Cameco Australia Pty Ltd

Exploration Licence EL 23461

MYRA PROJECT – NORTHERN TERRITORY

2001 - 2003 ANNUAL REPORT

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Authors: G Otto, Geologist II
T O'Connor, P. Geo., Project Geologist
G Beckitt, Geophysicist
G Zaluski, Geoscientist

Copies: Cameco Australia Pty Ltd, Master File (1)
Northern Territory Department of Mines & Energy (1)
Cameco Corporation (1)

SUMMARY

The Myra project is a uranium exploration project in northwestern Arnhem Land, which is managed and operated by Cameco Australia Pty Ltd (Cameco). In the past this project has be managed and operated jointly with the Kukalak project and comprises of EL 23461 (Myra) and EL 23462 (Kukalak).

During 2001, the Northern Land Council (NLC), on the assumption that granting of the original licence applications by the Department of Business Industry and Resource Development, Mines and Energy (NTDME) would be imminent, accepted approval for reconnaissance exploration. Cameco conducted a helicopter supported exploration-sampling program during September 2001. At this time, Cameco was informed by the NTDME that granting of the licences could not be approved as the application process contained irregularities. The original exploration licence was the not granted by the NTDME due to the Attorney General's decision that the process had contravened sections of the NT Aboriginal Land Rights Act (1976) in spite of both deemed and actual consent from both NLC and the ATSIC Minister.

In order for the application process to proceed, Cameco were advised to relinquish and re-apply for the licence. The relinquishment and re-application of the licence (EL 23461) was completed in December 2001 with the application process "fast tracked" by the NLC and NTDME. EL 23461 was granted on 25 July 2002. This report represents work completed prior to and within the actual first year of grant.

The exploration activities planned for 2001 and 2002 were designed to determine the uranium potential of the project over the next several years. This was accomplished by diamond drilling on EL 23461 during 2002. Additional work to target future drill holes on the tenement consisted of outcrop sampling, preliminary mapping and airborne geophysical surveys. A helicopter was utilised to aid with personnel movement on the project area.

The field based exploration activities commenced on 17 August 2002 with demobilisation on 16 October 2002. The Afmeco operated Myra Falls Camp was utilised as the base camp for exploration activities during 2002. In total 76 outcrop samples were collected from the Myra tenement area project area and 234 samples from the entire project area during 2001 to 2002. Three diamond drill holes were completed on EL23461 in the Two Rocks area with uranium mineralisation intercepted in one drill hole.

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INTRODUCTION

The Myra Kukalak project is a uranium exploration project and jointly comprises exploration licences EL23461 (Myra) and EL23462 (Kukalak). The project is managed and operated by Cameco Australia Pty Ltd (Cameco). This report details exploration work completed by Cameco on the project during 2002, the first year of tenure. Further to this, work completed by Cameco during 2001 is included as the NLC approved pre-grant exploration access to the licences.

The prime objective of the project is to discover economic uranium mineralisation within a geological environment similar to deposits to the known deposits of the Alligator Rivers Region, Northern Territory and the concealed high-grade deposits of the Athabasca Region, Saskatchewan, Canada.

The project lands are underlain by favourable lower Cahill Formation basement rocks, which are known to host the significant uranium deposits of the Alligator Rivers Region. The Kombolgie sandstone formation outcrops extensively throughout the area. Favourable structures and hydrothermal alteration occur in the region. Several uranium occurrences have been identified in the project area, including the sub-economic Two Rocks showing, indication of a favourable mineralising and alteration event.

The exploration activities planned for 2001 and 2002 were designed to determine the uranium potential of the exploration licence over the next several years. Work was aimed at targeting future drill holes on the tenement and consisted of outcrop sampling, preliminary mapping and airborne geophysical surveys. Diamond drilling consisting of three holes was completed in the Two Rocks area on EL 23461 during 2002. A helicopter was utilised to transport field personnel for outcrop sampling and movement on the project.

The field based exploration activities commenced on 17 August 2002 with demobilisation on 16 October 2002. The Afmeco operated Myra Falls Camp was utilised as the base camp for exploration activities during 2002.

Exploration activities in 2001 were based out of a temporary field camp close to Tin Camp Creek at the end of the Two Rocks track. Work commenced on 2 September with helicopter-assisted sampling temporarily based out of Cameco's King River Camp until the field camp was established. The temporary field camp was established 4 September and operated for approximately three weeks with demobilisation to Darwin on 22 September 2001. Field activities were terminated prematurely due to the Attorney Generals decision to decline the granting of the tenements.

The objectives of the work completed by Cameco during the 1st year (2001 and 2002) of the Exploration Licences were:

- To characterise the stratigraphy, structure, alteration and uranium mineralisation potential of the Two Rocks and Khyber Pass areas by diamond drilling. These objectives were to be achieved by evaluating features identified megascopically and by using physical properties, reflectance spectroscopy (PIMA) and geochemistry;
- To evaluate anomalous areas delineated by previous exploration;
- To commence and generate regional datasets of outcrop samples with regional and detailed geological mapping and prospecting;

- To use remote sensing techniques such as the AMS survey to delineate surface features structure, lithology, alteration etc.
- To delineate further areas requiring investigation by drilling.

Location and Access

EL23461 is located in Western Arnhem Land, Northern Territory on the Alligator Rivers (SD-5301) 1:250,000 scale topographic map sheet and the Oenpelli (5573) 1:100,000 scale topographic map sheet. The tenement is comprised 14 blocks with an area of 46.8km2.

Project Location Map

The Myra licence is located approximately 55 km northeast of Jabiru and 15 km south of Nabarlek. The Kukalak licence is located approximately 20km further to the southeast of the Myra licence. Current access to the Myra area is by a seasonal track from Nabarlek to the Afmeco Mining and Exploration Pty Ltd (Afmeco) Myra Falls camp. A network of tracks in various repair and disrepair cross the Myra licence within the basement area. Cameco refurbished the access track from Myra Falls camp to the Two Rocks and the Khyber Pass area in 2002 to facilitate drilling.

The Afmeco Myra Falls camp was utilised as the base camp for field exploration activities during 2002. This camp was built by Uranerz in 1987 and has been utilised as an exploration base camp more recently by Afmeco. A rental agreement was negotiated with Afmeco for the use of the camp and facilities. The camp consists of four air-conditioned demountable buildings; a kitchen, ablution and two offices, and two permanent corrugated iron sheds. A purpose built caravan was used for logging drill core. A 35-kVa diesel powered Yanmah generator supplied electric power for the camp. Water was sourced from Tin Camp Creek and pumped by an electric pump to a 10000-litre water tank. Field personal slept in canvas tents. The drilling contractors utilised an air-conditioned sleeping caravan for the night shift personal.

Four-wheel-drive Toyota Land Cruiser vehicles were used for personnel movements between Darwin and the camp, and for provisions obtained from Oenpelli and Darwin. Regular food supplies were picked up from Oenpelli, which were freighted from Darwin. A 7-tonne Isuzu four-wheel drive truck was used to deliver 200 litre fuel drums and mobilise and demobilise camp equipment.

The rugged nature of the sandstone, which overlies most of the two licences, means that access is only possible by helicopter or by foot. As such, a Rotor Services 206 Jet Ranger helicopter was on site at for three weeks to assist in the sampling program and transport personnel to work areas.

Tenure

The Myra Exploration Licence (EL 23461) is located in western Arnhem Land and covers an area of 46.8 km^2. The exploration licence was ratified at NLC Full Council in late May 2002 and formally granted by DBIRD Mines and Energy on 25 July 2002.

The original exploration licence application was not granted by the NTDME in 2001 due to the Attorney General's decision that the process had contravened sections of the NT Aboriginal Land Rights Act (1976) in spite of both deemed and actual consent having been given from both the NLC representing the Traditional Owners and the ATSIC Minister. Under advise from NTDME and the NLC, the exploration licence application was relinquished and re-applied for in December 2001. As an exploration agreement and work proposal had been negotiated, the exploration licence was "fast tracked" by NLC and DBIRD.

The Myra licence contains two classes of areas, which are sensitive or have cultural and/or social significance to the Traditional Owners of the area. The most important of these areas are the No Go Areas, which are absolutely excluded from exploration access. The other class areas are restricted access, in that permission from the Traditional Owners must be sought before conducting exploration within the designated areas.

Terms of Exploration by Cameco

Grant of the Exploration Licence is for a period of six years, exploration activities will be carried out during this tenure, or longer, as permitted by extensions to the period and re-issue of the exploration licence under the Mining Act. A 50 percent relinquishment of the exploration tenements is required after three years. An extension or waiver of surrender can be granted from the NTDME, however this is at the discretion of the NTDME. All exploration activities and results must be reported one month after the grant date anniversary.

Geological Setting

The project area lies in the western portion of the Pine Creek Geosyncline, roughly on the boundary of the so-called East Alligator and Nimbuwah structural domains. The region is structurally complex with Palaeoproterozoic basement lithologies having undergone at least three recognisable phases of deformation. The region also marks the rapid transition in metamorphic grade from lower amphibolite to granulite facies within the basement rocks. Metamorphism of basement lithologies on EL23461 has reached upper to middle amphibolite grade.

The basement lithologies have been unconformably blanketed by Meso-Palaeoproterozoic sedimentary and volcanic members assigned to the Kombolgie Subgroup. Late stage orogenic granite assigned to Tin Camp Creek Granite intrudes and is exposed to the southeast of the Myra area.

EL23461 (Myra) Local Geology

Myra Geology Map

The dominant feature of the Myra area is the Myra Falls Inlier, a 35km long basement window within the sandstone platform. The Inlier is walled to the north and south by spectacular escarpments, with a flat lying unconformity surface exposed below the sandstone scarps. The Palaeoproterozoic Mamadawerre

Sandstone (Ⱡhe), the lower most unit of the Kombolgie Subgroup, overlies the northern portion of the tenement.

The Myra Falls Inlier contains extensive exposures of basement rocks of Lower Palaeoproterozoic age Kakadu Group, Cahill Formation, and Myra Falls Metamorphics overlying Archaean Nanambu Complex granites and gneisses dated at a minimum crystallisation age of 2470 Ma (Needham 1988). The Lower Palaeoproterozoic rocks of the region have been affected by the Top End Orogeny (1870 to 1800 Ma), which has generated tight folding and faulting of the basement rocks.

ROCK UNIT	THICKNESS	GEOLOGICAL AGE
Residual sand cover and laterite on tableland, silt and alluvium in valleys	A few metres	Quaternary-Tertiary
Oenpelli Dolerite – intrusive sills and dykes		Mesoproterozoic – 1690 Ma
Tin Camp Creek Granite – altered granites and trondhjemites		Mesoproterozoic
Mamadawerre Sandstone – quartz arenite, quartzite and conglomerate	Greater than 150m	Meso to Palaeoproterozoic 1730 – 1822 Ma
Zamu Dolerite– dolerite and gabbro intrusive bodies, dykes and sills		Palaeoproterozoic
Myra Falls Metamorphics - Lit-par-lit gneiss, garnet-biotite schist, minor quartzite, amphibolite and marbles		Palaeoproterozoic
Lower Cahill Formation – banded calc-silicate gneiss, mica-quartz-feldspar gneiss and schist, tremolite-dolomite marble		Palaeoproterozoic
Kudjumarndi Quartzite – orthoquartzite, muscovite quartzite and minor gneissic biotite quartzite		Palaeoproterozoic
Mount Howship Gneiss - quartz feldspar gneiss, biotite gneiss, sillimanite gneiss, and amphibolite		
Nimbuwah Metamorphic Complex – foliated granite and granodiorite		Palaeoproterozoic

Summary of Rocks units exposed on EL23461 (Myra)

The oldest rocks (Lower Palaeoproterozoic) exposed in the area are the Mount Howship Gneiss (Ⱡkh) of the Kakadu Group. Ⱡkh is generally comprised of leucocratic pegmatoidal quartz feldspar gneiss, biotite gneiss, sillimanite gneiss, and amphibolite layers.

The Kudjumarndi Quartzite (Ⱡkk) conformably overlies the Mt Howship Gneiss, and is one of the marker stratigraphic horizons in the region. Ⱡkk is generally comprised of meta-arkose, micaceous and felspathic quartzite, amphibolite and minor mica-schists and calc-silicates. The term quartzite is somewhat of a misnomer, as drilling would suggest that Ⱡkk is comprised of at least 25% amphibolites. The contact between the Ƥkk and Ƥkh appears, in drill core, to be somewhat transitional over several metres.

The Kakadu Group is conformably overlain by the Lower Palaeoproterozoic age meta-sedimentary Cahill Formation (Ƥc), comprised of calc-silicate gneiss and schists, amphibolite, mica and quartz feldspar schists and minor marbles. The Cahill Formation is best exposed along Tin Camp Creek. The Two Rocks Unit, which has only been defined by drilling, appears to be a meta-sedimentary equivalent to portions of the Lower Cahill Formation and is comprised of numerous thin amphibolites within micaceous quartz feldspar schists and gneisses, calc-silicates and minor porphyroblastic garnet quartz lenticle calc-silicates. Pyrite is a common accessory mineral within the amphibolitic units, and garnets are common throughout.

