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# **WHITE SPUR CREEK EL 10/2011 ANNUAL REPORT**

**FOR THE PERIOD ENDING 6TH NOVEMBER 2017**

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**Date:** 4<sup>th</sup> October 2017

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## **1 SUMMARY**

Exploration Licence 10/2011 was granted to MMG on the 6<sup>th</sup> November 2011. Work completed during the period was follow up of grid based soil and rock sampling as part of a bigger regional program with 6 line kilometres of grid cutting for soil sampling, a total of 122 soil samples were collected and a consistent Te-Sb-Ag-Pb anomaly at the base of the White Spur formation is identified.

## **2 INTRODUCTION**

This report details work undertaken on EL 10/2011 White Spur Creek (Figure 1) from 7<sup>th</sup> November 2016 to 6<sup>th</sup> November 2017.

The White Spur licence covers a portion of the Cambrian Mount Read Volcanics to the south of the Rosebery and Hercules Mines and to the west of the Henty Mine in Western Tasmania. The principal exploration targets sought within the licence area are Hellyer or Rosebery-type VHMS Pb-Zn-Cu-Ag-Au massive sulphide deposits. A 5km strike length of the contact between the White Spur Formation (WSF) and the Central Volcanic Complex (CVC) runs through the centre of the tenement and has been the main target of recent exploration. The CVC – WSF contact has been considered to be a correlate of the Rosebery-Hercules host horizon by previous workers (Hicks, 2009, Vicary, 1997). A second and less well understood target is the Jones Creek package, in the NE part of the tenement. This sequence of shales and fine volcanogenic sediments associated with rhyolitic intrusives is thought to correlate with the Rosebery host position, but correlations are not as clear as for the base of the White Spur Formation due to structural complications.

Access into the tenement is via Howards Rd. (off the Anthony Rd) or on 4WD tracks (in particular the Moore's Pimple track) heading south from Mt Read and the Hercules Mine. Within the EL access is via a series of old logging tracks and a new HEC road, which follows a major canal.

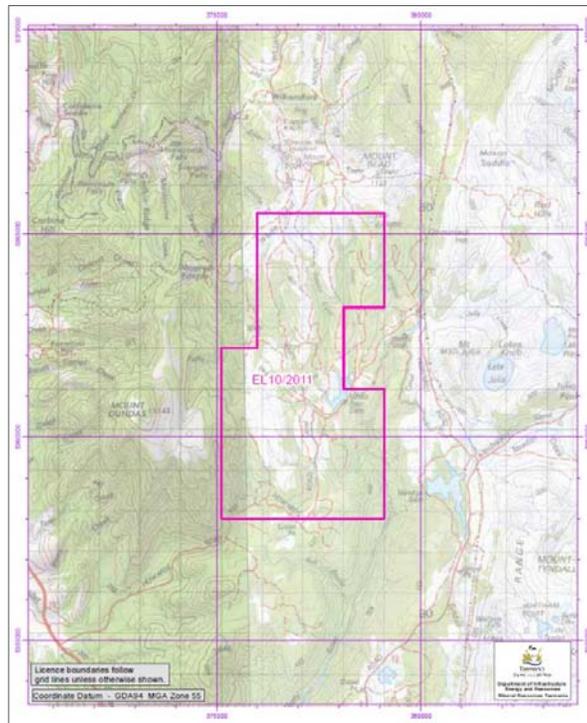


Figure 1: Location of EL 10/2011

### 3 GEOLOGY

The MRV in the area of EL 10/2011 can be subdivided into three main units; the WSF, CVC and Henty Fault Wedge Sequence. Of these only the first two are part of the VHMS prospective sequence.

The WSF was formally defined by Corbett and Lees (1987) as a west facing sequence of felsic tuff, siltstone, greywacke and slate that unconformably overlies the Central Volcanic Complex between the North Henty Fault and Williamsford. The WSF is conformably overlain by Dundas Group conglomerate, quartzwacke, mudstone and lithicwacke on the western end of Howards Road. The abundance of quartz-phyric detritus in the White Spur Formation may suggest derivation from Tyndall Group rocks located to the east of the Henty Fault Zone.

### 4 PREVIOUS EXPLORATION

Previous exploration was compiled in the 2014 annual report – the reader is referred to this report for information to 2014 and work completed in 2015 and 2016 is contained within the annual reports.

## 5 WORK COMPLETED (YEAR 6)

During the period 7 kilometres of grids were sampled for a total of 122 soil samples. All of the samples were assayed by an ICP-MS/AES method after a 4 acid digest (ALS method ME-MS61) and the data was reviewed by Scott Halley. The report is included below and as appendix 1 and assay results are included as Appendix 2.

### 5.1 A REVIEW OF SURFACE GEOCHEMISTRY ON WHITE SPUR EL10/2011 FOR MMG.

Scott Halley,  
Mineral Mapping Pty Ltd  
05/09/2017

#### **Introduction**

This report is a review of multi element geochemistry collected by MMG on the White Spur EL over two different sampling campaigns. It includes a mixture of rock chip samples and soil samples. All of the samples were assayed by an ICP-MS/AES method after a 4 acid digest (ALS method ME-MS61).

