Biogeochemical and Regolith expression of buried non-ferrous mineralisation in the Northern Middleback Ranges, Iron Knob North

Daniel James Tanti

Geology and Geophysics, School of Earth and Environmental Science,
University of Adelaide, Adelaide, SA 5005, Australia

A manuscript submitted for the Honours Degree of Bachelor of Science
University of Adelaide October 2011

Supervised by Dr. Steven M. Hill
Secondary Supervisor: Prof. David Giles

ABSTRACT

South Australia hosts some of the world's largest non-ferrous mineral deposits. Exploration for such mineralisation systems has so far been impeded by thick regolith that conceals much of the prospective regions throughout Australia. The project tenement studied here is on the Eyre Peninsula at the central northern edge of the Spencer Domain (Middleback Ranges) within the Gawler Craton. It considered highly prospective for mineralization, such as associated with Iron Ore Copper Gold (IOCG) mineralisation. This study provides a preliminary characterisation of the plant biogeochemistry in relation to potential mineralisation sources in the area, and evaluates the potential for plant biogeochemistry to provide an effective and efficient representation of the mineral prospectivity. Three different plant species (*Marianna sedifolia*, *Acacia papyrocarpa* and *Casuarina pauper*) were sampled along east-west transects. Regolith mapping was conducted from aerial imagery of the area and ground-proofing along transects. A landscape geochemical dispersion model was constructed to highlight material flow directions to further understand the regolith units, landform history and its relation to the biogeochemistry of the area. Multi-element plant biogeochemical results show elevated levels of the commodity elements (Cu, Au, U) over known fault structures, the western alluvial system, and surrounding the mineralised Hutchison Group. Three statistical methods were selected to analyse and interpret the data: 1) Normal distribution- two standard deviations; 2) Median absolute deviation; and 3) Normal probability plots & histograms. The median absolute deviation presented consistent parameters for isolating the natural (interpreted natural) uptake of the selected 19 elements. Threshold values displayed limits that were interpreted as showing minimal potential of inhibiting any interpretation of single points of interest or overshadowing any broad scale element trends. Thus this method was utilised in displaying the biogeochemical results. Proposed exploration models for the area include close spaced transect sampling of vegetation along fault structures. Results from this study have implications for the future of mineral exploration, both within this tenement and in other regions comprising similar species and regolith cover. Results demonstrate that biogeochemistry can assist in the exploration of mineral deposits at both the prospect and regional scale. The importance of regolith mapping and developing an understanding for the tenement and regional landscape are important components in identifying likely areas of mineralistion, the success of sampling and result analysis.

Key words: Middleback Ranges, non-ferrous, biogeochemistry, fault structure, mineral exploration, landscape regolith, geochemistry

INTRODUCTION

Sampling regolith materials as a part of the search for elevated metal concentrations associated with mineralisation is a widely adopted technique for locating concealed ore bodies. For this to be a reliable technique the source of the regolith geochemical characteristics needs to be well constrained, therefore the mechanisms that can produce the surface signature of mineralisation buried under tens of metres of cover need to be understood (Anand *et al.* 2007). The chemical characteristics of plant materials and their relationship with geological substrates (plant biogeochemistry) provide insights into these mechanisms, as well as having potential applications as a mineral exploration technique in its own right. The greatest potential for the application of plant biogeochemistry in mineral exploration is in areas of transported overburden, where deep sinker roots, and, if the cover is shallow, lateral roots, may access weathered bedrock and associated groundwater. The value of plants in providing an expression of buried geological substrate is controlled by the need for the plants (especially those in semi-arid and arid areas) to have deep root systems to access deep groundwater reserves (Anand *et al.* 2007). Australian native plants have evolved to mitigate the stress caused by dry climates and nutrient-poor soils. One adaption is dimorphic root systems with shallow lateral and deep sinker roots. The latter may reach over 30 m and are able to access water and nutrients deep in the regolith (Dell *et al.* 1983; Dodd & Bell 1993; Canadell *et al.* 1996; Pate *et al.* 1999; Zencich *et al.* 2002; Aspandiar *et al.* 2006). Australian native plants also produce cyanide, oxalate, citrate and complex polyphenolics it is likely that these dissolve trace elements and render them suitable for plant uptake. Vegetation takes up and metabolizes a range of elements from groundwater or mineral surfaces, and stores or expels others (Brooks *et al.* 1995). Biologically essential elements are taken up by vegetation becoming concentrated in plant organs even if their abundance is low in the regolith. Non-essential elements (Ag, As, Au, Pb, U) are also taken up and may reflect more closely the composition of the substrate (Anand *et al.* 2007).

The aims of this study are to provide a preliminary characterisation of the plant biogeochemistry in relation to potential mineralisation sources in the study area (Figures 1 & 2), and from that, evaluate the potential for plant biogeochemistry to provide an effective and efficient representation of the mineral prospectivity. This study focuses on an area prospective for buried Cu, Au, Pb–Zn–Ag and sedimentary U mineralisation and provides a characterisation and assessment of plant biogeochemical exploration. As this exploration and geochemical dispersion takes place within the context of an evolving landscape, a regolith-landform mapping and landscape evolution framework provide foundations for these exploration approaches, and in particular constrain the landscape processes that have operated in the area that have largely controlled the geochemical dispersion in the landscape (Anand 2005; deBroekert 2005; Pain 2008). The study area is ideal for assessing and refining regolith geochemical and biogeochemical techniques for exploration under cover, as the area is dominated by transported regolith associated with the outer western margins of the Cenozoic Pirie Basin (Drexel & Priess 1995).

This study area is dominated by two vegetation distributions patterns. Black oak (*Casuarina pauper*) and western myall *(Acacia papyrocarpa)* are confined to corridors of open woodland with pearl blue bush (*Maireana sedifolia*) dominating a more open landscape terrain. These species have previously been shown to biogeochemically express buried Au mineralisation elsewhere in the Gawler Craton, including at Tunkillia Au-prospect (Lowrey J.R. & Hill S.M. 2006; Lowrey 2007), Challenger Au mine (Lintern & Sheard 1999), Birthday Au prospect (Lintern *et al.* 2000) and Boomerang Au prospect (Lintern *et al.* 2006). There has been less assessment of its use for multi-element commodities in the Gawler Craton, except for an Honours study at the Hillside Cu-Au prospect (Dietman 2009).

This study will evaluate the efficiency of locally sparse and abundant plant species, through their biogeochemical signatures and natural background element uptake, as a means of identifying potential points of interest and subsequently any expression of buried bedrock and potentially non-ferrous mineralisation. For this study the term anomaly will not be used as it invokes the idea of an economic prospect. Single points that display characteristics that require further analysis will be termed 'Points of Interest.'

SETTING

Geology

The Middleback Ranges (MBR) are located in central northern tip of the Spencer domain in the Gawler Craton. The study area is geologically influenced by a number of lithological units. Predominately this influence is sourced from the Hutchison Group in the south and the Corunna conglomerate in the north. Detailed descriptions of all influencing units are provided in Supplementary Appendix 1 – Regional geology.

Iron Knob Fe Mineralisation

The deposits of the Middleback Ranges formed by supergene enrichment of Banded Iron Formation (B.I.F), and involved the dissolution of gangue minerals and their replacement by ore-forming minerals (Miles *et al.* 1952; Owen 1964; Yeates 1990). The enrichment occurred as a multi-stage process. Haematite ore is preserved as clasts in the Corunna Conglomerate (Lemon 1972) suggesting that diagenetic magnetite was recrystallised and remobilised before the Mesoproterozoic, probably during deformation and metamorphism of the B.I.F. during the Kimban Orogeny (Yeates 1990; Parker *et al.* 1993). Tertiary haematite ore scree deposits are extensive along the eastern and western flanks of the Middleback Ranges and suggest that there was a subsequent enrichment episode at this time (Owen 1964).

Climate

The Iron Knob North (IKN) area presently experiences a Mediterranean climate with warm to hot, dry summers (23.6˚C) and cool, moist winters (14.4˚C). Averaged, mean annual rainfall (1945-2011) is 270 mm (BoM 2011), mostly falling during the winter-spring months of June – October with maximum mean temperature (31°C) typically in December (BoM 2011). Dominant wind direction is highly variable in mornings, with a dominant afternoon sea breeze from the south.

Regional Vegetation

The vegetation of the Iron Knob and Middleback Ranges is consistent with a semi arid to arid area with a pastoral history. Vegetation varies along the length of the ranges with Iron Knob in the north being the most arid with sparse cover. The remaining area is covered by sparse saltbush and pearl bluebush *(Maireana sedifolia)*. There is isolated western myall *(Acacia papyrocarpa)* in an open woodland band extending from Port Augusta across the study area and out onto the western arid rangelands of South Australia. Intermittent areas of black oak *(Casuarina pauper)* are located in and along ephemeral channels and quartz vein exposures.

Target vegetation & organs

This study utilises two different organs of three plant species. Each species varies in its distribution and abundance within the study area, hence the need for multiple species rather than a solitary species for analysis. In general, the main source for trace elements to a plant is its growth media. Some species of plant are able to uptake metals above that of established background levels; these are known as hyperaccumulators (Kabata-Pendias 2000). Absorption by roots is the main pathway of trace elements into a plant's system (Kabata-Pendias 2000). Aerial sources of elements that are uptake by leaves can play a major role in plant contamination, especially given that translocation of elements from one organ to another is regular. Depending upon organ age concentrations within a single organ, can vary greatly. This is highlighted by research results indicating that 73 -95% of total Pb content in some plants are up taken by leaves through aerial deposition and then relocated throughout the plant (Kabata-Pendias 2000).

For this study, the two plant organs analysed are twigs and phyllodes (modified organs resembling leaves in acacias). There are numerous considerations for the sampling of both these organs and the potential results they present. The chemical characteristics of a leaf (or phyllode, but from here on referred to as a leaf) are susceptible to seasonal variations at a rapid rate in comparison to that of twigs (Dunn 2007). The chemical requirements for a leaf vary seasonally as a result of budding, flowering and its general life cycle, which is typically shorter than that of a twig. As a twig has a greater life expectancy variations in element uptake and chemistry are progressively adapted into its system over a number of years and are subsequently less intense and influential. This presents a noticeable hindrance for sampling and analysing twigs, as no single twig has the same age as another on a single plant. Concentrations of elements are heightened towards the tips of a twig as it continues to grow. Given this, care must be taken to ensure a relatively consistent age of twigs and leaves are sampled as incorrect sampling techniques may result in misleading results due to differing organ ages (Dunn 2007).

The three species used in this study were selected for analysis based upon their spatial availability and past biogeochemical success in this region (Hill 2009). Detailed description of the black oak (*Casuarina pauper)* along with the pearl bluebush *(Maireana sedifolia)* can be found in 'Vegetation sampling in the Gawler Craton, (Hill 2009), which details species characteristics and past biogeochemical uses and success. In the Iron Knob study area the leaflets (small leaf-like structures on stems) of the black oak and phyllodes of western myall along with the twigs of the pearl blue bush were analysed for their elemental content.

The final species studied was the western myall *(Acacia papyrocarpa)*. Because a detailed biogeochemical related description has yet to be published on this species, a brief description is attached in Supplementary Appendix 1. This description is based upon observations seen at the study area, in association with background papers (Lange & Purdie 1976; Lange & Sparrow 1992).

METHODOLOGY

Plant Biogeochemistry

Detailed fieldwork was conducted within the study area of Iron Knob North during three field trips - 21st - 25th March, 26th - 30th April 2011 and 29 August – 3 September. The selected plant species and organs (twig and leaves / leaflets / phyllodes) were all sampled where available along the six by one km east-west orientated transects with a spacing of one km between each transect (Figure 3). Samples were taken at 200 m intervals along transect lines and where possible, comparison samples between species and organs were taken. In total, 172 samples were collected, including: eight black oak; 32 western myall; and 131 pearl bluebush. The validity of the analytical procedures and representative nature of the results were assured and controlled via analytical "blanks", reference materials and duplicate samples taken from the full 172 sample data set. Seventeen random duplicate samples were prepared from the 172 samples including; two black oak, six western myall, and nine pearl blue bush. Duplicate samples, like original samples, were prepared by grinding the sample to powder, mixed, and then placed onto a clean A4 sheet of paper. Duplicates underwent sample splitting into two approximate halves and placed into a new bag as a duplicate. Sampling error was reduced by using the methodology adapted from Hill, (2002, 2008). Analytical error calculation was conducted, including; percentage difference error, half relative difference and 95% confidence intervals. An additional alternative duplication method was undertaken in order to ascertain a number of important factors associated with element uptake, movement and storage.

To prevent chemical cross-contamination between samples, powder-free latex gloves were worn. Plants sampled were in good health with minimal disease and insect infestation on leaves. For both organs, middle-aged specimens were selected. Plants, particularly pearl bluebush, were not sampled if the organ for sampling was deemed too close to the soil surface as this could result in an increased risk of contamination from disturbed and airborne soil particles that concentrate on the lower foliage.

Samples were assigned identification codes (eg. KNOB-DT001) and placed in a brown paper bag, which allowed the samples to air dry and subsequently reduce sample degradation and contamination via organ sweat and mould development. Once air dried, samples were exposed to additional drying in a low temperature oven (<60 ˚C) for 24 hours to prevent smearing during milling. Dried vegetation samples were ground into a fine powder using a stainless-steel grinder containing a rotating blade and placed in sample envelopes labelled with the corresponding identification code.

Dry Ashing

Vegetation samples of 15 g dry plant were converted to ash through controlled ignition, which minimizes volatilization of elements. Results are normalised to a dry weight basis by taking the concentration in ash, dividing by 100 and multiplying by the ash yield, giving lower detection limits and greater precision. Ashing takes place by slowly increasing the temperature of a furnace or kiln to 475°C as this the lowest temperature at which vegetation will be reduced to ash without a long period of charring (Dunn 2007). Dry tissues of plants commonly used in biogeochemical exploration contain tens to hundreds ppm of element concentration. On reduction to ash, these concentrations are magnified 30- to 100-fold, depending on the type of plant organ sampled (Dunn 2007).

Provided that the ashing takes place under controlled conditions the biogeochemical signatures are robust. Comparisons of 'ash' versus 'dry' analyses of the same samples permit evaluation of concentrations of a wide array of elements (Dunn 2007). By reducing the samples to ash prior to analysis, elements are concentrated to levels above the detection limit. Elements that are typically at or close to the analytical detection limit for ICP-MS, and for which ashing may provide valuable insight, are specifically Re, Se and U for this study. Gold and As data can be quite imprecise at low levels in dry vegetation, hence ashing can be quite advantageous. Strong relationship between patterns derived from the analysis of ash and those from the analysis of dried tissue are typically very similar for most elements, attesting to the robustness of the biogeochemical method *(Dunn 2007).* Kovalevsky (1987) noted that: "the percentage losses of volatile elements for background and mineralised samples under standard ashing conditions are similar and have no effect on the main results of exploration: i.e., the shape, degree of contrast, and intensity of biogeochemical anomalies and haloes."

The most important consideration in dry ashing is the potential loss of some elements due to volatilisation. Volatilisation depends on the chemical form of the element as well as the composition of the matrix (organ type). Although there is partial loss of many elements during ashing the critical factor for exploration is that, for a given plant species, the amount of an element lost remains constant across all samples. For example, Sample 1 loses 15% Pb and so do all remaining samples for a particular species. Element concentrations are critical when interpreting biogeochemical data, as the individual points and the patterns they form within a landscape potentially define stratigraphic, lithological and structural trends, in addition to zones of mineralisation. Nonaka, et al.(1981) "determined from losses of elements during dry ashing of standard reference material that there were no losses of alkaline earths, REE, or Al, Co, Fe, Mn, V and Zn."

Previous biogeochemical studies (Mitchell, 2010; Hicks, 2010; Thomas, 2011 *in prep* within the Gawler Craton) are applicable in regards to the analytical methods in the study and their recorded results. The ashing undertaken in this study does not appear to have depleted the alkaline earths, REE, Al, Co, Fe, Mn, V and Zn elements during the process as has been suggested by Nonaka et al, (1981). Hence, from an exploration perspective, ashing has only concentrated the elements, potentially highlighting points of interest, structures or underlying mineralisation. In order to validate this statement, 67 duplicate samples were sent in for non-ashing analytical testing of the 53 element suite. However, any conclusions of this comparison were unable to be made as the laboratory turn-around did not meet the deadline of this study.

Duplicate Samples – Element transport, organ and species suitability

During sample preparation two differing duplication methods were undertaken. Method one was explained in the above section, 'Plant Biogeochemistry', which gives in detail, the steps conducted in order to create blank duplicate samples. The second duplicate method differs in a simple manner but allows for the analysis of each species ability to translocate elements throughout the plant system. This enables the evaluation of each sampled species in regards to its suitability for biogeochemistry in this study area. The method is different because first, the sample was separated into two batches, with no bias towards any twig/leaf age, thickness or condition. Secondly, one batch was ground to a powder form and labelled as the original sample. Following this, the remaining batch is ground to a powder and labelled as an original sample but is noted as being the duplicate sample to the first batch. This segregation of the sample and prevention of the two batches from mixing (the opposite to the first duplicate method) enables analysis to be conducted via ICP-MS, which will show how the elements are translocated and stored within the same organ of the same species (Dunn 2007). Subsequently ascertaining how homogenous a sample is for a particular species and organ. This in turn has numerous implications for exploration programs, given the potential to target specific species and organs that can consistently store and accumulate individual elements.

Statistical Analysis

An increase in the normal statistical analysis of the biogeochemical data was undertaken during this study as a means of both evaluating and refining current and past techniques when establishing background threshold limits for the perceived normal element uptake of the selected species and organs. Below are details of the statistical tests undertaken in this study along with a broad introduction to geochemical data and their analysis. It should be noted that for the purpose of data evaluation all results measured at or below the minimum detection limit (MIDL) were taken as half the value of the analytical detection limit in order gain a measurable result (eg. MDL of 0.1ppb was converted to 0.05ppb). Those that were measured on or above the maximum detection limit were increased by 50% of the MDL (eg MDL of 10,000 ppm was converted to 15,000 ppm).

Scott & Pain (2008) defined geochemical anomalies as geochemical features different from what is considered normal. They can be the result of:

- Unusual or uncommon processes concentrating particular elements (such as an ore-forming process, weathering and element dispersion from an unusual element concentration such as an ore body);
- Element accumulation or concentration by common processes acting over long periods;
- Artificial contamination of sites or samples; and,
- Analytical noise or error particularly for element concentrations close to the detection limit.

Traditionally, geochemical anomalies have been identified by setting threshold values, which mark the upper and lower limits of normal variation for a particular population of data. Values within their limits are referred to as background values with those above or below considered anomalies. In this study the term anomaly will not be used as it invokes the idea of an economic prospect. For geochemical data, in particularly biogeochemical data, it is not a single data point that indentifies an area of interest, but a number of points creating a pattern or signature. Single points that display characteristics that require further analysis will be termed 'Points of Interest.'

In mineral exploration, interest is generally in positive "points of interest", however, negative anomalies can also be important as they potentially reflect depletion in some elements during host rock alteration accompanying ore formation (Scott & Pain 2008). Caution should be exercised when choosing and ultimately calculating data sets with any statistical method. Geochemical data sets rarely represent a single population or distribution as the data is spatially dependent upon the site it was sampled, as each sample site is influenced by differing processes that control the element abundances. A range of statistical techniques should be employed before calculating and evaluating threshold parameters and thus any possible points of interest.

A common approach has been to transform geochemical data to a normal distribution pattern with a simple log transformation. This process is only valid for a single population of data, which for biogeochemical data is not the case as numerous subpopulations generally exist within a data set (Scott & Pain 2008). Most geochemical data sets lie between normal and lognormal distributions (Reimann & Fizmoser 2000).

Geochemical points of interest are typically expressed in more than one element. This is a result of the source or process generating the elevated result in association elements that generally accompany a potential deposit. Different ore deposit types typically have specific element associations of target and pathfinder elements. Multi-element analysis can identify ore and non ore-related associations, such as those generated by normal regolith processes or the result of anthropogenic contamination. In this study two multi-elements tests were undertaken to ascertain if any such relationships were present in this study area.

- Scatter plots - bivariate plots comparing pairs of elements

- Principal component factor analysis - grouping elements into associations

NORMAL DISTRIBUTION – TWO STANDARD DEVIATION (NDTSD)

A simple way of statistically defining an anomaly in a single population of normally distributed data has been to consider values outside the threshold or limit of normal variation (Scott & Pain 2008). This was set at two standard deviations from the mean and the points of interest values taken as the top 2.5% of the population (positive anomalies) and the lower 2.5% of the population (negative anomalies). Rarely do geochemical data fit a normal distribution pattern as they are typically positively skewed towards higher values (Scott & Pain 2008).

MEDIAN ABSOLUTE DEVIATION (MAD)

Instead of rejecting extreme values, robust statistics can use methods that are less affected by these values. An alternative method for handling skewed data is to set the threshold at two median absolute deviations (MAD) from the median. In skewed data populations, the median will lie away from the mean and the skewness of the data and extreme values will have less influence. The medium absolute deviation is a fairly simple estimate of the standard deviation and is defined as the median value of the absolute deviations from the median of all the data (Tukey 1977).

$$MAD = Median\ (|x_i - \widetilde{x}|\ i = 1, 2 \dots \dots n)$$

With $\tilde{x}$ being the Median

For the purpose of this study, all MAD and NDTSD calculations were performed using Microsoft Excel and a Robust Statistical add in package.

NORMAL PROBABILITY PLOTS & HISTOGRAMS (NPPH)

This method was based upon visual assessment of probability plots and histograms from each of the data sets. In comparison to the straight statistical calculations of the previously mentioned two methods which gave a straight numeric figure for the upper and lower threshold limits. The data sets were statistically analysed in ioGAS, where probability plots and histograms were created followed by a secondary visual interpretation of these probability plots and histograms to determine the threshold values.

Detailed methodologies of techniques or instrumentation used during this study (Acid digest, Induced Coupled Plasma-Mass Spectrometry (ICP-MS), Field Emission Environmental Scanning Electron Microscope (FEI/Philips XL30 ESEM-FEG) and Regolith landform Mapping) are provided in Supplementary Appendix 1.

RESULTS

Target Elements

A target element is the commodity being sought (in this case IOCG ±U) and a pathfinder element is one that accompanies this element, but may be more widely dispersed or easier to detect. Element associations can be used to advantage by taking a multi-element approach to geochemical exploration detection. A suite of 53 elements were analysed of which 19 were selected based upon relative abundance, mineralisation relationship, association with commodity element, rare earth elements (REE) and finally on contamination assessment.

(1) Commodity elements: Iron (Fe), Copper (Cu), Gold (Au), Uranium (U), Tin (Sb)

(2) Pathfinder elements: Lead (Pb), Zinc (Zn), Silver (Ag), Molybdenum (Mo), Manganese (Mn), Yttrium (Y), Arsenic (As), Selenium (Se)

(3) Rare Earth Element (REE): Yttrium (Y), Lanthanum (La), Cerium (Ce)

(4) Detrital Elements(contamination: Aluminium (Al), Zirconium (Zr), excess Iron (Fe)

Statistical Analysis

The three methods listed above were used to determine the background threshold limits for each species and in turn organ background levels for this study area. The background threshold (upper and lower limits) displayed the natural (interpreted natural) uptake of the selected 19 elements that were considered standard for these species and sampled organs in this study area. The three methods were individually applied to each species with an 'All species' assessment conducted to determine possible applications on an inter-species spectrum. The results from this statistical analysis are given below and are evaluated from an individual species perspective across all three methods to ascertain if any method(s) are suitable for constraining parameters around the natural uptake of the 19 elements studied. The interpretations of these results are based upon a selected element and its calculated parameters across each statistical method. All calculated data for each species and each method are shown in tables 1-4. With Robust statistic summary; black oak, western myall, pearl blue bush and all species attached in Appendix 3.

In addition to the three statistical methods a principal component analysis on each species and an "all species" data set was undertaken to evaluate any element associations within the species and specific organs as is shown in Figures 4-15, Supplementary Appendix 1. The data is represented visually and interpreted by the area inside the circle representing the region of valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better it is represented by the coordinates in the plot. All calculated data for each species and 'All Species' are attached in Appendix 3.

PEARL BLUE BUSH (*Maireana sedifolia)*

All calculated data for each species, method and all selected 19 elements are are shown in Tables 1-4.

The elements Mo, Cu, Pb, Zn, Mn, Fe, La, Al, Se, Sn, Y, Ce, U, Re and Li showed strong relationships between the parameters calculated for the MAD and the NDTSD methods. Across the three methods there was poor consistency for Ag, As, Au or Zr as each method had differing threshold limits for the upper and lower boundaries. For these elements no singular method could be recommended to define of threshold values. The NDTSD method displayed both upper and lower threshold values that were considered too broad to show points of interest for Zn, Mn, Pb and Re. This large parameter spread for both the upper lower threshold has the potential to conceal possible individual points of interest and on a broader scale cover element patterns within the landscape. Element association via principal component analysis, Figures 6-9, showed three major groups that were considered similar and close to the unit circle which demonstrates a correlation at PC1 – PC2 61%. Group 1: Al, Li, Ce and La. Group 2: U, As, Fe, Pb and Y. Group 3: Zn, Ag and Cu. PC1 – PC3 53% showed a broader correlation compared to PC1-PC2 between Sn, Al, Li, Pb, Ce, La, and Y with a very strong grouping of As, Fe and U.

WESTERN MYALL (*Acacia papyrocarpa)*

The elements Cu, Pb, Ag, Mn, Fe, As, U, La, Zr, Y and Li have a strong correlation in upper and lower threshold limits between the MAD and NPPH methods. Copper, Pb, Mn, La, Y and Li results have calculated limits for the NDTSD method that were far greater or far less than those of the limits for the MAD and NPPH methods. This large parameter spread for both the upper and lower threshold has the potential to conceal any possible individual points of interest and on, a broader scale, cover any element pattern within the landscape. Across the methods Mo, Au, Se and Ce displayed threshold limits with no level of consistency. For these elements a suitable method for ascertaining background uptake could not be recommended. Aluminium displayed threshold values that were consistent across all three methods with a strong relationship occurring between the MAD and NPPH methods. Element association via principal component analysis, Figures 10-12, showed two major groups that are similar and close to the unit circle which demonstrates a correlation at PC1 – PC2 44.5%. Group 1: Al, U, Fe and As. Group 2:

La, Y and Ce. Mo and Mn showed no correlation with any other element. PC1 – PC3 at 42.5% displayed again two major groups of correlated elements. Group 1: Fe, Al, U, As and Pb. Group 2: La, Y and Ce.

BLACK OAK (*Casuarina pauper)*

The elements Zn, As, Au, La, Sn, Y, Mo, and Re showed a strong relationship between MAD and NHHP methods with similar upper and lower parameter limits. Zinc, As, Au, La, Sn, Y, Re, Li and Mn displayed limits for the NDTSD method that were either non-comparable with the other two methods or resulted in a threshold range that did not allow for points of interest to exist outside the calculated limits, as is the case for Mn. Uranium and Se displayed calculated parameters that were consistent across all three statistical methods tested. Element association via principal component analysis, Figures 13-15, showed one major group that was considered similar and close to the unit circle which demonstrates a correlation at PC1 – PC2 60%. Group 1: Al, Fe, Sn, Pb, Re, Se, Li with Mo and As showing no correlation with any other elements other than themselves. PC1 – PC3 at 56.1% displayed two major groups of correlated elements. Group 1: Se, Ce, U and Pb. Group 2: Zn, Re and Au. With Mo and As displaying a stronger correlation between each other whilst displaying no relationship at all with the other 17 elements.

ALL SPECIES

The elements Cu, Pb, Fe, As, U, Al and Se displayed consistent threshold limits across each method tested and as such no specific method could be isolated and recommended as an ideal method for each of these elements. All 19 elements analysed show a very strong relationship for the calculated upper threshold limit and the NDTSD and NPPH methods. The all species data displayed a trend not seen in the individual species analysis. This trend being a very strong relationship between the NDTSD and NPPH methods along with no correlation between the MAD and either of the other methods, across all 19 elements. Element association via principal component analysis, Figures 4-6, showed three major groups that were considered similar and close to the unit circle which demonstrates a correlation at PC1 – PC2 52.6%. Group 1: Pb, Ce, U, La, Sn, Y, As and Fe. Group 2: Li, Zn Re and Mo. Group 3: Al, Ag and Mn. PC1 – PC4 at 45.2% displayed two major groups of correlated elements with Group 1 being divided into two subgroups. Group 1-SG1: Fe, Y, As, U and Ag. Group 1-SG2: Al, Pb, La and Ce. Group 2: Being Re, Mo and Zn and showing no correlation with the other 16 elements.

Large variability between the three methods was only detected within the black oak results. This is either due to variation in element uptake, translocation and storage within the sampled organ or statistical inaccuracies. As only eight different black oak specimens were sampled in the study area, there is a very limited sample population with the potential for high variances in elementary data.

The threshold limits calculated on an individual species basis displayed a strong relationship between the MAD and NPPH methods. When all data were complied and tested using the three methods to obtain inter-species threshold limits there was a strong similarity between the NDTSD and NPPH methods, especially in the upper threshold values. This relationship significance is questioned, however, as implications on basing a broad statistical method across multiple species would result in misinterpretation of data and the dismissal of individual points of interest.

Based on the calculations of individual species and the comparison of background threshold limits (both upper and lower) between the selected elements and each method, the most suited for application in determining and isolating the natural (interpreted natural) uptake of the selected 19 elements is the Median Absolute Deviation. This has consistent threshold limits across all selected elements with no extreme thresholds calculated that may inhibit any interpretation of single points of interest or overshadow any broad scale element trends.

Biogeochemistry

PEARL BLUE BUSH (*Maireana sedifolia)*

The spatial distribution of pearl bluebush is uniform across all regolith-landform types, as is shown in Figure 3. This species is widespread across the study area with exceptions of alluvial channels, the ironstone hills (Hutchison Group) and a small section along the northernmost transect. No samples were collected in this section as no sample media was present. Pearl bluebush elementary distributions and concentrations are presented in Appendix 2 for all 19 elements selected from the suite analysed. Figure 16 Commodity Elements – pearl bluebush and western myall show results above and below the threshold limits set by the MAD analysis and highlights the distribution of points of interest throughout the study area. The figure displays elevated Au concentrations along both the F-14 and F-19 faults.

WESTERN MYALL (*Acacia papyrocarpa)*

Interpretation of the spatial distribution for this species is intractable. Their distribution, as shown in Figure 3, reflects no real discernable pattern, both in regolith-landform distribution, topographical relief or vicinity to drainage systems. The sampled trees have a greater density in the colluvial fan associated with the ironstone hills, Iron Monarch and Iron Princess. However, this is most likely a result of land protection around the mining lease preventing clearance of established native species. At least a third of the samples are sporadically spread around the study area, which again highlights the difficulty in drawing associations against landform units. Western myall's sampled along known faults zones (F-19) displayed high concentration of Cu at several locations (146.51 & 190.71ppm).

BLACK OAK (*Casuarina pauper)*

The limited number of samples for black oak reflects its limited distribution within the study area. The majority of samples were collected from a large quartz outcrop south of the southernmost transect. A regolith unit relationship between this species and eastern alluvial channels and colluvial rises was recognised with a geobotanical relationship visually present between in-situ quartz exposure and this species. Although limited in its distribution, this geobotanical association prompted the collection of these samples to assess the geochemical 'fertility' of these quartz veins.

Element associations

Discussed below is the relationship between elements of interest and the remaining selected suite of elements. Evaluation of Copper (Cu) Figure 17, against the remaining selected element suite demonstrated minimal association trends with exception to Cu:Mo. All XY combinations displayed varied scattering of data for all elements and species with no visible correlation. The Cu:Mo plot illustrated a clear division of the three species, showing a linear uptake of Cu (10-250ppm) for pearl bluebush in association with a very limited amount of Mo (0-5ppm). The western myall presented a spread of data with no correlation for the Cu:Mo XY plot.

Evaluation of Lithium (Li), Figure 18, against the remaining selected element suite shows a consistent segregation of species with obvious opposing trends. Pearl blue bush displays tight aggregation around points which can be interpreted as representing its background threshold limits. Additionally visible are the data points outside these ranges that are identified as points of interest. These observations are applicable for Li:La, Ag, Au, Fe, Al, Y and Ce. The western myall again has a spread of data that generally portray trends with the exception of Li:U, Fe, Mn, Al and As.

Evaluation of Molybdenum (Mo), Figure 19, against the remaining selected element suite, like the above mentioned Lithium results, demonstrates a clear separation of the pearl bluebush and western myall in response to element association. This is particularly evident in the Mo:Li, Pb, Re, Au, La, Y, Ce, Se, As, Cu, Mn, Fe and Ag. Like the previously mentioned Lithium scatter plots, the data displayed clear clusters of pearl bluebush data that are interpreted as the background threshold limits with the remaining data points spread towards higher element concentrations identifying them as points of interest. A visible trait with the Mo XY scatter plots is the ability of the western myall to accumulate Mo in comparison to the pearl bluebush. The western myall uptakes a high concentration of Mo whilst up taking a small volume of Al, Fe, As, Mn, and Y.

Evaluation of Iron (Fe), Figure 20, against the remaining selected element suite revealed three key aspects. Again, a firm separation of the three species was evident, but for the previously mentioned element comparisons Cu, Li & Mo the, western myall and pearl blue bush are significantly different in Fe to Mo, Ag, As, Mn, La, Y, Li, Re, Al, Ce and Se. Of these element associations Fe:Mo, As, Li and Re have the largest difference between species, as is shown in Figure 20. Generally observed in all Fe XY scatter plots is that pearl blue bush showed positive correlation to each element and a correlation that was far stronger and with higher element concentrations than that of the western myall and black oak. For example, the linear component for pearl blue bush in Fe: As was 1:1.

Evaluation of Gold (Au), Figure 21, against the remaining selected element suite showed poor association between other elements and Au. There is a general dispersion of points with no species segregation with the exception to the Au:Mo XY scatter plot, which did isolate the three species, particularly the pearl blue bush and western myall. The pearl blue bush showed uptake of Au at high levels in association with uptake of Mo at low and consistent levels around 5-6 ppm across the spread of Au uptake 0-12.3 ppm.

Species and organ comparison of element uptake

Where possible during sampling, samples from several species were taken at single sites to assess the differing biogeochemical characteristics of each species. Of the 172 collected samples, 11 sites were suitable for duel species sampling. Of these 11 sites, seven compared pearl blue bush and western myall, three compared pearl blue bush and black oak and one compared black oak and western myall. Notably, this singular sample site for black oak and western myall presents an assessment dilemma as, for a single sample, consistency and element/organ trends are not reliable. Summarised results from Table 5 are displayed in Figure 22. These are a portion of the results collected but are considered relevant in displaying the individual species ability to uptake selected elements, but also their ability to store within the sampled organs.

Duplicated Samples – Element transport, organ and species suitability

The aim of this method is to show how elements are translocated and stored within the same organ of the same species, subsequently ascertaining how homogenous a sample is for a particular species. This in turn enables the evaluation of each sampled species for its suitability for biogeochemistry in this study area. All calculated data is detailed in Table 6 and summarised in Tables 8 & 9. All non mentioned elements of the selected 19 displayed a neutral relationship which displayed results in both the positive and negative facets, hence no conclusion could be drawn. It was determined that, as there was, only a single duplicate (black oak) exposed to the alternate method, any evaluations or opinions formed from this single sample would have significant bias and as such no formal appraisals were conducted. However, the data from this single sample is still presented alongside the remaining species in Table 6.

A positive (consistent) relationship has been identified by calculating the difference in element concentrations between the two duplicate samples and dividing the difference by the larger concentration in order to gain a percentage difference between the two samples. In order for a species and organ to have a positive (consistent) relationship the percentage difference must fall between 0 and 10%. This demonstrates that there has been consistent element translocation and storage across the entire sample, representing how homogenous the species is. As for a positive relationship, a negative (inconsistent) relationship was determined via the same method of calculations to assess the percentage difference of the two duplicate samples. A negative (inconsistent) relationship, however, is classified by having a percentage difference that is greater than 40%. This reflects a negative relationship between element, organ and species. This may show that the element is not consistently translocated throughout the entire sample. It may also demonstrate a reflection of organ age and its ability to store the element or its ability to externally exclude the element. Overall, it can display that for this specific element this species is not ideal as a sample medium, as consistency throughout the organ's distribution is not guaranteed. In order for an accurate, homogenous representation of this organ/species concentration of an element, samples must be collected from all ages, sizes and across the entire species canopy.

Regolith-Landform Map

The regolith materials and associated landforms of the study area correspond to the slightly weathered bedrock associated with relief and the influence of colluvial and alluvial processes that have contributed this landscape in its current form. The material that delineates this study area is sourced from a series of defining points. To the south, the Middleback Ranges (Katunga ridge) along with the Iron Princess and Iron Monarch mines are associated with topographic relief resulting in alluvial and colluvial dispersion from these areas. Towards the centre of the study area a series of Ironstone hills influence the eastern region of the study area through lateral dispersion of material. To the north, the hills associated with the Corunna Conglomerate disperses a series of large sheet flow fans, associated depositional plains with alluvial channels and drainage depressions that cover a large proportion of the mapping area. The entire study area is dissected by two major, south flowing ephemeral channels with tributaries from the east and west. The western most ephemeral dendritic system flows southwards into the Pine Creek system whilst the eastern unnamed system flows towards the southeast, where it becomes poorly defined in outwash plains. Material sourced via a series of drainage depressions and erosion plains in the west gather material from undifferentiated, deformed Paleoproterozoic intrusions and Burkitt Granite. All material transport directions are displayed in Figure 23.

Regolith carbonates are locally abundant within the upper parts of transported regolith of the study area. Typically these carbonates are at depths of 1-2 m, with exposures in creek bed, road cuttings and road surfaces. An example of the indurated calcrete occurs on the eastern side of Iron Monarch between the mine and town (GR 701157E

6376189N). Further indurated calcrete is in the northeast corner of the study area along a deeply eroded channel, as is shown in Figure 24b. A thin layer of ferricrete occurs in the southern parts of the study area, just to the northeast of the Iron Princess open cut mine, Figure 24a (GR 701058E 6378162N). More extensive occurrences of ferricrete occur to the south of this study area, where mapping has been conducted by Thomas (2011, *in prep)*. These possibly are associated with a paleochannel that may have had its headwaters in this study area and flowed to the south. The occurrence in this study area is at a current rise in comparison to the ferricrete in the lower lying occurrences to the south, which may indicate that a N-S Paleo-drainage divide may have occurred north of Iron Knob. The area has been further divided and characterised with regolith-landform units (RLUs) mapped at (1:38,000). Details of unit description are given below.

TRANSPORTED REGOLITH

Alluvial landform units (Figure 25 & 26) include: alluvial fans (*Afa1-2),* alluvial depressions *(Aed 1-4)* and, alluvial swamp *(Aaw)*. Two shallow, south flowing dendritic ephemeral systems (Aed 1 & 2) extend through the mapping area with tributaries (Aed 3 & 4) from the west and east. The channels, plains, flood plains and depressions form the lowest parts of the area that contain mainly a mixture of fine clays and re-worked sediments varying in clast size depending on the geological feeder source. The lithologies of those that flow off the Hutchinson Group (Aed 2) are dominated by ferruginous pebbles and gravel. The Corunna Conglomerate provides sediments consisting of Fe gravel, quartz, ironstone, calcrete, granite, and maghaemite and are generally sub-rounded to sub-angular in shape. Afa are situated at the termination of the minor Aed's (3 & 4). Their fans shape is skewed in direction of flow, down gradient, and they represent the transition between minor and major alluvial systems. The Aaw is a single unit situated in the centre of the mapping area. This location is at a topographical low with a shallow gradient which allows for water to pool and an increase in vegetation density.

Colluvial sediments make up the majority of the regolith-landform units in the study area. Colluvial landforms include: erosional plains (CH*ep1-5*); depositional plains (CH*pd1-3*), erosional rise (Ch*er1-3*), and colluvial fans (CH*fc1-3*). Sheetwash sediments have been transported along a relatively flat low gradient surface from regions of moderately increased topographical relief. CHpd units occur within low depositional settings, possibly adjacent to

Apd or Aed units. They consist of finer grained sediments with lithic fragments (quartz, calcrete, ironstone and granite). CHfc units are dominated and depicted by the topographical outcropping of both the Hutchison Group ironstones in the centre and south (Iron Monarch & Iron Princess) and the Corunna Conglomerate in the north. These act as sediment sources for the lower CHer and CHpd units that display a gradational decrease in sediment grain size, lithic fragment size and angularity.

In this mapping region, Fill (Fm) is defined as an area that's natural land surface characteristics cannot be ascertained or interpreted as a direct result of anthropogenic influence. The Fm unit, in this case, are associated with OneSteel's open cut mining operations (workings & tailings).

IN-SITU REGOLITH

Moderately weathered bedrock (SMer) is exposed in three general locations of the mapping area, all of which are the Ironstone Hutchison Group. The slightly weathered rock has undergone minimal chemical alterations and weathering retaining most of its original lithological features.

DISCUSSION

Landscape evolution

In general, the age constraints on the weathering are poor in this area because of a lack of dated sediments and lithological units. The youngest dated bedrock that is weathered is the Corunna Conglomerate, constrained at 1740 Ma - 1585 Ma (Drexel *et al.* 1993). The only potential constraints are derived from extrapolation of flanking sedimentary basins. The main Cainozoic basin in the area is the Pirie Basin, of which this study area occurs within the basin hinterland. The main sedimentary units of this basin are the Karaka Beds; consisting of a succession of carbonaceous siltstone, shale and sand with minor lignite (Parker, 1980). The unit was deposited in the Late Eocene to early Oligocene and the Melton Limestone consists of a transgressive marine succession of calcareous sediments with detrital inputs which was deposited between the Late Oligocene and early Middle Miocene. Some weathering may predate the Pirie Basin with it consequently eroded during basin forming tectonism during the Cainozoic.

The presence of Fe gravels (Tertiary haematite ore scree, Curtis, (2006)) at elevated sites in the study area demonstrates a topographical inversion of the current land surface and displays a paleo surface at the level of the Fe gravels. The rounded to sub rounded nature of the gravels (Figure 24a) characterise physical weathering and transportation processes that have occurred during the formation of this contemporary system with lithic and quartz fragmentations forming within the valleys. Formation of a thin ferricrete with potential linkage to ferricretes in the south possibly indicates a N-S Paleo-drainage divide north of Iron Knob. From the development of a pedogenic calcrete matrix combining the rounded to sub rounded Fe gravel it could be deduced that these were formed as a result of water table changes during the topographical inversion from the paleo-surface to current land surface.

Sheetflow extends from the current Corunna conglomerate and Hutchison Group. Climatic conditions have resulted in increased weathering and erosion. Increased temperature and reduced vegetation, most likely initiated in the Miocene and being predominant in the Quaternary, have influenced the spread of eroded material in the form of colluival and alluvial fans. Additionally, extensive periods of glaciations and/or grazing have attributed to material spread and dispersion.

Anthropogenic influences through extensive clearance of native vegetation for agricultural expansion have caused increased surface erosion and a loss in overall soil structural stability. Agricultural methodologies in reference to livestock density and farming practices greatly increased the loss of vegetation coverage, increasing material movement via sheetflow. In 97 years of Fe ore production, 207,000,000 tonnes of ore has been removed resulting in a dramatic impact upon the landscape.

Statistical suitability

The results from the statistical analysis evaluated from an individual species perspective across all three methods (NSTSD, MAD & NPPH) ascertained a single method suitable for constraining parameters around the natural uptake of the 19 elements studied. Based on the calculations of individual species and the comparison of background threshold limits (both upper and lower) the Median Absolute Deviation presented consistent parameters for isolating the natural (interpreted natural) uptake of the selected 19 elements. Its threshold values displayed limits that were interpreted as showing the minimal potential of inhibiting any interpretation of single points of interest or overshadowing any broad scale element trends. As the results showed a strong relationship between the calculated MAD and NPPH parameters it should be noted that this relationship was not ignored. However, the NPPH method involved a secondary visual interpretation of probability plots and histograms to fix threshold limits. It was felt that this cast questions over consistency as this is based upon individual interpretation. Given the general relationship between the two methods, for consistency and potential further application the MAD method selected.

Plotting calculated black oak MAD figures and excluding background levels, exposing all points of interest that lie above and below the calculated natural uptake thresholds, shows that 6 of the 19 elements (Pb, Ag, U, Al, Se and Zr) failed to express any points of interest. This is also evident for the NDTSD method, however the NPPH analysis did display at least 1 value outside the upper threshold limit for all 6 elements. This has a number of potential causes and subsequent implications. Mainly that these methods, like all statistical approaches, are sensitive to population (n) size. Given that the black oak only has a sample population of eight specimens it is likely that this is a limitation. It is also plausible that black oaks lack the ability to uptake or store these elements to the levels determined by the background threshold. Notably of the six elements failing to present points of interest two are the mostly typically associated with detrital contamination (Zr & Al). Again, implications of this occurrence are important as it may reflect minimal to zero contamination of these samples sites or conversely, the species' ability to only uptake its growth/survival requirements for Al but not Zr.

Background and anomalous values are commonly established via orientation surveys or case studies that compare typical background materials, sites and samples with materials from areas of known mineralisation to establish thresholds (Scott & Pain 2008). As this is the initial study in this area, the purpose being to establish background threshold limits, it is reasonable to expect some inaccuracies in the three methods or possible misinterpretation of any "points of Interest"

Sample media relationship

Copper (Cu) displayed similar results for the black oak and western myall. The alternate duplication method for pearl blue bush showed that storage and translocation within this organ is inconsistent. The Cu mobility within plant tissue strongly depends on the level of Cu supply, Cu has low mobility relative to other elements in plants and most of this metal appears to remain in root and leaves tissue until they senesce (Kabata-Pendias 2000). One explanation for such variability within the pearl blue bush is that Cu, being an essential nutrient to plant development and growth, potentially is stored at the nodes or leaf buds prior to leaf shooting. Preceding sampling, a series of small rain events occurred within the study area, potentially prompting the translocation of Cu from the twigs into the nodes and primary buds, resulting in the discrepancies found in the pearl blue bush.

Plants can absorb Au in soluble forms, and when Au enters the root vascular system of plant, it can be easily transported to the canopy (Kabata-Pendias 2000). Au is 2-3 times more abundant in pearl blue bush. This is especially prevalent near quartz exposures or heavy quartz lag, as is shown in Figure 16 Commodity element, and along the F14 & 19 faults shown in Roopena Map, (Figures 27 & 28 3D) crossing sample transects. Prospectively Au showed no consistency across both sample organs, however it did demonstrate a greater tendency to be up taken by the pearl blue bush. This maybe a reflection of the pearl blue bushes' ability to absorb soluble Au in greater amounts.

Manganese is preferentially transported to meristeatic tissue, thus its concentration is mostly observed in young expanding tissue (Kabata-Pendias 2000). Heenan & Campbell (1980) reported that at a high Mn supply, the leaves accumulated higher concentrations with age, but small amounts of Mn were translocated from old leaves when young expanding leaves were Mn deficient. Given the above mentioned climatic events occurring prior to sampling, this is one possible explanation as to the Mn concentrations being 4-8 times higher in pearl blue bush than western myall as Mn was 1 of 3 elements demonstrating consistent results in the alternate duplication method.

The western myall uptakes a high concentration of Mo whilst up taking small concentrations of Al, Fe, As, Mn, and Y, potentially highlighting its upper limit for uptake of those elements. The western myall's ability to uptake large concentrations of Mo may not be a direct reflection of its sequestration abilities, but a reflection of the element's availability to the species. One explanation for this is the western myall's interaction with hypersaline groundwater of which the pearl bluebush has less access due to its shallower, lateral root system. In order to ascertain this link, Mo was plotted against sodium (Na) to assess their correlation potential (Figure 29). However, after assessing this relationship, it was evident that there is no correlation between the two elements in this study area. This suggests that the broad and general uptake of Mo for western myall may either be as a result of an unknown element association or, as is displayed in both Tables 5 & 6, that the western myall has a natural ability to uptake and store Mo at a rate far greater than both pearl bluebush and black oak. Molybdenum was one of three elements that displayed consistent uptake, translocation and storage across all species and organs.

Warren (1978) and Kovalevsky (1979) described Pb as a very useful element for geochemical prospecting. The Pb content of plants grown in mineralised areas is, in general, highly correlated with Pb concentrations in soils. The translocation of Pb from roots to tops is greatly limited. As Zimdahl (1975) described, only three percent of the Pb in the root is translocated to the shoot. This was demonstrated in so as far as the species and organ comparison showed that Pb had double the concentration in the pearl blue bush compared to the western myall. Thereby demonstrating the differences between organ sampling and potentially indicating a sample preferential species

Iron is a relatively mobile metal in chemically reduced conditions. Given the abundance of Fe within the Hutchison Group, it would be expected that vegetation would have high Fe content. Given that both U and Fe concentrations (AW) were low (Fe – 6.82% PBB and U – 1.5ppm PBB) it suggests that major regional redox controls on element uptake have not been important.

The results identified which organs and subsequently which species are either consistent or inconsistent in individual element storage and translocation. These discrepancies hold important implications into future biogeochemical studies and highlight the need for continual research into element uptake within native species specifically used in exploration programs. Understanding a species ability to uptake, translocate and store commodity, pathfinder and REE elements will enable expanded exploration in areas of established overburden and environmentally and culturally sensitive areas.

Analytical error calculations were undertaken to assess the accuracy and consistency of ACME Laboratories (Gray *et al.* 2009). It was found that duplicate samples, blanks and pulp standards all calculated within the expected margin of error. Regression analysis (Figure 30), showed a R^2 value = .9984, with all error analysis displayed in Table 7. The duplicated method emphasised the identification of contamination as an important factor in any biogeochemical survey, see Figure 31: Spatial distribution of contamination element – Al, Zr and Fe in pearl blue bush, western myall and black oak. These results showed what was expected with Zr concentration prominent in pearl blue bush. This is shown in great detail through SEM images of the outer cuticle with the trichome hair fibres surrounding. Situated on these hair fibres are detrital FeO crystals, Figures 32a & 32b PBB twig at 500µm and FeO detrital crystal - contamination at 100 µm. Because iron is an essential element for plants it's not always a detrital element however if present in excessive amounts it can be an indicator of detritus.

Trace element association

DISPERSION MECHANISMS

The dispersion of metals in the environment is an important factor to consider in exploration, particularly when using non-invasive methods to explore. Aspandiar *et al*,(2006) proposed two mechanical methods for metal movement within regolith; phreatic (below the water table) and vadose (above the water table). Phreatic mechanisms include advective, chemical mechanisms and electrochemical transport. Vadose mechanisms include capillary action; gaseous processes, vegetation, mobilisation of the litter layer, dissolving of the organic compounds moving laterially and vertically through the soil profile, root uptake and bioturbation (Aspandiar *et al.* 2006). Three mechanisms have important inputs in terms of biogeochemical surveys, being vegetation uptake and bioturbation, as well as the movement of fluid along faults. Detailed mechanism descriptions of the remaining processes can be found in Aspandiar *et al,*(*2006*).

In order for an elevated concentration associated with mineralisation to be established within the regolith, metal movement must occur from an area of mineralisation to the surface. Phreatic processes are driven by groundwater as the main solute for element transfer. Mineralised water can be transferred to the surface via faults due to seismic or dilatancy pumping. Compressional stresses along fault structures force mineralised groundwater upwards with potential surface discharge and evaporation resulting in a near surface anomaly (Aspandiar *et al.* 2006). The pumping of groundwater along these structures can additionally occur by convection and hydraulic lift and flow along the path of least resistance. Where in arid and semi arid environments the rapid evaporation of water within soil pores means metals are generally in close proximity to mineralisation rather than being dispersed (Aspandiar *et al,*2006). This would explain the minimal dispersion of elements around the known fault structures (F-14 &F-19) within the study area.

While phreatic mechanisms work well below the watertable at transporting metals through the regolith processes become limited above the water table (Aspandiar *et al,*2006). This is a particularly apparent in arid to semi-arid with deep water tables and thick cover sequence, like this study area. One such mechanism which accounts for elevated concentrations in determined points of interests is vegetation uptake.

Vegetation acts as a pump with both deep and laterally wide spreading root systems. They have the ability to access groundwater from a large area and actively transfer it to the surface against gravity. The root zone has the potential to access a range of regolith, groundwater and soil types and with this, access trace metals from any underlying mineralisation. The plant further influences the chemistry of the surrounding area via element enrichment at different profile depths which possibility explains differing results between species at a single location. Suggesting that most contained metals were fixed at near surface by bioturbation and do not percolate deeper into the profile. This is possibly due to slow decomposition of litter in arid terrains, with continuous loss off soil and fine litter particles by wind erosion and bush fires (Kabata-Pendias 2000).

MINERALISATION MODEL A OR B I) & II)

The study area and subsequent results present two end-member models for the source and dispersion of biogeochemical characteristics, A and B, of which B is further subdivided into two categories.

Model A – Transported overburden and prevailing lateral geochemical transport

Three major locations were identified as displaying elevated element concentrations within transported regolith. The Iron Monarch and Princess Mines with surrounding regolith units of CHcf and CHer with their forming processes having transported commodity, Pathfinder and REE element of the mineralised Hutchison Group to the colluvial fans and rises surrounding the mines. This subsequently explains the elevated biogeochemical signatures depicted in Figures 16, 33 and 34 Iron stone hills of the previously mentioned Hutchison Group are situated in the centre of the study area. These hills, like the mines, are shedding colluvial and alluvial lag and subsequent associated element signatures which are being expressed in the biogeochemical results surrounding, Large alluvial and colluvial fans combined with the larger Aed channel system in the west are displaying element concentrations and signatures from the west, outside the tenement/study area and north from the Corunna Conglomerate.

Model B – i) Subcrop/Outcrop (in situ) and prevailing vertical geochemical transport

This model appears in two identifiable locations within the study area. Both these locations exist along faults as the presence of dirty quartz outcropping is visible, Figure 35a & 35b. These two locations are displayed in Figures 16 & 28 as points A and B respectively and are identified as the F14 and F-19 on the Cultana 3D Map (Figures 27 & 28). Biogeochemical results highlight both of these structures in outcrop and subcrop. Elevated results in both Au and Cu in pearl blue bush and western myall are present along and within close vicinity of the fault through heavy quartz lag. Additional halo style sampling was conducted around KNOB-DT-148, point A, (western myall) which displayed high Cu (190.7 ppm, AW) to ascertain if element signatures dispersed around the subcrop and outcropping fault. These analytical results are currently outstanding.

Model B – ii) Buried (in situ) and prevailing vertical geochemical transport

This model of element concentration is generally identified through the presence of a geochemical halo that is displayed via a cluster of points of interests. As this was an initial survey the transects and sampling interval distance was too great to pick up such a halo. In order to ascertain the presence of possible buried mineralisation closer targeting would have to be undertaken.

Implications for exploration

REGIONAL

On a regional scale regolith mapping and biogeochemistry are useful mineral exploration tools, however their value is dependent upon the scale at which the work is conducted and sampling media distribution as to whether it is a worthwhile and cost effective method for exploration. To the east and west of the Middleback Ranges, the landscape hosts sparse vegetation cover as a result of pasturalisation and is now colonised by native chenopod shrubland. A regional sampling program proposed by Mitchell, (2010 *unpublished*) would be suitable for this region and would allow for fault structures and geological units to be detected. The establishment of background threshold limits as a case study for the three species will aid any such additional exploration. Additionally highlighting the refinement of organ selection and organ sampling for specific elements will increase accuracy and reduce error.

TENEMENT

As this study area is already at a tenement size, the following recommendations are based on increasing the accuracy of the already collected results and linking them with additional exploration tools. Increasing sample densities by decreasing transect spacing and sample spacing will create an enhanced element signature across the tenement. Linking biogeochemical results with airborne/ground magnetic and gravity may assist in identification of buried and subcrop mineralisation present. This has been conducted by OneSteel in the recent months however the data collected (50m spacing at 30m elevation) has yet to be released.

PROSPECT

Initial identification of points of interest maybe subsequently followed with halo sampling around the elevated results to ascertain element dispersion direction and concentration in surrounding regolith. This combined with geophysical exploration approaches may potentially lead to the identification of an anomaly. Following successful identification of such an anomaly a target drilling program may be established to ascertain if any mineralisation is present under the covering overburden.

CONCLUSION

This study provides a preliminary characterisation of biogeochemical signatures and natural background element uptake to identify sites of potential to host buried and sub-cropping non-ferrous mineralisation in the area between Iron Knob and Corunna. From this, it has been shown that plant biogeochemistry has the potential to provide an effective and efficient representation of the mineral prospectivity in this area and therefore is a useful mineral exploration technique in areas of transported regolith, such as in this area. Specific highlights of the results from this study include:

- Isolation of natural (interpreted natural) element uptake via the Median Absolute Deviation (MAD) method displayed parameters which showed minimalistic potential to inhibiting any interpretation of single points of interest or to overshadow any broad scale element trends.
- Mo, Mn and Ce displayed consistent uptake, translocation and storage across all species and organs.
- The study area and subsequent results present two end-member models for the source and dispersion of biogeochemical characteristics:

  Model A –Commodity, Pathfinder and REE elements of the mineralised Hutchison Group were laterally dispersed through colluvial fans and rises surrounding outcropping giving elevated biogeochemical signatures.

  Model Bi) Identified as a NE-SW trending fault (F-14) with Au results (5.3, 3.8 & 3.7 ppb) and Cu results (195.58, 190.71 & 146.51 ppm) in both pearl blue and western myall. This model was further validated with the NE-SW F-19 fault with a Au concentration of 12.3ppb in a pearl blue bush.

  Model Bii) As this was an initial survey, transects and sampling interval distance was too great to define element halos. In order to ascertain the presence of possible buried mineralisation closer targeting would have to be undertaken.

- The study identified organs and subsequently which species are either consistent or inconsistent in individual element storage and translocation, highlighting future biogeochemical research into element uptake within native species specifically used in exploration programs.

FUTURE RESEARCH

Recommended follow-up exploration approaches for the area include close spaced transect sampling of vegetation across fault structures. This will further constrain and test for the "chemical fertility" of structures broadly defined from an upcoming geophysical program to be conducted by OneSteel Ltd. Future research within this area and methods presented provide a direct course for additional research opportunities. The analytical results from the 67 non-ashed samples allow for direct comparison between Ashing and Dry vegetation techniques. Potential conclusions from their analytical comparison entail:

- The study of volatiles lost, particularly in reference to any specific species.
- Which elements were concentrated during ashing which were previously below detection limits using acid digest.
- Establishment of a conversion factor for each element from Ashed to Dry. If possible, an inverse conversion factor (Dry to Ash). Enabling regional data sets compiled in other work already conducted to be analysed and potentially as a means of further classification of points of interest and sub-classifying internal classes in order to enhance and halo dispersions patterns.

ACKNOWLEGDEMENTS

I would like to thank Steve Hill for his assistance throughout the year, his guidance and of course for one single statement that resinates each time I see a football oval.

I would also like to thank Geoff Johnson and Russell Hodges from OneSteel for their contribution, support and for allowing Louise and myself to work in such a unique setting.

To Louise, thank you for your patients with me and my endless "Dad Jokes." The year wouldn't have been the same without you and I'm very grateful for our friendship.

To the regolith PhD's; Vander's, Verity, Ashlyn and especially Charlotte, thank you for all your help, advice and willingness just to listen.

To Katie Howard, thank you for your open door and reassuring thoughts and attitude.

I'd like to thank my family for their constant support and endless understanding in regards to my continual absences from home.

A special thank you to Farid for all his kindness, assistance and for just being a top bloke and an amazing friend.

To Dr Love (Stew Ruggling), thank you for patients, editing and for your continual dismissal of Geology as true science, as means of encouragement.

To the entire 2011 honours group, thank you for all the wonderful experiences, in and out of uni over the past fours.

Finally a special thanks to everyone who help me in any way during the past 5 months. Life with only one functional leg was definitely made easier by the generosity of you all.

REFERENCES

ANAND R. R. 2005. Weathering history, landscape evolution and implications for exploration IN Anand, R.R. and de Broekert, P. (eds.) "Regolith Landscape Evolution Across Australia: a compilation of regolith landscape case studies with regolith landscape evolution models". *CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration)* 1, 2-40.

ANAND R. R., CORNELIUS M. & PHANG C. 2007. Use of vegetation and soil in mineral exploration in areas of transported overburden, Yilgarn Craton, Western Australia: a contribution towards understanding metal transportation processes. *Geochemistry: Exploration, Environment, Anaylsis*, 267-288.

ASPANDIAR M. F., ANAND R. R., GRAY D. J. & CUCUZZA J. 2006. Mechanisms of metal transfer through transported overburden within the Australian regolith. *Explore* 125, 9-12.

BOM 2011. Climate statistics for Australian locations -Whyalla Aero(retrieved 12/10/2011 2011).

BROOKS R. R., DUNN C. E. & HALL G. E. M. 1995. *Biological Systems in Mineral Exploration and Processing*. Ellis Horwood, Hertfordshire, New York.

CANADELL J., JACKSON R. B., EHLERNINGER J. R., MOONEY H. A., SALA O. & SCHULZE E. D. 1996. Maximum rooting depth of vegetation types at the global scale. *Oecologia* 108, 583-595.

CURTIS S. 2006. *The geology and mineral potential of the Port Augusta area, eastern Gawler Craton*. Branch G. S. PIRSA, Adelaide.

DEBROEKERT 2005. Lady Bountiful Extended gold deposit, Western Australia IN Anand, R.R. and de Broekert, P. (eds.) "Regolith Landscape Evolution Across Australia: a compilation of regolith landscape case studies with regolith landscape evolution models". *CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration)* 1, 312-316.

DELL B., BARTLE J. R. & TACEY W. H. 1983. Root occupation and root channels of Jarrah forest subsoils. *Australian Journal of Botany* 31, 615-627.

DIETMAN B. J. 2009. *Regolith and associated geochemical and biogeochemical expression of buried copper-gold mineralisation at the Hillside Prospect, Yorke Peninsula*. University of Adelaide BSc (Hons) thesis (unpublished), Adelaide.

DODD J. & BELL D. 1993. Water relations of the canopy species in a Banksia Woodland, Swan Coastal Plain, Western Australia. *Australian Journal of Ecology* 18.

DREXEL J. F., PREISS W. V. & PARKER A. J. 1993. The geology of South Australia. Volume 1 - The Precambrian. Bulletin 54 *Geological Survey of South Australia* Bulletin 54 124.

DREXEL J. F. & PRIESS W. V. 1995. The geology of South Australia. Vol 2, The Phanerozoic. Geological Survey of South Australia. *Bullentin 54* 2.

DUNN C. E. 2007. *Biogeochemistry in Mineral Exploration - Handbook of Exploration and Environmental Geochemistry* (Vol. Volume 9, 2007).

GRAY D., NOBLE R. R. P. & REID N. 2009. Hydrogeochemical mapping of northeast Yilgarn groundwater: Geological Survey of Western Australia. Record 2009/21, 78p.

HEENAN D. P. & CAMPBELL L. C. 1980. Transport and distribution of manganese in two cultivars of soybean. *Aust. J. Agric. Res.,* 31, 943.

HICKS C. B. 2010. The Regolith Expression of IOCG mineralisation within the Northern region of the Project Mawson area, NE Eyre Peninsula, South Australia. BSc (Hons) thesis (unpublished) thesis, Geology and Geophysics, The University of Adelaide, Adelaide (unpubl.).

HILL L. J. 2002. Branching out into biogeochemical surveys: A guide to vegetation sampling. In: Roach, I.C., (ed), Regolith and Landscapes of Eastern Australia. *CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration)*, 50-53.

HILL S. M. 2008. Guide to the use of biogeochemical techniques in mineral exploration in Australia. *CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration) Perth*.

HILL S. M. 2009. Vegetation sampling in the Gawler Craton. . *crC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration) Publication-guides*.

KABATA-PENDIAS A. 2000. *Trace Elements in Soils and Plants, Third Edition,* . CRC Press, New York.

KOVALEVSKY A. L. 1979. Biogeochemical Exploration for Mineral Deposits. *USDI and the NSF, Amerind Publ. Co. Pvt. Ltd., New Delhi*, 136.

KOVALEVSKY A. L. 1987. Biogeochemical Exploration for Mineral Deposits. *VNU Press, Utrecht*, 224.

LANGE R. & PURDIE R. 1976. Western Myall (*Acacia Sowdenii*) Its survival prospects and mangement needs. *Australian Rangelands Journal* 1, 64-69.

LANGE R. T. & SPARROW A. D. 1992. Growth rates of western myall (*Acacia papyrocarpa* Benth.) during its main phase of canopy spreading. *Australian Journal of Ecology* 17.

LEMON N. A. G., V.A.., 1983. Fluvial Sedimentology Field Excursion. Whyalla-Corunna-Depot Creek Area. *Geological Society of Australia*.

LEMON N. M. 1972. Sedimentological approach to the geology of the Corunna area, South Australia. University of Adelaide thesis, Geology University of Adelaide, Adelaide (unpubl.).

LINTERN M. J. & SHEARD M. J. 1999. Regolith studies related to the Challenger Gold Deposit, Gawler Craton, South Australia. *CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration)* Open File Report 78.

LINTERN M. J., SHEARD M. J. & CHIVAS A. R. 2006. The source of pedogenic carbonate associated with gold-calcrete anomalies in the western Gawler craton, South Australia. *Chemical Geology*, 235, 233-234, 299-324.

LINTERN M. J., SHEARD M. J. & GOUTHAS G. 2000. Regolith studies related to the Birthday Gold Prospect, Gawler Craton, South Australia. *CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration)* Open File Report 79, 201.

LOWREY J.R. & HILL S.M. (Editors) 2006. *Plant biogeochemistry of Au-mineralisation buried by an Aeolian Dunefield: Tunkillia SA*. (Regolith 2006 – Consolidation and dispersion of ideas). CRC LEME 217–220, Perth.

LOWREY J. R. 2007. Plant biogeochemical expression of gold mineralisation buried by an Aeolian dunefield: Tunkillia, South Australia. Hons Thesis thesis, Department of Geology and Geophysics, University of Adelaide, Adelaide (unpubl.).

MILES K. R., JOHNS R. K. & SOLOMON M. 1952. *Roopena map sheet*. Geological Survey, South Australia, Adelaide.

MITCHELL C. 2010. The Regolith Expression of IOCG mineralisation within the Southern region of the Project Mawson area, NE Eyre Peninsula, South Australia. BSc (Hons) thesis (unpublished) thesis, Geology and Geophysics, The University of Adelaide, Adelaide (unpubl.).

NONAKA N., HIGUCHI H., HAMAGUCHI H. & TOMARA K. 1981. Losses of the elements during dry ashing of plant materials. *Banseki Kagaku* 30, 599-604.

OWEN H. B. 1964. The geology of the Iron Monarch orebody. *Australian Institute of Mining and Metallurgy* Proceedings, 43-67.

PAIN C. 2008. *Regolith mapping and description* (Regolith Science). CSIRO Publishing, Victoria.

PARKER A. J., DALY S. J., FLINT D. J., FLINT R. B., PREISS W. V. & TEALE G. S. 1993. Palaeoproterozoic in Drexel, J.F., Preiss, W.V. and Parker, A.J., 1993.The Geology of South Australia. *The Precambrian. South Australia. Geological Survey.* 1, 66.

PATE J. S., JESCHKE D. W., DAWSON T. E., RAPHAEL C., HARTUNG W. & BOWEN B. J. 1999. Growth and seasonal utilisation of water and nutrients by Banksia prionotes. *Australian Journal of Botany* 46, 511-532.

REIMANN C. & FIZMOSER P. 2000. Normal and log-normal data distribution in geochemistry: death of a myth. Consequences for statistical treatment of geochemical and environmental data *Environmental Geology* 39, 1001-1014.

SCOTT K. M. & PAIN C. 2008. *Regolith Science*. CSIRO Publishing, Victoria.

SHEARD M. J., KEELING J. L., LINTERN M. J., HOU B., MCQUEEB K. G. & HILL S. M. 2009. A guide for mineral exploration through the regolith of the central Gawler Craton, South Australia. *CRC LEME c/o CSIRO Exploration and Mining." CRC LEME (Cooperative Research Centre for Landscape Environments and Mineral Exploration).*

THOMAS L. 2011. *Regolith-Landforms and plant biogeochemical expression of buried mineralisation targets in the Northern Middleback Ranges, ("Iron Knob South") South Australia*. University of Adelaide BSc (Hons) thesis (unpublished), Adelaide.

TUKEY J. W. 1977. Exploratory Data Analysis. *Addison-Wesley, Reading, MA*.

WARREN H. V. 1978. Biogeochemical prospecting for lead, in The Biogeochemistry of Lead in the Environment. *Nriagu, J. O., Ed., Elsevier, Amsterdam*, 395.

YEATES G. 1990. Middleback Ranges Iron Ore Deposits: in Hughes FE (Ed.). *1990 Geology of the Mineral Deposits of Australia & Papua New Guinea The AusIMM, Melbourne* 2, 10451048.

ZENCICH S. J., FROEND R. H., TURNER J. V. & GAILITIS V. 2002. Influence of groundwater depth on the seasonal sources of water accessed by Banksia tree species on a shallow coastal aquifer. *Oecologia* 131, 8-19.

ZIMDAHL R. L. 1975. Entry and movement in vegetation of lead derived from air and soil sources, paper presented at 68th Annu. Meeting of the Air Pollution Control Association, Boston, MA, June 15, . 2.

FIGURE CATIONS

TABLES

Figure 1: Iron Knob - Whyalla - South Australia

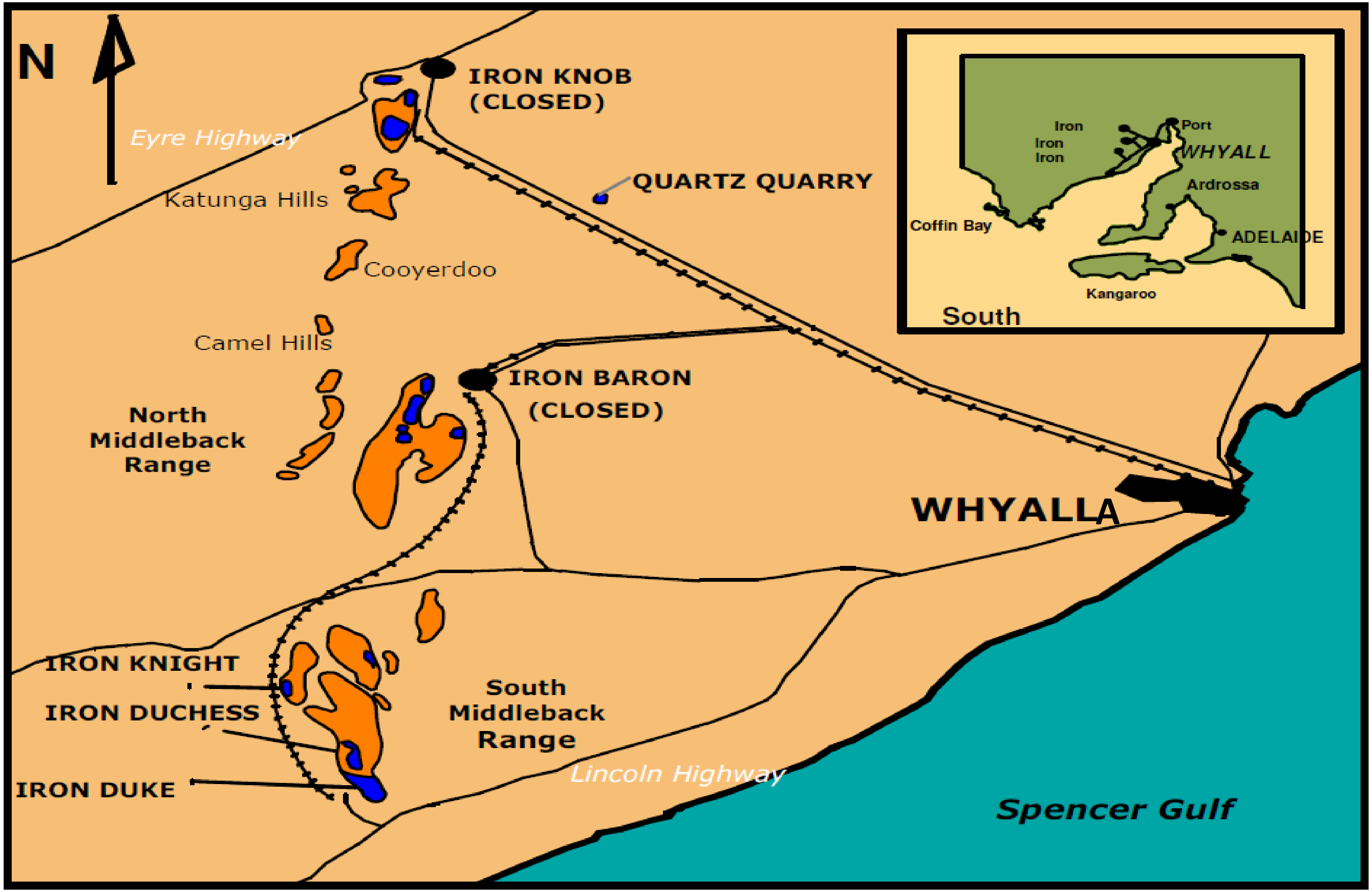


Figure 1: Iron Knob Project Area

Figure 3: Spatial Distribution of all Sample Locations; Pearl Blue Bush - Western Myall - Black Oak

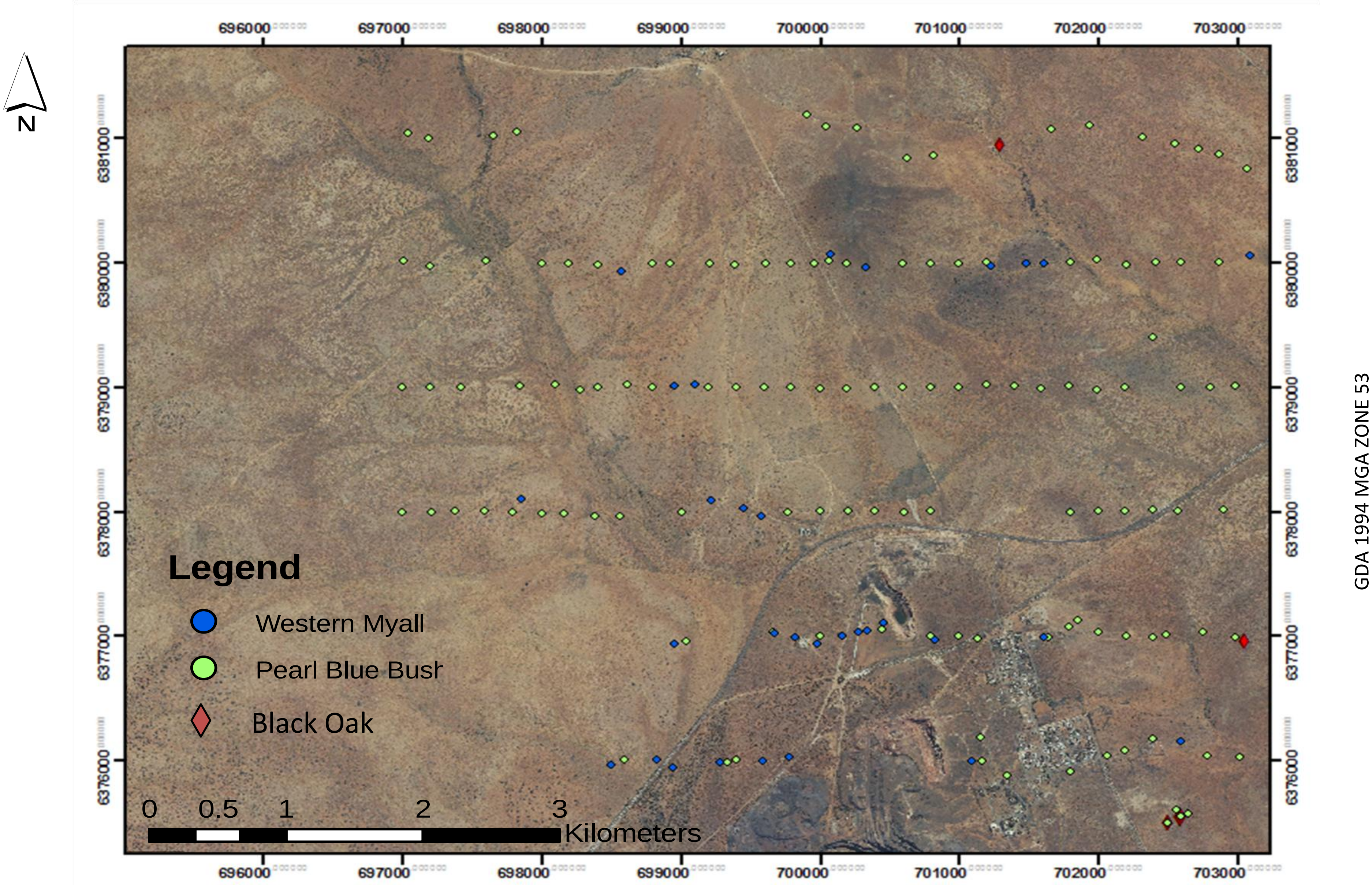
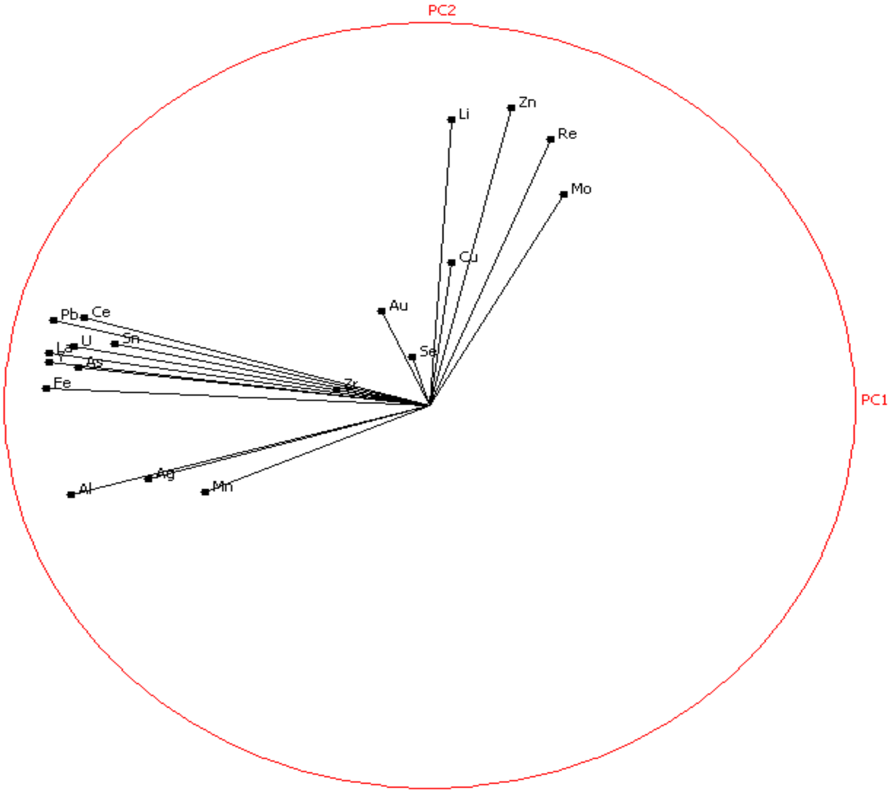
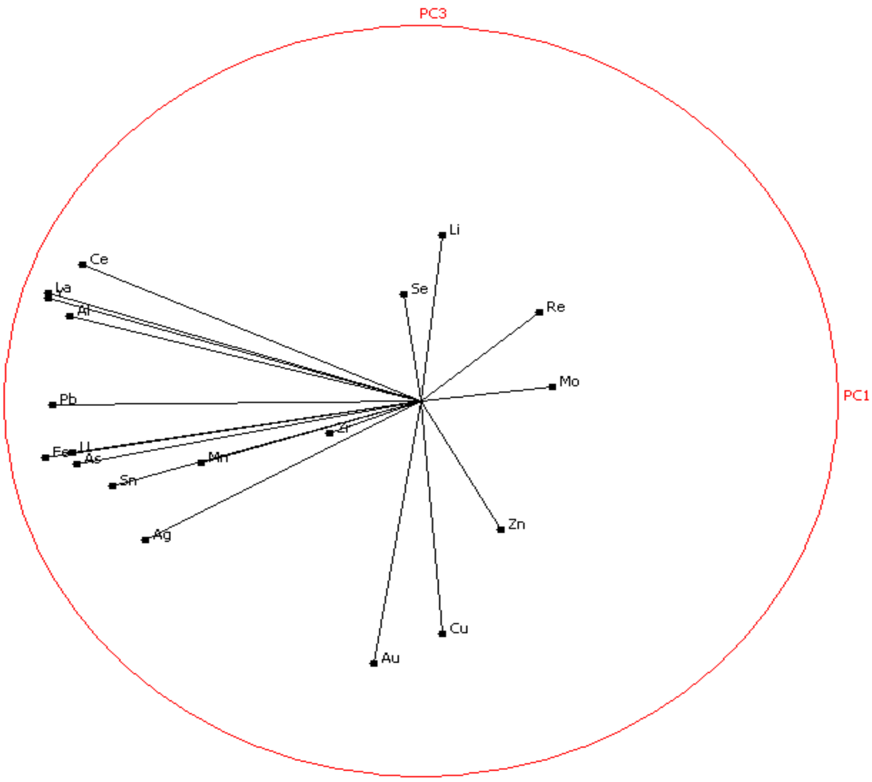


Figure 4: Principal Component Analysis - ALL SPECIES - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



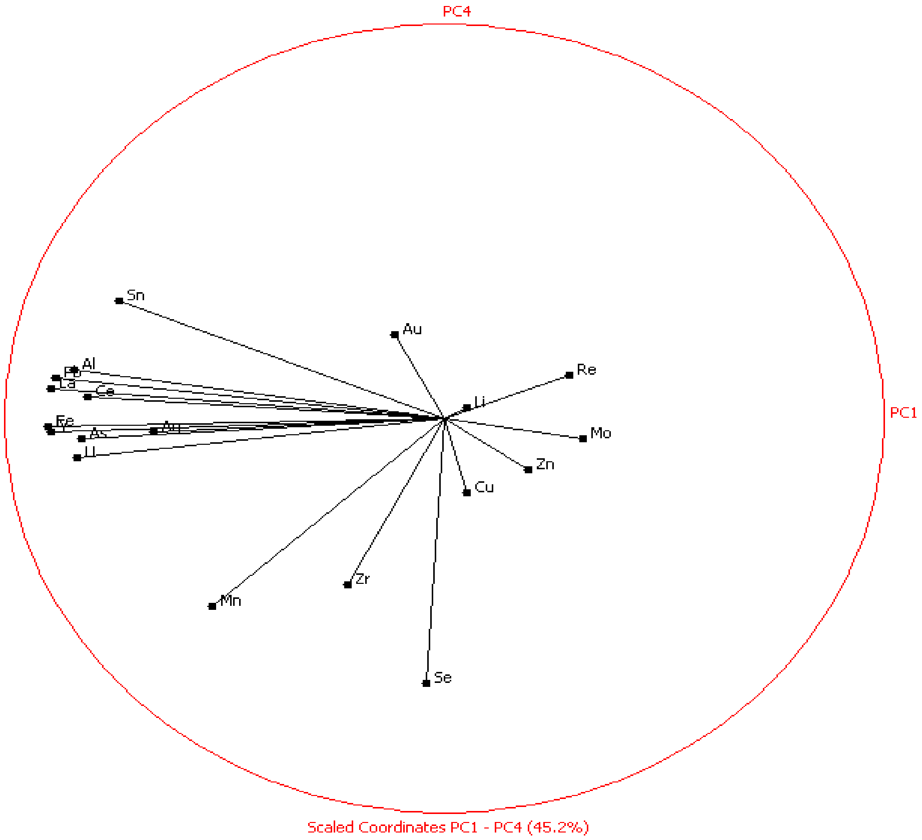
Scaled Coordinates PC1 - PC2 (52.6%)



Scaled Coordinates PC1 - PC3 (49.7%)

Figure 5: Principal Component Analysis - ALL SPECIES - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



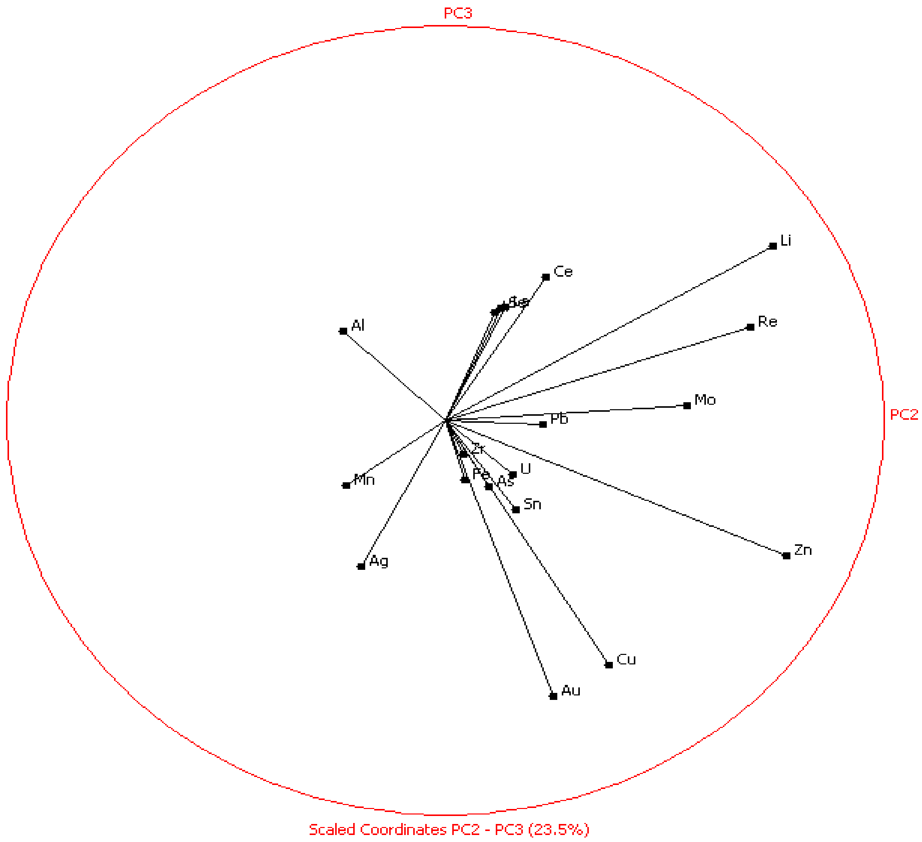
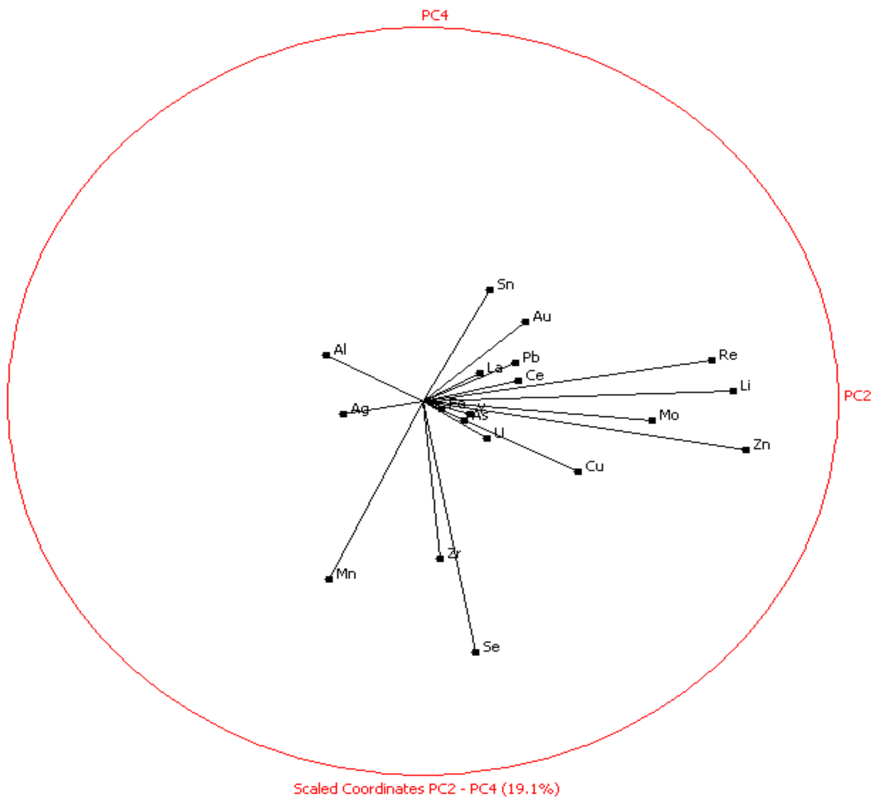


Figure 6: Principal Component Analysis - ALL SPECIES - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



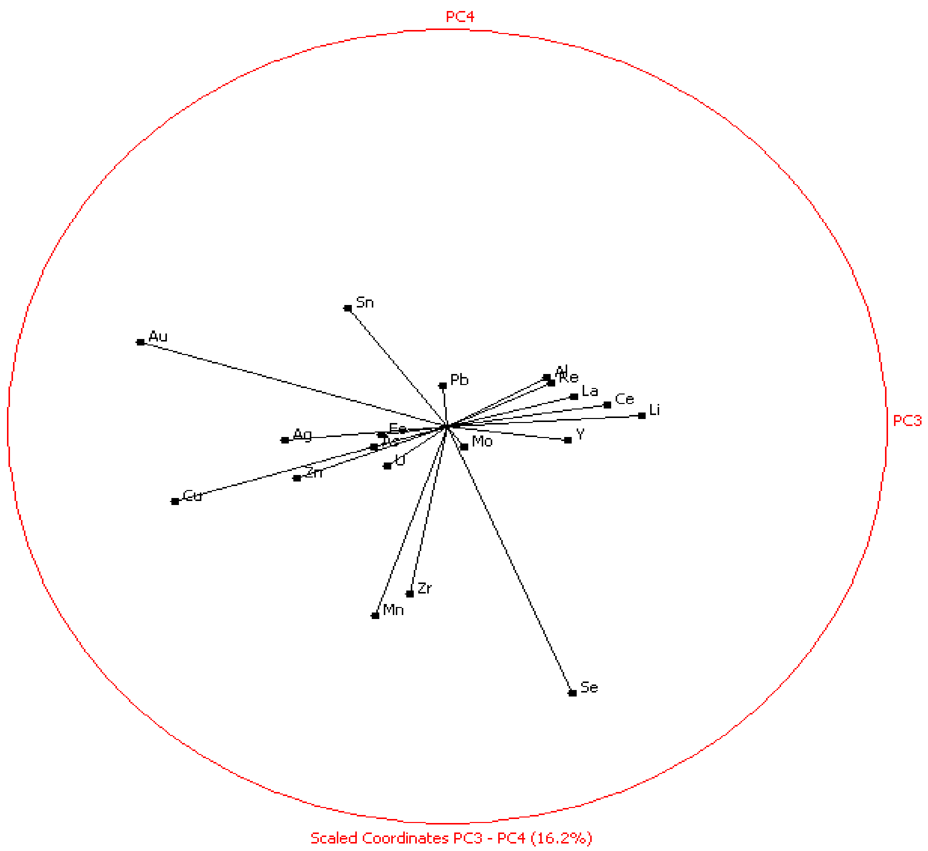
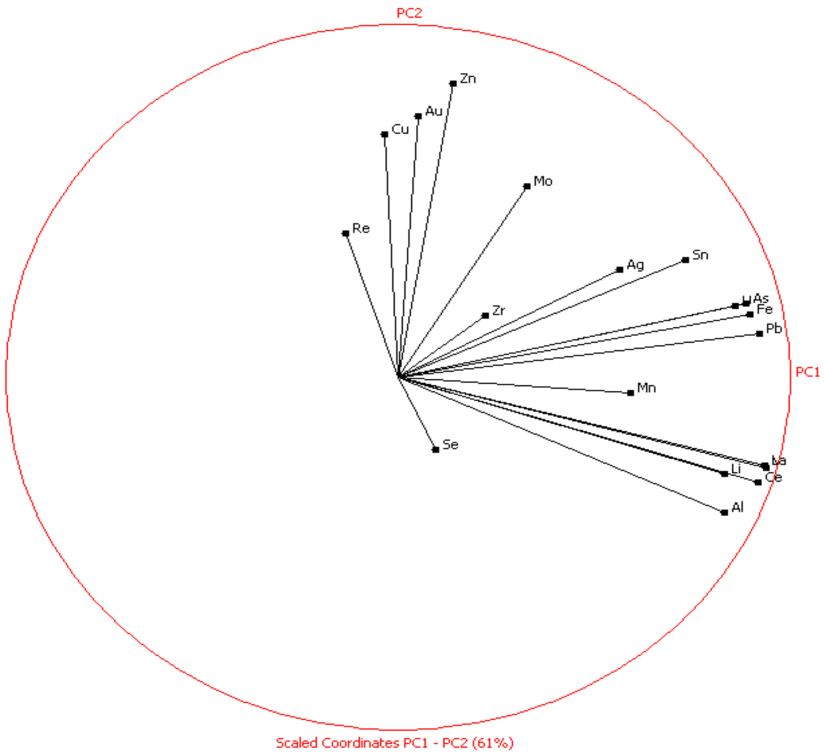


Figure 7: Principal Component Analysis - PEARL BLUE BUSH - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



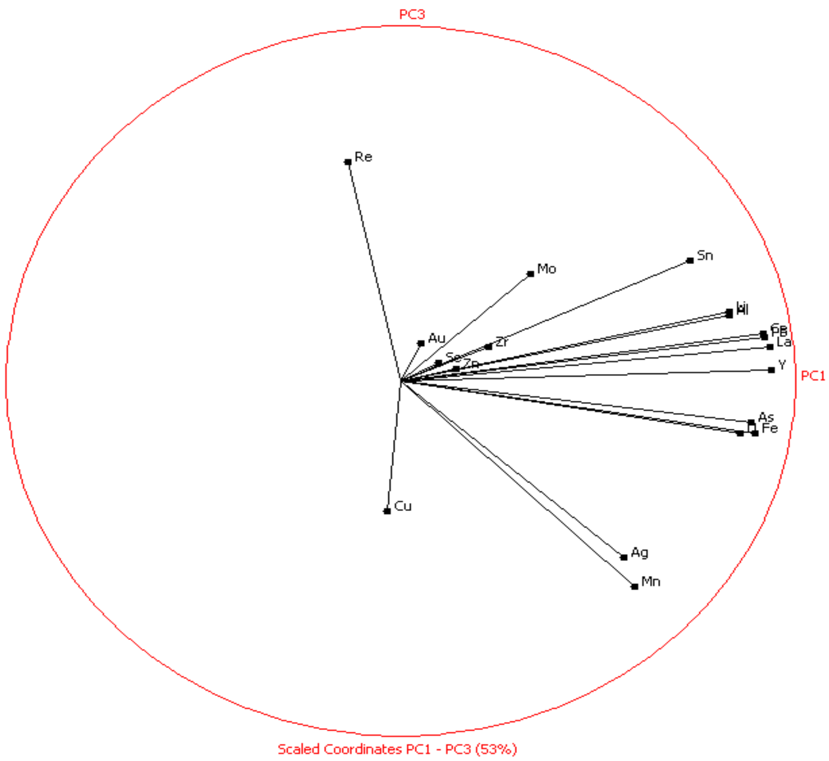
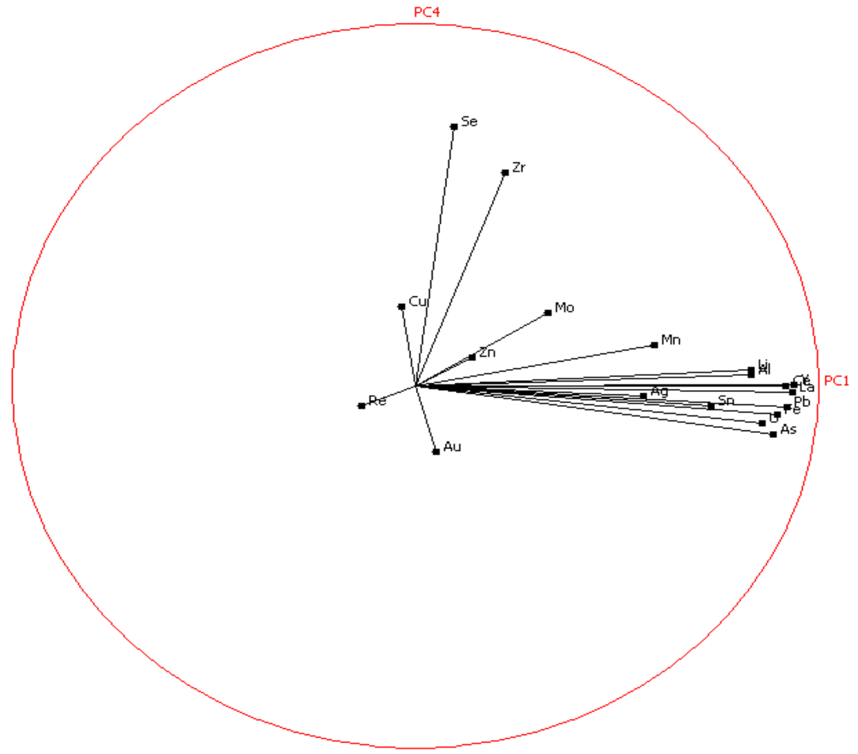
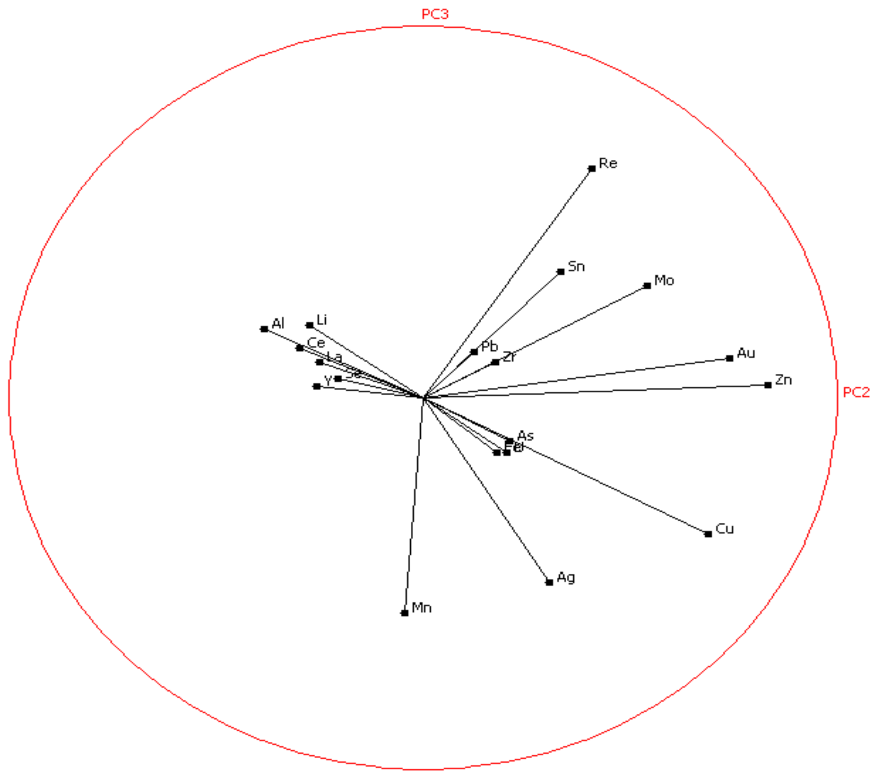


Figure 8: Principal Component Analysis - PEARL BLUE BUSH - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



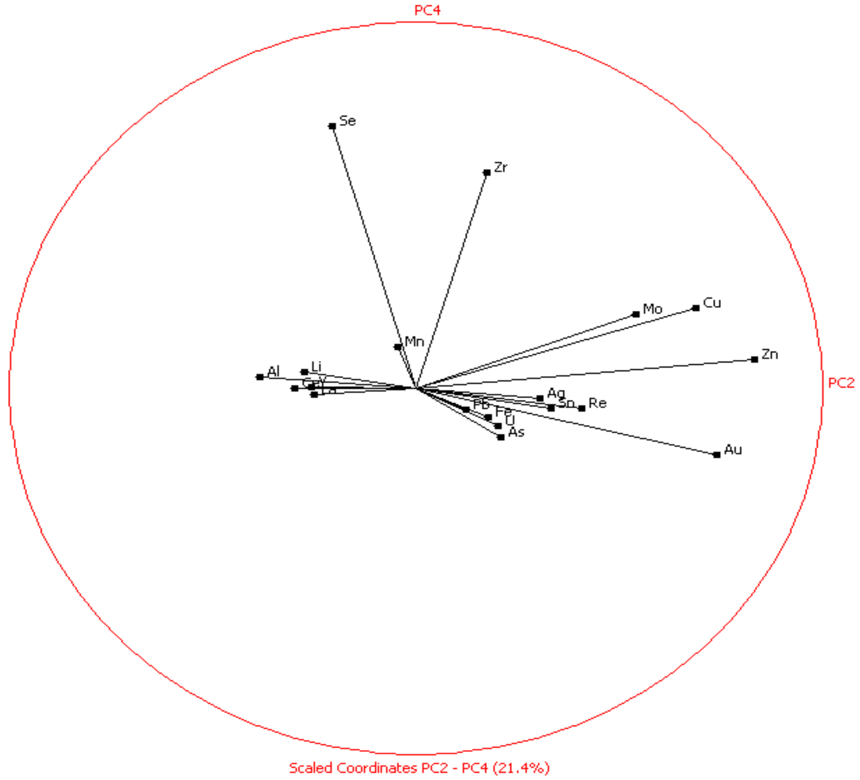
Scaled Coordinates PC1 - PC4 (50.7%)



Scaled Coordinates PC2 - PC3 (23.8%)

Figure 9: Principal Component Analysis - PEARL BLUE BUSH - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



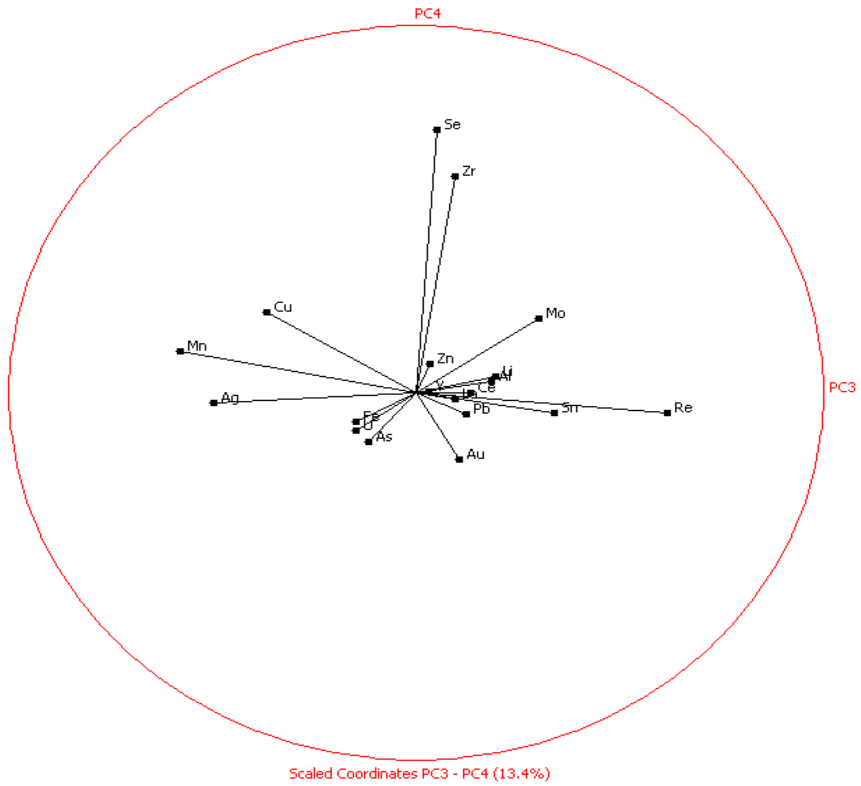
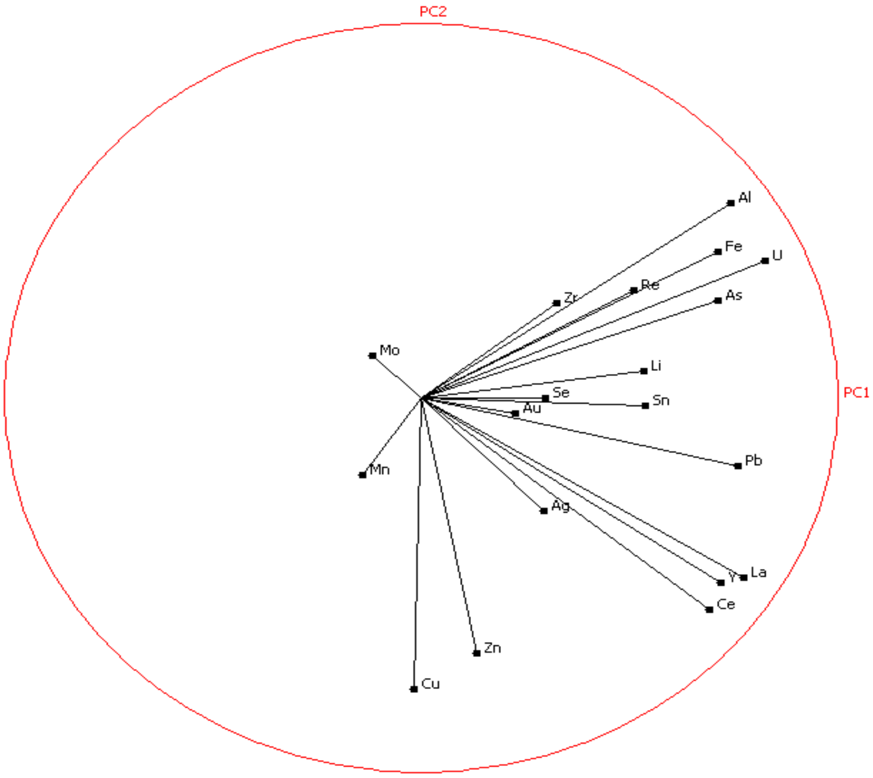
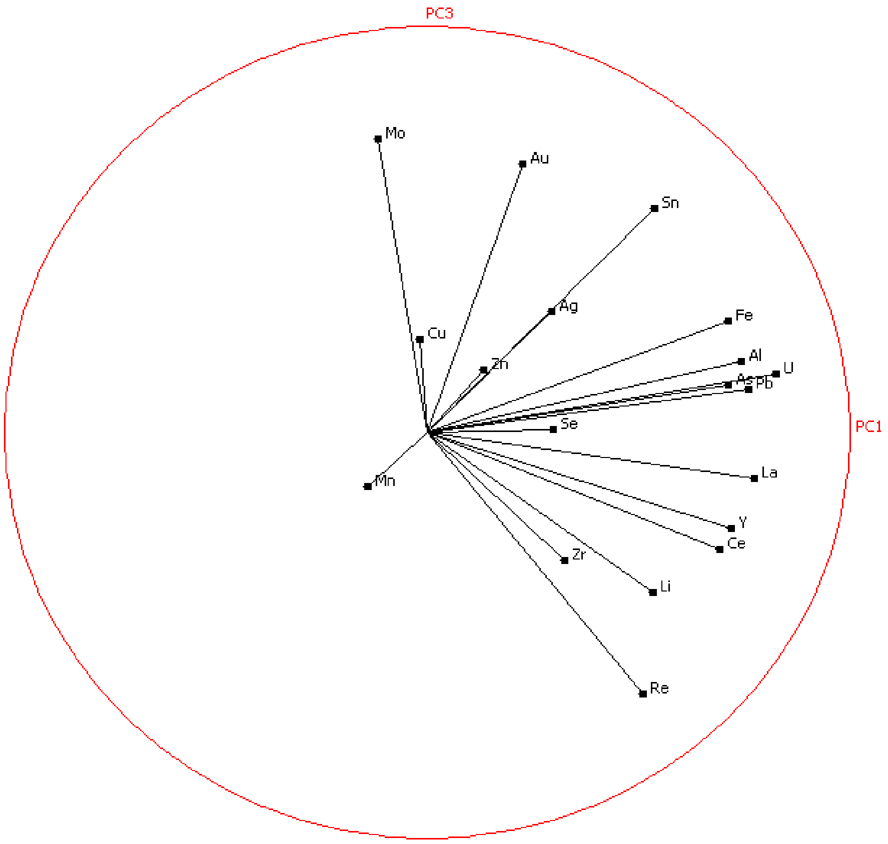


