FINAL REPORT FOR WELLINGTON RANGE
2015-2016 CORE COLLABORATIONS FUNDING

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Target Commodity Uranium
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Summary

Cameco Australia Pty Ltd (Cameco) and Rio Tinto Exploration Pty Ltd (RTX) have entered into a Joint Venture (JV) to explore for unconformity style uranium mineralisation in the Wellington Range (EL5893), King River (EL25064 and EL25065), and Waidaboonar (EL24017 and EL27059) tenements in eastern Arnhem Land. As part of a tenement wide data review process the JV has identified several areas where there are significant knowledge gaps in the understanding of the distribution of prospective basement lithological units. The most significant knowledge gaps occur in the northern-most JV tenement, EL5893, where there are significant thicknesses of Cretaceous sedimentary cover blanketing the area and where there has been limited historic drilling.

The JV applied for CORE Geophysics and Drilling Collaborations Program funding to complete four diamond drillholes within EL5893. Three of these holes were drilled in areas where in-house interpretations identified geological settings analogous to those observed in the Ranger area. The fourth hole targeted a high tenor, surficial uranium anomaly in an area that has seen limited, ineffective exploration.

The total CORE Geophysics and Drilling Collaborations Program funding approved by the NTGS totalled $100,000. Three of the proposed holes were completed as proposed, the fourth hole (WRDD0129) failed prior to reaching the targeted depth due to difficult ground conditions. As a result of the reduced amount of core drilling completed, the CORE contribution to the overall program was $78,838 (inclusive of GST).

The CORE collaborations drillholes completed have provided information that will assist in generating an improved geological framework for this part of Arnhemland. In addition this work has assisted in defining a new, previously unrecognised fertile corridor in the southwestern corner of EL5893 at the Emu Prospect.

The CORE funded diamond drillhole completed at the Emu prospect (WRDD0127) intersected three zones of weak uranium mineralisation in fractured, veined and altered Nimbuwah complex. The mineralisation occurs as 0.5 to 3 cm wide laminated quartz-chlorite-carbonate-pitchblende veins surrounded by Mg-rich chlorite and phengite-illite alteration haloes. The alteration is coincident with Na and Ca depletion of the granite and Mg and K enrichment. Elevated V, Mo and Pb assays were observed in association with the mineralised intervals. This mineralisation occurs along an interpreted NNW trending lineament that extends to the south.

The drillhole completed at Condor North (WRDD0129) intersected the Cretaceous/Proterozoic unconformity at a depth of 313.5 metres. The rocktypes intersected were consistent with the Cahill Formation.

The drillhole completed at Condor South (WRDD0131) intersected a ~ 50 metre thick sequence of metasedimentary rocks similar in composition to the lower part of the Ranger Mine sequence. The sedimentary sequence comprised a 5 metre zone of interbedded psammitic and semipelitic units overlain by sillimanite-garnet bearing pelite in turn overlain by an 18 m thick, auto-breciated marble. The metasedimentary sequence unconformably overlies interpreted Archean gneiss. The marble unit is bounded by shear zones which are intensely Mg-rich chlorite altered. Anomalous uranium results were returned (whole rock and WAL) from intervals flanking the marble unit. This discovery demonstrates that there is further potential for Ranger/Jabiluka style mineralisation along the northern strike extension of the Nanambu/Cahill unconformity.
The drillhole completed at Kiwi (WRDD0132) confirmed the presence of Proterozoic metasedimentary rocks in the northeastern part of the Wellington Range tenement. The units intersected include semipelite, calc-silicate and amphibolite. A 20 m interval of anomalously low $^{207}\text{Pb}/^{206}\text{Pb}$ (WAL) ratios, associated with Na depletion and relative K$_2$O enrichment was intersected within a semipelite and calc-silicate assemblage.
## Table of Contents

- Figures .................................................................................................................. 6
- Tables ...................................................................................................................... 6
- Appendices ............................................................................................................. 6
  1. Introduction ............................................................................................................ 7
  2. Regional Geology .................................................................................................... 8
  3. Previous Exploration ............................................................................................. 10
    a. Condor Area ......................................................................................................... 10
    b. Kiwi Area .............................................................................................................. 10
    c. Emu Area .............................................................................................................. 11
  4. Exploration Concept ............................................................................................... 12
    a. Condor Prospect Target ....................................................................................... 13
    b. Kiwi Prospect ....................................................................................................... 13
    c. Emu Prospect ....................................................................................................... 13
  5. Work Completed ...................................................................................................... 14
    a. Drilling Completed ............................................................................................... 14
    b. Downhole Geophysics ........................................................................................ 14
    c. Geochemical Sampling and Analysis ................................................................. 14
    d. ASD Analysis ....................................................................................................... 16
  6. Drilling Results and Interpretation ........................................................................... 17
    b. Condor South (WRDD0131) ................................................................................ 17
    c. Kiwi Prospect (WRDD0132) ................................................................................ 19
    d. Emu Prospect (WRDD0127) ................................................................................ 20
  7. Geochemistry Results and Interpretation .................................................................. 22
    a. Condor North (WRDD0129) ................................................................................ 22
    b. Condor South (WRDD0131) ................................................................................ 22
    c. Kiwi (WRDD0132) ............................................................................................... 23
    d. Emu (WRDD0127) ............................................................................................... 23
  8. Reflectance Spectroscopy Results and Interpretation ............................................... 24
    a. Condor North (WRDD0129) ................................................................................ 24
    b. Condor South (WRDD0131) ................................................................................ 24
    c. Kiwi (WRDD0132) ............................................................................................... 24
    d. Emu (WRDD0127) ............................................................................................... 24
  9. Conclusions ............................................................................................................ 25
Figures

