Geological observations and prospectivity;

Claude Hills North and Kunapula prospects

Summary of the geological field trip conducted between Monday, 8th to Monday, 15th April 2019

Prepared on behalf of Gempart NT

Author: Gary Price
Email: gary_n_price@hotmail.com
Date: 24th May 2018

Introduction

This report presents a summary of the geological field trip conducted between Monday, 8th to Monday, 15th April 2019 to explore for a range of commodities at potential targets in three different tenement groups, all located in the southern part of the Northern Territory on behalf of GemPART NT (Figure 1).

The program involved site reconnaissance to assess the prospectivity of the following targets;

Table 1: Summary of site visits conducted during the April 2019 field trip;

Project area	Target	Tenements	Details
Claude Hills north	Target 10 (Area 4),	31383 & 25566	Gravity anomaly
Kunapula	Target A&B	31383 & 25566	Radiometric anomaly

Method

Field work conducted was preliminary by nature, and involved a site reconnaissance being conducted at each prospect area with geological mapping, and selective rock chip sampling and/or testing of the outcrop exposure by hand-held pXRF analysis. Surveys of radiometric target areas were conducted using a hand-held spectrometer

A summary of maximum values determined by the pXRF analysis is presented in; Tables 1-3 (Appendix 1).

All geological mapping observations were uploaded onto an excel spreadsheet at the conclusion of the field program (Tables 4-5, Appendix 2). Selected rock chip samples were submitted to a commercial laboratory for analysis at the conclusion of the field program with results unavailable by the completion of this report.

All pXRF readings were conducted using a Bruker hand-held pXRF analyser (model S1 Titan-Tracer 5) with the instrument set to Soils mode, 60 second read time.

All spectrometer surveys were conducted using a hand-held Exploranium Mini-SPEC (model GR130) set to survey mode to monitor the total radiometric count which assisted with determining the extent of each radiometric anomaly.

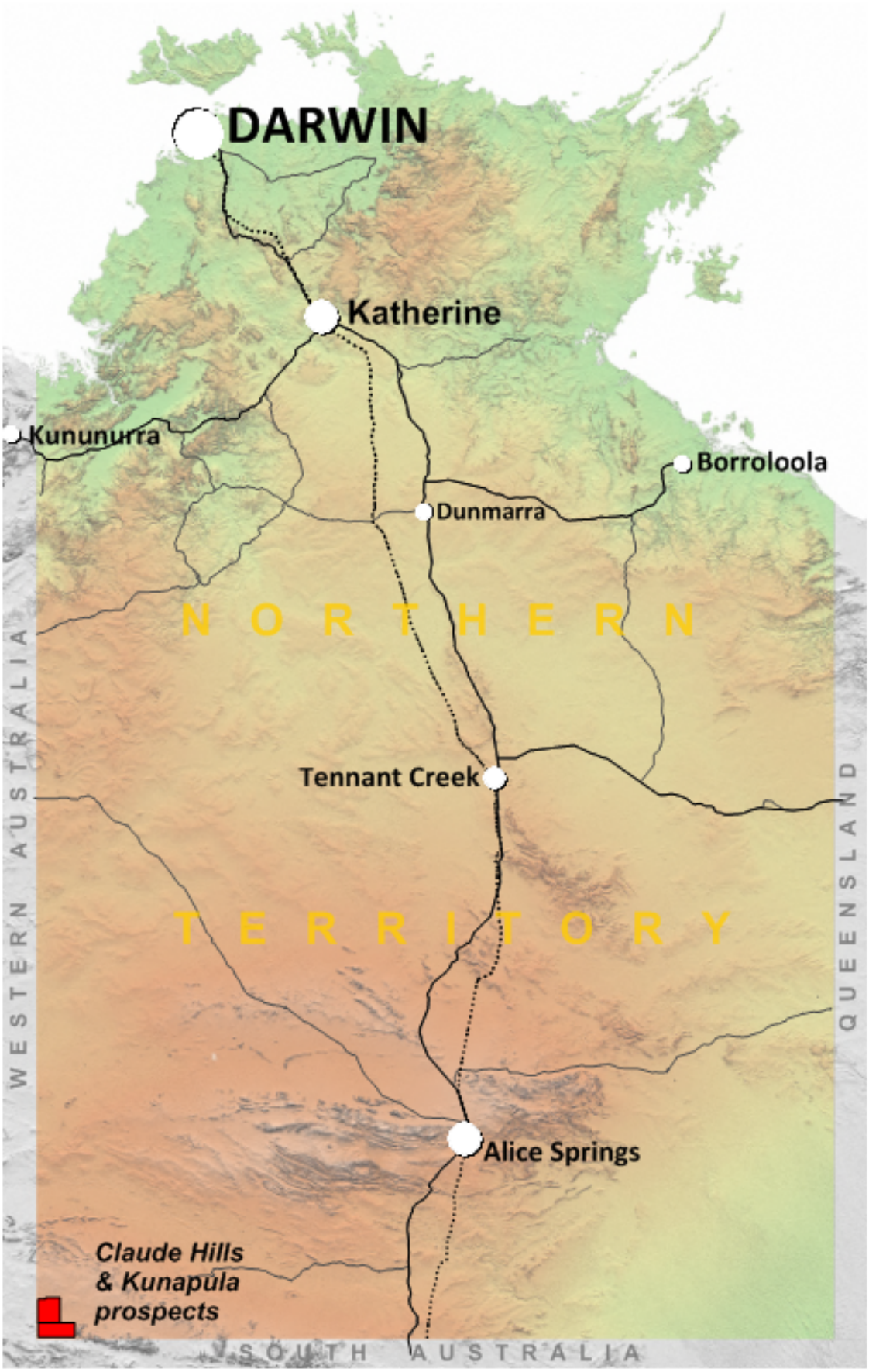

Figure 1: Location of GemPART NT tenements; Claude Hills north & Kunapula

Area#1: Claude Hills-Kunapula area (EL's 31383 & 25566)

Site visits were conducted to 2 prospects on Tuesday, 9th and Wednesday, 10th April 2019.