Immobile trace element signatures were used to characterize the magmatic compositions. This was applied to both the rocks and soils. The soils were C-horizon samples, and it was considered that in terms of immobile trace elements, these were comparable with the rocks.

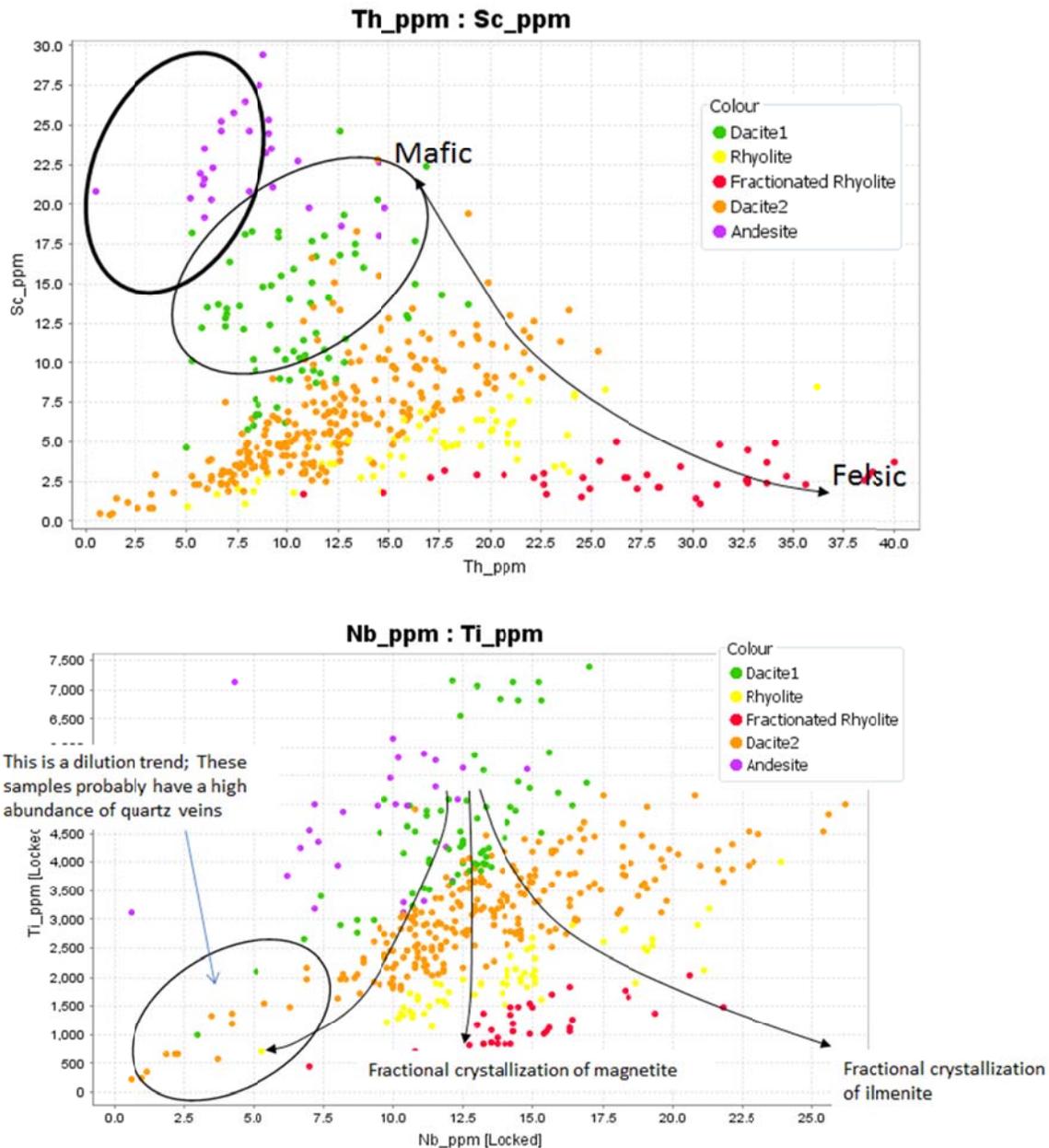
Major element plots were used to estimate the alteration mineralogy of the samples. Only the rock samples were used for this assessment. Both sample media were combined to make pathfinder element maps.

**Discussion; using immobile trace elements to fingerprint lithology.**

Scandium is a useful immobile element for identifying primary rock compositions because it substitutes for Fe into common silicate minerals such as hornblende, pyroxene, chlorite, etc. Sc can be considered as a proxy for the Fe content, but it is much less mobile than Fe during alteration and weathering. As a guide;

