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Headwaters Project (EL25220)

Annual Technical Report For the Period 22/04/10 – 21/04/11

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EXECUTIVE SUMMARY

Uranium exploration and mining in the West Arnhem Land region has concentrated on the Alligator Rivers Uranium Field, with the main focus being on unconformity-related deposits such as the Ranger and Jabiluka Deposits (refer Figure 1). Previous explorers in the West Arnhem Land region persisted with exploring for unconformity-style uranium targets, but found the depths to the unconformity and prospective basement sequences to be too restrictive.

A review of the regional exploration potential of the Headwaters Project has identified geological environments that hold similarities to the style of uranium mineralisation present at Westmoreland in north-west Queensland. Mineralisation at Westmoreland is associated with regional structures and volcanic rocks within McArthur Basin sequences which are equivalent to the sequences widely distributed throughout the Headwaters Project area.

Uranium Equities believes the region has the potential for significant near surface "Westmoreland-style" uranium and primary gold – platinum – palladium – uranium mineralisation associated with brecciation, faulting and silica/clay alteration zones at shallow depths within the McArthur Basin sediments.

Aerial imagery of the area showed similarities to the Deaf Adder prospects located to the south which returned encouraging results for this style of mineralisation. In 2010 Uranium Equities Ltd completed the first drilling program to be undertaken on EL25220 that consisted of three diamond drill holes totalling 608.2m.

Uranium Equities Ltd applied for and received a co-funding grant, as part of the NT Governments' 'Bringing Forward Discovery' Initiative, for $100,000 to assist with direct drilling costs. As part of the initiative, the drill core was scanned using the HyLogger system to log mineralogy and hydrothermal alteration assemblages. 39 samples were analysed for a full suite of elements and ten representative core samples were taken for petrology analysis.

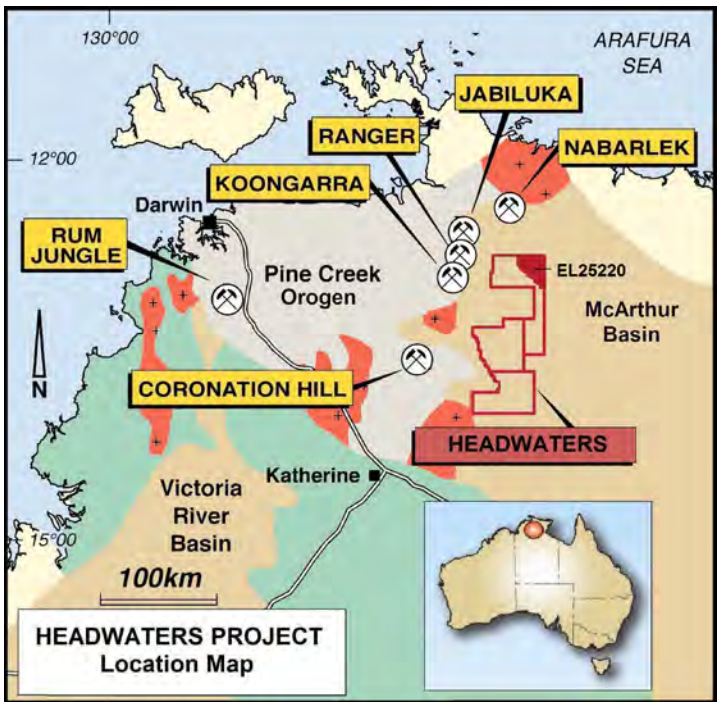

Figure 1: Headwaters location map and uranium deposits

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1 INTRODUCTION

1.1 Tenure

The Headwaters Project is located within the prospective West Arnhem Land region, Northern Territory. EL25220 is situated in the northeast corner of the Headwaters Project and covers an area of 448.7km^2. The exploration licence is held by GE Resources Pty Ltd, a wholly owned subsidiary of Uranium Equities Limited.

The Headwaters Project is subject to a joint venture agreement between Uranium Equities and Vale Exploration Pty Ltd, a wholly owned Australian subsidiary of Vale S.A. whereby Vale can earn up to 80% equity in the Headwaters Project area.

1.2 Access

EL25220 is located 60km east of the township of Jabiru. Access is difficult as there are no established roads to or within the exploration licence. Uranium Equities utilised helicopter assistance for the drilling program based out of the existing field camp on the Nabarlek Mineral Lease.

1.3 Heritage

The tenement is located on Aboriginal Freehold land, and therefore requires access approval of the traditional owners. Exploration agreements have been signed with the NLC who represent the traditional owners.

A Work Program Meeting was held on the 26th March 2010 with the traditional owners being supportive of reconnaissance exploration within EL25220. The likelihood of a heli-supported drilling program was also approved by the traditional owners.

With the assistance of the NLC, a consulting archaeologist and a senior Traditional Owner were used to assist with site heritage clearances. The heritage report makes up Appendix I.

2 REGIONAL CONTEXT

2.1 Regional Geology

The regional geology is characterised by intensely deformed and metamorphosed sedimentary successions of the Pine Creek Basin, notably the Palaeoproterozoic aged Nimbuwah Metamorphic Complex and the Myra Falls Metamorphics. These basement rocks are host to the major unconformity related uranium deposits of the Alligator Rivers region. Peak deformation and metamorphism is attributed to the Barramundi Orogeny (~1880 – 1850Ma).

