Cameco Australia Pty Ltd

EXPLORATION LICENCE EL 3347

CADELL PROJECT

ANNUAL REPORT FOR THE PERIOD 28 JULY 2004 TO 27 JULY 2005

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SUMMARY

Cadell is a uranium exploration project area in northwest Arnhem Land, which is owned and operated by Cameco Australia Pty Ltd (Cameco). Cameco assumed ownership of this project in early 2003 following the dissolution of an unrelated joint venture. Cameco was granted an extension/renewal in July 2003, whereby the tenement is due to expire on the 27th of July 2005. During the current reporting period, Cameco have been unable to access any of EL3347 outside of the immediate vicinity of Steven's Anomaly, due to the lack of an anthropological site clearance. At the Traditional Owners request, a survey took place during the current reporting period. Prior to the expiry date, Cameco relinquished most of the tenement. This report relates only to the portion retained for an extension period of two years. This retained portion will expire on 27th July 2007. Cameco will submit a separate report for the relinquished portion of the tenement.

Exploration activities carried out during the 2004-2005 reporting period were designed mainly to determine the uranium mineralisation potential of Steven's Anomaly in the northwestern corner of the tenement. This consisted of a helicopter-assisted drilling program of one diamond drill hole, CDD002, outcrop sampling and a high-resolution airborne magnetic-radiometric survey (Table 1). A Hymap Hyperspectral survey was also flown over the entire tenement.

Outcrop sampling (n=11) at Steven's has confirmed the geochemical anomaly >500 m long and >200 m wide, coincident with an established airborne radiometric anomaly. The best results include 1330 ppm U plus 370 ppb Au; and 711, 602, 362 & 358 ppm U.

Two heli-rig diamond holes were planned 200 m to the south of previous holes, to test the surface anomaly and adjacent Steven's Fault. CDD0002 was collared on the southern edge of the airborne radiometric anomaly that defines Steven's Anomaly and inclined southward to intersect the subsurface projection of Steven's Fault. A total of 83.8 m was drilled, consisting entirely of altered Oenpelli Dolerite, with the hole abandoned before target depth in broken ground. The best analytical result obtained was 518 ppm and 71 ppb Au over 20 cm at 31.8 m. Saprolitic clay from 7.3 to 26 m assayed 31 ppb Au and 14 ppm U over 18.7 m (composite). The base of the drill hole comprises massive haematite, sericite and chlorite alteration and significant brecciation, interpreted to be associated with propagation of Steven's Fault and related hydrothermal fluid movement. Pervasive and intense chlorite, haematite, sericite (phengite) and leucoxene alteration and veining appears to be directly associated with all the radiogenic intervals.

Due to poor ground conditions and lack of alternative drill sites, no further heli-drilling took place at Steven's in 2004. It was deemed that a more powerful land-based RC and /or core rig was required with the capability to penetrate the broken ground and case off the regolith, and this was proposed for 2005.

The overall geochemical signature of Steven's Anomaly consists of strong anomalism in U, Au, Be, Co, Mg and Pb with or without As, Bi, Fe, K, Li, Mo, P, Pd, Sn, V, W and Zn. The concentration of Middle Rare Earth Elements (MREE) is elevated overall. Pb isotope ratios are uniformly low and are associated with high U/Th and RUI (U/Zr*100). Phosphate with mildly elevated U, Th and REE in relatively fresh dolerite and granite, and sandstone with elevated Th, appear to be the distal signatures. Spot assays of gamma spikes in CDD001 (drilled in 2003 at Steven's) at 138.8 m and 286.1 m yield 92 ppm & 95 ppm U respectively (plus ~10 ppb Au).

Re-logging of CDD001, permitted identification of the fault and associated alteration at depth and show's Steven's Fault is subvertical. Altered lamprophyre dykes were also recognised from petrography at Steven's Anomaly.

High-resolution airborne radiometric-magnetic data collected over Steven's in 2004 have resulted in a reduction in the dimensions of the main zones of elevated U^2/Th compared to 200 m spaced data, probably due to noise reduction. There are less high-frequency indicators of structure in radiometrics, but magnetics shows marked improvement in structural resolution. These data will be useful in the planning of future drill programs at Steven's.

Airborne hyperspectral data indicate that upper Mamadawerre Sandstone in the northwest of the tenement is clay poor, with weak goethite and kaolinite. This is underlain by illite and dickite. Gumarrirnbang Sandstone has lower illitic and upper dickitic units. High-grade diagenesis has affected the Kombolgie sandstone, but there are several possible illitic targets related to project scale structures. No obvious clay alteration corresponds to Steven's Anomaly.

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INTRODUCTION

Cadell is a uranium exploration project covering exploration licence EL3347. The project is managed and operated by Cameco Australia Pty Ltd (Cameco). This report details exploration work completed by Cameco during the 2004-2005 licence year.

The prime objective of work on the project is to discover economic 'unconformity style' uranium mineralisation within a geological environment similar to the known deposits of the Alligator Rivers Region, Northern Territory, and the concealed high-grade deposits of the Athabasca Region, Saskatchewan, Canada.

The project lands are underlain by a variety of granitic and metamorphic basement units of the Nimbuwah Complex, which are unconformably overlain by a cover sequence of Kombolgie Subgroup sandstone and volcanic units. Basement and cover are intruded by sills and dykes of the Oenpelli Dolerite. Favourable structures and hydrothermal alteration occur in the region. Several uranium occurrences have been identified in the project area, an indication of a favourable mineralising and alteration event.

The exploration activities planned for the 2004 field season were designed to determine the uranium potential of Steven's Anomaly. A drilling target was generated from interpretation of historical and previous AFmeco Mining and EXploration Pty Ltd (AFMEX) outcrop sampling, drilling, mapping and airborne geophysical surveys.

Location and Access

EL3347 is located in western Arnhem Land, Northern Territory on the Millingimbi (SD-5302) 1:250 000 scale topographic map sheet and the Goomadeer (5673) 1:100 000 scale topographic map sheet. The tenement is centred approximately 90 km northeast of Jabiru and 35 km southeast of the now rehabilitated mine site at Nabarlek (Figure 1; Figure 2). Access is either by air to the Nabarlek or Mamadawerre airstrips, or by road via the Arnhem Highway to Jabiru and then via Cahill's Crossing and unsealed roads towards Mamadawerre outstation.

Figure 1: Project Location Map

Figure 2: Cadell Tenement After Relinquishment at the End of this Reporting Period

The rugged nature of the sandstone, which overlies most of the Cadell tenement, means that access during the current and previous exploration programs was only possible by helicopter or by foot. In 2004, helicopter access was based from a semi-permanent field camp located on Tin Camp Creek, named 'Myra Camp', which was previously operated by AFMEX. Road access to Myra Camp is via the Arnhem Highway to Jabiru and bitumen road to Cahill's Crossing, then by dirt road via Oenpelli and Nabarlek.

Tenure

The Cadell project Exploration Licence (EL3347) is located in western Arnhem Land (Figure 1; Figure 2). The licence was originally granted on 28th July 1997 for a period of six years, covering an area of 770 km^2 (230 blocks). The tenement was explored by a Joint Venture comprising AFMEX – operator (19.6%), S.A.E Australia Pty Ltd

(19.6%), Kumagai Gumi Co. Ltd (19.6%), Uranerz Australia Pty Ltd (19.6%), Pasminco Exploration Pty Ltd (formerly Savage Australian Exploration Pty Ltd) (19.6%) and Kunbohwinjgu Land Corporation Pty Ltd (2%). During the fourth year of tenure, a 50% reduction was made to the area, leaving approximately 384 km^2 (115 blocks). Cameco acquired 98%of this project in early 2003 following dissolution of the Joint Venture; 2% remains with the Kunbohwinjgu Land Corporation Pty Ltd (2%). Cameco applied for and was granted a two-year extension in July 2003, whereby the tenement was due to expire on the 27th of July 2005. Prior to this expiry date, Cameco relinquished 109 blocks and applied for an extension for the remaining 6 blocks of the tenement for a further (and final) two years (Figure 2).

The Cadell tenement is located within the Arnhem Land Aboriginal Reserve and is subject to a Consent Deed with the Northern Land Council (NLC) on behalf of Traditional Owners. Cadell contains two classes of area that are sensitive or have cultural and/or social significance to the Traditional Owners. The most important of these classes is the 'No Go Areas', which are absolutely excluded from exploration access. The other class is 'Restricted Access Areas', where permission from the Traditional Owners must be sought before conducting exploration within the designated areas. As a result of prior arrangements between the earlier Joint Venturers and Traditional Owners, a tenement-wide site clearance for Cadell was only carried out in mid 2004.

GEOLOGICAL SETTING

The project area lies in the western portion of the Pine Creek Orogen, roughly on the boundary of the East Alligator and Nimbuwah structural domains (Needham, 1988; Needham and Stuart-Smith, 1980). The oldest rocks exposed in the region are gneiss, migmatite, granite and schist belonging to the Archaean Nanambu Complex. These are overlain by the Palaeoproterozoic Pine Creek Succession, which initiates with the Mount Howship Gneiss and the distinctive Kudjumarndi Quartzite, both belonging to the Kakadu Group. Psammitic rocks of the Kakadu Group are in turn overlain by the Cahill Formation (Mount Partridge Group) that hosts the main uranium ore bodies in the region (e.g. Ranger and Jabiluka). The Lower Cahill Formation consists of a basal calcareous unit that is overlain by a sequence of pelitic schists, meta-arkose and amphibolite. A well-defined amphibolitic unit at the top of the Lower Cahill Formation hosts the Nabarlek uranium deposit. The Upper Cahill Formation and overlying Nourlangie Schist consist of a monotonous sequence of meta-arkose, schist and amphibolite. The Nourlangie Schist is most likely a temporal correlative of the Wildman Siltstone further west and therefore equates to the upper Mount Partridge Group. Thin mafic sills and dykes of the Zamu Dolerite are locally prolific within the Pine Creek Succession.

The sedimentary and igneous rocks of the Pine Creek Succession are structurally complex, having undergone at least three recognisable phases of deformation (Thomas, 2002). They have also undergone high-temperature low-pressure metamorphism, including local migmatisation and remobilisation, during the ~1870 Ma Barramundi Orogeny (Page and Williams, 1988). The intensity of metamorphism varies across the region, however, a broad trend of increasing grade from southwest to northeast is apparent in the Kakadu-East Arnhem region. Distinctions based on metamorphic grade and protolith type have been made on regional maps (Needham, 1988).

1. Greenschist to amphibolite facies metasedimentary rocks in the west can generally be distinguished stratigraphically and are assigned to specific formations and groups.
2. Amphibolite to granulite facies metasedimentary rocks that lie between the Nimbuwah Complex in the east and the areas of better-defined stratigraphy in the west are mapped as Myra Falls Metamorphics. They incorporate outcrop that cannot be distinguished from the Zamu Dolerite and Mount Partridge or South Alligator Groups, but where a sedimentary precursor can be demonstrated (Needham, 1988). Rocks with a likely felsic (to intermediate) igneous protolith are assigned to the Nimbuwah Complex (see below).
3. Magmatic rocks (mostly I type granite) and felsic to intermediate migmatite and granulite in the east 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 has a sedimentary protolith (e.g. lit par lit zones).

