



**NORTHERN  
MINERALS**

**AMADEUS BASIN  
FINAL SURRENDER REPORT for the period  
20th April 2009 to 14th April 2014**

**Exploration License EL26920**

**OPERATED BY  
NORTHERN MINERALS LIMITED**

Due Date:	06/06/2014
Report No.	
Prepared By	Luke Meter
Date	14/04/2013

# Northern Minerals Limited

## Final Surrender Report

EL26920

**Operator:** Northern Minerals Limited

**1:250,000 Sheet:** SF53-14 Alice Springs

**1:100,000 Sheet:** 5750 Udoolya  
5751 Laughlen  
5850 Fergusson Range  
5851 Riddoch

**Datum:** GDA94

**Projection:** MGA

**Zone:** 53

**Report Type:** Final Surrender Report

**Repeort Period:** 20<sup>th</sup> April 2009 to 14<sup>th</sup> April 2014

**Author:** Luke Meter

**Tenement Holders:** Northern Minerals Limited

**Distribution:** Northern Territory Department of Mines and Energy  
Northern Minerals Limited  
MMWC Group

## TABLE OF CONTENTS

1.	SUMMARY .....	1
2.	INTRODUCTION .....	1
3.	LOCATION AND ACCESS.....	2
4.	TENURE .....	4
5.	REGIONAL GEOLOGY .....	4
6.	WORK COMPLETED.....	7
	6.1 Data Compilation and Review .....	7
	6.2 Sacred Site Inspection .....	7
	6.3 Geophysical Data Compilation.....	7
	6.4 Reconnaissance Geological Mapping and Rock Chip Sampling .....	9
7.	CONCLUSIONS.....	9
8.	REFERENCES.....	10

### FIGURES:

Figure 1	Satellite Imagery .....	2
Figure 2	Access and Location.....	3
Figure 3	Local Geology .....	6
Figure 4	Amadeus Basin Project Radiometrics (U).....	8

### TABLES:

Table 1	Tenement Schedule.....	4
---------	------------------------	---

## **1. SUMMARY**

EL26920 lies within the northeast portion of the elongated Proterozoic Amadeus Basin approximately 65 km to the east of the township of Alice Springs, Northern Territory. The Amadeus Basin is a large east-west trending intra-cratonic Basin of Late Proterozoic to Carboniferous aged marine and continental sediments derived from erosion of surrounding early to mid-Proterozoic granites and metamorphic rocks of the Arunta Block to the north and the Musgrave Block to the south.

The tenement once formed part of Northern Minerals Amadeus Basin Project along with tenements EL26920, 27016, 27017, 27018, 27019 and 27020. Exploration licence EL26920 was granted to Northern Minerals Limited on the 20<sup>th</sup> April 2009 for a period of 6 years and comprised of 214 blocks (671.96 km<sup>2</sup>). On the 19<sup>th</sup> March 2013 the company relinquished 107 blocks (337.05 km<sup>2</sup>) of less prospective ground before abandoning the project and surrendering EL26920 on 8<sup>th</sup> April 2014.

Northern Minerals Limited was targeting Cambrian aged phosphorite deposits, base metals and rare earth mineralisation within the Amadeus Basin project. The Todd River Dolomite, which outcrops throughout the tenements, is considered to be a potential host for economic phosphate mineralisation.