Undeformed fluvial sediments and intraformational volcanics of the Kombolgie Subgroup (~1822 – 1720Ma) unconformably overlie the basement rocks and represent the basal portion of the McArthur Basin. The platform sediment thickness is poorly known, but progressively thickens to the southeast, probably reaching depths in excess of 1000 metres in the southeast of the project area.

2.2 Project Geology

The geology of EL25220 is dominated by platform sequences of the Kombolgie Subgroup sediments, with a general succession of formations towards the south-east (Figure 2). The lowermost unit, the Mamadawerre Sandstone and the overlying Nungbalgarri Volcanics do not outcrop within the project area but are present immediately to the north.

The lowermost unit exposed on the project is the Gumarrirnbang Sandstone, consisting of a fine to very coarse grained, medium to thickly bedded quartz arenite. Deposition of the Gumarrirnbang Sandstone is interpreted to have been in a braided fluvial system with an overall upwards fining and better-sorting of the sands within the upper portions of the formation.

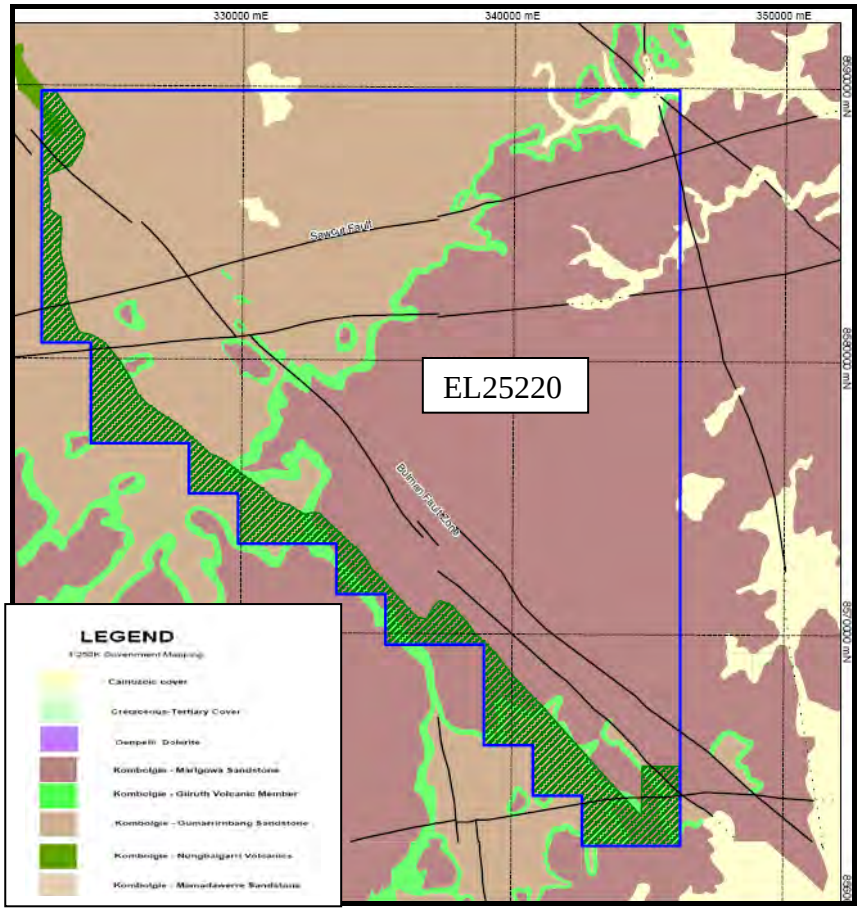

Figure 2: Regional Geology

The Gilruth Volcanic Member is a thin mafic volcanic horizon which conformably overlies the Gumarrirnbang Sandstone. The Gilruth Volcanics are generally recessive in outcrop, forming lateritised terraces of ferruginous debris that are clearly recognisable in the radiometric imagery.

Conformably overlying the Gilruth Volcanics is the Marlgowa Sandstone, a fine grained to granular, thickly bedded quartz arenite deposited in a braided fluvial to shallow marine, tidal environment.

While not exposed on the licence area, dolerite dykes and sills of the Oenpelli Dolerite are visible in the magnetic imagery.

It has been suggested that the Oenpelli Dolerite could be the feeder dykes to the Nungbalgarri or Gilruth Volcanics basaltic units.

Major structures occur through the region with the NW – SE trending regionally significant Bulman Fault present within EL25220.

2.3 Mineralisation

Uranium mineralisation is well known in the region, with the Ranger, Jabiluka, Koongarra, Coronation Hill and Nabarlek Deposits being the most significant. These deposits are typically associated with the unconformity at the base of the McArthur Basin sediments.

Various mechanisms have been proposed to explain the source, transport, and formation of these deposits, with it widely noted that there is a lack of extensive mineralisation in the cover (Kombolgie Subgroup) rocks.

There are several known uranium occurrences within the southern tenements in the Headwaters Project, as defined by previous explorers from radiometric anomalies and surface geochemistry, as indicated in Figure 3. The most significant of these is the Flying Ghost Prospect. These are documented within the MODAT mineral occurrences as being secondary uranium mineralisation associated with clays within zones of intense fracturing in the Kombolgie Subgroup sediments.

