



Cameco Australia Pty Ltd

**EXPLORATION LICENCE EL734
ARNHEM LAND WEST JV
YEAR END 12 MAY 2000 ANNUAL REPORT
CONFIDENTIAL**

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SUMMARY

This report describes exploration work undertaken within Exploration Licence 734 during the 1999 field season. The tenement is located in north-western Arnhem Land and was granted in May 1996.

Exploration was carried out by PNC Exploration (Australia) Pty Ltd on behalf of the Nadjinem Joint Venture partners; PNC Exploration (Australia) Pty Ltd, Cameco Australia Pty Ltd, and the Nadjinem Aboriginal Corporation.

The primary exploration target is unconformity related vein type uranium deposits similar to the nearby Ranger, Nabarlek and Koongarra deposits.

Exploration work undertaken during 1999 included RAB drilling (80 holes for 1711 metres) and ground magnetics (45.6 line kilometres). Fishtail and TP11 were the only specific prospects investigated.

The most significant results included further improvements to the accuracy of the tectonostratigraphic map, specifically relating to the extent of the prospective pelitic lithologies by RAB drilling, and on-going definition of the alteration zone at the Fishtail uranium prospect.

Further exploration including an airborne survey and RAB drilling is required to provide more data on the largely untested block of Myra Falls Metamorphics which cover an extensive area in the west of the tenement.

There has been no significant environmental impact with vigorous regrowth of disturbed areas such as RAB access tracks and drillhole sites.

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1. INTRODUCTION

This report details exploration work completed within Exploration Licence 734 (EL734) during the fourth year of tenure (12 months ending 12 May 2000). The tenement was explored concurrently with two adjoining tenements, ELs 5890 and 5891. Field activities commenced in late May and were completed by early October.

Exploration is subject to the terms of consent documentation dated 1 March 1996 agreed with the Northern Land Council in accordance with the *Aboriginal Land Rights (Northern Territory) Act*. As required by the agreement the Work Program was cleared at a meeting of the Liaison Committee held on 27 April 1999.

The Work Program was carried out by PNC Exploration (Australia) Pty Ltd (“PNC”) as operator for the Nadjinem Joint Venture, a joint venture between the Arnhem Land West Joint Venture partners, PNC and Cameco Australia Pty Ltd, and the Nadjinem Aboriginal Corporation.

1.1. Location and Access

EL734 is located in western Arnhem Land and is wholly within Aboriginal land immediately to the north of the now rehabilitated Nabarlek mine (Figure AW_EL734_99-01). The Oenpelli-Maningrida road provides good access to the southern part of EL734.

[Figure AW_EL734_99-01 Location Plan](#)

1.2. Tenure

EL 734 covers an area of 886 square kilometres of which 62 square kilometres has been designated restricted zones following a site survey undertaken by the Northern Land Council. Tenure was granted on 13 May 1996 for a period of six years.

1.3. Personnel

Fieldwork was undertaken by the PNC geologists P Melville, L Sawyer, E Sasao, and T. Tsuruta. They were supported by FieldAsst Pty Ltd personnel: C Fenton (senior field technician), J Clarke (field assistant) and V Bartlem (cook). Four aboriginal traditional owners, R. Managku, G Wurrkgidj, L Lamilami, and C Nawindal were also employed as field assistants.

Contractors and consultants used were:

- Transport and track work by Wildman River Stock Contractors, Darwin;
- Air charter between Darwin and Oenpelli by Hardy Aviation, Darwin;
- RAB drilling by Century Drilling, Batchelor;
- Analytical work by CHEMNORTH, Darwin;
- Helicopter assisted activities by Rotor Services, Darwin;
- Petrographic work by Pontifex and Associates, Adelaide.