Prospect 1; Gravity target 10 (Area 4), Claude Hills north

This was first prospect explored in this field program, on the afternoon of Tuesday, 9th April. Target#10 comprised a 5 milliGal gravity anomaly interpreted in the Claude Hills north area under shallow sandy cover (Figures 2&4).

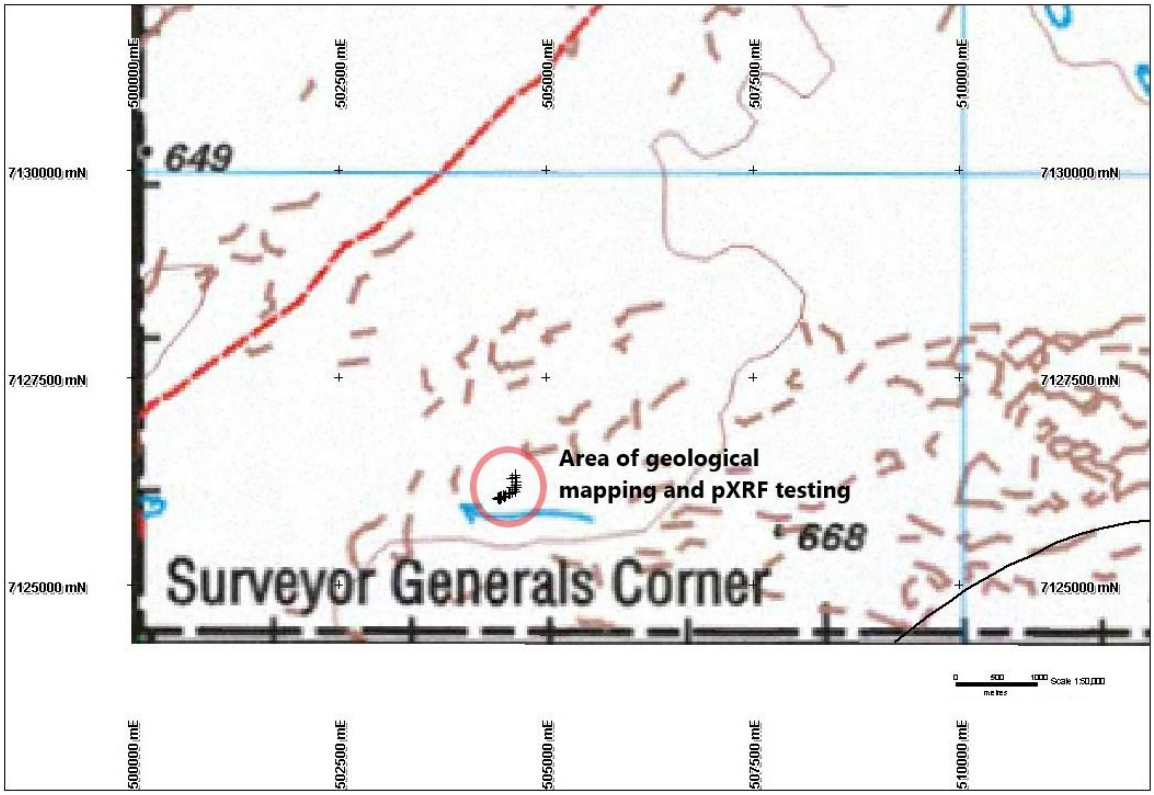

Figure 2: Topographic image showing location of gravity anomaly (Target#10).

To access Target#10, a historical track was followed from the Gunbarrel Highway, just east of Wingellina. Turning north, this track was followed to Surveyor Generals Corner. This track was then followed for about 3-4 kilometres further towards east, north-east to reach to closest point on the track to the target location. A traverse cross-country was then conducted towards east, south-east to reach the area where the gravity anomaly had been identified.

This traverse was conducted through open, sandy country before encountering a series of shallow sand dunes and swales for the last 1-2 kilometres where small areas of stumpy scrub along the edge of several of the dunes resulted in several tyre punctures. The vehicles were halted after the second puncture, with the final part of the traverse was conducted on-foot. This headed east for ~200metres to the first exposure of calcrete which mapped near the southern tip of the target area at 604485mE, 7126275mN (Plate 1).

Plate 1: Panorama view towards east across the gravity target area. Note; the calcrete exposures in the foreground of the image.

Plate 2: Calcrete exposure (paleosurface) under surficial sandy cover.

Plate 3: Calcrete exposures under surficial sands and spinifex.