Metamorphic, igneous and sedimentary rocks of the Pine Creek Succession have been intruded by later Palaeoproterozoic 'post-orogenic' granites of the Cullen Batholith, including the Jim Jim, Nabarlek and Tin Camp Creek Granites (Jagodzinski and Wyborn, 1997).

The Pine Creek Succession 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 and are generally absent due to erosion in the north in the Alligator River region.

The various basement units are unconformably overlain by the Kombolgie Subgroup, the basal unit of the late Palaeoproterozoic Katherine River Group, McArthur Basin (Sweet et al., 1999a; Sweet et al., 1999b). This subgroup consists of a series of sandstone formations (Mamadawerre and Gumarrirnbang Sandstones), which are divided by a thin basaltic unit (Nungbalgarri Volcanics). The sandstones form a flat-lying or shallow southeast-dipping strongly-jointed platform, called the Arnhem Land Plateau. The middle to upper part of the Katherine River Group is exposed ~50 km further to the southeast near Mount Marumba.

The Oenpelli Dolerite intrudes various levels of the stratigraphy in the Alligator Rivers region, including the Pine Creek Succession and Kombolgie Subgroup, forming sills, dykes, lopoliths and laccoliths. It is the youngest Precambrian rock unit outcropping in the area.

Deformation since the Katherine River Group includes transpressional movement along steep strike-slip faults of various orientations and possibly some shallow thrusting. However, it is clear that displacements have not been great, because the Arnhem Land Plateau is essentially coherent and offsets along lineaments are generally minor.

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.

Reconnaissance mapping of the western Arnhem-Kakadu region was carried out by BMR personnel dating back to 1946, with more detailed work in the 1950's and 60's following the discovery of uranium at Rum Jungle. This 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 for the Alligator Rivers region (Needham, 1990; Needham et al., 1983) and a detailed report (Needham, 1988). Relevant 1:100 000 scale compilation maps were also published in colour or black & white format. Other related publications are numerous (Needham et al., 1980; Needham and Stuart-Smith, 1985; Stuart-Smith and Ferguson, 1978; Stuart-Smith and Needham, 1982; Stuart-Smith and Needham, 1984). In more recent years, the NTGS has remapped the central parts of the Pine Creek Inlier and Milingimbi (Ahmad, 1998; Carson et al., 1999; Ferenczi and Sweet, 2004).

Regional and deposit scale metallogenic research, concentrated on uranium, has also been carried out in the Pine Creek region by a number of organisations, including BMR, Queens University, Johns Hopkins University, Bas Becking Laboratory, ANU, CSIRO, USGS and NTGS (Ahmad, 1998; Browne, 1990; Carville et al., 1990; Crick, 1981; Crick et al., 1980; Dunn et al., 1990; Ewers et al., 1985; Ferguson et al., 1980; Ferguson and Goleby, 1980; Fraser, 1980; Garven and Raffensperger, 1996; Hancock et al., 1990; Holk et al., 2003; Johnston, 1984; Maas and McCulloch, 1988; Mernagh, 1992; Needham, 1985; Needham and De Ross, 1990; Needham and Roarty, 1980; Needham and Stuart-Smith, 1980; Raffensperger and Garven, 1995a; Raffensperger and Garven, 1995b; Rossiter and Ferguson, 1980; Snelling, 1990; Solomon and Groves, 1994; Stuart-Smith et al., 1993; Stuart-Smith et al., 1980; Sweet, 2001; Tucker et al., 1980; Wilde et al., 1989; Wilde and Noakes, 1990; Wyborn, 1990).

Local Geology of Cadell

The following geological summary relates to the full EL3347 tenement extent of 115 block, prior to the relinquishment in July 2005. The geological units present within the tenement are summarised in Table 2. Cadell lies at the southern extremity of the main surface expression of the Nimbuwah Complex, which occupies coastal plains and escarpment country north of the tenement, centred on King River. In this respect, it is a similar geographical and geological setting to the Nabarlek deposit 30 km to the west. Amphibolite to granulite facies gneiss, migmatite and granite of the Nimbuwah Complex crop out in the northwestern corner of the tenement, bounded from the McArthur Basin sedimentary succession to the south by a series of east- and north-east-trending faults, including the Goomadeer and Steven's Faults (Figure 3).

ROCK UNIT	THICKNESS	GEOLOGICAL AGE
Residual sand cover and laterite on tableland, silt and alluvium in valleys	Up to several meters	Cenozoic
Undifferentiated Cretaceous-sandstone, siltstone and pebble conglomerate	Remnant outliers 10-50 m	Cretaceous
Oenpelli Dolerite – intrusive dolerite sills and dykes	Up to 200 m	Palaeoproterozoic
Gumarrirnbang Sandstone – quartz arenite with minor pebble conglomerate	100-400 m	Palaeoproterozoic
Nungbalgarri Volcanics – vesicular and amygdaloidal basalt	50-130 m	Palaeoproterozoic

Mamadawerre Sandstone – quartz arenite, quartzite and conglomerate	100-250 m	Palaeoproterozoic
Nimbuwah Metamorphic Complex – foliated granite and granodiorite; gneiss, migmatite	Unknown	Palaeoproterozoic

Table 2: Summary of Rock Units Exposed in Cadell

Figure 3: Geology of the Cadell Tenement Showing Location of Drill Holes

Sedimentary and volcanic rocks of the lower Kombolgie Subgroup unconformably overlie the majority of the tenement, including the Mamadawerre Sandstone, Nungbalgarri Volcanics and Gumarrirnbang Sandstone (Sweet et al., 1999a). The 100-250 m thick Mamadawerre Sandstone, the oldest formation of the Kombolgie Subgroup, occupies the northwestern third of the tenement, where it forms a deeply dissected plateau surface (Figure 3). This area is composed largely of bare rock with sparse areas of shallow sandy soil supporting Spinifex and scrub. Sandstone is quartzose to lithic and fine- to very coarse-grained with a variety of fluviatile to shallow high-energy marine bedforms, including trough and planar cross-beds (Ojakangas, 1979).

Mamadawerre Sandstone is unconformably overlain by the Nungbalgarri Volcanics. The 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 volcanic 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. The stratigraphic thickness of the volcanic unit is variable between 50 m and 130 m, however, it may also be locally absent (Carson et al., 1999).

The Gumarrirnbang Sandstone, which occupies the southeastern third of the tenement (Figure 3), unconformably overlies the volcanics, comprising fine- to coarse-grained quartz sandstone 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 (Sweet et al., 1999b).

Sills and dykes of Oenpelli Dolerite occur within basement in the northwestern corner of the tenement, at Steven’s Anomaly, and within the Nungbalgarri Volcanics in the south (Figure 3; Figure 4). However, it has only been intersected in any significant way within the most recent drill hole in the tenement, CDD002. The remaining 11 drill holes contain only rare narrow mafic dykes.

Figure 4: Geology of the Steven’s Anomaly Area, Showing Location of Drill Holes and 2005 Samples

Undifferentiated Cretaceous rocks have been mapped in the central part of the tenement (Figure 3). The rocks are exposed as weathered outcrops of lateritised sandstone and siltstone forming resistant mesa-like ridges.

PREVIOUS EXPLORATION

Previous exploration in Cadell has been carried out by AFMEX in the period 1997 to 2002, and is outlined chronologically below and is summarised in Table 3 and Table 4. Cameco's activities up until the current report are summarised in Table 5.

1997-1998

Exploration activities carried out during the first year of the licence (Table 4) included a helicopter-borne magnetic-radiometric geophysical survey, followed up by ground reconnaissance over 67 selected radiometric anomalies (Alonso and Kastellorizos, 1998). Selected samples were geochemically analysed.

Five different types of radiometric anomalies were observed over the surveyed area, which are either related to uranium-thorium and or radon/radium sources. The most interesting anomaly, Steven's Anomaly, is a broad and distinct uranium channel anomaly located in the northwest part of the project area. There, uranium was found associated with gold in altered Oenpelli Dolerite, the best results being 529 ppm U and 578 ppb Au.

A high-resolution (1:10 000 scale) colour aerial photographic survey was also flown, but there are no references to it in the annual reports.

1998-1999

Five helicopter-supported diamond drill holes (KBW1-5) totalling 1278 m, were drilled on EL3347 during the second year of exploration (Figure 3) (Kastellorizos, 1999). The aim of the program was to test the geological nature of the underlying basement, with a strong focus on the major structural zones. No mineralisation was encountered, but some weak gamma spikes were accompanied by up to 174 ppm U (Table 4).

Diamond drilling at Steven's (KBW1; Figure 4) focused on trying to intersect an extension of the surface mineralisation under the cover of 100 m of Mamadawerre Sandstone, 200 m south of the surface anomaly. However, no mineralisation was intersected.

During July 1998, Steven's Anomaly was gridded to provide a base for a ground radiometric survey. Radiometric readings were taken every 25 to 50 m, along 100 m spaced north-south grid lines. The mapping and ground radiometrics completed over the area confirmed that the radioactive anomaly is confined to the dolerite close to its faulted contact with the Mamadawerre Sandstone. A grab sample collected in talus at the anomaly with a maximum radioactivity of 8000 cps (SPP2) showed yellow uranium oxides in a clay and specular hematite matrix. The grab sample assayed 3.96% U, 1.3% Pb and 2.2% P_20_5.

1999-2000

Five helicopter-supported drill holes (KBW6-10) were completed during the third year of exploration, comprising 1359 m of diamond drilling (Figure 3) (Fabray et al., 2000). Nimbuwah Complex granitoid forms basement in the area and is overlain by a variable thickness of Kombolgie Formation sandstone. No mineralisation was encountered, but some weak gamma spikes were accompanied by up to 224 ppm U (Table 4). Petrology reports suggest that in the weakly mineralised veins, uranium may be contained within apatite grains or is adsorbed onto clays and oxides.

Five NanoTEM ground EM traverses carried out across the Daniel Fault in the eastern part of the tenement, show a number of offsets. A test regional gravity line was also completed in the west of the tenement. A helicopter supported regional stream sediment survey and limited radiometric anomaly follow up was also carried out. Results were low-order and no further follow-up was conducted (Table 4).

2000-2001

No exploration work was carried out on the licence during the forth year of tenure due to fundamental changes in the structure of the Joint Venture, as it existed previously and due to budget re-allocation (Ewington, 2001).

2001-2002

No exploration work was carried out on the licence during the fifth year due to budget re-allocation and the impending withdrawal of AFMEX from the project.

2002-2003

No exploration work was carried out on the licence during its sixth and final year of tenure due to budget re-allocation and the withdrawal of AFMEX as operator. Cameco began a review of AFMEX data (O'Connor, 2003).

