

# NABARLEK PROJECT- WEST ARNHEM JV (EL10176 & EL24371)

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#### NABARLEK PROJECT- WEST ARNHEM JV, WEST ARNHEM LAND, NORTHERN TERRITORY

#### ABSTRACT

The Nabarlek Project- WAJV is located in the western portion of the Arnhem Land Aboriginal Reserve, 28km east of the Gunbalanya (Oenpelli) Aboriginal Community and approximately 300km east of Darwin.

Nabarlek consists of two exploration licences, EL10176 and EL24371, with a total area of 383.8km<sup>2</sup>. Initially granted to Cameco Australia Pty Ltd (Cameco), the project is currently operated by Uranium Equities Limited (UEL) who is earning a 100% interest in the tenement.

Work completed during the year comprised:

- Ground gravity surveying (10,604 stations, total area: ~108 km<sup>2</sup>) over three areas of EL10176: southwest & northwest of Nabarlek Mining Lease, and east of the Quarry Fault Zone;
- 2) 59 Radon-in-soil measurements situated southwest of the Nabarlek ML within EL10176; and
- 3) Geological reconnaissance over EL24371 for validation of downhole logging records.

The ground gravity data was effective at delineating numerous structural trends defined by gravity lows, and geological features across the three survey areas. Gravity lows are prospective for uranium mineralisation and the new survey data will allow more robust geological models to be developed to assist with drill targeting. Of particular interest are gravity low trends that are not reflected in existing magnetic or electromagnetic surveys as this is more indicative of uranium-associated alteration processes that result in a density reduction rather than a change in geological unit. Integration of the gravity data with existing geological, geochemical and geophysical datasets is currently underway to determine which features warrant follow-up work.

Elevated radon-in-soil measurements were typically observed over areas of lower density and increased apparent structural complexity. 38 of the radon cups were exposed to undesirable levels of moisture which has reduced the concentration of radon detected due to the susceptibility of radon to be absorbed by water. Despite this, groups of elevated radon values were still observed in both moisture affected and dry samples. Elevated readings were notably present for stations proximal to the 2015 RC drilling of the GC11 anomaly. This indicates that the radon cups were likely detecting the same uranium mineralization that was intersected by the drilling. Scintillometer measurements should be made around all elevated measurements to further validate whether the radon values were derived from near-surface uranium mineralisation or a deeper uranium source.

Geological reconnaissance was carried out over EL24371 to validate and better understand the downhole logging reports from historic drilling on the tenement. Inspection of air core chips showed no logging errors and reconnaissance activities over the tenement a greater understanding of the units observed.



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# 1. INTRODUCTION

#### 1.1 Location

The Nabarlek Project is located in the western portion of the Arnhem Land Aboriginal Reserve, 40km east of the Gunbalanya (Oenpelli) Aboriginal Community and approximately 300km east of Darwin. The Project area lies within the prospective Alligator Rivers Uranium Field and surrounds the Nabarlek Mineral Lease (Figure 1).



Figure 1: Location Map

The tenements contain several outliers of dissected sandstone Arnhem Land Plateau and escarpment country. The remainder of the project consists of gently undulating sandy plains covered by open savannah woodland with patches of open grassland and low shrubs. Thin remnants of weathered and lateritised flat-lying Cretaceous sediments form tablelands in the north-eastern portion.

The main drainage systems are Birraduk Creek and Cooper Creek, which flow to the northwest.



# 1.2 Tenement Status

The Nabarlek Project was originally comprised of three exploration licences (EL10176, EL24371 and EL24372) which were granted to Cameco Australia Pty Ltd on 1<sup>st</sup> September 2004 for an initial period of six years. The original area of grant was 423km<sup>2</sup>.

In December 2006 a Joint Venture agreement was signed between Cameco Australia Pty Ltd and Uranium Equities Limited (UEL) allowing UEL to earn a 40% interest in the three exploration licences. To participate in the Joint Venture, UEL agreed to sole-fund exploration expenditure for a number of years (through a wholly-owned subsidiary GE Resources Pty Ltd) to earn its 40% stake.

On 31<sup>st</sup> August 2008, 9 blocks of the original 134 blocks, were relinquished from EL10176 and EL24372 was surrendered in September 2008. The Project now consists of the two remaining licences, EL10176 and EL24371, for a total area of 383.8km<sup>2</sup> (Figure 2).