The Myra Falls Metamorphics (Ƥxm) represent metamorphic equivalents to undifferentiated Kakadu Group and Cahill Formation meta-sediments.

The Zamu Dolerite (Ƥdz) intrudes the meta-sediments as sills. When intercepted in drilling, the thicker intersections of Zamu Dolerite appear as a conformable foliated amphibolite grading to meta-dolerite within the core of the unit. The thin layers of amphibolite recorded in drilling cannot be differentiated from a para-amphibolite (sedimentary protolith) or ortho-amphibolite (Zamu Dolerite, igneous or plutonic protolith), and are usually assumed to be metamorphosed sediments.

East and south of the Myra area the granitoid rocks of the Nimbuwah Complex are exposed. These granites, granodiorites and tonalites were extensively migmatised during the Top End Orogeny. The relationship between the Cahill Formation and the Nimbuwah Complex is little known, however the contact is interpreted to be gradational and migmatitic in nature.

The eastern portion of the Myra Inlier is intruded by the late stage post-orogenic Tin Camp Granite over which sediments of the Kombolgie Subgroup have been unconformably deposited. The Tin Camp Creek granite was broadly intruded at the same time as the Nabarlek Granite to the north. The Tin Camp Creek Granite has a crystallisation age of 1755Ma (Needham 1988).

Palaeoproterozoic age sedimentary and volcanic rocks of the Kombolgie Subgroup blanket all of these older rocks. The Kombolgie Subgroup is broken up into six subdivisions comprised of quartz arenites and volcanic members and are named in order of oldest to youngest; Mamadawerre Sandstone, Nungbalgarri Volcanic Member, Gumarrirnbang Sandstone, Gilruth Volcanic Member, Marlgowa Sandstone and Mackay Sandstone. Only the oldest, Mamadawerre Sandstone (Ƥhe), formation is exposed on the Myra project. The Nungbalgarri Volcanic Member (Ƥhn) and Gumarrirnbang Sandstone (Ƥhr) are exposed to the south and west of the project.

The Mamadawerre Sandstone is comprised of fine-to coarse-grained quartz arenites. Conglomeratic clastic units are preserved locally in what were likely palaeotopographic valleys. The sandstone has a variety of preserved structures and can be medium to thickly bedded, planar cross-bedded, trough cross bedded and rippled. The sedimentary structures suggest that the sandstone was formed in a braided stream environment, with coarse clastic material accumulating and infilling local depositional basins and palaeotopographic lows. The evolution of the sandstone is interpreted to be proximal fluvial at the base, to distal fluvial and grading into estuarine and aeolian conditions at the top of the member.

Sweet et.al. (1999) suggest that the age of the Kombolgie Subgroup can be constrained between 1822 Ma and greater than 1720 Ma based on constraining ages of enclosing formations.

The maximum age date constraints by Sweet et.al (1999) on the Kombolgie Subgroup cannot be older than 1755 Ma (Tin Camp Creek Granites). It is clear that the Ᵽhe unconformably overlies the granite, as quartz breccia veins crosscut the granite, and are truncated by the overlying sandstone. U-Pb age dating of the Nabarlek Granite by Kyser et.al (2002) has yielded an age of 1760 Ma, and Page et al (1980) have yielded Rb-Sr ages of biotite as 1780 Ma. Therefore the Mamadawerre Sandstone cannot be older than approximately 1755 Ma indicating that the entire Kombolgie Subgroup was deposited during an interval of approximately 35 Ma.

The Oenpelli Dolerite (Ᵽdo) intrudes the early Palaeoproterozoic metamorphic rocks and rocks of the Kombolgie Subgroup, as sills and dykes and can form large lopolithic bodies greater than 250m thick. Rb-Sr age dating by Page et.al. (1980), yielded dates of approximately 1688 Ma for the Oenpelli Dolerite.

Basement Structure

Basement metamorphic rocks have undergone polyphase deformation as indicated by the development of penetrative fabrics (S_1 and S_2) and folding (D_1, D_2 and D_3). The first two deformation events are interpreted to have occurred under middle to upper amphibolite facies metamorphic conditions.

The S_1 foliation is characterised by an alignment of phyllosilicate minerals and millimetre scale gneissic banding which is largely parallel to, or at a very low angle to the original layering and stratification of the rocks (D. Thomas, 2002). The S_1 penetrative fabric may have developed by layer parallel slip during intense folding and transposition prior to D_1 folding. The earliest deformation structures identified are tight to isoclinal recumbent folds. The D_1 axial plane is shallowly inclined to the east with a gently plunging fold axis varying from the southeast to the west.

The S_2 foliation is developed as a moderate schistosity in micaceous rocks and a spaced cleavage in more psammitic rocks. The associated deformation (D_2) is characterised by tight east-trending inclined axial planes with a gentle plunging fold axis, which is largely parallel to the earlier D_1 event. The D_1 folds are refolded and the resultant structures have the appearance of hook structures.

D_1 and D_2 structures are locally overprinted with a later set of asymmetric open to tight kink folds (D_3). The D_3 fold style changes from a rounded profile within psammitic rocks to tight angular chevron style in the more micaceous rocks.

Axial plane orientation measurements suggest two orientations, a steeply east dipping north trending set and a steeply north dipping west trending set (D. Thomas, 2002). The fold axes vary from steeply to moderately plunging. Flexural slip during the D_3 folding has produced localised small layer parallel breccias along the pre-existing foliation planes and along contrasting compositional layers.

The D_3 structural event is interpreted to be post-Kombolgie as areas of well-developed D_3 structures are coincident with NNW to N striking lineaments with faulting, quartz veining and brecciation developed along trend within the sandstone (D. Thomas, 2002).

Previous Exploration

Early Exploration - 1970's

Exploration in the area began after the discovery of the Ranger and Nabarlek orebodies in 1969 and 1970 respectively. Esso Minerals (Esso) and Queensland Mines Pty Ltd (QMPL) carried out exploration work over the Myra tenement in the early 1970's until exploration was banned in the Alligator Rivers area in early 1973 by a federal government imposed moratorium on exploration, pending a resolution on the issue of Aboriginal Land Rights.

QMPL conducted a regional 1.5km spaced airborne radiometric survey over the area including the Myra tenement, with Esso later conducting more detailed surveys. Soil sampling by Esso identified several uranium anomalies on the Myra tenement. A uranium anomalous area was discovered Esso in the mid 1970's during grid based RAB drilling on a 250m by 125m grid, designed to map basement rocks within areas masked by laterite and sand cover. 99 drill holes averaging 25m in depth were completed in the area (Bruneton, 1993). Down-hole radiometric logging was not possible or incomplete in many of the holes due to frequent collapse. The basal five feet of the hole was composite sampled for uranium and base metals that outlined a weak zone of uranium and copper enrichment. The anomalous area was infilled with RAB drilling on a 50m by 62.5m grid, however infill drilling along a zone of approximately 500m between the two anomalous areas was not completed. The anomalous area is now known as the Two Rocks Prospect.

QMPL conducted an airborne radiometric and magnetic survey over the Kukalak area during 1972. No further work is documented on the Kukalak tenement.

No exploration work was conducted from 1973 until Uranerz Australia Pty Ltd (Uranerz) negotiated rights to explore the Myra and Kukalak tenements and began exploration in August 1986 and September 1987 respectively.

Recent Exploration 1986 - 1994

The Myra tenement (old EL 3418) was the first exploration tenement to be granted in Arnhem Land following amendments to the Aboriginal Land Rights Act of 1976. Uranerz conducted detailed exploration over the Myra Falls and Kukalak areas from 1986 until the company departed Australia in June 1991. Afmeco (part of the

Cogema Group), in 1991, continued detailed exploration over the Myra Falls and Kukalak areas through a joint venture arrangement (Afmeco 50%, Uranerz 25%, Kumagai 25%). Afmeco subsequently quit the joint venture and relinquished EL 3418 (Myra) and EL 3421 (Kukalak) in March 1994 and September 1993 respectively. Uranium Australia N.L (UAL), a subsidiary of the Seracen Minerals, lodged application for exploration on the Myra Kukalak project. Cameco Australia recently acquired all UAL interests in Arnhem Land, including the Myra Kukalak tenements.

Exploration work conducted by Uranerz and Afmeco is summarised in the following tables. The previous exploration work is compiled and in some cases copied from Uranerz and Afmeco Annual and company reports.

EL 3418 (Myra) Previous Exploration Work Summary

Myra Exploration Work

During the Uranerz term of exploration, a variety of different exploration techniques were used including airborne magnetics, radiometric, and electromagnetic input surveys; ground magnetic and electromagnetic surveys; helicopter supported and ground gravity surveys; heliborne radiometry; radon gas surveys; stream sediment, water and sandstone geochemical sampling; RAB, RC and diamond core drilling.

Uranerz initially identified four prospective areas in the first two years of exploration. Three prospects; Kudjumarndi / Khyber Pass, Myra Fault zone and North South Corridor, were identified by following up airborne radiometric anomalies. In the Kudjumarndi / Khyber Pass and Myra Fault Zone, anomalies are generally associated with springs and swampy areas, with small fault related anomalies close to the unconformity. The Two Rocks prospect was identified by previous exploration by Esso.

EL 3418 (Myra) Uranerz Prospects and Drilling

Kudjumarndi / Khyber Pass Area

The Kudjumarndi / Khyber Pass prospect area is located at the southwest corner of the Khyber Pass near the foot of the sandstone escarpment extending northwest covering an area over the sandstone plateau. The area was targeted due to a number of airborne radiometric uranium anomalies that appeared to be associated with the unconformity between basement schists and gneisses interpreted as Lower Cahill Formation and the overlying Mamadawerre Sandstone.

Preliminary drilling discovered intense replacement chlorite alteration and quartz dissolution within the sandstone. This intense chlorite alteration was interpreted by Uranerz, as hydrothermal alteration similar in style to that seen within the sandstone overlying the Jabiluka deposit.

Outcrop sandstone sampling, radon tube surveys, and an EM-37 fixed loop transient electromagnetic survey were conducted over the area with mixed results.

The results from the radon tube survey indicated that the higher readings were associated with radon rich springs. It was thought that groundwater migrating through a hidden deposit might be the source of the high radon readings. The survey over the sandstone plateau identified several small responses along lineaments. Uranerz questioned the validity of these responses, as a radon response through 200m of sandstone did not seem plausible. It was interpreted that the responses may again be due to migration of radon rich ground water along the lineament.

The EM-37 survey did not detect any anomalies beneath the sandstone plateau. Small very low amplitude anomalies were identified in the basement rocks, however the response was not thought to be due to graphitic rocks.

Surface sandstone geochemical results from the Kudjumarndi and Khyber Pass areas did not identify significant geochemical anomalism that could be related to results derived from the sandstone overlying the Jabiluka uranium deposit (Paterson, 1989).

Sandstone sampling from drilling identified significant hydrothermal alteration restricted to the basal 40-50 metres of the sandstone. The geochemical enrichment observed in the Kudjumarndi and Khyber Pass drilling appeared to be directly comparable to the geochemistry of alteration identified from Jabiluka samples where alteration is related to a uranium-mineralising event (Paterson, 1989).

Sandstone sampling from drill core identified significant hydrothermal alteration was restricted to the basal 40-50 metres of the sandstone. The geochemical enrichment observed in the Kudjumarndi and Khyber Pass drilling appears to be directly comparable to the geochemistry of alteration identified from Jabiluka samples where alteration is related to a uranium-mineralising event (Paterson, 1989). Minor copper mineralisation intimately associated with an altered amphibolite unit was intercepted in two drill holes.

Follow-up work and subsequent drilling found that the intense chlorite and quartz dissolution noted in the sandstone did not extend into the basement schists and gneisses. The massive chlorite and white mica alteration present at Nabarlek and the Two Rocks prospect within the basement rocks is largely absent. It was concluded that the lack of significant uranium anomalies and potassic alteration confirmed that this style of chlorite alteration is unrelated to an ore-forming process but rather relates to a fault structures associated with a late tectonic event (Bruneton, 1993). Afmeco did not recommend any further work for this area following results obtained from 1991 drilling.

Myra Fault Zone

Airborne radiometric anomalies were followed up in the area, and found to be associated with radioactive springs in the reverse faulted contact between the Mamadawerre Sandstone and the basement Mount Howship Gneisses. RAB drilling identified several zones of chlorite alteration, however the alteration was found to have limited extent. No uranium anomalism was identified in the drilling. A water sample analysed by CSIRO for radium isotopes inferred that the water was sourced from aquifers from within the sandstone and had not come into contact with uranium bearing rocks (Coles, 1988). No further work was recommended for the area, and the area was partially surrendered in 1989.

North South Corridor

This area was defined by numerous small airborne radiometric responses in a structurally complex domain. Geology of the area is comprised of narrow elongate pods of Tin Camp Granite; Mount Howship Gneiss with thin schistose biotite units; and thin isoclinally folded lenses of quartzite interpreted as Kudjumarndi Quartzite, that often contains thorium rich heavy mineral concentrations, between the schistose and gneissic units. Narrow chloritised basic dykes intrude the sequence, and numerous north south faults are present.