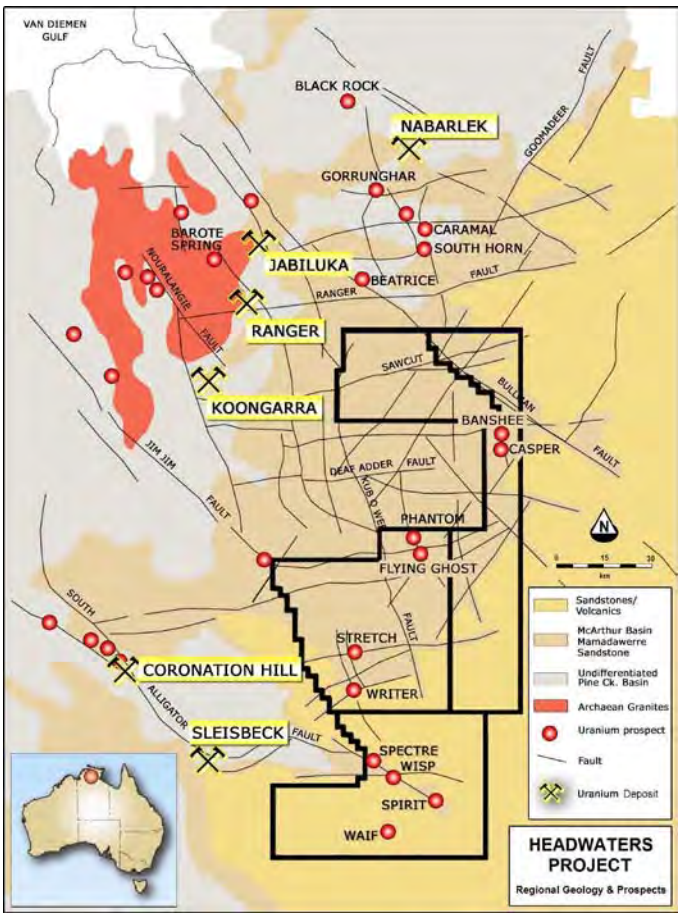

Figure 3: Regional Geology and uranium deposits and occurrences

3 PREVIOUS EXPLORATION

Due to its inaccessible nature, the Headwaters Project area was largely unexplored until Cameco Australia Ltd began evaluating the area in 1996. Their approach to exploration was heavily influenced by geophysics and clearly focused on targeting unconformity-style uranium deposits at the base of the Kombolgie Subgroup.

Cameco completed the following activities over four field seasons between 2002 and 2005:

- 208 lithogeochemical rock chip samples (2x2km grid with 68 elements, with higher density infill sampling in anomalous areas)
- airborne magnetic – radiometric – DTM survey (200m line spacing, flying height 60m)
- airborne electromagnetic survey (TEMPEST) on 200m line spacing
- airborne hyperspectral survey (HYMAP MkI)

Cameco concluded that the highest uranium geochemistry values are associated with the Gilruth Volcanic Member, which downgraded their significance with respect to unconformity related deposits. Furthermore, the geophysics was unable to identify any targets underneath the Kombolgie Subgroup, and thus the ground was relinquished.

Surficial uranium occurrences at the Flying Ghost Prospect (Figure 3) also reveal anomalism associated with the Gilruth Volcanics. Figure 4 shows downhole gamma and geochemistry plots from Cameco drillhole DAD003, which clearly shows radiometric anomalism and uranium – gold – PGE anomalism associated with the hangingwall and footwall contacts of the Gilruth Volcanics.