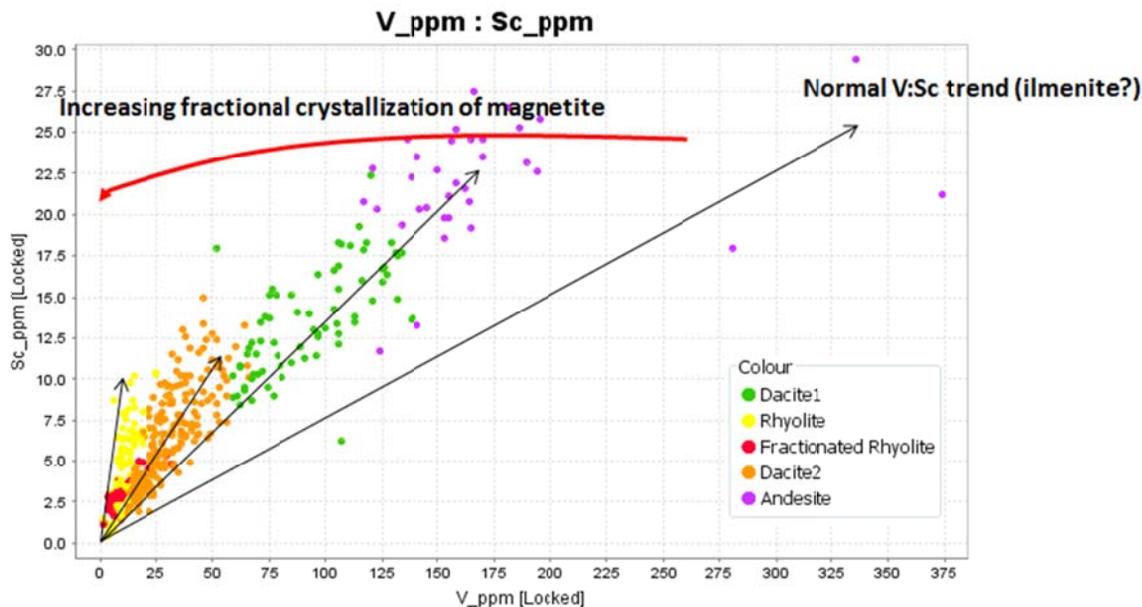
- basalt will have 30 to 50 ppm Sc,
- andesite 20 to 30ppm,
- dacite 10 to 20, and
- rhyolite less than 10ppm.

A plot of Sc versus Th plot is analogous to Ti vs Zr plots, but is more informative about compositions. This plot demonstrates a range from high Sc to low Th in mafic rocks through to low Sc to high Th in felsic rocks.

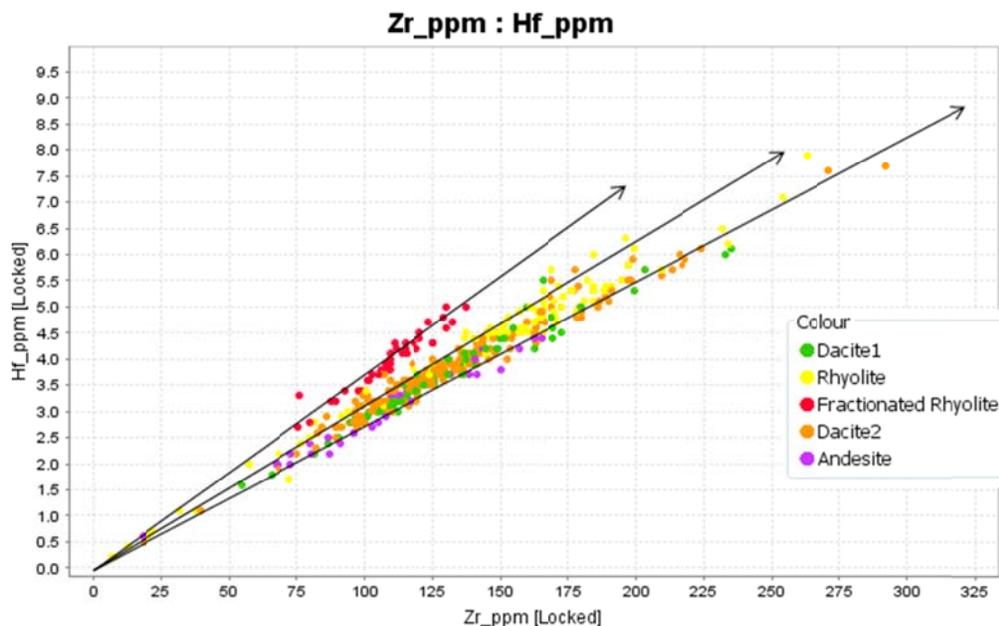


A plot of Ti vs Nb gives information about the nature of the opaque Fe-Ti oxide minerals in each magmatic suite. Ti vs Nb tends to generate a series of linear arrays that project back towards the origin. Nb substitutes for Ti in opaque minerals including titanite, rutile, magnetite and ilmenite. However niobium is relatively incompatible.

Therefore the Nb/Ti ratio in the melt increases during fractional crystallization of oxides. The greatest rate of increase occurs when there is fractional crystallization of ilmenite, and the least rate of increase occurs with titanite. A consequence of this is that fractionating reduced magmas become highly enriched in niobium (eg Sn-granites); fractionating oxidized magmas tend to lower Ti, but without Nb enrichment (eg porphyry Cu), and fractionating calc-alkaline magmas (fractionating magnetite) plot somewhere in between.