Basic mapping and sampling, reconnaissance spectrometric gridding, and radon tube surveys determined that chlorite and sericite alteration was present within the schists and gneissic units associated with faulting. Radiometric anomalies outlined areas of thorium rich heavy mineral concentrations within the Kudjumarndi Quartzite. The radon tube survey delineated three parallel trends spatially located near north south faults with mapped hydrothermal alteration. Trenching of narrow quartz veins identified copper, tin and minor uranium mineralisation, associated with chlorite alteration. Minor base metal anomalism was found to associated and restricted to the fault zones.

Follow-up RAB drilling determined that the hydrothermal chlorite alteration was of limited extent and was restricted to the fault zones. Minor uranium anomalism, intersected in drilling, was spatially related to the chlorite alteration within the fault zones. No further work was recommended, and the area was surrendered in 1989.

Two Rocks

Two Rocks Geology and Drill Hole Locations

The most prospective area on the Myra tenement is the Two Rocks area. The area identified by Esso drilling was the focus of Uranerz and Afmeco exploration work, with the area containing a favourable host lithology, intensive hydrothermal alteration and uranium mineralisation. 145 shallow RAB holes, 22 RC drill holes, and 10 diamond cored drill holes have delineated two areas of uranium mineralisation. These have been designated as north and south pods. The south pod has copper rich sections associated with the uranium mineralisation, while the north pod has uranium only. Best recorded intersections grade to 0.155% U_3O_8 over 4m relating to weathering and secondary enrichment, 5m at 400ppm U_3O_8 from 70m, 12m at 1% Cu and 0.275% Cu over 31m associated with uranium.

The main Kudjumarndi Quartzite ridge is exposed to the west of the prospect, and to the east of this ridge, extensive sands and laterite cover the metasediments of the Lower Cahill Formation and Mount Howship Gneiss.

The Lower Cahill Formation in the area has been further divided into a local facies named the Two Rocks Unit, which is up to 200m thick and represents the lowest unit of the Lower Cahill Formation. The Two Rocks Unit conformably overlies and forms a gradational contact with the Kudjumarndi Quartzite (Bruneton, 1993). The Two Rocks unit is comprised of calc-silicate gneisses, thin marbles, garnet-rich schists, biotite gneiss, mica schist, graphitic-pyritic schists, quartzites and amphibolites. The unit is not expressed regionally and may represent a localised palaeotopographic low during deposition of the meta-sediments.

Hydrothermal alteration intersected in drilling consists of intense chlorite and replacement of mineral assemblages and removal of quartz. The intense chlorite alteration is often massive, with original texture vaguely recognisable by virtue of remnant muscovite layers. A coarse silvery muscovite is also associated with the chlorite alteration. Petrographic work by Afmeco suggests that the muscovite may be relict metamorphic muscovite rich lithologies, which by its coarse nature may have been a conduit of hydrothermal fluids (Bruneton 1993). Afmeco interpreted that the alteration appeared to have a structural control, with an association with more intensely folded rocks and rocks with more steeply dipping foliation and is spatially associated with the contact of a calc-silicate unit (equivalent to the lower Cahill Formation) and the conformable contact with the Kudjumarndi Quartzite

Detailed mapping by Uranerz suggested that Kudjumarndi Quartzite ridge to the west of the Two Rocks area was bounded by shallow east dipping, ramping thrust structures. A thrust fault was also thought to control the hydrothermal chlorite and white mica alteration and shallow mineralisation identified from RAB drilling. The diamond core drilling by Uranerz was collared to the east of the mineralised area and drilled to the west in order to intersect the interpreted thrust fault at depth. Uranerz drilled eight RC holes and three diamond cored holes in the Two Rocks area.

Afmeco mapping, drilling and re-interpretation of the Uranerz drilling demonstrated that the stratigraphy in the Two Rocks area formed part of a regional shallow dipping, northerly trending recumbent fold with the fold closure forming the prominent quartzite ridge to the west of the prospect.

MRD-003 was the only cored hole that intersected hydrothermal chlorite and interpreted white mica alteration, however no uranium mineralisation was encountered. One hole, RC hole MRR-004, intersected intense alteration and uranium mineralisation up to 1100ppm U3O8. Best recorded intersections grade to 0.155% U_3O_8 over 4m relating to weathering and secondary enrichment, 5m at 400ppm U_3O_8 from 70m, 12m at 1% Cu and 0.275% Cu over 31m associated with uranium (Rich and Bruneton, 1992).

Afmeco interprets the alteration and mineralisation at Two Rocks as being controlled by two sets of structures. The apparent first controlling structure is a regional set of steeply dipping north-south quartz-hematite fault breccias that have been intersected by drilling and mapped on surface. The fault breccias are related to the emplacement of the Tin Camp Granite, which predates the deposition of the Kombolgie Subgroup sediments. In drilling the quartz hematite breccias are locally intensely corroded by hydrothermal alteration. The second controlling set of structures is steeply dipping to vertical east-west faults. These faults were recognised as regional lineaments in air photo interpretations. In some cases, these faults have been intruded with dolerite.

Afmeco postulated that the dolerite intrusion may be responsible for the uranium and copper remobilisation and the hydrothermal alteration, but the original metal concentration of the host rocks were not high enough and the remobilisation event was not strong enough to produce an economic ore body.

CAMECO EXPLORATION WORK – 2001 AND 2002

Exploration on EL23461 during the 1st year of licence consisted of reconnaissance outcrop sampling, ground proofing of previous geological mapping and general familiarisation of the tenements in context with the regional scale of the area. A small diamond drilling program was completed in the Two Rocks area of Myra to test and investigate the historical reporting of uranium mineralisation.

The work included in this report was completed over a period of two field seasons, beginning in 2001 and continuing into 2002. The work completed during 2001 was not previously reported due to the tenement grant complications outlined in the introduction of this report.

The Afmeco Myra Falls Camp was utilised as the base camp for field operations during the work program. The exploration activities commenced on 17 August 2002 and were on going until demobilisation on the 16 October 2002.

The following tables outline the work completed and expenditures on the project. All digital data, which has been acquired by Cameco has been submitted on CD and DVD with this report. In some cases data over culturally sensitive "nogo" zones has been excised from figures and data in accordance with requests by Traditional Owners.

Myra Work Summary 2002

Myra Kukalak Annual Expenditure

Myra Kukalak Annual Assessment

Outcrop Sampling

The outcrop sampling program was designed to provide a semi-regional lithogeochemical and clay mineralogy dataset. This data set would be used as a basis for definition of alteration systems and anomalous areas that may be associated with unconformity-style U mineralisation.

Uranerz conducted extensive regional scale sampling and detailed sampling of the Kombolgie Subgroup sandstone cover sequence during their term of exploration. The level of sampling coverage should have discovered any obvious U mineralisation on the project. The Uranerz geochemical detection limits, by today's modern standards are high, and subtle geochemical anomalies, if they exist, may have been missed or were below the level of detection.

Cameco selected areas of investigation based on a model that any mineralisation requires a post-Kombolgie structural element in order to focus and provide a pathway for basinal fluids to interact with basement fluids and form a deposit. Therefore sampling was concentrated within and proximal to identified lineaments from satellite and remote sensing imagery, as these areas may be the surficial expression of structural elements, where alteration fluids may have interacted with the wall rocks.

Myra - Sample Outcrop Location Map

Myra – Fracture Samples Location Map

Myra & Kukalak Outcrop Locations and Description

Myra & Kukalak Lithology and Physical Properties

Myra & Kukalak Alteration and Structural Measurements

Outcrop Sample Procedures

Outcrop samples collected are used to create regional background signatures for lithological, spectral and geochemical parameters at each location. Geomorphological, geological and radiometric parameters are recorded, and a digital photograph at each site is taken. The samples are systematically processed in the field camp. Lithological textures, alteration colours (Munsell), grain-size variations, petrophysical parameters (magnetic susceptibility) are routinely recorded.

All samples are taken using a hammer, and sometimes a chisel, in order to collect only the targeted vein or fracture. Fracture samples consist of small broken pieces of rock, which are placed into a 100ml vial. The fracture sample physical shape and size characteristics are not favourable for PIMA spectral measurements. Sampling from breccia and veins provides a medium which can be subjected to low level detection geochemical techniques, and may display geochemical anomalies indicative of alteration, and leakage of uranium or indicator element from an otherwise blind uranium deposit at the unconformity. This type of sampling is referred to as fracture sampling and the samples are subjected to the G950 geochemical method, which provides ultra-low detection limits.

Sampling Technique

Samples are routinely halved using a core saw. One half is described (grain-size, Munsell colour, and magnetic susceptibility). The same sample is measured for spectral parameters using the PIMA II spectrometer. These samples are retained within the Cameco storage facility in Darwin. The other half of the sample is used for litho-geochemical analysis. A segment of each sample is also sent for petrographic thin section processing.

Codes for Competency Friability & Grain Size

Codes for Munsell Colours

Geochemical Processing

All samples were sent to NTEL in Darwin and Pine Creek, Northern Territory, for multi-element analysis. In total, four separate methods were used to analyse up to 65 elements and four isotopes. The geochemical methods used are detailed in the following tables.

G400 Analytical Procedures

G950 Analytical Procedures

The following appendices list the geochemical results for the outcrop and fracture samples collected.

Myra & Kukalak Geochemistry for Outcrop Samples

Myra & Kukalak Geochemistry for Fracture Samples (G950)

Reflectance Spectroscopy (PIMA)

Reflectance spectroscopy (PIMA) analysis was completed using the PIMA II short-wave infrared spectrometer on all samples collected. This instrument measures the reflected energy from a sample in the short wave infrared (SWIR) region of the energy spectrum. The sampling area on the rock specimen that is measured is permanently marked. Multiple measurements are occasionally taken, particularly if variations in spectral features are noted. The spectra are converted to an ASCII format and processed using "The Spectral Geologist" (TSG) developed by AusSpec International, and a Cameco in-house software program called Minspec.
TSG is routinely used to process all spectral data. The SWIR spectra, once processed, provide a mineral identification utilising internal software pattern matching algorithms called "The Spectral Assistant" (TSA). The experienced user can collect information on the degree of mineral crystallinity, and chemical composition variations within mineral groups from the spectra. The program also allows the user to create scalars based on spectral features and parameters. This allows for quantifying crystallinity parameters; classifying chlorite species based on Mg and Fe absorption features and a multitude of other features.

The in-house software "Minspec" utilises the PIMA spectra to classify the data into proportions of six clay mineral species (illite, kaolinite, dickite, halloysite, chlorite and dravite). A signal to noise ratio is calculated. Careful visual attention to detail along with the signal to noise value within each spectra, is required to determine the validity of the classification.

All outcrop samples were processed using PIMA, with results in the following appendices and figures.

Myra & Kukalak Outcrop Samples TSA Analysis (Identified Mineral Species)

Myra – Outcrop PIMA TSA Clay Distribution Map

Myra & Kukalak Outcrop Samples Minspec Analysis

Myra - Outcrop PIMA Minspec Clay Distribution Map

<u>Outcrop Sampling Results</u>

In total 57 outcrop samples were collected from the Myra tenement of which 49 were collected from the Mamadawerre Sandstone, and the remaining 8 samples from basement rocks. 17 fracture samples were collected from drusy quartz veins, breccias and quartz fractures.

Fracture samples collected during 2001 from the Myra project appear to be elevated in a number of elements. The cause of these elevated values is unclear, as the laboratory re-ran the samples through ICPMS, with similar results. It may be speculated that the original samples became contaminated by unknown causes, either at the time of collection, or during the laboratory preparation of the samples. The results for these possibly contaminated samples have been included in the related appendix.

<u>Myra Results</u>

From the limited sampling coverage on the Myra tenement, three areas are anomalous in U, albeit low order, within the sandstone,. The highest returned value for U within sandstones of the Mamadawerre Sandstone is 2.21ppm, and in the basement rocks the highest U value is 19.1ppm with associated 302ppm thorium found within muscovite rich quartzite of the Kudjumarndi Quartzite.

An area on the western side of the tenement has three samples which are anomalous in U, with the highest returning 2.21ppm U. The sample is close to two other anomalous samples collected from sandstone with hydrothermal drusy quartz brecciation which have values of 1.4ppm and 0.65ppm U in proximity to a mapped northerly striking reverse fault within a linear valley.

Myra – Gridded Uranium – Sandstone Samples

The central U anomaly is located approximately 1 kilometre to the west of the Kudjumarndi prospect. U results returned values of 1.09ppm and 0.95ppm U from the sampled outcrop and 14.7ppb U from a fracture sample. Samples were taken from drusy quartz brecciated sandstone that may be interpreted as being a fault breccia. The outcrop is located on the edge of the sandstone escarpment in close proximity to the unconformity with basement rocks. A zone of drusy quartz hydraulically fractured sandstone extends to the north north-west for a distance of

450m. The sandstone bedding in the area is tilted to the north away from the Myra Inlier and dips of up to 73° have been recorded with an average dip of bedding of approximately 15° to the north.

The eastern U anomaly is located immediately to the east of the Kudjumarndi prospect. The sample was collected from a tilted sandstone block with bedding dipping at 28° to the north and is stratigraphically proximal to the basement unconformity. The outcrop represents the coarse trough cross-bedded basal portion of the Mamadawerre Sandstone. Results from geochemistry returned a U value of 1.09ppm.