Figure 10: Principal Component Analysis - WESTERN MYALL - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



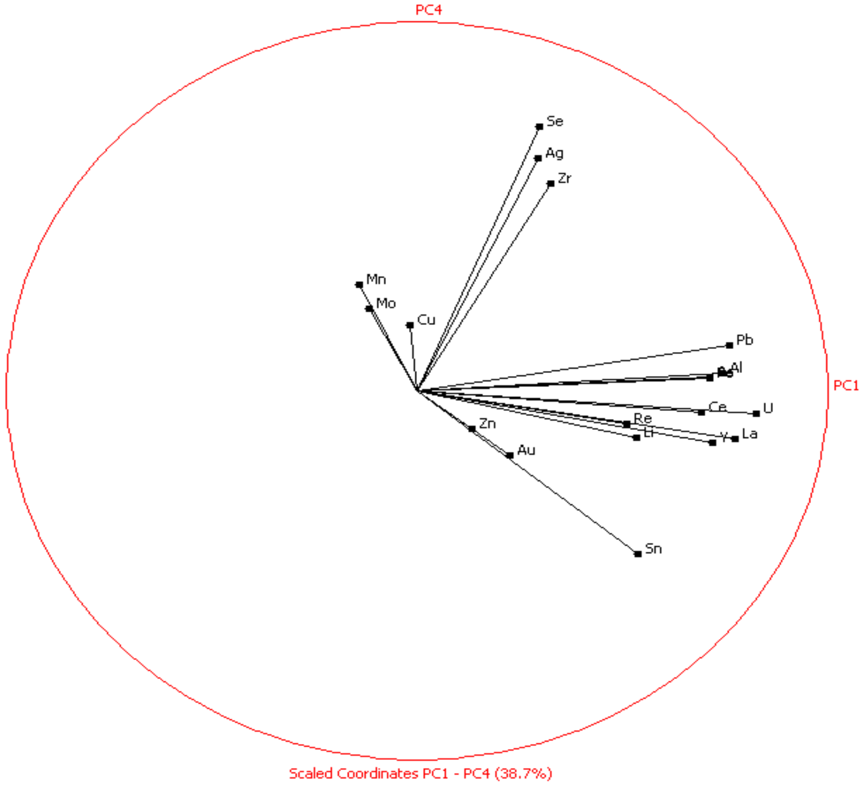
Scaled Coordinates PC1 - PC2 (44.5%)



Scaled Coordinates PC1 - PC3 (42.5%)

Figure 11: Principal Component Analysis - WESTERN MYALL - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



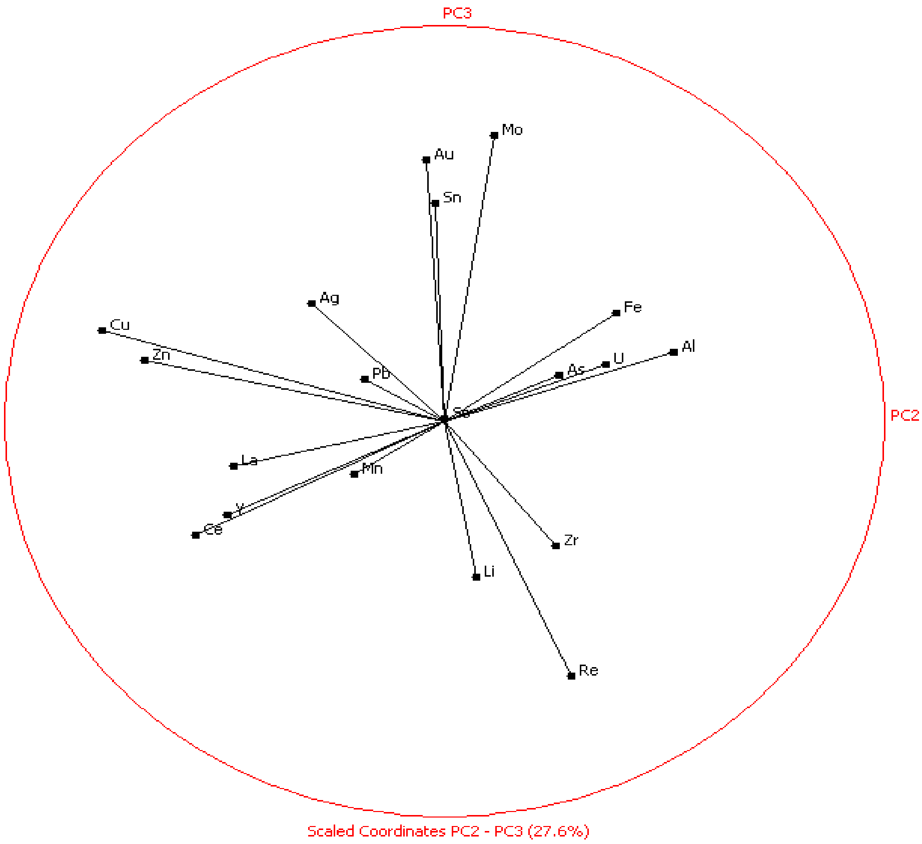
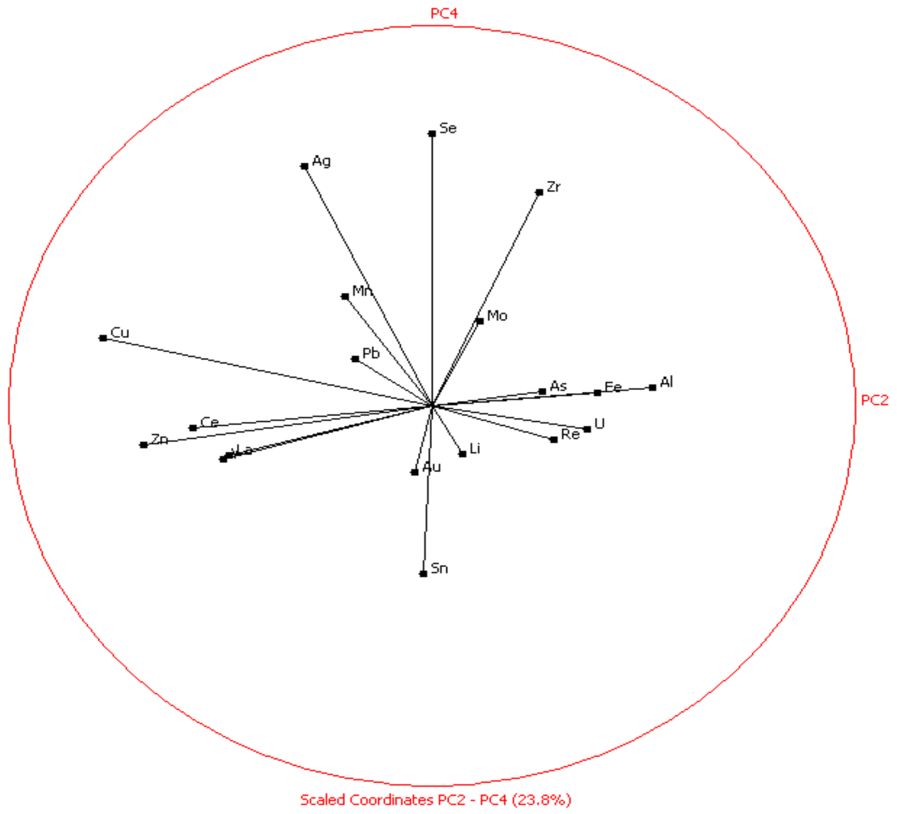


Figure 12: Principal Component Analysis - WESTERN MYALL - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



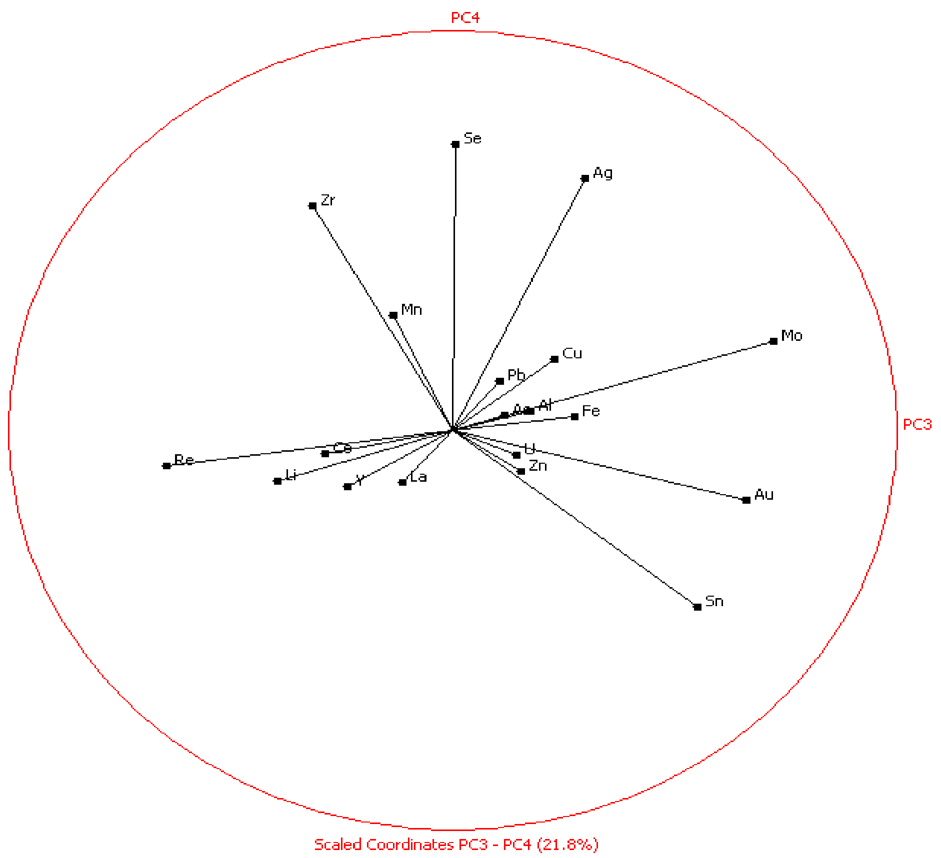


Figure 13: Principal Component Analysis - BLACK OAK - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS

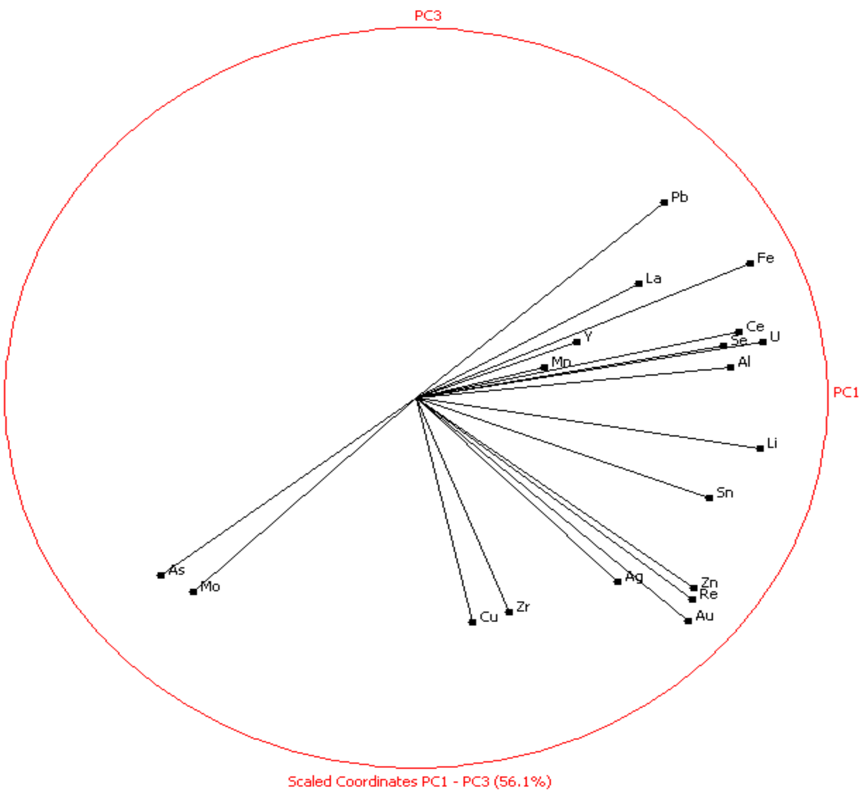
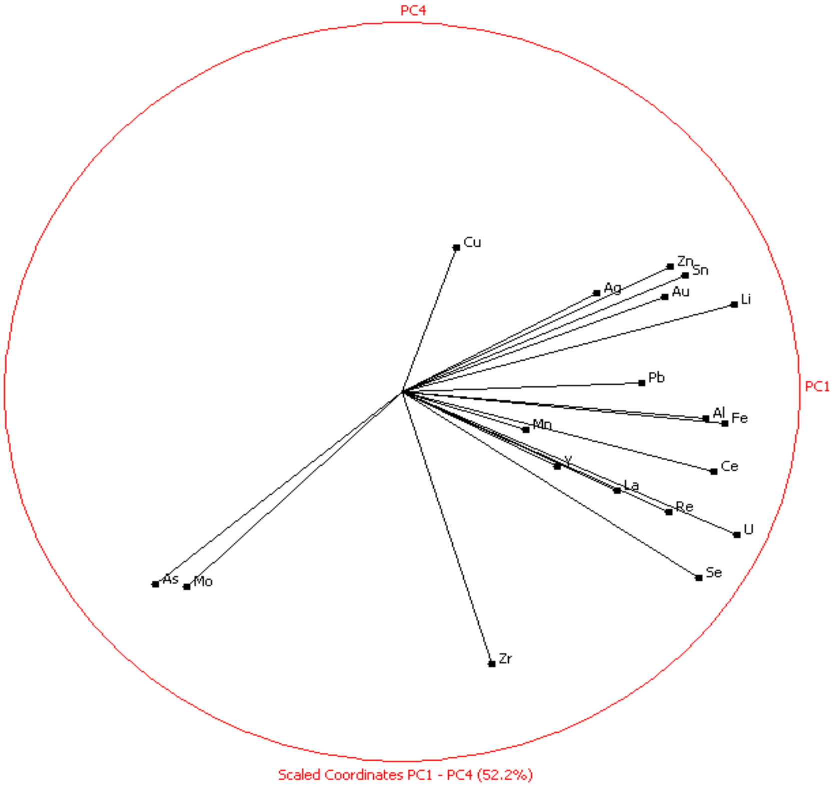


Figure 14: Principal Component Analysis - BLACK OAK - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



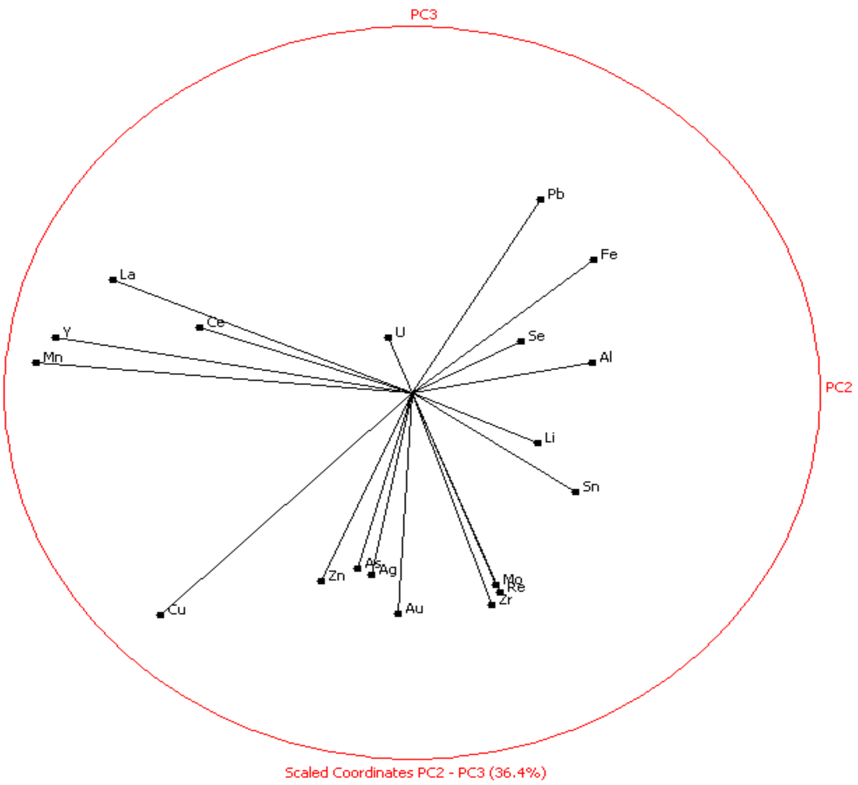
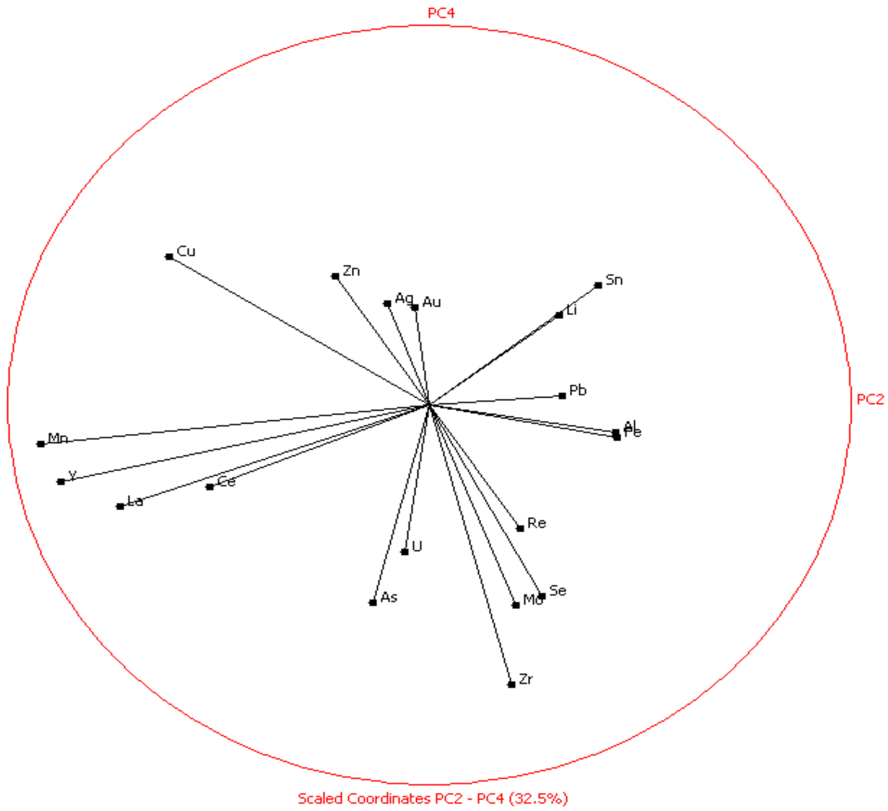


Figure 15: Principal Component Analysis - BLACK OAK - Plots of scaled coordinates

Area inside the unit circle represents the region of the valid (possible) scaled coordinates (loadings). The closer the variable is to the unit circle the better is its representation by the coordinates in the plot. All plots created in IoGAS



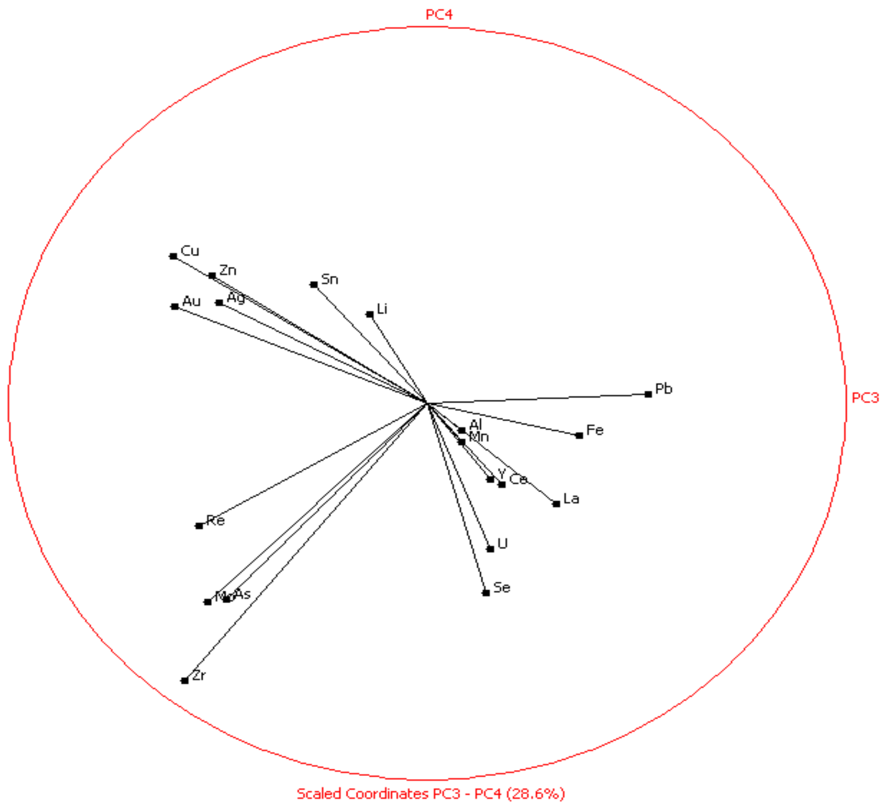


Figure 16: Spatial Distribution of Commodity Elements; Fe-Cu-Au in Pearl Blue Bush, Western Myall & Black Oak

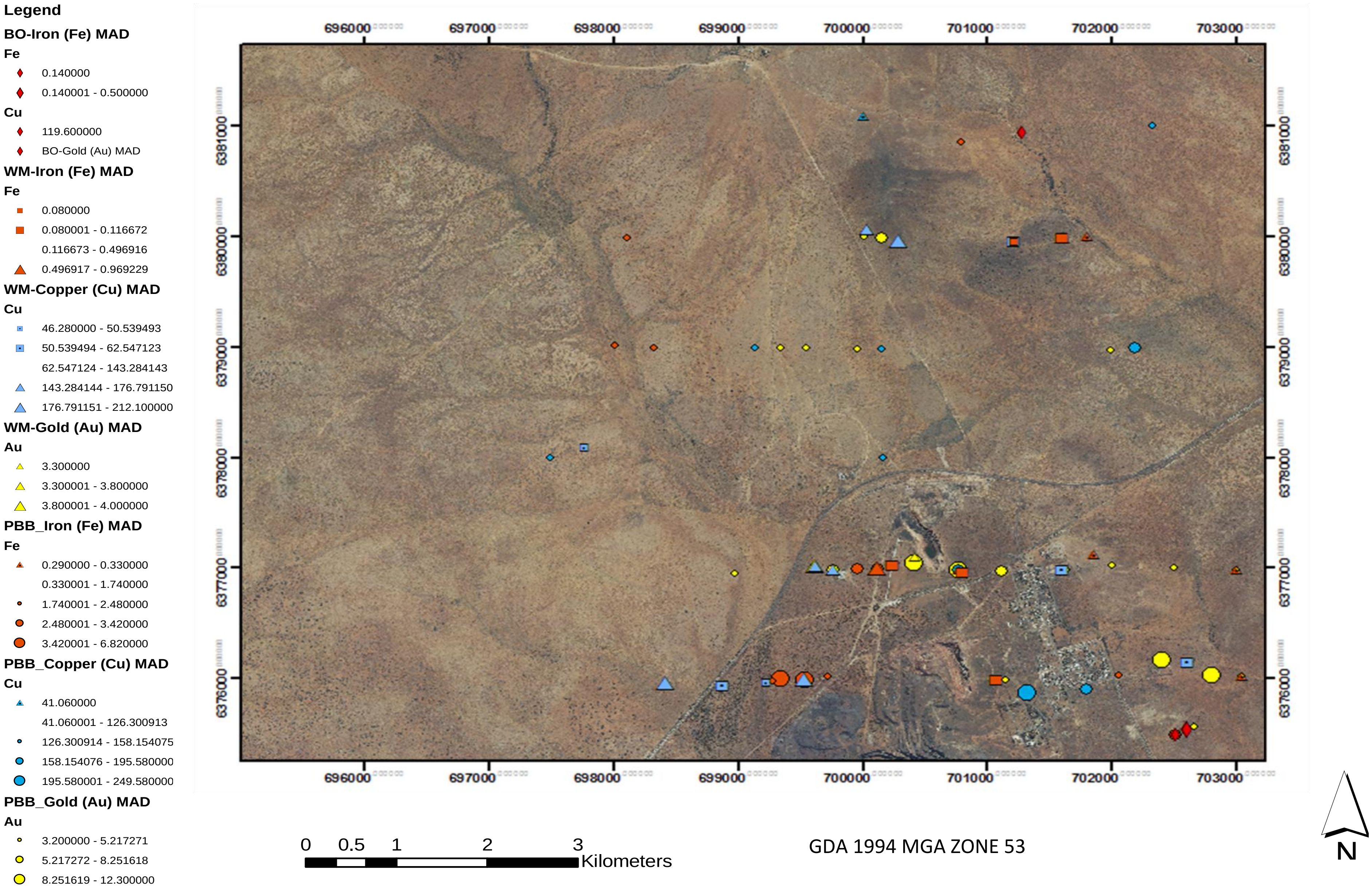


Figure 17: Copper (Cu): All 18 elements

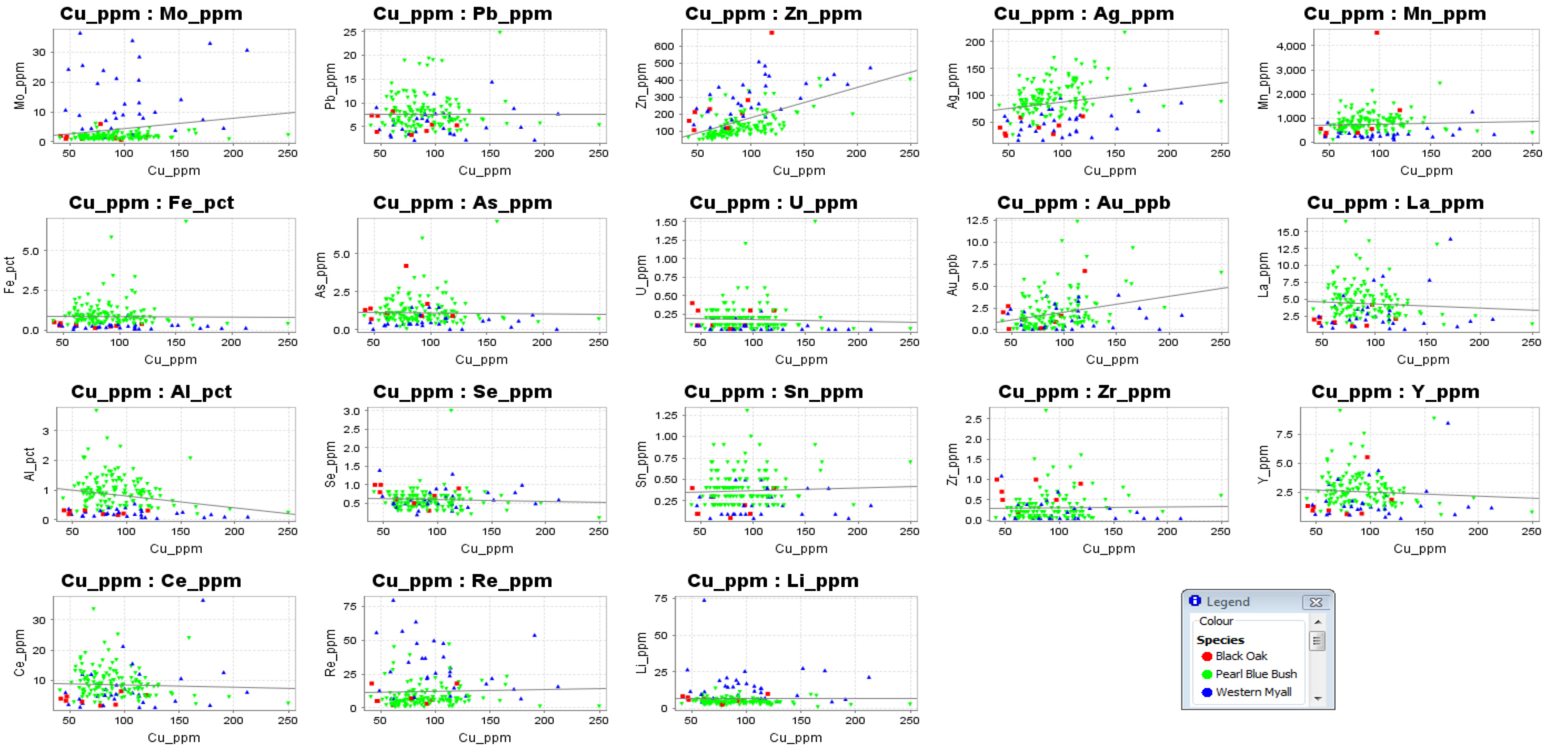


Figure 18: Lithium (Li): All 18 elements

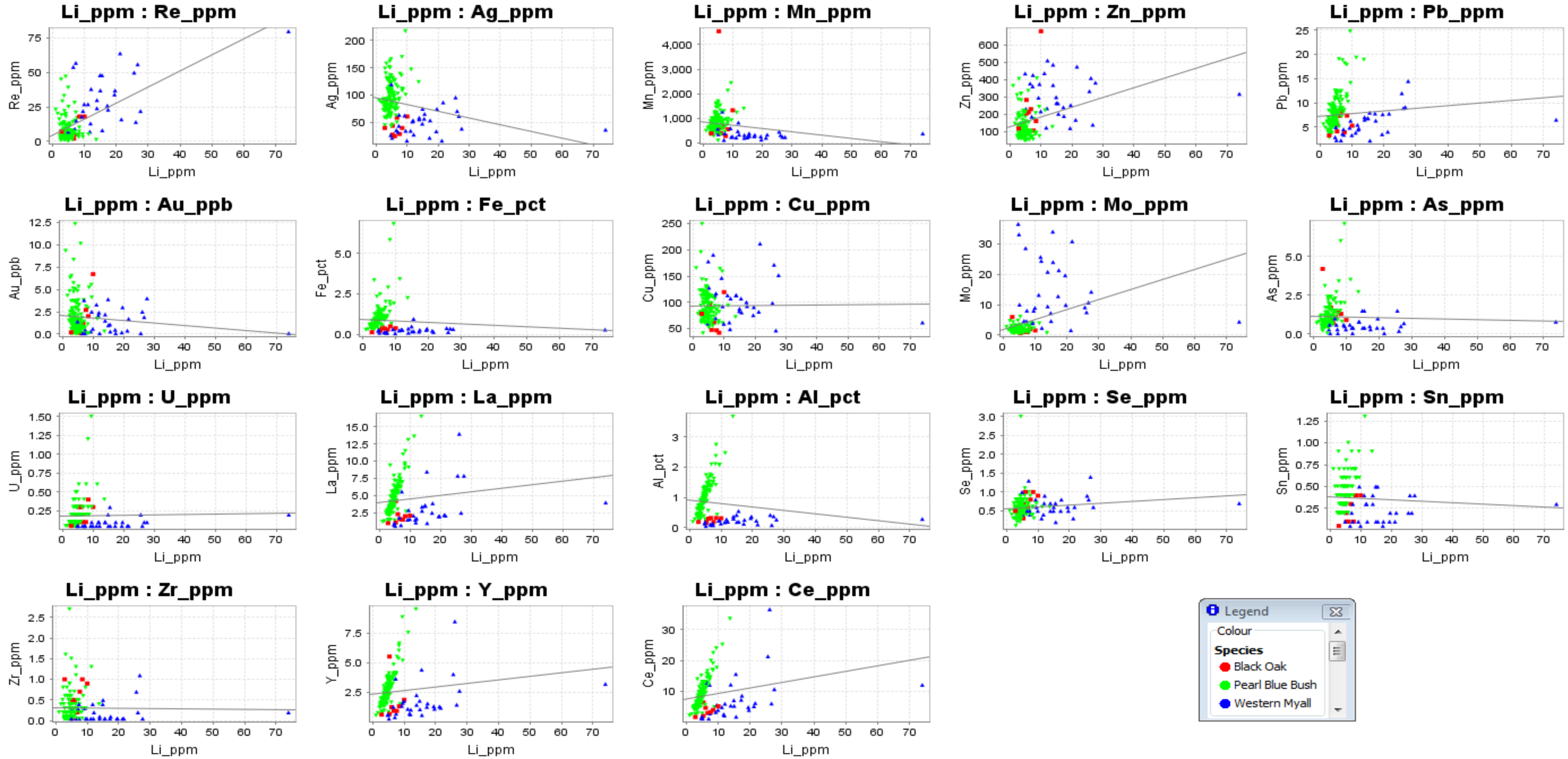


Figure 19: Molybdenum (Mo): All 18 elements

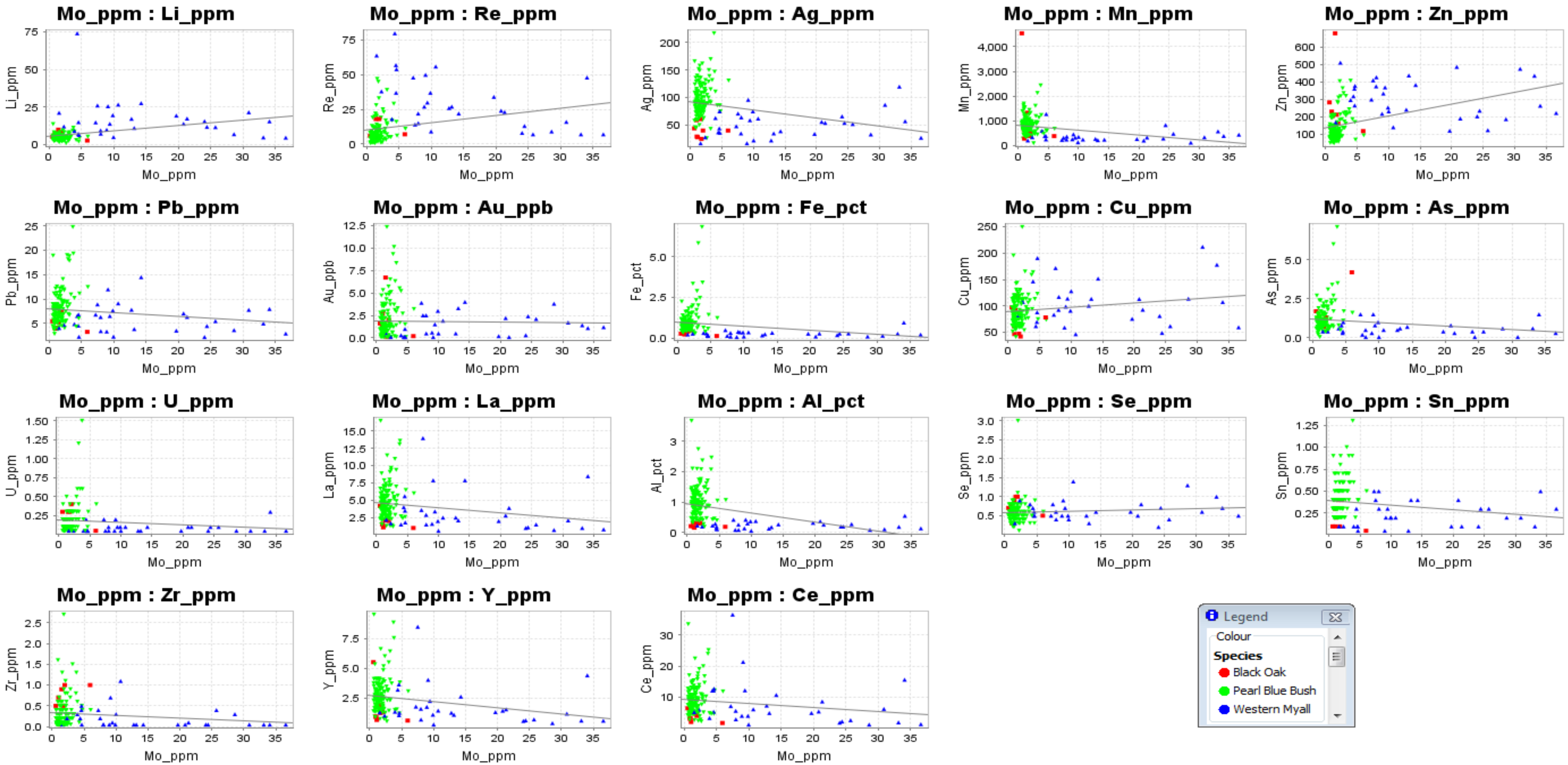


Figure 20: Iron (Fe): All 18 elements

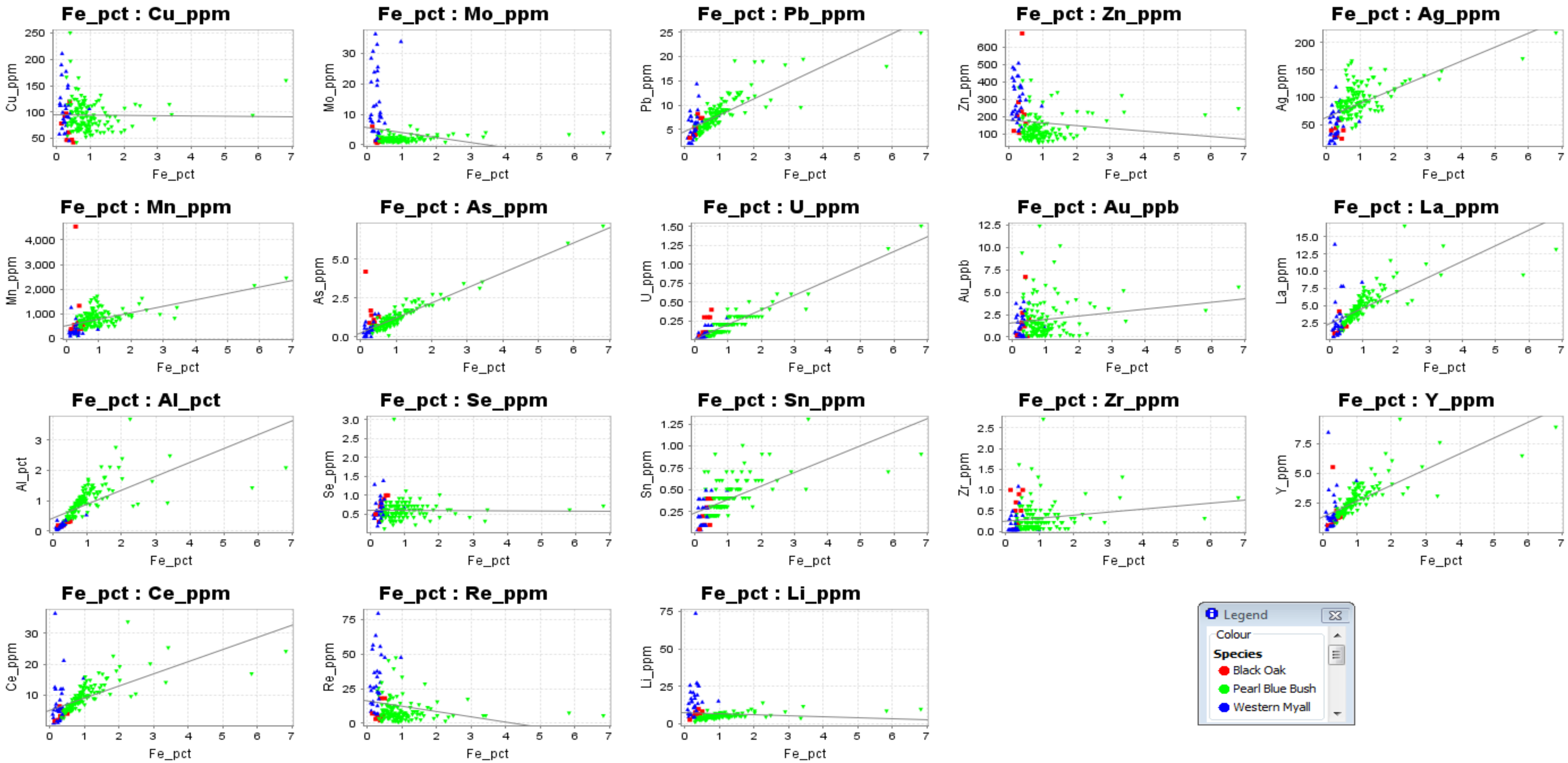


Figure 21: Gold (Au): All 18 elements

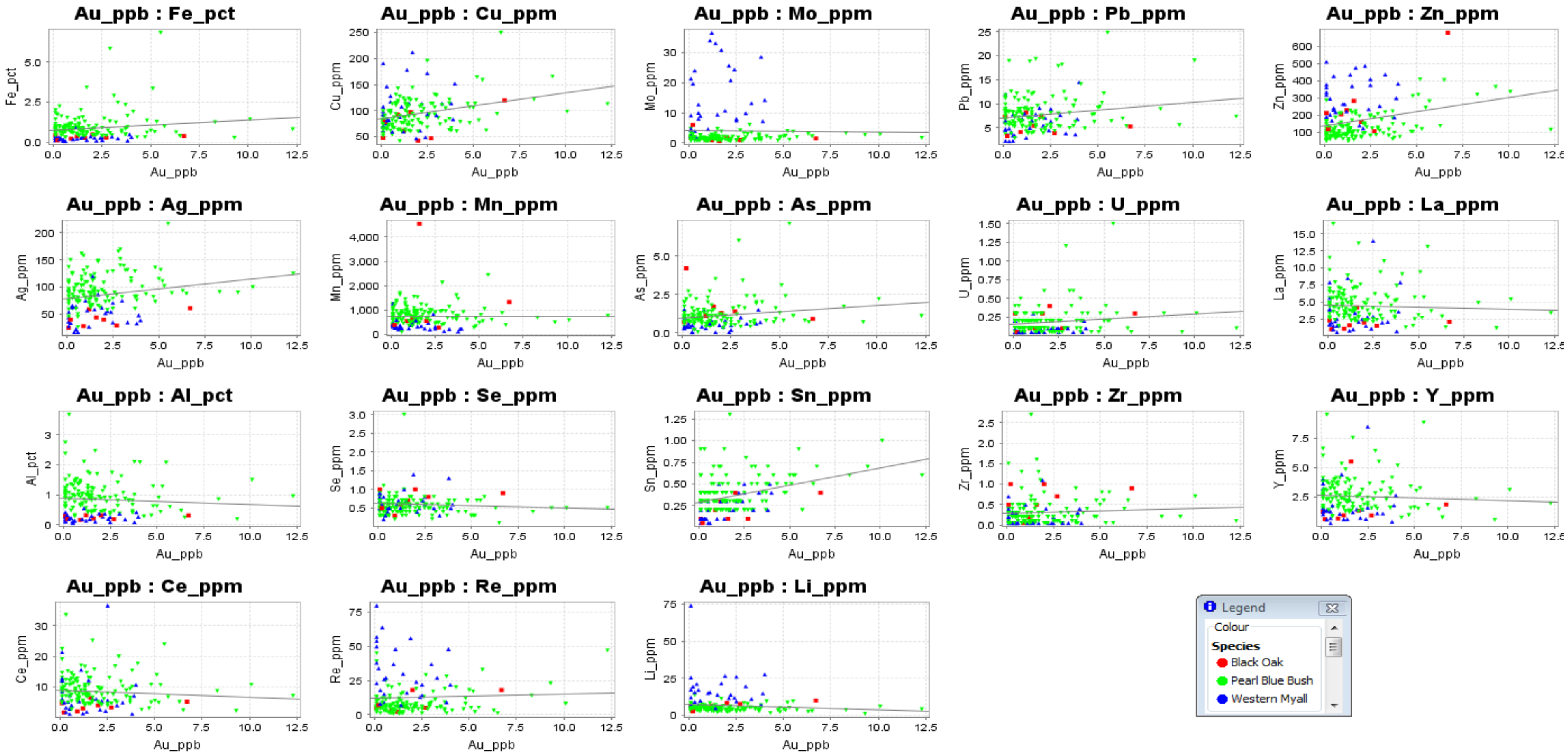
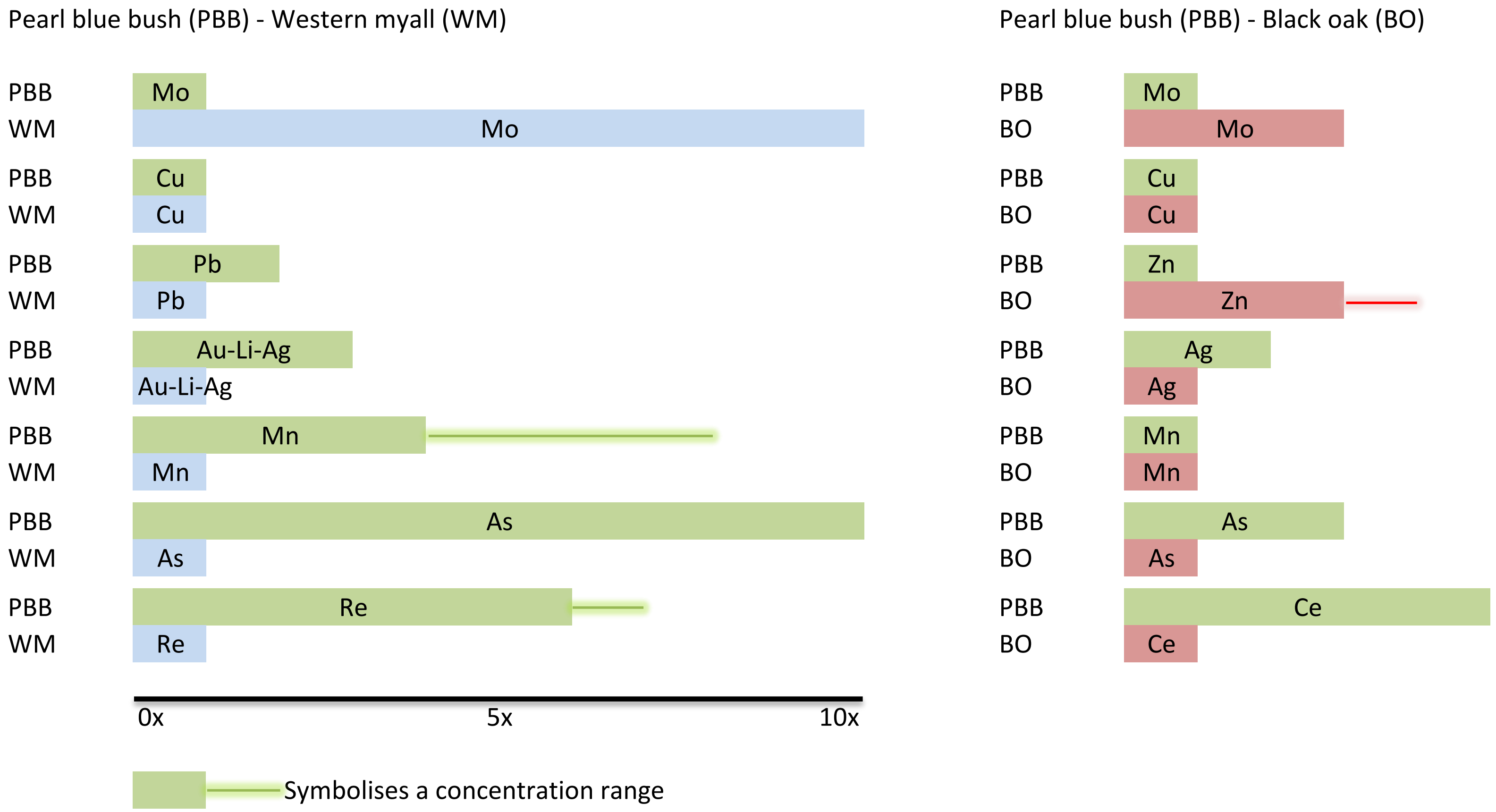


Figure 22: Summarised species & organ comparison on element uptake (AW) PBB, WM & BO



This represents general trend across all comparison sample sites for each species and isn't an precise measurement of magnitude of difference

Figure 23: Material Transport Model - Direction of Material Flow

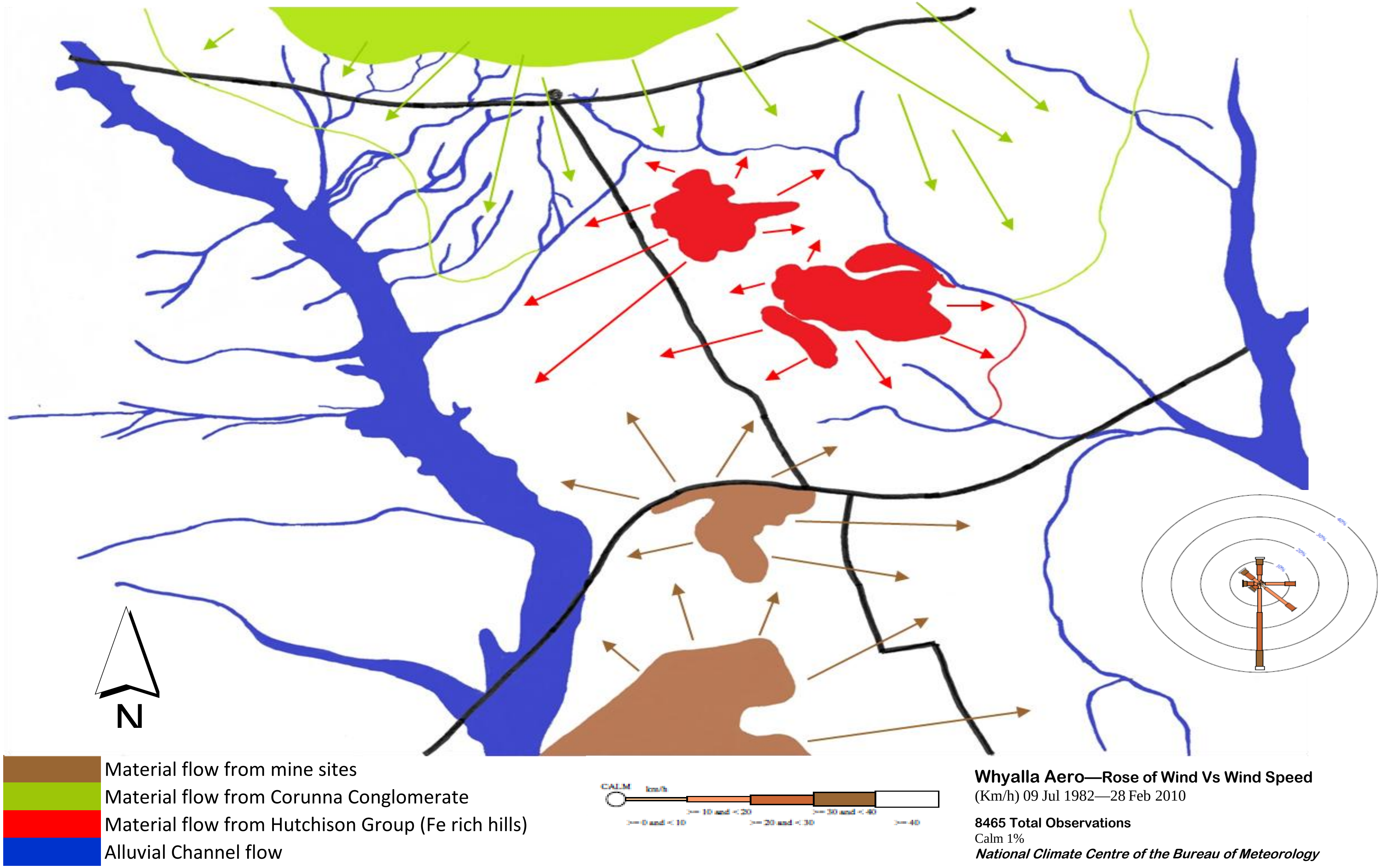
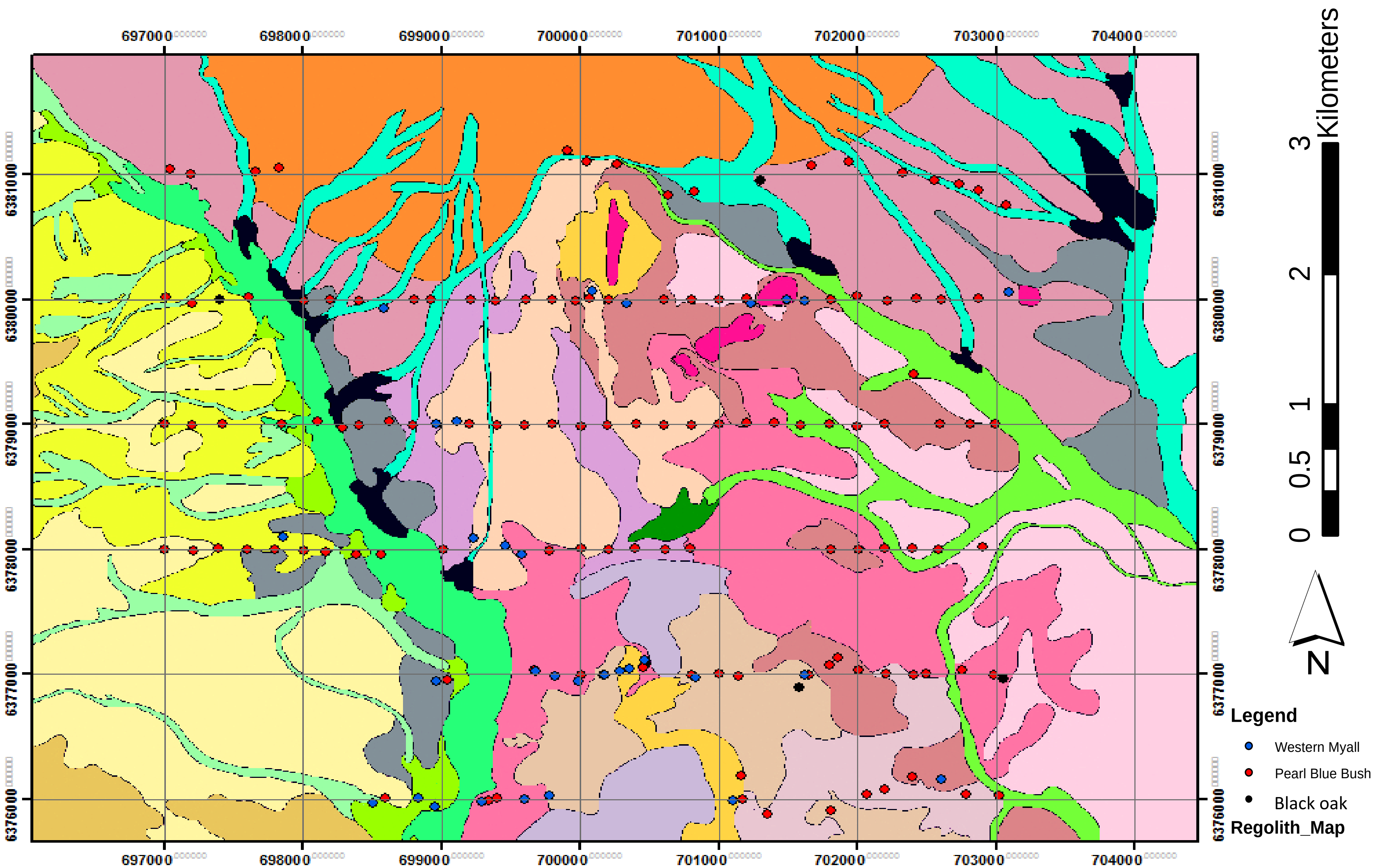


Figure 24a: Calcrete profiles underlying transported regolith

Figure 24b: Ferricrete gravel in calcrete matrix - profiles in transported regolith

Hill, 2011

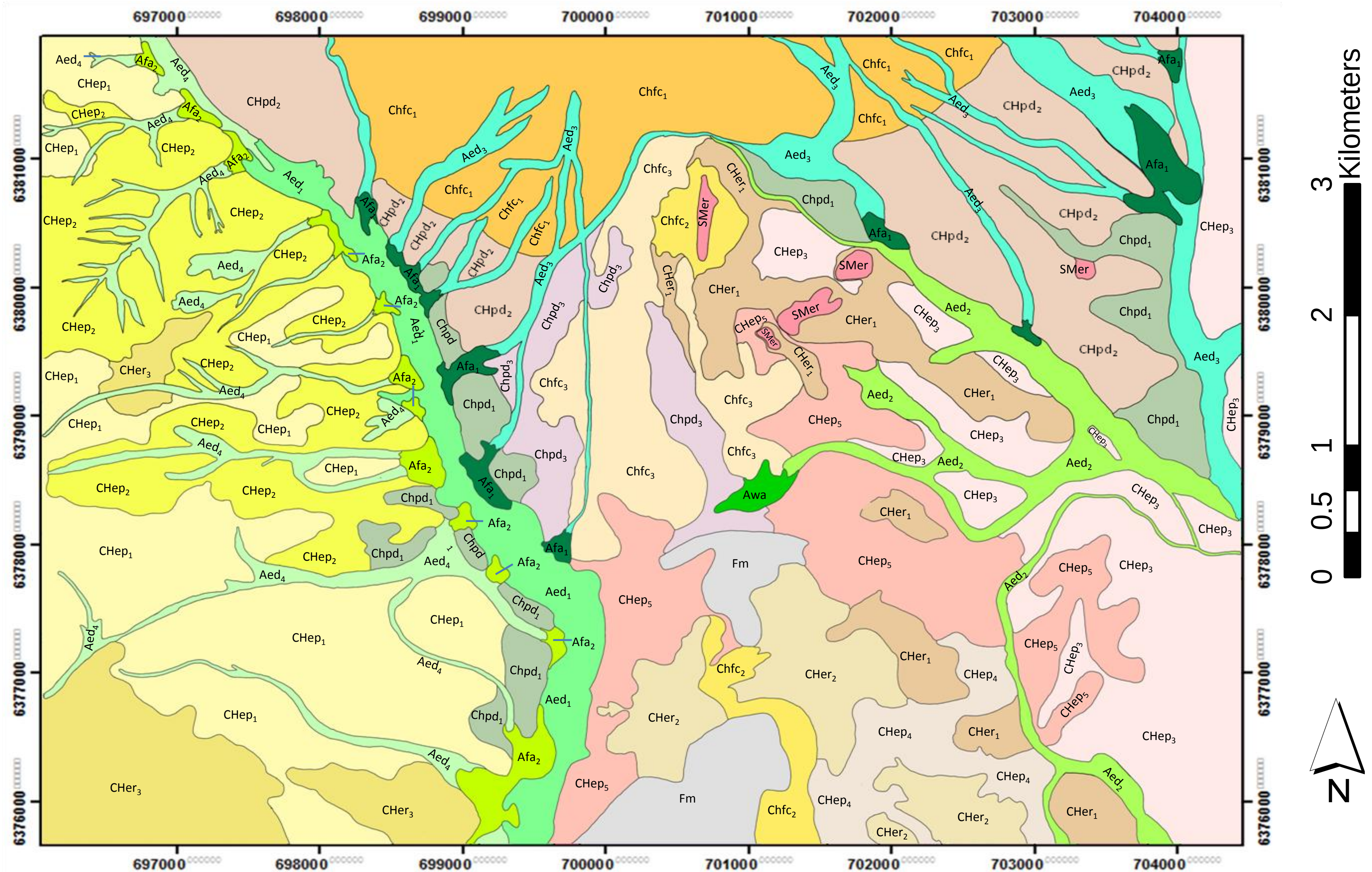
Regolith Landform Map - Spatail Distribution of all samples points & species - PBB, WM & BO



* Due to map input into Arc GIS unit colours were distorted from original

GDA 1994 MGA ZONE 53

Regolith-Landform map of the EM5167 - Iron Knob North, Northern Middleback Ranges



Regolith-Landform map of the EM5167 - Iron Knob North, Northern Middleback Ranges. Eyre Peninsular, SA. Created using aerial images provided by OneSteel. Compiled by Daniel Tanti - GDA 1994 MGA ZONE 53

Figure 27: Cultana 3D Geology Map - Iron Knob Study Area - Tenement Geology

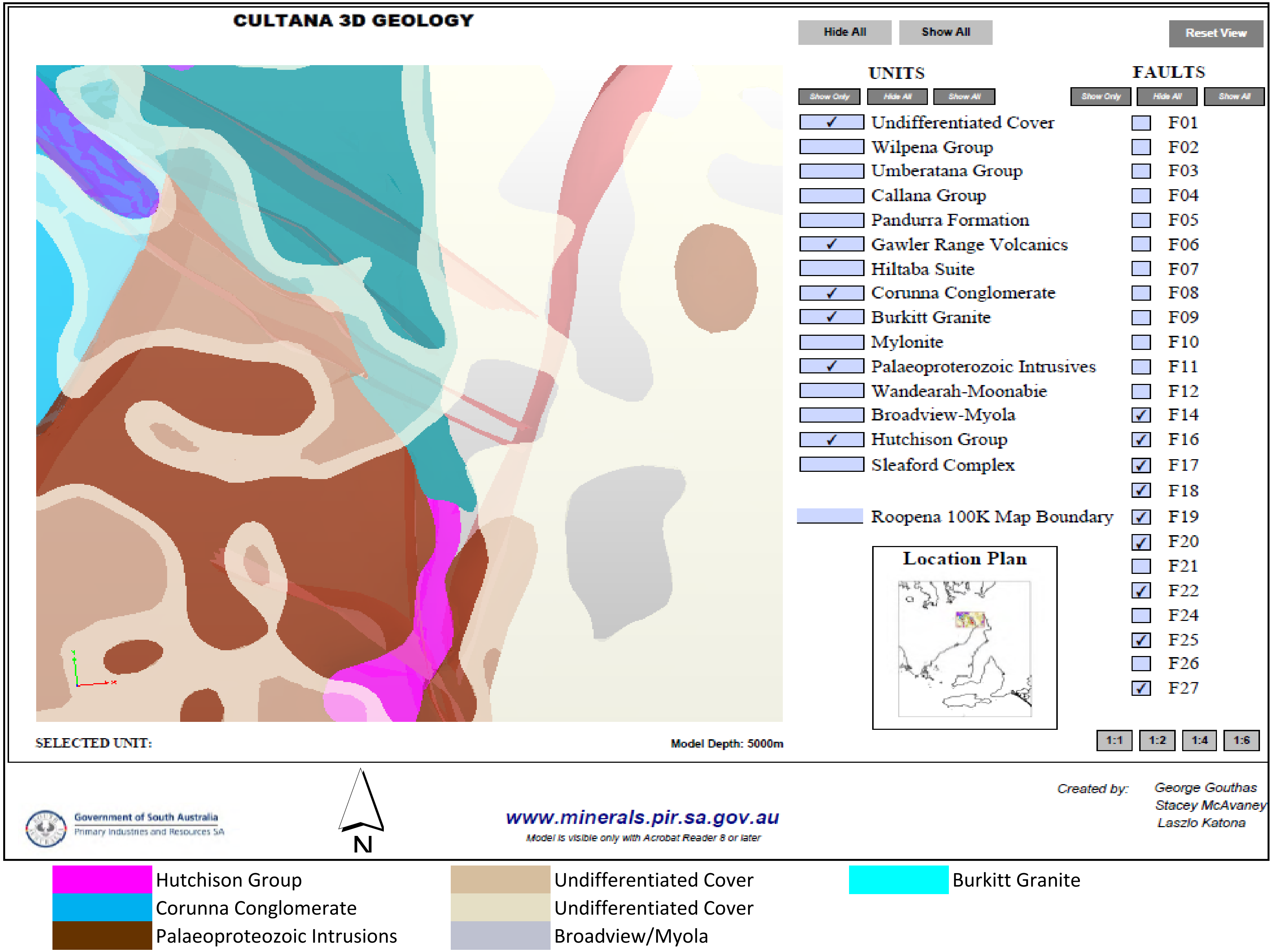


Figure 28: Cultana 3D Geology Map - Regional Geology - Fault Systems

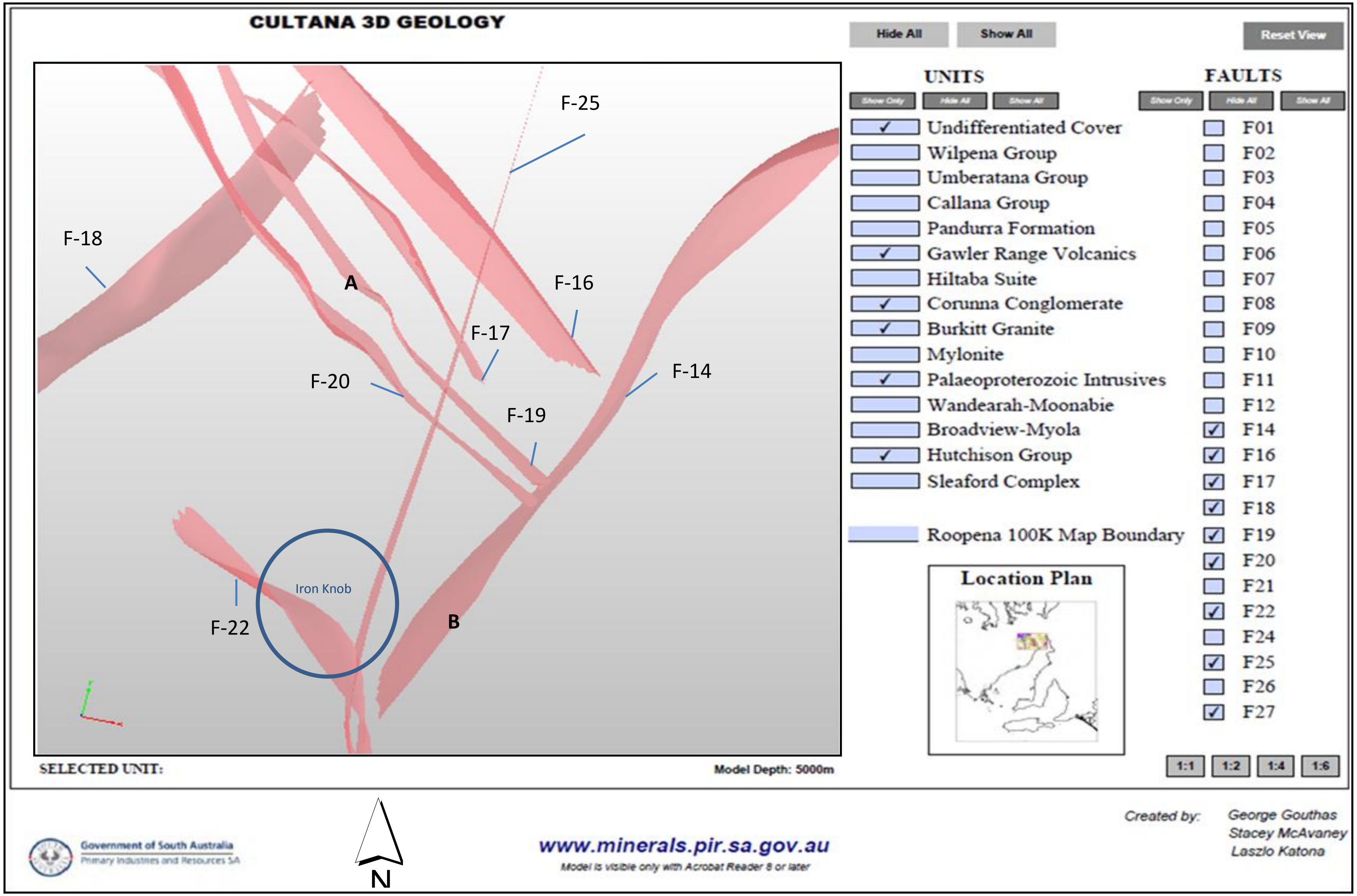


Figure 29: Scatter Plot of Molybdenum (Mo): Sodium (Na) plotted with ioGAS

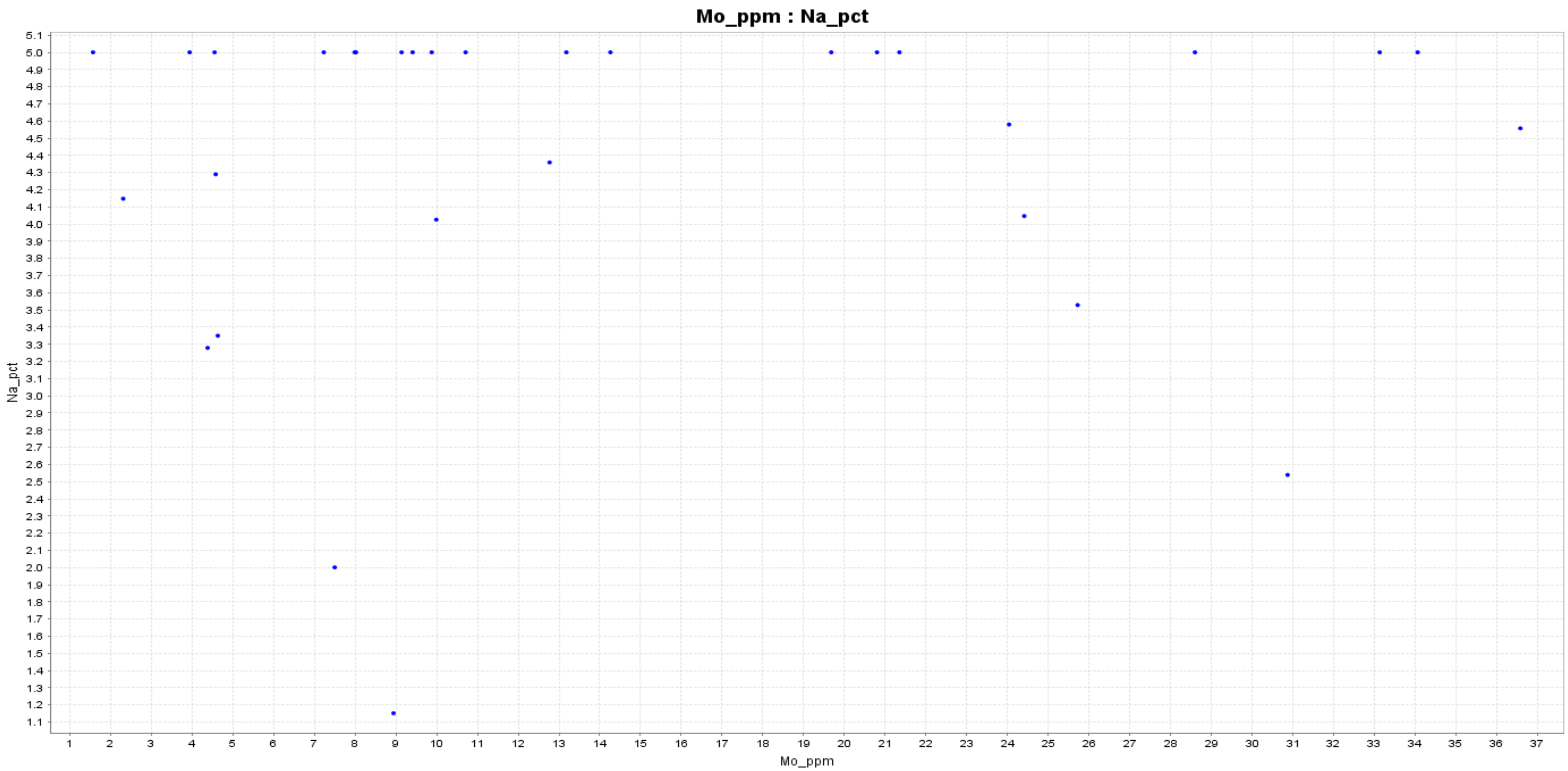


Figure 30: Analytical Error Regression - Assay 1: Assay 2

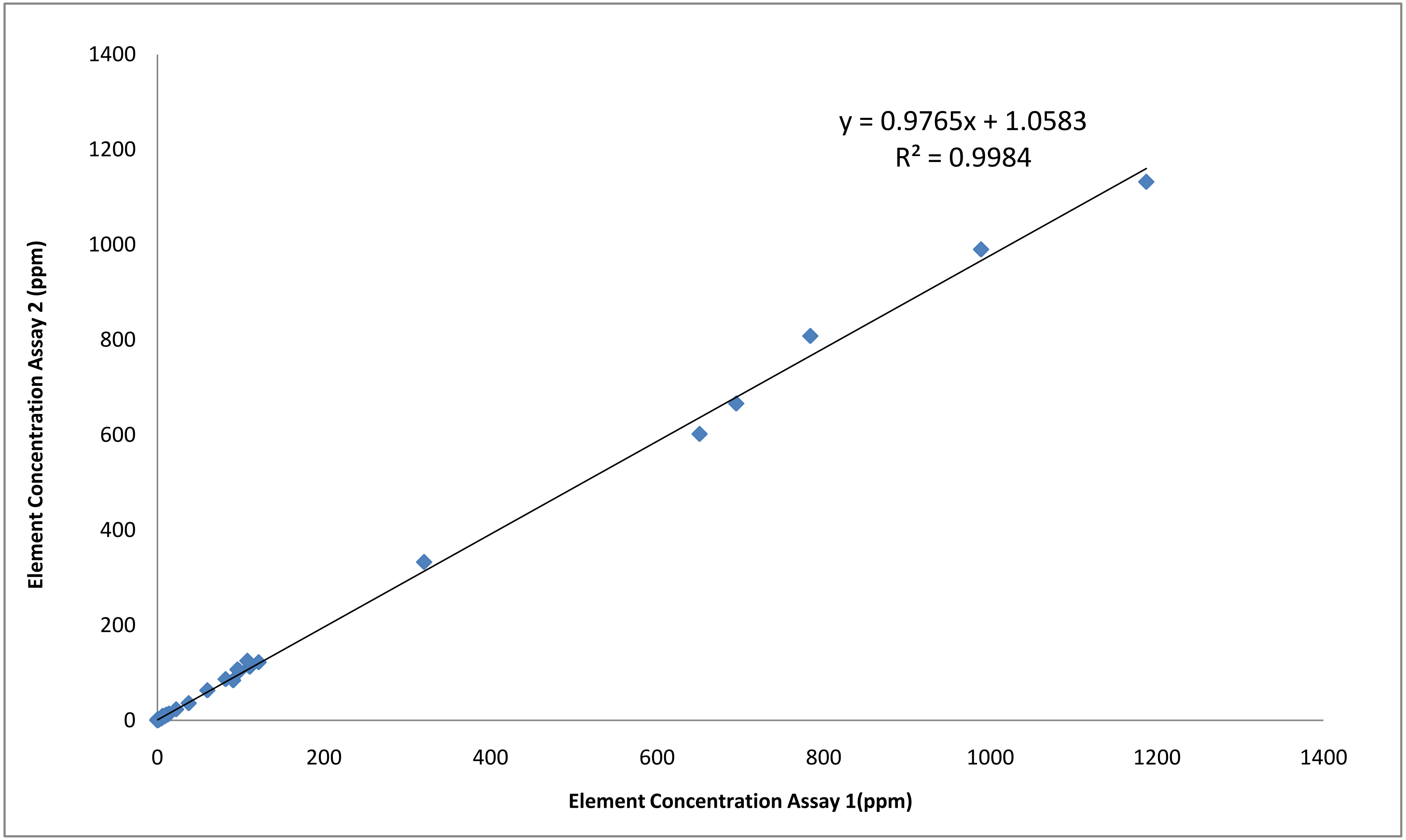


Figure 31: Spatial Distribution of Contamination Elements; Al-Zr-Fe in Pearl Blue Bush, Western Myall & Black Oak

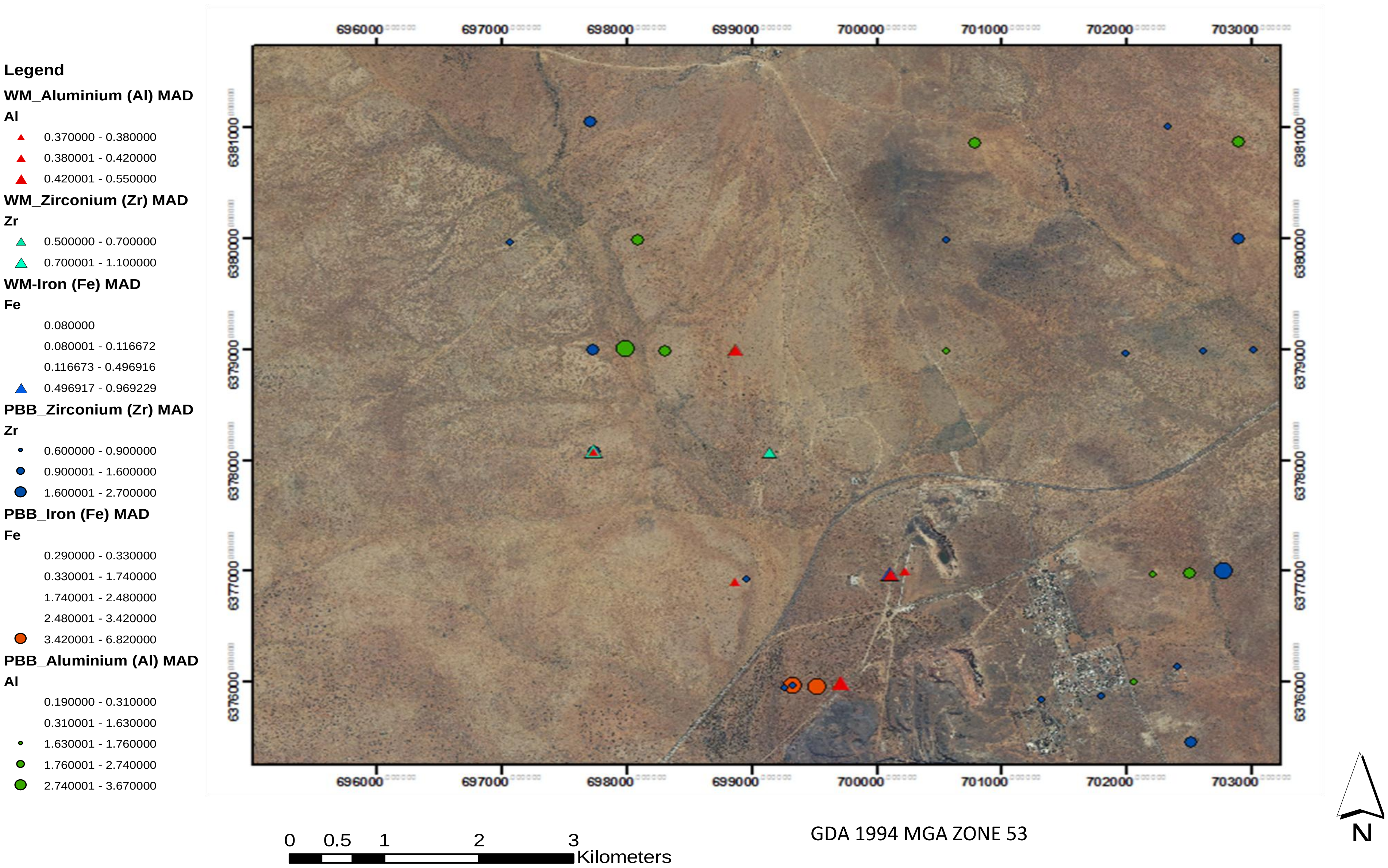


Figure 32a: Pearl blue bush twig in cross section - 500 µm

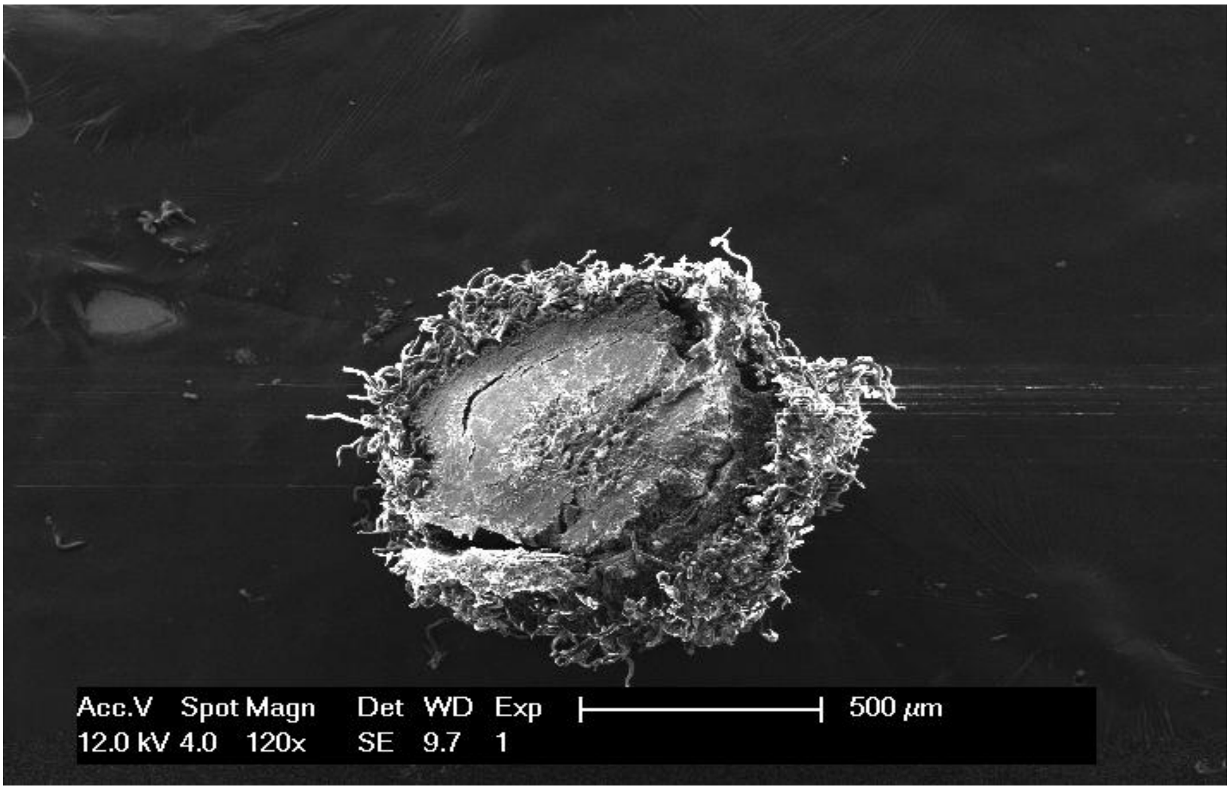


Figure 32b: Iron Oxalate (FeO) detrital crystal - contamination - 100 µm

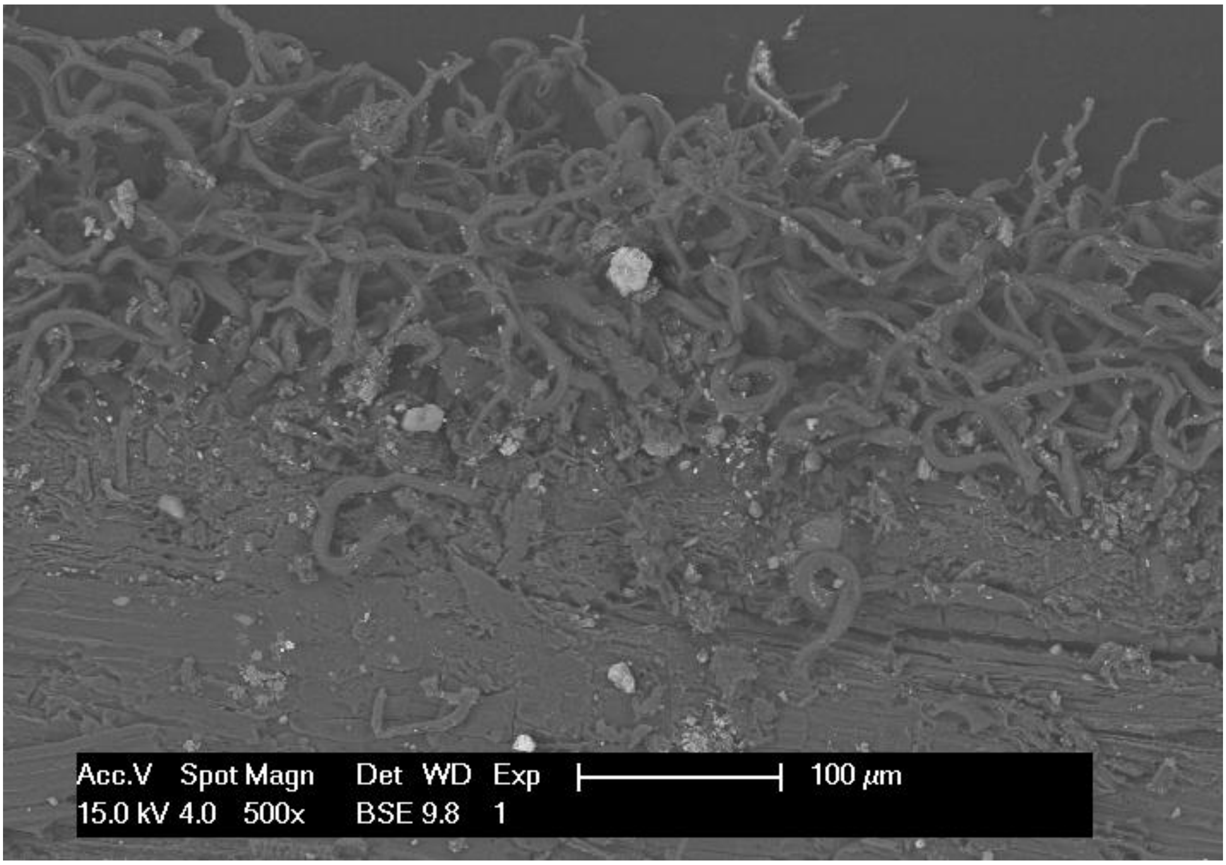


Figure 33: Spatial Distribution of Pathfinder Elements; Zn-Y-Pb-Mo-Mn- in Pearl Blue Bush, Western Myall & Black Oak

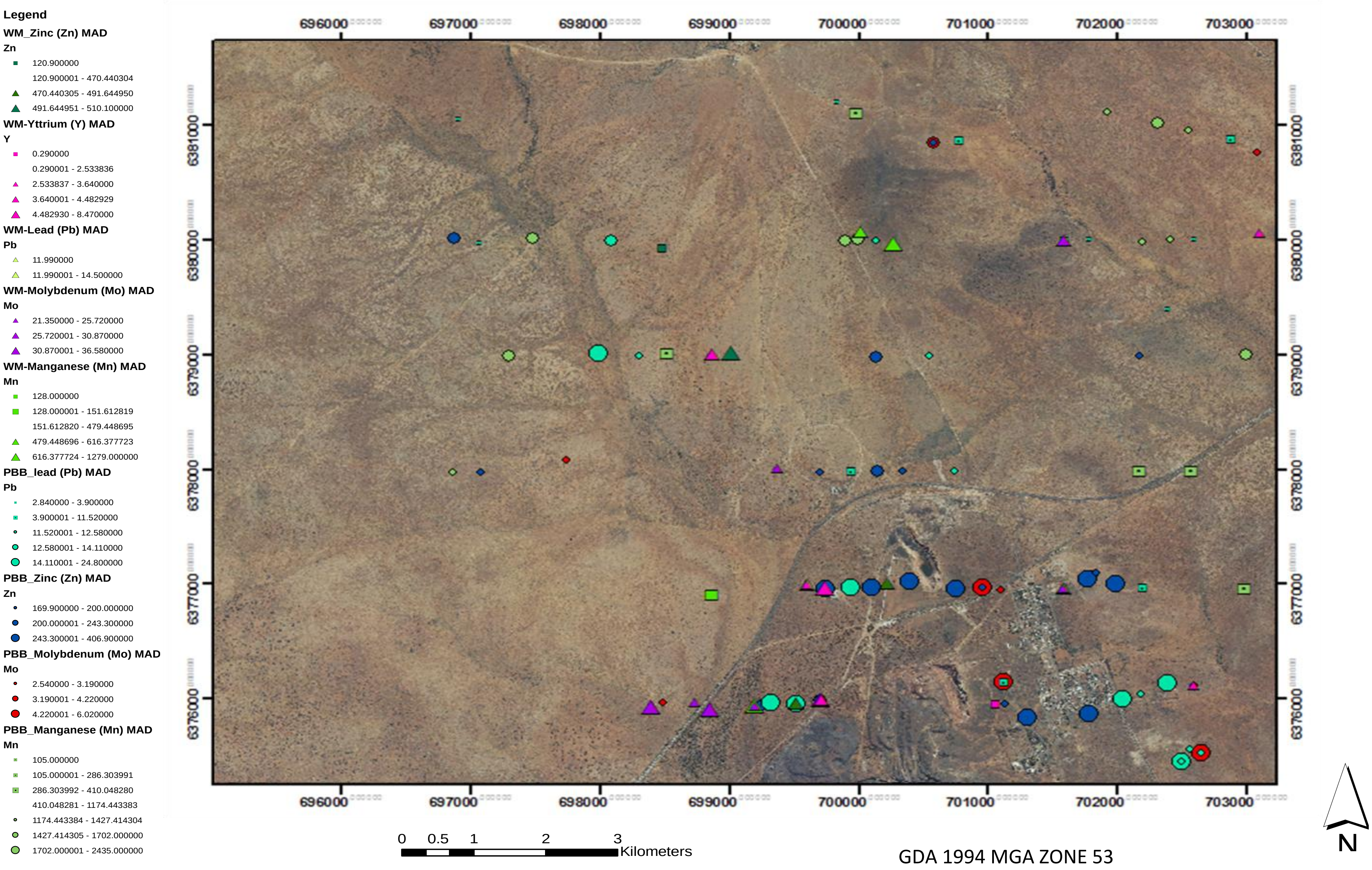


Figure 34: Spatial Distribution of Rare Earth Elements; Li-La-Ce in Pearl Blue Bush, Western Myall & Black Oak

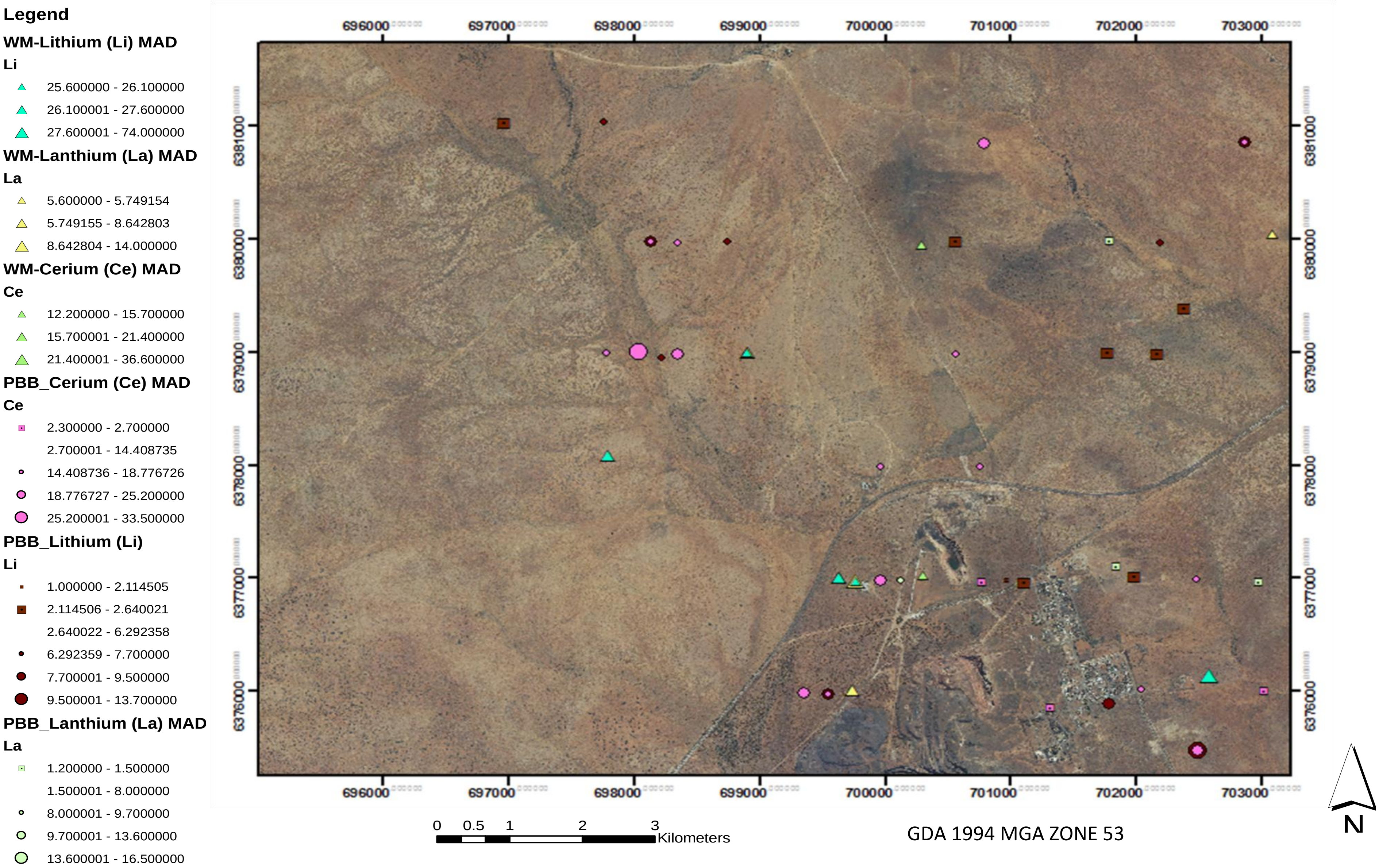


Figure 35a: Western myall on F-19 fault outcropping exposed quartz

Figure 35b: Black oak and Pearl blue bush on F-14 fault outcropping exposed quartz

Figure 36: Australian vegetation distribution map

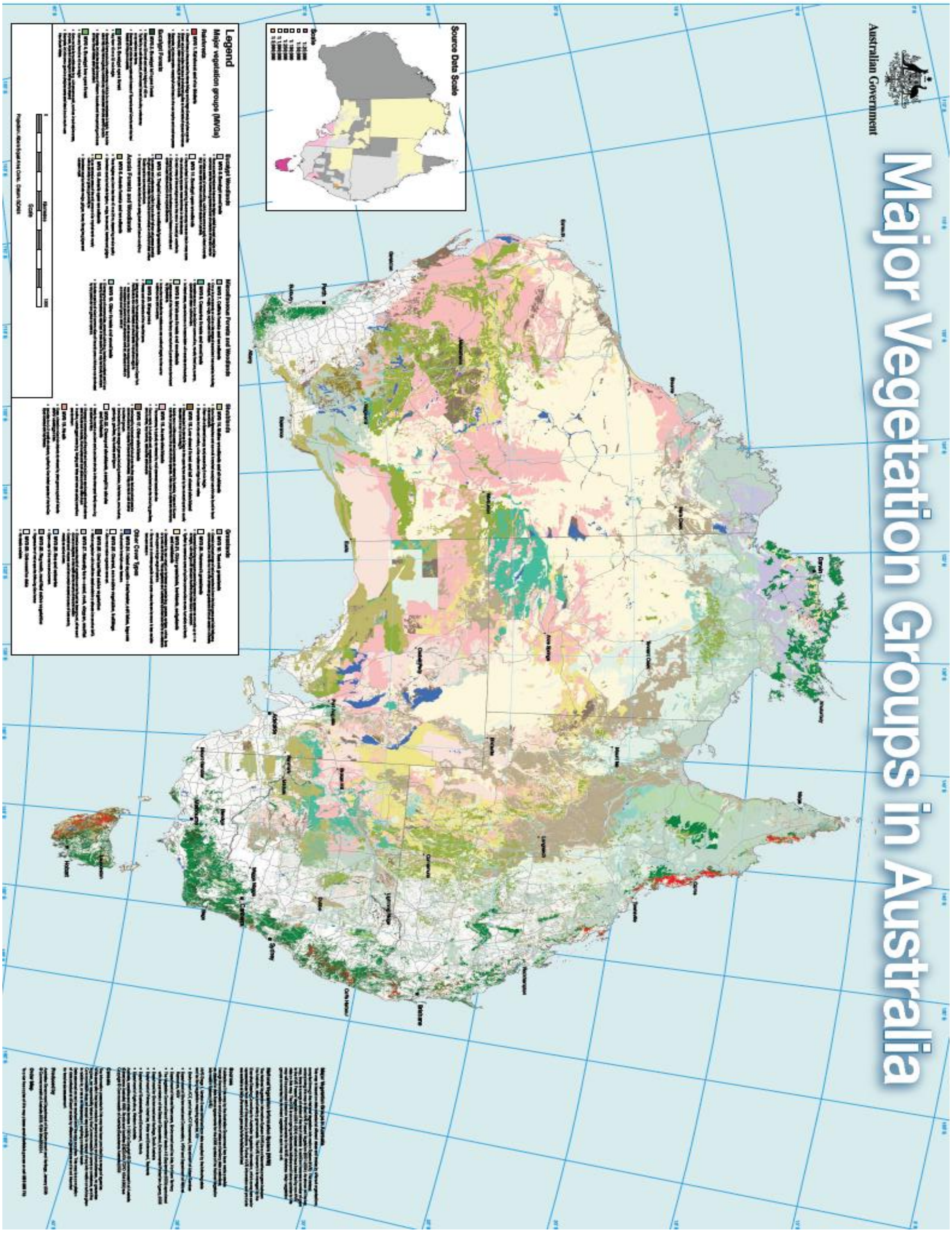


Figure 37a: Western myall root system -showing tree and & erosional channel with root exposure (Dietman 2011)

Figure 37b: Western myall root system -showing erosional channel & lateral root system (Dietman 2011)

Table 1: Summary Statistics - Background Threshold Values

Pearl Blue Bush (AW)	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Minimum	0.59	41.06	2.84	49.50	26.00	105.00	0.29	0.05	0.05	0.10	1.20	0.19	0.10	0.20	0.05	0.55	2.30	0.50	1.00
Maximum	6.02	249.58	24.80	406.90	217.00	2435.00	6.82	7.10	1.50	12.30	16.50	3.67	3.00	1.30	2.70	9.49	33.50	47.00	13.70
Mean	1.71	91.87	8.16	131.44	96.95	826.54	1.03	1.22	0.20	1.99	4.80	1.01	0.58	0.41	0.31	2.76	9.30	8.58	4.75
Median	1.43	86.47	7.49	107.80	91.00	790.50	0.82	1.00	0.20	1.30	4.35	0.95	0.60	0.40	0.20	2.52	8.50	6.00	4.50
Standard Deviation	0.94	29.46	3.59	71.79	29.18	352.70	0.86	0.93	0.19	2.10	2.50	0.53	0.28	0.20	0.36	1.45	4.82	8.21	1.86
Interquartile Range	1.07	38.39	3.47	66.95	33.75	386.25	0.51	0.78	0.10	2.18	2.70	0.62	0.30	0.20	0.30	1.60	5.70	6.75	1.78
Range	5.43	208.52	21.96	357.40	191.00	2330.00	6.53	7.05	1.45	12.20	15.30	3.48	2.90	1.10	2.65	8.94	31.20	46.50	12.70
Statistical Method #1 Normal Distribution																			
Two Standard Deviation (+/-)	1.89	58.91	7.19	143.59	58.35	705.40	1.73	1.86	0.37	4.20	5.00	1.06	0.55	0.39	0.72	2.90	9.64	16.43	3.71
Normal Dist BGL (Lower)	**0.00**	**32.96**	**0.97**	**0.00**	**38.60**	**121.14**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.03**
Normal Dist BGL (Upper)	**3.60**	**150.78**	**15.35**	**275.03**	**155.30**	**1531.9**	**2.76**	**3.08**	**0.57**	**6.19**	**9.80**	**2.07**	**1.13**	**0.80**	**1.04**	**5.66**	**18.94**	**25.01**	**8.46**
Statistical Method #2 Median Absolute Deviation (MAD)																			
Median	1.43	86.47	7.49	107.80	91.00	790.50	0.82	1.00	0.20	1.30	4.35	0.95	0.60	0.40	0.20	2.52	8.50	6.00	4.50
Median Absolute Deviation	0.52	19.32	1.73	29.70	17.00	192.00	0.23	0.30	0.10	0.90	1.35	0.32	0.10	0.10	0.15	0.79	2.85	3.00	0.90
Two Absolute Deviations	1.03	38.63	3.45	59.40	34.00	384.00	0.46	0.60	0.20	1.80	2.70	0.63	0.20	0.20	0.30	1.58	5.70	6.00	1.80
BGL (Lower)	**0.40**	**47.84**	**4.04**	**48.40**	**57.00**	**406.50**	**0.36**	**0.40**	**0.00**	**0.00**	**1.65**	**0.32**	**0.40**	**0.20**	**0.00**	**0.94**	**2.80**	**0.00**	**2.70**
BGL (Upper)	**2.46**	**125.10**	**10.94**	**167.20**	**125.00**	**1174.5**	**1.28**	**1.60**	**0.40**	**3.10**	**7.05**	**1.58**	**0.80**	**0.60**	**0.50**	**4.10**	**14.20**	**12.00**	**6.30**
Statistical Method #3 Normal Probability Plots & Histograms																			
BGL (Lower)	**0.59**	**51.47**	**3.94**	**49.5**	**54.65**	**338**	**0.29**	**0.05**	**0.05**	**0.1**	**1.2**	**0.364**	**0.245**	**0.2**	**0.05**	**0.55**	**3.86**	**0.5**	**2.27**
BGL (Upper)	**2.22**	**124.47**	**12.722**	**192.46**	**150.15**	**1270**	**1.9225**	**2.52**	**0.34**	**4.98**	**8.085**	**1.756**	**0.825**	**0.75**	**0.7125**	**4.126**	**14.78**	**14.45**	**7.35**

Table 2: Summary Statistics - Background Threshold Values

Western Myall (AW)																			
	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Minimum	1.57	46.28	2.21	120.90	17.00	128.00	0.08	0.05	0.05	0.10	0.60	0.06	0.20	0.05	0.05	0.29	1.30	7.00	4.70
Maximum	36.58	212.10	14.50	510.10	120.00	1279.00	0.97	1.50	0.30	4.00	14.00	0.55	1.40	0.50	1.10	8.47	36.60	80.00	74.00
Mean	14.65	105.07	5.89	302.01	51.13	374.97	0.27	0.56	0.09	1.40	3.17	0.23	0.64	0.23	0.20	1.77	7.59	29.90	16.24
Median	9.99	98.74	5.47	296.50	52.00	329.00	0.28	0.50	0.05	1.10	2.10	0.20	0.60	0.20	0.05	1.31	5.50	26.00	13.90
Standard Deviation	10.44	41.87	2.81	111.34	24.00	220.89	0.17	0.40	0.06	1.27	2.90	0.12	0.27	0.14	0.24	1.62	7.15	19.30	12.64
Interquartile Range	16.81	41.59	4.01	164.80	30.00	147.00	0.17	0.50	0.05	2.10	2.10	0.16	0.30	0.20	0.25	1.07	7.80	34.00	10.40
Range	35.01	165.82	12.29	389.20	103.00	1151.00	0.89	1.45	0.25	3.90	13.40	0.49	1.20	0.45	1.05	8.18	35.30	73.00	69.30
Statistical Method #1 Normal Distribution																			
Two Standard Deviation (+/-)	20.88	83.74	5.62	222.68	48.00	441.78	0.33	0.80	0.12	2.54	5.80	0.24	0.53	0.29	0.48	3.24	14.31	38.60	25.28
Normal Dist BGL (Lower)	**0.00**	**21.33**	**0.28**	**79.33**	**3.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Normal Dist BGL (Upper)	**35.53**	**188.81**	**11.51**	**524.69**	**99.13**	**816.75**	**0.60**	**1.37**	**0.21**	**3.94**	**8.96**	**0.47**	**1.17**	**0.52**	**0.67**	**5.01**	**21.90**	**68.50**	**41.52**
Statistical Method #2 Median Absolute Deviation (MAD)																			
Median	9.99	98.74	5.47	296.50	52.00	329.00	0.28	0.50	0.05	1.10	2.10	0.20	0.60	0.20	0.05	1.31	5.50	26.00	13.90
Median Absolute Deviation	5.44	18.42	1.83	81.00	17.00	77.00	0.08	0.20	0.05	1.00	1.00	0.08	0.10	0.10	0.18	0.48	2.80	12.00	5.50
Two Absolute Deviations	10.88	36.84	3.66	162.00	34.00	154.00	0.16	0.40	0.09	2.00	2.00	0.16	0.20	0.20	0.36	0.96	5.60	24.00	11.00
BGL (Lower)	**0.00**	**61.90**	**1.81**	**134.50**	**18.00**	**175.00**	**0.12**	**0.10**	**0.00**	**0.00**	**0.10**	**0.04**	**0.40**	**0.00**	**0.00**	**0.35**	**0.00**	**2.00**	**2.90**
BGL (Upper)	**20.87**	**135.58**	**9.13**	**458.50**	**86.00**	**483.00**	**0.44**	**0.90**	**0.14**	**3.10**	**4.10**	**0.36**	**0.80**	**0.40**	**0.41**	**2.27**	**11.10**	**50.00**	**24.90**
Statistical Method #3 Normal Probability Plots & Histograms																			
BGL (Lower)	**1.57**	**46.28**	**2.21**		**17.00**	**128.00**	**0.08**	**0.05**	**0.05**	**0.01**	**0.60**	**0.08**	**0.26**	**0.10**	**0.05**	**0.29**	**1.30**	**7.00**	**4.70**
BGL (Upper)	**15.57**	**129.19**	**8.36**		**78.80**	**645.95**	**0.39**	**0.85**	**0.11**	**2.64**	**4.62**	**0.33**	**0.92**	**0.41**	**0.42**	**2.74**	**13.66**	**54.45**	**22.03**

When the MAD is equal to 0 the sMAD is used, this is compromise

*BGL - Back Ground Level

*All samples with negative BGL were assigned 0

Table 3 :Summary Statistics - Background Threshold Values

Black Oak (AW)	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Minimum	0.57	41.90	3.27	107.60	25.00	290.00	0.14	0.70	0.05	0.10	1.00	0.16	0.30	0.05	0.05	0.62	1.80	2.00	2.80
Maximum	5.93	119.60	8.20	678.30	61.00	4535.00	0.50	4.20	0.40	6.70	4.20	0.32	1.00	0.40	1.00	5.51	6.50	18.00	10.00
Mean	1.83	73.01	5.61	249.95	40.75	1091.88	0.33	1.53	0.21	1.93	1.98	0.25	0.73	0.21	0.61	1.64	3.89	8.00	6.51
Median	1.29	69.77	5.37	209.25	40.00	562.50	0.33	1.20	0.20	1.40	1.80	0.26	0.75	0.15	0.60	1.10	3.75	5.50	6.35
Standard Deviation	1.72	28.28	1.83	182.61	13.65	1427.63	0.12	1.13	0.13	2.12	1.01	0.07	0.25	0.14	0.36	1.61	1.61	6.37	2.20
Interquartile Range	0.94	49.05	3.39	140.35	27.00	766.25	0.19	0.73	0.20	2.15	1.05	0.13	0.45	0.28	0.70	0.99	2.82	11.75	2.90
Range	5.36	77.70	4.93	570.70	36.00	4245.00	0.36	3.50	0.35	6.60	3.20	0.16	0.70	0.35	0.95	4.89	4.70	16.00	7.20
Statistical Method #1 Normal Distribution																			
Two Standard Deviation (+/-)	3.43	56.57	3.66	365.22	27.29	2855.27	0.23	2.25	0.26	4.24	2.02	0.14	0.50	0.29	0.72	3.23	3.22	12.74	4.40
Normal Dist BGL (Lower)	**0.00**	**16.44**	**1.95**	**0.00**	**13.46**	**0.00**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.11**	**0.23**	**0.00**	**0.00**	**0.00**	**0.67**	**0.00**	**2.11**
Normal Dist BGL (Upper)	**5.26**	**129.57**	**9.27**	**615.17**	**68.04**	**3947.1**	**0.57**	**3.78**	**0.47**	**6.16**	**4.00**	**0.39**	**1.22**	**0.49**	**1.32**	**4.87**	**7.10**	**20.74**	**10.92**
Statistical Method #2 Median Absolute Deviation (MAD)																			
Median	1.29	69.77	5.37	209.25	40.00	562.50	0.33	1.20	0.20	1.40	1.80	0.26	0.75	0.15	0.60	1.10	3.75	5.50	6.35
Median Absolute Deviation	0.38	22.81	1.70	60.95	11.50	164.50	0.08	0.30	0.10	0.90	0.40	0.07	0.20	0.08	0.35	0.33	1.30	2.00	1.15
Two Absolute Deviations	0.76	45.61	3.40	121.90	23.00	329.00	0.15	0.60	0.20	1.80	0.80	0.13	0.40	0.15	0.70	0.66	2.60	4.00	2.30
BGL (Lower)	**0.53**	**24.16**	**1.97**	**87.35**	**17.00**	**233.50**	**0.18**	**0.60**	**0.00**	**0.00**	**1.00**	**0.13**	**0.35**	**0.00**	**0.00**	**0.44**	**1.15**	**1.50**	**4.05**
BGL (Upper)	**2.05**	**115.38**	**8.77**	**331.15**	**63.00**	**891.50**	**0.48**	**1.80**	**0.40**	**3.20**	**2.60**	**0.39**	**1.15**	**0.30**	**1.30**	**1.76**	**6.35**	**9.50**	**8.65**
Statistical Method #3 Normal Probability Plots & Histograms																			
BGL (Lower)	**0.57**	**41.90**	**3.92**	**107.60**	**39.40**	**290.00**	**0.24**	**0.70**	**0.09**	**0.10**	**1.00**	**0.16**	**0.30**	**0.09**	**0.19**	**0.62**	**2.10**	**2.00**	**5.30**
BGL (Upper)	**2.18**	**97.12**	**7.32**	**278.81**	**44.80**	**714.50**	**0.45**	**1.75**	**0.31**	**2.74**	**2.12**	**0.22**	**0.93**	**0.31**	**0.91**	**1.35**	**5.30**	**7.60**	**8.40**