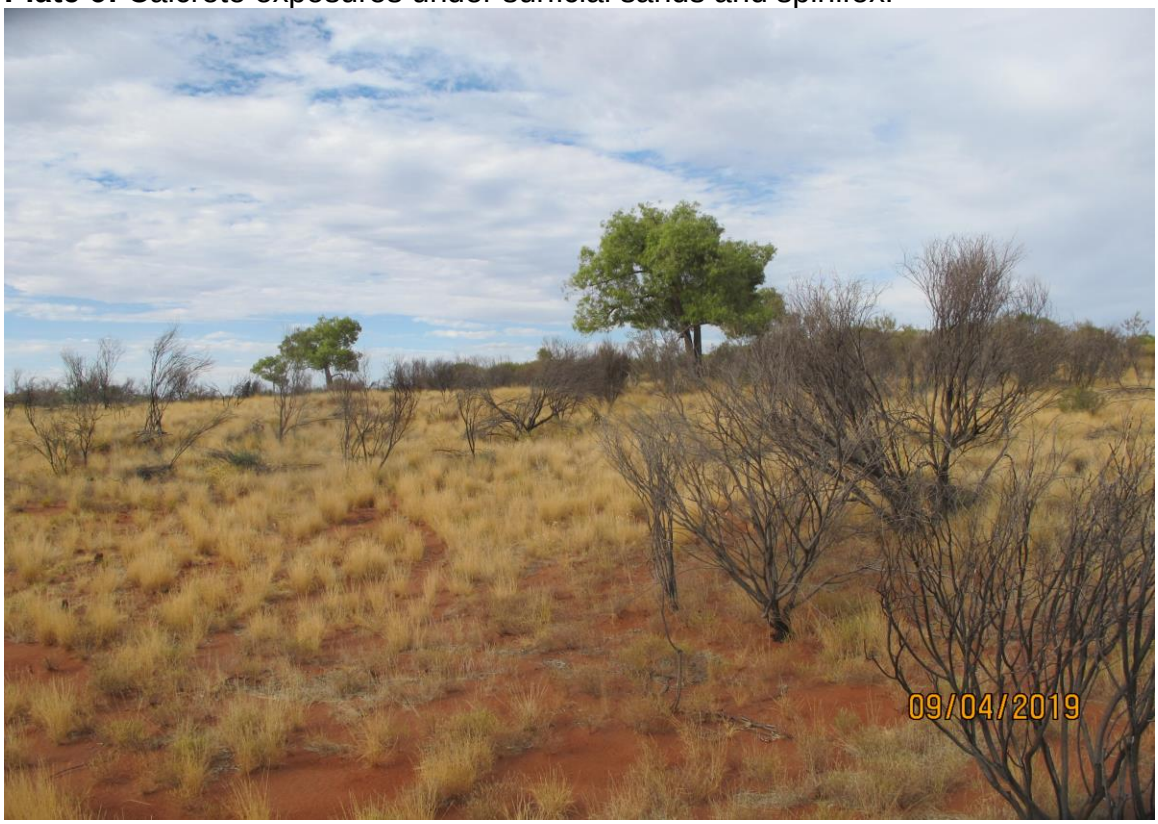

Plate 4: Shallow sand dune cover along the northern edge of the target area, which has potentially covered the calcrete paleosurface in this direction.

A quick reconnaissance of the area failed to locate any outcrop, but mapping identified frequent exposures of calcrete, part of a broader calcrete paleosurface under surficial sandy cover interpreted to follow an 060º strike trend over a distance of several hundred metres (Plates 2&3). This paleosurface was mapped to the edge of shallow dune cover and although obscured, was interpreted to potentially extend further towards the north-east (Plate 4).

A total of 24 point-readings; 454-459 and 461-479 (Figure 3) were conducted to test calcrete exposures along this trend using a from south to north (Table 1, Appendix).

Testing of calcrete exposures via pXRF testing identified a maximum of; 981ppm Cu, 7ppm Pb, 59ppm Zn, 174ppm V, 48ppm Cr, 16ppm Mo, 4ppm Ag, 20ppm Nb, 155ppm Sr, 158ppm Ta2O5, 17ppm Th and 419ppm S. No nickel values >detection limit where detected and only one arsenic value was detected (8ppm).

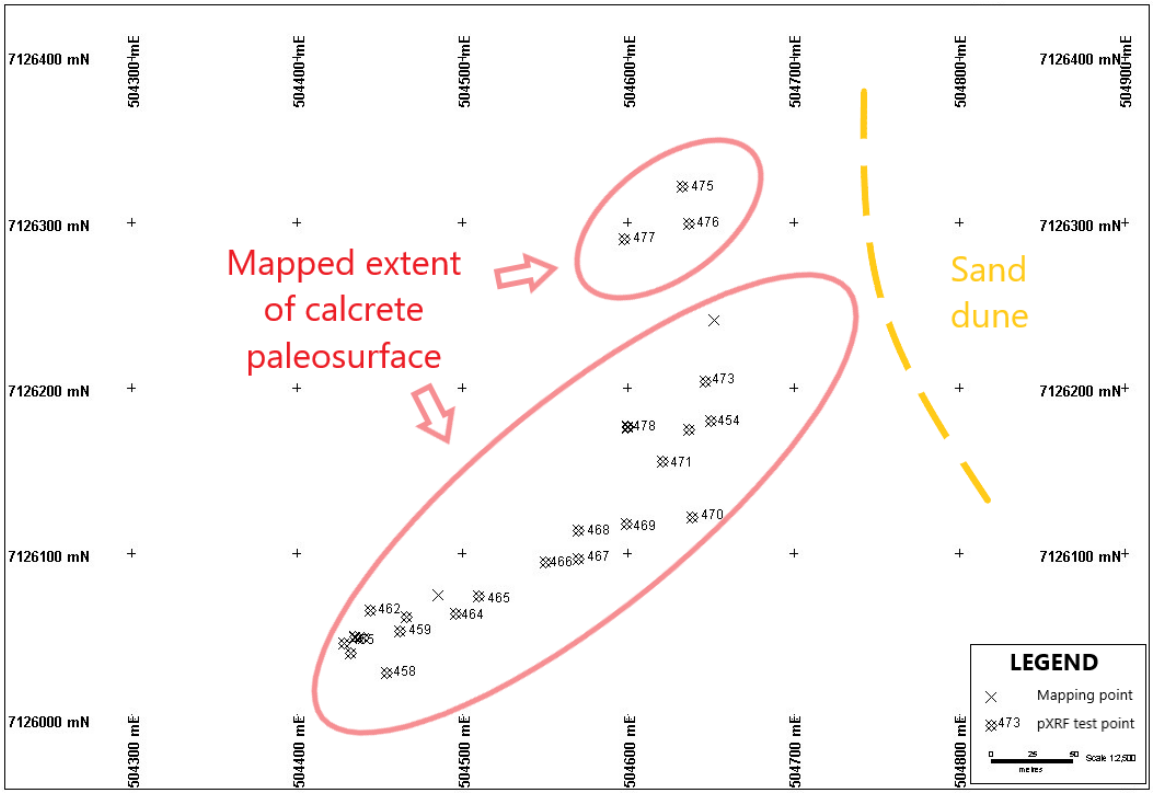

Figure 3: Location of individual pXRF readings within the calcrete paleosurface.

Discussion

No evidence of outcrop or sub-crop could be located within the vicinity of the gravity anomaly, but a semi-continuous calcrete paleosurface was mapped to extend along a roughly NE/SW strike trend across the target area (Figure 4).

Testing of 24 calcrete exposures at various points along the strike of this mapped paleosurface using the pXRF confirmed potentially anomalous copper, lead, zinc, vanadium, chromium and also identified one silver value >detection limit. However, no nickel values >detection limit were confirmed and cobalt values where generally low (maximum of 2ppm).

