**Cameco Australia Pty Ltd**

**EL 24291, EL 26796**
**BEATRICE PROJECT**
**NORTHERN TERRITORY**
**ANNUAL REPORT**

**CONFIDENTIAL**

| | |
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| **Datum/Zone:** | GDA94 (Zone 53) |
| **Map Sheets:** | 1: 250, 000: Alligator River (SD-5301)<br>1:100, 000: Howship (SD-5572) |
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**SUMMARY**

The Beatrice project comprises two exploration licences (EL 24291 and EL 26796), located in western Arnhem Land, approximately 250 km east of Darwin. The project ELs were granted to Cameco Australia Pty Ltd (Cameco) on 4th July 2008.

The exploration program for reporting period consisted of ground resistivity, airborne electromagnetic (TEMPEST) survey and helicopter-supported ground activities, comprising diamond drilling, geological mapping, reconnaissance, and outcrop sampling. The focus of the exploration program was the Violet Prospect and the Beatrice Prospect, the latter was discovered in 1970 by Queensland Mines Limited using airborne radiometrics.

Diamond drilling at the Violet prospect comprised 1836.7 m from six holes (BTD0278 to BTD0279). The best geochemical assay results from the diamond drilling were returned from BTD0278 with 20.6 m at an average grade of 850.6ppm $U_3O_8$ from 30.1 to 50.7 m downhole. The highest assay results received were from 50.5 to 50.7 m (sample C014437) with assays7559 ppm of $U_3O_8$.

Outcrop sampling, reconnaissance and mapping was conducted across EL 24291 and EL26796 with 234 sites recorded. 217 sites were recorded on EL24291 with 164 mapping stations and 53 assay samples collected. 17 sites were recorded on EL26796 with 3 mapping station and 14 assay samples collected. The best assay result from outcrop sampling at the Violet Prospect was 992 ppm $U_3O_8$ from dolerite. The Violet prospect was discovered in 2008 by airborne radiometrics and ground investigation.

Further recommended work on the project includes a compilation of existing data; diamond drilling to the east of the Violet prospect; and follow-up sampling of encouraging results from previous radiometric anomaly sampling.

The total reportable expenditures for reporting period are $2,002,947.94 for EL 24291 and $56,067.73 for EL 26796.

The estimated expenditure to complete the work program as planned for the 2011 field season is expected to be approximately of $10,000, and can be broken into $7,500 on EL 24291 and $2,500 on EL 26796.

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## INTRODUCTION

The Beatrice project comprises two non-contiguous exploration licences (EL's), located in western Arnhem Land, approximately 250 km east of Darwin. EL24291 and EL26796 were granted to Cameco Australia Pty. Ltd. (Cameco) on 4 July 2008 for an initial period of six years. The total area covered by the licences is 356.99 $km^2$.

Exploration activities carried out during the period from 4 July 2010 to the anniversary date were conducted under the terms of consent documentation agreed with the Northern Land Council (NLC) pursuant to the Aboriginal Land Rights Act of 1976 (Northern Territory).

The field program for the second year of exploration consisted of ground geophysical surveys; and helicopter-supported ground activities, comprising drilling, geological mapping, reconnaissance, and outcrop sampling.

### Location

EL's 24291 and 26796 are non-contiguous exploration licences located in western Arnhem Land in the Northern Territory of Australia (see Figure 1). The project area is centred about 260 km east of Darwin, 230 km north east of Katherine, and 45 km east of Jabiru.

Figure 1: Regional Location Map

The tenements are located on map sheets:

1:250, 000: Alligator River (SD-5301)
1:100, 000: Howship (SD-5572)
1:50,000: Mount Howship (5572-4).

There are no access tracks to the area and the tenements are only accessible by helicopter. Exploration in the 1970's was via a track that was constructed from the Nabarlek mine site through the East Alligator River valley to the Beatrice prospect. This track no longer exists.

### Tenure

EL's 24291 and 26796 were granted on 4 July 2008 for an initial period of six years. At the time of grant, the total area covered by the two licences was 356.99 $km^2$ (131 sub-blocks), comprising 337.21 $km^2$ (121 sub-blocks) on EL 24291 and 19.78 $km^2$ (10 sub-blocks) on EL 26796.

### Physiography

The topography of the southern portion of EL 24291 is dominated by deeply jointed Kombolgie Subgroup sandstone plateau, bisected on the eastern side by the south-east trending East Alligator River. The sandstone can form local escarpments up to 80m high. The northern portion of the tenement has high sandstone escarpments to the eastern and western sides, with smaller rounded hills in the central area.

Vegetation varies with geology and topography but generally consists of eucalyptus scrubland, isolated remnants of monsoonal forest confined to deep gorges, and grassland dominating the northern central hills.

EL 26796 is dominantly covered by Kombolgie Subgroup sandstone with deeply incised valleys. A creek bisects the north east portion of the tenement. A small area in the north-west corner is comprised of undifferentiated Cainozoic sediments.

**Exploration Target**

The focus of Cameco's exploration strategy in Arnhem Land is the discovery of unconformity-related uranium deposits. The archetype unconformity-style uranium deposits are found in the Athabasca Basin of northern Saskatchewan, Canada. A detailed summary of these deposits can be found in (Jefferson, Thomas et al. 2006). The prospective nature of the Alligator Rivers region is demonstrated by the presence of nearby economic deposits at Ranger, Jabiluka, Koongarra, and the now depleted Nabarlek Mine. The presence of gold, palladium and platinum in these deposits and the economic gold-platinum resource at Coronation Hill in the South Alligator Valley, indicates an additional potential for this deposit style. These major deposits appear to have a common position relative to the base of the Kombolgie Subgroup i.e. the Palaeoproterozoic unconformity, or to its erosional margin, and serve here as exploration models.

The Beatrice project is considered to be prospective for uranium mineralisation based upon the following:

1. Proximity to the unconformity between metasedimentary packages and overlying Kombolgie Sandstone; and,
2. Association of chloritic and hematitic breccias in the vicinity of fault structures.

Alternative mineralisation styles also occur in the area, such as the shear-zone hosted mineralisation at the Beatrice prospect.

## GEOLOGICAL SETTING

### Regional Geology

The regional geology of Arnhem Land has been systematically and intensely studied and described in detail since 1946, comprising work from the Bureau of Mineral Resources (BMR) (1972-1988), the Northern Territory Geological Survey (late 1990's to 2008), Geoscience Australia (2004) and many previous reports for Cameco Exploration Licences in the western Arnhem Land area. Studies included geological mapping and reconnaissance, as well as regional-scale and deposit-scale metallogenic research. Only a brief summary and overview of the geology will be provided here. This section is largely based on the work by (Needham, Crick et al. 1980; Needham, Smart et al. 1983; Needham and De Ross 1990). Information that is not based on these references is indicated below.

The Beatrice project area is located in the north-eastern margin of the Neoarchaean and Palaeoproterozoic Pine Creek Orogen, which has been subdivided into the Nimbuwah Domain of the Alligator Rivers region (Figure 2).

Figure 2: Simplified geology of the Pine Creek Orogen showing the location of selected mineral deposits

The Bureau of Mineral Resources (now Geoscience Australia) completed 1:250,000-scale geological maps of the Pine Creek Orogen between the 1940s and 1960s following the discovery of uranium at Rum Jungle near Batchelor. The Alligator Rivers region was systematically mapped by the BMR and the Northern Territory Geological Survey between 1972 and 1983. This later work produced 1:100,000-scale geological maps and reports for the region from Darwin to Katherine to the Alligator Rivers region. (Figure 3)

Figure 3: Regional Geology Map of the Beatrice Area

The oldest exposed rocks in the Alligator Rivers region are within the Neo-Archaean (ca. 2500 Ma) Nanambu Complex. The complex consists of paragneiss, orthogneiss, migmatite, and schist forming domical structures that are unconformably overlain by Palaeoproterozoic metasedimentary and metavolcanic rocks, which were formerly included in the Pine Creek Geosyncline. Recent collaborative research work by the NTGS and Geoscience Australia indicates that SHRIMP U-Pb age dating of an area of previously mapped Myra Falls Metamorphics outcropping within the Myra Inlier is Neo-Archaean in age (Hollis, Carson et al. 2009a). This quartzofeldspathic gneiss is now referred to as the 'Kukalak Gneiss' (Hollis, Carson et al. 2009b).