Figure 1: Project location map showing location of the Wellington Range tenement (EL5893) with road access and camp location. ................................................................. 7

Figure 2: Cameco geological interpretation for the Wellington Range tenement showing existing diamond drillhole locations and prospect areas where CORE co-funded drilling was completed. ................................................................. 9

Figure 3: 2012 Cameco RTP Aeromagnetic Image across EL5893 showing existing diamond drillhole locations and proposed areas for CORE co-funded drilling. ..................... 11

Figure 4: 2012 Cameco Radiometric U2/Th Image across EL5893 showing existing diamond drillhole locations and proposed areas for CORE co-funded drilling. ..................... 12

Figure 5: Interpreted geological section for WRDD0129 (Condor North Prospect). .......... 18

Figure 6: Interpreted geological section for WRDD0131 (Condor South Prospect). ........ 19

Figure 7: Interpreted geological section for WRDD0132 (Kiwi Prospect). .................... 20

Figure 8: Interpreted geological section for WRDD0127 (Emu Prospect). ..................... 22

Figure 9: Detailed spectral investigation of mineralisation in drillhole WRDD0127 showing the mineral compositions in the vein alteration halo as calculated by TSG. ............. 25

Tables

Table 1: Details for CORE co-funded diamond drillholes. Note collar location information is recorded in GDA94 – Zone 53. ................................................................. 15

Appendices

Appendix 1: NTDME Geological Sample Submission Forms ........................................ 26

Appendix 2: Drillhole Information and Logging codes .................................................. 27

Appendix 3: Assay Methodology and Core Logging Procedures ................................. 28

Appendix 4: Reflectance Spectroscopy Methodology and Data .................................... 29
1. Introduction

The Wellington Range project (EL5893) is located in western Arnhem Land, and centred 100 km north-northeast of Jabiru (Figure 1). The unsealed road to Gurig National Park on the Cobourg Peninsula provides good vehicular access to the eastern margins of the tenement. Several east-west trending roads and tracks provide additional access.

![Figure 1: Project location map showing location of the Wellington Range tenement (EL5893) with road access and camp location.](image)

The tenement contains several areas of large remnant dissected sandstone plateau, which form the western extension of the Wellington Range. The remainder of the property consists predominantly of gently undulating country covered by savannah woodland. The principal drainage systems in the region are Angularli Creek draining to the east and Murenella Creek draining to the west.

There is a semi-permanent camp (King River Camp; Figure 1) established on EL25064 which was used to support the drilling program.

A meeting was held with the NLC and local traditional land owners on the 23rd of April to seek approval for the proposed CORE program and the wider JV exploration program. Following initial program approval by the traditional land owners, a heritage survey was conducted in July. The proposed CORE drillholes were included on the Mine Management Plan (MMP) proposal that was submitted to the NTDME in late April.
2. **Regional Geology**

The Wellington Range tenement is located near the eastern margin of the Neoarchean and Paleoproterozoic Pine Creek Orogen (PCO), in an area that has been subdivided into the Nimbuwah Domain of the Alligator Rivers region. There is limited outcrop within the project area due to the presence of thick sequences (up to 300 m) of unconformably overlying Cretaceous aged marine sediments of the Bathurst Island Formation.

Lithostratigraphic units of the Neoarchean Nanambu Complex (ca. 2500 Ma) are interpreted to form the basement within the northern part of EL5893. The mapped distribution of the Neoarchean rocks is based upon regional geophysical compilations which have been partially verified by limited Cameco drilling (Figure 2).

Metasedimentary rocks of the Paleoproterozoic Cahill Formation and Nourlangie Schist are interpreted to unconformably overlie the Neoarchean stratigraphy and in the south are intruded by the Nimbuwah Complex (ca. 1847 Ma) which comprises granite, granodiorite, granitic gneisses and migmatite. The metasedimentary rocks of the Cahill Formation and the Nourlangie Schist are interpreted to sub-crop throughout the northern half of EL8593 below the Bathurst Island Formation, within the central part of the tenement and in the far south of the tenement (Emu Prospect).