Table 4: Summary Statistics - Background Threshold Values

All Species (AW)																			
	Mo	**Cu**	**Pb**	**Zn**	**Ag**	**Mn**	**Fe**	**As**	**U**	**Au**	**La**	**Al**	**Se**	**Sn**	**Zr**	**Y**	**Ce**	**Re**	**Li**
	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Minimum	0.57	41.06	2.21	49.50	17.00	105.00	0.08	0.05	0.05	0.10	0.60	0.06	0.10	0.05	0.05	0.29	1.30	0.50	1.00
Maximum	36.58	249.58	24.80	678.30	217.00	4535.00	6.82	7.10	1.50	12.30	16.50	3.67	3.00	1.30	2.70	9.49	36.60	80.00	74.00
Mean	4.06	93.38	7.63	167.91	86.01	757.09	0.86	1.12	0.18	1.88	4.37	0.83	0.60	0.37	0.30	2.53	8.74	12.42	6.91
Median	1.70	87.80	6.93	124.80	85.00	686.00	0.71	0.90	0.10	1.30	3.80	0.81	0.60	0.30	0.20	2.29	7.60	7.00	4.90
Standard Deviation	6.71	32.51	3.53	110.28	34.30	473.33	0.82	0.90	0.17	1.98	2.65	0.57	0.27	0.20	0.35	1.54	5.35	13.69	7.11
Interquartile Range	1.90	40.69	3.50	122.10	45.00	471.00	0.59	0.80	0.10	2.00	3.10	0.74	0.20	0.30	0.35	1.69	5.70	11.00	3.10
Range	36.01	208.52	22.59	628.80	200.00	4430.00	6.74	7.05	1.45	12.20	15.90	3.61	2.90	1.25	2.65	9.20	35.30	79.50	73.00
Statistical Method #1 Normal Distribution																			
Two Standard Deviation (+/-)	13.42	65.03	7.06	220.56	68.60	946.65	1.65	1.81	0.35	3.96	5.30	1.14	0.55	0.40	0.70	3.08	10.70	27.38	14.22
Normal Dist BGL (Lower)	**0.00**	**28.36**	**0.57**	**0.00**	**17.41**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Normal Dist BGL (Upper)	**17.48**	**158.41**	**14.69**	**388.47**	**154.61**	**1703.7**	**2.51**	**2.92**	**0.53**	**5.83**	**9.67**	**1.97**	**1.14**	**0.77**	**1.01**	**5.61**	**19.44**	**39.80**	**21.14**
Statistical Method #2 Median Absolute Deviation (MAD)																			
Median	1.70	87.80	6.93	124.80	85.00	686.00	0.71	0.90	0.10	1.30	3.80	0.81	0.60	0.30	0.20	2.29	7.60	7.00	4.90
Median Absolute Deviation	0.71	20.21	1.64	45.30	22.00	232.00	0.29	0.30	0.05	0.90	1.50	0.39	0.10	0.10	0.15	0.83	2.60	4.00	1.40
Two Absolute Deviations	1.42	40.42	3.28	90.60	44.00	464.00	0.58	0.60	0.10	1.80	3.00	0.78	0.20	0.20	0.30	1.66	5.20	8.00	2.80
BGL (Lower)	**0.28**	**47.38**	**3.65**	**34.20**	**41.00**	**222.00**	**0.13**	**0.30**	**0.00**	**0.00**	**0.80**	**0.03**	**0.40**	**0.10**	**0.00**	**0.63**	**2.40**	**0.00**	**2.10**
BGL (Upper)	**3.12**	**128.22**	**10.21**	**215.40**	**129.00**	**1150.0**	**1.29**	**1.50**	**0.20**	**3.10**	**6.80**	**1.59**	**0.80**	**0.50**	**0.50**	**3.95**	**12.80**	**15.00**	**7.70**
Statistical Method #3 Normal Probability Plots & Histograms																			
BGL (Lower)	**0.57**	**51.49**	**2.21**	**49.50**	**17.00**	**105.00**	**0.08**	**0.05**	**0.05**	**0.10**	**0.60**	**0.06**	**0.25**	**0.05**	**0.05**	**0.29**	**1.30**	**0.50**	**1.00**
BGL (Upper)	**14.97**	**166.17**	**14.63**	**395.34**	**157.00**	**1877.0**	**3.11**	**3.58**	**0.41**	**6.20**	**10.14**	**2.23**	**1.12**	**0.86**	**1.11**	**5.81**	**22.48**	**40.25**	**19.25**

Table 5: Species & Organ Comparison on Element Uptake (AW)

Sample	Easting	Northing	Species	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
				PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
				0.01	0.01	0.01	0.1	2	1	0.01	0.1	0.1	0.2	0.5	0.01	0.1	0.1	0.1	0.01	0.1	1	0.1
KNOB-DT-017	701645	6376996	Pearl Blue Bush	2.15	105.50	9.18	133.7	115	484	0.74	1.3	0.2	5.0	3.1	0.62	0.3	0.6	0.5	1.62	5.6	45	2.7
KNOB-DT-018	701615	6376992	Western Myall	25.72	61.80	5.47	124.3	52	488	0.30	0.4	0.1	2.1	1.5	0.28	0.4	0.3	0.4	0.72	2.7	18	4.2
KNOB-DT-027	700794	6376997	Pearl Blue Bush	2.66	165.32	5.58	363.5	90	502	0.29	0.7	0.1	9.3	1.2	0.19	0.5	0.7	0.2	0.55	2.3	16	2.1
KNOB-DT-028	700830	6376972	Western Myall	8.02	117.16	3.41	426.8	64	373	0.10	0.1	0.1	0.5	1.5	0.09	0.4	0.3	0.1	0.71	3.0	23	1.0
KNOB-DT-034	700165	6376998	Pearl Blue Bush	2.35	113.52	9.41	318.2	132	808	3.35	3.1	0.4	5.1	9.4	0.91	0.3	0.5	0.8	3.03	14.0	30	13.9
KNOB-DT-035	700167	6376999	Western Myall	7.23	83.20	6.82	299.2	48	239	0.50	1.5	0.2	3.9	3.6	0.42	0.5	0.5	0.4	1.79	7.2	5	3.5
KNOB-DT-043	699594	6375997	Pearl Blue Bush	3.17	92.64	17.87	207.7	170	2129	5.83	6.0	1.2	2.9	9.4	1.41	0.6	0.7	0.3	6.41	16.8	16	21.6
KNOB-DT-042	699594	6375997	Western Myall	30.87	212.10	7.80	474.9	87	345	0.16	0.1	0.1	1.7	2.1	0.11	0.6	0.2	0.1	1.20	6.3	5	9.4
KNOB-DT-045	699776	6376025	Pearl Blue Bush	3.42	110.83	10.95	216.9	132	1135	2.48	2.4	0.6	3.3	5.7	0.87	0.5	0.6	0.3	3.73	10.3	48	15.5
KNOB-DT-044	699778	6376025	Western Myall	34.06	107.39	7.98	264.1	57	399	0.97	1.5	0.3	1.1	8.5	0.55	0.7	0.5	0.1	4.41	15.7	7	8.3
KNOB-DT-047	699661	6377032	Pearl Blue Bush	1.28	131.02	8.01	129.1	152	978	1.31	1.7	0.3	2.9	4.8	0.80	0.2	0.5	0.1	2.82	8.7	22	27.6
KNOB-DT-046	699671	6377027	Western Myall	14.26	151.78	14.50	382.7	39	249	0.34	0.7	0.1	4.0	7.9	0.27	0.6	0.4	0.1	2.63	10.8	5	5.3
KNOB-DT-068	697855	6378098	Pearl Blue Bush	3.17	76.70	6.71	162.3	43	455	0.76	0.7	0.2	0.1	4.3	0.89	0.8	0.4	1.5	2.35	8.5	56	26.7
KNOB-DT-067	697855	6378098	Western Myall	10.71	46.28	9.13	141.0	62	252	0.37	0.5	0.1	1.9	2.5	0.38	1.4	0.2	1.1	1.46	6.2	5	4.7
KNOB-DT-048	702497	6375501	Pearl Blue Bush	3.79	94.07	19.34	222.9	147	1242	3.42	3.5	0.6	1.7	13.6	2.46	0.6	1.3	1.3	7.53	25.2	8	4.2
KNOB-DT-051	702497	6375501	Pearl Blue Bush	2.32	90.08	12.03	214.7	124	841	1.58	1.8	0.3	1.5	7.2	1.09	0.4	0.6	0.1	3.90	13.2	I.S.	I.S.
KNOB-DT-049	702497	6375501	Black Oak	1.47	119.60	5.29	678.3	61	1331	0.39	0.9	0.3	6.7	2.1	0.31	0.9	0.4	0.9	1.86	5.3	5	11.3
KNOB-DT-057	702649	6375569	Pearl Blue Bush	6.02	73.64	12.47	95.0	131	686	1.24	1.6	0.4	3.2	6.0	1.07	0.6	0.5	0.4	3.07	11.9	5	6.0
KNOB-DT-056	702649	6375569	Black Oak	1.70	47.33	7.32	212.8	25	401	0.45	0.7	0.3	0.1	2.3	0.30	1.0	0.1	0.5	1.25	4.8	6	5.5
KNOB-DT-058	702593	6375552	Pearl Blue Bush	2.14	76.54	8.99	87.7	109	502	1.07	1.3	0.3	1.1	4.9	0.85	0.4	0.5	0.3	2.37	9.0	11	5.3
KNOB-DT-059	702593	6375552	Black Oak	1.96	41.90	7.36	161.6	40	564	0.50	1.3	0.4	2.0	2.0	0.32	1.0	0.4	1.0	1.33	4.1	6	4.5
KNOB-DT-031	700471	6377089	Black Oak	1.10	91.97	4.09	205.7	28	561	0.24	0.9	0.1	0.9	1.1	0.16	0.3	0.2	0.1	0.67	2.1	14	3.6
KNOB-DT-032	700456	6377112	Western Myall	13.18	113.44	3.84	436.8	35	228	0.25	0.6	0.1	3.3	2.1	0.18	0.3	0.4	0.1	1.10	5.0	3	5.3

Table 6: Duplication Samples - Alternate method to ascertain element transport; Organ and Species suitability

Analyte	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
Unit	PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
MDL	0.01	0.01	0.01	0.1	2	1	0.01	0.1	0.1	0.2	0.5	0.01	0.1	0.1	0.1	0.01	0.1	1	0.1
Pearl Blue Bush																			
KNOB-DT-112	2.21	70.14	11.13	93.1	74	839	1.22	1.4	0.2	0.1	7.4	1.94	0.9	0.5	0.2	4.34	14.5	10	6.4
KNOB-DT-065	2.09	66.86	6.93	78.5	89	623	0.74	1.0	0.2	0.1	4.9	0.99	0.7	0.3	0.4	2.64	9.8	10	4.8
Difference %	5	5	38	16	17	26	39	29	0	0	34	49	22	40	50	39	32	0	25
KNOB-DT-114	1.11	413.83	9.05	107.1	100	872	1.11	1.0	0.2	0.8	4.6	1.22	0.8	13.8	0.3	2.90	8.7	6	4.8
KNOB-DT-088	1.08	113.08	10.72	107.9	93	844	1.13	1.2	0.2	0.8	5.3	1.37	0.6	0.7	0.2	2.86	9.6	6	5.8
Difference %	3	73	16	1	7	3	2	17	0	0	13	11	25	95	33	1	9	0	17
KNOB-DT-177	1.96	239.74	6.82	120.7	141	1277	0.70	0.7	0.1	0.1	4.0	0.88	0.5	6.6	0.4	2.36	7.5	12	4.7
KNOB-DT-108	2.00	83.51	8.44	103.6	126	1326	1.03	0.8	0.1	0.3	6.4	1.63	1.1	0.4	0.2	3.79	12.4	6	5.8
Difference %	2	65	19	14	11	4	32	13	0	67	38	46	55	94	50	38	40	50	19
KNOB-DT-178	1.09	122.23	9.74	108.8	193	714	1.13	1.0	0.2	1.0	7.7	1.75	0.7	2.9	0.5	4.53	15.0	9	6.3
KNOB-DT-110	0.81	59.95	11.16	86.8	136	760	1.41	1.5	0.2	1.1	8.9	2.10	0.6	0.7	0.2	5.33	17.1	3	8.2
Difference %	26	51	13	20	30	6	20	33	0	9	13	17	14	76	60	15	12	67	23
KNOB-DT-179	1.19	289.13	11.49	167.6	215	1054	1.12	0.8	0.2	1.2	4.9	1.00	0.9	9.5	0.4	2.86	9.5	3	3.5
KNOB-DT-124	0.87	67.59	8.14	193.5	129	906	0.91	0.9	0.2	2.5	4.1	0.91	0.8	0.4	0.2	2.47	8.0	4	3.5
Difference %	27	77	29	13	40	14	19	11	0	52	16	9	11	96	50	14	16	25	0
KNOB-DT-180	2.18	123.43	13.65	164.6	159	878	0.52	1.9	0.1	10.3	3.0	0.64	0.8	0.5	0.8	1.76	5.5	5	3.3
KNOB-DT-136	2.07	103.34	5.5	130.6	74	1005	0.58	0.9	0.5	2.3	3.2	0.77	0.7	0.3	0.5	1.86	6.2	4	4.1
Difference %	5	16	60	21	53	13	10	53	80	78	6	17	13	40	38	5	11	20	20
KNOB-DT-182	0.98	138.31	6.16	110.2	536	821	0.57	0.4	0.1	1.7	3.4	0.80	0.7	1.3	0.5	1.88	6.6	8	3.4
KNOB-DT-156	0.90	119.91	4.11	106.7	74	692	0.39	0.5	0.5	1.6	2.2	0.46	0.6	0.2	1.6	1.34	4.6	5	3.1
Difference %	8	15	33	3	86	16	32	20	80	6	35	43	14	85	69	29	30	38	9
KNOB-DT-183	1.84	131.52	10.23	103.0	115	1026	0.78	0.5	0.1	2.1	4.3	0.99	0.4	2.8	0.3	2.34	8.4	4	3.1
KNOB-DT-169	1.69	74.03	7.51	89.1	97	1049	0.83	0.9	0.2	0.1	4.5	1.07	0.7	0.4	0.5	2.53	8.8	2	4.4
Difference %	8	44	27	13	16	2	6	44	50	95	4	7	43	86	40	8	5	50	30
KNOB-DT-185	3.94	127.52	10.64	357.4	148	394	0.49	0.3	0.2	1.8	2.6	0.38	0.3	0.5	0.3	1.50	4.9	14	11.5
KNOB-DT-020	3.94	164.05	10.25	406.9	111	546	0.65	0.8	0.2	5.2	2.7	0.43	0.3	0.6	0.6	1.51	5.0	17	8.7
Difference %	0	22	4	12	25	28	25	63	0	65	4	12	0	17	50	1	2	18	24

Table 6: Duplication Samples - Alternate method to ascertain element transport; Organ and Species suitability

Analyte	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
Unit	PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
MDL	0.01	0.01	0.01	0.1	2	1	0.01	0.1	0.1	0.2	0.5	0.01	0.1	0.1	0.1	0.01	0.1	1	0.1
Western Myall																			
KNOB-DT-113	11.79	80.29	17.94	258.8	123	490	0.29	1.1	0.5	0.1	11.5	0.30	1.1	0.2	0.1	5.80	31.0	55	36.5
KNOB-DT-075	9.14	98.74	11.99	333.8	96	467	0.40	1.5	0.2	0.1	7.9	0.42	0.9	0.2	0.7	4.03	21.4	50	25.6
Difference %	22	23	50	22	22	5	28	27	60	0	31	29	22	0	86	31	31	9	30
KNOB-DT-176	5.21	75.60	5.78	423.7	62	442	0.12	0.3	0.5	1.1	5.7	0.12	0.5	0.2	0.5	3.89	13.5	72	7.1
KNOB-DT-099	4.55	69.81	4.54	361.4	44	399	0.16	0.3	0.5	0.1	5.6	0.14	0.5	0.1	0.4	3.64	12.2	57	7.3
Difference %	13	8	21	15	29	10	25	0	0	91	2	14	0	50	20	6	10	21	3
KNOB-DT-181	2.16	81.27	7.82	169.6	36	230	0.31	0.5	0.5	0.1	2.5	0.26	0.7	0.2	0.1	1.52	6.0	70	18.2
KNOB-DT-152	1.57	82.22	4.05	169.0	17	218	0.24	0.4	0.5	0.4	2.2	0.23	0.3	0.1	0.5	1.31	5.3	64	21.2
Difference %	27	1	48	0	53	5	23	20	0	75	12	12	57	50	80	14	12	9	14
KNOB-DT-184	4.32	65.31	10.60	296.3	95	399	0.31	0.2	0.2	0.9	4.2	0.30	0.7	0.2	0.2	3.10	11.9	35	66.6
KNOB-DT-004	4.38	61.61	6.53	318.6	37	391	0.31	0.8	0.2	0.1	4.0	0.29	0.7	0.3	0.2	3.20	12.2	80	74.0
Difference %	1	6	38	7	61	2	0	75	0	89	5	3	0	33	0	3	2	56	10
KNOB-DT-186	6.72	105.70	5.84	408.3	57	384	0.14	0.8	0.5	0.7	1.6	0.12	0.5	0.5	0.5	0.85	3.3	17	5.8
KNOB-DT-028	8.02	117.16	3.41	426.8	64	373	0.10	0.5	0.5	0.5	1.5	0.09	0.4	0.3	0.5	0.71	3.0	15	7.4
Difference %	16	10	42	4	11	3	29	38	0	29	6	25	20	40	0	16	9	12	22
KNOB-DT-187	6.89	66.61	5.30	261.0	33	184	0.39	0.2	0.1	0.1	2.6	0.30	0.3	0.1	0.5	1.32	5.5	40	11.6
KNOB-DT-035	7.23	83.20	6.82	299.2	48	239	0.50	1.5	0.2	3.9	3.6	0.42	0.5	0.5	0.4	1.79	7.2	48	14.9
	0.34	16.59	1.52	38.20	15.00	55.00	0.11	1.30	0.10	3.80	1.00	0.12	0.20	0.40	0.10	0.47	1.70	8.00	3.30
Black Oak																			
KNOB-DT-189	2.69	40.70	8.12	141.4	17	555	0.28	0.8	0.2	0.1	1.2	0.19	0.5	0.1	0.5	0.88	2.6	14	6.2
KNOB-DT-059	1.96	41.90	7.36	161.6	40	564	0.50	1.3	0.4	2.0	2.0	0.32	1.0	0.4	1.0	1.33	4.1	18	8.4
Difference %	27	3	9	13	58	2	44	38	50	95	40	41	50	75	50	34	37	22	26

Duplicate Sample

Original Sample

0 - 10%	Good relationship between element, organ and species
10 - 25%	Neutral relationship that opposes other samples for a specific element for the same species
< 40%	bad relationship between element, organ and species; may show that element is not consistantly translocated throughout entire sample; may also demonstrate a reflection of organ age and its ability to store element; Overall can display that for this specific element this species is not ideal as a sample medium as consistancy throughout organ distribution is not guaranteed

Table 7: Quality Control - Analytical Error

	Analyte	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
	Unit	PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
	MDL	0.01	0.01	0.01	0.1	2	1	0.01	0.1	0.1	0.2	0.5	0.01	0.1	0.1	0.1	0.01	0.1	1	0.1
KNOB-DT-030_Assay 1	Veg	3.19	121.53	8.91	320.2	91	695	1.26	1.7	0.3	8.3	4.9	0.85	0.4	0.6	0.2	2.32	8.8	14	3.6
KNOB-DT-030_Assay 2	REP	3.39	122.01	8.62	332.7	84	666	1.27	1.9	0.3	8.1	4.6	0.85	0.3	0.5	0.1	2.36	8.6	14	3.7
Assay difference		-0.20	-0.48	0.29	-12.50	7.00	29.00	-0.01	-0.20	0.00	0.20	0.30	0.00	0.10	0.10	0.10	-0.04	0.20	0.00	-0.10
% difference error		**-5.90**	**-0.39**	**3.25**	**-3.76**	**7.69**	**4.17**	**-0.79**	**-10.53**	**0.00**	**2.41**	**6.12**	**0.00**	**25.00**	**16.67**	**50.00**	**-1.69**	**2.27**	**0.00**	**-2.70**
Half relative difference		**-3.04**	**-0.20**	**1.65**	**-1.91**	**4.00**	**2.13**	**-0.40**	**-5.56**	**0.00**	**1.22**	**3.16**	**0.00**	**14.29**	**9.09**	**33.33**	**-0.85**	**1.15**	**0.00**	**-1.37**
Duplicates = n	**19**																			
STDEV	7.52																			
95% Confidence Interval	**Upper**	3.488																		
	Lower	-3.488																		
KNOB-DT-097_Assay 1	Veg	1.02	98.27	8.10	110.9	60	784	0.74	1.0	0.1	0.5	4.6	0.99	0.6	0.3	0.2	2.70	8.5	6	4.6
KNOB-DT-097_Assay 2	REP	1.17	103.83	8.32	112.6	63	808	0.73	0.7	0.2	2.6	4.7	0.94	0.4	0.4	0.8	2.77	8.8	9	5.2
Assay difference		-0.15	-5.56	-0.22	-1.70	-3.00	-24.00	0.01	0.30	-0.10	-2.10	-0.10	0.05	0.20	-0.10	-0.60	-0.07	-0.30	-3.00	-0.60
% difference error		**-12.82**	**-5.35**	**-2.64**	**-1.51**	**-4.76**	**-2.97**	**1.35**	**30.00**	**-50.00**	**-80.77**	**-2.13**	**5.05**	**33.33**	**-25.00**	**-75.00**	**-2.53**	**-3.41**	**-33.33**	**-11.54**
Half relative difference		**-6.85**	**-2.75**	**-1.34**	**-0.76**	**-2.44**	**-1.51**	**0.68**	**17.65**	**-33.33**	**-67.74**	**-1.08**	**2.59**	**20.00**	**-14.29**	**-60.00**	**-1.28**	**-1.73**	**-20.00**	**-6.12**
Duplicates = n	**19**																			
STDEV	5.50																			
95% Confidence Interval	**Upper**	2.473																		
	Lower	-2.473																		

% difference error ((assay 1 - assay 2)/maximum (assay 1 or assay 2)) x 100

half relative difference ((assay 1 - assay 2)/(assay 1 + assay 2)) x 100

95% Confidence Interval $\pm 1.96 (\sigma/(\sqrt{19}))$

Table 7: Quality Control - Analytical Error Cont.

		Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
	Analyte	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
	Unit	PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
	MDL	0.01	0.01	0.01	0.1	2	1	0.01	0.1	0.1	0.2	0.5	0.01	0.1	0.1	0.1	0.01	0.1	1	0.1
OVEN STD-1_Assay 1	Pulp	0.56	37.52	11.72	1187.4	651	15000	0.05	0.6	0.2	0.4	0.25	0.07	0.3	1.5	0.5	0.11	0.5	5	1.7
OVEN STD-1_Assay 2	REP	0.60	35.89	11.28	1132.1	602	15000	0.05	0.2	0.2	0.7	0.25	0.06	0.4	1.4	0.5	0.11	0.5	4	1.4
Assay difference		-0.04	1.63	0.44	55.30	49.00	0.00	0.00	0.40	0.00	-0.30	0.00	0.01	-0.10	0.10	0.00	0.00	0.00	1.00	0.30
% difference error		**-6.67**	**4.34**	**3.75**	**4.66**	**7.53**	**0.00**	**0.00**	**66.67**	**0.00**	**-42.86**	**0.00**	**14.29**	**-25.00**	**6.67**	**0.00**	**0.00**	**0.00**	**20.00**	**17.65**
Half relative difference		**-3.45**	**2.22**	**1.91**	**2.38**	**3.91**	**0.00**	**0.00**	**50.00**	**0.00**	**-27.27**	**0.00**	**7.69**	**-14.29**	**3.45**	**0.00**	**0.00**	**0.00**	**11.11**	**9.68**
Duplicates = n	**19**																			
STDEV	16.42																			
95% Confidence Interval	**Upper**	7.382																		
	Lower	-7.382																		
KNOB-DT-167_Assay 1	Veg	1.71	81.91	11.29	96.1	108	989	1.83	2.0	0.3	0.1	11.5	2.74	0.6	0.6	0.5	6.60	22.5	10	8.4
KNOB-DT-167_Assay 2	REP	1.85	86.50	11.80	106.7	125	990	1.85	1.7	0.3	0.9	11.7	2.78	0.6	0.8	0.5	6.87	23.0	11	9.0
Assay difference		-0.14	-4.59	-0.51	-10.60	-17.00	-1.00	-0.02	0.30	0.00	-0.80	-0.20	-0.04	0.00	-0.20	0.00	-0.27	-0.50	-1.00	-0.60
% difference error		**-7.57**	**-5.31**	**-4.32**	**-9.93**	**-13.60**	**-0.10**	**-1.08**	**15.00**	**0.00**	**-88.89**	**-1.71**	**-1.44**	**0.00**	**-25.00**	**0.00**	**-3.93**	**-2.17**	**-9.09**	**-6.67**
Half relative difference		**-3.93**	**-2.73**	**-2.21**	**-5.23**	**-7.30**	**-0.05**	**-0.54**	**8.11**	**0.00**	**-80.00**	**-0.86**	**-0.72**	**0.00**	**-14.29**	**0.00**	**-2.00**	**-1.10**	**-4.76**	**-3.45**
Duplicates = n	**19**																			
STDEV	4.43																			
95% Confidence Interval	**Upper**	1.992																		
	Lower	-1.992																		

% difference error ((assay 1 - assay 2)/maximum (assay 1 or assay 2)) x 100

half relative difference ((assay 1 - assay 2)/(assay 1 + assay 2)) x 100

95% Confidence Interval ±1.96 (σ/(√19))

Table 8: Summary of species suitability for biogeochemistry in this study area based upon individual elements

Species	Organ	Positive (consistent)	Negative (inconsistent)
Pearl blue bush	Twig	Molybdenum (Mo) Manganese (Mn) Yttrium (Y) Cerium (Ce) Lithium (Li)	Copper (Cu) Silver (Ag) Uranium (U) Gold (Au) Tin (Sn) Zirconium (Zr) Rhenium (Re)
		Positive (consistent)	Negative (inconsistent)
Western myall	leaves	Molybdenum (Mo) Copper (Cu) Zinc (Zn) Cerium (Ce) Manganese (Mn)	Lead (Pb) Silver (Ag) Arsenic (As) Gold (Au) Selenium (Sn) Uranium (U)

Table 9: Summary of organ consistency in this study area

	Positive (consistent)	Negative (inconsistent)
Both (organs)	Molybdenum (Mo) Manganese (Mn) Cerium (Ce)	Silver (Ag) Gold (Au) Arsenic (As) Uranium (U) Tin (Sn)
Leaves	Zinc (Zn) Copper (Cu)	Lead (Pb)
Twigs	Yttrium (Y) Lithium (Li)	Copper (Cu) Rhenium (Re) Zirconium (Zr)

Supplementary Appendix #1

- Land use and Setting
- Regional Geology
- Target vegetation and organs
- Acid Digest
- Induced Coupled Plasma-Mass Spectrometry (ICP-MS)
- Field Emission Environmental Scanning Electron Microscope (FEI/Philips XL30 ESEM-FEG
- Regolith Landform & landscape evolution

Land Use and Setting

Iron Knob is approximately 52 km northwest of Whyalla on the northeastern Eyre Peninsula, South Australia (Figure 1). Iron Knob is synonymous with the early development of BHP and the initiation of the Australian steel industry. After 100 years of combined mining at Iron Monarch, Iron Knob and Iron Princess, extraction of ore ceased in June 1998 although the exploration and mining leases in the area are still held by One Steel Ltd. The project area is predominately between the Iron Knob township and Corunna Station (Figure 2). To the north of Iron Knob, across an alluvial and sheetwash plain is the Corunna Range, which rises to a height of 150 m before sloping down to a plain in the north. Prior to the discovery of the iron deposit, pastoralists were establishing the area and in 1854 'Cooroona Hill' (now known as 'Corunna Station') had been established. Today Corunna Station still operates as a pastoral lease.

Regional Geology

The study area is in the eastern part of the Gawler Craton. This craton is an Archaean to early Mesoproterozoic terrane including metamorphosed sediments, volcanics and intrusives which underwent periodic deformation during the Sleaford Orogeny (ca.2440 Ma), Neill Event (ca.1850 Ma), Kimban Orogeny (ca.1730–1700 Ma) and Kararan Orogeny (ca.1690–1540 Ma) (Curtis 2006). Locally the Middleback Ranges (MBR) is along the western border of the Cleve and Spencer domains of the Gawler Craton. Metamorphic grade is variable with the rocks in the Middleback Ranges having experienced up to lower amphibolite facies grade metamorphism (Ashworth, 1971).

Paleoproterozoic

Hutchison Group

The Hutchison Group consists of a sequence of shallow platform clastic sediments and is exposed in a low range between Iron Baron and Iron Knob. The Hutchison Group has been differentiated into a basal Warrow Quartzite, the Middleback Subgroup, which includes the Katunga Dolomite, Lower Middleback Jaspilite, Cook Gap Schist, Upper Middleback Jaspilite, and the Yadnarie Schist (Parker and Lemon, 1982). The Warrow Quartzite is a massive to flaggy quartzite containing local pelitic schist interbeds (Parker and Lemon, 1982). The Katunga Dolomite is a white to pale bluish-grey dolomitic marble that grades from pure dolomite to dolomite interbedded with chert, banded chert interbedded with dolomite, into cherts of the Middleback Jaspilite (Miles, 1954). The Middleback Jaspilite consists of banded haematite and magnetite quartzite with chert grading into red and black jaspilites (Miles, 1954). The Middleback Jaspilite occurs in a belt north of the Middleback Range, enclosing the Iron Baron, Iron Monarch and Iron Knob ore bodies.

Myola Volcanics

The Myola Volcanics are a sequence of deformed felsic volcanics and fine-grained gneisses that have been metamorphosed to upper greenschist – lower amphibolite facies (Parker et al., 1993). They're exposed 9 km north-northeast of Iron Baron and south of Iron Knob. They include interbanded porphyritic rhyolite and rhyodacite, fine-grained felsic and hornblende-bearing gneisses and fine-grained amphibolite, as is described by (Parker *et al*.1988).

Broadview Schist

The Broadview Schist comprises a sequence of deformed schist, quartzite and interlayered amphibolites. The stratigraphic relationship between the Broadview Schist and Myola Volcanics is uncertain as the contact between the two units is not exposed. The interbedded amphibolites are similar in composition and texture to those in the Myola Volcanics, and are probably related with the Myola Volcanics either underlying, overlying or interbedding with the Broadview Schist (Parker et al., 1993).

Paleoproterozoic Intrusions – Donnington & Colbert Suite equivalents

The granitoids and mafic intrusives which intruded the Sleaford Complex and Hutchison Group during the Kimban Orogeny have previously been referred to as the Lincoln Complex (Thomson, 1980; Parker et al., 1985; Parker, 1993). They intrude the Hutchison Group and Broadview Schist. Although the lithology of the intrusives is variable no distinct members have been differentiated. The deformed Paleoproterozoic granitoids and amphibolites are most likely equivalent to the Donnington and/or Colbert Suites in the southern Eyre Peninsula. They are poorly exposed with exposure evident along flanks defined by the Middleback Subgroup Ridges (Weste, 1996).

Burkitt Granite

The Burkitt Granite is a hornblende bearing granite pluton that intrudes the Hutchison Group northwest of Iron Knob. The Burkitt Granite contains a shear zone 500 m to the south of its contact with the Corunna Conglomerate, which is associated with quartz and barite veins containing fluorite and galena (Lemon, 1972). Compositionally it varies from leucogranite to syenite (Lemon, 1972) and is composed of coarse-grained euhedral to subhedral crystals of orthoclase, quartz, minor plagioclase, hornblende and sphene (Turner, 1975). The granite has a Rb-Sr age of 1655±61 Ma by Rb-Sr and a K-Ar hornblende age of 1687 Ma (Webb et al., 1986).

Mesoproterozoic

Corunna Conglomerate

Stratigraphically the Corunna Conglomerate is defined by seven units (Mcc1 to Mcc7) as is detailed by Lemon (1972). The fourth (Mcc4) is predominately exposed within the mapping area. The basal unit is a poorly outcropping polymict conglomerate (Mcc1) containing clasts and is best observed in drill core between Iron Knob and Corunna Homestead (Lemon and Gostin, 1983). This is overlain by 100 m of buff siliceous and brecciated dolomite (Mcc2) of which is overlain by the upper polymict conglomerate (Mcc3). This in turns grades into the lower green sandstone (Mcc4), which was deposited in a floodplain environment. The red conglomerate member (Mcc5) forms the prominent hills behind Corunna Homestead and represents an alluvial fan desposit.

Tertiary fericrete and silcrete

Ferricrete and silcrete occur as cappings on a number of stratigraphic units and are believed to have formed during the Tertiary (Alley and Lindsay, 1995). Ferricrete forms cappings overlying the Middleback Subgroup to the west of Lake Gilles, and is exposed on low rises. Silcrete occurs as cappings overlying Paleoproterozoic granitoids to the north and east of Lake Gilles, and forms a prominent capping on dissected pediment surfaces in the Tent Hill area (Twidale et al., 1970)

Target vegetation and organs

The western myall occurs in small widely spaced groves forming open, sparse woodland. This species is generally associated with rises and depositional plains near major alluvial depressions. It has a large tap root system that combines with an extensive shallow root system that spreads up to 30 m from the tree base Figures 37a & 37b. The western myall has an estimated life span of 250 years (Correll and Lange, 1966). Throughout this life span the plant undergoes 6 stages of growth and shape appearance with canopy growth occurring around spring to early summer and flowering during spring. It was noted by Lange and Sparrow (1992) that there are few seedlings (Stage I) and a complete absence of 'juvenile' individuals in Stages II and III within the Middleback area. This is likely that its abundance has been reduced due to farming practises and the use of the species for fencing stumps during early stages of settlement.

Acid Digest

Acid digest is a critical aspect to the biogeochemical analysis technique for both the ashing and dry analytical methods. Aqua regia is a highly corrosive mixture of acids which is also known as nitro-hydrochloric acid and is usually concentrated in a volume ratio of 1:3 respectively. It provides data for the greatest range of elements at the lowest cost. Both techniques require samples to be exposed to the acid digest process before being analysed. Samples at the ACME labs Canada are analysed through ICP Mass Spectrometry. Analysis of vegetation samples is conducted using a 0.5g split digested in HNO3 followed by Aqua regia and finally analysed by ICP-MS for ultralow detection limits.

Induced Coupled Plasma-Mass Spectrometry (ICP-MS)

Induced Coupled Plasma Mass Spectrometry (ICP-MS) is an analytical technique used for element determinations. In recent years it has become a valuable tool for low-cost multi-element analysis of plant tissue. ICP-MS exhibits a simple spectrum with a wide linear range (104–105). It has the ability to measure a diverse range of isotopes as well as element concentrations at an excellent detection limits in solution (0.01–0.1 ppb).

An ICP-MS combines a high temperature ICP source with a mass spectrometer. The ICP source converts the atoms of the element in the sample to ions. These ions are then separated and detected by the mass spectrometer. The sample is typically introduced into the ICP plasma as an aerosol. Once the sample aerosol is introduced into the plasma torch, it is completely desolated and the elements in the aerosol are converted first into gaseous atoms and then ionized towards the end of the plasma.

Once the elements in the sample are converted into ions, they are then bought into the mass spectrometer via the interface cones. The ions from the ICP source are then focused by the electrostatic lenses in the system. Once the ions enter the mass spectrometer, they are separated by their mass-to-charge ration. Once this occurs they are detected or counted by a suitable detector. The fundamental purpose of the detector is to translate the number of ions striking the detector into an electrical signal that can be measured and related to the number of atoms in that element in the sample via the use of calibration standards..

Field Emission Environmental Scanning Electron Microscope (FEI/Philips XL30 ESEM-FEG)

A scanning electron microscope uses high energy beams of electrons in a raster scan pattern to image a selected sample. The SEM has a number of signals to create imagery; Back-Scatter Electron (BSE), characteristic x-rays, light (cathodoluminescence), specimen current and transmitted electrons.

SEM micrographs have a large depth of field yielding a characteristic three dimensional appearance which is useful for understanding the surface structure of a sample. BSE are beam electrons that are reflected from the sample by elastic scattering. BSE are often used in analytical SEM along with spectra made from the strongly characteristic x-rays. Because on the intensity of the BSE signal is strongly related to atomic number of the specimen, BSE images can provide information about the distribution of different elements in the sample.

Characteristic x-rays are emitted when the electron beam removes an inner shell electron from the sample, causing a higher energy electron to fill the shell and release energy. These x-rays from the energy release are used to identify the composition and measure the abundance of elements in the sample. For SEM a specimen is usually required to be dry and is mounted on a specimen stub using an adhesive such as epoxy resin or electrically – conductive double sided adhesive tape. In this study an SEM was utilised in order to visual analyse the sample media (species and organs) in order to determine if any trace elements were present within the cell structure of the samples and if surface contamination was visible along the epidermis of the leaves or twigs.

Regolith Landform & landscape evolution

The objective of this mapping is to: gain an expression of the distribution and types of regolith materials in an area; account for the landscape processes operating in the area; and, provide a foundation of results to develop landscape evolution model of the study area. Regolith mapping encompasses a large proportion of differing geological aspects that each individually influences regolith formation and evolution from the surface to the underlying bedrock. The main attributes considered in this mapping are dominant regolith lithology, landform expression including surface lags, soil type, and dominant vegetation community and species.

Satellite imagery provided by One Steel along to assist in depicting areas of equivalent appearance and areas of high RLU diversity and complexity whilst allowing visualisation of surface relief and insight into topographical elevations and depressions. PIRSA geophysics analysed displayed minimal responses to either magnetic or gravity in the study area. This resulted as the scale and subsequent resolution was too broad. The RLUs is a system of categorising regolith materials and associated landform expression developed by Geoscience Australia (Pain, 2008)

The categorisation and description of individual units within a mapping area are based upon five main attributes. These require visual or compositional change in regolith; its colour or lag size, vegetation; its pattern, density and species or even soil type or colour.

Primary Units- This is the observation of the primary and dominant regolith surrounding your given location. The volume/density, shape and distribution of the regolith are described as well.

Secondary Unit - This is the description of the remaining regolith in the location. Soil types, for example amount of clay, sand or silt. The soil colour and any other regolith that may be present but not dominant.

Vegetation - A description of all vegetation within the unit polygon, from ground cover to the dominant species is the vegetation community structure (eg shrubland, woodland) is fist described and then dominant species.

Landform - Is conducted by the use of routine landform descriptions consisting of shape, relief and the influencing process taking place at this location.

Other Features - Is used to describe any visual observations that cannot be classified into any of the other categories. This may consist of land disturbance or fauna impacts onto the region.

Supplementary Appendix # 1A

- Ashing to Non Ashing 'Dry' comparison

  Introduction

  Results

  Conclusion

- XY Scatter Plot – Species Comparison
- XY Scatter Plot –Lead (Pb), Yttrium (Y), Zinc (Zn), Arsenic (As), Silver (Ag), Gold (Au), Copper (Cu), Manganese (Mn), Lanthanum (La), Cerium (Ce), Selenium (Se), Tin (Sn), Uranium (U), Iron (Fe), Lithium (Li), Molybdenum (Mo), Zirconium (Zr), Aluminium (Al), Rhenium (Re)
- Pearl blue bush – Non ashed – Ashed (AVG) all elements
- Pearl blue bush – Non ashed – Ashed (AVG) Fe – Li
- Element concentration – All species
- Summary table – Ashed & Non – Ashed 'Dry' – Pearl blue bush
- Summary table – Ashed & Non – Ashed 'Dry' – Western myall
- Summary table – Ashed & Non – Ashed 'Dry' – Black oak

Introduction

Dry tissues of plants commonly used in biogeochemical exploration contain tens to hundreds ppm of element concentration. On reduction to ash, these concentrations are magnified 30- to 100-fold, depending on the type of plant organ sampled (Dunn 2007). Provided that the ashing takes place under controlled conditions the biogeochemical signatures are robust. Comparisons of 'ash' versus 'dry' analyses of the same samples permit evaluation of concentrations of a wide array of elements (Dunn 2007). By reducing the samples to ash prior to analysis, elements are concentrated to levels above the detection limit.

Results

The comparison of the Ashed to Non ashed 'dry' data displayed three different relationships.

- Positive linear – Fe, Cu, Zn, Mo, Mn, La, Li, Y and Ce
- Scatter & dispersed – Pb and Zr
- Striped – Ag, Sn, Au, U, As, Re, Al and Se

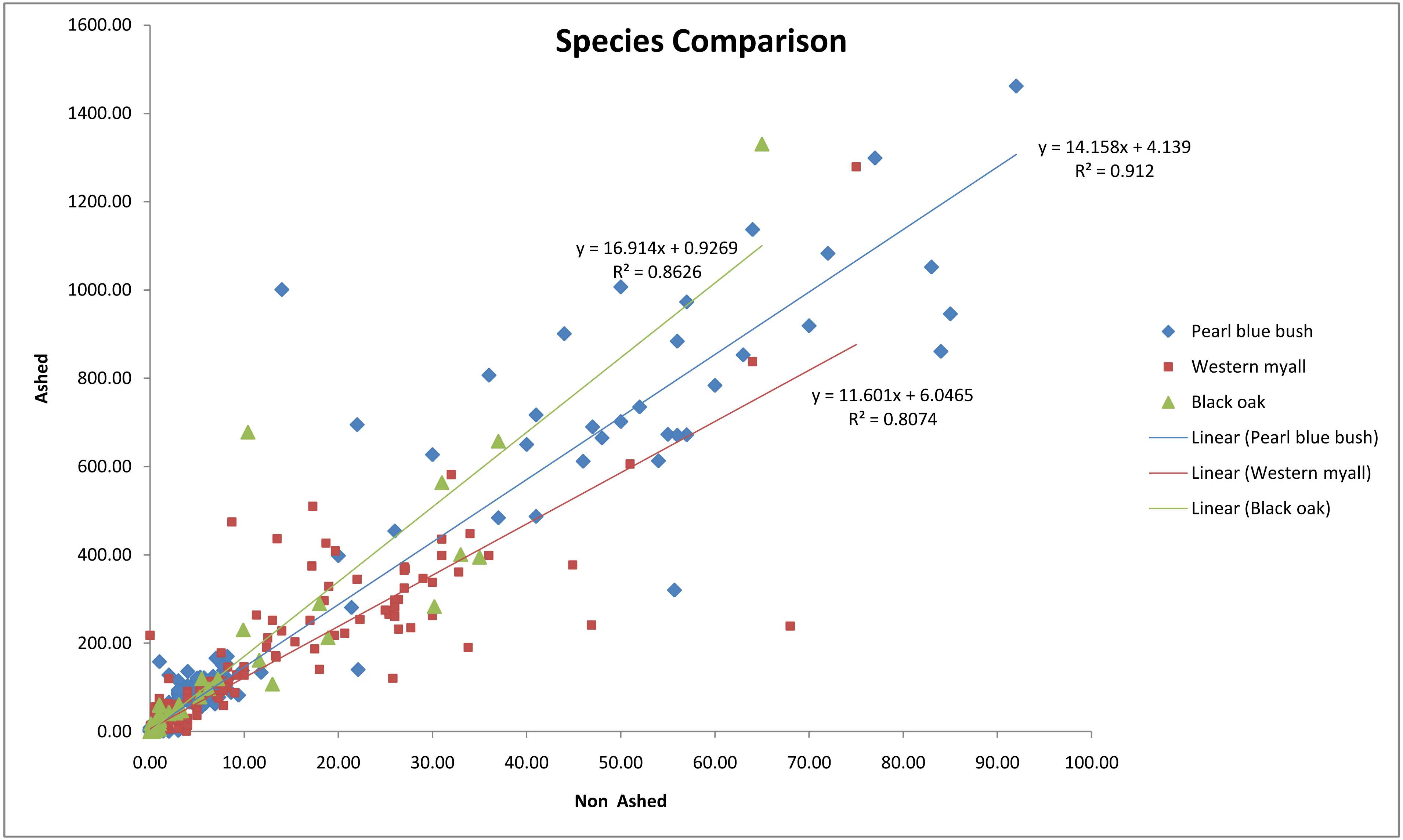
Zirconium showed variations in results comparing ashed with non ashed 'dry'. Consistant results were only found within the Black oak which displayed ashing as having elevated concentration of Zr for all samples compared to the Pearl blue bush and western myall. This demonstrated fluctuations in Zr for Pearl blue bush and Western myall as a result of the ashing process. Gold detection limits are 0.2 ppb, given this and the way in which data was analysed (half detection limits) the XY plot (Au) demonstrates the majority of data is situated at the minimum detection limit (MDL) with points increasing along the ashed axis. Data points outside the MDL show a weak linear trend towards a positive relationship.

Molybdenum demonstrates clear species segregation and clustering, as is showing in the Mo XY plot. The western myall displayed the greatest spread of data with all data points demonstrating a very strong positive linear relationship. The western myall data showed two distinct clusters with the elevated cluster possibly demonstrating points of interest that potentially fall outside the species natural element uptake. Aluminium demonstrated a combination of striping and species clustering. An approximate positive linear relationship is present and depicted by the clustering of pearl blue bush.

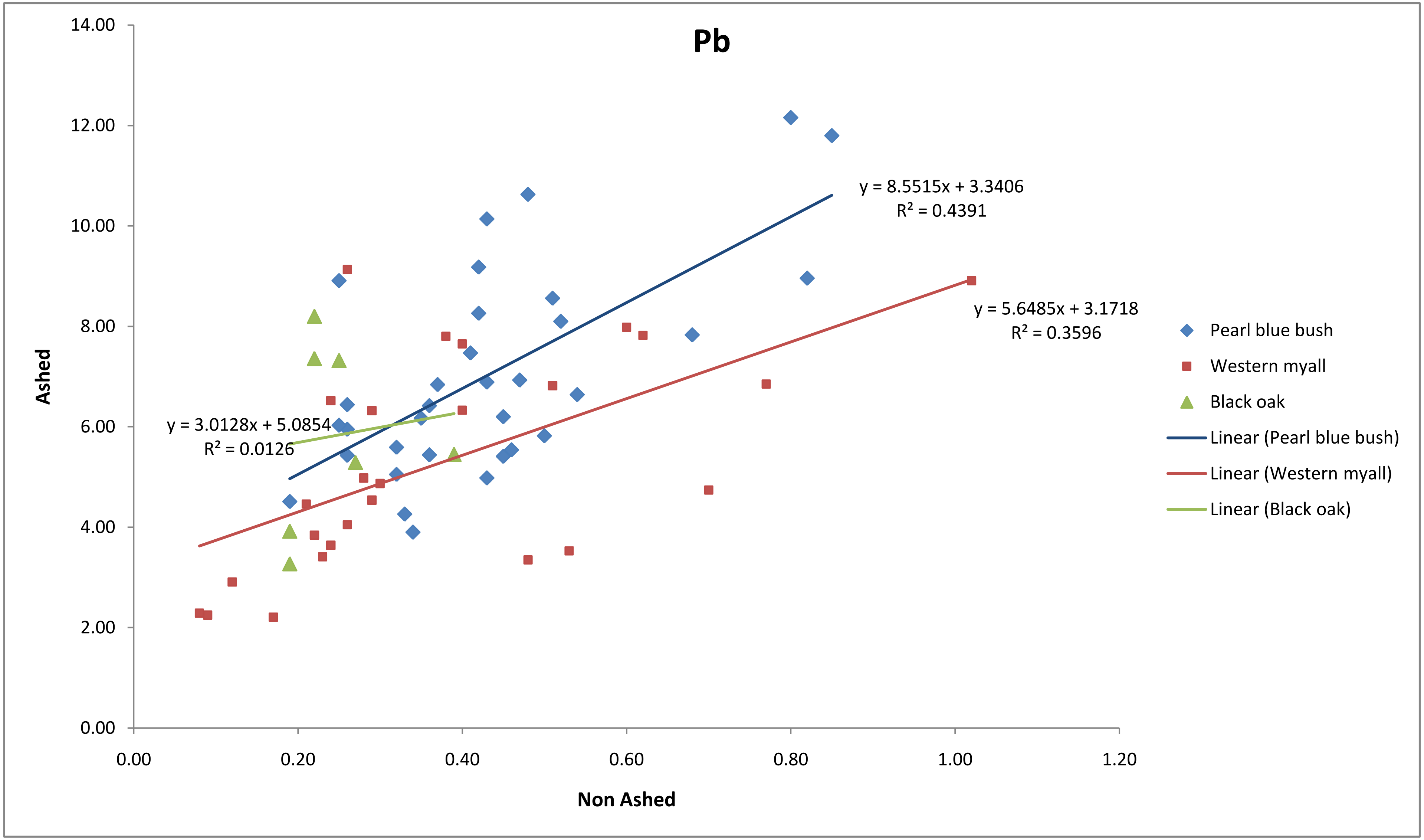
Iron, Cu, Zn, Ag, Zr, Mo, Mn, La, Li, Y, Re and Al all displayed species clustering of data. Ag, Zr and Re demonstrate a weak association, a greater spread of data points compared to the remaining elements that demonstrated defined clustering based upon individual species. This species clustering is highlighted in the Cu and Mo XY scatter plots

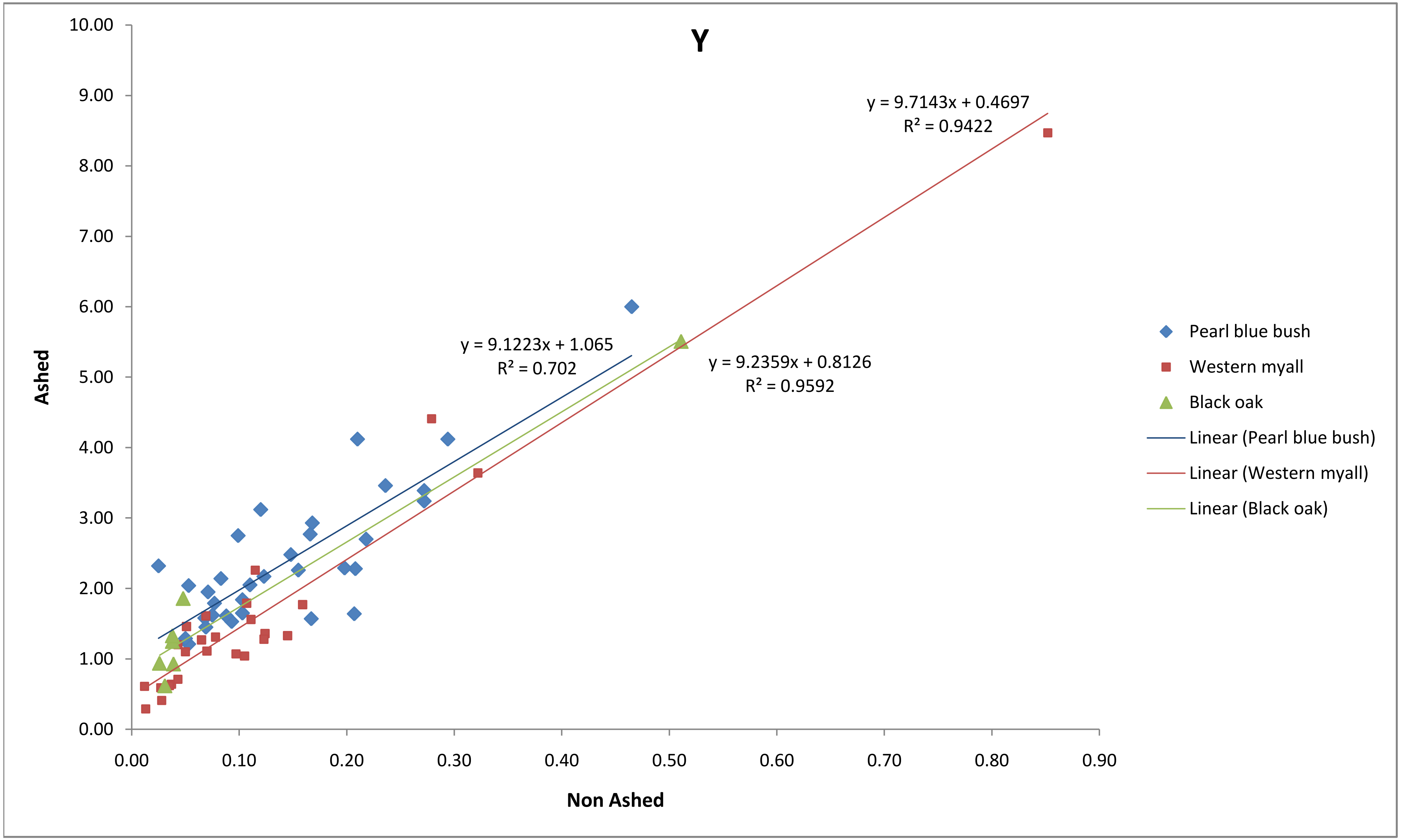
Conclusion

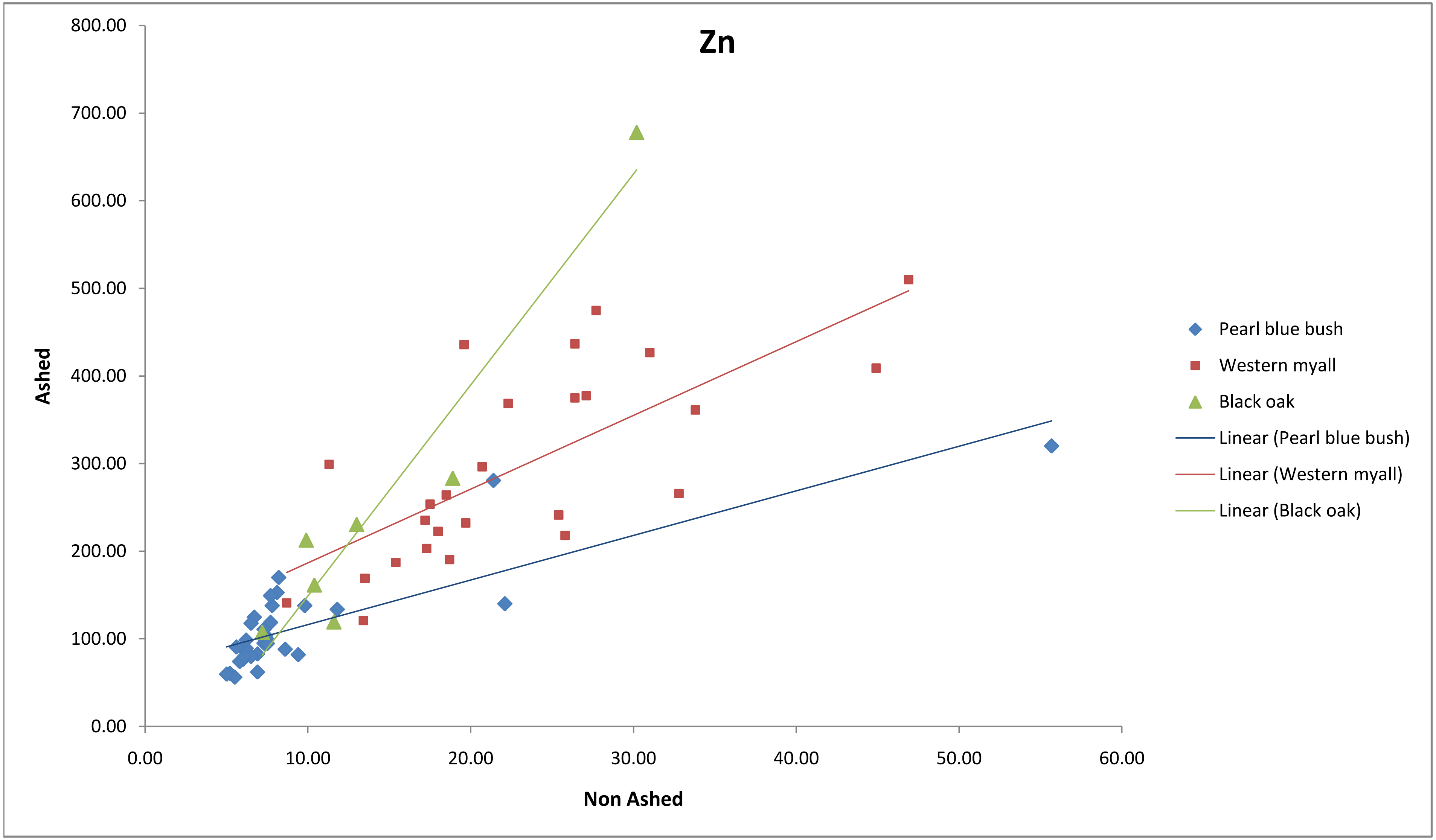
For the purpose of this study and from an exploration perceptive the process of ashing prior to element analysis via ICP-MS has resulted in the concentrating of the 53 element suite analysed, with no elements other than zirconium of the 19 selected showing losses through volatilisation. This allows for potential points of interests, structures or underlying mineralisation to be highlighted.

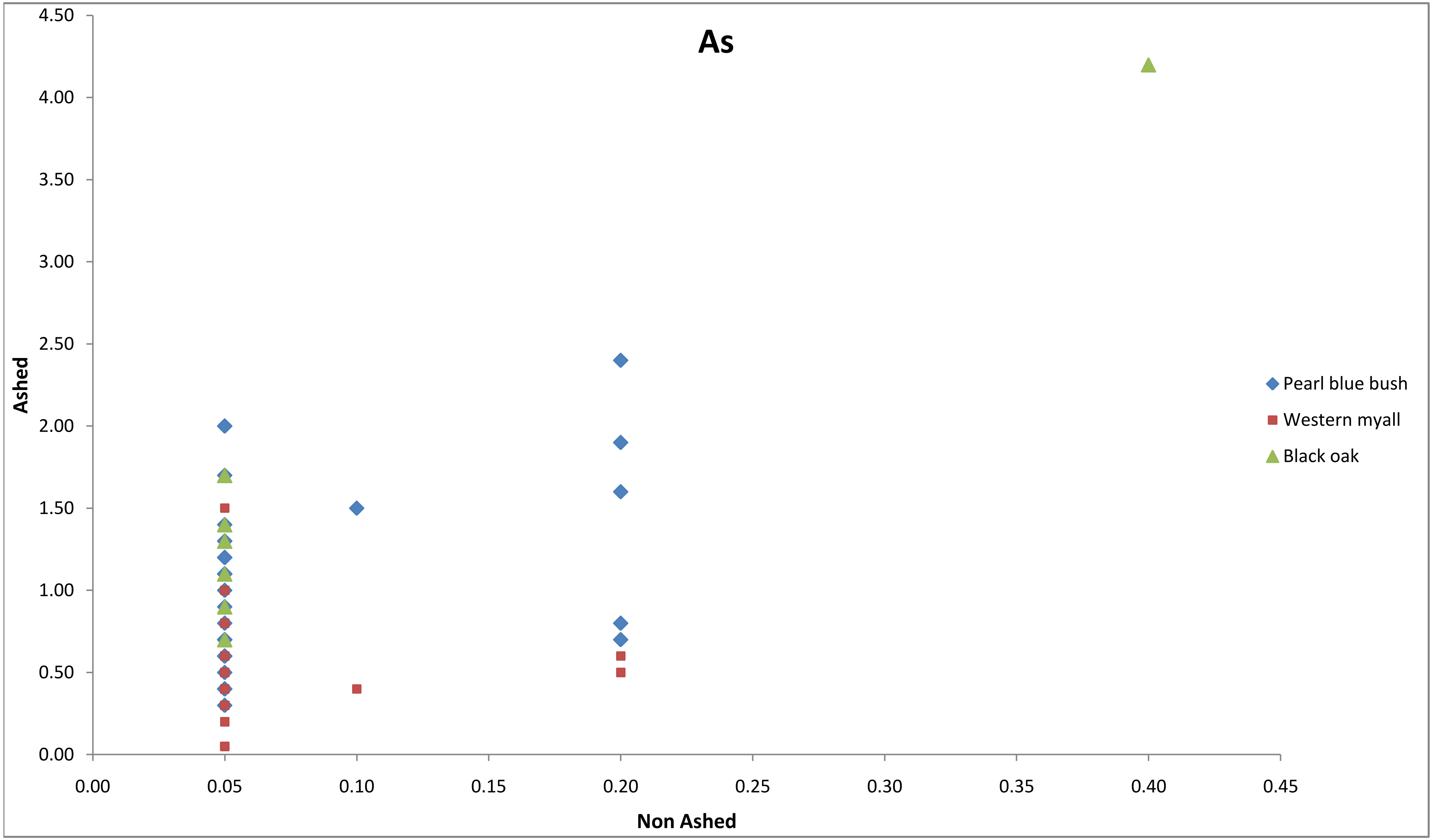


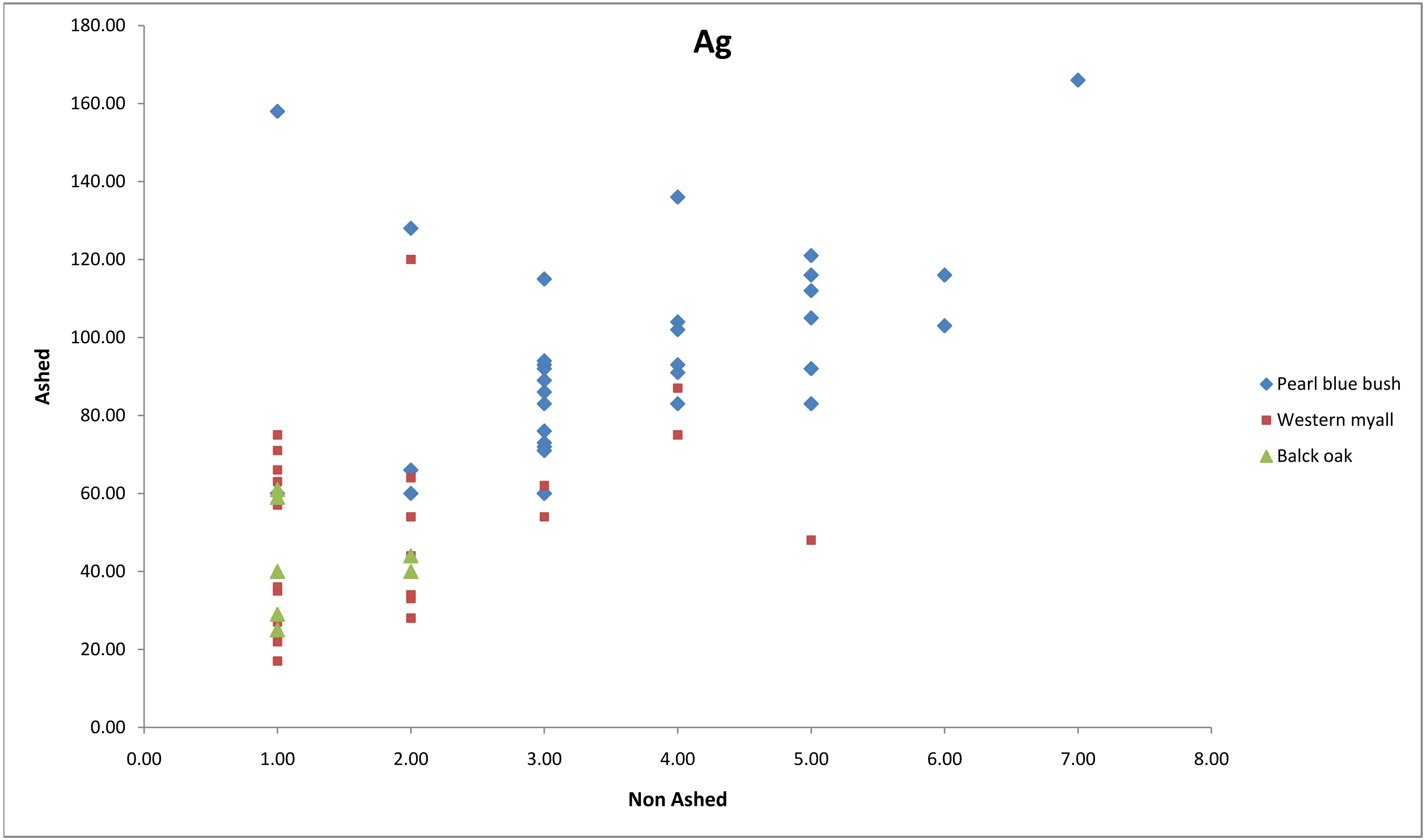
Species Comparison
Ashed
Non Ashed
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
y = 14.158x + 4.139
R² = 0.912
y = 16.914x + 0.9269
R² = 0.8626
y = 11.601x + 6.0465
R² = 0.8074
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)


Pb
Ashed
Non Ashed
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
y = 8.5515x + 3.3406
R² = 0.4391
y = 5.6485x + 3.1718
R² = 0.3596
y = 3.0128x + 5.0854
R² = 0.0126
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)

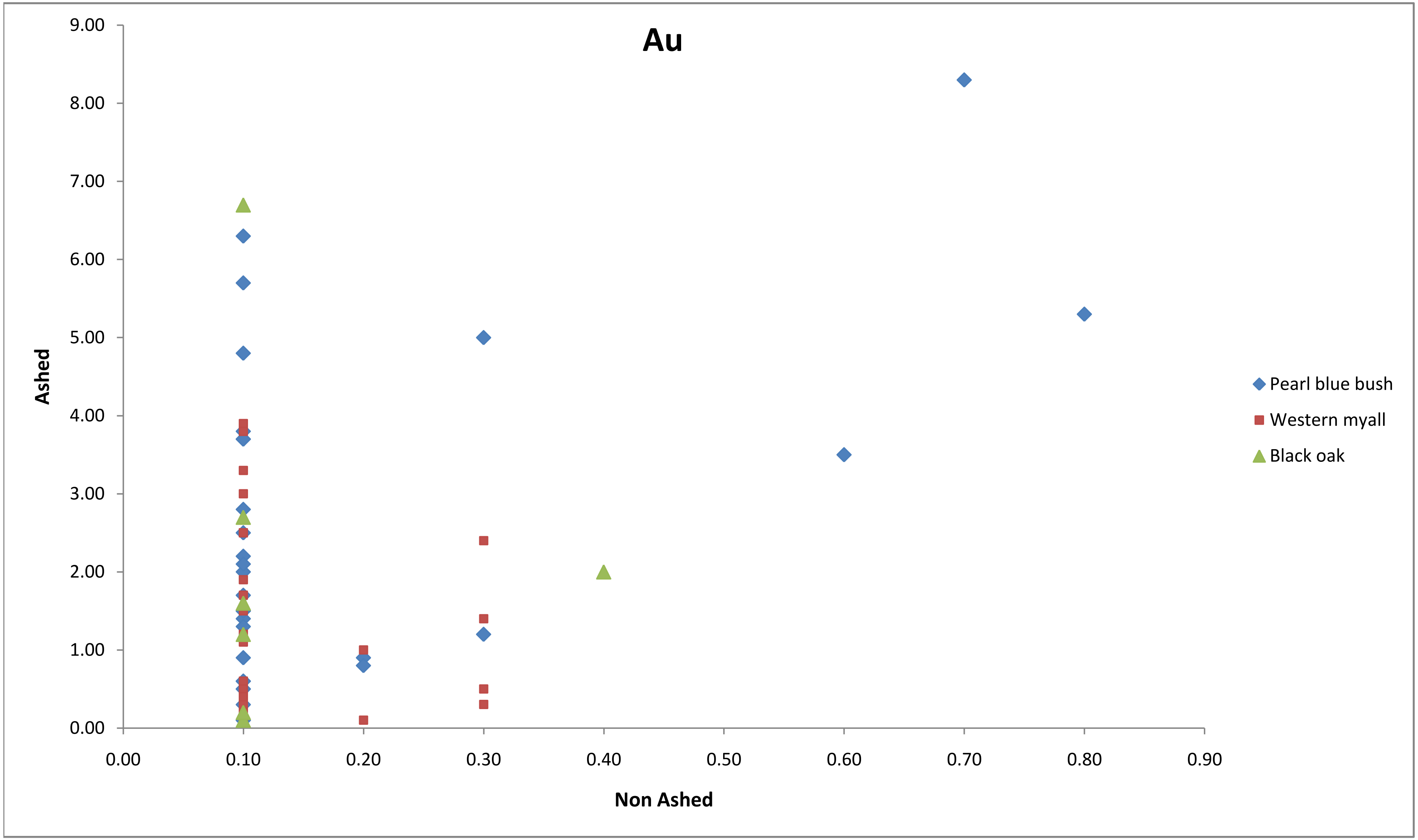

Y
Ashed
Non Ashed
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
y = 9.7143x + 0.4697
R² = 0.9422
y = 9.1223x + 1.065
R² = 0.702
y = 9.2359x + 0.8126
R² = 0.9592
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)


Zn
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Ashed
0.00
10.00
20.00
30.00
40.00
50.00
60.00
Non Ashed
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)

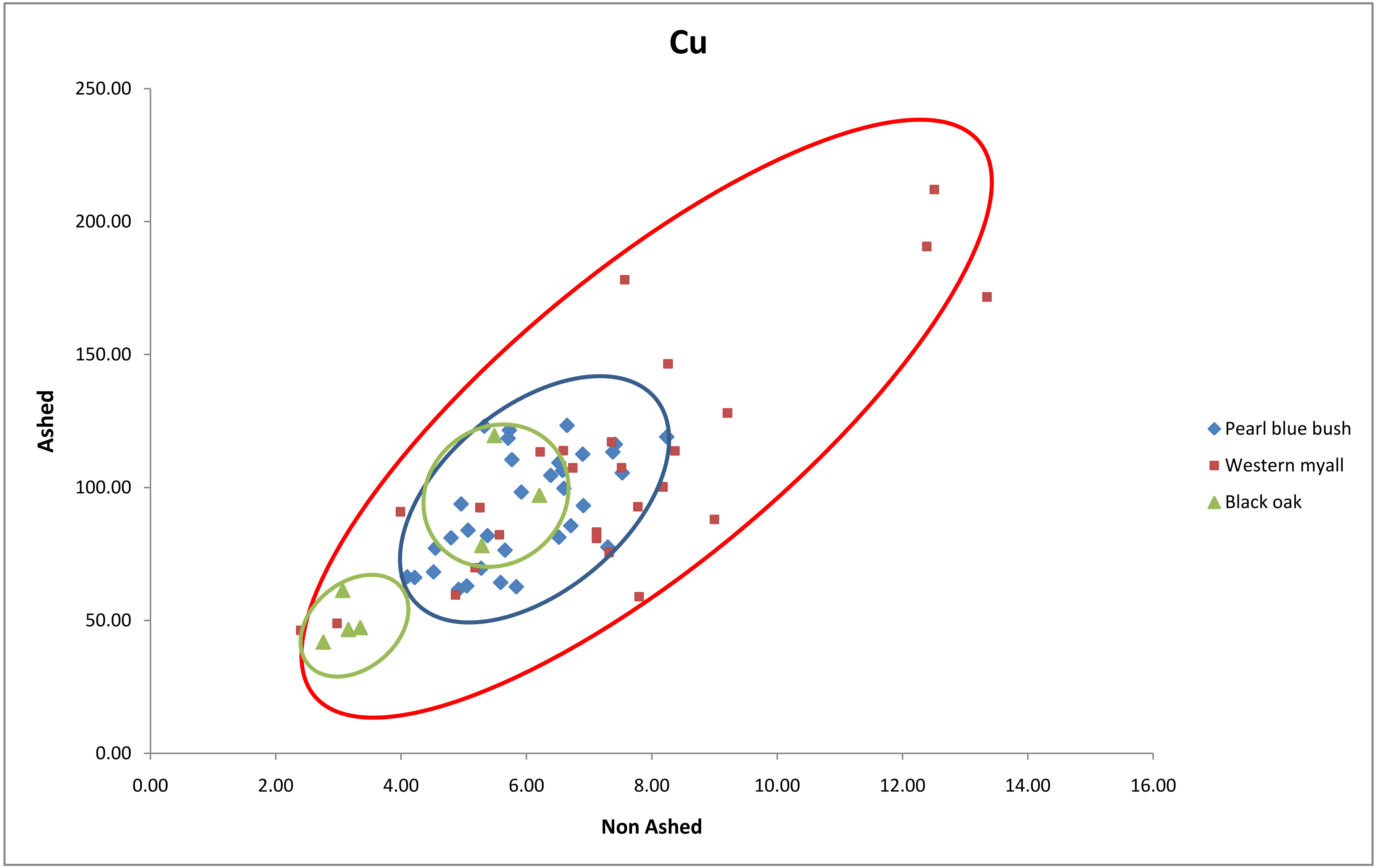

As
Ashed
Non Ashed
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
Pearl blue bush
Western myall
Black oak

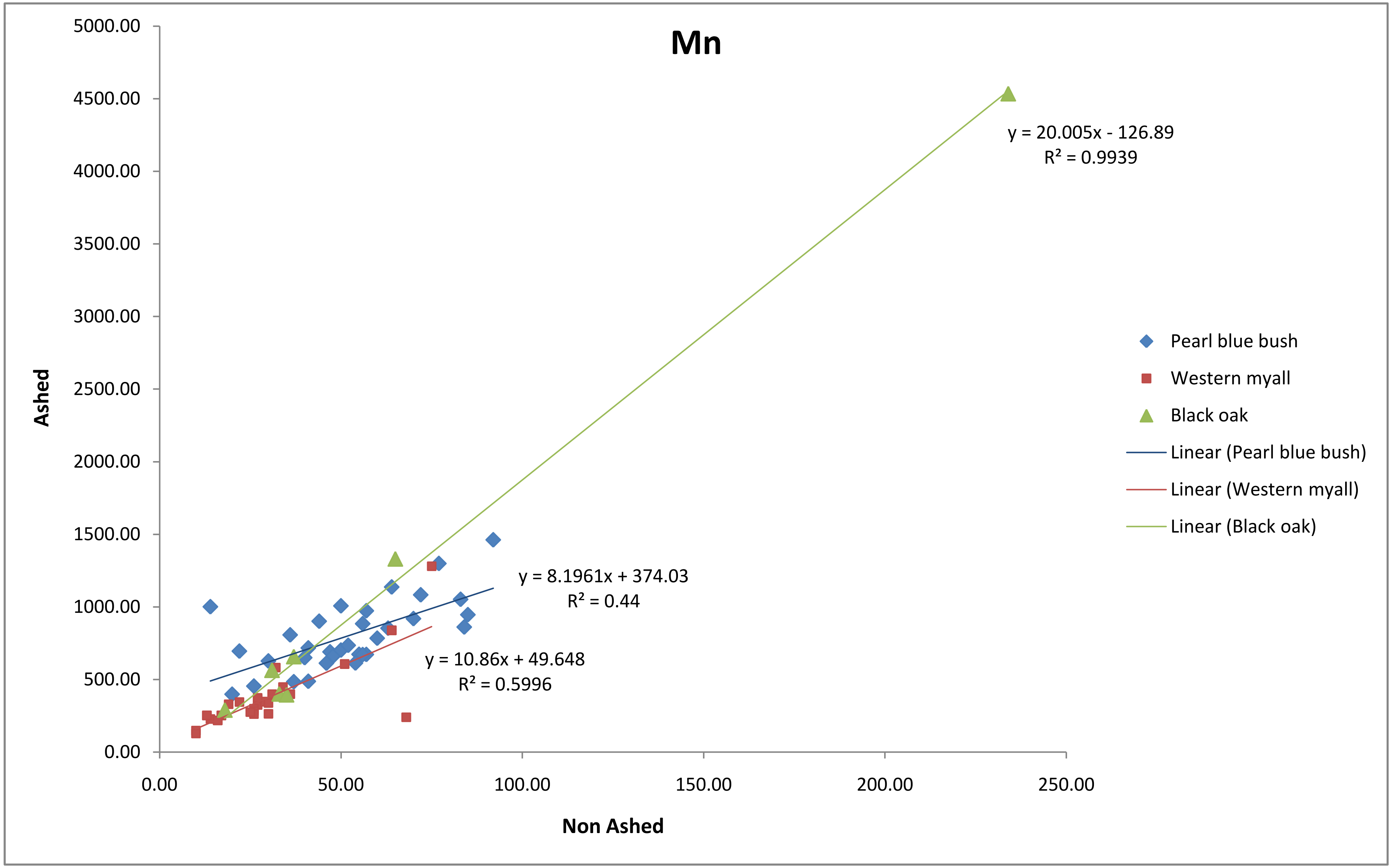


Ag
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Ashed
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Non Ashed
Pearl blue bush
Western myall
Balck oak

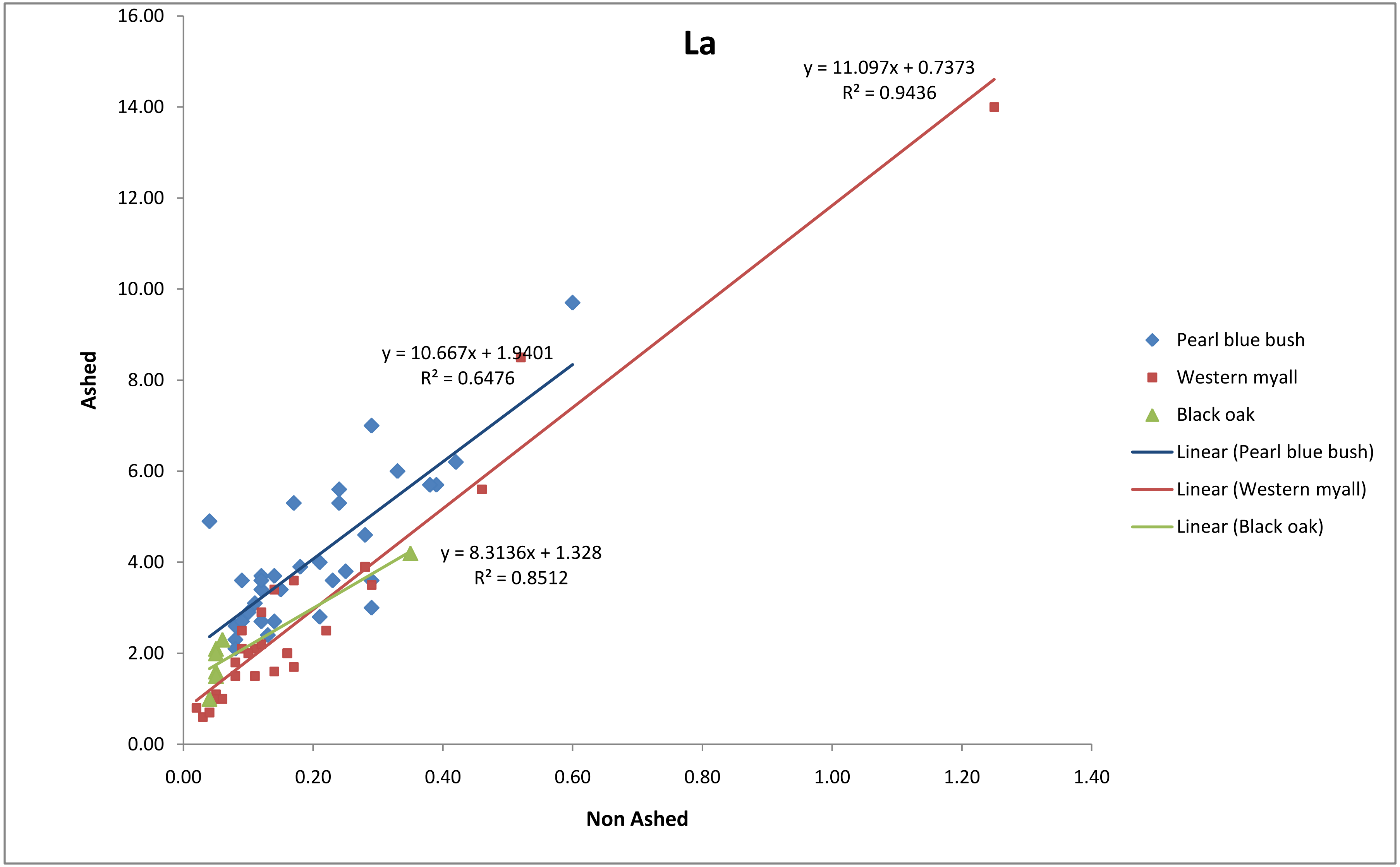


Au
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Ashed
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non Ashed
Pearl blue bush
Western myall
Black oak

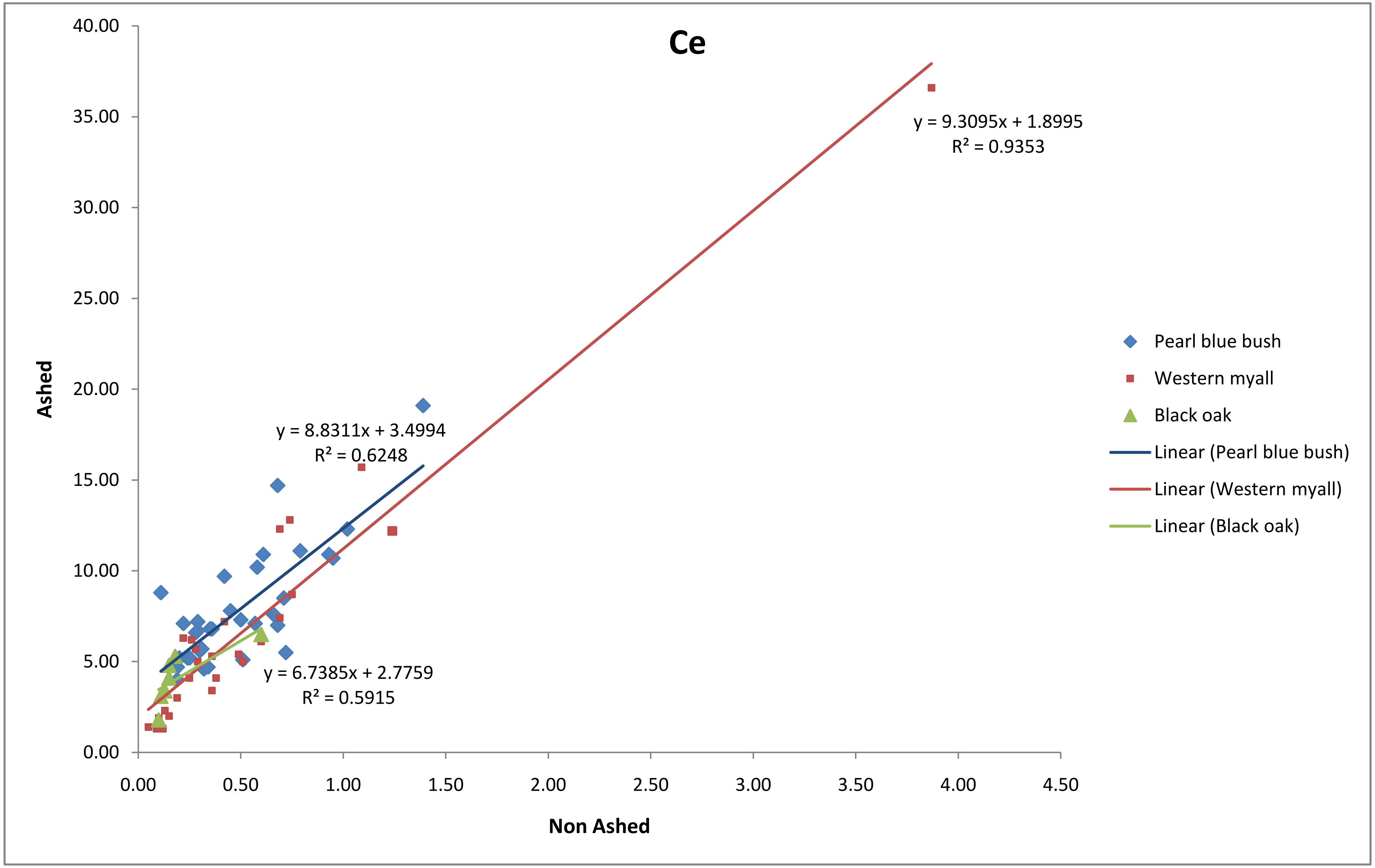

Cu
250.00
200.00
150.00
100.00
50.00
0.00
Ashed
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Non Ashed
Pearl blue bush
Western myall
Black oak



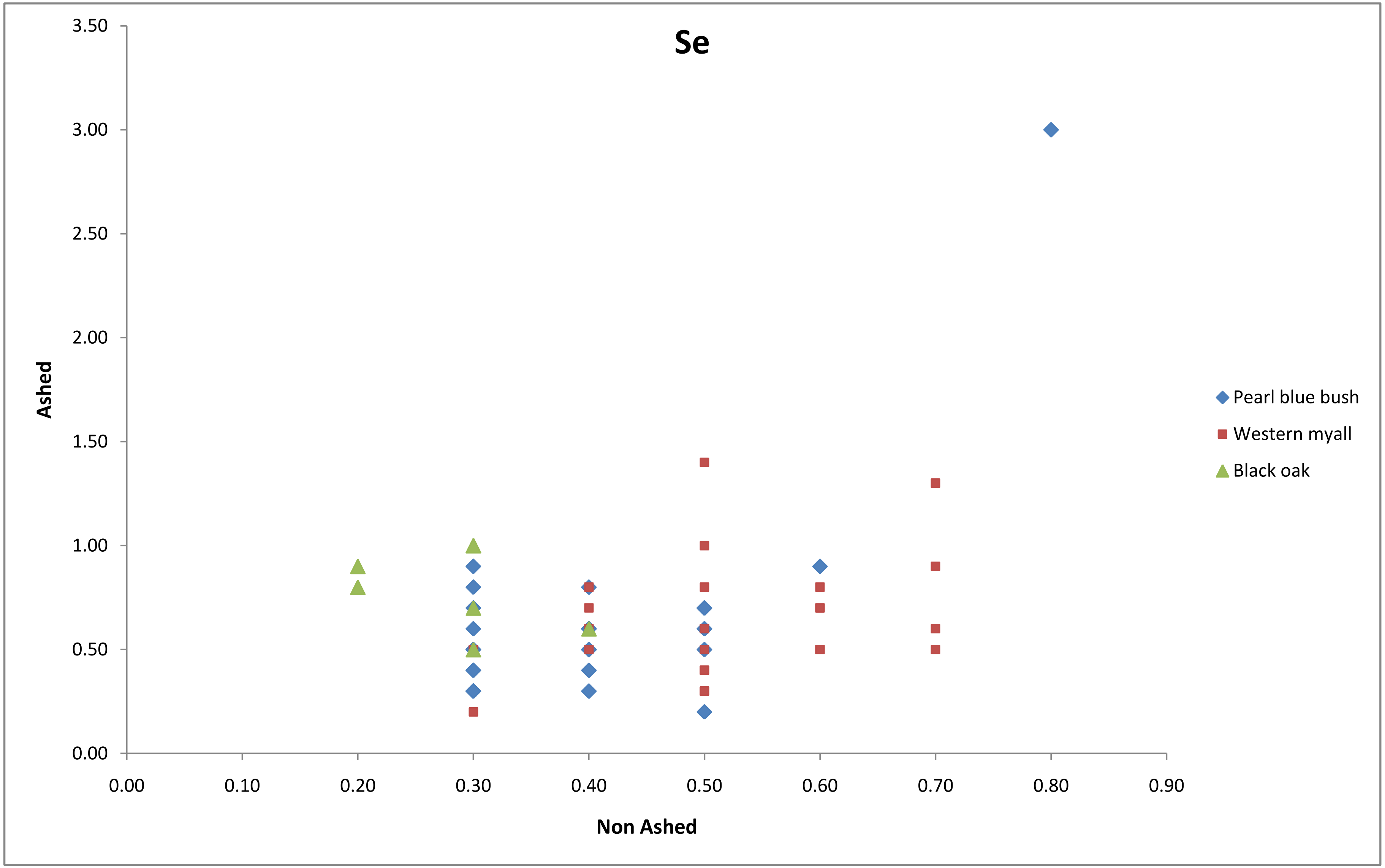
Mn
Ashed
Non Ashed
5000.00
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
0.00
50.00
100.00
150.00
200.00
250.00
y = 20.005x - 126.89
R² = 0.9939
y = 8.1961x + 374.03
R² = 0.44
y = 10.86x + 49.648
R² = 0.5996
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)

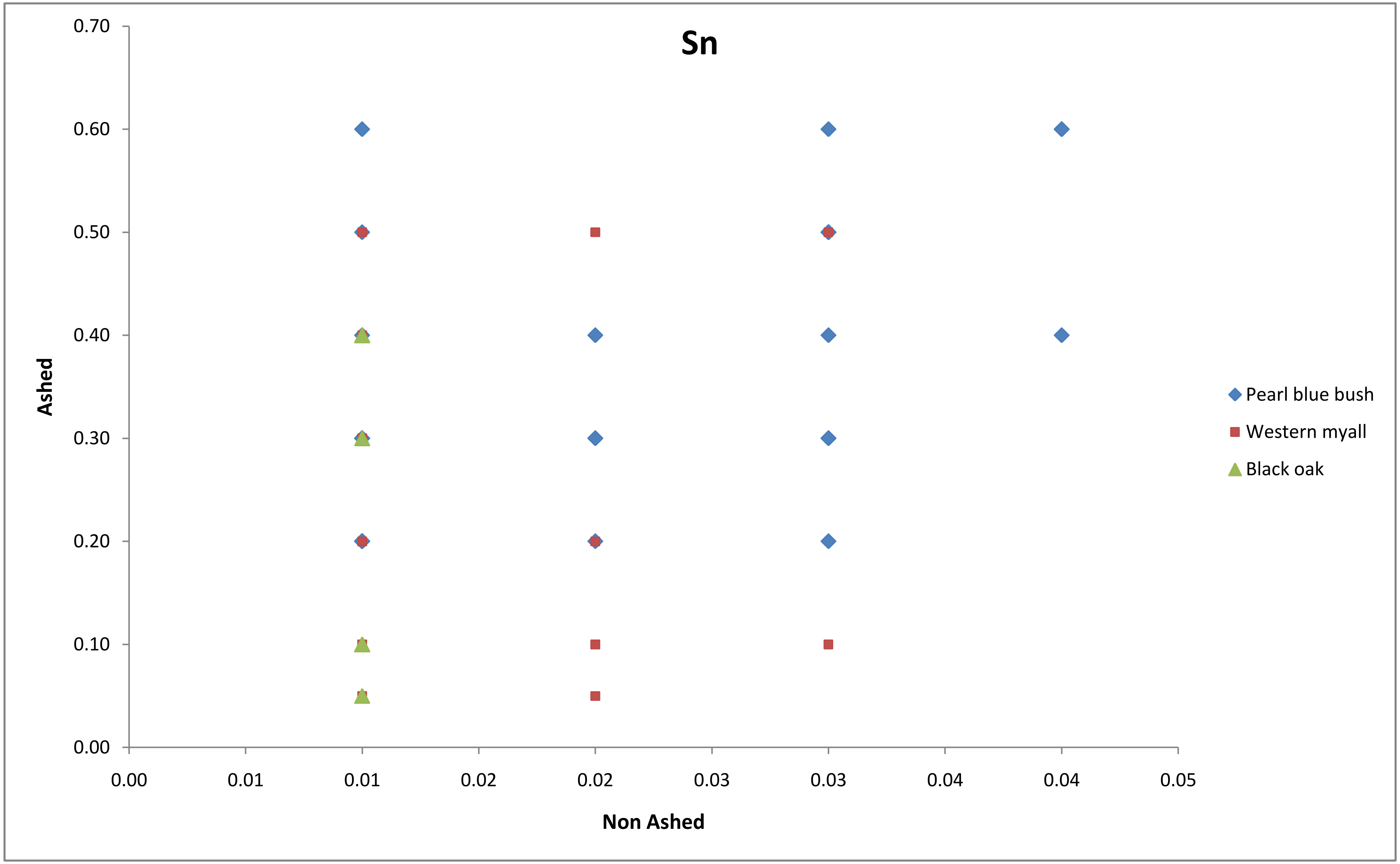


La
Ashed
Non Ashed
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
y = 11.097x + 0.7373
R² = 0.9436
y = 10.667x + 1.9401
R² = 0.6476
y = 8.3136x + 1.328
R² = 0.8512
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)

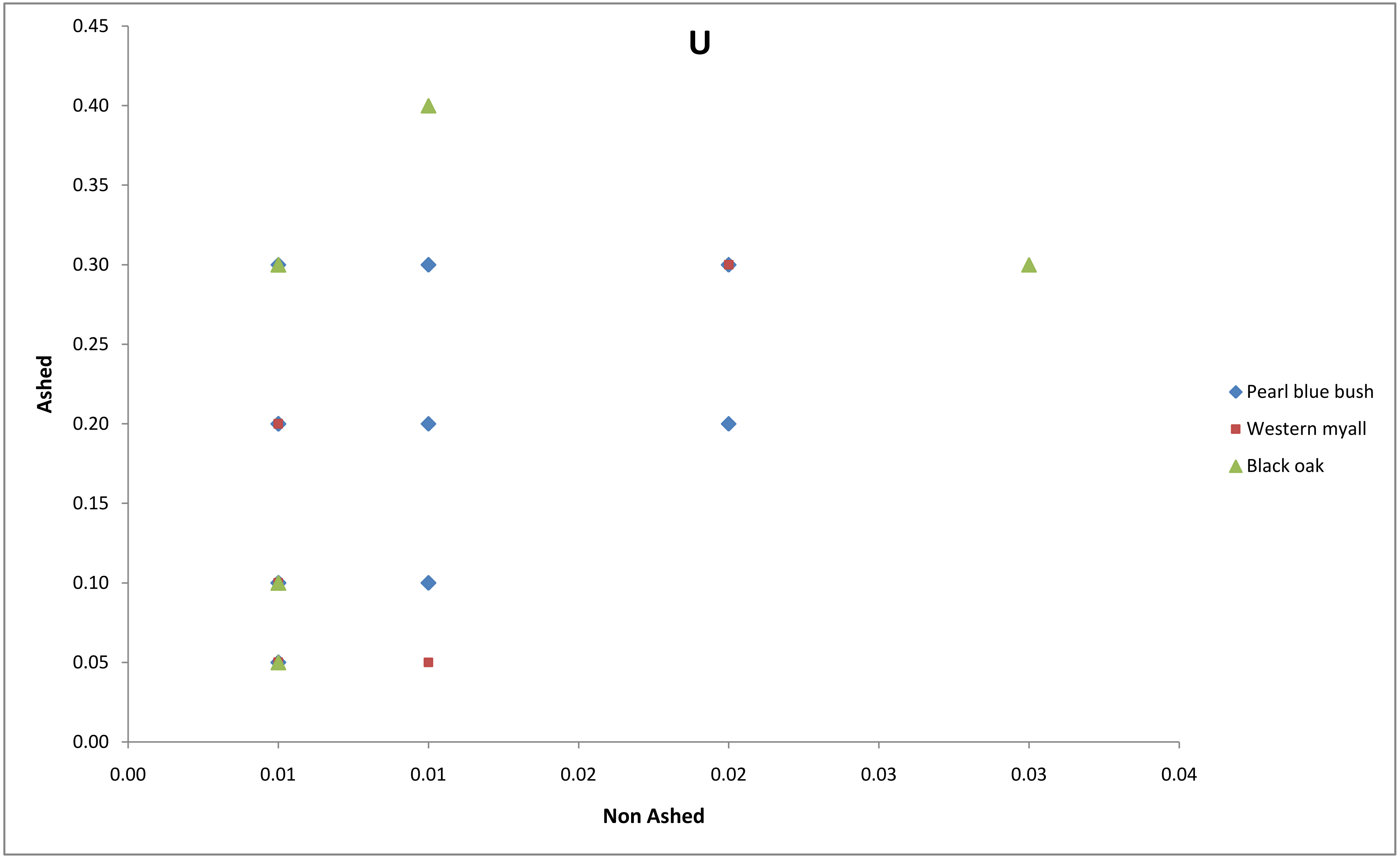


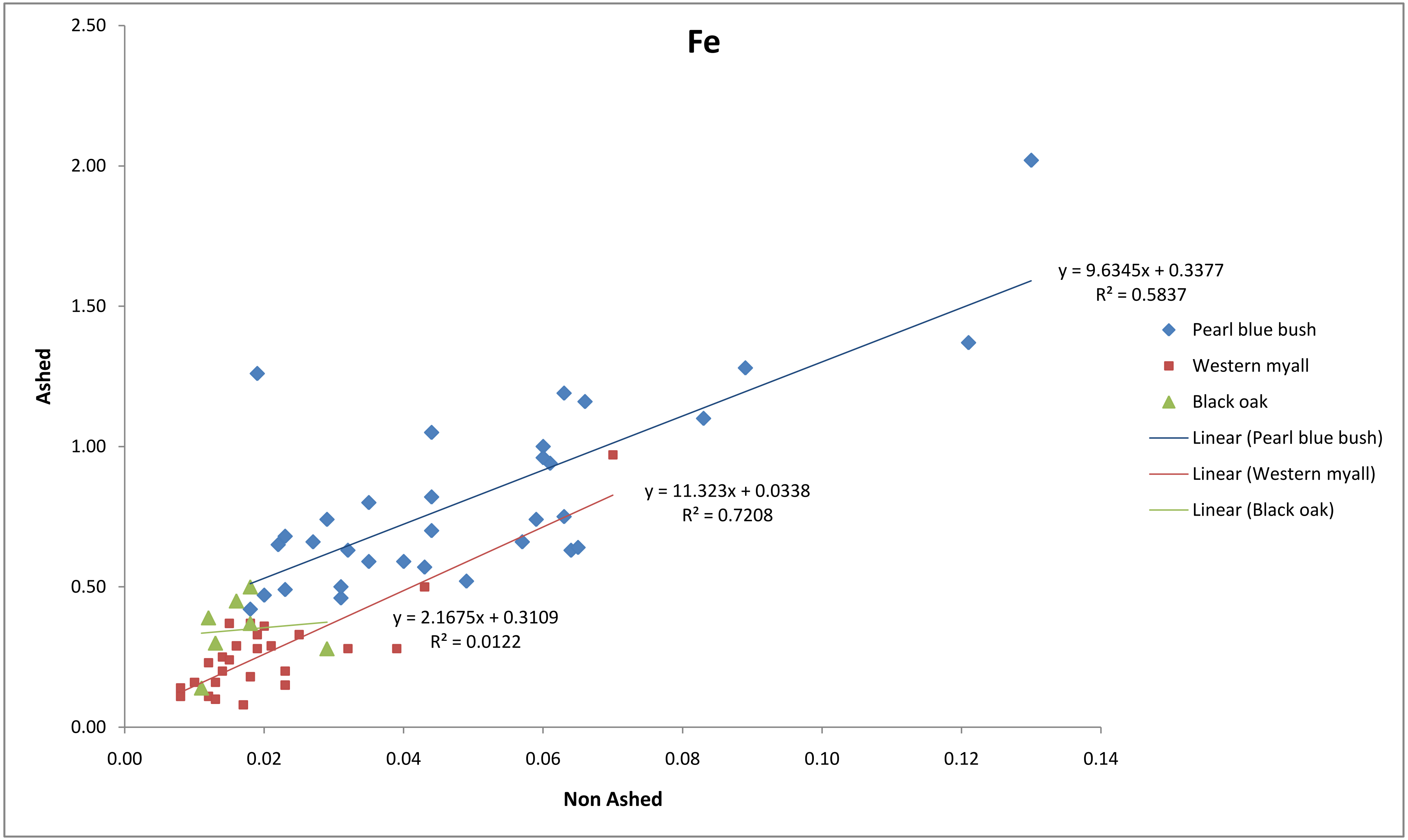
Ce
Ashed
Non Ashed
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
y = 9.3095x + 1.8995
R² = 0.9353
y = 8.8311x + 3.4994
R² = 0.6248
y = 6.7385x + 2.7759
R² = 0.5915
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)

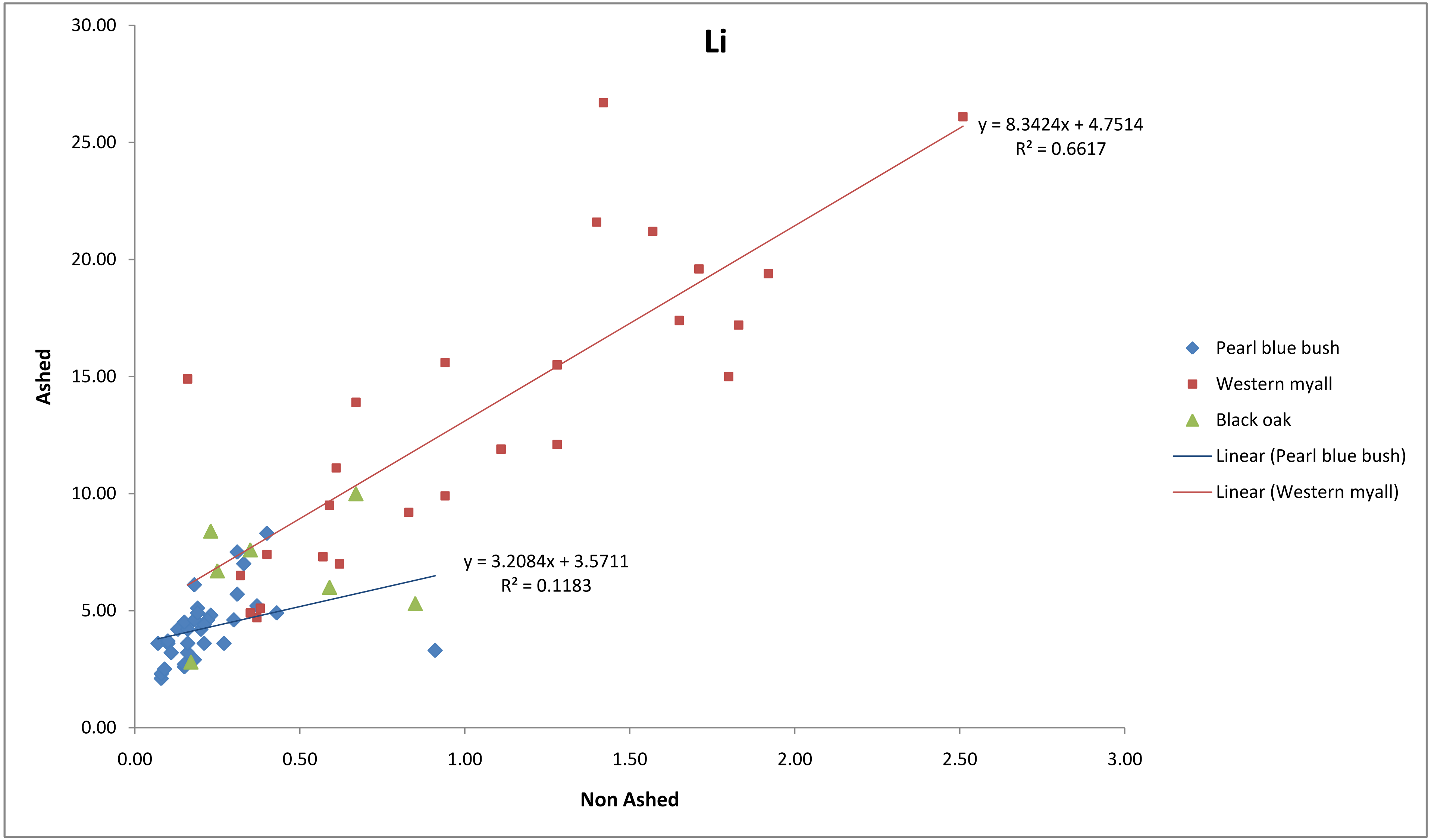

Se
Ashed
Non Ashed
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Pearl blue bush
Western myall
Black oak