Palaeoproterozoic rocks in the Alligator Rivers region are amphibolite facies psammites assigned in the Mount Howship Gneiss and the Kudjumarndi Quartzite. These formations are included in the Kakadu Group and are probably correlatives of the Mount Basedow Gneiss and Munmarlary Quartzite, respectively (Ferenczi, Sweet et al. 2005). The group appears to onlap Neoarchaean basement highs, with gneissic variants thought to pass transitionally into paragneiss of the Nanambu Complex.

The Cahill Formation of the Namoona Group conformably overlies the Kudjumarndi Quartzite. The lower part of the Cahill Formation (informally referred to as the Lower Cahill Formation) hosts the Nabarlek, Ranger and Jabiluka uranium deposits. The Lower Cahill Formation consists of a structurally lower calcareous marble and calc-silicate gneiss, which is overlain by pyritic, garnetiferous and carbonaceous schist, quartz-feldspar-mica gneiss, and minor proportions of amphibolite.

The informally named Upper Cahill Formation is psammitic and consists of feldspar-quartz schist, quartzite, lesser proportions of mica-feldspar-quartz-magnetite schist, and minor proportions of metaconglomerate and amphibolite. The Upper Cahill Formation is magnetic and significantly so at the base of psammitic unit in what is informally known as 'hanging wall sequence'. The magnetic characteristic of this unit is due to the presence of mafic sills or magnetite and it is a useful characteristic used to distinguishing the Cahill Formation from surrounding less magnetic rocks (Kendall 1990). Mafic sills and dykes assigned to the Goodparla and Zamu Dolerites intruded the Cahill Formation prior to metamorphism.

The Nourlangie Schist overlies the Cahill Formation and consists of argillaceous to quartzose phyllite and quartz-mica schist that locally contain garnet and staurolite.

The supercrustal rocks of the region are structurally complex, having been affected by at least three deformation event before deposition of the late Palaeo- to Mesoproterozoic Kombolgie Subgroup (Thomas 2002). The rocks have also been locally migmatised during the ca. 1847-30 Ma Nimbuwah Event. In addition, there is a broad trend of increasing grade from southwest to northeast in the Nimbuwah Domain. This gradient is thought to reflect the synchronous emplacement of ca. 1865 Ma granites in the Nimbuwah Complex.

The Kombolgie Subgroup is the basal unit of the late Palaeo- to Mesoproterozoic Katherine River Group of the McArthur Basin (Sweet, Brakel et al. 1999; Sweet, Brakel et al. 1999). 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. The Mamadawerre Sandstone has a minimum age of ca. 1700 Ma, which is the minimum age of the intrusive Oenpelli Dolerite. Detrital zircon SHRIMP data from the GA OZCRON database constrain the maximum age of the sandstone at ca. 1810 Ma.

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 Neo-Archaean, Palaeoproterozoic, and the Kombolgie Subgroup units, forming magnetic sills, dykes, lopoliths, and laccoliths. The Oenpelli Dolerite has a SHRIMP U-Pb baddeleyite date of 1723 ± 6 Ma (Ferenczi, Sweet et al. 2005). Geochemical and geophysical data suggests several phases of intrusion throughout the region. 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.

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, and northeast strikes, giving rise to the characteristic linearly dissected landform pattern of the Kombolgie Plateau. Another significant structural trend strikes east – west which includes both the Ranger and Beatrice Faults.

The Bulman Fault Zone is a principal regional feature and is considered to represent a long-lived deep crustal structure. However, it appears that post-Kombolgie displacements along this and other faults have not been great, because the Arnhem Land Plateau is essentially coherent and offsets along lineaments are generally minor. Field investigations of many interpreted 'faults', including those with a marked geomorphic expression, show no displacement, and are best described as joints or lineaments (Thomas 2002).

Erosional remnants of flat-lying Palaeozoic Arafura Basin and Cretaceous Carpentaria Basin are present as a veneer throughout the coastal zone of the Top End. Various regolith components are ubiquitous as cover throughout much of the region.

**Project Geology**

The Beatrice tenements lie to the south of the Myra Falls Inlier (Figure 4). EL 26796 is almost entirely Mamadawerre Sandstone, typically deeply jointed and faulted. A small area in the northwest corner is comprised of undifferentiated Cainozoic sediments. The northern part of EL 24291 is bisected by the east trending Beatrice Fault, to the north of which lies Mamadawerre Sandstone of the Kombolgie Subgroup, and to the south is the Beatrice Inlier. The Beatrice Inlier is comprised of outcropping Nimbuwah Complex gneisses and granites, intruded by Oenpelli Dolerite, and bounded to the south-west by the Bulman Fault Zone. Mamadawerre Sandstone overlies the remainder of EL 24291.

EL 26796 is almost entirely Mamadawerre Sandstone, typically deeply jointed and faulted. A small area in the northwest corner is comprised of undifferentiated Cainozoic sediments.

Figure 4: Beatrice Project Geology Map

## PREVIOUS EXPLORATION

**Queensland Mines Limited**

Limited exploration work was conducted by Queensland Mines Limited (QML) between 1970 and 1973 before the cessation of exploration in Arnhem Land with the introduction of the Aboriginal Land Rights Act in 1973. Airborne and ground radiometric and magnetic surveys and mapping in 1970 and 1971 lead to the identification of the Beatrice Prospect (Robinson 1971, Lockhart 1974).

In 1971 radiometric surveying and costeaning of the most anomalous zones at the Beatrice prospect was conducted, followed by topographic and surface geological mapping. Trenches at the prospect were bulldozed for mapping. A track was bulldozed from the west along the East Alligator River valley into the Beatrice Inlier to permit truck-mounted drill rig access. Diamond drilling in 1971 comprised eight holes for a total of 490.7 m. Low-grade secondary sooty pitchblende is reported to have been intersected below the surface anomalies. Despite a best result of 7 m at 3.3 % $U_3O_8$, at the completion of the program it was suggested that all prospective sites had been tested and there was no further exploration potential.

In 1973, a grid-based mapping, radiometric and soil-sampling survey was conducted over the Beatrice prospect. Lockhart (1974) noted that the mineralisation is restricted to an area of chloritised gneiss, spatially associated with a series of northeast trending quartz stockwork breccias. QML's exploration was curtailed in early 1973 by the Federal Government imposed moratorium on exploration pending a resolution of the issue of Aboriginal Land Rights, and no further on-ground exploration work was conducted by QML.

Reinterpretation of results by QML geologists in 1982 (Foy 1982) concluded that potential remained within the prospect area based on the intersections from the 1971 drilling. Re-examination of drill core failed to confirm the presence of the previously reported "sooty pitchblende". Further drilling and surface investigations were recommended by Foy (1982).

**Cameco Exploration**

Afmeco Mining and Exploration Pty Ltd (AFMEX) acquired the exploration licence application from QML in 1998 and formed part of the joint venture partnership between AFMEX (25% operating partner), Cameco (50%) and SAE Australia Pty Ltd (25%).

Following the dissolution of the joint venture agreement in 2003, the exploration licence application was transferred to Cameco. The original exploration licence application area (EL24291) was split by non-consent areas as determined by an anthropological survey conducted prior to grant, forming the two non-contiguous EL24291 and EL26796. Grant of licence was given on 4$^{th}$ July 2008, for a period of six years.

**2008 – 2009**

The 2008 exploration program consisted of airborne geophysical surveys and helicopter-supported ground activities, comprising geological mapping, reconnaissance, and outcrop sampling.

Air photography over the Beatrice Project area produced a digital image which was geometrically corrected to create an ortho-photograph and digital elevation model of the Beatrice project area. Two airborne geophysics surveys were flown over the Beatrice project area. These were a helicopter-borne VTEM (time domain electromagnetic system) and magnetic data, and fixed wing radiometrics and total field magnetics.

Ground investigations consisted of reconnaissance and sampling of the identified airborne radiometric anomalies, geological reconnaissance across the tenement, with focus given to the Beatrice prospect. Outcrop sampling returned a best assay result of 0.15% $U_3O_8$ in a strongly chloritised sheared granite from the Beatrice prospect.

A large radiometric anomaly identified in the northwest of EL24291, sited within a shallow gully to the south of and parallel to the Beatrice Fault near the intersection with the Bulman Fault Zone returned elevated uranium results within sandstone, with a best assay result of 8.8 ppm $U_3O_8$ in hematised, fine-medium grained sandstone. This anomaly was named the "Violet" prospect.