The lack of available outcrop and sub-crop makes any interpretation of the underlying geology difficult. However, the occurrence of calcrete paleosurface above this target suggests that a calcium-rich lithology; e.g. mafic intrusive rocks may underlie the area. Any mafic occurrence would be associated with basement rocks of the Paleoproterozoic Musgrave Block and the elevated to potentially anomalous values determined by the pXRF for copper, base/battery-metals further confirms this.

Elevated concentrations for potassium, strontium, thorium, tantalum oxide, molybdenum and silver suggest potential for hydrothermal fluid flow in association with granite emplacement.

It is currently difficult to determine the prospectivity of this target owing to the lack of available outcrop, but results from the pXRF testing of calcrete exposures are encouraging. An interpretation of available open-file geophysical datasets identified a co-incident magnetic anomaly (Figure 5), which suggests potential may exist, for economic copper mineralisation within an iron oxide-copper-gold (IO-C-G) deposit setting. A potential extension towards the south-western direction can be interpreted in both the gravity and magnetic images.

As a consequence of the field work completed, further exploration for copper and gold, within an IOCG deposit setting at the interface between the discrete gravity anomaly and the magnetic anomaly is recommended.

Future exploration should initially consider conducting low-impact drilling (i.e. deep auger, or shallow RAB) as a first-pass option, with an aim to gain exposure to the underlying lithology. More detailed ground-based geophysical surveys are also recommended (i.e. ground-based magnetic and gravity surveys) to assist with mapping out the known anomalies along with key structures to assist with targeting of potential mineralisation at greater depth, plus along strike towards the south-western direction.

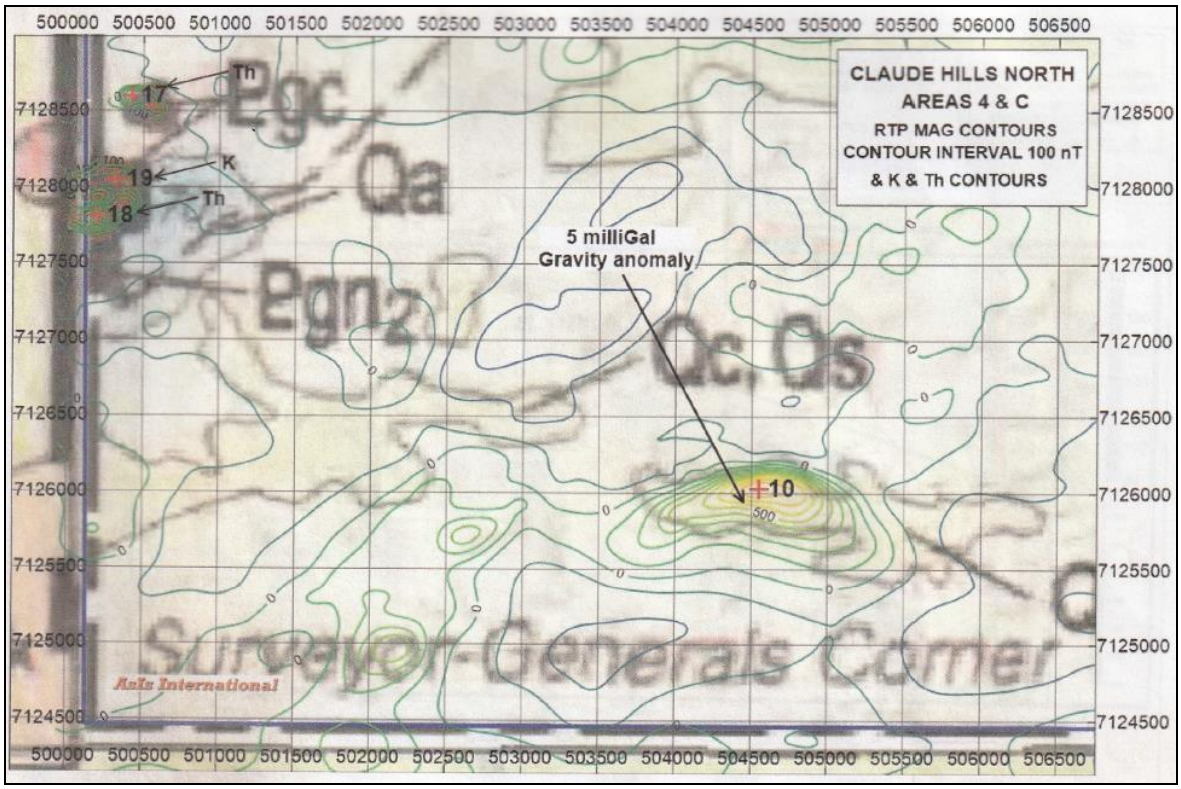

Figure 4: Claude Hills north gravity target overlain on 1:250K topographic map.

Figure 5: Target#10 survey area, showing correlation with magnetic anomaly on the Magnetic Intensity (TMI) image. Note; trend in magnetics towards south-west.

Prospect 2; Radiometric targets 13-16 (Area 3), Kunapula

The next prospect area was explored on Wednesday, 10th April with a field reconnaissance being conducted to investigate two radiometric anomalies (Targets A&B) in the Kunapula area (Figure 6). Both targets were interpreted to be co-incident U, Th and K anomalies which corresponded with outcrops identified within the Petermann Ranges 250K topographical map.