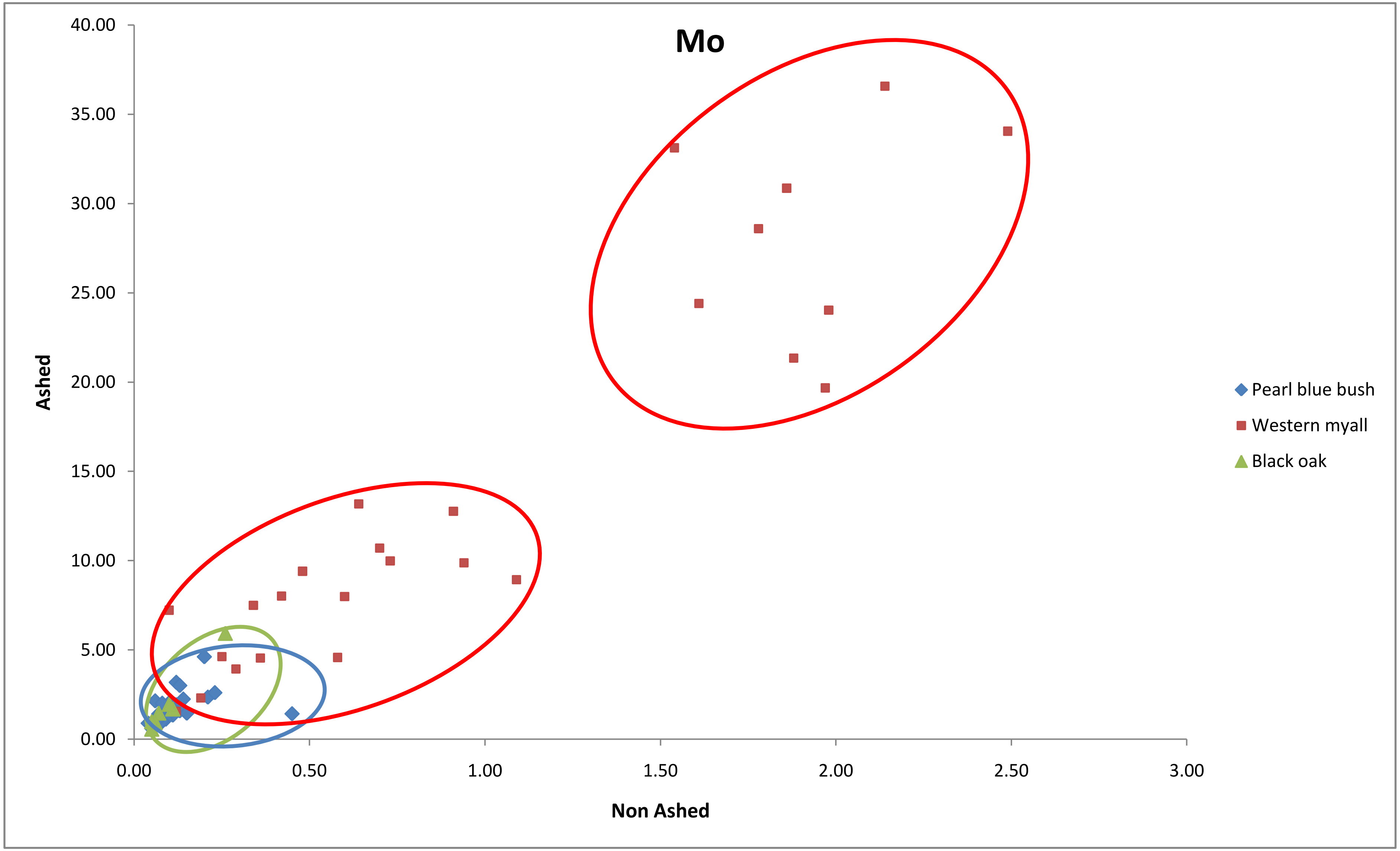


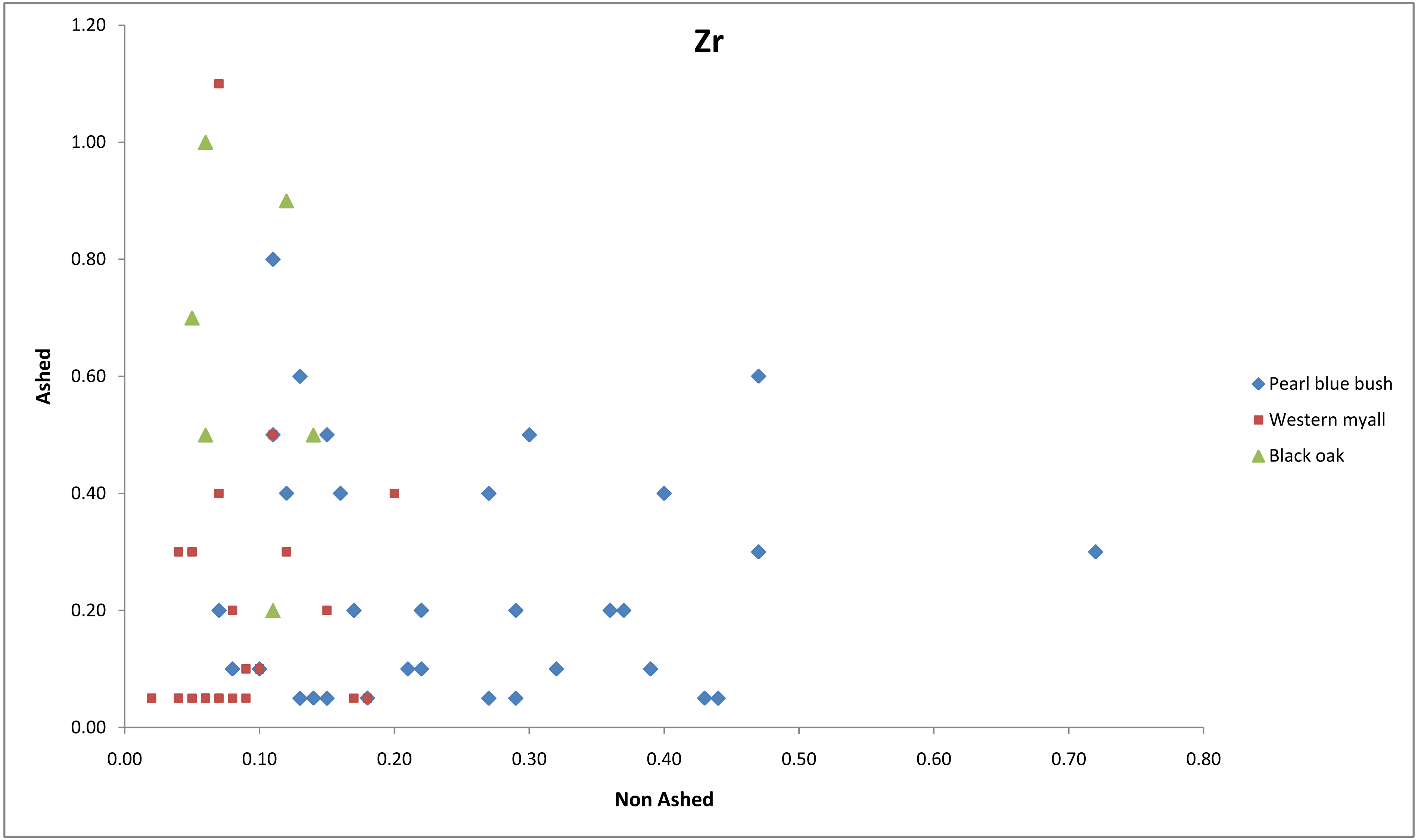
Sn
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Ashed
0.00
0.01
0.01
0.02
0.02
0.03
0.03
0.04
0.04
0.05
Non Ashed
Pearl blue bush
Western myall
Black oak


U
Ashed
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.01
0.01
0.02
0.02
0.03
0.03
0.04
Non Ashed
Pearl blue bush
Western myall
Black oak

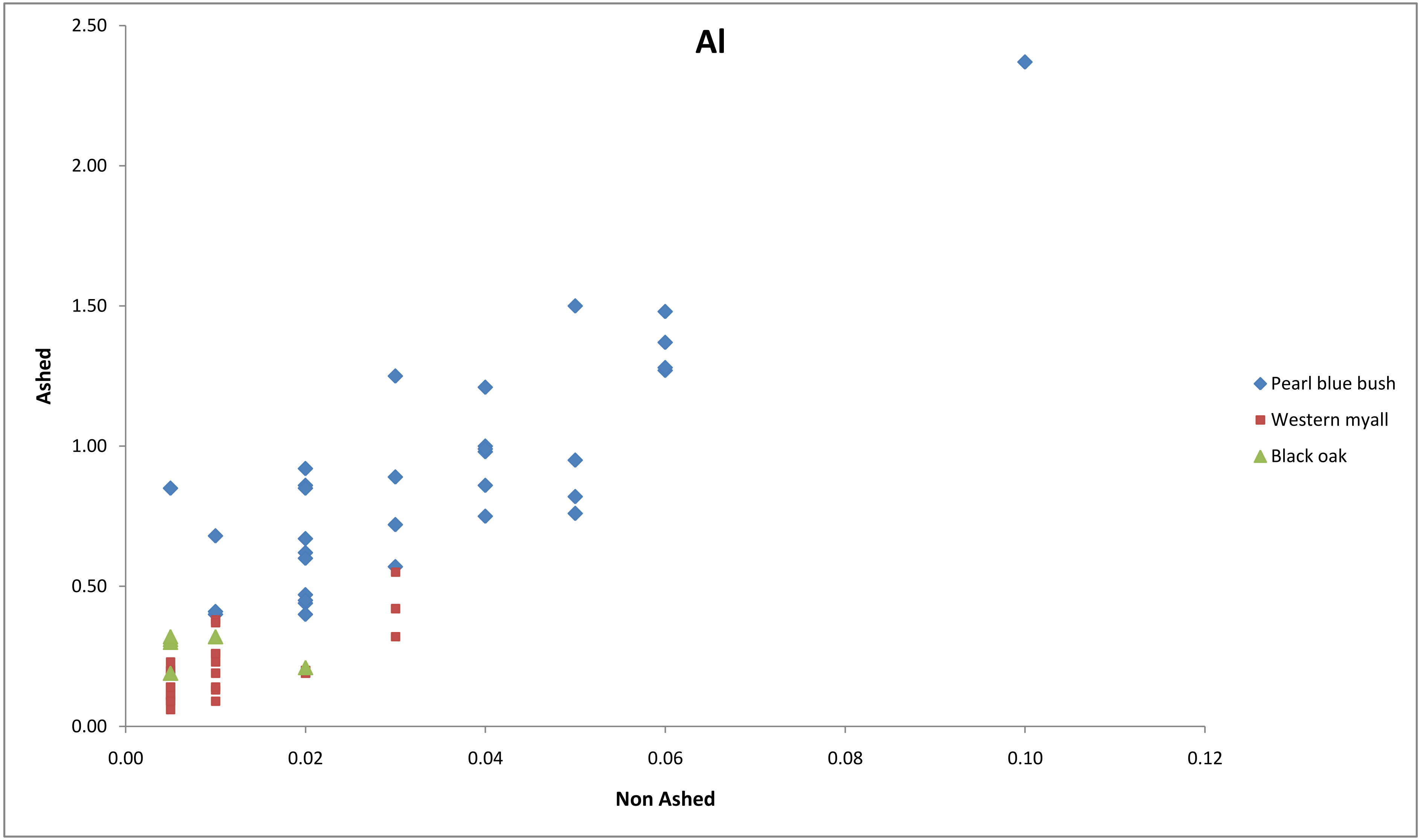

Fe
2.50
2.00
1.50
1.00
0.50
0.00
Ashed
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
Non Ashed
y = 9.6345x + 0.3377
R² = 0.5837
y = 11.323x + 0.0338
R² = 0.7208
y = 2.1675x + 0.3109
R² = 0.0122
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)
Linear (Black oak)


Li
Ashed
Non Ashed
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
y = 8.3424x + 4.7514
R² = 0.6617
y = 3.2084x + 3.5711
R² = 0.1183
Pearl blue bush
Western myall
Black oak
Linear (Pearl blue bush)
Linear (Western myall)

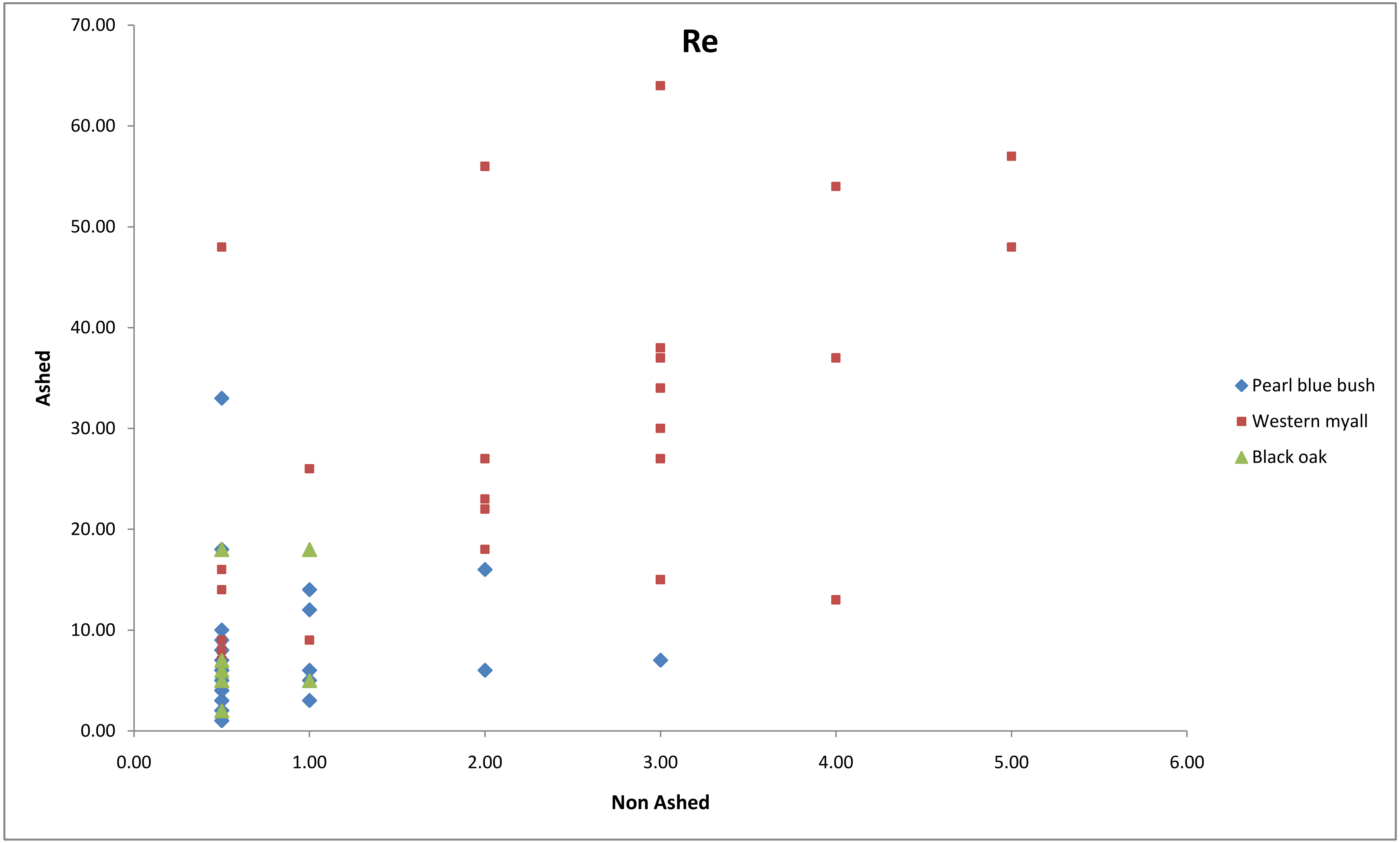

Mo
Ashed
Non Ashed
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
Pearl blue bush
Western myall
Black oak

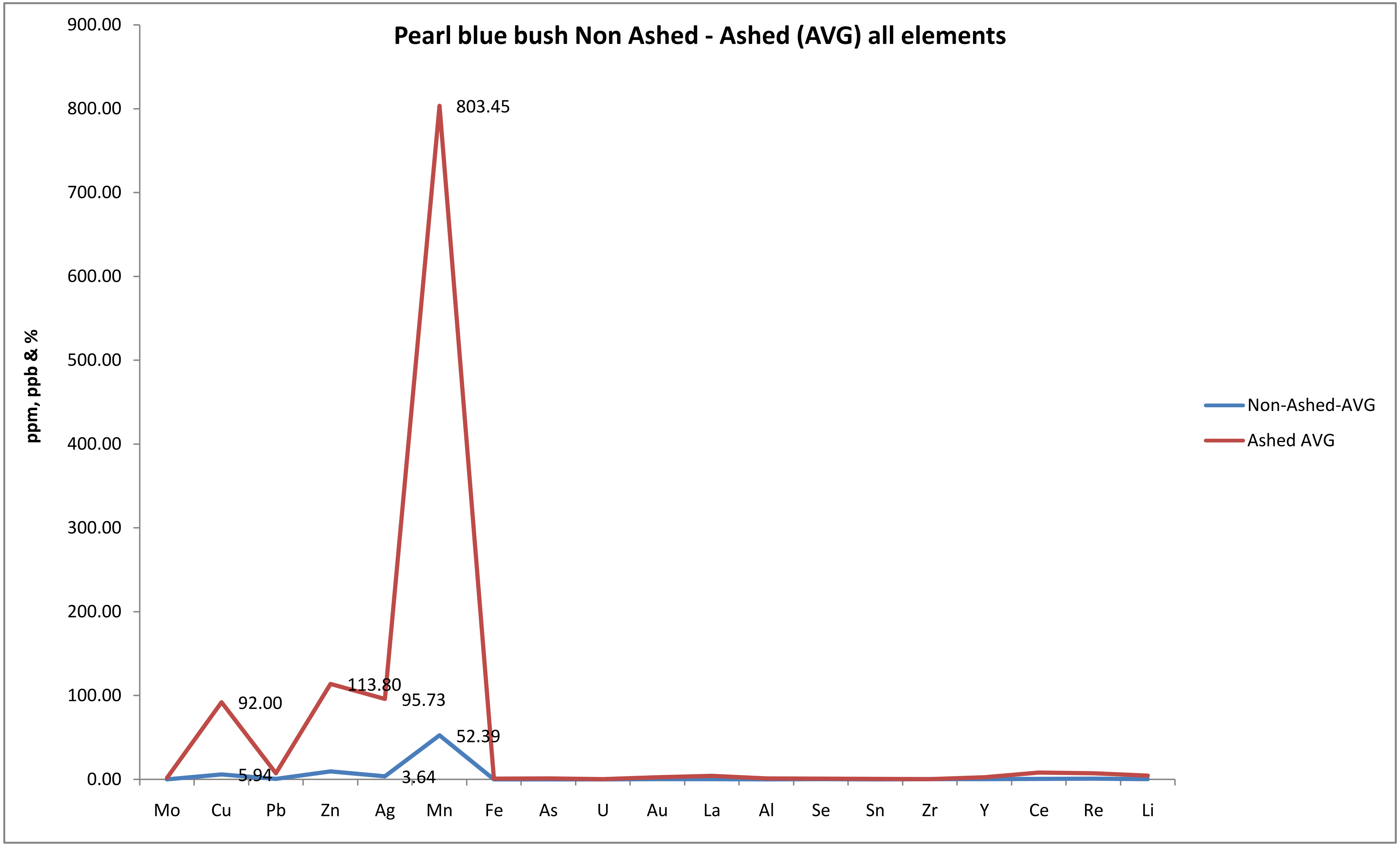


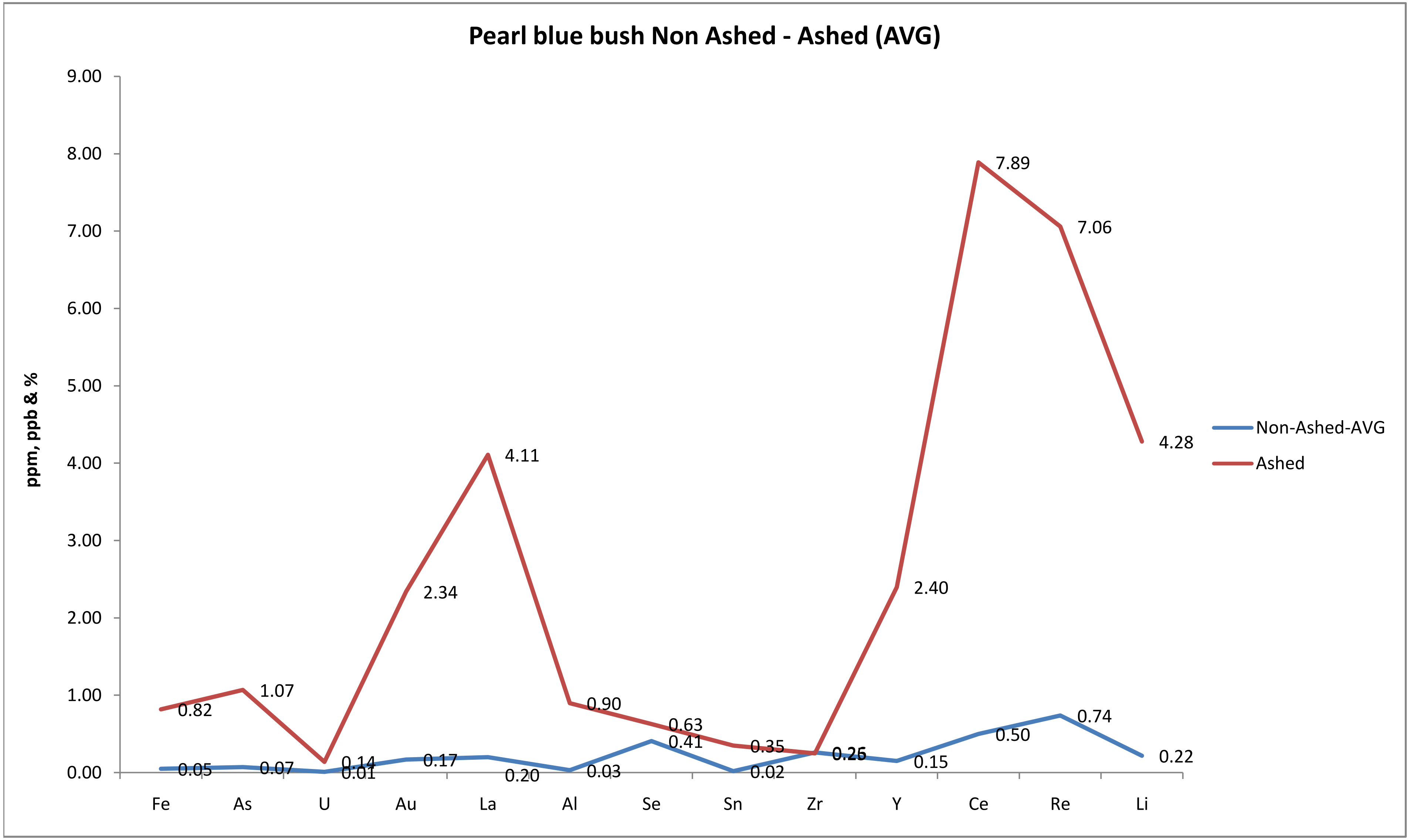
Zr
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Ashed
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Non Ashed
Pearl blue bush
Western myall
Black oak



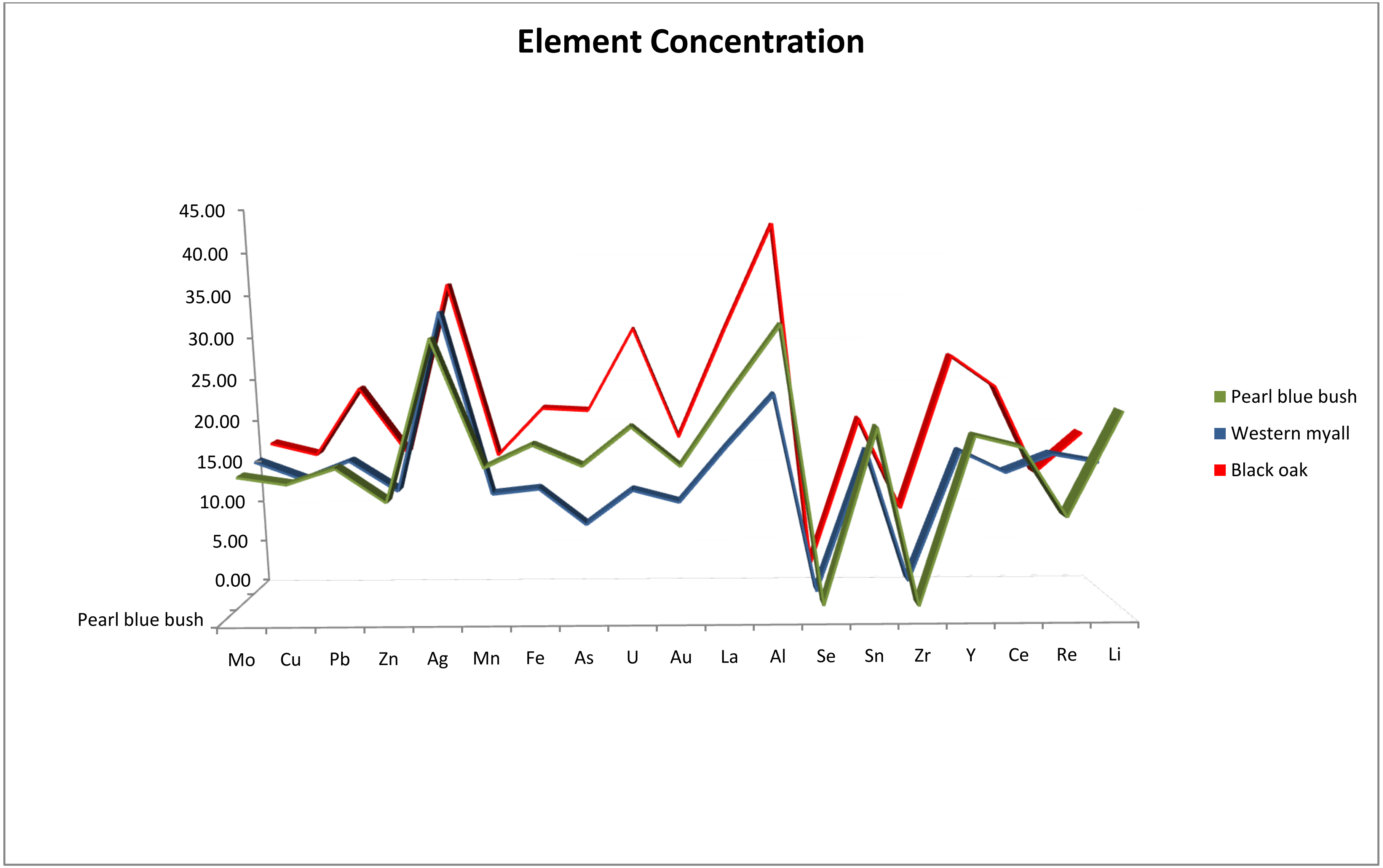
Al
Ashed
Non Ashed
2.50
2.00
1.50
1.00
0.50
0.00
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Pearl blue bush
Western myall
Black oak


Re
Ashed
Non Ashed
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Pearl blue bush
Western myall
Black oak


Pearl blue bush Non Ashed - Ashed (AVG) all elements
ppm, ppb & %
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
803.45
113.80
92.00
95.73
52.39
5.94
3.64
Mo
Cu
Pb
Zn
Ag
Mn
Fe
As
U
Au
La
Al
Se
Sn
Zr
Y
Ce
Re
Li
Non-Ashed-AVG
Ashed AVG



Pearl blue bush Non Ashed - Ashed (AVG)
ppm, ppb & %
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Fe
As
U
Au
La
Al
Se
Sn
Zr
Y
Ce
Re
Li
0.82
1.07
0.14
2.34
4.11
0.90
0.63
0.35
0.25
2.40
7.89
7.06
4.28
0.05
0.07
0.01
0.17
0.20
0.03
0.41
0.02
0.26
0.15
0.50
0.74
0.22
Non-Ashed-AVG
Ashed


Element Concentration
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Pearl blue bush
Mo
Cu
Pb
Zn
Ag
Mn
Fe
As
U
Au
La
Al
Se
Sn
Zr
Y
Ce
Re
Li
Pearl blue bush
Western myall
Black oak

Summary Table - Ashed & Non Ashed 'Dry' - Pearl blue bush

			Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
		Analyte	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
		Unit	PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
		MDL	0.01	0.01	0.01	0.1	2	1	0.001	0.1	0.01	0.2	0.01	0.01	0.1	0.02	0.01	0.001	0.01	1	0.01
Non-Ashed-001	701645	6376996	0.06	7.53	0.42	11.80	3.00	37.00	0.03	0.05	0.01	0.30	0.11	0.02	0.40	0.03	0.15	0.08	0.30	0.50	0.13
KNOB-DT-017	701645	6376996	2.15	105.50	9.18	133.70	115.00	484.00	0.74	1.30	0.20	5.00	3.10	0.62	0.30	0.60	0.50	1.62	5.60	18.00	4.20
		Conc	**35.83**	**14.01**	**21.86**	**11.33**	**38.33**	**13.08**	**25.52**	**26.00**	**40.00**	**16.67**	**28.18**	**31.00**	**0.75**	**20.00**	**3.33**	**21.60**	**18.67**	**36.00**	**32.31**
Non-Ashed-003	698793	6378998	0.07	5.77	0.43	8.10	2.00	50.00	0.04	0.05	0.01	0.10	0.17	0.03	0.30	0.01	0.22	0.12	0.42	2.00	0.18
KNOB-DT-129	698793	6378998	1.42	110.48	10.14	152.90	128.00	1007.00	1.05	1.10	0.20	2.20	5.30	1.25	0.50	0.50	0.20	3.12	9.70	6.00	6.10
		Conc	**20.29**	**19.15**	**23.58**	**18.88**	**64.00**	**20.14**	**23.86**	**22.00**	**40.00**	**22.00**	**31.18**	**41.67**	**1.67**	**50.00**	**0.91**	**26.00**	**23.10**	**3.00**	**33.89**
Non-Ashed-007	699011	6378000	0.08	7.42	0.35	9.80	4.00	64.00	0.04	0.05	0.01	0.20	0.12	0.02	0.30	0.01	0.16	0.08	0.29	0.50	0.16
KNOB-DT-119	699011	6378000	1.43	116.26	6.17	138.00	104.00	1137.00	0.80	0.80	0.10	0.90	3.70	0.92	0.80	0.30	0.40	2.14	7.20	2.00	4.20
		Conc	**17.88**	**15.67**	**17.63**	**14.08**	**26.00**	**17.77**	**22.86**	**16.00**	**20.00**	**4.50**	**30.83**	**46.00**	**2.67**	**30.00**	**2.50**	**25.78**	**24.83**	**4.00**	**26.25**
Non-Ashed-011	699818	6376988	0.12	4.92	0.36	21.40	3.00	46.00	0.06	0.05	0.01	0.10	0.14	0.02	0.40	0.01	0.18	0.10	0.35	0.50	0.21
KNOB-DT-054	699818	6376988	1.93	61.67	6.42	280.80	89.00	612.00	1.00	1.10	0.30	5.70	3.70	0.60	0.80	0.20	0.05	1.84	6.80	33.00	3.60
		Conc	**16.08**	**12.53**	**17.83**	**13.12**	**29.67**	**13.30**	**16.67**	**22.00**	**30.00**	**57.00**	**26.43**	**30.00**	**2.00**	**20.00**	**0.28**	**17.86**	**19.43**	**66.00**	**17.14**
Non-Ashed-013	701199	6379020	0.10	6.90	0.26	6.70	3.00	36.00	0.02	0.05	0.01	0.10	0.09	0.02	0.80	0.01	0.13	0.05	0.22	0.50	0.15
KNOB-DT-161	701199	6379020	2.05	112.54	5.95	124.80	93.00	807.00	0.68	0.40	0.10	1.40	3.60	0.86	3.00	0.30	0.05	2.04	7.10	10.00	4.50
		Conc	**20.50**	**16.31**	**22.88**	**18.63**	**31.00**	**22.42**	**29.57**	**8.00**	**20.00**	**14.00**	**40.00**	**43.00**	**3.75**	**30.00**	**0.38**	**38.49**	**32.27**	**20.00**	**30.00**
Non-Ashed-017	698403	6378999	0.21	5.59	0.85	8.60	5.00	63.00	0.13	0.05	0.02	0.10	0.60	0.10	0.30	0.04	0.72	0.47	1.39	0.50	0.40
KNOB-DT-128	698403	6378999	2.36	64.28	11.80	88.20	112.00	853.00	2.02	2.00	0.30	0.10	9.70	2.37	0.40	0.60	0.30	6.00	19.10	5.00	8.30
		Conc	**11.24**	**11.50**	**13.88**	**10.26**	**22.40**	**13.54**	**15.54**	**40.00**	**15.00**	**1.00**	**16.17**	**23.70**	**1.33**	**15.00**	**0.42**	**12.90**	**13.74**	**10.00**	**20.75**
Non-Ashed-018	700399	6379004	0.11	6.60	0.36	6.90	3.00	47.00	0.04	0.05	0.01	0.10	0.15	0.03	0.30	0.01	0.22	0.11	0.36	1.00	0.16
KNOB-DT-079	700399	6379004	1.35	99.69	5.44	82.70	76.00	690.00	0.57	0.90	0.20	0.50	3.40	0.57	0.30	0.30	0.20	2.05	6.80	12.00	3.20
		Conc	**12.27**	**15.10**	**15.11**	**11.99**	**25.33**	**14.68**	**13.26**	**18.00**	**40.00**	**5.00**	**22.67**	**19.00**	**1.00**	**30.00**	**0.91**	**18.64**	**18.89**	**12.00**	**20.00**
Non-Ashed-021	700452	6377052	0.12	5.73	0.25	55.70	4.00	22.00	0.02	0.05	0.01	0.70	0.04	0.01	0.30	0.01	0.07	0.03	0.11	1.00	0.07
KNOB-DT-030	700452	6377052	3.19	121.53	8.91	320.20	91.00	695.00	1.26	1.70	0.30	8.30	4.90	0.85	0.40	0.60	0.20	2.32	8.80	14.00	3.60
		Conc	**26.58**	**21.21**	**35.64**	**5.75**	**22.75**	**31.59**	**66.32**	**34.00**	**60.00**	**11.86**	**122.50**	**170.00**	**1.33**	**60.00**	**2.86**	**92.80**	**80.00**	**14.00**	**51.43**

Non-Ashed-022	699400	6379000	0.07	6.39	0.43	6.50	5.00	48.00	0.06	0.05	0.01	0.60	0.29	0.05	0.40	0.03	0.39	0.21	0.68	0.50	0.30
KNOB-DT-131	699400	6379000	0.93	104.55	4.98	117.90	116.00	665.00	0.63	0.40	0.10	3.50	3.60	0.82	0.40	0.30	0.10	2.28	7.00	6.00	4.60
		Conc	**13.29**	**16.36**	**11.58**	**18.14**	**23.20**	**13.85**	**9.84**	**8.00**	**10.00**	**5.83**	**12.41**	**16.40**	**1.00**	**10.00**	**0.26**	**10.96**	**10.29**	**12.00**	**15.33**
Non-Ashed-024	701805	6378000	0.06	4.55	0.42	6.20	3.00	26.00	0.04	0.05	0.01	0.10	0.18	0.03	0.30	0.01	0.22	0.12	0.45	0.50	0.10
KNOB-DT-146	701805	6378000	1.13	77.18	8.26	89.30	83.00	454.00	0.82	1.40	0.10	1.50	3.90	0.89	0.70	0.30	0.10	2.17	7.80	1.00	3.60
		Conc	**18.83**	**16.96**	**19.67**	**14.40**	**27.67**	**17.46**	**18.64**	**28.00**	**10.00**	**15.00**	**21.67**	**29.67**	**2.33**	**30.00**	**0.45**	**17.64**	**17.33**	**2.00**	**36.00**
Non-Ashed-025	700995	6377001	0.20	5.33	0.25	8.20	3.00	30.00	0.04	0.05	0.01	0.10	0.08	0.01	0.30	0.01	0.11	0.05	0.19	2.00	0.08
KNOB-DT-026	700995	6377001	4.62	123.02	6.03	170.10	86.00	627.00	0.59	1.10	0.10	1.50	2.60	0.40	0.30	0.40	0.50	1.21	4.70	16.00	2.10
		Conc	**23.10**	**23.08**	**24.12**	**20.74**	**28.67**	**20.90**	**16.86**	**22.00**	**20.00**	**15.00**	**32.50**	**40.00**	**1.00**	**40.00**	**4.55**	**22.83**	**24.74**	**8.00**	**26.25**
Non-Ashed-027	703069	6380759	0.23	6.52	0.41	5.60	5.00	44.00	0.06	0.05	0.01	0.10	0.33	0.06	0.30	0.03	0.47	0.24	0.79	1.00	0.31
KNOB-DT-111	703069	6380759	2.61	81.29	7.47	90.70	105.00	901.00	0.94	0.70	0.10	0.60	6.00	1.48	0.90	0.40	0.30	3.46	11.10	3.00	5.70
		Conc	**11.35**	**12.47**	**18.22**	**16.20**	**21.00**	**20.48**	**15.41**	**14.00**	**20.00**	**6.00**	**18.18**	**24.67**	**3.00**	**13.33**	**0.64**	**14.66**	**14.05**	**3.00**	**18.39**
Non-Ashed-029	700997	6380002	0.05	7.38	0.54	6.20	7.00	85.00	0.06	0.05	0.01	0.10	0.25	0.05	0.50	0.02	0.32	0.20	0.66	0.50	0.23
KNOB-DT-150	700997	6380002	0.61	113.36	6.64	85.20	166.00	946.00	0.75	1.20	0.10	2.80	3.80	0.95	0.50	0.30	0.10	2.29	7.60	4.00	4.80
		Conc	**12.20**	**15.36**	**12.30**	**13.74**	**23.71**	**11.13**	**11.90**	**24.00**	**20.00**	**28.00**	**15.20**	**19.00**	**1.00**	**15.00**	**0.31**	**11.57**	**11.52**	**8.00**	**20.87**
Non-Ashed-033	700608	6377996	0.13	8.24	0.48	7.50	5.00	72.00	0.06	0.05	0.01	0.10	0.24	0.04	0.50	0.02	0.29	0.17	0.61	0.50	0.18
KNOB-DT-115	700608	6377996	1.82	119.06	10.63	99.40	121.00	1083.00	1.19	2.00	0.30	1.30	5.60	1.21	0.70	0.40	0.20	2.77	10.90	4.00	4.60
		Conc	**14.00**	**14.45**	**22.15**	**13.25**	**24.20**	**15.04**	**18.89**	**40.00**	**30.00**	**13.00**	**23.33**	**30.25**	**1.40**	**20.00**	**0.69**	**16.69**	**17.87**	**8.00**	**25.56**
Non-Ashed-034	700599	6380000	0.08	5.38	0.19	6.00	3.00	55.00	0.02	0.05	0.01	0.10	0.08	0.02	0.30	0.01	0.11	0.05	0.20	0.50	0.08
KNOB-DT-149	700599	6380000	2.02	81.89	4.51	76.50	92.00	673.00	0.47	1.20	0.05	2.00	2.30	0.44	0.50	0.20	0.80	1.29	5.20	4.00	2.30
		Conc	**25.25**	**15.22**	**23.74**	**12.75**	**30.67**	**12.24**	**23.50**	**24.00**	**10.00**	**20.00**	**28.75**	**22.00**	**1.67**	**20.00**	**7.27**	**25.80**	**26.00**	**8.00**	**28.75**
Non-Ashed-035	700799	6380002	0.45	5.71	0.26	22.10	1.00	14.00	0.02	0.05	0.01	0.10	0.09	0.01	0.50	0.01	0.08	0.07	0.24	3.00	0.91
KNOB-DT-094	700799	6380002	1.43	118.52	6.44	140.10	158.00	1001.00	0.65	1.20	0.10	0.90	2.70	0.68	0.20	0.20	0.10	1.58	5.20	7.00	3.30
		Conc	**3.18**	**20.76**	**24.77**	**6.34**	**158.00**	**71.50**	**29.55**	**24.00**	**20.00**	**9.00**	**30.00**	**68.00**	**0.40**	**20.00**	**1.25**	**23.24**	**21.67**	**2.33**	**3.63**
Non-Ashed-038	700198	6380002	0.07	4.80	0.80	7.70	4.00	83.00	0.09	0.20	0.02	0.80	0.39	0.06	0.50	0.04	0.43	0.27	0.95	0.50	0.37
KNOB-DT-093	700198	6380002	1.04	81.09	12.16	118.80	102.00	1052.00	1.28	2.40	0.20	5.30	5.70	1.27	0.70	0.60	0.05	3.24	10.70	2.00	5.20
		Conc	**14.86**	**16.89**	**15.20**	**15.43**	**25.50**	**12.67**	**14.38**	**12.00**	**10.00**	**6.63**	**14.62**	**21.17**	**1.40**	**15.00**	**0.12**	**11.91**	**11.26**	**4.00**	**14.05**
Non-Ashed-039	700062	6380013	0.07	4.10	0.45	6.20	5.00	92.00	0.06	0.20	0.01	0.10	0.24	0.04	0.30	0.03	0.29	0.17	0.58	0.50	0.19
KNOB-DT-147	700062	6380013	0.92	66.40	6.20	98.60	83.00	1462.00	0.96	1.90	0.20	3.80	5.30	1.00	0.60	0.50	0.05	2.93	10.20	1.00	5.10
		Conc	**13.14**	**16.20**	**13.78**	**15.90**	**16.60**	**15.89**	**16.00**	**9.50**	**40.00**	**38.00**	**22.08**	**25.00**	**2.00**	**16.67**	**0.17**	**17.44**	**17.59**	**2.00**	**26.84**

Non-Ashed-043	701590	6378991	0.04	5.28	0.32	5.80	2.00	41.00	0.03	0.05	0.01	0.10	0.12	0.02	0.30	0.01	0.17	0.07	0.29	1.00	0.19
KNOB-DT-160	701590	6378991	0.90	69.62	5.59	74.20	66.00	717.00	0.66	1.10	0.10	1.70	3.40	0.85	0.50	0.20	0.20	1.95	6.70	5.00	4.90
		Conc	**22.50**	**13.19**	**17.47**	**12.79**	**33.00**	**17.49**	**24.44**	**22.00**	**20.00**	**17.00**	**28.33**	**42.50**	**1.67**	**20.00**	**1.18**	**27.46**	**23.10**	**5.00**	**25.79**
Non-Ashed-046	702208	6379991	0.06	6.91	0.82	7.30	6.00	77.00	0.08	0.10	0.01	0.20	0.42	0.06	0.50	0.03	0.44	0.29	1.02	0.50	0.33
KNOB-DT-154	702208	6379991	0.94	93.19	8.96	100.60	103.00	1299.00	1.10	1.50	0.20	0.80	6.20	1.37	0.70	0.50	0.05	4.12	12.30	7.00	7.00
		Conc	**15.67**	**13.49**	**10.93**	**13.78**	**17.17**	**16.87**	**13.25**	**15.00**	**20.00**	**4.00**	**14.76**	**22.83**	**1.40**	**16.67**	**0.11**	**14.01**	**12.06**	**14.00**	**21.21**
Non-Ashed-047	701139	6376985	0.13	4.96	0.47	7.80	4.00	56.00	0.03	0.20	0.01	0.10	0.10	0.02	0.40	0.03	0.12	0.07	0.25	0.50	0.09
KNOB-DT-025	701139	6376985	3.01	93.80	6.93	138.00	93.00	884.00	0.63	0.80	0.10	6.30	2.90	0.47	0.50	0.50	0.40	1.45	5.20	3.00	2.50
		Conc	**23.15**	**18.91**	**14.74**	**17.69**	**23.25**	**15.79**	**19.69**	**4.00**	**20.00**	**63.00**	**29.00**	**23.50**	**1.25**	**16.67**	**3.33**	**21.01**	**20.80**	**6.00**	**27.78**
Non-Ashed-048	702397	6379400	0.07	5.66	0.34	7.30	3.00	50.00	0.03	0.05	0.01	0.10	0.13	0.02	0.40	0.01	0.14	0.10	0.32	0.50	0.15
KNOB-DT-158	702397	6379400	0.80	76.43	3.90	95.10	73.00	702.00	0.46	0.30	0.05	2.10	2.40	0.45	0.60	0.20	0.05	1.65	4.60	7.00	2.60
		Conc	**11.43**	**13.50**	**11.47**	**13.03**	**24.33**	**14.04**	**14.84**	**6.00**	**10.00**	**21.00**	**18.46**	**22.50**	**1.50**	**20.00**	**0.36**	**16.02**	**14.38**	**14.00**	**17.33**
Non-Ashed-049	701996	6378981	0.07	5.07	0.26	7.70	1.00	40.00	0.02	0.05	0.01	0.10	0.12	0.02	0.40	0.01	0.13	0.10	0.28	0.50	0.10
KNOB-DT-159	701996	6378981	1.05	83.94	5.43	149.40	60.00	650.00	0.49	0.60	0.05	3.70	3.60	0.67	0.50	0.30	0.60	2.75	6.60	3.00	3.70
		Conc	**15.00**	**16.56**	**20.88**	**19.40**	**60.00**	**16.25**	**21.30**	**12.00**	**10.00**	**37.00**	**30.00**	**33.50**	**1.25**	**30.00**	**4.62**	**27.78**	**23.57**	**6.00**	**37.00**
Non-Ashed-050	697653	6381025	0.09	4.52	0.50	6.50	3.00	84.00	0.07	0.05	0.01	0.10	0.29	0.05	0.50	0.02	0.36	0.21	0.72	0.50	0.27
KNOB-DT-089	697653	6381025	1.12	68.25	5.82	79.90	72.00	861.00	0.64	0.60	0.10	0.60	3.00	0.76	0.70	0.20	0.20	1.64	5.50	5.00	3.60
		Conc	**12.44**	**15.10**	**11.64**	**12.29**	**24.00**	**10.25**	**9.85**	**12.00**	**10.00**	**6.00**	**10.34**	**15.20**	**1.40**	**10.00**	**0.56**	**7.92**	**7.64**	**10.00**	**13.33**
Non-Ashed-051	702577	6378005	0.11	4.22	0.37	5.20	5.00	20.00	0.04	0.05	0.01	0.10	0.14	0.03	0.30	0.01	0.21	0.09	0.34	0.50	0.15
KNOB-DT-090	702577	6378005	1.69	66.13	6.84	60.70	92.00	398.00	0.59	0.70	0.10	0.10	2.70	0.72	0.30	0.20	0.10	1.53	4.70	3.00	2.70
		Conc	**15.36**	**15.67**	**18.49**	**11.67**	**18.40**	**19.90**	**14.75**	**14.00**	**20.00**	**1.00**	**19.29**	**24.00**	**1.00**	**20.00**	**0.48**	**16.45**	**13.82**	**6.00**	**18.00**
Non-Ashed-054	699037	6376959	0.13	6.58	0.68	7.40	4.00	57.00	0.12	0.20	0.02	0.10	0.38	0.06	0.50	0.03	0.47	0.27	0.93	0.50	0.43
KNOB-DT-174	699037	6376959	1.59	106.41	7.83	103.70	136.00	672.00	1.37	1.60	0.30	4.80	5.70	1.28	0.70	0.50	0.60	3.39	10.90	8.00	4.90
		Conc	**12.23**	**16.17**	**11.51**	**14.01**	**34.00**	**11.79**	**11.32**	**8.00**	**15.00**	**48.00**	**15.00**	**21.33**	**1.40**	**16.67**	**1.28**	**12.46**	**11.72**	**16.00**	**11.40**
Non-Ashed-057	702898	6378018	0.05	6.71	0.32	9.40	3.00	70.00	0.02	0.05	0.01	0.10	0.08	0.01	0.40	0.03	0.10	0.08	0.19	0.50	0.11
KNOB-DT-091	702898	6378018	0.91	85.62	5.05	82.00	60.00	919.00	0.42	0.70	0.05	2.50	2.10	0.41	0.60	0.20	0.10	1.79	4.00	6.00	3.20
		Conc	**18.20**	**12.76**	**15.78**	**8.72**	**20.00**	**13.13**	**23.33**	**14.00**	**10.00**	**25.00**	**26.25**	**41.00**	**1.50**	**6.67**	**1.00**	**23.25**	**21.05**	**12.00**	**29.09**
Non-Ashed-061	699597	6379000	0.15	5.84	0.45	6.90	4.00	54.00	0.03	0.05	0.01	0.10	0.12	0.02	0.40	0.01	0.15	0.09	0.31	0.50	0.16
KNOB-DT-077	699597	6379000	1.46	62.68	5.41	62.10	83.00	613.00	0.50	0.60	0.10	3.70	2.70	0.40	0.50	0.20	0.05	1.61	5.70	9.00	3.60
		Conc	**9.73**	**10.73**	**12.02**	**9.00**	**20.75**	**11.35**	**16.13**	**12.00**	**20.00**	**37.00**	**22.50**	**20.00**	**1.25**	**20.00**	**0.33**	**18.30**	**18.39**	**18.00**	**22.50**

Non-Ashed-063	701198	6380007	0.11	6.65	0.33	6.10	3.00	52.00	0.05	0.05	0.01	0.30	0.21	0.04	0.50	0.01	0.27	0.17	0.51	1.00	0.18
KNOB-DT-095	701198	6380007	1.60	123.35	4.26	80.10	71.00	735.00	0.52	0.40	0.05	1.20	2.80	0.75	0.60	0.20	0.05	1.57	5.10	6.00	2.90
		Conc	**14.55**	**18.55**	**12.91**	**13.13**	**23.67**	**14.13**	**10.61**	**8.00**	**10.00**	**4.00**	**13.33**	**18.75**	**1.20**	**20.00**	**0.19**	**9.40**	**10.00**	**6.00**	**16.11**
Non-Ashed-064	702725	6380922	0.14	6.52	0.43	7.50	6.00	57.00	0.04	0.05	0.01	0.10	0.21	0.04	0.50	0.03	0.27	0.15	0.50	0.50	0.20
KNOB-DT-109	702725	6380922	2.25	109.31	6.89	94.70	116.00	973.00	0.70	0.50	0.10	1.50	4.00	0.98	0.70	0.30	0.40	2.48	7.30	8.00	4.20
		Conc	**16.07**	**16.77**	**16.02**	**12.63**	**19.33**	**17.07**	**15.91**	**10.00**	**20.00**	**15.00**	**19.05**	**24.50**	**1.40**	**10.00**	**1.48**	**16.76**	**14.60**	**16.00**	**21.00**
Non-Ashed-065	698404	6379990	0.07	7.30	0.51	5.50	3.00	56.00	0.07	0.05	0.01	0.10	0.29	0.05	0.60	0.04	0.40	0.21	0.68	0.50	0.31
KNOB-DT-084	698404	6379990	1.17	77.60	8.56	56.30	94.00	671.00	1.16	1.30	0.20	0.10	7.00	1.50	0.90	0.40	0.40	4.12	14.70	5.00	7.50
		Conc	**16.71**	**10.63**	**16.78**	**10.24**	**31.33**	**11.98**	**17.58**	**26.00**	**40.00**	**1.00**	**24.14**	**30.00**	**1.50**	**10.00**	**1.00**	**19.62**	**21.62**	**10.00**	**24.19**
Non-Ashed-066	701992	6380034	0.08	5.92	0.52	7.30	3.00	60.00	0.06	0.05	0.01	0.10	0.28	0.04	0.50	0.02	0.37	0.22	0.71	0.50	0.22
KNOB-DT-097	701992	6380034	1.02	98.27	8.10	110.90	60.00	784.00	0.74	1.00	0.10	0.50	4.60	0.99	0.60	0.30	0.20	2.70	8.50	6.00	4.60
		Conc	**12.75**	**16.60**	**15.58**	**15.19**	**20.00**	**13.07**	**12.54**	**20.00**	**20.00**	**5.00**	**16.43**	**24.75**	**1.20**	**15.00**	**0.54**	**12.39**	**11.97**	**12.00**	**20.91**
Non-Ashed-067	697399	6380005	0.07	5.05	0.46	5.00	2.00	41.00	0.06	0.20	0.01	0.10	0.23	0.04	0.30	0.01	0.30	0.16	0.57	0.50	0.21
KNOB-DT-086	697399	6380005	1.14	62.99	5.54	59.70	60.00	487.00	0.66	0.70	0.10	0.30	3.60	0.86	0.30	0.30	0.50	2.26	7.10	4.00	4.40
		Conc	**16.29**	**12.47**	**12.04**	**11.94**	**30.00**	**11.88**	**11.58**	**3.50**	**20.00**	**3.00**	**15.65**	**21.50**	**1.00**	**30.00**	**1.67**	**14.58**	**12.46**	**8.00**	**20.95**

Summary Table - Ashed & Non Ashed 'Dry' - Western myall

		Analyte	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
		Unit	PPM	PPM	PPM	PPM	PPB	PPM	%	PPM	PPM	PPB	PPM	%	PPM	PPM	PPM	PPM	PPM	PPB	PPM
		MDL	0.01	0.01	0.01	0.1	2	1	0.001	0.1	0.01	0.2	0.01	0.01	0.1	0.02	0.01	0.001	0.01	1	0.01
Non-Ashed-002	700456	6377112	0.64	6.22	0.22	26.40	1.00	14.00	0.01	0.05	0.01	0.10	0.11	0.01	0.50	0.01	0.04	0.05	0.29	2.00	0.61
KNOB-DT-032	700456	6377112	13.18	113.44	3.84	436.80	35.00	228.00	0.25	0.60	0.05	3.30	2.10	0.18	0.30	0.40	0.05	1.10	5.00	27.00	11.10
		Conc	**20.59**	**18.24**	**17.45**	**16.55**	**35.00**	**16.29**	**17.86**	**12.00**	**10.00**	**33.00**	**19.09**	**36.00**	**0.60**	**40.00**	**1.25**	**22.00**	**17.24**	**13.50**	**18.20**
Non-Ashed-004	700167	6376999	0.10	7.12	0.51	11.30	5.00	68.00	0.04	0.05	0.01	0.10	0.17	0.03	0.30	0.03	0.20	0.11	0.42	0.50	0.16
KNOB-DT-035	700167	6376999	7.23	83.20	6.82	299.20	48.00	239.00	0.50	1.50	0.20	3.90	3.60	0.42	0.50	0.50	0.40	1.79	7.20	48.00	14.90
		Conc	**72.30**	**11.69**	**13.37**	**26.48**	**9.60**	**3.51**	**11.63**	**30.00**	**40.00**	**39.00**	**21.18**	**14.00**	**1.67**	**16.67**	**2.00**	**16.73**	**17.14**	**96.00**	**93.13**
Non-Ashed-005	699778	6376025	2.49	6.74	0.60	18.50	1.00	31.00	0.07	0.05	0.02	0.10	0.52	0.03	0.60	0.02	0.18	0.28	1.09	5.00	1.28
KNOB-DT-044	699778	6376025	34.06	107.39	7.98	264.10	57.00	399.00	0.97	1.50	0.30	1.10	8.50	0.55	0.70	0.50	0.05	4.41	15.70	48.00	15.50
		Conc	**13.68**	**15.93**	**13.30**	**14.28**	**57.00**	**12.87**	**13.86**	**30.00**	**15.00**	**11.00**	**16.35**	**18.33**	**1.17**	**25.00**	**0.28**	**15.81**	**14.40**	**9.60**	**12.11**
Non-Ashed-006	700080	6380068	0.29	8.26	0.30	20.70	1.00	51.00	0.03	0.05	0.01	0.10	0.11	0.01	0.50	0.01	0.12	0.12	0.36	2.00	0.83
KNOB-DT-092	700080	6380068	3.94	146.51	4.87	296.50	63.00	606.00	0.33	0.60	0.05	0.30	1.50	0.23	0.80	0.10	0.30	1.36	3.40	18.00	9.20
		Conc	**13.59**	**17.74**	**16.23**	**14.32**	**63.00**	**11.88**	**13.20**	**12.00**	**10.00**	**3.00**	**13.64**	**23.00**	**1.60**	**10.00**	**2.50**	**10.97**	**9.44**	**9.00**	**11.08**
Non-Ashed-008	698948	6375945	2.14	4.87	0.12	18.00	1.00	34.00	0.01	0.05	0.01	0.10	0.02	0.01	0.40	0.01	0.04	0.01	0.05	0.50	0.37
KNOB-DT-038	698948	6375945	36.58	59.56	2.91	222.70	27.00	448.00	0.23	0.30	0.05	1.20	0.80	0.14	0.50	0.30	0.05	0.61	1.40	7.00	4.70
		Conc	**17.09**	**12.23**	**24.25**	**12.37**	**27.00**	**13.18**	**19.17**	**6.00**	**10.00**	**12.00**	**40.00**	**28.00**	**1.25**	**30.00**	**1.25**	**50.83**	**28.00**	**14.00**	**12.70**
Non-Ashed-009	697855	6378098	0.70	2.40	0.26	8.70	3.00	13.00	0.02	0.05	0.01	0.10	0.09	0.01	0.50	0.01	0.07	0.05	0.26	2.00	1.42
KNOB-DT-067	697855	6378098	10.71	46.28	9.13	141.00	62.00	252.00	0.37	0.50	0.10	1.90	2.50	0.38	1.40	0.20	1.10	1.46	6.20	56.00	26.70
		Conc	**15.30**	**19.28**	**35.12**	**16.21**	**20.67**	**19.38**	**24.67**	**10.00**	**20.00**	**19.00**	**27.78**	**38.00**	**2.80**	**20.00**	**15.71**	**28.63**	**23.85**	**28.00**	**18.80**
Non-Ashed-010	699594	6375997	1.86	12.51	0.38	27.70	4.00	22.00	0.01	0.05	0.01	0.10	0.09	0.01	0.50	0.01	0.02	0.04	0.22	0.50	1.40
KNOB-DT-042	699594	6375997	30.87	212.10	7.80	474.90	87.00	345.00	0.16	0.05	0.05	1.70	2.10	0.11	0.60	0.20	0.05	1.20	6.30	16.00	21.60
		Conc	**16.60**	**16.95**	**20.53**	**17.14**	**21.75**	**15.68**	**16.00**	**1.00**	**10.00**	**17.00**	**23.33**	**22.00**	**1.20**	**20.00**	**2.50**	**27.91**	**28.64**	**32.00**	**15.43**
Non-Ashed-012	699284	6375981	1.61	2.98	0.21	17.20	2.00	64.00	0.02	0.05	0.01	0.30	0.05	0.01	0.60	0.01	0.06	0.04	0.13	4.00	1.11
KNOB-DT-039	699284	6375981	24.41	48.87	4.46	235.30	54.00	838.00	0.29	0.05	0.10	2.40	1.10	0.20	0.70	0.30	0.05	0.64	2.30	13.00	11.90
		Conc	**15.16**	**16.40**	**21.24**	**13.68**	**27.00**	**13.09**	**13.81**	**1.00**	**20.00**	**8.00**	**22.00**	**40.00**	**1.17**	**30.00**	**0.83**	**17.30**	**17.69**	**3.25**	**10.72**

Non-Ashed-015	699982	6376942	0.60	5.26	0.29	26.40	1.00	17.00	0.02	0.05	0.01	0.10	0.12	0.01	0.50	0.01	0.07	0.07	0.28	2.00	0.59
KNOB-DT-037	699982	6376942	7.99	92.44	6.32	375.00	35.00	252.00	0.33	0.50	0.10	2.50	2.90	0.26	0.60	0.50	0.05	1.61	5.70	22.00	9.50
		Conc	**13.32**	**17.57**	**21.79**	**14.20**	**35.00**	**14.82**	**17.37**	**10.00**	**20.00**	**25.00**	**24.17**	**26.00**	**1.20**	**50.00**	**0.71**	**23.33**	**20.36**	**11.00**	**16.10**
Non-Ashed-028	701098	6375992	0.73	9.21	0.08	19.70	1.00	27.00	0.01	0.05	0.01	0.10	0.03	0.01	0.50	0.01	0.04	0.01	0.09	1.00	0.38
KNOB-DT-023	701098	6375992	9.99	128.03	2.29	232.20	22.00	365.00	0.11	0.05	0.05	0.50	0.60	0.06	0.40	0.20	0.30	0.29	1.30	9.00	5.10
		Conc	**13.68**	**13.90**	**28.63**	**11.79**	**22.00**	**13.52**	**13.75**	**1.00**	**10.00**	**5.00**	**20.00**	**12.00**	**0.80**	**20.00**	**7.50**	**22.31**	**14.44**	**9.00**	**13.42**
Non-Ashed-030	699818	6376988	0.34	13.35	1.02	44.90	1.00	27.00	0.02	0.05	0.01	0.10	1.25	0.01	0.40	0.01	0.08	0.85	3.87	0.50	2.51
KNOB-DT-053	699818	6376988	7.50	171.71	8.91	409.00	71.00	325.00	0.15	0.20	0.05	2.50	14.00	0.09	0.80	0.40	0.20	8.47	36.60	14.00	26.10
		Conc	**22.06**	**12.86**	**8.74**	**9.11**	**71.00**	**12.04**	**6.52**	**4.00**	**10.00**	**25.00**	**11.20**	**9.00**	**2.00**	**40.00**	**2.50**	**9.94**	**9.46**	**28.00**	**10.40**
Non-Ashed-031	700334	6379968	0.25	12.39	0.09	27.10	1.00	75.00	0.01	0.05	0.01	0.10	0.08	0.01	0.50	0.01	0.02	0.07	0.74	4.00	0.32
KNOB-DT-148	700334	6379968	4.63	190.71	2.25	377.50	36.00	1279.00	0.14	1.00	0.05	0.10	1.80	0.11	0.50	0.05	0.05	1.27	12.80	54.00	6.50
		Conc	**18.52**	**15.39**	**25.00**	**13.93**	**36.00**	**17.05**	**17.50**	**20.00**	**10.00**	**1.00**	**22.50**	**22.00**	**1.00**	**5.00**	**2.50**	**19.54**	**17.30**	**13.50**	**20.31**
Non-Ashed-032	700347	6377049	0.48	6.59	0.24	22.30	1.00	19.00	0.02	0.05	0.01	0.10	0.14	0.01	0.40	0.01	0.09	0.12	0.69	3.00	0.67
KNOB-DT-033	700347	6377049	9.41	113.88	6.52	368.70	59.00	329.00	0.37	0.80	0.10	1.50	3.40	0.30	0.70	0.30	0.10	2.26	12.30	30.00	13.90
		Conc	**19.60**	**17.28**	**27.17**	**16.53**	**59.00**	**17.32**	**20.56**	**16.00**	**20.00**	**15.00**	**24.29**	**60.00**	**1.75**	**30.00**	**1.11**	**19.65**	**17.83**	**10.00**	**20.75**
Non-Ashed-036	698954	6376943	0.94	3.99	0.40	17.50	1.00	10.00	0.02	0.05	0.01	0.10	0.10	0.01	0.30	0.02	0.09	0.07	0.25	4.00	1.71
KNOB-DT-175	698954	6376943	9.88	90.89	7.65	253.70	75.00	147.00	0.36	1.00	0.10	3.00	2.00	0.37	0.50	0.20	0.05	1.11	4.10	37.00	19.60
		Conc	**10.51**	**22.78**	**19.13**	**14.50**	**75.00**	**14.70**	**18.00**	**20.00**	**20.00**	**30.00**	**20.00**	**37.00**	**1.67**	**10.00**	**0.56**	**15.86**	**16.40**	**9.25**	**11.46**
Non-Ashed-040	701611	6379994	1.78	8.37	0.24	15.40	2.00	10.00	0.01	0.20	0.01	0.10	0.04	0.01	0.70	0.01	0.05	0.03	0.12	0.50	0.62
KNOB-DT-096	701611	6379994	28.60	113.75	3.64	187.20	33.00	128.00	0.11	0.60	0.05	3.80	0.70	0.09	1.30	0.20	0.30	0.41	1.30	9.00	7.00
		Conc	**16.07**	**13.59**	**15.17**	**12.16**	**16.50**	**12.80**	**9.17**	**3.00**	**10.00**	**38.00**	**17.50**	**18.00**	**1.86**	**20.00**	**6.00**	**14.64**	**10.83**	**18.00**	**11.29**
Non-Ashed-041	698831	6376012	1.98	7.12	0.17	17.30	1.00	26.00	0.01	0.10	0.01	0.30	0.05	0.01	0.30	0.01	0.06	0.03	0.10	0.50	0.94
KNOB-DT-171	698831	6376012	24.04	80.88	2.21	203.20	66.00	298.00	0.20	0.40	0.05	0.30	1.00	0.20	0.20	0.10	0.05	0.59	1.90	8.00	15.60
		Conc	**12.14**	**11.36**	**13.00**	**11.75**	**66.00**	**11.46**	**14.29**	**4.00**	**10.00**	**1.00**	**20.00**	**40.00**	**0.67**	**10.00**	**0.83**	**21.85**	**19.00**	**16.00**	**16.60**
Non-Ashed-042	699108	6379021	0.19	7.52	0.70	46.90	2.00	29.00	0.04	0.05	0.01	0.10	0.17	0.02	0.70	0.01	0.15	0.11	0.60	3.00	1.28
KNOB-DT-130	699108	6379021	2.31	107.48	4.74	510.10	28.00	347.00	0.28	0.40	0.05	0.10	1.70	0.20	0.90	0.10	0.20	1.04	6.10	38.00	12.10
		Conc	**12.16**	**14.29**	**6.77**	**10.88**	**14.00**	**11.97**	**7.18**	**8.00**	**5.00**	**1.00**	**10.00**	**10.00**	**1.29**	**10.00**	**1.33**	**9.90**	**10.17**	**12.67**	**9.45**
Non-Ashed-044	699576	6377963	0.91	8.18	0.62	25.40	1.00	26.00	0.02	0.20	0.01	0.30	0.22	0.01	0.60	0.02	0.07	0.12	0.69	1.00	1.83
KNOB-DT-063	699576	6377963	12.77	100.26	7.82	241.40	22.00	282.00	0.18	0.50	0.05	0.50	2.50	0.13	0.50	0.05	0.05	1.28	7.40	26.00	17.20
		Conc	**14.03**	**12.26**	**12.61**	**9.50**	**22.00**	**10.85**	**10.00**	**2.50**	**10.00**	**1.67**	**11.36**	**13.00**	**0.83**	**2.50**	**0.71**	**10.41**	**10.72**	**26.00**	**9.40**

Non-Ashed-045	699225	6378095	0.58	9.00	0.77	32.80	4.00	26.00	0.02	0.05	0.01	0.20	0.29	0.02	0.40	0.01	0.11	0.10	0.49	3.00	1.80
KNOB-DT-064	699225	6378095	4.58	88.00	6.85	265.90	75.00	261.00	0.20	0.40	0.05	1.00	3.50	0.19	0.60	0.10	0.50	1.07	5.40	37.00	15.00
		Conc	**7.90**	**9.78**	**8.90**	**8.11**	**18.75**	**10.04**	**8.70**	**8.00**	**10.00**	**5.00**	**12.07**	**9.50**	**1.50**	**10.00**	**4.55**	**11.03**	**11.02**	**12.33**	**8.33**
Non-Ashed-053	703093	6380058	0.36	5.18	0.29	33.80	2.00	36.00	0.01	0.05	0.01	0.20	0.46	0.01	0.60	0.01	0.07	0.32	1.24	5.00	0.57
KNOB-DT-099	703093	6380058	4.55	69.81	4.54	361.40	44.00	399.00	0.16	0.30	0.05	0.10	5.60	0.14	0.50	0.10	0.40	3.64	12.20	57.00	7.30
		Conc	**12.64**	**13.48**	**15.66**	**10.69**	**22.00**	**11.08**	**12.31**	**6.00**	**10.00**	**0.50**	**12.17**	**28.00**	**0.83**	**10.00**	**5.71**	**11.30**	**9.84**	**11.40**	**12.81**
Non-Ashed-055	699457	6378028	1.88	7.78	0.40	18.70	3.00	30.00	0.02	0.05	0.01	0.10	0.28	0.01	0.60	0.01	0.10	0.11	0.75	2.00	1.65
KNOB-DT-118	699457	6378028	21.35	92.76	6.33	190.50	54.00	338.00	0.29	0.30	0.10	0.10	3.90	0.26	0.80	0.10	0.10	1.56	8.70	23.00	17.40
		Conc	**11.36**	**11.92**	**15.83**	**10.19**	**18.00**	**11.27**	**18.13**	**6.00**	**20.00**	**1.00**	**13.93**	**26.00**	**1.33**	**10.00**	**1.00**	**14.05**	**11.60**	**11.50**	**10.55**
Non-Ashed-056	700830	6376972	0.42	7.36	0.23	31.00	2.00	27.00	0.01	0.05	0.01	0.10	0.08	0.01	0.50	0.01	0.05	0.04	0.19	3.00	0.40
KNOB-DT-028	700830	6376972	8.02	117.16	3.41	426.80	64.00	373.00	0.10	0.05	0.05	0.50	1.50	0.09	0.40	0.30	0.05	0.71	3.00	15.00	7.40
		Conc	**19.10**	**15.92**	**14.83**	**13.77**	**32.00**	**13.81**	**7.69**	**1.00**	**10.00**	**5.00**	**18.75**	**18.00**	**0.80**	**30.00**	**1.00**	**16.51**	**15.79**	**5.00**	**18.50**
Non-Ashed-058	698500	6375968	1.54	7.57	0.28	19.60	2.00	32.00	0.02	0.05	0.01	0.30	0.06	0.01	0.50	0.03	0.08	0.04	0.15	0.50	0.35
KNOB-DT-173	698500	6375968	33.13	178.19	4.98	435.80	120.00	582.00	0.28	0.60	0.05	1.40	1.00	0.19	1.00	0.10	0.05	0.62	2.00	7.00	4.90
		Conc	**21.51**	**23.54**	**17.79**	**22.23**	**60.00**	**18.19**	**14.74**	**12.00**	**10.00**	**4.67**	**16.67**	**19.00**	**2.00**	**3.33**	**0.63**	**17.71**	**13.33**	**14.00**	**14.00**
Non-Ashed-059	701227	6379971	1.09	7.80	0.48	25.80	1.00	30.00	0.02	0.05	0.01	0.10	0.14	0.01	0.70	0.01	0.08	0.16	0.38	3.00	0.94
KNOB-DT-151	701227	6379971	8.94	58.92	3.35	217.90	17.00	263.00	0.08	0.30	0.05	0.60	1.60	0.14	0.50	0.05	0.05	1.77	4.10	27.00	9.90
		Conc	**8.20**	**7.55**	**6.98**	**8.45**	**17.00**	**8.77**	**4.71**	**6.00**	**10.00**	**6.00**	**11.43**	**14.00**	**0.71**	**5.00**	**0.63**	**11.13**	**10.79**	**9.00**	**10.53**
Non-Ashed-060	698577	6379930	1.97	7.32	0.53	13.40	2.00	25.00	0.03	0.05	0.01	0.10	0.16	0.03	0.70	0.02	0.17	0.15	0.51	3.00	1.92
KNOB-DT-137	698577	6379930	19.68	75.57	3.53	120.90	34.00	275.00	0.28	0.40	0.05	0.20	2.00	0.32	0.60	0.10	0.05	1.33	5.00	34.00	19.40
		Conc	**9.99**	**10.32**	**6.66**	**9.02**	**17.00**	**11.00**	**8.75**	**8.00**	**10.00**	**2.00**	**12.50**	**10.67**	**0.86**	**5.00**	**0.29**	**9.17**	**9.80**	**11.33**	**10.10**
Non-Ashed-062	701488	6380000	0.12	5.57	0.26	13.50	1.00	16.00	0.02	0.05	0.01	0.10	0.12	0.01	0.50	0.02	0.06	0.08	0.36	3.00	1.57
KNOB-DT-152	701488	6380000	1.57	82.22	4.05	169.00	17.00	218.00	0.24	0.40	0.05	0.40	2.20	0.23	0.30	0.10	0.05	1.31	5.30	64.00	21.20
		Conc	**13.08**	**14.76**	**15.58**	**12.52**	**17.00**	**13.63**	**16.00**	**8.00**	**10.00**	**4.00**	**18.33**	**46.00**	**0.60**	**5.00**	**0.83**	**16.79**	**14.72**	**21.33**	**13.50**

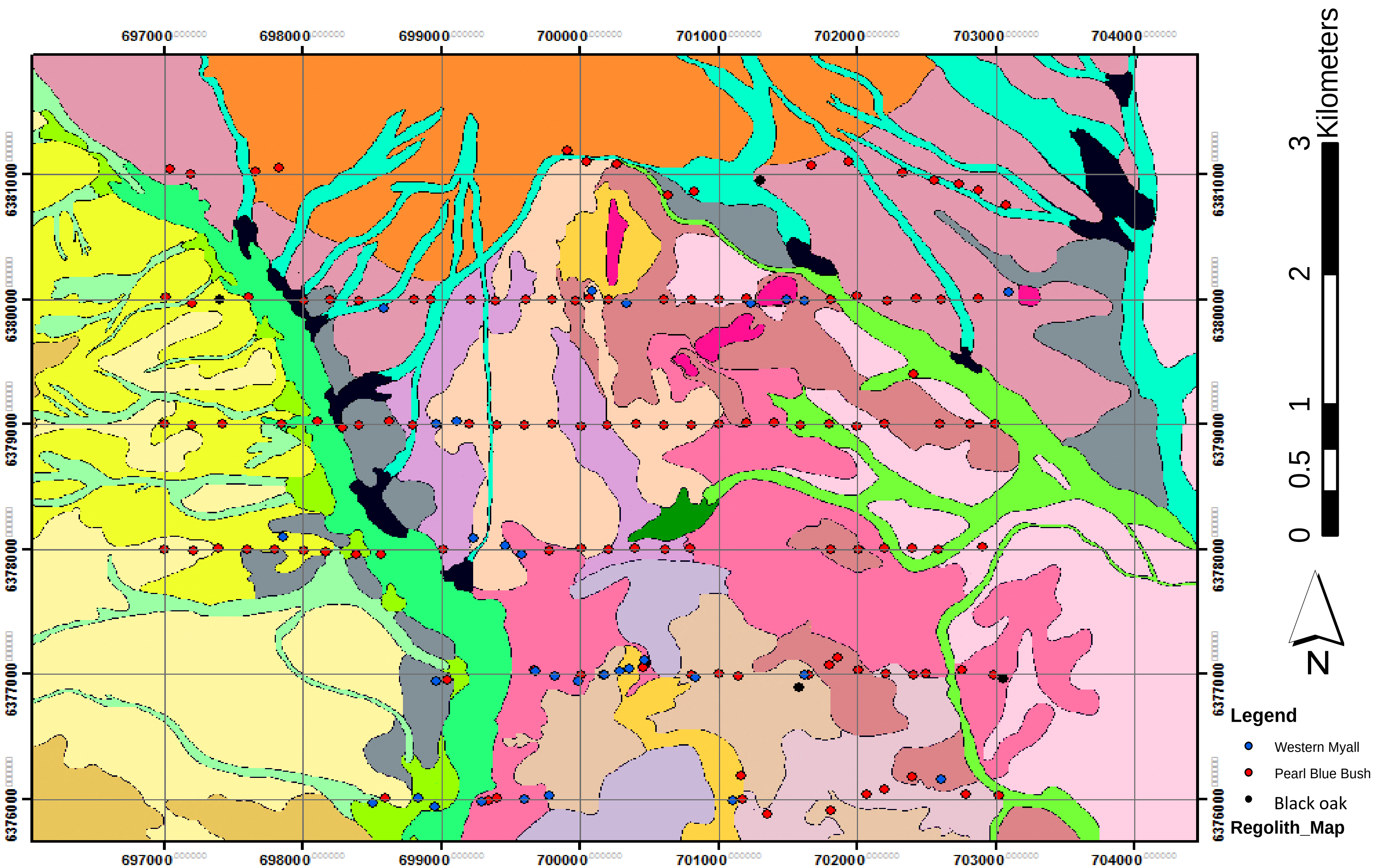
Summary Table - Ashed & Non Ashed 'Dry' - Black oak

Non-Ashed-016	702497	6375501	0.07	5.49	0.27	30.20	1.00	65.00	0.01	0.05	0.01	0.10	0.05	0.01	0.20	0.01	0.12	0.05	0.18	0.50	0.67
KNOB-DT-049	702497	6375501	1.47	119.60	5.29	678.30	61.00	1331.00	0.39	0.90	0.30	6.70	2.10	0.31	0.90	0.40	0.90	1.86	5.30	18.00	10.00
		Conc	**21.00**	**21.79**	**19.59**	**22.46**	**61.00**	**20.48**	**32.50**	**18.00**	**60.00**	**67.00**	**42.00**	**62.00**	**4.50**	**40.00**	**7.50**	**38.75**	**29.44**	**36.00**	**14.93**
Non-Ashed-019	703052	6376963	0.05	6.21	0.39	18.90	2.00	234.00	0.03	0.05	0.03	0.10	0.35	0.02	0.30	0.01	0.14	0.51	0.60	0.50	0.85
KNOB-DT-009	703052	6376963	0.57	97.12	5.45	283.50	44.00	4535.00	0.28	1.70	0.30	1.60	4.20	0.21	0.70	0.10	0.50	5.51	6.50	6.00	5.30
		Conc	**11.40**	**15.64**	**13.97**	**15.00**	**22.00**	**19.38**	**9.66**	**34.00**	**10.00**	**16.00**	**12.00**	**10.50**	**2.33**	**10.00**	**3.57**	**10.78**	**10.83**	**12.00**	**6.24**
Non-Ashed-020	702649	6375569	0.11	3.35	0.25	9.90	1.00	33.00	0.02	0.05	0.01	0.10	0.06	0.01	0.30	0.01	0.06	0.04	0.15	0.50	0.59
KNOB-DT-056	702649	6375569	1.70	47.33	7.32	212.80	25.00	401.00	0.45	0.70	0.30	0.10	2.30	0.30	1.00	0.10	0.50	1.25	4.80	5.00	6.00
		Conc	**15.45**	**14.13**	**29.28**	**21.49**	**25.00**	**12.15**	**28.13**	**14.00**	**60.00**	**1.00**	**38.33**	**60.00**	**3.33**	**10.00**	**8.33**	**32.89**	**32.00**	**10.00**	**10.17**
Non-Ashed-023	701579	6376898	0.06	3.07	0.22	13.00	1.00	37.00	0.02	0.05	0.01	0.10	0.05	0.01	0.40	0.01	0.11	0.03	0.11	0.50	0.25
KNOB-DT-019	701579	6376898	0.94	61.33	8.20	230.70	59.00	658.00	0.37	1.10	0.10	1.20	1.60	0.32	0.60	0.30	0.20	0.94	3.10	2.00	6.70
		Conc	**15.67**	**19.98**	**37.27**	**17.75**	**59.00**	**17.78**	**20.56**	**22.00**	**20.00**	**12.00**	**32.00**	**32.00**	**1.50**	**30.00**	**1.82**	**36.15**	**28.18**	**4.00**	**26.80**
Non-Ashed-026	702562	6375607	0.05	3.16	0.19	7.20	1.00	18.00	0.01	0.05	0.01	0.10	0.05	0.01	0.20	0.01	0.05	0.04	0.13	1.00	0.35
KNOB-DT-052	702562	6375607	0.99	46.60	3.92	107.60	29.00	290.00	0.30	1.40	0.10	2.70	1.50	0.19	0.80	0.10	0.70	0.93	3.40	5.00	7.60
		Conc	**19.80**	**14.75**	**20.63**	**14.94**	**29.00**	**16.11**	**23.08**	**28.00**	**20.00**	**27.00**	**30.00**	**38.00**	**4.00**	**10.00**	**14.00**	**23.85**	**26.15**	**5.00**	**21.71**
Non-Ashed-037	701295	6380953	0.26	5.29	0.19	11.60	2.00	35.00	0.01	0.40	0.01	0.10	0.04	0.01	0.30	0.01	0.06	0.03	0.10	0.50	0.17
KNOB-DT-168	701295	6380953	5.93	78.21	3.27	119.40	40.00	395.00	0.14	4.20	0.05	0.20	1.00	0.19	0.50	0.05	1.00	0.62	1.80	7.00	2.80
		Conc	**22.81**	**14.78**	**17.21**	**10.29**	**20.00**	**11.29**	**12.73**	**10.50**	**10.00**	**2.00**	**25.00**	**38.00**	**1.67**	**5.00**	**16.67**	**20.00**	**18.00**	**14.00**	**16.47**
Non-Ashed-052	702593	6375552	0.10	2.76	0.22	10.40	1.00	31.00	0.02	0.05	0.01	0.40	0.05	0.01	0.30	0.01	0.06	0.04	0.15	1.00	0.23
KNOB-DT-059	702593	6375552	1.96	41.90	7.36	161.60	40.00	564.00	0.50	1.30	0.40	2.00	2.00	0.32	1.00	0.40	1.00	1.33	4.10	18.00	8.40
		Conc	**19.60**	**15.18**	**33.45**	**15.54**	**40.00**	**18.19**	**27.78**	**26.00**	**40.00**	**5.00**	**40.00**	**64.00**	**3.33**	**40.00**	**16.67**	**35.00**	**27.33**	**18.00**	**36.52**

Appendix 2

- Regolith Landform Map - Spatial Distribution of all samples points & species - PBB, WM & BO
- Regolith-Landform map of the EM5167 - Iron Knob North, Northern Middleback Ranges
- Regolith Landform Legend : Iron Knob North, Northern Middleback Ranges - EML5167
- Spatial distribution of all Sample locations; Pearl blue bush – Western myall – Black oak
- Spatial distribution of all Sample locations; Pearl blue bush – Western myall – Black oak
- Spatial Distribution of Pathfinder Elements; Zn-Y-Pb-Mo-Mn- in Pearl Blue Bush, Western Myall & Black Oak
- Spatial Distribution of Rare Earth Elements; Li-La-Ce in Pearl Blue Bush, Western Myall & Black Oak
- Spatial Distribution of Contamination Elements; Al-Zr-Fe in Pearl Blue Bush, Western Myall & Black Oak
- Spatial Distribution of Pearl Blue Bush (Zr, Zn, Y, Se, Re, Pb, Mn, Li, La, Cu, Ce, Au, Al, Ag, U, Fe, Mo & Sn)
- Spatial Distribution of Western Myall (Al, U, Se & Pb)
- Spatial Distribution of Western Myalla and Black Oak (Zn, Zr, Y, Sn, Re, Ag, Mo, Mn, Li, La, Cu, Ce, Au

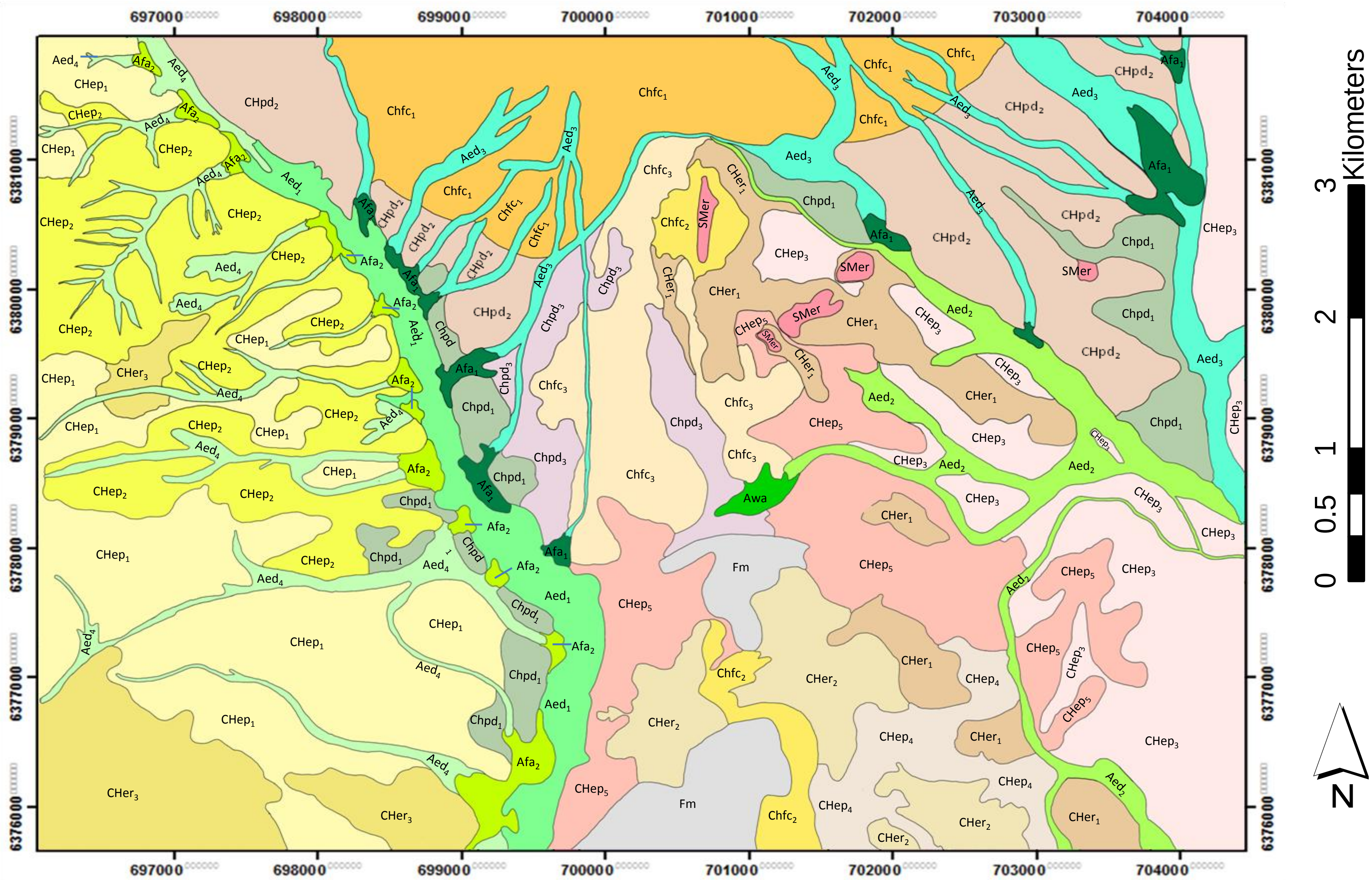
Regolith Landform Map - Spatail Distribution of all samples points & species - PBB, WM & BO



* Due to map input into Arc GIS unit colours were distorted from original

GDA 1994 MGA ZONE 53

Regolith-Landform map of the EM5167 - Iron Knob North, Northern Middleback Ranges



Regolith-Landform map of the EM5167 - Iron Knob North, Northern Middleback Ranges. Eyre Peninsular, SA. Created using aerial images provided by OneSteel. Compiled by Daniel Tanti - GDA 1994 MGA ZONE 53

Regolith Landform Legend : Iron Knob North, Northern Middleback Ranges - EML5167

Aaw	Alluvial swamp - Situated in the centre of the mapping area at a topographical low with a shallow gradient allowing water to pool. Fine red to dark clays and an increase in vegetation density.
Aed_1	Alluvial drainage depression - major western, south flowing system, continues into Pine Creek, Corunna Conglomerate, Gawler Range volcanics and Hutchison Group (input at south end of Aed) Fine red-brown silts and very fine red clays +/- Quartzite, vein quartz, banded haematite & magnetite, ironstone, jaspilite, schist and clasts.
Aed_2	Alluvial drainage depression - Fine red-brown silts and very fine red clays +/- Quartzite, vein quartz, banded haematite & magnetite, ironstone, jaspilite, schist and clasts. System flows towards the southwest before dissipating into erosion plains - No Gawler Range volcanics
Aed_3	Alluvial drainage depression - inputs from $CHpd_{1-3}$, fine clay to medium sand - medium to large angular clasts - large cobbles of subangular to subrounded Ironstone - sparse Blader salt bush with intermittent native grasses
Aed_4	Alluvial drainage depression - input on from the west, being $CHep_{1-2}$ and $CHer_3$ with sediment outputs into Aed1 and Afa_2 - light red to dark brown sediments ranging from clay to coarse sand - Western myall is sporadically along depression edges - Sediment sources from further west containing fragments of Paleoprotozoic intrusions
Afa_1	Alluvial fan - situated at the termination of the minor Aed_3 - fan shape is skewed in direction of flow, down gradient - they represent the transition between minor and major alluvial systems. Grading of sediment load from large and angular at the origin and small rounded and well sorted at the lobe end - input from Aed_3, $CHfc_{1\&3,}$ $Chpd_{1-3}$ and output to Aed_1
$Chep_5$	Colluvial sheetflow erosional plain – Fine red-brown sands with angular to sub-rounded lag +/- vein quartz, ironstone, red - black jaspilites, haematite quartz, cherty quartz with banding -Sparse chenopod shrubland, young Pearl blue bush dotted with western myall - Surface lag is minimal compared to the previous CHep's
$Cher_1$	Colluvial rise - Isolated topohgraphic rises in the south with associations to $CHfc_2$ and SMer in the central areas - Red-brown sands and clays with and angular to sub-angular Ironstone fragments from the Hutchison Group +/- quartz vein lag, red - black jaspilites, haematite quartz, cherty quartz. Sparse open chenopod shrubland, Mature Pearl Blue bush dominates - prodominately located in the southern areas. Inputs from SMer and $CHfc_2$ - Outputs to $CHep_{3-5}$ and Aed_2
$Cher_2$	Colluvial rise - Red-brown sands and clays with and angular to sub-angular Ironstone fragments from the Hutchison Group +/- quartz vein lag, red - black jaspilites, haematite quartz, cherty quartz. Sparse open chenopod shrubland.prodominately located in the southern areas. Inputs from Fm and $CHfc_2$ - Outputs to $CHep_{4-5}$ and $Cher_1$
$Cher_3$	Colluvial rise - Red-brown sands and clays with and angular to sub-angular +/- quartz vein lag, quartzite, vien quartz, Gawler Range volcanicscherty fragments. Sparse open mature chenopod shrubland - Pearl blue bush population density has increased compared to $CHer_2$. Prodominately located in the southern western to central western area - decreased suface lag than $CHer_2$
$CHfc_1$	colluvial sheetflow fan - Angular clasts poorly sorted from large fragments and small rounded clasts from the Corunna conglomerate. Rounded clean and vein quartz, red quartz, red - black jaspilite, well rounded ironstone pebbles and sandstone fragments. Northern expressions of this unit have little to no vegetation cover with Pearl blue bush density increasing towards the south and fan lobe..
$CHfc_2$	Colluvial Sheetflow fan - Fine red-brown sands with angular to sub-rounded lag +/- vein quartz, ironstone, red - black jaspilites, haematite quartz, cherty quartz with banding. Large angular ironstone clasts of Hutchison Group, 10+cm, quartz vien outcropping - Scattered Western myalls with sparse mature Pearl blue bush.

Regolith Landform Legend : Iron Knob North, Northern Middleback Ranges - EML5167

Afa$_2$ Alluvial fan - situated at the termination of the minor Aed$_{4-}$ fans shape is skewed in direction of flow, down gradient, and they represent the transition between minor and major alluvial systems Aed$_{1\&4}$. Grading of sediment load from large and angular at the origin and small rounded and well sorted at the lobe end - input CHep$_{1\&2}$, Cher$_3$ & Chpd$_1$

Chep$_1$ Colluvial sheetflow erosional plain – Fine red-brown clay and sand - soil with angular to sub-rounded lag +/- vein quartz, volcanics - open chenopod shrubland dominated by Pearl blue bush, 20-40cm high - minimal surface lag with large subrounded to subangular Quartz vein fragments - Inputs from CHep$_2$ & CHer$_3$

Chep$_2$ Colluvial sheetflow erosional plain – Fine red-brown clay and sand - soil with angular to sub-rounded lag +/- vein quartz, volcanics - greater chenopod shrubland density than CHep$_1$ dominated by Pearl blue bush, 20-40cm high - Increased surface lag with large subrounded to subangular Quartz vein fragments - Inputs from CHep$_1$ CHpd$_1$ - Outputs Aed$_4$ and Afa$_2$

Chep$_3$ Colluvial sheetflow erosional plain – Fine red-brown clay and sand soil with angular to sub-rounded lag +/- vein quartz, ironstone, Change in lag to sub rounded quartz, underlying red to brown sandy soil, lag is reduced in size compared to CHep$_2$, rounded quartz, open but not sparse chenopod shrub land. Chenopod shrubland dotted with western myall.

Chep$_4$ Colluvial sheetflow erosional plain – deep red clays to coarse sands with angular to sub-rounded lag +/- vein quartz, ironstone with smaller haematite fragments. Chenopod shrubland with mature Pearl blue bush, spacing between 2-3m

Smer Moderately weather bedrock - Hutchison group - black, grey, brown, and white banded haemmatite and magnetite quartzite, red-black jaspilite, heqavy banded cherty quartz - Moderate relief with sparse Pearl blue bush cover and Western Myall along slopes

CHfc$_3$ Colluvial Sheetflow fan - Fine red-brown sands with angular to sub-rounded lag, redueced surface lag compared to CHfc$_{2,}$ +/- vein quartz, ironstone, red - black jaspilites, haematite quartz, cherty quartz with banding. Large angular ironstone clasts of Hutchison Group - Scattered mature Pearl blue bush iwth decreased density compared to CHfc$_2$.

CHpd$_1$ Colluvial sheetflow depositional plain – Fine red-brown sands, clays, clay dominate over sand. Sub-rounded gravel lag +/- quartz, Corunna conglomerate clean and vein quartz, red quartz, well rounded ironstone pebbles, sandstone fragments and Gawler Range volcanics. Chenopod shrubland with sparse native grasses, in or around Aed's. Inputs CHpd$_{2-3}$, Afa$_{1-2}$, Aed$_{3-4}$, CHep$_{1\&2}$

CHpd$_2$ Colluvial sheetflow depositional plain – Fine red-brown sands & clays.gradation sediment and lag change between CHpd $_{1\ \&2}$ Sub-rounded gravel lag +/- quartz, Corunna conglomerate clean and vein quartz, red quartz, well rounded ironstone pebbles, sandstone fragments. Chenopod shrubland with sparse native grasses, in or around Aed's. Inputs CHpd$_{2\&3}$, Afa$_{1\&2}$, Aed$_{3\&4}$, CHep$_{1\&2}$

CHpd$_3$ Colluvial sheetflow depositional plain - Fine red to brown clays and sands - cobble to pebble sized quartz surface lag with subangualr to subrounded haematite and banded cherty clasts. Pearl blue bush dominates with scatter western myall - Inouts from Fm, CHfc3&2 and CHer1 - Outpits CHep$_5$, Aed$_{1\&3}$ and Afa$_2$

Fm In this mapping region this is defined as an area that's natural land surface characteristics cannot be ascertained or interpreted as a direct result of anthropogenic influence. Fm units, in this case, are associated with open cut mining operations (workings & tailings).

Spatial Distribution of Commodity Elements; Fe-Cu-Au in Pearl Blue Bush, Western Myall & Black Oak

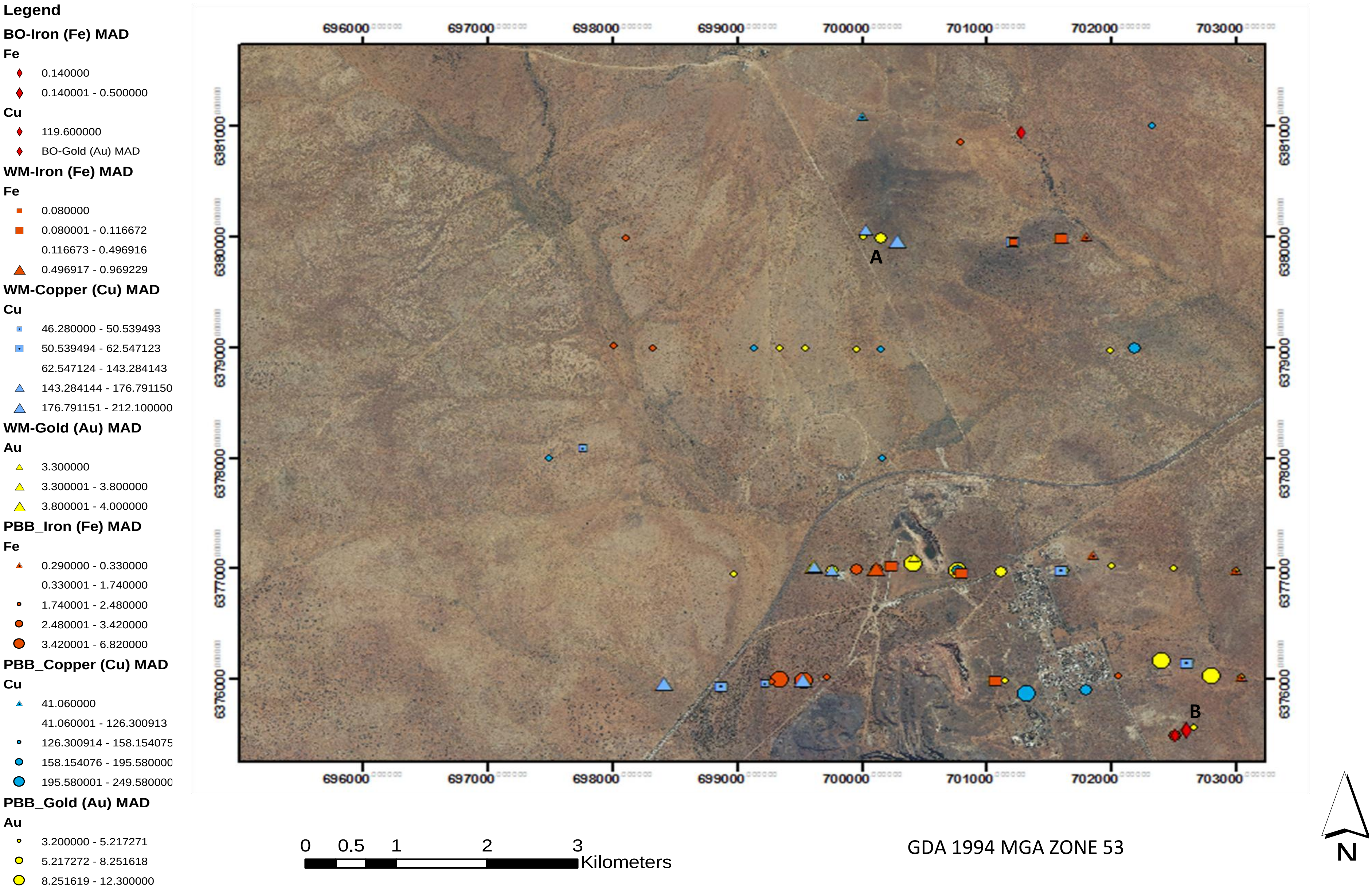


Figure 33: Spatial Distribution of Pathfinder Elements; Zn-Y-Pb-Mo-Mn- in Pearl Blue Bush, Western Myall & Black Oak

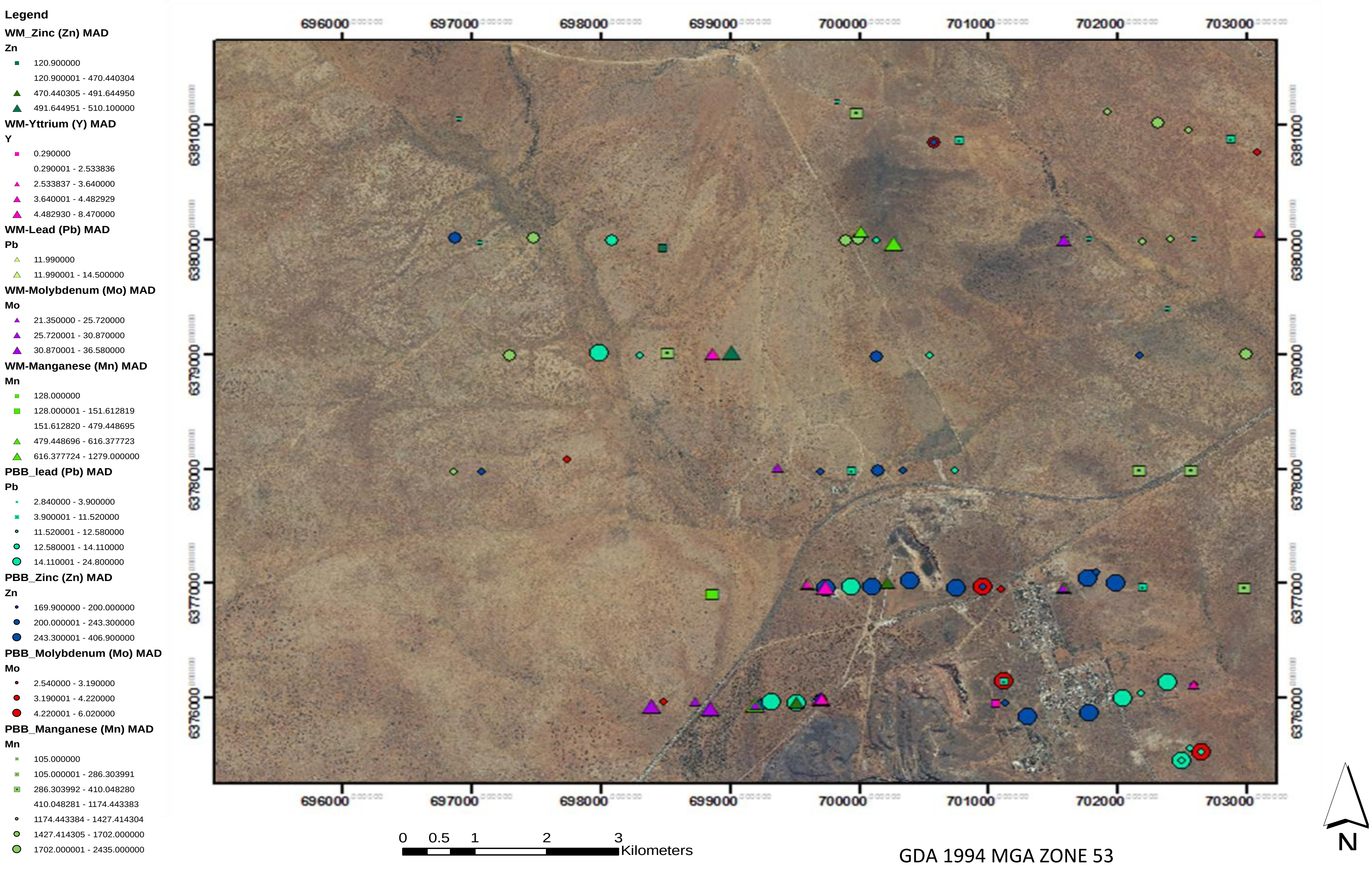
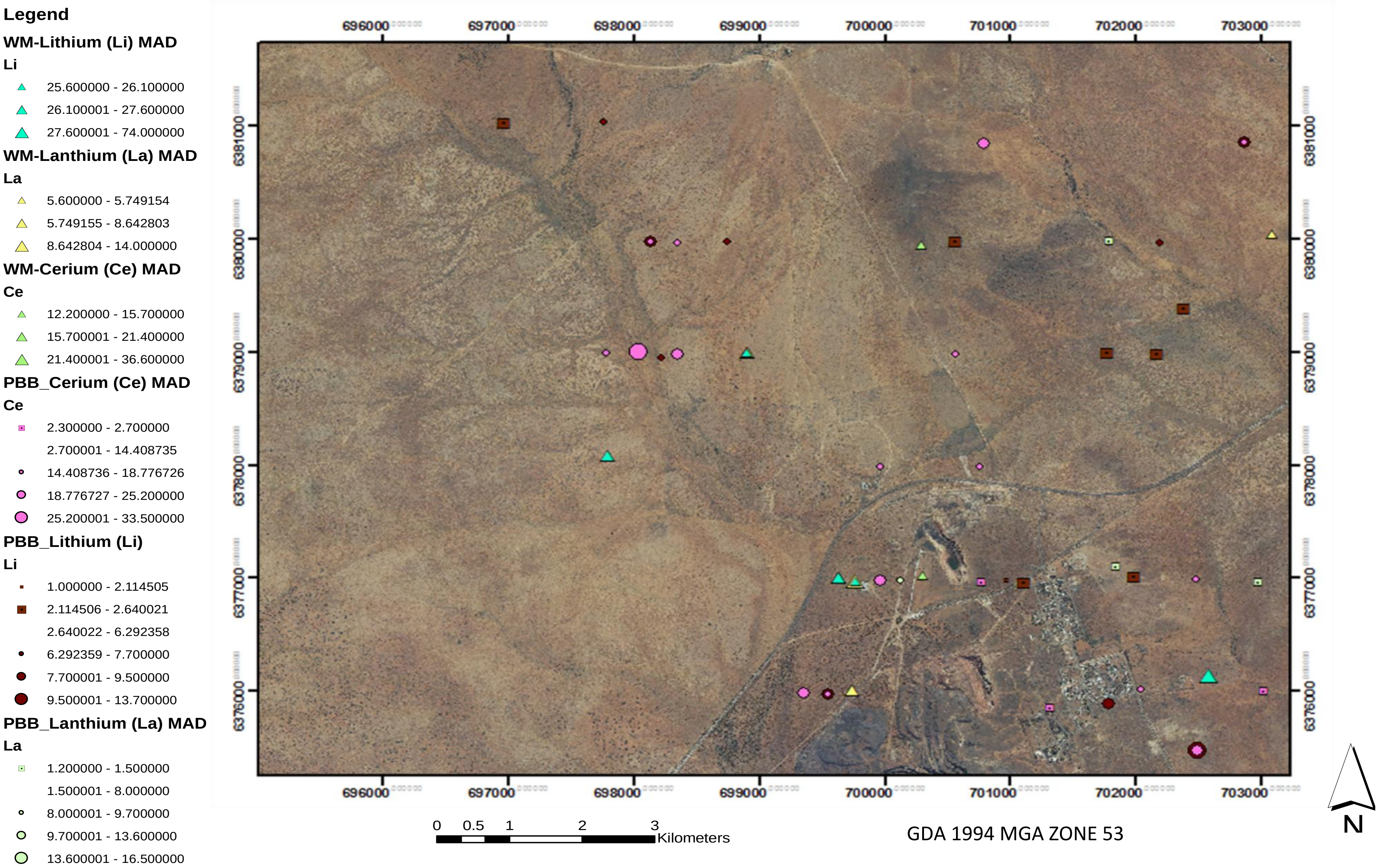


Figure 34: Spatial Distribution of Rare Earth Elements; Li-La-Ce in Pearl Blue Bush, Western Myall & Black Oak



Spatial Distribution of Contamination Elements; Al-Zr-Fe in Pearl Blue Bush, Western Myall & Black Oak

Legend

WM_Aluminium (Al) MAD
Al
- 0.370000 - 0.380000
- 0.380001 - 0.420000
- 0.420001 - 0.550000

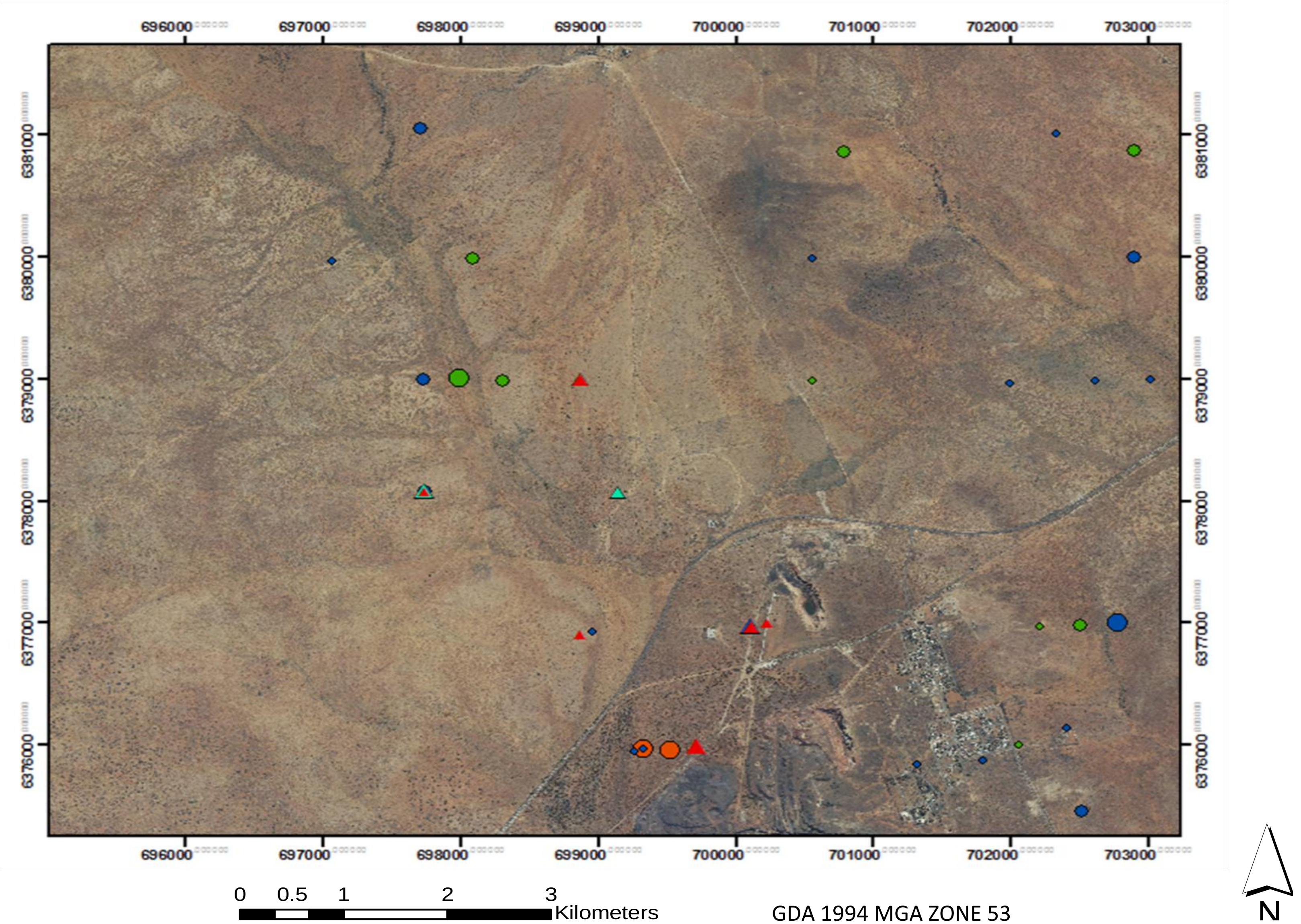
WM_Zirconium (Zr) MAD
Zr
- 0.500000 - 0.700000
- 0.700001 - 1.100000

WM-Iron (Fe) MAD
Fe
- 0.080000
- 0.080001 - 0.116672
- 0.116673 - 0.496916
- 0.496917 - 0.969229

PBB_Zirconium (Zr) MAD
Zr
- 0.600000 - 0.900000
- 0.900001 - 1.600000
- 1.600001 - 2.700000