**2009 – 2010**

Work conducted in 2009 consisted of an airborne radiometric and magnetic survey, an airborne hyperspectral survey, a ground-based sub-audio magnetic (SAM) survey over the

Beatrice prospect, five diamond core drill holes for 730.5 m and 272 auger drill holes at the Beatrice prospect, and rock outcrop sampling in conjunction with reconnaissance mapping over the two licences.

**Drilling**

Helicopter supported drilling was conducted at the Beatrice prospect from May to July 2009. Five diamond holes and 272 auger holes were drilled.

272 auger holes were drilled adjacent to the Beatrice prospect, with a portable track-mounted machine with a detachable auger bit. Auger holes penetrated the top 1.2 meters of the soil horizon, and samples were collected of the bottom of hole from the auger flyte.

Helicopter supported diamond drilling was carried out at the Beatrice prospect during June and July. Five diamond holes were drilled at the Beatrice prospect, for a total of 730.5 m. The diamond holes were drilled with variable orientations as conditions and targeting warranted.

**Outcrop Sampling**

105 stations were recorded, comprised of 10 mapping points and 95 rock samples. 98 sites were recorded on EL24291 with 9 mapping stations and 89 assay samples collected. 7 sites were recorded on EL26796 with one mapping station and six assay samples collected.

**2010 EXPLORATION PROGRAM**

Work conducted in 2010 consisted of a ground-based geophysics survey, six diamond core drill holes at the Violet prospect for 1836.7 m, and rock outcrop sampling in conjunction with reconnaissance mapping over the two licences.

**Diamond Core Drilling**

Helicopter supported diamond drilling at Beatrice prospect commenced on 8th May 2010 and was completed on 31st August 2010. Winmax Drilling Pty. Ltd. of Perth, Western Australia conducted the drilling using a helicopter portable Alton 600 drill rig. Six diamond holes were drilled at the Violet prospect, for a total of 1836.7 m with locations shown in Figure 5. The diamond holes were drilled with variable orientations as conditions and targeting warranted. Hole collar summaries are presented in Table 1.

Figure 5: Diamond Drill Hole Locations – Violet prospect

Table 1: Diamond Drill Hole Collar Summary – Violet Prospect

| Hole Number | UtmE | UtmN | RL | Dip | Azimuth | Total Depth (m) | Significant Results (100 ppm eU3O8 Cut-off) |
|---|---|---|---|---|---|---|---|
| BTD0278 | 292640 | 8608168 | 72.8 | -50 | 350 | 290.4 | DOL/SDST: 24.80 - 26.95 = 2.15m @ 935 ppm (max 2,181 ppm)<br>SDST: 30.5 - 30.88 = 0.38m @ 150 ppm (max 200 ppm)<br>SDST: 38.12 - 38.33 = 0.21m @ 177 ppm (max 293 ppm)<br>SDST Fault: 165.10 - 166.57 = 1.47m @ 141 ppm (max 226 ppm) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BTD0279 | 292638 | 8608164 | 75.6 | -75 | 40 | 314.2 | DOL: 22.9 - 23.2m = 0.3m @ 119 ppm (max. 130 ppm)<br>DOL: 58.3 - 60.4m = 2.1m @ 374 ppm (max. 1,571 ppm)<br>DOL: 61.7 - 62.1m = 0.4m @ 460 ppm (max 836 ppm)<br>DOL: 223.9 - 224.1m = 0.2m @ 158 ppm (max. 188 ppm)<br>PELT: 247.5 - 248.5m = 1.0m @ 221 ppm (max. 345 ppm) |
| BTD0280 | 292057 | 8608032 | 115 | -70 | 0 | 371.9 | DOL: 46.1m - 0.21% eU3O8 |
| BTD0281 | 292050 | 8608045 | 112 | -78 | 0 | 346.7 | DOL: 48.52 - 49.62m = 1.08m @ 278 ppm (max 901 ppm)<br>DOL: 56.62 - 58.22m = 1.57m @ 829 ppm (max 1432 ppm) |
| BTD0282 | 292645 | 292645 | 74 | -65 | 180 | 176.8 | DOL: 45.2 - 45.9m = 0.75m @ 174 ppm (max 252 ppm)<br>GRAN: 64.8 - 64.9m = 0.15m @ 142 ppm (max 239 ppm) |
| BTD0283 | 292641 | 292641 | 75 | -68 | 355 | 336.7 | DOL: 24.9 - 27.45m = 2.36m @ 251 ppm (max 452 ppm)<br>FAULT: 77.05 - 78.55m = 1.39m @ 437 ppm (max 1044 ppm) |

Selected samples were analysed at NTEL in Darwin for a suite of over 50 elements, and 4 lead isotopes by weak acid leach. Drill logging codes and sampling, geochemical analysis, and infra-red spectroscopy methodology is summarised in Appendix 1.

Appendix 1: Cameco Australia Standard Sampling Methodology and Procedures and NTEL Methodology and Procedures

Detailed reports of the drill logging information, including lithology, colour, and alteration, can be found in Appendix 2.

Appendix 2: Detailed Diamond Drill Logs

Major and trace element geochemical data for drillcore samples is tabulated in Table 2, tabulated clay mineralogy as determined by The Spectral Geologist from ASD spectra is presented in Table 3 and graphical strip plots presenting downhole lithology and geochemistry is presented in Appendix 3.

Table 2: Diamond Drilling - Geochemical Analytical Results
Table 3: Diamond Drilling - TSA Clay Minerals

Appendix 3: Diamond Drill Hole Strip Plots

Diamond drill holes were logged with an Auslog gamma probe. Charts of the corrected depths and equivalent $U_3O_8$ values are presented in Appendix 4. Raw gamma data (*.las files) can be found in digital format in the Data directory of this report.

Appendix 4: Diamond Drilling – Downhole Gamma – Calculated Equivalent U3O8 Charts

**BTD0278**

Figure 6: BTD0278 Strip Plot

BTD0278 was drilled to test for subsurface extension of the mineralisation identified at surface within sandstone in the brecciated contact with dolerite. The drill hole was planned to provide further spatial information on the location of the unconformity and orientation of the Beatrice fault. TEMPEST indicated that the unconformity may have been intersected at about -50 m RL. The hole was drilled at an azimuth of 350° and a dip of -50°. EOH depth is 290.4 m.

0 – 24.4 m: Saprolitic clays

- Sandstone saprolith characterised by strong clay, hematite and limonite alteration indicating strong oxidation. Black iron oxides occur in clumps around more competent components of this unit. Some minor less weathered boulders (?) occur in this unit. Rock is relatively competent with some visible sandstone textures.

24.4 – 25.3 m: Dolerite (Pdo)

25.3 – 140.4 m: Sandstone (Phe)

- 27.5 to 28.0 m: three east-west striking, near vertical fractures were intersected. The fractures were grey to black in colour and correspond to anomalous counts on the RS-125 (up to 1500 cps).
- There are a couple of clay gouges / breccias within this interval also.
- 63.0 – 83.0 m: strong silicification and bleaching.
- 25.3 – 140.0 m: well-defined bedding planes, with hematite along bedding planes. More diagenetic hematite. Hematite along fractures disseminating out into matrix.
- 140.0 – 140.4 m: Poorly sorted pebbly sandstone, with quartz clasts up to 1 cm in size. This zone seems moderately more bleached than above.

140.4 – 150.0 m: Pebbly sandstone (Phe)

- Poorly sorted matrix-supported pebbly sandstone. With moderate diagenetic hematite and moderate to strong clay alteration. Clay is replacing feldspar and also coated fractures. Fractures are generally parallel to bedding planes.
- 145.0 – 146.0 m there is a friable zone that is associated with core loss and rock just crumbles due to quartz dissolution of the matrix.

150.0 – 166.8 m: Sandstone (Phe)

- Well- to moderately-sorted medium – grained strongly bedded sandstone. With several bedding planes associated with quartz dissolution. This unit is characterised by moderate clay alteration that is dominantly bedding controlled.
- 164.4 – 165.1 m: there is strong dark-red hydrothermal hematite that is fracture controlled.
- 165.1 – 166.8 m: there is weak to moderate dark-green chlorite alteration that is following and cross cutting bedding planes. Chlorite alteration is associated with trace sulphides.
- Moderate to strong chlorite alteration before clay gouge/fault.