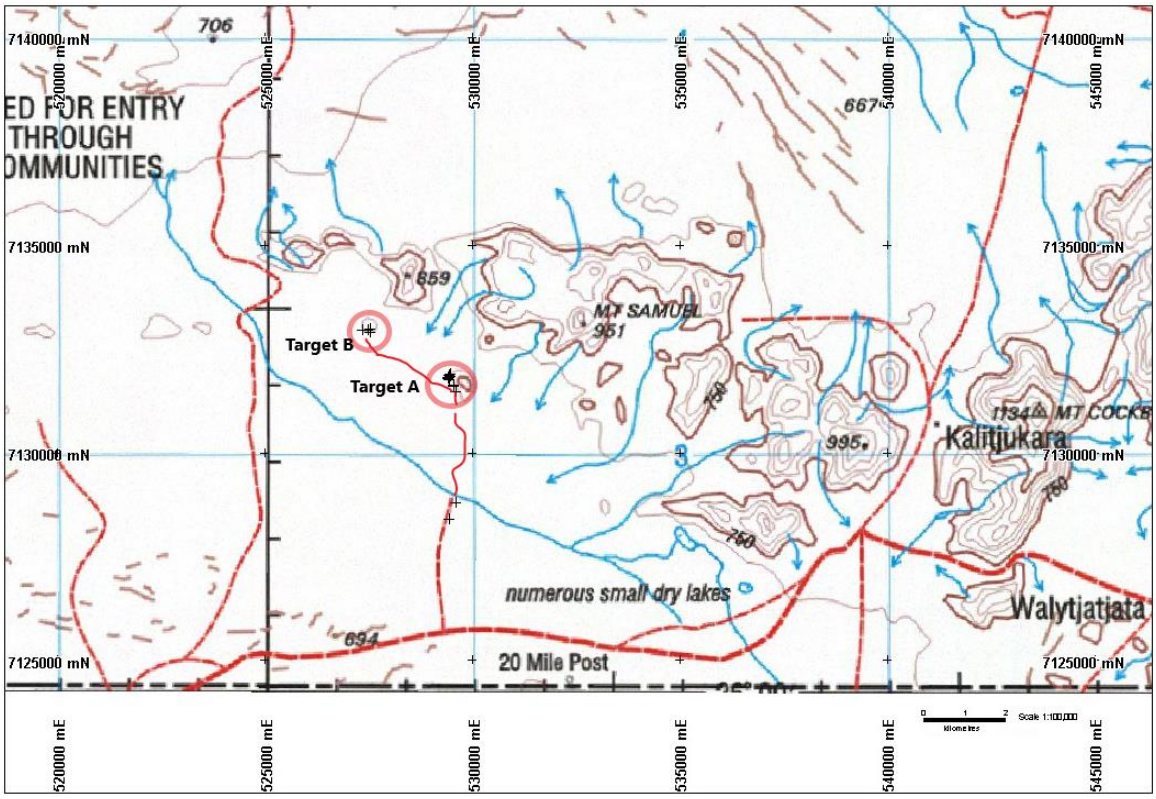

Figure 6: Location of Kunapula radiometric anomalies; Targets A&B, on Petermann Ranges topographic map.

The 'Telstra' track was followed from the Gunbarrel Highway, towards east, north-east for about 30 kilometres to 530000mE, which was determined to be the closest point to both targets which were located ~5 kilometres further north from this track. A traverse was then conducted cross-country, through open country for several kilometres to the north. No outcrops were mapped, apart from several small exposures of chalcedony and calcrete for 100metres+ around the area 529440mE, 7128400mN. From this point, the traverse continued north-east through moderately to heavily wooded country (acacia, mulga) to the southern flank of a wide east-west trending creek line at 529600mE, 7128800mN.

A slow traverse was then conducted through dense scrub along the southern bank of the creek with the track being cleared of fallen timber by hand to avoid any tyre punctures. Calcrete exposures were noted along this part of the traverse but no locations were mapped or tested using the pXRF.

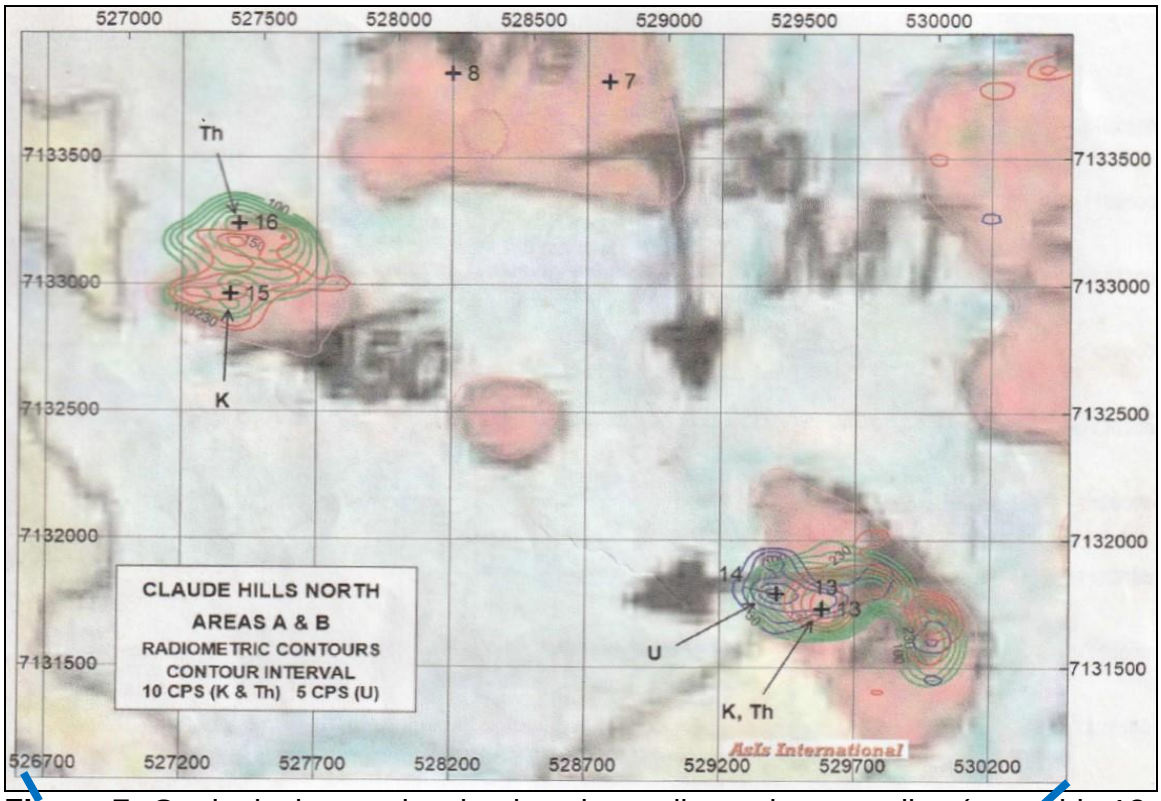

Figure 7: Geological map showing location radiometric anomalies (centroids 13-14; Target A and centroids 15-16; Target B). Image generated by Bubner (2018).

