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) 1:100, 000: Howship (SD-5572)
Tenement manager:	AMETS
Copies:	Cameco Corporation (1) Cameco Australia Pty Ltd (1) DRDPIFR - Minerals and Energy (1) Northern Land Council (1)

EXECUTIVE 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 4 July 2008 for an initial period of six years. The total area covered by the licences is 356.99 km2. The Beatrice tenements lie to the south of the Myra Falls Inlier. The northern part of EL 24291 is bisected by the east trending Beatrice Fault, to the north of which lies Mamadawerre Sandstone, and to the south is the Beatrice Inlier, comprised of outcropping Nimbuwah Complex gneisses and granites, intruded by Oenpelli Dolerite, and bounded to the southeast by the Bulman Fault Zone. Mamadawerre Sandstone overlies the majority of the remainder of EL 24291. EL 26796 is almost entirely Mamadawerre Sandstone, with a small area in the northwest corner comprised of undifferentiated Cainozoic sediments. The focus of Cameco's exploration strategy in Arnhem Land is the discovery of unconformity-related uranium deposits, and this is the focus of all exploration conducted. The exploration program consisted of airborne geophysical surveys, and helicopter-supported ground activities, comprising geological mapping, reconnaissance, and outcrop sampling. A helicopter borne time domain electromagnetic survey, known as VTEM, was flown over both exploration licences EL 24291 and EL 26796. The survey coverage for both areas totalled 1694 line km (1599 line km and 95 line km respectively) with a line spacing of 250 m and a tie line spacing of 2500 m. A fixed wing airborne magnetic and radiometric survey was also flown, totalling 4982 line km of data collection. A flight line spacing of 100 m and tie line spacing 1000 m was used during the magnetic/radiometric survey for both EL24291 (4420 line km) and EL26796 (364 line km). An additional 198 line km composed of 50 m flight lines, and 500 m tie lines, were flown to infill the larger survey over EL 24291. This was done to provide increased spatial resolution in the Beatrice prospect area. 79 points on EL 24291 were visited. 26 samples from 13 stations were submitted for chemical analysis, and 4 samples were submitted for thin-section analysis. The Beatrice prospect was discovered by airborne radiometrics in 1970. Mapping done by Cameco in 2008 has generated a local geology map for the Beatrice prospect and immediate surrounding area. 4 rock chip samples were taken from the Beatrice prospect, with a maximum assay result from sample BT080013 of 0.15% U_3O_8, in a strongly chloritised sheared granite. A radiometric grid survey (218 points) was conducted over the prospect to better define the surface radiometric contour map with direct comparison to surface geology than that provided by the airborne survey. Continuation of anomalous uranium between the airborne radiometric anomalies BT_ARAD_2 & BT_ARAD_8 was confirmed, and this is now called the Violet prospect. 6 rock chip samples were taken, and results include sample BT080020 with 8.8 ppm U_3O_8, in a hematised and bleached, fine-medium grained sandstone. Further work required includes detailed mapping and sampling at the Beatrice and Violet prospects; and mapping, geological reconnaissance, and outcrop sampling of the remainder of the unvisited radiometric anomalies, as well as several airborne and ground geophysical surveys. The total reportable expenditures for 2008 are $695,287.04 for EL 24291 and $77,664.06 for EL 26796. The estimated expenditure to complete the work program as planned for 2009 is expected to be in excess of $420,000, and can be broken into $395,000 on EL 24291 and $25,000 on EL 26796.