## **2. INTRODUCTION**

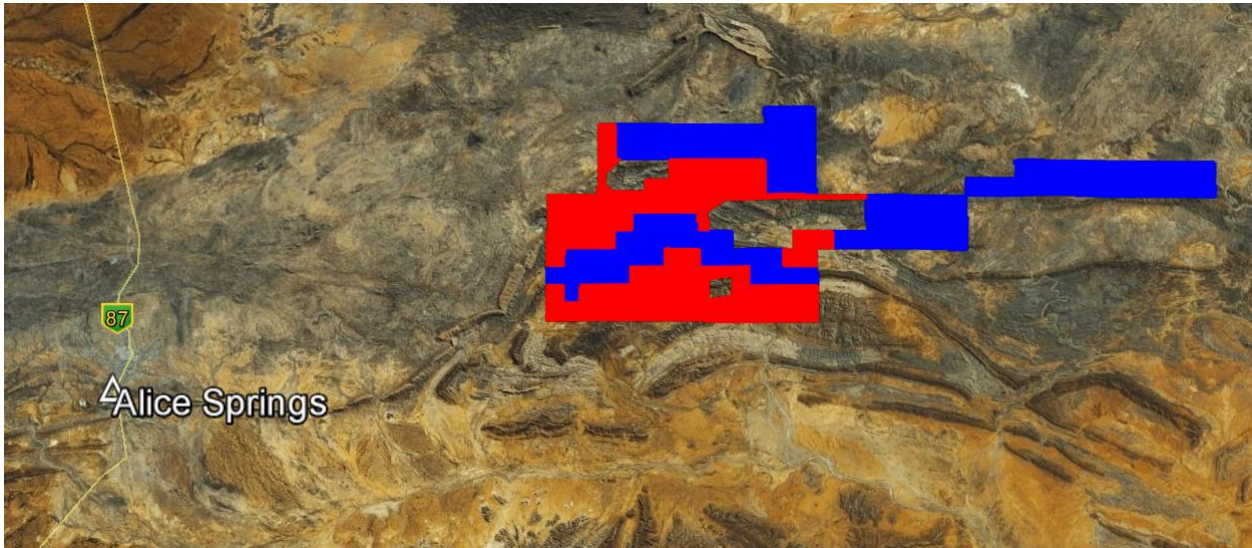
This report is the final surrender report for the tenement EL26920, which was formerly part of the Amadeus Basin Project for group reporting. The tenement has now been surrendered by Northern Minerals, and this report covers the exploration conducted during the period of tenure.

Several phosphate occurrences have been recorded within the Cambrian sediments of the Amadeus Basin. All major Australian phosphate deposits occur in the world-class Georgina Basin, a sedimentary Cambrian phosphorite province. The Cambrian Todd River Dolomite which outcrops in the north eastern margin of the Amadeus Basin is noted to contain significant phosphatic occurrences.

A literature review has also found reports of Cambrian phosphorite occurrences within the (Middle Cambrian) Tempe Formation (Late Cambrian – Ordovician) Pacoota Sandstone and (Early Cambrian) Todd River Dolomite, all of which are located in the central and eastern portion of the Amadeus Basin. The Todd River Dolomite is of Cambrian age and is considered the most prospective unit for hosting phosphate mineralisation

This report details exploration activities conducted by Northern Minerals Limited within EL26920 from date of grant on 20<sup>th</sup> April 2009 through to date of surrender on 14<sup>th</sup> April 2014.

### 3. LOCATION AND ACCESS



**Figure 1 Satellite Imagery showing original outline of EL26920 with 2013's partial relinquishment in red.**

The Amadeus Basin Project lies approximately 65km to the east of the township of Alice Springs in the Northern Territory (Figures 1 and 2).

Access to the tenement is via the sealed Ross Highway and Numery Road which crosses the Ross River several times. Graded gravel tracks provide limited 4WD access within the tenement area, and along with the river pass are subject to flooding after heavy rains. The project is located within close proximity to existing rail and road infrastructure, with supplies and support easily sources from Alice Springs.