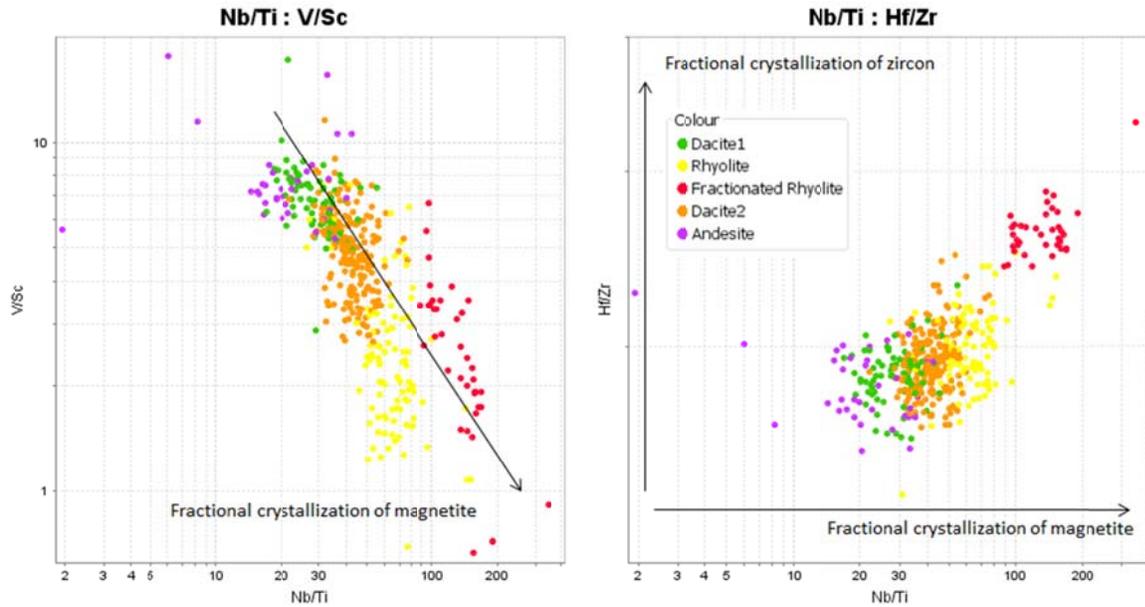


A plot of Sc vs V is a useful way to track fractional of magnetite. Most magmas have a Sc to V ratio of around 1:7. Both Sc and  $V^{3+}$  substitute for Fe in amphibole and pyroxene, and they tend to have very linear correlations. However,  $V^{4+}$  can substitute into oxides, but  $Sc^{3+}$  does not. There is a very high partition coefficient of V into titanomagnetite. Calc-alkaline rocks begin fractional crystallization of magnetite early in the cooling history. As the melts fractionate, V is incorporated into magnetite, the magnetite crystals settle out in the magma chamber, and the remaining melt is depleted in V. The Mount Read Volcanics from around Rosebery show a very distinct signature of magnetite fractional crystallization.

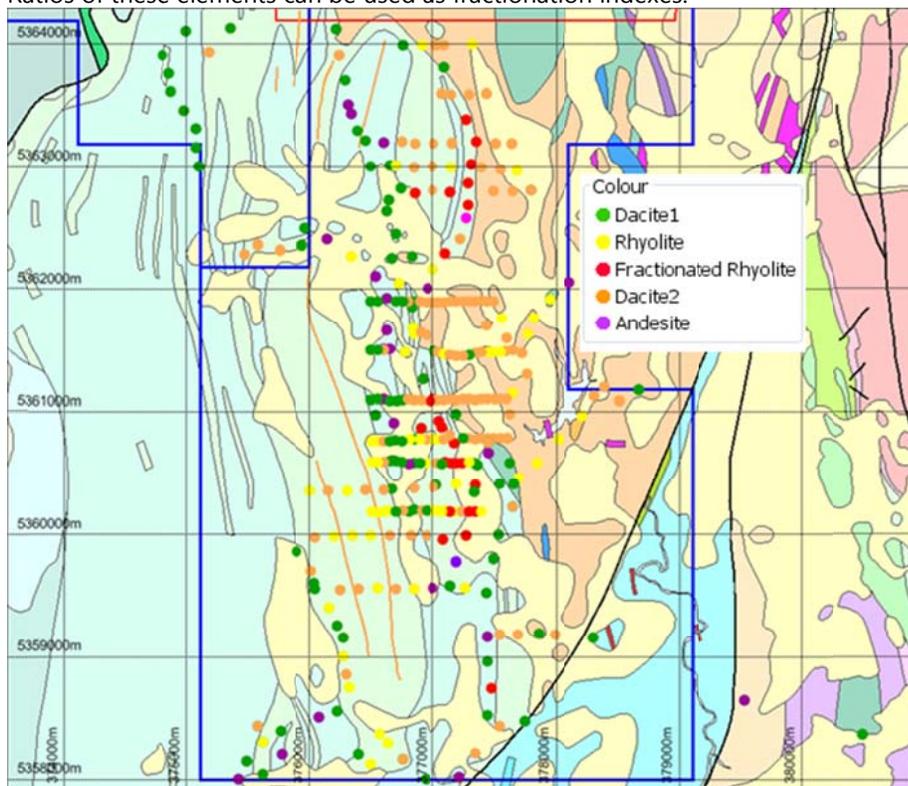


A plot of Hf vs Zr is a very effective way to test for fractional crystallization of zircon. Hf and Zr always plot with a near perfect straight line correlation; Hf can only substitute into the lattice of zircon crystals. However, hafnium is quite incompatible. As zircons crystallize, the melt very gradually evolves to higher Hf/Zr ratios. Zircons tend not to