166.8 – 169.0 m: Clay/Fault zone

- Beatrice Fault.
- Vertical contact with above sandstone.
- Strongly clay altered zone with sub-vertical sharp contacts with the overlying and underlying sandstone. From 166.8 to 166.9 the clay is chlorite altered. From 166.9 to 168.7 m the clay is strongly hematised. From 168.7 to 169.0 the clay switches back to being moderately chlorite altered. The unit is relatively massive with specks of white clay.
- Slightly elevated in gamma (400 cps on a RS-125).

- Strongly hematised in the center and moderately to strongly chloritised on the outer boundaries where the unit contacts with the sandstone.
- Brecciation at lower contact.

169.0 – 239.0 m: Sandstone (Phe)

- Moderately- to poorly sorted sandstone that is medium-grained.
- Several minor pebbly bands throughout.
- Pervasive chlorite alteration, drusy quartz and several intervals that have been strongly desilicified.

239.0 – 259.4 m: Pebbly sandstone (Phe)

- Strong quartz dissolution.

259.4 – 283.5 m: Sandstone (Phe)

- Medium-grained sandstone that is moderately- to poorly-sorted.
- This unit is characterised by thin pebbly beds interbedded with fine- to medium-grained, thinly bedded sandstone.

283.5 – 290.4 m: Pebbly sandstone (Phe)

- Strong chlorite alteration which has been over printed by hydrothermal hematite.
- Several fracture surfaces have hematite drusy quartz.
- Several large (7 cm thick) white-grey clay gouges.

Drilling was abandoned at 290.4 m due to difficult drilling conditions.

Mineralisation was intersected near the brecciated contact of the dolerite and sandstone, with a maximum of 2,181 ppm eU3O8 associated with grey to black near vertical, east-west striking fractures within moderately chloritised sandstone. The location of the mineralisation and sandstone dolerite contact is spatially vertical to the surface mineralisation.

The Beatrice Fault was intersected between 165.8 – 169.0 m and is represented as strongly hematised clay gouge with a thin halo of chlorite at the upper and lower clay-sandstone contacts.

From mapping to the east of the Violet prospect, and on the south of the dolerite dyke, the unconformity was observed to be shallowly dipping to the northwest at an elevation of 50 m RL. Extrapolation of this contact would indicate that the unconformity should have been intersected in the drilling of BTD0278, before intersecting the Beatrice Fault. It is interpreted that there may be some amount of structural displacement with north side down, across the dolerite. This is further complicated by further displacement across the Beatrice fault with apparent north side down displacement.

Assay results include 0.6 m @ 820.23 ppm U3O8 from 27.4 – 27.98 m, with a maximum of 911.37 ppm U3O8 from 27.4 – 27.58 m, at the contact between saprolitic dolerite and sandstone. This interval is within a wider interval of 23.6 m @ 234.67 ppm U3O8 from 23.6 – 48.0 m.

Across the Beatrice Fault, assay results include 2.2 m @ 8.96 ppm U3O8 from 166.8 – 169.0 m, with a maximum of 11.64 ppm U3O8 from 166.8 – 166.9 m. This interval also contains an average of 479 ppm V.

**BTD0279**

Figure 7: BTD0279 Strip Plot

The hole was drilled at an azimuth of 040° and a dip of -75°, on the same drill pad as BTD0278. EOH depth is 314.2 m.

0 – 19.6 m: Saprolitic clay
19.6 – 201.95 m: Dolerite (Pdo)

- Ophitic and porphyritic dolerite with minor feldspar phenocrysts.
- 167.0 – 179.0 m: strong clay alteration.
- Increasingly fractured toward the end of interval.
- Variable hematite and chlorite alteration, sometimes associated with minor quartz veins.
- 194.5 – 195.5 m: Sandstone (Phe) xenolith within dolerite, 200-250 cps, moderately silicified and weak hematite pervasive alteration.
- 195.5 – 201.95 m: Fractured and brecciated fine grained dolerite, dominant hematite pervasive alteration.

201.95 – 256.3 m: Sandstone (Phe)

- Bleached and silicified, weakly hematite altered, disseminated pyrite from 238 – 240 m. Brecciated intervals: 208 – 221 m, 238 – 250 m. 247.7 – 248.4 m approx. 500 cps.
- 201.95 – 205.4 m: coarse-grained to pebbly sandstone, massive with minor bedding, bleached and weakly silicified.
- 205.4 – 220.5 m: brecciated sandstone, with moderate pervasive silica alteration, some weak clay alteration toward the end of interval.
- 220.5 – 256.3 m: massive to bedded coarse-grained sandstone, weak to moderate hematite alteration.
- 224.3 – 224.4 m: vuggy/leached sandstone with up to 600 cps.
- Several siltstone bands characterised by strong hydrothermal hematite and/or chlorite, and sericitic clay.
- 238 – 246.7 m: the basal portion of the sandstone intensely hematite altered with alternate intense chlorite alteration.
- 256.0 – 256.3 m: Conglomerate, matrix supported, quartz cobble clasts, with the matrix weakly sericite altered closer to the clasts.
- Structures appear to dip towards north-north-west.

256.3 – 268.1 m: Silty sandstone (Phe)

- Sandy siltstone, moderate to strong hematite alteration. Weakly bedded, shallowly dipping, fine to very-fine grained. Hydrothermal hematite increases in intensity with proximity to underlying granite.

268.1 – 314.2 m: Granite gneiss (Pxn)

- Idiomorphic quartz-K feldspar-biotite, on average looks fresh, slightly bleached, minor foliation, trace pyrite over biotite.
- Clay/chlorite altered closer to the sandstone/granite contact, weak potassic alteration along the fractures. Chlorite accompanies fractures throughout the granite.

The presence of Nimbuwah Complex granitoids in the bottom of BTD0279 underlying the pelitic basement was unexpected, although not considered unlikely. In the regional geology the Nimbuwah Complex has been mapped within the surrounding areas. The nature of the contact between the granite and the overlying pelitic rocks is semi-consolidated clays and may represent a structural contact. Given the complexity of the lithological units and structures present within the basal portion of this hole, further work is required to understand the relationships observed in the drilling and how these fit with observations made from mapping.

Assay results include: 76.40 ppm U3O8 from 59.4 – 59.5 m, within dolerite.

**BTD0280**

Figure 8: BTD0280 Strip Plot

BTD0280 located 600 m to the west of the previous two drill holes. The hole was drilled at an azimuth of 000° and a dip of -70°. EOH depth is 371.9 m. The hole was planned to determine along strike extension of the mineralisation to the east, and to determine orientation on the sandstone-dolerite contact and unconformity.

0.0 – 22.2 m: Saprolite

- Saprolitic red/yellow clay.
- 20.95 – 22.20 m: dolerite saprock.
- Saprolite is strongly oxidised with common hematite and limonite coloured clay.
- Rare black iron oxides occur in clumps.

22.2 – 77.95 m: Dolerite (Pdo)

- Coarse ophitic and porphyritic dolerite.
- Weak to moderate chlorite/sericite replacement throughout the core, rare intervals with more leucoxene.
- Pyrite is observed on fractures towards the base of the intrusion.
- Steeply dipping and north-east trending structures.
- Sub-vertical east-west trending structures (fractures, sheared quartz veins and breccias) and younger quartz-hematite veins cross-cut and alter older quartz-chlorite-pyrite (with minor chalcopyrite) veins.
- These structures are anomalous with up to 750 cps (SPP2) recorded on the core with the gamma logging recording a maximum value of 0.21 eU3O8 %.
- 28.2 – 51.9 m: hematite altered breccias and fractured zones are observed within the upper portion.
- Bleached and hematite altered dolerite from 30 – 36 m and from 45 – 47 m (accompanied with elevated activity of up to 3,000 cps).
- Dark chlorite clay is present at joint surfaces as coating and/or fracture filling.
- East-west trending quartz-carbonate-chlorite sheeted veins are common, some with pyrite and lesser chalcopyrite. Strong enveloping chlorite and leucoxene alteration is prevalent.

- 75.20 – 77.95 m: Chilled margin dolerite (and finer grained) is located at the end of interval.