Diamond drilling completed by Cameco along the interpreted unconformable contact between the Neoarchean and Paleoproterozoic sequences in the northwest part of EL5893 intersected rocktypes which are characteristic of the Lower Cahill Formation. These rocktypes include calcsilicate, marble, graphitic semipelite and magnetic pelite. The Lower Cahill is the interpreted host sequence for the Jabiluka and Ranger Deposits.

Outside of the areas which have seen some limited drill testing, the distribution of Paleoproterozoic stratigraphic units within EL5893 is poorly understood. On the regional geology map the area between Condor and Kiwi is thought to comprise Nourlangie Schist but there is no drilling or direct mapping evidence to support this interpretation. Regional deformation styles and geological compilations completed elsewhere in Arnhem Land where outcrop and drilling information is more abundant suggest that the current geological interpretation is over-simplified.

Unconformably overlying the Neoarchean and Paleoproterozoic stratigraphy is the basal member of the Kombolgie Subgroup, the Mamadawerre Sandstone. The Mamadawerre Sandstone outcrops as the Wellington Range escarpment, which dominates the central and southeastern parts of the project area (Figure 2). Several smaller isolated outliers of sandstone are also mapped in the southeast.

The Mamadawerre Sandstone and the Paleoproterozoic rocks are intruded by several different suites of mafic intrusive rocks. The Oenpelli Dolerite is the most common of these mafic intrusive suites forming voluminous sills, lopoliths and dykes within pre-existing structural corridors and along stratigraphic discontinuities.
Uranium mineralisation was discovered within the Wellington Range tenement in 2009 at the Angularli prospect hosted within a multiply reactivated, highly silicified, NNW trending fault. Full details on the distribution and nature of this mineralisation are included in the 2010, 2011 and 2012 annual reports.

Relevant map sheets are:

- 1:250K Cobourg Peninsula SC5313
- 1:100K Wellington Range 5574
- 1:50K Laterite Point
3. Previous Exploration

Prior to the granting of EL5893 in 2004, previous exploration within the tenement was limited to regional geophysical surveys, government mapping and interpretations. Upon grant of the Wellington Range tenement Cameco completed various airborne radiometric, magnetic, gravity, TEMPEST EM and hyperspectral surveys. A brief summary of the local geology and exploration completed in the areas in which the CORE co-funded drilling was completed is given below. Additional information on exploration activities completed by Cameco in the wider tenement area can be sourced from annual exploration reports submitted to the NTDME.

a. Condor Area

The Condor area is covered by 200 to 300 metres of variably consolidated Cretaceous sediments. The Cretaceous aged sediments unconformably overlie Paleoproterozoic basement.

In 2006 and 2007 a twenty two (22) diamond drillhole program was completed in the Condor area targeting a curvi-linear, north-trending magnetic feature (Figure 3) and the interpreted Proterozoic/Neoarchean unconformable contact. The magnetic feature was interpreted to be the “magnetic marker horizon” which has been observed in the lower Cahill Formation in the Ranger area. Lithological units consistent with the lower Cahill Formation were intersected in several of the drillholes completed to the north and south of the CORE drilling areas.

b. Kiwi Area

The Kiwi area is covered by approximately 150 metres of unconsolidated Cretaceous sediment. Based upon historic drillholes the Cretaceous marine sand, clay and mud is interpreted to unconformably overlie Paleoproterozoic basement. An exposure of Mamadawerre Sandstone outcropping on the coast five kilometres to the east of the proposed drillhole location suggests proximity to the Mesoproterozoic/Paleoproterozoic unconformity.

In 2008 Cameco completed two diamond holes in the eastern Kiwi area (Figure 3) where a basement topography high below the Cretaceous cover had been interpreted. The northernmost of these two holes intersected semi-pelitic gneiss and quartzite overlying monotonous quartzo-feldspathic gneiss. The crystalline quartzo-feldspathic rock in the base of the hole is interpreted to be Neoarchean gneiss. It is not known whether the quartzite is of Neoarchean or Paleoproterozoic age. The southern hole failed within the Cretaceous cover.
c. Emu Area

The Emu area is thought to be covered by < 20 m of Cretaceous sediment and recent alluvial cover. Drilling completed on the tenement directly to the south indicates that the upper part of the basement may have been exposed to surficial weathering during the Cretaceous period and in modern times. The resulting regolith profile comprises 10 to 20 metres of variably leached and weathered saprolite overlying un-weathered basement.