SUMMARY

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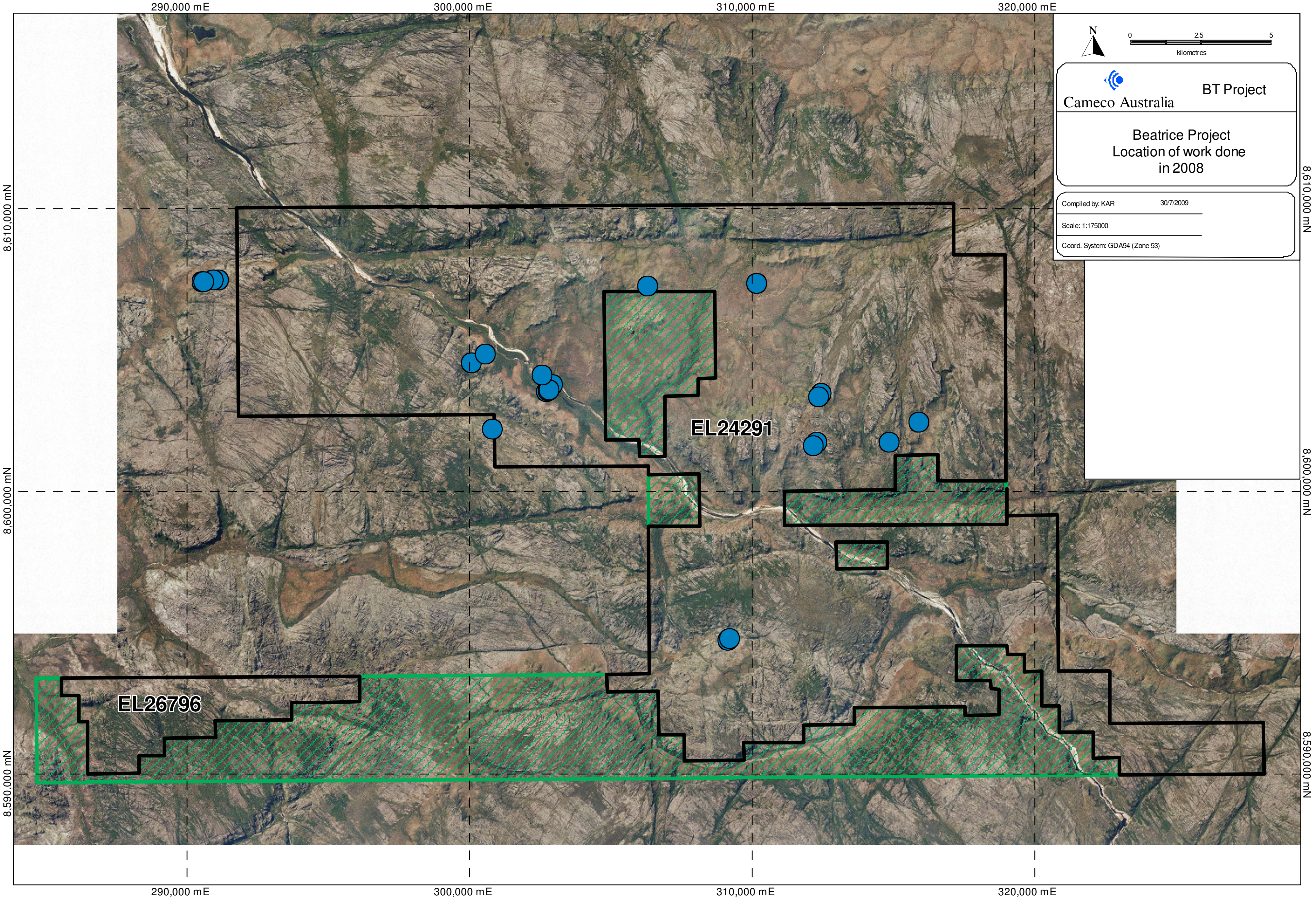
Figure 1: Summary of work done in 2008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kilometres
Cameco Australia
BT Project
Beatrice Project
Location of work done
in 2008
Compiled by: KAR
30/7/2009
Scale: 1:175000
Coord. System: GDA94 (Zone 53)
EL24291
EL26796

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INTRODUCTION

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 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 from 4 July 2008 to the anniversary date were carried out under the terms of consent documentation agreed with the Northern Land Council (NLC) pursuant to the Aboriginal Land Rights (Northern Territory) Act 1976.

The field program for the first year consisted of airborne geophysical surveys; aerial photography; and helicopter-supported ground activities.

Location and Access

Exploration Licences (ELs) 24291 and 26796 are two non-contiguous licences located in western Arnhem Land (see Figure 2) in the Northern Territory of Australia. The project area is centred about 260 km east of Darwin, 230 km north east of Katherine, and 20 km south west of Cameco's Myra camp.

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, with the tenements 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.

Figure 2: Regional Location Map

Tenure

ELs 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.

The 2008 program was approved by the Traditional Owners at the work clearance meeting held prior to grant on 15 April 2008.

Physiography

The topography of the southern portion of EL 24291 is mainly 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 half of the tenement has high sandstone escarpments to the eastern and western sides, with smaller rounded hills in the central area, formed on granitic and doleritic rocks.

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.

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 (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, and 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 et al. (1988), Needham (1988, 1990), and Needham and Stuart-Smith (1980). Information that is not based on these references has been indicated below.

The Plateau project area is located within the eastern margin of the Neoarchaean and Palaeoproterozoic Pine Creek Orogen, and is in a region that has been subdivided into the Nimbuwah Domain of the Alligator Rivers region. See Figure 3 for a regional geology map.

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. The Alligator Rivers region was systematically mapped by the Bureau of Mineral Resources 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.

The oldest exposed rocks in the Alligator Rivers region are included in the Neoarchaean (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. 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 et al., 2005). The group appears to on-lap Neoarchaean basement highs, but gneissic variants are also thought pass transitional into paragneiss of the Nanambu Complex.

The Cahill Formation of the Namoona Group conformably overlies the Munmarlary 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 Cahill Formation is magnetic and significantly so at the base of psammitic unit in what is informally known as 'hangingwall 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 intrude the Upper Cahill Formation.

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 migmatisation 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 et al., 1999a, b). 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 units Neoarchaean and Palaeoproterozoic units, and the Kombolgie Subgroup, forming magnetic sills, dykes, lopoliths, and laccoliths. The Oenpelli Dolerite has a SHRIMP U-Pb baddeleyite date of 1723 ± 6 Ma (Ferenczi et al., 2005); however, geochemical and geophysical data suggest 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.

Project Geology

The Beatrice tenements lie to the south of the Myra Falls Inlier. See Figure 3 for a map of the geology of the Beatrice licence areas. 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 basement Nimbuwah Complex gneisses and granites, intruded by Oenpelli Dolerite, and is bounded to the south-east by the Bulman Fault Zone along which flows the East Alligator River. Lower Kombolgie Subgroup (Mamadawerre Sandstone) rocks overlie the majority of the remainder of EL 24291.