77.95 – 83.7 m: Sandstone (Phe)

- Coarse-grained sandstone. Strongly bleached and strongly silicified, weak pervasive hematite altered.
- Sharp upper contact with dolerite and moderately chlorite altered lower contact with dolerite marked with milled doleritic material.
- The fault zone is intersected from 78 – 103.7 m with fault wedges of altered sandstone and dolerite juxtaposed against each other. The basal dolerite contact with the sandstone is an aphanitic chilled margin. A sub-vertical east-west contact trend is consistent with outcrop observations.

83.7 – 86.9 m: Dolerite (Pdo)

- Fine grained bleached dolerite, dominantly ophitic and minor porphyritic feldspars.
- Strong shearing and faulting is intersected from 83.7 to 103.7 m, with apparent north to north-east trend dipping towards the south.

86.9 – 92.7 m: Sandstone (Phe)

- Coarse-grained sandstone, fractured and strongly altered along the fractures parallel to core axis.
- Generally bleached and moderately silicified.

92.7 – 103.85 m: Dolerite (Pdo)

- Dolerite, fine grained, fractured, bleached.
- Make-up hematite coating on fractures.
- 99.8 – 103.85 m: Intrusive breccia, dolerite is mixed with intrusive/milled matrix-supported breccia with hematite altered sandstone clasts and bleached matrix made of doleritic material.

103.85 – 146.85 m: Sandstone (Phe)

- Coarse-grained sandstone, generally bleached and weakly silicified with minor interstitial yellow-cream clay.
- Stronger silica alteration closer to dolerite contact.
- 108.8 – 108.9 m: 10 cm dolerite dyke, hematite and clay pervasive altered.

146.85 – 156.55 m: Dolerite (Pdo)

- Dolerite, fine grained and porphyritic for feldspars. Unaltered upper and lower contacts with 1-2 cm of milled material.
- Chlorite alteration throughout the core with locally sericite/hematite/quartz/bleached zones along the veins. Strong hematite alteration after the upper and before the lower contact.
- Both contacts have east-westerly sub-vertical orientation.

156.55 – 212.3 m: Sandstone (Phe)

- Sandstone, coarse grained. Silicified closer to the dolerite contact, further away weak pervasive hematite altered. Minor interstitial clay.
- 189.7 – 189.9 m: Possibly dolerite, strong clay and limonite alteration.
- 201.8 – 202.1 m: 30 cm strongly clay and hematite altered dolerite dyke.

212.3 – 213.7 m: Clay

- Intense clay altered, probably dolerite, weak to moderate limonite and hematite altered.
- Not Beatrice Fault.

213.7 – 308.8 m: Sandstone (Phe)

- Sandstone, pebbly, sub-horizontal.
- Weak pervasive hematite alteration, minor silicified zones.
- Fractured from 256.5 m to end of interval.
- 227.3 – 227.5 m. Siltstone, clay and limonite altered.
- 251.2 – 252.2 m: Conglomerate, few conglomeratic zones within coarse/pebbly grained sandstone, minor diagenetic hematite.

308.8 – 312.9 m: Siltstone (Phe)

- Siltstone, thinly bedded (sub-horizontal), hematitic.
- Few fractures with Quartz-carbonate infill.

312.9 – 314.2 m: Conglomerate (Phe)

- Conglomerate, coarse grained to pebbly matrix, rounded quartz clasts.

314.2 – 314.6 m: Clay (Phe)

- Intensely sericitised unconformity horizon.

314.6 – 329.7 m: Semi-pelite (Pc or Pxn?)

- Pelitic and semi-pelitic quartzo-feldspathic foliated granite-gneisses and garnetiferous quartz schists.
- Weak to moderate chlorite-sericite alteration is present but is limited to fractures as coating or fracture infill and bleaching along the joints.
- Strong sericite-illite alteration in the last 2 m.
- Several interbedded pelite zones, north-east dipping 30-40°.
- Some garnetiferous pelites, others quartz-sericite-hematite, illite.

329.7 – 371.9 m: Granite gneiss (Pxn)

- Equigranular, fresh with minor potassic alteration along the fractures and veins.
- Minor albite altered veins and fractures, and pervasive bleaching near the upper contact.
- Weakly foliated.

Assay results received: 20.6 m @ 850.6 ppm U3O8 from 30.1 – 50.7 m, with a maximum of 0.2 m @ 7557 ppm U3O8 from 50.5 – 50.7 m, within dolerite with hematised and mineralised fractures, and quartz veins.

There is also 3.6 m @ 21.6 ppm U3O8 from 285.9 – 289.5 m in a clay fault within the sandstone.

**BTD0281**

Figure 9: BTD0281 Strip Plot

BTD0281 was planned to undercut BTD0280 so that it could target the intersection of the dolerite-sandstone fault and the unconformity. The hole was drilled at an azimuth of 000° and a dip of -78°. EOH depth is 346.7 m.

0.00 – 21.40 m: SAP, saprolite

- Saprolitic clay. Hematite, limonite altered, with a few blobs of iron oxides.

- 11.60 – 11.80 m: dolerite, unweathered dolerite block, chlorite/sericite altered. Ophitic and porphyritic texture. Ophitic and porphyritic texture, plagioclase porphyroblasts replaced by sericite, olivine altered into chlorite weakly weathered.

21.40 – 118.50 m: Dolerite (Pdo)

- Ophitic and porphyritic dolerite.
- Altered feldspar porphyroblasts, and replacement of sericite and chlorite. Leucoxene alteration. Minor potassic alteration.
- 39.0 – 43.0 m: sheeted quartz veins.
- 48 – 66 m: elevated radioactivity related to quartz-hematite veins and stronger hematite alteration.
- Sheared lower contact with sandstone with a basal chilled margin and fine-grained to porphyritic texture.

118.5 – 294.8 Sandstone (Phe)

- Coarse grained and bleached, with increased silicification closer to dolerite intrusive.
- Becoming coarser with more pebbles towards the base of the unit.
- Weak-moderate diagenetic hematite alteration; weak interstitial clay in more potassic zones within sandstone.
- Many broken zones up to 190 m, where the core becomes more competent and less fractured. Strongly silicified to ~206 m, then less silicified, hematised, and interstitial clay increases.
- 206.5 – 220.5 m: patchy moderate hematite alteration increases, whereas silicification decreases, and interstitial clay remains prominent.
- Minor strongly hematite altered siltstones are recorded throughout the sandstone from 207.30 m to the base of the unit. These siltstones are generally less than 0.5 m thick but can be up to 1.5 m in thickness.
- 220.5 – 231.0 m: the core increases slightly in banded hematite. There are more silty layers and also a clay fault from 229.4-230 m.
- ~238.4 m: start of fault zone comprising many zones of severely broken core, brecciation, clay, and sand. It is faulted up to the Unconformity at 297 m, with lots of clay. Mostly strongly bleached, with some zones with weak hydrothermal hematite; after this is only patchy very weak hematite, and an increase in chlorite. There are some silty bands which are strongly hematised, and above the Unconformity from 294.8 m it is mostly siltstone to the Unconformity, with visible quartz grains within the silts.
- Chlorite alteration increases towards the base of the sandstone from 277 m, becoming pervasive from 282 m. From 292 m the hematite picks up again as is common near the Unconformity.
- A basal quartz-pebble conglomerate is present overlying the unconformity.

294.80 – 296.30 m: Siltstone (Phe)

- Strongly hematised siltstones above the Unconformity.
- Visible quartz grains within the silts.
- 295.15-295.4 m: Interbedded fine-medium grained sandstone. Weakly hematised and chloritised. Sharp upper and lower contact.

296.30 – 297.05 m: Conglomerate (Phe)

- Mostly massive quartz – looks brecciated but is quartz pebbles at base of Phe.

- Clay infill matrix, green sericite(?) altered.
- 0.15 m wide breccia/shear clay-rich contact with Unconformity.

297.05 – 325.30 m: Granite gneiss (Pxn)

- Biotite-rich gneiss.
- Foliation is variable from moderate to weak to a trace alignment of minerals.
- 307.1-308.55 m: fine-grained section with sharp upper and lower contacts.
- Strongly hematised from the Unconformity to 300.1 m (red zone) then strongly chloritised to 312.4 m (green zone).
- Feldspars are sericitised. From 312.4 m feldspars become saussuritised to 317.7 m, then strongly chloritised again.
- Contacts are diffuse rather than sharp. There are a couple of minor breccias/shears (<5 cm width) as well as some minor quartz veining and quartz sweats. Rock is generally hard and very competent.
- 307.10 – 308.60 m: Fine-grained granite intrusive, with sharp upper and lower contacts. Sericitised and chloritised feldspars, very small amount of biotite (fine-grained).