In 2012 Cameco acquired detailed aeromagnetic and radiometric data over the entire tenement. A high amplitude radiometric anomaly, not present within the previous low resolution radiometric dataset was noted in the southern part of the Wellington Range tenement in an area now referred to as the Emu Prospect (Figure 4). In 2013 a termitaria geochemical sampling survey was completed across the radiometric response. The termitaria samples returned anomalous uranium results broadly co-incident with the airborne radiometric anomaly.
The Emu area had been previously explored as part of a broader 500 x 1000 m spaced aircore/RAB drilling campaign in 2007. A review of the drilling information demonstrated that not all of the holes completed in the Emu area were drilled deep enough to sample basement (3 – 4 m total depth) and the wide spaced drilling was too broad to directly test the radiometric anomaly.

Figure 4: 2012 Cameco Radiometric U2/Th Image across EL5893 showing existing diamond drillhole locations and proposed areas for CORE co-funded drilling.

4. Exploration Concept

The exploration target for the Wellington Range tenement is a high tonnage, unconformity style uranium deposit similar to the world class Ranger and Jabiluka deposits or a large, higher grade, fault hosted deposit similar in geometry to the Nabarlek deposit.

These deposits are often hosted by strongly sheared, metasedimentary rocks including graphitic pelite, calcsilicate, marble and magnetite bearing pelite which in the ARUF are common lithotypes within the Paleoproterozoic Cahill Formation. In the ARUF
unconformity related uranium deposits have a strong spatial correlation with both Neoarchean/Paleoproterozoic and Mesoproterozoic/Paleoproterozoic unconformities.

a. **Condor Prospect Target**

The limited drilling completed by Cameco along the interpreted Neoarchean/Paleoproterozoic contact in the Condor area intersected lower Cahill-like stratigraphy (calcisilicate, marble, graphitic and magnetic pelite) overlying Neoarchean gneiss. In the hanging wall to the contact the drilling intersected a magnetite bearing pelitic unit within the Cahill Formation that, based upon the aeromagnetic data, appears to strike broadly parallel with the Neoarchean/Paleoproterozoic contact.

The historic drilling completed by Cameco was designed to target the prospective stratigraphy below the magnetic lineament. There are two sections of the magnetic lineament which have not been drill tested. The northernmost of these segments is approximately 7 km long and the southernmost 5 km long. The drillholes completed as part of the CORE co-funded drilling campaign were designed to test for the presence of the lower Cahill stratigraphy below the magnetic unit along these two segments and to look for evidence of fluid rock interaction (alteration) and/or structural complexity which may prove prospective.

b. **Kiwi Prospect**

The one effective diamond hole previously completed in the Kiwi area demonstrated that crystalline basement (Neoarchean gneiss) sub-crops under the Cretaceous cover and that these basement rocks are interpreted to be overlain by Paleoproterozoic sediments. The orientation of the contact is unknown.

The Paleoproterozoic stratigraphy in this part of the project is poorly constrained. A review of the available aeromagnetic data has resulted in the identification of a linear magnetic response which has a similar width and geometry to the magnetic marker horizon observed in the Condor area (Figure 3). It is speculated that this linear magnetic feature may indicate the presence of lower Cahill stratigraphy in the Kiwi area.

The CORE drilling completed at Kiwi was designed to test the linear magnetic response and a NW trending fault to determine if lithological units consistent with the lower Cahill formation are present.

c. **Emu Prospect**

The radiometric response over the Emu prospect is the highest tenor anomaly observed in the whole of the Wellington Range tenement (Figure 4). The termitaria sampling returned elevated uranium responses further confirming the radiometric response is uranium related.

The basement rocks underlying the Emu surficial anomaly had been previously interpreted to be Nimbuwah Complex gneiss. A regional lithostructural interpretation completed in 2014 by Cameco suggests that Paleoproterozoic stratigraphy, intersected in drilling on the exploration project to the south, may extend up into the Emu area. An outlier of the Mamadawerre Sandstone outcrops on the western side of the
anomaly suggesting proximity to the Paleoproterozoic/Mesoproterozoic unconformity.

The proposed drilling at Emu was designed to test for the presence of a basement source for the surficial uranium anomaly.

5. Work Completed

a. Drilling Completed

The CORE co-funded drilling was completed by DDH1 Drilling Pty Ltd between the 22nd August and the 3rd October 2015. All holes were pre-collared with a PCD bit using drill mud additives. Core orientation was completed at 3 m intervals using a Reflex ACT III rapid descent core orientation tool. Downhole drillhole orientation information was collected using a Reflex R3048 camera. The drillhole collar locations were surveyed using a Hemisphere S320 GPS with Omnistar differential correction.

Drillhole collar location information (including drillhole collar elevations) and drilling methodologies are summarised in Table 1 and the NTDME Geological Sample Submission Forms for the completed holes are included as Appendix 1. Cameco’s core logging procedures are included as Appendix 3.