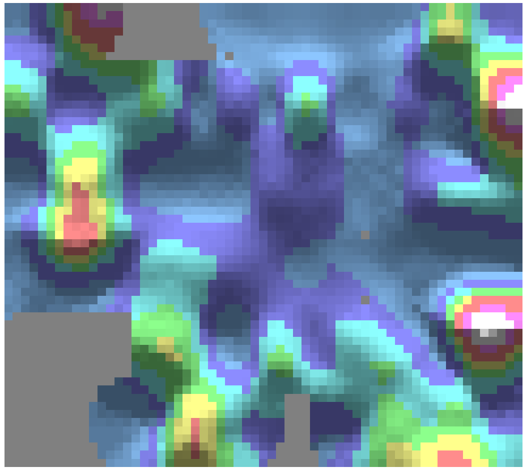
PBB_Iron (Fe) MAD
Fe
- 0.290000 - 0.330000
- 0.330001 - 1.740000
- 1.740001 - 2.480000
- 2.480001 - 3.420000
- 3.420001 - 6.820000

PBB_Aluminium (Al) MAD
Al
- 0.190000 - 0.310000
- 0.310001 - 1.630000
- 1.630001 - 1.760000
- 1.760001 - 2.740000
- 2.740001 - 3.670000



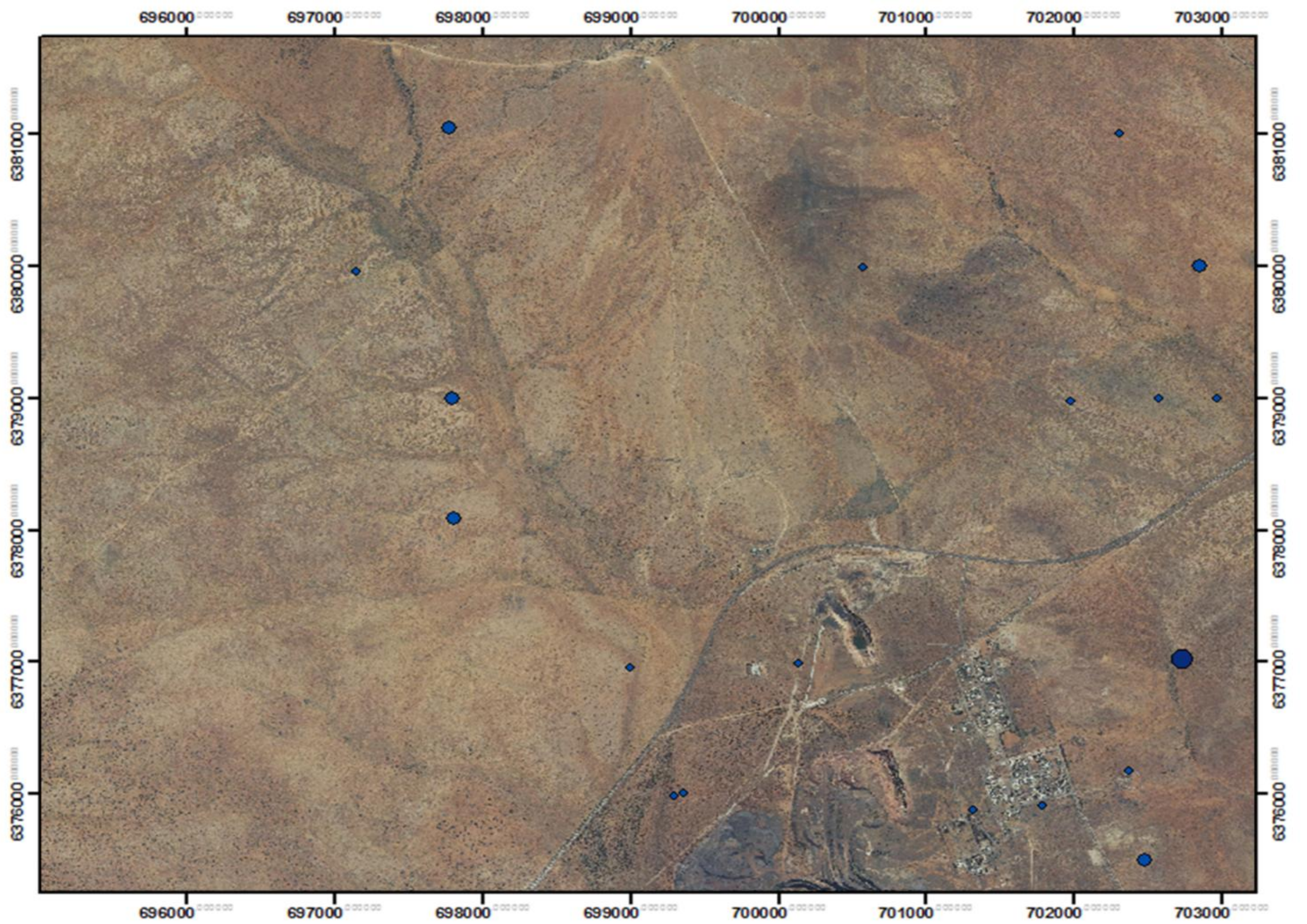
GDA 1994 MGA ZONE 53

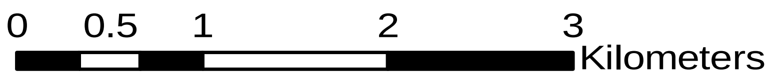
Spatial Distribution of Zirconium (Zr) ppm in Pearl Blue Bush

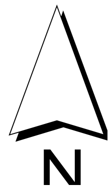


Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53







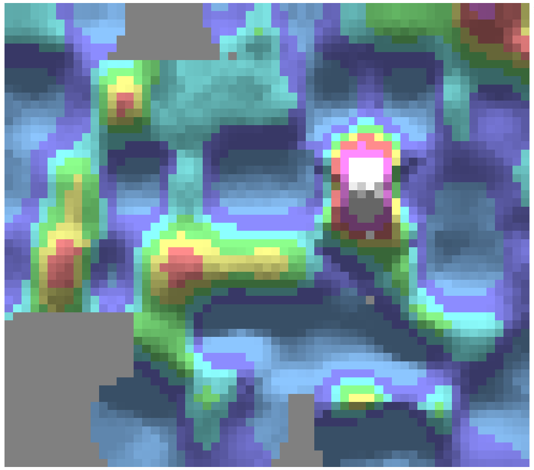
Legend

PBB_Zirconium (Zr) MAD

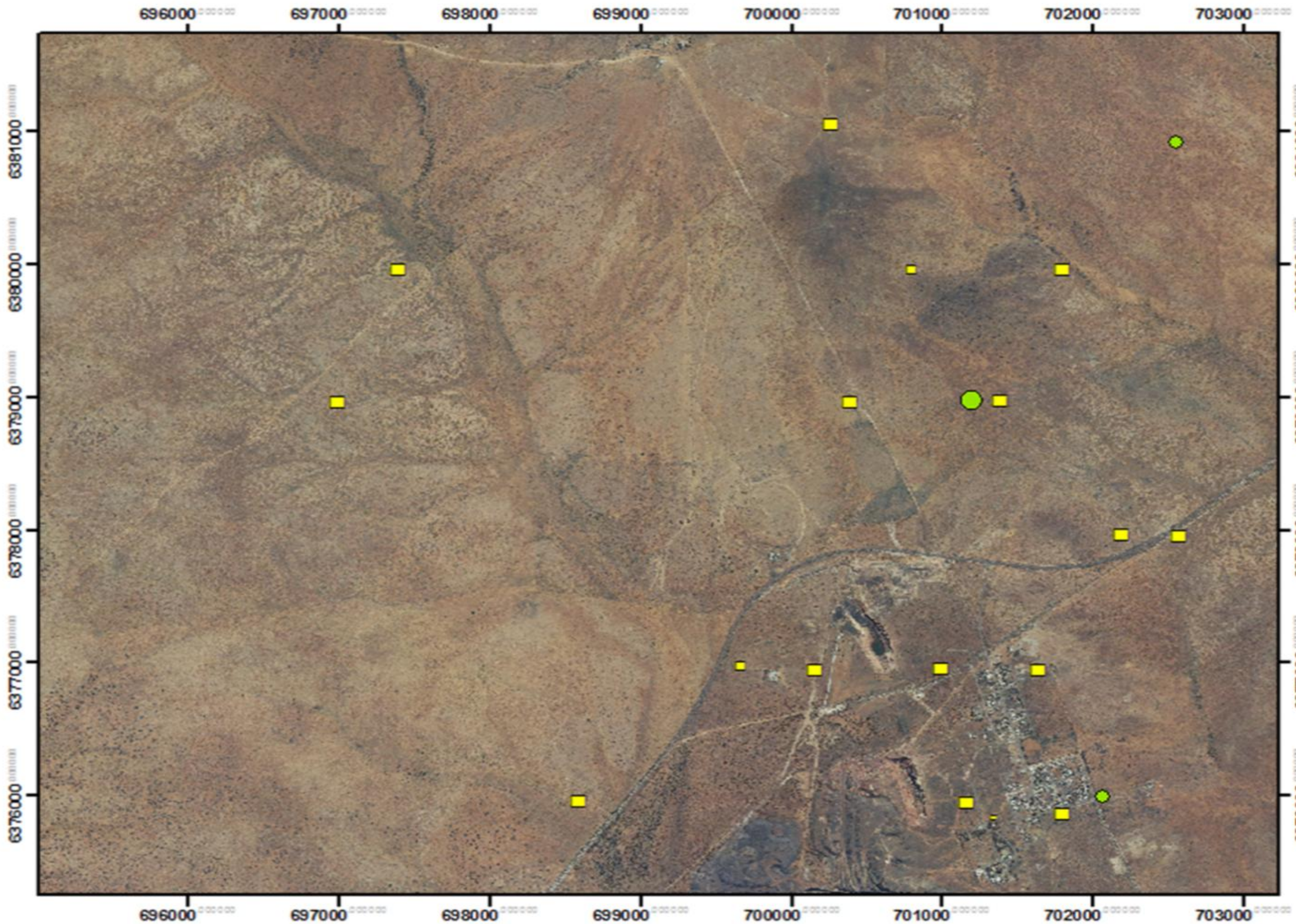
Zr

- 0.600000 - 0.900000
- 0.900001 - 1.600000
- 1.600001 - 2.700000

Spatial Distribution of Selenium (Se) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS



Legend

PBB_Selenium (Se) MAD

Se

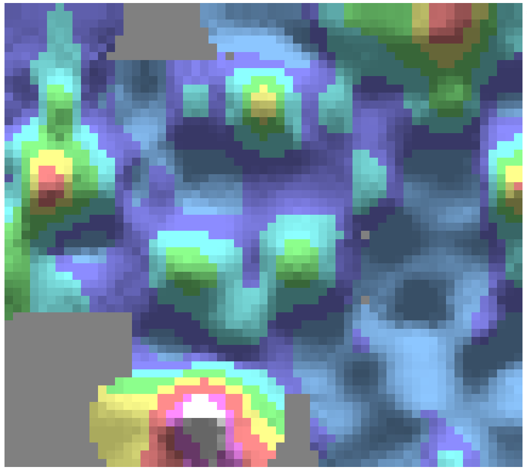
- 0.100000
- 0.100001 - 0.200000
- 0.200001 - 0.300000
- 0.300001 - 0.900000
- 0.900001 - 1.100000
- 1.100001 - 3.000000

GDA 1994 MGA ZONE 53

0 0.5 1 2 3 Kilometers

N

Spatial Distribution of Manganese (Mn) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

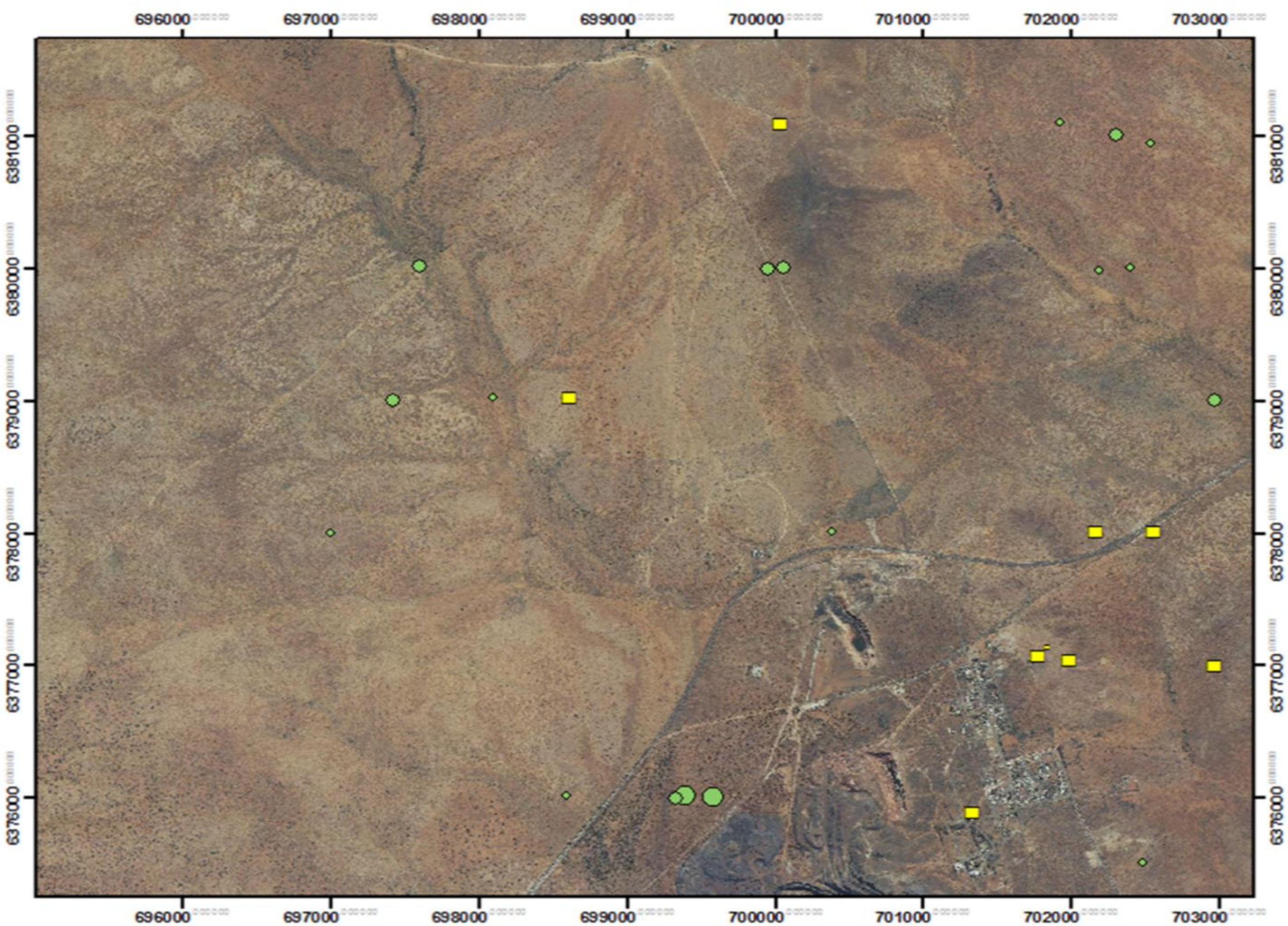
GDA 1994 MGA ZONE 53

Legend

PBB_Manganese (Mn) MAD

Mn

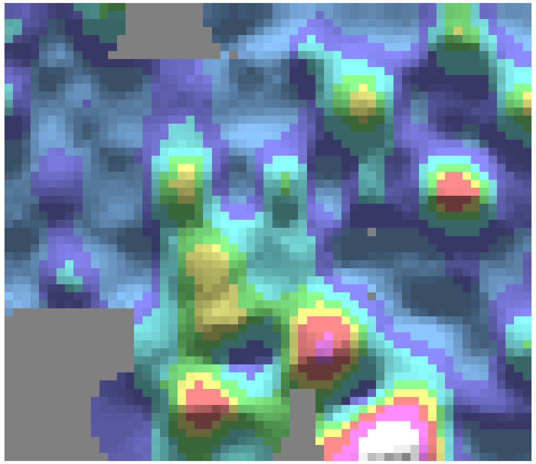
- 105.000000
- 105.000001 - 286.303991
- 286.303992 - 410.048280
- 410.048281 - 1174.443383
- 1174.443384 - 1427.414304
- 1427.414305 - 1702.000000
- 1702.000001 - 2435.000000



0 0.5 1 2 3 Kilometers

N

Spatial Distribution of Copper (Cu) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

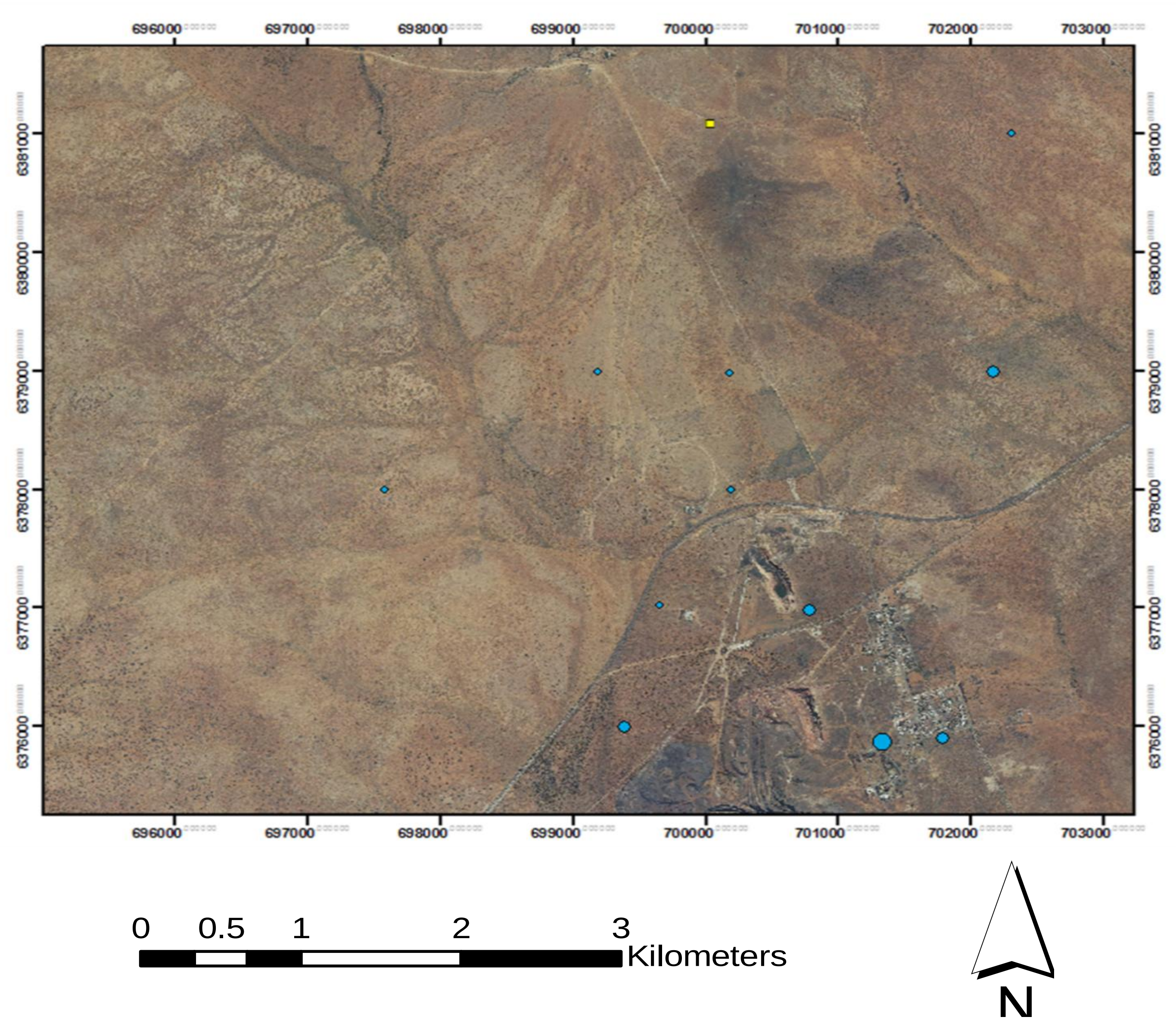
GDA 1994 MGA ZONE 53

Legend

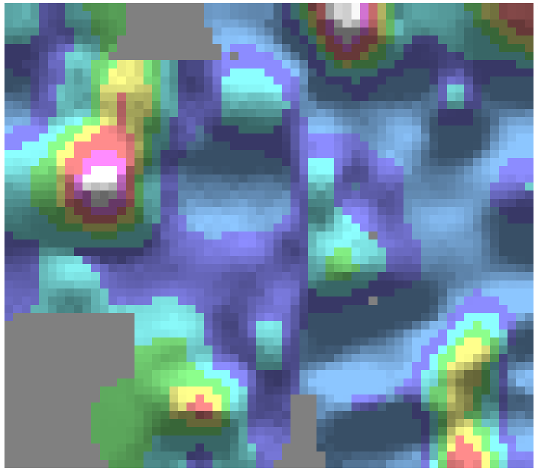
PBB_Copper (Cu) MAD

Cu

- 41.060000
- 41.060001 - 126.300913
- 126.300914 - 158.154075
- 158.154076 - 195.580000
- 195.580001 - 249.580000



Spatial Distribution of Aluminium (Al) Percentage in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53

Legend

PBB_Aluminium (Al) MAD

Al

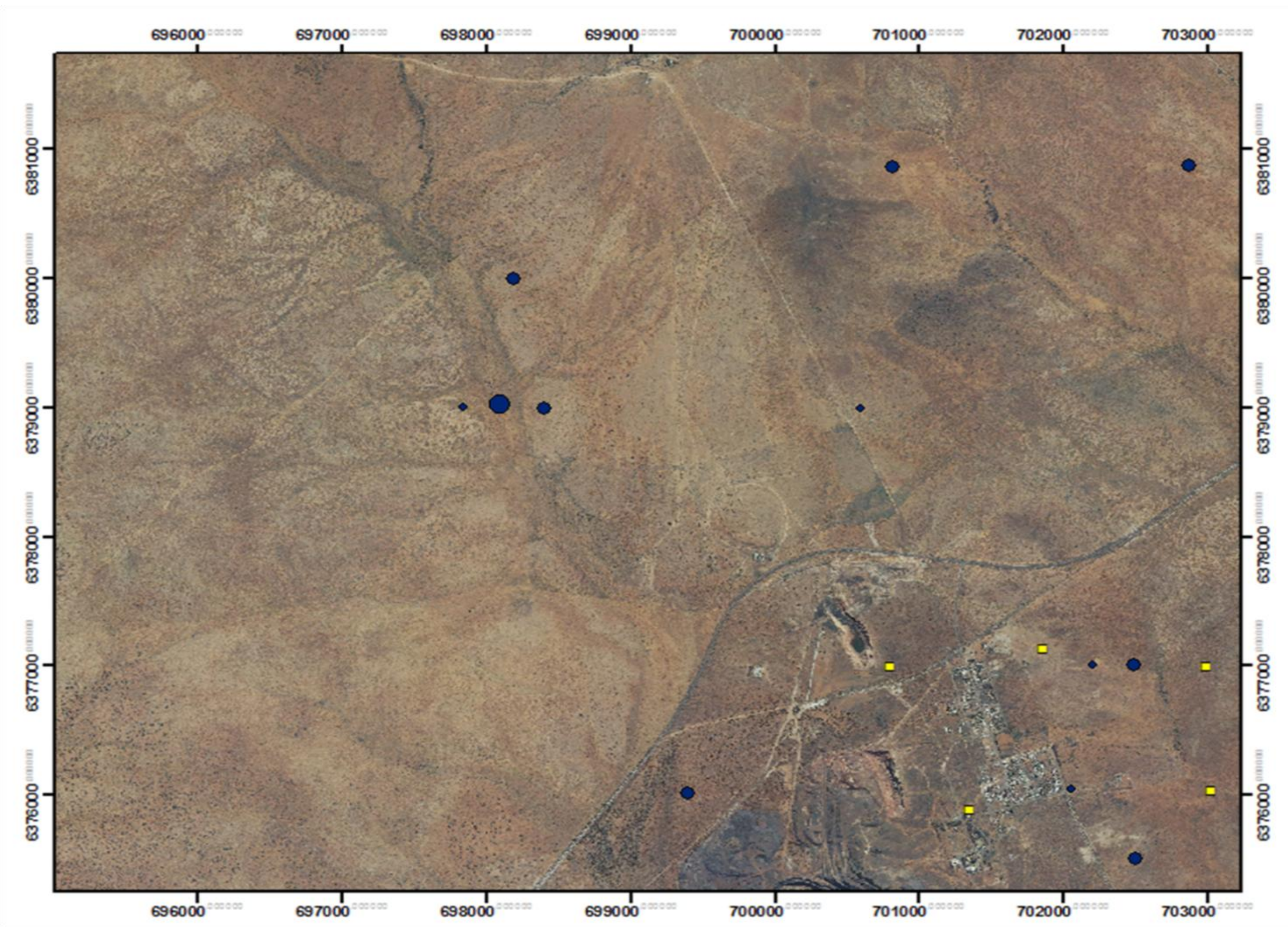
0.190000 - 0.310000

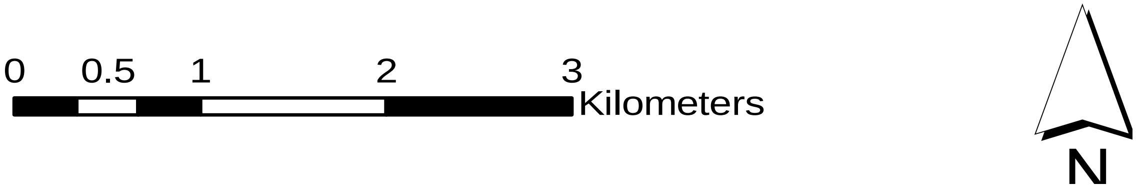
0.310001 - 1.630000

1.630001 - 1.760000

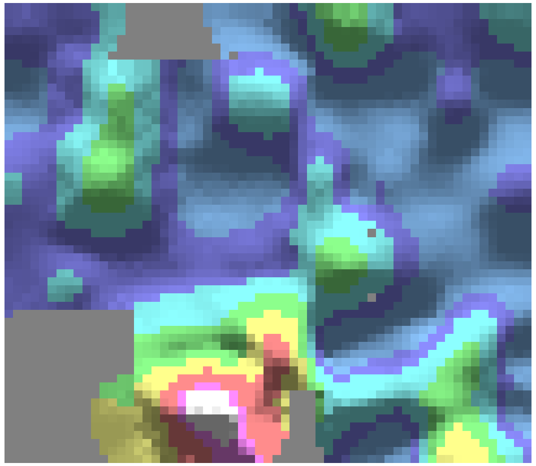
1.760001 - 2.740000

2.740001 - 3.670000



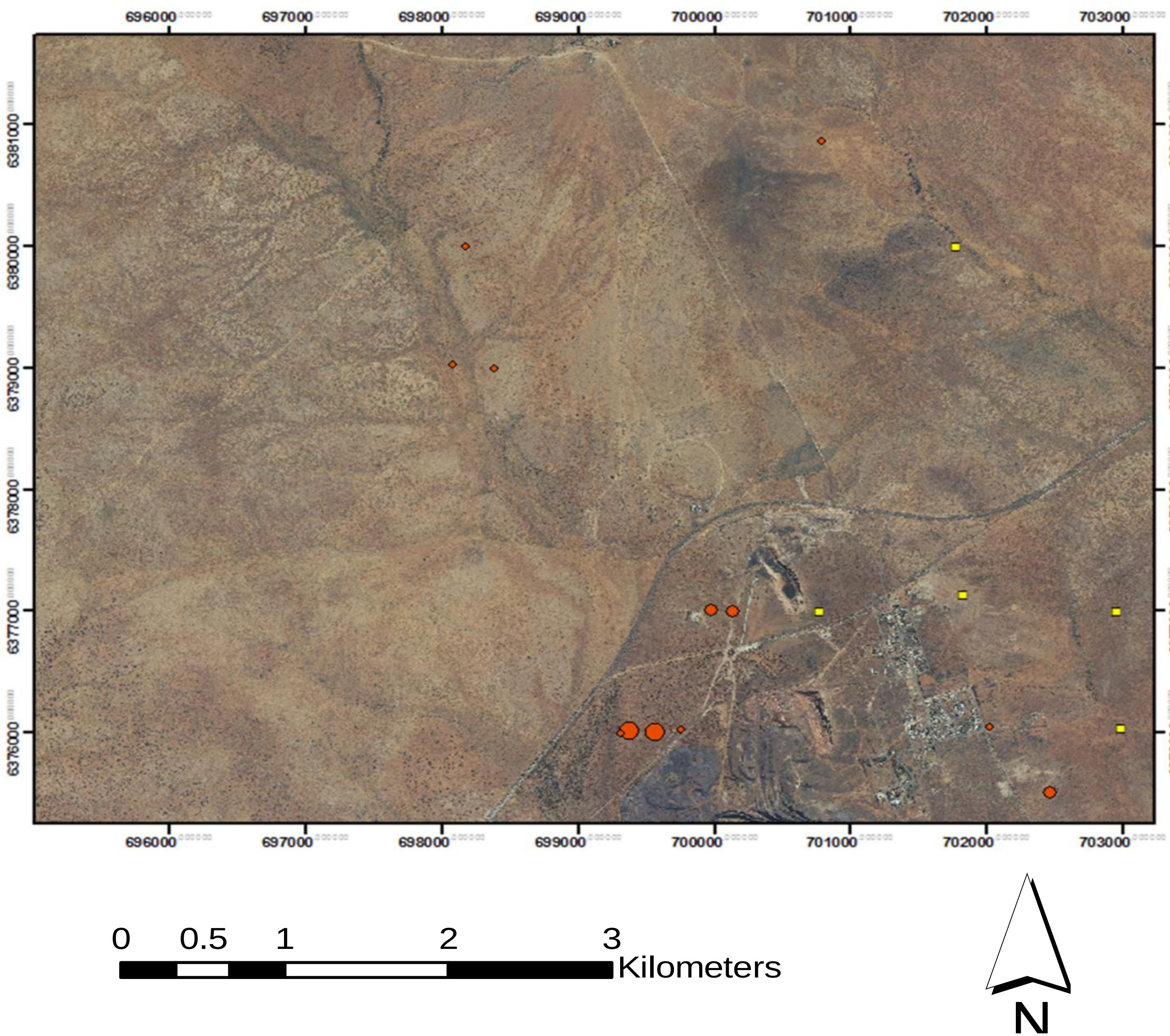


Spatial Distribution of Iron (Fe) Percentage in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53



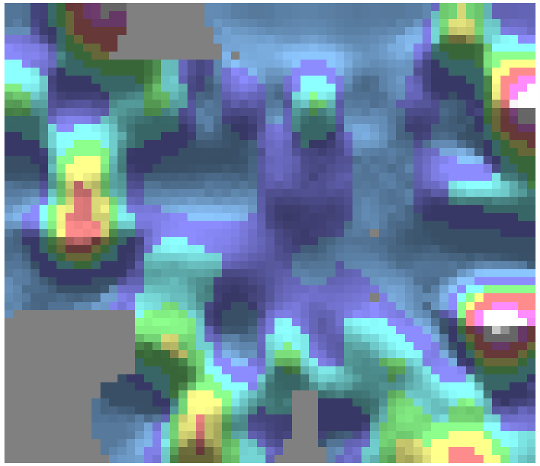
Legend

PBB_Iron (Fe) MAD

Fe

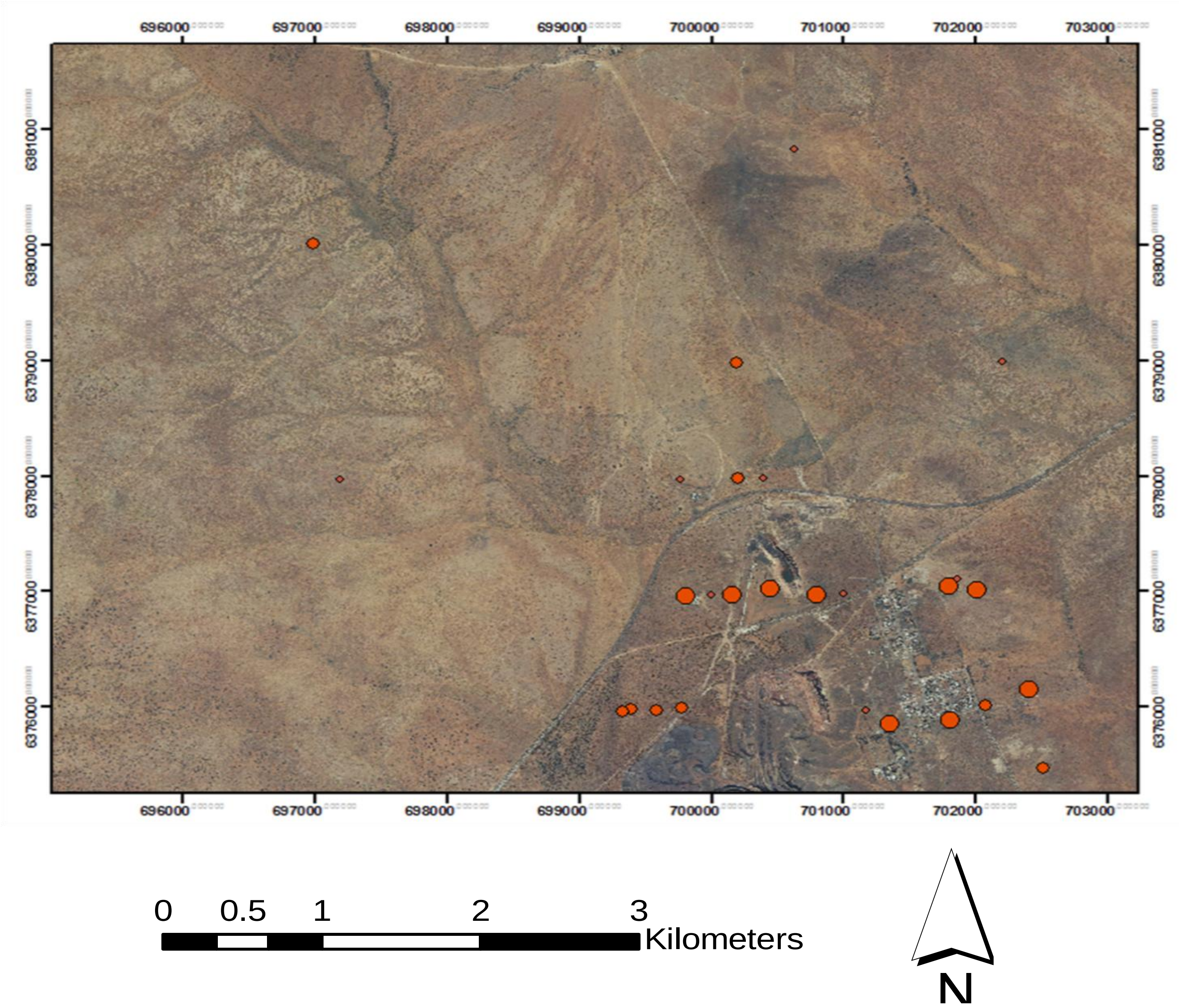
- 0.290000 - 0.330000
- 0.330001 - 1.740000
- 1.740001 - 2.480000
- 2.480001 - 3.420000
- 3.420001 - 6.820000

Spatial Distribution of Zinc (Zn) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53



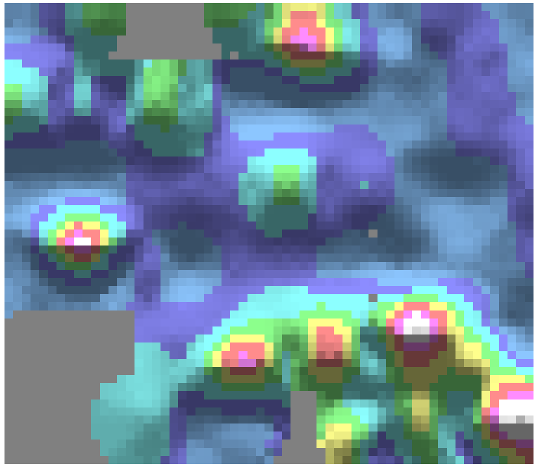
Legend

PBB_Zinc (Zn) MAD

Zn

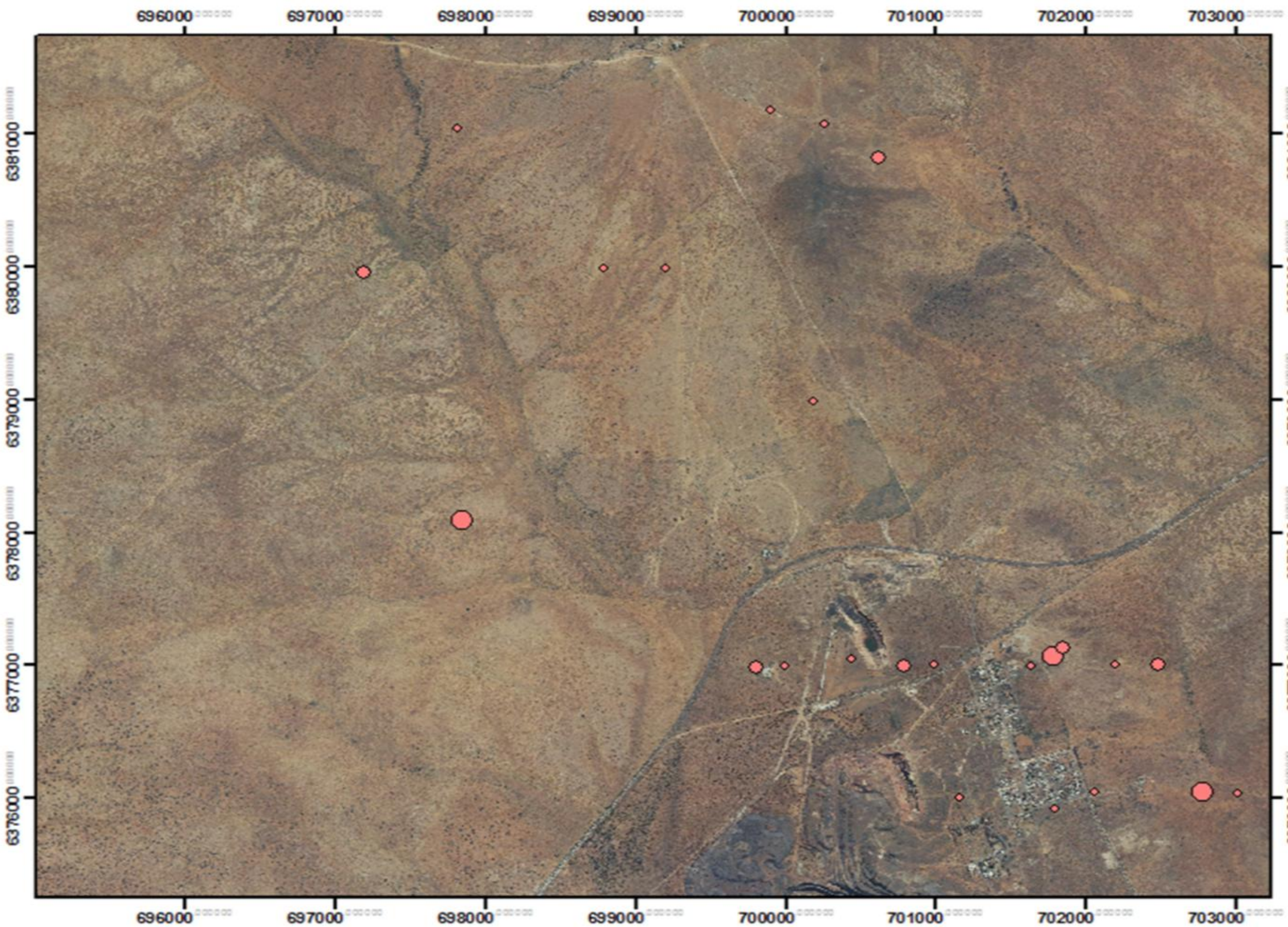
- 169.900000 - 200.000000
- 200.000001 - 243.300000
- 243.300001 - 406.900000

Spatial Distribution of Rheium (Re) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53



Legend

PBB_Rheium (Re)

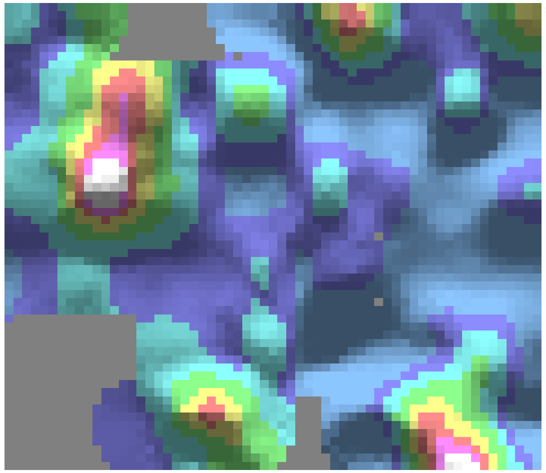
Re

- 13.000000 - 21.00000C
- 21.000001 - 33.00000C
- 33.000001 - 47.00000C

0 0.5 1 2 3 Kilometers

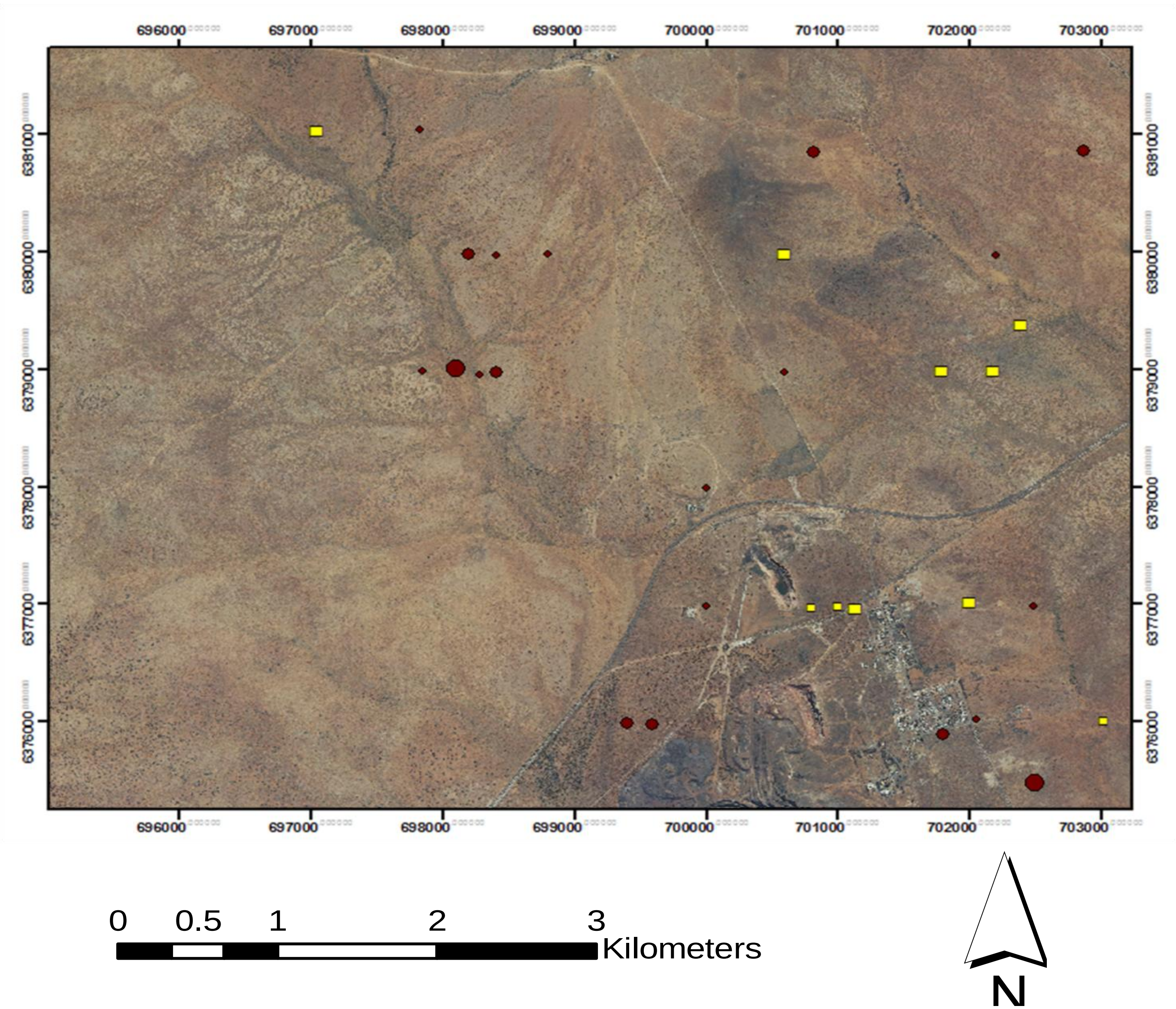
N

Spatial Distribution of Lithium (Li) ppm in Pearl Blue Bush

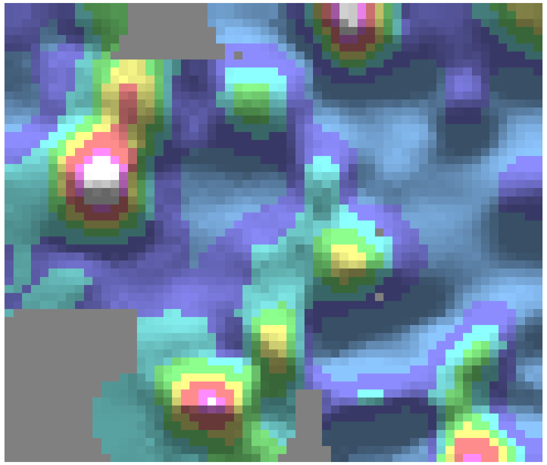


Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53

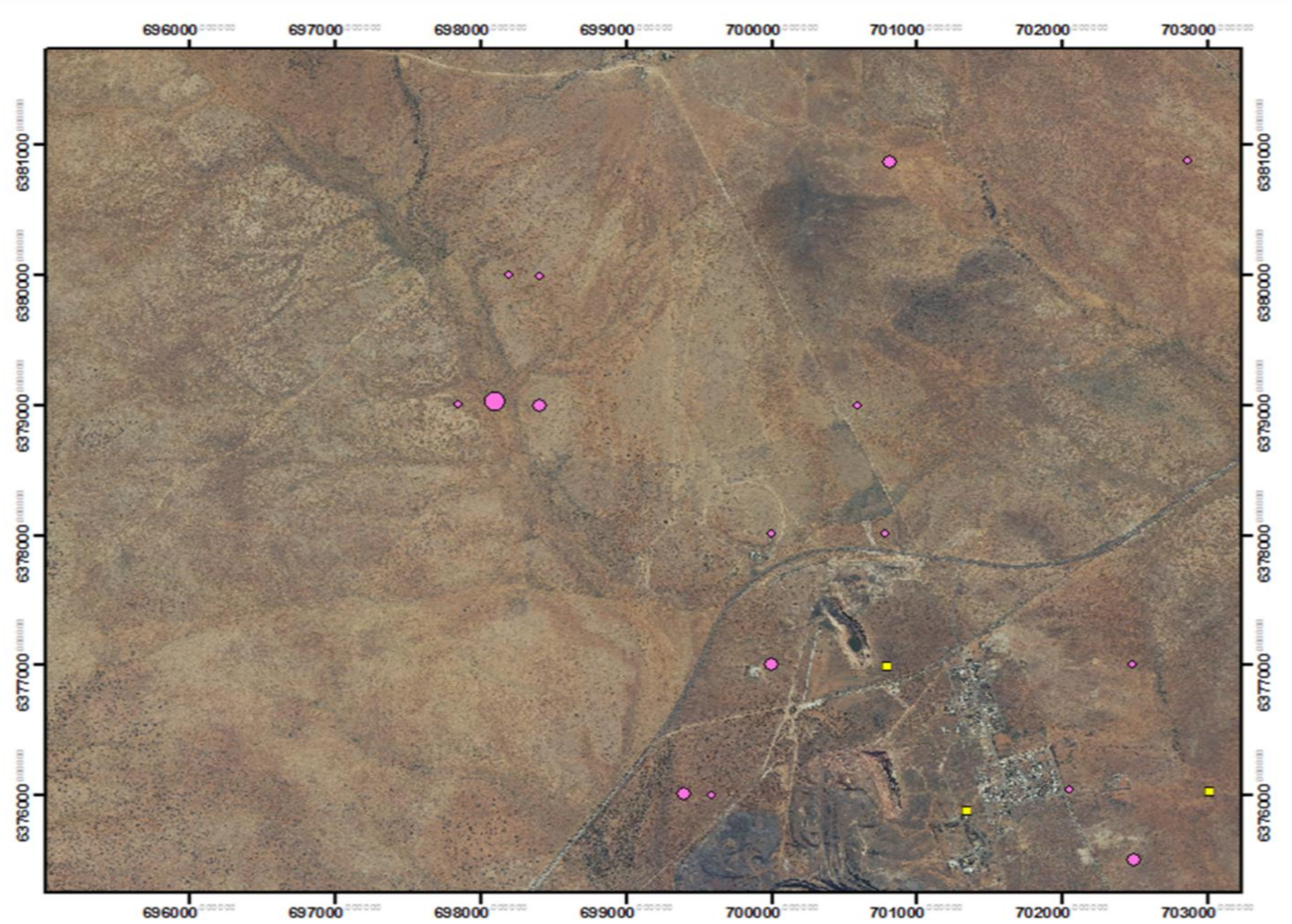


Spatial Distribution of Cerium (Ce) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53

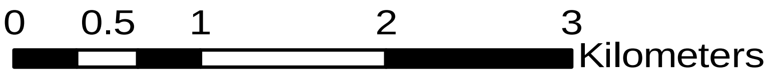


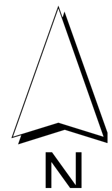
Legend

PBB_Cerium (Ce) MAD

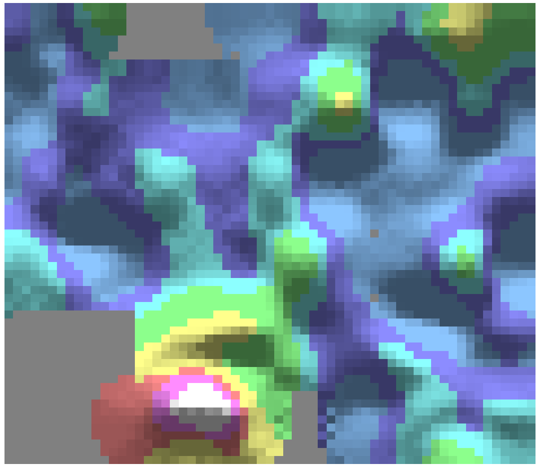
Ce

- 2.300000 - 2.700000
- 2.700001 - 14.408735
- 14.408736 - 18.776726
- 18.776727 - 25.200000
- 25.200001 - 33.500000



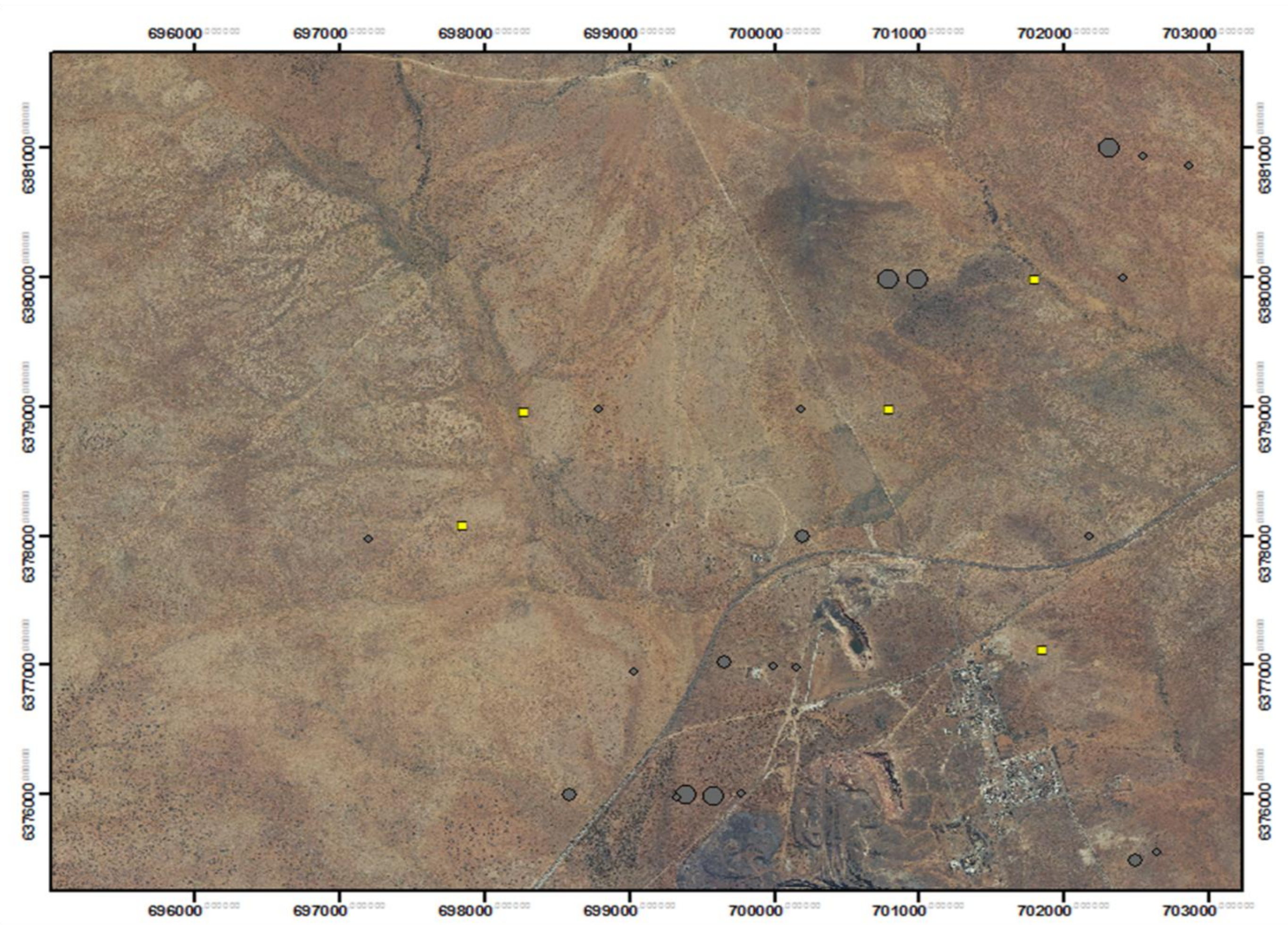


Spatial Distribution of Silver (Ag) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53

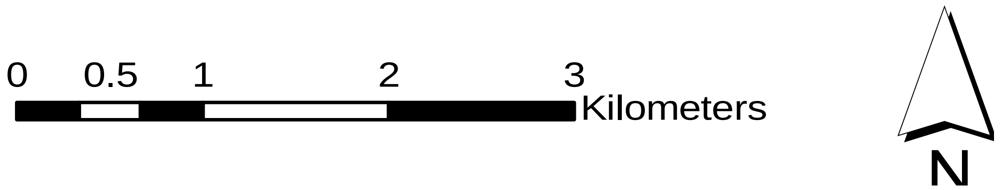


Legend

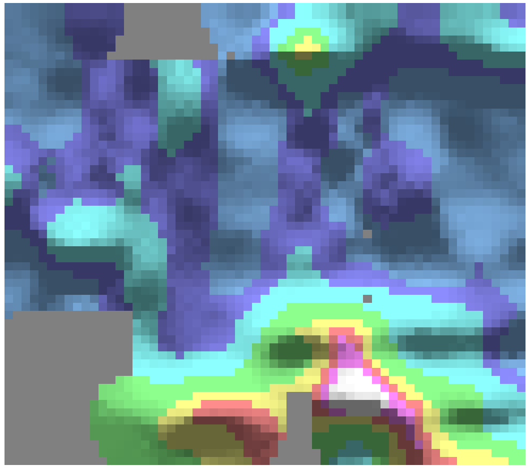
PBB_Silver (Ag) MAD

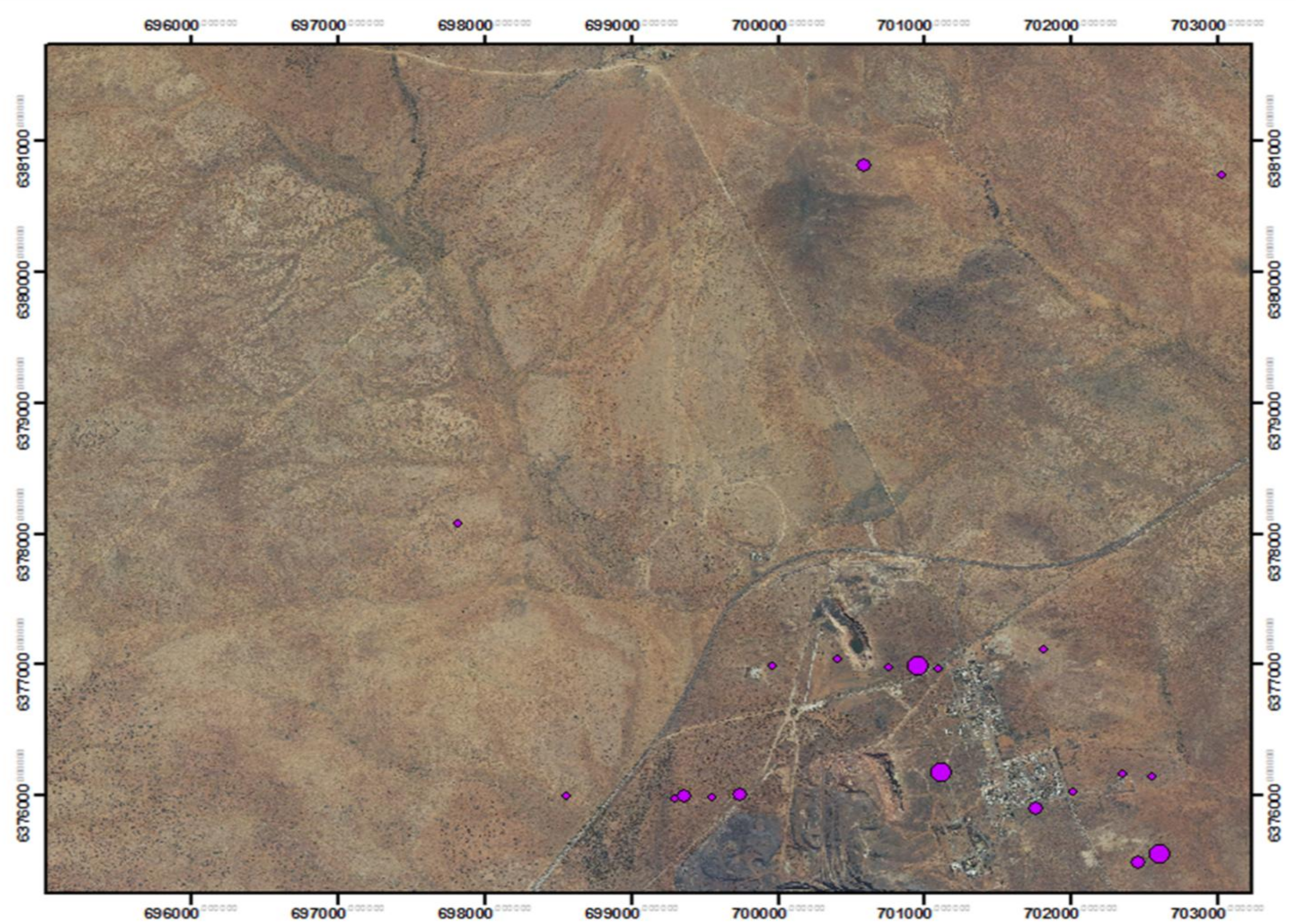
Ag

- 26.000000 - 50.000000
- 50.000001 - 125.352315
- 125.352316 - 141.159179
- 141.159180 - 154.529152
- 154.529153 - 217.000000



Spatial Distribution of Molybdenum (Mo) ppm in Pearl Blue Bush





Element Disperson - All sample locations - Plotted with ioGAS

GDA 1994 MGA ZONE 53

Legend

PBB_Molybdenum (Mo) MAD

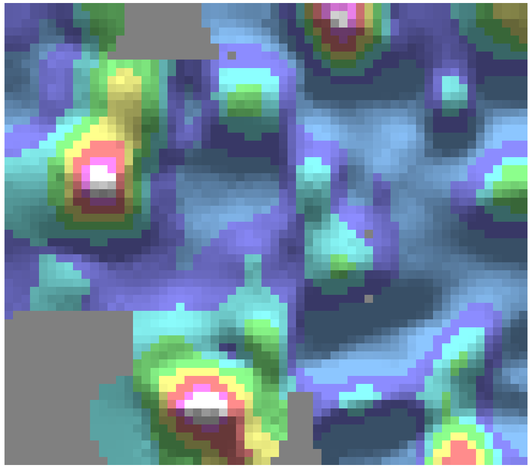
Mo

- 2.540000 - 3.190000
- 3.190001 - 4.220000
- 4.220001 - 6.020000

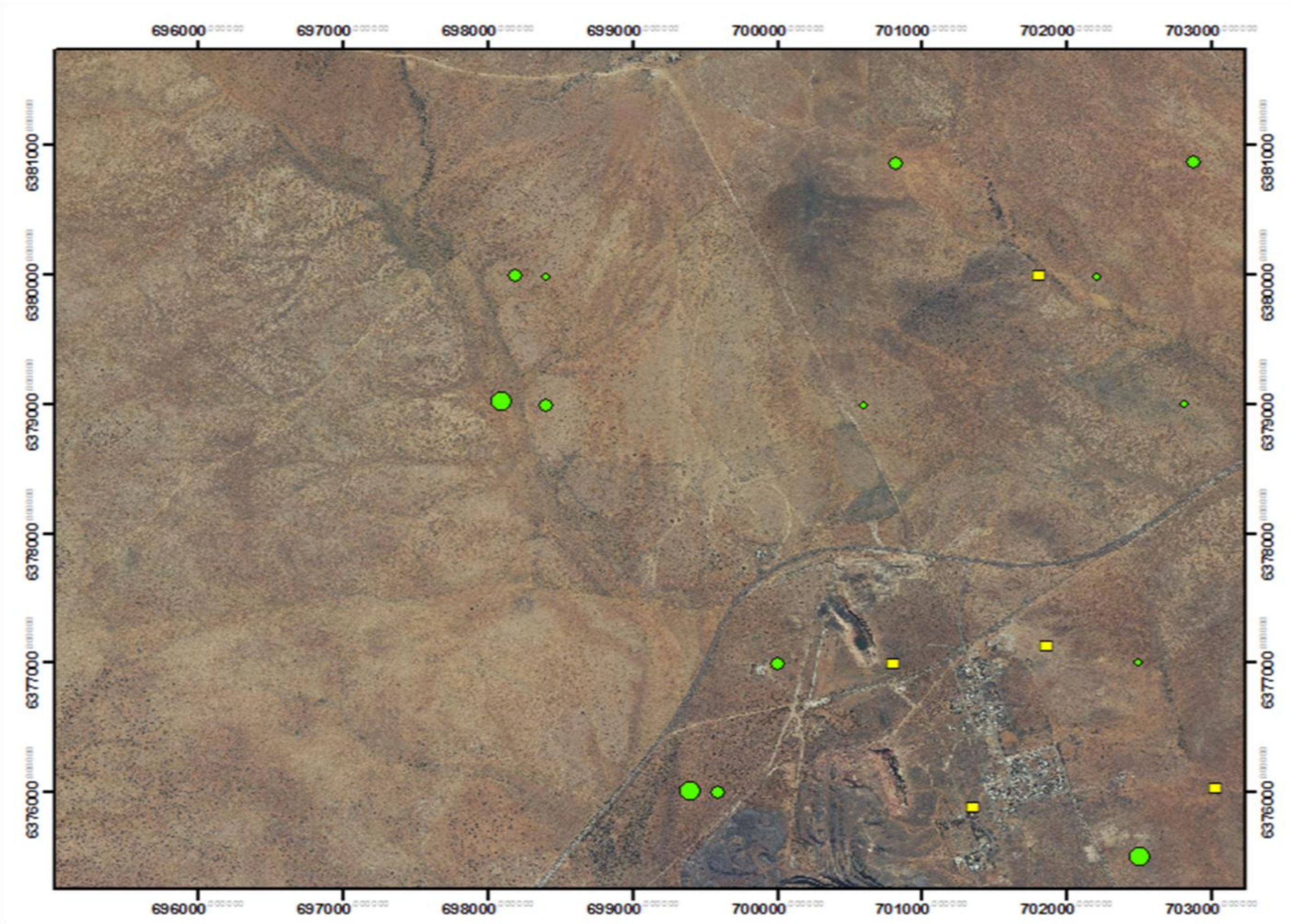
0 0.5 1 2 3 Kilometers

N

Spatial Distribution of Yttrium (Y) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS



GDA 1994 MGA ZONE 53

Legend

PBB_Yttrium (Y) MAD

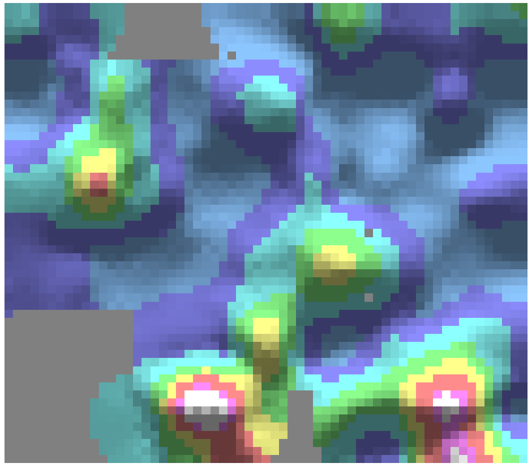
Y

- 0.550000 - 0.900000
- 0.900001 - 4.830000
- 4.830001 - 6.600000
- 6.600001 - 9.490000

0 0.5 1 2 3 Kilometers

N

Spatial Distribution of Lead (Pb) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

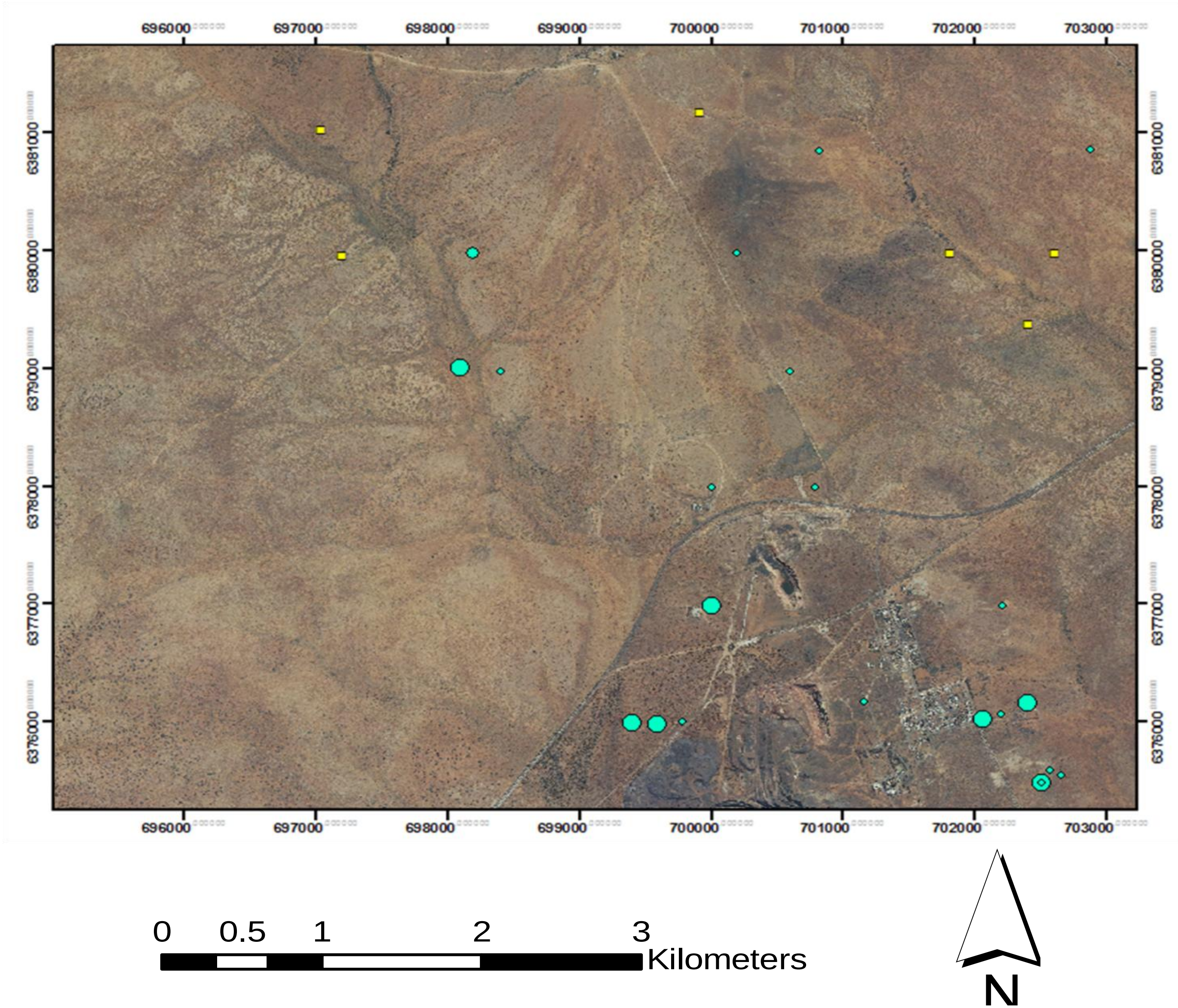
GDA 1994 MGA ZONE 53

Legend

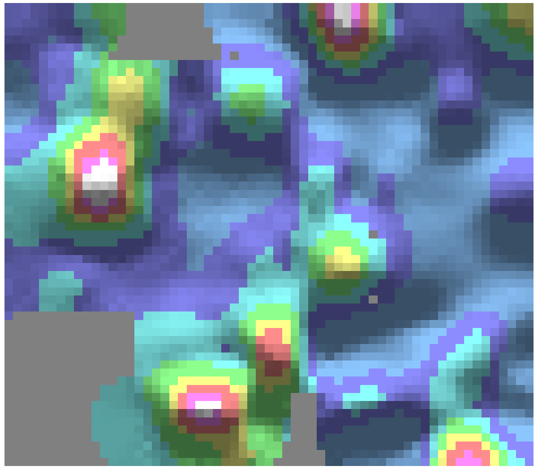
PBB_lead (Pb) MAD

Pb

- 2.840000 - 3.900000
- 3.900001 - 11.520000
- 11.520001 - 12.580000
- 12.580001 - 14.110000
- 14.110001 - 24.800000



Spatial Distribution of lanthium (La) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

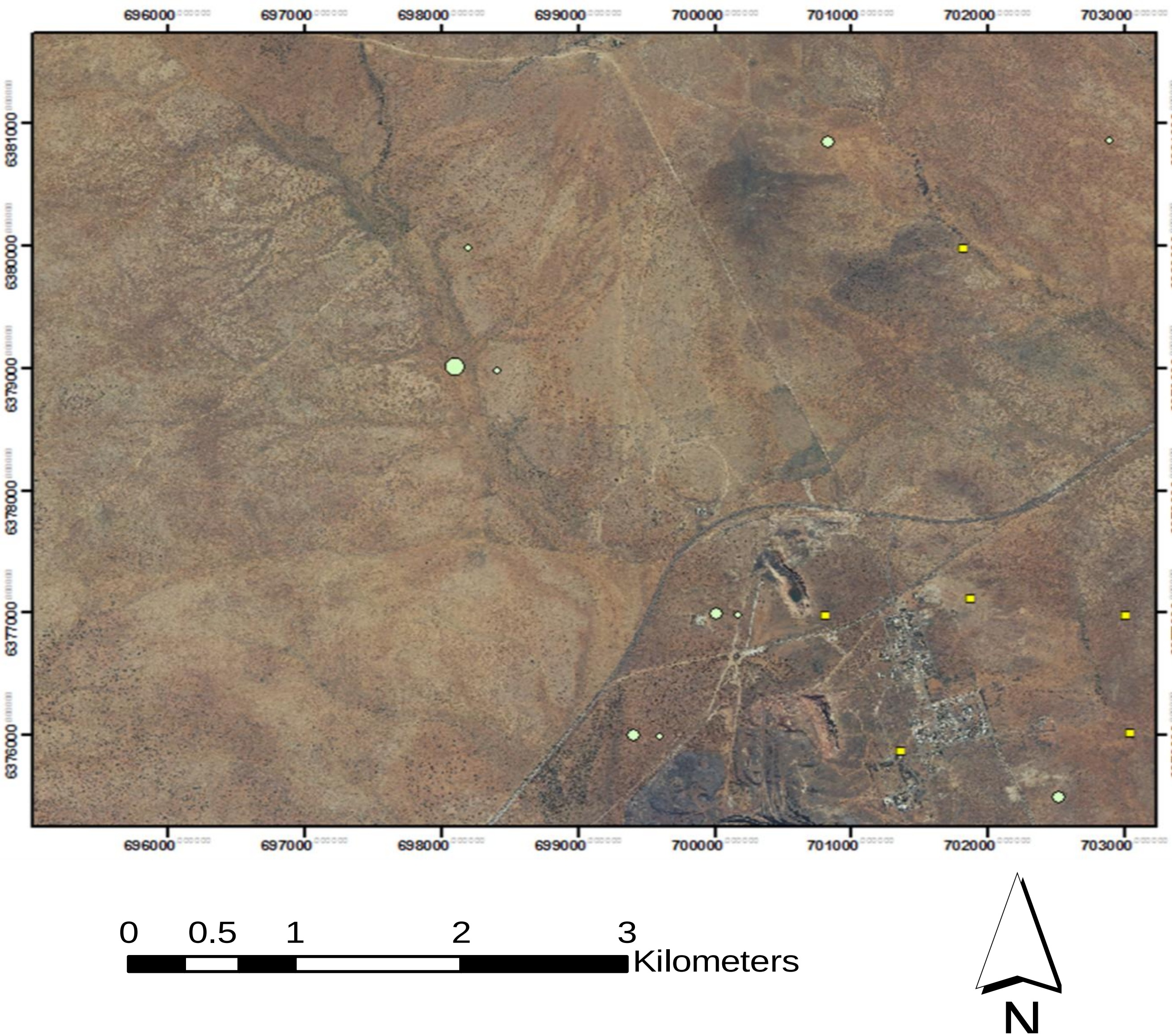
GDA 1994 MGA ZONE 53

Legend

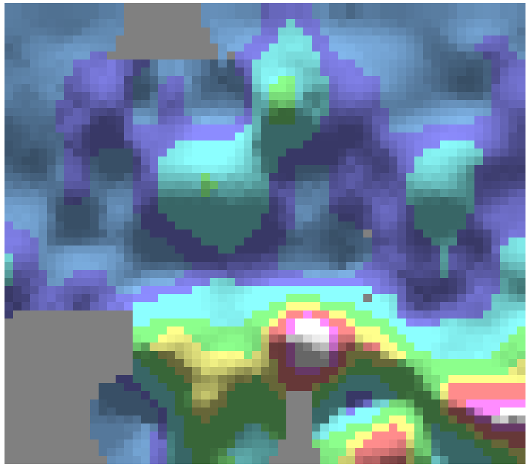
PBB_Lanthium (La) MAD

La

- 1.200000 - 1.500000
- 1.500001 - 8.000000
- 8.000001 - 9.700000
- 9.700001 - 13.600000
- 13.600001 - 16.500000



Spatial Distribution of Gold (Au) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

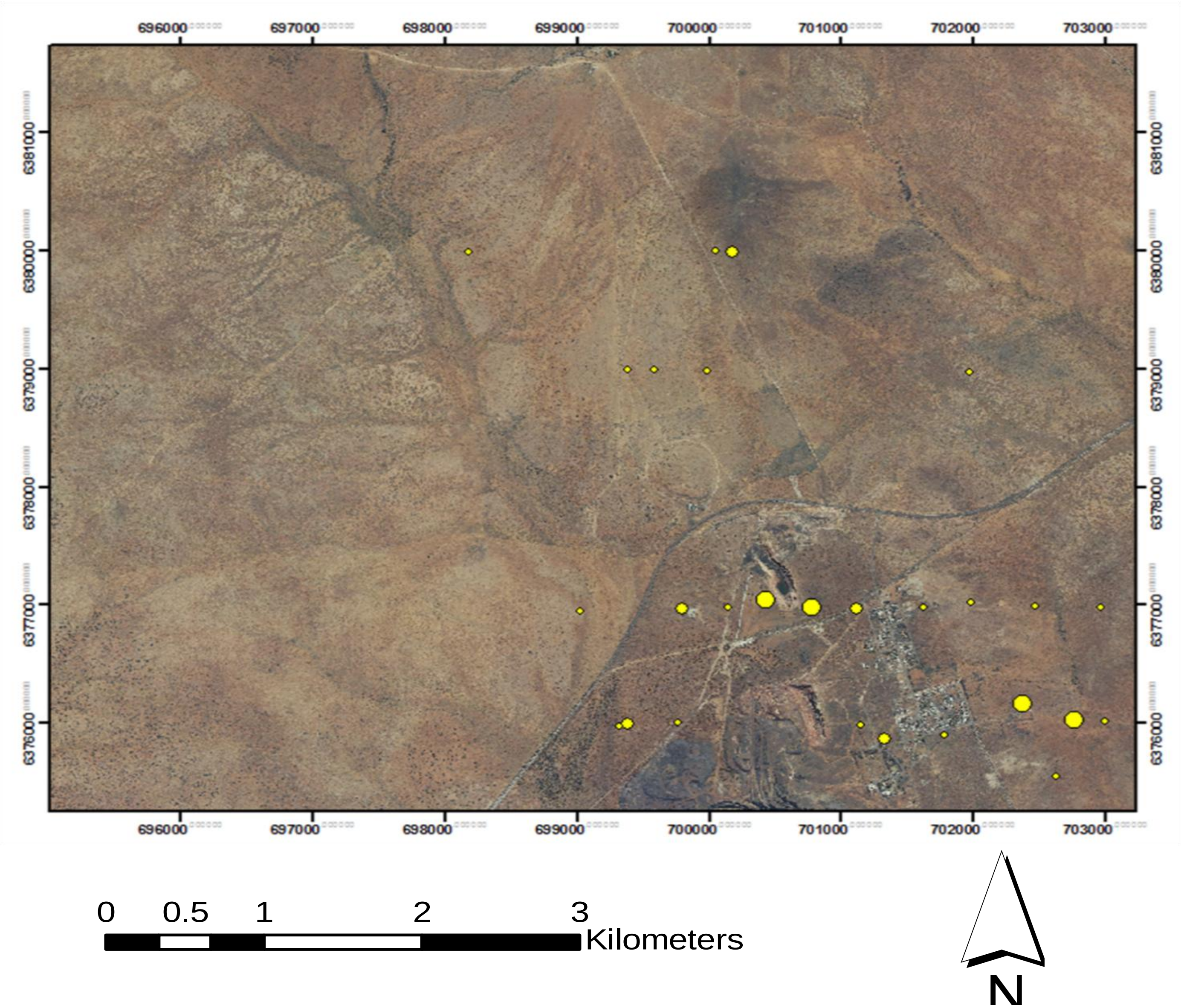
GDA 1994 MGA ZONE 53

Legend

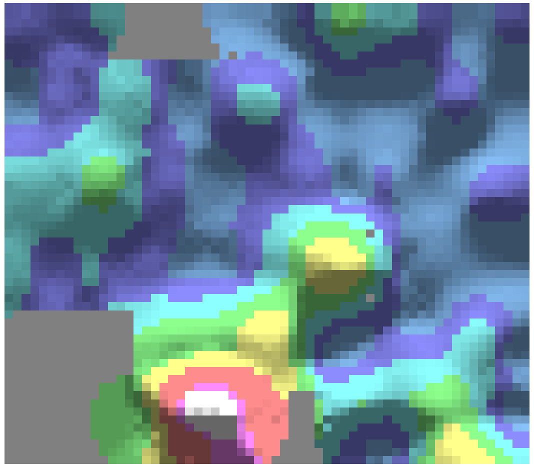
PBB_Gold (Au) MAD

Au

- 3.200000 - 5.217271
- 5.217272 - 8.251618
- 8.251619 - 12.300000



Spatial Distribution of Uranium (U) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

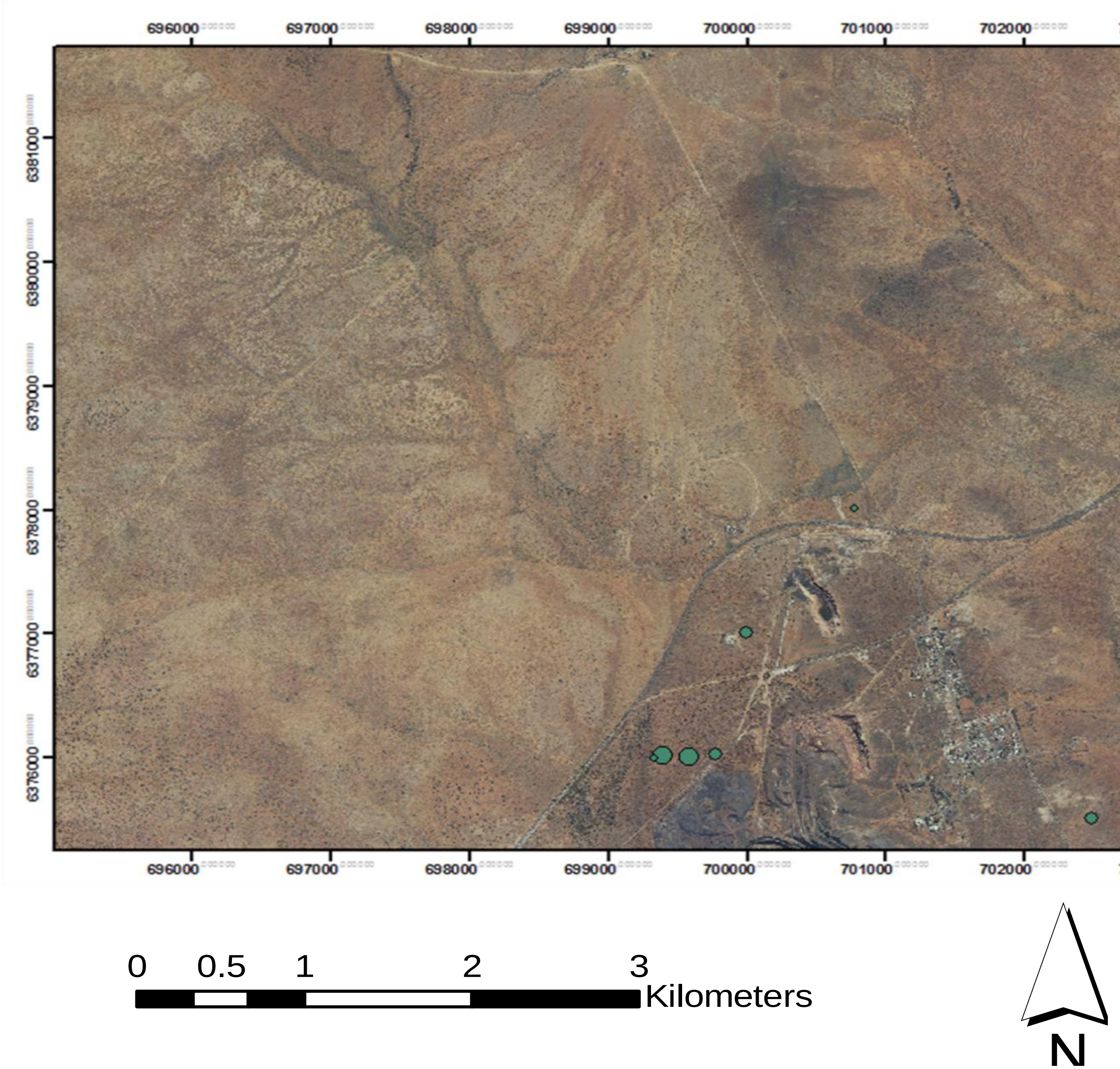
GDA 1994 MGA ZONE 53

Legend

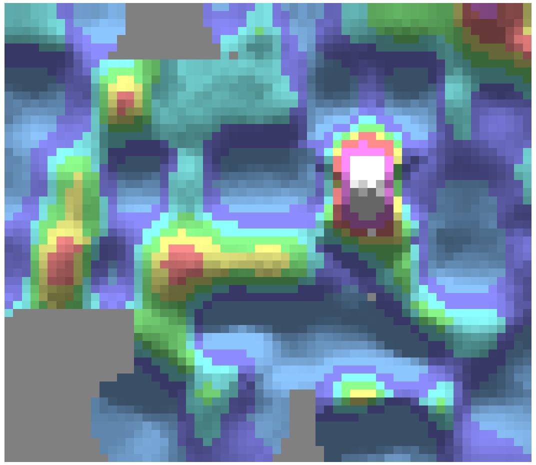
PBB_Uranium (U) MAD

U

- 0.500000
- 0.500001 - 0.600000
- 0.600001 - 1.500000



Spatial Distribution of Tin (Sn) ppm in Pearl Blue Bush



Element Disperson - All sample locations - Plotted with ioGAS

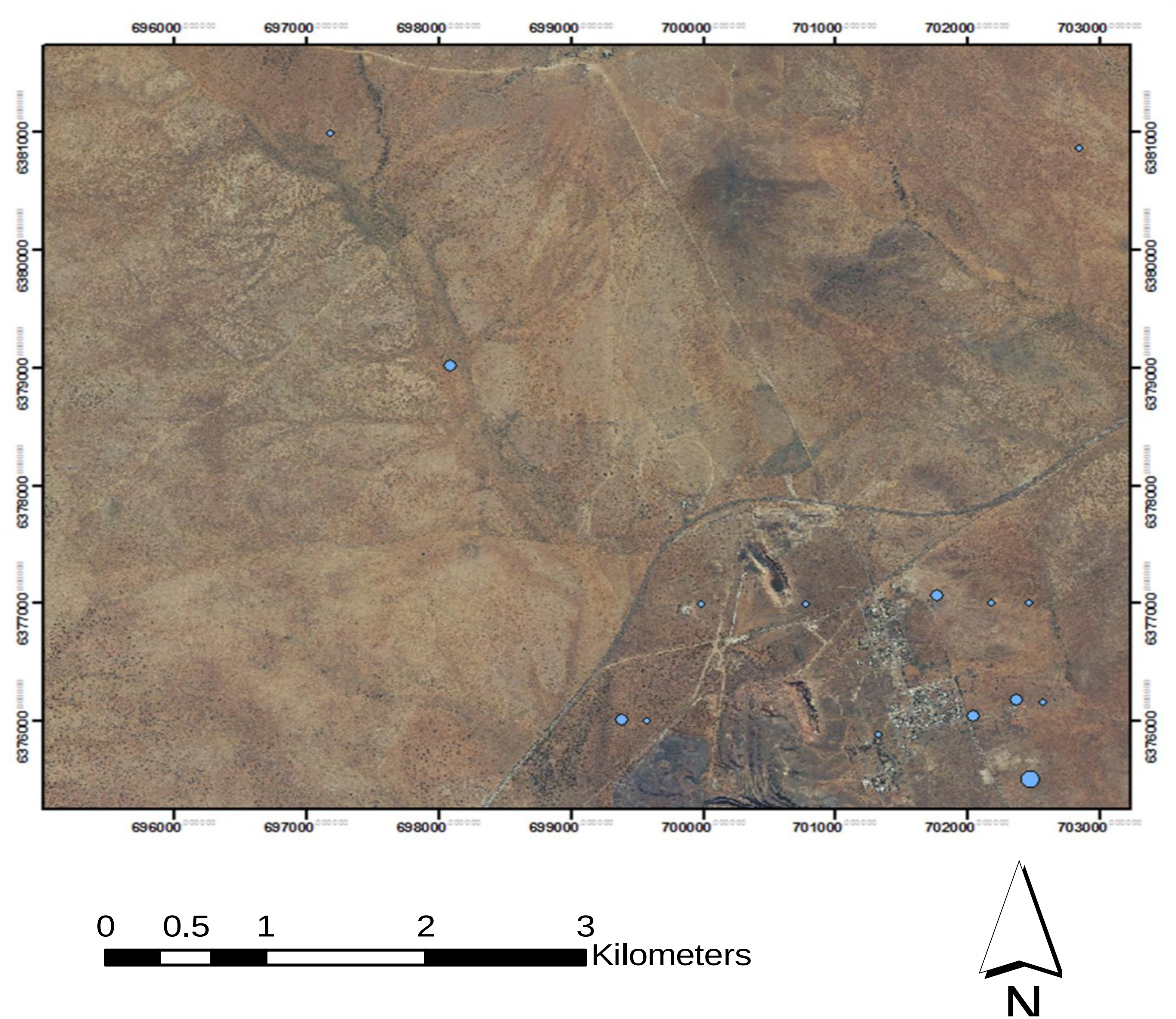
GDA 1994 MGA ZONE 53

Legend

PBB_Tin (Sn) MAD

Sn

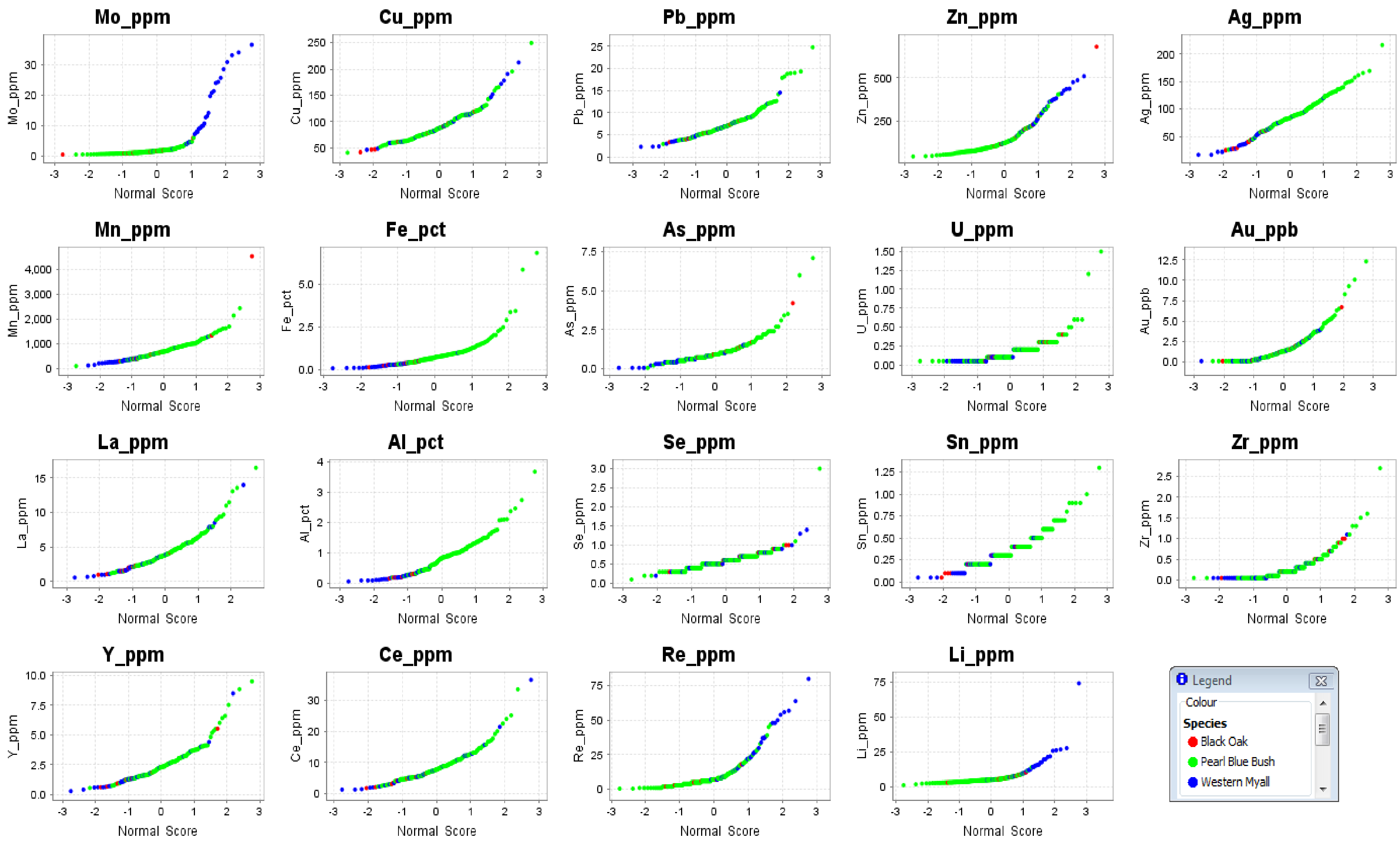
- 0.700000 - 0.800000
- 0.800001 - 1.000000
- 1.000001 - 1.300000



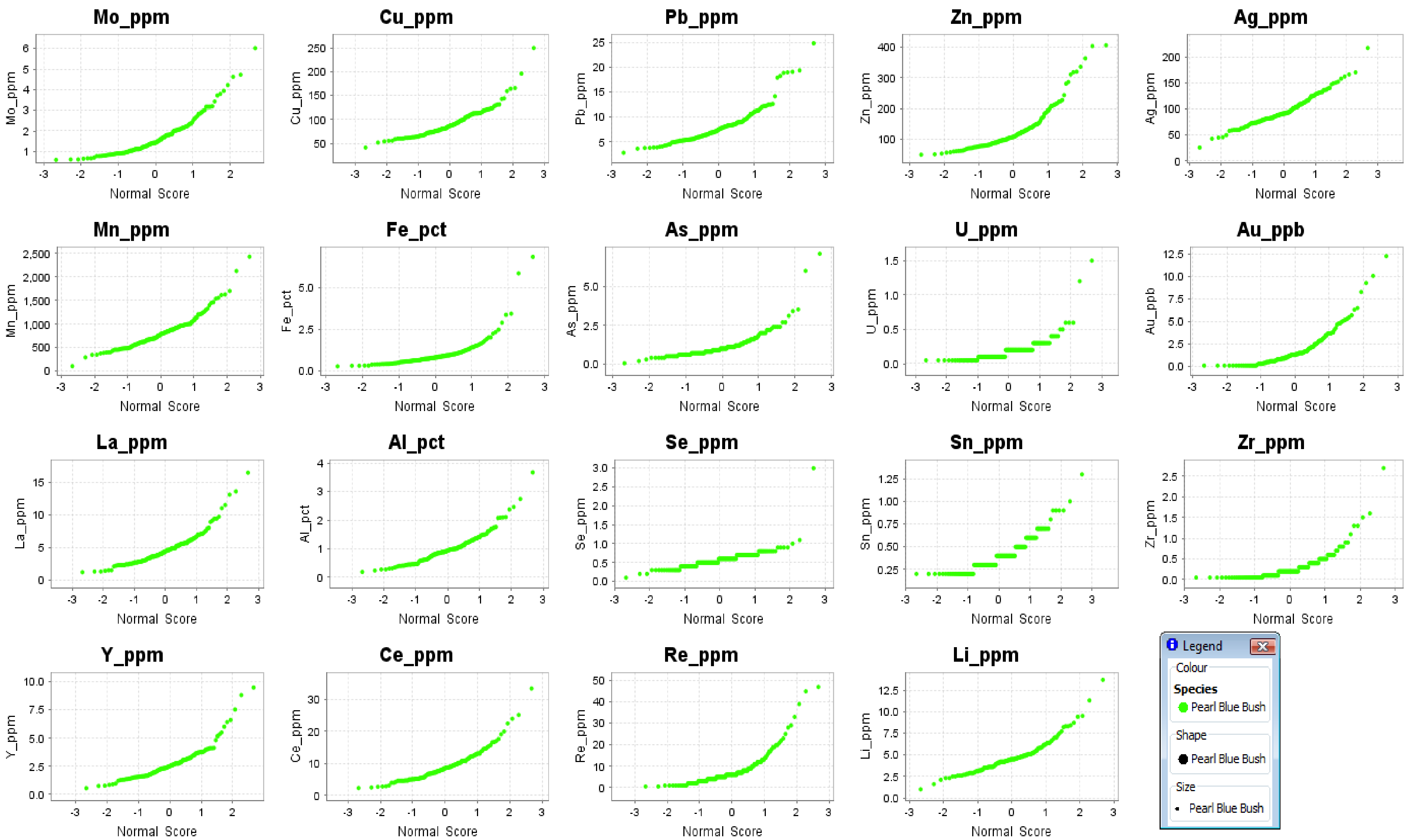
Appendix 3

- Normal Probability Plots – All Species – Pearl blue bush – Western myall – Black oak
- Histograms - All Species – Pearl blue bush – Western myall – Black oak
- Robust Statistics Summary - All Species – Pearl blue bush – Western myall – Black oak
- PCA Report: Transform None, Scaling True - All Species – Pearl blue bush – Western myall – Black oak
- Pearl blue bush – All data & GPS
- Western myall – All data & GPS
- Black oak – All data & GPS
- ACME Analytical Results 196 Samples – Ashed – duplicates, blanks, pulp
- ACME Analytical Results 67 Re-samples – Non Ashed – duplicates, blanks, pulp

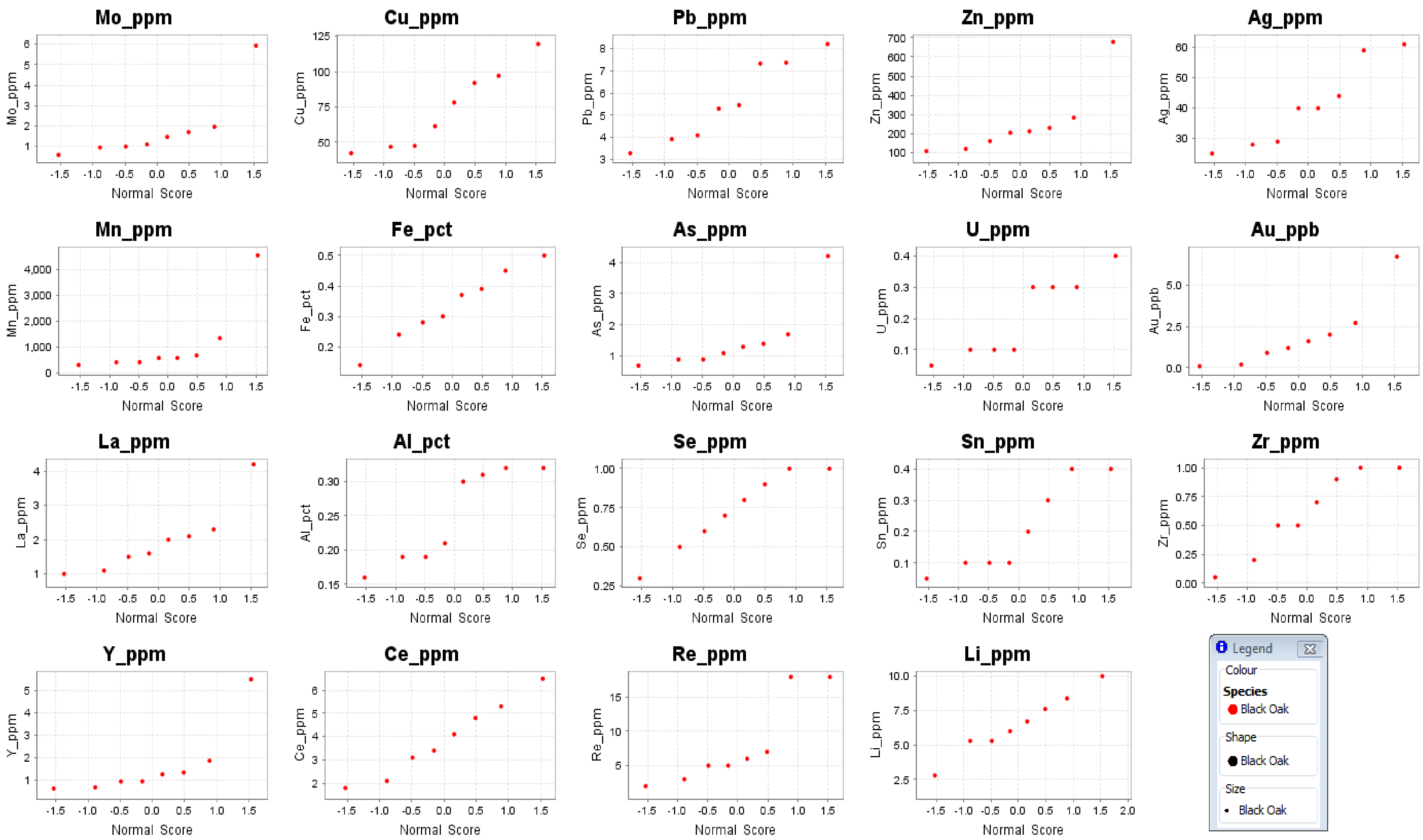
Normal Probability Plots - All Species



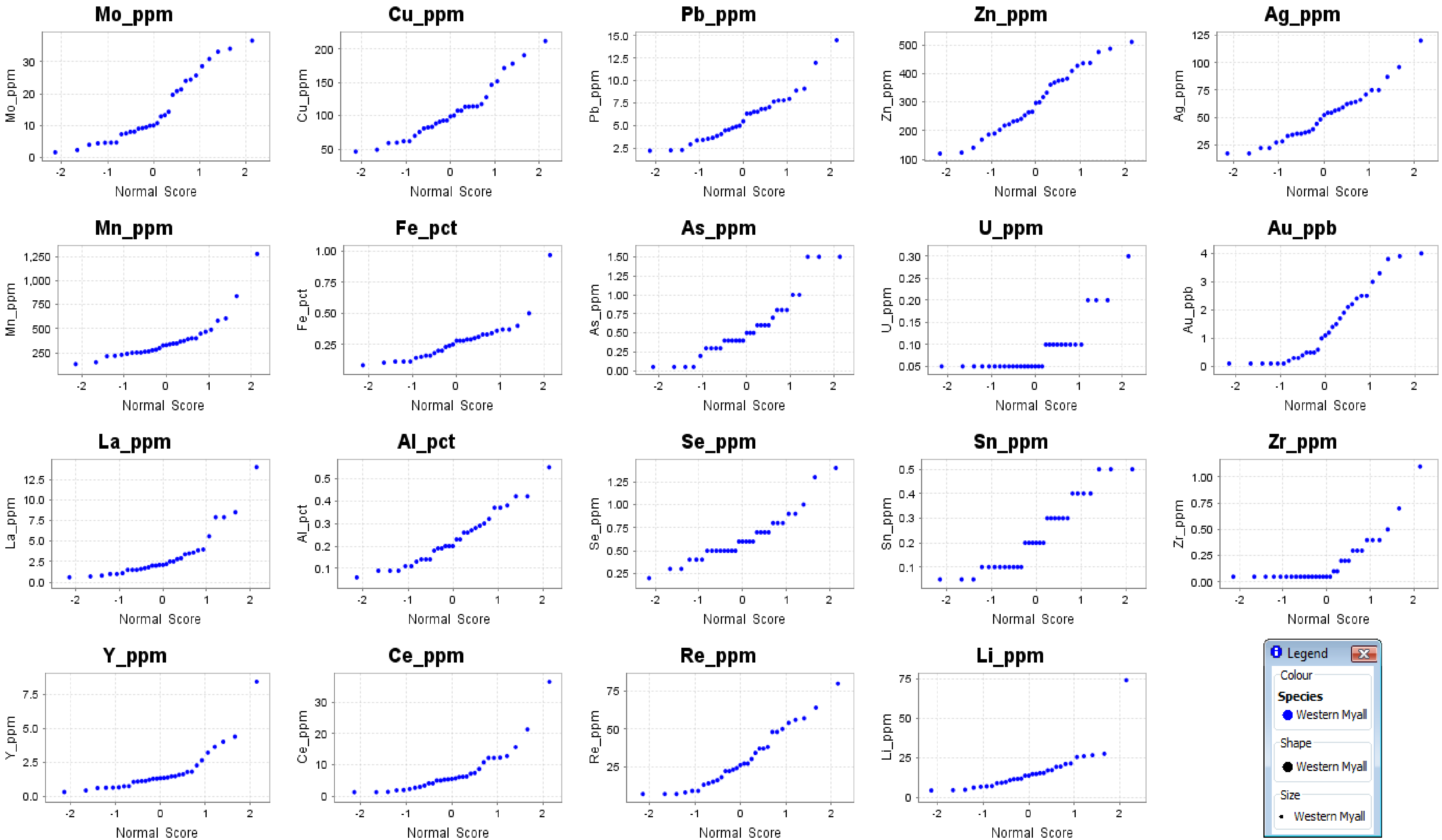
Normal Probability Plots - Pearl blue bush