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

Figure 3: Regional geology of the Beatrice Licence Area

Beatrice Prospect

The Beatrice prospect was discovered by airborne radiometrics in 1970. It had only 4 seasons of fieldwork, which included surface mapping, digging of trenches and costeans, and 8 diamond drillholes in 1971. More discussion follows in Previous Exploration and Beatrice Prospect Geology.

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 et al (2006). The prospective nature of the Alligator Rivers region is demonstrated by the presence of nearby economic deposits at Coronation Hill, Ranger, Jabiluka, Koongarra and the now depleted Nabarlek Mine. The presence of gold, palladium and platinum in these deposits plus 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;
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, of which discussion follows.

Previous Exploration

The Beatrice project has had limited exploration work with four years of exploration by Queensland Mines Limited (QML) between 1970 and late 1973. Initial exploration in 1970 consisted of a fixed-wing airborne radiometric and magnetic survey over areas of basement rocks. This was followed in 1971 by helicopter supported ground radiometric survey and regional mapping, leading to the identification of the Beatrice Prospect (Robinson, 1971, Lockhart, 1974). The prospect is located near the centre of EL 24291.

In mid 1971, a grid was established over the prospect and radiometric surveying and costeaning of the most anomalous zones was conducted, followed by topographic and surface geological mapping. A track was bulldozed along the East Alligator River valley into the Beatrice Inlier to permit truck-mounted drill rig access. Trenches at the prospect were bulldozed for mapping. Diamond drilling in late 1971 comprised eight holes for a total of 490.7 metres. Low-grade secondary sooty pitchblende is reported to have been intersected below the surface anomalies. Despite a best result of 7 m at 33,000 ppm 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. This was after costeans had been excavated, and contamination of some of the samples from the various earthworks was likely (Lockhart, 1974, Foy 1982). Lockhart

(1974) noted that the mineralisation is restricted to an area of chloritised gneiss, spatially associated with a series of NNE quartz stockwork breccias. A regional stream-sediment survey was conducted.

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. No further on-ground exploration work was conducted until 2008.

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).

QML reapplied for the exploration licence in 1980. Afmeco Mining and Exploration Pty Ltd (AFMEX) acquired the exploration licence application from QML in 1998 and it 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, the exploration licence application was transferred to Cameco in 2003.

EXPLORATION PROGRAM

The exploration program consisted of airborne geophysical surveys, helicopter-supported ground activities, comprising geological mapping, reconnaissance, and outcrop sampling. Field operations were based out of Cameco's Arnhem Land Myra camp, with personnel ferried daily to, from and around the licence area by helicopter.

Geophysics

Two airborne surveys were flown over the Beatrice project area in 2008. GEOTECH Airborne Limited of Malaga WA, flew 1694 line kilometers of their VTEM helicopter-borne time domain electromagnetic system, between the 23rd of May to the 7th of July, 2008. UTS Geophysics of Belmont WA, flew 4982 line kilometers of fixed wing radiometrics and total field magnetics over the Beatrice project area between July 9th and July 14th 2008. Survey coverage for these surveys is presented in Figure 4. A summary of the survey coverage between the two exploration licenses is presented in Table 1. At the request of the traditional land owners; data collected over no-go areas has been windowed out of this report.

Figure 4: Beatrice 2008 Airborne Geophysical Surveys
Table 1: Geophysical Airborne Coverage

VTEM Helicopter-borne Electromagnetic Survey

The VTEM system uses a powerful transmitter loop that is 26 meters in diameter and composed of four turns of wire, pulsed with a peak current of 200 Amps twenty five times a second. The receiver coil is made from 100 turns of wire, 1.2 meters in diameter and located in the centre of the transmitter loop. The transmitter and receiver loop are suspended beneath the helicopter by a 42 meter cable and flown at a nominal terrain clearance of 34 meters (where safety permitted). The data recorded from the receiver loop represents the change of the secondary magnetic field with time (dB/dt) at 0.1 second sample interval composed of 28 time windows of increasing width. Magnetic data was also collected during this survey with an optically pumped cesium vapor magnetometer suspended 13 meters beneath the helicopter. The survey was flown with 200 meter line spacing, and included 2500 meter tie-lines. Processing of electromagnetic data used a three stage digital filtering process to reduce system noise and help reject sferic events. A further description of the equipment used during the VTEM survey and an introduction to interpretation may be found in Appendix 1.

Appendix 1: VTEM A323 Beatrice Final Report

The VTEM survey is capable of measuring the conductive nature of the earth directly beneath the transmitter. As an electric current is pulsed through the transmitter loop, a time varying magnetic field is generated, and is known as the "primary". This primary magnetic field interacts with the earth, and generates an electrical field as a natural consequence. This process is known as electromagnetic (EM) induction and the resulting electrical currents generated from the EM induction are proportional to the conductance of the underlying geology. A consequence of the induced electrical currents is a secondary magnetic field, which is measured at the receiver and whose amplitude decays with time. This decay is representative of another phenomenon known as self induction, and represents the propagation of a transient EM wave into the earth. The propagation of this transient is represented by voltage as measured with time with the receiver coil. Twenty-eight time windows represent the decay of the secondary magnetic field, and as a qualitative approximate, the magnitude of increasingly later time channels represent the conductivity at greater and greater depth.