1.4. Physiography

Some remnant sandstone escarpment is present along the southern boundary of EL 734, this area is excluded from exploration. The remainder of the tenement consists dominantly of gently undulating sandy plains, generally underlain by a ferruginous duricrust. Erosion of this duricrust in the western part has led to the development of a breakaway along the erosional boundary. Thin remnants of lateritised Cretaceous sediments form tablelands in the eastern part of the tenement. The main drainage systems are Cooper and Birraduk Creeks.

1.5. Regional Geology

EL734 is located near the north-east margin of the Pine Creek Geosyncline, which consists of Palaeoproterozoic sediments and volcanics overlapping Archaean basement highs of the Nanambu Complex and Nimbuwah Complex. The Palaeoproterozoic rocks were metamorphosed during an 1820 to 1870 Ma orogeny. The metamorphic grade varies from lower greenschist to granulite facies with the higher grade rocks (mostly amphibolite facies, minor granulite) restricted to the western Arnhem Land area, including the tenement. The metamorphic rocks are overlain by late Palaeoproterozoic sandstone of the Kombolgie Subgroup.

A more detailed description of the Pine Creek Geosyncline can be found in previous Annual Reports (Melville *et. al.*, 1998).

1.6. Exploration Target

The main focus of exploration is the discovery of unconformity related vein type uranium deposits. The nearby uranium deposits of Ranger, Jabiluka, Koongarra and Nabarlek serve as models for this exploration. Nabarlek is particularly appropriate as a model in view of the similar geological setting and close geographical proximity. The presence of economic gold in Jabiluka 2 and Koongarra plus the gold-platinum group elements +/- uranium mineralisation in a similar geological environment at Coronation Hill south-west of EL734, indicates additional potential for Au and PGE mineralisation. The area is also considered to hold potential for kimberlite or lamproite hosted diamond deposits.

1.7. Exploration History

1.7.1. Union Carbide Exploration Corporation (UCEX)

The current licence area was previously part of a much larger tenement held by Union Carbide Exploration Corporation, who carried out substantial exploration in 1970-1972 principally for uranium. They undertook a number of airborne surveys with much of the area flown utilizing a total count scintillometer. The western section of what is now EL734 was flown with a spectrometer / magnetometer. A photogeological interpretation of the entire area was compiled by Hunting Geology and Geophysics. Airborne anomalies were ground checked and a number were selected for gridding and more detailed work; consisting generally of ground radiometrics, geochemical sampling (stream sediment,

pisoliths, rock chip or termite mounds), geological mapping and in some cases, auger drilling. Core drilling was undertaken at the Tadpole Prospect, and at airborne anomalies TP11 and TP14. No mineralisation was intersected apart from a 5mm crystal of pitchblende in drillhole TP7 (Tadpole) and a trace of alteration at TP11.

Union Carbide's exploration work was curtailed in early 1973 by a Federal Government imposed moratorium on further exploration pending a resolution of Aboriginal land rights.

1.7.2. PNC Exploration Results

PNC 1996 Field Season

Following grant of title in 1996, initial reconnaissance work, orientation geochemistry and airborne surveys were carried out (Mackie, 1997). Airborne surveys included fixed wing magnetics and spectrometrics at 200 metre line spacing. There was also a bulk sampling program for diamonds, including BLEG.

PNC 1997 Field Season

The 1997 program consisted of follow up geochemistry and RAB drilling of anomalies determined from airborne survey analysis. Regional programs of RAB drilling, BLEG and stream sediment geochemistry with geological mapping were also conducted. One cored hole was drilled at Fishtail prospect (Melville *et. al.*, 1998).

PNC 1998 Field Season

Exploration focused on delineation of prospective lithologies towards the base of the Myra Falls Metamorphics as well as ongoing evaluation of the Fishtail, NIM6 and Dreadnought anomalies. Activities included mapping, geochemical sampling (stream, auger), RAB drilling and ground geophysics.

1.8. Stockdale Farm-In

Agreement in principle was reached with Stockdale Prospecting Limited providing for it to earn a 51% interest in diamond exploration within the tenement. Final documentation is awaiting agreement from the Northern Land Council.