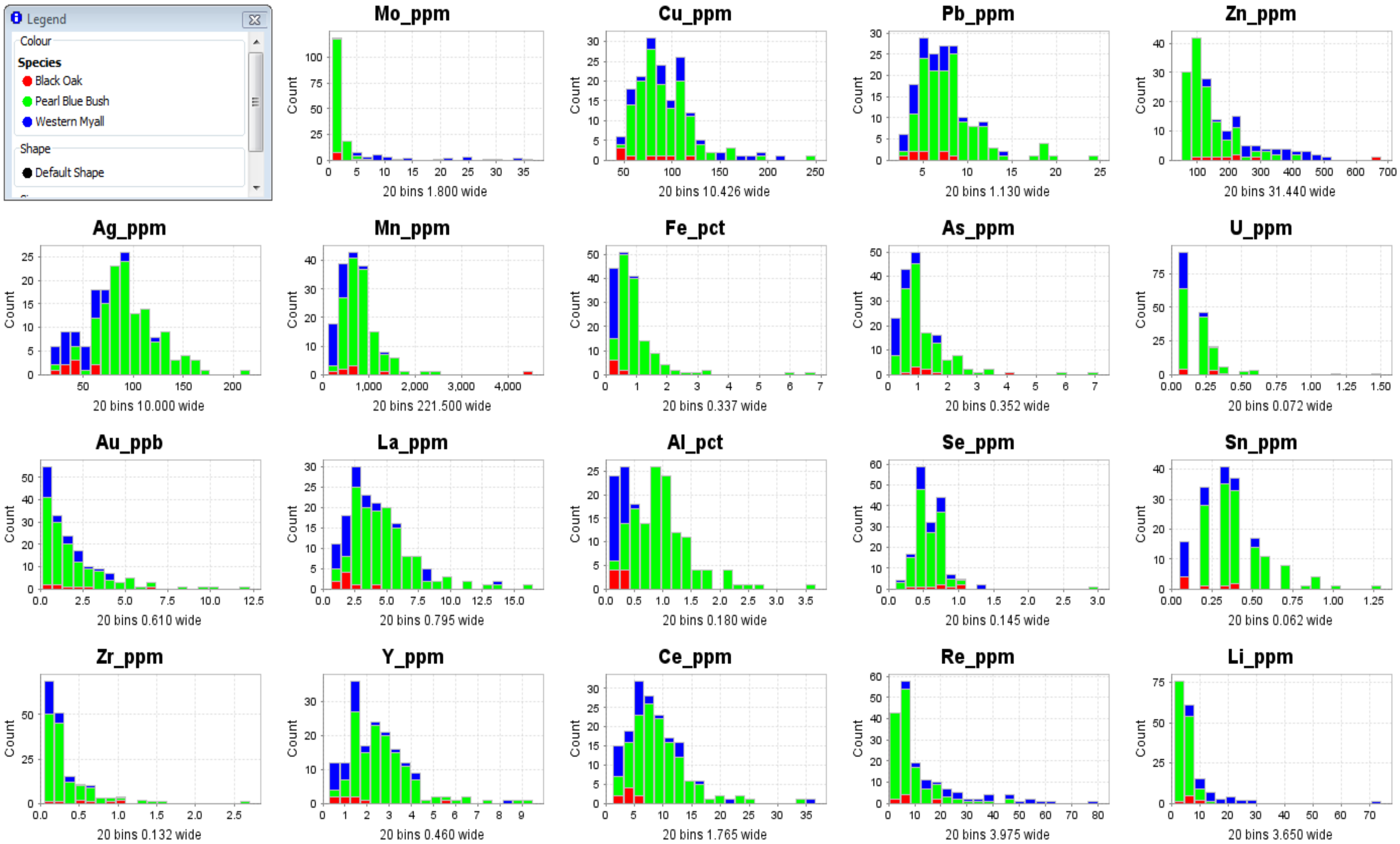
Normal Probability Plots - Black oak



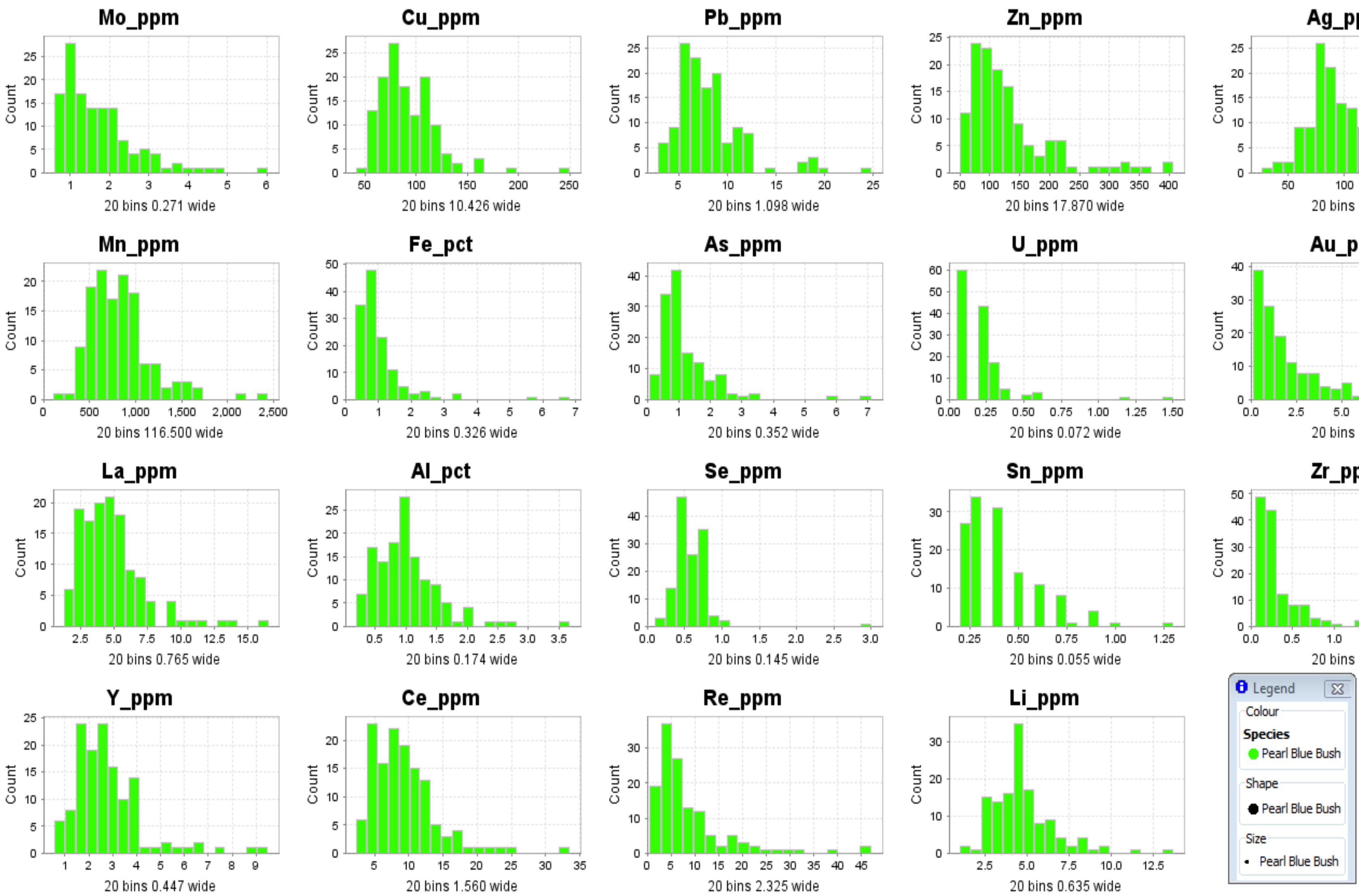
Normal Probability Plots - Western myall



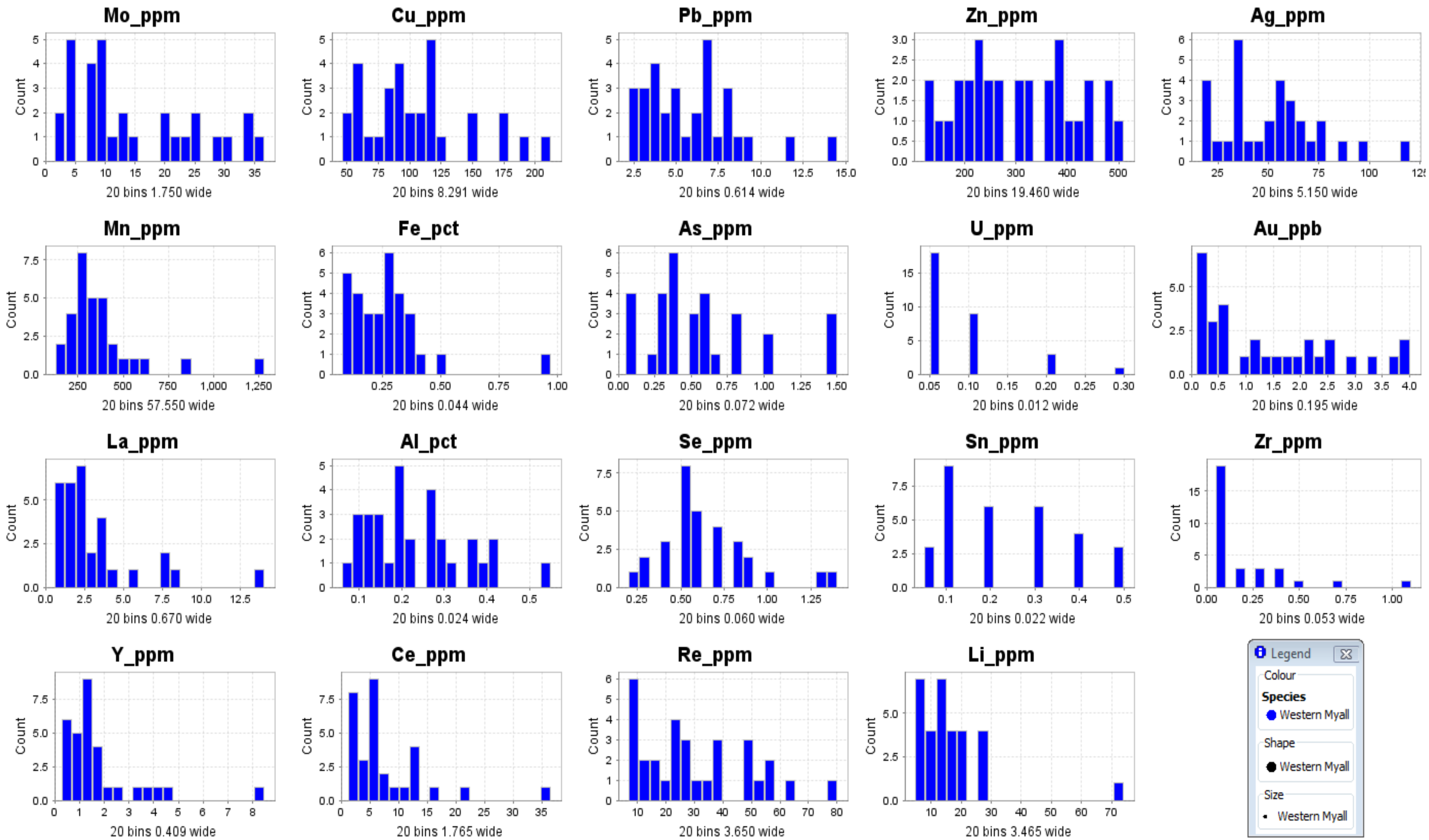
All Species Histograms - All Elements



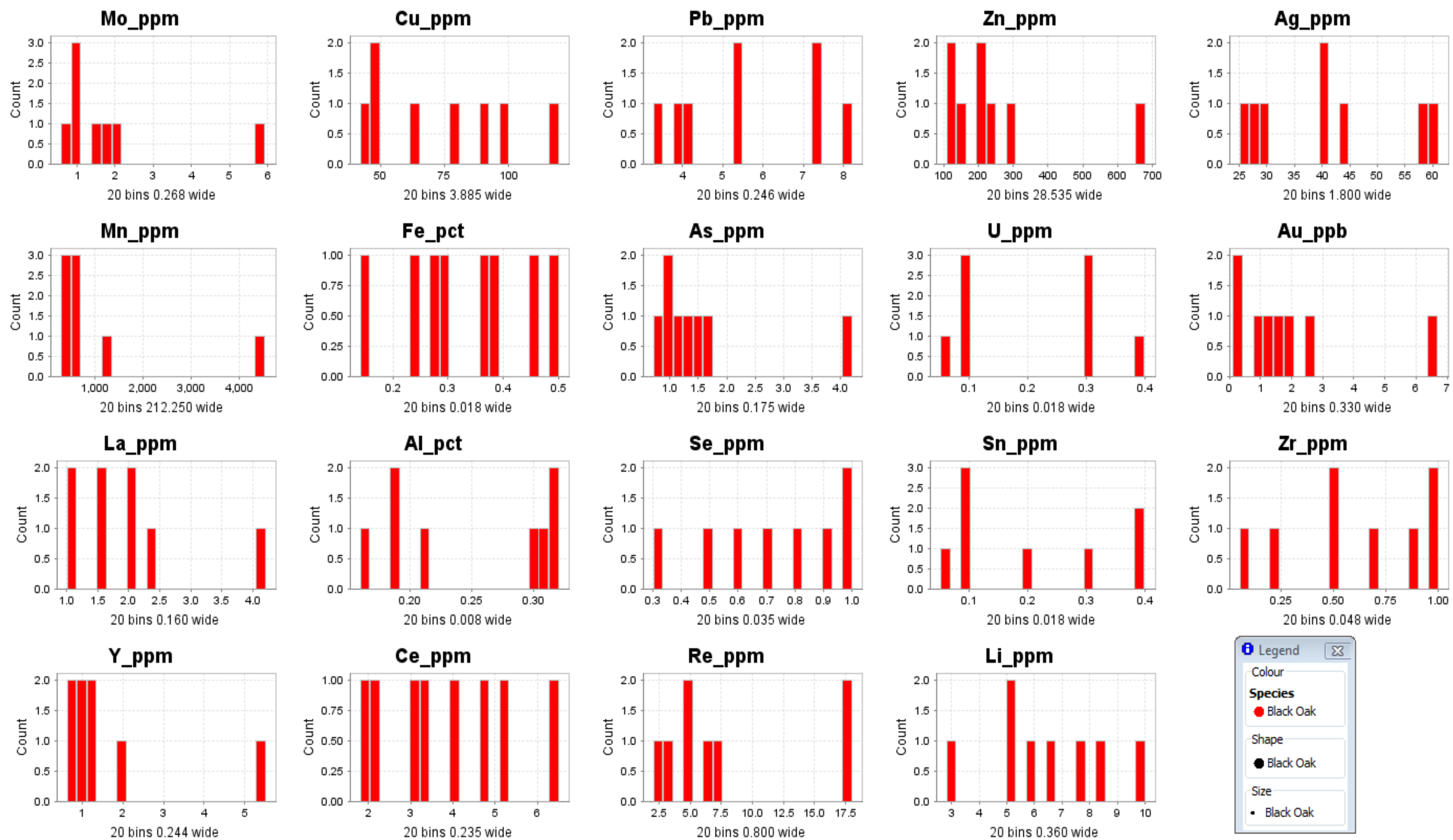
Pearl blue bush Histograms - All Elements



Western myall Histograms - All Elements



Black oak Histograms - All Elements



Robust Summary Statistics - All Species

AMC Robust Statistics V1.0
All Species **Mo**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.7
A15 mean	1.9225196
H15 mean	2.120198
MAD	0.71
MADe	1.0526466
sMAD	1.0526466
H15 Std Dev	1.4113768

AMC Robust Statistics V1.0
All Species Cu
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	87.8
A15 mean	90.21085086
H15 mean	90.17353
MAD	20.21
MADe	29.96336348
sMAD	29.96336348
H15 Std Dev	26.89897906

AMC Robust Statistics V1.0
All Species **Mn**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	686
A15 mean	706.53287
H15 mean	708.74301
MAD	232
MADe	343.9634
sMAD	343.9634
H15 Std Dev	340.37264

AMC Robust Statistics V1.0
All Species **Fe**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.71
A15 mean	0.728382583
H15 mean	0.732847507
MAD	0.29
MADe	0.429954251
sMAD	0.429954251
H15 Std Dev	0.438732743

AMC Robust Statistics V1.0
All Species **La**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	3.8
A15 mean	4.0630479
H15 mean	4.0887043
MAD	1.5
MADe	2.2239013
sMAD	2.2239013
H15 Std Dev	2.1847611

AMC Robust Statistics V1.0
All Species **Al**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.81
A15 mean	0.792942917
H15 mean	0.784346332
MAD	0.39
MADe	0.578214337
sMAD	0.578214337
H15 Std Dev	0.512028306

AMC Robust Statistics V1.0
All Species **Y**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	2.29
A15 mean	2.3543863
H15 mean	2.359783
MAD	0.83
MADe	1.2305587
sMAD	1.2305587
H15 Std Dev	1.2265842

AMC Robust Statistics V1.0
All Species **Ce**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	7.6
A15 mean	8.023370979
H15 mean	8.150906465
MAD	2.6
MADe	3.854762249
sMAD	3.854762249
H15 Std Dev	4.227946767

Robust Summary Statistics - All Species

AMC Robust Statistics V1.0

All Species **Pb**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	6.93
A15 mean	7.1312933
H15 mean	7.2278341
MAD	1.64
MADe	2.4314654
sMAD	2.4314654
H15 Std Dev	2.7351789

AMC Robust Statistics V1.0

All Species **Zn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	124.8
A15 mean	142.43531
H15 mean	151.19073
MAD	45.3
MADe	67.161819
sMAD	67.161819
H15 Std Dev	82.745167

AMC Robust Statistics V1.0

All Species **As**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.9
A15 mean	0.9497783
H15 mean	0.9832555
MAD	0.3
MADe	0.4447803
sMAD	0.4447803
H15 Std Dev	0.5502873

AMC Robust Statistics V1.0

All Species **U**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.1
A15 mean	0.1373136
H15 mean	0.1559288
MAD	0.05
MADe	0.07413
sMAD	0.07413
H15 Std Dev	0.1047717

AMC Robust Statistics V1.0

All Species **Se**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.6
A15 mean	0.5750159
H15 mean	0.5741647
MAD	0.1
MADe	0.1482601
sMAD	0.1482601
H15 Std Dev	0.1929262

AMC Robust Statistics V1.0

All Species **Sn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.3
A15 mean	0.3362139
H15 mean	0.3492843
MAD	0.1
MADe	0.1482601
sMAD	0.1482601
H15 Std Dev	0.1757661

AMC Robust Statistics V1.0

All Species **Re**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	7
A15 mean	8.5357627
H15 mean	9.6413342
MAD	4
MADe	5.9304035
sMAD	5.9304035
H15 Std Dev	7.8418429

AMC Robust Statistics V1.0

All Species **Li**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	4.9
A15 mean	5.2563991
H15 mean	5.463057
MAD	1.4
MADe	2.0756412
sMAD	2.0756412
H15 Std Dev	2.4700324

Robust Summary Statistics - All Species

AMC Robust Statistics V1.0

All Species **Ag**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	85
A15 mean	85.094001
H15 mean	85.11630799
MAD	22
MADe	32.61721903
sMAD	32.61721903
H15 Std Dev	33.7596499

AMC Robust Statistics V1.0

All Species **Au**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.3
A15 mean	1.530080841
H15 mean	1.599152405
MAD	0.9
MADe	1.334340778
sMAD	1.334340778
H15 Std Dev	1.423882637

AMC Robust Statistics V1.0

All Species **Zr**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.2
A15 mean	0.241459824
H15 mean	0.245919863
MAD	0.15
MADe	0.22239013
sMAD	0.22239013
H15 Std Dev	0.212767572

Robust Summary Statistics - Pearl blue bush

AMC Robust Statistics V1.0

Pearl Blue Bush **Mo**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	1.43
A15 mean	1.57421351
H15 mean	1.595429402
MAD	0.515
MADe	0.763539445
sMAD	0.763539445
H15 Std Dev	0.755527049

AMC Robust Statistics V1.0

Pearl Blue Bush **Pb**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	7.49
A15 mean	7.651133908
H15 mean	7.70486349
MAD	1.725
MADe	2.557486492
sMAD	2.557486492
H15 Std Dev	2.712467328

AMC Robust Statistics V1.0

Pearl Blue Bush **Cu**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	86.465
A15 mean	89.49232749
H15 mean	89.34909828
MAD	19.315
MADe	28.63643571
sMAD	28.63643571
H15 Std Dev	24.94034035

AMC Robust Statistics V1.0

Pearl Blue Bush **Zn**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	107.8
A15 mean	116.2128529
H15 mean	120.275096
MAD	29.7
MADe	44.03324569
sMAD	44.03324569
H15 Std Dev	51.27240148

AMC Robust Statistics V1.0

Pearl Blue Bush **Fe**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	0.82
A15 mean	0.855628338
H15 mean	0.879189558
MAD	0.23
MADe	0.340998199
sMAD	0.340998199
H15 Std Dev	0.401196335

AMC Robust Statistics V1.0

Pearl Blue Bush **As**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	1
A15 mean	1.042255671
H15 mean	1.080715786
MAD	0.3
MADe	0.444780259
sMAD	0.444780259
H15 Std Dev	0.553279175

AMC Robust Statistics V1.0

Pearl Blue Bush **Au**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	1.3
A15 mean	1.576043782
H15 mean	1.672138228
MAD	0.9
MADe	1.334340778
sMAD	1.334340778
H15 Std Dev	1.472341366

AMC Robust Statistics V1.0

Pearl Blue Bush **La**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	4.35
A15 mean	4.499052532
H15 mean	4.517622536
MAD	1.35
MADe	2.001511168
sMAD	2.001511168
H15 Std Dev	1.969106305

Robust Summary Statistics - Pearl blue bush

AMC Robust Statistics V1.0

Pearl Blue Bush **Ag**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	91
A15 mean	94.59162751
H15 mean	95.47779277
MAD	17
MADe	25.2042147
sMAD	25.2042147
H15 Std Dev	26.85066314

AMC Robust Statistics V1.0

Pearl Blue Bush **Mn**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	790.5
A15 mean	791.419542
H15 mean	792.5063875
MAD	192
MADe	284.6593661
sMAD	284.6593661
H15 Std Dev	292.8094736

AMC Robust Statistics V1.0

Pearl Blue Bush **U**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	0.2
A15 mean	0.177654024
H15 mean	0.171056643
MAD	0.1
MADe	0.148260086
sMAD	0.148260086
H15 Std Dev	0.104651311

AMC Robust Statistics V1.0

Pearl Blue Bush **Al**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	0.945
A15 mean	0.95655522
H15 mean	0.954688028
MAD	0.315
MADe	0.467019272
sMAD	0.467019272
H15 Std Dev	0.442551563

AMC Robust Statistics V1.0

Pearl Blue Bush **Y**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	2.52
A15 mean	2.59079588
H15 mean	2.592446948
MAD	0.79
MADe	1.171254683
sMAD	1.171254683
H15 Std Dev	1.087772444

AMC Robust Statistics V1.0

Pearl Blue Bush **Ce**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	8.5
A15 mean	8.79920866
H15 mean	8.790421398
MAD	2.85
MADe	4.225412465
sMAD	4.225412465
H15 Std Dev	3.915424188

AMC Robust Statistics V1.0

Pearl Blue Bush **Re**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	6
A15 mean	6.796370405
H15 mean	7.068541486
MAD	3
MADe	4.447802595
sMAD	4.447802595
H15 Std Dev	4.887621039

AMC Robust Statistics V1.0

Pearl Blue Bush **Li**

ROBUST STATISTICS SUMMARY

Estimate	*Estimate value*
Median	4.5
A15 mean	4.528925258
H15 mean	4.55496699
MAD	0.9
MADe	1.334340778
sMAD	1.334340778
H15 Std Dev	1.476380633

Robust Summary Statistics - Pearl blue bush

AMC Robust Statistics V1.0

Pearl Blue Bush	**Zr**
ROBUST STATISTICS SUMMARY	
Estimate	*Estimate value*
Median	0.2
A15 mean	0.246879687
H15 mean	0.250036983
MAD	0.15
MADe	0.22239013
sMAD	0.22239013
H15 Std Dev	0.20446938

AMC Robust Statistics V1.0

Pearl Blue Bush	**Sn**
ROBUST STATISTICS SUMMARY	
Estimate	*Estimate value*
Median	0.4
A15 mean	0.384067413
H15 mean	0.387348757
MAD	0.1
MADe	0.148260086
sMAD	0.148260086
H15 Std Dev	0.165984779

AMC Robust Statistics V1.0

Pearl Blue Bush	**Se**
ROBUST STATISTICS SUMMARY	
Estimate	*Estimate value*
Median	0.6
A15 mean	0.561058508
H15 mean	0.559726066
MAD	0.1
MADe	0.148260086
sMAD	0.148260086
H15 Std Dev	0.18185729

Robust Summary Statistics - Western Myall

AMC Robust Statistics V1.0

Western Myall **Mo**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	9.99
A15 mean	12.69400595
H15 mean	14.22261475
MAD	5.44
MADe	8.065348705
sMAD	8.065348705
H15 Std Dev	10.9192994

AMC Robust Statistics V1.0

Western Myall **Cu**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	98.74
A15 mean	98.86248541
H15 mean	101.1949889
MAD	18.42
MADe	27.30950793
sMAD	27.30950793
H15 Std Dev	38.61527331

AMC Robust Statistics V1.0

Western Myall **Ag**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	52
A15 mean	49.81426698
H15 mean	49.40498021
MAD	17
MADe	25.2042147
sMAD	25.2042147
H15 Std Dev	22.88472617

AMC Robust Statistics V1.0

Western Myall **Mn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	329
A15 mean	334.2090581
H15 mean	336.3420311
MAD	77
MADe	114.1602666
sMAD	114.1602666
H15 Std Dev	123.6176011

AMC Robust Statistics V1.0

Western Myall **U**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.05
A15 mean	0.073514951
H15 mean	0.073996879
MAD	0
MADe	0
sMAD	0.046493912
H15 Std Dev	0.033522008

AMC Robust Statistics V1.0

Western Myall **Au**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.1
A15 mean	1.344248513
H15 mean	1.336030812
MAD	1
MADe	1.482600865
sMAD	1.482600865
H15 Std Dev	1.29963378

AMC Robust Statistics V1.0

Western Myall **Se**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.6
A15 mean	0.601444524
H15 mean	0.609573676
MAD	0.1
MADe	0.148260086
sMAD	0.148260086
H15 Std Dev	0.223237511

AMC Robust Statistics V1.0

Western Myall **Sn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.2
A15 mean	0.223134529
H15 mean	0.225959468
MAD	0.1
MADe	0.148260086
sMAD	0.148260086
H15 Std Dev	0.152971422

Robust Summary Statistics - Western Myall

AMC Robust Statistics V1.0

Western Myall **Pb**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	5.47
A15 mean	5.655467056
H15 mean	5.643405712
MAD	1.83
MADe	2.713159583
sMAD	2.713159583
H15 Std Dev	2.513448568

AMC Robust Statistics V1.0

Western Myall **Zn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	296.5
A15 mean	300.6216777
H15 mean	301.1386247
MAD	81
MADe	120.0906701
sMAD	120.0906701
H15 Std Dev	124.3840519

AMC Robust Statistics V1.0

Western Myall **Fe**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.28
A15 mean	0.251925668
H15 mean	0.251478282
MAD	0.08
MADe	0.118608069
sMAD	0.118608069
H15 Std Dev	0.116110697

AMC Robust Statistics V1.0

Western Myall **As**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.5
A15 mean	0.507896137
H15 mean	0.519031756
MAD	0.2
MADe	0.296520173
sMAD	0.296520173
H15 Std Dev	0.346347134

AMC Robust Statistics V1.0

Western Myall **La**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	2.1
A15 mean	2.449016338
H15 mean	2.529757238
MAD	1
MADe	1.482600865
sMAD	1.482600865
H15 Std Dev	1.555667378

AMC Robust Statistics V1.0

Western Myall **Al**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.2
A15 mean	0.224246723
H15 mean	0.226716562
MAD	0.08
MADe	0.118608069
sMAD	0.118608069
H15 Std Dev	0.119335151

AMC Robust Statistics V1.0

Western Myall **Zr**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.05
A15 mean	0.144754654
H15 mean	0.159742384
MAD	0
MADe	0
sMAD	0.181932697
H15 Std Dev	0.163337832

AMC Robust Statistics V1.0

Western Myall **Y**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.31
A15 mean	1.381446314
H15 mean	1.443751736
MAD	0.48
MADe	0.711648415
sMAD	0.711648415
H15 Std Dev	0.860598331

Robust Summary Statistics - Western Myall

AMC Robust Statistics V1.0

Western Myall **Li**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	13.9
A15 mean	14.6320765
H15 mean	14.64075409
MAD	5.5
MADe	8.154304757
sMAD	8.154304757
H15 Std Dev	7.849375475

AMC Robust Statistics V1.0

Western Myall **Re**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	26
A15 mean	28.36884122
H15 mean	29.00394127
MAD	12
MADe	17.79121038
sMAD	17.79121038
H15 Std Dev	19.69745303

AMC Robust Statistics V1.0

Western Myall **Ce**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	5.5
A15 mean	6.264144046
H15 mean	6.501625553
MAD	2.8
MADe	4.151282422
sMAD	4.151282422
H15 Std Dev	4.619582509

Robust Summary Statistics - Black oak

AMC Robust Statistics V1.0

Black Oak **Mo**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.285
A15 mean	1.357510312
H15 mean	1.379751403
MAD	0.38
MADe	0.563388329
sMAD	0.563388329
H15 Std Dev	0.662027802

AMC Robust Statistics V1.0

Black Oak **Cu**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	69.77
A15 mean	73.0075
H15 mean	72.61940562
MAD	22.805
MADe	33.81071272
sMAD	33.81071272
H15 Std Dev	31.24185394

AMC Robust Statistics V1.0

Black Oak **Ag**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	40
A15 mean	40.75
H15 mean	40.75
MAD	11.5
MADe	17.04990995
sMAD	17.04990995
H15 Std Dev	15.46631645

AMC Robust Statistics V1.0

Black Oak **Mn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	562.5
A15 mean	590.7079409
H15 mean	694.8343527
MAD	164.5
MADe	243.8878423
sMAD	243.8878423
H15 Std Dev	473.5332632

AMC Robust Statistics V1.0

Black Oak **U**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.2
A15 mean	0.20625
H15 mean	0.20625
MAD	0.1
MADe	0.148260086
sMAD	0.148260086
H15 Std Dev	0.149742391

AMC Robust Statistics V1.0

Black Oak **Au**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.4
A15 mean	1.512688896
H15 mean	1.501378622
MAD	0.9
MADe	1.334340778
sMAD	1.334340778
H15 Std Dev	1.290832236

AMC Robust Statistics V1.0

Black Oak **Se**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.75
A15 mean	0.725
H15 mean	0.732091756
MAD	0.2
MADe	0.296520173
sMAD	0.296520173
H15 Std Dev	0.267384766

AMC Robust Statistics V1.0

Black Oak **Sn**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.15
A15 mean	0.185448149
H15 mean	0.20625
MAD	0.075
MADe	0.111195065
sMAD	0.111195065
H15 Std Dev	0.161533307

Robust Summary Statistics - Black oak

AMC Robust Statistics V1.0
Black Oak **Pb**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	5.37
A15 mean	5.6125
H15 mean	5.6125
MAD	1.7
MADe	2.52042147
sMAD	2.52042147
H15 Std Dev	2.075101478

AMC Robust Statistics V1.0
Black Oak **Fe**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.335
A15 mean	0.337275925
H15 mean	0.335629455
MAD	0.075
MADe	0.111195065
sMAD	0.111195065
H15 Std Dev	0.128770712

AMC Robust Statistics V1.0
Black Oak **La**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.8
A15 mean	1.784226783
H15 mean	1.794075193
MAD	0.4
MADe	0.593040346
sMAD	0.593040346
H15 Std Dev	0.683691643

AMC Robust Statistics V1.0
Black Oak **Zr**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.6
A15 mean	0.60625
H15 mean	0.60625
MAD	0.35
MADe	0.518910303
sMAD	0.518910303
H15 Std Dev	0.406892586

AMC Robust Statistics V1.0
Black Oak **Zn**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	209.25
A15 mean	208.1231743
H15 mean	206.0379514
MAD	60.95
MADe	90.36452272
sMAD	90.36452272
H15 Std Dev	86.16554853

AMC Robust Statistics V1.0
Black Oak **As**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.2
A15 mean	1.233396299
H15 mean	1.23764235
MAD	0.3
MADe	0.444780259
sMAD	0.444780259
H15 Std Dev	0.473214008

AMC Robust Statistics V1.0
Black Oak **Al**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	0.255
A15 mean	0.25
H15 mean	0.25
MAD	0.065
MADe	0.096369056
sMAD	0.096369056
H15 Std Dev	0.077583308

AMC Robust Statistics V1.0
Black Oak **Y**
ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	1.095
A15 mean	1.174721857
H15 mean	1.204282296
MAD	0.33
MADe	0.489258285
sMAD	0.489258285
H15 Std Dev	0.591825171

Robust Summary Statistics - Black oak

AMC Robust Statistics V1.0

Black Oak **Li**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	6.35
A15 mean	6.5
H15 mean	6.549804688
MAD	1.15
MADe	1.704990995
sMAD	1.704990995
H15 Std Dev	2.195895379

AMC Robust Statistics V1.0

Black Oak **Re**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	5.5
A15 mean	5.986950649
H15 mean	8
MAD	2
MADe	2.96520173
sMAD	2.96520173
H15 Std Dev	7.219224442

AMC Robust Statistics V1.0

Black Oak **Ce**

ROBUST STATISTICS SUMMARY

Estimate	Estimate value
Median	3.75
A15 mean	3.8875
H15 mean	3.874672366
MAD	1.3
MADe	1.927381124
sMAD	1.927381124
H15 Std Dev	1.796233133

PCA Report: All Species -Transform None, Scaling true (171 rows)

Summary	Count
Rows	171
Columns	19

	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
Correlation	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**pct**	**ppm**	**ppm**	**ppm**	**ppm**	**pct**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
Mo_ppm	1	0.1679	-0.1463	0.4056	-0.2893	-0.2905	-0.1995	-0.1681	-0.1292	-0.0205	-0.191	-0.3611	0.08524	-0.1666	-0.1257	-0.2239	-0.1591	0.2567	0.3518
Cu_ppm	0.1679	1	-0.006542	0.5253	0.2291	0.04846	-0.01115	-0.02281	-0.03775	0.3011	-0.08058	-0.2269	-0.06276	0.05105	0.01869	-0.06913	-0.04413	0.0323	0.007909
Pb_ppm	-0.1463	-0.006542	1	-0.02157	0.5265	0.3021	0.7854	0.7396	0.7697	0.1863	0.7947	0.7046	0.06866	0.7588	0.1774	0.7514	0.7245	-0.1291	0.1123
Zn_ppm	0.4056	0.5253	-0.02157	1	-0.1952	-0.1057	-0.1196	-0.05225	-0.006446	0.2957	-0.1397	-0.4219	0.03399	0.03274	0.005165	-0.1318	-0.06606	0.4405	0.3643
Ag_ppm	-0.2893	0.2291	0.5265	-0.1952	1	0.429	0.6184	0.4904	0.5113	0.2065	0.4676	0.5297	-0.04271	0.4654	0.07504	0.4588	0.3796	-0.3628	-0.2549
Mn_ppm	-0.2905	0.04846	0.3021	-0.1057	0.429	1	0.459	0.4465	0.4851	0.004446	0.3498	0.3694	0.06773	0.199	0.1234	0.4905	0.2889	-0.3207	-0.202
Fe_pct	-0.1995	-0.01115	0.7854	-0.1196	0.6184	0.459	1	0.8831	0.9224	0.1614	0.706	0.6572	-0.003639	0.633	0.174	0.7041	0.601	-0.2299	-0.07892
As_ppm	-0.1681	-0.02281	0.7396	-0.05225	0.4904	0.4465	0.8831	1	0.8634	0.1805	0.6169	0.5467	-0.03372	0.566	0.2334	0.6243	0.5368	-0.163	-0.03756
U_ppm	-0.1292	-0.03775	0.7697	-0.006446	0.5113	0.4851	0.9224	0.8634	1	0.1588	0.6341	0.5142	0.02595	0.5662	0.1942	0.6543	0.55	-0.1307	0.02116
Au_ppb	-0.0205	0.3011	0.1863	0.2957	0.2065	0.004446	0.1614	0.1805	0.1588	1	-0.04023	-0.06772	-0.08919	0.3897	0.06627	-0.05849	-0.08447	0.04069	-0.1007
La_ppm	-0.191	-0.08058	0.7947	-0.1397	0.4676	0.3498	0.706	0.6169	0.6341	-0.04023	1	0.8002	0.07138	0.6113	0.1345	0.955	0.9622	-0.1415	0.1397
Al_pct	-0.3611	-0.2269	0.7046	-0.4219	0.5297	0.3694	0.6572	0.5467	0.5142	-0.06772	0.8002	1	0.06331	0.6471	0.132	0.7833	0.7243	-0.3425	-0.1387
Se_ppm	0.08524	-0.06276	0.06866	0.03399	-0.04271	0.06773	-0.003639	-0.03372	0.02595	-0.08919	0.07138	0.06331	1	-0.06476	0.093	0.09493	0.1073	0.05867	0.1234
Sn_ppm	-0.1666	0.05105	0.7588	0.03274	0.4654	0.199	0.633	0.566	0.5662	0.3897	0.6113	0.6471	-0.06476	1	0.1796	0.5736	0.536	-0.1283	-0.05659
Zr_ppm	-0.1257	0.01869	0.1774	0.005165	0.07504	0.1234	0.174	0.2334	0.1942	0.06627	0.1345	0.132	0.093	0.1796	1	0.1435	0.1187	-0.02541	-0.01192
Y_ppm	-0.2239	-0.06913	0.7514	-0.1318	0.4588	0.4905	0.7041	0.6243	0.6543	-0.05849	0.955	0.7833	0.09493	0.5736	0.1435	1	0.9354	-0.1499	0.1422
Ce_ppm	-0.1591	-0.04413	0.7245	-0.06606	0.3796	0.2889	0.601	0.5368	0.55	-0.08447	0.9622	0.7243	0.1073	0.536	0.1187	0.9354	1	-0.02614	0.2417
Re_ppm	0.2567	0.0323	-0.1291	0.4405	-0.3628	-0.3207	-0.2299	-0.163	-0.1307	0.04069	-0.1415	-0.3425	0.05867	-0.1283	-0.02541	-0.1499	-0.02614	1	0.611
Li_ppm	0.3518	0.007909	0.1123	0.3643	-0.2549	-0.202	-0.07892	-0.03756	0.02116	-0.1007	0.1397	-0.1387	0.1234	-0.05659	-0.01192	0.1422	0.2417	0.611	1

Eigenvectors

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	0.1147	0.348	0.02666	-0.04827	-0.1754	0.2818	0.3699	-0.6031	0.1274	-0.3825	0.1244	0.2624	-0.0437	0.01444	-0.04636	0.006077	0.01001	0.003382	-0.02538
Cu_ppm	0.01916	0.2359	-0.4434	-0.1783	-0.4284	-0.2674	-0.2305	-0.1519	-0.2306	0.1942	-0.0962	0.02371	-0.5177	0.07737	0.03281	0.05741	0.06057	4.10E-05	0.0407
Pb_ppm	-0.3237	0.1398	-0.006972	0.09796	0.06403	-0.03223	0.145	-0.05133	-0.05111	0.08319	0.05275	-0.3063	-0.01901	0.4285	-0.6918	0.17	-0.1593	0.0695	-0.09752
Zn_ppm	0.07049	0.4915	-0.2452	-0.1242	-0.1087	-0.02047	-0.09947	0.03344	0.2971	0.3413	0.1837	-0.15	0.5407	-0.2778	-0.0264	0.1514	-0.01827	0.01339	0.003267
Ag_ppm	-0.2414	-0.121	-0.2649	-0.03353	-0.2328	-0.08255	0.01247	0.03174	-0.6074	-0.3684	0.1916	0.01996	0.4683	-0.08164	-0.03092	-0.1439	0.05071	0.04105	-7.49E-04
Mn_ppm	-0.1931	-0.1431	-0.1175	-0.4533	-0.1958	0.2439	-0.2623	0.3077	0.4195	-0.3868	0.2514	-0.04018	-0.143	0.07103	-0.1029	-0.02455	-0.08777	-0.1637	-0.006087
Fe_pct	-0.3288	0.02809	-0.108	-0.01953	0.07467	0.2889	0.08258	-0.01522	-0.1699	0.1407	-0.05533	0.07614	-0.05369	-0.05715	0.3706	0.2605	-0.6816	-0.07315	-0.2102
As_ppm	-0.3012	0.06323	-0.1197	-0.04806	0.1827	0.367	0.01531	-0.01397	-0.07212	0.1986	-0.154	0.07264	-0.1999	-0.5269	-0.3248	-0.453	0.1128	0.04341	0.05952
U_ppm	-0.3052	0.09794	-0.09844	-0.09494	0.1357	0.4091	0.06089	0.04362	-0.08237	0.141	-0.06708	-0.03273	0.06494	0.3625	0.3039	0.2238	0.6011	-0.05012	0.1142
Au_ppb	-0.04195	0.1562	-0.5	0.2015	0.2365	-0.2182	0.2575	0.3049	0.225	-0.3714	-0.4271	0.1739	-0.003232	-0.04449	-0.02385	0.1262	0.0236	-0.01093	-0.01268
La_ppm	-0.3264	0.08649	0.2044	0.07044	-0.1428	-0.156	-0.06501	-0.07279	0.09707	0.01558	-0.1747	0.1795	0.1244	0.07441	0.008479	-0.05237	-0.1942	-0.2256	0.7747
Al_pct	-0.308	-0.1475	0.1626	0.1157	-0.03821	-0.216	0.07586	-0.0627	0.03134	-0.06669	0.2596	0.01598	-0.2005	-0.5017	-0.06202	0.5957	0.2438	-0.05152	0.00297
Se_ppm	-0.01453	0.08074	0.204	-0.6388	0.02272	-0.2812	0.6102	0.2307	-0.1051	0.1277	-0.01136	-0.002992	-0.04294	-0.02491	0.0453	-0.0769	-0.004595	0.002424	0.02148
Sn_ppm	-0.2707	0.1021	-0.1619	0.283	0.1538	-0.2495	0.1806	-0.05288	0.1918	0.01422	0.514	-0.2352	-0.1838	0.08424	0.3362	-0.421	0.004003	-0.03048	0.007385
Zr_ppm	-0.0806	0.02587	-0.06012	-0.4007	0.644	-0.2751	-0.3652	-0.4188	-0.04143	-0.1374	-0.00104	0.04243	0.06752	0.02237	0.008308	0.03894	-0.01822	-9.61E-04	-0.008662
Y_ppm	-0.3264	0.07184	0.1964	-0.03152	-0.167	-0.1024	-0.1327	0.01509	0.1884	-0.05236	-0.1377	0.146	0.03907	0.04409	0.1338	-0.05709	0.01357	0.822	-0.1161
Ce_ppm	-0.2974	0.1454	0.2588	0.05165	-0.1775	-0.2124	-0.1256	-0.03433	0.09208	0.05287	-0.2161	0.2327	0.1294	0.05823	0.004543	-0.1924	0.1514	-0.4727	-0.5582
Re_ppm	0.1036	0.4398	0.1686	0.1025	0.2091	0.03213	-0.1736	0.4035	-0.2482	-0.01995	0.3878	0.5139	-0.1398	0.09016	-0.1032	0.0435	-0.02061	0.03311	0.03133
Li_ppm	0.01883	0.4708	0.3151	0.02629	0.01025	0.0599	-0.1456	0.1165	-0.1945	-0.3798	-0.2165	-0.5837	-0.1301	-0.1675	0.1502	-0.003249	-0.008954	-0.04261	0.02146

	Eigenvalues	Percent	Cumulative %		Eigenvalues	Percent	Cumulative %
PC1	7.477	39.35	39.35	**PC11**	0.3431	1.806	94.54
PC2	2.51	13.21	52.57	**PC12**	0.3047	1.604	96.14
PC3	1.961	10.32	62.89	**PC13**	0.2369	1.247	97.39
PC4	1.109	5.839	68.73	**PC14**	0.1475	0.7762	98.17
PC5	1.056	5.556	74.28	**PC15**	0.1371	0.7218	98.89
PC6	0.9392	4.943	79.23	**PC16**	0.1151	0.6059	99.49
PC7	0.8564	4.507	83.73	**PC17**	0.04369	0.2299	99.72
PC8	0.7434	3.913	87.65	**PC18**	0.03317	0.1746	99.9
PC9	0.5342	2.812	90.46	**PC19**	0.0193	0.1016	100
PC10	0.4323	2.275	92.73				

Scaled Coordinates

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	0.3136	0.5514	0.03734	-0.05084	-0.1802	0.2731	0.3423	-0.52	0.09309	-0.2515	0.07287	0.1449	-0.02127	0.005545	-0.01717	0.002062	0.002092	6.16E-04	-0.003526
Cu_ppm	0.05239	0.3738	-0.621	-0.1878	-0.4402	-0.2591	-0.2133	-0.131	-0.1685	0.1277	-0.05635	0.01309	-0.252	0.02971	0.01215	0.01948	0.01266	7.46E-06	0.005653
Pb_ppm	-0.8851	0.2215	-0.009764	0.1032	0.06579	-0.03123	0.1342	-0.04426	-0.03736	0.05469	0.0309	-0.1691	-0.009253	0.1646	-0.2562	0.05769	-0.03329	0.01266	-0.01355
Zn_ppm	0.1928	0.7787	-0.3433	-0.1308	-0.1117	-0.01984	-0.09205	0.02883	0.2172	0.2244	0.1076	-0.08278	0.2632	-0.1067	-0.009779	0.05137	-0.003818	0.002439	4.54E-04
Ag_ppm	-0.6602	-0.1917	-0.3709	-0.03531	-0.2392	-0.08	0.01154	0.02737	-0.4439	-0.2422	0.1122	0.01102	0.2279	-0.03135	-0.01145	-0.04883	0.0106	0.007477	-1.04E-04
Mn_ppm	-0.528	-0.2267	-0.1645	-0.4774	-0.2012	0.2364	-0.2427	0.2653	0.3066	-0.2543	0.1473	-0.02218	-0.06961	0.02728	-0.03811	-0.008331	-0.01835	-0.02982	-8.46E-04
Fe_pct	-0.8992	0.0445	-0.1512	-0.02057	0.07672	0.2799	0.07642	-0.01313	-0.1242	0.0925	-0.03241	0.04203	-0.02613	-0.02195	0.1372	0.08838	-0.1425	-0.01332	-0.0292
As_ppm	-0.8237	0.1002	-0.1676	-0.05062	0.1877	0.3557	0.01417	-0.01205	-0.05271	0.1306	-0.09021	0.0401	-0.09727	-0.2024	-0.1203	-0.1537	0.02358	0.007906	0.008267
U_ppm	-0.8347	0.1552	-0.1379	-0.09999	0.1395	0.3965	0.05635	0.03761	-0.06021	0.0927	-0.03929	-0.01807	0.03161	0.1392	0.1125	0.07592	0.1256	-0.009129	0.01587
Au_ppb	-0.1147	0.2475	-0.7001	0.2123	0.243	-0.2114	0.2383	0.2629	0.1644	-0.2442	-0.2502	0.09599	-0.001573	-0.01708	-0.008833	0.0428	0.004932	-0.001992	-0.001761
La_ppm	-0.8926	0.137	0.2862	0.0742	-0.1467	-0.1511	-0.06016	-0.06276	0.07095	0.01025	-0.1024	0.09912	0.06053	0.02857	0.00314	-0.01777	-0.0406	-0.04109	0.1076
Al_pct	-0.8421	-0.2337	0.2277	0.1219	-0.03926	-0.2093	0.0702	-0.05406	0.02291	-0.04384	0.1521	0.008819	-0.0976	-0.1926	-0.02297	0.2021	0.05096	-0.009383	4.13E-04
Se_ppm	-0.03973	0.1279	0.2857	-0.6728	0.02334	-0.2725	0.5647	0.1989	-0.07684	0.08395	-0.006655	-0.001652	-0.0209	-0.009567	0.01678	-0.02609	-9.60E-04	4.42E-04	0.002984
Sn_ppm	-0.7402	0.1618	-0.2268	0.2981	0.1581	-0.2418	0.1672	-0.04559	0.1402	0.009346	0.3011	-0.1298	-0.08945	0.03235	0.1245	-0.1428	8.37E-04	-0.005552	0.001026
Zr_ppm	-0.2204	0.04099	-0.08419	-0.4221	0.6617	-0.2666	-0.338	-0.3611	-0.03028	-0.0903	-6.09E-04	0.02342	0.03286	0.008592	0.003077	0.01321	-0.003809	-1.75E-04	-0.001203
Y_ppm	-0.8924	0.1138	0.275	-0.0332	-0.1716	-0.09927	-0.1228	0.01301	0.1377	-0.03442	-0.08068	0.08059	0.01902	0.01693	0.04956	-0.01937	0.002837	0.1497	-0.01612
Ce_ppm	-0.8131	0.2303	0.3625	0.0544	-0.1824	-0.2058	-0.1162	-0.0296	0.0673	0.03476	-0.1266	0.1285	0.06296	0.02236	0.001682	-0.06528	0.03163	-0.0861	-0.07754
Re_ppm	0.2833	0.6969	0.2361	0.1079	0.2149	0.03113	-0.1607	0.3479	-0.1814	-0.01311	0.2271	0.2837	-0.06806	0.03462	-0.03823	0.01476	-0.004307	0.00603	0.004353
Li_ppm	0.05148	0.7459	0.4413	0.02769	0.01053	0.05805	-0.1348	0.1004	-0.1422	-0.2497	-0.1268	-0.3222	-0.0633	-0.06433	0.05563	-0.001102	-0.001871	-0.00776	0.002981

PCA Report: **PEARL BLUE BUSH** - Transform None, Scaling true (132 rows)

Summary	Count
Rows	132
Columns	19

Correlation	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe pct	As ppm	U ppm	Au ppm	La ppm	Al pct	Se ppm	Sn ppm	Zr ppm	Y ppm	Ce ppm	Re ppm	Li ppm
Mo_ppm	1	0.19	0.4004	0.398	0.2203	0.01087	0.3777	0.3804	0.4102	0.2566	0.1808	0.05168	0.04684	0.4042	0.2261	0.1472	0.1514	0.2724	0.1307
Cu_ppm	0.19	1	-0.006789	0.5941	0.3421	0.08328	0.04518	0.04271	0.03152	0.3872	-0.1908	-0.2476	-0.08869	0.1152	0.1558	-0.1575	-0.2243	0.02292	-0.1558
Pb_ppm	0.4004	-0.006789	1	0.2261	0.4871	0.4253	0.8098	0.834	0.807	0.1551	0.8181	0.7256	0.06036	0.7908	0.1784	0.8103	0.8049	-0.06814	0.7378
Zn_ppm	0.398	0.5941	0.2261	1	0.245	0.04661	0.2221	0.2358	0.2165	0.5431	-0.03714	-0.154	-0.0802	0.4161	0.1389	-0.05347	-0.08277	0.2857	-0.05665
Ag_ppm	0.2203	0.3421	0.4871	0.245	1	0.5471	0.5675	0.5438	0.5492	0.1938	0.4145	0.309	-0.01248	0.3574	0.06618	0.4346	0.3763	-0.1303	0.3095
Mn_ppm	0.01087	0.08328	0.4253	0.04661	0.5471	1	0.5882	0.5564	0.5764	-0.0624	0.482	0.4092	0.1409	0.2249	0.1051	0.5482	0.4618	-0.2749	0.3713
Fe_pct	0.3777	0.04518	0.8098	0.2221	0.5675	0.5882	1	0.9561	0.9511	0.1368	0.7606	0.5763	0.03581	0.5969	0.1828	0.7745	0.7123	-0.09367	0.605
As_ppm	0.3804	0.04271	0.834	0.2358	0.5438	0.5564	0.9561	1	0.9245	0.1863	0.7355	0.5618	-0.01923	0.6286	0.1764	0.74	0.6991	-0.08575	0.5838
U_ppm	0.4102	0.03152	0.807	0.2165	0.5492	0.5764	0.9511	0.9245	1	0.131	0.6991	0.4939	0.01328	0.5581	0.16	0.7161	0.6596	-0.0619	0.5603
Au_ppb	0.2566	0.3872	0.1551	0.5431	0.1938	-0.0624	0.1368	0.1863	0.131	1	-0.1092	-0.1721	-0.1333	0.3497	0.04096	-0.1231	-0.1344	0.2837	-0.1256
La_ppm	0.1808	-0.1908	0.8181	-0.03714	0.4145	0.482	0.7606	0.7355	0.6991	-0.1092	1	0.9155	1.07E-01	0.618	0.1661	0.9672	0.9917	-0.1793	0.8604
Al_pct	0.05168	-0.2476	0.7256	-0.154	0.309	0.4092	0.5763	0.5618	0.4939	-0.1721	0.9155	1	0.1656	0.591	0.1365	0.9156	0.9387	-0.1635	0.8648
Se_ppm	0.04684	-0.08869	0.06036	-0.0802	-0.01248	0.1409	0.03581	-0.01923	0.01328	-0.1333	1.07E-01	0.1656	1	-0.02493	2.20E-04	0.129	0.1309	-0.01876	0.133
Sn_ppm	0.4042	0.1152	0.7908	0.4161	0.3574	0.2249	0.5969	0.6286	0.5581	0.3497	0.618	0.591	-0.02493	1	0.2204	0.6003	0.6093	0.1427	0.5856
Zr_ppm	0.2261	0.1558	0.1784	0.1389	0.06618	0.1051	0.1828	0.1764	0.16	0.04096	0.1661	0.1365	2.20E-04	0.2204	1	0.1627	0.1633	-0.008028	0.1645
Y_ppm	0.1472	-0.1575	0.8103	-0.05347	0.4346	0.5482	0.7745	0.74	0.7161	-0.1231	0.9672	0.9156	0.129	0.6003	0.1627	1	0.9678	-0.2007	0.8767
Ce_ppm	0.1514	-0.2243	0.8049	-0.08277	0.3763	0.4618	0.7123	0.6991	0.6596	-0.1344	0.9917	0.9387	0.1309	0.6093	0.1633	0.9678	1	-0.1704	0.8772
Re_ppm	0.2724	0.02292	-0.06814	0.2857	-0.1303	-0.2749	-0.09367	-0.08575	-0.0619	0.2837	-0.1793	-0.1635	-0.01876	0.1427	-0.008028	-0.2007	-0.1704	1	-0.1228
Li_ppm	0.1307	-0.1558	0.7378	-0.05665	0.3095	0.3713	0.605	0.5838	0.5603	-0.1256	0.8604	0.8648	0.133	0.5856	0.1645	0.8767	0.8772	-0.1228	1

Eigenvectors

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	0.1127	0.3107	0.2461	0.1973	0.169	0.4279	-0.4231	0.3504	2.40E-01	-0.274	-0.3686	-0.05742	0.02317	-0.05914	0.03755	0.01744	0.00586	0.01697	0.002504
Cu_ppm	-0.01139	0.3967	-0.2999	0.2131	-0.2045	-0.3437	-0.09506	0.3252	-0.1515	0.4091	-0.2927	0.3617	0.1423	0.04951	-0.02297	-0.02589	-0.03254	-0.02394	-8.41E-05
Pb_ppm	0.3142	0.07067	0.1004	-0.05552	0.01104	-0.01418	-0.171	-0.05865	0.01239	-0.04434	0.1976	0.2286	-0.143	0.8097	0.1081	0.008566	0.2255	-0.1331	0.01498
Zn_ppm	0.04779	0.4783	0.02733	0.0756	-0.02169	-0.2296	-0.05909	0.04015	-0.5175	-0.2407	0.2393	-0.5554	-0.04343	0.02012	0.05464	0.06957	-0.03025	0.03865	0.0139
Ag_ppm	0.1933	0.1747	-0.4046	-0.02784	0.08363	-0.1133	0.1665	0.3484	0.6178	-0.01308	0.4152	-0.1911	-0.06568	-0.04916	0.01245	-0.01186	-0.005909	0.02867	0.006057
Mn_ppm	0.2027	-0.02635	-0.4735	0.1102	0.1452	0.04146	0.4105	-0.06622	-0.1658	-0.5704	-0.364	0.1559	-0.06337	0.06394	0.0108	-0.06452	7.04E-04	-0.064	0.00451
Fe_pct	0.3068	0.102	-0.1198	-0.07564	0.1208	0.2401	0.01127	-0.1189	-0.1348	0.2538	0.05022	-0.01459	0.07351	-0.3231	0.0532	0.253	0.4253	-0.545	0.2214
As_ppm	0.3024	0.1201	-0.09481	-0.1304	0.08798	0.2356	-0.0174	-0.1738	-0.1181	0.2045	0.07243	0.08047	0.0926	-0.1279	0.6293	-0.3755	-0.1634	0.3295	-0.09811
U_ppm	0.293	0.117	-0.1212	-0.1002	0.1619	0.3202	0.004685	-0.09951	-0.1436	0.235	6.36E-02	0.05678	-0.1469	0.07156	-0.5156	0.2935	-0.4822	0.1885	-0.08427
Au_ppb	0.0175	0.4259	0.08652	-0.1787	0.02592	-0.2667	0.04991	-0.6108	0.4055	0.05414	-0.3711	-0.1508	-0.02833	0.02482	-0.04029	0.02618	-0.0018	-3.73E-04	-0.00322
La_ppm	0.3192	-0.143	0.07912	-0.017	-0.05821	-0.07885	-0.009633	0.057	-0.006607	0.05196	-0.08534	-0.2345	2.87E-01	0.02052	-0.2227	-0.3657	-0.05184	-0.3589	-0.6287
Al_pct	0.2846	-0.2205	0.1514	0.03152	-0.09682	-0.2486	0.04694	0.0783	0.07835	-0.07796	-0.1031	-0.01872	0.2608	0.00234	0.3902	0.6397	-0.3287	-0.04471	-0.06529
Se_ppm	0.03304	-0.1179	0.04179	0.6999	0.5881	-0.2234	-0.08705	-0.2259	0.03086	0.1248	0.1353	0.0304	0.01314	-0.03139	-0.005677	-3.81E-02	-0.01278	0.01772	-0.01528
Sn_ppm	0.25	0.1921	0.2767	-0.05464	-0.1189	-0.2226	-0.08498	-0.09082	0.008935	-0.3714	0.3327	0.5419	0.06398	-0.3867	-0.1947	-0.08464	-0.01584	0.0236	-0.003935
Zr_ppm	0.07586	0.1013	0.07755	0.5748	-0.6191	0.3358	0.2758	-0.2049	0.1186	0.03925	0.1138	-0.05741	-0.01556	0.03583	0.001471	0.008944	0.001298	0.006664	-0.005515
Y_ppm	0.3209	-0.1482	0.02502	0.004409	-0.04332	-0.09232	0.03654	0.05354	-0.03847	0.0645	-0.1414	-0.1144	0.1245	-0.04443	-0.1954	0.1404	0.5857	0.6298	-0.07769
Ce_ppm	0.3134	-0.1717	0.1101	-0.001072	-0.06265	-0.1081	0.006275	0.05663	0.01278	0.03777	-0.1046	-0.1855	0.251	0.08149	-0.1728	-0.3419	-0.224	-0.01342	0.7264
Re_ppm	-0.04591	0.2342	0.5034	-0.05417	0.2792	0.04359	0.6968	0.2789	-0.04043	0.1507	-0.02741	0.08786	0.03921	0.0802	0.02076	-0.03312	0.03372	-0.008632	-0.01002
Li_ppm	0.2838	-0.1573	0.1599	0.0423	-0.1099	-0.2054	-0.004981	0.1367	-0.02685	0.1246	-0.1903	-0.05727	-0.8228	-0.1941	0.092	-0.09311	-0.03871	-0.07193	-0.01165

	Eigenvalues	Percent	Cumulative %		Eigenvalues	Percent	Cumulative %
PC1	8.579	45.15	45.15	**PC11**	0.2935	1.545	96.44
PC2	3.018	15.88	61.04	**PC12**	0.2316	1.219	97.66
PC3	1.499	7.889	68.93	**PC13**	0.1642	0.864	98.52
PC4	1.044	5.497	74.42	**PC14**	0.1048	0.5516	99.07
PC5	0.9934	5.228	79.65	**PC15**	0.07142	0.3759	99.45
PC6	0.906	4.769	84.42	**PC16**	0.04742	0.2496	99.7
PC7	0.6134	3.229	87.65	**PC17**	0.03015	0.1587	99.86
PC8	0.58	3.052	90.7	**PC18**	0.02449	0.1289	99.98
PC9	0.4589	2.415	93.12	**PC19**	0.003041	0.01601	100
PC10	0.3373	1.775	94.89				

Scaled Coordinates

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	0.3302	0.5397	0.3014	0.2017	0.1684	0.4073	-0.3314	0.2669	0.1623	-0.1592	-0.1997	-0.02763	0.009389	-0.01915	0.01004	0.003799	0.001017	0.002655	1.38E-04
Cu_ppm	-0.03337	0.6892	-0.3672	0.2178	-0.2038	-0.3272	-0.07445	0.2477	-0.1026	0.2376	-0.1586	0.1741	0.05766	0.01603	-6.14E-03	-5.64E-03	-5.65E-03	-0.003747	-4.64E-06
Pb_ppm	0.9204	0.1228	0.1229	-0.05674	0.01101	-0.0135	-0.1339	-0.04466	0.00839	-0.02575	0.1071	0.11	-0.05793	0.2622	0.02888	0.001865	0.03916	-0.02083	8.26E-04
Zn_ppm	0.14	0.8309	0.03347	0.07726	-0.02162	-0.2186	-0.04628	0.03058	-0.3505	-0.1398	0.1297	-2.67E-01	-0.01759	0.006515	0.0146	0.01515	-0.005253	0.006048	7.67E-04
Ag_ppm	0.5661	0.3035	-0.4953	-0.02845	0.08335	-0.1078	0.1304	0.2654	0.4185	-0.007599	2.25E-01	-0.09197	-0.02661	-0.01592	0.003328	-0.002583	-1.03E-03	0.004486	3.34E-04
Mn_ppm	0.5936	-0.04578	-0.5798	0.1126	0.1447	0.03947	0.3215	-0.05043	-0.1123	-0.3313	-0.1972	0.07503	-0.02567	0.0207	0.002887	-0.01405	1.22E-04	-0.01001	2.49E-04
Fe_pct	0.8985	0.1771	-0.1467	-0.0773	0.1204	0.2285	0.008824	-0.09056	-0.09131	0.1474	0.02721	-0.007023	2.98E-02	-0.1046	1.42E-02	5.51E-02	7.39E-02	-0.08529	0.01221
As_ppm	0.8857	0.2087	-0.1161	-0.1332	0.08769	0.2243	-0.01362	-0.1324	-0.07998	0.1188	0.03924	0.03873	0.03752	-0.04141	0.1682	-0.08178	-0.02837	0.05156	-0.005411
U_ppm	0.8581	0.2033	-0.1484	-0.1024	0.1614	0.3048	0.00367	-0.07579	-0.0973	0.1365	0.03446	0.02733	-0.05953	0.02317	-0.1378	6.39E-02	-0.08373	0.0295	-0.004647
Au_ppb	0.05127	0.7398	0.1059	-0.1826	0.02583	-0.2538	0.03909	-0.4652	0.2747	3.14E-02	-0.201	-0.07258	-0.01148	0.008036	-0.01077	5.70E-03	-3.13E-04	-5.84E-05	-1.78E-04
La_ppm	0.9349	-0.2484	0.09687	-0.01738	-0.05802	-0.07506	-0.007545	0.04341	-0.004476	0.03018	-0.04623	-0.1129	0.1164	0.006644	-0.05953	-0.07963	-9.00E-03	-0.05616	-0.03467
Al_pct	0.8336	-0.383	0.1853	0.03221	-0.0965	-0.2366	0.03676	0.05963	0.05307	-0.04528	-0.05587	-0.00901	0.1057	7.58E-04	0.1043	0.1393	-0.05707	-0.006997	-0.003601
Se_ppm	0.09679	-0.2049	0.05117	0.7152	0.5861	-0.2126	-0.06818	-0.172	0.02091	0.07249	0.07327	0.01463	0.005324	-0.01016	-0.001517	-0.008288	-0.00222	0.002772	-8.43E-04
Sn_ppm	0.7322	0.3337	0.3388	-0.05584	-0.1185	-0.2119	-0.06656	-0.06916	0.006052	-0.2157	0.1802	0.2608	0.02592	-0.1252	-0.05203	-0.01843	-0.002751	0.003693	-2.17E-04
Zr_ppm	0.2222	0.176	0.09495	0.5874	-0.617	0.3196	0.216	-0.156	0.08034	0.02279	0.06162	-0.02763	-0.006304	0.0116	3.93E-04	0.001948	2.25E-04	0.001043	-3.04E-04
Y_ppm	0.9398	-0.2575	0.03063	0.004506	-0.04318	-0.08787	0.02862	0.04077	-0.02606	0.03746	-0.07662	-0.05506	0.05045	-0.01438	-0.05222	0.03058	0.1017	0.09856	-0.004284
Ce_ppm	0.9181	-0.2983	0.1348	-0.001095	-0.06244	-0.1029	0.004915	0.04313	0.008657	0.02194	-0.05667	-0.08927	0.1017	0.02638	-0.04619	-0.07445	-0.03889	-0.0021	0.04006
Re_ppm	-0.1345	0.4069	0.6163	-0.05535	0.2782	0.04149	0.5457	0.2124	-0.02739	0.08755	-0.01485	0.04228	0.01589	0.02597	0.005547	-0.007213	0.005855	-0.001351	-5.53E-04
Li_ppm	0.8311	-0.2733	0.1958	0.04323	-0.1095	-0.1955	-0.003901	0.1041	-0.01819	0.07235	-0.1031	-0.02756	-0.3334	-0.06285	0.02459	-0.02028	-0.006721	-0.01126	-6.43E-04

PCA Report: **WESTERN MYALL** - Transform None, Scaling true (31 rows)

Summary	Count
Rows	31
Columns	19

	Mo	**Cu**	**Pb**	**Zn**	**Ag**	**Mn**	**Fe**	**As**	**U**	**Au**	**La**	**Al**	**Se**	**Sn**	**Zr**	**Y**	**Ce**	**Re**	**Li**
Correlation	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**pct**	**ppm**	**ppm**	**ppm**	**ppm**	**pct**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
Mo_ppm	1	0.06666	-0.0678	-0.1672	0.257	0.02167	0.1949	-0.06208	0.1058	0.2162	-0.156	0.06926	0.1152	0.1646	-0.2583	-0.2115	-0.262	-0.5436	-0.2283
Cu_ppm	0.06666	1	0.1462	0.6164	0.3669	0.2862	-0.1465	0.01397	-0.2218	0.08801	0.205	-0.3215	0.0612	-0.01787	-0.2899	0.1677	0.2814	-0.2613	-0.1552
Pb_ppm	-0.0678	0.1462	1	0.1937	0.3524	-0.259	0.3921	0.406	0.4683	0.3493	0.6654	0.4916	0.3217	0.3555	0.3087	0.502	0.5163	0.2041	0.4416
Zn_ppm	-0.1672	0.6164	0.1937	1	0.2891	0.1129	-0.1226	0.07173	-0.05282	0.1072	0.2304	-0.1522	-0.03224	0.2634	-0.2603	0.2262	0.281	-0.02474	-0.02534
Ag_ppm	0.257	0.3669	0.3524	0.2891	1	0.1144	0.1823	0.1856	0.1584	0.0607	0.2187	0.2266	0.3015	0.01526	0.2164	0.1742	0.2068	-0.1624	0.02435
Mn_ppm	0.02167	0.2862	-0.259	0.1129	0.1144	1	-0.02249	0.04204	-0.02896	-0.3219	-0.1064	-0.1879	-0.0113	-0.216	-0.08877	-0.05141	0.08567	0.03476	-0.1704
Fe_pct	0.1949	-0.1465	0.3921	-0.1226	0.1823	-0.02249	1	0.6693	0.831	0.1255	0.3427	0.8153	0.1763	0.4573	0.1131	0.2687	0.2062	0.3243	0.1711
As_ppm	-0.06208	0.01397	0.406	0.07173	0.1856	0.04204	0.6693	1	0.7519	0.1843	0.303	0.748	0.1289	0.3258	0.1697	0.2502	0.2923	0.4848	0.1966
U_ppm	0.1058	-0.2218	0.4683	-0.05282	0.1584	-0.02896	0.831	0.7519	1	0.1152	0.4196	0.8124	0.143	0.5554	0.1863	0.3706	0.3259	0.4571	0.435
Au_ppb	0.2162	0.08801	0.3493	0.1072	0.0607	-0.3219	0.1255	0.1843	0.1152	1	0.1303	0.1484	0.1322	0.6466	-0.002208	0.02139	-0.02541	-0.2744	-0.07056
La_ppm	-0.156	0.205	0.6654	0.2304	0.2187	-0.1064	0.3427	0.303	0.4196	0.1303	1	0.2675	0.1461	0.3971	0.1374	0.9512	0.9247	0.2326	0.3513
Al_pct	0.06926	-0.3215	0.4916	-0.1522	0.2266	-0.1879	0.8153	0.748	0.8124	0.1484	0.2675	1	0.1613	0.4073	0.2548	0.1936	0.1477	0.4413	0.3031
Se_ppm	0.1152	0.0612	0.3217	-0.03224	0.3015	-0.0113	0.1763	0.1289	0.143	0.1322	0.1461	0.1613	1	-0.06857	0.5332	0.1551	0.1721	0.07004	0.1342
Sn_ppm	0.1646	-0.01787	0.3555	0.2634	0.01526	-0.216	0.4573	0.3258	0.5554	0.6466	0.3971	0.4073	-0.06857	1	-0.07107	0.3303	0.2498	-0.06085	0.1357
Zr_ppm	-0.2583	-0.2899	0.3087	-0.2603	0.2164	-0.08877	0.1131	0.1697	0.1863	-0.002208	0.1374	0.2548	0.5332	-0.07107	1	0.1231	0.1411	0.3194	0.1541
Y_ppm	-0.2115	0.1677	0.502	0.2262	0.1742	-0.05141	0.2687	0.2502	0.3706	0.02139	0.9512	0.1936	0.1551	0.3303	0.1231	1	0.9538	0.2856	0.3893
Ce_ppm	-0.262	0.2814	0.5163	0.281	0.2068	0.08567	0.2062	0.2923	0.3259	-0.02541	0.9247	0.1477	0.1721	0.2498	0.1411	0.9538	1	0.3062	0.3693
Re_ppm	-0.5436	-0.2613	0.2041	-0.02474	-0.1624	0.03476	0.3243	0.4848	0.4571	-0.2744	0.2326	0.4413	0.07004	-0.06085	0.3194	0.2856	0.3062	1	0.564
Li_ppm	-0.2283	-0.1552	0.4416	-0.02534	0.02435	-0.1704	0.1711	0.1966	0.435	-0.07056	0.3513	0.3031	0.1342	0.1357	0.1541	0.3893	0.3693	0.564	1

Eigenvectors

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	-0.04851	0.06693	0.4649	0.1694	-0.05362	-0.4533	-0.2408	0.2109	0.06905	-0.06096	-0.1444	0.04132	-0.4731	0.4062	0.08074	0.09982	-0.02854	-0.01193	0.01517
Cu_ppm	-0.006553	-0.4635	0.1483	0.1348	-0.2243	0.1981	-0.06713	0.07101	0.3506	0.1811	-2.16E-04	0.6047	0.1436	0.03884	0.2426	-0.1698	0.1161	0.01643	0.0295
Pb_ppm	0.3202	-0.1078	0.06728	0.09455	0.229	0.1331	-0.2047	-0.06972	0.1036	0.3881	0.6134	-0.1728	-0.2482	0.04126	-0.1012	-0.09814	-0.1899	-0.01075	0.262
Zn_ppm	0.05565	-0.4055	0.09808	-0.078	-0.1858	0.4827	-0.09933	0.01508	-0.1365	-0.5033	0.1281	-0.1908	-0.2706	0.09757	-0.07276	0.2817	0.1875	-0.07761	-0.07594
Ag_ppm	0.1238	-0.1789	0.1914	0.482	-0.08877	0.04121	-0.3299	-0.3429	-0.4234	0.04887	-0.2996	-0.1271	0.2939	0.0248	-0.149	-0.1512	-0.1621	0.04042	0.01671
Mn_ppm	-0.05979	-0.1216	-0.08664	0.2198	-0.5432	-0.1205	0.3419	0.409	-0.3351	0.3225	0.2109	-0.2278	0.02224	0.0155	0.06347	0.05233	0.06463	0.08785	0.001796
Fe_pct	0.2999	0.2332	0.1771	0.02518	-0.2413	-0.1326	0.06313	-0.07325	0.1613	-0.1678	0.2962	0.1873	0.4766	0.1959	-0.2547	0.4579	-0.1082	-0.09877	0.008914
As_ppm	0.2998	0.1553	0.07571	0.02877	-0.303	0.2428	0.1529	-0.1077	0.2825	0.2089	-0.413	-0.0408	-0.3388	-0.316	-0.1065	0.2479	-0.2378	0.2294	0.03649
U_ppm	0.3475	0.2186	0.09349	-0.0465	-0.2035	-0.06752	-0.036	0.1181	-0.1184	-0.1095	0.02915	0.2009	-0.1637	-0.2453	-0.3986	-0.4799	0.395	-0.2434	-0.02699
Au_ppb	0.09524	-0.02374	0.4247	-0.1339	0.3445	0.2729	0.253	0.2246	0.004775	0.3602	-0.2691	-0.2022	0.2198	0.2295	-0.1363	0.07076	0.2883	-0.1732	-0.06032
La_ppm	0.3261	-0.2849	-0.07171	-0.09827	0.1142	-0.274	0.09065	-0.1358	0.05275	0.03993	0.06319	-0.03534	-0.02898	0.1109	-0.1012	-0.05738	0.1002	0.4584	-0.653
Al_pct	0.3126	0.3109	0.1124	0.03776	-0.1259	0.0626	-0.0905	-0.2169	0.02458	-0.0171	0.07697	-0.2318	0.07502	-0.0255	0.733	-0.04259	0.3147	-0.04874	-0.09583
Se_ppm	0.126	-8.99E-04	0.00497	0.5465	0.248	0.03701	0.1346	0.4334	0.3439	-0.3926	0.00618	-0.2152	0.1365	-0.1953	0.02626	-0.1502	-0.09647	0.08678	-0.03109
Sn_ppm	0.2268	-0.01194	0.3539	-0.3376	0.08904	0.06533	0.2047	0.1981	-0.3965	-0.2064	0.04657	0.2093	0.0438	-0.08186	0.2424	-0.1858	-0.4655	0.2078	0.09161
Zr_ppm	0.1373	0.1505	-0.2032	0.4301	0.3184	0.1364	0.3228	-0.109	-0.3387	0.01253	0.021	0.4553	-0.2661	0.1323	0.07339	0.245	0.1361	-0.03058	-0.02201
Y_ppm	0.302	-0.2932	-0.1517	-0.1075	0.08371	-0.3188	0.1088	-0.05606	0.004442	-0.1214	-0.1893	-0.07099	0.06442	0.02406	0.02195	0.09595	0.3192	0.2282	0.6638
Ce_ppm	0.2917	-0.3363	-0.1839	-0.04556	0.01251	-0.2482	0.1456	-0.0206	0.02889	0.02474	-0.161	-0.06382	-0.06228	-0.0606	0.1488	0.04611	-0.2967	-0.7152	-0.1402
Re_ppm	0.2154	0.1717	-0.4145	-0.06702	-0.1635	0.2555	-0.03144	0.1296	0.08192	-0.05132	-0.1818	-0.04074	0.01248	0.6774	-0.02039	-0.3131	-0.1774	0.04196	0.05661
Li_ppm	0.225	0.04243	-0.2538	-0.09563	0.1149	0.03214	-0.5939	0.5044	-0.1741	0.1511	-0.1154	0.1311	0.1043	-0.1784	0.0616	0.3296	0.04012	0.05362	-0.09739

	Eigenvalues	**Percent**	**Cumulative %**		**Eigenvalues**	**Percent**	**Cumulative %**
PC1	5.645	29.71	29.71	**PC11**	0.3172	1.669	95.38
PC2	2.815	14.82	44.53	**PC12**	0.2336	1.23	96.61
PC3	2.423	12.75	57.28	**PC13**	0.228	1.2	97.81
PC4	1.713	9.014	66.29	**PC14**	0.1771	0.9321	98.74
PC5	1.617	8.513	74.81	**PC15**	0.1029	0.5417	99.29
PC6	1.098	5.78	80.59	**PC16**	0.06214	0.327	99.61
PC7	0.8368	4.404	84.99	**PC17**	0.0331	0.1742	99.79
PC8	0.6667	3.509	88.5	**PC18**	0.0247	0.13	99.92
PC9	0.5296	2.787	91.29	**PC19**	0.01573	0.08281	100
PC10	0.461	2.427	93.71				

Scaled Coordinates

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	-0.1153	0.1123	0.7237	0.2217	-0.0682	-0.475	-0.2202	0.1722	0.05024	-0.04139	-0.08134	0.01997	-0.2259	0.171	0.0259	0.02488	-0.005192	-0.001875	0.001903
Cu_ppm	-0.01557	-0.7777	0.2308	0.1764	-0.2852	0.2076	-0.06141	0.05798	0.2552	0.123	-1.22E-04	0.2923	0.06858	0.01634	0.07782	-0.04232	0.02112	0.002582	0.0037
Pb_ppm	0.7607	-0.1809	0.1047	0.1237	0.2912	0.1395	-0.1873	-0.05692	0.07541	0.2636	0.3455	-0.08351	-0.1185	0.01736	-0.03247	-0.02446	-0.03455	-0.001689	0.03286
Zn_ppm	0.1322	-0.6805	0.1527	-0.1021	-0.2363	0.5058	-0.09087	0.01231	-0.09933	-0.3418	0.07214	-0.0922	-0.1292	0.04106	-0.02334	0.07021	0.03411	-0.0122	-0.009525
Ag_ppm	0.2942	-0.3001	0.2979	0.6308	-0.1129	0.04319	-0.3018	-0.28	-0.3081	0.03319	-0.1687	-0.06142	0.1403	0.01044	-0.04779	-0.03768	-0.02949	0.006352	0.002096
Mn_ppm	-0.1421	-0.204	-0.1349	0.2877	-0.6908	-0.1263	0.3128	0.3339	-0.2439	0.219	0.1188	-0.1101	0.01062	0.006524	0.02036	0.01304	0.01176	0.01381	2.25E-04
Fe_pct	0.7126	0.3912	0.2756	0.03296	-0.3069	-0.1389	0.05775	-0.05981	0.1174	-0.1139	0.1668	0.09052	0.2275	0.08242	-0.08172	0.1141	-0.01969	-0.01552	0.001118
As_ppm	0.7122	0.2606	0.1179	0.03765	-0.3854	0.2544	0.1399	-0.08796	0.2056	0.1418	-0.2326	-0.01972	-0.1618	-0.133	-0.03416	0.0618	-0.04327	0.03606	0.004578
U_ppm	0.8255	0.3668	0.1455	-0.06086	-0.2588	-0.07075	-0.03293	0.09643	-0.08619	-0.07436	0.01642	0.09711	-0.07818	-0.1032	-0.1279	-0.1196	0.07186	-0.03825	-0.003386
Au_ppb	0.2263	-0.03983	0.6611	-0.1752	0.4382	0.286	0.2314	0.1834	0.003475	0.2446	-0.1515	-0.09776	0.1049	0.0966	-0.04372	0.01764	0.05246	-0.02723	-0.007566
La_ppm	0.7747	-0.4781	-0.1116	-0.1286	0.1452	-0.2871	0.08293	-0.1109	0.03838	0.02712	0.03559	-0.01708	-0.01384	0.04668	-0.03246	-0.0143	0.01823	0.07204	-0.08191
Al_pct	0.7427	0.5216	0.1749	0.04942	-0.1601	0.0656	-0.08278	-0.1771	0.01789	-0.01161	0.04335	-0.112	0.03582	-0.01073	0.2352	-0.01062	0.05725	-0.007659	-0.01202
Se_ppm	0.2993	-0.001508	0.007737	0.7152	0.3154	0.03878	0.1231	0.3539	0.2503	-0.2666	0.003481	-0.104	0.06517	-0.08219	0.008423	-0.03745	-0.01755	0.01364	-0.0039
Sn_ppm	0.5388	-0.02003	0.5508	-0.4418	0.1132	0.06846	0.1872	0.1618	-0.2886	-0.1401	0.02623	0.1012	0.02091	-0.03445	0.07776	-0.04632	-0.08468	0.03265	0.01149
Zr_ppm	0.3261	0.2525	-0.3163	0.5628	0.4049	0.1429	0.2953	-0.08899	-0.2464	0.008509	0.01182	0.2201	-0.127	0.05567	0.02354	0.06108	0.02476	-0.004805	-0.00276
Y_ppm	0.7176	-0.4919	-0.2361	-0.1407	0.1065	-0.3341	0.09948	-0.04578	0.003232	-0.08242	-0.1066	-0.03431	0.03076	0.01013	0.007041	0.02392	0.05808	0.03587	0.08326
Ce_ppm	0.6931	-0.5643	-0.2863	-0.05963	0.01591	-0.2601	0.1332	-0.01682	0.02103	0.0168	-0.09065	-0.03085	-0.02974	-0.0255	0.04773	0.01149	-0.05397	-0.1124	-0.01759
Re_ppm	0.5116	0.2882	-0.6453	-0.08771	-0.2079	0.2677	-0.02876	0.1058	0.05962	-0.03485	-0.1024	-0.01969	0.00596	0.2851	-0.006542	-0.07806	-0.03227	0.006593	0.0071
Li_ppm	0.5345	0.0712	-0.395	-0.1252	0.1461	0.03368	-0.5433	0.4118	-0.1267	0.1026	-0.06499	0.06339	0.0498	-0.07508	0.01976	0.08215	0.007298	0.008426	-0.01222

PCA Report: **BLACK OAK** - Transform None, Scaling true (8 rows)

Summary	Count
Rows	8
Columns	19

	Mo	**Cu**	**Pb**	**Zn**	**Ag**	**Mn**	**Fe**	**As**	**U**	**Au**	**La**	**Al**	**Se**	**Sn**	**Zr**	**Y**	**Ce**	**Re**	**Li**
Correlation	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**pct**	**ppm**	**ppm**	**ppm**	**ppm**	**pct**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
Mo_ppm	1	-0.02296	-0.4116	-0.2597	-0.05844	-0.3392	-0.4807	0.8859	-0.3266	-0.2907	-0.4542	-0.1957	-0.199	-0.3081	0.556	-0.3714	-0.5197	0.1049	-0.5611
Cu_ppm	-0.02296	1	-0.3965	0.745	0.4816	0.4984	-0.3947	0.06099	-0.02244	0.5217	0.2279	-0.2127	-0.361	0.1398	-0.0651	0.3956	0.2389	0.1847	0.03323
Pb_ppm	-0.4116	-0.3965	1	0.08669	0.3031	-0.003473	0.8177	-0.5421	0.5232	-0.07584	0.2814	0.8607	0.5075	0.4981	-0.1861	0.0652	0.3613	0.1098	0.3786
Zn_ppm	-0.2597	0.745	0.08669	1	0.6546	0.2889	0.2461	-0.3518	0.3847	0.8385	0.2745	0.4037	0.2495	0.5503	0.1288	0.2697	0.5234	0.5329	0.5989
Ag_ppm	-0.05844	0.4816	0.3031	0.6546	1	0.2648	0.1258	0.006965	0.108	0.5751	0.1579	0.523	0.05669	0.6069	0.1535	0.2082	0.2491	0.3714	0.391
Mn_ppm	-0.3392	0.4984	-0.003473	0.2889	0.2648	1	-0.1227	-0.009398	0.3596	0.1268	0.9047	-0.128	-0.001154	-0.1346	-0.08586	0.986	0.7296	0.01035	-0.07753
Fe_pct	-0.4807	-0.3947	0.8177	0.2461	0.1258	-0.1227	1	-0.7021	0.7693	0.2674	0.2447	0.8483	0.8087	0.6361	0.1132	-0.004052	0.4857	0.4846	0.7307
As_ppm	0.8859	0.06099	-0.5421	-0.3518	0.006965	-0.009398	-0.7021	1	-0.4376	-0.3181	-0.2263	-0.4221	-0.3533	-0.4768	0.4796	-0.06316	-0.4174	-0.05969	-0.6782
U_ppm	-0.3266	-0.02244	0.5232	0.3847	0.108	0.3596	0.7693	-0.4376	1	0.3236	0.6323	0.6003	0.7753	0.4718	0.3454	0.4681	0.7769	0.6875	0.5424
Au_ppb	-0.2907	0.5217	-0.07584	0.8385	0.5751	0.1268	0.2674	-0.3181	0.3236	1	0.1178	0.3075	0.3612	0.6123	0.3605	0.1334	0.414	0.6725	0.8113
La_ppm	-0.4542	0.2279	0.2814	0.2745	0.1579	0.9047	0.2447	-0.2263	0.6323	0.1178	1	0.1569	0.3769	-0.06816	-0.005412	0.958	0.9152	0.1131	0.1099
Al_pct	-0.1957	-0.2127	0.8607	0.4037	0.523	-0.128	0.8483	-0.4221	0.6003	0.3075	0.1569	1	0.6949	0.6882	0.2122	-0.05261	0.3906	0.4915	0.6105
Se_ppm	-0.199	-0.361	0.5075	0.2495	0.05669	-0.001154	0.8087	-0.3533	0.7753	0.3612	0.3769	0.6949	1	0.3166	0.5407	0.1509	0.6351	0.5938	0.6319
Sn_ppm	-0.3081	0.1398	0.4981	0.5503	0.6069	-0.1346	0.6361	-0.4768	0.4718	0.6123	-0.06816	0.6882	0.3166	1	0.1387	-0.1316	0.1593	0.6845	0.7805
Zr_ppm	0.556	-0.0651	-0.1861	0.1288	0.1535	-0.08586	0.1132	0.4796	0.3454	0.3605	-0.005412	0.2122	0.5407	0.1387	1	-0.01761	0.1412	0.7466	0.215
Y_ppm	-0.3714	0.3956	0.0652	0.2697	0.2082	0.986	-0.004052	-0.06316	0.4681	0.1334	0.958	-0.05261	0.1509	-0.1316	-0.01761	1	0.8119	0.0657	-0.01008
Ce_ppm	-0.5197	0.2389	0.3613	0.5234	0.2491	0.7296	0.4857	-0.4174	0.7769	0.414	0.9152	0.3906	0.6351	0.1593	0.1412	0.8119	1	0.3556	0.441
Re_ppm	0.1049	0.1847	0.1098	0.5329	0.3714	0.01035	0.4846	-0.05969	0.6875	0.6725	0.1131	0.4915	0.5938	0.6845	0.7466	0.0657	0.3556	1	0.6428
Li_ppm	-0.5611	0.03323	0.3786	0.5989	0.391	-0.07753	0.7307	-0.6782	0.5424	0.8113	0.1099	0.6105	0.6319	0.7805	0.215	-0.01008	0.441	0.6428	1

Eigenvectors

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	-0.1969	0.1049	-0.2975	-0.345	-0.2329	-0.1053	-0.2993	0.004722	-0.1804	0.516	0.2134	-0.0703	-0.1861	-0.1885	0.2917	-0.1866	0.2075	0.03431	-0.06545
Cu_ppm	0.05028	-0.3146	-0.3456	0.2539	-0.02782	-0.2394	-0.3489	0.1305	0.2364	-0.01515	-0.2552	0.2308	-0.2701	-0.2002	0.05872	-0.02229	-0.456	-0.1319	-0.02988
Pb_ppm	0.2193	0.1613	0.3007	0.01528	-0.4525	-0.01688	-0.05531	0.01253	0.2616	0.328	0.2238	0.07772	0.3548	0.1356	0.1331	0.05106	-0.4443	-0.02709	0.1792
Zn_ppm	0.2459	-0.1141	-0.292	0.2218	-0.001042	0.05763	-0.5084	-0.08352	0.05389	-0.1755	0.2422	-0.4275	0.3337	0.1066	-0.05204	0.1339	0.1379	0.2725	-0.1077
Ag_ppm	0.1783	-0.05095	-0.283	0.1745	-0.5385	0.2944	0.2473	0.003758	0.09711	0.06184	-0.002299	-0.1414	-0.4012	0.2486	-0.3378	-0.1114	0.1454	-0.08754	0.07656
Mn_ppm	0.1132	-0.4707	0.04661	-0.06679	-0.1112	-0.06807	0.2197	0.1541	-0.06886	0.07646	0.02247	-0.1114	-0.04883	0.14	0.4163	0.5879	0.1427	-0.2116	-0.2011
Fe_pct	0.2948	0.2275	0.2061	-0.05614	0.006588	-0.08973	-0.06598	0.01783	-0.08175	-0.1622	0.3877	-0.07722	-0.4699	-0.4485	-0.1691	0.3698	-0.09527	0.07188	0.1101
As_ppm	-0.2259	-0.06848	-0.2722	-0.3407	-0.2564	0.08367	0.147	-0.001596	0.2106	-0.4598	0.3865	0.3257	0.2029	-0.1438	-0.06102	0.01025	-0.06501	-0.04014	-0.2777
U_ppm	0.3058	-0.029	0.08639	-0.2524	0.07854	-0.4579	-0.1153	0.1879	-0.1181	0.00839	0.1216	0.2503	-0.1369	0.5285	-0.265	-0.1409	0.02741	0.1202	-0.2743
Au_ppb	0.2408	-0.01796	-0.3431	0.1686	0.2606	0.2861	0.1019	0.3101	-0.2732	0.2015	0.244	0.4781	0.1677	-0.01517	0.01251	0.09048	0.06211	0.05978	0.3029
La_ppm	0.1967	-0.3746	0.1755	-0.174	-0.05371	0.03172	0.03199	0.399	-0.1491	0.08638	-0.03237	-0.26	0.2681	-0.4086	-0.327	-0.317	-0.006139	-0.2185	-0.05776
Al_pct	0.2773	0.2263	0.04617	-0.04588	-0.3821	0.1297	-0.2163	0.02082	-0.5029	-0.3893	-0.3686	0.1629	0.06232	-0.03105	0.2725	-0.05538	0.02137	-0.07684	-0.0462
Se_ppm	0.2708	0.1365	0.08047	-0.3278	0.1608	0.3371	-0.1761	0.312	0.5947	-0.03627	-0.2079	0.04732	-0.1201	-0.005163	0.1949	-0.0321	0.2641	0.05118	0.006197
Sn_ppm	0.2585	0.2049	-0.1547	0.2057	-0.149	-0.404	0.3468	-0.04725	0.1794	0.1458	-0.2371	0.1126	0.2133	-0.3507	-0.0176	0.05644	0.2939	0.2871	-0.2321
Zr_ppm	0.08201	0.0996	-0.3299	-0.4816	0.09792	0.144	0.1434	-0.08117	-0.1216	0.1495	-0.3384	-0.2041	0.07332	0.0416	-0.206	0.2994	-0.4424	0.2352	-0.0399
Y_ppm	0.1423	-0.4464	0.08615	-0.1314	-0.05949	-0.01909	0.1963	-0.1679	-0.02197	-0.1492	0.05351	-0.007232	-0.1322	-0.04248	0.2963	-0.3072	-0.08259	0.5995	0.3031
Ce_ppm	0.2853	-0.2667	0.1021	-0.1412	0.07121	0.1722	-0.1679	-0.7017	0.02968	0.199	-0.04169	0.3102	0.03337	-0.1126	-0.1743	0.0362	0.1552	-0.2193	-0.07536
Re_ppm	0.2441	0.1097	-0.3101	-0.2135	0.1192	-0.3836	0.1415	-0.1469	0.09079	-0.2	0.05345	-0.2016	0.1026	0.06798	0.1347	-0.1153	0.06492	-0.4543	0.4846
Li_ppm	0.3039	0.1573	-0.0788	0.1551	0.2619	0.1937	0.2485	-0.1107	-0.03342	0.03585	0.2183	-0.1723	-0.1131	-0.007408	0.3204	-0.339	-0.2928	-0.1462	-0.5052

	Eigenvalues	Percent	Cumulative %		Eigenvalues	Percent	Cumulative %
PC1	7.568	39.83	39.83	**PC11**	1.96E-16	1.03E-15	100
PC2	3.824	20.13	59.96	**PC12**	1.87E-16	9.84E-16	100
PC3	3.09	16.26	76.22	**PC13**	6.54E-17	3.44E-16	100
PC4	2.344	12.34	88.56	**PC14**	-4.76E-17	-2.51E-16	100
PC5	1.246	6.556	95.12	**PC15**	-8.26E-17	-4.35E-16	100
PC6	0.4935	2.597	97.71	**PC16**	-1.52E-16	-7.98E-16	100
PC7	0.4344	2.286	100	**PC17**	-2.95E-16	-1.55E-15	100
PC8	7.71E-16	4.06E-15	100	**PC18**	-5.52E-16	-2.90E-15	100
PC9	6.59E-16	3.47E-15	100	**PC19**	-1.30E-15	-6.86E-15	100
PC10	4.57E-16	2.40E-15	100				

Scaled Coordinates

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
Mo_ppm	-0.5418	0.2052	-0.523	-0.5282	-0.2599	-0.07397	-0.1972	1.31E-10	-4.63E-09	1.10E-08	2.99E-09	-9.61E-10	-1.51E-09	NaN	NaN	NaN	NaN	NaN	NaN
Cu_ppm	0.1383	-0.6152	-0.6075	0.3888	-0.03105	-0.1682	-0.23	3.62E-09	6.07E-09	-3.24E-10	-3.57E-09	3.16E-09	-2.19E-09	NaN	NaN	NaN	NaN	NaN	NaN
Pb_ppm	0.6034	0.3154	0.5285	0.02339	-0.5051	-0.01186	-0.03645	3.48E-10	6.71E-09	7.01E-09	3.13E-09	1.06E-09	2.87E-09	NaN	NaN	NaN	NaN	NaN	NaN
Zn_ppm	0.6764	-0.2231	-0.5133	0.3396	-0.001163	0.04049	-0.3351	-2.32E-09	1.38E-09	-3.75E-09	3.39E-09	-5.85E-09	2.70E-09	NaN	NaN	NaN	NaN	NaN	NaN
Ag_ppm	0.4906	-0.09964	-0.4974	0.2671	-0.601	0.2068	0.163	1.04E-10	2.49E-09	1.32E-09	-3.22E-11	-1.93E-09	-3.25E-09	NaN	NaN	NaN	NaN	NaN	NaN
Mn_ppm	0.3114	-0.9204	0.08193	-0.1023	-0.1242	-0.04782	0.1448	4.28E-09	-1.77E-09	1.63E-09	3.14E-10	-1.52E-09	-3.95E-10	NaN	NaN	NaN	NaN	NaN	NaN
Fe_pct	0.8109	0.4449	0.3622	-0.08596	0.007352	-0.06303	-0.04349	4.95E-10	-2.10E-09	-3.47E-09	5.43E-09	-1.06E-09	-3.80E-09	NaN	NaN	NaN	NaN	NaN	NaN
As_ppm	-0.6216	-0.1339	-0.4784	-0.5216	-0.2861	0.05878	0.09689	-4.43E-11	5.40E-09	-9.83E-09	5.41E-09	4.45E-09	1.64E-09	NaN	NaN	NaN	NaN	NaN	NaN
U_ppm	0.8411	-0.05671	0.1519	-0.3864	0.08766	-0.3217	-0.07596	5.22E-09	-3.03E-09	1.79E-10	1.70E-09	3.42E-09	-1.11E-09	NaN	NaN	NaN	NaN	NaN	NaN
Au_ppb	0.6624	-0.03512	-0.6031	0.2582	0.2909	0.201	0.06715	8.61E-09	-7.01E-09	4.31E-09	3.41E-09	6.54E-09	1.36E-09	NaN	NaN	NaN	NaN	NaN	NaN
La_ppm	0.541	-0.7326	0.3084	-0.2664	-0.05995	0.02228	0.02108	1.11E-08	-3.83E-09	1.85E-09	-4.53E-10	-3.56E-09	2.17E-09	NaN	NaN	NaN	NaN	NaN	NaN
Al_pct	0.763	0.4426	0.08116	-0.07025	-0.4265	0.09109	-0.1426	5.78E-10	-1.29E-08	-8.32E-09	-5.16E-09	2.23E-09	5.04E-10	NaN	NaN	NaN	NaN	NaN	NaN
Se_ppm	0.745	0.2669	0.1415	-0.502	0.1794	0.2368	-0.116	8.66E-09	1.53E-08	-7.75E-10	-2.91E-09	6.47E-10	-9.72E-10	NaN	NaN	NaN	NaN	NaN	NaN
Sn_ppm	0.7112	0.4007	-0.272	0.315	-0.1663	-0.2838	0.2286	-1.31E-09	4.60E-09	3.12E-09	-3.32E-09	1.54E-09	1.73E-09	NaN	NaN	NaN	NaN	NaN	NaN
Zr_ppm	0.2256	0.1948	-0.58	-0.7373	0.1093	0.1012	0.0945	-2.25E-09	-3.12E-09	3.20E-09	-4.74E-09	-2.79E-09	5.93E-10	NaN	NaN	NaN	NaN	NaN	NaN
Y_ppm	0.3914	-0.873	0.1514	-0.2012	-0.06639	-0.01341	0.1294	-4.66E-09	-5.64E-10	-3.19E-09	7.49E-10	-9.89E-11	-1.07E-09	NaN	NaN	NaN	NaN	NaN	NaN
Ce_ppm	0.7847	-0.5216	0.1796	-0.2162	0.07947	0.121	-0.1106	-1.95E-08	7.62E-10	4.25E-09	-5.83E-10	4.24E-09	2.70E-10	NaN	NaN	NaN	NaN	NaN	NaN
Re_ppm	0.6716	0.2145	-0.5451	-0.3269	0.133	-0.2695	0.09324	-4.08E-09	2.33E-09	-4.27E-09	7.48E-10	-2.76E-09	8.30E-10	NaN	NaN	NaN	NaN	NaN	NaN
Li_ppm	0.8361	0.3076	-0.1385	0.2375	0.2923	0.1361	0.1638	-3.07E-09	-8.58E-10	7.66E-10	3.06E-09	-2.36E-09	-9.15E-10	NaN	NaN	NaN	NaN	NaN	NaN

Sample	Easting	Northing	Species	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
KNOB-DT-001	702062	6376039	Pearl Blue Bush	3.17	106.06	18.81	227.1	115	938	2.02	2.7	0.4	1.4	7.0	1.71	1.0	0.9	0.2	4.04	14.7	15	7.0
KNOB-DT-002	702194	6376084	Pearl Blue Bush	1.70	66.38	12.15	92.9	74	686	1.54	2.2	0.3	0.7	5.6	1.53	0.5	0.6	0.4	3.20	11.4	2	6.3
KNOB-DT-003	702394	6376180	Pearl Blue Bush	2.83	97.84	19.04	336.1	100	589	1.44	2.2	0.3	10.1	5.4	1.50	0.5	1.0	0.7	3.11	10.8	8	5.9
KNOB-DT-005	702601	6376160	Pearl Blue Bush	2.73	75.48	9.12	138.2	90	471	0.95	1.2	0.2	1.2	3.8	1.01	0.4	0.7	0.2	2.32	7.7	9	4.5
KNOB-DT-006	702784	6376039	Pearl Blue Bush	1.67	112.52	7.33	116.1	125	765	0.82	1.1	0.1	12.3	3.4	0.95	0.5	0.6	0.1	1.95	7.2	47	4.1
KNOB-DT-007	703017	6376028	Pearl Blue Bush	1.59	77.88	4.89	147.1	87	620	0.32	0.8	0.1	4.3	1.3	0.28	0.4	0.5	0.4	0.75	2.7	20	1.6
KNOB-DT-008	702983	6376996	Pearl Blue Bush	0.79	113.02	7.74	104.4	82	292	0.33	0.7	0.1	4.7	1.5	0.31	0.4	0.4	0.2	0.96	3.1	4	3.6
KNOB-DT-010	702753	6377031	Pearl Blue Bush	1.80	87.47	8.64	112.3	101	971	1.10	1.4	0.2	1.3	4.7	1.31	0.7	0.5	2.7	2.86	9.8	2	4.3
KNOB-DT-011	702493	6377009	Pearl Blue Bush	1.51	61.19	10.64	70.3	76	757	1.66	2.0	0.3	3.8	7.4	2.09	0.7	0.7	0.2	4.14	15.5	28	6.9
KNOB-DT-012	702398	6376996	Pearl Blue Bush	1.79	58.74	7.16	61.7	67	480	0.87	1.0	0.2	1.3	3.7	0.98	0.5	0.4	0.1	2.20	7.6	11	4.8
KNOB-DT-013	702203	6377004	Pearl Blue Bush	1.80	92.22	11.52	124.3	90	485	1.49	1.6	0.2	2.6	6.2	1.74	0.6	0.8	0.1	3.66	13.1	13	5.2
KNOB-DT-014	702004	6377033	Pearl Blue Bush	2.02	76.01	6.20	311.0	73	347	0.61	0.9	0.1	4.8	2.5	0.62	0.7	0.4	0.2	1.55	5.1	12	2.3
KNOB-DT-015	701858	6377133	Pearl Blue Bush	2.54	53.88	5.26	186.5	26	105	0.32	0.6	0.1	0.6	1.4	0.28	0.8	0.2	0.1	0.84	2.9	25	5.0
KNOB-DT-016	701796	6377072	Pearl Blue Bush	1.84	62.16	8.40	286.2	59	386	0.61	0.9	0.1	0.1	2.8	0.63	0.5	0.9	0.1	1.47	5.4	45	2.7
KNOB-DT-017	701645	6376996	Pearl Blue Bush	2.15	105.50	9.18	133.7	115	484	0.74	1.3	0.2	5.0	3.1	0.62	0.3	0.6	0.5	1.62	5.6	18	4.2
KNOB-DT-020	701806	6375913	Pearl Blue Bush	3.94	164.05	10.25	406.9	111	546	0.65	0.8	0.2	5.2	2.7	0.43	0.3	0.6	0.6	1.51	5.0	17	8.7
KNOB-DT-021	701343	6375883	Pearl Blue Bush	2.22	249.58	5.35	403.8	88	396	0.40	0.7	0.1	6.5	1.3	0.24	0.1	0.7	0.6	0.77	2.5	1	2.9
KNOB-DT-022	701170	6376001	Pearl Blue Bush	2.23	121.29	9.66	183.0	82	760	0.85	0.8	0.2	3.7	2.9	0.46	0.3	0.4	0.1	1.59	5.0	19	2.8
KNOB-DT-024	701154	6376188	Pearl Blue Bush	4.72	74.76	11.13	69.9	75	602	1.44	1.7	0.3	0.1	6.5	1.05	0.9	0.4	0.4	3.82	12.3	6	4.6
KNOB-DT-025	701139	6376985	Pearl Blue Bush	3.01	93.80	6.93	138.0	93	884	0.63	0.8	0.1	6.3	2.9	0.47	0.5	0.5	0.4	1.45	5.2	3	2.5
KNOB-DT-026	700995	6377001	Pearl Blue Bush	4.62	123.02	6.03	170.1	86	627	0.59	1.1	0.1	1.5	2.6	0.40	0.3	0.4	0.5	1.21	4.7	16	2.1
KNOB-DT-027	700794	6376997	Pearl Blue Bush	2.66	165.32	5.58	363.5	90	502	0.29	0.7	0.1	9.3	1.2	0.19	0.5	0.7	0.2	0.55	2.3	23	1.0
KNOB-DT-030	700452	6377052	Pearl Blue Bush	3.19	121.53	8.91	320.2	91	695	1.26	1.7	0.3	8.3	4.9	0.85	0.4	0.6	0.2	2.32	8.8	14	3.6
KNOB-DT-034	700165	6376998	Pearl Blue Bush	2.35	113.52	9.41	318.2	132	808	3.35	3.1	0.4	5.1	9.4	0.91	0.3	0.5	0.8	3.03	14.0	5	3.5
KNOB-DT-036	700005	6376999	Pearl Blue Bush	2.97	85.55	18.20	174.1	139	962	2.90	3.4	0.6	3.1	11.0	1.62	0.4	0.7	0.2	5.49	20.0	17	7.7
KNOB-DT-040	699337	6375989	Pearl Blue Bush	2.84	113.59	9.51	222.2	129	1614	2.34	2.4	0.5	3.7	5.2	0.81	0.6	0.5	0.9	3.21	9.5	4	4.3
KNOB-DT-041	699399	6376009	Pearl Blue Bush	3.71	158.93	24.80	243.3	217	2435	6.82	7.1	1.5	5.5	13.1	2.07	0.7	0.9	0.8	8.82	24.0	5	9.4
KNOB-DT-043	699594	6375997	Pearl Blue Bush	3.17	92.64	17.87	207.7	170	2129	5.83	6.0	1.2	2.9	9.4	1.41	0.6	0.7	0.3	6.41	16.8	7	8.3
KNOB-DT-045	699776	6376025	Pearl Blue Bush	3.42	110.83	10.95	216.9	132	1135	2.48	2.4	0.6	3.3	5.7	0.87	0.5	0.6	0.3	3.73	10.3	5	5.3
KNOB-DT-047	699661	6377032	Pearl Blue Bush	1.28	131.02	8.01	129.1	152	978	1.31	1.7	0.3	2.9	4.8	0.80	0.2	0.5	0.1	2.82	8.7	8	4.2
KNOB-DT-048	702497	6375501	Pearl Blue Bush	3.79	94.07	19.34	222.9	147	1242	3.42	3.5	0.6	1.7	13.6	2.46	0.6	1.3	1.3	7.53	25.2	5	11.3
KNOB-DT-051	702497	6375501	Pearl Blue Bush	2.32	90.08	12.03	214.7	124	841	1.58	1.8	0.3	1.5	7.2	1.09	0.4	0.6	0.1	3.90	13.2	7	4.9
KNOB-DT-054	699818	6376988	Pearl Blue Bush	1.93	61.67	6.42	280.8	89	612	1.00	1.1	0.3	5.7	3.7	0.60	0.8	0.2	0.1	1.84	6.8	33	3.6
KNOB-DT-055	702562	6375607	Pearl Blue Bush	2.01	59.79	12.28	57.7	77	476	1.30	1.5	0.3	1.6	7.1	1.20	0.6	0.5	0.5	3.34	13.2	6	5.5

KNOB-DT-057	702649	6375569	Pearl Blue Bush	6.02	73.64	12.47	95.0	131	686	1.24	1.6	0.4	3.2	6.0	1.07	0.6	0.5	0.4	3.07	11.9	11	5.3
KNOB-DT-058	702593	6375552	Pearl Blue Bush	2.14	76.54	8.99	87.7	109	502	1.07	1.3	0.3	1.1	4.9	0.85	0.4	0.5	0.3	2.37	9.0	6	4.5
KNOB-DT-060	700792	6378006	Pearl Blue Bush	1.24	70.98	12.58	78.0	82	837	1.63	2.4	0.5	0.4	7.9	1.35	0.5	0.4	0.2	3.63	15.2	5	4.7
KNOB-DT-061	700393	6378006	Pearl Blue Bush	1.79	80.94	9.89	169.9	109	1264	0.98	1.4	0.4	0.1	5.6	0.89	0.6	0.3	0.1	2.67	11.5	8	4.0
KNOB-DT-062	700003	6378010	Pearl Blue Bush	1.24	55.48	11.27	78.7	81	577	1.06	1.4	0.3	0.6	7.1	1.19	0.7	0.4	0.2	3.76	14.6	7	6.4
KNOB-DT-065	698563	6377960	Pearl Blue Bush	2.09	66.86	6.93	78.5	89	623	0.74	1.0	0.2	0.1	4.9	0.99	0.7	0.3	0.4	2.64	9.8	10	4.8
KNOB-DT-066	698164	6377984	Pearl Blue Bush	1.80	65.76	6.10	77.8	79	620	0.71	1.1	0.2	0.3	4.3	0.84	0.4	0.4	0.2	2.31	8.9	5	4.7
KNOB-DT-068	697855	6378098	Pearl Blue Bush	3.17	76.70	6.71	162.3	43	455	0.76	0.7	0.2	0.1	4.3	0.89	0.8	0.4	1.5	2.35	8.5	39	4.9
KNOB-DT-069	697381	6378006	Pearl Blue Bush	1.22	64.46	8.30	71.1	86	968	0.94	0.8	0.2	0.3	5.6	1.07	0.6	0.4	0.3	3.05	10.9	7	4.8
KNOB-DT-070	697001	6377999	Pearl Blue Bush	0.98	59.85	7.58	71.0	108	1199	0.83	0.8	0.2	2.0	4.9	0.87	0.4	0.3	0.1	2.59	9.9	2	3.9
KNOB-DT-071	696998	6379001	Pearl Blue Bush	1.31	63.57	8.81	49.5	64	526	0.89	1.1	0.2	1.3	5.1	1.00	0.3	0.3	0.1	2.61	10.3	1	4.7
KNOB-DT-072	697845	6379009	Pearl Blue Bush	2.07	89.16	9.57	106.9	63	823	1.02	1.0	0.2	1.8	7.6	1.69	0.8	0.4	1.1	4.04	15.8	4	6.4
KNOB-DT-073	698283	6378976	Pearl Blue Bush	1.39	72.78	7.15	68.1	50	595	0.87	1.1	0.2	0.6	6.4	1.42	0.6	0.4	0.5	3.49	12.8	6	6.7
KNOB-DT-074	698619	6379028	Pearl Blue Bush	1.34	87.16	5.11	91.0	77	348	0.55	0.6	0.1	1.2	3.0	0.56	0.4	0.2	0.1	1.65	5.7	8	5.9
KNOB-DT-076	699201	6379001	Pearl Blue Bush	1.85	129.10	5.27	111.0	82	433	0.45	0.4	0.1	3.0	2.5	0.38	0.8	0.2	0.1	1.52	5.1	9	4.5
KNOB-DT-077	699597	6379000	Pearl Blue Bush	1.46	62.68	5.41	62.1	83	613	0.50	0.6	0.1	3.7	2.7	0.40	0.5	0.2	0.1	1.61	5.7	9	3.6
KNOB-DT-078	700006	6378990	Pearl Blue Bush	1.21	79.11	8.07	82.2	110	888	0.75	0.7	0.2	3.5	4.5	0.80	0.5	0.4	0.2	2.40	9.0	5	4.4
KNOB-DT-079	700399	6379004	Pearl Blue Bush	1.35	99.69	5.44	82.7	76	690	0.57	0.9	0.2	0.5	3.4	0.57	0.3	0.3	0.2	2.05	6.8	12	3.2
KNOB-DT-080	699966	6379994	Pearl Blue Bush	0.90	61.47	6.33	99.2	104	1702	0.95	1.6	0.2	0.5	5.7	0.99	0.7	0.3	0.2	3.23	12.2	3	5.0
KNOB-DT-081	699607	6380001	Pearl Blue Bush	1.11	55.10	8.57	53.0	73	720	1.00	1.0	0.2	0.1	6.6	1.22	0.8	0.4	0.3	3.76	13.2	2	6.2
KNOB-DT-082	699211	6379999	Pearl Blue Bush	2.04	80.44	5.97	107.7	89	797	0.55	0.4	0.1	0.1	3.3	0.60	0.7	0.4	0.1	1.76	6.9	13	3.5
KNOB-DT-083	698800	6380002	Pearl Blue Bush	1.50	86.96	8.02	73.4	91	458	1.02	0.9	0.2	0.7	7.0	1.51	0.5	0.5	0.5	3.99	13.8	21	7.3
KNOB-DT-084	698404	6379990	Pearl Blue Bush	1.17	77.60	8.56	56.3	94	671	1.16	1.3	0.2	0.1	7.0	1.50	0.9	0.4	0.4	4.12	14.7	5	7.5
KNOB-DT-085	698000	6379994	Pearl Blue Bush	1.12	98.81	5.89	81.0	98	486	0.64	0.7	0.1	0.4	4.3	0.89	0.5	0.3	0.3	2.34	8.5	12	5.5
KNOB-DT-086	697399	6380005	Pearl Blue Bush	1.14	62.99	5.54	59.7	60	487	0.66	0.7	0.1	0.3	3.6	0.86	0.3	0.3	0.5	2.26	7.1	4	4.4
KNOB-DT-087	697198	6379973	Pearl Blue Bush	1.39	100.04	3.78	105.2	63	723	0.43	0.6	0.1	1.3	2.3	0.45	0.4	0.2	0.6	1.31	4.6	22	3.7
KNOB-DT-088	697190	6381004	Pearl Blue Bush	1.08	113.08	10.72	107.9	93	844	1.13	1.2	0.2	0.8	5.3	1.37	0.6	0.7	0.2	2.86	9.6	6	5.8
KNOB-DT-089	697653	6381025	Pearl Blue Bush	1.12	68.25	5.82	79.9	72	861	0.64	0.6	0.1	0.6	3.0	0.76	0.7	0.2	0.2	1.64	5.5	5	3.6
KNOB-DT-090	702577	6378005	Pearl Blue Bush	1.69	66.13	6.84	60.7	92	398	0.59	0.7	0.1	0.1	2.7	0.72	0.3	0.2	0.1	1.53	4.7	3	2.7
KNOB-DT-091	702898	6378018	Pearl Blue Bush	0.91	85.62	5.05	82.0	60	919	0.42	0.7	0.1	2.5	2.1	0.41	0.6	0.2	0.1	1.79	4.0	6	3.2
KNOB-DT-093	700198	6380002	Pearl Blue Bush	1.04	81.09	12.16	118.8	102	1052	1.28	2.4	0.2	5.3	5.7	1.27	0.7	0.6	0.1	3.24	10.7	2	5.2
KNOB-DT-094	700799	6380002	Pearl Blue Bush	1.43	118.52	6.44	140.1	158	1001	0.65	1.2	0.1	0.9	2.7	0.68	0.2	0.2	0.1	1.58	5.2	7	3.3
KNOB-DT-095	701198	6380007	Pearl Blue Bush	1.60	123.35	4.26	80.1	71	735	0.52	0.4	0.1	1.2	2.8	0.75	0.6	0.2	0.1	1.57	5.1	6	2.9
KNOB-DT-097	701992	6380034	Pearl Blue Bush	1.02	98.27	8.10	110.9	60	784	0.74	1.0	0.1	0.5	4.6	0.99	0.6	0.3	0.2	2.70	8.5	6	4.6
KNOB-DT-098	702420	6380008	Pearl Blue Bush	1.27	88.48	8.99	148.9	137	1220	0.80	0.9	0.2	0.1	4.4	0.98	0.7	0.3	0.4	2.73	8.1	5	4.5