The core was transported to Cameco King River Camp for core processing and logging. The logging codes used to capture the geological information are provided in Appendix 2.

b. Downhole Geophysics

Downhole gamma logging of WRDD0127, WRDD0131 and WRDD0132 was conducted within the drill rods following the completion of each drillhole using Cameco’s Mount Sopris logging system. Downhole gamma measurements were collected at 5 cm intervals at an averaged logging speed of 5 m/min.

All downhole geophysical data is included in Appendix 2 of this report.

c. Geochemical Sampling and Analysis

Geochemical sampling and analysis was completed using Cameco standard protocol.

Non-mineralised or altered basement were sampled at nominal 5 to 10 m intervals ensuring that the sampling did not cross lithological unit boundaries and that the samples were representative of the interval. Mineralised core was sampled at 0.5 m intervals with sampling extending 1.5 m outside of the mineralized zone.

Matrix matched standards were inserted at a rate of 1 in 20 samples. Laboratory repeat analyses were completed at a rate of 1 in 10 samples.

Samples were submitted to Northern Territory Environmental Laboratories (NTEL) in Darwin for geochemical analysis. All samples were submitted for total 4Acid Digest followed by ICP-OES and ICP-MS analysis. The analytical suite used includes Ag, Al, As, Au, Ba, Be, Bi, Ca, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Hf, Ho, K, La, Li, Lu, Mg, Mn, Mo, Na, Nd, Ni, P, Pb, Pr, Re, S, Sb, Sc, Se, Sm, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn and Zr.
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<td>NQ Diamond</td>
<td>187.6</td>
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Table 1: Details for CORE co-funded diamond drillholes. Note collar location information is recorded in GDA94 – Zone 53.

A selection of samples was also submitted for analysis using the Weak Acid Leach technique (WAL). This involves sample preparation using a weak acid digest followed by ICP-MS analysis. The following elemental analyses were completed on the WAL samples: As, Bi, Co, Cu, Ge, Mo, Pb total, $^{204}$Pb, $^{206}$Pb, $^{207}$Pb, $^{208}$Pb, Sb, Se, Te, U, V and Zn.

As the JV has provided half core splits of all diamond core completed under the collaborative funding to the NTGS, all JV geochemical analyses were conducted on half core samples.

All geochemical analyses are included in this report in Appendix 2 and the laboratory methodology is summarised in Appendix 3.
**d. ASD Analysis**

Reflectance spectroscopy measurements were collected using an ASD Hi-Res Terraspec 4 spectrometer which captures data in the visible to near infrared (VNIR) and short-wave infrared (SWIR) spectral regions (350 – 2500 nm). The raw spectral data was then imported into ‘The Spectral Geologist’ (TSG) for analysis. Upon creation of this file the Spectral Assistant (a program within TSG) automatically attempts to identify minerals. It matches the spectra to a built in library and will decide (based on user derived parameters) if each spectrum is that of a single mineral or a linear mixture of two minerals. If the spectrum is considered a mix of two minerals the software will advise on the relative weighting of each mineral categorising it into Mineral 1 or Mineral 2.

As spectra from each drill hole were imported into TSG the corresponding hole ID and depth were also imported. All drillhole TSG files were merged into a single TSG dataset and a number of spectral parameters were then created. Once a single dataset of all measurements had been created lithology, alteration, eU₃O₈ and mag susceptibility values were imported for all holes. All spectral data, in digital format, are provided in Appendix 4 along with the applied ASD methodology.

**e. Magnetic Susceptibility**

Magnetic susceptibility measurements were collected on the drill core using a Terraplus LT-10 Kappameter handheld tool. Each measurement was collected at the 1 meter depth markings for the entire length of each drillhole. A > 20 cm length of core was lifted from the core table, away from metal objects and a single reading was collected from the side of the core. The tool was used in flat mode not using a pin. Core diameter corrections were automatically completed by the tool (see Appendix 3 – Core Logging Procedure).

The raw data collected is provided in Appendix 2. The units for the magnetic susceptibility readings included in Appendix 2 were recorded in SI x 10⁻³.
6. Drilling Results and Interpretation

a. Condor North (WRDD0129)

Core drilling of WRDD0129 commenced at the Condor North Prospect on the 4th of September, concluding on the 13th of September.

The first 219.8 m of the hole was drilled using mud rotary drilling, intersecting variably consolidated Cretaceous-aged, marine sediment. At 219.8 m a hard band of cemented carbonate nodules was intersected ceasing the usefulness of the mud rotary drill. HQ diamond coring was commenced and at 230.5 m coring was reduced to NQ2. Mud rotary drilling recommenced at 247.0 m due to an unconsolidated sandy layer. A narrow band of quartz cobble conglomerate between 263.5 and 264.3 m could not be penetrated using mud rotary, so the narrow interval was drilled using NQ2 diamond drilling. Mud rotary drilling was again recommenced at 264.3 m until Proterozoic basement was intersected at a depth of 313.5 m. At this point HQ diamond drilling recommenced. At a depth of 318.3 m the rod string separated and the drillhole was abandoned.