nucleate as new crystals; rather they just form overgrowing rims, so the final Hf/Zr ratio remains constant. Zircons usually crystallize late in the crystallization sequence, and felsic magmas are too viscous to allow crystal settling at that stage. However, where there is fractional crystallization of zircons, early formed zircons sink in the magma chamber, and the separated melt has a lower zircon content but a higher Hf/Zr ratio. This can only happen in melts with a very high water content. The high water content de-polymerizes silicate chains, significantly reduces the viscosity of silicate melts, and allows island silicates like zircon to crystallize earlier than feldspars; hence fractional crystallization can occur. This is a rare process, but an exceptionally good indicator of magmas that have high potential for ore-formation. The lower-most unit of the White Spur Formation shows a VERY distinct signature of fractional crystallization of zircons. This time window in the Mount Read Volcanics has exceptionally high potential for VMS mineralization.



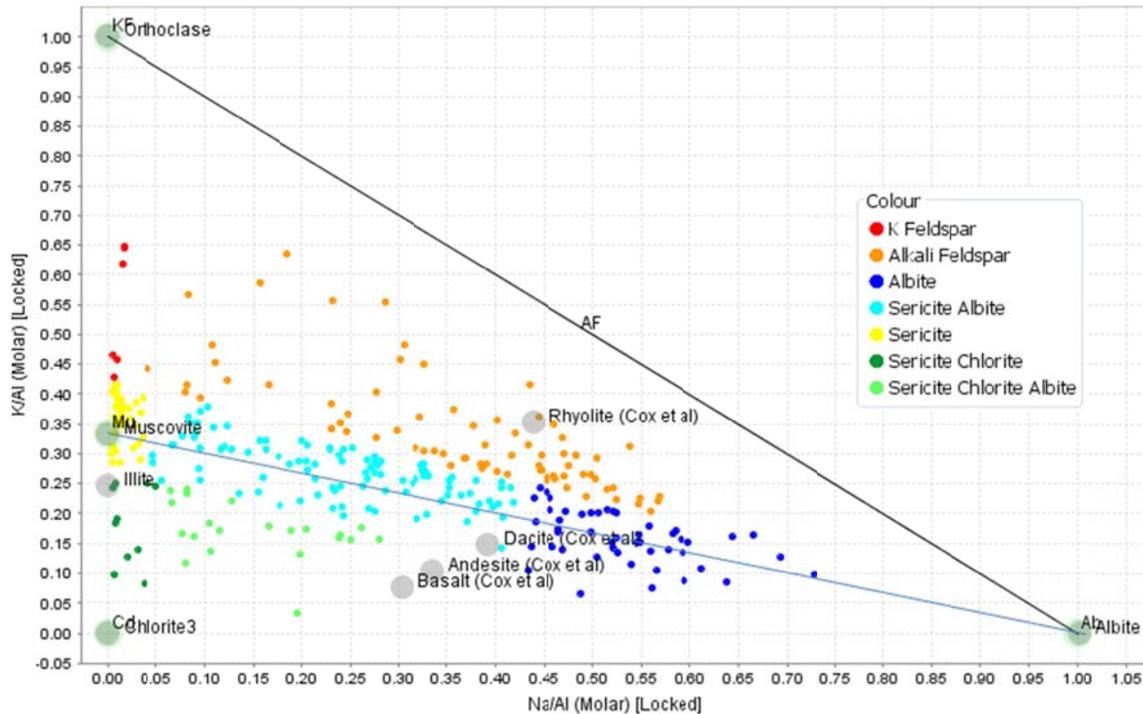
Ratios of these elements can be used as fractionation indexes.



