SUMMARY

This report describes exploration work undertaken within Exploration Licence 5890 (EL5890) during the sixth year of tenure ending 12 May 2002. The licence area is located in north western Arnhem Land and was granted in May 1996.

The exploration program was managed by Cameco Australia Pty Ltd on behalf of the Yok Joint Venture partners, Cameco Australia Pty Ltd, PNC Exploration (Australia) Pty Ltd and the Yok Aboriginal Corporation.

The primary exploration target is unconformity related uranium deposits similar to the nearby Ranger, Jabiluka and Koongarra deposits and the now depleted Nabarlek mine.

The current year's exploration activities consisted solely of a RAB drilling program, which covered the southern extensions of the Aurari Fault Zone and associated airborne anomaly BIR 2.
INTRODUCTION

This report describes program activities carried out during the 2001 field season on behalf of the Yok Joint Venture, a joint venture between Cameco Australia Pty Ltd (Cameco), PNC Exploration (Australia) Pty Ltd (PNC) and the Yok Aboriginal Corporation. EL5890 forms part of the King River Project which is included within the Cameco / PNC joint venture agreement termed the ‘Arnhem Land West Joint Venture’ (AWJV). Exploration on this licence is presently being conducted simultaneously with that on the adjoining King River tenements, EL734 and EL5891. Since the Exploration Licences are located on Aboriginal Land the exploration program was carried out under the terms of consent documentation as agreed with the Northern Land Council pursuant to the Aboriginal Land Rights (Northern Territory) Act and dated 1 March 1996.

Commencing 2002, PNC Australia Pty Ltd has no further interest in the exploration tenements that once constituted the Arnhem Land West Joint Venture. Cameco Australia Pty Ltd has assumed full control on the purchase of all interests once held by PNC.

Clearance for the program was given by the Northern Land Council following the Liaison Committee Meeting held on April 24 at Gunbalanya (Oenpelli).

A RAB program was the only activity undertaken. The work was performed by Johannsen Drilling Pty Ltd of Port Lincoln, South Australia. Drilling on the tenement commenced on 30 August and was completed on 3 September.

Location and Access

The tenement is located in western Arnhem Land immediately north-east of the Aboriginal settlement of Gunbalanya and is wholly within Aboriginal Land. The Ranger uranium mine is situated approximately 100km to the south-west and the rehabilitated Nabarlek site is within tenements which adjoin the southern boundary of the King River project area. Access from Darwin is via the Arnhem Highway to Jabiru then north to Gunbalanya. The main Gurig National Park / Wark (Murgenella) road traverses the licence area and provides access to various parts of the tenement.

Location Plan

Vehicular access is variable dependent upon topography. In general, most of the country is flat lying and can be traversed relatively easily by four-wheel drive vehicle.

Tenure

EL5890 was granted on 13 May 1996 for an initial period of six years. On granting, the total area under licence was 1188 square kilometres of which 645.9 square kilometres remained into the sixth year. A total of 160.3 square kilometers was designated as restricted zones following site surveys undertaken by the Northern Land Council.

Under the Mining Act a reduction in area is required on each anniversary commencing 13th May 1998 unless a waiver is obtained from DBIRD (Department of Business Industry and Resource Development, Minerals and Energy). A waiver for 2000 / 2001
(Year 5) was granted by the department in respect of EL5890 where an insufficient number of blocks were relinquished to meet the statutory requirement. The number of blocks was reduced from 266 (Year 5) to 193 for Year 6.

Physiography

The far north-western corner of the tenement consists of dissected sandstone plateau of the Wellington Range. The remainder is comprised dominantly of gently undulating sandy plains, underlain by a ferruginous duricrust. In places, erosion of this duricrust has led to the development of ‘breakaways’ along the erosional boundary. Thin remnants of lateritised Cretaceous sediments form scattered localised tablelands and small mesas throughout the tenement. The main drainage systems are Cooper and Birraduk Creeks draining westwards and the north-east flowing tributaries of the King River.

Tenement Geology

Paleoproterozoic rocks, which are present in the project area, have been named the Myra Falls Metamorphics (MFM). These are considered to be higher metamorphic grade equivalents of the Cahill Formation (the host rocks to the Alligator Rivers uranium deposits) and consist broadly of quartz-feldsparic garnet gneiss, quartz-mica-amphibole-garnet schist and amphibolite. No carbonates have as yet been identified on the tenements but probable calc-silicate lithotypes are present as amphibole-rich schists and ?para-amphibolite. Structurally the MFM form a broad synclinal structure (the ‘Oenpelli Syncline’), which is confined to the western half of the tenement. The structure contains a well defined and easily traceable sequence of ‘lower’ and ‘upper’ units. A thin but fairly persistent quartzitic unit, formerly considered to be Kudjumarndi Quartzite by the BMR (AGSO), forms a stratigraphic marker in the upper MFM and accurately outlines the fold structure. Outcrop is extremely sparse, being confined mostly to drainage channels. Ferricrete and Quaternary sands cover much of the area. Mapping of the stratigraphy has been made possible by a combination of air photo studies, geophysical interpretation and regional RAB drilling traverses.