2003-2004

Exploration for the first year of a two year extension to EL3347, under Cameco's management, consisted of a data review, reprocessing of geophysical survey data and a single helicopter-assisted diamond drill hole at Steven's Anomaly, CDD001 (Table 5; Figure 4) (Rawlings and Beckitt, 2004). The hole was collared 200 m south of the principal radiometric anomaly that defines Steven's Anomaly, and 150 m west of KBW1, which was designed by AFMEX to test the same target. The hole was drilled to 339 m depth, inclined at 70° to the north, in an attempt to intersect the contact between Oenpelli Dolerite and Nimbuwah Complex, below the Mamadawerre Sandstone unconformity. Instead, the drill hole passed through Mamadawerre

Sandstone to 106 m, where Nimbuwah Complex was intersected, continuing through to termination depth. Oenpelli Dolerite was not intersected. Like KBW1, CDD001 also failed to intersect any mineralisation, and contained only small radiometric and geochemical anomalies. Significantly, however, the unconformity is represented by massive specular haematite and chlorite, in contact with sericite-haematite altered granodiorite.

CAMECO EXPLORATION 2004-2005

Due to the lack of a current anthropological site clearance survey, Cameco have been unable to access any of EL3347 outside of the immediate vicinity of Steven's Anomaly during the current reporting period (Figure 3). As a result, exploration activities carried out during the 2004-2005 period were focussed solely to determine the uranium mineralisation potential of the Steven's Anomaly area in the northwestern corner of the tenement. This work consisted of a helicopter-assisted drilling program of one diamond drill hole, CDD002, outcrop sampling, re-logging of the two previous drill holes and a high-resolution airborne geophysical survey (Table 1; Figure 4). A Hymap hyperspectral survey was also conducted over the entire tenement.

Anthropological Site Survey

As a result of prior arrangements between the earlier Joint Venturers and Traditional Owners, a tenement-wide site clearance for Cadell was not carried out prior to 2004. Only selected access was permitted to AFMEX with worksite-specific on-going archaeological clearances provided on an ad hoc basis. At the Traditional Owners request, a survey took place in July 2004 over the entire EL3347 and some of the adjacent Cameco EL Applications.

Hyperspectral

An airborne hyperspectral survey was flown over the entire EL3347 using the Hymap Mark1 system operated by Stockdale-De Beers (Table 1). The survey was conducted to identify areas of clay alteration that might be indicative of mineralisation. A logistics report (Hussey and Hornibrook, 2004) is included as Appendix 1.

Appendix 1: Hyperspectral Survey Logistics Report

The data indicate that upper Mamadawerre Sandstone in the northwest of the tenement is clay poor, with weak goethite and kaolinite. This is underlain by illite and dickite as seen in gorges. Gumarrirnbang Sandstone has lower illitic and upper dickitic units. High-grade diagenesis has affected Kombolgie, but there are no obvious alteration haloes in the sandstone. However, there are several possible illitic targets related to project scale structures. No obvious clay alteration corresponds to Stevens Anomaly.

High-resolution Airborne Geophysical Survey

A digital high-resolution (50 m spaced) airborne magnetic-radiometric-terrain elevation survey was flown over a 12 km^2 portion of EL3347, centred on Steven's Anomaly, (UTS Geophysics, 2004). Survey specifications and logistics are summarised in Table 1 and Appendix 2. Digital data are supplied on disc. The radiometric and magnetic data show improved resolution compared to the earlier 100 m-spaced dataset, with substantially reduced high frequency noise. Radiometrics show an intense asymmetric U and TC high 600 m long and 200 m wide bordering Steven's Fault at Steven's Anomaly (Figure 5), with a maximum intensity on the eastern end at 339600E and 8635350N, best illustrated by the U^2/Th image (Figure 6).

Figure 5: Uranium Channel Radiometric Image for Steven's Anomaly

Figure 6: U/Th Radiometric Image for Steven's Anomaly

Appendix 2: Specifications for Airborne Geophysics

Outcrop Investigation and Sampling

Access to most areas in EL3347 is by helicopter. Fieldwork involved mapping using a base of remotely sensed or geophysical data (e.g. radiometrics, airphotos, Hymap) or topographic sheet, and prospecting using hand held scintillometer. Samples and observation data were collected at sites of geological interest or radioactive anomalies. A hand-held GPS was used for locations (Figure 4). A total of 11 samples were collected from Steven's Anomaly for geochemical analysis (Appendix 3), petrography (Appendix 4; Appendix 5) and PIMA analysis (Appendix 6). Important results are summarised in the results section of this document.

Appendix 3: Geochemical Analyses for Outcrop and Drillcore Samples

Appendix 4: Petrographic Sample List for Outcrop and Drillcore Samples

Appendix 5: Petrographic Observations for Outcrop and Drillcore Samples

Appendix 6: Pima TSA Data for Outcrop Samples

Outcrop Sample Processing Techniques

Outcrop samples are routinely cut, broken or divided into two approximately equal halves. About half, usually with a minimum mass of 400 g, is used for geochemical analysis (see below). The remainder is used to visually estimate grain-size, friability and Munsell colour, and measure spectral parameters using the PIMA II spectrometer. This sample is retained within the Cameco storage facility in Darwin for reference, but can also be used as a repeat geochemical sample in the event of a lost or erroneous analysis. Small portions of selected samples are sent for thin sectioning, with or without petrographic description (Pontifex & Associates). Generally, spectral parameters are also captured for these petrographic samples using the PIMA II spectrometer. Codes used by Cameco for lithology description are summarized in Appendix 7.

Appendix 7: Cameco Logging Codes

Drilling

The two previous unsuccessful drill holes near Steven's Anomaly, KBW1 (AFMEX) and CDD001 (Cameco), had been designed to test the same sub-Kombolgie 'target', a subsurface extrapolation of Steven's (Figure 4). In contrast, Cameco planned the drilling of two heli-rig diamond holes in 2004-2005 at the actual site of Steven's Anomaly to test the vertical extent of surface uranium anomalism, interpreted to be associated with the east trending Steven's Fault. There was difficulty in finding suitable drill pads without substantial disturbance to the vegetation, but one site was selected 150 m west of KBW1 and 130 m north of CDD001 (Figure 4) for drilling of two angled holes. The first shallower hole was designed to test the geometry of the fault which earlier drilling had failed to resolve, and to test for any associated, uranium mineralisation. The second hole would be designed to test the fault at depth at the contact between sandstone and basement once fault geometry was determined.

Drilling was carried out by United Drilling Services (UDS, formerly Underground Diamond Drillers) using a helicopter-transportable diamond rig (Onram 1000). The rig capacity is up to 500 m (NQ2) under optimum conditions. Helicopter support was provided by Jayrow with a BA Squirrel.

CDD002 was collared on the southern edge of the airborne radiometric anomaly that defines Steven's and inclined southward at 70° to intersect the subsurface projection of Steven's Fault. Location and technical information are in Table 6. A total of 83.8 m was drilled before the hole was abandoned in broken ground prior to target depth of 150 m. Drill difficulties were due to a combination of broken ground at the end of hole and no casing available to case off the clayey and friable upper regolith. The core consists entirely of Oenpelli Dolerite, and the fault was not intersected. No significant mineralisation was intersected, but a number of small geochemical and gamma ray anomalies (hand-held scintillometer) were encountered (see below). The gamma probe was not run due to the poor ground conditions. For these reasons and lack of alternative sites, Cameco decided that the second planned hole should not be drilled as similar problems would be encountered. It was deemed that a more powerful land-based drill rig would be needed to penetrate the broken ground, and casing was required to prevent regolith falling in the hole and locking up the rods.

Table 6: Drill Hole Summary for Cadell for 2004-2005

Core Sample Processing Techniques

A ~15 cm long interval of drill core is routinely cut longitudinally with a diamond saw into two equal halves from every row of each core tray for the entire drill hole. One side remains in the core tray to maintain continuity of the drill core, while the other side is used for a variety of purposes. Half is used as part of a composite geochemical analysis (see below). The other half is used to visually estimate grain-size, friability and Munsell colour, and measure magnetic susceptibility and spectral parameters using the PIMA II spectrometer. This sample is retained within the Cameco storage facility in Darwin, and together with the other retained samples forms a 'skeleton log' of the drill hole. Selected samples of half core are sent for thin sectioning, with or without petrographic description (Pontifex & Associates). Generally, spectral parameters are also captured for these petrographic samples using the PIMA II spectrometer. Logging codes used for lithology logging are summarized in Appendix 7.

Analytical Methods

Drill core and outcrop samples are submitted to Northern Territory Environmental Laboratories Pty Ltd (NTEL) in Darwin for multi-element analysis. Sample preparation and production of fire assay disc are carried out at Northern Australian Laboratories Pty Ltd (NAL) in Pine Creek. Two distinct sample preparation schemes are used by Cameco:

- 'basement samples' are jaw crushed, rolls crushed and pulverised in a Vertical Spindle Pulveriser (VSP) or ring mill, then split to produce a 50 g subsample for major and minor element analysis, and another 50 g split used for Au-PGE fire assay;

- 'sandstone samples' are jaw crushed and rolls crushed ONLY, and split to produce two subsamples, the first smaller subsample (30 g) used directly for major and minor element analysis, and a 50 g sample pulverised in a VSP or ring mill and used for Au-PGE fire assay, and determination of B and LOI (300-500 g).

This sample preparation procedure has been devised by Cameco to reduce the extent of potential contamination to the harder sandstone samples by the pulverising process. An evaluation of Cameco QC (Garnett, 2005) showed there is unsatisfactorily poor (>>10%) repeatability for samples analysed using this process. Quality assessment further suggests that sample jaw crushing and rolls crushing may be the greater source of sample contamination, particularly for gold.

At NTEL and NAL, four separate methods were used to analyse for 65 elements and four isotopes, detailed in Appendix 8.

Appendix 8: Standard Geochemical Methods Used by Cameco

Petrography

A total of 23 samples were submitted to Pontifex and Associates (Adelaide) for thin-section preparation (Appendix 4). Thin sections were prepared from both core and outcrop samples. Both polished and standard types were made. Some thin-sections of the more problematic rocks were described by Pontifex in order to resolve specific issues that require expertise or specialist equipment (e.g. SEM, Autoradiograph or Microprobe), the remainder were described internally by Cameco (Appendix 5; Appendix 9).

Appendix 9: Detailed Petrographic Descriptions

Reflectance Spectroscopy (PIMA)

Reflectance spectroscopy (PIMA) analysis is completed using the PIMA II short-wave infrared spectrometer on all drill core and outcrop samples collected. This instrument measures the reflected energy from a sample in the short wave infrared (SWIR) region of the energy spectrum. The sampling area on the rock specimen that is measured is permanently marked. Multiple measurements are occasionally taken, particularly if variations in spectral features are noted. The spectra are converted to an ASCII format and processed using "The Spectral Geologist" (TSG) developed by AusSpec International. TSG is routinely used to process all spectral data. The SWIR spectra, once processed, provide a mineral identification utilising internal software pattern matching algorithms called 'The Spectral Assistant' (TSA).