During 1999 Stockdale undertook an initial program of airborne magnetics and follow-up sampling (Figure AW_EL734_99-02). A separate preliminary report has been submitted (Milliken 1999).

[Figure AW_EL734_99-02 Stockdale Program](#)

2. EXPLORATION PROGRAM

Exploration within the tenement was dominated by RAB drilling, focusing on further delineation of the prospective pelitic Lower Cahill equivalents (Lower Pelite Zone) principally to the north and east of Fishtail prospect. Several RAB traverses were also drilled south of the Maningrida Road to complete the subsurface lithological mapping of that area.

Ground magnetic surveys were completed over both Fishtail and TP11 anomalies.

Drilling and magnetic survey areas are located on Figure AW_EL734_99-03.

[Figure AW_EL734_99-03 Program Activities](#)

2.1. RAB Drilling

The principal aim of the RAB drilling is primarily to map the lithologies beneath surficial cover and the deep weathering profile which is prevalent in the region. Good quality samples are provided for assay, PIMA studies and petrography. In addition, the technique is convenient and relatively inexpensive as an anomaly testing tool. For RAB data compilation, including location, lithological logs, analyses, PIMA etc see List of Appendices.

2.1.1. Location and Access

Eighty holes were drilled totalling 1711 metres at a cost of \$15 per metre. Access tracks were surveyed and hole locations were marked out utilizing an Omnistar DGPS unit which gave an accuracy of around five metres. Regionally, drill hole spacing was gridded at 800 metres along east-west lines with the lines spaced 1km north-south. At Fishtail prospect, holes were spaced at 100 metres on a single north-south line. A front-end loader was used to clear tracks and establish the drill sites. Drilling was undertaken between 18 and the 31 July using a Mark V Investigator rig.

RAB Drill Hole Location Data

2.1.2. Logging and Sampling Methodology

Each two metre interval was lithologically logged and representative samples placed in storage trays for future reference. Duplicate bottom of hole samples were collected, one being forwarded for geochemical analysis and the other stored. Additional samples were collected for geochemistry where spectrometrics indicated an anomalous response. Altogether, 92 samples were submitted for assay. Elements analysed for are as follows: Au by FA/AAS; Al, Ba, Ca, Cr, Fe, K, Mg, Mn, Na, P, S, Ti, by ICP-OES and As, Ce, Co, Cu, Li, Mo, Ni, Pb, Rb, Sr, Th, U (total), Y, Zn, Zr by ICP-MS.

PIMA spectra were read for all bottom of hole samples (fresh rock) and for each two metre interval. GR256 spectrometer data was collected from the drill cuttings, normally at two metre intervals. Magnetic susceptibility measurements were taken on bottom of hole samples.

RAB Drill Hole Logs

RAB Drill Chip Assay Data

RAB Drill Chip Magnetic Susceptibility Data

RAB Drill Chip Spectrometrics Data

2.1.3. Results

Garnet-rich lithologies which lie at the base of the Myra Falls Metamorphics were successfully mapped by the RAB drilling (see Figure AW_EL734_99-04). These rocks are interlayered with fine grained biotite gneiss and minor amphibolite. The latter range from fine to coarse grained, and vary from garnet-amphibole gneiss to probable meta-dolerite in composition.

Low order anomalous uranium occurs in several holes drilled at the Fishtail prospect and are shown on Figure AW_EL734_99-05. Values range from 15 to 70 ppm. RAB654 is the most altered with scintillometer readings to 170cps over an interval of reddish hematite-chlorite alteration between 8 and 13 metres. Minor alteration comprising hematite, illite and chlorite has affected the pelitic lithologies at Fishtail where a north-west trending structure intersects the Oenpelli Dolerite. This zone is well mapped by both RAB and diamond drilling completed over several field seasons. The current observations concur with those of previous years.