The cored intervals through the Cretaceous marine sediments include moderately consolidated weakly pyritic, organic and carbonate-rich silt and sand, glauconitic sand, quartz-cobble conglomerate and organic-rich nodular carbonate beds.

The five metres of Proterozoic basement cored below the Cretaceous/Proterozoic unconformity were amphibolite grade metamorphic rocks with a semi-pelitic composition (Figure 5). The semi-pelite has some weakly garnetiferous bands with some associated chlorite alteration. This chlorite is interpreted to be retrograde, rather than hydrothermal, in origin. The basement rocks are interpreted to be part of the Cahill Formation.

b. Condor South (WRDD0131)

The second CORE co-funded drillhole completed in the Condor area was WRDD0131. Drilling commenced on the 19th of September and was completed on the 29th of September. The completed drillhole depth was 444.7 m.

The first 257.3 m of the hole was drilled using the mud rotary drilling technique. HQ diamond drilling commenced at 257.3 m. At 265.78 m the drilling bit was reduced to a NQ2 diameter till the end of hole.

The drillhole intersected Cretaceous sediment to an interpreted depth of 230 m. The unconformable contact between the Cretaceous sediment and the basement was percussion drilled but based upon the drilling chips and downhole radiometric logs, the basement rock at the unconformity was interpreted as dolerite (Figure 6).

Core drilling commenced within dolerite. An intrusive contact between dolerite and highly sheared and altered metasedimentary rock was intersected at a depth of 280.3 m. The sheared and altered metasedimentary unit is approximately 3 m wide and directly overlies ~ 18 m of auto-brecciated, stylolitised, chlorite altered, marble (Figure 6). The base of the marble unit is bounded by a second, 5 m wide, intensely chloritised shear zone within a metasedimentary rock.
The footwall lithological units to the marble are a sequence of variably sheared and deformed, garnet and sillimanite bearing pelitic rocks. The lower most part of this sequence transitions into rocks of a semi-pelitic composition and then into several 20 to 100 cm wide quartzite bands. One of these quartzite units sits unconformably on-top of what is interpreted to be Archean basement gneiss at a depth of 362.5 m. The unconformable contact is annealed and metamorphosed. The semi-pelitic gneiss was drilled to the end of hole.

The mafic intrusive unit observed at the top of the hole is interpreted to be a phase of the Oenpelli Dolerite. The dolerite is interpreted to have intruded along a stratigraphy parallel shear developed along the upper margin of the carbonate horizon. The marble and associated pelitic and quartzite lithologies are interpreted to be part of the Lower Cahill Stratigraphy similar to the Ranger Mine sequence.
Figure 6: Interpreted geological section for WRDD0131 (Condor South Prospect).

c. Kiwi Prospect (WRDD0132)

Drilling commenced at the Kiwi Prospect on the 27th of September and concluded on the 5th of October. The upper 176.1 m of the drillhole was completed using the mud rotary drilling technique. HQ diameter diamond coring commenced at 176.1 m and reduced to NQ2 diameter coring at 187.60 m. The hole was completed at a depth of 375.7 m.

The upper ~ 176 m of the drillhole passed through unconsolidated Cretaceous marine sediment (Figure 7). The diamond core commenced below the Cretaceous/Proterozoic unconformity, intersected a sequence of semi-pelitic schists interbedded with 10 – 15
m wide hornblende or tremolite-bearing amphibolite units. Using fold vergence and stratigraphic repetition information the drillhole is interpreted to cross-cut several recumbent isoclinal folds.

The stratigraphic package intersected lacks the marble and pelitic horizons typically observed in the lower parts of the Cahill Formation as observed on the western side of the ARUF. The lithological units intersected may be a distal deeper water facies equivalent of the lower Cahill or part of the Upper Cahill stratigraphy.

Figure 7: Interpreted geological section for WRDD0132 (Kiwi Prospect).

d. Emu Prospect (WRDD0127)

The CORE drilling program commenced at the Emu Prospect on the 22\textsuperscript{nd} of August with the hole completed on the 26\textsuperscript{th} of August. The first 35.6 m of the hole was completed using the mud rotary drilling technique. At 35.6 m HQ diameter diamond drilling commenced and at 52.1 m was reduced to NQ2 to a total depth of 163.1 m.
The drillhole was collared in Quaternary alluvial material which was in the order of 2 – 3 m in depth. The upper ~ 20 m of the basement was interpreted to be highly weathered, saprolitic gneissic granitoids. Relatively fresh, un-weathered, chlorite altered gneissic granodiorite was intersected at 35.6 m at the top of the cored interval. The granodiorite has a very coarse grained, porphyritic texture with feldspar phenocrysts of up to 5 mm in diameter. The granodiorite is weakly foliated and cross-cut by numerous, 1 – 3 mm wide carbonate-quartz-chlorite veins.