Major and Minor Element Geochemical Interpretation Methodology

The Refractory Uranium Index or 'RUI' (nominally U/Zr*100) is used in this report as a guide to how much uranium is contained in the principal refractory uraniferous silicate phase (zircon) in sandstone, basalt, dolerite and granite (the main rock types in the tenement). This ratio is generally consistent in any given homogeneous rock unit, unless uranium is present as: (i) non-refractory magmatic or hydrothermal uranium-bearing minerals (e.g. uraninite, pitchblende, torbernite); (ii) a lattice component of other silicate phases (e.g. allanite, feldspar, apatite, monazite, baddeleyite) or; (iii) compounds or ligands adsorbed to grain boundaries and clays. These accessory minerals are absent or insignificant on most occasions, and RUI is considered a good proxy for U_G950 (weak acid leach or 'labile' uranium) or can be used effectively in conjunction with this analysis type. If a sample exhibits an RUI above background for its particular rock unit, it is deemed anomalous. Importantly, this ratio is essentially unchanged by the partial dissolution of zircon by hydrothermal fluids.

Loss on Ignition (LOI), SiO2, K2O, CaO, Al2O3, combined Fe2O3 & MgO, and a variety of elemental ratios (eg Fe/Mg) are also used as a gauge of the type and total hydrous aluminosilicate component in the rocks, which enables an accurate assessment of alteration mineralogy and provides quality control for the PIMA data. These geochemical analyses, together with the RUI and PIMA, permit the assessment of the geochemical behaviour of the rock system during deposition and diagenesis. This, in turn, enables the delineation of alteration systems related to uranium mineralisation.

Lead Isotope Interpretation Methodology

^{204}Pb, ^{206}Pb, ^{207}Pb and ^{208}Pb are routinely determined by Cameco as a means of vectoring uranium transport (Holk et al., 2003). Three of the four common isotopes of lead can be produced by the decay of uranium and thorium. ^{204}Pb is the only lead isotope not influenced by these radiogenic processes. ^{206}Pb is the final daughter product of the decay of ^{238}U whilst ^{207}Pb is produced during the decay of ^{235}U. The decay of ^{232}Th is responsible for production of ^{208}Pb. For a rock containing uranium and/or thorium, the concentrations of these isotopes are gradually increasing with time while the amount of ^{204}Pb held within the rock remains constant.

The uranium and thorium isotopes responsible for the gradual increase in the concentrations of radiogenic lead with time have variable decay rates. ^{238}U has a half-life of 4.47 billion years and ^{235}U has a half-life of only 0.70 billion years. For thorium, the half-life of ^{232}Th is 14.01 billion years. These differences in decay rates make it possible to determine fluid history related to radioactive and radiogenic isotopes as follows.

1. Increasing radiogenic lead concentrations through the decay of uranium- and thorium-bearing minerals (closed-system scenario).

2. Post-mineralization precipitation of radiogenic lead during interaction with basinal fluids and volatiles that have leached lead from uranium or thorium-rich sources (open-system scenario).

3. The delineation of exploration vectors that may point toward economic uranium deposits.

The general parameters determined for sandstone analysis are:

$^{207}Pb/^{206}Pb$ – a monitor of the influence of uranium on the system.

- $^{207}Pb/^{206}Pb$ between 0.95 and 1.15
  Indicates no addition of radiogenic lead from the decay of uranium.

- $^{207}Pb/^{206}Pb$ between 0.80 and 0.95
  Typical range of isotopic ratio for system equilibrated with 'typical' crust.

- $^{207}Pb/^{206}Pb$ between 0.4 and 0.80
  Anomalously low ratio indicates contribution of uranium-source lead to system.

- $^{207}Pb/^{206}Pb < 0.40$
  Extremely low isotopic ratio indicates major addition of lead formed by the radioactive decay of uranium to rock.

$^{208}Pb/^{206}Pb$ – parameter that determines the relative influence of thorium versus uranium in lead isotopic system

- $^{208}Pb/^{206}Pb > 2.5$
  Thorium is dominant element contributing lead to system through radioactive decay.

- $^{208}Pb/^{206}Pb$ between 1.60 and 2.50
  Range of isotopic ratio for system equilibrated with 'typical' crust.

- $^{208}Pb/^{206}Pb$ between 0.5 and 1.60
  Greater contribution of uranium-product lead to system.

- $^{208}Pb/^{206}Pb < 0.50$
  Uranium is dominant (and probably only) radioactive element contributing to system.

EXPLORATION RESULTS AND INTERPRETATION IN 2004-2005

Outcrop Investigation and Sampling

The principal findings of the outcrop investigations during 2004 are summarised below.

- Fresh Oenpelli Dolerite contains primary olivine, indicating a primitive nature. This is consistent with relatively high average Ni, Co and Cu.
- There are numerous fast-flowing radon springs immediately west of Steven's Anomaly, suggesting a subsurface radiogenic source and persistent fluid flow along Steven's Fault. Gamma ray reading of up to 350 cps (GR110 scintillometer) were measured.
- Geochemical analyses confirm the results of AFMEX, with up to 1330 ppm U and 370 ppb Au. Half the samples contain anomalous U (>100 ppm) and Au (>10 ppb).
- The overall geochemical signature of Steven's Anomaly consists of strong anomalism in U, Au, As, Be, Co and Pb with or without Bi, Li, Mo, P, Sn, V, W and Zn. The concentration of Middle Rare Earth Elements (MREE; eg Dy, Gd) is elevated overall. MREE are also enriched relative to the Heavy Rare Earth Elements (HREE; eg Er, Lu) and Light Rare Earth Elements (LREE; eg Ce, La). LREE concentrations are generally depleted in the highest U grade samples, but are somewhat variable. This is consistent with their more 'mobile' chemistry.
- Pb isotope ratios are very low, with Pb207/Pb206 averaging 0.08 and Pb208/Pb206 averaging 0.02 for the samples with U>100 ppm. This indicates a dominantly U source for Pb daughter products, and is consistent with the high U/Th ratio of all dolerite samples collected (up to 900).
- Sandstone samples from south of Steven's Fault are elevated in Th.
- Phosphate with mildly elevated U, Th and REE in relatively fresh dolerite and granite appears to be a distal signature of Steven's Anomaly (at least to the north). There is, however, no petrographic evidence of this phosphate phase, suggesting it is finely disseminated.
- Alteration in dolerite samples containing substantial U and/or Au is entirely chloritic with most samples containing 30% SiO_2, 20% Al_2O_3, 25% Fe_2O_3, 10% MgO and 10% LOI (Appendix 3; Appendix 6). K_2O and CaO are generally <1%, implying a lack of phyllosilicates (micas and clays). TiO_2 appears to be evenly concentrated at 1.8%, which is considered normal for Oenpelli Dolerite. This does not support the contention of mobile Ti and therefore significant open-system leucoxene alteration. This style of alteration must be closed-system.

Drilling

Geology

CDD002 was logged in detail for lithological and alteration information (Appendix 10; Appendix 11). A graphical log is also presented in Figure 7 (Thomas, 2004). The upper 27 m intersected dolerite-derived regolith (soil and saprolite). Less weathered but altered weakly-porphyritic Oenpelli Dolerite was encountered at 27 m and continued to 83.8 m, (EOH). The only noteworthy, but relatively minor radiometric anomaly (450 cps or 36 ppm eU with SPP2 scintillometer) occurs as a discrete spike at 31.9 m, associated with a quartz-chlorite-haematite-leucoxene vein (Figure 8). Similar but weakly- to non-radiogenic veins are common at the top of the hole and show vertical north-trending alignment.

Figure 7: Lithological and Alteration log for CDD002 (from Thomas 2004)

Figure 8: Photograph of U-bearing Quartz-chlorite-haematite-leucoxene Vein in Chlorite-altered Dolerite in CDD002 at 31.9 m

Appendix 10: Detailed Lithology, Alteration and Structure for CDD002

Appendix 11: Point Structure Data for CDD002

Five phases of alteration are present: (i) weak and pervasive early/diagenetic chlorite; (ii) pervasive to patchy and weak to intense haematite+/-limonite; (iii) weak disseminated sericite (phengite); (iv) weak disseminated leucoxene and; (v) intense selvages of late hydrothermal chlorite. The latter four exhibit mutually cross-cutting relationships, suggesting similar timing, perhaps due to fluid mixing. Alteration is controlled to some extent by brecciation and veining (selvages), but approximately 50% occurs in coherent rock. Importantly, intense chlorite (selvage), sericite (phengite) and leucoxene alteration appears to be directly associated with all the radiogenic intervals.

Disregarding vein selvages, alteration and brecciation intensity appear to increase systematically down hole. The lower ~5 m of core comprises the most intense haematite-chlorite-sericite alteration and brecciation within the drill hole. Brecciation is monomict (dolerite) and open to closed framework, with jigsaw-fit and rotated clasts, and is considered evidence of the nearby Steven's Fault zone (as interpreted).

Major and Minor Element Geochemistry

Geochemical results for drill hole samples from CDD002 can be found in Appendix 3. Some of these data are presented in the form of down-hole plots (Figure 9; Figure 10). The best spot (20 cm) sample analysis obtained was for a 2 cm wide vein of chlorite, quartz, haematite and leucoxene at 31.9 m, with 518 ppm and 71 ppb Au. The dolerite saprolite interval at the top of the hole (7.3-26 m) assayed 31 ppb Au and 14 ppm U over 18.7 m (composite). These elevated U and Au results probably fairly reflect the surface anomaly at Steven's.

Figure 9: Downhole Major Element Geochemical Plots for CDD002

Figure 10: Downhole Trace Element Geochemical Plots for CDD002, Including Lead Isotopes

Based on a comparison of average elemental data in the region, the overall geochemical signature of the rock system in CDD002 can be summarised as follows.

1. Dolerite is at least 50% altered, but generally 70%, with chlorite, sericite and haematite being the main secondary mineral phases.
2. Strong and consistent (down hole) anomalism in U, averaging 11 ppm for composite samples, which is an order of magnitude above background for Oenpelli Dolerite (~1 ppm).
3. Strong but inconsistent anomalism in Au.
4. Moderate and consistent anomalism in MgO (max 20%), Be (5.9 ppm), Co (80 ppm) and Li (160 ppm).
5. Weak and inconsistent enhancement in: K2O (4.3%), Pd (11 ppb), Pb (54 ppm), V (584 ppm) and W (32 ppm).
6. Strong and consistent enrichment of Middle REE, relative to other REE. Overall REE concentrations appear normal.
7. Uniformly high Refractive Uranium Index (RUI; U/Zr*100), averaging 10 for composite samples, which is an order of magnitude above background for Oenpelli Dolerite (~0.5).
8. Uniformly high U/Th ratio, averaging 6.5 for composite samples. Thorium is consistent throughout all samples in the range 1.3 to 2.1ppm, which is normal for Oenpelli Dolerite.
9. MgO is greater than Fe2O3 in many analyses, specifically in the highest U grade sample, where MgO/Fe2O3 reaches a peak of 1.4.