[Figure AW_EL734_99-04 Geology](#)

[Figure AW_EL734_99-05 Uranium Assays](#)

KRR621, located several kilometres east of Fishtail, exhibits similar alteration and geochemical characteristics. Minor uranium and gold are present (8.4ppm and 11ppb respectively) in altered hematitic-chloritic quartz-feldspar-biotite gneiss adjacent to the Oenpelli Dolerite.

Clay mineralogy determined from PIMA spectra confirms that the only significant chlorite occurrence in the region is at Fishtail. 1M illite is associated with and surrounds the chlorite alteration. 2M mica is most abundant in the mica rich lithologies at the base of the Myra Falls Metamorphics. Both kaolinite and smectite are common, the former relates to quartzofeldspathic lithologies or Cretaceous cover. Smectite minerals are coincident with biotite-rich lithologies. Potassic alteration is evident in KRR621. Clay mineral determinations from PIMA analyses are shown on Figure AW_EL734_99-06.

[Figure AW_EL734_99-06 Clay Mineralogy](#)

Three samples of cuttings were collected for petrographic description, from drill holes KRR 604, 621 and 654 (sample Nos. 109769, 109771 and 109772). The samples represent respectively: fine grained orthoamphibolite, altered quartzofeldspathic gneiss and altered muscovite-biotite-plagioclase schist of pelitic origin. For detailed descriptions see Appendix Petrology/Mineralogy Report 7942.

[Petrology / Mineralogy Report 7942](#)

2.1.4. Conclusions

RAB hole lithological mapping of the Fishtail region has succeeded in further 'fine-tuning' the contacts between the major lithological units. The lower Cahill equivalents have now been more confidently outlined and their relationship to other units better defined.

'Fishtail-type' alteration with associated anomalous uranium and gold has been identified in KRR621. At Fishtail prospect, further weak alteration and low order uranium anomalism was detected in the north-south traverse which lies between two parallel RAB lines drilled in 1997-1998. All have been centered on the intersection of the Fishtail structure with the Oenpelli dolerite. Observations are similar to those of previous years with no upgrading of the prospect.

2.2. Ground Magnetism

Ground magnetic data was collected over Fishtail prospect and Union Carbide prospect TP11 using a Scintrex MP3 field unit and base station (refer Figure AW_EL734_99-03). A station spacing of five metres along 50 metre spaced lines was employed over both grids. Twenty nine lines each 1.2km in length were completed at Fishtail and nine lines at TP11. The close station spacing, suggested by Encom Technology, is designed to 'filter out' the spikey effect produced by the magnetic properties of ferricrete. Ferricrete is well developed at Fishtail, particularly over the area of interest. A previous ground magnetism survey conducted at wider spacings indicated an area of smoothed magnetic character within the target zone.

The data was levelled and TMI images with decorrugation were produced by Encom Technology Pty Limited.

2.2.1. Results

At Fishtail, a magnetic elevated 'flat' high, (Figure AW_EL734_99-07) of dimensions 1x0.5km coincides with the intersection of the north-west trending structure and the south dipping Oenpelli Dolerite. Drilling has shown that the magnetic high corresponds to the zone of strong illite-chlorite alteration.

Ground Magnetism Survey Data

Figure AW_EL734_99-07 Fishtail Magnetism

The ferricrete cover is characterized by spikey magnetic zones, best seen on stacked profiles. These zones do not mask the magnetic signature of the alteration.

TMI images for TP11, Figure AW_EL734_99-08, fail to show any significant feature associated with the north-west trending structure which was the focus of the survey. The structure comprises a zone of quartz veining and brecciation with anomalous uranium and weak alteration at surface. Drilling by Union Carbide intersected only trace mineralization at depth (Union Carbide 1972).

[Figure AW EL734 99-08 TP11 Magnetics](#)

3. BIBLIOGRAPHY

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