



**northern**minerals

**SUPLEJACK PROJECT**

**ANNUAL TECHNICAL REPORT for the period**

**14<sup>th</sup> March 2013 to 13<sup>th</sup> March 2013**

**Exploration Licenses EL27368 & EL29620**

**OPERATED BY**

**NORTHERN MINERALS LIMITED**

ANNUAL REPORT

NUMBER	GR074-13
NAME	SUPLEJACK PROJECT - ANNUAL TECHNICAL REPORT Exploration Licenses EL27368 & EL29620
DUE DATE	13-May-2014
PREPARED BY	Kurt Warburton
DATE	08-May-2014
NTU-REPORT NO	2014-11
TARGET COMMODITIES	Heavy rare earths
NT 1:100,000 Sheet	4758 "Pargee, 4858"Tanami"
NT1:250,000 Sheet	SE5215 "Tanami"

**Abstract:**

The Suplejack project currently comprises of tenements EL27368 and EL29620. EL27368 was granted on the 29/12/2009, and EL29620 on the 04/04/2013. Tenement EL23934 was surrendered during the 2013.

The project is located along the northern edge of the Palaeo-Proterozoic Coomarie Dome, formed by the intrusion of granitic units circa 1815 Ma. The surrounding units include the deformed Palaeo-Proterozoic Tanami and Macfarlane Peak Groups. Each of these units has been eroded and covered by the Mesoproterozoic Birrindudu Basin (Gardiner Sandstone, Talbot Well Formation and Coomarie Sandstone). Much of the surface geology is covered with Tertiary duricrusts, mainly calcrete, and unconsolidated Quaternary sediments.

During the reporting period, no field work was completed on either tenement. A review of hyperspectral data acquired over EL27368 during 2012 was undertaken to identify targets for ground based reconnaissance work. Minerals that are potentially indicative of hydrothermal processes were identified, for which field checks are recommended.

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**Declaration**

To the best of our knowledge, this document conforms to the format outline for an annual report, as shown by the Northern Territory Geological Survey- Minerals and Energy Division website.

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## **1. INTRODUCTION**

The Suplejack project, also referred to as the Tanami–Granites project, originally comprised of Exploration Licenses (EL) 23934, 24178 and 24166. Group reporting status was granted for the project on the 25th May 2007.

Exploration License 23934 was granted to Norman McCleary on 13 February 2004, whilst EL24178 and EL24166 were granted to Norman McCleary on 10 February 2005. Ferrum Crescent Limited (FCL) (formerly known as Washington Resources Limited (WRL)) became the registered holder having purchased a 100% interest following listing of the Company on the ASX on 14 November 2005. On 11th May, 2006 Polaris Metals NL and Washington Resources Limited announced their intention to combine uranium assets, to form a new dedicated uranium company, Northern Uranium Ltd, to be funded through an initial public offering (“IPO”) and new listing on the ASX. Subsequently on the 2nd August 2006 the Uranium Tenements and Uranium Rights Assignment Deed was signed by Polaris Metals, Washington Resources and Northern Uranium, whereby certain uranium rights and uranium tenements of Washington Resources and Polaris Metals would be vested into Northern Uranium in exchange for shares in Northern Uranium. Under the terms of the Uranium Tenements and Uranium Rights Assignment Deed, the Suplejack Project tenements would remain in the name of, and the non-uranium rights are retained by, Washington Resources Limited.

On 15th November 2006, Northern Uranium Limited was listed on the Australian Stock Exchange having completed an Initial Public Offer and raising \$4 million for the purposes of exploring and developing uranium deposits on tenements which include the Suplejack Project.

EL27368 was granted to Northern Uranium on the 29th December 2009. On the 27 June 2011 approval was granted by the Northern Territory Department of Resources for EL27368 to be included with the aforementioned tenements for group reporting purposes (reference number GR-074/09).

Washington Resources underwent a name change to Ferrum Crescent Limited following a merger with a private company of the same name in December 2009. Northern Uranium underwent a name change in February 2011 to Northern Minerals.

Northern Minerals acquired the non-uranium rights to the tenements in early 2011, and the tenements were transferred into the name of Northern Minerals on the 26<sup>th</sup> May 2011.