Figure 5 displays the magnitude of channel 12 (154 us to 183 us window) and is representative of the terrain bulk conductivity in approximately the upper 80 m. In this figure it can be seen that known structural corridors such as the Beatrice Fault and Bulman Fault have a conductive signature. It is also noticed that conductive anomalies located in the south east corner of EL 24291 appear to be related to Nungbalgarri Volcanics. Also observed in the south east corner is a conductive intersection of Oenpelli Dolerite and Nimbuwah Tonolite (316000E, 8597300N). Located in the north central area of EL 24291 a broad conductive high is seen. Surface alluvium does exist in this area and is no doubt contributing to the observed anomaly, however the anomaly does not correspond everywhere the alluvium is seen. Figure 6 displays VTEM time channel 20 (628 us to 750 us) which can approximately represent the conductivity below 100 m. The most obvious conductive feature in Figure 6 is centered at approximately 304600E 8605500E, and located one kilometer north of the Beatrice prospect. This conductive anomaly appears to be associated with the broader conductive feature observed in VTEM Ch 12, which somewhat straddles the contact between the Nimbuwah and cover. The cause of this anomaly is not believed to be strictly caused by the presence of cover, but rather the cover is present because of preferential weathering, possibly related to the cause of the broader conductive anomaly.

Figure 5: Colour Grid of VTEM Ch 12
Figure 6: Colour Grid of VTEM Ch 20

Airborne Magnetic/Radiometric Survey

The UTS airborne radiometric and magnetic survey used a CRESCO-08-600 fixed wing aircraft flown at a minimal ground clearance of 50 m (or as safety permits). Line spacing varied from 50 meters to 100 meters, with tie lines of 500 meters and 1000 meters respectively. The survey aircraft was equipped with a tail mounted Scintrex Cesium Vapor CS-2 Magnetometer, capable of measuring a scalar magnetic field to an accuracy of 0.001 nT. A three component magnetometer was also used to compensate for the magnetic distortions caused by the aircraft. Processing of the magnetic data included corrections for diurnal variations, spikes and an IGRF 2005 correction, which removes effects of the regional magnetic gradient. The resulting Total Magnetic Intensity (TMI) grid is presented in Figure 7. A further description of the survey equipment and data processing is available in Appendix 2.

Figure 7: Colour Grid of Total Magnetic Intensity Over the Beatrice Project Area
Appendix 2: UTS A951 Logistics Report

Radiometric measurements were made with an Exploranium GR820, 256 channel spectrometer. This detector uses a 32 liter NaI (TI) crystal detector and was checked for consistency using a thorium source on each survey day to monitor system resolution and sensitivity. A calibration line was also flown at the start and end of each day to monitor system performance. Processing of the radiometric data included Noise Adjusted Singular Value Decomposition, spectral smoothing, background removal, dead time corrections and radon background removal. The data was then corrected for height above the ground and tie-leveled. A further description of the equipment used and processing performed may be found in Appendix 2. The result of radiometric survey is the reported equivalence of potassium (K%), uranium (U ppm) and thorium (Th ppm) isotopes, which are the most abundant radioactive elements observed on the surface of the Earth. Thorium tends to be of higher abundance than uranium in nature, so a common way to develop radiometric anomalies in favour of uranium is to divide the square of the determined uranium abundance by that of thorium. The resulting U^2/Th grid is displayed in Figure 8. Selected uranium anomalies generated from this may be found in Figure 9 and Table 2.

Figure 8: Coloured Grid of U^2/Th Anomalies
Figure 9: Airborne radiometric anomaly location map
Table 2: Airborne radiometric anomalies – location and description

Aerial Photography

Air photography was performed over the Beatrice Project area on June 2 2008, by Aerometrex of Adalaide SA. A Vexcel UltraCam D was used to image the project area. This image, which has a resolution of 90cm per pixel, was then geometrically corrected to create an orthophotograph, as seen in Figure 10 and a digital elevation model of the Beatrice project area.

Figure 10: Beatrice Project air photo image

Beatrice Prospect Geology

Mapping done by Cameco in 2008 has generated a local geology map for the Beatrice prospect and immediate surrounding area. See Figure 11. The following summary is a synthesis of previous exploration reports by QML in the early-1970's and 1980's.

Figure 11: Beatrice Prospect Geology Map

The Beatrice Prospect area covers the western end of a northeast trending (045°) ridge of high-grade Lower Proterozoic gneisses and granitoid rocks, most likely of the Nimbuwah Complex (BMR, 1973), although Foy (1981) considers they may be part of the Nanambu Complex. These rocks are intruded by quartz stockwork breccias having the same general trend as the ridge.