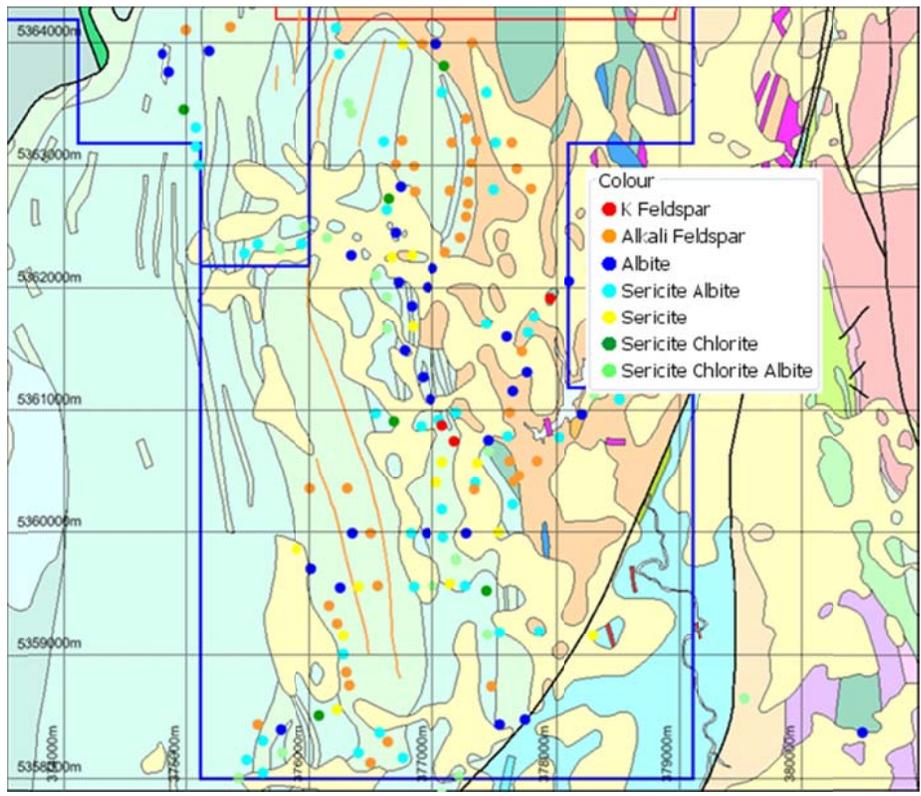
## Alteration Mapping

One of the most useful plots for distinguishing alteration is K/Al versus Na/Al, calculated on a molar basis. Consider a rock that is totally sericitised. The mineralogy of the rock might be muscovite-quartz-carbonate-pyrite. All of the K and Al in that rock will be within sericite. Muscovite has a composition of  $KAl_3Si_3O_{10}(OH)_2$ . Therefore the ratio of K:Al in the sericitised rock is 1:3. Similarly, a totally K feldspar ( $KAlSi_3O_8$ ) altered rock will have a K:Al ratio of 1:1. In the same way, albitisation can also be tracked. Albite is  $NaAlSi_3O_8$ : Na:Al = 1:1.