In 2012, Northern Minerals surrendered tenements EL24166 and EL24178. Tenement EL29620 was granted on the 4<sup>th</sup> May 2013, and approval for this tenement to be added the combined reported group approved by the Department of Mines and Energy on the 6<sup>th</sup> September 2013 (GR074-13). Tenement EL23934 was surrendered in late 2013.

## **2. LOCATION & ACCESS**

The project area is located approximated 600km northwest of Alice Springs within the Suplejack pastoral lease. The tenements are approximately 40 km north of Tanami, 468 km west of Tennant Creek and 260 km south west from Kalkarindji. The Tanami 1:250,000 map

sheet (SE5215) covers the two tenement areas. There are three 1:100,000 map sheets which cover the tenements; Pargee (4758), Breaden (4859) and Tanami (4858).

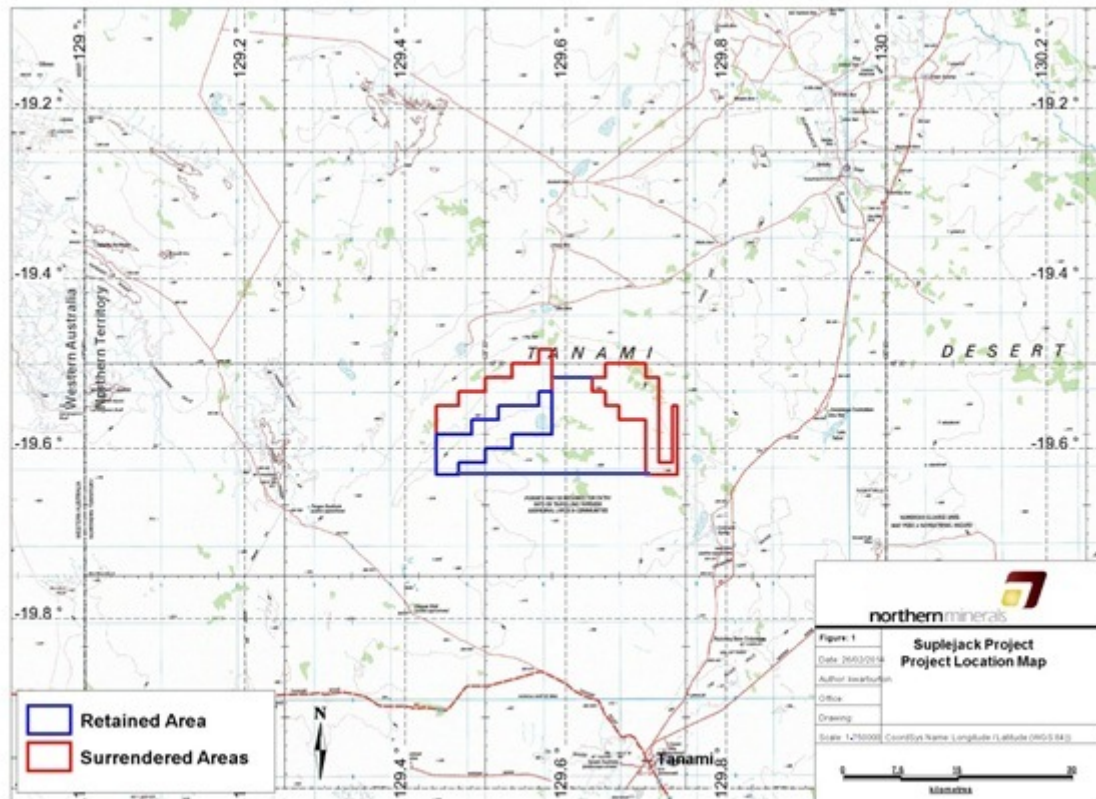


Figure 1: Location of Tenements

Access to the project from Alice Springs is northwest via the Tanami road for approximately 600km to the Tanami Gold Mine, then north-northeast for approximately 90km along the Lajamanu road to Suplejack Station homestead. Access from Suplejack Station homestead is via a limited number of station tracks heading westwards.