The main rocktypes in the Beatrice area are high-grade augen gneisses (tending to granitic), and minor schistose rocks. Brief reconnaissance work by Lockhart (1974) noted that the gneissic rocks vary in grain-size, composition, alteration, texture, and weathering. Grain size ranges from fine-grained mica-quartz gneisses to porphyritic granitoids, with some feldspar crystals up to 5 centimetres in size. In places they have a distinctly granitic texture, whereas elsewhere they are gneissic with strong development of leucobands of acid minerals. Rocks from the Beatrice Prospect consistently show foliation, though it can range from strong to weak.

Cover varies from sand to earthy sand, with minor fragments of quartz breccia transported down the slopes of the ridge. The flat-lying area to the south-east of the hill is covered by alluvium and colluvium to unknown depth.

<u>Alteration</u>

The Beatrice Prospect lies in an alteration zone where the mineralogy of the rocks has been completely or partly changed (Lockhart, 1974). This generally manifests as strong chlorite alteration, with sericite alteration also prevalent. Pyrite is common, and minor chalcopyrite is present. It appears chloritic alteration of the gneiss is greatest where the rock is in close proximity to the quartz breccias, although it is not clear whether the invasion of these structures is responsible for chloritisation (Lockhart, 1973). To the northwest of the prospect, hematitic alteration is predominant, possibly overprinting the chlorite alteration. Drillhole B39-7 shows that the chloritic granitoid rock has been hematised in zones surrounding several quartz veins, possibly indicating a chloritisation event prior to intrusion of the quartz. This is also readily recognisable in hole B39-6. In the altered rocks, adamellites may be distinguished from granites by a higher chlorite content and the presence of saussuritised plagioclase. Hornblende when present has been only weakly chloritised, yet biotite is usually completely altered to chlorite and/or epidote. The quartz stockwork breccias are predominantly silicified rock fragments and quartz veining with associated hematite, which is sometimes specular.

Almost all feldspars have been partly or wholly altered to sericite (and minor chlorite), with their colours ranging from light yellow, generally near sulphide mineralisation (pyrite and chalcopyrite), through to light to deep green. Alteration reaction rims have also been observed in the feldspars. All feldspars in the alteration zone have a waxy or friable texture (Lockhart, 1974).

Pyrite mineralisation shortly followed silicification, replacing chloritised and kaolinised feldspars in vertical zones continuous with upper or lower quartz vein structures. Lesser amounts of pyrite are also found in small vugs or disseminated throughout the quartz veins. The pyrite is accompanied by minor chalcopyrite and pitchblende. Pyrite appears to be very commonly associated with the siliceous breccia zones, and is commonly described as an accessory mineral in the granitoid gneiss.

<u>Structure</u>

Discontinuous quartz veins intruded the altered rock along shear zones trending 050° north, with most dipping vertically but having local variations around granite-adamellite contacts and pre-existing joint planes. The majority of the quartz is white non-crystalline bull quartz with occasional small vugs, although some clear quartz is also present.

The siliceous breccia zones near the prospect trend between 030° north and 040° north, but in the immediate vicinity of the mineralised zone they kink to a 050° north trend.

Although Robinson (1971) mapped the zones of quartz veins at the surface as vertical, Lockhart (1973) assumes that the veins are vertical to steeply dipping (90°-65°) northwest, and Foy (1981) says that mineralisation appears to be limited to the north-northwest by a siliceous breccia zone with a southeast dip. Work done by Cameco in 2008 (Bagas, 2008) shows that at surface, the quartz breccias dip steeply towards the northwest. Drillhole logs from the diamond holes drilled in 1971 indicate that at depth the breccias are dipping steeply to the southeast. Cameco's drilling in 2009 will determine the true direction of dip.

Quartz-free "deformation zones" have been logged as similar to the quartz stockwork breccias, although flow rather than brecciation is predominant. Silicification has occurred along lithological layering rather than anastomosing quartz veins as in the stockwork, and the original rock type is still recognisable (Lockhart, 1974). The exact genetic nature of these zones is unknown but there appears to be either a mylonitic zone caused by faulting, or wall rock alteration by solutions during alteration.

Serpentinised shear zones are also recognised and these are recorded as such in the historic drill logs.

Mineralisation

The anomalous region is confined to an area of highly chloritised gneiss which is spatially associated with a series of quartz stockwork breccias with a north-northeast trend. Uranium mineralisation is confined to the southern flank of the hill, trending 040° north along one quartz vein set in a broader quartz vein zone. Approximate dimensions of the ground radiometric anomaly are 300 meters by 200 meters.

Surface mapping by Robinson (1971) indicated that uranium mineralisation followed vertical zones of quartz-hematite veins. At and near the surface, mineralisation consists of secondary uranium minerals in a highly weathered alteration zone. Surface mineralisation found in the costeans is described by Robinson (1971) as yellow and green uranyl phosphates and minor blue aburite after chalcopyrite, locally rich but discontinuous. Relatively rich surface mineralisation appears to be derived from the same low grade primary source, but has been concentrated by multiple accretion phases in the near surface oxidising-reducing interface. It was theorised (by Robinson, 1981) that surface mineralisation was related to the secondary seepage from quartz-vein structures further upslope. Secondary sooty pitchblende was encountered in drill holes below the projection of surface mineralisation. Phosphate was derived from weathering of fine-grained apatite, which forms an accessory mineral in the granitic rocks.