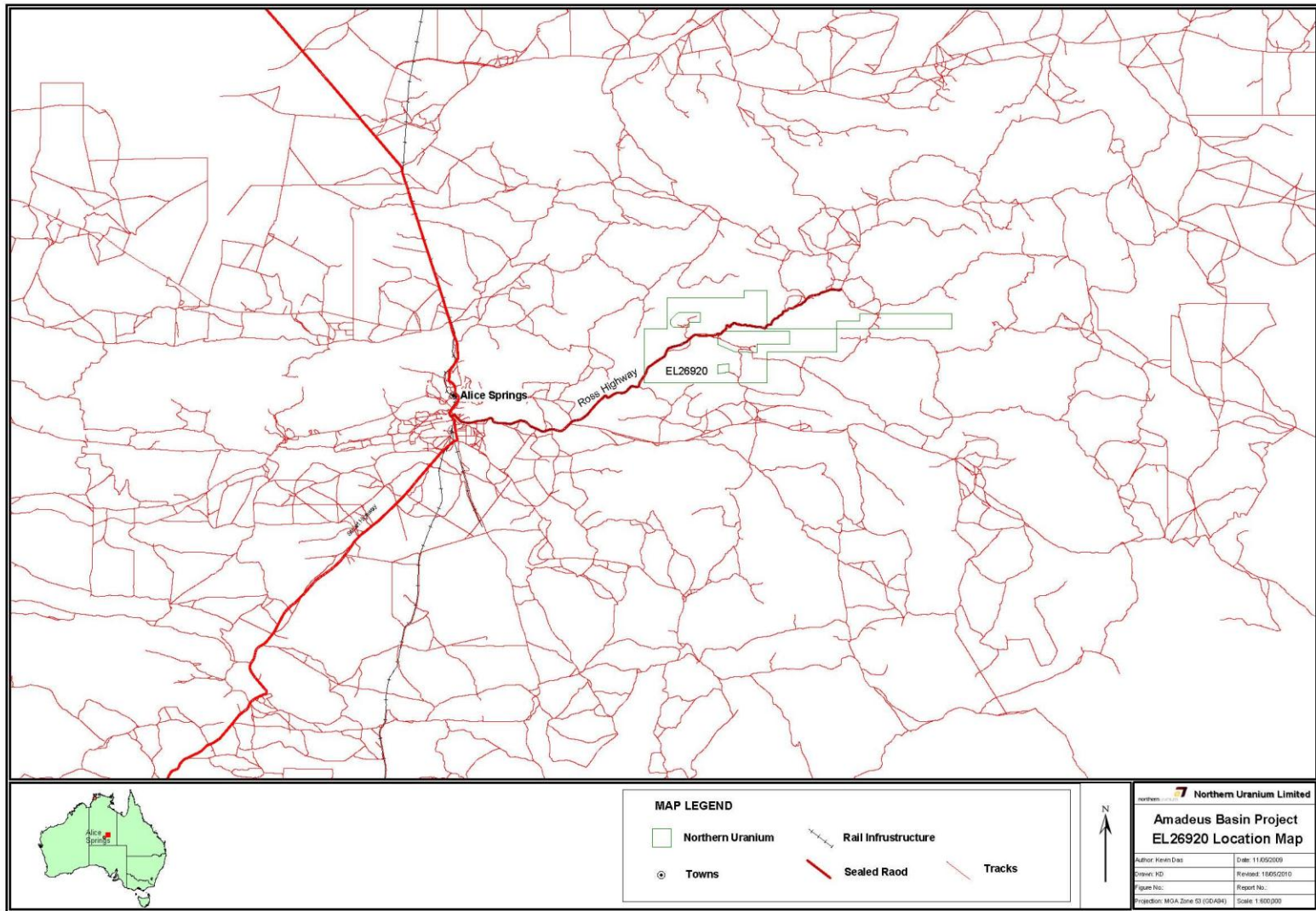


Figure 2 Access and Location

## 4. TENURE

EL26920 was granted on the 20<sup>th</sup> April 2009 for a period of 6 years, expiring on the 19<sup>th</sup> April 2015. Originally consisting of 214 blocks (671.96 Km<sup>2</sup>), the project formed part of Northern Minerals Amadeus Basin Project in conjunction with exploration leases EL27016, 27017, 27018, 27019, 27020, 28530 and 28531.

In March of 2013, a fourth year reduction of the tenement resulted in 107 blocks (337.05 km<sup>2</sup>) of less prospective ground within the tenement being surrendered. In the same year all other tenements of the Amadeus Basin Project were surrendered.

On the 14<sup>th</sup> April 2014, Northern Minerals completed full surrender of the remainder of EL26920 as the company focused on other opportunities.

Table 1 Tenement Summary

Tenement	Project	Holder	Lease Status	Grant Date	Expiry Date	Relinquished Date	Original Area	Current Area
EL26920	Amadeus Basin	Northern Minerals Ltd	Surrendered	20/04/2009	19/04/2015	14/04/2014	214 Blocks	107 Blocks

## 5. REGIONAL GEOLOGY

The tenement lies within the northeast portion of the elongated Proterozoic Amadeus Basin and is located within the Alice Springs 1:250,000 map sheet, number SF 53-14.