Late in 2012, UEL finalised an agreement to acquire Cameco Australia's remaining 60% interest in the project. This acquisition gives UEL the opportunity to secure 100% ownership and full exploration management of a contiguous land holding in the heart of the Alligator Rivers Uranium Field. Uranium Equities has become the Manager and Operator of the Project.



Figure 2: Nabarlek Project- WAJV: Current Ground Position



# **1.3** Aboriginal Heritage

The project area lies within the Arnhem Land Aboriginal Reserve and is therefore freehold Aboriginal Land. All personnel entering the project area are required to obtain the appropriate Northern Land Council (NLC) permit.

Permission to explore over Aboriginal Freehold land is gained via Exploration Agreements with the relevant Traditional Owners under the Commonwealth *Aboriginal Land Rights (NT) Act.* 

Legislation requires that all sacred, cultural and heritage sites are initially documented by the Traditional Owners and NLC Anthropologists and Archaeologists prior to exploration commencing. This information is then utilised to determine 'No-Go' areas.

Uranium Equities Limited liaises with the Traditional Owners each year to discuss future exploration activities and have developed a strong professional relationship, which includes employment in exploration and rehabilitation activities.

#### 1.4 Access

Access to the site is via the unsealed and seasonal Oenpelli – Maningrida road from Cahill's Crossing at the East Alligator River to the 'Three Ways' intersection to the Coburg Peninsula. From there, access is via the old Nabarlek Mine access road to the Nabarlek Mineral Lease.

The Nabarlek Mineral Lease is central to the Project area with reasonable dry season access along 4WD bush tracks throughout the project area.

Access to the Nabarlek site is also possible using a light plane direct from Darwin, to land on the all-weather sealed airstrip at the Nabarlek Mineral Lease. Uranium Equities Limited has established a semi-permanent field camp adjacent to the airstrip (Figure 3).



Figure 3: Aerial View of Nabarlek Camp and Airstrip



# 2. PROJECT GEOLOGY

#### 2.1 Conceptual Model

The primary focus of exploration on Nabarlek is for the discovery of a high grade Nabarlek-style uranium deposit. Nabarlek is an unconformity-associated uranium deposit whereby mineralisation is concentrated within structural zones, spatially associated with a regional unconformity between flat-lying siliciclastic basinal sediments and the underlying metamorphic basement rocks.

The highly prospective nature of the Alligator Rivers Region for this type of mineralisation is demonstrated by the presence of economic uranium deposits not only at Nabarlek, but also at Ranger, Jabiluka and Koongarra.

In addition to uranium, significant gold, platinum and palladium resources are present at existing uranium occurrences within the Alligator Rivers Uranium Field (Ranger, Jabiluka, Koongarra and Coronation Hill/South Alligator Valley-style deposits) suggesting that economic mineralisation of gold and PGE's (Platinum Group Elements) associated with economic or sub-economic uranium may also be present within the project area.

## 2.2 Geological Setting

The Nabarlek Project area is located within the eastern margin of the Neoarchaean and Palaeoproterozoic Pine Creek Orogen in a region that has been subdivided into the Nimbuwah Domain of the Alligator Rivers region.

The oldest rocks are a sequence of Early-Proterozoic metamorphosed sediments (semipelites), schists and amphibolites termed the Myra Falls Metamorphics. This unit is considered to be stratigraphically equivalent to the Cahill Formation in the western part of the Alligator Rivers Uranium Field and forms the host lithologies of the Nabarlek Deposit.

The Kombolgie Subgroup is the basal unit of the late Palaeo – Mesoproterozoic Katherine River Group of the McArthur Basin. The subgroup consists of sandstone units called the Mamadawerre Sandstone, Gumarrirnbang Sandstone, and Marlgowa Sandstone, which are divided by thin basaltic units called the Nungbalgarri Volcanics, and Gilruth Volcanics. Mamadawerre Sandstone unconformably overlies the basement sequences described above, forming an extensive inaccessible plateau.

The Oenpelli Dolerite is the most pervasive mafic intrusive suite to affect the Alligator Rivers region and is the youngest Proterozoic rock unit exposed. It intrudes various units Neoarchaean and Palaeoproterozoic units, and the Kombolgie Subgroup, forming magnetic sills, dykes, lopoliths, and laccoliths.