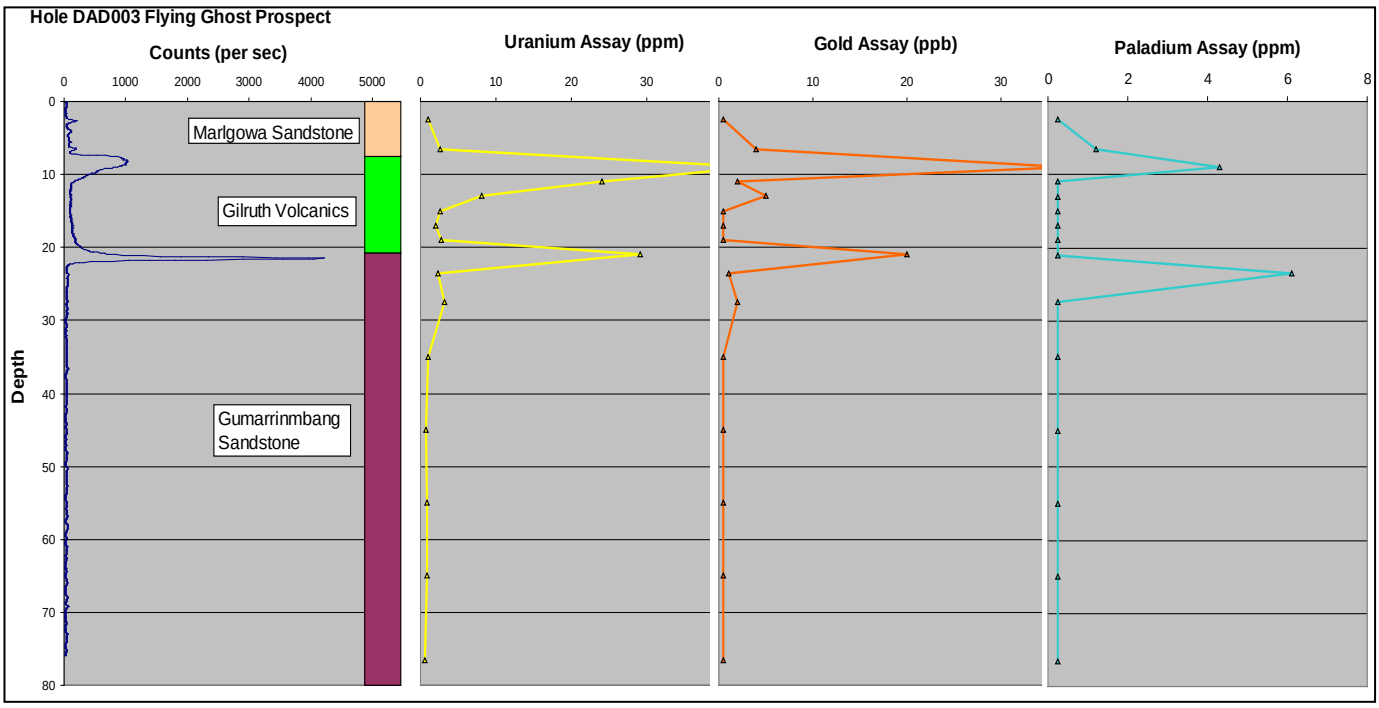

Figure 4: Downhole data plotted from DAD003 showing correlation between the Gilruth Volcanics and uranium-gold-PGE anomalism at the Flying Ghost Prospect

4 EXPLORATION CONCEPT

4.1 Westmoreland-style Uranium Mineralisation

In contrast to previous explorers, Uranium Equities Limited is targeting Westmoreland-style deposits in Arnhem Land. These deposits occur within conglomerate, sandstone and mafic volcanic rocks within the McArthur Basin succession more than one kilometre above the unconformity as well as in the basement (Wall, 2006).

They have some features in common with sandstone–hosted, vein-type and unconformity-related deposits and are associated with redox boundaries near the contacts between different lithologies, in a variety of geological settings (Lally and Bajwah, 2006).

Uranium and primary gold – PGE mineralisation at Westmoreland is associated with brecciation, faulting and silica/clay alteration zones within the McArthur Basin sediments above the unconformity. Higher grade mineralisation is spatially associated with north-east trending mafic dykes emplaced along steep trending fault systems. Extensive, shallow dipping, stratabound mineralised zones are also associated with the fault interaction zones. Figure 5 shows the comparison between the geological setting between the two areas.

A significant feature of this style of mineralisation is that the target footprint is relatively large, with the vertical dykes likely to be in the order of 10 – 20m thick, and stratabound mineralisation possibly up to 600m away.

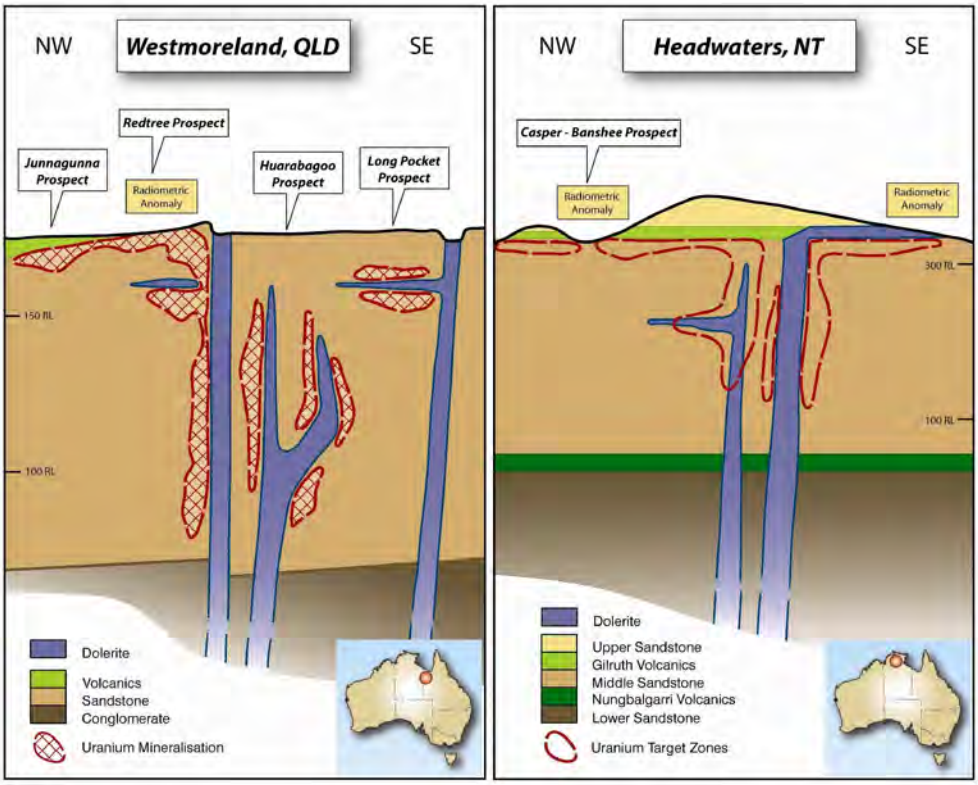

Figure 5: Schematic cross-section of Westmoreland-style mineralisation

4.2 Target Application to EL25220

The most prospective targets for Westmoreland-style uranium mineralisation are considered to be north-east trending dyke swarms, most likely representing significant structural zones and their intersections with the Gilruth Volcanics. The model invokes migration of uranium rich fluids through the major fault zones and deposition at structural or redox traps. The Gilruth Volcanics are an ideal redox trap due to the iron content compared to the surrounding sediments.