It is important to note that these geochemical traits relate to one or more of the alteration (or weathering) styles present in the drill core, only some of which are probably involved in the mineralising process (see below). The only elements that exhibit anomalism in the 20 cm sample incorporating the main U-Au-bearing vein are Be, Li, Mg and V. However, there is still no certainty that they reflect the geochemical conditions during mineralisation. It appears that the rock package in CDD002 has undergone significant Mg metasomatism, which may have been important in the mineralisation process at Steven's. Consistently low Th indicates that this element was not introduced during U mineralisation. There is no evidence in the geochemical data for significant Ti mobility, which makes the observed leucoxene alteration closed system.

Lead Isotopes

$^{207}Pb/^{206}Pb$ and $^{208}Pb/^{206}Pb$ isotopic ratios for CDD002 follow a similar pattern to each other and indicate a differing contribution of uranium to the isotope system at various intervals of the dolerite (Figure 10). Large inflexions in both Pb isotope ratios occur in the down hole geochemical plots at the composite interval containing the main U-bearing vein (26-32 m). This indicates a dominantly U source for daughter product Pb in the rock system. Low Pb ratios in the regolith above are enigmatic. They may be reflecting the residual low Pb isotopic composition in the regolith, which implies stripping of U in the regolith profile. They may also represent equilibration with modern radon-bearing spring water. A small inflexion to lower Pb isotope ratios also occurs in the composite interval 68.6-74.5 m, but with no elevated U or Au. This interval coincides with an increased concentration of Ca, K, P and V, suggesting increased sericite and minor phosphate alteration, possibly peripheral to mineralisation.

Reflectance Spectrometry and Alteration Geochemistry

A tabulation of the hydrous minerals identified by TSA from PIMA data for CDD002 is presented in Appendix 12. A graphical log is presented in Figure 11. Raw PIMA spectra as *.fos files are contained in the data directory. Together with the downhole geochemical trends depicted in Figure 9 and Figure 10, lithological logging (Appendix 10), bulk geochemistry (Appendix 3), PIMA spectra and TSA can be used to recognise the principal zones of alteration in the drill core, which are summarised below. Chlorite, sericite, haematite and leucoxene were the principal alteration-related mineral phases identified during logging. Geochemical sampling intervals have been designed to discriminate these styles as best as possible. All alteration styles have been confirmed by bulk geochemistry, but their relative proportions are estimated only. The extent of haematite alteration is difficult to determine based only on this data, without detailed down-hole petrography.

Appendix 12: TSA PIMA Data for CDD002

Figure 11: Graphical PIMA TSA Log for CDD002

- The upper part of CDD002 from near the base of the regolith profile at 26 m to 37 m (including the U bearing vein) is dominated by sericite and chlorite, in equal proportions. These minerals appear to occupy ~50% of the rock volume based on the average composition of 48% SiO2, 16% Al2O3, 4.2% K2O, 22% combined Fe2O3 and MgO, and 7% LOI. The PIMA spectra typically fall into the category of phengite (Fe-bearing 'muscovite') or Mg-dominated chlorite, although the Mg/Fe ratio of bulk chemistry is consistent with 'intermediate' (i.e. Mg~Fe) composition chlorite. It is not possible to conclusively distinguish the hydrous mineral phases as alteration or weathering related, however, the H2O peaks and crystallinity parameters of the spectra support alteration.
- The vein directly associated with elevated U at 31.9 m has a discrete (dm-scale) Mg chlorite-rich selvage.
- 37 to 40.4 m is a narrow zone of intense 'intermediate'-chlorite alteration and minor haematite, with a bulk composition of 30% SiO2, 19% Al2O3, 0.4% K2O, 37% combined Fe2O3 and MgO and 12% LOI. This alteration has affected >90% of the rock volume. PIMA spectra again suggest Mg-chlorite, whereas bulk chemistry (MgO/Fe2O3 average 1.2) suggests 'intermediate' composition.
- 40.4 to 43.5 m is similar to the top of hole, with interpreted mixed sericite (phengite) and 'intermediate'-chlorite alteration affecting 50% of the rock volume. This is supported by the bulk geochemistry of 42% SiO2, 17% Al2O3, 4.3% K2O, 28% combined Fe2O3 and MgO and 8% LOI.
- The middle part of CDD002 (43.5 to 68.6 m) is dominated by 'intermediate'-chlorite alteration with minor sericite (phengite) and haematite. Based on bulk average composition of 35% SiO2, 18% Al2O3, 1.4% K2O, 32% combined

Fe_2O_3 and MgO and 11% LOI, alteration has affected between 70 and 90% of the rock volume.

- 68.6 to 74.5 m comprises a mixture of 'intermediate'-chlorite and lesser sericite (phengite), occupying ~70% of the rock volume. The bulk chemistry of 36% SiO_2, 21% Al_2O_3, 3.5% K_2O, 28% combined Fe_2O_3 and MgO and 9% LOI also supports the presence of haematite in significant volumes.
- 74.5 to 79.5 m is the same as 43.5-68.6 m, with 'intermediate'-chlorite alteration and minor sericite (phengite) and haematite, affecting 90% of the rock volume. Bulk chemistry is 32% SiO_2, 1.5% K_2O, 34% combined Fe_2O_3 and MgO and 11% LOI.
- 79.5 to 83.8 m (EOH) is much the same as 68.6 to 74.5 m, comprising a mixture of 'intermediate'-chlorite and lesser sericite (phengite) and haematite, occupying ~70% of the rock volume. The bulk chemistry of 35% SiO_2, 22.5% Al_2O_3, 3.5% K_2O, 26% combined Fe_2O_3 & MgO, and 10% LOI suggests an increasing aluminous (clay alteration) component toward the base of the drill hole. PIMA data also suggest a substantial increase in sericite in the lower 1-2 m.

In summary, it is observed that weak U-Au anomalism in CDD002 is spatially associated with sericite, chlorite, leucoxene and haematite alteration (although this does not mean all four were required for mineral precipitation). The principal uranium-gold vein at 31.9 m is encased in a dm-scale selvage of Mg chlorite, but occurs in a thick interval of sericite-dominated alteration, which continues through the geochemically-anomalous regolith profile. The base of the drill hole, which was broken and intensely altered and caused drilling to be terminated early, contains increasing quantities of sericite and haematite, supporting the existence of uranium-gold mineralisation below the termination depth.

<u>Petrography</u>

A list of samples and individual descriptions are provided in Appendix 4, Appendix 5 and Appendix 9. Dolerite is pervasively altered, with few samples containing remnant primary mineral phases apart from Fe/Ti oxides and minor quartz. Some samples contain up to 15% residual plagioclase or pyroxene. Regardless, in all cases a relict ophitic to subophitic dolerite texture is evident, some being porphyritic.

Sericite, chlorite and haematite are the main alteration phases recognised, but minor leucoxene is also observed. Adularia appears to be widespread in the samples, but is hard to quantify. Bulk geochemistry precludes it being a major mineral phase. In a general sense, plagioclase tends to alter to sericite, while pyroxene and olivine alter to chlorite. However, in samples where chlorite alteration dominates, all mineral phases have been replaced by chlorite. Haematite altered samples contain opaque oxides as rims around mineral grains, disseminations, replacing entire crystals, or lamellae along host cleavage. In samples where alteration is most intense, quartz may occur interstitially as inclusion-rich polygonal masses.

The general observation regarding alteration in CDD002 is that there is evidence of mutual overprinting relationships of alteration mineral phases, but a paragenetic sequence can be established for most textural styles (i.e. 'early' and 'late' phases).

Chlorite and sericite occur both as early and late phases, with or without an intervening haematite phase. As a general rule, early chlorite is cryptocrystalline and pale green or pale brown, while early sericite is cryptocrystalline and typically intergrown with early chlorite. These may represent an early 'saussuritic' style of alteration. Late chlorite is coarser, darker brown or tan, and slightly pleochroic, while late sericite is generally colourless or weakly iron-stained, relatively coarse ('muscovitic') and hydrothermal in origin. A phengitic composition has been suggested.

In some thin-sections, late chlorite and haematite alteration phases are overprinted by domains of late sericite alteration, whereas in other thin-sections the reverse is noted. Haematite has also been consumed by (rather than been introduced with) chlorite in one thin-section, while in others it occurs as a replacement along chlorite cleavage.

In the selvages adjacent to radioactive veins, leucoxene is finely disseminated within former pyroxene crystals or has pseudomorphed large primary opaque oxide grains. The disseminated leucoxene habit appears to be a situation unique to the radiogenic veins. The U-bearing vein at 31.9 m has a major vein of granular, columnar and peculiar spherulitic quartz, with complex margins of intergrown fine Mg-Al-rich chlorite and fine hematite-chlorite-quartz.

Importantly, there is evidence that the latest and most important alteration events in CDD002 have involved the synchronous formation of coarse sericite and chlorite, fine haematite and leucoxene, all of which are important at the principal uranium deposits of the Alligator Rivers region.

Relogging and Sampling of Previous Core from Steven's Anomaly

Two previous diamond drill cores from the Stevens Anomaly were re- logged during 2004. Selected geochemical samples, petrographic samples and PIMA samples were collected and submitted for processing (Appendix 3; Appendix 4; Appendix 5; Appendix 9; Appendix 13).

Appendix 13: TSA PIMA Data for KBW001 Drillcore

CDD001 (Steven's Anomaly; Figure 3; Figure 4)

The Mamadawerre Sandstone from the drill collar to 90.4 m comprises silicified medium-grained quartz sandstone with common kaolinite, drusy quartz and rare ferruginous pits. The interval 90.4 to 102.5 m has significant brecciation and intense pervasive haematite-chlorite-sericite alteration (Figure 12), probably associated with dissolution and volume loss. The paragenetic sequence appears inconsistent, but brecciation and slickenside development occurred both prior to and after alteration. The small gamma peak recognized at ~100 m during down-hole logging (Rawlings and Beckitt, 2004) is not evident in the core. Pebbles are only present in the basal unaltered 4 m of Mamadawerre Sandstone (102.5 to 106.2 m). At the actual unconformity, there is a notable 30 cm wide interval of 100% haematite.

Figure 12: Graphical PIMA TSA Log for CDD001

The underlying Nimbuwah Complex is megacrystic granodiorite with a weak foliation and rare tourmaline-bearing pegmatite and 'aplite' dykes (actually biotite micromonzogranite; Appendix 9). The latter are typically associated with small peaks on the downhole gamma log (Rawlings and Beckitt, 2004). There is considerable diversity in colour and alteration style and intensity downhole. The upper ~25 m (down to 132 m) is limey green to pale brown, interpreted as sericite-chlorite alteration overprinting haematite. The chlorite to sericite ratio appears to increase downhole, but overall alteration diminishes. There is no obvious explanation for the small downhole gamma spikes and anomalous U in composite geochemical samples in the interval 125-133 m (Rawlings and Beckitt, 2004).