KNOB-DT-100	702987	6379008	Pearl Blue Bush	1.07	87.80	7.03	143.4	79	1556	0.77	0.7	0.1	1.3	4.6	1.08	0.7	0.3	0.7	3.71	8.9	12	4.5
KNOB-DT-101	702594	6379004	Pearl Blue Bush	0.84	88.75	8.94	102.4	95	666	0.72	0.5	0.2	1.5	3.8	0.81	0.5	0.3	0.6	2.75	7.2	6	4.3
KNOB-DT-102	702189	6379002	Pearl Blue Bush	0.83	195.58	5.68	200.0	79	457	0.41	0.5	0.1	2.5	2.5	0.35	0.5	0.2	0.2	1.98	4.6	1	2.5
KNOB-DT-103	701795	6379009	Pearl Blue Bush	2.42	112.63	4.05	119.0	88	555	0.43	0.5	0.1	1.3	2.3	0.41	0.6	0.2	0.1	1.27	4.0	1	2.6
KNOB-DT-104	701395	6379012	Pearl Blue Bush	1.11	99.02	8.51	109.3	69	1091	0.90	1.0	0.2	0.1	4.9	1.13	0.3	0.3	0.2	2.84	8.8	6	4.3
KNOB-DT-105	701001	6379007	Pearl Blue Bush	0.59	97.69	4.48	144.1	58	890	0.47	0.6	0.1	2.2	2.3	0.47	0.5	0.3	0.2	1.40	4.3	8	3.3
KNOB-DT-106	700599	6378998	Pearl Blue Bush	2.11	80.08	12.47	96.7	83	880	1.52	2.3	0.2	1.3	8.0	1.76	0.7	0.4	0.3	4.83	16.7	6	6.6
KNOB-DT-107	702323	6381012	Pearl Blue Bush	1.83	130.67	8.34	148.3	162	1449	0.73	0.8	0.1	0.8	4.3	1.01	0.6	0.4	0.9	2.44	8.2	5	4.4
KNOB-DT-108	702554	6380955	Pearl Blue Bush	2.00	83.51	8.44	103.6	126	1326	1.03	0.8	0.1	0.3	6.4	1.63	1.1	0.4	0.2	3.79	12.4	6	5.8
KNOB-DT-109	702725	6380922	Pearl Blue Bush	2.25	109.31	6.89	94.7	116	973	0.70	0.5	0.1	1.5	4.0	0.98	0.7	0.3	0.4	2.48	7.3	8	4.2
KNOB-DT-110	702868	6380877	Pearl Blue Bush	0.81	59.95	11.16	86.8	136	760	1.41	1.5	0.2	1.1	8.9	2.10	0.6	0.7	0.2	5.33	17.1	3	8.2
KNOB-DT-111	703069	6380759	Pearl Blue Bush	2.61	81.29	7.47	90.7	105	901	0.94	0.7	0.1	0.6	6.0	1.48	0.9	0.4	0.3	3.46	11.1	3	5.7
KNOB-DT-115	700608	6377996	Pearl Blue Bush	1.82	119.06	10.63	99.4	121	1083	1.19	2.0	0.3	1.3	5.6	1.21	0.7	0.4	0.2	2.77	10.9	4	4.6
KNOB-DT-116	700205	6378005	Pearl Blue Bush	1.42	143.74	6.40	208.0	149	1007	0.57	0.7	0.1	1.7	2.8	0.47	0.8	0.3	0.3	1.60	5.5	7	2.9
KNOB-DT-117	699773	6377993	Pearl Blue Bush	1.04	120.50	6.83	194.1	95	938	0.79	1.2	0.1	1.9	4.1	0.94	0.7	0.3	0.3	2.51	8.2	7	4.1
KNOB-DT-119	699011	6378000	Pearl Blue Bush	1.43	116.26	6.17	138.0	104	1137	0.80	0.8	0.1	0.9	3.7	0.92	0.8	0.3	0.4	2.14	7.2	2	4.2
KNOB-DT-120	698380	6377964	Pearl Blue Bush	1.35	73.04	5.34	116.6	67	990	0.73	0.7	0.1	1.4	3.6	0.97	0.5	0.3	0.1	2.09	6.9	1	4.0
KNOB-DT-121	698002	6377987	Pearl Blue Bush	0.78	107.79	6.91	151.7	88	880	0.89	1.0	0.2	2.1	4.7	1.13	0.6	0.3	0.1	2.74	9.3	5	5.1
KNOB-DT-122	697793	6378002	Pearl Blue Bush	0.66	85.97	8.27	158.1	85	1000	1.13	1.1	0.2	0.9	6.0	1.47	0.8	0.4	0.2	3.50	11.7	4	5.4
KNOB-DT-123	697593	6378005	Pearl Blue Bush	1.41	126.95	6.38	135.1	124	825	0.83	0.6	0.1	1.0	4.0	1.04	0.9	0.3	0.1	2.62	8.0	4	4.2
KNOB-DT-124	697207	6377993	Pearl Blue Bush	0.87	67.59	8.14	193.5	129	906	0.91	0.9	0.2	2.5	4.1	0.91	0.8	0.4	0.2	2.47	8.0	4	3.5
KNOB-DT-125	697196	6378999	Pearl Blue Bush	2.19	71.87	7.94	86.0	83	801	0.99	1.1	0.2	0.1	4.9	1.23	0.5	0.4	0.1	3.05	9.5	4	4.7
KNOB-DT-126	697417	6379007	Pearl Blue Bush	0.86	95.08	8.35	118.7	104	1628	0.87	1.2	0.2	0.5	5.5	1.31	0.6	0.4	0.2	3.25	10.8	3	5.1
KNOB-DT-127	698099	6379028	Pearl Blue Bush	0.66	71.85	18.93	127.6	124	1397	2.25	2.7	0.4	0.3	16.5	3.67	0.6	0.9	0.4	9.49	33.5	1	13.7
KNOB-DT-128	698403	6378999	Pearl Blue Bush	2.36	64.28	11.80	88.2	112	853	2.02	2.0	0.3	0.1	9.7	2.37	0.4	0.6	0.3	6.00	19.1	5	8.3
KNOB-DT-129	698793	6378998	Pearl Blue Bush	1.42	110.48	10.14	152.9	128	1007	1.05	1.1	0.2	2.2	5.3	1.25	0.5	0.5	0.2	3.12	9.7	6	6.1
KNOB-DT-131	699400	6379000	Pearl Blue Bush	0.93	104.55	4.98	117.9	116	665	0.63	0.4	0.1	3.5	3.6	0.82	0.4	0.3	0.1	2.28	7.0	6	4.6
KNOB-DT-132	699793	6379002	Pearl Blue Bush	0.77	80.37	5.18	76.7	92	627	0.56	0.6	0.1	1.7	2.8	0.61	0.4	0.2	0.1	1.65	5.2	9	3.5
KNOB-DT-133	700191	6378993	Pearl Blue Bush	1.26	142.47	6.58	211.9	131	801	0.64	0.9	0.1	0.9	3.1	0.63	0.5	0.3	0.5	1.78	6.0	20	4.2
KNOB-DT-134	699790	6380001	Pearl Blue Bush	0.61	62.80	8.97	78.2	91	818	1.19	1.3	0.2	0.9	6.7	1.41	0.5	0.4	0.4	3.75	12.8	1	6.2
KNOB-DT-135	699390	6379987	Pearl Blue Bush	1.48	112.80	5.99	129.0	76	969	0.71	0.9	0.1	0.6	4.0	0.95	0.5	0.2	0.1	2.35	7.6	11	4.2
KNOB-DT-136	698920	6380002	Pearl Blue Bush	2.07	103.34	5.50	130.6	74	1005	0.58	0.9	0.1	2.3	3.2	0.77	0.7	0.3	0.5	1.86	6.2	4	4.1
KNOB-DT-138	698194	6380001	Pearl Blue Bush	2.17	60.11	14.11	75.1	101	923	1.92	2.0	0.3	4.1	9.1	2.08	0.7	0.6	0.3	5.17	17.7	3	9.5
KNOB-DT-139	697603	6380018	Pearl Blue Bush	0.92	72.32	7.74	97.3	98	1537	0.91	1.0	0.2	1.5	5.7	1.23	0.6	0.4	0.1	3.09	10.9	6	5.8
KNOB-DT-140	697009	6380018	Pearl Blue Bush	0.90	115.20	6.55	210.1	113	995	0.79	1.0	0.2	0.8	4.8	1.00	0.6	0.3	0.2	2.76	8.8	1	5.0

KNOB-DT-141	697041	6381042	Pearl Blue Bush	1.39	61.33	3.90	74.3	91	529	0.44	0.6	0.1	1.5	2.3	0.45	0.7	0.2	0.1	1.36	4.6	2	2.6
KNOB-DT-142	697824	6381056	Pearl Blue Bush	1.57	110.03	8.40	97.5	119	846	0.95	1.5	0.2	0.8	6.2	1.36	0.4	0.4	1.3	3.67	12.5	14	6.4
KNOB-DT-143	702391	6378015	Pearl Blue Bush	1.11	97.24	7.09	123.8	112	679	0.78	0.8	0.1	1.4	4.1	0.89	0.6	0.3	0.1	2.20	7.9	6	3.6
KNOB-DT-144	702189	6378009	Pearl Blue Bush	1.03	106.26	5.42	122.1	140	401	0.59	0.7	0.1	2.9	3.0	0.63	0.3	0.2	0.1	1.70	5.6	6	3.1
KNOB-DT-145	702000	6378004	Pearl Blue Bush	0.97	63.72	5.51	89.3	80	562	0.61	0.7	0.1	1.0	3.3	0.66	0.4	0.2	0.2	1.93	6.4	3	3.0
KNOB-DT-146	701805	6378000	Pearl Blue Bush	1.13	77.18	8.26	89.3	83	454	0.82	1.4	0.1	1.5	3.9	0.89	0.7	0.3	0.1	2.17	7.8	1	3.6
KNOB-DT-147	700062	6380013	Pearl Blue Bush	0.92	66.40	6.20	98.6	83	1462	0.96	1.9	0.2	3.8	5.3	1.00	0.6	0.5	0.1	2.93	10.2	1	5.1
KNOB-DT-149	700599	6380000	Pearl Blue Bush	2.02	81.89	4.51	76.5	92	673	0.47	1.2	0.1	2.0	2.3	0.44	0.5	0.2	0.8	1.29	5.2	4	2.3
KNOB-DT-150	700997	6380002	Pearl Blue Bush	0.61	113.36	6.64	85.2	166	946	0.75	1.2	0.1	2.8	3.8	0.95	0.5	0.3	0.1	2.29	7.6	4	4.8
KNOB-DT-153	701803	6380003	Pearl Blue Bush	0.88	72.94	2.84	65.1	45	875	0.33	0.2	0.1	0.6	1.5	0.32	0.3	0.2	0.3	0.90	2.8	3	2.8
KNOB-DT-154	702208	6379991	Pearl Blue Bush	0.94	93.19	8.96	100.6	103	1299	1.10	1.5	0.2	0.8	6.2	1.37	0.7	0.5	0.1	4.12	12.3	7	7.0
KNOB-DT-155	702596	6380004	Pearl Blue Bush	0.77	73.06	3.81	105.2	93	645	0.43	0.7	0.1	0.4	2.4	0.48	0.4	0.2	0.1	1.39	5.0	9	3.5
KNOB-DT-156	702872	6380012	Pearl Blue Bush	0.90	119.91	4.11	106.7	74	692	0.39	0.5	0.1	1.6	2.2	0.46	0.6	0.2	1.6	1.34	4.6	5	3.1
KNOB-DT-157	702810	6379002	Pearl Blue Bush	0.64	89.70	7.81	130.9	109	919	0.90	1.0	0.2	1.0	5.3	1.01	0.5	0.4	0.1	4.11	10.2	1	5.1
KNOB-DT-158	702397	6379400	Pearl Blue Bush	0.80	76.43	3.90	95.1	73	702	0.46	0.3	0.1	2.1	2.4	0.45	0.6	0.2	0.1	1.65	4.6	7	2.6
KNOB-DT-159	701996	6378981	Pearl Blue Bush	1.05	83.94	5.43	149.4	60	650	0.49	0.6	0.1	3.7	3.6	0.67	0.5	0.3	0.6	2.75	6.6	3	3.7
KNOB-DT-160	701590	6378991	Pearl Blue Bush	0.90	69.62	5.59	74.2	66	717	0.66	1.1	0.1	1.7	3.4	0.85	0.5	0.2	0.2	1.95	6.7	5	4.9
KNOB-DT-161	701199	6379020	Pearl Blue Bush	2.05	112.54	5.95	124.8	93	807	0.68	0.4	0.1	1.4	3.6	0.86	3.0	0.3	0.1	2.04	7.1	10	4.5
KNOB-DT-162	700800	6378998	Pearl Blue Bush	0.70	51.56	5.73	50.7	46	699	0.87	1.1	0.1	0.1	4.6	1.13	0.5	0.3	0.3	2.55	9.3	6	5.1
KNOB-DT-163	699903	6381198	Pearl Blue Bush	0.85	79.78	3.66	124.5	82	573	0.42	0.6	0.1	0.1	2.6	0.59	0.5	0.2	0.1	1.62	5.2	13	2.9
KNOB-DT-164	700046	6381102	Pearl Blue Bush	1.20	41.06	5.24	62.9	81	376	0.59	0.9	0.1	1.0	3.5	0.72	0.8	0.2	0.1	1.92	6.8	8	3.2
KNOB-DT-165	700263	6381090	Pearl Blue Bush	0.97	74.66	4.98	97.1	82	569	0.66	0.5	0.1	2.2	3.8	0.91	0.3	0.3	0.1	2.26	7.5	19	3.9
KNOB-DT-166	700631	6380840	Pearl Blue Bush	4.22	113.10	4.35	187.5	86	491	0.41	0.5	0.1	2.7	2.4	0.46	0.5	0.2	0.1	1.55	4.7	29	3.1
KNOB-DT-167	700821	6380868	Pearl Blue Bush	1.71	81.91	11.29	96.1	108	989	1.83	2.0	0.3	0.1	11.5	2.74	0.6	0.6	0.1	6.60	22.5	10	8.4
KNOB-DT-169	701667	6381076	Pearl Blue Bush	1.69	74.03	7.51	89.1	97	1049	0.83	0.9	0.2	0.1	4.5	1.07	0.7	0.4	0.1	2.53	8.8	2	4.4
KNOB-DT-170	701936	6381109	Pearl Blue Bush	1.11	78.65	7.17	80.6	103	1207	0.79	0.1	0.2	0.8	4.6	1.12	0.7	0.3	0.1	2.75	9.1	12	4.2
KNOB-DT-172	698591	6376012	Pearl Blue Bush	2.90	90.47	8.34	136.5	150	1199	1.74	2.2	0.3	0.2	5.5	1.31	0.3	0.3	0.1	3.15	10.2	11	4.5
KNOB-DT-174	699037	6376959	Pearl Blue Bush	1.59	106.41	7.83	103.7	136	672	1.37	1.6	0.3	4.8	5.7	1.28	0.7	0.5	0.6	3.39	10.9	8	4.9

Sample #	Easting	Northing	Species	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
KNOB-DT-004	702601	6376160	Western Myall	4.38	61.61	6.53	318.6	37	391	0.31	0.8	0.2	0.1	4.0	0.29	0.7	0.3	0.2	3.20	12.2	80	74.0
KNOB-DT-018	701615	6376992	Western Myall	25.72	61.80	5.47	124.3	52	488	0.30	0.4	0.1	2.1	1.5	0.28	0.4	0.3	0.4	0.72	2.7	7	11.7
KNOB-DT-023	701098	6375992	Western Myall	9.99	128.03	2.29	232.2	22	365	0.11	0.1	0.1	0.5	0.6	0.06	0.4	0.2	0.3	0.29	1.3	9	5.1
KNOB-DT-028	700830	6376972	Western Myall	8.02	117.16	3.41	426.8	64	373	0.10	0.1	0.1	0.5	1.5	0.09	0.4	0.3	0.1	0.71	3.0	15	7.4
KNOB-DT-029	700280	6377030	Western Myall	20.80	113.17	7.04	486.3	56	213	0.11	0.8	0.1	2.2	2.8	0.37	0.5	0.4	0.1	1.45	5.5	24	13.9
KNOB-DT-032	700456	6377112	Western Myall	13.18	113.44	3.84	436.8	35	228	0.25	0.6	0.1	3.3	2.1	0.18	0.3	0.4	0.1	1.10	5.0	27	11.1
KNOB-DT-033	700347	6377049	Western Myall	9.41	113.88	6.52	368.7	59	329	0.37	0.8	0.1	1.5	3.4	0.30	0.7	0.3	0.1	2.26	12.3	30	13.9
KNOB-DT-035	700167	6376999	Western Myall	7.23	83.20	6.82	299.2	48	239	0.50	1.5	0.2	3.9	3.6	0.42	0.5	0.5	0.4	1.79	7.2	48	14.9
KNOB-DT-037	699982	6376942	Western Myall	7.99	92.44	6.32	375.0	35	252	0.33	0.5	0.1	2.5	2.9	0.26	0.6	0.5	0.1	1.61	5.7	22	9.5
KNOB-DT-038	698948	6375945	Western Myall	36.58	59.56	2.91	222.7	27	448	0.23	0.3	0.1	1.2	0.8	0.14	0.5	0.3	0.1	0.61	1.4	7	4.7
KNOB-DT-039	699284	6375981	Western Myall	24.41	48.87	4.46	235.3	54	838	0.29	0.1	0.1	2.4	1.1	0.20	0.7	0.3	0.1	0.64	2.3	13	11.9
KNOB-DT-042	699594	6375997	Western Myall	30.87	212.10	7.80	474.9	87	345	0.16	0.1	0.1	1.7	2.1	0.11	0.6	0.2	0.1	1.20	6.3	16	21.6
KNOB-DT-044	699778	6376025	Western Myall	34.06	107.39	7.98	264.1	57	399	0.97	1.5	0.3	1.1	8.5	0.55	0.7	0.5	0.1	4.41	15.7	48	15.5
KNOB-DT-046	699671	6377027	Western Myall	14.26	151.78	14.50	382.7	39	249	0.34	0.7	0.1	4.0	7.9	0.27	0.6	0.4	0.1	2.63	10.8	22	27.6
KNOB-DT-053	699818	6376988	Western Myall	7.50	171.71	8.91	409.0	71	325	0.15	0.2	0.1	2.5	14.0	0.09	0.8	0.4	0.2	8.47	36.6	14	26.1
KNOB-DT-063	699576	6377963	Western Myall	12.77	100.26	7.82	241.4	22	282	0.18	0.5	0.1	0.5	2.5	0.13	0.5	0.1	0.1	1.28	7.4	26	17.2
KNOB-DT-064	699225	6378095	Western Myall	4.58	88.00	6.85	265.9	75	261	0.20	0.4	0.1	1.0	3.5	0.19	0.6	0.1	0.5	1.07	5.4	37	15.0
KNOB-DT-067	697855	6378098	Western Myall	10.71	46.28	9.13	141.0	62	252	0.37	0.5	0.1	1.9	2.5	0.38	1.4	0.2	1.1	1.46	6.2	56	26.7
KNOB-DT-075	698953	6379010	Western Myall	9.14	98.74	11.99	333.8	96	467	0.40	1.5	0.2	0.1	7.9	0.42	0.9	0.2	0.7	4.03	21.4	50	25.6
KNOB-DT-092	700080	6380068	Western Myall	3.94	146.51	4.87	296.5	63	606	0.33	0.6	0.1	0.3	1.5	0.23	0.8	0.1	0.3	1.36	3.4	18	9.2
KNOB-DT-096	701611	6379994	Western Myall	28.60	113.75	3.64	187.2	33	128	0.11	0.6	0.1	3.8	0.7	0.09	1.3	0.2	0.3	0.41	1.3	9	7.0
KNOB-DT-099	703093	6380058	Western Myall	4.55	69.81	4.54	361.4	44	399	0.16	0.3	0.1	0.1	5.6	0.14	0.5	0.1	0.4	3.64	12.2	57	7.3
KNOB-DT-118	699457	6378028	Western Myall	21.35	92.76	6.33	190.5	54	338	0.29	0.3	0.1	0.1	3.9	0.26	0.8	0.1	0.1	1.56	8.7	23	17.4
KNOB-DT-130	699108	6379021	Western Myall	2.31	107.48	4.74	510.1	28	347	0.28	0.4	0.1	0.1	1.7	0.20	0.9	0.1	0.2	1.04	6.1	38	12.1
KNOB-DT-137	698577	6379930	Western Myall	19.68	75.57	3.53	120.9	34	275	0.28	0.4	0.1	0.2	2.0	0.32	0.6	0.1	0.1	1.33	5.0	34	19.4
KNOB-DT-148	700334	6379968	Western Myall	4.63	190.71	2.25	377.5	36	1279	0.14	1.0	0.1	0.1	1.8	0.11	0.5	0.1	0.1	1.27	12.8	54	6.5
KNOB-DT-151	701227	6379971	Western Myall	8.94	58.92	3.35	217.9	17	263	0.08	0.3	0.1	0.6	1.6	0.14	0.5	0.1	0.1	1.77	4.1	27	9.9
KNOB-DT-152	701488	6380000	Western Myall	1.57	82.22	4.05	169.0	17	218	0.24	0.4	0.1	0.4	2.2	0.23	0.3	0.1	0.1	1.31	5.3	64	21.2
KNOB-DT-171	698831	6376012	Western Myall	24.04	80.88	2.21	203.2	66	298	0.20	0.4	0.1	0.3	1.0	0.20	0.2	0.1	0.1	0.59	1.9	8	15.6
KNOB-DT-173	698500	6375968	Western Myall	33.13	178.19	4.98	435.8	120	582	0.28	0.6	0.1	1.4	1.0	0.19	1.0	0.1	0.1	0.62	2.0	7	4.9
KNOB-DT-175	698954	6376943	Western Myall	9.88	90.89	7.65	253.7	75	147	0.36	1.0	0.1	3.0	2.0	0.37	0.5	0.2	0.1	1.11	4.1	37	19.6

Sample #	Northing	Easting	Species	Mo	Cu	Pb	Zn	Ag	Mn	Fe	As	U	Au	La	Al	Se	Sn	Zr	Y	Ce	Re	Li
KNOB-DT-009	6376963	703052	Black Oak	0.57	97.12	5.45	283.5	44	4535	0.28	1.7	0.3	1.6	4.2	0.21	0.7	0.1	0.5	5.51	6.5	6	5.3
KNOB-DT-019	6376898	701579	Black Oak	0.94	61.33	8.20	230.7	59	658	0.37	1.1	0.1	1.2	1.6	0.32	0.6	0.3	0.2	0.94	3.1	2	6.7
KNOB-DT-031	6377089	700471	Black Oak	1.10	91.97	4.09	205.7	28	561	0.24	0.9	0.1	0.9	1.1	0.16	0.3	0.2	0.1	0.67	2.1	3	5.3
KNOB-DT-049	6375501	702497	Black Oak	1.47	119.60	5.29	678.3	61	1331	0.39	0.9	0.3	6.7	2.1	0.31	0.9	0.4	0.9	1.86	5.3	18	10.0
KNOB-DT-052	6375607	702562	Black Oak	0.99	46.60	3.92	107.6	29	290	0.30	1.4	0.1	2.7	1.5	0.19	0.8	0.1	0.7	0.93	3.4	5	7.6
KNOB-DT-056	6375569	702649	Black Oak	1.70	47.33	7.32	212.8	25	401	0.45	0.7	0.3	0.1	2.3	0.30	1.0	0.1	0.5	1.25	4.8	5	6.0
KNOB-DT-059	6375552	702593	Black Oak	1.96	41.90	7.36	161.6	40	564	0.50	1.3	0.4	2.0	2.0	0.32	1.0	0.4	1.0	1.33	4.1	18	8.4
KNOB-DT-168	6380953	701295	Black Oak	5.93	78.21	3.27	119.4	40	395	0.14	4.2	0.1	0.2	1.0	0.19	0.5	0.1	1.0	0.62	1.8	7	2.8

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Submitted By:	Daniel Tanti
Receiving Lab:	Canada-Vancouver
Received:	July 07, 2011
Report Date:	August 15, 2011
Page:	1 of 8

CERTIFICATE OF ANALYSIS VAN11002985.1

CLIENT JOB INFORMATION

Project:	Iron Knob North
Shipment ID:	
P.O. Number	
Number of Samples:	196

SAMPLE DISPOSAL

STOR-PLP Store After 90 days Invoice for Storage

Acme does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Method Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
VA475	196	Vegetation Ashing at 475	15	Completed	VAN
Split Ash from VA475	196	Analysis sample split/packet			VAN
1F04	194	1:1:1 Aqua Regia digestion Ultratrace ICP-MS analysis	0.5	Completed	VAN

ADDITIONAL COMMENTS

Invoice To: University of Adelaide
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005
Australia

CC: Steven Hill

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.
All results are considered the confidential property of the client. Acme assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.
"*" asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	Unit	g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-001	Vegetation		17.61	0.951	3.17	106.1	18.81	227.1	115	14.2	5.4	938	2.02	2.7	0.4	1.4	2.0	820.3	1.60	0.21	0.44
KNOB-DT-002	Vegetation		16.40	0.918	1.70	66.38	12.15	92.9	74	12.3	4.5	686	1.54	2.2	0.3	0.7	1.6	1037	0.75	0.14	0.28
KNOB-DT-003	Vegetation		16.99	0.890	2.83	97.84	19.04	336.1	100	15.5	4.3	589	1.44	2.2	0.3	10.1	1.7	544.6	1.56	0.20	0.46
KNOB-DT-004	Vegetation		10.94	0.490	4.38	61.61	6.53	318.6	37	2.9	0.8	391	0.31	0.8	0.2	<0.2	0.3	1237	0.04	0.08	0.11
KNOB-DT-005	Vegetation		13.57	0.798	2.73	75.48	9.12	138.2	90	9.3	3.3	471	0.95	1.2	0.2	1.2	1.1	578.4	0.78	0.12	0.18
KNOB-DT-006	Vegetation		15.37	0.775	1.67	112.5	7.33	116.1	125	11.3	4.2	765	0.82	1.1	0.1	12.3	1.0	404.2	0.78	0.12	0.30
KNOB-DT-007	Vegetation		11.75	0.596	1.59	77.88	4.89	147.1	87	7.7	2.2	620	0.32	0.8	<0.1	4.3	0.4	598.7	1.23	0.10	0.19
KNOB-DT-008	Vegetation		9.598	0.550	0.79	113.0	7.74	104.4	82	6.2	2.3	292	0.33	0.7	<0.1	4.7	0.4	381.3	0.69	0.07	0.12
KNOB-DT-009	Vegetation		8.995	0.469	0.57	97.12	5.45	283.5	44	14.0	1.2	4535	0.28	1.7	0.3	1.6	0.3	447.6	0.04	0.09	0.08
KNOB-DT-010	Vegetation		14.03	0.634	1.80	87.47	8.64	112.3	101	13.6	5.0	971	1.10	1.4	0.2	1.3	1.4	745.8	1.97	0.09	0.23
KNOB-DT-011	Vegetation		12.29	0.807	1.51	61.19	10.64	70.3	76	16.7	5.4	757	1.66	2.0	0.3	3.8	2.3	749.2	0.90	0.09	0.35
KNOB-DT-012	Vegetation		10.66	0.855	1.79	58.74	7.16	61.7	67	8.9	2.7	480	0.87	1.0	0.2	1.3	1.1	628.6	0.98	0.08	0.15
KNOB-DT-013	Vegetation		18.78	0.998	1.80	92.22	11.52	124.3	90	17.7	3.8	485	1.49	1.6	0.2	2.6	2.1	690.4	0.83	0.11	0.25
KNOB-DT-014	Vegetation		9.972	0.608	2.02	76.01	6.20	311.0	73	8.0	2.0	347	0.61	0.9	0.1	4.8	0.8	382.1	1.28	0.10	0.44
KNOB-DT-015	Vegetation		10.32	0.607	2.54	53.88	5.26	186.5	26	3.5	0.6	105	0.32	0.6	<0.1	0.6	0.3	361.7	0.07	0.13	0.14
KNOB-DT-016	Vegetation		11.62	0.819	1.84	62.16	8.40	286.2	59	8.1	1.9	386	0.61	0.9	0.1	<0.2	0.8	358.2	1.54	0.13	0.13
KNOB-DT-017	Vegetation		8.836	0.475	2.15	105.5	9.18	133.7	115	10.4	2.5	484	0.74	1.3	0.2	5.0	0.9	325.6	1.60	0.20	0.23
KNOB-DT-018	Vegetation		15.66	1.113	25.72	61.80	5.47	124.3	52	1.3	0.7	488	0.30	0.4	0.1	2.1	0.4	2164	0.08	0.25	0.13
KNOB-DT-019	Vegetation		13.55	0.708	0.94	61.33	8.20	230.7	59	17.3	1.7	658	0.37	1.1	0.1	1.2	0.5	305.5	0.06	0.15	0.07
KNOB-DT-020	Vegetation		24.37	0.789	3.94	164.1	10.25	406.9	111	8.5	3.9	546	0.65	0.8	0.2	5.2	0.8	562.5	1.21	0.17	0.31
KNOB-DT-021	Vegetation		18.52	0.601	2.22	249.6	5.35	403.8	88	12.9	2.7	396	0.40	0.7	<0.1	6.5	0.4	725.1	1.37	0.14	0.35
KNOB-DT-022	Vegetation		20.00	1.112	2.23	121.3	9.66	183.0	82	9.4	3.7	760	0.85	0.8	0.2	3.7	0.8	773.5	1.80	0.17	0.36
KNOB-DT-023	Vegetation		13.13	0.811	9.99	128.0	2.29	232.2	22	1.7	0.3	365	0.11	<0.1	<0.1	0.5	<0.1	958.5	0.08	0.03	0.03
KNOB-DT-024	Vegetation		12.31	1.078	4.72	74.76	11.13	69.9	75	7.9	4.2	602	1.44	1.7	0.3	<0.2	1.7	1399	0.91	0.15	0.31
KNOB-DT-025	Vegetation		10.59	0.493	3.01	93.80	6.93	138.0	93	7.2	4.6	884	0.63	0.8	0.1	6.3	0.8	823.0	1.26	0.17	0.21
KNOB-DT-026	Vegetation		19.88	0.822	4.62	123.0	6.03	170.1	86	8.1	3.5	627	0.59	1.1	0.1	1.5	0.7	499.0	1.28	0.15	0.17
OVEN STD-1	Pulp		32.12	1.046	0.73	51.00	8.64	1620	737	13.5	1.1	>10000	0.10	<0.1	0.2	1.1	<0.1	460.0	0.26	0.78	0.48
KNOB-DT-027	Vegetation		12.49	0.517	2.66	165.3	5.58	363.5	90	8.2	1.8	502	0.29	0.7	<0.1	9.3	0.4	287.3	0.64	0.14	0.54
KNOB-DT-028	Vegetation		13.77	0.705	8.02	117.2	3.41	426.8	64	2.9	0.6	373	0.10	<0.1	<0.1	0.5	0.2	804.8	0.11	0.05	0.05
KNOB-DT-029	Vegetation		22.43	1.208	20.80	113.2	7.04	486.3	56	5.1	1.1	213	0.11	0.8	0.1	2.2	0.6	1024	0.07	0.17	0.12

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
	Unit	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
	MDL	2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
KNOB-DT-001	Vegetation	20	9.53	0.815	7.0	39.9	2.78	234.0	0.023	248	1.71	>5	>10	0.1	2.6	0.12	2.06	<5	1.0	<0.02	3.3
KNOB-DT-002	Vegetation	17	9.56	0.613	5.6	31.9	2.38	192.4	0.018	258	1.53	>5	>10	<0.1	2.2	0.06	1.34	<5	0.5	<0.02	3.0
KNOB-DT-003	Vegetation	17	7.34	2.080	5.4	45.5	2.24	132.0	0.025	287	1.50	>5	>10	0.1	2.3	0.08	1.96	<5	0.5	0.02	3.2
KNOB-DT-004	Vegetation	3	17.54	1.856	4.0	6.3	3.34	99.8	0.009	687	0.29	3.279	>10	<0.1	0.9	<0.02	2.41	<5	0.7	<0.02	0.7
KNOB-DT-005	Vegetation	11	7.24	0.992	3.8	32.9	2.80	133.3	0.018	194	1.01	>5	>10	0.2	1.6	0.05	1.87	<5	0.4	<0.02	2.1
KNOB-DT-006	Vegetation	10	4.51	1.453	3.4	69.9	1.85	111.9	0.020	209	0.95	>5	>10	0.1	1.8	0.06	1.69	<5	0.5	<0.02	2.1
KNOB-DT-007	Vegetation	3	6.40	2.188	1.3	24.3	4.76	107.8	0.012	227	0.28	>5	>10	0.2	1.2	0.07	0.95	<5	0.4	0.02	0.7
KNOB-DT-008	Vegetation	4	5.23	1.233	1.5	17.8	2.84	62.1	0.010	241	0.31	>5	>10	0.2	1.3	0.12	1.60	<5	0.4	<0.02	0.9
KNOB-DT-009	Vegetation	3	16.97	1.449	4.2	5.4	5.59	102.5	0.007	694	0.21	>5	6.42	0.1	1.6	0.06	1.37	<5	0.7	<0.02	0.7
KNOB-DT-010	Vegetation	14	6.01	0.773	4.7	29.1	3.22	208.5	0.018	258	1.31	>5	>10	0.1	1.9	0.09	1.94	<5	0.7	<0.02	2.7
KNOB-DT-011	Vegetation	22	7.73	0.506	7.4	66.5	2.26	297.9	0.025	239	2.09	>5	>10	<0.1	3.0	0.08	1.19	<5	0.7	0.03	4.2
KNOB-DT-012	Vegetation	11	8.55	0.471	3.7	26.6	2.14	154.5	0.013	178	0.98	>5	>10	<0.1	1.7	0.04	1.27	<5	0.5	0.03	1.9
KNOB-DT-013	Vegetation	19	8.44	1.261	6.2	48.8	2.21	214.8	0.024	215	1.74	>5	>10	0.2	2.7	0.08	1.03	<5	0.6	<0.02	3.7
KNOB-DT-014	Vegetation	8	5.58	0.866	2.5	92.6	1.99	99.0	0.012	198	0.62	>5	>10	0.2	1.3	0.03	2.24	<5	0.7	<0.02	1.5
KNOB-DT-015	Vegetation	4	7.48	1.665	1.4	9.0	2.90	22.9	0.008	282	0.28	>5	>10	<0.1	1.0	<0.02	1.79	<5	0.8	<0.02	0.7
KNOB-DT-016	Vegetation	8	5.80	1.252	2.8	35.0	1.64	97.8	0.014	189	0.63	>5	>10	0.2	1.3	0.02	1.61	<5	0.5	<0.02	1.5
KNOB-DT-017	Vegetation	8	5.74	0.870	3.1	26.1	2.69	86.5	0.014	297	0.62	>5	>10	0.4	2.1	0.04	1.70	<5	0.3	<0.02	1.4
KNOB-DT-018	Vegetation	3	24.64	1.027	1.5	7.4	1.79	287.3	0.008	744	0.28	3.528	>10	<0.1	0.9	<0.02	1.83	<5	0.4	0.11	0.7
KNOB-DT-019	Vegetation	3	18.52	1.115	1.6	11.1	5.38	79.7	0.010	683	0.32	>5	8.82	<0.1	1.2	<0.02	1.09	<5	0.6	0.02	0.9
KNOB-DT-020	Vegetation	6	7.58	2.676	2.7	47.0	2.26	86.9	0.021	289	0.43	>5	>10	0.2	1.7	0.07	2.65	<5	0.3	0.03	1.1
KNOB-DT-021	Vegetation	3	9.35	3.237	1.3	53.3	2.56	113.4	0.018	319	0.24	>5	>10	0.2	1.1	0.06	2.43	<5	0.1	0.05	0.7
KNOB-DT-022	Vegetation	7	9.81	0.847	2.9	45.6	2.37	201.4	0.017	173	0.46	>5	>10	0.1	1.8	0.03	1.35	<5	0.3	0.03	1.2
KNOB-DT-023	Vegetation	<2	14.12	1.115	0.6	3.3	2.38	63.8	0.005	571	0.06	4.026	>10	<0.1	0.3	<0.02	1.79	<5	0.4	0.05	0.2
KNOB-DT-024	Vegetation	14	15.93	0.659	6.5	18.2	1.01	72.1	0.018	177	1.05	>5	5.21	<0.1	1.8	<0.02	2.74	<5	0.9	0.06	2.5
KNOB-DT-025	Vegetation	6	10.15	1.545	2.9	38.0	2.41	89.7	0.016	228	0.47	>5	>10	<0.1	1.8	0.04	1.71	<5	0.5	0.05	1.3
KNOB-DT-026	Vegetation	5	5.98	2.386	2.6	27.7	2.69	64.8	0.019	265	0.40	>5	>10	0.1	1.7	0.09	2.04	<5	0.3	0.02	1.1
OVEN STD-1	Pulp	<2	22.59	3.370	<0.5	3.0	3.01	339.6	0.014	175	0.08	0.023	>10	0.1	0.5	0.81	1.49	<5	0.3	0.03	1.4
KNOB-DT-027	Vegetation	<2	5.70	2.812	1.2	50.5	2.21	57.7	0.014	288	0.19	>5	>10	0.2	0.9	0.04	3.13	<5	0.5	<0.02	0.8
KNOB-DT-028	Vegetation	<2	12.50	1.584	1.5	3.7	2.70	20.7	0.007	568	0.09	>5	>10	<0.1	0.3	<0.02	2.05	<5	0.4	0.05	0.3
KNOB-DT-029	Vegetation	5	12.97	2.134	2.8	8.6	2.71	120.8	0.015	339	0.37	>5	>10	0.4	1.1	<0.02	1.76	<5	0.5	0.07	1.0

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-001	Vegetation	0.82	<0.1	<0.02	0.04	21.5	0.9	<0.05	0.2	4.04	14.7	0.02	15	0.4	7.0	32	84
KNOB-DT-002	Vegetation	0.75	0.1	<0.02	0.04	25.5	0.6	<0.05	0.4	3.20	11.4	<0.02	2	0.2	6.3	20	14
KNOB-DT-003	Vegetation	0.78	0.1	0.04	0.11	29.6	1.0	<0.05	0.7	3.11	10.8	<0.02	8	0.3	5.9	45	16
KNOB-DT-004	Vegetation	0.35	0.1	<0.02	0.05	32.5	0.3	<0.05	0.2	3.20	12.2	<0.02	80	0.2	74.0	19	3
KNOB-DT-005	Vegetation	0.57	0.1	<0.02	0.07	29.5	0.7	<0.05	0.2	2.32	7.7	<0.02	9	0.2	4.5	40	98
KNOB-DT-006	Vegetation	0.56	0.1	<0.02	0.08	36.9	0.6	<0.05	0.1	1.95	7.2	<0.02	47	0.2	4.1	47	26
KNOB-DT-007	Vegetation	0.25	0.1	<0.02	0.06	24.9	0.5	<0.05	0.4	0.75	2.7	<0.02	20	<0.1	1.6	44	93
KNOB-DT-008	Vegetation	0.33	0.1	<0.02	0.06	52.4	0.4	<0.05	0.2	0.96	3.1	<0.02	4	<0.1	3.6	26	46
KNOB-DT-009	Vegetation	0.51	0.1	<0.02	0.04	33.0	0.1	<0.05	0.5	5.51	6.5	<0.02	6	<0.1	5.3	27	<2
KNOB-DT-010	Vegetation	0.70	0.1	<0.02	0.05	33.4	0.5	<0.05	2.7	2.86	9.8	<0.02	2	0.2	4.3	<10	14
KNOB-DT-011	Vegetation	1.13	0.2	<0.02	0.03	37.4	0.7	<0.05	0.2	4.14	15.5	0.02	28	0.3	6.9	18	3
KNOB-DT-012	Vegetation	0.58	0.2	<0.02	0.04	27.8	0.4	<0.05	<0.1	2.20	7.6	<0.02	11	0.1	4.8	44	14
KNOB-DT-013	Vegetation	0.87	0.2	<0.02	0.06	26.9	0.8	<0.05	0.1	3.66	13.1	<0.02	13	0.3	5.2	23	16
KNOB-DT-014	Vegetation	0.44	0.1	<0.02	0.07	24.8	0.4	<0.05	0.2	1.55	5.1	<0.02	12	<0.1	2.3	65	12
KNOB-DT-015	Vegetation	0.24	0.2	<0.02	0.06	31.3	0.2	<0.05	0.1	0.84	2.9	<0.02	25	0.1	5.0	37	<2
KNOB-DT-016	Vegetation	0.33	0.2	<0.02	0.09	19.9	0.9	<0.05	<0.1	1.47	5.4	<0.02	45	0.2	2.7	89	53
KNOB-DT-017	Vegetation	0.54	<0.1	<0.02	0.10	38.8	0.6	<0.05	0.5	1.62	5.6	0.03	18	0.2	4.2	83	24
KNOB-DT-018	Vegetation	0.23	<0.1	<0.02	0.06	16.4	0.3	<0.05	0.4	0.72	2.7	<0.02	7	<0.1	11.7	<10	<2
KNOB-DT-019	Vegetation	0.25	<0.1	<0.02	0.08	24.0	0.3	<0.05	0.2	0.94	3.1	<0.02	2	<0.1	6.7	33	2
KNOB-DT-020	Vegetation	0.33	<0.1	0.03	0.12	34.1	0.6	<0.05	0.6	1.51	5.0	<0.02	17	<0.1	8.7	79	24
KNOB-DT-021	Vegetation	0.41	<0.1	<0.02	0.09	39.8	0.7	<0.05	0.6	0.77	2.5	<0.02	1	<0.1	2.9	43	102
KNOB-DT-022	Vegetation	0.36	0.1	<0.02	0.10	41.6	0.4	<0.05	0.1	1.59	5.0	<0.02	19	0.1	2.8	46	<2
KNOB-DT-023	Vegetation	0.39	<0.1	<0.02	0.02	52.1	0.2	<0.05	0.3	0.29	1.3	<0.02	9	<0.1	5.1	<10	3
KNOB-DT-024	Vegetation	0.67	<0.1	<0.02	0.03	25.4	0.4	<0.05	0.4	3.82	12.3	<0.02	6	0.3	4.6	39	3
KNOB-DT-025	Vegetation	0.35	<0.1	<0.02	0.09	43.7	0.5	<0.05	0.4	1.45	5.2	<0.02	3	0.1	2.5	38	3
KNOB-DT-026	Vegetation	0.27	<0.1	<0.02	0.12	29.9	0.4	<0.05	0.5	1.21	4.7	<0.02	16	<0.1	2.1	63	36
OVEN STD-1	Pulp	5.49	<0.1	<0.02	0.03	406.9	2.1	<0.05	<0.1	0.14	0.6	<0.02	3	<0.1	2.1	132	<2
KNOB-DT-027	Vegetation	0.17	<0.1	<0.02	0.07	28.4	0.7	<0.05	0.2	0.55	2.3	<0.02	23	<0.1	1.0	99	19
KNOB-DT-028	Vegetation	0.68	<0.1	<0.02	0.03	43.3	0.3	<0.05	<0.1	0.71	3.0	<0.02	15	<0.1	7.4	30	8
KNOB-DT-029	Vegetation	0.45	0.1	<0.02	0.10	35.5	0.4	<0.05	<0.1	1.45	5.5	<0.02	24	<0.1	13.9	44	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	Unit	g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-030	Vegetation		15.44	0.748	3.19	121.5	8.91	320.2	91	14.2	4.8	695	1.26	1.7	0.3	8.3	1.3	498.9	0.71	0.28	0.41
KNOB-DT-031	Vegetation		25.06	1.489	1.10	91.97	4.09	205.7	28	16.8	1.0	561	0.24	0.9	0.1	0.9	0.3	407.1	0.09	0.10	0.05
KNOB-DT-032	Vegetation		12.77	0.670	13.18	113.4	3.84	436.8	35	2.9	0.5	228	0.25	0.6	<0.1	3.3	0.3	1042	0.04	0.14	0.08
KNOB-DT-033	Vegetation		17.16	0.835	9.41	113.9	6.52	368.7	59	3.0	0.8	329	0.37	0.8	0.1	1.5	0.5	905.5	0.07	0.14	0.08
KNOB-DT-034	Vegetation		18.78	0.913	2.35	113.5	9.41	318.2	132	21.4	4.8	808	3.35	3.1	0.4	5.1	1.5	535.8	1.06	0.27	0.82
KNOB-DT-035	Vegetation		12.28	0.750	7.23	83.20	6.82	299.2	48	2.7	1.1	239	0.50	1.5	0.2	3.9	0.6	1431	0.06	0.17	0.29
KNOB-DT-036	Vegetation		14.59	0.977	2.97	85.55	18.20	174.1	139	21.5	6.0	962	2.90	3.4	0.6	3.1	2.6	874.7	1.03	0.24	0.76
KNOB-DT-037	Vegetation		14.83	0.755	7.99	92.44	6.32	375.0	35	3.4	1.1	252	0.33	0.5	0.1	2.5	0.4	1031	0.07	0.13	0.14
KNOB-DT-038	Vegetation		14.85	0.935	36.58	59.56	2.91	222.7	27	2.0	0.6	448	0.23	0.3	<0.1	1.2	0.2	1291	0.07	0.07	0.07
KNOB-DT-039	Vegetation		15.18	0.940	24.41	48.87	4.46	235.3	54	2.9	0.7	838	0.29	<0.1	0.1	2.4	0.3	1330	0.60	0.14	0.10
KNOB-DT-040	Vegetation		15.01	0.839	2.84	113.6	9.51	222.2	129	13.8	8.3	1614	2.34	2.4	0.5	3.7	1.3	597.4	0.95	0.43	0.83
KNOB-DT-041	Vegetation		16.24	0.713	3.71	158.9	24.80	243.3	217	47.0	12.6	2435	6.82	7.1	1.5	5.5	3.1	912.1	1.65	0.76	2.31
KNOB-DT-042	Vegetation		12.13	0.744	30.87	212.1	7.80	474.9	87	2.3	0.6	345	0.16	<0.1	<0.1	1.7	0.2	1658	0.09	0.08	0.07
KNOB-DT-043	Vegetation		15.87	0.996	3.17	92.64	17.87	207.7	170	26.2	9.9	2129	5.83	6.0	1.2	2.9	2.2	680.9	1.46	0.78	2.02
KNOB-DT-044	Vegetation		13.87	0.868	34.06	107.4	7.98	264.1	57	6.3	1.9	399	0.97	1.5	0.3	1.1	0.8	771.3	0.09	0.27	0.31
KNOB-DT-045	Vegetation		17.58	0.901	3.42	110.8	10.95	216.9	132	18.2	6.8	1135	2.48	2.4	0.6	3.3	1.3	873.8	1.21	0.41	0.82
KNOB-DT-046	Vegetation		18.29	0.972	14.26	151.8	14.50	382.7	39	4.4	1.2	249	0.34	0.7	0.1	4.0	0.4	1510	0.09	0.13	0.13
KNOB-DT-047	Vegetation		23.50	1.211	1.28	131.0	8.01	129.1	152	11.9	5.8	978	1.31	1.7	0.3	2.9	1.2	796.3	1.63	0.18	0.26
KNOB-DT-048	Vegetation		19.11	0.954	3.79	94.07	19.34	222.9	147	29.7	8.7	1242	3.42	3.5	0.6	1.7	3.6	823.3	1.11	0.27	0.67
KNOB-DT-049	Vegetation		6.707	0.236	1.47	119.6	5.29	678.3	61	38.3	1.4	1331	0.39	0.9	0.3	6.7	0.4	354.2	0.07	0.17	0.18
KNOB-DT-050	Vegetation		5.629	0.190	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.
KNOB-DT-051	Vegetation		21.39	1.196	2.32	90.08	12.03	214.7	124	16.6	4.3	841	1.58	1.8	0.3	1.5	1.8	634.1	1.65	0.23	0.33
KNOB-DT-052	Vegetation		6.808	0.275	0.99	46.60	3.92	107.6	29	9.4	0.6	290	0.30	1.4	0.1	2.7	0.3	390.9	0.04	0.11	0.18
OVEN STD-1	Pulp		30.84	0.993	0.56	37.52	11.72	1187	651	11.3	0.7	>10000	0.05	0.6	0.2	0.4	<0.1	312.2	0.20	0.60	<0.02
KNOB-DT-053	Vegetation		9.834	0.511	7.50	171.7	8.91	409.0	71	3.7	0.6	325	0.15	0.2	<0.1	2.5	0.2	1086	0.08	0.11	0.09
KNOB-DT-054	Vegetation		13.46	0.731	1.93	61.67	6.42	280.8	89	10.6	3.6	612	1.00	1.1	0.3	5.7	1.0	718.6	1.06	0.19	0.31
KNOB-DT-055	Vegetation		11.46	0.682	2.01	59.79	12.28	57.7	77	9.9	2.9	476	1.30	1.5	0.3	1.6	2.2	534.8	1.02	0.15	0.31
KNOB-DT-056	Vegetation		6.233	0.279	1.70	47.33	7.32	212.8	25	9.1	0.7	401	0.45	0.7	0.3	<0.2	0.6	604.1	0.09	0.14	0.12
KNOB-DT-057	Vegetation		20.99	0.929	6.02	73.64	12.47	95.0	131	12.8	3.7	686	1.24	1.6	0.4	3.2	2.0	629.0	0.92	0.17	0.32
KNOB-DT-058	Vegetation		12.80	0.716	2.14	76.54	8.99	87.7	109	10.4	2.4	502	1.07	1.3	0.3	1.1	1.6	462.5	0.84	0.17	0.30

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

Method		1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
Analyte		V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
Unit		ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
MDL		2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
KNOB-DT-030	Vegetation	10	8.48	1.610	4.9	41.8	1.97	101.6	0.024	265	0.85	>5	>10	0.2	2.8	0.03	2.43	<5	0.4	0.05	2.0
KNOB-DT-031	Vegetation	<2	15.83	0.964	1.1	7.1	3.85	130.8	0.007	915	0.16	>5	>10	<0.1	0.7	<0.02	1.63	<5	0.3	0.03	0.5
KNOB-DT-032	Vegetation	2	14.72	2.514	2.1	4.9	3.59	44.0	0.012	734	0.18	>5	>10	<0.1	0.7	<0.02	1.77	<5	0.3	0.06	0.6
KNOB-DT-033	Vegetation	4	14.71	1.925	3.4	7.5	3.56	37.0	0.012	709	0.30	>5	>10	<0.1	0.9	<0.02	1.87	<5	0.7	0.02	0.8
KNOB-DT-034	Vegetation	15	8.56	1.616	9.4	53.3	2.08	152.2	0.029	196	0.91	>5	>10	0.5	1.7	0.03	1.24	<5	0.3	0.04	2.2
KNOB-DT-035	Vegetation	4	21.26	1.635	3.6	8.3	2.08	43.9	0.011	610	0.42	>5	9.92	<0.1	1.3	<0.02	1.85	<5	0.5	0.08	1.1
KNOB-DT-036	Vegetation	22	12.75	0.561	11.0	50.6	2.41	191.8	0.037	268	1.62	>5	>10	0.2	2.7	0.04	1.40	<5	0.4	0.04	4.2
KNOB-DT-037	Vegetation	3	10.30	1.995	2.9	6.2	2.49	223.8	0.012	488	0.26	>5	>10	0.1	0.9	<0.02	2.15	<5	0.6	0.04	0.7
KNOB-DT-038	Vegetation	<2	18.74	1.226	0.8	5.7	2.72	120.7	0.007	295	0.14	4.558	>10	<0.1	0.5	<0.02	1.13	<5	0.5	0.05	0.4
KNOB-DT-039	Vegetation	2	18.73	1.319	1.1	6.2	3.44	37.7	0.009	545	0.20	4.047	>10	<0.1	0.8	<0.02	1.51	<5	0.7	0.05	0.6
KNOB-DT-040	Vegetation	11	8.90	1.729	5.2	31.0	1.97	250.2	0.031	248	0.81	>5	>10	0.3	1.7	<0.02	1.79	<5	0.6	0.03	2.2
KNOB-DT-041	Vegetation	27	10.92	0.906	13.1	96.4	2.30	338.9	0.052	329	2.07	>5	>10	0.5	3.6	0.05	1.73	<5	0.7	0.06	5.4
KNOB-DT-042	Vegetation	<2	21.05	2.105	2.1	2.9	3.41	69.6	0.009	318	0.11	2.539	>10	0.1	0.4	<0.02	1.86	<5	0.6	0.08	0.3
KNOB-DT-043	Vegetation	20	10.78	0.685	9.4	54.1	2.31	243.4	0.040	254	1.41	>5	>10	0.4	2.6	0.04	1.48	<5	0.6	0.03	3.7
KNOB-DT-044	Vegetation	6	10.60	1.339	8.5	12.9	1.76	43.7	0.016	292	0.55	>5	>10	0.1	1.6	<0.02	1.30	<5	0.7	<0.02	1.5
KNOB-DT-045	Vegetation	13	11.34	0.990	5.7	54.0	2.26	199.5	0.026	297	0.87	>5	>10	0.3	1.7	<0.02	2.39	<5	0.5	0.06	2.2
KNOB-DT-046	Vegetation	2	18.03	2.089	7.9	8.0	3.06	56.1	0.014	547	0.27	>5	>10	0.1	1.0	<0.02	1.74	<5	0.6	0.05	0.8
KNOB-DT-047	Vegetation	9	13.10	0.858	4.8	34.7	2.55	151.2	0.027	231	0.80	>5	>10	0.2	1.6	0.04	1.80	<5	0.2	0.05	2.1
KNOB-DT-048	Vegetation	30	10.06	1.414	13.6	61.8	2.79	230.4	0.058	408	2.46	>5	>10	0.3	3.9	0.06	1.75	<5	0.6	0.03	6.5
KNOB-DT-049	Vegetation	2	16.35	1.922	2.1	7.1	6.06	130.4	0.014	977	0.31	>5	>10	0.3	1.8	<0.02	2.14	<5	0.9	0.02	0.9
KNOB-DT-050	Vegetation	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.
KNOB-DT-051	Vegetation	13	11.42	0.832	7.2	37.1	2.43	203.3	0.036	284	1.09	>5	>10	0.2	1.9	0.04	1.47	<5	0.4	<0.02	2.9
KNOB-DT-052	Vegetation	3	16.48	0.861	1.5	5.5	4.60	44.3	0.009	759	0.19	>5	7.63	<0.1	1.0	<0.02	1.28	<5	0.8	0.03	0.5
OVEN STD-1	Pulp	<2	17.79	2.326	<0.5	2.1	2.19	410.2	0.014	130	0.07	0.044	8.95	<0.1	0.2	0.35	0.90	<5	0.3	0.03	2.0
KNOB-DT-053	Vegetation	<2	15.71	1.302	14.0	2.5	2.94	58.9	0.010	449	0.09	2.001	>10	0.2	0.3	<0.02	1.98	<5	0.8	0.02	0.8
KNOB-DT-054	Vegetation	7	9.21	0.577	3.7	21.4	2.08	132.3	0.019	205	0.60	>5	9.25	0.2	1.1	<0.02	1.81	<5	0.8	<0.02	1.6
KNOB-DT-055	Vegetation	14	7.33	0.488	7.1	33.2	1.98	125.7	0.035	219	1.20	>5	>10	0.2	1.9	0.02	1.61	<5	0.6	<0.02	2.8
KNOB-DT-056	Vegetation	4	13.58	0.703	2.3	6.0	4.46	100.0	0.012	672	0.30	>5	9.52	<0.1	1.7	<0.02	1.35	<5	1.0	0.06	1.1
KNOB-DT-057	Vegetation	13	8.61	0.640	6.0	33.7	2.17	103.6	0.031	250	1.07	>5	>10	0.2	1.8	<0.02	2.33	<5	0.6	0.02	2.5
KNOB-DT-058	Vegetation	10	7.31	0.784	4.9	32.7	2.00	120.1	0.028	209	0.85	>5	>10	0.2	1.4	<0.02	2.05	<5	0.4	<0.02	1.9

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-030	Vegetation	0.48	<0.1	<0.02	0.14	34.5	0.6	<0.05	0.2	2.32	8.8	<0.02	14	0.2	3.6	92	24
KNOB-DT-031	Vegetation	0.22	0.1	<0.02	0.05	42.4	0.2	<0.05	<0.1	0.67	2.1	<0.02	3	<0.1	5.3	28	<2
KNOB-DT-032	Vegetation	0.42	<0.1	<0.02	0.06	37.4	0.4	<0.05	<0.1	1.10	5.0	<0.02	27	<0.1	11.1	29	<2
KNOB-DT-033	Vegetation	0.26	<0.1	<0.02	0.08	19.9	0.3	<0.05	0.1	2.26	12.3	<0.02	30	0.1	13.9	29	<2
KNOB-DT-034	Vegetation	0.44	0.1	0.03	0.22	27.4	0.5	<0.05	0.8	3.03	14.0	0.02	5	0.2	3.5	38	16
KNOB-DT-035	Vegetation	0.56	<0.1	0.03	0.08	24.2	0.5	<0.05	0.4	1.79	7.2	<0.02	48	<0.1	14.9	32	<2
KNOB-DT-036	Vegetation	1.01	0.2	<0.02	0.06	35.7	0.7	<0.05	0.2	5.49	20.0	0.03	17	0.4	7.7	29	9
KNOB-DT-037	Vegetation	2.22	<0.1	<0.02	0.08	95.8	0.5	<0.05	<0.1	1.61	5.7	<0.02	22	<0.1	9.5	29	3
KNOB-DT-038	Vegetation	0.11	<0.1	<0.02	0.05	32.5	0.3	<0.05	<0.1	0.61	1.4	<0.02	7	<0.1	4.7	<10	22
KNOB-DT-039	Vegetation	0.16	0.1	<0.02	0.07	44.6	0.3	<0.05	<0.1	0.64	2.3	<0.02	13	<0.1	11.9	<10	<2
KNOB-DT-040	Vegetation	0.50	<0.1	0.03	0.18	29.1	0.5	<0.05	0.9	3.21	9.5	0.04	4	0.3	4.3	64	13
KNOB-DT-041	Vegetation	1.17	0.2	0.03	0.16	36.9	0.9	<0.05	0.8	8.82	24.0	0.10	5	0.9	9.4	39	8
KNOB-DT-042	Vegetation	0.23	<0.1	<0.02	0.05	55.2	0.2	<0.05	<0.1	1.20	6.3	<0.02	16	<0.1	21.6	11	<2
KNOB-DT-043	Vegetation	0.78	0.1	<0.02	0.09	29.8	0.7	<0.05	0.3	6.41	16.8	0.07	7	0.6	8.3	37	8
KNOB-DT-044	Vegetation	0.47	<0.1	<0.02	0.10	57.6	0.5	<0.05	<0.1	4.41	15.7	<0.02	48	0.1	15.5	<10	<2
KNOB-DT-045	Vegetation	0.49	<0.1	<0.02	0.10	22.5	0.6	<0.05	0.3	3.73	10.3	0.03	5	0.4	5.3	66	154
KNOB-DT-046	Vegetation	0.38	<0.1	0.03	0.11	44.7	0.4	<0.05	<0.1	2.63	10.8	<0.02	22	<0.1	27.6	36	<2
KNOB-DT-047	Vegetation	0.52	0.1	<0.02	0.09	30.3	0.5	<0.05	<0.1	2.82	8.7	<0.02	8	0.2	4.2	22	30
KNOB-DT-048	Vegetation	1.55	0.1	0.05	0.23	48.4	1.3	<0.05	1.3	7.53	25.2	0.05	5	0.6	11.3	38	<2
KNOB-DT-049	Vegetation	0.23	0.1	0.03	0.10	39.3	0.4	<0.05	0.9	1.86	5.3	<0.02	18	0.2	10.0	59	<2
KNOB-DT-050	Vegetation	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.
KNOB-DT-051	Vegetation	0.73	<0.1	<0.02	0.07	35.9	0.6	<0.05	<0.1	3.90	13.2	<0.02	7	0.3	4.9	36	<2
KNOB-DT-052	Vegetation	0.16	<0.1	<0.02	0.07	16.3	0.1	<0.05	0.7	0.93	3.4	<0.02	5	0.1	7.6	10	9
OVEN STD-1	Pulp	3.99	<0.1	<0.02	0.03	268.5	1.5	<0.05	<0.1	0.11	0.5	<0.02	5	<0.1	1.7	49	<2
KNOB-DT-053	Vegetation	0.41	<0.1	<0.02	0.05	35.0	0.4	<0.05	0.2	8.47	36.6	<0.02	14	<0.1	26.1	15	3
KNOB-DT-054	Vegetation	0.36	<0.1	<0.02	0.05	21.4	0.2	<0.05	<0.1	1.84	6.8	<0.02	33	0.3	3.6	42	2
KNOB-DT-055	Vegetation	0.70	0.1	<0.02	0.06	27.0	0.5	<0.05	0.5	3.34	13.2	<0.02	6	0.3	5.5	10	5
KNOB-DT-056	Vegetation	0.25	<0.1	<0.02	0.10	24.8	0.1	<0.05	0.5	1.25	4.8	<0.02	5	<0.1	6.0	21	<2
KNOB-DT-057	Vegetation	0.64	<0.1	<0.02	0.08	25.7	0.5	<0.05	0.4	3.07	11.9	<0.02	11	0.1	5.3	18	8
KNOB-DT-058	Vegetation	0.52	<0.1	<0.02	0.08	26.1	0.5	<0.05	0.3	2.37	9.0	<0.02	6	0.1	4.5	19	8

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

Method		VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
Analyte		Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
Unit		g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
MDL		0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-059	Vegetation		8.932	0.370	1.96	41.90	7.36	161.6	40	11.6	0.8	564	0.50	1.3	0.4	2.0	0.5	363.0	0.05	0.14	0.19
KNOB-DT-060	Vegetation		14.87	1.008	1.24	70.98	12.58	78.0	82	8.6	4.4	837	1.63	2.4	0.5	0.4	2.5	531.2	1.40	0.20	0.44
KNOB-DT-061	Vegetation		14.60	0.639	1.79	80.94	9.89	169.9	109	10.1	6.0	1264	0.98	1.4	0.4	<0.2	1.7	504.1	1.93	0.16	0.25
KNOB-DT-062	Vegetation		13.84	0.831	1.24	55.48	11.27	78.7	81	6.7	4.2	577	1.06	1.4	0.3	0.6	2.1	601.4	0.67	0.14	0.22
KNOB-DT-063	Vegetation		13.09	0.809	12.77	100.3	7.82	241.4	22	2.9	0.8	282	0.18	0.5	<0.1	0.5	0.2	851.5	0.04	0.10	0.04
KNOB-DT-064	Vegetation		12.88	0.916	4.58	88.00	6.85	265.9	75	2.4	0.6	261	0.20	0.4	<0.1	1.0	0.3	884.9	0.06	0.10	0.04
KNOB-DT-065	Vegetation		14.33	0.977	2.09	66.86	6.93	78.5	89	6.4	4.0	623	0.74	1.0	0.2	<0.2	1.7	531.6	0.68	0.08	0.12
KNOB-DT-066	Vegetation		12.83	0.865	1.80	65.76	6.10	77.8	79	9.4	5.3	620	0.71	1.1	0.2	0.3	1.5	551.8	1.41	0.08	0.16
KNOB-DT-067	Vegetation		13.30	0.527	10.71	46.28	9.13	141.0	62	4.1	1.1	252	0.37	0.5	0.1	1.9	0.7	574.5	0.06	0.15	0.08
KNOB-DT-068	Vegetation		14.52	0.814	3.17	76.70	6.71	162.3	43	5.1	4.6	455	0.76	0.7	0.2	<0.2	1.5	273.3	1.62	0.12	0.12
KNOB-DT-069	Vegetation		14.18	0.764	1.22	64.46	8.30	71.1	86	6.7	5.9	968	0.94	0.8	0.2	0.3	1.8	738.8	1.15	0.12	0.15
KNOB-DT-070	Vegetation		15.31	0.724	0.98	59.85	7.58	71.0	108	6.2	4.7	1199	0.83	0.8	0.2	2.0	1.6	886.5	1.73	0.11	0.14
KNOB-DT-071	Vegetation		15.08	0.894	1.31	63.57	8.81	49.5	64	49.0	3.4	526	0.89	1.1	0.2	1.3	1.6	1051	0.89	0.10	0.16
KNOB-DT-072	Vegetation		10.67	0.548	2.07	89.16	9.57	106.9	63	13.1	4.7	823	1.02	1.0	0.2	1.8	2.6	607.1	2.08	0.08	0.16
KNOB-DT-073	Vegetation		12.59	0.734	1.39	72.78	7.15	68.1	50	10.1	3.4	595	0.87	1.1	0.2	0.6	2.1	465.1	0.67	0.06	0.13
KNOB-DT-074	Vegetation		17.52	0.968	1.34	87.16	5.11	91.0	77	4.8	1.9	348	0.55	0.6	0.1	1.2	0.9	655.7	0.58	0.10	0.10
KNOB-DT-075	Vegetation		20.70	0.885	9.14	98.74	11.99	333.8	96	3.4	1.2	467	0.40	1.5	0.2	<0.2	0.8	863.6	0.06	0.15	0.07
KNOB-DT-076	Vegetation		14.27	0.611	1.85	129.1	5.27	111.0	82	5.3	2.5	433	0.45	0.4	0.1	3.0	0.7	412.6	1.02	0.12	0.07
KNOB-DT-077	Vegetation		8.753	0.507	1.46	62.68	5.41	62.1	83	5.7	2.4	613	0.50	0.6	0.1	3.7	0.9	490.9	0.93	0.13	0.11
KNOB-DT-078	Vegetation		13.22	0.569	1.21	79.11	8.07	82.2	110	6.2	4.4	888	0.75	0.7	0.2	3.5	1.4	533.1	1.67	0.16	0.12
OVEN STD-1	Pulp		30.85	0.987	0.58	36.99	8.20	1158	692	10.9	0.5	>10000	0.05	0.3	0.2	0.7	<0.1	336.5	0.26	0.61	<0.02
KNOB-DT-079	Vegetation		13.27	0.616	1.35	99.69	5.44	82.7	76	7.5	2.5	690	0.57	0.9	0.2	0.5	1.1	584.2	0.89	0.14	0.11
KNOB-DT-080	Vegetation		16.73	0.927	0.90	61.47	6.33	99.2	104	5.0	6.3	1702	0.95	1.6	0.2	0.5	1.7	839.0	1.84	0.15	0.12
KNOB-DT-081	Vegetation		15.70	1.125	1.11	55.10	8.57	53.0	73	5.4	3.4	720	1.00	1.0	0.2	<0.2	1.9	725.3	0.62	0.10	0.13
KNOB-DT-082	Vegetation		13.29	0.580	2.04	80.44	5.97	107.7	89	4.4	4.8	797	0.55	0.4	0.1	<0.2	1.0	479.5	1.31	0.13	0.08
KNOB-DT-083	Vegetation		18.24	1.103	1.50	86.96	8.02	73.4	91	7.2	3.9	458	1.02	0.9	0.2	0.7	2.2	591.3	0.44	0.10	0.14
KNOB-DT-084	Vegetation		14.70	0.890	1.17	77.60	8.56	56.3	94	6.8	3.3	671	1.16	1.3	0.2	<0.2	2.2	593.6	0.61	0.10	0.16
KNOB-DT-085	Vegetation		13.82	0.770	1.12	98.81	5.89	81.0	98	6.4	3.8	486	0.64	0.7	0.1	0.4	1.4	404.3	0.95	0.08	0.08
KNOB-DT-086	Vegetation		16.11	0.856	1.14	62.99	5.54	59.7	60	4.2	2.5	487	0.66	0.7	0.1	0.3	1.0	660.3	0.87	0.08	0.06
KNOB-DT-087	Vegetation		14.30	0.648	1.39	100.0	3.78	105.2	63	7.5	3.3	723	0.43	0.6	<0.1	1.3	0.6	323.2	0.95	0.08	0.03

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
	Unit	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
	MDL	2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
KNOB-DT-059	Vegetation	4	16.79	0.820	2.0	13.5	5.07	115.5	0.011	1045	0.32	>5	6.94	0.3	1.7	<0.02	1.58	<5	1.0	0.03	1.0
KNOB-DT-060	Vegetation	16	9.68	0.447	7.9	25.8	2.12	244.4	0.028	161	1.35	>5	8.89	0.1	2.1	0.04	1.10	<5	0.5	0.05	3.1
KNOB-DT-061	Vegetation	10	7.29	0.776	5.6	20.8	2.28	266.3	0.024	210	0.89	>5	>10	0.1	1.5	0.03	1.69	<5	0.6	<0.02	2.2
KNOB-DT-062	Vegetation	13	9.35	0.439	7.1	22.7	1.64	224.8	0.026	191	1.19	>5	>10	<0.1	1.8	0.03	1.77	<5	0.7	<0.02	2.7
KNOB-DT-063	Vegetation	<2	12.90	1.383	2.5	3.6	1.80	29.8	0.011	387	0.13	4.359	>10	<0.1	0.4	<0.02	1.33	<5	0.5	0.05	0.5
KNOB-DT-064	Vegetation	2	16.28	1.128	3.5	3.5	1.69	32.4	0.010	295	0.19	4.290	>10	<0.1	0.7	<0.02	1.50	<5	0.6	0.03	0.6
KNOB-DT-065	Vegetation	10	7.81	1.131	4.9	16.3	1.26	104.3	0.028	173	0.99	>5	>10	<0.1	1.7	<0.02	1.94	<5	0.7	<0.02	2.3
KNOB-DT-066	Vegetation	9	5.16	1.144	4.3	28.0	2.23	118.1	0.028	178	0.84	>5	8.88	<0.1	1.4	<0.02	1.15	<5	0.4	<0.02	2.1
KNOB-DT-067	Vegetation	4	7.69	2.726	2.5	6.7	3.09	121.1	0.022	653	0.38	>5	>10	<0.1	1.0	0.02	2.57	<5	1.4	<0.02	1.1
KNOB-DT-068	Vegetation	9	4.04	2.328	4.3	19.3	1.46	104.8	0.036	219	0.89	>5	9.08	<0.1	1.7	<0.02	2.18	<5	0.8	0.02	2.2
KNOB-DT-069	Vegetation	11	9.43	0.591	5.6	22.4	2.28	223.3	0.027	209	1.07	>5	8.97	0.1	1.7	<0.02	1.67	<5	0.6	0.03	2.5
KNOB-DT-070	Vegetation	9	10.40	0.564	4.9	20.1	2.62	199.9	0.024	206	0.87	>5	>10	<0.1	1.4	0.03	1.29	<5	0.4	0.04	2.2
KNOB-DT-071	Vegetation	13	15.04	0.456	5.1	22.4	1.41	207.5	0.021	186	1.00	>5	8.55	<0.1	1.6	0.04	1.09	<5	0.3	0.07	2.3
KNOB-DT-072	Vegetation	17	9.10	1.466	7.6	29.6	1.62	312.0	0.039	217	1.69	>5	9.12	0.2	2.3	0.03	1.36	<5	0.8	<0.02	3.8
KNOB-DT-073	Vegetation	12	8.58	1.119	6.4	23.3	1.63	213.2	0.034	186	1.42	>5	>10	<0.1	2.0	0.02	1.02	<5	0.6	0.03	3.2
KNOB-DT-074	Vegetation	6	15.16	0.916	3.0	14.8	1.17	183.4	0.018	191	0.56	>5	8.62	<0.1	1.0	<0.02	1.74	<5	0.4	0.03	1.3
KNOB-DT-075	Vegetation	5	12.94	1.604	7.9	7.8	3.11	46.8	0.018	883	0.42	>5	>10	0.1	0.8	<0.02	1.70	<5	0.9	<0.02	1.2
KNOB-DT-076	Vegetation	5	6.37	1.018	2.5	15.4	1.79	147.1	0.017	220	0.38	>5	>10	<0.1	1.0	<0.02	2.06	<5	0.8	<0.02	1.0
KNOB-DT-077	Vegetation	5	9.62	0.499	2.7	16.8	1.41	168.5	0.014	187	0.40	>5	8.86	<0.1	1.0	<0.02	1.63	<5	0.5	0.03	1.1
KNOB-DT-078	Vegetation	9	6.40	0.988	4.5	20.3	1.91	161.9	0.026	224	0.80	>5	>10	0.1	1.3	0.02	1.32	<5	0.5	0.04	1.9
OVEN STD-1	Pulp	<2	17.97	2.446	<0.5	1.8	2.20	227.6	0.013	161	0.07	0.044	8.45	<0.1	0.2	0.21	1.03	<5	0.2	<0.02	2.1
KNOB-DT-079	Vegetation	8	9.26	0.742	3.4	19.2	1.70	148.0	0.019	198	0.57	>5	>10	0.1	1.0	<0.02	1.67	<5	0.3	<0.02	1.8
KNOB-DT-080	Vegetation	12	12.95	0.709	5.7	17.2	1.31	170.0	0.025	212	0.99	>5	8.21	0.1	1.7	<0.02	1.64	<5	0.7	<0.02	2.7
KNOB-DT-081	Vegetation	13	13.48	0.409	6.6	18.5	1.20	226.2	0.031	208	1.22	>5	7.64	<0.1	2.0	<0.02	1.45	<5	0.8	<0.02	3.1
KNOB-DT-082	Vegetation	7	5.51	1.184	3.3	15.8	2.01	120.6	0.022	244	0.60	>5	>10	<0.1	1.1	<0.02	1.42	<5	0.7	0.03	1.6
KNOB-DT-083	Vegetation	15	8.68	1.074	7.0	25.1	1.56	153.4	0.043	188	1.51	>5	9.01	0.1	2.1	<0.02	1.56	<5	0.5	<0.02	3.5
KNOB-DT-084	Vegetation	15	9.66	0.505	7.0	21.3	1.35	157.5	0.037	208	1.50	>5	8.97	0.1	2.3	<0.02	2.10	<5	0.9	0.03	3.5
KNOB-DT-085	Vegetation	9	6.14	0.839	4.3	19.3	2.04	142.8	0.028	252	0.89	>5	>10	<0.1	1.5	<0.02	1.37	<5	0.5	<0.02	2.2
KNOB-DT-086	Vegetation	9	8.03	0.612	3.6	22.7	2.48	246.2	0.024	263	0.86	>5	>10	<0.1	1.4	<0.02	1.87	<5	0.3	0.04	1.8
KNOB-DT-087	Vegetation	6	4.61	2.534	2.3	21.8	1.78	132.5	0.023	257	0.45	>5	>10	<0.1	1.0	<0.02	1.46	6	0.4	<0.02	1.2

AcmeLabs
Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: University of Adelaide
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-059	Vegetation	0.27	<0.1	<0.02	0.09	17.4	0.4	<0.05	1.0	1.33	4.1	<0.02	18	0.2	8.4	<10	8
KNOB-DT-060	Vegetation	0.82	<0.1	<0.02	0.06	39.2	0.4	<0.05	0.2	3.63	15.2	<0.02	5	0.3	4.7	12	<2
KNOB-DT-061	Vegetation	0.57	<0.1	<0.02	0.07	32.0	0.3	<0.05	0.1	2.67	11.5	<0.02	8	0.3	4.0	17	<2
KNOB-DT-062	Vegetation	0.74	0.1	<0.02	0.06	32.3	0.4	<0.05	0.2	3.76	14.6	<0.02	7	0.3	6.4	17	<2
KNOB-DT-063	Vegetation	0.27	<0.1	<0.02	0.05	41.9	<0.1	<0.05	<0.1	1.28	7.4	<0.02	26	0.1	17.2	16	<2
KNOB-DT-064	Vegetation	0.30	<0.1	<0.02	0.07	27.1	0.1	<0.05	0.5	1.07	5.4	<0.02	37	<0.1	15.0	14	<2
KNOB-DT-065	Vegetation	0.60	<0.1	<0.02	0.09	24.8	0.3	<0.05	0.4	2.64	9.8	<0.02	10	<0.1	4.8	16	4
KNOB-DT-066	Vegetation	0.54	<0.1	<0.02	0.09	23.7	0.4	<0.05	0.2	2.31	8.9	<0.02	5	0.2	4.7	72	4
KNOB-DT-067	Vegetation	0.64	<0.1	0.04	0.14	35.4	0.2	<0.05	1.1	1.46	6.2	<0.02	56	0.1	26.7	<10	<2
KNOB-DT-068	Vegetation	0.56	<0.1	0.08	0.23	20.8	0.4	<0.05	1.5	2.35	8.5	<0.02	39	0.3	4.9	63	3
KNOB-DT-069	Vegetation	0.67	<0.1	<0.02	0.07	34.2	0.4	<0.05	0.3	3.05	10.9	<0.02	7	0.3	4.8	17	<2
KNOB-DT-070	Vegetation	0.52	<0.1	<0.02	0.07	32.8	0.3	<0.05	<0.1	2.59	9.9	<0.02	2	0.2	3.9	<10	<2
KNOB-DT-071	Vegetation	0.68	<0.1	<0.02	0.04	33.5	0.3	<0.05	0.1	2.61	10.3	<0.02	<1	0.3	4.7	<10	<2
KNOB-DT-072	Vegetation	0.92	<0.1	0.04	0.15	28.5	0.4	<0.05	1.1	4.04	15.8	<0.02	4	0.4	6.4	29	5
KNOB-DT-073	Vegetation	0.81	0.1	0.02	0.10	30.8	0.4	<0.05	0.5	3.49	12.8	<0.02	6	0.4	6.7	19	<2
KNOB-DT-074	Vegetation	0.37	0.1	<0.02	0.08	23.0	0.2	<0.05	0.1	1.65	5.7	<0.02	8	<0.1	5.9	<10	<2
KNOB-DT-075	Vegetation	0.56	<0.1	0.02	0.10	44.7	0.2	<0.05	0.7	4.03	21.4	<0.02	50	0.2	25.6	17	<2
KNOB-DT-076	Vegetation	0.28	<0.1	<0.02	0.08	25.4	0.2	<0.05	<0.1	1.52	5.1	<0.02	9	<0.1	4.5	20	<2
KNOB-DT-077	Vegetation	0.29	<0.1	<0.02	0.06	24.9	0.2	<0.05	<0.1	1.61	5.7	<0.02	9	<0.1	3.6	31	<2
KNOB-DT-078	Vegetation	0.53	<0.1	<0.02	0.08	36.0	0.4	<0.05	0.2	2.40	9.0	<0.02	5	0.1	4.4	<10	<2
OVEN STD-1	Pulp	3.86	<0.1	<0.02	<0.02	269.8	1.6	<0.05	<0.1	0.11	0.4	<0.02	5	<0.1	1.9	50	<2
KNOB-DT-079	Vegetation	0.40	<0.1	<0.02	0.08	25.3	0.3	<0.05	0.2	2.05	6.8	<0.02	12	0.2	3.2	15	<2
KNOB-DT-080	Vegetation	0.73	<0.1	<0.02	0.05	38.3	0.3	<0.05	0.2	3.23	12.2	0.04	3	0.4	5.0	17	<2
KNOB-DT-081	Vegetation	0.80	0.1	<0.02	0.06	31.1	0.4	<0.05	0.3	3.76	13.2	<0.02	2	0.6	6.2	16	<2
KNOB-DT-082	Vegetation	0.40	<0.1	<0.02	0.10	31.1	0.4	<0.05	<0.1	1.76	6.9	<0.02	13	0.3	3.5	36	<2
KNOB-DT-083	Vegetation	0.91	<0.1	<0.02	0.14	30.2	0.5	<0.05	0.5	3.99	13.8	<0.02	21	0.4	7.3	33	<2
KNOB-DT-084	Vegetation	0.91	0.2	<0.02	0.07	37.7	0.4	<0.05	0.4	4.12	14.7	0.02	5	0.2	7.5	16	<2
KNOB-DT-085	Vegetation	0.60	<0.1	<0.02	0.07	42.4	0.3	<0.05	0.3	2.34	8.5	<0.02	12	0.2	5.5	15	<2
KNOB-DT-086	Vegetation	0.48	<0.1	<0.02	0.07	32.8	0.3	<0.05	0.5	2.26	7.1	<0.02	4	0.3	4.4	33	<2
KNOB-DT-087	Vegetation	0.32	<0.1	<0.02	0.16	41.5	0.2	<0.05	0.6	1.31	4.6	<0.02	22	<0.1	3.7	102	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	Unit	g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-088	Vegetation		12.68	0.571	1.08	113.1	10.72	107.9	93	8.2	4.7	844	1.13	1.2	0.2	0.8	1.6	651.8	1.36	0.07	0.14
KNOB-DT-089	Vegetation		12.02	0.672	1.12	68.25	5.82	79.9	72	8.2	4.0	861	0.64	0.6	0.1	0.6	0.8	650.6	0.88	0.06	0.08
KNOB-DT-090	Vegetation		14.54	0.741	1.69	66.13	6.84	60.7	92	3.5	1.8	398	0.59	0.7	0.1	<0.2	0.7	1581	2.22	0.08	0.11
KNOB-DT-091	Vegetation		12.72	0.672	0.91	85.62	5.05	82.0	60	6.3	3.5	919	0.42	0.7	<0.1	2.5	0.5	667.6	1.26	0.08	0.06
KNOB-DT-092	Vegetation		15.03	0.737	3.94	146.5	4.87	296.5	63	3.4	0.8	606	0.33	0.6	<0.1	0.3	0.3	855.7	0.08	0.12	0.07
KNOB-DT-093	Vegetation		9.303	0.434	1.04	81.09	12.16	118.8	102	6.9	4.0	1052	1.28	2.4	0.2	5.3	1.6	782.1	0.97	0.29	0.34
KNOB-DT-094	Vegetation		13.26	0.628	1.43	118.5	6.44	140.1	158	8.6	3.2	1001	0.65	1.2	0.1	0.9	0.8	571.9	1.62	0.13	0.21
KNOB-DT-095	Vegetation		17.14	0.741	1.60	123.3	4.26	80.1	71	6.8	2.8	735	0.52	0.4	<0.1	1.2	0.7	1041	0.88	0.09	0.16
KNOB-DT-096	Vegetation		9.096	0.472	28.60	113.7	3.64	187.2	33	2.7	0.2	128	0.11	0.6	<0.1	3.8	0.1	907.1	0.06	0.08	0.15
KNOB-DT-097	Vegetation		14.78	0.724	1.02	98.27	8.10	110.9	60	4.9	3.7	784	0.74	1.0	0.1	0.5	1.1	465.3	1.91	0.13	0.23
KNOB-DT-098	Vegetation		15.72	0.750	1.27	88.48	8.99	148.9	137	7.6	6.5	1220	0.80	0.9	0.2	<0.2	1.2	718.7	2.90	0.12	0.20
KNOB-DT-099	Vegetation		16.22	0.940	4.55	69.81	4.54	361.4	44	3.1	0.4	399	0.16	0.3	<0.1	<0.2	0.2	407.2	0.05	0.09	0.10
KNOB-DT-100	Vegetation		16.58	1.005	1.07	87.80	7.03	143.4	79	10.2	13.4	1556	0.77	0.7	0.1	1.3	1.1	671.6	1.35	0.14	0.17
KNOB-DT-101	Vegetation		14.36	0.813	0.84	88.75	8.94	102.4	95	6.1	6.2	666	0.72	0.5	0.2	1.5	0.9	749.7	0.75	0.16	0.26
KNOB-DT-102	Vegetation		9.843	0.491	0.83	195.6	5.68	200.0	79	7.4	4.1	457	0.41	0.5	<0.1	2.5	0.6	550.8	1.46	0.13	0.24
KNOB-DT-103	Vegetation		16.44	0.754	2.42	112.6	4.05	119.0	88	6.2	2.7	555	0.43	0.5	<0.1	1.3	0.6	692.7	4.67	0.12	0.12
KNOB-DT-104	Vegetation		13.74	0.794	1.11	99.02	8.51	109.3	69	7.3	6.3	1091	0.90	1.0	0.2	<0.2	1.4	705.8	2.80	0.12	0.19
OVEN STD-1	Pulp		32.94	1.105	0.77	54.96	7.62	1782	803	15.9	0.8	>10000	0.06	0.7	0.2	<0.2	<0.1	448.6	0.21	0.78	0.03
KNOB-DT-105	Vegetation		16.67	0.730	0.59	97.69	4.48	144.1	58	7.5	4.7	890	0.47	0.6	<0.1	2.2	0.7	501.7	0.82	0.18	0.18
KNOB-DT-106	Vegetation		16.06	1.043	2.11	80.08	12.47	96.7	83	7.8	4.9	880	1.52	2.3	0.2	1.3	2.0	803.5	1.10	0.18	0.25
KNOB-DT-107	Vegetation		16.33	0.650	1.83	130.7	8.34	148.3	162	9.1	6.3	1449	0.73	0.8	0.1	0.8	1.1	588.0	1.47	0.09	0.13
KNOB-DT-108	Vegetation		12.01	0.549	2.00	83.51	8.44	103.6	126	7.7	4.1	1326	1.03	0.8	0.1	0.3	1.5	947.2	2.43	0.08	0.27
KNOB-DT-109	Vegetation		17.77	0.876	2.25	109.3	6.89	94.7	116	5.1	5.3	973	0.70	0.5	0.1	1.5	1.1	858.3	1.46	0.10	0.15
KNOB-DT-110	Vegetation		15.80	0.792	0.81	59.95	11.16	86.8	136	8.9	4.4	760	1.41	1.5	0.2	1.1	2.2	747.5	1.05	0.08	0.18
KNOB-DT-111	Vegetation		17.31	0.805	2.61	81.29	7.47	90.7	105	6.4	5.7	901	0.94	0.7	0.1	0.6	1.6	662.5	1.02	0.09	0.14
KNOB-DT-112	Vegetation		9.473	0.705	2.21	70.14	11.13	93.1	74	14.2	5.1	839	1.22	1.4	0.2	<0.2	2.2	648.5	0.74	0.07	0.18
KNOB-DT-113	Vegetation		14.93	0.845	11.79	80.29	17.94	258.8	123	4.4	0.6	490	0.29	1.1	<0.1	<0.2	0.4	1734	0.03	0.07	0.06
KNOB-DT-114	Vegetation		11.11	0.549	1.11	413.8	9.05	107.1	100	7.6	4.4	872	1.11	1.0	0.2	0.8	1.3	636.8	1.43	0.09	0.11
KNOB-DT-115	Vegetation		13.17	0.681	1.82	119.1	10.63	99.4	121	12.1	4.8	1083	1.19	2.0	0.3	1.3	1.4	545.2	2.13	0.17	0.31
KNOB-DT-116	Vegetation		14.02	0.578	1.42	143.7	6.40	208.0	149	10.3	5.6	1007	0.57	0.7	0.1	1.7	0.6	474.9	2.15	0.14	0.38

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

Method		1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
Analyte		V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
Unit		ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
MDL		2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
KNOB-DT-088	Vegetation	14	6.53	0.668	5.3	29.0	2.36	187.7	0.017	241	1.37	>5	>10	<0.1	1.9	0.10	1.84	<5	0.6	<0.02	2.7
KNOB-DT-089	Vegetation	8	9.03	0.773	3.0	18.1	2.37	116.5	0.011	199	0.76	>5	>10	<0.1	1.2	0.08	1.76	<5	0.7	0.02	1.4
KNOB-DT-090	Vegetation	8	11.14	0.609	2.7	17.5	1.96	322.3	0.011	223	0.72	>5	>10	<0.1	1.3	0.05	0.95	<5	0.3	0.03	1.4
KNOB-DT-091	Vegetation	6	8.11	0.680	2.1	16.6	2.23	299.4	0.009	197	0.41	>5	>10	<0.1	1.0	0.07	1.64	<5	0.6	0.03	0.9
KNOB-DT-092	Vegetation	4	9.09	1.723	1.5	4.8	3.00	54.5	0.012	450	0.23	>5	>10	<0.1	0.5	0.19	1.75	<5	0.8	0.05	0.6
KNOB-DT-093	Vegetation	16	10.16	0.925	5.7	26.9	2.08	233.5	0.018	267	1.27	>5	>10	<0.1	2.3	0.18	1.90	<5	0.7	<0.02	2.6
KNOB-DT-094	Vegetation	8	6.98	0.960	2.7	12.2	2.49	173.3	0.014	197	0.68	>5	>10	<0.1	1.3	0.15	1.87	<5	0.2	0.02	1.3
KNOB-DT-095	Vegetation	8	14.57	0.803	2.8	10.7	2.05	221.9	0.011	219	0.75	>5	>10	<0.1	1.3	0.08	1.33	<5	0.6	0.05	1.5
KNOB-DT-096	Vegetation	<2	10.85	2.276	0.7	2.1	2.82	97.4	0.008	728	0.09	>5	>10	<0.1	0.2	<0.02	2.40	<5	1.3	0.04	0.3
KNOB-DT-097	Vegetation	10	5.63	0.769	4.6	13.0	2.47	172.3	0.014	226	0.99	>5	>10	<0.1	1.9	0.12	1.25	<5	0.6	0.03	2.1
KNOB-DT-098	Vegetation	10	5.27	0.577	4.4	13.7	3.13	105.2	0.014	242	0.98	>5	>10	<0.1	1.9	0.28	1.77	<5	0.7	0.03	2.0
KNOB-DT-099	Vegetation	<2	9.23	1.245	5.6	2.2	2.24	12.9	0.005	269	0.14	>5	>10	<0.1	0.3	0.03	1.69	<5	0.5	<0.02	0.5
KNOB-DT-100	Vegetation	13	9.30	0.978	4.6	12.9	2.18	128.7	0.014	176	1.08	>5	>10	<0.1	2.2	0.11	1.99	<5	0.7	<0.02	2.2
KNOB-DT-101	Vegetation	12	14.03	0.470	3.8	10.5	1.71	117.5	0.012	188	0.81	>5	>10	<0.1	1.7	0.13	1.16	<5	0.5	0.03	1.7
KNOB-DT-102	Vegetation	6	7.43	0.764	2.5	7.0	2.68	237.4	0.009	226	0.35	>5	>10	<0.1	1.1	0.07	1.28	<5	0.5	0.02	1.0
KNOB-DT-103	Vegetation	6	6.56	1.432	2.3	8.1	2.29	43.3	0.013	163	0.41	>5	>10	<0.1	1.0	0.03	1.02	<5	0.6	0.04	1.1
KNOB-DT-104	Vegetation	12	8.15	0.747	4.9	14.9	1.94	152.5	0.017	127	1.13	>5	>10	<0.1	1.8	0.06	1.24	<5	0.3	0.04	2.3
OVEN STD-1	Pulp	<2	24.35	3.226	<0.5	2.5	3.21	339.5	0.011	206	0.08	0.076	>10	<0.1	0.5	1.23	1.54	<5	0.5	0.02	0.7
KNOB-DT-105	Vegetation	6	6.88	0.727	2.3	8.2	2.45	209.6	0.010	227	0.47	>5	>10	<0.1	1.1	0.11	1.22	<5	0.5	0.03	1.3
KNOB-DT-106	Vegetation	21	10.29	0.553	8.0	28.0	2.35	252.1	0.016	231	1.76	>5	9.63	<0.1	2.3	0.15	1.85	<5	0.7	0.03	3.6
KNOB-DT-107	Vegetation	10	6.19	1.441	4.3	20.2	2.60	114.8	0.016	225	1.01	>5	>10	<0.1	1.6	0.10	1.80	<5	0.6	<0.02	2.2
KNOB-DT-108	Vegetation	15	8.09	0.531	6.4	21.7	3.02	183.8	0.016	255	1.63	>5	>10	<0.1	2.2	0.16	1.56	<5	1.1	0.06	3.3
KNOB-DT-109	Vegetation	9	8.99	0.674	4.0	16.3	2.22	151.9	0.014	227	0.98	>5	>10	<0.1	1.7	0.14	1.72	<5	0.7	0.03	2.0
KNOB-DT-110	Vegetation	19	6.15	0.623	8.9	31.3	2.89	129.9	0.024	297	2.10	>5	>10	<0.1	2.7	0.11	1.21	<5	0.6	0.04	4.4
KNOB-DT-111	Vegetation	14	7.17	0.629	6.0	18.0	2.84	147.9	0.019	339	1.48	>5	>10	<0.1	2.1	0.22	1.58	<5	0.9	0.03	3.0
KNOB-DT-112	Vegetation	17	8.15	1.027	7.4	31.7	1.52	127.1	0.020	168	1.94	>5	>10	<0.1	2.5	0.08	2.01	<5	0.9	0.03	4.0
KNOB-DT-113	Vegetation	3	16.44	1.415	11.5	6.2	3.58	39.5	0.008	983	0.30	>5	>10	<0.1	0.7	0.02	1.85	<5	1.1	0.07	0.9
KNOB-DT-114	Vegetation	13	6.56	0.567	4.6	24.6	2.36	196.7	0.016	226	1.22	>5	>10	<0.1	2.0	0.09	1.87	<5	0.8	0.04	2.7
KNOB-DT-115	Vegetation	14	7.50	0.941	5.6	21.0	1.72	192.7	0.017	267	1.21	>5	>10	<0.1	1.9	0.15	1.97	<5	0.7	<0.02	2.6
KNOB-DT-116	Vegetation	6	6.10	1.602	2.8	10.8	2.71	140.2	0.012	290	0.47	>5	>10	<0.1	1.1	0.09	2.36	<5	0.8	0.03	1.3

AcmeLabs
Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-088	Vegetation	0.67	0.1	<0.02	0.04	30.0	0.7	<0.05	0.2	2.86	9.6	<0.02	6	0.3	5.8	12	<2
KNOB-DT-089	Vegetation	0.35	0.1	<0.02	0.06	24.4	0.2	<0.05	0.2	1.64	5.5	<0.02	5	0.2	3.6	10	<2
KNOB-DT-090	Vegetation	0.35	<0.1	<0.02	0.05	21.7	0.2	<0.05	0.1	1.53	4.7	<0.02	3	0.1	2.7	16	<2
KNOB-DT-091	Vegetation	0.40	<0.1	<0.02	0.04	36.8	0.2	<0.05	0.1	1.79	4.0	<0.02	6	<0.1	3.2	18	<2
KNOB-DT-092	Vegetation	2.87	0.1	<0.02	0.05	60.5	0.1	<0.05	0.3	1.36	3.4	<0.02	18	<0.1	9.2	18	<2
KNOB-DT-093	Vegetation	0.68	0.2	<0.02	0.06	29.3	0.6	<0.05	<0.1	3.24	10.7	0.03	2	0.1	5.2	14	<2
KNOB-DT-094	Vegetation	0.35	0.2	<0.02	0.03	34.5	0.2	<0.05	0.1	1.58	5.2	<0.02	7	0.1	3.3	16	<2
KNOB-DT-095	Vegetation	0.40	<0.1	<0.02	0.04	28.3	0.2	<0.05	<0.1	1.57	5.1	<0.02	6	0.1	2.9	<10	<2
KNOB-DT-096	Vegetation	0.36	<0.1	<0.02	0.03	36.3	0.2	<0.05	0.3	0.41	1.3	<0.02	9	<0.1	7.0	<10	<2
KNOB-DT-097	Vegetation	0.47	<0.1	<0.02	0.07	31.3	0.3	<0.05	0.2	2.70	8.5	<0.02	6	0.2	4.6	30	<2
KNOB-DT-098	Vegetation	0.52	<0.1	<0.02	0.06	45.2	0.3	<0.05	0.4	2.73	8.1	<0.02	5	0.3	4.5	40	<2
KNOB-DT-099	Vegetation	3.29	<0.1	<0.02	0.03	253.7	0.1	<0.05	0.4	3.64	12.2	<0.02	57	<0.1	7.3	36	<2
KNOB-DT-100	Vegetation	0.47	<0.1	0.02	0.05	21.7	0.3	<0.05	0.7	3.71	8.9	<0.02	12	0.2	4.5	29	<2
KNOB-DT-101	Vegetation	0.48	<0.1	<0.02	0.05	34.5	0.3	<0.05	0.6	2.75	7.2	<0.02	6	0.1	4.3	<10	4
KNOB-DT-102	Vegetation	0.83	<0.1	<0.02	0.05	69.8	0.2	<0.05	0.2	1.98	4.6	<0.02	1	<0.1	2.5	30	<2
KNOB-DT-103	Vegetation	0.31	<0.1	<0.02	0.06	42.8	0.2	<0.05	<0.1	1.27	4.0	<0.02	1	0.1	2.6	26	<2
KNOB-DT-104	Vegetation	0.52	<0.1	<0.02	0.07	26.4	0.3	<0.05	0.2	2.84	8.8	<0.02	6	0.3	4.3	24	<2
OVEN STD-1	Pulp	5.23	<0.1	<0.02	<0.02	382.6	2.1	<0.05	<0.1	0.15	0.5	<0.02	8	<0.1	2.4	159	<2
KNOB-DT-105	Vegetation	0.33	<0.1	<0.02	0.05	28.7	0.3	<0.05	0.2	1.40	4.3	<0.02	8	<0.1	3.3	43	<2
KNOB-DT-106	Vegetation	0.87	<0.1	<0.02	0.04	27.8	0.4	<0.05	0.3	4.83	16.7	0.02	6	0.3	6.6	17	<2
KNOB-DT-107	Vegetation	0.59	<0.1	0.03	0.08	44.9	0.4	<0.05	0.9	2.44	8.2	<0.02	5	0.2	4.4	51	<2
KNOB-DT-108	Vegetation	0.79	<0.1	<0.02	0.03	34.2	0.4	<0.05	0.2	3.79	12.4	<0.02	6	0.2	5.8	25	<2
KNOB-DT-109	Vegetation	0.55	<0.1	<0.02	0.06	40.9	0.3	<0.05	0.4	2.48	7.3	<0.02	8	0.1	4.2	19	<2
KNOB-DT-110	Vegetation	1.04	<0.1	<0.02	0.05	37.1	0.7	<0.05	0.2	5.33	17.1	0.03	3	0.4	8.2	46	<2
KNOB-DT-111	Vegetation	1.51	<0.1	<0.02	0.05	50.4	0.4	<0.05	0.3	3.46	11.1	<0.02	3	0.2	5.7	27	<2
KNOB-DT-112	Vegetation	0.92	<0.1	<0.02	0.04	28.0	0.5	<0.05	0.2	4.34	14.5	<0.02	10	0.5	6.4	34	6
KNOB-DT-113	Vegetation	0.45	<0.1	0.02	0.05	38.5	0.2	<0.05	0.1	5.80	31.0	<0.02	55	0.2	36.5	18	<2
KNOB-DT-114	Vegetation	0.60	<0.1	<0.02	0.04	29.8	13.8	<0.05	0.3	2.90	8.7	<0.02	6	0.4	4.8	31	<2
KNOB-DT-115	Vegetation	0.67	<0.1	<0.02	0.05	46.8	0.4	<0.05	0.2	2.77	10.9	<0.02	4	0.2	4.6	41	<2
KNOB-DT-116	Vegetation	0.35	<0.1	<0.02	0.07	46.9	0.3	<0.05	0.3	1.60	5.5	<0.02	7	0.1	2.9	52	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	Unit	g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-117	Vegetation		9.892	0.495	1.04	120.5	6.83	194.1	95	9.1	5.3	938	0.79	1.2	0.1	1.9	1.1	434.6	2.20	0.15	0.28
KNOB-DT-118	Vegetation		15.67	1.000	21.35	92.76	6.33	190.5	54	3.7	0.8	338	0.29	0.3	0.1	<0.2	0.3	1415	0.11	0.12	0.10
KNOB-DT-119	Vegetation		14.35	0.662	1.43	116.3	6.17	138.0	104	8.7	4.4	1137	0.80	0.8	0.1	0.9	1.0	636.7	1.49	0.11	0.29
KNOB-DT-120	Vegetation		14.72	0.944	1.35	73.04	5.34	116.6	67	8.4	3.3	990	0.73	0.7	0.1	1.4	1.1	921.2	1.26	0.08	0.22
KNOB-DT-121	Vegetation		10.16	0.548	0.78	107.8	6.91	151.7	88	11.3	4.6	880	0.89	1.0	0.2	2.1	1.3	515.7	1.52	0.14	0.40
KNOB-DT-122	Vegetation		13.42	0.630	0.66	85.97	8.27	158.1	85	12.8	5.5	1000	1.13	1.1	0.2	0.9	1.7	715.4	2.13	0.13	0.35
KNOB-DT-123	Vegetation		12.77	0.527	1.41	127.0	6.38	135.1	124	10.0	5.2	825	0.83	0.6	0.1	1.0	1.1	637.4	1.49	0.14	0.26
KNOB-DT-124	Vegetation		12.86	0.616	0.87	67.59	8.14	193.5	129	5.5	3.4	906	0.91	0.9	0.2	2.5	1.1	786.8	2.38	0.21	0.43
KNOB-DT-125	Vegetation		12.02	0.843	2.19	71.87	7.94	86.0	83	10.2	3.6	801	0.99	1.1	0.2	<0.2	1.4	626.0	1.36	0.10	0.20
KNOB-DT-126	Vegetation		13.76	0.698	0.86	95.08	8.35	118.7	104	12.7	5.8	1628	0.87	1.2	0.2	0.5	1.4	966.5	1.91	0.08	0.17
KNOB-DT-127	Vegetation		15.26	1.096	0.66	71.85	18.93	127.6	124	18.6	10.3	1397	2.25	2.7	0.4	0.3	4.7	897.2	1.04	0.10	0.30
KNOB-DT-128	Vegetation		15.06	0.949	2.36	64.28	11.80	88.2	112	17.3	4.7	853	2.02	2.0	0.3	<0.2	2.6	1006	1.53	0.13	0.36
KNOB-DT-129	Vegetation		14.72	0.625	1.42	110.5	10.14	152.9	128	10.9	4.7	1007	1.05	1.1	0.2	2.2	1.5	593.6	2.04	0.14	0.25
KNOB-DT-130	Vegetation		11.04	0.663	2.31	107.5	4.74	510.1	28	4.0	0.6	347	0.28	0.4	<0.1	<0.2	0.3	1017	0.22	0.11	0.08
OVEN STD-1	Pulp		30.70	1.015	0.79	47.63	6.78	1576	758	13.4	0.9	>10000	0.07	0.6	0.2	3.7	<0.1	433.1	0.27	0.83	0.05
KNOB-DT-131	Vegetation		11.32	0.579	0.93	104.5	4.98	117.9	116	6.0	3.6	665	0.63	0.4	0.1	3.5	0.9	661.2	1.23	0.11	0.38
KNOB-DT-132	Vegetation		14.91	0.929	0.77	80.37	5.18	76.7	92	6.4	2.3	627	0.56	0.6	0.1	1.7	0.7	557.8	1.75	0.10	0.23
KNOB-DT-133	Vegetation		12.47	0.460	1.26	142.5	6.58	211.9	131	7.3	4.7	801	0.64	0.9	0.1	0.9	0.7	451.4	1.22	0.22	0.57
KNOB-DT-134	Vegetation		16.24	1.041	0.61	62.80	8.97	78.2	91	5.8	3.1	818	1.19	1.3	0.2	0.9	1.6	701.1	1.26	0.10	0.24
KNOB-DT-135	Vegetation		15.52	0.742	1.48	112.8	5.99	129.0	76	6.3	6.1	969	0.71	0.9	0.1	0.6	0.9	412.6	1.44	0.07	0.15
KNOB-DT-136	Vegetation		12.65	0.576	2.07	103.3	5.50	130.6	74	5.4	6.6	1005	0.58	0.9	<0.1	2.3	0.8	427.1	1.70	0.17	0.27
KNOB-DT-137	Vegetation		16.23	1.159	19.68	75.57	3.53	120.9	34	1.8	0.6	275	0.28	0.4	<0.1	0.2	0.3	987.2	0.14	0.05	0.06
KNOB-DT-138	Vegetation		15.38	1.008	2.17	60.11	14.11	75.1	101	9.0	5.5	923	1.92	2.0	0.3	4.1	2.4	1050	0.84	0.14	0.39
KNOB-DT-139	Vegetation		16.16	0.887	0.92	72.32	7.74	97.3	98	10.3	6.0	1537	0.91	1.0	0.2	1.5	1.6	710.2	1.10	0.16	0.12
KNOB-DT-140	Vegetation		14.55	0.595	0.90	115.2	6.55	210.1	113	8.4	9.9	995	0.79	1.0	0.2	0.8	1.1	560.7	1.44	0.11	0.18
KNOB-DT-141	Vegetation		13.26	0.757	1.39	61.33	3.90	74.3	91	2.7	2.6	529	0.44	0.6	<0.1	1.5	0.5	882.7	0.45	0.11	0.15
KNOB-DT-142	Vegetation		16.74	0.908	1.57	110.0	8.40	97.5	119	9.7	7.3	846	0.95	1.5	0.2	0.8	1.6	555.7	0.88	0.09	0.31
KNOB-DT-143	Vegetation		13.70	0.675	1.11	97.24	7.09	123.8	112	3.8	2.7	679	0.78	0.8	0.1	1.4	1.0	1253	2.28	0.09	0.21
KNOB-DT-144	Vegetation		16.87	0.722	1.03	106.3	5.42	122.1	140	4.0	2.0	401	0.59	0.7	0.1	2.9	0.7	711.3	1.50	0.12	0.26
KNOB-DT-145	Vegetation		17.05	1.191	0.97	63.72	5.51	89.3	80	3.4	2.1	562	0.61	0.7	0.1	1.0	0.8	1149	0.98	0.09	0.12