The key targeting criteria used by Uranium Equities are summarised as follows:

- **Dolerite Dykes**: These appear to be the same orientation (north-east trending) and possibly same age as the Westmoreland dykes. They form topographic lows filled by colluvium and therefore would not show up as radiometric anomalies if mineralised. They represent the 2nd-3rd order structures along which uranium-bearing solutions could have migrated. A north-west trending dyke is interpreted to exploit the zone of weakness caused by the Bulman Fault, and this dyke is also prospective for Westmoreland-style mineralisation

- **Gilruth Volcanics**: On EL25220 these appear to be flat lying to slightly southerly dipping. The Cameco drilling to the south proved an association of uranium anomalism with the Gilruth Volcanics via the gamma logging (Figure 4). Presence of Gilruth Volcanics is a key target ingredient as it provides the redox contrast to precipitate uranium out of solution.

- **Nungbalgarri Volcanics**: In a similar manner to the Gilruth Volcanics, the stratigraphically deeper Nungbalgarri Volcanics represent another prospective lithology, however occurs at depths in the order of +200m.

- **Structural Complexity**: The first order faults along which uranium-mineralised fluids could have migrated. The Bulman Fault is a wide north-west trending structure, likely to represent high strain. The Sawcut Fault appears to be a brittle feature with an east-west orientation. The intersection of the Bulman and Sawcut Faults is considered a highly prospective structural position for mobilisation or remobilisation of uranium-bearing solutions.

- **Radiometric Anomalies**: High resolution airborne magnetics and radiometrics flown by Cameco indicate the outcropping Gilruth Volcanics are radiometrically anomalous over a strike length of 6 km. Unexplained weak radiometric trends associated with the dykes crosscutting 'down dip' from the outcropping Gilruth Volcanics, especially towards their intersection with the north-west trending Bulman Fault, are directly analogous with the Westmoreland mineralisation along the Redtree Dyke Zone.

- **Rock Chip Geochemistry:** Anomalous uranium occurs along the Bulman Fault as well as on one of the north-east trending dykes.

5 EXPLORATION PROGRAM

5.1 Exploration Strategy

The primary drill target was testing the Gilruth Volcanics in proximity to major structures, at a number of locations within EL25220. This would hopefully encounter mineralisation at relatively shallow depths. Drillholes were planned to be collared in the hangingwall sandstone sequences and drill through the Gilruth Volcanics into footwall sandstones. It was proposed that at least one drillhole be deepened to intersect the lower volcanic unit, the Nungbalgarri Volcanics at depth.

A total of 12 proposed drill sites were selected. The drilling strategy is to collar holes generally close to interpreted regional structures and aim to intersect the contact with the shallow south-easterly dipping Gilruth Volcanics. Subject to field verification, the proposed collar locations are shown in Figure 6.