325.30 – 326.90 m: Granite (Pxn)

- Fine-grained k-feldspar granite. Fractured.
- Sharp upper and lower contacts with gneiss.

326.90 – 346.70 m: Granite gneiss (Pxn)

- Fresh granite biotite-rich gneiss, variably foliated.
- Hard competent core.

342.20 – 342.35 m: Granite (Pxn)

- Fine-grained granite dyke.

The hole was gamma probed with the NQ S837 probe. The gamma survey recorded two main intervals of anomalous radioactivity within the dolerite, with the best zone being 1.57 m @ 829 ppm (max 1432 ppm) from 56.62 m.

Maximum uranium value received is 0.127 % $U_3O_8$ in sample C015459, corresponding to a depth of 64.25-64.4m, an interval of only 0.15m within dolerite. This sample is also elevated in several other elements such as Bi (1.38 ppm), Cu (4910 ppm), S (7360 ppm), and Pb tot (32700 ppm). There is also 8.05 m @ 287 ppm $U_3O_8$ from 57.35m, and 0.55 m @ 301 ppm $U_3O_8$ from 48.2 m, both of these within dolerite.

**BTD0282**

Figure 10: BTD0282 Strip Plot

BTD0282 was drilled on the eastern drill pad (where holes BTD0278 & BTD0279 were drilled). BTD0282 was drilled to test for uranium mineralisation on the southern side of the dolerite, and to determine depth to unconformity on the southern side of dolerite. The hole was drilled at an azimuth of 180° and a dip of -65°. EOH depth is 176.8 m.

0.00 – 18.30 m: Saprolitic clay

- Hematite & limonite altered.
- 15.20 – 15.90 m: dolerite boulder, feldspar porphyritic, strong clay-sericite altered, clay replacement over feldspars.

21.40 – 50.2 m: Dolerite (Pdo)

- Change in texture at 38.9 m from ophitic holocrystalline dolerite to fine grained / porphyritic, associated with elevated radioactivity. Porphyritic plagioclase feldspar (labradorite) crystals in fine-grained olivine-pyroxene-plagioclase-chlorite mass.
- Weak oxidation along fractures and frequent quartz-hematite (ex-sulphides?) veins. Core is moderately altered to clay, sericite and serpentinite.
- Gamma probing indicates 0.75 m @ 0.014% eU3O8 from 45.2 m, with a maximum grade of 0.025 % eU3O8 (310 cps on SPP2), associated with stronger pervasive hematite alteration and sub-vertical east-west and south dipping east-southeast trending fractures.
- The basal dolerite contact is an aphanitic chilled margin with the granite.

50.20 – 176.8 m: Granite gneiss (Pxn)

- Equigranular, grey to pink. Occasional fractures with pink potassic alteration halo.
- A few north dipping east-westerly trending joints (approx. 70/015) from 63 – 66 m with hematite fracture filling and enveloping dark chlorite.
- A swarm of sub-parallel thin planar quartz-chlorite-pyrite veins from 66 – 70 m, sub-vertical east-west trending, with rare mottled chalcopyrite.
- Occasional fractures with pink potassic alteration halo.
- Occasional leucoxene replacement over unknown mafic opaque minerals (apparently non-magnetic).

Weak uranium mineralisation within the dolerite was returned by the gamma with 0.75 m @ 0.014% eU3O8 from 45.2 m, with a maximum grade of 0.025 % eU3O8 (310 cps on SPP2), associated with stronger pervasive hematite alteration and sub-vertical east-west and south dipping east-southeast trending fractures.

Within the granite gneiss, gamma probing indicates 0.15 m @ 0.014% eU3O8, with a maximum grade of 0.024% eU3O8 (410 cps on SPP2). Occasional leucoxene replacement over unknown mafic opaque minerals (apparently non-magnetic).

Assay results: from surface, 50.4 m@ 89.6 ppm U3O8 within Dolerite, with a maximum of 495 ppm U3O8, and including 1.6 m @ 204.85 ppm U3O8.

**BTD0283**

Figure 11: BTD0283 Strip Plot

BTD0283 drilled to test the unconformity at the intersection with the Beatrice Fault. The hole was drilled at an azimuth of 355° and a dip of -68°. EOH depth is 336.7 m.

0.0 – 10.9 m: Saprolite

- Highly weathered saprolite, strongly oxidised, clay-rich.

10.9 – 78.05 m: Dolerite (Pdo)

- 10.9 – 21.0 m: Weathered dolerite. Rock structure still present, not totally altered to clay. Hematised throughout (weathering).
- 21.0 – 78.0 m: Unweathered dolerite. Maroon 'make-up' hematite on fractures common to 29 m, then reduces to some fractures.
- Dolerite is typically altered, with chloritisation and sericitisation of feldspars.
- Quartz veins prevalent from 33.8-40.5 m with associated maroon hematite. Thereafter, quartz veining is sporadic.
- No orientation on fractures as they are all broken up, but ~60 degrees to LCA.
- Elevated radioactivity from 24.75 (250 cps on SPP2) in a fractured zone, rich with maroon 'make-up' hematite.
- 300 cps on SPP2) at 36.8 m, on a fracture with maroon 'make-up' hematite and black chlorite, with slickensides present.
- 71.8 – 74.0 m: fault zone. Orientation is indeterminate, but it is 40-60 degrees to LCA. The fault zone is defined by upper and lower brecciated fault zones separated by bleached dolerite.
- 77.5-78.05 m: Lower strongly hematised fault zone, marking the contact between the dolerite and sandstone. The fault contains chunks of sandstone, and brecciated clasts of dolerite and sandstone and is strongly hematite altered.

78.05 – 234.6 m: Sandstone (Phe)

- Strongly bleached, strongly silicified.
- Stylolites common around 82-84 m, 131-133 m and 138 – 141 m.
- Hematite on fractures, increasing from 94.0 m, and then decreasing after 105 m.
- 97.9 – 98.7 m: Fault, completely clay altered.
- 109.9 – 129.9 m and 133.3 – 136.5 m: Sand (fault?) continues until 182.6 m. Mostly unconsolidated sand and extremely friable sandstone, with varying amounts of interstitial clay and hematisation, though mostly strongly bleached. May represent a large desilicification zone possibly related to structure.
- From 182.6 m, the rock becomes much more competent. It remains coarse-grained to pebbly up to ~205 m, containing quartz pebbles 20 mm, although most is coarse to very-coarse grained. There are also minor silty bands 5-10 mm wide.
- 175 – 205 m: core is strongly bleached and weak-moderately silicified, with quite a lot of interstitial clay.
- 199.9 to 202.3 m: Silty sandstone beds and rare silty bands.
- Desilicified from 211.2 to 212.6 m. Broken and silicified from 225.8 to 234.6 m. Represents the outer damage zone of the Beatrice Fault.

234.6 – 235.8 m: Clay (Phe)

- Fault clay, hematite/limonite altered, slightly elevated counts (approx. 100 cps on SPP2), contact with sandstone at 45 degrees to core axis.

235.8 – 267.0 m: Sandstone (Phe)

- Beatrice Fault Zone. Sandstone, very coarse grained, minor interstitial clay. Weak-moderate patchy hematite alteration, and occasional weak desilification. Fault zone is quite broken. Common clay micro faults are present throughout the fault zone.

- Several chunks of different rock types (dolerite, siltstone) all mixed up together, starting from 248.9 m – before this is only sandstone.
- Broken sandstone blocks have varying degrees of silicification. Blocks are separated by brecciated zones containing small rounded sandstone pebbles.
- Most indications are that the fault is ~45 degrees to LCA, although there are no definite orientations to confirm a dip direction.
- From 248.9 m there begins to be inclusions of different rock types. E.g. Dolerite – completely hematised with sericitised feldspars, and random complete bleaching/sericitisation(?). Following this dolerite, are zones of complete sericitisation/chloritisation, chunks of bedded sandstone, and brecciated siltstones (of the type as is common close to base of Mamadawerre Sandstone in the Violet area).
- Below this Major Interval, the fault zone continues to 273 m, although it includes less sandstone, and more altered dolerite fragments, and therefore is logged as such.