Myra – Gridded Rare Earth Elements – Sandstone Samples

Myra – Gridded Gold – Sandstone Samples

Myra - Gridded Metals – Sandstone Samples

Fracture samples taken from breccias, quartz veins and siliceous fractures show some correlation to the outcrop sampling. The highest U value is 77.1ppb from sample MR01W10210, taken from a thin siliceous deformation band within medium to coarse grained sandstone, near the edge of a deeply incised lineament. Five other samples range from 37ppb to 57ppb U and are related to small scale faulting, hydraulic drusy quartz brecciation and siliceous deformation bands within the sandstone.

Myra – Uranium – Fracture Samples

Uranium within the sandstone samples appears to be correlated with elements of the rare earths, magnesium, gold and with various metals. The western and central anomalies have a structural affinity and are associated with drusy quartz veining and faulting. The anomalies only indicate that the fluids associated with structural events did contain slightly anomalous levels of U, REE and metals, and that further sampling needs to be completed in order to fully evaluate the targets.

Drilling

Three diamond-cored holes were drilled on EL 23461, Myra, during the 2002 field season. All three holes were drilled in the Two Rocks area. The holes were designed to test the favourable Lower Cahill Formation along strike from the Two Rocks and also to test the conjectured fold repeated sequence of Lower Cahill Formation at depth in the area. One drill hole was planned for the Khyber Pass area to target the inferred fault system identified from previous data compilation and observations in 2002, but was not drilled as a small drill rig would be required to access the drill site.

Stanley Drilling based from Perth, West Australia, were contracted to perform the drilling utilising a truck mounted UDR 1500. Drilling commenced on 18 September 2002 and finished 7 October 2002. A total of 1323.2m were drilled in three holes.

Myra Drill Summary

Myra Drill Location Map

Myra Drill Location Map – Two Rocks

MRD-0100 was drilled to the south of the Two Rocks prospect. MRD-0101 and 0102, sited within 10m of each other, were drilled in the central portion of the Two Rocks in an area defined by Afmex as the North Pod, where previous drilling had outlined an area of U anomalism with minor U mineralisation from RC drilling.

MRD-0100 was drilled to the south of known uranium anomalism at Two Rocks. It was targeted upon a large gravity low feature that extends from the Two Rocks area southward with coincident DIGHEM conductive anomaly and an inferred TEMPEST airborne anomaly at surface that dips steeply to the west and moderately to the east. It was interpreted to represent pyritic-graphitic Lower Cahill Formation rocks comprised of calcsilicate-amphibolite-pelitic rocks (known locally as the Two Rocks Unit) overlying resistive Kudjumarndi Quartzite to the east. The western edge of the TEMPEST anomaly was believed to be fault related. The stratigraphy of the local area comprises shallow east dipping units that have been tightly folded with a coincident shallow east dipping axial plane (S0-S1) coincident on fold limbs.

MRD-0100 did not encounter any U mineralisation and no hydrothermal alteration was observed. This drill hole is considered as representative of the unaltered lithologies in the Two Rocks area.

The second drill hole, MRD-0101 was drilled proximal to the anomalous uranium area discovered by Esso, and drill tested by Uranerz and Afmex with primarily RAB and RC drilling. The only diamond drill hole to intersect any anomalism in the Two Rocks area was MRD-0003 (drilled at -60º towards 270º) drilled in 1988 and deepened in 1993. The top 31m of MRD-003 was RC collared, before commencement of diamond coring. The mineralisation is described as microscopic disseminations of uranium minerals with associated chlorite and hematite alteration. The best results were 4000 cps (Mt Sopris 1000) and assayed between 45-60 ppm. This historical drill hole was re-logged by Darwin staff, but only weak (2-3 times background) radioactivity was observed in chloritic-hematitic calc silicate rocks above the quartzite unit.

MRD-0101was drilled to the east at –80°. The hole encountered mineralisation at 72.4m, in the form of uraninite and coffinite, with associated chalcopyrite and pentlandite within a thin irregular sub-vertical fracture hosted in quartz lenticle amphibolitic calc-silicate of the Lower Cahill Formation (Two Rocks Unit). A similar quartz lenticle rock unit is observed from 52.35 to 56.65m, with the unit being more marble-like in texture and has very coarse-grained altered garnet porphyroblasts (now chlorite pseudomorphs) and a somewhat wavy irregular S0/S1 fabric. This unit is anomalous in U with the geochemistry composite from 50 to 55m assaying 33ppm U. Intense hydrothermal alteration has overprinted much of the original mineralogy with Mg chlorite and fine to coarse-grained muscovite and illite. Alteration is spatially associated with increased Mg, Co and to a lesser degree Li in comparison with MRD-0100. Alteration extends from surface to an approximate depth of 240m.

MRD-0102 was drilled to the west at –80° to a depth of 519.4m. The drill hole was designed to target the Two Rocks zone to the west of MRD-0101and to intersect both the upper and lower anticline limb contacts between the Kudjumarndi Quartzite and the lower Cahill calc-silicate rocks.

The hole encountered similarly intensive chlorite alteration within the upper portion of the hole. No mineralisation was present in this hole, although anomalous U, up to 71ppm U, was encountered from 55 to 60m within the same anomalous rock unit identified at 52.35 to 56.65m in MRD-0101. Intense chlorite alteration extends to approximately 240m in depth.

MRD-0100

MRD-0100 Chemistry Strip Plot

MRD-0100 Pima Strip Plot

MRD-0100 Drill Logs

MRD-0100 was drilled to the south of known uranium anomalism at Two Rocks. It was targeted upon a large gravity low feature that extends from the Two Rocks area southward with coincident DIGHEM conductive anomaly and an inferred TEMPEST airborne anomaly at surface that dips steeply to the west and moderately to the east. It was interpreted to represent pyritic-graphitic Lower Cahill Formation rocks comprised of calcsilicate-amphibolite-pelitic rocks (known locally as the Two Rocks Unit) overlying resistive Kudjumarndi Quartzite to the east. The western edge of the TEMPEST anomaly was believed to be fault related. The stratigraphy of the local area comprises shallow east dipping units that have been tightly folded with a coincident shallow east dipping axial plane (S0-S1) coincident on fold limbs Originally this hole was to be drilled west to best intersect stratigraphy. It was ultimately decided to drill the hole at –80º to the east (090º) to target the interpreted west dipping structure from TEMPEST results.

This hole intersected approximately 28m of very weathered or clay altered calcsilicates and mica rich schist/gneiss passing rapidly into transitional/fresh Lower Cahill Formation (Ꝑc1 - Two Rocks Unit) down to 44.25m. This is underlain by 147m of weakly to unaltered Kudjumarndi Quartzite (Ꝑkk) and then passing into very fresh Mount Howship gneiss (Ꝑkh) for the remainder of the hole. The hole was terminated at 522.4 m after only reaching the interpreted core of the anticline. The contacts between the various units appear to be gradational, and the contacts were based on the first appearance of the dominant rock type from each unit, eg. the contact between the base of the Lower Cahill Formation with Kudjumarndi Quartzite was placed at the first appearance of arkosic quartzite.

The Two Rocks Unit of the Lower Cahill Formation is comprised of para-amphibolite/calc-silicate, minor garnet-biotite gneiss/schist and minor intrusive pegmatite and quartz segregations. The clay mineralogy from PIMA suggests that the dominant clay assemblages are chlorite with minor muscovite. Kaolinite is the dominant clay within the clay-altered horizon at the top of the hole.

The Kudjumarndi Quartzite is comprised of meta-arkosic quartzite and para-amphibolite, with minor semi-pelitic and biotite rich pelitic units. Para-amphibolite makes up a little over 30% of the Kudjumarndi Quartzite. The term "quartzite" for this rock formation (at least from drilling in the Two Rocks area) appears to be a misnomer. The dominant clay assemblages from PIMA for the Kudjumarndi Quartzite are illite and muscovite with subordinate intermediate chlorite associated with the amphibolitic units.

The Mount Howship Gneiss is dominantly a quartz-feldspar-biotite-muscovite and minor sillimanite gneiss with common remobilised, partially melted zones and pegmatites. Biotite with muscovite defines foliation planes between the quartz feldspar gneissic segregations. The biotite rich melanosome is commonly well foliated and often crenulated and S2 tight folding is often defined within the quartz-feldspar leucosome. Common faserkeisel (quartz-sillimanite knots) are present within the upper portions of the Mount Howship Gneiss.

There were no results of significance from this drill hole, and no hydrothermal alteration was noted. Lithologically and geochemically, this drill hole may be considered as being background for the Two Rocks area.

No significant U was encountered within the drill hole. The chemistry strip plot shows anomalous Au is found within the weathered or clay altered portion of the Cahill Formation at the top of the drill hole and in one sample within the Mount Howship Gneiss. The composite sample from 0 to 5m returned Au assay of 827ppb, from 15 to 20m an assay of 96ppb Au was returned and from 210 to 215m, 73ppb Au was returned in assay.

A small 5cm zone of pyrite and magnetite rich mineralisation was observed at the bottom of the hole at 522.2m. Assays taken from this zone show elevated Au, Bi, Cu, Zn, with a slight increase in U. Magnetite is observed as small discrete grains and also as subhedral disseminations up to 10mm wide.

The PIMA strip plot shows muscovite as the dominant clay type, with slightly lesser amounts of illite, paragonite and intermediate chlorite and biotite throughout the rock types encountered in the drill hole. Biotite is mainly confined to the Mount Howship Gneiss.

<u>MRD-0101</u>

MRD-0101 Chemistry Strip Plot

MRD-0101 Pima Strip Plot

MRD-0101 Drill Logs

MRD-0101 was drilled at –80° towards the east, and is located 50m west of MRD-0003. Regolith clay development to a depth of 11.5m is substantially less than in hole MRD-0100. The bedrock calc-silicate rocks, attributed to the Two Rocks Unit, possess features indicative of a lower haematitic alteration grading into a Transition zone and then a green zone palaeoweathering alteration, suggesting that the sub-Kombolgie unconformity is not very far removed. Below 15 m of green zone chlorite altered amphibolite-calc-silicate-marble rocks secondary brick-red hematite and dark chlorite alteration commences and intensifies down hole. This coincides with rocks possessing relatively flat west dipping foliation (perpendicular to core axis). At ~68 m background radioactivity jumps to 250 cps form 60-70 cps (SPP-2) and at approximately 72.0-72.7 m an interval containing a single vein of pitchblende was encountered. The vein is up to 1 cm wide and contains sub-metallic to moderately shiny metallic amorphous uraninite-pitchblende surrounding chalcopyrite crystals. The vein has the appearance of being boudinaged and has experienced moderate sub-horizontal principal strain under semi-ductile/plastic conditions. This implies that during or after vein emplacement moderately high temperatures coincided with the sub-horizontal strain. This is hopefully related to the post-sandstone Myra uplift and coincident chlorite alteration of the basal Kombolgie sandstone. The alternative interpretation could be that the vein is pre-sandstone. An attempt to date the uraninite using SHRIMP instrumentation was attempted after discussion with Queen's University Canada personnel in December.

Several age determinations were completed on the limited samples of mineralisation. The Pb-Pb model age of mineralisation ranges between 641 to 784 Ma (Polito, 2003, unpubl. data) using in-situ Laser ablation ICP-MS techniques at Queen's University.

A determination of P-T conditions for formation of the semi-regional chlorite alteration within the Kombolgie sandstone proximal to the Myra high will also be attempted through the Queen's University researchers.

Alteration within and surrounding the vein comprises black chlorite present with a vein selvage relationship. Host-rock alteration proximal to the pitchblende vein consists of a fairly symmetrical halo of brick-red hematite altering pre-existing clay minerals (after feldspar) that penetrates outwards along foliation planes. The hematite halo is slightly outboard from the vein in some places (redox front), but the black chlorite wall-rock alteration selvage appears to commence directly adjacent to the vein. As the vein narrows down hole the pitchblende is no longer present and it becomes a thin, hairline quartz-carbonate veinlet with associated wall-rock alteration comprising black chlorite and yellow-green sericite alteration of the feldspars (saussuritisation). The vein has extremely elevated radiometrics at >15Kcps (SPP-2) and has a maximum of >41Kcps (UG135 Minispec – Urtec). Down hole probing with both the NQ probe and BQ probe has revealed that the NQ probe becomes saturated at approximately 0.7% eU_3O_8. The BQ probe is proven to be more reliable at high grades in NQ drill holes (G. Beckitt, SIROLOG presentation). The results of the BQ probe calculate a maximum of 1.68% eU_3O_8. The BQ probe of this narrow interval also exhibits some saturation and may underestimate the actual grade present. Grade thickness calculations are being prepared using the Gamma software.

The remainder of the drill hole remains moderately to intensely altered with sericite and bleaching overprinting the intense chlorite alteration and brick-red hematite that is present along foliation planes, some is fracture-controlled and also as patchy/blotchy alteration of the amphibolitic rocks even within the quartzite. The upper Mount Howship gneiss is also very chlorite altered in this hole relative to MRD-0100. The final alteration phase observed in the paragenetic sequence is a coarse (mm) sericite-muscovite alteration observed within the more amphibolitic sections of the Kudjumarndi Quartzite unit and within the Mt. Howship gneiss. The muscovite occurs as large discreet intervals of 30-80% muscovite replacement of the previously chloritic basement rocks.