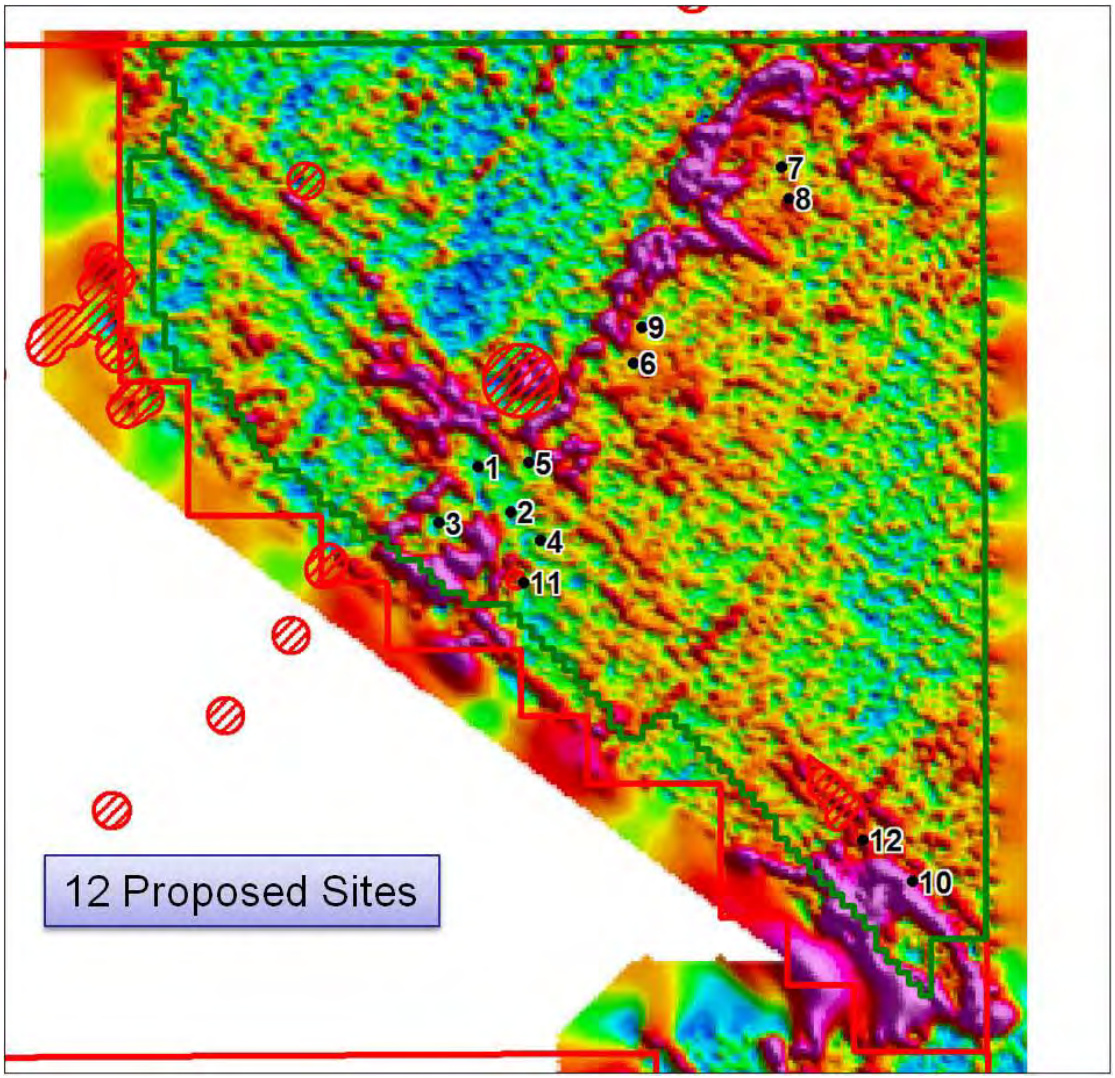

Figure 6: Proposed drill sites on radiometric image

5.2 Drilling Operations

The drilling program commenced in mid – September following the site heritage clearances. Drilling contractor Winmax Drilling Pty Ltd were contracted to do the drilling with helicopter support provided by Fleet Helicopters Pty Ltd. Uranium Equities' camp at the Nabarlek Mineral Lease was utilised as a base for field personnel.

A total of three drillholes (HED001 – HED003) were completed for 608.2m. HED001 and HED002 targeted the Gilruth Volcanics while HED003 focussed on the central part of the project area, targeting the intersection of the NW – SE trending Bulman Fault and drilled to test the Nungbalgarri Volcanics.

Hole Details						Core Size			Target Details			
Hole ID	E_MGA94	N_MGA94	RL	Azi	Dec	HQ	NQ2	Total Depth	Gilruth	Bulman Fault	Sawcut Fault	Lower Volcanics
HED001	331798	8578974	253	0	-90	69	38.6	107.6	✓	×	×	×
HED002	330994	8579835	236	0	-90	56.8	N/A	56.8	✓	×	×	×
HED003	331880	8579920	199	209	-60	26.9	416.9	443.8	×	✓	✓	✓