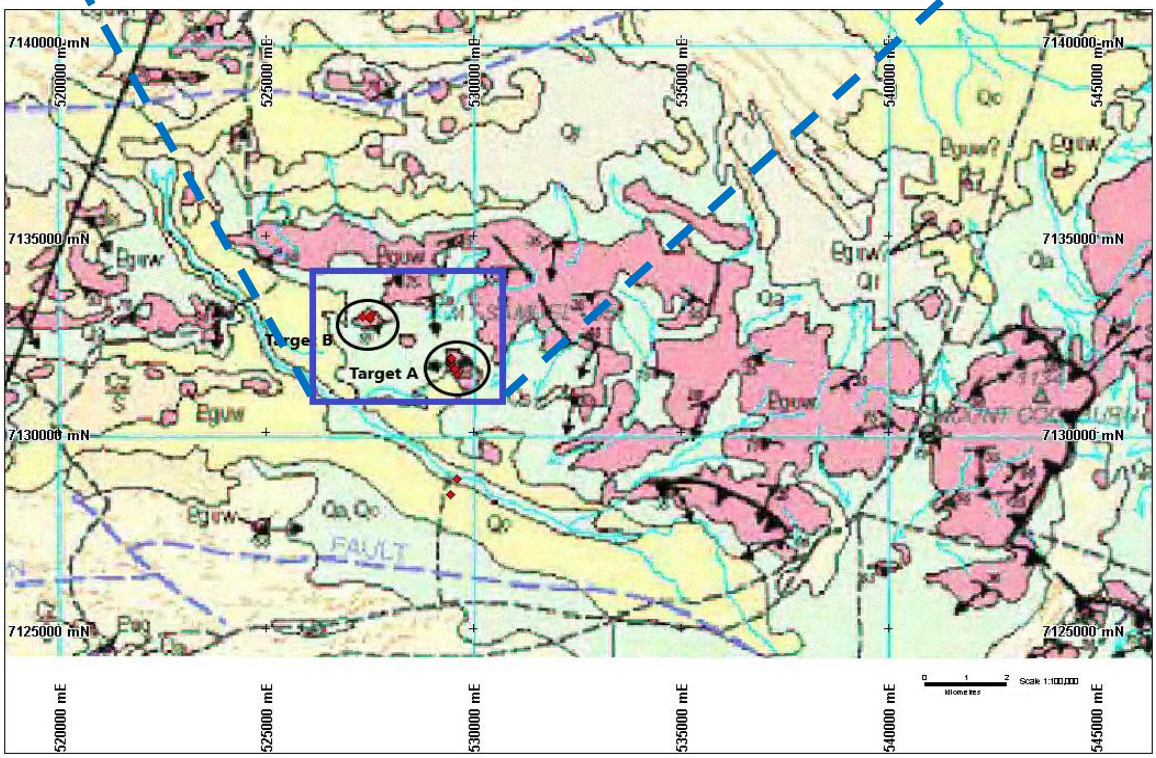

Figure 8: Geological map showing location of radiometric anomalies. Note extent of granite intrusive rocks identified by the pink coloured shape files (Pguw).

After traversing across the wide creek corridor, the traverse moved slowly up and along the heavily timbered northern bank then continued north-west for another 1-2 kilometres to the southern edge of a large granite outcrop at 529605mE, 7131475mN (Plate 5).

An elevated radiometric response (160cps) was noted immediately after first starting the spectrometer next to the field vehicles, with readings up to 200cps+ being recorded at the first exposure of gneiss mapped at 529556mE, 7131600mN. A traverse was then conducted on-foot along the edge of the granite outcrop using a hand-held spectrometer to investigate the nature and extent of the first radiometric anomaly, with spot readings being conducted at selected outcrops using the hand-held pXRF.

Outcropping granite and gneiss exposures were mapped and tested by pXRF along the edge of the outcrop before a traverse was conducted up the steep edge of the outcrop to explore the extension of a potential fault or shear zone that was mapped along an 050º strike trend (Figure 9).