Dave Thomas from Cameco Corporation in Canada spent 2 days at Myra camp in September reviewing the available drill core from two holes MRD-0100 and MRD-0101. His interpretation of the alteration within the mineralised drill hole has been integral to the understanding of the mineralisation and alteration described above.

MRD-0102

MRD-0102 Chemistry Strip Plot

MRD-0102 Pima Strip Plot

MRD-0102 Drill Logs

The third and final drill hole, MRD-0102, was completed in early October. This hole also targeted the Two Rocks zone, but was drilled towards the west of MRD-0101. The hole was drilled to intersect both the upper and lower anticline limb contacts between the Kudjumarndi Quartzite and the lower Cahill calc-silicate rocks. The drill hole intersected more intense chloritic and muscovitic alteration to deeper levels than MRD-0101 and was terminated at 519.4 m in fresh calc-pelitic rocks with minor graphitic intervals. No radiometric results of significance were intersected. However, veins similar in character to the mineralised vein in MRD-0101 without pitchblende were observed. The alteration within the veins and in the host rock proximal to the veins was also very similar in appearance. The lower calc-silicate/pelitic rock (lower Cahill) contact with the Kudjumarndi Quartzite is quite gradational but has very little alteration within these virtually fresh units. The early conclusion to be drawn from this deep drill hole is that this lower fold repetition of the favourable lower Cahill unit is not prospective for unconformity-related basement hosted mineralisation.

Contract down hole geophysical surveys were completed by mid-October by Surtron. Surveys completed included: resistivity-conductivity, magnetic susceptibility, radiometry and density on MRD-0100 and MRD-0101. Drill hole MRD-0102 could not be surveyed due to a blockage at ~30 m depth just below the casing. The sonic tool did not work again this year due to damage during mobilization. However; the acoustic tele-viewer was attempted over the top 150 m of MRD-0101 with varied, but limited success. Apparently this technique is good at determining the nature and orientation of open fractures and faults, but for healed fractures and veins it may be considerably less useful. Results for all down hole surveys are pending.

Geophysics

A vast amount of geophysics has been undertaken at the Myra project. Historical geophysical data has been compiled in this report; however, a large proportion could not be located or was found to be of poor quality. Consequently, Cameco has completed an array of geophysical surveys aimed at substantiate previous results and to generate new targets. The geophysics completed by Cameco includes: detailed airborne magnetics and radiometrics, airborne TEMPEST, airborne HyMap MkI, ground gravity and down-hole geophysics.

The historical geophysical work undertaken at Myra is summarised in the below table and available project scale maps are summarised in the below compilation figure.

Summary Table of Historical Geophysics

Compilation Map of Historical Project Scale Geophysics
Location Map showing Cameco Geophysics and Hyperspectral Surveys

Hyperspectral

HYMAP Introduction

The De Beers HYMAP Mark II instrument was built by Integrated Spectronics Pty. Ltd (ISPL) in 1996 and is a similar system to the Probe-1 and is a later version of the ISPL HYMAP scanner. It is a 96 channel, 3 spectrometer, whiskbroom scanner with a signal to noise ratio greater than 800:1. The scanner measures reflectance from the ground surface, with each spectrometer consisting of 32 channels with an approximate 15 nm spectral resolution; VNIR from 500 to 1000 nm, SWIR1 from 1400 to 1900 nm, and SWIR2 from 2000 to 2450 nm. While most of the geological information is detected by SWIR2 (clays, carbonates, sulphates, etc), the VNIR range can map Fe-oxides and hydroxides, vegetation, and general land cover. Although the most diagnostic spectral features are contained within specific windows or wavelength regions, full VNIR to SWIR spectral sampling is advantageous for properly correcting the data for atmospheric effects.

Gerard Zaluski, Geoscientist completed the HYMAP data interpretation in Saskatoon at Cameco Corporation Head Office.

The survey data was collected over EL 8568 (Myra) and EL 9029 (Kukalak) of the Myra Kukalak project between July 9 and July 11, 2000. The scanner was operated by M. Hornibrook (Spectral Geology Pty. Ltd.) flown aboard Kevron Aviations's Cessna 404 (VH-AZU). Sixteen alternating north-south and south-north flight lines of data were collected at a ground speed of 140 knots from an altitude of approximately 2800 m, providing a ground resolution of approximately 5.6 m. Relatively constant solar illumination was maintained by collecting the data near midday (between 10:06 AM. and 3:03 PM local time) with cloud cover less than or equal to 1/8. The following figure outlines the survey area.

Myra Kukalak HYMAP Coverage

HYMAP Processing

Processing of hyperspectral image data involves several major steps. Within each of these stages, a number of different processing approaches are possible. The spectral processing was all undertaken using ENVI 3.4 on the separate, non-georeferenced images. While this is a more laborious process, it is recommended over the use of endmembers derived from other images unless the lighting, atmospheric conditions, and atmospheric correction are nearly identical (Farrand, personal communication, 2001). Flight line data is also calibrated for radiance and converted to apparent reflectance using ACORN software which is a radioactive transfer based atmospheric correction program and uses the calibrated radiance data and information about the data acquisition conditions to model and remove atmospheric absorptions and scattering effects. The resultant data is then processed using ENVI to determine end members. ERMapper 6.1 was used for preparation and producing mosaics of the final images.

Endmember spectra were identified using spectral identification programs in ENVI. The main procedure used was Spectral Feature Fitting™ (SFF). It is a process that compares discrete absorption features of spectra with those of known minerals from a spectral library. This technique works well for minerals with diagnostic, strong absorption features such as clays and carbonates but it may be strongly affected by noise, particularly for spectra with only weak, broad absorption features. A limitation of this technique is that it focuses entirely on absorption features, entirely neglecting the rest of the spectrum.

HYMAP Results

The processing of HYMAP airborne hyperspectral scanner data over the Myra Kukalak project using standard hyperspectral processing techniques identified prominent clay patterns within the exposed Kombolgie Sandstone and nearby basement rocks.

Endmember processing identified seven clay and rock types within the project area. The abundances of these endmembers are displayed as psuedocolour images with blue being nil to low abundance and red being high abundance in the respective figures.

Illite

The endmember identified as illite is present in some of the sandstone outcrops of all of the flight lines. It is most easily identified by its narrow absorption feature near 2195 nm which suggests a paragonitic or sodium rich illite. This short wavelength position of the absorption feature of Kombolgie Sandstone illites has also been noted from PIMA spectroscopic analysis in other areas. The Na-rich composition of the illites is not supported by whole rock geochemistry of samples but it may possibly be due to Fe substitution for Al within the illites. At Cuprite, Nevada two different muscovites were identified from AVIRIS data as Na-montmorillonite and paragonite, apparently due to shifts in the position of the 2200 nm absorption band caused by variations in the Fe/Al ratio (Swayze *et al*, 1992).

Illite MTMF

The highest illite abundances are present within the Gumarrirnbang Sandstone. A significant zone of illite is present in the southeastern corner of the survey where the Ranger Fault crosses the Gumarrirnbang Sandstone. In contrast, the Mamadawerre Sandstone generally features very low illite contents, except for an area southeast of the Caramal Inlier and the basal unit exposed along the edges of the escarpment.

Significant zones of scattered illite are indicated in the lowlands near the escarpment edges. While much of this appears to be related to sandstone talus, some also appears to be basement material, exposed along the base of the escarpment. This is supported by field observations of considerable amounts of muscovite schist talus along the escarpment edge on the Myra project. In some areas it was observed that the sub-Kombolgie unconformity is located approximately 150 m above the base elevation of the Myra Falls Inlier. It may also be noted that weak illite distributions correspond to the basement ridges within the basement windows, presumably related to weathering of muscovite and feldspar bearing metamorphic rocks related to the Kudjumarndi Quartzite.

Long Wavelength Muscovite

Distinct from the illite is an illite/muscovite phase featuring a broader and longer wavelength absorption feature from 2192 to 2210 nm. This is within the range more typical of illite or muscovite and for purposes of this study has been named a long wavelength muscovite because of the slightly better developed secondary AlOH absorption features at 2425 nm. It is most prominent in the Kombolgie Sandstone and appears to often form mixtures with illite, suggesting that these phases may represent differing degrees of crystallinity or physical mixtures of the minerals. However, it is probably due, at least in part, to the difficulties of determining the sub-pixel proportions of these very similar endmembers within mixed spectra. Like the illite, this phase is most abundant in the Gumarrirnbang Sandstone and is abundant in the Kudjumarndi Quartzite basement ridges. However, unlike the illite, it is more abundant over the Tin Camp Granite in the Caramal Re-entrant area and has very low abundances in the basal portion of the Mamadawerre Sandstone.

Long Wavelength Muscovite MTMF

Illite2/Chlorite

This endmember features a weak absorption feature at 2210 nm and a second weak feature near 2365 nm. While this latter feature is too shallow to be diagnostic, its depth relative to the 2210 nm feature is sufficiently great that it is probably related to MgOH bond vibrations rather than secondary AlOH features. This is most likely indicative of Mg-bearing chlorites but could possibly represent high Mg content illite. Image pixels constituting this endmember are most often found mafic volcanics but some are found within the Kombolgie Sandstone. The relatively complex continuum shape of this spectrum suggests that it is likely a rock type rather than a discrete mineral phase. It shows a strong similarity in distribution to the mafic rock endmembers and therefore likely represents an alteration product of these mafic rocks. Although it shows weak distributions within the basement rocks, the strongest responses are identified in streambeds across areas underlain by Nungbalgarri Volcanics or Oenpelli Dolerite.

Illite2/Chlorite MTMF

Dickite

This endmember is widespread in the Kombolgie Sandstone and is characterized by a broad absorption feature from 2175 to 2210 nm that is interpreted as a poorly developed absorption doublet. This doublet is only rarely observed, most likely because it nears the spectral resolution of the HYMAP scanner but possibly also because it represents mixtures with small amounts of illitic clays or illite/kaosmectite weathering products. It is interpreted as dickite because of the deeper, better-developed absorption feature than the kaolinite endmember discussed below. Sandstone with this spectral signature has been verified to contain dominantly dickitic clays, identified by PIMA.

Dickite is most abundant within the Gumarrirnbang Sandstone remnants north of the Goomadeer River. Although some intermixtures with illite and/or long wavelength muscovite are present, the dickite usually occupies different sandstone units, apparently overlying the illitic unit. Dickite is present but generally exists in very minor within the Mamadawerre Sandstone.

Dickite MTMF

Kaolinite

This endmember is observed in sandstone outcrops of the Kombolgie plateau. It features a similar broad absorption feature from about 2175 to 2225 nm like the dickite endmember, but is usually a shallower feature. The absorption feature shows evidence of a weakly developed doublet with a greater depth for the longer wavelength feature, as is typical of kaolinite.

Kaolinite is present in low to moderate amounts in the Mamadawerre Sandstone. Within the Gumarrirnbang Sandstone, distributions are variable. Elevated values are observed within this unit in the eastern side of the survey area, north of the Ranger Fault. The highest values are observed in the lower sandstone along the south side of the Goomadeer River valley, proximal to the Oenpelli Dolerite intrusion. Some kaolinite is also indicated along the edges of the Cenozoic laterite overlying the Nungbalgarri Volcanics in the southeast part of the image.

Kaolinite MTMF

Goethitic Sand or Sandstone

This endmember is present in all of the flight lines, in both the clay-poor sandstones and in recent sands on the sandstone plateau. It features a high reflectance and a flat to gently concave spectral profile from about 2050 to 2250 nm. It has tentatively been termed goethitic sand or sandstone because it gives a relatively consistent, albeit only fair, match to goethite from the spectral library.

Goethitic sand and sandstone is relatively widespread in the area. It includes both sandstone bedrock exposures (especially in Myra) and sand cover on the plateau (especially in Kukalak). This endmember probably represents both ferruginous sandstone and pisolithic sands on the plateau since endmember pixels appear to be indicative of both materials. Sandstone values appear to be higher in the Mamadawerre than in the Gumarrirnbang Sandstone.

Goethitic Sand/Sandstone MTMF

Kaolinite/Halloysite Sand

This endmember bears some similarity to the general shape of the goethitic sand endmember and is mainly confined to surficial sediments in the valleys both on and off the plateau. It features a broad absorption feature suggestive of an absorption doublet from 2135 to 2200 nm. The increasing depth toward longer wavelength within this feature is typical of the shape of kaolinite spectra. It is interpreted as representing poorly consolidated, mixed sediments containing low crystallinity kaolinite because of the lack of sharpness in the absorption feature and its apparent tendency to form mixtures with Goethitic Sand. This phase appears to represent a discrete unit from the dickite and kaolinitic sandstone phases discussed above because they consistently are mapped in separate environments, however some confusion exists in endmember unmixed products.

Kaolinite/Halloysite Sand MTMF

Kaolinite/Muscovite Sand

Pixels belonging to this class are found in present day stream beds within basement exposures. The typical spectrum features high reflectance with a well defined absorption feature suggestive of muscovite. A component of kaolinite is possibly indicated by the width of the absorption feature. Muscovite-rich sands were observed within these areas on the Myra project. The kaolinite-muscovite bearing sands shown in are a very distinctive phase, being mapped almost exclusively to sand bars along the streams in the Myra Falls Inlier. This is consistent with field observations within the Myra project.