The only record of the type of uranium mineralisation intersected in diamond drilling is provided by Robinson (1971), showing that with the exception of secondary mineralisation intersected in the weathered portion of holes B39-2 and B39-3, all mineralisation is located in deformation zones, be they silicic or serpentinised shear zones. The primary mineralisation is sooty pitchblende associated with pyrite and chalcopyrite, occurring as tiny disseminations through the rock and on occasions in hairline veins, although Foy (1981) says this is unsupported by microscopic evidence or assays. While minor chalcopyrite is present, pyrite is the most common sulphide and appears to be very commonly associated with the siliceous breccia zones, but is far more widely distributed than the uranium mineralisation, being commonly described as an accessory mineral in the granitoid gneiss. Pyrite mineralisation accompanied or shortly followed silicification, which replaced chloritised and kaolinised feldspar in vertical zones, continuous with upper or lower quartz vein structures. Continuous vertical veins formed from quartz-rich zones or pyrite-rich zones. Lesser amounts of pyrite are found in small vugs or disseminated throughout the quartz veins.

It was assumed by Lockhart (1973) that the uranium mineralisation is vertical to steeply dipping and associated with the quartz veins. Initial primary uranium was oxidised, became soluble in groundwater, and encountered unoxidised pyrite by downward percolation. Limited oxidation of pyrite thus occurred, forming strong reducing agents of sulphites which precipitated the uranium as a 4.5m thick zone of UO_2 (sooty pitchblende). All mineralisation is low-grade at depth and occurs in discontinuous shoots (Lockhart, 1974).

It is considered by Foy (1981) that this concentration of uranium could have resulted from a number of processes including:

1. Simple secondary concentration of uranium during weathering at or near a fluctuating water table;
2. Primary mineralisation associated with chloritised and sericitised shear zones and fractures in the gneiss (similar to other uranium concentrations found in the basement granitic gneiss of the Nanambu Complex below the Ranger deposit and to the north of Koongarra); or,
3. Less likely as a segregation product developed during formation of the granitic gneiss associated with rare earth phosphates (similar (?) to Mary Kathleen). Allanite is a commonly described accessory mineral in the rocks of the Beatrice area.

Lockhart (1973) noted that both on the surface and at depth, anomalous uranium values are, with some minor exceptions, not continued a significant distance towards the northeast. It appears likely that the quartz stockwork breccias play an important part in mineralisation control, and no exact structural control can be determined by surface mapping. Radiometrics have delineated the zone of interest to the east, north, and west. The southern edge of the anomaly has not been delineated due to the surface cover, but appears to follow the natural drainage pattern of the area indicating that it is probably a tail of the anomaly (Lockhart, 1973). Foy (1981) considers that the lack of surviving records of the mapping or general results from costean number 5 (located on the flat area to the southeast of the hill), mean it can be assumed that no mineralisation was encountered and the southern extension of the radiometric anomaly was discounted and treated as a downslope dispersion effect.

Outcrop Sampling

All outcrop sampling and processing was performed using Cameco standard methodology, as outlined in Appendix 3. This document details procedures 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 3.

Appendix 3: Cameco Outcrop Sampling Procedures

Outcrop sampling was conducted over seven days between 1 August and 15 August 2008. The aim of the 2008 program was ground investigation of the airborne radiometric anomalies identified from the survey flown in 2008, with general geological reconnaissance and familiarisation across the tenement, with a focus at the known Beatrice prospect. 79 stations on EL 24291 were visited. At the conclusion of the program, 26 samples from 13 stations were submitted for chemical analysis, and 4 samples were submitted for thin-section analysis. The outstanding stations being mapping locations where no sample was collected.

Of the 17 preliminary identified anomalies from the unprocessed airborne radiometric data, 5 anomalies were ground investigated and followed-up during the 2008 program. 3 anomalies were not visited due to them occurring in inaccessible locations, and the remainder were not visited, but will be in 2009. Table 2 shows a listing of all radiometric anomalies, and Table 3 shows a summary of the results from all follow-up work associated with the radiometric anomalies. The locations of the anomalies are shown in Figure 9.

Table 3: Airborne radiometric anomalies – follow-up summary

Figure 12 and Figure 13 show the locations of the samples taken, and Table 4 to Table 8 detail the data and results from samples and mapping points collected during the program.

Figure 12: Sample Location Map – air photo imagery
Figure 13: Sample location map – geology
Table 4: Sample and mapping points – Locations
Table 5: Sample and mapping points – Descriptions and Properties
Table 6: Sample and mapping points – Alteration
Table 7: Sample and mapping points – Structural Measurements
Table 8: Sample points – assay results

The uranium results from the chemical analysis from the years sampling program are shown in Figure 14. The highest assay results were returned from the Beatrice prospect near the centre of the image, and elevated uranium values in sandstone were also returned from the newly-named Violet prospect in the northwest of EL 24291. Further discussion follows below.