A set of dolerite dykes/sills were intersected between ~ 45 and 61.5 m. The chilled intrusive margins between the dolerite and the host granodiorite are intact. The dolerite units have an overall aphanitic groundmass, with porphyroblasts of feldspar observed only within the central portions of some of the thicker intrusive units.

Variably veined and altered, weakly foliated and fractured, granodiorite, was intersected between 61.5 m and 129.8 m. This granodiorite hosts three zones of weak uranium mineralisation (Figure 8) that occur in the form of narrow, 1 – 30 mm wide, laminated, druzy quartz-carbonate-chlorite-pitchblende (?) veins. These veinlets are enveloped in 5 to 20 cm wide, symmetrical, chlorite-sericite alteration halos. This alteration takes the form of strong to intense host rock mineral replacement. The granodiorite outside of the proximal alteration haloes is moderately chlorite-sericite+/hematite altered.

Below the mineralised granodiorite interval a thick aphanitic dolerite body was intersected, continuing until the end of the hole. The upper portion of the dolerite was cross-cut by narrow quartz-carbonate-chlorite veins with associated chlorite-sericite alteration haloes but these veins were not mineralised.

The granodiorite is interpreted to be part of the Nimbuwah Complex and the mafic intrusive rocks have been interpreted as a member of the Oenpelli Dolerite.
7. Geochemistry Results and Interpretation

A total of 173 diamond core samples were collected from the CORE collaboration holes for geochemical analysis. All 173 samples were submitted for whole rock analysis using the 4 acid digest technique. Of these 173 samples, 103 were also analysed using the WAL technique.

All of the geochemical results are included in Appendix 2.

a. Condor North (WRDD0129)

Four samples from WRDD0129 were submitted for whole rock and WAL analysis. Three samples were collected from the Proterozoic basement and one sample from the Cretaceous cover.

There were no significant whole rock analysis results to report from the Proterozoic basement samples. The peak uranium result of 6.09 ppm U is just above regional background. There was no significant pathfinder anomalism.

There were no significant results to report from the WAL analysis.

b. Condor South (WRDD0131)

A total of 42 samples were submitted for whole rock and WAL analysis from WRDD0131. Of this suite, 6 samples were collected from the dolerite, 19 samples
were collected from the Proterozoic basement and 17 from the granitic gneissic basement interpreted to be of Archean age.

The most significant result from the geochemical sampling completed on WRDD0131 was 55.5 ppm U at a depth of 296.38 – 296.68 m. The elevated uranium result occurs in an interval of intensely chlorite altered, sheared metasediment at the lower contact of the carbonate horizon. This interval also has elevated CaO (10.9 %) and MgO (11.2%).

There are several lower order anomalies of 20.5 ppm U and 24.4 ppm U from samples at 324.76 m and 376.3 m, respectively. Elevated sulphur values of > 1000 ppm were returned from samples above and below the anomalous result at 324.76 m.

The WAL geochemical results returned anomalous Pb isotope values for nearly all of the samples collected from the hole. Anomalously low $^{207}\text{Pb}/^{206}\text{Pb}$ ratios of less than 0.3 were returned from most of the samples collected from the Proterozoic metasediments below 296.38 m. All samples collected within the Archean granite gneiss basement returned anomalously low $^{207}\text{Pb}/^{206}\text{Pb}$ ratios.

It was noted that all of the samples collected from the dolerite in the hanging wall to the marble had elevated U WAL results with all samples bar one returning > 1000 ppb with a peak result of 2920 ppb U.

c. **Kiwi (WRDD0132)**

A total of 40 samples were submitted for whole rock and WAL analysis from WRDD0132. All of the samples were collected from Proterozoic basement interpreted to be part of the upper Cahill Formation.

There were no significant uranium results to report from the samples submitted for whole rock analysis.

The results from the WAL analysis highlight an interval with anomalously low $^{207}\text{Pb}/^{206}\text{Pb}$ ratios (< 0.3) collected from five samples between 235 and 255.3 m. The interval sampled is composed of semi-pelite containing a ~ 3 m wide calc-silicate unit. The whole interval appears to have some relative Na depletion and weakly elevated K$_2$O. A peak whole rock result of 4.48 ppm U was returned from this interval.

d. **Emu (WRDD0127)**

A total of 87 samples were submitted for analysis from WRDD0127. All 87 samples were submitted for whole rock while only 17 non-mineralised samples were submitted for WAL analysis. Eleven samples were collected from the dolerite unit with the remaining samples collected from the interpreted Nimbuwah granitoid.