The Myra Falls Metamorphics abut the granulite facies Nimbuwah Complex, which consist of gneiss and migmatite and various granitic intrusives. The most recent age determinations place the Nimbuwah within 1870-1850 Ma. The ‘complex’ has an I-type granite origin and is considered to be in part, intrusive into the paleoproterozoic metasediments (Carson and others 1999). An anomalously magnetic unit, termed the Stromatic Migmatite marks the inferred contact with the MFM. It is a finely banded, fine grained quartzofeldspathic gneiss containing magnetite and almandine garnet and is considered to be a transitional phase between the MFM and the Nimbuwah Complex. There appears to be a rapid regional progression of metamorphic grade increasing from west to east. Outcrop tends to be slightly more extensive in comparison to the MFM. Good exposures of both gneissic rocks and the intrusive granitic variants occur throughout.

The basement rocks are overlain by the Kombolgie Subgroup (formerly Kombolgie Formation), which forms the base of the early Proterozoic Katherine River Group. The Mamadawerre Sandstone, the fluviatile basal unit of the Kombolgie, outcrops as the
characteristic escarpment country of the Arnhem Land plateau. It outcrops in the north western corner of the tenement forming rugged cliffs and dissected plateau as part of the southern extensions of the Wellington Range. The age of the Mamadawerre has been constrained between 1822 and 1720 Ma and is probably closer to 1800 Ma (Sweet and others 1999).

Remnants of the Cretaceous outcrop in various parts of the tenement usually along the erosional fringes of lateritised tablelands. They overlie both the MFM and Nimbuwah Complex rocks.

Intrusive rocks other than the Nimbuwah granites include extensive sills and lopoliths of Oenpelli dolerite and several generations of younger crosscutting dolerite. Circular features, as defined by airborne magnetics, are considered to be pipe-like mafic bodies, which have been identified elsewhere in the Alligator Rivers region (Andrew Brown, pers. comm.). These features were the focus of diamond exploration by De Beers on the tenement.

Regional Geology and Major Structures Plan

Regional Structure and Geological History

The early Proterozoic rocks of the region have been affected by the Top End orogeny (1880 to 1780 Ma), which includes the initial Nimbuwah Event, or Barramundi Orogeny at about 1870 Ma. This produced a prograde metamorphic effect with associated tight folding and faulting. The various ‘domains’ exhibited a variability of deformation and metamorphic grade with the western and eastern margins of the Pine Creek Inlier (Litchfield Province and Nimbuwah domain respectively) exhibiting the most pronounced effects.

Major regional faults, which affect the early Proterozoic, have north-west (Bulman), north-north-west (Aurari) and northerly (Anuru, Goomadeer) strikes. Another significant set trends to the east and includes both the Ranger and Beatrice faults. The Bulman Fault Zone is the principle regional feature and is considered to represent a long-lived, deep crustal structure, which has exerted a large lateral component in rocks of the Pine Creek Inlier.

A more intense concentration of structures traverse the mid Proterozoic and younger rocks and include north-west, east, north-east and north trends. Both faulting and jointing with displacements ranging from a few metres up to 100 metres locally heavily dissect the Kombolgie.

The King River region occupies the north-western extension of the Arnhem Shelf in the northern McArthur Basin. Deposition of the Mamadawerre Sandstone took place in an environment of extension and local basin formation with probable fault-controlled sedimentation. Rapid thickening and thinning of the sequence imply this.

The widespread Oenpelli Dolerite intrusive event took place at about 1715 Ma. Localised effects in the sandstone include silicification, the introduction of magnesium rich to intermediate chlorite and the formation of muscovite-illite. A characteristic
mineral assemblage of prehnite-pumpellyite-epidote has formed in the quartzofeldspathic basement rocks adjacent to the intrusions.

**Exploration Target**

The focus of the exploration strategy is the discovery of unconformity-related uranium deposits. The nearby economic deposits at Ranger, Jabiluka, Koongarra and the now depleted Nabarlek Mine serve as models for this strategy. The presence of gold, palladium and platinum in these deposits plus the economic gold-platinum resource at Coronation Hill in the South Alligator Valley, indicates an additional potential for this deposit style.

**Previous Exploration**

During the period 1970-1972 Union Carbide Exploration Corporation undertook substantial exploration, principally for uranium. This work comprised airborne magnetics and radiometrics, regional geochemical surveys and geological mapping. Numerous radiometric anomalies were investigated including the more important Tadpole group of prospects and Dreadnought Creek. Results were discouraging.

Union Carbide’s exploration work was curtailed in early 1973 by a federal Government imposed moratorium on exploration pending a resolution on the issue of Aboriginal land rights.

**Previous Joint Venture Exploration**

**1996 Field Season**

Grant of title was given in May 1996. Initial reconnaissance work included regional outcrop mapping, orientation soil geochemistry and regional drainage BLEG in conjunction with diamond indicator sampling (Mackie, 1997). A regional fixed wing airborne survey at 200-metre line spacing was conducted and included magnetics, spectrometrics and VLF. This was carried out by Geoterrex Pty Ltd (now Fugro Airborne Systems Corp). A consultant was utilised to conduct the regional stream sampling program.