### 3. TENURE

The Project area currently consists of tenement EL27368, which contains 23 blocks and covers an area of 70 km<sup>2</sup>, and EL29620 which contains 55 blocks and covers an area of 171km<sup>2</sup>. During 2013, a compulsory 50% partial surrender was required for EL27368 totalling 23 blocks.

The current tenement schedule is outlined in Table 1.

Table 1: Tenement Schedule (February 2014)

Tenement	Tenement No.	Area (Blocks)	Blocks Relinquished	Grant Date	Expiry Date
Suplejack Project	EL27368	23	23	29/12/2009	28/12/2015
Suplejack Project	EL29620	55	0	04/04/2013	03/04/2019

### 1. REGIONAL GEOLOGY

In the Tanami Region, one of the most important tectonic units in the North Australian Craton, the stratigraphic succession shows similarities with the Pine Creek and Halls Creek Orogens, other Paleoproterozoic successions in northern Australia.

Within the region, the MacFarlane Peak Group, which is interpreted to be the basal unit of the Paleoproterozoic sequence, is dominated by volcanic and volcanoclastic rocks, along with clastic and calc-silicate sediments. These are overlain by siltstone, carbonaceous shale, calc silicates and BIF of the Dead Bullock Formation. This in turn is overlain by a thick sequence of turbidites, the Killi Killi Formation. Interbedded siltstone, greywacke and chert west of Tanami are included in the Twigg Formation. The latter three units are grouped together in the Tanami Group.

The Pargee Sandstone and the Mount Charles Formation occur in small extensional basins. A period of wider extension follows, accompanied by felsic volcanism in the Mount Winnecke Group and Nanny Goat Volcanics.

Five main granitic suites are recognised in the Tanami Region, the most important being the Coomarie and Frederick Suites. The youngest granites in the area belong to The Granites Suite. Archaean rocks identified from drilling comprise of the Browns Range Metamorphics and the Billabong Complex.

Deposition in the Birrindudu Basin began with sandstone transgressing over the metamorphic and crystalline basement probably at about 1.7 Ga. This was accompanied by regionally extensive north-trending growth faults and volcanism, possibly indicating rifting. The Birrindudu and Tolmer Groups represent the exposed basal section of this basin and may be as much as 6,000m thick locally. Apart from minor felsic volcanic rocks (tentatively assigned to undifferentiated Birrindudu Group) and carbonate rocks and shale in the upper Tolmer Group, these units are dominated by coarse clastic sedimentary rocks.