These intrusive events had a pronounced thermal effect within the Kombolgie Subgroup, with the promotion of fluid flow and aquifer or aquitard modification. Localised effects in the sandstone include silicification, desilicification, chloritisation, sericitisation, and pyrophyllite alteration. A characteristic mineral assemblage of prehnite-pumpellyite-epidote has formed in the quartzofeldspathic basement rocks adjacent to the intrusions.

Mineralisation in the Nabarlek region is believed to be at least partially controlled by the structural regime through the area. Deformation since deposition of the Katherine River Group includes transpressional movement along steep regional-scale strike-slip faults and possibly some shallow thrusting. These regional faults follow a pattern of predominantly north – northwest trends.



## 3. PREVIOUS INVESTIGATIONS

### 3.1 Exploration by Queensland Mines Pty Ltd: 1969 – 1998

The area was previously held by Queensland Mines Pty Ltd (QMPL) with investigations consisting of airborne radiometric and magnetic surveys, regional geochemical programs, ground total count radiometric surveys, reconnaissance exploration and mapping with some facilitated by surveyed grids.

The Nabarlek Deposit was discovered by radiometric survey and ground follow-up in June 1970. QMPL's exploration was curtailed in early 1973 when the Federal Government imposed moratorium on exploration pending a resolution of the issue of Aboriginal Land Rights. No further exploration work was completed until 1988.

EL2508 was granted to QMPL on 29<sup>th</sup> June 1988 and eventually expired on 28<sup>th</sup> June 1998. During QMPL's tenure they completed airborne geophysical surveys, geological mapping, soil sampling, ground radiometrics, radon track etch surveying, trenches, rotary air blast (RAB) drilling, percussion and diamond drilling.

Significant, but sub-economic uranium mineralisation in strong to moderately altered zones was intersected at a number of prospects. Many other anomalies were discovered but were discounted.

#### 3.2 Exploration by AFMEX, Cameco, SAE Australia JV: 1998 – 2003

In 1998, four months prior to expiry of EL2508, a joint venture partnership consisting of 25% Afmeco Mining and Exploration Pty Ltd (AFMEX) as the operating partner, 50% Cameco and 25% SAE Australia Pty Ltd acquired the tenement from QMPL. Exploration Retention Licences (ERLs) were lodged over those portions of EL2508 that were considered the most prospective and the remainder was permitted to expire. On 20<sup>th</sup> May 1999, the joint venture partners were granted ERL150 – 152.

Investigations consisted predominantly of reverse circulation and diamond drilling programs at some of the more advanced prospects including SMLB, N147 and U65 Prospects. While significant alteration and some minor zones of mineralisation were encountered, all three exploration retention licences were surrendered.

#### 4. EXPLORATION BY CAMECO AND URANIUM EQUITIES LTD

Cameco lodged an application for EL10176, covering the former EL2508 and ERL150 – 152 in June 1999. Grant of title was given on 1<sup>st</sup> September 2004, as three separate tenements, EL10176 the largest central portion, and two smaller titles (EL24371 and EL24372) separated by areas of non-consent land.

#### 4.1 2004 Field Season

Investigations during 2004 consisted of various data compilations and reviews of historical data, but included minor field reconnaissance, sampling and geological mapping.

Full details were documented in Potter (2005).

#### 4.2 2005 Field Season

In 2005, an airborne hyperspectral survey and a TEMPEST survey were flown. In addition, airborne radiometric and magnetic survey of the S27 and N84 Prospect areas was completed. The TEMPEST survey identified a number of targets that were highlighted for further work.



Full details were documented in Doyle et al (2006).

### 4.3 2006 Field Season

Investigations during 2006 consisted of a reverse circulation and diamond drilling program and a regional TEMPEST survey over the western, central and eastern portions of the project area.

A trial SAM (sub-audio magnetic) survey by GAP Geophysics Australia Pty Ltd (GAP) was completed to the southeast of the N147 Prospect. This survey was aimed at determining whether extensions of the Nabarlek Shear could be imaged below sandstone towards the south-east of the prospect. The results of the SAM survey were inconclusive.

Full details were documented in Otto et al (2007).

#### 4.4 2007 Field Season

In 2007, Uranium Equities participated in the exploration program.

Investigations during the field season consisted of helicopter supported diamond drilling, RC drilling with diamond tails and aircore drilling. Regional outcrop sampling was also completed.