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
	Unit	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
	MDL	2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
KNOB-DT-117	Vegetation	10	6.09	0.966	4.1	13.4	2.05	153.9	0.017	230	0.94	>5	>10	<0.1	1.6	0.04	1.87	<5	0.7	0.03	2.0
KNOB-DT-118	Vegetation	3	12.52	1.285	3.9	4.6	2.63	44.6	0.007	450	0.26	>5	>10	<0.1	0.6	<0.02	1.24	<5	0.8	0.03	0.7
KNOB-DT-119	Vegetation	9	7.34	1.254	3.7	12.9	2.80	200.3	0.017	255	0.92	>5	>10	<0.1	1.8	0.06	1.83	<5	0.8	0.03	1.9
KNOB-DT-120	Vegetation	9	11.85	0.665	3.6	12.8	2.43	282.5	0.013	210	0.97	>5	>10	<0.1	1.5	0.10	0.93	<5	0.5	0.03	2.1
KNOB-DT-121	Vegetation	11	4.39	0.761	4.7	16.9	2.58	128.0	0.019	222	1.13	>5	>10	<0.1	1.9	0.05	0.91	<5	0.6	0.03	2.5
KNOB-DT-122	Vegetation	14	7.11	0.741	6.0	20.9	2.79	258.6	0.023	242	1.47	>5	>10	<0.1	2.0	0.07	1.01	<5	0.8	<0.02	3.1
KNOB-DT-123	Vegetation	10	8.84	0.937	4.0	14.8	1.84	170.5	0.018	259	1.04	>5	>10	<0.1	1.7	0.04	1.24	<5	0.9	0.05	2.2
KNOB-DT-124	Vegetation	10	9.26	0.573	4.1	12.5	2.86	237.3	0.015	253	0.91	>5	>10	<0.1	1.5	0.08	1.14	<5	0.8	0.03	2.0
KNOB-DT-125	Vegetation	13	10.23	0.584	4.9	19.1	1.80	198.8	0.016	194	1.23	>5	>10	<0.1	1.9	0.08	1.24	7	0.5	0.03	2.4
KNOB-DT-126	Vegetation	13	14.14	0.693	5.5	20.5	2.59	400.4	0.014	225	1.31	>5	>10	<0.1	1.9	0.09	1.28	<5	0.6	0.05	2.7
KNOB-DT-127	Vegetation	36	8.30	0.889	16.5	38.0	1.91	373.8	0.037	185	3.67	>5	>10	<0.1	4.9	0.17	0.82	<5	0.6	0.07	8.6
KNOB-DT-128	Vegetation	22	9.61	0.689	9.7	34.6	1.75	242.9	0.027	186	2.37	>5	>10	<0.1	3.3	0.10	1.41	<5	0.4	0.06	4.8
KNOB-DT-129	Vegetation	13	5.36	0.776	5.3	19.5	2.97	173.6	0.025	241	1.25	>5	>10	<0.1	1.8	0.08	1.07	<5	0.5	0.06	2.8
KNOB-DT-130	Vegetation	3	10.74	1.871	1.7	4.0	2.37	21.1	0.009	376	0.20	4.148	>10	<0.1	0.5	<0.02	1.66	<5	0.9	<0.02	0.6
OVEN STD-1	Pulp	<2	21.42	3.068	<0.5	2.3	2.90	440.0	0.011	215	0.08	0.409	>10	<0.1	0.4	0.97	1.33	<5	0.3	<0.02	0.6
KNOB-DT-131	Vegetation	8	8.82	0.737	3.6	10.3	2.69	211.6	0.015	237	0.82	>5	>10	<0.1	1.4	0.04	1.17	<5	0.4	<0.02	1.7
KNOB-DT-132	Vegetation	7	8.99	0.527	2.8	10.0	1.37	140.1	0.013	194	0.61	>5	>10	<0.1	1.2	0.03	1.47	<5	0.4	<0.02	1.2
KNOB-DT-133	Vegetation	8	6.04	1.451	3.1	10.4	2.54	125.0	0.016	263	0.63	>5	>10	<0.1	1.7	<0.02	1.26	<5	0.5	<0.02	1.3
KNOB-DT-134	Vegetation	15	10.62	0.442	6.7	19.3	2.29	301.6	0.020	205	1.41	>5	>10	<0.1	1.9	0.08	1.46	7	0.5	<0.02	2.9
KNOB-DT-135	Vegetation	9	6.56	1.095	4.0	11.8	1.93	139.3	0.020	248	0.95	>5	>10	<0.1	1.4	0.06	1.42	<5	0.5	<0.02	2.0
KNOB-DT-136	Vegetation	7	5.15	1.461	3.2	12.2	2.09	126.7	0.019	239	0.77	>5	>10	<0.1	1.3	<0.02	2.16	<5	0.7	<0.02	1.6
KNOB-DT-137	Vegetation	4	9.54	1.281	2.0	3.2	2.18	54.8	0.010	516	0.32	>5	>10	<0.1	0.8	<0.02	1.29	5	0.6	<0.02	0.7
KNOB-DT-138	Vegetation	22	14.26	0.461	9.1	28.6	2.06	302.9	0.025	234	2.08	>5	7.94	<0.1	2.7	0.05	0.97	5	0.7	<0.02	4.0
KNOB-DT-139	Vegetation	14	10.07	0.476	5.7	19.8	2.48	320.7	0.020	193	1.23	>5	>10	<0.1	1.8	0.04	1.04	<5	0.6	0.02	2.6
KNOB-DT-140	Vegetation	11	5.41	0.785	4.8	16.0	2.58	421.7	0.026	291	1.00	>5	>10	<0.1	1.6	0.13	1.24	6	0.6	<0.02	2.1
KNOB-DT-141	Vegetation	6	10.29	0.615	2.3	7.5	1.96	381.2	0.011	184	0.45	>5	>10	<0.1	1.0	<0.02	1.10	<5	0.7	<0.02	1.1
KNOB-DT-142	Vegetation	14	6.71	0.923	6.2	17.1	2.38	173.5	0.027	253	1.36	>5	>10	<0.1	2.0	0.09	1.26	<5	0.4	0.04	2.9
KNOB-DT-143	Vegetation	9	11.60	0.693	4.1	14.9	2.54	245.9	0.016	255	0.89	>5	>10	<0.1	1.3	0.04	1.55	<5	0.6	0.02	1.9
KNOB-DT-144	Vegetation	7	6.96	0.766	3.0	8.0	2.96	108.0	0.016	240	0.63	>5	>10	<0.1	1.1	0.03	1.32	<5	0.3	<0.02	1.2
KNOB-DT-145	Vegetation	7	14.78	0.525	3.3	13.5	1.65	221.4	0.013	201	0.66	>5	>10	<0.1	1.1	<0.02	0.99	7	0.4	0.02	1.4

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-117	Vegetation	0.65	<0.1	<0.02	0.05	34.9	0.3	<0.05	0.3	2.51	8.2	<0.02	7	0.2	4.1	36	<2
KNOB-DT-118	Vegetation	0.30	<0.1	0.02	0.05	46.3	0.1	<0.05	0.1	1.56	8.7	<0.02	23	<0.1	17.4	<10	<2
KNOB-DT-119	Vegetation	0.49	<0.1	<0.02	0.06	28.3	0.3	<0.05	0.4	2.14	7.2	<0.02	2	<0.1	4.2	41	<2
KNOB-DT-120	Vegetation	0.57	<0.1	<0.02	0.05	40.0	0.3	<0.05	0.1	2.09	6.9	<0.02	1	0.3	4.0	16	<2
KNOB-DT-121	Vegetation	0.70	<0.1	<0.02	0.05	38.3	0.3	<0.05	<0.1	2.74	9.3	<0.02	5	0.2	5.1	35	<2
KNOB-DT-122	Vegetation	0.89	<0.1	<0.02	0.05	39.7	0.4	<0.05	0.2	3.50	11.7	<0.02	4	0.3	5.4	28	<2
KNOB-DT-123	Vegetation	0.68	<0.1	<0.02	0.04	34.3	0.3	<0.05	0.1	2.62	8.0	<0.02	4	0.2	4.2	34	<2
KNOB-DT-124	Vegetation	0.69	<0.1	<0.02	0.07	44.9	0.4	<0.05	0.2	2.47	8.0	<0.02	4	0.3	3.5	33	<2
KNOB-DT-125	Vegetation	0.70	<0.1	<0.02	0.03	31.4	0.4	<0.05	<0.1	3.05	9.5	<0.02	4	0.2	4.7	33	<2
KNOB-DT-126	Vegetation	0.83	<0.1	<0.02	0.03	42.2	0.4	<0.05	0.2	3.25	10.8	<0.02	3	0.2	5.1	21	<2
KNOB-DT-127	Vegetation	2.23	<0.1	<0.02	0.04	52.0	0.9	<0.05	0.4	9.49	33.5	0.03	1	0.5	13.7	25	<2
KNOB-DT-128	Vegetation	1.37	<0.1	0.02	0.04	38.4	0.6	<0.05	0.3	6.00	19.1	<0.02	5	0.4	8.3	28	<2
KNOB-DT-129	Vegetation	0.84	<0.1	0.03	0.05	40.5	0.5	<0.05	0.2	3.12	9.7	<0.02	6	0.2	6.1	28	<2
KNOB-DT-130	Vegetation	0.50	<0.1	<0.02	0.04	52.9	0.1	<0.05	0.2	1.04	6.1	<0.02	38	0.1	12.1	51	<2
OVEN STD-1	Pulp	5.17	0.2	<0.02	0.03	357.3	2.1	<0.05	<0.1	0.16	0.6	0.03	4	<0.1	2.6	130	<2
KNOB-DT-131	Vegetation	0.65	<0.1	<0.02	0.05	42.2	0.3	<0.05	0.1	2.28	7.0	<0.02	6	0.3	4.6	22	<2
KNOB-DT-132	Vegetation	0.53	<0.1	<0.02	0.05	44.9	0.2	<0.05	0.1	1.65	5.2	<0.02	9	<0.1	3.5	27	<2
KNOB-DT-133	Vegetation	0.48	<0.1	<0.02	0.09	36.5	0.3	<0.05	0.5	1.78	6.0	<0.02	20	0.4	4.2	92	<2
KNOB-DT-134	Vegetation	0.98	<0.1	<0.02	0.03	39.0	0.4	<0.05	0.4	3.75	12.8	0.02	1	0.2	6.2	14	<2
KNOB-DT-135	Vegetation	0.71	<0.1	<0.02	0.07	40.0	0.2	<0.05	0.1	2.35	7.6	<0.02	11	0.2	4.2	22	<2
KNOB-DT-136	Vegetation	0.58	<0.1	<0.02	0.09	37.7	0.3	<0.05	0.5	1.86	6.2	<0.02	4	<0.1	4.1	59	<2
KNOB-DT-137	Vegetation	0.35	<0.1	<0.02	0.05	57.1	0.1	<0.05	<0.1	1.33	5.0	<0.02	34	<0.1	19.4	<10	<2
KNOB-DT-138	Vegetation	1.11	<0.1	<0.02	0.03	27.1	0.6	<0.05	0.3	5.17	17.7	<0.02	3	0.4	9.5	<10	<2
KNOB-DT-139	Vegetation	0.71	<0.1	<0.02	0.03	23.5	0.4	<0.05	0.1	3.09	10.9	<0.02	6	0.1	5.8	15	<2
KNOB-DT-140	Vegetation	0.81	<0.1	<0.02	0.06	45.0	0.3	<0.05	0.2	2.76	8.8	<0.02	1	0.3	5.0	25	<2
KNOB-DT-141	Vegetation	0.47	<0.1	<0.02	0.05	29.7	0.2	<0.05	0.1	1.36	4.6	<0.02	2	<0.1	2.6	18	<2
KNOB-DT-142	Vegetation	1.04	<0.1	<0.02	0.05	52.9	0.4	<0.05	1.3	3.67	12.5	<0.02	14	0.3	6.4	13	<2
KNOB-DT-143	Vegetation	0.66	<0.1	<0.02	0.05	31.4	0.3	<0.05	<0.1	2.20	7.9	<0.02	6	0.2	3.6	<10	<2
KNOB-DT-144	Vegetation	0.58	<0.1	<0.02	0.07	43.5	0.2	<0.05	<0.1	1.70	5.6	<0.02	6	0.2	3.1	26	<2
KNOB-DT-145	Vegetation	0.59	<0.1	<0.02	0.04	31.5	0.2	<0.05	0.2	1.93	6.4	<0.02	3	0.2	3.0	15	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	Unit	g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-146	Vegetation		12.42	0.631	1.13	77.18	8.26	89.3	83	9.3	2.8	454	0.82	1.4	0.1	1.5	0.9	710.7	1.25	0.09	0.14
KNOB-DT-147	Vegetation		13.53	0.656	0.92	66.40	6.20	98.6	83	9.9	4.2	1462	0.96	1.9	0.2	3.8	1.2	1077	1.31	0.15	0.12
KNOB-DT-148	Vegetation		18.66	0.912	4.63	190.7	2.25	377.5	36	2.0	0.4	1279	0.14	1.0	<0.1	<0.2	0.1	878.2	0.04	0.04	<0.02
KNOB-DT-149	Vegetation		10.71	0.481	2.02	81.89	4.51	76.5	92	4.9	2.9	673	0.47	1.2	<0.1	2.0	0.6	519.6	1.26	0.08	0.05
KNOB-DT-150	Vegetation		13.95	0.733	0.61	113.4	6.64	85.2	166	4.5	4.5	946	0.75	1.2	0.1	2.8	0.9	840.7	1.91	0.09	0.09
KNOB-DT-151	Vegetation		16.77	1.615	8.94	58.92	3.35	217.9	17	0.2	0.2	263	0.08	0.3	<0.1	0.6	0.1	1965	0.14	0.04	<0.02
KNOB-DT-152	Vegetation		16.92	0.954	1.57	82.22	4.05	169.0	17	1.9	0.5	218	0.24	0.4	<0.1	0.4	0.2	1135	0.02	0.05	<0.02
KNOB-DT-153	Vegetation		15.31	0.964	0.88	72.94	2.84	65.1	45	2.2	2.4	875	0.33	0.2	<0.1	0.6	0.4	643.9	0.78	0.06	<0.02
KNOB-DT-154	Vegetation		16.25	0.845	0.94	93.19	8.96	100.6	103	13.5	11.1	1299	1.10	1.5	0.2	0.8	1.6	677.4	1.52	0.08	0.12
KNOB-DT-155	Vegetation		15.16	0.833	0.77	73.06	3.81	105.2	93	3.7	5.0	645	0.43	0.7	<0.1	0.4	0.6	455.9	1.91	0.06	0.03
KNOB-DT-156	Vegetation		10.13	0.448	0.90	119.9	4.11	106.7	74	4.9	3.2	692	0.39	0.5	<0.1	1.6	0.5	370.5	1.02	0.04	<0.02
OVEN STD-1	Pulp		31.66	1.034	0.75	46.64	5.90	1582	776	13.0	0.8	>10000	0.06	0.3	0.2	<0.2	<0.1	424.7	0.23	0.75	<0.02
KNOB-DT-157	Vegetation		15.27	0.832	0.64	89.70	7.81	130.9	109	6.3	5.9	919	0.90	1.0	0.2	1.0	1.1	711.3	0.99	0.08	0.07
KNOB-DT-158	Vegetation		11.44	0.598	0.80	76.43	3.90	95.1	73	7.4	6.4	702	0.46	0.3	<0.1	2.1	0.6	547.7	1.12	0.04	0.03
KNOB-DT-159	Vegetation		11.48	0.504	1.05	83.94	5.43	149.4	60	3.8	3.6	650	0.49	0.6	<0.1	3.7	0.9	850.8	1.75	0.09	0.11
KNOB-DT-160	Vegetation		11.13	0.557	0.90	69.62	5.59	74.2	66	6.2	2.9	717	0.66	1.1	0.1	1.7	0.9	1015	0.97	0.05	0.05
KNOB-DT-161	Vegetation		12.11	0.476	2.05	112.5	5.95	124.8	93	10.7	3.6	807	0.68	0.4	0.1	1.4	0.9	624.7	1.33	0.06	0.05
KNOB-DT-162	Vegetation		15.92	1.212	0.70	51.56	5.73	50.7	46	4.0	3.5	699	0.87	1.1	0.1	<0.2	1.2	701.6	0.83	0.06	0.09
KNOB-DT-163	Vegetation		11.00	0.675	0.85	79.78	3.66	124.5	82	3.4	3.4	573	0.42	0.6	<0.1	<0.2	0.6	359.3	0.73	0.11	0.09
KNOB-DT-164	Vegetation		10.28	0.728	1.20	41.06	5.24	62.9	81	5.5	2.4	376	0.59	0.9	0.1	1.0	0.9	581.2	0.95	0.08	0.08
KNOB-DT-165	Vegetation		13.16	0.864	0.97	74.66	4.98	97.1	82	5.0	6.0	569	0.66	0.5	0.1	2.2	1.0	625.5	0.90	0.12	0.17
KNOB-DT-166	Vegetation		14.52	0.697	4.22	113.1	4.35	187.5	86	5.1	3.4	491	0.41	0.5	<0.1	2.7	0.6	293.8	0.72	0.15	0.12
KNOB-DT-167	Vegetation		17.85	1.071	1.71	81.91	11.29	96.1	108	11.3	6.4	989	1.83	2.0	0.3	<0.2	2.9	594.4	1.55	0.07	0.18
KNOB-DT-168	Vegetation		8.377	0.409	5.93	78.21	3.27	119.4	40	10.3	0.4	395	0.14	4.2	<0.1	0.2	0.2	533.2	0.07	0.07	0.04
KNOB-DT-169	Vegetation		15.52	0.873	1.69	74.03	7.51	89.1	97	5.9	4.9	1049	0.83	0.9	0.2	<0.2	1.2	940.9	0.94	0.07	0.10
KNOB-DT-170	Vegetation		20.72	1.063	1.11	78.65	7.17	80.6	103	6.1	5.6	1207	0.79	<0.1	0.2	0.8	1.2	872.5	1.18	0.07	0.09
KNOB-DT-171	Vegetation		17.12	0.991	24.04	80.88	2.21	203.2	66	3.3	0.5	298	0.20	0.4	<0.1	0.3	0.2	1589	0.05	0.05	0.04
KNOB-DT-172	Vegetation		19.43	0.973	2.90	90.47	8.34	136.5	150	7.5	4.0	1199	1.74	2.2	0.3	0.2	1.6	746.4	1.67	0.17	0.39
KNOB-DT-173	Vegetation		17.61	0.786	33.13	178.2	4.98	435.8	120	3.2	0.6	582	0.28	0.6	<0.1	1.4	0.3	811.4	0.21	0.13	0.05
KNOB-DT-174	Vegetation		12.84	0.577	1.59	106.4	7.83	103.7	136	10.2	2.8	672	1.37	1.6	0.3	4.8	1.5	710.4	0.70	0.15	0.39

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
	Unit	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
	MDL	2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
KNOB-DT-146	Vegetation	10	15.45	0.524	3.9	19.5	2.47	218.4	0.015	232	0.89	>5	>10	<0.1	1.4	<0.02	1.41	<5	0.7	0.04	1.7
KNOB-DT-147	Vegetation	13	11.26	0.726	5.3	23.4	3.05	271.4	0.019	248	1.00	>5	>10	<0.1	1.5	<0.02	1.08	<5	0.6	<0.02	2.1
KNOB-DT-148	Vegetation	<2	13.13	1.892	1.8	1.8	3.93	50.9	0.007	784	0.11	3.350	>10	<0.1	0.2	<0.02	1.51	<5	0.5	<0.02	0.4
KNOB-DT-149	Vegetation	6	5.24	1.519	2.3	12.4	2.22	78.6	0.014	313	0.44	>5	>10	<0.1	1.2	<0.02	2.28	8	0.5	<0.02	1.0
KNOB-DT-150	Vegetation	10	8.14	0.806	3.8	17.2	2.28	191.0	0.019	229	0.95	>5	>10	<0.1	1.4	<0.02	1.66	<5	0.5	<0.02	1.9
KNOB-DT-151	Vegetation	<2	27.14	0.850	1.6	2.1	1.64	19.7	0.005	633	0.14	1.151	8.24	<0.1	0.4	<0.02	0.79	<5	0.5	0.03	0.3
KNOB-DT-152	Vegetation	3	15.93	1.122	2.2	3.1	3.18	18.8	0.008	833	0.23	>5	>10	<0.1	0.6	<0.02	1.45	8	0.3	<0.02	0.6
KNOB-DT-153	Vegetation	4	11.84	0.506	1.5	9.2	1.72	167.4	0.009	153	0.32	>5	>10	<0.1	1.0	<0.02	1.28	10	0.3	<0.02	0.8
KNOB-DT-154	Vegetation	16	8.76	0.525	6.2	25.0	2.49	279.1	0.032	268	1.37	>5	>10	0.1	2.0	0.02	1.12	5	0.7	0.02	3.0
KNOB-DT-155	Vegetation	6	5.94	0.600	2.4	19.5	2.43	94.5	0.014	306	0.48	>5	>10	<0.1	1.0	<0.02	1.11	<5	0.4	<0.02	1.1
KNOB-DT-156	Vegetation	5	5.55	1.132	2.2	18.5	2.62	106.3	0.017	250	0.46	>5	>10	<0.1	1.5	<0.02	1.38	<5	0.6	<0.02	1.0
OVEN STD-1	Pulp	<2	22.08	3.162	<0.5	2.2	2.99	458.1	0.011	226	0.09	0.535	>10	<0.1	0.3	0.69	1.35	5	0.3	<0.02	0.7
KNOB-DT-157	Vegetation	16	10.39	0.661	5.3	17.9	2.13	106.1	0.025	223	1.01	>5	>10	<0.1	1.8	<0.02	1.31	<5	0.5	<0.02	2.2
KNOB-DT-158	Vegetation	7	7.71	0.574	2.4	17.9	2.04	98.0	0.016	212	0.45	>5	>10	<0.1	1.1	<0.02	1.34	<5	0.6	<0.02	1.0
KNOB-DT-159	Vegetation	8	9.92	1.215	3.6	18.7	2.72	203.4	0.020	232	0.67	>5	>10	<0.1	1.9	<0.02	1.06	15	0.5	<0.02	1.6
KNOB-DT-160	Vegetation	9	8.97	0.705	3.4	17.0	2.61	198.7	0.021	234	0.85	>5	>10	<0.1	1.2	<0.02	1.76	<5	0.5	<0.02	1.6
KNOB-DT-161	Vegetation	9	7.25	1.158	3.6	24.4	3.76	247.1	0.025	244	0.86	>5	>10	<0.1	1.3	<0.02	1.52	8	3.0	<0.02	1.8
KNOB-DT-162	Vegetation	12	12.37	0.442	4.6	16.4	1.65	229.0	0.023	160	1.13	>5	9.05	<0.1	1.5	<0.02	1.86	<5	0.5	<0.02	2.2
KNOB-DT-163	Vegetation	6	6.40	0.688	2.6	11.4	2.12	126.3	0.016	172	0.59	>5	>10	<0.1	1.0	<0.02	1.32	<5	0.5	<0.02	1.3
KNOB-DT-164	Vegetation	8	9.37	0.472	3.5	14.3	2.14	308.3	0.017	194	0.72	>5	>10	<0.1	1.1	<0.02	1.15	<5	0.8	<0.02	1.5
KNOB-DT-165	Vegetation	9	7.76	0.559	3.8	17.1	2.69	201.5	0.024	157	0.91	>5	>10	<0.1	1.1	<0.02	1.11	8	0.3	<0.02	2.0
KNOB-DT-166	Vegetation	6	4.21	2.336	2.4	8.9	2.04	113.5	0.023	185	0.46	>5	>10	<0.1	0.9	<0.02	1.60	8	0.5	<0.02	1.2
KNOB-DT-167	Vegetation	28	6.20	0.482	11.5	35.4	2.19	216.1	0.066	209	2.74	>5	>10	<0.1	3.4	0.02	1.02	<5	0.6	<0.02	6.1
KNOB-DT-168	Vegetation	3	16.64	1.078	1.0	5.0	4.88	350.7	0.008	707	0.19	4.225	9.05	<0.1	0.4	<0.02	2.58	11	0.5	<0.02	0.6
KNOB-DT-169	Vegetation	12	10.41	0.624	4.5	19.1	2.37	240.3	0.025	211	1.07	>5	>10	<0.1	1.4	<0.02	1.87	<5	0.7	<0.02	2.2
KNOB-DT-170	Vegetation	12	11.05	0.551	4.6	17.0	3.08	195.3	0.031	243	1.12	>5	>10	<0.1	1.3	<0.02	1.45	<5	0.7	<0.02	2.4
KNOB-DT-171	Vegetation	3	16.74	1.595	1.0	4.4	2.32	112.9	0.011	605	0.20	4.580	>10	<0.1	0.6	<0.02	1.44	8	0.2	<0.02	0.6
KNOB-DT-172	Vegetation	14	8.80	0.973	5.5	23.0	2.76	147.1	0.036	224	1.31	>5	>10	0.2	1.5	<0.02	1.60	14	0.3	<0.02	2.7
KNOB-DT-173	Vegetation	3	10.23	3.293	1.0	3.6	3.48	33.8	0.016	437	0.19	>5	>10	<0.1	0.4	<0.02	1.58	7	1.0	0.03	0.6
KNOB-DT-174	Vegetation	13	8.92	1.244	5.7	15.8	2.00	200.0	0.034	235	1.28	>5	>10	<0.1	1.5	<0.02	1.27	7	0.7	<0.02	2.9

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-146	Vegetation	0.72	<0.1	<0.02	0.05	34.9	0.3	<0.05	0.1	2.17	7.8	<0.02	1	<0.1	3.6	13	<2
KNOB-DT-147	Vegetation	0.71	<0.1	<0.02	0.03	31.4	0.5	<0.05	<0.1	2.93	10.2	<0.02	1	0.2	5.1	17	<2
KNOB-DT-148	Vegetation	0.41	<0.1	<0.02	<0.02	32.9	<0.1	<0.05	<0.1	1.27	12.8	<0.02	54	<0.1	6.5	32	<2
KNOB-DT-149	Vegetation	0.38	<0.1	0.02	0.08	38.5	0.2	<0.05	0.8	1.29	5.2	<0.02	4	<0.1	2.3	57	<2
KNOB-DT-150	Vegetation	0.76	<0.1	<0.02	0.05	49.0	0.3	<0.05	0.1	2.29	7.6	<0.02	4	0.1	4.8	39	<2
KNOB-DT-151	Vegetation	0.75	<0.1	<0.02	0.03	19.9	<0.1	<0.05	<0.1	1.77	4.1	<0.02	27	0.1	9.9	11	<2
KNOB-DT-152	Vegetation	2.95	<0.1	<0.02	0.05	74.1	0.1	<0.05	<0.1	1.31	5.3	<0.02	64	0.1	21.2	20	<2
KNOB-DT-153	Vegetation	0.33	<0.1	<0.02	0.05	36.5	0.2	<0.05	0.3	0.90	2.8	<0.02	3	<0.1	2.8	<10	<2
KNOB-DT-154	Vegetation	0.93	0.1	<0.02	0.04	39.6	0.5	<0.05	<0.1	4.12	12.3	<0.02	7	0.5	7.0	29	<2
KNOB-DT-155	Vegetation	0.67	<0.1	<0.02	0.06	45.7	0.2	<0.05	<0.1	1.39	5.0	<0.02	9	<0.1	3.5	28	<2
KNOB-DT-156	Vegetation	0.52	<0.1	0.03	0.13	52.9	0.2	<0.05	1.6	1.34	4.6	<0.02	5	0.2	3.1	24	<2
OVEN STD-1	Pulp	5.45	<0.1	<0.02	<0.02	365.9	2.0	<0.05	<0.1	0.13	0.6	<0.02	3	<0.1	2.2	139	<2
KNOB-DT-157	Vegetation	0.64	<0.1	<0.02	0.05	30.3	0.4	<0.05	<0.1	4.11	10.2	<0.02	<1	0.2	5.1	22	<2
KNOB-DT-158	Vegetation	0.63	<0.1	<0.02	0.06	60.7	0.2	<0.05	<0.1	1.65	4.6	<0.02	7	0.2	2.6	27	<2
KNOB-DT-159	Vegetation	0.60	<0.1	0.02	0.13	50.9	0.3	<0.05	0.6	2.75	6.6	<0.02	3	0.1	3.7	41	<2
KNOB-DT-160	Vegetation	0.67	<0.1	<0.02	0.06	37.4	0.2	<0.05	0.2	1.95	6.7	<0.02	5	<0.1	4.9	22	<2
KNOB-DT-161	Vegetation	0.72	<0.1	<0.02	0.07	57.3	0.3	<0.05	<0.1	2.04	7.1	<0.02	10	<0.1	4.5	24	<2
KNOB-DT-162	Vegetation	0.66	<0.1	<0.02	0.05	28.6	0.3	<0.05	0.3	2.55	9.3	<0.02	6	0.3	5.1	20	<2
KNOB-DT-163	Vegetation	0.51	<0.1	<0.02	0.06	39.6	0.2	<0.05	<0.1	1.62	5.2	<0.02	13	0.2	2.9	50	<2
KNOB-DT-164	Vegetation	0.76	<0.1	<0.02	0.04	39.8	0.2	<0.05	<0.1	1.92	6.8	<0.02	8	0.1	3.2	26	<2
KNOB-DT-165	Vegetation	0.63	<0.1	<0.02	0.06	29.9	0.3	<0.05	<0.1	2.26	7.5	0.02	19	<0.1	3.9	33	<2
KNOB-DT-166	Vegetation	0.40	0.1	<0.02	0.13	28.2	0.2	<0.05	0.1	1.55	4.7	<0.02	29	<0.1	3.1	55	<2
KNOB-DT-167	Vegetation	1.55	<0.1	<0.02	0.06	47.8	0.6	<0.05	<0.1	6.60	22.5	0.02	10	0.5	8.4	29	<2
KNOB-DT-168	Vegetation	0.27	<0.1	0.06	0.05	25.1	<0.1	<0.05	1.0	0.62	1.8	<0.02	7	<0.1	2.8	<10	4
KNOB-DT-169	Vegetation	0.67	<0.1	<0.02	0.05	33.6	0.4	<0.05	<0.1	2.53	8.8	<0.02	2	0.2	4.4	19	<2
KNOB-DT-170	Vegetation	0.61	0.1	<0.02	0.06	30.7	0.3	<0.05	<0.1	2.75	9.1	<0.02	12	0.1	4.2	<10	3
KNOB-DT-171	Vegetation	0.18	<0.1	<0.02	0.04	21.2	0.1	<0.05	<0.1	0.59	1.9	<0.02	8	<0.1	15.6	<10	<2
KNOB-DT-172	Vegetation	0.56	0.1	<0.02	0.08	26.5	0.3	<0.05	<0.1	3.15	10.2	<0.02	11	0.2	4.5	29	<2
KNOB-DT-173	Vegetation	0.43	0.1	<0.02	0.05	43.4	0.1	<0.05	<0.1	0.62	2.0	<0.02	7	<0.1	4.9	<10	<2
KNOB-DT-174	Vegetation	0.77	0.1	<0.02	0.09	26.4	0.5	<0.05	0.6	3.39	10.9	<0.02	8	0.2	4.9	14	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

Method		VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
Analyte		Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
Unit		g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
MDL		0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
KNOB-DT-175	Vegetation		14.90	0.777	9.88	90.89	7.65	253.7	75	3.4	0.8	147	0.36	1.0	0.1	3.0	0.5	1021	0.09	0.16	0.10
KNOB-DT-176	Vegetation		11.03	0.594	5.21	75.60	5.78	423.7	62	4.2	0.4	442	0.12	0.3	<0.1	1.1	0.2	478.3	0.08	0.07	0.06
KNOB-DT-177	Vegetation		10.54	0.467	1.96	239.7	6.82	120.7	141	6.7	4.3	1277	0.70	0.7	0.1	<0.2	1.1	810.2	2.35	0.09	0.08
KNOB-DT-178	Vegetation		10.94	0.520	1.09	122.2	9.74	108.8	193	9.0	4.4	714	1.13	1.0	0.2	1.0	2.0	765.3	0.87	0.05	0.14
KNOB-DT-179	Vegetation		11.05	0.495	1.19	289.1	11.49	167.6	215	7.3	4.0	1054	1.12	0.8	0.2	1.2	1.4	955.3	2.69	0.19	0.28
KNOB-DT-180	Vegetation		9.767	0.428	2.18	123.4	13.65	164.6	159	9.0	6.9	878	0.52	1.9	0.1	10.3	0.7	439.7	1.42	0.22	0.25
KNOB-DT-181	Vegetation		14.08	0.807	2.16	81.27	7.82	169.6	36	4.6	0.7	230	0.31	<0.1	<0.1	<0.2	0.3	1169	0.07	0.08	0.02
KNOB-DT-182	Vegetation		12.15	0.598	0.98	138.3	6.16	110.2	536	6.3	3.8	821	0.57	0.4	0.1	1.7	0.9	456.8	0.95	0.09	0.07
OVEN STD-1	Pulp		31.78	1.035	0.65	55.38	8.54	1813	923	18.0	1.0	>10000	0.04	0.1	0.2	<0.2	<0.1	486.3	0.24	0.72	0.03
KNOB-DT-183	Vegetation		11.46	0.669	1.84	131.5	10.23	103.0	115	5.9	4.5	1026	0.78	0.5	0.1	2.1	1.1	958.9	1.01	0.09	0.11
KNOB-DT-184	Vegetation		13.87	0.641	4.32	65.31	10.60	296.3	95	3.4	0.7	399	0.31	0.2	0.2	0.9	0.4	1124	0.03	0.09	0.06
KNOB-DT-185	Vegetation		10.16	0.435	3.94	127.5	10.64	357.4	148	7.1	3.5	394	0.49	0.3	0.2	1.8	0.6	480.6	0.88	0.17	0.18
KNOB-DT-186	Vegetation		12.63	0.666	6.72	105.7	5.84	408.3	57	4.4	0.4	384	0.14	0.8	<0.1	0.7	0.2	690.3	0.08	0.07	0.03
KNOB-DT-187	Vegetation		13.72	0.849	6.89	66.61	5.30	261.0	33	4.5	0.7	184	0.39	0.2	0.1	<0.2	0.4	1183	0.05	0.11	0.08
KNOB-DT-188	Vegetation		5.647	0.193	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.
KNOB-DT-189	Vegetation		8.438	0.364	2.69	40.70	8.12	141.4	17	5.6	0.4	555	0.28	0.8	0.2	<0.2	0.3	401.5	<0.01	0.09	0.03

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	**V**	**Ca**	**P**	**La**	**Cr**	**Mg**	**Ba**	**Ti**	**B**	**Al**	**Na**	**K**	**W**	**Sc**	**Tl**	**S**	**Hg**	**Se**	**Te**	**Ga**
	Unit	**ppm**	**%**	**%**	**ppm**	**ppm**	**%**	**ppm**	**%**	**ppm**	**%**	**%**	**%**	**ppm**	**ppm**	**ppm**	**%**	**ppb**	**ppm**	**ppm**	**ppm**
	MDL	**2**	**0.01**	**0.001**	**0.5**	**0.5**	**0.01**	**0.5**	**0.001**	**20**	**0.01**	**0.001**	**0.01**	**0.1**	**0.1**	**0.02**	**0.02**	**5**	**0.1**	**0.02**	**0.1**
KNOB-DT-175	Vegetation	4	12.93	1.112	2.0	5.8	2.79	61.2	0.011	520	0.37	>5	>10	<0.1	0.7	0.03	1.65	17	0.5	<0.02	1.0
KNOB-DT-176	Vegetation	<2	9.85	1.471	5.7	2.3	2.29	12.8	0.007	264	0.12	>5	>10	<0.1	0.2	<0.02	1.84	16	0.5	<0.02	0.4
KNOB-DT-177	Vegetation	10	7.18	0.697	4.0	22.1	3.16	162.0	0.021	233	0.88	>5	>10	<0.1	1.9	<0.02	1.53	16	<0.1	<0.02	2.1
KNOB-DT-178	Vegetation	17	5.84	0.657	7.7	23.2	2.80	127.7	0.037	309	1.75	>5	>10	<0.1	2.1	0.03	1.21	<5	0.7	<0.02	4.1
KNOB-DT-179	Vegetation	13	11.88	0.542	4.9	19.4	2.66	272.5	0.022	210	1.00	>5	>10	<0.1	2.1	<0.02	1.49	<5	0.9	<0.02	2.4
KNOB-DT-180	Vegetation	7	5.59	2.413	3.0	11.8	2.26	122.1	0.026	261	0.64	>5	>10	<0.1	1.6	<0.02	1.88	12	0.8	<0.02	1.6
KNOB-DT-181	Vegetation	4	14.36	1.182	2.5	5.7	3.42	18.1	0.011	768	0.26	>5	>10	<0.1	0.6	<0.02	1.78	14	0.7	<0.02	0.7
KNOB-DT-182	Vegetation	8	6.36	0.894	3.4	22.4	2.69	114.0	0.024	210	0.80	>5	>10	<0.1	1.3	0.04	1.41	<5	0.7	<0.02	1.8
OVEN STD-1	Pulp	<2	24.97	3.558	<0.5	2.8	3.31	195.1	0.015	214	0.08	<0.001	>10	0.1	0.3	0.53	1.49	6	0.3	<0.02	0.6
KNOB-DT-183	Vegetation	11	10.50	0.724	4.3	16.2	2.26	215.7	0.022	206	0.99	>5	>10	<0.1	1.3	0.03	2.10	<5	0.4	<0.02	2.1
KNOB-DT-184	Vegetation	4	16.02	1.723	4.2	5.3	3.21	96.3	0.010	688	0.30	4.920	>10	0.1	0.6	<0.02	2.27	6	0.7	<0.02	0.9
KNOB-DT-185	Vegetation	6	5.65	1.801	2.6	42.7	2.13	75.7	0.022	306	0.38	>5	>10	0.1	1.4	<0.02	3.08	5	0.3	<0.02	1.0
KNOB-DT-186	Vegetation	<2	12.13	1.379	1.6	2.6	2.88	20.2	0.008	589	0.12	>5	>10	<0.1	0.3	<0.02	2.00	10	0.5	<0.02	0.4
KNOB-DT-187	Vegetation	4	14.65	1.314	2.6	5.5	1.80	30.1	0.010	514	0.30	>5	>10	<0.1	0.6	<0.02	1.44	<5	0.3	0.03	0.9
KNOB-DT-188	Vegetation	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.
KNOB-DT-189	Vegetation	3	16.15	1.007	1.2	3.8	4.24	127.2	0.009	1221	0.19	>5	8.38	<0.1	0.7	<0.02	1.95	14	0.5	<0.02	0.6

Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

CERTIFICATE OF ANALYSIS VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
KNOB-DT-175	Vegetation	0.38	<0.1	<0.02	0.08	20.0	0.2	<0.05	<0.1	1.11	4.1	<0.02	37	<0.1	19.6	21	<2
KNOB-DT-176	Vegetation	3.44	<0.1	<0.02	0.03	284.7	0.2	<0.05	<0.1	3.89	13.5	<0.02	72	<0.1	7.1	28	<2
KNOB-DT-177	Vegetation	0.52	<0.1	<0.02	0.11	32.2	6.6	<0.05	0.4	2.36	7.5	<0.02	12	<0.1	4.7	53	<2
KNOB-DT-178	Vegetation	0.97	<0.1	<0.02	0.07	36.3	2.9	<0.05	<0.1	4.53	15.0	<0.02	9	0.5	6.3	61	<2
KNOB-DT-179	Vegetation	0.61	<0.1	<0.02	0.10	35.3	9.5	<0.05	0.4	2.86	9.5	<0.02	3	<0.1	3.5	29	5
KNOB-DT-180	Vegetation	0.40	<0.1	0.04	0.18	39.1	0.5	<0.05	0.8	1.76	5.5	<0.02	5	0.2	3.3	65	<2
KNOB-DT-181	Vegetation	2.58	<0.1	<0.02	0.06	68.5	0.2	<0.05	0.1	1.52	6.0	<0.02	70	<0.1	18.2	15	<2
KNOB-DT-182	Vegetation	0.50	0.1	<0.02	0.07	42.7	1.3	<0.05	<0.1	1.88	6.6	<0.02	8	<0.1	3.4	26	<2
OVEN STD-1	Pulp	5.33	<0.1	<0.02	0.04	432.6	2.2	<0.05	<0.1	0.14	0.6	<0.02	8	<0.1	2.3	130	<2
KNOB-DT-183	Vegetation	0.58	0.1	<0.02	0.05	31.1	2.8	<0.05	0.3	2.34	8.4	<0.02	4	0.2	3.1	<10	<2
KNOB-DT-184	Vegetation	0.36	<0.1	<0.02	0.06	31.0	0.2	<0.05	0.2	3.10	11.9	<0.02	35	0.2	66.6	18	<2
KNOB-DT-185	Vegetation	0.28	<0.1	<0.02	0.17	32.6	0.5	<0.05	0.3	1.50	4.9	<0.02	14	<0.1	11.5	73	16
KNOB-DT-186	Vegetation	0.75	<0.1	<0.02	0.04	42.3	<0.1	<0.05	<0.1	0.85	3.3	<0.02	17	<0.1	5.8	32	<2
KNOB-DT-187	Vegetation	0.41	<0.1	<0.02	0.06	22.5	0.1	<0.05	<0.1	1.32	5.5	<0.02	40	<0.1	11.6	19	<2
KNOB-DT-188	Vegetation	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.	I.S.
KNOB-DT-189	Vegetation	0.13	<0.1	<0.02	0.06	12.1	0.1	<0.05	<0.1	0.88	2.6	<0.02	14	<0.1	6.2	17	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

QUALITY CONTROL REPORT VAN11002985.1

	Method	VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	Unit	g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
Pulp Duplicates																					
KNOB-DT-030	Vegetation		15.44	0.748	3.19	121.5	8.91	320.2	91	14.2	4.8	695	1.26	1.7	0.3	8.3	1.3	498.9	0.71	0.28	0.41
REP KNOB-DT-030	QC				3.39	122.0	8.62	332.7	84	13.9	4.8	666	1.27	1.9	0.3	8.1	1.2	476.2	0.70	0.27	0.39
OVEN STD-1	Pulp		30.84	0.993	0.56	37.52	11.72	1187	651	11.3	0.7	>10000	0.05	0.6	0.2	0.4	<0.1	312.2	0.20	0.60	<0.02
REP OVEN STD-1	QC				0.60	35.89	11.28	1132	602	10.8	0.6	>10000	0.05	0.2	0.2	0.7	<0.1	297.5	0.19	0.57	0.02
KNOB-DT-097	Vegetation		14.78	0.724	1.02	98.27	8.10	110.9	60	4.9	3.7	784	0.74	1.0	0.1	0.5	1.1	465.3	1.91	0.13	0.23
REP KNOB-DT-097	QC				1.17	103.8	8.32	112.6	63	5.1	3.7	808	0.73	0.7	0.2	2.6	1.2	460.4	1.74	0.14	0.28
KNOB-DT-167	Vegetation		17.85	1.071	1.71	81.91	11.29	96.1	108	11.3	6.4	989	1.83	2.0	0.3	<0.2	2.9	594.4	1.55	0.07	0.18
REP KNOB-DT-167	QC				1.85	86.50	11.80	106.7	125	11.6	6.8	990	1.85	1.7	0.3	0.9	3.1	633.0	1.79	0.07	0.21
Reference Materials																					
STD DS8	Standard				13.32	103.8	115.8	293.7	1707	37.7	7.6	611	2.48	26.4	2.7	106.0	6.5	59.6	2.30	3.94	6.04
STD DS8	Standard				13.43	102.8	123.4	308.1	1733	34.7	7.2	602	2.35	26.5	2.7	100.8	6.5	68.1	2.36	4.45	6.29
STD DS8	Standard				13.04	110.2	123.0	307.5	1585	36.9	7.4	586	2.42	24.0	2.6	99.7	6.6	68.9	2.25	4.14	6.50
STD DS8	Standard				14.35	117.5	131.9	317.5	1856	42.2	8.7	629	2.54	24.3	2.5	133.0	6.9	68.1	2.43	4.14	6.71
STD DS8	Standard				13.11	116.8	138.3	326.9	1686	39.1	7.5	586	2.50	25.7	2.9	103.4	6.2	63.8	2.32	4.22	6.32
STD DS8	Standard				12.01	105.3	124.8	298.2	1683	35.0	7.2	577	2.32	25.4	2.7	114.1	6.1	61.4	2.31	3.99	6.04
STD DS8	Standard				14.27	118.3	140.5	324.0	1867	39.6	7.8	621	2.49	26.3	3.0	125.4	7.7	69.9	2.42	4.40	7.35
STD DS8	Standard				11.54	103.8	112.3	289.3	1658	35.0	7.3	561	2.43	24.9	2.3	136.8	5.7	62.5	2.16	2.85	4.95
STD OREAS45CA	Standard				0.87	504.1	19.50	61.0	265	251.1	90.4	896	15.75	3.6	1.2	37.5	7.0	13.4	0.10	0.10	0.18
STD OREAS45CA	Standard				0.87	481.8	18.72	60.7	254	240.1	82.2	850	15.29	4.2	1.1	41.8	6.3	14.9	0.10	0.10	0.15
STD OREAS45CA	Standard				0.64	492.1	21.42	59.8	256	250.2	94.5	894	15.64	3.0	1.2	37.1	7.3	15.5	0.12	0.05	0.17
STD OREAS45CA	Standard				0.83	489.9	20.41	63.9	254	245.9	98.1	966	15.92	3.1	1.2	36.0	7.0	15.2	0.12	0.08	0.17
STD OREAS45CA	Standard				0.82	481.3	21.47	62.8	272	229.9	87.5	908	14.91	3.7	1.2	34.6	7.0	16.1	0.11	0.12	0.24
STD OREAS45CA	Standard				0.75	479.6	20.78	64.7	282	233.1	86.6	923	15.33	3.4	1.2	38.4	6.9	16.5	0.07	0.06	0.27
STD OREAS45CA	Standard				0.76	470.6	21.75	57.5	263	242.1	83.4	839	14.26	3.3	1.3	44.9	7.4	15.1	0.10	0.08	0.19
STD OREAS45CA	Standard				0.63	460.8	19.49	56.5	262	220.1	82.0	857	14.07	2.5	1.1	31.3	6.4	12.5	0.06	0.06	0.16
STD DS8 Expected					13.44	110	123	312	1690	38.1	7.5	615	2.46	26	2.8	107	6.89	67.7	2.38	4.8	6.67
STD OREAS45CA Expected					1	494	20	60	275	240	92	943	15.69	3.8	1.2	43	7	15	0.1	0.13	0.19
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02

Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

QUALITY CONTROL REPORT VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
	Unit	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
	MDL	2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
Pulp Duplicates																					
KNOB-DT-030	Vegetation	10	8.48	1.610	4.9	41.8	1.97	101.6	0.024	265	0.85	>5	>10	0.2	2.8	0.03	2.43	<5	0.4	0.05	2.0
REP KNOB-DT-030	QC	9	8.36	1.786	4.6	40.6	1.95	91.5	0.023	270	0.85	>5	>10	0.2	2.5	0.03	2.39	<5	0.3	0.03	2.1
OVEN STD-1	Pulp	<2	17.79	2.326	<0.5	2.1	2.19	410.2	0.014	130	0.07	0.044	8.95	<0.1	0.2	0.35	0.90	<5	0.3	0.03	2.0
REP OVEN STD-1	QC	<2	17.38	2.133	<0.5	1.8	2.13	341.9	0.013	119	0.06	0.043	8.55	<0.1	0.3	0.32	0.96	<5	0.4	<0.02	1.6
KNOB-DT-097	Vegetation	10	5.63	0.769	4.6	13.0	2.47	172.3	0.014	226	0.99	>5	>10	<0.1	1.9	0.12	1.25	<5	0.6	0.03	2.1
REP KNOB-DT-097	QC	10	6.24	0.898	4.7	14.3	2.42	172.9	0.014	231	0.94	>5	>10	<0.1	1.9	0.16	1.23	<5	0.4	0.02	2.1
KNOB-DT-167	Vegetation	28	6.20	0.482	11.5	35.4	2.19	216.1	0.066	209	2.74	>5	>10	<0.1	3.4	0.02	1.02	<5	0.6	<0.02	6.1
REP KNOB-DT-167	QC	28	6.23	0.496	11.7	36.6	2.20	226.1	0.069	195	2.78	>5	>10	<0.1	3.7	0.03	1.07	6	0.6	<0.02	6.1
Reference Materials																					
STD DS8	Standard	43	0.73	0.092	13.8	119.5	0.61	309.3	0.111	<20	0.93	0.090	0.41	2.4	2.4	5.39	0.17	185	4.8	4.82	4.4
STD DS8	Standard	40	0.68	0.084	14.7	116.6	0.58	292.3	0.111	<20	0.87	0.084	0.39	2.6	2.3	5.49	0.16	204	5.1	5.07	4.9
STD DS8	Standard	42	0.72	0.078	14.9	115.3	0.59	308.0	0.113	<20	0.88	0.081	0.39	2.4	2.0	5.10	0.17	177	5.2	4.44	4.4
STD DS8	Standard	42	0.71	0.084	12.8	126.4	0.62	283.7	0.112	<20	0.90	0.082	0.41	2.7	2.1	5.40	0.18	195	5.3	4.77	4.8
STD DS8	Standard	39	0.67	0.080	13.1	111.4	0.59	293.7	0.105	<20	0.84	0.069	0.38	2.7	1.9	5.68	0.17	183	6.0	4.61	4.4
STD DS8	Standard	38	0.62	0.076	13.6	111.2	0.57	277.2	0.108	<20	0.84	0.092	0.41	3.2	1.8	5.12	0.16	198	4.8	4.84	4.5
STD DS8	Standard	40	0.74	0.074	17.3	128.1	0.62	299.1	0.123	<20	0.94	0.093	0.41	2.4	2.3	6.12	0.17	226	5.8	5.84	5.0
STD DS8	Standard	39	0.62	0.067	13.0	106.3	0.49	259.2	0.102	<20	0.83	0.107	0.38	2.6	1.8	5.00	0.16	174	4.9	4.58	4.3
STD OREAS45CA	Standard	211	0.43	0.042	15.3	801.2	0.13	169.5	0.130	<20	3.63	0.016	0.07	<0.1	40.4	0.07	0.02	38	0.6	<0.02	18.5
STD OREAS45CA	Standard	197	0.41	0.037	15.0	680.7	0.14	152.9	0.120	<20	3.47	0.013	0.07	<0.1	40.7	0.07	0.02	21	0.6	0.08	17.3
STD OREAS45CA	Standard	204	0.41	0.037	16.0	746.3	0.15	168.5	0.141	<20	3.59	0.024	0.10	<0.1	34.8	0.07	0.03	28	0.2	0.04	17.8
STD OREAS45CA	Standard	207	0.41	0.039	16.0	743.6	0.13	157.2	0.135	<20	3.51	0.013	0.07	<0.1	35.1	0.07	0.03	24	0.4	0.06	17.6
STD OREAS45CA	Standard	200	0.43	0.038	16.2	655.7	0.13	165.5	0.119	<20	3.17	0.011	0.07	<0.1	35.4	0.07	0.03	32	0.6	0.06	17.7
STD OREAS45CA	Standard	200	0.41	0.041	17.2	701.8	0.15	169.6	0.128	<20	3.27	0.005	0.08	<0.1	35.5	0.07	0.03	23	0.4	<0.02	17.6
STD OREAS45CA	Standard	199	0.35	0.037	16.0	666.1	0.14	153.6	0.120	<20	3.61	0.013	0.07	<0.1	35.1	0.07	0.03	36	0.6	0.03	17.8
STD OREAS45CA	Standard	194	0.38	0.036	14.6	680.9	0.11	143.0	0.119	<20	3.04	0.041	0.07	<0.1	31.3	0.06	0.02	42	0.4	0.05	17.1
STD DS8 Expected		41.1	0.7	0.08	14.6	115	0.6045	279	0.113	2.6	0.93	0.0883	0.41	3	2.3	5.4	0.1679	192	5.23	5	4.7
STD OREAS45CA Expected		215	0.4265	0.0385	15.9	709	0.1358	164	0.128		3.592	0.0075	0.0717		39.7	0.07	0.021	30	0.5	0.06	18.4
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

QUALITY CONTROL REPORT VAN11002985.1

	Method	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
	Analyte	Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
Pulp Duplicates																	
KNOB-DT-030	Vegetation	0.48	<0.1	<0.02	0.14	34.5	0.6	<0.05	0.2	2.32	8.8	<0.02	14	0.2	3.6	92	24
REP KNOB-DT-030	QC	0.46	0.1	<0.02	0.14	31.2	0.5	<0.05	0.1	2.36	8.6	<0.02	14	0.2	3.7	62	44
OVEN STD-1	Pulp	3.99	<0.1	<0.02	0.03	268.5	1.5	<0.05	<0.1	0.11	0.5	<0.02	5	<0.1	1.7	49	<2
REP OVEN STD-1	QC	3.78	<0.1	<0.02	0.03	253.6	1.4	<0.05	<0.1	0.11	0.5	<0.02	4	<0.1	1.4	47	<2
KNOB-DT-097	Vegetation	0.47	<0.1	<0.02	0.07	31.3	0.3	<0.05	0.2	2.70	8.5	<0.02	6	0.2	4.6	30	<2
REP KNOB-DT-097	QC	0.48	<0.1	<0.02	0.05	31.7	0.4	<0.05	0.8	2.77	8.8	<0.02	9	0.3	5.2	41	<2
KNOB-DT-167	Vegetation	1.55	<0.1	<0.02	0.06	47.8	0.6	<0.05	<0.1	6.60	22.5	0.02	10	0.5	8.4	29	<2
REP KNOB-DT-167	QC	1.63	0.1	<0.02	0.07	49.1	0.8	<0.05	<0.1	6.87	23.0	0.03	11	0.4	9.0	32	<2
Reference Materials																	
STD DS8	Standard	2.48	<0.1	0.07	0.88	35.9	6.0	<0.05	1.9	5.30	26.6	1.91	50	5.0	29.3	115	357
STD DS8	Standard	2.51	0.1	0.05	0.86	38.8	6.3	<0.05	1.3	5.68	26.4	2.02	62	5.3	28.8	120	351
STD DS8	Standard	2.31	<0.1	0.05	0.81	36.4	6.3	<0.05	1.4	5.50	25.2	2.18	49	5.0	27.2	106	328
STD DS8	Standard	2.44	<0.1	0.06	0.78	39.9	6.6	<0.05	1.8	5.40	22.9	2.15	53	5.3	25.8	107	332
STD DS8	Standard	2.37	<0.1	0.07	0.75	39.4	7.0	<0.05	1.5	5.20	22.9	2.29	54	5.1	26.2	111	360
STD DS8	Standard	2.35	0.1	0.06	0.79	36.8	6.8	<0.05	1.6	4.93	23.9	2.24	58	5.5	26.5	108	347
STD DS8	Standard	2.73	<0.1	0.08	0.89	39.3	7.0	<0.05	1.8	6.10	31.4	2.39	52	5.5	26.1	145	358
STD DS8	Standard	2.20	<0.1	0.07	0.70	36.2	6.5	<0.05	1.7	5.02	23.0	2.02	55	5.0	20.4	108	325
STD OREAS45CA	Standard	1.16	<0.1	0.60	0.17	9.3	1.8	<0.05	22.1	7.73	35.2	0.08	<1	0.7	7.7	25	50
STD OREAS45CA	Standard	1.18	0.2	0.26	0.11	8.9	1.7	<0.05	12.2	7.63	32.8	0.08	<1	0.7	7.5	46	59
STD OREAS45CA	Standard	1.09	<0.1	0.53	0.14	8.7	1.9	<0.05	19.1	7.54	32.0	0.08	<1	0.8	8.5	21	72
STD OREAS45CA	Standard	1.09	<0.1	0.52	0.17	8.8	1.7	<0.05	21.3	7.76	33.6	0.09	<1	0.6	6.5	16	61
STD OREAS45CA	Standard	0.95	<0.1	0.43	0.17	8.4	2.0	<0.05	19.6	8.34	35.4	0.09	<1	0.5	6.4	31	66
STD OREAS45CA	Standard	1.05	0.1	0.52	0.15	8.2	1.8	<0.05	19.5	8.16	37.5	0.08	<1	0.4	6.4	36	66
STD OREAS45CA	Standard	1.13	0.1	0.49	0.12	8.2	1.8	<0.05	20.7	8.06	36.0	0.10	<1	0.8	6.9	41	63
STD OREAS45CA	Standard	0.89	<0.1	0.53	0.23	7.4	1.6	<0.05	18.8	6.95	30.5	0.10	<1	0.4	4.1	43	53
STD DS8 Expected		2.48	0.13	0.08	1.1	39	6.7	0.003	2.1	6.1	29.8	2.19	55	5.2	26.34	110	339
STD OREAS45CA Expected		1.03	0.11	0.5	0.22	8.2	1.8		21.6	7.84	35	0.09			6.2	36	61
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2

Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North

Report Date: August 15, 2011

QUALITY CONTROL REPORT VAN11002985.1

		VA475	VA475	VA475	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
		Rec. Wt	Pre Ash	Ashed	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
		g	g	g	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
		0.01	0.001	0.001	0.01	0.01	0.01	0.1	2	0.1	0.1	1	0.01	0.1	0.1	0.2	0.1	0.5	0.01	0.02	0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02
BLK	Blank				<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.1	<1	<0.01	<0.1	<0.1	<0.2	<0.1	<0.5	<0.01	<0.02	<0.02

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North

Report Date: August 15, 2011

QUALITY CONTROL REPORT VAN11002985.1

		1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
		V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga
		ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm
		2	0.01	0.001	0.5	0.5	0.01	0.5	0.001	20	0.01	0.001	0.01	0.1	0.1	0.02	0.02	5	0.1	0.02	0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1
BLK	Blank	<2	<0.01	<0.001	<0.5	<0.5	<0.01	<0.5	<0.001	<20	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.02	<5	<0.1	<0.02	<0.1

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: Iron Knob North
Report Date: August 15, 2011

QUALITY CONTROL REPORT VAN11002985.1

		1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F	1F
		Cs	Ge	Hf	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
		0.02	0.1	0.02	0.02	0.1	0.1	0.05	0.1	0.01	0.1	0.02	1	0.1	0.1	10	2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2
BLK	Blank	<0.02	<0.1	<0.02	<0.02	<0.1	<0.1	<0.05	<0.1	<0.01	<0.1	<0.02	<1	<0.1	<0.1	<10	<2

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Submitted By: Daniel Tanti
Receiving Lab: Canada-Vancouver
Received: August 31, 2011
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

CLIENT JOB INFORMATION

Project: ADKnob
Shipment ID:
P.O. Number
Number of Samples: 67

SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Method Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
No Prep	67	Sorting of samples on arrival and labeling			VAN
1VE2-1VE6	67	1:1:1 Aqua Regia Digestion - ICP-MS finish	5	Completed	VAN

SAMPLE DISPOSAL

STOR-PLP Store After 90 days Invoice for Storage

ADDITIONAL COMMENTS

Acme does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: University of Adelaide
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005
Australia

CC: Steven Hill

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.
All results are considered the confidential property of the client. Acme assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.
"*" asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.

Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
	Unit	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%
	MDL	0.01	0.01	0.01	0.1	2	0.1	0.01	1	0.001	0.1	0.01	0.2	0.01	0.5	0.01	0.02	0.02	2	0.01	0.001
001	Vegetation	0.06	7.53	0.42	11.8	3	0.4	0.21	37	0.029	<0.1	<0.01	0.3	0.04	17.5	0.10	<0.02	0.04	<2	0.30	0.060
002	Vegetation	0.64	6.22	0.22	26.4	<2	0.2	0.05	14	0.014	<0.1	<0.01	<0.2	<0.01	55.2	<0.01	<0.02	<0.02	<2	1.05	0.128
003	Vegetation	0.07	5.77	0.43	8.1	2	0.5	0.27	50	0.044	<0.1	<0.01	<0.2	0.05	27.2	0.08	<0.02	0.02	<2	0.33	0.037
004	Vegetation	0.10	7.12	0.51	11.3	5	0.6	0.23	68	0.043	<0.1	<0.01	<0.2	0.05	31.0	0.11	<0.02	0.03	<2	0.46	0.045
005	Vegetation	2.49	6.74	0.60	18.5	<2	0.5	0.14	31	0.070	<0.1	0.02	<0.2	0.04	57.2	<0.01	<0.02	0.03	<2	0.78	0.075
006	Vegetation	0.29	8.26	0.30	20.7	<2	0.2	0.07	51	0.025	<0.1	<0.01	<0.2	0.03	58.4	<0.01	<0.02	<0.02	<2	0.84	0.104
007	Vegetation	0.08	7.42	0.35	9.8	4	0.4	0.26	64	0.035	<0.1	<0.01	0.2	0.04	25.0	0.07	<0.02	0.03	<2	0.36	0.091
008	Vegetation	2.14	4.87	0.12	18.0	<2	0.2	0.04	34	0.012	<0.1	<0.01	<0.2	<0.01	78.6	<0.01	<0.02	<0.02	<2	1.35	0.090
009	Vegetation	0.70	2.40	0.26	8.7	3	0.2	0.04	13	0.015	<0.1	<0.01	<0.2	0.02	40.8	<0.01	<0.02	<0.02	<2	0.54	0.152
010	Vegetation	1.86	12.51	0.38	27.7	4	0.2	0.04	22	0.010	<0.1	<0.01	<0.2	<0.01	94.3	<0.01	<0.02	<0.02	<2	1.33	0.107
011	Vegetation	0.12	4.92	0.36	21.4	3	0.5	0.25	46	0.060	<0.1	0.01	<0.2	0.03	52.5	0.06	<0.02	<0.02	<2	0.73	0.042
012	Vegetation	1.61	2.98	0.21	17.2	2	0.2	0.04	64	0.021	<0.1	<0.01	0.3	0.02	81.2	0.05	<0.02	<0.02	<2	1.34	0.084
013	Vegetation	0.10	6.90	0.26	6.7	3	0.5	0.17	36	0.023	<0.1	<0.01	<0.2	0.03	22.8	0.07	<0.02	<0.02	<2	0.31	0.065
014	Vegetation	0.07	2.39	0.23	8.4	<2	0.4	0.05	19	0.020	<0.1	<0.01	<0.2	0.01	19.2	<0.01	<0.02	<0.02	<2	0.78	0.043
015	Vegetation	0.60	5.26	0.29	26.4	<2	0.2	0.07	17	0.019	<0.1	<0.01	<0.2	0.02	57.2	<0.01	<0.02	<0.02	<2	0.78	0.129
016	Vegetation	0.07	5.49	0.27	30.2	<2	1.8	0.09	65	0.012	<0.1	<0.01	<0.2	<0.01	13.6	<0.01	<0.02	<0.02	<2	0.69	0.086
017	Vegetation	0.21	5.59	0.85	8.6	5	1.1	0.45	63	0.130	<0.1	0.02	<0.2	0.19	83.0	0.14	<0.02	0.03	<2	1.04	0.046
018	Vegetation	0.11	6.60	0.36	6.9	3	0.4	0.20	47	0.043	<0.1	<0.01	<0.2	0.05	35.1	0.07	<0.02	<0.02	<2	0.60	0.045
019	Vegetation	0.05	6.21	0.39	18.9	2	0.9	0.12	234	0.029	<0.1	0.03	<0.2	0.02	36.0	<0.01	<0.02	<0.02	<2	1.72	0.070
020	Vegetation	0.11	3.35	0.25	9.9	<2	0.6	0.06	33	0.016	<0.1	<0.01	<0.2	0.01	32.4	<0.01	<0.02	<0.02	<2	0.98	0.050
021	Vegetation	0.12	5.73	0.25	55.7	4	0.3	0.18	22	0.019	<0.1	<0.01	0.7	<0.01	15.7	0.03	<0.02	0.02	<2	0.29	0.095
022	Vegetation	0.07	6.39	0.43	6.5	5	0.7	0.35	48	0.064	<0.1	0.01	0.6	0.07	57.4	0.09	<0.02	<0.02	<2	0.92	0.042
023	Vegetation	0.06	3.07	0.22	13.0	<2	0.9	0.08	37	0.018	<0.1	<0.01	<0.2	0.01	15.3	<0.01	<0.02	<0.02	<2	1.06	0.061
024	Vegetation	0.06	4.55	0.42	6.2	3	0.5	0.19	26	0.044	<0.1	0.01	<0.2	0.05	43.7	0.09	<0.02	<0.02	<2	1.13	0.029
025	Vegetation	0.20	5.33	0.25	8.2	3	0.3	0.19	30	0.035	<0.1	<0.01	<0.2	0.03	22.6	0.06	<0.02	0.02	<2	0.27	0.089
026	Vegetation	0.05	3.16	0.19	7.2	<2	0.6	0.05	18	0.013	<0.1	<0.01	<0.2	0.01	23.3	<0.01	<0.02	<0.02	<2	0.89	0.063
027	Vegetation	0.23	6.52	0.41	5.6	5	0.7	0.42	44	0.061	<0.1	<0.01	<0.2	0.10	34.9	0.09	<0.02	<0.02	<2	0.42	0.036
028	Vegetation	0.73	9.21	0.08	19.7	<2	0.3	0.03	27	0.008	<0.1	<0.01	<0.2	<0.01	69.7	<0.01	<0.02	<0.02	<2	1.22	0.082
029	Vegetation	0.05	7.38	0.54	6.2	7	0.5	0.38	85	0.063	<0.1	<0.01	<0.2	0.09	62.2	0.17	<0.02	<0.02	<2	0.79	0.049
030	Vegetation	0.34	13.35	1.02	44.9	<2	0.3	0.08	27	0.023	<0.1	<0.01	<0.2	0.02	132.6	<0.01	<0.02	<0.02	<2	1.57	0.100

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga	Cs	Ge	Hf
	Unit	ppm	ppm	%	ppm	ppm	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.1	0.001	0.1	1	1	0.01	0.001	0.01	0.1	0.1	0.02	0.01	1	0.1	0.02	0.1	0.005	0.01	0.001
001	Vegetation	0.11	1.6	0.113	6.9	5	10	0.02	0.499	0.96	<0.1	0.2	<0.02	0.13	2	0.4	<0.02	<0.1	0.018	0.02	0.005
002	Vegetation	0.11	1.3	0.217	2.5	7	32	<0.01	0.290	0.73	<0.1	0.2	<0.02	0.25	11	0.5	<0.02	<0.1	0.026	0.02	0.004
003	Vegetation	0.17	1.8	0.145	8.1	6	9	0.03	0.504	0.81	<0.1	0.2	<0.02	0.09	2	0.3	<0.02	<0.1	0.027	<0.01	0.010
004	Vegetation	0.17	1.8	0.132	10.0	6	9	0.03	0.531	0.92	<0.1	0.2	<0.02	0.15	3	0.3	<0.02	<0.1	0.028	0.04	0.010
005	Vegetation	0.52	1.8	0.121	2.7	7	17	0.03	0.708	1.57	<0.1	0.2	<0.02	0.19	29	0.6	<0.02	<0.1	0.030	0.04	0.010
006	Vegetation	0.11	1.5	0.191	3.0	6	24	0.01	0.313	1.15	<0.1	0.1	0.06	0.23	13	0.5	<0.02	<0.1	0.220	0.03	0.007
007	Vegetation	0.12	1.7	0.168	9.6	7	10	0.02	0.645	0.94	<0.1	0.3	<0.02	0.13	3	0.3	<0.02	<0.1	0.019	0.04	0.005
008	Vegetation	0.02	1.3	0.198	7.8	5	13	<0.01	0.181	1.15	<0.1	0.2	<0.02	0.20	9	0.4	<0.02	<0.1	0.006	0.04	0.002
009	Vegetation	0.09	1.3	0.171	6.5	8	23	0.01	0.243	0.83	<0.1	0.2	<0.02	0.25	14	0.5	<0.02	<0.1	0.030	0.02	0.005
010	Vegetation	0.09	1.2	0.258	4.5	6	16	<0.01	0.161	1.10	<0.1	0.2	<0.02	0.24	11	0.5	<0.02	<0.1	0.015	0.02	<0.001
011	Vegetation	0.14	2.0	0.132	8.8	5	10	0.02	0.702	0.65	<0.1	0.2	<0.02	0.17	4	0.4	<0.02	<0.1	0.023	0.02	0.008
012	Vegetation	0.05	1.3	0.251	2.8	5	33	<0.01	0.273	1.19	<0.1	0.2	<0.02	0.22	13	0.6	<0.02	<0.1	0.011	0.03	0.003
013	Vegetation	0.09	2.4	0.199	9.5	5	9	0.02	0.600	0.95	<0.1	0.2	0.02	0.13	<1	0.8	<0.02	<0.1	0.022	<0.01	0.007
014	Vegetation	0.07	1.1	0.230	5.3	3	28	<0.01	0.328	0.41	<0.1	0.2	<0.02	0.14	13	0.3	<0.02	<0.1	0.009	0.02	0.001
015	Vegetation	0.12	1.5	0.158	10.7	7	20	0.01	0.260	1.01	<0.1	0.2	<0.02	0.35	9	0.5	<0.02	<0.1	0.128	<0.01	0.003
016	Vegetation	0.05	1.1	0.273	4.5	5	27	<0.01	0.331	0.62	<0.1	0.1	<0.02	0.12	8	0.2	<0.02	<0.1	0.010	<0.01	0.006
017	Vegetation	0.60	3.6	0.122	19.9	12	9	0.10	0.476	0.61	<0.1	0.3	0.02	0.14	6	0.3	<0.02	0.3	0.084	0.02	0.023
018	Vegetation	0.15	2.4	0.129	8.3	5	10	0.03	0.612	0.91	<0.1	0.2	<0.02	0.17	1	0.3	<0.02	<0.1	0.025	0.02	0.008
019	Vegetation	0.35	1.3	0.365	7.6	5	50	0.02	0.397	0.29	<0.1	0.2	<0.02	0.15	26	0.3	<0.02	<0.1	0.031	0.01	0.003
020	Vegetation	0.06	1.2	0.262	5.0	3	46	<0.01	0.685	0.44	<0.1	0.1	<0.02	0.16	12	0.3	<0.02	<0.1	0.013	<0.01	0.002
021	Vegetation	0.04	1.7	0.093	4.0	5	9	<0.01	0.866	0.85	0.1	0.2	<0.02	0.17	1	0.3	<0.02	<0.1	0.009	0.02	<0.001
022	Vegetation	0.29	2.1	0.158	19.2	7	11	0.05	0.392	0.83	<0.1	0.2	0.02	0.11	3	0.4	<0.02	0.1	0.045	0.02	0.017
023	Vegetation	0.05	1.3	0.380	4.1	4	22	0.01	0.431	0.50	<0.1	0.2	<0.02	0.13	7	0.4	<0.02	<0.1	0.010	0.02	0.003
024	Vegetation	0.18	1.8	0.134	13.2	5	9	0.03	0.418	0.44	<0.1	0.2	<0.02	0.12	3	0.3	<0.02	<0.1	0.030	<0.01	0.013
025	Vegetation	0.08	3.8	0.142	3.2	6	11	0.01	0.761	0.96	<0.1	0.2	<0.02	0.15	1	0.3	<0.02	<0.1	0.013	0.02	0.006
026	Vegetation	0.05	1.1	0.225	2.8	4	32	<0.01	0.343	0.44	<0.1	0.2	<0.02	0.13	11	0.2	<0.02	<0.1	0.008	<0.01	0.003
027	Vegetation	0.33	2.9	0.214	6.7	8	16	0.06	0.825	0.73	<0.1	0.3	0.04	0.13	6	0.3	<0.02	0.2	0.115	<0.01	0.021
028	Vegetation	0.03	1.2	0.179	4.8	4	32	<0.01	0.220	1.25	<0.1	0.1	<0.02	0.26	7	0.5	<0.02	<0.1	0.030	0.03	<0.001
029	Vegetation	0.25	2.3	0.143	14.7	8	11	0.05	0.830	0.81	<0.1	0.3	0.03	0.20	3	0.5	<0.02	0.1	0.053	0.02	0.016
030	Vegetation	1.25	1.3	0.205	6.4	6	23	0.01	0.199	0.76	<0.1	0.2	<0.02	0.22	16	0.4	<0.02	<0.1	0.039	0.01	0.001

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.01	0.1	0.02	0.001	0.01	0.001	0.01	0.02	1	0.1	0.01	2	1
001	Vegetation	<0.01	1.8	0.03	<0.001	0.15	0.075	0.30	<0.02	<1	<0.1	0.13	<2	<1
002	Vegetation	<0.01	2.3	<0.02	<0.001	0.04	0.050	0.29	<0.02	2	<0.1	0.61	<2	<1
003	Vegetation	<0.01	1.6	<0.02	<0.001	0.22	0.120	0.42	<0.02	2	<0.1	0.18	<2	<1
004	Vegetation	<0.01	2.5	0.03	<0.001	0.20	0.107	0.42	<0.02	<1	<0.1	0.16	<2	<1
005	Vegetation	<0.01	4.1	0.02	<0.001	0.18	0.279	1.09	<0.02	5	<0.1	1.28	<2	<1
006	Vegetation	<0.01	4.2	<0.02	<0.001	0.12	0.124	0.36	<0.02	2	<0.1	0.83	<2	<1
007	Vegetation	<0.01	1.7	<0.02	<0.001	0.16	0.083	0.29	<0.02	<1	<0.1	0.16	<2	<1
008	Vegetation	<0.01	2.4	<0.02	<0.001	0.04	0.012	0.05	<0.02	<1	<0.1	0.37	<2	<1
009	Vegetation	<0.01	1.9	<0.02	<0.001	0.07	0.051	0.26	<0.02	2	<0.1	1.42	<2	<1
010	Vegetation	<0.01	4.1	<0.02	<0.001	0.02	0.043	0.22	<0.02	<1	<0.1	1.40	<2	<1
011	Vegetation	<0.01	1.4	<0.02	<0.001	0.18	0.103	0.35	<0.02	<1	<0.1	0.21	<2	<1
012	Vegetation	<0.01	3.0	<0.02	<0.001	0.06	0.037	0.13	<0.02	4	<0.1	1.11	<2	<1
013	Vegetation	<0.01	3.2	<0.02	<0.001	0.13	0.053	0.22	<0.02	<1	<0.1	0.15	<2	<1
014	Vegetation	<0.01	0.9	<0.02	<0.001	0.06	0.050	0.18	<0.02	<1	<0.1	0.17	<2	<1
015	Vegetation	<0.01	5.7	<0.02	<0.001	0.07	0.069	0.28	<0.02	2	<0.1	0.59	<2	<1
016	Vegetation	<0.01	2.3	<0.02	<0.001	0.12	0.048	0.18	<0.02	<1	<0.1	0.67	<2	<1
017	Vegetation	0.02	2.9	0.04	<0.001	0.72	0.465	1.39	<0.02	<1	<0.1	0.40	<2	<1
018	Vegetation	<0.01	1.7	<0.02	<0.001	0.22	0.110	0.36	<0.02	1	<0.1	0.16	<2	<1
019	Vegetation	<0.01	2.0	<0.02	<0.001	0.14	0.511	0.60	<0.02	<1	<0.1	0.85	<2	<1
020	Vegetation	<0.01	1.4	<0.02	<0.001	0.06	0.038	0.15	<0.02	<1	<0.1	0.59	<2	<1
021	Vegetation	<0.01	1.5	<0.02	<0.001	0.07	0.025	0.11	<0.02	1	<0.1	0.07	<2	<1
022	Vegetation	0.01	2.6	0.03	<0.001	0.39	0.208	0.68	<0.02	<1	<0.1	0.30	<2	<1
023	Vegetation	<0.01	1.3	<0.02	<0.001	0.11	0.026	0.11	<0.02	<1	<0.1	0.25	<2	<1
024	Vegetation	<0.01	2.0	<0.02	<0.001	0.22	0.123	0.45	<0.02	<1	<0.1	0.10	<2	<1
025	Vegetation	<0.01	1.9	<0.02	<0.001	0.11	0.053	0.19	<0.02	2	<0.1	0.08	<2	<1
026	Vegetation	<0.01	1.0	<0.02	<0.001	0.05	0.039	0.13	<0.02	1	<0.1	0.35	<2	<1
027	Vegetation	0.01	3.8	0.03	<0.001	0.47	0.236	0.79	<0.02	1	<0.1	0.31	<2	<1
028	Vegetation	<0.01	4.1	<0.02	<0.001	0.04	0.013	0.09	<0.02	1	<0.1	0.38	<2	<1
029	Vegetation	<0.01	3.1	0.02	<0.001	0.32	0.198	0.66	<0.02	<1	<0.1	0.23	<2	<1
030	Vegetation	<0.01	2.2	<0.02	<0.001	0.08	0.852	3.87	<0.02	<1	<0.1	2.51	<2	<1

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

Method		1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
Analyte		Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
Unit		ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%
MDL		0.01	0.01	0.01	0.1	2	0.1	0.01	1	0.001	0.1	0.01	0.2	0.01	0.5	0.01	0.02	0.02	2	0.01	0.001
031	Vegetation	0.25	12.39	0.09	27.1	<2	0.2	0.04	75	0.008	<0.1	<0.01	<0.2	<0.01	40.6	<0.01	<0.02	<0.02	<2	0.81	0.125
032	Vegetation	0.48	6.59	0.24	22.3	<2	0.3	0.04	19	0.018	<0.1	<0.01	<0.2	0.01	48.3	<0.01	<0.02	<0.02	<2	1.00	0.102
033	Vegetation	0.13	8.24	0.48	7.5	5	0.5	0.33	72	0.063	<0.1	0.01	<0.2	0.07	40.5	0.14	<0.02	0.03	<2	0.73	0.052
034	Vegetation	0.08	5.38	0.19	6.0	3	0.2	0.18	55	0.020	<0.1	<0.01	<0.2	0.02	31.3	0.08	<0.02	<0.02	<2	0.37	0.108
035	Vegetation	0.45	5.71	0.26	22.1	<2	0.3	0.07	14	0.022	<0.1	<0.01	<0.2	0.02	72.6	<0.01	<0.02	<0.02	<2	1.19	0.112
036	Vegetation	0.94	3.99	0.40	17.5	<2	0.1	0.05	10	0.020	<0.1	<0.01	<0.2	0.02	34.4	<0.01	<0.02	<0.02	<2	0.59	0.094
037	Vegetation	0.26	5.29	0.19	11.6	2	0.7	0.02	35	0.011	0.4	<0.01	<0.2	0.01	33.5	<0.01	<0.02	<0.02	<2	1.34	0.077
038	Vegetation	0.07	4.80	0.80	7.7	4	0.7	0.28	83	0.089	0.2	0.02	0.8	0.11	58.4	0.07	<0.02	0.02	<2	0.91	0.046
039	Vegetation	0.07	4.10	0.45	6.2	5	0.4	0.26	92	0.060	0.2	<0.01	<0.2	0.07	62.7	0.09	<0.02	<0.02	<2	0.89	0.043
040	Vegetation	1.78	8.37	0.24	15.4	2	0.1	0.04	10	0.012	0.2	<0.01	<0.2	<0.01	77.0	<0.01	<0.02	<0.02	<2	1.05	0.174
041	Vegetation	1.98	7.12	0.17	17.3	<2	0.2	0.03	26	0.014	0.1	<0.01	0.3	0.01	99.4	<0.01	<0.02	<0.02	<2	1.15	0.119
042	Vegetation	0.19	7.52	0.70	46.9	2	0.4	0.09	29	0.039	<0.1	0.01	<0.2	0.03	52.1	<0.01	<0.02	<0.02	<2	0.80	0.123
043	Vegetation	0.04	5.28	0.32	5.8	2	0.3	0.15	41	0.027	<0.1	<0.01	<0.2	0.03	61.5	0.07	<0.02	<0.02	<2	0.68	0.050
044	Vegetation	0.91	8.18	0.62	25.4	<2	0.2	0.06	26	0.018	0.2	<0.01	0.3	0.02	83.0	<0.01	<0.02	<0.02	<2	1.19	0.139
045	Vegetation	0.58	9.00	0.77	32.8	4	0.3	0.04	26	0.023	<0.1	<0.01	0.2	0.02	118.0	<0.01	<0.02	<0.02	<2	1.88	0.121
046	Vegetation	0.06	6.91	0.82	7.3	6	0.7	0.71	77	0.083	0.1	0.01	0.2	0.10	35.9	0.11	<0.02	<0.02	<2	0.49	0.033
047	Vegetation	0.13	4.96	0.47	7.8	4	0.2	0.21	56	0.032	0.2	<0.01	<0.2	0.03	44.7	0.06	<0.02	<0.02	<2	0.58	0.082
048	Vegetation	0.07	5.66	0.34	7.3	3	0.4	0.54	50	0.031	<0.1	<0.01	<0.2	0.03	43.7	0.09	<0.02	<0.02	<2	0.64	0.039
049	Vegetation	0.07	5.07	0.26	7.7	<2	0.3	0.19	40	0.023	<0.1	<0.01	<0.2	0.03	48.0	0.10	<0.02	<0.02	<2	0.59	0.058
050	Vegetation	0.09	4.52	0.50	6.5	3	0.6	0.37	84	0.065	<0.1	0.01	<0.2	0.09	59.4	0.08	<0.02	<0.02	<2	1.04	0.043
051	Vegetation	0.11	4.22	0.37	5.2	5	0.3	0.10	20	0.040	<0.1	<0.01	<0.2	0.04	69.8	0.13	<0.02	<0.02	<2	0.63	0.045
052	Vegetation	0.10	2.76	0.22	10.4	<2	0.4	0.04	31	0.018	<0.1	0.01	0.4	<0.01	23.4	<0.01	<0.02	<0.02	<2	0.95	0.069
053	Vegetation	0.36	5.18	0.29	33.8	2	0.3	0.04	36	0.013	<0.1	<0.01	0.2	0.01	33.0	<0.01	<0.02	<0.02	<2	0.85	0.107
054	Vegetation	0.13	6.58	0.68	7.4	4	0.7	0.23	57	0.121	0.2	0.02	<0.2	0.12	43.1	0.07	<0.02	0.04	<2	0.70	0.074
055	Vegetation	1.88	7.78	0.40	18.7	3	0.1	0.04	30	0.016	<0.1	<0.01	<0.2	0.02	121.8	<0.01	<0.02	<0.02	<2	1.36	0.117
056	Vegetation	0.42	7.36	0.23	31.0	2	0.3	0.03	27	0.013	<0.1	<0.01	<0.2	0.01	43.3	<0.01	<0.02	<0.02	<2	0.95	0.097
057	Vegetation	0.05	6.71	0.32	9.4	3	0.2	0.20	70	0.018	<0.1	<0.01	<0.2	0.02	45.6	0.09	<0.02	<0.02	<2	0.66	0.050
058	Vegetation	1.54	7.57	0.28	19.6	2	0.2	0.06	32	0.019	<0.1	<0.01	0.3	0.02	39.4	<0.01	<0.02	<0.02	<2	0.65	0.165
059	Vegetation	1.09	7.80	0.48	25.8	<2	0.2	0.03	30	0.017	<0.1	<0.01	<0.2	0.01	199.2	0.02	<0.02	<0.02	<2	2.92	0.125
060	Vegetation	1.97	7.32	0.53	13.4	2	0.4	0.06	25	0.032	<0.1	<0.01	<0.2	0.03	81.9	<0.01	<0.02	<0.02	<2	0.94	0.134

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

Method		1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
Analyte		La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga	Cs	Ge	Hf
Unit		ppm	ppm	%	ppm	ppm	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm	ppm	ppm	ppm
MDL		0.01	0.1	0.001	0.1	1	1	0.01	0.001	0.01	0.1	0.1	0.02	0.01	1	0.1	0.02	0.1	0.005	0.01	0.001
031	Vegetation	0.08	1.2	0.221	2.7	6	27	<0.01	0.114	0.90	<0.1	0.1	0.02	0.24	8	0.5	<0.02	<0.1	0.021	<0.01	0.004
032	Vegetation	0.14	1.3	0.201	2.1	6	33	<0.01	0.231	0.62	<0.1	0.2	<0.02	0.25	14	0.4	<0.02	<0.1	0.012	<0.01	0.002
033	Vegetation	0.24	2.1	0.101	13.3	7	12	0.04	0.712	0.77	<0.1	0.2	0.03	0.17	3	0.5	<0.02	<0.1	0.043	<0.01	0.013
034	Vegetation	0.08	1.7	0.087	4.2	6	9	0.02	0.394	0.53	<0.1	0.2	<0.02	0.13	2	0.3	<0.02	<0.1	0.014	<0.01	0.003
035	Vegetation	0.09	1.4	0.121	1.9	6	27	0.01	0.340	0.75	<0.1	0.2	<0.02	0.22	20	0.5	<0.02	<0.1	0.036	0.04	0.003
036	Vegetation	0.10	1.3	0.192	2.2	6	28	0.01	0.565	0.94	<0.1	0.2	<0.02	0.20	18	0.3	<0.02	<0.1	0.030	0.03	0.006
037	Vegetation	0.04	1.0	0.295	24.6	4	35	<0.01	0.211	0.52	<0.1	0.1	<0.02	0.22	16	0.3	<0.02	<0.1	0.009	0.01	0.004
038	Vegetation	0.39	2.6	0.135	16.1	10	12	0.06	0.422	0.76	<0.1	0.3	0.04	0.12	6	0.5	<0.02	0.2	0.065	0.04	0.019
039	Vegetation	0.24	2.0	0.212	15.7	6	12	0.04	0.663	0.60	<0.1	0.2	0.02	0.08	4	0.3	<0.02	0.1	0.041	0.02	0.015
040	Vegetation	0.04	1.3	0.180	8.3	9	37	<0.01	0.454	0.80	<0.1	0.2	<0.02	0.27	19	0.7	<0.02	<0.1	0.032	0.02	<0.001
041	Vegetation	0.05	1.3	0.159	10.5	6	25	<0.01	0.202	0.88	<0.1	0.3	<0.02	0.20	11	0.3	<0.02	<0.1	0.010	0.03	0.004
042	Vegetation	0.17	1.6	0.186	1.7	8	21	0.02	0.517	1.53	<0.1	0.3	<0.02	0.22	20	0.7	<0.02	<0.1	0.033	0.03	0.008
043	Vegetation	0.12	1.9	0.182	13.6	5	9	0.02	0.645	0.90	<0.1	0.3	<0.02	0.11	3	0.3	<0.02	<0.1	0.022	0.05	0.008
044	Vegetation	0.22	1.4	0.139	2.1	7	28	0.01	0.329	1.37	<0.1	0.1	<0.02	0.22	15	0.6	<0.02	<0.1	0.021	0.05	0.003
045	Vegetation	0.29	1.4	0.170	2.8	7	20	0.02	0.306	1.03	<0.1	0.2	<0.02	0.27	24	0.4	0.02	<0.1	0.027	0.02	0.005
046	Vegetation	0.42	2.5	0.196	17.3	9	12	0.06	0.744	0.64	<0.1	0.4	0.02	0.11	6	0.5	<0.02	0.2	0.064	<0.01	0.019
047	Vegetation	0.10	3.0	0.146	4.9	5	12	0.02	0.797	1.04	<0.1	0.3	<0.02	0.13	3	0.4	<0.02	<0.1	0.018	0.02	0.004
048	Vegetation	0.13	1.9	0.134	7.5	5	13	0.02	0.690	1.12	<0.1	0.2	<0.02	0.14	6	0.4	<0.02	<0.1	0.029	0.02	0.006
049	Vegetation	0.12	1.8	0.142	11.8	5	10	0.02	0.603	0.68	<0.1	0.2	0.02	0.12	1	0.4	<0.02	<0.1	0.024	0.01	0.003
050	Vegetation	0.29	2.5	0.142	12.1	8	13	0.05	0.613	0.79	<0.1	0.3	0.02	0.18	6	0.5	<0.02	0.2	0.045	0.04	0.016
051	Vegetation	0.14	2.1	0.127	13.4	5	9	0.03	0.698	0.79	<0.1	0.2	<0.02	0.07	3	0.3	<0.02	<0.1	0.024	0.02	0.007
052	Vegetation	0.05	1.1	0.250	6.6	6	41	<0.01	0.393	0.56	<0.1	0.2	<0.02	0.12	15	0.3	<0.02	<0.1	0.011	<0.01	0.003
053	Vegetation	0.46	1.2	0.144	1.1	6	17	<0.01	0.302	1.32	<0.1	0.2	<0.02	0.28	17	0.6	<0.02	<0.1	0.300	0.02	0.003
054	Vegetation	0.38	2.7	0.124	14.1	11	14	0.06	0.702	0.77	<0.1	0.2	<0.02	0.12	6	0.5	<0.02	0.2	0.050	0.04	0.014
055	Vegetation	0.28	1.2	0.195	3.8	6	29	0.01	0.182	1.40	<0.1	0.1	<0.02	0.24	22	0.6	<0.02	<0.1	0.017	0.05	0.002
056	Vegetation	0.08	1.3	0.170	1.4	5	26	<0.01	0.276	1.09	<0.1	0.2	<0.02	0.25	5	0.5	<0.02	<0.1	0.056	0.03	0.003
057	Vegetation	0.08	1.7	0.121	22.9	4	9	0.01	0.475	0.94	<0.1	0.2	<0.02	0.13	2	0.4	<0.02	<0.1	0.027	0.04	0.005
058	Vegetation	0.06	1.4	0.172	1.4	9	19	0.01	0.346	0.84	<0.1	0.2	<0.02	0.19	20	0.5	<0.02	<0.1	0.036	<0.01	0.004
059	Vegetation	0.14	1.3	0.181	2.3	7	40	0.01	0.163	0.80	<0.1	0.1	<0.02	0.23	22	0.7	<0.02	<0.1	0.084	0.02	0.002
060	Vegetation	0.16	1.6	0.214	3.8	8	34	0.03	0.528	1.59	<0.1	0.3	<0.02	0.22	21	0.7	<0.02	<0.1	0.032	0.03	0.009

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.01	0.1	0.02	0.001	0.01	0.001	0.01	0.02	1	0.1	0.01	2	1
031	Vegetation	<0.01	1.9	<0.02	<0.001	0.02	0.065	0.74	<0.02	4	<0.1	0.32	<2	<1
032	Vegetation	<0.01	1.1	<0.02	<0.001	0.09	0.115	0.69	<0.02	3	<0.1	0.67	<2	<1
033	Vegetation	0.01	3.0	0.02	<0.001	0.29	0.166	0.61	<0.02	<1	<0.1	0.18	<2	<1
034	Vegetation	<0.01	1.2	<0.02	<0.001	0.11	0.050	0.20	<0.02	<1	<0.1	0.08	<2	<1
035	Vegetation	<0.01	1.8	<0.02	<0.001	0.08	0.068	0.24	<0.02	3	<0.1	0.91	<2	<1
036	Vegetation	<0.01	1.8	0.02	<0.001	0.09	0.070	0.25	<0.02	4	<0.1	1.71	<2	<1
037	Vegetation	<0.01	1.3	<0.02	<0.001	0.06	0.031	0.10	<0.02	<1	<0.1	0.17	<2	<1
038	Vegetation	0.02	2.3	0.04	<0.001	0.43	0.272	0.95	<0.02	<1	<0.1	0.37	<2	<1
039	Vegetation	<0.01	2.2	0.03	<0.001	0.29	0.168	0.58	<0.02	<1	<0.1	0.19	<2	<1
040	Vegetation	<0.01	2.6	<0.02	<0.001	0.05	0.028	0.12	<0.02	<1	<0.1	0.62	<2	<1
041	Vegetation	<0.01	1.5	<0.02	<0.001	0.06	0.027	0.10	<0.02	<1	<0.1	0.94	<2	<1
042	Vegetation	<0.01	3.8	<0.02	<0.001	0.15	0.105	0.60	<0.02	3	<0.1	1.28	<2	<1
043	Vegetation	<0.01	2.0	<0.02	<0.001	0.17	0.071	0.29	<0.02	1	<0.1	0.19	<2	<1
044	Vegetation	<0.01	3.4	0.02	<0.001	0.07	0.123	0.69	<0.02	1	<0.1	1.83	<2	<1
045	Vegetation	<0.01	2.6	<0.02	<0.001	0.11	0.097	0.49	<0.02	3	<0.1	1.80	<2	<1
046	Vegetation	0.02	3.1	0.03	<0.001	0.44	0.294	1.02	<0.02	<1	<0.1	0.33	<2	<1
047	Vegetation	<0.01	2.5	0.03	<0.001	0.12	0.069	0.25	<0.02	<1	<0.1	0.09	<2	<1
048	Vegetation	<0.01	3.5	<0.02	<0.001	0.14	0.103	0.32	<0.02	<1	<0.1	0.15	<2	<1
049	Vegetation	<0.01	2.7	<0.02	<0.001	0.13	0.099	0.28	<0.02	<1	<0.1	0.10	<2	<1
050	Vegetation	0.02	2.1	0.02	<0.001	0.36	0.207	0.72	<0.02	<1	<0.1	0.27	<2	<1
051	Vegetation	<0.01	1.9	<0.02	0.001	0.21	0.093	0.34	<0.02	<1	<0.1	0.15	<2	<1
052	Vegetation	<0.01	1.1	<0.02	<0.001	0.06	0.038	0.15	<0.02	1	<0.1	0.23	<2	<1
053	Vegetation	<0.01	20.1	<0.02	<0.001	0.07	0.322	1.24	<0.02	5	<0.1	0.57	<2	<1
054	Vegetation	0.02	1.9	0.03	<0.001	0.47	0.272	0.93	<0.02	<1	<0.1	0.43	<2	<1
055	Vegetation	<0.01	3.7	<0.02	<0.001	0.10	0.111	0.75	<0.02	2	<0.1	1.65	<2	<1
056	Vegetation	<0.01	3.2	<0.02	<0.001	0.05	0.043	0.19	<0.02	3	<0.1	0.40	<2	<1
057	Vegetation	<0.01	2.8	0.03	<0.001	0.10	0.077	0.19	<0.02	<1	<0.1	0.11	<2	<1
058	Vegetation	<0.01	2.4	0.03	<0.001	0.08	0.035	0.15	<0.02	<1	<0.1	0.35	<2	<1
059	Vegetation	<0.01	2.3	<0.02	<0.001	0.08	0.159	0.38	<0.02	3	<0.1	0.94	<2	<1
060	Vegetation	<0.01	6.1	0.02	<0.001	0.17	0.145	0.51	<0.02	3	<0.1	1.92	<2	<1

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

Method		1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
Analyte		Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
Unit		ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%
MDL		0.01	0.01	0.01	0.1	2	0.1	0.01	1	0.001	0.1	0.01	0.2	0.01	0.5	0.01	0.02	0.02	2	0.01	0.001
061	Vegetation	0.15	5.84	0.45	6.9	4	0.4	0.21	54	0.031	<0.1	<0.01	<0.2	0.02	48.4	0.13	<0.02	<0.02	<2	0.99	0.041
062	Vegetation	0.12	5.57	0.26	13.5	<2	0.2	0.04	16	0.015	<0.1	<0.01	<0.2	0.01	66.1	<0.01	<0.02	<0.02	<2	1.12	0.091
063	Vegetation	0.11	6.65	0.33	6.1	3	0.5	0.22	52	0.049	<0.1	<0.01	0.3	0.06	70.3	0.07	<0.02	<0.02	<2	1.09	0.042
064	Vegetation	0.14	6.52	0.43	7.5	6	0.5	0.31	57	0.044	<0.1	<0.01	<0.2	0.06	51.6	0.11	<0.02	<0.02	<2	0.67	0.041
065	Vegetation	0.07	7.30	0.51	5.5	3	0.6	0.26	56	0.066	<0.1	<0.01	<0.2	0.09	52.6	0.04	<0.02	<0.02	<2	0.91	0.042
066	Vegetation	0.08	5.92	0.52	7.3	3	0.5	0.30	60	0.059	<0.1	<0.01	<0.2	0.08	36.5	0.15	<0.02	<0.02	<2	0.48	0.042
067	Vegetation	0.07	5.05	0.46	5.0	2	0.6	0.20	41	0.057	0.2	<0.01	<0.2	0.07	52.3	0.07	<0.02	<0.02	<2	0.79	0.037

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Te	Ga	Cs	Ge	Hf
	Unit	ppm	ppm	%	ppm	ppm	ppm	%	%	%	ppm	ppm	ppm	%	ppb	ppm	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.1	0.001	0.1	1	1	0.01	0.001	0.01	0.1	0.1	0.02	0.01	1	0.1	0.02	0.1	0.005	0.01	0.001
061	Vegetation	0.12	1.9	0.143	15.4	4	12	0.02	0.922	0.88	<0.1	0.1	<0.02	0.17	3	0.4	<0.02	<0.1	0.020	0.01	0.006
062	Vegetation	0.12	1.2	0.234	1.2	5	43	<0.01	0.367	0.83	<0.1	<0.1	0.03	0.24	15	0.5	<0.02	<0.1	0.233	0.02	0.003
063	Vegetation	0.21	2.2	0.109	14.7	6	11	0.04	0.351	0.58	<0.1	0.2	<0.02	0.13	2	0.5	<0.02	0.1	0.040	0.03	0.006
064	Vegetation	0.21	2.1	0.118	9.0	6	11	0.04	0.471	0.93	<0.1	0.2	0.03	0.14	<1	0.5	<0.02	0.1	0.038	0.03	0.015
065	Vegetation	0.29	2.4	0.115	11.8	8	11	0.05	0.568	0.78	<0.1	0.3	0.02	0.19	2	0.6	<0.02	0.1	0.049	0.03	0.012
066	Vegetation	0.28	2.5	0.143	12.5	7	13	0.04	0.693	1.01	<0.1	0.3	<0.02	0.12	4	0.5	<0.02	0.1	0.042	0.02	0.015
067	Vegetation	0.23	3.2	0.144	22.3	6	11	0.04	0.520	0.79	<0.1	0.2	<0.02	0.19	5	0.3	<0.02	0.1	0.039	0.02	0.009

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

CERTIFICATE OF ANALYSIS VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.01	0.1	0.02	0.001	0.01	0.001	0.01	0.02	1	0.1	0.01	2	1
061	Vegetation	<0.01	2.5	<0.02	<0.001	0.15	0.088	0.31	<0.02	<1	<0.1	0.16	<2	<1
062	Vegetation	<0.01	5.6	0.02	<0.001	0.06	0.078	0.36	<0.02	3	<0.1	1.57	<2	<1
063	Vegetation	0.01	2.3	<0.02	<0.001	0.27	0.167	0.51	<0.02	1	<0.1	0.18	<2	<1
064	Vegetation	<0.01	2.6	0.03	<0.001	0.27	0.148	0.50	<0.02	<1	<0.1	0.20	<2	<1
065	Vegetation	<0.01	2.5	0.04	<0.001	0.40	0.210	0.68	<0.02	<1	<0.1	0.31	<2	<1
066	Vegetation	0.01	2.2	0.02	<0.001	0.37	0.218	0.71	<0.02	<1	<0.1	0.22	<2	<1
067	Vegetation	0.01	2.2	<0.02	<0.001	0.30	0.155	0.57	<0.02	<1	<0.1	0.21	<2	<1

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

QUALITY CONTROL REPORT VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
	Unit	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%
	MDL	0.01	0.01	0.01	0.1	2	0.1	0.01	1	0.001	0.1	0.01	0.2	0.01	0.5	0.01	0.02	0.02	2	0.01	0.001
Pulp Duplicates																					
008	Vegetation Pu	2.14	4.87	0.12	18.0	<2	0.2	0.04	34	0.012	<0.1	<0.01	<0.2	<0.01	78.6	<0.01	<0.02	<0.02	<2	1.35	0.090
REP 008	QC	2.11	4.90	0.15	19.3	<2	0.2	0.03	30	0.012	<0.1	<0.01	<0.2	<0.01	78.4	<0.01	<0.02	<0.02	<2	1.37	0.092
045	Vegetation Pu	0.58	9.00	0.77	32.8	4	0.3	0.04	26	0.023	<0.1	<0.01	0.2	0.02	118.0	<0.01	<0.02	<0.02	<2	1.88	0.121
REP 045	QC	0.54	9.25	0.79	34.2	5	0.3	0.04	28	0.027	<0.1	<0.01	<0.2	0.03	121.5	<0.01	<0.02	<0.02	<2	1.91	0.121
Reference Materials																					
STD V14	Standard	0.07	5.25	0.97	17.5	20	1.5	0.78	2303	0.019	12.5	<0.01	8.2	<0.01	7.0	0.22	0.05	0.10	<2	0.65	0.093
STD V14	Standard	0.06	5.34	1.04	16.1	20	1.6	0.89	2245	0.018	11.7	<0.01	10.8	<0.01	6.7	0.21	0.05	0.10	<2	0.66	0.090
STD V16	Standard	1.57	7.16	3.47	45.9	30	6.6	1.13	815	0.408	1.8	<0.01	1.1	<0.01	12.2	0.10	0.05	<0.02	<2	0.34	0.056
STD V16	Standard	1.92	7.69	3.32	42.8	26	8.5	1.38	784	0.510	1.7	<0.01	0.6	<0.01	12.0	0.09	0.06	<0.02	<2	0.34	0.052
STD V14 Expected		0.06	4.8	0.881	14.5	24	1.4	0.75	2094	0.016	11.038		8		6.668	0.21	0.06	0.089		0.6082	0.087
STD V16 Expected		1.6	6.92	3.11	39.2	32	7.8	1.17	732	0.4367	1.6		1.1		11.6	0.093	0.07			0.302	0.0498
FLOUR	Blank	0.64	3.96	0.19	30.7	<2	0.2	0.01	36	0.005	<0.1	<0.01	<0.2	<0.01	1.2	0.02	<0.02	<0.02	<2	0.03	0.357
BLK	Blank	<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.01	<1	<0.001	<0.1	<0.01	<0.2	<0.01	<0.5	<0.01	<0.02	<0.02	<2	<0.01	<0.001
FLOUR	Blank	0.70	4.32	0.08	32.7	<2	0.3	0.01	40	0.005	<0.1	<0.01	<0.2	<0.01	1.3	0.02	<0.02	0.02	<2	0.03	0.376
BLK	Blank	<0.01	<0.01	<0.01	<0.1	<2	<0.1	<0.01	<1	<0.001	<0.1	<0.01	<0.2	<0.01	<0.5	<0.01	<0.02	<0.02	<2	<0.01	<0.001

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.

1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob

Report Date: November 01, 2011

QUALITY CONTROL REPORT VAN11004366.1

Method		1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
Analyte		**La**	**Cr**	**Mg**	**Ba**	**Ti**	**B**	**Al**	**Na**	**K**	**W**	**Sc**	**Tl**	**S**	**Hg**	**Se**	**Te**	**Ga**	**Cs**	**Ge**	**Hf**
Unit		**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**%**	**%**	**%**	**ppm**	**ppm**	**ppm**	**%**	**ppb**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
MDL		**0.01**	**0.1**	**0.001**	**0.1**	**1**	**1**	**0.01**	**0.001**	**0.01**	**0.1**	**0.1**	**0.02**	**0.01**	**1**	**0.1**	**0.02**	**0.1**	**0.005**	**0.01**	**0.001**
Pulp Duplicates																					
008	Vegetation Pu	0.02	1.3	0.198	7.8	5	13	<0.01	0.181	1.15	<0.1	0.2	<0.02	0.20	9	0.4	<0.02	<0.1	0.006	0.04	0.002
REP 008	QC	0.03	1.3	0.198	8.4	5	13	<0.01	0.184	1.16	<0.1	0.1	<0.02	0.20	9	0.4	<0.02	<0.1	0.006	0.04	0.004
045	Vegetation Pu	0.29	1.4	0.170	2.8	7	20	0.02	0.306	1.03	<0.1	0.2	<0.02	0.27	24	0.4	0.02	<0.1	0.027	0.02	0.005
REP 045	QC	0.32	1.4	0.180	3.3	8	19	0.02	0.320	1.03	<0.1	0.2	<0.02	0.27	26	0.6	<0.02	<0.1	0.028	0.02	0.008
Reference Materials																					
STD V14	Standard	0.03	1.2	0.084	1.6	7	11	0.16	<0.001	0.53	<0.1	0.1	0.04	0.08	59	0.2	<0.02	0.2	0.036	0.01	0.002
STD V14	Standard	0.03	1.3	0.080	1.5	8	11	0.16	<0.001	0.50	<0.1	0.2	0.04	0.09	54	0.1	<0.02	0.2	0.033	0.01	0.003
STD V16	Standard	0.05	322.5	0.060	2.3	13	5	0.05	0.002	0.25	<0.1	0.2	<0.02	0.03	47	0.4	<0.02	0.2	0.045	0.06	0.008
STD V16	Standard	0.05	372.3	0.057	2.3	12	5	0.05	0.002	0.24	<0.1	0.2	<0.02	0.03	44	0.2	<0.02	0.2	0.045	0.04	0.006
STD V14 Expected		0.03	1.2	0.079	1.3	6.699	10.7	0.147		0.509		0.117	0.038	0.064	52	0.15			0.029		
STD V16 Expected		0.05	345.2	0.0543	1.9	12	5	0.0498	0.0015	0.231				0.0174	41			0.2	0.037	0.05	0.006
FLOUR	Blank	0.01	1.3	0.141	3.6	16	<1	<0.01	<0.001	0.35	<0.1	0.2	<0.02	0.19	<1	0.9	<0.02	<0.1	<0.005	0.02	<0.001
BLK	Blank	<0.01	<0.1	<0.001	<0.1	<1	<1	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.01	<1	<0.1	<0.02	<0.1	<0.005	<0.01	<0.001
FLOUR	Blank	<0.01	1.4	0.161	3.3	19	<1	<0.01	<0.001	0.36	<0.1	0.3	<0.02	0.20	<1	0.9	<0.02	<0.1	<0.005	<0.01	<0.001
BLK	Blank	<0.01	<0.1	<0.001	<0.1	<1	<1	<0.01	<0.001	<0.01	<0.1	<0.1	<0.02	<0.01	<1	<0.1	<0.02	<0.1	<0.005	<0.01	<0.001

AcmeLabs Acme Analytical Laboratories (Vancouver) Ltd.
1020 Cordova St. East Vancouver BC V6A 4A3 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **University of Adelaide**
Geology and Geophysics
Mawson Laboratories North Terrace
Adelaide SA 5005 Australia

Project: ADKnob
Report Date: November 01, 2011

QUALITY CONTROL REPORT VAN11004366.1

	Method	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE	1VE
	Analyte	Nb	Rb	Sn	Ta	Zr	Y	Ce	In	Re	Be	Li	Pd	Pt
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb	ppb
	MDL	0.01	0.1	0.02	0.001	0.01	0.001	0.01	0.02	1	0.1	0.01	2	1
Pulp Duplicates														
008	Vegetation Pu	<0.01	2.4	<0.02	<0.001	0.04	0.012	0.05	<0.02	<1	<0.1	0.37	<2	<1
REP 008	QC	<0.01	2.4	<0.02	<0.001	0.03	0.012	0.06	<0.02	1	<0.1	0.42	<2	<1
045	Vegetation Pu	<0.01	2.6	<0.02	<0.001	0.11	0.097	0.49	<0.02	3	<0.1	1.80	<2	<1
REP 045	QC	<0.01	2.8	<0.02	<0.001	0.13	0.117	0.53	<0.02	3	<0.1	1.84	<2	<1
Reference Materials														
STD V14	Standard	<0.01	2.0	0.03	<0.001	0.05	0.017	0.07	<0.02	<1	<0.1	0.08	<2	<1
STD V14	Standard	<0.01	2.0	0.06	<0.001	0.05	0.018	0.06	<0.02	<1	<0.1	0.10	<2	<1
STD V16	Standard	0.12	2.0	0.20	<0.001	0.18	0.043	0.12	<0.02	<1	<0.1	0.04	<2	<1
STD V16	Standard	0.13	1.9	0.23	<0.001	0.17	0.048	0.13	<0.02	<1	<0.1	0.06	2	<1
STD V14 Expected			1.8	0.04										
STD V16 Expected		0.11	1.7	0.23		0.18	0.043	0.09				0.07		
FLOUR	Blank	<0.01	2.7	0.03	<0.001	0.01	<0.001	<0.01	<0.02	<1	<0.1	0.11	<2	<1
BLK	Blank	<0.01	<0.1	<0.02	<0.001	<0.01	<0.001	<0.01	<0.02	<1	<0.1	<0.01	<2	<1
FLOUR	Blank	<0.01	2.9	0.02	<0.001	<0.01	<0.001	<0.01	<0.02	<1	<0.1	0.10	<2	<1
BLK	Blank	<0.01	<0.1	<0.02	<0.001	<0.01	<0.001	<0.01	<0.02	<1	<0.1	<0.01	<2	<1