267.0 – 273.0 m: Dolerite (Pdo)

- Beatrice Fault Zone. Cataclastic. The dominant breccia clasts are intensely chlorite and sericite altered dolerite, with rare intermixed brecciated sandstone and siltstone fragments.
- Some sandstone fragments with strong bedding.
- This part of the fault zone also includes sections of complete sericite replacement (after dolerite).
- 272.65 – 273.0 m is the quartz-pebble conglomerate normally found immediately above the unconformity in the Violet area, although it is strongly brecciated (some quartz bits broken to <5 mm square) and there is also some large platy muscovite of 2 cm diameter.

273.0 – 274.0 m: Conglomerate (Phe)

- Quartz-pebble conglomerate normally found immediately above the unconformity in the Violet area. Consists of large rounded quartz pebbles up to 70 cm diameter, although more commonly <5 cm diameter, matrix-supported. Matrix comprises quartz sand grains, with chloritised/sericitised or hematised clays and flakes of muscovite.
- Below this unit is the Unconformity.

274.0 – 336.7 m: Granite gneiss (Pxn)

- Weak-moderate foliation. Red zone under unconformity to 279 m then transitional to 287 m, then Green zone to 294 m. After this, unaltered biotite rich basement rock.
- Core is extremely competent, few joints or fractures.
- Sporadic quartz veining throughout.
- 300.10 – 301.65 m: mafic intrusion with a sharp upper contact and a sheared lower contact. Contains quartz veining with specular red-brown hematite. No elevated gamma counts.
- Healed breccia at 309.55-309.7 m, hematised and quartz in-filled.

Within dolerite, gamma probing indicates 2.87 m @ 0.022% eU3O8 from 24.75 with a maximum grade of 0.045% eU3O8 (250 cps on SPP2) at 25.5-25.8 m in a fractured zone, rich with maroon 'make-up' hematite. Also 1.07 m @ 0.013% eU3O8 from 36.1 m with a maximum grade of 0.02% eU3O8 (300 cps on SPP2) at 36.8 m, again on a fracture (oriented) with maroon 'make-up' hematite and black chlorite, with slickensides present.

Weak uranium mineralisation is associated with the lower breccia zone between dolerite and sandstone, with gamma probing indicates 1.67 m @ 0.038% eU3O8 from 76.9 m, with a maximum grade of 0.104% eU3O8 (530 cps on SPP2) at 77.9-78.05 m.

Within dolerite, although no uranium mineralisation, gamma probing indicates 1.53 m @ 0.01% eU3O8 from 271.1 m, with a maximum grade of 0.014 % eU3O8 (150 cps on SPP2).

Within dolerite, weak radioactivity is registered on the gamma probing with 1.53 m @ 0.01% eU3O8 from 271.1 m, with a maximum grade of 0.014 % eU3O8.

Also received assay results for 0 – 79m in hole BTD0283. Maximum results include 1m @ 671 ppm U3O8 from 77.5m, with a maximum of 0.1066% from 77.9 – 78.1 m. Sample C014719 from 77.5 – 77.9 m also contains 9890 ppb Au and sample C014720 from 77.9 – 78.1 m contains 3820 ppb Au. This interval marks the faulted contact between the dolerite and sandstone at the Violet prospect.

There is also 0.6 m @ 680 ppm U3O8 from 25.2 m. This interval is within a fractured zone in dolerite, rich with maroon 'make-up' hematite.

**Outcrop Sampling**

All outcrop sampling and processing was performed using Cameco standard methodology, as outlined in Appendix 1. This document details procedure followed for outcrop sample collection, Cameco codes for geological logging, methodology used for reflectance spectroscopy, laboratory techniques and methods, and analysed elements. All samples were analysed at the NTEL lab in Darwin using the techniques outlined in Appendix 1.

During the reporting period 234 stations were recorded, comprised of 178 assay samples collected and 56 mapping points. Figure 12 shows the location of samples taken and mapping points on the project. 217 stations were recorded on EL24291 with 164 assay samples collected and 53 mapping points recorded. 17 stations were recorded on EL26796 with one 14 assay samples collected and 3 mapping points recorded.

Figure 12: Location of mapping and sample points – Geology background

Table 4 to Table 8 detail the data collected at mapping and sample points.

Table 4: Sample and mapping point – Locations
Table 5: Sample and mapping point – Descriptions and properties
Table 6: Sample and mapping point – Alteration
Table 7: Sample and mapping point – Structural measurements
Table 8: Sample – Geochemical Assay Results

Airborne radiometric and hyperspectral anomalies that were followed up are summarised in Table 9 and Table 10 and the locations of the anomalies are displayed in Figure 13, Figure 14 and Figure 15.

Table 9: Airborne radiometric anomalies – Locations & Descriptions
Table 10: Airborne hyperspectral anomalies – Locations & Descriptions

Figure 13: Airborne Radiometric Anomaly Location Map – Beatrice tenement
Figure 14: Airborne Radiometric Anomaly Location Map – Violet prospect
Figure 15: Airborne Hyperspectral Anomaly Location Map – Beatrice tenement

**ASD Reflectance Spectroscopy**

All outcrop samples were processed for reflectance spectroscopy using a TerraSpec instrument built by Analytical Spectral Device Pty. Ltd. (ASD) capturing reflectance spectrum. The ASD machine records similar information to the Integrated Spectronics PIMA instrument, but the advantage of the ASD is the speed of acquisition of the spectra (a reading every 10 seconds), and the wider spectral range from the visible to near infra-red wavelength range (350 - 2500 nm). The spectra are processed using the same methodology as PIMA, using The Spectral Geologist (TSG) software and The Spectral Assistant (TSA) algorithms written by AusSpec. The data are shown in Table 11.

Table 11: Sample points – ASD TSA minerals

**Geophysics**

Geophysical surveys during 2010 consisted of a ground resistivity and an airborne electromagnetic (TEMPEST) survey.

**TEMPEST**

In April 2010, 50 line kilometers of an airborne electromagnetic (EM) survey using the TEMPEST system was flown over the Violet prospect on EL24291 (35 line km, Figure 16) and on EL26796 (15 line km, Figure 17) by Fugro Airborne Surveys . The survey was flown to map out possible conductive zones due to hydrothermal alteration within the sandstone and underlying basement rock, especially in areas where the sandstone is vertically offset. The airborne EM survey should also be capable of mapping the unconformity depth and in turn the sandstone thickness. The airborne EM survey may also map graphitic conductors within the basement rock.

Figure 16. Beatrice-Violet Prospect TEMPEST survey flightline diagram, and tenement (EL24291) boundary.

Figure 17. Beatrice-Fishless Prospect TEMPEST survey flightline diagram, and tenement (EL26796) boundary.

**SURVEY SPECIFICATIONS**

The airborne EM survey was flown with the TEMPEST system which is a fixed wing, towed receiver time domain airborne EM system. The system also contains a magnetometer, and an approximate digital elevation model is derived from using the onboard differential GPS and radar altimeter.  The system is fully described in Lawrence and Stenning, 2010. The survey specifications are outlined in Table 12. Appendix 5 contains the survey logistics report.

Table 12. Summary of specifications of TEMPEST survey.

Appendix 5. TEMPEST Survey Logistics Report

Fugro Airborne Surveys provides a conductivity model of the TEMPEST data derived using EMFlow (Macnae et al, 1998, Stolz and Macnae, 1998). EMFLOW is a fast approximate transform that provides conductivity depth images. These are calculated for the X and Z component data separately. Conductivity values were calculated to a depth of 500 m below surface at each point, using a depth increment of 5 m.

**MODELLING**

The TEMPEST data was inverted using a smoothed 1D Layered Earth algorithm by an Occam's  approach. The inversion utilized non-geometry corrected data and simultaneously inverted both X and Z component data. The 1D model consisted of 30 layers, whose thickness increased exponentially as defined in Table 13. The inversion has improvements in spatial resolution and is numerically more accurate than the model derived from EMFLOW.  Most noticeable in EMFLOW models are limited to 20 discrete values, whereas the inversion provides a higher dynamic range.

Table 13. Inversion layer depth increments.