The Amadeus Basin is a large east-west trending intra-cratonic Basin of Late Proterozoic to Carboniferous aged marine and continental sediments. These sediments were derived from the surrounding early to mid-Proterozoic granites and metamorphic rocks of the Arunta Block to the north and Musgrave Block to the south.

Sedimentary lithologies include dolostone, limestone, shale, sandstone, siltstone, quartzite, evaporite, diamictite and conglomerate. The rocks are deformed by broad folding and faulting. The main trends are east-west, while faulting is both normal and thrusting styles. The Amadeus Basin is generally not metamorphosed, although minor highly deformed rocks interleaved with basement in the northeast and southwest are greenschist to amphibolite facies.

The Early Cambrian basal deltaic sediments of the Arumbera Sandstone underlie the lower Cambrian Todd River Dolomite which itself is overlain by the Giles Creek Dolomite and subsequently the Chandler Limestone. The siltstone, shale and limestone Shannon Formation is overlain by Goyder Formation which is subsequently overlain by the Pacoota Sandstone. The sediments of the Larapinta Group can be separated

into the Carmichael and Stairway Sandstones which are overlain by the cross-bedded Mereenie Sandstone. The valleys floors and creek lines primarily consist of Quaternary and Tertiary aged transported sediment cover.

Historical reports describe Cambrian phosphorite occurrences within the (Early Cambrian) Todd River Dolomite, (Middle Cambrian) Tempe Formation (Late Cambrian – Ordovician) and Pacoota Sandstone, all of which are located in the central and eastern portion of the Amadeus Basin.

Phosphate in the Amadeus Basin is confirmed with historic Broken Hill Pty Ltd (BHP) drilling intercepting 6m @ 22.8% P<sub>2</sub>O<sub>5</sub> composed of calcareous silty sandstones associated with minor limestone, chert and ferruginous siltstone in the Todd River Dolomite. Sporadic values of up to 5% P<sub>2</sub>O<sub>5</sub> also occur in the overlying red siltstone.

Historical drilling (PD2) has also intercepted the Todd River Dolomite and returned assay values of 4.13% P<sub>2</sub>O<sub>5</sub> @ 30-32m and 1.28% P<sub>2</sub>O<sub>5</sub> @ 32-34m.

The Amadeus basin also contains sandstone-type uranium deposits, and gold at White Range in the Arltunga Nappe Complex. Minor base metal and small-scale mines are also present. BHP, CRA, MIM and other companies have explored the north-western part of the basin for base metals and evaporites. Extensive uranium exploration has been undertaken. More than thirty wells have been drilled to investigate petroleum in a 170,000 km<sup>2</sup> area.

Significant rock chip results up to 1.66% TREO from the Hale River Project (Kidman Resources 150kms East of Alice Springs) in 3.5km of outcropping carbonate-rich veins in dykes located in the Arunta complex, to the south-east of the project area, are of note given Northern Minerals strategic focus on Heavy Rare Earths exploration.

Historical reports describe Cambrian phosphorite occurrences within the (Early Cambrian) Todd River Dolomite, (Middle Cambrian) Tempe Formation (Late Cambrian – Ordovician) and Pacoota Sandstone, all of which are located in the central and eastern portion of the Amadeus Basin.

Phosphate in the Amadeus Basin is confirmed with historic Broken Hill Pty Ltd (BHP) drilling intercepting 6m @ 22.8% P<sub>2</sub>O<sub>5</sub> composed of calcareous silty sandstones associated with minor limestone, chert and ferruginous siltstone in the Todd River Dolomite. Sporadic values of up to 5% P<sub>2</sub>O<sub>5</sub> also occur in the overlying red siltstone.