Kaolinite-Muscovite Sand MTMF

Kaolinite2 Sand

This endmember exhibits a broad but shallow absorption feature with a generally rounded shape, suggesting a mixture of low crystallinity clays. The width and wavelength range suggest a kaolinitic composition. Pixels with this spectral signature are found in the recent ferruginous sand cover (and possibly laterite) overlying what is interpreted as Nungbalgarri Volcanics on the plateau and some Cenozoic sand cover on the sandstone plateau.

Kaolinite2 Sand MTMF

Muscovite2 Sandstone

Muscovite2 is present as an endmember in only one flightline, CC3808. Pixels constituting the endmember are located in the Kombolgie Sandstone southwest of the Horn and along the eastern side of the Caramal Re-entrant on the Kukalak project. These spectra exhibit relatively high reflectance and a relatively broad, well-developed absorption feature from 2192 to 2209 nm similar to muscovite in basement rocks. It may be a variation of the long wavelength muscovite endmember.

Muscovite2 MTMF

Muscovite-Bearing Basement

This phase exhibits a well-defined absorption band from 2192 to 2209 nm interpreted as an AlOH absorption feature with weaker features at 2344 and 2425 nm (interpreted as secondary AlOH features). This is therefore interpreted as well crystalline muscovite schist endmember within Myra Falls Metamorphics basement rocks exposed in creek bottoms and on basement ridges within the basement exposures of the western half of the study area. This endmember is mapped virtually entirely to exposed bedrock within the basement areas, with no significant values on the sandstone. This phase is therefore easier to distinguish from mixtures than either the long wavelength muscovite or the illite.

Muscovite Basement MTMF

Mafic Rock 1and Mafic Rock 2

Pixels classified as Mafic Rock1 exhibit low reflectance and a lack of strong, diagnostic absorption features. Typical spectra show a flat to gently sloping profile from 2000 to 2200 nm with a significant drop in reflectance from 2200 to 2300 nm, followed by a relatively flat profile to longer wavelengths. This drop near 2300 nm is interpreted as broad, non-selective absorptions caused by Fe and Mg rich silicate rocks. This endmember may be indicative of either mafic metamorphic basement rocks or volcanic units and dolerites on the plateau. The most prominent signatures appear to correspond to exposures of the Nungbalgarri Volcanic Member (and probably also Oenpelli Dolerite) on the plateau and in streambeds across it. Also indicated are scattered exposures on the sandstone plateau, possibly either scattered erosional remnants of weathered volcanic rock or dark, ferruginous materials.

Mafic Rock1 MTMF

The Mafic Rock 2 endmember features general similarities to Mafic Rock 1, with a lack of diagnostic absorption features. Its low reflectance, weak hint of a broad absorption feature near 2325 nm, and the spatial distribution of the endmember pixels within zones underlain by either mafic volcanics or basement rocks suggest that it too is a mafic rock phase. Mafic Rock 2 endmember is also present along stream valleys through the mafic volcanics and intrusives but this endmember also shows weak values in the basement exposures. These may identify mafic varieties of the Myra Falls Metamorphics, Oenpelli Dolerite, or Zamu Dolerite within the basement. In reality, these endmember spectra display considerable variability and likely also map the different mafic units quite ambiguously. Both indicated endmembers are found in both basement and sandstone areas.

Mafic Rock2 MTMF

RGB and RGBI Images

Two geo-referenced, 3 band mosaics have been created for false colour composites of the study area. The HYMAP spectral Bands 73,79,87 figure shows the 2105 nm band as red, 2210 nm as green, and 2344 nm as blue. Phases with high reflectance in these ranges will look bright in the corresponding colour band whereas those with absorption features will appear dark. Therefore, vegetation will appear as green because of the local maximum near 2210 nm while clays will appear shades of red and magenta due to the presence of an absorption feature near 2210 nm. Bare rock and clay-poor soil will appear as bright tones due to relatively high reflectance in all bands. Some lithological differences can be seen in this image, with Gumarrirnbang Sandstone and Tin Camp Granite exhibiting a slight reddish colour (identifying lower reflectance in the green and blue bands or a steeper continuum slope) than the Mamadawerre Sandstone (whitish to grey colour).

Spectral Bands 73,79,87 as RGB

The image produces similar results to a colour infrared photograph (NIR as red, red as green, and green light as blue). This is very similar to the Landsat 4,3,1 or 4,3,2 as RGB combinations which were found to be very effective for lithological and land cover differentiation in the Arnhem Land region (Zaluski, 1998). In this combination, lush vegetation will appear bright red, drying and sparse vegetation as light red, sandstone outcrop as pale to medium blue, and Fe-rich materials and soils as green. In this combination, the distributions of the Nungbalgarri Volcanic Member and its overlying soils can be identified by the Fe-rich soils (green) surrounding vegetated areas (red) on the sandstone plateau. Oenpelli Dolerite underlain areas can be identified as darker green zones within the volcanic terrain. Sand cover on the plateau is indicated as the light brown to white patches.

Spectral Bands 20,10,3 as RGB

The distributions of long wavelength muscovite, dickite, and illite (in red, green, and blue respectively) are shown simultaneously in the Musc-Dick_Ill MTMF RGB figure. This rendition clearly shows the relationships between the distributions of the clays. In this image, relatively pure endmember clays are indicated by saturated primary colours of red, green, and blue respectively. Mixtures of two clays will be indicated by the mixing of these two primary colours, for instance, long wavelength muscovite plus dickite will be yellow, dickite plus illite will be cyan, and long wavelength muscovite plus illite will be magenta. Relatively high abundances of all three clays will be indicated by pastel to white tones. Although small areas exhibit mixtures of dickite with the K-bearing clays, in general, the relatively pure greens indicate that the dickite is generally present in different portions of the sandstone. The common abundance of magenta tones indicates that the illite and long wavelength muscovite are generally found together or are difficult to discriminate within the sandstone. The Tin Camp Granite located at the top of the Horn is characterized by muscovite (red) while the illitic basal Mamadawerre Sandstone is shown as blue.

Musc-Dick-Ill MTMF RGB

While this image portrays the clay distributions very well, it lacks topographic information, particularly off the plateau or in the areas underlain by volcanics. An effective way of showing these effects is by adding the topographic information of a single band image (in this case, band 73) as an intensity layer as shown in. The addition of the topographic information is very advantageous for showing the relationships between these clay endmembers and the lithologic units based on texture and weathering habit. One disadvantage of this technique is that the addition of the topographic information as an intensity variable makes the distinction of subtle mixture variations more difficult to recognize. Therefore, both types of images are necessary for a complete interpretation.

The Musc-Dick-Kaol MTMF RGB and Musc-Dick-Kaol MTMF RGBI images show the distributions of these three clays within the sandstone. The Gumarrirnbang Sandstone shows higher contents of clays than the Mamadawerre Sandstone. The former mainly consists of dickite and long wavelength muscovite while the latter exhibits generally low clay contents with a dominance of kaolinitic clays. It is presently unknown whether this is related to surface weathering or reflects matrix clay compositions. It is noteworthy that the strongest kaolinite signatures are found adjacent to the Oenpelli Dolerite intrusions, both along the Goomadeer River Valley at Kukalak and along the western side of the Caramal Inlier. A zone of muscovite and dickite is also present within the Mamadawerre Sandstone southeast of the Horn.

HYMAP Conclusions

The Kombolgie Sandstone within the study area includes both the upper and lower Kombolgie units (Ᵽhk$_1$ and Ᵽhk$_2$) on the Alligator Rivers mapsheet (BMR, 1983) or using the modern nomenclature, the Mamadawerre (Phe) and Gumarrirnbang (Ᵽhr) Sandstones as shown on the Milingimbi mapsheet (Carson *et al*., 1999). Between these units lies the Nungbalgarri Volcanic Member (Ᵽhn), widely distributed in subcrop on the plateau in Myra Kukalak (as interpreted by both BMR, 1983 and Carson *et al*., 1999) however, only very locally exposed due to the extensive ferruginous sand cover overlying it.

These stratigraphic subdivisions are also shown by the endmember abundance distributions from the HYMAP survey data. In general, the Gumarrirnbang Sandstone appears to contain more clay and less Fe-oxide than the Mamadawerre Sandstone, as was interpreted from Landsat by Zaluski (1998). Although intraformational variations in clay patterns appear to be less obvious than in the Birraduk and King River areas, some laterally continuous patterns do exist. It should be noted, however, that these distributions do not necessarily reflect bulk sandstone composition; they may have been significantly modified during diagenesis and/or alteration events because of the permeability properties of the units.

The very general clay and mineral patterns within a schematic section are shown in Myra Kukalak Schematic Cross-Section. The lowermost sandstone unit, exposed locally along the edges of the escarpment is dominantly illitic. This is overlain by a clay-poor sandstone unit, which gives a goethitic sandstone signature. This unit may possibly be similar to the goethitic, clay-poor upper sandstone unit observed at Birraduk. A kaolinitic clay signature is also present, however, this may be related to surface weathering. The poorly exposed Nungbalgarri Volcanic is typified by the mafic rock endmembers or where altered, the illite2/chlorite endmember. The Gumarrirnbang Sandstone appears to contain significantly higher clay contents than the lower unit. These include apparent mixtures of illite and muscovite as well as widespread dickite. Although some intermixing of these clay types is indicated, for the most part, these occur in separate units. While these are not strictly stratigraphically controlled, in general a zone of illite/muscovite underlies the dickitic sandstone.

These general patterns outline the most obvious aspects of the distributions but the individual clays may be present in many areas in low amounts. For example, although the dickite contents of the Mamadawerre Sandstone are generally very low, some dickite is present. This is known because of the existence of good dickite endmember spectra in virtually all of the flight lines, even those showing very low abundances in the MTMF unmixed images.

The distributions of the mafic volcanic and intrusive rocks are very limited because of their limited bedrock exposure. As shown in Mafic Rock Valley Outcrops, these rocks are well defined by the MTMF process where good outcrop exposures exist, such as along the Goomadeer River valley.

Oenpelli-Related Patterns

Despite the existence of Oenpelli Dolerite within the region, no pyrophyllite endmember was identified in any of the flight lines. In contrast, pyrophyllite was identified in the sandstone near the dolerite intrusions in both Birraduk (Zaluski, 2001b) and King River (Zaluski, 2001a). Oenpelli Related Clay Patterns shows the distributions of the long wavelength muscovite, dickite, and kaolinite (as red, green, and blue respectively) in relation to the Oenpelli Dolerite intrusions. The strongest clay signature proximal to the dolerite appears to be kaolinite, both along the Goomadeer River and along the western side of the Caramal Inlier. It is unknown whether the kaolinite is a hydrothermal alteration effect related to the dolerite, a later hydrothermal alteration effect, or whether it is a weathering product of precursor alteration phases.

The dolerite itself, although only poorly exposed, is not readily distinguished spectrally from the Nungbalgarri Volcanic Member, at least in the shortwave infrared wavelength region. However, the visual distinction that can be made from both VNIR bands of HYMAP data and Landsat suggests that these may be distinguished spectrally from the VNIR wavelength region.

On the basis of the known unconformity uranium deposits in the region, the alteration phases of interest would be muscovite (or illite) and chlorite. In addition, clay patterns associated with Athabasca Basin uranium mineralization often show abrupt changes in the dominant clay proportions. Therefore, the main features of interest would be chlorite and muscovite/illite signatures, especially those that are juxtaposed against dickite or kaolinite signatures within the same lithologic unit.

Potential areas of interest within the project bounds are shown in HYMAP Targets. This is not meant to be an exhaustive list, but rather, a recognition of some of the more obvious patterns. Several of these targets encompass or lie adjacent to known uranium occurrences (discussed below). Target 1 (shown over muscovite, dickite, illite RGB) is a zone of muscovite/illite alteration along the Ranger Fault that appears to crosscut a dickite background signature

Airborne Electromagnetics - TEMPEST

In 2002, Fugro Airborne Surveys Pty Ltd (Fugro) undertook a TEMPEST airborne electromagnetic survey over the whole of the Myra project. This is a high-powered time-domain system with a broad bandwidth, which enables good resolution of variations in resistivity and penetration through relatively thick sandstone. In addition, the airborne platform allows electromagnetic data to be acquired over areas where ground geophysics is impractical due to rugged topography. The survey was flown with the aim of providing 3-D electromagnetic data over a broad area to identify structure/alteration and in particular, infer the depth to the unconformity below sandstone. An alternative aim was to determine whether a historical electromagnetic anomaly at the Two Rocks prospect is real. The survey line spacing was 200 m and flying height was 120 m. A total of 256 line kms was flown. EMFlow has been used by Fugro to produce CDIs (Conductivity Depth Images) that have been combined by CIN3D processing to produce various 3-D renditions.