**Feldspar Na-K GER Diagram**

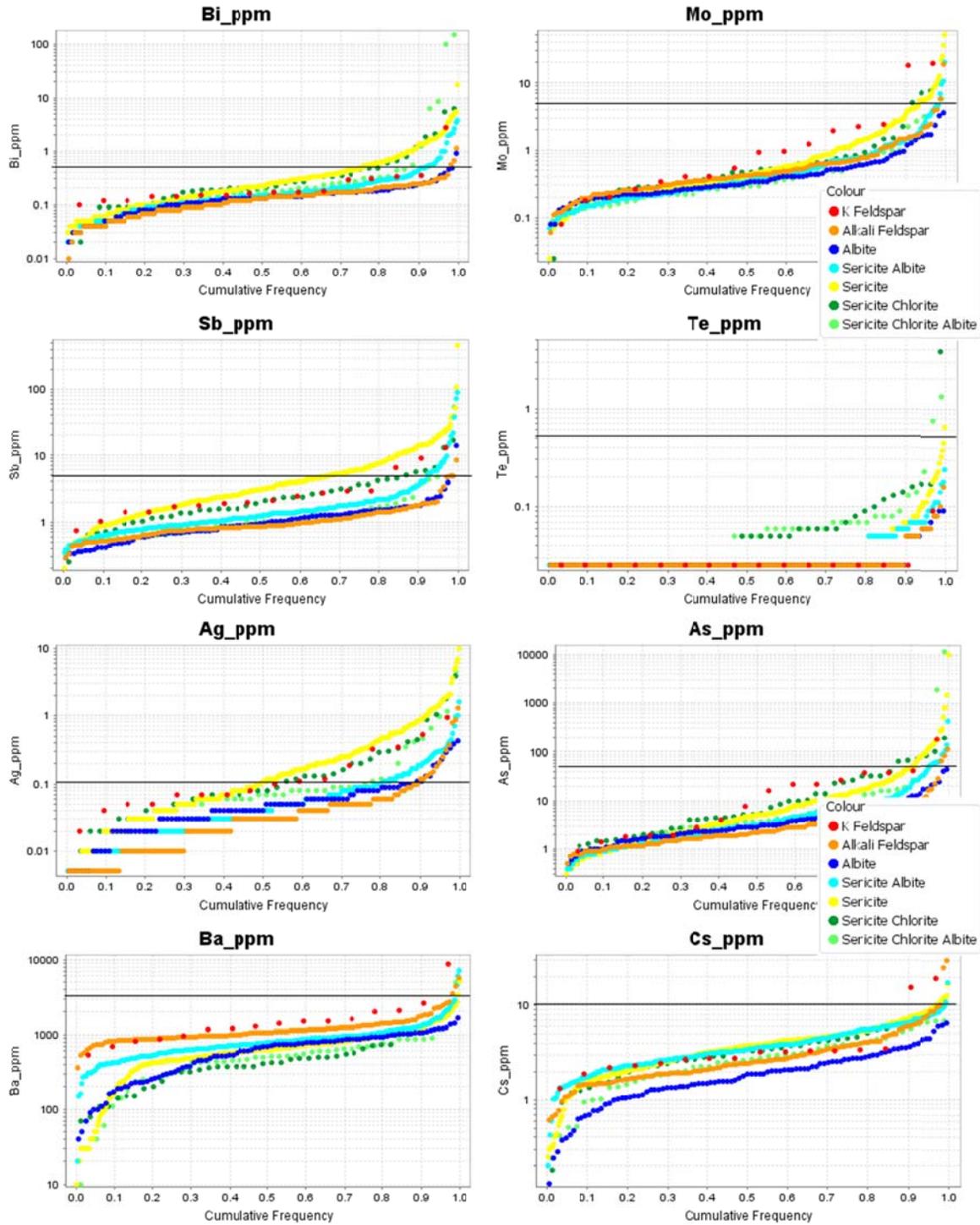


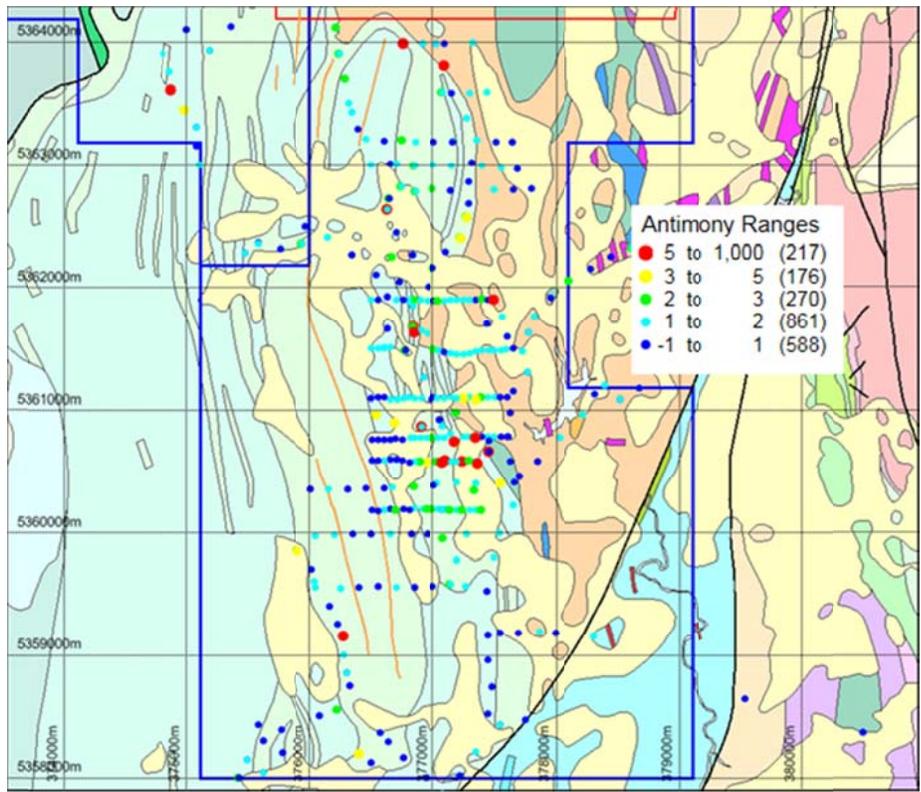
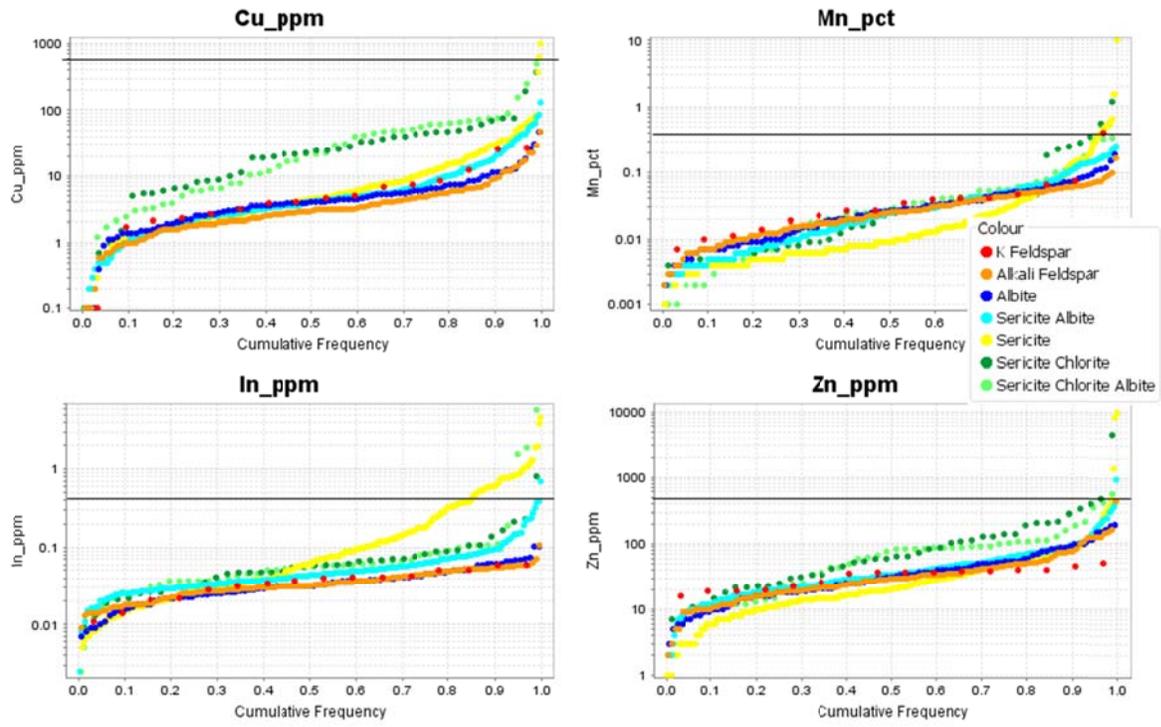
Note the points that plot along the sericite-albite tie line. Some of these are a little more albitic (dark blue) than the expected background. Many are somewhat Na-depleted, and plotting on a trajectory towards sericite (pale blue). There is a cluster of points (yellow) that are completely sericitised, and even a few points with strong K feldspar alteration. Samples that plot below the albite-sericite tie line are albite-sericite-chlorite mixtures.