Below 133 m, granodiorite becomes relatively fresh and grey, with ~60% plagioclase, 5-15% orthoclase, 10-15% biotite and 10-15% quartz. Weak sericite-chlorite alteration ('saussuritisation') decreases gradually down hole to ~250 m. There is also a corresponding diminution of the apparent foliation downhole, suggesting it is enhanced by alteration. The large spike in the downhole gamma at 138.2 m correlates to a narrow chlorite-sericite-limonite altered and fractured zone within a pink biotite micromonzogranite (logged as 'aplite') dyke at 138.8 m (i.e. the gamma log has 60 cm misfit). A 20 cm sample incorporating a narrow sulphide-bearing quartz-sericite-chlorite-phlogopite veinlet assayed 92 ppm U and 13 ppb Au (Appendix 3; Appendix 9). There is no corresponding anomaly in the previous equivalent composite geochemical analysis (Rawlings and Beckitt, 2004).

Over the interval 267 to 280 m, alteration intensity increases, with limey green and pink styles predominating. PIMA data indicate that it is sericite and chlorite (Figure 12). Also in this zone, shearing and foliation increase in intensity, suggesting the presence of a fault, as indicated at 273 m in earlier logging. This is supported by a large offset in the median cps in the gamma log (Rawlings and Beckitt, 2004). It also coincides with a change to more felsic granitoid composition and the appearance of a characteristic porphyritic/megacrystic texture below ~275 m, with large aligned pink orthoclase crystals to 6 cm long. The composition appears to be 40% orthoclase, 25-35% quartz, 20-30% plagioclase and 5% biotite, and classifies as granite or monzogranite sensu stricto. Alteration is similar to that noted above.

The juxtaposition of granodiorite and granite across the fault zone at 273 m was not recognised in previous logging (Rawlings and Beckitt, 2004). The fault zone is here interpreted as the subsurface expression of Steven's Fault. This greatly alters the interpretive cross-section in the vicinity of KBW1, CDD001 and CDD002. Revised plans and cross-sections are presented in Figure 13, Figure 14 and Figure 15. The geometry of Steven's Fault now appears to be vertical or steeply north-dipping (>80°). The sandstone-basement contact intersected in CDD001 at ~106 m is an unconformity, not Steven's Fault as earlier proposed. As interpreted, CDD002 was terminated a few metres short of Steven's Fault.

A small spike in the gamma log at 285.5 m coincides with a 1 m wide zone of unusual deep yellow sericite alteration and intensified shearing. Petrography identified sericite, clay, chlorite, leucoxene and limonite alteration with veins containing quartz, clay, rutile and limonite (Appendix 9). A spot geochemical analysis gave 95 ppm U and 7 ppb Au.

Below 288 m, alteration again diminishes to the end of hole at 339 m. There is no explanation for the small increase in U to 10 ppm in the lowermost composite geochemical sample (Rawlings and Beckitt, 2004).

Geochemical data for selected reanalysis of CDD0001 shows: -
- 92 ppm U and 13 ppb Au at 138.8 m, a radiometric spike that had not previously been geochemically defined.
- 95 ppm U and 7 ppb Au at 286.1 m, complementing a previous 8 m composite assay of 11 ppm U and 2 ppb Au at this depth.

Geochemical data for these two samples are consistent with those from outcrop and CDD002, showing strong correlative uranium and gold enrichment, with complementary elevated Be, Ba and Pb (Appendix 3). The U/Th ratio and RUI are both high, and the low Pb isotope ratios support the proposed U-source Pb isotope fractionation in the area. Weakly anomalous Mo, Pb, Sn, Ta and W, together with strong LREE enrichment, reflect the composition of fractionated granitic host rock, rather than the veins.

Figure 13: Plan of Steven's Anomaly and Drill Hole Locations

Figure 14: Cross-sectional Interpretation of Drill Holes CDD001 and CDD002 at Steven's Anomaly

Figure 15: Cross-Section Of CDD001 and CDD002 at Steven's Anomaly, with KBW001 Projected

KBW001 (Steven's Anomaly; Figure 4)

Relogging of this drill core indicates a similar section to CDD001, ~150 m to the northeast (Figure 13). The principal stratigraphic difference is the lack of a juxtaposition of granitoid types in the lower part of the hole that may have indicated the presence of Steven's Fault. A brief summary of the core is presented below.

The bulk of the Mamadawerre Sandstone (0-83.5 m) is weakly ferruginised fine- to medium-grained quartz-cemented sandstone with rare ferruginous pits and fractures. Kaolinite is the dominant clay mineral present (Figure 16). Scattered quartz pebbles are present only in the lower 10 m of this section. The underlying interval 83.5 to 93.5 m is intensely chlorite-haematite altered sandstone, in which original sedimentary fabrics have been destroyed and replaced with bedding-parallel stylolamination and breccia bands. In thin-section (Appendix 5), this facies is composed of 0.5-10 cm-sized 'clasts' or domains of quartz-cemented sandstone, suspended in a stylolaminated (foliated) matrix of fine-grained to cryptocrystalline chlorite and lesser haematite with scattered small residual quartz grains. These quartz grains are generally wispy and elongate parallel to the foliation, and have serrated boundaries (dissolution fronts). The chlorite matrix appears to be constructed of angular 'intraclasts' that have undergone only minor rotation, presumably during compaction. Clasts are rimmed by haematite. This fabric is interpreted to indicate dissolution of the lowermost Mamadawerre Sandstone, in which quartz has been chemically removed and chlorite introduced and/or built up as a chemically inert residuum. Immediately below the chlorite-haematite zone, there is a further 2 m of intensely sericite-haematite altered rock (?sandstone) from 93.5 to 95.3 m (Appendix 13; Figure 16). Similar textures are preserved to the dissolution zone above (Appendix 9).

Figure 16: Graphical PIMA TSA Log for KBW001

Bulk geochemistry (Appendix 3) indicates that the altered sandstone interval is composed of approximately 50% residual quartz and 50% combined alteration phases. In the upper part, these phases are chlorite and haematite in approximately equal proportions, with minor but significant apatite (~3%). In the lower 2 m, sericite dominates over chlorite and haematite (Figure 16). Extremely elevated Zr (up to 440 ppm, compared to 20-100 ppm in typical sandstone) is consistent with volume loss (and therefore relative enrichment of immobile zircon) of at least 300%. This volume loss can be attributed entirely to quartz dissolution. Anomalous elements in the altered sandstone are U, Be, Fe, Mg, P, Zn, Pt and W, similar to the U mineralisation in CDD002. This, together with the low Pb207/206 ratio, suggests the now-altered lower Mamadawerre Sandstone was a pathway for U transport at Steven's.

Below the interpreted unconformity at 95.3 m is Nimbuwah Complex granitoid, not unlike that intersected in CDD001. The upper 15 m is friable and dark brown with mild but pervasive haematite-sericite alteration. Alteration decreases gradually below 110 m. It is dominantly sericite with lesser chlorite, but there are sporadic intervals of more intense sericite alteration (Appendix 13; Figure 16). Colour varies from pale green/brown to grey/green and pale orange or red/brown.

Moderately fresh granitoid is composed of 10-25% K-feldspar (commonly as megacrysts), 40-55% plagioclase, 10-20% biotite and 15-20% quartz. Accessory phases include green pleochroic hornblende, epidote, titanite and large zircon. The K-feldspar megacryst content varies downhole, such that in some places it is absent or it comprises up to 50% of the rock volume, but generally the rocks fall largely into the granodiorite compositional field. There is a crude alignment of megacrysts.

The granitoid also contains rare mafic intervals with a foliation consistent with the megacryst alignment in the host granitoid (e.g. 147 m and 279 m). These have historically been interpreted as metasedimentary enclaves or melt residuum ('restite'). However, petrography now indicates that these are amphibolite facies metamorphic gneiss enclaves, composed of equigranular plagioclase and amphibole, with minor quartz and biotite (Appendix 5). A mafic igneous protolith appears most likely, possibly correlating with the Zamu Dolerite, but geochemistry is required to confirm this.

Cryptic banding and compositional variations that are locally evident on a 5-100 cm scale in the granitoid are probably magmatic differentiation layering, rather than relict bedding. No metamorphic fabrics or mineral assemblages have been identified within these intervals.

Aplite dykes with or without tourmaline and muscovite were recorded at 111-114.5 m, 123 m, 127.5m, 137.5 m, 181-182 m, 255-260 m, 270-275 m, 277 m, 280 m and 285 m. Pegmatite dykes with granophyric orthoclase crystals were recorded at 144.5-146.4 m and 194-195 m.

Dykes of fine-grained mafic rock with plagioclase phenocrysts and ~20% primary biotite are present at 152.2-154 m and 154.5-161.5 m. Geochemistry and petrography suggest these dykes are unrelated to the Oenpelli Dolerite, and instead have affinities with lamprophyres, specifically the group 'minettes' (Appendix 5). Evidence includes major element geochemistry of 4% K2O, 17% MgO+Fe2O3, 49% SiO2, 7% LOI, 1% TiO2 and Mg>Fe (Appendix 3). Elevated Al2O3 of 20% supports petrographic observations of sericite alteration, and together with low Pb isotopes and low level anomalism in U (up to 723 ppb U_G950) and trace and minor elements such as Be and REE, suggests these dykes were overprinted by the alteration and mineralisation process at Steven's. Their age is important to establishing the timing of the most recent uranium mobilisation in this area. A number of lamprophyre dyke sets have been recognised in northern Australia, including 1830 Ma Mount Bundey (Sheppard and Taylor, 1992), 1830 Ma and 1670 Ma Coanjula (Taylor, 1997) and 1660 Ma Tennant Creek (Duggan and Jaques, 1996). Other un-dated dykes have been documented at Toms Gully, Ranger and Jabiluka. Correlation with any of these suites is feasible, but difficult to prove without geochronology.

A revised cross-section at Steven's Anomaly based on outcrop geology and interpreted subsurface geology in CDD001 and CDD002, with a projection of KBW001 is presented in Figure 15. It shows that Steven's Fault was not intersected in KBW001, and that this drill hole terminated well short of any likely manifestation of the fault zone. This is supported by the lack of deformation and alteration at the end of hole. Steven's Fault and associated alteration halo is now recognised in subsurface from re-logging of CDD001. From this a sub-vertical geometry for the structure is interpreted.

Hyperspectral

An in depth interpretation of hyperspectral data flown over the Cadell project has been submitted with this report as Appendix 14 (Zaluski, 2005). The clay distributions in outcrop sandstones of the Cadell project have successfully been mapped using the De Beers Hyperspectral Scanner. The patterns identified are consistent with the determinations made for nearby projects with similar stratigraphic positions such as Myra, Kukalak, and Tin Camp Creek. The clay mineralogy of the Kombolgie sandstones is dominated by clays of the illite and kandite groups. Three illite group spectral endmembers can be distinguished on the basis of the wavelength position of the ~2200 nm AlOH absorption feature. The general trend of a longward shift in the position of the AlOH absorption feature with increasing stratigraphic position noted in most Arnhem Land surveys is not observed. This is likely a result of the limited stratigraphic exposure in Cadell rather than a fundamental difference in clay patterns.