Logistics Report for TEMPEST

TEMPEST ZCDI (every 6th) Map

The TEMPEST system has been used in Arnhem Land over the past two years. From this experience several conclusions can be made:

- A weakly conductive semi-horizontal feature is consistently identified from line to line below the sandstone. This feature has been named the "conductive unconformity" since its position is defined by a resistivity contrast caused by alteration surrounding the unconformity and may not in fact be the location of the true unconformity.
- Generally the TEMPEST conductive unconformity is within +/- 30 m of the true unconformity. However, the presence of Oenpelli Dolerite and cover may complicate the response since both of these units may actually be conductive or resistive.
- At this stage the increased conductivity at the unconformity cannot be related to a specific type of alteration observed from drilling (i.e. clay or

hematite). Instead, we can merely assume that it is due to physical property changes at the unconformity, which could for instance be due to alteration or paleo-regolith.

- It is important when interpreting the TEMPEST data to:
    - Observe the x and z component data since these couple differently (z component is generally best for horizontal features),
    - Apply linear and log colour schemes due to the large and variable range in conductivities, and
    - Confirm the consistency of features from line to line to avoid errors introduced by the inversion.

Historical Electromagnetic Surveys

In 1987, a Barringer airborne INPUT survey (Geoterrex Pty Ltd) was flown over the Myra project using 700 m line spacing and 60 m bird terrain clearance. Some bedrock conductors were located within the known zone of Myra Falls Metamorphics:

- Zone 1: believed to be a formational conductor extending 4 km in a west-east direction;
- Zone 2 and Zone 3 were isolated conductors believed to be graphitic; and
- Zone 4 was a broad zone interpreted to reflect flat lying sediments.

Unfortunately, the digital data cannot be sourced and the location of these conductors is unknown since the coordinates were reported according to flight line fiducials. During the 1998-1999 field season ground EM-37 surveys were conducted that are believed to have targeted these anomalies. The specifications employed were 300x600 m transmitter with 50 m receiver loops. These surveys were conducted in the Kombolgie sandstone within the Khyber Pass and Kudjumarndi areas and failed to confirm the presence of any basement conductors. Once again there is no digital EM-37 data available to confirm the results.

Four orientation SIROTEM ground electromagnetic surveys have been conducted over the Two Rocks prospect, however, discrete bedrock conductors have not been identified.

In 1997, an airborne DIGHEM (Geoterrex Pty Ltd) survey flown over the Tin Camp Ck project included tie lines over the Myra project. One of these west-east tie lines indicates a conductive response at the Two Rocks prospect. M. Hallett (Geoterrex pers. comm. 2001) believes that this is an unusual conductive zone greater than 100m wide (rather than a discrete conductor), which is shallow dipping within a highly conductive area (5 ohmm for 56khz frequency).

Myra Unconformity Elevation and Structure

A weakly conductive semi-horizontal feature is clearly identified by the TEMPEST below the sandstone outliers at Myra project, which has been called the conductive unconformity. One of the primary TEMPEST products is the CIN3D elevation of top of conductive unit (using the z-component). This product allows the elevation of the conductive unconformity to be approximated in 3D, which is likely to be an underestimation of the actual unconformity elevation. At Myra Project (and elsewhere in Arnhem Land) the TEMPEST data indicates that the sandstone often has a lozenge shape. That is, as you move away from the escarpment edge (towards the sandstone) the interpreted unconformity elevation decreases inversely with the increased sandstone elevation. This is likely to be related to post sandstone warping and preferential weathering of the resulting basement (and sometimes dolerite) highs. However, more catastrophic structural changes (such as faulting) should not be discounted in some areas.

According to the conductive unconformity elevation inferred from the TEMPEST data, the sandstone at Myra can be divided into blocks by the northerly trending Khyber Pass Fault and the west-east trending Myra Fault Zone. Broadly, the northwest, northeast and southeast blocks have unconformity elevations of approximately 50m, -100m and 100m respectively (deepening to the northeast).

Across the Khyber Pass Fault the elevation change is gradual, approximately 100m over a distance of 1km. The TEMPEST does not indicate significant vertical offsetting of this interpreted structure. In contrast, the unconformity elevation change associated with the Myra Fault Zone is more dramatic. It decreases in elevation by 200m across a distance of 200m, which is also more dramatic than the unconformity elevation change that usually occurs at the edge of sandstone outliers. There is a strong contrast in magnetics across the Myra Fault Zone providing additional evidence of major kinematic movement. Further investigation of the Myra Fault Zone is warranted to determine whether the RAB drilling in the area has fully tested the prospectivity of the structure.

The conductive unconformity elevation from the TEMPEST indicates that although the southeast sandstone block (off-property) has a relatively high elevation there is also a localized basin low approximately 1.4 km in diameter. It is unknown whether this localised basin is partially controlled by Tin Camp Granite mapped in the area.

Surface mapping in the northeast corner of the project has identified the presence of the Nungbalgarri Volcanic Member. According to the TEMPEST data the Mamadewerre sandstone is approximate >300m thick at this location, which is it's thickest point for the survey.

There are no major conductive unconformity elevation changes occurring away from the sandstone edge that can be interpreted as structures. The Myra Fault Zone is indicated to be a major structure according to the TEMPEST, although the effect of warping along the edge of the sandstone cannot be discounted. It is recommended that the significance of this structure should be reviewed, although the sandstone is not thought to be anomalous in geochemistry or clays (interpreted hyperspectral).

Geology with TEMPEST CDIs and Conductivity Unconformity Elevation Contours

Conductors

The CIN3D conductance grid is the primary dataset for interpreting conductors. The main conductive feature at Myra is elongate within the basement inlier, stretching northeast at the Two Rocks prospect and bending eastward along the Myra Fault Zone. The response is relatively weak (<1 S), however, it is a distinct feature when compared with the background. This feature is discussed in the Two Rocks prospect section below. Directly south of the Khyber Pass prospect the west east conductive response centred on the Myra Fault Zone appears to be terminated by the inferred Khyber Pass Fault providing further evidence that the Khyber Pass Fault is a major fault with possibly possible offset.

MR-COND1

The Myra TEMPEST survey slightly overflew the northern part of the Myra project boundary. Consequently, the most northerly line (Line 10010 west-east) is actually situated within the Tin Camp Creek EL 2505. A moderate conductor (6 mS/m) named MR_COND1 is located on this line within sandstone terrain approximately 3 kms northwest of Kudjumarndi Prospect. It is apparent in both the x and z component data, open to the north and progressively weakens on the two lines to the south. The body is interpreted to:

- Have a northerly strike (no similar feature is present in the nearby northerly tie-line),
- Dip to the east at approximately 38^o,
- Be contained within the basement below the inferred unconformity estimated to be 125m below surface (conductive unconformity).

MR_COND1 may represent alteration (or graphite) associated with a northerly structure similar in orientation to the Khyber Pass Fault. A major structure may be indicated by historical gravity (Becker, 1991), however, magnetic and satellite data fail to confirm such an interpretation and there is no surface radiometric anomaly or hyperspectral clay (hyperspectral) anomaly. A less prospective alternative is that MR_COND1 is lithological. For instance, it could represent a conductive sulphide-rich portion of the Lower Cahill Formation similar to the intersection at Tin Camp Ck in drill-hole EMA001 (Moreau, 2002).

It is recommended that this basement conductor be drill tested. However, prior to drill testing the following should be considered:

- The current TEMPEST coverage could be extended north to establish the strike length of conductor, which is currently open.
- Ground electromagnetics and additional TEMPEST north-south tie-lines could be considered in order to further constrain the anomaly's geometry.
- Surface prospecting, geochemistry and structural analysis could be undertaken to confirm that there is no surface uranium or clay anomalies and identify any kinematic indicators.

MR_Cond1 is within the Tin Camp Creek project and therefore should be considered as a Tin Camp Creek project target.

Tin Camp Creek Project Conductor - MR_Cond1

Two Rocks Prospect

There is a prominent TEMPEST conductance response at the Two Rocks prospect, which is orientated northeast. CDIs indicate that this feature is surficial and correlates with the Two Rocks Unit, which has been mapped by drilling. The Two Rocks Unit is a local facies of the Lower Cahill Formation comprising of calc-silicate gneisses, thin marbles, garnet-rich schists, biotite gneiss, mica schist, graphitic-pyritic schists, quartzite and amphibolites. It is interpreted that the increased surface conductivity is due to an increase in conductive clays associated with alteration or weathering of the Two Rocks Unit, since other occurrences of this unit fail to have a similar response. However, the Two Rocks Unit is known to have graphite and sulphide rich zones (Moreau, 2002), which could also provide a conductive response.

In 2002, preliminary TEMPEST (x-component only) and preliminary gravity data was utilized to target drill hole MRD0100. The hole was planned to intersect a semi-vertical (dipping to the west) moderately conductive feature, which is coincident with a gravity low extending from the Two Rocks mineralisation. In addition, a northwest trending magnetic linear is also known to occur in the area. The hole intersected favourable Lower Cahill Formation in the upper 44.25 m. However, it failed to intersect any significant hydrothermal alteration or anomalous geochemistry. No further work is planned since the prospectivity of the area has been downgraded by the present drilling results.

Two Rocks Prospect Comparison of Drilling with TEMPEST CDIs
Two Rocks Prospect Geophysics Compilation
Two Rocks Prospect Geophysics of MRD0100

Unfortunately, the 2002 drilling has not explained the weakly resistive TEMPEST features in the basement at the Two Rocks prospect. The digitising of historical drill hole data is currently ongoing. If this data becomes available in the future then further comparison with TEMPEST is warranted. In particular, further work should be aimed at explaining the deep conductive basement features in the Two Rocks area.

Magnetics and Radiometrics

In 1986 an airborne magnetic and radiometric survey was undertaken over Myra Project at a flying height of 80m and a line spacing of 150m. The project was re-flown in 2001, since the 1986 survey was poorly levelled. The new survey was undertaken by UTS Geophysics Pty Ltd (UTS) and totalled 1066 line kilometres. The survey was flown at 50 m line spacing and 30 m flying height.

Airborne Geophysics Logistics Report by UTS

Airborne Magnetics – Reduced to Pole (RTP) with 1st Vertical Derivative (1VD)
Airborne Radiometrics – Total Counts (TC)

Airborne Radiometrics – Potassium (K)
Airborne Radiometrics – Uranium (U)
Airborne Radiometrics – Thorium (Th)
Airborne Radiometrics – RGB=U,Th,K
Airborne DTM – Height with NE Sun Angle

Historical Magnetics

An airborne and ground magnetic interpretation was undertaken by Barrett (1987), which was supplemented by physical property measurements shown in the attached Table 2. The report concluded that whilst the magnetic variations are extremely low (<10 nT), some lithological and structural information could be inferred. In particular it was determined that:

- The main magnetic features are due to variations in amphibolite content,
- Surface effects such as laterite contribute to the high frequency effects,
- There are at least two major northerly trending faults that are located in the Two Rocks and Kyber Pass areas,
- Tremolite-rich schist units (that are magnetic) occur in places at Myra, however, the lack of strong airborne magnetic signatures imply that they have relatively small dimensions,
- Although pure quartzite is non-magnetic the Kudjumarndi Quartzite is magnetic in places due to amphibolite rich zones, and
- The occurrences of Oenpelli Dolerite cannot be linked to magnetic anomalies.

TABLE 2

PHYSICAL PROPERTIES OF SOME ROCKS IN THE PINE CREEK GEOSYNCLINE

ROCK TYPE	DENSITY (t/m^3)	MAGNETIC MINERAL	TYPICAL ANOMALY (nT)	SUSCEP. (SI)	KOENIGS-BERGER RATIO *
L. CAHILL	2.8	MAGNETITE	10		
U. CAHILL	2.8?	MAGNETITE	200	.005-.16	<1
KOOLPIN	2.82	PYRRHOTITE	200	.002-.06	12-185
OENPELLI	2.9?	MAGNETITE	500	.015	2
ZAMU	2.98	PYRRHOTITE	30	.0006-.00	216-44
NUMBALGARRI			70		
ARCHAEAN	2.65		<10		
YOUNG GRANITES	2.65		<10		
KOMBOLGIE SS	2.63		<5		

$$* \quad \text{KOENIGSBERGER RATIO} = \frac{\text{REMANENT MAGNETISATION}}{\text{INDUCED MAGNETISATION}}$$

Cameco Magnetics

The interpretation work completed by Barrett (1987) can be used as the basis for interpreting the present UTS survey, rather than undertaken a separate new magnetic interpretation. However, the UTS magnetics should been utilised to update the ongoing geology interpretation map used by Cameco. Some of the features not previously noted by the interpretation by Barrett are:

- Khyber Pass appears to be a magnetically quiet zone, which may be due to demagnetisation,
- A west east trending dyke through the centre of the project is interpreted to be Oenpelli Dolerite due to it's negative polarity, and
- A northwest-demagnetised structure appears to go through the southern part of the Two Rocks prospect near drill hole MRD0100.

Cameco Magnetics with Historical Interpretation

Radiometrics

UAL were involvedompanies who previously operated the Myra project before Cameco's involvement have followed up at least 48 airborne radiometric anomalies.

Historical Radiometric Anomalies with Cameco Radiometric Data

Gravity

In 2001, Fugro Ground Surveys Pty Ltd undertook ground gravity on behalf of Cameco. The survey was aimed at confirming the historical Two Rocks gravity low and extending coverage over the southern part of the project to assist with lithological mapping and the identification of structures (and alteration). The Two Rocks gravity was conducted at 50 m stations and 200 m lines, which was extended at 100 m stations and 400 m lines. The survey totalled 341 stations and was terrain corrected using a DTM from the abovementioned 50 m line spaced airborne geophysics.