Table 1: Completed drill program with respect to target criteria

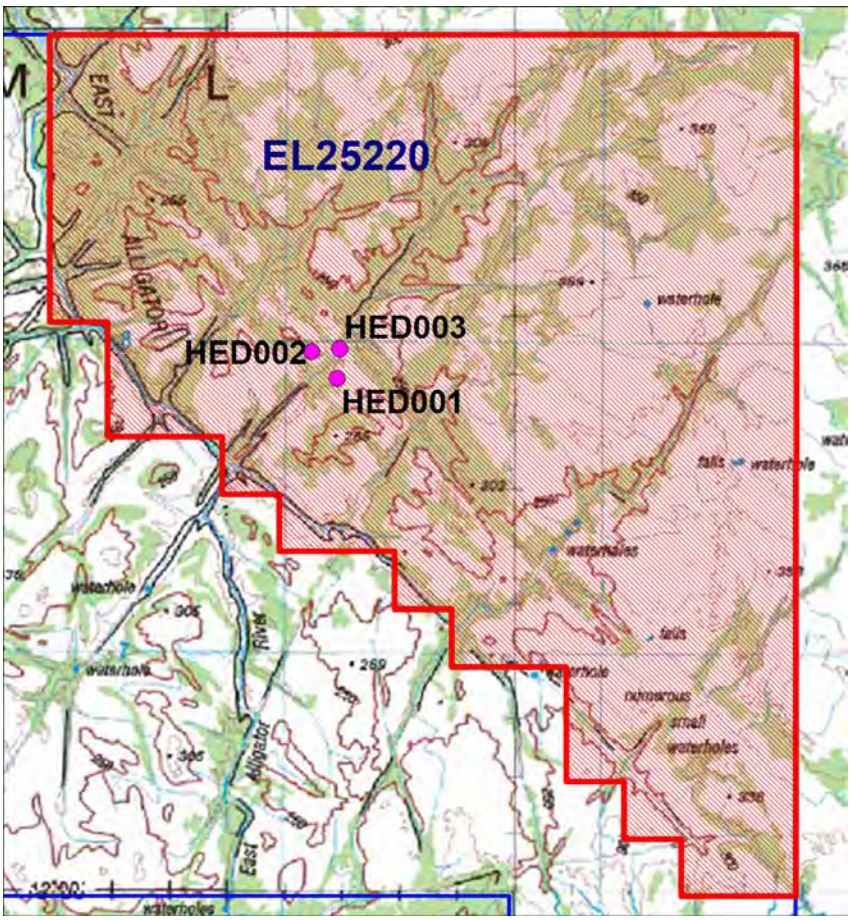

Figure 7: 2010 Drill Collar Locations

Appendix II contains scanned drill logs and Appendix III contains core photos.

5.3 Drill Hole Summaries

5.3.1 HED001

Summary Log:	0-50.3m	Variably hematitic sandstone
	50.3-55.5m	Strongly hematitic fine grained altered basalt
	55.5- 66.4m	Variably hematitic sandstone
	66.4-66.5m	Strongly hematitic fine grained volcanics
	66.5-107.6m	Variably hematitic sandstone

HED001 was designed to drill through the upper and lower sandstone contacts of the Gilruth Volcanic unit proximal to the Bulman Fault Zone. The upper Marlgowa Sandstone and conglomerate comprised the top 50.3m of the hole with the flat-lying to shallow dipping altered basalts of the Gilruth Volcanics from 50.3 to 55.5m. What was identified at hand specimen level to be rip up clasts present in the Marlgowa Sandstone were determined through thin section petrology to be hematite-sericite clasts derived from shale.

The volcanic are underlain by the Gumarrirnbang Sandstone which continues to the end of the hole excepting a small earlier volcanic event seen at 66.4m. Within the fine-to medium-grained Gumarrirnbang Sandstone, heavy minerals including Fe tourmaline, zircon and leucoxene are present.

The Gilruth Volcanic unit returned higher scintillometer readings than the sandstone units but no significant uranium mineralisation was intersected.

The volcanic sequences returned uranium assay values between 15 – 45ppm while surrounding sandstone sequences report uranium values less than detection. Au assays for the drillhole are generally <10ppb however the peak assay value of 102ppb Au is located in the sandstone sample immediately beneath the Gilruth Volcanics footwall contact.

5.3.2 HED002

Summary Log:	0-14.5m	Variably hematitic sandstone
	14.5-19.5m	Strongly hematitic fine grained volcanics
	19.5-56.8m	Variably hematitic sandstone

HED002 was also planned to intersect the Gilruth Volcanics and further test the concept. Logistical considerations meant the location of the hole was geographically close to HED001 with both holes intersecting the same lithologies. The contact between the Marlgowa and Gilruth units occurs at 14.3m giving a shallow north-westerly dip to the volcanics. The hole showed similar cps and U_3O_8 values to HED001. HED002 was successful in providing further stratigraphic information of the area however as cps and eU_3O_8 results produced a similar pattern to HED001 they were again disappointing in light of the target model.

HED002 recorded a peak uranium assay value of 50ppm and marginally elevated Co, Ni and Zn associated with the Gilruth Volcanics footwall contact. Au assays for the drillhole are generally <10ppb however in a similar manner as HED001, the peak assay value of 90ppb Au is located in sandstone sample immediately beneath the Gilruth Volcanics footwall contact.

5.3.3 HED003

Summary Log:	0 – 332.87m	Variably hematitic sandstone
	(Three sub-vertical dolerite/basalt dykes at 231.85-232.2m, 251.20-251.5m and 315.2-315.35m)	
	332.87 – 407.0m	Quartz-bearing dolerite
	407.0 – 415.5m	Chilled margin; grain size decrease
	415.5 – 427.2m	Porphyritic amygdaloidal basalt
	427.2 – 427.8m	Tectonic breccia zone
	427.8 – 435.0m	Altered basalt

After two drill holes successfully tested the Gilruth Volcanic unit, HED003 was drilled to provide structural and stratigraphic information of the underexplored area. The hole drilled through Gumarrirnbang Sandstone, intersected a swarm of narrow dolerite sills and dykes and a 78m thick dolerite intrusion and terminated 32m into the lower Nungbalgarri Volcanics. The lower Mamadawerre Sandstone and basement unconformity were not drilled.

Drilling through the sandstone proved difficult particularly through the top 120m, and at ~176m where a cavity resulted in water loss which required plugging. A sample cut for petrology from 47.8m underwent semi-quantitative XRD, which was undertaken by AEC Environmental. The XRD identified an alunite-group mineral could not be specifically identified optically, but conceivably contains anomalous Th. Narrow sub-horizontal to sub-vertical intrusions of sericite-chlorite-carbonate-leucoxene-albite altered dolerite with carbonate-quartz veinlets occur at 231.85-232.2m, 251.2-251.5m and 315.2-315.35m.