Appendix 14: Interpretation of Hyperspectral Data

The Mamadawerre Sandstone exposed in the northwestern part of the project is characterized by very low clay contents. The most characteristic hyperspectral endmembers are the goethitic sand and kaolinte, the latter being very weak and interpreted as a weathering product. Illite and dickite are found locally, especially in stream valleys where the sandstone is likely eroded down to more clay-rich strata. The clay in the lowermost strata is believed to be a mixture of the short wavelength and long wavelength illite varieties. At the uppermost stratigraphic levels just below the Nungbalgarri Volcanics, the very long wavelength illite variety is locally present in significant abundance.

The Nungbalgarri Volcanics underlie a NE-SW trending swath through the centre of the survey. They are overlain by surficial sediments characterized by the ferruginous sediment SWIR endmember. Kaolinitic sediments are predicted along the edges of lateritic soils. The lower strata of the Gumarrirnbang Sandstone, exposed in the southeastern part of the project contain much higher clay contents than the Mamadawerre Sandstone. They are characterized by a basal, illitic layer overlain by a dickite-dominant sandstone. This latter unit also contains significant illite and long wavelength illite.

Basement rocks of the Nimbuwah Complex are exposed along an east-west trending ridge in the northwestern corner of the project. The endmembers corresponding to this unit are muscovite, illitic basement, and ferruginous sediment/nontronite. No alteration effects related to the Oenpelli Dolerite intrusions were noted.

The clay distributions interpreted from the DBHS survey are consistent with those indicated by PIMA analysis of drill core (Rawlings and Beckitt, 2004), when the differences of the techniques are considered. The chlorite indicated in the basal sandstone of the drill holes is not identified in this survey, presumably because of the lack of outcrop exposure of these basal units. Although this is likely the case, it is significant that other than the Ranger No. 3 pit, chlorite has not been identified in the sandstone in any of the Arnhem Land project areas. It is therefore recommended that field follow up be undertaken to verify that there is no problem with the preservation of chlorite in the outcrop exposures or its detection by hyperspectral remote sensing.

No strong hydrothermal mineral signatures indicative of deposit-scale alteration targets, such as chlorite or dravite are exposed in the surface outcrops of Cadell. The identified exploration targets therefore focus on more regional alteration clay signatures (mainly illite) that crosscut the stratigraphy. Because these phases are not uniquely hydrothermal in origin, assessment of targets must be made within the context of other exploration data. These features may indicate the broader background in which to interpret geochemical and field PIMA data.

Expenditure for 2004-2005

Expenditure on EL3347 during the current reporting period totalled $184 993 as detailed in Table 7. Overheads such as office costs are allowable, but have not been included here. Compensation payments made to the NLC and DBIRD property rentals do not constitute reportable exploration costs.

Table 7: Financial Summary for Cadell for 2003-2004

CONCLUSIONS

Exploration work completed by Cameco during the 2004-2005 reporting period failed to determine the mineralisation potential of Steven's Anomaly. Due to difficult ground conditions, diamond drill hole CDD002 was terminated prior to target depth and failed to intersect Steven's Fault and/or significant U concentrations in the subsurface at Steven's Anomaly (maximum 518 ppm U). However, intense alteration and brecciation in the basal few metres of the hole are considered highly encouraging and support a future multi-hole land-based diamond/RC drilling campaign. Outcrop sampling also confirmed the earlier results of AFMEX at Steven's Anomaly, with up to 1330 ppm U and 370 ppb Au in altered dolerite. High-resolution aerial magnetics and radiometrics flown during 2004 have refined the surface expression of Steven's Anomaly and will help in the design of future drill programs.

Airborne hyperspectral data collected in 2004 have not delineated any anomalous 'halo'-style clay targets, but show several lower-rank illitic targets related to project scale structures. No obvious clay alteration corresponds to Steven's Anomaly.

RECOMMENDATIONS

A review of radiometric, magnetic, gravity, drilling, outcrop observation, down hole and outcrop geochemistry, stream sediment geochemistry, geological mapping and landsat data was carried out in early 2004 (Rawlings and Beckitt, 2004). The resulting recommendations could not be fulfilled during this reporting period largely because the NLC and traditional owners denied access to the tenement (with the exception of Steven's Anomaly) until an anthropological site clearance was carried out.

Further drill testing of Steven's Anomaly (Figure 3; Figure 4), to ascertain the source of the large east-west oriented radiometric anomaly. Drilling should take place over the actual anomaly, instead of testing the basement-sandstone unconformity as two of the three previous drill holes have done. The rationale for drilling to the south of the actual ground anomaly appears to have been twofold. Firstly, historically there was a focus on the Kombolgie unconformity by most explorers, and basement- or dolerite-hosted mineralisation was considered low priority. Secondly, the remoteness of the area necessitated drilling with a helicopter-supported rig, and as it was difficult to identify suitably flat and open sites to drill the undulating and vegetated basement anomaly, the adjacent open pavements of sandstone were the next best option.

It is clear from the failures of the past that Steven's Anomaly cannot be tested properly without the use of a more powerful land-based diamond or percussion drill rig that can be sited in undulating terrain in such a way as to minimise vegetation removal. For this, land access from Nabarlek is required and an expanded drilling effort in 2005. Drilling should investigate other possible mineralisation models at Steven's, perhaps involving the Oenpelli Dolerite. The drill sites should be chosen given consideration to: (i) testing the full extent of the U channel anomaly in the new high-resolution airborne radiometric survey; (ii) intersecting Steven's Fault in at least some of the holes; (iii) testing any cross-cutting structural corridors (eg the north-northwest fracture system (Ponting Fault) is evident in outcrop patterns) and; (iv) intersecting the Oenpelli-Nimbuwah contact on the north side of Steven's Fault.

WORK PROGRAM FOR 2005-2006

Work planned for the dry season of 2005 for the Cadell tenement is focussed at Steven's Anomaly and will include up to six land-based diamond and RC drill holes. These holes are designed to test geological and structural targets outlined in this report and to determine if the surface radiometric and geochemical anomaly is associated with uranium mineralisation at depth. The holes will be positioned immediately on the north side of Steven's Fault, over an east-west distance of 1.5 km. Some holes will test the intersection of the Mamadawerre unconformity with Stevens' Fault, while others will test the vertical extent of the Oenpelli Dolerite. The position of the holes will be partly determined during the process of obtaining access to the site with earth moving equipment, because the sighting of holes will be at least partly controlled by topography, vegetation and the presence of swampy/boggy ground. The first hole will be collared on the centre of the radiometric anomaly that defines Steven's and will be inclined southward to intersect the contact between the Oenpelli Dolerite and Nimbuwah Complex at ~100 m depth. The radiometric results of this first hole will aid the sighting of the remaining holes up to 300 m deep.

It is also possible that, pending availability of funds, Cameco will fly a small number of lines of Tempest over Steven's Anomaly. Flying height for the survey will be about 50 m.

Only limited outcrop investigation and sampling in the vicinity of Steven's is envisaged. No other ground work will be carried out in 2005.

It is anticipated that expenditures on EL3347 for the next reporting period will be $150 000 to complete the proposed exploration work. Any work planned for this tenement during subsequent years will be dependent upon results.

BIBLIOGRAPHY

Ahmad M., 1998. Geology and mineral deposits of the Pine Creek Inlier and McArthur Basin, Northern Territory. *In:* Hodgson I. and Hince B. (Eds.), Geology and mineral potential of major Australian mineral provinces. *AGSO Journal of Australian Geology and Geophysics*, 17, 3; 1-17.

Alonso D. and Kastellorizos P., 1998. EL 3347 Kunbohwinjgu Joint Venture Arnhem Land NT First Annual Report 1997-1998. *Afmeco Mining and Exploration Pty Ltd*, *Annual report*, PCD/98/004.

Browne A.L.L., 1990. Ranger 68 uranium deposit. *In:* Hughes F.E. (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, vol. 1. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 14; p. 795-797.

Carson L., Brakel A.T. and Haines P.W., 1999. Milingimbi, Northern Territory (Second Edition); 1:250 000 Geological Map Series, sheet SD53-2. *Northern Territory Geological Survey-Australian Geological Survey Organisation (NGMA)*, *Map and Explanatory Notes*.

Carville D.P., Leckie J.F., Moorhead C.F., Rayner J.G. and Durbin A.A., 1990. Coronation Hill gold-platinum-palladium deposit. *In:* Hughes F.E. (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, vol. 1. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 14; p. 759-762.

Crick I.H., 1981. Early Proterozoic evaporites and uranium mineralisation in the Pine Creek Geosyncline. *BMR Journal of Australian Geology and Geophysics*, 6, 3; 276-277.

Crick I.H., Muir M.D., Needham R.S. and Roarty M.J., 1980. The geology and mineralisation of the South Alligator Valley uranium field. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 273-285.

Duggan M.B. and Jaques A.L., 1996. Mineralogy and geochemistry of Proterozoic shoshonitic lamprophyres from the Tennant Creek Inlier, Northern Territory. *In:* Sutherland F.L. (Ed.), The Nicholas Rock symposium; Alkaline rocks and their associated mineralisation. *Australian Journal of Earth Sciences*, 43, 3; 269-278.

Dunn P.R., Battey G.C., Miezitis Y. and McKay A.D., 1990. The uranium deposits of the Northern Territory. *In:* Glasson K.R. and Rattigan J.H. (Eds.), Geological aspects of the discovery of some important mineral deposits in Australia. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 17; p. 463-476.

Ewers G.R., Needham R.S., Stuart-Smith P.G. and Crick I.H., 1985. Geochemistry of the low-grade early Proterozoic sedimentary sequence in the Pine Creek Geosyncline, Northern Territory. *Australian Journal of Earth Sciences*, 32, 2; 137-154.

Ewington D., 2001. EL 3347 Kunbohwinjgu Joint Venture Arnhem Land NT Fourth Annual Report 2000-2001. *Afmeco Mining and Exploration Pty Ltd*, *Annual report*, PCD/01/001.

Fabray J., Bisset A., Ewington D. and Wollenberg P., 2000. EL 3347 Kunbohwinjgu Joint Venture Arnhem Land NT Third Annual Report 28 July 1999 to 27 July 2000. *Afmeco Mining and Exploration Pty Ltd*, *Annual report*, PCD/00/001.

Ferenczi P.A. and Sweet I.P., 2004. Mount Evelyn, Northern Territory (Second Edition); 1:250 000 Geological Map Series, sheet SD53-5. 1:250000 scale Map. *Northern Territory Geological Survey*.

Ferguson J., Ewers G.R. and Donnelly T.H., 1980. Model for the development of economic uranium mineralisation in the Alligator River uranium field. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 563-574.

Ferguson J. and Goleby A.B. (Eds.), 1980. Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*.

Fraser W.J., 1980. Geology and exploration of the Rum Jungle uranium field. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the

International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 287-297.