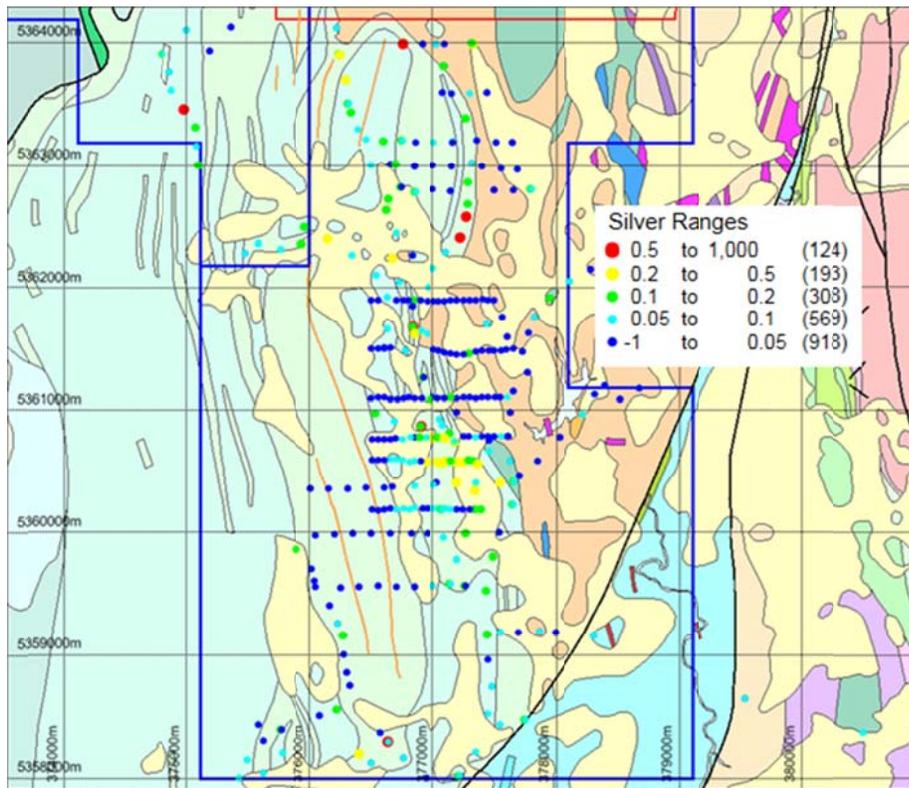


## Pathfinder Elements

A very useful way to evaluate the level of anomalism in an assay data set is to look at cumulative frequency plots coloured by the alteration mineralogy (as in this case) or by classified lithology. These plots show cumulative frequency coloured by alteration mineralogy, for a suite of pathfinder elements. The black lines show 10x average crustal abundance eg., significant threshold level. The most anomalous metals in this data relative to the expected background are antimony, silver and bismuth.







The White Spur prospect has a relatively small (<1km strike) anomalous footprint of Sb-Ag-Pb, associated with a localized cell of K feldspar alteration and felsic volcanics in the lowest unit of the White Spur formation that are derived from an extremely fractionated magma source.

Although this is a small anomaly, it would be worth reviewing historic drill core from here to see what the fractionated rocks look like in core, and it would also be worth reviewing historic IP data to see how the rock chip and soil geochem anomaly matches up with the chargeability. Has the previous drilling tested the best part of the geochem anomaly and/or most chargeable zone?

## 6 CONCLUSIONS & RECOMMENDATIONS FOR 2017-18

The results from White Spur need to be reviewed along with relogging of the already completed drillholes in this area to understand both the pathfinder anomaly and also the importance of the evolved felsic volcanic. Additional mapping, logging and soil sampling will be completed by a dedicated exploration geologist rather than work being done by the Rosebery mine geology team. Estimated expenditure is \$80,000.

If no drilling is completed then a partial relinquishment would be done.

## 7 ENVIRONMENT & REHABILITATION

No rehabilitation was completed during the period.

## 8 EXPENDITURE

A total of \$49,237 was spent on EL 10/2011 for the reporting period. A detailed expenditure statement is given below (Table 1).

**TABLE 1: EXPENDITURE FOR EL 10/2011 WHITE SPUR CREEK**

	White Spur Creek EL 10/2011
<b>TOTAL COSTS</b>	<b>\$ 49, 237</b>
PERSONNEL	\$ 17153
GEOSCIENCE CONSULTANTS	\$ 3300
TRACK CUTTING & GRIDDING	\$ 20640
GEOCHEMICAL & ASSAYING	\$ 3537
VEHICLE, PLANT, EQUIP	\$ 3500
STORES & SUPPLIES	
ADMIN OVERHEADS & LICENCE FEES	\$ 5697
LAND & ENVIRONMENT	
EQUIPMENT HIRE	