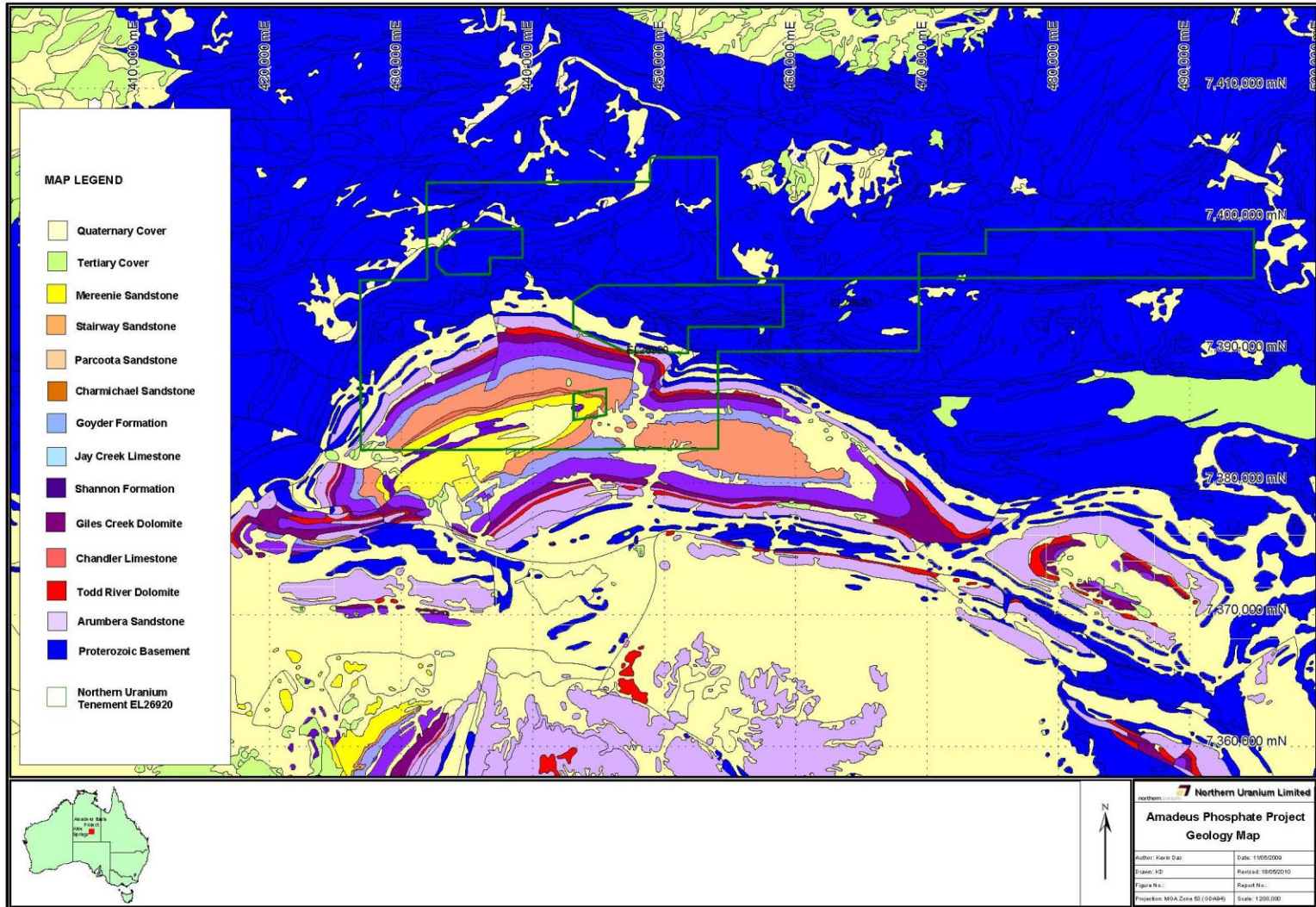


Figure 3 Local Geology

## **6. WORK COMPLETED**

To date exploration work completed by Northern Minerals Limited has been a review of the previous completed historical exploration work and compilation of all publicly available government data sets including geological and geophysical data, and reconnaissance geological mapping and rock chip sampling. An Aboriginal sacred site desktop study/inspection was also carried out through the Aboriginal Areas Protection Authority (AAPA). The results of the review are described below.

### **6.1 Data Compilation and Review**

A detailed review of previous work has been completed on all available data relevant to the EL areas which were compiled into GIS format using MapInfo/Discover software. The data include topographical, cadastral, geological, geophysical, and geochemical and drill hole information sourced from NT government agencies and reports of historical exploration activities. The data was interpreted to identify exploration target areas for follow-up geological reconnaissance mapping, surface geochemical sampling where appropriate, and drill target areas.