Figure 14: Uranium values of outcrop samples

Beatrice Prospect

4 rock chip samples were taken from the Beatrice prospect, and 218 radiometric readings were recorded. Scintillometer readings were up to 31,000 cps (RS-125 spectrometric instrument). The maximum assay result returned was from sample BT080013 with 0.15% U_3O_8 (15,000 cps, RS-125 instrument) in a strongly chloritised sheared granite, within a costean dug in 1971. This sample also contained elevated molybdenum (9.45 ppm Mo). Other samples collected in the prospect area included BT080012 with 156.8 ppm U_3O_8 (2,000 cps, RS-125 instrument) in a hematised quartz breccia, also with elevated gold (17 ppb Au). BT080014 contains 88.1 ppm U_3O_8 (31,000 cps, RS-125 instrument) in a strongly hematised and chloritised granite, taken from a trench dug in 1970. Background radiation may have affected the cps reading from this sample, as the high value of the reading suggests that more uranium should be present.

A radiometric grid survey was conducted over the prospect to better define the surface radiometric contour map with direct comparison to surface geology than that provided by the airborne survey. Figure 15 shows the contour map produced, and Table 9 shows the values used.

Figure 15: Radiometric grid and contour map over the Beatrice prospect

Table 9: Radiometric Ground Grid at Beatrice Prospect

Violet Prospect - BT_ARAD_2 & BT_ARAD_8

An anomalous zone of elevated scintillometer counts lies between ARAD anomalies 2 and 8, and is now called the Violet prospect. The Violet prospect is located in a shallow gully to the south of and parallel to the Beatrice Fault, near the intersection with the Bulman Fault Zone. 6 rock chip samples were taken from the Violet prospect. Assay results included sample BT080020 with 8.8 ppm U_3O_8 (1050 cps, RS-125 instrument), in a hematised and bleached, fine-medium grained sandstone, and sample BT080024 with 5.6 ppm U_3O_8 and 62 ppm vanadium (4000 cps, RS-125 instrument), in a strongly bleached and highly silicified sandstone. Sample BT080023, with 4.2 ppm U_3O_8, also contains elevated gold (7 ppb), molybdenum (2.3 ppm) and vanadium (26 ppm). Sample BT080025, although with less uranium (3.18 ppm U_3O_8) contains elevated gold and vanadium, with 14 ppb Au and 24 ppm vanadium.

BT_ARAD_3 & BT_ARAD_4

Airborne radiometric anomalies BT_ARAD_3 and BT_ARAD_4 were considered high-priority uranium anomalies 900 m apart on the Beatrice Fault, east of its intersection with the Bulman Fault Zone, and 4.5 km along strike to the east of the Violet prospect. They are located in a heavily-wooded and difficult to access valley with no outcrop. 3 mapping points were recorded near each site, but no assay samples were collected. Scintillometer readings of the colluvium and alluvium returned values up to 340 cps (RS-125 instrument).

BT_ARAD_6

Airborne radiometric anomaly BT_ARAD_6, located in the northern portion of EL 24291, was considered a moderate priority uranium anomaly, possibly related to cover/drainage on a north-northwest structure inferred from magnetics. The site was found to be an area of Quaternary sediments with no outcrop, with a scintillometer (RS-125) reading of 400 cps. A soil sample was collected (BT080026), which returned an assay of 3.4 ppm U_3O_8.

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 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 nm to 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 results are shown in Figure 16 and Table 10.

Figure 16: Outcrop ASD Clay Distribution Map
Table 10: Sample points – ASD TSA minerals

There was a range of clay minerals identified by the ASD instrument. The chloritised and hematised granite samples from the Beatrice prospect contain illite alteration according to the ASD.

Samples collected of hematised and silicified sandstone at the Violet prospect contain halloysite and illite alteration according to the ASD.

Overall, there is limited data and it is therefore difficult to interpret. More sampling is needed to draw better conclusions as to the clay distribution over the tenements.

Thin Section Petrography

4 samples were sent to Pontifex & Associates Pty. Ltd in Adelaide for thin section petrographical analysis. Table 11 shows a summary of each sample. Appendix 4 is the report received from Pontifex & Associates.

Table 11: Sample thin section analysis
Appendix 4: Pontifex Petrographic Report

Only one of the samples was taken from the Beatrice prospect (BT080015). It is a foliated granodiorite gneiss, with a visually estimated primary mineralogy of 48% plagioclase, 22% quartz, 11% K-spar, 11% biotite, 8% hornblende and accessory apatite + minor zircon (Pontifex, 2009). The plagioclase is mostly less than 5 millimetres in grainsize and strongly altered to sericite or illite. The quartz is anhedral and as much as 7 millimetres long, commonly subparallel to the foliation. The sample returned an assay of 6.1 ppm U_3O_8.

The remaining samples were taken from various points throughout EL 24291. All are varieties of gneiss with sericite alteration and varying amounts of chlorite alteration.

CONCLUSIONS AND RECOMMENDATIONS

In 2008, preliminary work was completed over the Beatrice project tenements (EL 24291 & EL 26796). Airborne geophysics provided a number of prospective radiometric anomalies, some of which were investigated. Continuation of anomalous uranium between the airborne radiometric anomalies BT_ARAD_2 & BT_ARAD_8 was confirmed, and is now called the Violet prospect. Many radiometric anomalies were not followed up in 2008 due to time constraints, and work in 2009 will continue with this.