Garven G. and Raffensperger J.P., 1996. Two-dimensional reactive-flow modeling of uranium transport in Proterozoic sedimentary basins. *In:* Stevens P.R. and Nicholson T.J. (Eds.), Joint U.S. Geological Survey, U.S. Nuclear Regulatory Commission workshop on Research related to low level radioactive waste disposal. *U. S. Geological Survey*, *Water-Resources Investigations*; p. 196-200.

Hancock M.C., Maas R. and Wilde A.R., 1990. Jabiluka uranium-gold deposits. *In:* Hughes F.E. (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, vol. 1. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 14; p. 785-793.

Hussey, M.C., and Hornibrook, M.J.. 2004. De Beers Hyperspectral Scanner Data and Logistics Report. Cameco Survey, Arnhem Land, June, 2004.

Holk G.J., Kyser K.T., Chipley D., Hiatt E.E. and Marlatt J., 2003. Mobile Pb-isotopes in Proterozoic sedimentary basins as guides for exploration of uranium deposits. *Journal of Geochemical Exploration*, 80; 297-320.

Jagodzinski E.A. and Wyborn L.A.I., 1997. The Cullen Event: A major felsic magmatic episode in the Proterozoic Pine Creek Inlier of Northern Australia. *In:* Rutland R.W.R. and Drummond B.J. (Eds.), Paleoproterozoic Tectonics and Metallogenesis: Comparative analysis of parts of the Australian and Fennoscandian Shields. *Australian Geological Survey Organisation*, *Record*, 1997/44; p. 65-66.

Jagodzinski L., 1992. A study of the felsic volcanic succession south-east of Coronation Hill: Palaeovolcanology-geochemistry-geochronology. *Bureau of Mineral Resources, Geology and Geophysics*, *Record*, 1992/9.

Johnston J.D., 1984. Structural evolution of the Pine Creek Inlier and mineralisation therein, NT, Australia. *Monash University*, *Doctoral Thesis*.

Kastellorizos P., 1999. EL 3347 Kunbohwinjgu Joint Venture Arnhem Land NT Second Annual Report July 1998 to July 1999. *Afmeco Mining and Exploration Pty Ltd*, *Annual report*, PCD/99/002.

Maas R. and McCulloch M.T., 1988. The age and origin of unconformity-type uranium deposits, Sm-Nd and Rb-Sr isotopic evidence. *In:* Bottinga Y. (Ed.), International congress of geochemistry and cosmochemistry. *Chemical Geology*, 70, 1-2; 135.

Mernagh T., 1992. Fluid inclusion and oxygen-isotope evidence for low-temperature Au-Pt-Pd-U mineralisation at Coronation Hill, NT. *BMR Research Newsletter*, 16; 3-5.

Needham R.S., 1978. Giant-scale hydroplastic deformation structures formed by the loading of basalt onto water-saturated sand, middle Proterozoic, Northern Territory, Australia. *Sedimentology*, 25, 2; 285-294.

Needham R.S., 1985. A review of the distribution and controls of uranium mineralization in the Alligator Rivers uranium field, Northern Territory, Australia. *In:* Sibbald T.I.I. and Petruk W. (Eds.), Geology of uranium deposits. *Canadian Institute of Mining and Metallurgy*, *Special Volume*, 32; p. 216-230.

Needham R.S., 1988. Geology of the Alligator Rivers uranium field, Northern Territory. *Bureau of Mineral Resources, Geology and Geophysics*, *Bulletin*, 224.

Needham R.S., 1990. Geological and mineralisation Map of the Alligator Rivers uranium field, Northern Territory. 1:250 000 scale Map. *Bureau of Mineral Resources, Geology and Geophysics*.

Needham R.S., Crick I.H. and Stuart-Smith P.G., 1980. Regional geology of the Pine Creek Geosyncline. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 1-22.

Needham R.S. and De Ross G.J., 1990. Pine Creek Inlier - Regional Geology and Mineralisation. *In:* Hughes F.E. (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, vol. 1. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 14; p. 727-737.

Needham R.S. and Roarty M.J., 1980. An overview of metallic mineralization in the Pine Creek Geosyncline. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 157-173.

Needham R.S., Smart P.G., Watchman A.L., Stuart-Smith P.G. and Roarty M.J., 1983. Alligator Rivers, Northern Territory; 1:250 000 Geological Map Series, sheet SD53-3. 1:250 000 scale Map. *Bureau of Mineral Resources, Geology and Geophysics*.

Needham R.S. and Stuart-Smith P.G., 1980. Geology of the Alligator Rivers uranium field. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 233-257.

Needham R.S. and Stuart-Smith P.G., 1985. Stratigraphy and tectonics of the early to middle Proterozoic transition, Katherine-El Sherana area, Northern Territory. *Australian Journal of Earth Sciences*, 32, 2; 219-230.

Nott J. and Ryan P., 1996. Large-scale, subcircular depressions across western Arnhem Land interpreted as exhumed giant lunate current ripples. *Australian Journal of Earth Sciences*, 43, 2; 139-145.

O'Connor T., 2003. Exploration Licence EL 3347, Cadell Project, Northern Territory. *Cameco Australia*, *2002-2003 Annual Report*, CD03-02.

Ojakangas R.W., 1979. Sedimentation of the basal Kombolgie Formation (upper Precambrian-Carpentarian), Northern Territory, Australia; possible significance in the genesis of the underlying Alligator Rivers unconformity-type uranium deposits. *US Dept. of Energy*, *Report (unpublished)*.

Page R.W. and Williams I.S., 1988. Age of the Barramundi Orogeny in northern Australia by means of ion microprobe and conventional U-Pb zircon studies. *In:* Wyborn L.A.I. and Etheridge M.A. (Eds.), The early to middle Proterozoic of Australia. *Precambrian Research*, 40-41; 21-36.

Raffensperger J.P. and Garven G., 1995a. The formation of unconformity-type uranium ore deposits; 1, Coupled groundwater flow and heat transport modeling. *American Journal of Science*, 295, 5; 581-636.

Raffensperger J.P. and Garven G., 1995b. The formation of unconformity-type uranium ore deposits; 2, Coupled hydrochemical modeling. *American Journal of Science*, 295, 5; 639-696.

Rawlings D. and Beckitt G., 2004. Exploration Licence EL 3347, Cadell Project, Northern Territory. *Cameco Australia*, *2003-2004 Annual Report*, CD04-02.

Rossiter A.G. and Ferguson J., 1980. A Proterozoic tectonic model for northern Australia and its economic implications. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 209-232.

Sheppard S. and Taylor W.R., 1992. Barium- and LREE-rich, olivine-mica-lamprophyres with affinities to lamproites, Mt. Bundey, Northern Territory, Australia. *In:* Foley S. and Peccerillo A. (Eds.), Potassic and ultrapotassic magmas and their origin; Sixth meeting of the European Union of Geosciences. *Lithos*, 28, 3-6; 303-325.

Snelling A.A., 1990. Koongarra uranium deposits. *In:* Hughes F.E. (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, vol. 1. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 14; p. 807-812.

Solomon M. and Groves D.I., 1994. The geology and origin of Australia's mineral deposits. Oxford Monographs on Geology and Geophysics, 28. *Oxford University Press, Oxford, UK*; 951 p.

Stuart-Smith P.G. and Ferguson J., 1978. The Oenpelli Dolerite; a Precambrian continental tholeiitic suite from the Northern Territory, Australia. *BMR Journal of Australian Geology and Geophysics*, 3, 2; 125-133.

Stuart-Smith P.G. and Needham R.S., 1982. The influence of tectonism on petrogenetic processes in the South Alligator Valley area in early to middle Proterozoic time. *BMR Journal of Australian Geology and Geophysics*, 7, 2; 141-142.

Stuart-Smith P.G. and Needham R.S., 1984. Late Proterozoic peralkaline intrusives of the Alligator Rivers region, Northern Territory. *BMR Journal of Australian Geology and Geophysics*, 9, 1; 9-12.

Stuart-Smith P.G., Needham R.S., Page R.W. and Wyborn L.A.I., 1993. Geology and mineral deposits of the Cullen mineral field, Northern Territory. *Australian Geological Survey Organisation*, *Bulletin*, 229.

Stuart-Smith P.G., Wills K., Crick I.H. and Needham R.S., 1980. Evolution of the Pine Creek Geosyncline. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 23-37.

Sweet I.P., 2001. The geology of the McArthur basin in the Mount Evelyn 1:250 000 sheet area, Northern Territory. *Northern Territory Geological Survey*, *Technical Report*, GS2001/010.

Sweet I.P., Brakel A.T. and Carson L., 1999a. The Kombolgie Subgroup - a new look at an old 'formation'. *AGSO Research Newsletter*, 30; 26-28.

Sweet I.P., Brakel A.T., Rawlings D.J., Haines P.W., Plumb K.A. and Wygralak A.S., 1999b. Mount Marumba, Northern Territory (Second Edition); 1:250 000 Geological Map Series, sheet SD53-6. *Australian Geological Survey Organisation-Northern Territory Geological Survey (NGMA)*, *Map and Explanatory Notes*.

Taylor W.R., 1997. Nature and Significance of Palaeoproterozoic Alkaline Magmatism in Northern Australia. *In:* Rutland R.W.R. and Drummond B.J. (Eds.), Paleoproterozoic Tectonics and Metallogenesis: Comparative analysis of parts of the Australian and

Fennoscandian Shields. *Australian Geological Survey Organisation*, *Record*, 1997/44; p. 123-125.

Thomas D., 2002. Reconnaissance structural observations: Myra-Kukalak Project, Arnhem Land, Northern Territory. *Cameco Australia*, *Internal Report (Confidential)*.

Thomas D., 2004. Observations and recommendations on drill core from the 2004 exploration programs, Northern Territory, Australia. *Cameco Corporation*, *Internal Technical Report*.

Tucker D.H., Stuart D.C., Hone I.G. and Sampath N., 1980. The characteristics and interpretation of regional gravity, magnetic and radiometric surveys in the Pine Creek Geosyncline. *In:* Ferguson J. and Goleby A.B. (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 101-140.

UTS Geophysics, 2004. Logistics report for detailed airborne magnetic, radiometric and DTM survey at Wellington Ranges, King River-Fish Tail and Steven's projects. *UTS Geophysics*, *Logistics report (to Cameco)*, PCD/04/001.

Wilde A.R., Mernagh T.P., Bloom M.S. and Hoffmann C.F., 1989. Fluid inclusion evidence on the origin of some Australian unconformity-related uranium deposits. *Economic Geology*, 84, 6; 1627-1642.

Wilde A.R. and Noakes J.S., 1990. Nabarlek uranium deposit. *In:* Hughes F.E. (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, vol. 1. *Australasian Institute of Mining and Metallurgy*, *Monograph Series*, 14; p. 779-783.

Wyborn L., 1990. High uranium granites of the Kakadu-NW Arnhem Land region. *BMR Research Newsletter*, 12; 2-4.

Zaluski G. 2005. Processing and Interpretation of De Beers Hyperspectral Scanner Data for the Cadell Project (EL3347 and ELA 22784), *Cameco Corporation Internal Report.*