Gravity Logistics report by Fugro Pty Ltd

Gravity Map - Terrain Corrected 1st Order Residual
Historical and Cameco Gravity with UAL Modelling

Historical Gravity

Uranerz Pty Ltd has completed some historical gravity surveys at Myra project. However, the data is not available in digital format for reprocessing.

A historical gravity contour map by Becker (1991) shows the Bouger and residual gravity (terrain corrected) contours along with a basic interpretation. The survey covers the northern 2/3 of the project (north of the Two Rocks prospect) at a station spacing of approximately 300 m. The survey is dominated by a strong gradient from 6 mgal (60 gu) in the west to –5 mgal (-50 gu) in the east, which is attributed to Tin Camp Granite. Some features of the data and interpretation are:

- A north-northwest fault has been postulated just west of Khyber Pass prospect.
- Modelling has been used to confirm that a dense body is likely to be present below the sandstone in the northern part of the project. The model fit was achieved using a dense body 1.92 g/cc more than the Lower Cahill Formation body, which is reported to have a mean density of 2.73 g/cc. It is postulated that this body could be due to amphibolite rich Cahill Formation, since Oenpelli Dolerite is not indicated by the magnetics.

A separate historical gravity survey has also been conducted over the Two Rocks prospect along west east lines at 100 x 200 m stations). Bruneton (1993) reports that:

- A prominent north-northeast trending gravity high is present along the eastern portion of the area coincident with several low order magnetic anomalies suggested by modelling to be wedges of higher density amphibolite (thinning to the east and dipping 12 deg).
- A west-east gravity high is attributed to a dolerite dyke, however this has not been confirmed by drilling.

It is interesting to note that the abovementioned report fails to recognise the northeast trending gravity low, which correlates well with the identified chlorite-sericite-hematite alteration and mineralisation defined by historical drilling.

Cameco Gravity

A strong gravity gradient occurs in the 2001 gravity survey from approximately 21 mgal in the west to less than 16 mgal in the east (over a distance of 4.5 km). This is likely to be controlled by deep-seated Tin Camp Granites, which outcrop within the project. Polynomials have been used to remove this regional trend, allowing shallower features to be more readily identified. The residual gravity appears to be dominated by three lows:

- Northerly trending low along the western edge of the tenement,
- Northeast trending low through the Two Rock prospect, and
- A low in the east of the survey.

The eastern low is believed to be lithological and is attributed to shallow Tin Camp Creek granite, which is known to outcrop in the eastern part of the project. The other two lows are interpreted to be due to alteration and are discussed in more detail below.

Two Rocks Gravity

Perhaps the most prominent feature in this survey is a northeast trending gravity low at the Two Rocks prospect, which decreases by 1 mgal and is open to the north and south. The gravity low is interpreted to be due to chlorite-sericite-hematite alteration, which has been defined by historical drilling. However, it possible that Kudjumarndi Quartzite could also have some bearing on the response. The main zone of mineralisation at Two Rocks prospect is located at MRD0101. The gravity low is slightly less pronounced at this location despite increased alteration intensity. Gravity highs to the west and east of the Two Rocks gravity low may indicate the presence of some northwest features running through the main mineralised zone.

Modelling of the Two Rocks gravity low was undertaken in 2001 on Line 2060, which are approximately 300m north of hole MRD0100. Modelling was achieved using a 2.5 g/cc body within a 2.67 g/cc host that is 143m wide and dips steeply to the west. This modelling indicates that although the dip cannot be firmly established the response could indeed be the result of alteration associated with a steeply dipping structure. This interpretation compares favourably with the TEMPEST, which indicates a sub-vertical (westerly dipping) weakly conductive feature that extends from the surface to depth (especially in the x-component).

Two Rocks Gravity Modelling with TEMPEST

Northerly Trending Low in the West

The 2001 gravity shows a decreased response of approximately .8 mgal along the western edge of the exploration licence, which is not fully delineated by the current coverage. This feature is analogous to the signature at the Two Rocks prospect and may represent a north-northeast trending structurally controlled alteration of the Lower Cahill Formation. The gravity low corresponds with a major structure clearly observable in the magnetics and confirmed by a hematite quartz breccia shown on the 1:15,000 scale mapping. Further prospectivity evaluation of this structure should be considered. Follow-up could consist of the following.

- Systematic sampling could be undertaken of exposed basement and exposed hematite breccia.
- The structure could be walked to determine whether kinematic indicators are present.

In July 2003, G. Zaluski processed the VNIR portion of the Myra project HyMap MkI with the aim of determining whether hematite is associated with the gravity low and postulated structure. He failed to identify any anomalous hematite and reports that there are no SWIR or VNIR anomalies that can be associated with this structure. However, he does question the credibility of the VNIR interpretation because of the lack of field-testing, field spectra and difficulties with distinguishing end-members (Zaluski, 2003).

Down Hole Geophysics

In October 2002, Surtron Technologies Pty Ltd (Surtron) undertook down-hole geophysics on behalf of Cameco at the Two Rocks Prospect. The aim of the program was to increase the physical property database and to determine whether physical property changes could be associated with uranium mineralisation. Surtron logged holes MRD0100 (300m) and MRD0101 (180m) for a total of 480 m. An attempt was made to log hole MRD102, which could not be surveyed due to a blockage at 29 m. Parameters surveyed were natural gamma, magnetic susceptibility, density, inductive conductivity, and multi-parameter resistivity. A test acoustic televiewer survey was undertaken on hole MRD0101from 38-150m. Upon mobilisation to site, the full waveform sonic tool was found to be unserviceable therefore no velocity data could be acquired.

Logistics Report by Surtron

MRD0100 – Down Hole Geophysics Figure
MRD0101 – Down Hole Geophysics Figure

Unfortunately, the down-hole geophysics has failed to identify any diagnostic physical property changes that can be utilised to identify the vein mineralisation encountered in MRD0101. The gamma spikes associated with the mineralisation can be related to inverse spikes in the density. However, it is probable that these density readings are actually spurious, resulting from natural gamma rays originating from the mineralisation rather than the tool.

The broader alteration assemblage in MRD0101 consists of increased chlorite, hematite and sericite. Altered Kudjumarndi Quartzite and Mt Howship Gneiss averages 310 ohmm and is far less resistive than their unaltered equivalents in hole MRD0100, which average greater then 4000 ohmm (the tools resistivity limit). It is interesting to note that the resistivity patterns the down-hole resistivity data cannot be reconciled to the TEMPEST CDIs. A conductivity spike occurs at 45.1 m in hole MRD0101 with an amplitude of 859 mohm/m and is attributed to copper mineralisation associated with observed chalcopyrite.

MRD0100 – Down Hole Electromagnetics with TEMPEST CDI
MRD0101 – Down Hole Electromagnetics with TEMPEST CDI

The most intense zone of alteration occurs in MRD0101 around the mineralisation and may relate to a marginal increase in density from 2.64 to 2.83 g/cc. However, zones averaging 2.99 g/cc are common in MRD0100 and are believed to represent amphibolitic zones primarily occurring within the quartzite.

Geophysics Conclusions

A vast amount of geophysics has been undertaken at the Myra project. Historical geophysical data has been compiled in this report; however, a large proportion could not be located or was found to be of poor quality. Consequently, Cameco has completed an array of geophysical surveys aimed at substantiate previous results and to generate new targets. The geophysics completed by Cameco includes: detailed airborne magnetics and radiometrics, airborne TEMPEST, airborne HyMap MkI, ground gravity and down-hole geophysics.

Several new targets have been generated, which are shown in the attached figure. These targets should be reviewed to determine whether further follow-up and testing is warranted.

1) Hyperspectral data indicates that the sandstone surrounding the Khyber Pass fault is anomalous in muscovite.
2) TEMPEST indicates that the Myra Fault Zone has significant displacement (up 200m across a distance of 200m). Some of the Myra Fault Zone is within the Myra project, however, it extends east into the Tin Camp Ck project.
3) Within basement south of the Khyber Pass, displacement of the Khyber Pass fault may be indicated by the termination of an easterly trending TEMPEST conductive feature.
4) A TEMPEST conductor has been identified at the unconformity below Kombolgie Subgroup sandstone, which may represent alteration. However, it is outside of the Myra Project within a Tin Camp Ck exploration licence and is therefore not a Myra project target.
5) Gravity indicates that some northwest trending structures may be present at the Two Rocks prospect including a structure running through the main mineralisation at drill hole MRD0101.
6) In the southwest a northerly trending gravity low has been identified, which corresponds to a known structure and has a similar signature to northeast trending gravity low at Two Rocks prospect (attributed to alteration).

The most prospective area within the Myra project is the Two Rocks prospect where drilling has encountered mineralisation and alteration. Both TEMPEST and gravity may be responding to the alteration at Two Rocks, however, lithological and structural factors cannot be discounted. The digitising of historical drill hole data is currently ongoing. If this data becomes available in the future then further comparison with the geophysics is warranted. In particular, further work should be aimed at explaining the deep conductive basement features in the Two Rocks area, which may be used for further targeting elsewhere in the project area.

Geophysical Targets for Consideration

CONCLUSIONS

The potential of the Two Rocks area has been enhanced after the discovery of a pitchblende vein that appears to be sub-parallel to regional steeply dipping north-north-westerly structures and lineaments observed in outcrop. Although anomalous in historical drilling, the best intercept on this drill section previously was from a 1 m interval sample from an Afmex hole that contained 65 ppm Uranium.

The local stratigraphy of the Cahill group equivalent basement rocks has been confirmed as well as the inferred anticlinal structure immediately at Two Rocks. A fault located east of the Two Rocks area must exist to juxtapose Cahill rocks next to Mount Howship Gneiss. The exact location has yet to be determined. Geophysical survey results (gravity, TEMPEST) and future RAB work will aid in locating this fault.

The gravity low feature observed at south Myra that extends from the Two Rocks area southwest towards the EL boundary is most likely the result of 'recent' surface weathering rather than due to alteration proximal to a structure. Results from drill hole MRD-0100 indicate that although there is a thick layer of intensely altered rock, weathering is the primary cause. Immediately below the intense weathering the basement rocks become very fresh very suddenly.

The Kyber Pass lineament is more than likely an actual structure with east side down displacement from TEMPEST results. Observations of quartz brecciation and silicification/de-silicification alteration to the north of Myra along the Kyber Pass trend on Afmex ground also suggest that this is a real structure.

An east-west trending fault has been interpreted from TEMPEST work in the area immediately south of the sandstone escarpment in the central northern portion of Myra. Although the attitude of this structure is unknown, it is known that the north side is down-dropped relative to the south side to a larger degree than previously thought. The majority of this movement is thought to be post-Kombolgie based upon a variety of geophysical (TEMPEST), outcrop (sandstone bedding and paleocurrents) and looking at the sub-Kombolgie unconformity depths from historical diamond drilling.

RECOMMENDATIONS

All attempts should be made to drill test the Kyber Pass target that was not completed in 2002. The target remains valid, but may require expensive helicopter-assisted drilling for access.

The mineralisation at Two Rocks should be followed up with additional diamond drill holes targeting potential additional steeply east dipping veins and areal anomalism in Cu from historical work.

The fault juxtaposition of Mount Howship gneiss and Cahill calc-silicate rocks should be located and drill tested to determine the nature of this structure. Once the structure is unravelled, targeting potential mineralisation along this fault will be easier.

Additional semi-regional to detailed sampling should be planned for sandstone areas tracing favourable structures and lithologies from the basement inlier outward into areas of Kombolgie cover.

WORK PROGRAM FOR 2002 - 2003 (2nd YEAR)

A RAB drilling program is planned for four lines (approximately 50 holes) in the Two Rocks area to map basement stratigraphy and ideally locate the contact between the Cahill pelitic and calc-silicate rocks and the Mount Howship gneiss. These units must be in fault contact and determining the location of this fault will be important for future diamond drilling to determine the orientation and style of this fault.

Three diamond drill holes are planned in two areas on the Myra tenement. Two drill holes will be completed at the Two Rocks area stepping towards the north and south of the mineralised drill hole from 2002 (MRD-0101). These will attempt to intersect sub-vertical veins and structures interpreted from the single mineralised vein discovered in 2002. One drill hole is planned for the Kyber Pass area in the northeastern central portion of the Myra tenement. This drill hole was planned for 2002 and could not be reached by wheeled drill rig due to logistical problems with the drill contractor associated with the steep and rugged terrain. The target is an interpreted jog in the north-south feature represented by the Kyber Pass lineament valley that is trends directly to the Nabarlek deposit some 15 to 20 km to the north.

Additional field investigations comprising sampling and structural element mapping will also occur in areas of anomalous lithogeochemistry as well as target areas outlined from geophysical surveys. The main areas of interest for such investigations occur in western Myra from within the Myra high towards the northwest under Kombolgie sandstone cover.

Proposed expenditure on the Myra portion of the Myra Kukalak project is expected to be half of the overall project budget. EL 23461 expenditures for the 2003 reporting period are expected to be $250,000 to complete the proposed exploration program.

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