Work proposed for 2009 includes heli-supported diamond drilling at the Beatrice prospect; shallow auger drilling at the Beatrice prospect; detailed mapping and sampling at the Violet prospect; geophysics including an airborne hyperspectral and magnetic/radiometric survey; a ground-based sub-audio magnetics (SAM) survey over the Beatrice prospect; and mapping, geological reconnaissance, and outcrop sampling of the remainder of the unvisited radiometric anomalies, as well as new anomalies generated from the geophysics.

The SAM survey over the Beatrice prospect is intended to provide a detailed magnetic and resistivity map of the area, useful for delineating structures. This will be complete prior to drilling and is anticipated to provide focus for drill targets.

The diamond drilling at the Beatrice prospect will confirm historical drilling results, provide correlation between historic logs and new drilling, and further delineate the mineralisation, in strike and depth directions.

Auger drilling at the Beatrice prospect is planned to investigate the south-eastern extension of the anomaly currently concealed by Quaternary sediments. Detailed mapping and sampling at the Violet prospect will investigate the nature and association of the elevated uranium values, and determine lithology of the host rocks currently concealed beneath cover.

EXPENDITURE

A summary of the expenditure for the reporting period is given in Table 12 and Table 13. The total reportable expenditure for EL 24291 up until 31 December 2008 is $695,287.04 and is in excess of the proposed $60,000. The total reportable expenditure for EL 26796 up until 31 December 2008 is $77,664.06 and is in excess of the proposed $18,000.

Table 12: Summary of Expenditure EL 24291
Table 13: Summary of Expenditure EL 26796

WORK PROGRAM FOR 2008-2009 (YEAR 2)

Work proposed for 2009 includes heli-supported diamond drilling at the Beatrice prospect; shallow auger drilling at the Beatrice prospect; detailed mapping and sampling at the Violet prospect; geophysics including an airborne hyperspectral and magnetic/radiometric survey; a ground-based sub-audio magnetics (SAM) survey over the Beatrice prospect; and mapping, geological reconnaissance, and outcrop sampling of the remainder of the unvisited radiometric anomalies, as well as new anomalies generated from the geophysics. Archaeological clearances will be carried out prior to drilling activities.

The estimated expenditure to complete the work program as planned is expected to be in excess of $420,000, and can be broken into $395,000 on EL 24291 and $25,000 on EL 26796.

BIBLIOGRAPHY

Ferenczi PA and Sweet IP, 2005. Mount Evelyn, Northern Territory (2nd edition). 1:250,000 Geological Map Series explanatory notes, SD53-05. *Northern Territory Geological Survey*, Darwin.

Foy MF, 1981. Beatrice prospect geology and evaluation and exploration program. *Queensland Mines Limited*, internal report 1982/5.

Foy MF, 1982. Beatrice and Magela Creek Windows. Assessment and Proposed Exploration program. *Queensland Mines Limited*, internal report 1982/11.

Kendall CJ, 1990. Ranger uranium deposits. *In:* Hughes FE (Ed.), Geology of the mineral deposits of Australia and Papua New Guinea, Vol. 1. *The Australasian Institute of Mining & Metallurgy, Monograph Series, 14*; p. 799–805.

Kruse PD, Sweet IP, Stuart-Smith PG, Wygralak AS, Pieters PE, and Crick IH, 1994. Katherine. 1:250,000 Geological Map Series explanatory notes, SD53-09. *Northern Territory Geological Survey*, Darwin.

Lockhart JD, 1973. Beatrice prospect – Summary of the available data up to July 1973. *Queensland Mines Limited*, internal report 1973/47.

Lockhart JD, 1974. A Summary of the geology and mineralisation at B39 (Beatrice Prospect), Arnhem Land. *Queensland Mines Limited*, internal report 1974/20.

Needham RS, 1988. Geology of the Alligator Rivers Uranium Field, Northern Territory. *Bureau of Mineral Resources, Geology and Geophysics, Bulletin, 224.*

Needham RS, 1990. Geological and mineralisation map of the Alligator Rivers uranium field, Northern Territory. 1:250,000 scale Map. *Bureau of Mineral Resources, Geology and Geophysics*.

Needham RS and Stuart-Smith PG, 1980. Geology of the Alligator Rivers uranium field. *In:* Ferguson J and Goleby AB (Eds.), Uranium in the Pine Creek Geosyncline; proceedings of the International uranium symposium on the Pine Creek Geosyncline. *International Atomic Energy Agency*; p. 233-257.

Robinson I, 1971. Beatrice Prospect preliminary report. *Queensland Mines Limited*, internal report 1971/10.

Sweet IP, Brakel AT & Carson L, 1999a. The Kombolgie Subgroup — a new look at an old 'formation'. *AGSO Research Newsletter, No. 30*. p. 26–28.

Sweet IP, Brakel AT, Rawlings DJ, Haines PW, Plumb KA and Wygralak AS, 1999b. Mount Marumba, Northern Territory (2nd edition). 1:250,000 Geological Map Series explanatory notes, SD53-06. *Northern Territory Geological Survey*, Darwin.