**1997 Field Season**

The 1997 program consisted of airborne anomaly follow up, further geochemistry (soil, rock, stream and BLEG), geological mapping and RAB drilling. Two shallow Diamond holes were drilled into the lower MFM to gain data on host rock lithology and alteration. (Melville and others 1998).

**1998 Field Season**

The 1998 program consisted of ongoing regional work including geological mapping and interpretation, stream sediment sampling concentrating on the Nimbuwah Complex and RAB drilling. A further two diamond holes were drilled into the lower MFM to gain additional data on the sequence. Prospect scale activities on several airborne radiometric anomalies included auger soil sampling, ground
magnetics and some systematic RAB drilling (BIR 1 anomaly only). A DIGHEM test survey was flown across a section of the Myra Falls Metamorphics to gain data on the response of the various lithotypes. (Williams and others 1999).

1999 Field Season

Some regional RAB traversing was continued across the Myra Falls Metamorphics and one diamond drill hole was collared on radiometric anomaly BIR 1. Stream sediment and auger soil sampling was conducted across ‘Ralph’s Fault’ where a low order gold anomaly was previously outlined. Ground magnetic surveys were conducted across the latter as well as at anomaly BIR 4. UTS Pty Ltd conducted a heli-borne EM-Magnetic survey over the southward extensions of the Aurari Fault zone.

Stockdale Prospecting Ltd (now De Beers Exploration Australia) undertook detailed airborne magnetic surveys, field inspection and check sampling of four magnetic anomalies. Negative results of the loam sampling coupled with poor MMI geochemical signatures appeared to rule out the presence of kimberlitic intrusions on the licence. Formal notification of De Beers’s withdrawal from the King River program was given in early 2000 (Vercoe 2000).

2000 Field Season

Heliborne DIGHEM was flown over the western half of the tenement by Fugro Airborne Surveys to give complete coverage of the Myra Falls Metamorphics.

PROGRAM ACTIVITIES

The current years exploration activities consisted solely of a RAB drilling program, which covered the southern extensions of the Aurari Fault Zone and associated airborne anomaly BIR 2. The aim of the program was to prospect across the fault zone and environs, to check the environment of the radiometric anomaly and to clarify the geology of the area.

A total of 27 holes was drilled for 566 m over six east-west aligned traverses. The holes were spaced at 400 m intervals and the traverses 800 m apart. Hole numbers were designated KRR0740 to 0766 inclusive. The original program area was greatly reduced due to a combination of wet creek systems and extensive areas of boggy ground.

RAB Location Map

The program was only moderately successful. Of the final 35 holes planned, only 26 were drilled. Three locations were abandoned due to poor track construction, and a further six were considered to have ‘too thick’ Cretaceous overburden. Of the 26 holes drilled, 11 were unsuccessful in penetrating to basement, the majority of these (nine) being blocked by debris within the Cretaceous sediments. Two holes blew out in loose sands. The Cretaceous cover ranged from 6m to greater than 43m in depth.

From the lithological perspective, the successful holes can be classified into two groups, those intersecting quartz-feldspar ± biotite leucogneiss and those that intersected mafic
biotite-rich gneiss (with minor orange garnet). The latter were intersected along the western edge of the leucogneiss sequence.

The leucogneiss were the most widespread rock type. Dolerite was recognised in five holes, predominantly on the northernmost traverse. The Cretaceous cover is widespread and overlies both the basement rocks and the dolerite. Outcropping Cretaceous sediments are present to the east and west of BIR2 and some fine to medium grained leucocratic gneiss was noted.

The gneisses are assumed to be part of the Nimbuwash Complex. At this stage there is no evidence that the Myra Falls Metamorphics are present in the area. The interpreted geology has so far been based on airborne geophysics and totally lacks any subsurface confirmation. Heliborne EM and magnetics carried in in 1999 failed to clarify the situation. More regional drilling would be required prior to attempting a final interpretation.

Combined with the results of a previous RAB program (Melville et al 1998), chemical analysis of drill cuttings from traverse one confirms the widespread presence of dolerite to the north of BIR 2. Anomalous Co (50 ppm), Ni (up to 160 ppm), V (140 to 300 ppm) and Zn (80 to 110 ppm) reflect the mafic lithology, which was intersected in all but two holes.

Three holes on adjacent traverses, KRR0746, 755 and 764 intersected minor alteration within gneissic rocks at depths of up to 27 m. The alteration, consisting of chlorite, hematite and silicification, may indicate proximity to the Aurari Fault and the sub-surface trace of the structure related to anomaly BIR2. KRR0755, located adjacent to the outcropping BIR 2 structure, intersected a low order uranium anomaly of 11.49 ppm within greenish silicified gneiss. Further drilling to the west on this traverse intersected dolerite.

G400 RAB Drilling Geochemistry
G950 RAB Drilling Geochemistry
Fire Assay Geochemistry for RAB Drilling

TSA PIMA for RAB Drilling
REFERENCES