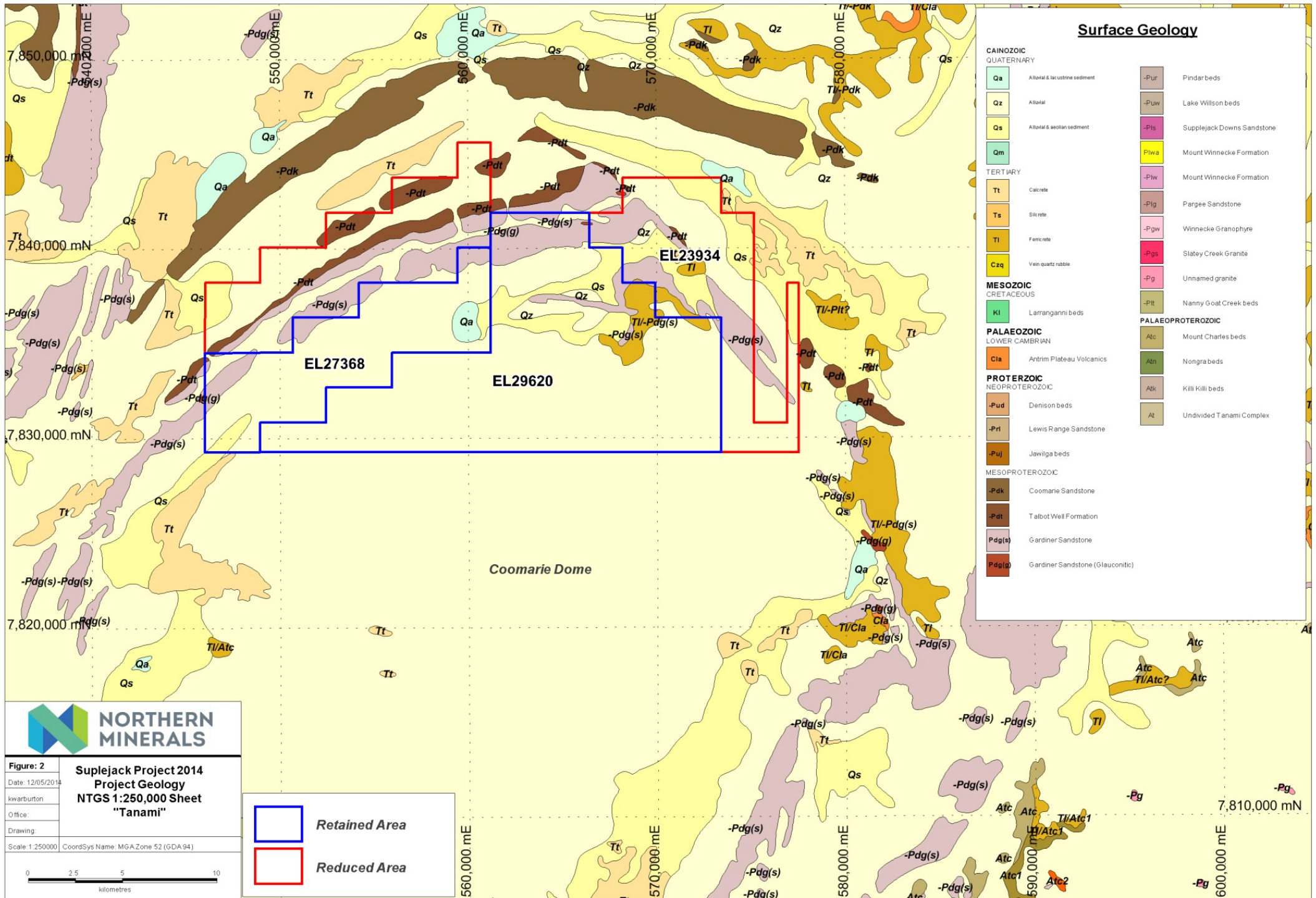
The eastern margin of the project is covered by Cambrian flood basalts (Antrim Plateau Volcanics), which overlie Mesoproterozoic Gardiner Sandstones of the Birrindudu Basin.

Several ESE, SE and N-trending structures have been identified within the project area, which represent subsidiary structures to the major regional ESE-trending structures, such as the Trans-Tanami Fault and the Bluebush Fault.

A Large portion of the area is covered by ferricrete as well as surficial deposits including alluvium, lateritic lag and windblown sand. The Gardiner Formation outcrops are frequently capped by a silcrete layer of variable thickness.

Surface outcropping of the Birrindudu Group (Gardiner Sandstone and Talbot Well Formation) covers the northern edge of the project area. These units trend in a general NE-SW orientation where they wrap around the northwest margin of the Palaeo-Proterozoic Coomarie Dome. The Birrindudu Group sediments are overlain by Tertiary calcrete deposits and surficial Quaternary sediments. The southern portion of the project is covered by alluvial deposits developed over granodiorite of the Coomarie Dome.

Figure 2 below shows the outcrop geology of the project area taken from the NTGS 1:250,000 scale geological mapping of the area.



**NORTHERN MINERALS**

Figure: 2  
 Date: 12/05/2014  
 kwarburton  
 Office:  
 Drawing:  
 Scale: 1:250000  
 CoordSys Name: MGA Zone 52 (GDA 94)

**Suplejack Project 2014  
 Project Geology  
 NTGS 1:250,000 Sheet  
 "Tanami"**

0 2.5 5 10  
 kilometres

Retained Area

Reduced Area



## **4. Previous Exploration by Northern Minerals**

### **4.1. 2012**

#### **Hyperspectral Survey (Hymap)**

During 2012, Northern Minerals conducted a hyperspectral survey covering the entire tenement area of EL27368 using the Hymap scanner operated by Hyvista Corporation. The HyMap provides 128 bands across the reflective solar wavelength region of 0.45 – 2.5 nm with contiguous spectral coverage (except in the atmospheric water vapour bands) and bandwidths between 15 – 20 nm.

