Thomas et.al., (see REFERENCES), identified two types of ore-related alteration haloes in the Athabasca Basin unconformity-style deposits that are currently used in the exploration models for Arnhem Land. One type of alteration comprises illite, chlorite and haematite; the other consists of illite, dravite, chlorite and kaolinite.

Interpretation of the HyMap data generated several anomalies, however most of the favourable alteration minerals (with the exception of tourmaline), such as illite, chlorite and kaolinite, were found to occur as earlier original clay matrix material prior to being diagenetically altered to dickite (Zamudio, 2007). When favourable clay alteration minerals were observed, they were not found to be associated with each other at the surface. As tourmaline (dravite) is not a product of earlier diagenetic alteration, it was identified as the highest priority for investigation (Zamudio, 2007).

Most of the outcrop samples collected were of Gumarrimbang Sandstone, however three were taken from the overlying Cainozoic sediments, see Table 3.
Table 3 Summary of results for HyMap outcrop sample suite

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Easting</th>
<th>Northing</th>
<th>Sample Description</th>
<th>Radiometric Reading (Av), CPS</th>
<th>Uranium Assay Result (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR071000</td>
<td>344916</td>
<td>8595581</td>
<td>Coarse-grained sandstone with quartz veining in and along joints/fractures and occasional small pebbles</td>
<td>42</td>
<td>0.63</td>
</tr>
<tr>
<td>GR071002</td>
<td>344918</td>
<td>8595640</td>
<td>Medium-coarse-grained, pitted sandstone with internal limonite and haematite alteration</td>
<td>170</td>
<td>0.46</td>
</tr>
<tr>
<td>GR071006</td>
<td>344853</td>
<td>8595867</td>
<td>Well-sorted, medium-grained sandstone</td>
<td>110</td>
<td>0.35</td>
</tr>
<tr>
<td>GR071008</td>
<td>344687</td>
<td>8595890</td>
<td>Cross-bedded, minor conglomerate</td>
<td>90</td>
<td>1.29</td>
</tr>
<tr>
<td>GR071010</td>
<td>344940</td>
<td>8596041</td>
<td>Cross-bedded, fine-medium-grained sandstone, some limonitic alteration</td>
<td>110</td>
<td>0.96</td>
</tr>
<tr>
<td>GR071022</td>
<td>345189</td>
<td>8598443</td>
<td>Ferruginous sandstone float</td>
<td>60</td>
<td>0.34</td>
</tr>
<tr>
<td>GR071025</td>
<td>345332</td>
<td>8598213</td>
<td>Well sorted, medium-grained, clean quartz arenite. Occasional small black tourmaline crystals</td>
<td>90</td>
<td>0.73</td>
</tr>
<tr>
<td>GR071028</td>
<td>345902</td>
<td>8597760</td>
<td>Well-sorted, clean quartz arenite, occasional tourmalines throughout, cross-bedded</td>
<td>85</td>
<td>0.56</td>
</tr>
</tbody>
</table>
Geochemical assay results from the 2007 sample suite were also disappointing (Table 4).

Table 4 Geochemical assay results for 2007 sample suite.

PIMA analysis identified an iron-bearing tourmaline mineral (possibly foitite) and ankerite in sample GR071002 only, however ground radiometrics and geochemistry were both disappointing and did not support the PIMA result (Table 3).

Table 5 SWIR results for 2007 sample suite.

Petrographical analysis identified medium- to very coarse-grained sandstone containing abundant illite and haematite, both interstitial and associated with stylolitic grain boundaries (Table 6). Authigenic quartz was also identified, mostly in crystal-lined cavities but also as rims around subrounded quartz grains within the sandstone. It is likely that the black mineral initially interpreted in the field (Appendix 7) as tourmaline was actually fine-grained biotite or earthy, crystalline (partly microplaty) haematite, as identified by petrography.

Table 6 Petrographical report for the 2007 outcrop sample suite.
EXPENDITURE FOR 2007-2008

Expenditure on EL23035 for the 3rd year of tenure totalled $68,516 (Table 7). The main expenditure items were payroll costs, including geologists, consultants and field assistants; fuel and air charters; camp costs; NLC administration costs; analytical expenses; equipment; travel and communications. Compensation payments made to the NLC and tenement rental payments made to DPIFM (Minerals and Energy – formerly DBIRD) do not constitute reportable exploration costs.

Table 7 Eligible expenditure for exploration period 2007-2008 (3rd year of tenure).

CONCLUSIONS

The airborne Hyperspectral survey flown in 2006 provided a number of anomalies for follow-up investigation during the 2007-2008 field season, however many returned disappointing results. The highest uranium assay returned from the 2007 sample suite was 1.29ppm from a ferruginous conglomerate in the Gumarrinbang Sandstone (Sample GR071008).

Geochemical comparison of the outcrop samples revealed significant peaks in the aluminium and iron oxide assays (Figure 6) that correlate with slight elevations in the uranium assay results (samples GR071023 and GR071032; Figure 7), however both samples were taken from intensely ferruginised regolith located in creeks (GR071023 was a haematitic, gossanous float and GR071032 was an intensely ferric, pisolitic laterite). Uranium assays for these samples were 1.97 and 5.60ppm, respectively. This weak anomaly in the regolith may, however, have resulted from the leaching, weathering and erosion, and subsequent deposition, of pre-existing sandstone that already contained slightly elevated levels of uranium.

Figure 6 Graph showing comparison of various element concentrations within 2007 HyMap outcrop sample suite.

Figure 7 Graph illustrating uranium concentration within 2007 HyMap outcrop sample suite.

APPENDICES

Appendix 1 Procedures for SWIR analysis using PIMA
Appendix 2 Outcrop sampling procedures
Appendix 3 Logging codes for outcrop sampling
Appendix 4 Procedures for NTEL sample preparation
Appendix 5 Multi-element suite analysed by NTEL
Appendix 6 Procedures for NTEL sample analysis
Appendix 7 Thin-section listing for 2007 outcrop sample suite
REFERENCES


Needham, R. S. and G. J. De Ross (1990). Pine Creek Inlier - Regional Geology and