The resultant inverted conductivity model for Beatrice-Violet was gridded using Geosoft Oasis using a minimum curvature algorithm with a 50 metre cell size. The data was logged (Base 10) prior to gridding. Resultant grids were decorrugated using the PGW Microlevelling Geosoft extension to remove minor spurious line to line artifacts. A decorrugation wavelength of 800 metres was applied.  The two transects for Beatrice Fishless were simply presented as conductivity-depth sections.

**DATA PRODUCTS**

Survey data is presented in Appendix 6. The digital elevation model derived from the TEMPEST Beatrice-Violet data is presented as Figure 18. The Total Magnetic Intensity data is presented as Figure 19.

Appendix 6. TEMPEST Survey Data

Figure 18. Digital elevation model derived from Beatrice-Violet TEMPEST survey.

Figure 19. Total Magnetic Intensity derived from Beatrice-Violet TEMPEST survey.

The conductivity model is presented as a series of conductivity plan models for a number of cumulative depth layers ie ~ 50m, 100m, 200m 300 m and 400m (Figure 20 to Figure 29). The original EMFLOW conductivity for the Z components data is shown for comparison. As the layers of the inversion are exponentially increasing with depth, the EMFLOW layers were averaged over the equivalent interval as shown in Table 14.

Figure 20. Beatrice-Violet TEMPEST EMFLOW Conductivity depth slice 45 to 55 metres.

Figure 21. Beatrice Violet Layered Earth Inversion Conductivity depth slice 45.7 to 54.3 metres.

Figure 22. Beatrice Violet EMFLOW Conductivity depth slice 100 to 110 metres.

Figure 23. Beatrice Violet Layered Earth Inversion Conductivity depth slice 98.1 to 111.9 metres.

Figure 24. Beatrice Violet EMFLOW Conductivity depth slice 205 to 230 metres.

Figure 25. Beatrice Violet Layered Earth Inversion Conductivity depth slice 204.6 to 229.1 metres.

Figure 26. Beatrice Violet EMFLOW Conductivity depth slice 285 to 320 metres.

Figure 27. Beatrice Violet Earth Inversion Conductivity depth slice 285.6 to 318.2 metres.

Figure 28. Beatrice Violet EMFLOW Conductivity depth slice 350 to 395 metres.

Figure 29. Beatrice Violet Layered Earth Inversion Conductivity depth slice 354.0 to 393.4 metres.

Table 14. Example grids intervals.

An inversion conductivity depth slice from the inversion model is shown for 435.6 to 482.3 metres in Figure 30 which would likely be at the maximum depth of penetration for the TEMPEST Survey in the area and as such features in this image should be treated with some caution. The Fugro EMFLOW model does not image to this depth, as the sigtime function suggests the data has lost signal at this depth (See Lawrence and Stenning, 2010 for description of the sigtime algorithm).

As only two transects were flown over the Beatrice-Fishless prospect, these are presented as conductivity depth sections in Figure 31 and Figure 32.

Figure 30. Beatrice Violet Layered Earth Inversion Conductivity depth slice 435.6 to 482.3 metres.

Figure 31. Beatrice- Fishless East-West Conductivity Depth Section.

Figure 32. Beatrice- Fishless North-South Conductivity Depth Section.

**DC Resistivity**

During July 2010, Cameco employees performed an automated DC resistivity survey in two remote areas of the Beatrice Project. Both surveys were intended to investigate conductors seen in airborne electromagnetic data from 2008 (Geotech- VTEM). Results suggest that the anomalies observed may be caused by near surface inhomogeneity in the regolith.

*Theory*

DC resistivity surveys require the simultaneous measurement of electrical current injected into the earth between two points, and the measurement of electrical potential in between or directly adjacent to the current injectors. The ratio between the measured potential and current injected is referred to as resistance, when a geometrical factor is introduced; taking into account the relative location between the current and potential measurements, a resistivity is derived. The resistivity is a physical property of the earth, controlled primarily by porosity and pore fluid conductivity, but can be strongly influenced by the presence of clay, graphite or sulphides.

For each of the current-potential pairs a reported *Apparent Resistivity* is derived. The Apparent Resistivity assumes a homogeneous earth, which it is not. Through the process of a geophysical Inversion an earth model is retrieved from many apparent resistivity readings along a profile. Inversions for line data are commonly performed in 2.5D, which assumes the retrieved earth model is symmetrical on both sides of the survey line.

*Survey Equipment and Software*

The Super-Stinger-R1 automated resistivity meter (Appendix 7), is made by Advanced Geoscience Inc (AGI) of Austin Texas and was used during the Beatrice survey. The Super-Stinger uses a total of 56 digitally addressed nodes, positioned at 6 meter intervals providing a maximum 330 meter electrode spread. These "smart" electrodes are constructed of stainless steel and can either inject current or measure electrical potential depending on that dictated by the command file (.cmd). The command file is created by the operator prior to the survey and first associates node addresses with the relative position of the electrodes, and then dictates which electrodes are to inject current and which electrodes are to measure potential. The resulting survey file is saved in a Stinger file format (.stg).

Appendix 7. Super-Stinger-R1 Manual

The Super-Stinger uses an external 12V deep-cycle battery as a power source, which is ramped up to the survey voltage of between 160V and 200V and can achieve an electrical current injection exceeding 1A. The "smart electrodes where secured to 20cm stainless steel steaks using rubber straps.

A handheld GPS (Garman 450T) was used to establish the start of the survey lines. A compass and 150m tape measure was then used to install individual probe locations, with tall high visibility stakes used to ensure trueness. The 2.5D inversion of the field data was performed using RES2DINV (v3.70 created by GEOTOMO SOFTWARE of Penang, Malaysia). Elevations used in the 2.5D inversion were derived from sampling a digital terrain model from a 2009 UTS airborne Mag/Rad survey (Job-B094) using the software package Oasis Montage, developed by GeoSoft.

*Survey design, Location and Field Procedures*

Figure 33 shows the survey lines with respect to the Beatrice lease boundary. Table 15 summarizes the location and orientation of the two survey lines.

Figure 33. 2010 Resistivity Survey Locations

Table 15. Resistivity Survey Summary

Electrode configurations used during the surveys included both wenner and dipole-dipole configurations. To help increase the depth of investigation at the location of survey 2, a series of extensions were performed using both configurations. This was done by extending the first electrode out 168 meters and executing a command file that was to measure a series of dipole and wenner configurations. These readings are prefixed by an EXA, in order to distinguish them. Not all of the extensions were used in the inversion of Line 2, however the data is included in Appendix 8 with the rest of the field data and command files.

Appendix 8. Resistivity Survey Data

High contact resistances were observed in both survey areas (>200ohm) which prompted the use of salt water. Each of the stainless steel electrodes were treated with at least 4L of salt water. This helped at least halve the contact resistance, with reported values saved to the contact resistance files (.crs) by the Super Stinger before each command file was executed.

**EXPENDITURE**

A summary of the expenditure for the reporting period is given in Table 16 and Table 17. The total reportable expenditures for 2010 are $2,002,947.94 for EL 24291 and $56,067.73 for EL 26796.

Table 16: Summary of Expenditure EL 24291

Table 17: Summary of Expenditure EL 26796

The estimated expenditure to complete the work program as planned for 2011 is expected to be in excess of $10,000, and can be broken into $7,500 on EL 24291 and $2,500 on EL 26796.

**CONCLUSIONS AND RECOMMENDATIONS**

Further work is recommended:

- The TEMPEST survey successfully mapped the unconformity in the Violet and Fishless areas. A conductive zone was identified in the basement rock at Violet underneath a fault/offset in the unconformity which may reflect alteration or graphitic material. This conductor could be verified by follow-up ground EM or by drilling.

- At BTVR-19 located 1 km to the west-southwest of the Violet prospect, to determine the reason behind the high radiometric counts here, and whether there is related structure in the sandstone;

- At ARAD_22 on EL26796, to understand the relationship of the anomalies and a possible structural context along the trend of the structure;

- At ARAD_01, located approximately 2 km north-west of the Beatrice prospect, requires further investigation to the south and east of the ridge, prior to being considered as a drill target;

- At ARAD_12, located 8 km northeast of the Beatrice prospect, in order to determine whether the basement schists and elevated counts are related to localised faulting, and whether this area should be considered as a drill target.

**WORK PROGRAM FOR 2010-2011 (YEAR 4)**

Work proposed for 2011 includes compilation and further follow-up of areas deemed worthwhile from previous years sampling and mapping.

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