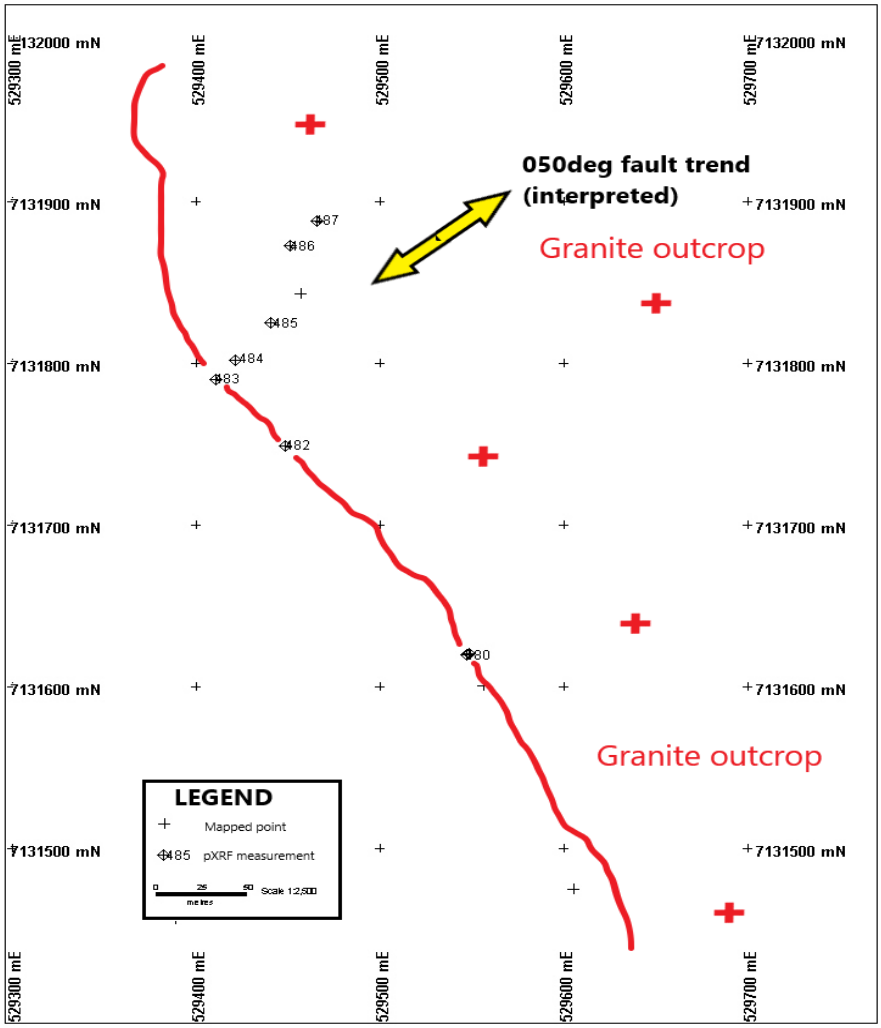

Figure 9: Location of pXRF readings granite/gneiss outcrop (Target A).

Plate 5: Prominent granite outcrop corresponding with first radiometric target.

Plate 6: Spectrometer reading at 529548mE, 7131622mN, reading is 586cps.

Plate 7: Prominent granite outcrop (Target area B) at 527540mE, 7132988mN.

Plate 8: Exposure of quartz veining with pegmatitic textures was mapped within an isoclinal fold hinge at 527529mE, 7132893mN. Results from spectrometer and pXRF testing were disappointing.

Granite and gneiss outcrops were mapped over a distance of ~300metres which identified spectrometer readings up to 800cps+ (Plate 6). Mapping identified prominent structural trends; brittle and ductile deformation along an 050º and 300º strike trends within the gneiss and granite outcrops, but no evidence of the source of the radiometric anomaly (i.e. any visible uranium minerals such as carnotite) was confirmed in any of the outcrop exposures examined.

The mapped granite outcrop was interpreted to correlate closely with the radiometric anomaly (Target; 13-14). This led to the early conclusion that the radiometric anomaly identified as Target A was probably a function of a radiometrically-'hot' granite.

A total of 8 readings were conducted at outcrops of granite using the pXRF which identified a maximum of; 8ppm uranium (3 out of 8 reads) and 33ppm thorium (7 out of 8 reads), with a maximum of 3.16% K also determined. Other elevated to anomalous pXRF results also included; 639ppm Rb, 71ppm Ce, 69ppm Mo, 81ppm Zn, 198ppm Pb and 77ppm Bi. No copper, arsenic or nickel readings >detected were confirmed however.

Target B

Following conclusion of the reconnaissance of the first target anomaly the field traverse continued west, across an open, grassy plain for ~3 kilometres to locate the second radiometric anomaly; Targets 15-16.

As per the previous target examined, the radiometric anomaly was confirmed to correlate to a prominent granite outcrop with readings up to 200cps+ being identified as soon as the spectrometer was started next to the field vehicles at 527540mE, 7132988mN (Plate 7). A traverse was conducted on-foot to explore along a steep erosional gully within the broader granite outcrop to investigate for a potential source of the radiometric anomaly.

Geological mapping confirmed evidence of faulting and foliation along a N-S strike trend which corresponded with spectrometer readings up to 600cps+ with this structure being followed up into a narrow, erosional gulley within the broader granite outcrop.

After following this gulley for ~50metres an exposure of quartz veining with pegmatitic textures was mapped within an isoclinal fold hinge at 527529mE, 7132893mN (Plate 8). Spectrometer results were disappointing however, with only 200cps being determined and only low concentrations being determined by the follow-up pXRF analysis.

A total of 5 pXRF readings were conducted at selected granite outcrops which identified a maximum of; 8ppm uranium (1 out of 5 reads) and 10ppm thorium (5 out of 5 reads), with a maximum of 5.43% K also determined. Other elevated to anomalous pXRF results also included; 604ppm Rb, 78ppm Ce, 100ppm V,

69ppm Zn, 399ppm Pb and 29ppm Bi. No copper or nickel were detected in any of the 5 readings.

Discussion

The geological reconnaissance conducted at the two radiometric anomalies; Targets A&B failed to identify any direct evidence of uranium or thorium mineralisation within the outcrop areas that were mapped. The first radiometric anomaly (Target A) was identified to comprise of predominantly granite, probably K-feldspar dominant and radiometrically-'hot', with lesser gneiss which also contained an elevated radiometric signature.

The second radiometric anomaly (Target B) was identified to comprise of granite, probably K-feldspar dominant and radiometrically-'hot', with minor pegmatitic veining which was not confirmed to be mineralised or contain anomalous uranium or thorium.

No evidence of uranium or thorium mineralisation was confirmed at either target area examined, and testing of outcrop exposures at both targets using the pXRF identified only marginally anomalous uranium with a maximum of 8ppm detected in less than half of the outcrops tested. Thorium values were higher than uranium, with a maximum of 33ppm identified and >detection values determined in most outcrops tested.

Whilst results from the pXRF testing determined only slightly elevated concentrations for uranium, the radiometrically-hot granite represents a potential source rock for the remobilisation of uranium-rich fluids.

Although there was no uranium mineral confirmed at either target area examined, further investigation of the potential for conductor lithologies i.e. graphite-rich sediments and/or other potential uranium conductors to occur in conjunction with key structures along the contact margins of the granite intrusive rocks at both target areas is currently recommended going forward as such sites may have the potential to host secondary uranium mineralisation.