Significant uranium mineralisation was intersected in three intervals in WRDD0127 (Emu Prospect).

- 0.5 m @ 0.05 % U from 82.2 m
- 0.5 m @ 0.09 % U from 99 m
0.5 m @ 0.12 % U from 114.4 m

Within each of these mineralised intervals the Nimbuwah granitoid samples show overall Na and Ca depletion and relative Mg and K_2O enrichment. The highest grade samples also contain elevated V (> 100 ppm), Mo (up to 63.7 ppm) and Pb (up to 111 ppm).

Nearly all the Nimbuwah granitoid samples submitted for WAL analysis returned ^{207}\text{Pb}/^{206}\text{Pb} values of less than 0.3. All of the dolerite WAL samples returned elevated uranium (>1000 ppb U) with a maximum result of 10700 ppb U from 150 – 150.3 m. The WAL U values from the Nimbuwah samples were nearly all < 1000 ppb U.

8. Reflectance Spectroscopy Results and interpretation

The three most abundant spectrally recognisable minerals in the 2015 diamond drilling spectral dataset were intermediate (Fe-Mg) chlorite → Muscovite → Paragonitic Illite.

a. Condor North (WRDD0129)

No reflectance spectroscopy measurements were collected from this hole.

b. Condor South (WRDD0131)

The most pertinent finding from spectral analysis of WRDD0131 is the widespread (257 – 334 m) occurrence of Mg-rich chlorite adjacent to the carbonate unit. The Mg-chlorite occurs throughout the carbonate within stylolite dissolution fronts, completely replacing metasedimentary units below the carbonate contact. In the footwall shear zone the chlorite transitions from Mg-rich chlorite to chlorite with a more typical mixed Fe-Mg composition. At around 334 m the chlorite becomes Fe-rich.

c. Kiwi (WRDD0132)

The reflectance spectroscopy measurements returned mineral compositions generally consistent with unaltered Proterozoic metasedimentary rocks.

In light of the geochemical results returned from the interval between 235 and 255.3 metres (Section 7c of this report) it is recommended that additional sampling be conducted throughout this interval to determine if there is a mineralogical change in the mineral assemblage that can explain the sodium depletion.

d. Emu (WRDD0127)

The mineralised zone at Emu is dominated by Mg-rich chlorite and sericite of phengitic to illitic composition in the alteration halo.

A detailed ASD study was completed across a metre of core to better understand the distribution of the phyllosilicate alteration species occurring in association with mineralisation (Figure 9). The ASD measurements were collected at 1 cm intervals for approximately 0.5 m above and below a 1 cm wide mineralised vein. The 5 – 10 cm wide, symmetrical, black alteration selvedges surrounding mineralised veins comprise magnesium-rich chlorite and sericite of phengitic to illitic composition, with the latter forming a distal alteration zone up to 30 cm from the vein. Magnesium-rich chlorite and siderite occur within the mineralised laminated veins.
9. Conclusions

The CORE co-funded drilling performed at Wellington Range in 2015 produced information that augments the understanding of the region.

The drillhole completed at Condor North (WRDD0129) unfortunately failed before it reached the planned depth but the hole did confirm the presence of Proterozoic stratigraphy in the area.

The drillhole completed at Condor South (WRDD0131) successfully intersected a sequence of metasedimentary rocks similar in composition to the lower part of the Ranger Mine sequence including an 18 m thick, auto-brecciated marble unit. This ~ 50 m wide sequence of metasedimentary rocks unconformably overlies what is interpreted to be Archean gneiss. Anomalous uranium results were returned (whole rock and WAL) from intervals flanking the marble unit. The marble unit and the bounding shear zones are intensely Mg-rich chlorite altered.

The drillhole completed at Kiwi (WRDD0132) confirmed the presence of Proterozoic metasedimentary rocks in the northeastern part of the Wellington Range tenement. The units intersected include semipelite, calc-silicate and amphibolite. A 20 m interval of anomalously low $^{207}$Pb/$^{206}$Pb (WAL) ratios, associated with Na depletion and relative K$_2$O enrichment was intersected within a semipelite and calc-silicate assemblage.

The drillhole completed at Emu (WRDD0127) intersected three zones of weak uranium mineralisation hosted by Nimbuwah Complex granitoid. The mineralisation occurred as 0.5 to 3 cm wide laminated quartz-chlorite-carbonate-pitchblende veins surrounded by Mg-rich chlorite and phengite-illite alteration haloes. The alteration is coincident with Na and Ca depletion of the granite and Mg and K enrichment. Elevated V, Mo and Pb assays were observed in association with the mineralised intervals.
Appendix 1: NTDME Geological Sample Submission Forms
Appendix 2: Drillhole Information and Logging codes
Appendix 3: Assay Methodology and Core Logging Procedures
Appendix 4: Reflectance Spectroscopy Methodology and Data