### **4.2. 2011**

#### **Geophysical Data Review and Targeting Exercise:**

Northern engaged a consulting geophysicist from Fathom Geophysics to reprocess and interpret the data from various airborne magnetic and radiometric surveys completed between 2007 and 2008. This was considered necessary for the following reasons:

- The geophysical surveys conducted over Northern Mineral's contiguous land holdings in Western Australia and the Northern Territory hadn't been merged into a single grid.
- No comprehensive magnetic interpretation has been previously completed over the entire area covered by the surveys.
- To assist in selecting conceptual gold and uranium targets for future work.

The data from the detailed surveys conducted by AREVA / Northern Minerals was merged with regional government datasets onto a single grid to provide regional context to the surveys. From the merged grids a coarse, regional interpretation was completed over the entire area for an overview of regional basement geology and to identify major structures. A second, more detailed interpretation was then completed over the detailed surveys flown in 2007 and 2008.

The targeting exercise involved identifying potential gold and uranium targets based on the characteristics of known mineralisation in the Tanami area, and from models of possible deposit types in the area.

The gold targeting methodology involved locating areas of interest with large scale structures to provide the main pathway for mineralising fluids, secondary, cross-cutting structures, lithological complexity, and an iron rich lithology that could act as a chemical trap through sulfidation. Each area was ranked according to these criteria.

For uranium the targeting methodology involved a locating areas of interest with a porous host rock, a nearby potential uranium source (such as granites or from with Killi Killi Beds), structures to act as fluid pathways, and any evidence of uranium from the radiometric data.

Several conceptual targets identified for gold and uranium require further investigation, including ground checks.

### **4.3. 2009/2010**

No work undertaken on the tenement due to financial constraints experienced at the time

## **5. Exploration Rational**

Until 2011, prior to the withdrawal of Afmeco/Areva, all exploration on the Suplejack Project had been directed towards identifying targets for unconformity type uranium deposits. With the exploration success at the Browns Range heavy rare earth (HREE) project in Western Australia, the identification of similar deposits within the Tanami region has now become primary focus for Northern Mineral's exploration activities.

The Browns Range HREE mineralisation is hosted by xenotime bearing hydrothermal breccias located at the western edge of the Browns Range Dome, a geological feature formed by the intrusion of palaeo-Proterozoic granites into the late Achaean or palaeo-Proterozoic Browns Range Metamorphics. Later doming of the granite has affected the unconformably overlying, meso-Proterozoic Gardiner Sandstone, which forms an outlying ring of small hills and ridges around the granite dome.

The Suplejack Project shares a number of geological features with Browns Range. It is located along the northern edge of the Coomarie Dome, formed by a granitic intrusion of similar age to the Browns Range granite, near the Gardiner Sandstone unconformity. Xenotime has been identified outside the project at the nearby Boulder Ridge prospect.

Northern's exploration strategy is to utilize geophysical (radiometric and magnetic) and hyperspectral data to identify targets for further ground based exploration, including geological mapping and geochemical surveys, with the aim of generating drill targets.

## **6. EXPLORATION ACTIVITIES**

There was no on – ground exploration completed over the project during the reporting period.

A review of the hyperspectral data acquired over EL27368 in 2012 was undertaken with specific interest on minerals that potentially indicate hydrothermal processes, such as dickite, illite, sericite, and well-ordered kaolinite.

While there are occurrences of these minerals within the tenement, most notably dickite which provides the strongest indication of hydrothermal alteration, this needs confirmation in the field. Most minerals however, show distribution patterns that indicate lithological control.

## **7. PROPOSED EXPLORATION**

A helicopter supported field reconnaissance visit is proposed to ground check targets identified from the hyperspectral survey and geophysical data.

## **8. REFERENCES**

Tanami, NTGS 1:250,000 Geological Series Explanatory Notes, Sheet SE/52-15