Drilling at the N147 Prospect intersected dolerite-hosted uranium mineralisation. Further work is required at the prospect to better define the outline of the mineralisation, and to test for further potential of dolerite related uranium mineralisation along the Gabo Fault Trend.

Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result		
NARD6016	318355	8637581	225	-60	200.3	22m @ 0.12% U <sub>3</sub> O <sub>8</sub> from 67m		
NARD6017	318397	8637621	225	-60	242.7	21.1m @ 0.37% U <sub>3</sub> O <sub>8</sub> from 115.1m		

Table 1: 2007 Best Drilling Results

The regional AC drilling did not intersect any highly anomalous uranium results but outlined anomalous uranium and base metal at the N23, U65 North and Contact Prospect areas, providing impetus for further exploration in the areas.

Full details of the exploration investigations were documented in Otto et al (2008).

#### 4.5 2008 Field Season

In 2008, the exploration program consisted predominantly of an extensive systematic drilling campaign targeting the extent of the north northwest trending Nabarlek Structural Zone. A total of 85 reverse circulation holes for 7475m and 532 aircore drillholes for 8101m were completed.

A detailed airborne radiometric and magnetic survey completed at the U40/42 Prospect area for 321 line kilometres and a test VTEM survey by Fugro of 35.8 line kilometres.

Further drilling at the N147 Prospect produced significant intercepts and the first anomalous geochemical uranium results were outlined from shallow aircore traverses at Coopers and Coopers South Prospects.

Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result
NAR6318	318288	8637565	225	-60	156	34m @ 0.12% U <sub>3</sub> O <sub>8</sub> from 109m

Full details were documented in Otto and Mathieson (2009).



#### 4.6 2009 Field Season

The exploration program for 2009 consisted of drilling of 417 aircore drillholes for 7,617m. An airborne radiometric and magnetic survey was completed at the N84 and N23 Prospects and a Sub Audio Magnetic (SAM) survey at the N147 Prospect. Minor reconnaissance mapping and sampling was also completed.

Full details were documented in Otto and Mathieson (2010).

#### 4.7 2010 Field Season

The exploration program for 2010 included drilling of 42 reverse circulation drillholes for 6,158m, 91 aircore drillholes for 1,394m and 4 diamond drillholes for 486.7m. In addition, a gravity survey that consisted of 959 stations and regional sampling and reconnaissance mapping programs were completed.

Reverse circulation drilling was focussed on follow up of geochemical and structural targets throughout the project area. Significant results were encountered at the Coopers and U40 Prospects.

					<u> </u>	
Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result
NAR7374	320036	8638041	135	-60	154	6m @ 0.33% U <sub>3</sub> O <sub>8</sub> from 23m
NAR7386	319980	8637901	135	-60	142	23m @ 0.20% U <sub>3</sub> O <sub>8</sub> from 40m
NAR7389	327140	8644994	090	-60	220	5m @ 1.20% U <sub>3</sub> O <sub>8</sub> from 78m

#### Table 3: 2010 Best RC Drilling Results

Diamond drilling was conducted at the U40 Prospect to follow up on mineralisation intersected in NAR7389.

	Table 4. 2010 Dest Diamond Drining Results								
Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result			
NAD7492	327141	8644994	090	-60	124	6.8m @ 6.71% U <sub>3</sub> O <sub>8</sub> from 75m			
NAD7493	327222	8644998	270	-60	110.6	4.8m @ 1.85% U <sub>3</sub> O <sub>8</sub> from 80.4m			

#### Table 4: 2010 Best Diamond Drilling Results

The ground gravity surveys were found to be influenced primarily by variations in overburden thickness and composition. This helped distinguish sub-cropping structure as such features undergo preferential weathering.

Full details and discussion on the work program can be found in the Annual Technical Report (Urbatsch and Mathieson, 2011).

#### 4.8 2011 Field Season

The exploration program for 2011 included diamond drilling and a ground gravity survey focussed on the Quarry Fault Zone.

Drilling at the Coopers Prospect investigated the nature of mineralisation, basement lithology and structures intercepted by 2010 reverse circulation drilling. The drilling program at the U40 Prospect was designed to determine the size, geometry and controls of high grade mineralisation intercepted by 2010 RC and diamond drilling.

Two holes were drilled at Coopers and 11 holes were drilled at the U40 Prospect for a total of 1991.7m.

Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result
NAD7496	319976	8637909	135	-60	114.4	20m @ 0.22% U <sub>3</sub> O <sub>8</sub> from 40.5m
NAD7498	327219	8645032	210	-60	231.5	2m @ 0.05% U <sub>3</sub> O <sub>8</sub> from 25.5m

#### Table 5: 2011 Best Diamond Drilling Results

The ground gravity program was completed along the entire length of the Quarry Fault Zone. A structural interpretation of the various geophysical products generated from the survey has identified a series of northwest trending structures which cross-cut the northerly trending structures sympathetic to the Quarry Fault Zone. Combined with previously acquired aeromagnetic datasets, several other potential targets analogous to U40 Prospect have been identified.

Details can be found in the Annual Technical Report by Kuldkepp et al (2012).

## 4.9 2012 – 2013

No field work was completed however office based research and targeting continued.

Investigations included reprocessing and interpretation of geophysical datasets and a review of historical geological data to generate potential exploration targets in the region.

Aurel Consulting was commissioned with constructing 3D models of key target areas in the Nabarlek region. A completion report has been received which includes 3D models of the Nabarlek ML region including SMLB, Coopers, Coopers South and N147 Prospects areas, plus separate models for the U40 – U42 Prospect areas.

Details can be found in the Annual Technical Report by Williamson (2014).

#### 4.10 2014 Field Season

Work completed in the 2014 field season comprised (Williamson, 2014):

- An RC drilling program completing 23 drillholes for 2998m examining priority target areas at Coopers, Coopers South, U39 and the U40 Prospect areas. Significant results are listed in Tables Six and Seven;
- Field reconnaissance examining potential future targets

Field XRF results using a 100ppm U<sub>3</sub>O<sub>8</sub> cut-off are summarised below.

Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result
NAR7510	320331	8637507	135	-60	84	10m @ 217ppm U <sub>3</sub> O <sub>8</sub> from 35m
NAR7514	327119	8644952	268	-60	156	8m @ 297ppm U <sub>3</sub> O <sub>8</sub> from 92m
NAR7520	327201	8645048	268	-60	156	7m @ 1781ppm $U_3O_8$ from 46m
NAR7527	327117	8644900	268	-60	144	6m @ 935ppm U₃O <sub>8</sub> from 19m
NAR7528	327188	8644898	268	-60	186	12m @ 509ppm U <sub>3</sub> O <sub>8</sub> from 80m

#### Table 6: 2014 Best RC Drilling Results- pXRF analysis

Drillhole	MGA_E	MGA_N	Azi	Dec	TD	Best Result
NAR7520	327201	8645048	268	-60	156	7m @ 0.27% U <sub>3</sub> O <sub>8</sub> from 46m
NAR7527	327117	8644900	268	-60	144	6m @ 0.13% U <sub>3</sub> O <sub>8</sub> from 19m
NAR7528	327188	8644898	268	-60	186	9m @ 0.06% U <sub>3</sub> O <sub>8</sub> from 79m

#### Table 7: 2014 Best RC Drilling Results- Chemical Analysis

## 4.11 2015 Field Season

Exploration undertaken during the 2015 field season comprised (McIntyre, 2015):

- An RC drilling program completing 6 holes for 1329m examining the GC-11 and GC-26 priority target areas; and
- An alteration study which aimed to characterise the spectral and lithogeochemical signature of the Nabarlek orebody with the purpose of identifying 'near-miss' opportunities in historical drilling on the wider Nabarlek Project;

Drill hole	MGA_E	MGA_N	Azi	Dec	TD	Significant Intersections
NAR7535	320331	8637507	135	-60	84	5m @ 1065 ppm U <sub>3</sub> O <sub>8</sub> from 169m
				including		1m @ 2143ppm U <sub>3</sub> O <sub>8</sub> from 172m
						1m @ 699ppm U <sub>3</sub> O <sub>8</sub> from 177m
						1m @ 322ppm U <sub>3</sub> O <sub>8</sub> 8 from 182m
NAR7537	327119	8644952	268	-60	156	2m @ 875ppm U <sub>3</sub> O <sub>8</sub> from 130m
						2m @ 2,354ppm U <sub>3</sub> O <sub>8</sub> from 135m
						3m @ 325ppm U <sub>3</sub> O <sub>8</sub> from 141m
						3m @ 653ppm U <sub>3</sub> O <sub>8</sub> from 147m
						1m @ 802ppm U <sub>3</sub> O <sub>8</sub> from 154m
						1m @ 232ppm U <sub>3</sub> O <sub>8</sub> from 157m