Appendix 1

Table 1: Summary of maximum pXRF results (Wingellina targets)

Element	Claude Hills North 24 pXRF readings		Radiometric A 13-14 8 pXRF readings		Radiometric B 15-16 5 pXRF readings	
	No reads >detn	Max value	No reads >detn	Max value	No reads >detn	Max value
Magnesium	4	5.98%	1	2.29%	0	< detn
Aluminium	24	7.09%	8	15.5%	5	13.4%
Silicon	24	50.3%	8	35.5%	5	35.6%
Phosphorus	21	1.58%	0	< detn	0	< detn
Sulphur	3	419ppm	1	141ppm	2	231ppm
Potassium	24	0.61%	8	3.16%	5	5.43%
Calcium	21	25.9%	5	0.26%	5	0.13%
Titanium	23	0.5%	8	0.11%	5	0.19%
Vanadium	21	174ppm	6	49ppm	4	100ppm
Chromium	21	48ppm	6	46ppm	4	21ppm
Manganese	16	660ppm	6	817ppm	5	268ppm
Iron	23	1.25%	8	1.99%	5	3.53%
Cobalt	8	2ppm	4	6ppm	3	7ppm
Nickel	0	< detn	0	< detn	0	< detn
Copper	21	981ppm	0	< detn	0	< detn
Zinc	21	59ppm	7	81ppm	4	69ppm
Gallium	0	< detn	0	< detn	0	< detn
Arsenic	1	8ppm	0	< detn	1	5ppm
Selenium	0	< detn	0	< detn	0	< detn
Rubidium	0	< detn	8	639ppm	4	604ppm
Strontium	24	155ppm	8	53ppm	5	76ppm
Yttrium	8	21ppm	6	31ppm	2	17ppm
Zirconium	8	21ppm	5	185ppm	1	237ppm
Niobium	17	20ppm	7	29ppm	4	31ppm
Molybdenum	2	16ppm	2	69ppm	2	3ppm
Silver	1	4ppm	0	< detn	0	< detn
Cadmium	0	< detn	0	< detn	0	< detn
Tin	0	< detn	0	< detn	0	< detn
Antimony	0	< detn	0	< detn	0	< detn
Caesium	0	< detn	0	< detn	0	< detn
Barium	10	0.11%	5	475ppm	4	783ppm
Cerium	9	39ppm	7	71ppm	4	78ppm
Ta2O5	9	158ppm	1	42ppm	3	81ppm
Lead	11	7ppm	4	198ppm	3	399ppm
Bismuth	0	< detn	3	77ppm	1	29ppm
Thorium	7	17ppm	7	33ppm	5	10ppm
Uranium	0	< detn	3	8ppm	1	8ppm

Appendix 2

Table 4: Mapping points, Kunapula North project

Pt	Easting	Northing	pXRF read	Description	Date
1	504485	7126075		Start calcrete	9/04/2019
2	504650	7126180		Nth edge of calcrete target, surficial sands/sandy soils, scattered calcrete gravels	9/04/2019
3	504428	7126046	455	Southern tip of large calcrete exposure	9/04/2019
4	504432	7126040	456	Calcrete	9/04/2019
5	504435	7126050	457	Calcrete	9/04/2019
6	504454	7126028	458	Calcrete	9/04/2019
7	504462	7126053	459	Calcrete	9/04/2019
8	504435	7126049	460	Calcrete	9/04/2019
9	504440	7126049	461	Calcrete	9/04/2019
10	504444	7126066	462	Calcrete	9/04/2019
11	504466	7126062	463	Calcrete	9/04/2019
12	504496	7126064	464	Calcrete	9/04/2019
13	504510	7126074	465	Calcrete	9/04/2019
14	504550	7126095	466	Calcrete	9/04/2019
15	504570	7126097	467	Calcrete	9/04/2019
16	504570	7126114	468	Calcrete, sample taken	9/04/2019
17	504599	7126118	469	Calcrete	9/04/2019
18	504639	7126122	470	Calcrete	9/04/2019
19	504621	7126156	471	Calcrete	9/04/2019
20	504637	7126175	472	Calcrete	9/04/2019
21	504647	7126204	473	Calcrete	9/04/2019
22	504652	7126241	474	Calcrete	9/04/2019
23	504633	7126322	475	Calcrete	9/04/2019
24	504637	7126299	476	Calcrete	9/04/2019
25	504598	7126290	477	Calcrete	9/04/2019
26	504600	7126176	478	Calcrete	9/04/2019
27	504600	7126177	479	Calcrete	9/04/2019
28	529440	7128400		Chalcedony, calcrete, surface exposures over 100m+	10/04/2019
29	529600	7128800		North edge of calcrete-capped palaeosurface, wide drainage corridor towards north	10/04/2019
30	529605	7131475		Gneiss, strike E-W, subvertical. Spectrometer 160cps	10/04/2019
31	529556	7131601		Gneiss, strike 050^{o}, dip -70^{o} toward E. Spectrometer 240cps	10/04/2019
32	529547	7131620	480	Granite, strike 050^{o} (apparent). Spectrometer 500cps+	10/04/2019
33	529548	7131621	481	Granite, strike 050^{o} (apparent). Spectrometer 500cps+	10/04/2019
34	529448	7131749	482	Granite. Spectrometer 700cps+	10/04/2019
35	529410	7131790	483	Granite, Target#14. Spectrometer 530cps	10/04/2019

36	529421	7131802	484	Granite. Spectrometer 600-650cps	10/04/2019
37	529440	7131825	485	Granite/gneiss contact. Spectrometer 700cps+	10/04/2019
38	529457	7131843		Granite. fault strikes 305^{o}. Spectrometer 600cps+	10/04/2019
39	529451	7131873	486	Granite, pegmatitic textures. Spectrometer 600cps+	10/04/2019
40	529465	7131888	487	Granite, weakly foliated. Spectrometer 700-800cps	10/04/2019
41	527540	7132988	488	Gneiss, pegmatite veining. Spectrometer 420cps, background 300cps	10/04/2019
42	527541	7132989	489	Gneiss, pegmatite veining. Spectrometer 420cps, background 300cps	10/04/2019
43	527529	7132893	490	Pegmatite vein, boudinaged, strike N-S. Spectrometer 200cps	10/04/2019
44	527496	7132951	491	Granite, minor gneiss, foliated, faulting strikes N-S (apparent). Spectrometer 600cps+, values decrease in outcrops on east and west	10/04/2019
45	527339	7132951	492	Granite, large feldspar phenocrysts. Spectrometer 400cps	10/04/2019