### **6.2 Sacred Site Inspection**

An Aboriginal sacred site database inspection through the Aboriginal Areas Protection Authority (AAPA) was carried over the Project area. The inspection comprised a search of all recorded sacred sites within the Project area on the AAPA register.

### **6.3 Geophysical Data Compilation**

All available government geophysical data over the north-eastern Amadeus Basin has been acquired for processing and interpretation. The data has been processed by Resource Potential to produce several new images, and has been compiled into (GIS) MapInfo format. The data has been interpreted by Northern Minerals Limited geologists to identify potential exploration target areas for follow-up geological reconnaissance mapping and surface geochemical sampling. . A Regional radiometric (U) plan outlines numerous radiometric anomalies throughout the Project area (Figure 4).

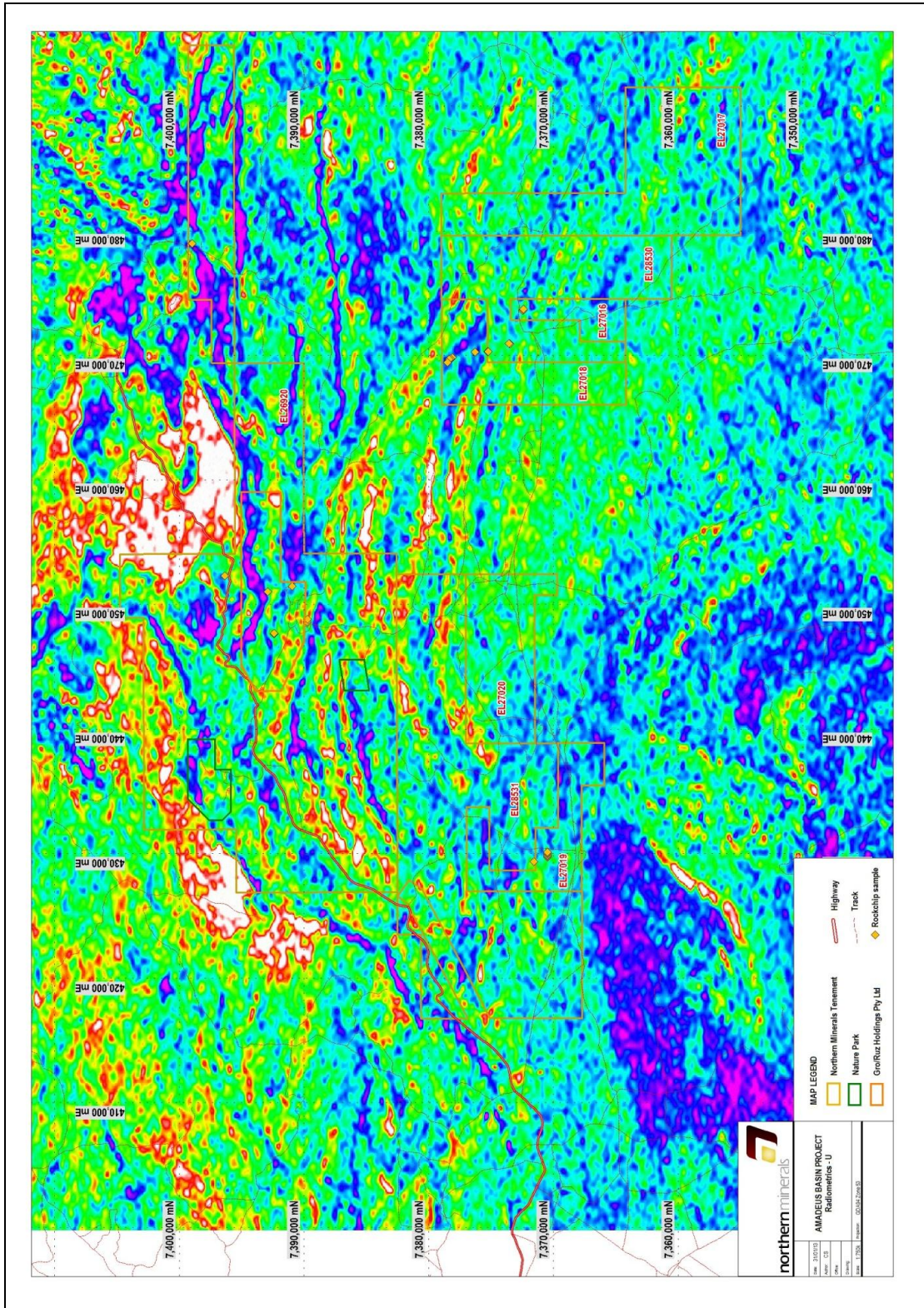


Figure 4 Amadeus Basin Project Radiometrics (U)

#### **6.4 Reconnaissance Geological Mapping and Rock Chip Sampling**

A reconnaissance field trip was made to the Amadeus Project area in August 2011. Several prospective phosphate horizons (Tod River Dolomite) and base metal geochemical anomalies were investigated.

A total of 6 rock chip samples were taken from several possible phosphate prospective horizons, and base metal anomalous areas within EL26920.

Samples were submitted to ALS Laboratory in Perth. Analytes requested include: Al<sub>2</sub>O<sub>3</sub>; As; BaO; CaO; Cl; Co; Cr<sub>2</sub>O<sub>3</sub>; Cu; Fe<sub>2</sub>O<sub>3</sub>; K<sub>2</sub>O; MgO; MnO; Mo; Na<sub>2</sub>O; Ni; P<sub>2</sub>O<sub>5</sub>; Pb; SiO<sub>2</sub>; SO<sub>3</sub>; TiO<sub>2</sub>; V<sub>2</sub>O<sub>5</sub> and Zn.

No significant Results obtained.

## **7. CONCLUSIONS**

Due to Northern Minerals focus on other opportunities, the license area was surrendered.

## 8. REFERENCES

Jewson, R, 2013, "Amadeus Basin Project Partial Surrender Report Exploration License EL26920" Northern Minerals Limited