#### Table 8: 2015 Best RC Drilling Results- Chemical Analysis

# 5. WORK COMPLETED DURING THE CURRENT REPORTING PERIOD

Work completed during the 2015-2016 reporting period comprised:

- A ground gravity survey carried out over three areas: southwest and northwest of the Nabarlek Mining Lease, and over an extensive area east of the 2011 Quarry Fault Zone (QFZ) ground gravity survey;
- A radon-cup survey south of the Nabarlek Mining Lease; and
- Geological reconnaissance over EL24371.

#### 5.1 Ground Gravity Surveying

During the reporting period UEQ commissioned Atlas Geophysics to carry out a ground gravity survey over three areas of interest of EL10176 (Figure 4). The purpose of the survey was to acquire higher resolution imaging of structural features over areas that demonstrated strong exploration potential as well as areas containing limited exploration data. Prominent structural features evident in the 2011 gravity data prompted interest in extending the survey area eastward to investigate continuity of prospective gravity lows and provide a stronger basis to assess the exploration potential of areas lacking previous work. The strong surface geochemical anomalism observed over the GC11 survey area and several high-grade drill intercepts east of the SLMB survey area prompted their inclusion in the survey program.



Figure 4: Location plan of the 2016 and 2011 ground gravity survey areas showing 1VD Bouguer anomaly

The duration of the gravity survey extended beyond the reporting period of this report; however the complete survey dataset has been included in Appendix 1. Note that expenditure reporting for the gravity survey only includes costs leading up to the end of the reporting period.

A total of 10,604 ground gravity measurements were acquired by two walking crews, each using a Scrintex CG5 gravimeter over a 100 x 100 metre grid. A combined area of  $\sim$ 109km<sup>2</sup> was surveyed as part of the 2016 program (Appendix 1).

Gravity lows are the primary feature of interest as they potentially reflect hydrothermal fluid alteration associated with high-grade uranium mineralisatoin. This alteration results in the creation of porosity, and therefore a measureable density contrast, through the displacement and removal of minerals and elements within the host rock by the hydrothermal fluid.

Prominent structural features defined by gravity lows are evident from the gridded data in all three survey areas. The east QFZ area in particular shows strong continuity of prospective gravity lows extending east from the 2011 survey area, as well as numerous northwest trending features conforming with regional structural trends. All survey areas have effectively deliniated the contact of the Oenpelli dolerite which, in certain areas, can host significant uranium mineralisation (e.g. U42). The U40 and U42 prospects are also situated proximal to a dolerite contact indicating this unit may be facillitating hydrothermal fluid migration (Figure 4). Of particular interest are gravity low trends that are not reflected in existing magnetic or electromagnetic surveys as this is more indicative of uranium-associated alteration processes resulting in a reduction in density rather than a geological boundary.

Ground gravity data was only recently completed at the time this report was submitted, as such, on-going analysis and integration with other datasets is currently underway. A more robust account of significant findings will be compiled during the 2016-2017 reporting period.



# 5.2 Radon-In-Soil Surveying

A radon-in-soil survey was originally planned to be carried out within a valley extending from the south east of portion of EL10176 into EL23700. Field personnel reported unforseen swamplike conditions within the valley which would have comprimised the survey as radon gas is highly susceptable to absorbtion by water. The survey was redesigned to target areas thought to be dry within EL23700. Unused radon monitoring cups were used to provide coverage of two areas lacking surface geochemistry located southwest of the Nabarlek mining lease on EL10176 (Figure 5).



Figure 5: Radon-in-soil survey over 2016 ground gravity 1VD Bouguer anomaly

59 radon-cups were burried at surface level for 14 days with a station spacing of 200m westeast by 100m north-south over two areas. The first area is located proximal to the 2015 RC drilling at the GC11 anomally (i.e. holes NAR7534 – NAR7537) which intersected anomalous uranium mineralisation (Table 8). The second area is situated approximately 2km westsouthwest of the first, over a region containing no surface geochemistry. Although every effort was made to ensure station locations were suitably dry, the laboratory reported 38 radon cups were exposed to undesirable levels of moisture. It is important to note that the influence of moisture on the survey will only reduce the concentration of radon detected, and therefore, false positives will not occur. This provides confidence that measurements reporting elevated concentrations of radon are real regardless of exposure to moisture.