The sandstone is heavily jointed leading up to the sharp contact at 332.85m to a sub-volcanic quartz-bearing dolerite comprised of calcic plagioclase and carbonate-clay-altered pyroxene. The dolerite cuts across the Nungbalgarri Volcanics at 411m. Albite-chlorite-hematite-quartz altered basalts with amygdales of quartz and chlorite and amoeboid patches of chlorite and clay run from 411m to the end of the hole.

The dolerite exhibits higher background radiation than the sandstone. The 360m depth limit of the gamma probe meant the dolerite-basalt contact and Nungbalgarri Volcanics were not probed. Scintillometer readings returned no anomalous values.

Assays returned no anomalous uranium. The dolerite dykes within the sandstone sequences recorded up to 32ppm Pd, 370ppm Cu and 110ppm Zn. The lower Nungbalgarri Volcanic unit recorded up to 85ppm Ni, 150ppm Cu and 41ppm Co.

5.4 Sampling Methodology

Geotechnical and lithological logging was completed with scintillometer readings recorded for each metre using an RS-111. Each hole was scanned using a downhole gamma probe and these plots are available in Appendix IV.

After core was logged at the Nabarlek camp, it was transported to the NTGS core facility in Darwin and scanned using the HyLogger machine. The HyLogger uses reflectance spectroscopy to log mineralogical and alteration assemblages and

produces high-resolution core images. The HyLogger data package had not been received at the time this report was submitted.

Sampling of selected intervals was done with 39 half core samples (HED1001 – HED1039) submitted to Northern Territory Environmental Laboratories Pty Ltd (NTEL) in Darwin. Samples were assayed using ICPMS for Ag, As, Bi, Co, Cu, Ni, Pb, Th, U and Zn, with additional 50g fire assay analysis for Au, Pd and Pt.

The quoted accuracy on ICPMS uranium assay is +/- 10% with a 5ppm detection limit. Assay results are available in Appendix V. These samples are listed in Table 2.

Sampling Type- Element Assay		Company- NTEL		Total Samples- 39
Method	ICPMS for Ag, As, Bi, Co, Cu, Ni, Pb, Th, U, Zn. Fire assay for Au, Pd, Pt.			
Sample No	**Hole No**	**From (m)**	**To (m)**	**Interval (m)**
HED1001	HED002	13	14	1
HED1002	HED002	14	14.3	0.3
HED1003	HED002	14.3	15.3	1
HED1004	HED002	15.3	16.3	1
HED1005	HED002	16.3	17.3	1
HED1006	HED002	17.3	18.3	1
HED1007	HED002	18.3	19.3	1
HED1008	HED002	19.3	20	0.7
HED1009	HED002	20	21	1
HED1010	HED002	21	22	1
HED1011	HED002	22	23	1
HED1012	HED001	11	11.4	0.4
HED1013	HED001	11.4	11.95	0.55
HED1014	HED001	11.95	12.45	0.5
HED1015	HED001	47	48	1
HED1016	HED001	48	49	1
HED1017	HED001	49	50	1
HED1018	HED001	50	50.3	0.3
HED1019	HED001	50.3	51.3	1
HED1020	HED001	51.3	52.3	1
HED1021	HED001	52.3	53.3	1
HED1022	HED001	53.3	54.3	1
HED1023	HED001	54.3	55	0.7
HED1024	HED001	55	55.5	0.5
HED1025	HED001	55.5	56.5	1
HED1026	HED001	56.5	57.5	1
HED1027	HED001	57.5	58.5	1
HED1028	HED001	58.5	59.5	1
HED1029	HED003	231	231.85	0.85
HED1030	HED003	231.85	232.2	0.35
HED1031	HED003	232.2	233	0.8
HED1032	HED003	250.2	251.2	1
HED1033	HED003	251.2	251.5	0.3
HED1034	HED003	251.5	252.5	1
HED1035	HED003	332	333	1
HED1036	HED003	333	334	1
HED1037	HED003	334	335	1
HED1038	HED003	442	443	1
HED1039	HED003	443	443.8	0.8

Table 2: Laboratory Assay samples list

Ten representative core samples were also cut and halves forwarded to Pontifex Pty Ltd for thin section preparation and petrology analysis (Table 3). The full petrology report is available in Appendix VI.

Sampling Type- Petrology		Company- Pontifex Pty Ltd
Method	Thin section preparation from half-core samples	
Hole No	**Sample Interval**	**Geology Unit**
HED001	50.3m	Marlgowa Sandstone
HED001	52.7m	Gilruth Volcanics
HED001	58.9m	Gumarrirnbang Sandstone
HED001	60.05m	Gumarrirnbang Sandstone
HED002	54.1m	Gumarrirnbang Sandstone
HED003	251.4m	Dolerite
HED003	372.85m	Dolerite
HED003	422.45m	Amygdaloidal Basalt
HED003	443.65m	Basalt
HED003	47.8m	Gumarrirnbang Sandstone

Table 3: Petrology samples list

6 FURTHER WORK

Moving forward, the structural and stratigraphic information from drilling and mineralogical and alteration assemblage data from HyLogger and assay results garnered from the 2010 program will be used by Uranium Equities to further refine the target model and continue to test for Westmoreland-style mineralisation in the West Arnhem region.

Recommendations are for further ground truthing and rock chip sampling of the radiometric anomalies and outcropping regions of the Gilruth Volcanic unit before undertaking additional drilling operations.

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