Sheriff, C, 2012, "Amadeus Basin Project Annual Group Technical Report for the period 20<sup>th</sup> April 2010 to 30<sup>th</sup> November 2011 for Exploration Licences EL26920, 27016, 27017, 27018, 27019, 27020", Northern Minerals Limited

Shaw, R, Wells, A, 1983, "Alice Springs (Second Edition), NT 1:250,000 Geological Series Explanatory Notes, Sheet SF/53-14", Department of Resources and Energy, Bureau of Mineral Resources, Geology and Geophysics

[http://www.nt.gov.au/d/Minerals\\_Energy/Geoscience/index.cfm?newscat1=&newscat2=&header=Amadeus%20Basin](http://www.nt.gov.au/d/Minerals_Energy/Geoscience/index.cfm?newscat1=&newscat2=&header=Amadeus%20Basin)

[http://www.nt.gov.au/d/Minerals\\_Energy/Geoscience/Content/File/Pubs/FactSheets/BFDPhosphate.pdf](http://www.nt.gov.au/d/Minerals_Energy/Geoscience/Content/File/Pubs/FactSheets/BFDPhosphate.pdf)

## **Acknowledgement and Warranty:**

1. Subject to 2, the tenure holder acknowledges that this Report, including the material, information and data incorporated in it, has been made under the direction or control of the Northern Territory (the State) within the meaning of section 176 of the Copyright Act 1968 (Cwth).

2. To the extent that copyright in any material included in this Report is not owned by the State, the tenure holder warrants that it has the full legal right and authority to grant, and does hereby grant, to the Territory, subject to any confidentiality obligation undertaken by the Territory, the right to do (including to authorise any other person to do) any act in the copyright, including to:

- use;
- reproduce;
- publish; and
- communicate in electronic form to the public, such material, including any data and information included in the material.

3. Without limiting the scope of 1 and 2 above, the tenure holder warrants that all relevant authorisations and consents have been obtained for all acts referred to in 1 and 2 above, to ensure that the doing of any of the acts is not unauthorised within the meaning of section 29(6) of the Copyright Act (Cwth).

### 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.