A notable increase in radon concentration is observed in the western group of stations that are situated over slightly lower density regions of the survey area (Figure 5). Radon cups situated around drillholes that targetted the GC11 anomally also show elevated radon values. This indicates that these radon cups were likely detecting the same uranium mineralization that was intersected by the drilling. Identifying the true spatial extent of the radon anomalism is difficult due to moisture exposure and the limited spatial range of measurements. Follow up scintillometer measurements are recommended to assess whether the anomalous radon-cups were detecting a uranium source at depth, or near-surface mineralisation.



# 5.3 Geological Reconnaissance

During the reporting period, geological reconnaissance was carried out over EL24371 for the purpose of validating and better understanding the logging from historic drill holes within the tenement. While much of the area comprises regolith cover, the shallow depth to basement in the area allows useful obervaitons to be made from ourcropping and sub-cropping units to the south.

Prior to this reconnaissance, there was uncertainty regarding associating lateritic residuum to a particular rock type. It was observed that a dark red/brown lateritic duricrust is present over Oenpelli dolerite units, whereas lighter-coloured, silica-rich cover is attributed to psammitic sediments. To the south of the tenement, basement schists are found to outcrop near the sandstone escarpments.

Inspection of aircore drilling chips showed no logging errors within the drilling database.

# 6. CONCLUSIONS AND RECOMMENDATIONS

Exploration during the 2015-2016 reporting period comprised:

- 1. Ground gravity surveying over three areas of EL10176 to obtain higher resolution subsurface data for the purpose of delineating structural features and trends. Areas surveys were:
  - a. GC11 area located southwest of the Nabarlek ML,
  - b. SLMB area located northwest of the Nabarlek ML; and
  - c. The area east of the QFZ.
- 2. Radon-in-soil surveying south of the Nabarlek ML (EL10176) over areas lacking radon surface geochemical testing.
- 3. Geological surveying of EL24371 and validation with the exploration database.

Ground gravity measurements were taken over 10,604 stations and covered a total area of 108 km<sup>2</sup>. Numerous structural and geological trends can be observed defined by gravity lows within the three survey area. Gravity lows are prospective for uranium mineralisation and this new survey data will assist in developing more robust geological models and refining exploration targets. Integration of the gravity data with all existing geological, geochemical and geophysical datasets is currently underway to determine which anomalies warrant follow-up work. Of particular interest are trends defined by gravity lows that are not reflected in existing magnetic or electromagnetic surveys as this is more indicative of uranium-associated hydrothermal alteration processes that result in a density reduction rather than a change in geological unit.

The radon-in-soil survey carried out south of the Nabarlek ML was originally planned to investigate radon leakage within a valley located at the southeast of EL10176. Conditions in the valley were excessively moist which would have been detrimental to the accurate measurement of radon gas leakage. The survey was redesigned within EL23700 with the stations within EL10176 being contingency for unused radon-cups. These contingency stations were positioned over areas lacking surface geochemistry. Radon stations proximal to the 2015 RC drilling, that intersected anomalous uranium mineralisation, showed elevated radon readings. The western survey area contains a cluster of elevated radon values at the east end of the two lines which appears to coincide with a density contrast in the ground gravity data which shows uniformly high gravity values to the west that transitions into lower values towards the east. 38 cups were exposed to undesirable levels of moisture during their placement; however, this would only reduce the maximum potential radon reading due to radon gas being absorbed by water. Therefore, the radon values for affected cups should be regarded as an underestimation of the true value which would be obtained under ideal conditions.

Geological reconnaissance was carried out over EL24371 to validate and better understand the downhole logging reports from historic drilling on the tenement. Inspection of air core chips showed no logging errors and reconnaissance activities over the tenement a greater understanding of the units observed.

Continued analysis and integration of the newly acquired ground gravity and radon-in-soil survey data with existing geological, geochemical, and geophysics datasets will be carried out during the 2016-2017 reporting period. A follow-up scintillometer survey over areas containing elevated radon readings is recommended to validate whether the measurements were derived from a deep or near-surface uranium source.

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Appendix I

Ground Gravity Survey Data



Appendix II Radon Survey Data